



**FCC CFR47 PART 22H, 24E, 27L, AND 90S  
CERTIFICATION TEST REPORT**

**FOR**

**CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS**

**MODEL NUMBER: A1660, A1780**

**FCC ID: BCG-E3085A**

**REPORT NUMBER: 16U23309-E6V4**

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**NVLAP LAB CODE 200065-0**

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|------|------------|----------------------------------------|------------|
| V1   | 07/07/2016 | Initial Review                         | Chin Pang  |
| V2   | 07/21/2016 | Address TCB's Questions                | Chin Pang  |
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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

**MODEL:** A1660, A1780

**SERIAL NUMBER:** C7CRP09RHCR3 (CONDUCTED); C7CRP05LHCR3 (RADIATED)

**DATE TESTED:** FEBRUARY 24, 2016 – JUNE 20, 2016

| APPLICABLE STANDARDS               |              |
|------------------------------------|--------------|
| STANDARD                           | TEST RESULTS |
| CFR 47 Part 22H, 24E, 27L, AND 90S | Pass         |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-D, FCC CFR 47 Part 2, FCC CFR 47 Part 22, FCC CFR Part 24, FCC Part 27 and FCC KDB 971168 D01 v02r02.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47266 Benicia Street, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 47173 Benicia Street               | 47266 Benicia Street                          |
|------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Chamber A | <input type="checkbox"/> Chamber D            |
| <input type="checkbox"/> Chamber B | <input checked="" type="checkbox"/> Chamber E |
| <input type="checkbox"/> Chamber C | <input checked="" type="checkbox"/> Chamber F |
|                                    | <input checked="" type="checkbox"/> Chamber G |
|                                    | <input type="checkbox"/> Chamber H            |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)  
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

## 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                                | UNCERTAINTY |
|------------------------------------------|-------------|
| Conducted Disturbance, 9KHz to 0.15 MHz  | 3.84 dB     |
| Conducted Disturbance, 0.15 to 30 MHz    | 3.65 dB     |
| Radiated Disturbance, 9KHz to 30 MHz     | 3.15 dB     |
| Radiated Disturbance, 30 to 1000 MHz     | 5.36 dB     |
| Radiated Disturbance, 1000 to 18000 MHz  | 4.32 dB     |
| Radiated Disturbance, 18000 to 26000 MHz | 4.45 dB     |
| Radiated Disturbance, 26000 to 40000 MHz | 5.24 dB     |

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT, Model A1660, A1780 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n/ac, NFC and Bluetooth radio. The rechargeable battery is not user accessible.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum average conducted and ERP / EIRP output powers as follows:

### 5.2.1. LAT

#### GSM MODES

##### Part 22 / RSS 132 850MHz Band

| Frequency range (MHz) | Modulation | Conducted (Average) |        | ERP (Average) |       |
|-----------------------|------------|---------------------|--------|---------------|-------|
|                       |            | dBm                 | mW     | dBm           | mW    |
| 824- 849              | GPRS       | 33.5                | 2238.7 | 28.9          | 776.2 |
|                       | EGPRS      | 29.0                | 794.3  | 24.6          | 291.1 |

##### Part 24 / RSS 133 1900MHz Band

| Frequency range (MHz) | Modulation | Conducted (Average) |        | EIRP (Average) |        |
|-----------------------|------------|---------------------|--------|----------------|--------|
|                       |            | dBm                 | mW     | dBm            | mW     |
| 1850 - 1910           | GPRS       | 30.5                | 1122.0 | 30.2           | 1047.1 |
|                       | EGPRS      | 28.0                | 631.0  | 27.9           | 616.6  |

#### CDMA2000 MODES

##### Part 90 800MHz Band

| Frequency range (MHz) | Modulation           | Conducted (Average) |       | ERP (Average) |       |
|-----------------------|----------------------|---------------------|-------|---------------|-------|
|                       |                      | dBm                 | mW    | dBm           | mW    |
| 816 - 824             | CDMA 2000 1xRTT      | 25.0                | 316.2 | 21.6          | 143.5 |
|                       | CDMA 2000 EVDO-Rev A | 25.0                | 316.2 | 21.6          | 145.9 |

##### Part 22 / RSS 132 850MHz Band

| Frequency range (MHz) | Modulation           | Conducted (Average) |       | ERP (Average) |       |
|-----------------------|----------------------|---------------------|-------|---------------|-------|
|                       |                      | dBm                 | mW    | dBm           | mW    |
| 824 – 849             | CDMA 2000 1xRTT      | 25.0                | 316.2 | 21.8          | 150.0 |
|                       | CDMA 2000 EVDO-Rev A | 25.0                | 316.2 | 21.8          | 151.0 |

##### Part 24 / RSS 133 1900MHz Band

| Frequency range (MHz) | Modulation           | Conducted (Average) |       | EIRP (Average) |       |
|-----------------------|----------------------|---------------------|-------|----------------|-------|
|                       |                      | dBm                 | mW    | dBm            | mW    |
| 1850 – 1910           | CDMA 2000 1xRTT      | 25.2                | 331.1 | 25.1           | 324.3 |
|                       | CDMA 2000 EVDO-Rev A | 25.2                | 331.1 | 25.1           | 326.6 |

## **UMTS MODES**

### **Part 22 / RSS 132 850MHz Band**

| Frequency range<br>(MHz) | Modulation  | Conducted (Average) |       | ERP (Average) |       |
|--------------------------|-------------|---------------------|-------|---------------|-------|
|                          |             | dBm                 | mW    | dBm           | mW    |
| 824 – 849                | REL 99      | 25.0                | 316.2 | 22.8          | 192.3 |
|                          | HSDPA REL 5 | 24.0                | 251.2 | 21.9          | 156.0 |

### **Part 24 / RSS 133 1900MHz Band**

| Frequency range<br>(MHz) | Modulation  | Conducted (Average) |       | EIRP (Average) |       |
|--------------------------|-------------|---------------------|-------|----------------|-------|
|                          |             | dBm                 | mW    | dBm            | mW    |
| 1850 – 1910              | REL 99      | 25.2                | 331.1 | 25.7           | 369.8 |
|                          | HSDPA REL 5 | 24.2                | 263.0 | 24.8           | 302.0 |

### **Part 27 /RSS 139 1700MHz Band**

| Frequency range<br>(MHz) | Modulation  | Conducted (Average) |       | EIRP (Average) |       |
|--------------------------|-------------|---------------------|-------|----------------|-------|
|                          |             | dBm                 | mW    | dBm            | mW    |
| 1710– 1755               | REL 99      | 25.2                | 331.1 | 22.7           | 185.8 |
|                          | HSDPA REL 5 | 24.2                | 263.0 | 21.8           | 150.3 |

## 5.2.2. UAT

### GSM MODES

#### Part 22 / RSS 132 850MHz Band

| Frequency range (MHz) | Modulation | Conducted (Average) |        | ERP (Average) |       |
|-----------------------|------------|---------------------|--------|---------------|-------|
|                       |            | dBm                 | mW     | dBm           | mW    |
| 824- 849              | GPRS       | 30.5                | 1122.0 | 27.1          | 509.3 |
|                       | EGPRS      | 24.7                | 295.1  | 20.3          | 107.2 |

#### Part 24 / RSS 133 1900MHz Band

| Frequency range (MHz) | Modulation | Conducted (Average) |       | EIRP (Average) |       |
|-----------------------|------------|---------------------|-------|----------------|-------|
|                       |            | dBm                 | mW    | dBm            | mW    |
| 1850 - 1910           | GPRS       | 25.2                | 331.1 | 25.4           | 345.9 |
|                       | EGPRS      | 22.5                | 177.8 | 21.9           | 154.5 |

### CDMA2000 MODES

#### Part 90 800MHz Band

| Frequency range (MHz) | Modulation           | Conducted (Average) |       | ERP (Average) |      |
|-----------------------|----------------------|---------------------|-------|---------------|------|
|                       |                      | dBm                 | mW    | dBm           | mW   |
| 816 - 824             | CDMA 2000 1xRTT      | 23.5                | 223.9 | 17.9          | 62.2 |
|                       | CDMA 2000 EVDO-Rev A | 23.5                | 221.3 | 18.0          | 62.5 |

#### Part 22 / RSS 132 850MHz Band

| Frequency range (MHz) | Modulation           | Conducted (Average) |       | ERP (Average) |      |
|-----------------------|----------------------|---------------------|-------|---------------|------|
|                       |                      | dBm                 | mW    | dBm           | mW   |
| 824 – 849             | CDMA 2000 1xRTT      | 23.5                | 223.9 | 16.5          | 45.1 |
|                       | CDMA 2000 EVDO-Rev A | 23.5                | 223.9 | 16.6          | 45.5 |

#### Part 24 / RSS 133 1900MHz Band

| Frequency range (MHz) | Modulation           | Conducted (Average) |       | EIRP (Average) |      |
|-----------------------|----------------------|---------------------|-------|----------------|------|
|                       |                      | dBm                 | mW    | dBm            | mW   |
| 1850 – 1910           | CDMA 2000 1xRTT      | 21.0                | 125.9 | 19.7           | 94.2 |
|                       | CDMA 2000 EVDO-Rev A | 21.0                | 125.9 | 19.8           | 94.8 |

## **UMTS MODES**

### **Part 22 / RSS 132 850MHz Band**

| Frequency range (MHz) | Modulation  | Conducted (Average) |       | ERP (Average) |      |
|-----------------------|-------------|---------------------|-------|---------------|------|
|                       |             | dBm                 | mW    | dBm           | mW   |
| 824 – 849             | REL 99      | 23.0                | 199.5 | 17.1          | 50.9 |
|                       | HSDPA REL 5 | 22.0                | 158.5 | 16.1          | 40.9 |

### **Part 24 / RSS 133 1900MHz Band**

| Frequency range (MHz) | Modulation  | Conducted (Average) |       | EIRP (Average) |      |
|-----------------------|-------------|---------------------|-------|----------------|------|
|                       |             | dBm                 | mW    | dBm            | mW   |
| 1850 – 1910           | REL 99      | 21.0                | 125.9 | 17.7           | 58.6 |
|                       | HSDPA REL 5 | 20.4                | 109.6 | 16.9           | 48.6 |

### **Part 27 /RSS 139 1700MHz Band**

| Frequency range (MHz) | Modulation  | Conducted (Average) |       | EIRP (Average) |      |
|-----------------------|-------------|---------------------|-------|----------------|------|
|                       |             | dBm                 | mW    | dBm            | mW   |
| 1710– 1755            | REL 99      | 21.0                | 125.9 | 18.9           | 77.6 |
|                       | HSDPA REL 5 | 20.4                | 109.6 | 17.9           | 61.0 |

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

| Frequency (MHz) | Port A (LAT)<br>Antenna Gain<br>(dBi) | Port B (UAT)<br>Antenna Gain<br>(dBi) |
|-----------------|---------------------------------------|---------------------------------------|
| 816 -824        | -3.37                                 | -3.72                                 |
| 824 - 849       | -2.17                                 | -2.36                                 |
| 1710 -1755      | -1.87                                 | -0.90                                 |
| 1850 - 1910     | -0.05                                 | 0.05                                  |

### 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.26.02.

### 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case is EUT on the highest power. Based on Peak Power measurement investigations, the following modes should be considered as worst-case scenario for all other measurements.

Worst-case modes:

- GSM GPRS
- GSM EGPRS
- CDMA 2000 1xRTT
- CDMA 2000 EVDO REV. A
- UMTS REL 99
- UMTS HSDPA

We only performed the conducted test at LAT port as worst case since it has higher output powers.

The fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Portrait orientation was worst-case orientation for cell bands; Flatbed orientation was worst-case orientation for pcs bands without AC/DC adapter and headset.

For simultaneous transmission of multiple channels from the same antenna in the 2.4GHz, 5GHz bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |                   |                |
|------------------------|--------------|-------------------|----------------|
| Description            | Manufacturer | Model             | Serial Number  |
| AC/DC adapter          | HP           | HSTNN-DA40        | WDWR70BAR9AKS8 |
| Laptop                 | HP           | HP ProBook 450 G2 | CND5367Z97     |
| DC power supply        | Sorensen     | XT 20-3           | 1318A00530     |

### I/O CABLES (RF Conducted Test)

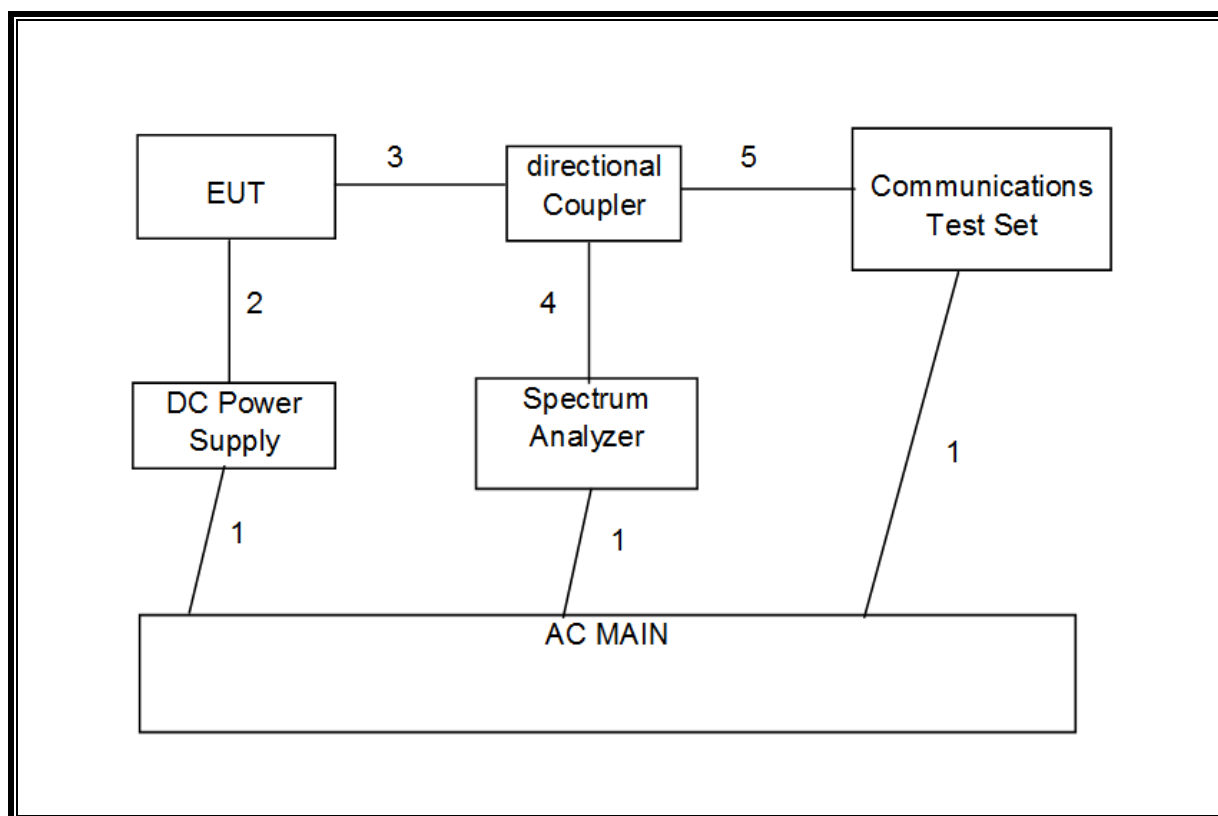
| I/O Cable List |           |                      |                        |             |                  |         |
|----------------|-----------|----------------------|------------------------|-------------|------------------|---------|
| Cable No       | Port      | # of identical ports | Connector Type         | Cable Type  | Cable Length (m) | Remarks |
| 1              | AC        | 1                    | US 115V                | Un-shielded | 2m               | N/A     |
| 2              | DC        | 1                    | DC                     | Un-shielded | 1.4m             | N/A     |
| 3              | RF In/Out | 1                    | EUT                    | Un-shielded | 0.4m             | N/A     |
| 4              | RF In/Out | 1                    | Barrel                 | N/A         | N/A              | N/A     |
| 5              | RF In/Out | 1                    | Communication Test Set | Un-shielded | 1m               | N/A     |

### I/O CABLES (RF Radiated Test)

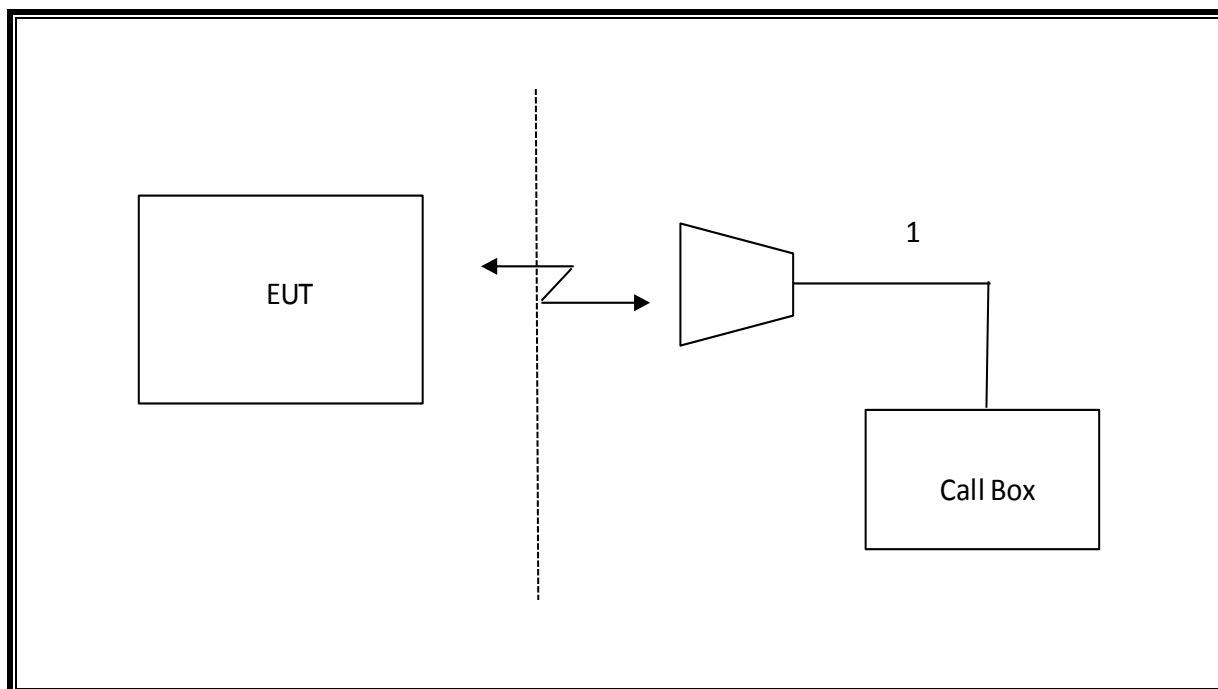
| I/O Cable List |           |                      |                |             |                  |         |
|----------------|-----------|----------------------|----------------|-------------|------------------|---------|
| Cable No       | Port      | # of identical ports | Connector Type | Cable Type  | Cable Length (m) | Remarks |
| 1              | RF In/Out | 1                    | Antenna        | Un-shielded | 5m               | NA      |

### TEST SETUP

### CONDUCTED SETUP



### RADIATED SETUP



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST                               |                     |                        |       |          |
|---------------------------------------------------|---------------------|------------------------|-------|----------|
| Description                                       | Manufacturer        | Model                  | T No. | Cal Due  |
| Spectrum Analyzer, PSA, 3Hz to 44GHz              | Agilent             | E4446A                 | T123  | 10/21/16 |
| Wideband Communication Test Set, Call Box         | Rohde & Schwarz     | CMW500                 | T971  | 07/22/16 |
| *Directional Coupler, 10dB SMA, 0.5GHz to 26.5GHz | Krytar              | 152610                 | T922  | 06/10/16 |
| P - Series Power Meter                            | Keysight            | N1911A                 | T1245 | 05/03/17 |
| *Wideband Power Sensor 50 MHz - 18 GHz            | Keysight            | N1921A                 | T1228 | 06/06/16 |
| Spectrum Analyzer, PSA, 3Hz to 26.5GHz            | Agilent             | E4440A                 | T200  | 09/01/16 |
| Wideband Communication Test Set, Call Box         | Rohde & Schwarz     | CMW500                 | T954  | 05/03/17 |
| Directional Coupler, 10dB SMA, 0.5GHz to 26.5GHz  | Krytar              | 152613                 | T1538 | 04/11/17 |
| Wireless Communications Test Set, 8960 Series 10  | Agilent             | E5515C                 | T211  | 11/18/16 |
| Chamber, Environmental                            | Cincinnati Sub Zero | ZPHS-8-3.5-SCT/WC      | T754  | 09/14/16 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz              | Keysight            | N9030A                 | T1466 | 03/09/17 |
| Directional Coupler, 10dB SMA, 0.5GHz to 26.5GHz  | Krytar              | 152610                 | T1161 | 04/12/17 |
| Antenna, Horn 1-18GHz                             | Emco                | 3115                   | T59   | 11/18/16 |
| *Tuned Dipole, 400 - 1000MHz                      | ETS Lindgren        | 3121C DB4              | T273  | 05/16/16 |
| *Filter, Highpass 4.0GHz                          | Micro-Tronics       | HPM13351               | T1239 | 06/24/16 |
| Filter, HPF 1.0GHz                                | Micro-Tronics       | HPM18129               | T889  | 09/01/16 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz              | Agilent             | N9030A                 | T341  | 10/14/16 |
| Wideband Communication Test Set, Call Box         | Rohde & Schwarz     | CMW500                 | T260  | 07/09/16 |
| Antenna, Horn 1-18GHz                             | ETS-Lindgren        | 3117                   | T344  | 02/22/17 |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz       | Sunol Sciences      | JB3                    | T185  | 03/09/17 |
| *Spectrum Analyzer, PXA, 3Hz to 44GHz             | keysight            | N9030A                 | T905  | 05/26/16 |
| Wideband Communication Test Set, Call Box         | Rohde & Schwarz     | CMW500                 | T1526 | 04/15/17 |
| Antenna, Horn 1-18GHz                             | ETS-Lindgren        | 3117                   | T136  | 03/14/17 |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz       | Sunol Sciences      | JB3                    | T900  | 05/03/17 |
| Amplifier, 1 - 18GHz                              | Miteq               | AFS42-00101800-25-S-42 | T493  | 07/23/16 |
| *Amplifier, 10KHz to 1GHz, 32dB                   | Sonoma              | 310N                   | T834  | 06/08/16 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz              | Agilent             | N9030A                 | T1113 | 11/08/16 |
| Wideband Communication Test Set, Call Box         | Rohde & Schwarz     | CMW500                 | T259  | 10/22/16 |
| Antenna, Horn 1-18GHz                             | ETS-Lindgren        | 3117                   | T711  | 01/12/17 |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz       | Sunol Sciences      | JB3                    | T243  | 09/24/16 |

\*Testing is completed before equipment expiration date.

## 7. RF POWER OUTPUT VERIFICATION

### 7.1. GSM

#### Using CMW500 Communication Test Set

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press **Connection control** to choose the different menus

Press **RESET** > choose all to reset all settings

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection | Press <b>Signal Off</b> to turn off the signal and change settings<br>Network Support > GSM+GPRS or GSM+EGPRS<br>Main Service > Packet Data<br>Service selection > Test Mode A – Auto Slot Config. off                                                                                                                                                                                                                                                                                                                       |
| MS Signal  | Press Slot Config bottom on the right twice to select and change the number of time slots and power setting<br>> Slot configuration > Uplink/Gamma<br>> 33 dBm for GPRS 850/900<br>> 27 dBm for EGPRS 850/900<br>> 30 dBm for GPRS1800/1900<br>> 26 dBm for EGPRS1800/1900                                                                                                                                                                                                                                                   |
| BS Signal  | Enter the same channel number for TCH channel (test channel) and BCCH channel<br><br>Frequency Offset > + 0 Hz<br>Mode > BCCH and TCH<br>BCCH Level > -85 dBm (May need to adjust if link is not stable)<br>BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]<br><br>Channel Type > Off<br>P0> 4 dB<br>Slot Config > Unchanged (if already set under MS Signal)<br>TCH > choose desired test channel<br>Hopping > Off<br>Main Timeslot > 3 (Default) |
| Network    | Coding Scheme > CS 4 (GPRS) and MCS5-9 (EGPRS)<br>Bit Stream > 2E9-1PSR Bit Pattern                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| AF/RF      | Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Connection | Press <b>Signal On</b> to turn on the signal and change settings                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

**Using Agilent 8960A Communication Test Set**

**System Config:** GSM/GPRS Mobile Test  
E1968A A.06.31

**Call Params:** BCH → Cell Band: GSM850/PCS  
TCH → Traffic Band: GSM850/PCS  
Traffic Channel: 128/192/251 or 512/661/810  
MS Tx Level: 0  
PDTCH → Traffic Band: GSM850/PCS  
Traffic Channel: 128/192/251 512/661/810  
MS Tx Level: 0  
Coding Scheme: CS-4 (GPRS)  
Coding Scheme: MCS-5 to 9 (EGPRS)  
MultiSlot Config: 1up, 1 down (Assuming that the highest  
conducted power)

**Control:** Active Cell → GSM/GPRS

### 7.1.1. PORT A GPRS/EGPRS (LAT)

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 6/24/16 |
|------------|-------|--------------|---------|

| Mode  | Ch. | f (MHz) | 1 time slot |               | 2 time slots |               |
|-------|-----|---------|-------------|---------------|--------------|---------------|
|       |     |         | Peak (dBm)  | Average (dBm) | Peak (dBm)   | Average (dBm) |
| GPRS  | 128 | 824.2   | <b>33.7</b> | <b>33.5</b>   | 32.6         | 32.5          |
|       | 190 | 836.6   | 33.6        | 33.4          | 32.5         | 32.4          |
|       | 251 | 848.8   | 33.5        | 33.3          | 32.5         | 32.4          |
| EGPRS | 128 | 824.2   | <b>32.0</b> | <b>29.0</b>   | 31.0         | 28.0          |
|       | 190 | 836.6   | 31.8        | 28.9          | 30.8         | 27.8          |
|       | 251 | 848.8   | 31.7        | 28.8          | 30.7         | 27.9          |
| GPRS  | 512 | 1850.2  | <b>30.7</b> | <b>30.5</b>   | 29.7         | 29.5          |
|       | 661 | 1880.0  | 30.5        | 30.3          | 29.6         | 29.4          |
|       | 810 | 1909.8  | 30.4        | 30.2          | 29.4         | 29.2          |
| EGPRS | 512 | 1850.2  | <b>31.1</b> | <b>28.0</b>   | 30.3         | 26.9          |
|       | 661 | 1880.0  | 31.0        | 27.8          | 30.1         | 26.8          |
|       | 810 | 1909.8  | 30.9        | 27.8          | 30.0         | 26.6          |

### 7.1.2. PORT B GPRS/EGPRS (UAT)

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 6/24/16 |
|------------|-------|--------------|---------|

| Mode  | Ch. | f (MHz) | 1 time slot |               | 2 time slots |               |
|-------|-----|---------|-------------|---------------|--------------|---------------|
|       |     |         | Peak (dBm)  | Average (dBm) | Peak (dBm)   | Average (dBm) |
| GPRS  | 128 | 824.2   | 30.6        | 30.5          | 29.5         | 29.4          |
|       | 190 | 836.6   | <b>30.6</b> | <b>30.5</b>   | 29.7         | 29.5          |
|       | 251 | 848.8   | 30.6        | 30.5          | 29.4         | 29.5          |
| EGPRS | 128 | 824.2   | 27.6        | 24.5          | 26.4         | 23.4          |
|       | 190 | 836.6   | 27.5        | 24.5          | 26.4         | 23.4          |
|       | 251 | 848.8   | <b>27.8</b> | <b>24.7</b>   | 26.6         | 23.5          |
| GPRS  | 512 | 1850.2  | 25.3        | 25.1          | 24.2         | 23.6          |
|       | 661 | 1880.0  | <b>25.4</b> | <b>25.2</b>   | 24.2         | 24.1          |
|       | 810 | 1909.8  | 25.3        | 25.2          | 24.3         | 24.1          |
| EGPRS | 512 | 1850.2  | 25.6        | 22.5          | 21.7         | 21.5          |
|       | 661 | 1880.0  | <b>25.7</b> | <b>22.5</b>   | 21.6         | 21.4          |
|       | 810 | 1909.8  | 25.6        | 22.5          | 21.5         | 21.3          |

## 7.2. CDMA2000

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

### CDMA2000 1xRTT

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| <u>Application</u>   | <u>Rev, License</u> |
|----------------------|---------------------|
| CDMA2000 Mobile Test | B.15.18, L          |

- Protocol Rev > 6 (IS-2000-0)
- System ID: 18; NID: 65535, Reg. Ch. #: 610 for Cell, 600 for PCS & 450 for AWS
- Radio Config (RC) > RC1 or RC3
- Service Option (SO) Setup > SO55 or SO32
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

### RESULT

### 7.2.1. PORT A 1XRTT (LAT)

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 6/24/16 |
|------------|-------|--------------|---------|

#### 1xRTT, BC10, SECONDARY 800

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |         |                 |         |                    |         |
|--------------------------|---------------------|------------------------------|---------|-----------------|---------|--------------------|---------|
|                          |                     | CH 450 - 817.25MHz           |         | CH 560 - 820MHz |         | CH 670 - 822.75MHz |         |
|                          |                     | Peak                         | Average | Peak            | Average | Peak               | Average |
| RC1                      | 2 (Loopback)        | 28.9                         | 24.9    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 55 (Loopback)       | 28.9                         | 24.8    | 28.6            | 24.8    | 28.7               | 24.9    |
| RC2                      | 9 (Loopback)        | 28.9                         | 25.0    | 28.6            | 24.9    | 28.7               | 25.0    |
|                          | 55 (Loopback)       | 28.9                         | 24.8    | 28.7            | 24.8    | 28.7               | 24.9    |
| RC3                      | 2 (Loopback)        | 28.8                         | 24.8    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 55 (Loopback)       | 28.9                         | 24.9    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 32 (+ F-SCH)        | 28.7                         | 24.9    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 32 (+ SCH)          | 28.8                         | 24.8    | 28.5            | 24.8    | 28.6               | 24.9    |
| RC4                      | 2 (Loopback)        | 28.8                         | 24.8    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 55 (Loopback)       | 28.8                         | 24.9    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 32 (+ F-SCH)        | 28.9                         | 24.9    | 28.6            | 24.8    | 28.6               | 24.9    |
|                          | 32 (+ SCH)          | 28.8                         | 24.9    | 28.6            | 24.9    | 28.6               | 24.9    |
| RC5                      | 9 (Loopback)        | 28.9                         | 24.9    | 28.6            | 24.9    | 28.5               | 24.9    |
|                          | 55 (Loopback)       | 28.8                         | 24.8    | 28.6            | 24.9    | 28.7               | 24.9    |
| RC11                     | 2 (Loopback)        | 28.7                         | 24.8    | 28.6            | 24.9    | 28.6               | 24.9    |
|                          | 75 (Loopback)       | 28.8                         | 24.9    | 28.8            | 24.8    | 28.7               | 24.9    |
|                          | 32 (+ F-SCH)        | 28.8                         | 24.9    | 28.7            | 24.8    | 28.7               | 24.9    |
|                          | 32 (+ SCH)          | 28.8                         | 24.8    | 28.7            | 24.9    | 28.8               | 24.9    |

**1xRTT, BC0, CELL BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |         |                    |         |                    |         |
|--------------------------|---------------------|------------------------------|---------|--------------------|---------|--------------------|---------|
|                          |                     | CH 1013 - 824.7MHz           |         | CH 384 - 836.52MHz |         | CH 777 - 848.31MHz |         |
|                          |                     | Peak                         | Average | Peak               | Average | Peak               | Average |
| RC1                      | 2 (Loopback)        | 28.4                         | 24.8    | 28.6               | 24.9    | 28.1               | 24.8    |
|                          | 55 (Loopback)       | 28.4                         | 24.8    | 28.6               | 24.9    | 28.1               | 24.8    |
| RC2                      | 9 (Loopback)        | 28.4                         | 24.8    | 28.7               | 25.0    | 28.1               | 25.0    |
|                          | 55 (Loopback)       | 28.4                         | 24.8    | 28.7               | 24.8    | 28.1               | 24.8    |
| RC3                      | 2 (Loopback)        | 28.4                         | 24.8    | 28.5               | 24.9    | 28.1               | 24.8    |
|                          | 55 (Loopback)       | 28.4                         | 24.8    | 28.6               | 24.8    | 28.0               | 24.8    |
|                          | 32 (+ F-SCH)        | 28.3                         | 24.7    | 28.5               | 24.8    | 28.1               | 24.8    |
|                          | 32 (+ SCH)          | 28.4                         | 24.8    | 28.4               | 24.8    | 28.1               | 24.8    |
| RC4                      | 2 (Loopback)        | 28.3                         | 24.8    | 28.5               | 24.9    | 28.1               | 24.7    |
|                          | 55 (Loopback)       | 28.4                         | 24.8    | 28.5               | 24.8    | 28.1               | 24.8    |
|                          | 32 (+ F-SCH)        | 28.4                         | 24.8    | 28.6               | 24.8    | 28.1               | 24.8    |
|                          | 32 (+ SCH)          | 28.4                         | 24.8    | 28.5               | 24.7    | 28.1               | 24.7    |
| RC5                      | 9 (Loopback)        | 28.4                         | 24.8    | 28.6               | 24.8    | 28.0               | 24.8    |
|                          | 55 (Loopback)       | 28.3                         | 24.8    | 28.6               | 24.8    | 28.1               | 24.7    |
| RC11                     | 2 (Loopback)        | 28.3                         | 24.8    | 28.6               | 24.8    | 28.0               | 24.8    |
|                          | 75 (Loopback)       | 28.4                         | 24.8    | 28.6               | 24.8    | 28.0               | 24.8    |
|                          | 32 (+ F-SCH)        | 28.4                         | 24.8    | 28.6               | 24.8    | 28.1               | 24.8    |
|                          | 32 (+ SCH)          | 28.4                         | 24.8    | 28.5               | 24.8    | 28.1               | 24.9    |

**1xRTT, BC1, PCS BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |         |                  |         |                      |         |
|--------------------------|---------------------|------------------------------|---------|------------------|---------|----------------------|---------|
|                          |                     | CH 25 - 1851.25MHz           |         | CH 600 - 1880MHz |         | CH 1175 - 1908.75MHz |         |
|                          |                     | Peak                         | Average | Peak             | Average | Peak                 | Average |
| RC1                      | 2 (Loopback)        | 28.8                         | 25.1    | 29.1             | 25.1    | 28.8                 | 25.1    |
|                          | 55 (Loopback)       | 28.8                         | 25.2    | 29.0             | 25.1    | 28.8                 | 25.2    |
| RC2                      | 9 (Loopback)        | 28.8                         | 25.2    | 29.1             | 25.2    | 29.0                 | 25.1    |
|                          | 55 (Loopback)       | 28.8                         | 25.1    | 28.8             | 25.1    | 28.8                 | 25.1    |
| RC3                      | 2 (Loopback)        | 28.8                         | 25.2    | 28.9             | 25.1    | 28.7                 | 25.2    |
|                          | 55 (Loopback)       | 28.8                         | 25.2    | 28.7             | 25.1    | 28.6                 | 25.1    |
|                          | 32 (+ F-SCH)        | 28.8                         | 25.1    | 29.0             | 25.1    | 29.0                 | 25.2    |
|                          | 32 (+ SCH)          | 28.8                         | 25.2    | 29.0             | 25.1    | 28.8                 | 25.2    |
| RC4                      | 2 (Loopback)        | 28.8                         | 25.1    | 28.9             | 25.1    | 28.7                 | 25.1    |
|                          | 55 (Loopback)       | 28.8                         | 25.2    | 28.7             | 25.1    | 28.7                 | 25.1    |
|                          | 32 (+ F-SCH)        | 28.8                         | 25.1    | 29.1             | 25.1    | 28.8                 | 25.1    |
|                          | 32 (+ SCH)          | 28.8                         | 25.1    | 29.1             | 25.1    | 28.7                 | 25.1    |
| RC5                      | 9 (Loopback)        | 28.8                         | 25.1    | 28.9             | 25.1    | 28.7                 | 25.1    |
|                          | 55 (Loopback)       | 28.8                         | 25.2    | 28.8             | 25.2    | 28.7                 | 25.1    |
| RC11                     | 2 (Loopback)        | 28.8                         | 25.1    | 28.8             | 25.1    | 28.8                 | 25.2    |
|                          | 75 (Loopback)       | 28.9                         | 25.1    | 28.7             | 25.1    | 28.8                 | 25.2    |
|                          | 32 (+ F-SCH)        | 28.9                         | 25.1    | 28.8             | 25.1    | 28.9                 | 25.1    |
|                          | 32 (+ SCH)          | 28.8                         | 25.2    | 28.9             | 25.1    | 28.9                 | 25.1    |

## 7.2.2. PORT B 1XRTT (UAT)

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 6/24/16 |
|------------|-------|--------------|---------|

### 1xRTT, BC10, SECONDARY 800

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |         |                 |         |                    |         |
|--------------------------|---------------------|------------------------------|---------|-----------------|---------|--------------------|---------|
|                          |                     | CH 450 - 817.25MHz           |         | CH 560 - 820MHz |         | CH 670 - 822.75MHz |         |
|                          |                     | Peak                         | Average | Peak            | Average | Peak               | Average |
| RC1                      | 2 (Loopback)        | 27.1                         | 23.4    | 26.8            | 23.4    | 27.6               | 23.4    |
|                          | 55 (Loopback)       | 27.0                         | 23.4    | 25.8            | 23.4    | 27.6               | 23.4    |
| RC2                      | 9 (Loopback)        | 27.5                         | 23.4    | 27.7            | 23.5    | 27.7               | 23.4    |
|                          | 55 (Loopback)       | 27.1                         | 23.4    | 26.8            | 23.4    | 27.5               | 23.4    |
| RC3                      | 2 (Loopback)        | 27.0                         | 23.4    | 26.7            | 23.4    | 27.3               | 23.4    |
|                          | 55 (Loopback)       | 27.0                         | 23.4    | 26.7            | 23.1    | 27.1               | 23.4    |
|                          | 32 (+ F-SCH)        | 27.0                         | 23.4    | 26.8            | 23.4    | 27.3               | 23.4    |
|                          | 32 (+ SCH)          | 27.0                         | 23.4    | 26.8            | 23.4    | 27.2               | 23.4    |
| RC4                      | 2 (Loopback)        | 27.0                         | 23.4    | 27.0            | 23.4    | 27.3               | 23.4    |
|                          | 55 (Loopback)       | 27.6                         | 23.4    | 26.8            | 23.4    | 27.2               | 23.4    |
|                          | 32 (+ F-SCH)        | 27.0                         | 23.4    | 26.9            | 23.4    | 27.2               | 23.4    |
|                          | 32 (+ SCH)          | 27.0                         | 23.3    | 27.1            | 23.4    | 27.3               | 23.4    |
| RC5                      | 9 (Loopback)        | 27.0                         | 23.4    | 27.0            | 23.4    | 27.3               | 23.4    |
|                          | 55 (Loopback)       | 26.9                         | 23.4    | 26.9            | 23.4    | 27.2               | 23.4    |
| RC11                     | 2 (Loopback)        | 27.0                         | 23.4    | 26.9            | 23.4    | 27.3               | 23.4    |
|                          | 75 (Loopback)       | 27.0                         | 23.4    | 26.9            | 23.4    | 27.4               | 23.4    |
|                          | 32 (+ F-SCH)        | 27.0                         | 23.4    | 26.9            | 23.4    | 27.3               | 23.4    |
|                          | 32 (+ SCH)          | 27.0                         | 23.4    | 27.0            | 23.4    | 27.2               | 23.4    |

**1xRTT, BC0, CELL BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |         |                    |         |                    |         |
|--------------------------|---------------------|------------------------------|---------|--------------------|---------|--------------------|---------|
|                          |                     | CH 1013 - 824.7MHz           |         | CH 384 - 836.52MHz |         | CH 777 - 848.31MHz |         |
|                          |                     | Peak                         | Average | Peak               | Average | Peak               | Average |
| RC1                      | 2 (Loopback)        | 27.4                         | 23.4    | 27.2               | 23.4    | 27.3               | 23.4    |
|                          | 55 (Loopback)       | 27.5                         | 23.4    | 27.0               | 23.5    | 27.3               | 23.4    |
| RC2                      | 9 (Loopback)        | 27.9                         | 23.5    | 27.7               | 23.4    | 27.5               | 23.5    |
|                          | 55 (Loopback)       | 27.2                         | 23.4    | 27.3               | 23.4    | 27.2               | 23.5    |
| RC3                      | 2 (Loopback)        | 27.1                         | 23.5    | 27.6               | 23.4    | 27.5               | 23.5    |
|                          | 55 (Loopback)       | 27.4                         | 23.4    | 27.1               | 23.4    | 27.6               | 23.4    |
|                          | 32 (+ F-SCH)        | 27.6                         | 23.5    | 27.2               | 23.4    | 27.4               | 23.4    |
|                          | 32 (+ SCH)          | 27.1                         | 23.4    | 27.6               | 23.3    | 27.3               | 23.4    |
| RC4                      | 2 (Loopback)        | 27.2                         | 23.4    | 27.6               | 23.4    | 27.5               | 23.4    |
|                          | 55 (Loopback)       | 27.6                         | 23.4    | 27.4               | 23.4    | 27.1               | 23.4    |
|                          | 32 (+ F-SCH)        | 27.1                         | 23.3    | 27.0               | 23.4    | 27.2               | 23.4    |
|                          | 32 (+ SCH)          | 27.3                         | 23.4    | 27.2               | 23.4    | 27.0               | 23.4    |
| RC5                      | 9 (Loopback)        | 27.5                         | 23.5    | 27.2               | 23.4    | 27.4               | 23.4    |
|                          | 55 (Loopback)       | 27.4                         | 23.4    | 27.5               | 23.5    | 27.3               | 23.4    |
| RC11                     | 2 (Loopback)        | 27.4                         | 23.5    | 27.3               | 23.5    | 27.5               | 23.4    |
|                          | 75 (Loopback)       | 27.1                         | 23.5    | 27.1               | 23.4    | 27.2               | 23.4    |
|                          | 32 (+ F-SCH)        | 27.7                         | 23.3    | 27.2               | 23.4    | 27.1               | 23.4    |
|                          | 32 (+ SCH)          | 27.3                         | 23.4    | 27.2               | 23.4    | 27.2               | 23.5    |

**1xRTT, BC1, PCS BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |             |                  |         |                      |         |
|--------------------------|---------------------|------------------------------|-------------|------------------|---------|----------------------|---------|
|                          |                     | CH 25 - 1851.25MHz           |             | CH 600 - 1880MHz |         | CH 1175 - 1908.75MHz |         |
|                          |                     | Peak                         | Average     | Peak             | Average | Peak                 | Average |
| RC1                      | 2 (Loopback)        | 25.2                         | 20.9        | 25.0             | 20.8    | 25.2                 | 21.0    |
|                          | 55 (Loopback)       | 25.0                         | 20.8        | 24.6             | 20.9    | 25.0                 | 20.9    |
| RC2                      | 9 (Loopback)        | <b>25.2</b>                  | <b>21.0</b> | 24.4             | 20.9    | 24.9                 | 21.0    |
|                          | 55 (Loopback)       | 25.0                         | 20.9        | 24.6             | 20.9    | 24.7                 | 21.0    |
| RC3                      | 2 (Loopback)        | 24.8                         | 20.8        | 25.0             | 20.9    | 25.0                 | 20.8    |
|                          | 55 (Loopback)       | 24.9                         | 20.8        | 24.9             | 20.8    | 24.9                 | 20.9    |
|                          | 32 (+ F-SCH)        | 24.9                         | 20.8        | 24.8             | 21.0    | 24.8                 | 21.0    |
|                          | 32 (+ SCH)          | 24.6                         | 20.9        | 24.6             | 20.9    | 24.9                 | 20.9    |
| RC4                      | 2 (Loopback)        | 24.8                         | 20.8        | 24.9             | 20.9    | 24.7                 | 20.8    |
|                          | 55 (Loopback)       | 24.9                         | 20.9        | 24.8             | 21.0    | 25.1                 | 20.8    |
|                          | 32 (+ F-SCH)        | 25.0                         | 21.0        | 24.8             | 21.0    | 25.1                 | 20.9    |
|                          | 32 (+ SCH)          | 24.7                         | 20.8        | 25.0             | 20.8    | 24.8                 | 21.0    |
| RC5                      | 9 (Loopback)        | 24.7                         | 20.9        | 24.8             | 20.8    | 25.0                 | 20.9    |
|                          | 55 (Loopback)       | 24.8                         | 21.0        | 24.6             | 20.8    | 25.0                 | 20.9    |
| RC11                     | 2 (Loopback)        | 25.0                         | 21.0        | 24.6             | 20.9    | 24.9                 | 20.9    |
|                          | 75 (Loopback)       | 25.0                         | 20.7        | 24.8             | 20.9    | 24.8                 | 21.0    |
|                          | 32 (+ F-SCH)        | 24.7                         | 20.9        | 24.9             | 20.9    | 24.8                 | 20.9    |
|                          | 32 (+ SCH)          | 24.6                         | 20.9        | 25.0             | 21.0    | 24.8                 | 20.9    |

### 7.3. 1xEV-DO - Release 0 (REV 0)

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

#### EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > RTAP
  - RTAP Rate > 153.6 kbps
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

#### EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

### RESULTS

### 7.3.1. PORT A 1xEV-DO - REV 0 (LAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### **CDMA2000 EVDO REV. 0 800MHz SECONDARY BAND**

| FTAP Rate                   | RTAP Rate  | Channel | f (MHz) | Conducted Output Power (dBm) |             |
|-----------------------------|------------|---------|---------|------------------------------|-------------|
|                             |            |         |         | Peak                         | Average     |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 450     | 817.25  | 28.5                         | 24.9        |
|                             |            | 560     | 820.00  | <b>28.7</b>                  | <b>25.0</b> |
|                             |            | 670     | 822.75  | 28.5                         | 24.9        |

#### **CDMA2000 EVDO REV 0 850MHz BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|-----------------------------|------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2 Kbps<br>(2 slot QPSK) | 153.6 Kbps | 1013    | 824.70          | 28.7                       | 24.9                          |
|                             |            | 384     | 836.52          | <b>28.9</b>                | <b>25.0</b>                   |
|                             |            | 777     | 848.31          | 28.6                       | 24.8                          |

#### **CDMA2000 EVDO REV 0 1900MHz BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|-----------------------------|------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2 Kbps<br>(2 slot QPSK) | 153.6 Kbps | 25      | 1851.25         | 28.9                       | 25.2                          |
|                             |            | 600     | 1880.00         | <b>29.0</b>                | <b>25.2</b>                   |
|                             |            | 1175    | 1908.75         | 28.9                       | 25.2                          |

### 7.3.2. PORT B 1xEV-DO - REV 0 (UAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### CDMA2000 EVDO REV. 0 800MHz SECONDARY BAND

| FTAP Rate                   | RTAP Rate  | Channel | f (MHz) | Conducted Output Power (dBm) |             |
|-----------------------------|------------|---------|---------|------------------------------|-------------|
|                             |            |         |         | Peak                         | Average     |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 450     | 817.25  | 27.3                         | <b>23.5</b> |
|                             |            | 560     | 820.00  | 27.2                         | 23.4        |
|                             |            | 670     | 822.75  | <b>27.5</b>                  | 23.4        |

#### CDMA2000 EVDO REV 0 850MHz BAND

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|-----------------------------|------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2 Kbps<br>(2 slot QPSK) | 153.6 Kbps | 1013    | 824.70          | 27.8                       | 23.4                          |
|                             |            | 384     | 836.52          | <b>27.9</b>                | <b>23.4</b>                   |
|                             |            | 777     | 848.31          | 27.8                       | 23.3                          |

#### CDMA2000 EVDO REV 0 1900MHz BAND

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|-----------------------------|------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2 Kbps<br>(2 slot QPSK) | 153.6 Kbps | 25      | 1851.25         | 25.1                       | 20.9                          |
|                             |            | 600     | 1880.00         | 25.1                       | 20.9                          |
|                             |            | 1175    | 1908.75         | <b>25.2</b>                | <b>21.0</b>                   |

## 7.4. CDMA2000 1xEV-DO - Revision A (REV A)

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| <u>Application</u>    | <u>Rev, License</u> |
|-----------------------|---------------------|
| 1xEV-DO Terminal Test | A.09.13             |

### EVDO Rev. A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000: 00000000: 00000000: 00000000
- > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

### EVDO Rev. A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000: 00000000: 00000000: 00000000
- > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

## RESULTS

### 7.4.1. PORT A 1xEV-DO - REV A (LAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 44366 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### **CDMA2000 EVDO REV A 800MHz SECONDARY BAND**

| FETAP Traffic Format                                       | RETAP Data Payload Size | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|------------------------------------------------------------|-------------------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2k, QPSK / ACK channel is transmitted at all the slots | 4096                    | 450     | 817.25          | 28.8                       | 25.0                          |
|                                                            |                         | 560     | 820.00          | <b>29.0</b>                | <b>25.0</b>                   |
|                                                            |                         | 670     | 822.75          | 28.8                       | 24.9                          |

#### **CDMA2000 EVDO REV A 850MHz BAND**

| FETAP Traffic Format                                       | RETAP Data Payload Size | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|------------------------------------------------------------|-------------------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2k, QPSK / ACK channel is transmitted at all the slots | 4096                    | 1013    | 824.70          | 28.9                       | 25.0                          |
|                                                            |                         | 384     | 836.52          | <b>29.0</b>                | <b>25.0</b>                   |
|                                                            |                         | 777     | 848.31          | 28.8                       | 25.0                          |

#### **CDMA2000 EVDO REV A 1900MHz BAND**

| FETAP Traffic Format                                       | RETAP Data Payload Size | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|------------------------------------------------------------|-------------------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2k, QPSK / ACK channel is transmitted at all the slots | 4096                    | 25      | 1851.25         | 29.0                       | 25.1                          |
|                                                            |                         | 600     | 1880.00         | <b>29.2</b>                | <b>25.2</b>                   |
|                                                            |                         | 1175    | 1908.75         | 29.1                       | 25.2                          |

## 7.4.2. PORT B 1xEV-DO - REV A (UAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

### CDMA2000 EVDO REV A 800MHz SECONDARY BAND

| FETAP Traffic Format                                       | RETAP Data Payload Size | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|------------------------------------------------------------|-------------------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2k, QPSK / ACK channel is transmitted at all the slots | 4096                    | 450     | 817.25          | 27.3                       | 23.3                          |
|                                                            |                         | 560     | 820.00          | 27.2                       | 23.2                          |
|                                                            |                         | 670     | 822.75          | <b>27.8</b>                | <b>23.5</b>                   |

### CDMA2000 EVDO REV A 850MHz BAND

| FETAP Traffic Format                                       | RETAP Data Payload Size | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|------------------------------------------------------------|-------------------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2k, QPSK / ACK channel is transmitted at all the slots | 4096                    | 1013    | 824.70          | <b>28.0</b>                | <b>23.5</b>                   |
|                                                            |                         | 384     | 836.52          | 27.8                       | 23.3                          |
|                                                            |                         | 777     | 848.31          | 27.9                       | 23.2                          |

### CDMA2000 EVDO REV A 1900MHz BAND

| FETAP Traffic Format                                       | RETAP Data Payload Size | Channel | Frequency (MHz) | Peak Conducted Power (dBm) | Average Conducted Power (dBm) |
|------------------------------------------------------------|-------------------------|---------|-----------------|----------------------------|-------------------------------|
| 307.2k, QPSK / ACK channel is transmitted at all the slots | 4096                    | 25      | 1851.25         | <b>25.2</b>                | <b>21.0</b>                   |
|                                                            |                         | 600     | 1880.00         | 25.2                       | 20.9                          |
|                                                            |                         | 1175    | 1908.75         | 25.2                       | 20.9                          |

## 7.5. UMTS

### TEST PROCEDURE

The transmitter output was connected to the input terminal of Directional Coupler via calibrated coaxial cable. The output coupling terminal of the Directional Coupler was directly connected to a spectrum analyzer while the output through terminal connected to the communication test set via calibrated coaxial cable.

The output power was measured with the spectrum analyzer at the low, middle and high channel in each band.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW  $\geq$  RBW  $\geq$  26dB BW, typically 5MHz.
- Set a marker to point the corresponding peak value.

### UMTS REL99

The following summary of these settings are illustrated below:

|                        | Mode                    | Rel99          |
|------------------------|-------------------------|----------------|
|                        | Subtest                 | -              |
| WCDMA General Settings | Loopback Mode           | Test Mode 1    |
|                        | Rel99 RMC               | 12.2kbps RMC   |
|                        | HSDPA FRC               | Not Applicable |
|                        | HSUPA Test              | Not Applicable |
|                        | Power Control Algorithm | Algorithm2     |
|                        | $\beta_c$               | Not Applicable |
|                        | $\beta_d$               | Not Applicable |
|                        | $\beta_{ec}$            | Not Applicable |
|                        | $\beta_c/\beta_d$       | 8/15           |
|                        | $\beta_{hs}$            | Not Applicable |
|                        | $\beta_{ed}$            | Not Applicable |

### RESULTS

### 7.5.1. PORT A UMTS REL99 (LAT)

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 6/24/16 |
|------------|-------|--------------|---------|

#### Part 22 / RSS 132 850MHz Band

| Band                | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|---------------------|------------|------------|-----------------|------------------|---------------------|
| UMTS Rel. 99 850MHz | 4132       | 4357       | 826.4           | 28.4             | 24.9                |
|                     | 4183       | 4408       | 836.6           | 28.5             | 25.0                |
|                     | 4233       | 4458       | 846.6           | 28.3             | 25.0                |

#### Part 24 / RSS 133 1900MHz Band

| Band                 | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|----------------------|------------|------------|-----------------|------------------|---------------------|
| UMTS Rel. 99 1900MHz | 9262       | 9662       | 1852.4          | 28.7             | 25.1                |
|                      | 9400       | 9800       | 1880.0          | 28.6             | 25.1                |
|                      | 9538       | 9938       | 1907.6          | 28.7             | 25.2                |

#### Part 27 / RSS 139 1700MHz Band

| Band                 | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|----------------------|------------|------------|-----------------|------------------|---------------------|
| UMTS Rel. 99 1700MHz | 1312       | 1537       | 1712.4          | 28.8             | 25.2                |
|                      | 1413       | 1638       | 1732.6          | 28.7             | 25.2                |
|                      | 1513       | 1738       | 1752.6          | 28.7             | 25.1                |

### 7.5.2. PORT B UMTS REL99 (UAT)

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 6/24/16 |
|------------|-------|--------------|---------|

#### Part 22 / RSS 132 850MHz Band

| Band                | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|---------------------|------------|------------|-----------------|------------------|---------------------|
| UMTS Rel. 99 850MHz | 4132       | 4357       | 826.4           | 27.1             | 22.9                |
|                     | 4183       | 4408       | 836.6           | 27.2             | 23.0                |
|                     | 4233       | 4458       | 846.6           | 27.0             | 22.8                |

#### Part 24 / RSS 133 1900MHz Band

| Band                 | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|----------------------|------------|------------|-----------------|------------------|---------------------|
| UMTS Rel. 99 1900MHz | 9262       | 9662       | 1852.4          | 25.4             | 20.9                |
|                      | 9400       | 9800       | 1880.0          | 25.5             | 21.0                |
|                      | 9538       | 9938       | 1907.6          | 25.3             | 20.9                |

#### Part 27 / RSS 139 1700MHz Band

| Band                 | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|----------------------|------------|------------|-----------------|------------------|---------------------|
| UMTS Rel. 99 1700MHz | 1312       | 1537       | 1712.4          | 25.6             | 20.6                |
|                      | 1413       | 1638       | 1732.6          | 25.6             | 21.0                |
|                      | 1513       | 1738       | 1752.6          | 25.5             | 21.0                |

## 7.6. HSDPA REL 5

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121.

Summary of settings are illustrated below:

|                               | Mode                                 | Rel5 HSDPA   |       |       |       |
|-------------------------------|--------------------------------------|--------------|-------|-------|-------|
|                               | Subtest                              | 1            | 2     | 3     | 4     |
| WCDMA<br>General<br>Settings  | Loopback Mode                        | Test Mode 1  |       |       |       |
|                               | Rel99 RMC                            | 12.2kbps RMC |       |       |       |
|                               | HSDPA FRC                            | H-Set1       |       |       |       |
|                               | Power Control Algorithm              | Algorithm 2  |       |       |       |
|                               | Bc                                   | 2/15         | 11/15 | 15/15 | 15/15 |
|                               | Bd                                   | 15/15        | 15/15 | 8/15  | 4/15  |
|                               | Bd (SF)                              | 64           |       |       |       |
|                               | $\beta_c/\beta_d$                    | 2/15         | 11/15 | 15/8  | 15/4  |
|                               | Bhs                                  | 4/15         | 24/15 | 30/15 | 30/15 |
| HSDPA<br>Specific<br>Settings | MPR (dB)                             | 0            | 0     | 0.5   | 0.5   |
|                               | $D_{ACK}$                            | 8            |       |       |       |
|                               | $D_{NAK}$                            | 8            |       |       |       |
|                               | DCQI                                 | 8            |       |       |       |
|                               | Ack-Nack repetition factor           | 3            |       |       |       |
|                               | CQI Feedback (Table 5.2B.4)          | 4ms          |       |       |       |
|                               | CQI Repetition Factor (Table 5.2B.4) | 2            |       |       |       |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15        |       |       |       |

## RESULT

### 7.6.1. PORT A HSDPA REL 5 (LAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### Part 22 / RSS 132 850MHz Band

| Band              | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 850MHz | 1       | 4132       | 4357       | 826.4           | 27.8             | 23.8                |
|                   |         | 4183       | 4408       | 836.6           | 28.0             | 24.0                |
|                   |         | 4233       | 4458       | 846.6           | 27.9             | 23.9                |
|                   | 2       | 4132       | 4357       | 826.4           | 27.8             | 23.9                |
|                   |         | 4183       | 4408       | 836.6           | 27.8             | 23.9                |
|                   |         | 4233       | 4458       | 846.6           | 27.8             | 24.0                |
|                   | 3       | 4132       | 4357       | 826.4           | 27.7             | 23.5                |
|                   |         | 4183       | 4408       | 836.6           | 27.6             | 23.5                |
|                   |         | 4233       | 4458       | 846.6           | 27.8             | 23.4                |
|                   | 4       | 4132       | 4357       | 826.4           | 27.8             | 23.5                |
|                   |         | 4183       | 4408       | 836.6           | 27.5             | 23.4                |
|                   |         | 4233       | 4458       | 846.6           | 27.6             | 23.4                |

#### Part 24 / RSS 133 1900MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1900MHz | 1       | 9262       | 9662       | 1852.4          | 28.1             | 24.2                |
|                    |         | 9400       | 9800       | 1880.0          | 28.1             | 24.1                |
|                    |         | 9538       | 9938       | 1907.6          | 28.1             | 24.2                |
|                    | 2       | 9262       | 9662       | 1852.4          | 28.1             | 24.1                |
|                    |         | 9400       | 9800       | 1880.0          | 28.1             | 24.1                |
|                    |         | 9538       | 9938       | 1907.6          | 28.1             | 24.0                |
|                    | 3       | 9262       | 9662       | 1852.4          | 27.8             | 23.6                |
|                    |         | 9400       | 9800       | 1880.0          | 27.9             | 23.6                |
|                    |         | 9538       | 9938       | 1907.6          | 28.0             | 23.6                |
|                    | 4       | 9262       | 9662       | 1852.4          | 27.9             | 23.7                |
|                    |         | 9400       | 9800       | 1880.0          | 27.5             | 23.6                |
|                    |         | 9538       | 9938       | 1907.6          | 27.9             | 23.5                |

#### Part 27 / RSS 139 1700MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1700MHz | 1       | 1312       | 1537       | 1712.4          | 28.1             | 24.2                |
|                    |         | 1413       | 1638       | 1732.6          | 28.2             | 24.2                |
|                    |         | 1513       | 1738       | 1752.6          | 28.1             | 24.2                |
|                    | 2       | 1312       | 1537       | 1712.4          | 28.1             | 24.1                |
|                    |         | 1413       | 1638       | 1732.6          | 28.1             | 24.1                |
|                    |         | 1513       | 1738       | 1752.6          | 28.0             | 24.1                |
|                    | 3       | 1312       | 1537       | 1712.4          | 27.8             | 23.6                |
|                    |         | 1413       | 1638       | 1732.6          | 28.1             | 23.5                |
|                    |         | 1513       | 1738       | 1752.6          | 28.1             | 23.5                |
|                    | 4       | 1312       | 1537       | 1712.4          | 28.0             | 23.4                |
|                    |         | 1413       | 1638       | 1732.6          | 28.1             | 23.5                |
|                    |         | 1513       | 1738       | 1752.6          | 28.0             | 23.5                |

## 7.6.2. PORT B HSDPA REL 5 (UAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 44366 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

### Part 22 / RSS 132 850MHz Band

| Band              | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 850MHz | 1       | 4132       | 4357       | 826.4           | 26.6             | 22.0                |
|                   |         | 4183       | 4408       | 836.6           | 26.3             | 21.9                |
|                   |         | 4233       | 4458       | 846.6           | 26.2             | 21.8                |
|                   | 2       | 4132       | 4357       | 826.4           | 26.4             | 21.9                |
|                   |         | 4183       | 4408       | 836.6           | 26.3             | 21.9                |
|                   |         | 4233       | 4458       | 846.6           | 26.3             | 22.0                |
|                   | 3       | 4132       | 4357       | 826.4           | 26.0             | 21.4                |
|                   |         | 4183       | 4408       | 836.6           | 25.9             | 21.5                |
|                   |         | 4233       | 4458       | 846.6           | 25.9             | 21.5                |
|                   | 4       | 4132       | 4357       | 826.4           | 25.8             | 21.4                |
|                   |         | 4183       | 4408       | 836.6           | 25.7             | 21.4                |
|                   |         | 4233       | 4458       | 846.6           | 25.7             | 21.4                |

### Part 24 / RSS 133 1900MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1900MHz | 1       | 9262       | 9662       | 1852.4          | 24.8             | 20.1                |
|                    |         | 9400       | 9800       | 1880.0          | 24.7             | 19.9                |
|                    |         | 9538       | 9938       | 1907.6          | 24.6             | 20.0                |
|                    | 2       | 9262       | 9662       | 1852.4          | 24.7             | 20.0                |
|                    |         | 9400       | 9800       | 1880.0          | 24.7             | 20.0                |
|                    |         | 9538       | 9938       | 1907.6          | 24.8             | 20.1                |
|                    | 3       | 9262       | 9662       | 1852.4          | 24.1             | 19.5                |
|                    |         | 9400       | 9800       | 1880.0          | 24.2             | 19.5                |
|                    |         | 9538       | 9938       | 1907.6          | 24.3             | 19.5                |
|                    | 4       | 9262       | 9662       | 1852.4          | 24.4             | 19.5                |
|                    |         | 9400       | 9800       | 1880.0          | 24.4             | 19.5                |
|                    |         | 9538       | 9938       | 1907.6          | 24.4             | 19.5                |

### Part 27 / RSS 139 1700MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1700MHz | 1       | 1312       | 1537       | 1712.4          | 24.9             | 20.1                |
|                    |         | 1413       | 1638       | 1732.6          | 24.7             | 19.97               |
|                    |         | 1513       | 1738       | 1752.6          | 24.8             | 20.0                |
|                    | 2       | 1312       | 1537       | 1712.4          | 24.7             | 20.0                |
|                    |         | 1413       | 1638       | 1732.6          | 24.7             | 19.9                |
|                    |         | 1513       | 1738       | 1752.6          | 24.7             | 20.0                |
|                    | 3       | 1312       | 1537       | 1712.4          | 24.2             | 19.5                |
|                    |         | 1413       | 1638       | 1732.6          | 24.4             | 19.6                |
|                    |         | 1513       | 1738       | 1752.6          | 24.3             | 19.6                |
|                    | 4       | 1312       | 1537       | 1712.4          | 24.3             | 19.5                |
|                    |         | 1413       | 1638       | 1732.6          | 24.4             | 19.5                |
|                    |         | 1513       | 1738       | 1752.6          | 24.5             | 19.5                |

## 7.7. HSPA REL 6 (HSDPA & HSUPA)

### TEST PROCEDURE

The following summary of these settings are illustrated below:

|                               | Mode                                 | Rel6<br>HSUPA                                                                                                                                | Rel6<br>HSUPA | Rel6<br>HSUPA                                         | Rel6<br>HSUPA                                                                                                                                | Rel6<br>HSUPA |
|-------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|                               | Subtest                              | 1                                                                                                                                            | 2             | 3                                                     | 4                                                                                                                                            | 5             |
| WCDMA<br>General<br>Settings  | Loopback Mode                        | Test Mode 1                                                                                                                                  |               |                                                       |                                                                                                                                              |               |
|                               | Rel99 RMC                            | 12.2kbps RMC                                                                                                                                 |               |                                                       |                                                                                                                                              |               |
|                               | HSDPA FRC                            | H-Set1                                                                                                                                       |               |                                                       |                                                                                                                                              |               |
|                               | HSUPA Test                           | HSUPA Loopback                                                                                                                               |               |                                                       |                                                                                                                                              |               |
|                               | Power Control Algorithm              | Algorithm2                                                                                                                                   |               |                                                       |                                                                                                                                              |               |
|                               | $\beta_c$                            | 11/15                                                                                                                                        | 6/15          | 15/15                                                 | 2/15                                                                                                                                         | 15/15         |
|                               | $\beta_d$                            | 15/15                                                                                                                                        | 15/15         | 9/15                                                  | 15/15                                                                                                                                        | 0             |
|                               | $\beta_{ec}$                         | 209/225                                                                                                                                      | 12/15         | 30/15                                                 | 2/15                                                                                                                                         | 5/15          |
|                               | $\beta_c/\beta_d$                    | 11/15                                                                                                                                        | 6/15          | 15/9                                                  | 2/15                                                                                                                                         | 15/1          |
|                               | $\beta_{hs}$                         | 22/15                                                                                                                                        | 12/15         | 30/15                                                 | 4/15                                                                                                                                         | 5/15          |
|                               | $\beta_{ed}$                         | 1309/225                                                                                                                                     | 94/75         | 47/15                                                 | 56/75                                                                                                                                        | 47/15         |
|                               | CM (dB)                              | 1                                                                                                                                            | 3             | 2                                                     | 3                                                                                                                                            | 1             |
|                               | MPR (dB)                             | 0                                                                                                                                            | 2             | 1                                                     | 2                                                                                                                                            | 0             |
| HSDPA<br>Specific<br>Settings | DACK                                 | 8                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | DNAK                                 | 8                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | DCQI                                 | 8                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | Ack-Nack repetition factor           | 3                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | CQI Feedback (Table 5.2B.4)          | 4ms                                                                                                                                          |               |                                                       |                                                                                                                                              |               |
|                               | CQI Repetition Factor (Table 5.2B.4) | 2                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15                                                                                                                                        |               |                                                       |                                                                                                                                              |               |
| HSUPA<br>Specific<br>Settings | D E-DPCCH                            | 6                                                                                                                                            | 8             | 8                                                     | 5                                                                                                                                            | 7             |
|                               | DHARQ                                | 0                                                                                                                                            | 0             | 0                                                     | 0                                                                                                                                            | 0             |
|                               | AG Index                             | 20                                                                                                                                           | 12            | 15                                                    | 17                                                                                                                                           | 12            |
|                               | ETFCI (from 34.121 Table C.11.1.3)   | 75                                                                                                                                           | 67            | 92                                                    | 71                                                                                                                                           | 67            |
|                               | Associated Max UL Data Rate kbps     | 242.1                                                                                                                                        | 174.9         | 482.8                                                 | 205.8                                                                                                                                        | 308.9         |
|                               | Reference E_TFCIs                    | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 |               | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 92<br>E-TFCI PO 18 | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 |               |
|                               |                                      |                                                                                                                                              |               |                                                       |                                                                                                                                              |               |
|                               |                                      |                                                                                                                                              |               |                                                       |                                                                                                                                              |               |

### RESULTS

### 7.7.1. PORT A HSPA REL 6 (HSDPA & HSUPA) (LAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### Part 22 / RSS 132 850MHz Band

| Band              | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSUPA 850MHz | 1       | 4132       | 4357       | 826.4           | 27.8             | 24.0                |
|                   |         | 4183       | 4408       | 836.6           | 27.8             | 24.0                |
|                   |         | 4233       | 4458       | 846.6           | 27.9             | 23.9                |
|                   | 2       | 4132       | 4357       | 826.4           | 26.9             | 22.0                |
|                   |         | 4183       | 4408       | 836.6           | 27.2             | 22.0                |
|                   |         | 4233       | 4458       | 846.6           | 27.3             | 21.9                |
|                   | 3       | 4132       | 4357       | 826.4           | 27.5             | 23.0                |
|                   |         | 4183       | 4408       | 836.6           | 27.4             | 22.9                |
|                   |         | 4233       | 4458       | 846.6           | 27.4             | 22.9                |
|                   | 4       | 4132       | 4357       | 826.4           | 27.1             | 22.0                |
|                   |         | 4183       | 4408       | 836.6           | 26.9             | 22.0                |
|                   |         | 4233       | 4458       | 846.6           | 26.8             | 21.9                |
|                   | 5       | 4132       | 4357       | 826.4           | 27.8             | 23.9                |
|                   |         | 4183       | 4408       | 836.6           | 27.8             | 23.9                |
|                   |         | 4233       | 4458       | 846.6           | 27.8             | 23.9                |

#### Part 24 / RSS 133 1900MHz Band

| Band                        | Subtest | UL Ch | DL Ch | Frequency | Conducted Output Power (dBm) |         |
|-----------------------------|---------|-------|-------|-----------|------------------------------|---------|
|                             |         |       |       |           | Peak                         | Average |
| UMTS HSUPA 1900MHz (Band 2) | 1       | 9262  | 9662  | 1852      | 28.1                         | 24.1    |
|                             |         | 9400  | 9800  | 1880      | 28.0                         | 24.2    |
|                             |         | 9538  | 9938  | 1908      | 28.1                         | 24.1    |
|                             | 2       | 9262  | 9662  | 1852      | 27.8                         | 22.0    |
|                             |         | 9400  | 9800  | 1880      | 27.6                         | 22.1    |
|                             |         | 9538  | 9938  | 1908      | 27.6                         | 22.1    |
|                             | 3       | 9262  | 9662  | 1852      | 27.3                         | 23.2    |
|                             |         | 9400  | 9800  | 1880      | 27.8                         | 23.1    |
|                             |         | 9538  | 9938  | 1908      | 27.6                         | 23.0    |
|                             | 4       | 9262  | 9662  | 1852      | 27.2                         | 22.1    |
|                             |         | 9400  | 9800  | 1880      | 27.3                         | 22.0    |
|                             |         | 9538  | 9938  | 1908      | 27.2                         | 22.1    |
|                             | 5       | 9262  | 9662  | 1852      | 27.9                         | 24.1    |
|                             |         | 9400  | 9800  | 1880      | 27.8                         | 24.1    |
|                             |         | 9538  | 9938  | 1908      | 27.8                         | 24.1    |

**Part 27 / RSS 139 1700MHz Band**

| Band                  | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-----------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSUPA<br>1700MHz | 1       | 1312       | 1537       | 1712.4          | 28.1             | 24.1                |
|                       |         | 1413       | 1638       | 1732.6          | 27.2             | 24.2                |
|                       |         | 1513       | 1738       | 1752.6          | 27.8             | 24.1                |
|                       | 2       | 1312       | 1537       | 1712.4          | 27.1             | 22.1                |
|                       |         | 1413       | 1638       | 1732.6          | 27.1             | 22.2                |
|                       |         | 1513       | 1738       | 1752.6          | 27.0             | 22.1                |
|                       | 3       | 1312       | 1537       | 1712.4          | 27.6             | 23.1                |
|                       |         | 1413       | 1638       | 1732.6          | 27.7             | 23.1                |
|                       |         | 1513       | 1738       | 1752.6          | 27.7             | 23.0                |
|                       | 4       | 1312       | 1537       | 1712.4          | 27.1             | 22.1                |
|                       |         | 1413       | 1638       | 1732.6          | 27.1             | 22.0                |
|                       |         | 1513       | 1738       | 1752.6          | 27.0             | 22.1                |
|                       | 5       | 1312       | 1537       | 1712.4          | 27.8             | 24.1                |
|                       |         | 1413       | 1638       | 1732.6          | 28.0             | 24.1                |
|                       |         | 1513       | 1738       | 1752.6          | 28.0             | 24.1                |

### 7.7.2. PORT B HSPA REL 6 (HSDPA & HSUPA) (UAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 44366 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### Part 22 / RSS 132 850MHz Band

| Band              | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSUPA 850MHz | 1       | 4132       | 4357       | 826.4           | 26.5             | 22.0                |
|                   |         | 4183       | 4408       | 836.6           | 26.4             | 21.8                |
|                   |         | 4233       | 4458       | 846.6           | 26.5             | 21.9                |
|                   | 2       | 4132       | 4357       | 826.4           | 26.4             | 20.0                |
|                   |         | 4183       | 4408       | 836.6           | 25.4             | 19.9                |
|                   |         | 4233       | 4458       | 846.6           | 25.5             | 19.9                |
|                   | 3       | 4132       | 4357       | 826.4           | 25.6             | 21.0                |
|                   |         | 4183       | 4408       | 836.6           | 25.5             | 20.9                |
|                   |         | 4233       | 4458       | 846.6           | 25.5             | 20.9                |
|                   | 4       | 4132       | 4357       | 826.4           | 25.3             | 20.0                |
|                   |         | 4183       | 4408       | 836.6           | 25.3             | 19.9                |
|                   |         | 4233       | 4458       | 846.6           | 25.2             | 19.9                |
|                   | 5       | 4132       | 4357       | 826.4           | 26.0             | 22.0                |
|                   |         | 4183       | 4408       | 836.6           | 26.3             | 21.9                |
|                   |         | 4233       | 4458       | 846.6           | 26.5             | 21.9                |

#### Part 24 / RSS 133 1900MHz Band

| Band                        | Subtest | UL Ch | DL Ch | Frequency | Conducted Output Power (dBm) |         |
|-----------------------------|---------|-------|-------|-----------|------------------------------|---------|
|                             |         |       |       |           | Peak                         | Average |
| UMTS HSUPA 1900MHz (Band 2) | 1       | 9262  | 9662  | 1852      | 24.2                         | 20.0    |
|                             |         | 9400  | 9800  | 1880      | 24.2                         | 20.0    |
|                             |         | 9538  | 9938  | 1908      | 24.1                         | 19.8    |
|                             | 2       | 9262  | 9662  | 1852      | 22.4                         | 18.0    |
|                             |         | 9400  | 9800  | 1880      | 22.3                         | 17.9    |
|                             |         | 9538  | 9938  | 1908      | 22.3                         | 17.9    |
|                             | 3       | 9262  | 9662  | 1852      | 23.1                         | 18.8    |
|                             |         | 9400  | 9800  | 1880      | 23.1                         | 18.9    |
|                             |         | 9538  | 9938  | 1908      | 23.0                         | 18.9    |
|                             | 4       | 9262  | 9662  | 1852      | 22.4                         | 17.8    |
|                             |         | 9400  | 9800  | 1880      | 22.4                         | 17.7    |
|                             |         | 9538  | 9938  | 1908      | 22.4                         | 17.8    |
|                             | 5       | 9262  | 9662  | 1852      | 24.1                         | 20.0    |
|                             |         | 9400  | 9800  | 1880      | 24.2                         | 19.9    |
|                             |         | 9538  | 9938  | 1908      | 24.2                         | 20.0    |

**Part 27 / RSS 139 1700MHz Band**

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSUPA 1700MHz | 1       | 1312       | 1537       | 1712.4          | 24.30            | 19.90               |
|                    |         | 1413       | 1638       | 1732.6          | 24.23            | 19.80               |
|                    |         | 1513       | 1738       | 1752.6          | 24.60            | 20.00               |
|                    | 2       | 1312       | 1537       | 1712.4          | 22.03            | 17.80               |
|                    |         | 1413       | 1638       | 1732.6          | 22.07            | 17.74               |
|                    |         | 1513       | 1738       | 1752.6          | 22.15            | 17.90               |
|                    | 3       | 1312       | 1537       | 1712.4          | 23.30            | 18.70               |
|                    |         | 1413       | 1638       | 1732.6          | 23.25            | 18.77               |
|                    |         | 1513       | 1738       | 1752.6          | 23.27            | 18.80               |
|                    | 4       | 1312       | 1537       | 1712.4          | 22.20            | 17.70               |
|                    |         | 1413       | 1638       | 1732.6          | 22.25            | 17.76               |
|                    |         | 1513       | 1738       | 1752.6          | 22.30            | 17.75               |
|                    | 5       | 1312       | 1537       | 1712.4          | 24.45            | 19.90               |
|                    |         | 1413       | 1638       | 1732.6          | 24.50            | 19.96               |
|                    |         | 1513       | 1738       | 1752.6          | 24.52            | 19.80               |



## 7.8. DUAL CARRIER HSDPA

### DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0.

A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

**Table E.5.0: Levels for HSDPA connection setup**

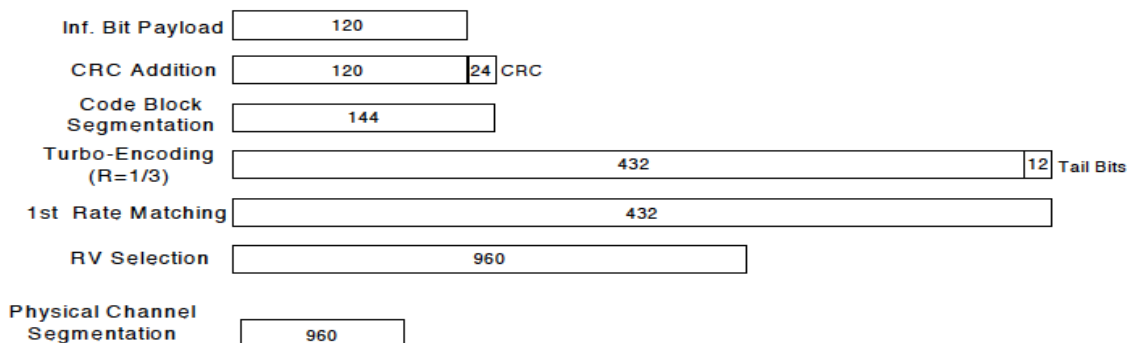
| Parameter<br>During Connection setup | Unit | Value |
|--------------------------------------|------|-------|
| P-CPICH_Ec/Ior                       | dB   | -10   |
| P-CCPCH and SCH_Ec/Ior               | dB   | -12   |
| PICH_Ec/Ior                          | dB   | -15   |
| HS-PDSCH                             | dB   | off   |
| HS-SCCH_1                            | dB   | off   |
| DPCH_Ec/Ior                          | dB   | -5    |
| OCNS_Ec/Ior                          | dB   | -3.1  |

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

**Table C.8.1.12: Fixed Reference Channel H-Set 12**

| Parameter                                                                                                                                              | Unit      | Value |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|
| Nominal Avg. Inf. Bit Rate                                                                                                                             | kbps      | 60    |
| Inter-TTI Distance                                                                                                                                     | TTI's     | 1     |
| Number of HARQ Processes                                                                                                                               | Processes | 6     |
| Information Bit Payload ( $N_{INF}$ )                                                                                                                  | Bits      | 120   |
| Number Code Blocks                                                                                                                                     | Blocks    | 1     |
| Binary Channel Bits Per TTI                                                                                                                            | Bits      | 960   |
| Total Available SML's in UE                                                                                                                            | SML's     | 19200 |
| Number of SML's per HARQ Proc.                                                                                                                         | SML's     | 3200  |
| Coding Rate                                                                                                                                            |           | 0.15  |
| Number of Physical Channel Codes                                                                                                                       | Codes     | 1     |
| Modulation                                                                                                                                             |           | QPSK  |
| Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.               |           |       |
| Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used. |           |       |



**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

|                               | Mode                            | Rel6 HSDPA   | Rel6 HSDPA | Rel6 HSDPA | Rel6 HSDPA |
|-------------------------------|---------------------------------|--------------|------------|------------|------------|
|                               | Subtest                         | 1            | 2          | 3          | 4          |
| WCDMA<br>General<br>Settings  | Loopback Mode                   | Test Mode 1  |            |            |            |
|                               | Rel99 RMC                       | 12.2kbps RMC |            |            |            |
|                               | HSDPA FRC                       | H-Set1       |            |            |            |
|                               | Power Control Algorithm         | Algorithm2   |            |            |            |
|                               | $\beta_c$                       | 2/15         | 12/15      | 15/15      | 15/15      |
|                               | $\beta_d$                       | 15/15        | 15/15      | 8/15       | 4/15       |
|                               | $\beta_d$ (SF)                  | 64           |            |            |            |
|                               | $\beta_c/\beta_d$               | 2/15         | 12/15      | 15/8       | 15/4       |
|                               | $\beta_{hs}$                    | 4/15         | 24/15      | 30/15      | 30/15      |
|                               | MPR                             | 0            | 0          | 0.5        | 0.5        |
| HSDPA<br>Specific<br>Settings | DACK                            | 8            |            |            |            |
|                               | DNAK                            | 8            |            |            |            |
|                               | DCQI                            | 8            |            |            |            |
|                               | Ack-Nack Repetition factor      | 3            |            |            |            |
|                               | CQI Feedback                    | 4ms          |            |            |            |
|                               | CQI Repetition Factor           | 2            |            |            |            |
|                               | $A_{hs} = \beta_{hs} / \beta_c$ | 30/15        |            |            |            |

## **RESULT**

### 7.8.1. PORT A DUAL CARRIER HSDPA (LAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### Part 22 / RSS 132 850MHz Band

| Band              | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 850MHz | 1       | 4132       | 4357       | 826.4           | 27.2             | 24.0                |
|                   |         | 4183       | 4408       | 836.6           | 27.5             | 23.9                |
|                   |         | 4233       | 4458       | 846.6           | 27.6             | 23.8                |
|                   | 2       | 4132       | 4357       | 826.4           | 27.1             | 23.8                |
|                   |         | 4183       | 4408       | 836.6           | 27.6             | 24.0                |
|                   |         | 4233       | 4458       | 846.6           | 27.5             | 23.8                |
|                   | 3       | 4132       | 4357       | 826.4           | 27.3             | 23.6                |
|                   |         | 4183       | 4408       | 836.6           | 27.3             | 23.6                |
|                   |         | 4233       | 4458       | 846.6           | 27.5             | 23.5                |
|                   | 4       | 4132       | 4357       | 826.4           | 27.6             | 23.4                |
|                   |         | 4183       | 4408       | 836.6           | 27.3             | 23.4                |
|                   |         | 4233       | 4458       | 846.6           | 27.3             | 23.4                |

#### Part 24 / RSS 133 1900MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1900MHz | 1       | 9262       | 9662       | 1852.4          | 27.9             | 24.1                |
|                    |         | 9400       | 9800       | 1880.0          | 28.0             | 24.2                |
|                    |         | 9538       | 9938       | 1907.6          | 27.8             | 24.1                |
|                    | 2       | 9262       | 9662       | 1852.4          | 27.9             | 24.1                |
|                    |         | 9400       | 9800       | 1880.0          | 27.9             | 24.1                |
|                    |         | 9538       | 9938       | 1907.6          | 28.0             | 24.1                |
|                    | 3       | 9262       | 9662       | 1852.4          | 27.6             | 23.7                |
|                    |         | 9400       | 9800       | 1880.0          | 27.5             | 23.7                |
|                    |         | 9538       | 9938       | 1907.6          | 27.4             | 23.6                |
|                    | 4       | 9262       | 9662       | 1852.4          | 27.6             | 23.6                |
|                    |         | 9400       | 9800       | 1880.0          | 27.4             | 23.6                |
|                    |         | 9538       | 9938       | 1907.6          | 27.5             | 23.6                |

#### Part 27 / RSS 139 1700MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1700MHz | 1       | 1312       | 1537       | 1712.4          | 27.9             | 24.1                |
|                    |         | 1413       | 1638       | 1732.6          | 27.9             | 24.1                |
|                    |         | 1513       | 1738       | 1752.6          | 28.1             | 24.2                |
|                    | 2       | 1312       | 1537       | 1712.4          | 27.9             | 24.2                |
|                    |         | 1413       | 1638       | 1732.6          | 27.8             | 24.1                |
|                    |         | 1513       | 1738       | 1752.6          | 27.8             | 24.1                |
|                    | 3       | 1312       | 1537       | 1712.4          | 27.3             | 23.5                |
|                    |         | 1413       | 1638       | 1732.6          | 27.1             | 23.6                |
|                    |         | 1513       | 1738       | 1752.6          | 27.4             | 23.6                |
|                    | 4       | 1312       | 1537       | 1712.4          | 27.1             | 23.6                |
|                    |         | 1413       | 1638       | 1732.6          | 27.3             | 23.6                |
|                    |         | 1513       | 1738       | 1752.6          | 27.5             | 23.6                |

### 7.8.2. PORT B DUAL CARRIER HSDPA (UAT)

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 44366 | <b>Date:</b> | 6/3/16 |
|------------|-------|--------------|--------|

#### Part 22 / RSS 132 850MHz Band

| Band              | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|-------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 850MHz | 1       | 4132       | 4357       | 826.4           | 26.4             | 21.9                |
|                   |         | 4183       | 4408       | 836.6           | 26.4             | 22.0                |
|                   |         | 4233       | 4458       | 846.6           | 26.3             | 22.0                |
|                   | 2       | 4132       | 4357       | 826.4           | 26.3             | 21.9                |
|                   |         | 4183       | 4408       | 836.6           | 26.4             | 21.9                |
|                   |         | 4233       | 4458       | 846.6           | 26.2             | 21.9                |
|                   | 3       | 4132       | 4357       | 826.4           | 25.9             | 21.5                |
|                   |         | 4183       | 4408       | 836.6           | 26.1             | 21.4                |
|                   |         | 4233       | 4458       | 846.6           | 25.9             | 21.4                |
|                   | 4       | 4132       | 4357       | 826.4           | 25.6             | 21.5                |
|                   |         | 4183       | 4408       | 836.6           | 25.7             | 21.4                |
|                   |         | 4233       | 4458       | 846.6           | 25.8             | 21.5                |

#### Part 24 / RSS 133 1900MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1900MHz | 1       | 9262       | 9662       | 1852.4          | 24.8             | 20.1                |
|                    |         | 9400       | 9800       | 1880.0          | 24.7             | 20.0                |
|                    |         | 9538       | 9938       | 1907.6          | 24.7             | 19.9                |
|                    | 2       | 9262       | 9662       | 1852.4          | 24.7             | 20.0                |
|                    |         | 9400       | 9800       | 1880.0          | 24.0             | 19.9                |
|                    |         | 9538       | 9938       | 1907.6          | 24.6             | 20.0                |
|                    | 3       | 9262       | 9662       | 1852.4          | 24.6             | 19.5                |
|                    |         | 9400       | 9800       | 1880.0          | 24.1             | 19.5                |
|                    |         | 9538       | 9938       | 1907.6          | 24.4             | 19.5                |
|                    | 4       | 9262       | 9662       | 1852.4          | 24.7             | 19.5                |
|                    |         | 9400       | 9800       | 1880.0          | 24.5             | 19.5                |
|                    |         | 9538       | 9938       | 1907.6          | 24.6             | 19.5                |

#### Part 27 / RSS 139 1700MHz Band

| Band               | Subtest | UL Channel | DL Channel | Frequency (MHz) | Peak Power (dBm) | Average Power (dBm) |
|--------------------|---------|------------|------------|-----------------|------------------|---------------------|
| UMTS HSDPA 1700MHz | 1       | 1312       | 1537       | 1712.4          | 24.5             | 20.0                |
|                    |         | 1413       | 1638       | 1732.6          | 24.7             | 20.0                |
|                    |         | 1513       | 1738       | 1752.6          | 24.4             | 19.9                |
|                    | 2       | 1312       | 1537       | 1712.4          | 24.6             | 19.9                |
|                    |         | 1413       | 1638       | 1732.6          | 24.7             | 20.0                |
|                    |         | 1513       | 1738       | 1752.6          | 24.4             | 19.9                |
|                    | 3       | 1312       | 1537       | 1712.4          | 24.3             | 19.5                |
|                    |         | 1413       | 1638       | 1732.6          | 24.7             | 19.5                |
|                    |         | 1513       | 1738       | 1752.6          | 24.2             | 19.6                |
|                    | 4       | 1312       | 1537       | 1712.4          | 24.3             | 19.5                |
|                    |         | 1413       | 1638       | 1732.6          | 24.5             | 19.5                |
|                    |         | 1513       | 1738       | 1752.6          | 24.2             | 19.5                |

## **8. CONDUCTED TEST RESULTS**

### **8.1. OCCUPIED BANDWIDTH**

#### **RULE PART(S)**

FCC: §2.1049

#### **LIMITS**

For reporting purposes only

#### **TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

#### **RESULTS**

**GSM-GPRS MODE PART 22 AND 24 / RSS 132 AND 133**

| Band | Mode | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|------|------|---------|---------|--------------|----------------|
| CELL | GPRS | 128     | 824.2   | 250.8575     | 306.152        |
|      |      | 190     | 836.6   | 245.8125     | 326.086        |
|      |      | 251     | 848.8   | 242.8981     | 311.123        |

| Band | Mode | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|------|------|---------|---------|--------------|----------------|
| PCS  | GPRS | 512     | 1850.2  | 247.1165     | 322.269        |
|      |      | 661     | 1880.0  | 244.8640     | 315.349        |
|      |      | 810     | 1909.8  | 244.7142     | 308.254        |

**GSM-EGPRS MODE PART 22 AND 24 / RSS 132 AND 133**

| Band | Mode  | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|------|-------|---------|---------|--------------|----------------|
| CELL | EGPRS | 128     | 824.2   | 254.6025     | 321.579        |
|      |       | 190     | 836.6   | 227.8810     | 288.838        |
|      |       | 251     | 848.8   | 252.3181     | 317.378        |

| Band | Mode  | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|------|-------|---------|---------|--------------|----------------|
| PCS  | EGPRS | 512     | 1850.2  | 250.7674     | 317.635        |
|      |       | 661     | 1880.0  | 251.9302     | 318.614        |
|      |       | 810     | 1909.8  | 242.9968     | 312.835        |

**CDMA2000 1xRTT, PART 22, 24, 27 AND 90/ RSS 132, 133 AND 139**

| Band                 | Mode               | Channel | f(MHz)  | 99% BW (MHz) | -26dB BW (MHz) |
|----------------------|--------------------|---------|---------|--------------|----------------|
| CELL                 | CDMA 2000<br>1xRTT | 1013    | 824.70  | 1.2709       | 1.415          |
|                      |                    | 384     | 836.52  | 1.2715       | 1.416          |
|                      |                    | 777     | 848.31  | 1.2794       | 1.431          |
| PCS                  |                    | 25      | 1851.25 | 1.2815       | 1.414          |
|                      |                    | 600     | 1880.00 | 1.2749       | 1.419          |
|                      |                    | 1175    | 1908.75 | 1.2774       | 1.428          |
| 800 MHz<br>Secondary |                    | 450     | 817.25  | 1.2752       | 1.420          |
|                      |                    | 560     | 820.00  | 1.2731       | 1.421          |
|                      |                    | 670     | 822.75  | 1.2727       | 1.406          |

**CDMA2000 EVDO REV A, PART 22, 24, 27 AND 90/ RSS 132, 133 AND 139**

| Band                 | Mode                     | Channel | f(MHz)  | 99% BW (MHz) | -26dB BW (MHz) |
|----------------------|--------------------------|---------|---------|--------------|----------------|
| CELL                 | CDMA 2000<br>EVDO Rev. A | 1013    | 824.70  | 1.2761       | 1.435          |
|                      |                          | 384     | 836.52  | 1.2705       | 1.428          |
|                      |                          | 777     | 848.31  | 1.2667       | 1.419          |
| PCS                  |                          | 25      | 1851.25 | 1.2755       | 1.434          |
|                      |                          | 600     | 1880.00 | 1.2757       | 1.438          |
|                      |                          | 1175    | 1908.75 | 1.2781       | 1.423          |
| 800 MHz<br>Secondary |                          | 450     | 817.25  | 1.2729       | 1.423          |
|                      |                          | 560     | 820.00  | 1.2751       | 1.429          |
|                      |                          | 670     | 822.75  | 1.2766       | 1.428          |

**UMTS REL99 MODE PART 22, 24, AND 27 / RSS 132, 133 AND 139**

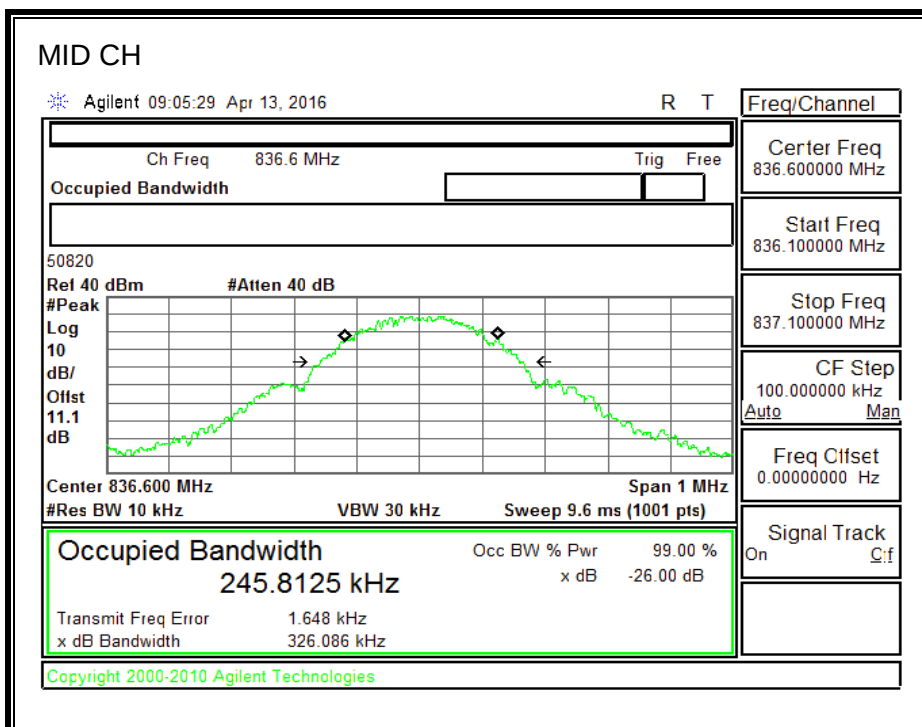
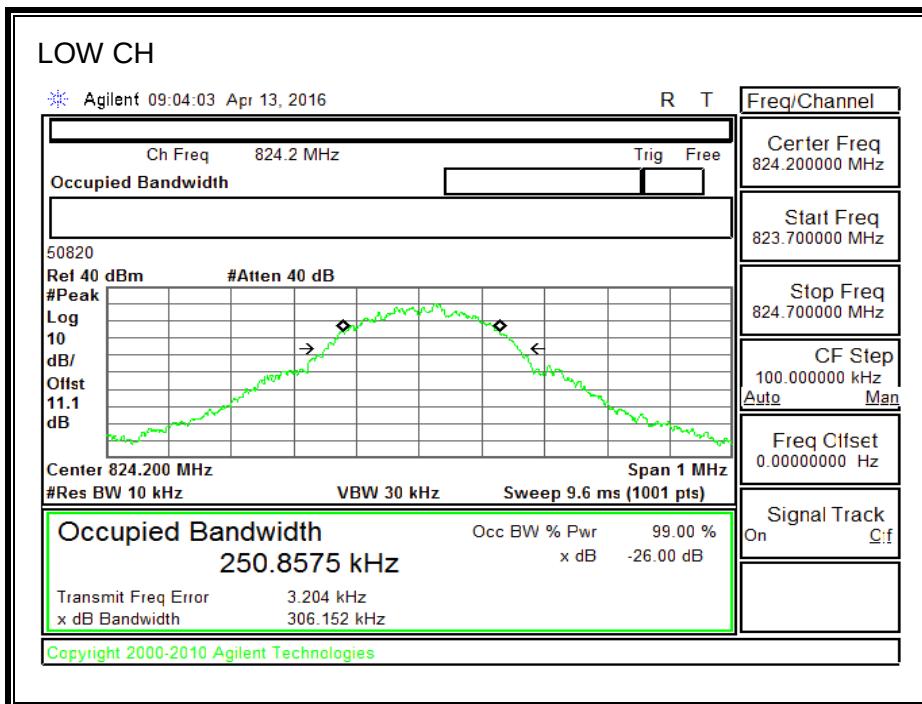
| Band    | Mode            | DL Channel | f(MHz)  | 99% BW (MHz) | -26dB BW (MHz) |
|---------|-----------------|------------|---------|--------------|----------------|
| 850MHz  | UMTS<br>Rel. 99 | 4357       | 826.40  | 4.1479       | 4.712          |
|         |                 | 4408       | 836.60  | 4.1240       | 4.693          |
|         |                 | 4458       | 846.60  | 4.1307       | 4.698          |
| 1900MHz |                 | 9662       | 1852.40 | 4.1756       | 4.720          |
|         |                 | 9800       | 1880.00 | 4.1417       | 4.725          |
|         |                 | 9938       | 1907.60 | 4.1463       | 4.682          |
| 1700MHz |                 | 1537       | 1712.40 | 4.1368       | 4.693          |
|         |                 | 1638       | 1732.60 | 4.1152       | 4.696          |
|         |                 | 1738       | 1752.60 | 4.1754       | 4.714          |

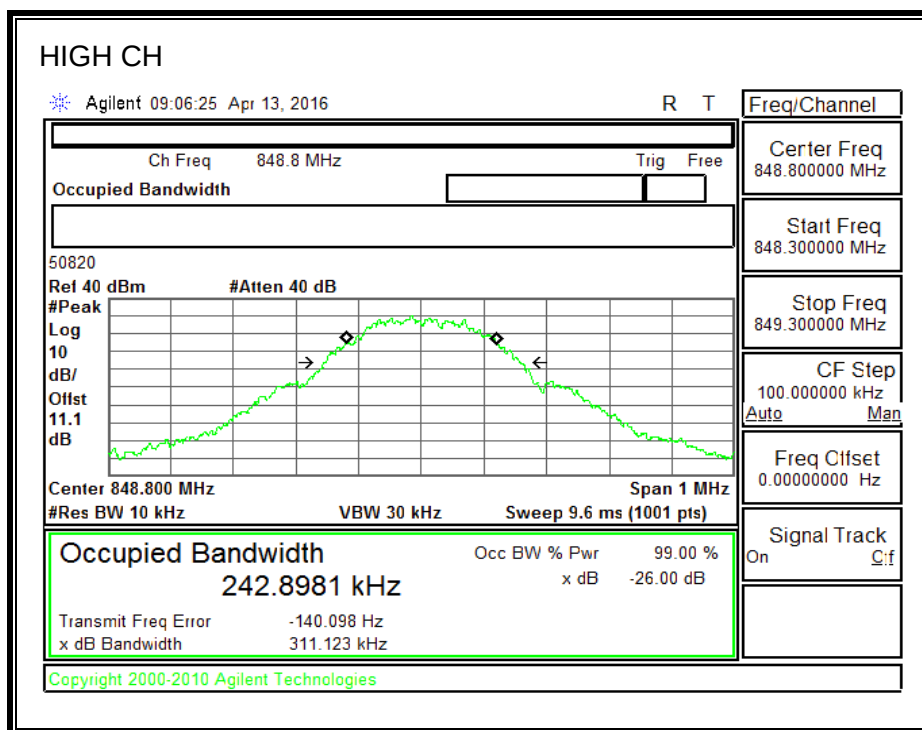
**UMTS HSDPA MODE PART 22, 24, AND 27 / RSS 132, 133 AND 139**

| Band    | Mode          | DL Channel | f(MHz)  | 99% BW (MHz) | -26dB BW (MHz) |
|---------|---------------|------------|---------|--------------|----------------|
| 850MHz  | UMTS<br>HSDPA | 4357       | 826.40  | 4.1333       | 4.699          |
|         |               | 4408       | 836.60  | 4.1357       | 4.725          |
|         |               | 4458       | 846.60  | 4.1436       | 4.731          |
| 1900MHz |               | 9662       | 1852.40 | 4.1448       | 4.697          |
|         |               | 9800       | 1880.00 | 4.1360       | 4.704          |
|         |               | 9938       | 1907.60 | 4.1631       | 4.694          |
| 1700MHz |               | 1537       | 1712.40 | 4.1555       | 4.699          |
|         |               | 1638       | 1732.60 | 4.1200       | 4.729          |
|         |               | 1738       | 1752.60 | 4.1433       | 4.707          |

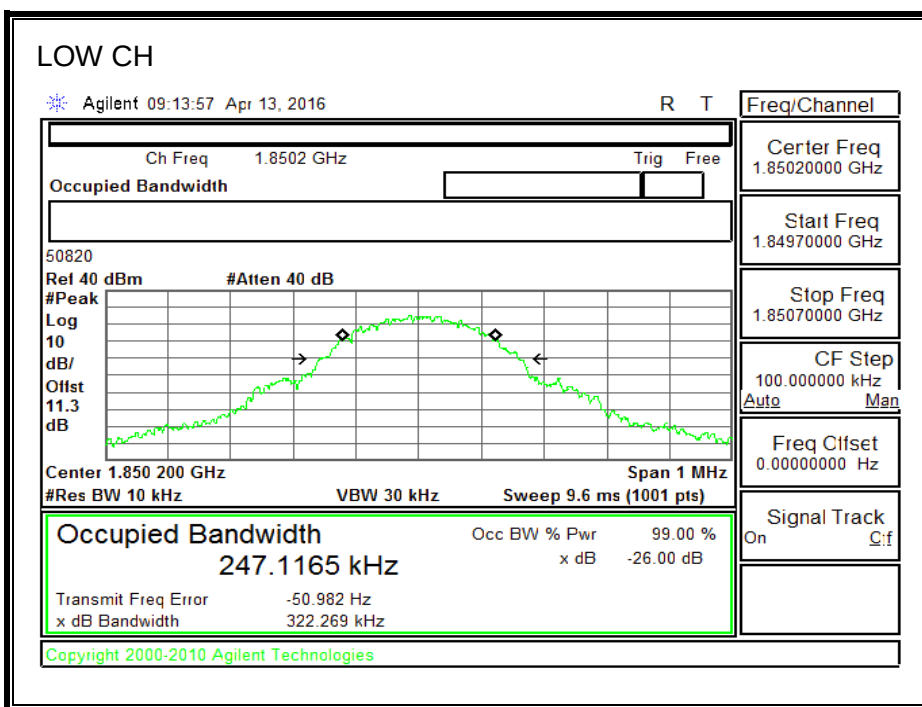
### 8.1.1. GSM GPRS

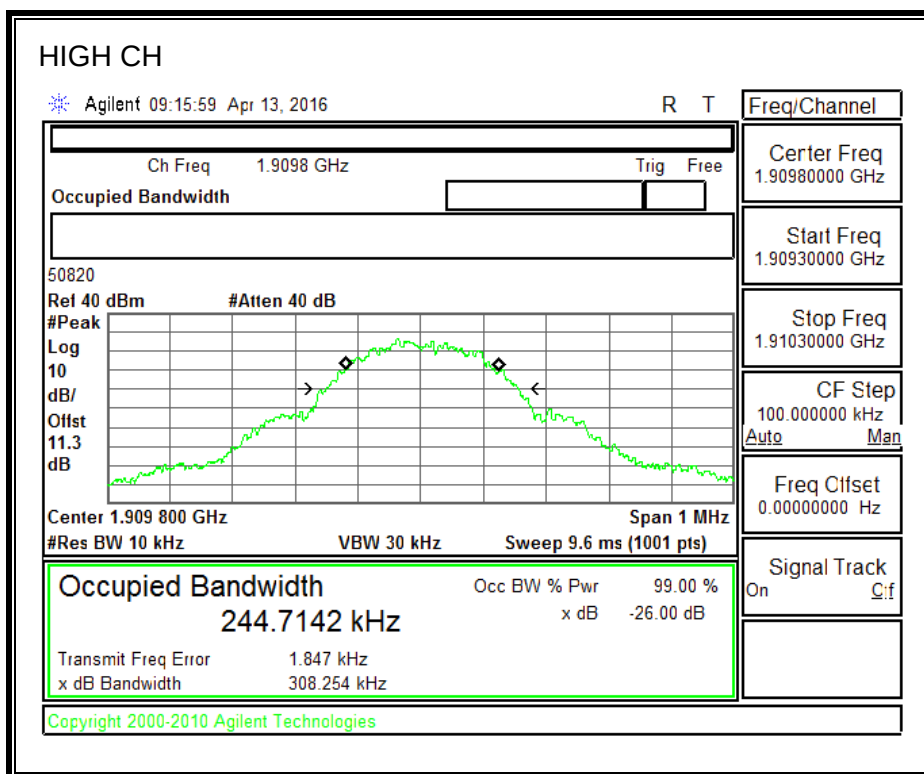
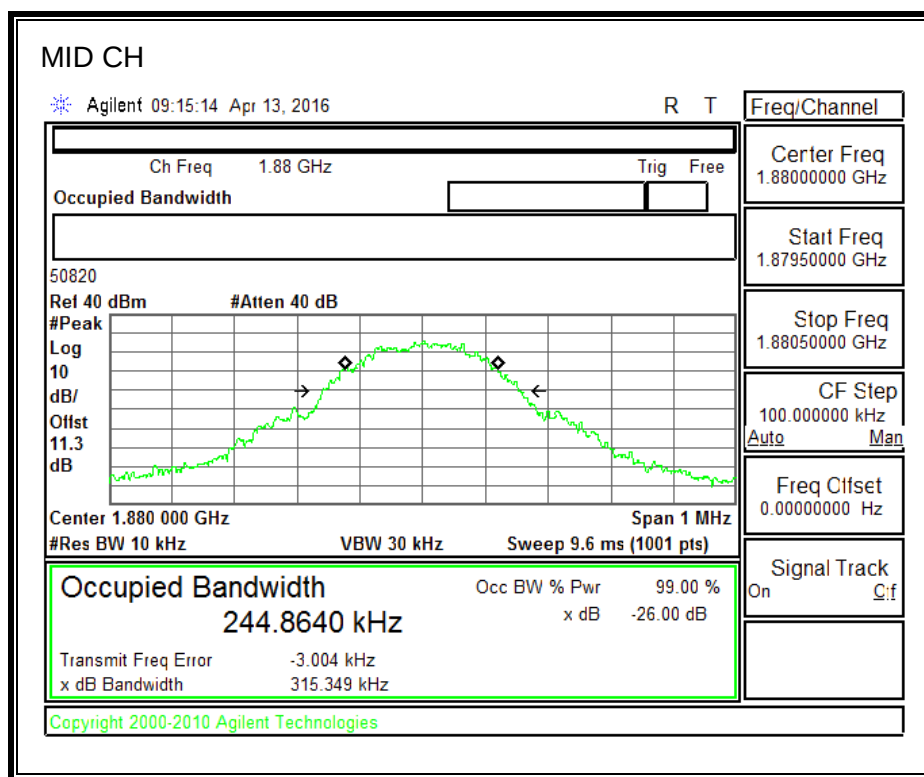
#### 850MHz BAND





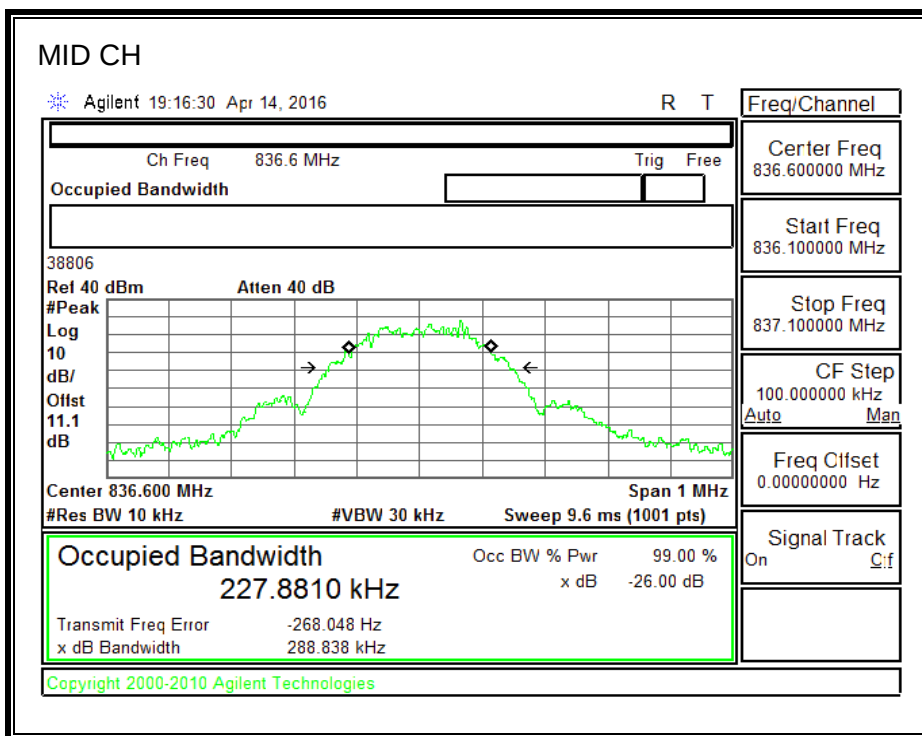
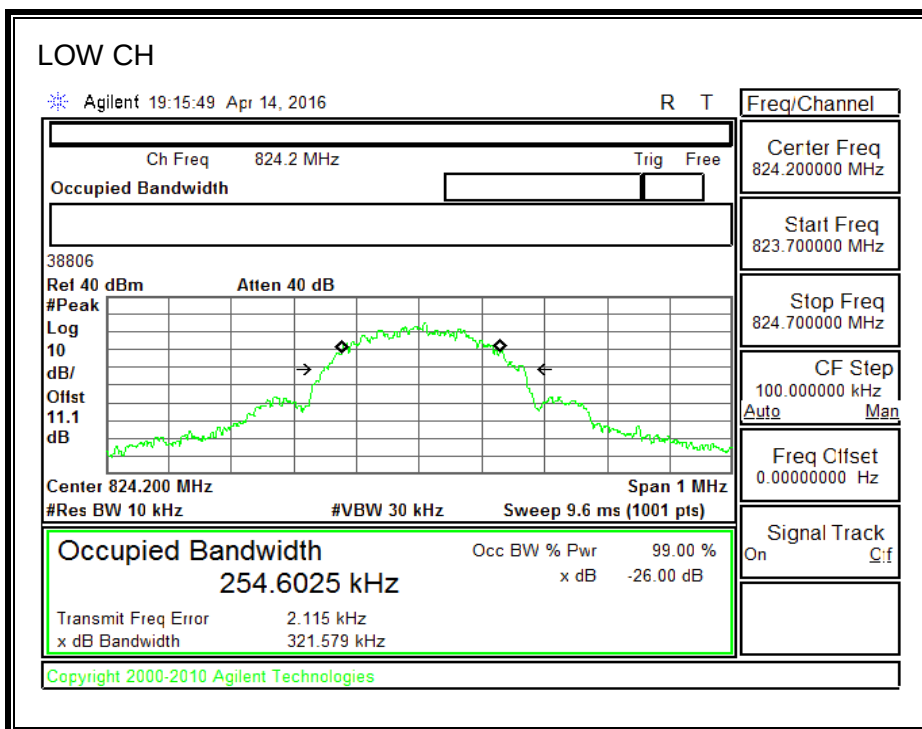
### 1900MHz BAND



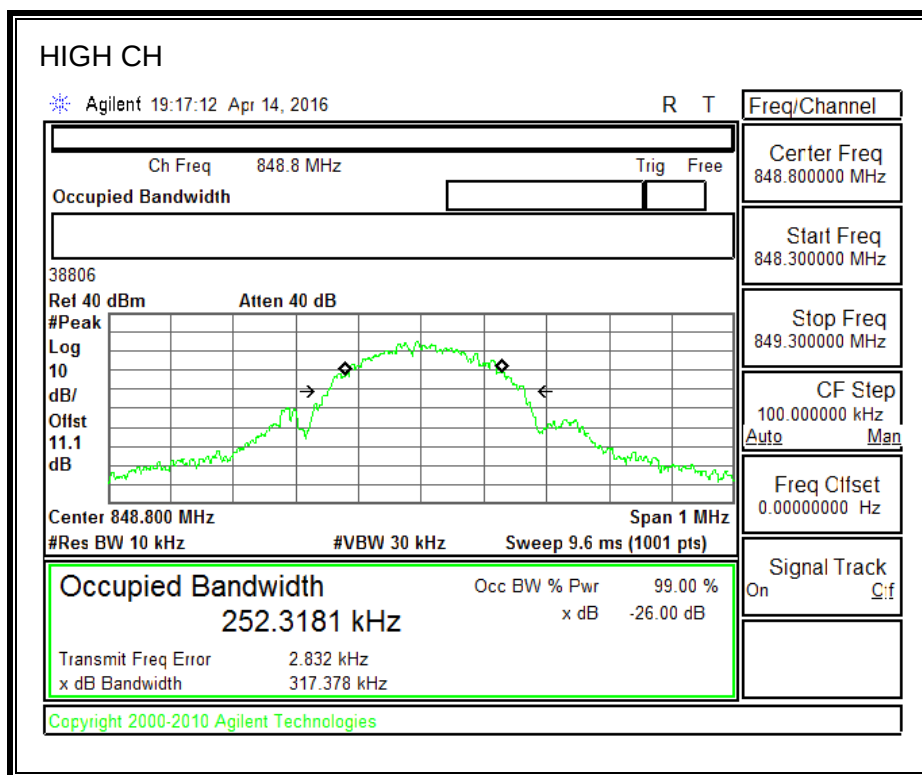


## 8.1.2. GSM EGPRS

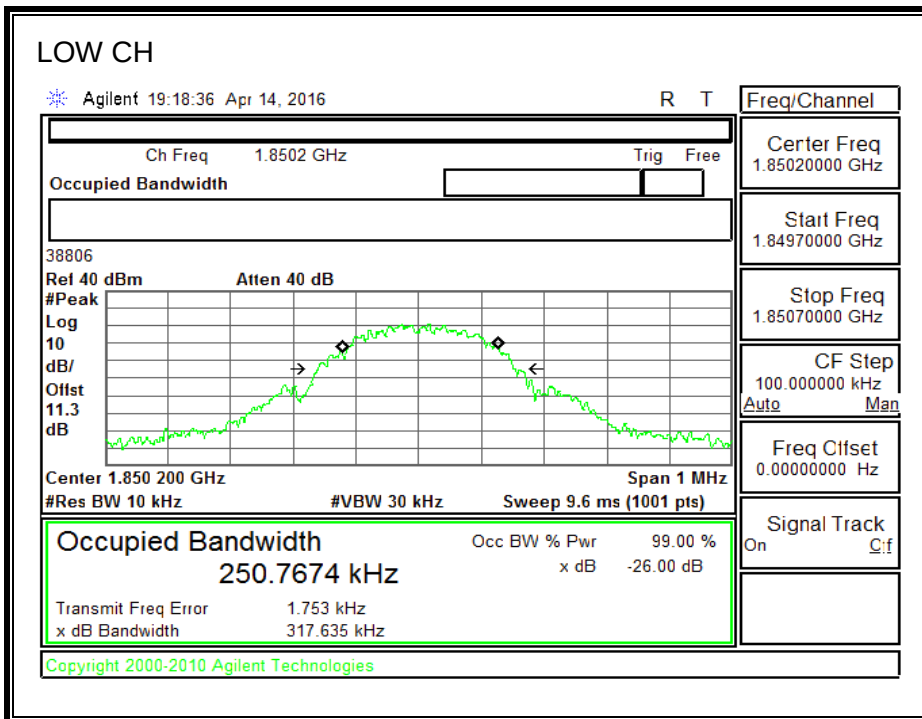
### 850MHz BAND

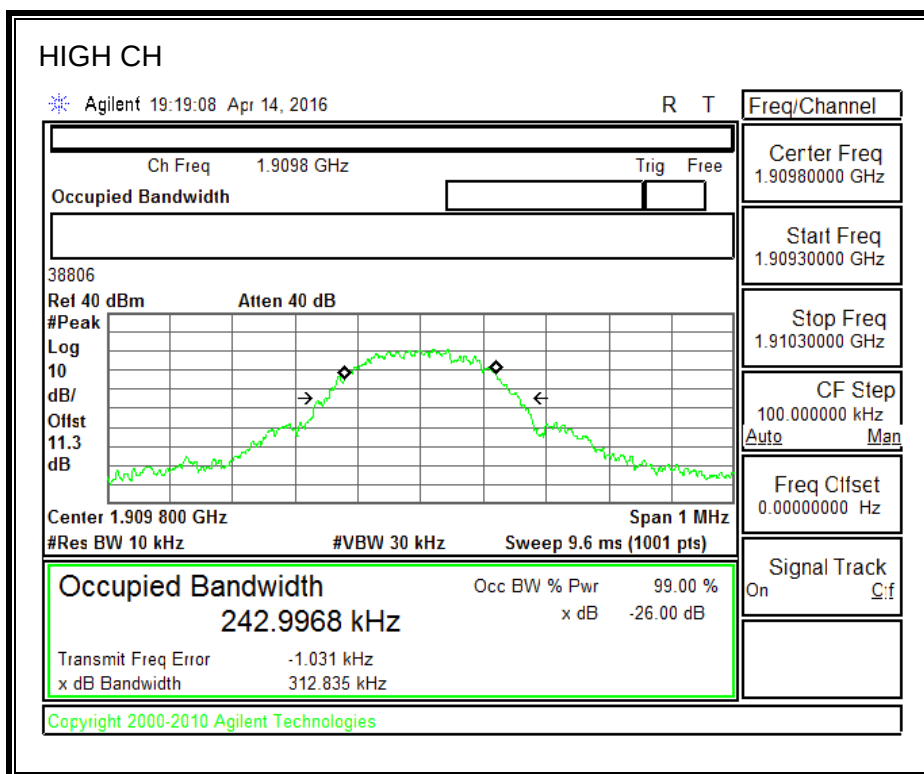
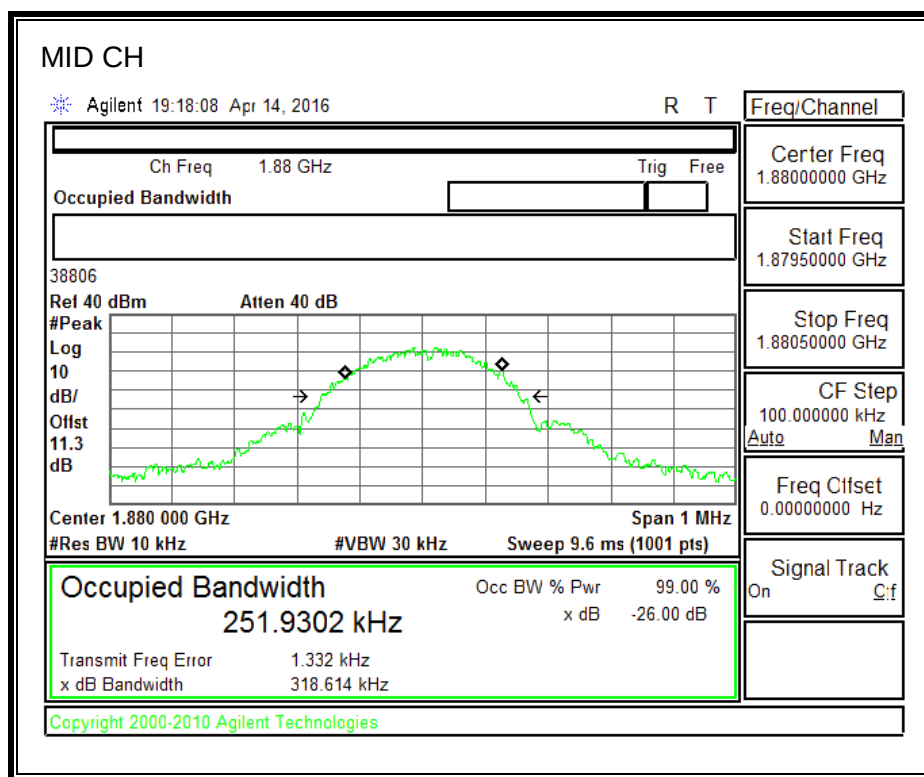






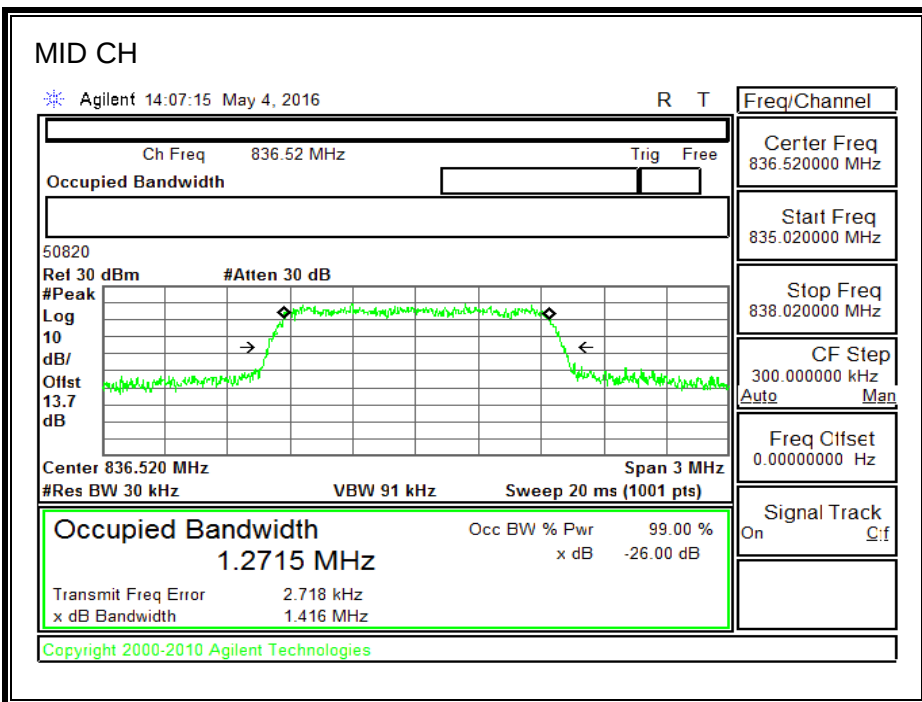
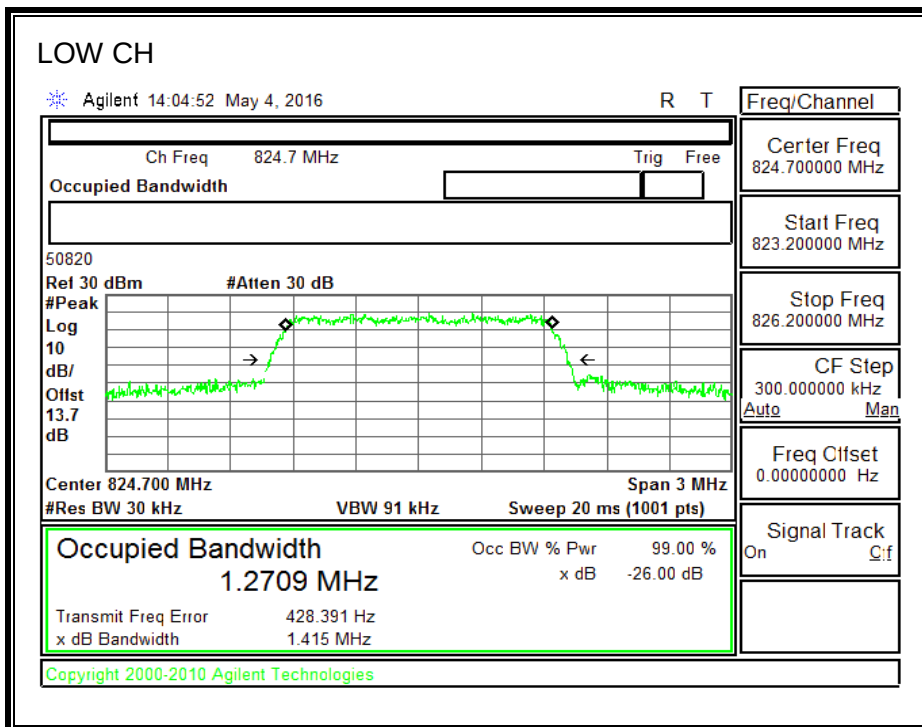
**1900MHz BAND**

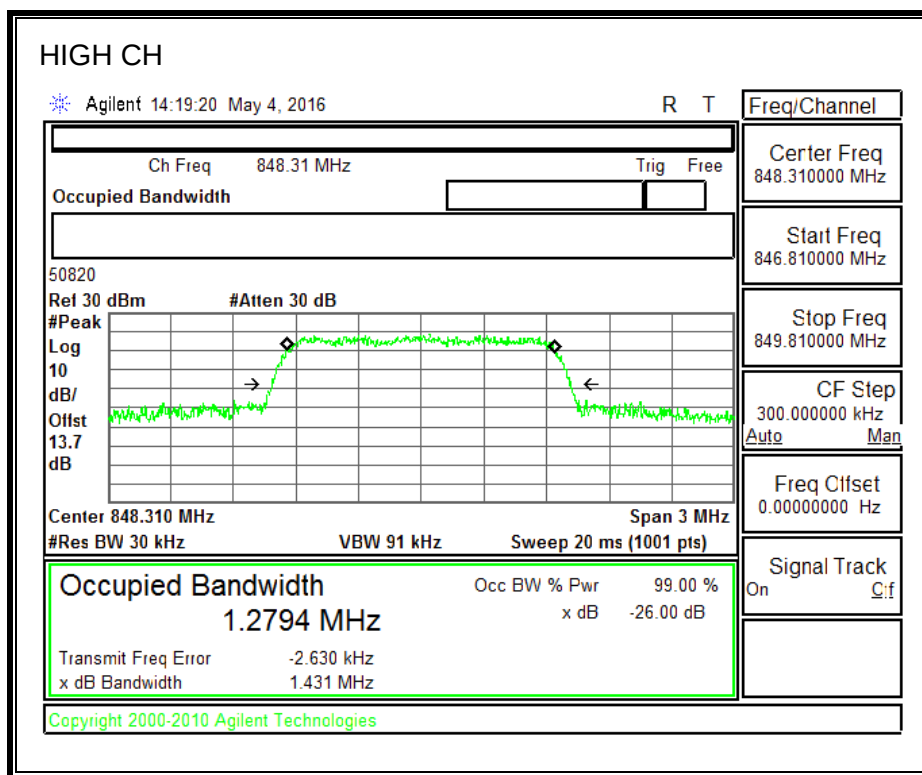




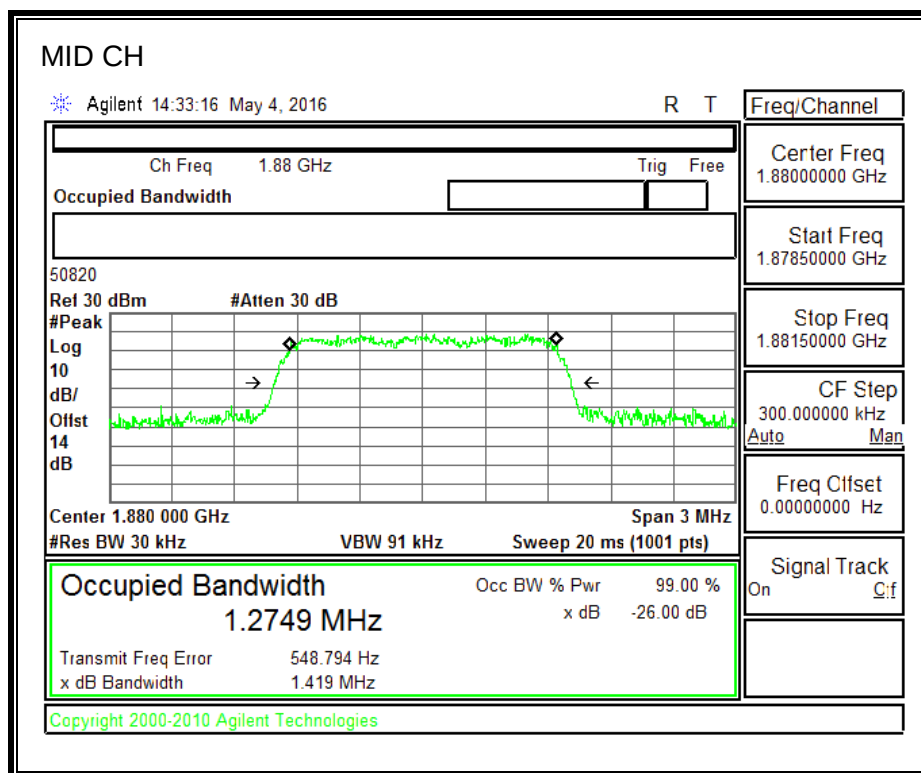
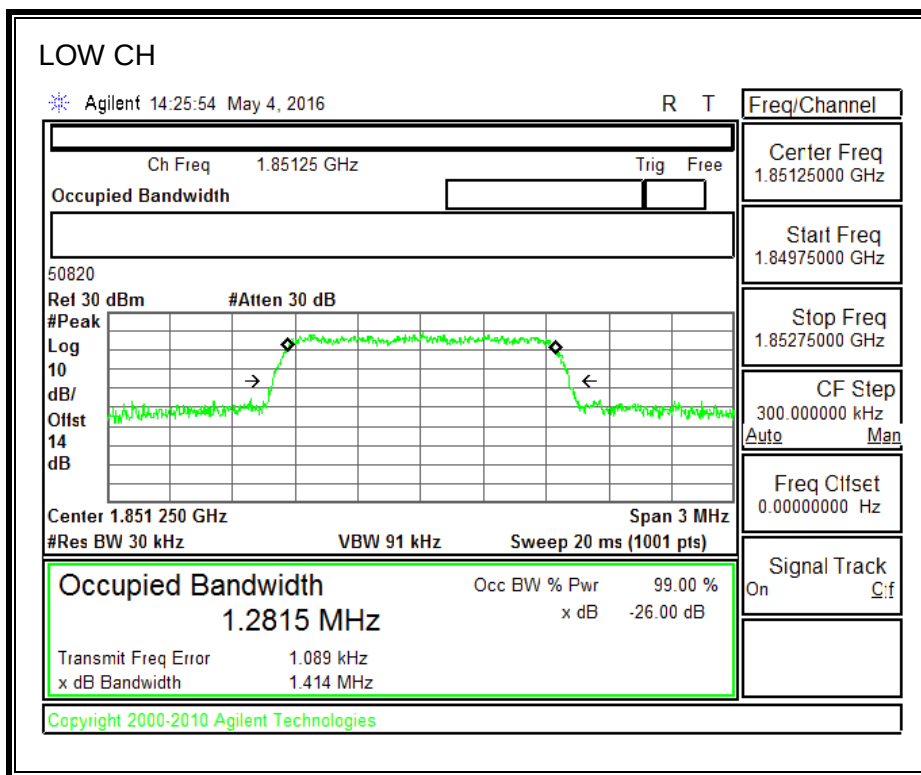
### 8.1.3. CDMA2000 1xRTT

#### 850MHz BAND

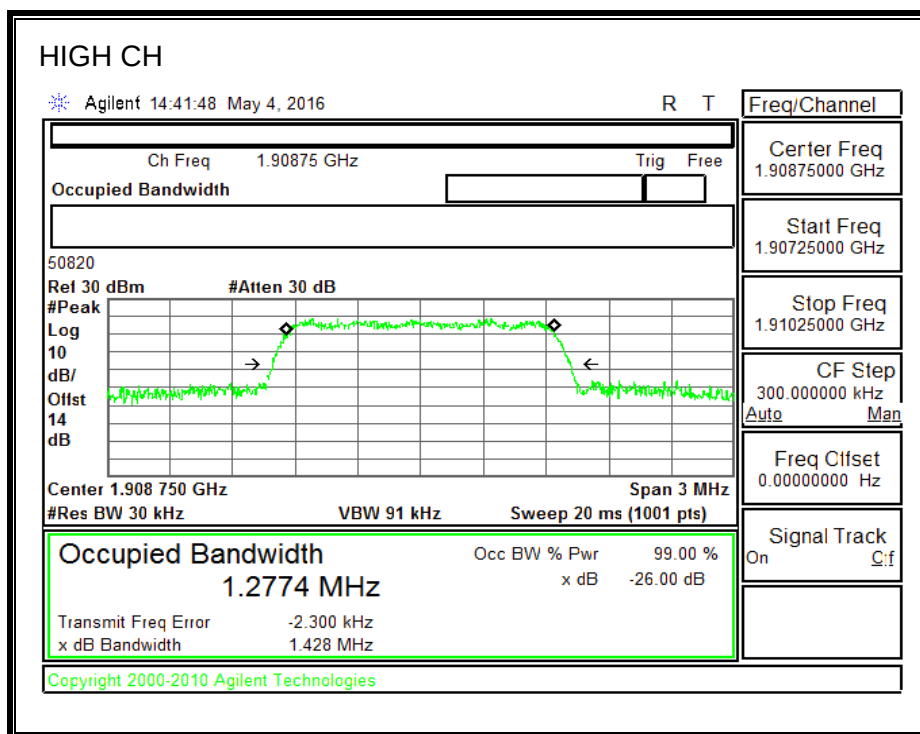




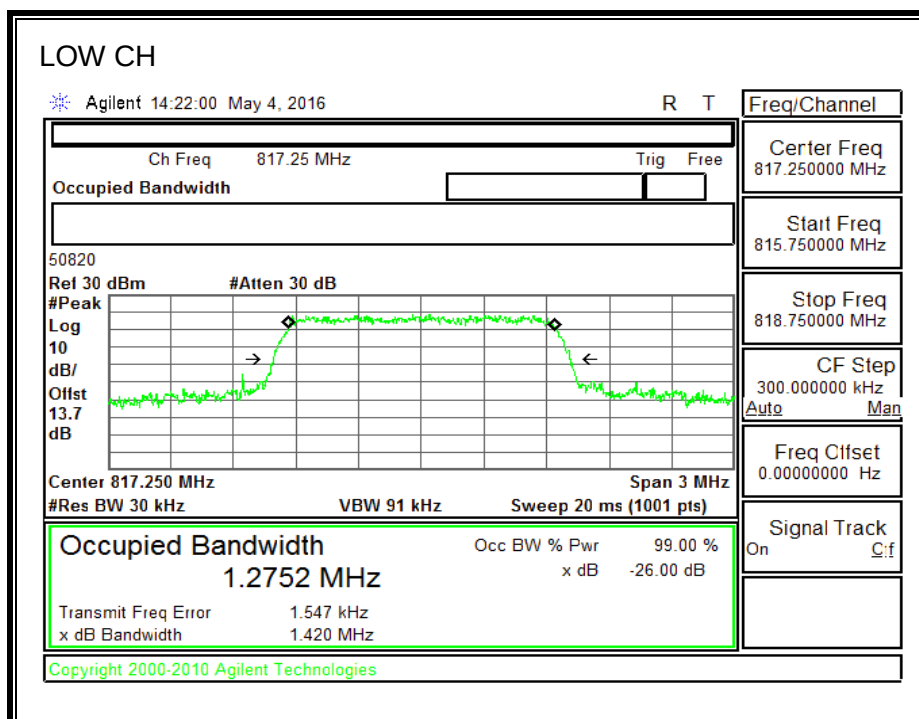
**1900MHz BAND**

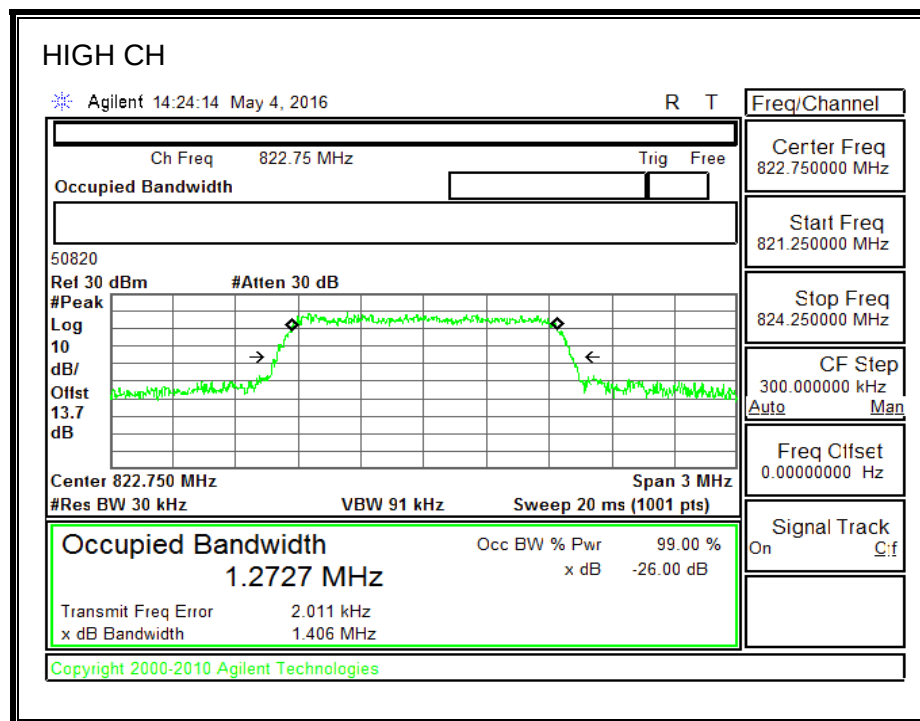
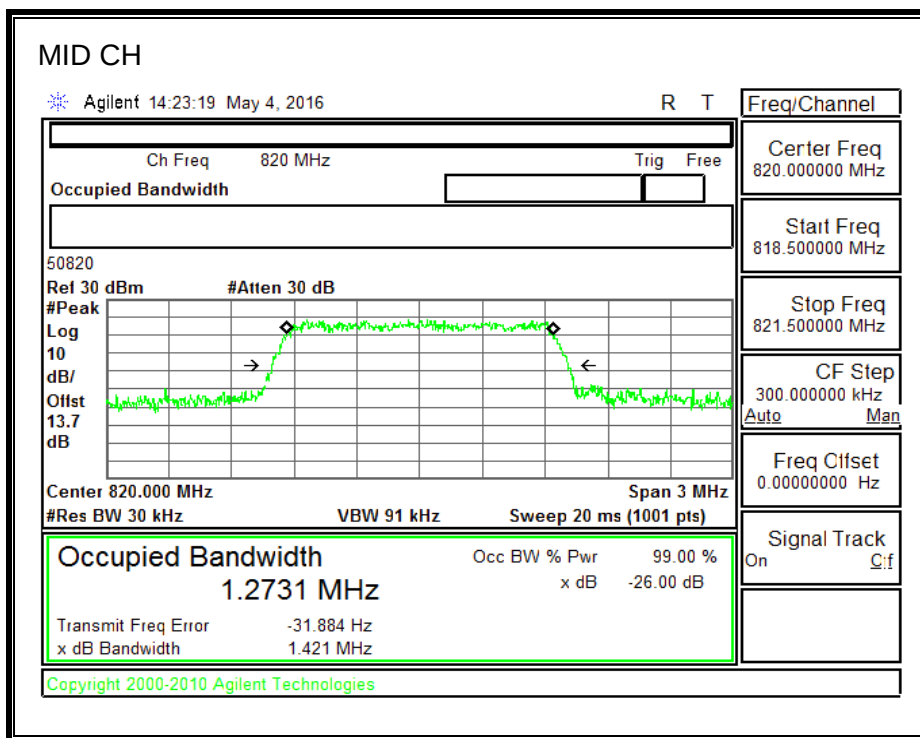






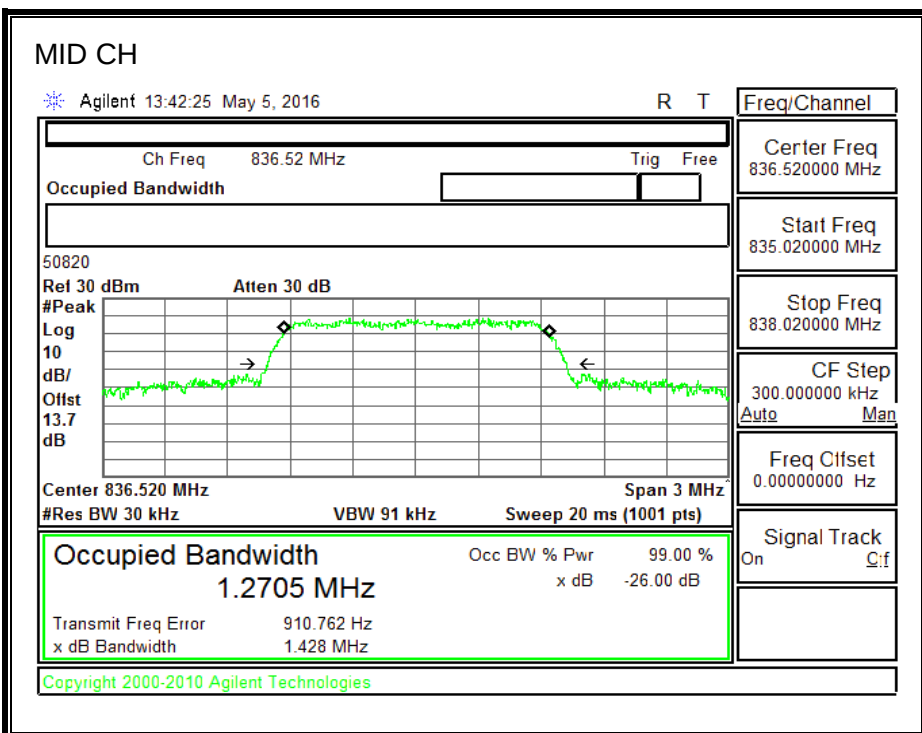
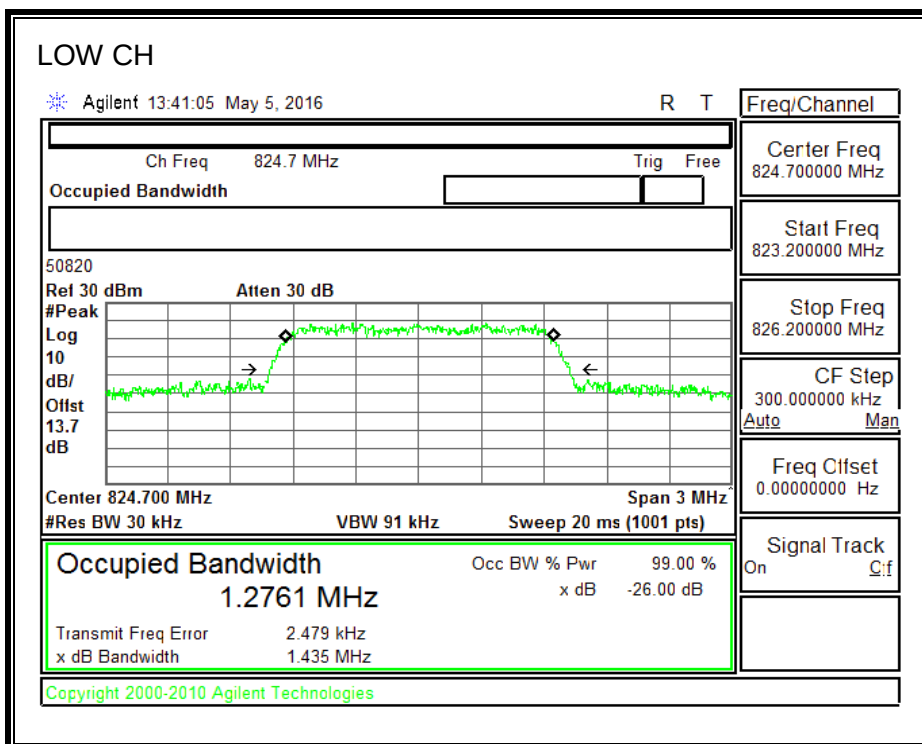
### 800MHz SECONDARY BAND



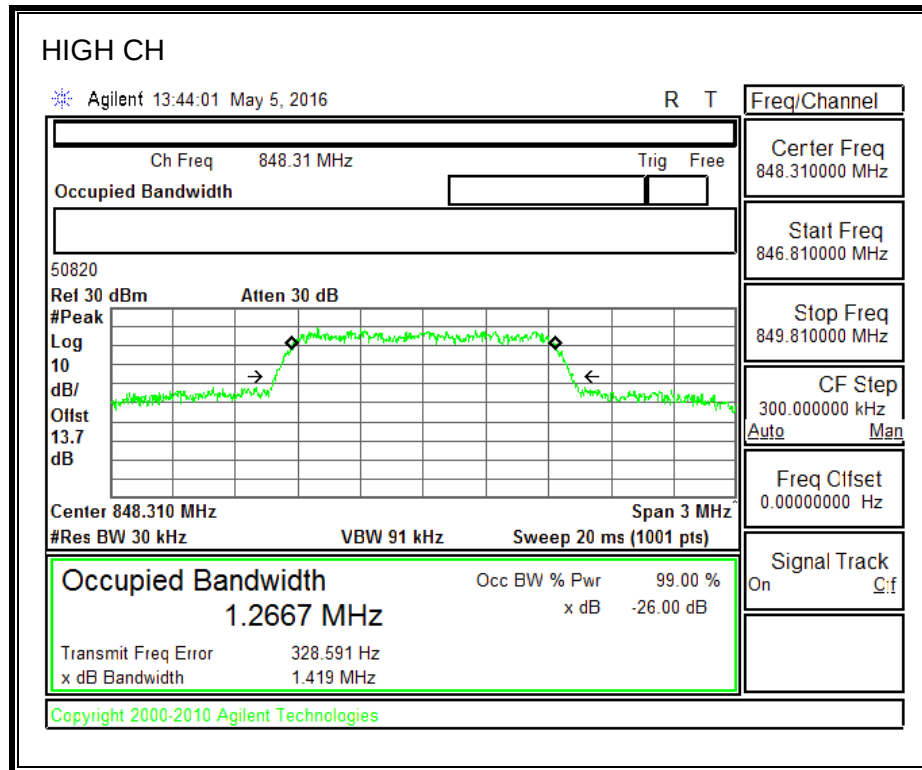


### 8.1.4. CDMA2000 EVDO Rev. A

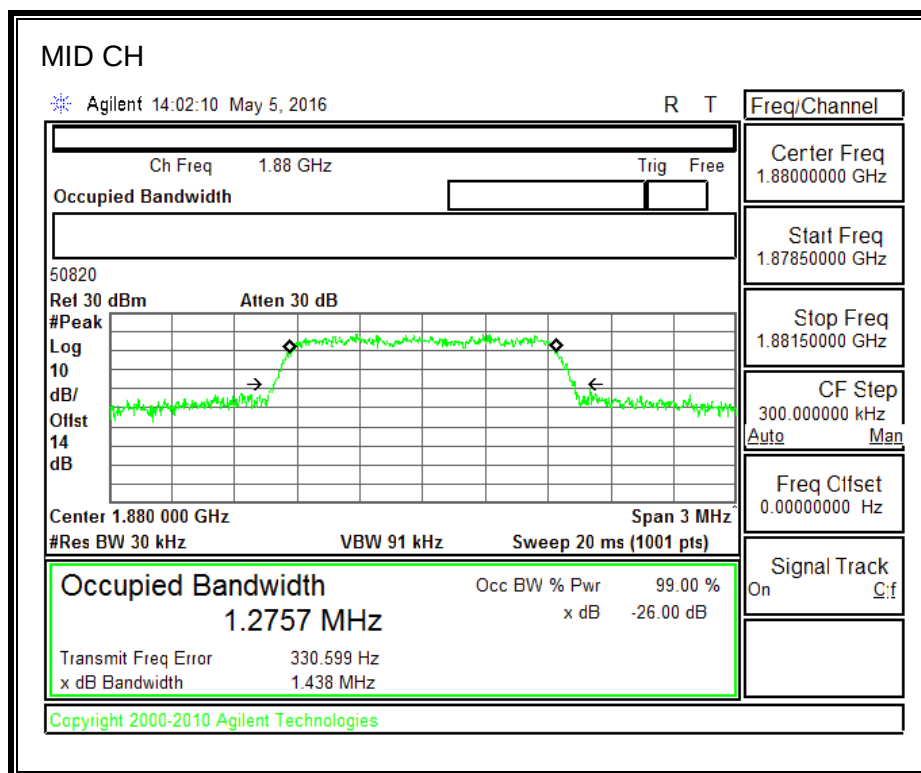
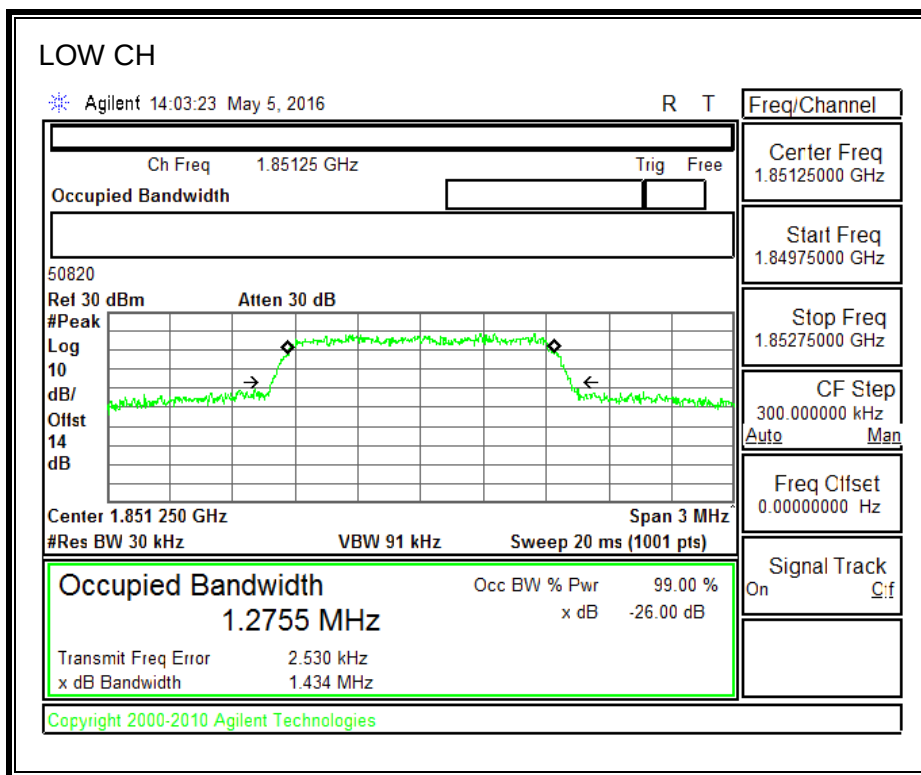
#### 850MHz BAND



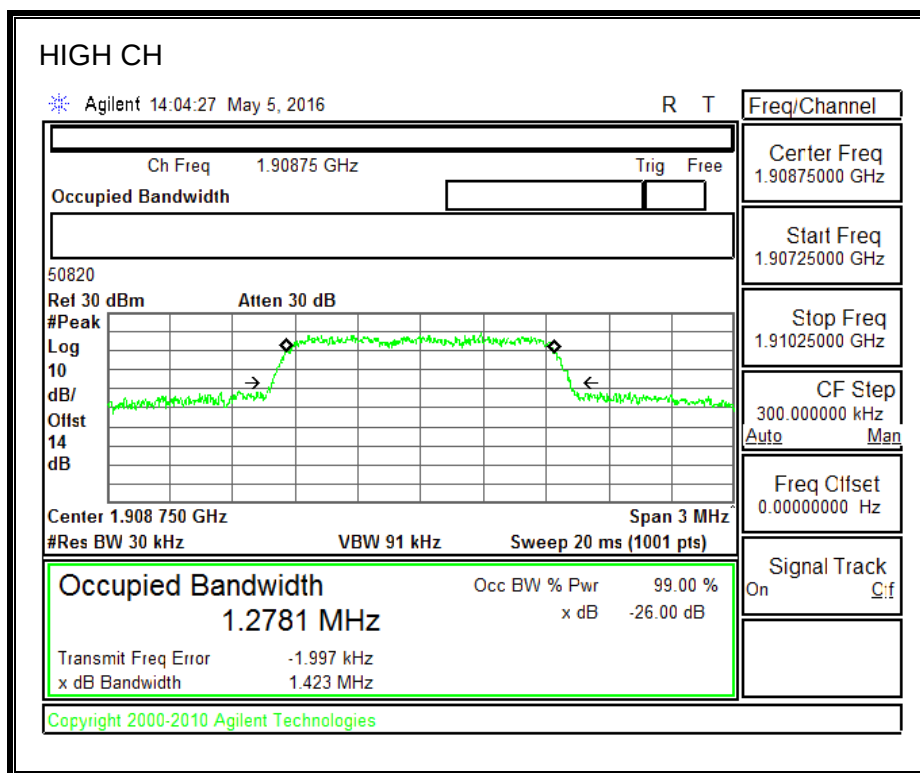




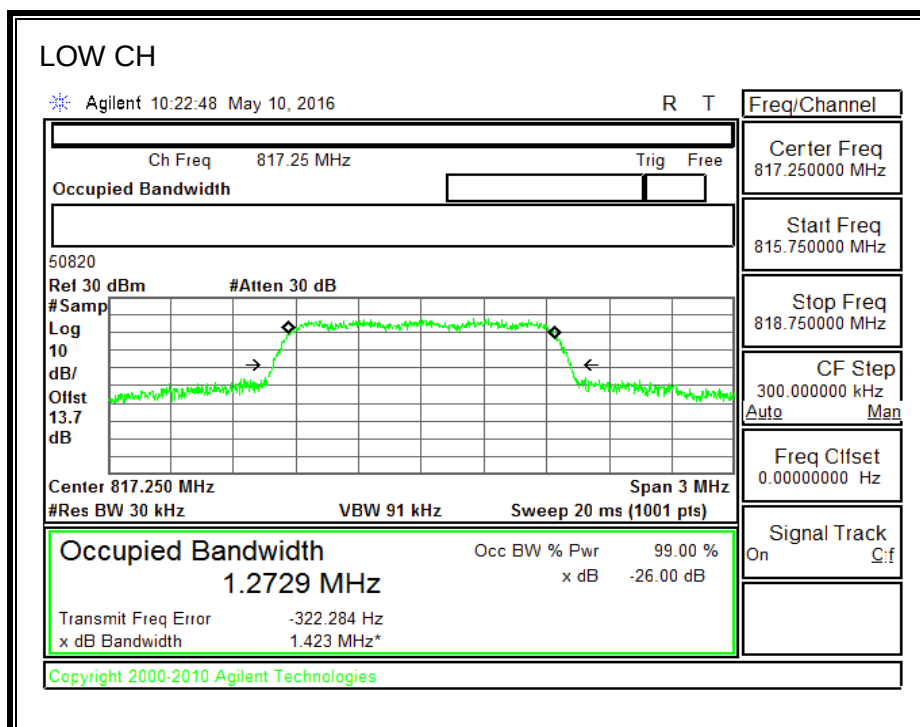
**1900MHz BAND**

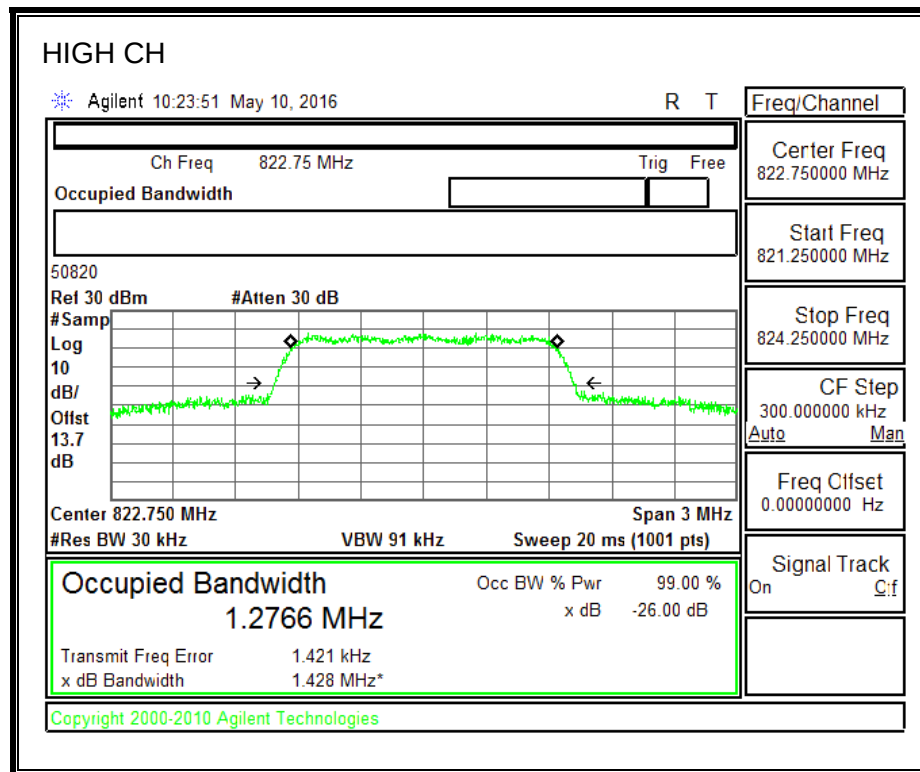
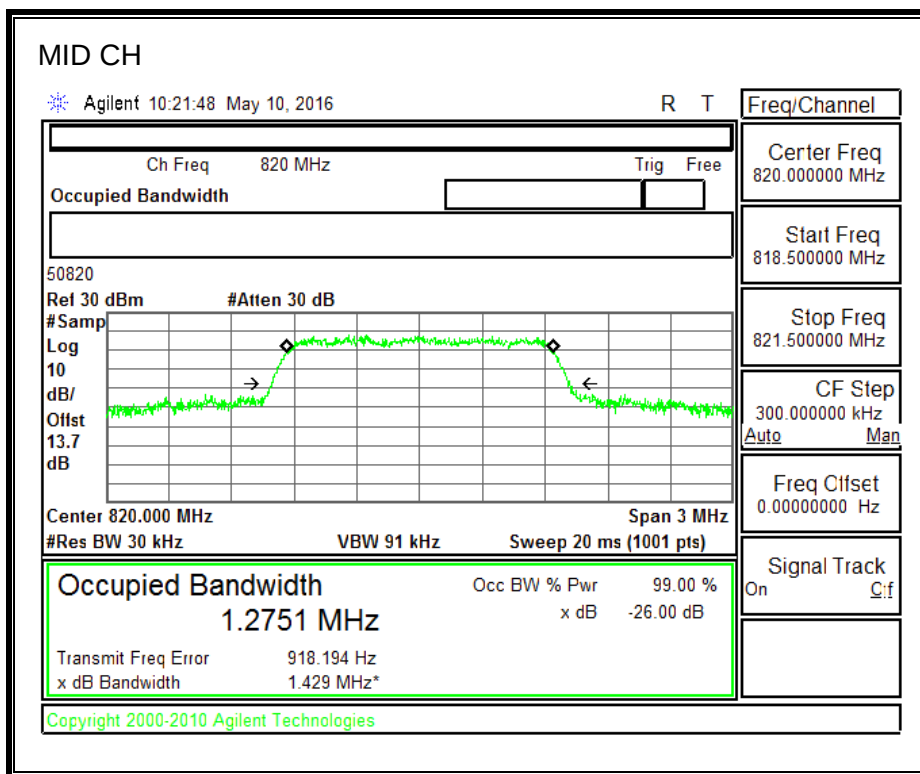






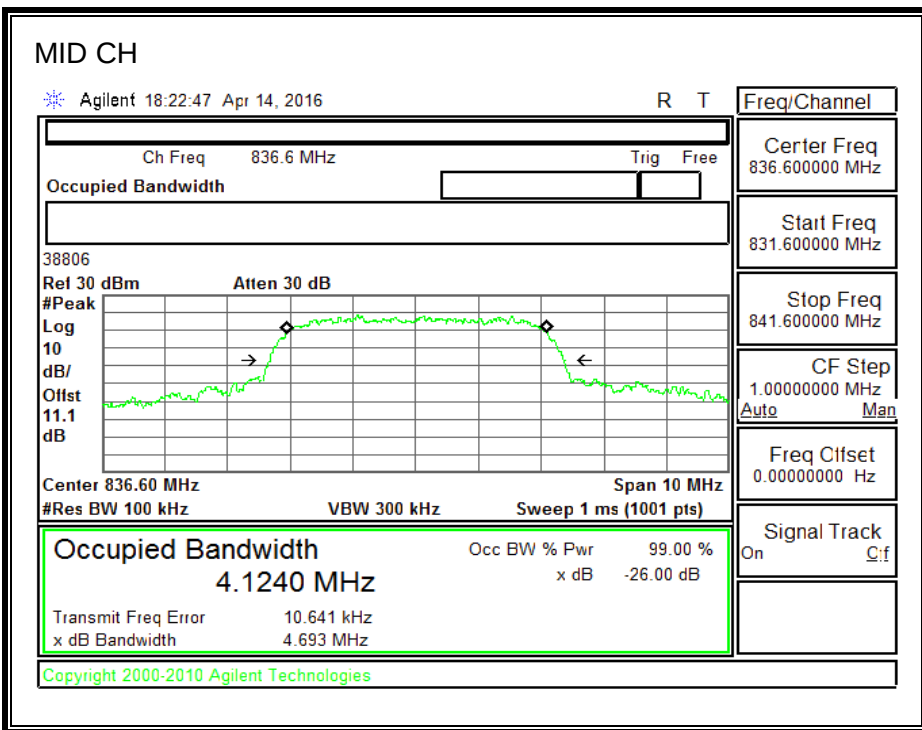
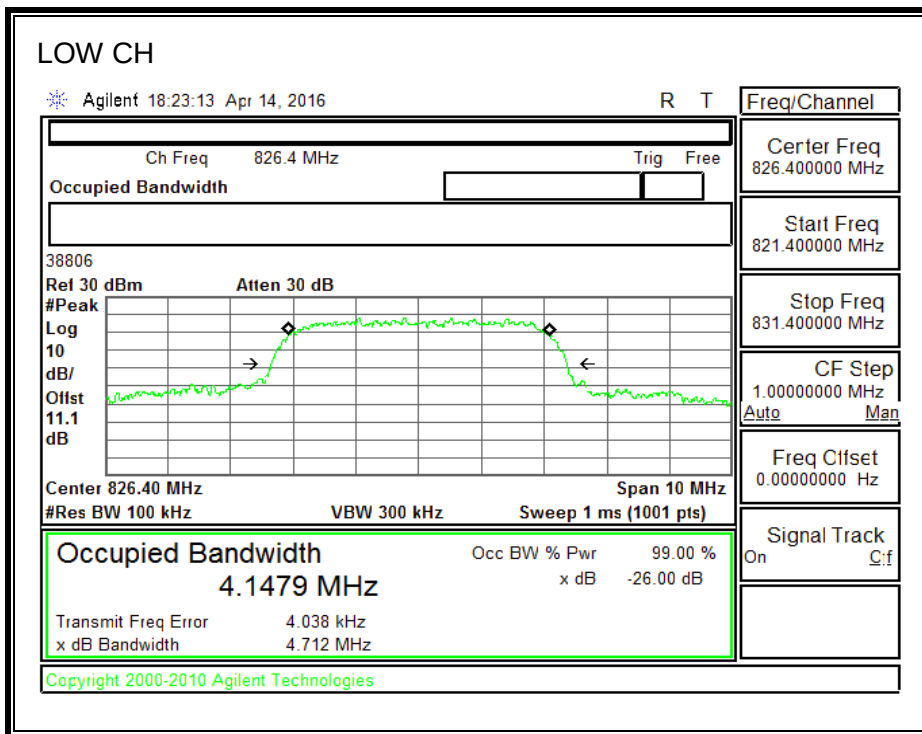
### 800MHz SECONDARY BAND



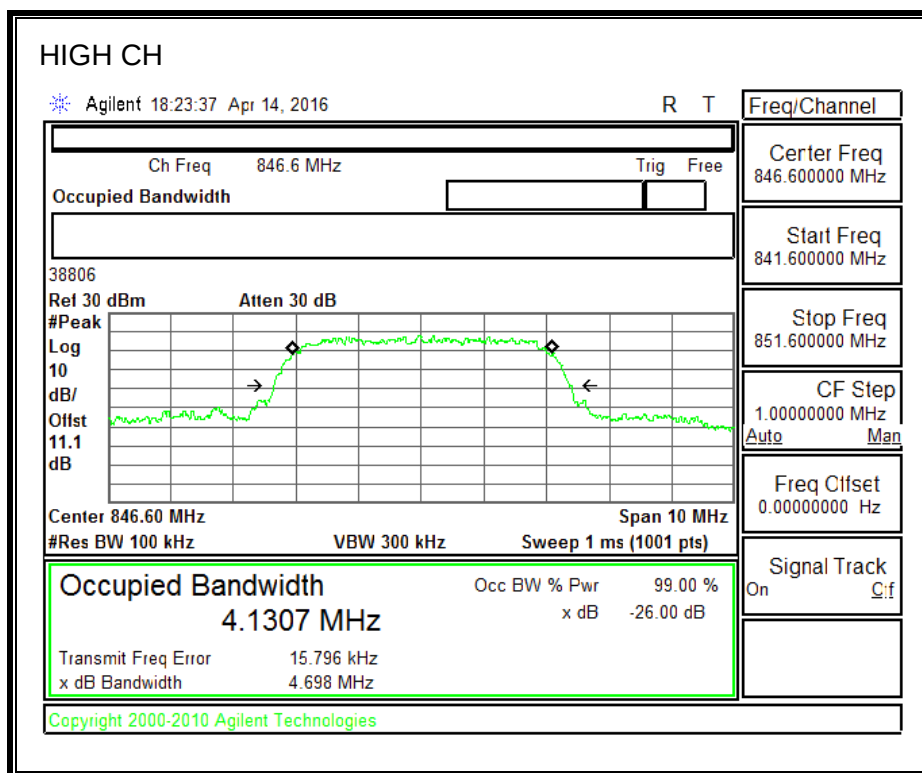


## 8.1.5. UMTS REL 99

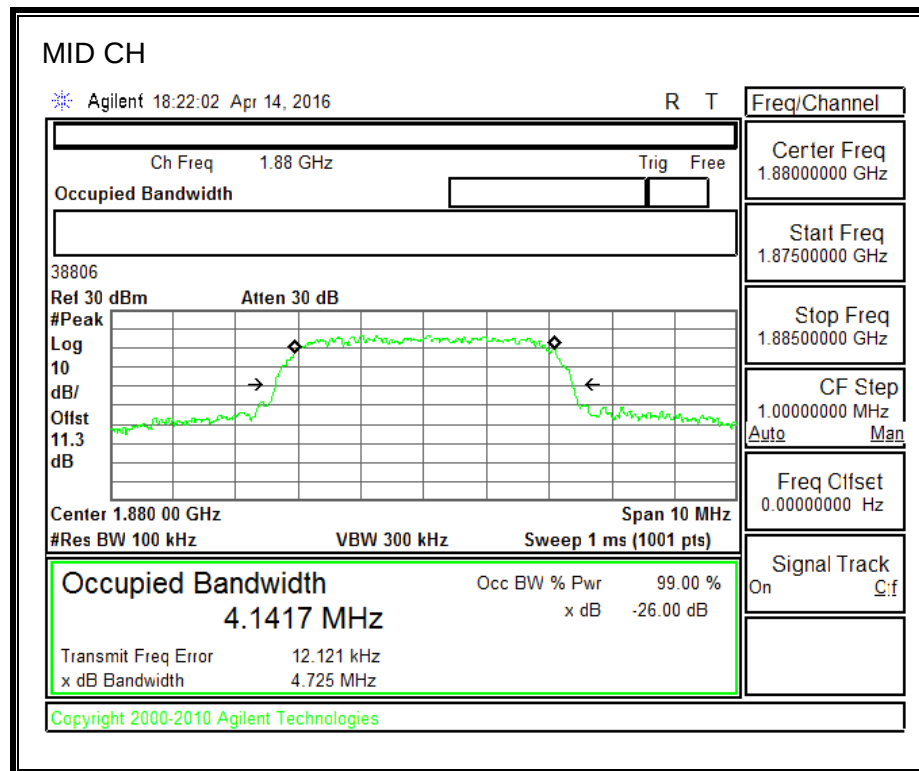
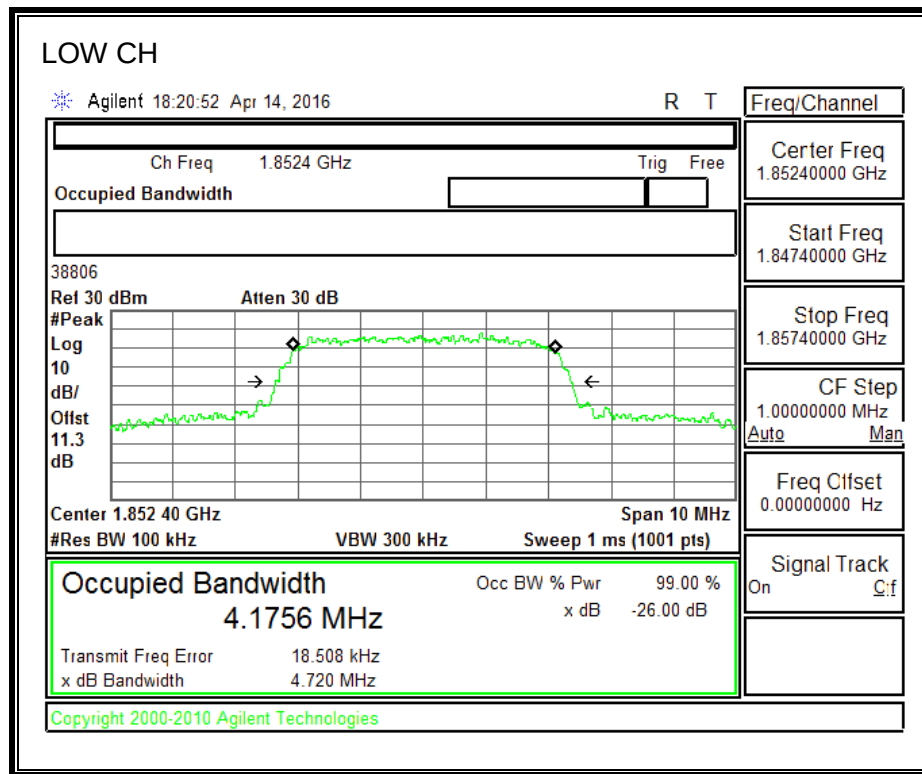
### 850MHz BAND



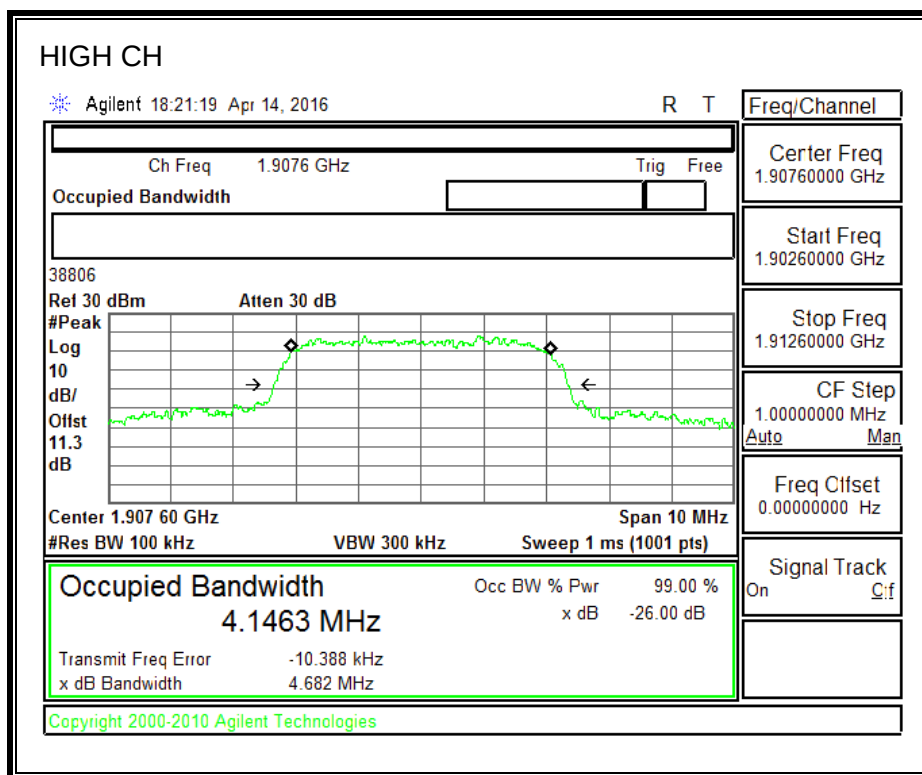




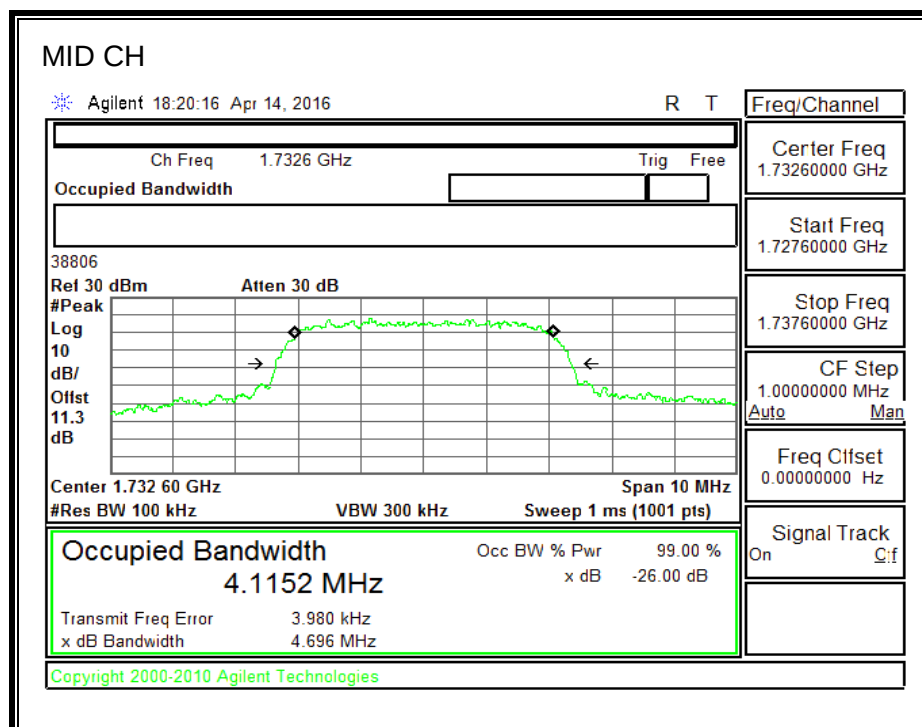
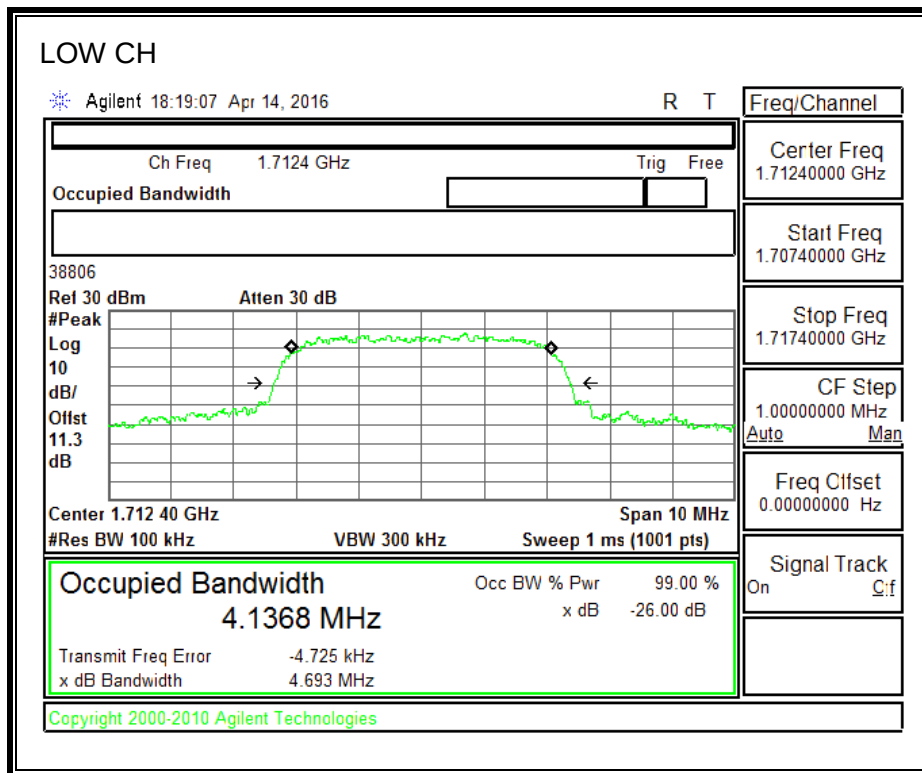
**1900MHz BAND**

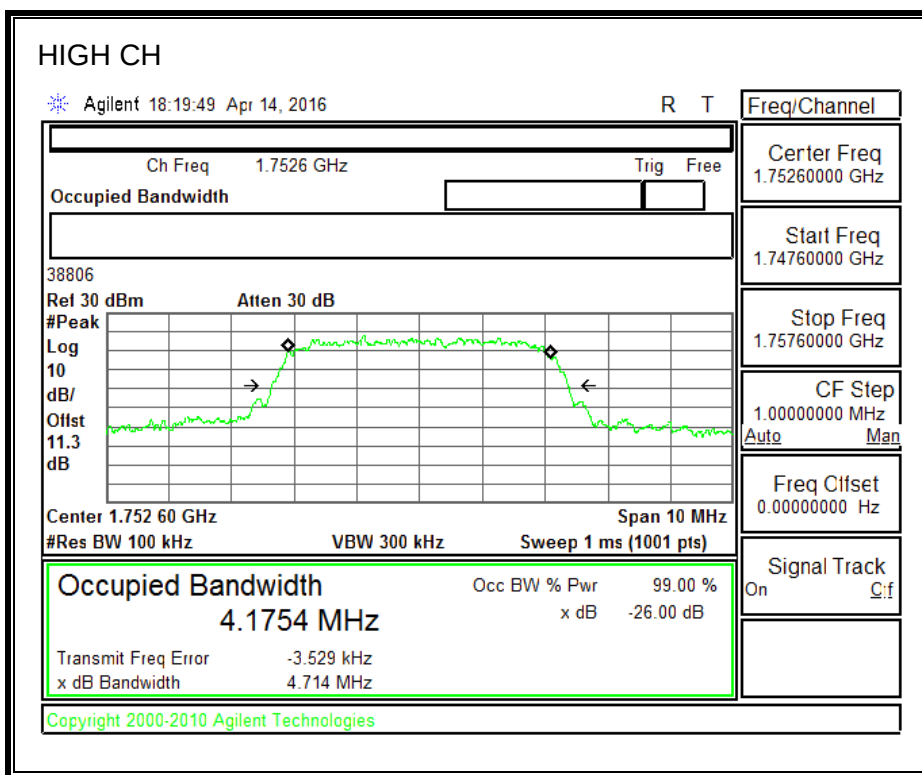






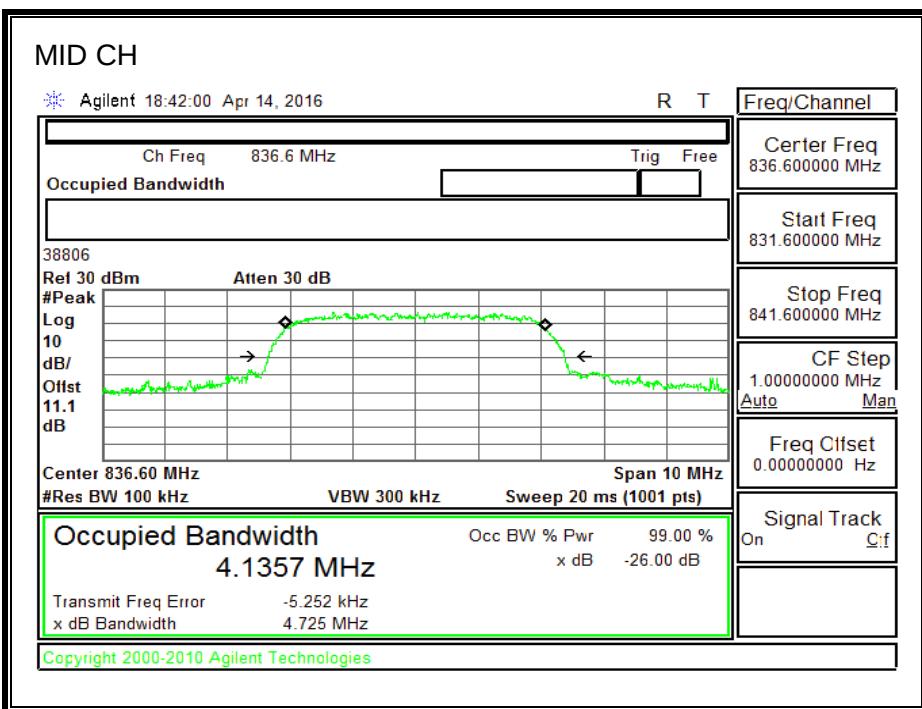
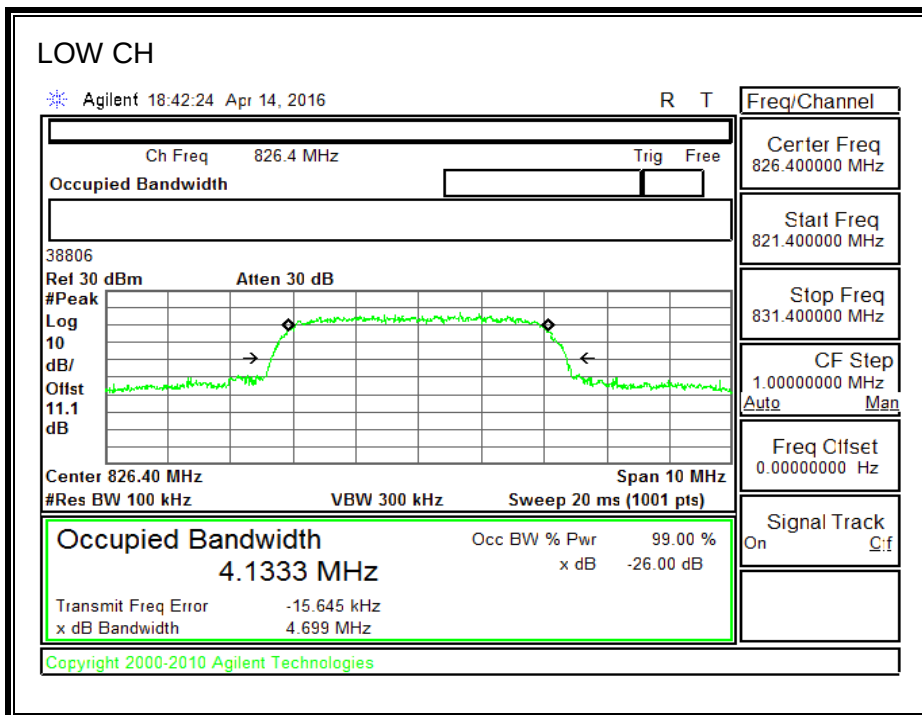
**1700MHz BAND**

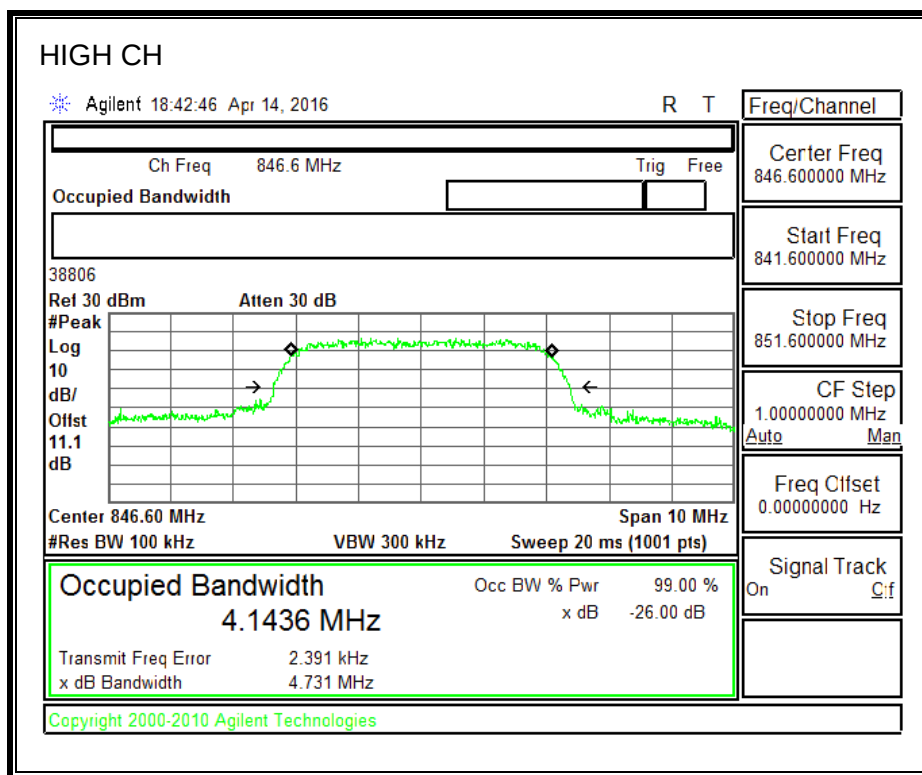




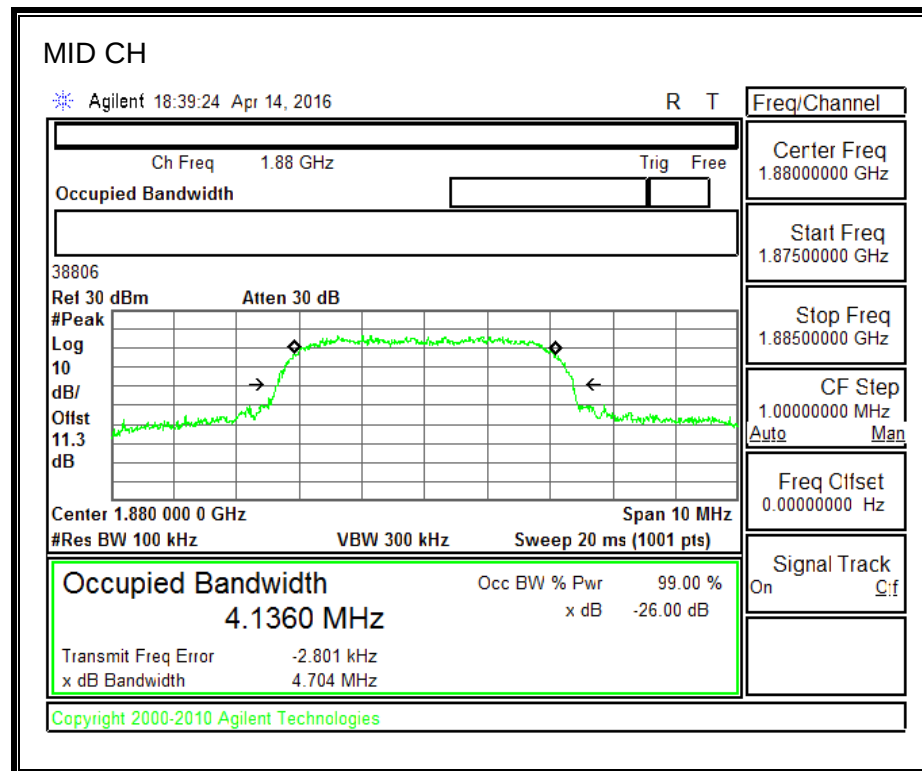
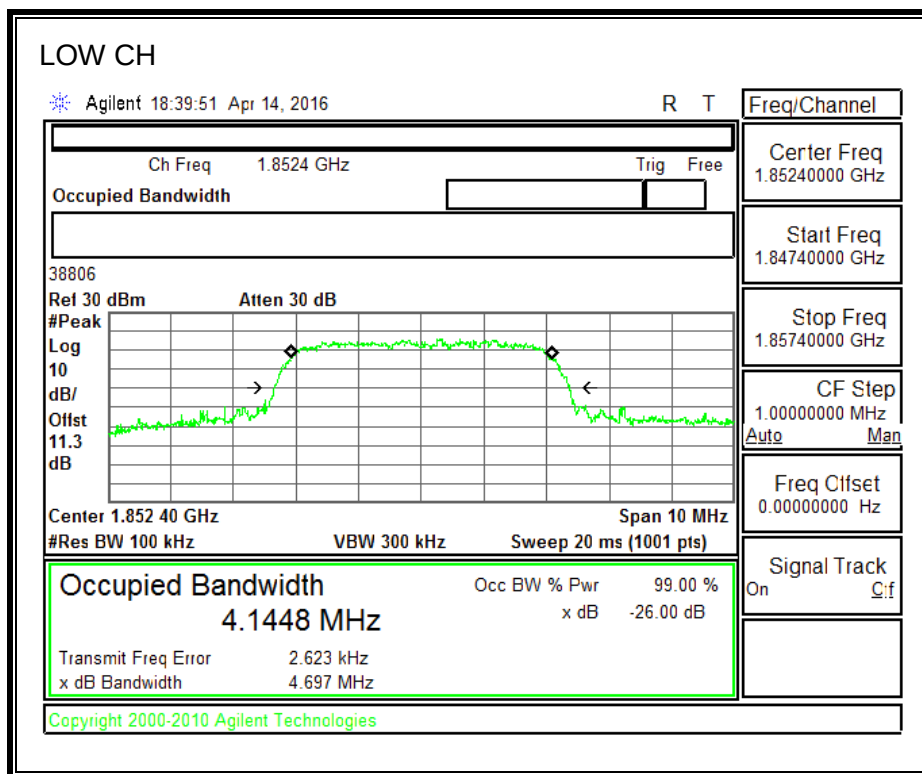
## 8.1.6. UMTS HSDPA

### 850MHz BAND

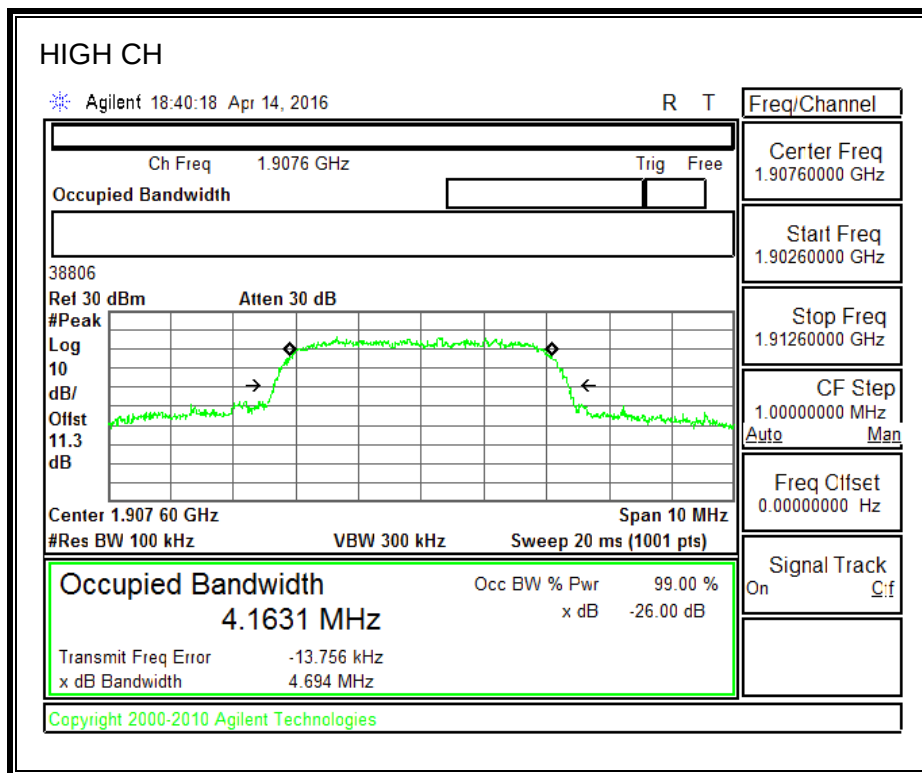




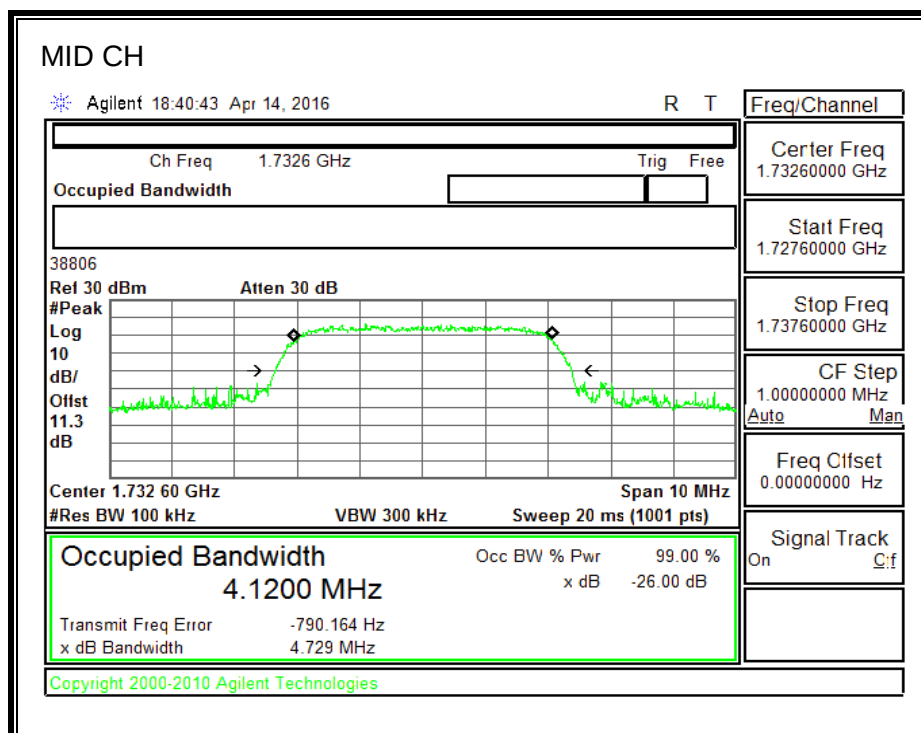
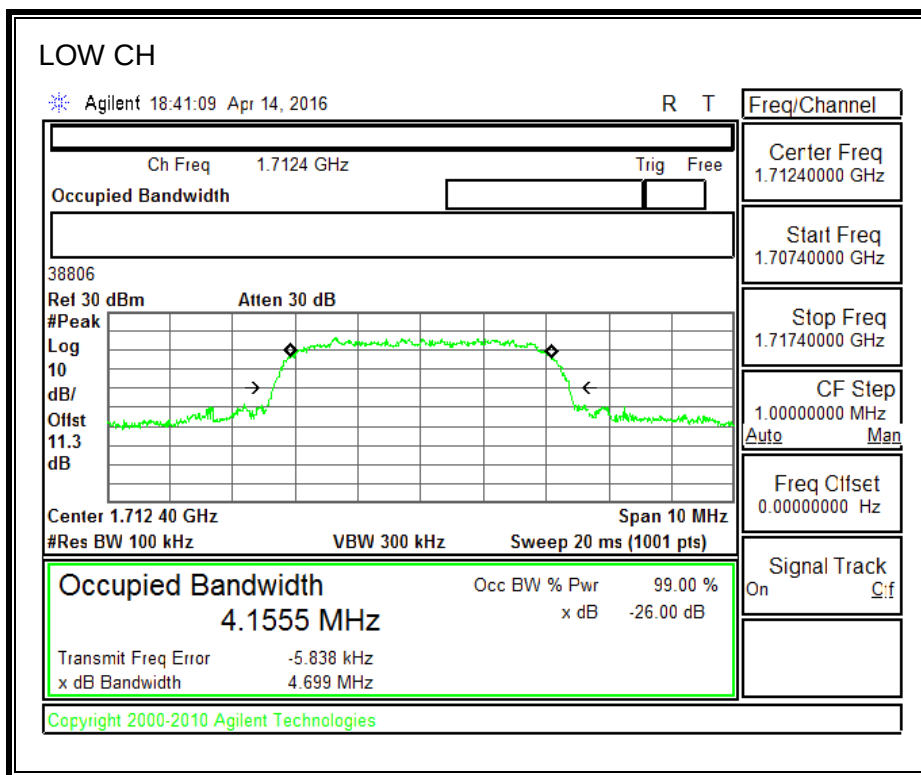
**1900MHz BAND**

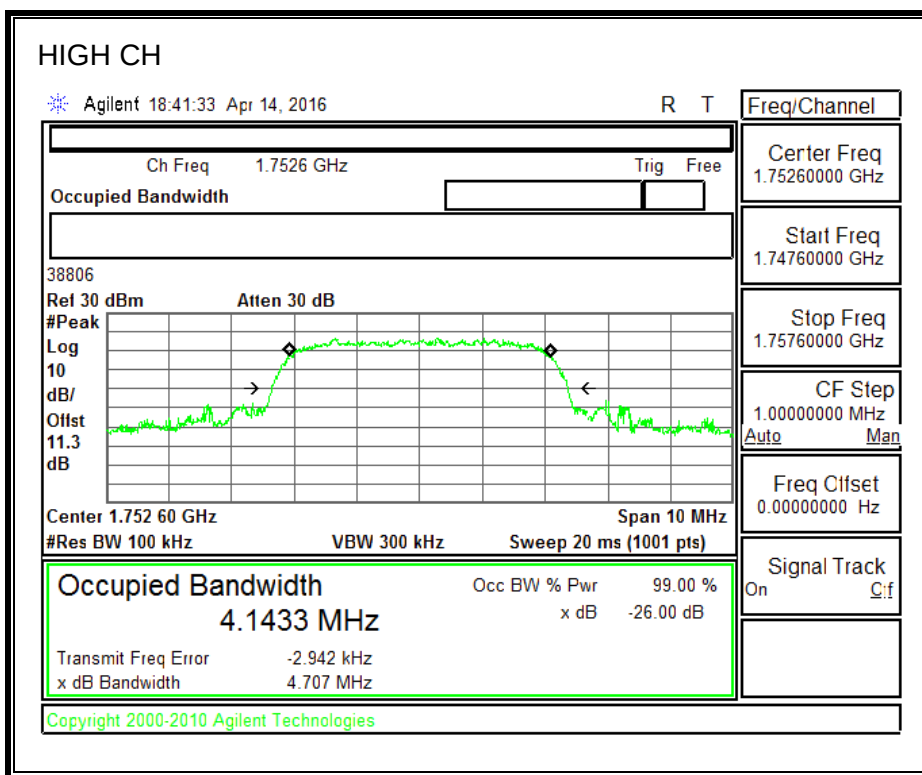






**1700MHz BAND**





## **8.2. BAND EDGE**

### **RULE PART(S)**

FCC: §22.359, 24.238, §27.53 and §90.691

### **LIMITS**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;

On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.

Compliance with the provisions of paragraphs above of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

### **TEST PROCEDURE**

The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

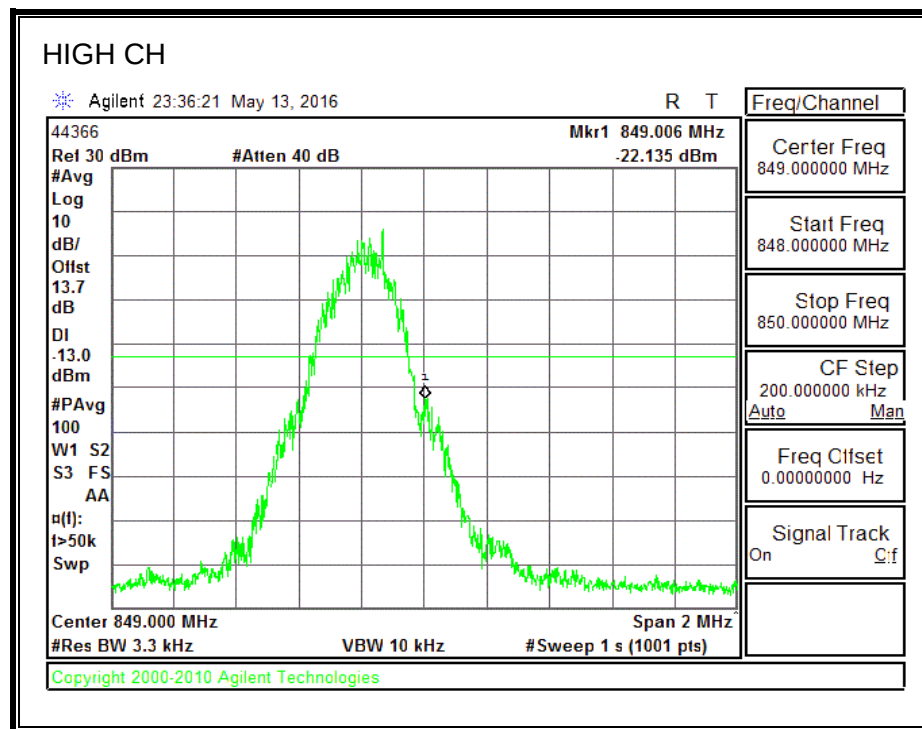
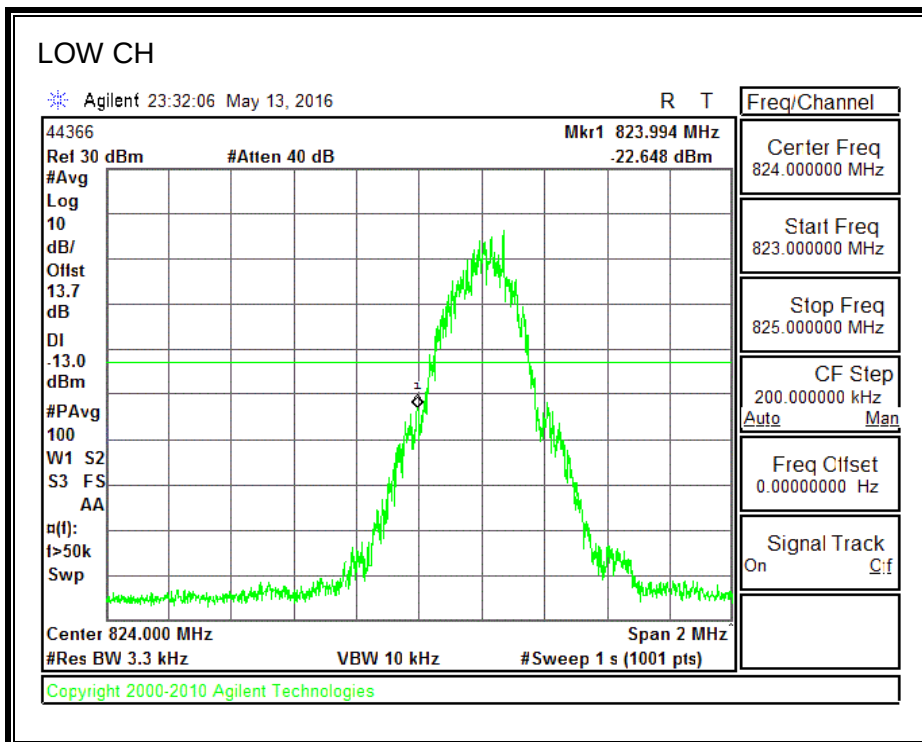
For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (824, 849, 1850, 1910MHz)
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

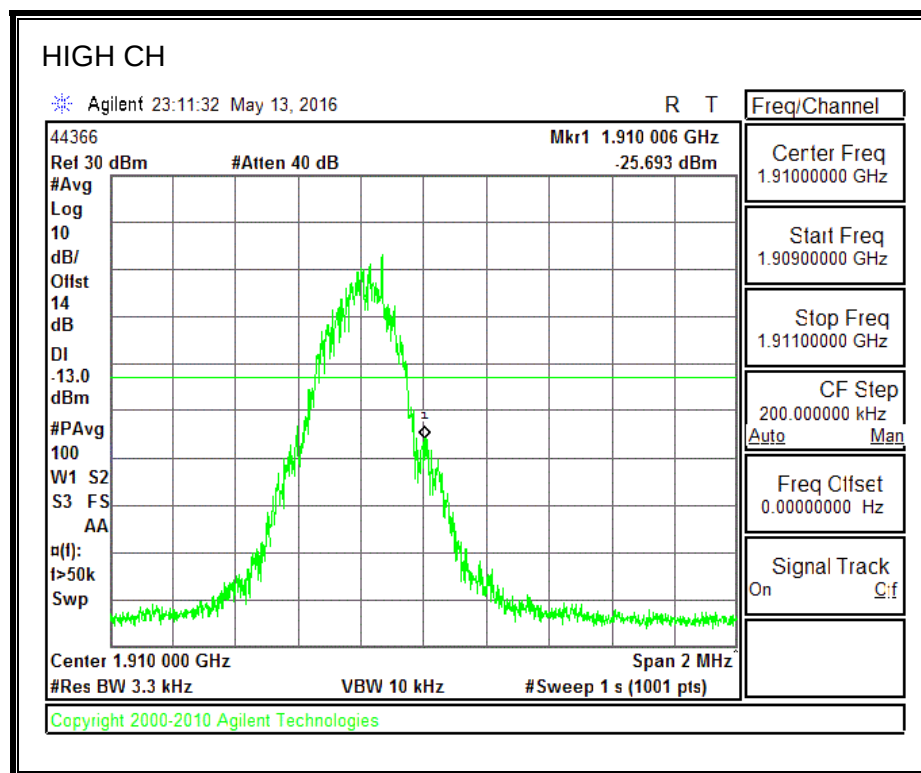
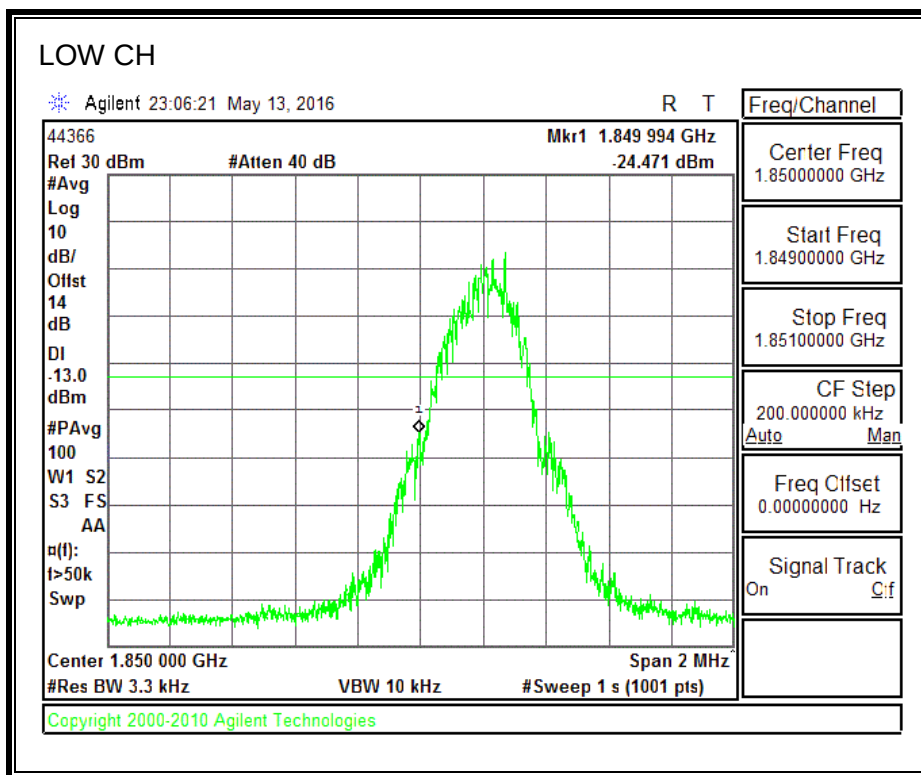
### **RESULTS**

## 8.2.1. GSM-GPRS

### 850MHz BAND

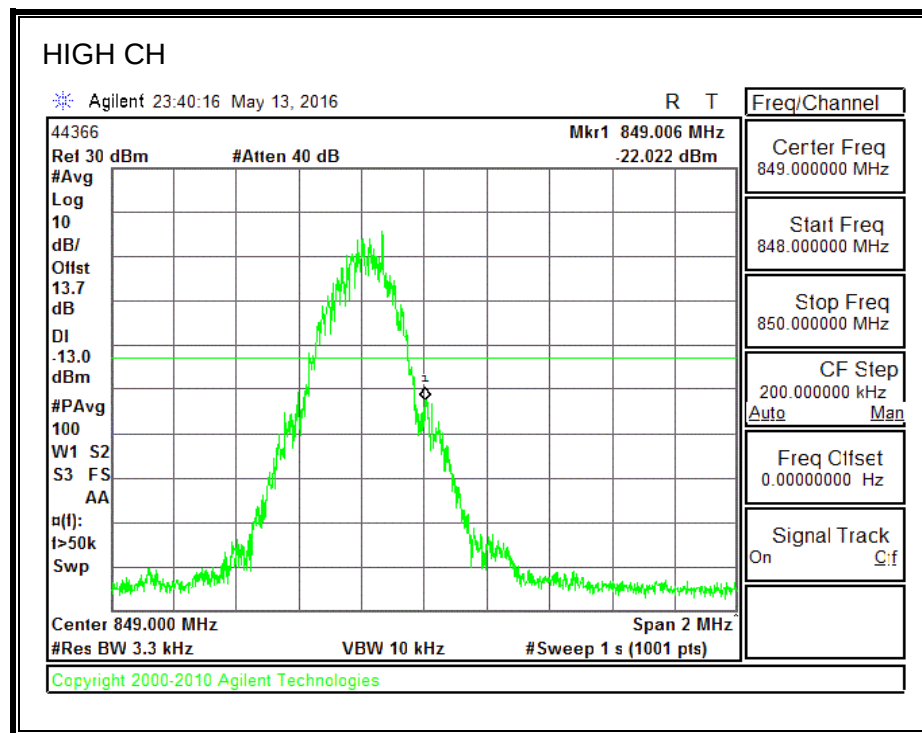
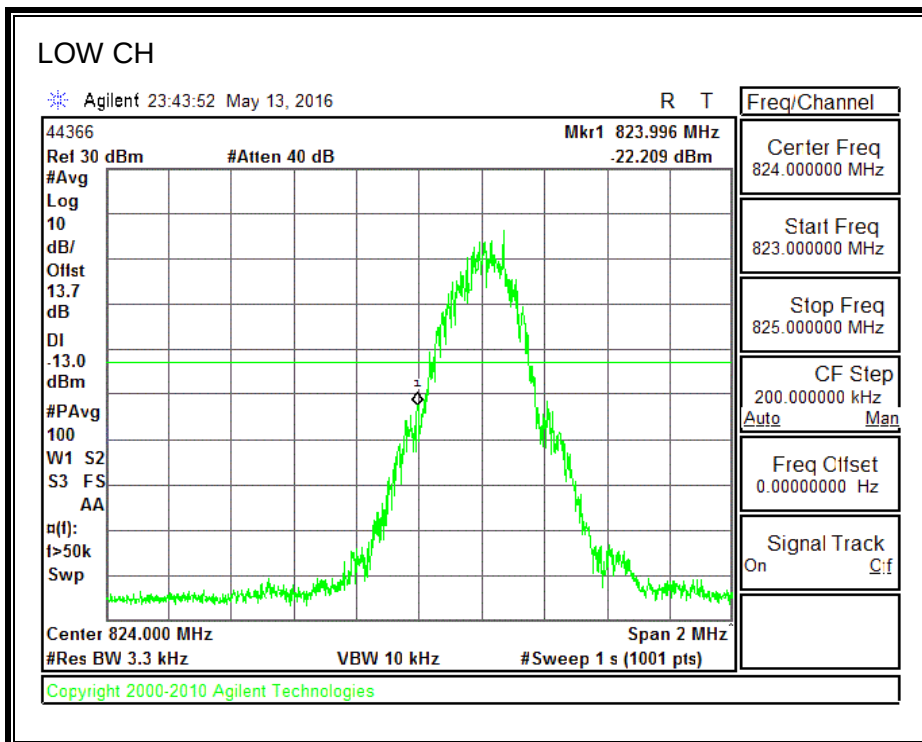


**1900MHz BAND**

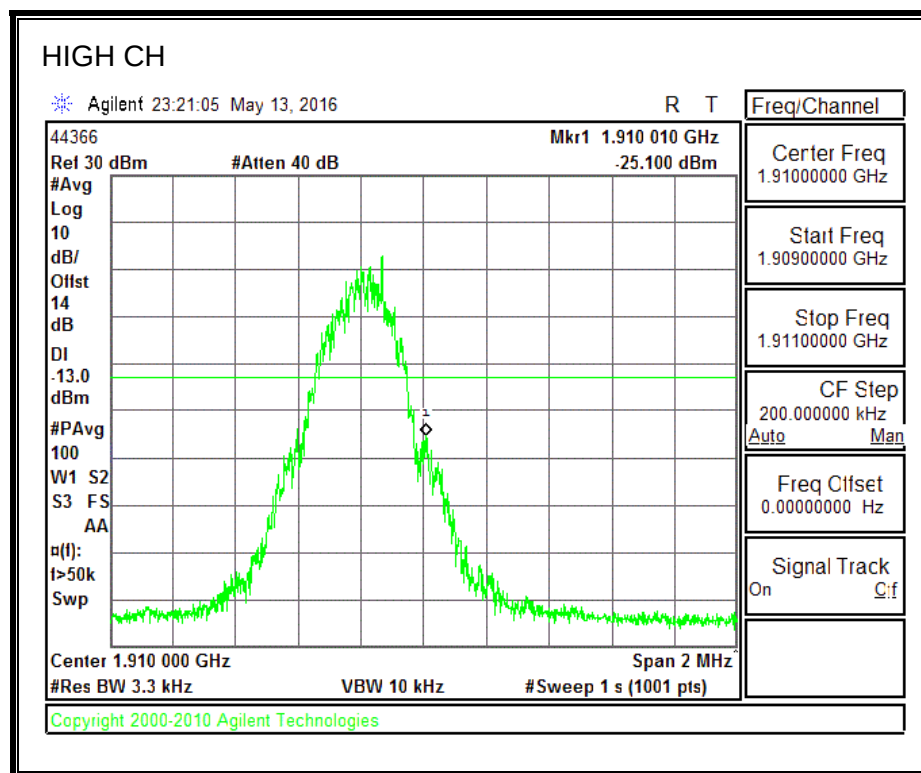
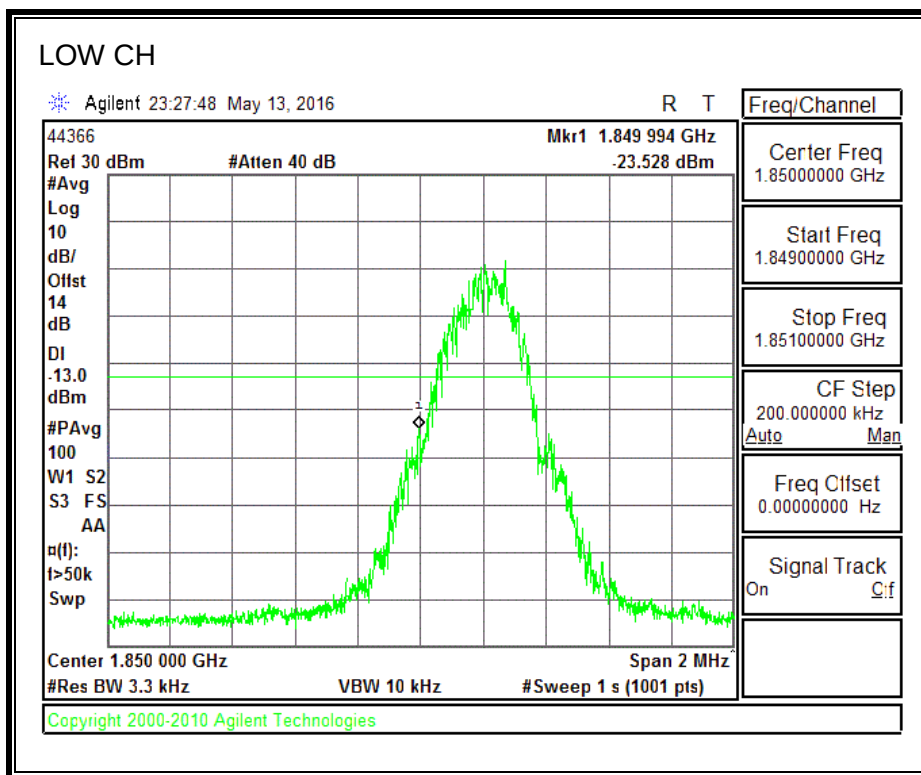


## 8.2.2. GSM-EGPRS

### 850MHz BAND

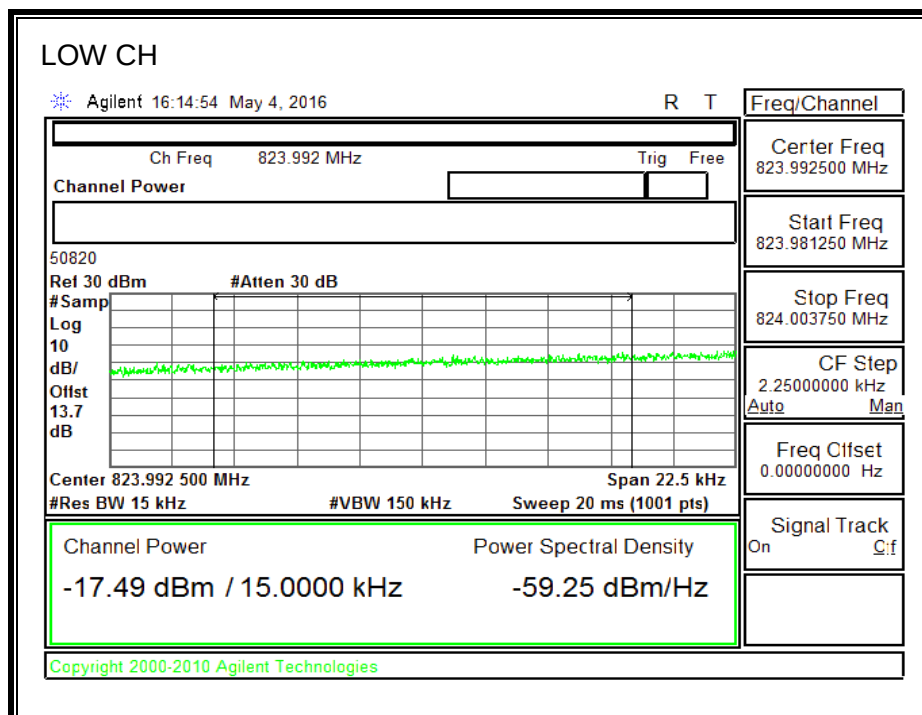
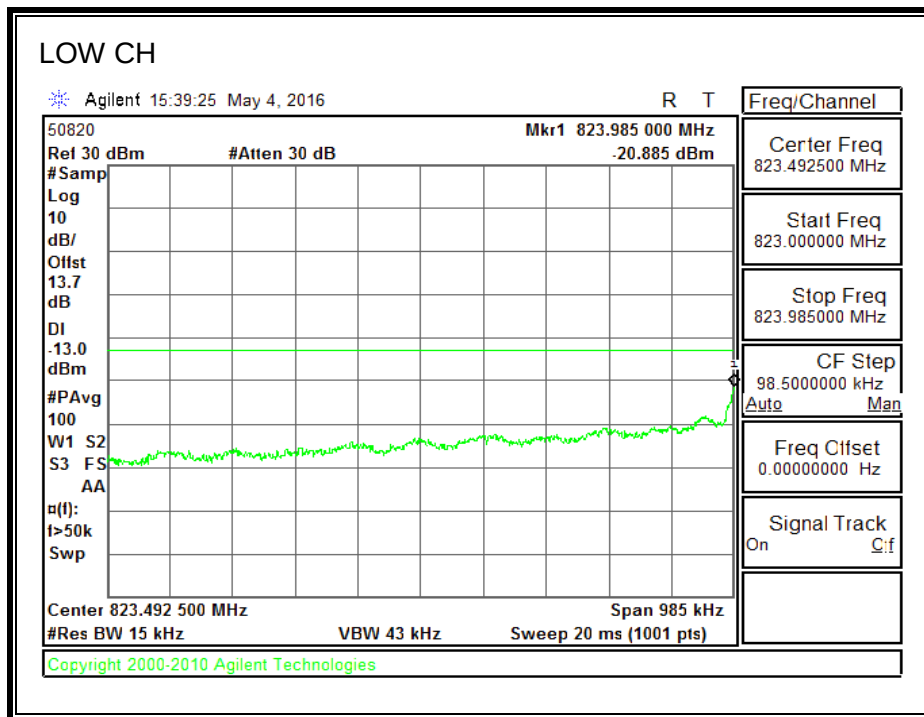


**1900MHz BAND**

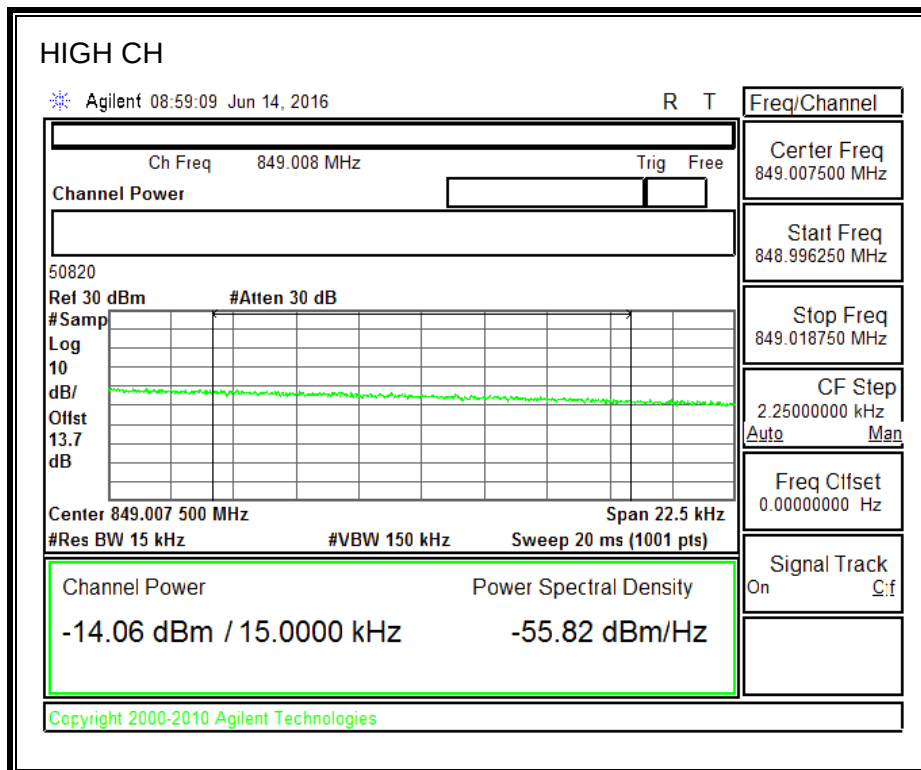
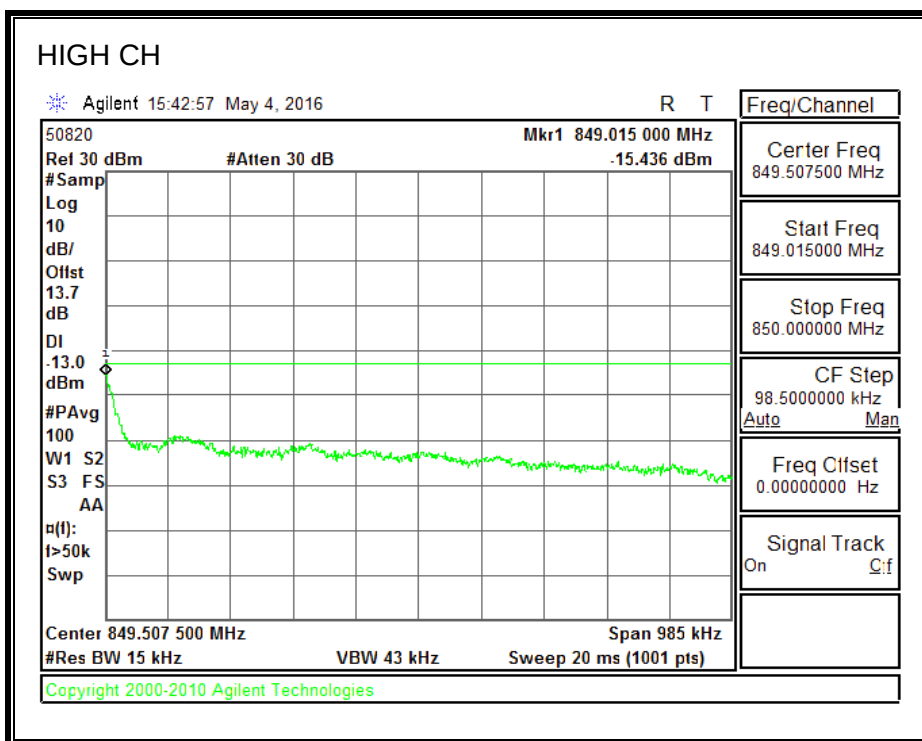


### 8.2.3. CDMA2000 1xRTT

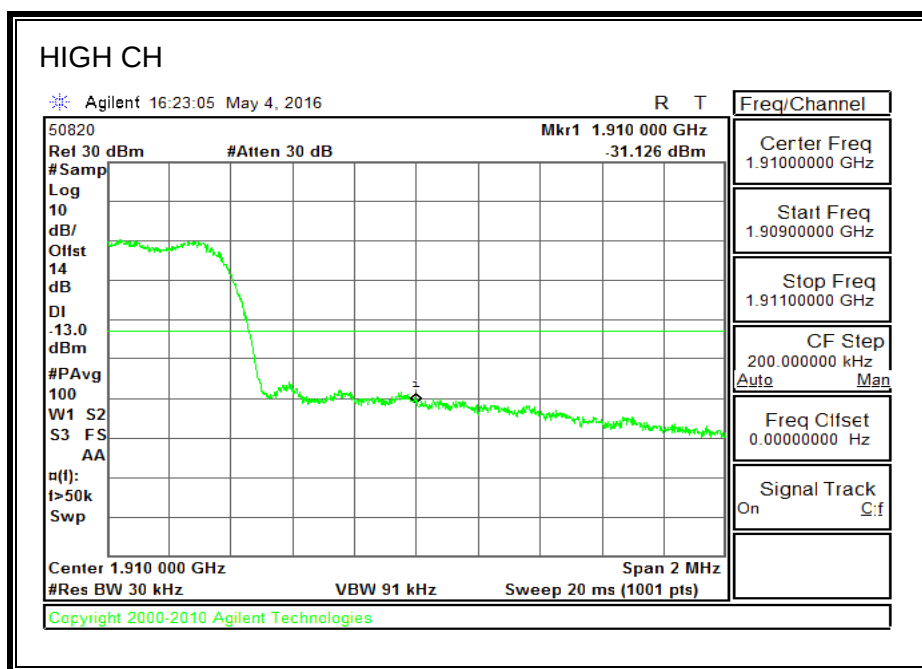
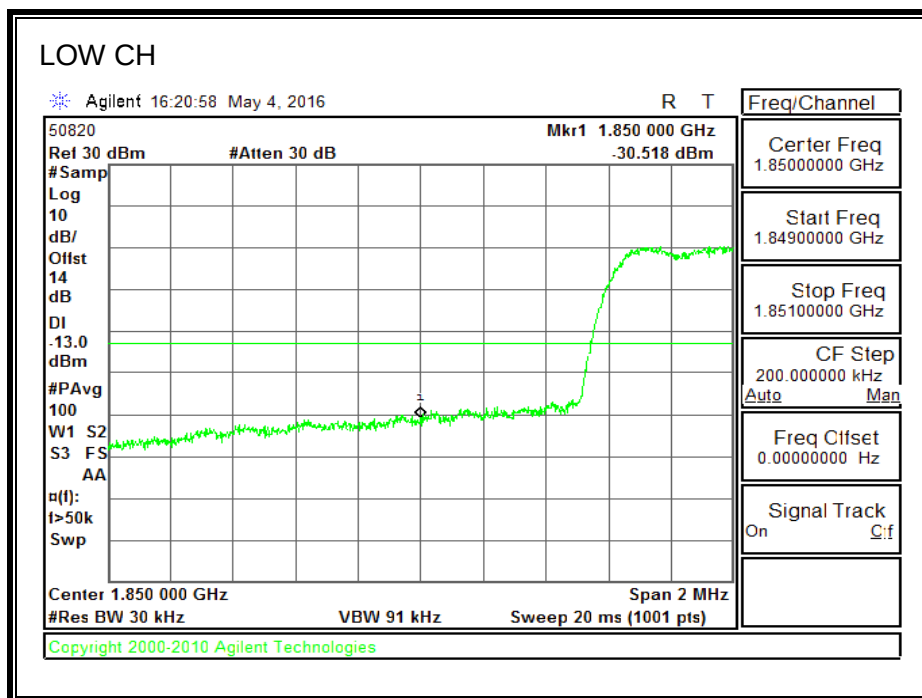
#### 850MHz BAND



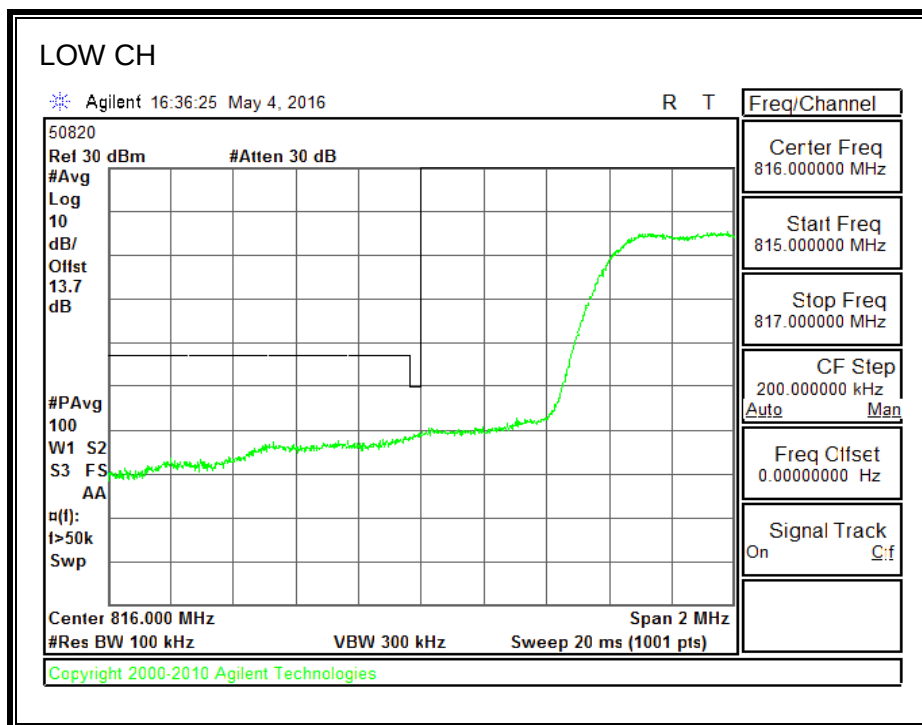




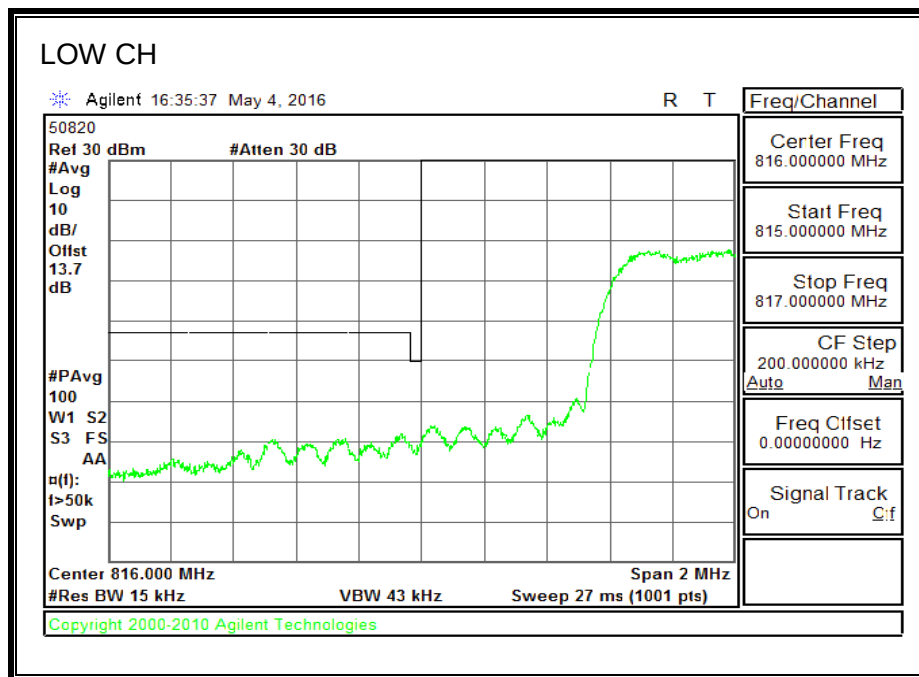
**1900MHz BAND**



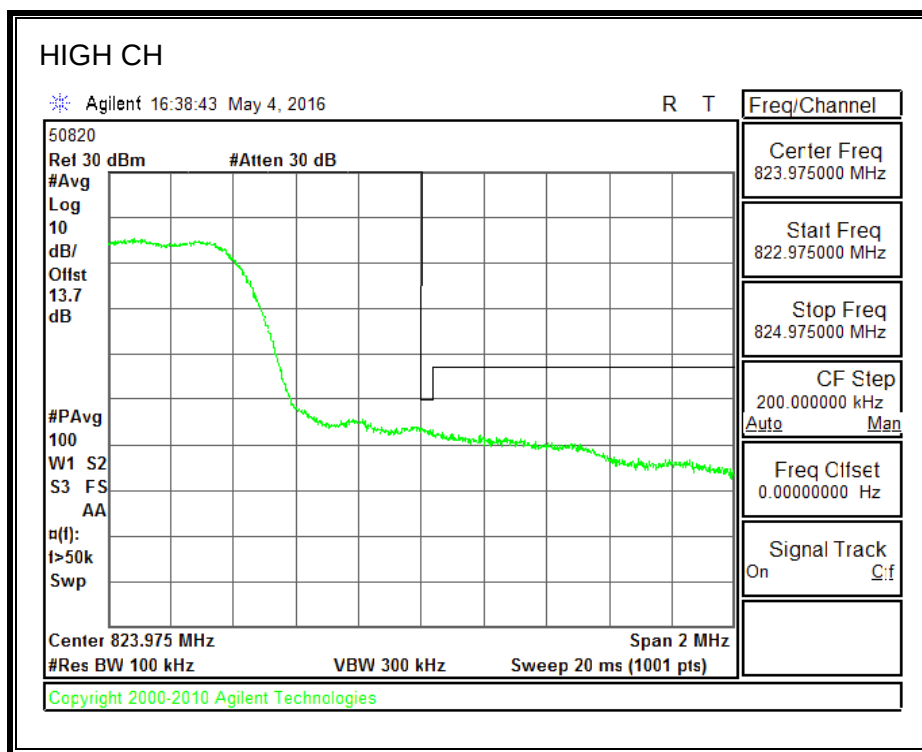
**CDMA2000 1xRTT BC10 MASK**



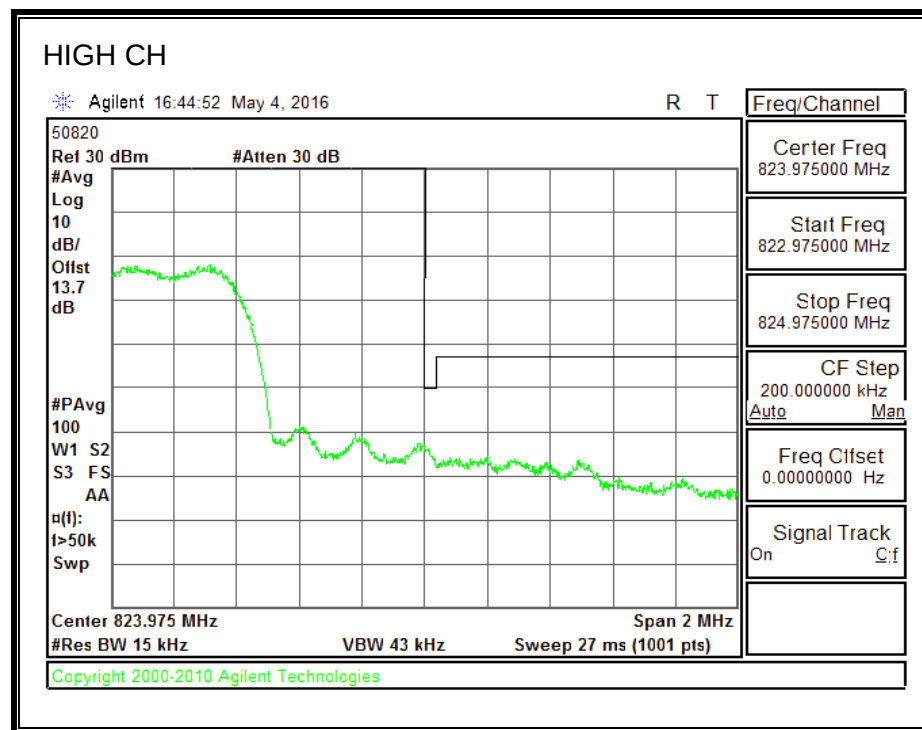
Note: RBW=1% of EBW



Note: RBW of 1% of 37.5KHz of outer channel frequency block



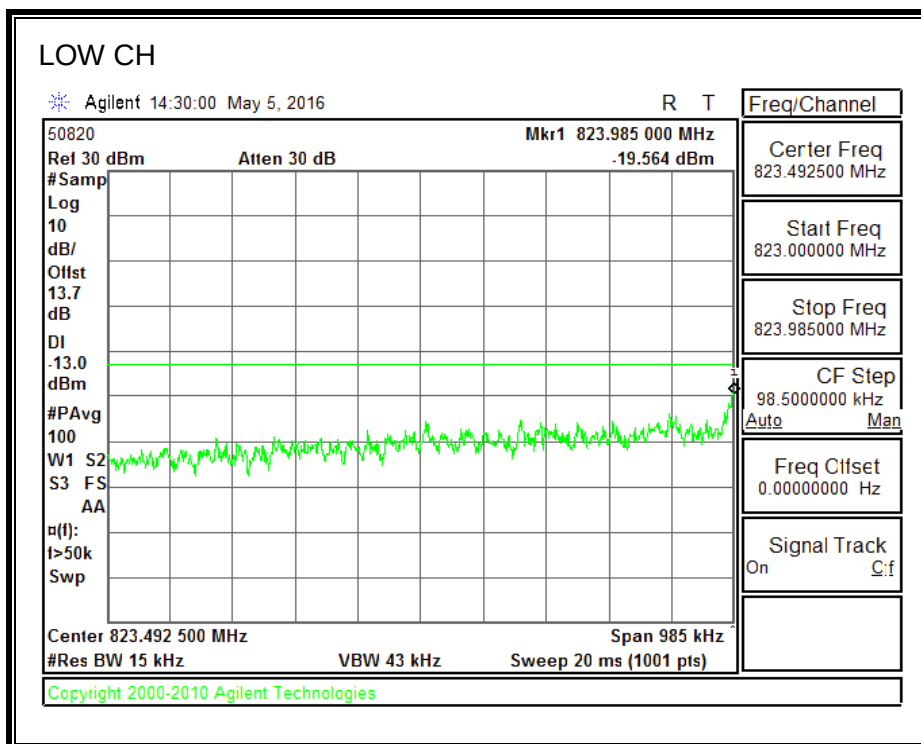
Note: RBW=1% of EBW

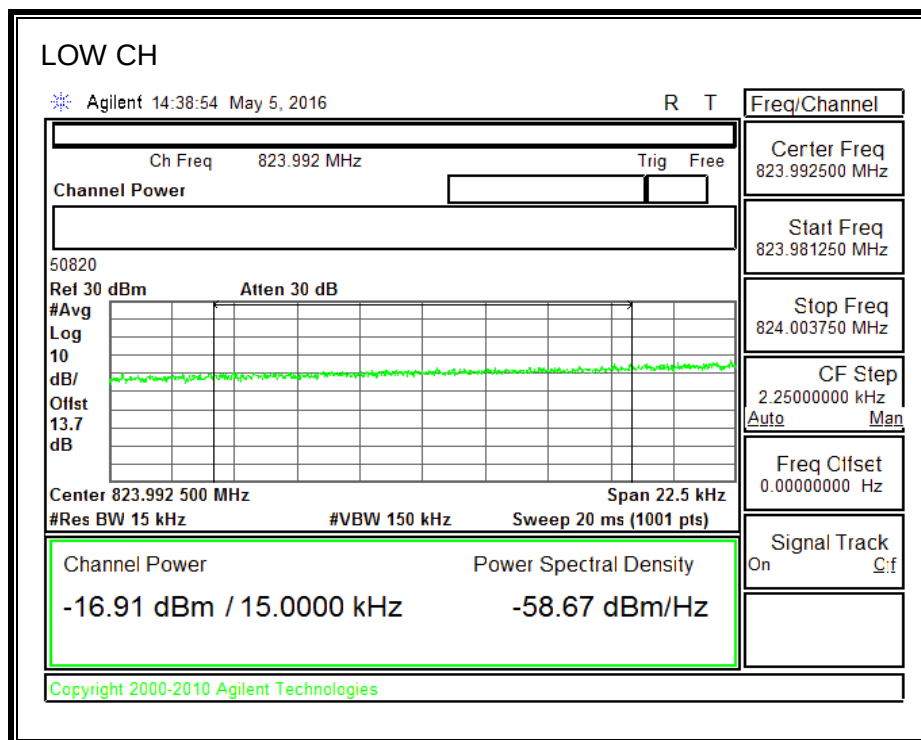


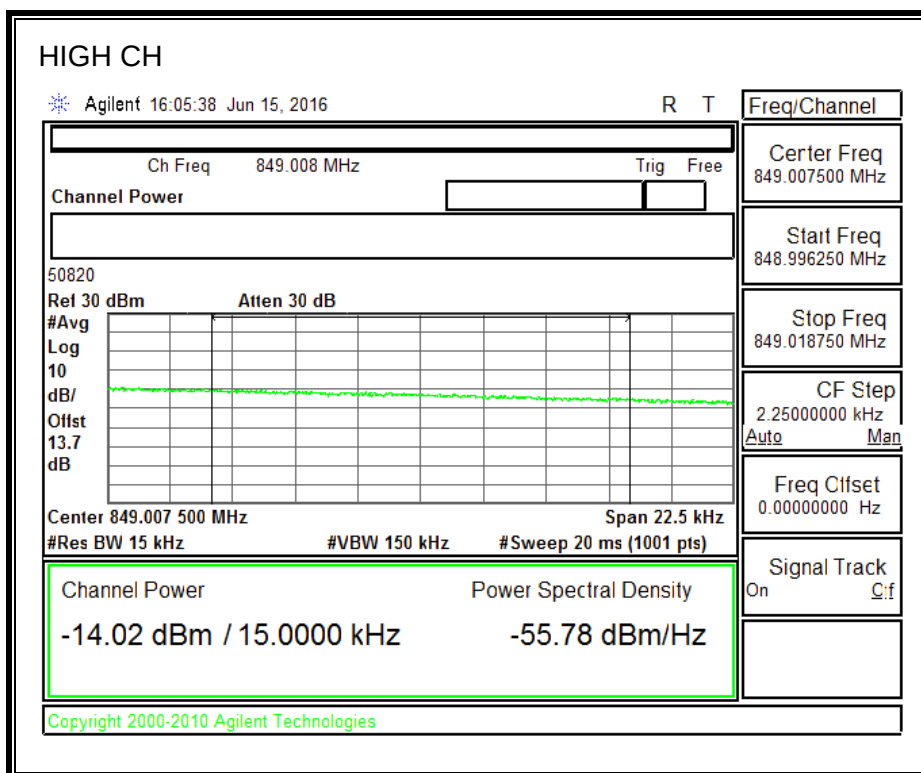
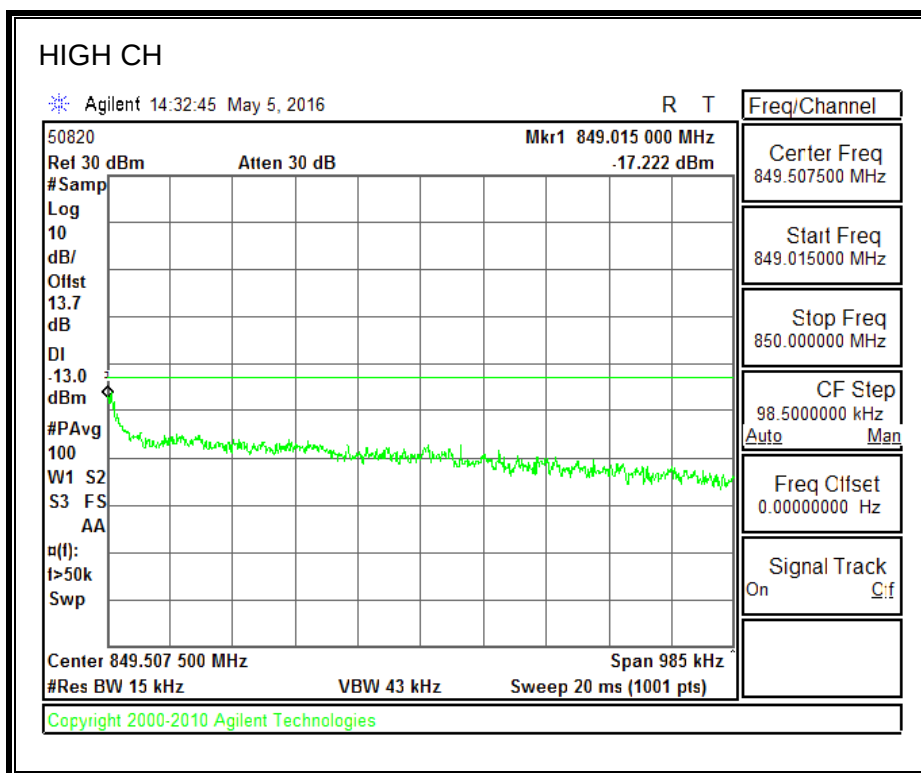
Note: RBW of 1% of 37.5KHz of outer channel frequency block

## 8.2.4. CDMA2000 EVDO REV A

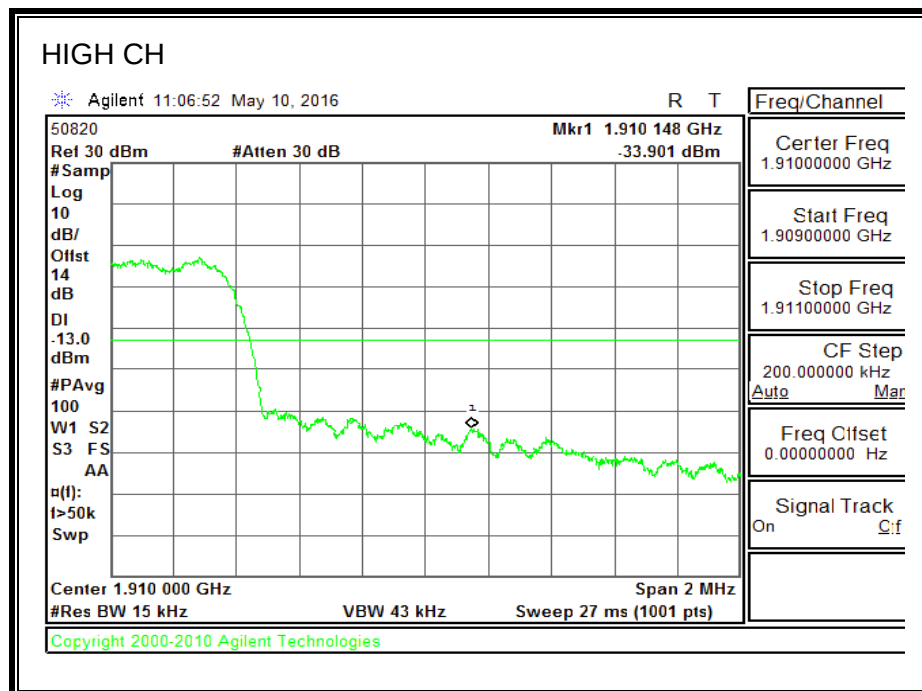
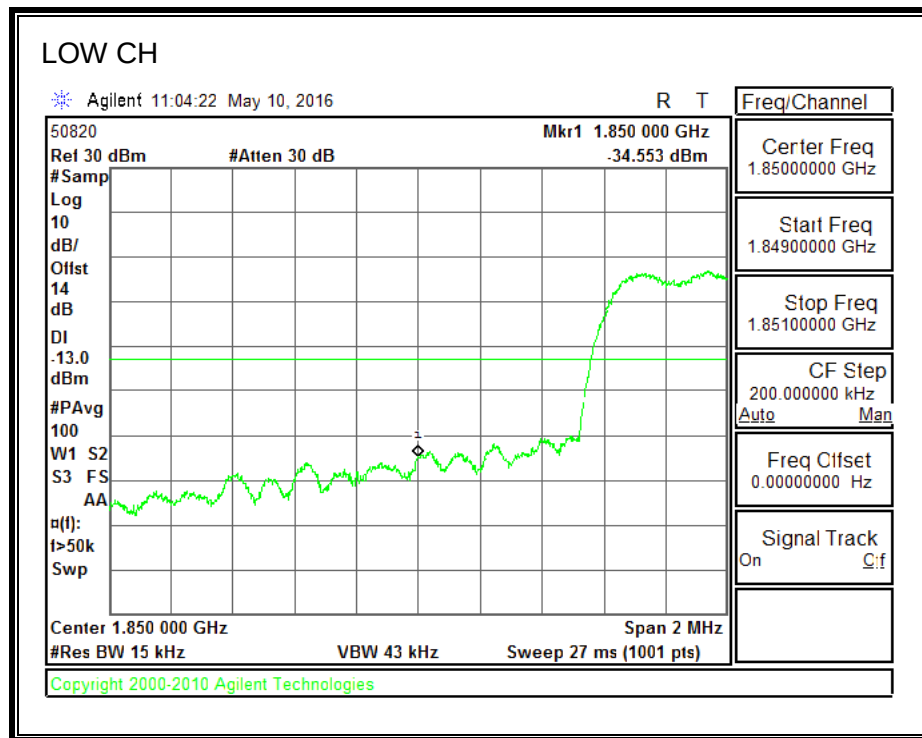
### 850MHz BAND



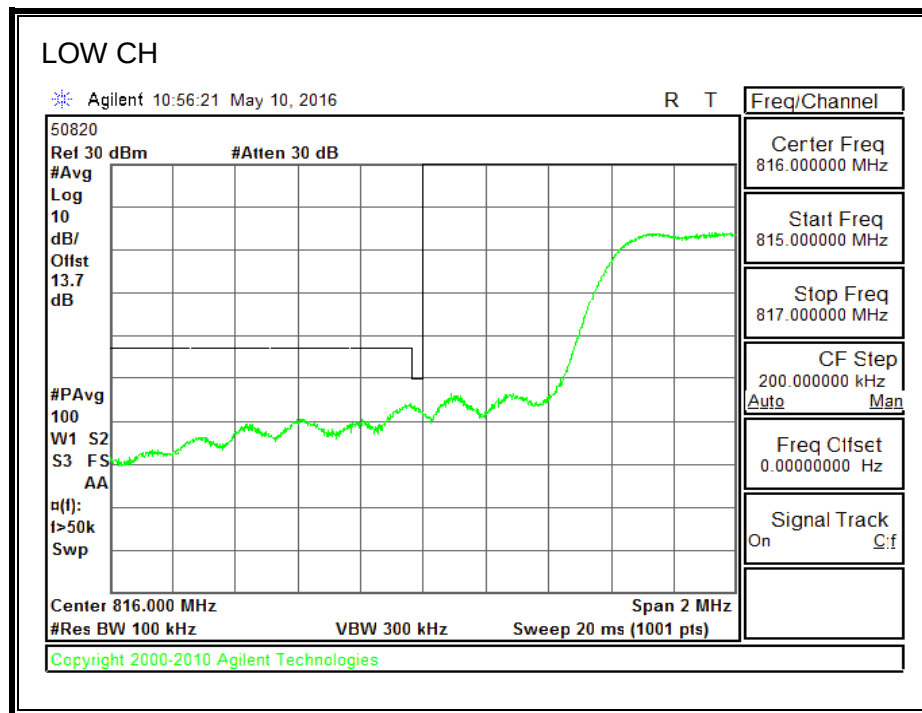




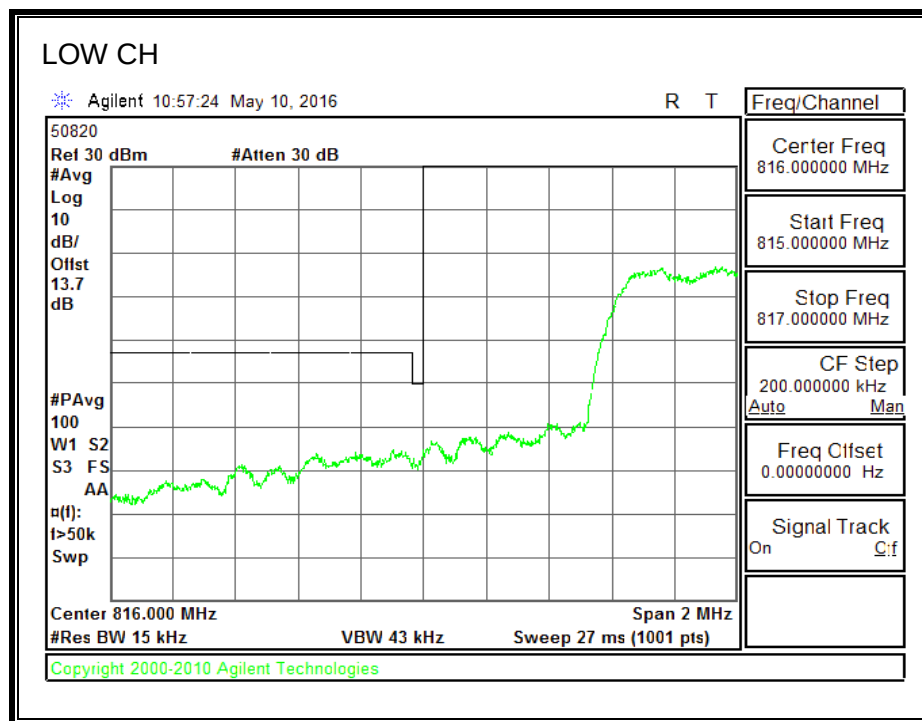
**1900MHz BAND**



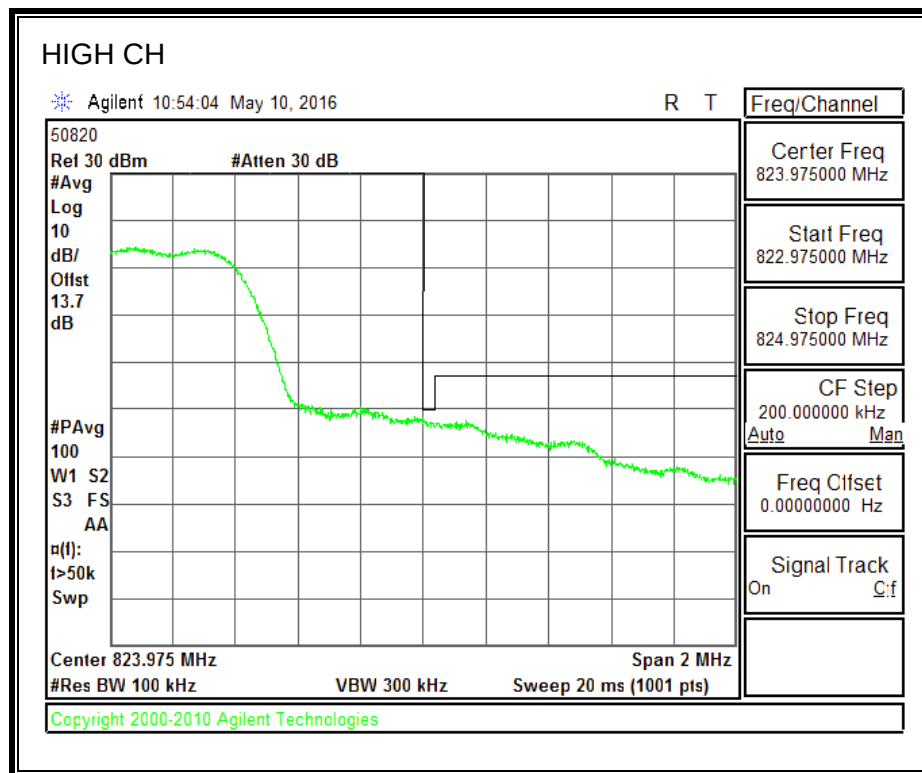
### 8.2.5. CDMA2000 EVDO REV A BC10 MASK



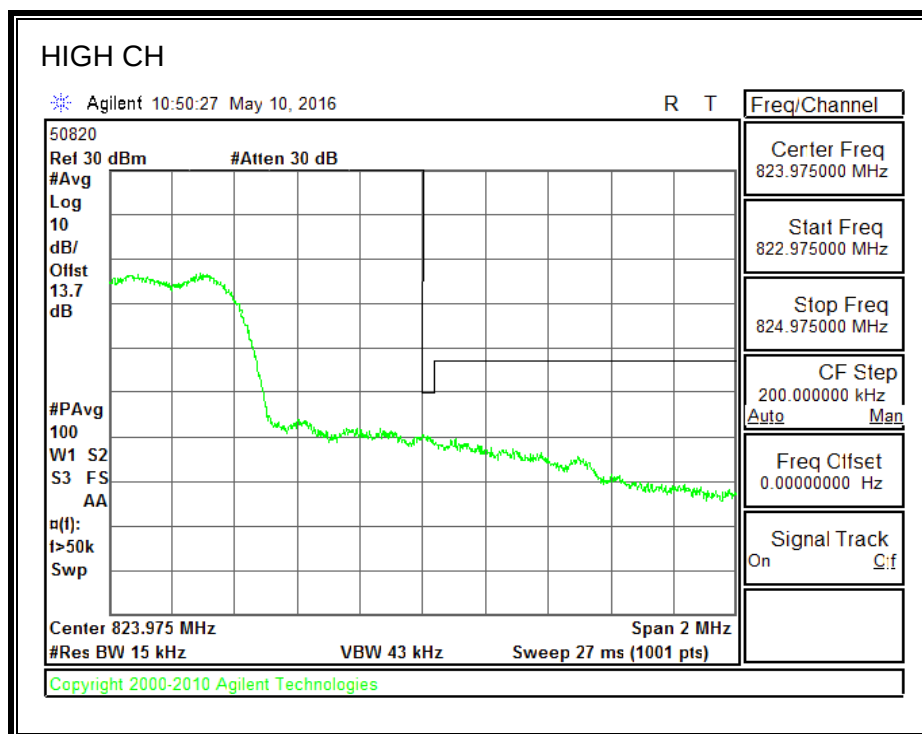
Note: RBW=1% of EBW



Note: RBW of 1% of 37.5KHz of outer channel frequency block



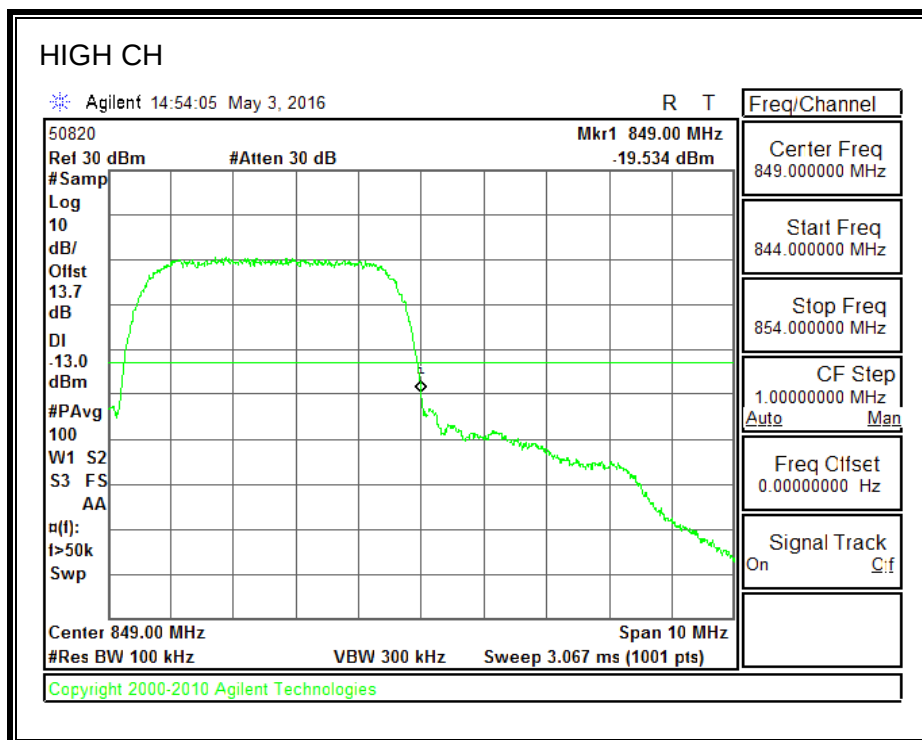
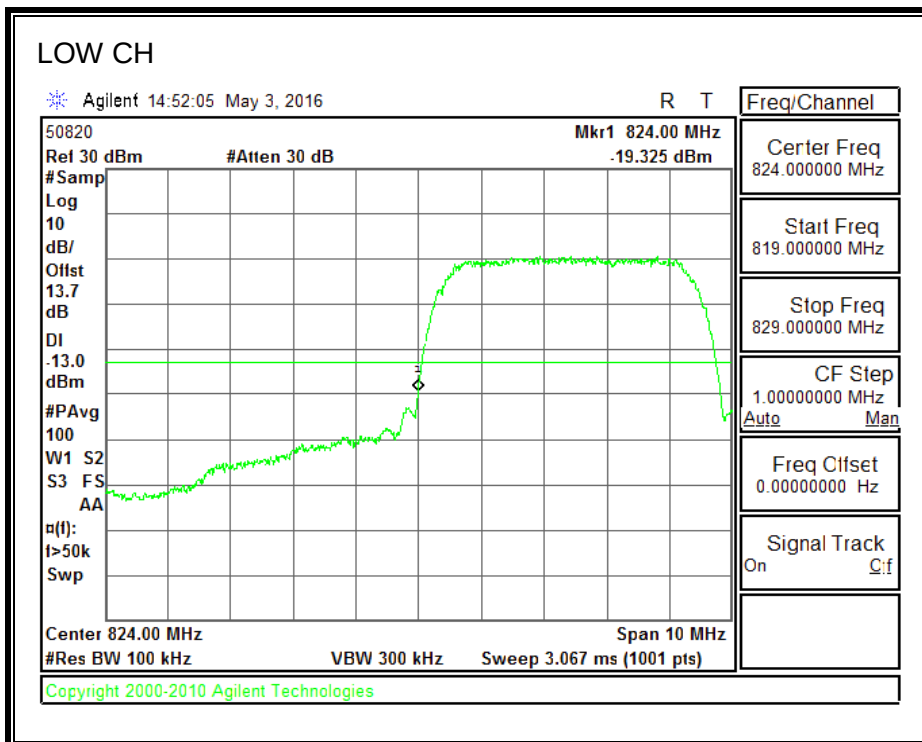
Note: RBW=1% of EBW



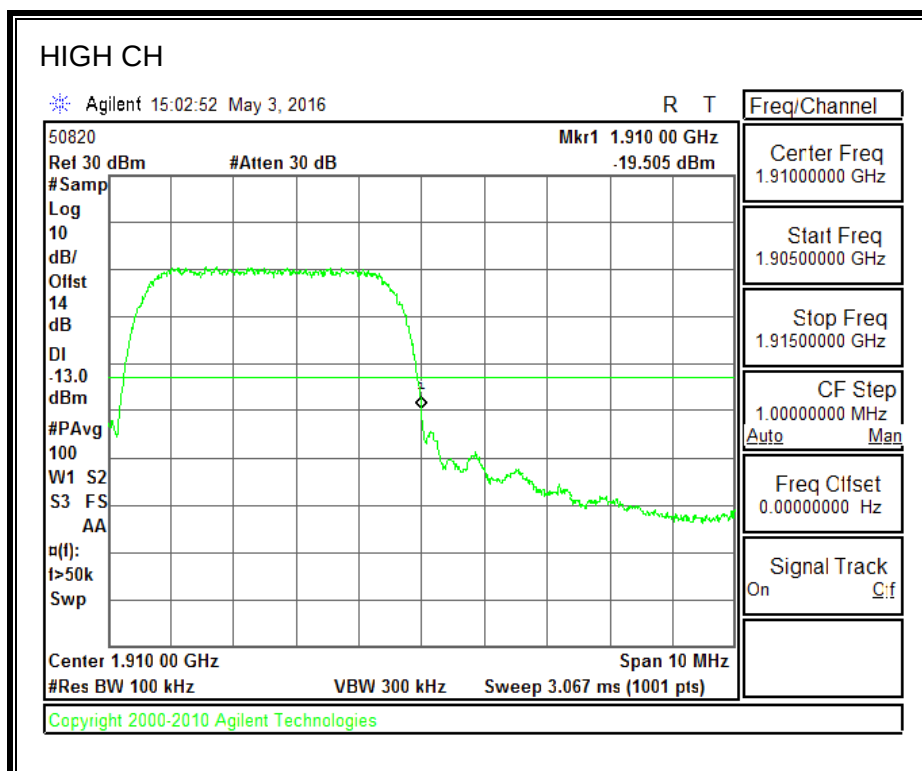
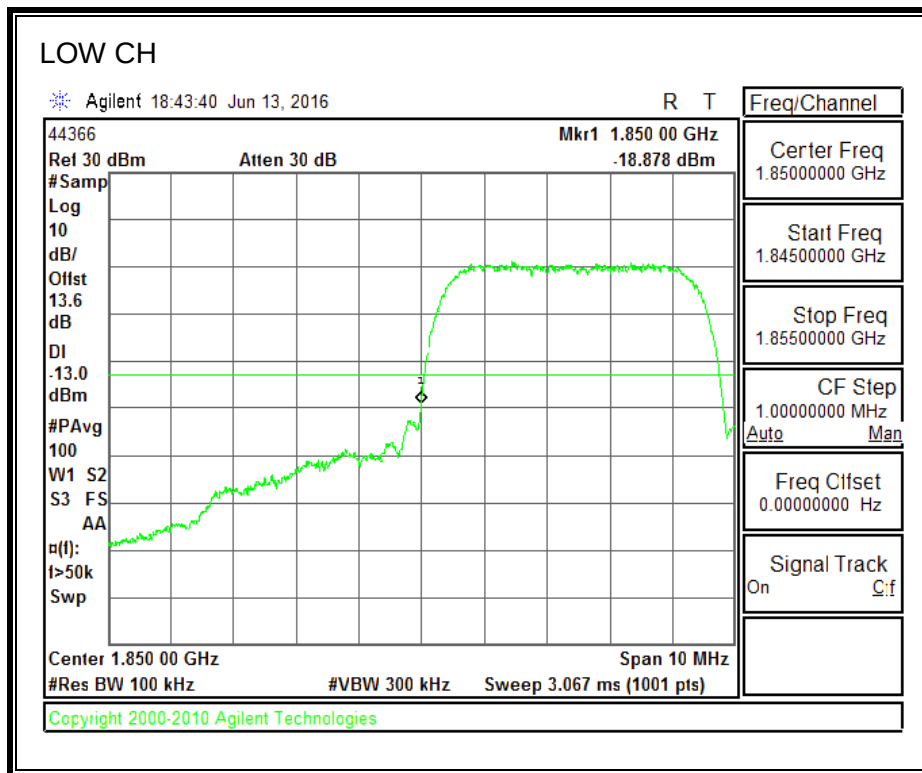
Note: RBW of 1% of 37.5KHz of outer channel frequency block

## 8.2.6. UMTS REL 99

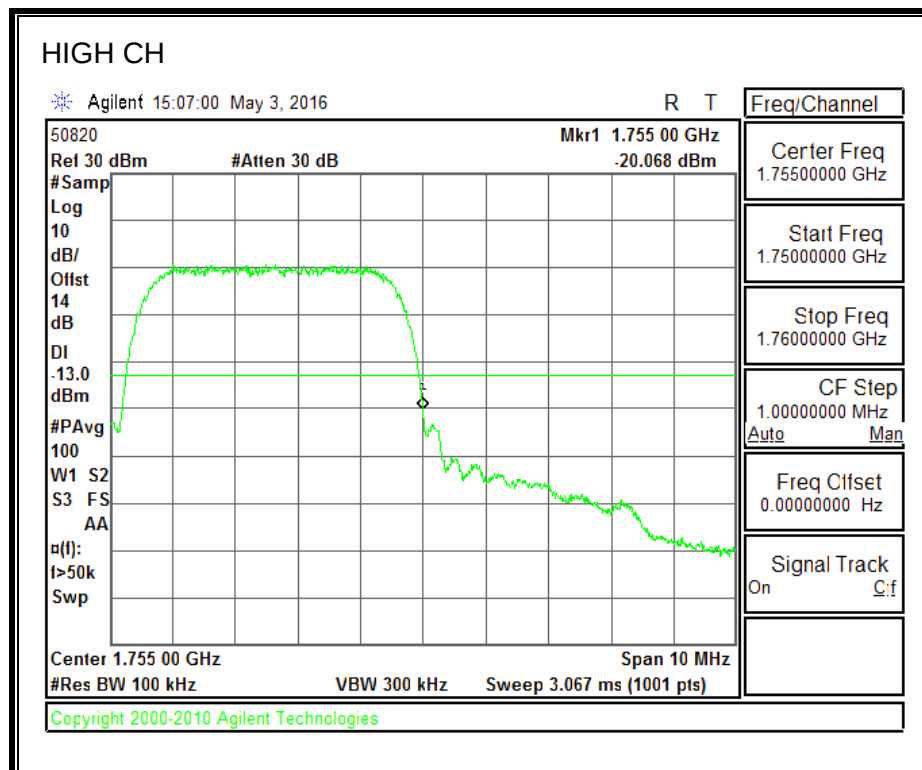
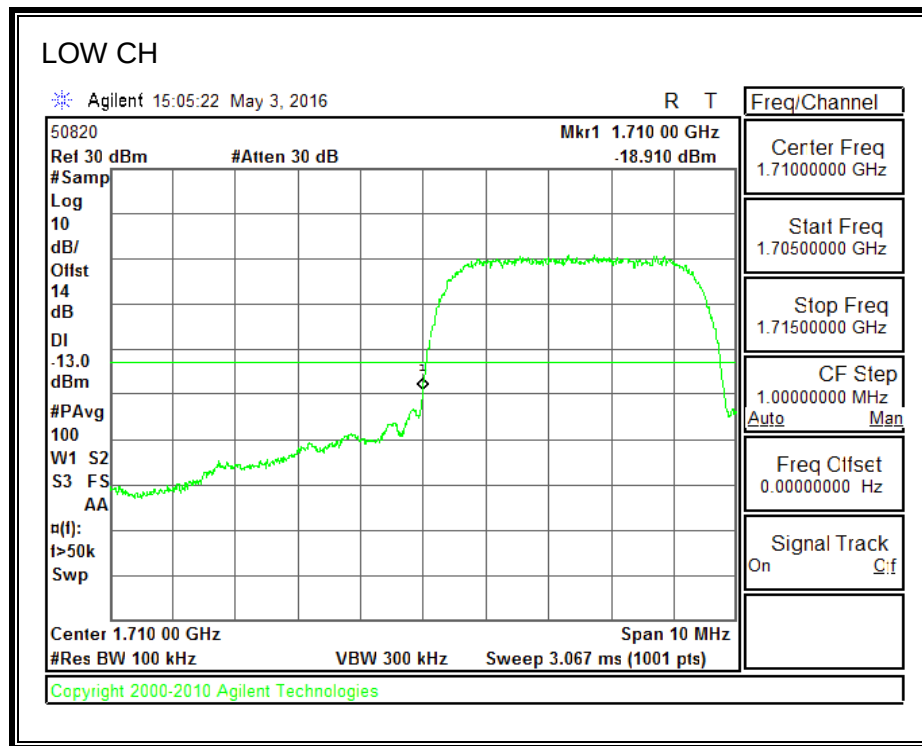
### 850MHz BAND



**1900MHz BAND**

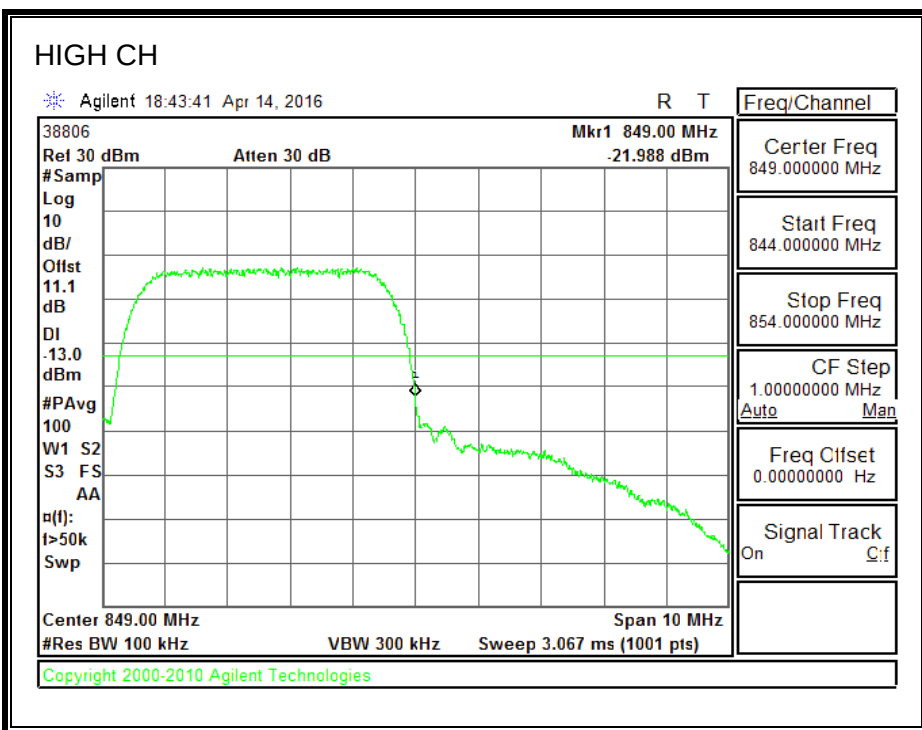
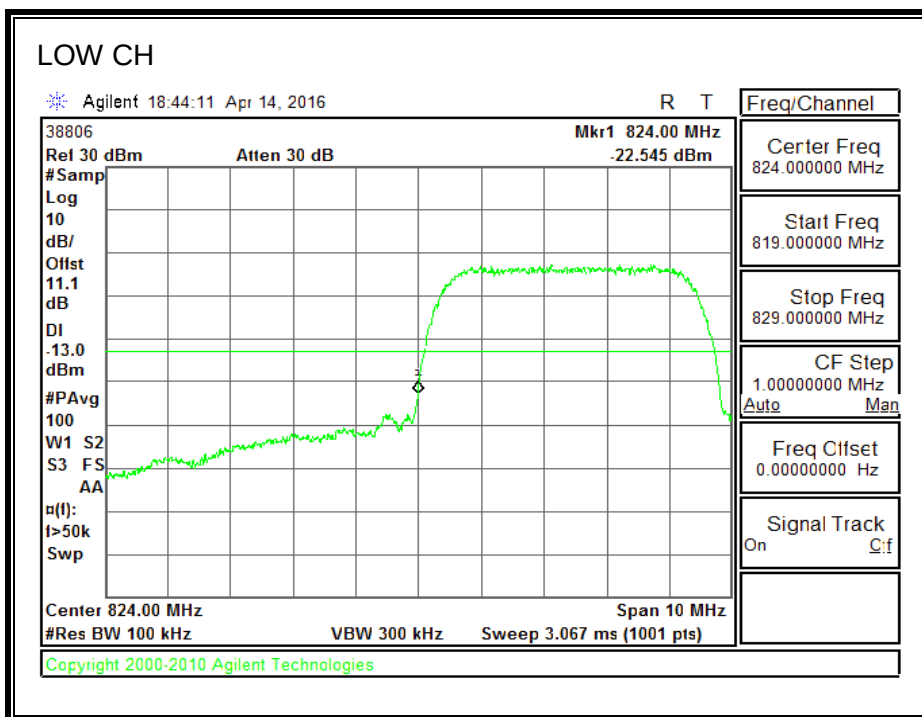


**1700MHz BAND**

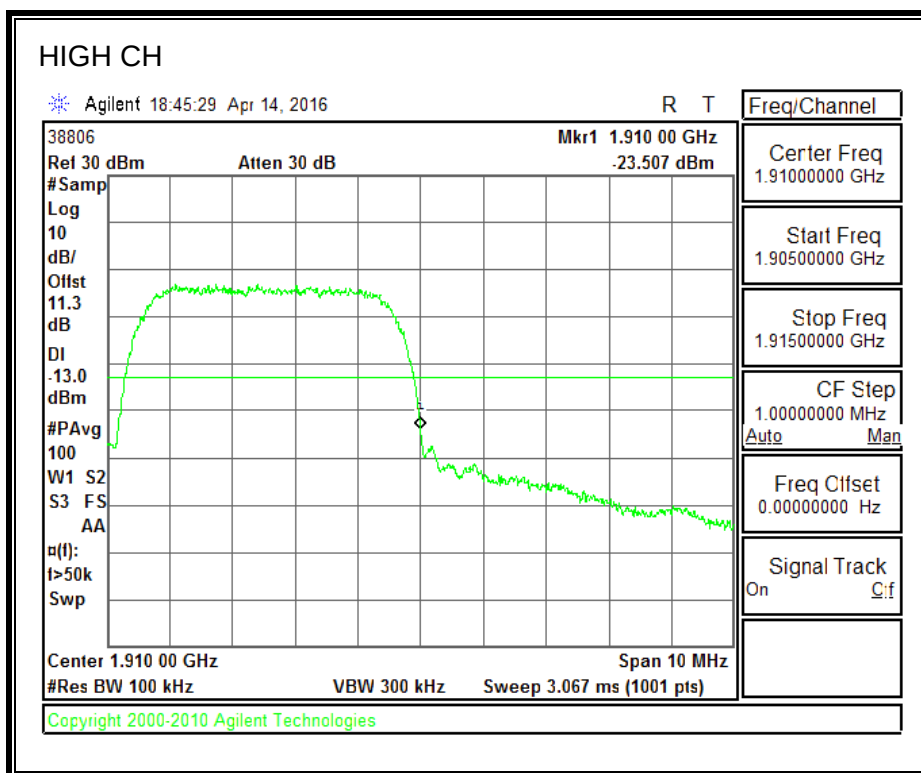
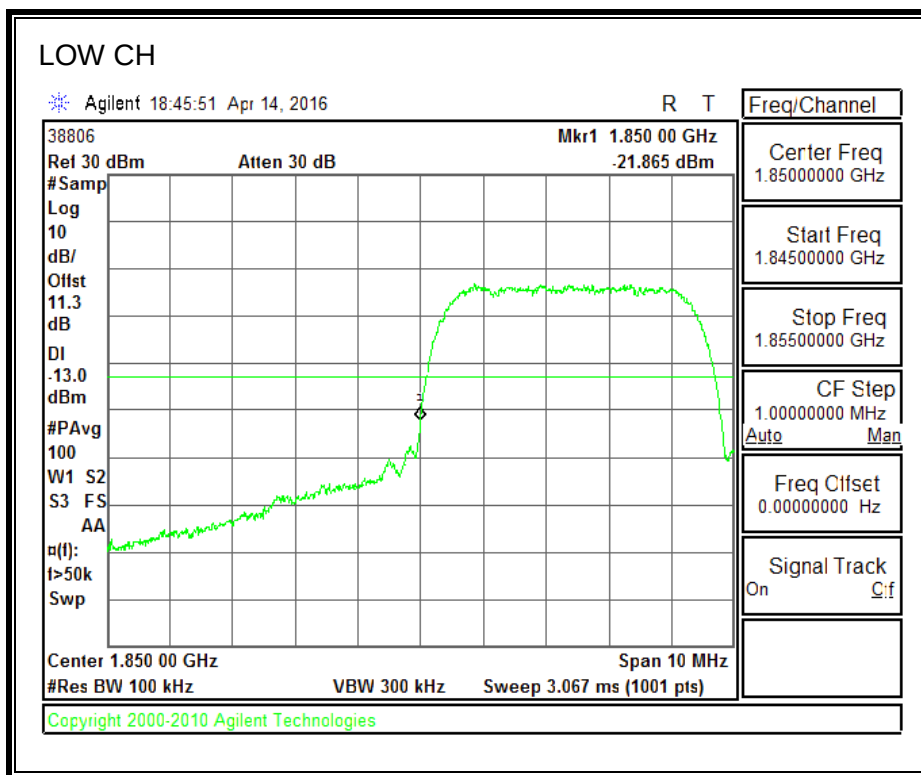


## 8.2.7. UMTS HSDPA

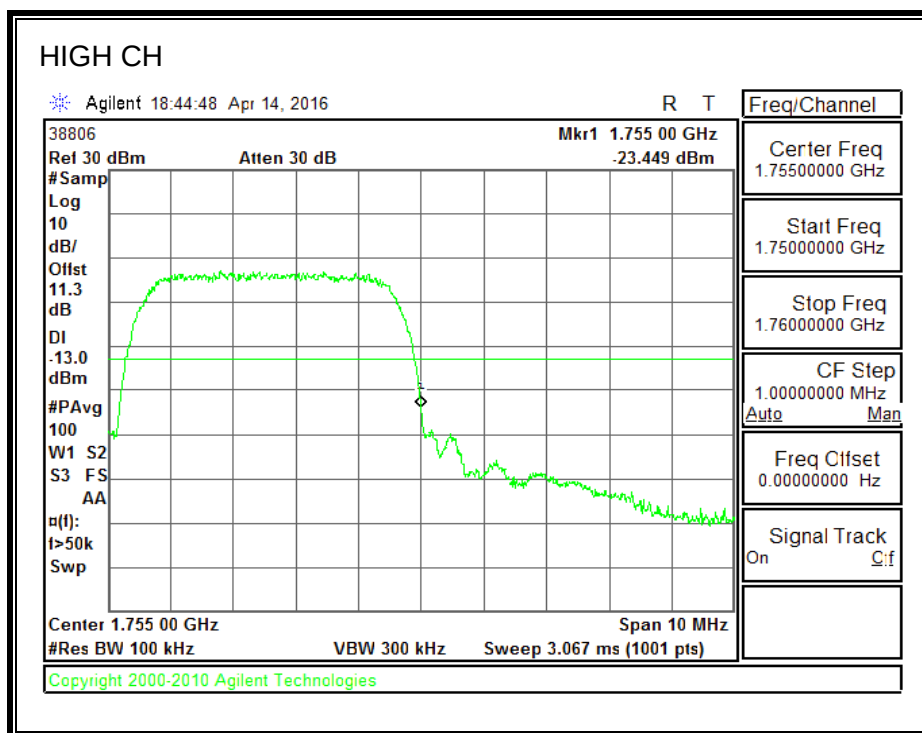
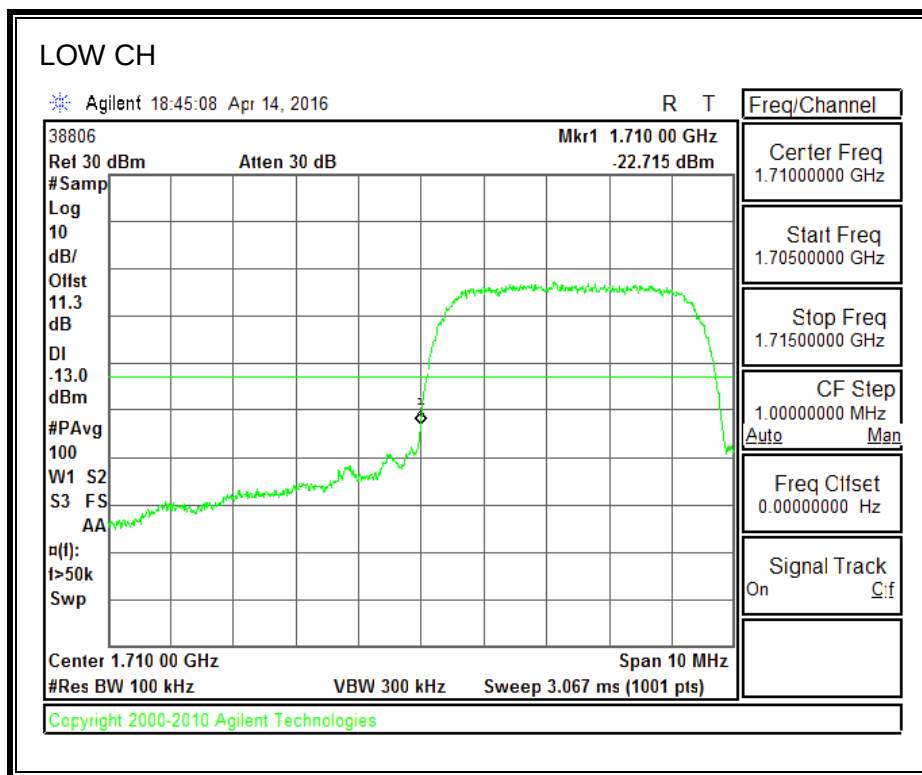
### 850MHz BAND



**1900MHz BAND**



# **1700MHz BAND**



### **8.3. OUT OF BAND EMISSIONS**

#### **RULE PART(S)**

FCC: §2.1051, §22.901, §22.917, §24.238 and §90.691

#### **LIMITS**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

#### **TEST PROCEDURE**

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

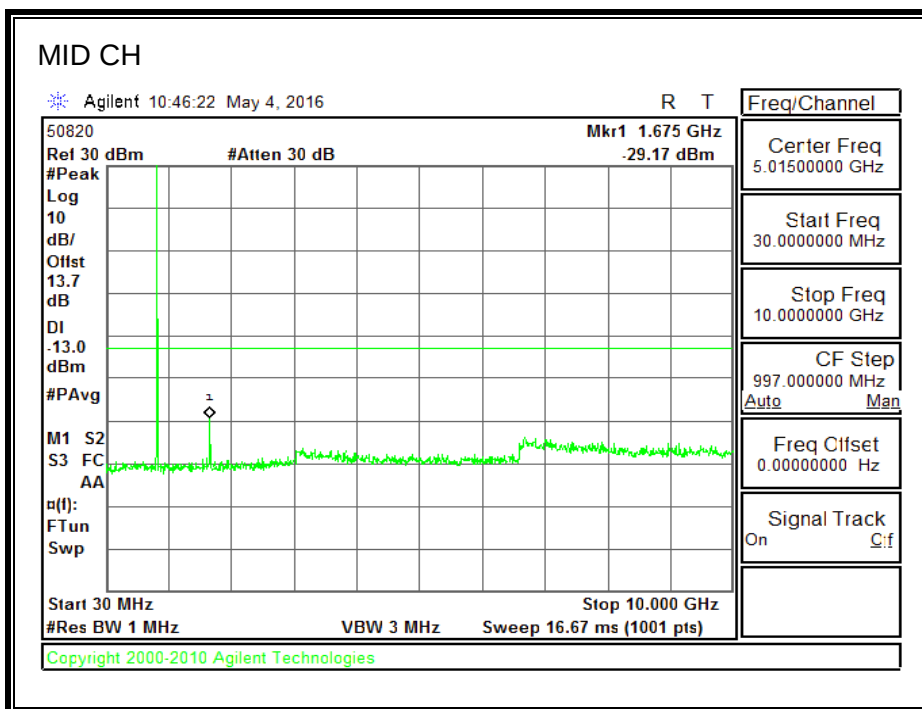
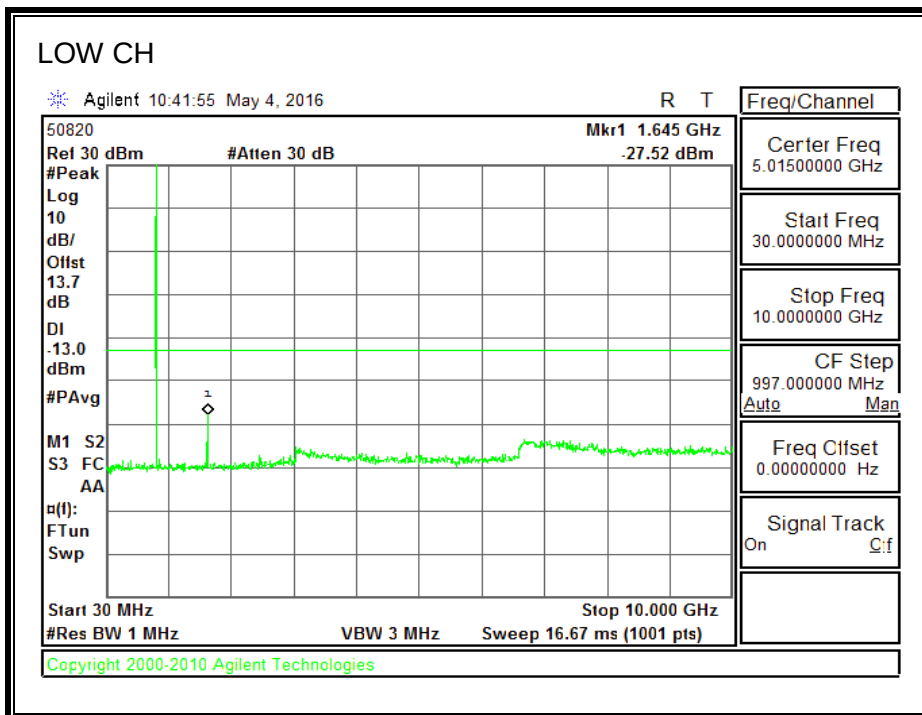
For each out of band emissions measurement:

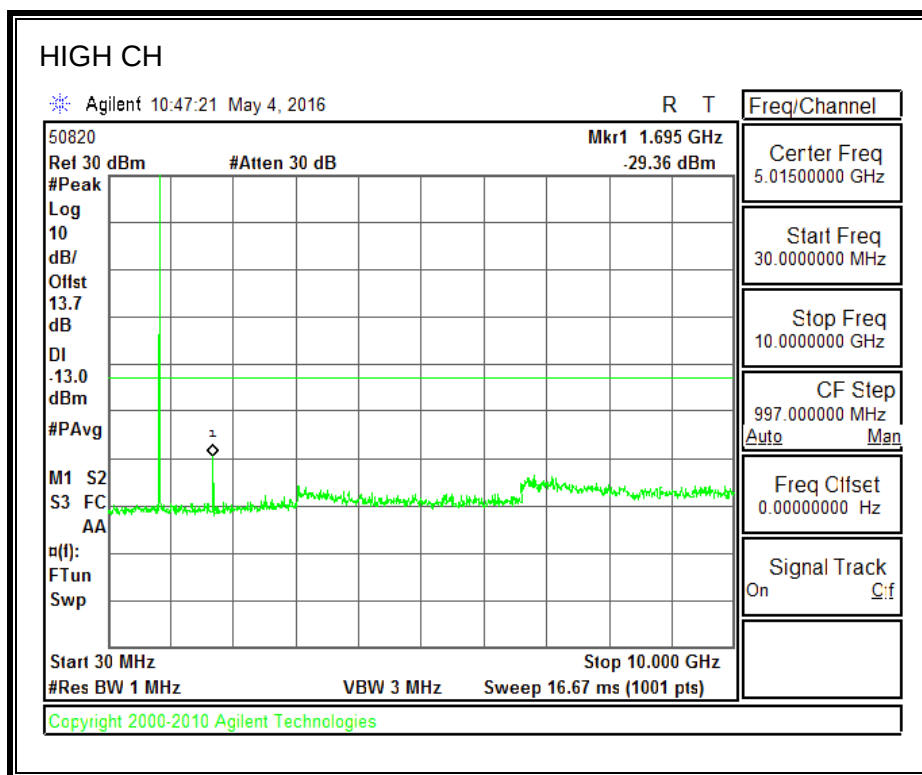
- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

#### **RESULTS**

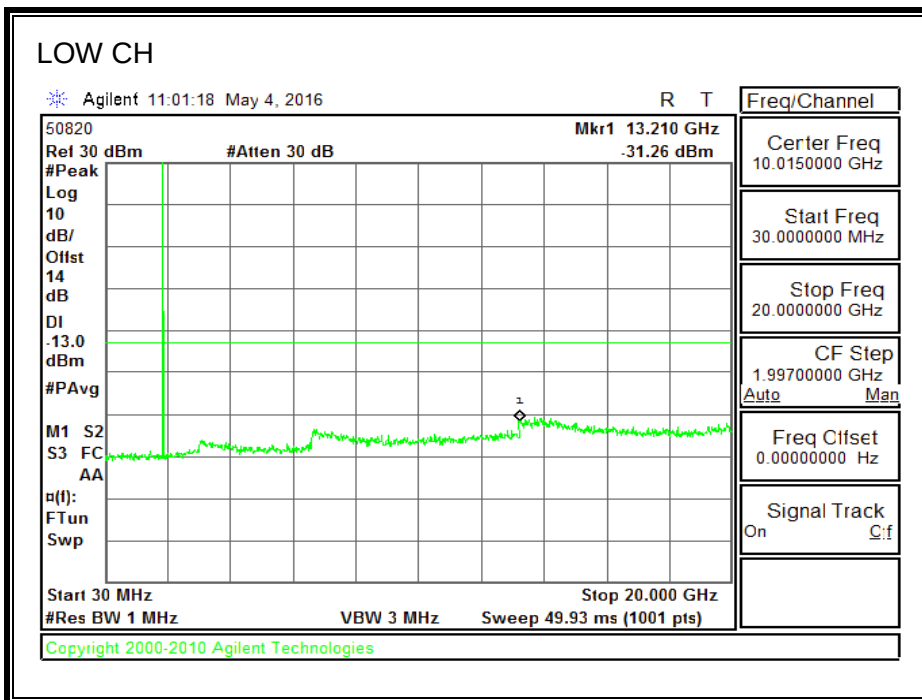
### 8.3.1. GSM-GPRS

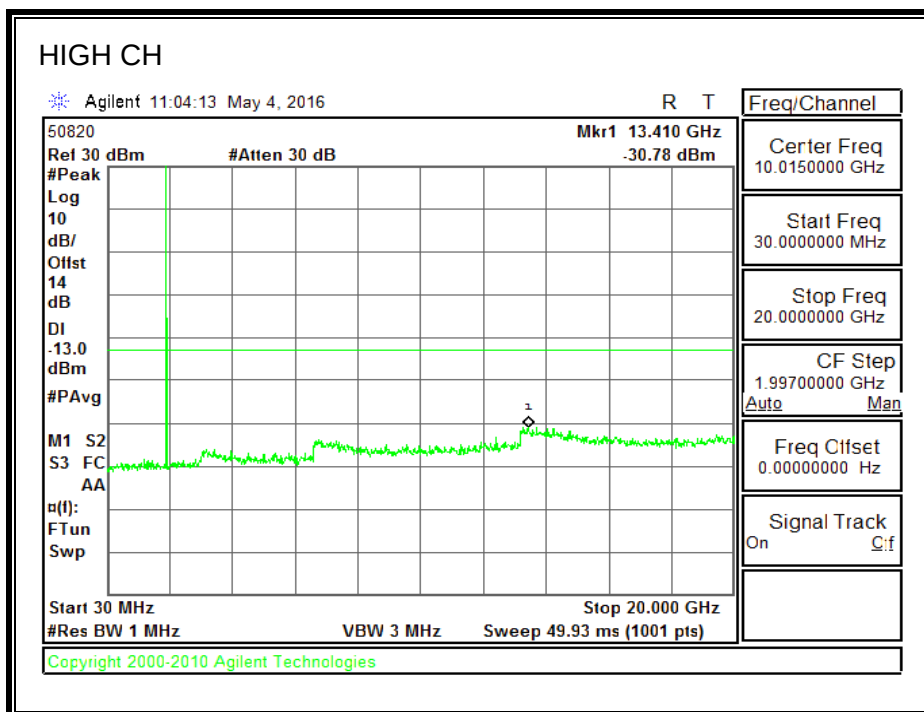
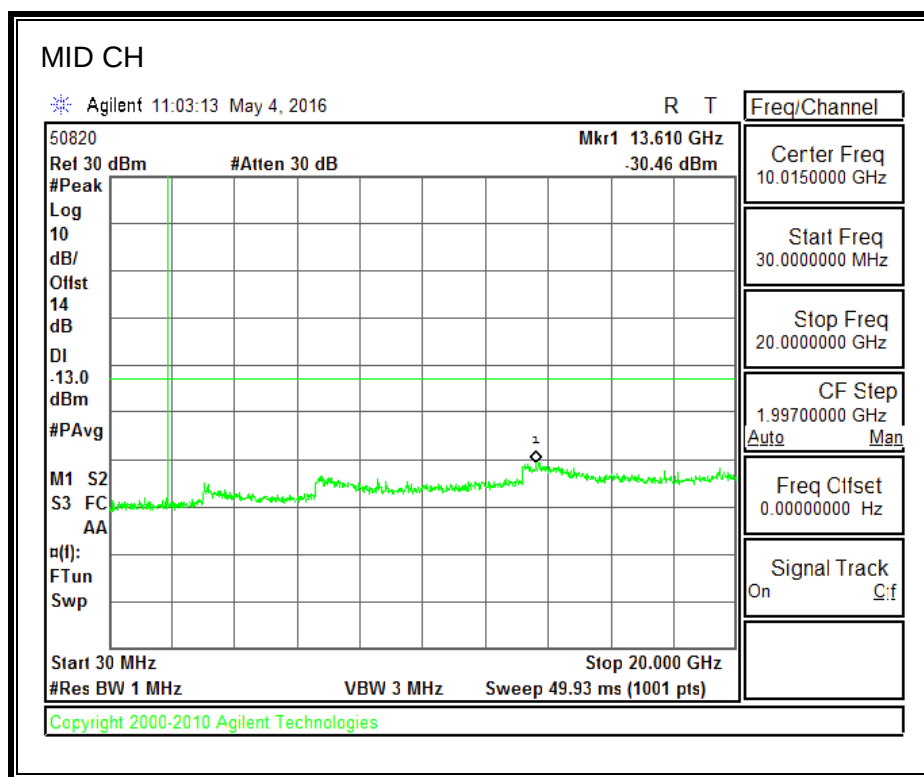
#### 850MHz BAND





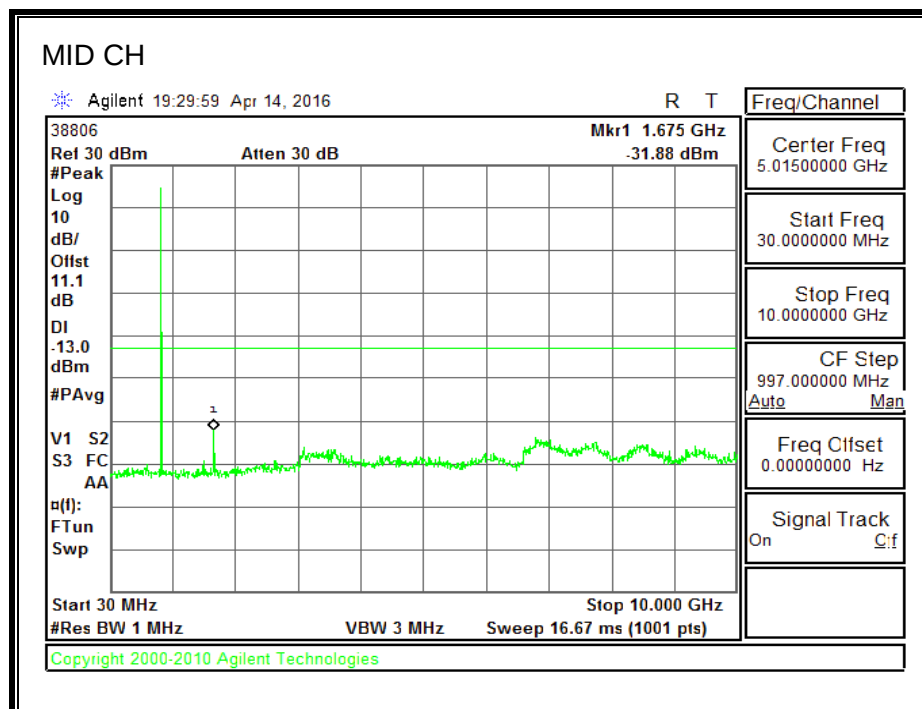
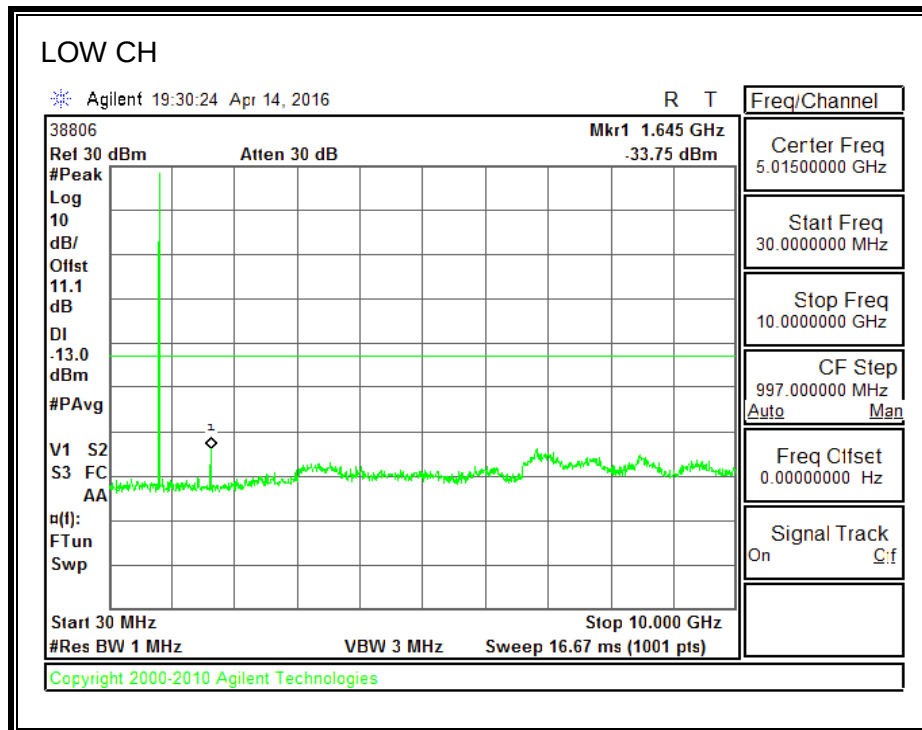
## 1900MHz BAND

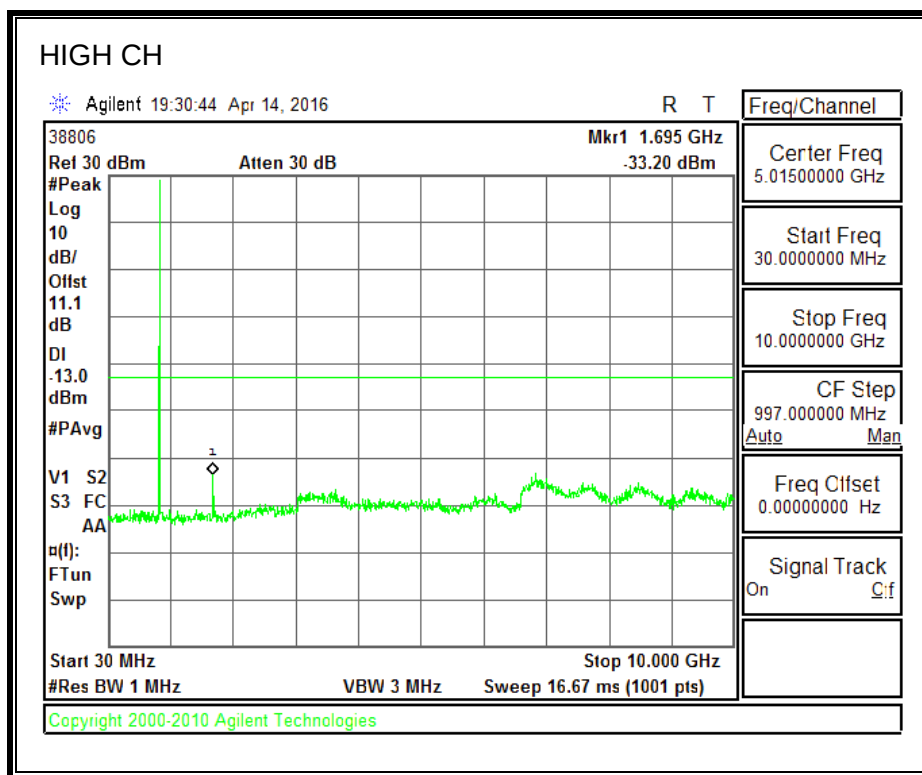




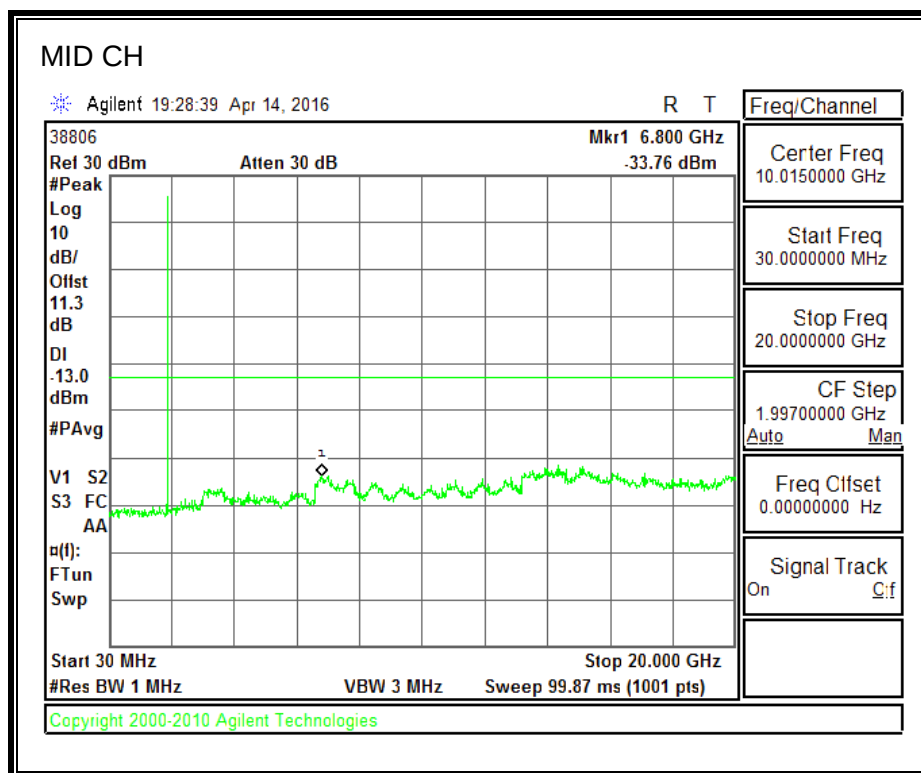
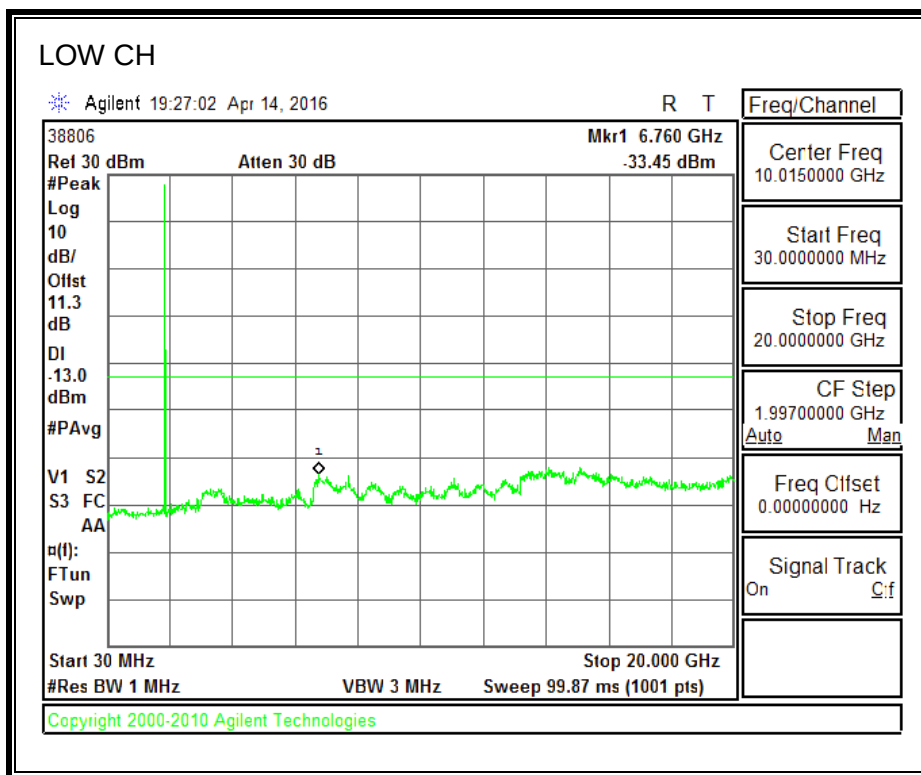
### 8.3.2. GSM-EGPRS

#### 850MHz BAND

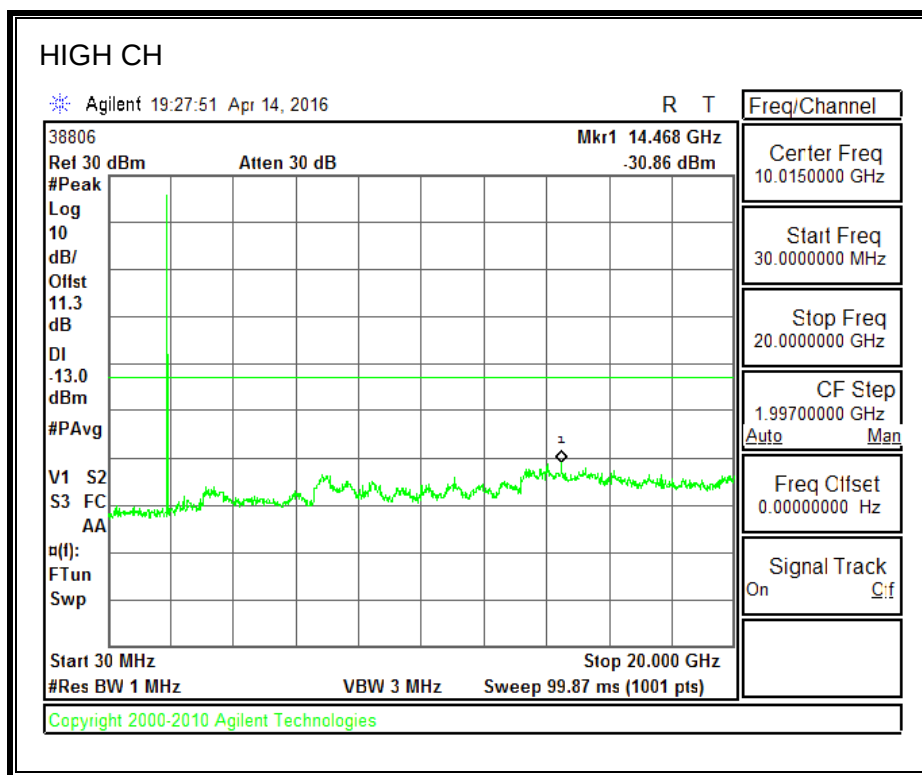




**1900MHz BAND**

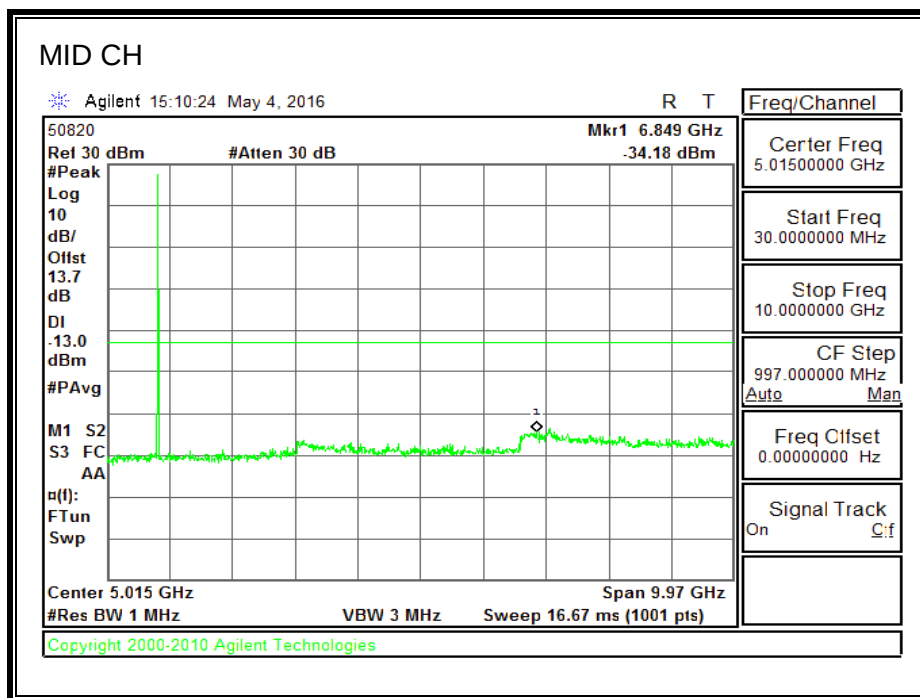
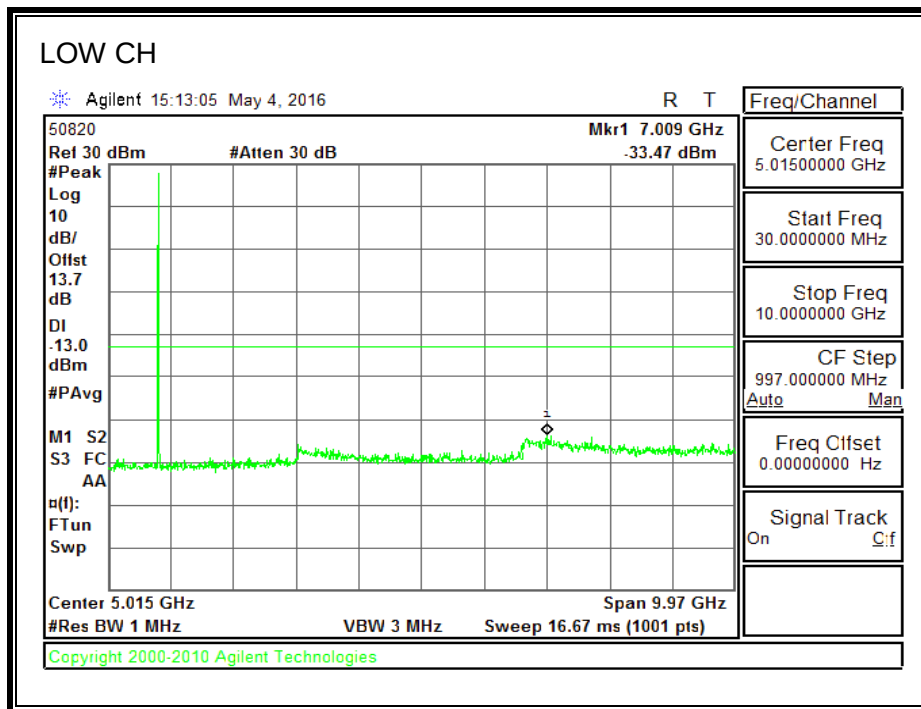


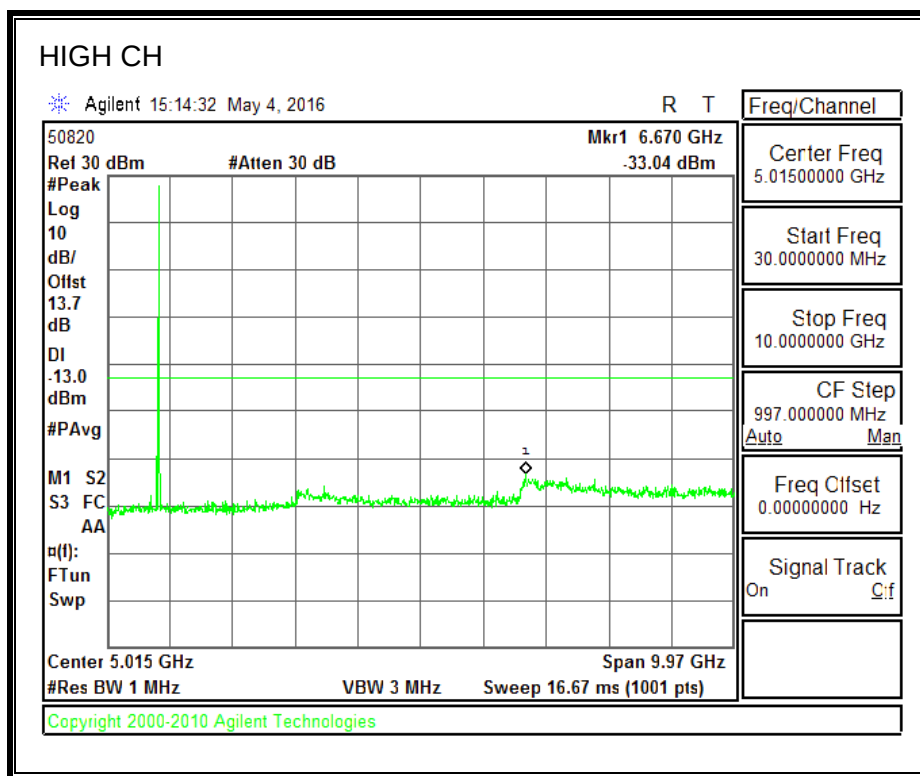




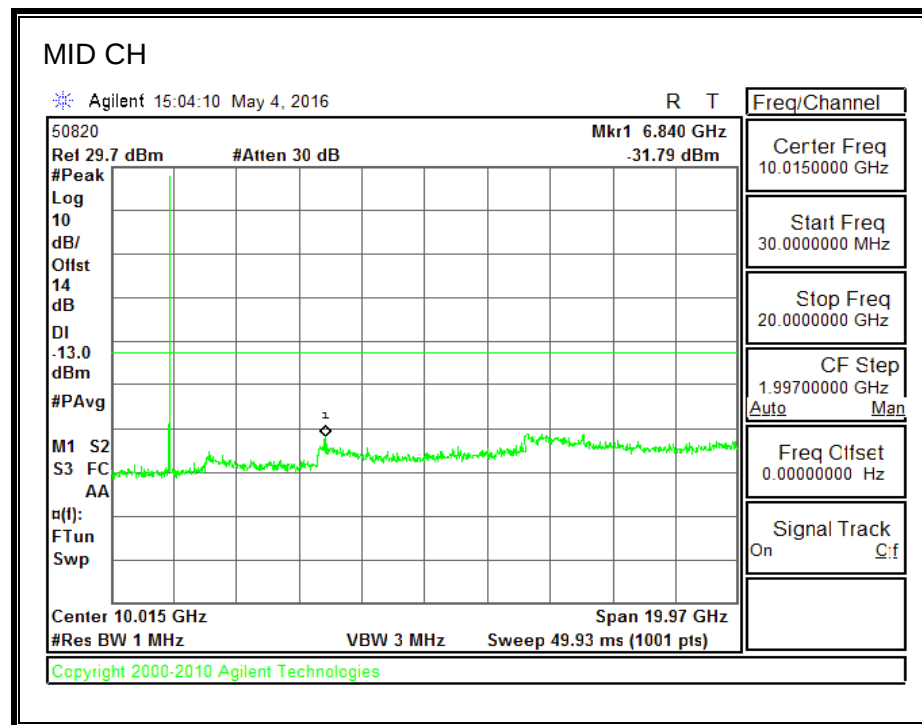
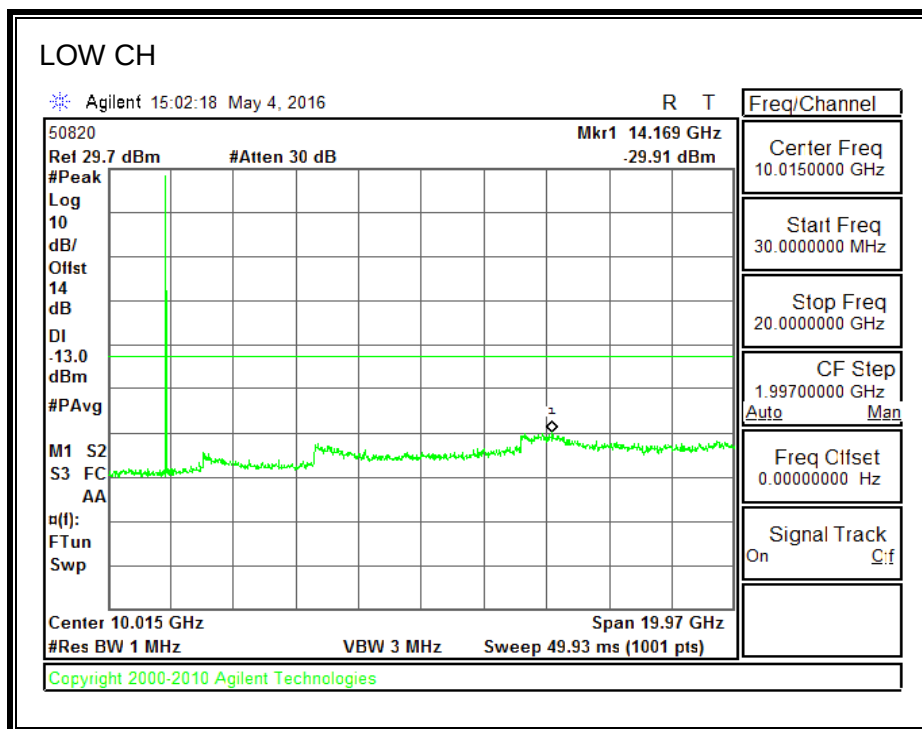
### 8.3.3. CDMA2000 1xRTT

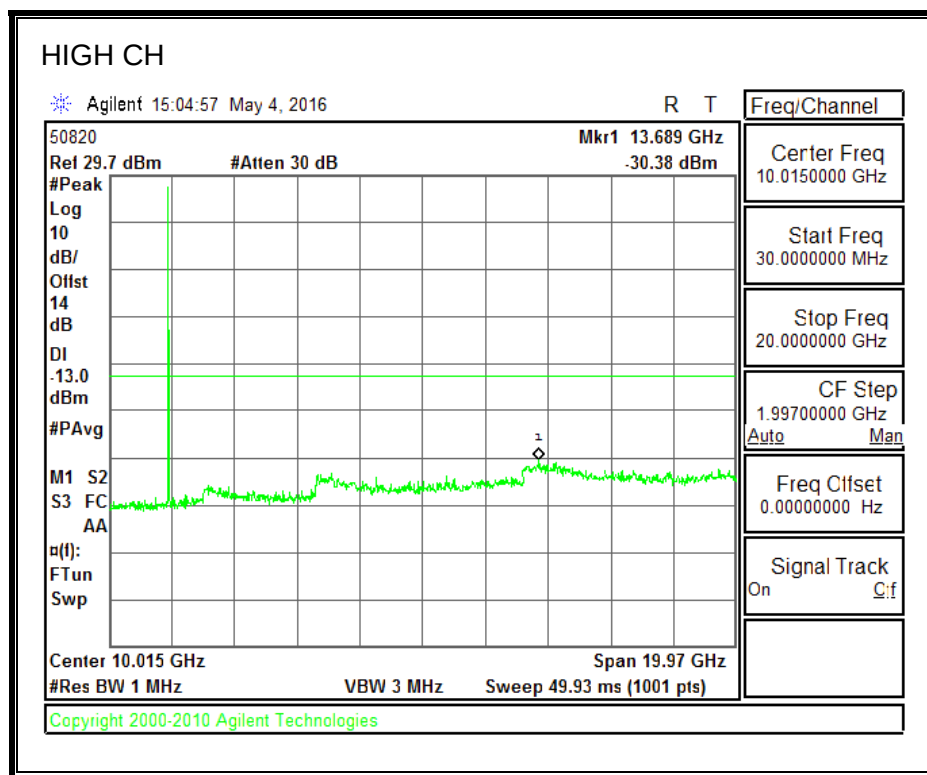
#### 850MHz BAND



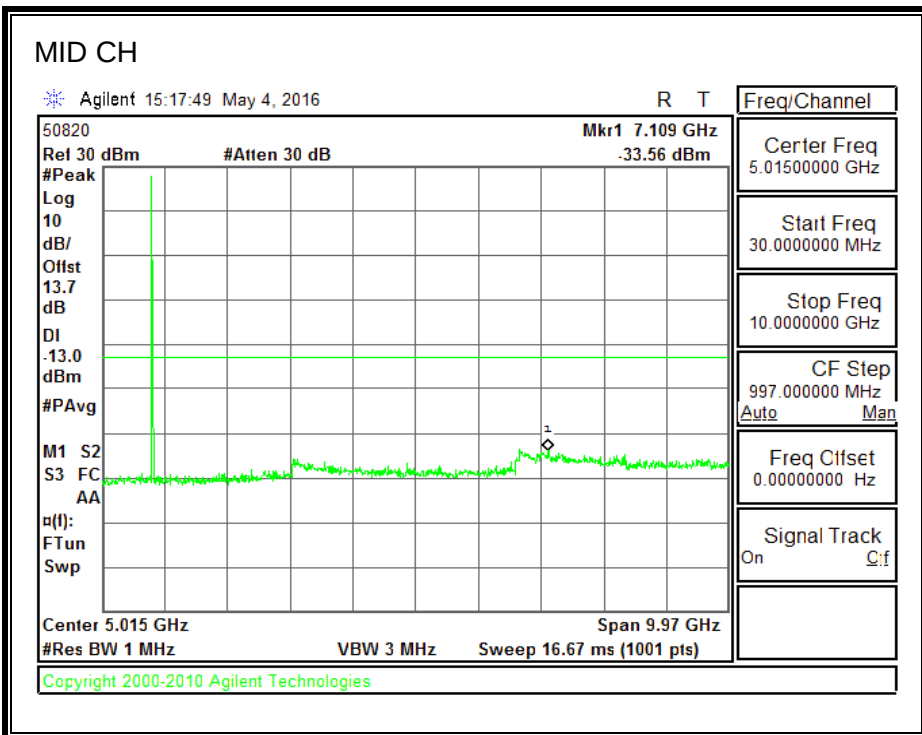
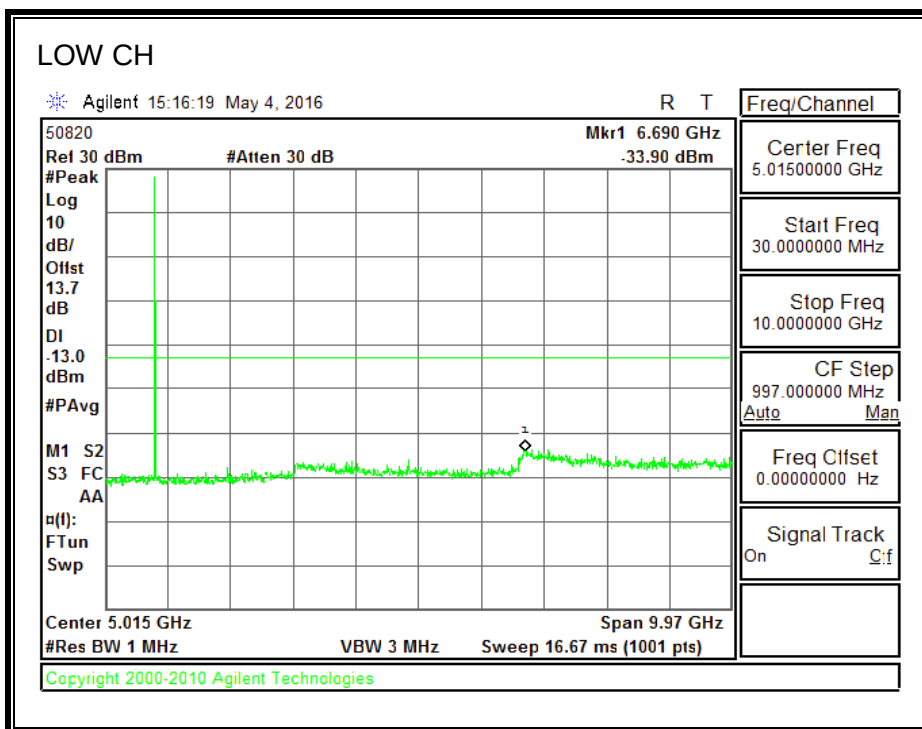


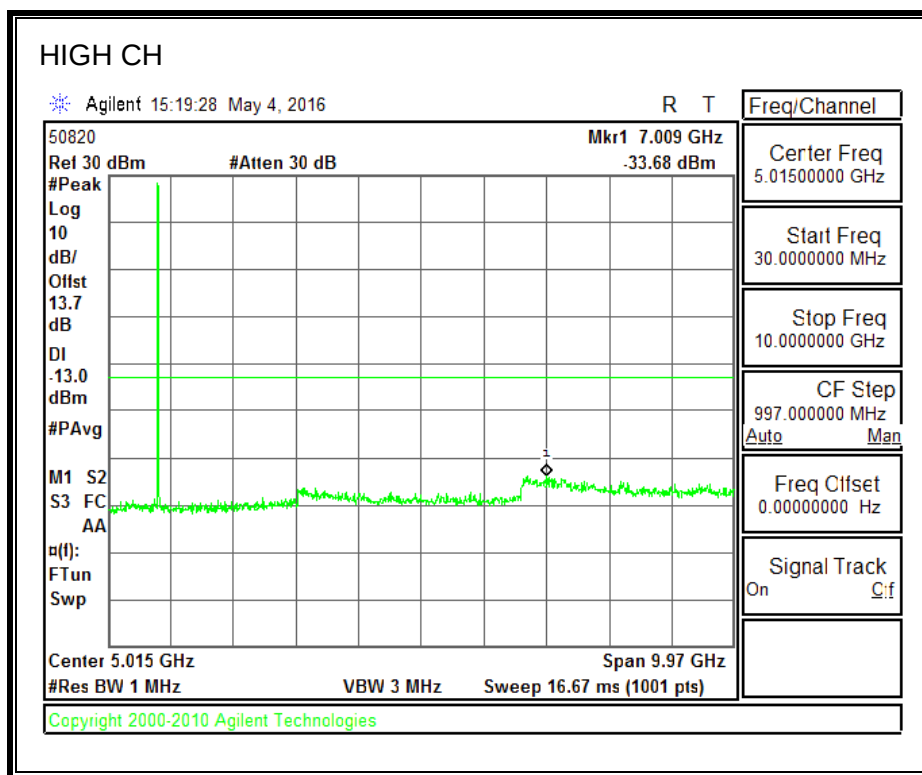
**1900MHz BAND**





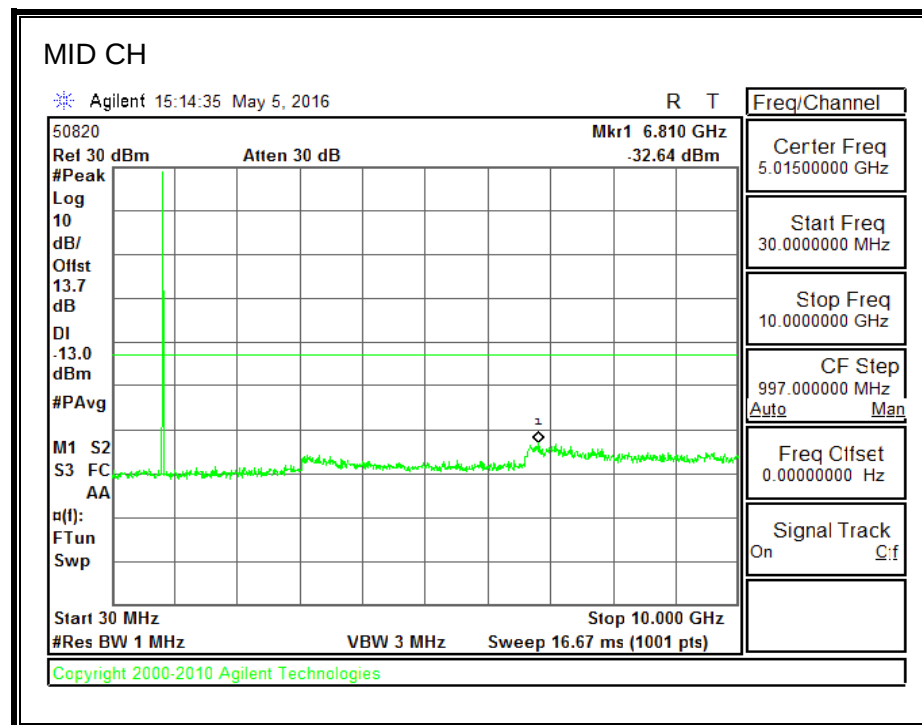
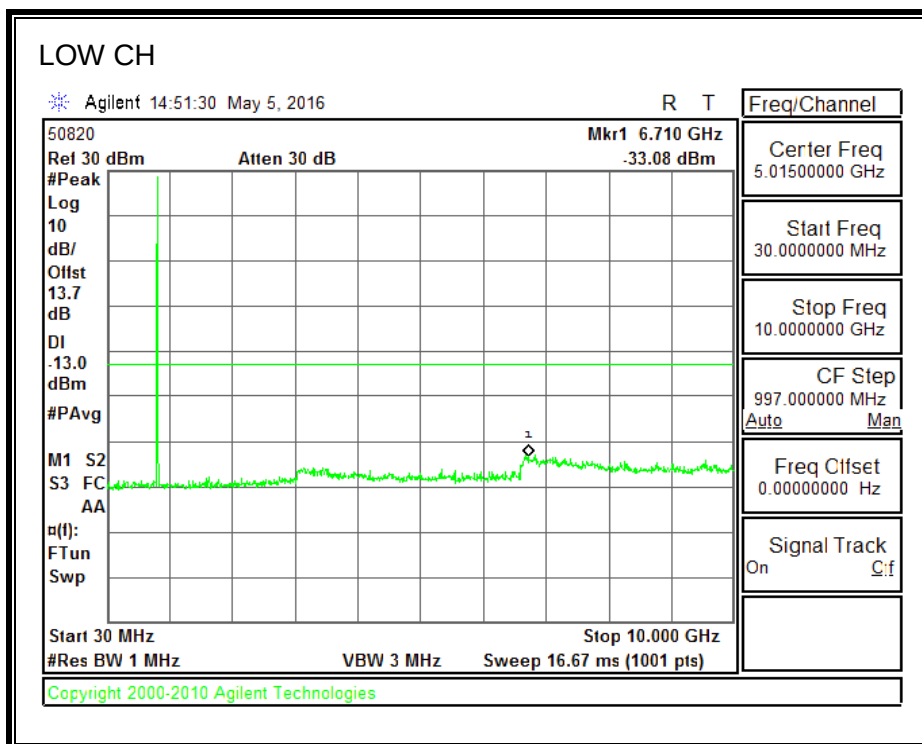
**800MHz SECONDARY BAND**



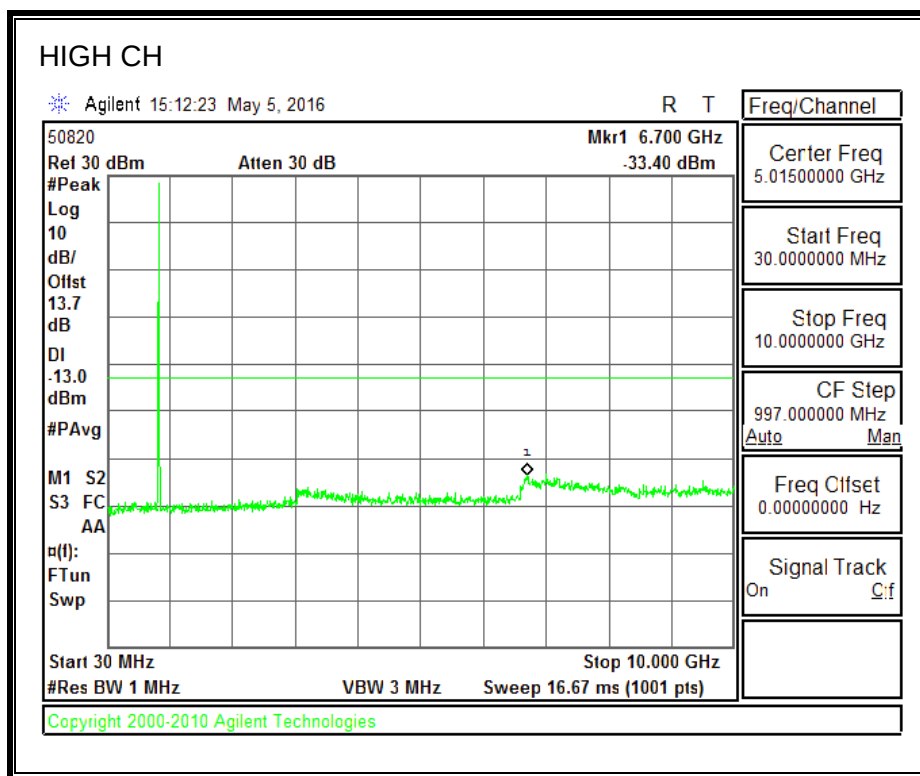


### 8.3.4. CDMA2000 EVDO REV A

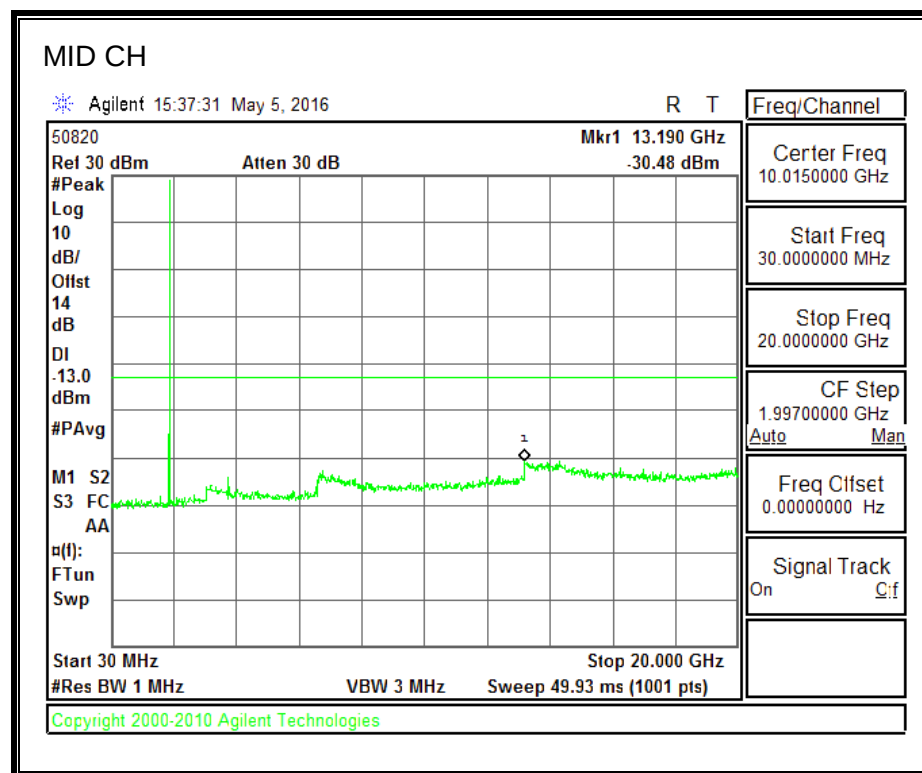
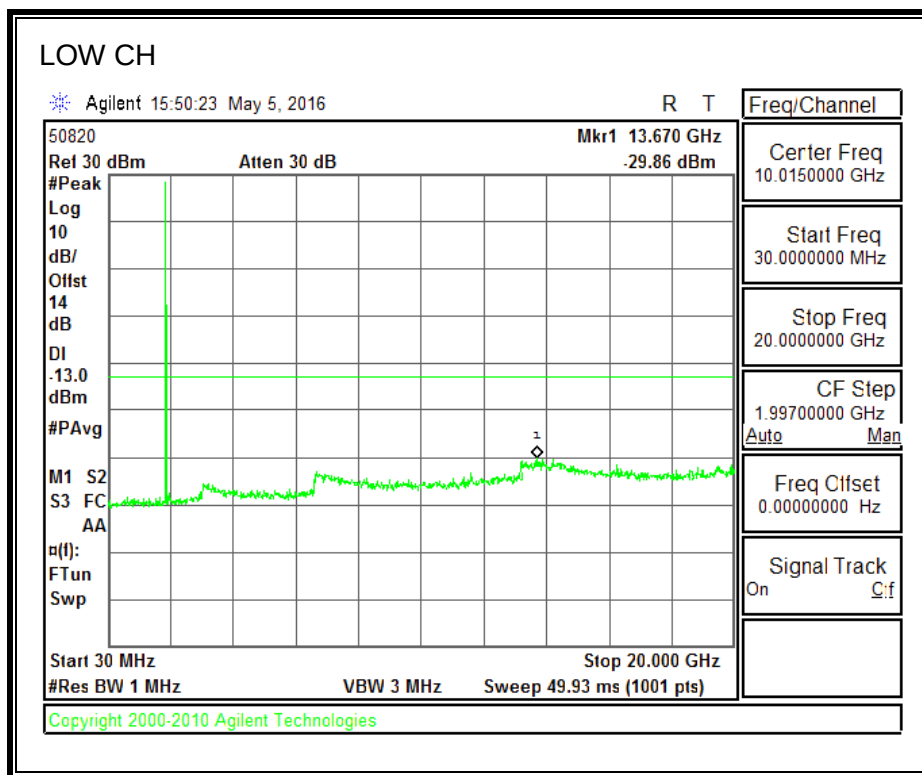
#### 850MHz BAND



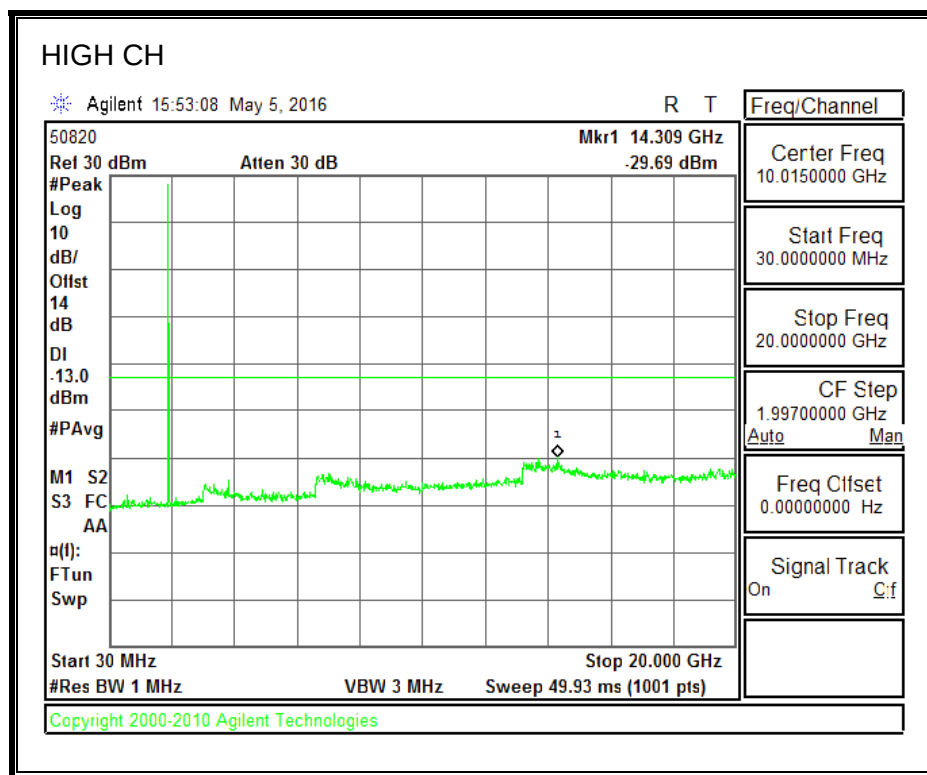




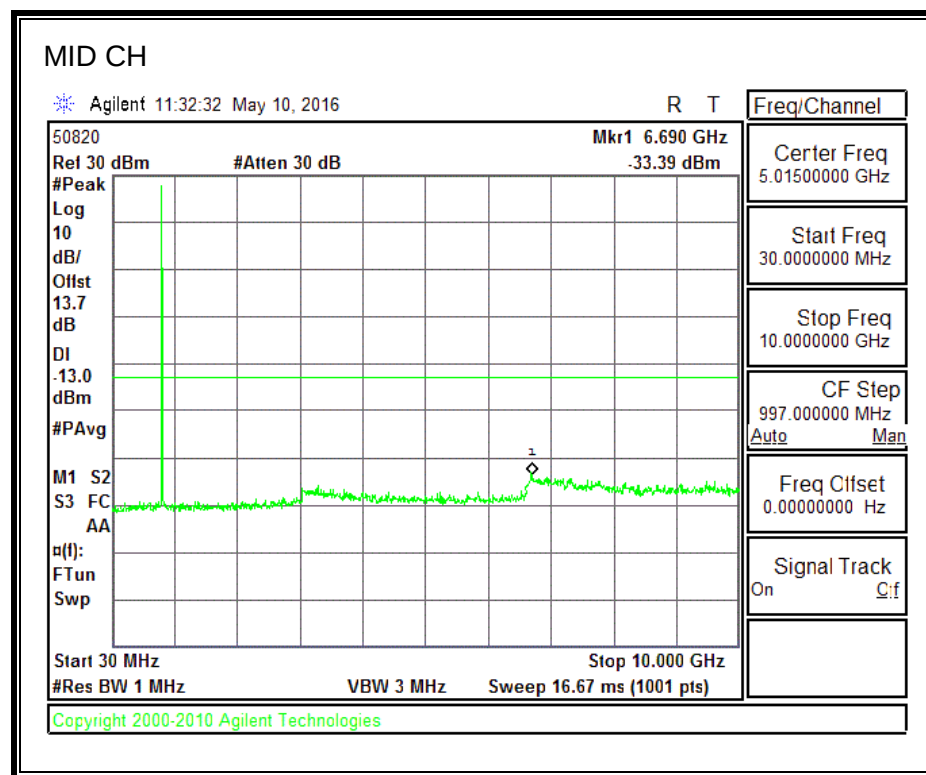
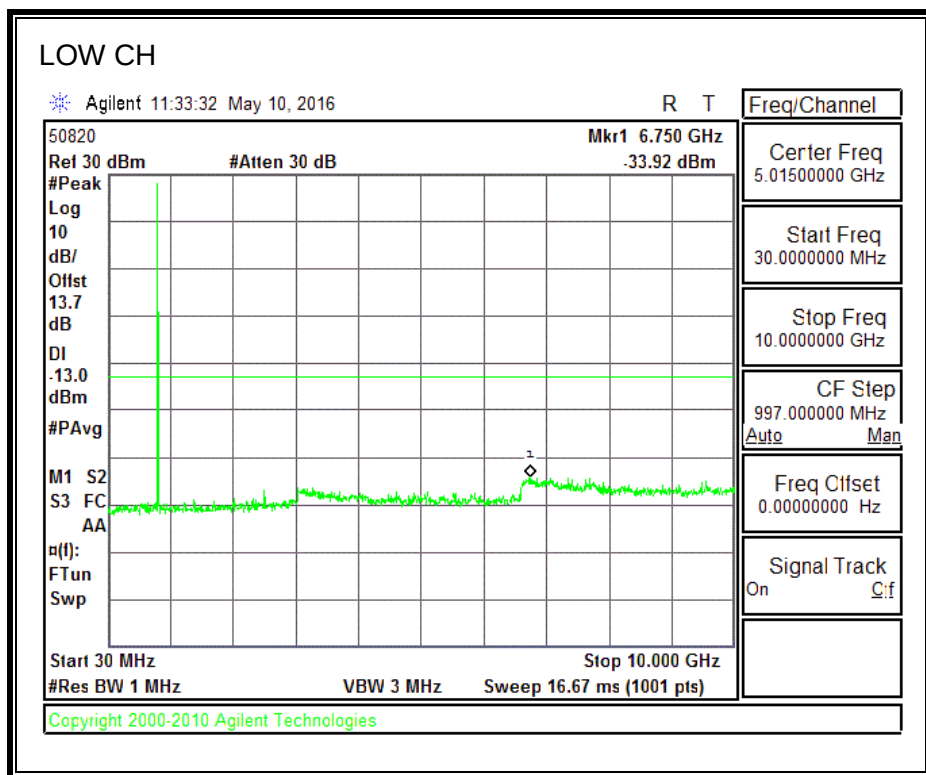
**1900MHz BAND**



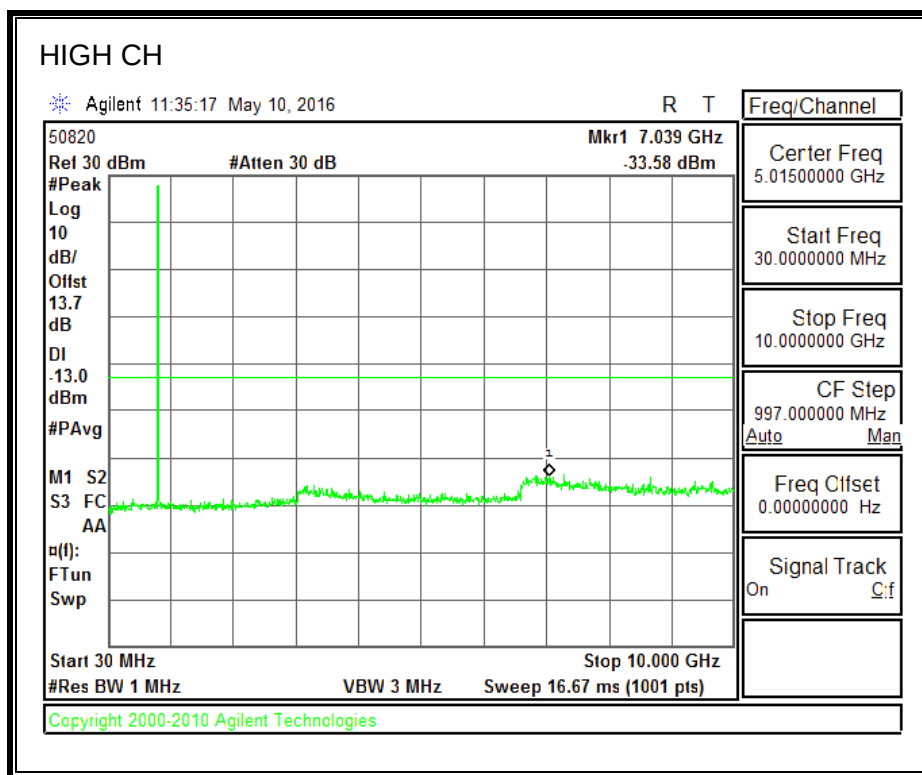




**800MHz SECONDARY BAND**

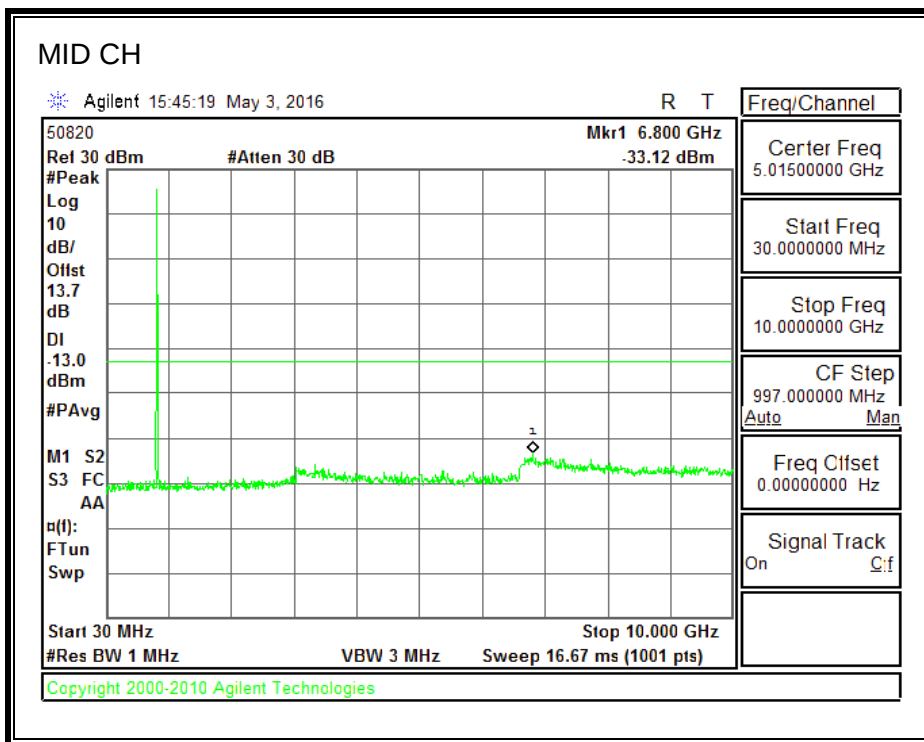
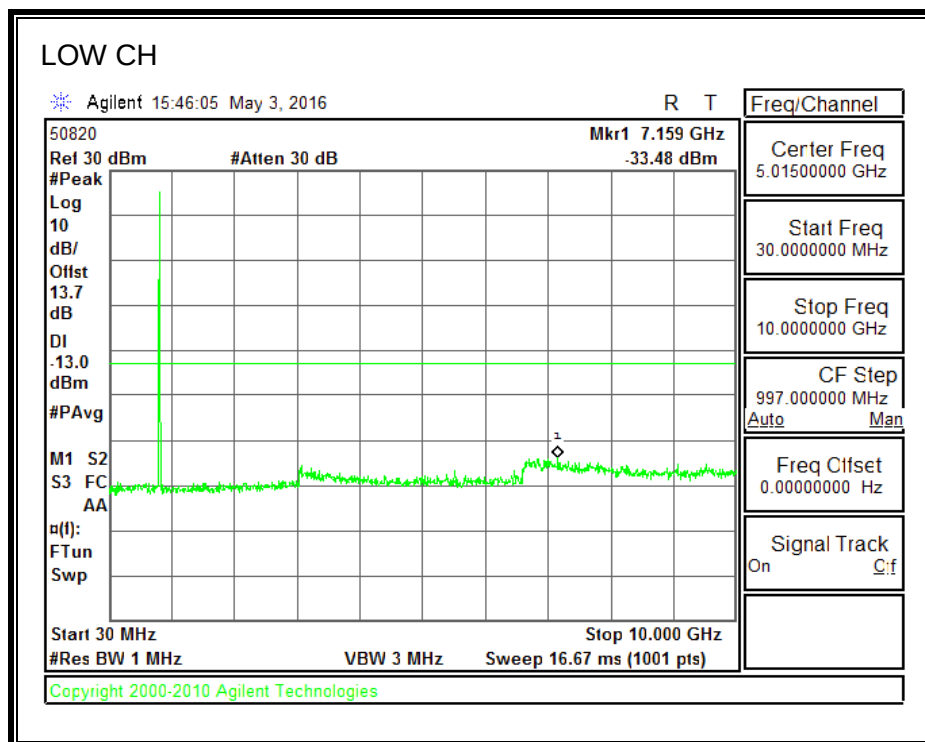




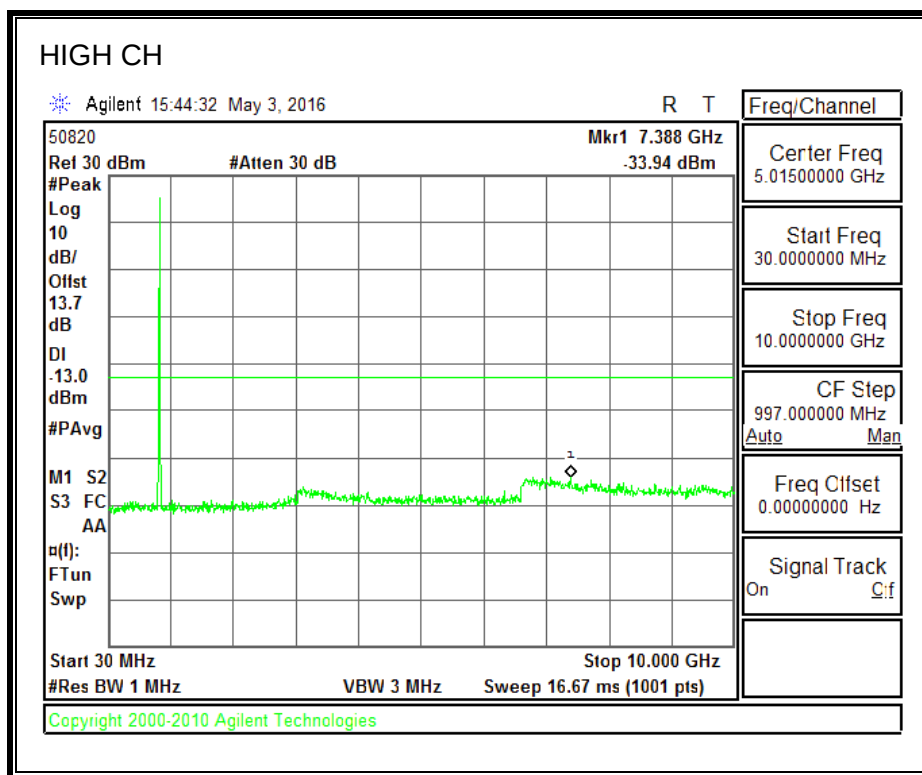


### 8.3.5. UMTS REL 99

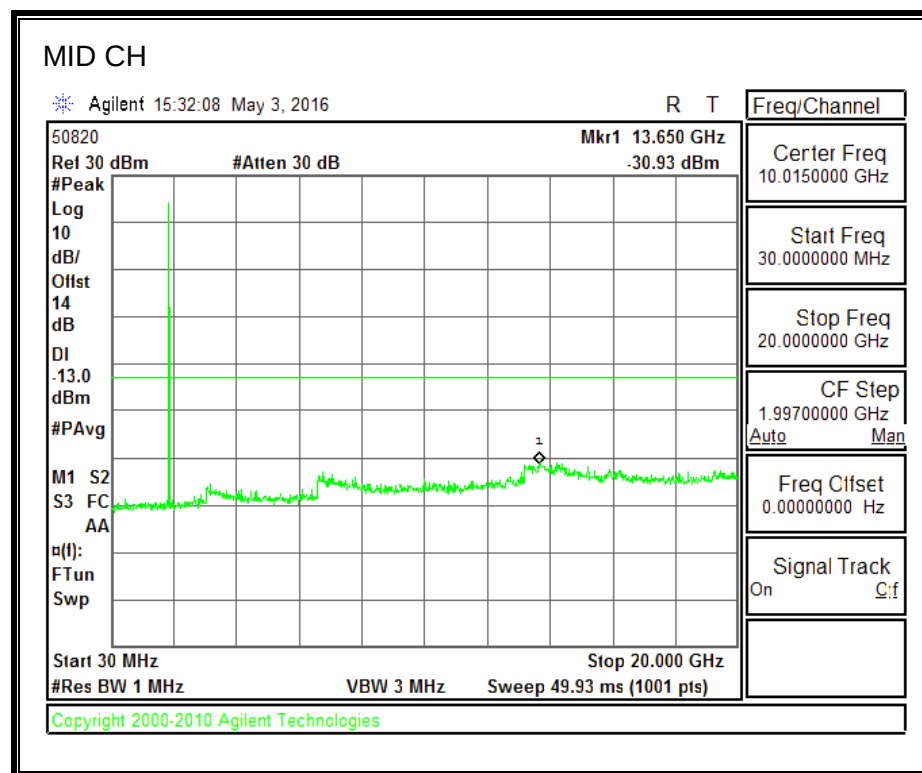
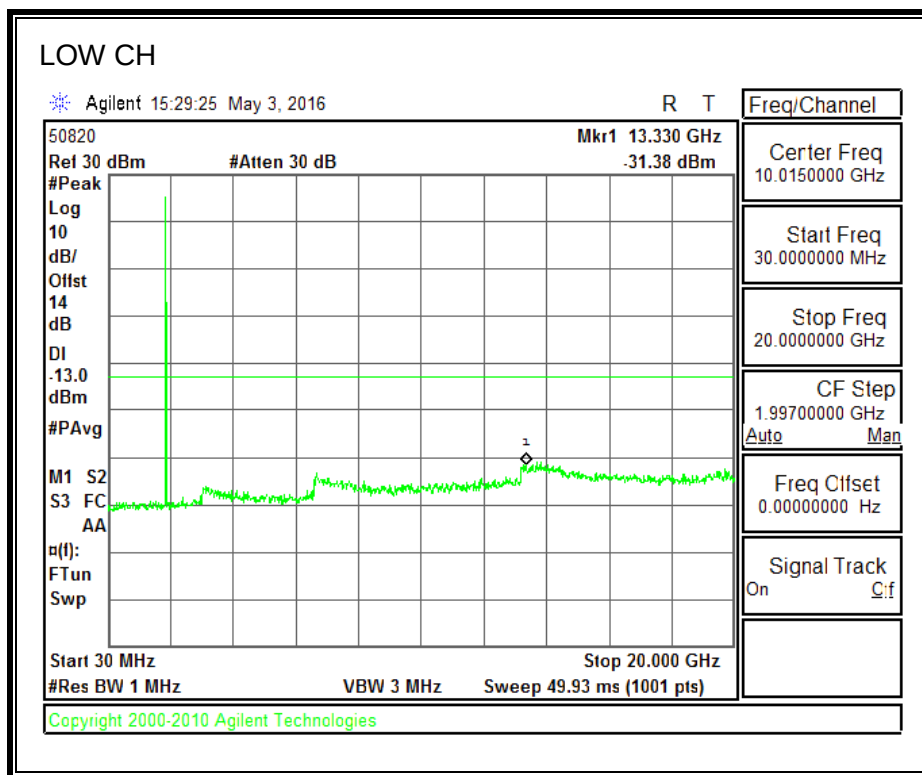
#### 850MHz BAND



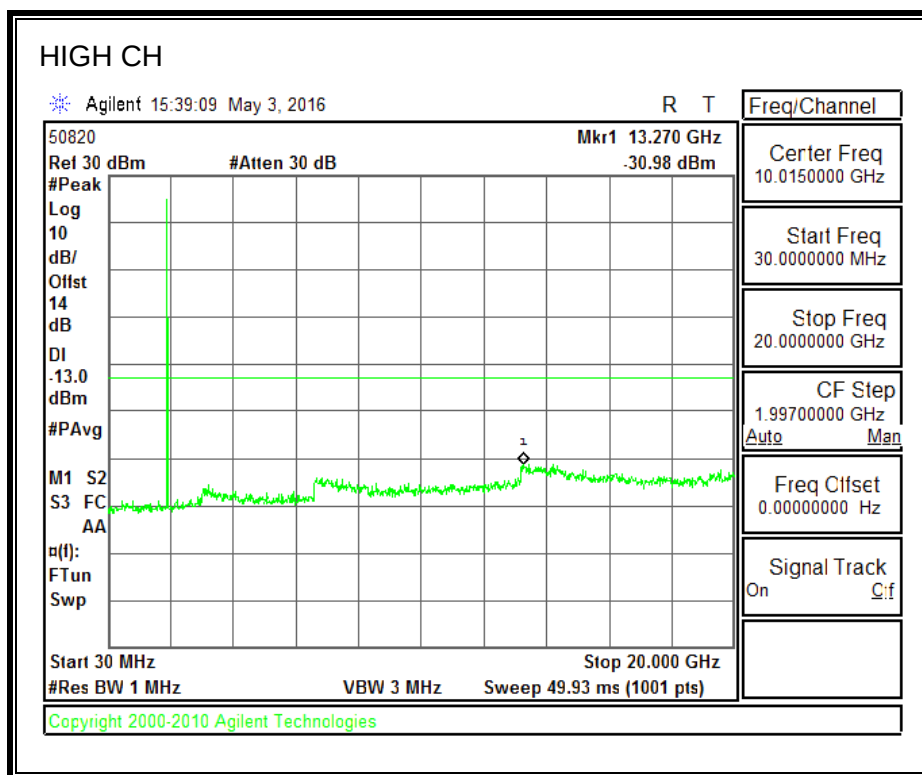




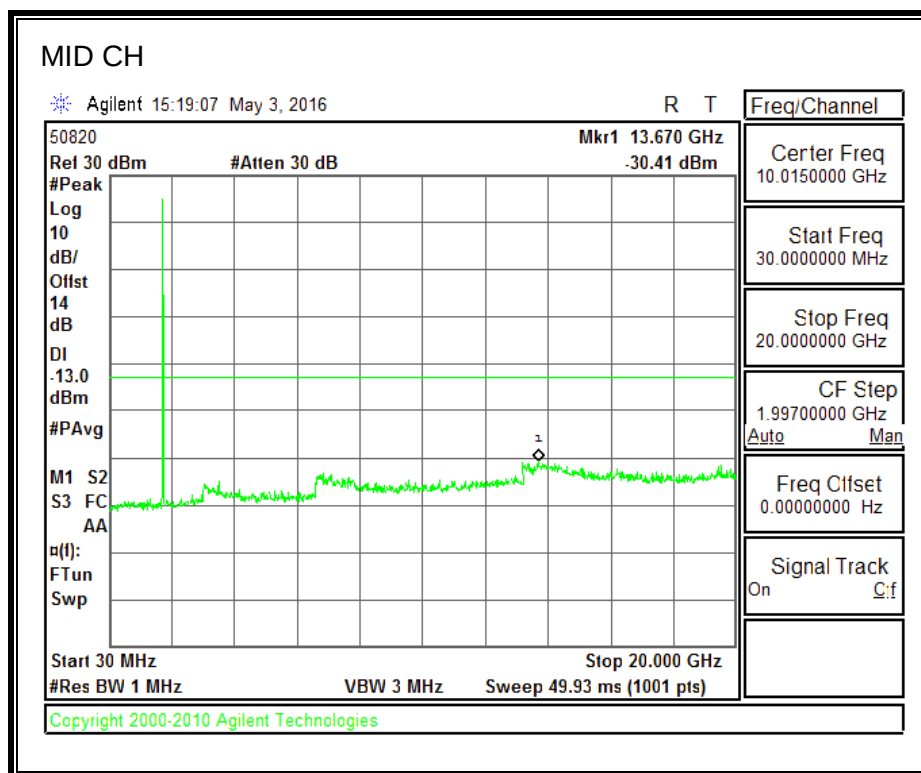
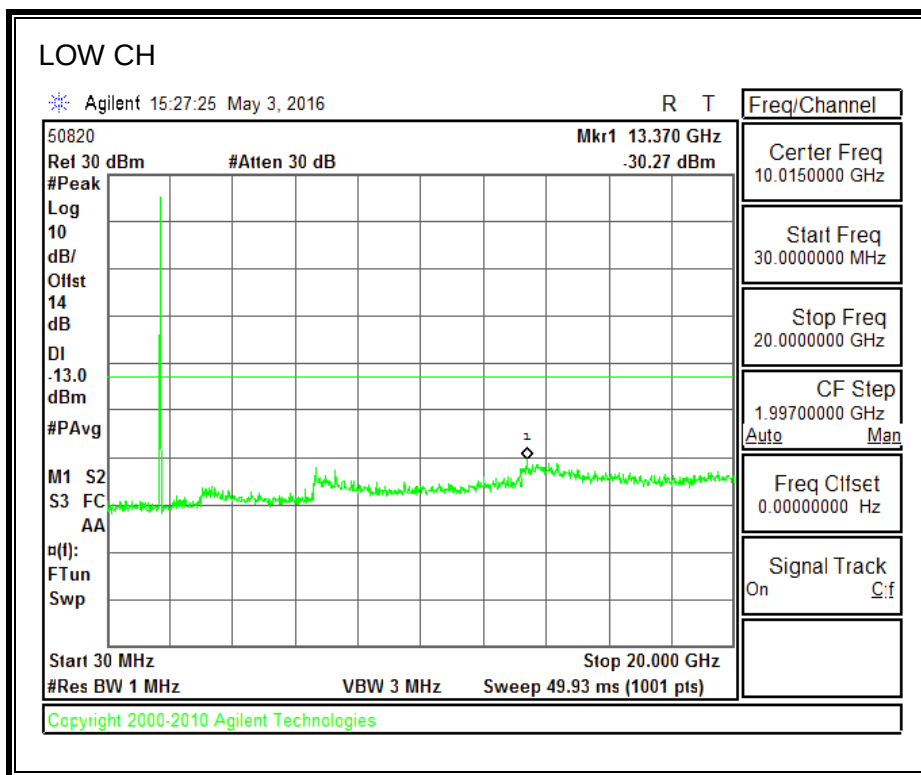
**1900MHz BAND**



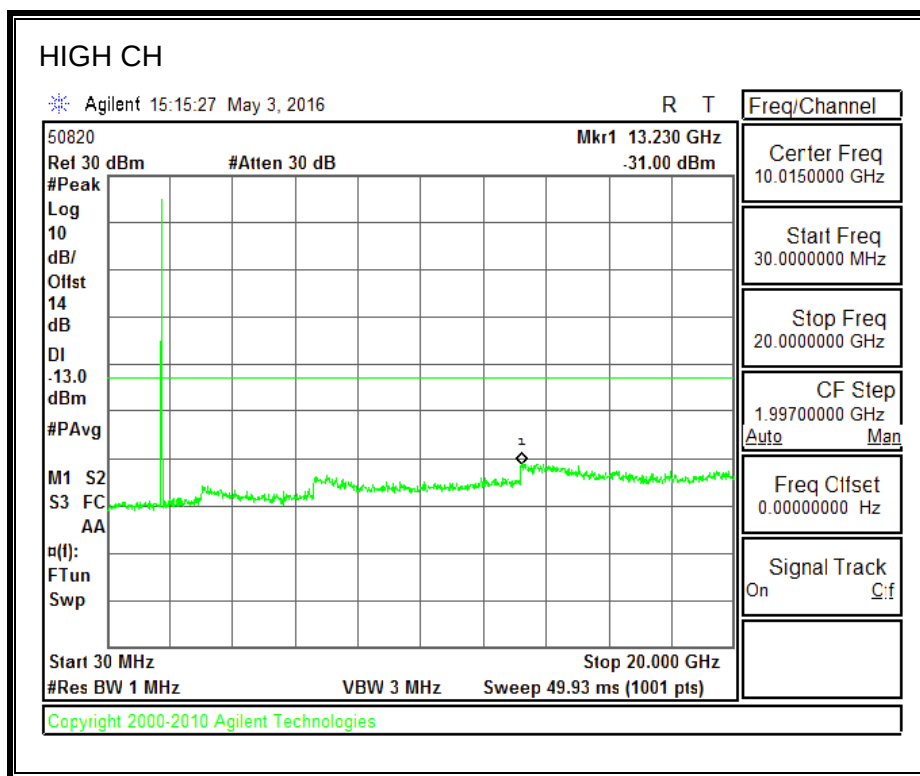




**1700MHz BAND**

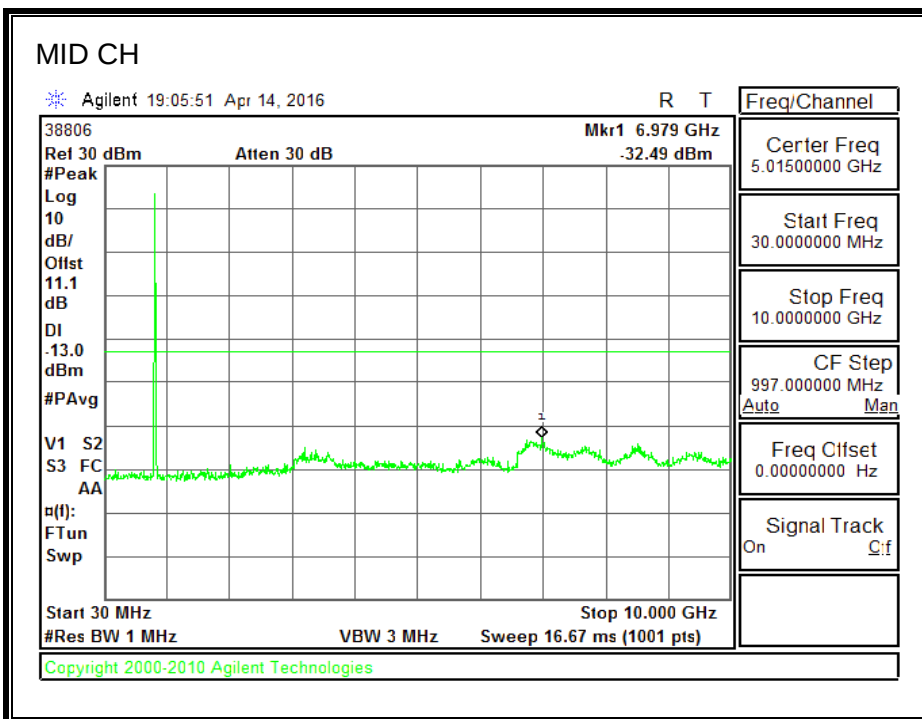
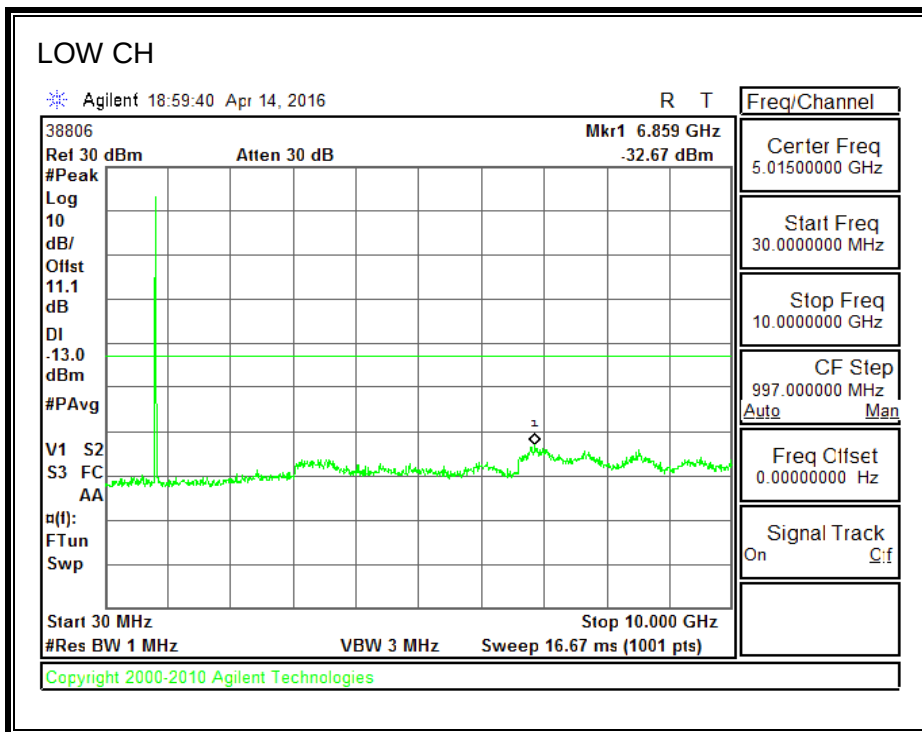




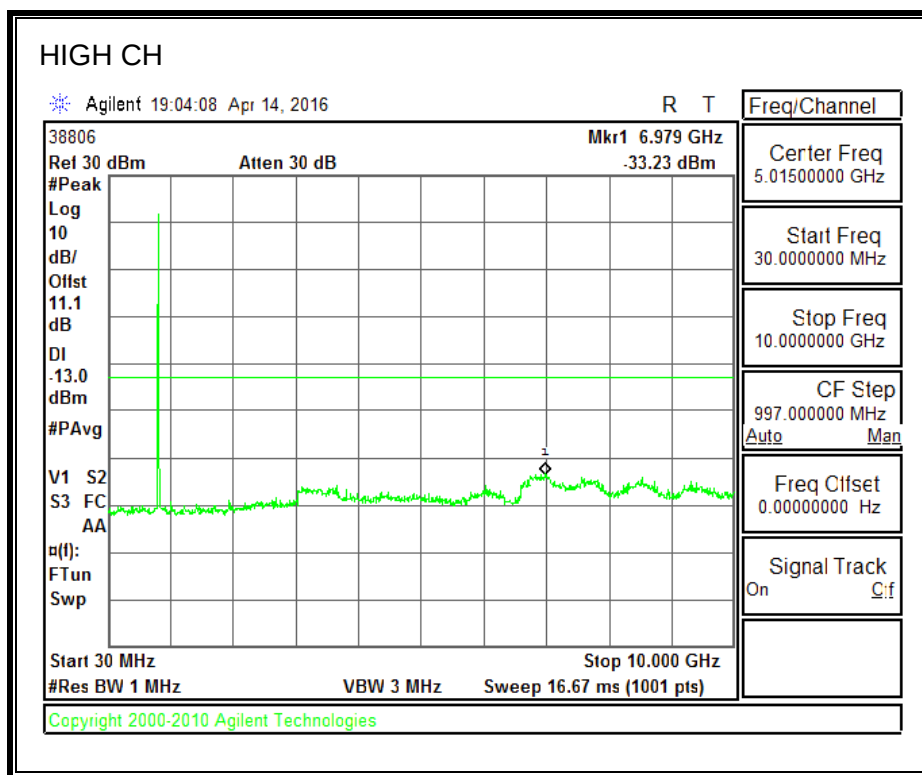


### 8.3.6. UMTS HSDPA

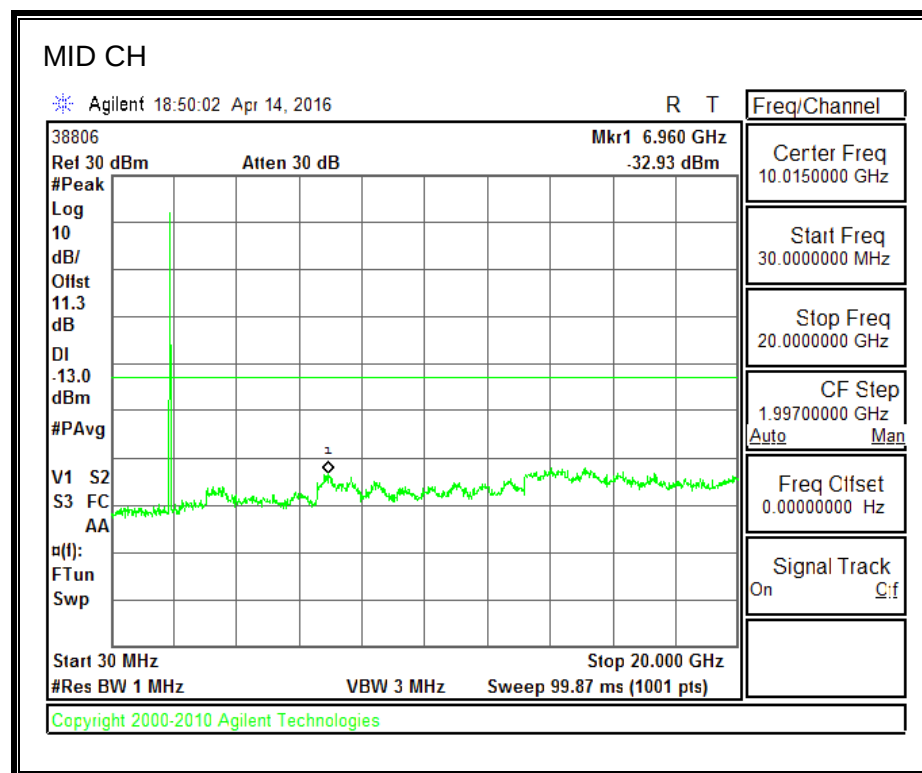
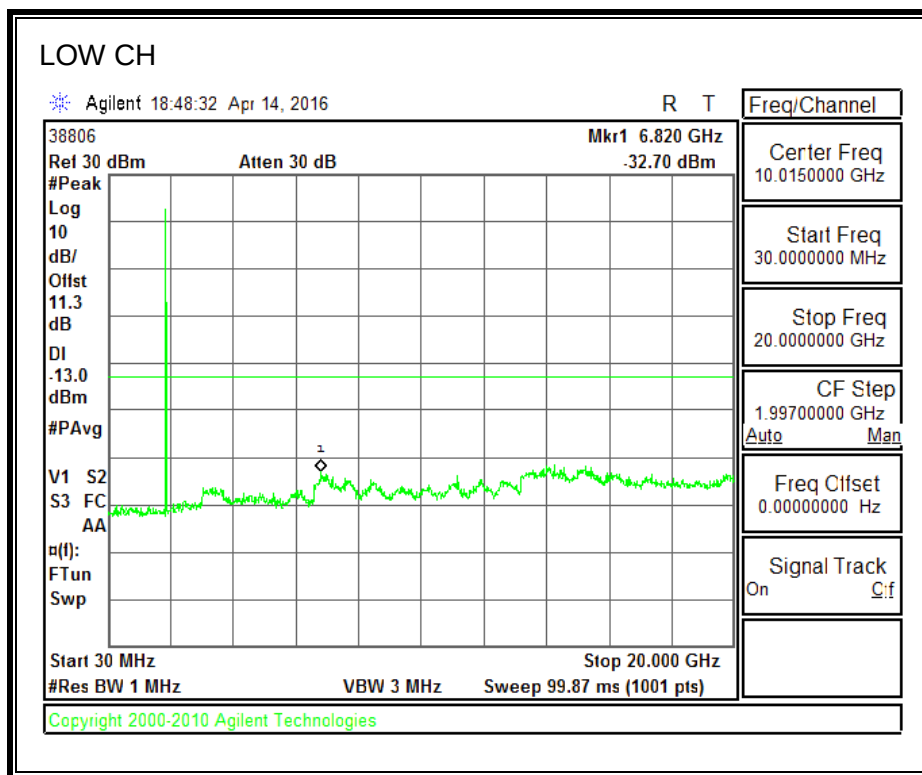
#### 850MHz BAND



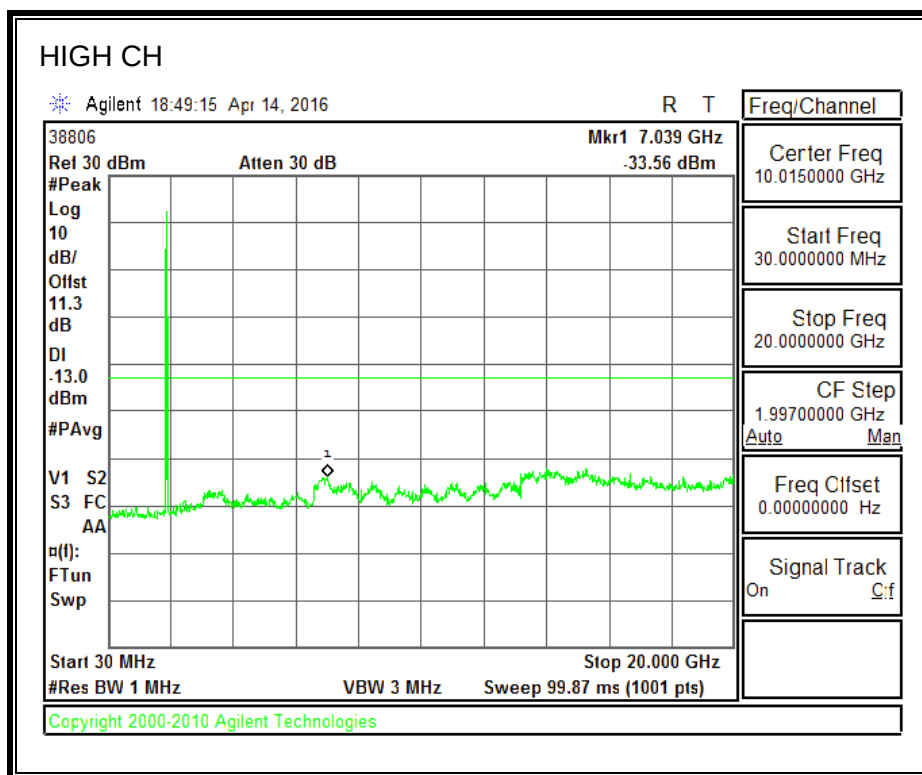




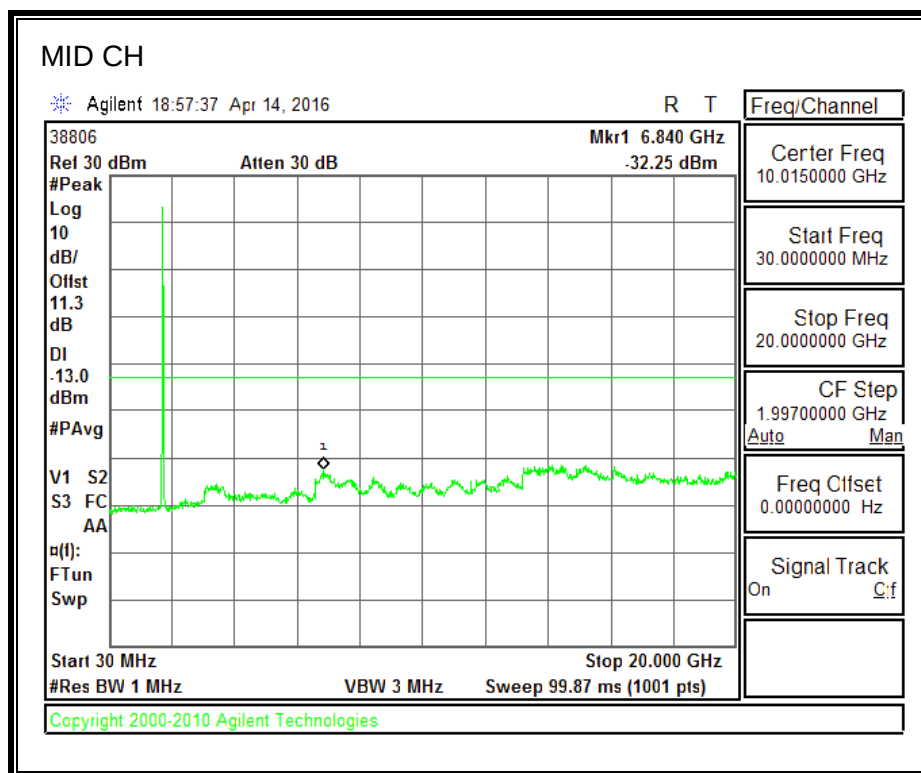
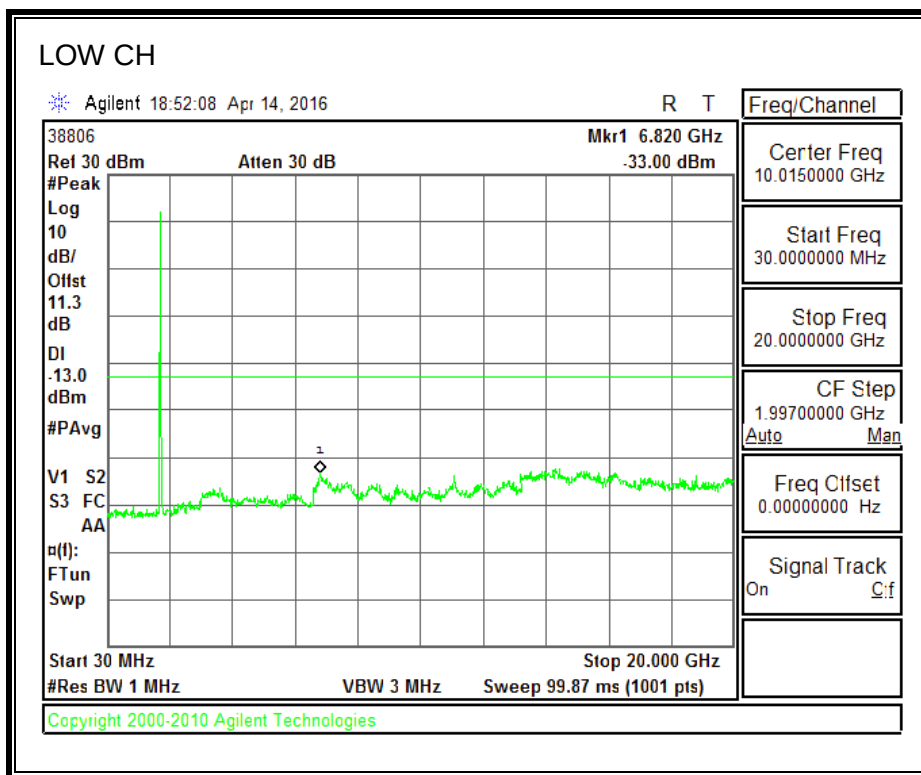
# **1900MHz BAND**



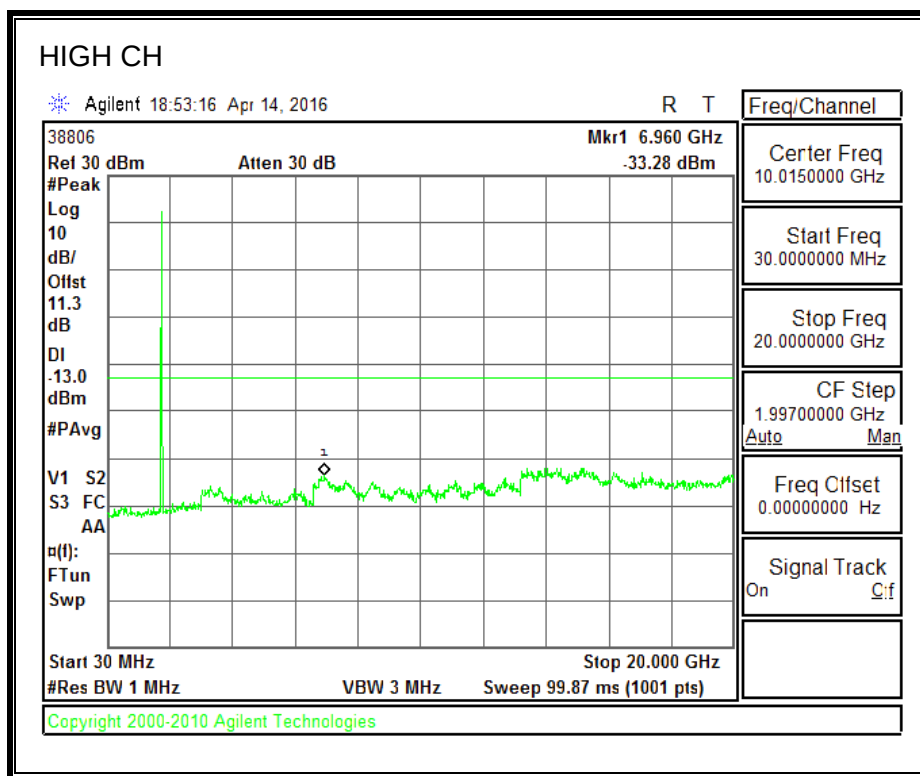




**1700MHz BAND**







## 9. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54.and §90.213

### LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 & §27.54 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§90.213 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations

### TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
- Voltage = (85% - 115%)

#### **Frequency Stability vs Temperature:**

The EUT is place inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

#### **Frequency Stability vs Voltage:**

The peak frequency error is recorded (worst-case).

### RESULTS

See the following pages.

## 9.1. GSM

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 29426 | <b>Date:</b> | 4/18/16 |
|------------|-------|--------------|---------|

### GPRS 850

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (25C)   | Normal    | 824.0011             | 848.9824              |            |                           |
| Extreme (50C)  |           | 824.0011             | 848.9824              | 28.0       | 0.03                      |
| Extreme (40C)  |           | 824.0011             | 848.9824              | 26.5       | 0.03                      |
| Extreme (30C)  |           | 824.0011             | 848.9824              | 24.0       | 0.03                      |
| Extreme (10C)  |           | 824.0011             | 848.9824              | 19.3       | 0.02                      |
| Extreme (0C)   |           | 824.0011             | 848.9824              | 20.4       | 0.02                      |
| Extreme (-10C) |           | 824.0011             | 848.9824              | 31.5       | 0.04                      |
| Extreme (-20C) |           | 824.0011             | 848.9824              | 33.0       | 0.04                      |
| Extreme (-30C) |           | 824.0011             | 848.9824              | 37.8       | 0.05                      |
|                |           |                      |                       |            |                           |
| 25C            | 10%       | 824.0011             | 848.9824              | 28.4       | 0.03                      |
|                | -10%      | 824.0011             | 848.9824              | 30.5       | 0.04                      |
|                | End Point | 824.0011             | 848.9824              | 35.2       | 0.04                      |

### EGPRS 850

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (25C)   | Normal    | 824.0338             | 848.9995              |            |                           |
| Extreme (50C)  |           | 824.0339             | 848.9995              | 29.8       | 0.04                      |
| Extreme (40C)  |           | 824.0339             | 848.9995              | 27.5       | 0.03                      |
| Extreme (30C)  |           | 824.0339             | 848.9995              | 25.3       | 0.03                      |
| Extreme (10C)  |           | 824.0339             | 848.9995              | 27.0       | 0.03                      |
| Extreme (0C)   |           | 824.0339             | 848.9995              | 26.2       | 0.03                      |
| Extreme (-10C) |           | 824.0339             | 848.9995              | 27.2       | 0.03                      |
| Extreme (-20C) |           | 824.0339             | 848.9995              | 26.9       | 0.03                      |
| Extreme (-30C) |           | 824.0339             | 848.9995              | 30.4       | 0.04                      |
|                |           |                      |                       |            |                           |
| 25C            | 10%       | 824.0339             | 848.9995              | 26.5       | 0.03                      |
|                | -10%      | 824.0339             | 848.9995              | 27.3       | 0.03                      |
|                | End Point | 824.0339             | 848.9995              | 28.7       | 0.03                      |

**GPRS 1900**

| Limit          |           | 1850                       | 1910                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (25C)   | Normal    | 1850.0212                  | 1909.9741                   |               |                                 |
| Extreme (50C)  |           | 1850.0212                  | 1909.9741                   | 36.8          | 0.02                            |
| Extreme (40C)  |           | 1850.0212                  | 1909.9741                   | 28.7          | 0.02                            |
| Extreme (30C)  |           | 1850.0212                  | 1909.9741                   | 25.5          | 0.01                            |
| Extreme (10C)  |           | 1850.0212                  | 1909.9741                   | 24.2          | 0.01                            |
| Extreme (0C)   |           | 1850.0212                  | 1909.9741                   | 23.1          | 0.01                            |
| Extreme (-10C) |           | 1850.0212                  | 1909.9741                   | 24.5          | 0.01                            |
| Extreme (-20C) |           | 1850.0212                  | 1909.9741                   | 35.0          | 0.02                            |
| Extreme (-30C) |           | 1850.0212                  | 1909.9741                   | 38.4          | 0.02                            |
|                |           |                            |                             |               |                                 |
| 25C            | 10%       | 1850.0212                  | 1909.9741                   | 31.5          | 0.02                            |
|                | -10%      | 1850.0212                  | 1909.9741                   | 32.4          | 0.02                            |
|                | End Point | 1850.0212                  | 1909.9741                   | 37.5          | 0.02                            |

**EGPRS 1900**

| Limit          |           | 1850                       | 1910                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (25C)   | Normal    | 1850.0353                  | 1909.9560                   |               |                                 |
| Extreme (50C)  |           | 1850.0353                  | 1909.9561                   | 37.7          | 0.02                            |
| Extreme (40C)  |           | 1850.0353                  | 1909.9561                   | 38.5          | 0.02                            |
| Extreme (30C)  |           | 1850.0353                  | 1909.9561                   | 38.0          | 0.02                            |
| Extreme (10C)  |           | 1850.0353                  | 1909.9561                   | 36.3          | 0.02                            |
| Extreme (0C)   |           | 1850.0353                  | 1909.9561                   | 35.0          | 0.02                            |
| Extreme (-10C) |           | 1850.0353                  | 1909.9561                   | 34.1          | 0.02                            |
| Extreme (-20C) |           | 1850.0353                  | 1909.9561                   | 30.7          | 0.02                            |
| Extreme (-30C) |           | 1850.0353                  | 1909.9561                   | 33.6          | 0.02                            |
|                |           |                            |                             |               |                                 |
| 25C            | 10%       | 1850.0353                  | 1909.9561                   | 37.0          | 0.02                            |
|                | -10%      | 1850.0353                  | 1909.9561                   | 37.6          | 0.02                            |
|                | End Point | 1850.0353                  | 1909.9561                   | 39.2          | 0.02                            |

## 9.2. CDMA2000

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 29426 | <b>Date:</b> | 4/18/16 |
|------------|-------|--------------|---------|

### CDMA 1xRTT BC0

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (25C)   | Normal    | 824.0334             | 848.8118              |            |                           |
| Extreme (50C)  |           | 824.0334             | 848.8118              | -8.0       | -0.01                     |
| Extreme (40C)  |           | 824.0334             | 848.8118              | -7.3       | -0.01                     |
| Extreme (30C)  |           | 824.0334             | 848.8118              | -7.5       | -0.01                     |
| Extreme (10C)  |           | 824.0334             | 848.8118              | -8.1       | -0.01                     |
| Extreme (0C)   |           | 824.0334             | 848.8118              | -5.7       | -0.01                     |
| Extreme (-10C) |           | 824.0334             | 848.8118              | -6.2       | -0.01                     |
| Extreme (-20C) |           | 824.0334             | 848.8118              | -4.6       | -0.01                     |
| Extreme (-30C) |           | 824.0334             | 848.8118              | -4.3       | -0.01                     |
|                |           |                      |                       |            |                           |
| 25C            | 10%       | 824.0334             | 848.8118              | -8.3       | -0.01                     |
|                | -10%      | 824.0334             | 848.8118              | -7.4       | -0.01                     |
|                | End Point | 824.0334             | 848.8118              | -4.3       | -0.01                     |

### CDMA 1x RTT BC1

| Limit          |           | 1850                 | 1910                  | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (25C)   | Normal    | 1850.0220            | 1909.6164             |            |                           |
| Extreme (50C)  |           | 1850.0220            | 1909.6164             | -27.5      | -0.01                     |
| Extreme (40C)  |           | 1850.0220            | 1909.6164             | -22.6      | -0.01                     |
| Extreme (30C)  |           | 1850.0220            | 1909.6164             | -23.5      | -0.01                     |
| Extreme (10C)  |           | 1850.0220            | 1909.6164             | -20.5      | -0.01                     |
| Extreme (0C)   |           | 1850.0220            | 1909.6164             | -21.0      | -0.01                     |
| Extreme (-10C) |           | 1850.0220            | 1909.6164             | -20.4      | -0.01                     |
| Extreme (-20C) |           | 1850.0220            | 1909.6164             | -18.5      | -0.01                     |
| Extreme (-30C) |           | 1850.0220            | 1909.6164             | -19.3      | -0.01                     |
|                |           |                      |                       |            |                           |
| 25C            | 10%       | 1850.0220            | 1909.6164             | -21.5      | -0.01                     |
|                | -10%      | 1850.0220            | 1909.6164             | -22.3      | -0.01                     |
|                | End Point | 1850.0220            | 1909.6164             | -24.8      | -0.01                     |

**CDMA 1xRTT BC10**

| Limit          |           | 816.35                     | 823.65                      | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (25C)   | Normal    | 816.3963                   | 823.6481                    |               |                                 |
| Extreme (50C)  |           | 816.3963                   | 823.6481                    | -8.0          | -0.01                           |
| Extreme (40C)  |           | 816.3963                   | 823.6481                    | -7.1          | -0.01                           |
| Extreme (30C)  |           | 816.3963                   | 823.6481                    | -6.2          | -0.01                           |
| Extreme (10C)  |           | 816.3963                   | 823.6481                    | -5.6          | -0.01                           |
| Extreme (0C)   |           | 816.3963                   | 823.6481                    | -5.3          | -0.01                           |
| Extreme (-10C) |           | 816.3963                   | 823.6481                    | -5.1          | -0.01                           |
| Extreme (-20C) |           | 816.3963                   | 823.6481                    | -2.5          | 0.00                            |
| Extreme (-30C) |           | 816.3963                   | 823.6481                    | -0.7          | 0.00                            |
|                |           |                            |                             |               |                                 |
| 25C            | 10%       | 816.3963                   | 823.6481                    | -6.1          | -0.01                           |
|                | -10%      | 816.3963                   | 823.6481                    | -6.8          | -0.01                           |
|                | End Point | 816.3963                   | 823.6481                    | -4.3          | -0.01                           |

### 9.3. UMTS

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 4/14/16 |
|------------|-------|--------------|---------|

#### UMTS REL99 BAND 5

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (25C)   | Normal    | 824.1822             | 848.8205              |            |                           |
| Extreme (50C)  |           | 824.1822             | 848.8205              | 27.0       | 0.03                      |
| Extreme (40C)  |           | 824.1822             | 848.8205              | 23.8       | 0.03                      |
| Extreme (30C)  |           | 824.1822             | 848.8205              | 22.0       | 0.03                      |
| Extreme (10C)  |           | 824.1822             | 848.8205              | 20.6       | 0.02                      |
| Extreme (0C)   |           | 824.1822             | 848.8205              | 15.4       | 0.02                      |
| Extreme (-10C) |           | 824.1822             | 848.8205              | 17.3       | 0.02                      |
| Extreme (-20C) |           | 824.1822             | 848.8205              | 18.0       | 0.02                      |
| Extreme (-30C) |           | 824.1822             | 848.8205              | 20.3       | 0.02                      |
|                |           |                      |                       |            |                           |
| 25C            | 10%       | 824.1822             | 848.8205              | 22.4       | 0.03                      |
|                | -10%      | 824.1822             | 848.8205              | 23.5       | 0.03                      |
|                | End Point | 824.1822             | 848.8205              | 26.2       | 0.03                      |

#### UMTS REL99 BAND 2

| Limit          |           | 1850                 | 1910                  | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (25C)   | Normal    | 1850.2002            | 1909.7976             |            |                           |
| Extreme (50C)  |           | 1850.2002            | 1909.7976             | 27.5       | 0.01                      |
| Extreme (40C)  |           | 1850.2002            | 1909.7976             | 22.4       | 0.01                      |
| Extreme (30C)  |           | 1850.2002            | 1909.7976             | 18.5       | 0.01                      |
| Extreme (10C)  |           | 1850.2002            | 1909.7976             | 20.6       | 0.01                      |
| Extreme (0C)   |           | 1850.2002            | 1909.7976             | 23.4       | 0.01                      |
| Extreme (-10C) |           | 1850.2002            | 1909.7976             | 22.9       | 0.01                      |
| Extreme (-20C) |           | 1850.2002            | 1909.7976             | 23.6       | 0.01                      |
| Extreme (-30C) |           | 1850.2002            | 1909.7976             | 24.1       | 0.01                      |
|                |           |                      |                       |            |                           |
| 25C            | 10%       | 1850.2002            | 1909.7976             | 23.0       | 0.01                      |
|                | -10%      | 1850.2002            | 1909.7976             | 23.7       | 0.01                      |
|                | End Point | 1850.2002            | 1909.7976             | 24.8       | 0.01                      |

**UMTS REL99 BAND 4**

| Limit          |           | 1710                       | 1755                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (25C)   | Normal    | 1710.1976                  | 1754.8286                   |               |                                 |
| Extreme (50C)  |           | 1710.1977                  | 1754.8287                   | 37.5          | 0.02                            |
| Extreme (40C)  |           | 1710.1977                  | 1754.8287                   | 36.0          | 0.02                            |
| Extreme (30C)  |           | 1710.1977                  | 1754.8287                   | 32.8          | 0.02                            |
| Extreme (10C)  |           | 1710.1977                  | 1754.8287                   | 33.5          | 0.02                            |
| Extreme (0C)   |           | 1710.1977                  | 1754.8287                   | 33.2          | 0.02                            |
| Extreme (-10C) |           | 1710.1977                  | 1754.8287                   | 31.6          | 0.02                            |
| Extreme (-20C) |           | 1710.1977                  | 1754.8287                   | 30.2          | 0.02                            |
| Extreme (-30C) |           | 1710.1977                  | 1754.8287                   | 29.3          | 0.02                            |
|                |           |                            |                             |               |                                 |
| 25C            | 10%       | 1710.1977                  | 1754.8287                   | 33.5          | 0.02                            |
|                | -10%      | 1710.1977                  | 1754.8287                   | 34.2          | 0.02                            |
|                | End Point | 1710.1977                  | 1754.8287                   | 37.8          | 0.02                            |

## 10. RADIATED TEST RESULTS

### 10.1. RADIATED POWER (ERP & EIRP) (LAT)

#### RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50 and §90.635

#### LIMITS

§22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

§24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

§27.50(d) (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band are limited to 1 watt EIRP. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in this band must employ a means for limiting power to the minimum necessary for successful communications

§90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

Table—Equivalent Power and Antenna Heights for Base Stations in the 851–869 MHz and 935–940 MHz Bands Which Have a Requirement for a 32 km (20 mi) Service Area Radius

| Antenna height (ATT) meters (feet)   | Effective radiated power (watts) <sup>1,2,4</sup> |
|--------------------------------------|---------------------------------------------------|
| Above 1,372 (4,500)                  | 65                                                |
| Above 1,220 (4,000) to 1,372 (4,500) | 70                                                |
| Above 1,067 (3,500) to 1,220 (4,000) | 75                                                |
| Above 915 (3,000) to 1,067 (3,500)   | 100                                               |
| Above 763 (2,500) to 915 (3,000)     | 140                                               |
| Above 610 (2,000) to 763 (2,500)     | 200                                               |
| Above 458 (1,500) to 610 (2,000)     | 350                                               |
| Above 305 (1,000) to 458 (1,500)     | 600                                               |
| Up to 305 (1,000)                    | 31,000                                            |

1 Power is given in terms of effective radiated power (ERP).

2 Applicants in the Los Angeles, CA, area who demonstrate a need to serve both the downtown and fringe areas will be permitted to utilize an ERP of 1 kw at the following mountaintop sites: Santiago Park, Sierra Peak, Mount Lukens, and Mount Wilson.

3 Stations with antennas below 305 m (1,000 ft) (AAT) will be restricted to a maximum power of 1 kw (ERP).

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

### **TEST PROCEDURE**

ANSI / TIA / EIA 603-D Clause 2.2.17

KDB 971168 D01 RF Power output using broadband peak and average power meter method

### **MODES TESTED**

- GPRS/EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, 1xRTT and EVDO, Rev A

### **RESULTS**

### 10.1.1. GSM

#### Part 22 / RSS 132 850MHz Band

| Band | Mode  | Channel | f (MHz) | ERP (Average) |        |
|------|-------|---------|---------|---------------|--------|
|      |       |         |         | dBm           | mW     |
| CELL | GPRS  | 128     | 824.2   | 28.43         | 696.63 |
|      |       | 190     | 836.6   | 28.51         | 709.58 |
|      |       | 251     | 848.8   | <b>28.90</b>  | 776.25 |
|      | EGPRS | 128     | 824.2   | 24.33         | 271.02 |
|      |       | 190     | 836.6   | 24.39         | 274.79 |
|      |       | 251     | 848.8   | <b>24.64</b>  | 291.07 |

#### Part 24 / RSS 133 1900MHz Band

| Band | Mode  | Channel | f (MHz) | EIRP (Average) |         |
|------|-------|---------|---------|----------------|---------|
|      |       |         |         | dBm            | mW      |
| PCS  | GPRS  | 512     | 1850.2  | <b>30.20</b>   | 1047.13 |
|      |       | 661     | 1880.0  | 30.17          | 1039.92 |
|      |       | 810     | 1909.8  | 30.14          | 1032.76 |
|      | EGPRS | 512     | 1850.2  | 27.63          | 579.43  |
|      |       | 661     | 1880.0  | 27.78          | 599.79  |
|      |       | 810     | 1909.8  | <b>27.90</b>   | 616.60  |

### 10.1.2. CDMA2000

#### Part 90 800MHz Band

| Band | Mode         | Channel | f (MHz) | ERP (Average) |        |
|------|--------------|---------|---------|---------------|--------|
|      |              |         |         | dBm           | mW     |
| CELL | BC10, 1xRTT  | 450     | 817.3   | <b>21.57</b>  | 143.55 |
|      |              | 560     | 820.0   | 21.37         | 137.09 |
|      |              | 670     | 822.8   | 21.56         | 143.22 |
|      | BC10, EVDO A | 450     | 817.3   | <b>21.64</b>  | 145.88 |
|      |              | 560     | 820.0   | 21.45         | 139.64 |
|      |              | 670     | 822.8   | 21.61         | 144.88 |

#### Part 22 / RSS 132 850MHz Band

| Band | Mode             | Channel | f (MHz) | ERP (Average) |        |
|------|------------------|---------|---------|---------------|--------|
|      |                  |         |         | dBm           | mW     |
| CELL | BC 0, 1xRTT      | 1013    | 824.7   | 21.75         | 149.62 |
|      |                  | 384     | 836.5   | <b>21.76</b>  | 149.97 |
|      |                  | 777     | 848.3   | 21.24         | 133.05 |
|      | BC 0, EVDO Rev A | 1013    | 824.7   | 21.78         | 150.66 |
|      |                  | 384     | 836.5   | <b>21.79</b>  | 151.01 |
|      |                  | 777     | 848.3   | 21.44         | 139.32 |

#### Part 24 / RSS 133 1900MHz Band

| Band | Mode            | Channel | f (MHz) | EIRP (Average) |        |
|------|-----------------|---------|---------|----------------|--------|
|      |                 |         |         | dBm            | mW     |
| PCS  | BC1, 1xRTT      | 25      | 1851.3  | 24.83          | 304.09 |
|      |                 | 600     | 1880.0  | 24.91          | 309.74 |
|      |                 | 1175    | 1908.8  | <b>25.11</b>   | 324.34 |
|      | BC1, EVDO REV A | 25      | 1851.3  | 24.88          | 307.61 |
|      |                 | 600     | 1880.0  | 24.96          | 313.33 |
|      |                 | 1175    | 1908.8  | <b>25.14</b>   | 326.59 |

### 10.1.3. UMTS

#### Part 22 / RSS 132 850MHz Band

| Band   | Mode        | Channel | f (MHz) | ERP (Average) |        |
|--------|-------------|---------|---------|---------------|--------|
|        |             |         |         | dBm           | mW     |
| 850MHz | UMTS,REL 99 | 4132    | 826.4   | <b>22.84</b>  | 192.31 |
|        |             | 4183    | 836.6   | 22.50         | 177.83 |
|        |             | 4233    | 846.6   | 21.56         | 143.22 |
|        | UMTS, HSDPA | 4132    | 826.4   | <b>21.93</b>  | 155.96 |
|        |             | 4183    | 836.6   | 21.69         | 147.57 |
|        |             | 4233    | 846.6   | 21.74         | 149.28 |

#### Part 24 / RSS 133 1900MHz Band

| Band    | Mode        | Channel | f (MHz) | EIRP (Average) |        |
|---------|-------------|---------|---------|----------------|--------|
|         |             |         |         | dBm            | mW     |
| 1900MHz | UMTS,REL 99 | 9662    | 1852.4  | 25.42          | 348.34 |
|         |             | 9800    | 1880.0  | <b>25.68</b>   | 369.83 |
|         |             | 9938    | 1907.6  | 25.52          | 356.45 |
|         | UMTS, HSDPA | 9662    | 1852.4  | 24.52          | 283.14 |
|         |             | 9800    | 1880.0  | <b>24.80</b>   | 302.00 |
|         |             | 9938    | 1907.6  | 24.74          | 297.85 |

#### Part 27 / RSS 139 1700MHz Band

| Band    | Mode        | Channel | f (MHz) | EIRP (Average) |        |
|---------|-------------|---------|---------|----------------|--------|
|         |             |         |         | dBm            | mW     |
| 1700MHz | UMTS,REL 99 | 1537    | 1712.4  | 22.39          | 173.38 |
|         |             | 1638    | 1732.6  | 22.56          | 180.30 |
|         |             | 1738    | 1752.5  | <b>22.69</b>   | 185.78 |
|         | UMTS, HSDPA | 1537    | 1712.4  | 21.50          | 141.25 |
|         |             | 1638    | 1732.6  | 21.63          | 145.55 |
|         |             | 1738    | 1752.5  | <b>21.77</b>   | 150.31 |

# 10.1.4. GSM

## GPRS, 850MHz BAND 5

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F                                                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| <b>Company:</b><br><b>Project #:</b> 16U23309<br><b>Date:</b> 05/27/16<br><b>Test Engineer:</b> 39472<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> GSM 850MHz |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Equipment:</b><br><b>Receiving:</b> Sunol T185, and Chamber F Cable<br><b>Substitution:</b> Dipole S/N: 00022117, 8ft SMA Cable                            |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                                                                                                             |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.20                                                                                                                                                             | 29.0                | V                  | 0.6                | 0.0                   | 28.43        | 30.58         | 38.45              | 40.60               | -10.0          |       |
| 824.20                                                                                                                                                             | 15.3                | H                  | 0.6                | 0.0                   | 14.71        | 16.86         | 38.45              | 40.60               | -23.7          |       |
| Mid Ch                                                                                                                                                             |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                                                                                                             | 29.1                | V                  | 0.6                | 0.0                   | 28.51        | 30.66         | 38.45              | 40.60               | -9.9           |       |
| 836.60                                                                                                                                                             | 14.4                | H                  | 0.6                | 0.0                   | 13.76        | 15.91         | 38.45              | 40.60               | -24.7          |       |
| High Ch                                                                                                                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.80                                                                                                                                                             | 29.5                | V                  | 0.6                | 0.0                   | 28.90        | 31.05         | 38.45              | 40.60               | -9.6           |       |
| 848.80                                                                                                                                                             | 14.3                | H                  | 0.6                | 0.0                   | 13.69        | 15.84         | 38.45              | 40.60               | -24.8          |       |
| Rev. 05.31.16                                                                                                                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |

**EGPRS, 850MHz BAND 5**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber F**

Company:  
Project #: 16U23309  
Date: 05/27/16  
Test Engineer: 39472  
Configuration: EUT Only  
Mode: EDGE 850MHz

**Test Equipment:**  
Receiving: Sunol T185, and Chamber F Cable  
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Low Ch   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.20   | 24.9                | V                  | 0.6                | 0.0                   | 24.33        | 26.48         | 38.45              | 40.60               | -14.1          |       |
| 824.20   | 8.2                 | H                  | 0.6                | 0.0                   | 7.54         | 9.69          | 38.45              | 40.60               | -30.9          |       |
| Mid Ch   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60   | 25.0                | V                  | 0.6                | 0.0                   | 24.39        | 26.54         | 38.45              | 40.60               | -14.1          |       |
| 836.60   | 8.8                 | H                  | 0.6                | 0.0                   | 8.21         | 10.36         | 38.45              | 40.60               | -30.2          |       |
| High Ch  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.80   | 25.3                | V                  | 0.6                | 0.0                   | 24.64        | 26.79         | 38.45              | 40.60               | -13.8          |       |
| 848.80   | 8.4                 | H                  | 0.6                | 0.0                   | 7.82         | 9.97          | 38.45              | 40.60               | -30.6          |       |

Rev. 05.31.16

**GPRS, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 05/27/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> GSM 1900MHz                                                 |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 15.8                | V                  | 0.98               | 8.05                  | 22.87         | 33.0           | -10.1          |       |
| 1.851                                                                    | 23.1                | H                  | 0.98               | 8.05                  | 30.20         | 33.0           | -2.8           |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 15.9                | V                  | 0.98               | 8.03                  | 22.91         | 33.0           | -10.1          |       |
| 1.880                                                                    | 23.1                | H                  | 0.98               | 8.03                  | 30.17         | 33.0           | -2.8           |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.910                                                                    | 15.0                | V                  | 0.98               | 8.05                  | 22.07         | 33.0           | -10.9          |       |
| 1.910                                                                    | 23.1                | H                  | 0.98               | 8.05                  | 30.14         | 33.0           | -2.9           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**EGPRS, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309           |                    |                       |               |                |                |       |
| <b>Date:</b>                                                             |                     | 05/27/16           |                    |                       |               |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 39472              |                    |                       |               |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only           |                    |                       |               |                |                |       |
| <b>Mode:</b>                                                             |                     | EDGE 1900MHz       |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| <b>Low Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 20.2                | V                  | 0.98               | 8.05                  | 27.24         | 33.0           | -5.8           |       |
| 1.851                                                                    | 20.6                | H                  | 0.98               | 8.05                  | 27.63         | 33.0           | -5.4           |       |
| <b>Mid Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 19.9                | V                  | 0.98               | 8.03                  | 26.90         | 33.0           | -6.1           |       |
| 1.880                                                                    | 20.7                | H                  | 0.98               | 8.03                  | 27.78         | 33.0           | -5.2           |       |
| <b>High Ch</b>                                                           |                     |                    |                    |                       |               |                |                |       |
| 1.910                                                                    | 19.6                | V                  | 0.98               | 8.05                  | 26.65         | 33.0           | -6.4           |       |
| 1.910                                                                    | 20.8                | H                  | 0.98               | 8.05                  | 27.90         | 33.0           | -5.1           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

## 10.1.5. CDMA2000

### CDMA2000 1xRTT, 800MHz BC10

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F                                                                                                  |                     |                    |                    |                       |              |                |                |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|----------------|-------|
| <b>Company:</b><br><b>Project #:</b> 16U23309<br><b>Date:</b> 05/31/16<br><b>Test Engineer:</b> 39472<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> CDMA 1XRTT 800MHz |                     |                    |                    |                       |              |                |                |       |
| <b>Test Equipment:</b><br><b>Receiving:</b> Sunol T185, and Chamber F Cable<br><b>Substitution:</b> Dipole S/N: 00022117, 8ft SMA Cable                                   |                     |                    |                    |                       |              |                |                |       |
| f<br>GHz                                                                                                                                                                  | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                                                                                                                    |                     |                    |                    |                       |              |                |                |       |
| 817.25                                                                                                                                                                    | 22.19               | V                  | 0.6                | 0.0                   | 21.57        | 50.00          | -28.4          |       |
| 817.25                                                                                                                                                                    | 4.99                | H                  | 0.6                | 0.0                   | 4.38         | 50.00          | -45.6          |       |
| Mid Ch                                                                                                                                                                    |                     |                    |                    |                       |              |                |                |       |
| 820.00                                                                                                                                                                    | 21.99               | V                  | 0.6                | 0.0                   | 21.37        | 50.00          | -28.6          |       |
| 820.00                                                                                                                                                                    | 4.95                | H                  | 0.6                | 0.0                   | 4.33         | 50.00          | -45.7          |       |
| High Ch                                                                                                                                                                   |                     |                    |                    |                       |              |                |                |       |
| 822.75                                                                                                                                                                    | 22.18               | V                  | 0.6                | 0.0                   | 21.56        | 50.00          | -28.4          |       |
| 822.75                                                                                                                                                                    | 4.73                | H                  | 0.6                | 0.0                   | 4.11         | 50.00          | -45.9          |       |
| Rev. 05.31.16                                                                                                                                                             |                     |                    |                    |                       |              |                |                |       |

**EVDO-Rev A, 800MHz BC10**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F                                                                                                  |                     |                    |                    |                       |              |                |                |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|----------------|-------|
| <b>Company:</b><br><b>Project #:</b> 16U23309<br><b>Date:</b> 06/06/16<br><b>Test Engineer:</b> 39472<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> CDMA Rev A 800MHz |                     |                    |                    |                       |              |                |                |       |
| <b>Test Equipment:</b><br><b>Receiving:</b> Sunol T185, and Chamber F Cable<br><b>Substitution:</b> Dipole S/N: 00022117, 8ft SMA Cable                                   |                     |                    |                    |                       |              |                |                |       |
| f<br>GHz                                                                                                                                                                  | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| <b>Low Ch</b>                                                                                                                                                             |                     |                    |                    |                       |              |                |                |       |
| 817.25                                                                                                                                                                    | 22.26               | V                  | 0.6                | 0.0                   | 21.64        | 50.00          | -28.4          |       |
| 817.25                                                                                                                                                                    | 4.12                | H                  | 0.6                | 0.0                   | 3.50         | 50.00          | -46.5          |       |
| <b>Mid Ch</b>                                                                                                                                                             |                     |                    |                    |                       |              |                |                |       |
| 820.00                                                                                                                                                                    | 22.07               | V                  | 0.6                | 0.0                   | 21.45        | 50.00          | -28.6          |       |
| 820.00                                                                                                                                                                    | 4.70                | H                  | 0.6                | 0.0                   | 4.08         | 50.00          | -45.9          |       |
| <b>High Ch</b>                                                                                                                                                            |                     |                    |                    |                       |              |                |                |       |
| 822.75                                                                                                                                                                    | 22.23               | V                  | 0.6                | 0.0                   | 21.61        | 50.00          | -28.4          |       |
| 822.75                                                                                                                                                                    | 4.58                | H                  | 0.6                | 0.0                   | 3.96         | 50.00          | -46.0          |       |
| Rev. 05.31.16                                                                                                                                                             |                     |                    |                    |                       |              |                |                |       |

**CDMA2000 1xRTT, 850MHz BC0**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 05/31/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 39472                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: CDMA 1XRTT 850MHz                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Equipment:                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.70                                                                   | 22.4                | V                  | 0.6                | 0.0                   | 21.75        | 23.90         | 38.45              | 40.60               | -16.7          |       |
| 824.70                                                                   | 3.3                 | H                  | 0.6                | 0.0                   | 2.71         | 4.86          | 38.45              | 40.60               | -35.7          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.52                                                                   | 22.4                | V                  | 0.6                | 0.0                   | 21.76        | 23.91         | 38.45              | 40.60               | -16.7          |       |
| 836.52                                                                   | 4.1                 | H                  | 0.6                | 0.0                   | 3.47         | 5.62          | 38.45              | 40.60               | -35.0          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.31                                                                   | 21.9                | V                  | 0.6                | 0.0                   | 21.24        | 23.39         | 38.45              | 40.60               | -17.2          |       |
| 848.31                                                                   | 3.7                 | H                  | 0.6                | 0.0                   | 3.03         | 5.18          | 38.45              | 40.60               | -35.4          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**EVDO-Rev A, 850MHz BC0**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F                                                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| <b>Company:</b><br><b>Project #:</b> 16U23309<br><b>Date:</b> 06/06/16<br><b>Test Engineer:</b> 39472<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> CDMA Rev A 850MHz |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Equipment:</b><br><b>Receiving:</b> Sunol T185, and Chamber F Cable<br><b>Substitution:</b> Dipole S/N: 00022117, 8ft SMA Cable                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                                                                                                                  | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                                                                                                                    |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.70                                                                                                                                                                    | 22.4                | V                  | 0.6                | 0.0                   | 21.78        | 23.93         | 38.45              | 40.60               | -16.7          |       |
| 824.70                                                                                                                                                                    | 4.4                 | H                  | 0.6                | 0.0                   | 3.80         | 5.95          | 38.45              | 40.60               | -34.7          |       |
| Mid Ch                                                                                                                                                                    |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.52                                                                                                                                                                    | 22.4                | V                  | 0.6                | 0.0                   | 21.79        | 23.94         | 38.45              | 40.60               | -16.7          |       |
| 836.52                                                                                                                                                                    | 4.0                 | H                  | 0.6                | 0.0                   | 3.37         | 5.52          | 38.45              | 40.60               | -35.1          |       |
| High Ch                                                                                                                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.31                                                                                                                                                                    | 22.1                | V                  | 0.6                | 0.0                   | 21.44        | 23.59         | 38.45              | 40.60               | -17.0          |       |
| 848.31                                                                                                                                                                    | 4.9                 | H                  | 0.6                | 0.0                   | 4.29         | 6.44          | 38.45              | 40.60               | -34.2          |       |
| Rev. 05.31.16                                                                                                                                                             |                     |                    |                    |                       |              |               |                    |                     |                |       |

**CDMA2000 1xRTT, 1900MHz BC1**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309           |                    |                       |               |                |                |       |
| <b>Date:</b>                                                             |                     | 05/31/16           |                    |                       |               |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 39472              |                    |                       |               |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only           |                    |                       |               |                |                |       |
| <b>Mode:</b>                                                             |                     | CDMA 1XRTT 1900MHz |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 15.9                | V                  | 0.98               | 8.05                  | 22.94         | 33.0           | -10.1          |       |
| 1.851                                                                    | 17.8                | H                  | 0.98               | 8.05                  | 24.83         | 33.0           | -8.2           |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 16.2                | V                  | 0.98               | 8.03                  | 23.27         | 33.0           | -9.7           |       |
| 1.880                                                                    | 17.9                | H                  | 0.98               | 8.03                  | 24.91         | 33.0           | -8.1           |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.909                                                                    | 16.5                | V                  | 0.98               | 8.05                  | 23.59         | 33.0           | -9.4           |       |
| 1.909                                                                    | 18.0                | H                  | 0.98               | 8.05                  | 25.11         | 33.0           | -7.9           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**EVDO-Rev A, 1900MHz BC1**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F                                                                                                   |                     |                    |                    |                       |               |                |                |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b><br><b>Project #:</b> 16U23309<br><b>Date:</b> 06/06/16<br><b>Test Engineer:</b> 39472<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> CDMA Rev A 1900MHz |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b><br>Receiving: Horn T344 and Chamber F SMA Cables<br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                          |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                                                                                                                   | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                                                                                                                     |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                                                                                                                      | 16.0                | V                  | 0.98               | 8.05                  | 23.03         | 33.0           | -10.0          |       |
| 1.851                                                                                                                                                                      | 17.8                | H                  | 0.98               | 8.05                  | 24.88         | 33.0           | -8.1           |       |
| Mid Ch                                                                                                                                                                     |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                                                                                                                      | 16.3                | V                  | 0.98               | 8.03                  | 23.31         | 33.0           | -9.7           |       |
| 1.880                                                                                                                                                                      | 17.9                | H                  | 0.98               | 8.03                  | 24.96         | 33.0           | -8.0           |       |
| High Ch                                                                                                                                                                    |                     |                    |                    |                       |               |                |                |       |
| 1.909                                                                                                                                                                      | 17.1                | V                  | 0.98               | 8.05                  | 24.13         | 33.0           | -8.9           |       |
| 1.909                                                                                                                                                                      | 18.1                | H                  | 0.98               | 8.05                  | 25.14         | 33.0           | -7.9           |       |
| Rev. 05.31.16                                                                                                                                                              |                     |                    |                    |                       |               |                |                |       |

## 10.1.6. UMTS

### UMTS REL 99, 850MHz BAND 5

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 06/02/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 39472                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: WCDMA Rel 99 850MHz                                                |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Equipment:                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 826.40                                                                   | 23.5                | V                  | 0.6                | 0.0                   | 22.84        | 24.99         | 38.45              | 40.60               | -15.6          |       |
| 826.40                                                                   | 6.2                 | H                  | 0.6                | 0.0                   | 5.62         | 7.77          | 38.45              | 40.60               | -32.8          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                   | 23.1                | V                  | 0.6                | 0.0                   | 22.50        | 24.65         | 38.45              | 40.60               | -16.0          |       |
| 836.60                                                                   | 5.4                 | H                  | 0.6                | 0.0                   | 4.81         | 6.96          | 38.45              | 40.60               | -33.6          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 846.60                                                                   | 23.2                | V                  | 0.6                | 0.0                   | 22.56        | 24.71         | 38.45              | 40.60               | -15.9          |       |
| 846.60                                                                   | 4.3                 | H                  | 0.6                | 0.0                   | 3.68         | 5.83          | 38.45              | 40.60               | -34.8          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**UMTS HSDPA, 850MHz BAND 5**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 06/02/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 39472                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: WCDMAHSDPA 850MHz                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Equipment:                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 826.40                                                                   | 22.5                | V                  | 0.6                | 0.0                   | 21.93        | 24.08         | 38.45              | 40.60               | -16.5          |       |
| 826.40                                                                   | 5.4                 | H                  | 0.6                | 0.0                   | 4.82         | 6.97          | 38.45              | 40.60               | -33.6          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                   | 22.3                | V                  | 0.6                | 0.0                   | 21.69        | 23.84         | 38.45              | 40.60               | -16.8          |       |
| 836.60                                                                   | 4.2                 | H                  | 0.6                | 0.0                   | 3.61         | 5.76          | 38.45              | 40.60               | -34.8          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 846.60                                                                   | 22.4                | V                  | 0.6                | 0.0                   | 21.74        | 23.89         | 38.45              | 40.60               | -16.7          |       |
| 846.60                                                                   | 3.4                 | H                  | 0.6                | 0.0                   | 2.74         | 4.89          | 38.45              | 40.60               | -35.7          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**UMTS REL 99, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 5/27/2016                                                   |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 50822                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> WCDMA Rel 99 1900MHz                                        |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.852                                                                    | 17.4                | V                  | 0.98               | 8.05                  | 24.43         | 33.0           | -8.6           |       |
| 1.852                                                                    | 18.4                | H                  | 0.98               | 8.05                  | 25.42         | 33.0           | -7.6           |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 17.7                | V                  | 0.98               | 8.03                  | 24.71         | 33.0           | -8.3           |       |
| 1.880                                                                    | 18.6                | H                  | 0.98               | 8.03                  | 25.68         | 33.0           | -7.3           |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.908                                                                    | 17.5                | V                  | 0.98               | 8.04                  | 24.52         | 33.0           | -8.5           |       |
| 1.908                                                                    | 18.5                | H                  | 0.98               | 8.04                  | 25.52         | 33.0           | -7.5           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**UMTS HSDPA, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 06/02/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> WCDMA HSDPA 1900MHz                                         |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.852                                                                    | 16.0                | V                  | 0.98               | 8.05                  | 23.03         | 33.0           | -10.0          |       |
| 1.852                                                                    | 17.5                | H                  | 0.98               | 8.05                  | 24.52         | 33.0           | -8.5           |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 16.5                | V                  | 0.98               | 8.03                  | 23.51         | 33.0           | -9.5           |       |
| 1.880                                                                    | 17.7                | H                  | 0.98               | 8.03                  | 24.80         | 33.0           | -8.2           |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.908                                                                    | 16.2                | V                  | 0.98               | 8.04                  | 23.31         | 33.0           | -9.7           |       |
| 1.908                                                                    | 17.7                | H                  | 0.98               | 8.04                  | 24.74         | 33.0           | -8.3           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**UMTS REL 99, 1700MHz BAND 4**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 06/02/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> WCDMA Rel 99 1700MHz                                        |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.712                                                                    | 14.6                | V                  | 0.95               | 8.27                  | 21.95         | 30.0           | -8.1           |       |
| 1.712                                                                    | 15.1                | H                  | 0.95               | 8.27                  | 22.39         | 30.0           | -7.6           |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.733                                                                    | 14.8                | V                  | 0.95               | 8.23                  | 22.06         | 30.0           | -7.9           |       |
| 1.733                                                                    | 15.3                | H                  | 0.95               | 8.23                  | 22.56         | 30.0           | -7.4           |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.753                                                                    | 14.1                | V                  | 0.95               | 8.18                  | 21.37         | 30.0           | -8.6           |       |
| 1.753                                                                    | 15.5                | H                  | 0.95               | 8.18                  | 22.69         | 30.0           | -7.3           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**UMTS HSDPA, 1700MHz BAND 4**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 06/02/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> WCDMA HSDPA 1700MHz                                         |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.712                                                                    | 13.7                | V                  | 0.95               | 8.27                  | 20.99         | 30.0           | -9.0           |       |
| 1.712                                                                    | 14.2                | H                  | 0.95               | 8.27                  | 21.50         | 30.0           | -8.5           |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.733                                                                    | 14.1                | V                  | 0.95               | 8.23                  | 21.34         | 30.0           | -8.7           |       |
| 1.733                                                                    | 14.4                | H                  | 0.95               | 8.23                  | 21.63         | 30.0           | -8.4           |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.753                                                                    | 13.2                | V                  | 0.95               | 8.18                  | 20.40         | 30.0           | -9.6           |       |
| 1.753                                                                    | 14.5                | H                  | 0.95               | 8.18                  | 21.77         | 30.0           | -8.2           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

## 10.2. RADIATED POWER (ERP & EIRP) (UAT)

### 10.2.1. GSM

#### Part 22 / RSS 132 850MHz Band

| Band | Mode  | Channel | f (MHz) | ERP (Average) |        |
|------|-------|---------|---------|---------------|--------|
|      |       |         |         | dBm           | mW     |
| CELL | GPRS  | 128     | 824.2   | <b>27.07</b>  | 509.33 |
|      |       | 190     | 836.6   | 26.71         | 468.81 |
|      |       | 251     | 848.8   | 26.90         | 489.78 |
|      | EGPRS | 128     | 824.2   | 20.02         | 100.46 |
|      |       | 190     | 836.6   | 20.22         | 105.20 |
|      |       | 251     | 848.8   | <b>20.30</b>  | 107.15 |

#### Part 24 / RSS 133 1900MHz Band

| Band | Mode  | Channel | f (MHz) | EIRP (Average) |        |
|------|-------|---------|---------|----------------|--------|
|      |       |         |         | dBm            | mW     |
| PCS  | GPRS  | 512     | 1850.2  | <b>25.39</b>   | 345.94 |
|      |       | 661     | 1880.0  | 25.07          | 321.37 |
|      |       | 810     | 1909.8  | 25.17          | 328.85 |
|      | EGPRS | 512     | 1850.2  | <b>21.89</b>   | 154.53 |
|      |       | 661     | 1880.0  | 21.77          | 150.31 |
|      |       | 810     | 1909.8  | 21.67          | 146.89 |

## 10.2.2. CDMA2000

### Part 90 800MHz Band

| Band | Mode         | Channel | f (MHz) | ERP (Average) |       |
|------|--------------|---------|---------|---------------|-------|
|      |              |         |         | dBm           | mW    |
| CELL | BC10, 1xRTT  | 450     | 817.3   | 17.37         | 54.58 |
|      |              | 560     | 820.0   | 17.70         | 58.88 |
|      |              | 670     | 822.8   | <b>17.94</b>  | 62.23 |
|      | BC10, EVDO A | 450     | 817.3   | 17.38         | 54.70 |
|      |              | 560     | 820.0   | 17.76         | 59.70 |
|      |              | 670     | 822.8   | <b>17.96</b>  | 62.52 |

### Part 22 / RSS 132 850MHz Band

| Band | Mode             | Channel | f (MHz) | ERP (Average) |       |
|------|------------------|---------|---------|---------------|-------|
|      |                  |         |         | dBm           | mW    |
| CELL | BC 0, 1xRTT      | 1013    | 824.7   | 16.52         | 44.87 |
|      |                  | 384     | 836.5   | 16.21         | 41.78 |
|      |                  | 777     | 848.3   | <b>16.54</b>  | 45.08 |
|      | BC 0, EVDO Rev A | 1013    | 824.7   | 16.57         | 45.39 |
|      |                  | 384     | 836.5   | 16.31         | 42.76 |
|      |                  | 777     | 848.3   | <b>16.58</b>  | 45.50 |

### Part 24 / RSS 133 1900MHz Band

| Band | Mode            | Channel | f (MHz) | EIRP (Average) |       |
|------|-----------------|---------|---------|----------------|-------|
|      |                 |         |         | dBm            | mW    |
| PCS  | BC1, 1xRTT      | 25      | 1851.3  | 19.39          | 86.90 |
|      |                 | 600     | 1880.0  | <b>19.74</b>   | 94.19 |
|      |                 | 1175    | 1908.8  | 19.60          | 91.20 |
|      | BC1, EVDO REV A | 25      | 1851.3  | 19.42          | 87.50 |
|      |                 | 600     | 1880.0  | <b>19.77</b>   | 94.84 |
|      |                 | 1175    | 1908.8  | 19.67          | 92.68 |

### 10.2.3. UMTS

#### Part 22 / RSS 132 850MHz Band

| Band | Mode        | Channel | f (MHz) | ERP (Average) |       |
|------|-------------|---------|---------|---------------|-------|
|      |             |         |         | dBm           | mW    |
| CELL | UMTS,REL 99 | 4132    | 826.4   | 17.00         | 50.12 |
|      |             | 4183    | 836.6   | <b>17.07</b>  | 50.93 |
|      |             | 4233    | 846.6   | 16.85         | 48.42 |
|      | UMTS, HSDPA | 4132    | 826.4   | <b>16.12</b>  | 40.93 |
|      |             | 4183    | 836.6   | 16.11         | 40.83 |
|      |             | 4233    | 846.6   | 15.89         | 38.82 |

#### Part 24 / RSS 133 1900MHz Band

| Band | Mode        | Channel | f (MHz) | EIRP (Average) |       |
|------|-------------|---------|---------|----------------|-------|
|      |             |         |         | dBm            | mW    |
| PCS  | UMTS,REL 99 | 9662    | 1852.4  | 17.59          | 57.41 |
|      |             | 9800    | 1880.0  | 17.66          | 58.34 |
|      |             | 9938    | 1907.6  | <b>17.68</b>   | 58.61 |
|      | UMTS, HSDPA | 9662    | 1852.4  | 16.74          | 47.21 |
|      |             | 9800    | 1880.0  | <b>16.87</b>   | 48.64 |
|      |             | 9938    | 1907.6  | 16.71          | 46.88 |

#### Part 27 / RSS 139 1700MHz Band

| Band | Mode        | Channel | f (MHz) | EIRP (Average) |       |
|------|-------------|---------|---------|----------------|-------|
|      |             |         |         | dBm            | mW    |
| PCS  | UMTS,REL 99 | 1537    | 1712.4  | 18.71          | 74.30 |
|      |             | 1638    | 1732.6  | 18.65          | 73.28 |
|      |             | 1738    | 1752.5  | <b>18.90</b>   | 77.62 |
|      | UMTS, HSDPA | 1537    | 1712.4  | 17.80          | 60.26 |
|      |             | 1638    | 1732.6  | 17.84          | 60.81 |
|      |             | 1738    | 1752.5  | <b>17.85</b>   | 60.95 |

## 10.2.4. GSM

### GPRS, 850MHz BAND 5

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Date:</b> 06/01/16                                                    |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Mode:</b> GSM 850MHz                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.20                                                                   | 17.2                | V                  | 0.6                | 0.0                   | 16.60        | 18.75         | 38.45              | 40.60               | -21.8          |       |
| 824.20                                                                   | 27.7                | H                  | 0.6                | 0.0                   | 27.07        | 29.22         | 38.45              | 40.60               | -11.4          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                   | 17.1                | V                  | 0.6                | 0.0                   | 16.51        | 18.66         | 38.45              | 40.60               | -21.9          |       |
| 836.60                                                                   | 27.3                | H                  | 0.6                | 0.0                   | 26.71        | 28.86         | 38.45              | 40.60               | -11.7          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.80                                                                   | 17.6                | V                  | 0.6                | 0.0                   | 16.98        | 19.13         | 38.45              | 40.60               | -21.5          |       |
| 848.80                                                                   | 27.5                | H                  | 0.6                | 0.0                   | 26.90        | 29.05         | 38.45              | 40.60               | -11.5          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**EGPRS, 850MHz BAND 5**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 05/31/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 50822                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: EDGE 850MHz                                                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.20                                                                   | 13.9                | V                  | 0.6                | 0.0                   | 13.26        | 15.41         | 38.45              | 40.60               | -25.2          |       |
| 824.20                                                                   | 20.6                | H                  | 0.6                | 0.0                   | 20.02        | 22.17         | 38.45              | 40.60               | -18.4          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                   | 14.1                | V                  | 0.6                | 0.0                   | 13.50        | 15.65         | 38.45              | 40.60               | -25.0          |       |
| 836.60                                                                   | 20.8                | H                  | 0.6                | 0.0                   | 20.22        | 22.37         | 38.45              | 40.60               | -18.2          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.80                                                                   | 13.7                | V                  | 0.6                | 0.0                   | 13.08        | 15.23         | 38.45              | 40.60               | -25.4          |       |
| 848.80                                                                   | 20.9                | H                  | 0.6                | 0.0                   | 20.30        | 22.45         | 38.45              | 40.60               | -18.1          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**GPRS, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 06/03/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 52268                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> GSM 1900MHz                                                 |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| <b>Low Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 14.7                | V                  | 0.98               | 8.05                  | 21.79         | 33.0           | -11.2          |       |
| 1.851                                                                    | 18.3                | H                  | 0.98               | 8.05                  | 25.39         | 33.0           | -7.6           |       |
| <b>Mid Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 14.1                | V                  | 0.98               | 8.03                  | 21.15         | 33.0           | -11.9          |       |
| 1.880                                                                    | 18.0                | H                  | 0.98               | 8.03                  | 25.07         | 33.0           | -7.9           |       |
| <b>High Ch</b>                                                           |                     |                    |                    |                       |               |                |                |       |
| 1.910                                                                    | 14.7                | V                  | 0.98               | 8.05                  | 21.79         | 33.0           | -11.2          |       |
| 1.910                                                                    | 18.1                | H                  | 0.98               | 8.05                  | 25.17         | 33.0           | -7.8           |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**EGPRS, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309           |                    |                       |               |                |                |       |
| <b>Date:</b>                                                             |                     | 06/03/16           |                    |                       |               |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 52268              |                    |                       |               |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only           |                    |                       |               |                |                |       |
| <b>Mode:</b>                                                             |                     | EDGE 1900MHz       |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| <b>Low Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 9.4                 | V                  | 0.98               | 8.05                  | 16.50         | 33.0           | -16.5          |       |
| 1.851                                                                    | 14.8                | H                  | 0.98               | 8.05                  | 21.89         | 33.0           | -11.1          |       |
| <b>Mid Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 9.2                 | V                  | 0.98               | 8.03                  | 16.28         | 33.0           | -16.7          |       |
| 1.880                                                                    | 14.7                | H                  | 0.98               | 8.03                  | 21.77         | 33.0           | -11.2          |       |
| <b>High Ch</b>                                                           |                     |                    |                    |                       |               |                |                |       |
| 1.910                                                                    | 9.3                 | V                  | 0.98               | 8.05                  | 16.35         | 33.0           | -16.6          |       |
| 1.910                                                                    | 14.6                | H                  | 0.98               | 8.05                  | 21.67         | 33.0           | -11.3          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

## 10.2.5. CDMA2000

### CDMA2000 1xRTT, 800MHz BC10

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |              |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309           |                    |                       |              |                |                |       |
| <b>Date:</b>                                                             |                     | 05/31/16           |                    |                       |              |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 39472              |                    |                       |              |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only           |                    |                       |              |                |                |       |
| <b>Mode:</b>                                                             |                     | CDMA 1XRTT 800MHz  |                    |                       |              |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |              |                |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |                |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |                |                |       |
| 817.25                                                                   | 11.95               | V                  | 0.6                | 0.0                   | 11.33        | 50.00          | -38.7          |       |
| 817.25                                                                   | 17.99               | H                  | 0.6                | 0.0                   | 17.37        | 50.00          | -32.6          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |                |                |       |
| 820.00                                                                   | 12.30               | V                  | 0.6                | 0.0                   | 11.68        | 50.00          | -38.3          |       |
| 820.00                                                                   | 18.32               | H                  | 0.6                | 0.0                   | 17.70        | 50.00          | -32.3          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |                |                |       |
| 822.75                                                                   | 12.25               | V                  | 0.6                | 0.0                   | 11.63        | 50.00          | -38.4          |       |
| 822.75                                                                   | 18.56               | H                  | 0.6                | 0.0                   | 17.94        | 50.00          | -32.1          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |                |                |       |

**EVDO-Rev A, 800MHz BC10**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |              |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309           |                    |                       |              |                |                |       |
| <b>Date:</b>                                                             |                     | 06/06/16           |                    |                       |              |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 52268              |                    |                       |              |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only           |                    |                       |              |                |                |       |
| <b>Mode:</b>                                                             |                     | CDMA Rev A 800MHz  |                    |                       |              |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |              |                |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |                |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| <b>Low Ch</b>                                                            |                     |                    |                    |                       |              |                |                |       |
| 817.25                                                                   | 11.96               | V                  | 0.6                | 0.0                   | 11.34        | 50.00          | -38.7          |       |
| 817.25                                                                   | 18.00               | H                  | 0.6                | 0.0                   | 17.38        | 50.00          | -32.6          |       |
| <b>Mid Ch</b>                                                            |                     |                    |                    |                       |              |                |                |       |
| 820.00                                                                   | 12.57               | V                  | 0.6                | 0.0                   | 11.95        | 50.00          | -38.1          |       |
| 820.00                                                                   | 18.38               | H                  | 0.6                | 0.0                   | 17.76        | 50.00          | -32.2          |       |
| <b>High Ch</b>                                                           |                     |                    |                    |                       |              |                |                |       |
| 822.75                                                                   | 12.35               | V                  | 0.6                | 0.0                   | 11.73        | 50.00          | -38.3          |       |
| 822.75                                                                   | 18.58               | H                  | 0.6                | 0.0                   | 17.96        | 50.00          | -32.0          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |                |                |       |

**CDMA2000 1xRTT, 850MHz BC0**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 06/01/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 39472                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: CDMA 1XRTT 850MHz                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Equipment:                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.70                                                                   | 9.7                 | V                  | 0.6                | 0.0                   | 9.11         | 11.26         | 38.45              | 40.60               | -29.3          |       |
| 824.70                                                                   | 17.1                | H                  | 0.6                | 0.0                   | 16.52        | 18.67         | 38.45              | 40.60               | -21.9          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.52                                                                   | 9.6                 | V                  | 0.6                | 0.0                   | 8.98         | 11.13         | 38.45              | 40.60               | -29.5          |       |
| 836.52                                                                   | 16.8                | H                  | 0.6                | 0.0                   | 16.21        | 18.36         | 38.45              | 40.60               | -22.2          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.31                                                                   | 10.2                | V                  | 0.6                | 0.0                   | 9.59         | 11.74         | 38.45              | 40.60               | -28.9          |       |
| 848.31                                                                   | 17.2                | H                  | 0.6                | 0.0                   | 16.54        | 18.69         | 38.45              | 40.60               | -21.9          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**EVDO-Rev A, 850MHz BC0**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Date:</b> 06/03/16                                                    |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Engineer:</b> 52268                                              |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Mode:</b> CDMA Rev A 850MHz                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 824.70                                                                   | 11.7                | V                  | 0.6                | 0.0                   | 11.09        | 13.24         | 38.45              | 40.60               | -27.4          |       |
| 824.70                                                                   | 17.2                | H                  | 0.6                | 0.0                   | 16.57        | 18.72         | 38.45              | 40.60               | -21.9          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.52                                                                   | 12.0                | V                  | 0.6                | 0.0                   | 11.35        | 13.50         | 38.45              | 40.60               | -27.1          |       |
| 836.52                                                                   | 16.9                | H                  | 0.6                | 0.0                   | 16.31        | 18.46         | 38.45              | 40.60               | -22.1          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 848.31                                                                   | 12.3                | V                  | 0.6                | 0.0                   | 11.68        | 13.83         | 38.45              | 40.60               | -26.8          |       |
| 848.31                                                                   | 17.2                | H                  | 0.6                | 0.0                   | 16.58        | 18.73         | 38.45              | 40.60               | -21.9          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**CDMA2000 1xRTT, 1900MHz BC1**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309           |                    |                       |               |                |                |       |
| <b>Date:</b>                                                             |                     | 06/02/16           |                    |                       |               |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 52298              |                    |                       |               |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only 4122      |                    |                       |               |                |                |       |
| <b>Mode:</b>                                                             |                     | CDMA 1XRTT 1900MHz |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| <b>Low Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 10.7                | V                  | 0.98               | 8.05                  | 17.79         | 33.0           | -15.2          |       |
| 1.851                                                                    | 12.3                | H                  | 0.98               | 8.05                  | 19.39         | 33.0           | -13.6          |       |
| <b>Mid Ch</b>                                                            |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 10.5                | V                  | 0.98               | 8.03                  | 17.60         | 33.0           | -15.4          |       |
| 1.880                                                                    | 12.7                | H                  | 0.98               | 8.03                  | 19.74         | 33.0           | -13.3          |       |
| <b>High Ch</b>                                                           |                     |                    |                    |                       |               |                |                |       |
| 1.909                                                                    | 10.0                | V                  | 0.98               | 8.05                  | 17.02         | 33.0           | -16.0          |       |
| 1.909                                                                    | 12.5                | H                  | 0.98               | 8.05                  | 19.60         | 33.0           | -13.4          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**EVDO-Rev A, 1900MHz BC1**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 06/03/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> CDMA Rev A 1900MHz                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.851                                                                    | 10.9                | V                  | 0.98               | 8.05                  | 17.98         | 33.0           | -15.0          |       |
| 1.851                                                                    | 12.4                | H                  | 0.98               | 8.05                  | 19.42         | 33.0           | -13.6          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 10.4                | V                  | 0.98               | 8.03                  | 17.46         | 33.0           | -15.5          |       |
| 1.880                                                                    | 12.7                | H                  | 0.98               | 8.03                  | 19.77         | 33.0           | -13.2          |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.909                                                                    | 10.3                | V                  | 0.98               | 8.05                  | 17.38         | 33.0           | -15.6          |       |
| 1.909                                                                    | 12.6                | H                  | 0.98               | 8.05                  | 19.67         | 33.0           | -13.3          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

## 10.2.6. UMTS

### UMTS REL 99, 850MHz BAND 5

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 06/02/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 39472                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: WCDMA Rel 99 850MHz                                                |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Equipment:                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 826.40                                                                   | 11.2                | V                  | 0.6                | 0.0                   | 10.60        | 12.75         | 38.45              | 40.60               | -27.8          |       |
| 826.40                                                                   | 17.6                | H                  | 0.6                | 0.0                   | 17.00        | 19.15         | 38.45              | 40.60               | -21.5          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                   | 11.6                | V                  | 0.6                | 0.0                   | 11.02        | 13.17         | 38.45              | 40.60               | -27.4          |       |
| 836.60                                                                   | 17.7                | H                  | 0.6                | 0.0                   | 17.07        | 19.22         | 38.45              | 40.60               | -21.4          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 846.60                                                                   | 12.9                | V                  | 0.6                | 0.0                   | 12.27        | 14.42         | 38.45              | 40.60               | -26.2          |       |
| 846.60                                                                   | 17.5                | H                  | 0.6                | 0.0                   | 16.85        | 19.00         | 38.45              | 40.60               | -21.6          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**UMTS HSDPA, 850MHz BAND 5**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |              |               |                    |                     |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|---------------|--------------------|---------------------|----------------|-------|
| Company:                                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Project #: 16U23309                                                      |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Date: 06/02/16                                                           |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Engineer: 39472                                                     |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Configuration: EUT Only                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Mode: WCDMA HSDPA 850MHz                                                 |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Test Equipment:                                                          |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Receiving: Sunol T185, and Chamber F Cable                               |                     |                    |                    |                       |              |               |                    |                     |                |       |
| Substitution: Dipole S/N: 00022117, 8ft SMA Cable                        |                     |                    |                    |                       |              |               |                    |                     |                |       |
| f<br>MHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | EIRP<br>(dBm) | ERP Limit<br>(dBm) | EIRP Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 826.40                                                                   | 9.5                 | V                  | 0.6                | 0.0                   | 8.93         | 11.08         | 38.45              | 40.60               | -29.5          |       |
| 826.40                                                                   | 16.7                | H                  | 0.6                | 0.0                   | 16.12        | 18.27         | 38.45              | 40.60               | -22.3          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 836.60                                                                   | 10.2                | V                  | 0.6                | 0.0                   | 9.57         | 11.72         | 38.45              | 40.60               | -28.9          |       |
| 836.60                                                                   | 16.7                | H                  | 0.6                | 0.0                   | 16.11        | 18.26         | 38.45              | 40.60               | -22.3          |       |
| High Ch                                                                  |                     |                    |                    |                       |              |               |                    |                     |                |       |
| 846.60                                                                   | 11.0                | V                  | 0.6                | 0.0                   | 10.34        | 12.49         | 38.45              | 40.60               | -28.1          |       |
| 846.60                                                                   | 16.5                | H                  | 0.6                | 0.0                   | 15.89        | 18.04         | 38.45              | 40.60               | -22.6          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |              |               |                    |                     |                |       |

**UMTS REL 99, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 5/27/2016                                                   |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 50822                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> WCDMA Rel 99 1900MHz                                        |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.852                                                                    | 3.4                 | V                  | 0.98               | 8.05                  | 10.50         | 33.0           | -22.5          |       |
| 1.852                                                                    | 10.5                | H                  | 0.98               | 8.05                  | 17.59         | 33.0           | -15.4          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.880                                                                    | 3.9                 | V                  | 0.98               | 8.03                  | 10.92         | 33.0           | -22.1          |       |
| 1.880                                                                    | 10.6                | H                  | 0.98               | 8.03                  | 17.66         | 33.0           | -15.3          |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.908                                                                    | 3.8                 | V                  | 0.98               | 8.04                  | 10.84         | 33.0           | -22.2          |       |
| 1.908                                                                    | 10.6                | H                  | 0.98               | 8.04                  | 17.68         | 33.0           | -15.3          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

**UMTS HSDPA, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                     |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|---------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                     |                    |                       |               |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309            |                    |                       |               |                |                |       |
| <b>Date:</b>                                                             |                     | 06/02/16            |                    |                       |               |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 39472               |                    |                       |               |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only            |                    |                       |               |                |                |       |
| <b>Mode:</b>                                                             |                     | WCDMA HSDPA 1900MHz |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                     |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                     |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                     |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                     |                    |                       |               |                |                |       |
| 1.852                                                                    | 2.6                 | V                   | 0.98               | 8.05                  | 9.70          | 33.0           | -23.3          |       |
| 1.852                                                                    | 9.7                 | H                   | 0.98               | 8.05                  | 16.74         | 33.0           | -16.3          |       |
| Mid Ch                                                                   |                     |                     |                    |                       |               |                |                |       |
| 1.880                                                                    | 3.1                 | V                   | 0.98               | 8.03                  | 10.12         | 33.0           | -22.9          |       |
| 1.880                                                                    | 9.8                 | H                   | 0.98               | 8.03                  | 16.87         | 33.0           | -16.1          |       |
| High Ch                                                                  |                     |                     |                    |                       |               |                |                |       |
| 1.908                                                                    | 3.0                 | V                   | 0.98               | 8.04                  | 10.09         | 33.0           | -22.9          |       |
| 1.908                                                                    | 9.6                 | H                   | 0.98               | 8.04                  | 16.71         | 33.0           | -16.3          |       |
| Rev. 05.31.16                                                            |                     |                     |                    |                       |               |                |                |       |

**UMTS REL 99, 1700MHz BAND 4**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                      |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|----------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                      |                    |                       |               |                |                |       |
| <b>Project #:</b>                                                        |                     | 16U23309             |                    |                       |               |                |                |       |
| <b>Date:</b>                                                             |                     | 06/02/16             |                    |                       |               |                |                |       |
| <b>Test Engineer:</b>                                                    |                     | 39472                |                    |                       |               |                |                |       |
| <b>Configuration:</b>                                                    |                     | EUT Only             |                    |                       |               |                |                |       |
| <b>Mode:</b>                                                             |                     | WCDMA Rel 99 1700MHz |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                      |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                      |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                      |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)   | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                      |                    |                       |               |                |                |       |
| 1.712                                                                    | 1.7                 | V                    | 0.95               | 8.27                  | 9.00          | 30.0           | -21.0          |       |
| 1.712                                                                    | 11.4                | H                    | 0.95               | 8.27                  | 18.71         | 30.0           | -11.3          |       |
| Mid Ch                                                                   |                     |                      |                    |                       |               |                |                |       |
| 1.733                                                                    | 2.9                 | V                    | 0.95               | 8.23                  | 10.16         | 30.0           | -19.8          |       |
| 1.733                                                                    | 11.4                | H                    | 0.95               | 8.23                  | 18.65         | 30.0           | -11.4          |       |
| High Ch                                                                  |                     |                      |                    |                       |               |                |                |       |
| 1.753                                                                    | 3.2                 | V                    | 0.95               | 8.18                  | 10.46         | 30.0           | -19.5          |       |
| 1.753                                                                    | 11.7                | H                    | 0.95               | 8.18                  | 18.90         | 30.0           | -11.1          |       |
| Rev. 05.31.16                                                            |                     |                      |                    |                       |               |                |                |       |

**UMTS HSDPA, 1700MHz BAND 4**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber F |                     |                    |                    |                       |               |                |                |       |
|--------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| <b>Company:</b>                                                          |                     |                    |                    |                       |               |                |                |       |
| <b>Project #:</b> 16U23309                                               |                     |                    |                    |                       |               |                |                |       |
| <b>Date:</b> 06/02/16                                                    |                     |                    |                    |                       |               |                |                |       |
| <b>Test Engineer:</b> 39472                                              |                     |                    |                    |                       |               |                |                |       |
| <b>Configuration:</b> EUT Only                                           |                     |                    |                    |                       |               |                |                |       |
| <b>Mode:</b> WCDMA HSDPA 1700MHz                                         |                     |                    |                    |                       |               |                |                |       |
| <b>Test Equipment:</b>                                                   |                     |                    |                    |                       |               |                |                |       |
| Receiving: Horn T344 and Chamber F SMA Cables                            |                     |                    |                    |                       |               |                |                |       |
| Substitution: Horn T59 Substitution, and 8ft SMA Cable                   |                     |                    |                    |                       |               |                |                |       |
| f<br>GHz                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
| Low Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.712                                                                    | 1.3                 | V                  | 0.95               | 8.27                  | 8.58          | 30.0           | -21.4          |       |
| 1.712                                                                    | 10.5                | H                  | 0.95               | 8.27                  | 17.80         | 30.0           | -12.2          |       |
| Mid Ch                                                                   |                     |                    |                    |                       |               |                |                |       |
| 1.733                                                                    | 2.1                 | V                  | 0.95               | 8.23                  | 9.37          | 30.0           | -20.6          |       |
| 1.733                                                                    | 10.6                | H                  | 0.95               | 8.23                  | 17.84         | 30.0           | -12.2          |       |
| High Ch                                                                  |                     |                    |                    |                       |               |                |                |       |
| 1.753                                                                    | 2.5                 | V                  | 0.95               | 8.18                  | 9.77          | 30.0           | -20.2          |       |
| 1.753                                                                    | 10.6                | H                  | 0.95               | 8.18                  | 17.85         | 30.0           | -12.1          |       |
| Rev. 05.31.16                                                            |                     |                    |                    |                       |               |                |                |       |

### 10.3. PEAK-TO-AVERAGE RATIO

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 4/14/16 |
|------------|-------|--------------|---------|

| Mode                                                    | Modulation | Conducted Power (dBm) |         | Peak-to-Average Ratio |
|---------------------------------------------------------|------------|-----------------------|---------|-----------------------|
|                                                         |            | *Peak                 | Average |                       |
| GSM850                                                  | GPRS       | 34.24                 | 33.37   | 0.87                  |
|                                                         | EGPRS      | 32.33                 | 28.93   | 3.40                  |
| GSM1900                                                 | GPRS       | 30.87                 | 30.33   | 0.54                  |
|                                                         | EGPRS      | 31.28                 | 27.92   | 3.36                  |
| *Peak Reading = Average Reading + Peak-to-Average Ratio |            |                       |         |                       |

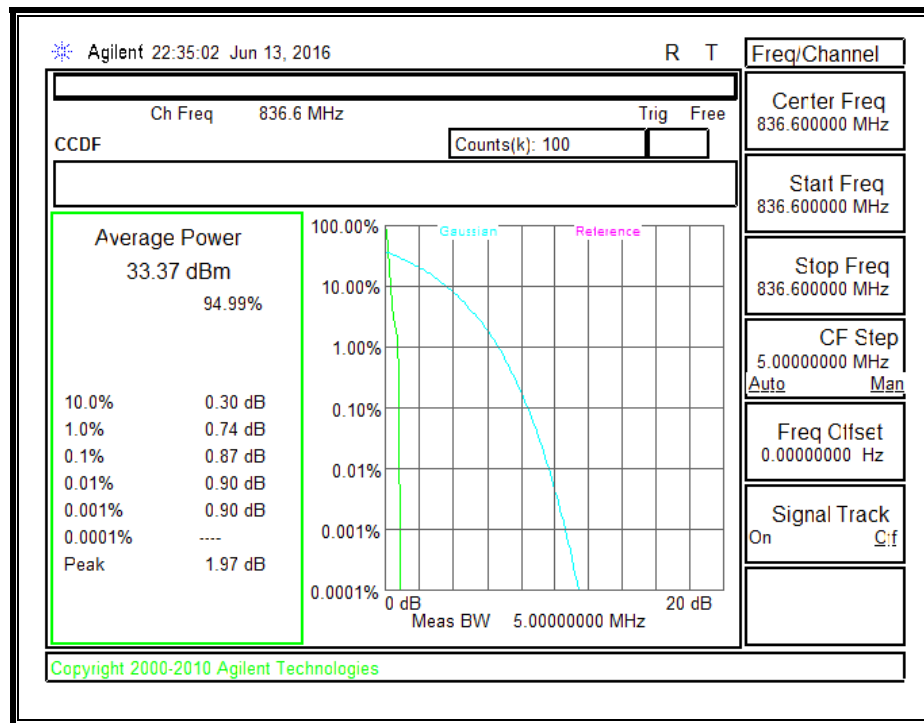
|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 50820 | <b>Date:</b> | 5/4/16 |
|------------|-------|--------------|--------|

| Mode                                                    | Modulation | Conducted Power (dBm) |         | Peak-to-Average Ratio |
|---------------------------------------------------------|------------|-----------------------|---------|-----------------------|
|                                                         |            | *Peak                 | Average |                       |
| CDMA2000 BC0                                            | 1xRTT      | 28.92                 | 25.04   | 3.88                  |
|                                                         | EVDO A     | 29.1                  | 25.07   | 4.03                  |
| CDMA2000 BC1                                            | 1xRTT      | 28.84                 | 25.27   | 3.57                  |
|                                                         | EVDO A     | 29.3                  | 25.30   | 4.00                  |
| CDMA2000 BC10                                           | 1xRTT      | 28.97                 | 25.00   | 3.97                  |
|                                                         | EVDO A     | 29.17                 | 24.88   | 4.29                  |
| *Peak Reading = Average Reading + Peak-to-Average Ratio |            |                       |         |                       |

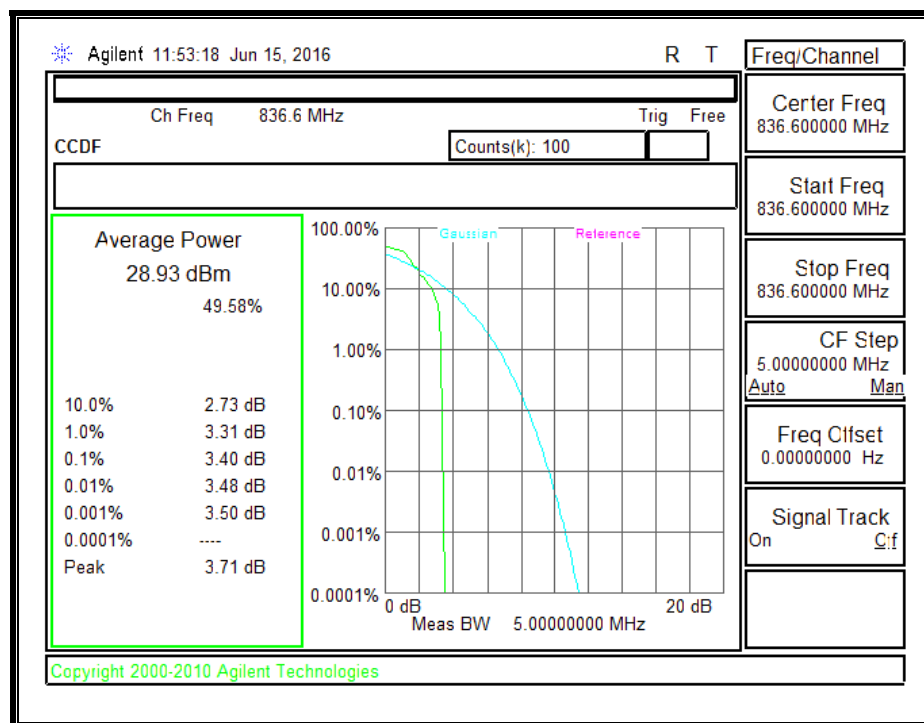
|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 38806 | <b>Date:</b> | 4/14/16 |
|------------|-------|--------------|---------|

| Mode                                                    | Modulation | Conducted Power (dBm) |         | Peak-to-Average Ratio |
|---------------------------------------------------------|------------|-----------------------|---------|-----------------------|
|                                                         |            | *Peak                 | Average |                       |
| UMTS Band 5                                             | REL99      | 5.14                  | 25.00   | 3.14                  |
|                                                         | HSDPA      | 27.55                 | 23.90   | 3.65                  |
| UMTS Band 2                                             | REL99      | 28.39                 | 25.22   | 3.17                  |
|                                                         | HSDPA      | 27.89                 | 24.09   | 3.80                  |
| UMTS Band 4                                             | REL99      | 28.22                 | 25.27   | 2.95                  |
|                                                         | HSDPA      | 27.81                 | 24.18   | 3.63                  |
| *Peak Reading = Average Reading + Peak-to-Average Ratio |            |                       |         |                       |

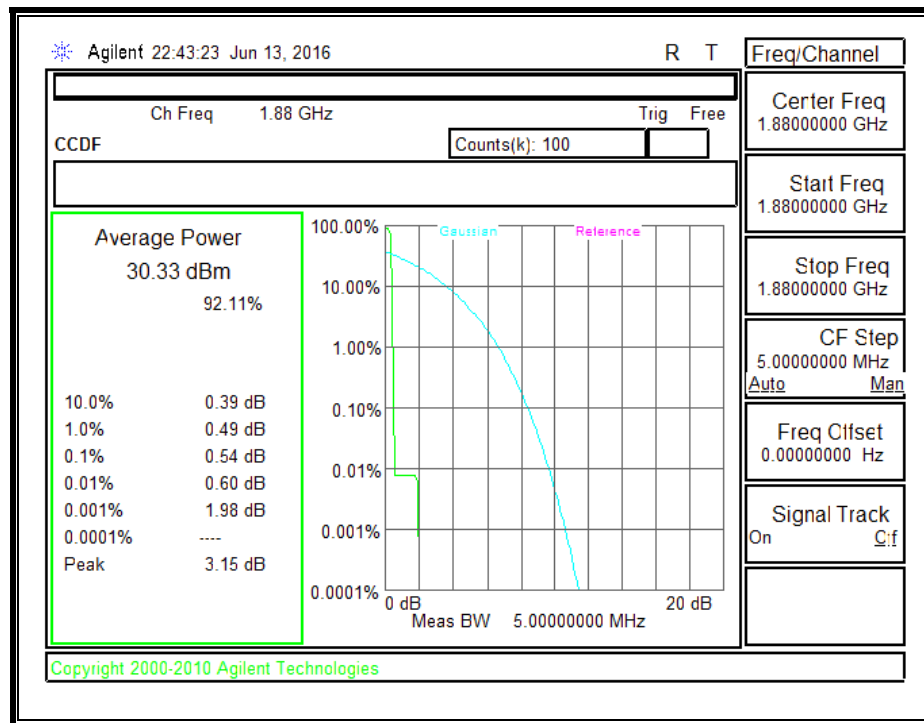
**GSM850, GPRS**



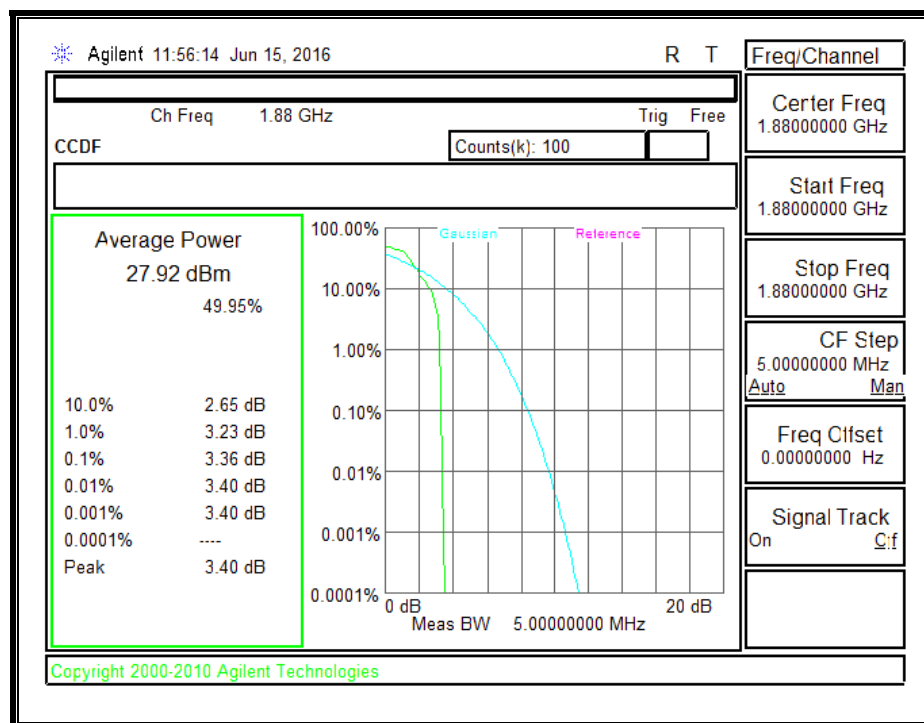
**GSM850, EGPRS**



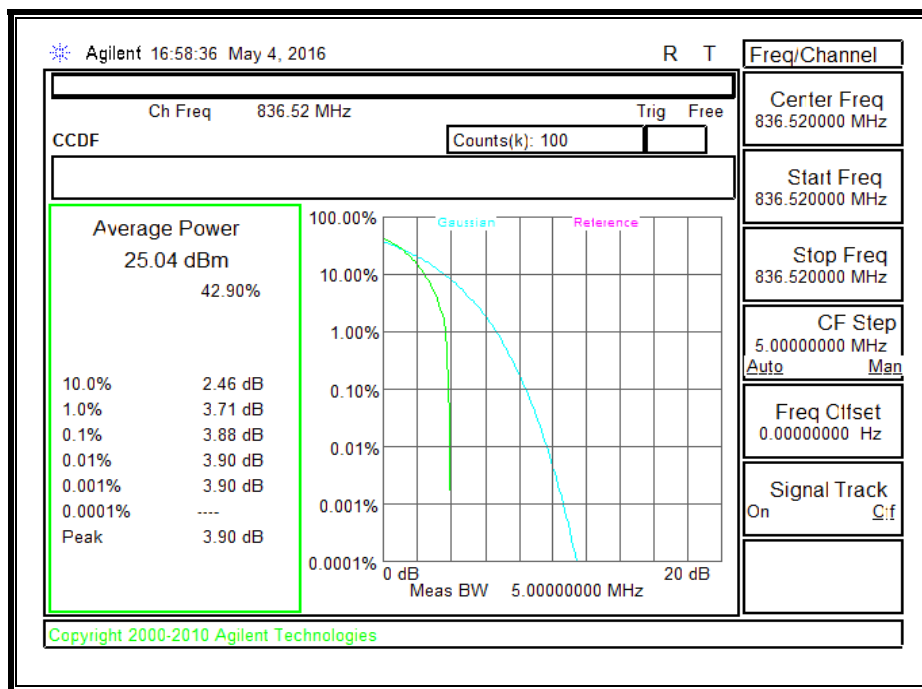
**GSM1900, GPRS**



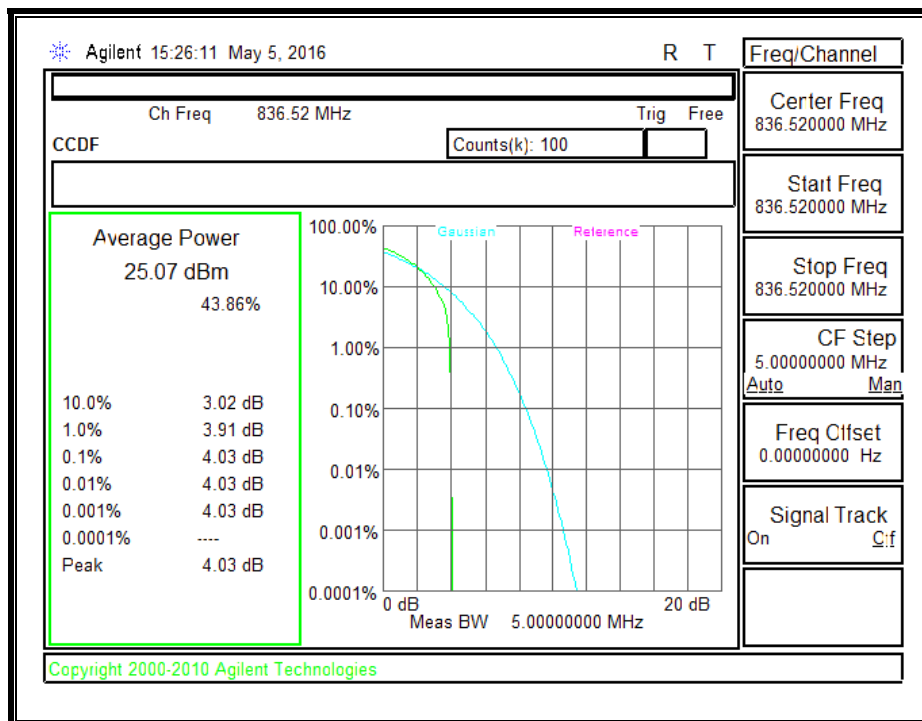
**GSM1900, EGPRS**



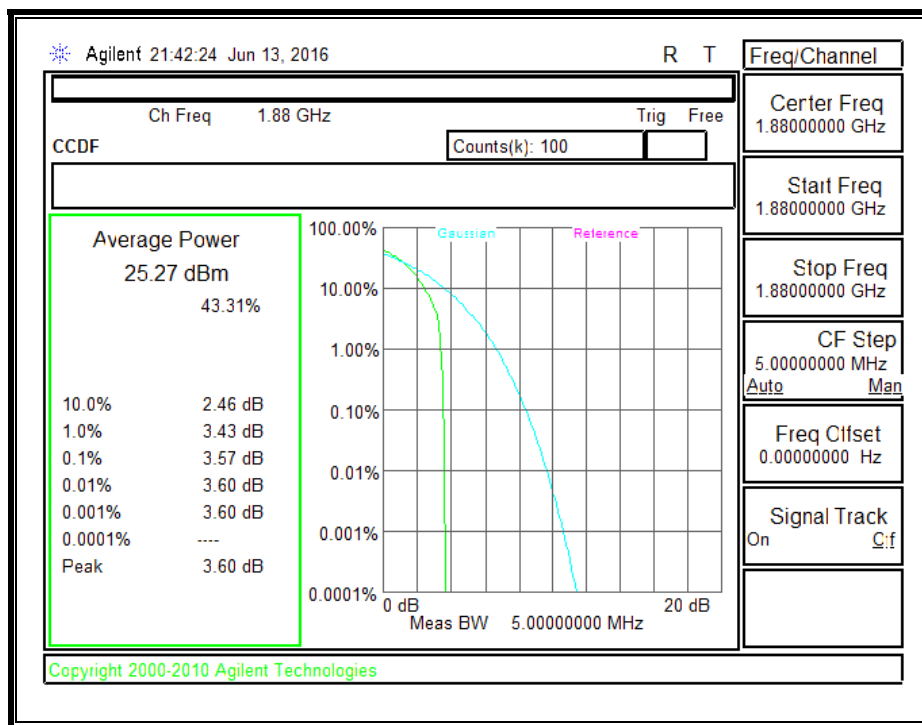
**BC 0, 1xRTT**



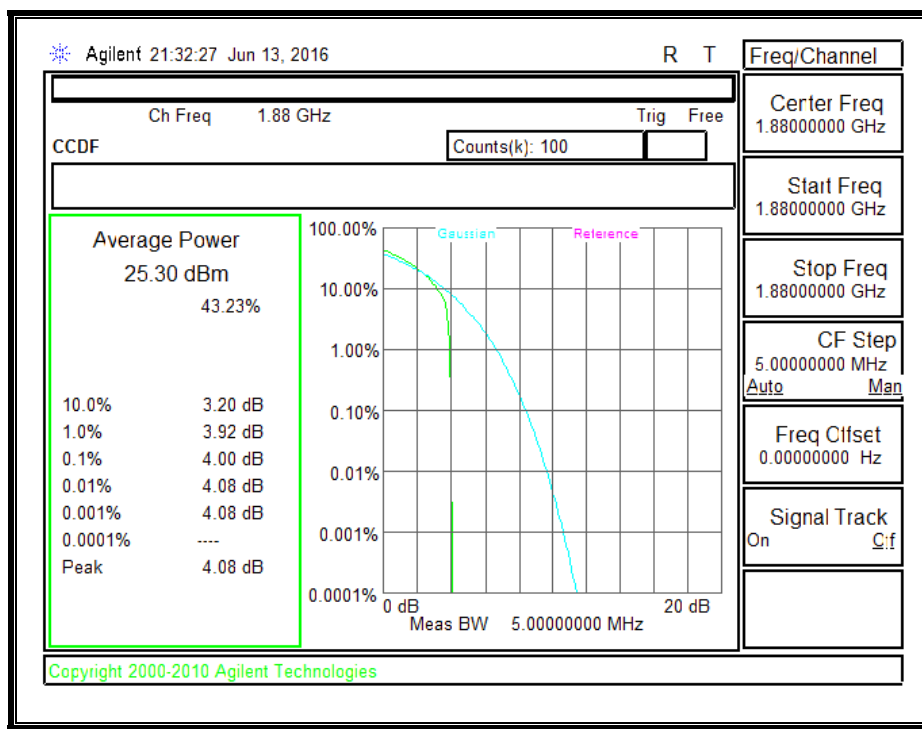
**BC 0, EVDO A**



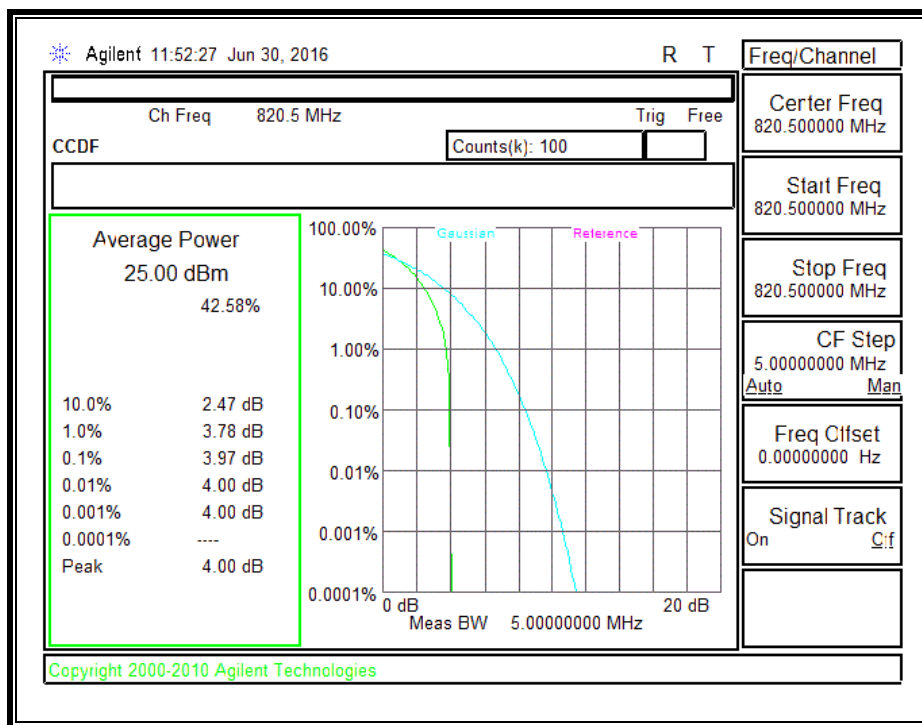
**BC 1, 1xRTT**



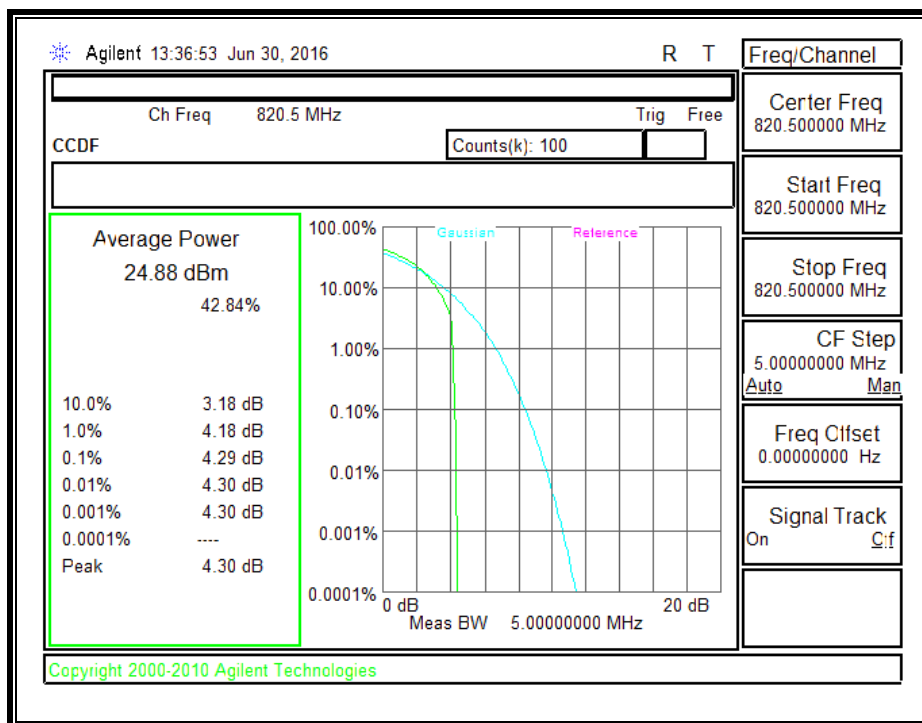
**BC 1, EVDO A**



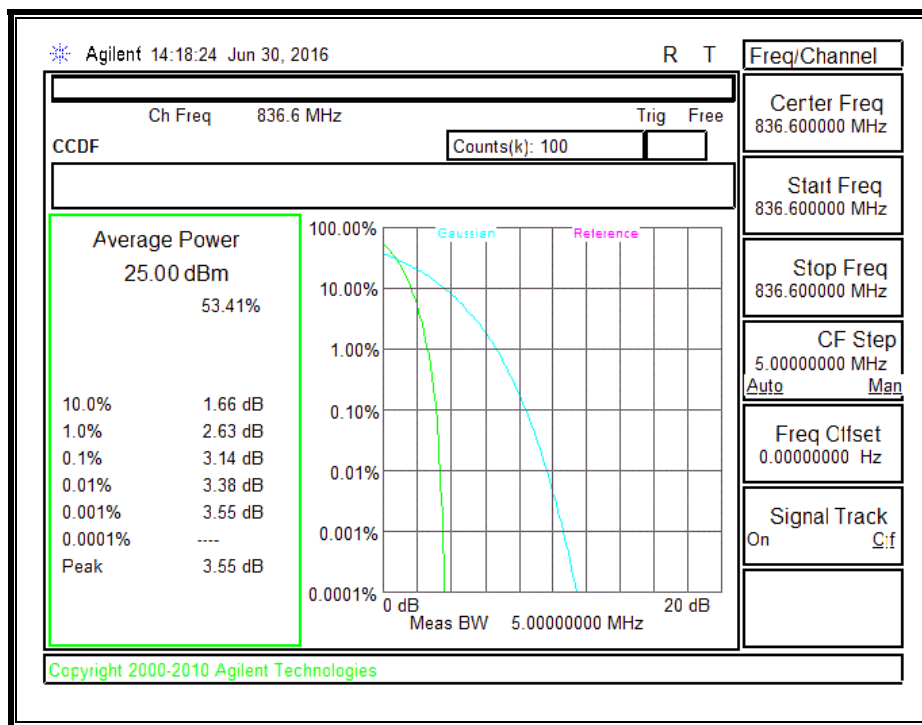
**BC10, 1xRTT**



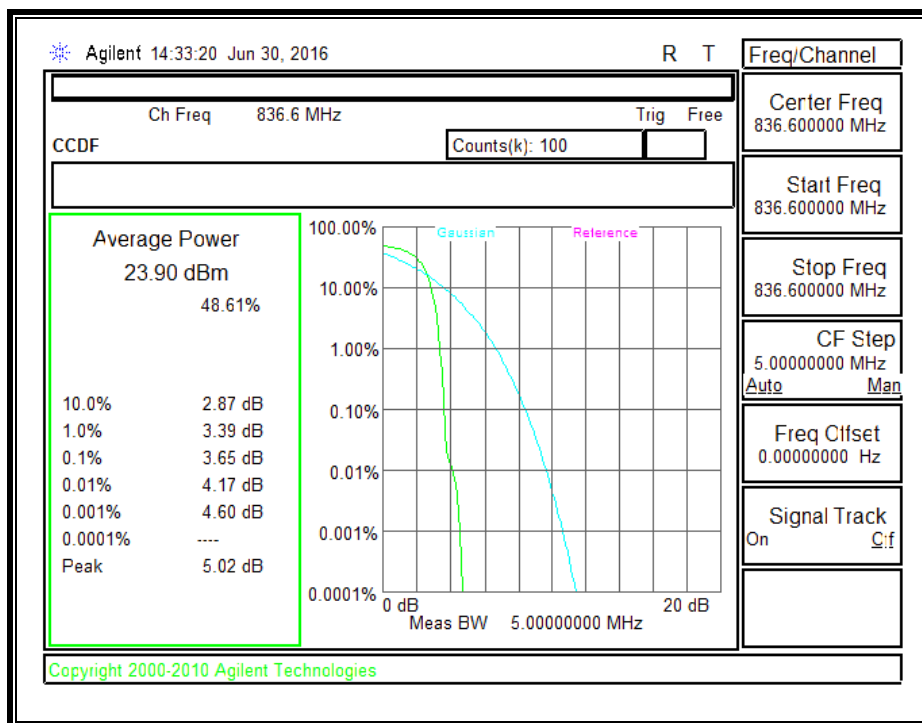
**BC10, EVDO A**



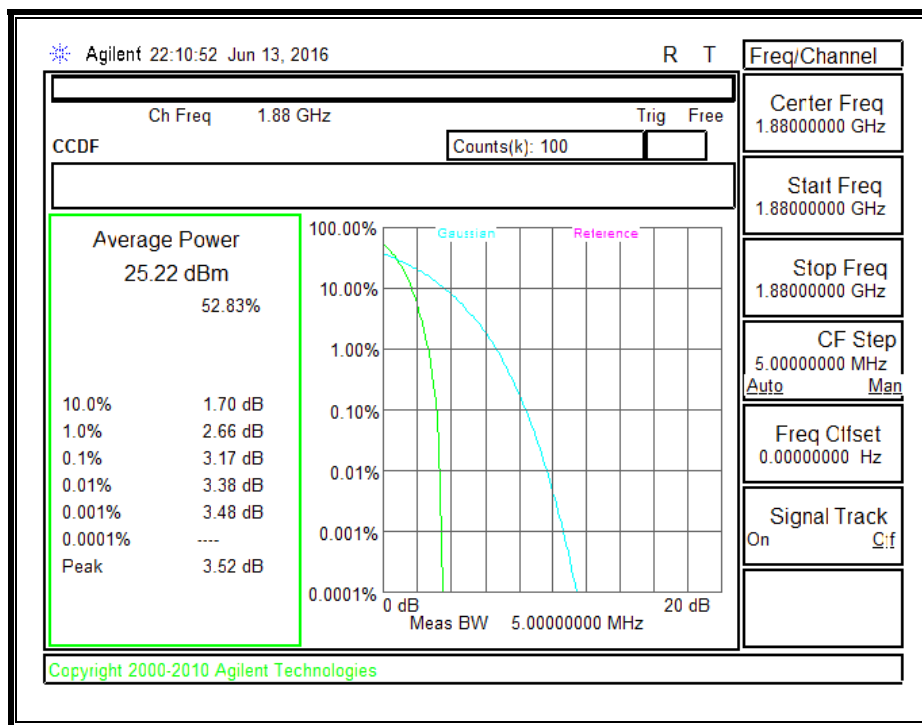
**UMTS850, REL 99 BAND 5**



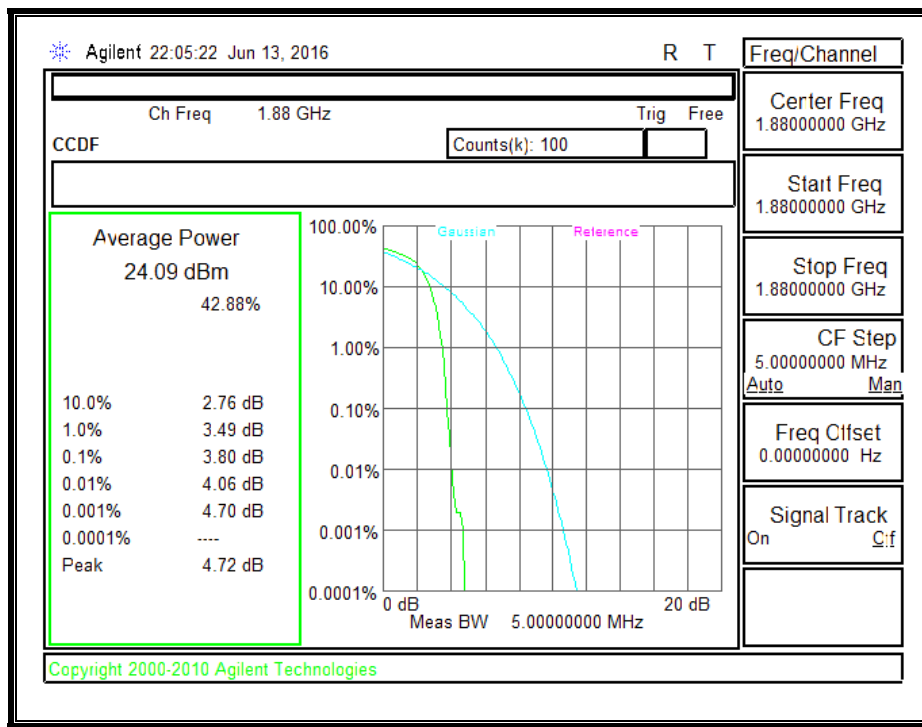
**UMTS 850, HSDPA BAND 5**



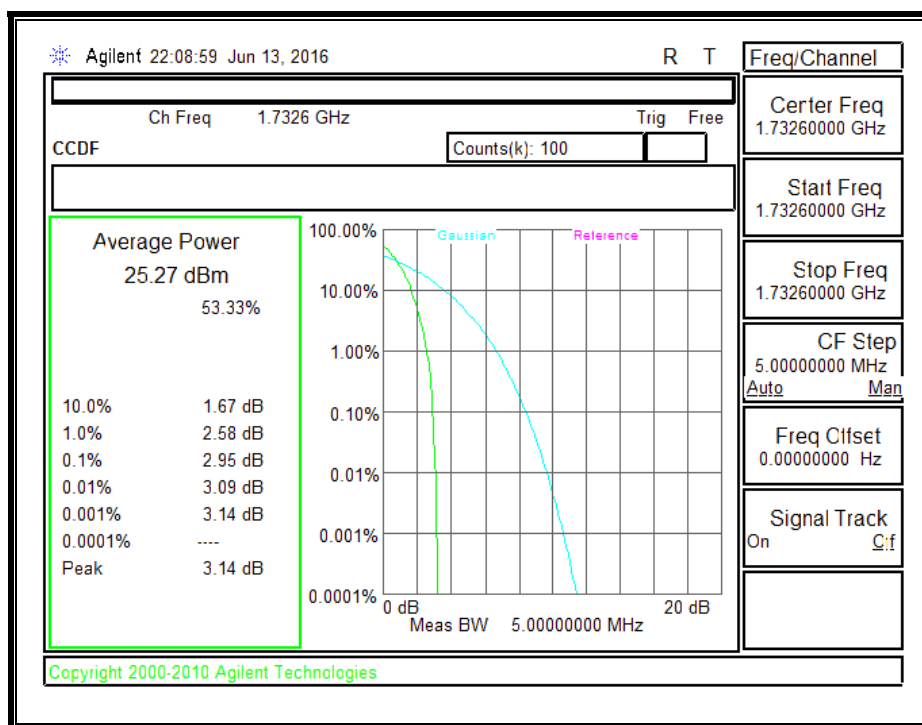
**UMTS 1900, REL99 BAND 2**



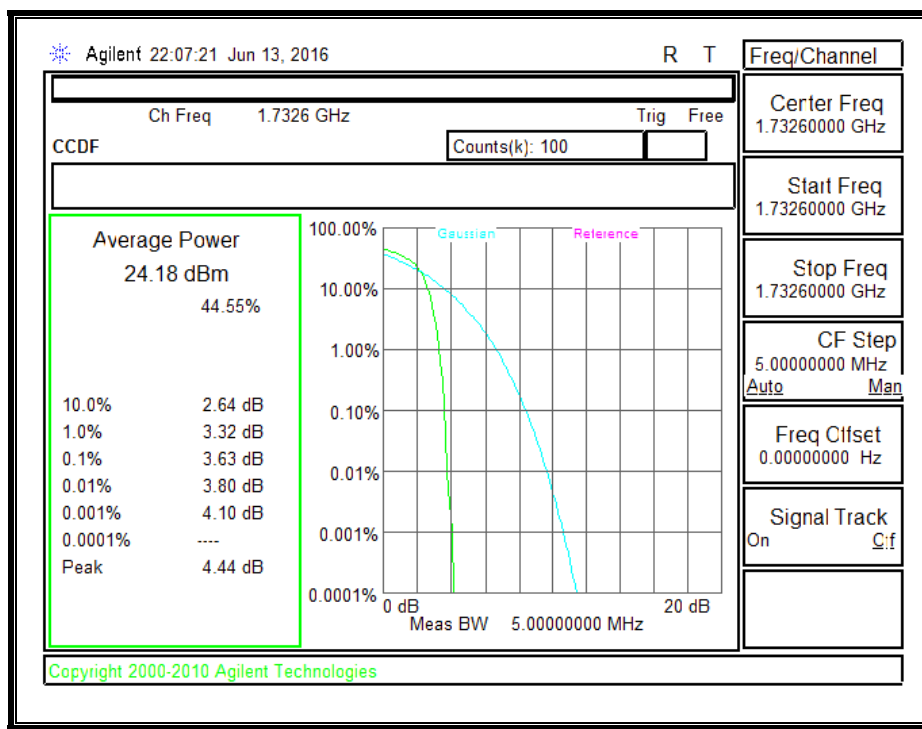
**UMTS 1900, HSDPA BAND 2**



**UMTS 1700, REL99 BAND 4**



**UMTS 1700, HSDPA BAND 4**



## 10.4. FIELD STRENGTH OF SPURIOUS RADIATION (LAT)

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691.

### LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB

§90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10} (f/6.1)$  decibels or  $50 + 10 \log_{10} (P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

RSS 132 --Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P ( dBW) by at least  $43 + 10 \log_{10} p$  (watts).
- ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS 133 --Equipment shall comply with the limits in (i) and (ii) below.

- i. In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).

- ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p(\text{watts})$ . If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

#### RSS 139 –

- i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p(\text{watts})$  dB.
- ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p(\text{watts})$  dB.

#### **TEST PROCEDURE**

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

#### **MODES TESTED**

- GPRS/EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, 1xRTT and EVDO, Rev A

#### **RESULTS**

# 10.4.1. GSM

## GPRS, 850MHz BAND 5

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                                                                      |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|
| <b>Company:</b><br><b>Project #:</b> 16U23309<br><b>Date:</b> 05/09/16<br><b>Test Engineer:</b> 39005<br><b>Configuration:</b> EUT only<br><b>Mode:</b> GPRS 850MHz                                         |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                                                                            |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |
| <div style="border: 1px solid black; padding: 2px; text-align: center; background-color: #e0f7fa;">Chamber</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">3m Chamber G</div> |                  | <div style="border: 1px solid black; padding: 2px; text-align: center; background-color: #e0f7fa;">Pre-amplifier</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">3m Chamber G</div> |          | <div style="border: 1px solid black; padding: 2px; text-align: center; background-color: #e0f7fa;">Filter</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">Filter</div> |         | <div style="border: 1px solid black; padding: 2px; text-align: center; background-color: #e0f7fa;">Limit</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">EIRP</div> |       |       |       |       |
| Frequency (GHz)                                                                                                                                                                                             | SA reading (dBm) | Ant. Pol. (H/V)                                                                                                                                                                                                   | Distance | EIRP @ TX Ant End (dBm)                                                                                                                                                                              | Preampl | Attenuator                                                                                                                                                                                        | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (824.2MHz)</b>                                                                                                                                                                               |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |
| 1.65                                                                                                                                                                                                        | -56.8            | H                                                                                                                                                                                                                 | 3.0      | -15.4                                                                                                                                                                                                | 37.8    | 1.0                                                                                                                                                                                               | -52.2 | -13.0 | -39.2 |       |
| 2.47                                                                                                                                                                                                        | -63.2            | H                                                                                                                                                                                                                 | 3.0      | -20.1                                                                                                                                                                                                | 36.6    | 1.0                                                                                                                                                                                               | -55.7 | -13.0 | -42.7 |       |
| 3.30                                                                                                                                                                                                        | -63.6            | H                                                                                                                                                                                                                 | 3.0      | -17.6                                                                                                                                                                                                | 36.5    | 1.0                                                                                                                                                                                               | -53.2 | -13.0 | -40.2 |       |
| 1.65                                                                                                                                                                                                        | -54.1            | V                                                                                                                                                                                                                 | 3.0      | -12.3                                                                                                                                                                                                | 37.8    | 1.0                                                                                                                                                                                               | -49.2 | -13.0 | -36.2 |       |
| 2.47                                                                                                                                                                                                        | -63.6            | V                                                                                                                                                                                                                 | 3.0      | -19.6                                                                                                                                                                                                | 36.6    | 1.0                                                                                                                                                                                               | -55.2 | -13.0 | -42.2 |       |
| 3.30                                                                                                                                                                                                        | -63.8            | V                                                                                                                                                                                                                 | 3.0      | -17.9                                                                                                                                                                                                | 36.5    | 1.0                                                                                                                                                                                               | -53.4 | -13.0 | -40.4 |       |
| <b>Mid Channel (836.6MHz)</b>                                                                                                                                                                               |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |
| 1.67                                                                                                                                                                                                        | -57.1            | H                                                                                                                                                                                                                 | 3.0      | -15.6                                                                                                                                                                                                | 37.8    | 1.0                                                                                                                                                                                               | -52.4 | -13.0 | -39.4 |       |
| 2.51                                                                                                                                                                                                        | -58.0            | H                                                                                                                                                                                                                 | 3.0      | -14.8                                                                                                                                                                                                | 36.4    | 1.0                                                                                                                                                                                               | -50.2 | -13.0 | -37.2 |       |
| 3.35                                                                                                                                                                                                        | -63.6            | H                                                                                                                                                                                                                 | 3.0      | -17.6                                                                                                                                                                                                | 36.5    | 1.0                                                                                                                                                                                               | -53.1 | -13.0 | -40.1 |       |
| 1.67                                                                                                                                                                                                        | -51.0            | V                                                                                                                                                                                                                 | 3.0      | -9.3                                                                                                                                                                                                 | 37.8    | 1.0                                                                                                                                                                                               | -46.1 | -13.0 | -33.1 |       |
| 2.51                                                                                                                                                                                                        | -59.5            | V                                                                                                                                                                                                                 | 3.0      | -15.2                                                                                                                                                                                                | 36.4    | 1.0                                                                                                                                                                                               | -50.6 | -13.0 | -37.6 |       |
| 3.35                                                                                                                                                                                                        | -63.6            | V                                                                                                                                                                                                                 | 3.0      | -17.6                                                                                                                                                                                                | 36.5    | 1.0                                                                                                                                                                                               | -53.1 | -13.0 | -40.1 |       |
| <b>High Channel (848.8MHz)</b>                                                                                                                                                                              |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |
| 1.70                                                                                                                                                                                                        | -57.4            | H                                                                                                                                                                                                                 | 3.0      | -15.8                                                                                                                                                                                                | 37.8    | 1.0                                                                                                                                                                                               | -52.7 | -13.0 | -39.7 |       |
| 2.55                                                                                                                                                                                                        | -56.0            | H                                                                                                                                                                                                                 | 3.0      | -12.7                                                                                                                                                                                                | 36.4    | 1.0                                                                                                                                                                                               | -48.1 | -13.0 | -35.1 |       |
| 3.40                                                                                                                                                                                                        | -64.1            | H                                                                                                                                                                                                                 | 3.0      | -18.0                                                                                                                                                                                                | 36.4    | 1.0                                                                                                                                                                                               | -53.4 | -13.0 | -40.4 |       |
| 1.70                                                                                                                                                                                                        | -53.6            | V                                                                                                                                                                                                                 | 3.0      | -11.8                                                                                                                                                                                                | 37.8    | 1.0                                                                                                                                                                                               | -48.6 | -13.0 | -35.6 |       |
| 2.55                                                                                                                                                                                                        | -55.6            | V                                                                                                                                                                                                                 | 3.0      | -11.3                                                                                                                                                                                                | 36.4    | 1.0                                                                                                                                                                                               | -46.7 | -13.0 | -33.7 |       |
| 3.40                                                                                                                                                                                                        | -64.1            | V                                                                                                                                                                                                                 | 3.0      | -17.9                                                                                                                                                                                                | 36.4    | 1.0                                                                                                                                                                                               | -53.3 | -13.0 | -40.3 |       |
| Rev. 03.19.15                                                                                                                                                                                               |                  |                                                                                                                                                                                                                   |          |                                                                                                                                                                                                      |         |                                                                                                                                                                                                   |       |       |       |       |

**EGPRS, 850MHz BAND 5**

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 16U23309  
**Date:** 05/09/16  
**Test Engineer:** 39005  
**Configuration:** EUT only  
**Mode:** EGPRS 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber G

**Pre-amplifier**  
 3m Chamber G

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency (GHz)                | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                           | -57.0            | H               | 3.0      | -15.5                   | 37.8   | 1.0        | -52.4 | -13.0 | -39.4 |       |
| 2.47                           | -63.5            | H               | 3.0      | -20.4                   | 36.6   | 1.0        | -55.9 | -13.0 | -42.9 |       |
| 3.30                           | -63.9            | H               | 3.0      | -17.9                   | 36.5   | 1.0        | -53.4 | -13.0 | -40.4 |       |
| 1.65                           | -55.8            | V               | 3.0      | -14.0                   | 37.8   | 1.0        | -50.8 | -13.0 | -37.8 |       |
| 2.47                           | -63.8            | V               | 3.0      | -19.8                   | 36.6   | 1.0        | -55.4 | -13.0 | -42.4 |       |
| 3.30                           | -63.9            | V               | 3.0      | -18.0                   | 36.5   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| <b>Mid Channel (836.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                           | -57.0            | H               | 3.0      | -15.5                   | 37.8   | 1.0        | -52.3 | -13.0 | -39.3 |       |
| 2.51                           | -59.3            | H               | 3.0      | -16.1                   | 36.4   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 3.35                           | -63.4            | H               | 3.0      | -17.3                   | 36.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 1.67                           | -51.1            | V               | 3.0      | -9.3                    | 37.8   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| 2.51                           | -60.4            | V               | 3.0      | -16.2                   | 36.4   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 3.35                           | -64.4            | V               | 3.0      | -18.3                   | 36.5   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| <b>High Channel (848.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                           | -58.5            | H               | 3.0      | -16.9                   | 37.8   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 2.55                           | -57.1            | H               | 3.0      | -13.7                   | 36.4   | 1.0        | -49.1 | -13.0 | -36.1 |       |
| 3.40                           | -64.3            | H               | 3.0      | -18.2                   | 36.4   | 1.0        | -53.6 | -13.0 | -40.6 |       |
| 1.70                           | -54.8            | V               | 3.0      | -13.0                   | 37.8   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 2.55                           | -56.4            | V               | 3.0      | -12.1                   | 36.4   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 3.40                           | -64.4            | V               | 3.0      | -18.2                   | 36.4   | 1.0        | -53.7 | -13.0 | -40.7 |       |

Rev. 03.19.15

**GPRS, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 05/09/16  
Test Engineer: 39005  
Configuration: EUT only  
Mode: GPRS 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -62.7            | H               | 3.0      | -16.0                   | 36.2   | 1.0        | -51.2 | -13.0 | -38.2 |       |
| 5.55                            | -62.6            | H               | 3.0      | -12.3                   | 36.1   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 7.40                            | -63.6            | H               | 3.0      | -10.5                   | 35.2   | 1.0        | -44.7 | -13.0 | -31.7 |       |
| 3.70                            | -62.9            | V               | 3.0      | -15.7                   | 36.2   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 5.55                            | -62.5            | V               | 3.0      | -12.4                   | 36.1   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 7.40                            | -63.7            | V               | 3.0      | -10.7                   | 35.2   | 1.0        | -44.9 | -13.0 | -31.9 |       |
| <b>Mid Channel (1880.0)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -63.0            | H               | 3.0      | -16.1                   | 36.2   | 1.0        | -51.3 | -13.0 | -38.3 |       |
| 5.64                            | -63.1            | H               | 3.0      | -12.6                   | 36.1   | 1.0        | -47.7 | -13.0 | -34.7 |       |
| 7.52                            | -64.2            | H               | 3.0      | -11.0                   | 35.1   | 1.0        | -45.1 | -13.0 | -32.1 |       |
| 3.76                            | -62.3            | V               | 3.0      | -15.0                   | 36.2   | 1.0        | -50.2 | -13.0 | -37.2 |       |
| 5.64                            | -63.0            | V               | 3.0      | -12.8                   | 36.1   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 7.52                            | -64.3            | V               | 3.0      | -11.2                   | 35.1   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| <b>High Channel (1909.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -62.3            | H               | 3.0      | -15.3                   | 36.1   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 5.73                            | -62.6            | H               | 3.0      | -12.0                   | 36.1   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 7.64                            | -64.4            | H               | 3.0      | -11.1                   | 35.0   | 1.0        | -45.1 | -13.0 | -32.1 |       |
| 3.82                            | -62.5            | V               | 3.0      | -15.0                   | 36.1   | 1.0        | -50.1 | -13.0 | -37.1 |       |
| 5.73                            | -63.5            | V               | 3.0      | -13.0                   | 36.1   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 7.64                            | -64.1            | V               | 3.0      | -10.9                   | 35.0   | 1.0        | -44.9 | -13.0 | -31.9 |       |

Rev. 03.19.15

**EGPRS, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 05/09/16  
Test Engineer: 39005  
Configuration: EUT only  
Mode: EGPRS 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -63.2            | H               | 3.0      | -16.5                   | 36.2   | 1.0        | -51.7 | -13.0 | -38.7 |       |
| 5.55                            | -63.2            | H               | 3.0      | -12.9                   | 36.1   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 7.40                            | -64.0            | H               | 3.0      | -10.9                   | 35.2   | 1.0        | -45.2 | -13.0 | -32.2 |       |
| 3.70                            | -63.1            | V               | 3.0      | -15.9                   | 36.2   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 5.55                            | -63.2            | V               | 3.0      | -13.1                   | 36.1   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 7.40                            | -64.0            | V               | 3.0      | -10.9                   | 35.2   | 1.0        | -45.2 | -13.0 | -32.2 |       |
| <b>Mid Channel (1880.0)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -62.5            | H               | 3.0      | -15.6                   | 36.2   | 1.0        | -50.8 | -13.0 | -37.8 |       |
| 5.64                            | -63.5            | H               | 3.0      | -13.0                   | 36.1   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 7.52                            | -64.6            | H               | 3.0      | -11.4                   | 35.1   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| 3.76                            | -63.2            | V               | 3.0      | -15.9                   | 36.2   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 5.64                            | -63.4            | V               | 3.0      | -13.1                   | 36.1   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 7.52                            | -64.2            | V               | 3.0      | -11.1                   | 35.1   | 1.0        | -45.2 | -13.0 | -32.2 |       |
| <b>High Channel (1909.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -62.8            | H               | 3.0      | -15.8                   | 36.1   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 5.73                            | -63.7            | H               | 3.0      | -13.1                   | 36.1   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 7.64                            | -63.3            | H               | 3.0      | -10.0                   | 35.0   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| 3.82                            | -62.4            | V               | 3.0      | -14.9                   | 36.1   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 5.73                            | -63.3            | V               | 3.0      | -12.9                   | 36.1   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 7.64                            | -63.5            | V               | 3.0      | -10.3                   | 35.0   | 1.0        | -44.3 | -13.0 | -31.3 |       |

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## 10.4.2. CDMA2000

### CDMA2000 1xRTT, 850MHz BC0

#### High Frequency Substitution Measurement UL Fremont Radiated Chamber

Company:  
Project #: 15U22288  
Date: 03/18/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: 1xRTT 850MHz

#### Test Equipment:

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|              |               |        |       |
|--------------|---------------|--------|-------|
| Chamber      | Pre-amplifier | Filter | Limit |
| 3m Chamber E | 3m Chamber E  | Filter | EIRP  |

| Frequency (GHz)          | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| Low Channel (824.7MHz)   |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                     | -56.2            | H               | 3.0      | -13.7                   | 37.8   | 1.0        | -50.6 | -13.0 | -37.6 |       |
| 2.47                     | -56.4            | H               | 3.0      | -11.4                   | 38.5   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 3.30                     | -56.8            | H               | 3.0      | -7.8                    | 38.5   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 1.65                     | -56.2            | V               | 3.0      | -14.0                   | 37.8   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 2.47                     | -57.5            | V               | 3.0      | -12.3                   | 38.5   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 3.30                     | -57.4            | V               | 3.0      | -8.7                    | 38.5   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| Mid Channel (836.52MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                     | -56.9            | H               | 3.0      | -14.4                   | 37.8   | 1.0        | -51.2 | -13.0 | -38.2 |       |
| 2.51                     | -57.2            | H               | 3.0      | -12.0                   | 38.6   | 1.0        | -49.6 | -13.0 | -36.6 |       |
| 3.35                     | -59.9            | H               | 3.0      | -10.8                   | 38.5   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 1.67                     | -57.2            | V               | 3.0      | -14.9                   | 37.8   | 1.0        | -51.7 | -13.0 | -38.7 |       |
| 2.51                     | -57.3            | V               | 3.0      | -12.0                   | 38.6   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 3.35                     | -59.4            | V               | 3.0      | -10.6                   | 38.5   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| High Channel (848.31MHz) |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                     | -55.8            | H               | 3.0      | -13.2                   | 37.9   | 1.0        | -50.1 | -13.0 | -37.1 |       |
| 2.54                     | -59.3            | H               | 3.0      | -13.8                   | 38.6   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 3.39                     | -59.0            | H               | 3.0      | -9.8                    | 38.5   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| 1.70                     | -55.9            | V               | 3.0      | -13.5                   | 37.9   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 2.54                     | -58.3            | V               | 3.0      | -12.7                   | 38.6   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 3.39                     | -58.7            | V               | 3.0      | -9.8                    | 38.5   | 1.0        | -47.3 | -13.0 | -34.3 |       |

Rev. 03.19.15

**EVDO-Rev A, 850MHz BC0**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/18/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: Rev A 850MHz

**Test Equipment:**

Substitution: Horn T69 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)          | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| Low Channel (824.7MHz)   |                  |                 |          |                         |        |            |       |       |       |       |
| 1.74                     | -59.3            | H               | 3.0      | -16.7                   | 37.9   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| 2.47                     | -62.0            | H               | 3.0      | -17.0                   | 38.5   | 1.0        | -54.5 | -13.0 | -41.5 |       |
| 3.30                     | -64.6            | H               | 3.0      | -15.6                   | 38.5   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| 1.65                     | -62.2            | V               | 3.0      | -20.1                   | 37.8   | 1.0        | -56.9 | -13.0 | -43.9 |       |
| 2.47                     | -64.0            | V               | 3.0      | -18.8                   | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.30                     | -63.1            | V               | 3.0      | -14.4                   | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| Mid Channel (836.52MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                     | -61.2            | H               | 3.0      | -18.7                   | 37.8   | 1.0        | -55.5 | -13.0 | -42.5 |       |
| 2.51                     | -62.2            | H               | 3.0      | -16.9                   | 38.6   | 1.0        | -54.5 | -13.0 | -41.5 |       |
| 3.35                     | -63.6            | H               | 3.0      | -14.5                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 1.67                     | -61.9            | V               | 3.0      | -19.6                   | 37.8   | 1.0        | -56.5 | -13.0 | -43.5 |       |
| 2.51                     | -61.8            | V               | 3.0      | -16.4                   | 38.6   | 1.0        | -54.0 | -13.0 | -41.0 |       |
| 3.35                     | -63.0            | V               | 3.0      | -14.2                   | 38.5   | 1.0        | -51.7 | -13.0 | -38.7 |       |
| High Channel (848.31MHz) |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                     | -63.1            | H               | 3.0      | -20.6                   | 37.9   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.54                     | -64.7            | H               | 3.0      | -19.3                   | 38.6   | 1.0        | -56.8 | -13.0 | -43.8 |       |
| 3.39                     | -64.7            | H               | 3.0      | -15.5                   | 38.5   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| 1.70                     | -63.0            | V               | 3.0      | -20.6                   | 37.9   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.54                     | -64.7            | V               | 3.0      | -19.2                   | 38.6   | 1.0        | -56.7 | -13.0 | -43.7 |       |
| 3.39                     | -64.2            | V               | 3.0      | -15.2                   | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |

Rev. 03.19.15

**CDMA2000 1xRTT, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/18/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: 1xRTT 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -56.3            | H               | 3.0      | -6.3                    | 38.6   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| 5.55                             | -57.7            | H               | 3.0      | -3.6                    | 38.6   | 1.0        | -41.2 | -13.0 | -28.2 |       |
| 7.41                             | -59.0            | H               | 3.0      | -1.3                    | 37.8   | 1.0        | -38.1 | -13.0 | -25.1 |       |
| 3.70                             | -56.8            | V               | 3.0      | -6.9                    | 38.6   | 1.0        | -44.5 | -13.0 | -31.5 |       |
| 5.55                             | -57.5            | V               | 3.0      | -3.8                    | 38.6   | 1.0        | -41.3 | -13.0 | -28.3 |       |
| 7.41                             | -57.6            | V               | 3.0      | -0.1                    | 37.8   | 1.0        | -37.0 | -13.0 | -24.0 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -56.9            | H               | 3.0      | -6.8                    | 38.6   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| 5.64                             | -58.7            | H               | 3.0      | -4.5                    | 38.5   | 1.0        | -42.0 | -13.0 | -29.0 |       |
| 7.52                             | -58.6            | H               | 3.0      | -0.8                    | 37.7   | 1.0        | -37.5 | -13.0 | -24.5 |       |
| 3.76                             | -56.6            | V               | 3.0      | -6.6                    | 38.6   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| 5.64                             | -58.2            | V               | 3.0      | -4.3                    | 38.5   | 1.0        | -41.8 | -13.0 | -28.8 |       |
| 7.52                             | -58.5            | V               | 3.0      | -0.9                    | 37.7   | 1.0        | -37.6 | -13.0 | -24.6 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -56.7            | H               | 3.0      | -6.5                    | 38.7   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 5.73                             | -58.1            | H               | 3.0      | -3.6                    | 38.5   | 1.0        | -41.1 | -13.0 | -28.1 |       |
| 7.64                             | -58.3            | H               | 3.0      | -0.3                    | 37.7   | 1.0        | -37.0 | -13.0 | -24.0 |       |
| 3.82                             | -55.3            | V               | 3.0      | -5.0                    | 38.7   | 1.0        | -42.7 | -13.0 | -29.7 |       |
| 5.73                             | -57.7            | V               | 3.0      | -3.6                    | 38.5   | 1.0        | -41.1 | -13.0 | -28.1 |       |
| 7.64                             | -59.2            | V               | 3.0      | -1.4                    | 37.7   | 1.0        | -38.1 | -13.0 | -25.1 |       |

Rev. 03.19.15

**EVDO-Rev A, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/18/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: Rev A 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -55.4            | H               | 3.0      | -5.5                    | 38.6   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| 5.55                             | -54.6            | H               | 3.0      | -0.6                    | 38.6   | 1.0        | -38.1 | -13.0 | -25.1 |       |
| 7.41                             | -57.2            | H               | 3.0      | 0.5                     | 37.8   | 1.0        | -36.3 | -13.0 | -23.3 |       |
| 3.70                             | -55.2            | V               | 3.0      | -5.3                    | 38.6   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| 5.55                             | -55.9            | V               | 3.0      | -2.1                    | 38.6   | 1.0        | -39.7 | -13.0 | -26.7 |       |
| 7.41                             | -58.0            | V               | 3.0      | -0.5                    | 37.8   | 1.0        | -37.4 | -13.0 | -24.4 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -54.4            | H               | 3.0      | -4.3                    | 38.6   | 1.0        | -42.0 | -13.0 | -29.0 |       |
| 5.64                             | -56.5            | H               | 3.0      | -2.3                    | 38.5   | 1.0        | -39.8 | -13.0 | -26.8 |       |
| 7.52                             | -57.7            | H               | 3.0      | 0.2                     | 37.7   | 1.0        | -36.6 | -13.0 | -23.6 |       |
| 3.76                             | -53.9            | V               | 3.0      | -3.8                    | 38.6   | 1.0        | -41.4 | -13.0 | -28.4 |       |
| 5.64                             | -55.6            | V               | 3.0      | -1.6                    | 38.5   | 1.0        | -39.2 | -13.0 | -26.2 |       |
| 7.52                             | -58.4            | V               | 3.0      | -0.8                    | 37.7   | 1.0        | -37.6 | -13.0 | -24.6 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -54.6            | H               | 3.0      | -4.4                    | 38.7   | 1.0        | -42.0 | -13.0 | -29.0 |       |
| 5.73                             | -55.9            | H               | 3.0      | -1.5                    | 38.5   | 1.0        | -39.0 | -13.0 | -26.0 |       |
| 7.64                             | -58.3            | H               | 3.0      | -0.3                    | 37.7   | 1.0        | -37.0 | -13.0 | -24.0 |       |
| 3.82                             | -54.5            | V               | 3.0      | -4.2                    | 38.7   | 1.0        | -41.9 | -13.0 | -28.9 |       |
| 5.73                             | -55.3            | V               | 3.0      | -1.2                    | 38.5   | 1.0        | -38.7 | -13.0 | -25.7 |       |
| 7.64                             | -57.8            | V               | 3.0      | 0.0                     | 37.7   | 1.0        | -36.7 | -13.0 | -23.7 |       |

Rev. 03.19.15

**CDMA2000 1xRTT, 800MHz BC10**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/18/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: 1xRTT 800MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)          | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| Low Channel (817.25MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.72                     | -55.7            | H               | 3.0      | -13.1                   | 37.9   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 2.45                     | -58.4            | H               | 3.0      | -13.5                   | 38.4   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 3.27                     | -58.9            | H               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 1.63                     | -57.2            | V               | 3.0      | -15.2                   | 37.8   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 2.45                     | -58.8            | V               | 3.0      | -13.7                   | 38.4   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 3.27                     | -58.7            | V               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| Mid Channel (820MHz)     |                  |                 |          |                         |        |            |       |       |       |       |
| 1.64                     | -55.6            | H               | 3.0      | -13.1                   | 37.8   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 2.46                     | -57.0            | H               | 3.0      | -12.0                   | 38.4   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 3.28                     | -57.4            | H               | 3.0      | -8.5                    | 38.5   | 1.0        | -45.9 | -13.0 | -32.9 |       |
| 1.64                     | -57.1            | V               | 3.0      | -15.0                   | 37.8   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 2.46                     | -57.0            | V               | 3.0      | -11.9                   | 38.4   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 3.28                     | -58.4            | V               | 3.0      | -9.8                    | 38.5   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| High Channel (822.75MHz) |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                     | -55.1            | H               | 3.0      | -12.7                   | 37.8   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 2.47                     | -55.1            | H               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 3.29                     | -56.7            | H               | 3.0      | -7.8                    | 38.5   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 1.65                     | -56.6            | V               | 3.0      | -14.5                   | 37.8   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 2.47                     | -57.0            | V               | 3.0      | -11.9                   | 38.5   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 3.29                     | -57.7            | V               | 3.0      | -9.0                    | 38.5   | 1.0        | -46.5 | -13.0 | -33.5 |       |

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**EVDO-Rev A, 800MHz BC10**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/18/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: Rev A, 800MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (817.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.72                            | -58.0            | H               | 3.0      | -15.4                   | 37.9   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 2.45                            | -59.1            | H               | 3.0      | -14.2                   | 38.4   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 3.27                            | -60.0            | H               | 3.0      | -11.2                   | 38.5   | 1.0        | -48.6 | -13.0 | -35.6 |       |
| 1.73                            | -52.6            | V               | 3.0      | -10.0                   | 37.9   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| 2.45                            | -48.7            | V               | 3.0      | -3.6                    | 38.4   | 1.0        | -41.0 | -13.0 | -28.0 |       |
| 3.27                            | -58.4            | V               | 3.0      | -9.8                    | 38.5   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| <b>Mid Channel (820MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 1.64                            | -53.4            | H               | 3.0      | -11.0                   | 37.8   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 2.46                            | -58.5            | H               | 3.0      | -13.6                   | 38.4   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 3.28                            | -59.4            | H               | 3.0      | -10.5                   | 38.5   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 1.64                            | -56.4            | V               | 3.0      | -14.3                   | 37.8   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 2.46                            | -58.9            | V               | 3.0      | -13.8                   | 38.4   | 1.0        | -51.2 | -13.0 | -38.2 |       |
| 3.28                            | -58.4            | V               | 3.0      | -9.8                    | 38.5   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| <b>High Channel (822.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -53.1            | H               | 3.0      | -10.6                   | 37.8   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 2.47                            | -57.8            | H               | 3.0      | -12.8                   | 38.5   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 3.29                            | -59.0            | H               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 1.65                            | -57.1            | V               | 3.0      | -15.0                   | 37.8   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 2.47                            | -59.6            | V               | 3.0      | -14.4                   | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 3.29                            | -59.3            | V               | 3.0      | -10.6                   | 38.5   | 1.0        | -48.1 | -13.0 | -35.1 |       |

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### 10.4.3. UMTS

#### UMTS REL 99, 850MHz BAND 5

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 16U23309  
**Date:** 03/18/16  
**Test Engineer:** 29426  
**Configuration:** EUT Only  
**Mode:** REL 99, 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber G

**Pre-amplifier**  
 3m Chamber G

**Filter**  
 10dB Pad

**Limit**  
 EIRP

| Frequency<br>(GHz)             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (826.4MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                           | -64.6               | H                  | 3.0      | -23.1                         | 37.8   | 10.0       | -51.0 | -13.0 | -38.0 |       |
| 2.48                           | -64.6               | H                  | 3.0      | -21.5                         | 36.5   | 10.0       | -48.0 | -13.0 | -35.0 |       |
| 3.31                           | -63.1               | H                  | 3.0      | -17.2                         | 36.5   | 10.0       | -43.7 | -13.0 | -30.7 |       |
| 1.65                           | -63.8               | V                  | 3.0      | -22.0                         | 37.8   | 10.0       | -49.9 | -13.0 | -36.9 |       |
| 2.48                           | -65.0               | V                  | 3.0      | -20.9                         | 36.5   | 10.0       | -47.4 | -13.0 | -34.4 |       |
| 3.31                           | -64.5               | V                  | 3.0      | -18.6                         | 36.5   | 10.0       | -45.1 | -13.0 | -32.1 |       |
| <b>Mid Channel (836.6MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                           | -65.1               | H                  | 3.0      | -23.6                         | 37.8   | 10.0       | -51.4 | -13.0 | -38.4 |       |
| 2.51                           | -65.5               | H                  | 3.0      | -22.3                         | 36.4   | 10.0       | -48.7 | -13.0 | -35.7 |       |
| 3.35                           | -65.7               | H                  | 3.0      | -19.7                         | 36.5   | 10.0       | -46.2 | -13.0 | -33.2 |       |
| 1.67                           | -64.1               | V                  | 3.0      | -22.3                         | 37.8   | 10.0       | -50.2 | -13.0 | -37.2 |       |
| 2.51                           | -64.6               | V                  | 3.0      | -20.4                         | 36.4   | 10.0       | -46.7 | -13.0 | -33.7 |       |
| 3.35                           | -64.2               | V                  | 3.0      | -18.2                         | 36.5   | 10.0       | -44.6 | -13.0 | -31.6 |       |
| <b>High Channel (846.6MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.69                           | -64.3               | H                  | 3.0      | -22.8                         | 37.8   | 10.0       | -50.6 | -13.0 | -37.6 |       |
| 2.54                           | -64.0               | H                  | 3.0      | -20.7                         | 36.4   | 10.0       | -47.1 | -13.0 | -34.1 |       |
| 3.39                           | -63.5               | H                  | 3.0      | -17.4                         | 36.5   | 10.0       | -43.8 | -13.0 | -30.8 |       |
| 1.69                           | -64.3               | V                  | 3.0      | -22.5                         | 37.8   | 10.0       | -50.3 | -13.0 | -37.3 |       |
| 2.54                           | -63.3               | V                  | 3.0      | -19.0                         | 36.4   | 10.0       | -45.4 | -13.0 | -32.4 |       |
| 3.39                           | -64.0               | V                  | 3.0      | -17.8                         | 36.5   | 10.0       | -44.3 | -13.0 | -31.3 |       |

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**UMTS HSDPA, 850MHz BAND 5**

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 15U22288  
**Date:** 03/21/16  
**Test Engineer:** 38602  
**Configuration:** EUT Only  
**Mode:** HSDPA 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber G

**Pre-amplifier**  
 3m Chamber G

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency<br>(GHz)             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (826.4MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                           | -63.0               | H                  | 3.0      | -21.5                         | 37.8   | 1.0        | -58.4 | -13.0 | -45.4 |       |
| 2.48                           | -62.8               | H                  | 3.0      | -19.7                         | 36.5   | 1.0        | -55.2 | -13.0 | -42.2 |       |
| 3.31                           | -61.9               | H                  | 3.0      | -16.0                         | 36.5   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 4.13                           | -61.5               | H                  | 3.0      | -13.9                         | 36.0   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 1.65                           | -62.6               | V                  | 3.0      | -20.8                         | 37.8   | 1.0        | -57.7 | -13.0 | -44.7 |       |
| 2.48                           | -63.4               | V                  | 3.0      | -19.3                         | 36.5   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| 3.31                           | -63.0               | V                  | 3.0      | -17.1                         | 36.5   | 1.0        | -52.6 | -13.0 | -39.6 |       |
| 4.13                           | -62.3               | V                  | 3.0      | -14.1                         | 36.0   | 1.0        | -49.1 | -13.0 | -36.1 |       |
| <b>Mid Channel (836.6MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                           | -63.4               | H                  | 3.0      | -21.9                         | 37.8   | 1.0        | -58.7 | -13.0 | -45.7 |       |
| 2.51                           | -63.2               | H                  | 3.0      | -20.0                         | 36.4   | 1.0        | -55.4 | -13.0 | -42.4 |       |
| 3.35                           | -62.4               | H                  | 3.0      | -16.4                         | 36.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 4.18                           | -62.0               | H                  | 3.0      | -14.3                         | 36.1   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 1.67                           | -62.8               | V                  | 3.0      | -21.0                         | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.51                           | -63.7               | V                  | 3.0      | -19.5                         | 36.4   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| 3.35                           | -63.8               | V                  | 3.0      | -17.8                         | 36.5   | 1.0        | -53.2 | -13.0 | -40.2 |       |
| 4.18                           | -62.7               | V                  | 3.0      | -14.4                         | 36.0   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| <b>High Channel (846.6MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.69                           | -62.9               | H                  | 3.0      | -21.4                         | 37.8   | 1.0        | -58.2 | -13.0 | -45.2 |       |
| 2.54                           | -63.0               | H                  | 3.0      | -19.7                         | 36.4   | 1.0        | -55.1 | -13.0 | -42.1 |       |
| 3.39                           | -62.1               | H                  | 3.0      | -16.0                         | 36.5   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 4.23                           | -61.8               | H                  | 3.0      | -14.0                         | 36.1   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 1.69                           | -62.8               | V                  | 3.0      | -21.0                         | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.54                           | -63.9               | V                  | 3.0      | -19.6                         | 36.4   | 1.0        | -55.0 | -13.0 | -42.0 |       |
| 3.39                           | -63.4               | V                  | 3.0      | -17.2                         | 36.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 4.23                           | -62.9               | V                  | 3.0      | -14.6                         | 36.1   | 1.0        | -49.6 | -13.0 | -36.6 |       |

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**UMTS REL 99, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/21/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: REL 99, 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1852.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.71                            | -61.7            | H               | 3.0      | -14.9                   | 36.2   | 1.0        | -50.2 | -13.0 | -37.2 |       |
| 5.56                            | -63.7            | H               | 3.0      | -13.4                   | 36.1   | 1.0        | -48.5 | -13.0 | -35.5 |       |
| 7.41                            | -64.2            | H               | 3.0      | -11.1                   | 35.2   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 9.26                            | -64.6            | H               | 3.0      | -9.8                    | 33.9   | 1.0        | -42.7 | -13.0 | -29.7 |       |
| 3.71                            | -62.1            | V               | 3.0      | -14.9                   | 36.2   | 1.0        | -50.2 | -13.0 | -37.2 |       |
| 5.56                            | -63.7            | V               | 3.0      | -13.6                   | 36.1   | 1.0        | -48.7 | -13.0 | -35.7 |       |
| 7.41                            | -64.9            | V               | 3.0      | -11.9                   | 35.2   | 1.0        | -46.1 | -13.0 | -33.1 |       |
| 9.26                            | -64.7            | V               | 3.0      | -10.0                   | 33.9   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| <b>Mid Channel (1880MHz)</b>    |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -62.0            | H               | 3.0      | -15.1                   | 36.2   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 5.64                            | -63.2            | H               | 3.0      | -12.7                   | 36.1   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 7.52                            | -63.8            | H               | 3.0      | -10.6                   | 35.1   | 1.0        | -44.7 | -13.0 | -31.7 |       |
| 9.40                            | -64.5            | H               | 3.0      | -9.5                    | 33.8   | 1.0        | -42.3 | -13.0 | -29.3 |       |
| 3.76                            | -62.1            | V               | 3.0      | -14.8                   | 36.2   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 5.64                            | -63.5            | V               | 3.0      | -13.2                   | 36.1   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 7.52                            | -64.6            | V               | 3.0      | -11.5                   | 35.1   | 1.0        | -45.6 | -13.0 | -32.6 |       |
| 9.40                            | -64.5            | V               | 3.0      | -9.7                    | 33.8   | 1.0        | -42.5 | -13.0 | -29.5 |       |
| <b>High Channel (1907.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -61.7            | H               | 3.0      | -14.7                   | 36.1   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 5.72                            | -63.7            | H               | 3.0      | -13.1                   | 36.1   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 7.63                            | -64.2            | H               | 3.0      | -10.9                   | 35.1   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| 9.54                            | -64.5            | H               | 3.0      | -9.4                    | 33.7   | 1.0        | -42.1 | -13.0 | -29.1 |       |
| 3.82                            | -62.2            | V               | 3.0      | -14.7                   | 36.1   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.72                            | -64.0            | V               | 3.0      | -13.6                   | 36.1   | 1.0        | -48.6 | -13.0 | -35.6 |       |
| 7.63                            | -64.3            | V               | 3.0      | -11.1                   | 35.1   | 1.0        | -45.1 | -13.0 | -32.1 |       |
| 9.54                            | -64.4            | V               | 3.0      | -9.5                    | 33.7   | 1.0        | -42.1 | -13.0 | -29.1 |       |

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**UMTS HSDPA, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/21/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: HSDPA 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1852.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.71                            | -61.0            | H               | 3.0      | -14.2                   | 36.2   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 5.56                            | -62.3            | H               | 3.0      | -12.0                   | 36.1   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.41                            | -63.0            | H               | 3.0      | -9.9                    | 35.2   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 9.26                            | -62.7            | H               | 3.0      | -7.9                    | 33.9   | 1.0        | -40.8 | -13.0 | -27.8 |       |
| 3.71                            | -60.3            | V               | 3.0      | -13.1                   | 36.2   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 5.56                            | -61.9            | V               | 3.0      | -11.8                   | 36.1   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| 7.41                            | -62.5            | V               | 3.0      | -9.5                    | 35.2   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| 9.26                            | -63.3            | V               | 3.0      | -8.6                    | 33.9   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| <b>Mid Channel (1880MHz)</b>    |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -60.5            | H               | 3.0      | -13.6                   | 36.2   | 1.0        | -48.8 | -13.0 | -35.8 |       |
| 5.64                            | -62.3            | H               | 3.0      | -11.8                   | 36.1   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| 7.52                            | -63.2            | H               | 3.0      | -10.0                   | 35.1   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 9.40                            | -62.8            | H               | 3.0      | -7.8                    | 33.8   | 1.0        | -40.6 | -13.0 | -27.6 |       |
| 3.76                            | -60.5            | V               | 3.0      | -13.2                   | 36.2   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 5.64                            | -62.6            | V               | 3.0      | -12.3                   | 36.1   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 7.52                            | -62.5            | V               | 3.0      | -9.4                    | 35.1   | 1.0        | -43.5 | -13.0 | -30.5 |       |
| 9.40                            | -63.5            | V               | 3.0      | -8.7                    | 33.8   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| <b>High Channel (1907.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -60.8            | H               | 3.0      | -13.8                   | 36.1   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 5.72                            | -62.5            | H               | 3.0      | -11.9                   | 36.1   | 1.0        | -47.0 | -13.0 | -34.0 |       |
| 7.63                            | -62.6            | H               | 3.0      | -9.3                    | 35.1   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| 9.54                            | -63.1            | H               | 3.0      | -8.0                    | 33.7   | 1.0        | -40.7 | -13.0 | -27.7 |       |
| 3.82                            | -60.2            | V               | 3.0      | -12.7                   | 36.1   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 5.72                            | -62.4            | V               | 3.0      | -12.0                   | 36.1   | 1.0        | -47.0 | -13.0 | -34.0 |       |
| 7.63                            | -62.6            | V               | 3.0      | -9.4                    | 35.1   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| 9.54                            | -63.1            | V               | 3.0      | -8.2                    | 33.7   | 1.0        | -40.8 | -13.0 | -27.8 |       |

Rev. 03.19.15

**UMTS REL 99, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/21/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: REL 99, 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.43                            | -64.0            | H               | 3.0      | -17.8                   | 36.4   | 1.0        | -53.2 | -13.0 | -40.2 |       |
| 5.14                            | -62.8            | H               | 3.0      | -13.2                   | 36.3   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 6.85                            | -63.3            | H               | 3.0      | -10.9                   | 35.6   | 1.0        | -45.4 | -13.0 | -32.4 |       |
| 8.56                            | -64.2            | H               | 3.0      | -10.0                   | 34.4   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| 3.43                            | -64.1            | V               | 3.0      | -17.8                   | 36.4   | 1.0        | -53.2 | -13.0 | -40.2 |       |
| 5.14                            | -62.3            | V               | 3.0      | -12.9                   | 36.3   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 6.85                            | -63.3            | V               | 3.0      | -10.9                   | 35.6   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| 8.56                            | -64.1            | V               | 3.0      | -10.0                   | 34.4   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -63.8            | H               | 3.0      | -17.5                   | 36.4   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| 5.20                            | -62.1            | H               | 3.0      | -12.4                   | 36.3   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 6.93                            | -62.9            | H               | 3.0      | -10.3                   | 35.5   | 1.0        | -44.9 | -13.0 | -31.9 |       |
| 8.66                            | -63.9            | H               | 3.0      | -9.6                    | 34.3   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| 3.47                            | -63.7            | V               | 3.0      | -17.3                   | 36.4   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 5.20                            | -62.1            | V               | 3.0      | -12.6                   | 36.3   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 6.93                            | -63.1            | V               | 3.0      | -10.6                   | 35.5   | 1.0        | -45.1 | -13.0 | -32.1 |       |
| 8.66                            | -63.5            | V               | 3.0      | -9.3                    | 34.3   | 1.0        | -42.7 | -13.0 | -29.7 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -64.0            | H               | 3.0      | -17.6                   | 36.4   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| 5.26                            | -63.2            | H               | 3.0      | -13.4                   | 36.3   | 1.0        | -48.6 | -13.0 | -35.6 |       |
| 7.01                            | -62.6            | H               | 3.0      | -9.9                    | 35.5   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| 8.76                            | -63.9            | H               | 3.0      | -9.5                    | 34.2   | 1.0        | -42.8 | -13.0 | -29.8 |       |
| 3.51                            | -63.9            | V               | 3.0      | -17.4                   | 36.4   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 5.26                            | -63.0            | V               | 3.0      | -13.4                   | 36.3   | 1.0        | -48.7 | -13.0 | -35.7 |       |
| 7.01                            | -62.6            | V               | 3.0      | -9.9                    | 35.5   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| 8.76                            | -63.8            | V               | 3.0      | -9.6                    | 34.2   | 1.0        | -42.8 | -13.0 | -29.8 |       |

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**UMTS HSDPA, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 15U22288  
Date: 03/21/16  
Test Engineer: 38602  
Configuration: EUT Only  
Mode: HSDPA 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.43                            | -63.5            | H               | 3.0      | -17.3                   | 36.4   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 5.14                            | -62.4            | H               | 3.0      | -12.8                   | 36.3   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 6.85                            | -62.8            | H               | 3.0      | -10.4                   | 35.6   | 1.0        | -44.9 | -13.0 | -31.9 |       |
| 8.56                            | -63.4            | H               | 3.0      | -9.2                    | 34.4   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 3.43                            | -63.3            | V               | 3.0      | -17.0                   | 36.4   | 1.0        | -52.4 | -13.0 | -39.4 |       |
| 5.14                            | -62.2            | V               | 3.0      | -12.8                   | 36.3   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 6.85                            | -63.0            | V               | 3.0      | -10.6                   | 35.6   | 1.0        | -45.2 | -13.0 | -32.2 |       |
| 8.56                            | -63.3            | V               | 3.0      | -9.2                    | 34.4   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -63.3            | H               | 3.0      | -17.0                   | 36.4   | 1.0        | -52.4 | -13.0 | -39.4 |       |
| 5.20                            | -61.8            | H               | 3.0      | -12.1                   | 36.3   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| 6.93                            | -62.5            | H               | 3.0      | -9.9                    | 35.5   | 1.0        | -44.5 | -13.0 | -31.5 |       |
| 8.66                            | -63.2            | H               | 3.0      | -8.9                    | 34.3   | 1.0        | -42.2 | -13.0 | -29.2 |       |
| 3.47                            | -63.0            | V               | 3.0      | -16.6                   | 36.4   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 5.20                            | -61.7            | V               | 3.0      | -12.2                   | 36.3   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 6.93                            | -62.9            | V               | 3.0      | -10.4                   | 35.5   | 1.0        | -44.9 | -13.0 | -31.9 |       |
| 8.66                            | -63.3            | V               | 3.0      | -9.1                    | 34.3   | 1.0        | -42.5 | -13.0 | -29.5 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -63.5            | H               | 3.0      | -17.1                   | 36.4   | 1.0        | -52.5 | -13.0 | -39.5 |       |
| 5.26                            | -62.7            | H               | 3.0      | -12.9                   | 36.3   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 7.01                            | -62.3            | H               | 3.0      | -9.6                    | 35.5   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 8.76                            | -63.4            | H               | 3.0      | -9.0                    | 34.2   | 1.0        | -42.3 | -13.0 | -29.3 |       |
| 3.51                            | -63.1            | V               | 3.0      | -16.6                   | 36.4   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.26                            | -62.7            | V               | 3.0      | -13.1                   | 36.3   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 7.01                            | -62.4            | V               | 3.0      | -9.7                    | 35.5   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| 8.76                            | -63.4            | V               | 3.0      | -9.2                    | 34.2   | 1.0        | -42.4 | -13.0 | -29.4 |       |

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## 10.5. FIELD STRENGTH OF SPURIOUS RADIATION (UAT)

### 10.5.1. GSM

#### GPRS, 850MHz BAND 5

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

Company: \_\_\_\_\_  
 Project #: 16U23309  
 Date: 05/10/16  
 Test Engineer: 38602  
 Configuration: EUT only  
 Mode: GPRS 850MHz

Test Equipment:  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber G

**Pre-amplifier**  
 3m Chamber G

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency (GHz)                | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                           | -59.3            | H               | 3.0      | -17.8                   | 37.8   | 1.0        | -54.7 | -13.0 | -41.7 |       |
| 2.47                           | -63.1            | H               | 3.0      | -20.0                   | 36.6   | 1.0        | -55.5 | -13.0 | -42.5 |       |
| 3.30                           | -63.1            | H               | 3.0      | -17.2                   | 36.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 4.12                           | -63.0            | H               | 3.0      | -15.4                   | 36.0   | 1.0        | -50.4 | -13.0 | -37.4 |       |
| 1.65                           | -56.3            | V               | 3.0      | -14.5                   | 37.8   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 2.47                           | -61.5            | V               | 3.0      | -17.5                   | 36.6   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| 3.30                           | -63.2            | V               | 3.0      | -17.3                   | 36.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 4.12                           | -63.0            | V               | 3.0      | -14.8                   | 36.0   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| <b>Mid Channel (836.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                           | -58.2            | H               | 3.0      | -16.7                   | 37.8   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| 2.51                           | -61.0            | H               | 3.0      | -17.8                   | 36.4   | 1.0        | -53.2 | -13.0 | -40.2 |       |
| 3.35                           | -63.2            | H               | 3.0      | -17.2                   | 36.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 4.18                           | -62.7            | H               | 3.0      | -15.0                   | 36.1   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 1.67                           | -57.1            | V               | 3.0      | -15.3                   | 37.8   | 1.0        | -52.1 | -13.0 | -39.1 |       |
| 2.51                           | -62.6            | V               | 3.0      | -18.4                   | 36.4   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 3.35                           | -63.4            | V               | 3.0      | -17.4                   | 36.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 4.18                           | -62.7            | V               | 3.0      | -14.4                   | 36.1   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| <b>High Channel (848.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                           | -60.3            | H               | 3.0      | -18.8                   | 37.8   | 1.0        | -55.6 | -13.0 | -42.6 |       |
| 2.55                           | -62.1            | H               | 3.0      | -18.7                   | 36.4   | 1.0        | -54.1 | -13.0 | -41.1 |       |
| 3.40                           | -62.5            | H               | 3.0      | -16.4                   | 36.4   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 4.24                           | -62.0            | H               | 3.0      | -14.1                   | 36.1   | 1.0        | -49.2 | -13.0 | -36.2 |       |
| 1.70                           | -54.5            | V               | 3.0      | -12.7                   | 37.8   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 2.55                           | -63.7            | V               | 3.0      | -19.4                   | 36.4   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| 3.40                           | -63.6            | V               | 3.0      | -17.4                   | 36.4   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 4.24                           | -62.5            | V               | 3.0      | -14.1                   | 36.1   | 1.0        | -49.2 | -13.0 | -36.2 |       |

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**EGPRS, 850MHz BAND 5**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 05/10/16  
Test Engineer: 39005  
Configuration: EUT only  
Mode: EGPRS 850MHz

Test Equipment:  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)         | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|-------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| Low Channel (824.2MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                    | -61.8            | H               | 3.0      | -20.3                   | 37.8   | 1.0        | -57.2 | -13.0 | -44.2 |       |
| 2.47                    | -63.4            | H               | 3.0      | -20.3                   | 36.6   | 1.0        | -55.8 | -13.0 | -42.8 |       |
| 3.30                    | -63.2            | H               | 3.0      | -17.3                   | 36.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 4.12                    | -63.1            | H               | 3.0      | -15.5                   | 36.0   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 1.65                    | -58.5            | V               | 3.0      | -16.7                   | 37.8   | 1.0        | -53.6 | -13.0 | -40.6 |       |
| 2.47                    | -62.3            | V               | 3.0      | -18.3                   | 36.6   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 3.30                    | -63.4            | V               | 3.0      | -17.5                   | 36.5   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| 4.12                    | -62.4            | V               | 3.0      | -14.2                   | 36.0   | 1.0        | -49.2 | -13.0 | -36.2 |       |
| Mid Channel (836.6MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                    | -60.7            | H               | 3.0      | -19.2                   | 37.8   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 2.51                    | -61.5            | H               | 3.0      | -18.3                   | 36.4   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 3.35                    | -63.3            | H               | 3.0      | -17.3                   | 36.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 4.18                    | -63.0            | H               | 3.0      | -15.3                   | 36.1   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 1.67                    | -56.5            | V               | 3.0      | -14.7                   | 37.8   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 2.51                    | -62.9            | V               | 3.0      | -18.7                   | 36.4   | 1.0        | -54.0 | -13.0 | -41.0 |       |
| 3.35                    | -63.3            | V               | 3.0      | -17.3                   | 36.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 4.18                    | -62.4            | V               | 3.0      | -14.1                   | 36.1   | 1.0        | -49.2 | -13.0 | -36.2 |       |
| High Channel (848.8MHz) |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                    | -62.8            | H               | 3.0      | -21.3                   | 37.8   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 2.55                    | -62.6            | H               | 3.0      | -19.2                   | 36.4   | 1.0        | -54.6 | -13.0 | -41.6 |       |
| 3.40                    | -63.3            | H               | 3.0      | -17.2                   | 36.4   | 1.0        | -52.6 | -13.0 | -39.6 |       |
| 4.24                    | -62.3            | H               | 3.0      | -14.4                   | 36.1   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 1.70                    | -58.3            | V               | 3.0      | -16.5                   | 37.8   | 1.0        | -53.3 | -13.0 | -40.3 |       |
| 2.55                    | -63.9            | V               | 3.0      | -19.6                   | 36.4   | 1.0        | -55.0 | -13.0 | -42.0 |       |
| 3.40                    | -63.9            | V               | 3.0      | -17.7                   | 36.4   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| 4.24                    | -63.2            | V               | 3.0      | -14.8                   | 36.1   | 1.0        | -49.9 | -13.0 | -36.9 |       |

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**GPRS, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 05/09/16  
Test Engineer: 39005  
Configuration: EUT only  
Mode: GPRS 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -63.5            | H               | 3.0      | -16.7                   | 36.2   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.55                            | -63.5            | H               | 3.0      | -13.2                   | 36.1   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 7.40                            | -64.5            | H               | 3.0      | -11.4                   | 35.2   | 1.0        | -45.6 | -13.0 | -32.6 |       |
| 3.70                            | -64.0            | V               | 3.0      | -16.8                   | 36.2   | 1.0        | -52.1 | -13.0 | -39.1 |       |
| 5.55                            | -63.5            | V               | 3.0      | -13.4                   | 36.1   | 1.0        | -48.5 | -13.0 | -35.5 |       |
| 7.40                            | -64.3            | V               | 3.0      | -11.3                   | 35.2   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| <b>Mid Channel (1880.0)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -63.5            | H               | 3.0      | -16.6                   | 36.2   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 5.64                            | -63.8            | H               | 3.0      | -13.3                   | 36.1   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 7.52                            | -65.1            | H               | 3.0      | -11.9                   | 35.1   | 1.0        | -46.0 | -13.0 | -33.0 |       |
| 3.76                            | -63.6            | V               | 3.0      | -16.3                   | 36.2   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 5.64                            | -64.3            | V               | 3.0      | -14.0                   | 36.1   | 1.0        | -49.1 | -13.0 | -36.1 |       |
| 7.52                            | -65.2            | V               | 3.0      | -12.1                   | 35.1   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| <b>High Channel (1909.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -62.9            | H               | 3.0      | -15.9                   | 36.1   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 5.73                            | -63.9            | H               | 3.0      | -13.3                   | 36.1   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 7.64                            | -64.5            | H               | 3.0      | -11.2                   | 35.0   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 3.82                            | -63.5            | V               | 3.0      | -16.0                   | 36.1   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 5.73                            | -64.3            | V               | 3.0      | -13.8                   | 36.1   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 7.64                            | -64.8            | V               | 3.0      | -11.6                   | 35.0   | 1.0        | -45.7 | -13.0 | -32.7 |       |

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**EGPRS, 1900MHz BAND 2**

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 16U23309  
**Date:** 05/09/16  
**Test Engineer:** 39005  
**Configuration:** EUT only  
**Mode:** EGPRS 1900MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber

3m Chamber G ▾

Pre-amplifier

3m Chamber G ▾

Filter

Filter ▾

Limit

EIRP ▾

| Frequency<br>(GHz)              | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 3.70                            | -64.0               | H                  | 3.0      | -17.3                         | 36.2   | 1.0        | -52.5 | -13.0 | -39.5 |       |
| 5.55                            | -63.7               | H                  | 3.0      | -13.4                         | 36.1   | 1.0        | -48.5 | -13.0 | -35.5 |       |
| 7.40                            | -64.6               | H                  | 3.0      | -11.6                         | 35.2   | 1.0        | -45.8 | -13.0 | -32.8 |       |
| 3.70                            | -64.3               | V                  | 3.0      | -17.2                         | 36.2   | 1.0        | -52.4 | -13.0 | -39.4 |       |
| 5.55                            | -63.7               | V                  | 3.0      | -13.6                         | 36.1   | 1.0        | -48.7 | -13.0 | -35.7 |       |
| 7.40                            | -64.2               | V                  | 3.0      | -11.2                         | 35.2   | 1.0        | -45.4 | -13.0 | -32.4 |       |
| <b>Mid Channel (1880.0)</b>     |                     |                    |          |                               |        |            |       |       |       |       |
| 3.76                            | -64.0               | H                  | 3.0      | -17.1                         | 36.2   | 1.0        | -52.3 | -13.0 | -39.3 |       |
| 5.64                            | -63.8               | H                  | 3.0      | -13.3                         | 36.1   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 7.52                            | -65.5               | H                  | 3.0      | -12.4                         | 35.1   | 1.0        | -46.5 | -13.0 | -33.5 |       |
| 3.76                            | -63.8               | V                  | 3.0      | -16.4                         | 36.2   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 5.64                            | -64.0               | V                  | 3.0      | -13.8                         | 36.1   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 7.52                            | -64.8               | V                  | 3.0      | -11.6                         | 35.1   | 1.0        | -45.8 | -13.0 | -32.8 |       |
| <b>High Channel (1909.8MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 3.82                            | -63.5               | H                  | 3.0      | -16.5                         | 36.1   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 5.73                            | -64.3               | H                  | 3.0      | -13.7                         | 36.1   | 1.0        | -48.8 | -13.0 | -35.8 |       |
| 7.64                            | -64.0               | H                  | 3.0      | -10.7                         | 35.0   | 1.0        | -44.7 | -13.0 | -31.7 |       |
| 3.82                            | -64.3               | V                  | 3.0      | -16.8                         | 36.1   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.73                            | -63.8               | V                  | 3.0      | -13.4                         | 36.1   | 1.0        | -48.4 | -13.0 | -35.4 |       |
| 7.64                            | -63.9               | V                  | 3.0      | -10.7                         | 35.0   | 1.0        | -44.7 | -13.0 | -31.7 |       |

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## 10.5.2. CDMA2000

### CDMA2000 1xRTT, 850MHz BC0

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 16U23309  
**Date:** 03/18/16  
**Test Engineer:** 29426  
**Configuration:** EUT only  
**Mode:** 1xRTT 850MHz

**Test Equipment:**  
**Substitution:** Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber E

**Pre-amplifier**  
 3m Chamber E

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency<br>(GHz)              | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.7MHz)</b>   |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                            | -56.3               | H                  | 3.0      | -13.9                         | 37.8   | 1.0        | -50.7 | -13.0 | -37.7 |       |
| 2.47                            | -59.1               | H                  | 3.0      | -14.1                         | 38.5   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 3.30                            | -59.0               | H                  | 3.0      | -10.1                         | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 1.65                            | -56.4               | V                  | 3.0      | -14.3                         | 37.8   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 2.47                            | -59.4               | V                  | 3.0      | -14.3                         | 38.5   | 1.0        | -51.7 | -13.0 | -38.7 |       |
| 3.30                            | -59.0               | V                  | 3.0      | -10.3                         | 38.5   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| <b>Mid Channel (836.52MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                            | -55.9               | H                  | 3.0      | -13.4                         | 37.8   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 2.51                            | -58.6               | H                  | 3.0      | -13.4                         | 38.6   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 3.35                            | -59.1               | H                  | 3.0      | -10.0                         | 38.5   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 1.67                            | -56.5               | V                  | 3.0      | -14.2                         | 37.8   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 2.51                            | -59.2               | V                  | 3.0      | -13.8                         | 38.6   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 3.35                            | -59.1               | V                  | 3.0      | -10.3                         | 38.5   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| <b>High Channel (848.31MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.70                            | -56.2               | H                  | 3.0      | -13.6                         | 37.9   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 2.54                            | -59.3               | H                  | 3.0      | -13.9                         | 38.6   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 3.39                            | -58.8               | H                  | 3.0      | -9.6                          | 38.5   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 1.70                            | -56.1               | V                  | 3.0      | -13.8                         | 37.9   | 1.0        | -50.6 | -13.0 | -37.6 |       |
| 2.54                            | -59.4               | V                  | 3.0      | -13.9                         | 38.6   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 3.39                            | -59.3               | V                  | 3.0      | -10.3                         | 38.5   | 1.0        | -47.8 | -13.0 | -34.8 |       |

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**EVDO-Rev A, 850MHz BC0**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/22/16  
Test Engineer: 00261  
Configuration: EUT Only  
Mode: Rev 0/A 850MHz

**Test Equipment:**

Substitution: Horn T69 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.7MHz)</b>   |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -63.0            | H               | 3.0      | -20.6                   | 37.8   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.47                            | -63.5            | H               | 3.0      | -18.5                   | 38.5   | 1.0        | -55.9 | -13.0 | -42.9 |       |
| 3.30                            | -63.0            | H               | 3.0      | -14.0                   | 38.5   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 1.65                            | -64.2            | V               | 3.0      | -22.1                   | 37.8   | 1.0        | -59.0 | -13.0 | -46.0 |       |
| 2.47                            | -64.1            | V               | 3.0      | -18.9                   | 38.5   | 1.0        | -56.4 | -13.0 | -43.4 |       |
| 3.30                            | -63.3            | V               | 3.0      | -14.6                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| <b>Mid Channel (836.52MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                            | -63.7            | H               | 3.0      | -21.2                   | 37.8   | 1.0        | -58.0 | -13.0 | -45.0 |       |
| 2.51                            | -63.4            | H               | 3.0      | -18.2                   | 38.6   | 1.0        | -55.7 | -13.0 | -42.7 |       |
| 3.35                            | -63.6            | H               | 3.0      | -14.5                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 1.67                            | -63.7            | V               | 3.0      | -21.4                   | 37.8   | 1.0        | -58.3 | -13.0 | -45.3 |       |
| 2.51                            | -63.8            | V               | 3.0      | -18.4                   | 38.6   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.35                            | -63.1            | V               | 3.0      | -14.3                   | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| <b>High Channel (848.31MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                            | -63.4            | H               | 3.0      | -20.9                   | 37.9   | 1.0        | -57.7 | -13.0 | -44.7 |       |
| 2.54                            | -64.9            | H               | 3.0      | -19.5                   | 38.6   | 1.0        | -57.0 | -13.0 | -44.0 |       |
| 3.36                            | -64.2            | H               | 3.0      | -15.1                   | 38.5   | 1.0        | -52.5 | -13.0 | -39.5 |       |
| 1.70                            | -62.6            | V               | 3.0      | -20.2                   | 37.9   | 1.0        | -57.1 | -13.0 | -44.1 |       |
| 2.54                            | -63.7            | V               | 3.0      | -18.1                   | 38.6   | 1.0        | -55.7 | -13.0 | -42.7 |       |
| 3.39                            | -64.6            | V               | 3.0      | -15.7                   | 38.5   | 1.0        | -53.2 | -13.0 | -40.2 |       |

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**CDMA2000 1xRTT, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/18/16  
Test Engineer: 29426  
Configuration: EUT only  
Mode: 1xRTT 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -56.9            | H               | 3.0      | -6.9                    | 38.6   | 1.0        | -44.5 | -13.0 | -31.5 |       |
| 5.55                             | -59.2            | H               | 3.0      | -5.1                    | 38.6   | 1.0        | -42.7 | -13.0 | -29.7 |       |
| 7.41                             | -59.1            | H               | 3.0      | -1.4                    | 37.8   | 1.0        | -38.2 | -13.0 | -25.2 |       |
| 3.70                             | -54.9            | V               | 3.0      | -5.0                    | 38.6   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 5.55                             | -57.7            | V               | 3.0      | -4.0                    | 38.6   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| 7.41                             | -58.1            | V               | 3.0      | -0.6                    | 37.8   | 1.0        | -37.4 | -13.0 | -24.4 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -55.6            | H               | 3.0      | -5.5                    | 38.6   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| 5.64                             | -58.7            | H               | 3.0      | -4.5                    | 38.5   | 1.0        | -42.0 | -13.0 | -29.0 |       |
| 7.52                             | -59.0            | H               | 3.0      | -1.2                    | 37.7   | 1.0        | -37.9 | -13.0 | -24.9 |       |
| 3.76                             | -55.7            | V               | 3.0      | -5.6                    | 38.6   | 1.0        | -43.3 | -13.0 | -30.3 |       |
| 5.64                             | -57.9            | V               | 3.0      | -4.0                    | 38.5   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| 7.52                             | -59.0            | V               | 3.0      | -1.4                    | 37.7   | 1.0        | -38.1 | -13.0 | -25.1 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -55.5            | H               | 3.0      | -5.2                    | 38.7   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| 5.73                             | -59.0            | H               | 3.0      | -4.6                    | 38.5   | 1.0        | -42.1 | -13.0 | -29.1 |       |
| 7.64                             | -59.7            | H               | 3.0      | -1.7                    | 37.7   | 1.0        | -38.4 | -13.0 | -25.4 |       |
| 3.82                             | -56.7            | V               | 3.0      | -6.5                    | 38.7   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 5.73                             | -59.1            | V               | 3.0      | -5.0                    | 38.5   | 1.0        | -42.5 | -13.0 | -29.5 |       |
| 7.64                             | -59.6            | V               | 3.0      | -1.8                    | 37.7   | 1.0        | -38.5 | -13.0 | -25.5 |       |

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**EVDO-Rev A, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 16U23309  
**Date:** 03/18/16  
**Test Engineer:** 29426  
**Configuration:** EUT only  
**Mode:** Rev 0/A 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -55.6            | H               | 3.0      | -5.7                    | 38.6   | 1.0        | -43.3 | -13.0 | -30.3 |       |
| 5.55                             | -59.1            | H               | 3.0      | -5.1                    | 38.6   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 7.41                             | -59.8            | H               | 3.0      | -2.1                    | 37.8   | 1.0        | -39.0 | -13.0 | -26.0 |       |
| 3.70                             | -56.8            | V               | 3.0      | -6.9                    | 38.6   | 1.0        | -44.6 | -13.0 | -31.6 |       |
| 5.55                             | -59.2            | V               | 3.0      | -5.5                    | 38.6   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| 7.41                             | -59.7            | V               | 3.0      | -2.3                    | 37.8   | 1.0        | -39.1 | -13.0 | -26.1 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -57.0            | H               | 3.0      | -6.9                    | 38.6   | 1.0        | -44.5 | -13.0 | -31.5 |       |
| 5.64                             | -59.3            | H               | 3.0      | -5.1                    | 38.5   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 7.52                             | -59.2            | H               | 3.0      | -1.4                    | 37.7   | 1.0        | -38.1 | -13.0 | -25.1 |       |
| 3.76                             | -55.0            | V               | 3.0      | -5.0                    | 38.6   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 5.64                             | -57.8            | V               | 3.0      | -3.9                    | 38.5   | 1.0        | -41.4 | -13.0 | -28.4 |       |
| 7.52                             | -58.2            | V               | 3.0      | -0.6                    | 37.7   | 1.0        | -37.3 | -13.0 | -24.3 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -57.0            | H               | 3.0      | -6.8                    | 38.7   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| 5.73                             | -59.3            | H               | 3.0      | -4.9                    | 38.5   | 1.0        | -42.4 | -13.0 | -29.4 |       |
| 7.64                             | -59.2            | H               | 3.0      | -1.3                    | 37.7   | 1.0        | -37.9 | -13.0 | -24.9 |       |
| 3.82                             | -55.0            | V               | 3.0      | -4.8                    | 38.7   | 1.0        | -42.4 | -13.0 | -29.4 |       |
| 5.73                             | -57.8            | V               | 3.0      | -3.7                    | 38.5   | 1.0        | -41.2 | -13.0 | -28.2 |       |
| 7.64                             | -58.2            | V               | 3.0      | -0.4                    | 37.7   | 1.0        | -37.1 | -13.0 | -24.1 |       |

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**CDMA2000 1xRTT, 800MHz BC10**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/18/16  
Test Engineer: 29426  
Configuration: EUT only  
Mode: 1xRTT 800MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (817.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.72                            | -56.0            | H               | 3.0      | -13.4                   | 37.9   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 2.45                            | -59.0            | H               | 3.0      | -14.1                   | 38.4   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 3.27                            | -59.3            | H               | 3.0      | -10.4                   | 38.5   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 1.63                            | -55.9            | V               | 3.0      | -13.8                   | 37.8   | 1.0        | -50.7 | -13.0 | -37.7 |       |
| 2.45                            | -58.4            | V               | 3.0      | -13.3                   | 38.4   | 1.0        | -50.7 | -13.0 | -37.7 |       |
| 3.27                            | -59.1            | V               | 3.0      | -10.5                   | 38.5   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| <b>Mid Channel (820MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 1.64                            | -55.9            | H               | 3.0      | -13.4                   | 37.8   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 2.46                            | -59.4            | H               | 3.0      | -14.5                   | 38.4   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 3.28                            | -58.3            | H               | 3.0      | -9.4                    | 38.5   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| 1.64                            | -56.0            | V               | 3.0      | -13.9                   | 37.8   | 1.0        | -50.7 | -13.0 | -37.7 |       |
| 2.46                            | -58.4            | V               | 3.0      | -13.3                   | 38.4   | 1.0        | -50.7 | -13.0 | -37.7 |       |
| 3.28                            | -59.7            | V               | 3.0      | -11.1                   | 38.5   | 1.0        | -48.5 | -13.0 | -35.5 |       |
| <b>High Channel (822.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -55.7            | H               | 3.0      | -13.2                   | 37.8   | 1.0        | -50.1 | -13.0 | -37.1 |       |
| 2.47                            | -59.2            | H               | 3.0      | -14.2                   | 38.5   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 3.29                            | -59.2            | H               | 3.0      | -10.3                   | 38.5   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 1.65                            | -56.2            | V               | 3.0      | -14.1                   | 37.8   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 2.47                            | -59.3            | V               | 3.0      | -14.2                   | 38.5   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 3.29                            | -58.6            | V               | 3.0      | -10.0                   | 38.5   | 1.0        | -47.4 | -13.0 | -34.4 |       |

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**EVDO-Rev A, 800MHz BC10**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/23/16  
Test Engineer: 39004  
Configuration: EUT only  
Mode: Rev 0/A, 800MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (817.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.72                            | -60.2            | H               | 3.0      | -17.6                   | 37.9   | 1.0        | -54.5 | -13.0 | -41.5 |       |
| 2.45                            | -59.5            | H               | 3.0      | -14.6                   | 38.4   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 3.27                            | -59.1            | H               | 3.0      | -10.2                   | 38.5   | 1.0        | -47.7 | -13.0 | -34.7 |       |
| 1.73                            | -59.2            | V               | 3.0      | -16.7                   | 37.9   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| 2.45                            | -49.2            | V               | 3.0      | -4.1                    | 38.4   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| 3.27                            | -58.8            | V               | 3.0      | -10.2                   | 38.5   | 1.0        | -47.7 | -13.0 | -34.7 |       |
| <b>Mid Channel (820MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 1.64                            | -60.1            | H               | 3.0      | -17.7                   | 37.8   | 1.0        | -54.5 | -13.0 | -41.5 |       |
| 2.46                            | -59.3            | H               | 3.0      | -14.4                   | 38.4   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 3.28                            | -59.0            | H               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 1.64                            | -45.8            | V               | 3.0      | -3.7                    | 37.8   | 1.0        | -40.5 | -13.0 | -27.5 |       |
| 2.46                            | -48.5            | V               | 3.0      | -3.4                    | 38.4   | 1.0        | -40.8 | -13.0 | -27.8 |       |
| 3.28                            | -59.1            | V               | 3.0      | -10.5                   | 38.5   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| <b>High Channel (822.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -60.5            | H               | 3.0      | -18.1                   | 37.8   | 1.0        | -54.9 | -13.0 | -41.9 |       |
| 2.47                            | -59.7            | H               | 3.0      | -14.7                   | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 3.29                            | -59.1            | H               | 3.0      | -10.2                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 1.65                            | -60.2            | V               | 3.0      | -18.1                   | 37.8   | 1.0        | -54.9 | -13.0 | -41.9 |       |
| 2.47                            | -45.7            | V               | 3.0      | -0.5                    | 38.5   | 1.0        | -38.0 | -13.0 | -25.0 |       |
| 3.29                            | -59.7            | V               | 3.0      | -11.0                   | 38.5   | 1.0        | -48.5 | -13.0 | -35.5 |       |

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### 10.5.3. UMTS

#### UMTS REL 99, 850MHz BAND 5

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:** 16U23309  
**Date:** 03/22/16  
**Test Engineer:** 38602  
**Configuration:** EUT only  
**Mode:** REL 99, 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber G

**Pre-amplifier**  
 3m Chamber G

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency<br>(GHz)             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (826.4MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                           | -64.9               | H                  | 3.0      | -23.4                         | 37.8   | 1.0        | -60.3 | -13.0 | -47.3 |       |
| 2.48                           | -63.7               | H                  | 3.0      | -20.6                         | 36.5   | 1.0        | -56.1 | -13.0 | -43.1 |       |
| 3.31                           | -64.4               | H                  | 3.0      | -18.4                         | 36.5   | 1.0        | -54.0 | -13.0 | -41.0 |       |
| 4.13                           | -63.7               | H                  | 3.0      | -16.1                         | 36.0   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 1.65                           | -64.7               | V                  | 3.0      | -22.9                         | 37.8   | 1.0        | -59.8 | -13.0 | -46.8 |       |
| 2.48                           | -64.9               | V                  | 3.0      | -20.8                         | 36.5   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.31                           | -64.3               | V                  | 3.0      | -18.4                         | 36.5   | 1.0        | -53.9 | -13.0 | -40.9 |       |
| 4.13                           | -63.6               | V                  | 3.0      | -15.4                         | 36.0   | 1.0        | -50.4 | -13.0 | -37.4 |       |
| <b>Mid Channel (836.6MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                           | -65.3               | H                  | 3.0      | -23.8                         | 37.8   | 1.0        | -60.6 | -13.0 | -47.6 |       |
| 2.51                           | -65.2               | H                  | 3.0      | -22.0                         | 36.4   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 3.35                           | -64.7               | H                  | 3.0      | -18.7                         | 36.5   | 1.0        | -54.1 | -13.0 | -41.1 |       |
| 4.18                           | -63.8               | H                  | 3.0      | -16.1                         | 36.0   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 1.67                           | -64.5               | V                  | 3.0      | -22.7                         | 37.8   | 1.0        | -59.6 | -13.0 | -46.6 |       |
| 2.51                           | -64.2               | V                  | 3.0      | -20.0                         | 36.4   | 1.0        | -55.3 | -13.0 | -42.3 |       |
| 3.35                           | -64.4               | V                  | 3.0      | -18.3                         | 36.5   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 4.18                           | -63.5               | V                  | 3.0      | -15.2                         | 36.0   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| <b>High Channel (846.6MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.69                           | -64.9               | H                  | 3.0      | -23.4                         | 37.8   | 1.0        | -60.2 | -13.0 | -47.2 |       |
| 2.54                           | -64.7               | H                  | 3.0      | -21.4                         | 36.4   | 1.0        | -56.8 | -13.0 | -43.8 |       |
| 3.39                           | -64.5               | H                  | 3.0      | -18.4                         | 36.4   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 4.23                           | -63.6               | H                  | 3.0      | -15.8                         | 36.1   | 1.0        | -50.8 | -13.0 | -37.8 |       |
| 1.69                           | -64.6               | V                  | 3.0      | -22.8                         | 37.8   | 1.0        | -59.6 | -13.0 | -46.6 |       |
| 2.54                           | -64.3               | V                  | 3.0      | -20.0                         | 36.4   | 1.0        | -55.4 | -13.0 | -42.4 |       |
| 3.39                           | -64.4               | V                  | 3.0      | -18.2                         | 36.4   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 4.23                           | -63.6               | V                  | 3.0      | -15.3                         | 36.1   | 1.0        | -50.3 | -13.0 | -37.3 |       |

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**UMTS HSDPA, 850MHz BAND 5**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/22/16  
Test Engineer: 38602  
Configuration: EUT only  
Mode: HSPA 850MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (826.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                           | -64.6            | H               | 3.0      | -23.1                   | 37.8   | 1.0        | -60.0 | -13.0 | -47.0 |       |
| 2.48                           | -64.3            | H               | 3.0      | -21.2                   | 36.5   | 1.0        | -56.7 | -13.0 | -43.7 |       |
| 3.31                           | -64.7            | H               | 3.0      | -18.7                   | 36.5   | 1.0        | -54.3 | -13.0 | -41.3 |       |
| 4.13                           | -62.6            | H               | 3.0      | -15.0                   | 36.0   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 1.65                           | -64.5            | V               | 3.0      | -22.7                   | 37.8   | 1.0        | -59.6 | -13.0 | -46.6 |       |
| 2.48                           | -64.8            | V               | 3.0      | -20.7                   | 36.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.31                           | -64.2            | V               | 3.0      | -18.3                   | 36.5   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 4.13                           | -62.2            | V               | 3.0      | -14.0                   | 36.0   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| <b>Mid Channel (836.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                           | -64.6            | H               | 3.0      | -23.1                   | 37.8   | 1.0        | -59.9 | -13.0 | -46.9 |       |
| 2.51                           | -64.6            | H               | 3.0      | -21.4                   | 36.4   | 1.0        | -56.8 | -13.0 | -43.8 |       |
| 3.35                           | -64.9            | H               | 3.0      | -18.9                   | 36.5   | 1.0        | -54.3 | -13.0 | -41.3 |       |
| 4.18                           | -63.6            | H               | 3.0      | -15.9                   | 36.0   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 1.67                           | -64.7            | V               | 3.0      | -22.9                   | 37.8   | 1.0        | -59.8 | -13.0 | -46.8 |       |
| 2.51                           | -63.5            | V               | 3.0      | -19.3                   | 36.4   | 1.0        | -54.6 | -13.0 | -41.6 |       |
| 3.35                           | -63.7            | V               | 3.0      | -17.6                   | 36.5   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| 4.18                           | -63.1            | V               | 3.0      | -14.8                   | 36.0   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| <b>High Channel (846.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.69                           | -64.5            | H               | 3.0      | -23.0                   | 37.8   | 1.0        | -59.8 | -13.0 | -46.8 |       |
| 2.54                           | -64.2            | H               | 3.0      | -20.9                   | 36.4   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.39                           | -64.7            | H               | 3.0      | -18.6                   | 36.4   | 1.0        | -54.0 | -13.0 | -41.0 |       |
| 4.23                           | -63.3            | H               | 3.0      | -15.5                   | 36.1   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 1.69                           | -65.1            | V               | 3.0      | -23.3                   | 37.8   | 1.0        | -60.1 | -13.0 | -47.1 |       |
| 2.54                           | -64.4            | V               | 3.0      | -20.1                   | 36.4   | 1.0        | -55.5 | -13.0 | -42.5 |       |
| 3.39                           | -65.1            | V               | 3.0      | -18.9                   | 36.4   | 1.0        | -54.4 | -13.0 | -41.4 |       |
| 4.23                           | -63.2            | V               | 3.0      | -14.9                   | 36.1   | 1.0        | -49.9 | -13.0 | -36.9 |       |

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**UMTS REL 99, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/22/16  
Test Engineer: 38602  
Configuration: EUT only  
Mode: REL 99, 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1852.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.71                            | -62.5            | H               | 3.0      | -15.7                   | 36.2   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 5.56                            | -62.7            | H               | 3.0      | -12.4                   | 36.1   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 7.41                            | -64.5            | H               | 3.0      | -11.4                   | 35.2   | 1.0        | -45.6 | -13.0 | -32.6 |       |
| 9.26                            | -65.6            | H               | 3.0      | -10.8                   | 33.9   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| 3.71                            | -62.4            | V               | 3.0      | -15.2                   | 36.2   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 5.56                            | -63.0            | V               | 3.0      | -12.9                   | 36.1   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 7.41                            | -64.0            | V               | 3.0      | -11.0                   | 35.2   | 1.0        | -45.2 | -13.0 | -32.2 |       |
| 9.26                            | -65.5            | V               | 3.0      | -10.8                   | 33.9   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| <b>Mid Channel (1880MHz)</b>    |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -62.5            | H               | 3.0      | -15.6                   | 36.2   | 1.0        | -50.8 | -13.0 | -37.8 |       |
| 5.64                            | -63.5            | H               | 3.0      | -13.0                   | 36.1   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 7.52                            | -63.2            | H               | 3.0      | -10.0                   | 35.1   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 9.40                            | -65.1            | H               | 3.0      | -10.1                   | 33.8   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| 3.76                            | -61.6            | V               | 3.0      | -14.3                   | 36.2   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 5.64                            | -62.3            | V               | 3.0      | -12.0                   | 36.1   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.52                            | -64.5            | V               | 3.0      | -11.4                   | 35.1   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| 9.40                            | -65.1            | V               | 3.0      | -10.3                   | 33.8   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| <b>High Channel (1907.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -61.7            | H               | 3.0      | -14.7                   | 36.1   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 5.72                            | -63.4            | H               | 3.0      | -12.8                   | 36.1   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 7.63                            | -63.9            | H               | 3.0      | -10.6                   | 35.1   | 1.0        | -44.7 | -13.0 | -31.7 |       |
| 9.54                            | -65.0            | H               | 3.0      | -9.9                    | 33.7   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 3.82                            | -62.0            | V               | 3.0      | -14.5                   | 36.1   | 1.0        | -49.6 | -13.0 | -36.6 |       |
| 5.72                            | -63.4            | V               | 3.0      | -13.0                   | 36.1   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 7.63                            | -64.4            | V               | 3.0      | -11.2                   | 35.1   | 1.0        | -45.2 | -13.0 | -32.2 |       |
| 9.54                            | -65.2            | V               | 3.0      | -10.3                   | 33.7   | 1.0        | -42.9 | -13.0 | -29.9 |       |

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**UMTS HSDPA, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/22/16  
Test Engineer: 38602  
Configuration: EUT only  
Mode: HSPA 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1852.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.71                            | -62.6            | H               | 3.0      | -15.8                   | 36.2   | 1.0        | -51.1 | -13.0 | -38.1 |       |
| 5.56                            | -62.8            | H               | 3.0      | -12.5                   | 36.1   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.41                            | -63.8            | H               | 3.0      | -10.7                   | 35.2   | 1.0        | -44.9 | -13.0 | -31.9 |       |
| 9.26                            | -65.3            | H               | 3.0      | -10.5                   | 33.9   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| 3.71                            | -62.9            | V               | 3.0      | -15.7                   | 36.2   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 5.56                            | -62.7            | V               | 3.0      | -12.6                   | 36.1   | 1.0        | -47.7 | -13.0 | -34.7 |       |
| 7.41                            | -63.5            | V               | 3.0      | -10.5                   | 35.2   | 1.0        | -44.7 | -13.0 | -31.7 |       |
| 9.26                            | -64.6            | V               | 3.0      | -9.9                    | 33.9   | 1.0        | -42.8 | -13.0 | -29.8 |       |
| <b>Mid Channel (1880MHz)</b>    |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -61.1            | H               | 3.0      | -14.2                   | 36.2   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 5.64                            | -62.8            | H               | 3.0      | -12.3                   | 36.1   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 7.52                            | -64.1            | H               | 3.0      | -10.9                   | 35.1   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| 9.40                            | -64.6            | H               | 3.0      | -9.6                    | 33.8   | 1.0        | -42.4 | -13.0 | -29.4 |       |
| 3.76                            | -62.4            | V               | 3.0      | -15.1                   | 36.2   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 5.64                            | -63.1            | V               | 3.0      | -12.8                   | 36.1   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 7.52                            | -64.5            | V               | 3.0      | -11.4                   | 35.1   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| 9.40                            | -65.0            | V               | 3.0      | -10.2                   | 33.8   | 1.0        | -43.0 | -13.0 | -30.0 |       |
| <b>High Channel (1907.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -62.4            | H               | 3.0      | -15.4                   | 36.1   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 5.72                            | -63.5            | H               | 3.0      | -12.9                   | 36.1   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 7.63                            | -64.2            | H               | 3.0      | -10.9                   | 35.1   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| 9.54                            | -65.3            | H               | 3.0      | -10.2                   | 33.7   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| 3.82                            | -62.2            | V               | 3.0      | -14.7                   | 36.1   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.72                            | -63.6            | V               | 3.0      | -13.2                   | 36.1   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 7.63                            | -63.8            | V               | 3.0      | -10.6                   | 35.1   | 1.0        | -44.6 | -13.0 | -31.6 |       |
| 9.54                            | -65.1            | V               | 3.0      | -10.2                   | 33.7   | 1.0        | -42.8 | -13.0 | -29.8 |       |

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**UMTS REL 99, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/22/16  
Test Engineer: 38602  
Configuration: EUT only  
Mode: REL 99, 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.43                            | -65.3            | H               | 3.0      | -19.1                   | 36.4   | 1.0        | -54.5 | -13.0 | -41.5 |       |
| 5.14                            | -63.4            | H               | 3.0      | -13.8                   | 36.3   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 6.85                            | -64.3            | H               | 3.0      | -11.9                   | 35.6   | 1.0        | -46.4 | -13.0 | -33.4 |       |
| 8.56                            | -64.7            | H               | 3.0      | -10.5                   | 34.4   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| 3.43                            | -64.6            | V               | 3.0      | -18.3                   | 36.4   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 5.14                            | -63.1            | V               | 3.0      | -13.7                   | 36.3   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 6.85                            | -63.9            | V               | 3.0      | -11.5                   | 35.6   | 1.0        | -46.1 | -13.0 | -33.1 |       |
| 8.56                            | -64.5            | V               | 3.0      | -10.4                   | 34.4   | 1.0        | -43.8 | -13.0 | -30.8 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -64.8            | H               | 3.0      | -18.5                   | 36.4   | 1.0        | -53.9 | -13.0 | -40.9 |       |
| 5.20                            | -63.5            | H               | 3.0      | -13.8                   | 36.3   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 6.93                            | -63.9            | H               | 3.0      | -11.3                   | 35.5   | 1.0        | -45.9 | -13.0 | -32.9 |       |
| 8.66                            | -64.9            | H               | 3.0      | -10.6                   | 34.3   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| 3.47                            | -63.9            | V               | 3.0      | -17.5                   | 36.4   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| 5.20                            | -63.5            | V               | 3.0      | -14.0                   | 36.3   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 6.93                            | -63.8            | V               | 3.0      | -11.3                   | 35.5   | 1.0        | -45.8 | -13.0 | -32.8 |       |
| 8.66                            | -63.6            | V               | 3.0      | -9.4                    | 34.3   | 1.0        | -42.8 | -13.0 | -29.8 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -64.8            | H               | 3.0      | -18.4                   | 36.4   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 5.26                            | -64.3            | H               | 3.0      | -14.5                   | 36.3   | 1.0        | -49.7 | -13.0 | -36.7 |       |
| 7.01                            | -64.5            | H               | 3.0      | -11.8                   | 35.5   | 1.0        | -46.3 | -13.0 | -33.3 |       |
| 8.76                            | -64.8            | H               | 3.0      | -10.4                   | 34.2   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| 3.51                            | -64.5            | V               | 3.0      | -18.0                   | 36.4   | 1.0        | -53.3 | -13.0 | -40.3 |       |
| 5.26                            | -63.6            | V               | 3.0      | -14.0                   | 36.3   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 7.01                            | -63.7            | V               | 3.0      | -11.0                   | 35.5   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| 8.76                            | -64.8            | V               | 3.0      | -10.6                   | 34.2   | 1.0        | -43.8 | -13.0 | -30.8 |       |

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**UMTS HSDPA, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #: 16U23309  
Date: 03/22/16  
Test Engineer: 38602  
Configuration: EUT only  
Mode: HSPA 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber G   | 3m Chamber G         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.43                            | -64.4            | H               | 3.0      | -18.2                   | 36.4   | 1.0        | -53.6 | -13.0 | -40.6 |       |
| 5.14                            | -63.7            | H               | 3.0      | -14.1                   | 36.3   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 6.85                            | -64.4            | H               | 3.0      | -12.0                   | 35.6   | 1.0        | -46.5 | -13.0 | -33.5 |       |
| 8.56                            | -64.5            | H               | 3.0      | -10.3                   | 34.4   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| 3.43                            | -64.9            | V               | 3.0      | -18.6                   | 36.4   | 1.0        | -54.0 | -13.0 | -41.0 |       |
| 5.14                            | -63.4            | V               | 3.0      | -14.0                   | 36.3   | 1.0        | -49.2 | -13.0 | -36.2 |       |
| 6.85                            | -64.3            | V               | 3.0      | -11.9                   | 35.6   | 1.0        | -46.5 | -13.0 | -33.5 |       |
| 8.56                            | -64.6            | V               | 3.0      | -10.5                   | 34.4   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -65.0            | H               | 3.0      | -18.7                   | 36.4   | 1.0        | -54.1 | -13.0 | -41.1 |       |
| 5.20                            | -63.7            | H               | 3.0      | -14.0                   | 36.3   | 1.0        | -49.2 | -13.0 | -36.2 |       |
| 6.93                            | -64.2            | H               | 3.0      | -11.6                   | 35.5   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| 8.66                            | -65.0            | H               | 3.0      | -10.7                   | 34.3   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| 3.47                            | -65.0            | V               | 3.0      | -18.6                   | 36.4   | 1.0        | -54.0 | -13.0 | -41.0 |       |
| 5.20                            | -64.1            | V               | 3.0      | -14.6                   | 36.3   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 6.93                            | -64.0            | V               | 3.0      | -11.5                   | 35.5   | 1.0        | -46.0 | -13.0 | -33.0 |       |
| 8.66                            | -65.0            | V               | 3.0      | -10.8                   | 34.3   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -64.7            | H               | 3.0      | -18.3                   | 36.4   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 5.26                            | -64.0            | H               | 3.0      | -14.2                   | 36.3   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 7.01                            | -63.5            | H               | 3.0      | -10.8                   | 35.5   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 8.76                            | -64.6            | H               | 3.0      | -10.2                   | 34.2   | 1.0        | -43.5 | -13.0 | -30.5 |       |
| 3.51                            | -64.8            | V               | 3.0      | -18.3                   | 36.4   | 1.0        | -53.6 | -13.0 | -40.6 |       |
| 5.26                            | -64.2            | V               | 3.0      | -14.6                   | 36.3   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 7.01                            | -63.9            | V               | 3.0      | -11.2                   | 35.5   | 1.0        | -45.7 | -13.0 | -32.7 |       |
| 8.76                            | -64.8            | V               | 3.0      | -10.6                   | 34.2   | 1.0        | -43.8 | -13.0 | -30.8 |       |

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