

# FCC Test Report

## (Part 22&24)

Product Name : LTE Router  
Model No : WLD71-T3  
FCC ID : NKR-WLD71-T3

Applicant : Wistron NeWeb Corporation

Address : 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.

Date of Receipt : 2016/10/28  
Issued Date : 2017/02/16  
Report No. : 16B0078R-HPUSP17V00  
Report Version : V2.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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## Test Report

Issued Date : 2017/02/16

Report No.: 16B0078R-HPUSP17V00



Product Name : LTE Router

Applicant : Wistron NeWeb Corporation

Address : 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.

Manufacturer : WNC

Trade Name : WNC

Model No. : WLD71-T3

EUT Rated Voltage : DC 12V

EUT Test Voltage : AC 120V/60Hz

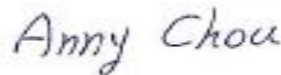
Measurement Standard : FCC CFR Title 47 Part 2 22 24

Measurement : TIA/EIA 603-D 2010

Reference : KDB 971168 D01V02r02

Test Result : Complied

Documented By :



(Adm. Specialist / Anny Chou)

Tested By :



(Senior Engineer / Vorana Chen)

Approved By :



(Director / Vincent Lin)

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

|                    |                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name       | LTE Router                                                                                                                                        |
| Model No.          | WLD71-T3                                                                                                                                          |
| Trade Name         | WNC                                                                                                                                               |
| IMEI No.           | 35526808                                                                                                                                          |
| FCC ID             | NKR-WLD71-T3                                                                                                                                      |
| TX Frequency       | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8MHz<br>WCDMA Band 2: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band 5: 826.4 MHz ~ 846.6 MHz  |
| Rx Frequency       | GSM850: 869.2 MHz ~ 893.8 MHz<br>GSM1900: 1930.2 MHz ~ 1989.8 MHz<br>WCDMA Band 2: 1932.4 MHz ~ 1987.6 MHz<br>WCDMA Band 5: 871.4 MHz ~ 891.6 MHz |
| Type of modulation | GPRS: GMSK; EGPRS: GMSK / 8PSK<br>WCDMA: QPSK (Uplink); HSDPA: QPSK (Uplink); HSUPA: QPSK (Uplink)                                                |
| HW Version         | 48WLD711.0GAPAL                                                                                                                                   |
| SW Version         | AR_WLD71-T3_v2.0                                                                                                                                  |
| Antenna Type       | Inverted-F Antenna                                                                                                                                |

### 1.2. Antenna List

| No | Manufacturer | Part No                             | Antenna Type       | Peak Gain                                            |
|----|--------------|-------------------------------------|--------------------|------------------------------------------------------|
| 1  | WNC          | 3AWLD7501S1-111<br>(WWAN Main)      | Inverted-F Antenna | 2.0 dBi for 824-894 MHz<br>2.7 dBi for 1710-2170 MHz |
| 2  | WNC          | 3AWLD7501S1-111<br>(WWAN Diversity) | Inverted-F Antenna | 2.0 dBi for 824-894 MHz<br>2.7 dBi for 1710-2170 MHz |

### 1.3. Operational Description

The information contained within this report is intended to show verification of compliance of the 850/1900MHz to the requirements of FCC 47 CFR Part 2, 22, 24

The EUT provide all functions described as above. The EUT is tested with maximum rated TX power via the Base Station simulator.

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined

as:

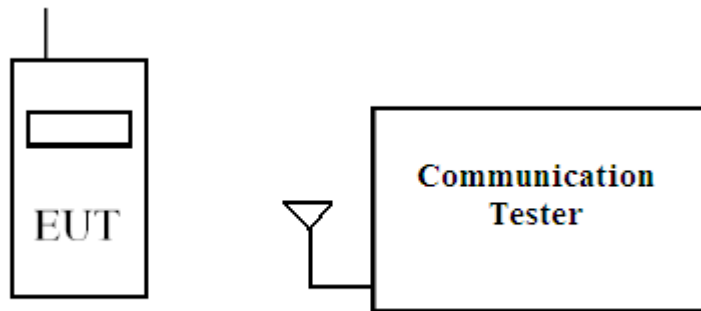
|            |                                      |
|------------|--------------------------------------|
| Test Mode: | GSM 850 VOICE                        |
|            | GSM 850 GPRS                         |
|            | GSM 850 EGPRS                        |
|            | PCS 1900 VOICE                       |
|            | PCS 1900 GPRS                        |
|            | PCS 1900 EGPRS                       |
|            | WCDMA BAND 2 (VOICE/RMC/HSDPA/HSUPA) |
|            | WCDMA BAND 5 (VOICE/RMC/HSDPA/HSUPA) |

Note:

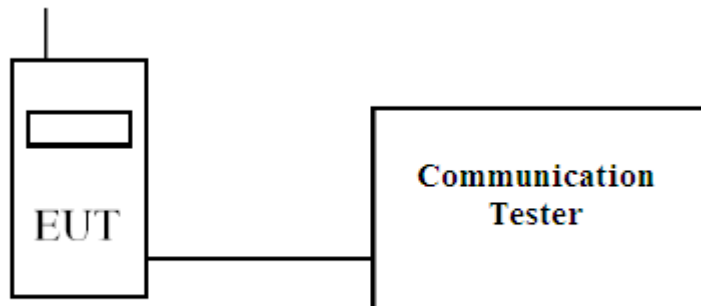
The maximum power levels are GPRS class8 mode for GSM 850/1900, EGPRS class8 mode for GSM 850/1900, RMC 12.2K mode for WCDMA Band 2/5, only these modes were used for all tests.

#### 1.4. Configuration of tested System

(a) Configuration of Radiated measurement



(b) Configuration of Conducted measurement



#### 1.5. EUT Setup Procedures

- (1) Setup the EUT and simulators as shown on 1.3
- (2) Turn on the power of all equipments.
- (3) The EUT was set to communicate with communication tester.
- (4) Repeat the above procedure (3).

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items                      | Required (IEC 68-1) | Actual |
|----------------------------|---------------------|--------|
| Temperature (°C)           | 15-35               | 22.7   |
| Humidity (%RH)             | 25-75               | 48     |
| Barometric pressure (mbar) | 860-1060            | 982    |

Site Description: File on  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
FCC Registration Number :92195

Site Name: DEKRA Testing and Certification Co., Ltd

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No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,  
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TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789  
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW1014

### 1.7. Type of Emission

| System                    | Type of modulation | Emission Designator |
|---------------------------|--------------------|---------------------|
| GSM850 GPRS class 12      | GMSK               | 251KGXW             |
| GSM850 EGPRS class 12     | 8PSK               | 250KG7W             |
| GSM1900 GPRS class 12     | GMSK               | 244KGXW             |
| GSM1900 EGPRS class 12    | 8PSK               | 246KG7W             |
| WCDMA Band 2 RMC 12.2kbps | QPSK               | 4M14F9W             |
| WCDMA Band 5 RMC 12.2kbps | QPSK               | 4M15F9W             |

### 1.8. Voltages and DC currents

|                                       |                                         |
|---------------------------------------|-----------------------------------------|
| GSM 850 GPRS                          |                                         |
| EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.072A |
| EUT Standby :                         | AC voltage : 120V , AC current : 0.032A |
| GSM 850 EGPRS                         |                                         |
| EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.046A |
| EUT Standby :                         | AC voltage : 120V , AC current : 0.032A |
| PCS 1900 GPRS                         |                                         |
| EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.070A |
| EUT Standby :                         | AC voltage : 120V , AC current : 0.032A |
| PCS 1900 EGPRS                        |                                         |
| EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.042A |
| EUT Standby :                         | AC voltage : 120V , AC current : 0.032A |
| WCDMA Band 2 RMC 12.2K                |                                         |
| EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.095A |
| EUT Standby :                         | AC voltage : 120V , AC current : 0.033A |
| WCDMA Band 5 RMC 12.2K                |                                         |
| EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.086A |
| EUT Standby :                         | AC voltage : 120V , AC current : 0.032A |

## 2. Technical Test

### 2.1. Summary of test result

| Standard  | Test Item                                     | Result | Note |
|-----------|-----------------------------------------------|--------|------|
| 2.1046    | Conducted Output Power                        | Pass   |      |
| 22.913(a) |                                               |        |      |
| 24.232(c) |                                               |        |      |
| 2.1049    | Occupied Bandwidth                            | Pass   |      |
| 22.917(a) |                                               |        |      |
| 24.238(b) |                                               |        |      |
| 2.1051    | Spurious Emission at Antenna Terminals        | Pass   |      |
| 22.917(a) |                                               |        |      |
| 24.238(a) |                                               |        |      |
| 2.1051    | Conducted Emission                            | Pass   |      |
| 22.917(a) |                                               |        |      |
| 24.238(a) |                                               |        |      |
| 2.1053    | Field Strength of Spurious Radiation          | Pass   |      |
| 22.917(a) |                                               |        |      |
| 24.238(a) |                                               |        |      |
| 2.1055    | Frequency Stability for Temperature & Voltage | Pass   |      |
| 22.355    |                                               |        |      |
| 24.235    |                                               |        |      |
| 24.232    | Peak to Average Ratio                         | Pass   |      |

## 2.2. List of test Equipment

Conducted /CTR

| Instrument                              | Manufacturer | Type No. | Serial No    | Cal. Date  |
|-----------------------------------------|--------------|----------|--------------|------------|
| Spectrum Analyzer                       | Agilent      | N9010A   | MY52220597   | 2016/02/18 |
| Directional coupler                     | Agilent      | 87300C   | MY44300353   | 2016/12/04 |
| Directional coupler                     | Agilent      | 778D-012 | 50550        | 2016/11/08 |
| Standard Temperature & Humidity Chamber | WIT          | TH-1S-B  | EQ-201-00146 | 2016/11/28 |
| DC power supply                         | Agilent      | E3610A   | MY40009845   | 2016/07/14 |
| Communication Tester                    | R&S          | CMU200   | 104846       | 2016/07/07 |

Radiated / Site3

| Instrument           | Manufacturer    | Type No. | Serial No  | Cal. Date  |
|----------------------|-----------------|----------|------------|------------|
| Bilog Antenna        | Schaffner Chase | CBL6112B | 2707       | 2016/05/25 |
| Horn Antenna         | R&S             | 9120D    | 867        | 2016/04/14 |
| Pre-Amplifier        | Agilent         | 87405C   | MY47010653 | 2016/08/11 |
| Spectrum Analyzer    | Agilent         | N9010A   | MY54510357 | 2016/04/13 |
| Communication Tester | R&S             | CMU200   | 104846     | 2016/07/07 |

## 2.3. Measurement Uncertainty

### Conducted Emission

The measurement uncertainty of confidence of 95% is evaluated as  $\pm 1.52$  dB

### Radiated Emission (Below 1GHz)

The measurement uncertainty of confidence of 95% is evaluated as  $\pm 3.44$  dB .

### Radiated Emission (Above 1GHz)

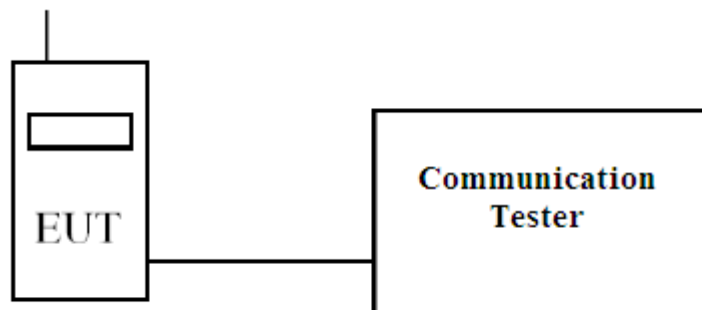
The measurement uncertainty of confidence of 95% is evaluated as  $\pm 4.08$  dB

### 3. Conducted Output Power Measurement

#### 3.1. Test Specification

According to Part 2.1046, 22.913, 24.232

#### 3.2. Test Setup



#### 3.3. Limits

| Band      | Limit |
|-----------|-------|
| 850       | <7W   |
| 1900      | <2W   |
| AWS(1700) | <1W   |

#### 3.4. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the output power was measured at the antenna terminals of the EUT.

### 3.5. Test Result of Maximum Power Output

|              |                             |           |     |
|--------------|-----------------------------|-----------|-----|
| Product      | LTE Router                  |           |     |
| Test Mode    | RF Output Power (Conducted) |           |     |
| Date of Test | 2016/12/03                  | Test Site | CTR |

| Band                                                            | GSM 850 |        |       |        | GSM 1900 |        |       |        |
|-----------------------------------------------------------------|---------|--------|-------|--------|----------|--------|-------|--------|
| CHANNEL                                                         | 128     | 189    | 251   | 512    | 661      | 810    |       |        |
| VOICE                                                           | 32.26   | 32.40  | 32.42 | 29.88  | 29.87    | 29.52  |       |        |
| GPRS Class 8                                                    | 32.26   | 32.36  | 32.43 | 29.89  | 29.83    | 29.58  |       |        |
| GPRS Class 10                                                   | 32.14   | 32.20  | 32.25 | 29.64  | 29.60    | 29.61  |       |        |
| GPRS Class 11                                                   | 31.97   | 32.07  | 32.05 | 29.77  | 29.68    | 29.43  |       |        |
| GPRS Class 12                                                   | 31.81   | 32.39  | 32.36 | 29.47  | 29.39    | 29.02  |       |        |
| EGPRS Class 8                                                   | 26.16   | 26.16  | 26.17 | 25.54  | 25.46    | 25.29  |       |        |
| EGPRS Class 10                                                  | 26.07   | 26.02  | 26.09 | 25.52  | 25.34    | 25.21  |       |        |
| EGPRS Class 11                                                  | 26.00   | 26.00  | 26.01 | 25.37  | 25.33    | 25.04  |       |        |
| EGPRS Class 12                                                  | 25.89   | 25.92  | 25.96 | 25.28  | 25.10    | 24.97  |       |        |
| Maximum Power                                                   | GPRS    | 32.43  | EGPRS | 26.17  | GPRS     | 29.89  | EGPRS | 25.54  |
| Antenna Gain                                                    | 2.0 dBi |        |       |        | 2.7 dBi  |        |       |        |
| ERP/EIRP (W)                                                    | GPRS    | 1.6904 | EGPRS | 0.3999 | GPRS     | 1.8155 | EGPRS | 0.6668 |
| Note: Unit : dBm 2. ERP/EIRP(W)= Conducted Power + Antenna Gain |         |        |       |        |          |        |       |        |

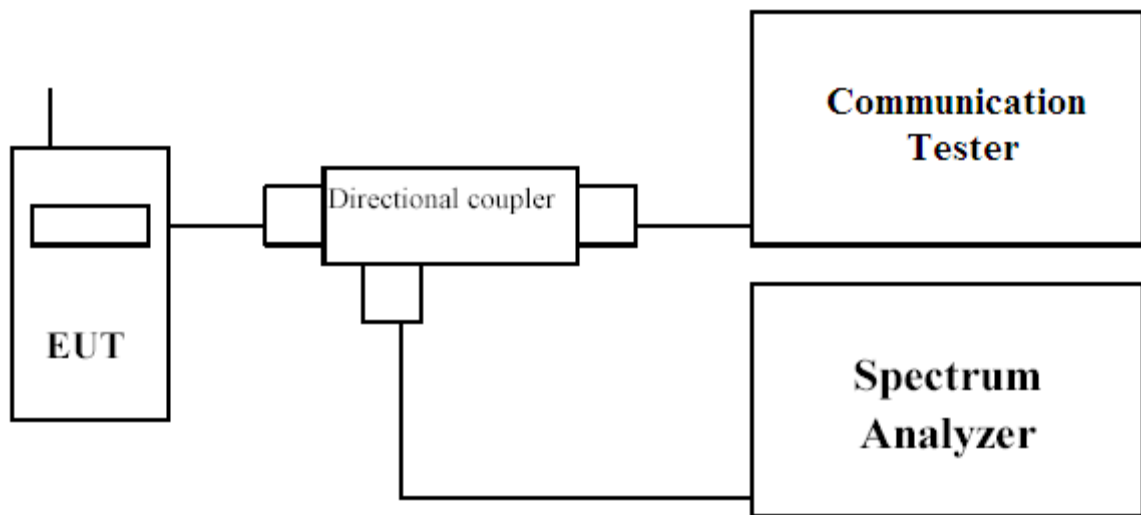
| Band                                                            | WCDMA Band 2 |       |              | WCDMA Band 5 |       |       |
|-----------------------------------------------------------------|--------------|-------|--------------|--------------|-------|-------|
| CHANNEL                                                         | 9262         | 9400  | 9538         | 4132         | 4183  | 4233  |
| VOICE                                                           | 23.14        | 23.17 | <b>23.35</b> | <b>23.03</b> | 22.90 | 22.87 |
| RMC                                                             | <b>23.41</b> | 23.12 | 23.19        | <b>23.14</b> | 22.76 | 22.71 |
| HSDPA Set 1                                                     | <b>22.55</b> | 22.31 | 22.42        | <b>21.98</b> | 21.88 | 21.85 |
| HSDPA Set 2                                                     | 22.15        | 21.83 | 22.09        | 21.76        | 21.51 | 21.47 |
| HSDPA Set 3                                                     | 22.05        | 21.83 | 22.05        | 21.72        | 21.64 | 21.67 |
| HSDPA Set 4                                                     | 22.03        | 21.83 | 22.05        | 21.78        | 21.53 | 21.60 |
| HSUPA Set 1                                                     | 21.55        | 21.72 | <b>22.27</b> | <b>22.04</b> | 21.89 | 21.36 |
| HSUPA Set 2                                                     | 21.24        | 21.15 | 20.76        | 20.89        | 20.78 | 20.74 |
| HSUPA Set 3                                                     | 20.96        | 20.75 | 20.64        | 21.03        | 20.93 | 20.59 |
| HSUPA Set 4                                                     | 21.37        | 21.37 | 21.11        | 21.04        | 20.95 | 21.28 |
| HSUPA Set 5                                                     | 21.57        | 21.30 | 21.82        | 21.96        | 21.13 | 21.22 |
| Maximum Power                                                   | 23.55        | 23.17 | 23.35        | 23.14        | 22.90 | 22.87 |
| Antenna Gain                                                    | 2.7 dBi      |       |              | 2.0 dBi      |       |       |
| ERP/EIRP (W)                                                    | 26.25        | 25.87 | 26.05        | 25.13        | 24.90 | 24.87 |
| Note: Unit : dBm 2. ERP/EIRP(W)= Conducted Power + Antenna Gain |              |       |              |              |       |       |

## 4. Occupied Bandwidth

### 4.1. Test Specification

According to Part 2.1049, 22.917, 24.238

### 4.2. Test Setup



### 4.3. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the occupied bandwidth was measured at the antenna terminals of the EUT.

The Resolution BW of the analyzer is set to 1 % of the emission bandwidth. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The plots below show the resultant display from the Spectrum Analyzer.

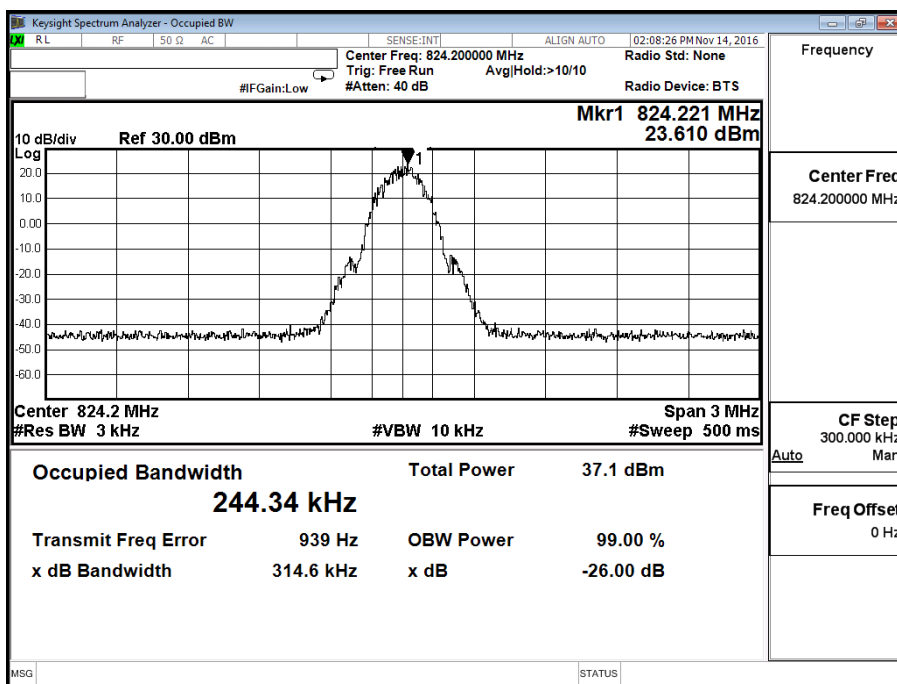
#### 4.4. Test Result of Occupied Bandwidth

|           |                    |
|-----------|--------------------|
| Product   | LTE Router         |
| Test Mode | Occupied Bandwidth |
| Test Site | CTR                |

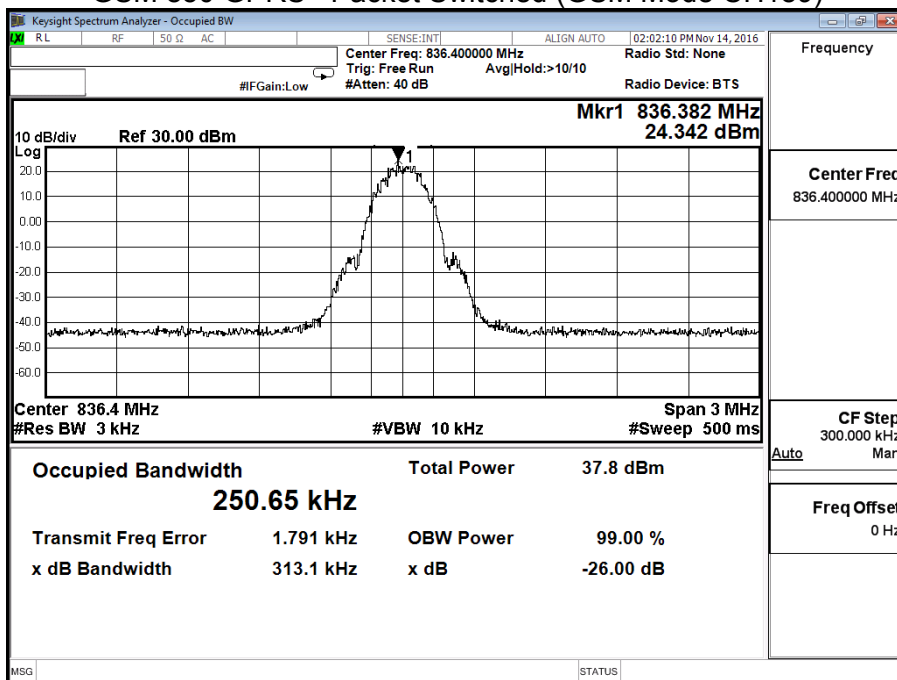
| Test Mode      | Channel & TX Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB bandwidth (kHz) | Required Limit (MHz) | Result |
|----------------|------------------------------|------------------------------|-----------------------|----------------------|--------|
| GSM 850 GPRS   | 128(824.2)                   | 244.34                       | 314.6                 | N/A                  | Pass   |
|                | 189(836.4)                   | 250.65                       | 313.1                 | N/A                  | Pass   |
|                | 251(848.8)                   | 244.58                       | 318.2                 | N/A                  | Pass   |
| GSM 850 EGPRS  | 128(824.2)                   | 245.19                       | 311.1                 | N/A                  | Pass   |
|                | 189(836.4)                   | 250.12                       | 303.6                 | N/A                  | Pass   |
|                | 251(848.8)                   | 244.89                       | 307.5                 | N/A                  | Pass   |
| PCS 1900 GPRS  | 512(1850.2)                  | 243.64                       | 317.0                 | N/A                  | Pass   |
|                | 661(1880)                    | 243.57                       | 321.5                 | N/A                  | Pass   |
|                | 810(1909.8)                  | 242.06                       | 314.9                 | N/A                  | Pass   |
| PCS 1900 EGPRS | 512(1850.2)                  | 245.92                       | 310.3                 | N/A                  | Pass   |
|                | 661(1880)                    | 245.04                       | 313.1                 | N/A                  | Pass   |
|                | 810(1909.8)                  | 244.34                       | 313.8                 | N/A                  | Pass   |
| WCDMA Band 2   | 9262(1852.4)                 | 4.1430                       | 4.738                 | N/A                  | Pass   |
|                | 9400(1880)                   | 4.1229                       | 4.727                 | N/A                  | Pass   |
|                | 9538(1907.6)                 | 4.1273                       | 4.729                 | N/A                  | Pass   |
| WCDMA Band 5   | 4132(826.4)                  | 4.1194                       | 4.705                 | N/A                  | Pass   |
|                | 4183(836.6)                  | 4.1542                       | 4.722                 | N/A                  | Pass   |
|                | 4233(846.6)                  | 4.1276                       | 4.708                 | N/A                  | Pass   |

|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | GSM 850 GPRS       |           |     |

## GSM 850 GPRS - Packet Switched (GSM Mode CH 128)

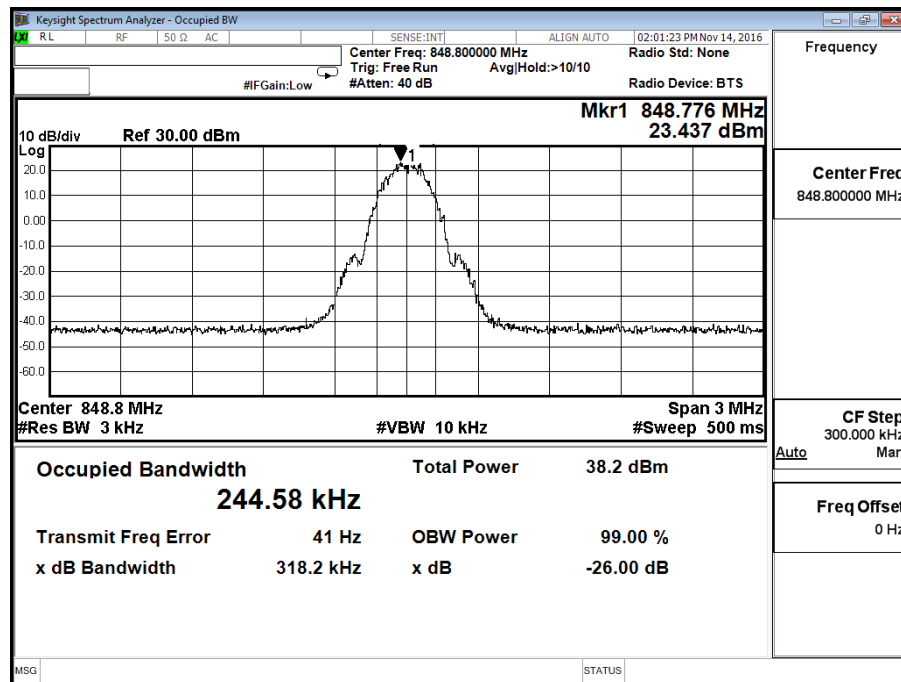


## GSM 850 GPRS - Packet Switched (GSM Mode CH189)



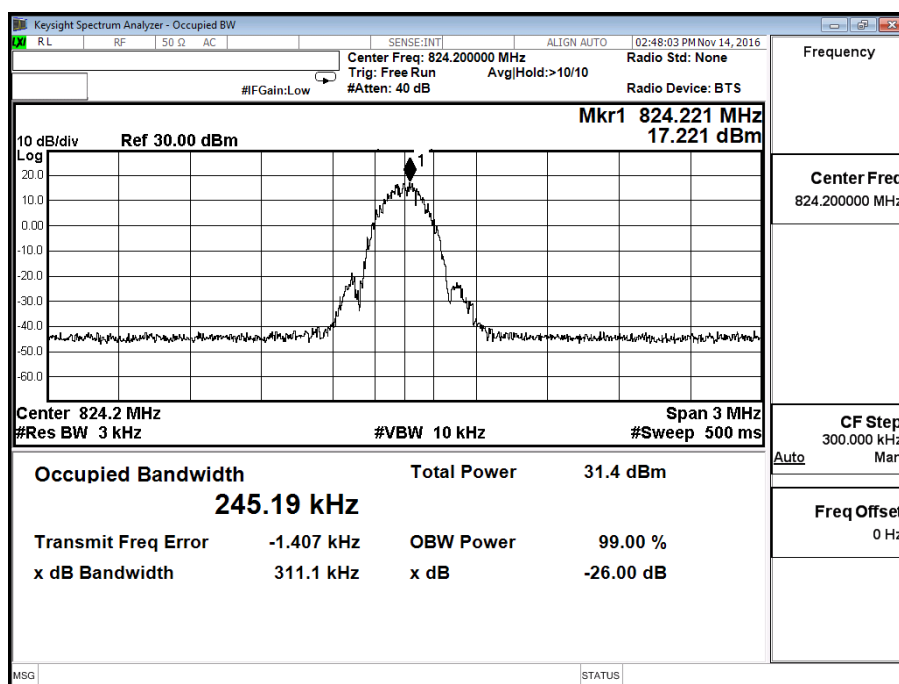
|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | GSM 850 GPRS       |           |     |

## GSM 850 GPRS - Packet Switched (GSM Mode CH 251)

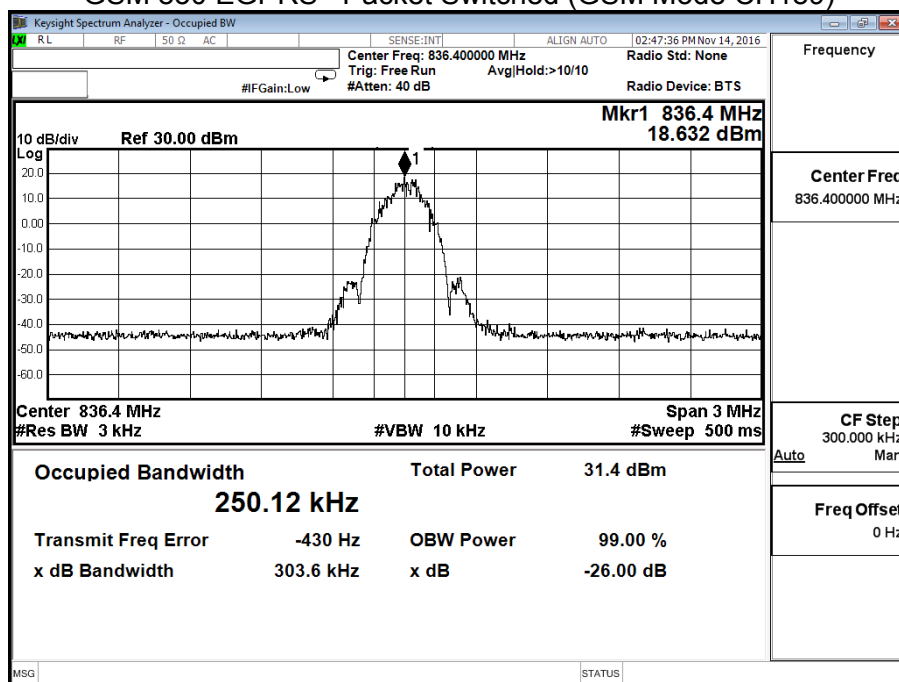


|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | GSM 850 EGPRS      |           |     |

## GSM 850 EGPRS - Packet Switched (GSM Mode CH 128)

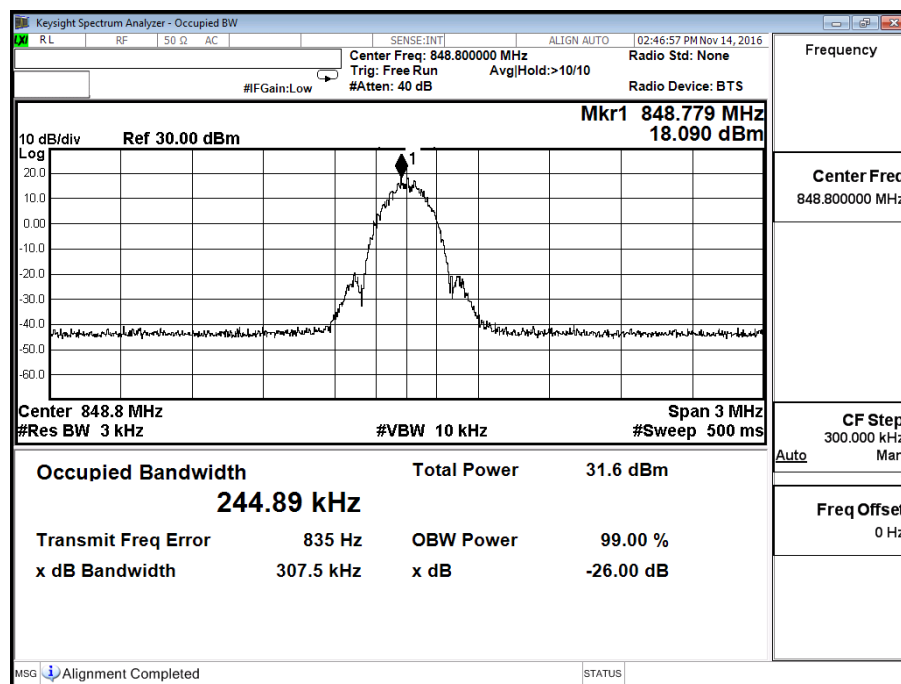


## GSM 850 EGPRS - Packet Switched (GSM Mode CH189)



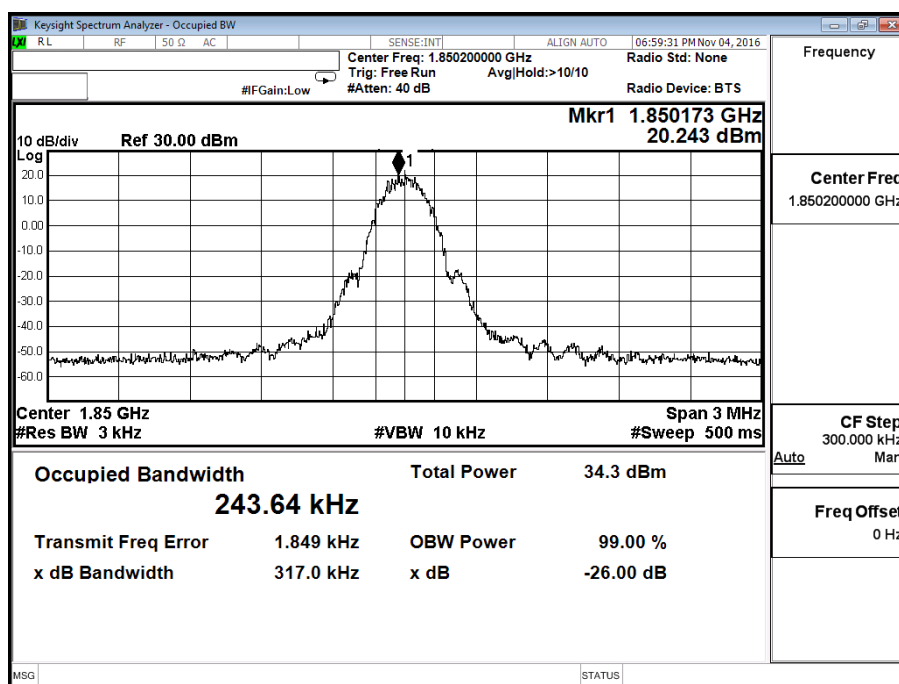
|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | GSM 850 EGPRS      |           |     |

## GSM 850 EGPRS - Packet Switched (GSM Mode CH 251)

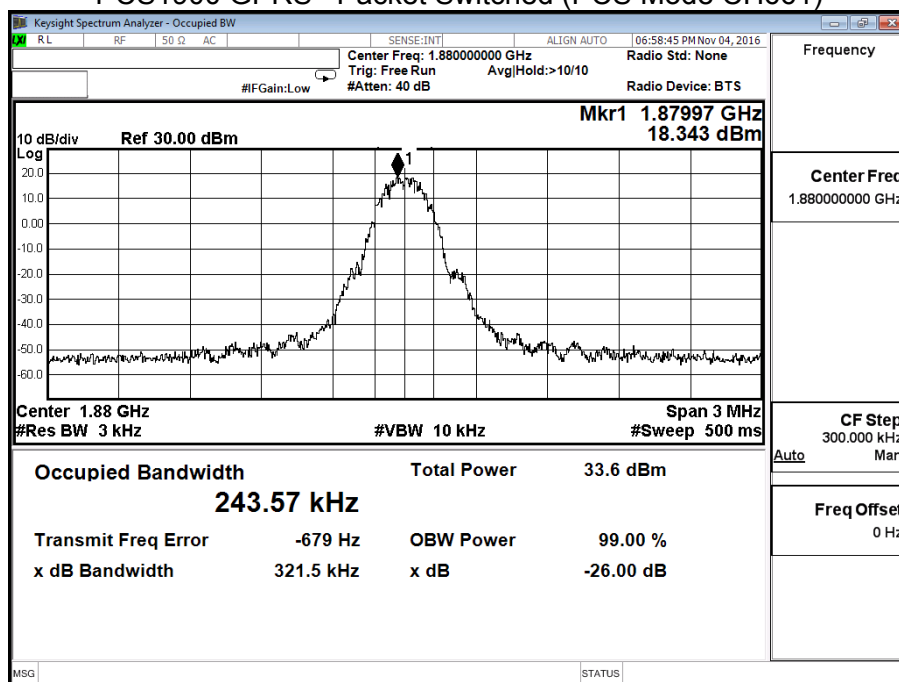


|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | PCS1900 GPRS       |           |     |

## PCS1900 GPRS - Packet Switched (PCS Mode CH 512)

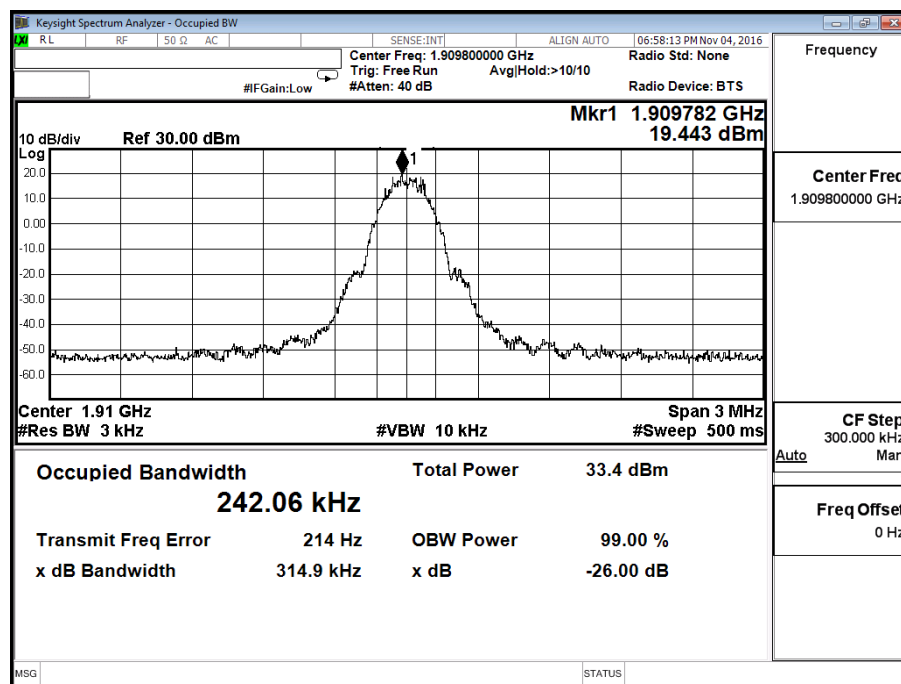


## PCS1900 GPRS - Packet Switched (PCS Mode CH661)



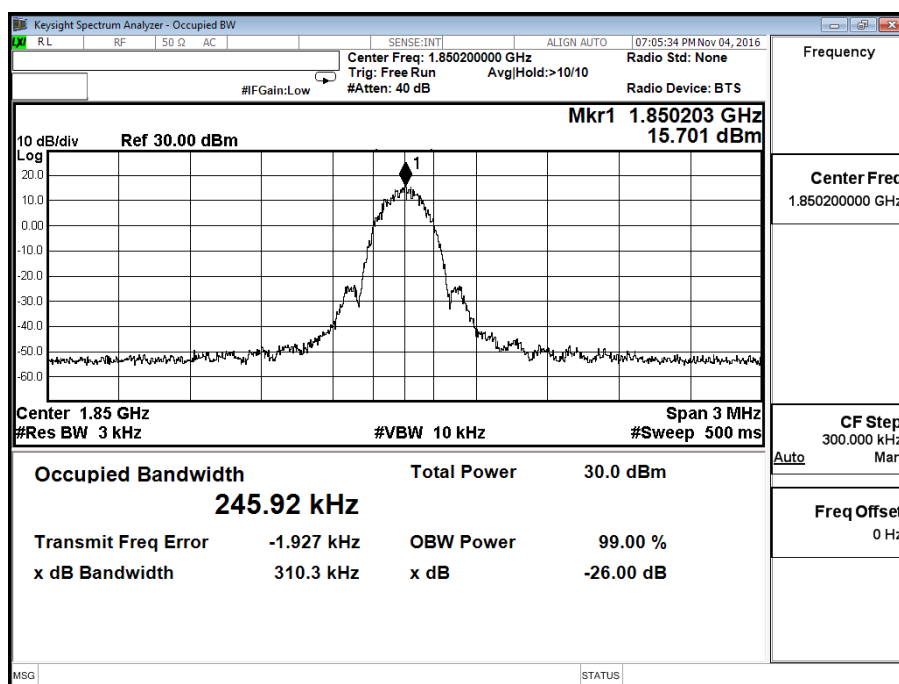
|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | PCS1900 GPRS       |           |     |

## PCS1900 GPRS - Packet Switched (PCS Mode CH 810)

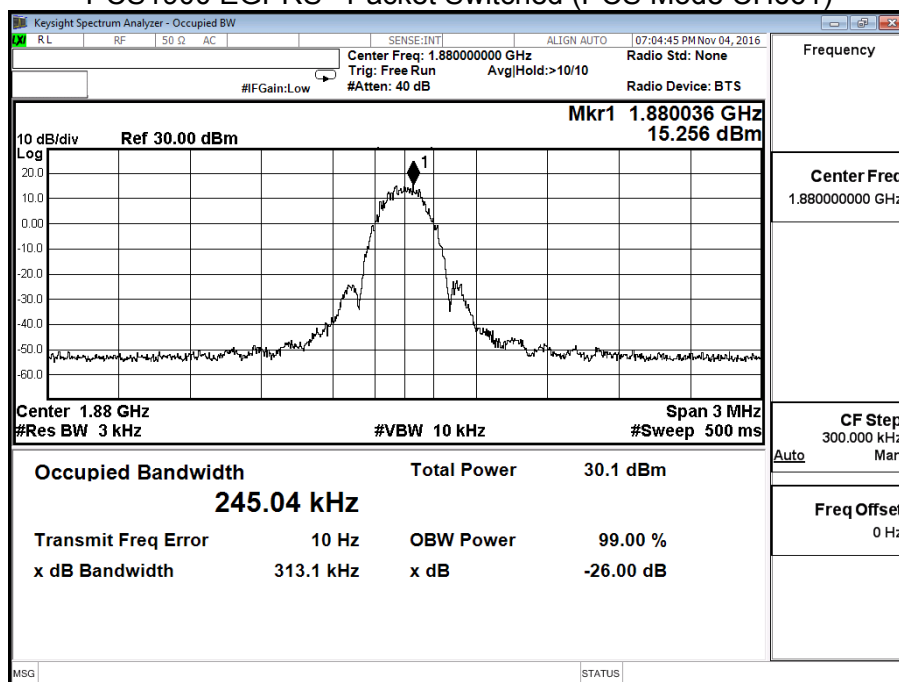


|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | PCS1900 EGPRS      |           |     |

## PCS1900 EGPRS - Packet Switched (PCS Mode CH 512)

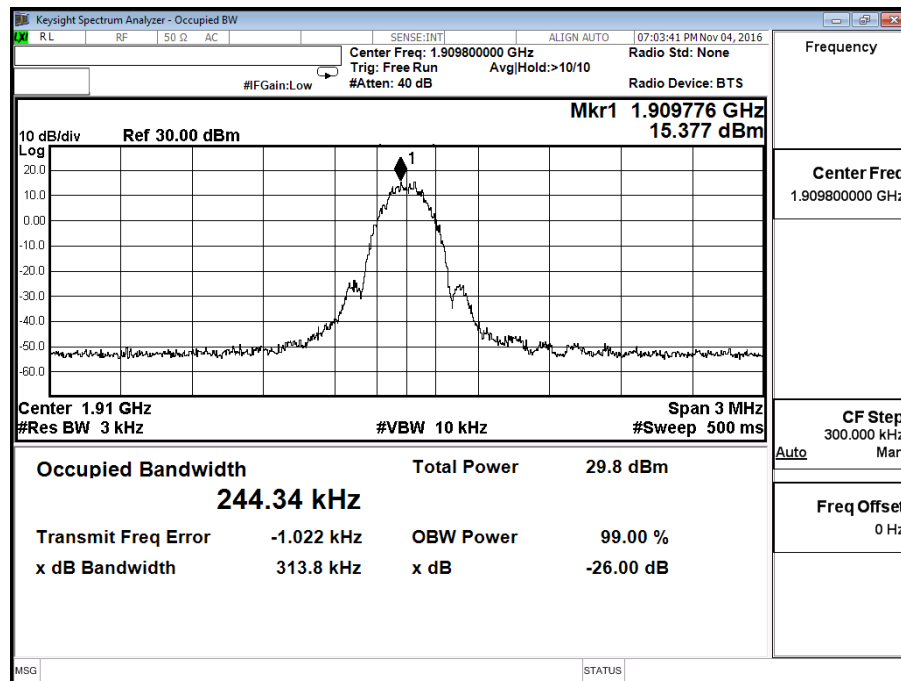


## PCS1900 EGPRS - Packet Switched (PCS Mode CH661)



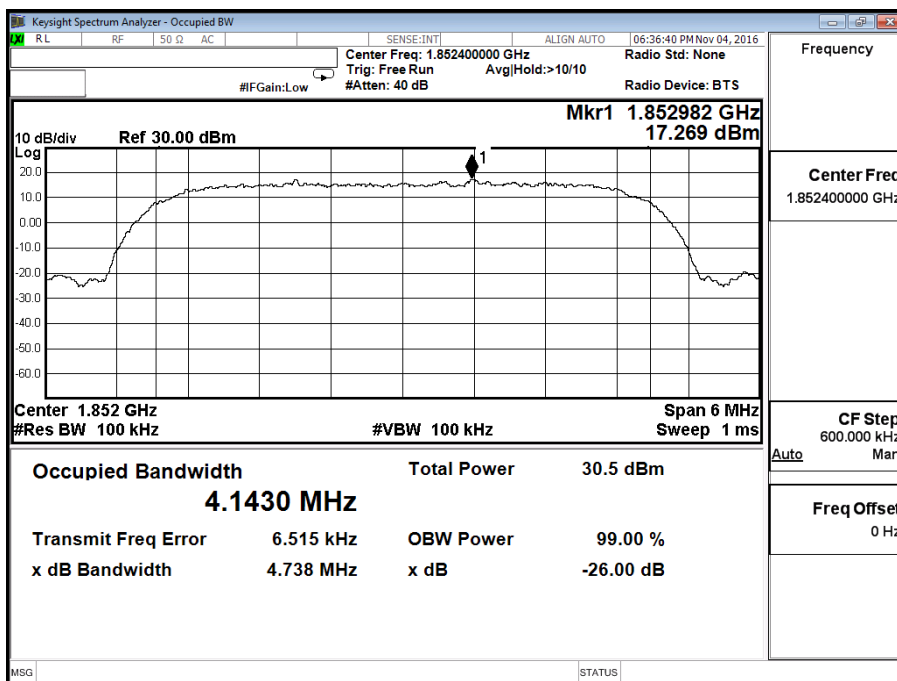
|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | PCS1900 EGPRS      |           |     |

## PCS1900 EGPRS - Packet Switched (PCS Mode CH 810)

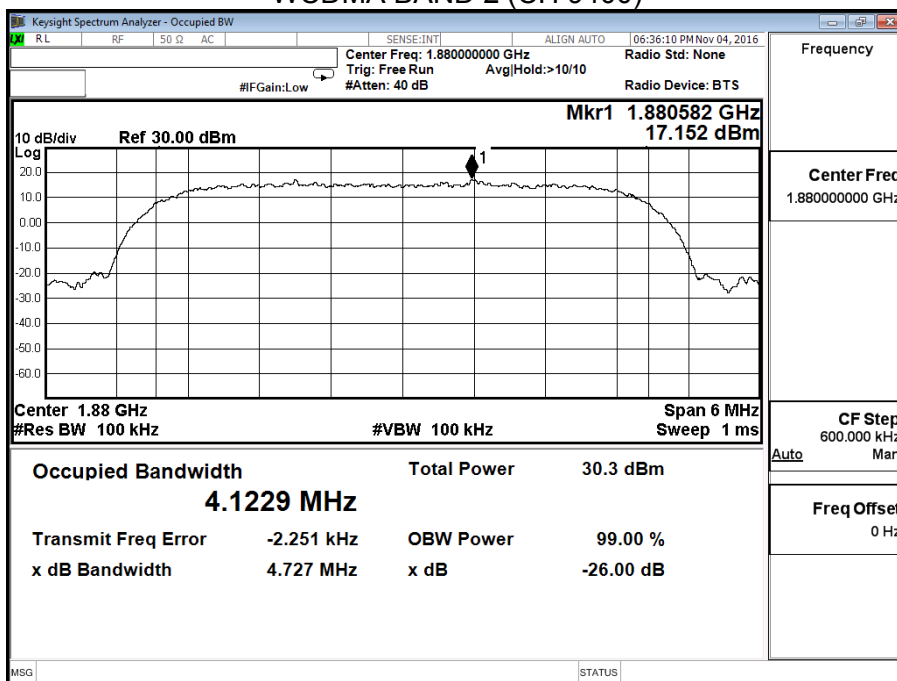


|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | WCDMA BAND 2       |           |     |

## WCDMA BAND 2 (CH 9262)

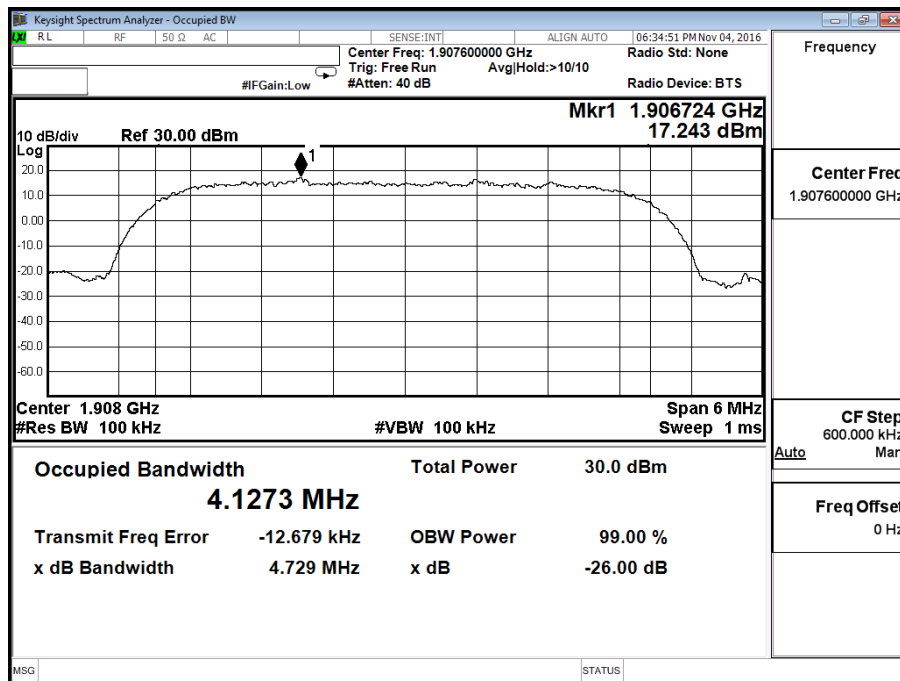


## WCDMA BAND 2 (CH 9400)



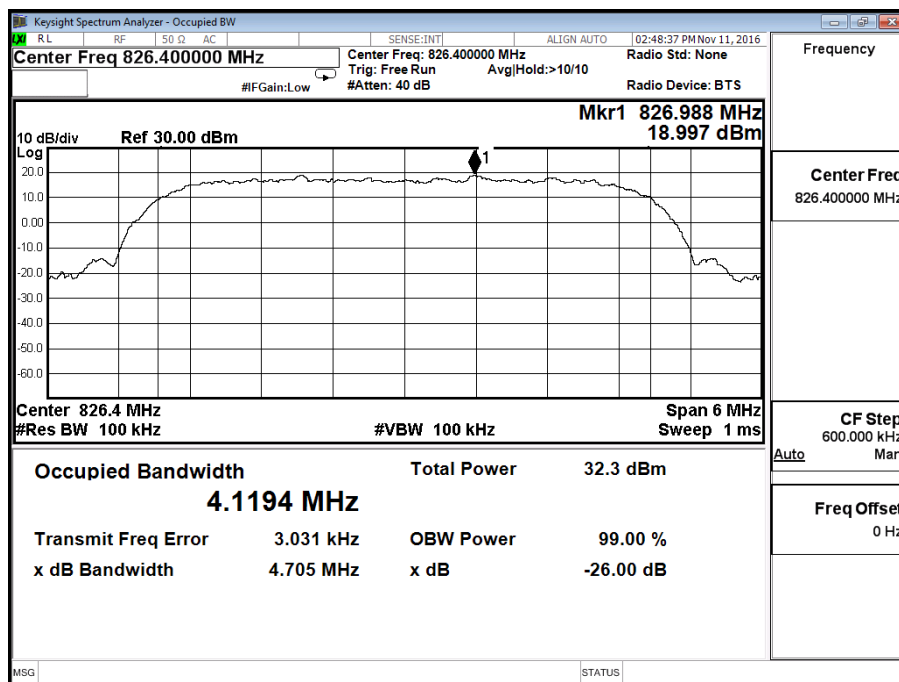
|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | WCDMA BAND 2       |           |     |

## WCDMA BAND 2 (CH 9538)

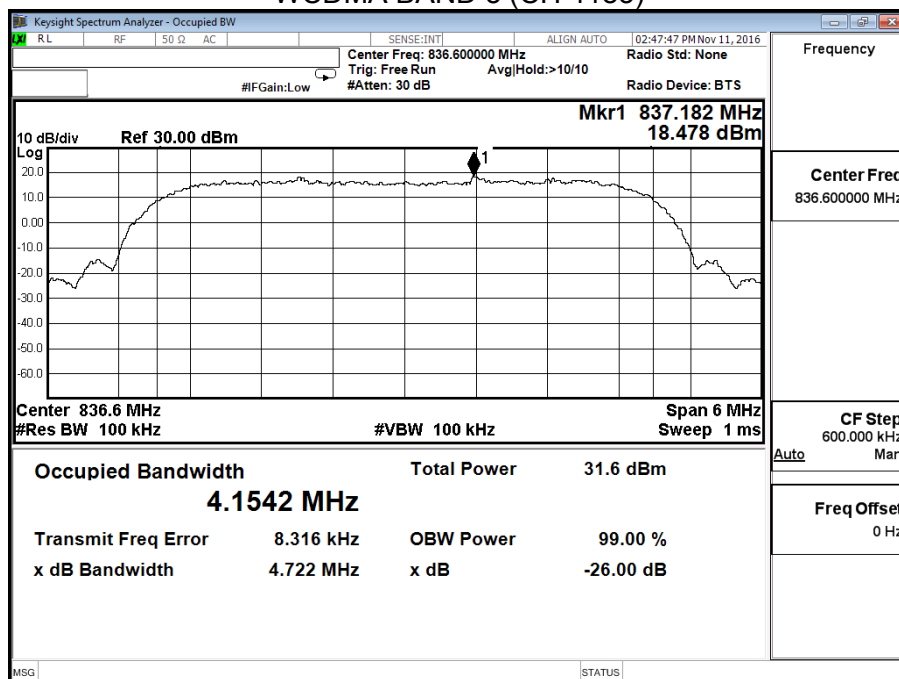


|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | WCDMA BAND 5       |           |     |

## WCDMA BAND 5 (CH 4132)

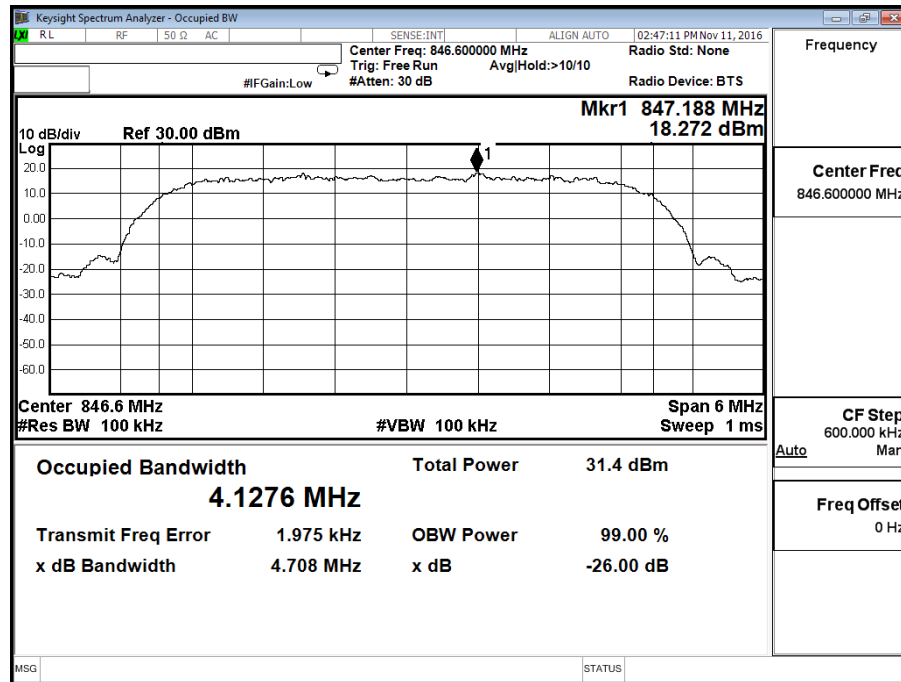


## WCDMA BAND 5 (CH 4183)



|                |                    |           |     |
|----------------|--------------------|-----------|-----|
| Product        | LTE Router         |           |     |
| Test Mode      | Occupied Bandwidth |           |     |
| Date of Test   | 2016/12/04         | Test Site | CTR |
| Test Condition | WCDMA BAND 5       |           |     |

## WCDMA BAND 5 (CH 4233)

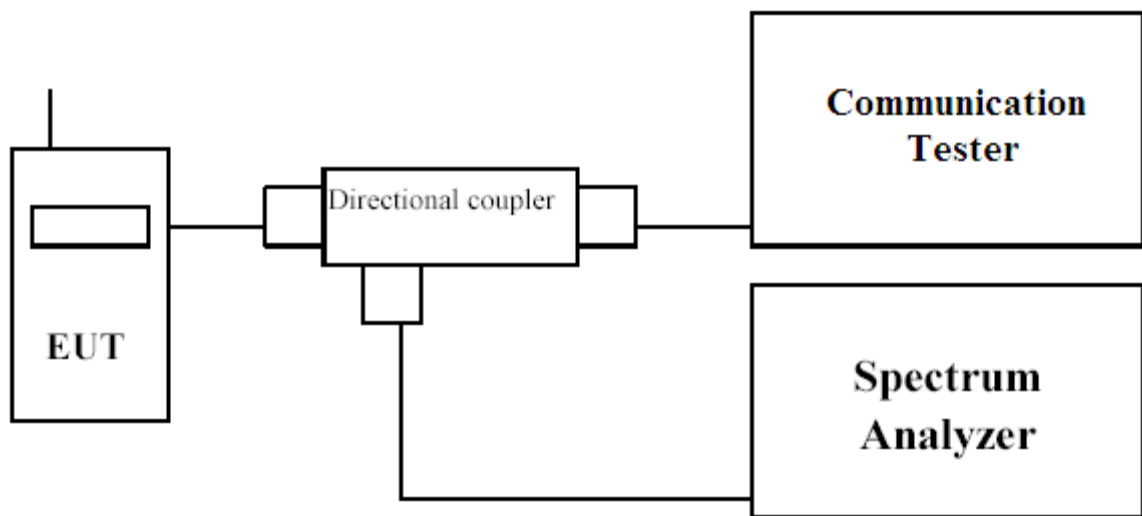


## 5. Spurious Emission At Antenna Terminals (+/-1MHz)

### 5.1. Test Specification

According to Part 2.1049, 22.917, 24.238

### 5.2. Setup



### 5.3. 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.

### 5.4. Test Procedure

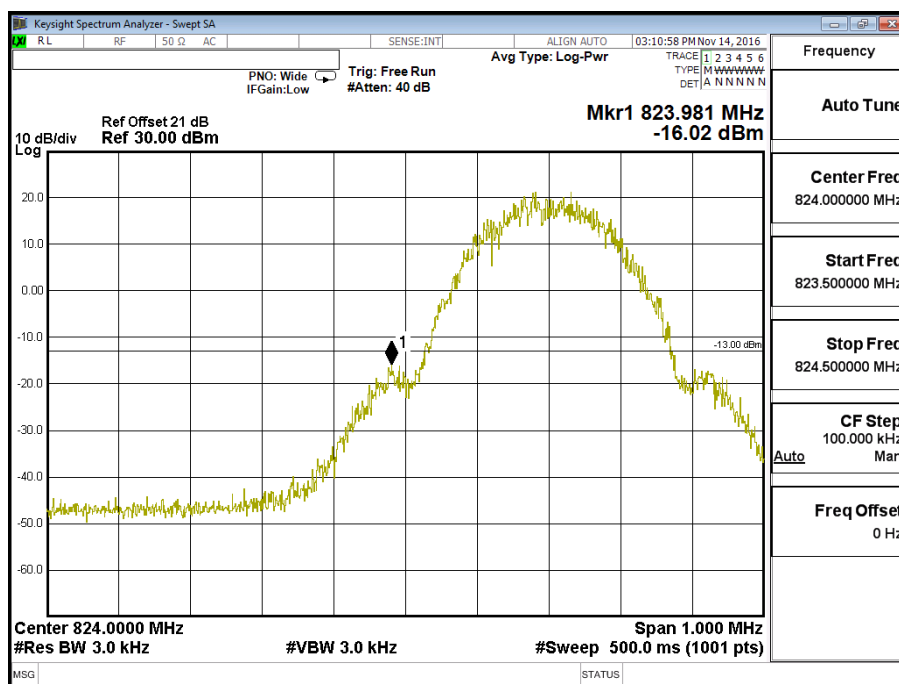
In accordance with Part 22.917, 24.238, at least 1% of the emission bandwidth was used for the resolution and video bandwidths up to 1MHz away from the Block Edge. At greater than 1MHz, the resolution and video bandwidth were set  $3 \times \text{RBW}$ .

The reference power and path losses of all channels used for testing in each frequency block were measured.

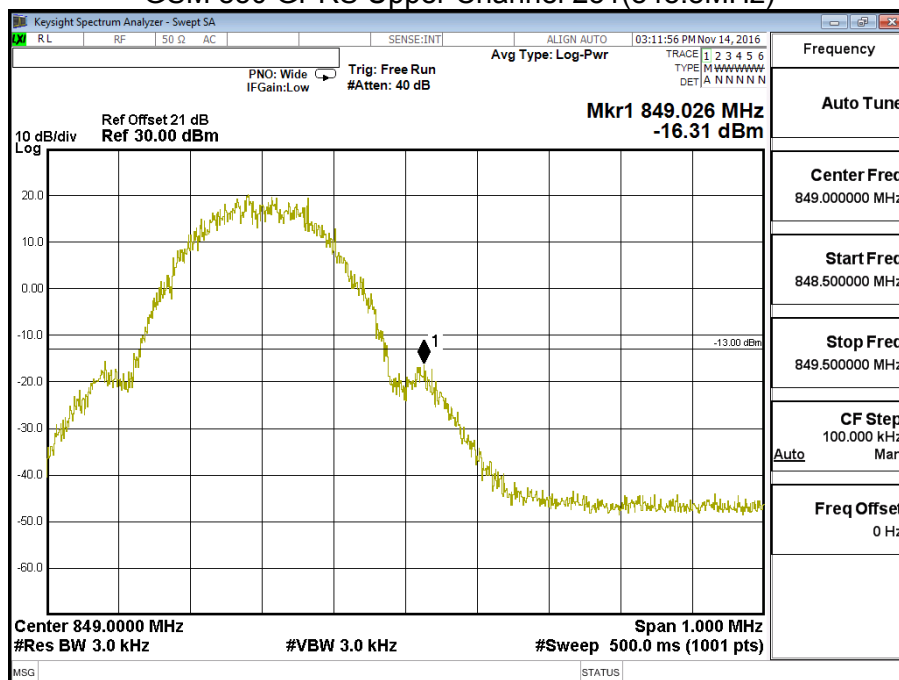
## 5.5. Test Result of Spurious Emission At Antenna Terminals (+/-1MHz)

|                |                                                  |           |     |
|----------------|--------------------------------------------------|-----------|-----|
| Product        | LTE Router                                       |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz) |           |     |
| Date of Test   | 2016/12/04                                       | Test Site | CTR |
| Test Condition | Block Edge Test (GSM 850 GPRS)                   |           |     |

GSM 850 GPRS Lower Channel 128 (824.2MHz)

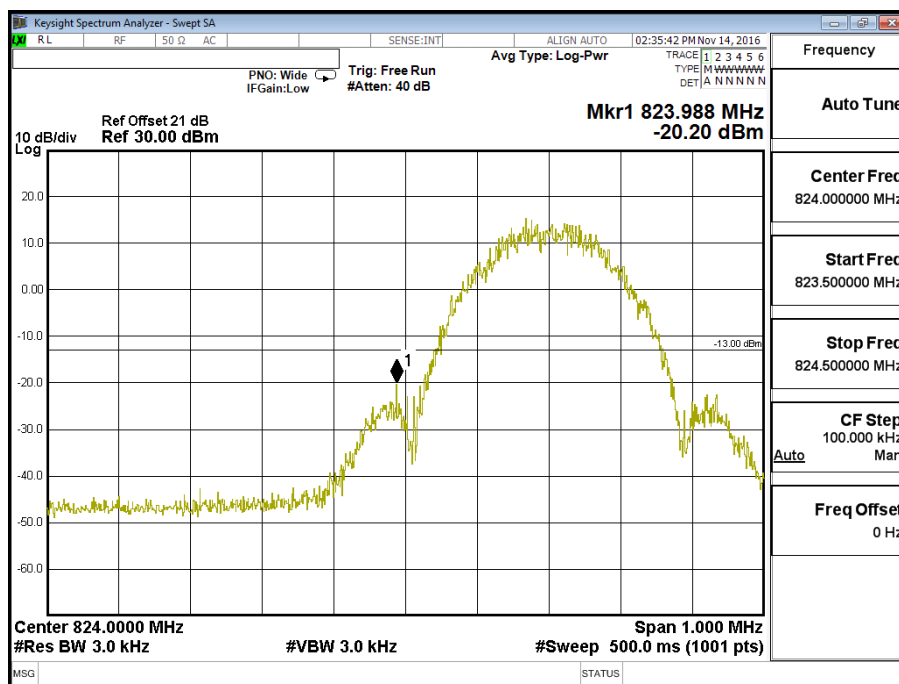


GSM 850 GPRS Upper Channel 251 (848.8MHz)

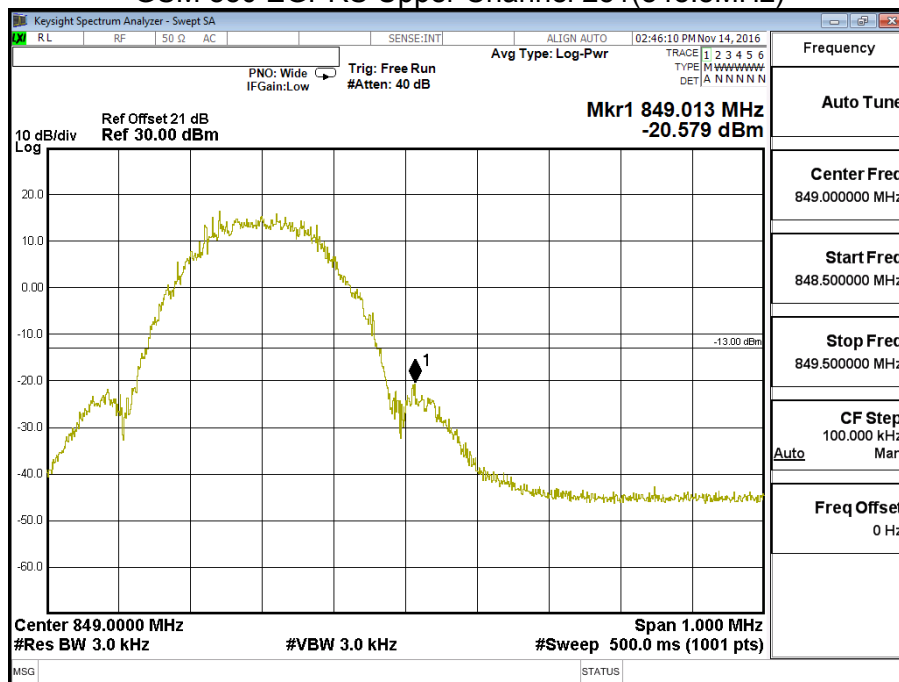


|                |                                                  |           |     |
|----------------|--------------------------------------------------|-----------|-----|
| Product        | LTE Router                                       |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz) |           |     |
| Date of Test   | 2016/12/04                                       | Test Site | CTR |
| Test Condition | Block Edge Test (GSM 850 EGPRS)                  |           |     |

## GSM 850 EGPRS Lower Channel 128 (824.2MHz)

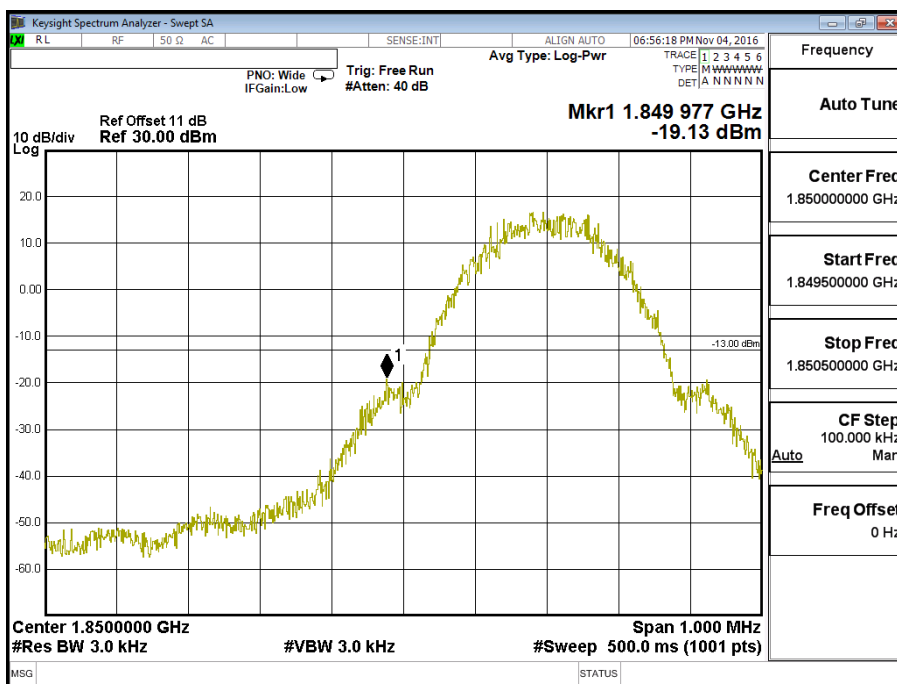


## GSM 850 EGPRS Upper Channel 251(848.8MHz)

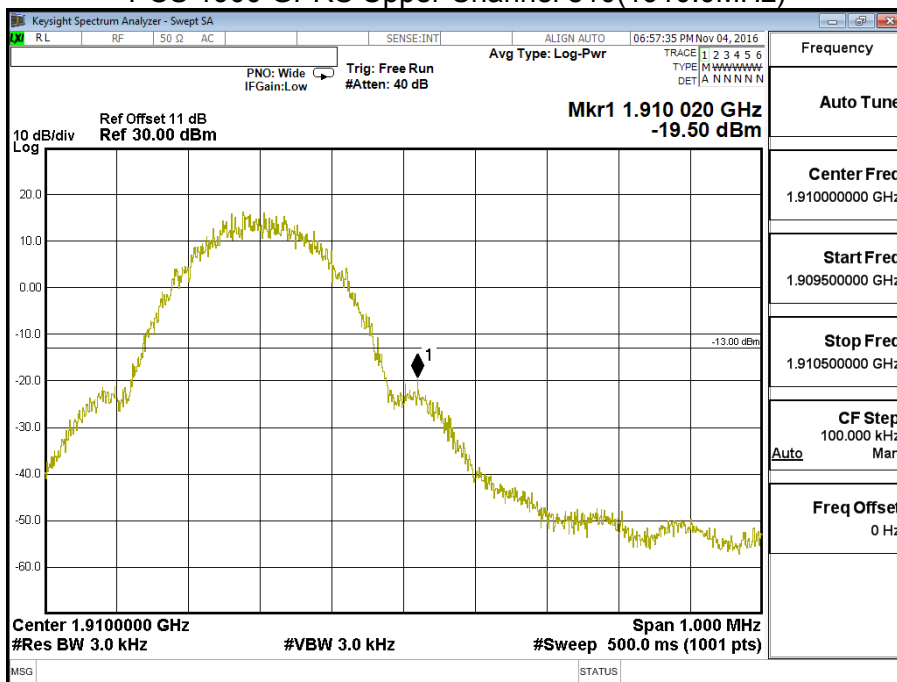


|                |                                                  |           |     |
|----------------|--------------------------------------------------|-----------|-----|
| Product        | LTE Router                                       |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz) |           |     |
| Date of Test   | 2016/12/04                                       | Test Site | CTR |
| Test Condition | Block Edge Test (PCS 1900 GPRS)                  |           |     |

## PCS 1900 GPRS Lower Channel 512 (1850.2MHz)

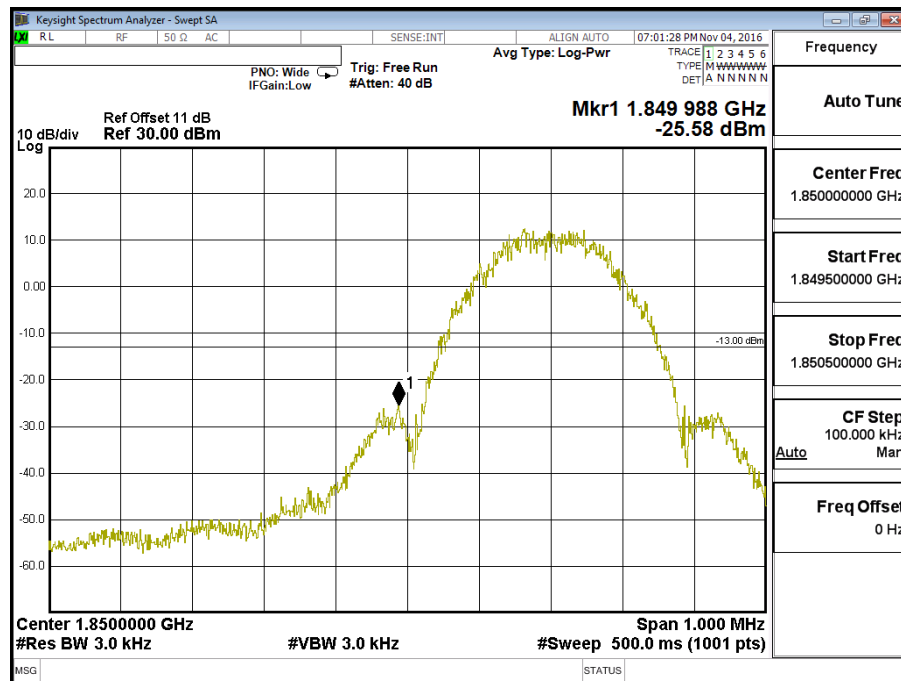


## PCS 1900 GPRS Upper Channel 810(1910.0MHz)

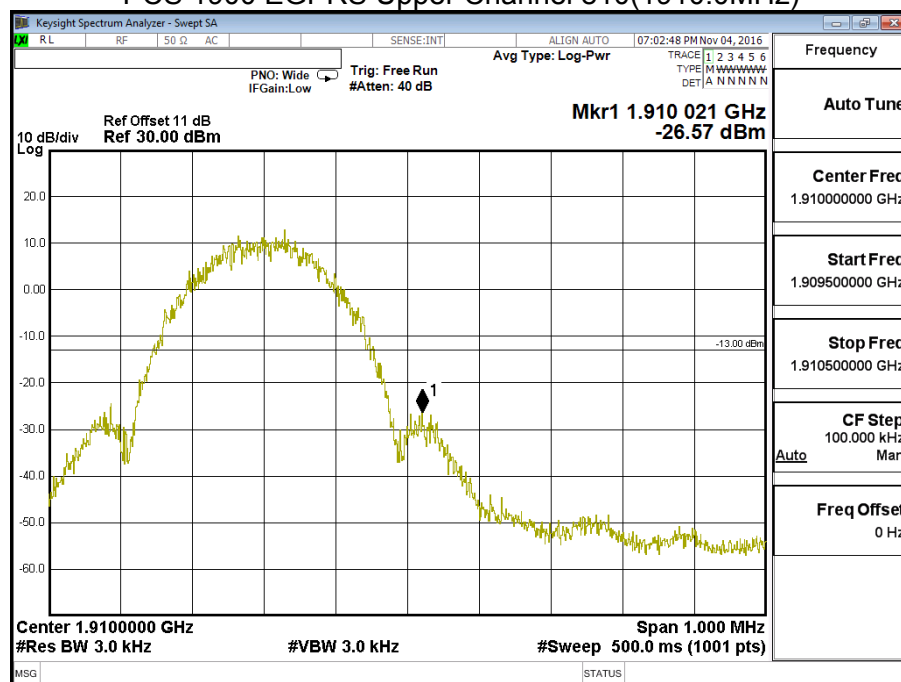


|                |                                                  |           |     |
|----------------|--------------------------------------------------|-----------|-----|
| Product        | LTE Router                                       |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz) |           |     |
| Date of Test   | 2016/12/04                                       | Test Site | CTR |
| Test Condition | Block Edge Test (PCS 1900 EGPRS)                 |           |     |

## PCS 1900 EGPRS Lower Channel 512 (1850.2MHz)

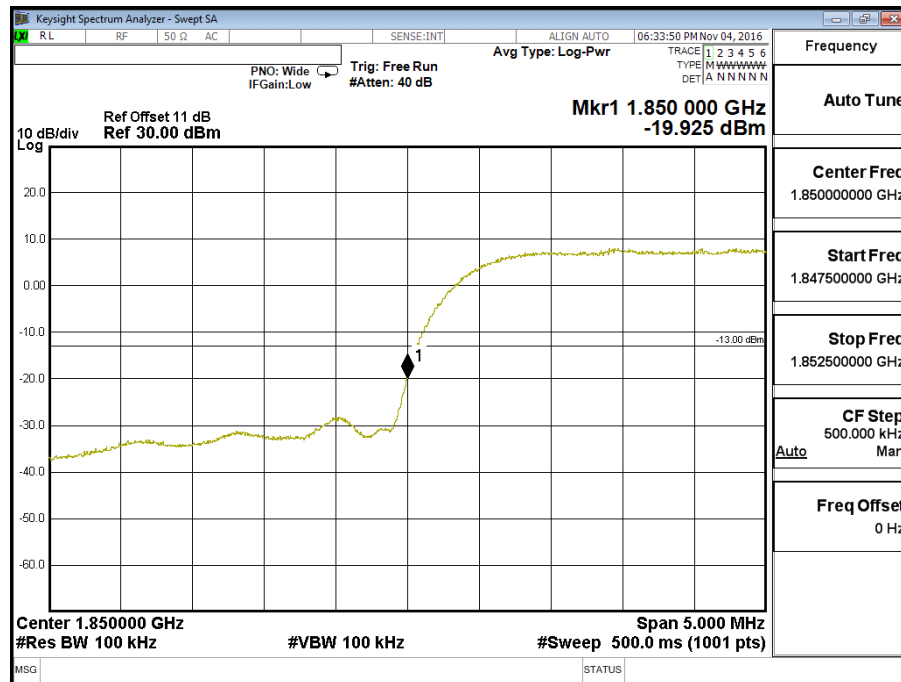


## PCS 1900 EGPRS Upper Channel 810(1910.0MHz)

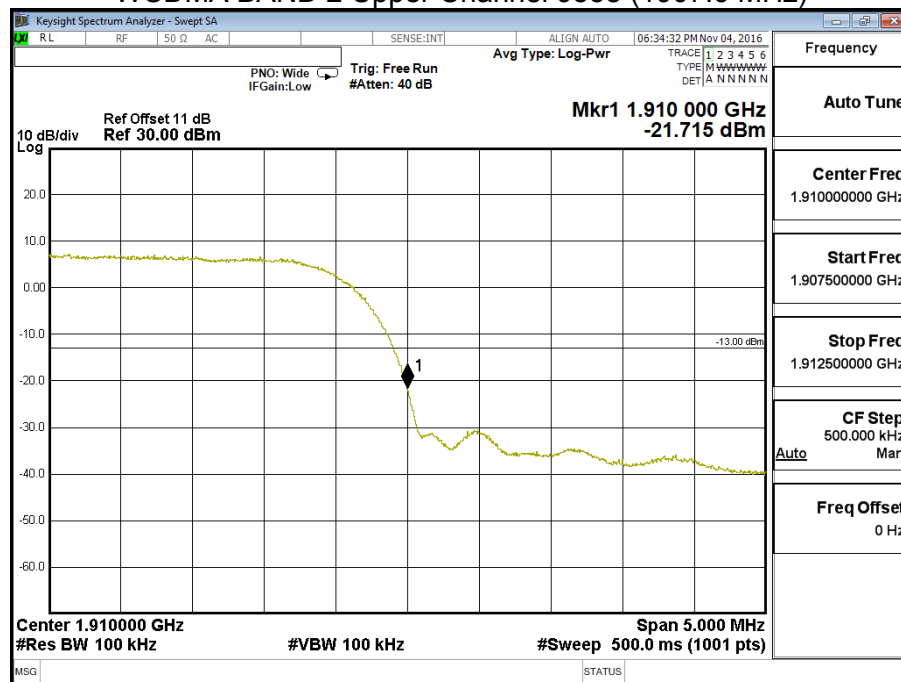


|                |                                                  |           |     |
|----------------|--------------------------------------------------|-----------|-----|
| Product        | LTE Router                                       |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz) |           |     |
| Date of Test   | 2016/12/04                                       | Test Site | CTR |
| Test Condition | Block Edge Test (WCDMA BAND 2)                   |           |     |

## WCDMA BAND 2 Lower Channel 9262 (1852.4MHz)

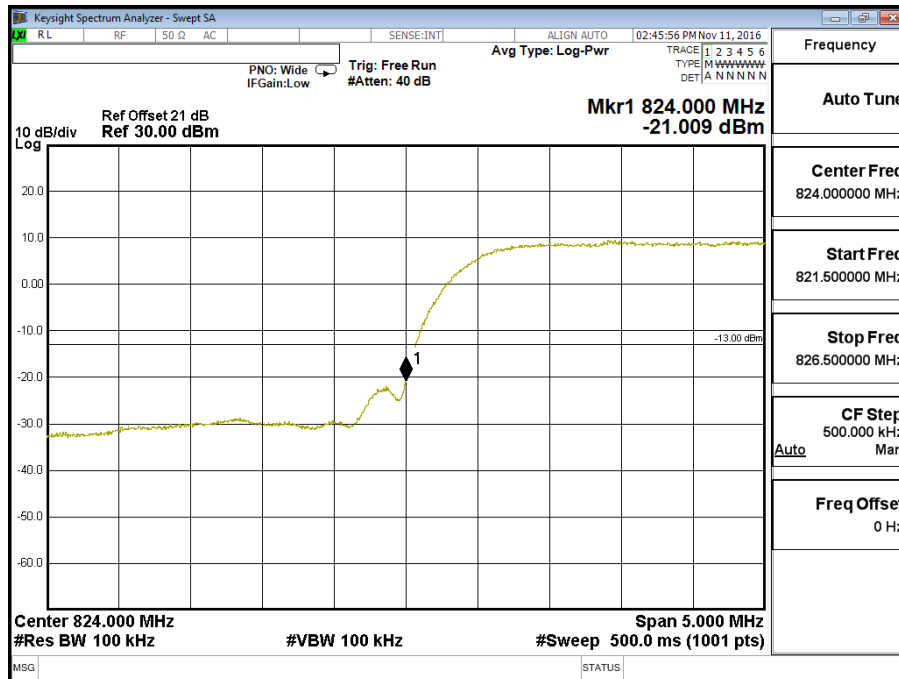


## WCDMA BAND 2 Upper Channel 9538 (1907.6 MHz)

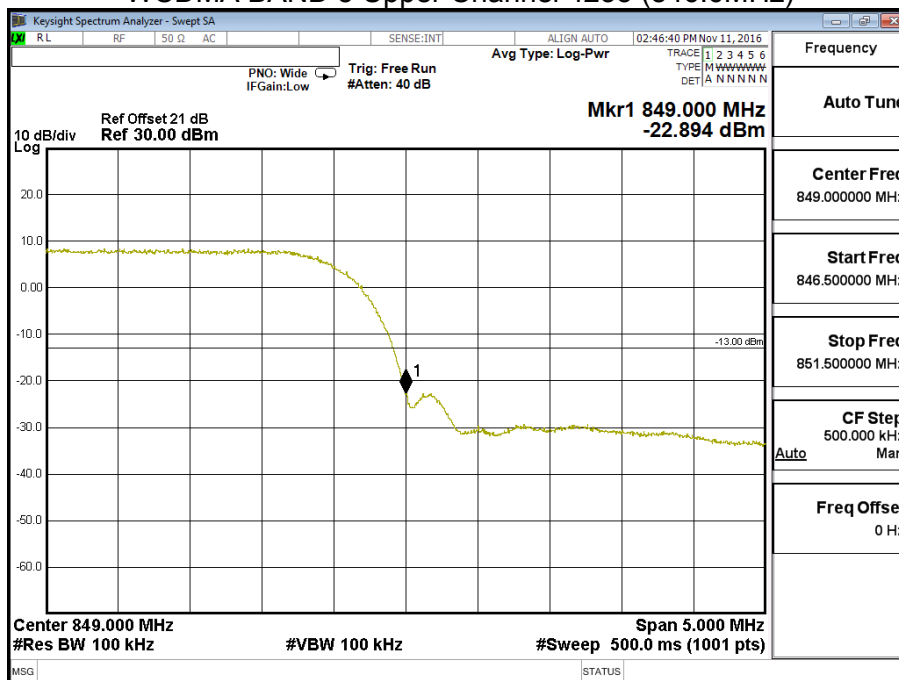


|                |                                                  |           |     |
|----------------|--------------------------------------------------|-----------|-----|
| Product        | LTE Router                                       |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz) |           |     |
| Date of Test   | 2016/12/04                                       | Test Site | CTR |
| Test Condition | Block Edge Test (WCDMA BAND 5)                   |           |     |

## WCDMA BAND 5 Lower Channel 4132 (826.4MHz)



## WCDMA BAND 5 Upper Channel 4233 (846.6MHz)



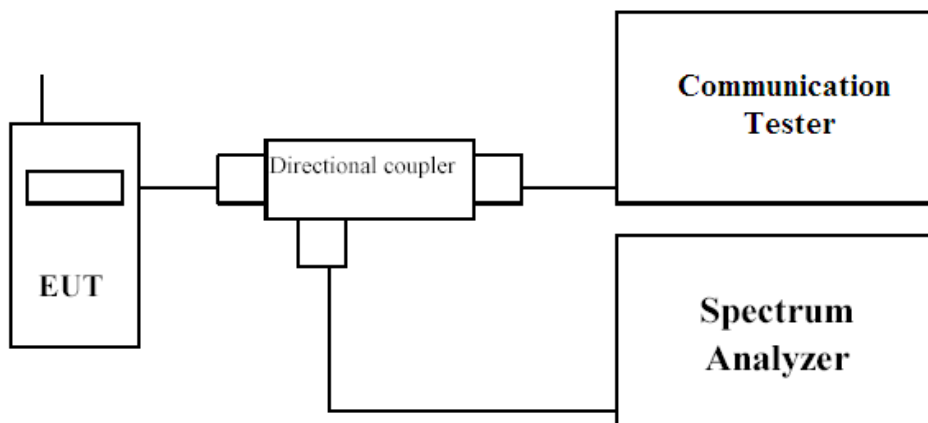
## 6. Spurious Emission

### 6.1. Test Specification

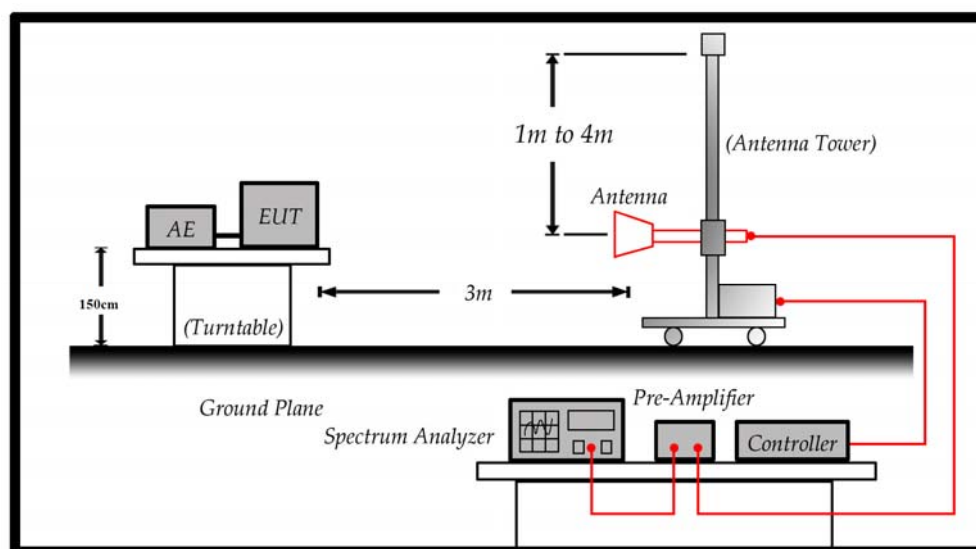
According to Part 2.1051, 2.1053, 22.917(a), 24.238(a).

### 6.2. Test Setup

#### 6.1.1 Spurious emissions at antenna terminals.



#### 6.1.2 Field strength of spurious radiation.



### 6.3. Limits

| Limit | <-13dBm |
|-------|---------|
|-------|---------|

$43 + 10\log(P)$  down on the carrier where P is the power in Watts.

### 6.4. Test Procedure

In accordance with Part 2.1051/2.1053, the spurious emissions from the EUT were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 30MHz to 20GHz. The EUT was set to transmit on full power. The resolution and video bandwidth was set to 1MHz and 3 x RBW. in accordance with Part 22.917 & 24.238. The spectrum analyzer detector was set to Max Hold. In addition, measurements were made up to the 10<sup>th</sup> harmonic of the fundamental. The device was then replaced with a substitution antenna, which input signal was adjusted until the received level matched that of the previously detected emission.

- (1) The EUT is tested with maximum rated TX power via the Base Station simulator.
- (2) The EUT is tested in three orthogonal planes; The worst case test configuration was record on report.

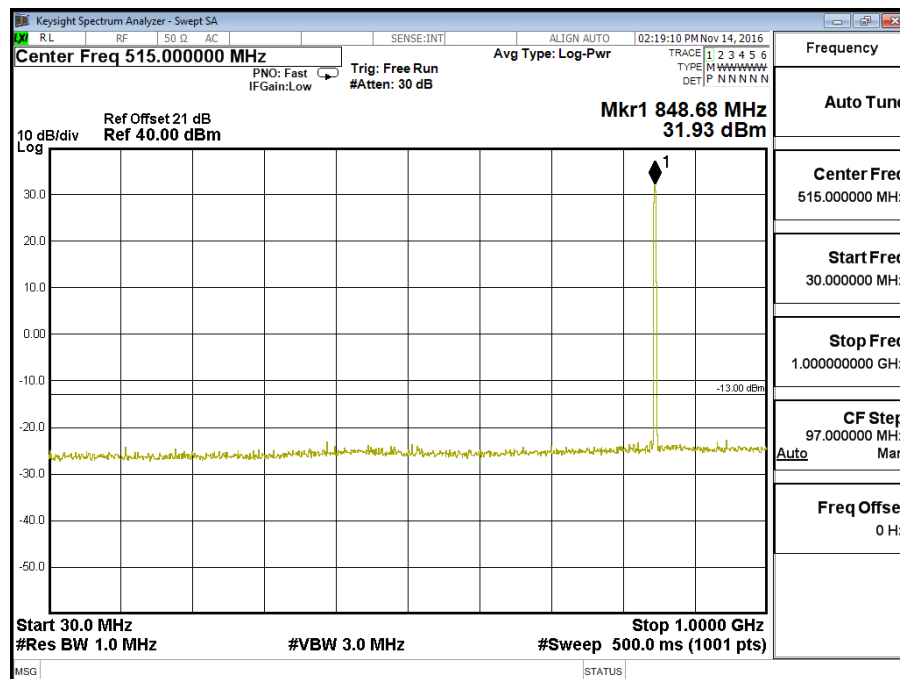
The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

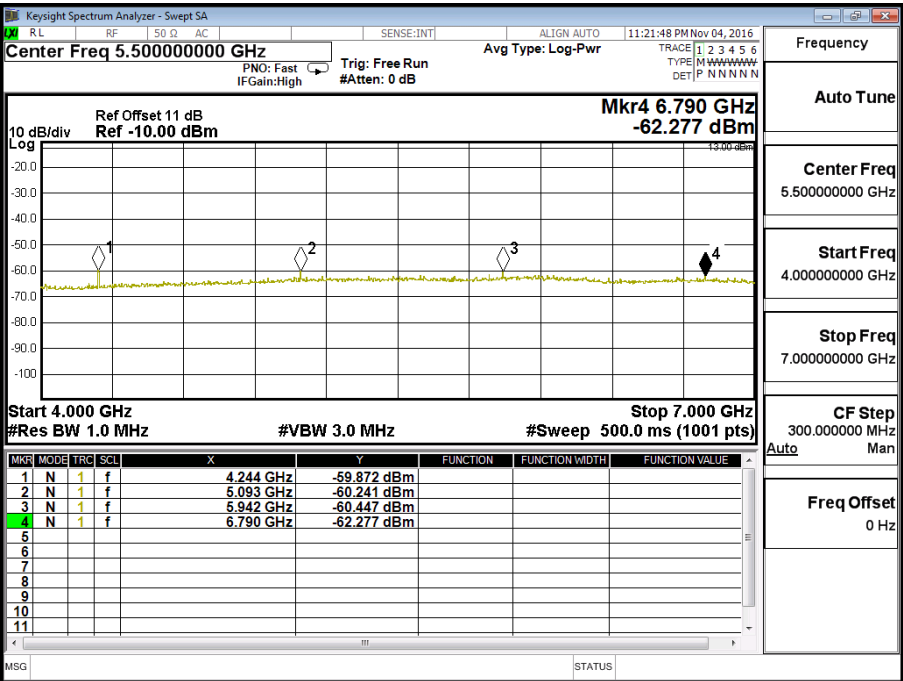
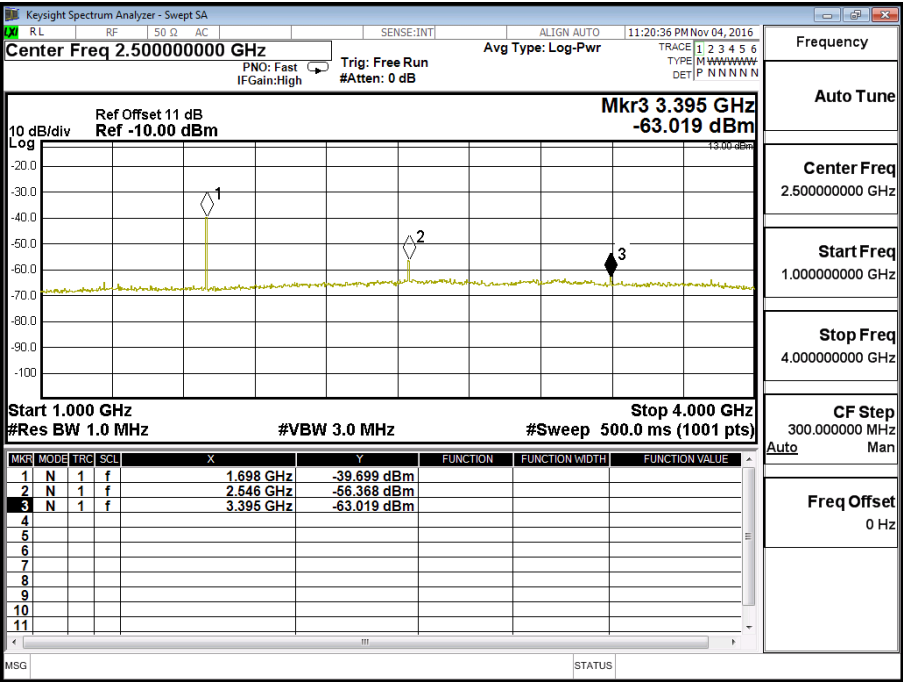
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

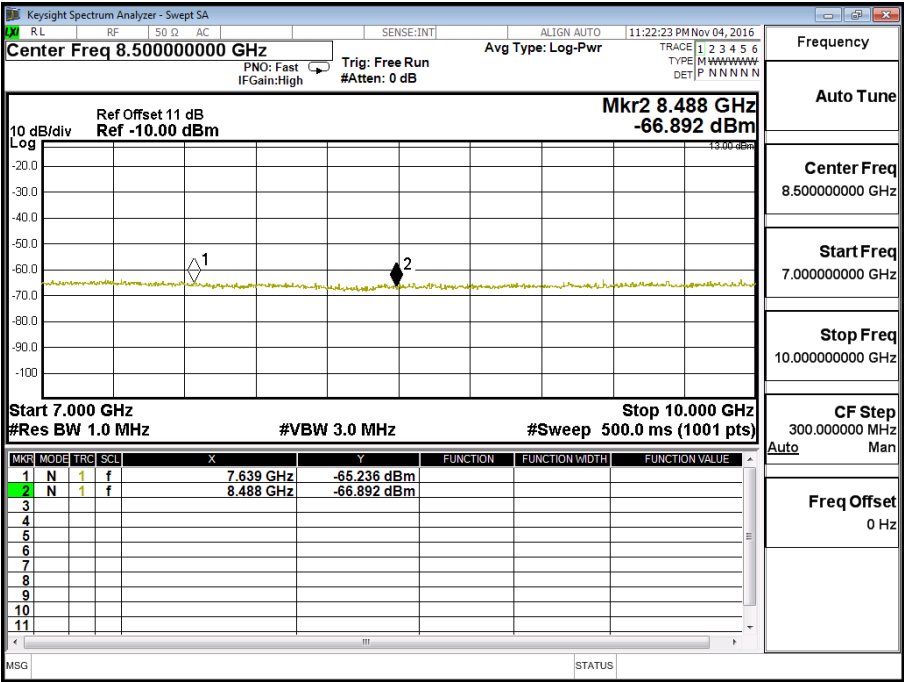
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to TIA/EIA 603-D on radiated measurement.

|                |                               |            |             |
|----------------|-------------------------------|------------|-------------|
| Product        | LTE Router                    |            |             |
| Test Mode      | Spurious Emission (Conducted) |            |             |
| Date of Test   | 2016/12/04                    | Test Site  | CTR         |
| Test Condition | GSM 850 GPRS                  | Test Range | 30MHz~10GHz |

| Frequency<br>(MHz) | Reading Level<br>(dBm) | Path Loss<br>(dB) | Emission Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|------------------------|-------------------|-------------------------|----------------|
| 1698               | -39.699                | 0.58              | -39.119                 | -13            |
| 2546               | -56.368                | 0.7               | -55.668                 | -13            |
| 3395               | -63.019                | 1.01              | -62.009                 | -13            |
| 4244               | -59.872                | 1.18              | -58.692                 | -13            |
| 5093               | -60.241                | 1.23              | -59.011                 | -13            |
| 5942               | -60.447                | 1.45              | -58.997                 | -13            |
| 6790               | -62.277                | 1.56              | -60.717                 | -13            |
| 7639               | -65.236                | 1.59              | -63.646                 | -13            |
| 8488               | -66.892                | 1.82              | -65.072                 | -13            |



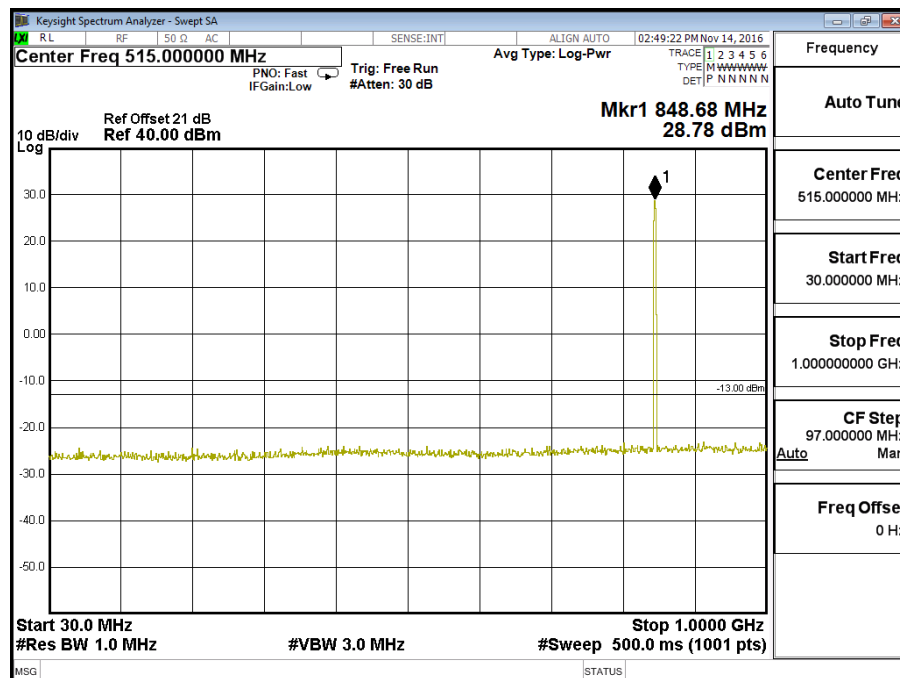


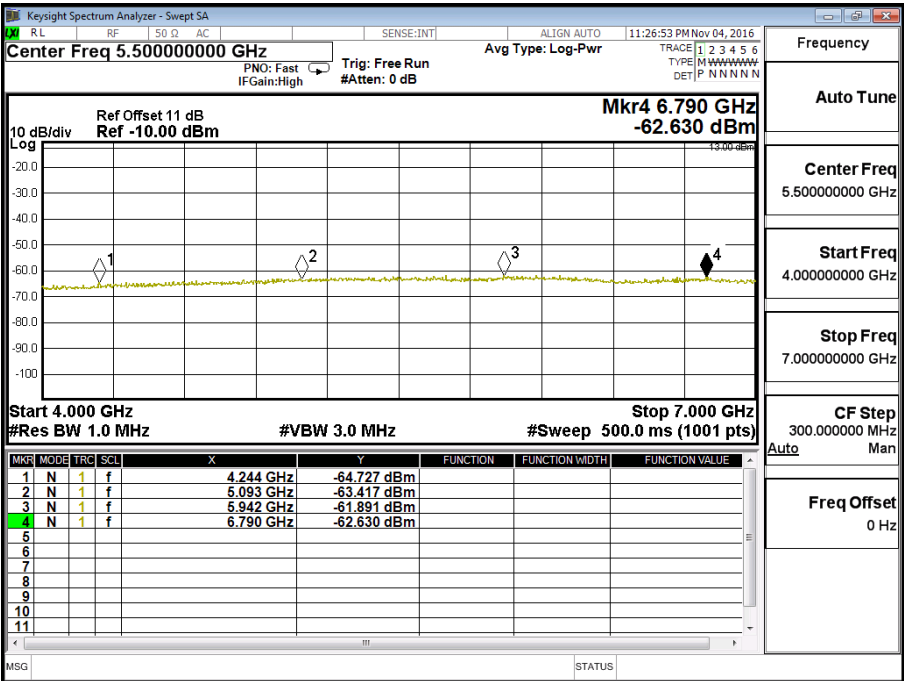
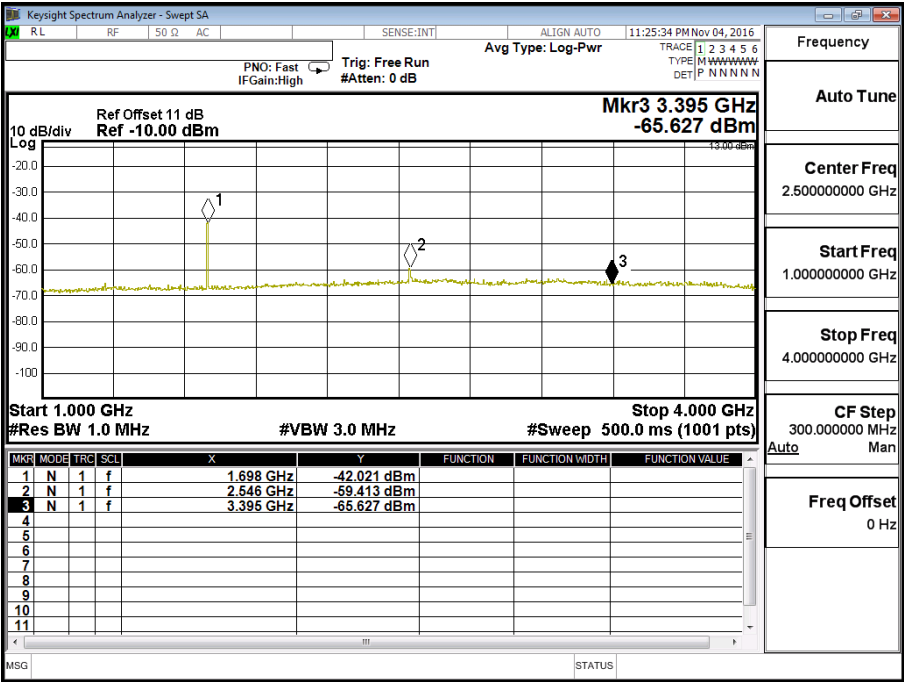


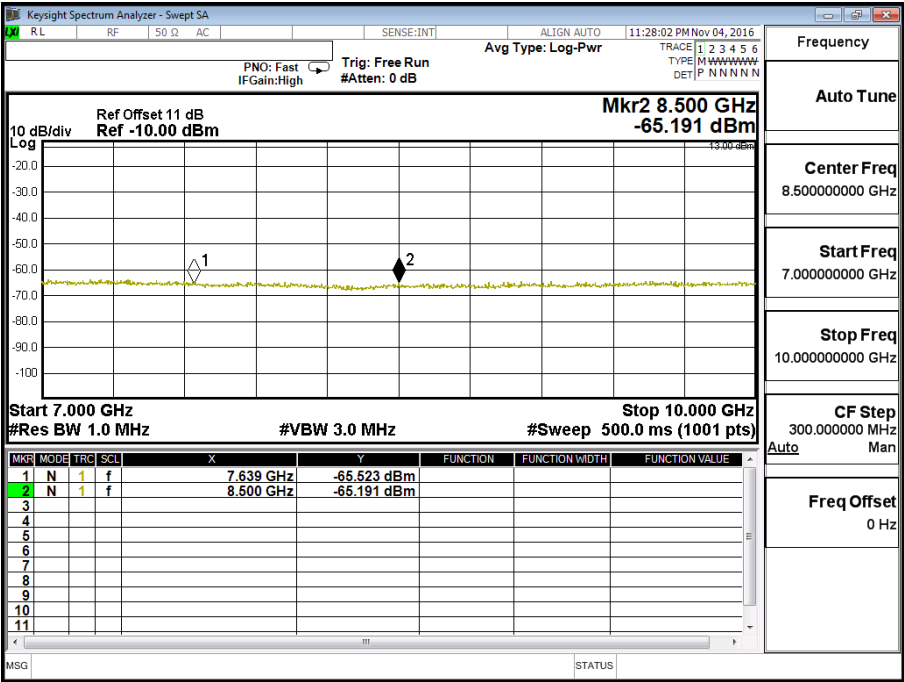
|                |                               |            |             |
|----------------|-------------------------------|------------|-------------|
| Product        | LTE Router                    |            |             |
| Test Mode      | Spurious Emission (Conducted) |            |             |
| Date of Test   | 2016/12/04                    | Test Site  | CTR         |
| Test Condition | GSM 850 EGPRS                 | Test Range | 30MHz~10GHz |

**GSM 850 EGPRS Mid-Channel 251**

| Frequency (MHz) | Reading Level (dBm) | Path Loss (dB) | Emission Level (dBm) | Limit (dBm) |
|-----------------|---------------------|----------------|----------------------|-------------|
| 1698            | -42.021             | 0.58           | -41.441              | -13         |
| 2546            | -59.413             | 0.7            | -58.713              | -13         |
| 3395            | -65.627             | 1.01           | -64.617              | -13         |
| 4244            | -64.727             | 1.18           | -63.547              | -13         |
| 5093            | -63.417             | 1.23           | -62.187              | -13         |
| 5942            | -61.891             | 1.45           | -60.441              | -13         |
| 6790            | -62.630             | 1.56           | -61.070              | -13         |
| 7639            | -65.523             | 1.59           | -63.933              | -13         |
| 8500            | -65.191             | 1.82           | -63.371              | -13         |



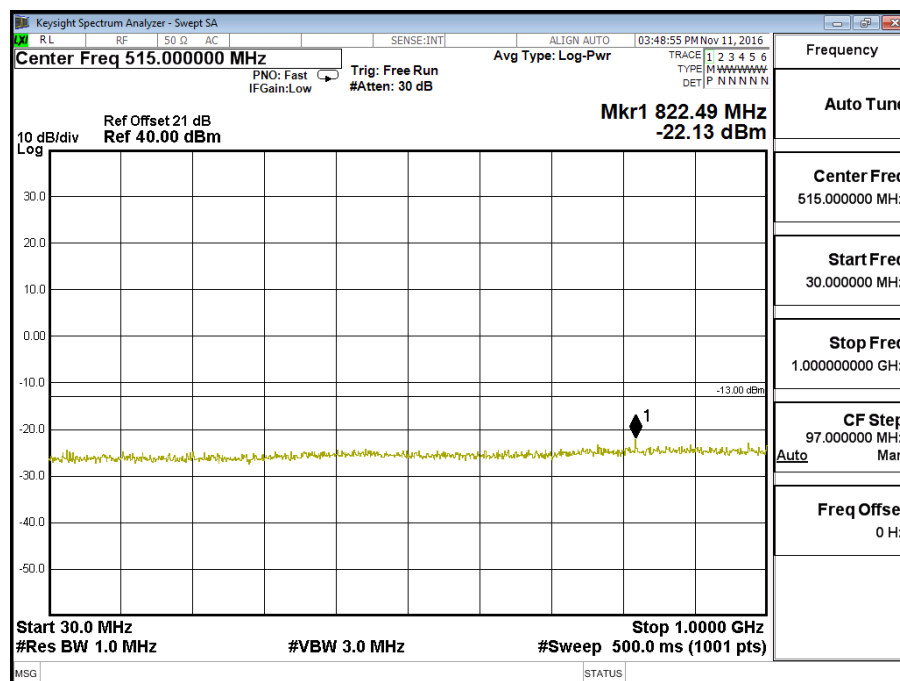


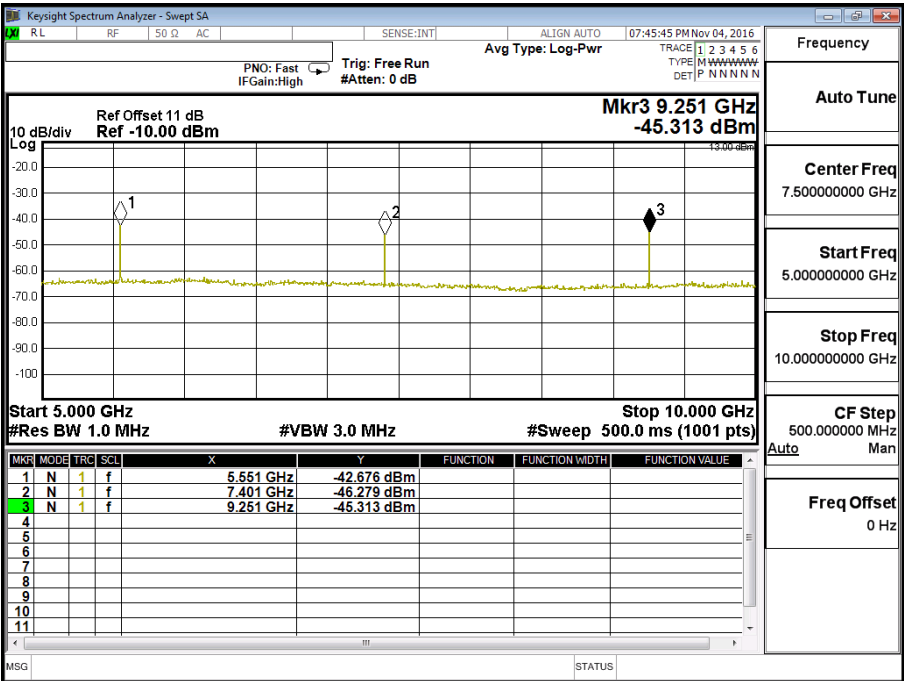
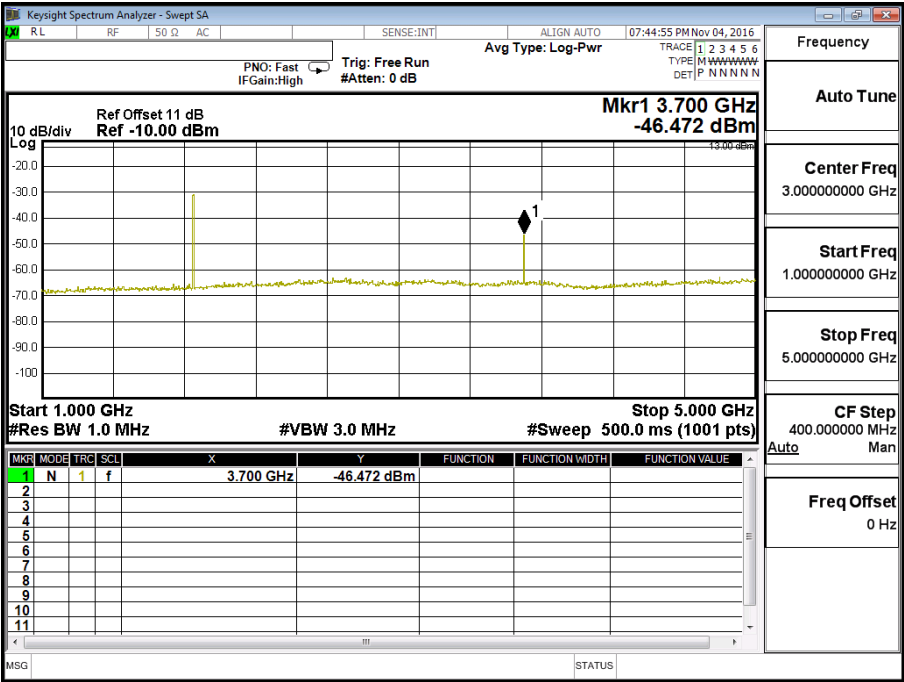


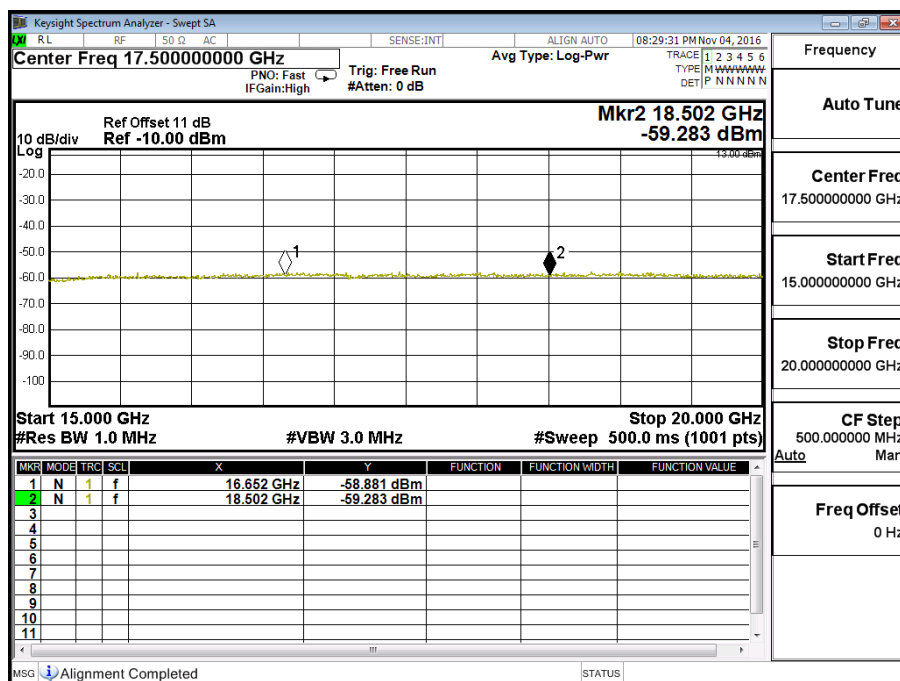
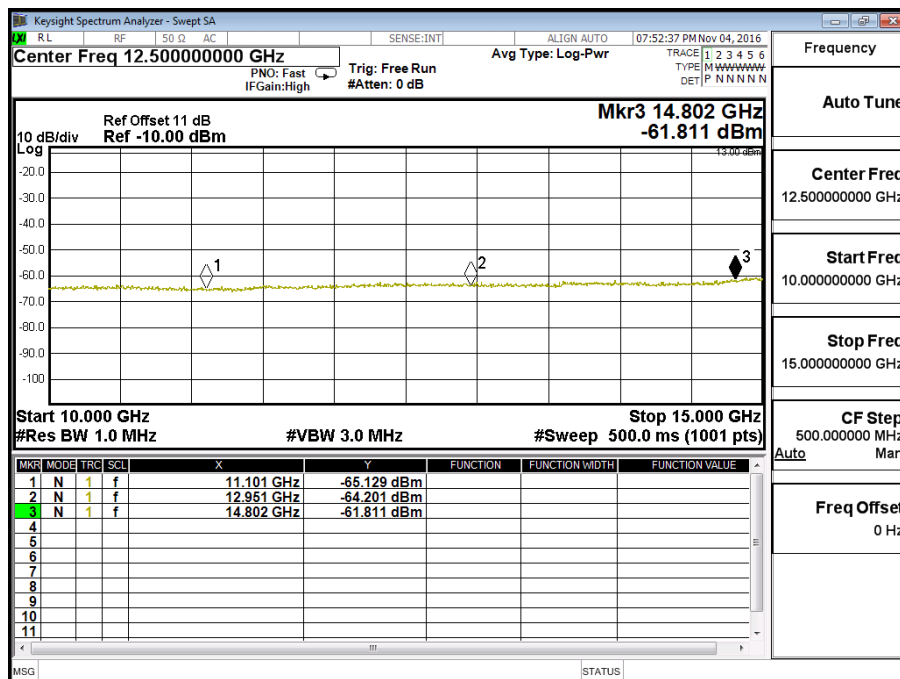
|                |                               |            |             |
|----------------|-------------------------------|------------|-------------|
| Product        | LTE Router                    |            |             |
| Test Mode      | Spurious Emission (Conducted) |            |             |
| Date of Test   | 2016/12/04                    | Test Site  | CTR         |
| Test Condition | PCS 1900 GPRS                 | Test Range | 30MHz~20GHz |

### PCS 1900 GPRS Mid-Channel 512

| Frequency (MHz) | Reading Level (dBm) | Path Loss (dB) | Emission Level (dBm) | Limit (dBm) |
|-----------------|---------------------|----------------|----------------------|-------------|
| 3700            | -46.472             | 1.1            | -45.372              | -13         |
| 5551            | -42.676             | 1.23           | -41.446              | -13         |
| 7401            | -46.279             | 1.59           | -44.689              | -13         |
| 9251            | -45.313             | 1.89           | -43.423              | -13         |
| 11101           | -65.129             | 2.07           | -63.059              | -13         |
| 12951           | -64.201             | 2.26           | -61.941              | -13         |
| 14802           | -61.811             | 2.64           | -59.171              | -13         |
| 16652           | -58.881             | 3.5            | -55.381              | -13         |
| 18502           | -59.283             | 3.7            | -55.583              | -13         |



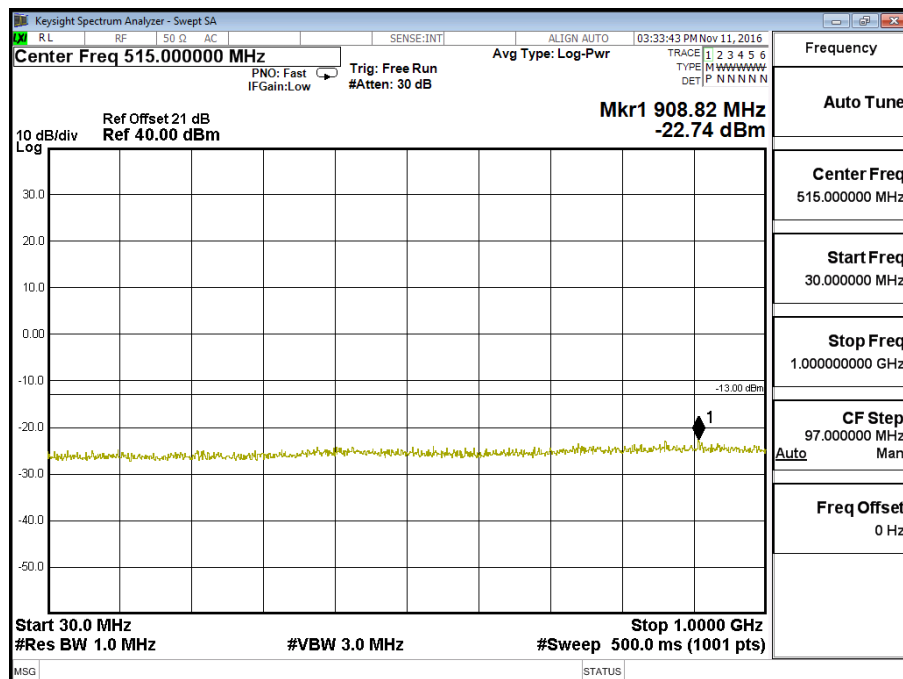


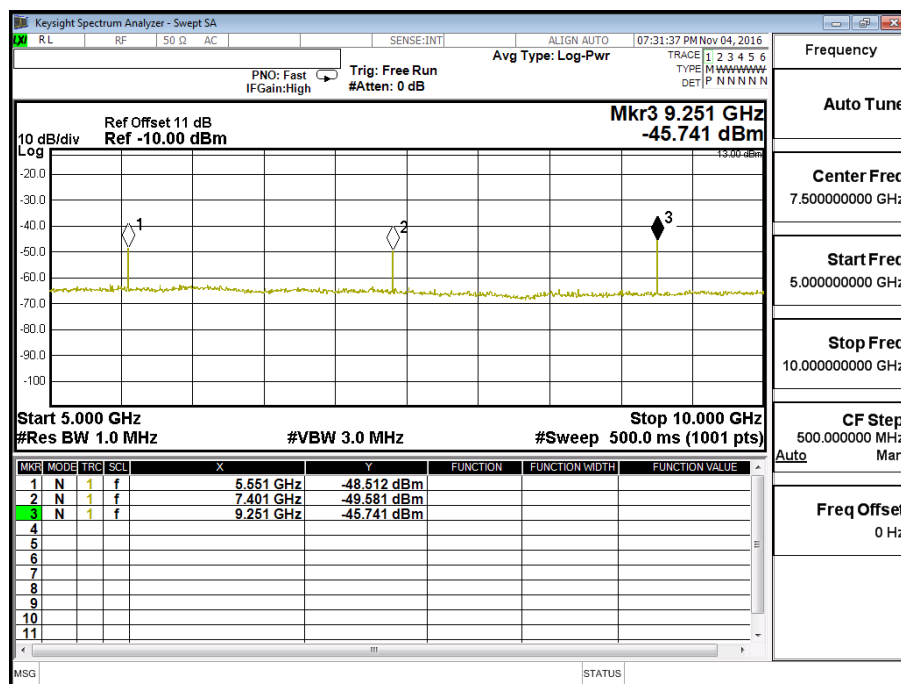
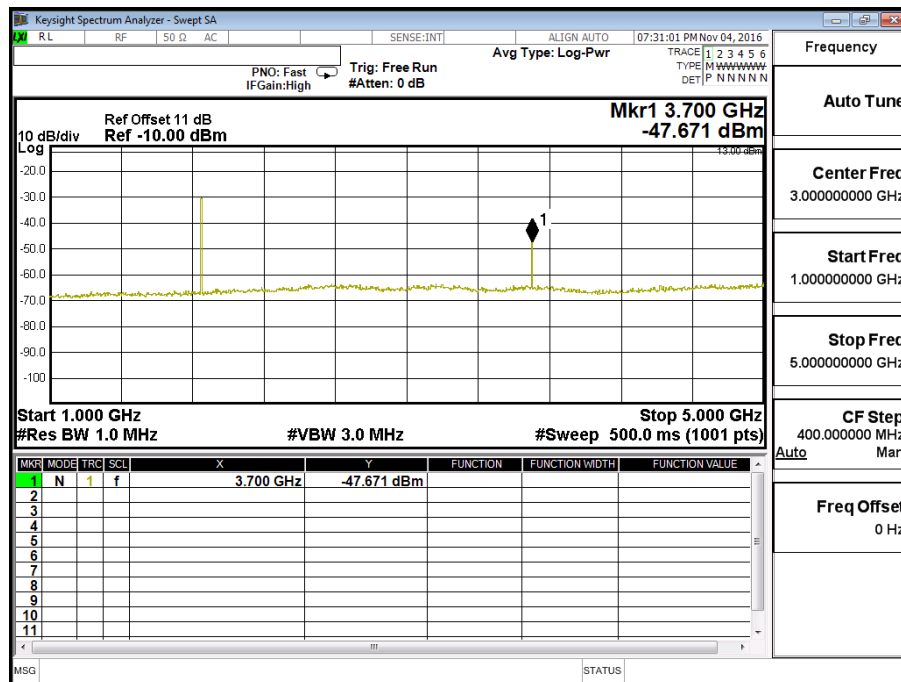


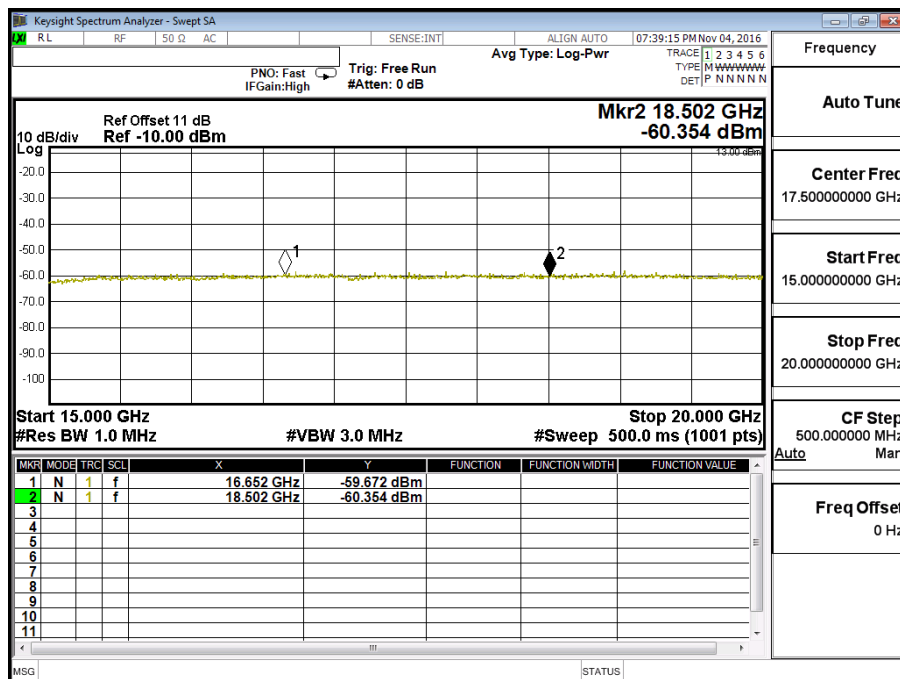
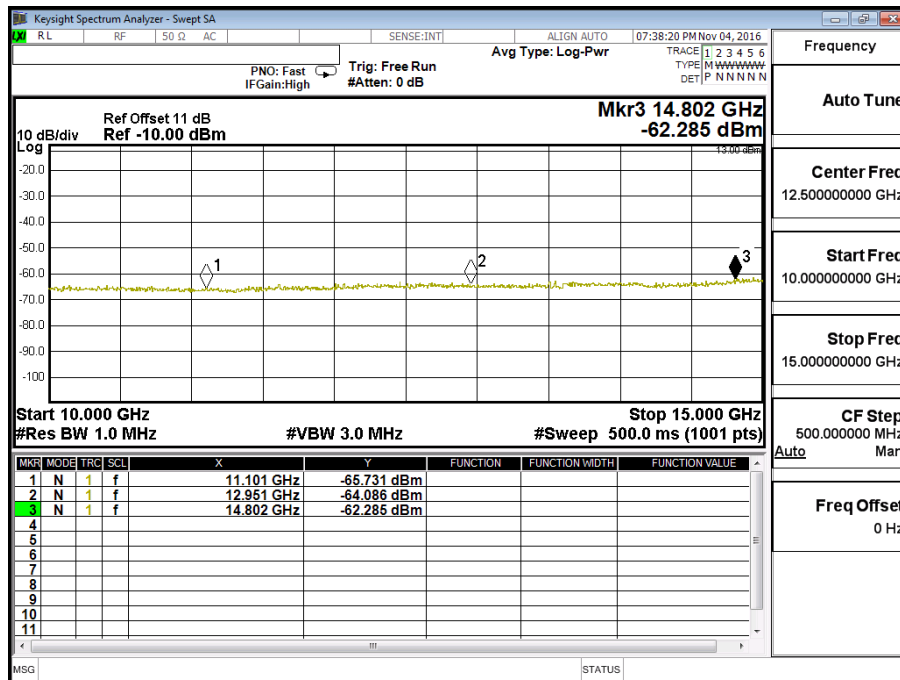
|                |                               |            |             |
|----------------|-------------------------------|------------|-------------|
| Product        | LTE Router                    |            |             |
| Test Mode      | Spurious Emission (Conducted) |            |             |
| Date of Test   | 2016/12/04                    | Test Site  | CTR         |
| Test Condition | PCS 1900 EGPRS                | Test Range | 30MHz~20GHz |

### PCS 1900 EGPRS Mid-Channel 512

| Frequency (MHz) | Reading Level (dBm) | Path Loss (dB) | Emission Level (dBm) | Limit (dBm) |
|-----------------|---------------------|----------------|----------------------|-------------|
| 3700            | -47.671             | 1.1            | -46.571              | -13         |
| 5551            | -48.512             | 1.23           | -47.282              | -13         |
| 7401            | -49.581             | 1.59           | -47.991              | -13         |
| 9251            | -45.741             | 1.89           | -43.851              | -13         |
| 11101           | -65.731             | 2.07           | -63.661              | -13         |
| 12951           | -64.086             | 2.26           | -61.826              | -13         |
| 14802           | -62.285             | 2.64           | -59.645              | -13         |
| 16652           | -59.672             | 3.5            | -56.172              | -13         |
| 18502           | -60.354             | 3.7            | -56.654              | -13         |



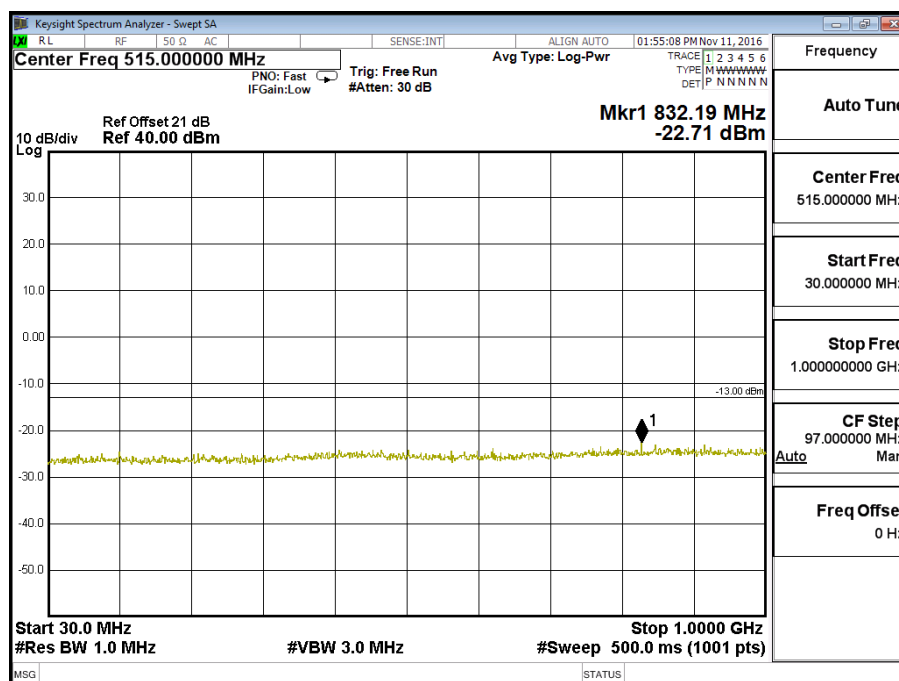


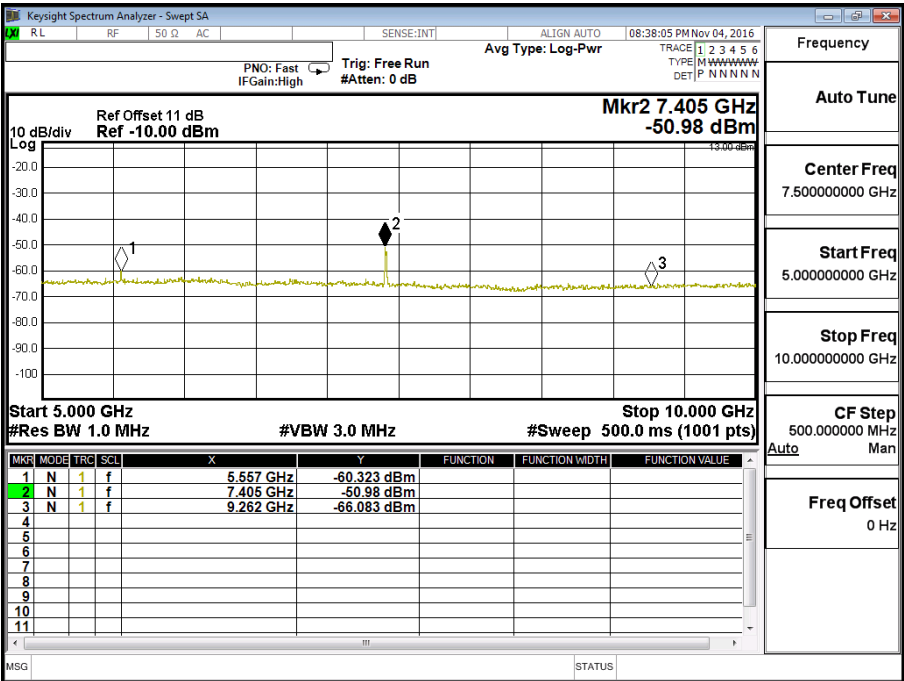
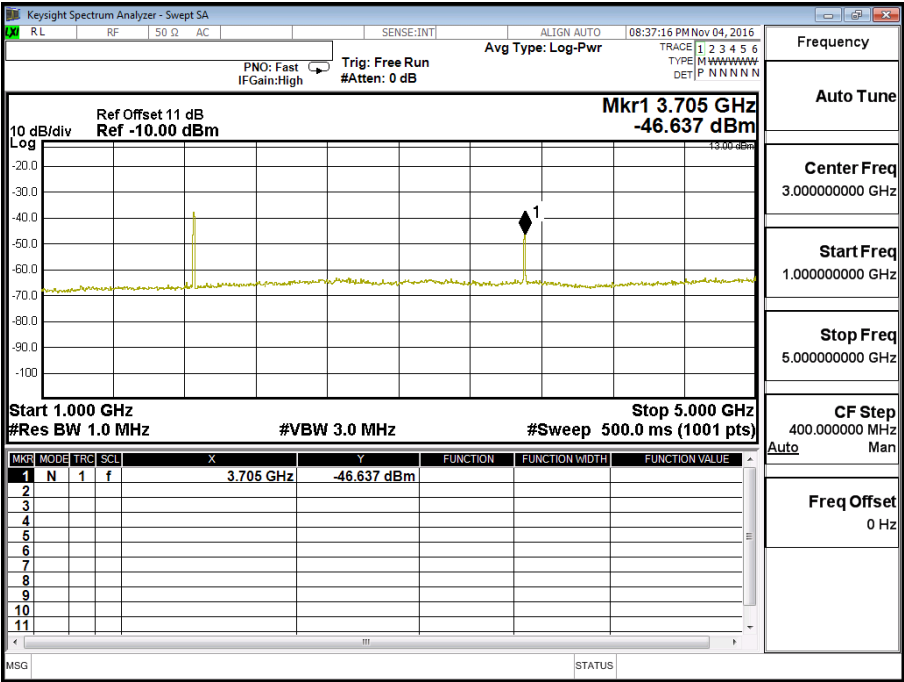


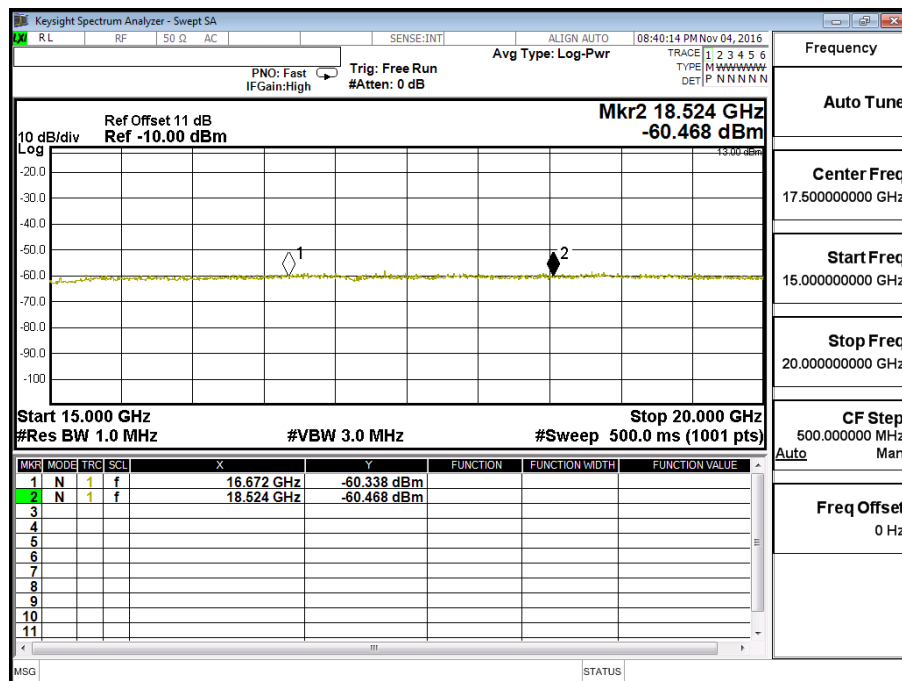
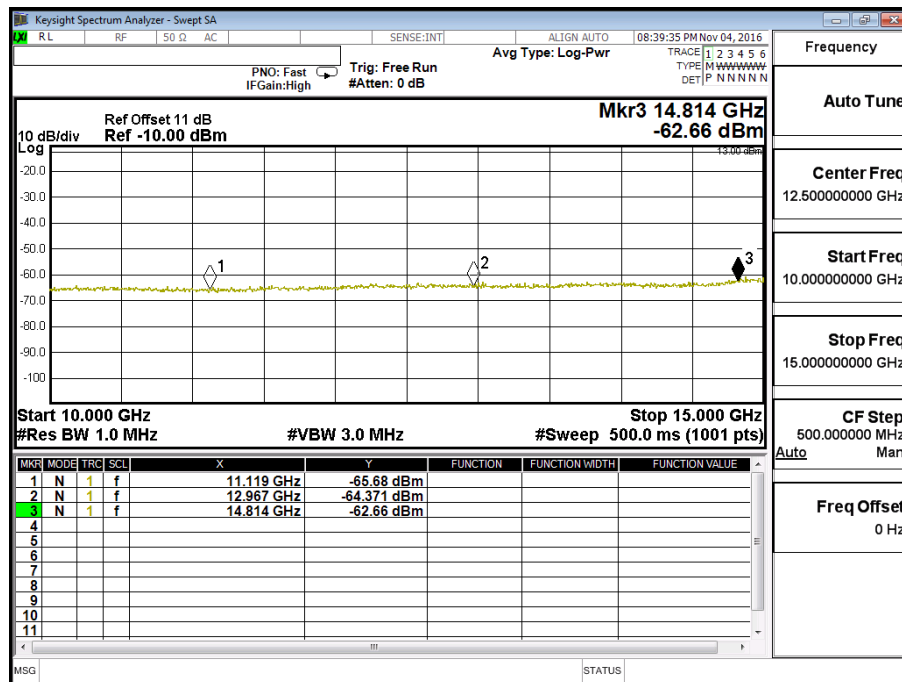
|                |                               |            |             |
|----------------|-------------------------------|------------|-------------|
| Product        | LTE Router                    |            |             |
| Test Mode      | Spurious Emission (Conducted) |            |             |
| Date of Test   | 2016/12/04                    | Test Site  | CTR         |
| Test Condition | WCDMA BAND 2                  | Test Range | 30MHz~20GHz |

**WCDMA BAND 2 Mid-Channel 9262**

| Frequency (MHz) | Reading Level (dBm) | Path Loss (dB) | Emission Level (dBm) | Limit (dBm) |
|-----------------|---------------------|----------------|----------------------|-------------|
| 3705            | -46.637             | 1.1            | -45.537              | -13         |
| 5557            | -60.323             | 1.23           | -59.093              | -13         |
| 7405            | -50.980             | 1.59           | -49.390              | -13         |
| 9262            | -66.083             | 1.89           | -64.193              | -13         |
| 11119           | -65.680             | 2.07           | -63.610              | -13         |
| 12967           | -64.371             | 2.26           | -62.111              | -13         |
| 14814           | -62.660             | 2.64           | -60.020              | -13         |
| 16672           | -60.338             | 3.5            | -56.838              | -13         |
| 18524           | -60.468             | 3.7            | -56.768              | -13         |



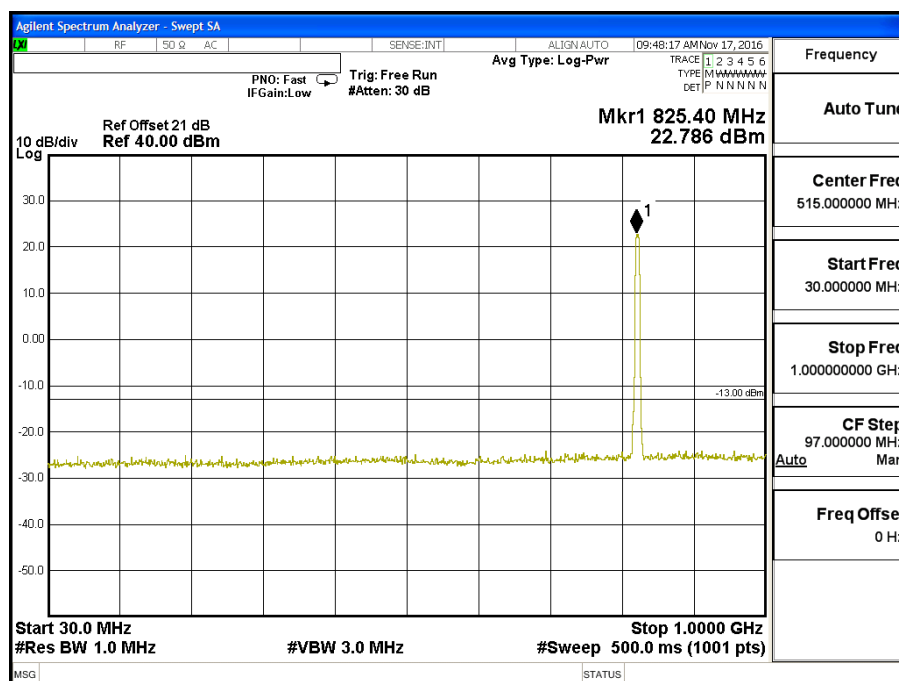


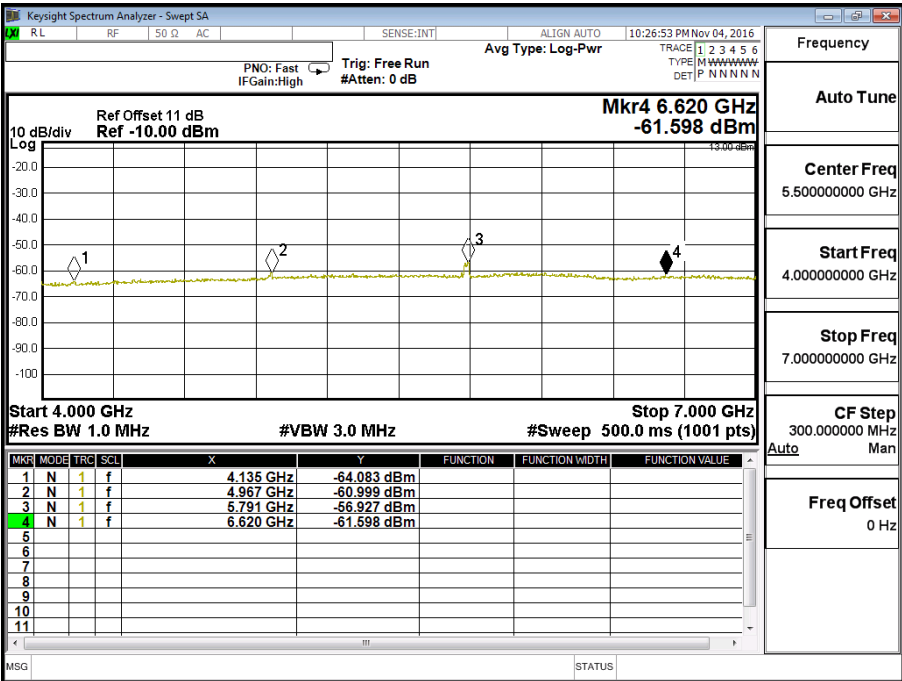
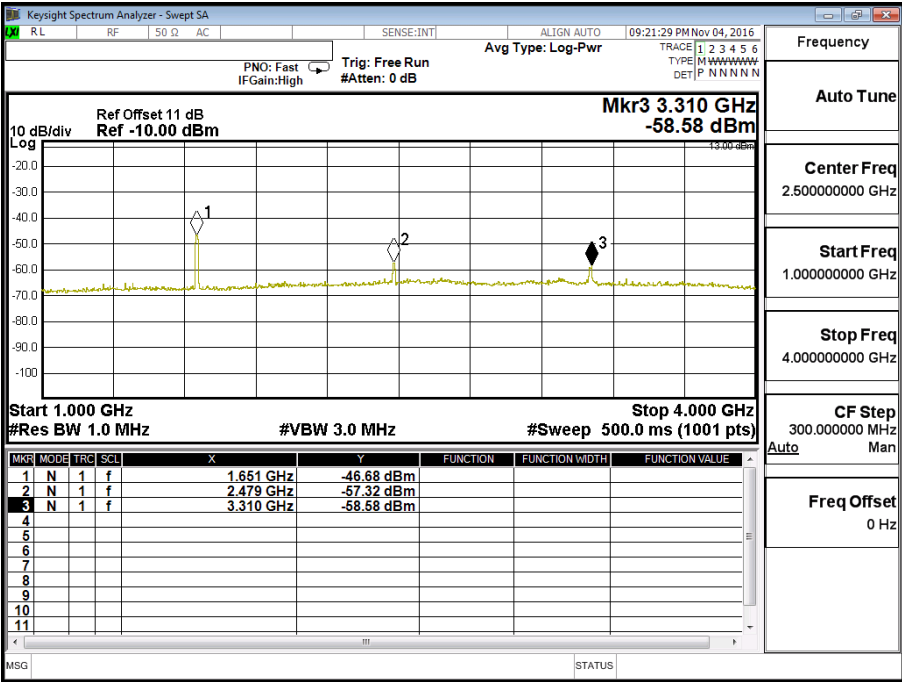


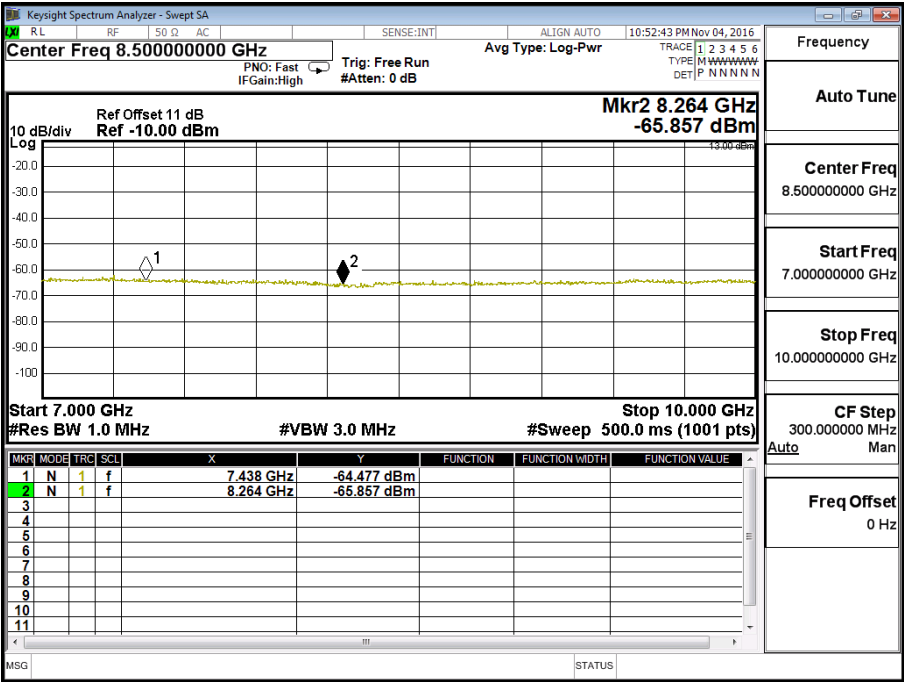
|                |                               |            |             |
|----------------|-------------------------------|------------|-------------|
| Product        | LTE Router                    |            |             |
| Test Mode      | Spurious Emission (Conducted) |            |             |
| Date of Test   | 2016/12/04                    | Test Site  | CTR         |
| Test Condition | WCDMA BAND 5                  | Test Range | 30MHz~10GHz |

### WCDMA BAND 5 High-Channel 4132

| Frequency (MHz) | Reading Level (dBm) | Path Loss (dB) | Emission Level (dBm) | Limit (dBm) |
|-----------------|---------------------|----------------|----------------------|-------------|
| 1651            | -46.680             | 0.58           | -46.100              | -13         |
| 2497            | -57.320             | 0.7            | -56.620              | -13         |
| 3310            | -58.580             | 1.01           | -57.570              | -13         |
| 4135            | -64.083             | 1.18           | -62.903              | -13         |
| 4967            | -60.999             | 1.23           | -59.769              | -13         |
| 5791            | -56.927             | 1.45           | -55.477              | -13         |
| 6620            | -61.598             | 1.56           | -60.038              | -13         |
| 7438            | -64.477             | 1.59           | -62.887              | -13         |
| 8264            | -65.857             | 1.82           | -64.037              | -13         |







|                |                              |            |             |
|----------------|------------------------------|------------|-------------|
| Product        | LTE Router                   |            |             |
| Test Mode      | Spurious Emission (Radiated) |            |             |
| Date of Test   | 2016/12/05                   | Test Site  | Site3       |
| Test Condition | Channel 251(GSM 850 GPRS)    | Test Range | 9kHz ~10GHz |

| Frequency | Reading Level | Signal Generator Level | Cable Loss | Antenna Gain | EIRP Value | Limit |
|-----------|---------------|------------------------|------------|--------------|------------|-------|
| (GHz)     | (dBm)         | (dBm)                  | (dB)       | (dBi)        | (dBm)      | (dBm) |

#### Horizontal Emissions

|      |         |         |       |        |         |     |
|------|---------|---------|-------|--------|---------|-----|
| 1696 | -49.325 | -52.082 | 1.630 | 9.800  | -43.912 | -13 |
| 2548 | -54.730 | -55.583 | 2.100 | 10.600 | -47.083 | -13 |
| 3394 | -60.310 | -61.805 | 2.350 | 12.300 | -51.855 | -13 |
| 4246 | -63.021 | -61.274 | 2.700 | 12.600 | -51.374 | -13 |
| 5092 | -63.178 | -58.612 | 2.830 | 12.700 | -48.742 | -13 |
| 5944 | -64.107 | -59.876 | 3.200 | 13.000 | -50.076 | -13 |

#### Vertical Emissions

|      |         |         |       |        |         |     |
|------|---------|---------|-------|--------|---------|-----|
| 1696 | -49.003 | -51.336 | 1.630 | 9.800  | -43.166 | -13 |
| 2548 | -53.295 | -53.284 | 2.100 | 10.600 | -44.784 | -13 |
| 3394 | -61.542 | -61.930 | 2.350 | 12.300 | -51.980 | -13 |
| 4246 | -62.409 | -59.519 | 2.700 | 12.600 | -49.619 | -13 |
| 5092 | -62.680 | -57.833 | 2.830 | 12.700 | -47.963 | -13 |
| 5944 | -64.524 | -60.241 | 3.200 | 13.000 | -50.441 | -13 |

#### Note:

1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:3MHz
2. EIRP Value = Signal Generator Level + Antenna Gain - Cable Loss
3. Spurious emissions past 6 GHz are not shown, due to the magnitude of spurious emissions attenuated more than 20 dB below the limit.

|                |                              |            |             |
|----------------|------------------------------|------------|-------------|
| Product        | LTE Router                   |            |             |
| Test Mode      | Spurious Emission (Radiated) |            |             |
| Date of Test   | 2016/12/05                   | Test Site  | Site3       |
| Test Condition | Channel 251 (GSM 850 EGPRS)  | Test Range | 9kHz ~10GHz |

| Frequency | Reading Level | Signal Generator Level | Cable Loss | Antenna Gain | EIRP Value | Limit |
|-----------|---------------|------------------------|------------|--------------|------------|-------|
| (GHz)     | (dBm)         | (dBm)                  | (dB)       | (dBi)        | (dBm)      | (dBm) |

#### Horizontal Emissions

|      |         |         |       |        |         |     |
|------|---------|---------|-------|--------|---------|-----|
| 1696 | -54.408 | -57.165 | 1.630 | 9.800  | -48.995 | -13 |
| 2548 | -61.597 | -62.450 | 2.100 | 10.600 | -53.950 | -13 |
| 3394 | -61.442 | -62.937 | 2.350 | 12.300 | -52.987 | -13 |
| 4246 | -62.455 | -60.709 | 2.700 | 12.600 | -50.809 | -13 |
| 5092 | -63.645 | -59.078 | 2.830 | 12.700 | -49.208 | -13 |
| 5944 | -64.377 | -60.146 | 3.200 | 13.000 | -50.346 | -13 |

#### Vertical Emissions

|      |         |         |       |        |         |     |
|------|---------|---------|-------|--------|---------|-----|
| 1696 | -53.763 | -56.096 | 1.630 | 9.800  | -47.926 | -13 |
| 2548 | -61.539 | -61.527 | 2.100 | 10.600 | -53.027 | -13 |
| 3394 | -61.125 | -61.513 | 2.350 | 12.300 | -51.563 | -13 |
| 4246 | -61.987 | -59.098 | 2.700 | 12.600 | -49.198 | -13 |
| 5092 | -63.329 | -58.483 | 2.830 | 12.700 | -48.613 | -13 |
| 5944 | -64.412 | -60.128 | 3.200 | 13.000 | -50.328 | -13 |

#### Note:

1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:3MHz
2. EIRP Value = Signal Generator Level + Antenna Gain - Cable Loss
3. Spurious emissions past 6 GHz are not shown, due to the magnitude of spurious emissions attenuated more than 20 dB below the limit.

|                |                              |            |             |
|----------------|------------------------------|------------|-------------|
| Product        | LTE Router                   |            |             |
| Test Mode      | Spurious Emission (Radiated) |            |             |
| Date of Test   | 2016/12/05                   | Test Site  | Site3       |
| Test Condition | Channel 512 (PCS1900 GPRS)   | Test Range | 9kHz ~20GHz |

| Frequency | Reading Level | Signal Generator Level | Cable Loss | Antenna Gain | EIRP Value | Limit |
|-----------|---------------|------------------------|------------|--------------|------------|-------|
| (GHz)     | (dBm)         | (dBm)                  | (dB)       | (dBi)        | (dBm)      | (dBm) |

#### Horizontal Emissions

|       |         |         |       |        |         |     |
|-------|---------|---------|-------|--------|---------|-----|
| 3704  | -56.730 | -57.341 | 2.530 | 12.600 | -47.271 | -13 |
| 5550  | -55.004 | -51.620 | 3.050 | 13.100 | -41.570 | -13 |
| 7400  | -60.161 | -45.479 | 3.650 | 11.500 | -37.629 | -13 |
| 9250  | -61.024 | -46.192 | 3.850 | 12.000 | -38.042 | -13 |
| 11100 | -64.541 | -46.992 | 4.580 | 12.000 | -39.572 | -13 |
| 12950 | -63.317 | -43.388 | 4.800 | 13.300 | -34.888 | -13 |

#### Vertical Emissions

|       |         |         |       |        |         |     |
|-------|---------|---------|-------|--------|---------|-----|
| 3704  | -53.515 | -51.880 | 2.530 | 12.600 | -41.810 | -13 |
| 5550  | -60.148 | -56.163 | 3.050 | 13.100 | -46.113 | -13 |
| 7400  | -60.733 | -45.653 | 3.650 | 11.500 | -37.803 | -13 |
| 9250  | -61.169 | -45.749 | 3.850 | 12.000 | -37.599 | -13 |
| 11100 | -64.478 | -46.727 | 4.580 | 12.000 | -39.307 | -13 |
| 12950 | -63.877 | -44.242 | 4.800 | 13.300 | -35.742 | -13 |

#### Note:

1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:3MHz
2. EIRP Value = Signal Generator Level + Antenna Gain - Cable Loss
3. Spurious emissions past 13GHz are not shown, due to the magnitude of spurious emissions attenuated more than 20 dB below the limit.

|                |                              |  |  |            |             |  |
|----------------|------------------------------|--|--|------------|-------------|--|
| Product        | LTE Router                   |  |  |            |             |  |
| Test Mode      | Spurious Emission (Radiated) |  |  |            |             |  |
| Date of Test   | 2016/12/05                   |  |  | Test Site  | Site3       |  |
| Test Condition | Channel 512 (PCS1900 EGPRS)  |  |  | Test Range | 9kHz ~20GHz |  |

| Frequency | Reading Level | Signal Generator Level | Cable Loss | Antenna Gain | EIRP Value | Limit |
|-----------|---------------|------------------------|------------|--------------|------------|-------|
| (GHz)     | (dBm)         | (dBm)                  | (dB)       | (dBi)        | (dBm)      | (dBm) |

#### Horizontal Emissions

|       |         |         |       |        |         |     |
|-------|---------|---------|-------|--------|---------|-----|
| 3704  | -58.075 | -58.686 | 2.530 | 12.600 | -48.616 | -13 |
| 5550  | -61.178 | -57.794 | 3.050 | 13.100 | -47.744 | -13 |
| 7400  | -62.342 | -47.660 | 3.650 | 11.500 | -39.810 | -13 |
| 9250  | -62.435 | -47.604 | 3.850 | 12.000 | -39.454 | -13 |
| 11100 | -64.479 | -46.930 | 4.580 | 12.000 | -39.510 | -13 |
| 12950 | -64.319 | -44.390 | 4.800 | 13.300 | -35.89  | -13 |

#### Vertical Emissions

|       |         |         |       |        |         |     |
|-------|---------|---------|-------|--------|---------|-----|
| 3704  | -55.501 | -53.866 | 2.530 | 12.600 | -43.796 | -13 |
| 5550  | -62.66  | -58.674 | 3.050 | 13.100 | -48.624 | -13 |
| 7400  | -62.635 | -47.554 | 3.650 | 11.500 | -39.704 | -13 |
| 9250  | -62.765 | -47.345 | 3.850 | 12.000 | -39.195 | -13 |
| 11100 | -64.129 | -46.378 | 4.580 | 12.000 | -38.958 | -13 |
| 12950 | -63.727 | -44.092 | 4.800 | 13.300 | -35.592 | -13 |

#### Note:

1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:3MHz
2. EIRP Value = Signal Generator Level + Antenna Gain - Cable Loss
3. Spurious emissions past 13GHz are not shown, due to the magnitude of spurious emissions attenuated more than 20 dB below the limit.

|                |                              |            |             |
|----------------|------------------------------|------------|-------------|
| Product        | LTE Router                   |            |             |
| Test Mode      | Spurious Emission (Radiated) |            |             |
| Date of Test   | 2016/12/05                   | Test Site  | OATS 3      |
| Test Condition | Channel 9262 (WCDMA BAND 2)  | Test Range | 30MHz~20GHz |

| Frequency | Reading Level | Signal Generator Level | Cable Loss | Antenna Gain | EIRP Value | Limit |
|-----------|---------------|------------------------|------------|--------------|------------|-------|
| (GHz)     | (dBm)         | (dBm)                  | (dB)       | (dBi)        | (dBm)      | (dBm) |

#### Horizontal Emissions

|       |         |         |       |        |         |     |
|-------|---------|---------|-------|--------|---------|-----|
| 3704  | -57.584 | -58.195 | 2.530 | 12.600 | -48.125 | -13 |
| 5560  | -63.341 | -60.037 | 3.050 | 13.100 | -49.987 | -13 |
| 7410  | -62.411 | -47.757 | 3.650 | 11.500 | -39.907 | -13 |
| 9260  | -62.989 | -48.116 | 3.850 | 12.000 | -39.966 | -13 |
| 11110 | -64.436 | -46.945 | 4.580 | 12.000 | -39.525 | -13 |
| 12970 | -64.220 | -44.189 | 4.800 | 13.300 | -35.689 | -13 |

#### Vertical Emissions

|       |         |         |       |        |         |     |
|-------|---------|---------|-------|--------|---------|-----|
| 3704  | -51.173 | -49.538 | 2.530 | 12.600 | -39.468 | -13 |
| 5560  | -61.925 | -57.999 | 3.050 | 13.100 | -47.949 | -13 |
| 7410  | -62.542 | -47.455 | 3.650 | 11.500 | -39.605 | -13 |
| 9260  | -62.151 | -46.676 | 3.850 | 12.000 | -38.526 | -13 |
| 11110 | -64.616 | -46.954 | 4.580 | 12.000 | -39.534 | -13 |
| 12970 | -64.317 | -44.624 | 4.800 | 13.300 | -36.124 | -13 |

Note:

1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:3MHz
2. EIRP Value = Signal Generator Level + Antenna Gain - Cable Loss
3. Spurious emissions past 13GHz are not shown, due to the magnitude of spurious emissions attenuated more than 20 dB below the limit.

|                |                              |            |             |
|----------------|------------------------------|------------|-------------|
| Product        | LTE Router                   |            |             |
| Test Mode      | Spurious Emission (Radiated) |            |             |
| Date of Test   | 2016/12/05                   | Test Site  | OATS 1      |
| Test Condition | Channel 4132 (WCDMA BAND 5)  | Test Range | 30MHz~10GHz |

| Frequency | Reading Level | Signal Generator Level | Cable Loss | Antenna Gain | EIRP Value | Limit |
|-----------|---------------|------------------------|------------|--------------|------------|-------|
| (GHz)     | (dBm)         | (dBm)                  | (dB)       | (dBi)        | (dBm)      | (dBm) |

#### Horizontal Emissions

|      |         |         |       |        |         |     |
|------|---------|---------|-------|--------|---------|-----|
| 1648 | -48.048 | -51.443 | 1.630 | 9.800  | -43.273 | -13 |
| 2482 | -61.492 | -61.843 | 2.100 | 10.600 | -53.343 | -13 |
| 3304 | -59.443 | -61.121 | 2.350 | 12.300 | -51.171 | -13 |
| 4132 | -61.195 | -60.231 | 2.700 | 12.600 | -50.331 | -13 |
| 4960 | -63.902 | -59.761 | 2.830 | 12.700 | -49.891 | -13 |
| 5782 | -63.975 | -61.926 | 3.200 | 13.000 | -52.126 | -13 |

#### Vertical Emissions

|      |         |         |       |        |         |     |
|------|---------|---------|-------|--------|---------|-----|
| 1648 | -49.633 | -52.720 | 1.630 | 9.800  | -44.550 | -13 |
| 2482 | -64.407 | -64.480 | 2.100 | 10.600 | -55.980 | -13 |
| 3304 | -59.872 | -60.499 | 2.350 | 12.300 | -50.549 | -13 |
| 4132 | -60.920 | -58.270 | 2.700 | 12.600 | -48.370 | -13 |
| 4960 | -63.795 | -59.047 | 2.830 | 12.700 | -49.177 | -13 |
| 5782 | -63.808 | -61.701 | 3.200 | 13.000 | -51.901 | -13 |

#### Note:

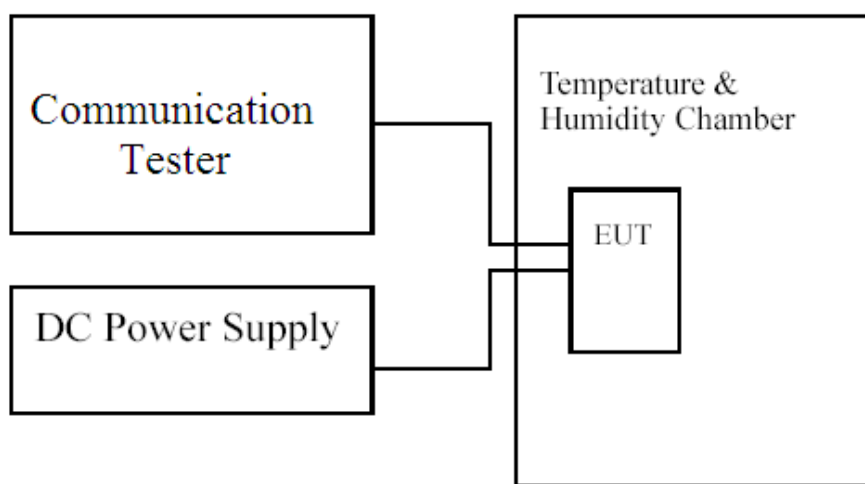
1. Receiver setting (Peak Detector) : RBW:1MHz; VBW:3MHz
2. EIRP Value = Signal Generator Level + Antenna Gain - Cable Loss
3. Spurious emissions past 6 GHz are not shown, due to the magnitude of spurious emissions attenuated more than 20 dB below the limit.

## 7. Frequency Stability Under Temperature & Voltage Variations

### 7.1. Test Specification

According to Part 2.1055, 22.355, 24.235

### 7.2. Test Setup



### 7.3. Limits

|       |                            |
|-------|----------------------------|
| Limit | $\leq \pm 2.5 \text{ ppm}$ |
|-------|----------------------------|

### 7.4. Test Procedure

The frequency stability of transmitter is measured by:

- Temperature: The temperature is varied from  $-30^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  in  $10^{\circ}\text{C}$  increment using a standard temperature & Humidity chamber.
- Primary Supply Voltage: The primary supply voltage is varied 85% to 115% of the nominal value for non hand-carried equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating endpoint which shall be specified by the manufacturer.

The EUT was connected via the base station simulator. Universal Radio Communication Tester, was used to measure The Frequency Error. The maximum result of measurements was recorded.

## 7.5. Test Result of Frequency Stability Under Temperature Variations

|                |                                                                       |            |           |
|----------------|-----------------------------------------------------------------------|------------|-----------|
| Product        | LTE Router                                                            |            |           |
| Test Mode      | Frequency Stability Under Temperature Variations & Voltage Variations |            |           |
| Date of Test   | 2016/12/13                                                            | Test Site  | CTR       |
| Test Condition | GSM 850 GPRS / Channel 189                                            | Test Range | 0°C~+35°C |

### Frequency Stability Under Temperature Variations

| Temperature Interval(°C) | Test Frequency (GHz) | Deviation (KHz) | Limit (KHz) |
|--------------------------|----------------------|-----------------|-------------|
| -30                      | 0.8364               | -0.022          | ±2.09       |
| -20                      | 0.8364               | -0.032          | ±2.09       |
| -10                      | 0.8364               | -0.025          | ±2.09       |
| 0                        | 0.8364               | -0.030          | ±2.09       |
| 10                       | 0.8364               | -0.025          | ±2.09       |
| 20                       | 0.8364               | 0.022           | ±2.09       |
| 35                       | 0.8364               | 0.022           | ±2.09       |
| 40                       | 0.8364               | 0.019           | ±2.09       |
| 50                       | 0.8364               | 0.024           | ±2.09       |

Note : Test Temperature specified by the manufacturer .

### Voltage Variations

| DC Voltage (V) | Test Frequency (GHz) | Deviation (KHz) | Limit (KHz) |
|----------------|----------------------|-----------------|-------------|
| 138            | 0.8364               | 0.021           | ±2.09       |
| 120            | 0.8364               | 0.022           | ±2.09       |
| 102            | 0.8364               | 0.022           | ±2.09       |

|                |                                                                       |            |           |
|----------------|-----------------------------------------------------------------------|------------|-----------|
| Product        | LTE Router                                                            |            |           |
| Test Mode      | Frequency Stability Under Temperature Variations & Voltage Variations |            |           |
| Date of Test   | 2016/12/13                                                            | Test Site  | CTR       |
| Test Condition | GSM 850 EGPRS / Channel 189                                           | Test Range | 0°C~+35°C |

## Frequency Stability Under Temperature Variations

| Temperature Interval(°C) | Test Frequency (GHz) | Deviation (KHz) | Limit (KHz) |
|--------------------------|----------------------|-----------------|-------------|
| -30                      | 0.8364               | -0.028          | ±2.09       |
| -20                      | 0.8364               | -0.034          | ±2.09       |
| -10                      | 0.8364               | -0.029          | ±2.09       |
| 0                        | 0.8364               | -0.033          | ±2.09       |
| 10                       | 0.8364               | -0.028          | ±2.09       |
| 20                       | 0.8364               | 0.019           | ±2.09       |
| 35                       | 0.8364               | 0.020           | ±2.09       |
| 40                       | 0.8364               | 0.016           | ±2.09       |
| 50                       | 0.8364               | 0.021           | ±2.09       |

Note : Test Temperature specified by the manufacturer .

## Voltage Variations

| DC Voltage (V) | Test Frequency (GHz) | Deviation (KHz) | Limit (KHz) |
|----------------|----------------------|-----------------|-------------|
| 138            | 0.8364               | 0.018           | ±2.09       |
| 120            | 0.8364               | 0.019           | ±2.09       |
| 102            | 0.8364               | 0.017           | ±2.09       |

|                |                                                                       |            |           |
|----------------|-----------------------------------------------------------------------|------------|-----------|
| Product        | LTE Router                                                            |            |           |
| Test Mode      | Frequency Stability Under Temperature Variations & Voltage Variations |            |           |
| Date of Test   | 2016/12/13                                                            | Test Site  | CTR       |
| Test Condition | PCS 1900 GPRS / Channel 661                                           | Test Range | 0°C~+35°C |

## Frequency Stability Under Temperature Variations

| Temperature Interval(°C) | Test Frequency (GHz) | Deviation (KHz) | Limit (KHz) |
|--------------------------|----------------------|-----------------|-------------|
| -30                      | 1.88                 | 0.030           | ±4.7        |
| -20                      | 1.88                 | -0.026          | ±4.7        |
| -10                      | 1.88                 | 0.024           | ±4.7        |
| 0                        | 1.88                 | 0.016           | ±4.7        |
| 10                       | 1.88                 | 0.018           | ±4.7        |
| 20                       | 1.88                 | 0.020           | ±4.7        |
| 35                       | 1.88                 | 0.033           | ±4.7        |
| 40                       | 1.88                 | 0.016           | ±4.7        |
| 50                       | 1.88                 | 0.022           | ±4.7        |

Note : Test Temperature specified by the manufacturer .

## Voltage Variations

| DC Voltage (V) | Test Frequency (GHz) | Deviation (KHz) | Limit (KHz) |
|----------------|----------------------|-----------------|-------------|
| 138            | 1.88                 | 0.019           | ±4.7        |
| 120            | 1.88                 | 0.020           | ±4.7        |
| 102            | 1.88                 | 0.019           | ±4.7        |

|                |                                                                       |            |           |
|----------------|-----------------------------------------------------------------------|------------|-----------|
| Product        | LTE Router                                                            |            |           |
| Test Mode      | Frequency Stability Under Temperature Variations & Voltage Variations |            |           |
| Date of Test   | 2016/12/13                                                            | Test Site  | CTR       |
| Test Condition | PCS 1900 EGPRS / Channel 661                                          | Test Range | 0°C~+35°C |

## Frequency Stability Under Temperature Variations

| Temperature Interval(°C) | Test Frequency (GHz) | Deviation (Hz) | Limit (kHz) |
|--------------------------|----------------------|----------------|-------------|
| -30                      | 1.88                 | 0.013          | ±4.7        |
| -20                      | 1.88                 | 0.021          | ±4.7        |
| -10                      | 1.88                 | 0.024          | ±4.7        |
| 0                        | 1.88                 | -0.039         | ±4.7        |
| 10                       | 1.88                 | 0.017          | ±4.7        |
| 20                       | 1.88                 | 0.038          | ±4.7        |
| 35                       | 1.88                 | 0.019          | ±4.7        |
| 40                       | 1.88                 | -0.013         | ±4.7        |
| 50                       | 1.88                 | 0.016          | ±4.7        |

Note : Test Temperature specified by the manufacturer .

## Voltage Variations

| DC Voltage (V) | Test Frequency (GHz) | Deviation (Hz) | Limit (kHz) |
|----------------|----------------------|----------------|-------------|
| 138            | 1.88                 | 0.032          | ±4.7        |
| 120            | 1.88                 | 0.038          | ±4.7        |
| 102            | 1.88                 | 0.023          | ±4.7        |

|                |                                                                       |            |           |
|----------------|-----------------------------------------------------------------------|------------|-----------|
| Product        | LTE Router                                                            |            |           |
| Test Mode      | Frequency Stability Under Temperature Variations & Voltage Variations |            |           |
| Date of Test   | 2016/12/13                                                            | Test Site  | CTR       |
| Test Condition | WCDMA BAND 2 / Channel 9400                                           | Test Range | 0°C~+35°C |

## Frequency Stability Under Temperature Variations

| Temperature Interval(°C) | Test Frequency (GHz) | Deviation (Hz) | Limit (kHz) |
|--------------------------|----------------------|----------------|-------------|
| -30                      | 1.88                 | -0.008         | ±4.7        |
| -20                      | 1.88                 | 0.009          | ±4.7        |
| -10                      | 1.88                 | 0.008          | ±4.7        |
| 0                        | 1.88                 | -0.011         | ±4.7        |
| 10                       | 1.88                 | -0.009         | ±4.7        |
| 20                       | 1.88                 | -0.007         | ±4.7        |
| 35                       | 1.88                 | -0.009         | ±4.7        |
| 40                       | 1.88                 | -0.007         | ±4.7        |
| 50                       | 1.88                 | -0.010         | ±4.7        |

Note : Test Temperature specified by the manufacturer .

## Voltage Variations

| AC Voltage (V) | Test Frequency (GHz) | Deviation (Hz) | Limit (kHz) |
|----------------|----------------------|----------------|-------------|
| 138            | 1.88                 | -0.009         | ±4.7        |
| 120            | 1.88                 | -0.007         | ±4.7        |
| 102            | 1.88                 | -0.009         | ±4.7        |

|                |                                                                       |            |           |
|----------------|-----------------------------------------------------------------------|------------|-----------|
| Product        | LTE Router                                                            |            |           |
| Test Mode      | Frequency Stability Under Temperature Variations & Voltage Variations |            |           |
| Date of Test   | 2016/12/13                                                            | Test Site  | CTR       |
| Test Condition | WCDMA BAND 5 / Channel 4183                                           | Test Range | 0°C~+35°C |

#### Frequency Stability Under Temperature Variations

| Temperature Interval(°C) | Test Frequency (GHz) | Deviation (Hz) | Limit (kHz) |
|--------------------------|----------------------|----------------|-------------|
| -30                      | 0.8366               | -0.005         | ±2.09       |
| -20                      | 0.8366               | -0.006         | ±2.09       |
| -10                      | 0.8366               | -0.009         | ±2.09       |
| 0                        | 0.8366               | -0.006         | ±2.09       |
| 10                       | 0.8366               | -0.005         | ±2.09       |
| 20                       | 0.8366               | -0.006         | ±2.09       |
| 33                       | 0.8366               | -0.005         | ±2.09       |
| 40                       | 0.8366               | -0.008         | ±2.09       |
| 50                       | 0.8366               | -0.009         | ±2.09       |

Note : Test Temperature specified by the manufacturer .

#### Voltage Variations

| AC Voltage (V) | Test Frequency (GHz) | Deviation (Hz) | Limit (kHz) |
|----------------|----------------------|----------------|-------------|
| 138            | 0.8366               | -0.008         | ±2.09       |
| 120            | 0.8366               | -0.006         | ±2.09       |
| 102            | 0.8366               | -0.005         | ±2.09       |

## **7. EMI Reduction Method During Compliance Testing**

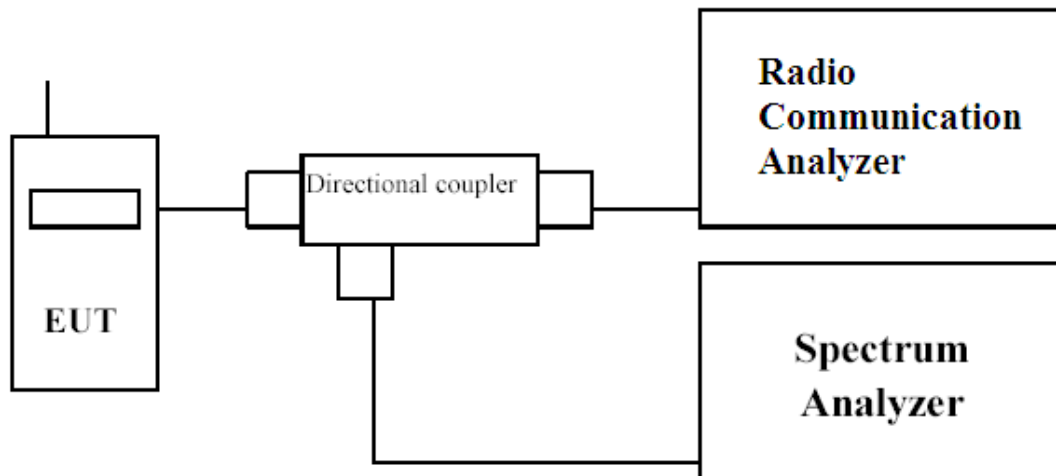
No modification was made during testing.

## 8. Peak to Average Ratio

### 8.1 Test Specification

According to Part 24.232.

### 8.2 Test Setup



### 8.3 Limits

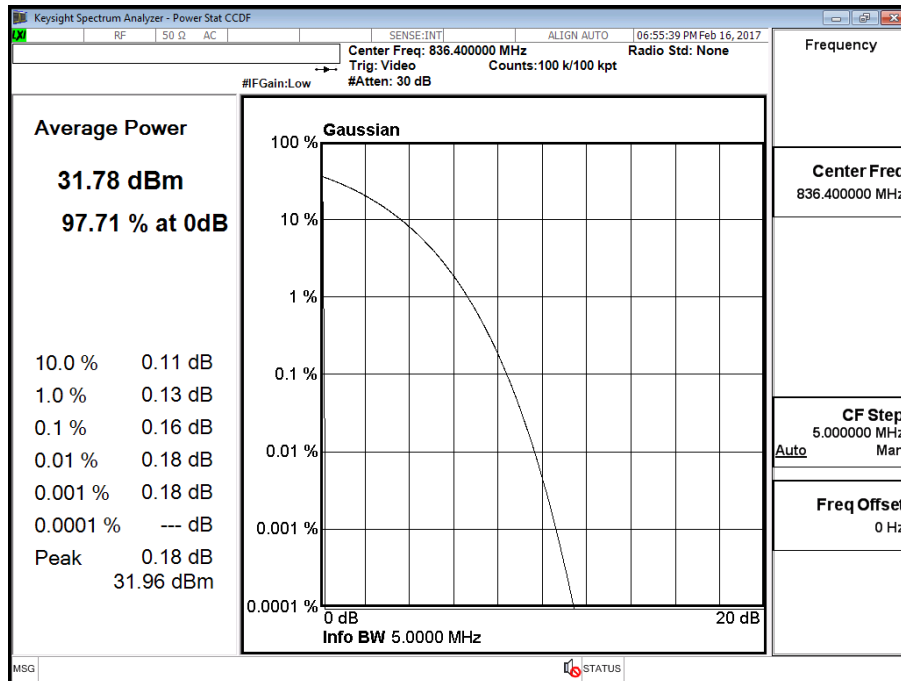
The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure.

### 8.4 Test Procedure

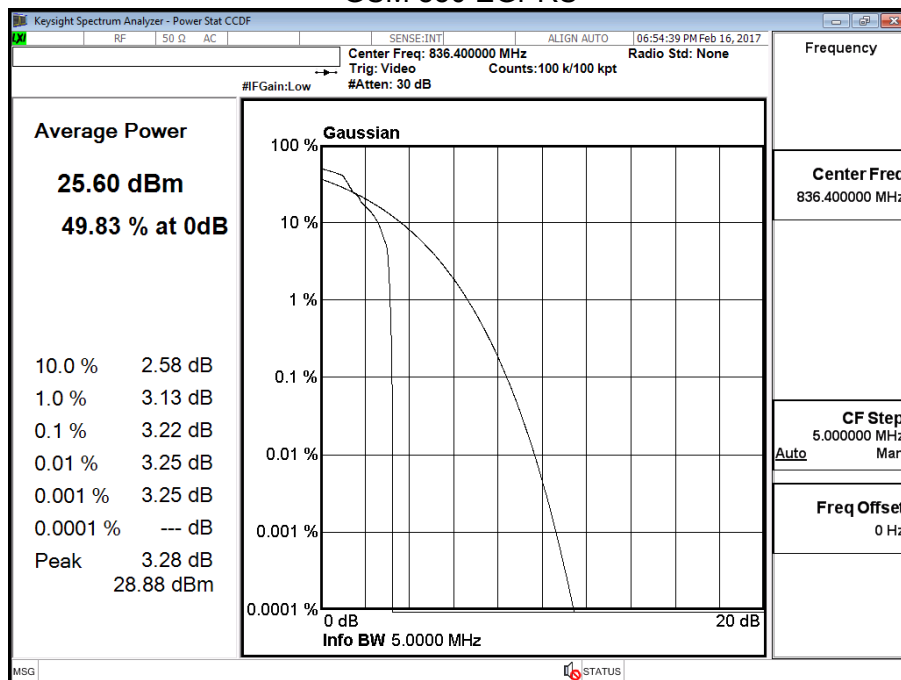
- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Set the measurement interval as follows:
  - 1) for continuous transmissions, set to 1 ms,
  - 2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- e) Record the maximum PAPR level associated with a probability of 0.1%.

|                |                       |           |     |
|----------------|-----------------------|-----------|-----|
| Product        | LTE Router            |           |     |
| Test Mode      | Peak to Average Ratio |           |     |
| Date of Test   | 2017/02/08            | Test Site | CTR |
| Test Condition | GSM 850               |           |     |

## GSM 850 GPRS

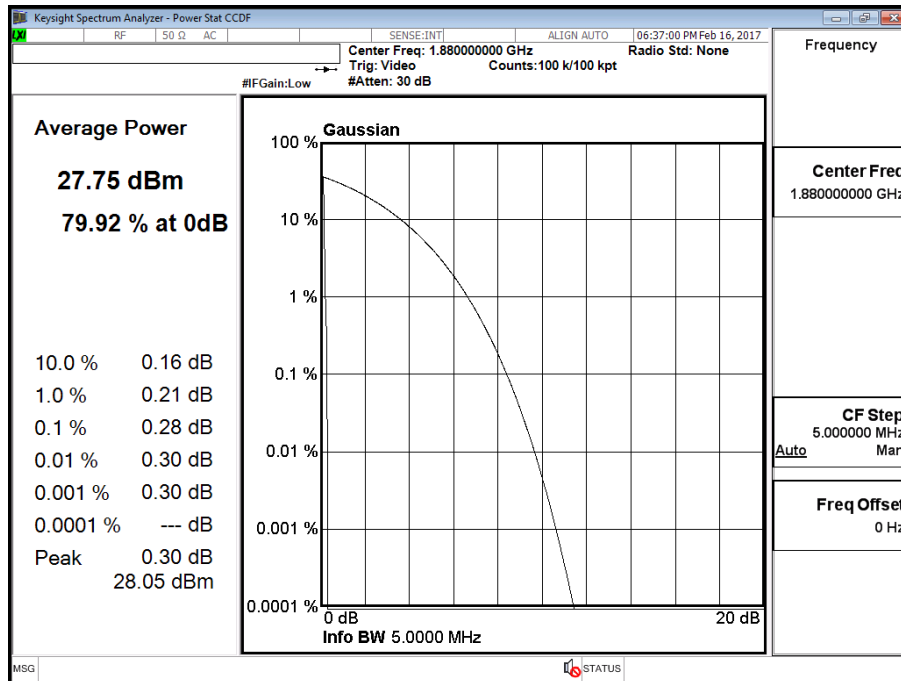


## GSM 850 EGPRS

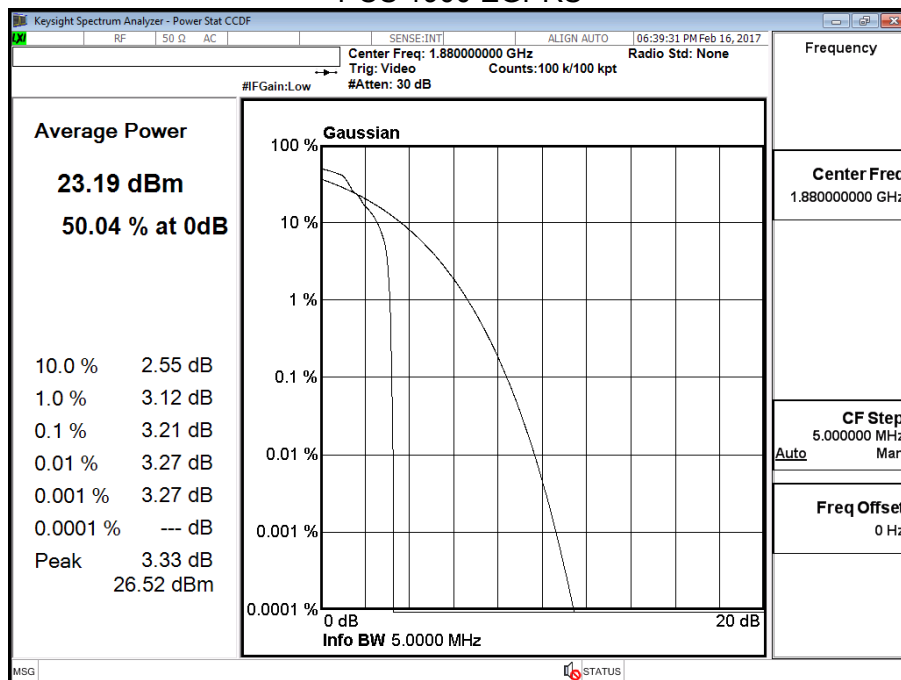


|                |                       |           |     |
|----------------|-----------------------|-----------|-----|
| Product        | LTE Router            |           |     |
| Test Mode      | Peak to Average Ratio |           |     |
| Date of Test   | 2017/02/08            | Test Site | CTR |
| Test Condition | PCS 1900              |           |     |

## PCS 1900 GPRS

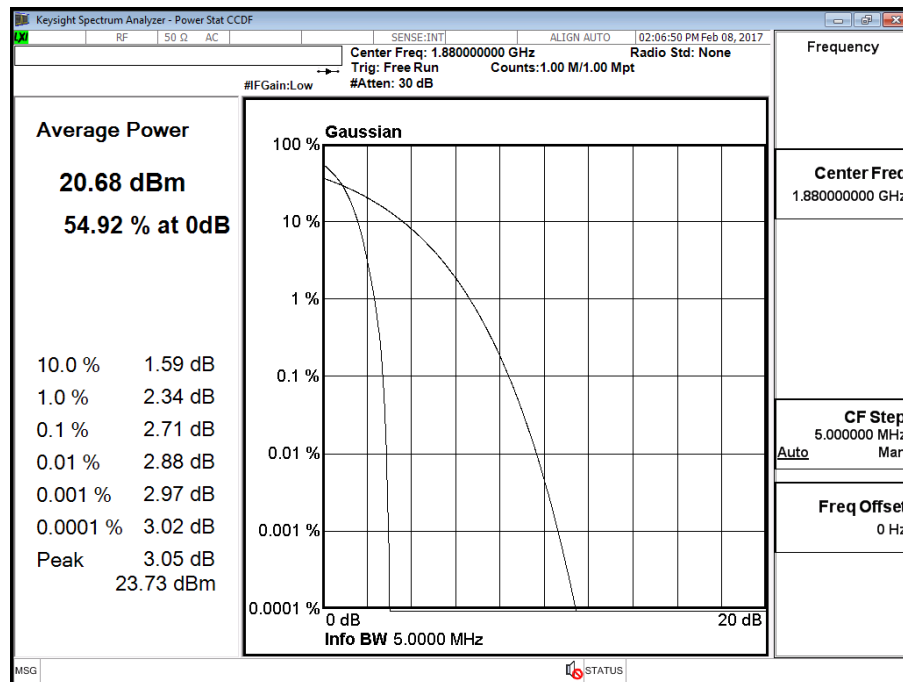


## PCS 1900 EGPRS



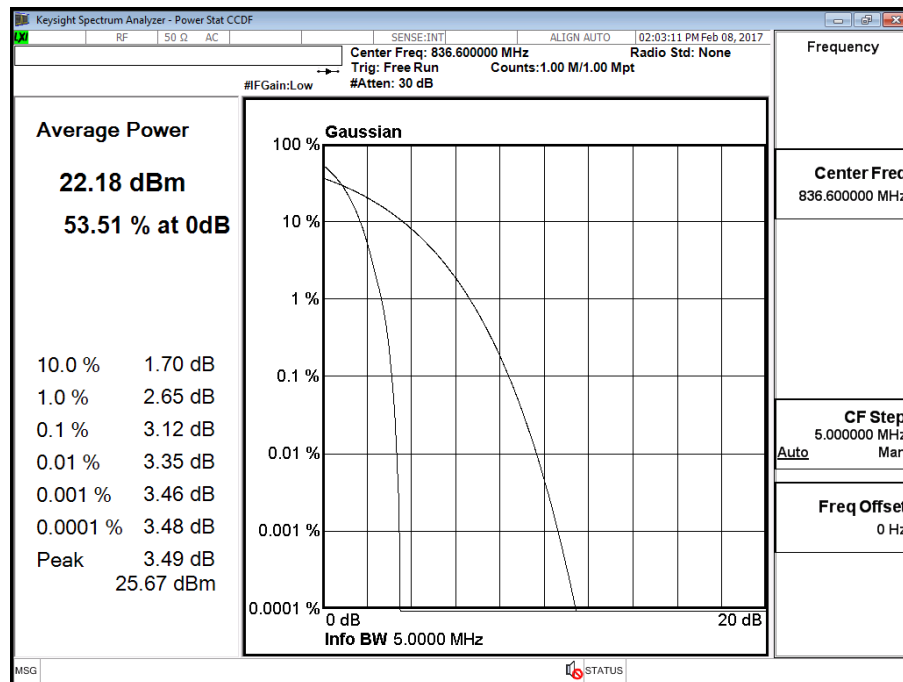
|                |                       |           |     |
|----------------|-----------------------|-----------|-----|
| Product        | LTE Router            |           |     |
| Test Mode      | Peak to Average Ratio |           |     |
| Date of Test   | 2017/02/08            | Test Site | CTR |
| Test Condition | WCDMA BAND 2          |           |     |

## WCDMA BAND 2



|                |                       |           |     |
|----------------|-----------------------|-----------|-----|
| Product        | LTE Router            |           |     |
| Test Mode      | Peak to Average Ratio |           |     |
| Date of Test   | 2017/02/08            | Test Site | CTR |
| Test Condition | WCDMA BAND 5          |           |     |

## WCDMA BAND 5



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## **Attachment 1: EUT Test Photographs**

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## **Attachment 2: EUT Detailed Photographs**