

# ***Radio Frequency Front End (RFFE) Type Acceptance Report***

*September 11, 2007*

**Submit technical questions to:  
[regulatory.support@qualcomm.com](mailto:regulatory.support@qualcomm.com)**



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September 11, 2007  
RFFE FCC Type Acceptance Report

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***Exhibit 1 – Certification of Test Data***

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the test under the conditions herein specified. This applies to all tests that were performed that did not require an Open Area Test Site (OATS). Tests that required an OATS site were performed by TUV Product Services.

Equipment Tested: RFFE 30-D8690-2

Dates of Test: 7/18 -7/31, 2007

Test Performed by:

EMC Engineer, Senior Staff Manager:  
Robert J Scodellaro

**Exhibit 2 – General Information**

1. Production Plans

Limited low level production for government contract.

2. Technical Description - Section 2.1033 (c)

(1) The full name and mailing address of the manufacturer of the device and the applicant

Applicant: QUALCOMM Incorporated.  
5775 Morehouse Drive  
San Diego, CA 92121-1714

Manufacture: QUALCOMM Incorporated.  
5525 Morehouse Drive  
San Diego, CA 92121-1710

(2) FCC Identifier

FCC ID: J9CRFFE1900

(3) User's Manual

See separate attachment

(4) Types of Emission

1M25F9W

(5) Frequency range

The frequency range of the equipment in the Personal Communications Services (PCS) bands, 1930 – 1990 MHz. The channel spacing is 1.25 MHz for CDMA.

(6) Operating power levels

The RFFE power amplifier produces a maximum output power of 20 watts.

***Exhibit 3 Test Results***

<b>FCC Rule</b>	<b>Description of Test</b>	<b>Results</b>	<b>Exhibit</b>
2.1046, 24.232	RF Power Output	Complies	4
2.1049, 24.238	Occupied Bandwidth	Complies	5
2.1051, 24.238	Out of Band Emissions t Antenna Terminals	Complies	6
2.1055, 24.235	Frequency Stability vs. Temperature and Voltage	Complies	7

**Exhibit 4**

**Transmitter RF Power Output - FCC part 24, Paragraph 2.1046, 24.232 (b)**

**Transmitter RF Power Output** - FCC part 24, Paragraph 2.1046, 24.232 (b)

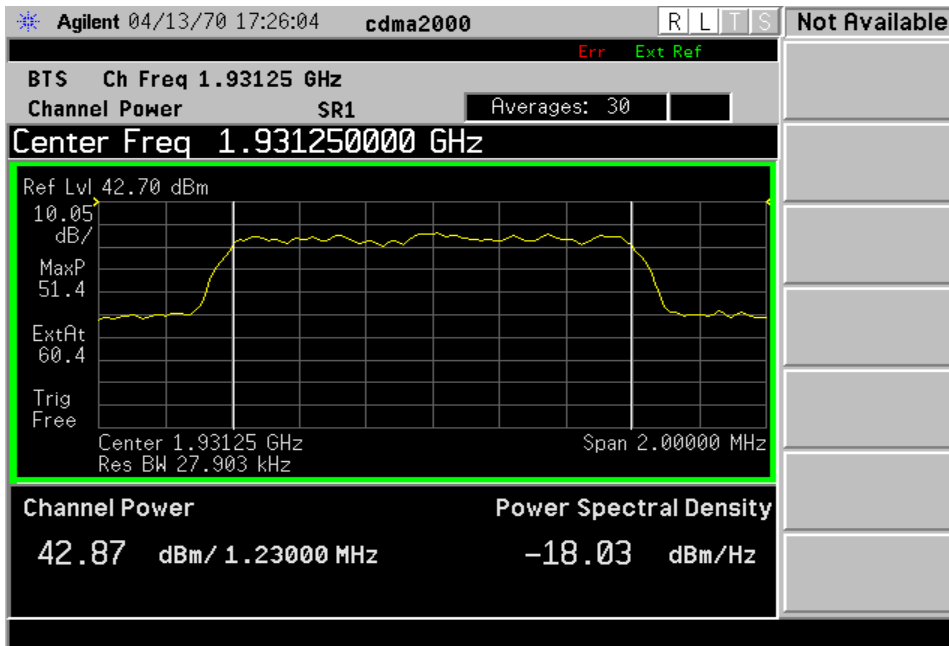
7/23/2007

Conducted power --

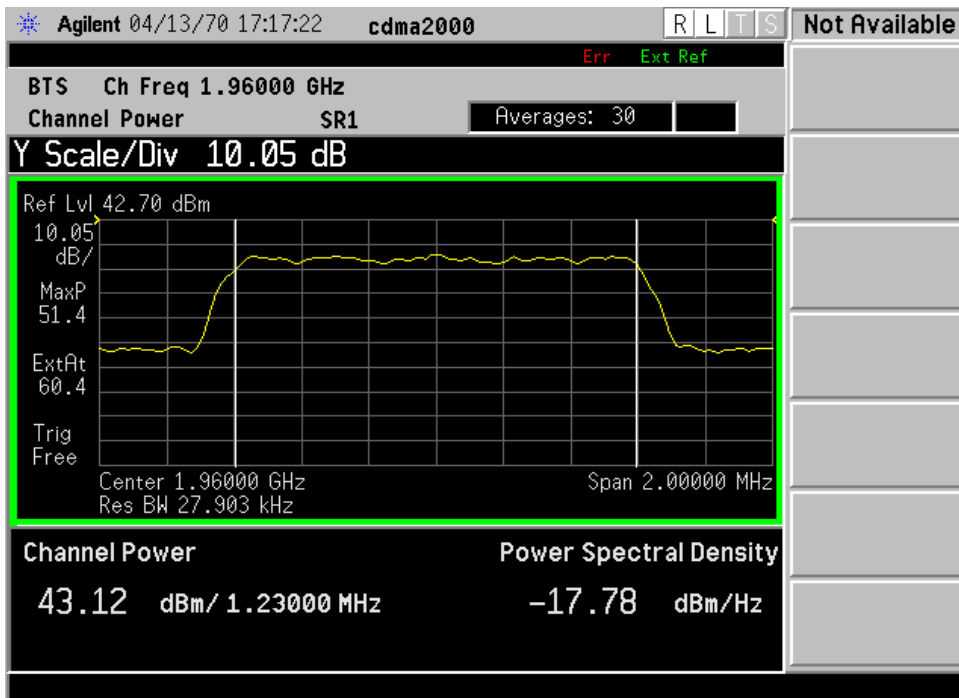
The RF output power was measured using a HP E4406A VSA Series Transmitter Tester.

carrier frequency (MHz)	Channel	RF output power (W) - PCS	
		CDMA	measured
1931.25	25		19.4
1960.0	600		20.5
1988.75	1175		20.2

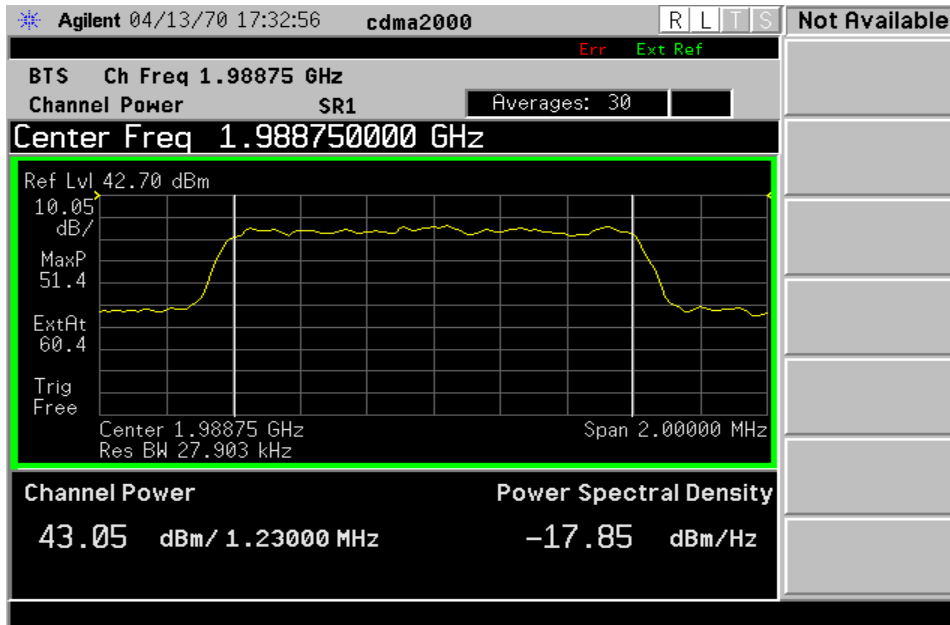




Channel 25 Conducted Power



Channel 600 Conducted Power



Channel 1175 Conducted Power

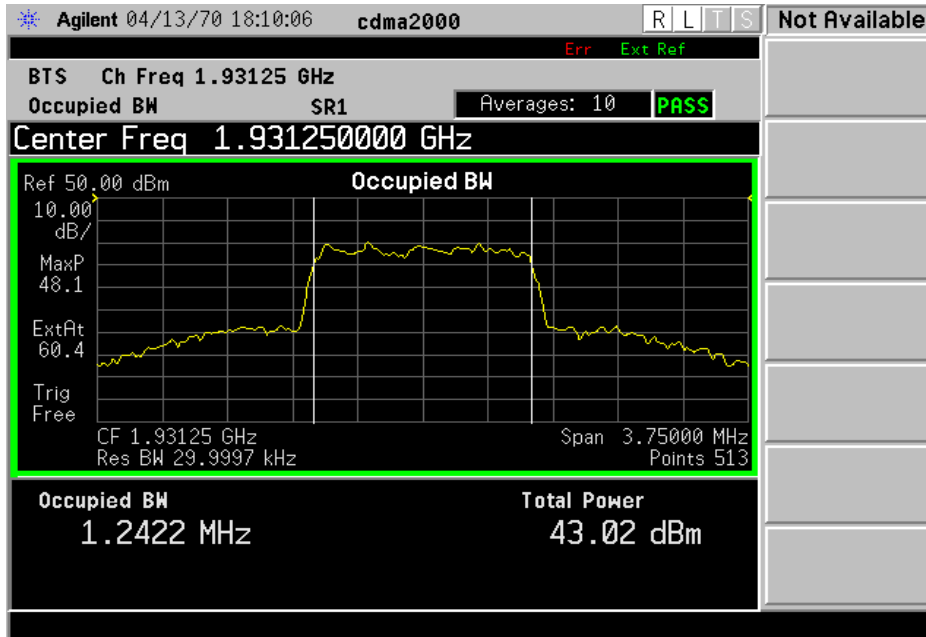
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*QSEC-2700 FCC Type*

*FCC ID: J9CRFFE1900*

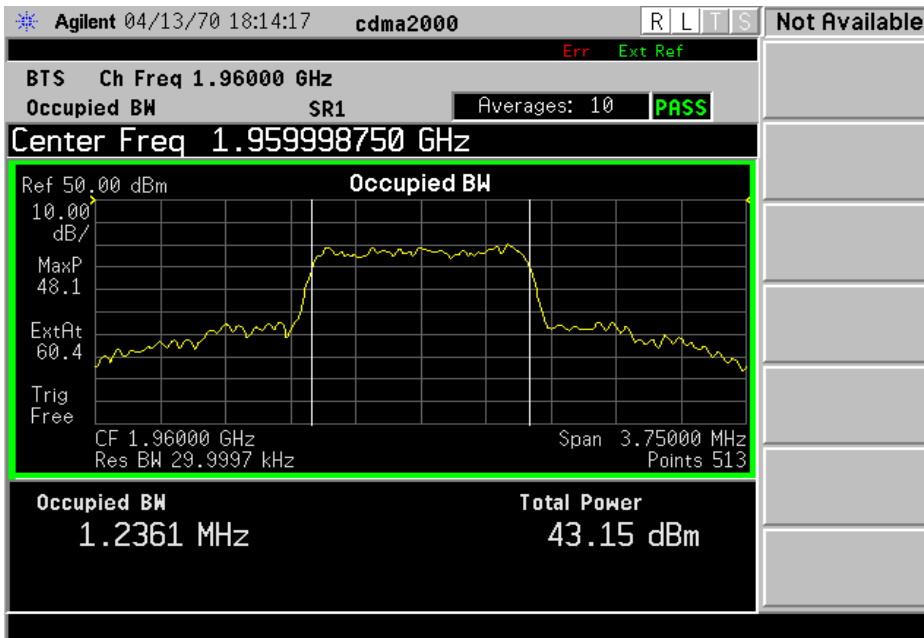
***Exhibit 5 – Occupied Bandwidth and Spurious Emission Measured Data – FCC Part  
2.1049, 24.238***

### 1. Occupied Bandwidth

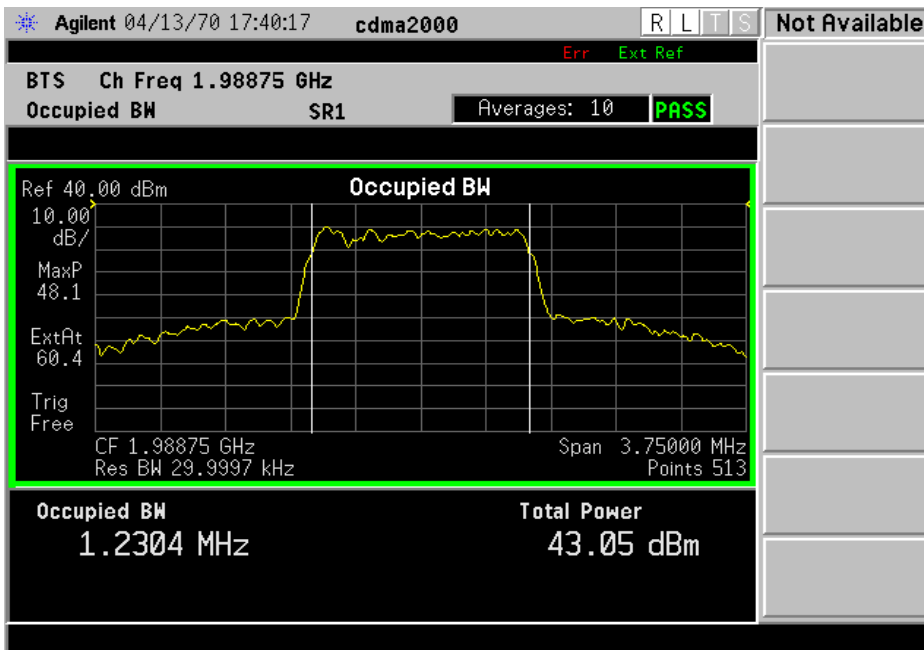


Channel 25

FCC ID: J9CRFFE1900



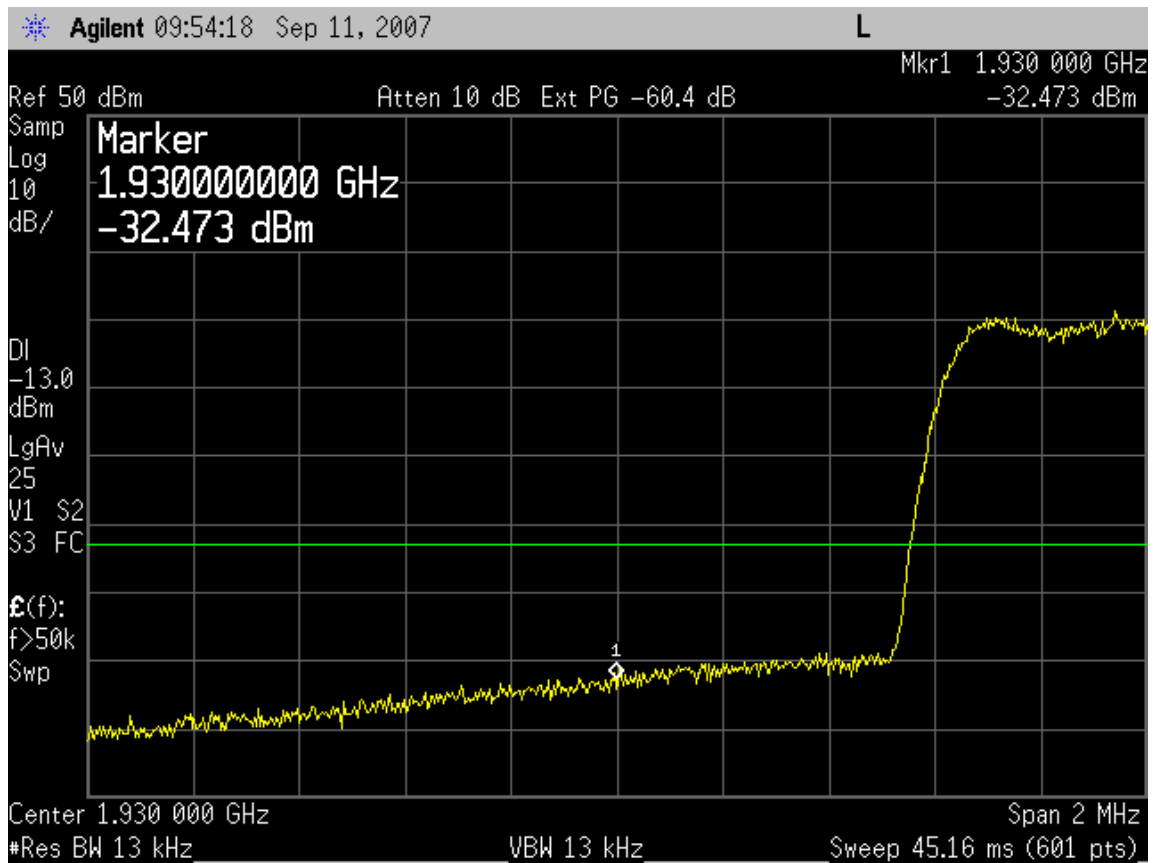
Channel 600



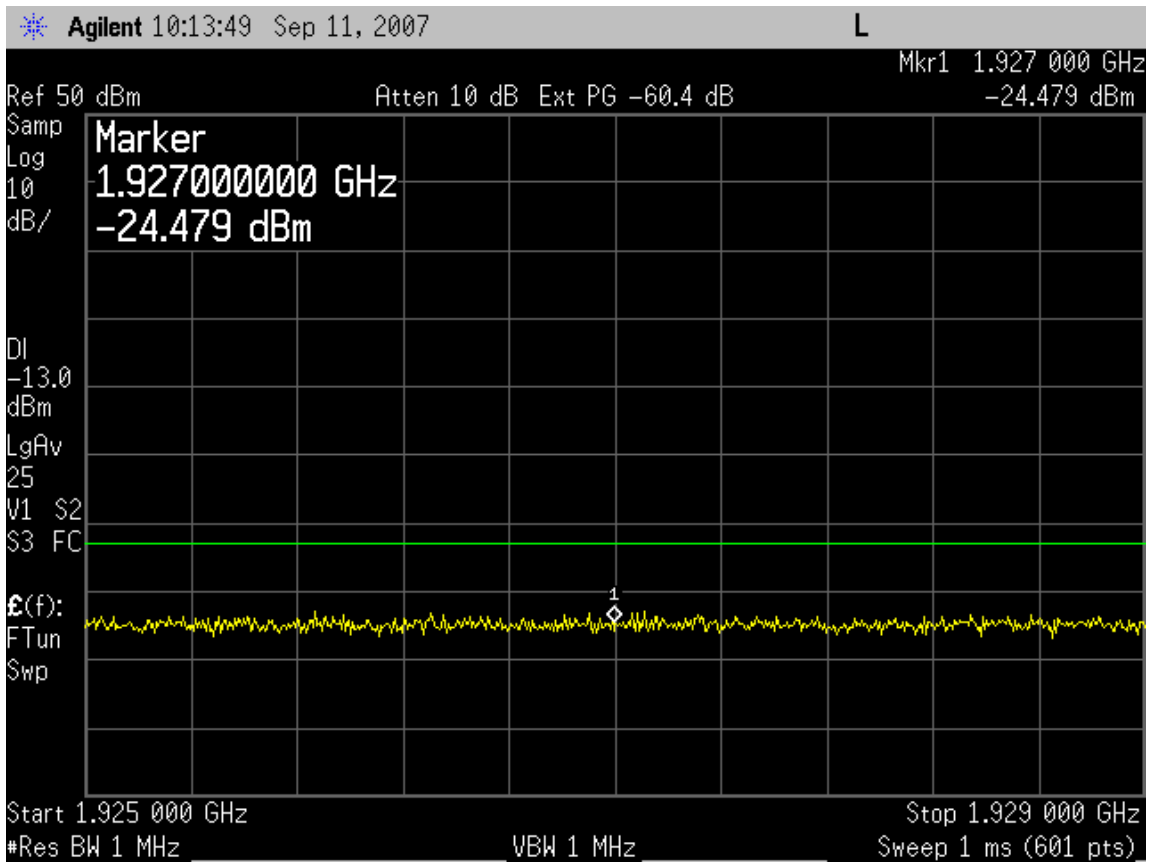
Channel 1175

**Test Results**

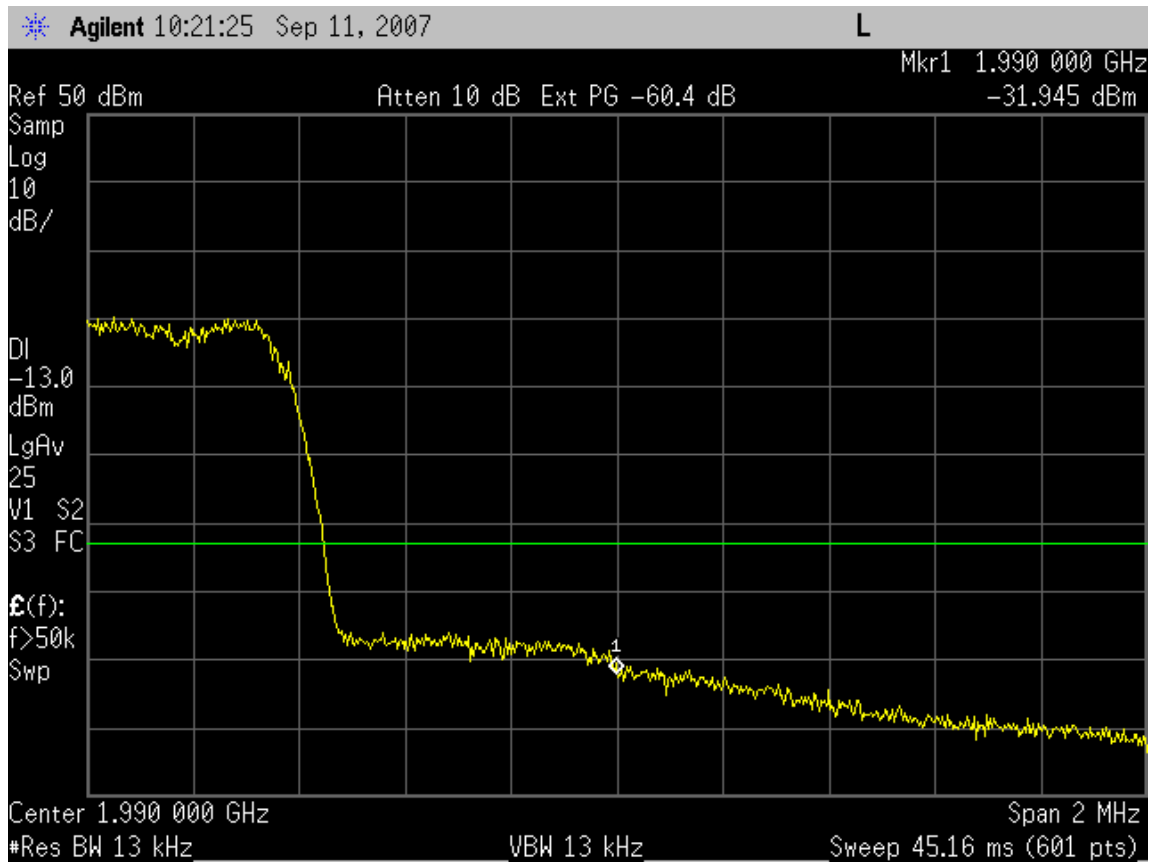
Band Edge measurements for Channels 25 and 1175



Channel 25 - adjacent 1 MHz to band edge

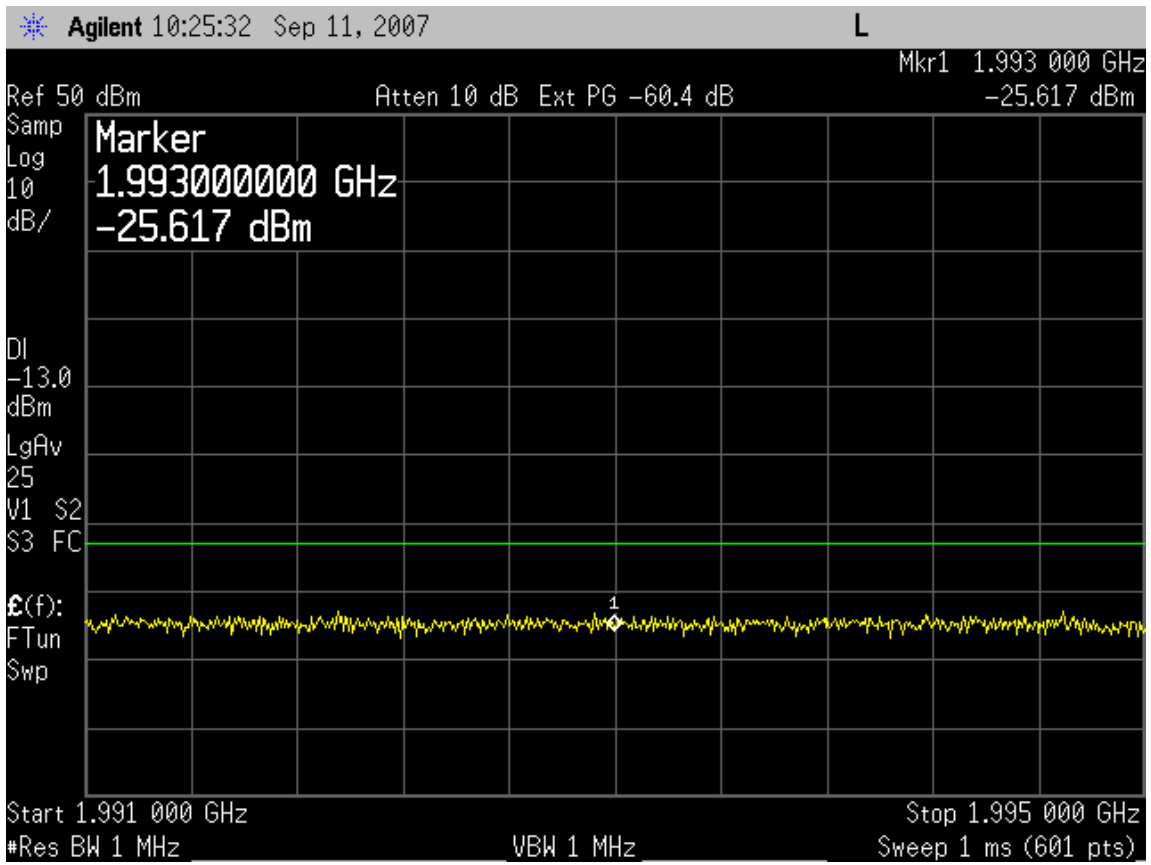


Channel 25 – 2 to 5 MHz from the band edge

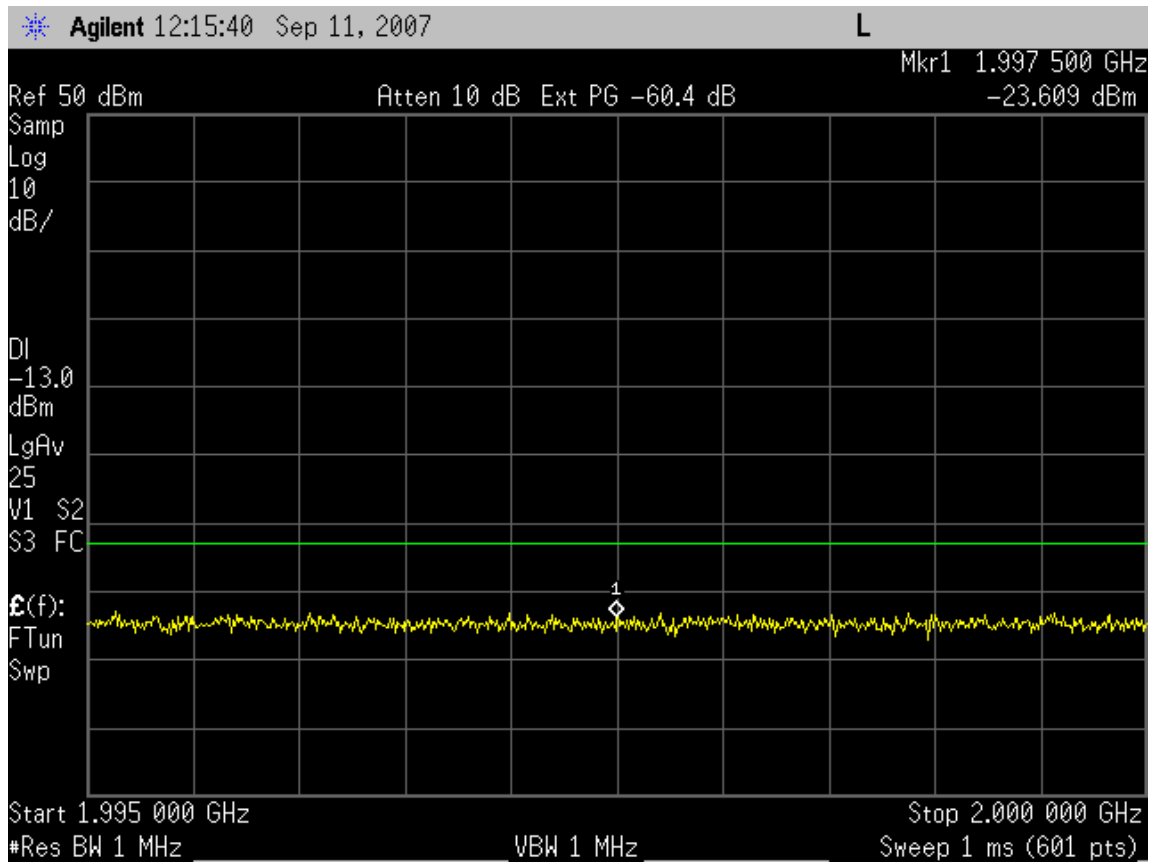


Channel 1175 - adjacent 1 MHz to band edge





Channel 1175 – 2 to 5 MHz from the band edge



Channel 1175 – 5 to 10 MHz from the band edge

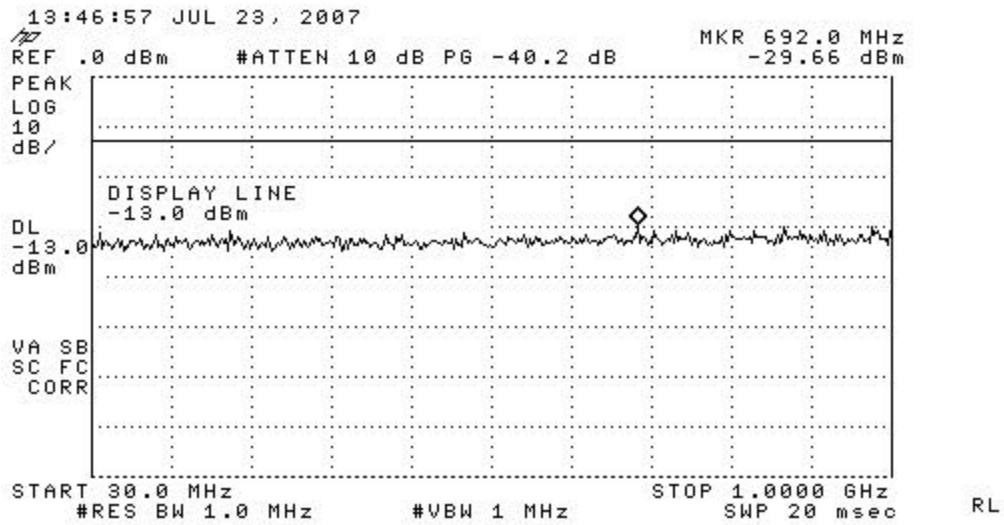
*Applicant: QUALCOMM Incorporated.  
Acceptance Report*

*QSEC-2700 FCC Type*

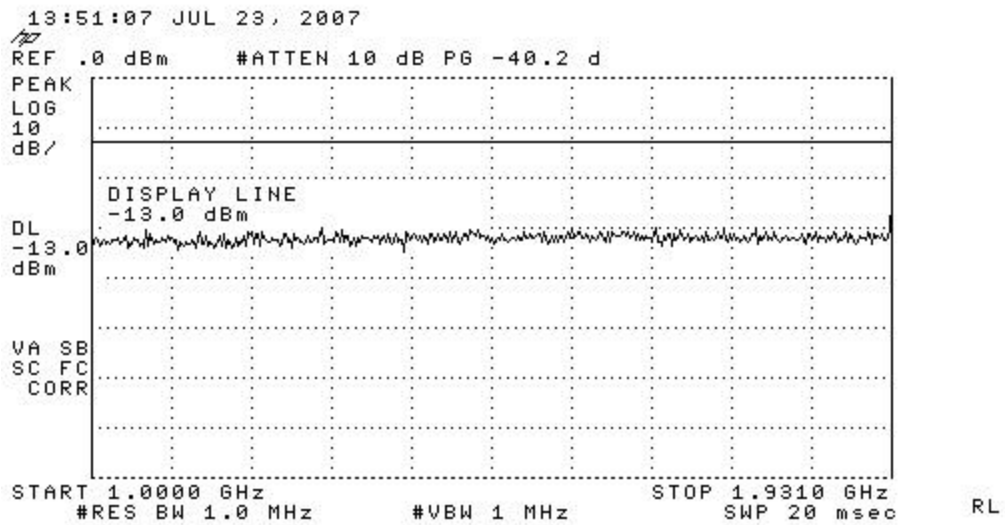
*FCC ID: J9CRFFE1900*

***Exhibit 6 – Conducted Emission Test Results (Harmonics) and Spurious Emissions  
FCC Part 2 and 24, Paragraph 2.1051, 24.238***

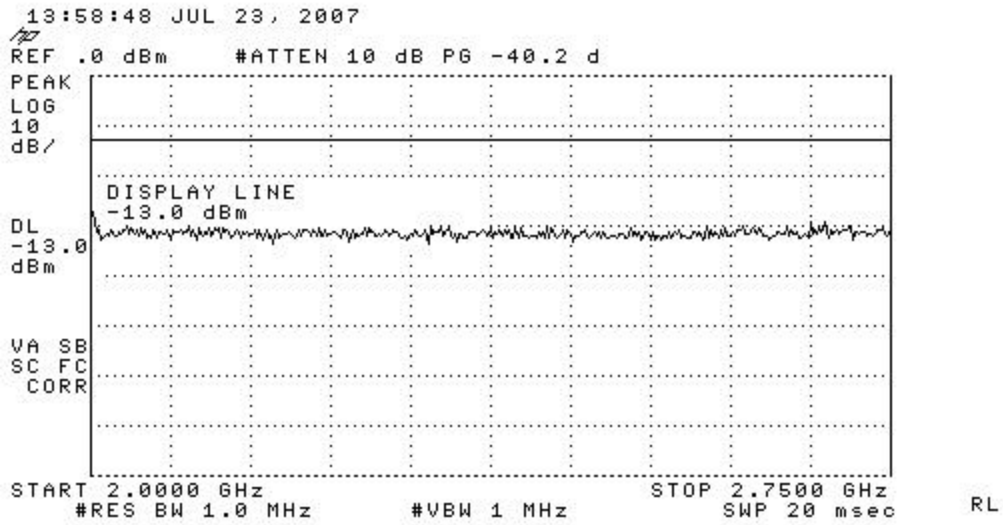
FCC ID: J9CRFFE1900



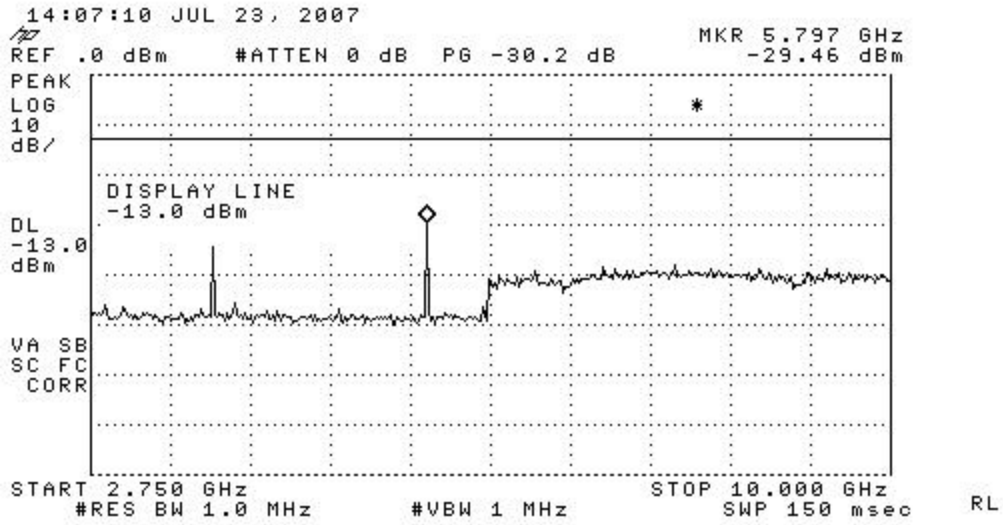
PCS Channel 25 TX Max Power



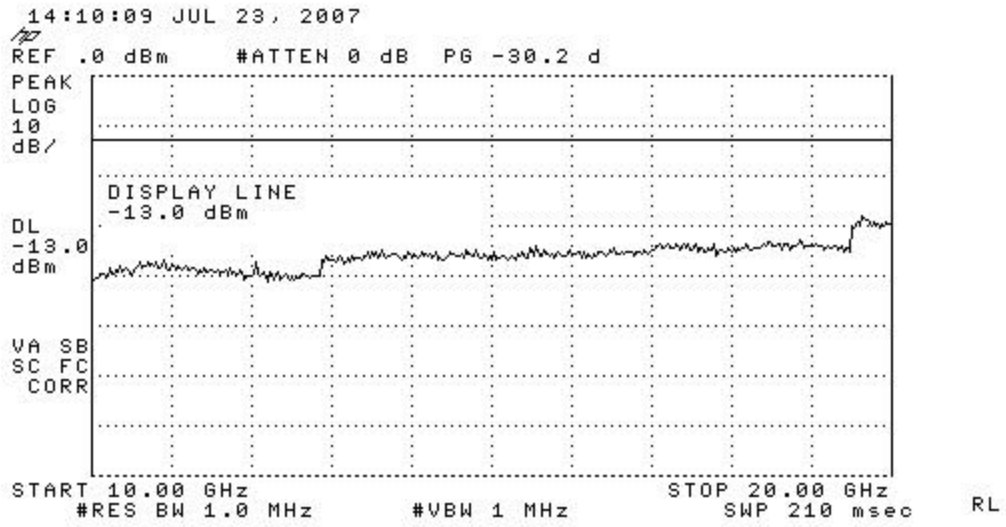
PCS Channel 25 TX Max Power



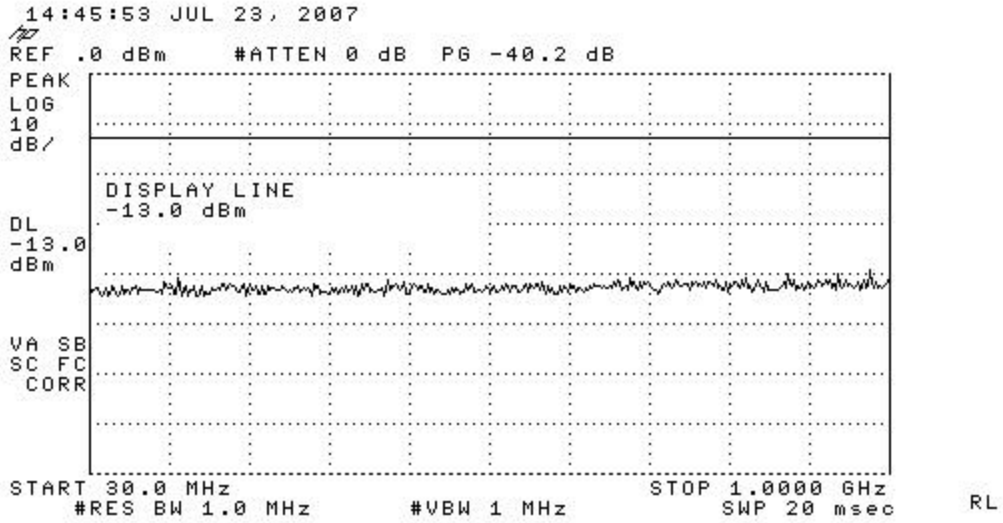
PCS Channel 25 TX Max Power



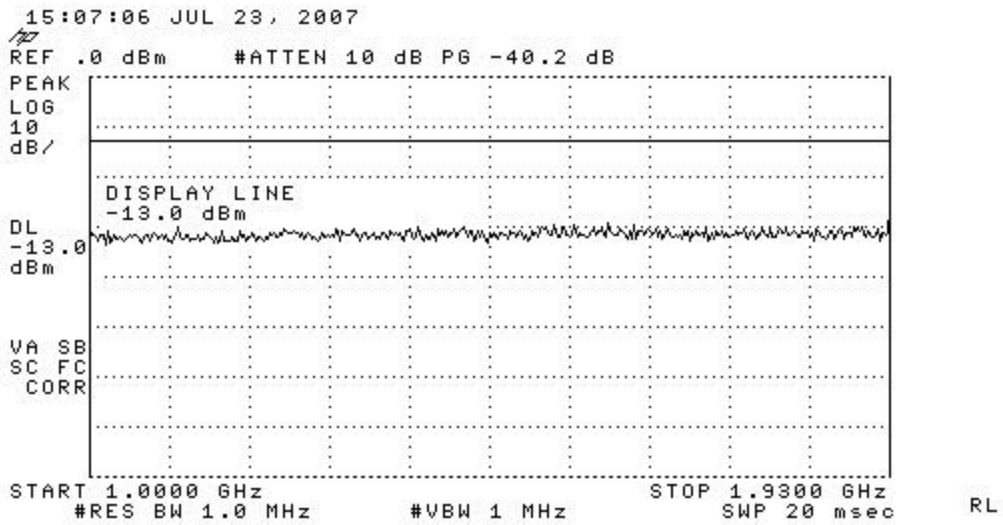
PCS Channel 25 TX Max Power



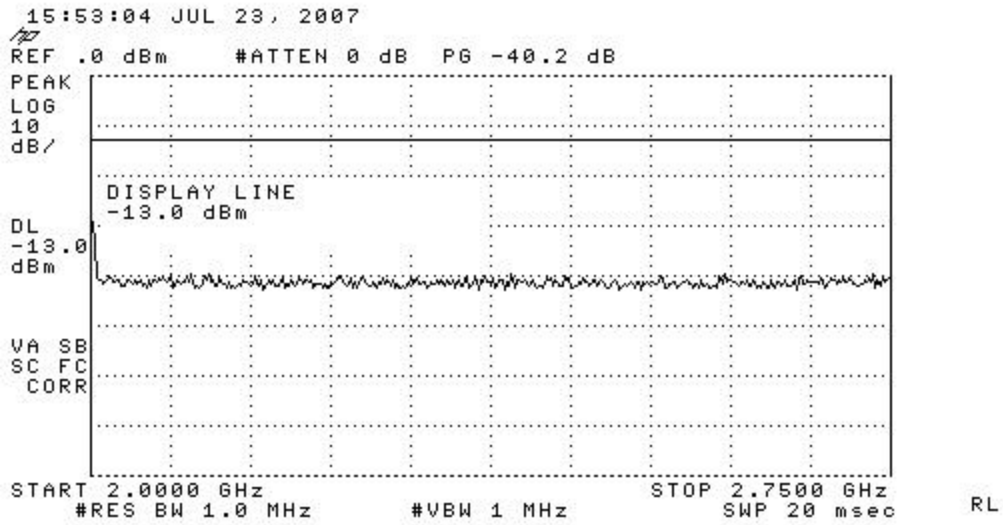
PCS Channel 25 TX Max



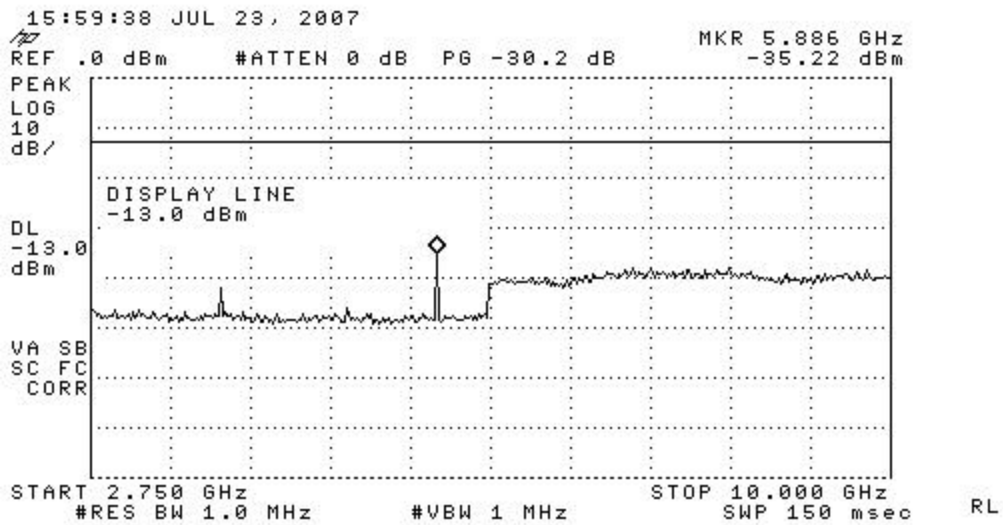
PCS Channel 600 TX Max Power



PCS Channel 600 TX Max Power

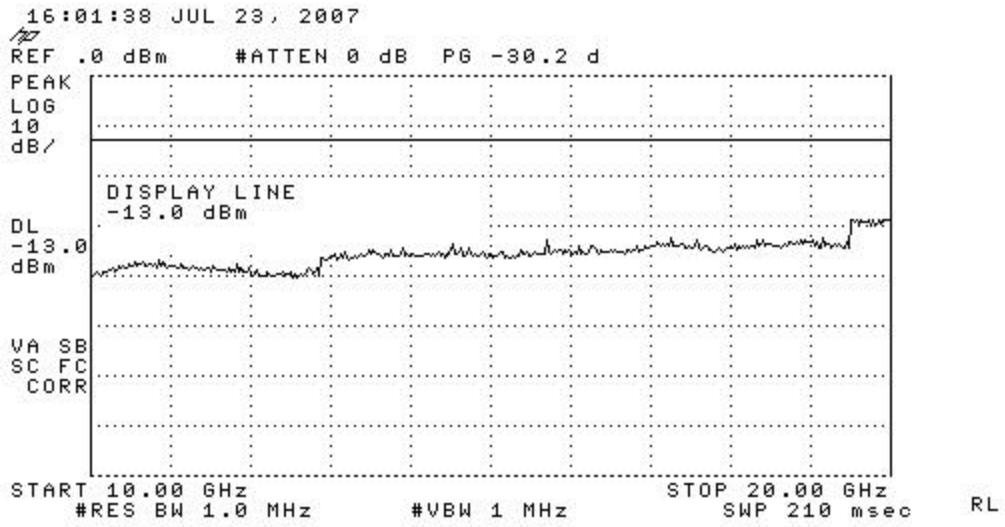


PCS Channel 600 TX Max Power

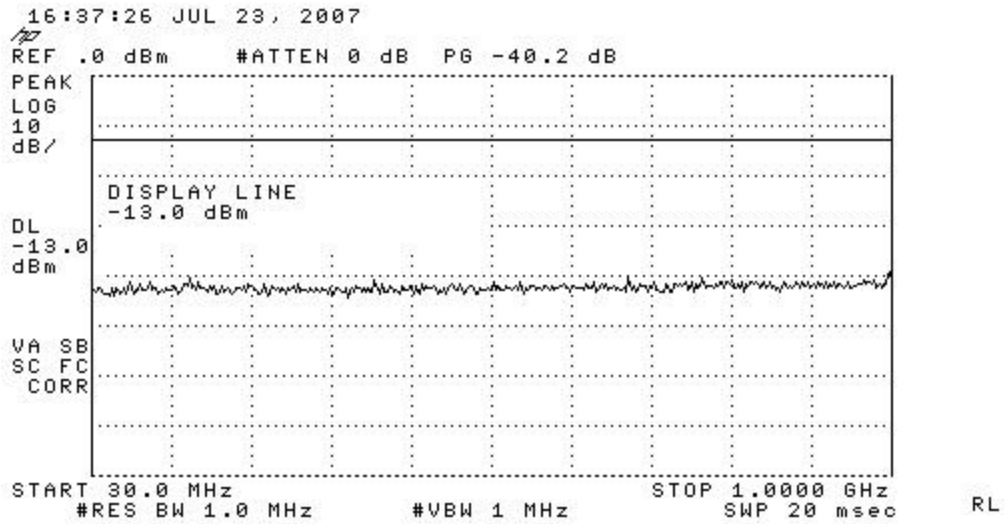


PCS Channel 600 TX Max Power

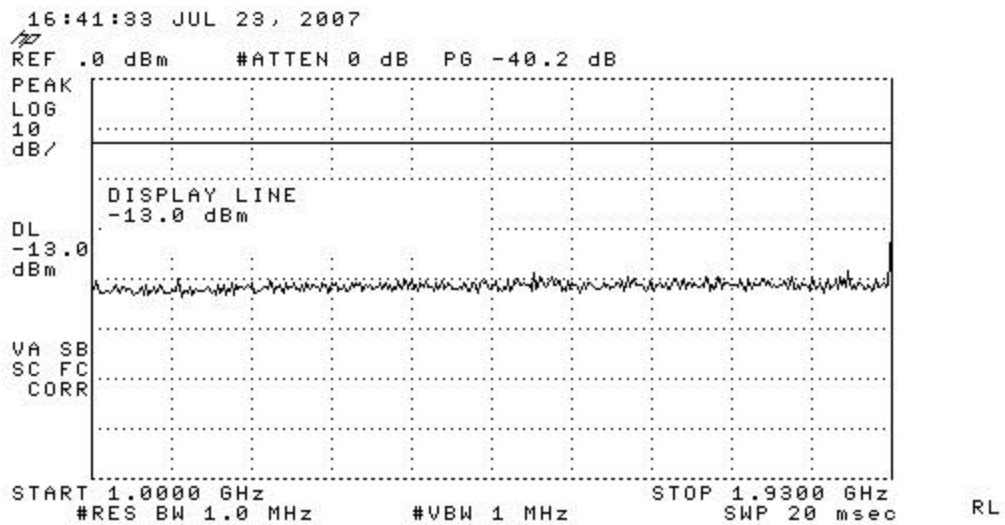




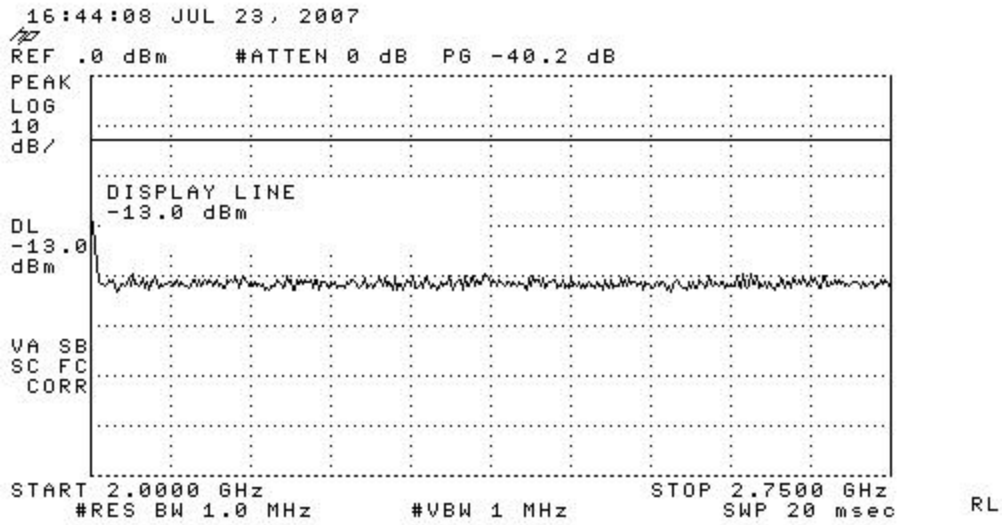
PCS Channel 600 TX Max Power



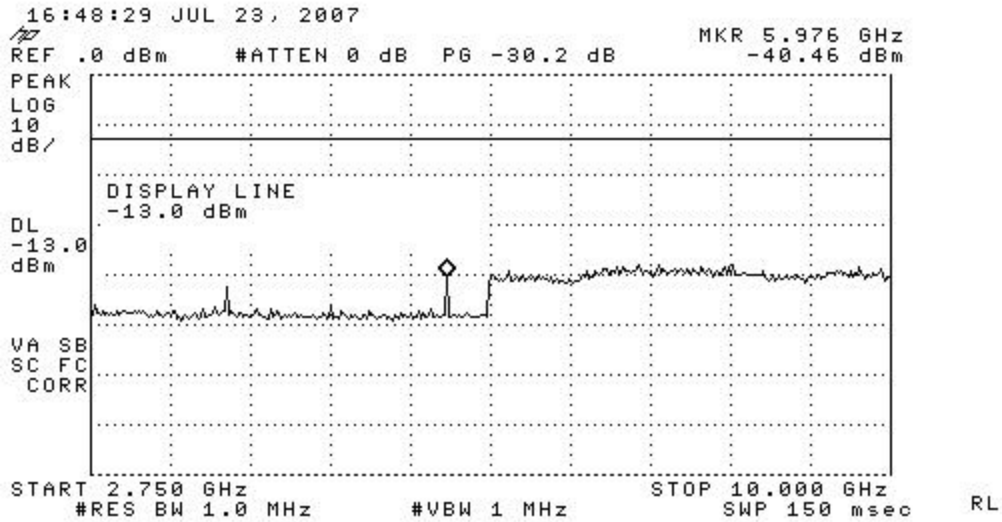
PCS Channel 1175 TX Max Power



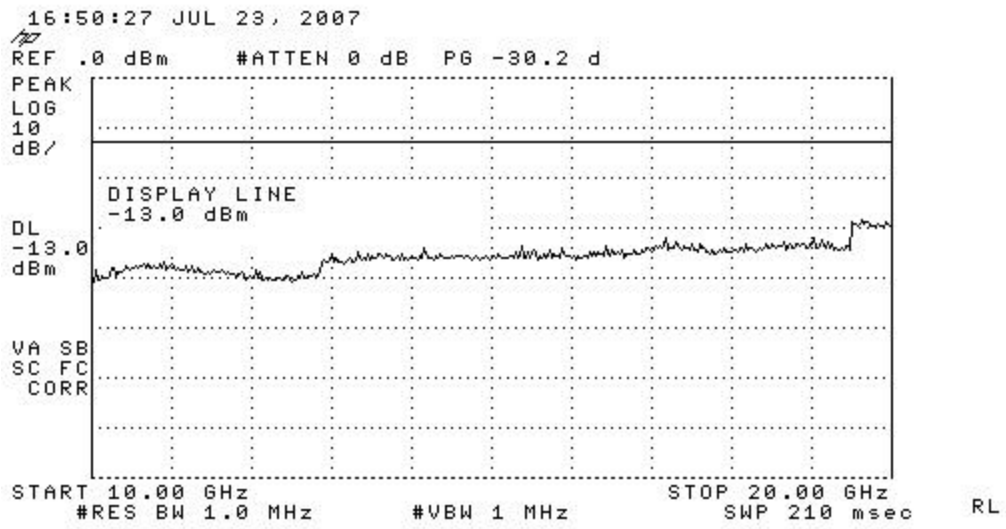
PCS Channel 1175 TX Max Power



PCS Channel 1175 TX Max Power



PCS Channel 1175 TX Max Power



PCS Channel 1175 TX Max Power

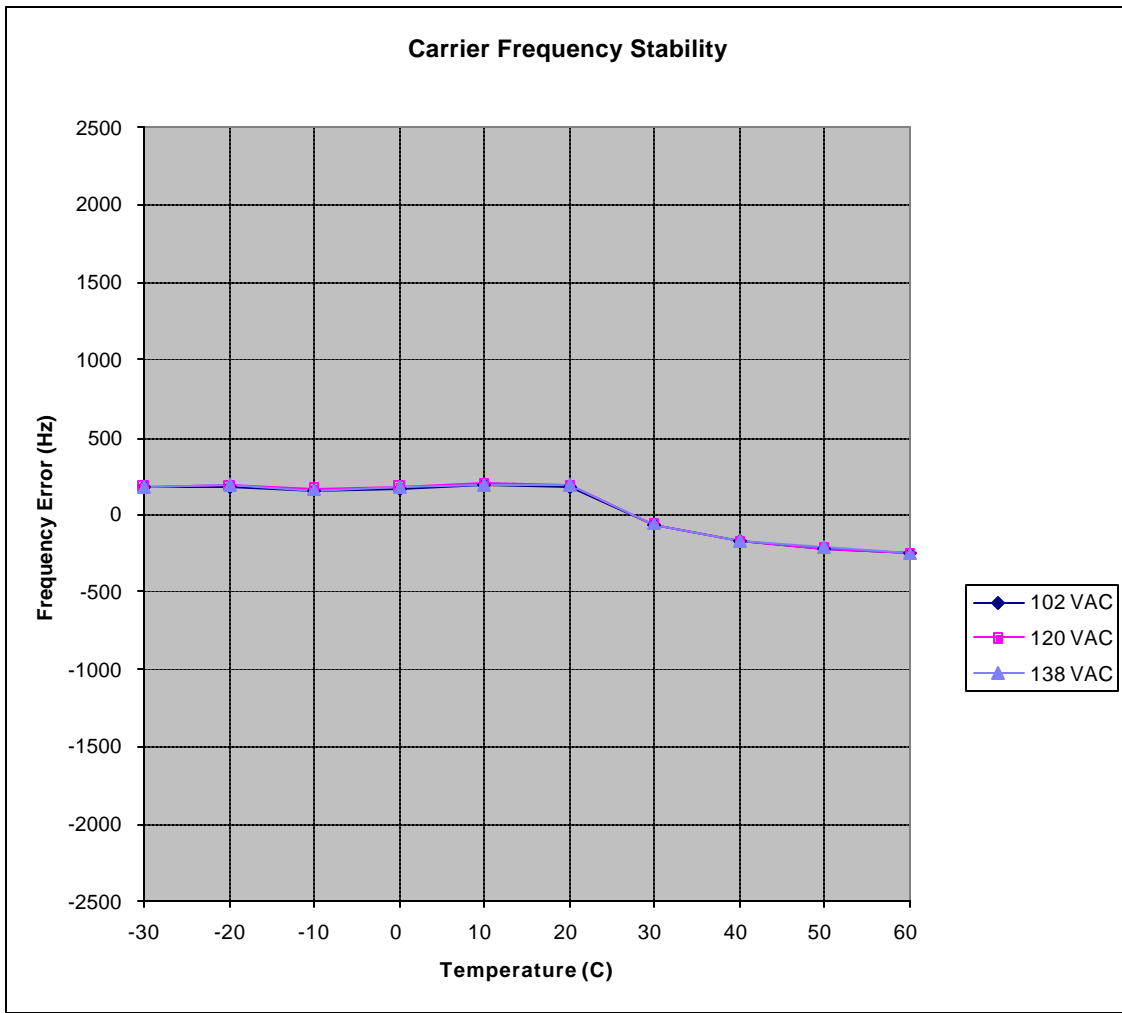
**Exhibit 7 – Transmitter RF Carrier Frequency Stability - FCC part 2.1055, 24.235**

**Transmitter RF Carrier Frequency Stability - FCC part 2, Paragraph 2.995**

Measured with a HP 8593A Spectrum Analyzer

Carrier Frequency Reference at 25 Degrees C: 1960000738Hz

temperature (C)	transmitter carrier frequency deviation		
	102 VAC	120 VAC	138 VAC
-30	181	182	176
-20	186	188	189
-10	162	165	163
0	174	179	184
10	197	202	198
20	186	189	192
30	-62	-62	-56
40	-169	-166	-165
50	-212	-214	-211
60	-252	-250	-252



**Exhibit 8 – Measurement Procedures and Techniques**

List of Equipment

Notebook Computer with QUALCOMM software  
Notebook Computer with Agilent software

Signal Generator:

Agilent E4438C ESG Vector Signal Generator, S/N 1036114, CAL DUE: 5/29/09

Measurement Equipment:

HP E4406A VSA Series Transmitter Tester, S/N 988465, CAL DUE: 6/13/08

Spectrum Analyzer:

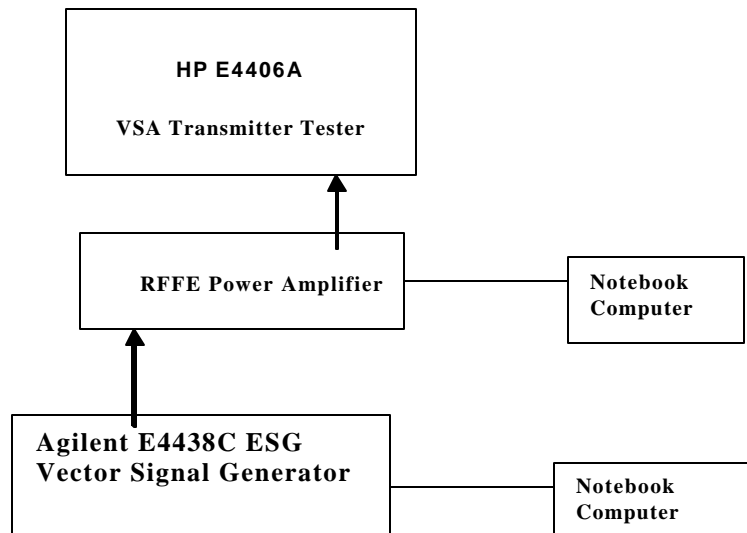
HP 8593A, S/N K15021, CAL DUE: 11/02/07

Environmental Chamber:

CSZ Z8, S/N K118586, CAL DUE: 10/17/07

Measurement Procedures

RF Output Power



**Definition** - The output power rating of the RFFE amplifier. is the power available at the output RF connector of the amplifier, when the RF connector is connected to the normal load.

**Method of Measurement** - Measure the amplifier maximum output power using the VSA Series Transmitter Tester..

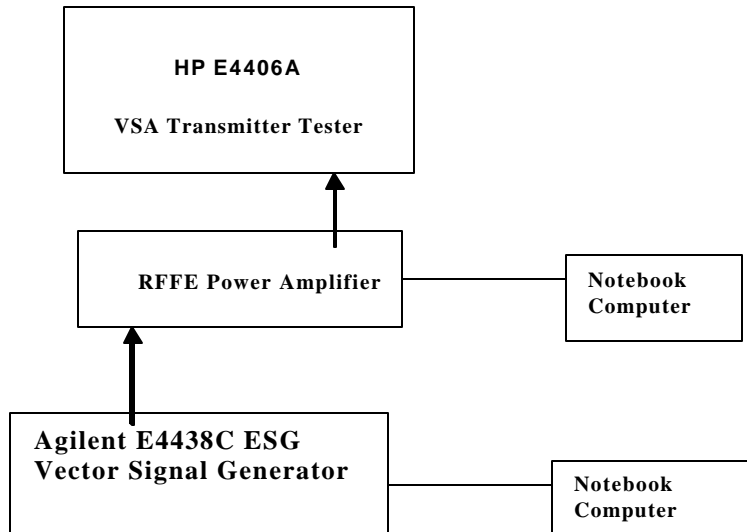
**Minimum Standard** - The amplifier output power shall be maintained within +2 / -4 dB.



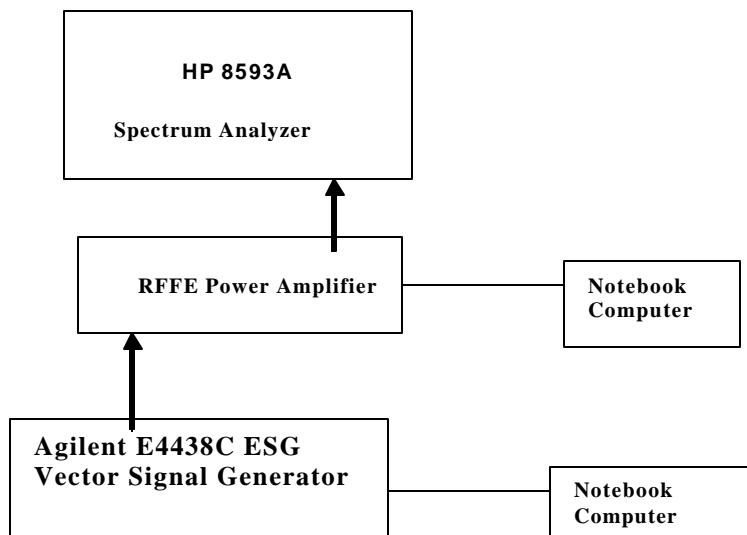
Occupied Bandwidth

The procedure has been stated in Exhibit 9

Conducted Spurious and Harmonic Emissions at Antenna Terminal



Test set-up for measurements within 4 MHz of the transmit frequency.



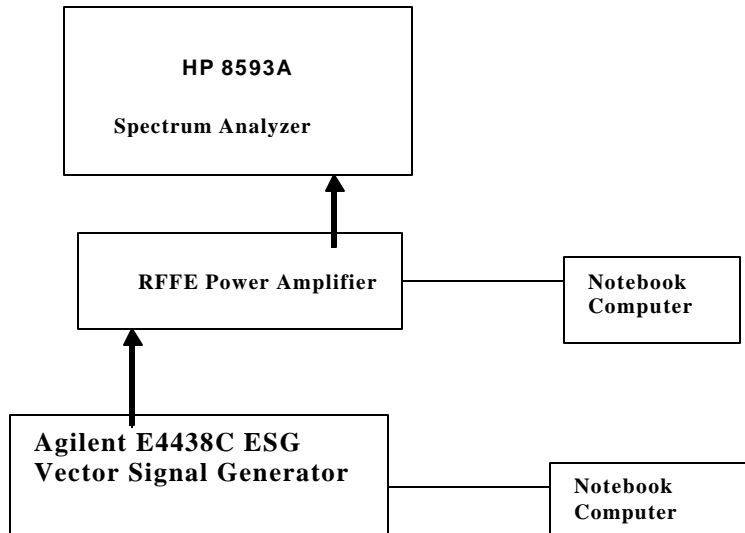
Test set-up for measurements from 0Hz to 20 GHz (except within 4MHz of the transmit frequency)

**Definition** - The conducted harmonic and spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside the authorized bandwidth of the transmitter.

**Method of Measurement** - Connect the measurement device to the RFFE's RF output connector. Set the RFFE amplifier to transmit at the maximum RF output level. Set the resolution bandwidth and video bandwidths of the measurement equipment to the appropriate values. Measure the desire frequency bands.

**Minimum Standard** - Conducted harmonic and spurious emissions shall be attenuated below the level of emissions of the carrier frequency by at least  $43 + 10 \log$  (mean output power in Watts) dB.

Frequency Stability



**Definition** - The frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

**Method of Measurement** – The RFFE was placed inside the temperature chamber. Use the spectrum analyzer to measure the transmitter RF frequency output signal at the ambient temperature. The ambient temperature was varied from -30 to +60 °C allowing approximately 30 minutes for temperature stabilization and also vary the AC supply voltage to the equipment from 102 to 138 V at each temperature setting as the measurements were performed.

**Minimum Standard** - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.