FCC RF Test Report

APPLICANT	:	**Motorola Solutions, Inc.**
EQUIPMENT	:	**Touch Computer**
BRAND NAME	:	**Motorola**
MODEL NAME	:	**TC55CH**
FCC ID	:	**UZ7TC55CH**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**

The product was received on Jan. 08, 2014 and testing was completed on Jan. 25, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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.

Louis Wu

Reviewed by: Louis Wu / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3O1108-01B	Rev. 01	Initial issue of report	Feb. 10, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)(1)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 17.31 dB at 85.080 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.00 dB at 13.558 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Motorola Solutions, Inc.
One Motorola Plaza, Holtsville, NY 11742-1300 USA

1.2 Manufacturer

Motorola Solutions, Inc.
One Motorola Plaza, Holtsville, NY 11742-1300 USA

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Touch Computer
Brand Name	Motorola
Model Name	TC55CH
FCC ID	UZ7TC55CH
Sample 1	EUT with Scanner
Sample 2	EUT without Scanner
EUT supports Radios application	CDMA/EV-DO/LTE WLAN 11abgn / Bluetooth 2.1 / 3.0 / 4.0 / NFC
HW Version	DV2.2
SW Version	Android 4.1.2
FW Version	BSP 1.7
EUT Stage	Identical Prototype

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	3.77 dBm (0.0024W)
Antenna Type	PIFA Antenna type with gain 0.20 dBi (Battery 1) PIFA Antenna type with gain 0.08 dBi (Battery 2)
Type of Modulation	Bluetooth 4.0 - LE : GFSK

The bluetooth antenna is not changed while using battery cover 1 or 2. The antenna gain difference is due to antenna gain measurement result by using different battery covers.

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 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 Registration No.
	TH02-HY	CO05-HY	03CH07-HY	722060

Note: 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 C63.4-2003

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	3.31 dBm
Ch19	2440MHz	**3.77 dBm**
Ch39	2480MHz	3.23 dBm

a. The EUT has been associated with peripherals 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 (Y 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.

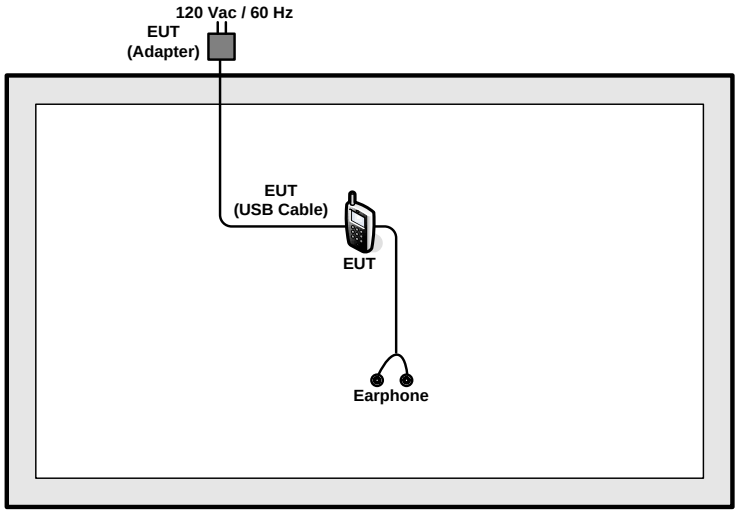
Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
	Bluetooth 4.0 – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1: CDMA2000 BC0 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Earphone + NFC active + Scanner + USB Cable (Charging from Adapter) + Battery 2 for Sample 1

Remark:

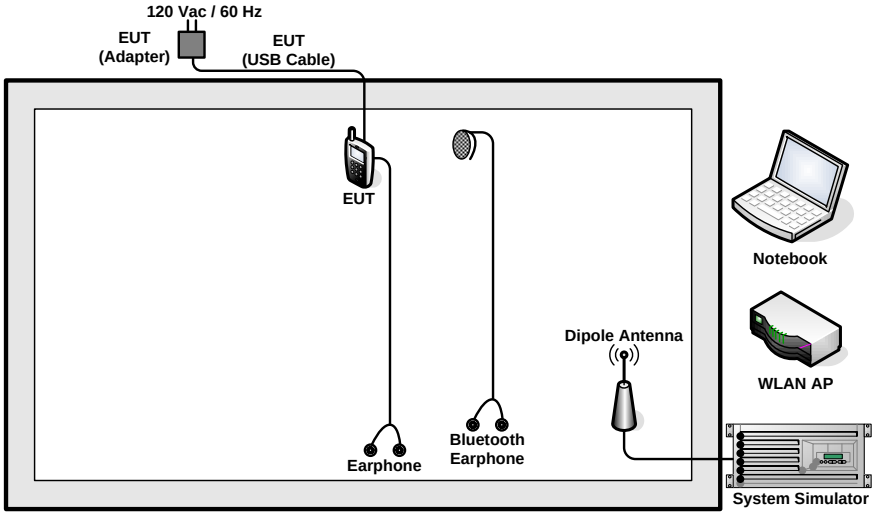
1. For Radiated TCs, the tests were performed with Battery 2 and Sample 1.
2. “Bluetooth Link” means EUT linked with Bluetooth headset.
3. “WLAN Link” means EUT associated with AP at 2.4GHz band.
4. ”Scanner” stands for scanning and decoding a barcode by scanner.
5. “NFC active” means turning on NFC function of EUT.

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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	Earphone	Cotron	MAX-300	N/A	Unshielded, 1.2 m	N/A
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

For Bluetooth function, programmed RF utility, “QRCT” 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.

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

= 4.2 + 10 = 14.2 (dB)

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.

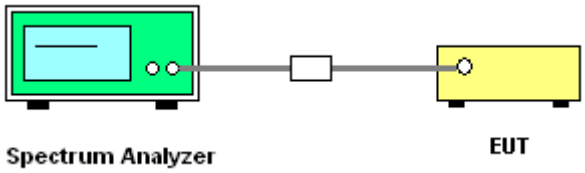
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 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

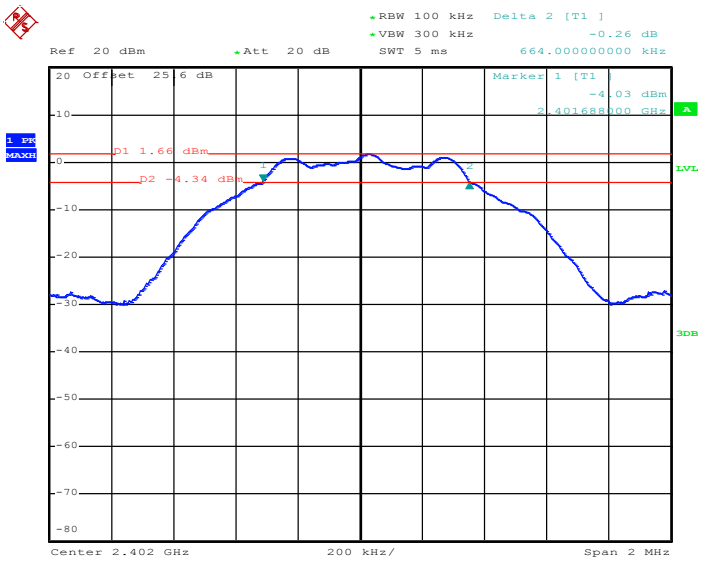


3.1.5 Test Result of 6dB Bandwidth

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

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
00	2402	0.664	0.5	Pass
19	2440	0.672	0.5	Pass
39	2480	0.680	0.5	Pass

6 dB Bandwidth Plot on Channel 00



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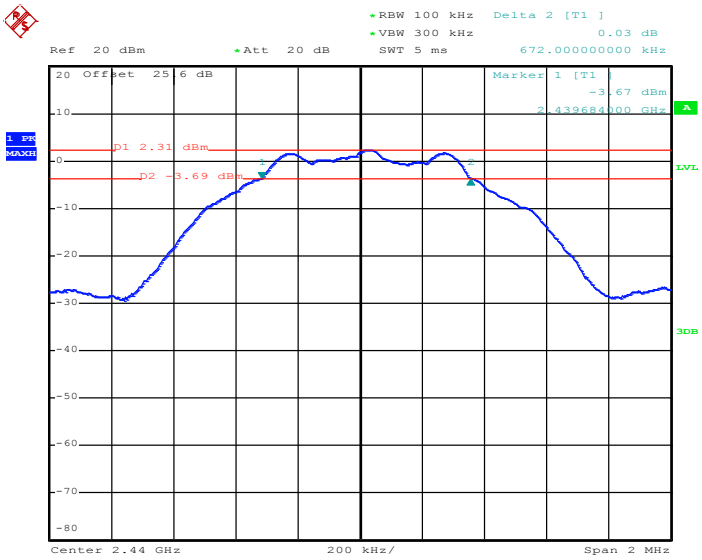
6 dB Bandwidth Plot on Channel 19



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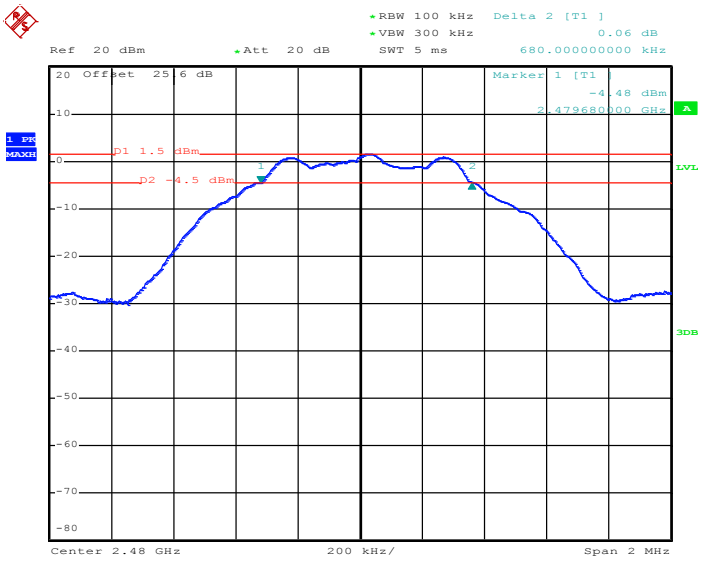
6 dB Bandwidth Plot on Channel 39



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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.

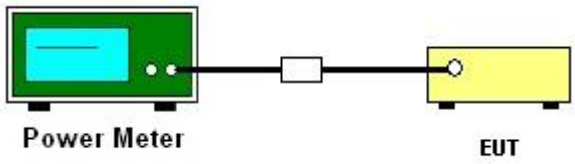
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 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 :	Rover Lee	Relative Humidity :	51~55%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	3.31	30.00	Pass
19	2440	3.77	30.00	Pass
39	2480	3.23	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.

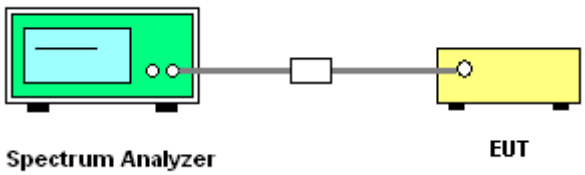
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 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 :	Rover Lee	Relative Humidity :	51~55%

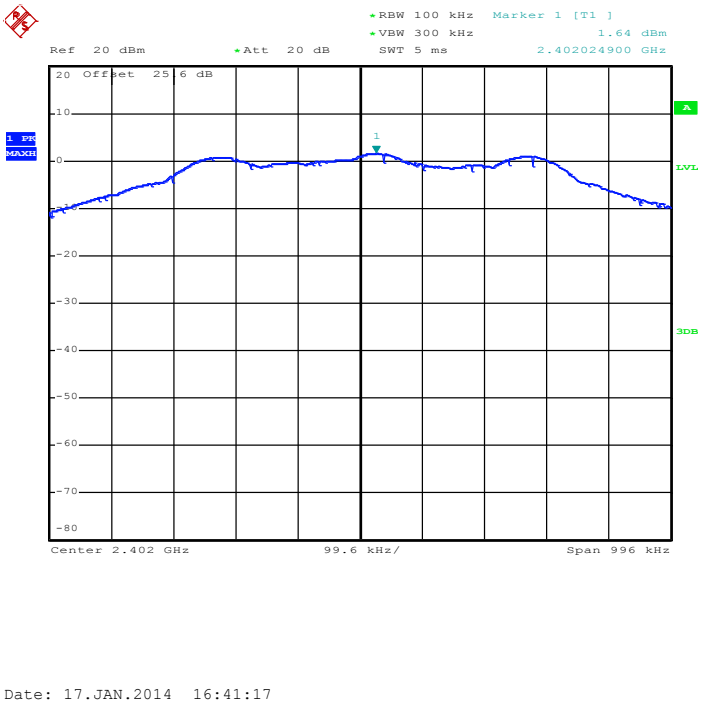
Channel	Frequency (MHz)	Power Density		Max. Limits (dBm/3kHz)	Pass/Fail
		PSD/100kHz (dBm)	PSD/3kHz (dBm)		
00	2402	1.64	-13.52	8	Pass
19	2440	2.31	-12.89	8	Pass
39	2480	1.49	-13.80	8	Pass

Note:

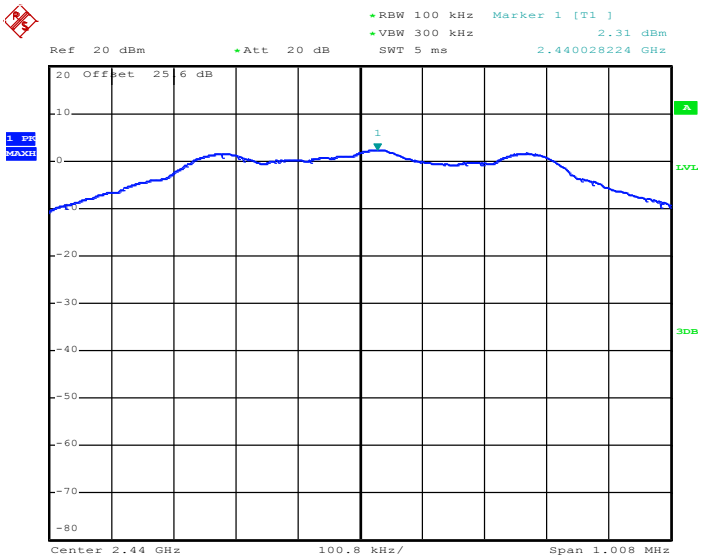
1. *Measured power density (dBm) has offset with cable loss.*
2. *The Measured power density (dBm)/ 100kHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.*

3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 00



PSD 100kHz Plot on Channel 19



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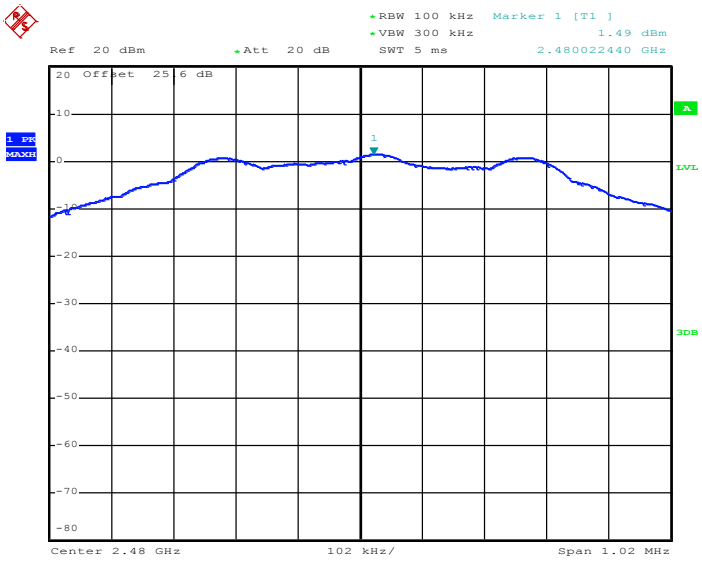
PSD 100kHz Plot on Channel 39



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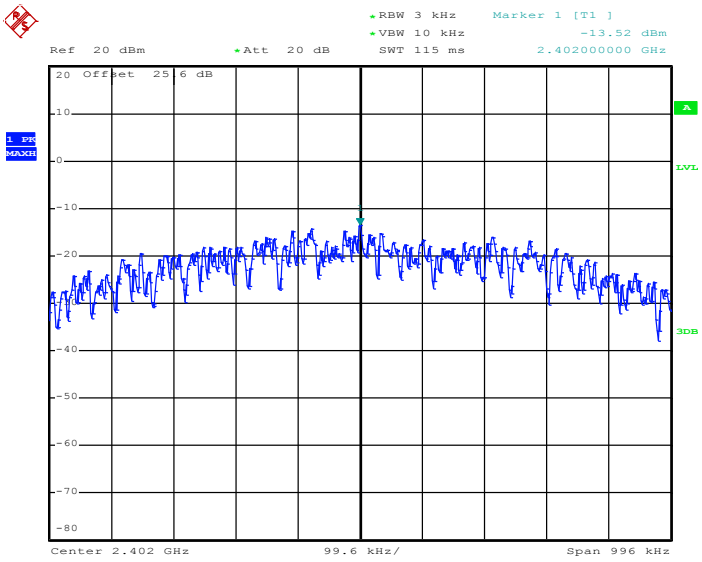
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 00



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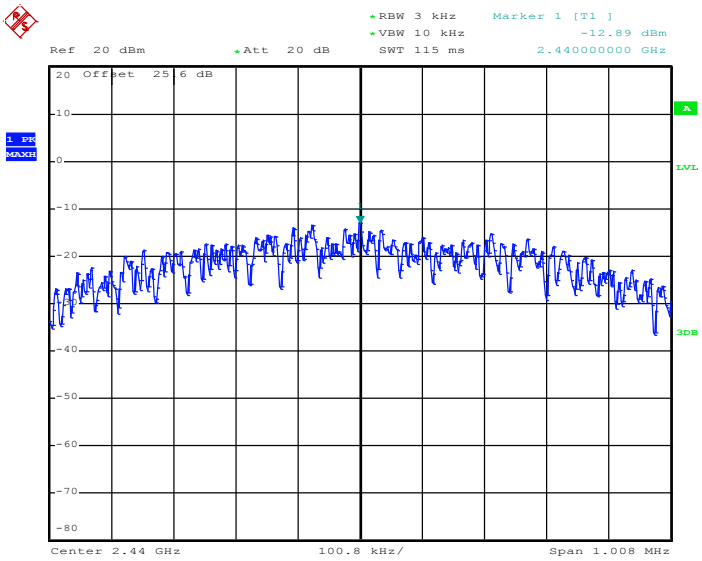
PSD 3kHz Plot on Channel 19



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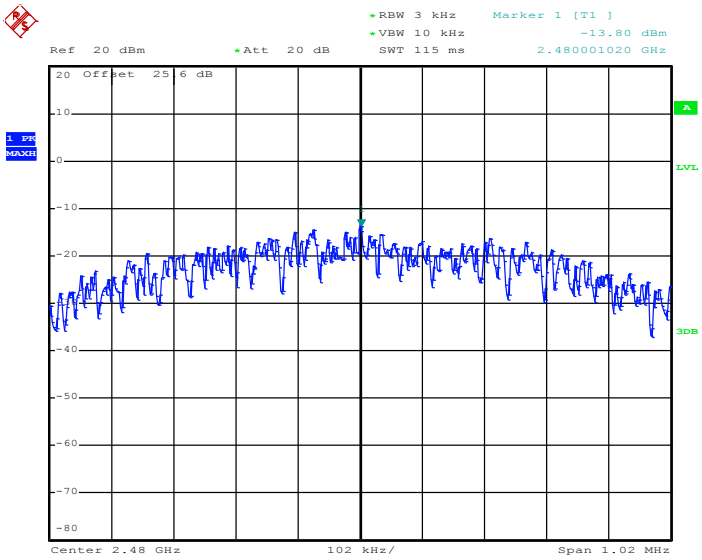
PSD 3kHz Plot on Channel 39



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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.

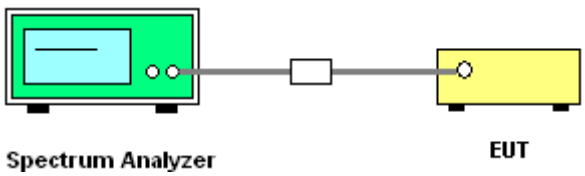
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 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.

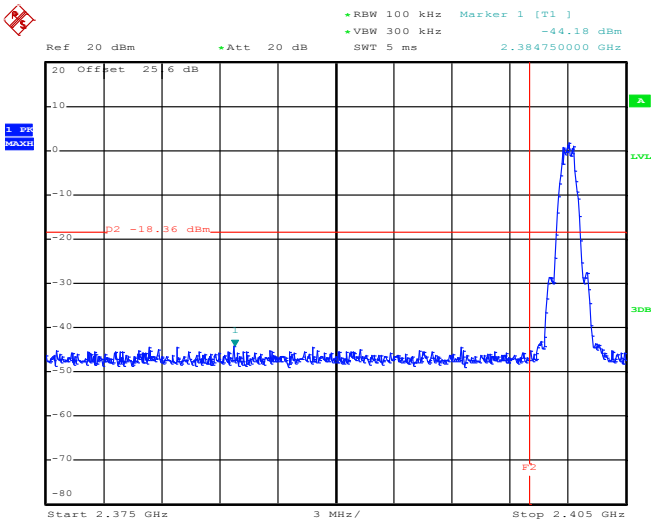
3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Channel :	00 and 39	Relative Humidity :	51~55%
		Test Engineer :	Rover Lee

Low Band Edge Plot on Channel 00



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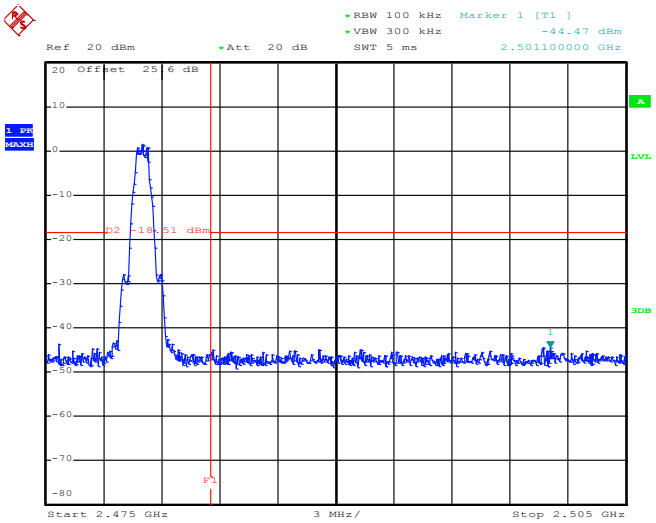
High Band Edge Plot on Channel 39



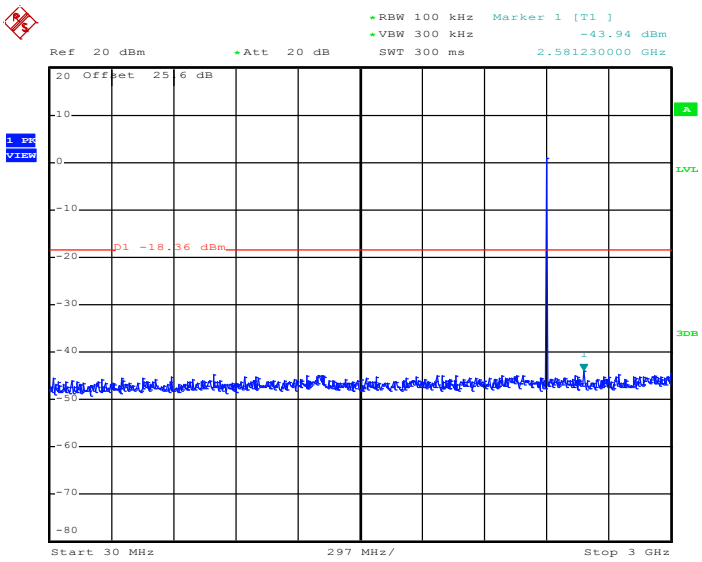
Date: 17.JAN.2014 16:46:31

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 :	Rover Lee

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 00



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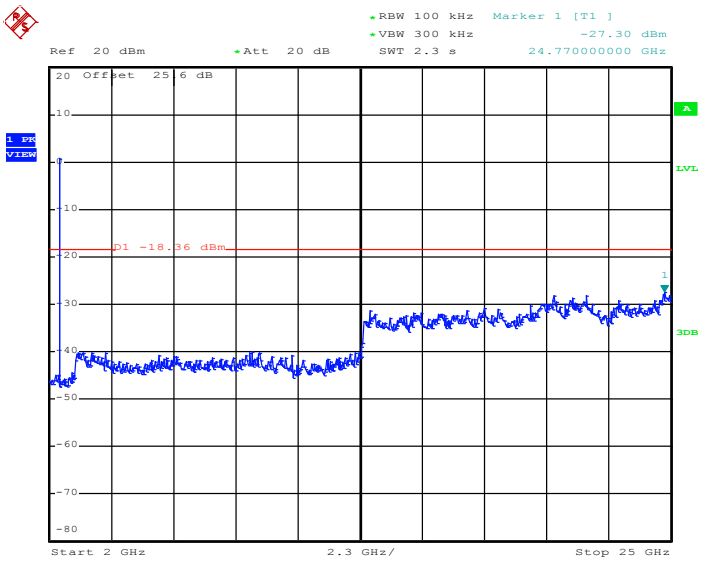
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 00

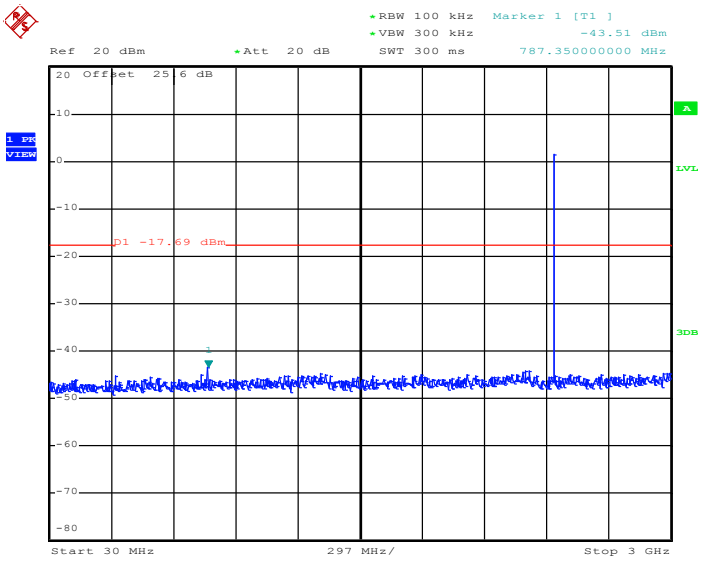


Date: 17.JAN.2014 16:42:51

Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Channel :	19	Relative Humidity :	51~55%
		Test Engineer :	Rover Lee

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 19



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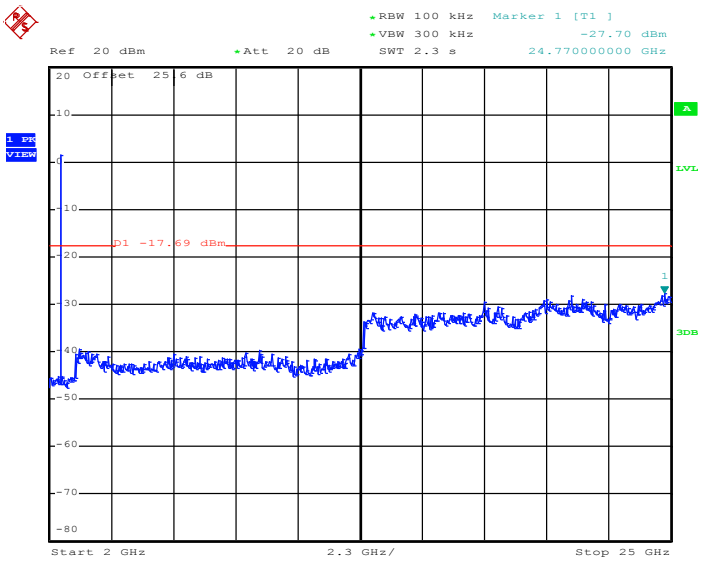
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 19



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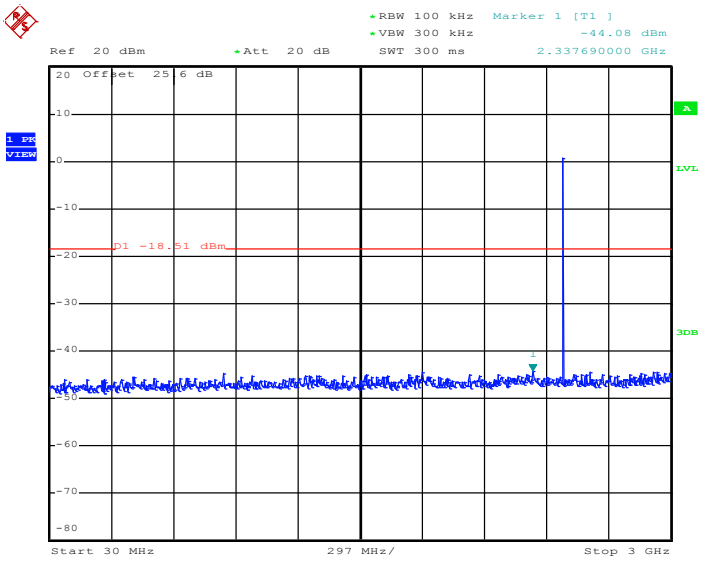
Test Mode :	Bluetooth 4.0 - LE	Temperature :	22~25℃
Test Channel :	39	Relative Humidity :	51~55%
		Test Engineer :	Rover Lee

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 39



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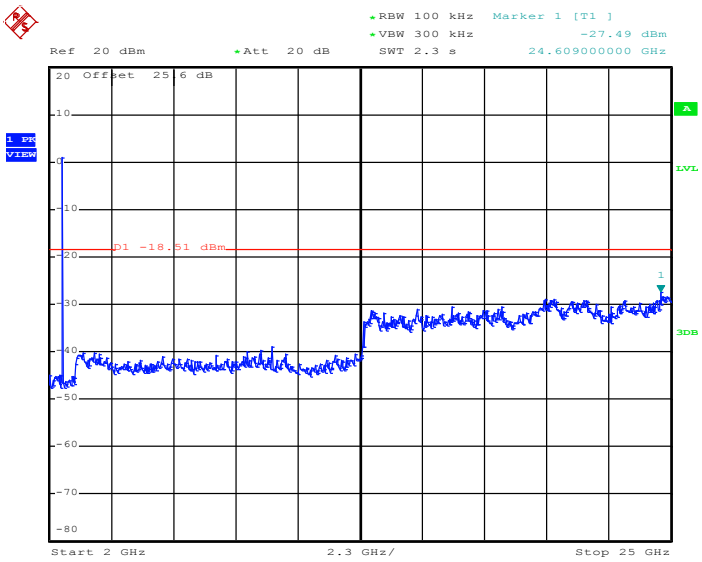
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 39



Date: 17.JAN.2014 16:47:25

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

The measuring equipment is listed in the section 4 of this test report.

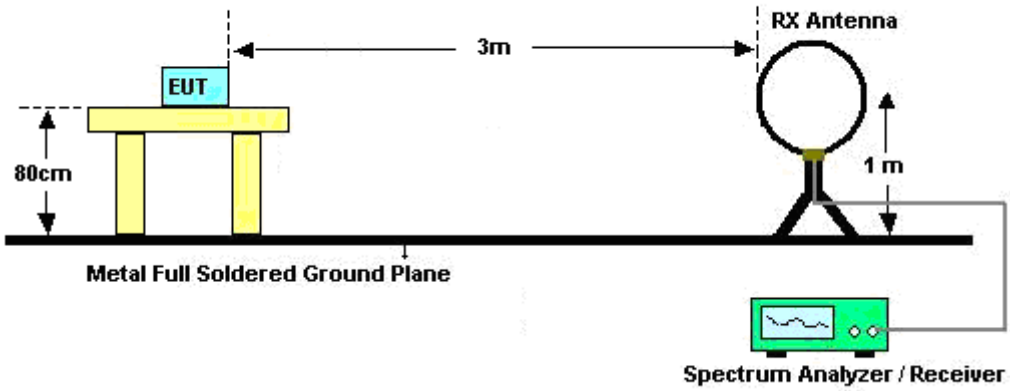
3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
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.

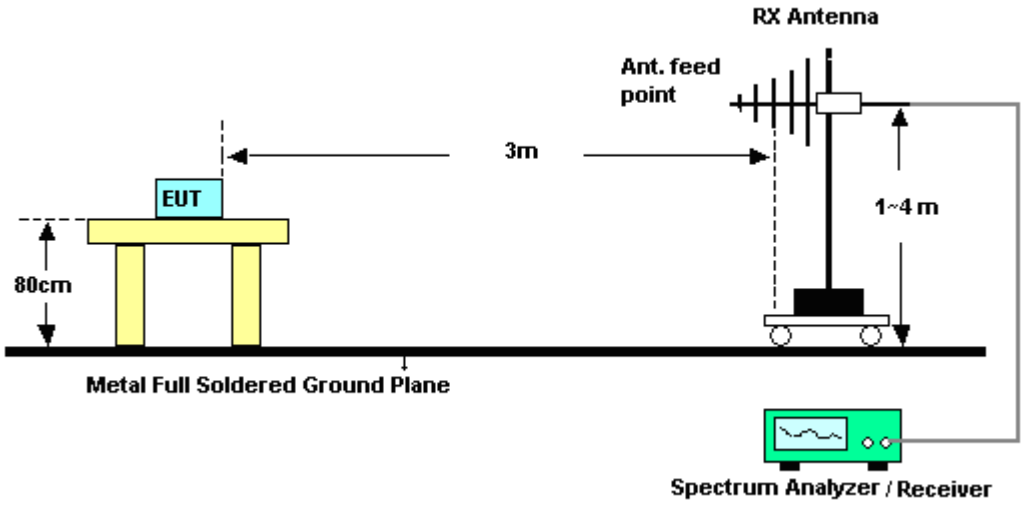
Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
Bluetooth 4.0 - LE	62.66	396	2.53	3kHz

3.5.4 Test Setup

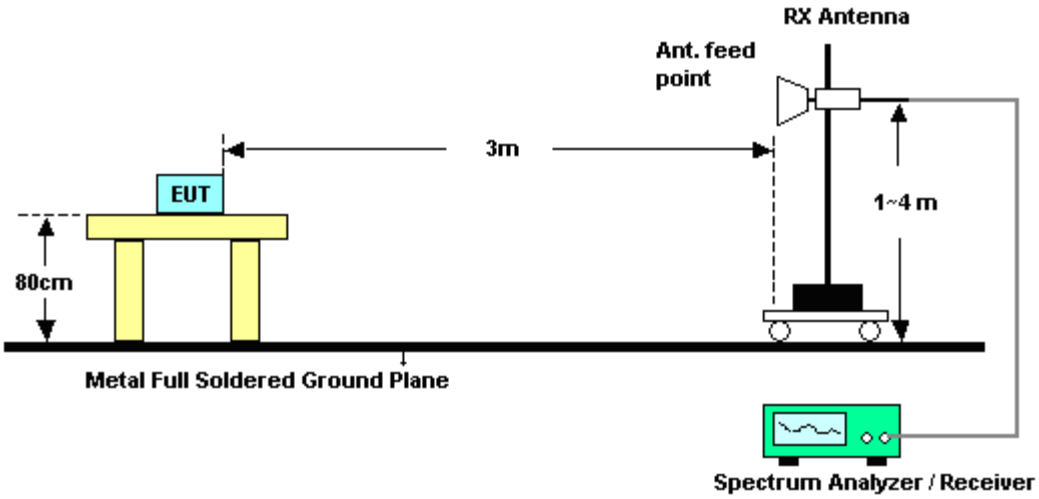
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious 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 Spurious at Band Edges

Test Mode :	Mode 1	Temperature :	19~21°C
Test Channel :	00	Relative Humidity :	47~49%
		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
2332.14	45.99	-28.01	74	41.14	32.23	6.84	34.22	101	37	Peak
2341.95	33.36	-20.64	54	28.53	32.24	6.84	34.25	101	37	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
2315.13	45.71	-28.29	74	40.92	32.21	6.8	34.22	100	322	Peak
2330.52	33	-21	54	28.19	32.23	6.8	34.22	100	322	Average

Test Mode :	Mode 3	Temperature :	19~21°C
Test Channel :	39	Relative Humidity :	47~49%
		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
2483.53	50.49	-23.51	74	45.48	32.38	7.06	34.43	100	35	Peak
2483.92	35.42	-18.58	54	30.41	32.38	7.06	34.43	100	35	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
2483.53	46.69	-27.31	74	41.68	32.38	7.06	34.43	102	128	Peak
2483.53	33.85	-20.15	54	28.84	32.38	7.06	34.43	102	128	Average

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

Test Mode :	Mode 1	Temperature :	19~21°C
Test Channel :	00	Relative Humidity :	47~49%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2402 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
85.89	15.94	-24.06	40	37.9	8.22	0.92	31.1	-	-	Peak
137.46	20.4	-23.1	43.5	38.81	11.5	1.19	31.1	-	-	Peak
213.33	15.96	-27.54	43.5	36.42	9.23	1.38	31.07	-	-	Peak
440	19.14	-26.86	46	30.56	17	2.28	30.7	-	-	Peak
684.3	22.64	-23.36	46	29.66	20.5	2.91	30.43	-	-	Peak
819.4	24.37	-21.63	46	29.02	22.5	3.19	30.34	105	21	Peak
2402	100.45	-	-	95.54	32.3	6.91	34.3	101	37	Average
2402	101.58	-	-	96.67	32.3	6.91	34.3	101	37	Peak
4803	40.71	-33.29	74	56.94	33.98	8.75	58.96	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 1	Temperature :	19~21°C
Test Channel :	00	Relative Humidity :	47~49%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2402 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
85.08	22.69	-17.31	40	44.78	8.1	0.91	31.1	133	75	Peak
128.82	18.27	-25.23	43.5	36.31	11.92	1.14	31.1	-	-	Peak
209.01	22.39	-21.11	43.5	42.94	9.19	1.36	31.1	-	-	Peak
435.8	18.55	-27.45	46	30.06	16.95	2.26	30.72	-	-	Peak
582.1	23.85	-22.15	46	32.3	19.58	2.64	30.67	-	-	Peak
843.2	25.76	-20.24	46	29.67	23.23	3.25	30.39	-	-	Peak
2402	88.3	-	-	83.39	32.3	6.91	34.3	100	322	Average
2402	89.43	-	-	84.51	32.31	6.91	34.3	100	322	Peak
4803	40.66	-33.34	74	56.89	33.98	8.75	58.96	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	19~21°C
Test Channel :	19	Relative Humidity :	47~49%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2440 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
85.62	15.6	-24.4	40	37.69	8.1	0.91	31.1	-	-	Peak
137.46	23.55	-19.95	43.5	41.96	11.5	1.19	31.1	111	30	Peak
156.36	22.11	-21.39	43.5	41.4	10.66	1.22	31.17	-	-	Peak
429.5	19.38	-26.62	46	30.99	16.9	2.24	30.75	-	-	Peak
617.8	22.78	-23.22	46	30.46	20.14	2.74	30.56	-	-	Peak
834.8	24.32	-21.68	46	28.46	23	3.23	30.37	-	-	Peak
2440	102.31	-	-	97.32	32.35	6.99	34.35	102	40	Average
2440	103.49	-	-	98.54	32.35	6.99	34.39	102	40	Peak
4881	39.75	-34.25	74	55.78	33.95	8.85	58.83	100	0	Peak
7320	42.07	-31.93	74	53.37	35.53	10.91	57.74	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	19~21°C
Test Channel :	19	Relative Humidity :	47~49%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2440 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
85.89	22.4	-17.60	40	44.36	8.22	0.92	31.1	177	67	Peak
168.78	18.62	-24.88	43.5	38.79	9.72	1.23	31.12	-	-	Peak
207.66	22.26	-21.24	43.5	42.84	9.17	1.35	31.1	-	-	Peak
442.8	18.03	-27.97	46	29.37	17.09	2.29	30.72	-	-	Peak
569.5	23.85	-22.15	46	32.24	19.73	2.6	30.72	-	-	Peak
849.5	24.99	-21.01	46	28.82	23.3	3.27	30.4	-	-	Peak
2440	96.76	-	-	91.77	32.35	6.99	34.35	133	136	Average
2440	97.87	-	-	92.92	32.35	6.99	34.39	133	136	Peak
4881	40.33	-33.67	74	56.36	33.95	8.85	58.83	100	0	Peak
7320	42.55	-31.45	74	53.85	35.53	10.91	57.74	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	19~21°C
Test Channel :	39	Relative Humidity :	47~49%
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
129.09	22.97	-20.53	43.5	41.01	11.92	1.14	31.1	-	-	Peak
137.46	25.25	-18.25	43.5	43.66	11.5	1.19	31.1	188	32	Peak
156.09	22.44	-21.06	43.5	41.72	10.66	1.22	31.16	-	-	Peak
456.8	18.84	-27.16	46	29.94	17.37	2.31	30.78	-	-	Peak
629	22.03	-23.97	46	29.41	20.38	2.78	30.54	-	-	Peak
914.6	25.81	-20.19	46	29.03	23.73	3.38	30.33	-	-	Peak
2480	101.13	-	-	96.12	32.38	7.06	34.43	100	35	Average
2480	102.24	-	-	97.23	32.38	7.06	34.43	100	35	Peak
4959	40.02	-33.98	74	55.85	33.91	8.92	58.66	100	0	Peak
7440	39.85	-34.15	74	51.15	35.51	11.04	57.85	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	19~21°C
Test Channel :	39	Relative Humidity :	47~49%
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
85.62	22.39	-17.61	40	44.48	8.1	0.91	31.1	182	34	Peak
128.82	18.73	-24.77	43.5	36.77	11.92	1.14	31.1	-	-	Peak
216.03	22.47	-23.53	46	42.85	9.26	1.4	31.04	-	-	Peak
412	16.84	-29.16	46	29.2	16.3	2.18	30.84	-	-	Peak
575.8	24.05	-21.95	46	32.49	19.64	2.62	30.7	-	-	Peak
804	25.03	-20.97	46	30.11	22.08	3.15	30.31	-	-	Peak
2480	95.83	-	-	90.82	32.38	7.06	34.43	102	128	Average
2480	96.99	-	-	91.98	32.38	7.06	34.43	102	128	Peak
4959	41.12	-32.88	74	56.95	33.91	8.92	58.66	100	0	Peak
7440	40.07	-33.93	74	51.37	35.51	11.04	57.85	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 (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.

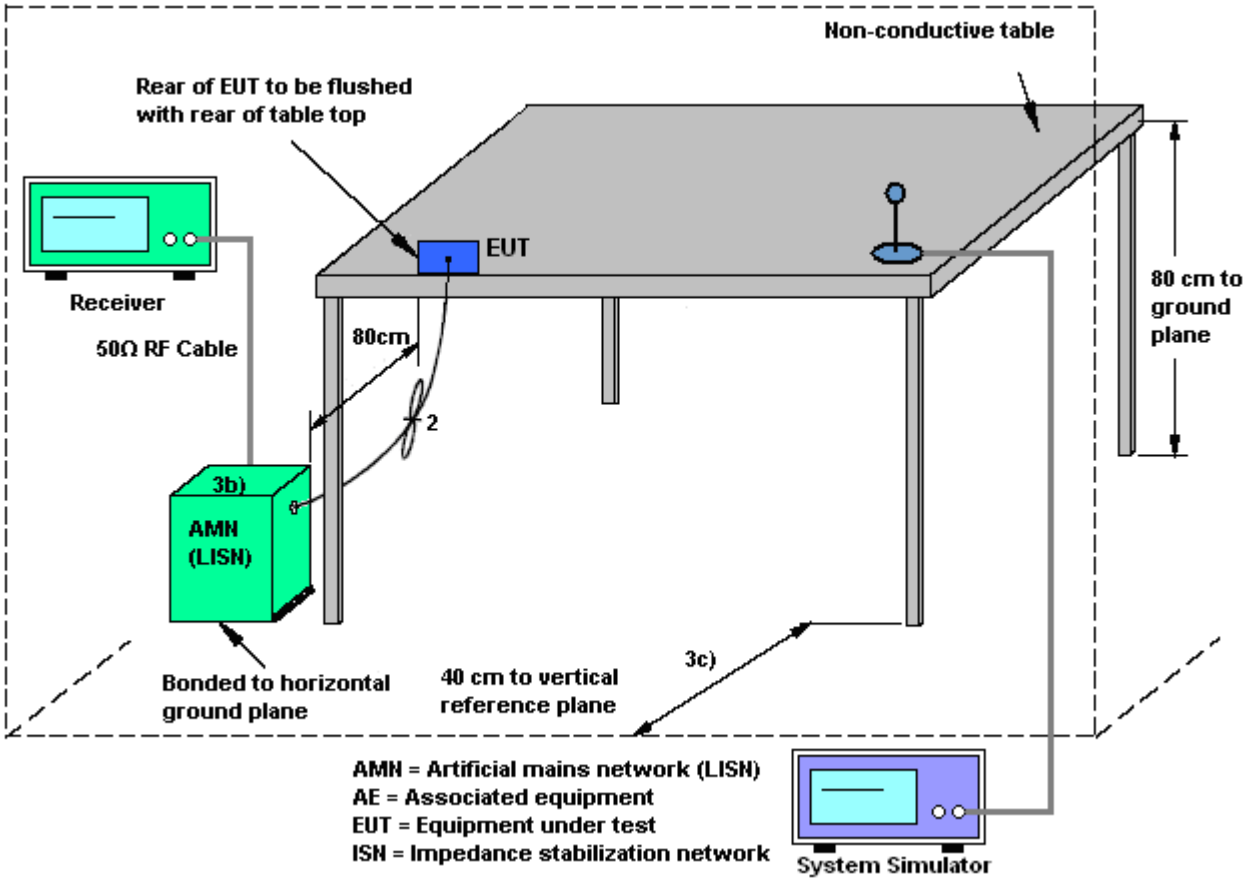
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

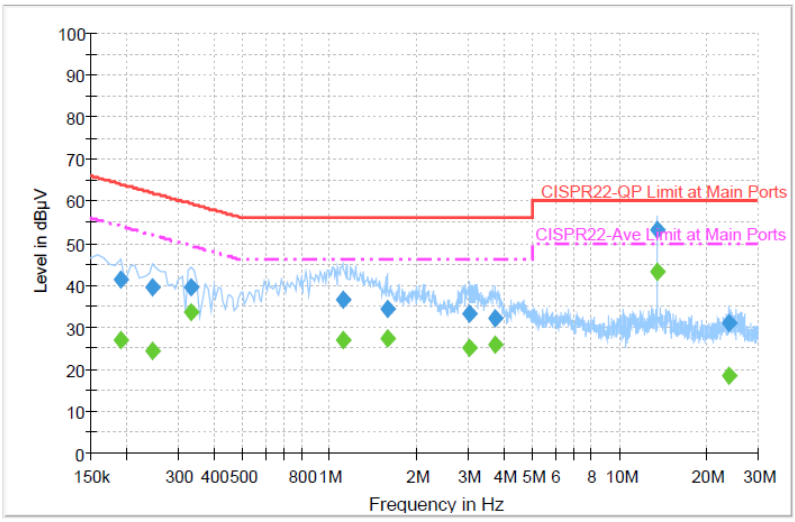
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. 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℃
Test Engineer :	Cosmo Xu	**Relative Humidity :**	46~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	CDMA2000 BC0 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Earphone + NFC active + Scanner + USB Cable (Charging from Adapter) + Battery 2 for Sample 1		



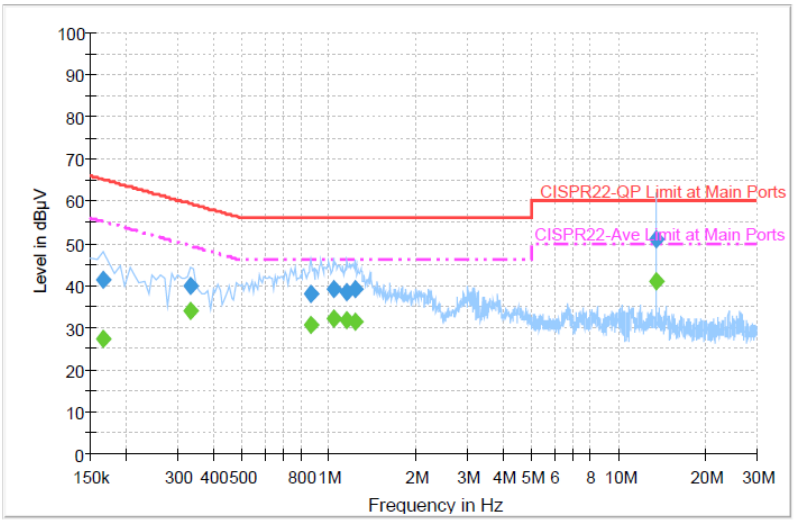
Final Result: Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	41.4	Off	L1	19.4	22.6	64.0
0.246000	39.3	Off	L1	19.4	22.6	61.9
0.334000	39.5	Off	L1	19.4	19.9	59.4
1.110000	36.6	Off	L1	19.4	19.4	56.0
1.582000	34.4	Off	L1	19.4	21.6	56.0
3.046000	33.3	Off	L1	19.6	22.7	56.0
3.734000	32.3	Off	L1	19.6	23.7	56.0
13.558000	53.0	Off	L1	19.8	7.0	60.0
24.022000	30.9	Off	L1	19.9	29.1	60.0

Final Result: Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	27.0	Off	L1	19.4	27.0	54.0
0.246000	24.4	Off	L1	19.4	27.5	51.9
0.334000	33.4	Off	L1	19.4	16.0	49.4
1.110000	27.0	Off	L1	19.4	19.0	46.0
1.582000	27.4	Off	L1	19.4	18.6	46.0
3.046000	25.0	Off	L1	19.6	21.0	46.0
3.734000	26.0	Off	L1	19.6	20.0	46.0
13.558000	43.0	Off	L1	19.8	7.0	50.0
24.022000	18.5	Off	L1	19.9	31.5	50.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Cosmo Xu	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	CDMA2000 BC0 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Earphone + NFC active + Scanner + USB Cable (Charging from Adapter) + Battery 2 for Sample 1		



Final Result: Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	41.4	Off	N	19.4	23.8	65.2
0.334000	40.0	Off	N	19.4	19.4	59.4
0.870000	37.9	Off	N	19.5	18.1	56.0
1.038000	39.0	Off	N	19.5	17.0	56.0
1.158000	38.5	Off	N	19.5	17.5	56.0
1.230000	39.1	Off	N	19.5	16.9	56.0
13.558000	51.0	Off	N	19.9	9.0	60.0

Final Result: Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	27.2	Off	N	19.4	28.0	55.2
0.334000	34.0	Off	N	19.4	15.4	49.4
0.870000	30.5	Off	N	19.5	15.5	46.0
1.038000	31.9	Off	N	19.5	14.1	46.0
1.158000	31.6	Off	N	19.5	14.4	46.0
1.230000	31.5	Off	N	19.5	14.5	46.0
13.558000	41.0	Off	N	19.9	9.0	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 Anti-Replacement Construction

An embedded-in antenna design is 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	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Jan. 17, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Feb. 05, 2013	Jan. 17, 2014	Feb. 04, 2014	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Feb. 05, 2013	Jan. 17, 2014	Feb. 04, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Sep. 06, 2013	Jan. 25, 2014	Sep. 05, 2014	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9 kHz ~ 30 GHz	Nov. 20, 2013	Jan. 25, 2014	Nov. 19, 2014	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MHz	Jul. 03, 2012	Jan. 25, 2014	Jul. 03, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30 MHz~1 GHz	Oct. 10, 2013	Jan. 25, 2014	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1 GHz~18 GHz	Aug. 22, 2013	Jan. 25, 2014	Aug. 21, 2014	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15 GHz~40 GHz	Oct. 03, 2013	Jan. 25, 2014	Oct. 02, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30 MHz~1 GHz	Feb. 26, 2013	Jan. 25, 2014	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Nov. 29, 2013	Jan. 25, 2014	Nov. 28, 2014	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	159088	DC~18 G High Gain	Feb. 27, 2013	Jan. 25, 2014	Feb. 26, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Jan. 25, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Jan. 25, 2014	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz~2.75GHz	Nov. 15, 2013	Jan. 16, 2014	Nov. 14, 2014	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 12, 2013	Jan. 16, 2014	Dec. 11, 2014	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 04, 2013	Jan. 16, 2014	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jan. 16, 2014	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**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.50**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.10**