



FCC 47 CFR PART 15 Subpart C

TEST REPORT

For

ALVA BC640 Braille Audio Feature Pack

Model Number: ALVA BC640

Trade Name: Optelec

Issued to

Optelec B.V.

Breslau 4 2993 LT Barendrecht The Netherlands

Issued by



Compliance Certification Services Inc.
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1. TEST RESULT CERTIFICATION

Applicant: Optelec B.V.
Breslau 4 2993 LT Barendrecht The Netherlands

Equipment Under Test: ALVA BC640 Braille Audio Feature Pack

Trade Name: Optelec

Model Number: ALVA BC640

Date of Test: July 25 ~ October 24, 2008

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

We hereby 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 emission limits of FCC Rules Part 15.107, 15.109, 15.207, 15.209 and 15.249.

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

Approved by:

Ethan Huang
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Julia Wei
Senior Specialist
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	ALVA BC640 Braille Audio Feature Pack
Trade Name	Optelec
Model Number	ALVA BC640
Model Discrepancy	N/A
EUT Power Rating	5VDC, 1.5A
Frequency Range	2402 ~ 2480 MHz
Transmit Power	91.66 dBuV
Modulation Technique	GFSK
Transmit Data Rate	1Mbps
Number of Channels	79 Channels
Antenna Specification	Chip Antenna / Gain: 1.2dBi

Remark:

- 1. The sample selected for test was production product and was provided by manufacturer.*
- 2. This submittal(s) (test report) is intended for FCC ID: WX8-ALVA-BC640 filing to comply with Section 15.107 & 15.109 (FCC Part 15, Subpart B) and Section 15.207, 15.209, 15.249 (FCC Part 15, Subpart C Rules.)*



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 (2003) and FCC CFR 47 Part 2, 15.207, 15.209 and 15.249.

3.1 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.

3.2 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 15.107 and 15.109 under the FCC Rules Part 15 Subpart B and Section 15.207, 15.209, 15.249 under the FCC Rules Part 15 Subpart C.

3.3 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 (2003) 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 (2003).

**3.4FCC 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:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

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.



3.5 DESCRIPTION OF TEST MODES

The EUT (model: ALVA BC640) had been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only, and powerline conducted emission below 30MHz, which worst case was in normal link mode with charging only.

Channel Low (2402MHz), Channel Mid (2441MHz) and Channel High (2480MHz) were chosen for the final testing.



4. INSTRUMENT CALIBRATION

4.1 MEASURING 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.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

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

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2008

1166 Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSP30	100112	10/14/2008
Spectrum Analyzer	R&S	FSEB	825829/011	10/11/2008
Pre-Amplifier	Anritsu	MH648A	M89145	07/20/2008
Pre-Amplifier	Agilent	8449B	3008A01738	03/28/2009
Bilog Antenna	FRANKONIA	BTA-M	030003M	N.C.R
Horn Antenna	EMCO	3115	00022257	12/16/2008
Antenna Tower	HD	AS620E	N/A	N.C.R
Controller	HD	HD100	N/A	N.C.R
Turn Table	HD	DT-K312	N/A	N.C.R
Test S/W	LabVIEW 6.1 (Wugu Chamber EMI Test V1_4.5.3)			

Remark: The measurement uncertainty is less than +/- 4.0235dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	845552/030	04/08/2009
LISN	R&S	ENV216	100074	12/03/2008
LISN	FCC	FCC-LISN-50/250-16-2-07	06013	10/12/2009
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

Remark: The measurement uncertainty is less than +/- 1.7806dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☐ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☒ No. 81-1, Lane 210, Pa-De 2nd Rd., Luchu Hsiang, Taoyuan Shien, (338) Taiwan, R.O.C.

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

5.2 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."

5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	CFR 47, FCC Part15/18, CISPR 22, EN 55022, ICES-003, AS/NZS CISPR 22, VCCI V-3, EN 55011, CISPR 11, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 61000-6-1/2/3/4, EN 55024, CISPR 24, AS/NZS CISPR 24, AS/NZS 61000.6.2, EN 55014-1/-2, ETSI EN 300 386 v1.3.2/v1.3.3, IEC/EN 61000-3-2, AS/NZS 61000.3.2, IEC/EN 61000-3-3, AS/NZS 61000.3.3	 ACCREDITED No. 0824-01
USA	FCC MRA	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 TW1026
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-2882/2541/2798/725/1868 C-402/747/912 T-321/325
Taiwan	TAF	EN 55014-1, CISPR 14, CNS 13781-1, EN 55013, CISPR 13, CNS 13439, EN 55011, CISPR 11, CNS 13803, PLMN09, IS2045-0, LP0002 FCC Part 27/90, Part 15B/C/D/E, RSS-192/193/210/310 ETSI EN 300 328/ 300 220-1/ 300 220-2/ 301 893/ 301 489-01/ 301 489-03/ 301 489-07 / 301 489-17/ 300 440-1/ 300 440-2 AS/NZS 4268, AS/NZS 4771 CISPR 22, EN 55022, CNS 13438, AS/NZS CISPR 22, VCCI, IEC/EN 61000-4-2/3/4/5/6/8/11, CNS 14676-2/3/4/5/6/8, CNS 14934-2/3, CNS 13783-1, CNS 13439, CNS 13803	 TAF Testing Laboratory 0363
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	SL2-IS-E-0014 / IN-E-0014 /A1-E-0014 /R1-E-0014 /R2-E-0014 /L1-E-0014
Canada	Industry Canada	RSS212, Issue 1	 IC 2324C-3 IC 2324C-5

Note: No part of this report may be used to claim or imply product endorsement by A2LA, TAF or other government agency.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

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

6.2 SUPPORT EQUIPMENT

No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook PC	S7110	DU4A00EG0944P0 10	FCC DOC	Fujitsu	USB Cable: Unshielded, 1.8m 1394 Cable: Unshielded, 1.8m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2	Multimedia Headset	CJC-5258MV	0507106339	FCC DoC	CJC	Unshielded, 1.8m	N/A
3	USB Mouse	MO19UCA	020440953	FCC DoC	HP	Unshielded, 1.8m	N/A
4	ALVA BC640 Base Unit	AVLA BC640	N/A	FCC DoC	Optelec	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark: Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



7. FCC PART 15.249 REQUIREMENTS

7.1 BAND EDGES MEASUREMENT

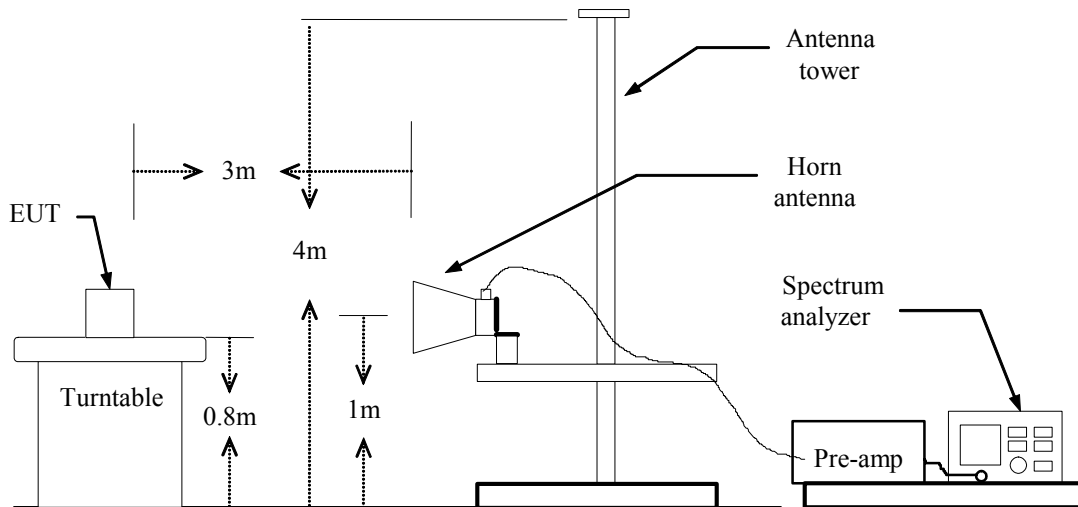
LIMIT

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

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ at 3-meter)	Field Strength (dB $\mu\text{V}/\text{m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

2. As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

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.

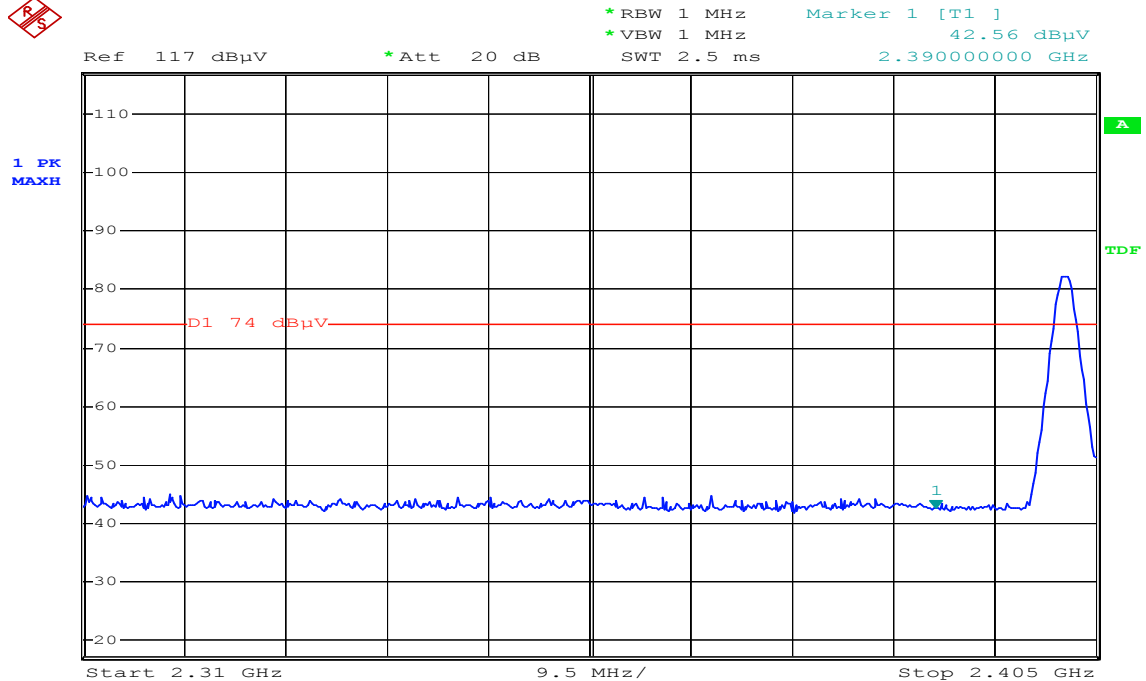


TEST RESULTS

Band Edges (CH Low)

Detector mode: Peak

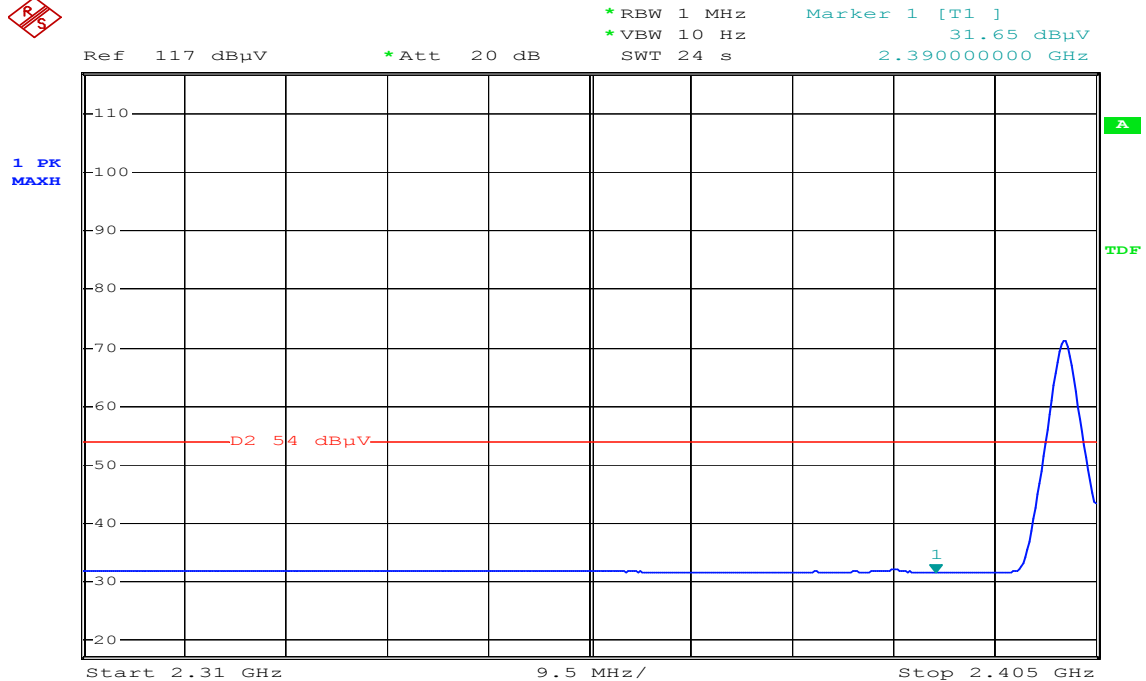
Polarity: Vertical



Date: 24.OCT.2008 18:18:42

Detector mode: Average

Polarity: Vertical

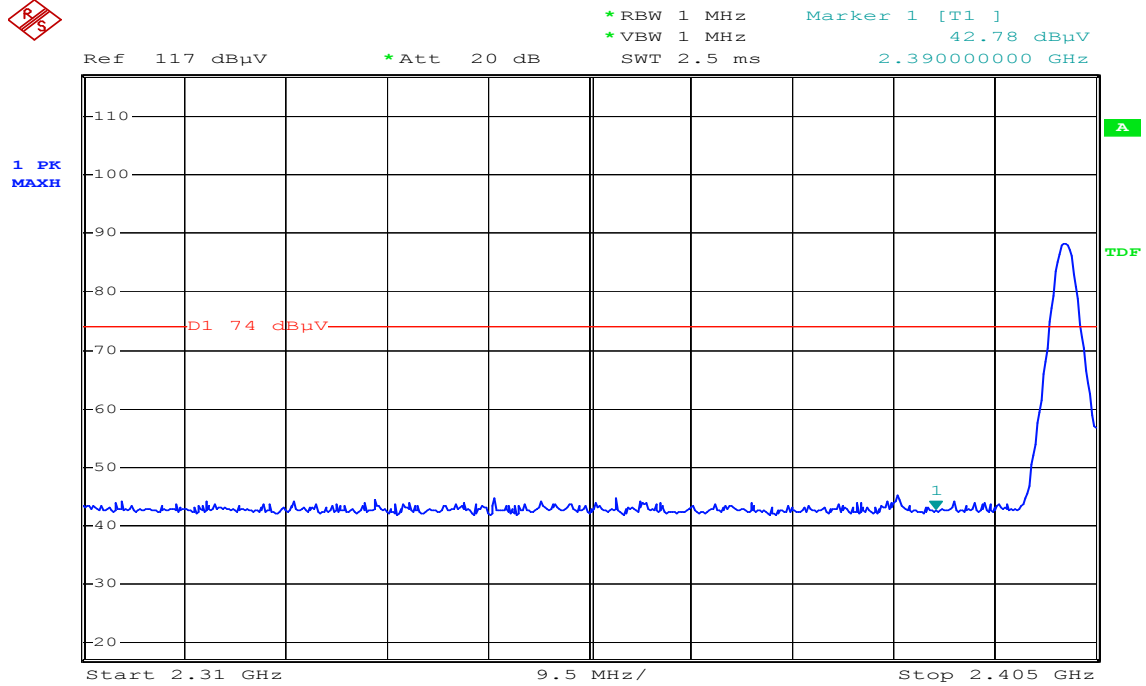


Date: 24.OCT.2008 18:19:22



Detector mode: Peak

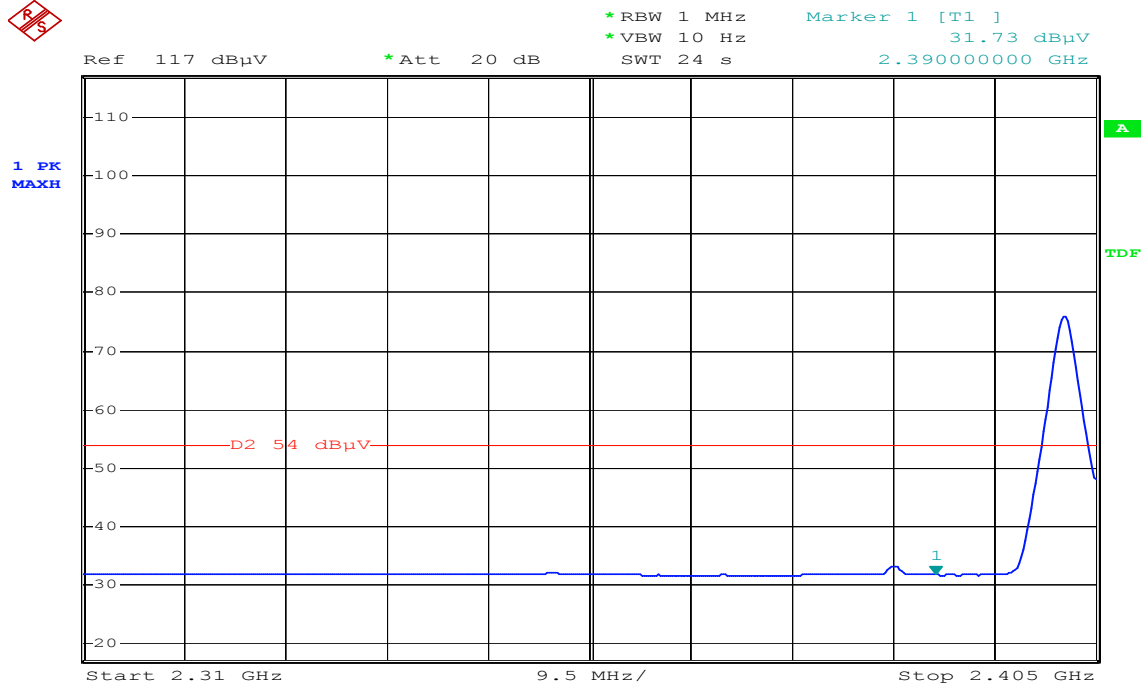
Polarity: Horizontal



Date: 24.OCT.2008 18:15:37

Detector mode: Average

Polarity: Horizontal



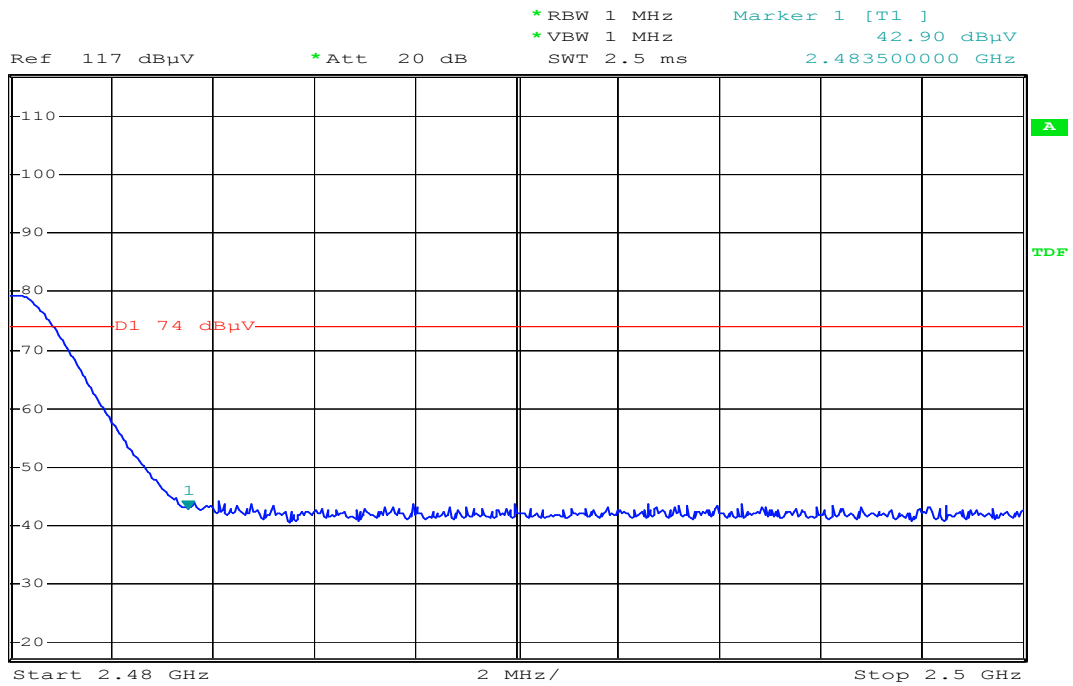
Date: 24.OCT.2008 18:16:33



Band Edges (CH High)

Detector mode: Peak

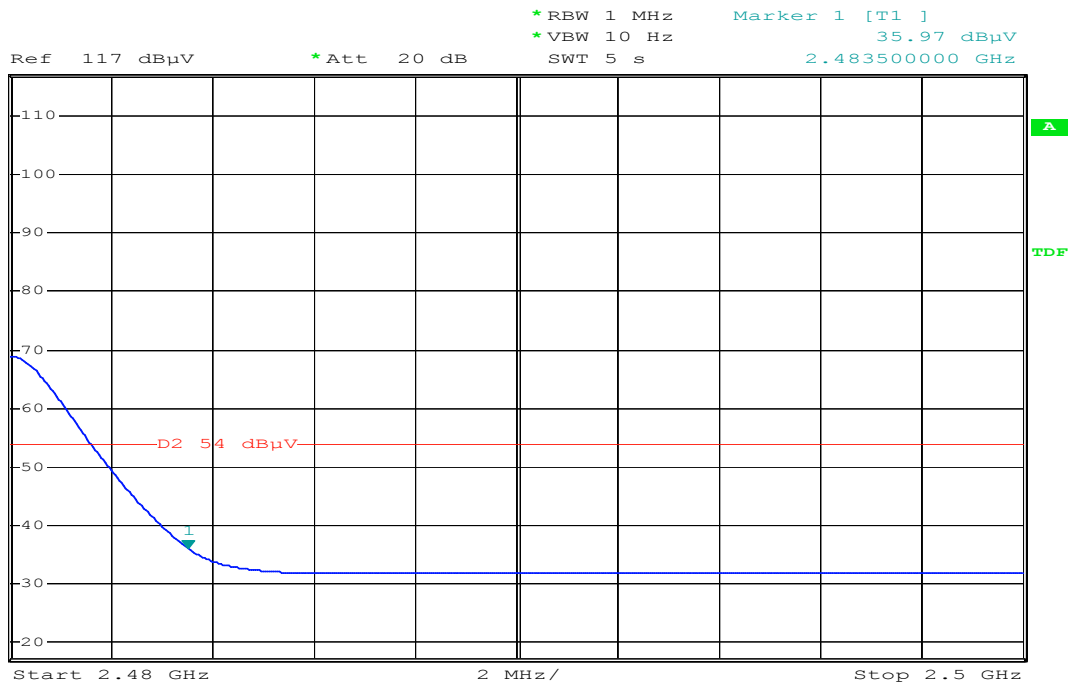
Polarity: Vertical



Date: 24.OCT.2008 18:34:15

Detector mode: Average

Polarity: Vertical

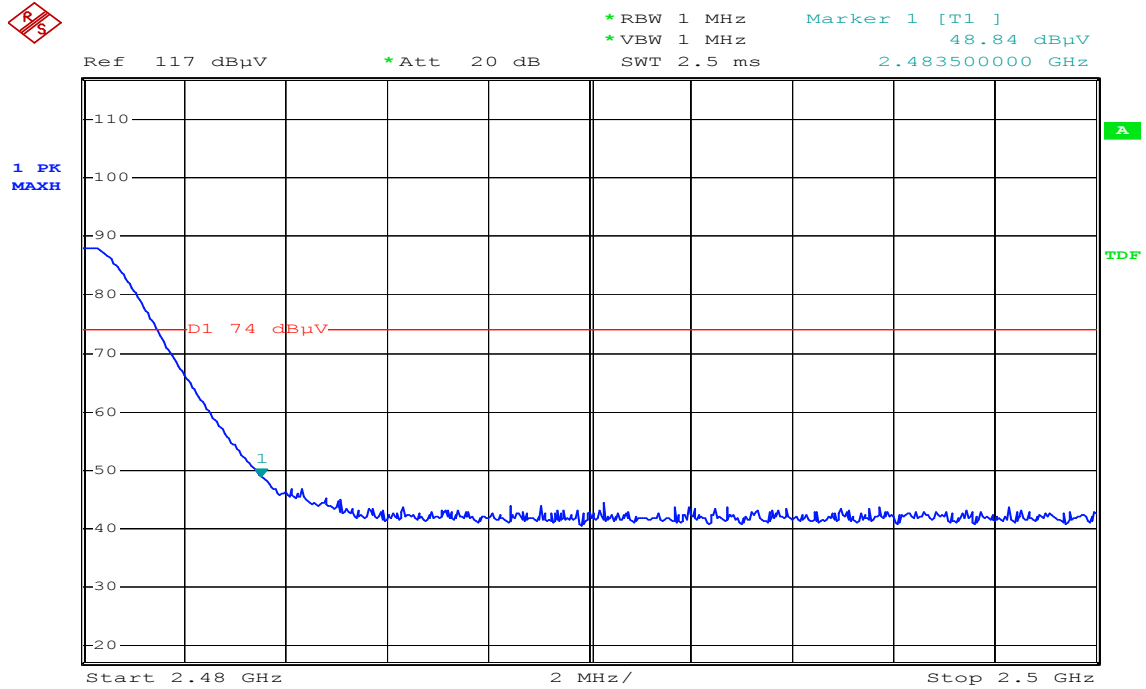


Date: 24.OCT.2008 18:33:56



Detector mode: Peak

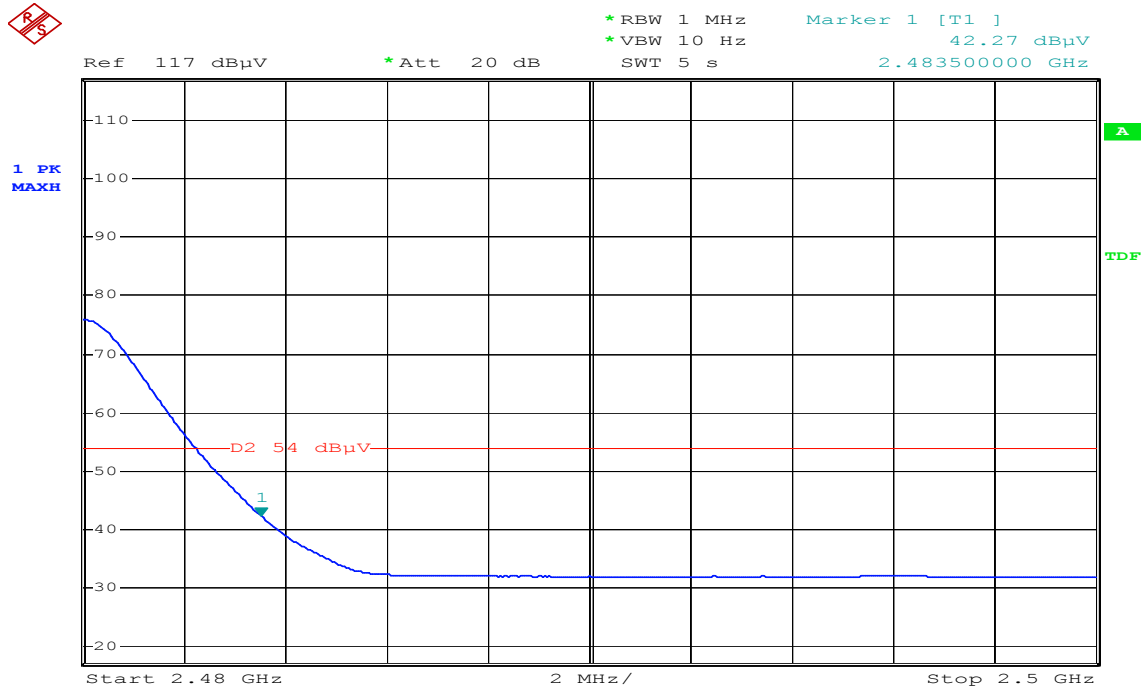
Polarity: Horizontal



Date: 24.OCT.2008 18:36:35

Detector mode: Average

Polarity: Horizontal



Date: 24.OCT.2008 18:37:17



7.2 SPURIOUS EMISSION

LIMIT

1. In the section 15.249(a):

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental Field Strength (mV/m)	Field Strength of Harmonics (μV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

2. 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 (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

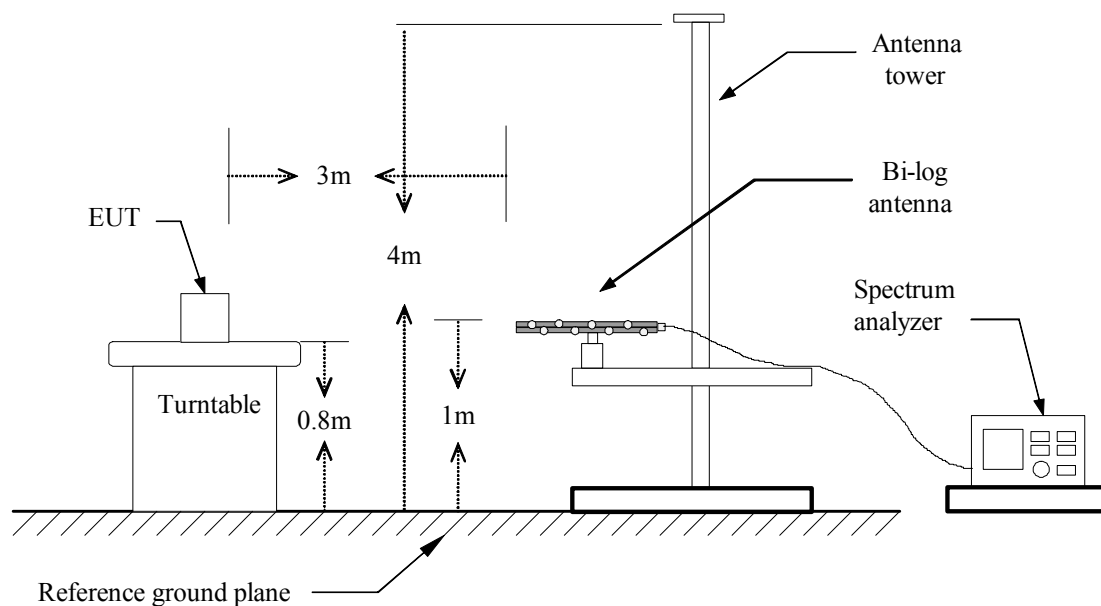
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

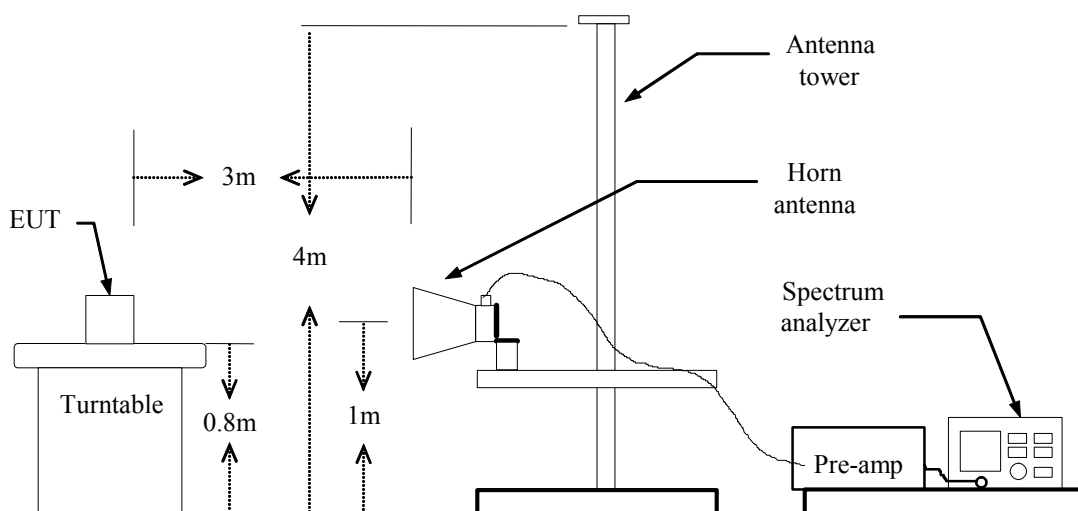
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

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:** October 24, 2008**Temperature:** 26°C**Tested by:** Abol Tsai**Humidity:** 60% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
34.8500	V	40.52	-15.25	25.27	40.00	-14.73	Peak
61.5250	V	34.68	-15.06	19.62	40.00	-20.38	Peak
73.6500	V	34.23	-17.08	17.15	40.00	-22.85	Peak
141.5500	V	35.49	-13.03	22.46	43.50	-21.04	Peak
156.1000	V	34.47	-12.38	22.09	43.50	-21.41	Peak
192.4750	V	35.49	-14.71	20.78	43.50	-22.72	Peak
243.4000	V	40.36	-13.74	26.62	46.00	-19.38	Peak
287.0500	V	35.44	-12.05	23.39	46.00	-22.61	Peak
61.5249	H	33.16	-15.06	18.10	40.00	-21.90	Peak
95.4749	H	36.39	-17.07	19.32	43.50	-24.18	Peak
141.5500	H	36.41	-13.03	23.38	43.50	-20.12	Peak
192.4749	H	37.09	-14.71	22.38	43.50	-21.12	Peak
255.5250	H	45.37	-13.26	32.11	46.00	-13.89	Peak
287.0500	H	38.06	-12.05	26.01	46.00	-19.99	Peak
384.0500	H	35.34	-9.99	25.35	46.00	-20.65	Peak
653.2250	H	34.39	-4.88	29.51	46.00	-16.49	Peak

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz 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****Operation Mode:** Tx / CH Low**Test Date:** October 23, 2008**Temperature:** 20°C**Tested by:** Alonso Lu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2402.00	V	90.30	78.92	-4.62	85.68	74.30	113.97	93.97	-19.67	AVG
1600.00	V	50.35	---	-7.82	42.53	---	74.00	54.00	-11.47	Peak
4010.00	V	43.63	---	1.22	44.85	---	74.00	54.00	-9.15	Peak
5430.00	V	42.35	---	3.23	45.59	---	74.00	54.00	-8.41	Peak
N/A										
2402.00	H	96.28	83.58	-4.62	91.66	78.96	113.97	93.97	-15.01	AVG
1600.00	H	52.79	---	-7.82	44.97	---	74.00	54.00	-9.03	Peak
5030.00	H	41.84	---	2.46	44.30	---	74.00	54.00	-9.70	Peak
7460.00	H	42.70	---	7.02	49.72	---	74.00	54.00	-4.28	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / CH Mid**Test Date:** October 23, 2008**Temperature:** 20°C**Tested by:** Alonso Lu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2441.00	V	90.24	78.69	-4.54	85.7	74.15	113.97	93.97	-19.82	AVG
1628.00	V	51.99	---	-7.66	44.33	---	74.00	54.00	-9.67	Peak
N/A										
2441.00	H	95.19	82.68	-4.54	90.65	78.14	113.97	93.97	-15.83	AVG
1628.00	H	53.96	---	-7.66	46.31	---	74.00	54.00	-7.69	Peak
6370.00	H	42.45	---	4.33	46.78	---	74.00	54.00	-7.22	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / CH High**Test Date:** October 23, 2008**Temperature:** 20°C**Tested by:** Alonso Lu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2480.00	V	87.21	76.22	-4.45	82.76	71.77	113.97	93.97	-22.20	AVG
1656.00	V	52.10	---	-7.50	44.60	---	74.00	54.00	-9.40	Peak
5130.00	V	42.64	---	2.65	45.29	---	74.00	54.00	-8.71	Peak
N/A										
2480.00	H	95.84	83.30	-4.45	91.39	78.85	113.97	93.97	-15.12	AVG
1656.00	H	56.26	---	-7.50	48.76	---	74.00	54.00	-5.24	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Rx**Test Date:** October 23, 2008**Temperature:** 20°C**Tested by:** Alonso Lu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Result		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1628.00	V	48.85	---	-7.66	41.19	---	74.00	54.00	-12.81	Peak
N/A										
1088.00	H	47.15	---	-10.29	36.86	---	74.00	54.00	-17.14	Peak
1628.00	H	53.88	---	-7.66	46.22	---	74.00	54.00	-7.78	Peak
5390.00	H	42.25	---	3.16	45.41	---	74.00	54.00	-8.59	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

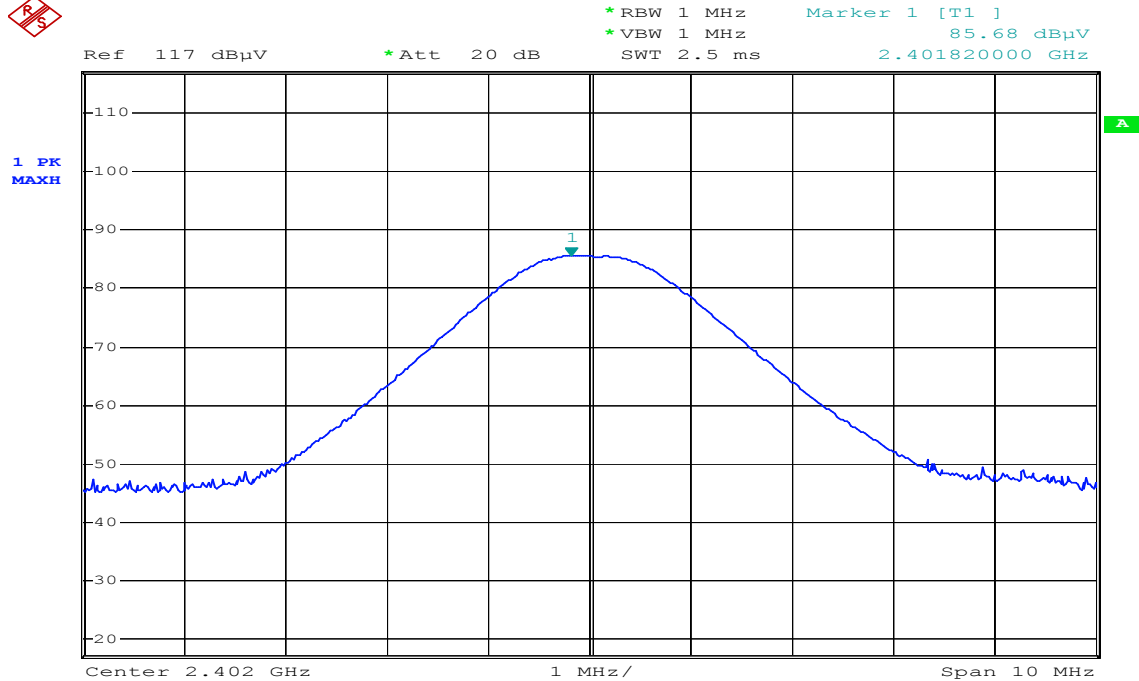


Test Plots

CH Low

Detector mode: Peak

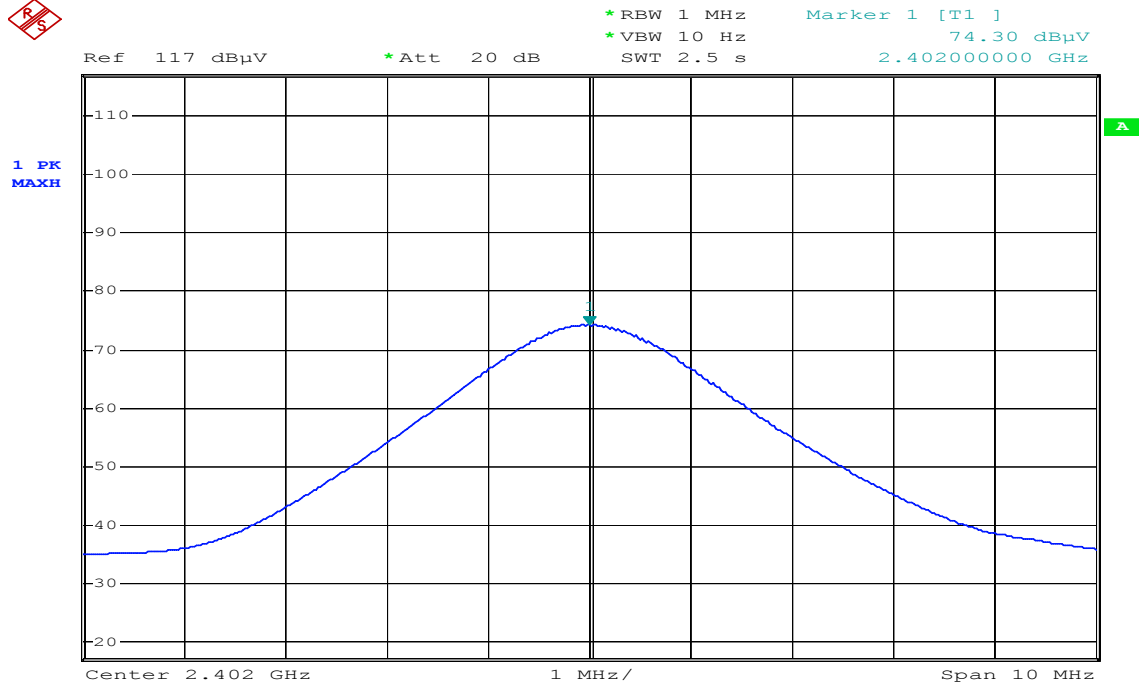
Polarity: Vertical



Date: 24.OCT.2008 18:20:48

Detector mode: Average

Polarity: Vertical

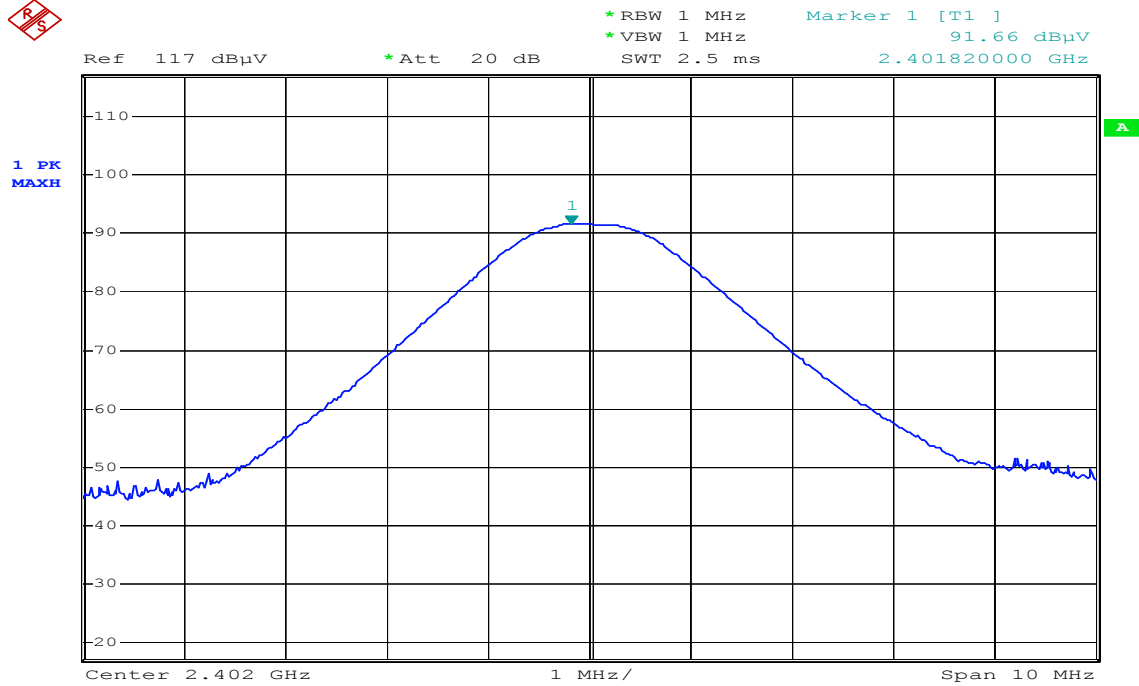


Date: 24.OCT.2008 18:21:12



Detector mode: Peak

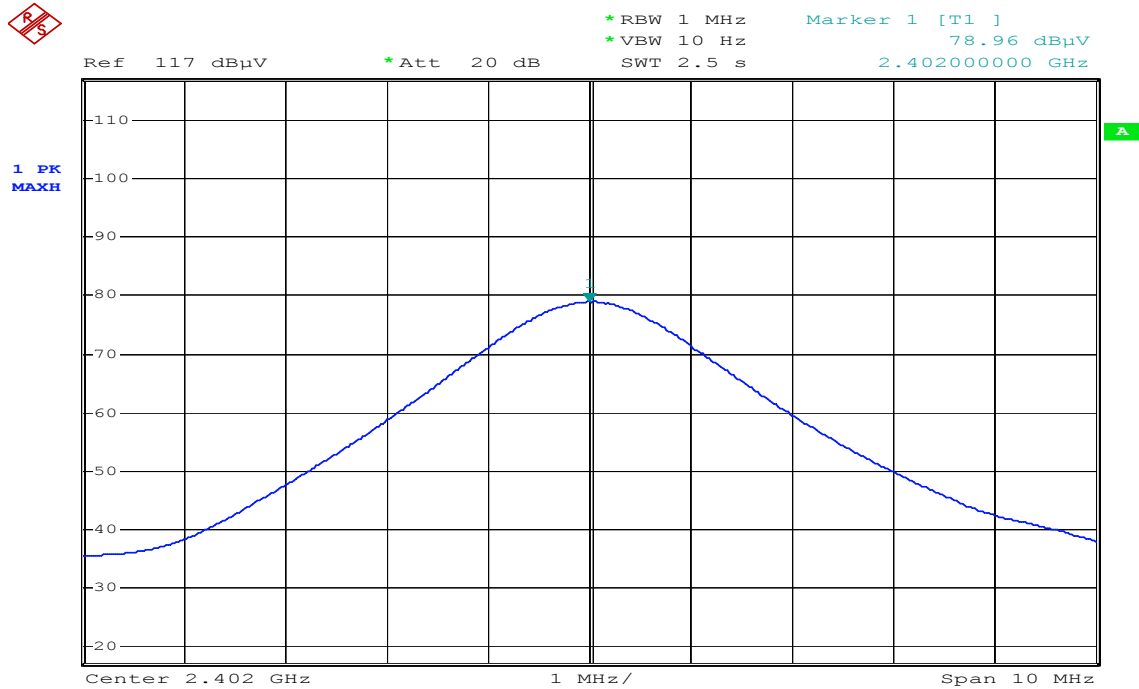
Polarity: Horizontal



Date: 24.OCT.2008 18:23:15

Detector mode: Average

Polarity: Horizontal



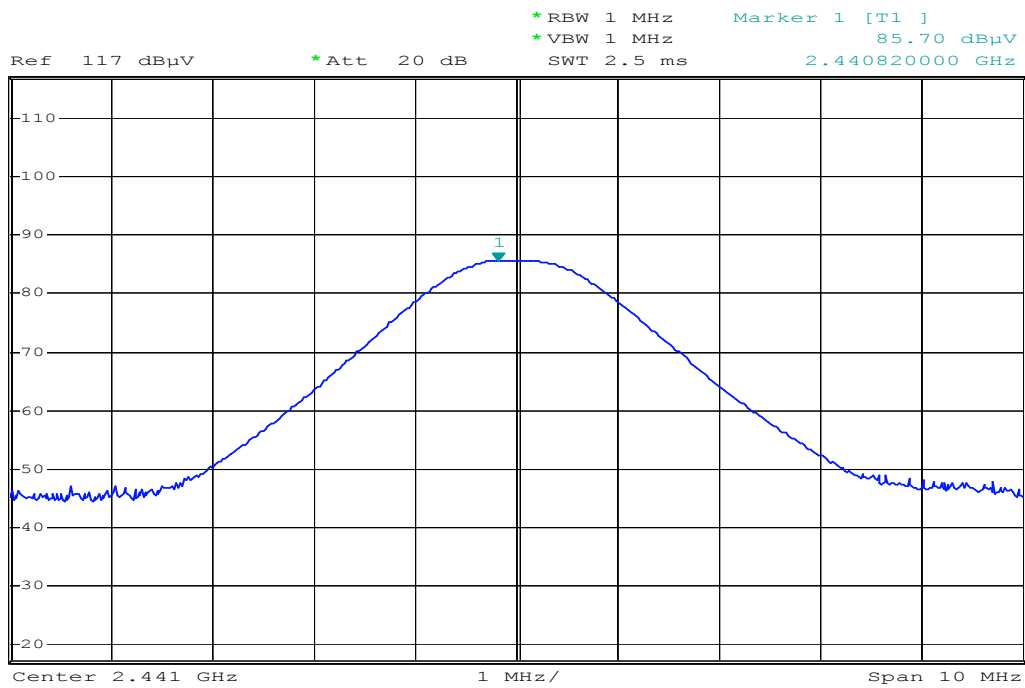
Date: 24.OCT.2008 18:23:33



CH Mid

Detector mode: Peak

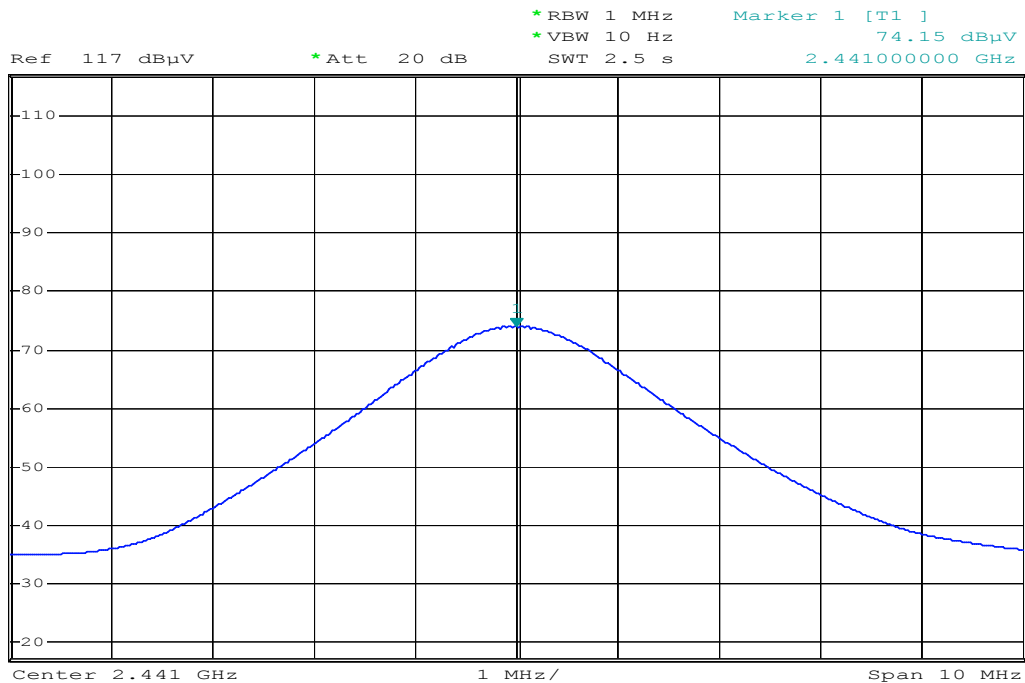
Polarity: Vertical



Date: 24.OCT.2008 18:52:49

Detector mode: Average

Polarity: Vertical

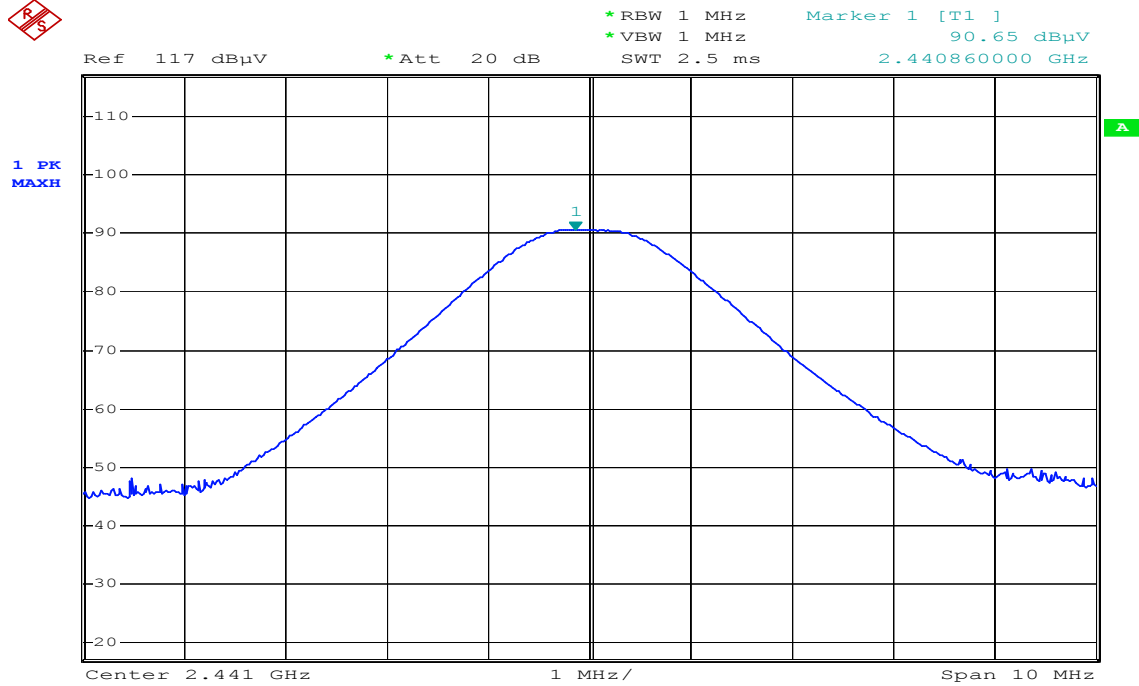


Date: 24.OCT.2008 18:53:17



Detector mode: Peak

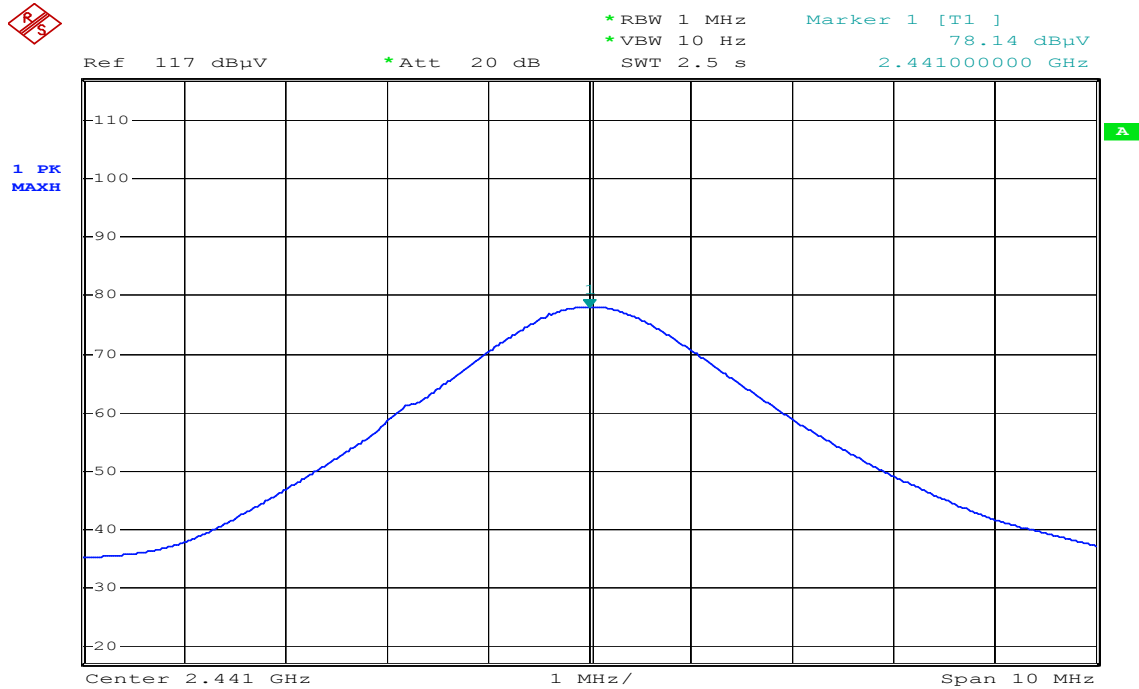
Polarity: Horizontal



Date: 24.OCT.2008 18:55:28

Detector mode: Average

Polarity: Horizontal



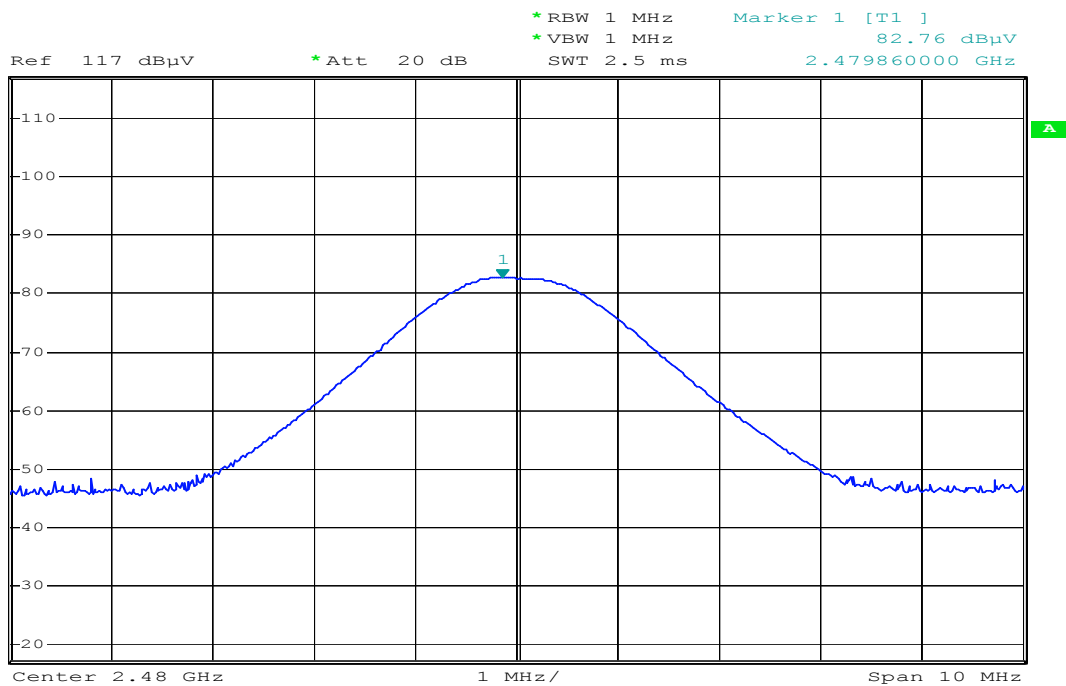
Date: 24.OCT.2008 18:56:08



CH High

Detector mode: Peak

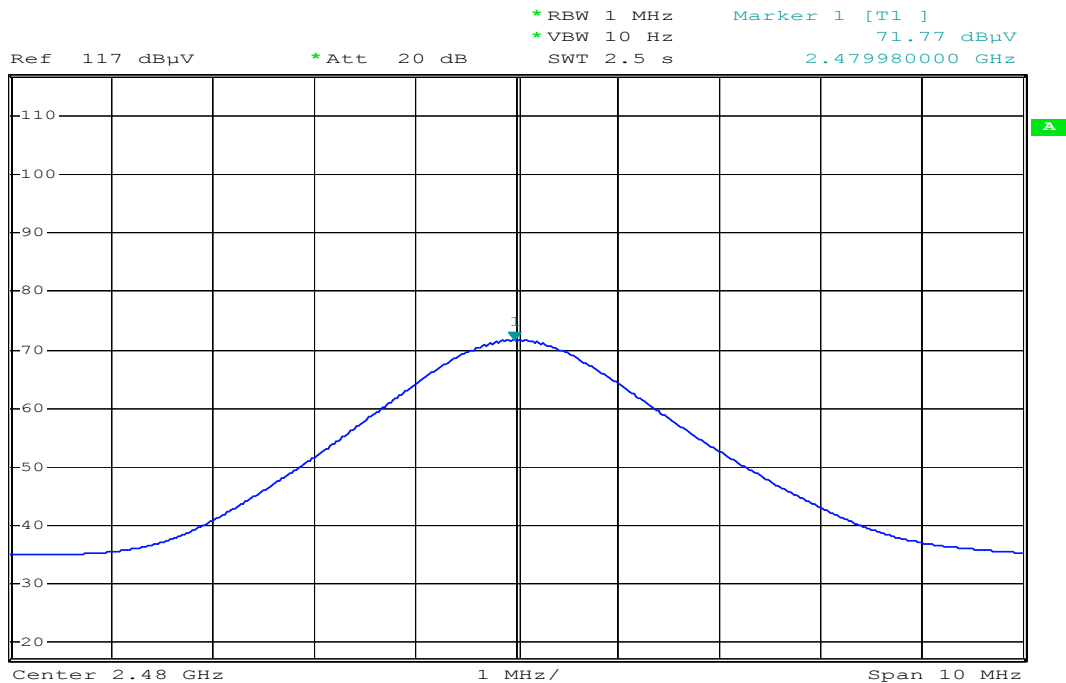
Polarity: Vertical



Date: 24.OCT.2008 18:31:38

Detector mode: Average

Polarity: Vertical

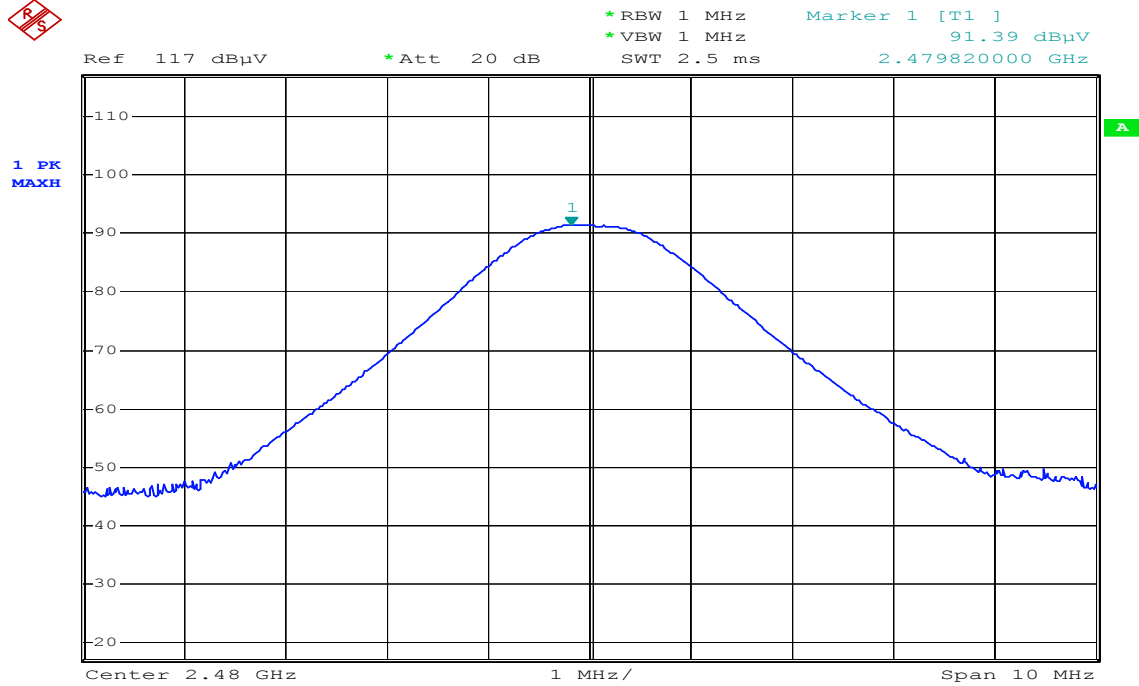


Date: 24.OCT.2008 18:31:58



Detector mode: Peak

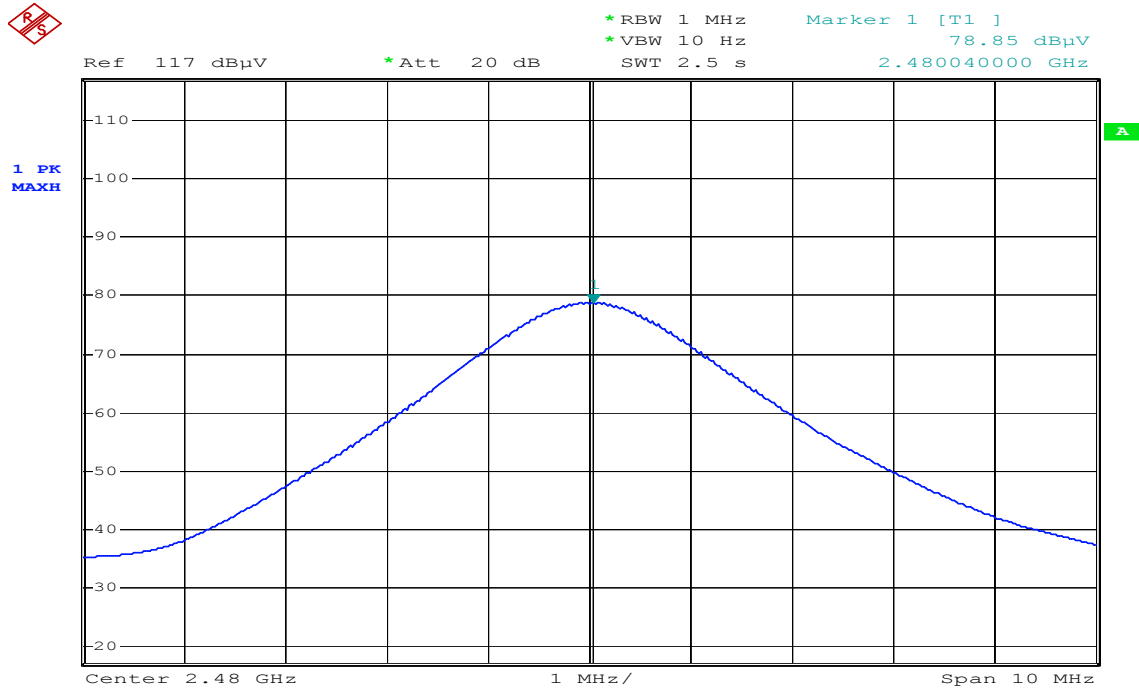
Polarity: Horizontal



Date: 24.OCT.2008 18:29:08

Detector mode: Average

Polarity: Horizontal



Date: 24.OCT.2008 18:29:30



7.3 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	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

* Decreases with the logarithm of the frequency.

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****Operation Mode:** Normal Link**Test Date:** July 25, 2008**Temperature:** 25°C**Tested by:** Bill Cheng**Humidity:** 57% RH

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.5328	20.91	8.91	9.59	30.50	18.50	56.00	46.00	-25.50	-27.50	L1
0.6148	22.61	13.51	9.59	32.20	23.10	56.00	46.00	-23.80	-22.90	L1
0.8766	21.50	10.00	9.60	31.10	19.60	56.00	46.00	-24.90	-26.40	L1
1.4078	19.46	4.26	9.64	29.10	13.90	56.00	46.00	-26.90	-32.10	L1
2.0875	20.09	7.19	9.71	29.80	16.90	56.00	46.00	-26.20	-29.10	L1
3.1969	19.88	6.58	9.72	29.60	16.30	56.00	46.00	-26.40	-29.70	L1
0.5445	20.01	11.41	9.59	29.60	21.00	56.00	46.00	-26.40	-25.00	L2
0.6188	21.41	13.21	9.59	31.00	22.80	56.00	46.00	-25.00	-23.20	L2
1.3453	18.27	5.67	9.63	27.90	15.30	56.00	46.00	-28.10	-30.70	L2
1.8492	18.91	9.11	9.69	28.60	18.80	56.00	46.00	-27.40	-27.20	L2
2.5992	16.78	3.28	9.72	26.50	13.00	56.00	46.00	-29.50	-33.00	L2
3.8570	18.07	3.77	9.73	27.80	13.50	56.00	46.00	-28.20	-32.50	L2

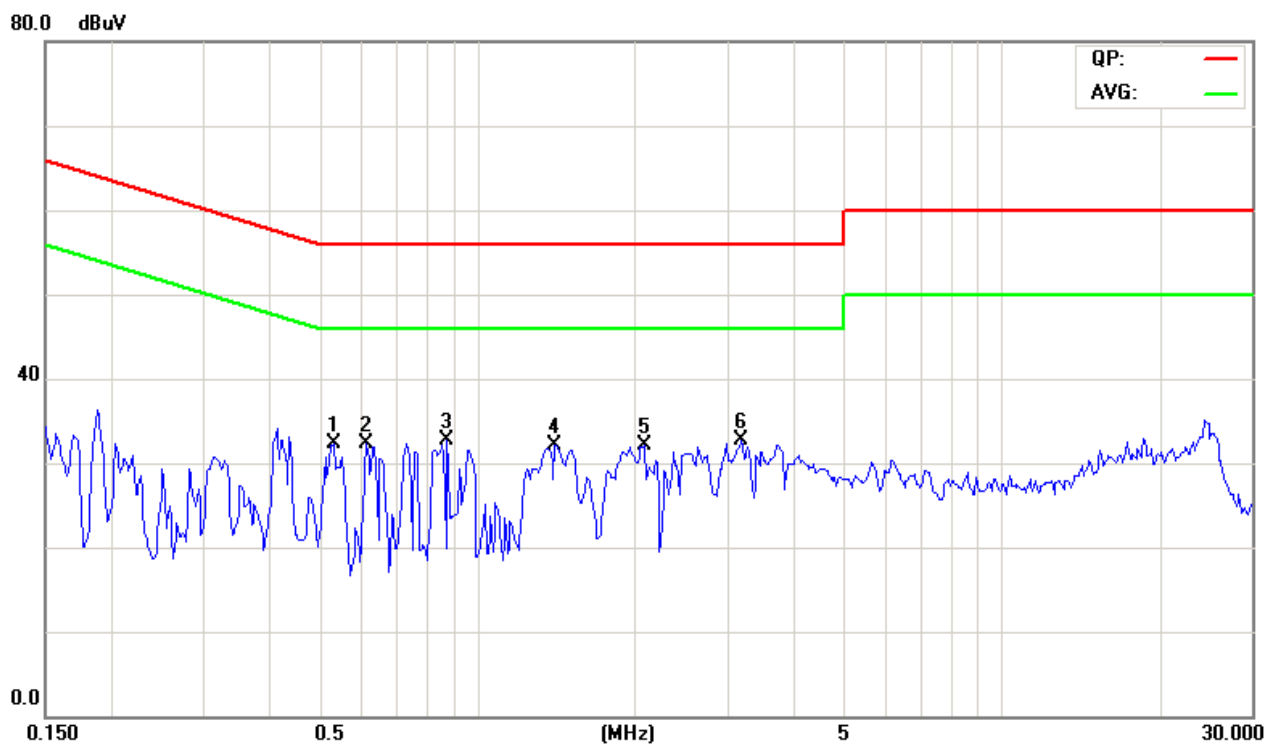
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 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
4. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
5. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)

