MEASUREMENT REPORT

of

Wireless Touch Pad

Applicant	**:**	TopSeed Technology Corp.
FCC ID	**:**	PTITSKJ-2401
EUT	**:**	Wireless touch keyboard
Model	**:**	TSKJ-2401

Test by :

Training Research Co., Ltd.

TEL : 886-2-26935155 FAX : 886-2-26934440

No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (2003) as a reference. All tests were conducted by ***Training Research Co., Ltd.***, No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.249.

Applicant	**:**	TopSeed Technology Corp.
Applicant address	**:**	9F-3, No. 16, Jain Ba Road, Chung Ho City, Taipei Hsien, Taiwan 235
Report No.	**:**	AA5151001204
Test Date	**:**	December 27, 2010

Prepared by: *Jack Tsai* **Approved by:** *Frank Tsai*

Conditions of issue :

(1) ***This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.***

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Chapter 1 General

1.1 Introduction

The following measurement report is submitted on behalf of Applicant in support of a wireless mouse certification in accordance with Part 2 Subpart J and Part 15 Subpart C of the Commission's Rules and Regulations.

1.2 Description of EUT

FCC ID	**:**	PTITSKJ-2401
Product Name	**:**	Wireless touch keyboard
Model	**:**	TSKJ-2401
Frequency Range	**:**	2400MHz ~ 2483.5Hz
Operating Frequency	**:**	2405MHz ~ 2477MHz
Modulation Skill	**:**	GFSK
Power Type	**:**	**Powered by battery.**
		Battery: Lithium-ion polymer rechargeable battery
Other:		**I/O of EUT: Mini USB port for battery recharge;**
		Power on/off button;
		Volume wheel switch; LED battery indicator

1.3 Test method

The fundamental frequency of transmitter emitted is due to a press on button of the EUT. There are security codes for avoiding the possibility of duplicating codes in adjacent systems. The coding must be matching with the companion receiver.

While testing the EUT was adjusted at a position, which transmits the maximum emission.

Test setting:

(1) Set different channel (Lowest/Middle/Highest) being tested.

(a) Radiated and conductd emmisions for intentional test:

making EUT to the mode of continuously transmission

1.4 Description of Support Equipment

NB	**:**	**IBM**
Model No.	:	2668HT
Serial No.	:	FX-V3657 01/11
FCC ID	:	Doc Approved
BSMI	:	3892B565

Power adaptor	**:**	**IBM**
Part No.	:	02K6809
Serial No.	:	S02K6309Z1Z3BH350LBL REV. D
FCC ID	:	Doc Approved
BSMI	:	3892A285
Power type	:	100 ~ 240VAC / 50 ~ 60Hz, 1.5A, Switching

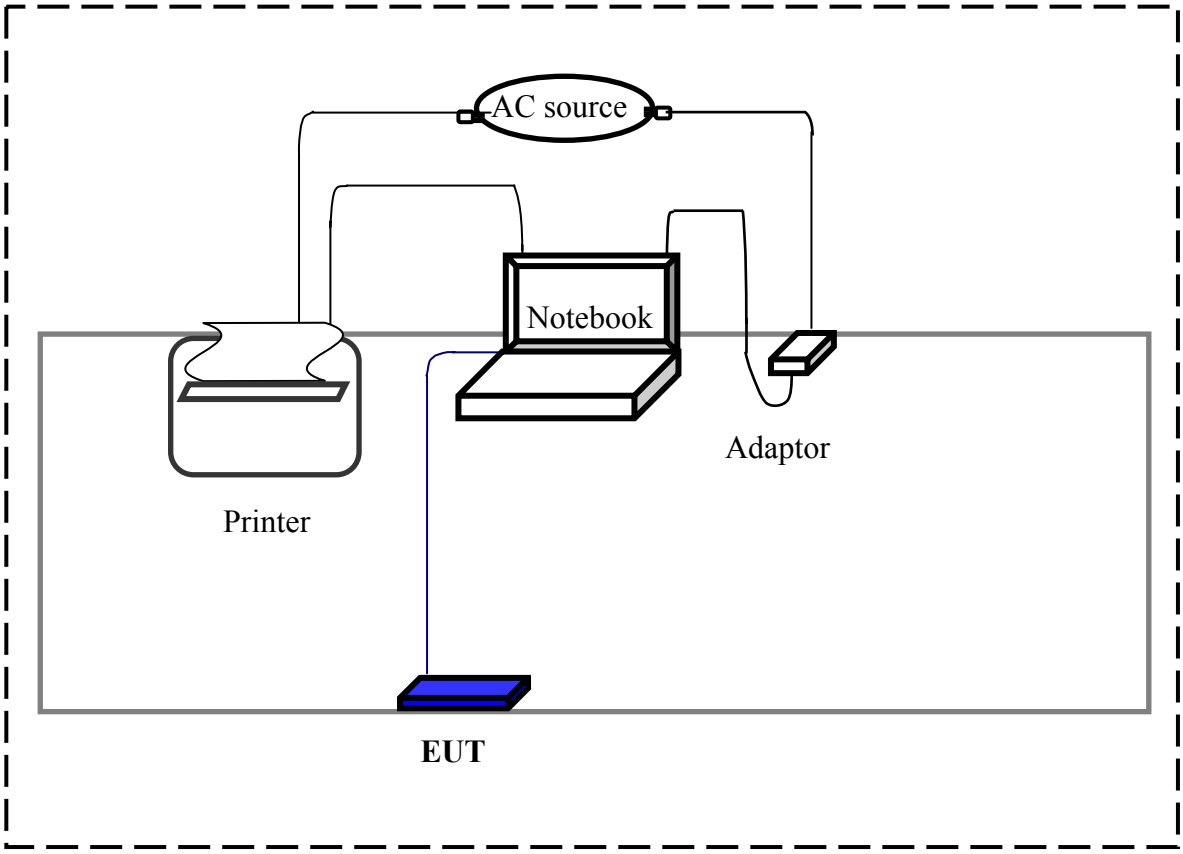
Power cord (Main power to adaptor) : Non-shielded, 1.8m length, Plastic hood, No ferrite core

Power cord (DC plug to adaptor) : Shielded, 1.8m length, Plastic hood, ferrite core

Printer	**:**	**HP**
Model No.	:	C6464A
Serial No.	:	TH16LEB5PK
FCC ID	:	N/A, DoC Approved
BSMI	:	3892H381
Power type	:	Switching adaptor
Power cord	:	Non-shielded, 180cm long, without ferrite core
Data cable	:	Shielded, 1.70m long, No ferrite core

1.5 Configuration of System Under Test

1.5.1 Radiated and Conducted emissions of test setup for EUT (Charging)



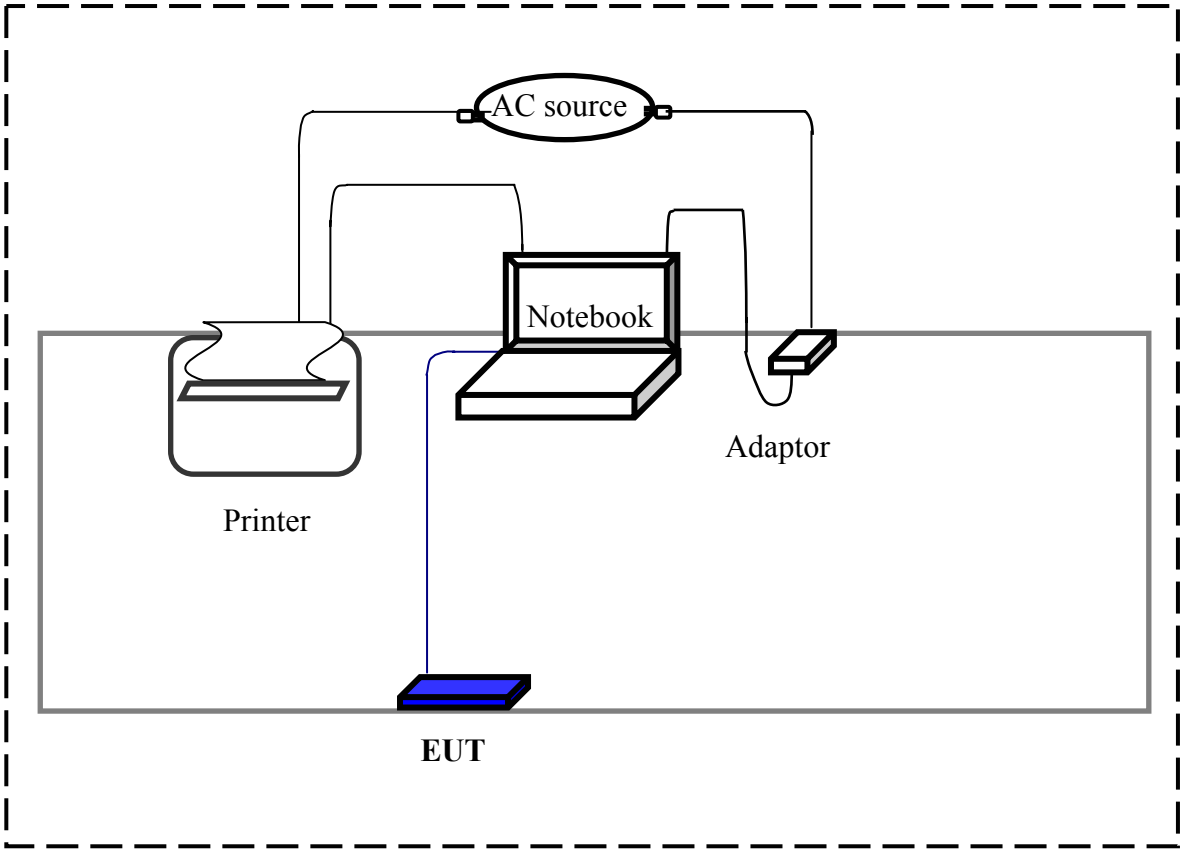
Connections of Equipment

NB: *USB Port --- a printer

*Charging Base --- **EUT**

EUT: 84cm length, Shielded, without ferrite core

1.5.2 Radiated and conducted emissions of test setup for EUT (With USB)



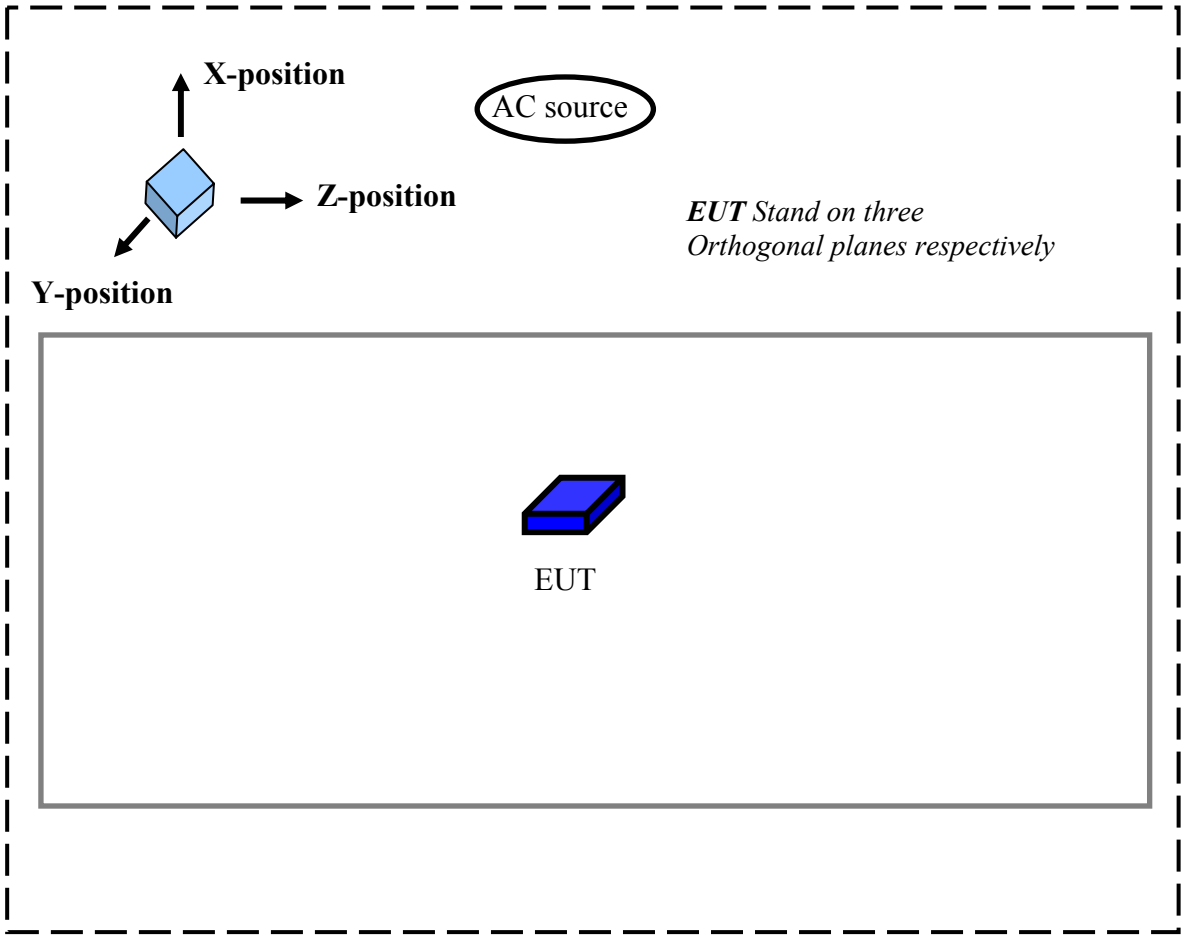
Connections of Equipment

PC: *USB #1Port --- a printer

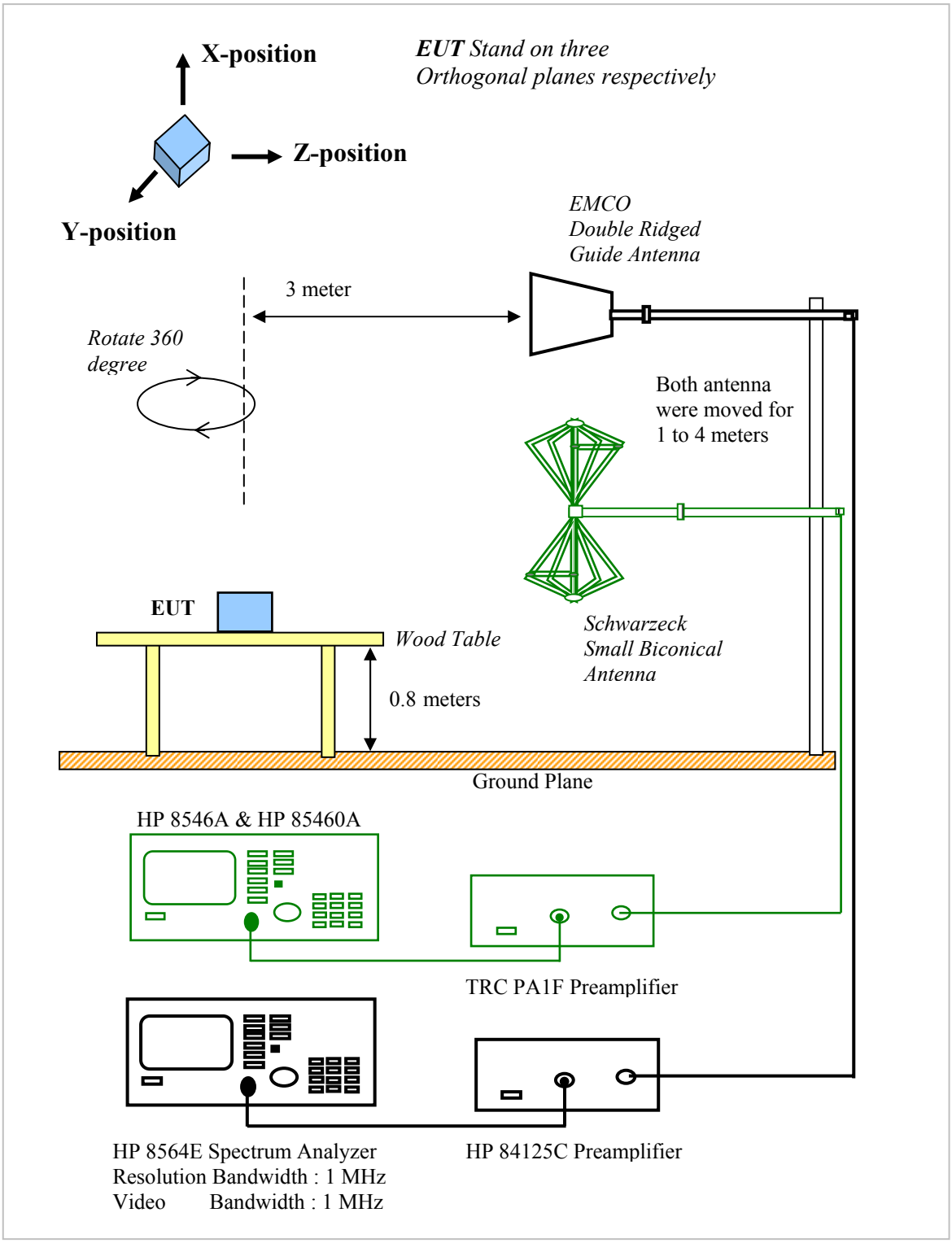
*USB #2Port --- **EUT**

EUT: 1.02m length, Shielded, without ferrite core

1.5.2 Radiated of test setup for EUT (Only EUT)



1.6 Configuration of System Under Test



1.7 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in Measurement procedure ANSI C63.4 (2003).

1.8 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter**, **Semi-anechoic Chamber (FCC Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in an semi-anechoic chamber also located at Training Research Co., Ltd. 1F, No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.9 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests was chosen as that which produced the highest emission levels. However, only those conditions which the EUT was considered likely to encounter in normal use were investigated.

In test, they were set in high power and continuously transmitting mode. The Highest, Middle and Lowest of EUT were all tested. The setting up procedure is recorded on 1.3 Test Method.

Chapter 2 Conducted Emissions Measurements

2.1 Test Condition & Setup

The power line conducted emission measurements were performed in an semi-anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak and average detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150KHz to 30MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.3

There is a test condition apply in this test item, the test procedure description as <1.3 test method>. Three channels were tested, one in the top (CH Lowest), one in the middle (CH Middle) and the other in bottom (CH Highest).

2.2 List of Test Instruments

Calibration Date

Instrument Name	Model	Brand	Serial No.	Next time
EMI Receiver	8546A	HP	3520A00242	03/12/11
RF Filter Section	85460A	HP	3448A00217	03/12/11
LISN (EUT)	3816/2	EMCO	00042976	01/26/11
LISN (Support E.)	3816/2	EMCO	00042989	01/15/11
Pre-amplifier	15542 ZFL-500	Mini – Circuits	0 0117	10/06/11
6dB Attenuator	MCL BW-S6W2	Mini – Circuits	9915 – Conducted	10/06/11
10dB Attenuator	A5542 VAT010	Mini – Circuits	0215 – Conducted	10/06/11
Coaxial Cable (2.0 meter)	A30A30-0058-50FS-2M	Jyebao	SMA-08	10/06/11
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-09	10/06/11
Coaxial Cable (20 meter)	RG-214/U	Jyebao	NP-01	10/06/11
Coaxial Cable (20 meter)	RG-214/U	Jyebao	NP-02	10/06/11
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	10/06/11

2.3 Test Result of Conducted Emissions

The following table shows a summary of the highest emissions of power line conducted emissions on the LIVE and NETURAL conductors of the EUT power cord. Show as follows.

Test Conditions: Temperature : 25 °C Humidity : 73 % RH

Test mode: Charging mode

Power Connected Emissions					***Class B***		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	522.770	45.48	40.50	20.80	56.00	46.00	-15.50
	595.280	46.09	38.55	16.56	56.00	46.00	-17.45
	629.155	46.42	40.21	19.30	56.00	46.00	-15.79
	752.000	42.71	---	---	56.00	46.00	-3.29
	844.915	44.76	37.89	21.14	56.00	46.00	-18.11
	1081.000	39.70	---	---	56.00	46.00	-6.30
Line 2	504.000	42.80	---	---	56.00	46.00	-3.20
	541.055	45.27	41.91	20.70	56.00	46.00	-14.71
	624.100	46.51	40.81	19.29	56.00	46.00	-15.33
	688.000	42.34	---	---	56.00	46.00	-3.66
	744.660	44.25	41.05	24.10	56.00	46.00	-14.95
	848.245	45.27	39.72	20.54	56.00	46.00	-16.28

NOTE:

(1)Margin = Peak Amplitude – Limit, *The reading amplitudes are all under limit.*

(2)A "+" sign in the margin column means the emission is OVER the Class B Limit and "–" sign of means UNDER the Class B limit

Test mode: Channel Lowest

Power Connected Emissions					*Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	308.000	45.92	---	---	61.49	51.49	-5.57
	359.000	45.50	---	---	60.03	50.03	-4.53
	528.000	42.69	---	---	56.00	46.00	-3.31
	573.725	45.81	40.40	19.61	56.00	46.00	-15.60
	667.700	46.06	39.79	19.37	56.00	46.00	-16.21
	802.000	41.26	---	---	56.00	46.00	-4.74
Line 2	355.000	45.97	---	---	60.14	50.14	-4.17
	443.000	40.77	---	---	57.63	47.63	-6.86
	554.155	44.61	40.16	22.26	56.00	46.00	-15.84
	621.555	46.00	39.65	17.57	56.00	46.00	-16.35
	863.625	45.14	38.07	22.29	56.00	46.00	-17.93
	17980.000	44.22	---	---	60.00	50.00	-5.78

Test mode: Channel Middle

Power Connected Emissions					*Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	518.000	42.87	---	---	56.00	46.00	-3.13
	579.365	45.67	40.39	19.79	56.00	46.00	-15.61
	658.220	45.70	39.14	17.25	56.03	46.03	-16.86
	745.000	42.25	---	---	56.00	46.00	-3.75
	1102.000	40.07	---	---	56.00	46.00	-5.93
	17890.000	45.30	---	---	60.00	50.00	-4.70
Line 2	515.165	44.91			56.00	46.00	-16.07
	578.705	45.69			56.00	46.00	-15.71
	645.705	45.10			56.00	46.00	-16.30
	759.560	43.73			56.00	46.00	-15.45
	841.000	41.96	---	---	56.00	46.00	-4.04
	17980.000	46.33	---	---	60.00	50.00	-3.67

Test mode: Channel Highest

Power Connected Emissions					*Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	305.000	46.41	---	---	61.57	51.57	-5.16
	485.000	41.79	---	---	56.43	46.43	-4.64
	550.375	44.65	40.38	21.32	56.00	46.00	-15.62
	664.740	45.57	39.73	18.11	56.00	46.00	-16.27
	781.000	41.34	---	---	56.00	46.00	-4.66
	18070.000	43.36	---	---	60.00	50.00	-6.64
Line 2	516.015	44.51	40.45	25.66	56.00	46.00	-15.55
	566.190	44.96	39.37	19.30	56.00	46.00	-16.63
	625.155	46.28	39.44	16.74	56.00	46.00	-16.56
	676.680	45.87	38.09	17.50	56.00	46.00	-17.91
	820.960	44.30	38.22	22.00	56.00	46.00	-17.78
	1006.000	42.11	---	---	56.00	46.00	-3.89

Chapter 3 Transmitter Duty Cycle Measurements

3.1 Test Condition and Setup

The duty cycle measurements were performed in a shielded enclosure. The EUT was placed on a wooded table which is 0.8 meters height and a bi-log periodic antenna was used distance about 3 meters for receiving. While testing EUT was set to transmit continuously. Various key configurations were also investigated to find the maximum duty cycle.

The resolution bandwidth and video bandwidth of the spectrum analyzer was all set to 1MHz to encompass all significant spectral components during the test. The analyzer operated in linear scale and zero span mode after tuning to the transmitter carrier frequency. The spectrum analyzer measured pules width. The pulse width was determined by the difference between the two half voltage points on a pulse.

The duty cycle was determined by the following equation:

$$\text{Duty Cycle (\%)} = \frac{\text{Total on interval in a complete pulse train}}{\text{Length of a complete pulse train}} \text{ X } 100\%$$

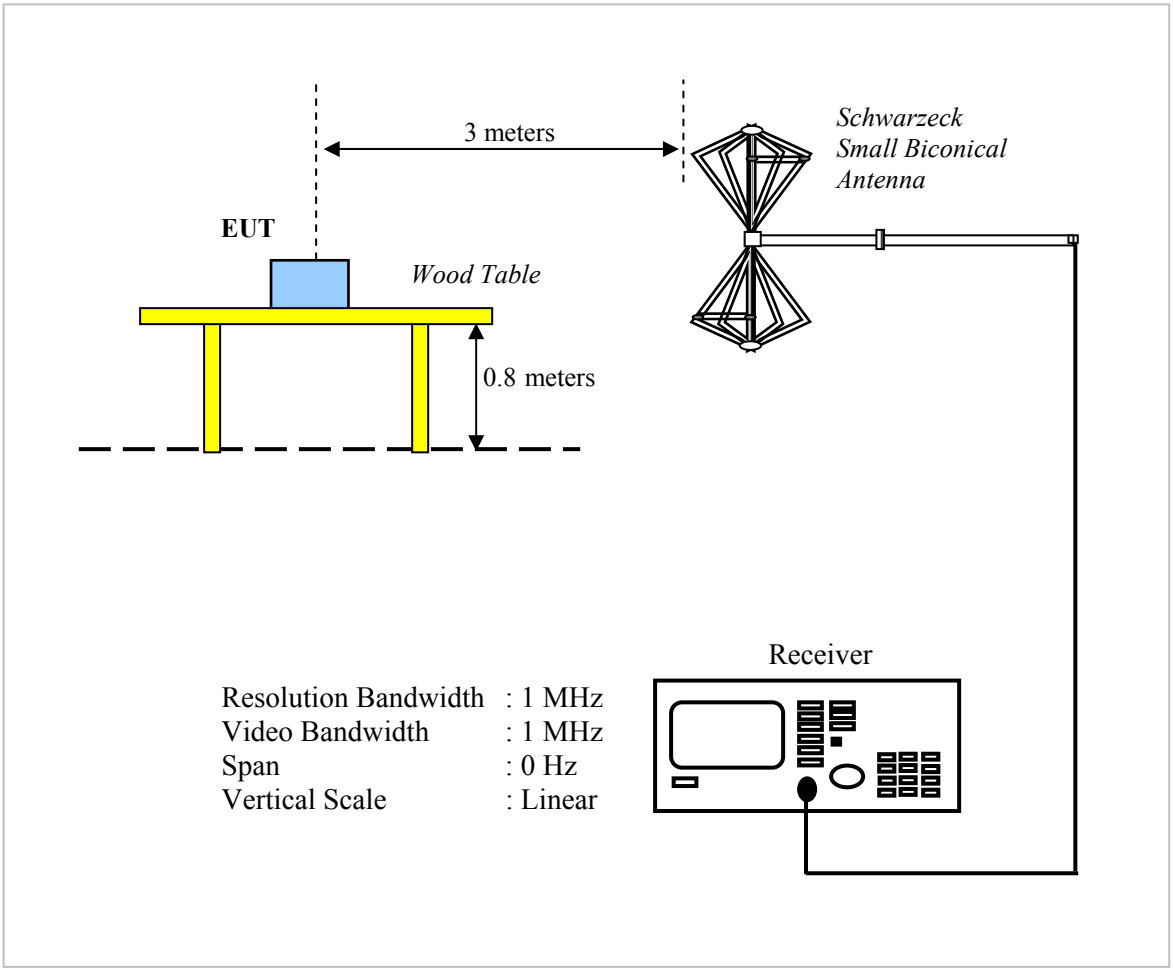
To calculate the actual field intensity, the duty cycle correction factor in decibel is needed for later use and be obtained from following conversion:

Duty Cycle Correction Factor (dB) = 20 X Log_{10} Duty Cycle

3.2 List of Test Instruments

				Calibration Date
Instrument Name	**Model No.**	**Brand**	**Serial No.**	**Next time**
EMI Receiver	8546A	HP	3520A00242	03/12/11
RF Filter Section	85460A	HP	3448A00217	03/12/11
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/15/11
Spectrum Analyzer	8564E	HP	3720A00840	03/03/11
Microwave Preamplifier	84125C	HP	US36433002	10/19/11
Small Biconical Antenna	UBAA9114 & BBVU9135	SCHWARZECK	127	09/21/11

3.3 Test Instruments Configuration



3.4 Test Result

Following is the test result, which produce maximum duty cycle:

Total on interval in a complete pulse train

= 186μs*16

Length of a complete pulse train

= 65.00ms

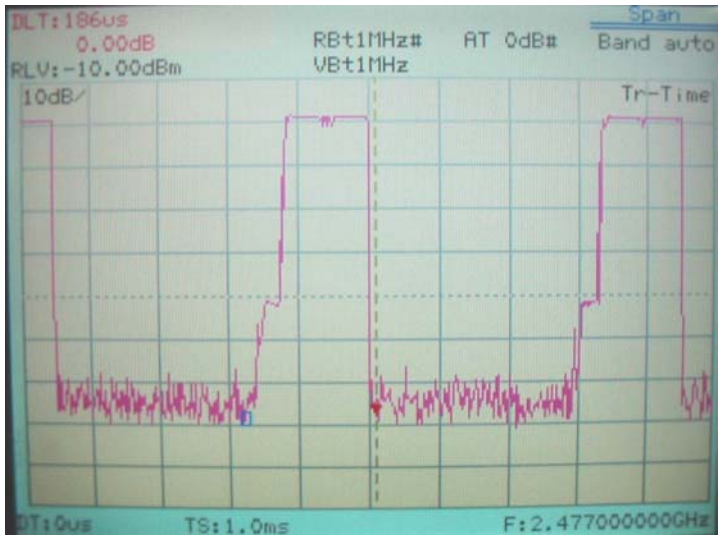
Duty Cycle (%) = 2.976ms / 65.00ms * 100% = 0.04578

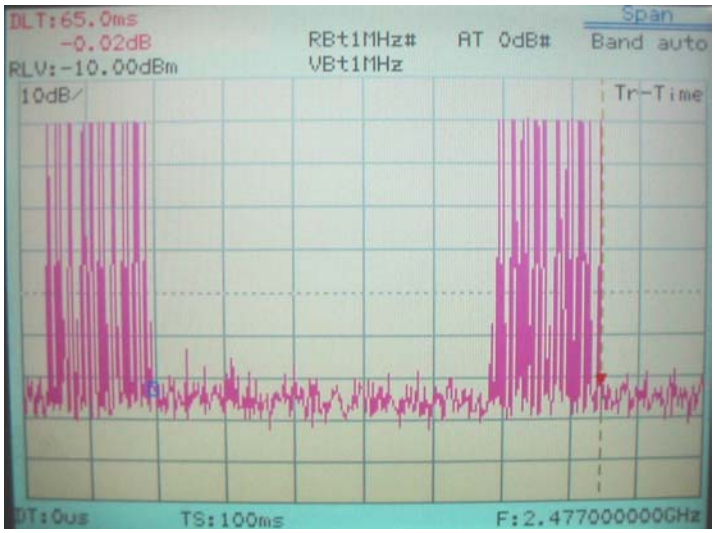
Duty Cycle Correction Factor (dB) = 20 * Log (0.04578) = -26.79

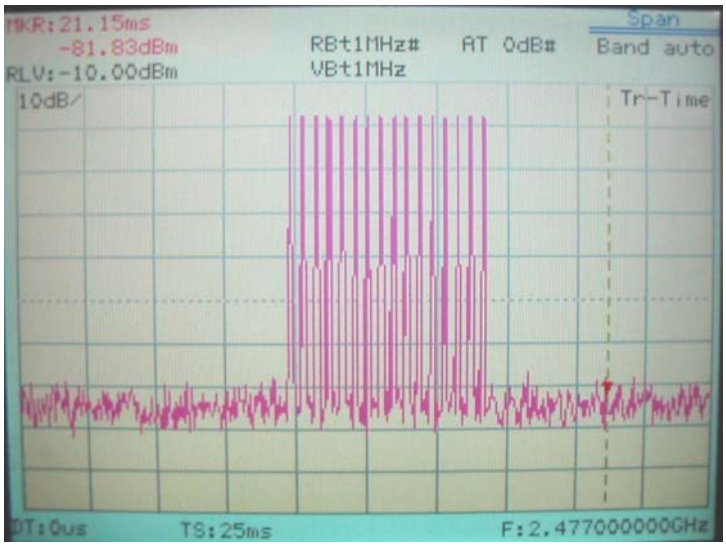
Maximum duty cycle according to FCC part 15.35(b): -20dB

A plot is attached on the following page.

Duty Cycle Test Picture







Chapter 4 Radiated Emissions Measurements

4.1 Test Condition & Setup

We'd performed the test by the radiated emission skill: The EUT was placed in a semi-anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we'd set the spectrum analyzer's 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, semi-anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, SCHWARZECK whole range Small Biconical Antenna (model: UBAA9114 & BBVU9135) is used to measure frequency from 30 MHz to 1GHz. The final test is used the HP 85460A spectrum and 8564E spectrum was examined from 1GHz to 25GHz using an Hewlett Packard Spectrum Analyzer, EMCO/HP Horn Antenna (Model 3115 / 84125-80008) for 1G - 25GHz.

A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 25GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 25GHz) and the analyzer was operated in the maximum hold mode. There is a test condition applies in this test item, the test procedure description as the following:

Three channels were tested, one in the top, one in the middle and the other in bottom. The setting up procedure is recorded on <1.3>

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, with *duty cycle* is present.

For frequency between 30MHz to 1000MHz

FIa (dBuV/m) = FIr (dBμV) + Correction Factors + Duty Cycle

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna factor + (Cable loss – Amplitude gain) + Switching box loss

For frequency between 1GHz to 25GHz

FIa (dBμV/m) = FIr (dBμV) + Correction Factor + Duty Cycle

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna factor + (Cable loss – Amplitude gain) + Switching box loss

4.2 List of Test Instruments

Calibration Date

Instrument Name	Model No.	Brand	Serial No.	Next time
EMI Receiver	8546A	HP	3520A00242	03/12/11
RF Filter Section	85460A	HP	3448A00217	03/12/11
Small Biconical Antenna	UBAA9114 & BBVU9135	SCHWARZECK	127	09/21/11
Pre-amplifier	PA1F	TRC	1FAC	10/06/11
Coaxial Cable (Double shielded, 15 meter)	A30A30-0058-50FS-15M	JYEBAO	SMA-01	10/06/11
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	JYEBAO	SMA-02	10/06/11
Spectrum Analyzer	8564E	HP	3720A00840	03/03/11
Microwave Preamplifier	84125C	HP	US36433002	10/19/11
Horn Antenna	3115	EMCO	9104-3668	01/20/11
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	01/19/11
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	01/15/11
Horn Antenna	1196E (3115)	HP (EMCO)	9704-5178	01/15/11
Pre-amplifier	PA2F	TRC	2F1GZ	04/10/11
Coaxial Cable (3 miter)	A30A30-0058-50FST118	JYEBAO	MSA-05	04/10/11
Coaxial Cable (1 meter)	A30A30-0058-50FST118	JYEBAO	MSA-04	04/10/11

4.3 Test Result of Radiated Emissions

The peak values of fundamental emissions from the EUT at various antenna heights, antenna polarization, EUT orientation, etc. are recorded on the following.

Testing room : Temperature : 25 ° C Humidity : 73 % RH

With USB

Fundamental Emissions

Channel	Frequency (MHz)	A. P. (H/V)	A.H. (m)	Table (degree)	Peak (dBμV/m)	Duty Cycle	True Value (dBμV/m)	Limit (dBμV)	Margin (dBμV)
Lowest	2405	H	1.00	173	97.89	-20.00	77.89	94.00	-16.11
		V	1.00	243	85.55	-20.00	65.55	94.00	-28.45
Middle	2442	H	1.00	144	98.33	-20.00	78.33	94.00	-15.67
		V	1.00	193	85.82	-20.00	65.82	94.00	-28.18
Highest	2477	H	1.00	142	98.26	-20.00	78.26	94.00	-15.74
		V	1.00	83	85.26	-20.00	65.26	94.00	-28.74

Only EUT

Fundamental Emissions

Channel	Frequency (MHz)	A. P. (H/V)	A.H. (m)	Table (degree)	Peak (dBμV/m)	Duty Cycle	True Value (dBμV/m)	Limit (dBμV)	Margin (dBμV)
Lowest	2405	H	1.00	130	97.55	-20.00	77.55	94.00	-16.45
		V	1.00	12	91.22	-20.00	71.22	94.00	-22.78
Middle	2442	H	1.00	177	98.16	-20.00	78.16	94.00	-15.84
		V	1.00	165	94.16	-20.00	74.16	94.00	-19.84
Highest	2477	H	1.00	100	97.93	-20.00	77.93	94.00	-16.07
		V	1.00	93	94.43	-20.00	74.43	94.00	-19.57

Note:

1. A. P. means antenna polarization, horizontal and vertical.
2. A. H. means antenna height.
3. Table means turntable turning position.
4. Peak amplitude means the fundamental emission measured.
5. True Value = Peak Value + Duty Cycle
6. Margin = True Value – Limit

4.4 Test Result of Spurious Radiated Emissions

The highest peak values of radiated emissions form the EUT at various antenna heights, antenna polarization, EUT orientation, etc. are recorded on the following.

Testing room : Temperature : 25 °C Humidity : 73% RH

Charging mode

Radiated Emissions of Horizontal for 30MHz to 25GHz

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
247.04	41.58	1.00	146	-3.32	38.26	---	38.26	46.00	-7.74
302.81	39.21	1.00	268	-2.86	36.35	---	36.35	46.00	-9.65
580.48	34.18	1.00	111	5.91	40.09	---	40.09	46.00	-5.91
732.04	32.10	1.00	350	9.86	41.96	---	41.96	46.00	-4.04
772.05	29.45	1.00	156	10.74	40.19	---	40.19	46.00	-5.81
2402.50	34.58	1.00	308	6.35	40.93	-20.00	20.93	53.96	-33.03
3217.08	32.90	1.00	165	9.65	42.55	-20.00	22.55	53.96	-31.41
5377.50	26.24	1.00	287	16.70	42.94	-20.00	22.94	53.96	-31.02
9868.33	21.74	1.00	201	23.11	44.85	-20.00	24.85	53.96	-29.11

Radiated Emissions of Vertical for 30MHz to 25GHz

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
34.85	32.16	1.00	91	6.14	38.30	---	38.30	40.00	-1.70
57.89	29.26	1.00	347	2.00	31.26	---	31.26	40.00	-8.74
580.48	32.11	1.00	80	5.91	38.02	---	38.02	46.00	-7.98
732.04	33.69	1.00	161	9.86	43.55	---	43.55	46.00	-2.45
772.05	28.41	1.00	175	10.74	39.15	---	39.15	46.00	-6.85
1205.42	38.91	1.00	324	1.00	39.91	-20.00	19.91	53.96	-34.05
2487.50	32.24	1.00	248	6.83	39.07	-20.00	19.07	53.96	-34.89
3422.50	32.24	1.00	263	10.21	42.45	-20.00	22.45	53.96	-31.51
6695.00	23.24	1.00	18	19.54	42.78	-20.00	22.78	53.96	-31.18
11540.00	22.91	1.00	10	21.65	44.56	-20.00	24.56	53.96	-29.40

With USB

Radiated Emissions of Horizontal for 30MHz to 25GHz [Lowest Channel]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
36.06	24.72	1.00	183	5.88	30.60	---	30.60	40.00	-9.40
301.60	39.92	1.00	343	-2.88	37.04	---	37.04	46.00	-8.96
580.48	33.52	1.00	101	5.91	39.43	---	39.43	46.00	-6.57
732.04	30.61	1.00	301	9.86	40.47	---	40.47	46.00	-5.53
772.05	28.52	1.00	147	10.74	39.26	---	39.26	46.00	-6.74
2258.33	35.84	1.00	24	8.81	44.65	-20.00	24.65	53.96	-29.31
4810.21	55.61	1.00	253	3.71	59.32	-20.00	39.32	53.96	-14.64
7214.37	41.78	1.00	121	9.97	51.75	-20.00	31.75	53.96	-22.21
9620.21	39.27	1.00	117	11.39	50.66	-20.00	30.66	53.96	-23.30
19239.58	47.30	1.00	349	1.60	48.90	-20.00	28.90	53.96	-25.06
24049.17	46.32	1.00	113	3.33	49.65	-20.00	29.65	53.96	-24.31

Radiated Emissions of Vertical for 30MHz to 25GHz [Lowest Channel]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
32.42	28.44	1.00	310	7.13	35.57	---	35.57	40.00	-4.43
194.90	38.26	1.00	321	-3.52	34.74	---	34.74	43.50	-8.76
580.48	34.42	1.00	134	5.91	40.33	---	40.33	46.00	-5.67
732.04	33.09	1.00	152	9.86	42.95	---	42.95	46.00	-3.05
772.05	29.56	1.00	187	10.74	40.30	---	40.30	46.00	-5.70
1687.50	35.33	1.00	137	12.97	48.30	-20.00	28.30	53.96	-25.66
4811.04	45.77	1.00	128	3.71	49.48	-20.00	29.48	53.96	-24.48
7215.62	39.44	1.00	9	9.98	49.42	-20.00	29.42	53.96	-24.54
19239.58	47.45	1.00	353	1.60	49.05	-20.00	29.05	53.96	-24.91
21644.37	45.69	1.00	163	2.82	48.51	-20.00	28.51	53.96	-25.45
24049.17	46.15	1.00	115	3.33	49.48	-20.00	29.48	53.96	-24.48

Radiated Emissions of Horizontal for 30MHz to 25GHz [Middle Channel]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
37.27	27.18	1.00	3	5.66	32.84	---	32.84	40.00	-7.16
244.61	41.06	1.00	231	-3.47	37.59	---	37.59	46.00	-8.41
580.48	32.54	1.00	108	5.91	38.45	---	38.45	46.00	-7.55
732.04	31.53	1.00	350	9.86	41.39	---	41.39	46.00	-4.61
772.65	28.33	1.00	154	10.74	39.07	---	39.07	46.00	-6.93
1722.92	34.67	1.00	351	12.41	47.08	-20.00	27.08	53.96	-26.88
4883.54	53.11	1.00	274	3.99	57.10	-20.00	37.10	53.96	-16.86
7324.37	41.77	1.00	107	10.33	52.10	-20.00	32.10	53.96	-21.86
9765.21	38.11	1.00	102	11.90	50.01	-20.00	30.01	53.96	-23.95
19537.08	49.00	1.00	358	1.70	50.70	-20.00	30.70	53.96	-23.26
21977.29	47.72	1.00	166	2.91	50.63	-20.00	30.63	53.96	-23.33

Radiated Emissions of Vertical for 30MHz to 25GHz [Middle Channel]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
34.85	29.14	1.00	173	6.14	35.28	---	35.28	40.00	-4.72
193.69	38.15	1.00	309	-3.58	34.57	---	34.57	43.50	-8.93
580.48	35.53	1.00	138	5.91	41.44	---	41.44	46.00	-4.56
732.04	34.19	1.00	163	9.86	44.05	---	44.05	46.00	-1.95
770.84	30.69	1.00	170	10.70	41.39	---	41.39	46.00	-4.61
1656.25	34.84	1.00	150	13.45	48.29	-20.00	28.29	53.96	-25.67
4883.54	45.61	1.00	88	3.99	49.60	-20.00	29.60	53.96	-24.36
7324.37	39.10	1.00	5	10.33	49.43	-20.00	29.43	53.96	-24.53
19537.08	48.79	1.00	340	1.70	50.49	-20.00	30.49	53.96	-23.47
21977.29	47.56	1.00	144	2.91	50.47	-20.00	30.47	53.96	-23.49
24421.04	47.08	1.00	126	3.03	50.11	-20.00	30.11	53.96	-23.85

Radiated Emissions of Horizontal for 30MHz to 25GHz [Highest Channel]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
32.42	30.80	1.00	333	7.13	37.93	---	37.93	40.00	-2.07
37.27	27.18	1.00	55	5.66	32.84	---	32.84	40.00	-7.16
302.81	42.35	1.00	357	-2.86	39.49	---	39.49	46.00	-6.51
732.04	34.56	1.00	207	9.86	44.42	---	44.42	46.00	-1.58
770.84	29.39	1.00	168	10.70	40.09	---	40.09	46.00	-5.91
1695.83	35.00	1.00	134	12.84	47.84	-20.00	27.84	53.96	-26.12
4956.04	51.94	1.00	313	4.23	56.17	-20.00	36.17	53.96	-17.79
7433.12	42.61	1.00	167	10.34	52.95	-20.00	32.95	53.96	-21.01
19816.87	46.95	1.00	294	1.90	48.85	-20.00	28.85	53.96	-25.11
22292.50	45.76	1.00	63	3.33	49.09	-20.00	29.09	53.96	-24.87
24771.67	47.29	1.00	123	2.26	49.55	-20.00	29.55	53.96	-24.41

Radiated Emissions of Vertical for 30MHz to 25GHz [Highest Channel]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
32.42	28.16	1.00	161	7.13	35.29	---	35.29	40.00	-4.71
194.90	38.03	1.00	306	-3.52	34.51	---	34.51	43.50	-8.99
580.48	35.15	1.00	132	5.91	41.06	---	41.06	46.00	-4.94
732.04	33.26	1.00	163	9.86	43.12	---	43.12	46.00	-2.88
773.66	29.70	1.00	170	10.78	40.48	---	40.48	46.00	-5.52
1693.75	35.50	1.00	182	12.87	48.37	-20.00	28.37	53.96	-25.59
7433.12	37.78	1.00	28	10.34	48.12	-20.00	28.12	53.96	-25.84
12387.29	38.10	1.00	325	9.08	47.18	-20.00	27.18	53.96	-26.78
19816.87	47.22	1.00	297	1.90	49.12	-20.00	29.12	53.96	-24.84
22292.50	45.87	1.00	83	3.33	49.20	-20.00	29.20	53.96	-24.76
24771.67	47.21	1.00	123	2.26	49.47	-20.00	29.47	53.96	-24.49

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)
3. Peak Value = Reading Amplitude + Correction Factors
4. True Value = Peak Value + Duty Cycle

Only EUT

Radiated Emissions of Horizontal for 30MHz to 25GHz [Lowest Channel, X-plane]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
38.49	21.31	1.00	264	5.43	26.74	---	26.74	40.00	-13.26
93.05	28.07	1.00	199	-0.15	27.92	---	27.92	43.50	-15.58
99.11	25.47	1.00	176	-0.48	24.99	---	24.99	43.50	-18.51
321.00	26.64	1.00	115	-2.64	24.00	---	24.00	46.00	-22.00
778.11	21.98	1.00	273	10.93	32.91	---	32.91	46.00	-13.09
2156.25	36.16	1.00	125	8.53	44.69	-20.00	24.69	53.96	-29.27
4810.19	50.61	1.00	186	3.71	54.32	-20.00	34.32	53.96	-19.64
7215.30	43.91	1.00	139	9.98	53.89	-20.00	33.89	53.96	-20.07
19239.58	47.32	1.00	349	1.60	48.92	-20.00	28.92	53.96	-25.04
21644.37	45.66	1.00	169	2.82	48.48	-20.00	28.48	53.96	-25.48
24049.17	46.15	1.00	126	3.33	49.48	-20.00	29.48	53.96	-24.48

Radiated Emissions of Vertical for 30MHz to 25GHz [Lowest Channel, Y-plane]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
31.21	22.94	1.00	255	7.62	30.56	---	30.56	40.00	-9.44
93.05	26.22	1.00	34	-0.15	26.07	---	26.07	43.50	-17.43
99.11	23.26	1.00	309	-0.48	22.78	---	22.78	43.50	-20.72
324.64	26.06	1.00	88	-2.59	23.47	---	23.47	46.00	-22.53
567.14	21.31	1.00	87	5.54	26.85	---	26.85	46.00	-19.15
2262.50	34.84	1.00	163	8.82	43.66	-20.00	23.66	53.96	-30.30
4810.22	51.61	1.00	171	3.71	55.32	-20.00	35.32	53.96	-18.64
7215.62	39.77	1.00	13	9.98	49.75	-20.00	29.75	53.96	-24.21
9620.21	36.27	1.00	5	11.39	47.66	-20.00	27.66	53.96	-26.30
19239.58	47.78	1.00	342	1.60	49.38	-20.00	29.38	53.96	-24.58
21644.37	45.23	1.00	75	2.82	48.05	-20.00	28.05	53.96	-25.91

Radiated Emissions of Horizontal for 30MHz to 25GHz [Middle Channel, X-plane]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
93.05	25.37	1.00	168	-0.15	25.22	---	25.22	43.50	-18.28
100.32	22.52	1.00	117	-0.57	21.95	---	21.95	43.50	-21.55
196.11	26.25	1.00	250	-3.47	22.78	---	22.78	43.50	-20.72
323.42	28.74	1.00	79	-2.60	26.14	---	26.14	46.00	-19.86
683.54	21.87	1.00	87	9.03	30.90	---	30.90	46.00	-15.10
1608.33	35.83	1.00	101	14.20	50.03	-20.00	30.03	53.96	-23.93
4884.20	49.27	1.00	174	3.99	53.26	-20.00	33.26	53.96	-20.70
7326.33	44.60	1.00	89	10.33	54.93	-20.00	34.93	53.96	-19.03
19537.08	48.99	1.00	354	1.70	50.69	-20.00	30.69	53.96	-23.27
21977.29	46.49	1.00	153	3.91	50.40	-20.00	30.40	53.96	-23.56
24421.04	46.99	1.00	133	3.03	50.02	-20.00	30.02	53.96	-23.94

Radiated Emissions of Vertical for 30MHz to 25GHz [Middle Channel, Y-plane]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
31.21	21.91	1.00	187	7.62	29.53	---	29.53	40.00	-10.47
34.85	21.78	1.00	21	6.14	27.92	---	27.92	40.00	-12.08
91.84	26.66	1.00	180	-0.09	26.57	---	26.57	43.50	-16.93
557.44	21.97	1.00	269	5.27	27.24	---	27.24	46.00	-18.76
683.54	21.68	1.00	140	9.03	30.71	---	30.71	46.00	-15.29
2189.58	40.00	1.00	344	8.62	48.62	-20.00	28.62	53.96	-25.34
4884.19	50.44	1.00	272	3.99	54.43	-20.00	34.43	53.96	-19.53
7324.37	39.10	1.00	63	10.33	49.43	-20.00	29.43	53.96	-24.53
19537.08	49.28	1.00	343	1.70	50.98	-20.00	30.98	53.96	-22.98
21977.29	47.54	1.00	167	2.91	50.45	-20.00	30.45	53.96	-23.51
24421.04	46.93	1.00	144	3.03	49.96	-20.00	29.96	53.96	-24.00

Radiated Emissions of Horizontal for 30MHz to 25GHz [Highest Channel, X-plane]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
37.27	21.07	1.00	304	5.66	26.73	---	26.73	40.00	-13.27
93.05	26.20	1.00	219	-0.15	26.05	---	26.05	43.50	-17.45
99.11	24.95	1.00	155	-0.48	24.47	---	24.47	43.50	-19.03
444.67	24.24	1.00	321	0.95	25.19	---	25.19	46.00	-20.81
739.31	21.92	1.00	199	9.93	31.85	---	31.85	46.00	-14.15
1666.67	34.67	1.00	319	13.29	47.96	-20.00	27.96	53.96	-26.00
4945.18	49.42	1.00	306	4.23	53.65	-20.00	33.65	53.96	-20.31
7431.30	44.27	1.00	193	10.35	54.62	-20.00	34.62	53.96	-19.34
9910.21	37.78	1.00	175	11.73	49.51	-20.00	29.51	53.96	-24.45
19816.87	46.99	1.00	297	1.90	48.89	-20.00	28.89	53.96	-25.07
24771.67	47.33	1.00	132	2.26	49.59	-20.00	29.59	53.96	-24.37

Radiated Emissions of Vertical for 30MHz to 25GHz [Highest Channel, Y-plane]

Radiated Emission				CF	Peak Value	Duty Cycle	True Value	FCC Class B	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
31.21	21.25	1.00	247	7.62	28.87	---	28.87	40.00	-11.13
39.70	22.88	1.00	28	5.21	28.09	---	28.09	40.00	-11.91
93.05	26.66	1.00	268	-0.15	26.51	---	26.51	43.50	-16.99
97.90	23.06	1.00	67	-0.42	22.64	---	22.64	43.50	-20.86
816.91	22.58	1.00	10	12.18	34.76	---	34.76	46.00	-11.24
1666.67	35.83	1.00	251	13.29	49.12	-20.00	29.12	53.96	-24.84
4954.19	48.94	1.00	162	4.23	53.17	-20.00	33.17	53.96	-20.79
7433.12	39.11	1.00	95	10.34	49.45	-20.00	29.45	53.96	-24.51
19816.87	47.18	1.00	309	1.90	49.08	-20.00	29.08	53.96	-24.88
22292.50	45.80	1.00	77	3.33	49.13	-20.00	29.13	53.96	-24.83
24771.67	47.46	1.00	139	2.26	49.72	-20.00	29.72	53.96	-24.24

4.5 Test Result of the Bandedge

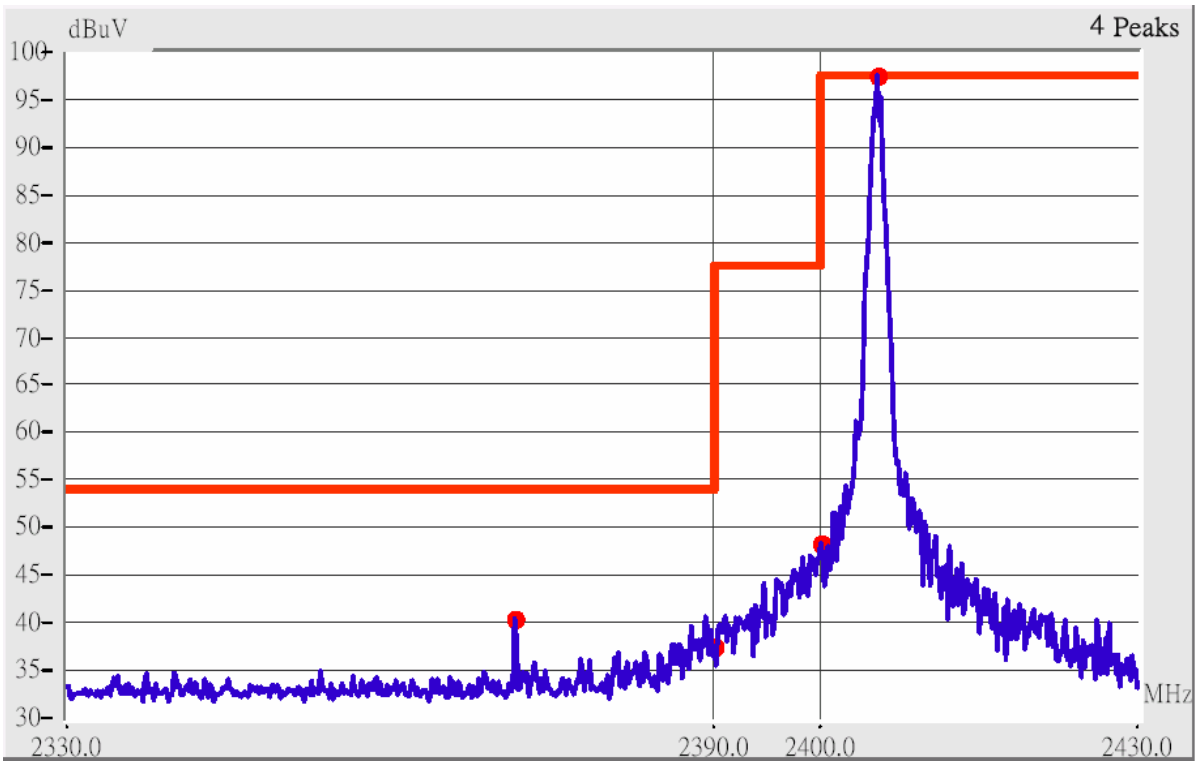
§ 15.249 (c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

We perform this section by the *radiated manner*, the RBW is set to 100kHz and VBW>RBW. We'd made the observation *up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 50dB below the highest emission level measured.* If the emissions fall in the restricted bands stated in the Part15.205(a) must also *comply with the radiated emission limits specified in Part15.209(a). (Peak mode: RBW=VBW=1MHz, Average mode: RBW=1MHz; VBW=10Hz)*

The following pages show our observations referring to the lowest channel and highest channel respectively. Test Condition & Setup: same as 4.1 to 4.2.

With USB

Lowest

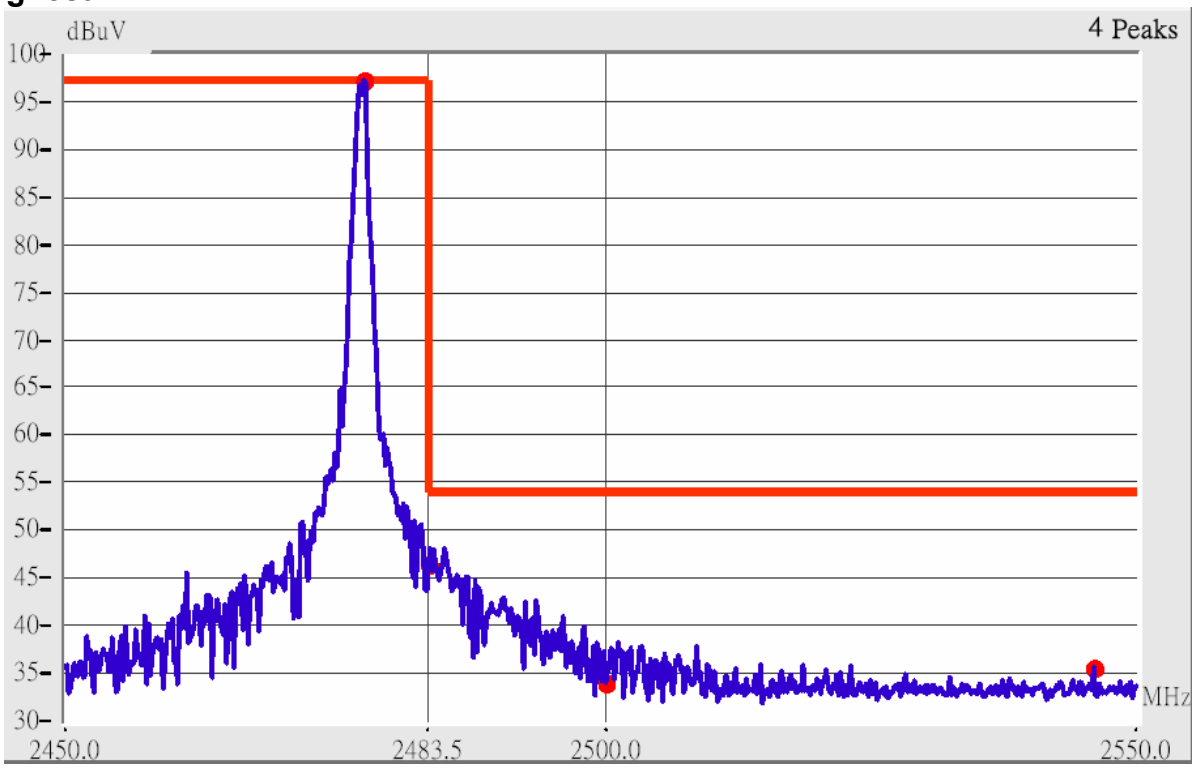


This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of lowest channel.

1. The lobe left by the fundamental side is already 50dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission				*CF*	*Peak Value*	*Duty Cycle*	*True Value*	*FCC Class B*	
Frequency (MHz)	Ant. P.	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
2384.44	Hor	1.00	190	9.17	55.17	-20.00	35.17	53.96	-18.79
2389.85	Hor	1.00	149	9.18	56.68	-20.00	36.68	53.96	-17.28
2384.82	Ver	1.00	164	9.17	47.17	-20.00	27.17	53.96	-26.79
2390.07	Ver	1.00	261	9.18	47.35	-20.00	27.35	53.96	-26.61

Highest



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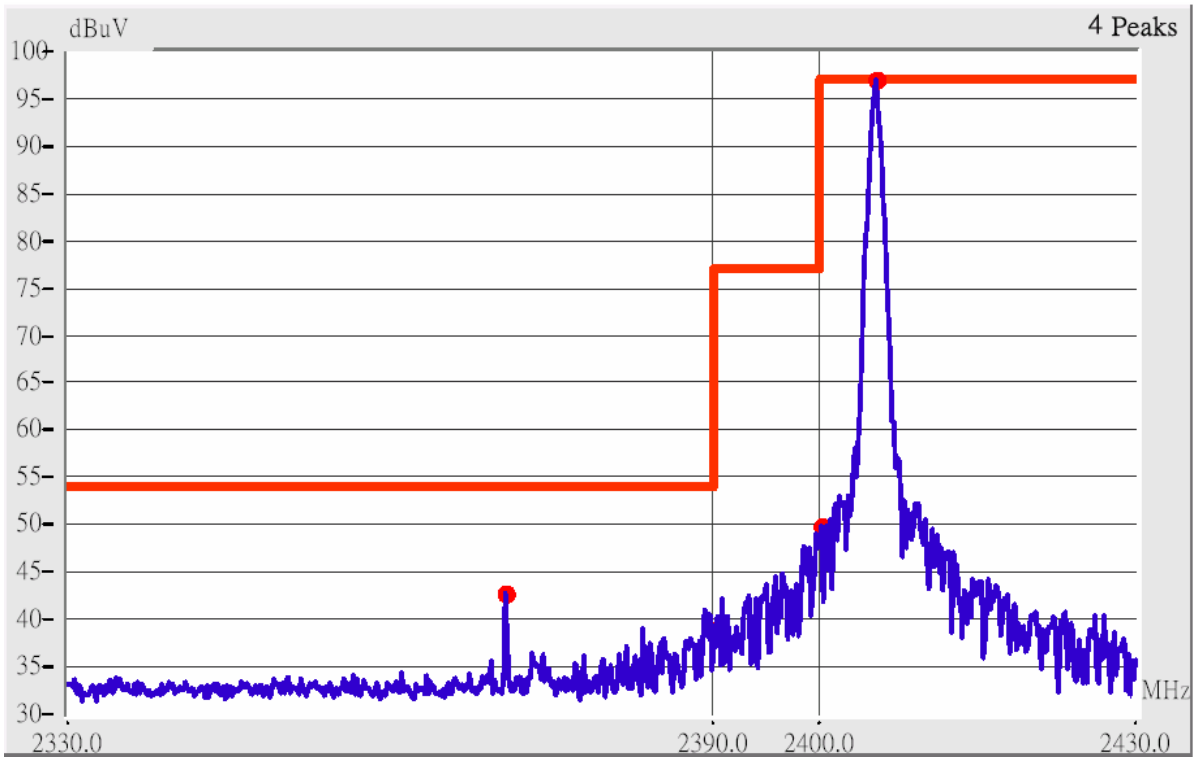
Frequency (MHz)	Ant. P.	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
2483.62	Hor	1.00	279	9.44	66.28	-20.00	46.28	53.96	-7.68
2486.77	Hor	1.00	286	9.45	64.45	-20.00	44.45	53.96	-9.51
2500.36	Hor	1.00	275	9.49	56.49	-20.00	36.49	53.96	-17.47
2503.62	Hor	1.00	285	9.50	55.66	-20.00	35.66	53.96	-18.30
2483.50	Ver	1.00	192	9.44	54.28	-20.00	34.28	53.96	-19.68
2486.12	Ver	1.00	192	9.45	53.28	-20.00	33.28	53.96	-20.68
2500.24	Ver	1.00	193	9.49	44.82	-20.00	24.82	53.96	-29.14
2504.03	Ver	1.00	192	9.50	45.83	-20.00	25.83	53.96	-28.13

Only EUT

Lowest



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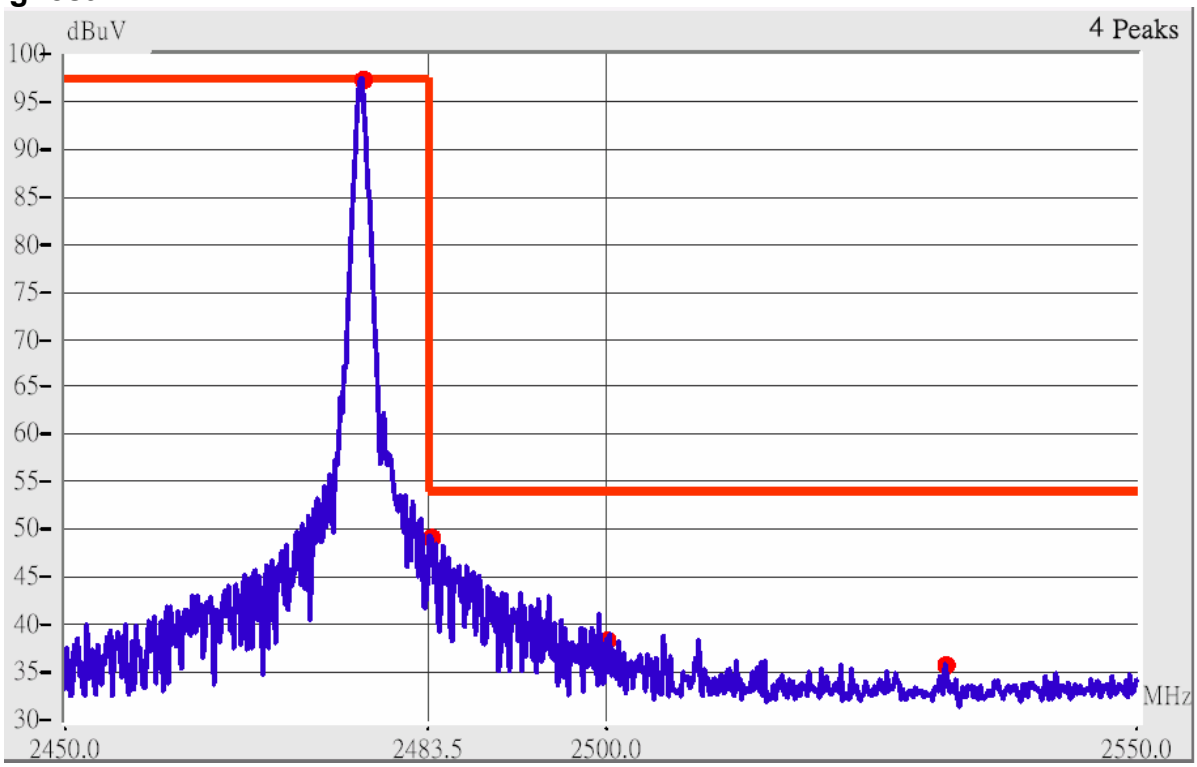
Radiated Emission				*CF*	*Peak Value*	*Duty Cycle*	*True Value*	*FCC Class B*	
Frequency (MHz)	Ant. P.	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
2385.74	Hor	1.00	181	9.17	54.50	-20.00	34.50	53.96	-19.46
2390.02	Hor	1.00	106	9.18	56.02	-20.00	36.02	53.96	-17.94
2384.87	Ver	1.00	10	9.17	51.33	-20.00	31.33	53.96	-22.63
2389.80	Ver	1.00	125	9.18	54.01	-20.00	34.01	53.96	-19.95

Highest



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Radiated Emission				*CF*	*Peak Value*	*Duty Cycle*	*True Value*	*FCC Class B*	
Frequency (MHz)	Ant. P.	Ant. H. (m)	Angle	(dB)	(dBμV/m)	(dB)	(dBμV/m)	Limit (Avg.) (dBμV/m)	Margin (dB)
2483.38	Hor	1.00	267	9.44	65.78	-20.00	45.78	53.96	-8.18
2487.00	Hor	1.00	256	9.45	63.62	-20.00	43.62	53.96	-10.34
2500.36	Hor	1.00	257	9.49	56.66	-20.00	36.66	53.96	-17.30
2504.21	Hor	1.00	257	9.50	54.83	-20.00	34.83	53.96	-19.13
2483.85	Ver	1.00	262	9.44	63.44	-20.00	43.44	53.96	-10.52
2486.47	Ver	1.00	234	9.45	60.79	-20.00	40.79	53.96	-13.17
2500.01	Ver	1.00	278	9.49	51.32	-20.00	31.32	53.96	-22.64
2501.29	Ver	1.00	227	9.49	51.99	-20.00	31.99	53.96	-21.97