

FCC RF Test Report

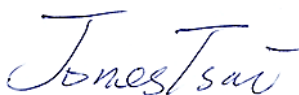
APPLICANT : JETVOX ACOUSTIC CORP.
EQUIPMENT : Bluetooth Headphone
BRAND NAME : ASUS
MODEL NAME : EB50N
FCC ID : VH7JW04Z
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Apr. 26, 2013 and completely tested on Jul. 25, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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FCC ID : VH7JW04Z

Page Number : 1 of 52

Report Issued Date : Jul. 29, 2013

Report Version : Rev. 01



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR342627B	Rev. 01	Initial issue of report	Jul. 29, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-210 A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)(1)	RSS-210 A8.1(b)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	-
3.5	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.25 dB at 4959.000 MHz
3.6	15.207	RSS-210 Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 11.90 dB at 0.150 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

JETVOX ACOUSTIC CORP.

4F., No. 22, Dalin Rd., Taoyuan City, Taoyuan County 330, Taiwan

1.2 Manufacturer

Vigor Audio Corp.

No. 199, QuanHai Road, Wujiang Economic and Technological Development Zone Wujiang City, SuZhou City, JiangSu Province, 215200 China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Bluetooth Headphone
Brand Name	ASUS
Model Name	EB50N
FCC ID	VH7JW04Z
EUT supports Radios application	Bluetooth 2.0/2.1/3.0/4.0 / NFC
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel(37 hopping + 3 advertising channel)
Maximum Output Power to Antenna	8.23 dBm (0.007 W)
Antenna Type	Print Chip Antenna with gain 1.27 dBi
Type of Modulation	Bluetooth 4.0 - LE : GFSK

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH07-HY	722060/4086B-1

The test site complies with ANSI C63.4 2003 requirement.

1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ANSI C63.10-2009

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

The RF output power was recorded in the following table:

Channel	Frequency	Bluetooth 4.0 – LE RF Output Power
		Data Rate / Modulation
		GFSK
		1Mbps
Ch00	2402MHz	6.94 dBm
Ch19	2440MHz	8.23 dBm
Ch39	2480MHz	7.87 dBm

- a. The EUT has been associated with peripherals pursuant to ANSI C63.10-2009 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (X plane as worst plane) from all possible combinations.
- b. AC power line Conducted Emission was tested under maximum output power.

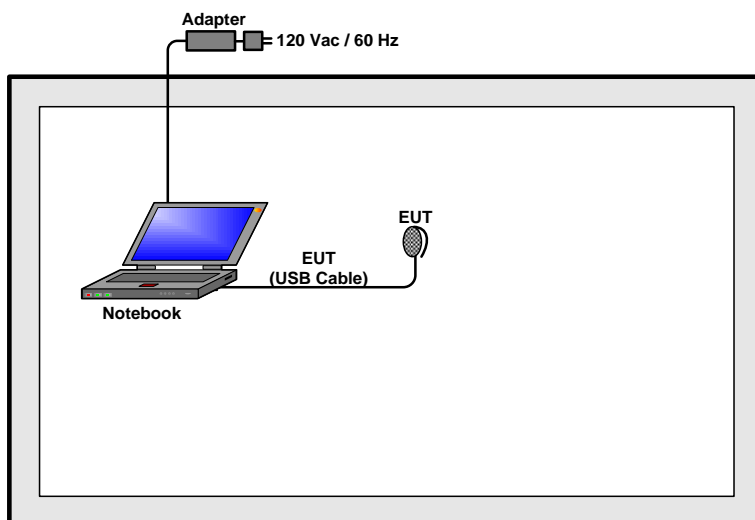
2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

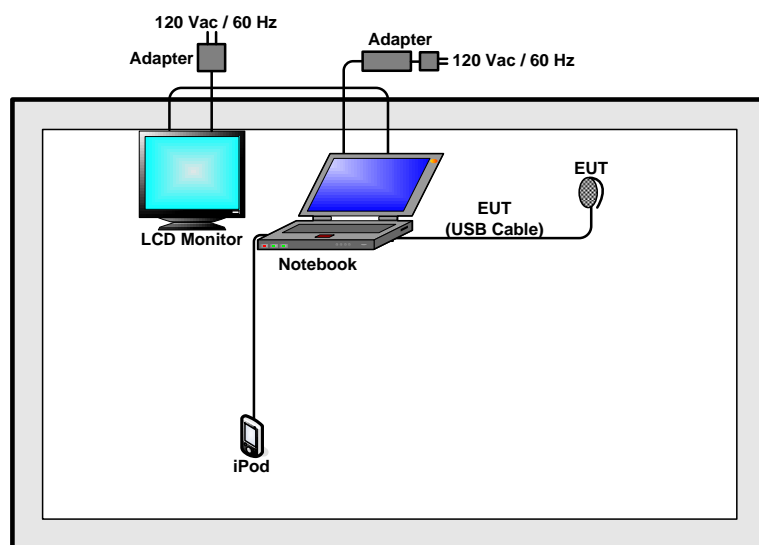
Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 4.0 – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1 :USB Cable (Charging from Notebook)

2.3 Connection Diagram of Test System

<Bluetooth 4.0 – LE Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
2.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
3.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

For Bluetooth function, programmed RF utility, "Blue Test3" installed in the notebook make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

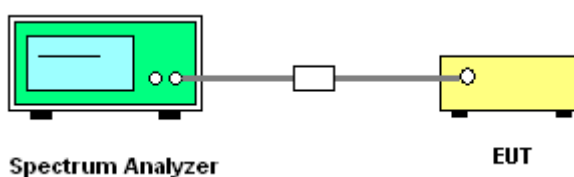
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup

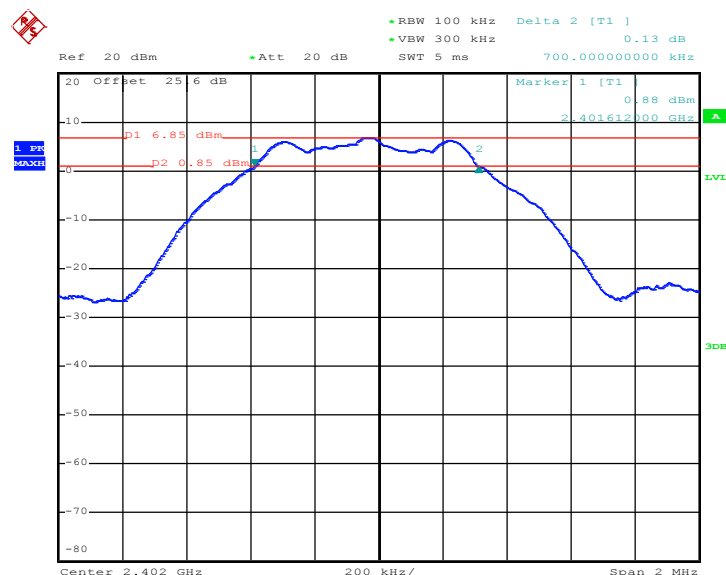


3.1.5 Test Result of 6dB Bandwidth

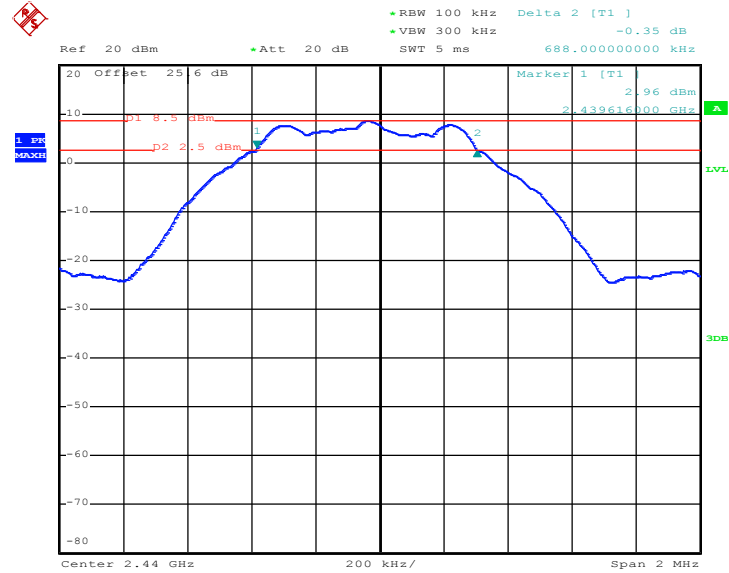
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Engineer :	Bill Kuo	Relative Humidity :	51~55%

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
00	2402	0.700	0.5	Pass
19	2440	0.688	0.5	Pass
39	2480	0.696	0.5	Pass

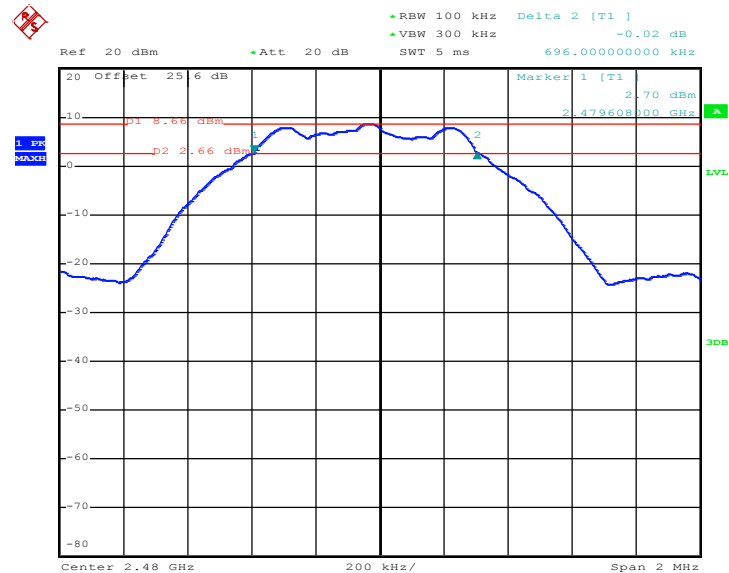
6 dB Bandwidth Plot on Channel 00



Date: 28.JUN.2013 20:41:04

6 dB Bandwidth Plot on Channel 19


Date: 28.JUN.2013 20:48:22

6 dB Bandwidth Plot on Channel 39


Date: 28.JUN.2013 21:10:23

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

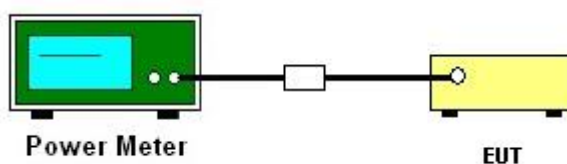
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Engineer :	Bill Kuo	Relative Humidity :	51~55%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	6.94	30.00	Pass
19	2440	8.23	30.00	Pass
39	2480	7.87	30.00	Pass

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

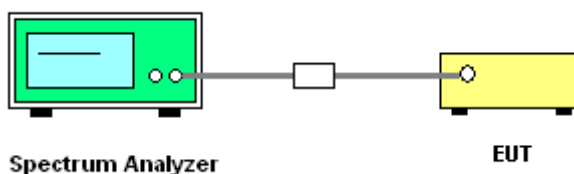
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Engineer :	Bill Kuo	Relative Humidity :	51~55%

Channel	Frequency (MHz)	Power Density		Max. Limits (dBm/3kHz)	Pass/Fail
		PSD/100kHz (dBm)	PSD/3kHz (dBm)		
00	2402	6.86	-8.75	8	Pass
19	2440	8.49	-6.95	8	Pass
39	2480	8.60	-6.80	8	Pass

Note:

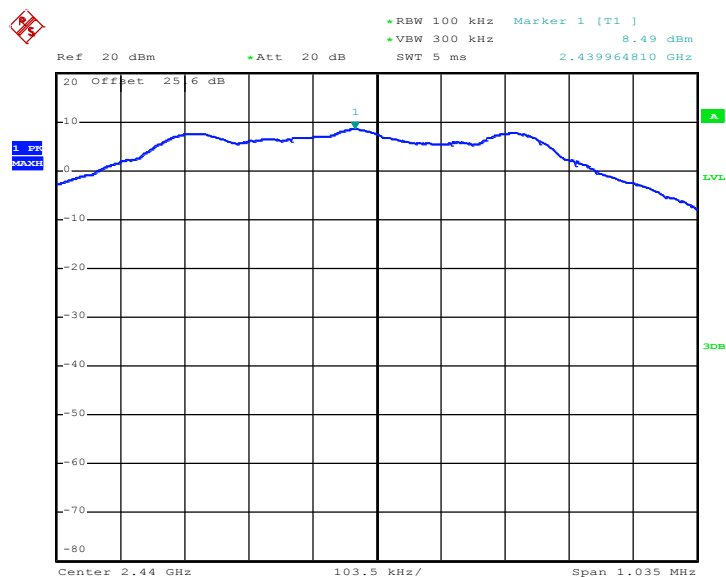
1. Measured power density (dBm) has offset with cable loss.
2. The Measured power density (dBm)/ 100kHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.



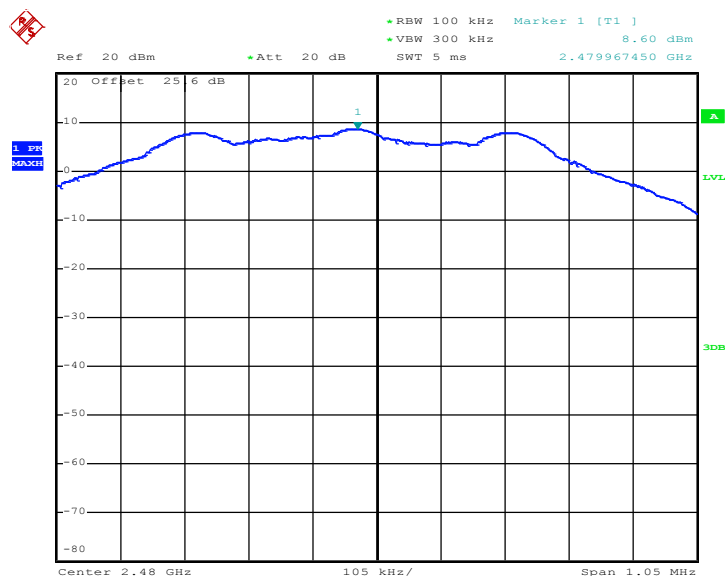
Ref 20 dBm • Att 20 dB • RBW 100 kHz Marker 1 [T1] 6.86 dBm
 • VBW 300 kHz SWT 5 ms 2.401964300 GHz

20 Offset 25 6 dB
 1 9% MAX
 -10
 0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 Center 2.402 GHz 105 kHz/ Span 1.05 MHz

Date: 28.JUN.2013 20:41:38

PSD 100kHz Plot on Channel 19


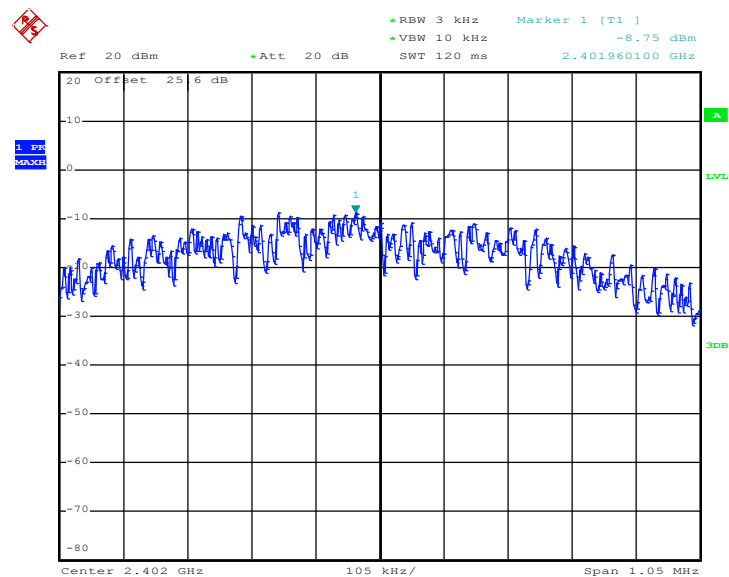
Date: 28.JUN.2013 20:49:04

PSD 100kHz Plot on Channel 39


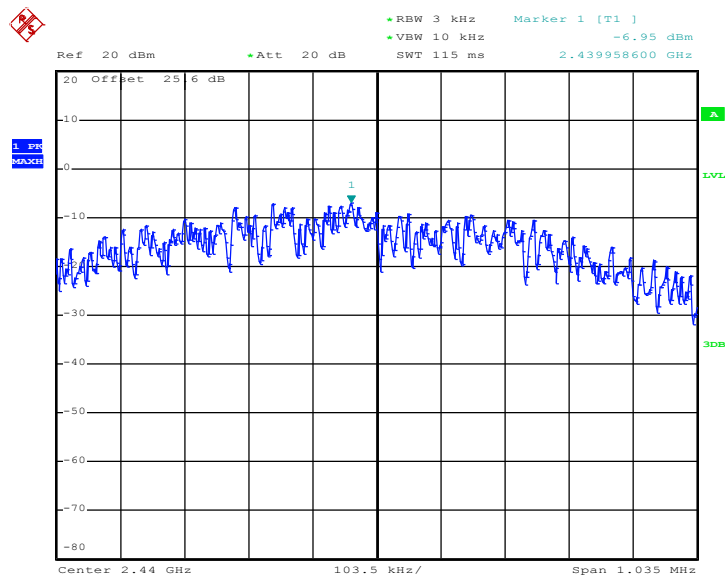
Date: 28.JUN.2013 21:10:57

3.3.7 Test Result of Power Spectral Density Plots (3kHz)

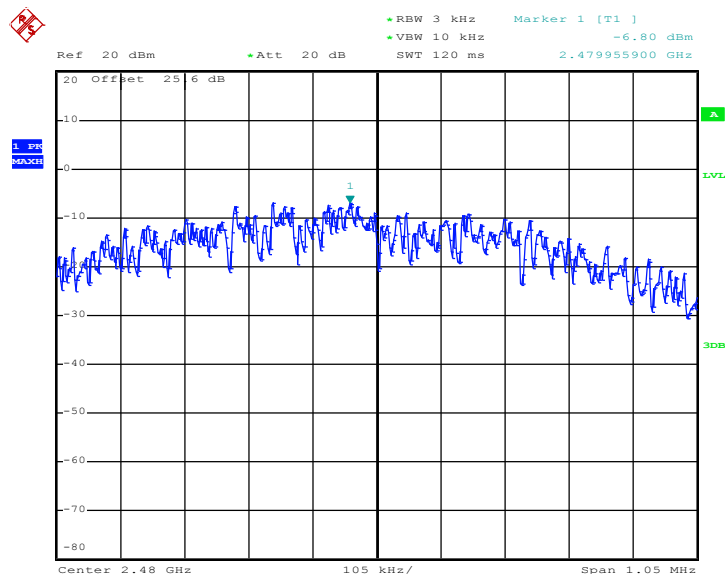
PSD 3kHz Plot on Channel 00



Date: 28.JUN.2013 20:41:27

PSD 3kHz Plot on Channel 19


Date: 28.JUN.2013 20:48:45

PSD 3kHz Plot on Channel 39


Date: 28.JUN.2013 21:10:47

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

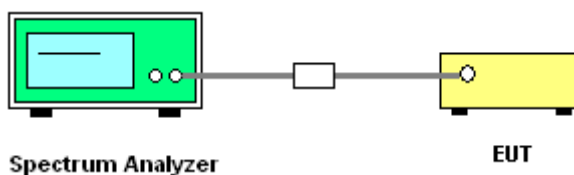
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

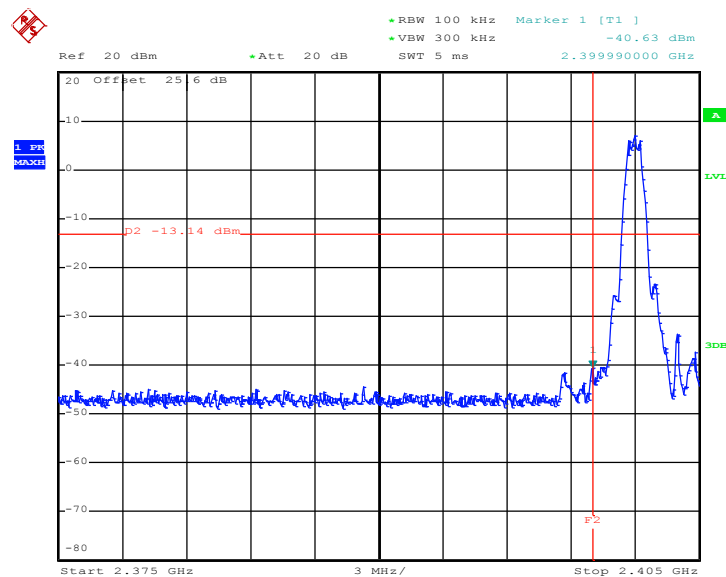
3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges

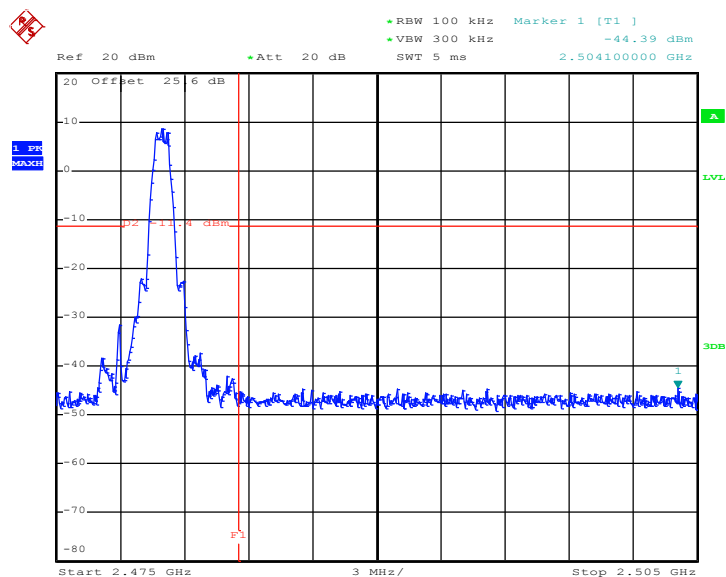
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Channel :	00 and 39	Relative Humidity :	51~55%
		Test Engineer :	Bill Kuo

Low Band Edge Plot on Channel 00



Date: 28.JUN.2013 20:41:56

High Band Edge Plot on Channel 39

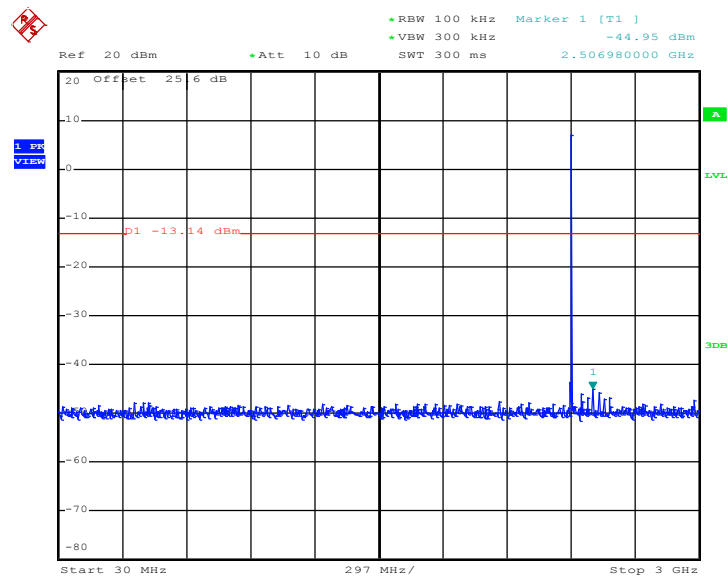


Date: 28.JUN.2013 21:11:13

3.4.6 Test Result of Conducted Spurious Emission

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Channel :	00	Relative Humidity :	51~55%
		Test Engineer :	Bill Kuo

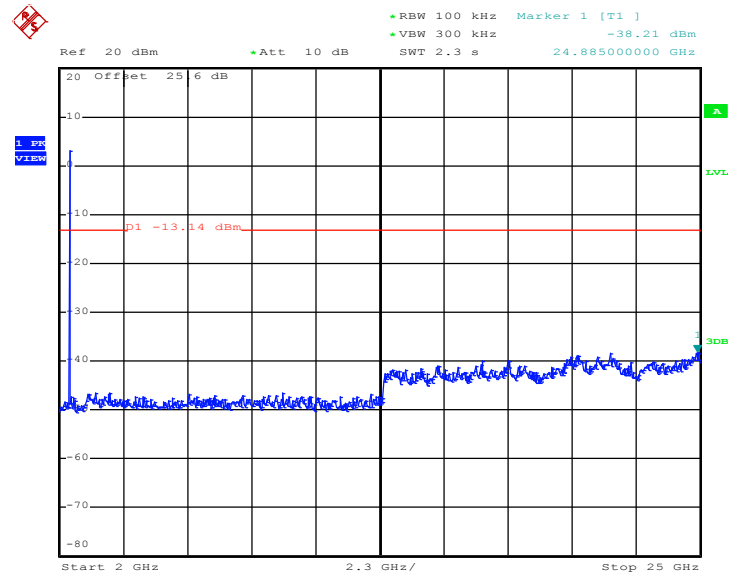
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



Date: 28.JUN.2013 20:43:45



Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 00

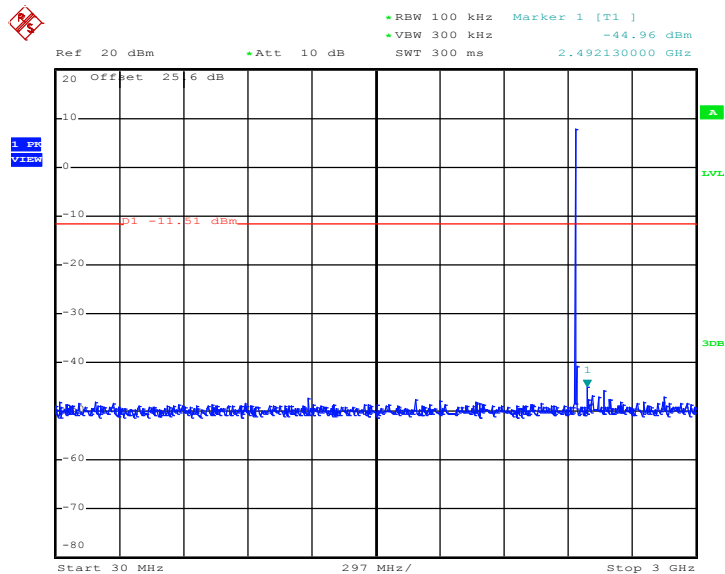


Date: 28.JUN.2013 20:44:04



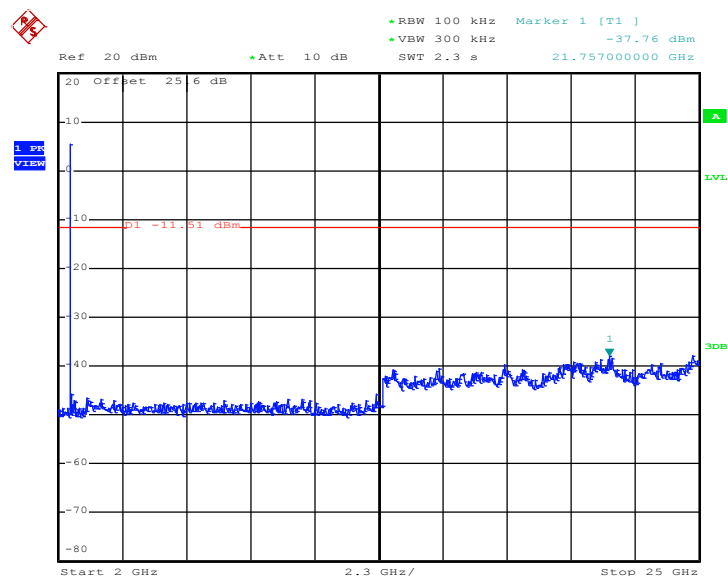
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Channel :	19	Relative Humidity :	51~55%
		Test Engineer :	Bill Kuo

**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 19**



Date: 28.JUN.2013 20:49:35

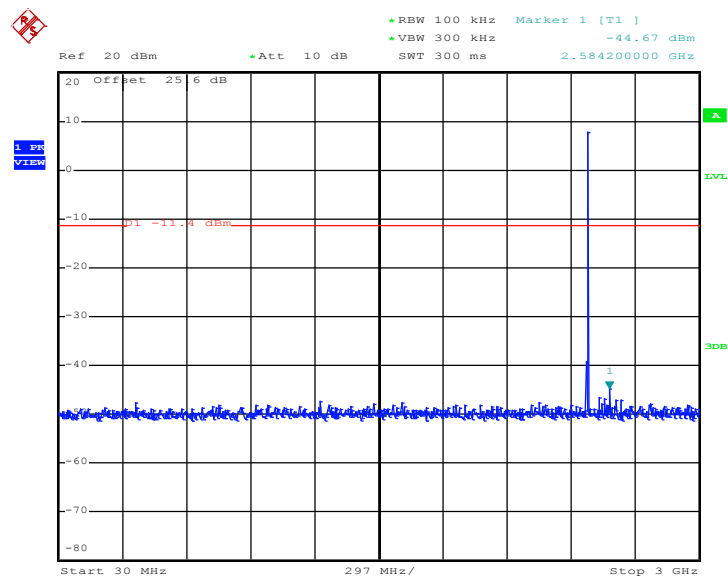
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 28.JUN.2013 20:49:54

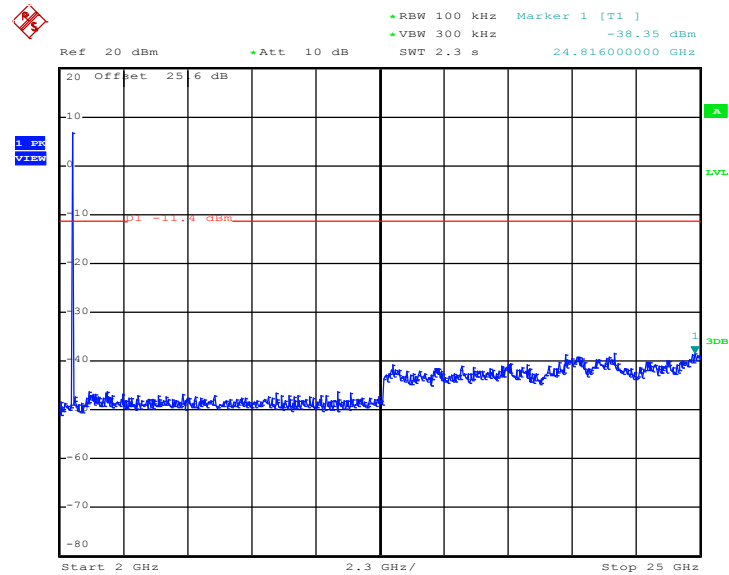
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25°C
Test Channel :	39	Relative Humidity :	51~55%
		Test Engineer :	Bill Kuo

**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 39**



Date: 28.JUN.2013 21:11:40

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 28.JUN.2013 21:11:58

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(μ s)	1/T(kHz)	VBW Setting
Bluetooth 4.0 - LE	69.7	400.00	2.50	3kHz

Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

Marker-Delta method :

- (1) Set RBW = 1 MHz, VBW = 3 MHz, peak detector.

Repeat the measurement with an average detector, use RBW = 1MHz

VBW = 10 Hz, when duty cycle is no less than 98 percent.

VBW $\geq 1/T$, when duty cycle is less than 98 percent

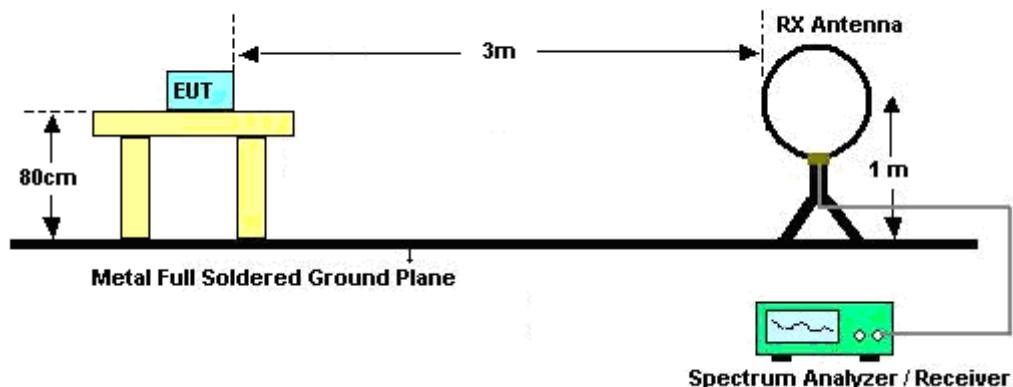
- (2) Set span = 10MHz, that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set RBW = 100kHz, 1% of the total span. Set VBW = 100kHz \geq RBW.

- (3) Subtract the delta measured in step (2) from the field strengths measured in step (1).

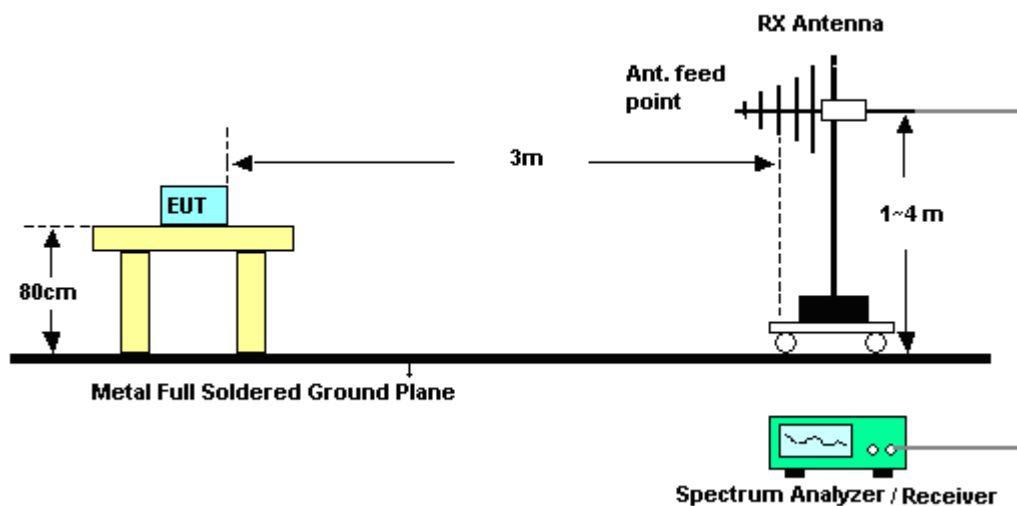
The resultant field strengths (peak/average) are then used to determine band-edge compliance as required by Section 15.205.

3.5.4 Test Setup

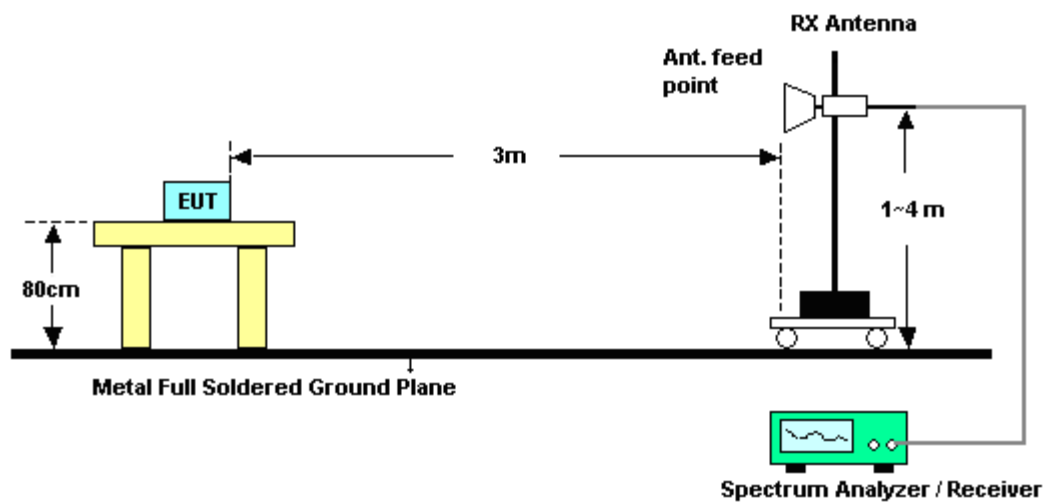
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	21~23°C
Test Channel :	00	Relative Humidity :	51~53%
		Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV /m)	Over Limit (dB)	Limit Line (dBμV /m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2349.96	49.99	-24.01	74	45.67	32.28	6.38	34.34	177	286	Peak
2349.96	39.42	-14.58	54	35.1	32.28	6.38	34.34	177	286	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV /m)	Over Limit (dB)	Limit Line (dBμV /m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2349.69	49.48	-24.52	74	45.16	32.28	6.38	34.34	100	268	Peak
2350.05	39.22	-14.78	54	34.9	32.28	6.38	34.34	100	268	Average

Test Mode :	Mode 3	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
		Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	60.17	-13.83	74	55.4	32.48	6.59	34.3	168	301	Peak
2483.5	56.13	*2.13	54	51.36	32.48	6.59	34.3	168	301	Average
2483.5	43.31	-30.69	74	-	-	-	-	-	-	Peak
2483.5	42.55	-11.45	54	-	-	-	-	-	-	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Measurement Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Peak	101.54	58.23	43.31	74	-30.69	Pass
Average	100.78	58.23	42.55	54	-11.45	Pass

Note :

1. Measurement result = Maximum field strength – Delta result
2. Delta-Marker Method is used for the 2483.5MHz average measurement as described in the test procedure of this report and the test result is under 11.45dB.

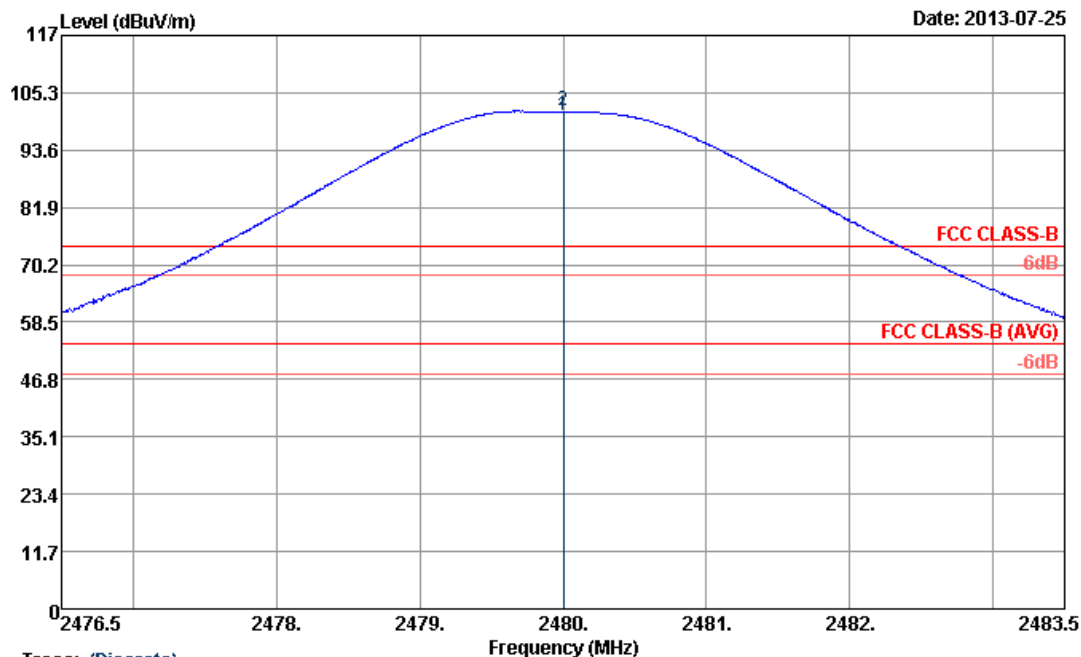
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	54.97	-19.03	74	50.2	32.48	6.59	34.3	100	266	Peak
2483.5	50.47	*-3.53	54	45.7	32.48	6.59	34.3	100	266	Average
2483.5	44.80	-29.20	74	-	-	-	-	-	-	Peak
2483.5	43.95	-10.05	54	-	-	-	-	-	-	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Measurement Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Peak	96.93	52.13	44.80	74	-29.20	Pass
Average	96.08	52.13	43.95	54	-10.05	Pass

Note : Measurement result = Maximum field strength – Delta result

Test Mode :	Bluetooth 4.0 - LE	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Horizontal



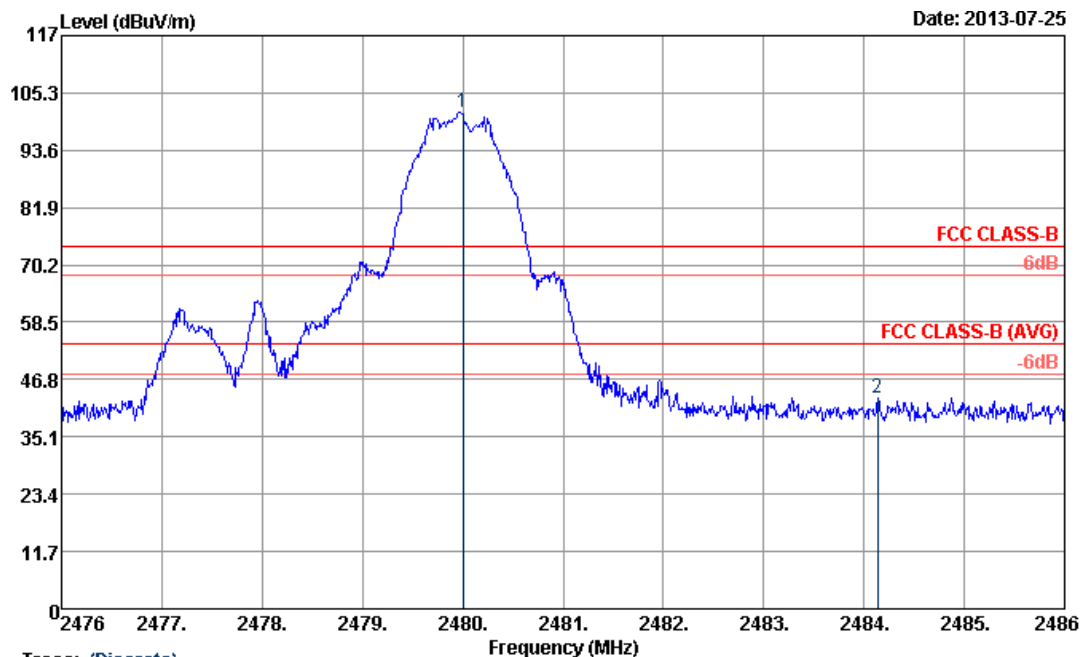
Trace: (Discrete)

Site : 03CH06-HY
 Condition : FCC CLASS-B 3m HF-ANT_120801 HORIZONTAL
 : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	cm	deg	
1 *	2480.00	100.78	46.78	54.00	96.01	32.48	6.59	34.30	168	301	Average
2 *	2480.00	101.54	27.54	74.00	96.77	32.48	6.59	34.30	168	301	Peak

* Maximum field strength of the fundamental emission

Test Mode :	Bluetooth 4.0 - LE	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Horizontal



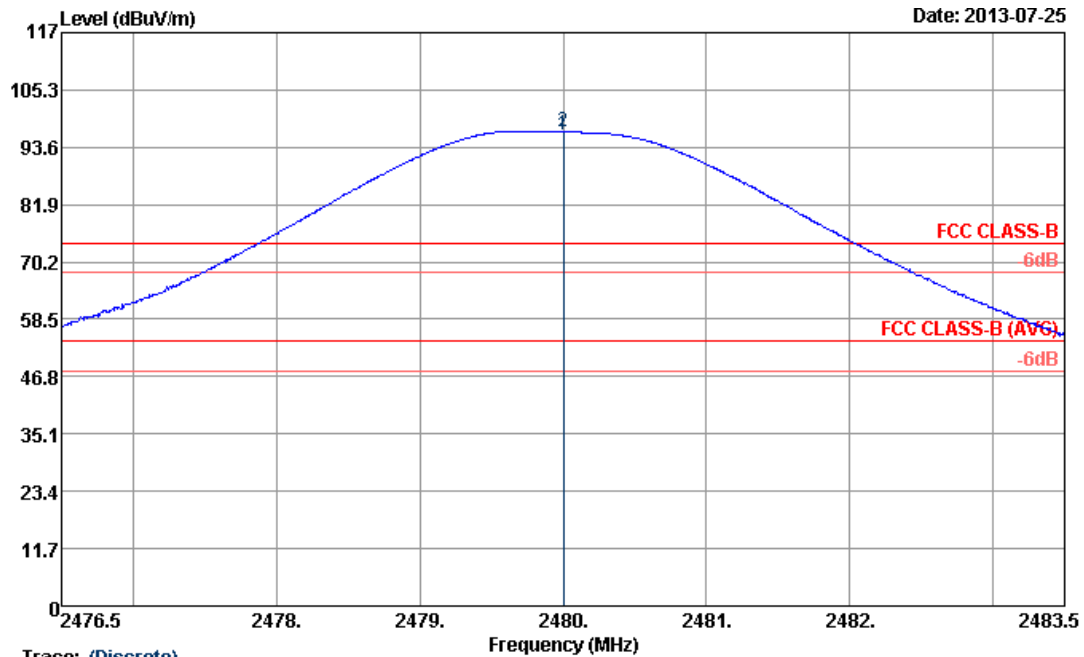
Trace: (Discrete)

Site : 03CH06-HY
 Condition : FCC CLASS-B 3m HF-ANT_120801 HORIZONTAL
 : RBW:100.000KHz VBW:300.000KHz SWT:Auto

	Freq	Level	Over Limit	Limit Line	ReadAntenna	Cable Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	Level Factor	Loss Factor	dB	cm	deg
1 *	2480.00	101.37	27.37	74.00	96.60	32.48	6.59	34.30	168 301 Peak
2	2484.14	43.14	-30.86	74.00	38.37	32.48	6.59	34.30	168 301 Peak

* Marker-Delta Method (RBW/VBW=100kHz): 58.23 dB , single carrier Mode

Test Mode :	Bluetooth 4.0 - LE	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Vertical



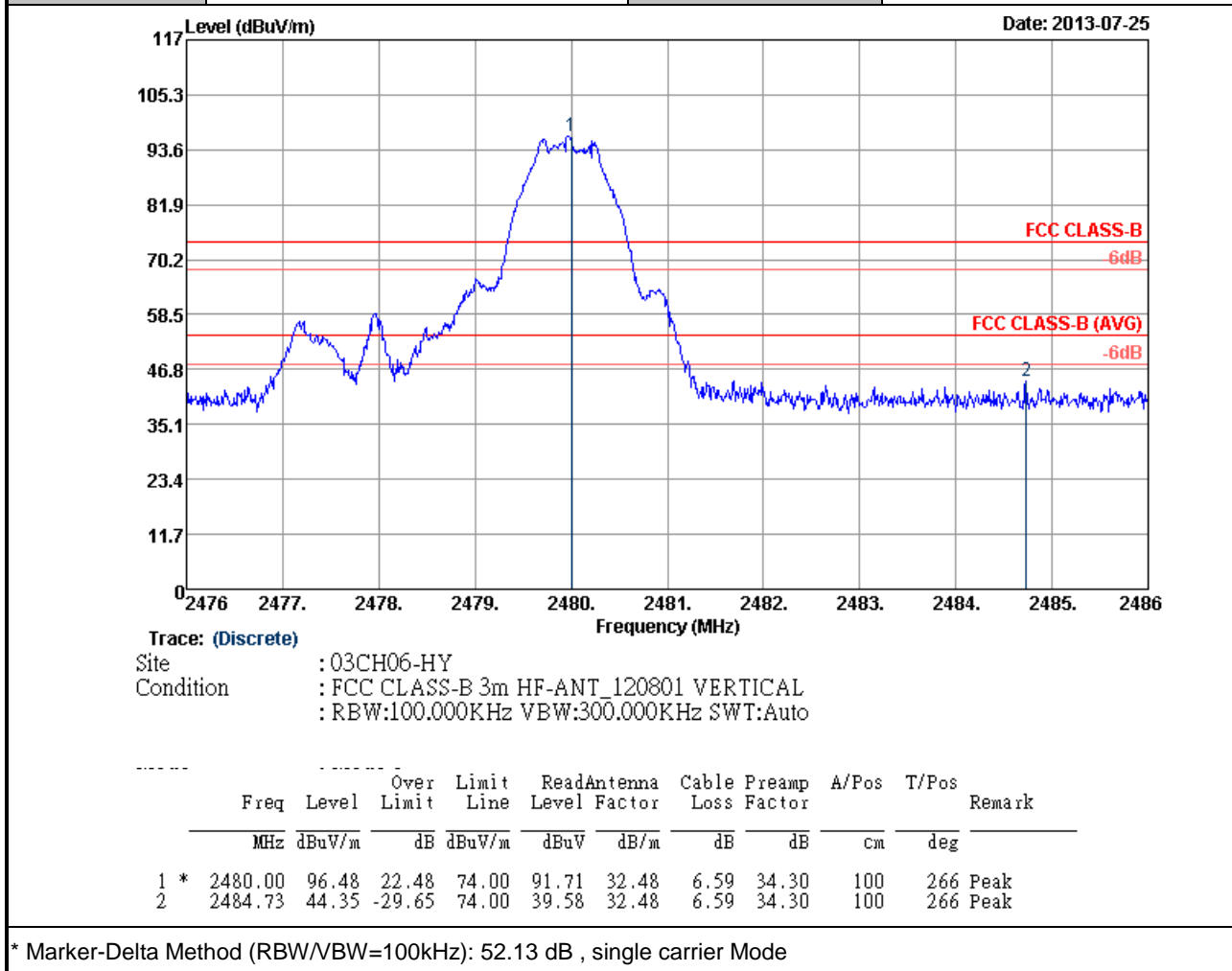
Trace: (Discrete)

Site : 03CH06-HY
Condition : FCC CLASS-B 3m HF-ANT_120801 VERTICAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Preamp Loss Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm deg
1 *	2480.00	96.08	42.08	54.00	91.31	32.48	6.59	34.30	100 266 Average
2 *	2480.00	96.93	22.93	74.00	92.16	32.48	6.59	34.30	100 266 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Bluetooth 4.0 - LE	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Vertical



3.5.7 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	21~23°C
Test Channel :	00	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 100.22 dB μ V/m - 20dB = 80.22dB μ V/m. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	99.31	-	-	94.83	32.36	6.45	34.33	177	286	Average
2402	100.22	-	-	95.74	32.36	6.45	34.33	177	286	Peak
4806	50.68	-23.32	74	61.19	34.88	10.17	55.56	100	0	Peak
7206	49.77	-30.45	80.22	59.13	36.16	10.97	56.49	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 1	Temperature :	21~23°C
Test Channel :	00	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	96.35	-	-	91.87	32.36	6.45	34.33	100	268	Average
2402	97.28	-	-	92.8	32.36	6.45	34.33	100	268	Peak
4803	50.43	-23.57	74	60.95	34.88	10.16	55.56	100	0	Peak
7206	49.36	-27.92	77.28	58.72	36.16	10.97	56.49	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	21~23°C
Test Channel :	19	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	2440 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2440	100.81	-	-	96.18	32.43	6.52	34.32	165	302	Average
2440	101.7	-	-	97.07	32.43	6.52	34.32	165	302	Peak
4881	49.48	-4.52	54	60.12	34.85	10.19	55.68	100	240	Average
4881	54.06	-19.94	74	64.7	34.85	10.19	55.68	100	240	Peak
7320	42.95	-11.05	54	52.12	36.13	10.94	56.24	120	137	Average
7320	52.19	-21.81	74	61.36	36.13	10.94	56.24	120	137	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	21~23°C
Test Channel :	19	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	2440 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2440	97.43	-	-	92.8	32.43	6.52	34.32	100	269	Average
2440	98.35	-	-	93.72	32.43	6.52	34.32	100	269	Peak
4881	47.43	-6.57	54	58.07	34.85	10.19	55.68	105	252	Average
4881	51.88	-22.12	74	62.52	34.85	10.19	55.68	105	252	Peak
7320	41.26	-12.74	54	50.43	36.13	10.94	56.24	100	126	Average
7320	51.06	-22.94	74	60.23	36.13	10.94	56.24	100	126	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
216.3	29.06	-16.94	46	50.1	9.1	1.61	31.75	-	-	Peak
268.14	30.99	-15.01	46	47.93	12.98	1.81	31.73	-	-	Peak
298.65	31.58	-14.42	46	48.22	13.18	1.9	31.72	-	-	Peak
331.5	32.8	-13.2	46	48.92	13.64	1.99	31.75	100	114	Peak
384	29.24	-16.76	46	43.78	15.12	2.14	31.8	-	-	Peak
665.4	30.72	-15.28	46	40.77	19.15	2.83	32.03	-	-	Peak
2480	101.35	-	-	96.58	32.48	6.59	34.3	168	301	Average
2480	102.17	-	-	97.4	32.48	6.59	34.3	168	301	Peak
4959	49.75	-4.25	54	60.57	34.81	10.21	55.84	100	328	Average
4959	53.28	-20.72	74	64.1	34.81	10.21	55.84	100	328	Peak
7440	50.98	-23.02	74	59.97	36.11	10.9	56	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	21~23°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	25.8	-14.2	40	38.06	18.9	0.64	31.8			Peak
130.44	29.04	-14.46	43.5	47.72	11.8	1.27	31.75			Peak
211.44	25.59	-17.91	43.5	46.66	9.1	1.58	31.75			Peak
398	27.69	-18.31	46	41.71	15.62	2.18	31.82			Peak
664	34.47	-11.53	46	44.52	19.15	2.83	32.03	100	181	Peak
910.4	26.34	-19.66	46	33.8	20.61	3.37	31.44			Peak
2480	95.48	-	-	90.71	32.48	6.59	34.3	100	266	Average
2480	96.31	-	-	91.54	32.48	6.59	34.3	100	266	Peak
4962	47.45	-6.55	54	58.27	34.81	10.21	55.84	103	252	Average
4962	51.57	-22.43	74	62.39	34.81	10.21	55.84	103	252	Peak
7440	50	-24	74	58.99	36.11	10.9	56	100	0	Peak

Note: Other harmonics are lower than background noise.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment 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.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

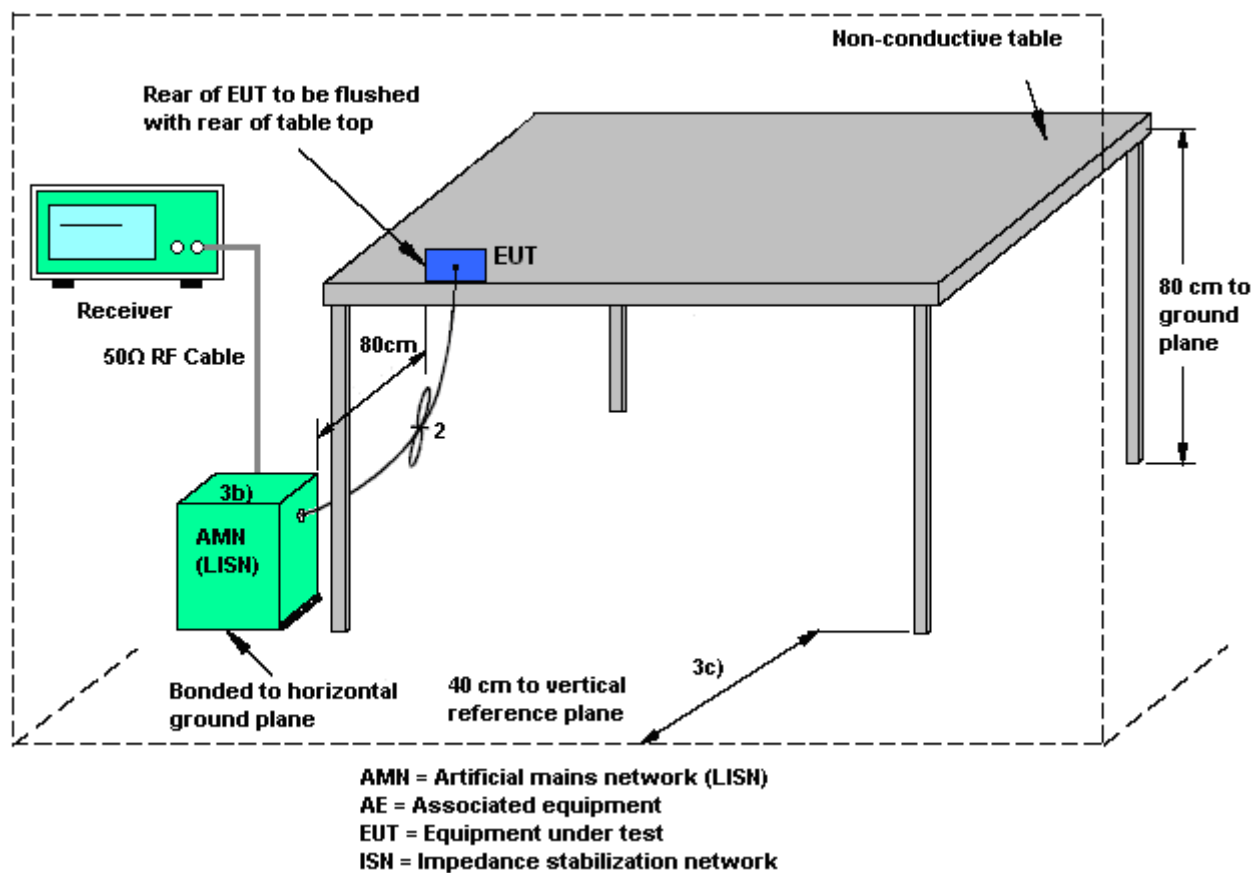
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

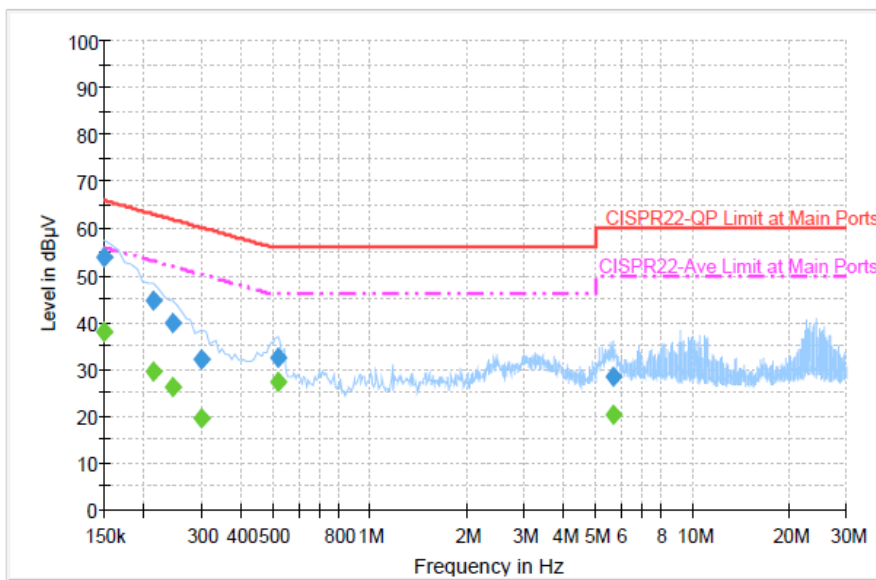
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Kai Chun Chu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	USB Cable (Charging from Notebook)		



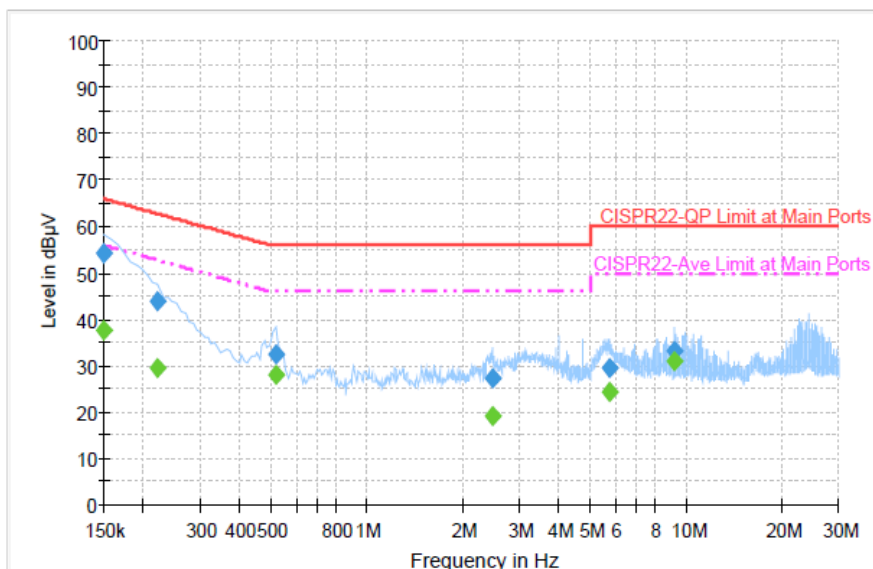
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	54.0	Off	L1	19.4	12.0	66.0
0.214000	44.5	Off	L1	19.4	18.5	63.0
0.246000	40.0	Off	L1	19.4	21.9	61.9
0.302000	32.2	Off	L1	19.3	28.0	60.2
0.518000	32.5	Off	L1	19.4	23.5	56.0
5.654000	28.6	Off	L1	19.6	31.4	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.0	Off	L1	19.4	18.0	56.0
0.214000	29.4	Off	L1	19.4	23.6	53.0
0.246000	26.4	Off	L1	19.4	25.5	51.9
0.302000	19.6	Off	L1	19.3	30.6	50.2
0.518000	27.5	Off	L1	19.4	18.5	46.0
5.654000	20.1	Off	L1	19.6	29.9	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Kai Chun Chu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	USB Cable (Charging from Notebook)		


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	54.1	Off	N	19.4	11.9	66.0
0.222000	43.9	Off	N	19.4	18.8	62.7
0.518000	32.6	Off	N	19.4	23.4	56.0
2.478000	27.4	Off	N	19.6	28.6	56.0
5.726000	29.5	Off	N	19.7	30.5	60.0
9.206000	33.1	Off	N	19.8	26.9	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	37.6	Off	N	19.4	18.4	56.0
0.222000	29.6	Off	N	19.4	23.1	52.7
0.518000	27.9	Off	N	19.4	18.1	46.0
2.478000	19.2	Off	N	19.6	26.8	46.0
5.726000	24.3	Off	N	19.7	25.7	50.0
9.206000	30.9	Off	N	19.8	19.1	50.0



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Connected Construction

Non-standard connector used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	May 10, 2013 ~ Jun. 04, 2013	Jun. 05, 2013	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Jun. 07, 2013 ~ Jun. 28, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Feb. 05, 2013	May 10, 2013 ~ Jun. 28, 2013	Feb. 04, 2014	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Feb. 05, 2013	May 10, 2013 ~ Jun. 28, 2013	Feb. 04, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz ~7GHz	Sep. 03, 2012	May 23, 2013~ Jul. 25, 2013	Sep. 02, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~30GHz	Nov. 30, 2012	May 23, 2013~ Jul. 25, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~1GHz	Oct. 06, 2012	May 23, 2013~ Jul. 25, 2013	Oct. 05, 2013	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz ~18GHz	Aug. 22, 2012	May 23, 2013~ Jul. 25, 2013	Aug. 21, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz ~40GHz	Sep. 28, 2012	May 23, 2013~ Jul. 25, 2013	Sep. 27, 2013	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30MHz ~1GHz	Feb. 26, 2013	May 23, 2013~ Jul. 25, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz ~26.5GHz	Dec. 01, 2012	May 23, 2013~ Jul. 25, 2013	Nov. 30, 2013	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MHz	Jul. 03, 2012	May 23, 2013~ Jul. 25, 2013	Jul. 03, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	May 23, 2013~ Jul. 25, 2013	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	May 23, 2013~ Jul. 25, 2013	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 13, 2012	Jul. 18, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Jul. 18, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	Jul. 18, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Jul. 18, 2013	N/A	Conduction (CO05-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.72
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP342627 as below.