COMPLIANCE WORLDWIDE INC.
TEST REPORT 224-10B

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

Co-Pilot Beacon

FCC ID: NVRCSI-CPBRW-CP

Report Issued on May 20, 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 Co-Pilot Beacon, 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.

2. Product Details

2.1. Manufacturer: Cellular Specialties

2.2. Model Number: Co-Pilot Beacon

2.3. Serial Number: 20

2.4. Description: The Co-Pilot Beacon is the first viable location based solution for simulcast CDMA Distributed Antenna Systems (DASs). It is designed to improve location accuracy of cell phones and wireless devices outdoors and within buildings.

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
Pulse In	1M	Yes	DUT	Unterminated
EST Out	1M	Yes	DUT	Unterminated
GPS	5M	No	DUT	Garmin GPS 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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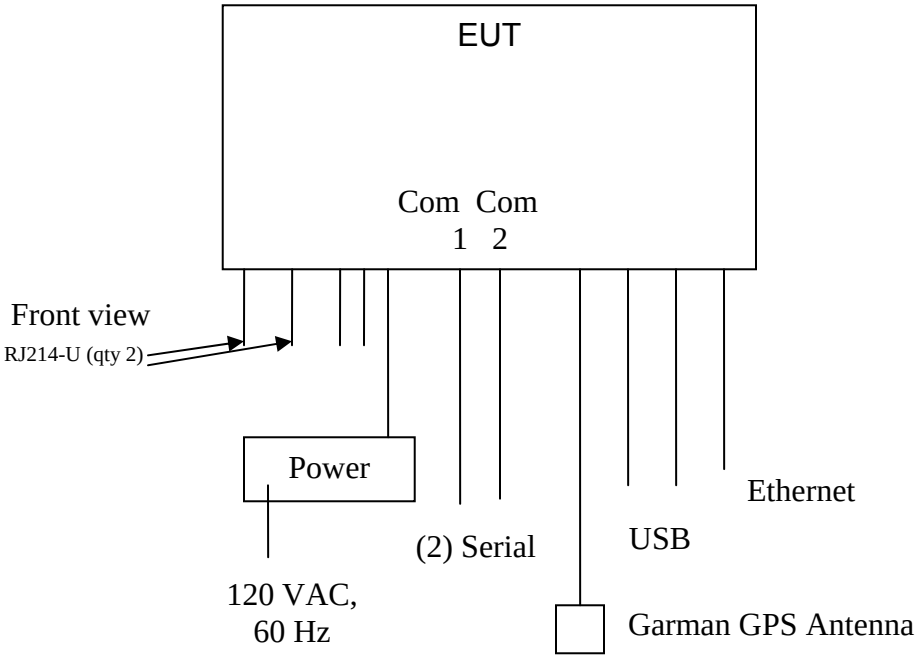
3. Product Configuration (continued)

3.3. Operational Characteristics & Software

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

(2) Using the laptop as control the unit was configured to operate on individual channels and all channels as required.

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	7/09/2010
EMI Receiver	Hewlett Packard	8546A	MY4510449	10/28/2010
Microwave Preamp	Hewlett Packard	8449B	3008A01323	9/22/2010
Bilog Antenna	Com-Power	AC-220	25509	8/6/2010
Horn Antenna	Electro-Metrics	EM-6961	6337	7/22/2010

4.2. Measurement & Equipment Setup

Test Date:	4/5 to 5/20 2010
Test Engineer:	Larry Stillings
Normal Site Temperature (15 – 35°C):	21.6
Relative Humidity (20 -75%RH):	25

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	6.4	Compliant	
Field Strength of Spurious Emissions	24.238	6.5	Compliant	
Frequency Stability	24.235	6.6	Compliant	Must stay in frequency block
Public Exposure to Radio Frequency Energy Levels	Section 1.1307 (b)(1)	6.7	Compliant	

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6. Measurement Data

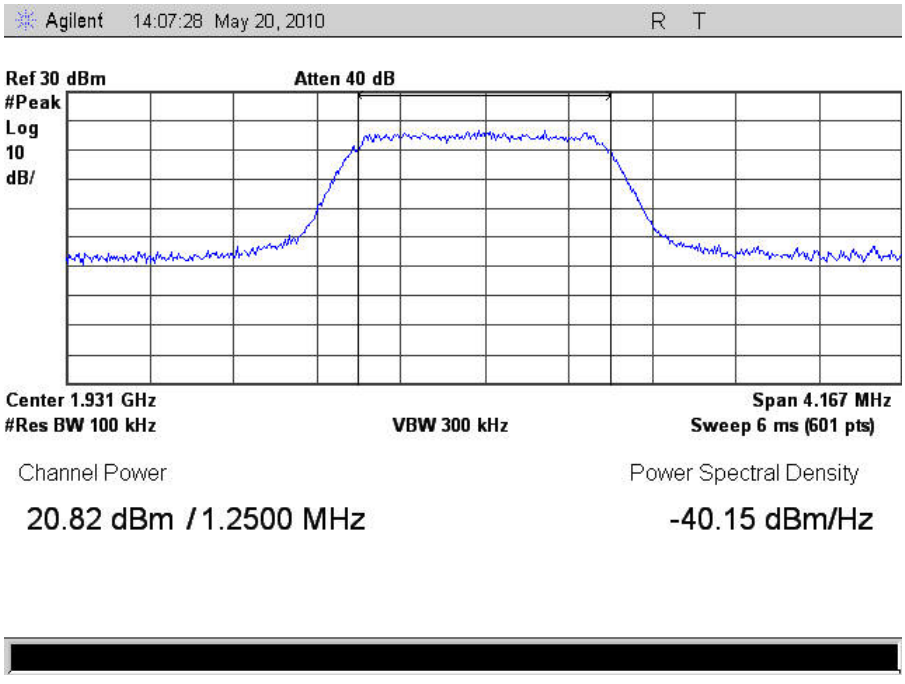
6.1. Power and Antenna Height Limits 24.232 (a)

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

6.1.1. Peak Transmitter Output Power, Transmitter Only

Channels	Frequency	Output Power		
	(MHz)	(W)	(dBm)	Result
Low Channel 16	1930.8	0.121	20.82	Compliant
Mid Channel 601	1960.05	0.112	20.51	Compliant
High Channel 1186	1989.3	0.119	20.74	Compliant
All Channels	1930.8-1989.3	0.109	20.37	Compliant

Low Channel 16



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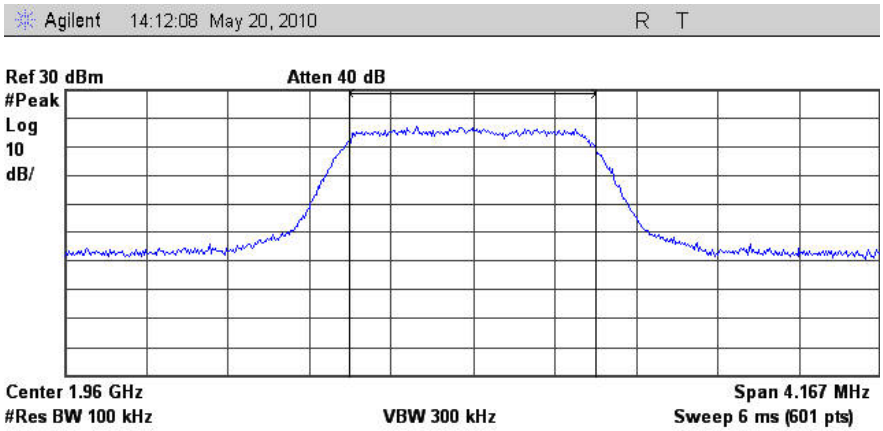
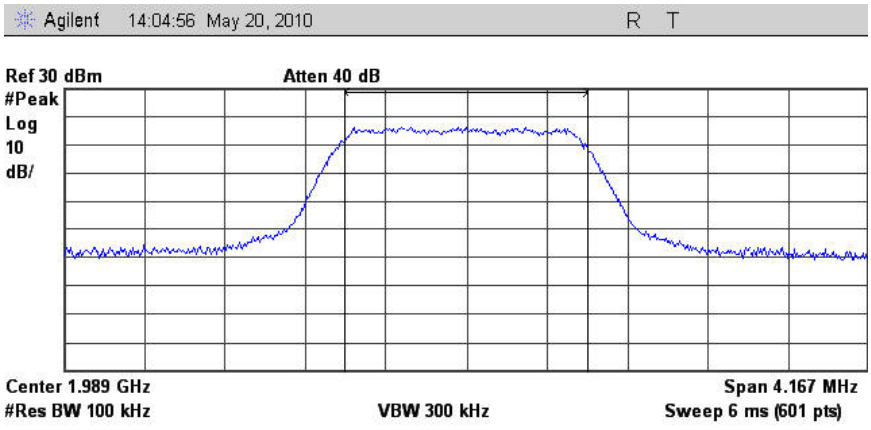
6. Measurement Data

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

Mid Channel 601



High Channel 1186



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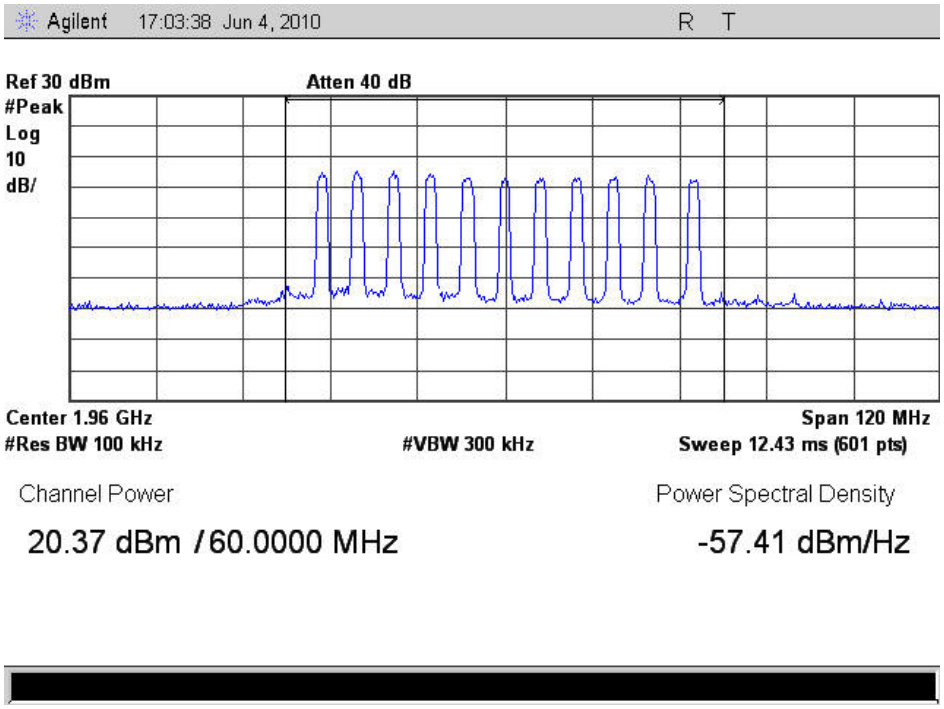
6. Measurement Data

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

All Channels



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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	20.82	0.00	+3	23.82	0.241
Mid	1960.05	20.51	0.00	+3	23.51	0.224
High	1989.3	20.74	0.00	+3	23.74	0.237
All	1930.8-1989.3	20.37	0.00	+3	23.37	0.217
Low	1930.8	20.82	0.00	+14	34.82	3.03
Mid	1960.05	20.51	0.00	+14	34.51	2.83
High	1989.3	20.74	0.00	+14	34.74	2.98
All	1930.8-1989.3	20.37	0.00	+14	34.37	2.74

[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)

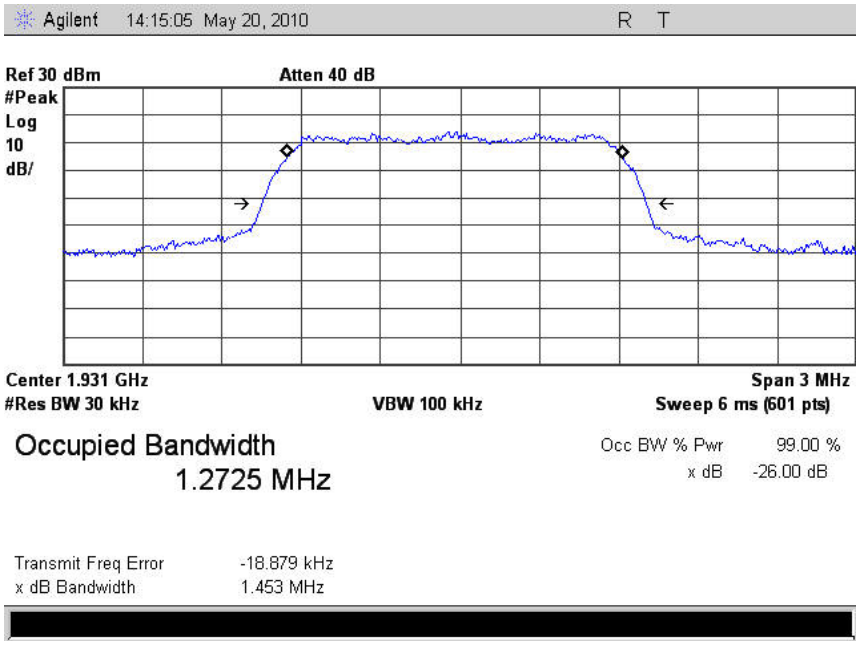
Requirement: Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission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

6.2.1. Occupied (99% Power) Bandwidth

	Frequency	Occupied Bandwidth	Result
	(MHz)	(MHz)	
Low Channel	1930.8	1.2725	Compliant
Mid Channel	1960.05	1.2685	Compliant
High Channel	1989.3	1.2716	Compliant

NOTE: EUT can only transmit a CDMA signal.

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



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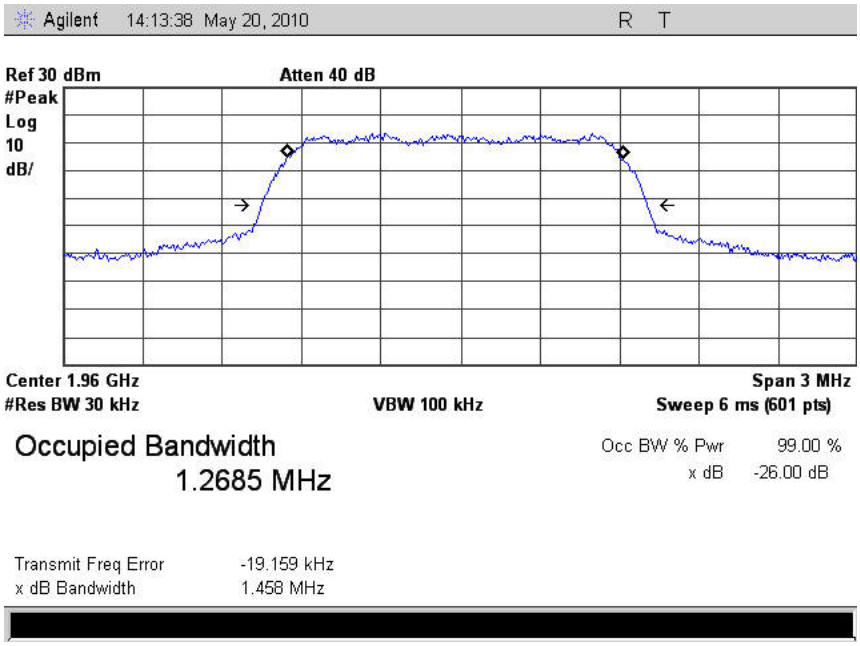
6. Measurement Data (continued)

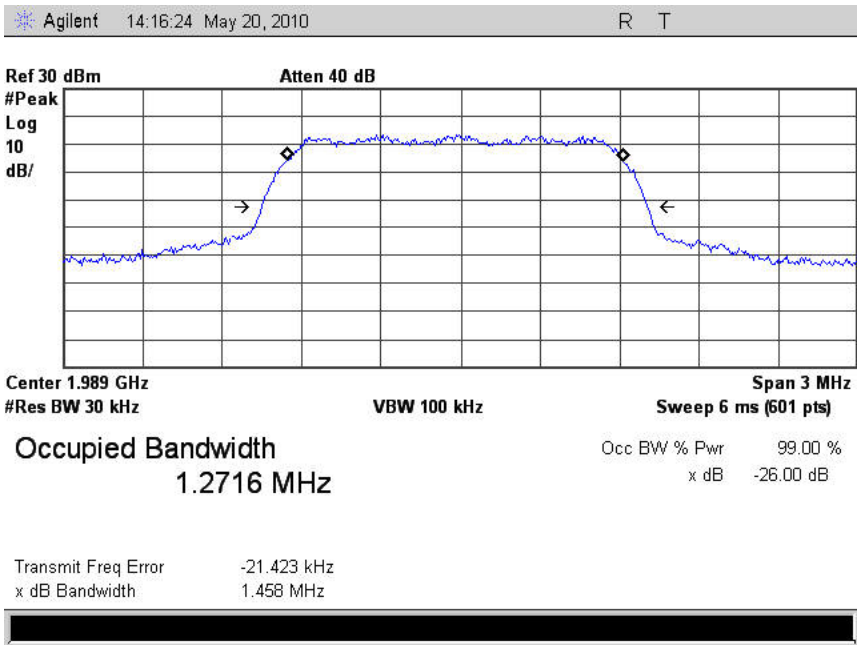
6.2. Bandwidth Limitations (FCC Part 2.1049) (continued)

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

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



6.2.1.3. Occupied (99% Power) Bandwidth Measurement, 1989.3 MHz



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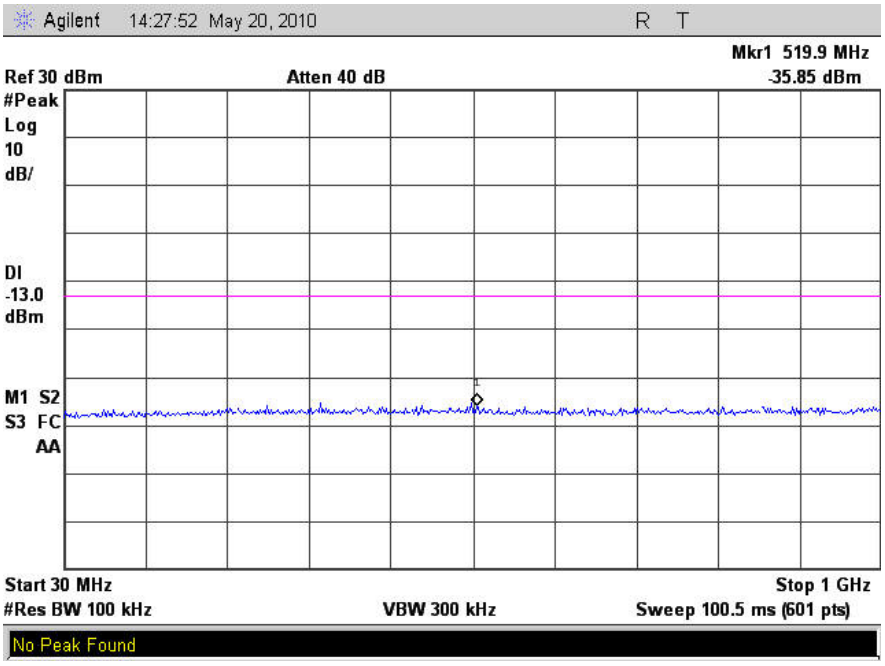
6. Measurement Data (continued)

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, 30 MHz to 1 GHz



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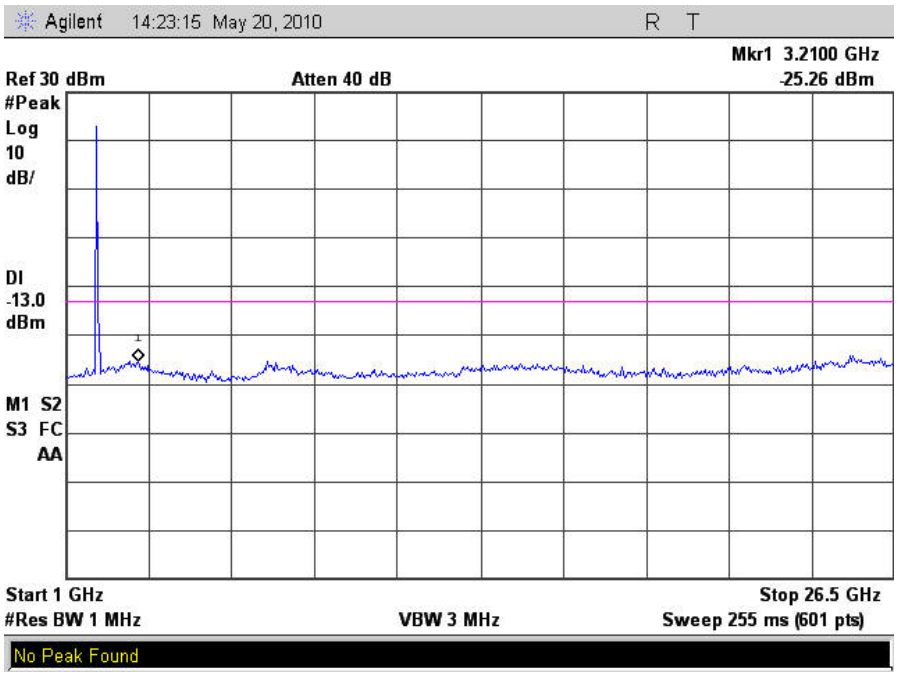
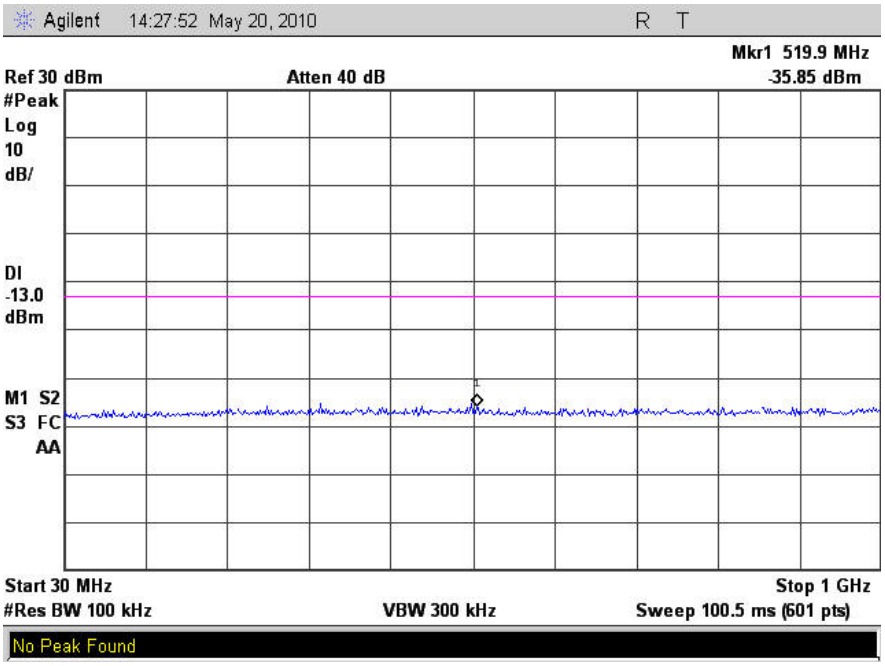
6. Measurement Data (continued)

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

6.3.2. Low Channel, 1 to 26.5 GHz



6.3.3. Mid Channel, 30 MHz to 1 GHz



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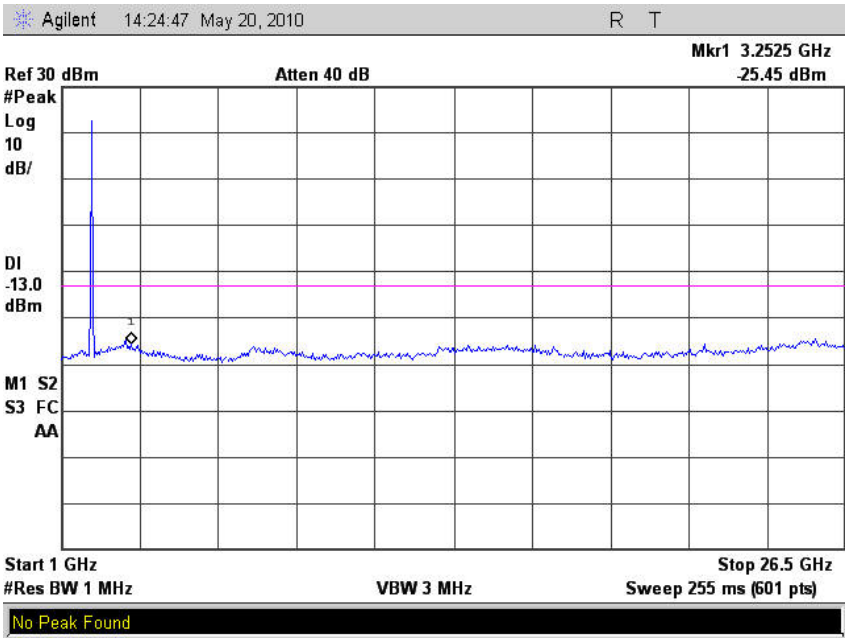
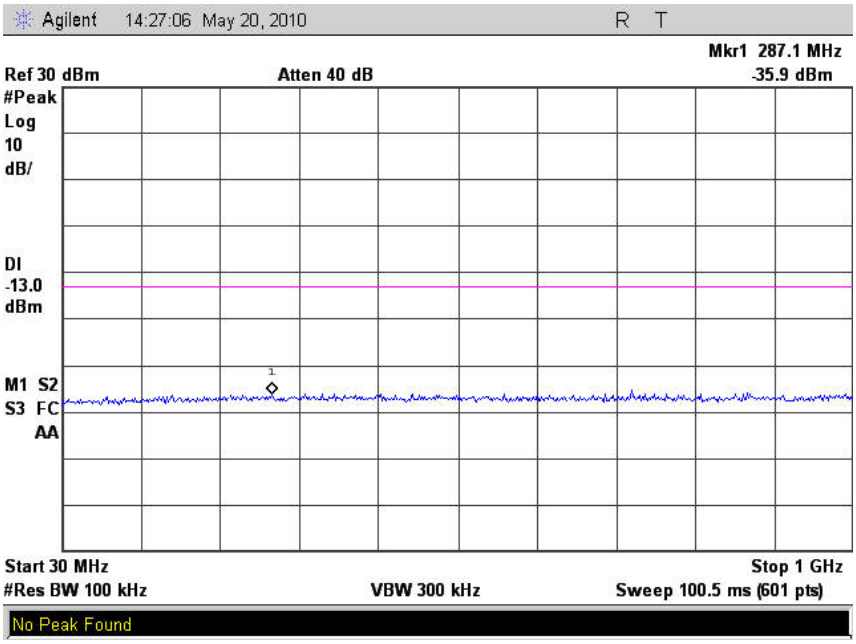
6. Measurement Data (continued)

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

6.3.4. Mid Channel, 1 to 26.5 GHz



6.3.5. High Channel, 30 to 1000 MHz



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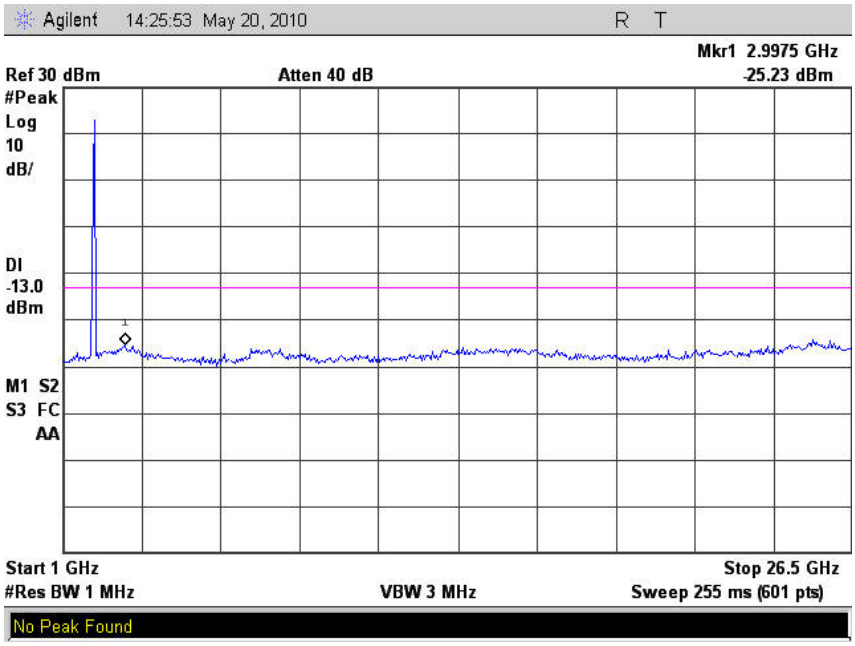
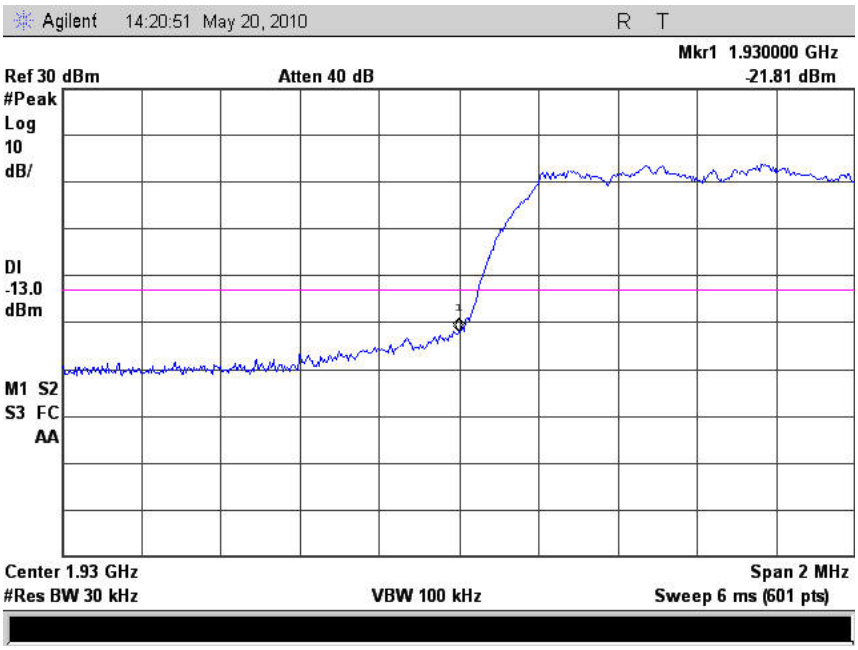
6. Measurement Data (continued)

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

6.3.6. High Channel, 1 to 26.5 GHz



6.3.7. 1930 MHz Bandedge Measurement



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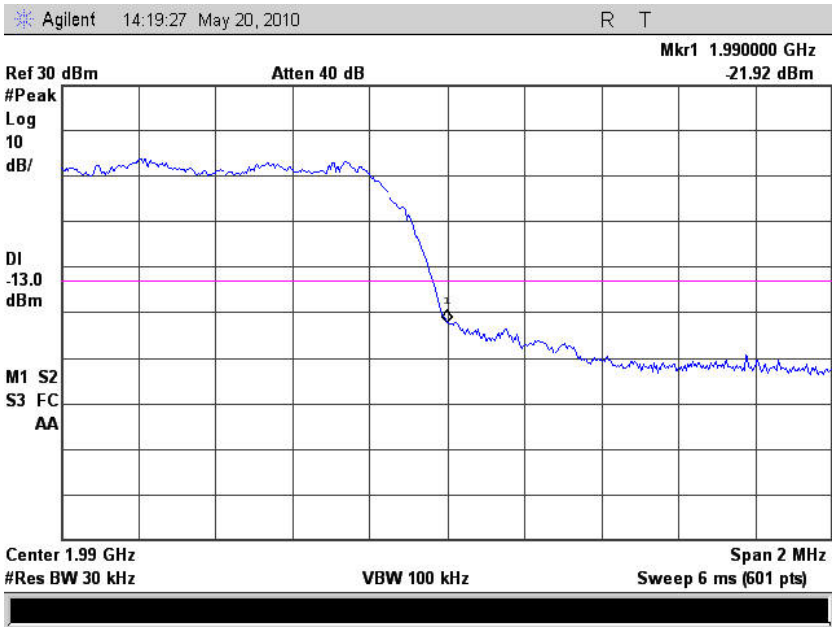
6. Measurement Data (continued)

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

6.3.8. 1990 MHz Bandedge Measurement



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6. Measurement Data (continued)

6.5. 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

6.5.1. Measurement and Equipment Setup

Test Date:	04/27/2010
Test Engineer:	Brian Breault
Site Temperature (°C):	21.2
Relative Humidity (%RH):	31
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

6.5.2 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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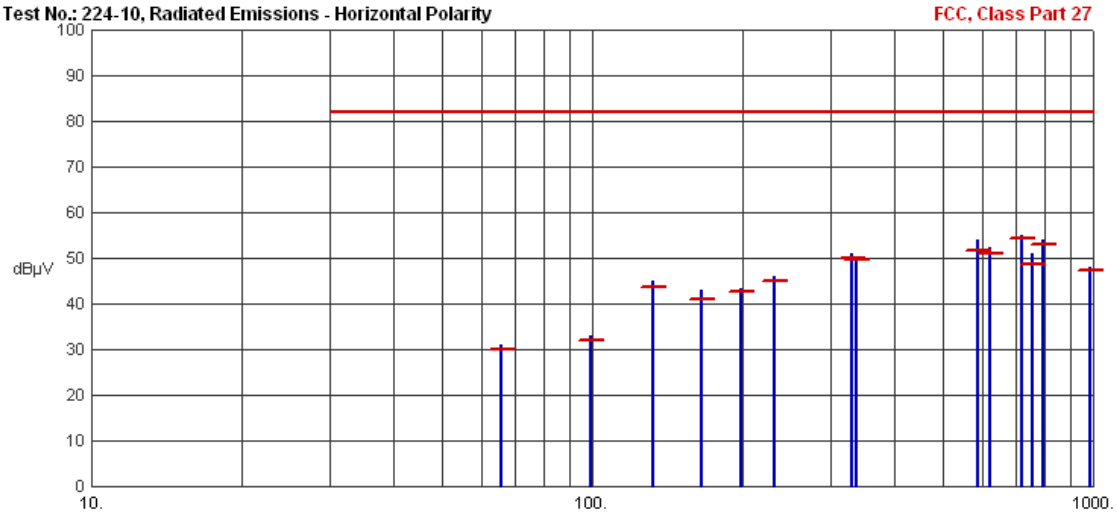
6. Measurement Data (continued)

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

6.5.3. Horizontal Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
65.9902	31.14	29.92	82.00	-52.08	N/A	N/A	
98.9954	32.99	32.12	82.00	-49.88	N/A	N/A	
131.9850	45.07	43.82	82.00	-38.18	N/A	N/A	
164.9735	43.14	41.03	82.00	-40.97	N/A	N/A	
198.0012	43.37	42.76	82.00	-39.24	N/A	N/A	
230.9915	46.06	44.90	82.00	-37.10	N/A	N/A	
329.9836	51.01	50.01	82.00	-31.99	N/A	N/A	
335.9893	50.35	49.52	82.00	-32.48	N/A	N/A	
589.7441	53.93	51.52	82.00	-30.48	N/A	N/A	
623.9926	52.28	50.90	82.00	-31.10	N/A	N/A	
720.0071	55.15	54.37	82.00	-27.63	N/A	N/A	
759.0055	51.02	48.56	82.00	-33.44	N/A	N/A	
791.9930	53.85	53.04	82.00	-28.96	N/A	N/A	
983.0191	48.13	47.27	82.00	-34.73	N/A	N/A	

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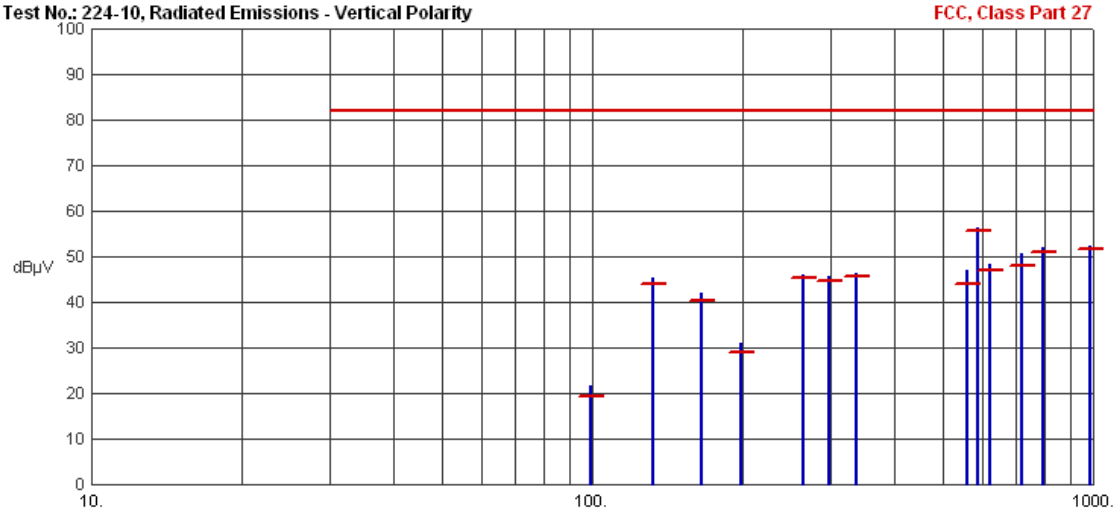
6. Measurement Data (continued)

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

6.5.4. Vertical Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
98.9898	21.53	19.33	82.00	-62.67	N/A	N/A	
131.9740	45.46	43.93	82.00	-38.07	N/A	N/A	
164.9772	42.00	40.34	82.00	-41.66	N/A	N/A	
197.9917	31.06	28.84	82.00	-53.16	N/A	N/A	
263.9831	46.07	45.33	82.00	-36.67	N/A	N/A	
296.9756	45.60	44.62	82.00	-37.38	N/A	N/A	
335.9776	46.38	45.82	82.00	-36.18	N/A	N/A	
560.9828	47.00	44.13	82.00	-37.87	N/A	N/A	
589.8073	56.43	55.56	82.00	-26.44	N/A	N/A	
623.9890	48.23	46.96	82.00	-35.04	N/A	N/A	
720.0096	50.50	48.02	82.00	-33.98	N/A	N/A	
791.9905	52.06	50.84	82.00	-31.16	N/A	N/A	
983.0203	52.33	51.60	82.00	-30.40	N/A	N/A	

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6. Measurement Data (continued)

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

6.5.5. Measurement and Equipment Setup

Test Date:	04/27/2010
Test Engineer:	Brian Breault
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

6.5.6. Radiated Emissions above 1 GHz

Note: There were no measurable signals above 1 GHz

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6. Measurement Data (continued)

6.6. 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 incorporates a GPS receiver that that frequency stability can be maintained.

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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	20.82	3	0.048	0.479	1	Compliant
Mid	20	20.51	3	0.045	0.446	1	Compliant
High	20	20.74	3	0.047	0.471	1	Compliant
All	20	20.37	3	0.043	0.432	1	Compliant
Low	20	20.82	14	0.604	6.035	1	Compliant
Mid	20	20.51	14	0.562	5.620	1	Compliant
High	20	20.74	14	0.593	5.926	1	Compliant
All	20	20.37	14	0.544	5.441	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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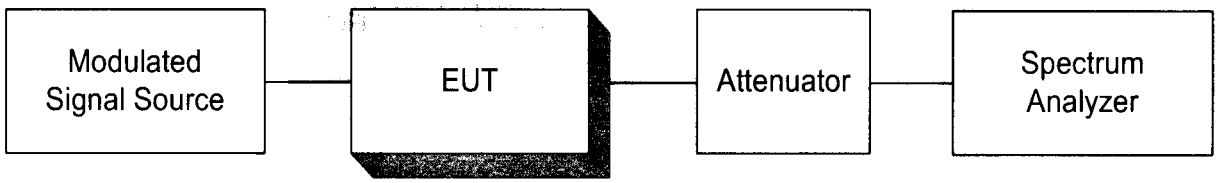
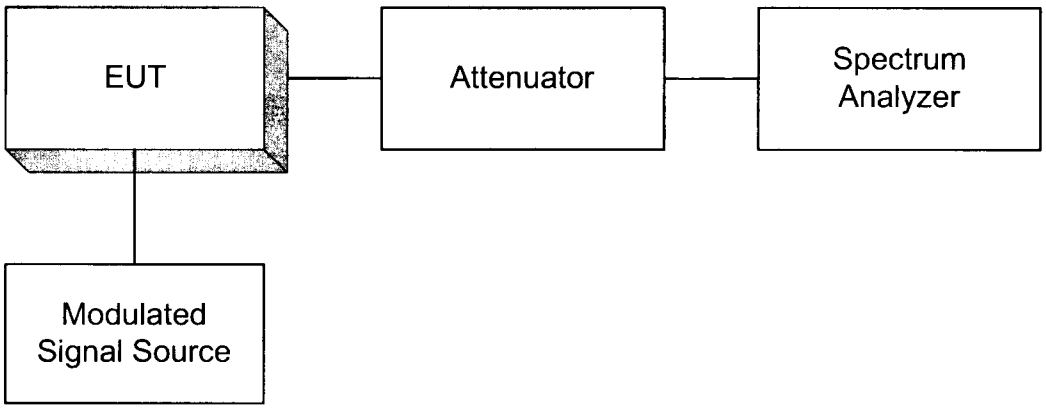
Appendix A

RF Output Power



Occupied Bandwidth



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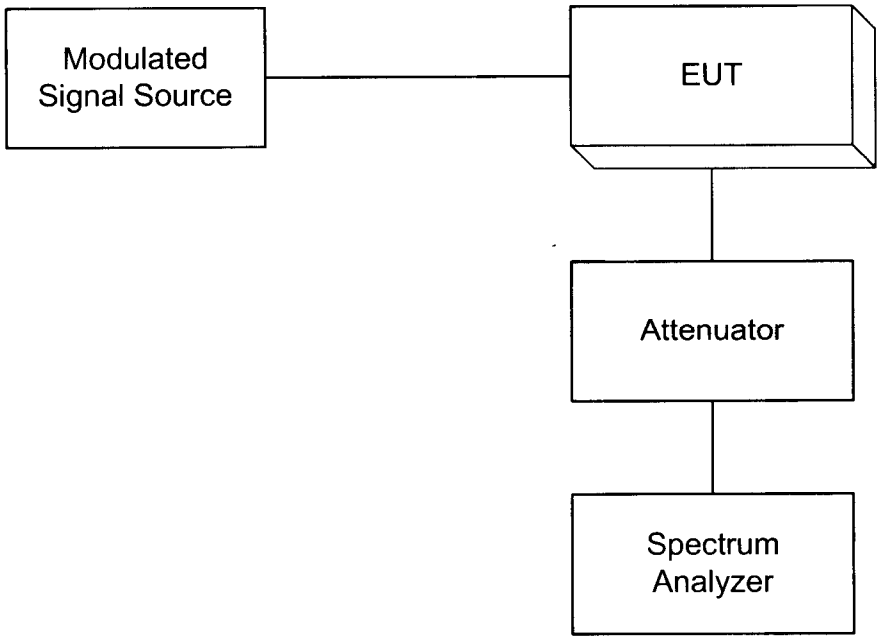
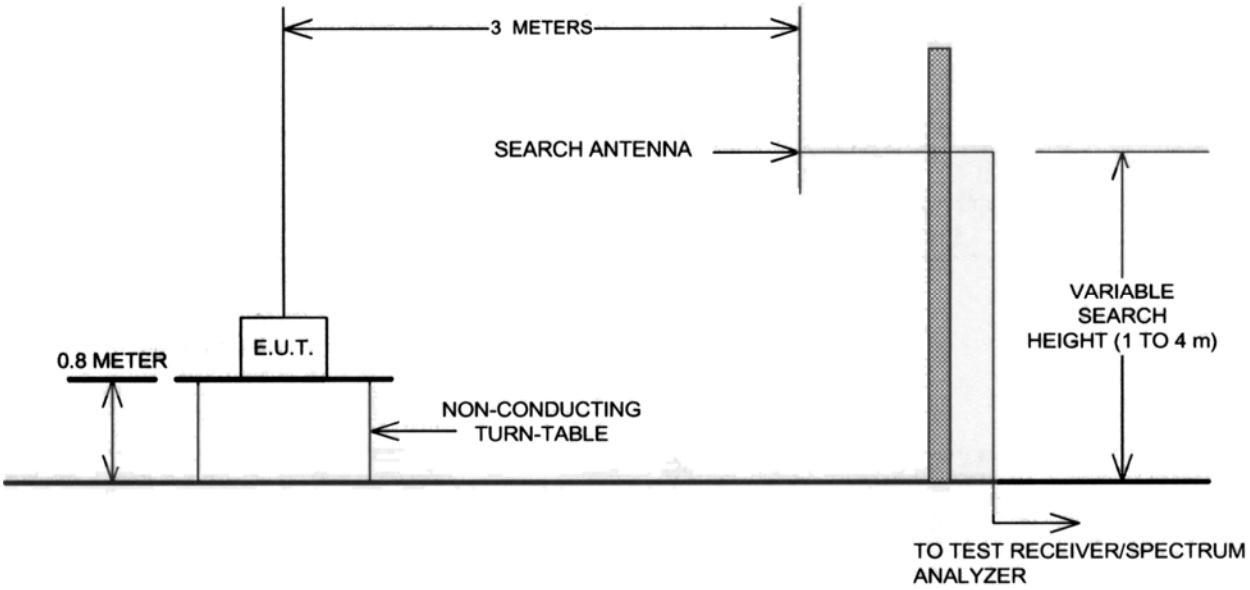
Appendix A

Spurious Emissions at the Antenna Terminals



Field Strength of Spurious Radiation



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