



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

**For
Navigation device**

Model: Magellan RoadMate™ 2055

Trade Name: MAGELLAN

Prepared for

**Mitac International Corporation
Building B, No.209, Sec. 1, Nan Gang Rd., Nan Gang Dsit., Taipei 11568,
Taiwan, R.O.C.**

Issued by

COMPLIANCE CERTIFICATION SERVICES (KUNSHAN) INC.

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1. TEST RESULT CERTIFICATION

Applicant: Mitac International Corporation
Building B, No.209, Sec. 1, Nan Gang Rd., Nan Gang Dsit.,
Taipei 11568, Taiwan, R.O.C.

Equipment Under Test: Navigation device

Trade Name: MAGELLAN

Model: Magellan RoadMate™ 2055

Date of Test: August 4, 2010

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We here by certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Reviewed by:

Miro Chueh
EMC Manager
Compliance Certification Services Inc.

Lin Zhang
EMC Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Navigation device
Trade Name	MAGELLAN
Model Number	Magellan RoadMate™ 2055
Model Discrepancy	NA
FCC ID	P4Q-N271
Power Supply	For AC adapter: Trade name: TPT Model number: MII050100 Input: AC 100-240V, 13-17VA, 50-60Hz, 0.5A Output: DC 5V, 1A; For car charger Trade name: MiTAC Model number: CA-051-00U-19 Input: 12/24V, 1A Output: 5V, 1A;
Frequency Range	2402 ~ 2480 MHz
Transmit Power	2.51dBm
Modulation Technique	FHSS
Transmit Data Rate	GFSK(1 Mbps), π/4-DQPSK(2 Mbps), 8-DPSK(3 Mbps)
Number of Channels	79 Channels
Antenna Specification	Max Gain: -0.02 dBi

Remark: This submittal(s) (test report) is intended for FCC ID: P4Q-N271 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

MODIFICATION

N/A



FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Table with 4 columns: MHz, MHz, MHz, GHz. It lists various frequency ranges such as 0.090 - 0.110, 16.42 - 16.423, 399.9 - 410, and 4.5 - 5.15.

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2 Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

The following test mode(s) were scanned during the preliminary test:

Mode 1: AC Mode at X Axis(lie-down position)

Mode 2: AC Mode at Y Axis(stand-up position1)

Mode 3: AC Mode at Z Axis(stand-up position2)

Mode 4: Car Charger Mode at X Axis(lie-down position)

Mode 5: Car Charger Mode at Y Axis(stand-up position1)

Mode 6: Car Charger Mode at Z Axis(stand-up position2)

Mode 7: PC link at X Axis(lie-down position)

Mode 8: PC link at Y Axis(stand-up position1)

Mode 9: PC link at Z Axis(stand-up position2)

After the preliminary scan, the following test mode was found to produce the highest emission level.

Then, the worst case is Mode 1 (GFSK and 8-DPSK) Channel Low (2402MHz) and High (2480MHz), these were chosen for full testing.



4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



5. FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC5743 for 10m chamber 10m, IC5743 for 10m chamber 3m.



TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.4:2003); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6. SETUP OF EQUIPMENT UNDER TEST

SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



7. FCC PART 15.247 REQUIREMENTS

PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

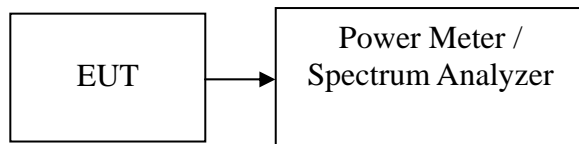
1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
3. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2010
Peak and Avg Power Sensor	Agilent	E9327A	US40441788	07/29/2011
EPM-P Series Power Meter	Agilent	E4416A	QB41292714	07/29/2011

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Power Meter.



TEST RESULTS

No non-compliance noted

Test Data

1M

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-0.99	3.50	2.51	0.00178	1	PASS
Mid	2441	-2.32	3.50	1.18	0.00131		PASS
High	2480	-1.33	3.50	2.17	0.00165		PASS

3M

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-1.18	3.50	2.32	0.00171	1	PASS
Mid	2441	-2.39	3.50	1.11	0.00129		PASS
High	2480	-1.47	3.50	2.03	0.00160		PASS

BAND EDGES MEASUREMENT

LIMIT

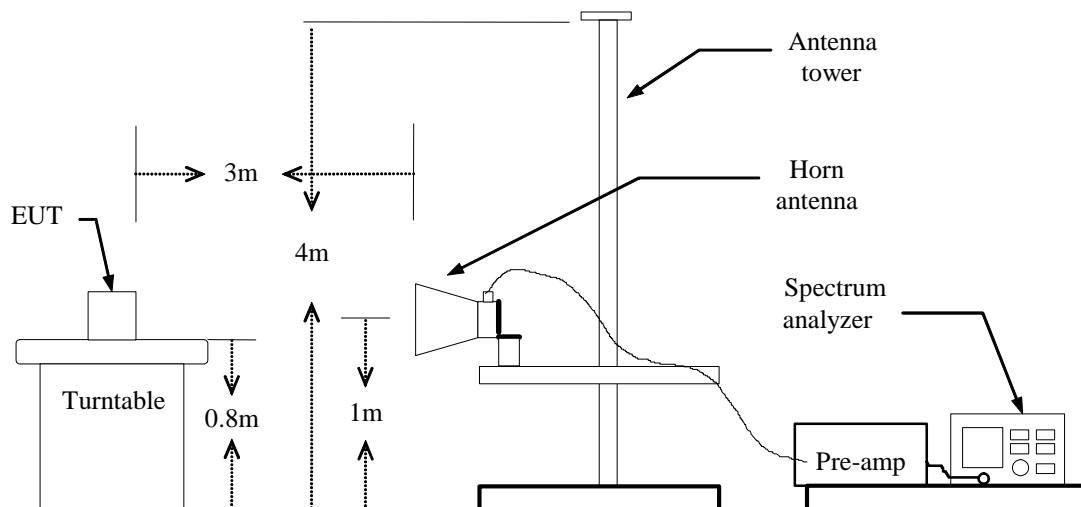
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

MEASUREMENT EQUIPMENT USED

3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2010
EMI Test Receiver	R&S	ESPI3	101026	04/28/2011
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	02/28/2011
Pre-Amplifier	Miteq	NSP4000-NF	870731	02/28/2011
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2010
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	12/04/2010
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	04/28/2011
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2011

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE



1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

1M

CH LOW

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	48.93	35.87	5.30	54.23	41.17	74	54	-19.77	-12.83
2390.00	H	46.90	35.09	5.30	52.20	40.39	74	54	-21.80	-13.61

CH HIGH

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	58.74	40.02	5.30	64.04	45.32	74	54	-9.96	-8.68
2483.50	H	56	39.55	5.30	61.3	44.85	74	54	-12.7	-9.15

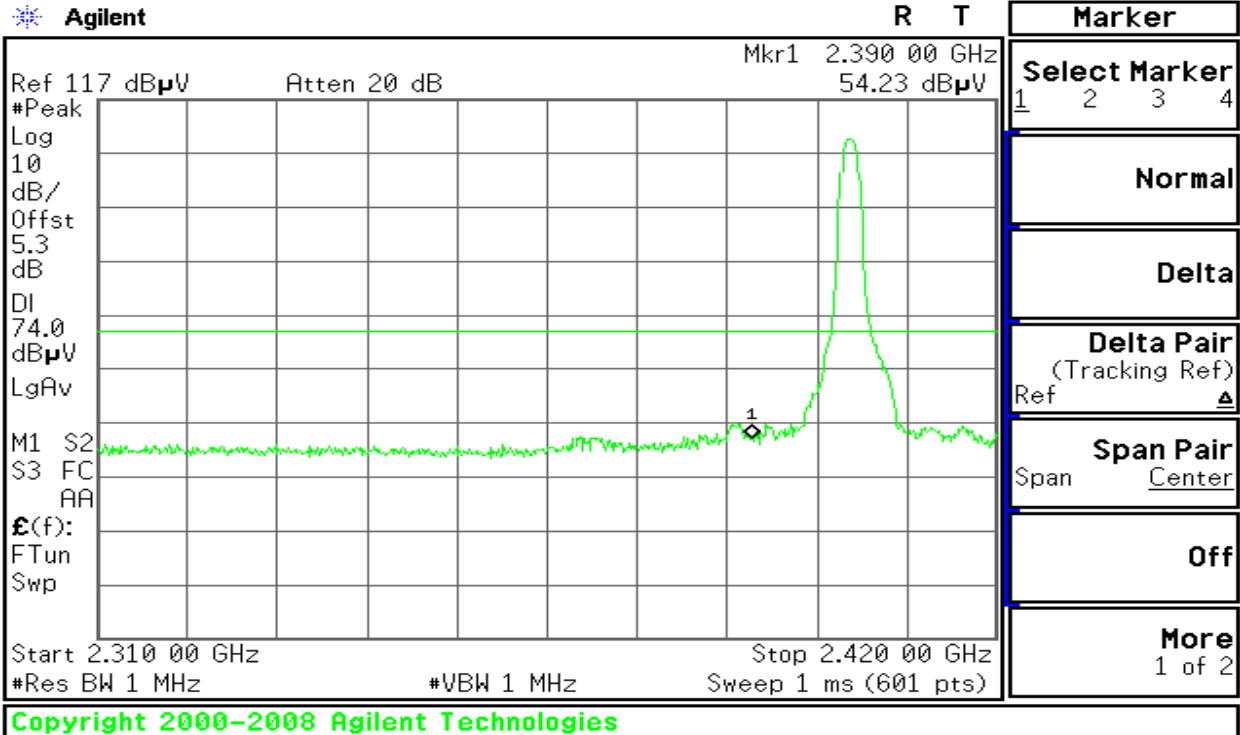
Refer to attach spectrum analyzer data chart.



Band Edges (CH Low)

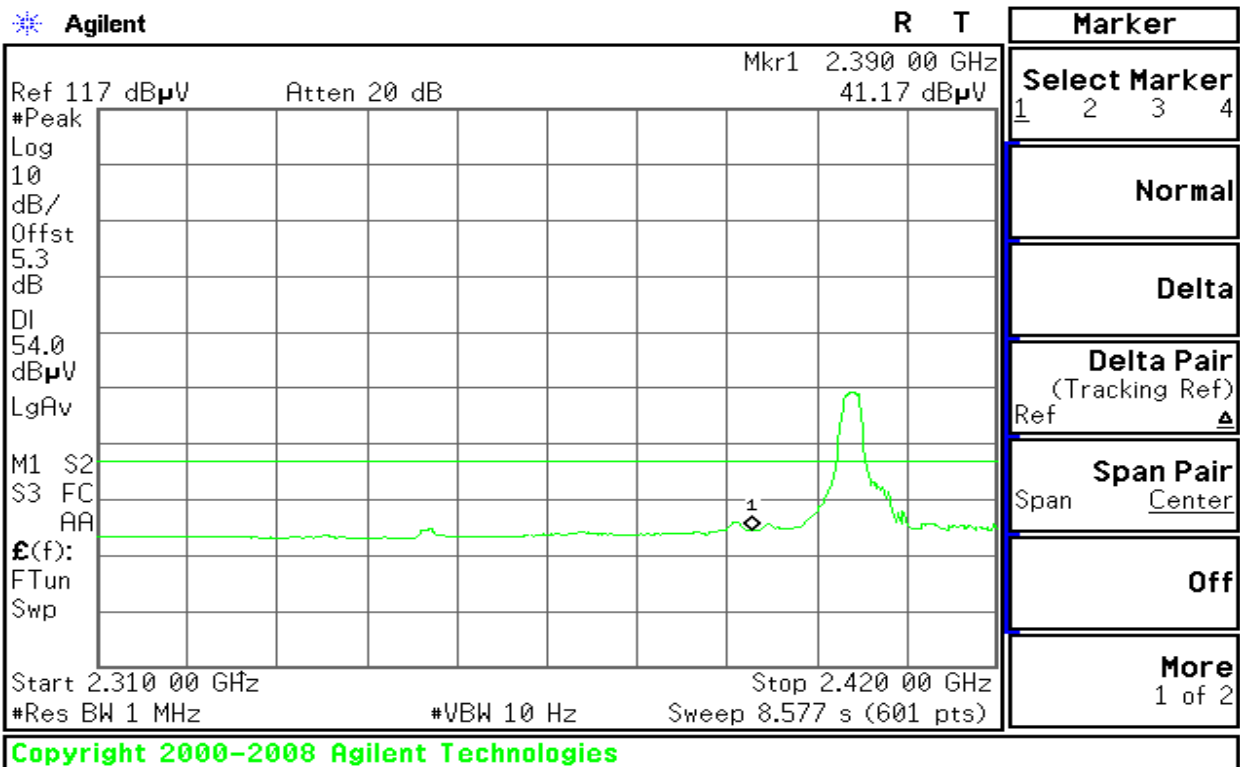
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





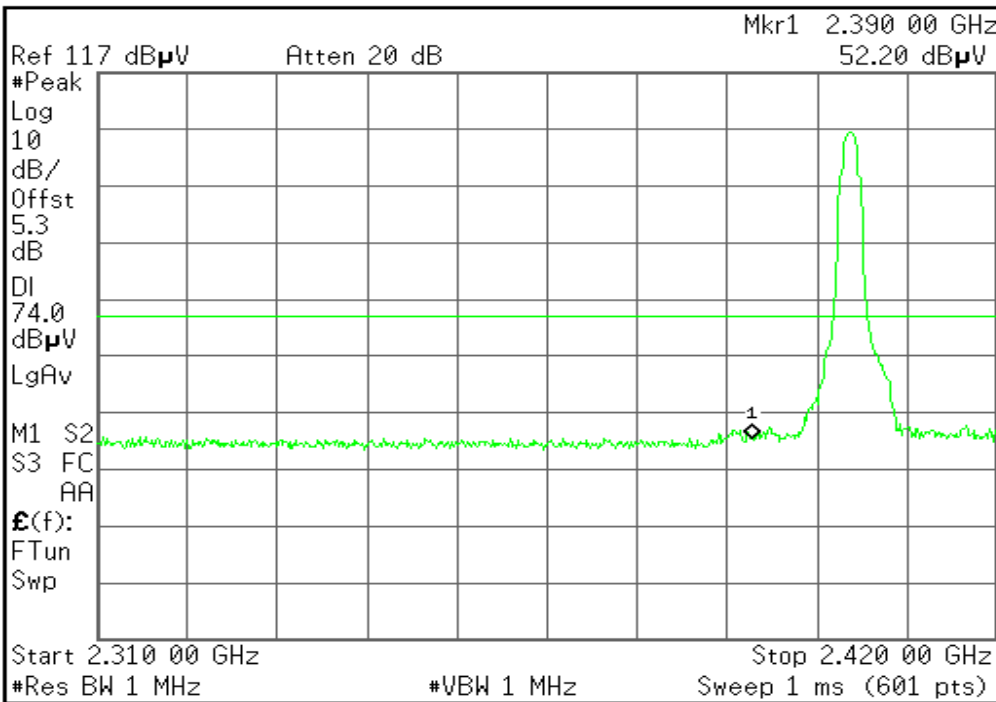
Detector mode: Peak

Polarity: Horizontal

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R T

Marker



Select Marker
1 2 3 4
Normal
Delta
Delta Pair (Tracking Ref)
Ref \blacktriangle
Span Pair
Span Center
Off
More 1 of 2

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Detector mode: Average

Polarity: Horizontal

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Marker



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More 1 of 2

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Band Edges (CH High)

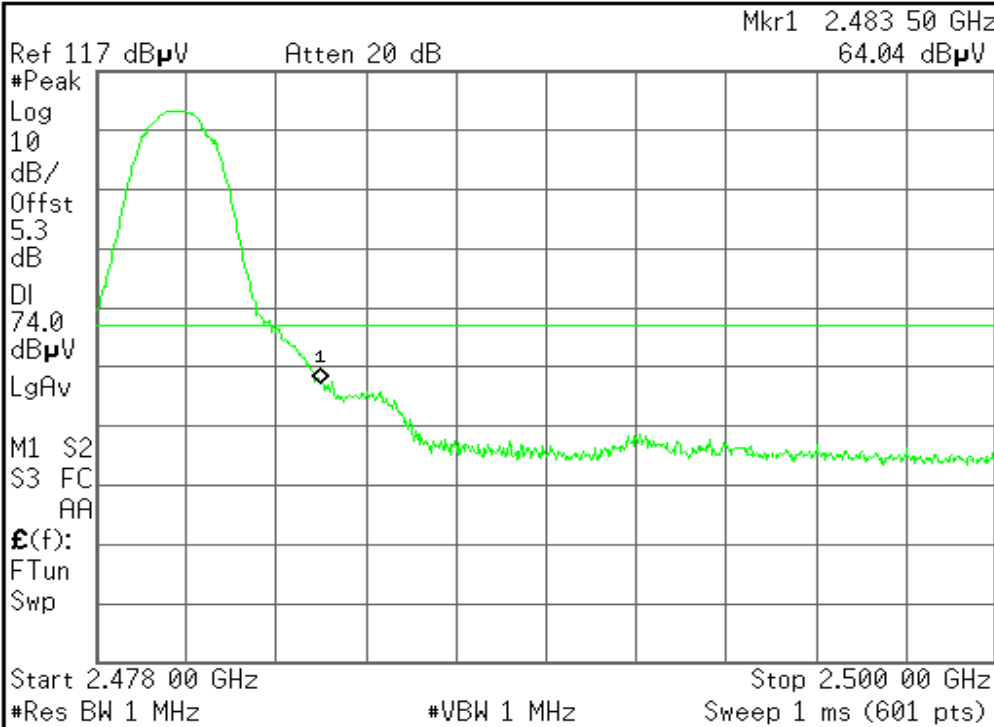
Detector mode: Peak

Polarity: Vertical

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(Tracking Ref)
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Span Pair
Span Center

Off

More
1 of 2

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Detector mode: Average

Polarity: Vertical

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Marker



Select Marker
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Normal

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Span Pair
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1 of 2

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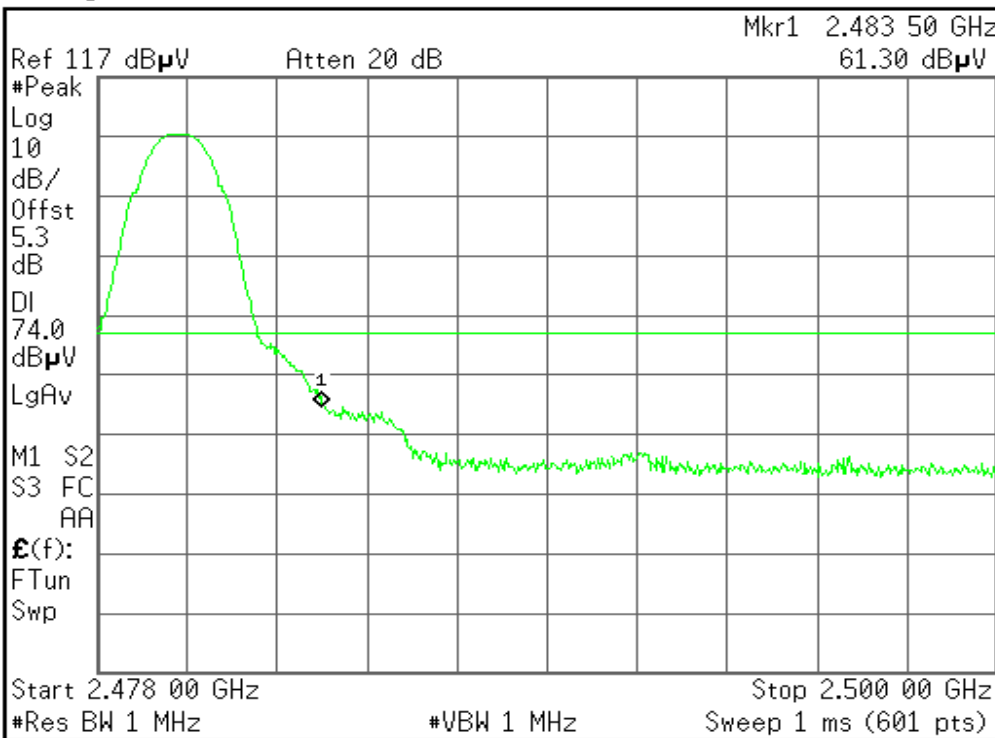
Detector mode: Peak

Polarity: Horizontal

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More 1 of 2

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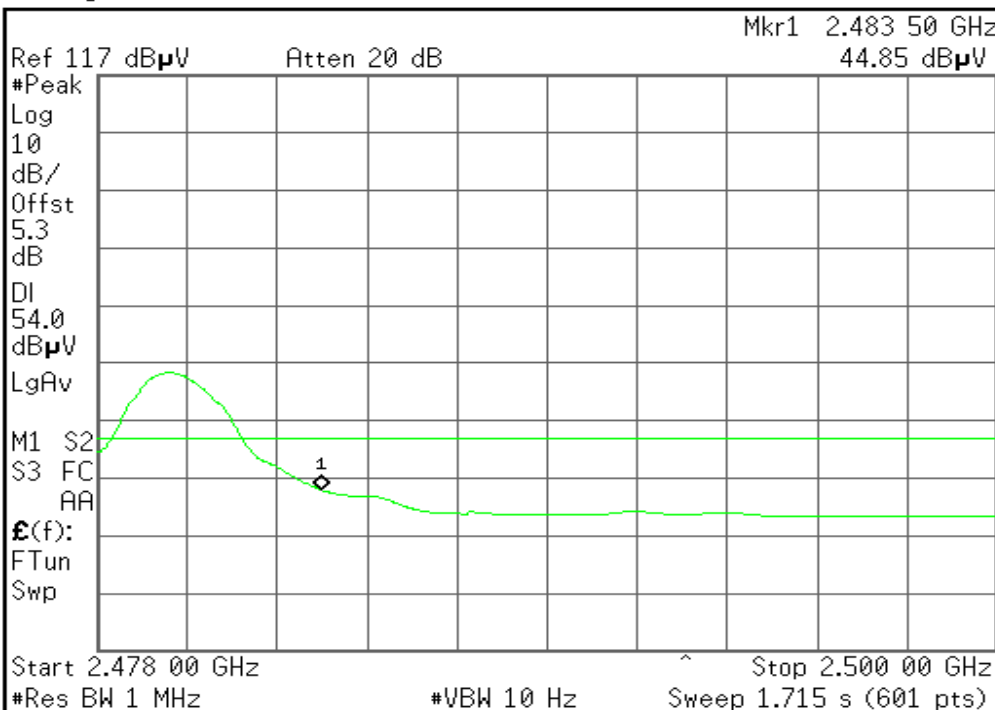
Detector mode: Average

Polarity: Horizontal

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3M

CH LOW

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	44.72	35.25	5.30	50.02	40.55	74	54	-23.98	-13.45
2390.00	H	46.81	35.17	5.30	52.11	40.47	74	54	-21.89	-13.53

CH HIGH

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	53.55	38.05	5.30	58.85	43.35	74	54	-15.15	-10.65
2483.50	H	51.71	37.8	5.30	57.01	43.1	74	54	-16.99	-10.9

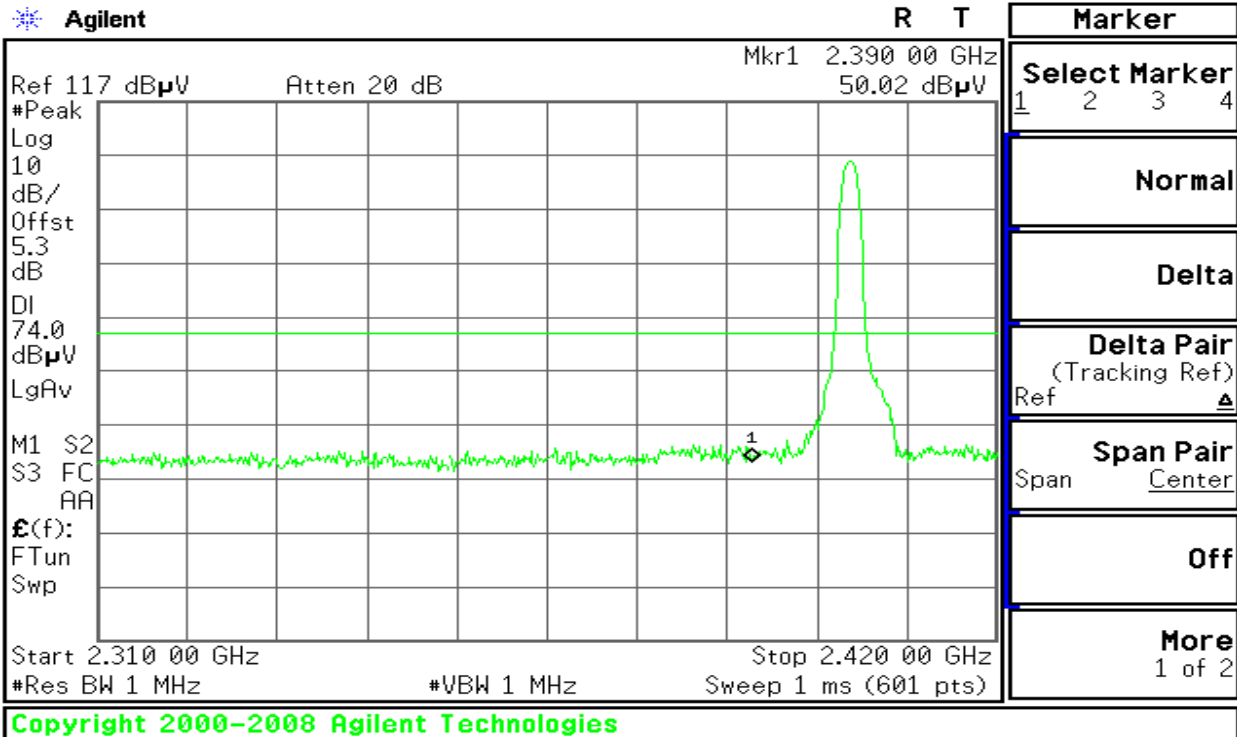
Refer to attach spectrum analyzer data chart.



Band Edges (CH Low)

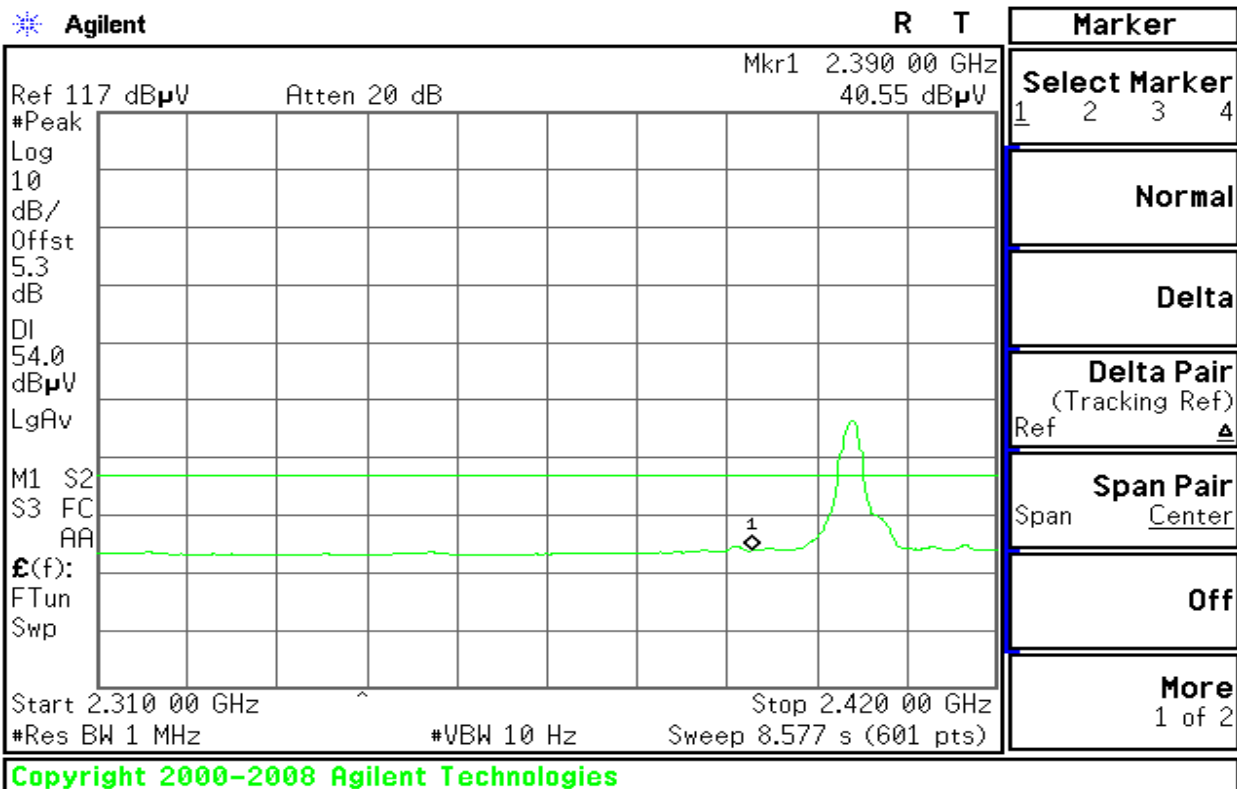
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





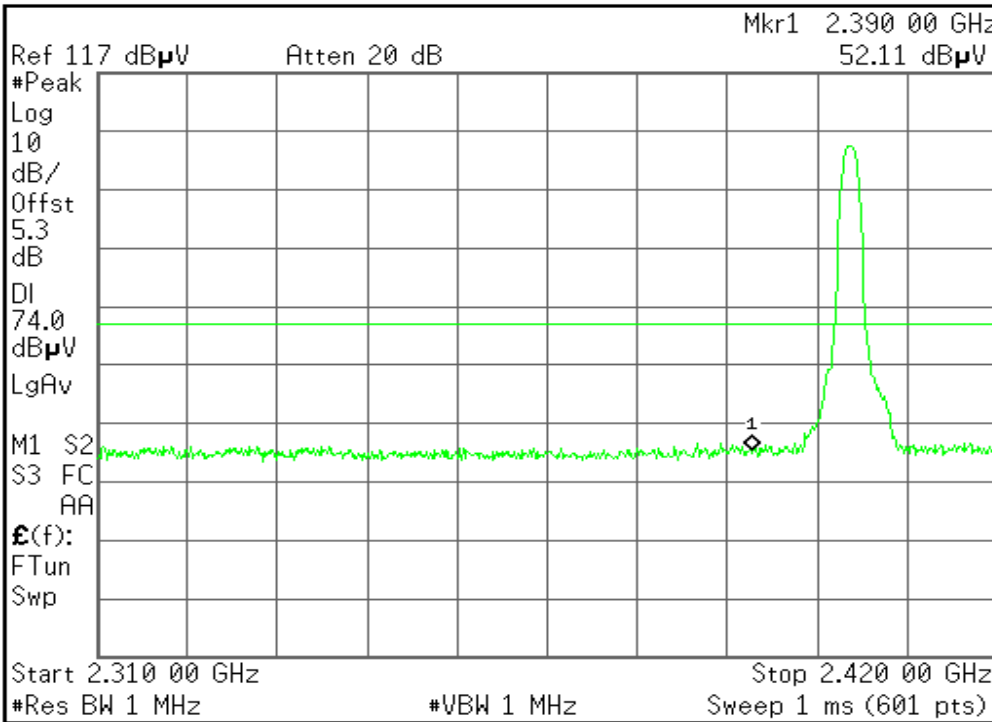
Detector mode: Peak

Polarity: Horizontal

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Span Pair
Span Center

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More
1 of 2

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Detector mode: Average

Polarity: Horizontal

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Select Marker
1 2 3 4

Normal

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1 of 2

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Band Edges (CH High)

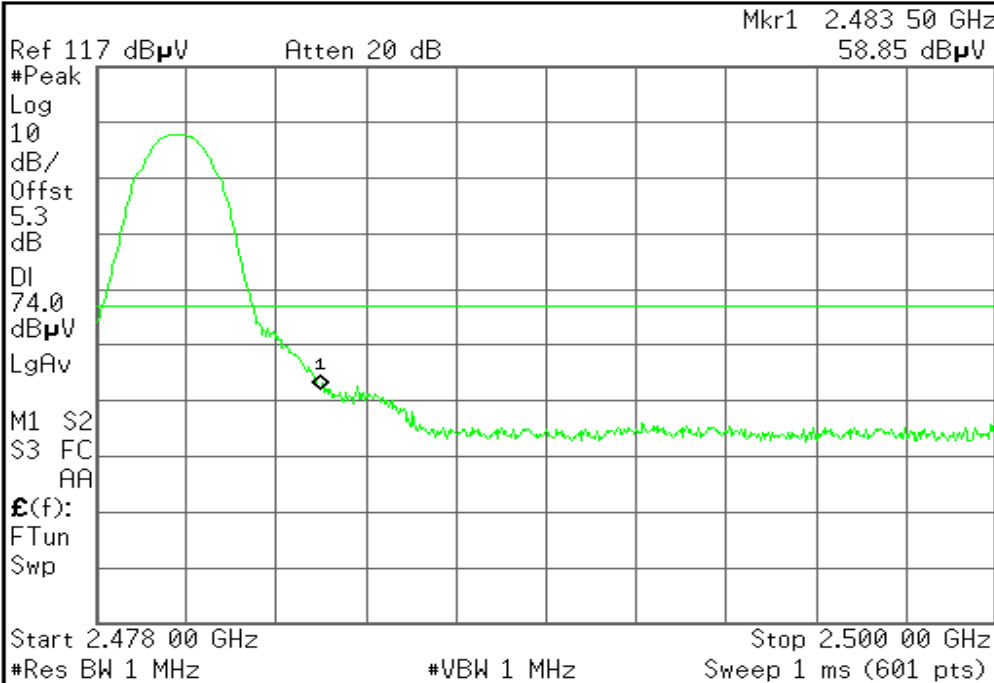
Detector mode: Peak

Polarity: Vertical

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Delta Pair (Tracking Ref)
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Span Pair
Span Center
Off
More 1 of 2

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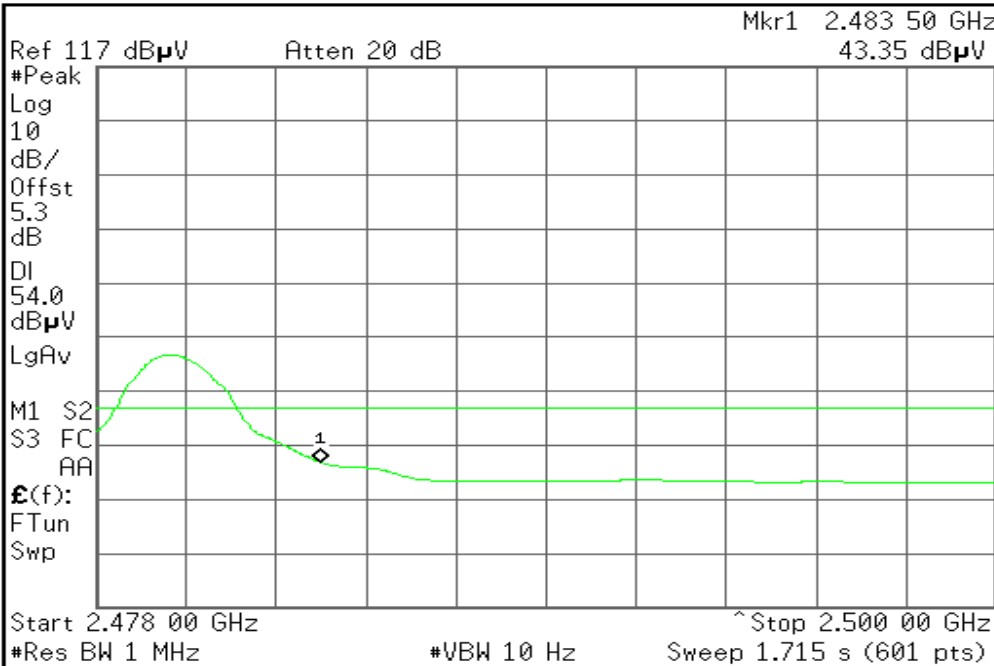
Detector mode: Average

Polarity: Vertical

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Span Center
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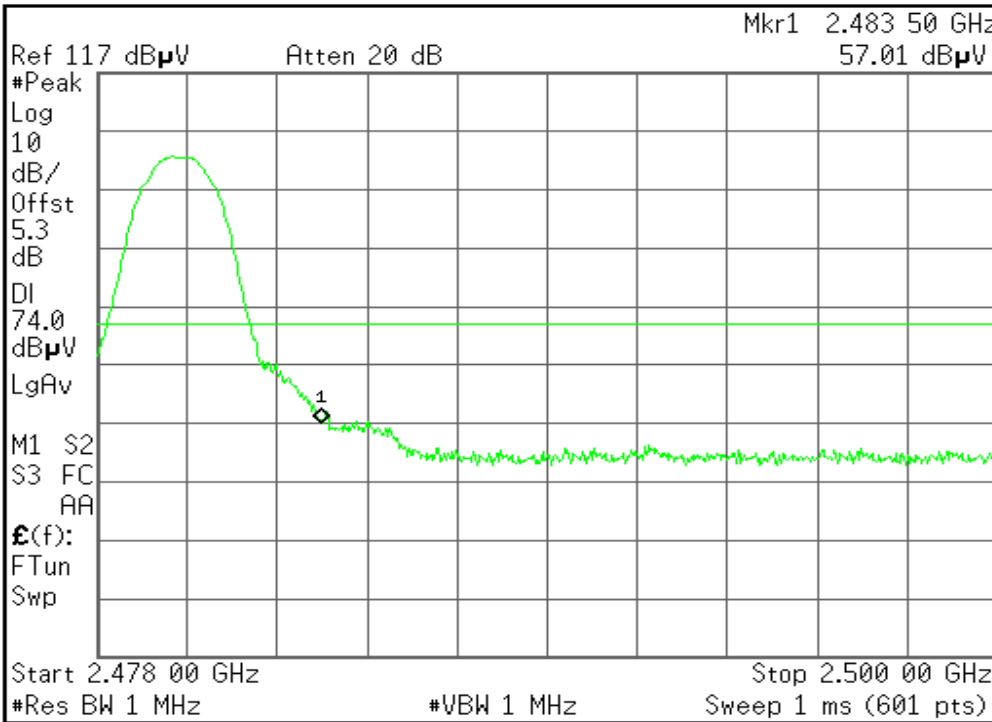
Detector mode: Peak

Polarity: Horizontal

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Select Marker
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Delta Pair (Tracking Ref)
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Span Pair
Span Center
Off
More 1 of 2

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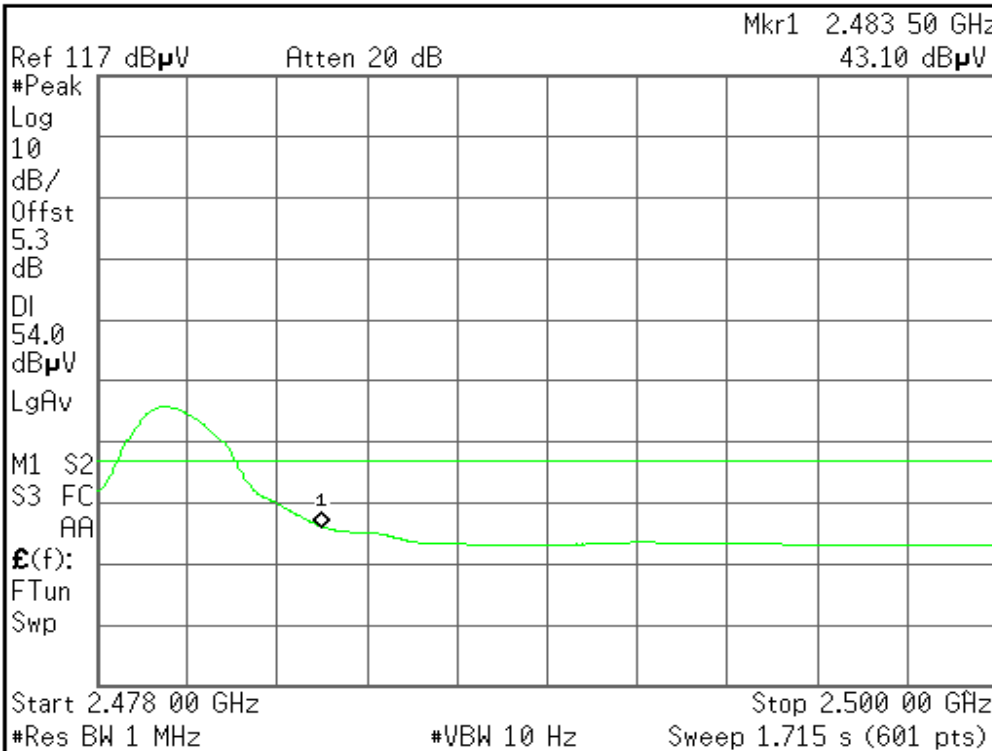
Detector mode: Average

Polarity: Horizontal

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Normal
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Delta Pair (Tracking Ref)
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Span Pair
Span Center
Off
More 1 of 2

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RADIO FREQUENCY EXPOSURE

LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §15.247(b)(4) and §1.1307(b)(1) of this chapter.

EUT Specification

EUT	Navigation device
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input checked="" type="checkbox"/> Others: <u>Bluetooth: 2.402GHz ~ 2.480GHz</u>
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others _____
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 5mW/cm^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	2.51dBm (1.782mW)
Antenna gain (Max)	-0.02 dBi (Numeric gain: 0.995mW)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

Remark:

1. The maximum output power is 2.51dBm (1.782mW) at 2402MHz (with 0.995 numeric antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm2 even if the calculation indicates that the power density would be larger.



TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²



EUT output power = 1.782mW

Numeric Antenna gain = 0.995

→ Power density = 0.0004 mW / cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)



SPURIOUS EMISSIONS

Radiated Emissions

LIMIT

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

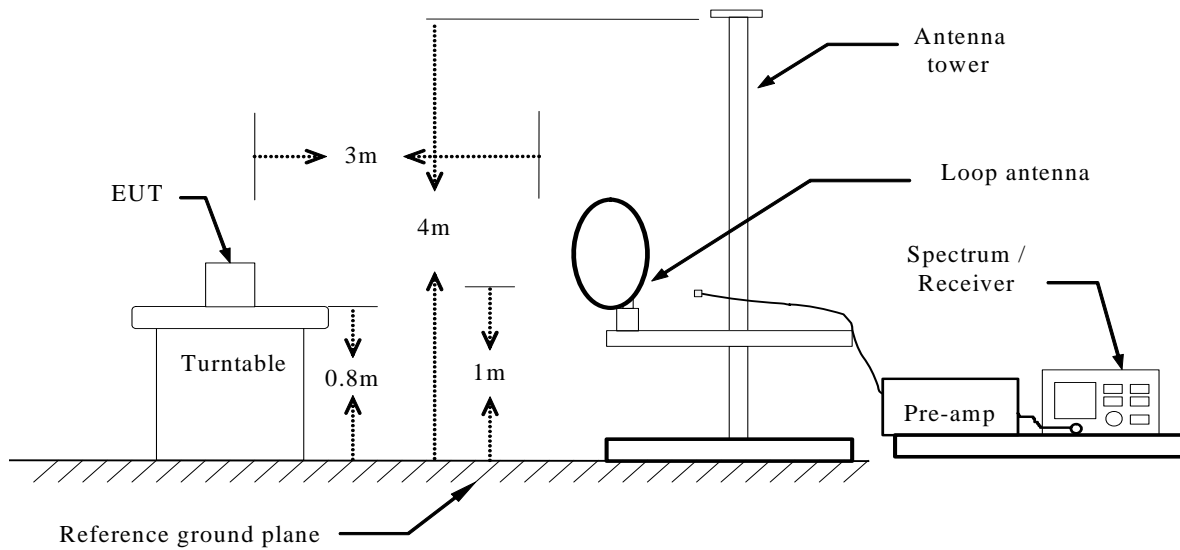
MEASUREMENT EQUIPMENT USED

3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2010
EMI Test Receiver	R&S	ESPI3	101026	04/28/2011
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	02/28/2011
Pre-Amplifier	Miteq	NSP4000-NF	870731	02/28/2011
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2010
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	12/04/2010
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	04/28/2011
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2011
Loop Antenna	ARA	PLA-1030/B	1029	02/24/2011

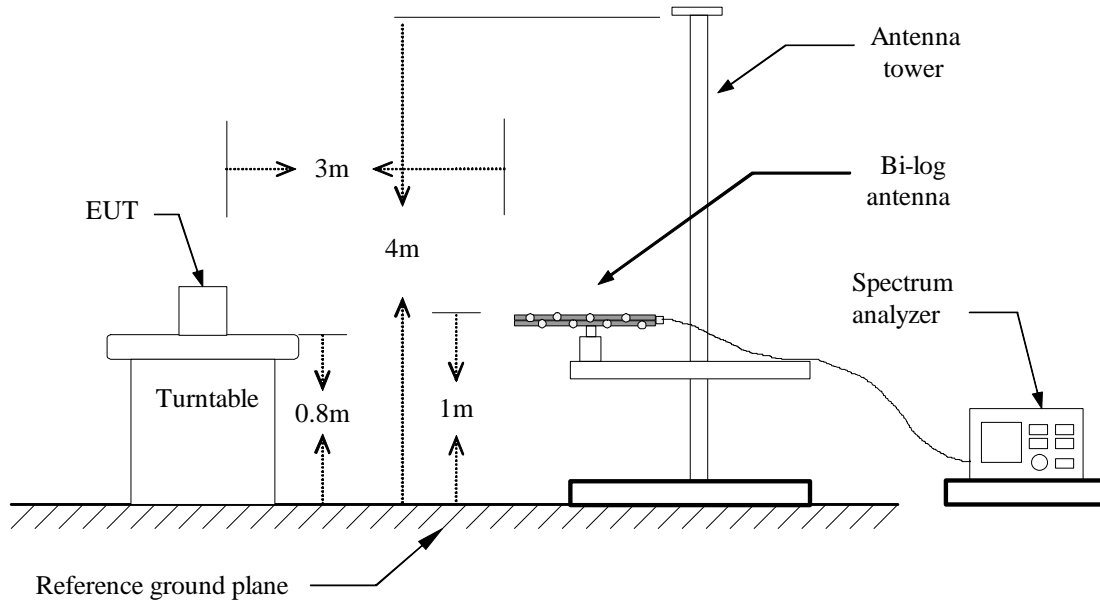
Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration

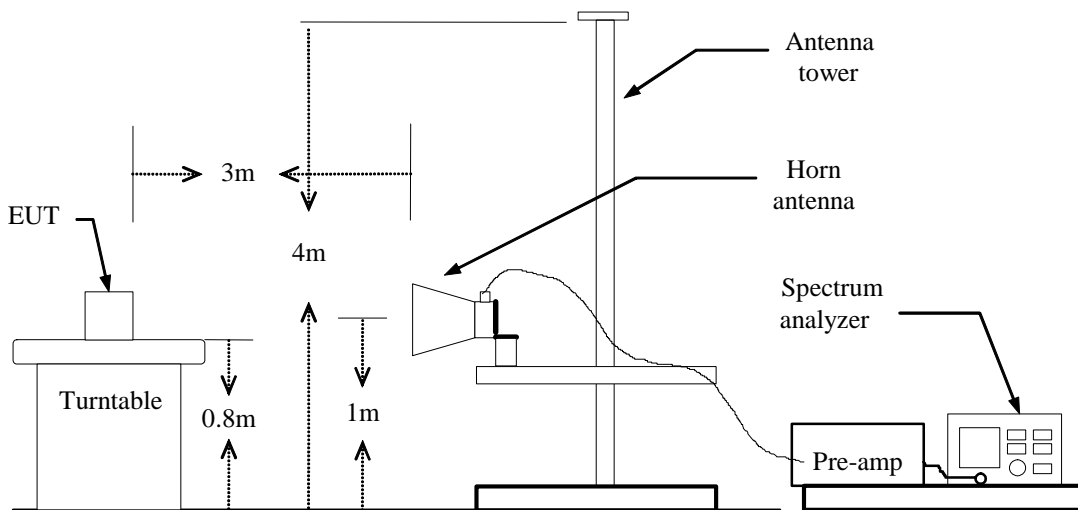
Below 30MHz



Below 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:



Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.



TEST RESULTS

Below 1 GHz

Operation Mode: Normal Link

Test Date: August 4, 2010

Temperature: 24°C

Tested by: Jeff Fang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
40.11	V	Peak	33.68	-8.2	25.48	40.0	-14.52
71.33	V	Peak	37.45	-13.7	23.75	40.0	-16.25
132.56	V	Peak	28.49	-7.03	21.46	43.5	-22.04
267.45	V	Peak	30.24	-7.19	23.05	46.0	-22.95
666.89	V	Peak	24.15	2.18	26.33	46.0	-19.67
724.35	V	Peak	24.67	2.95	27.62	46.0	-18.38
71.68	H	Peak	29.67	-13.67	16	43.5	-27.5
136.69	H	Peak	24.15	-7.13	17.02	43.5	-26.48
223.03	H	Peak	28.87	-8.73	20.14	46.0	-25.86
827.58	H	Peak	25.34	4.12	29.46	46.0	-16.54
935.66	H	Peak	24.15	6.42	30.57	46.0	-15.43
978.87	H	Peak	23.07	6.98	30.05	54.0	-23.95

Notes:

1. Measuring frequencies from 9 KHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9 KHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.



Above 1 GHz

1M

Operation Mode: TX/ CH Low

Test Date: August 4, 2010

Temperature: 24°C

Tested by: Jeff Fang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4805.00	V	41.03	29.88	10.85	51.88	40.73	74	54	-13.27	average
7203.34	V	39.67	26.89	18.37	58.04	45.26	74	54	-8.74	average
4805	H	40.21	29.16	10.85	51.06	40.01	74	54	-13.99	average
7205.67	H	38.75	25.67	18.37	57.12	44.04	74	54	-9.96	average

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX/ CH Mid
Temperature: 24°C
Humidity: 48 % RH

Test Date: August 4, 2010
Tested by: Jeff Fang
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4885	V	39.45	25.91	11.26	50.71	37.17	74	54	-16.83	average
7236.34	V	40.36	24.33	19.28	59.64	43.61	74	54	-10.39	average
4885	H	39.56	27.44	11.26	50.82	38.7	74	54	-15.3	average
7235.55	H	40.67	24.58	19.28	59.95	43.86	74	54	-10.14	average

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX/ CH High
Temperature: 24°C
Humidity: 48 % RH

Test Date: August 4, 2010
Tested by: Jeff Fang
Polarity: Ver. / Hor.

Table with 11 columns: Freq. (MHz), Ant. Pol H/V, Peak Reading (dBuV), AV Reading (dBuV), Ant. / CL CF (dB), Actual Fs (Peak, AV), Peak Limit (dBuV/m), AV Limit (dBuV/m), Margin (dB), Remark. Contains data for frequencies 4960.12, 7325.66, 4959.35, and 7324.65.

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded...
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode...
4. Spectrum setting:
a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



3M

Operation Mode: TX/ CH Low

Test Date: August 4, 2010

Temperature: 24°C

Tested by: Jeff Fang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4805.22	V	39.78	26.55	10.85	50.63	37.40	74	54	-16.60	average
7204.33	V	38.42	25.11	18.37	56.79	43.48	74	54	-10.52	average
4805	H	39.54	25.64	10.85	50.39	36.49	74	54	-17.51	average
7205.67	H	38.65	24.97	18.37	57.02	43.34	74	54	-10.66	average

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX/ CH Mid
Temperature: 24°C
Humidity: 48 % RH

Test Date: August 4, 2010
Tested by: Jeff Fang
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4886.56	V	39.89	26.56	11.26	51.15	37.82	74	54	-16.18	average
7325.56	V	39.15	23.77	19.28	58.43	43.05	74	54	-10.95	average
4885.34	H	38.16	26.24	11.26	49.42	37.5	74	54	-16.5	average
7326.33	H	39.26	23.74	19.28	58.54	43.02	74	54	-10.98	average

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX/ CH High
Temperature: 24°C
Humidity: 48 % RH

Test Date: August 4, 2010
Tested by: Jeff Fang
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4958.76	V	40.89	29.88	11.32	52.21	41.2	74	54	-12.8	average
7324.55	V	39.12	24.03	19.56	58.68	43.59	74	54	-10.41	average
4960.33	H	10.42	29.17	11.32	21.74	40.49	74	54	-13.51	average
7325.46	H	38.88	24.64	19.56	58.44	44.2	74	54	-9.80	average

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

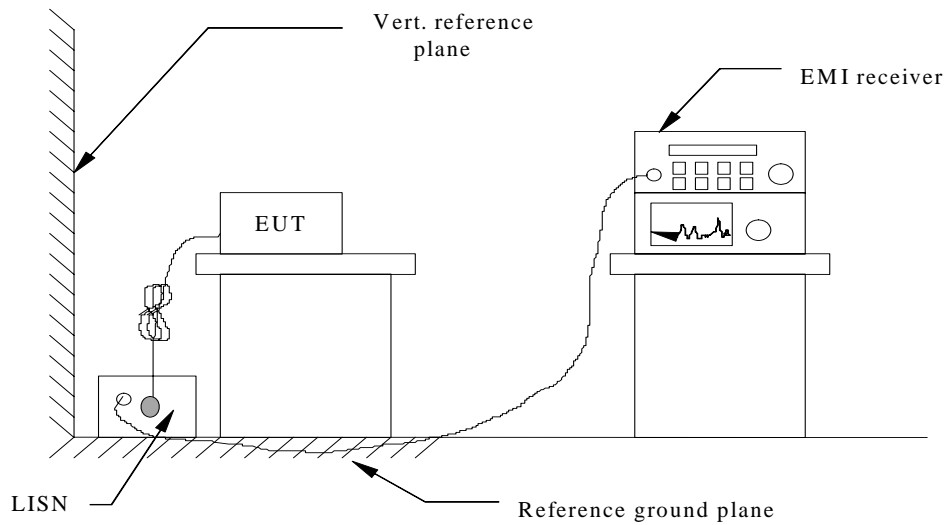
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC Analyzer	R&S	ESCI3	100781	04/28/2011
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	04/28/2011
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	04/28/2011
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	04/28/2011

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Model: Magellan RoadMate™ 2055

Test Mode: Normal Link

Temperature: 24°C

Humidity: 48% RH

Tested by: Jeff Fang

Test Results: Pass

Freq. (MHz)	Q.P. Raw reading (dBuV)	AVG Raw reading (dBuV)	Correction factor(dB)	Q.P. Amptd. (dBuV)	AVG Amptd. (dBuV)	Q.P. Limit (dBuV)	AVG Limit (dBuV)	Q.P. Margin (dB)	AVG Margin (dB)	Line/Neutral
0.172	42.01	27.76	10.07	52.08	37.83	65.37	55.37	-13.29	-17.54	Line
0.286	36.21	16.17	10.25	46.46	26.42	62.09	52.09	-15.63	-25.67	Line
0.586	38.01	20.52	10.87	48.88	31.39	56.00	46.00	-7.12	-14.61	Line
1.086	36.15	18.79	11.03	47.18	29.82	56.00	46.00	-8.82	-16.18	Line
1.607	35.34	19.18	11.06	46.40	30.24	56.00	46.00	-9.60	-15.76	Line
2.264	33.47	17.67	11.11	44.58	28.78	56.00	46.00	-11.42	-17.22	Line
0.187	42.47	27.08	10.17	52.64	37.25	64.49	54.49	-11.85	-17.24	Neutral
0.264	37.34	20.29	10.17	47.51	30.46	62.72	52.72	-15.21	-22.26	Neutral
0.582	35.02	21.22	10.14	45.16	31.36	56.00	46.00	-10.84	-14.64	Neutral
1.089	35.12	23.19	10.24	45.36	33.43	56.00	46.00	-10.64	-12.57	Neutral
1.593	33.70	20.06	10.42	44.12	30.48	56.00	46.00	-11.88	-15.52	Neutral
2.384	32.60	20.85	10.64	43.24	31.49	56.00	46.00	-12.76	-14.51	Neutral

Remark:

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
3. “--” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

Note:

Freq. = Emission frequency in KHz

Factor (dB) = cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER (The TRANSIENT LIMITER included 10 dB ATTENUATION)



$Amptd\ dBuV = Uncorrected\ Analyzer/Receiver\ reading + cable\ loss + Insertion\ loss\ of\ LISN + Insertion\ loss\ of\ TRANSIENT\ LIMITER,$
if it > 0.5 dB

Limit dBuV = Limit stated in standard

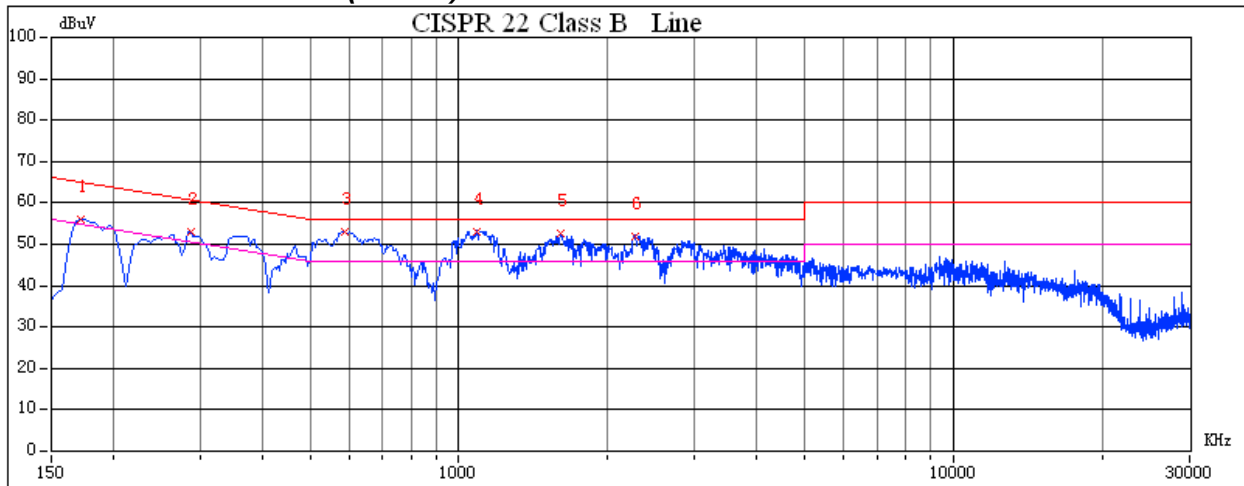
Margin dB = Reading in reference to limit

Calculation Formula

$$Margin\ (dB) = Amptd\ (dBuV) - Limit\ (dBuV)$$

Test Plot

Conducted emissions (Line 1)



Test Plot

Conducted emissions (Line 2)

