



## **AirCard 850 Test Report**

For

FCC Certification

**FCC ID: N7NAC850**

**Prepared by  
SIERRA WIRELESS INC.  
13811 WIRELESS WAY  
RICHMOND, BC V6V 3A4  
CANADA**

**Test Date(s): September 12, 2005, October 3, 2005**

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### 1 Introduction and Purpose

This document provides the FCC test data for the AC850 wireless network card. 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	6
2.1049	Occupied Bandwidth	Complies	7
2.1051, 22.901(d) 22.917, 24.238(a)	Out of Band Emissions at Antenna Terminals	Complies	15
FCC part 22H/24E	Block Edge Requirements	Complies	40
2.1053	Field Strength of Spurious Radiation	Complies	See CCS Report
2.1055	Frequency Stability versus Temperature	Complies	45
2.1055	Frequency Stability versus Voltage	Complies	48

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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### 3 Description of Equipment Under Test

The Sierra Wireless Inc. model AirCard AC850 is a 5-band PCMCIA card wireless network card operating on the GSM/GPRS/EDGE/UMTS network. In the US and Canada, only cellular and PCS bands are used for GSM/GPRS/EDGE operation, so this test report only contains data for these two bands (850MHz and 1900MHz). The EUT was tested in both modes of operation: GMSK modulation and 8-PSK modulation. The EUT is a production sample and the serial number is: X1620350059E2



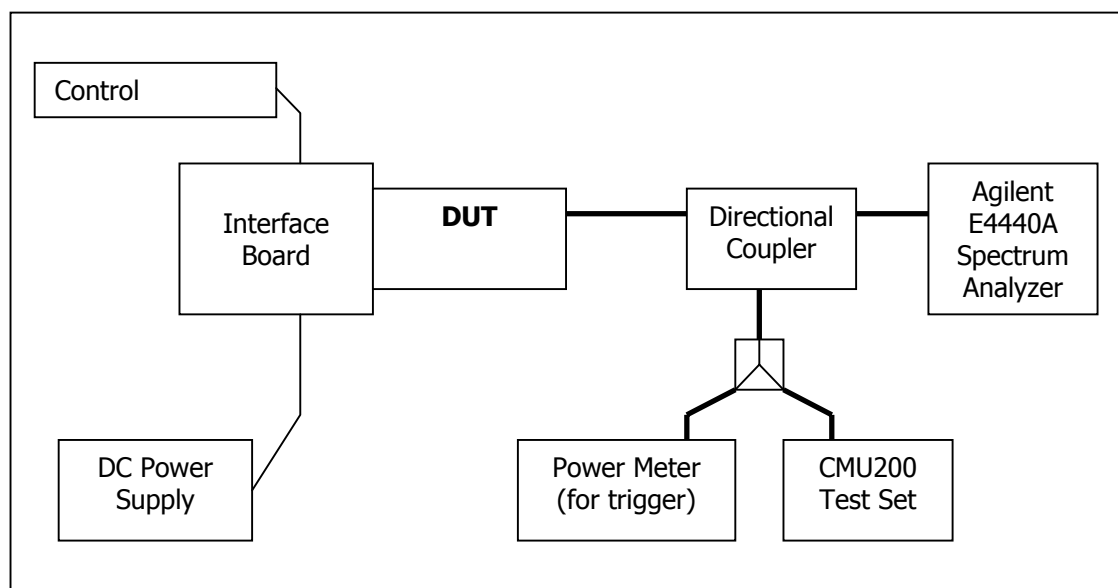
## 4 RF Power Output

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. 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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### 4.3 Test Results

Frequency (MHz)	Channel	Power (dBm)	
		GMSK Mode	8-PSK Mode
824.2	128	31.56	26.51
837.0	192	31.71	26.66
848.8	251	31.19	26.35
1850.2	512	28.37	25.58
1880.0	661	28.36	25.61
1909.8	810	28.89	25.42

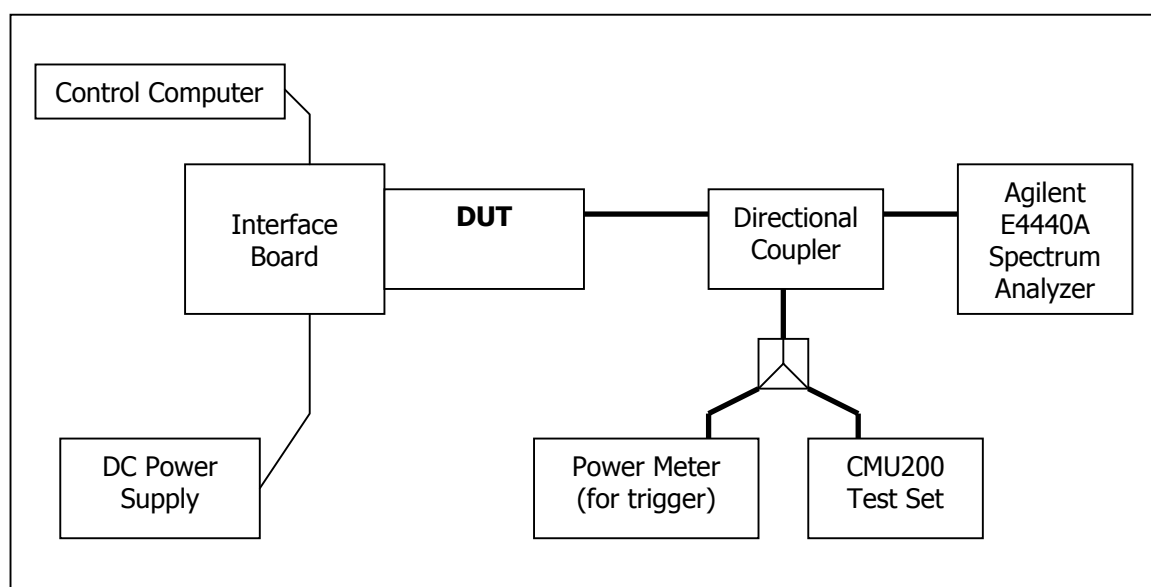
## 5 Occupied Bandwidth

FCC 2.1049

### 5.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, 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 center frequency of each band. The -26dB bandwidth was also measured and recorded.

### Test Setup



### 5.2 Test Results

The performance of 800 MHz cellular band is shown in plots 5.3.1 to 5.3.12.

Performance of 1900 MHz PCS band is shown in plots 5.3.13 to 5.3.24.

Frequency (MHz)	Channel	99% Occupied Bandwidth (kHz)		-26dBc Occupied Bandwidth (kHz)	
		GMSK Mode	8-PSK Mode	GMSK Mode	8-PSK Mode
824.2	128	242	243	313	296
837.0	192	242	242	312	304
848.8	251	243	243	314	308
1850.2	512	241	242	314	311
1880.0	661	242	244	315	308
1909.8	810	243	242	314	305

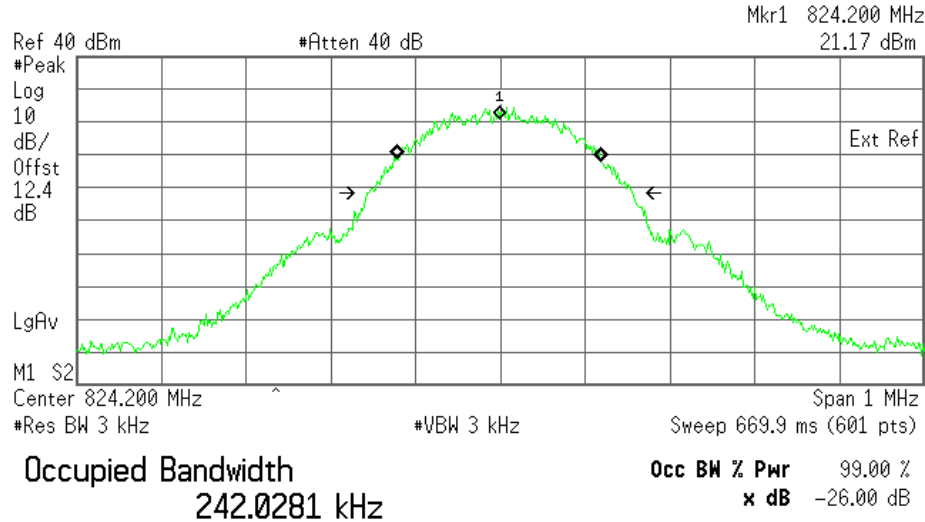
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### 5.3 Test Plots

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

Agilent 11:57:41 Sep 14, 2005

L

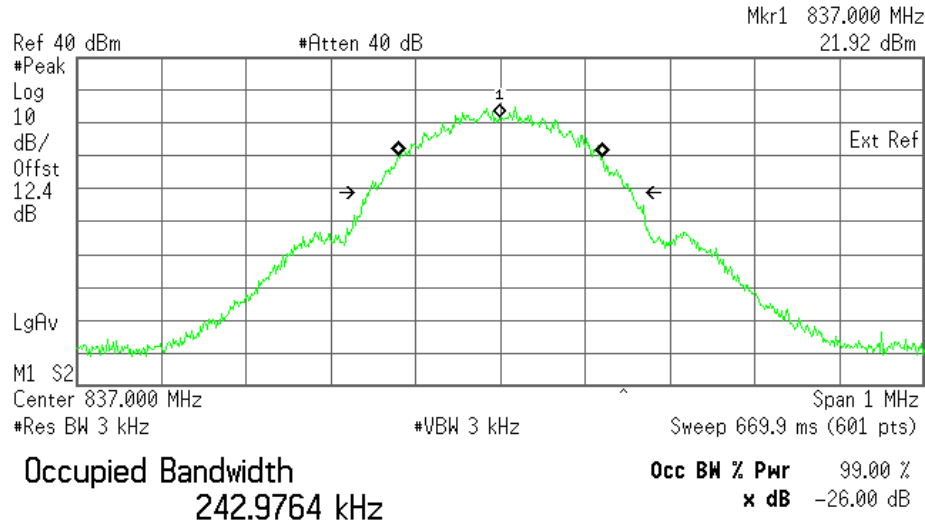


Transmit Freq Error -1.408 kHz  
x dB Bandwidth 313.797 kHz

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

Agilent 11:59:58 Sep 14, 2005

L



Transmit Freq Error -107.093 Hz  
x dB Bandwidth 312.677 kHz



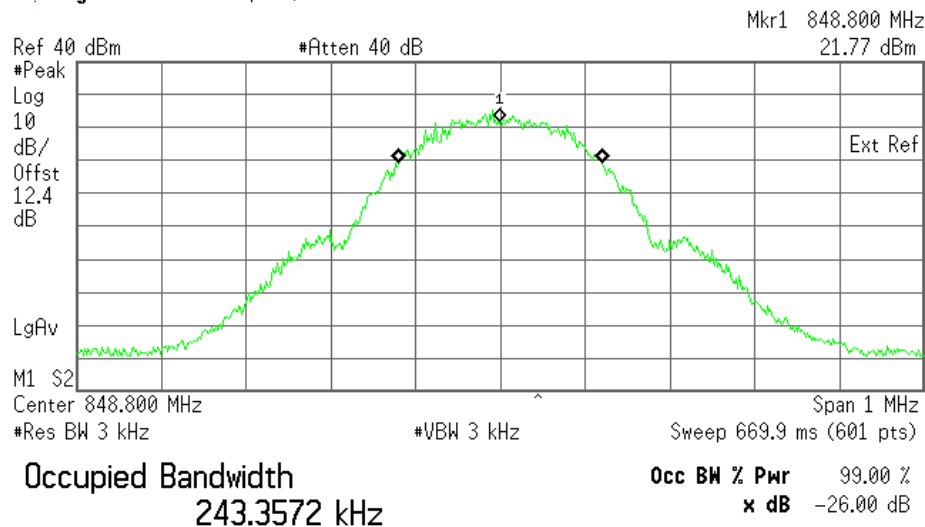
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## 5.3.5) GMSK Occupied Bandwidth, High channel, 848.8 MHz, 99% bandwidth

Agilent 12:02:06 Sep 14, 2005

L



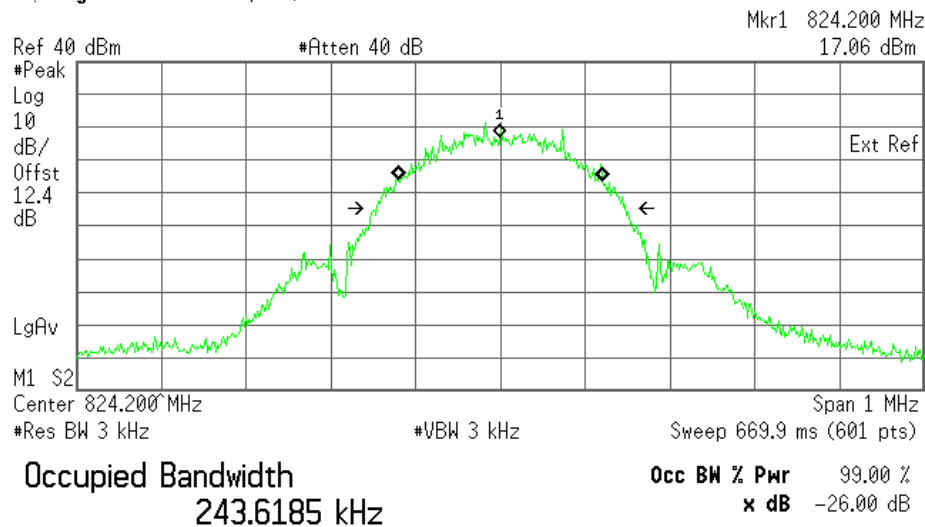
Transmit Freq Error -187.038 Hz

x dB Bandwidth 314.727 kHz

## 5.3.7) 8-PSK Occupied Bandwidth, Cellular Low channel, 824.2 MHz, 99% bandwidth

Agilent 12:04:25 Sep 14, 2005

L



Transmit Freq Error -385.125 Hz

Occupied Bandwidth 296.421 kHz

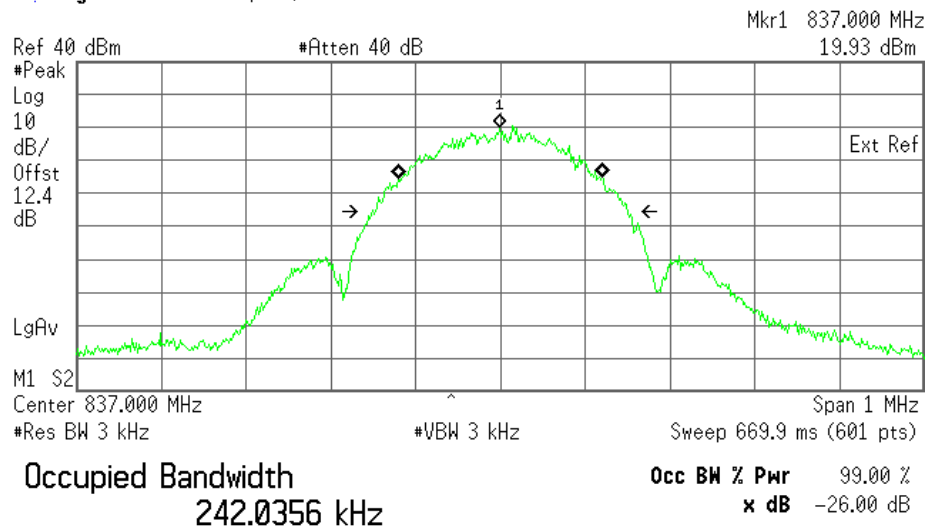
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## 5.3.9) 8-PSK Occupied Bandwidth, Middle channel, 837 MHz, 99% bandwidth

Agilent 12:06:42 Sep 14, 2005

L



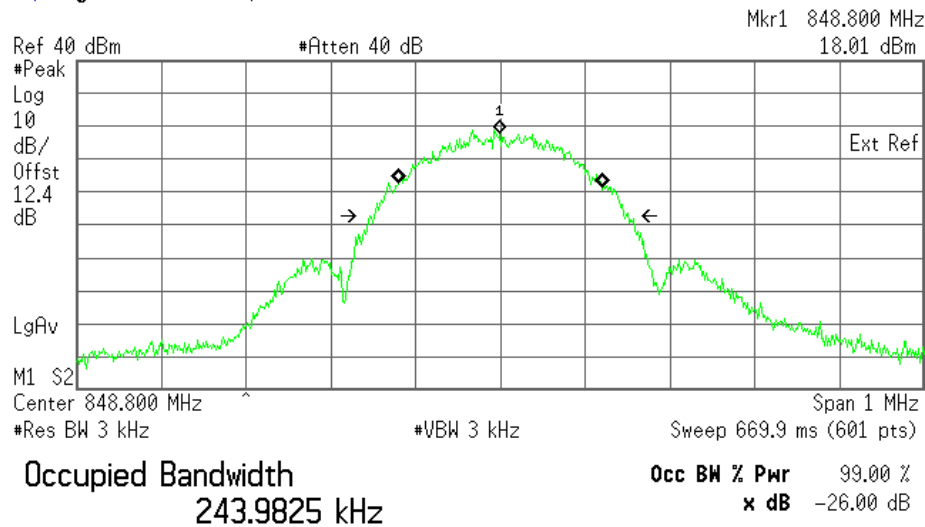
Transmit Freq Error -317.554 Hz

Occupied Bandwidth 304.069 kHz

## 5.3.11) 8-PSK Occupied Bandwidth, High channel, 848.8 MHz, 99% bandwidth

Agilent 12:07:46 Sep 14, 2005

L



Transmit Freq Error 235.710 Hz

Occupied Bandwidth 308.568 kHz

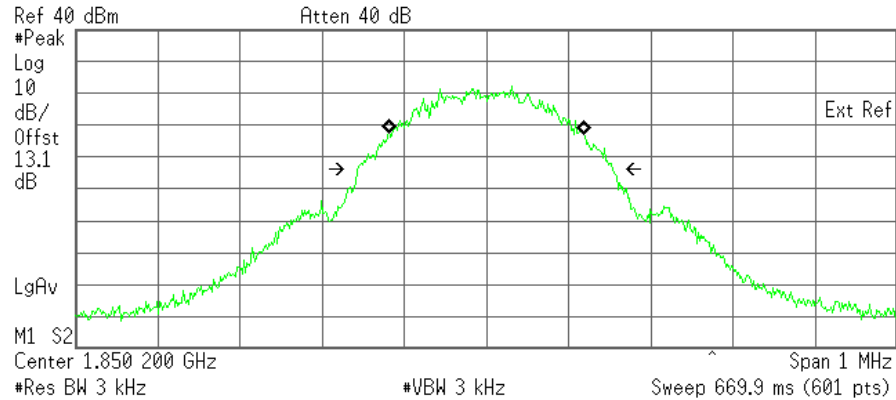
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## 5.3.13) GMSK Occupied Bandwidth, PCS Low channel, 1850.2 MHz, 99% bandwidth

Agilent 10:53:27 Oct 3, 2005

L



Occupied Bandwidth  
240.8537 kHz

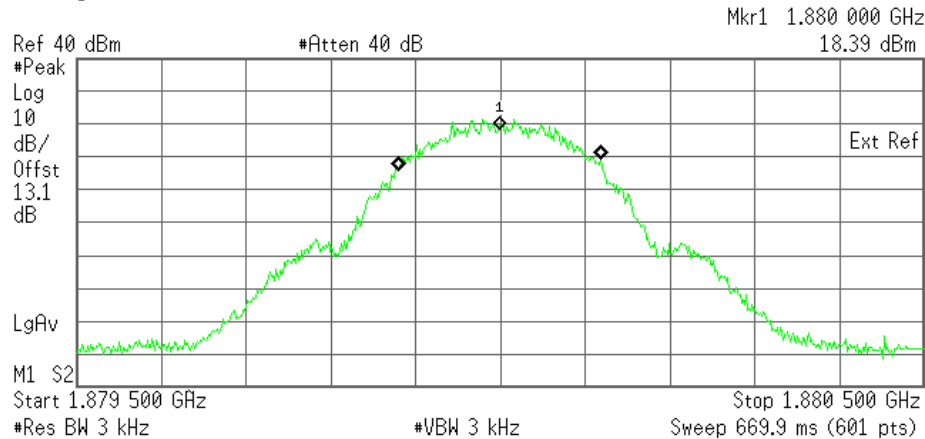
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -29.195 Hz  
x dB Bandwidth 313.469 kHz

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

Agilent 11:12:31 Sep 14, 2005

L



Occupied Bandwidth  
242.2010 kHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -1.148 kHz  
x dB Bandwidth 315.112 kHz

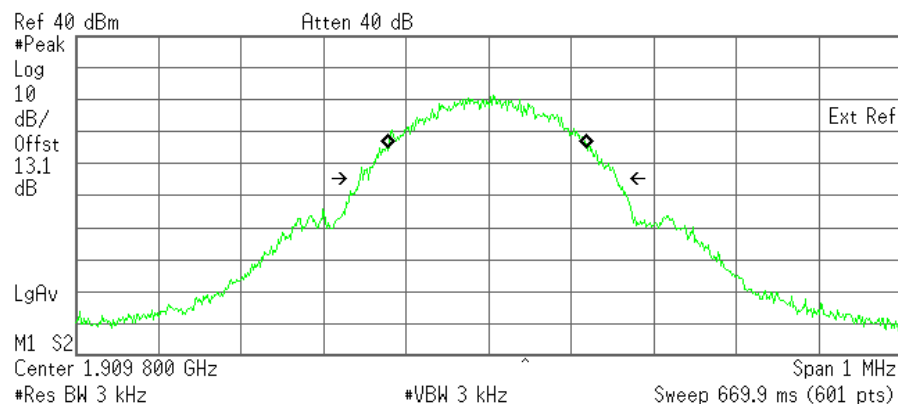
# SIERRA WIRELESS, INC.

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

Agilent 10:55:06 Oct 3, 2005

L



Occupied Bandwidth  
243.0513 kHz

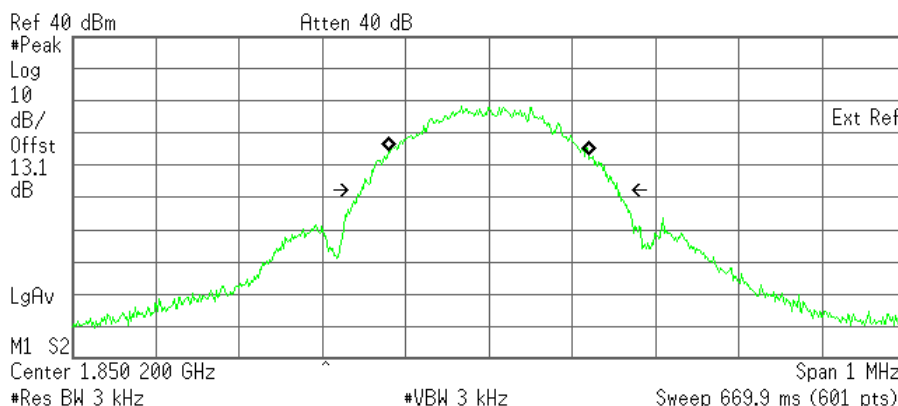
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -1.040 kHz  
x dB Bandwidth 313.499 kHz

## 5.3.19) 8-PSK Occupied Bandwidth, PCS Low channel, 1850.2 MHz, 99% bandwidth

Agilent 10:57:43 Oct 3, 2005

L



Occupied Bandwidth  
242.3608 kHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -367.488 Hz  
x dB Bandwidth 310.578 kHz

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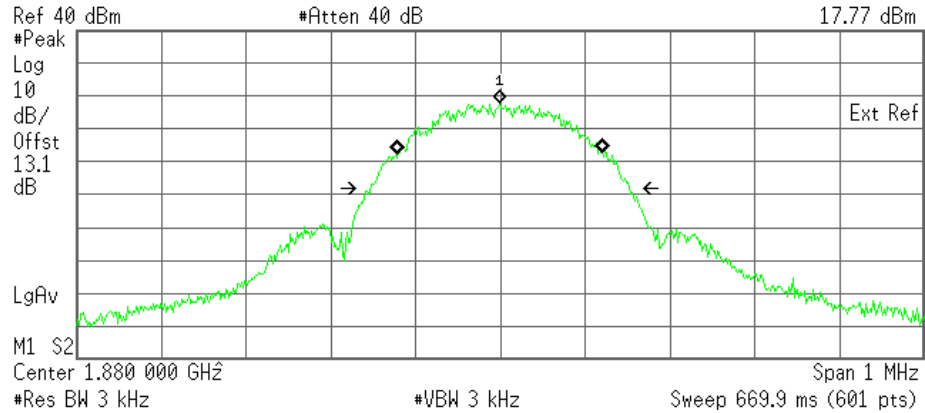
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## 5.3.21) 8-PSK Occupied Bandwidth, PCS Middle channel, 1880.0 MHz, 99% bandwidth

Agilent 11:27:43 Sep 14, 2005

L

Mkr1 1.880 000 GHz  
17.77 dBm



Occupied Bandwidth  
244.2140 kHz

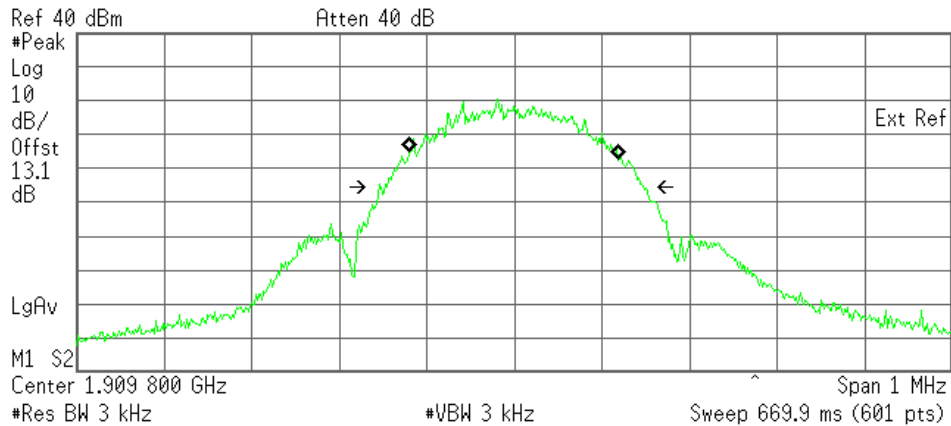
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -253.345 Hz  
x dB Bandwidth 308.739 kHz

## 5.3.23) 8-PSK Occupied Bandwidth, PCS High channel, 1909.8 MHz, 99% bandwidth

Agilent 11:02:04 Oct 3, 2005

L



Occupied Bandwidth  
241.7686 kHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -761.542 Hz  
x dB Bandwidth 305.053 kHz

## 6 Out of Band Emissions at Antenna Terminals

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

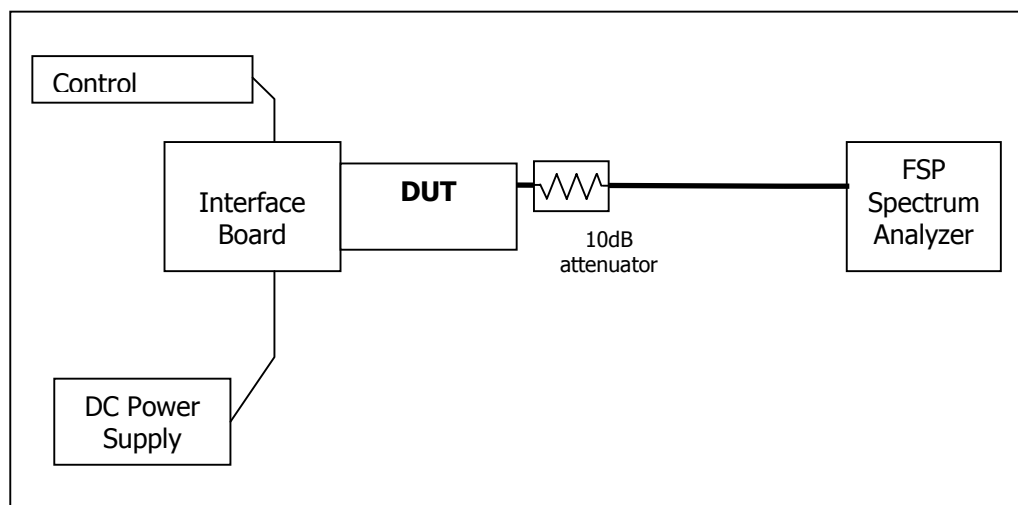
### Out of Band Emissions:

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 EUT was scanned for spurious emissions from 1MHz to 20GHz with sufficient bandwidth and video resolution. Data plots are included. The measurement cable path loss at 20GHz (including an attenuator) was 13dB (11dB at lower frequencies). The larger path loss of 13dB was used for all measurements to be conservative. 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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### 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**

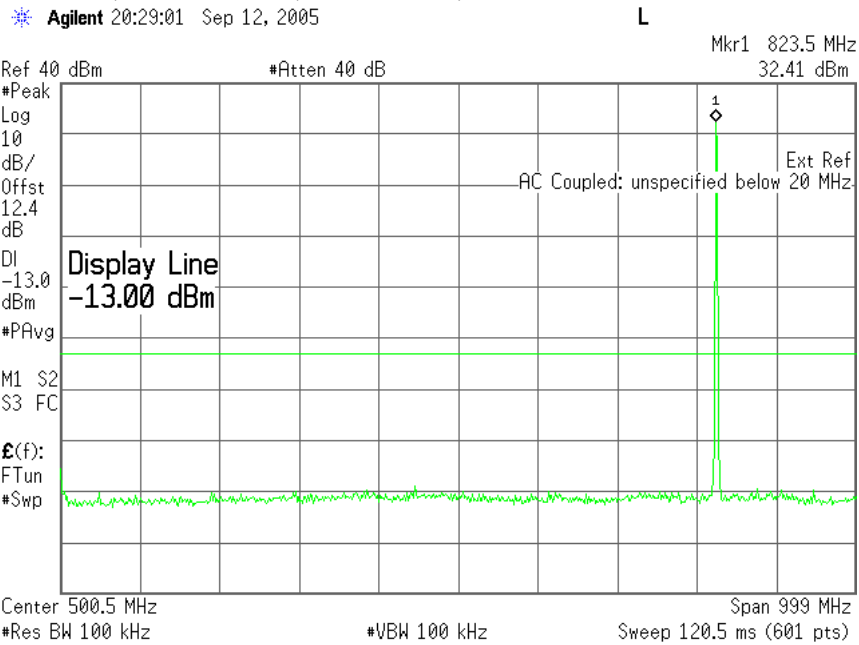
Plot Number	Description
6.4.19 – 6.4.21	GMSK Mode, Low Channel, 1850.2 MHz
6.4.22 – 6.4.24	GMSK Mode, Middle Channel, 1880.0 MHz
6.4.25 – 6.4.27	GMSK Mode, High Channel, 1909.8 MHz
6.4.28 – 6.4.30	8-PSK, Mode, Low Channel, 1850.2 MHz
6.4.31 – 6.4.33	8-PSK Mode, Middle Channel, 1880.0 MHz
6.4.34 – 6.4.36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

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

#### 6.4 Test Plots

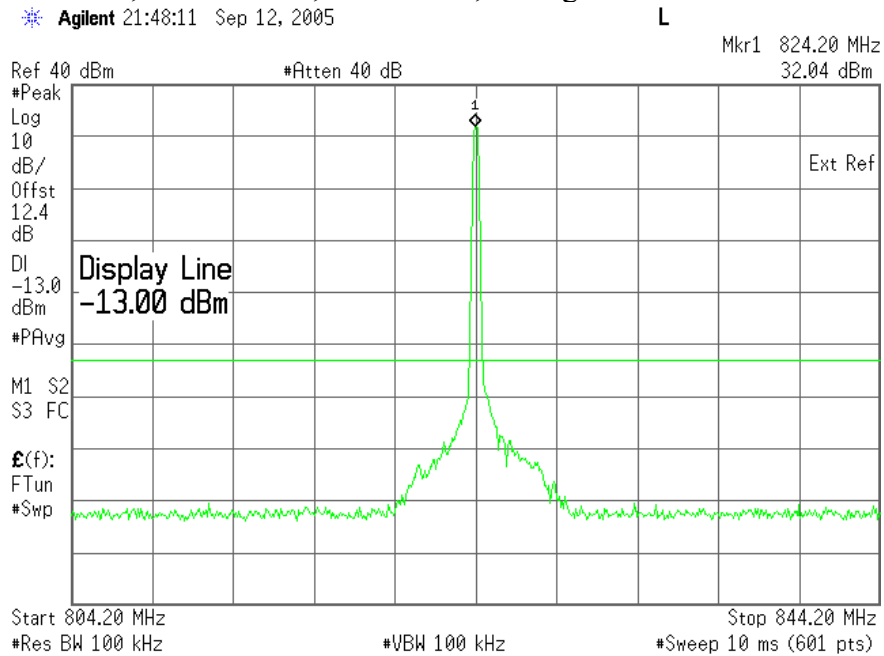
##### Plot 6.4.1) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 824.2 MHz, 1 MHz to 1 GHz



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

GMSK, Low channel, 824.2 MHz, TX signal +/- 20 MHz



**Strong emission shown in each case is the carrier signal.**



# SIERRA WIRELESS, INC.

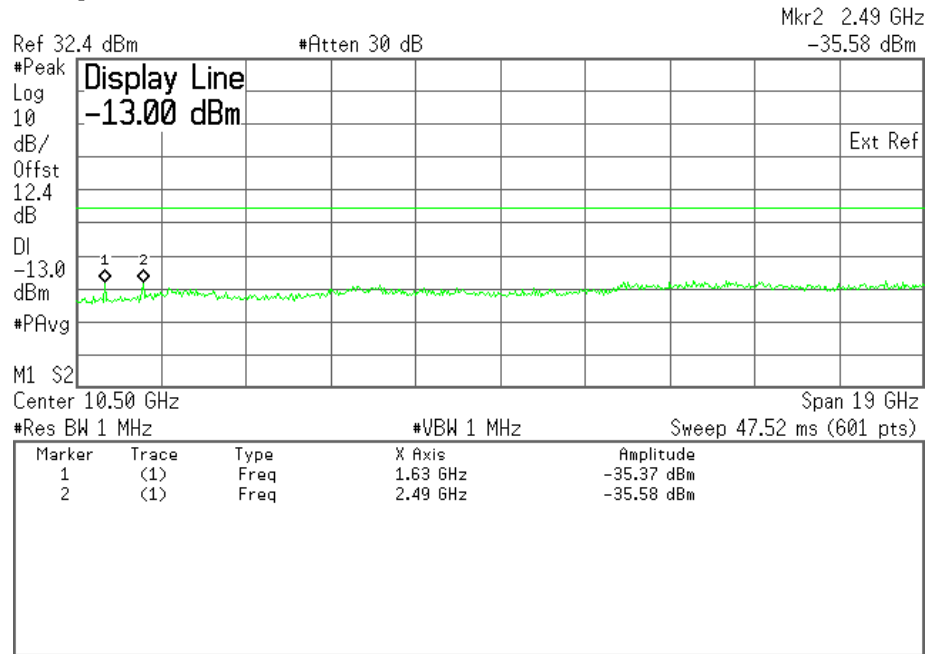
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## Plot 6.4.3) Out of Band Emissions at Antenna Terminals

GMSK, Low channel, 824.2 MHz, 1 GHz to 20 GHz

Agilent 22:28:59 Sep 12, 2005

L



Cellular Harmonics for Ch. 128 (824.2 MHz)	Level (dBm)
Second	-35 dBm
Third	-35 dBm
All others	< -30dBm up to 20GHz

# SIERRA WIRELESS, INC.

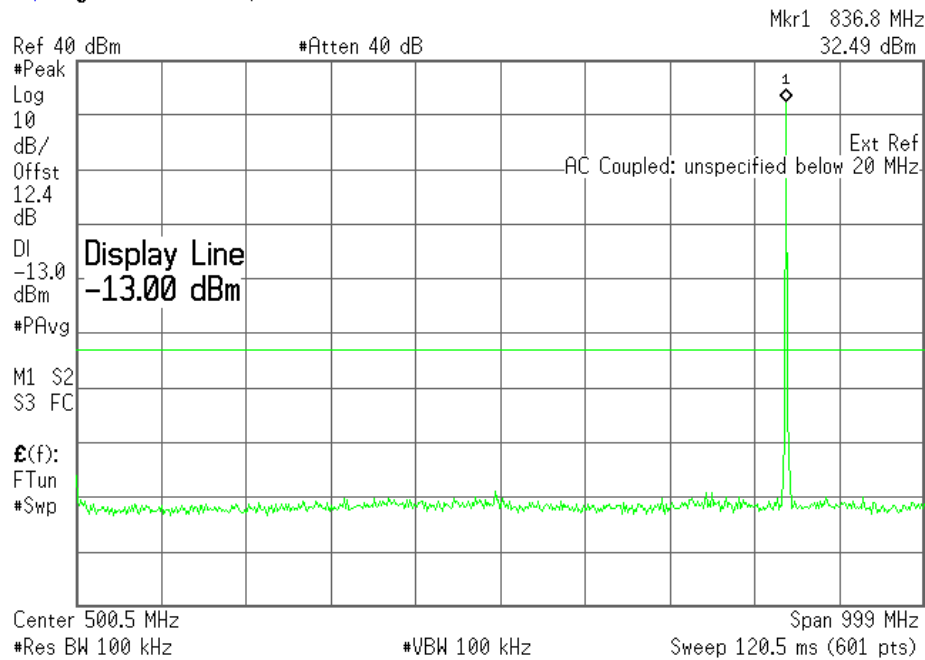
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## Plot 6.4.4) Out of Band Emissions at Antenna Terminals

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

Agilent 20:30:00 Sep 12, 2005

L

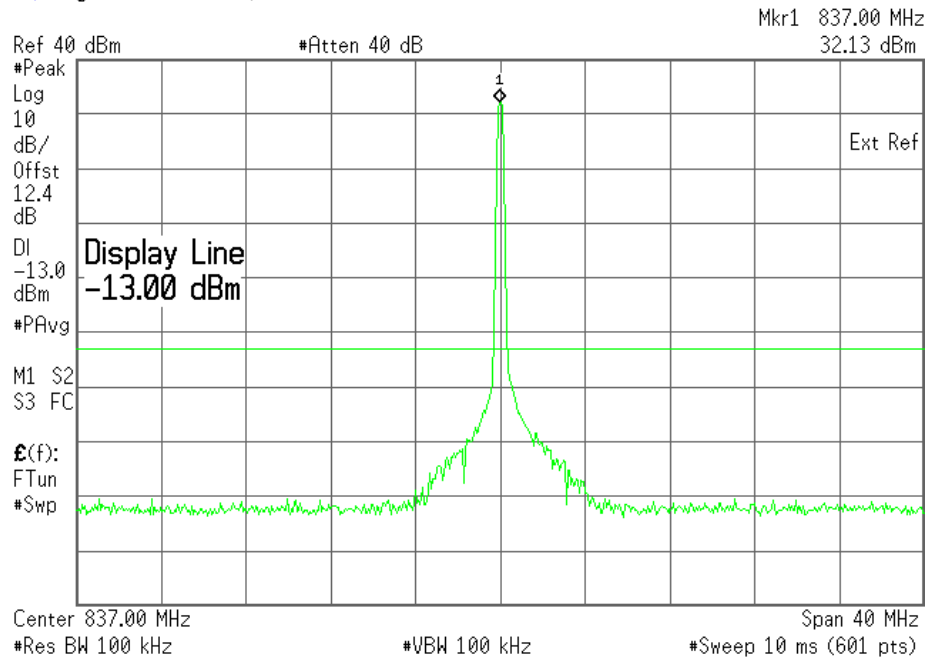


## Plot 6.4.5) Out of Band Emissions at Antenna Terminals

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

Agilent 21:52:10 Sep 12, 2005

L



**Strong emission shown in each case is the carrier signal.**

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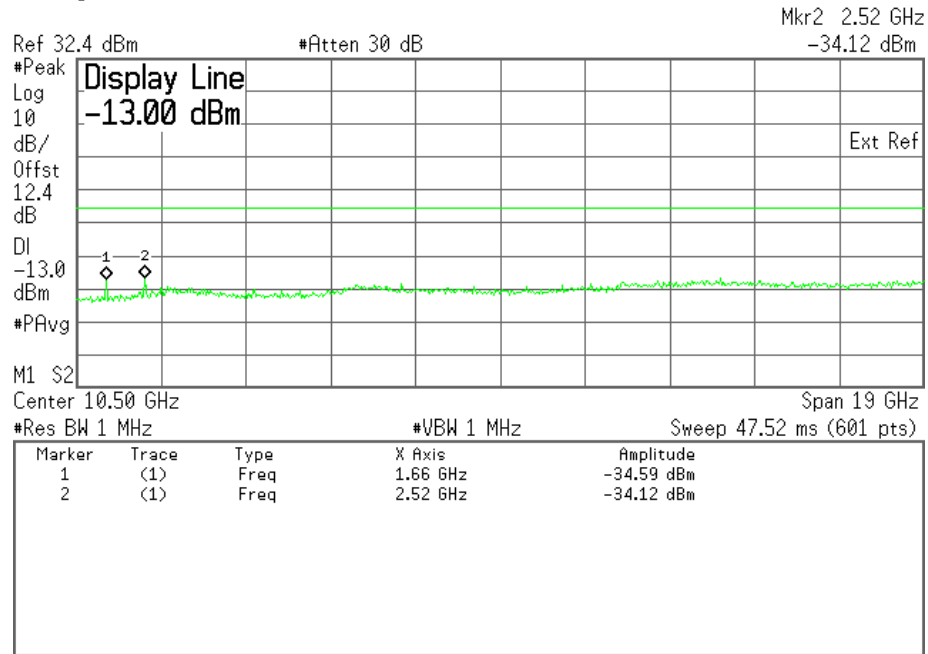
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## Plot 6.4.6) Out of Band Emissions at Antenna Terminals

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

Agilent 22:31:14 Sep 12, 2005

L



Cellular Harmonics for Ch. 190 (836.6 MHz)	Level (dBm)
Second	-34 dBm
Third	-34 dBm
All others	< -30dBm up to 20GHz

# SIERRA WIRELESS, INC.

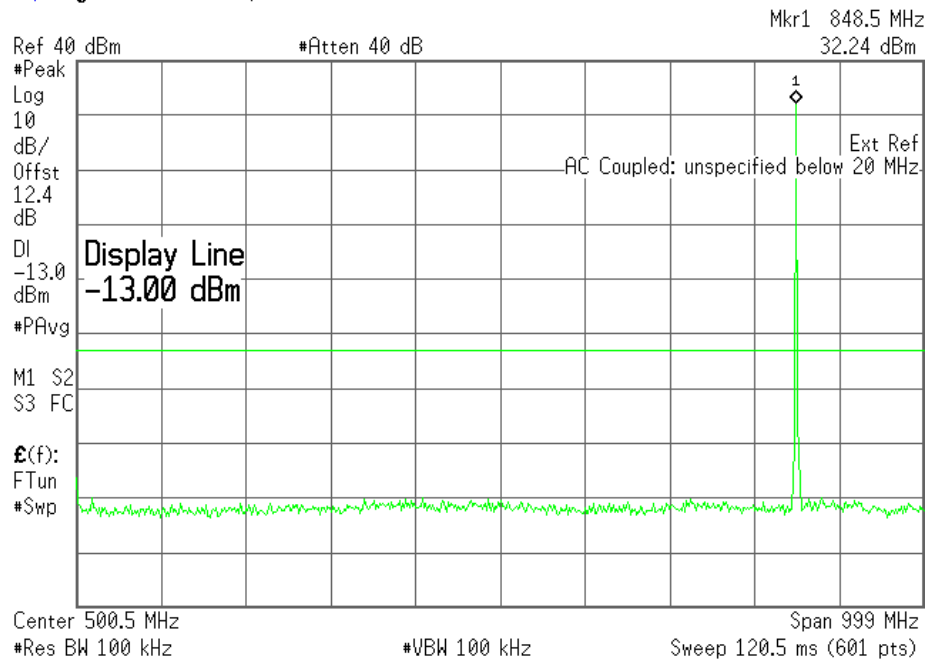
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## Plot 6.4.7) Out of Band Emissions at Antenna Terminals

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

Agilent 20:31:00 Sep 12, 2005

L

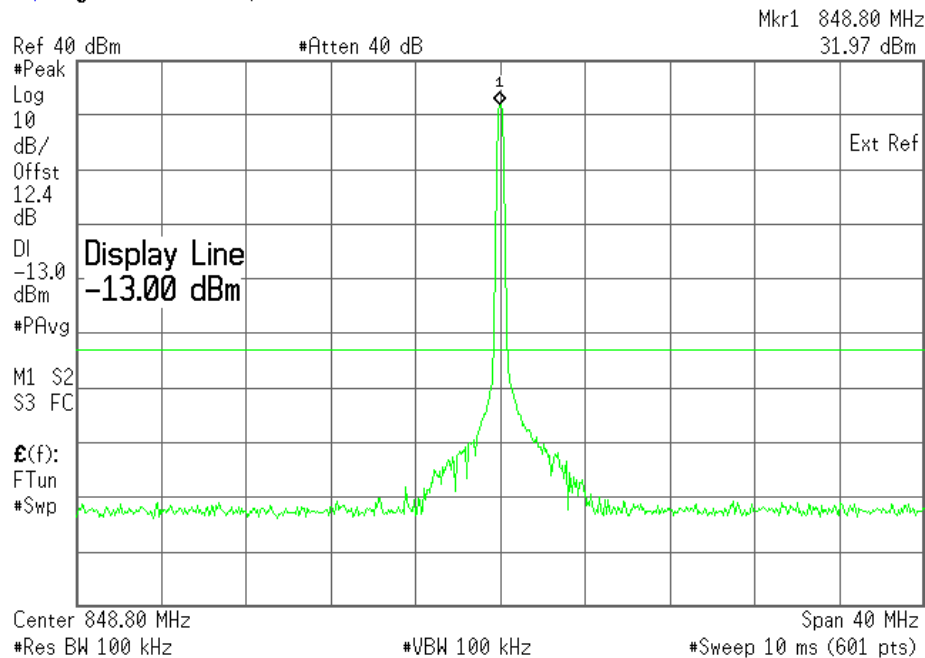


## Plot 6.4.8) Out of Band Emissions at Antenna Terminals

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

Agilent 21:53:28 Sep 12, 2005

L



**Strong emission shown in each case is the carrier signal.**

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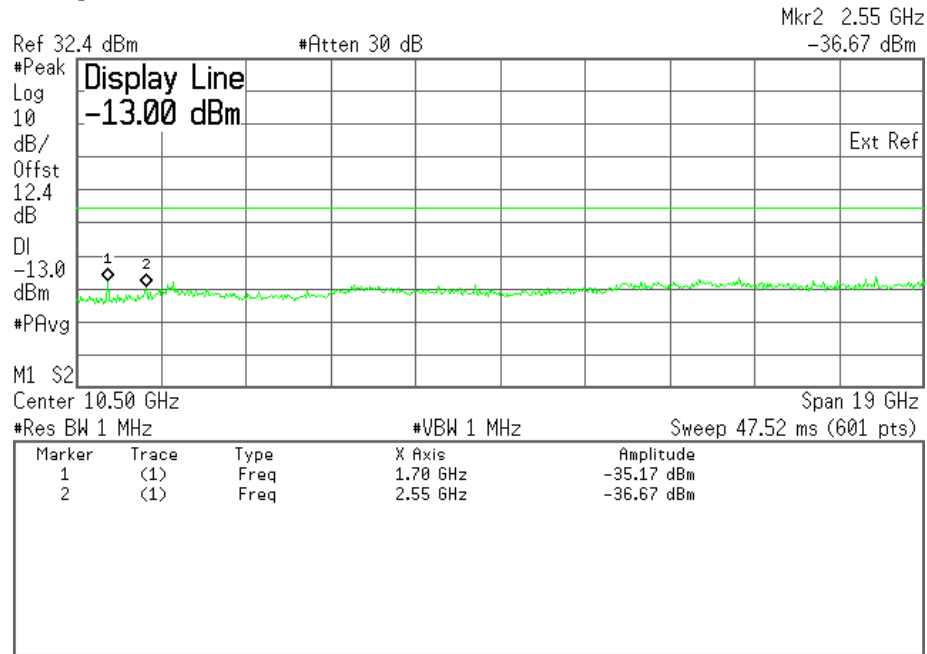
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## Plot 6.4.9) Out of Band Emissions at Antenna Terminals

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

Agilent 22:35:30 Sep 12, 2005

L



Cellular Harmonics for Ch. 251 (848.8 MHz)	Level (dBm)
Second	-35 dBm
Third	-36 dBm
All others	< -30dBm up to 20GHz

# SIERRA WIRELESS, INC.

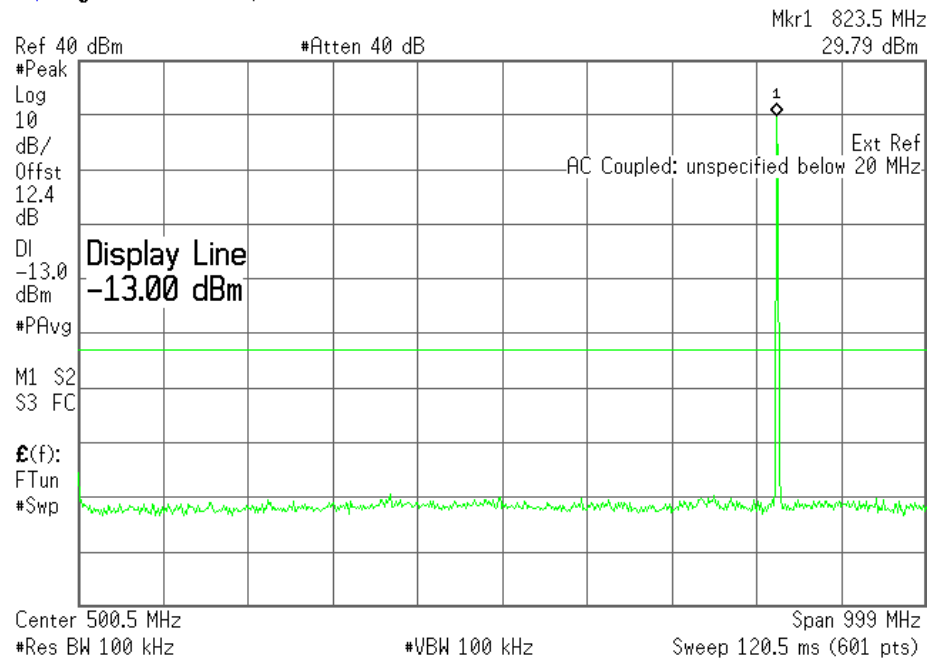
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## Plot 6.4.10) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 824.2 MHz, 1 MHz to 1 GHz

Agilent 20:32:12 Sep 12, 2005

L

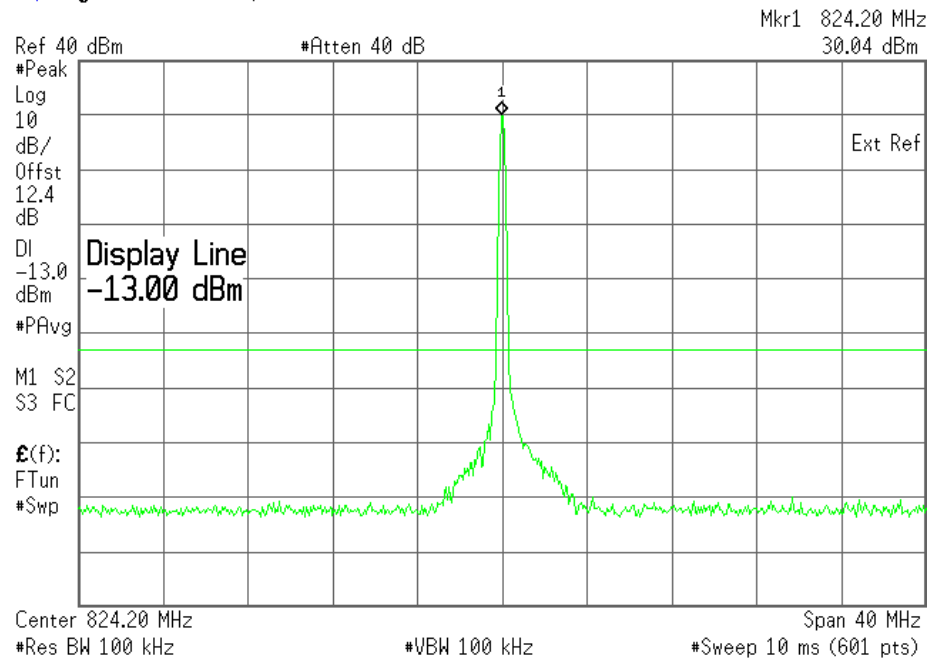


## Plot 6.4.11) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 824.2 MHz, TX signal +/- 20 MHz

Agilent 21:54:45 Sep 12, 2005

L



**Strong emission shown in each case is the carrier signal.**

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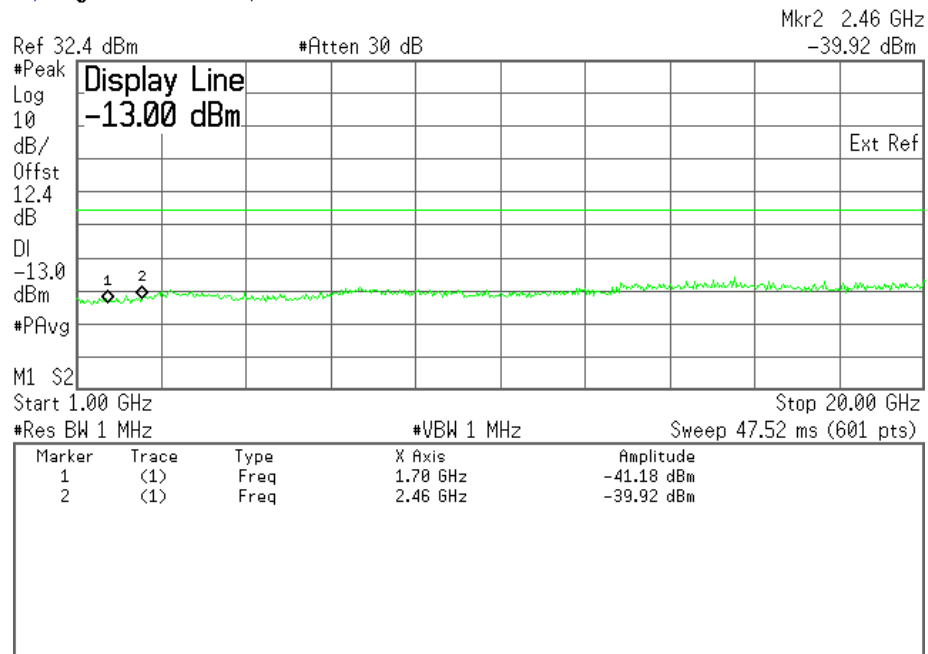
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## Plot 6.4.12) Out of Band Emissions at Antenna Terminals

8-PSK, Low channel, 824.2 MHz, 1 GHz to 20 GHz

Agilent 22:39:36 Sep 12, 2005

L



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

# SIERRA WIRELESS, INC.

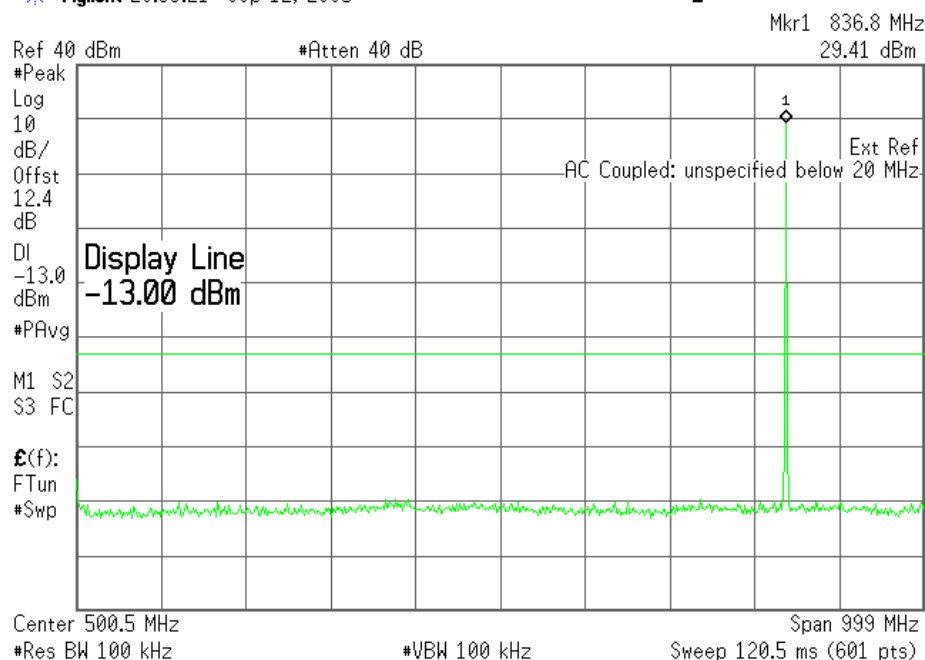
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## Plot 6.4.13) Out of Band Emissions at Antenna Terminals

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

Agilent 20:33:21 Sep 12, 2005

L

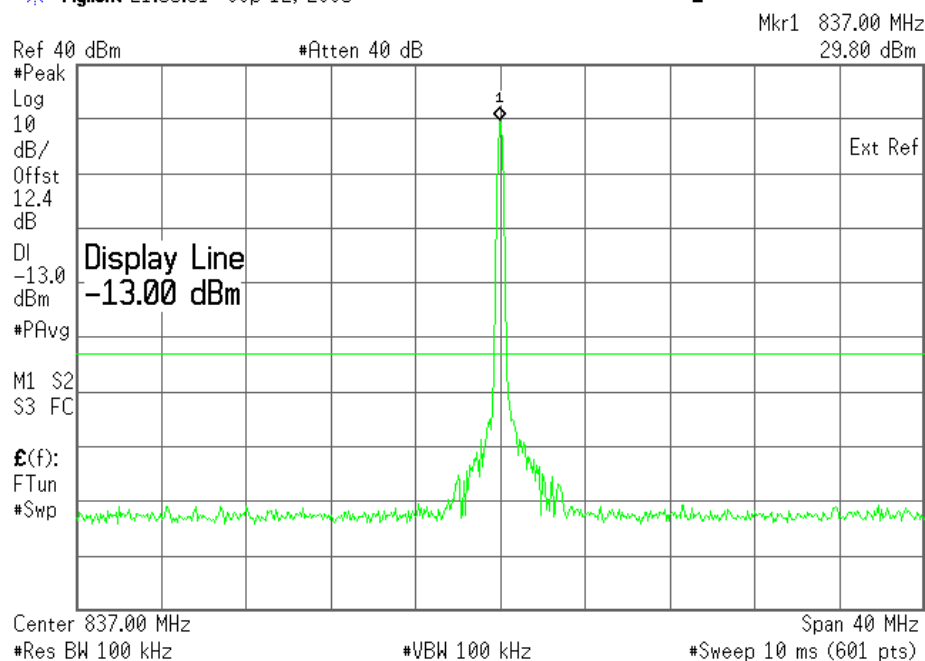


## Plot 6.4.14) Out of Band Emissions at Antenna Terminals

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

Agilent 21:55:51 Sep 12, 2005

L



**Strong emission shown in each case is the carrier signal.**

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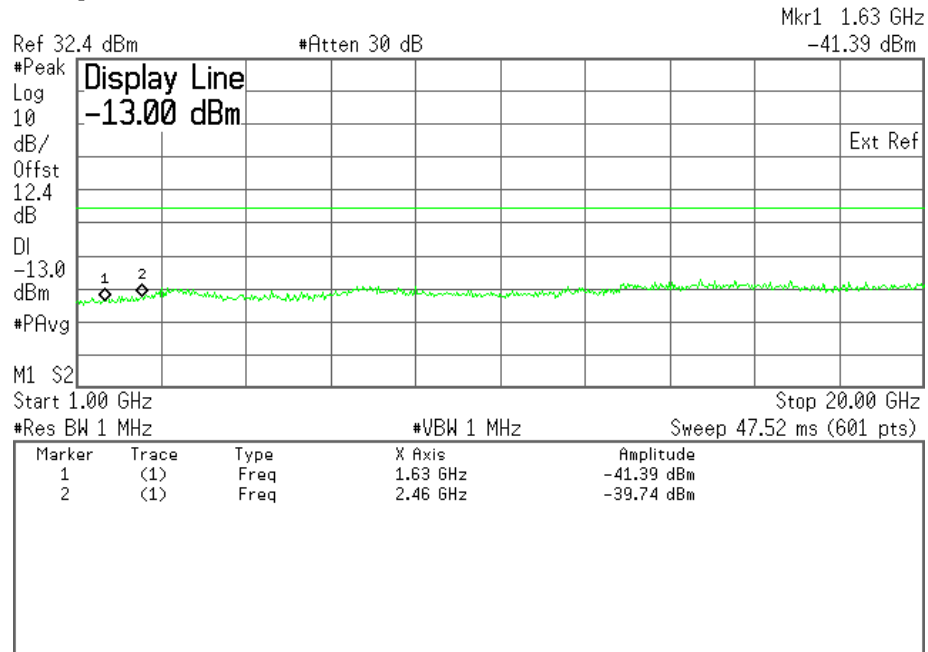
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## Plot 6.4.15) Out of Band Emissions at Antenna Terminals

8-PSK, Mid Channel, 837 MHz, 1 GHz to 20 GHz

Agilent 22:41:50 Sep 12, 2005

L



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

# SIERRA WIRELESS, INC.

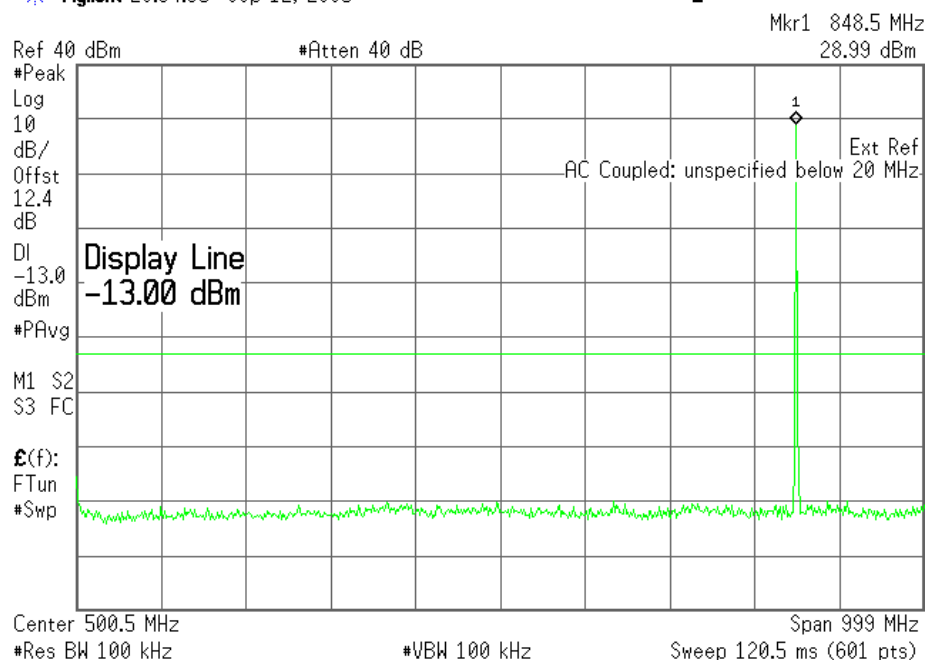
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## Plot 6.4.16) Out of Band Emissions at Antenna Terminals

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

Agilent 20:34:35 Sep 12, 2005

L

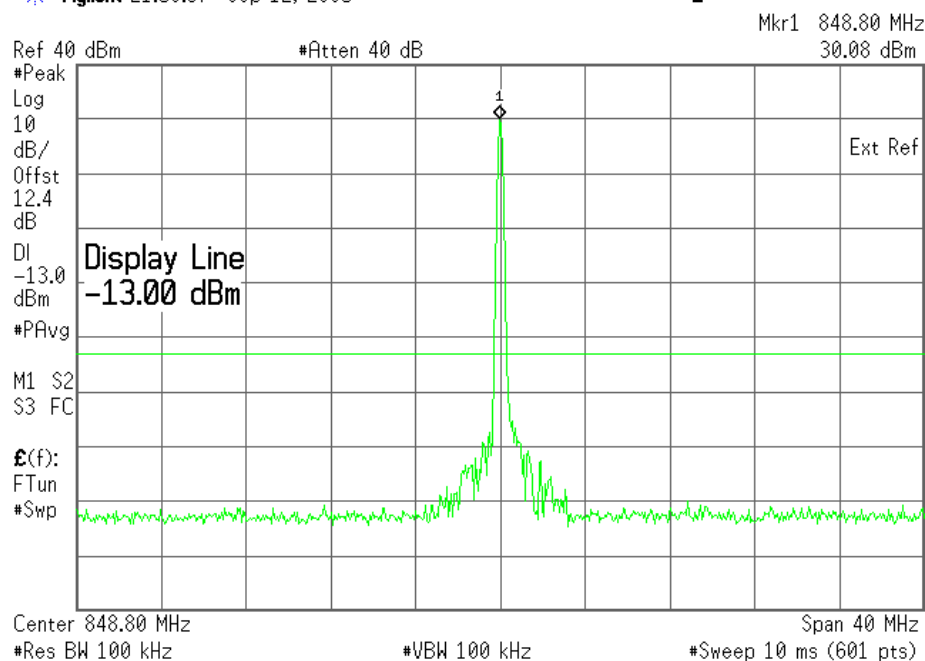


## Plot 6.4.17) Out of Band Emissions at Antenna Terminals

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

Agilent 21:56:37 Sep 12, 2005

L



**Strong emission shown in each case is the carrier signal.**

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# SIERRA WIRELESS, INC.

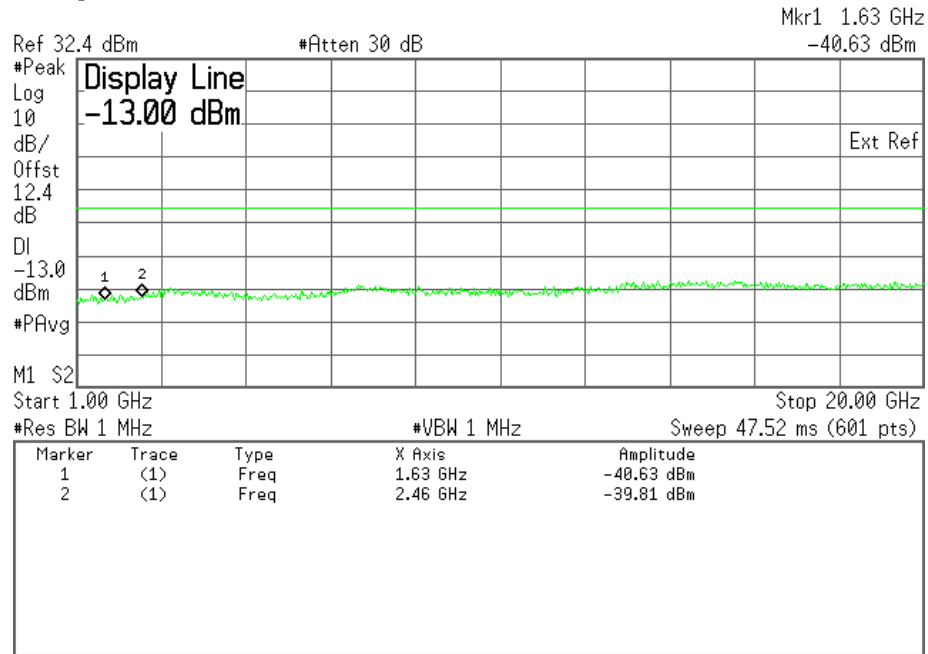
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## Plot 6.4.18) Out of Band Emissions at Antenna Terminals

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

Agilent 22:43:17 Sep 12, 2005

L



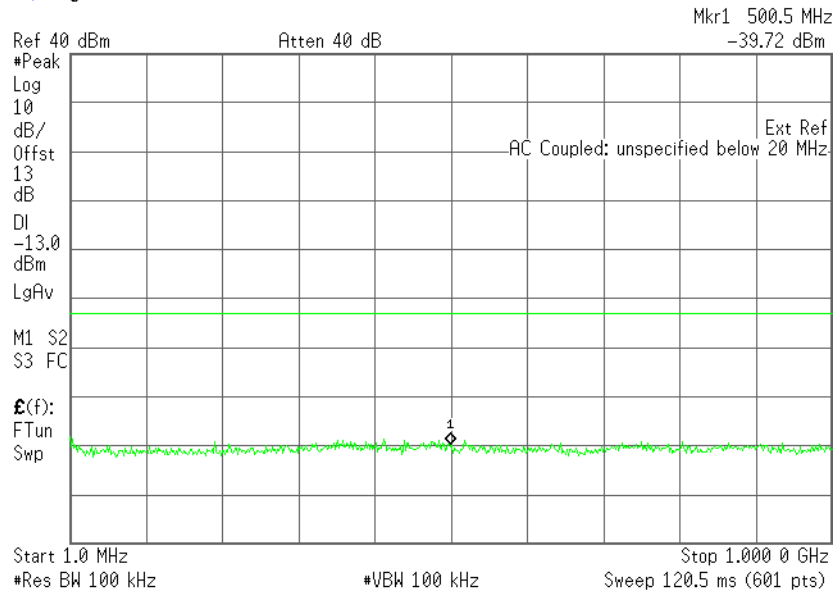
Cellular Harmonics for Ch. 251 (848.8 MHz)	Level (dBm)
Second	--
Third	--
All others	< -30dBm up to 20GHz

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

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

\* Agilent 11:40:16 Oct 3, 2005

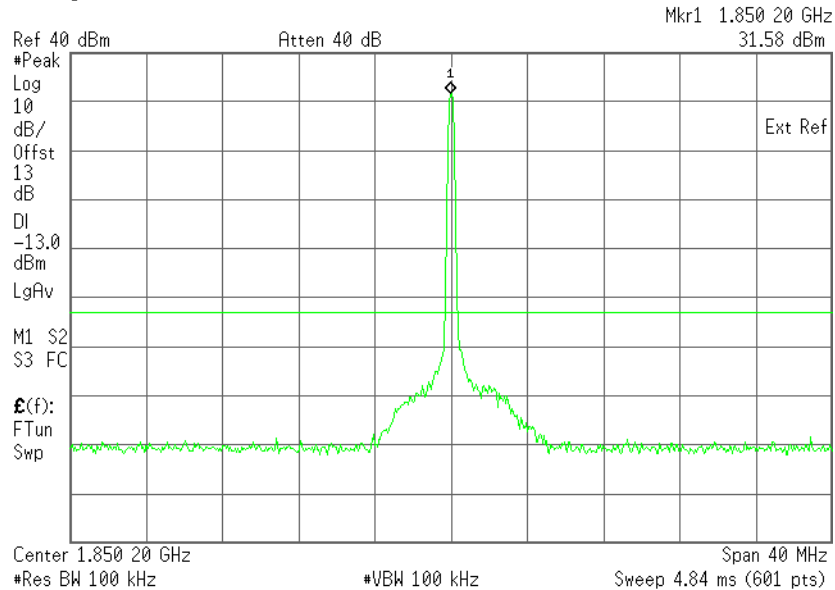
L

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

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

\* Agilent 11:41:24 Oct 3, 2005

L



SIERRA WIRELESS, INC.

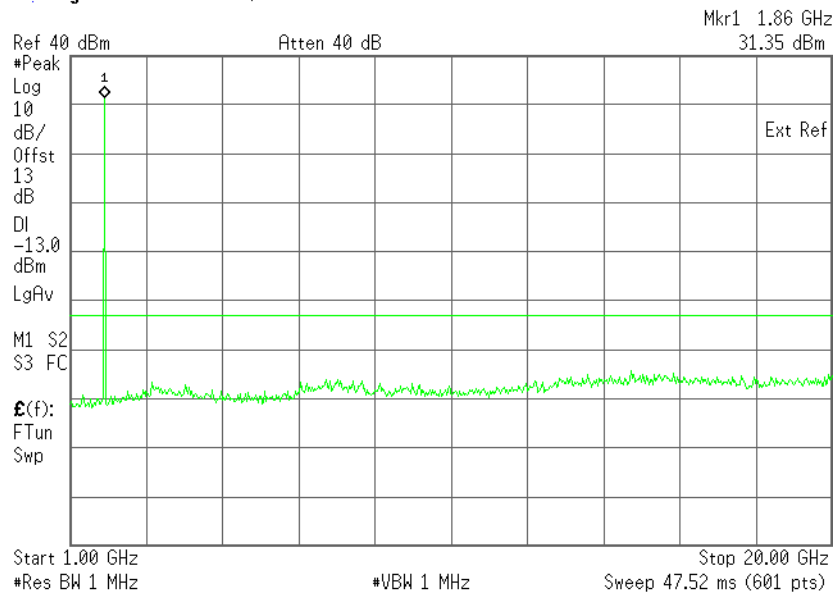
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Plot 6.4.21) Out of Band Emissions at Antenna Terminals

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

Agilent 11:49:46 Oct 3, 2005

L



Strong emission shown is the carrier signal.

# SIERRA WIRELESS, INC.

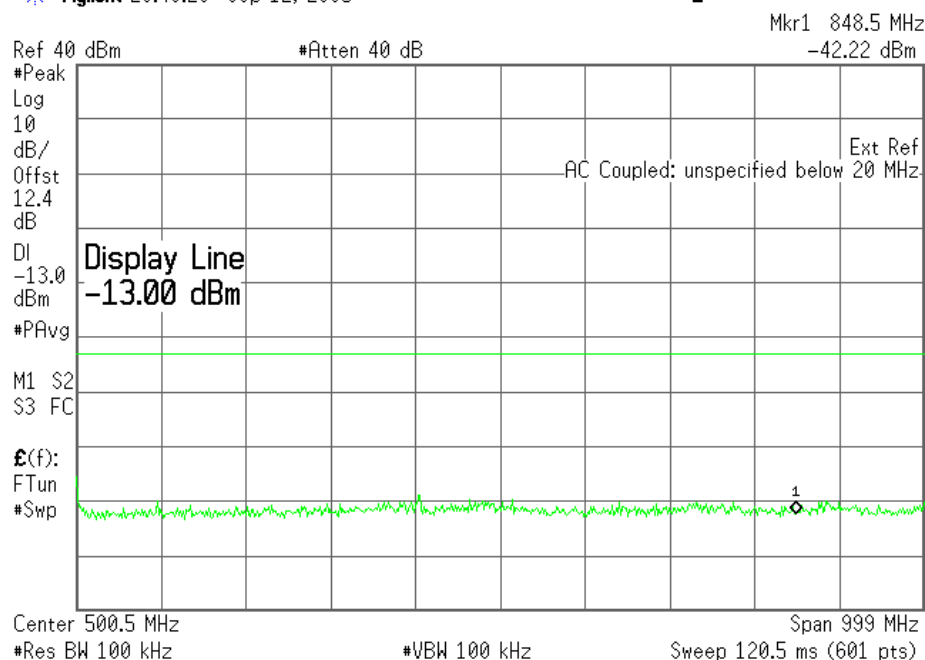
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## Plot 6.4.22) Out of Band Emissions at Antenna Terminals

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

Agilent 20:49:20 Sep 12, 2005

L

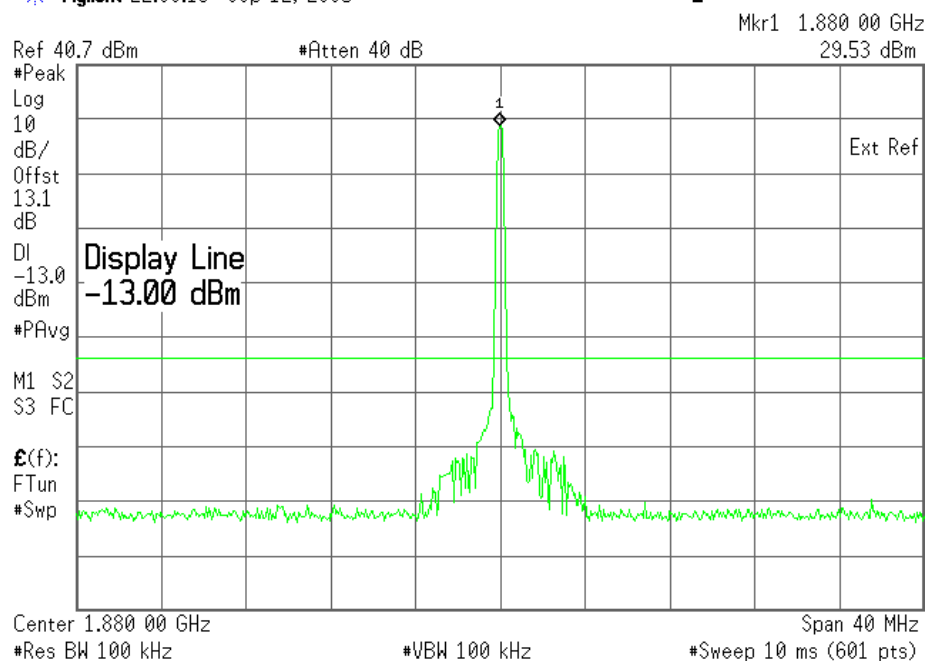


## Plot 6.4.23) Out of Band Emissions at Antenna Terminals

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

Agilent 22:00:13 Sep 12, 2005

L



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# SIERRA WIRELESS, INC.

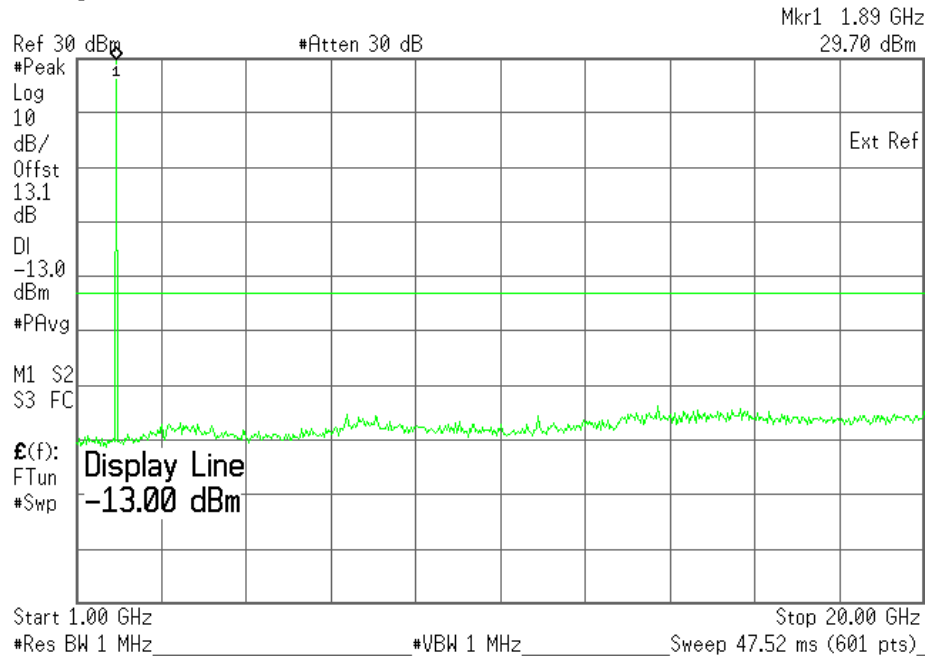
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## Plot 6.4.24) Out of Band Emissions at Antenna Terminals

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

Agilent 22:47:37 Sep 12, 2005

L



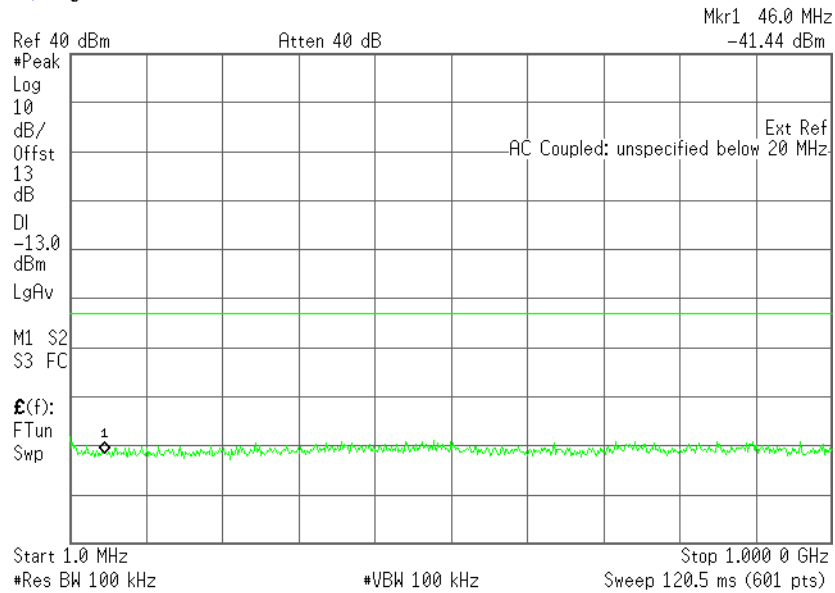
**Strong emission shown is the carrier signal.**

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

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

\* Agilent 11:43:59 Oct 3, 2005

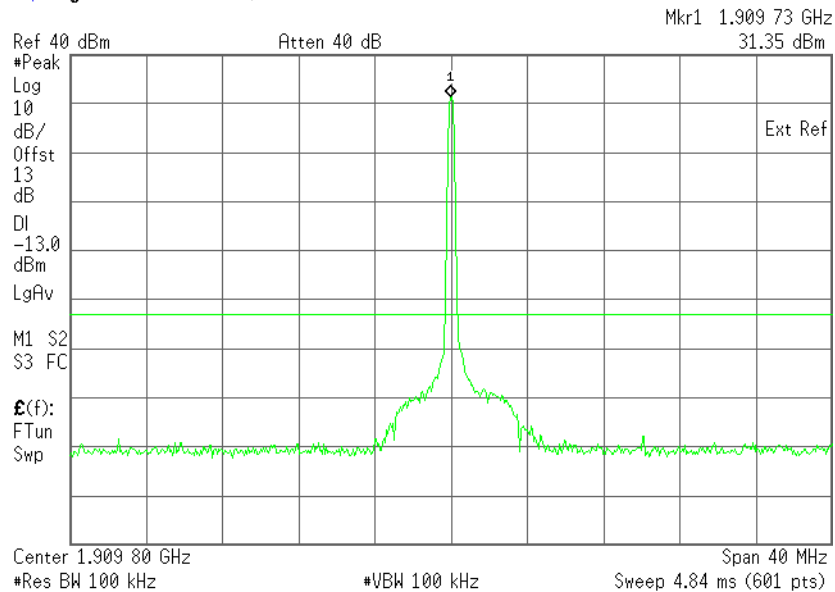
L

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

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

\* Agilent 11:45:04 Oct 3, 2005

L



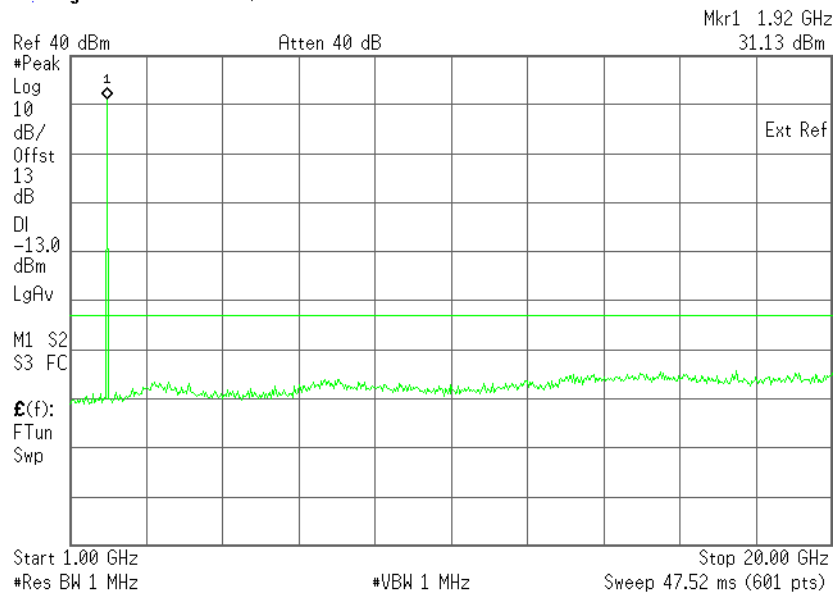


**Plot 6.4.27) Out of Band Emissions at Antenna Terminals**

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

Agilent 11:48:36 Oct 3, 2005

L



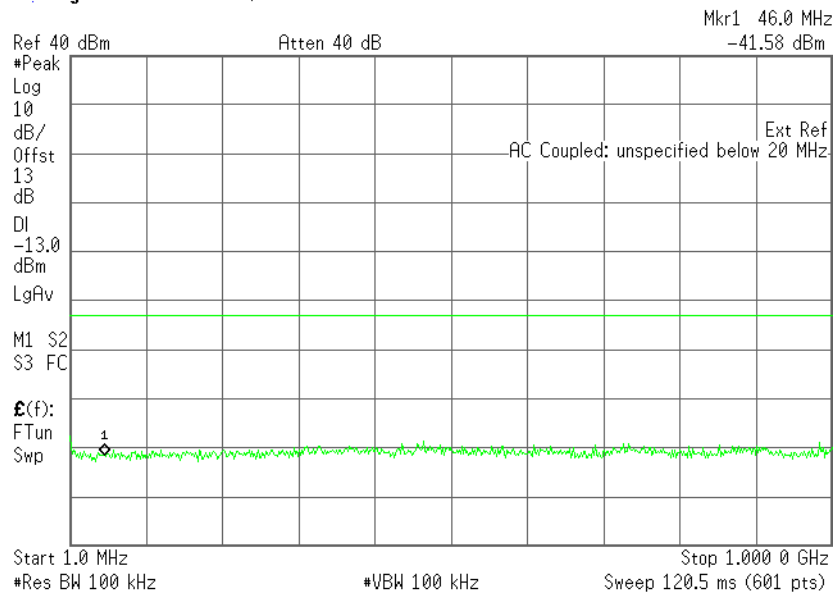
**Strong emission shown is the carrier signal.**

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

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

\* Agilent 11:50:58 Oct 3, 2005

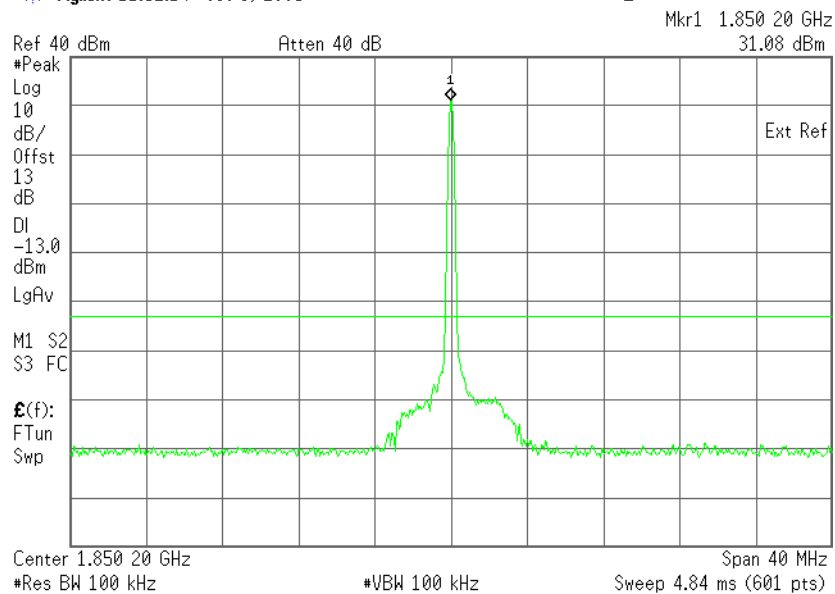
L

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

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

\* Agilent 11:52:14 Oct 3, 2005

L

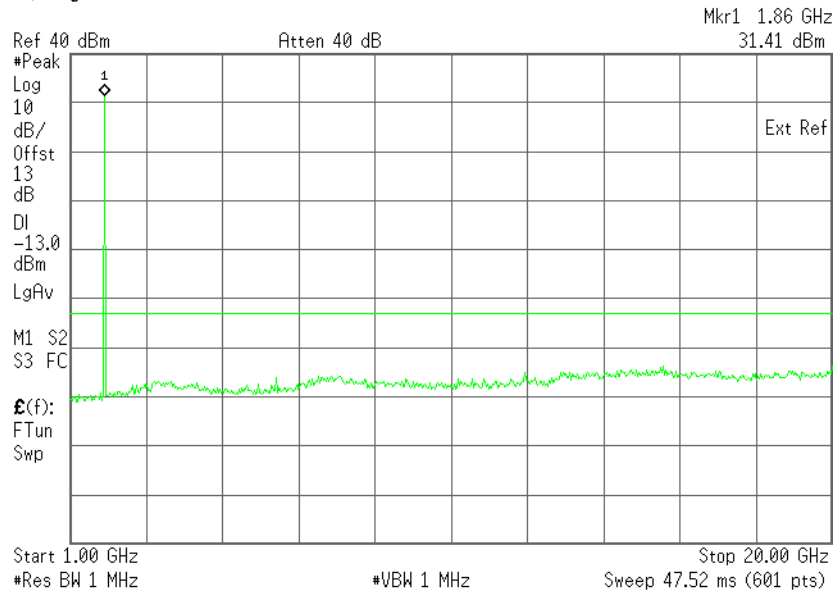


**Plot 6.4.30) Out of Band Emissions at Antenna Terminals**

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

Agilent 11:54:29 Oct 3, 2005

L



**Strong emission shown is the carrier signal.**

# SIERRA WIRELESS, INC.

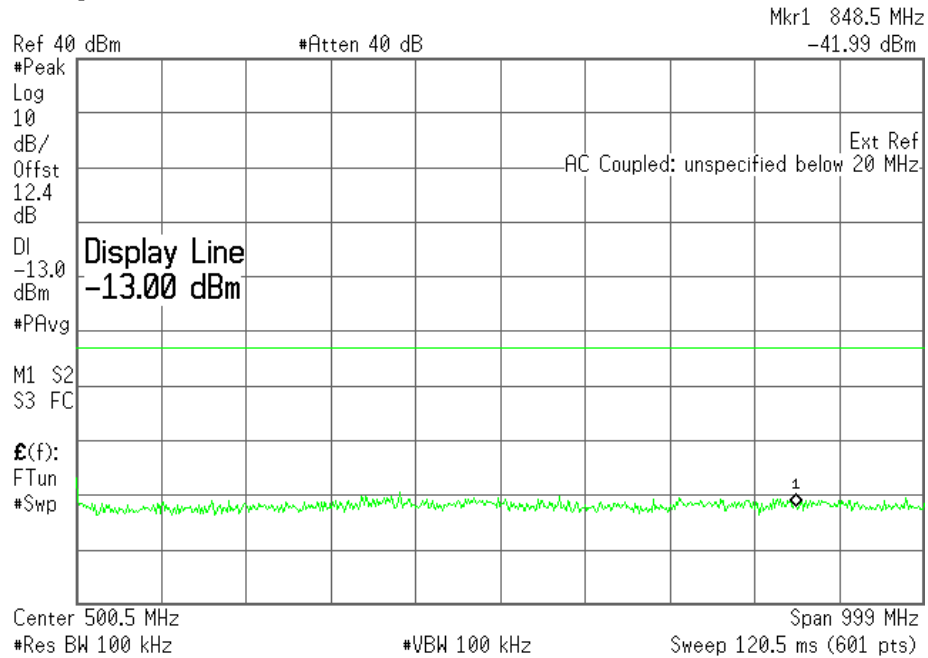
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## Plot 6.4.31) Out of Band Emissions at Antenna Terminals

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

Agilent 20:52:26 Sep 12, 2005

L

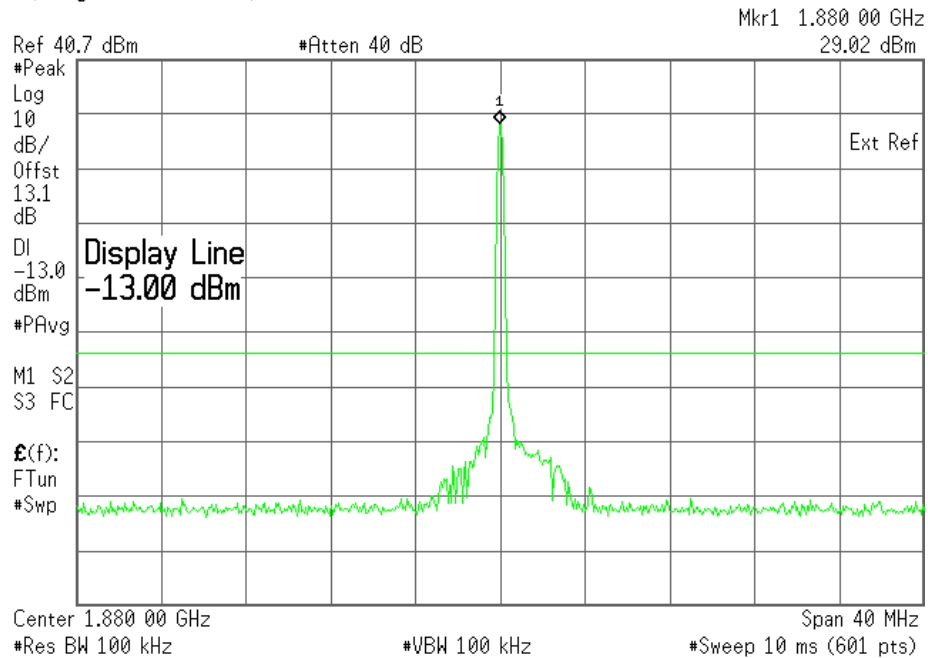


## Plot 6.4.32) Out of Band Emissions at Antenna Terminals

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

Agilent 22:04:43 Sep 12, 2005

L



# SIERRA WIRELESS, INC.

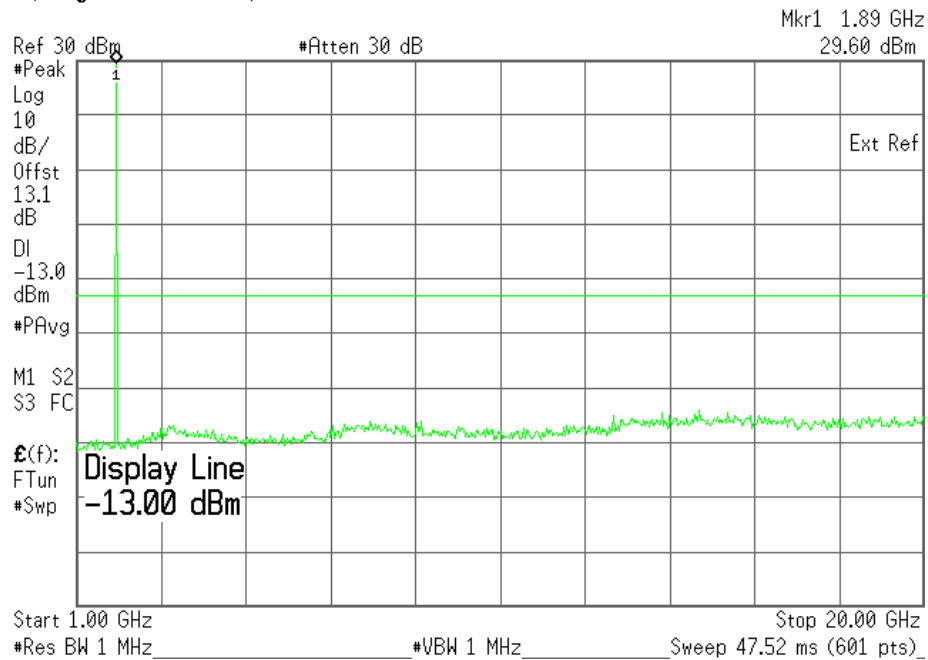
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## Plot 6.4.33) Out of Band Emissions at Antenna Terminals

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

Agilent 22:51:04 Sep 12, 2005

L



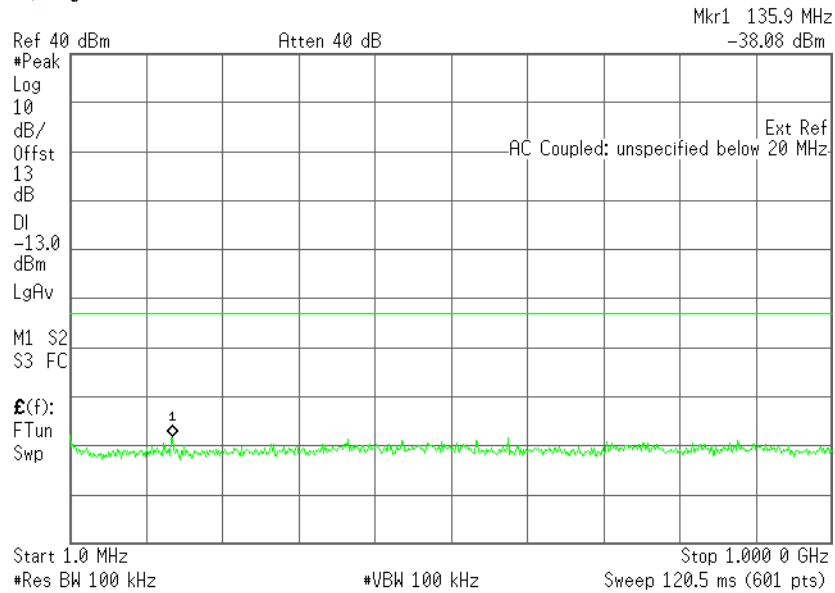
**Strong emission shown is the carrier signal.**

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

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

\* Agilent 11:55:43 Oct 3, 2005

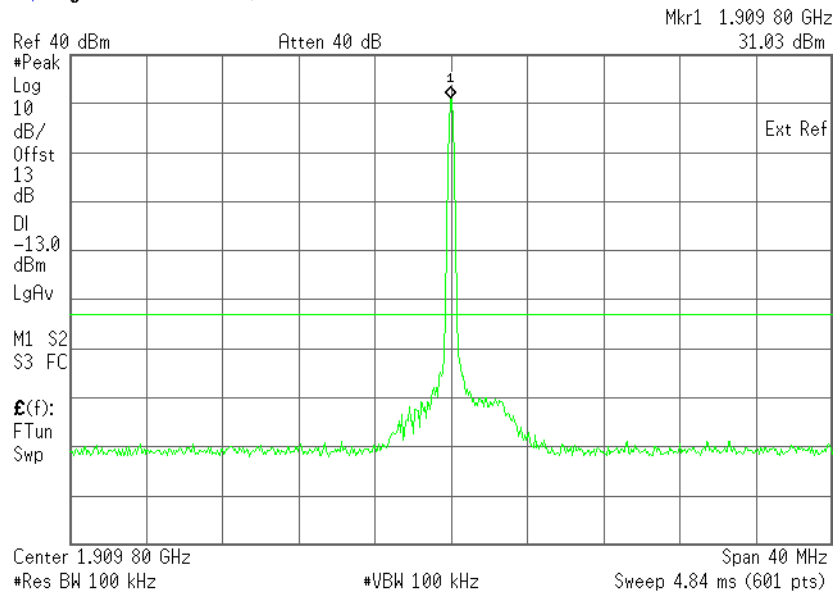
L

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

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

\* Agilent 11:56:46 Oct 3, 2005

L

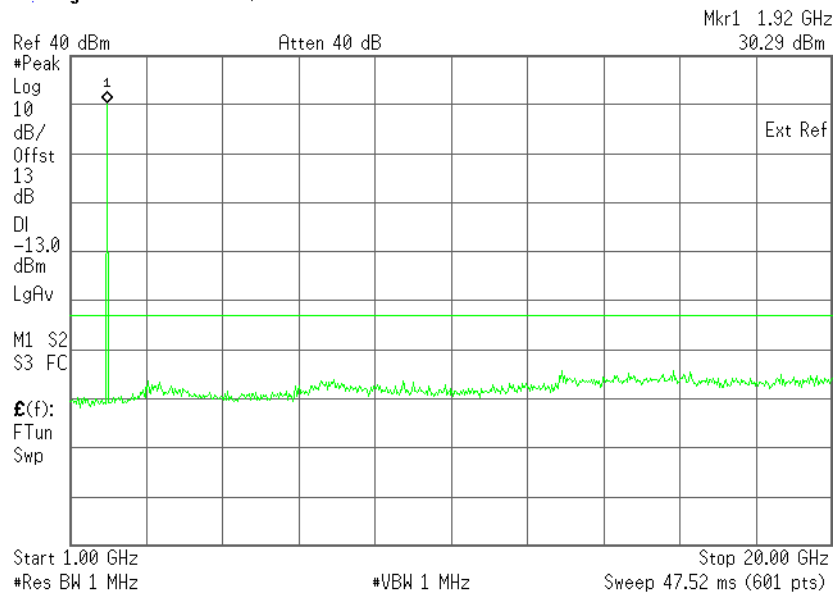


**Plot 6.4.36) Out of Band Emissions at Antenna Terminals**

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

Agilent 11:57:30 Oct 3, 2005

L



**Strong emission shown is the carrier signal.**

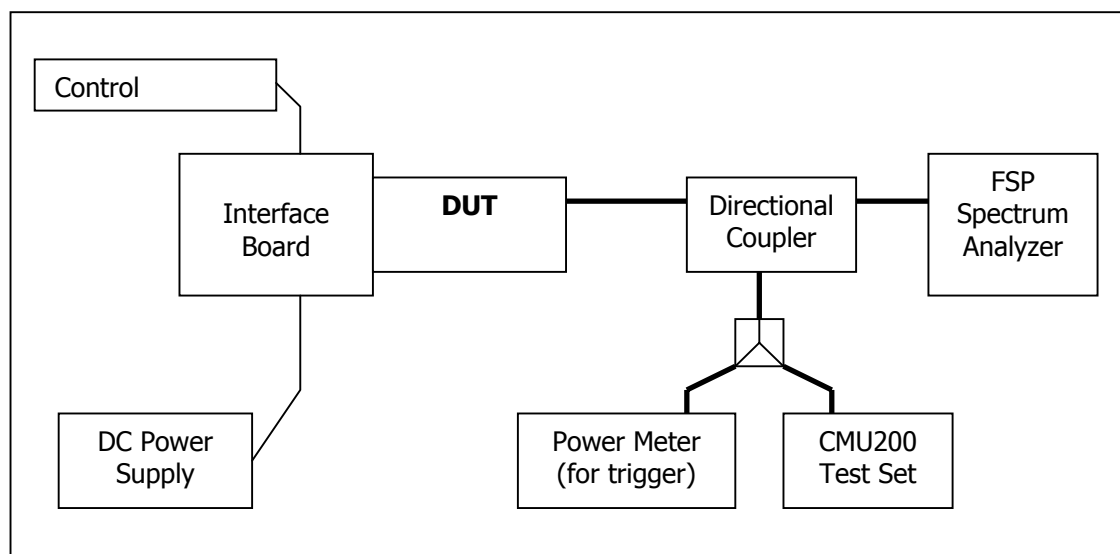
## 7 Block Edge Compliance

FCC part 22H/24E

### 7.1 Test Procedure

The transmitter output was connected to a Rohde & Schwarz CMU200 Test Set 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

### 7.4 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 1850.2MHz, above 1909.8MHz	512, 810	7.4.5, 7.4.6	Complies
4	8PSK: Below 1850.2MHz, above 1909.8MHz	512, 810	7.4.7, 7.4.8	Complies



# SIERRA WIRELESS, INC.

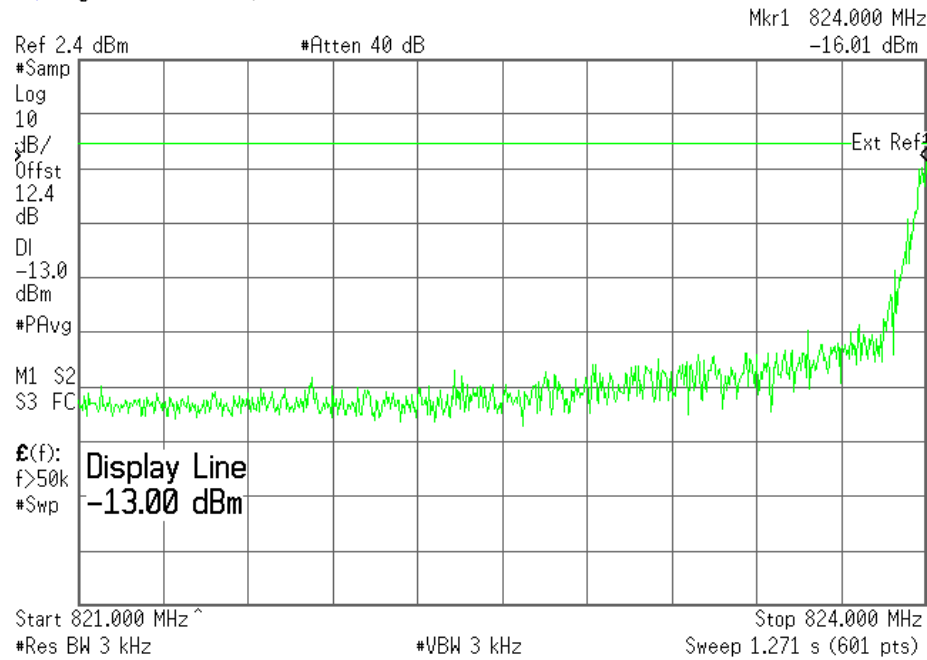
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## 7.5 Test Plots

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

Agilent 10:40:49 Sep 14, 2005

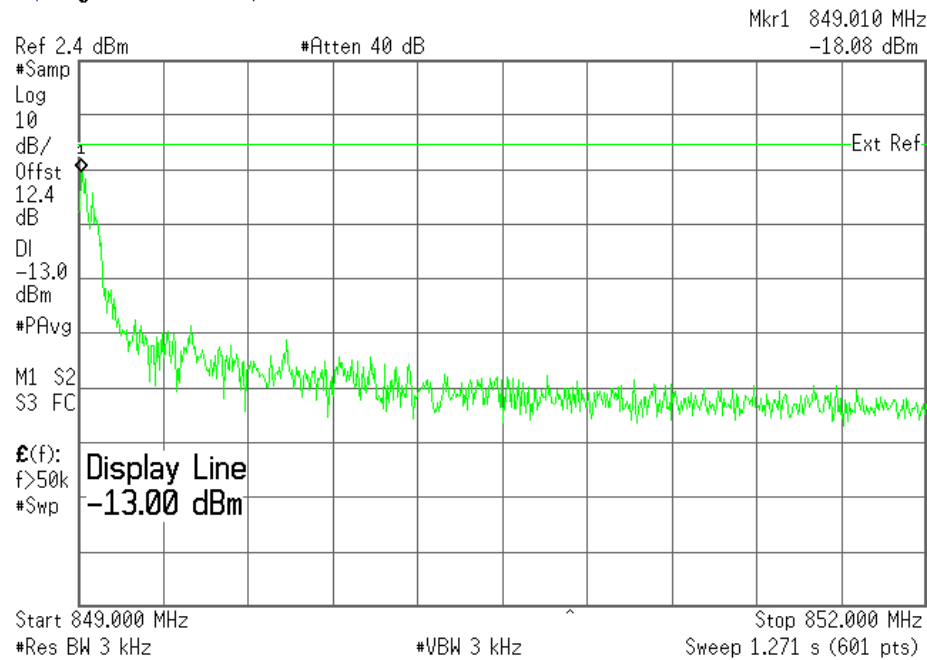
L



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

Agilent 10:38:42 Sep 14, 2005

L



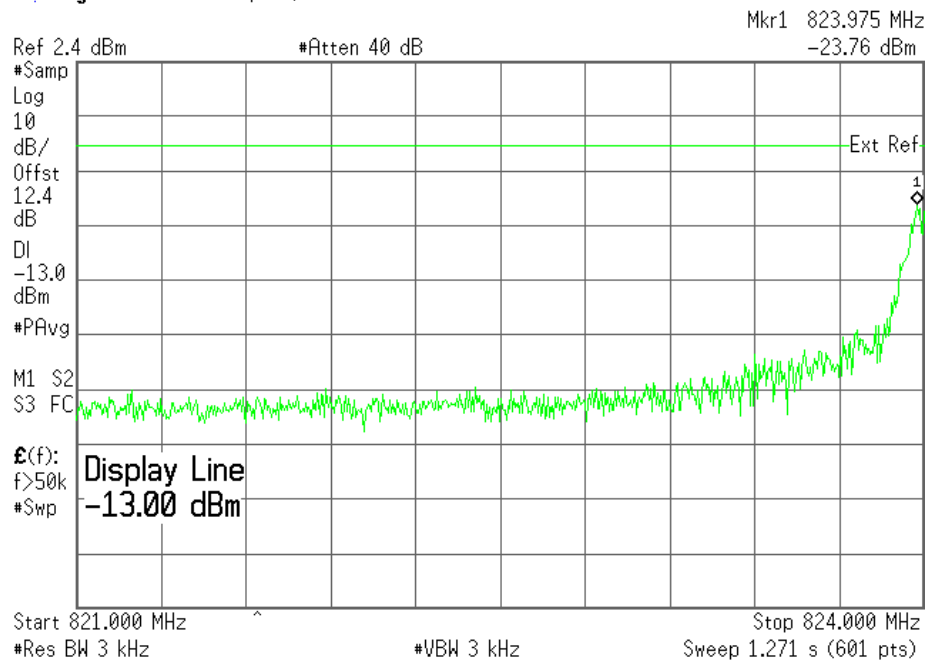
# SIERRA WIRELESS, INC.

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

Agilent 10:42:54 Sep 14, 2005

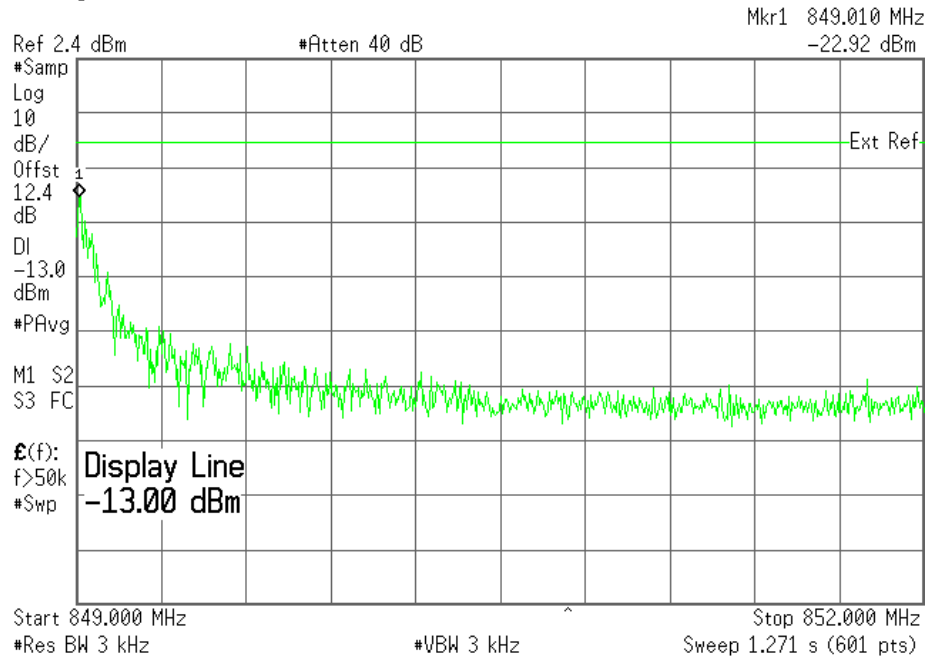
L



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

Agilent 10:25:08 Sep 14, 2005

L



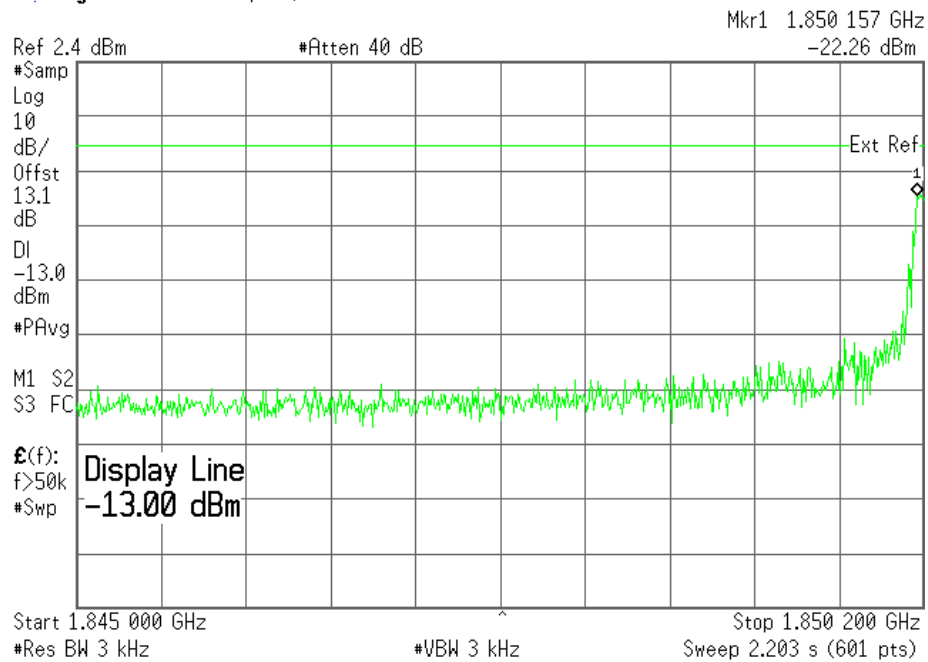
# SIERRA WIRELESS, INC.

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## Plot 7.4.5) GMSK; PCS low channel, below 1850.2 MHz

Agilent 10:49:43 Sep 14, 2005

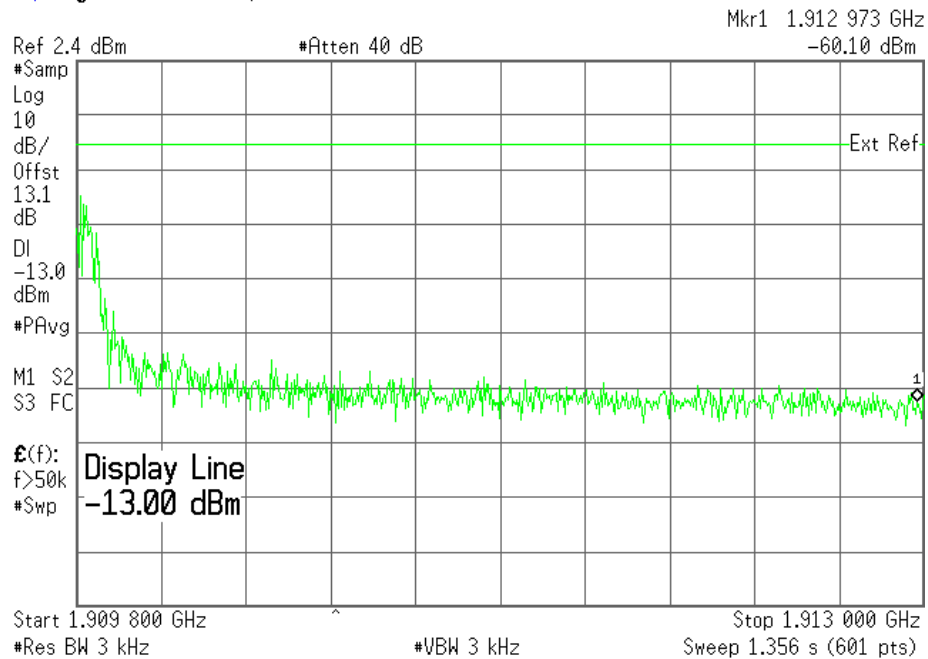
L



## Plot 7.4.6) GMSK; PCS high channel, above 1909.8 MHz

Agilent 10:55:42 Sep 14, 2005

L



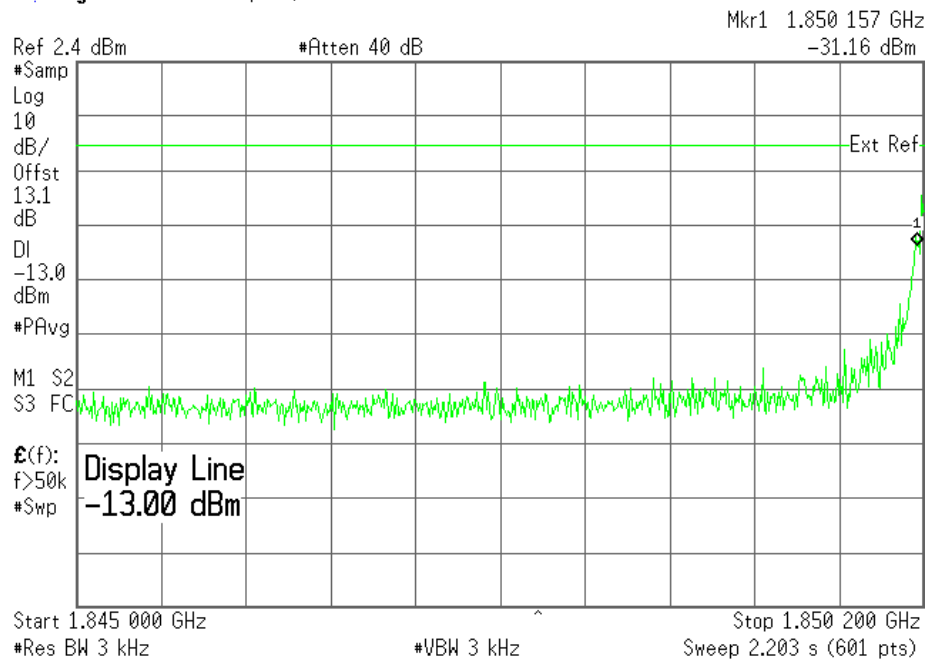
# SIERRA WIRELESS, INC.

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## Plot 7.4.7) 8-PSK; PCS low channel, below 1850.2 MHz

Agilent 10:51:44 Sep 14, 2005

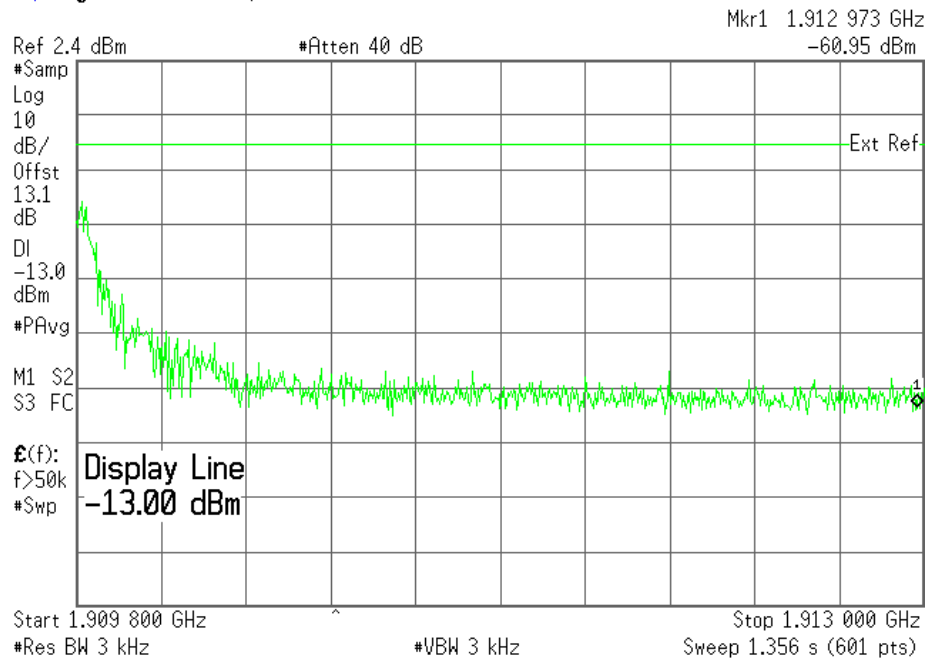
L



## Plot 7.4.8) 8-PSK; PCS high channel, above 1909.8 MHz

Agilent 10:54:29 Sep 14, 2005

L



## 8 Frequency Stability Versus Temperature

FCC 2.1055

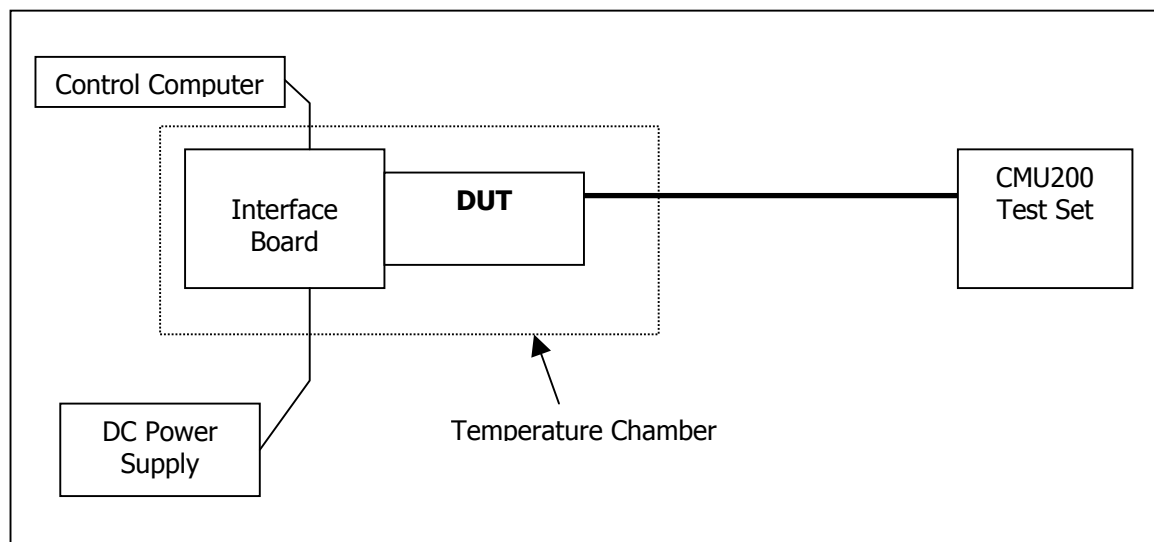
### 8.1 Summary of Results

The AC850 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 AC850 was placed inside the temperature chamber. The transmitting frequency error is measured at 25 degrees C, then the temperature is set to +60 degrees C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is decreased by 10 degrees, allowed to stabilize and soak, then the measurement is repeated. This is repeated until -20 degrees C is completed. The process is then repeated back up to +60 degrees C. Frequency metering included internal averaging of the CMU200 to stabilize the reading. Reference power supply voltage for these tests is 5.0 volts.

### Test Setup

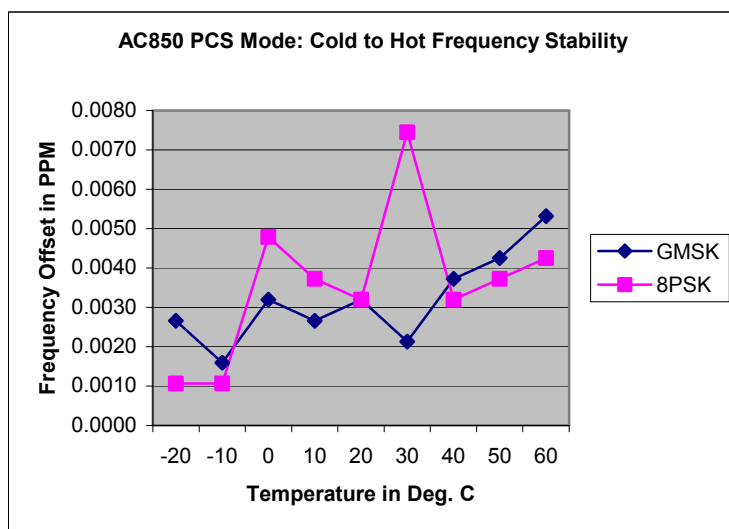
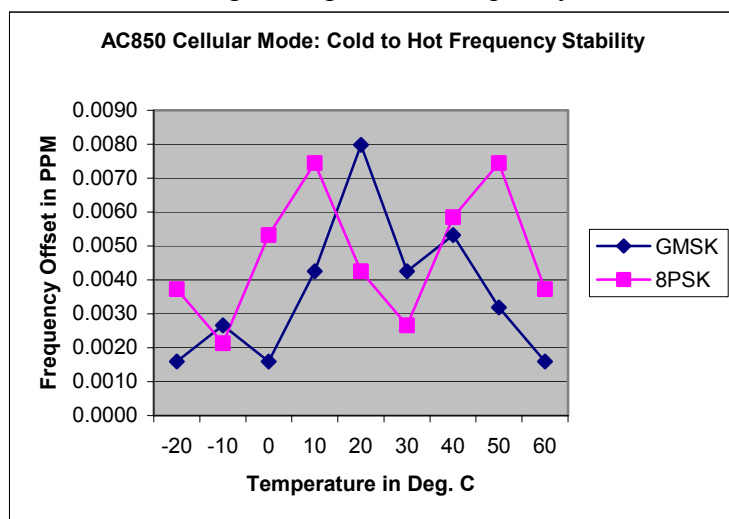


### 8.3 Test Equipment

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	Minnnow	N/A	N/A
Directional Coupler	Mini-Circuits	ZA3PD-2	N/A	N/A

## 8.4 Test Results

### Low to High Temperature Frequency Error



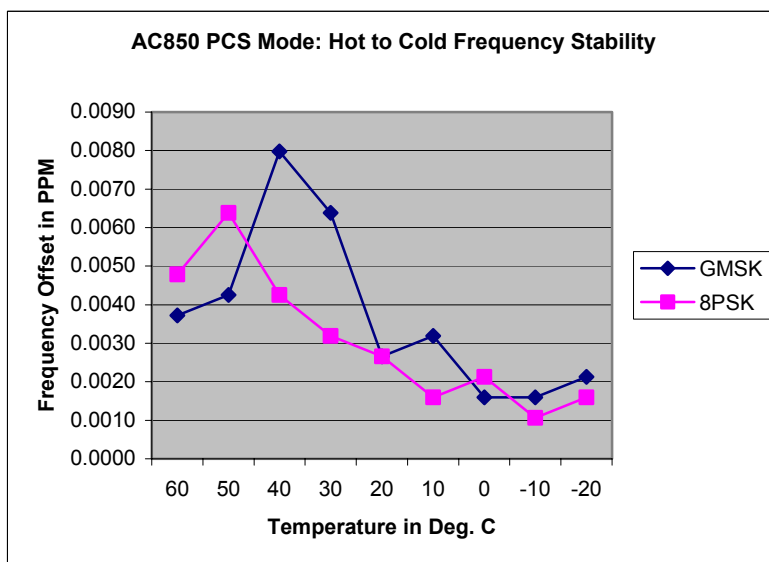
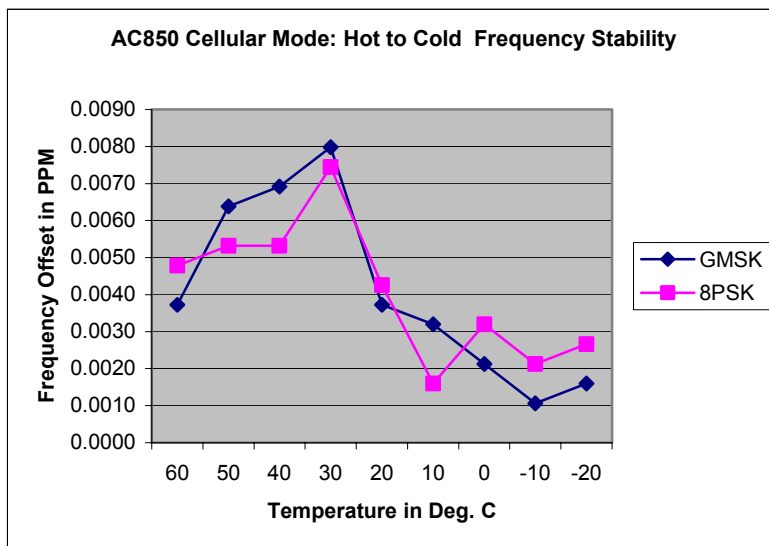
### Low to High Temperature Tabular Readings

Temp.(C)	Cellular Mode: 824MHz to 848MHz				PCS Mode: 1850MHz to 1909MHz			
	GMSK Mode		8-PSK Mode		GMSK Mode		8-PSK Mode	
	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)
-20	0.0016	-7	0.0037	-5	0.0027	-2	0.0011	0.014
-10	0.0027	-4	0.0021	-3	0.0016	-2	0.0011	0.017
0	0.0016	-10	0.0053	6	0.0032	9	0.0048	0.011
10	0.0043	-14	0.0074	-5	0.0027	-7	0.0037	0.011
20	0.0080	-8	0.0043	-6	0.0032	-6	0.0032	0.012
30	0.0043	-5	0.0027	-4	0.0021	-14	0.0074	0.014
40	0.0053	-11	0.0059	-7	0.0037	-6	0.0032	0.014
50	0.0032	-14	0.0074	8	0.0043	-7	0.0037	0.018
60	0.0016	-7	0.0037	-10	0.0053	8	0.0043	0.018

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## High to Low Temperature Frequency Error



## High to Low Temperature Tabular Readings

Temp.(C)	Cellular Mode: 824MHz to 848MHz				PCS Mode: 1850MHz to 1909MHz			
	GMSK Mode		8-PSK Mode		GMSK Mode		8-PSK Mode	
	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)
60	-7	0.0037	9	0.0048	-7	0.0037	-9	0.0048
50	12	0.0064	10	0.0053	8	0.0043	-12	0.0064
40	13	0.0069	-10	0.0053	-15	0.0080	-8	0.0043
30	15	0.0080	-14	0.0074	-12	0.0064	6	0.0032
20	7	0.0037	-8	0.0043	-5	0.0027	5	0.0027
10	-6	0.0032	-3	0.0016	-6	0.0032	-3	0.0016
0	-4	0.0021	-6	0.0032	3	0.0016	-4	0.0021
-10	-2	0.0011	-4	0.0021	-3	0.0016	-2	0.0011
-20	-3	0.0016	-5	0.0027	-4	0.0021	-3	0.0016

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## 9 Frequency Stability Versus Voltage

### FCC 2.1055

#### 9.1 Summary of Results

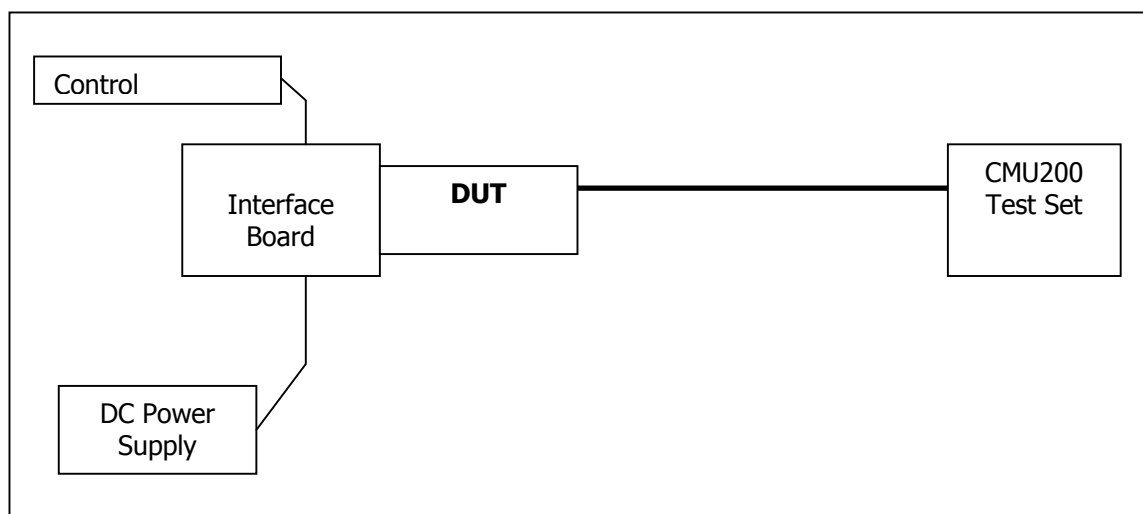
The unit meets the limit of less than 0.1ppm of frequency offset from center for 85% and 115% of the supply voltage for 5.0 volts.

#### 9.2 Test Procedure

The AC850 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 error is recorded (worst case).

The test voltages are 4.25 volts to 5.75 volts.

#### Test Setup



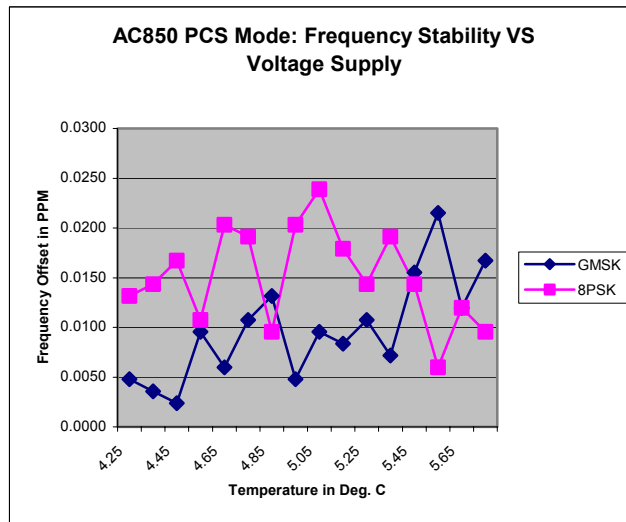
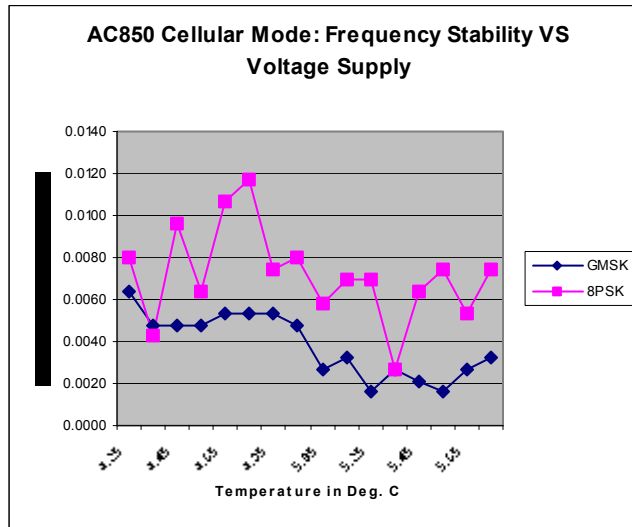
#### 9.3 Test Equipment

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



#### 9.4 Test Results

##### 85% to 115% of 5 Volts Frequency Error



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## 85% to 115% of 5 Volts Frequency Error, Tabular Data

Supply (V)	Cellular Mode: 824MHz to 848MHz				PCS Mode: 1850MHz to 1909MHz			
	GMSK Mode		8-PSK Mode		GMSK Mode		8-PSK Mode	
	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)	Offset (Hz)	Offset (ppm)
4.25	-12	0.0064	-15	0.0080	-4	0.0048	-11	0.0131
4.35	-9	0.0048	-8	0.0043	3	0.0036	-12	0.0143
4.45	-9	0.0048	-18	0.0096	-2	0.0024	-14	0.0167
4.55	-9	0.0048	-12	0.0064	8	0.0096	-9	0.0108
4.65	-10	0.0053	-20	0.0106	5	0.0060	-17	0.0203
4.75	-10	0.0053	-22	0.0117	9	0.0108	-16	0.0191
4.85	-10	0.0053	-14	0.0074	-11	0.0131	-8	0.0096
4.95	-9	0.0048	-15	0.0080	4	0.0048	-17	0.0203
5.05	-5	0.0027	-11	0.0059	8	0.0096	-20	0.0239
5.15	-6	0.0032	-13	0.0069	-7	0.0084	-15	0.0179
5.25	-3	0.0016	-13	0.0069	-9	0.0108	-12	0.0143
5.35	-5	0.0027	-5	0.0027	-6	0.0072	-16	0.0191
5.45	4	0.0021	-12	0.0064	-13	0.0155	-12	0.0143
5.55	3	0.0016	-14	0.0074	-18	0.0215	-5	0.0060
5.65	5	0.0027	-10	0.0053	-10	0.0119	-10	0.0119
5.75	6	0.0032	-14	0.0074	-14	0.0167	-8	0.0096