FCC RF Test Report

APPLICANT	:	DT Research Inc.
EQUIPMENT	:	WLAN Module
BRAND NAME	:	DT Research Inc.
MODEL NAME	:	600B
FCC ID	:	YE3600B
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Feb. 22, 2013 and completely tested on Mar. 16, 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.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR322149-01B	Rev. 01	Initial issue of report	Mar. 29, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(b)(1)	RSS-210 A8.1(b)	Peak Output Power	≤ 30dBm	Pass	-
3.2	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.69 dB at 2483.500 MHz
3.3	15.207	RSS-210 Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 18.90 dB at 29.510 MHz
3.4	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

DT Research Inc.
6F, NO. 1, NingPo E. St., Taipei, 100 Taiwan, R.O.C.

1.2 Manufacturer

DT Research Inc.
6F, NO. 1, NingPo E. St., Taipei, 100 Taiwan, R.O.C.

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	WLAN Module
Brand Name	DT Research Inc.
Model Name	600B
FCC ID	YE3600B
Installed into Mobile Tablet	Brand Name: DT Research Inc. Model Name: DT398 FCC ID: YE3800B
EUT supports Radios application	CDMA/EV-DO WLAN 11abgn / Bluetooth 2.1/3.0/4.0
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	Bluetooth 4.0 - LE : 5.71 dBm (0.0037 W)
Antenna Type	PIFA Antenna type with gain 1.80 dBi
Type of Modulation	Bluetooth 4.0 - LE : GFSK

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1st 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.

1.6 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 v02
- 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	5.65 dBm
Ch19	2440MHz	5.71 dBm
Ch39	2480MHz	5.63 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.

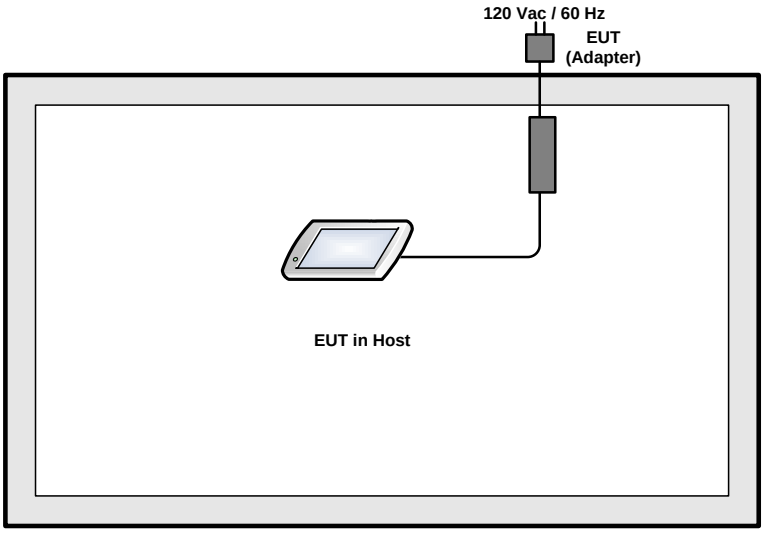
2.2 Test Mode

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

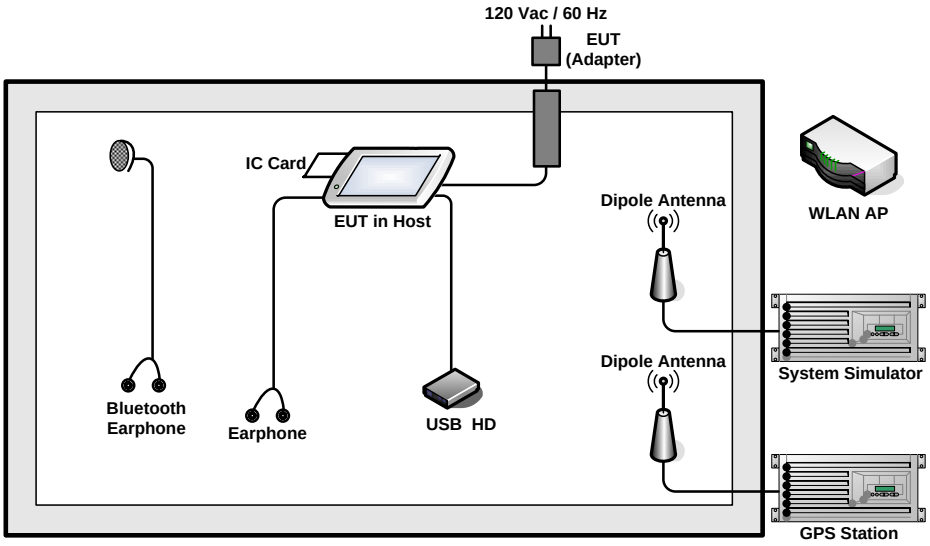
Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 4.0 – LE / GFSK
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1 :CDMA2000 BC1 Idle + WLAN (2.4G) Link + Bluetooth Link + GPS Rx + MPEG4 + H Patten + TC
Remark: TC stands for Test Configuration, and consists of USB Data Link with USB HD, Adapter, SD Card, Earphone, and IC Card.	

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.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	USB3.0 HD	WD	WDBPCK5000ABK-PESN	FCC DoC	Shielded, 0.5 m	N/A
5.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
6.	Earphone	Merry	EMC147-017	N/A	N/A	N/A
7.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
8.	IC Card	N/A	N/A	N/A	N/A	N/A

2.5 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.

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.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Peak Output Power Measurement

3.1.1 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.

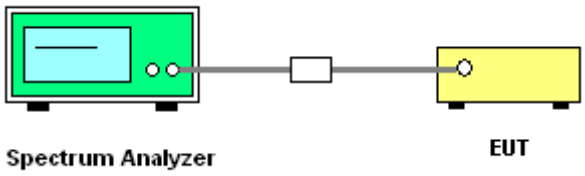
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v02.
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. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v01r02.

3.1.4 Test Setup

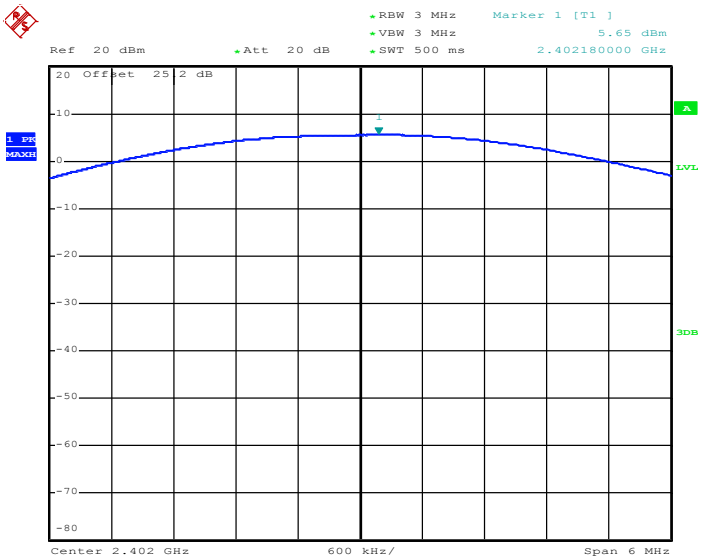


3.1.5 Test Result of Peak Output Power

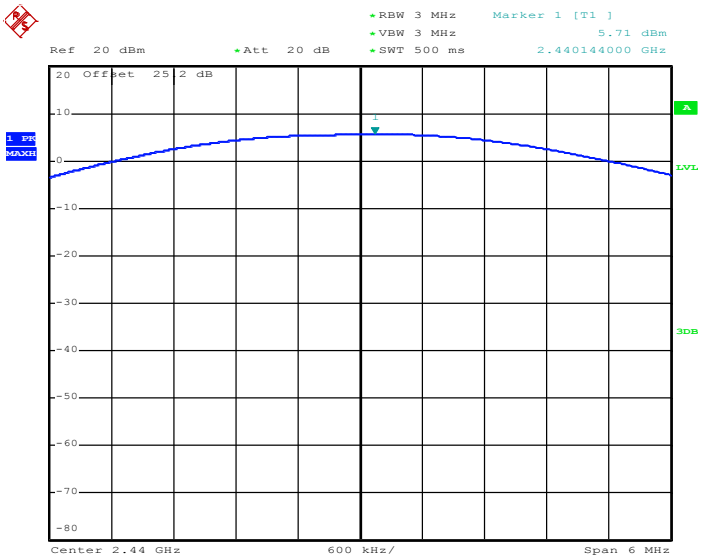
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Engineer :	Jeff Jhou	Relative Humidity :	51~55%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	5.65	30.00	Pass
19	2440	5.71	30.00	Pass
39	2480	5.63	30.00	Pass

Peak Output Power Plot on Channel 00

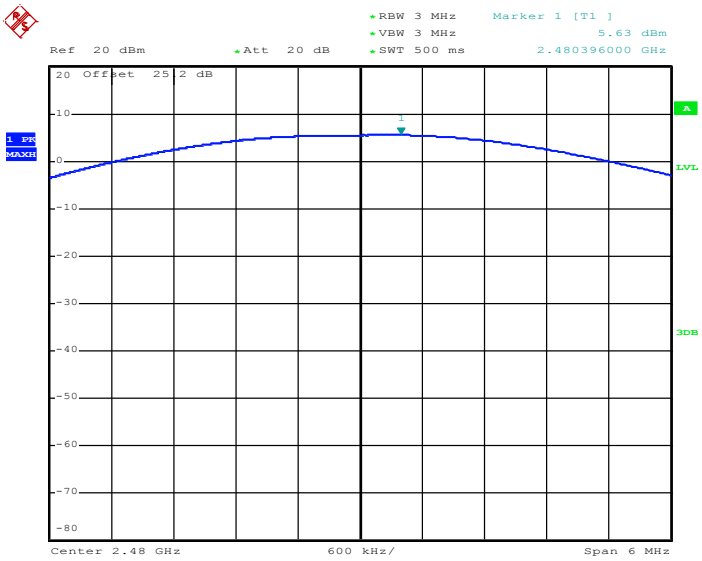


Peak Output Power Plot on Channel 19



Date: 11.MAR.2013 20:29:54

Peak Output Power Plot on Channel 39



Date: 11.MAR.2013 20:30:38

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 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

3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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(μs)	1/T(kHz)	VBW Setting
Bluetooth 4.0 - LE	66.87	444.00	2.252	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：

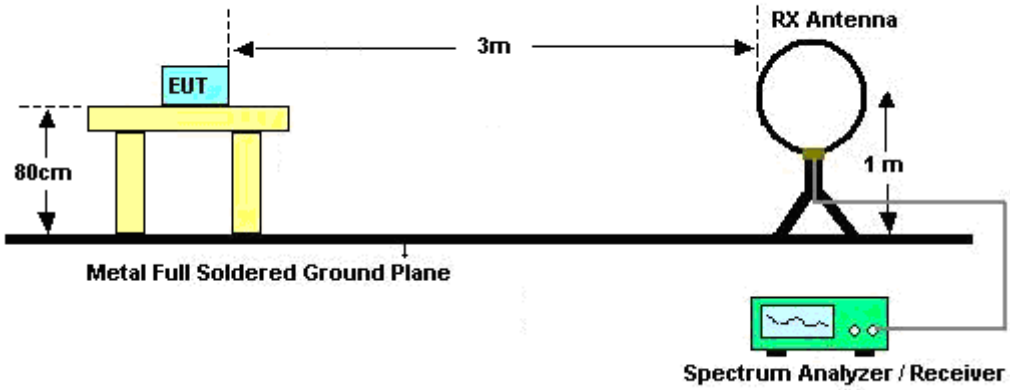
(1) Set RBW = 1 MHz, VBW = 3 MHz, peak detector.
Repeat the measurement with an average detector, use RBW = 1MHz
VBW = 10 Hz, when duty cycle is no less than 98 percent.
VBW ≥ 1/T, when duty cycle is less than 98 percent

(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 >= RBW.

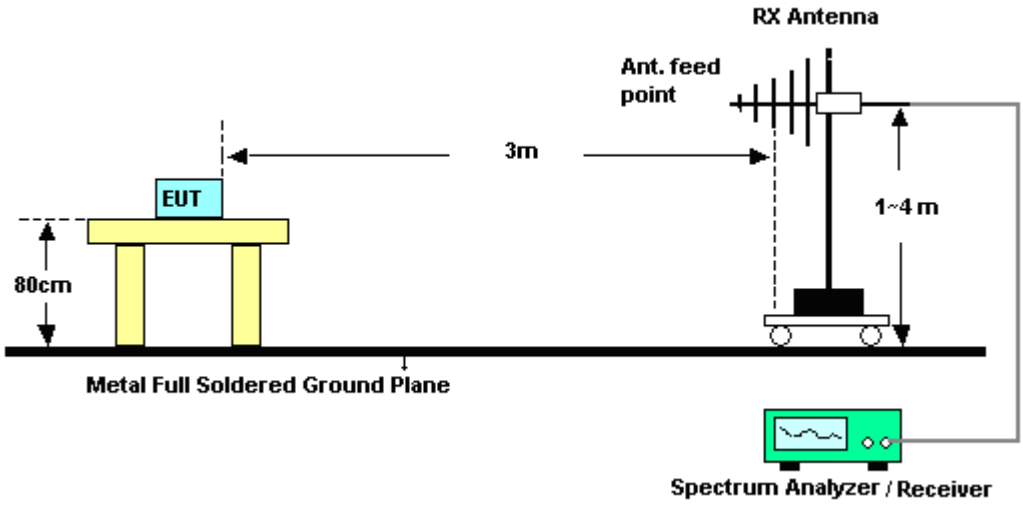
(3) Subtract the delta measured in step (2) from the field strengths measured in step (1). The resultant field strengths (peak/average) are then used to determine band-edge compliance as required by Section 15.205.

3.2.4 Test Setup

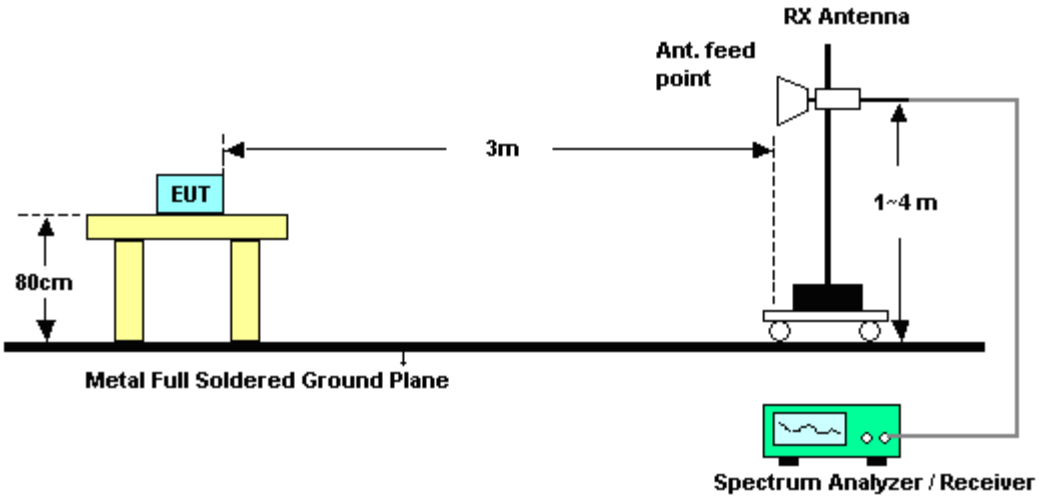
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 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.

3.2.6 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	22~23°C
Test Channel :	00	Relative Humidity :	41~42%
		Test Engineer :	Gavin Wu

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
2389.56	52.78	-21.22	74	47.84	32.3	6.91	34.27	102	12	Peak
2362.02	42.2	-11.8	54	37.31	32.26	6.88	34.25	102	12	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
2322.06	49	-25	74	44.19	32.23	6.8	34.22	189	103	Peak
2321.97	41.32	-12.68	54	36.51	32.23	6.8	34.22	189	103	Average

Test Mode :	Mode 3	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
		Test Engineer :	Gavin Wu

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	72.5	-1.5	74	67.49	32.38	7.06	34.43	100	18	Peak
2483.5	69.05	*15.05	54	64.04	32.38	7.06	34.43	100	18	Average
2483.5	51.14	-22.86	74	-	-	-	-	-	-	Peak
2483.5	50.31	-3.69	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	109.43	58.29	51.14	74	-22.86	Pass
Average	108.6	58.29	50.31	54	-3.69	Pass

Note : Measurement result = Maximum field strength – Delta result

*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 3.69 dB.

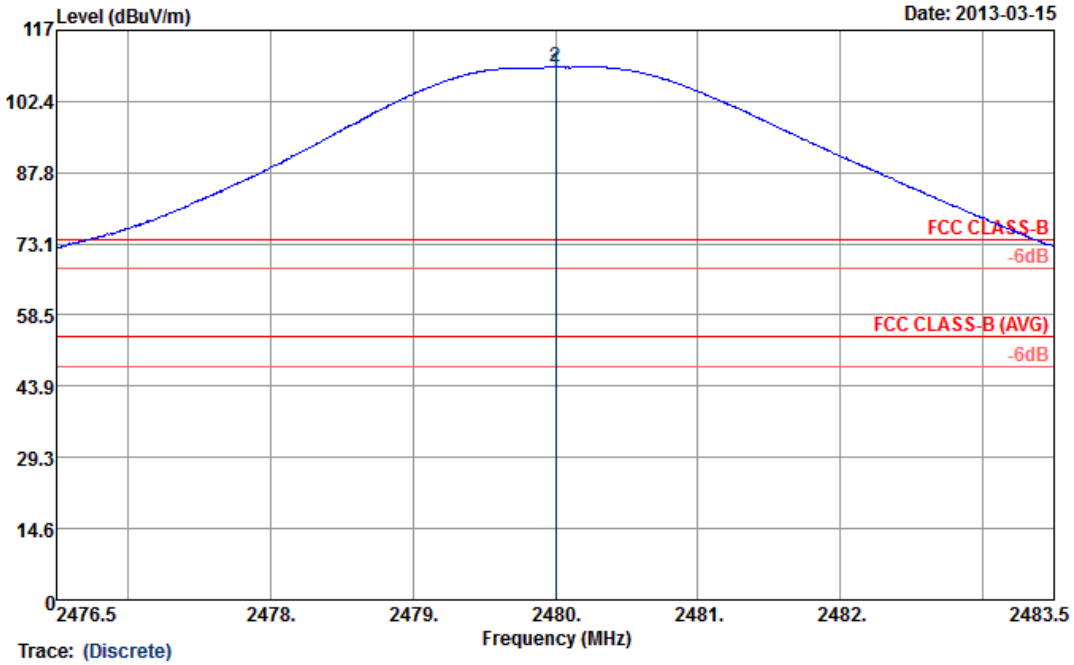
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	68.41	-5.59	74	63.4	32.38	7.06	34.43	157	196	Peak
2483.5	64.93	10.93	54	59.92	32.38	7.06	34.43	157	196	Average
2483.5	47.97	-26.03	74	-	-	-	-	-	-	Peak
2483.5	47.16	-6.84	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	105.1	57.13	47.97	74	-26.03	Pass
Average	104.29	57.13	47.16	54	-6.84	Pass

Note : Measurement result = Maximum field strength – Delta result

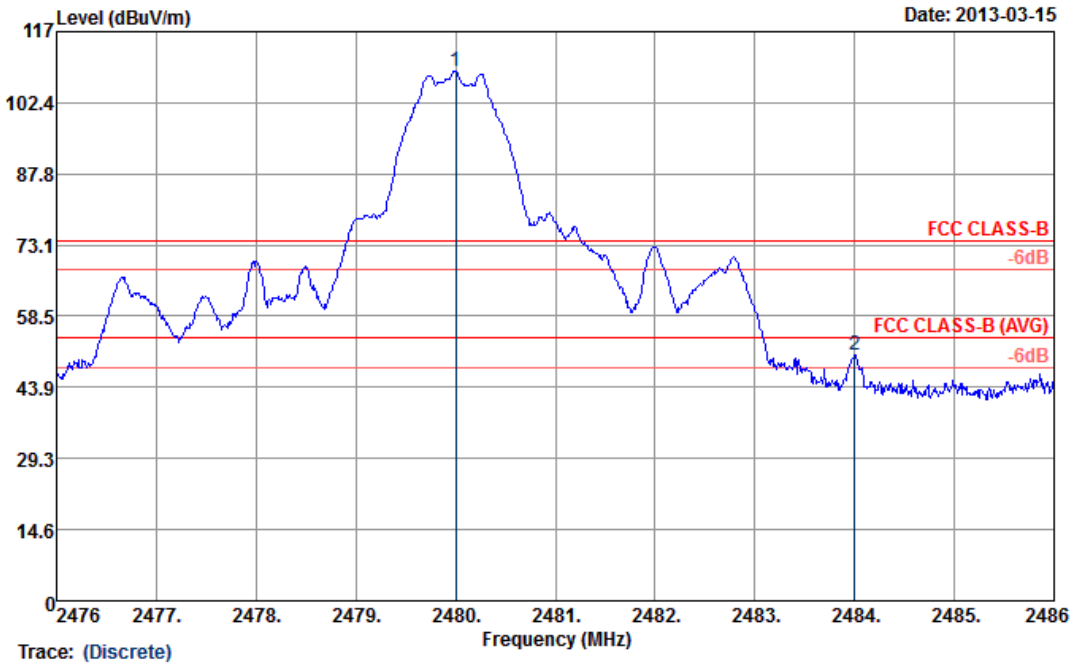
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Horizontal



		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	*	2480.00	108.60	54.60	54.00	103.59	32.38	7.06	34.43	100	18	Average
2	*	2480.00	109.43	35.43	74.00	104.42	32.38	7.06	34.43	100	18	Peak

* Maximum field strength of the fundamental emission

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Horizontal

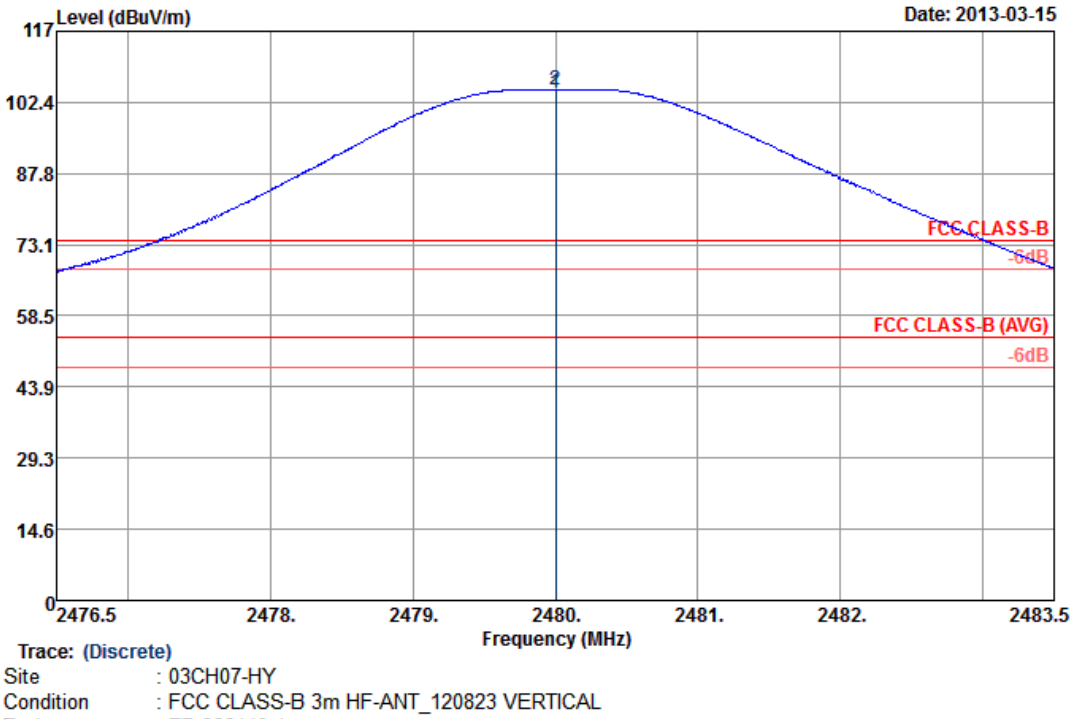


Site : 03CH07-HY
Condition : FCC CLASS-B 3m HF-ANT_120823 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	2480.00	108.89	34.89	74.00	103.88	32.38	7.06	34.43	100	18	Peak
2	2484.00	50.60	-23.40	74.00	45.59	32.38	7.06	34.43	100	18	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 58.29 dB , single carrier Mode

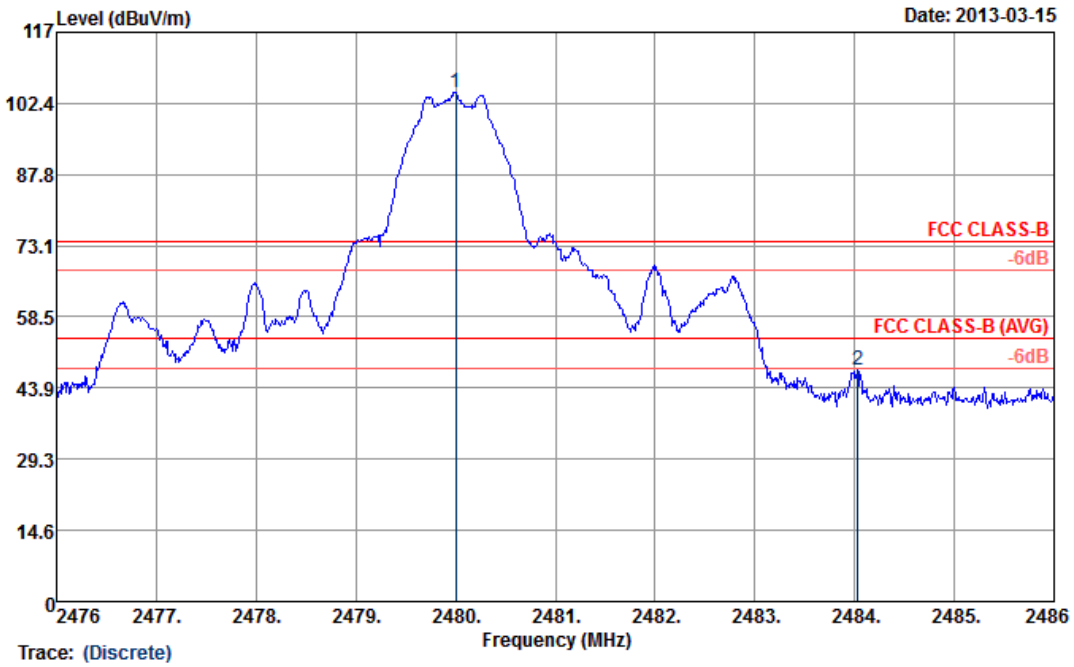
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	2480.00	104.29	50.29	54.00	99.28	32.38	7.06	34.43	157	196	Average
2 *	2480.00	105.10	31.10	74.00	100.09	32.38	7.06	34.43	157	196	Peak

* Maximum field strength of the fundamental emission

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Vertical



Trace: (Discrete)
Site : 03CH07-HY
Condition : FCC CLASS-B 3m HF-ANT_120823 VERTICAL

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	*	2480.00	104.74	30.74	74.00	99.73	32.38	7.06	34.43	157	196	Peak
2		2484.03	47.61	-26.39	74.00	42.60	32.38	7.06	34.43	157	196	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 57.13 dB , single carrier Mode

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

Test Mode :	Mode 1	**Temperature :**	22~23°C
Test Channel :	00	**Relative Humidity :**	41~42%
Test Engineer :	Gavin Wu	**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, 107.73 dBμV/m - 20dB = 87.73 dBμV/m. 3. 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
2402	106.87	-	-	101.96	32.3	6.91	34.3	102	12	Average
2402	107.73	-	-	102.82	32.3	6.91	34.3	102	12	Peak
4803	45.27	-28.73	74	60.01	33.98	8.75	57.47	100	0	Peak
7206	45.04	-42.69	87.73	56.63	35.56	10.81	57.96	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 1	**Temperature :**	22~23°C
Test Channel :	00	**Relative Humidity :**	41~42%
Test Engineer :	Gavin Wu	**Polarization :**	Vertical
Remark :	1. 2403 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 (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
2403	101.45	-	-	96.53	32.31	6.91	34.3	189	103	Average
2403	102.43	-	-	97.51	32.31	6.91	34.3	189	103	Peak
4806	45.68	-28.32	74	62.99	33.98	8.77	60.06	100	0	Peak
7206	44.3	-38.13	82.43	57.3	35.56	10.81	59.37	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	22~23°C
Test Channel :	19	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Horizontal
Remark :	1. 2441 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
2441	107.76	-	-	102.81	32.35	6.99	34.39	100	15	Average
2441	108.66	-	-	103.71	32.35	6.99	34.39	100	15	Peak
4881	45.4	-28.6	74	60.08	33.95	8.85	57.48	100	0	Peak
7320	44.89	-29.11	74	56.49	35.53	10.91	58.04	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	22~23°C
Test Channel :	19	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	1. 2441 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
2441	101.29	-	-	96.34	32.35	6.99	34.39	180	100	Average
2441	102.15	-	-	97.2	32.35	6.99	34.39	180	100	Peak
4881	45.8	-28.2	74	62.78	33.95	8.85	59.78	100	0	Peak
7320	44.3	-29.7	74	57.32	35.53	10.91	59.46	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Horizontal
Remark :	1. 2481 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
129.36	27.3	-16.2	43.5	46.12	11.62	1.14	31.58	-	-	Peak
196.05	24.86	-18.64	43.5	45.81	9.06	1.3	31.31	-	-	Peak
241.95	28.41	-17.59	46	46.01	12.06	1.53	31.19	-	-	Peak
452.6	30.77	-15.23	46	42.51	17.11	2.31	31.16	-	-	Peak
624.1	32.56	-13.44	46	40.26	19.99	2.76	30.45	100	216	Peak
780.2	29.86	-16.14	46	35.27	21.79	3.11	30.31	-	-	Peak
2481	108.63	-	-	103.62	32.38	7.06	34.43	100	18	Average
2481	109.38	-	-	104.37	32.38	7.06	34.43	100	18	Peak
4962	45.1	-28.9	74	59.76	33.91	8.92	57.49	100	0	Peak
7440	43.96	-30.04	74	55.53	35.51	11.04	58.12	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	22~23°C
Test Channel :	39	Relative Humidity :	41~42%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	1. 2481 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	28.28	-11.72	40	39.62	20	0.53	31.87	100	129	Peak
129.36	26.21	-17.29	43.5	45.03	11.62	1.14	31.58	-	-	Peak
260.04	25.01	-20.99	46	41.94	12.74	1.59	31.26	-	-	Peak
452.6	30.93	-15.07	46	42.67	17.11	2.31	31.16	-	-	Peak
624.1	28.85	-17.15	46	36.55	19.99	2.76	30.45	-	-	Peak
666.8	27.76	-18.24	46	34.96	20.33	2.87	30.4	-	-	Peak
2481	104.28	-	-	99.27	32.38	7.06	34.43	157	196	Average
2481	105.02	-	-	100.01	32.38	7.06	34.43	157	196	Peak
4962	43.37	-30.63	74	59.98	33.91	8.92	59.44	100	0	Peak
7440	43.14	-30.86	74	56.15	35.51	11.04	59.56	100	0	Peak

Note: Other harmonics are lower than background noise.

3.3 AC Conducted Emission Measurement

3.3.1 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 (dBμV)	
	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.

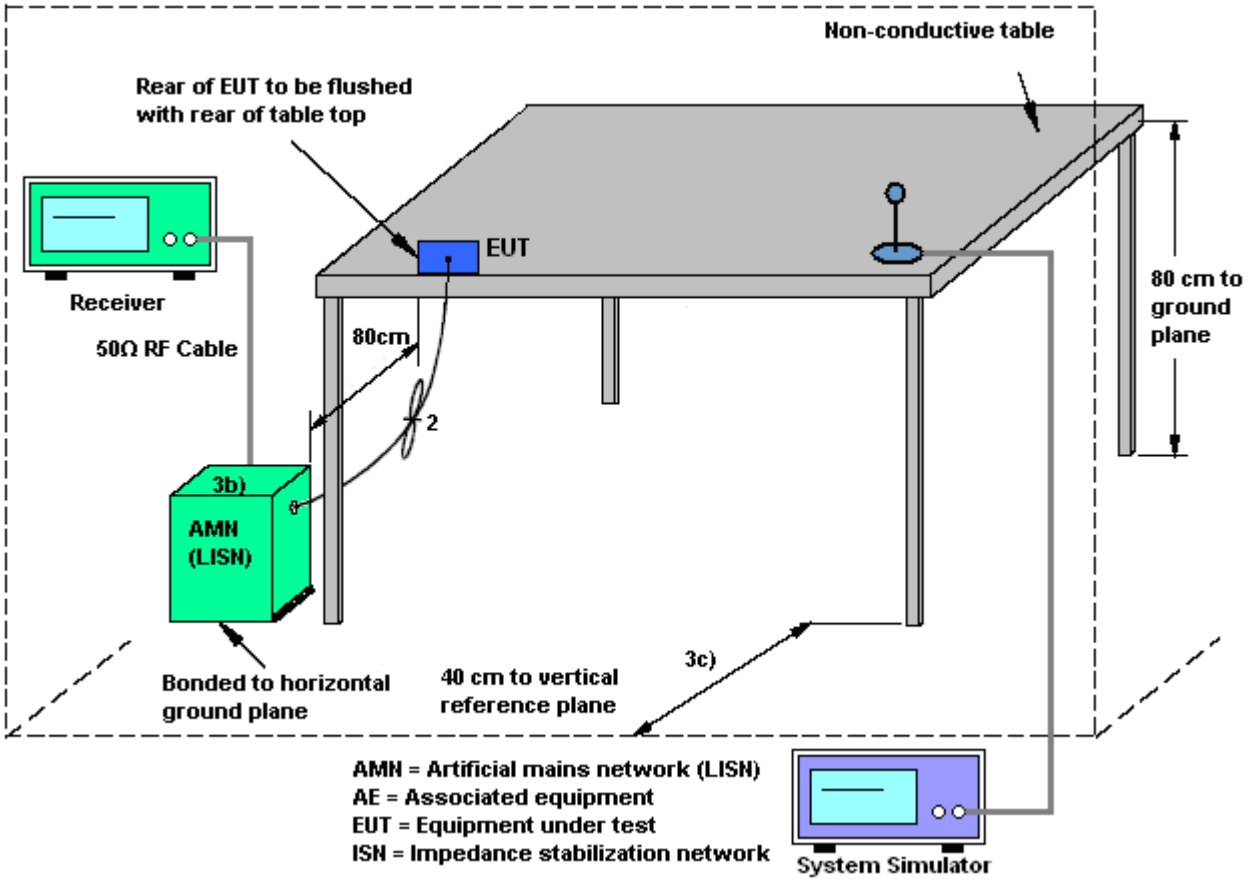
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

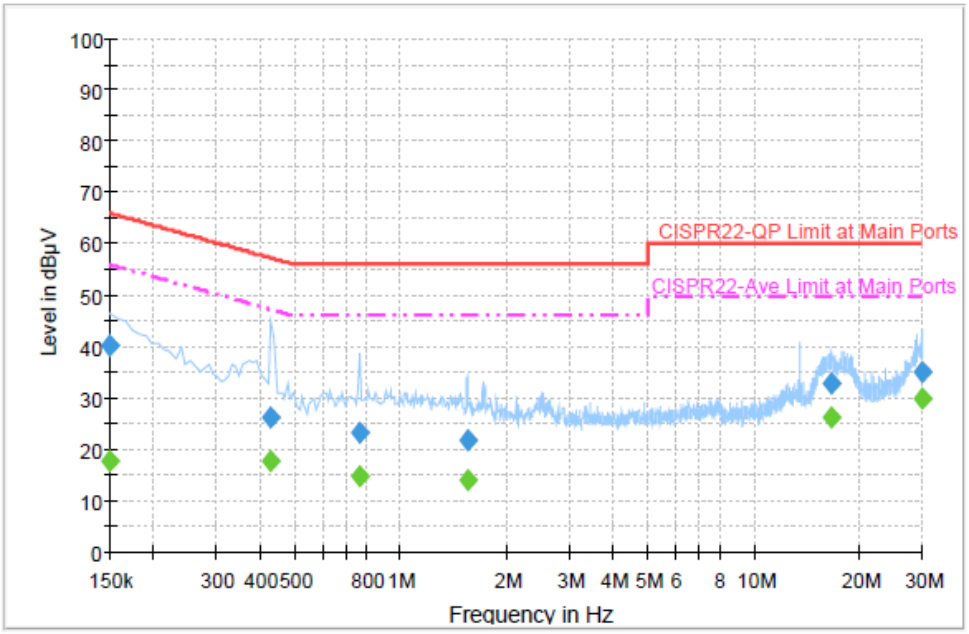
1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
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.

3.3.4 Test Setup



3.3.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Slash Huang	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	CDMA2000 BC1 Idle + WLAN (2.4G) Link + Bluetooth Link + GPS Rx + MPEG4 + H Patten + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



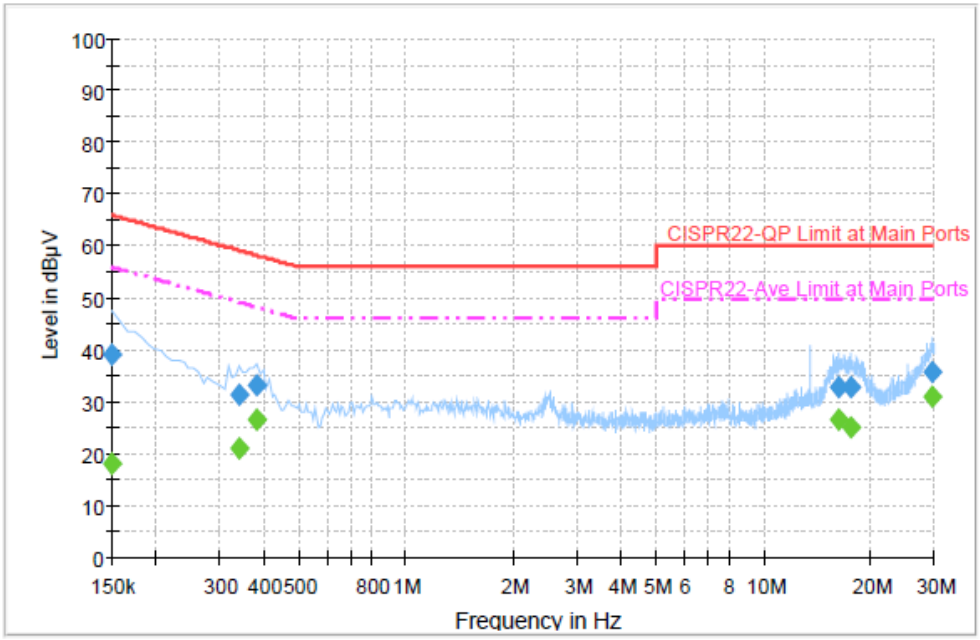
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.1	Off	L1	19.4	25.9	66.0
0.430000	26.2	Off	L1	19.3	31.1	57.3
0.766000	23.1	Off	L1	19.4	32.9	56.0
1.550000	21.8	Off	L1	19.5	34.2	56.0
16.646000	32.8	Off	L1	19.8	27.2	60.0
29.830000	35.0	Off	L1	20.0	25.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	17.8	Off	L1	19.4	38.2	56.0
0.430000	17.6	Off	L1	19.3	29.7	47.3
0.766000	14.9	Off	L1	19.4	31.1	46.0
1.550000	14.2	Off	L1	19.5	31.8	46.0
16.646000	26.0	Off	L1	19.8	24.0	50.0
29.830000	30.0	Off	L1	20.0	20.0	50.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	CDMA2000 BC1 Idle + WLAN (2.4G) Link + Bluetooth Link + GPS Rx + MPEG4 + H Patten + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	39.2	Off	N	19.4	26.8	66.0
0.342000	31.5	Off	N	19.3	27.7	59.2
0.382000	33.2	Off	N	19.4	25.0	58.2
16.182000	32.9	Off	N	19.9	27.1	60.0
17.614000	33.0	Off	N	19.9	27.0	60.0
29.510000	35.9	Off	N	20.1	24.1	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	18.0	Off	N	19.4	38.0	56.0
0.342000	21.2	Off	N	19.3	28.0	49.2
0.382000	26.4	Off	N	19.4	21.8	48.2
16.182000	26.6	Off	N	19.9	23.4	50.0
17.614000	25.2	Off	N	19.9	24.8	50.0
29.510000	31.1	Off	N	20.1	18.9	50.0

3.4 Antenna Requirements

3.4.1 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.

3.4.2 Antenna Connected Construction

I-PEX connector used.

3.4.3 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	Mar. 11, 2013	Jun. 05, 2013	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9KHz – 2.75GHz	Nov. 13, 2012	Mar. 06, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100081	9KHz ~ 30MHz	Dec. 12, 2012	Mar. 06, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9KHz ~ 30MHz	Dec. 06, 2012	Mar. 06, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Mar. 06, 2013	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117995	N/A	Jul. 28, 2011	Mar. 06, 2013	Jul. 27, 2013	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	Mar. 06, 2013	N/A	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz ~ 30GHz	Nov. 30, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Aug. 21, 2013	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 01, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Nov. 30, 2013	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	159088	1GHz ~ 18GHz	Feb. 27, 2013	Mar. 15, 2013 ~ Mar. 16, 2013	Feb. 26, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10-1000MHz. 32dB.GAIN	Feb. 26, 2013	Mar. 15, 2013 ~ Mar. 16, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Sep. 02, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Sep. 27, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Mar. 15, 2013 ~ Mar. 16, 2013	Jul. 02, 2013	Radiation (03CH07-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**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**

Appendix A. Photographs of EUT

Please refer to Sporton report number EP322149-01 as below.