



## **MiniCard 8765 Partial Test Report**

For

Industry Canada and FCC Certification

**IC: 2417C-MC8765**  
**FCC ID: N7NMC8765**

**Prepared by**  
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**Test Date(s): November 9, 2005**

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## Table of Contents

|     |                                                  |    |
|-----|--------------------------------------------------|----|
| 1   | Introduction and Purpose .....                   | 3  |
| 2   | Test Summary .....                               | 3  |
| 3   | Description of Device Under Test .....           | 4  |
| 4   | RF Power Output .....                            | 5  |
| 4.1 | Test Procedure .....                             | 5  |
| 4.2 | Test Equipment .....                             | 5  |
| 4.3 | Test Results GSM/EDGE .....                      | 6  |
| 4.4 | Test Results UMTS .....                          | 6  |
| 5   | Occupied Bandwidth .....                         | 7  |
| 5.1 | Test Procedure .....                             | 7  |
| 5.2 | Test Results .....                               | 7  |
| 5.3 | Test Plots .....                                 | 8  |
| 6   | Out of Band Emissions at Antenna Terminals ..... | 17 |
| 6.1 | Test Procedure .....                             | 17 |
| 6.2 | Test Equipment .....                             | 17 |
| 6.3 | Test Results .....                               | 18 |
| 6.4 | Test Plots .....                                 | 19 |
| 7   | Block Edge Compliance .....                      | 55 |
| 7.1 | Test Procedure .....                             | 55 |
| 7.2 | Test Equipment .....                             | 55 |
| 7.3 | Test Results .....                               | 55 |
| 7.4 | Test Plots .....                                 | 56 |
| 8   | Frequency Stability Versus Temperature .....     | 62 |
| 8.1 | Summary of Results .....                         | 62 |
| 8.2 | Test Procedure .....                             | 62 |
| 8.3 | Test Equipment .....                             | 62 |
| 8.4 | Test Results .....                               | 63 |
| 9   | Frequency Stability Versus Voltage .....         | 69 |
| 9.1 | Summary of Results .....                         | 69 |
| 9.2 | Test Procedure .....                             | 69 |
| 9.3 | Test Equipment .....                             | 69 |
| 9.4 | Test Results .....                               | 70 |

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|                              |        |              |              |
|------------------------------|--------|--------------|--------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 3 of 72 |
|------------------------------|--------|--------------|--------------|

### 1 Introduction and Purpose

This document provides the FCC test data for the MC8765 wireless modem. The tests included in this report are limited to all conducted tests required. The radiated tests were performed at an external test facility.

### 2 Test Summary

| FCC RULE                               | DESCRIPTION OF TEST                           | RESULT   | PAGE              |
|----------------------------------------|-----------------------------------------------|----------|-------------------|
| 2.1046                                 | RF Power Output                               | Complies | 5                 |
| 2.1049                                 | Occupied Bandwidth                            | Complies | 7                 |
| 2.1051, 22.901(d)<br>22.917, 24.238(a) | Out of Band Emissions at Antenna<br>Terminals | Complies | 17                |
| FCC part 22H/24E                       | Block Edge Requirements                       | Complies | 43                |
| 2.1053                                 | Field Strength of Spurious Radiation          | Complies | See CCS<br>Report |
| 2.1055                                 | Frequency Stability versus Temperature        | Complies | 61                |
| 2.1055                                 | Frequency Stability versus Voltage            | Complies | 66                |

The tests described in this report were performed by Mr. Philip Wright at:

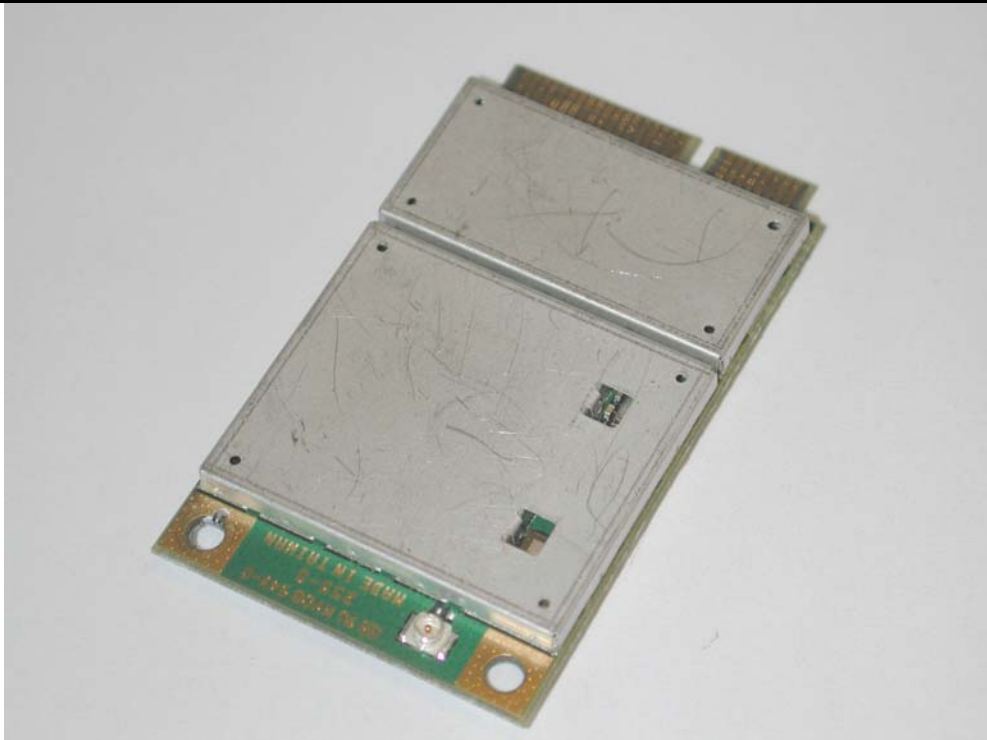
Sierra Wireless, Inc.  
13811 Wireless Way  
Richmond, B.C. V6V 3A4  
Canada

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|------------------------------|--------|--------------|--------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 4 of 72 |
|------------------------------|--------|--------------|--------------|

### 3 Description of Device Under Test

The Sierra Wireless Inc. model MiniCard MC8765 is a quad-band USB wireless modem operating on the GSM/GPRS/EDGE/UMTS network. In the US and Canada, only cellular and PCS bands are used for GSM/GPRS operation, so this test report only contains data for these two bands (850MHz and 1900MHz). The DUT was tested in all modes of operation: GMSK modulation, 8-PSK, and WCDMA modulation. The DUT is a production sample and the serial number is: S2128751015E2



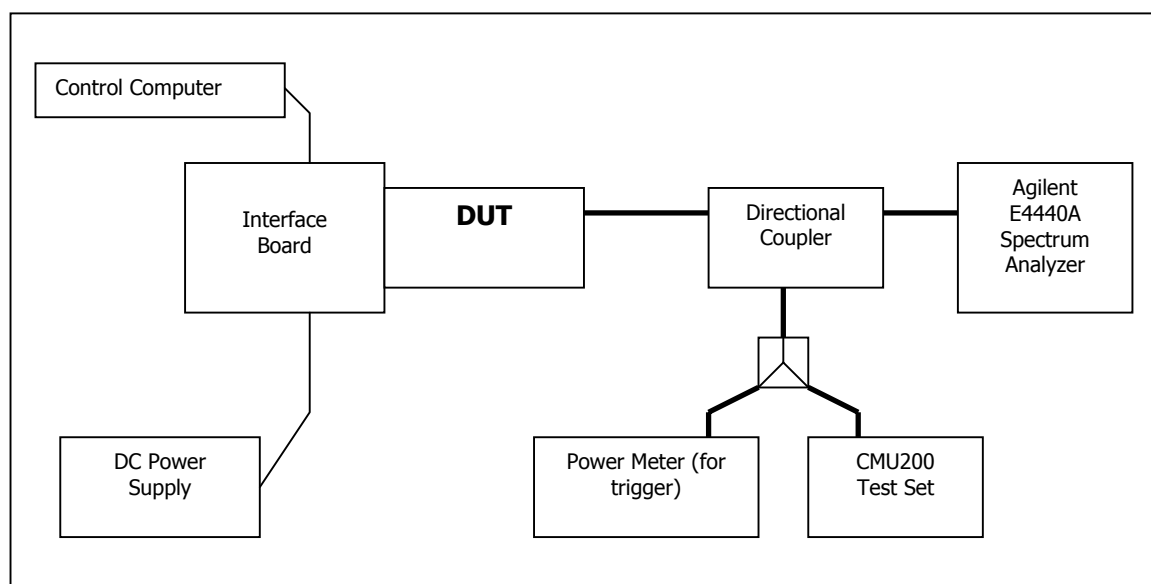
## 4 RF Power Output

FCC 2.1046

### 4.1 Test Procedure

The transmitter output was connected to a Rohde & Schwarz CMU200 Test Set and configured to operate at maximum power in a call. The power was measured using the spectrum analyzer at three equally spaced operating frequencies for each band. The RBW was set to 300 KHz for the GSM and EDGE measurements, and 5MHz for the WCDMA measurements. The spectrum analyzer was set to measure the RF output power with the cable and coupler losses accounted for.

### Test Setup



### 4.2 Test Equipment

#### Instrument List

| EQUIPMENT           | MANUFACTURER    | MODEL NO.  | SERIAL NO. | CAL. DATE      |
|---------------------|-----------------|------------|------------|----------------|
| Control Computer    | TC              | Generic PC | 100488     | N/A            |
| Wireless Test Set   | Rohde & Schwarz | CMU200     | 836766/030 | N/A            |
| Spectrum Analyzer   | Agilent         | PSA E4440A | US41421268 | Sept. 29, 2004 |
| DC Power Supply     | HP              | 6632A      | 3530A      | N/A            |
| Interface Board     | Shop built      | Minnow     | N/A        | N/A            |
| Directional Coupler | Mini-Circuits   | ZA3PD-2    | N/A        | N/A            |

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|------------------------------|--------|--------------|--------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 6 of 72 |
|------------------------------|--------|--------------|--------------|

### 4.3 Test Results GSM/EDGE

| Frequency<br>(MHz) | Channel | Power (dBm) |            |
|--------------------|---------|-------------|------------|
|                    |         | GMSK Mode   | 8-PSK Mode |
| 824.2              | 128     | 31.93       | 26.75      |
| 837.0              | 192     | 32.07       | 26.77      |
| 848.8              | 251     | 31.78       | 26.91      |
| 1850.2             | 512     | 29.12       | 26.01      |
| 1880.0             | 661     | 28.95       | 25.65      |
| 1909.8             | 810     | 28.90       | 25.44      |

### 4.4 Test Results UMTS

| Frequency<br>(MHz) | Channel | Power (dBm) |
|--------------------|---------|-------------|
| 826.4              | 4132    | 22.55       |
| 836.4              | 4182    | 22.92       |
| 846.6              | 4233    | 23.19       |
| 1852.4             | 9262    | 22.85       |
| 1880.0             | 9400    | 23.05       |
| 1907.6             | 9538    | 22.56       |

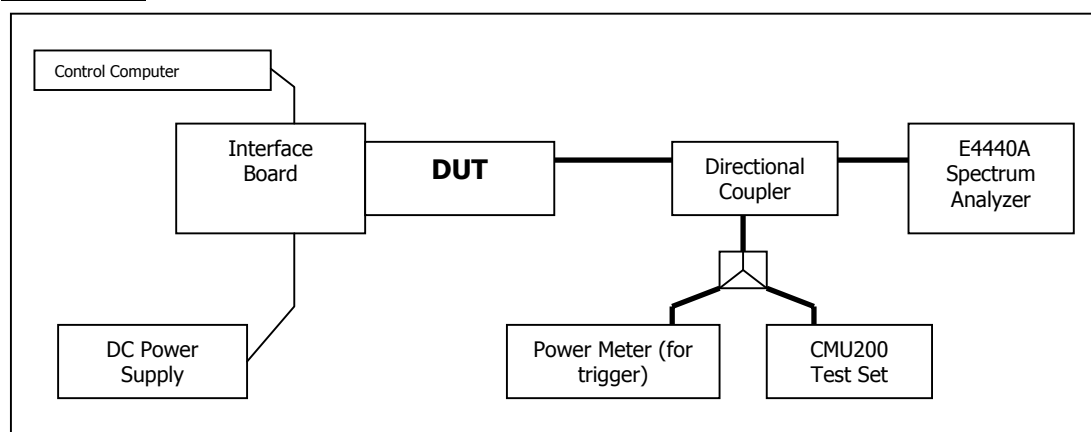
## 5 Occupied Bandwidth

FCC 2.1049

### 5.1 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 (defined as the 99% Power Bandwidth) was measured with the spectrum analyzer at the 3 frequencies in each band. The -26dB bandwidth was also measured and recorded. All results were obtained while in a call.

### Test Setup



### 5.2 Test Results

The performance of the GSM 850 MHz cellular band is shown in plots 5.3.1 to 5.3.6.

Performance of the GSM 1900 MHz PCS band is shown in plots 5.3.7 to 5.3.12.

Performance of the UMTS 850 cellular band is shown in plots 5.3.13 to 5.3.15

Performance of the UMTS 1900 PCS band is shown in plots 5.3.16 to 5.3.18

| Frequency (MHz) | Channel | 99% Occupied Bandwidth (kHz) |            | -26dBc Occupied Bandwidth (kHz) |            |
|-----------------|---------|------------------------------|------------|---------------------------------|------------|
|                 |         | GMSK Mode                    | 8-PSK Mode | GMSK Mode                       | 8-PSK Mode |
| 824.2           | 128     | 243                          | 244        | 312                             | 305        |
| 837.0           | 192     | 244                          | 246        | 312                             | 297        |
| 848.8           | 251     | 240                          | 246        | 307                             | 302        |
| 1850.2          | 512     | 242                          | 243        | 315                             | 305        |
| 1880.0          | 661     | 244                          | 243        | 314                             | 307        |
| 1909.8          | 810     | 243                          | 243        | 316                             | 310        |
| Frequency (MHz) | Channel | 99% Occupied Bandwidth (MHz) |            | -26dBc Occupied Bandwidth (MHz) |            |
| 826.4           | 4132    | 4.15                         |            | 4.61                            |            |
| 836.4           | 4182    | 4.14                         |            | 4.62                            |            |
| 846.6           | 4233    | 4.15                         |            | 4.60                            |            |
| 1852.4          | 9262    | 4.13                         |            | 4.62                            |            |
| 1880.0          | 9400    | 4.13                         |            | 4.61                            |            |
| 1907.5          | 9538    | 4.15                         |            | 4.60                            |            |

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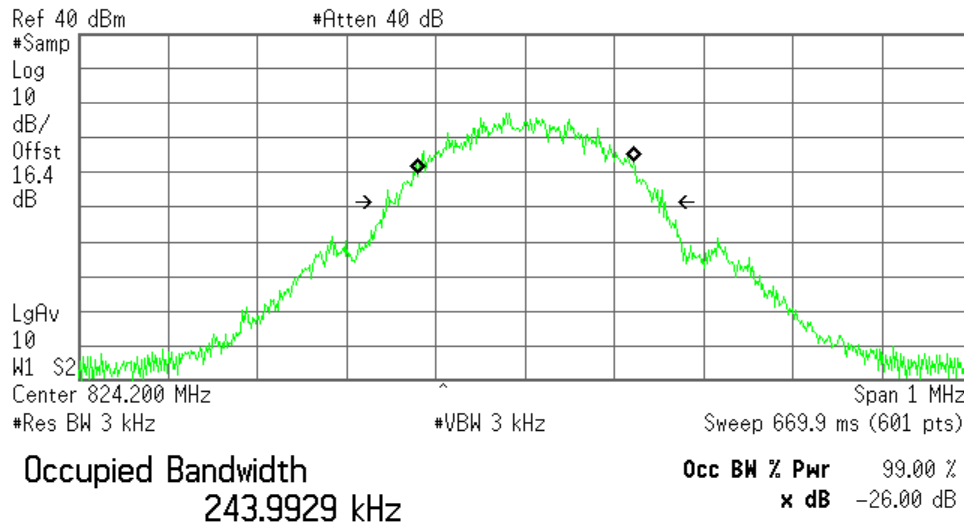
|                              |        |              |              |
|------------------------------|--------|--------------|--------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 8 of 72 |
|------------------------------|--------|--------------|--------------|

## 5.3 Test Plots

### 5.3.1) GMSK Occupied Bandwidth, Cellular Low channel, 824.2 MHz, 99% bandwidth

Agilent 14:41:40 Nov 7, 2005

L

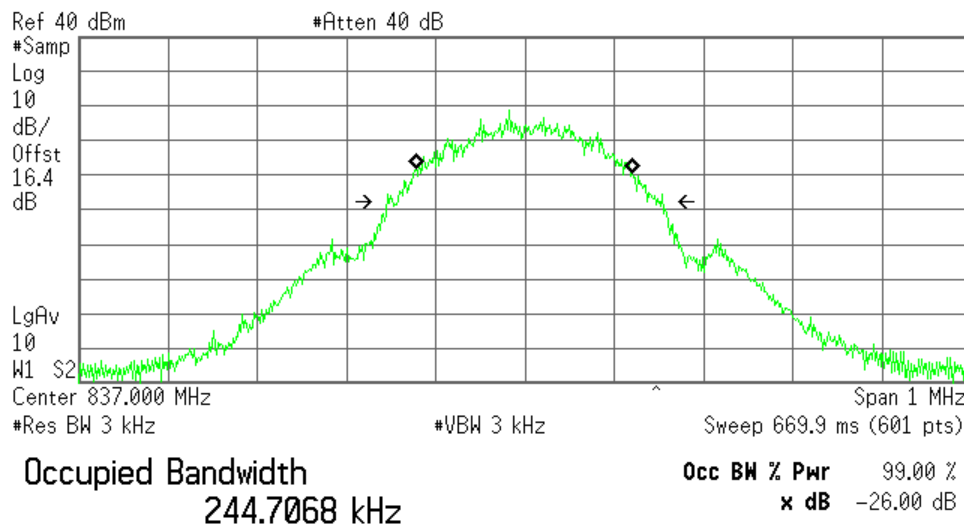


Transmit Freq Error 979.384 Hz  
x dB Bandwidth 312.896 kHz\*

### 5.3.2) GMSK Occupied Bandwidth, Middle channel, 837 MHz, 99% bandwidth

Agilent 14:47:58 Nov 7, 2005

L



Transmit Freq Error -920.458 Hz  
x dB Bandwidth 312.232 kHz\*

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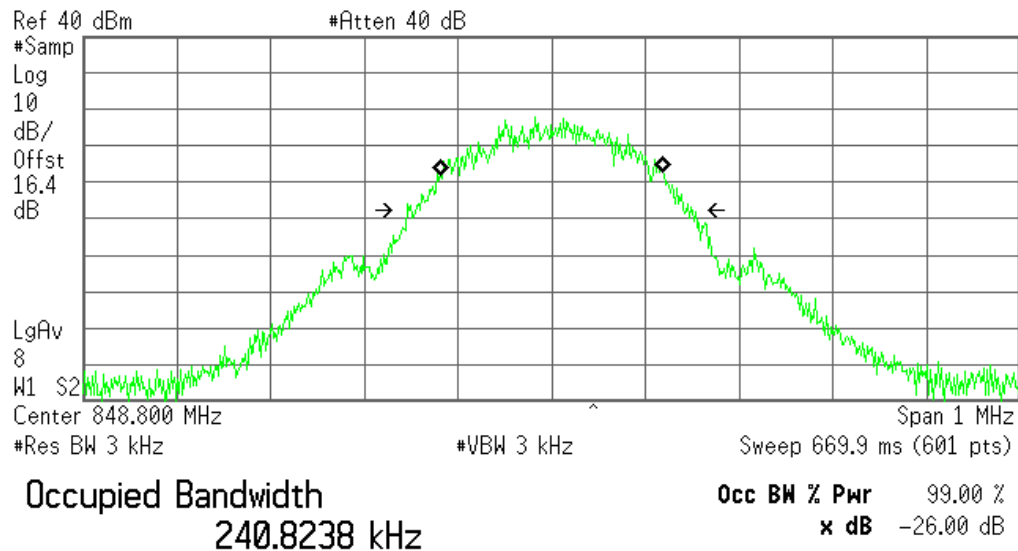
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|                              |        |              |              |
|------------------------------|--------|--------------|--------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 9 of 72 |
|------------------------------|--------|--------------|--------------|

## 5.3.3) GMSK Occupied Bandwidth, High channel, 848.8 MHz, 99% bandwidth

Agilent 14:45:00 Nov 7, 2005

L

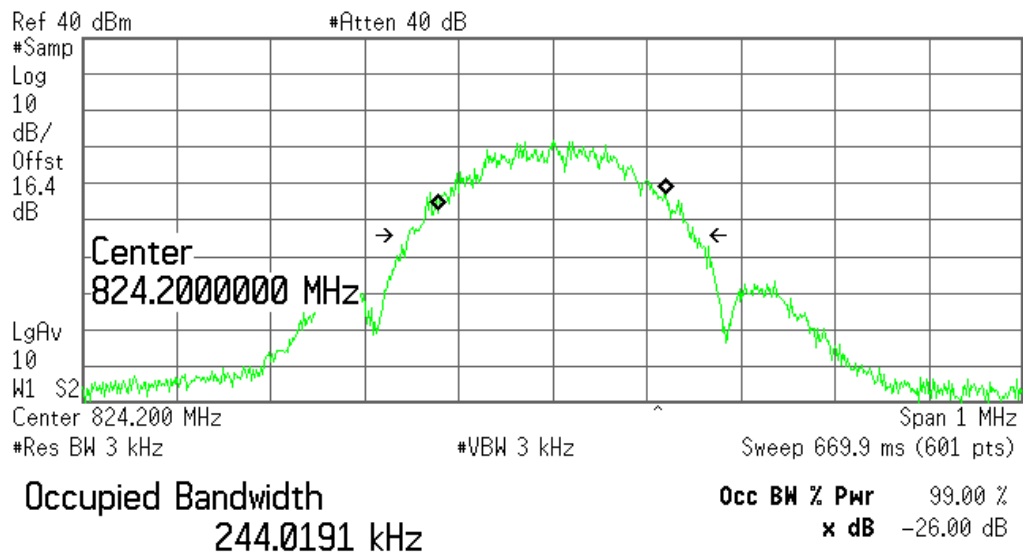


Transmit Freq Error 134.204 mHz  
x dB Bandwidth 307.739 kHz\*

## 5.3.4) 8-PSK Occupied Bandwidth, Cellular Low channel, 824.2 MHz, 99% bandwidth

Agilent 15:02:09 Nov 7, 2005

L



Transmit Freq Error -679.958 Hz  
x dB Bandwidth 305.857 kHz\*

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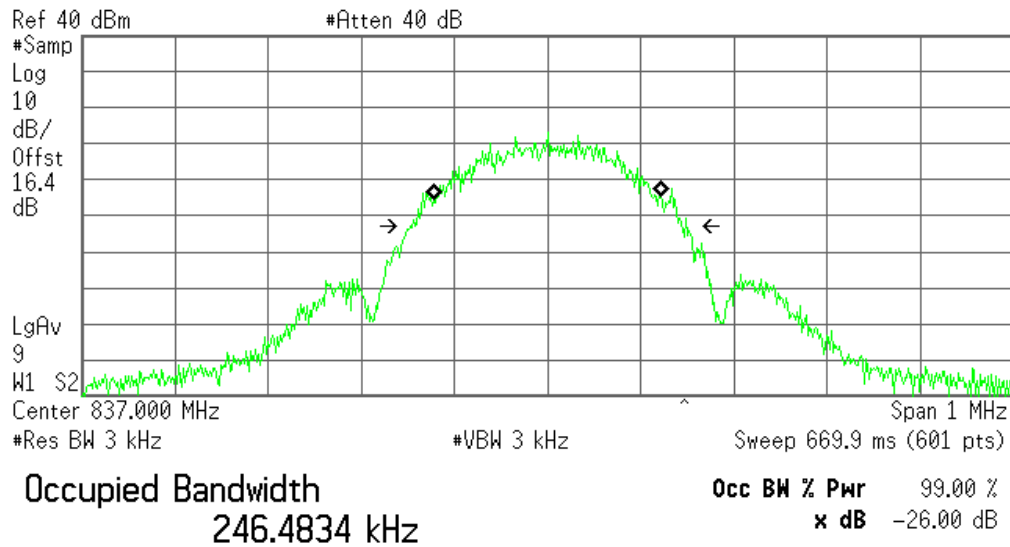
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|                              |        |              |               |
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| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 10 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.5) 8-PSK Occupied Bandwidth, Middle channel, 837 MHz, 99% bandwidth

Agilent 16:27:21 Nov 9, 2005

L

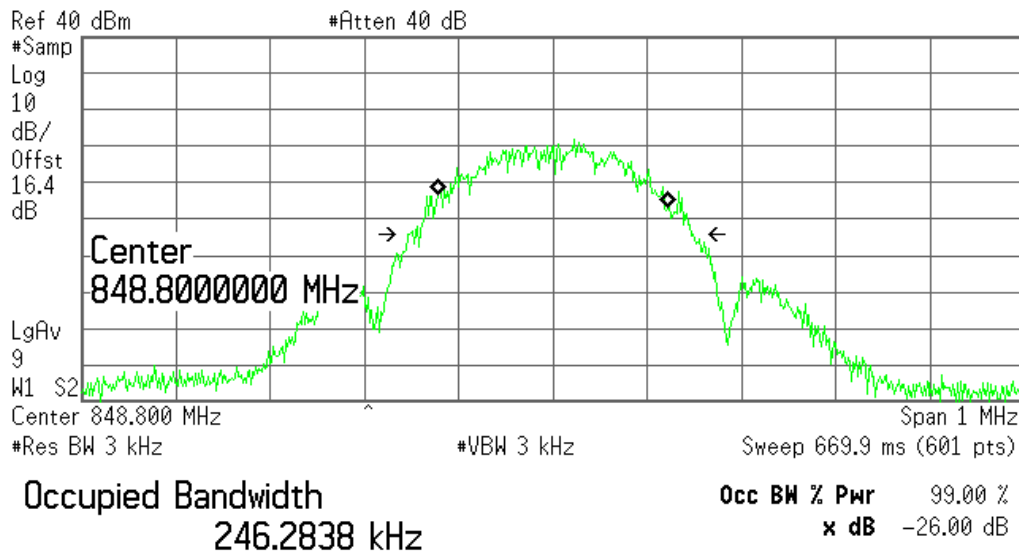


Transmit Freq Error -85.790 Hz  
x dB Bandwidth 297.313 kHz\*

## 5.3.6) 8-PSK Occupied Bandwidth, High channel, 848.8 MHz, 99% bandwidth

Agilent 15:05:09 Nov 7, 2005

L



Transmit Freq Error 73.418 Hz  
x dB Bandwidth 302.443 kHz\*

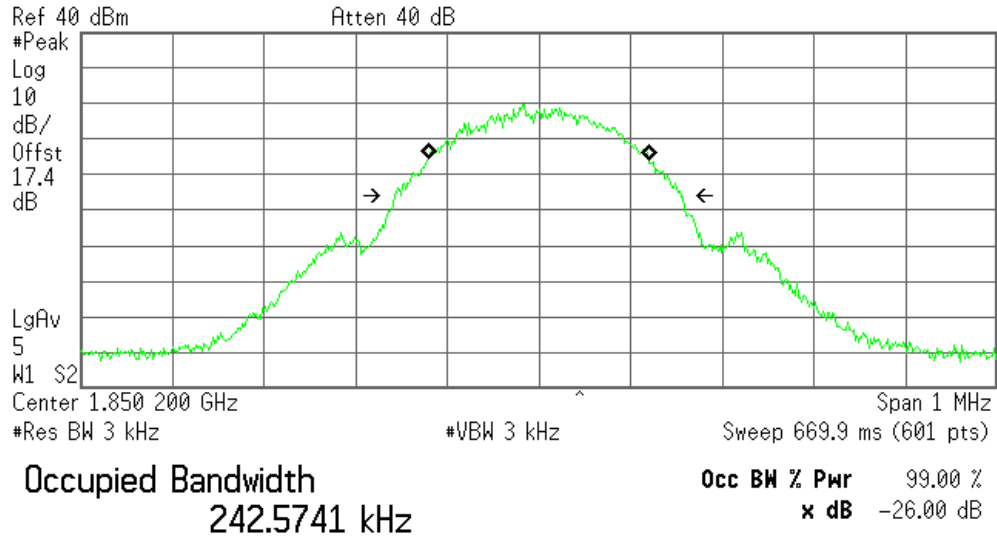
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|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 11 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.7) GMSK Occupied Bandwidth, PCS Low channel, 1850.2 MHz, 99% bandwidth

Agilent 16:08:10 Nov 7, 2005

L



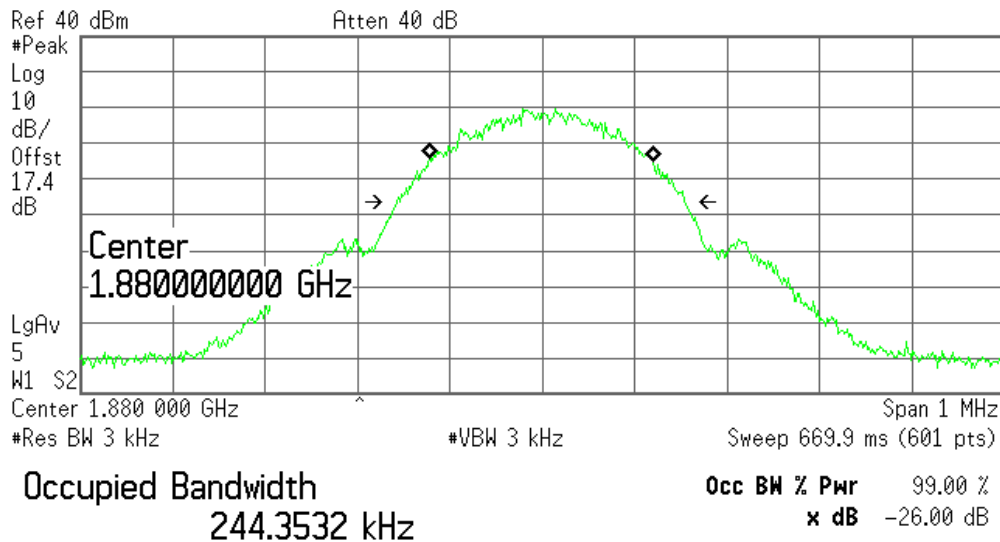
Transmit Freq Error -584.465 Hz

x dB Bandwidth 315.587 kHz\*

## 5.3.8) GMSK Occupied Bandwidth, PCS Middle channel, 1880.0 MHz, 99% bandwidth

Agilent 16:09:04 Nov 7, 2005

L



Transmit Freq Error -1.301 kHz

x dB Bandwidth 314.786 kHz\*

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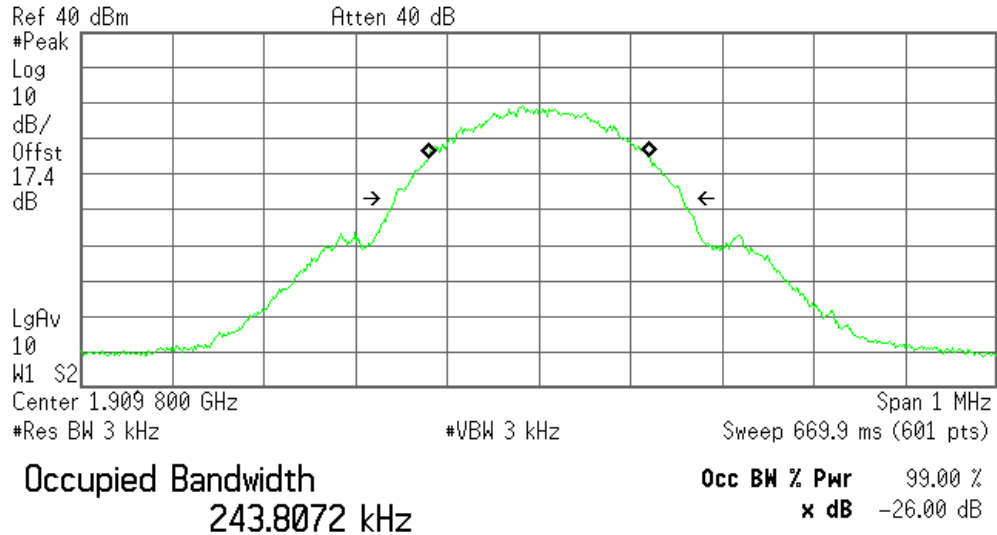
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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 12 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.9) GMSK Occupied Bandwidth, PCS High channel, 1909.8 MHz, 99% bandwidth

Agilent 16:20:44 Nov 7, 2005

L

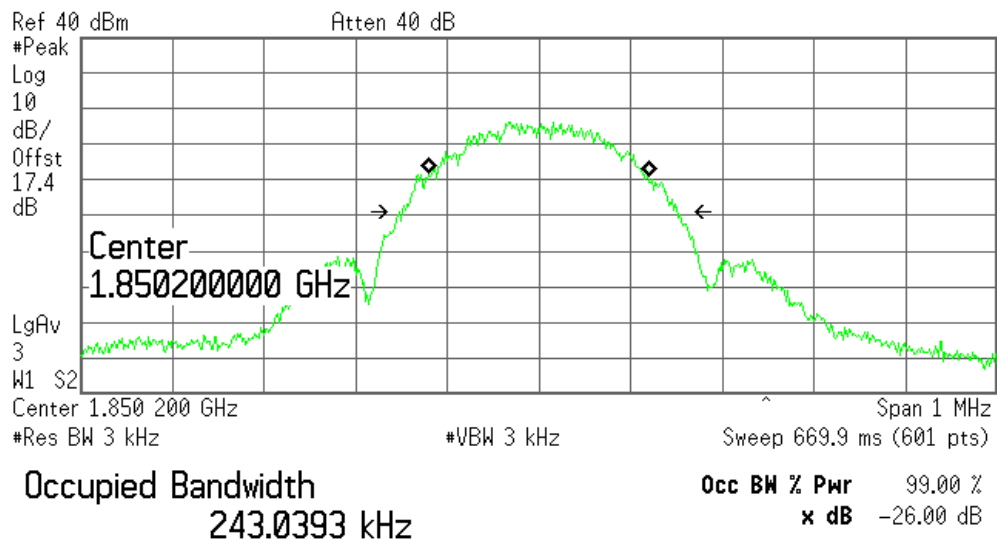


Transmit Freq Error -87.452 Hz  
x dB Bandwidth 316.538 kHz\*

## 5.3.10) 8-PSK Occupied Bandwidth, PCS Low channel, 1850.2 MHz, 99% bandwidth

Agilent 16:28:25 Nov 7, 2005

L



Transmit Freq Error -565.361 Hz  
x dB Bandwidth 305.130 kHz\*

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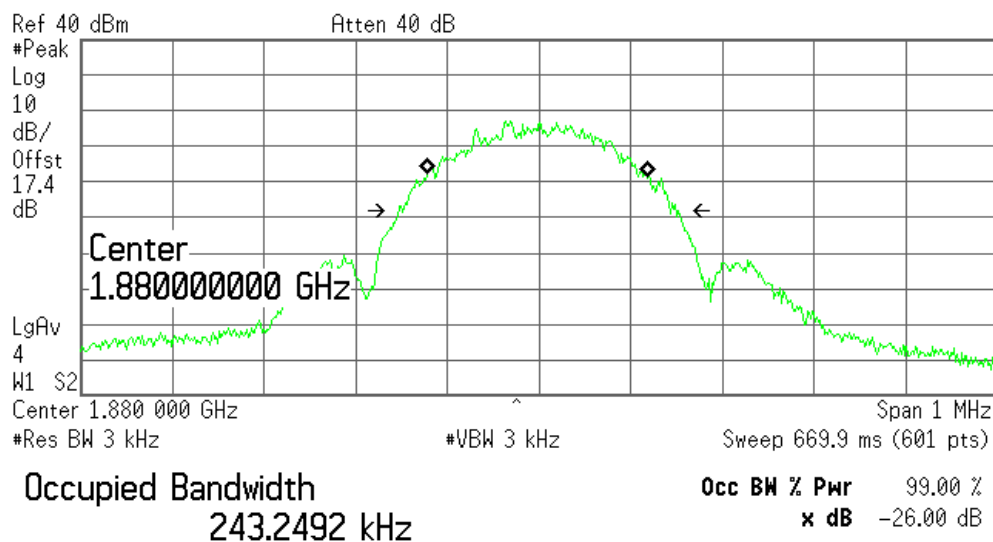
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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 13 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.11) 8-PSK Occupied Bandwidth, PCS Middle channel, 1880.0 MHz, 99% bandwidth

Agilent 16:27:18 Nov 7, 2005

L

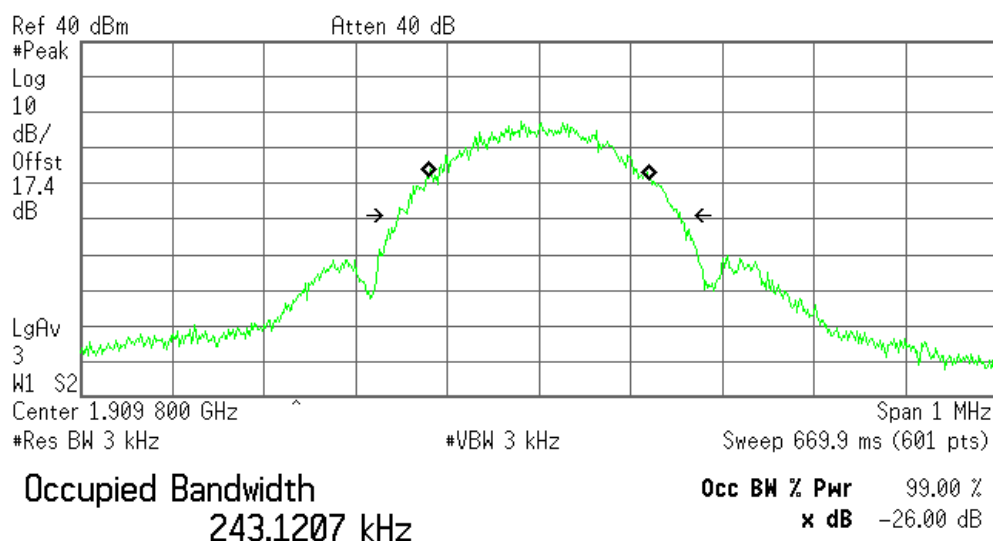


Transmit Freq Error -1.326 kHz  
x dB Bandwidth 307.527 kHz\*

## 5.3.12) 8-PSK Occupied Bandwidth, PCS High channel, 1909.8 MHz, 99% bandwidth

Agilent 16:25:27 Nov 7, 2005

L



Transmit Freq Error 483.148 Hz  
x dB Bandwidth 310.748 kHz\*

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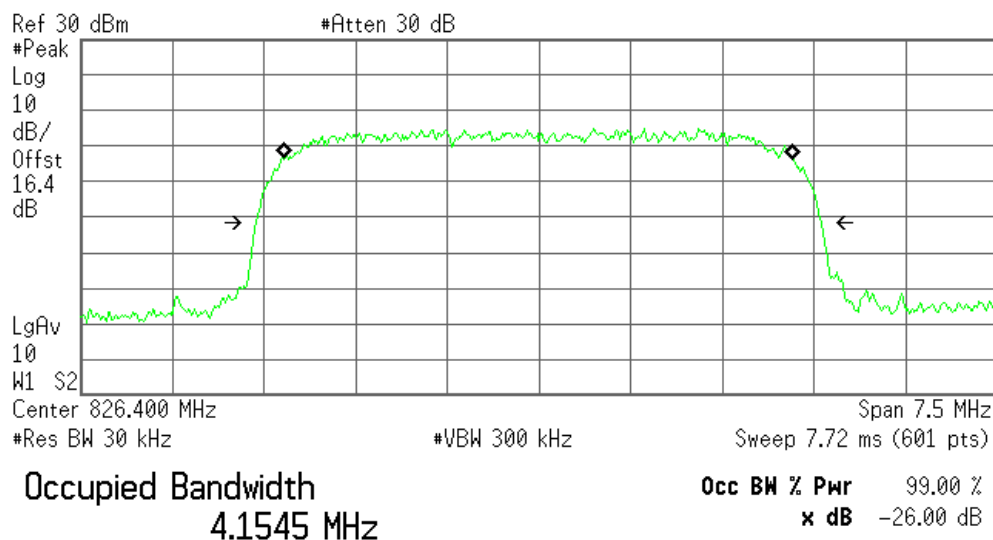
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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 14 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.13) WCDMA Occupied Bandwidth, Cellular Low channel, 826.4 MHz, 99% bandwidth

Agilent 15:38:45 Nov 7, 2005

L

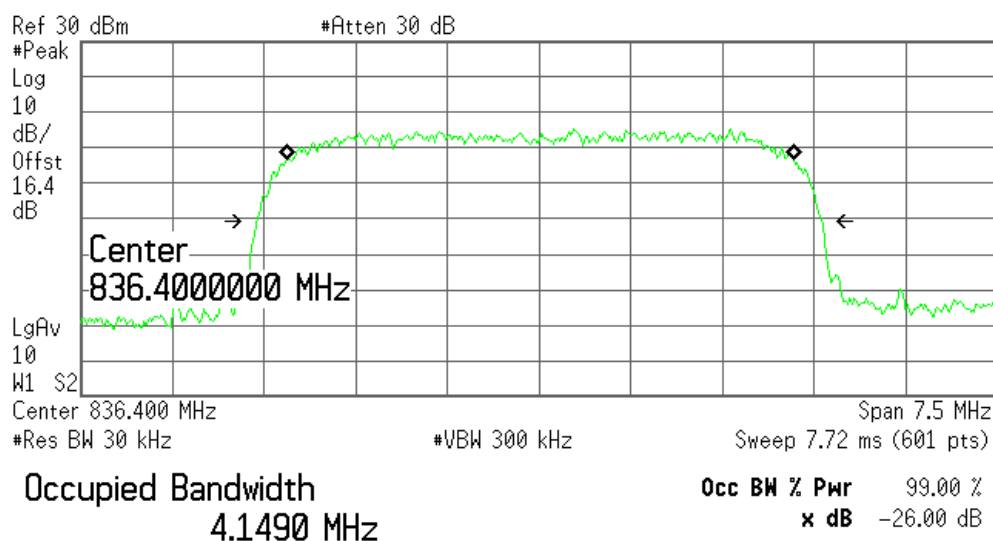


Transmit Freq Error -4.003 kHz  
x dB Bandwidth 4.619 MHz\*

## 5.3.14) WCDMA Occupied Bandwidth, Cellular Middle channel, 836.4 MHz, 99% bandwidth

Agilent 15:39:56 Nov 7, 2005

L



Transmit Freq Error 9.395 kHz  
x dB Bandwidth 4.622 MHz\*

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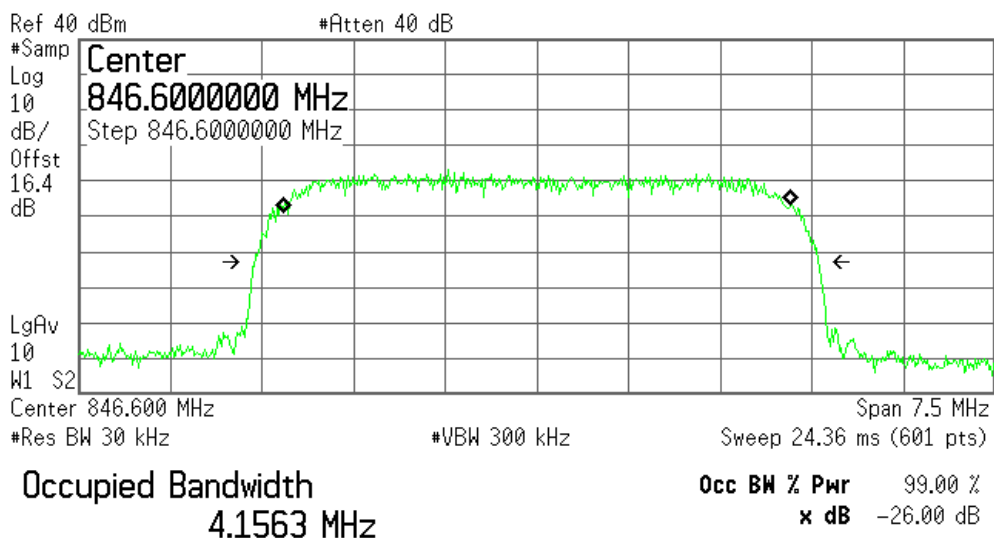
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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 15 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.15) WCDMA Occupied Bandwidth, Cellular High channel, 846.6 MHz, 99% bandwidth

Agilent 16:42:38 Nov 9, 2005

L

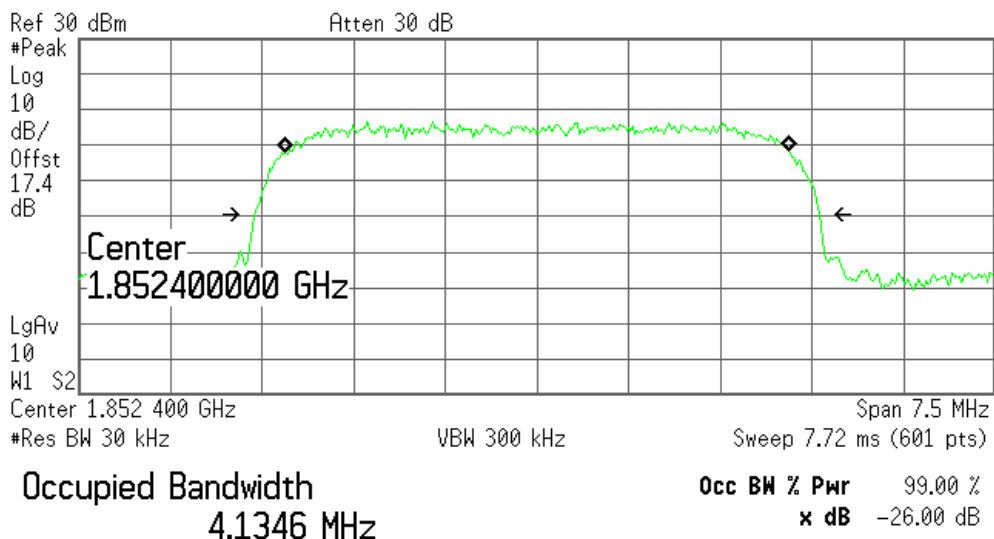


Transmit Freq Error -149.398 Hz  
x dB Bandwidth 4.608 MHz\*

## 5.3.16) WCDMA Occupied Bandwidth, PCS Low channel, 1852.4 MHz, 99% bandwidth

Agilent 15:55:54 Nov 7, 2005

L



Transmit Freq Error -286.427 Hz  
x dB Bandwidth 4.622 MHz\*

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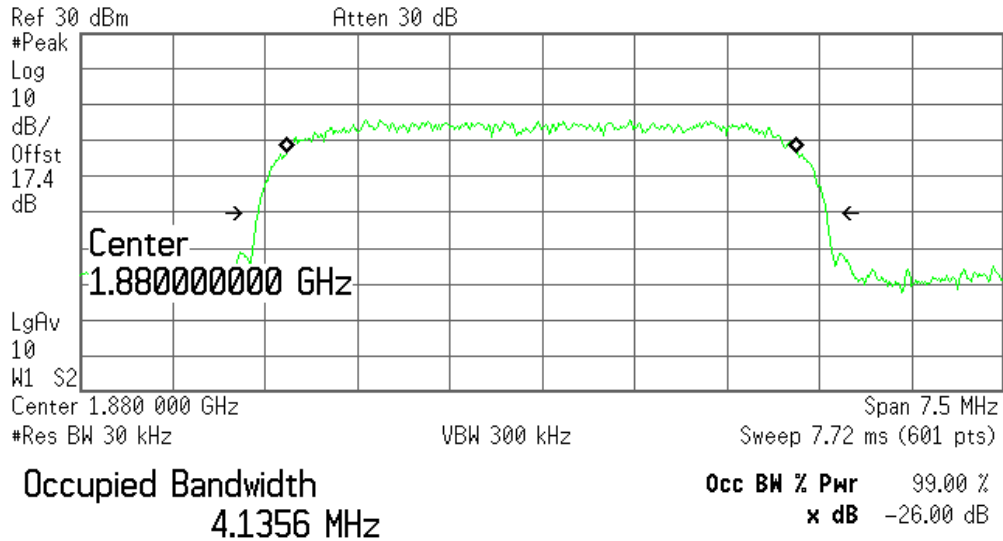
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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 16 of 72 |
|------------------------------|--------|--------------|---------------|

## 5.3.17) WCDMA Occupied Bandwidth, PCS Middle channel, 1880 MHz, 99% bandwidth

Agilent 15:57:01 Nov 7, 2005

L



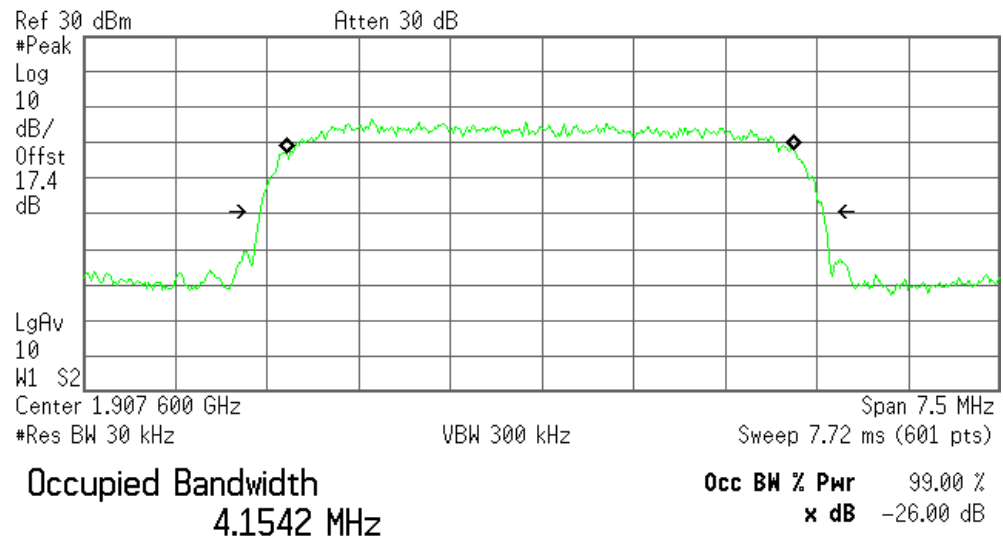
Transmit Freq Error -3.051 kHz

x dB Bandwidth 4.614 MHz\*

## 5.3.18) WCDMA Occupied Bandwidth, PCS High channel, 1907.6 MHz, 99% bandwidth

Agilent 16:00:30 Nov 7, 2005

L



Transmit Freq Error -16.623 kHz

x dB Bandwidth 4.605 MHz\*

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## 6 Out of Band Emissions at Antenna Terminals

FCC 22.901(d), 22.917, 24.238(a)

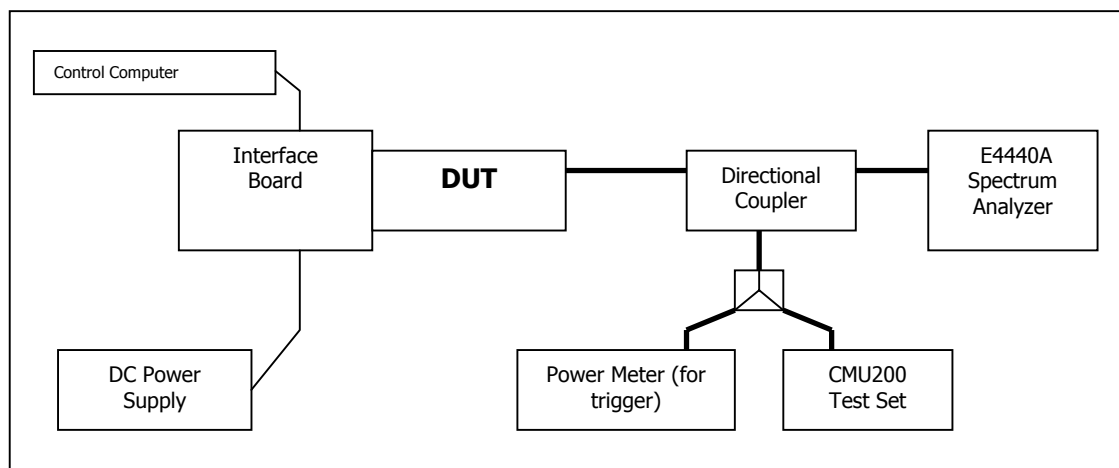
### Out of Band Emissions:

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least  $(43 + 10 \log P)$  dB, in this case, -13dBm.

### 6.1 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 10<sup>th</sup> harmonic. The DUT was scanned for spurious emissions from 1MHz to 20GHz with sufficient bandwidth and video resolution. Data plots are included. The measurement cable path loss varies since the coupler used has different loss at higher frequencies when compared to lower frequencies. To be conservative, the worst-case path loss was always chosen. While the unit was in a call, multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

### Test Setup



### 6.2 Test Equipment

| EQUIPMENT           | MANUFACTURER    | MODEL NO.  | SERIAL NO. | CAL. DATE      |
|---------------------|-----------------|------------|------------|----------------|
| Control Computer    | TC              | Generic PC | 100488     | N/A            |
| Wireless Test Set   | Rohde & Schwarz | CMU200     | 836766/030 | N/A            |
| Spectrum Analyzer   | Agilent         | PSA E4440A | US41421268 | Sept. 29, 2004 |
| DC Power Supply     | HP              | 6632A      | 3530A      | N/A            |
| Interface Board     | Shop built      | Minnow     | N/A        | N/A            |
| Directional Coupler | Mini-Circuits   | ZA3PD-2    | N/A        | N/A            |

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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 18 of 72 |
|------------------------------|--------|--------------|---------------|

### 6.3 Test Results

Refer to the following plots.

- **Cellular Band**

| Plot Number     | Description                         |
|-----------------|-------------------------------------|
| 6.4.1 – 6.4.3   | GMSK Mode, Low channel, 824.20 MHz  |
| 6.4.4 – 6.4.6   | GMSK Mode, Middle Channel, 837 MHz  |
| 6.4.7 – 6.4.9   | GMSK Mode, High Channel, 848.8 MHz  |
| 6.4.10 – 6.4.12 | 8-PSK Mode, Low channel, 824.20 MHz |
| 6.4.13 – 6.4.15 | 8-PSK Mode, Middle Channel, 837 MHz |
| 6.4.16 – 6.4.18 | 8-PSK Mode, High Channel, 848.8 MHz |

- **PCS Band**

| Plot Number     | Description                            |
|-----------------|----------------------------------------|
| 6.4.19 – 6.4.21 | GMSK Mode, Low Channel, 1850.2 MHz     |
| 6.4.22 – 6.4.24 | GMSK Mode, Middle Channel, 1880.0 MHz  |
| 6.4.25 – 6.4.27 | GMSK Mode, High Channel, 1909.8 MHz    |
| 6.4.28 – 6.4.30 | 8-PSK, Mode, Low Channel, 1850.2 MHz   |
| 6.4.31 – 6.4.33 | 8-PSK Mode, Middle Channel, 1880.0 MHz |
| 6.4.34 – 6.4.36 | 8-PSK Mode, High Channel, 1909.8 MHz   |

- **UMTS Cellular Band**

| Plot Number     | Description                           |
|-----------------|---------------------------------------|
| 6.4.37 – 6.4.39 | WCDMA Mode, Low Channel, 826.4 MHz    |
| 6.4.40 – 6.4.42 | WCDMA Mode, Middle Channel, 836.4 MHz |
| 6.4.43 – 6.4.45 | WCDMA Mode, High Channel, 846.6 MHz   |

- **UMTS PCS Band**

| Plot Number     | Description                            |
|-----------------|----------------------------------------|
| 6.4.46 – 6.4.48 | WCDMA Mode, Low Channel, 1852.4 MHz    |
| 6.4.49 – 6.4.51 | WCDMA Mode, Middle Channel, 1880.0 MHz |
| 6.4.52 – 6.4.54 | WCDMA Mode, High Channel, 1907.6 MHz   |

These plots show that the conducted emission limits requirements are met.

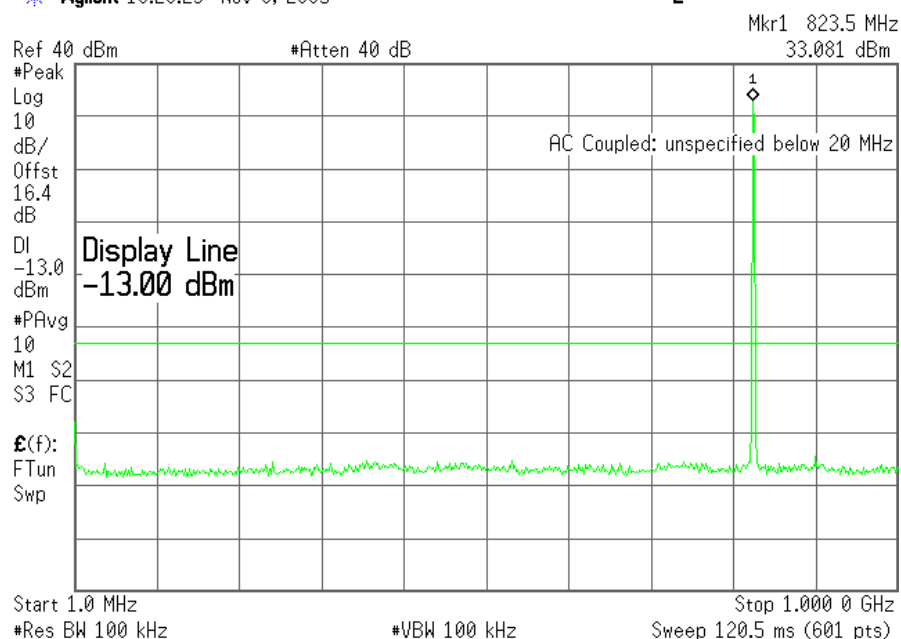
#### 6.4 Test Plots

##### Plot 6.4.1) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 824.200 MHz, 1 MHz to 1 GHz

Agilent 10:29:23 Nov 8, 2005

L

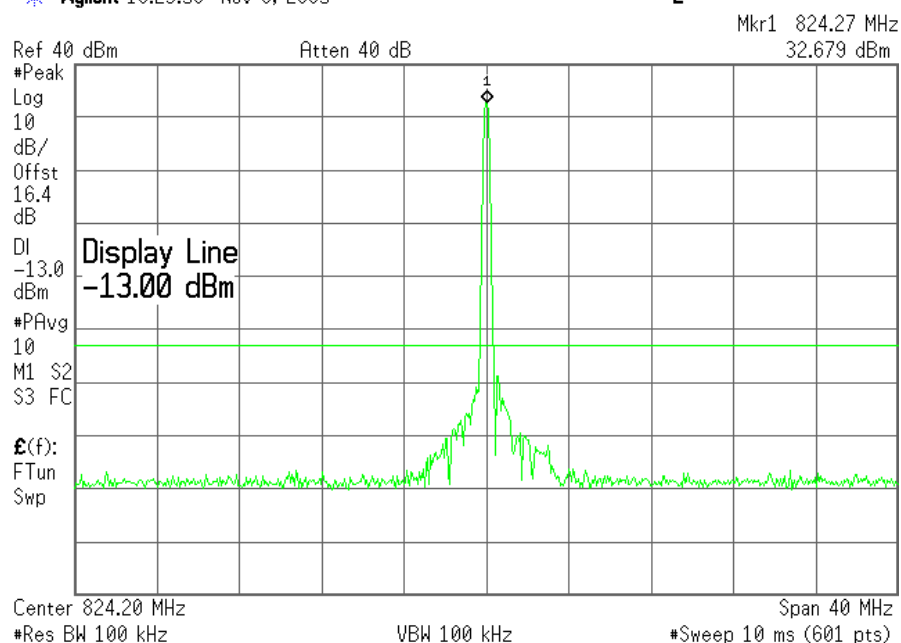


##### Plot 6.4.2) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 824.200 MHz, TX signal +/- 20 MHz

Agilent 10:23:59 Nov 9, 2005

L



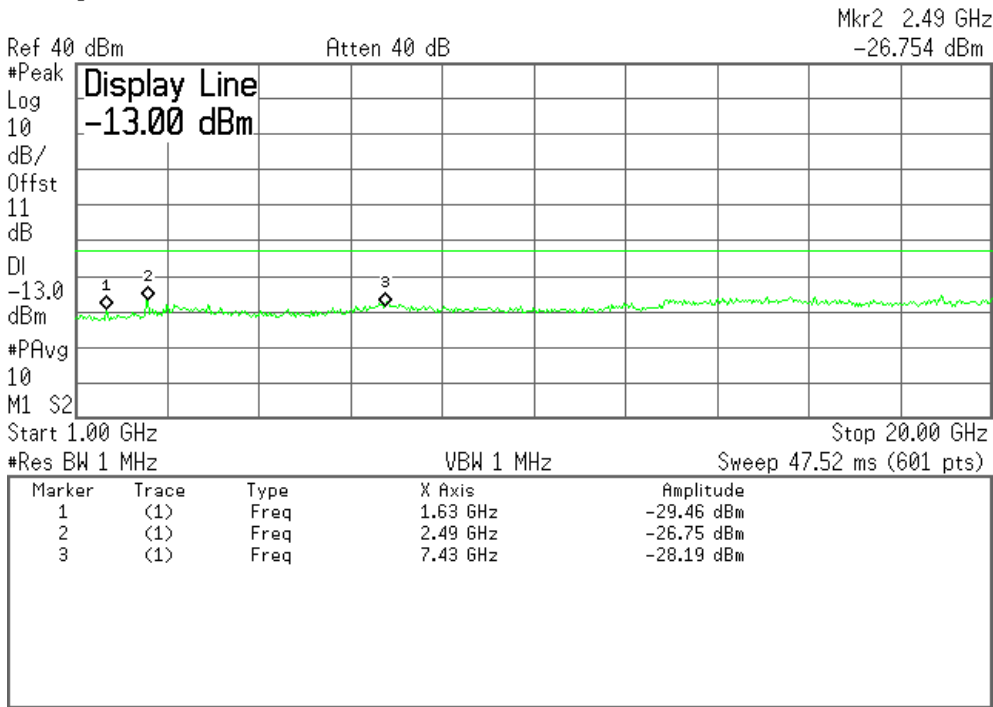
The strong emission shown in each case is the carrier signal.

**Plot 6.4.3) Out of Band Emissions at Antenna Terminals**

GMSK, Low channel, 824.200 MHz, 1 GHz to 20 GHz

Agilent 11:03:56 Nov 9, 2005

L



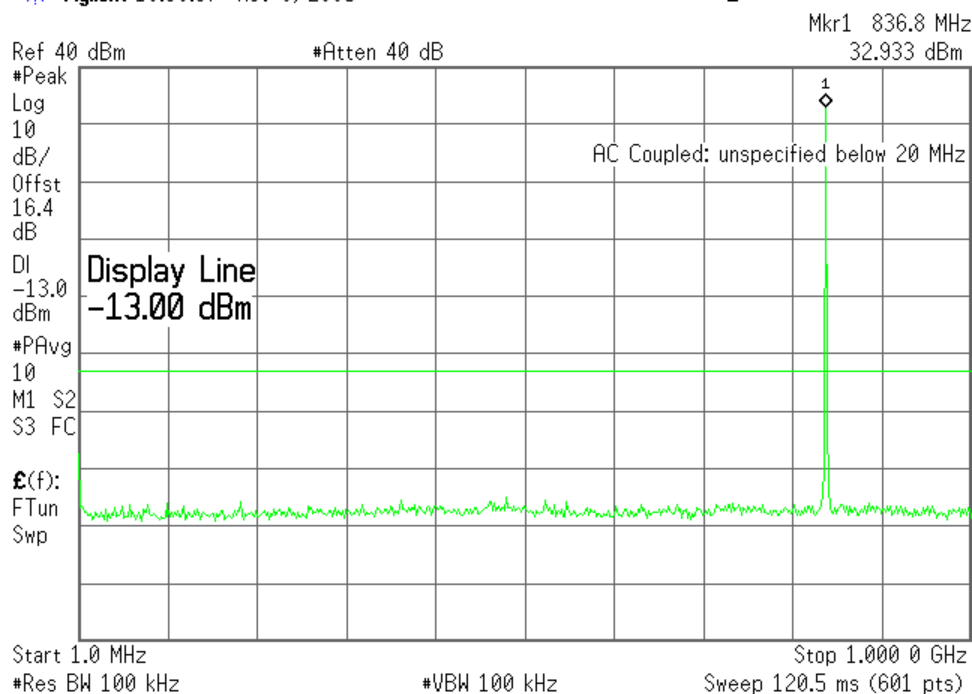
|                                               |                      |
|-----------------------------------------------|----------------------|
| Cellular Harmonics for<br>Ch. 128 (824.2 MHz) | Level (dBm)          |
| Second                                        | -29 dBm              |
| Third                                         | -26 dBm              |
| All others                                    | < -30dBm up to 20GHz |

**Plot 6.4.4) Out of Band Emissions at Antenna Terminals**

GMSK, Mid Channel, 837 MHz, 1 MHz to 1 GHz

Agilent 10:30:37 Nov 8, 2005

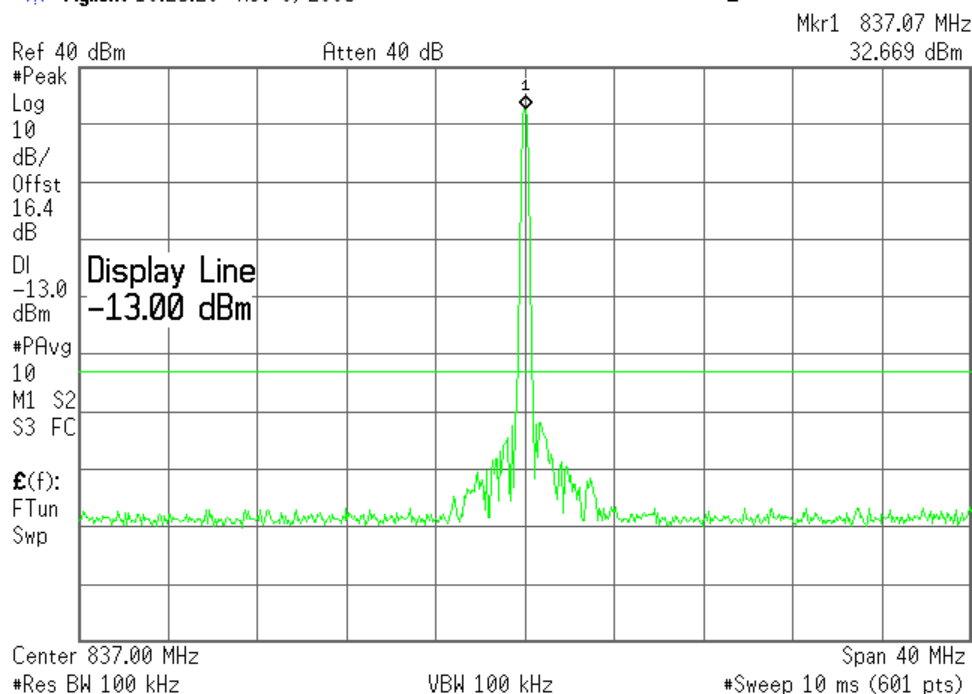
L

**Plot 6.4.5) Out of Band Emissions at Antenna Terminals**

GMSK, Mid Channel, 837 MHz, TX signal +/- 20 MHz

Agilent 10:25:20 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

# SIERRA WIRELESS, INC.

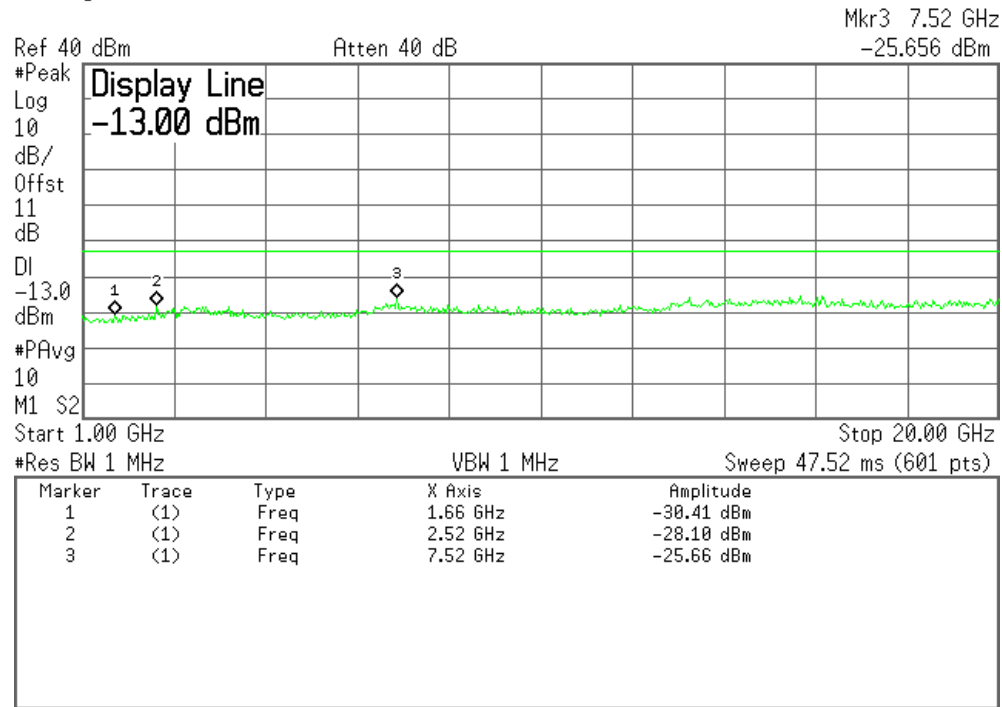
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 22 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.6) Out of Band Emissions at Antenna Terminals

GMSK, Mid Channel, 837 MHz, 1 GHz to 20 GHz

Agilent 11:05:17 Nov 9, 2005

L



| Cellular Harmonics for Ch. 190 (836.6 MHz) | Level (dBm)          |
|--------------------------------------------|----------------------|
| Second                                     | -30 dBm              |
| Third                                      | -28 dBm              |
| All others                                 | < -30dBm up to 20GHz |

# SIERRA WIRELESS, INC.

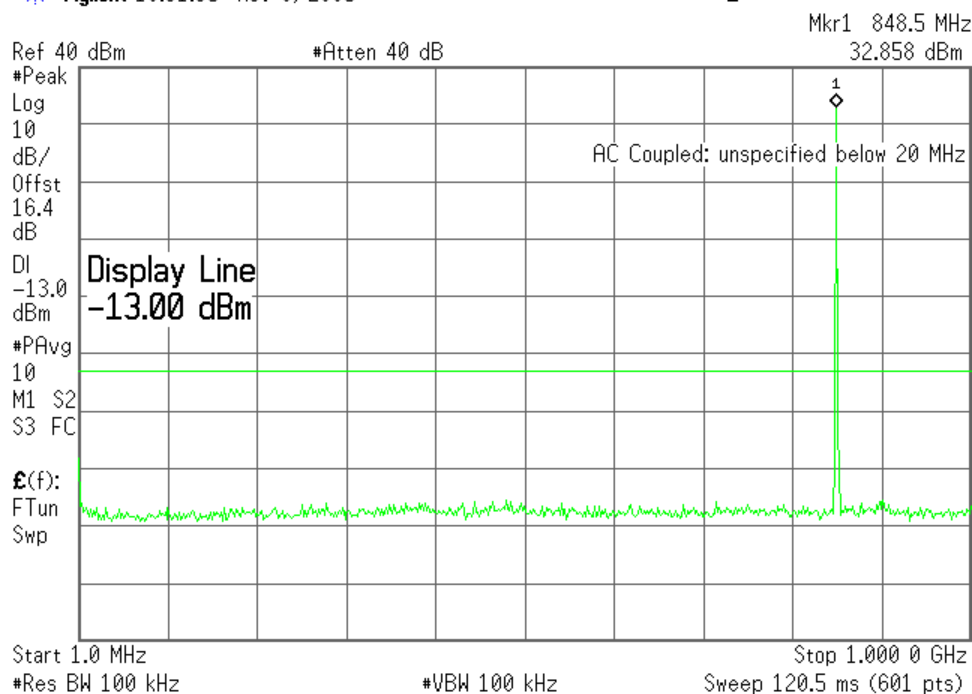
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 23 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.7) Out of Band Emissions at Antenna Terminals

GMSK, High Channel, 848.8 MHz, 1 MHz to 1 GHz

Agilent 10:31:35 Nov 8, 2005

L

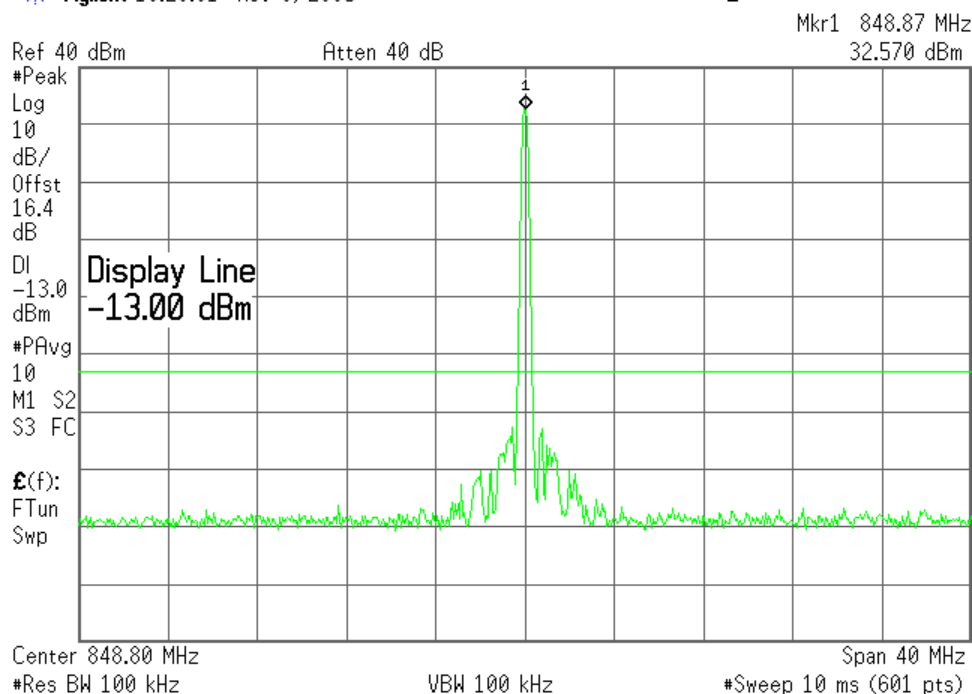


## Plot 6.4.8) Out of Band Emissions at Antenna Terminals

GMSK, High Channel, 848.8 MHz, TX signal +/- 20 MHz

Agilent 10:26:01 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

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# SIERRA WIRELESS, INC.

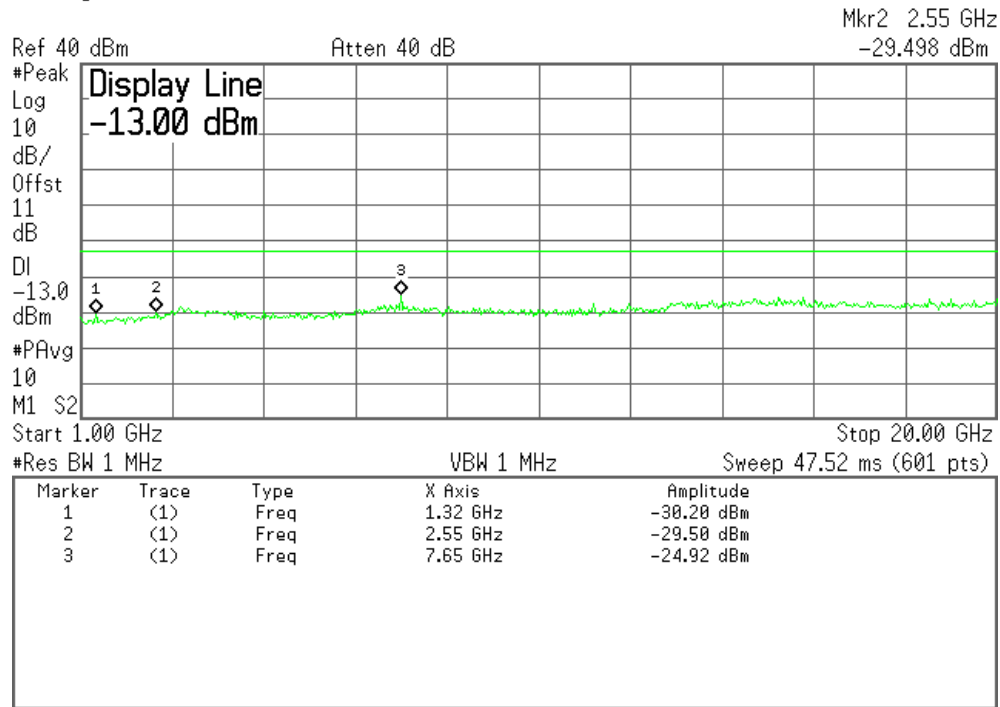
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 24 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.9) Out of Band Emissions at Antenna Terminals

GMSK, High Channel, 848.8 MHz, 1 GHz to 20 GHz

Agilent 11:07:48 Nov 9, 2005

L



| Cellular Harmonics for Ch. 251 (848.8 MHz) | Level (dBm)          |
|--------------------------------------------|----------------------|
| Second                                     | -30 dBm              |
| Third                                      | -29 dBm              |
| All others                                 | < -30dBm up to 20GHz |



# SIERRA WIRELESS, INC.

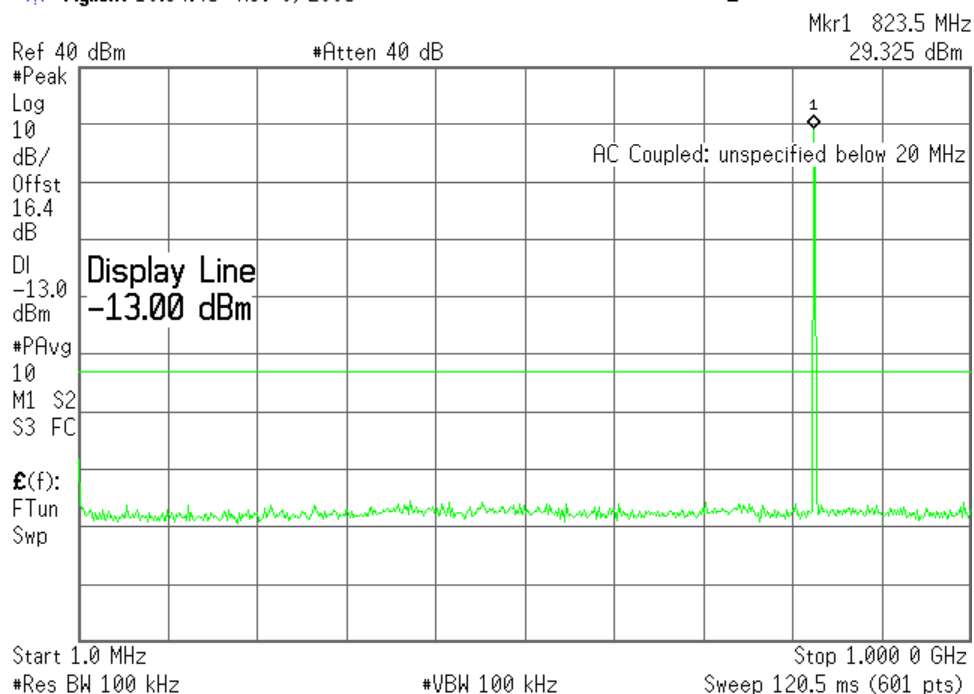
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 25 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.10) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 824.200 MHz, 1 MHz to 1 GHz

Agilent 10:34:45 Nov 8, 2005

L

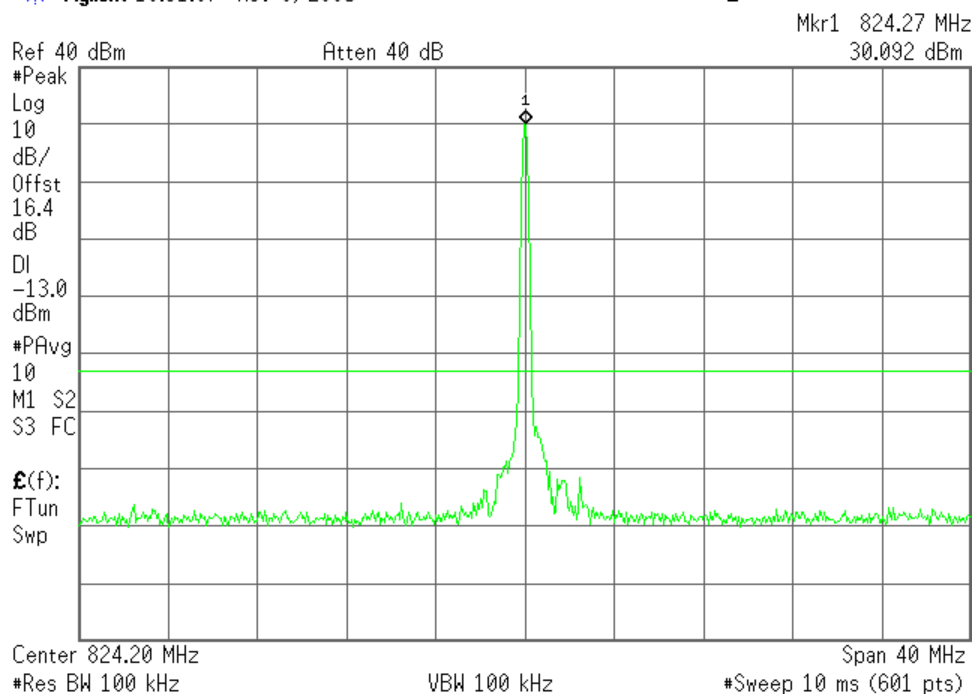


## Plot 6.4.11) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 824.200 MHz, TX signal +/- 20 MHz

Agilent 10:31:07 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

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# SIERRA WIRELESS, INC.

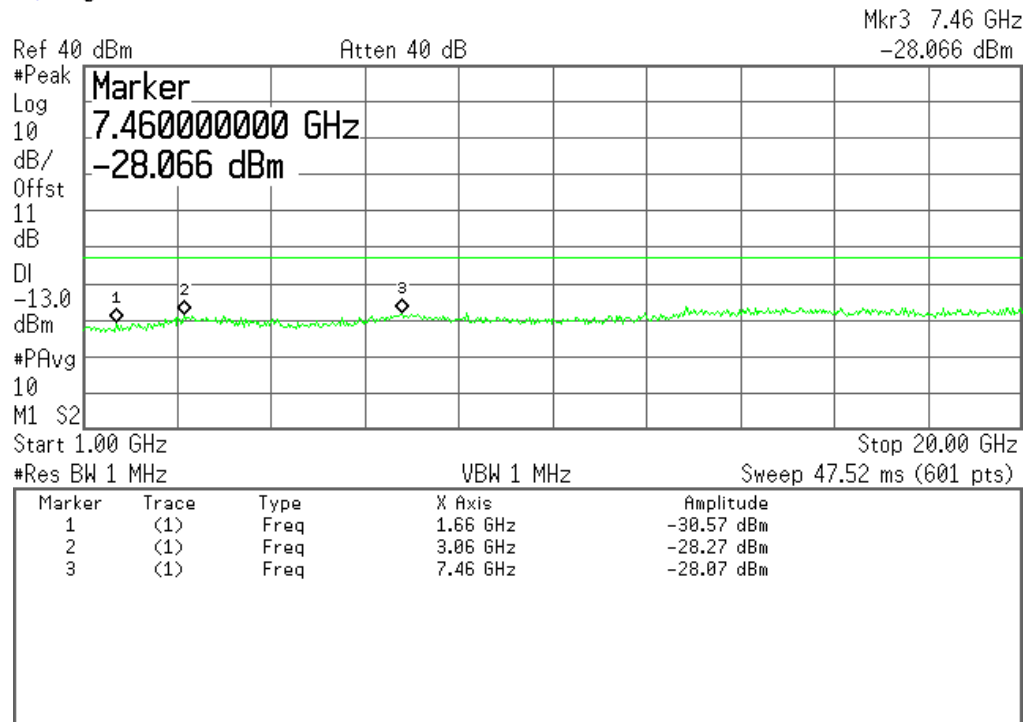
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 26 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.12) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 824.200 MHz, 1 GHz to 20 GHz

Agilent 11:09:20 Nov 9, 2005

L



| Cellular Harmonics for Ch. 128 (824.2 MHz) | Level (dBm)          |
|--------------------------------------------|----------------------|
| Second                                     | -30dBm               |
| Third                                      | -28dBm               |
| All others                                 | < -30dBm up to 20GHz |

# SIERRA WIRELESS, INC.

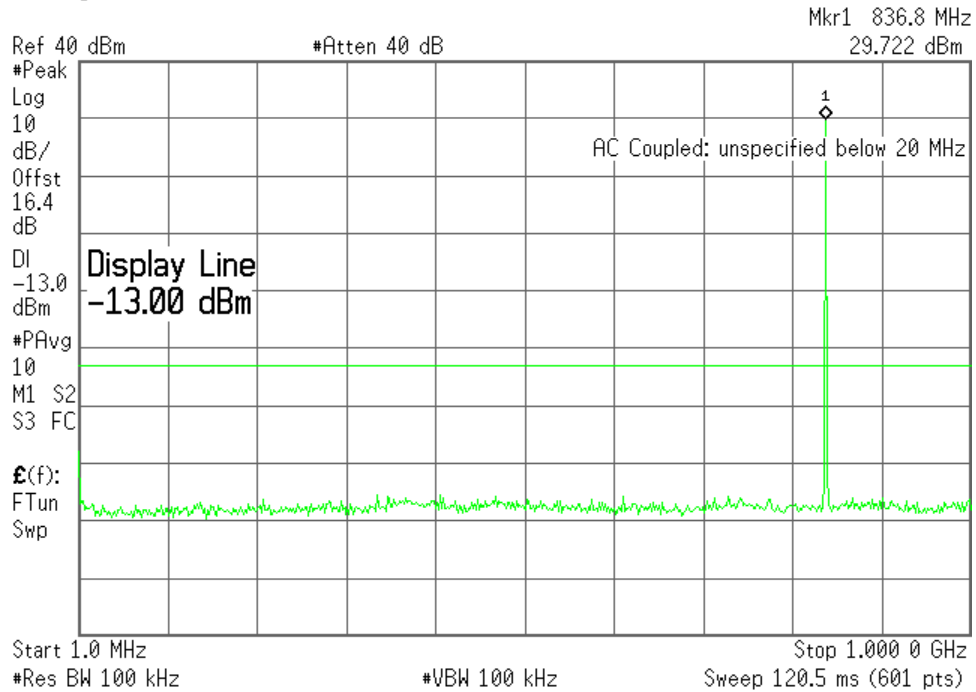
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 27 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.13) Out of Band Emissions at Antenna Terminals

8-PSK, Mid Channel, 837 MHz, 1 MHz to 1 GHz

Agilent 10:33:48 Nov 8, 2005

L

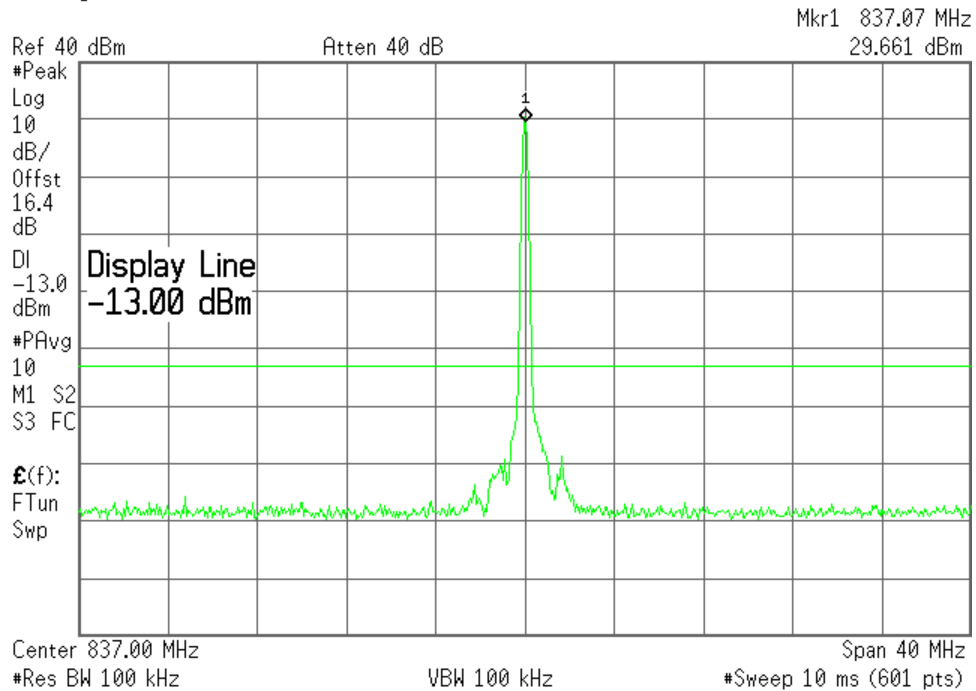


## Plot 6.4.14) Out of Band Emissions at Antenna Terminals

8-PSK, Mid Channel, 837 MHz, TX signal +/- 20 MHz

Agilent 10:28:09 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

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SIERRA WIRELESS, INC.

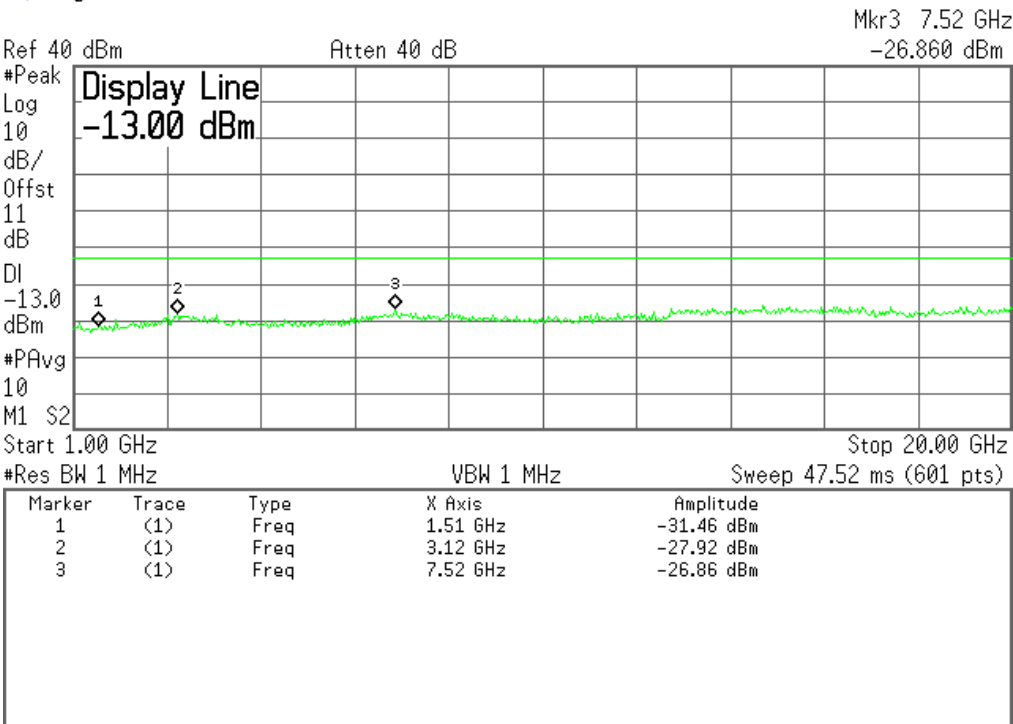
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 28 of 72 |
|------------------------------|--------|--------------|---------------|

Plot 6.4.15) Out of Band Emissions at Antenna Terminals

8-PSK, Mid Channel, 836.6 MHz, 1 GHz to 20 GHz

Agilent 11:11:22 Nov 9, 2005

L



| Cellular Harmonics for<br>Ch. 190 (836.6 MHz) | Level (dBm)          |
|-----------------------------------------------|----------------------|
| Second                                        | --                   |
| Third                                         | --                   |
| All others                                    | < -30dBm up to 20GHz |

# SIERRA WIRELESS, INC.

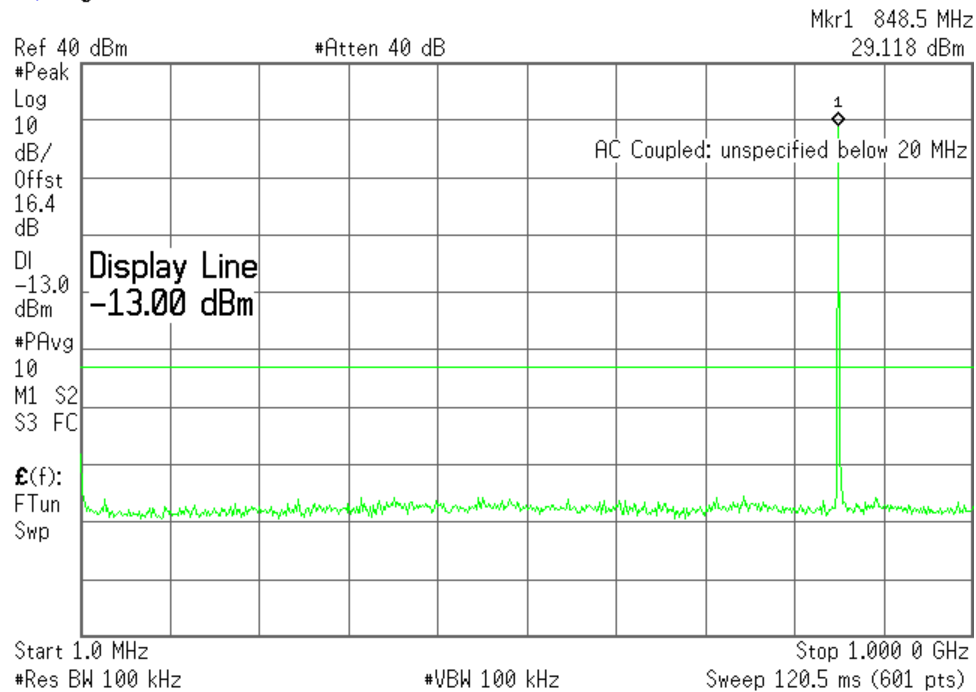
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 29 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.16) Out of Band Emissions at Antenna Terminals

8-PSK, High Channel, 848.8 MHz, 1 MHz to 1 GHz

Agilent 10:32:36 Nov 8, 2005

L

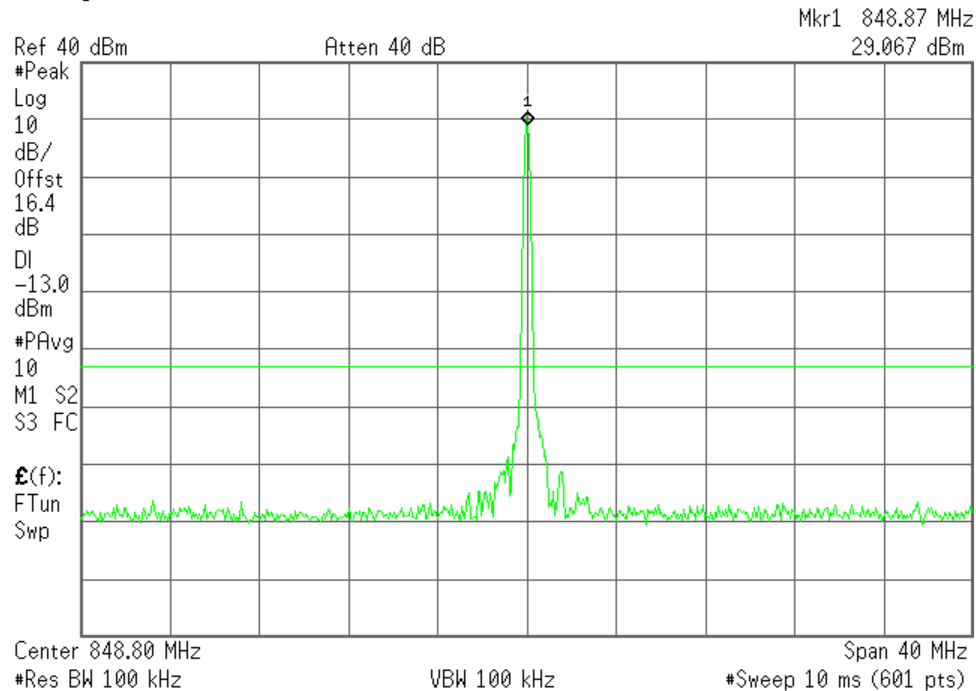


## Plot 6.4.17) Out of Band Emissions at Antenna Terminals

8-PSK, High Channel, 848.8 MHz, TX signal +/- 20 MHz

Agilent 10:29:48 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

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# SIERRA WIRELESS, INC.

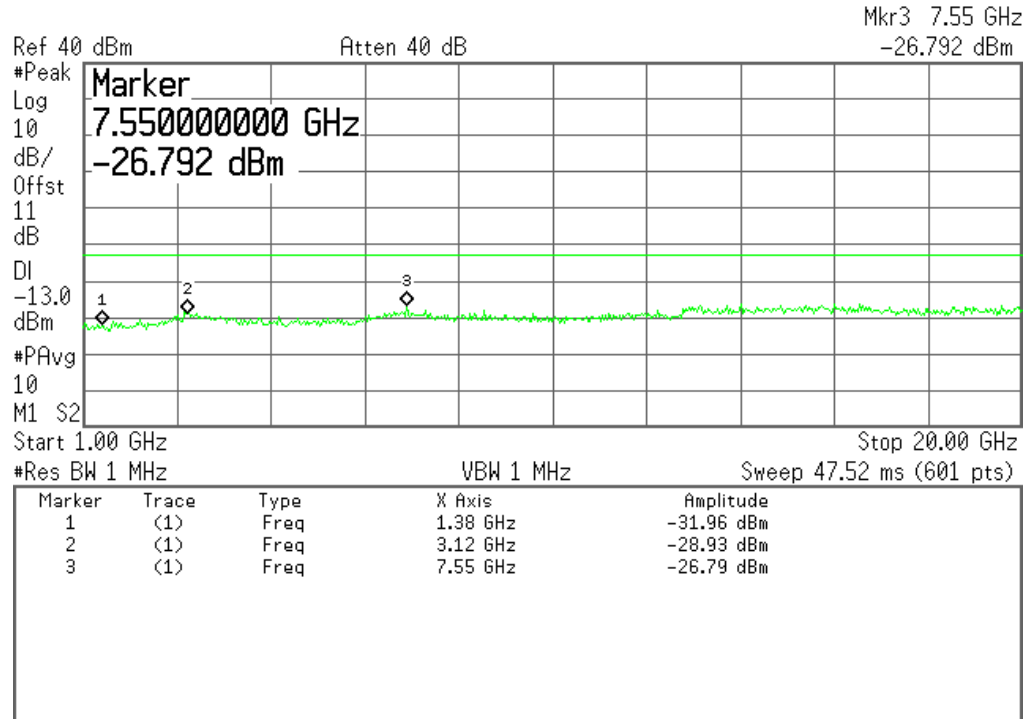
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 30 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.18) Out of Band Emissions at Antenna Terminals

8-PSK, High Channel, 848.8 MHz, 1 GHz to 20 GHz

Agilent 11:12:15 Nov 9, 2005

L



| Cellular Harmonics for Ch. 251 (848.8 MHz) | Level (dBm)          |
|--------------------------------------------|----------------------|
| Second                                     | --                   |
| Third                                      | --                   |
| All others                                 | < -30dBm up to 20GHz |

# SIERRA WIRELESS, INC.

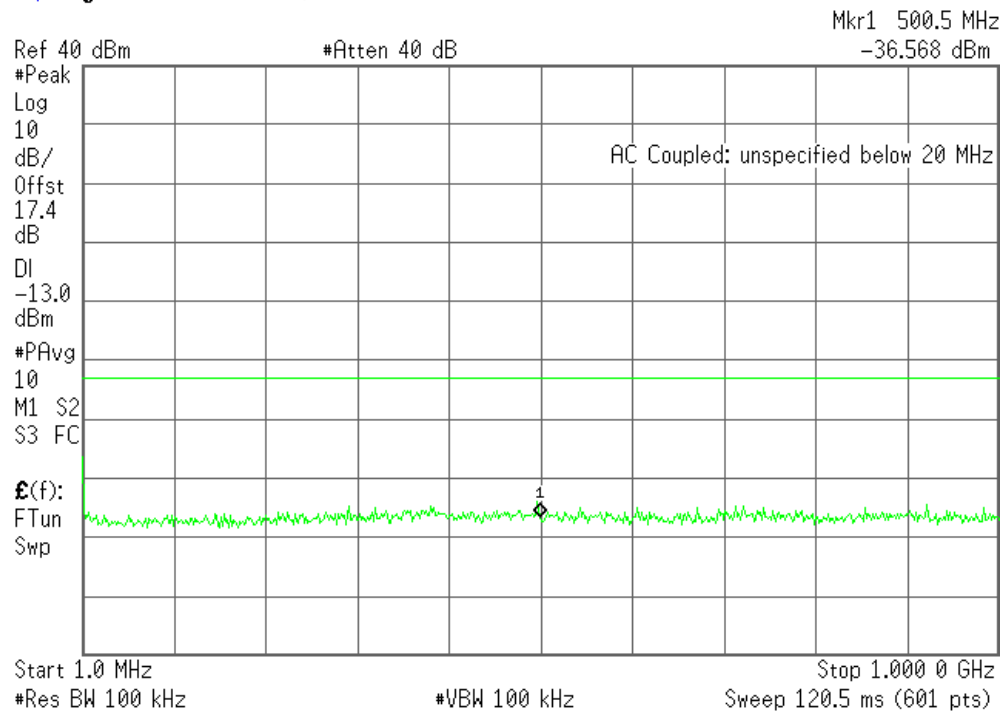
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 31 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.19) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 1850.2 MHz, 1 MHz to 1 GHz

Agilent 10:20:44 Nov 8, 2005

L

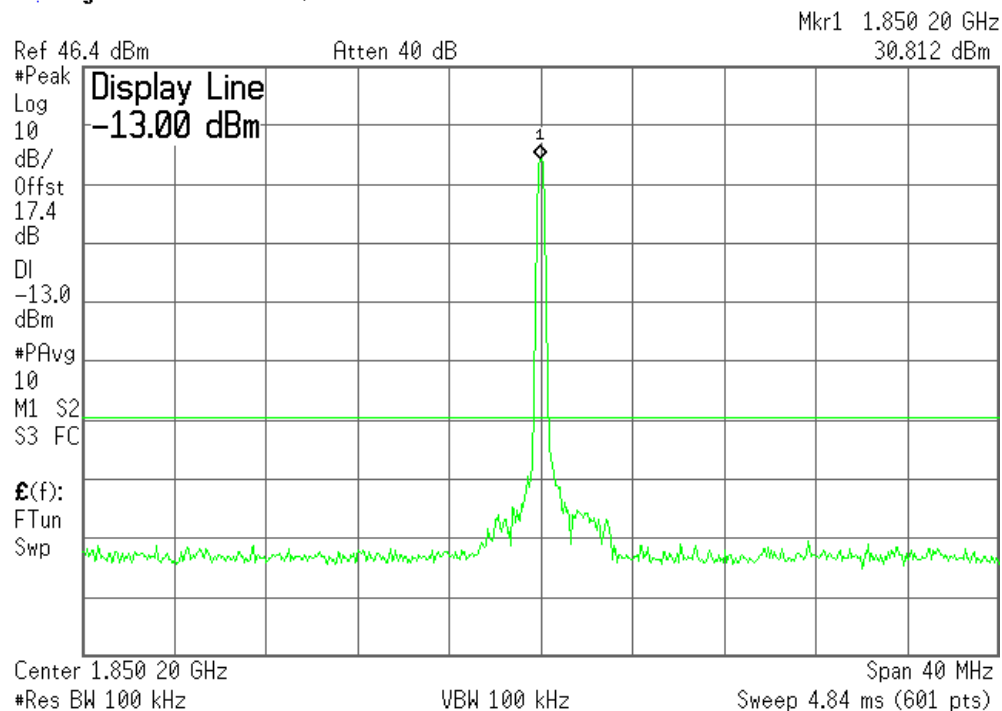


## Plot 6.4.20) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 1850.2 MHz, TX signal +/- 20 MHz

Agilent 11:45:39 Nov 9, 2005

L



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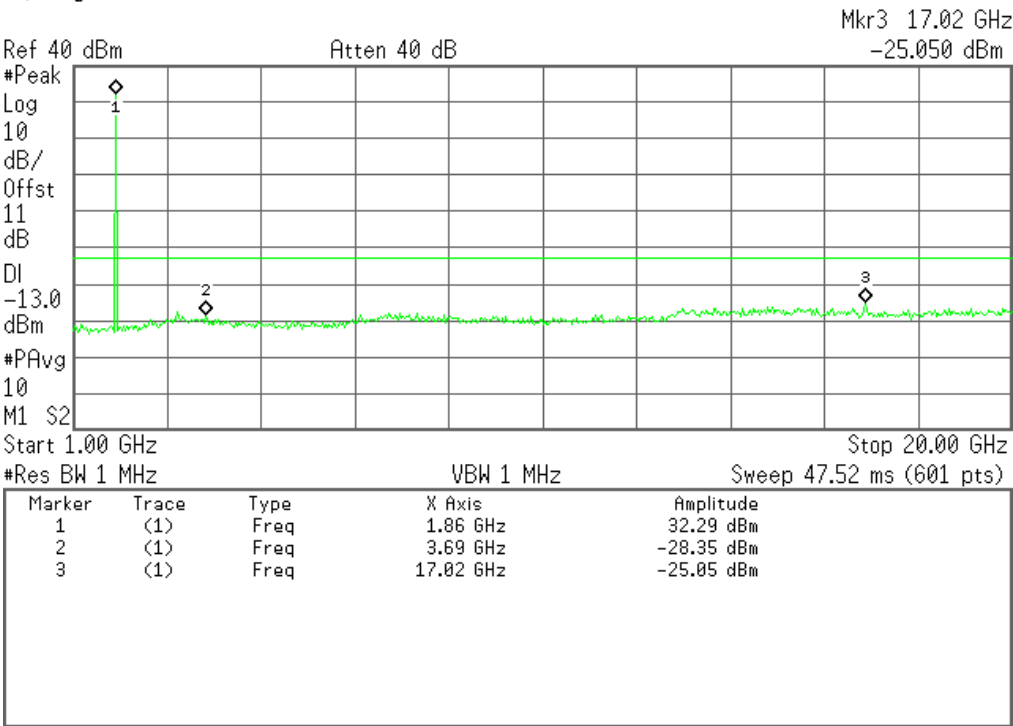
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 32 of 72 |
|------------------------------|--------|--------------|---------------|

Plot 6.4.21) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 1850.2 MHz, 1 GHz to 20 GHz

Agilent 11:16:58 Nov 9, 2005

L



The strong emission shown is the carrier signal.



# SIERRA WIRELESS, INC.

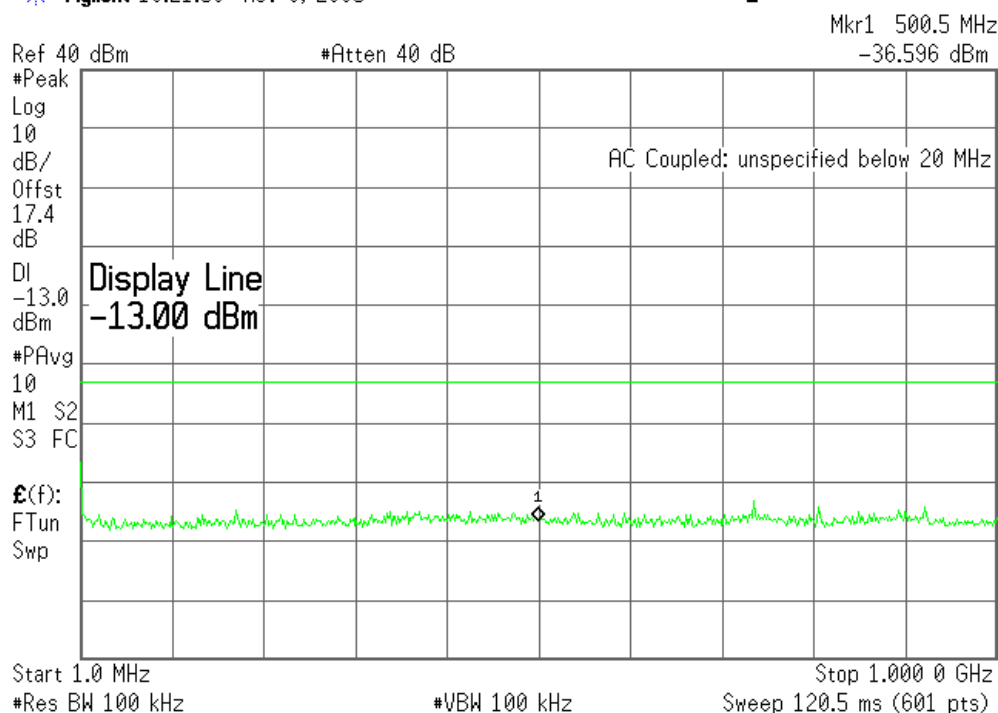
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 33 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.22) Out of Band Emissions at Antenna Terminals

GMSK, Middle channel, 1880.0 MHz, 1 MHz to 1 GHz

Agilent 10:21:58 Nov 8, 2005

L

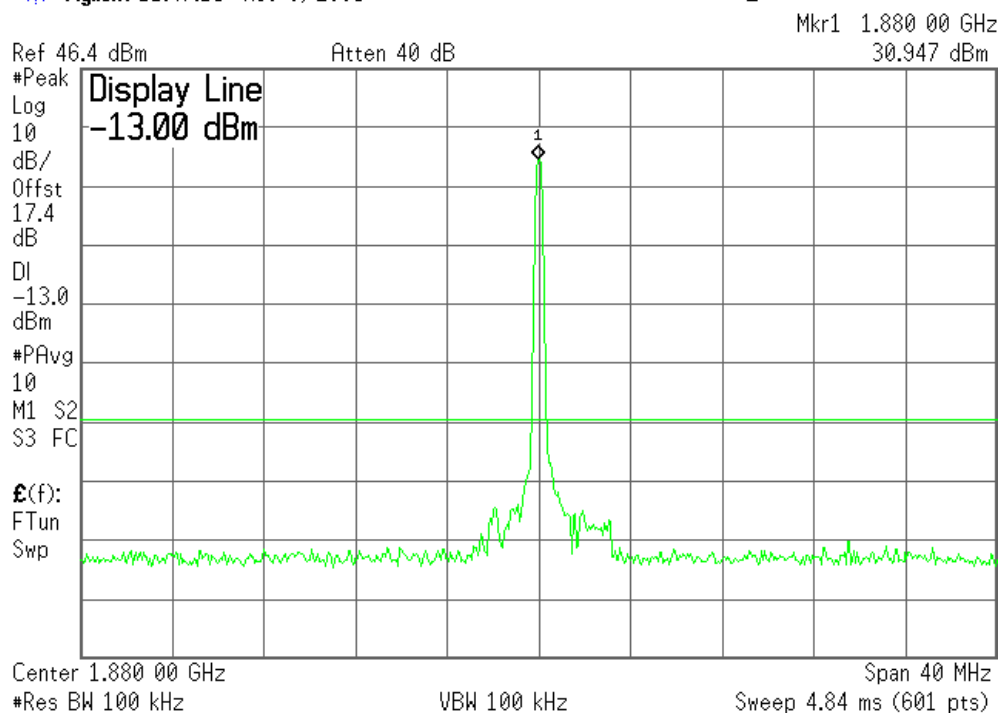


## Plot 6.4.23) Out of Band Emissions at Antenna Terminals

GMSK, Middle channel, 1880.0 MHz, TX signal +/- 20 MHz

Agilent 11:47:15 Nov 9, 2005

L



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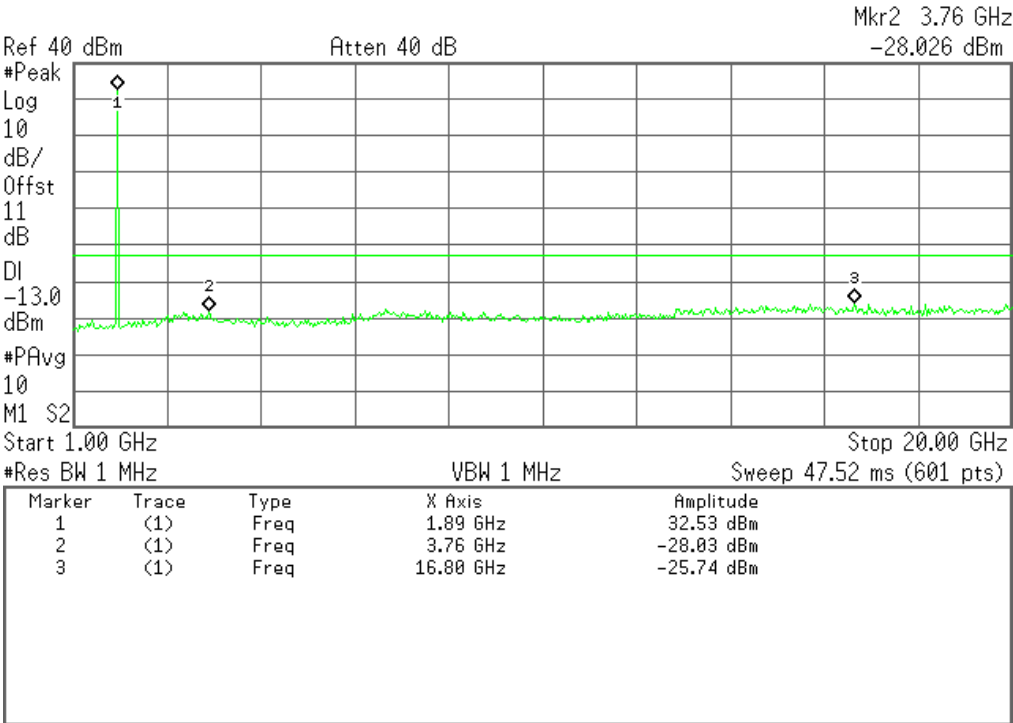
The contents of this page are subject to the confidentiality information on page one.

**Plot 6.4.24) Out of Band Emissions at Antenna Terminals**

GMSK, Middle channel, 1880.0 MHz, 1 GHz to 20 GHz

Agilent 11:18:17 Nov 9, 2005

L



The strong emission shown is the carrier signal.

# SIERRA WIRELESS, INC.

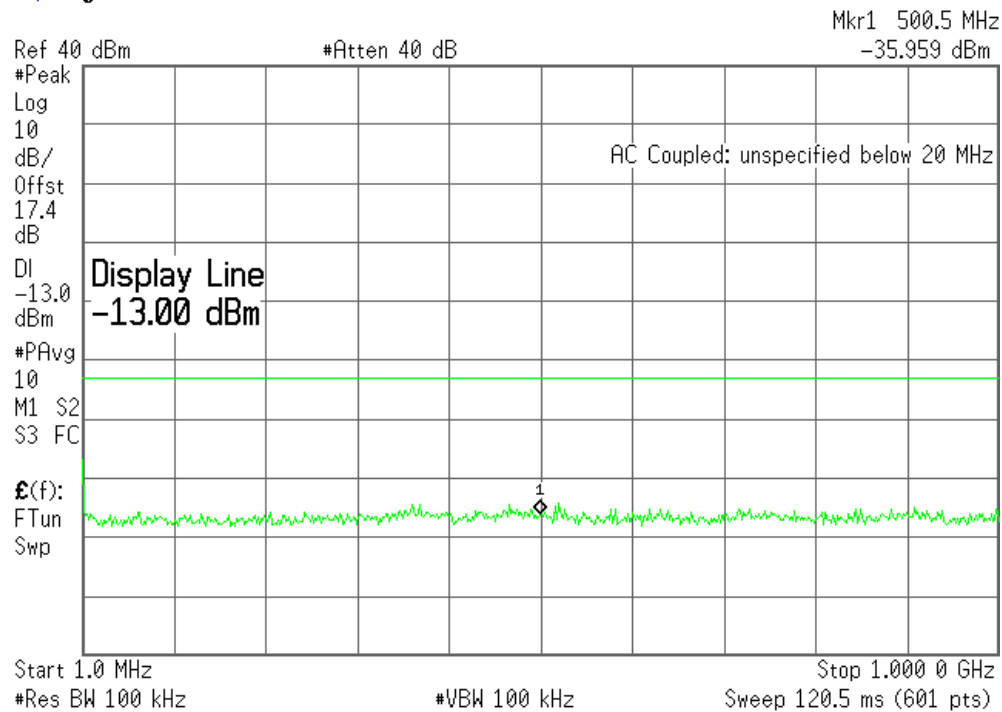
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 35 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.25) Out of Band Emissions at Antenna Terminals

GMSK, High channel, 1909.8 MHz, 1 MHz to 1 GHz

Agilent 10:23:26 Nov 8, 2005

L

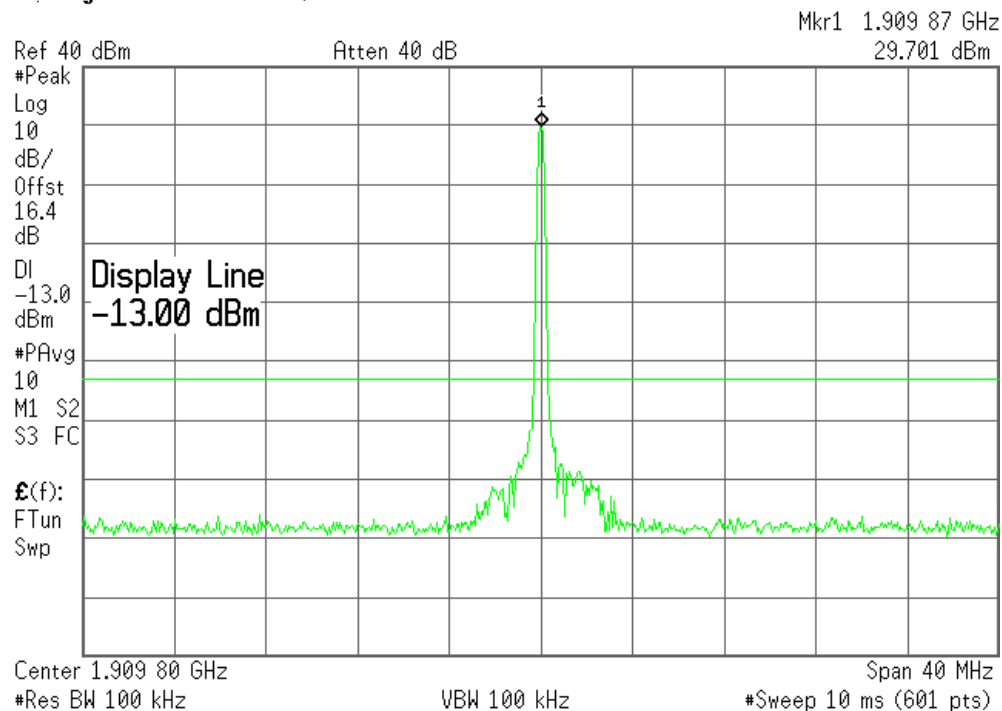


## Plot 6.4.26) Out of Band Emissions at Antenna Terminals

GMSK, High channel, 1909.8 MHz, TX signal +/- 20 MHz

Agilent 10:35:57 Nov 9, 2005

L



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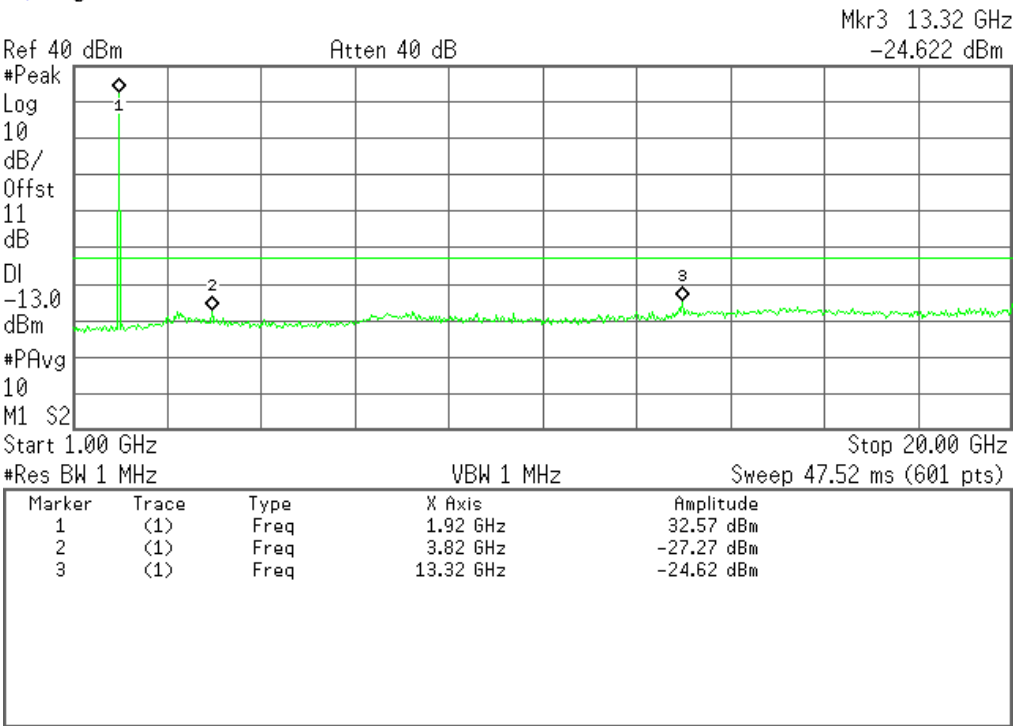
The contents of this page are subject to the confidentiality information on page one.

**Plot 6.4.27) Out of Band Emissions at Antenna Terminals**

GMSK, High channel, 1909.8 MHz, 1 GHz to 20 GHz

Agilent 11:19:26 Nov 9, 2005

L



The strong emission shown is the carrier signal.

# SIERRA WIRELESS, INC.

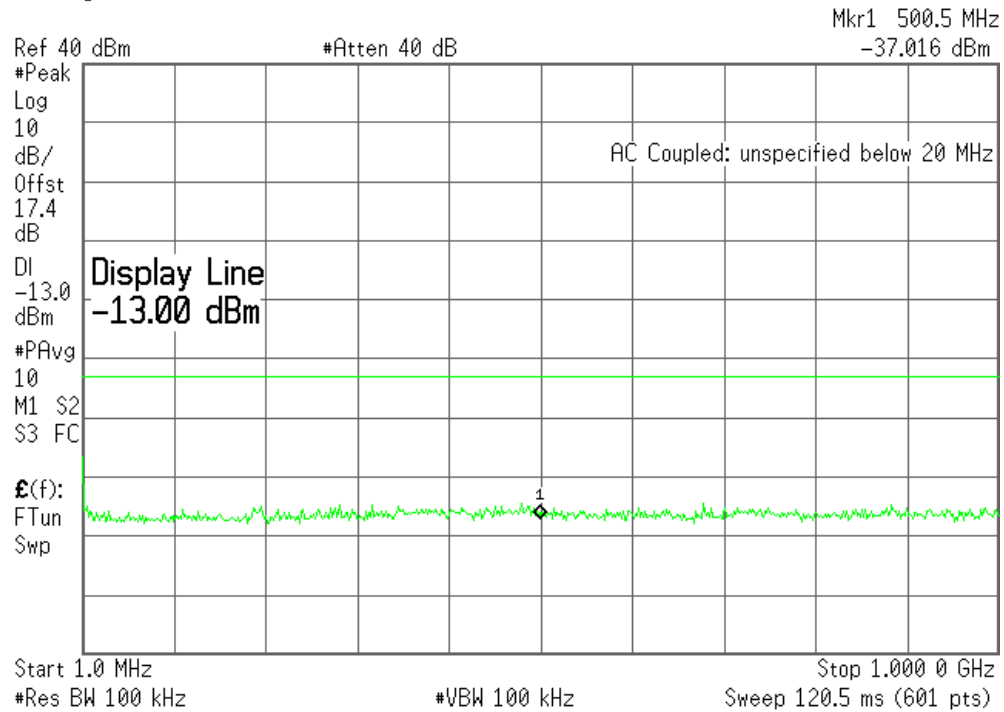
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 37 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.28) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 1850.2 MHz, 1 MHz to 1 GHz

Agilent 10:24:50 Nov 8, 2005

L

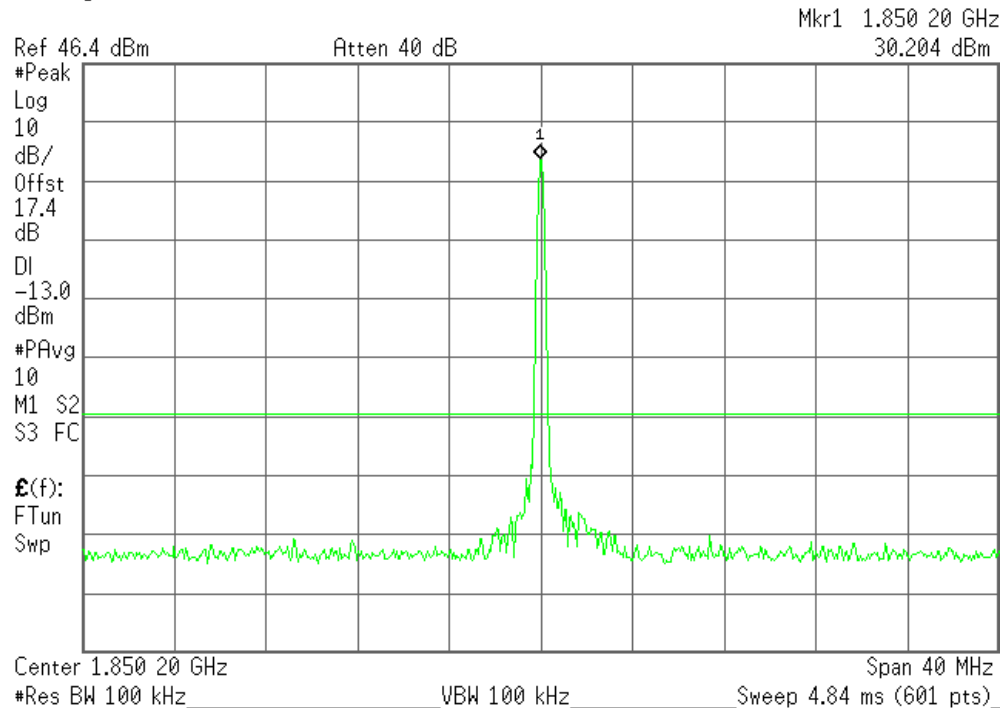


## Plot 6.4.29) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 1850.2 MHz, TX signal +/- 20 MHz

Agilent 11:48:39 Nov 9, 2005

L



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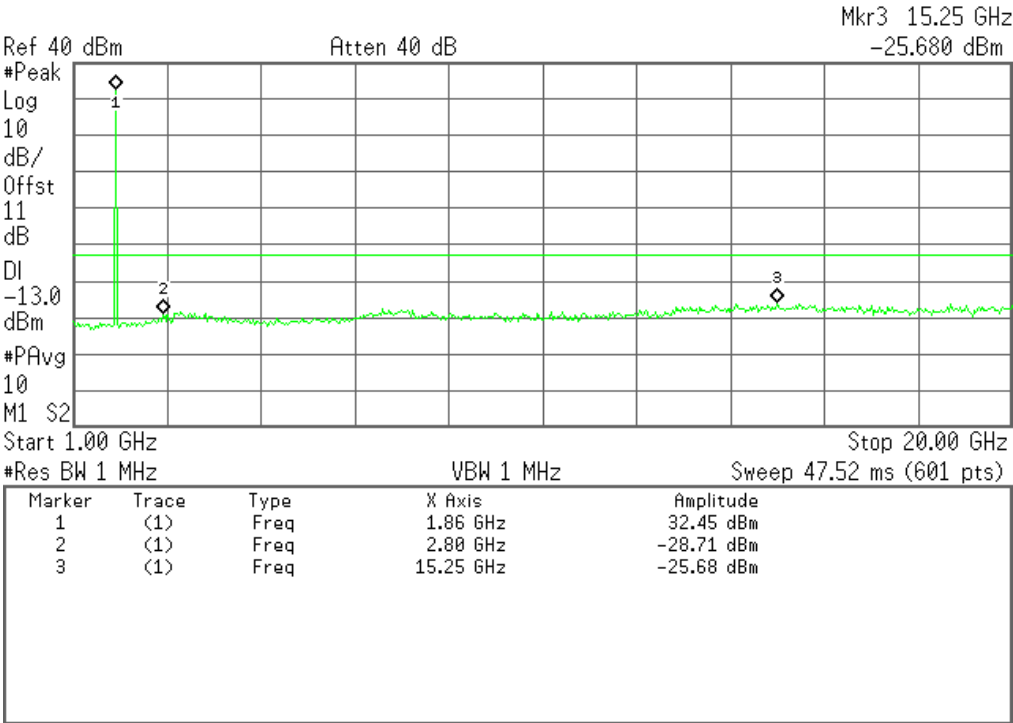
The contents of this page are subject to the confidentiality information on page one.

**Plot 6.4.30) Out of Band Emissions at Antenna Terminals**

8-PSK, Low channel, 1850.2 MHz, 1 GHz to 20 GHz

Agilent 11:21:29 Nov 9, 2005

L



The strong emission shown is the carrier signal.

# SIERRA WIRELESS, INC.

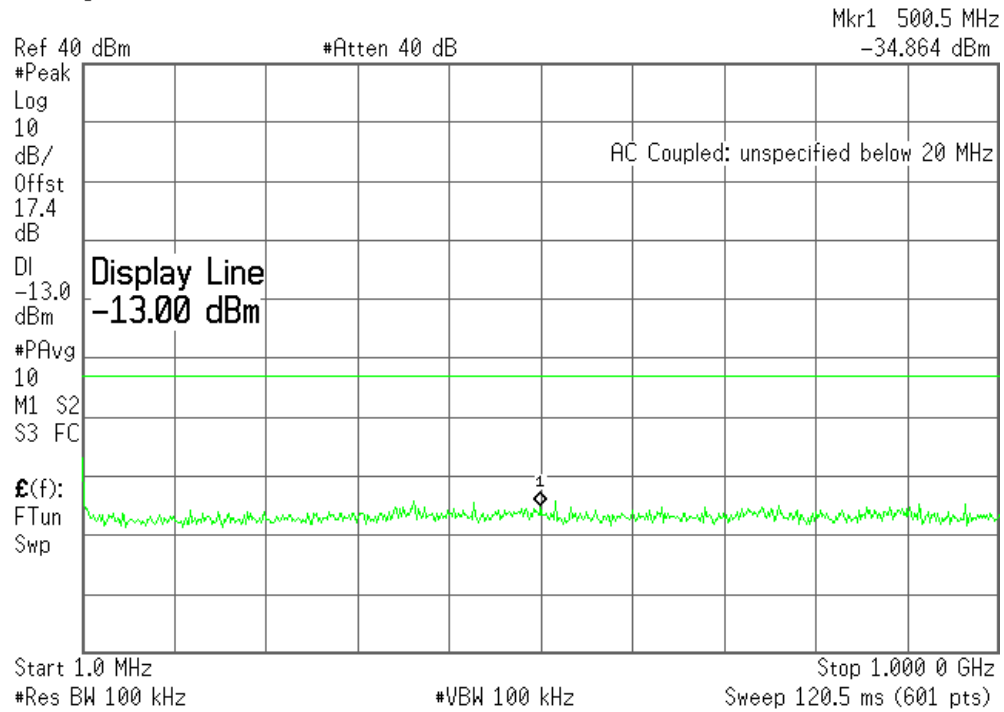
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 39 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.31) Out of Band Emissions at Antenna Terminals

8-PSK, Middle channel, 1880.0 MHz, 1 MHz to 1 GHz

Agilent 10:25:44 Nov 8, 2005

L

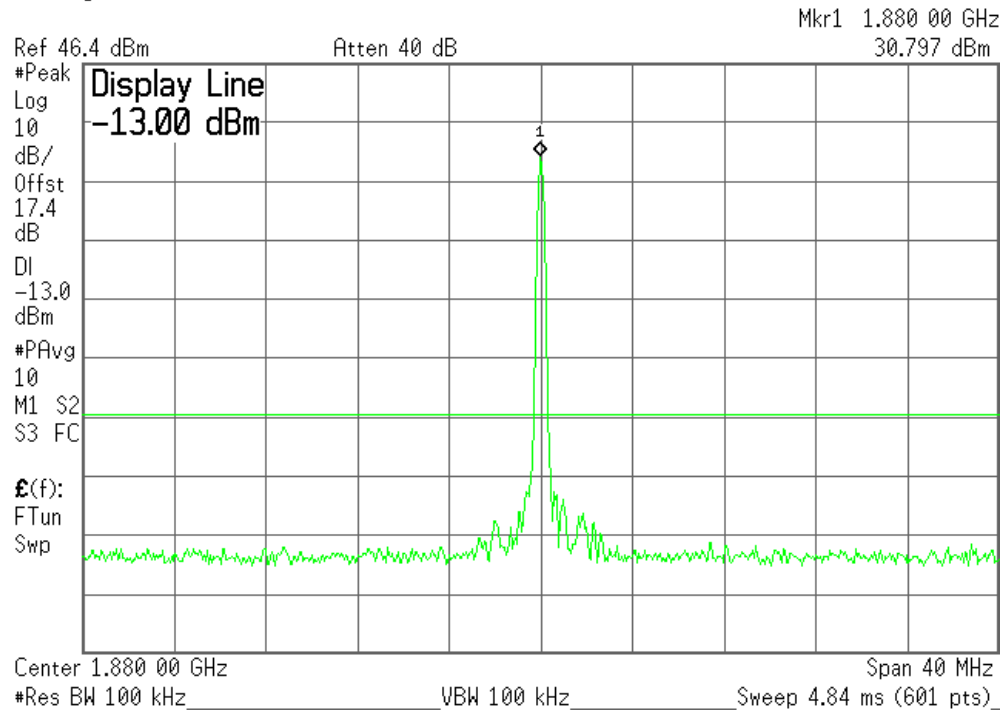


## Plot 6.4.32) Out of Band Emissions at Antenna Terminals

8-PSK, Middle channel, 1880.0 MHz, TX signal +/- 20 MHz

Agilent 11:49:27 Nov 9, 2005

L



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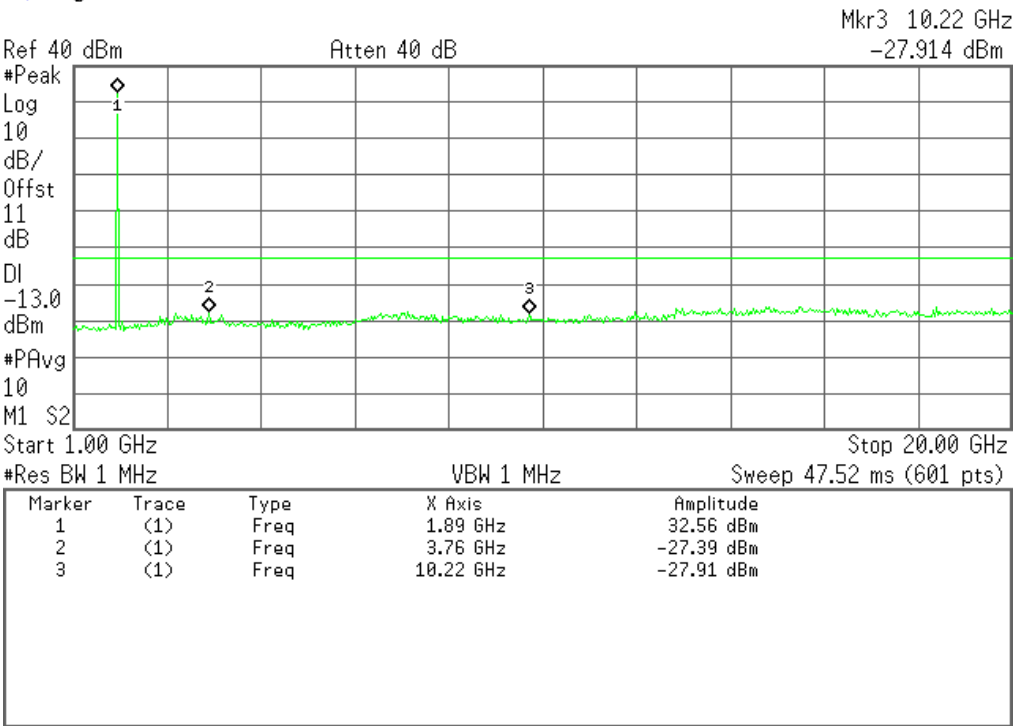
The contents of this page are subject to the confidentiality information on page one.

**Plot 6.4.33) Out of Band Emissions at Antenna Terminals**

8-PSK, Middle channel, 1880.0 MHz, 1 GHz to 20 GHz

Agilent 11:22:54 Nov 9, 2005

L



The strong emission shown is the carrier signal.



# SIERRA WIRELESS, INC.

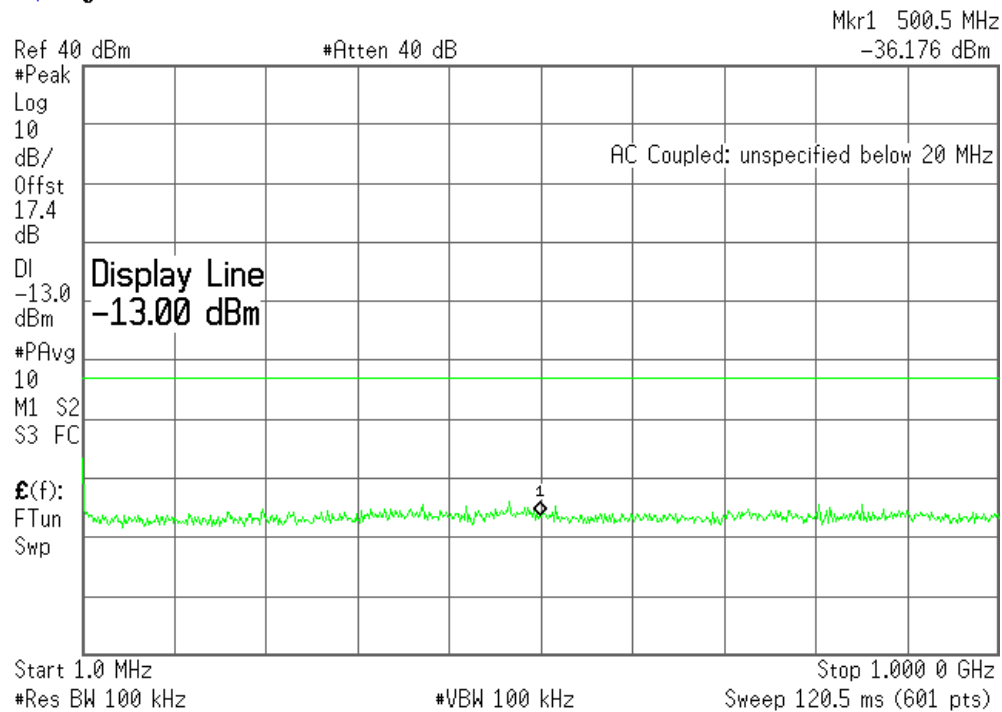
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 41 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.34) Out of Band Emissions at Antenna Terminals

8-PSK, High channel, 1909.8 MHz, 1 MHz to 1 GHz

Agilent 10:26:32 Nov 8, 2005

L

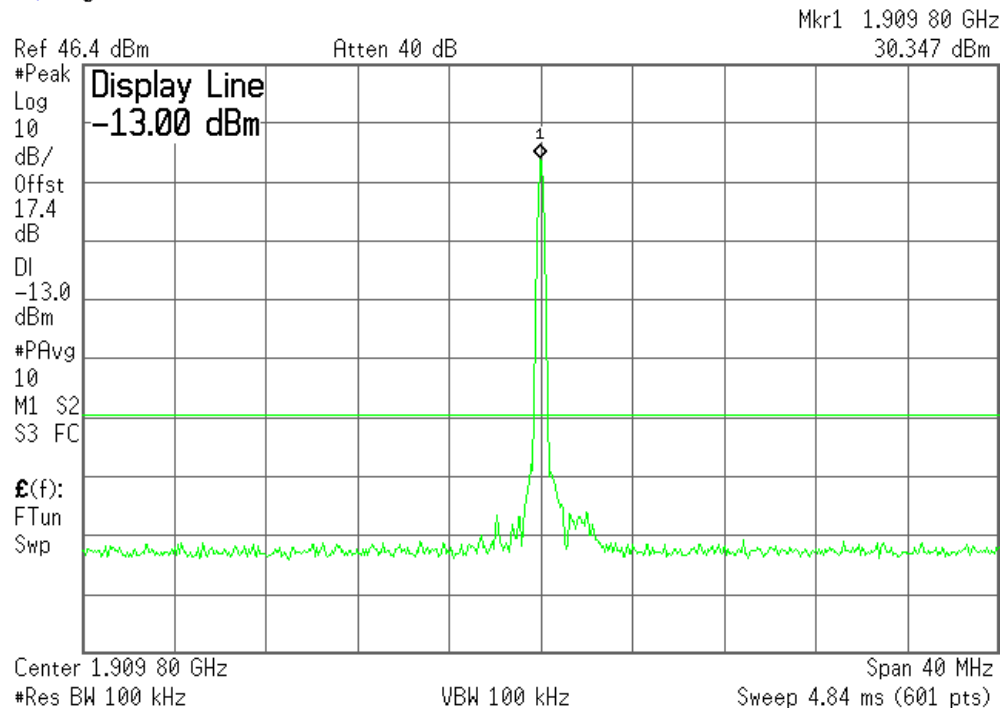


## Plot 6.4.35) Out of Band Emissions at Antenna Terminals

8-PSK, High channel, 1909.8 MHz, TX signal +/- 20 MHz

Agilent 11:50:52 Nov 9, 2005

L



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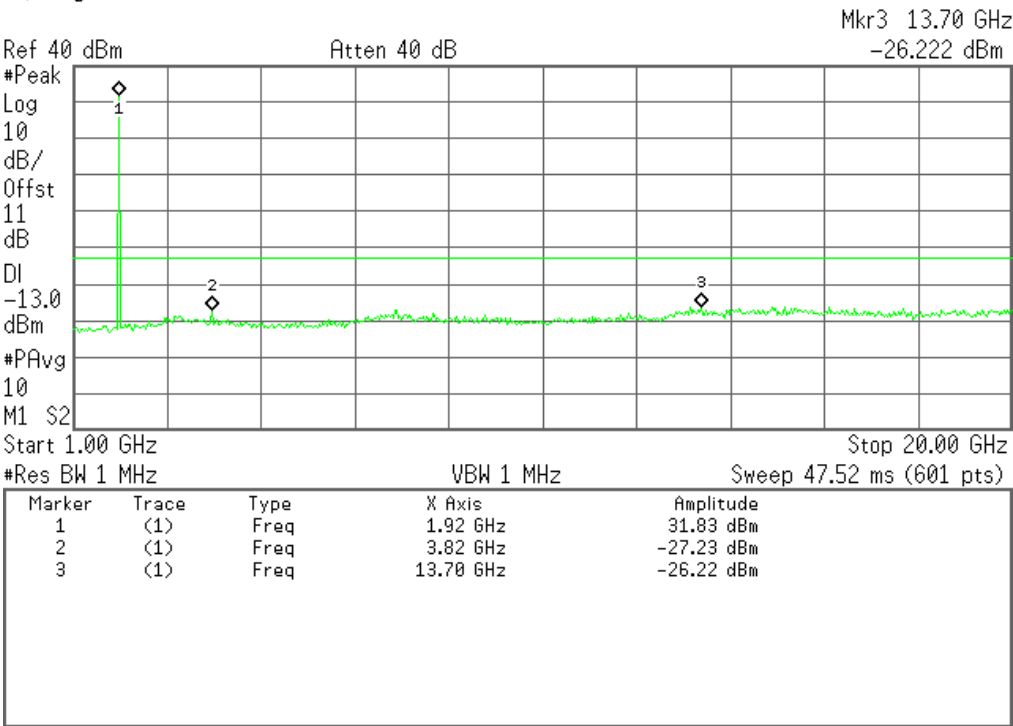
The contents of this page are subject to the confidentiality information on page one.

**Plot 6.4.36) Out of Band Emissions at Antenna Terminals**

8-PSK, High channel, 1909.8 MHz, 1 GHz to 20 GHz

Agilent 11:24:03 Nov 9, 2005

L



The strong emission shown is the carrier signal.

# SIERRA WIRELESS, INC.

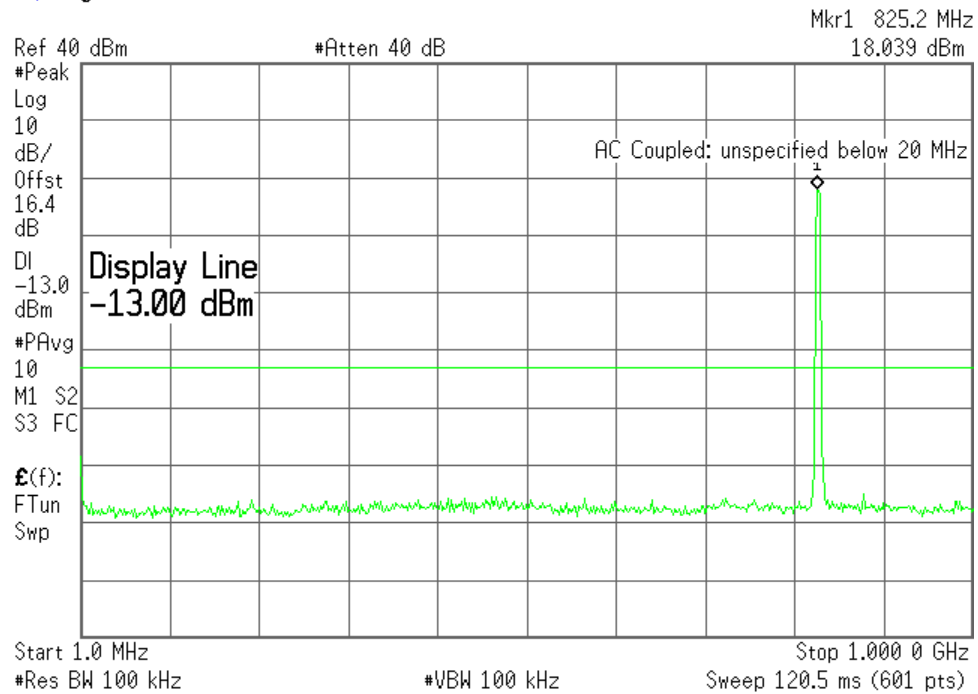
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 43 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.37) Out of Band Emissions at Antenna Terminals

WCDMA, Low channel, 826.4 MHz, 1 MHz to 1 GHz

Agilent 10:42:03 Nov 8, 2005

L

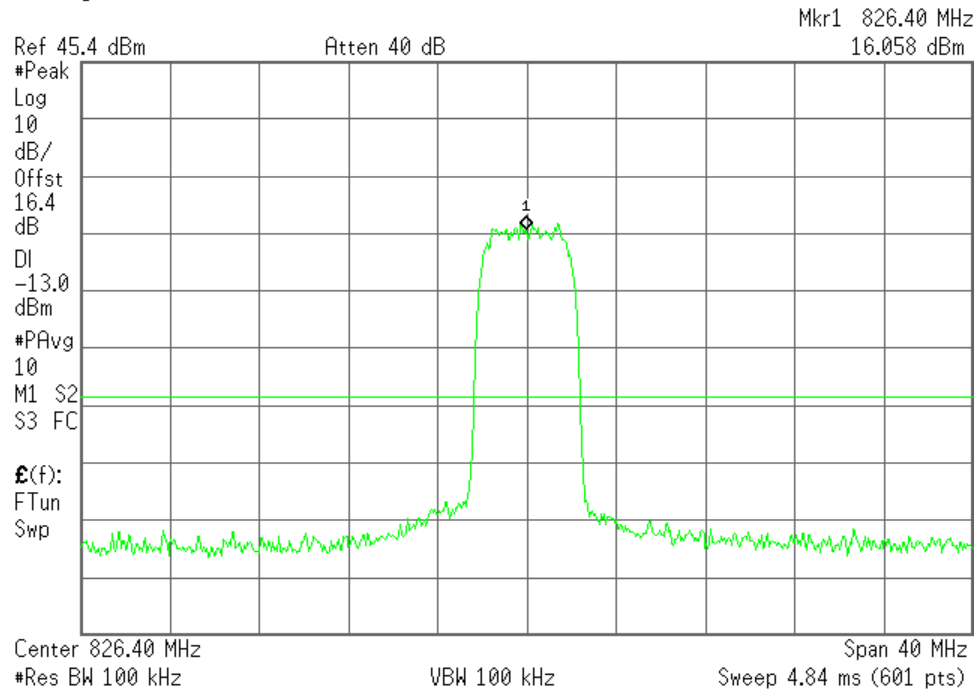


## Plot 6.4.38) Out of Band Emissions at Antenna Terminals

WCDMA, Low channel, 826.4 MHz, TX signal +/- 20 MHz

Agilent 12:16:40 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

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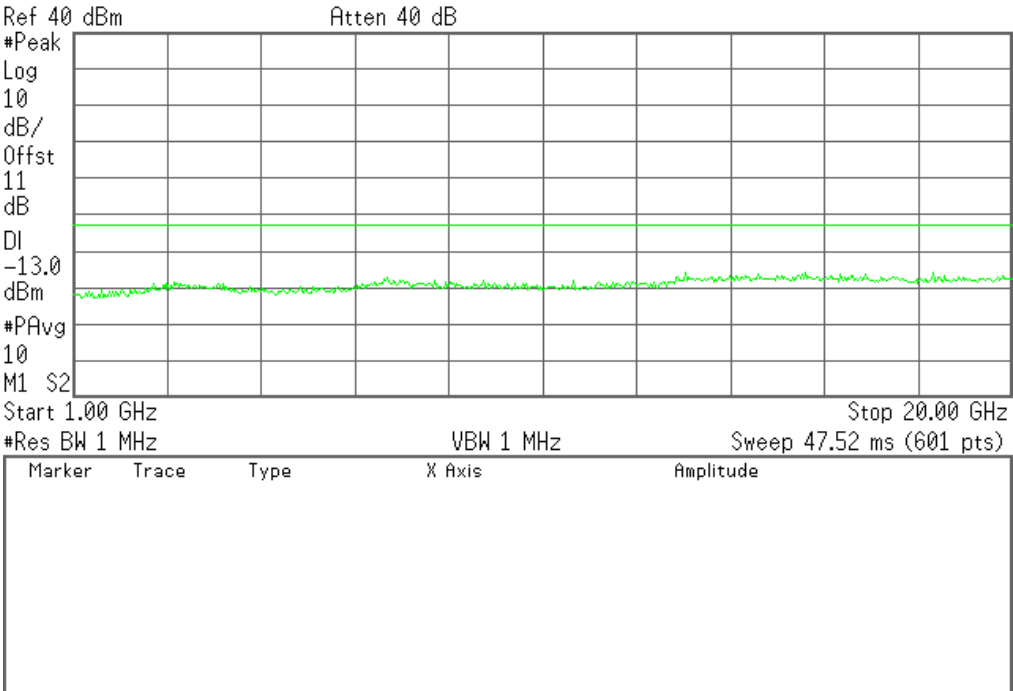
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 44 of 72 |
|------------------------------|--------|--------------|---------------|

Plot 6.4.39) Out of Band Emissions at Antenna Terminals

WCDMA, Low channel, 826.4 MHz, 1 GHz to 20 GHz

Agilent 11:26:54 Nov 9, 2005

L



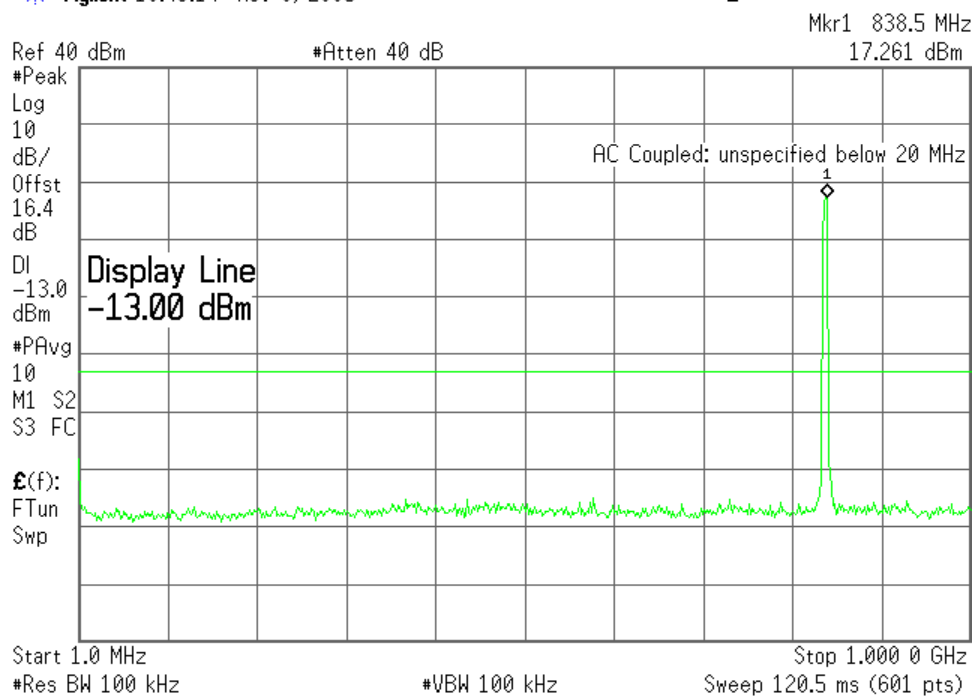
|                                                       |                      |
|-------------------------------------------------------|----------------------|
| <b>Cellular Harmonics for<br/>Ch. 128 (824.2 MHz)</b> | <b>Level (dBm)</b>   |
| <b>Second</b>                                         | --                   |
| <b>Third</b>                                          | --                   |
| <b>All others</b>                                     | < -30dBm up to 20GHz |

**Plot 6.4.40) Out of Band Emissions at Antenna Terminals**

WCDMA, Middle channel, 836.4 MHz, 1 MHz to 1 GHz

\* Agilent 10:43:14 Nov 8, 2005

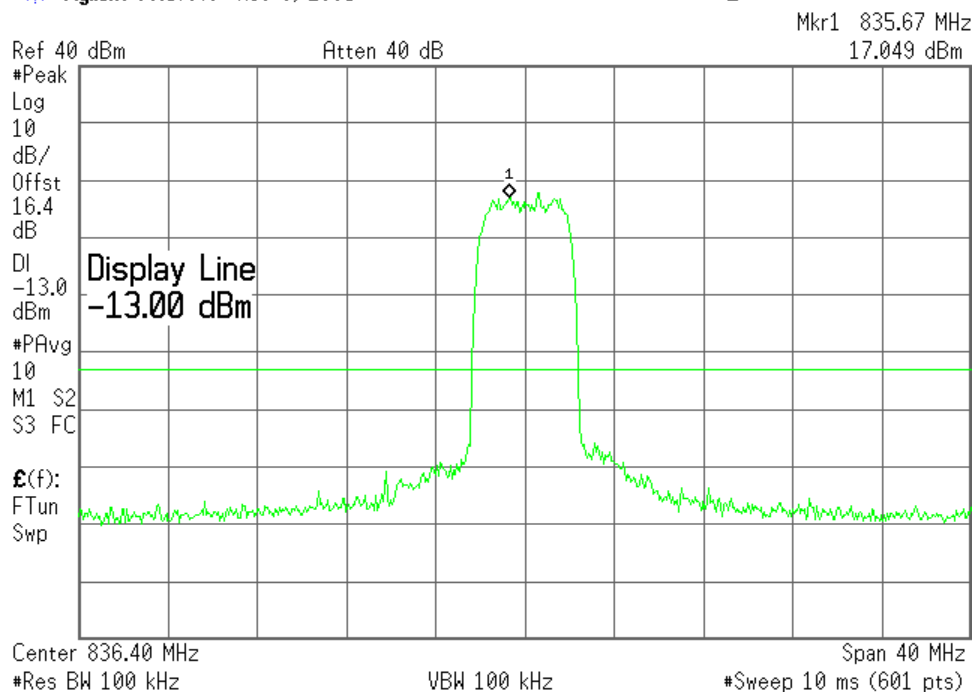
L

**Plot 6.4.41) Out of Band Emissions at Antenna Terminals**

WCDMA, Middle channel, 836.4 MHz, TX signal +/- 20 MHz

\* Agilent 09:57:40 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

**SIERRA WIRELESS, INC.**

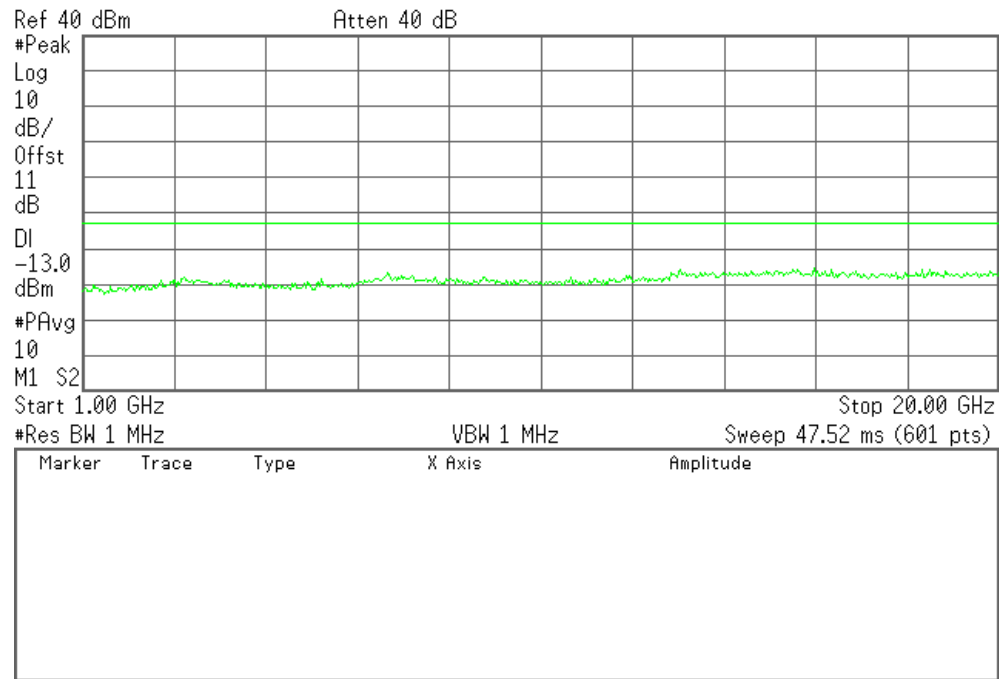
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 46 of 72 |
|------------------------------|--------|--------------|---------------|

### Plot 6.4.42) Out of Band Emissions at Antenna Terminals

WCDMA, Middle channel, 836.4 MHz, 1 GHz to 20 GHz

Agilent 11:28:31 Nov 9, 2005

**L**



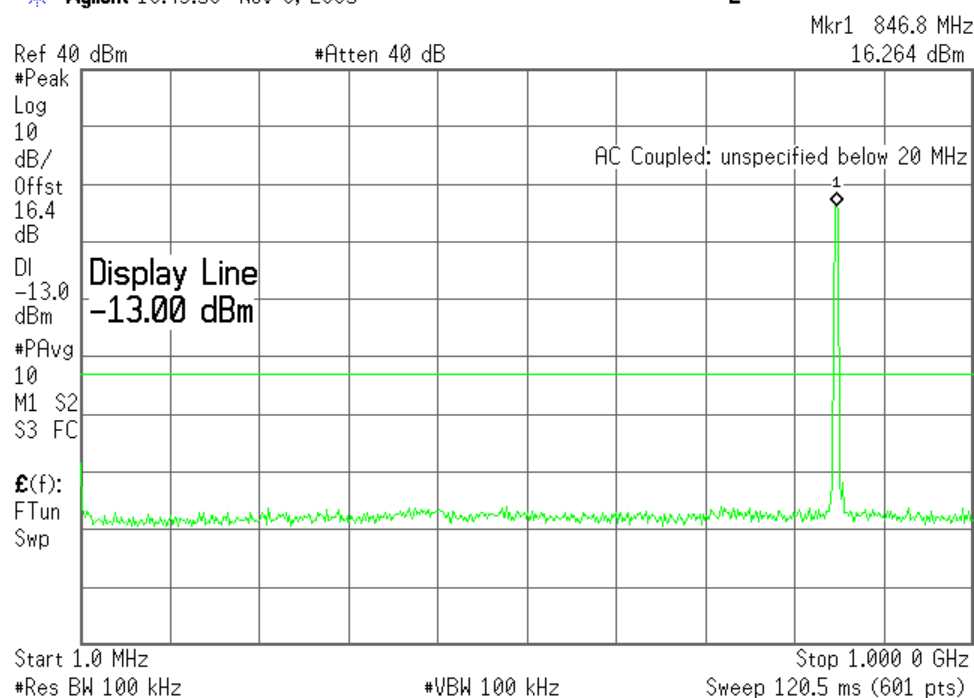
| Cellular Harmonics for Ch. 190 (836.6 MHz) | Level (dBm)          |
|--------------------------------------------|----------------------|
| Second                                     | --                   |
| Third                                      | --                   |
| All others                                 | < -30dBm up to 20GHz |

**Plot 6.4.43) Out of Band Emissions at Antenna Terminals**

WCDMA, High Channel, 846.6 MHz, 1 MHz to 1 GHz

\* Agilent 10:43:59 Nov 8, 2005

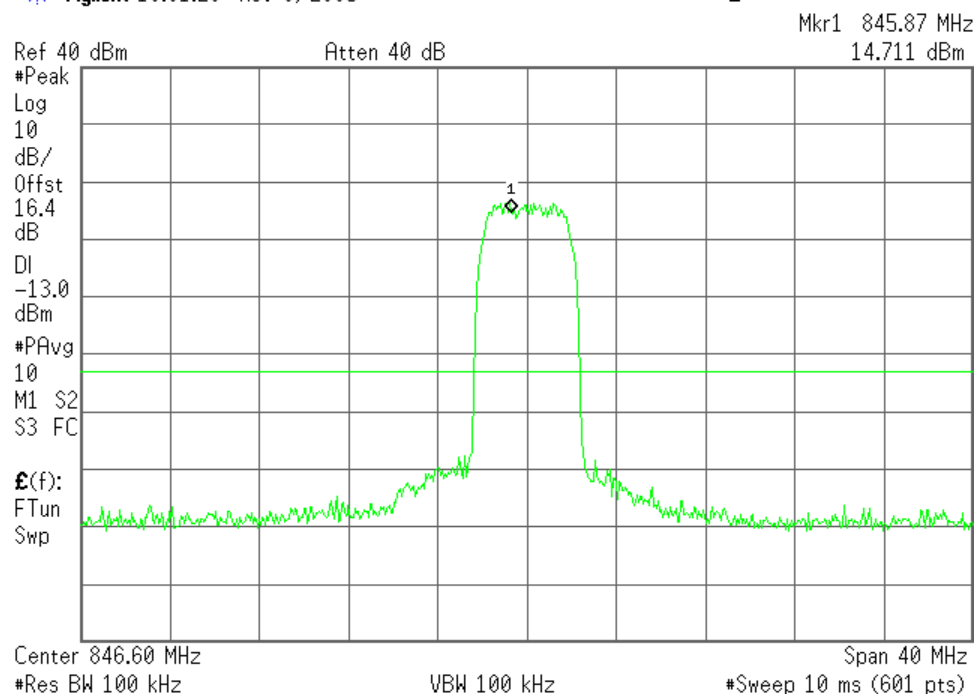
L

**Plot 6.4.44) Out of Band Emissions at Antenna Terminals**

WCDMA, High Channel, 846.6 MHz, TX signal +/- 20 MHz

\* Agilent 10:01:26 Nov 9, 2005

L



The strong emission shown in each case is the carrier signal.

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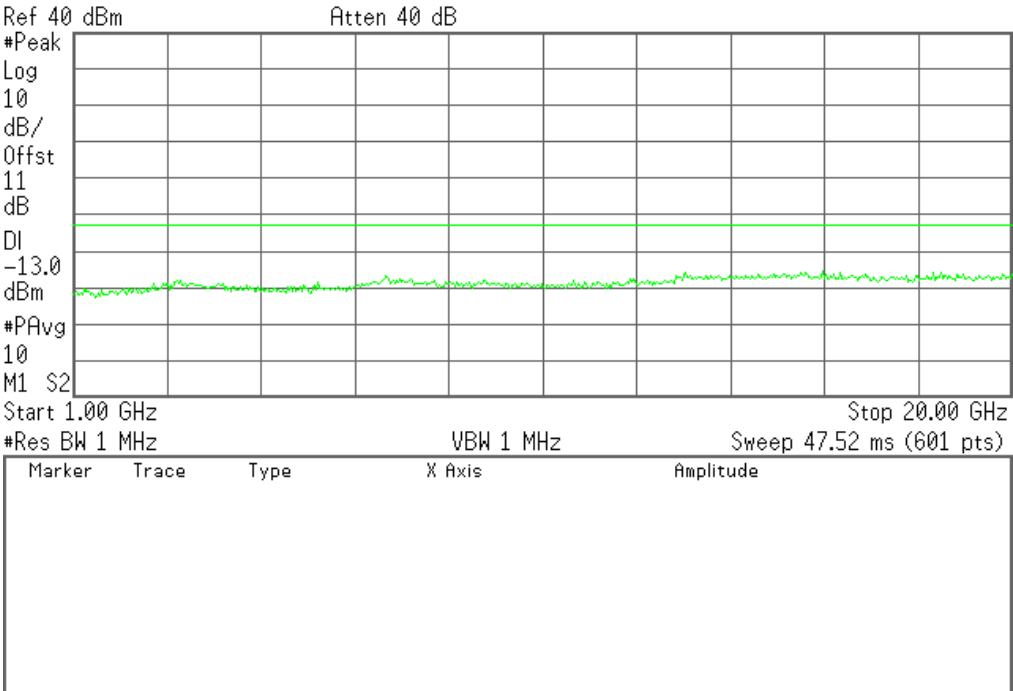
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 48 of 72 |
|------------------------------|--------|--------------|---------------|

Plot 6.4.45) Out of Band Emissions at Antenna Terminals

WCDMA, High Channel, 846.6 MHz, 1 GHz to 20 GHz

Agilent 11:29:01 Nov 9, 2005

L



|                                                   |                      |
|---------------------------------------------------|----------------------|
| <b>Cellular Harmonics for Ch. 251 (848.8 MHz)</b> | <b>Level (dBm)</b>   |
| <b>Second</b>                                     | --                   |
| <b>Third</b>                                      | --                   |
| <b>All others</b>                                 | < -30dBm up to 20GHz |



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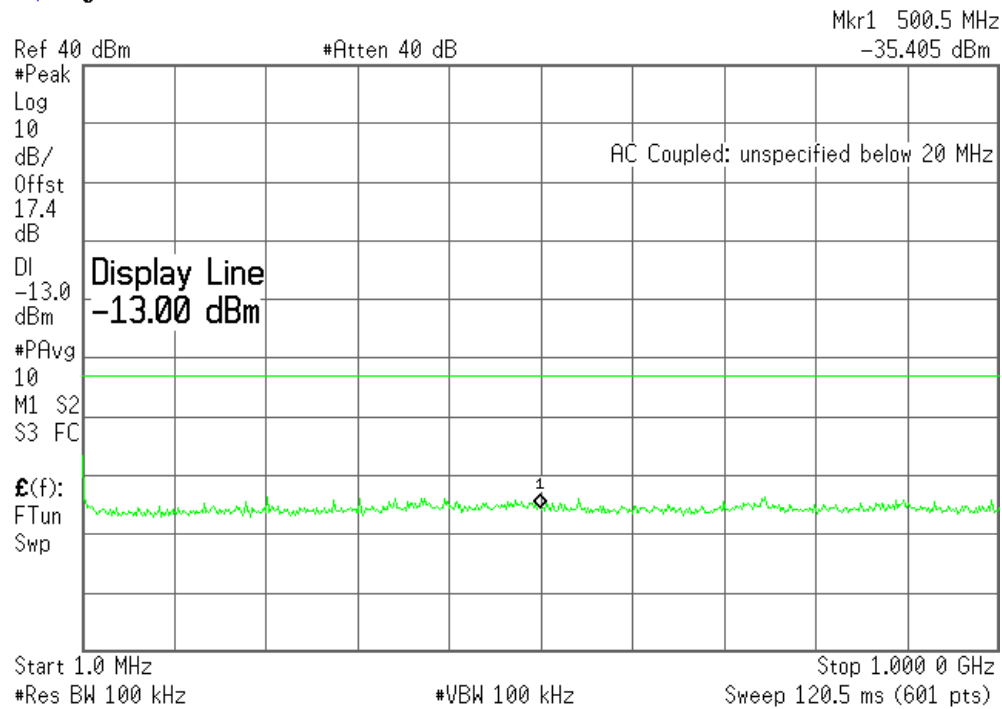
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 49 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 6.4.46) Out of Band Emissions at Antenna Terminals

WCDMA, Low channel, 1852.4 MHz, 1 MHz to 1 GHz

Agilent 09:54:48 Nov 8, 2005

L

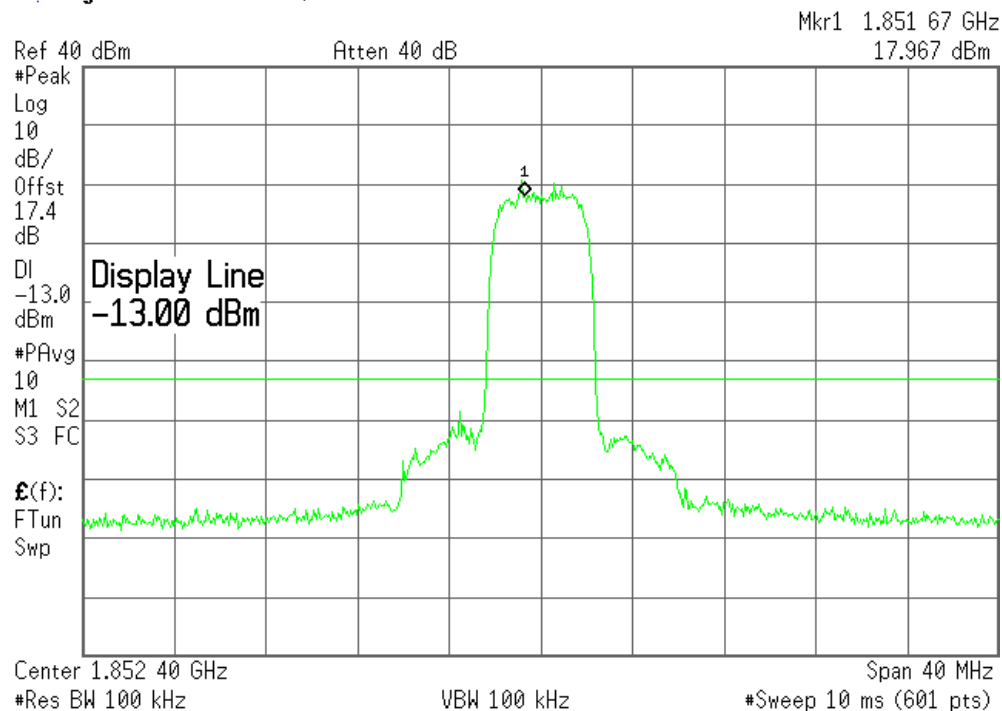


## Plot 6.4.47) Out of Band Emissions at Antenna Terminals

WCDMA, Low channel, 1852.4 MHz, TX signal +/- 20 MHz

Agilent 10:05:01 Nov 9, 2005

L



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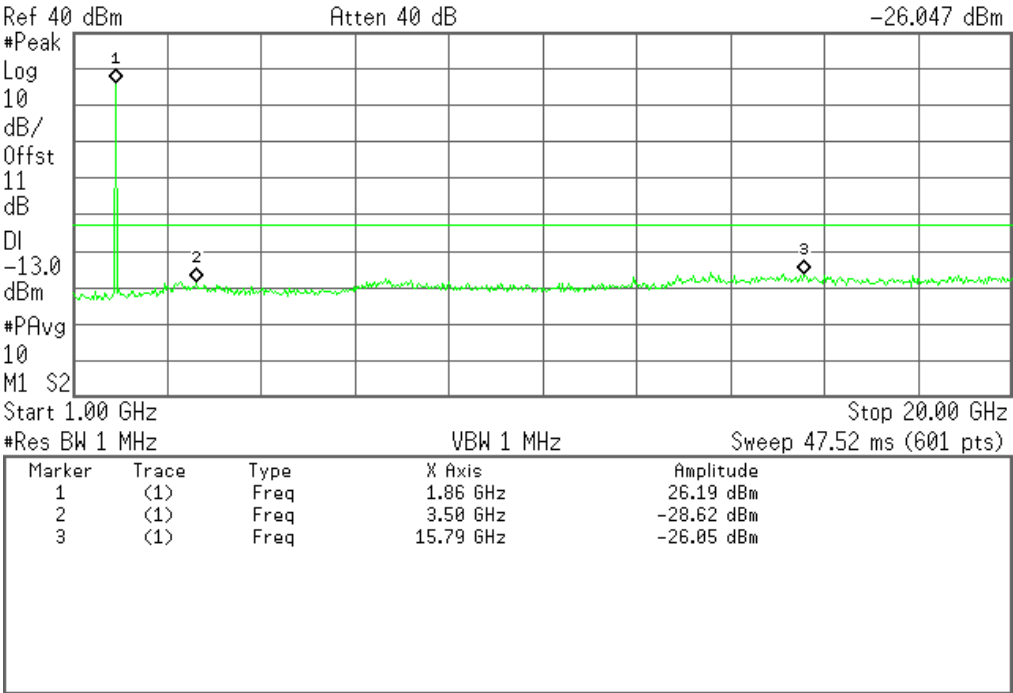
**Plot 6.4.48) Out of Band Emissions at Antenna Terminals**

WCDMA, Low channel, 1852.4 MHz, 1 GHz to 20 GHz

Agilent 11:33:29 Nov 9, 2005

L

Mkr3 15.79 GHz  
-26.047 dBm



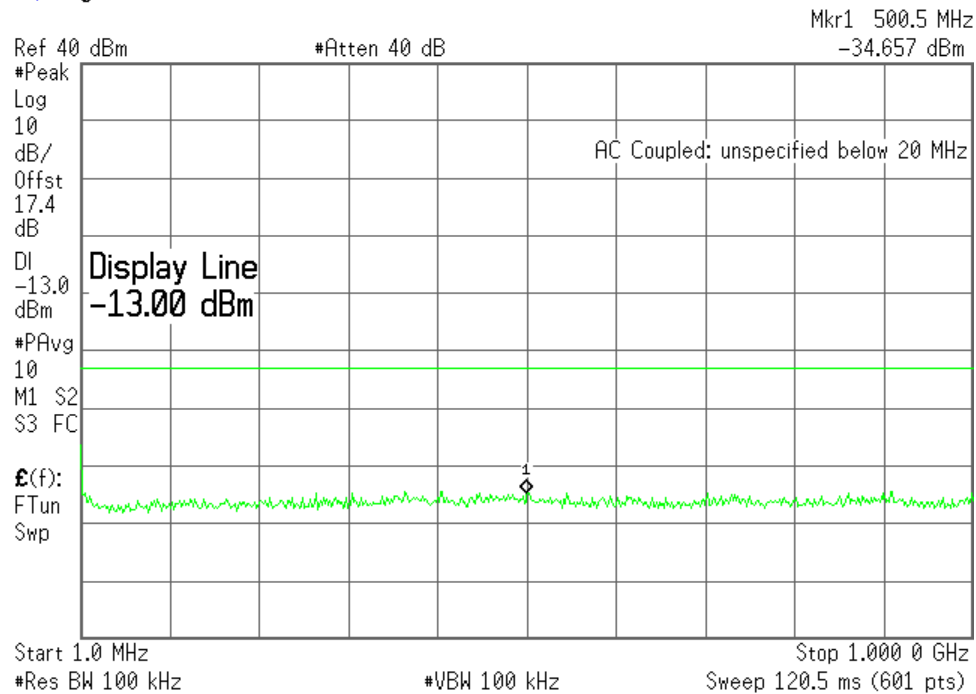
The strong emission shown is the carrier signal.

**Plot 6.4.49) Out of Band Emissions at Antenna Terminals**

WCDMA, Middle channel, 1880 MHz, 1 MHz to 1 GHz

Agilent 10:00:00 Nov 8, 2005

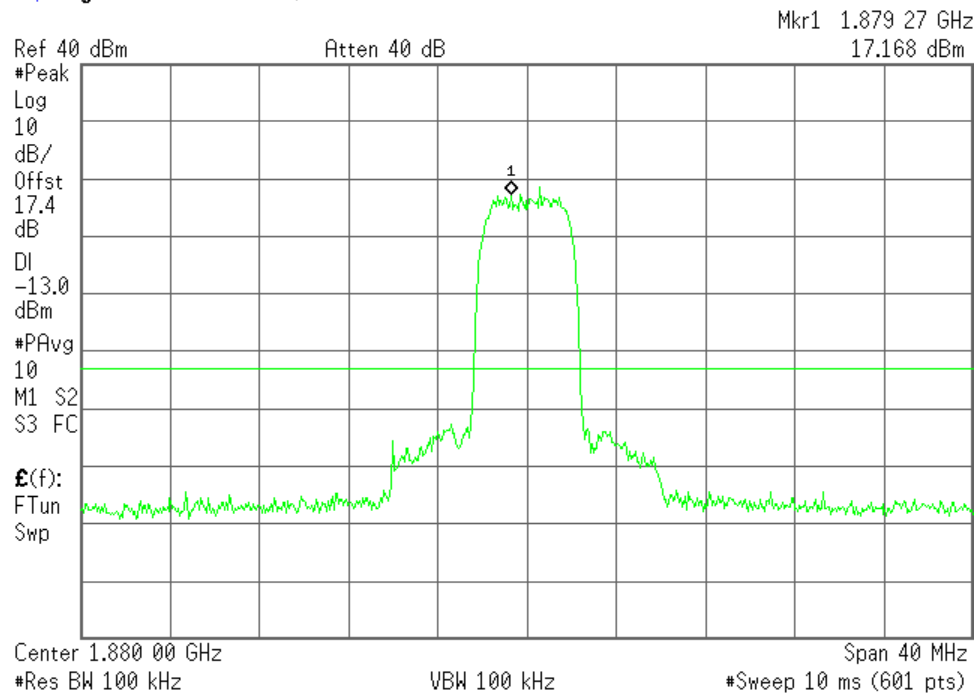
L

**Plot 6.4.50) Out of Band Emissions at Antenna Terminals**

WCDMA, Middle channel, 1880 MHz, TX signal +/- 20 MHz

Agilent 10:07:01 Nov 9, 2005

L



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|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 52 of 72 |
|------------------------------|--------|--------------|---------------|

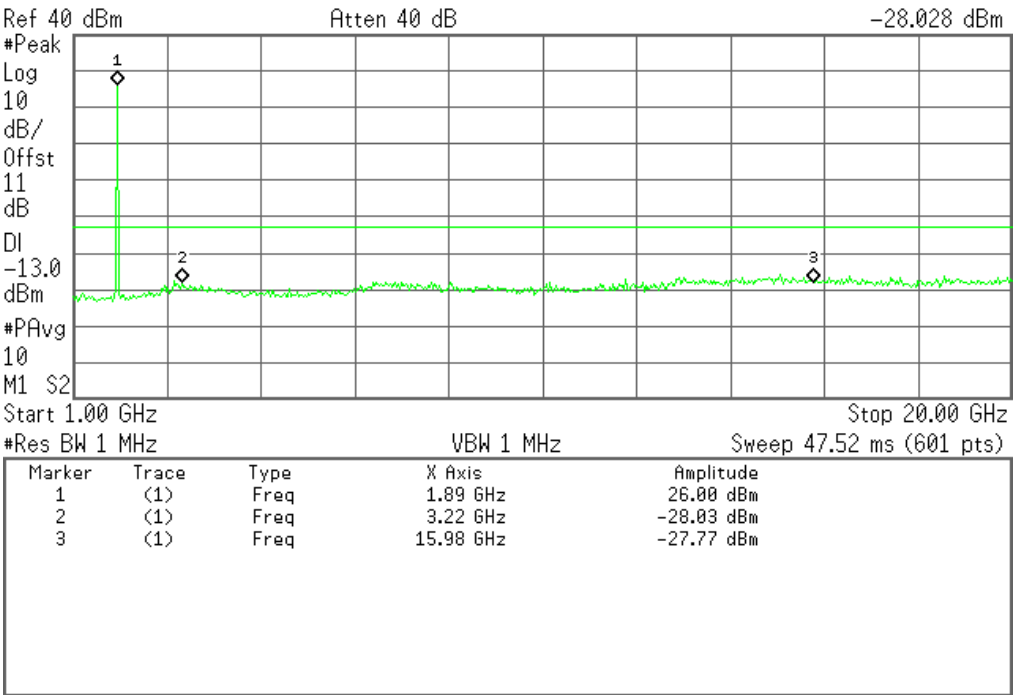
Plot 6.4.51) Out of Band Emissions at Antenna Terminals

WCDMA, Middle channel, 1880 MHz, 1 GHz to 20 GHz

Agilent 11:32:35 Nov 9, 2005

L

Mkr2 3.22 GHz  
-28.028 dBm



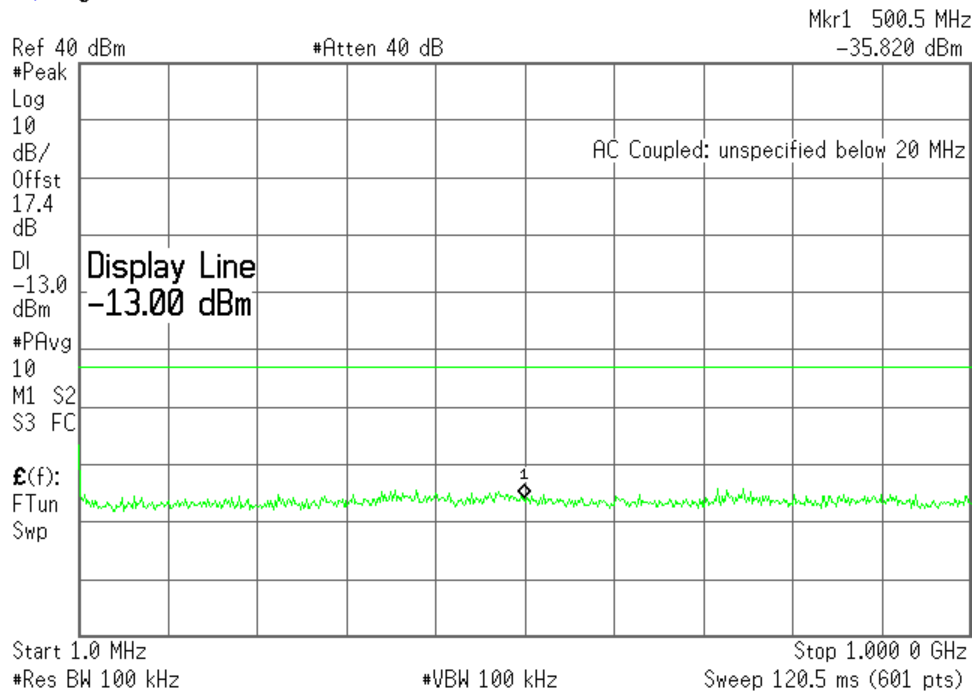
The strong emission shown is the carrier signal.

**Plot 6.4.52) Out of Band Emissions at Antenna Terminals**

WCDMA, High channel, 1907.6 MHz, 1 MHz to 1 GHz

Agilent 10:00:56 Nov 8, 2005

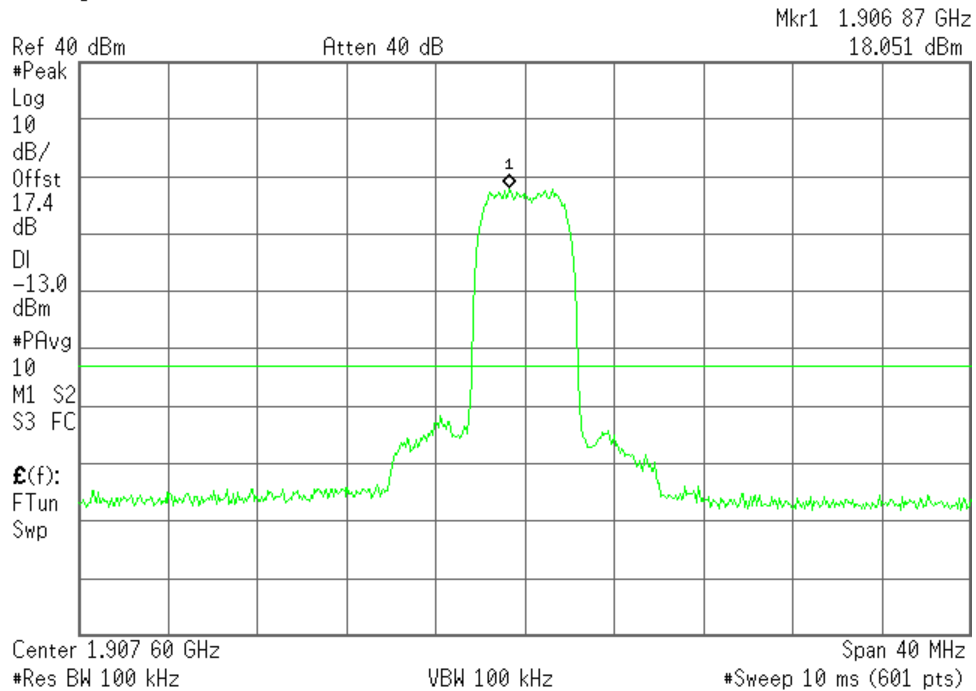
L

**Plot 6.4.53) Out of Band Emissions at Antenna Terminals**

WCDMA, High channel, 1907.6 MHz, TX signal +/- 20 MHz

Agilent 10:08:23 Nov 9, 2005

L



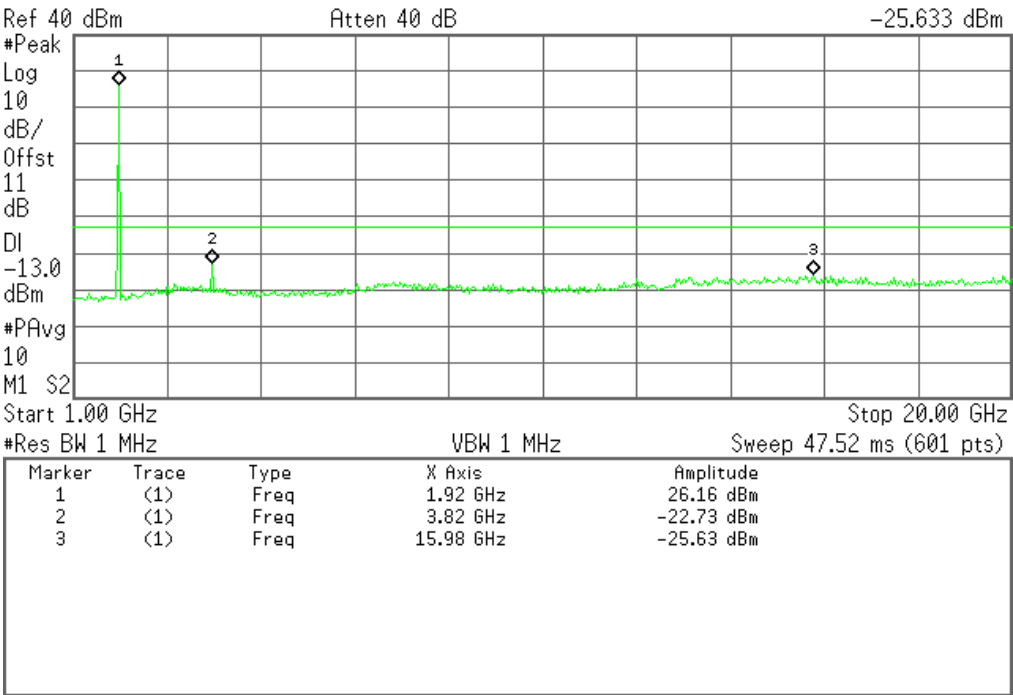
**Plot 6.4.54) Out of Band Emissions at Antenna Terminals**

WCDMA, High channel, 1907.6 MHz, 1 GHz to 20 GHz

Agilent 11:31:18 Nov 9, 2005

L

Mkr3 15.98 GHz  
-25.633 dBm



The strong emission shown is the carrier signal.

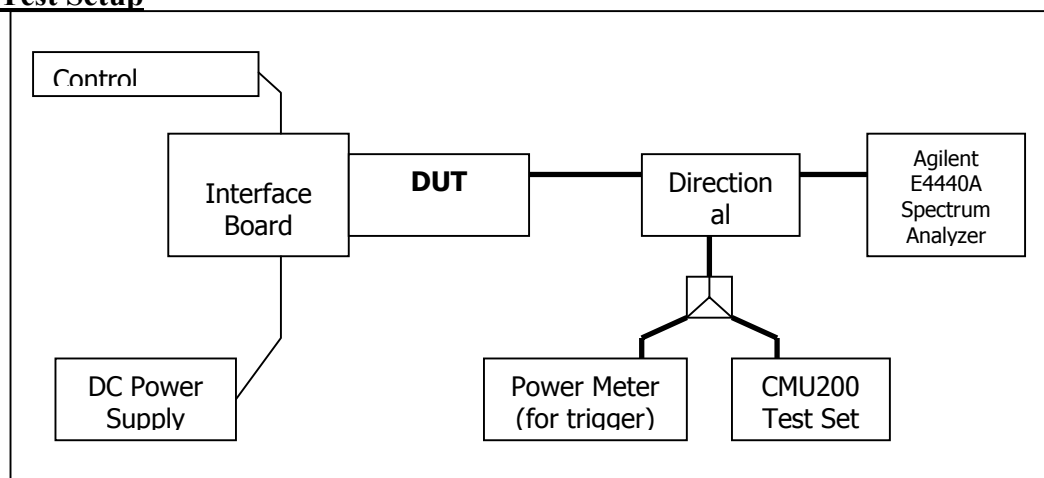
## 7 Block Edge Compliance

FCC part 22H/24E

### 7.1 Test Procedure

The transmitter output was connected to a Rohde & Schwarz CMU200 Test Set in a call and configured to operate at maximum power. The block edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

#### Test Setup



### 7.2 Test Equipment

#### Instrument List

| EQUIPMENT           | MANUFACTURER    | MODEL NO.  | SERIAL NO. | CAL. DATE      |
|---------------------|-----------------|------------|------------|----------------|
| Control Computer    | TC              | Generic PC | 100488     | N/A            |
| Wireless Test Set   | Rohde & Schwarz | CMU200     | 836766/030 | N/A            |
| Spectrum Analyzer   | Agilent         | PSA E4440A | US41421268 | Sept. 29, 2004 |
| DC Power Supply     | HP              | 6632A      | 3530A      | N/A            |
| Interface Board     | Shop built      | Minnow     | N/A        | N/A            |
| Directional Coupler | Mini-Circuits   | ZA3PD-2    | N/A        | N/A            |

### 7.3 Test Results

| Block Test | Frequency Boundaries (MHz)          | Channels Tested | Corresponding Plots | Result   |
|------------|-------------------------------------|-----------------|---------------------|----------|
| 1          | GMSK: Below 824 MHz, above 849 MHz  | 128, 251        | 7.4.1, 7.4.2        | Complies |
| 2          | 8PSK: Below 824 MHz, above 849 MHz  | 128, 251        | 7.4.3, 7.4.4        | Complies |
| 3          | GMSK: Below 1850MHz, above 1910MHz  | 512, 810        | 7.4.5, 7.4.6        | Complies |
| 4          | 8PSK: Below 1850MHz, above 1910MHz  | 512, 810        | 7.4.7, 7.4.8        | Complies |
| Block Test | Frequency Boundaries (MHz)          | Channels Tested | Corresponding Plots | Result   |
| 1          | WCDMA: Below 824MHz, above 849MHz   | 4132, 4233      | 7.4.9, 7.4.10       | Complies |
| 2          | WCDMA: Below 1850MHz, above 1910MHz | 9262, 9538      | 7.4.11, 7.4.12      | Complies |

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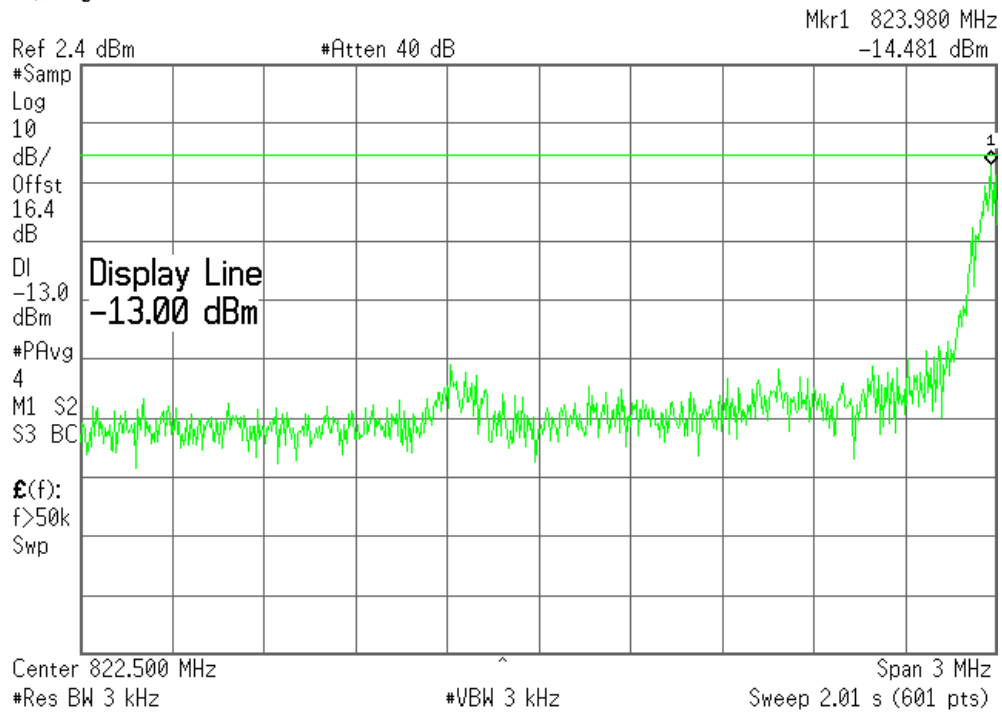
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 56 of 72 |
|------------------------------|--------|--------------|---------------|

## 7.4 Test Plots

### Plot 7.4.1) GSMK; Cellular low channel, below 824 MHz

Agilent 16:44:10 Nov 7, 2005

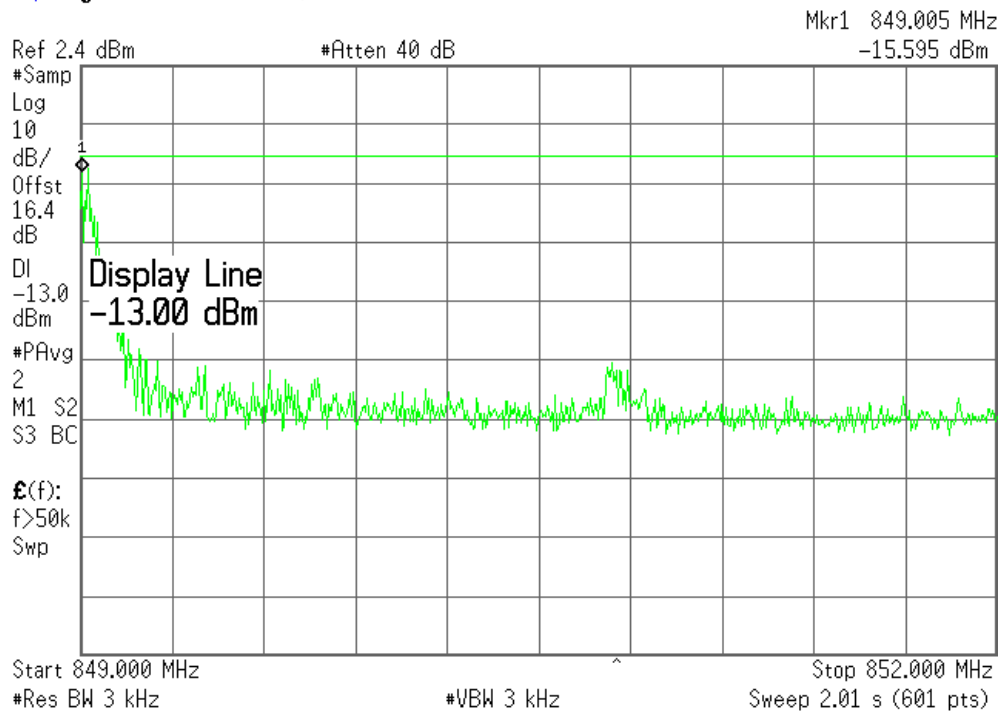
L



### Plot 7.4.2) GSMK; Cellular high channel, above 849 MHz

Agilent 16:48:07 Nov 7, 2005

L

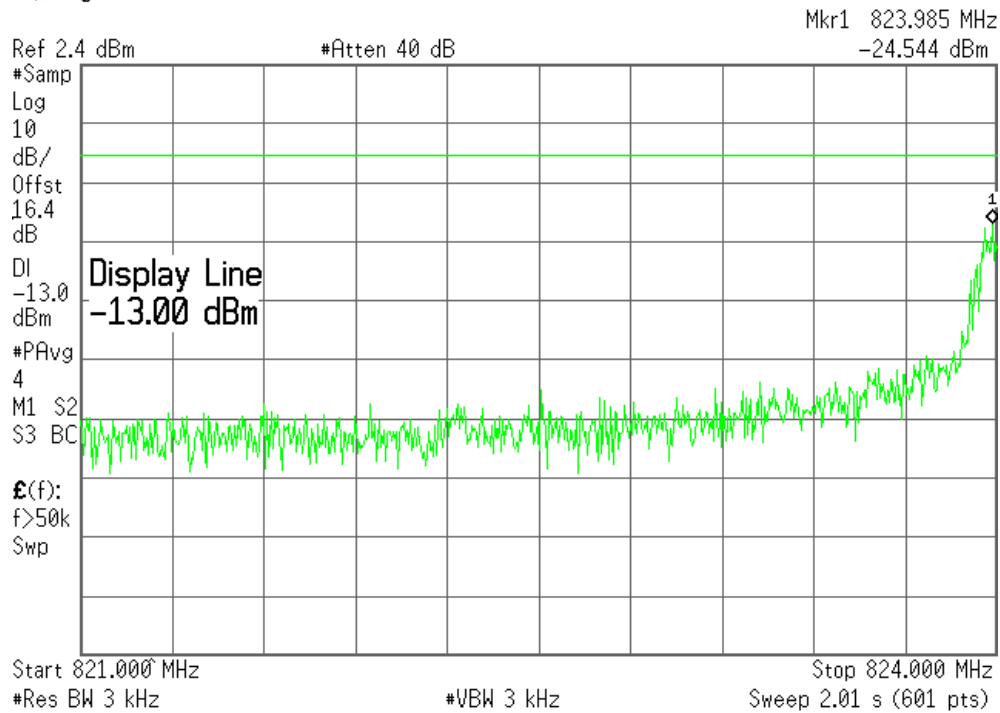




**Plot 7.4.3) 8-PSK; Cellular low channel, below 824 MHz**

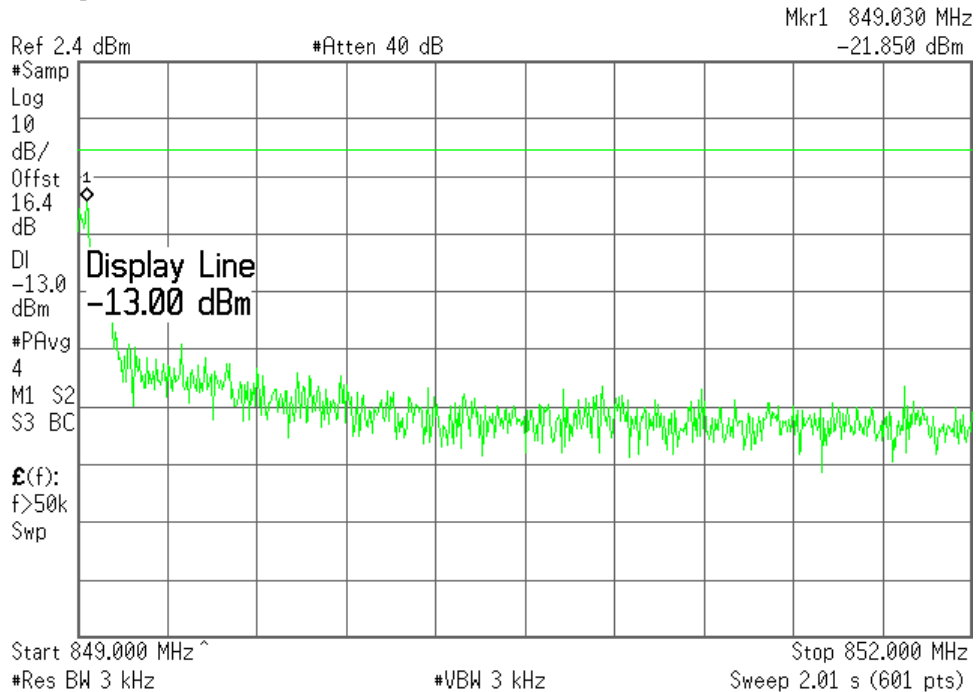
\* Agilent 16:52:46 Nov 7, 2005

L

**Plot 7.4.4) 8-PSK; Cellular high channel, above 849 MHz**

\* Agilent 16:50:35 Nov 7, 2005

L



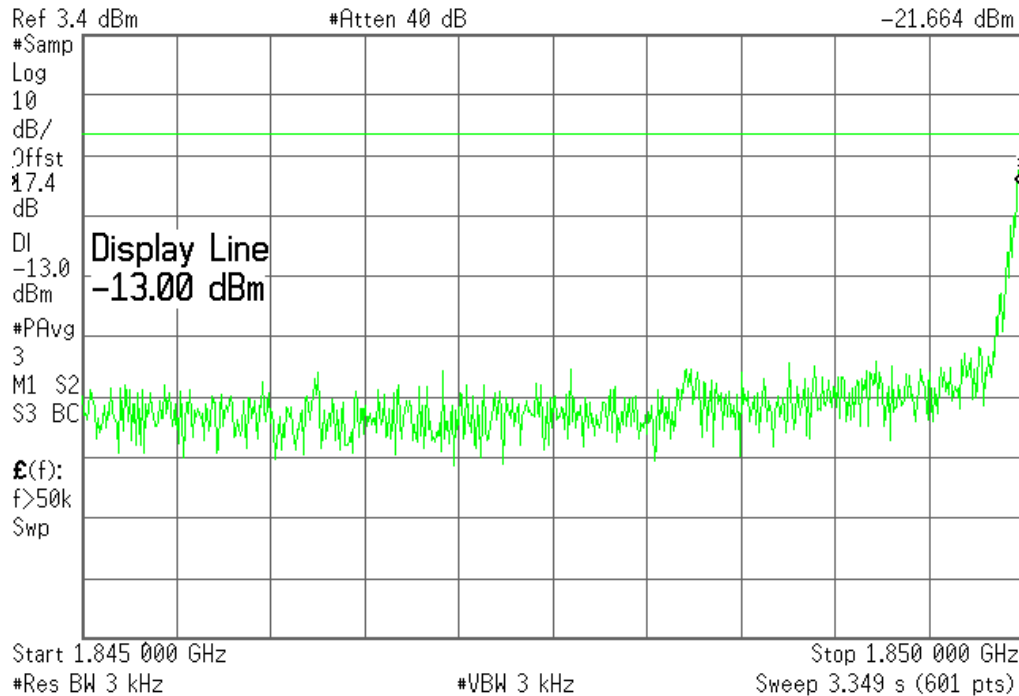
**Plot 7.4.5) GMSK; PCS low channel, below 1850 MHz**

\* Agilent 17:17:33 Nov 7, 2005

L

Mkr1 1.849 992 GHz

-21.664 dBm

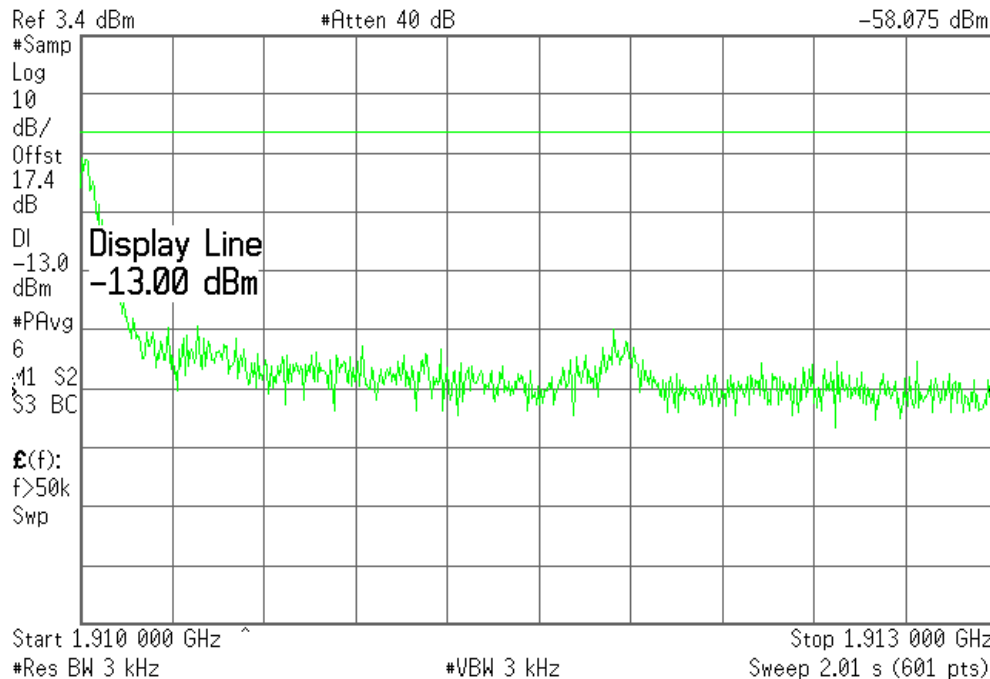
**Plot 7.4.6) GMSK; PCS high channel, above 1910 MHz**

\* Agilent 17:22:06 Nov 7, 2005

L

Mkr1 1.912 995 GHz

-58.075 dBm



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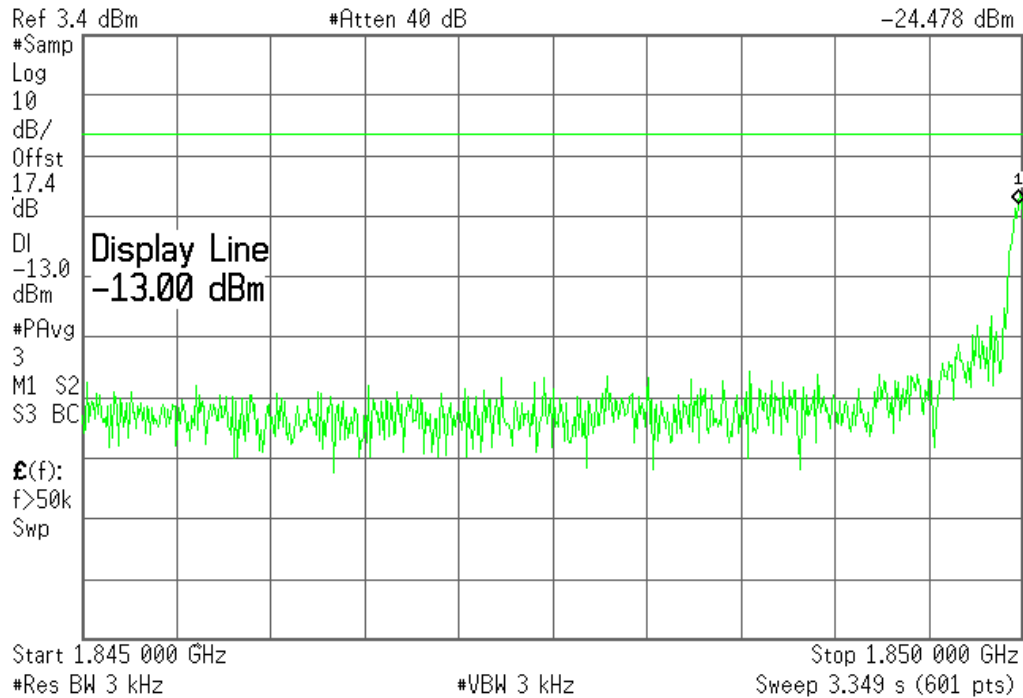
|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 59 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 7.4.7) 8-PSK; PCS low channel, below 1850 MHz

Agilent 17:29:20 Nov 7, 2005

L

Mkr1 1.849 975 GHz  
-24.478 dBm

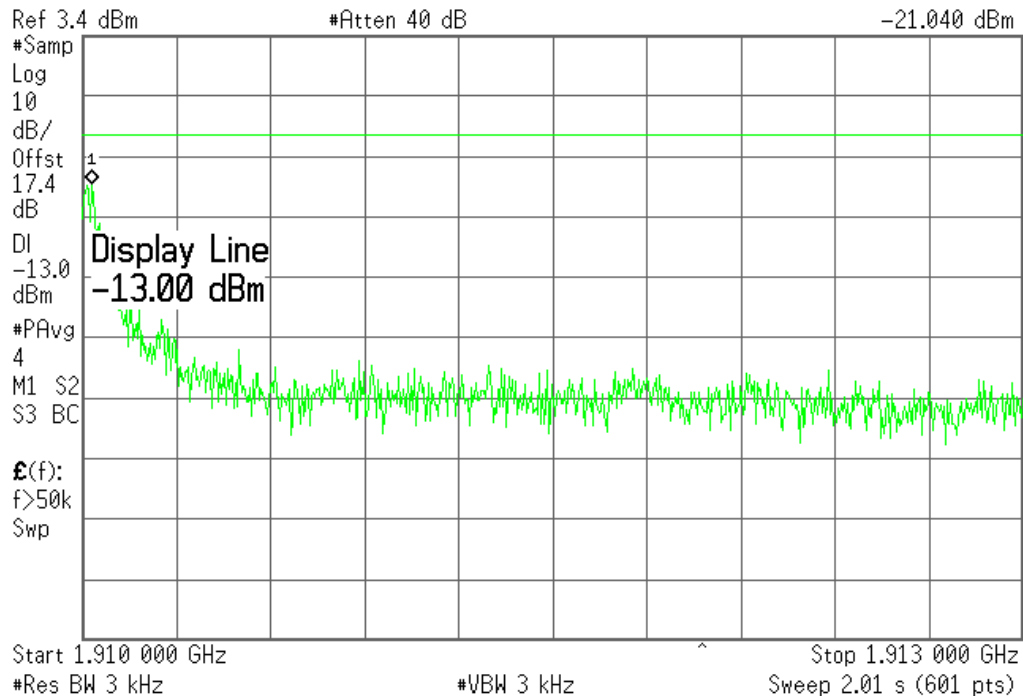


## Plot 7.4.8) 8-PSK; PCS high channel, above 1910 MHz

Agilent 17:26:33 Nov 7, 2005

L

Mkr1 1.910 030 GHz  
-21.040 dBm



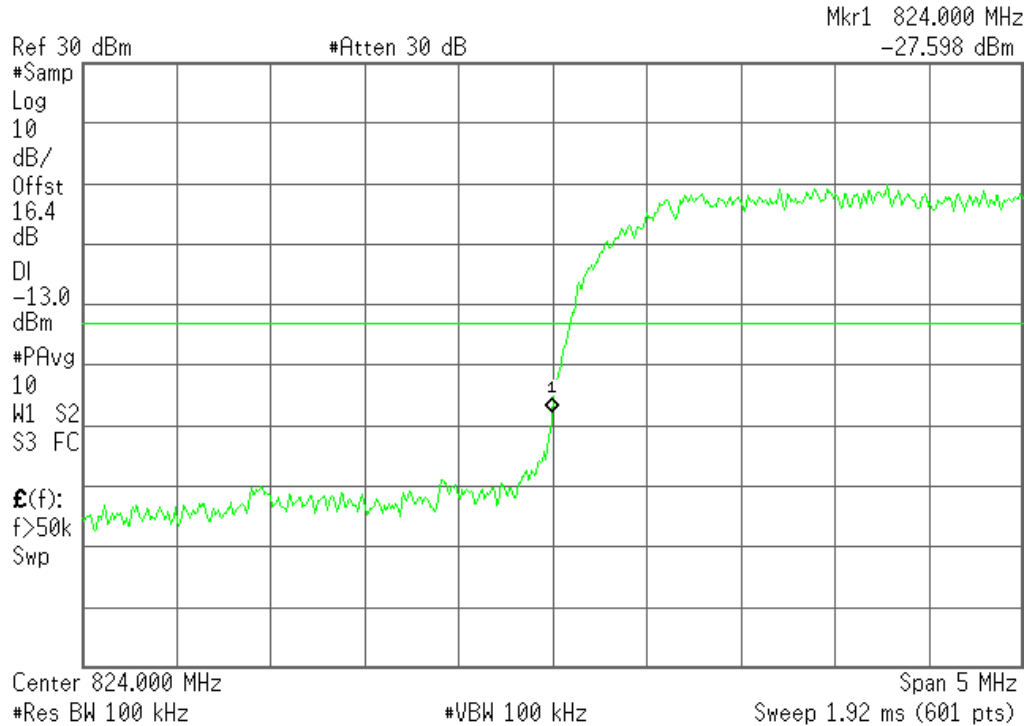
# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 60 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 7.4.9) WCDMA; Cellular low channel, below 824 MHz

Agilent 09:19:37 Nov 8, 2005

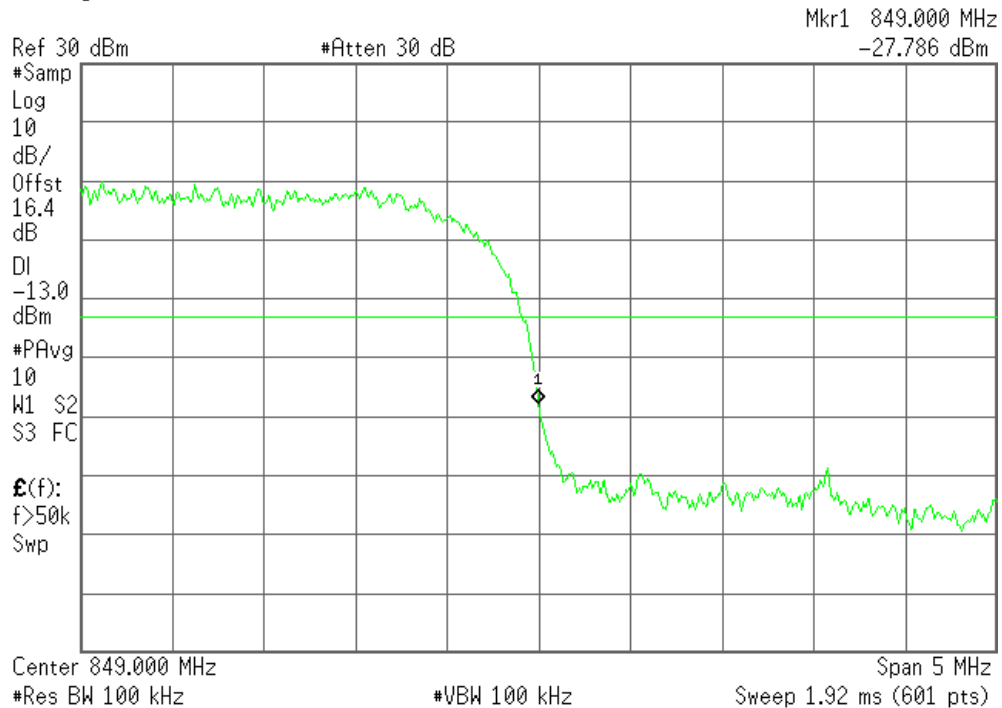
L



## Plot 7.4.10) WCDMA; Cellular high channel, above 849 MHz

Agilent 09:21:46 Nov 8, 2005

L



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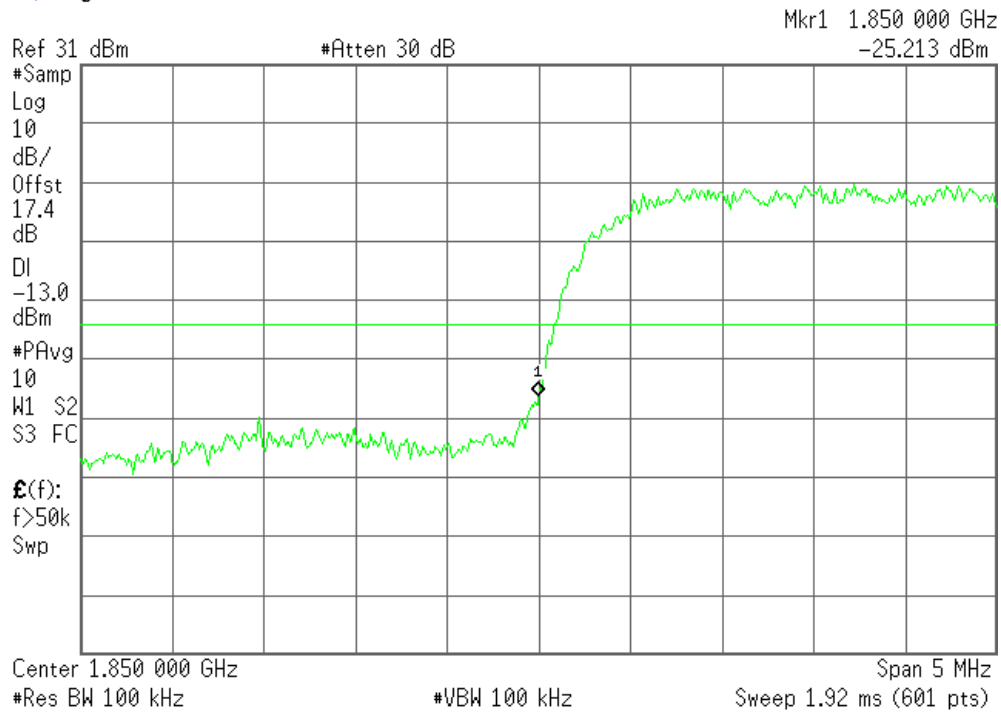
# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 61 of 72 |
|------------------------------|--------|--------------|---------------|

## Plot 7.4.11) WCDMA; PCS low channel, below 1850 MHz

Agilent 09:42:34 Nov 8, 2005

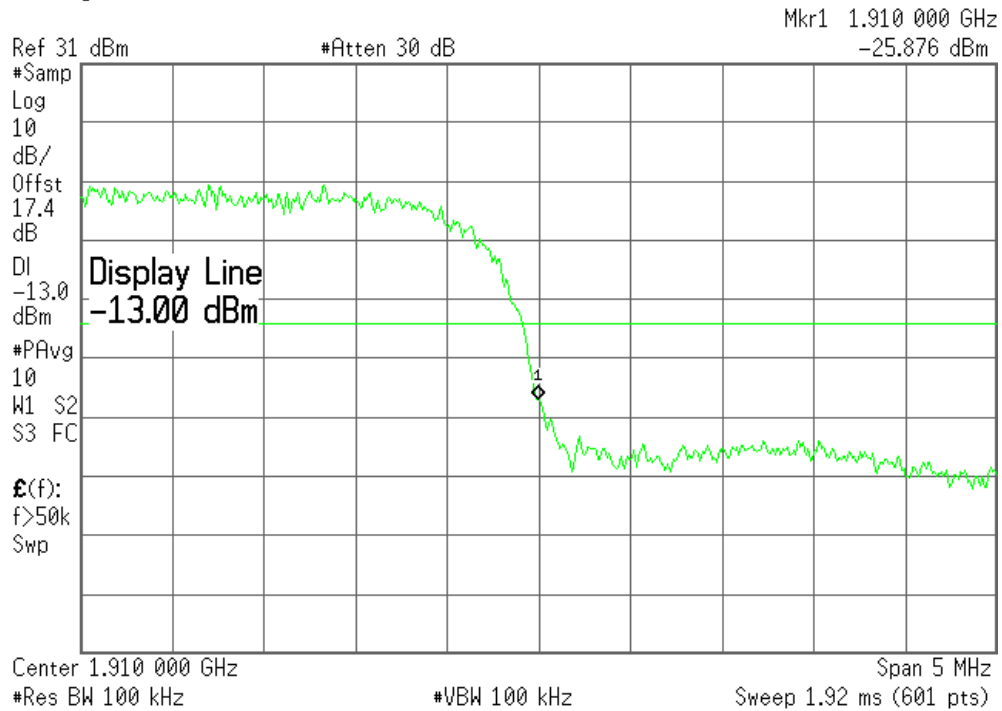
L



## Plot 7.4.12) WCDMA; PCS high channel, above 1910 MHz

Agilent 09:45:30 Nov 8, 2005

L



## 8 Frequency Stability Versus Temperature

FCC 2.1055

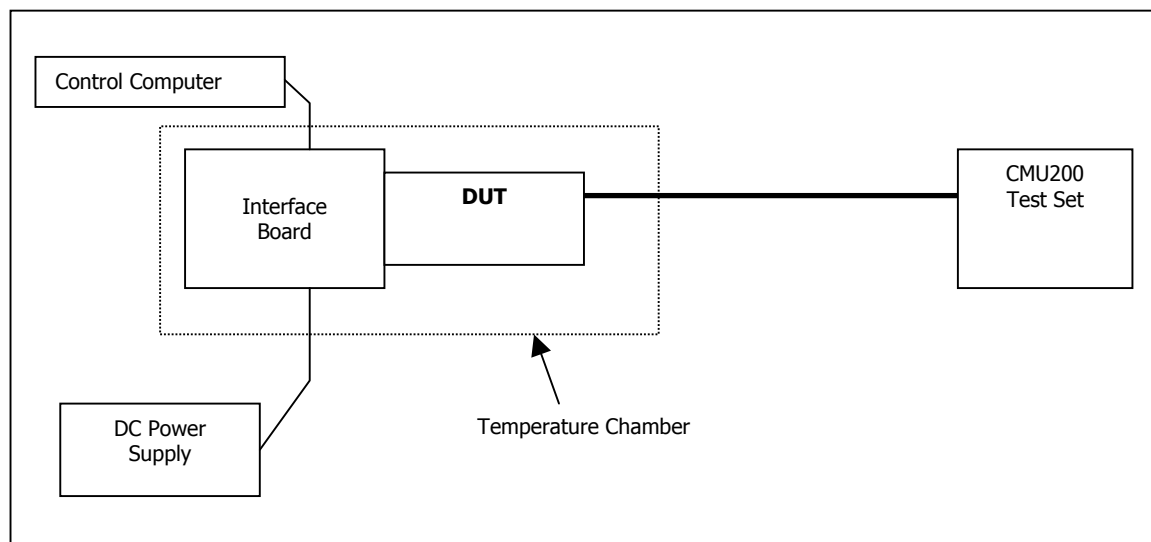
### 8.1 Summary of Results

The MC8765 Frequency Stability versus temperature meets the requirement of being within  $\pm 0.1$ ppm of the received base station frequency.

### 8.2 Test Procedure

The MC8765 was placed inside the temperature chamber. The transmitting frequency error is measured at 25 degrees C, then the temperature is set to +80 degrees C and allowed to stabilize. After sufficient soak time, the transmitting frequency offset is measured. The temperature is decreased by 10 degrees, allowed to stabilize and soak, then the measurement is repeated. This is repeated until -30 degrees C is completed. The process is then repeated back up to +80 degrees C. Frequency metering included internal averaging of the CMU200 to stabilize the reading. Reference power supply voltage for these tests is 3.3 volts.

### Test Setup



### 8.3 Test Equipment

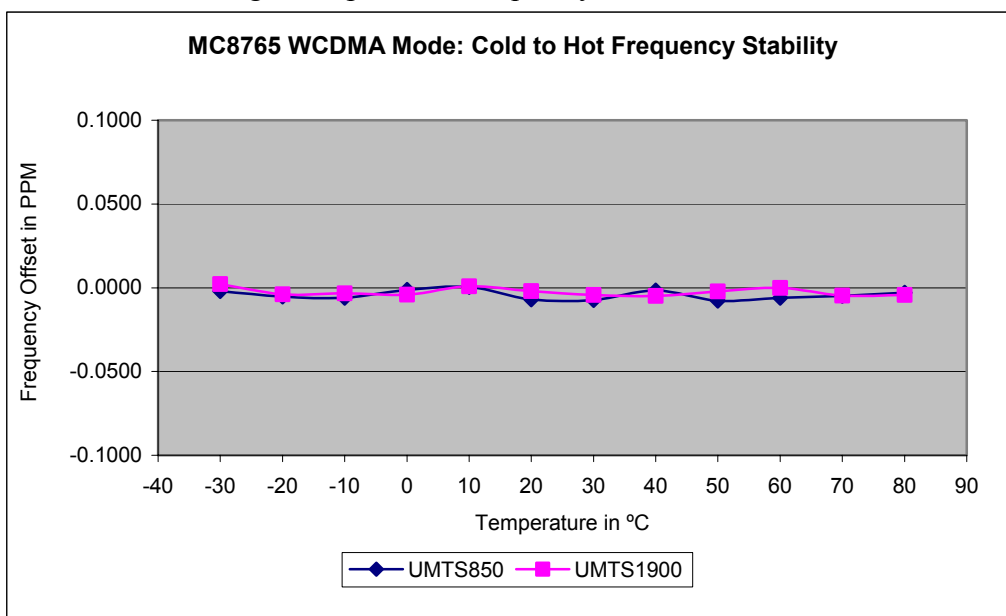
| EQUIPMENT           | MANUFACTURER    | MODEL NO.  | SERIAL NO. | CAL. DATE      |
|---------------------|-----------------|------------|------------|----------------|
| Control Computer    | TC              | Generic PC | 100488     | N/A            |
| Wireless Test Set   | Rohde & Schwarz | CMU200     | 836766/030 | N/A            |
| Spectrum Analyzer   | Agilent         | PSA E4440A | US41421268 | Sept. 29, 2004 |
| DC Power Supply     | HP              | 6632A      | 3530A      | N/A            |
| Interface Board     | Shop built      | Minnow     | N/A        | N/A            |
| Directional Coupler | Mini-Circuits   | ZA3PD-2    | N/A        | N/A            |

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|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 63 of 72 |
|------------------------------|--------|--------------|---------------|

## 8.4 Test Results

### Low to High Temperature Frequency Offset: WCDMA Mode



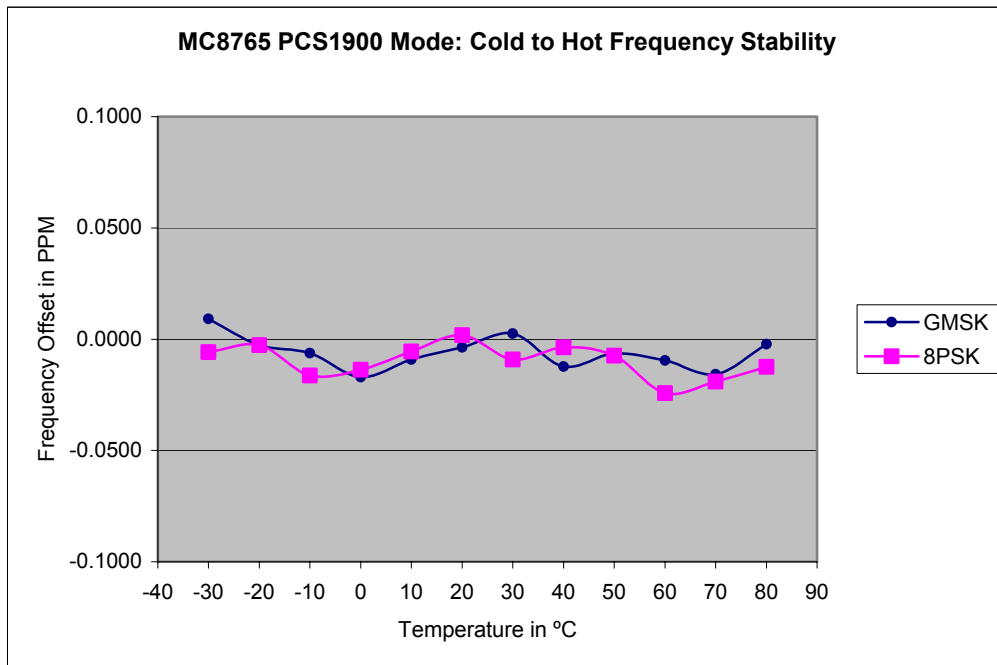
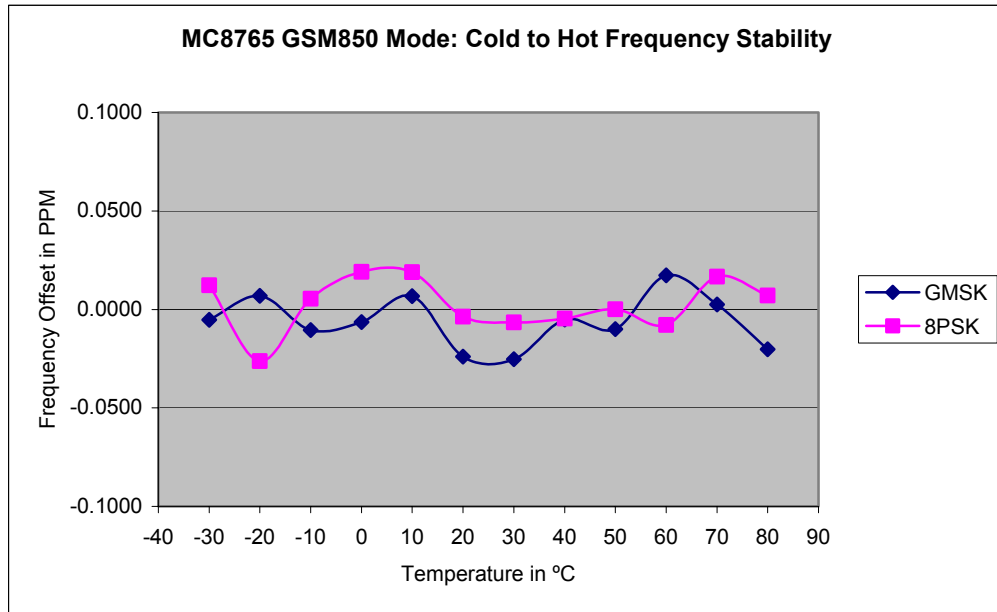
### Low to High Temperature Tabular Readings: WCDMA Mode

| Temp °C | WCDMA Mode - Band V -<br>ULCH4182 (836.4 MHz) |         | WCDMA Mode - Band II - ULCH9400<br>(1880 MHz) |         |
|---------|-----------------------------------------------|---------|-----------------------------------------------|---------|
|         | Hz                                            | ppm     | Hz                                            | ppm     |
| -30     | -1.63                                         | -0.0019 | 4.09                                          | 0.0022  |
| -20     | -4.39                                         | -0.0052 | -7.20                                         | -0.0038 |
| -10     | -5.08                                         | -0.0061 | -6.12                                         | -0.0033 |
| 0       | -0.96                                         | -0.0011 | -7.87                                         | -0.0042 |
| 10      | 0.40                                          | 0.0005  | 1.78                                          | 0.0009  |
| 20      | -5.89                                         | -0.0070 | -3.95                                         | -0.0021 |
| 30      | -6.20                                         | -0.0074 | -8.18                                         | -0.0044 |
| 40      | -1.39                                         | -0.0017 | -9.19                                         | -0.0049 |
| 50      | -6.41                                         | -0.0077 | -4.06                                         | -0.0022 |
| 60      | -5.08                                         | -0.0061 | -0.20                                         | -0.0001 |
| 70      | -4.04                                         | -0.0048 | -8.70                                         | -0.0046 |
| 80      | -2.44                                         | -0.0029 | -8.04                                         | -0.0043 |

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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 64 of 72 |
|------------------------------|--------|--------------|---------------|

## Low to High Temperature Frequency Offset: GSM and 8PSK Modes





# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 65 of 72 |
|------------------------------|--------|--------------|---------------|

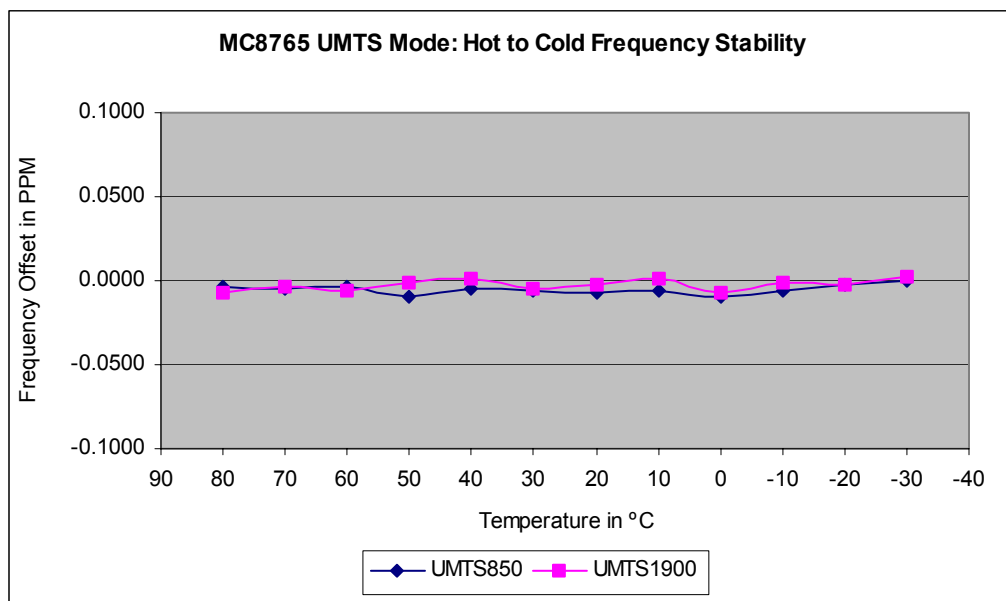
## Low to High Temperature Tabular Readings: GSM and 8PSK Modes

| Temp °C | Cellular Mode TCH192 (837 MHz) |         |            |         | PCS Mode TCH661(1880 MHz) |         |            |         |
|---------|--------------------------------|---------|------------|---------|---------------------------|---------|------------|---------|
|         | GMSK Mode                      |         | 8-PSK Mode |         | GMSK Mode                 |         | 8-PSK Mode |         |
|         | Hz                             | ppm     | Hz         | ppm     | Hz                        | ppm     | Hz         | ppm     |
| -30     | -4.39                          | -0.0052 | 10.27      | 0.0123  | 17.24                     | 0.0092  | -10.88     | -0.0058 |
| -20     | 5.75                           | 0.0069  | -21.92     | -0.0262 | -5.04                     | -0.0027 | -5.04      | -0.0027 |
| -10     | -8.78                          | -0.0105 | 4.58       | 0.0055  | -11.69                    | -0.0062 | -30.74     | -0.0164 |
| 0       | -5.36                          | -0.0064 | 15.95      | 0.0191  | -32.09                    | -0.0171 | -25.73     | -0.0137 |
| 10      | 5.68                           | 0.0068  | 15.79      | 0.0189  | -17.18                    | -0.0091 | -10.49     | -0.0056 |
| 20      | -20.02                         | -0.0239 | -3.00      | -0.0036 | -6.78                     | -0.0036 | 3.45       | 0.0018  |
| 30      | -21.18                         | -0.0253 | -5.46      | -0.0065 | 4.71                      | 0.0025  | -17.24     | -0.0092 |
| 40      | -4.26                          | -0.0051 | -3.94      | -0.0047 | -23.05                    | -0.0123 | -6.91      | -0.0037 |
| 50      | -8.39                          | -0.0100 | 0.03       | 0.0000  | -12.01                    | -0.0064 | -13.88     | -0.0074 |
| 60      | 14.53                          | 0.0174  | -6.55      | -0.0078 | -17.95                    | -0.0095 | -45.62     | -0.0243 |
| 70      | 2.13                           | 0.0025  | 13.95      | 0.0167  | -29.57                    | -0.0157 | -35.93     | -0.0191 |
| 80      | -16.92                         | -0.0202 | 5.94       | 0.0071  | -4.13                     | -0.0022 | -23.31     | -0.0124 |

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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 66 of 72 |
|------------------------------|--------|--------------|---------------|

## High to Low Temperature Frequency Offset: WCDMA Mode



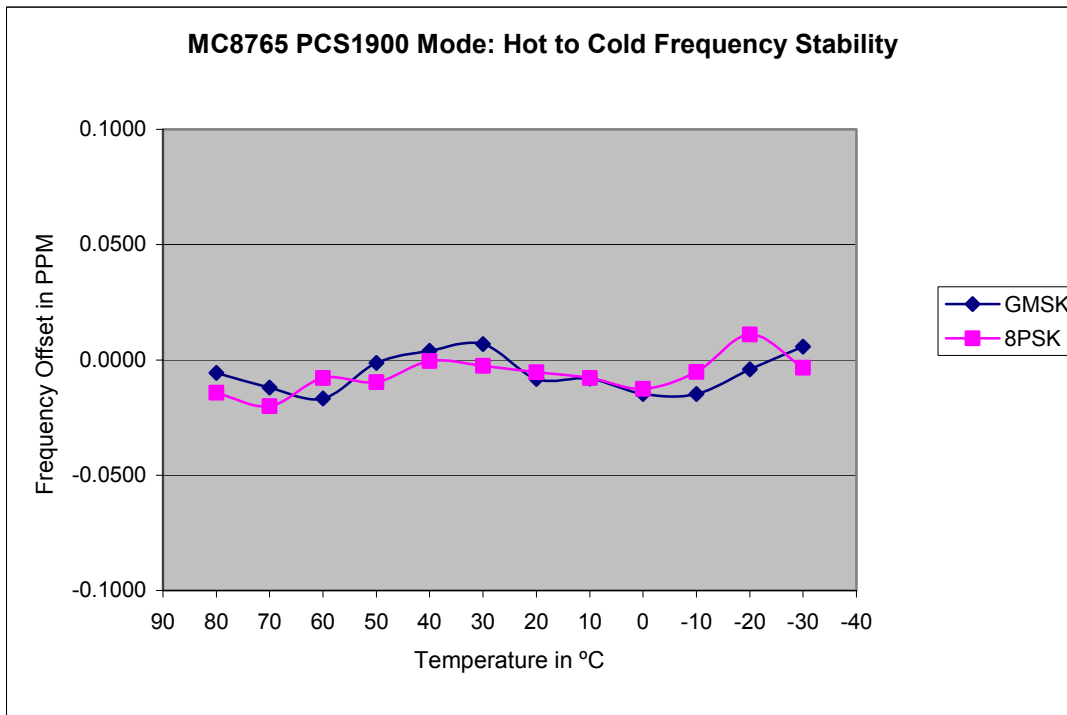
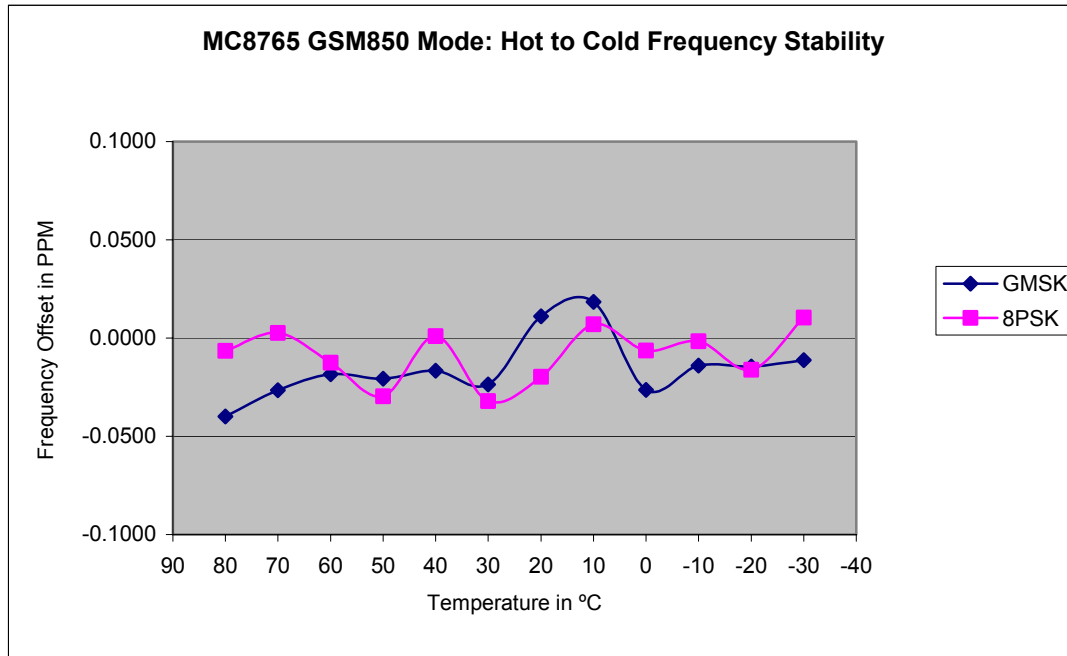
## High to Low Temperature Tabular Readings: WCDMA Mode

| Temp °C | WCDMA Mode - Band V -<br>ULCH4182 (836.4 MHz) |         | WCDMA Mode - Band II - ULCH9400<br>(1880 MHz) |         |
|---------|-----------------------------------------------|---------|-----------------------------------------------|---------|
|         | Hz                                            | ppm     | Hz                                            | ppm     |
| 80      | -3.04                                         | -0.0036 | -13.75                                        | -0.0073 |
| 70      | -4.03                                         | -0.0048 | -6.38                                         | -0.0034 |
| 60      | -3.13                                         | -0.0037 | -10.80                                        | -0.0057 |
| 50      | -7.92                                         | -0.0095 | -2.17                                         | -0.0012 |
| 40      | -3.80                                         | -0.0045 | 1.71                                          | 0.0009  |
| 30      | -5.16                                         | -0.0062 | -7.97                                         | -0.0042 |
| 20      | -5.69                                         | -0.0068 | -3.97                                         | -0.0021 |
| 10      | -5.48                                         | -0.0065 | 1.16                                          | 0.0006  |
| 0       | -7.64                                         | -0.0091 | -12.91                                        | -0.0069 |
| -10     | -5.42                                         | -0.0065 | -1.71                                         | -0.0009 |
| -20     | -1.89                                         | -0.0023 | -3.46                                         | -0.0018 |
| -30     | -0.29                                         | -0.0003 | 4.09                                          | 0.0022  |

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|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 67 of 72 |
|------------------------------|--------|--------------|---------------|

## High to Low Temperature Frequency Offset: GMSK and 8PSK Modes



# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 68 of 72 |
|------------------------------|--------|--------------|---------------|

## High to Low Temperature Tabular Readings: GMSK and 8PSK Modes

| Temp °C | Cellular Mode TCH192 (837 MHz) |         |            |         | PCS Mode TCH661(1880 MHz) |         |            |         |
|---------|--------------------------------|---------|------------|---------|---------------------------|---------|------------|---------|
|         | GMSK Mode                      |         | 8-PSK Mode |         | GMSK Mode                 |         | 8-PSK Mode |         |
|         | Hz                             | ppm     | Hz         | ppm     | Hz                        | ppm     | Hz         | ppm     |
| 80      | -33.45                         | -0.0400 | -5.42      | -0.0065 | -10.53                    | -0.0056 | -26.70     | -0.0142 |
| 70      | -22.28                         | -0.0266 | 2.20       | 0.0026  | -22.66                    | -0.0121 | -37.81     | -0.0201 |
| 60      | -15.43                         | -0.0184 | -10.56     | -0.0126 | -31.45                    | -0.0167 | -14.66     | -0.0078 |
| 50      | -17.31                         | -0.0207 | -24.83     | -0.0297 | -2.45                     | -0.0013 | -18.02     | -0.0096 |
| 40      | -13.95                         | -0.0167 | 0.81       | 0.0010  | 7.55                      | 0.0040  | -0.81      | -0.0004 |
| 30      | -19.76                         | -0.0236 | -26.80     | -0.0320 | 13.04                     | 0.0069  | -4.91      | -0.0026 |
| 20      | 9.30                           | 0.0111  | -16.43     | -0.0196 | -15.43                    | -0.0082 | -10.07     | -0.0054 |
| 10      | 15.43                          | 0.0184  | 5.88       | 0.0070  | -15.17                    | -0.0081 | -14.85     | -0.0079 |
| 0       | -22.02                         | -0.0263 | -5.26      | -0.0063 | -27.89                    | -0.0148 | -23.57     | -0.0125 |
| -10     | -11.69                         | -0.0140 | -1.39      | -0.0017 | -27.77                    | -0.0148 | -9.88      | -0.0053 |
| -20     | -12.14                         | -0.0145 | -13.50     | -0.0161 | -7.75                     | -0.0041 | 20.79      | 0.0111  |
| -30     | -9.43                          | -0.0113 | 8.78       | 0.0105  | 10.91                     | 0.0058  | -6.30      | -0.0034 |

## 9 Frequency Stability Versus Voltage

FCC 2.1055

### 9.1 Summary of Results

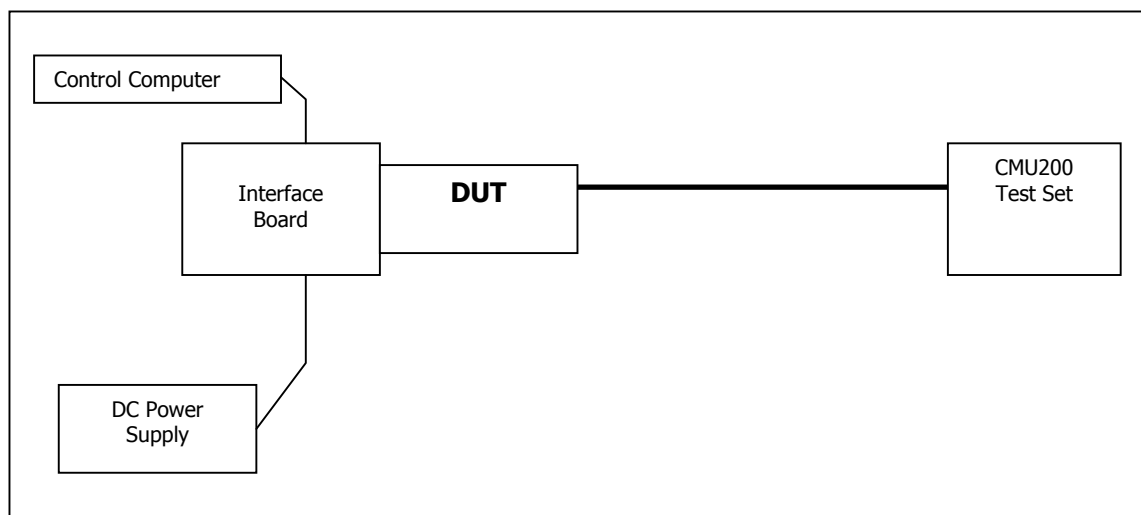
The unit meets the limit of less than 0.1ppm of frequency offset from center for 85% and 115% of the supply voltage for 3.3 volts.

### 9.2 Test Procedure

The MC8765 was connected to a DC Power Supply and a GSM test set (CMU 200) with frequency error measurement capability. The power supply output is adjusted to the test voltage as measured at the input terminals to the module while transmitting. A voltmeter was used to confirm the terminal voltage. The peak frequency offset is recorded (worst case).

The test voltages are 2.805 volts to 3.795 volts.

### Test Setup



### 9.3 Test Equipment

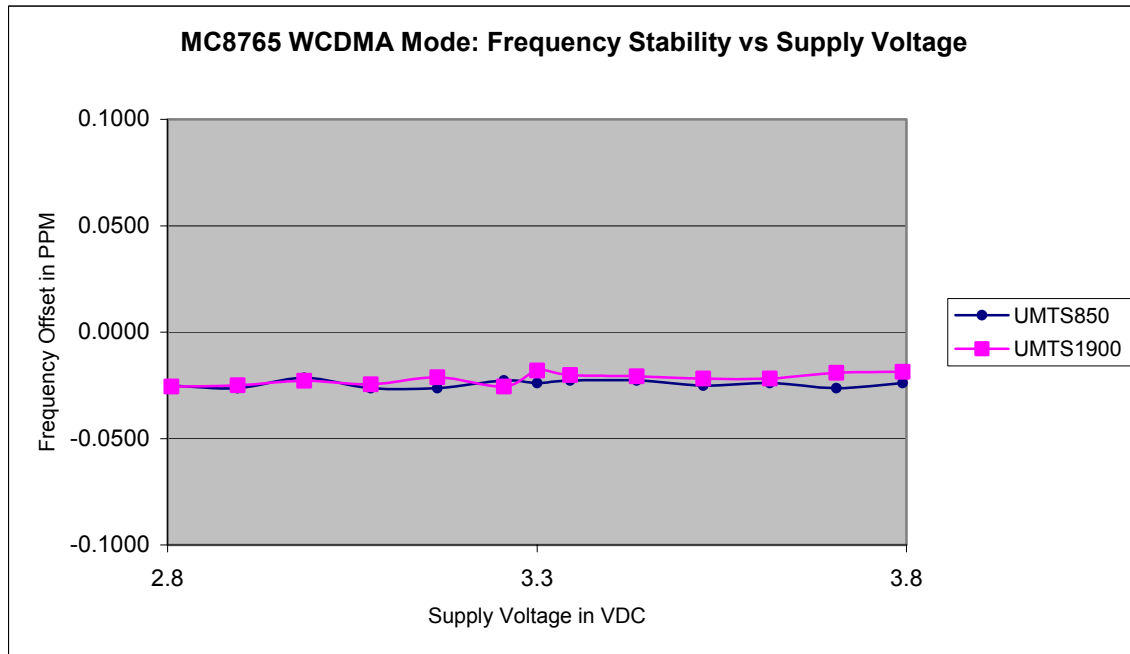
| EQUIPMENT           | MANUFACTURER    | MODEL NO.  | SERIAL NO. | CAL. DATE      |
|---------------------|-----------------|------------|------------|----------------|
| Control Computer    | TC              | Generic PC | 100488     | N/A            |
| Wireless Test Set   | Rohde & Schwarz | CMU200     | 836766/030 | N/A            |
| Spectrum Analyzer   | Agilent         | PSA E4440A | US41421268 | Sept. 29, 2004 |
| DC Power Supply     | HP              | 6632A      | 3530A      | N/A            |
| Interface Board     | Shop built      | Minnow     | N/A        | N/A            |
| Directional Coupler | Mini-Circuits   | ZA3PD-2    | N/A        | N/A            |

# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 70 of 72 |
|------------------------------|--------|--------------|---------------|

## 9.4 Test Results

### WCDMA Mode 85% to 115% of 3.3 Volts Frequency Offset, Tabular Data



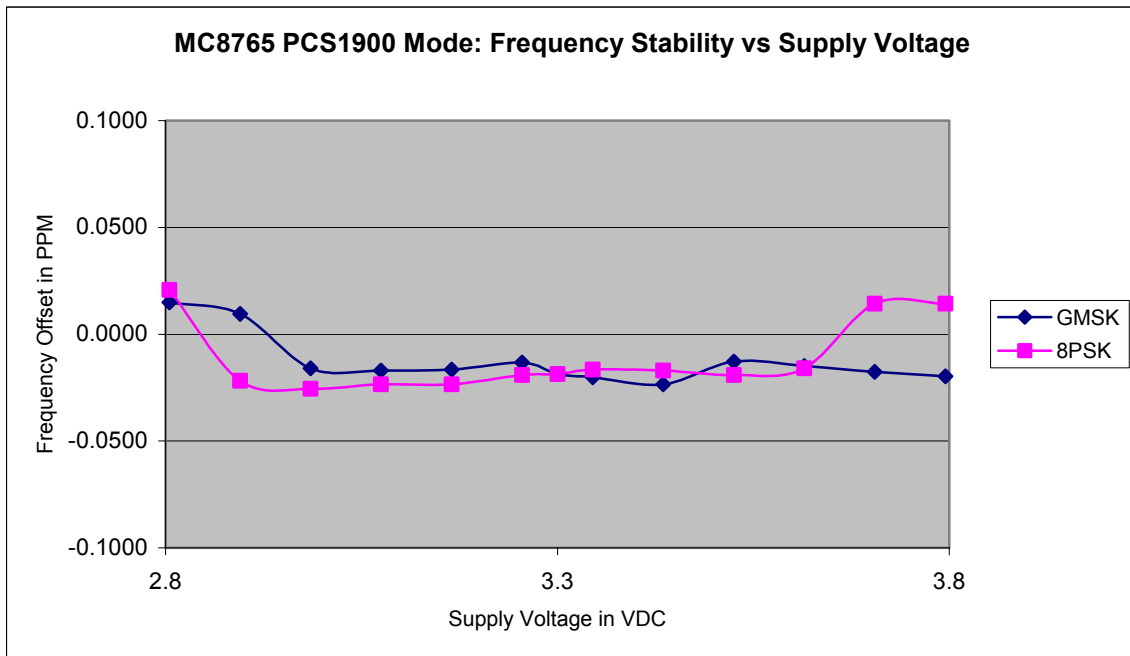
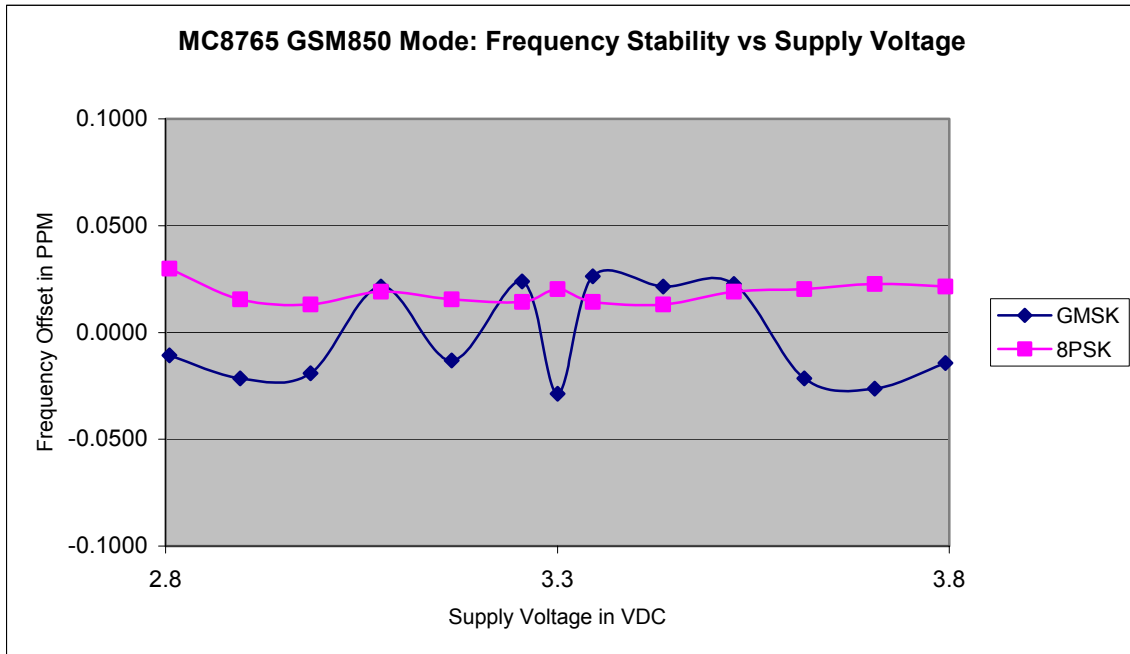
### WCDMA Mode 85% to 115% of 3.3 Volts Frequency Offset, Tabular Data

| Supply VDC | WCDMA Mode - Band V - ULCH4182 (836.4 MHz) |         | WCDMA Mode - Band II - ULCH 9400 (1880 MHz) |         |
|------------|--------------------------------------------|---------|---------------------------------------------|---------|
|            | Peak Hz                                    | ppm     | Peak Hz                                     | ppm     |
| 2.805      | -21.00                                     | -0.0251 | -48.00                                      | -0.0255 |
| 2.895      | -22.00                                     | -0.0263 | -47.00                                      | -0.0250 |
| 2.985      | -18.00                                     | -0.0215 | -43.00                                      | -0.0229 |
| 3.075      | -22.00                                     | -0.0263 | -46.00                                      | -0.0245 |
| 3.165      | -22.00                                     | -0.0263 | -40.00                                      | -0.0213 |
| 3.255      | -19.00                                     | -0.0227 | -48.00                                      | -0.0255 |
| 3.300      | -20.00                                     | -0.0239 | -34.00                                      | -0.0181 |
| 3.345      | -19.00                                     | -0.0227 | -38.00                                      | -0.0202 |
| 3.435      | -19.00                                     | -0.0227 | -39.00                                      | -0.0207 |
| 3.525      | -21.00                                     | -0.0251 | -41.00                                      | -0.0218 |
| 3.615      | -20.00                                     | -0.0239 | -41.00                                      | -0.0218 |
| 3.705      | -22.00                                     | -0.0263 | -36.00                                      | -0.0191 |
| 3.795      | -20.00                                     | -0.0239 | -35.00                                      | -0.0186 |

# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 71 of 72 |
|------------------------------|--------|--------------|---------------|

## GMSK and 8PSK Modes 85% to 115% of 3.3 Volts Frequency Offset



# SIERRA WIRELESS, INC.

|                              |        |              |               |
|------------------------------|--------|--------------|---------------|
| FCC Part 22 & 24 Test Report | MC8765 | Nov. 9, 2005 | Page 72 of 72 |
|------------------------------|--------|--------------|---------------|

## GMSK and 8PSK Modes 85% to 115% of 3.3 Volts Frequency Offset, Tabular Data

| Supply VDC | Cellular Mode TCH192 (837 MHz) |         |            |        | PCS Mode TCH661(1880 MHz) |         |            |         |
|------------|--------------------------------|---------|------------|--------|---------------------------|---------|------------|---------|
|            | GMSK Mode                      |         | 8-PSK Mode |        | GMSK Mode                 |         | 8-PSK Mode |         |
|            | Peak Hz                        | ppm     | Peak Hz    | ppm    | Peak Hz                   | ppm     | Peak Hz    | ppm     |
| 2.805      | -9.00                          | -0.0108 | 25.00      | 0.0299 | 28.00                     | 0.0149  | 39.00      | 0.0207  |
| 2.895      | -18.00                         | -0.0215 | 13.00      | 0.0155 | 18.00                     | 0.0096  | -41.00     | -0.0218 |
| 2.985      | -16.00                         | -0.0191 | 11.00      | 0.0131 | -30.00                    | -0.0160 | -48.00     | -0.0255 |
| 3.075      | 18.00                          | 0.0215  | 16.00      | 0.0191 | -32.00                    | -0.0170 | -44.00     | -0.0234 |
| 3.165      | -11.00                         | -0.0131 | 13.00      | 0.0155 | -31.00                    | -0.0165 | -44.00     | -0.0234 |
| 3.255      | 20.00                          | 0.0239  | 12.00      | 0.0143 | -25.00                    | -0.0133 | -36.00     | -0.0191 |
| 3.300      | -24.00                         | -0.0287 | 17.00      | 0.0203 | -35.00                    | -0.0186 | -35.00     | -0.0186 |
| 3.345      | 22.00                          | 0.0263  | 12.00      | 0.0143 | -38.00                    | -0.0202 | -31.00     | -0.0165 |
| 3.435      | 18.00                          | 0.0215  | 11.00      | 0.0131 | -44.00                    | -0.0234 | -32.00     | -0.0170 |
| 3.525      | 19.00                          | 0.0227  | 16.00      | 0.0191 | -24.00                    | -0.0128 | -36.00     | -0.0191 |
| 3.615      | -18.00                         | -0.0215 | 17.00      | 0.0203 | -28.00                    | -0.0149 | -30.00     | -0.0160 |
| 3.705      | -22.00                         | -0.0263 | 19.00      | 0.0227 | -33.00                    | -0.0176 | 27.00      | 0.0144  |
| 3.795      | -12.00                         | -0.0143 | 18.00      | 0.0215 | -37.00                    | -0.0197 | 27.00      | 0.0144  |