FCC RF Test Report

APPLICANT	:	Texas Instruments Incorporated
EQUIPMENT	:	WiFi and Bluetooth Module
BRAND NAME	:	Texas Instruments
MODEL NAME	:	WL18MODGB
MARKETING NAME	:	WL18xxMOD WiLink™ 8 Single-Band Combo Module –Wi-Fi®, Bluetooth®, and Bluetooth Low Energy (LE)
FCC ID	:	Z64-WL18SBMOD
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

This is a variant report. The product was received on Apr. 13, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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 District, Tao Yuan City, Taiwan, R.O.C.

TABLE OF CONTENTS

1 GENERAL DESCRIPTION 4
1.1 Applicant 4
1.2 Manufacturer 4
1.3 Product Feature of Equipment Under Test 4
1.4 Product Specification subjective to this standard 5
1.5 Modification of EUT 5
APPENDIX A. ORIGINAL REPORT
APPENDIX B. ORIGINAL REPORT OF FR4O2349B

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR741320B	Rev. 01	Initial issue of report	Feb. 07, 2018

1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI BLVD., Dallas Texas, 75243

1.2 Manufacturer

Texas Instruments Incorporated
12500 TI BLVD., Dallas Texas, 75243

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGB
Marketing Name	WL18xxMOD WiLink™ 8 Single-Band Combo Module – Wi-Fi®, Bluetooth®, and Bluetooth Low Energy (LE)
FCC ID	Z64-WL18SBMOD
EUT supports Radios application	WLAN 11b/g/n HT20/HT40 Bluetooth BR/EDR/LE v4.2
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report by adding antenna in antenna information. All the test cases were performed on the Sporton variant report, FR4O2349B.
3. The EUT module has performed with the WL18MODGB Test grade 35 placed on the WL1837MODCOM8I evaluation board. It is verified that an additional 1dB cable loss was included in the measurements and it has shown no measurement difference in output power as the original configuration (original: WL18MODGB placed on the WL1835MOCOM8B evaluation board). Hence, the change does not degrade any EMC parameters. This is also described in the operational description document.

1.4 Product Specification subjective to this standard

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)
Type of Modulation	Bluetooth LE : GFSK

Antenna information				
	Brand	**Antenna Type**	**Model**	**2.4GHz ~2.5GHz Gain**
1	Ethertronics	PCB	1000423	-0.6dBi
2	LSR	Rubber Whip / Dipole	001-0012	2dBi
3			080-0013	2dBi
4			080-0014	2dBi
5		PIFA	001-0016	2.5dBi
6			001-0021	2.5dBi
7	Laird	PCB	CAF94504	2dBi
8			CAF94505	2dBi
9	Pulse	Chip	W3006	3.2dBi
10	TDK	CHIP	ANT016008	2.4dBi

1.5 Modification of EUT

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

Appendix A. Original Report

Please refer to Sporton report number FR4O2349B as below.

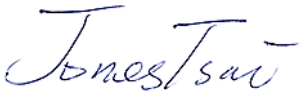
Variant FCC RF Test Report

APPLICANT	**:**	**Texas Instruments Incorporated**
EQUIPMENT	**:**	**WiFi and Bluetooth Module**
BRAND NAME	**:**	**Texas Instruments**
MODEL NAME	**:**	**WL18MODGB**
FCC ID	**:**	**Z64-WL18SBMOD**
STANDARD	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**(DTS) Digital Transmission System**

The product was received on Oct. 23, 2014 and testing was completed on Aug. 14, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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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TABLE OF CONTENTS

SUMMARY OF TEST RESULT 4

1 GENERAL DESCRIPTION 5

1.1 Applicant 5
1.2 Manufacturer 5
1.3 Product Feature of Equipment Under Test 5
1.4 Product Specification subjective to this standard 5
1.5 Modification of EUT 6
1.6 Testing Location 6
1.7 Applicable Standards 7

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST 8

2.1 Descriptions of Test Mode 8
2.2 Test Mode 8
2.3 Connection Diagram of Test System 9
2.4 Support Unit used in test configuration and system 9
2.5 EUT Operation Test Setup 9
2.6 Measurement Results Explanation Example 10

3 TEST RESULT 11

3.1 Peak Output Power Measurement 11
3.2 Radiated Band Edges and Spurious Emission Measurement 13
3.3 Antenna Requirements 17

4 LIST OF MEASURING EQUIPMENT 18

5 UNCERTAINTY OF EVALUATION 19

APPENDIX A. TEST RESULT OF CONDUCTED SPURIOUS EMISSION

APPENDIX B. TEST RESULT OF RADIATED SPURIOUS EMISSION

APPENDIX C. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4O2349B	Rev. 01	This is a variant report by adding 6 new antennas. All the test cases were performed on original report which can be referred to Sporton Report Number FR3N2752-01BTX. Based on the original report, only the peak output power and conducted spurious emission and cabinet radiation were performed.	Sep. 04, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.2	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.61 dB at 4806.000 MHz
3.3	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI Boulevard, M/S 8751, Dallas, TX 75243, USA

1.2 Manufacturer

Jorjin Technologies Inc
17F, No.239, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGB
FCC ID	Z64-WL18SBMOD
EUT supports Radios application	WLAN 11b/g/n HT20/HT40 Bluetooth v4.0 EDR/LE
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 subjective to this standard

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	6.95 dBm (0.0050 W)
Type of Modulation	Bluetooth LE : GFSK

Antenna Information		
Antenna Type	**Brand**	**2.4GHz~2.5GHz**
PCB	Ethertronics	-0.6
Dipole	LSR	2
PCB	Laird	2
Chip	Pulse	3.2
PIFA	LSR	2
Chip	TDK	2.4

1.5 Modification of EUT

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

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 58 , Aly. 75, Ln. 564, Wenhua 3rd Rd., Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH10

Note: The test site complies with ANSI C63.4 2009 requirement.

1.7 Applicable 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 v03r03
- 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. FCC permits the use of the 1.5 meter table as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. 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	**6.95** dBm
Ch19	2440MHz	6.71 dBm
Ch39	2480MHz	6.28 dBm

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: radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

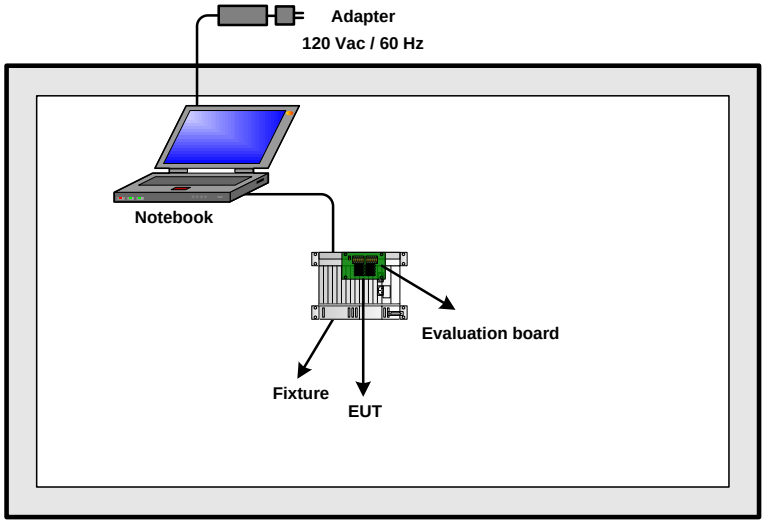
2.2 Test Mode

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

2.3 Connection Diagram of Test System

<Bluetooth 4.0 – LE Tx Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	E335 (with WiFi module TP00034A)	FCC DoC/ Contains FCC ID:QDS-BRCM1058	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, “HCI Tester” installed in the EUT make the EUT provide 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 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 with 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.

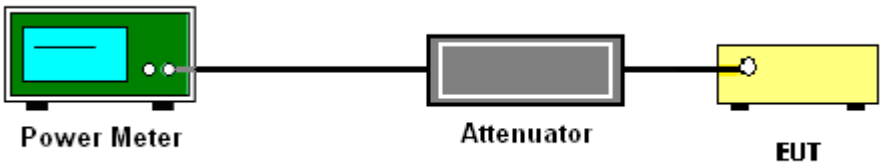
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 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 v03r03 section 9.1.2 PKPM1 Peak power meter method.
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.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power

Test Mode :	Bluetooth 4.0 - LE	Temperature :	24-26℃
Test Engineer :	Bill Kuo	Relative Humidity :	48-52%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	6.95	30.00	Pass
19	2440	6.71	30.00	Pass
39	2480	6.28	30.00	Pass

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

The section 4.0 of List of Measuring Equipment of this test report is used for test.

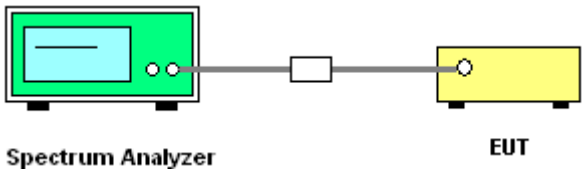
3.2.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
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 for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively 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.

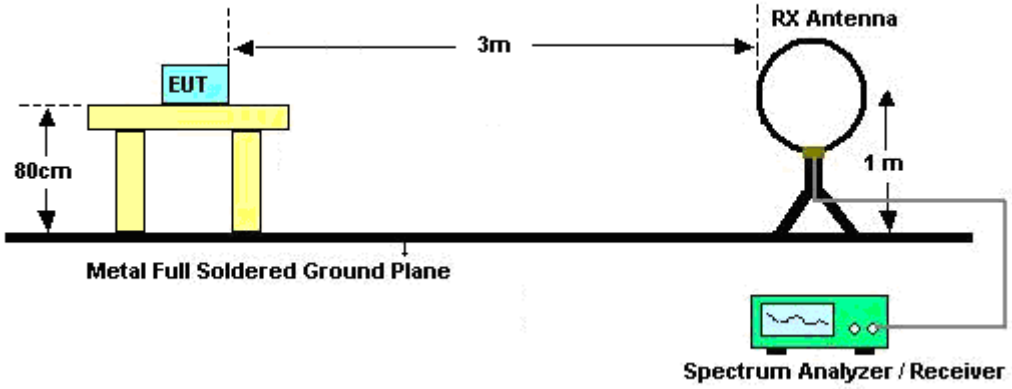
Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
Bluetooth 4.0 - LE	100	-	-	10Hz

3.2.4 Test Setup

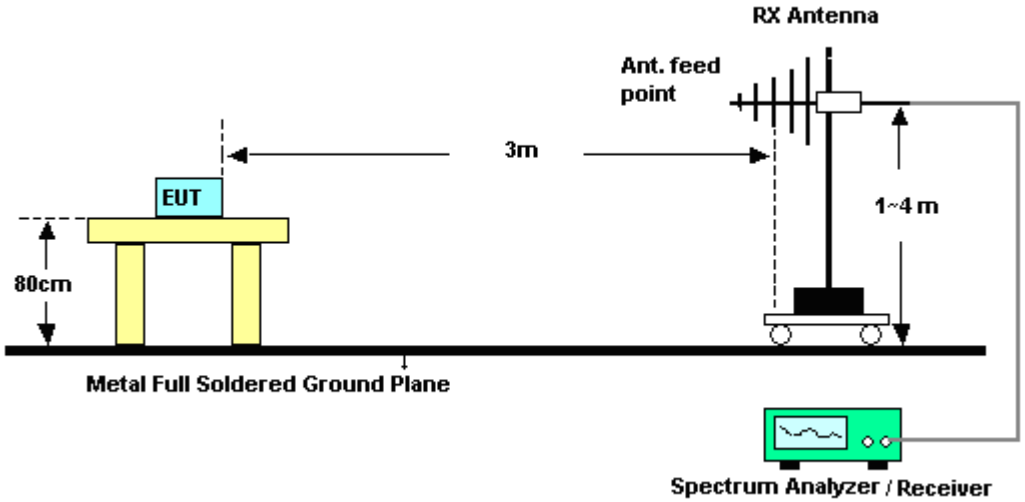
For Conducted Measurement Setup:



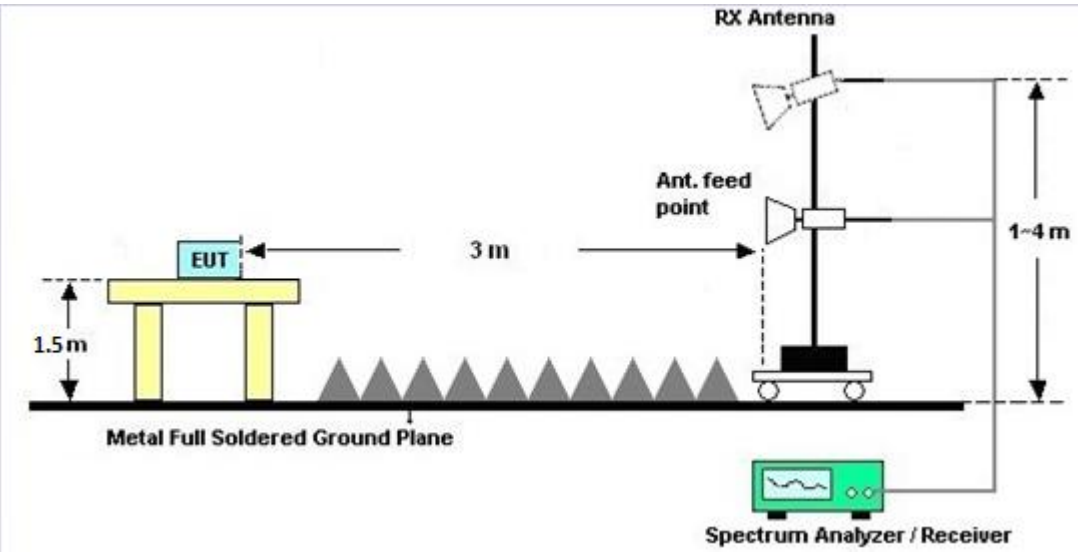
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated 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.

3.2.6 Test Result of Conducted Spurious at Band Edges in the Restricted Band

Please refer to Appendix A.

3.2.7 Test Result of Conducted Spurious Emission in the Restricted Band

Please refer to Appendix A.

3.2.8 Test Result of Cabinet Radiated Spurious at Band Edges

Please refer to Appendix B.

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

Please refer to Appendix B.

3.3 Antenna Requirements

3.3.1 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.

3.3.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.3.3 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
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Jan. 14, 2015	Aug. 12, 2015	Jan. 13, 2016	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Jan. 14, 2015	Aug. 12, 2015	Jan. 13, 2016	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jun. 18, 2015	Aug. 12, 2015	Jun. 17, 2016	Conducted (TH05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 03, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 02, 2015	Radiation (03CH10-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9kHZ~30MHz	Feb. 02, 2015	Aug. 13, 2015~ Aug. 14, 2015	Feb. 01, 2016	Radiation (03CH10-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Aug. 13, 2015~ Aug. 14, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
EMI Test Receiver	Keysight	N9038A	MY54130085	20Hz ~ 8.4GHz	Nov. 05, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 04, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	Aug. 13, 2015~ Aug. 14, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Nov. 20, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHZ	Oct. 14, 2014	Aug. 13, 2015~ Aug. 14, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 13, 2015~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 13, 2015~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	N/A	Aug. 13, 2015~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Preamplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Aug. 13, 2015~ Aug. 14, 2015	Jun. 01, 2016	Radiation (03CH10-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))	**4.90**

Appendix A. Test Result of Conducted Spurious

Test Result of Conducted Spurious at Band Edges in the Restricted Band

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Gain	Cable Loss	Grounding Factor	Peak Avg
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dBi)	(dB)	(dB)	(P/A)
BLE CH00 2402MHz		2364.36	-44.91	-23.71	-21.2	-49.37	3.2	1.26	0	P
		2389.74	-59.65	-18.45	-41.2	-64.12	3.2	1.27	0	A
	*	2401.753	13.13	-	-	8.66	3.2	1.27	0	P
	*	2402.004	12.4	-	-	7.93	3.2	1.27	0	A
BLE CH19 2440MHz		2390.01	-49.9	-28.7	-21.2	-54.37	3.2	1.27	0	P
		2389.11	-62.83	-21.63	-41.2	-67.3	3.2	1.27	0	A
	*	2440.748	12.79	-	-	8.31	3.2	1.28	0	P
	*	2440.999	12.1	-	-	7.62	3.2	1.28	0	A
		2492.16	-44.48	-23.28	-21.2	-48.97	3.2	1.29	0	P
		2483.52	-62.59	-21.39	-41.2	-67.07	3.2	1.28	0	A
BLE CH39 2480MHz	*	2479.742	12.52	-	-	8.04	3.2	1.28	0	P
	*	2480.076	11.8	-	-	7.32	3.2	1.28	0	A
		2483.52	-25.76	-4.56	-21.2	-30.24	3.2	1.28	0	P
		2483.52	-55.70	-14.50	-41.2	-60.18	3.2	1.28	0	A

Note: Integration method is used to determine the BLE channel 39 band edge emission average level.

Test Result of Conducted Spurious Emission in the Restricted Band

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Gain	Cable Loss	Grounding Factor	Peak Avg
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dBi)	(dB)	(dB)	(P/A)
BLE CH00 2402MHz		32.91	-70.44	-15.24	-55.2	-78.51	3.2	0.17	4.7	P
		273.47	-71.36	-22.16	-49.2	-79.65	3.2	0.39	4.7	P
		412.18	-70.66	-21.46	-49.2	-78.99	3.2	0.43	4.7	P
		612.97	-71.08	-21.88	-49.2	-79.51	3.2	0.53	4.7	P
		711.91	-70.82	-21.62	-49.2	-79.29	3.2	0.57	4.7	P
		801.15	-51.85	-2.65	-49.2	-60.32	3.2	0.57	4.7	P
		4804	-44.33	-23.13	-21.2	-49.2	3.2	1.67	0	P
		7206	-51.92	-30.72	-21.2	-57	3.2	1.88	0	P
BLE CH19 2440MHz		32.91	-70.48	-15.28	-55.2	-78.55	3.2	0.17	4.7	P
		155.13	-71.56	-19.86	-51.7	-79.73	3.2	0.27	4.7	P
		312.27	-71.99	-22.79	-49.2	-80.27	3.2	0.38	4.7	P
		496.57	-71.72	-22.52	-49.2	-80.06	3.2	0.44	4.7	P
		638.19	-71.45	-22.25	-49.2	-79.89	3.2	0.54	4.7	P
		813.76	-51.12	-1.92	-49.2	-59.61	3.2	0.59	4.7	P
		4880	-32.27	-11.07	-21.2	-37.17	3.2	1.70	0	P
		4880	-42.13	-0.93	-41.2	-47.03	3.2	1.70	0	A
		7320	-50.41	-29.21	-21.2	-55.58	3.2	1.97	0	P
BLE CH39 2480MHz		33.88	-70.2	-15	-55.2	-78.27	3.2	0.17	4.7	P
		287.05	-71.64	-22.44	-49.2	-79.93	3.2	0.39	4.7	P
		421.88	-71.42	-22.22	-49.2	-79.75	3.2	0.43	4.7	P
		574.17	-71.41	-22.21	-49.2	-79.82	3.2	0.51	4.7	P
		745.86	-70.54	-21.34	-49.2	-79.03	3.2	0.59	4.7	P
		827.34	-50.07	-0.87	-49.2	-58.56	3.2	0.59	4.7	P
		4960	-37.56	-16.36	-21.2	-42.49	3.2	1.73	0	P
		4960	-56.1	-14.9	-41.2	-61.03	3.2	1.73	0	A
		7440	-54.13	-32.93	-21.2	-59.4	3.2	2.07	0	P

Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2364.81	50.96	-23.04	74	51.67	27.14	5.39	33.24	122	225	P	H
		2354.28	42.5	-11.5	54	43.28	27.14	5.33	33.25	122	225	A	H
	*	2402.254	91.58	-	-	92.18	27.23	5.39	33.22	122	225	P	H
	*	2402.004	91.08	-	-	91.68	27.23	5.39	33.22	122	225	A	H
													H
													H
		2317.83	51.2	-22.8	74	52.14	27.05	5.27	33.26	345	10	P	V
		2350.32	42.38	-11.62	54	43.2	27.1	5.33	33.25	345	10	A	V
	*	2402.254	89	-	-	89.6	27.23	5.39	33.22	345	10	P	V
	*	2402.004	88.51	-	-	89.11	27.23	5.39	33.22	345	10	A	V
													V
													V
BLE CH 19 2440MHz		2371.38	50.7	-23.3	74	51.36	27.19	5.39	33.24	110	214	P	H
		2353.29	42.82	-11.18	54	43.6	27.14	5.33	33.25	110	214	A	H
	*	2439.746	88.74	-	-	89.16	27.37	5.42	33.21	110	214	P	H
	*	2439.997	88.24	-	-	88.66	27.37	5.42	33.21	110	214	A	H
		2487.88	51.55	-22.45	74	51.77	27.5	5.46	33.18	110	214	P	H
		2494.72	43.04	-10.96	54	43.25	27.5	5.46	33.17	110	214	A	H
		2363.64	50.91	-23.09	74	51.63	27.14	5.39	33.25	338	330	P	V
		2327.55	42.68	-11.32	54	43.56	27.05	5.33	33.26	338	330	A	V
	*	2439.746	87.02	-	-	87.44	27.37	5.42	33.21	338	330	P	V
	*	2439.997	86.5	-	-	86.92	27.37	5.42	33.21	338	330	A	V
		2491	51.04	-22.96	74	51.26	27.5	5.46	33.18	338	330	P	V
		2487.2	42.88	-11.12	54	43.14	27.46	5.46	33.18	338	330	A	V

BLE CH 39 2480MHz	*	2479.742	87.07	-	-	87.35	27.46	5.44	33.18	108	216	P	H
	*	2479.993	86.5	-	-	86.78	27.46	5.44	33.18	108	216	A	H
		2498.16	52.3	-21.7	74	52.51	27.5	5.46	33.17	108	216	P	H
		2486.68	43.05	-10.95	54	43.31	27.46	5.46	33.18	108	216	A	H
													H
													H
	*	2479.993	84.49	-	-	84.77	27.46	5.44	33.18	370	328	P	V
	*	2479.993	83.95	-	-	84.23	27.46	5.44	33.18	370	328	A	V
		2492	52.01	-21.99	74	52.22	27.5	5.46	33.17	370	328	P	V
		2485.24	43.46	-10.54	54	43.72	27.46	5.46	33.18	370	328	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4806	55.52	-18.48	74	77.16	31.42	7.58	60.64	300	145	P	H
		4806	53.39	-0.61	54	75.03	31.42	7.58	60.64	300	145	A	H
													H
													H
		4806	53.19	-20.81	74	74.83	31.42	7.58	60.64	301	0	P	V
		4806	50.58	-3.42	54	72.22	31.42	7.58	60.64	301	0	A	V
													V
													V
BLE CH 19 2440MHz		4878	54.38	-19.62	74	75.64	31.56	7.7	60.52	100	144	P	H
		4878	52.23	-1.77	54	73.49	31.56	7.7	60.52	100	144	A	H
		7320	44.75	-29.25	74	60.02	36.22	9.49	60.98	100	0	P	H
													H
		4878	53.94	-20.06	74	75.2	31.56	7.7	60.52	144	298	P	V
		4878	51.7	-2.3	54	72.96	31.56	7.7	60.52	144	298	A	V
		7320	46.93	-27.07	74	62.2	36.22	9.49	60.98	100	0	P	V
													V
BLE CH 39 2480MHz		4962	42.35	-31.65	74	62.93	31.73	8.05	60.36	100	0	P	H
		7440	43.67	-30.33	74	58.91	36.49	9.61	61.34	100	0	P	H
													H
													H
		4962	43.84	-30.16	74	64.42	31.73	8.05	60.36	100	0	P	V
		7440	44.25	-29.75	74	59.49	36.49	9.61	61.34	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		63.48	30.66	-9.34	40	56.13	6.34	0.93	32.74	100	99	P	H
		144.75	30.19	-13.31	43.5	49.77	11.76	1.33	32.67			P	H
		216.84	35.17	-10.83	46	56.02	10.26	1.62	32.73			P	H
		361.6	32.83	-13.17	46	48.18	15.51	1.94	32.8			P	H
		602.4	34.7	-11.3	46	45.54	19.62	2.57	33.03			P	H
		771.1	30.22	-15.78	46	38.35	21.81	2.97	32.91			P	H
													H
													H
													H
													H
													H
													H
		51.33	35.07	-4.93	40	58.03	8.89	0.93	32.78	158	41	P	V
		68.88	27.81	-12.19	40	52.96	6.64	0.93	32.72			P	V
		293.52	27	-19	46	44.17	13.68	1.88	32.73			P	V
		361.6	25.21	-20.79	46	40.56	15.51	1.94	32.8			P	V
		399.4	27.32	-18.68	46	41.53	16.5	2.13	32.84			P	V
		602.4	31.68	-14.32	46	42.52	19.62	2.57	33.03			P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBµV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBµV/m) – Limit Line(dBµV/m)

For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) – 35.86 (dB)

= 55.45 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 55.45(dBµV/m) – 74(dBµV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBµV) – 35.86 (dB)

= 43.54 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 43.54(dBµV/m) – 54(dBµV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix C. Setup Photographs

<Radiated Emission>

LF

HF

Appendix B. Original Report of FR4O2349B

Please refer to Sporton report number FR3N2752-01B as below.

FCC RF Test Report

APPLICANT	:	Texas Instruments Incorporated
EQUIPMENT	:	WiFi and Bluetooth Module
BRAND NAME	:	Texas Instruments
MODEL NAME	:	WL18MODGB
FCC ID	:	Z64-WL18SBMOD
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Nov. 27, 2013 and testing was completed on Dec. 27, 2013. 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.

Reviewed by: Joseph Lin / Supervisor

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.

TABLE OF CONTENTS

REVISION HISTORY **3**

SUMMARY OF TEST RESULT **4**

1 GENERAL DESCRIPTION **5**

1.1 Applicant 5
1.2 Manufacturer 5
1.3 Feature of Equipment Under Test 5
1.4 Product Specification of Equipment Under Test 5
1.5 Modification of EUT 6
1.6 Testing Site 6
1.7 Applied Standards 6

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **7**

2.1 Descriptions of Test Mode 7
2.2 Test Mode 7
2.3 Connection Diagram of Test System 8
2.4 Support Unit used in test configuration and system 9
2.5 EUT Operation Test Setup 9
2.6 Measurement Results Explanation Example 9

3 TEST RESULT **10**

3.1 6dB and 99% Bandwidth Measurement 10
3.2 Peak Output Power Measurement 15
3.3 Power Spectral Density Measurement 17
3.4 Conducted Band Edges and Spurious Emission Measurement 22
3.5 Radiated Band Edges and Spurious Emission Measurement 31
3.6 AC Conducted Emission Measurement 40
3.7 Antenna Requirements 44

4 LIST OF MEASURING EQUIPMENT **45**

5 UNCERTAINTY OF EVALUATION **46**

APPENDIX A. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3N2752-01B	Rev. 01	Initial issue of report	Jan. 27, 2014

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	≥ 0.5MHz	Pass	-
3.1	-	RSS-Gen 4.6.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)(1)	RSS-210 A8.1(b)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	≤ 8dBm	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges and Spurious Emission	≤ 20dBc	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 0.06 dB at 4806.000 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 8.50 dB at 0.350 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI Boulevard, M/S 8751, Dallas, TX 75243, USA

1.2 Manufacturer

Jorjin Technologies Inc.
17F., No. 239, Sec. 1, Datong Rd., Xizhi Dist. New Taipei City 221, Taiwan. R.O.C.

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGB
FCC ID	Z64-WL18SBMOD
EUT supports Radios application	WLAN 11b/g/n HT20/HT40 Bluetooth v3.0 + EDR Bluetooth v4.0 + LE
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	9.99 dBm (0.010 W)
99% Occupied Bandwidth	1.012MHz
Antenna Type	Chip Antenna type with gain -0.36 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 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

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	**9.99 dBm**
Ch19	2440MHz	9.59 dBm
Ch39	2480MHz	9.06 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).

b. AC power line Conducted Emission was tested under maximum output power.

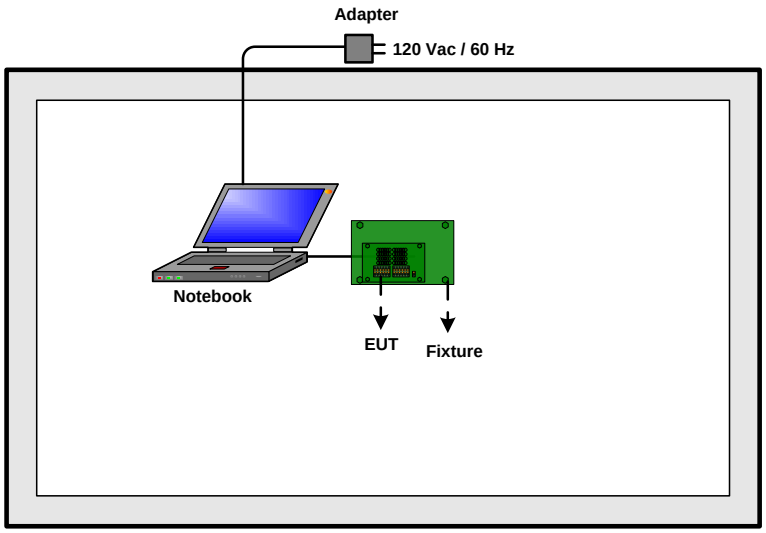
2.2 Test Mode

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

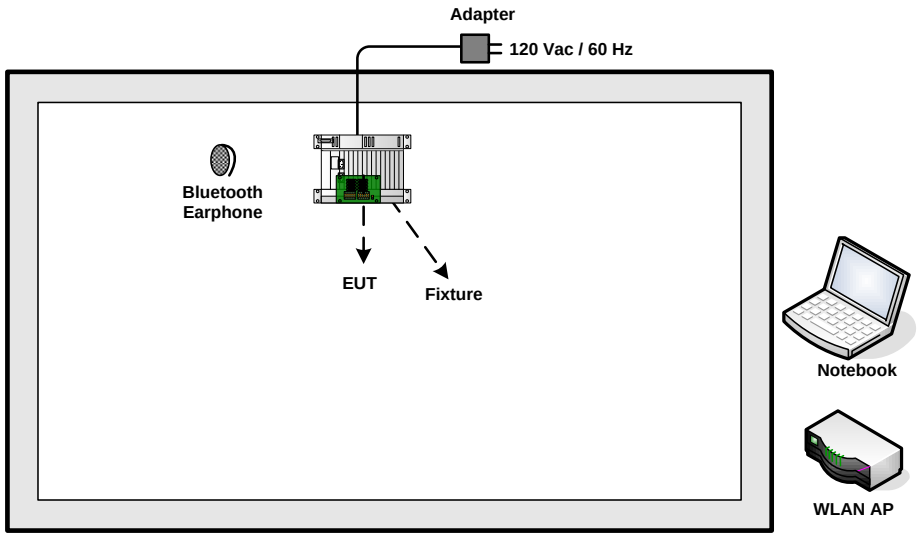
Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 4.0 – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1: WLAN Link + Bluetooth Link + Adapter

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.	Bluetooth Earphone	SonyErricsson	MW600	PY700A2029	N/A	N/A
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Vostro 1320	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
5.	Fixture	N/A	WG7XXXT01	N/A	N/A	N/A
6.	Adapter	Aviv Energy	HK-IP15-A05	N/A	N/A	Unshielded, 1.8 m

2.5 EUT Operation Test Setup

For Bluetooth function, programmed RF utility, “HCT tester” 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 and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

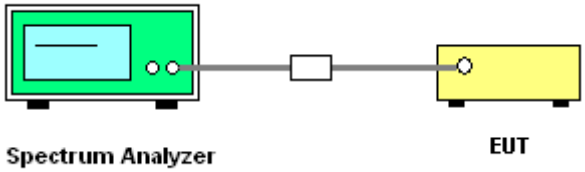
3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.
6. Measure and record the results in the test report.

3.1.4 Test Setup

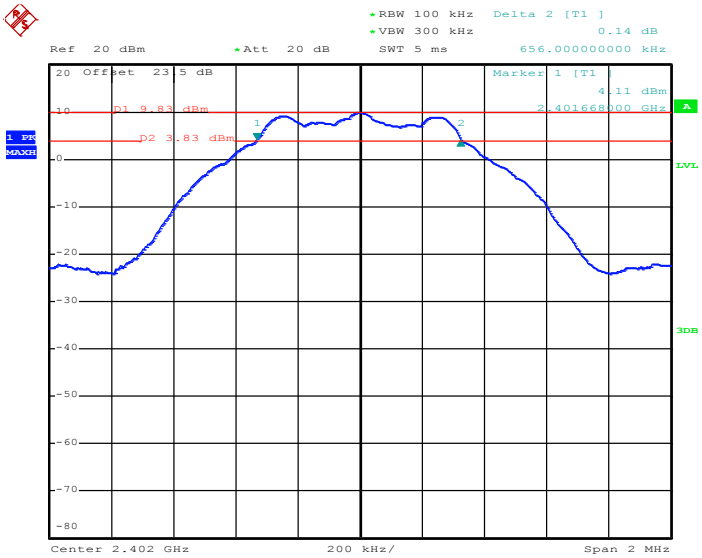


3.1.5 Test Result of 6dB Bandwidth

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

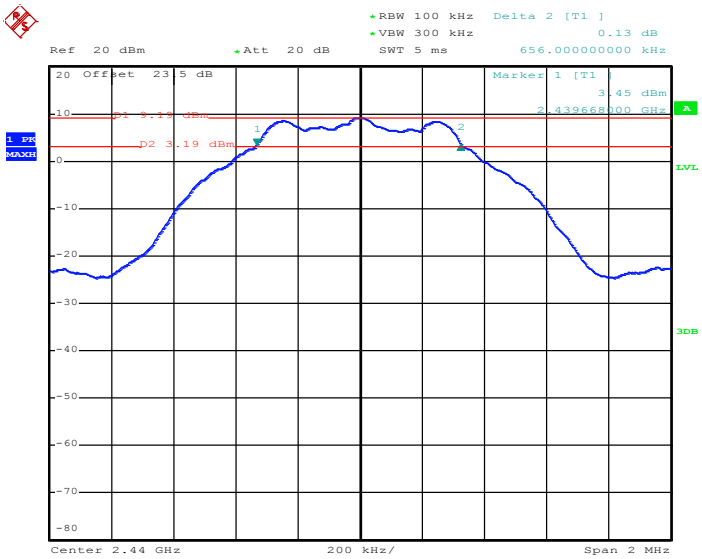
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
00	2402	0.656	0.5	Pass
19	2440	0.656	0.5	Pass
39	2480	0.660	0.5	Pass

6 dB Bandwidth Plot on Channel 00



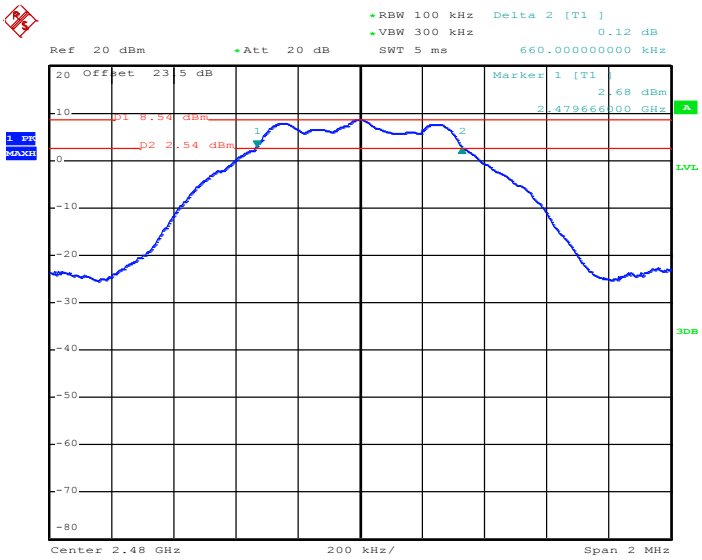
Date: 19.DEC.2013 09:34:13

6 dB Bandwidth Plot on Channel 19



Date: 19.DEC.2013 09:45:19

6 dB Bandwidth Plot on Channel 39



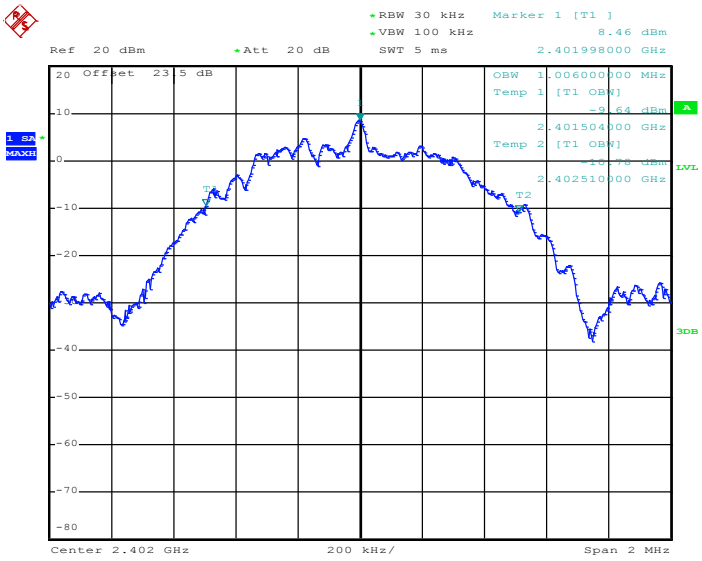
Date: 19.DEC.2013 09:50:03

3.1.6 Test Result of 99% Occupied Bandwidth

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

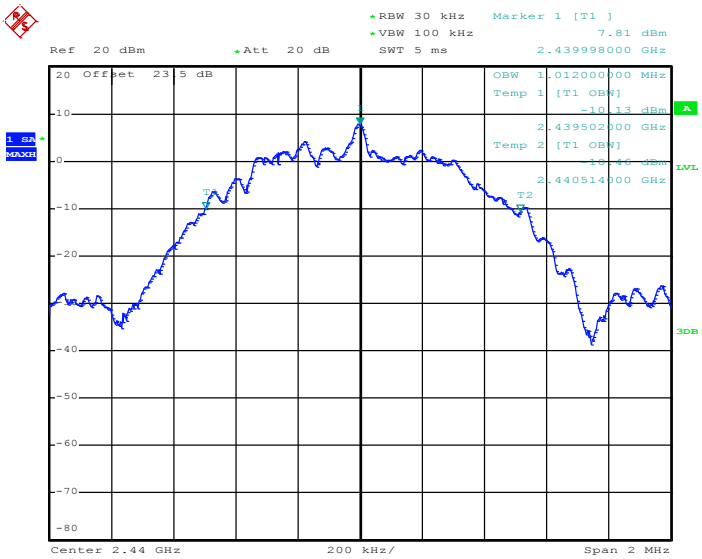
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.006
19	2440	1.012
39	2480	1.012

99% Bandwidth Plot on Channel 00



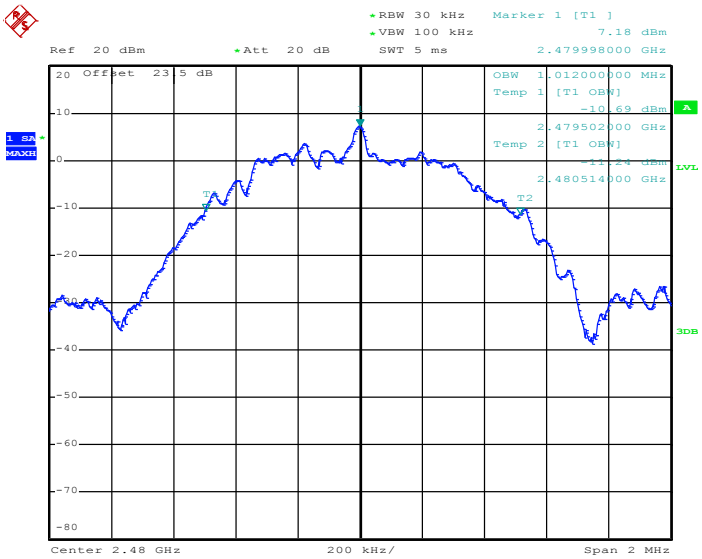
Date: 19.DEC.2013 09:39:13

99% Occupied Bandwidth Plot on Channel 19



Date: 19.DEC.2013 09:46:56

99% Occupied Bandwidth Plot on Channel 39



Date: 19.DEC.2013 09:51:56

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.

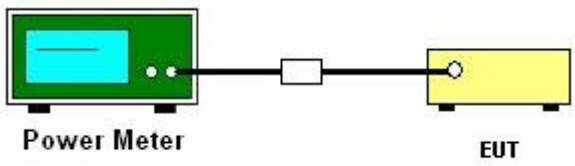
3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

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 :	Book Lin	Relative Humidity :	51~55%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	9.99	30.00	Pass
19	2440	9.59	30.00	Pass
39	2480	9.06	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.

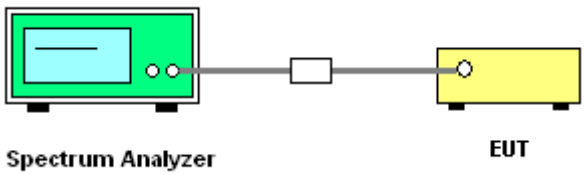
3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

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 :	Book Lin	Relative Humidity :	51~55%

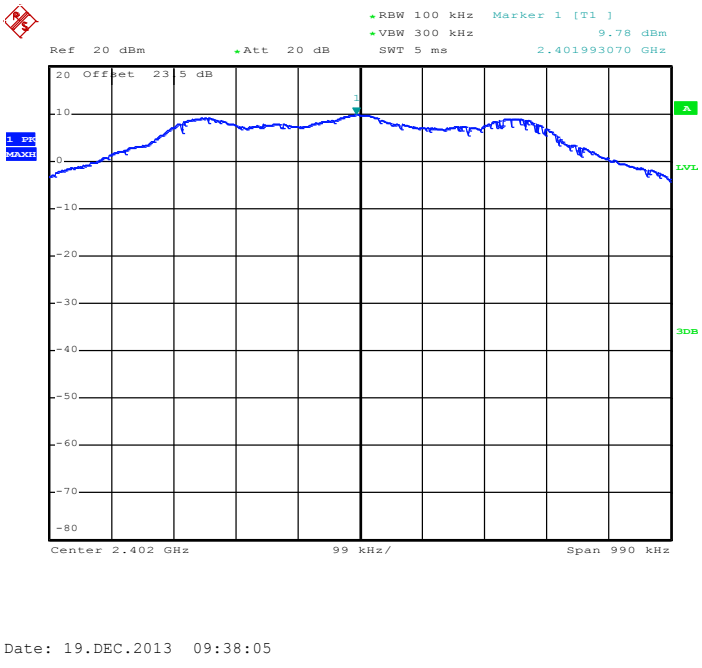
Channel	Frequency (MHz)	Power Density		Max. Limits (dBm/3kHz)	Pass/Fail
		PSD/100kHz (dBm)	PSD/3kHz (dBm)		
00	2402	9.78	-5.77	8	Pass
19	2440	9.15	-6.45	8	Pass
39	2480	8.53	-6.94	8	Pass

Note:

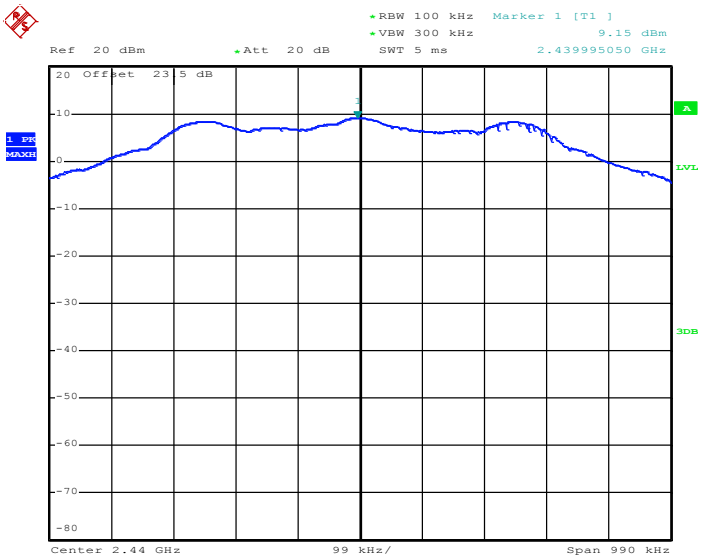
1. *Measured power density (dBm) has offset with cable loss.*
2. *The Measured power density (dBm)/ 100kHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.*

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

PSD 100kHz Plot on Channel 00

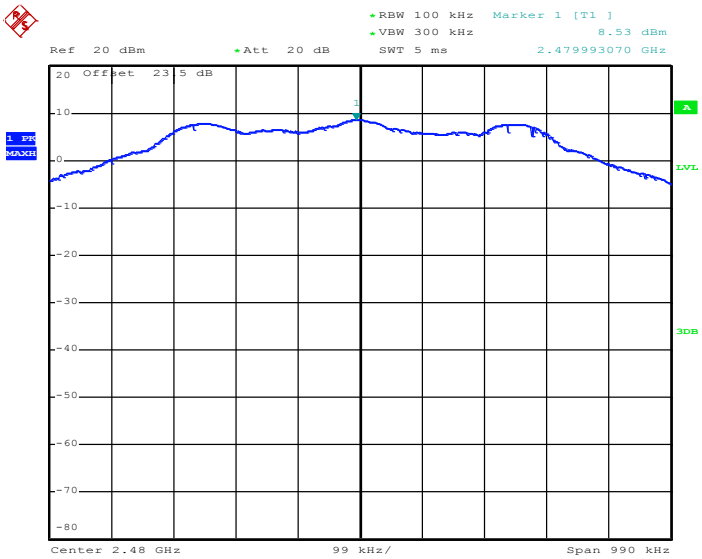


PSD 100kHz Plot on Channel 19



Date: 19.DEC.2013 09:46:01

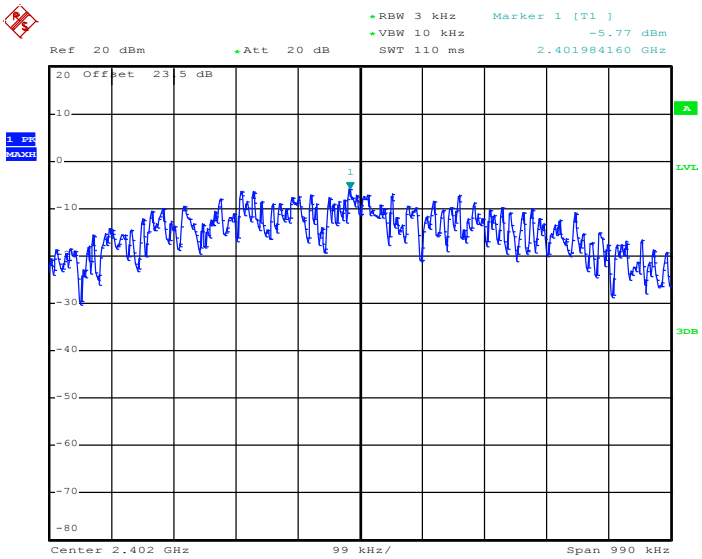
PSD 100kHz Plot on Channel 39



Date: 19.DEC.2013 09:50:35

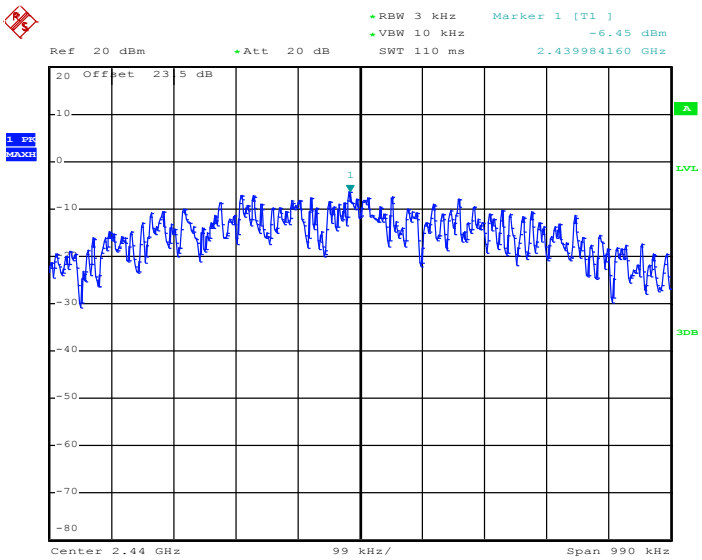
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 00



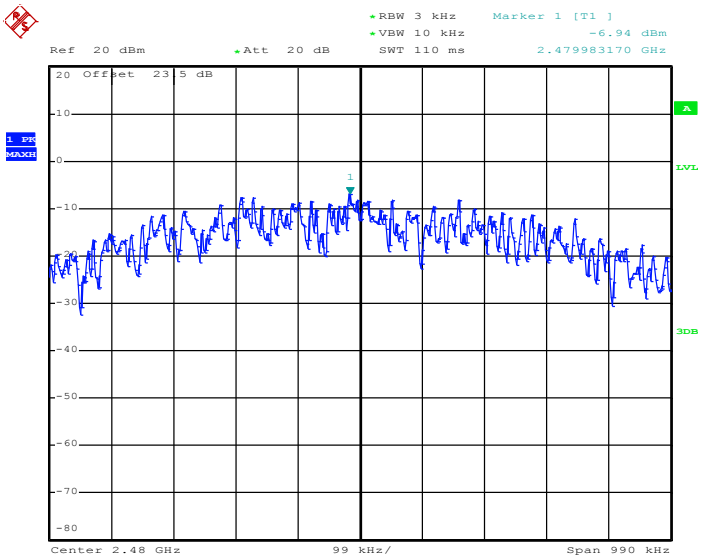
Date: 19.DEC.2013 09:37:54

PSD 3kHz Plot on Channel 19



Date: 19.DEC.2013 09:45:39

PSD 3kHz Plot on Channel 39



Date: 19.DEC.2013 09:50:23

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.

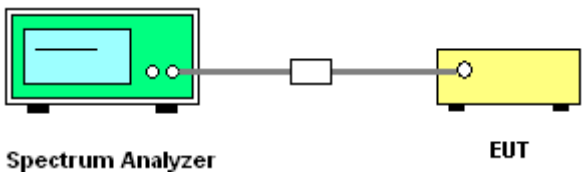
3.4.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

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.

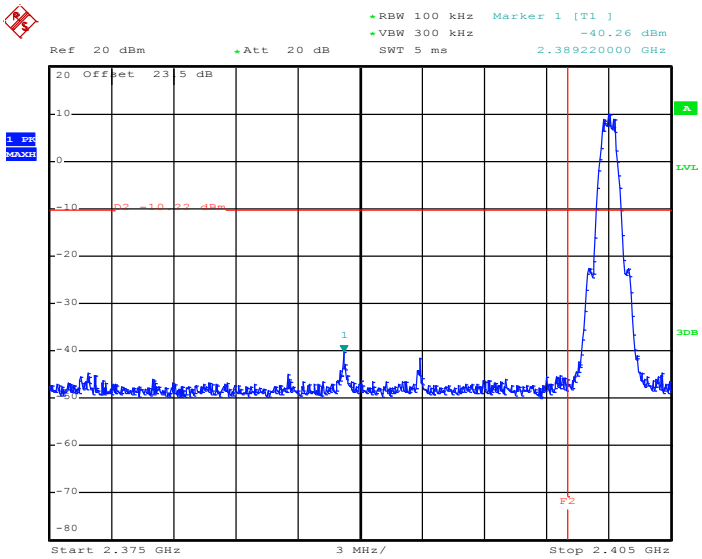
3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges

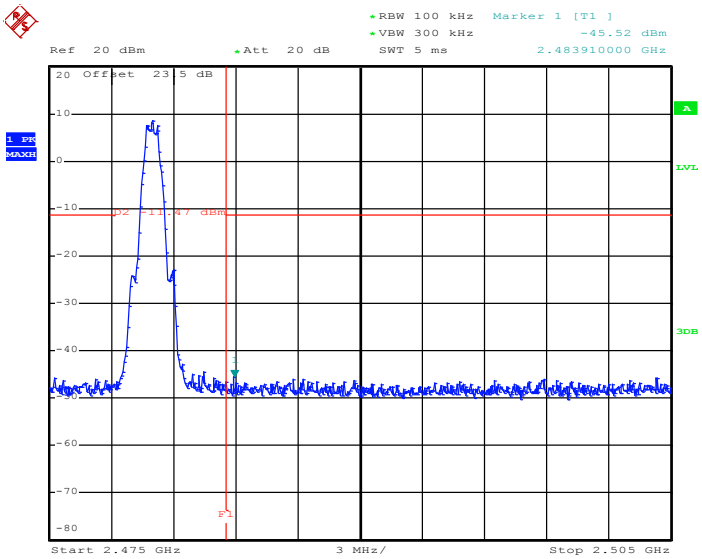
Test Mode :	Bluetooth 4.0 - LE	**Temperature :**	22~25℃
Test Channel :	00 and 39	**Relative Humidity :**	51~55%
		Test Engineer :	Book Lin

Low Band Edge Plot on Channel 00



Date: 19.DEC.2013 09:38:21

High Band Edge Plot on Channel 39



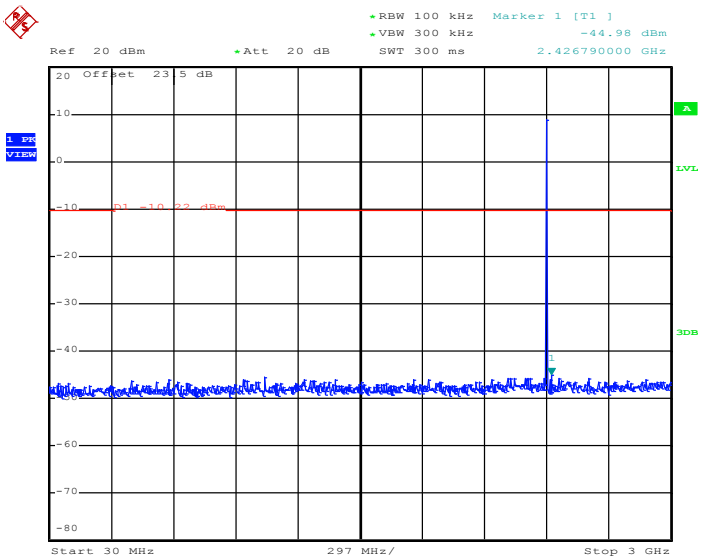
Date: 19.DEC.2013 09:51:02

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 :	Book Lin

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

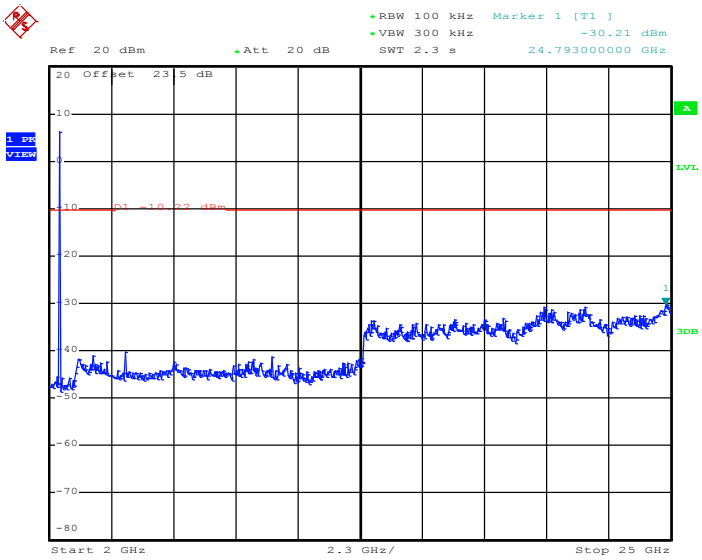
GFSK Channel 00



Date: 19.DEC.2013 09:58:21

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 00

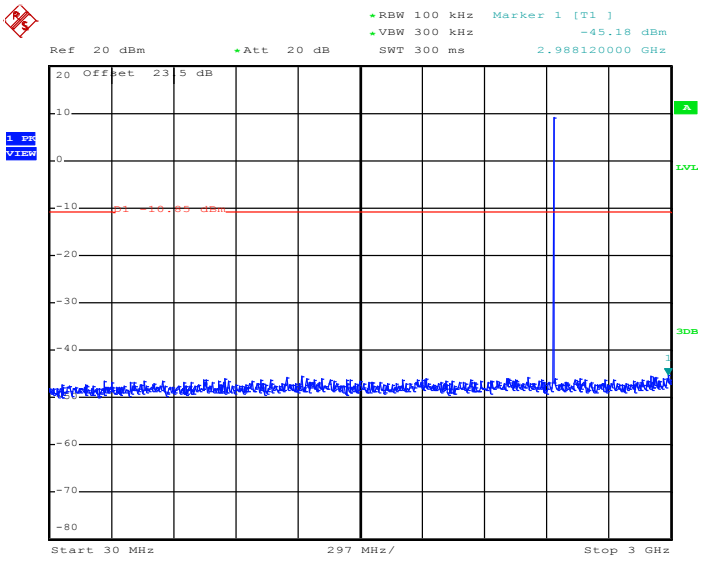


Date: 19.DEC.2013 09:58:40

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

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

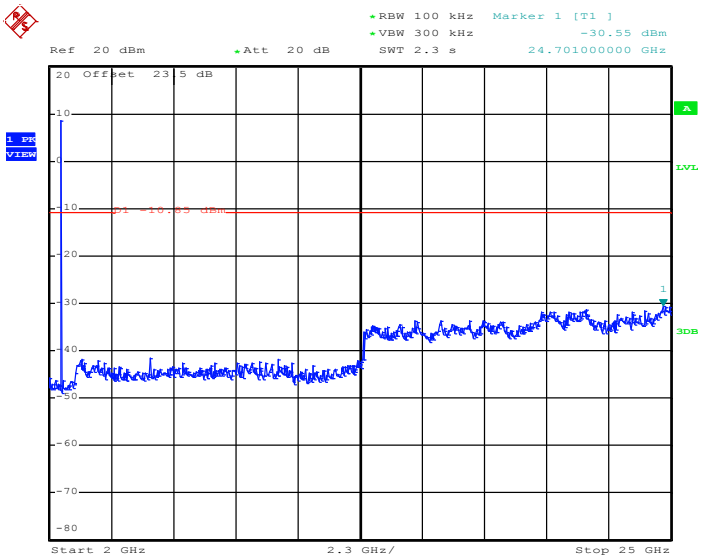
GFSK Channel 19



Date: 19.DEC.2013 09:46:24

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 19

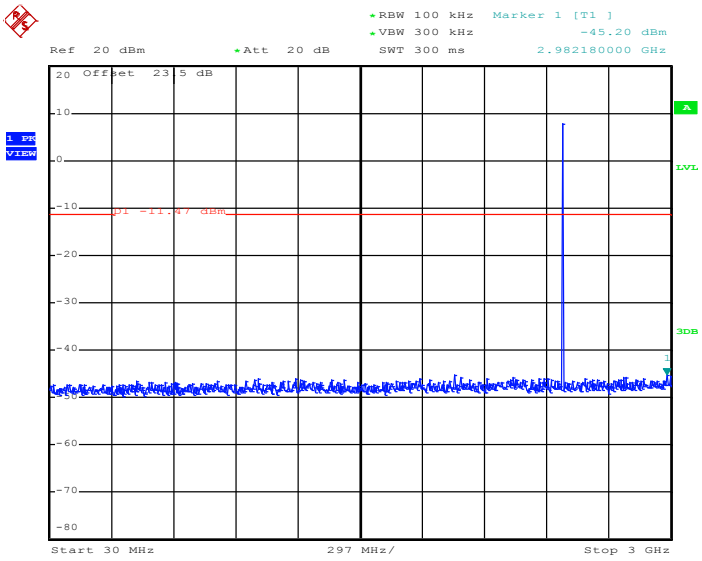


Date: 19.DEC.2013 09:46:43

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

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

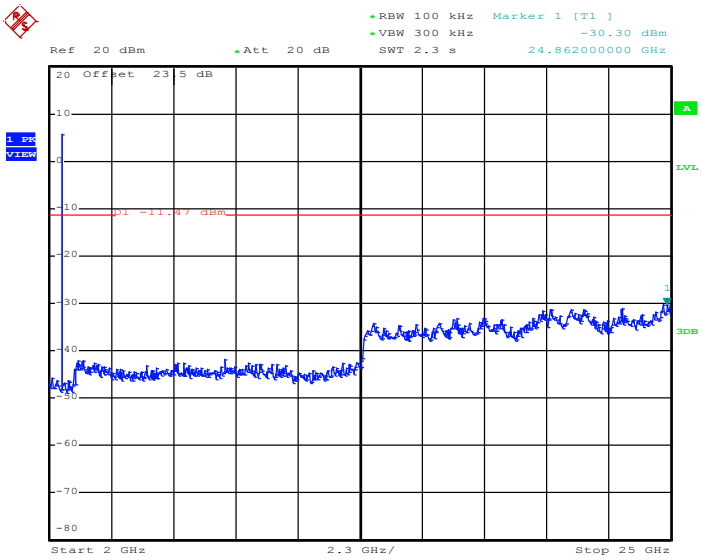
GFSK Channel 39



Date: 19.DEC.2013 09:51:25

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 39



Date: 19.DEC.2013 09:51:43

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 section 4.0 of List of Measuring Equipment of this test report is used for test.

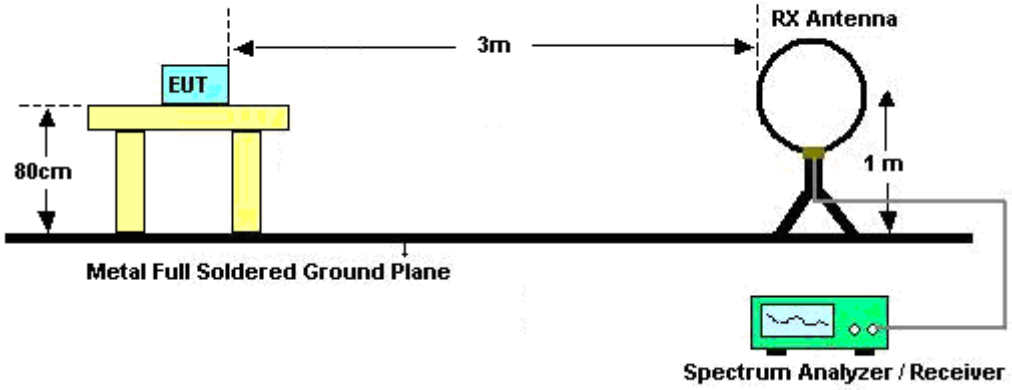
3.5.3 Test Procedures

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, detector = Peak for peak measurement.
   Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz detector = RMS for average measurement. Trace averaging with linear voltage averaging mode is used and the correction factor 20log(1/x) is added to the test results, where x is the duty cycle.

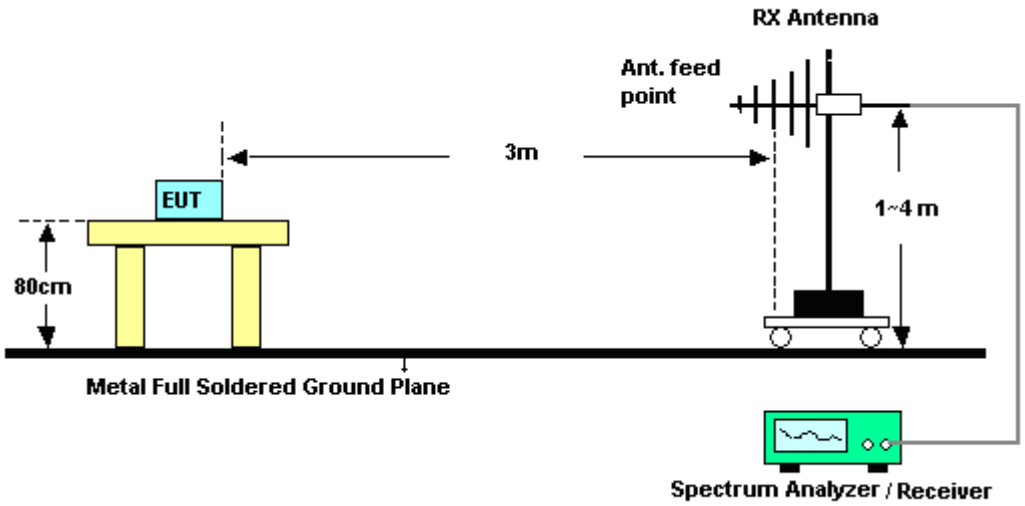
Band	x = Duty Cycle(%)	1/x	20log(1/x)
Bluetooth 4.0 - LE	51.59	1.938	5.85

3.5.4 Test Setup

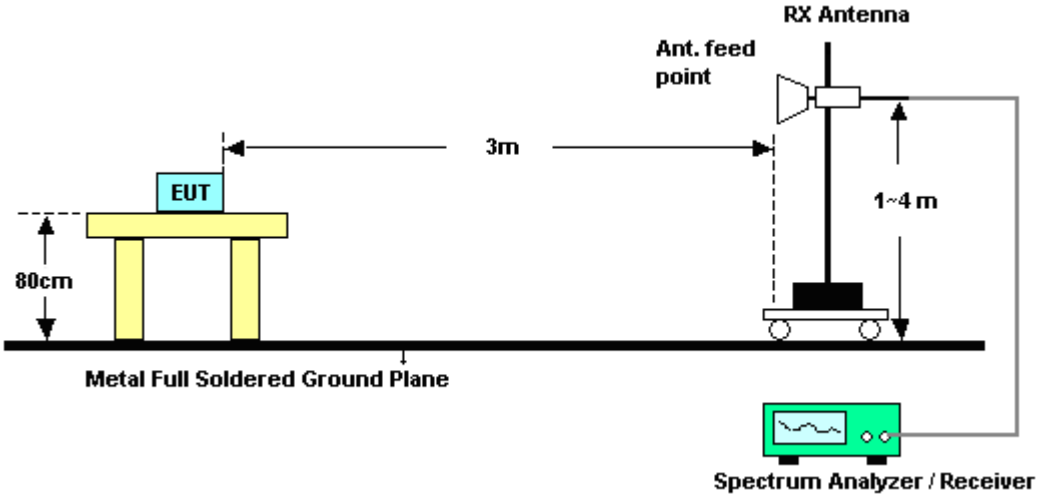
For radiated emissions below 30MHz



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 :**	20~22°C
Test Channel :	00	**Relative Humidity :**	51~56%
		Test Engineer :	Stan Hsieh

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**
2389.7	47.21	-26.79	74	42.27	32.3	6.91	34.27	169	139	Peak
2389.7	41.61	-12.39	54	36.67	32.3	6.91	34.27	169	139	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**
2389.9	48.21	-25.79	74	43.3	32.3	6.91	34.3	158	114	Peak
2389.9	41.51	-12.49	54	36.6	32.3	6.91	34.3	158	114	Average

Test Mode :	Mode 3	**Temperature :**	20~22°C
Test Channel :	39	**Relative Humidity :**	51~56%
		Test Engineer :	Stan Hsieh

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**
2491.51	49.52	-24.48	74	44.49	32.4	7.06	34.43	132	140	Peak
2491.51	41.46	-12.54	54	36.43	32.4	7.06	34.43	132	140	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**
2486.83	47.01	-26.99	74	42	32.38	7.06	34.43	124	88	Peak
2486.83	41.39	-12.61	54	36.38	32.38	7.06	34.43	124	88	Average

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

Note: Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

Test Mode :	Mode 1	**Temperature :**	20~22°C
Test Channel :	00	**Relative Humidity :**	51~56%
Test Engineer :	Stan Hsieh	**Polarization :**	Horizontal
Remark :	2402 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
66.72	36.5	-3.5	40	60.76	6.16	0.82	31.24	-	-	Peak
126.93	39.61	-3.89	43.5	57.82	11.76	1.13	31.1	-	-	Peak
288.93	42.6	-3.4	46	58.92	13.07	1.69	31.08	159	37	Peak
324.5	41.72	-4.28	46	57.29	13.6	1.83	31	-	-	Peak
745.9	39	-7	46	44.21	22.14	3.05	30.4	-	-	Peak
797	39.17	-6.83	46	44.37	21.97	3.14	30.31	-	-	Peak
2402	88.79	-	-	83.88	32.3	6.91	34.3	169	139	Average
2402	89.21	-	-	84.3	32.3	6.91	34.3	169	139	Peak
4803	52.5	-1.5	54	68.73	33.98	8.75	58.96	123	351	Average
4803	56.17	-17.83	74	72.4	33.98	8.75	58.96	123	351	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 1	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	51~56%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	2402 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
65.37	35.81	-4.19	40	60.21	6	0.8	31.2	145	173	Peak
126.66	32.37	-11.13	43.5	50.58	11.76	1.13	31.1	-	-	Peak
215.22	30.99	-12.51	43.5	51.4	9.25	1.39	31.05	-	-	Peak
396.6	33.07	-12.93	46	46.08	15.78	2.13	30.92	-	-	Peak
565.3	33.06	-12.94	46	41.37	19.84	2.59	30.74	-	-	Peak
797.7	35.2	-10.8	46	40.39	21.97	3.14	30.3	-	-	Peak
2402	82.18	-	-	77.27	32.3	6.91	34.3	158	114	Average
2402	83.46	-	-	78.55	32.3	6.91	34.3	158	114	Peak
4806	53.94	-0.06	54	70.15	33.98	8.77	58.96	157	93	Average
4806	59.28	-14.72	74	75.49	33.98	8.77	58.96	157	93	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	20~22°C
Test Channel :	19	Relative Humidity :	51~56%
Test Engineer :	Stan Hsieh	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	91.83	-	-	86.84	32.35	6.99	34.35	106	142	Average
2440	92.84	-	-	87.89	32.35	6.99	34.39	106	142	Peak
4881	52.29	-1.71	54	68.32	33.95	8.85	58.83	131	228	Average
4881	54.6	-19.4	74	70.63	33.95	8.85	58.83	131	228	Peak
7320	49.4	-4.6	54	60.7	35.53	10.91	57.74	126	118	Average
7320	55.19	-18.81	74	66.49	35.53	10.91	57.74	126	118	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 2	Temperature :	20~22°C
Test Channel :	19	Relative Humidity :	51~56%
Test Engineer :	Stan Hsieh	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	86.73	-	-	81.74	32.35	6.99	34.35	188	86	Average
2440	87.94	-	-	82.99	32.35	6.99	34.39	188	86	Peak
4881	53.9	-0.1	54	69.93	33.95	8.85	58.83	150	194	Average
4881	56.45	-17.55	74	72.48	33.95	8.85	58.83	150	194	Peak
7320	48.67	-5.33	54	59.97	35.53	10.91	57.74	130	207	Average
7320	52.58	-21.42	74	63.88	35.53	10.91	57.74	130	207	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	51~56%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	2480 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
2480	95.15	-	-	90.14	32.38	7.06	34.43	132	140	Average
2480	95.6	-	-	90.59	32.38	7.06	34.43	132	140	Peak
4962	51.66	-2.34	54	67.49	33.91	8.92	58.66	126	227	Average
4962	53.11	-20.89	74	68.94	33.91	8.92	58.66	126	227	Peak
7440	52.92	-1.08	54	64.22	35.51	11.04	57.85	136	127	Average
7440	55.05	-18.95	74	66.35	35.51	11.04	57.85	136	127	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 3	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	51~56%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	2480 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
2480	89.13	-	-	84.12	32.38	7.06	34.43	124	88	Average
2480	89.68	-	-	84.67	32.38	7.06	34.43	124	88	Peak
4959	53.11	-0.89	54	68.94	33.91	8.92	58.66	108	186	Average
4959	55.03	-18.97	74	70.86	33.91	8.92	58.66	108	186	Peak
7440	50.32	-3.68	54	61.62	35.51	11.04	57.85	121	156	Average
7440	52.94	-21.06	74	64.24	35.51	11.04	57.85	121	156	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.

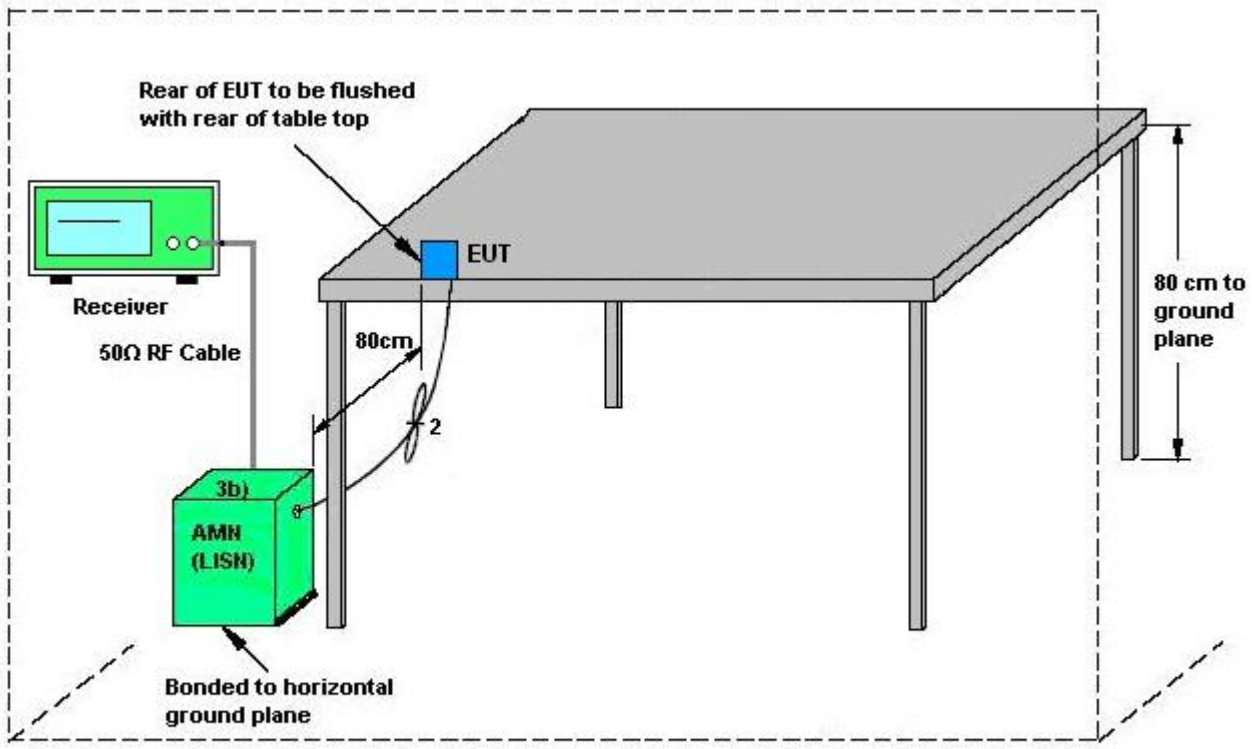
3.6.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

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.

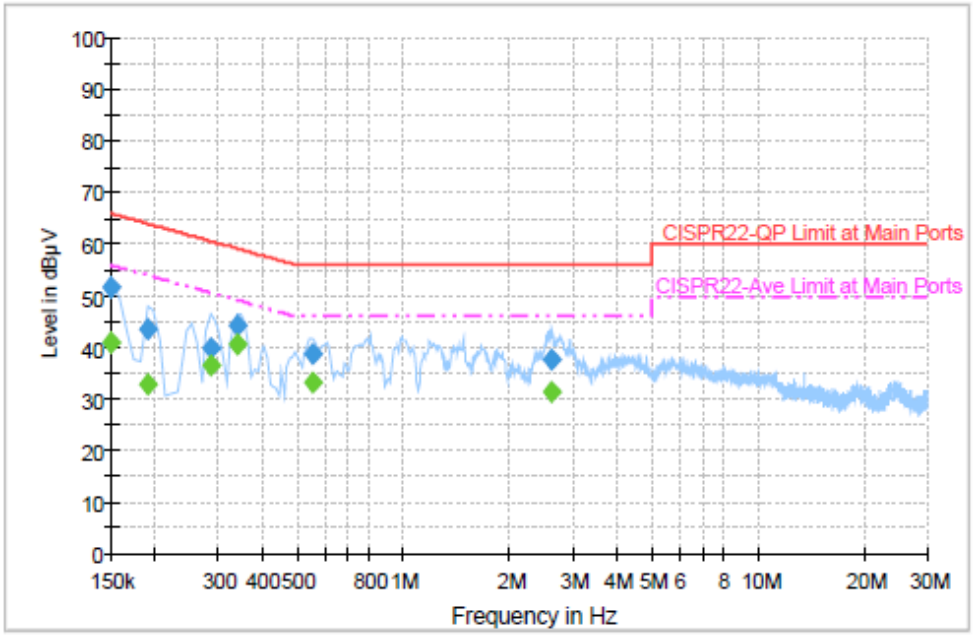
3.6.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + Bluetooth Link + Adapter		



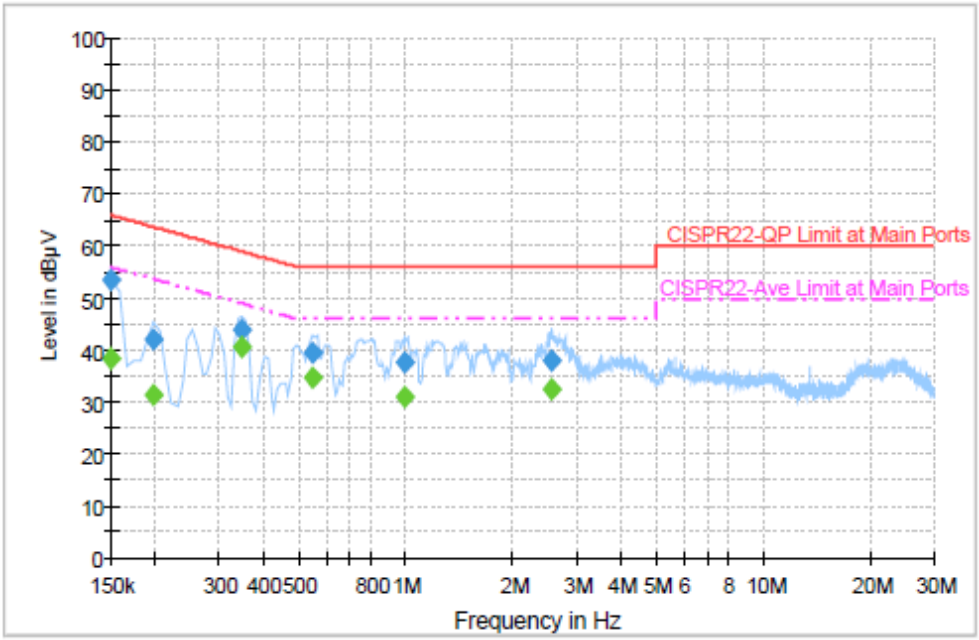
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	51.8	Off	L1	19.4	14.2	66.0
0.190000	43.4	Off	L1	19.4	20.6	64.0
0.286000	40.0	Off	L1	19.4	20.6	60.6
0.342000	44.2	Off	L1	19.4	15.0	59.2
0.558000	38.7	Off	L1	19.4	17.3	56.0
2.630000	37.5	Off	L1	19.6	18.5	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	41.1	Off	L1	19.4	14.9	56.0
0.190000	32.8	Off	L1	19.4	21.2	54.0
0.286000	36.5	Off	L1	19.4	14.1	50.6
0.342000	40.5	Off	L1	19.4	8.7	49.2
0.558000	33.2	Off	L1	19.4	12.8	46.0
2.630000	31.4	Off	L1	19.6	14.6	46.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + Bluetooth Link + Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	53.5	Off	N	19.4	12.5	66.0
0.198000	42.2	Off	N	19.3	21.5	63.7
0.350000	43.8	Off	N	19.4	15.2	59.0
0.550000	39.7	Off	N	19.4	16.3	56.0
0.990000	37.8	Off	N	19.4	18.2	56.0
2.574000	38.2	Off	N	19.6	17.8	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.4	Off	N	19.4	17.6	56.0
0.198000	31.5	Off	N	19.3	22.2	53.7
0.350000	40.5	Off	N	19.4	8.5	49.0
0.550000	34.9	Off	N	19.4	11.1	46.0
0.990000	30.9	Off	N	19.4	15.1	46.0
2.574000	32.6	Off	N	19.6	13.4	46.0

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

Non-standard antenna connector 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	Dec. 19, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Feb. 05, 2013	Dec. 19, 2013	Feb. 04, 2014	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Feb. 05, 2013	Dec. 19, 2013	Feb. 04, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7 GHz	Sep. 06, 2013	Dec. 26, 2013~ Dec. 27, 2013	Sep. 05, 2014	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30 GHz	Nov. 20, 2013	Dec. 26, 2013~ Dec. 27, 2013	Nov. 19, 2014	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9kHz~30 Mhz	Jul. 03, 2012	Dec. 26, 2013~ Dec. 27, 2013	Jul. 03, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30 MHz ~ 1 GHz	Oct. 10, 2013	Dec. 26, 2013~ Dec. 27, 2013	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1 GHz~18 GHz	Aug. 22, 2013	Dec. 26, 2013~ Dec. 27, 2013	Aug. 21, 2014	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15 GHz- 40 GHz	Oct. 03, 2013	Dec. 26, 2013~ Dec. 27, 2013	Oct. 02, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30 MHz~1 GHz	Feb. 26, 2013	Dec. 26, 2013~ Dec. 27, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A01917	1 GHz~26.5 GHz	Aug. 12, 2013	Dec. 26, 2013~ Dec. 27, 2013	Aug. 11, 2014	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	159088	DC~18 G High Gain	Feb. 27, 2013	Dec. 26, 2013~ Dec. 27, 2013	Feb. 26, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Dec. 26, 2013~ Dec. 27, 2013	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Dec. 26, 2013~ Dec. 27, 2013	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Dec. 10, 2013	Nov. 14, 2014	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Dec. 10, 2013	Dec. 11, 2014	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Dec. 10, 2013	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Dec. 10, 2013	N/A	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

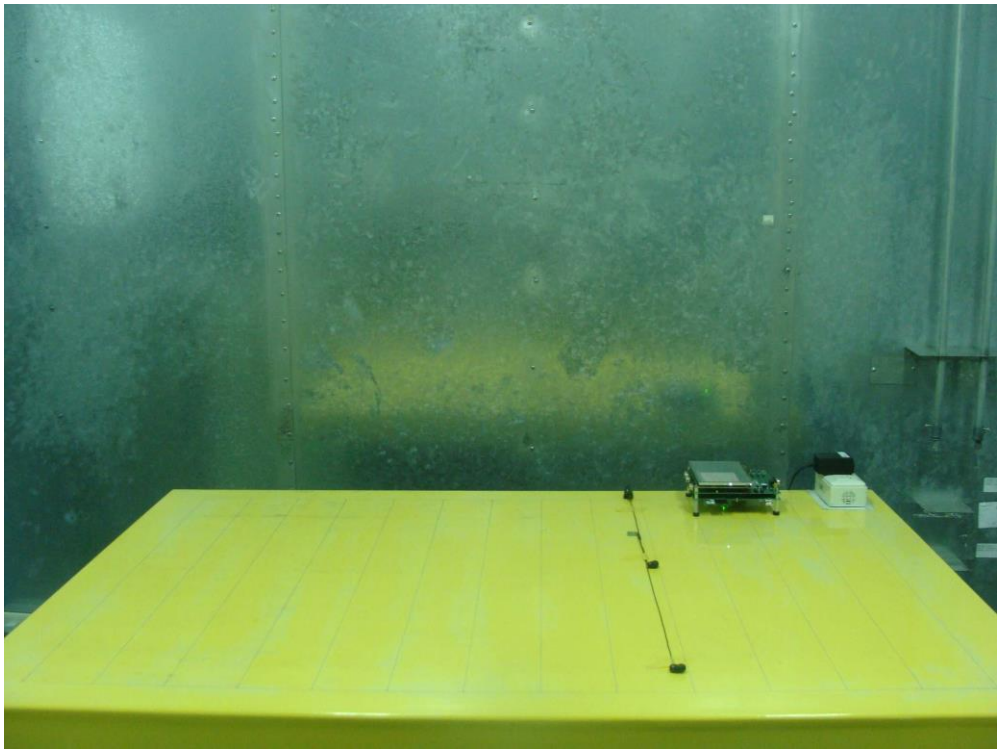
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

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

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

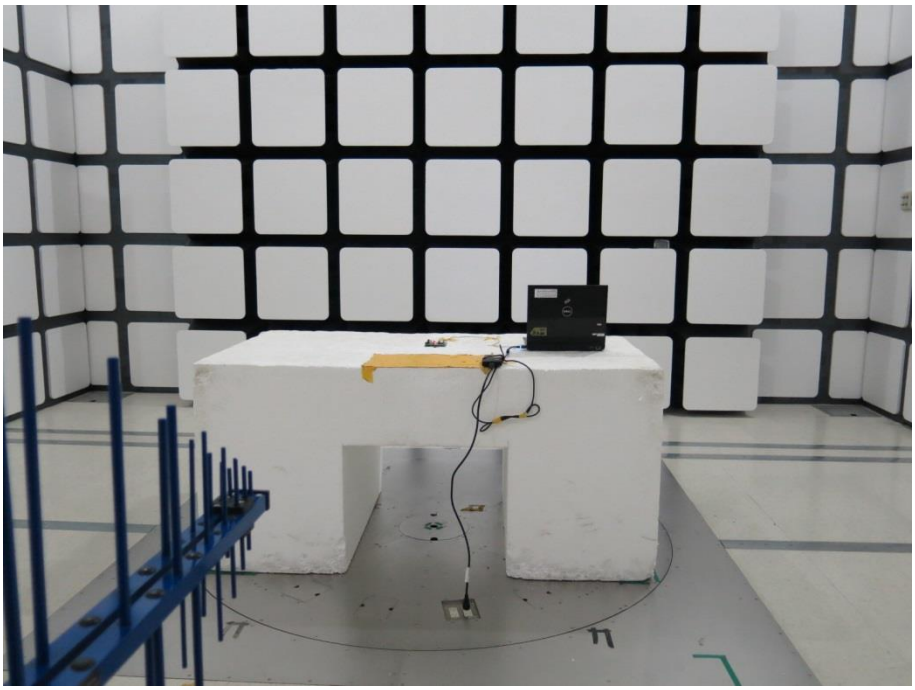
Appendix A. Setup Photographs

<Conducted Emission>



<Radiated Emission>

LF



HF