COMPLIANCE WORLDWIDE INC.
TEST REPORT 302-10BR2

In Accordance with the Requirements of

FCC PART 24:2009 Subpart E

Issued to

Cellular Specialties, Inc.
670 North Commercial Street
Manchester, NH 03010
(603) 626-6677

for

CELL PCS Repeater
CSI-DSP85-25X-C/P

FCC ID: NVRCSI-DSP25XCP

Report Issued on September 13, 2010

Tested by

Brian F. Breault

Reviewed by

Larry K. Stillings

Table of Contents

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1. Scope

This test report certifies that the Cellular Specialties CELL PCS Repeater, as tested, meets the FCC Part 24 Subpart E requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required. This report updates the Inter-modulation testing with a modulated input signal.

2. Product Details

2.1. Manufacturer: Cellular Specialties

2.2. Model Number: Represents CSI-DSP85-250-C/P

2.3. Serial Number: N/A

2.4. Description: The CSI modular digital repeater series is the industry's most flexible repeater. The versatile, lightweight design offers many options including multiple frequencies, custom passband filters, output power options, rack or wall-mount capabilities, and numerous port configurations - providing a user - friendly, easy-to-install repeater solution.

2.5. Power Source: 120 VAC, 60 Hz

2.6. EMC Modifications: None

3. Product Configuration

3.1. Support Equipment

Device	Manufacturer	Model	Serial No.	Comment
Power Supply	Cellular Specialties	015-2096-001-C	091100003	
Notebook PC	Dell	Latitude D610	19472301901	Configuring Unit

3.2. Cables

Cable Type	Length	Shield	From	To
RF, 50 Ω, N male – N male	1M	Yes	DUT	Celluar Antenna
RF, 50 Ω, N male – N male	1M	Yes	DUT	PCS Antenna
Power Supply	2M + 2M	Yes	DUT	120 VAC, 60 Hz
Serial 1 & Serial 2	2M	Yes	DUT	Notebook PC
USB 1 & USB 2	2M	Yes	DUT	Notebook PC
Ethernet	2M	No	DUT	Notebook PC

Notebook PC is connected only during setup

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3. Product Configuration (continued)

3.3. Operational Characteristics & Software

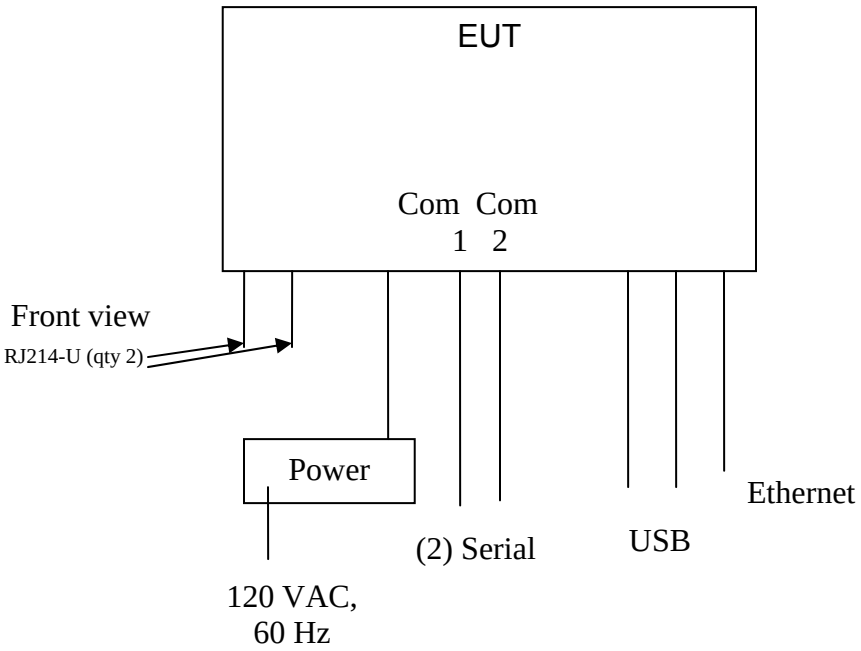
(1) The unit was allowed to power up normally and go through its configuration cycle.

(2) Using an RF Signal Generator on the Input and a Spectrum Analyzer on the output Downlink or Uplink frequencies a signal was generated over the intended bandwidth of operation.

(3) The signal generator was configured to provide several digital modulations to the input of the amplifier including CDMA modulation.

(4) The units internal AGC circuitry was toggled on and off to determine the maximum output power for each of the Uplink and Downlink frequencies and still maintain compliance with the standard.

3.4. Block Diagram



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4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
Spectrum Analyzer	Agilent	E4407B	MY4510449	7/09/2011
EMI Receiver	Hewlett Packard	8546A	3330A00115	10/28/2010
Microwave Preamp	Hewlett Packard	8449B	3008A01323	9/22/2010
Bilog Antenna	Com-Power	AC-220	25509	8/6/2011
Horn Antenna	Com-Power	AH-118	10078	7/23/2011

4.2. Measurement & Equipment Setup

Test Date:	7/20 – 8/14 2010
Test Engineer:	Larry Stillings
Normal Site Temperature (15 – 35°C):	21.1
Relative Humidity (20 -75%RH):	34

4.3. Test Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 2 & Part 24, Subpart E.

The test methods used to generate the data is this test report are in accordance with ANSI C63.4:2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

Measurements were made in accordance with TIA-603-C:2004 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard.

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5. Measurement Summary

Section Description or Test Requirement	FCC Part Reference	Test Report Section	Result	Comment
Power and Antenna height limits, Output Power	24.232	6.1	Compliant	
Occupied Bandwidth	Part 2.1049	6.2	Compliant	
Spurious Emissions at Antenna Terminals	24.238	6.3	Compliant	
Spurious Emissions at the Antenna Terminals Additional Requirements	24.238	6.3	Compliant	
Field Strength of Spurious Emissions	24.238	6.4	Compliant	
Frequency Stability	24.235	6.5	Compliant	Must stay in frequency block
Inter-modulation	N/A	6.6	Compliant	
Public Exposure to Radio Frequency Energy Levels	Section 1.1307 (b)(1)	6.7	Compliant	

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6. Measurement Data

6.1. Power and Antenna Height Limits 24.232 (a)

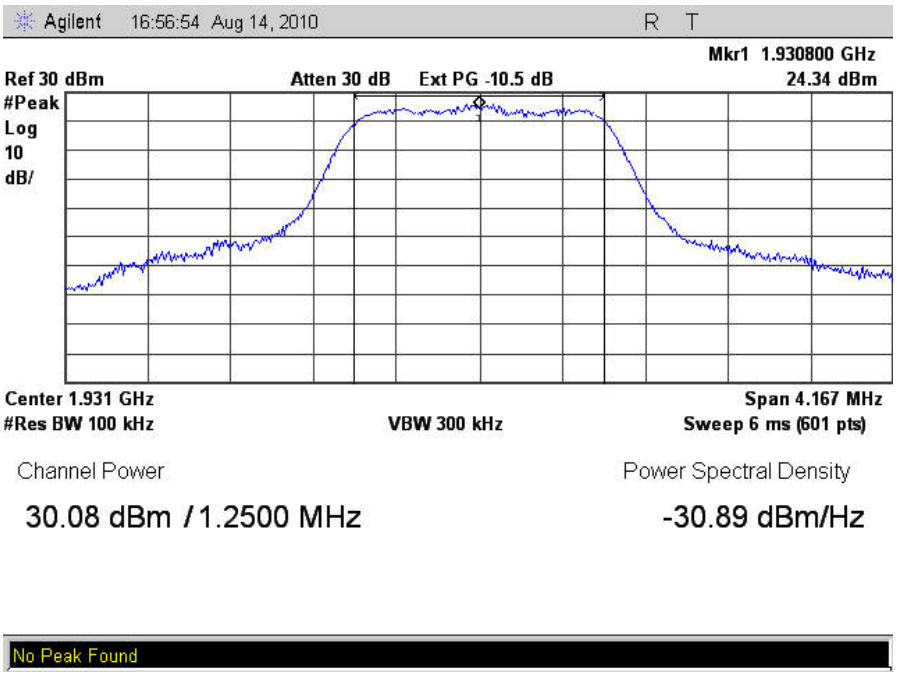
Requirement: Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

Note: Measurement of Conducted Output Power at the antenna terminal

6.1.1. Peak Transmitter Output Power, Transmitter Only

Channels	Frequency	Output Power		
	(MHz)	(W)	(dBm)	Result
Low Channel 16	1930.8	1.02	30.08	Compliant
Mid Channel 601	1960.05	1.02	30.09	Compliant
High Channel 1186	1989.3	1.00	30.04	Compliant
Low Channel 16	1850.8	1.06	30.26	Compliant
Mid Channel 601	1880.05	1.05	30.20	Compliant
High Channel 1186	1909.25	0.90	29.55	Compliant

Low Channel 16



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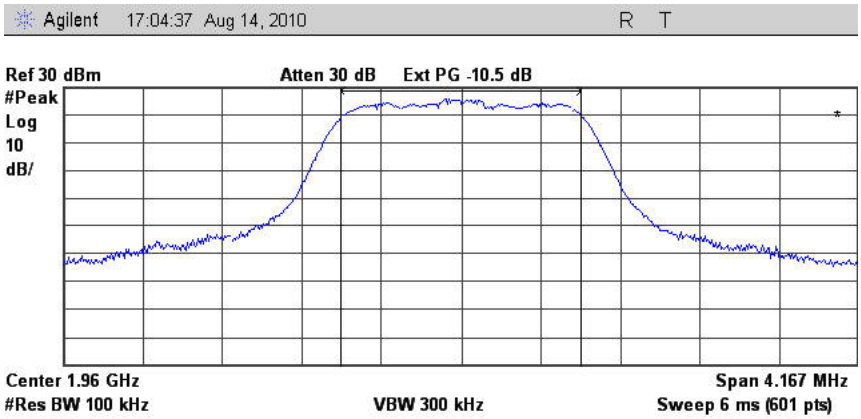
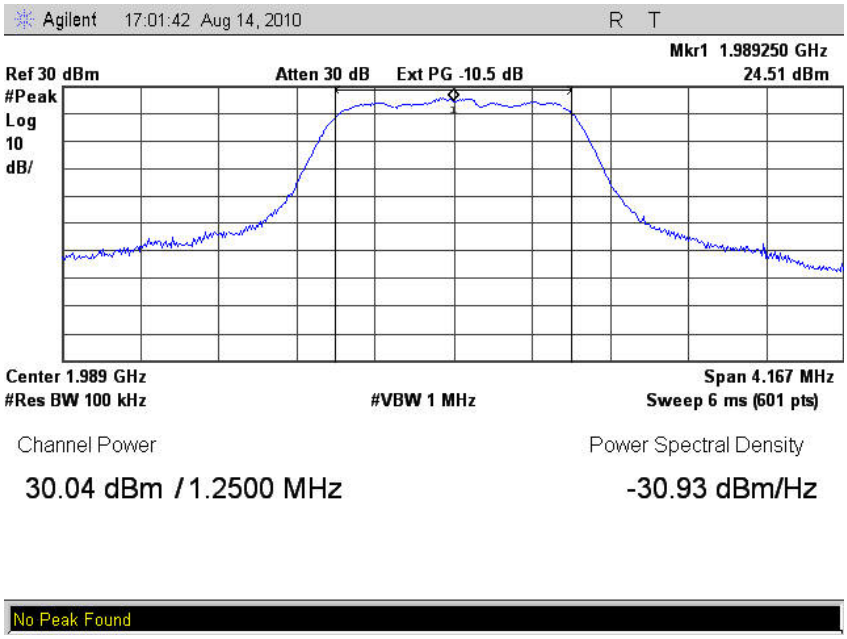
6. Measurement Data

6.1. Power and Antenna Height Limits 24.232 (a) (cont)

Mid Channel 601



High Channel 1186



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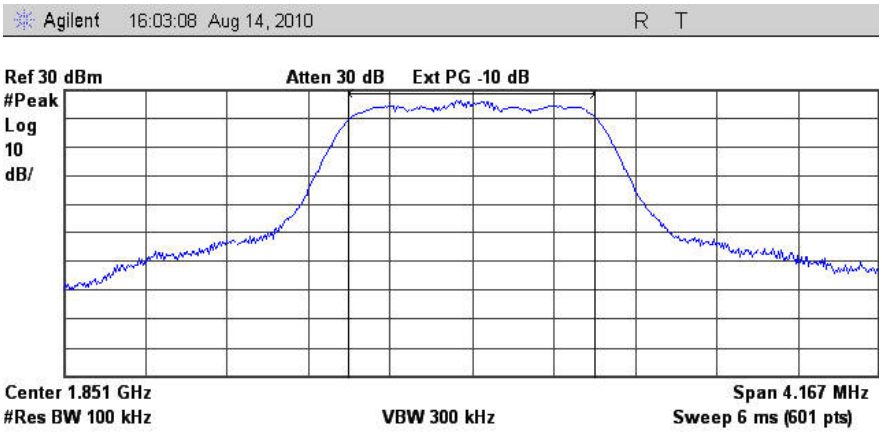
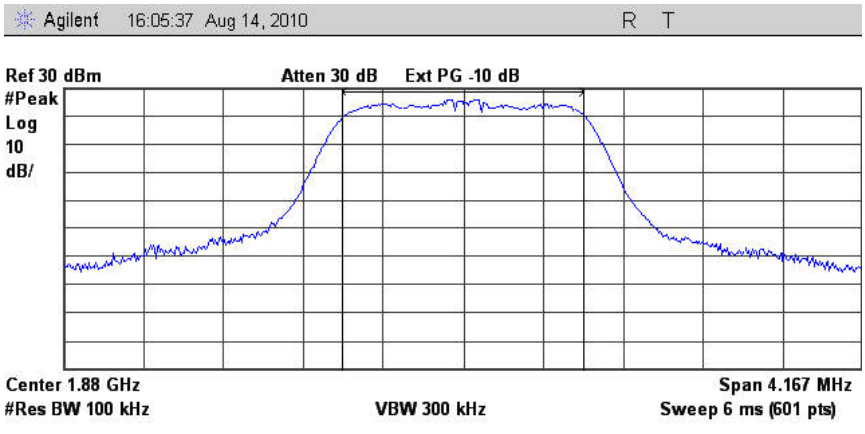
6. Measurement Data

6.1. Power and Antenna Height Limits 24.232 (a) (cont)

Low Channel 16



Mid Channel 601



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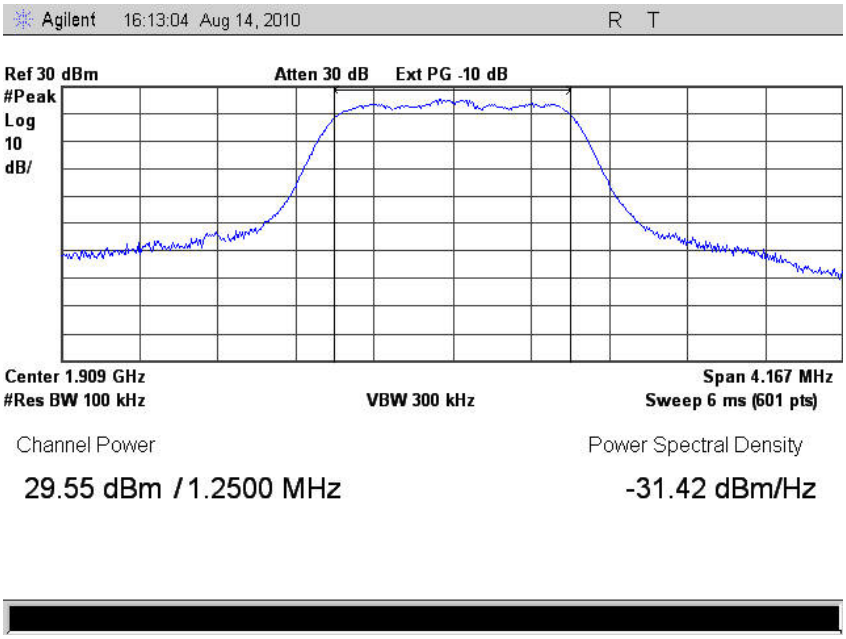
6. Measurement Data

6.1. Power and Antenna Height Limits 24.232 (a) (cont)

High Channel 1186



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6. Measurement Data

6.1. Power and Antenna Height Limits (continued)

6.1.2. Maximum ERP

ERP is defined in FCC Title 47, Chapter I, Part 2, Subpart A, Section 2.1 as "Effective Radiated Power. The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction."

ERP = Transmitter Power (dBm) - Cable Loss (dB) + Antenna Gain (dBi)

The manufacturer of the device under test recommends 2 antennas for use with their product. The following table provides the worst case effective radiated power based on the measured transmitter output power and the antenna gain:

Channel	Frequency	Transmitter Power[1]	Cable Insertion Loss	Antenna Gain[2]	Total Output Power	
	(MHz)	(dBm)	(dB)	(dBi)	(dBm)	(Watts)
Low	1930.8	30.08	0.00	+3	33.08	2.03
Mid	1960.05	30.09	0.00	+3	33.09	2.04
High	1989.3	30.04	0.00	+3	33.04	2.01
Low	1850.8	30.26	0.00	+3	33.26	2.12
Mid	1880.05	30.20	0.00	+3	33.20	2.09
High	1909.25	29.55	0.00	+3	32.55	1.80
Low	1930.8	30.08	0.00	+14	44.08	25.6
Mid	1960.05	30.09	0.00	+14	44.09	25.6
High	1989.3	30.04	0.00	+14	44.04	25.4
Low	1850.8	30.26	0.00	+14	44.26	26.7
Mid	1880.05	30.20	0.00	+14	44.20	26.3
High	1909.25	29.55	0.00	+14	43.55	22.6

[1] Measured. See section 6.1.1.
[2] Customer supplied. 3 dBi for Indoor Applications, 14 dBi for Outdoor Applications

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6. Measurement Data (continued)

6.2. Bandwidth Limitations (FCC Part 2.1049)

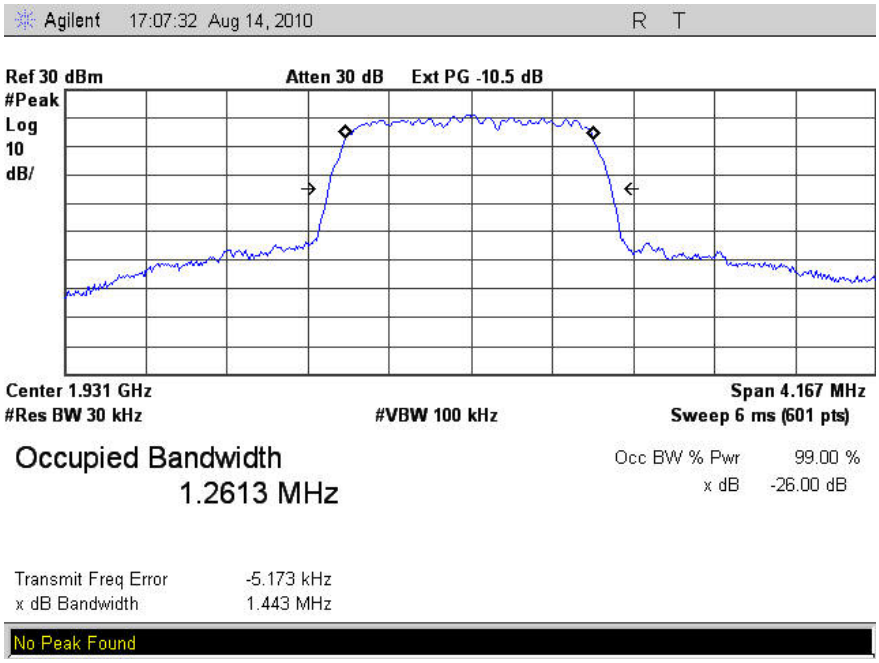
Requirement: Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission at any instant.

6.2.1. Occupied (99% Power) Bandwidth

	Frequency	Occupied Bandwidth	Result
	(MHz)	(MHz)	
Low Channel	1930.8	1.2613	Compliant
Mid Channel	1960.05	1.2613	Compliant
High Channel	1989.3	1.2608	Compliant
Low Channel	1850.8	1.2615	Compliant
Mid Channel	1880.05	1.2605	Compliant
High Channel	1909.25	1.2617	Compliant

NOTE: EUT is typically used to repeat CDMA signals in the PCS Band.

6.2.1.1. Occupied (99% Power) Bandwidth Measurement, 1930.8 MHz



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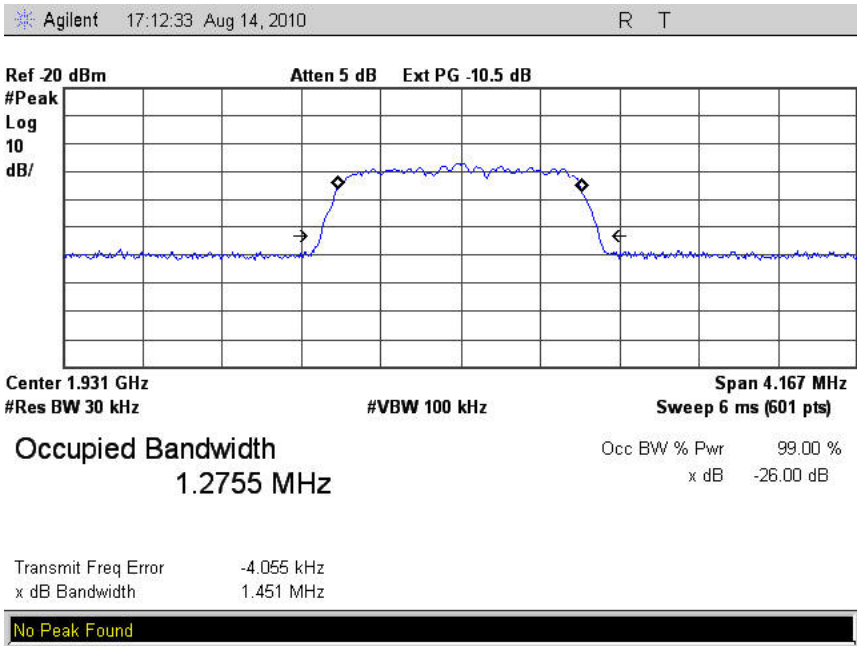
6. Measurement Data (continued)

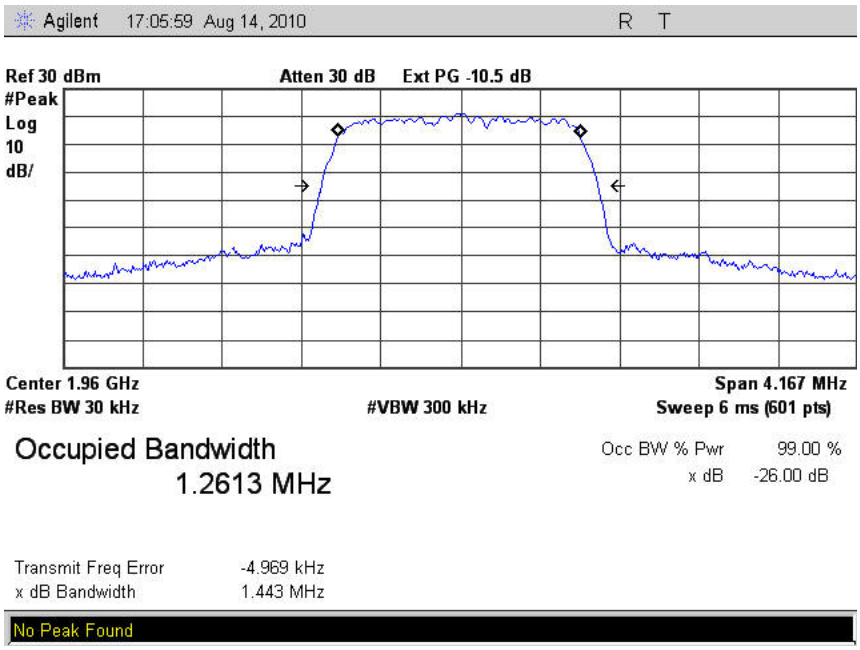
6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

6.2.1. Occupied (99% Power) Bandwidth (continued)

6.2.1.2. Occupied (99% Power) Bandwidth Input Signal, 1930.08 MHz



6.2.1.3. Occupied (99% Power) Bandwidth Measurement, 1960.05 MHz



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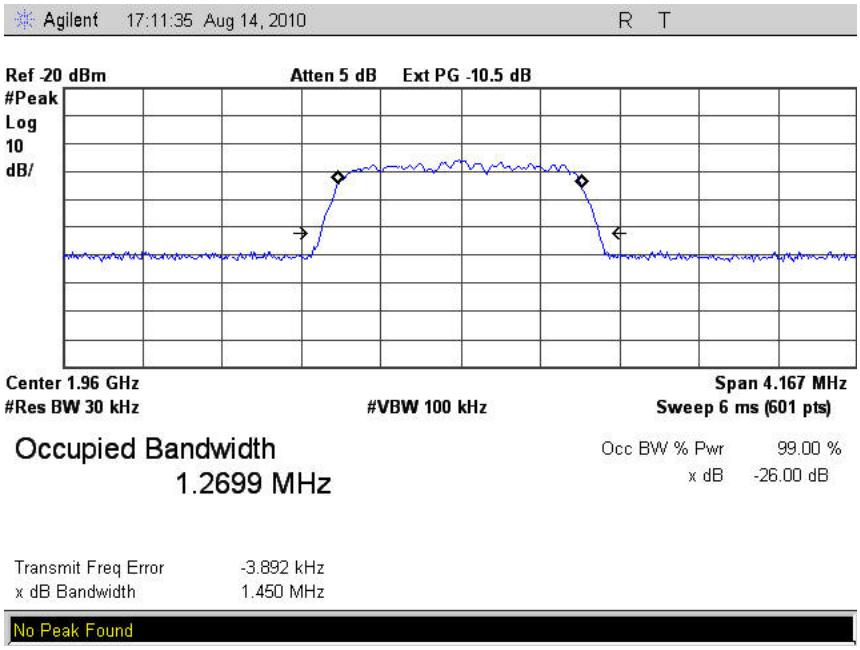
6. Measurement Data (continued)

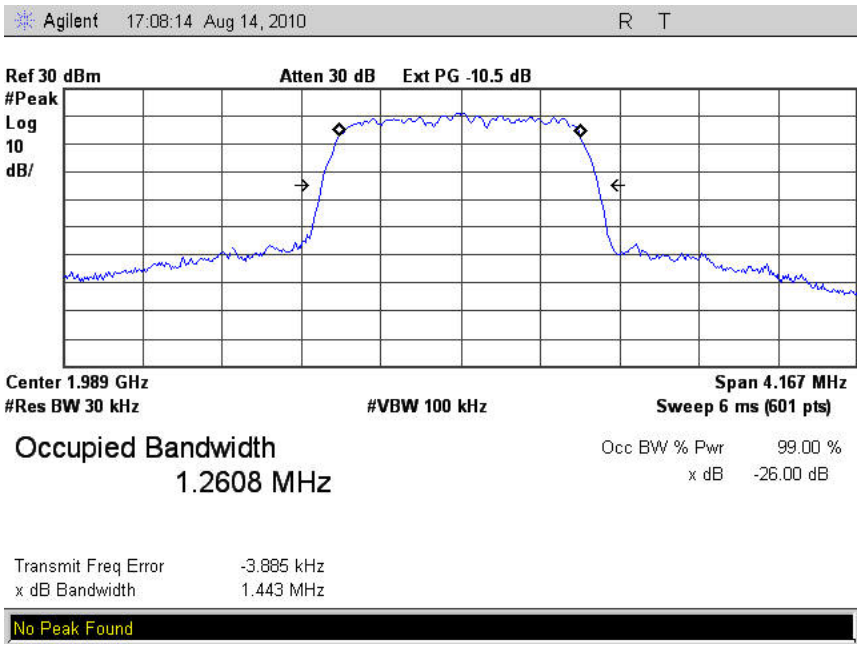
6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

6.2.1. Occupied (99% Power) Bandwidth (continued)

6.2.1.4. Occupied (99% Power) Bandwidth Input Signal, 1960.05 MHz



6.2.1.5. Occupied (99% Power) Bandwidth Measurement, 1989.25 MHz



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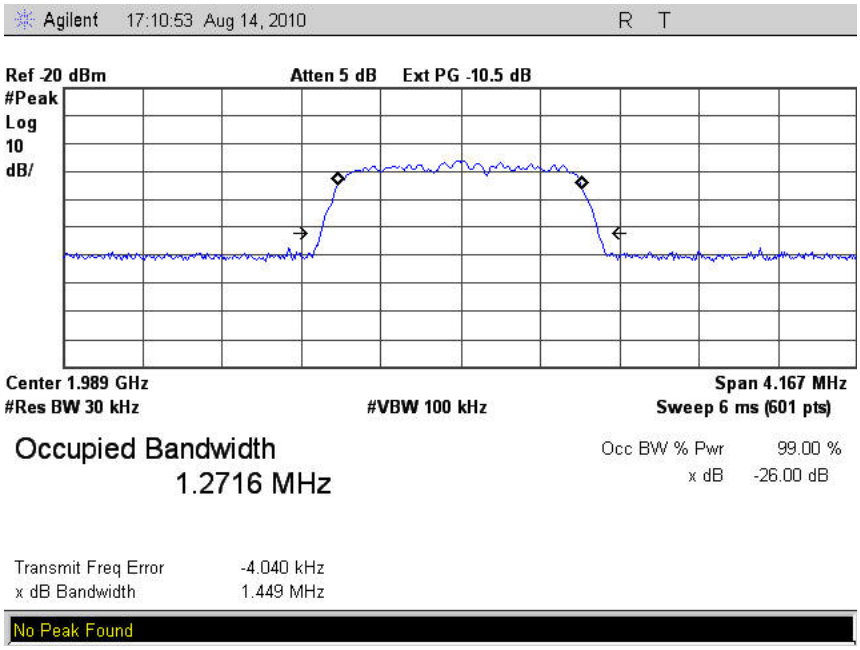
6. Measurement Data (continued)

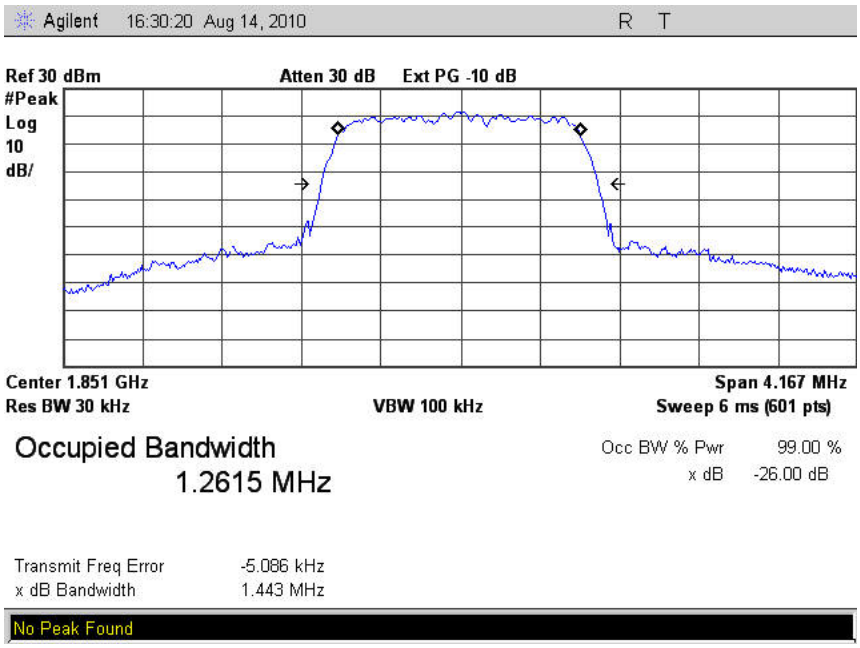
6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

6.2.1. Occupied (99% Power) Bandwidth (continued)

6.2.1.6. Occupied (99% Power) Bandwidth Input Signal, 1989.25 MHz



6.2.1.7. Occupied (99% Power) Bandwidth Measurement, 1850.8 MHz



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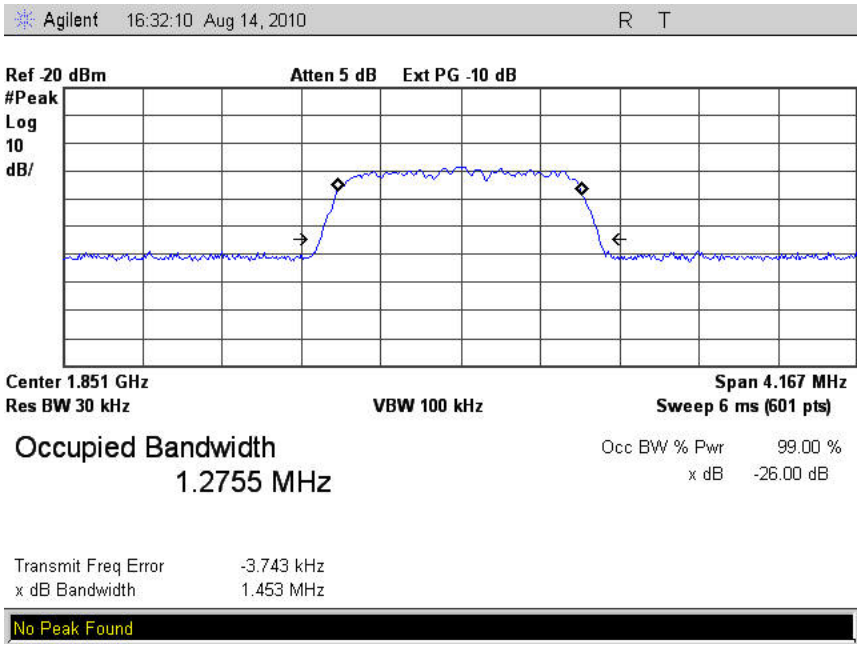
6. Measurement Data (continued)

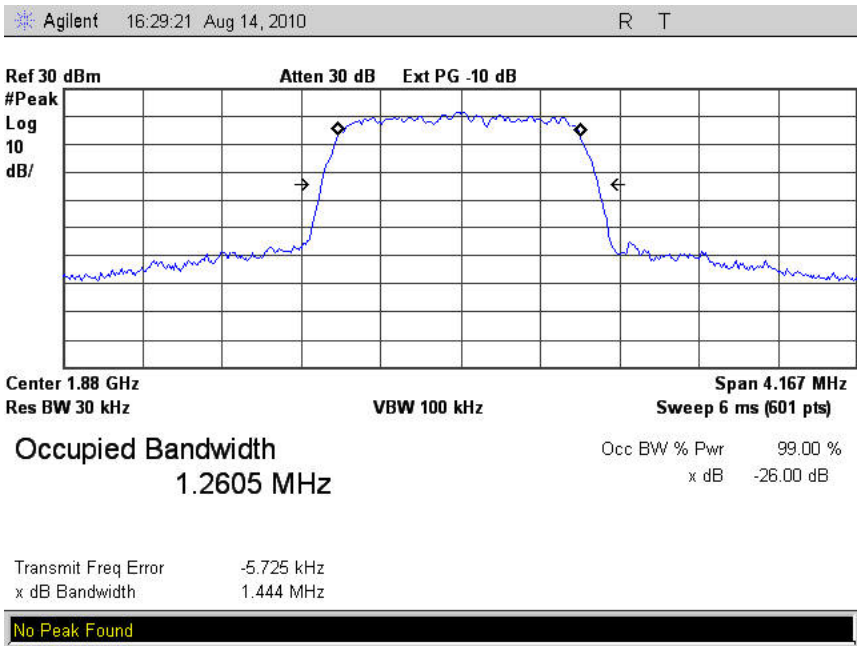
6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

6.2.1. Occupied (99% Power) Bandwidth (continued)

6.2.1.8. Occupied (99% Power) Bandwidth Input Signal, 1850.8 MHz



6.2.1.9. Occupied (99% Power) Bandwidth Measurement, 1880.05 MHz



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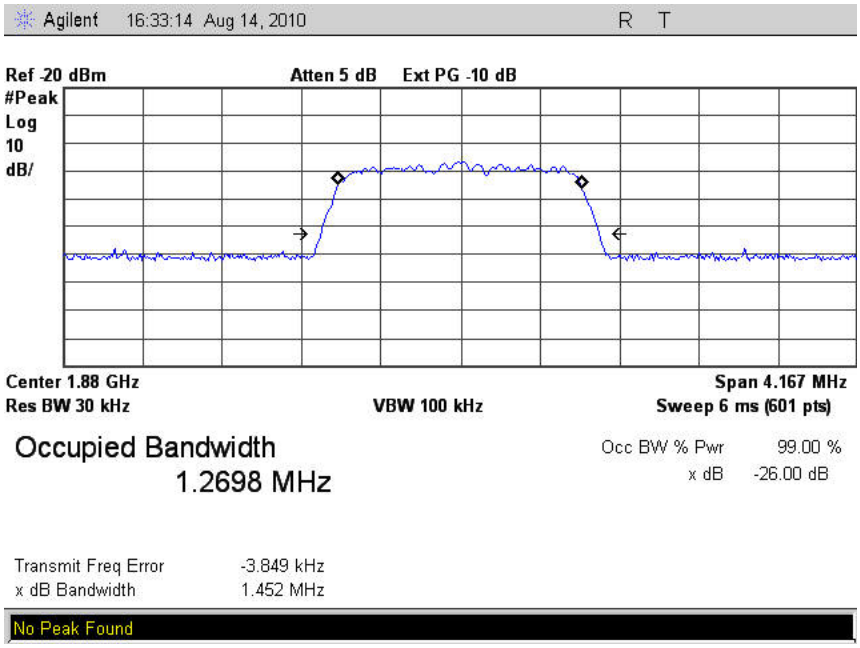
6. Measurement Data (continued)

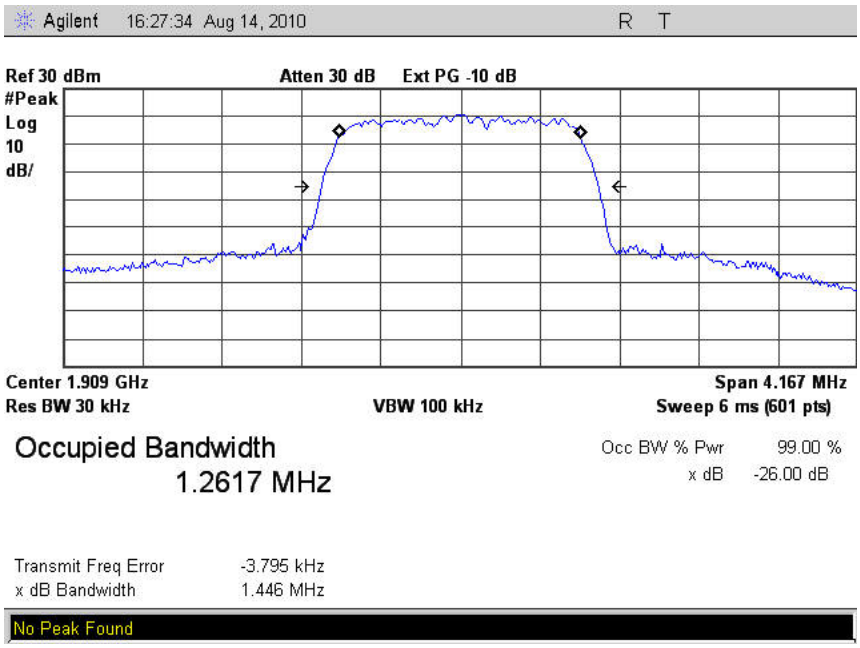
6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

6.2.1. Occupied (99% Power) Bandwidth (continued)

6.2.1.10. Occupied (99% Power) Bandwidth Input Signal, 1880.05 MHz



6.2.1.11. Occupied (99% Power) Bandwidth Measurement, 1909.25 MHz



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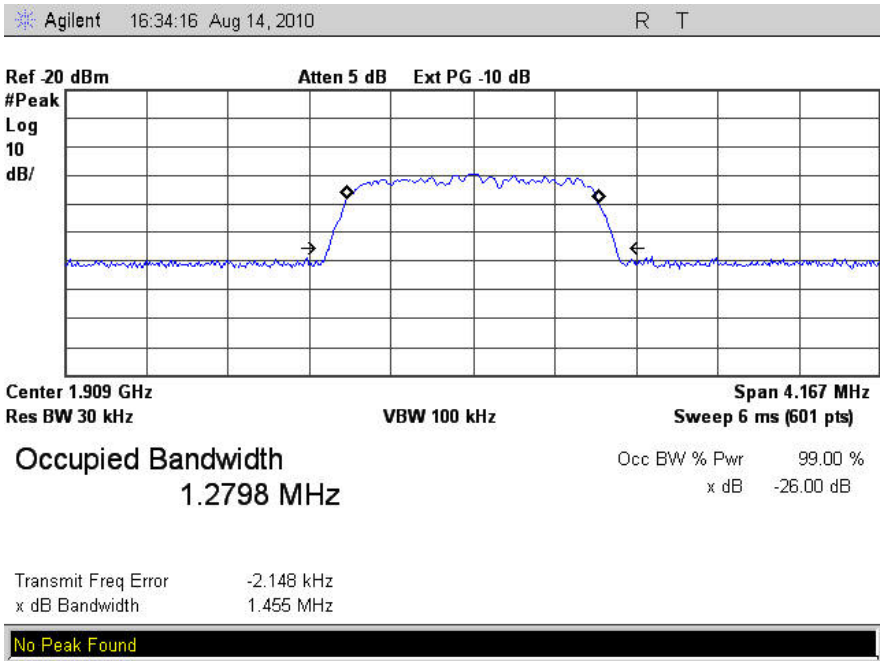
6. Measurement Data (continued)

6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

6.2.1. Occupied (99% Power) Bandwidth (continued)

6.2.1.12. Occupied (99% Power) Bandwidth Input Signal, 1909.25 MHz



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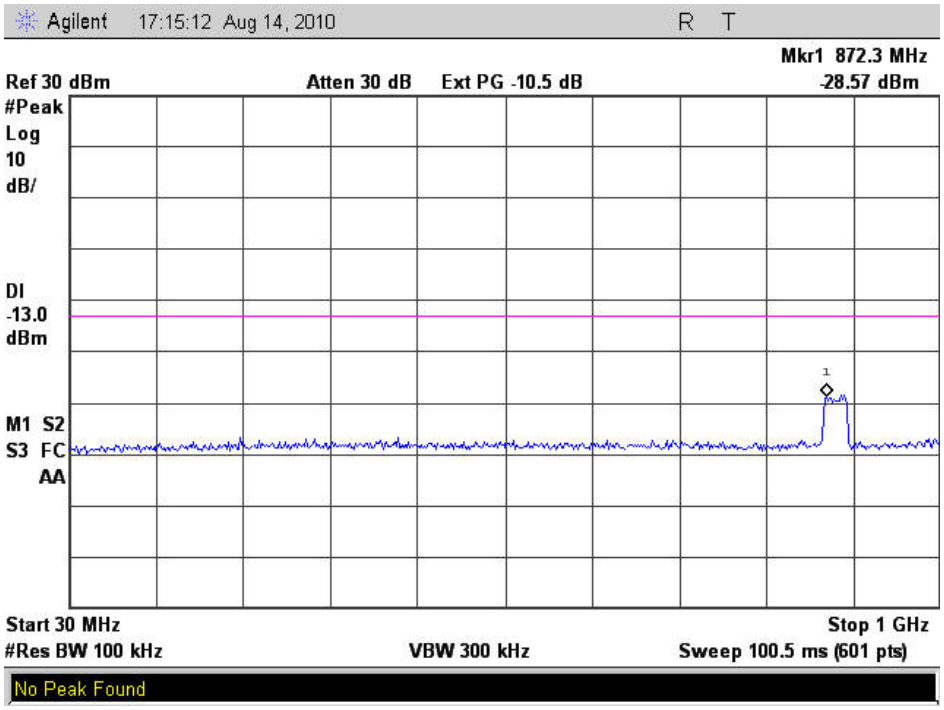
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a)

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

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

6.3.1. Low Channel 1930.8 MHz, 30 MHz to 1 GHz



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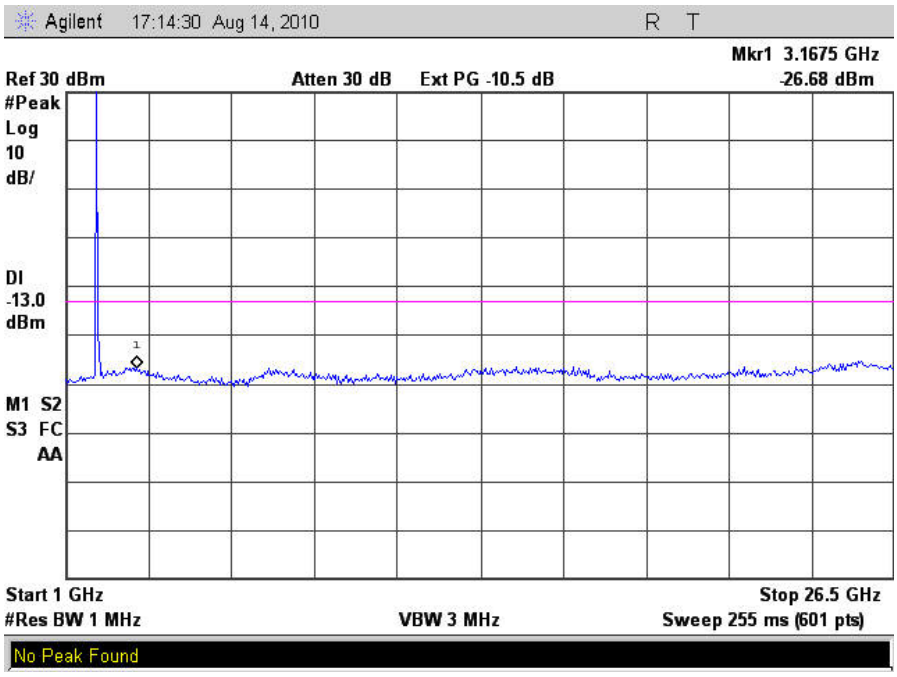
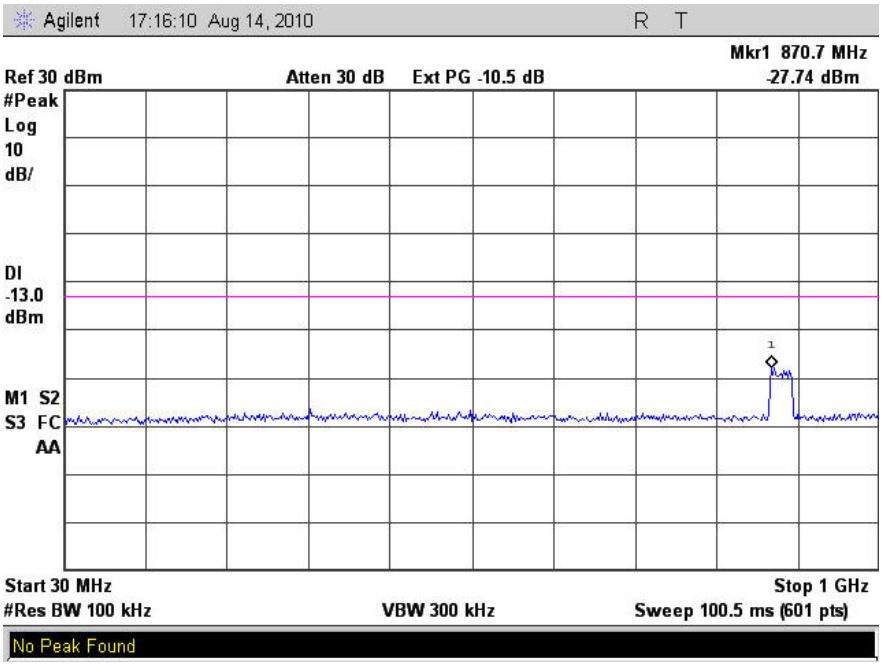
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.2. Low Channel 1930.8 MHz, 1 to 26.5 GHz



6.3.3. Mid Channel 1960.05 MHz, 30 MHz to 1 GHz



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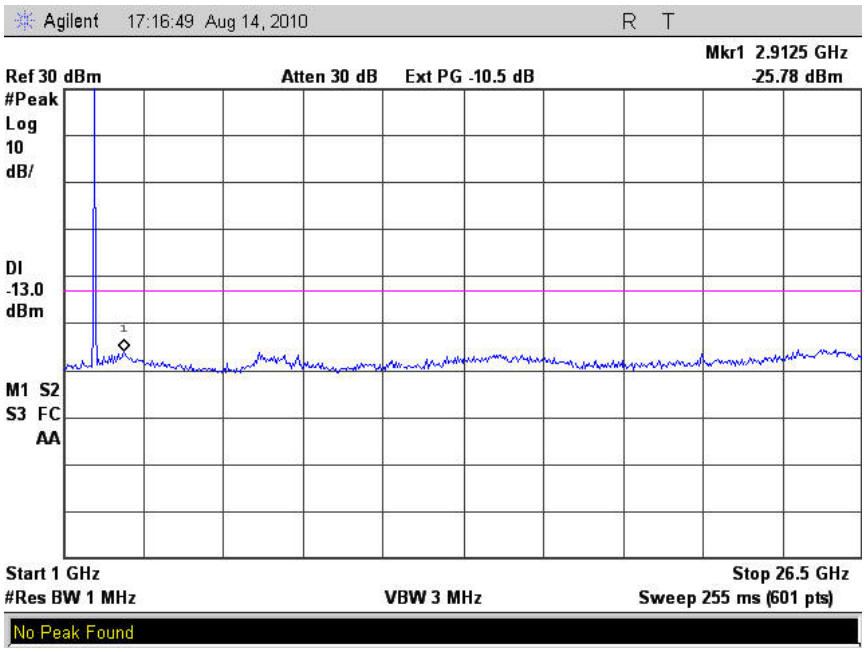
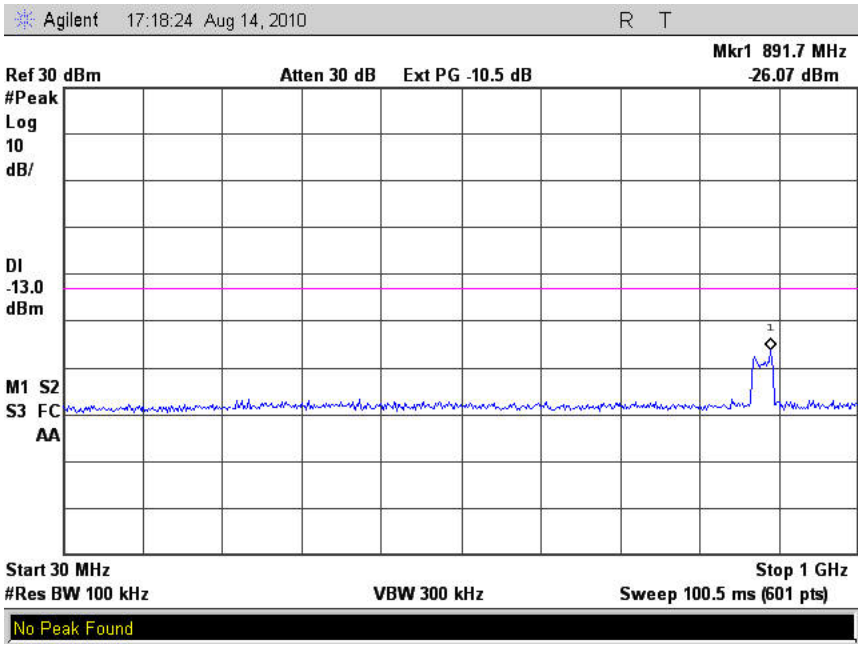
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.4. Mid Channel 1960.05 MHz, 1 to 26.5 GHz



6.3.5. High Channel 1989.25 MHz, 30 to 1000 MHz



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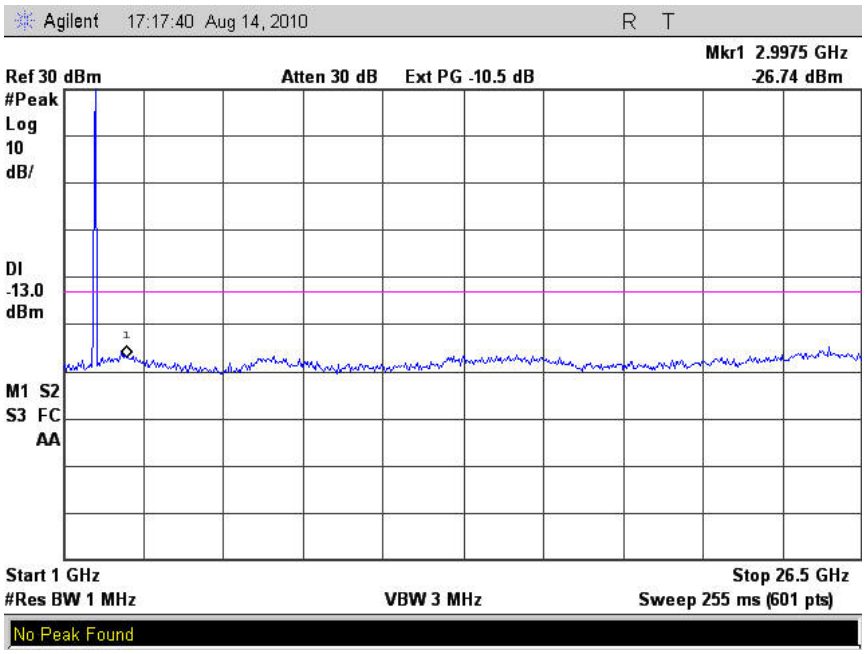
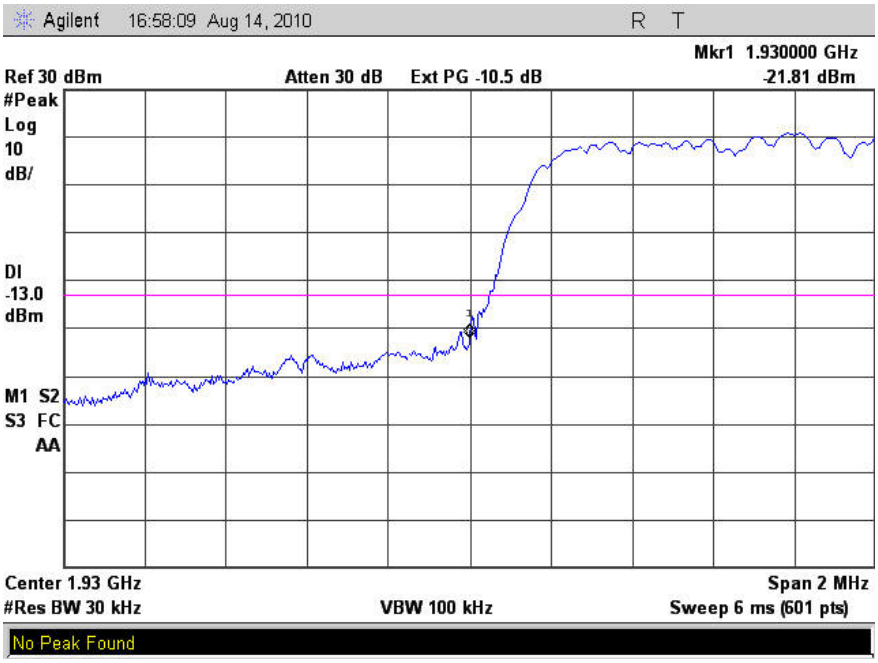
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.6. High Channel 1989.25 MHz, 1 to 26.5 GHz



6.3.7. 1930 MHz Bandedge Measurement



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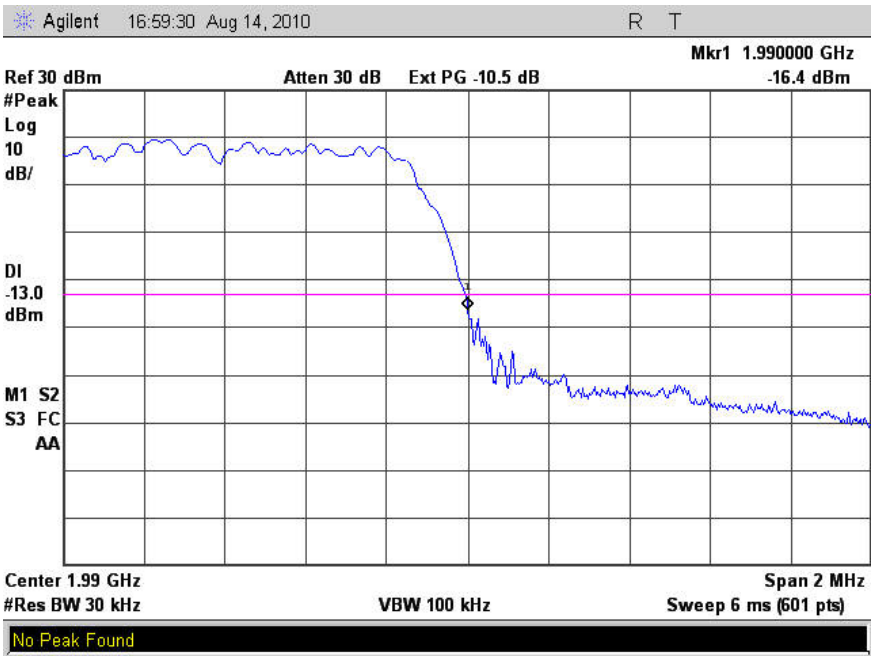
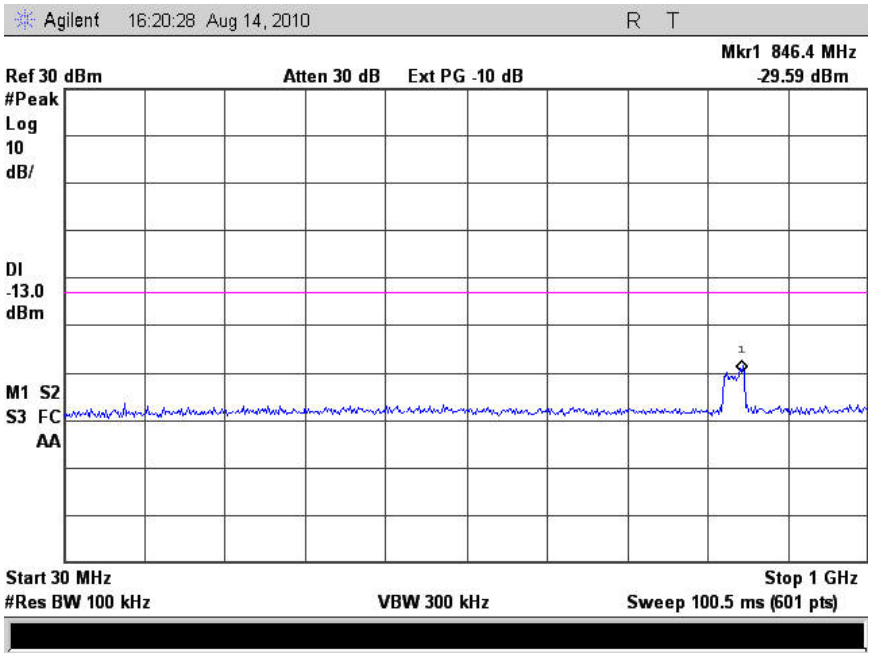
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.8. 1990 MHz Bandedge Measurement



6.3.9. Low Channel 1850.8 MHz, 30 MHz to 1 GHz



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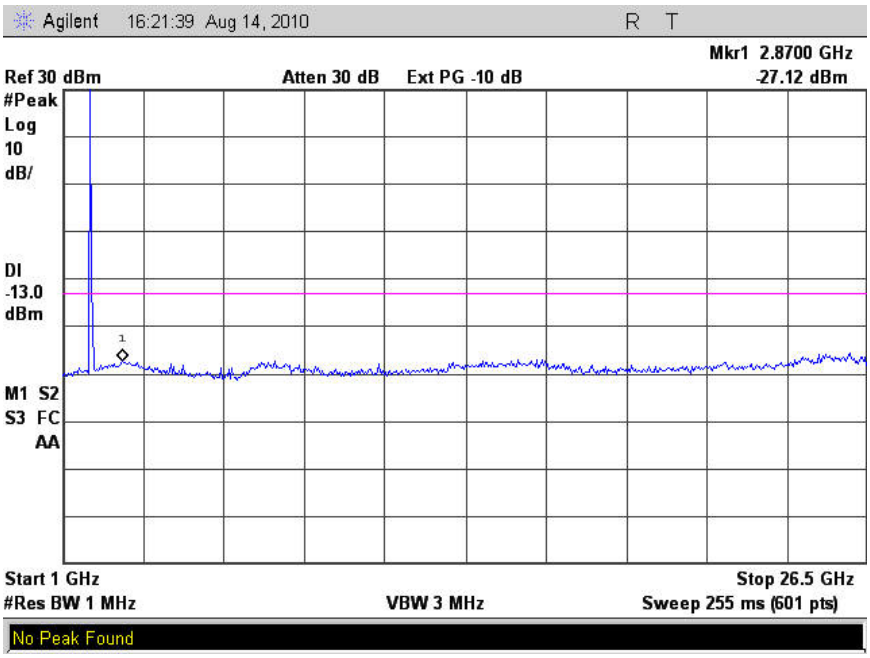
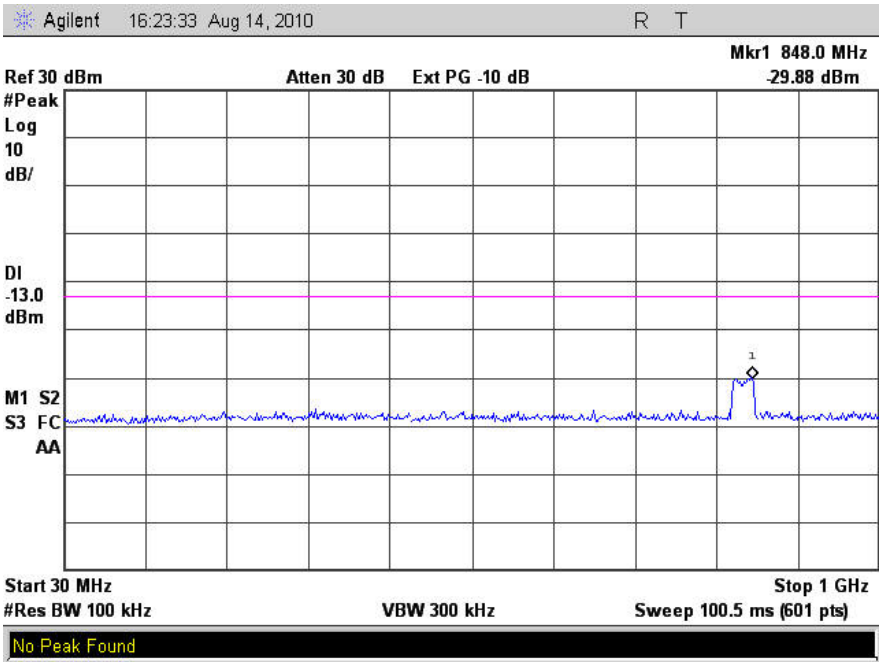
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.10. Low Channel 1850.8 MHz, 1 to 26.5 GHz



6.3.11. Mid Channel 1880.05 MHz, 30 MHz to 1 GHz



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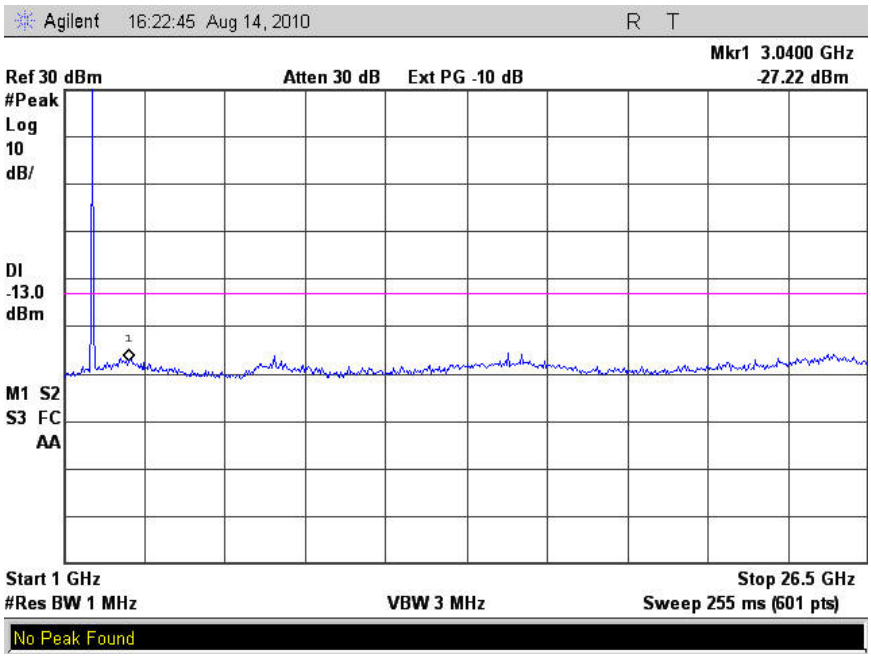
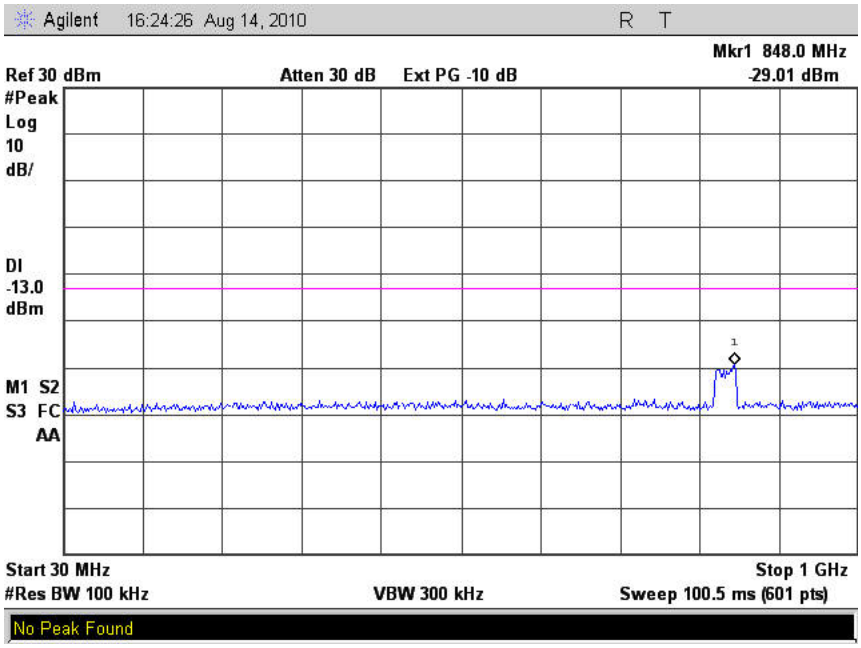
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.12. Mid Channel 1880.05 MHz, 1 to 26.5 GHz



6.3.13. High Channel 1909.25 MHz, 30 to 1000 MHz



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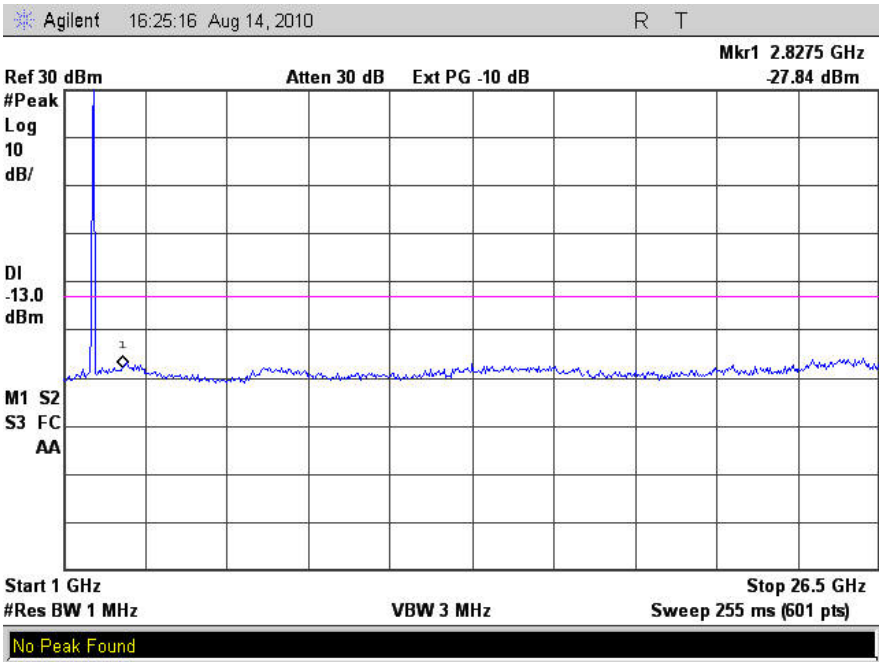
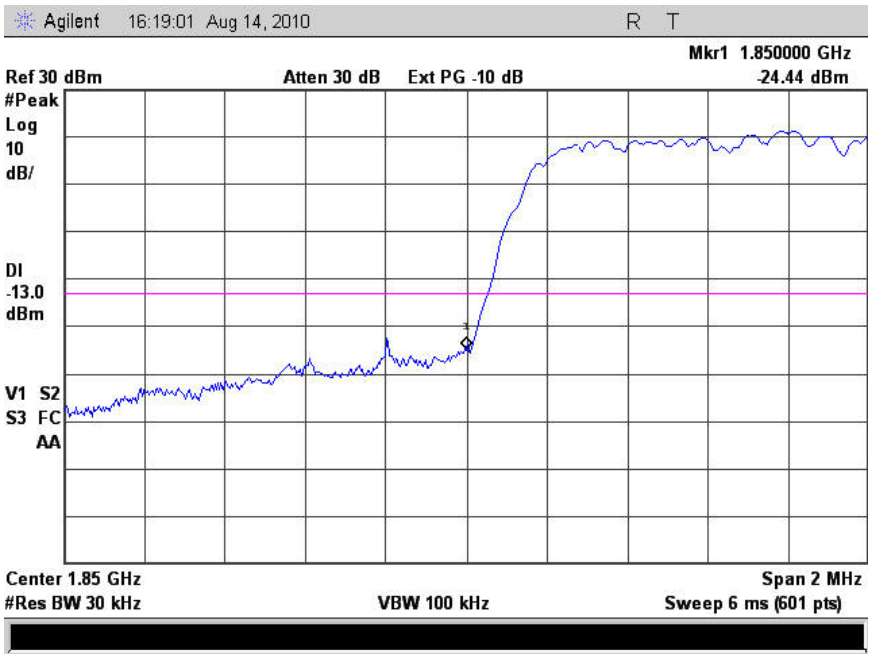
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.14. High Channel 1909.25 MHz, 1 to 26.5 GHz



6.3.15. 1850 MHz Bandedge Measurement



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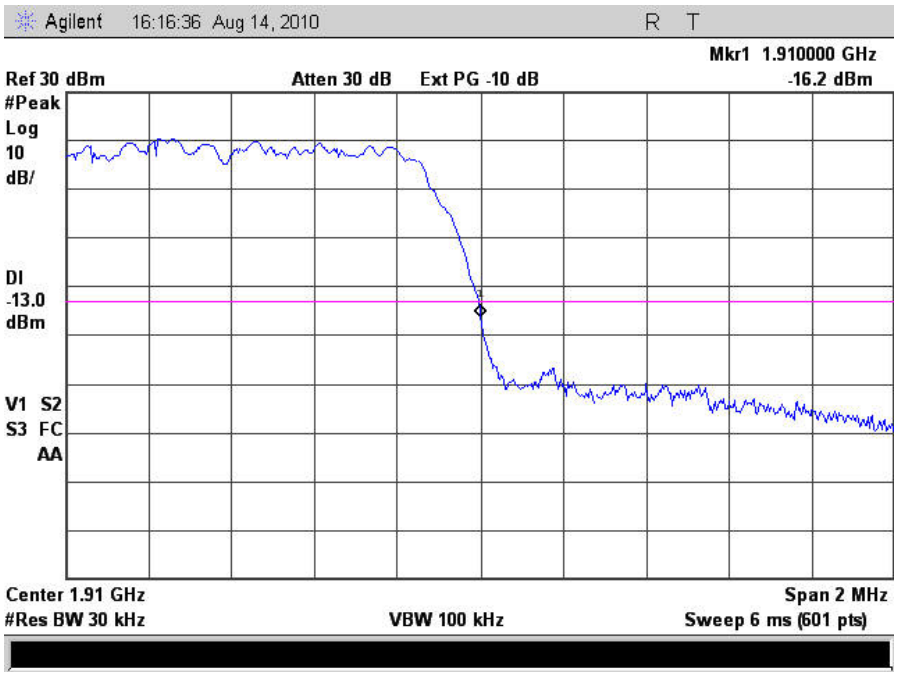
6. Measurement Data (continued)

6.3. Spurious Emissions at the Antenna Terminals 24.238 (a) (continued)

6.3.8. 1910 MHz Bandedge Measurement



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6. Measurement Data (continued)

6.4. Field Strength of Spurious Emissions 24.238 (a)

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

6.4.1. Measurement and Equipment Setup

Test Date:	07/20/2010
Test Engineer:	Ben Dovidio
Site Temperature (°C):	21.1
Relative Humidity (%RH):	34
Frequency Range:	30 MHz to 1 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	120 kHz
EMI Receiver Avg Bandwidth:	300 kHz
Detector Functions:	Peak and Quasi-Peak.
Antenna Height:	1 to 4 meters

6.4.2 Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

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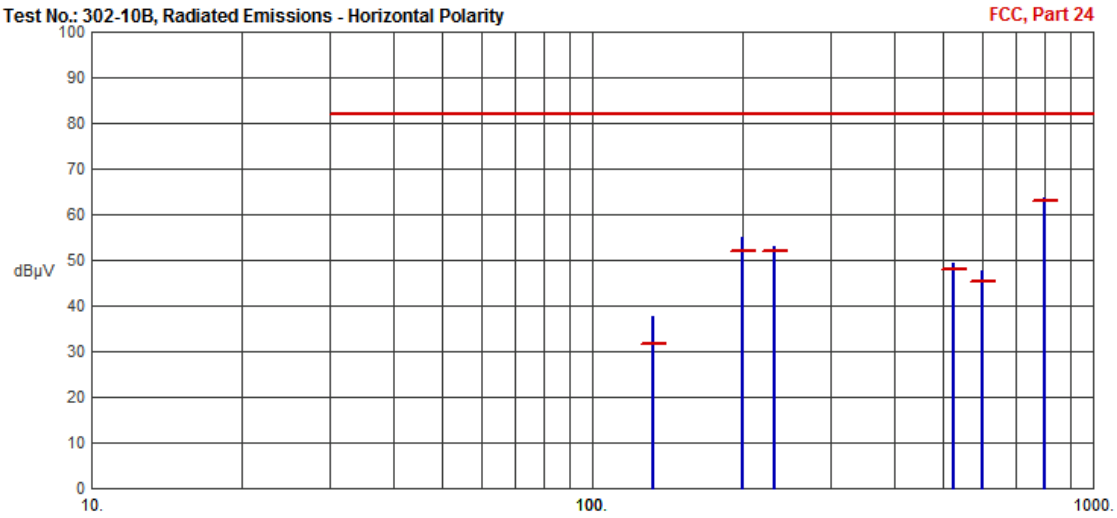
6. Measurement Data (continued)

6.4. Field Strength of Spurious Emissions 24.238 (a) (continued)

6.4.3. Horizontal Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
131.9919	37.79	31.71	82.00	-50.29	N/A	N/A	
200.0020	54.85	51.95	82.00	-30.05	N/A	N/A	
230.9908	53.09	51.99	82.00	-30.01	N/A	N/A	
528.0085	49.36	48.01	82.00	-33.99	N/A	N/A	
599.9937	47.77	45.47	82.00	-36.53	N/A	N/A	
800.0057	63.63	63.15	82.00	-18.85	N/A	N/A	

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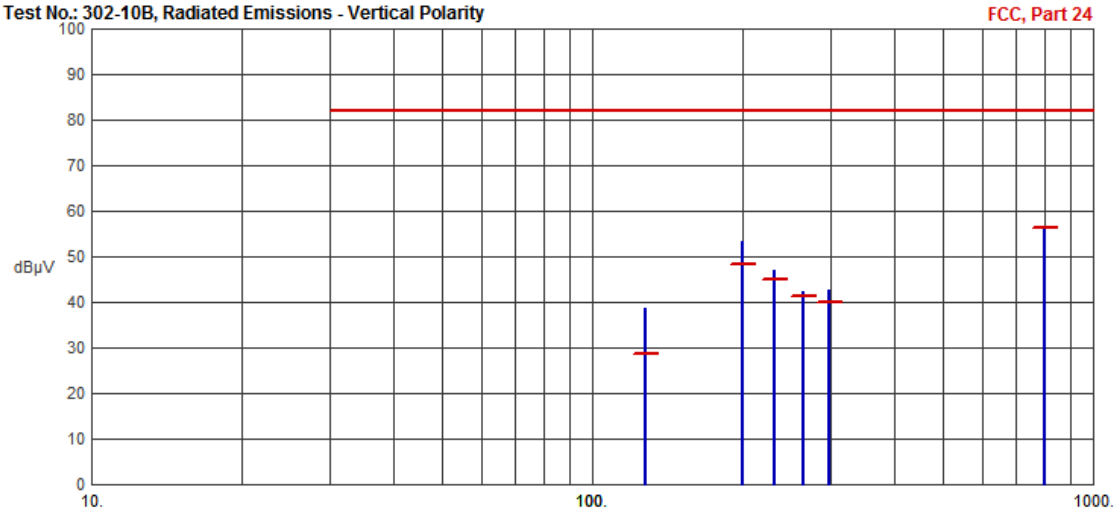
6. Measurement Data (continued)

6.4. Field Strength of Spurious Emissions 24.238 (a) (continued)

6.4.4. Vertical Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
127.2941	38.64	28.80	82.00	-53.20	N/A	N/A	
200.0007	53.29	48.34	82.00	-33.66	N/A	N/A	
231.0014	46.88	45.14	82.00	-36.86	N/A	N/A	
263.9990	42.19	41.30	82.00	-40.70	N/A	N/A	
296.9938	42.66	39.87	82.00	-42.13	N/A	N/A	
800.0041	56.71	56.19	82.00	-25.81	N/A	N/A	

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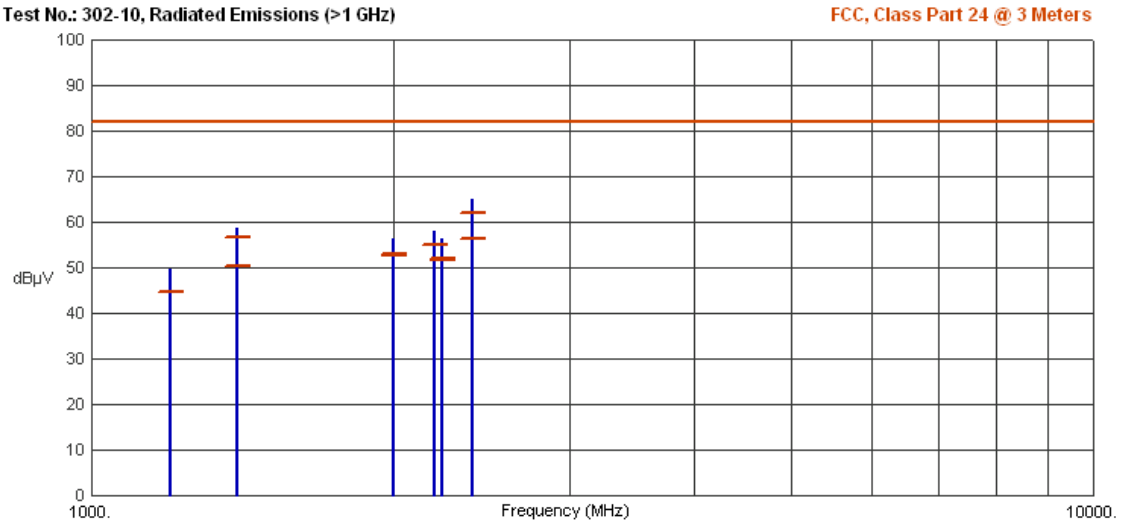
6. Measurement Data (continued)

6.4. Field Strength of Spurious Emissions 24.238 (a) (continued)

6.4.5. Measurement and Equipment Setup

Test Date:	08/25/2010
Test Engineer:	Ben Dovidio
Site Temperature (°C):	21.2
Relative Humidity (%RH):	31
Frequency Range:	Above 1 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	1 MHz
EMI Receiver Avg Bandwidth:	3 MHz
Detector Functions:	Peak and Average
Antenna Height:	1 to 4 meters

6.4.6. Radiated Emissions above 1 GHz



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6. Measurement Data (continued)

6.4.6. Radiated Emissions above 1 GHz

Frequency (MHz)	Pk Amp (dBµV/m)	Av Amp (dBµV/m)	Av Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
1199.8710	49.57	44.76	82.00	-37.24	N/A	N/A	
1399.9631	52.83	50.33	82.00	-31.67	N/A	N/A	
1400.0363	58.51	56.83	82.00	-25.17	N/A	N/A	
1999.9806	56.09	52.64	82.00	-29.36	N/A	N/A	
2000.0219	56.34	53.03	82.00	-28.97	N/A	N/A	
2200.0169	58.04	55.15	82.00	-26.85	N/A	N/A	
2239.8481	55.79	51.65	82.00	-30.35	N/A	N/A	
2239.9569	56.40	52.02	82.00	-29.98	N/A	N/A	
2400.0356	64.89	62.15	82.00	-19.85	N/A	N/A	
2400.0481	60.76	56.22	82.00	-25.78	N/A	N/A	

6.5. Frequency Stability 24.235

Requirement: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized band of operation.

Note: The EUT does not translate the input frequency

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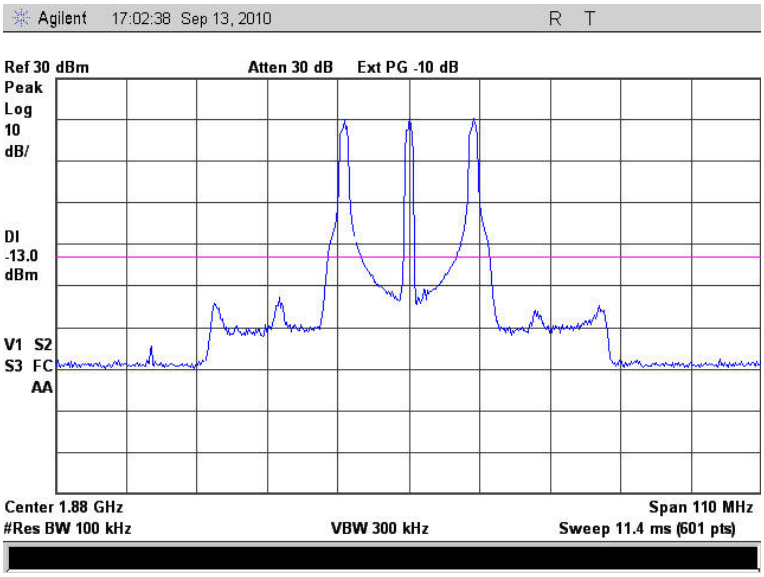
6. Measurement Data (continued)

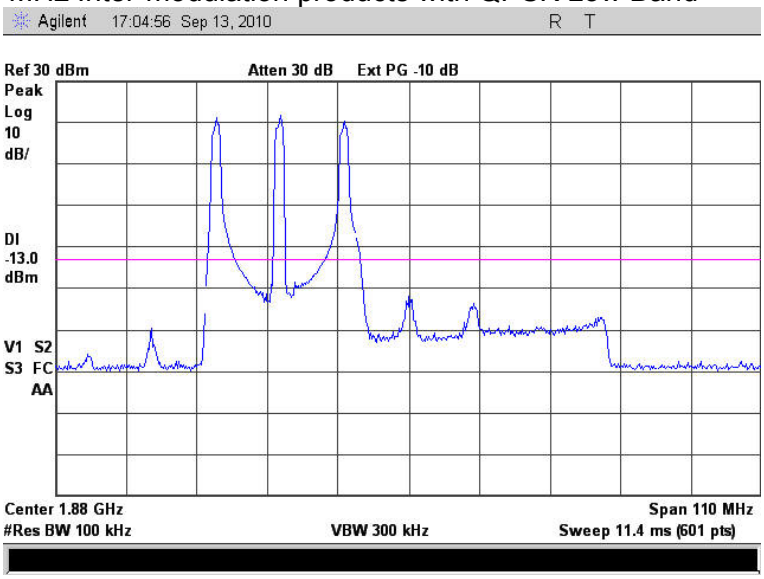
6.6. Inter-modulation

Requirement: Using the maximum drive level determined in the output power section apply three modulated tones at low, mid and high frequencies in the band and verify the inter-modulation products do not exceed -13 dBm conducted. Various modulation types were applied, and QPSK modulation was chosen for the testing.

6.6.1. 1880 MHz Inter-modulation products with QPSK Mid Band



6.6.2. 1880 MHz Inter-modulation products with QPSK Low Band



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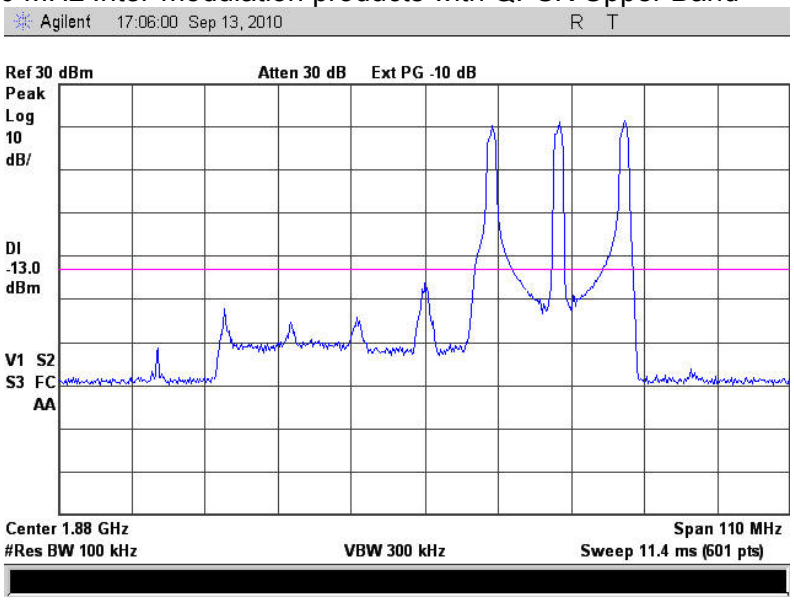
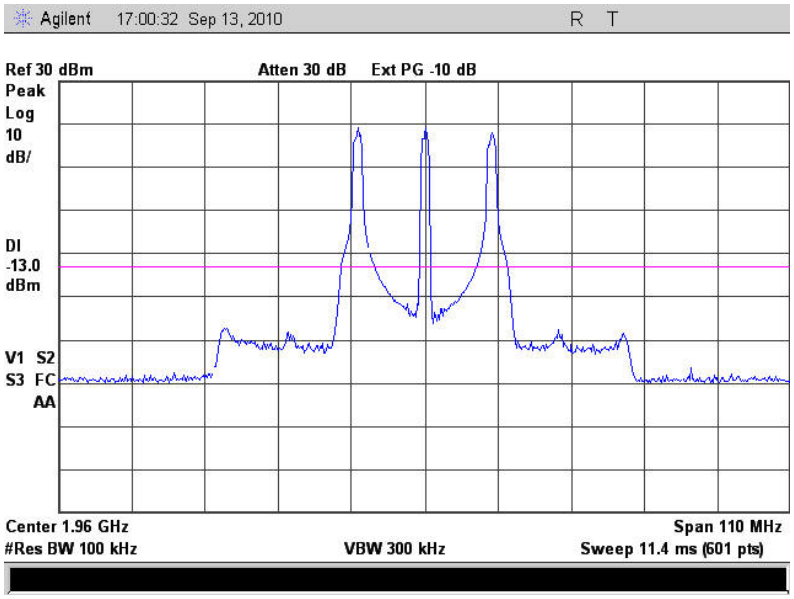
6. Measurement Data (continued)

6.6. Inter-modulation (cont)

6.6.3. 1880 MHz Inter-modulation products with QPSK Upper Band



6.6.4. 1960 MHz Inter-modulation products with QPSK Mid Band



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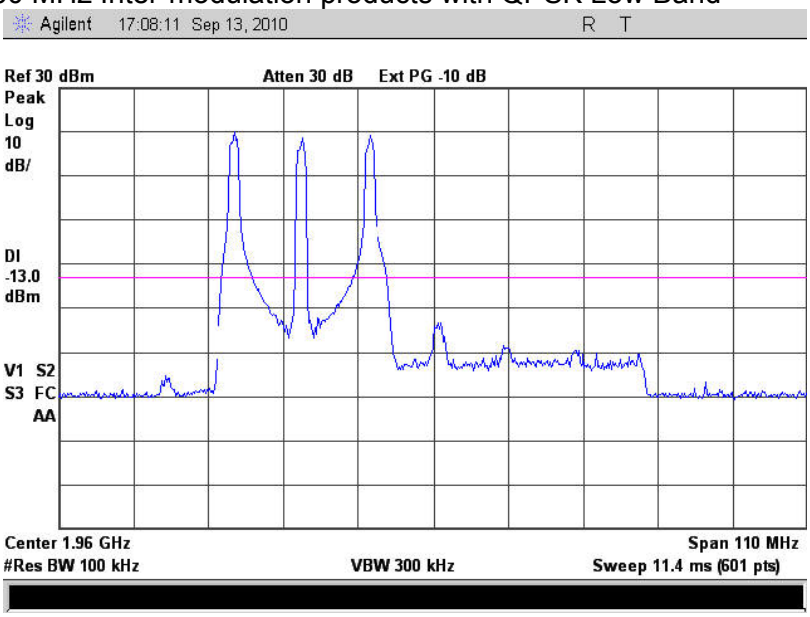
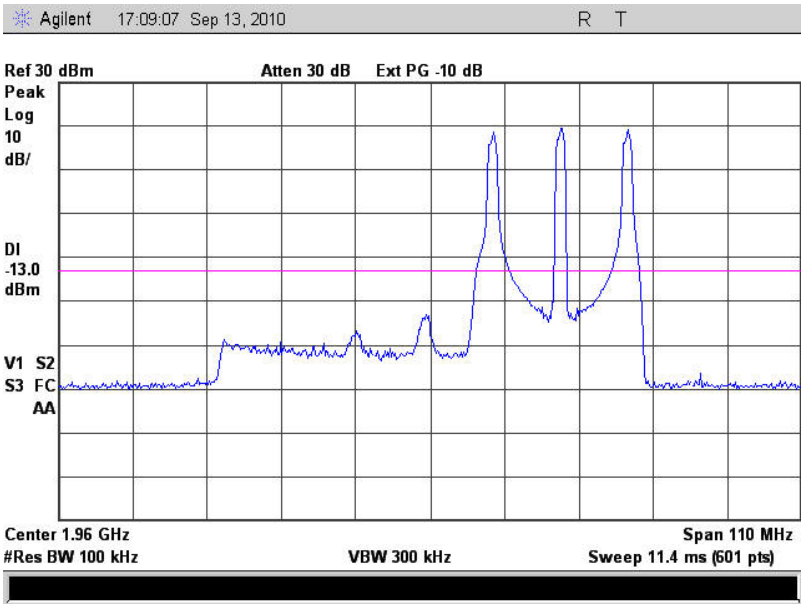
6. Measurement Data (continued)

6.6. Inter-modulation (cont)

6.6.5. 1960 MHz Inter-modulation products with QPSK Low Band



6.6.6. 1960 MHz Inter-modulation products with QPSK Upper Band



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6. Measurement Data (continued)

6.7. Public Exposure to Radio Frequency Energy Levels 1.1307 (b)(1)

Channel	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm^2)	Result
				(mW/cm^2)	(W/m^2)		
	(1)	(2)	(3)	(4)		(5)	
Low	20	30.08	3	0.4043246	4.0432458	1	Compliant
Mid	20	30.09	3	0.4052566	4.0525664	1	Compliant
High	20	30.04	3	0.4006177	4.0061771	1	Compliant
Low	20	30.26	3	0.4214346	4.2143456	1	Compliant
Mid	20	30.20	3	0.4156523	4.1565226	1	Compliant
High	20	29.55	3	0.3578740	3.5787400	1	Compliant
Low	46	30.08	14	0.9622202	9.6222021	1	Compliant
Mid	46	30.09	14	0.9644384	9.6443835	1	Compliant
High	45	30.04	14	0.9962426	9.9624260	1	Compliant
Low	47	30.26	14	0.9607147	9.6071466	1	Compliant
Mid	46	30.20	14	0.9891781	9.8917805	1	Compliant
High	43	29.55	14	0.9746602	9.7466018	1	Compliant

$$PD = \frac{OP + AG}{(4 \times \pi \times d^2)}$$

1. Reference CFR 2.1093(b): For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Actual separation distance was calculated for outdoor applications.
2. Section 6.1.2 of this test report. Note that the value has been adjusted to include the cable insertion loss.
3. Data supplied by the client. 3 dBi for Indoor, 14 dBi for Outdoor Applications
4. Power density is calculated from field strength measurement and antenna gain.
5. Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.

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7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023A-1)**.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meter W x 1.5 meter L x 2.0 meter H, floor standing or table top.

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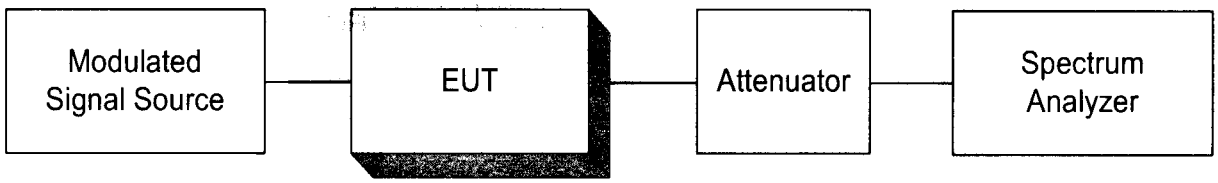
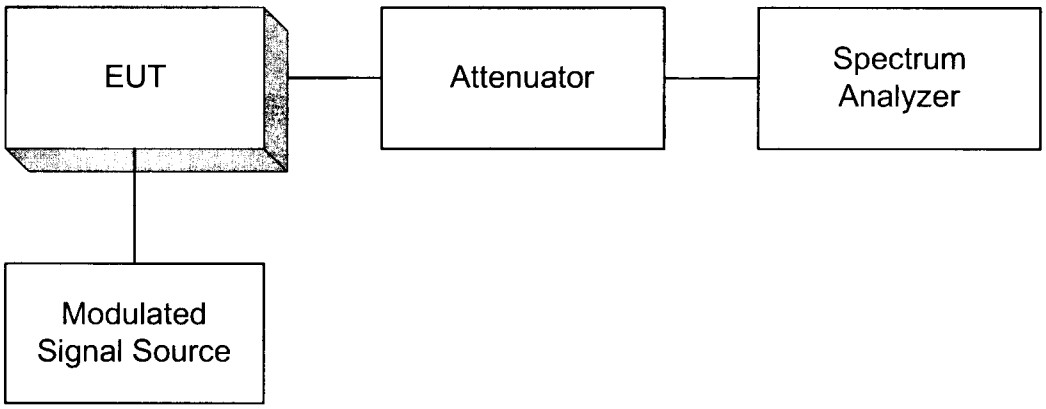
Appendix A

RF Output Power



Occupied Bandwidth



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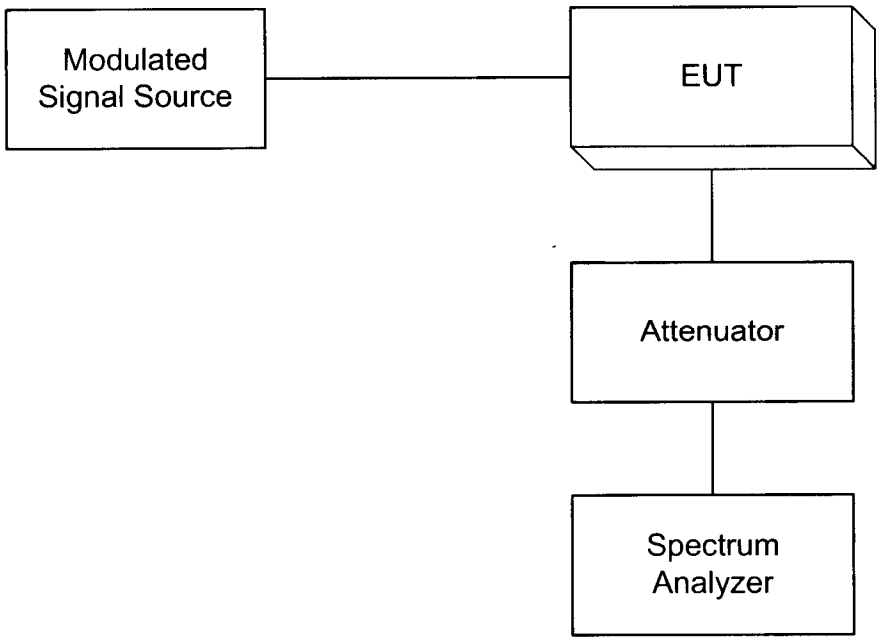
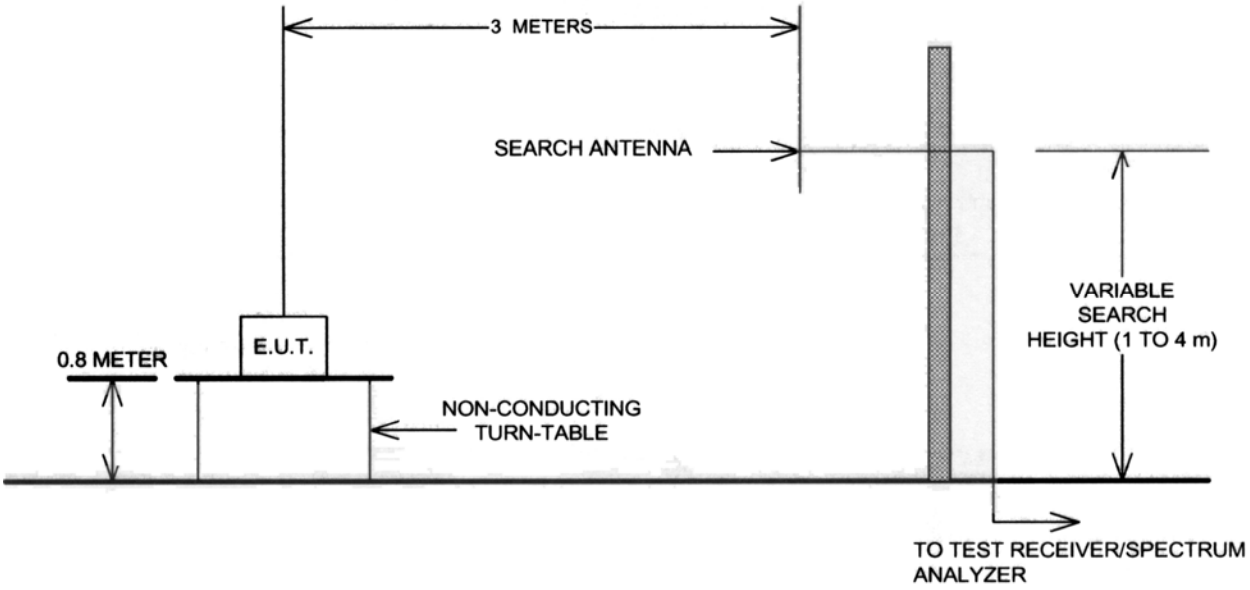
Appendix A

Spurious Emissions at the Antenna Terminals



Field Strength of Spurious Radiation



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