FCC RF Test Report

APPLICANT	:	**Motorola Mobility LLC**
EQUIPMENT	:	**Mobile Cellular Phone**
BRAND NAME	:	**Motorola**
MODEL NAME	:	**XT1944-3, XT1944-4**
FCC ID	:	**IHDT56XF4**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DSS) Spread Spectrum Transmitter**

The product was received on Dec. 20, 2017 and testing was completed on Jan. 23, 2018. We, Sporton International (Kunshan) 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

James Huang

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TESTING
NVLAP LAB CODE 600155-0

Approved by: James Huang / Manager

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR7D2007A	Rev. 01	Initial issue of report	Feb. 08, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 10.71 dB at 36.790 MHz
3.2	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.48 dB at 0.155 MHz
3.3	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT1944-3, XT1944-4
FCC ID	IHDT56XF4
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported)/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/ Bluetooth v3.0 + EDR/ Bluetooth v 4.0 LE/ Bluetooth v4.1 LE/ Bluetooth v4.2 LE/
IMEI Code	Conduction: 354123090006638/354123090006646 Radiation: 354123090006794/354123090006802
HW Version	DVT1B
SW Version	nora_row_n-userdebug 8.0.0 OPP27.60 222 intcfg,test-keys
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. There are two types of EUT, the only difference between two samples is SIM slot: sample 1(Model: XT1944-4) is dual SIM slot, sample 2(Model: XT1944-3) is single SIM slot. According to the difference, we chose sample 1 to evaluate for full test

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Antenna Type / Gain	Monopole Antenna with gain -1.35 dBi
Type of Modulation	Bluetooth BR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK

1.5 Modification of EUT

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

1.6 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	**Brand Name**	Motorola (Acbel)	**Model Name**	SPN5945A C-P35
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 1(EU)	**Brand Name**	Motorola (Acbel)	**Model Name**	SPN5944A C-P36
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 1(UK)	**Brand Name**	Motorola (Acbel)	**Model Name**	SPN5940A C-P37
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 1(IN)	**Brand Name**	Motorola (Acbel)	**Model Name**	SA18C19493 C-P49
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 1(AU)	**Brand Name**	Motorola (Acbel)	**Model Name**	SPN5953A C-P48
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 1(AR)	**Brand Name**	Motorola (Acbel)	**Model Name**	SPN5942A C-P47
	Power Rating	I/P: 100-240 Vac, 500mA, O/P: 5.2Vdc,2000mA		
AC Adapter 2(US)	**Brand Name**	Motorola (Salom)	**Model Name**	SSW-2919UMTJ C-P35 SPN5945A
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		

AC Adapter 2(EU)	**Brand Name**	Motorola (Salom)	**Model Name**	SSW-2919EU C-P36 SPN5944A
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 2(UK)	**Brand Name**	Motorola (Salom)	**Model Name**	SSW-2919UK C-P37 SPN5940A
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 2(AU)	**Brand Name**	Motorola (Salom)	**Model Name**	SSW-2919AU C-P48 SPN5953A
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 2(AR)	**Brand Name**	Motorola (Salom)	**Model Name**	SSW-2919AR C-P47 SPN5955A
	Power Rating	I/P: 100-240 Vac, 500mA, O/P: 5.2Vdc,2000mA		
Battery	**Brand Name**	Lenovo (SCUD)	**Model Name**	BL270
	Power Rating	3.85/4.4Vdc,4000mAh	Type	Li-ion
Earphone 1	**Brand Name**	Motorola(NEW Leaders)	**Model Name**	NLD-EM300V-01SF
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		
Earphone 2	**Brand Name**	Motorola(Cosonic)	**Model Name**	SH38C16617
	Signal Line Type	1.1 meter, non-shielded cable, without ferrite core		
USB Cable	**Brand Name**	Motorola (Saibao)	**Model Name**	SLQ-A081A
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		

1.7 Re-use of Measured Data

1.7.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT1944-3, XT1944-4, FCC ID: IHDT56XF4) is electrically identical to the reference device (Model: XT1922-5, XT1922-4, FCC ID: IHDT56XB5) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 178919 D01.

1.7.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., some difference of population/depopulation to enable support of different cellular bands, please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix C (Sporton RF Report No. FR7D0507A for the reference device Model: XT1922-5, XT1922-4, FCC ID: IHDT56XB5):

1.7.3 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for Conducted Power and Conducted spurious emission, the test result were consistent with FCC ID: IHDT56XB5 and radiated spurious emission, conducted Emission to re-test.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

1.7.4 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
DSS	IHDT56XB5	Part15C(FR7D0507A)	All conducted sections applicable
DTS (BLE)	IHDT56XB5	Part15C(FR7D0507B)	All conducted sections applicable

1.8 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No. is CN5013.

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**		**FCC Test Firm Registration No.**
	03CH03-KS	CO01-KS	630927

Note: The test site complies with ANSI C63.4 2014 requirement.

1.9 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
- ANSI C63.10-2013

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

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, and different data rates were conducted to determine the final configuration (Z plane as worst plane) from all possible combinations, and the worst mode of radiated spurious emissions is Bluetooth 3Mbps mode, and recorded in this report.

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

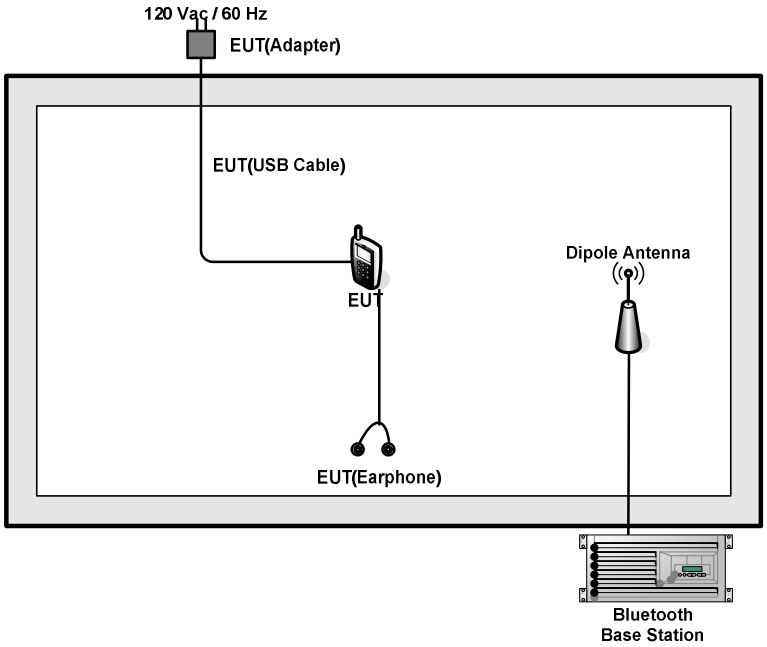
2.2 Test Mode

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

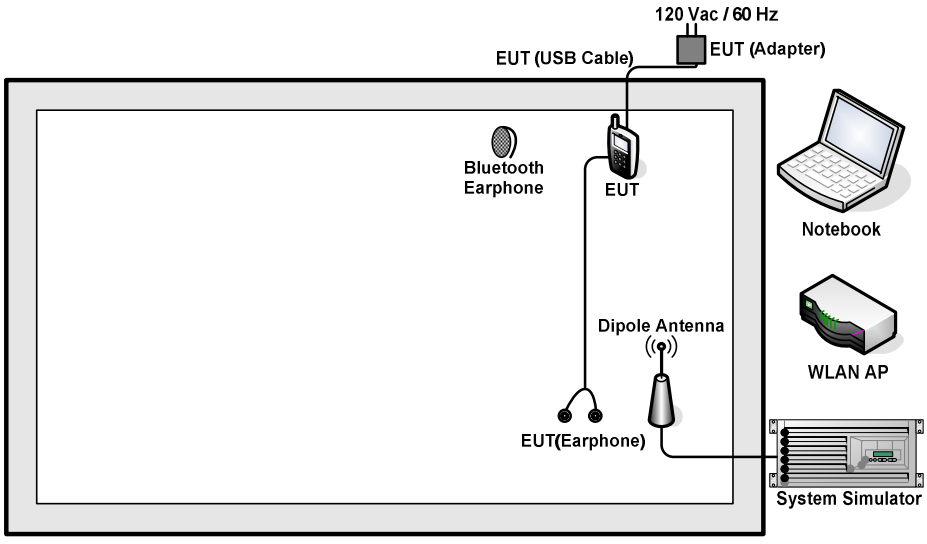
Summary table of Test Cases	
Radiated Test Cases	**Bluetooth EDR 3Mbps 8-DPSK**
	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1 :**GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter1) + Earphone 1 for Sample 1** Mode 2 : GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter2) + Earphone 2 for Sample 1
Remark: 1. The worst case of conducted emission is mode 1; only the test data of it was reported. 2. For Radiated Test Cases, The tests were performed with Adapter 1, Earphone 1 and USB Cable.	

2.3 Connection Diagram of Test System

<Bluetooth 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.	Bluetooth Base Station	R&S	CBT	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
4.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Lenovo	LBH308	NA	N/A	N/A

2.5 EUT Operation Test Setup

For Bluetooth function, the engineering test program was provided and enabled to make EUT connect with Bluetooth base station to continuous transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

3 Test Result

3.1 Radiated Band Edges and Spurious Emission Measurement

3.1.1 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. In addition, radiated emissions which fall in the restricted bands must also comply with the 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

3.1.2 Measuring Instruments

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

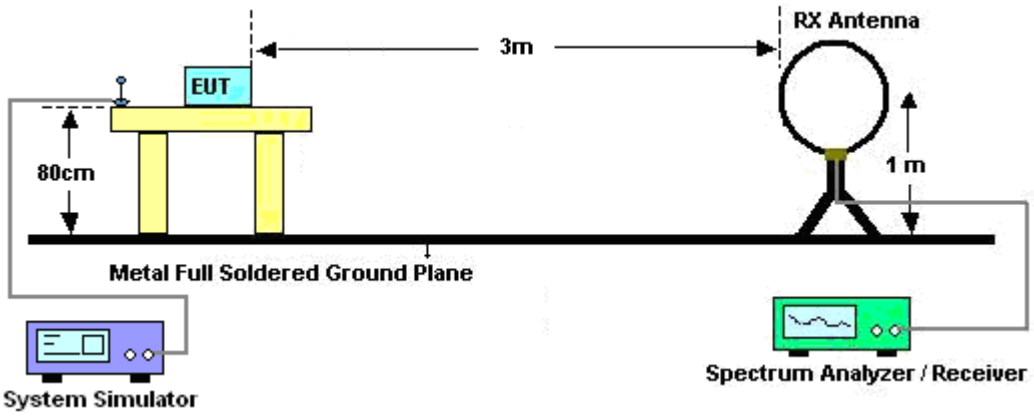
3.1.3 Test Procedures

1. 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.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, 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 to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. 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, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

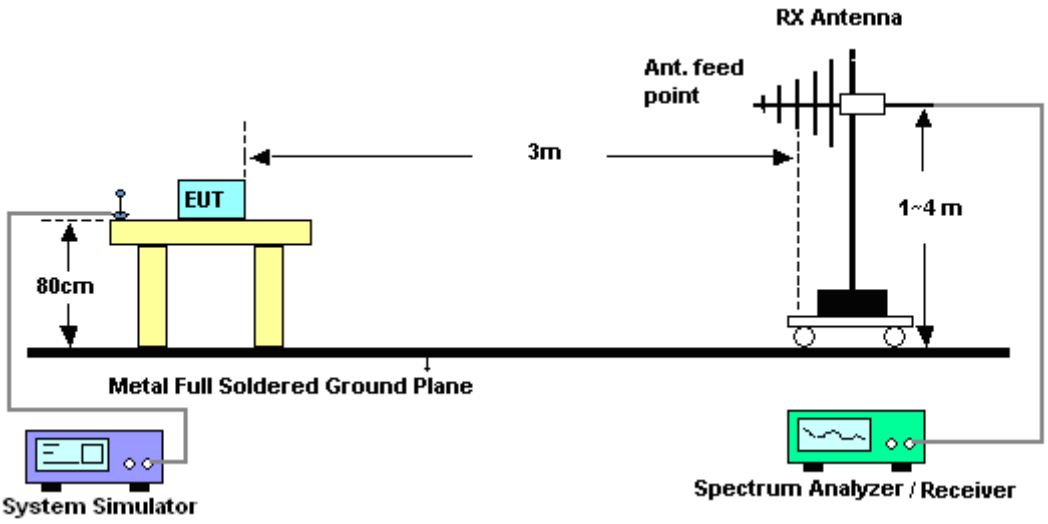
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.80dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.1.4 Test Setup

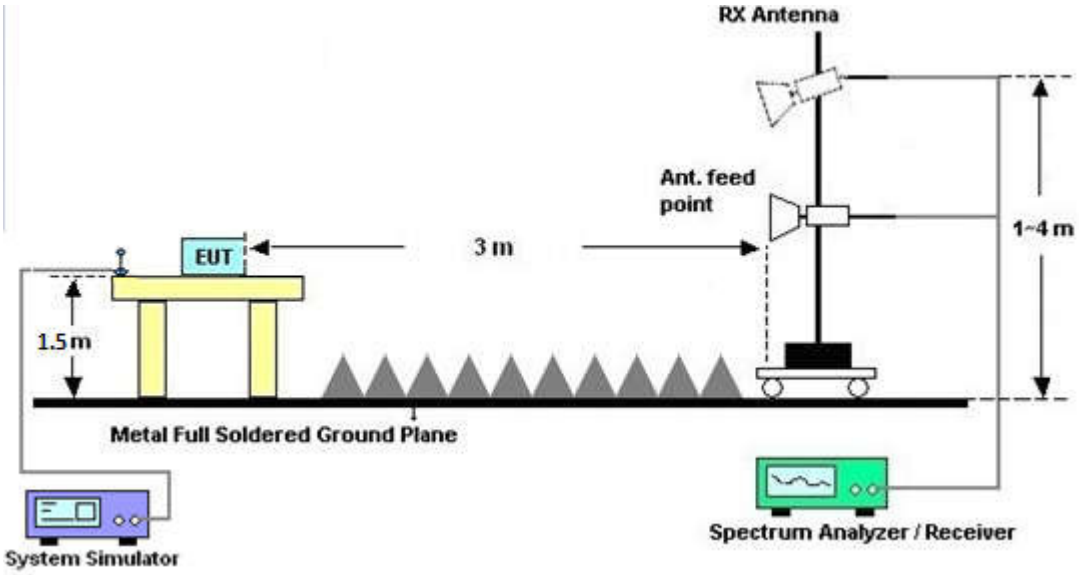
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

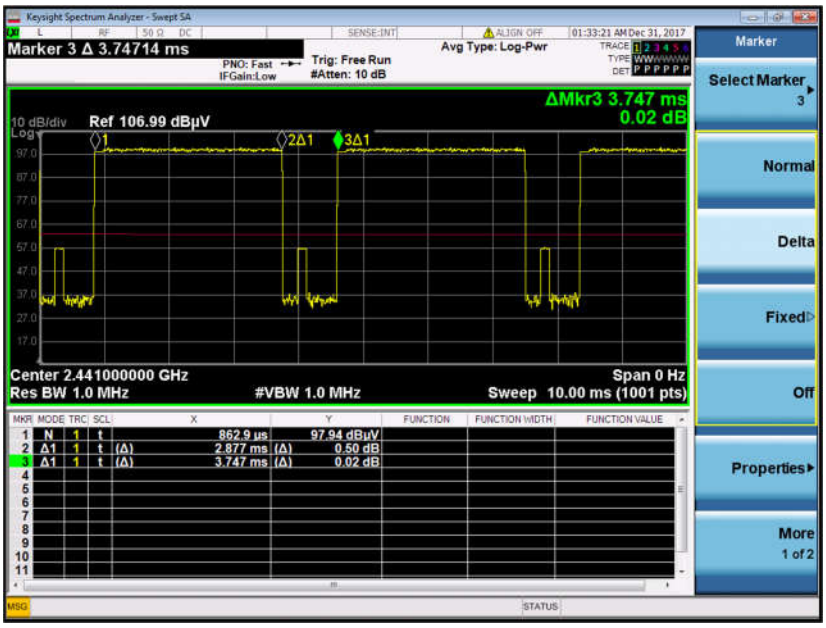


3.1.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

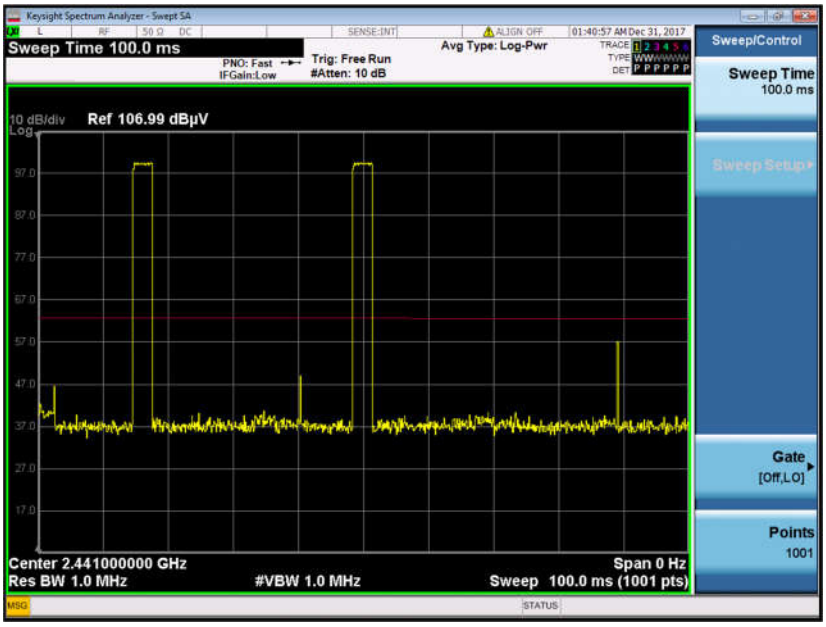
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

3.1.6 Duty cycle correction factor for average measurement

3DH5 on time (One Pulse) Plot on Channel 39



3DH5 on time (Count Pulses) Plot on Channel 39



Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.75 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.80 dB
3. 3DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

2.88 ms x 20 channels = 57.5 ms

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100ms / 57.5ms] = 2 hops

Thus, the maximum possible ON time:

2.88 ms x 2 = 5.75 ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(5.75 ms/100ms) = -24.80 dB

3.1.7 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

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

Please refer to Appendix A.

3.2 AC Conducted Emission Measurement

3.2.1 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.

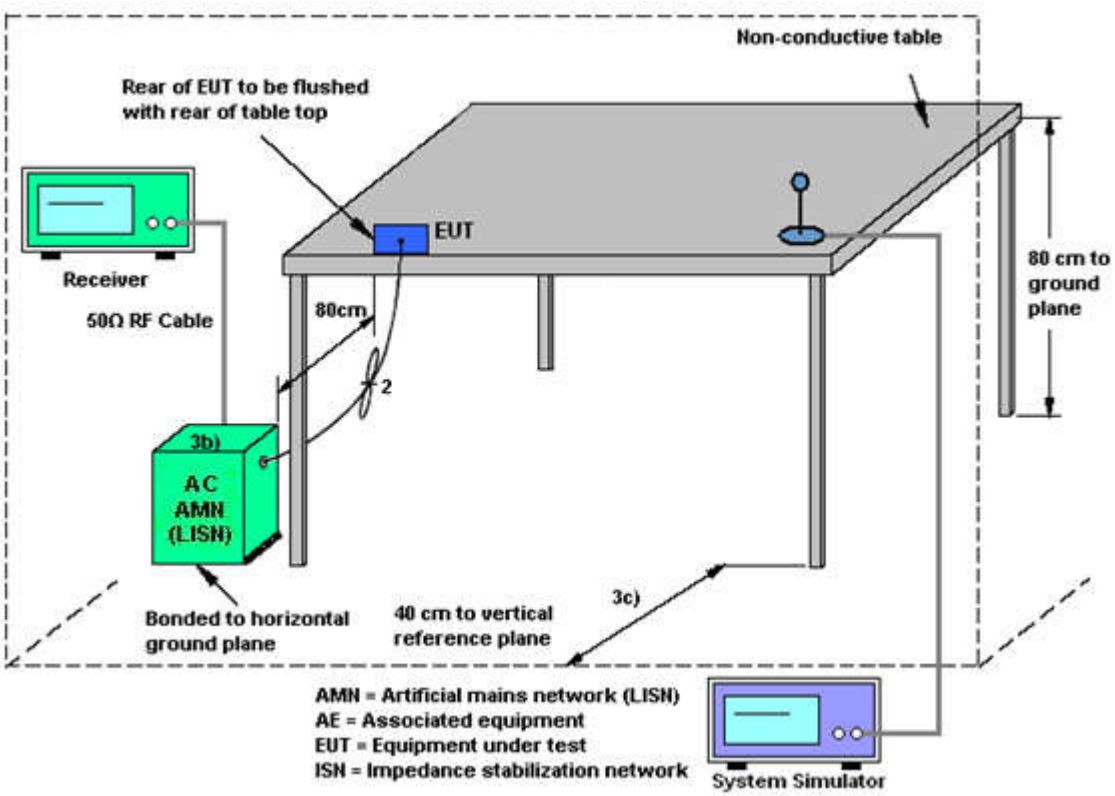
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

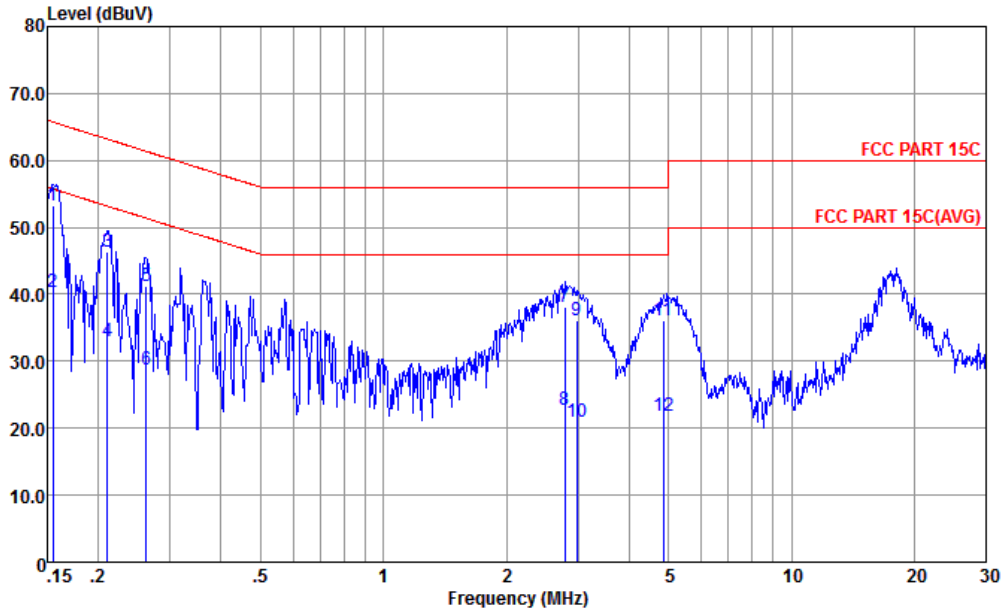
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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 (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.2.4 Test Setup



3.2.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	23~24℃
Test Engineer :	Amos Zhang	**Relative Humidity :**	42~46%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter1) + Earphone 1 for Sample 1		

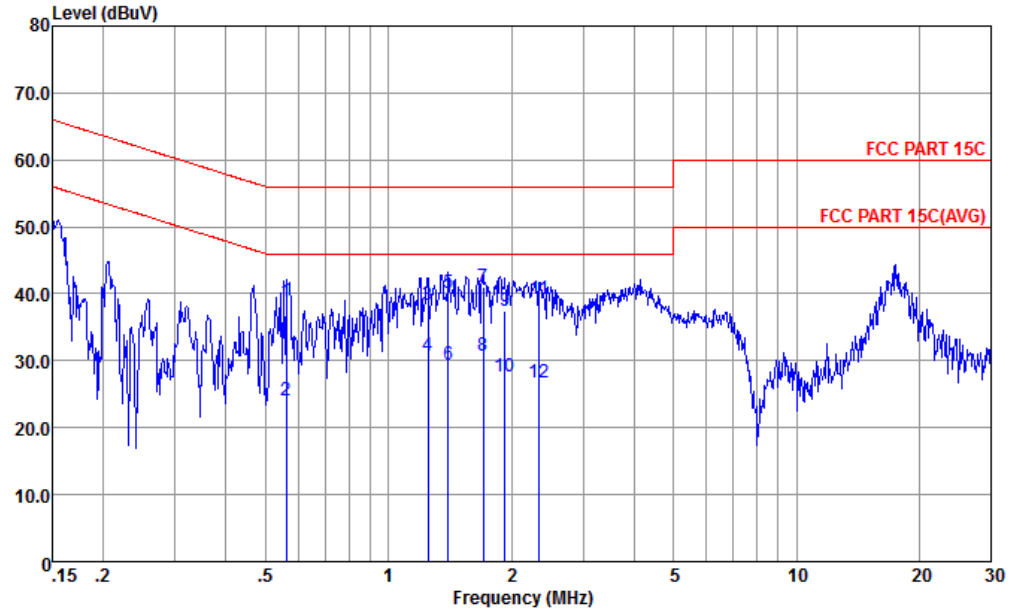


Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE

mode : Mode 1
: 354123090006638/354123090006646 #8

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.155	53.26	-12.48	65.74	42.50	0.16	10.60	QP
2	0.155	40.36	-15.38	55.74	29.60	0.16	10.60	Average
3	0.211	46.26	-16.92	63.18	35.61	0.20	10.45	QP
4	0.211	32.96	-20.22	53.18	22.31	0.20	10.45	Average
5	0.262	41.25	-20.13	61.38	30.59	0.22	10.44	QP
6	0.262	28.85	-22.53	51.38	18.19	0.22	10.44	Average
7	2.779	38.00	-18.00	56.00	27.50	0.31	10.19	QP
8	2.779	22.80	-23.20	46.00	12.30	0.31	10.19	Average
9	2.978	36.10	-19.90	56.00	25.59	0.32	10.19	QP
10	2.978	21.00	-25.00	46.00	10.49	0.32	10.19	Average
11	4.848	36.09	-19.91	56.00	25.50	0.37	10.22	QP
12	4.848	21.89	-24.11	46.00	11.30	0.37	10.22	Average

Test Mode :	Mode 1	Temperature :	23~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter1) + Earphone 1 for Sample 1		



Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

mode : Mode 1
: 354123090006638/354123090006646 #8

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.561	38.75	-17.25	56.00	28.20	0.29	10.26	QP
2		0.561	24.05	-21.95	46.00	13.50	0.29	10.26	Average
3		1.249	38.36	-17.64	56.00	27.91	0.31	10.14	QP
4		1.249	30.66	-15.34	46.00	20.21	0.31	10.14	Average
5		1.403	40.07	-15.93	56.00	29.60	0.31	10.16	QP
6		1.403	29.37	-16.63	46.00	18.90	0.31	10.16	Average
7	*	1.707	41.01	-14.99	56.00	30.50	0.32	10.19	QP
8		1.707	30.81	-15.19	46.00	20.30	0.32	10.19	Average
9		1.928	37.43	-18.57	56.00	26.90	0.32	10.21	QP
10		1.928	27.73	-18.27	46.00	17.20	0.32	10.21	Average
11		2.346	39.33	-16.67	56.00	28.81	0.32	10.20	QP
12		2.346	26.73	-19.27	46.00	16.21	0.32	10.20	Average

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 rule.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design 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
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz; Max 30dBm	Oct. 19, 2017	Dec. 31, 2017~ Jan. 23, 2018	Oct. 18, 2018	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 18, 2017	Dec. 31, 2017~ Jan. 23, 2018	Apr. 17, 2018	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 22, 2017	Dec. 31, 2017~ Jan. 23, 2018	Oct. 21, 2018	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 22, 2017	Dec. 31, 2017~ Jan. 23, 2018	Apr. 21, 2018	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 22, 2017	Dec. 31, 2017~ Jan. 23, 2018	Apr. 21, 2018	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 15, 2017	Dec. 31, 2017~ Jan. 23, 2018	Feb. 14, 2018	Radiation (03CH03-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr. 18, 2017	Dec. 31, 2017~ Jan. 23, 2018	Apr. 17, 2018	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18GHz~40GHz	Oct. 12, 2017	Dec. 31, 2017~ Jan. 23, 2018	Oct. 11, 2018	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Apr. 18, 2017	Dec. 31, 2017~ Jan. 23, 2018	Apr. 17, 2018	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Dec. 31, 2017~ Jan. 23, 2018	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Dec. 31, 2017~ Jan. 23, 2018	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Dec. 31, 2017~ Jan. 23, 2018	NCR	Radiation (03CH03-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 20, 2017	Dec. 30, 2017	Apr. 19, 2018	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Dec. 30, 2017	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Dec. 30, 2017	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Dec. 30, 2017	Oct. 11, 2018	Conduction (CO01-KS)

NCR: No Calibration Required

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))	2.3dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.6dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5dB

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5dB

Appendix A. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	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)
BT CH00 2402MHz		2362.52	46.86	-27.14	74	41.88	31.63	5.61	32.26	389	144	P	H
		2362.52	22.06	-31.94	54	-	-	-	-	-	-	A	H
		2402	101.58	-	-	96.53	31.7	5.65	32.3	389	144	P	H
		2402	76.78	-	-	-	-	-	-	-	-	A	H
		2323.78	46.5	-27.5	74	41.61	31.55	5.57	32.23	126	104	P	V
		2323.78	21.70	-32.30	54	-	-	-	-	-	-	A	V
		2402	104.94	-	-	99.89	31.7	5.65	32.3	126	104	P	V
		2402	80.14	-	-	-	-	-	-	-	-	A	V
BT CH 39 2441MHz		2336.26	46.75	-27.25	74	41.82	31.59	5.59	32.25	328	143	P	H
		2336.26	21.95	-32.05	54	-	-	-	-	-	-	A	H
		2442	102.27	-	-	97.03	31.87	5.71	32.34	328	143	P	H
		2442	77.47	-	-	-	-	-	-	-	-	A	H
		2489.29	46.32	-27.68	74	40.9	32.04	5.77	32.39	328	143	P	H
		2489.29	21.52	-32.48	54	-	-	-	-	-	-	A	H
		2378.25	46.32	-27.68	74	41.31	31.66	5.63	32.28	107	105	P	V
		2378.25	21.52	-32.48	54	-	-	-	-	-	-	A	V
		2442	105.15	-	-	99.91	31.87	5.71	32.34	107	105	P	V
		2442	80.35	-	-	-	-	-	-	-	-	A	V
		2483.55	46.77	-27.23	74	41.4	31.99	5.75	32.37	107	105	P	V
		2483.55	21.97	-32.03	54	-	-	-	-	-	-	A	V

BT CH 78 2480MHz		2483.50	50.86	-23.14	74	45.49	31.99	5.75	32.37	352	144	P	H
		2483.50	26.06	-27.94	54	-	-	-	-	-	-	A	H
		2480	100.39	-	-	95.02	31.99	5.75	32.37	352	144	P	H
		2480	75.59	-	-	-	-	-	-	-	-	A	H
		2483.50	50.48	-23.52	74	45.11	31.99	5.75	32.37	102	226	P	V
		2483.50	25.68	-28.32	54	-	-	-	-	-	-	A	V
		2480	101.94	-	-	96.57	31.99	5.75	32.37	102	226	P	V
		2480	77.14	-	-	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	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)
BT CH 00 2402MHz		4806	44.56	-29.44	74	63.13	34.94	7.84	61.35	100	360	P	H
		4806	45.34	-28.66	74	63.91	34.94	7.84	61.35	300	360	P	V
BT CH 39 2441MHz		4884	42.32	-31.68	74	60.63	34.99	7.9	61.2	100	360	P	H
		7323	41.05	-32.95	74	58.91	35.74	9.51	63.11	100	360	P	H
		4884	44.33	-29.67	74	62.64	34.99	7.9	61.2	100	0	P	V
		7323	40.61	-33.39	74	58.47	35.74	9.51	63.11	100	0	P	V
BT CH 78 2480MHz		4962	43.46	-30.54	74	61.44	35.06	7.97	61.01	100	0	P	H
		7440	41.29	-32.71	74	59.37	35.57	9.57	63.22	100	0	P	H
		4962	44.06	-29.94	74	62.04	35.06	7.97	61.01	100	0	P	V
		7440	40.55	-33.45	74	58.63	35.57	9.57	63.22	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BT (LF)

BT	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 BT LF		38.73	25.32	-14.68	40	35.01	20.78	0.69	31.16	-	-	P	H
		57.16	21.87	-18.13	40	39.45	13.14	0.82	31.54	-	-	P	H
		140.58	20.65	-22.85	43.5	32.84	17.4	1.27	30.86	-	-	P	H
		229.82	26.46	-19.54	46	38.97	17.01	1.64	31.16	-	-	P	H
		395.69	32.12	-13.88	46	38.95	22.49	2.18	31.5	100	0	P	H
		636.25	28.24	-17.76	46	30.17	26.08	2.84	30.85	-	-	P	H
		36.79	29.29	-10.71	40	37.57	22.14	0.66	31.08	100	0	P	V
		43.58	27.53	-12.47	40	39.91	18.26	0.72	31.36	-	-	P	V
		66.86	24.02	-15.98	40	41.53	13.08	0.87	31.46	-	-	P	V
		120.21	26.56	-16.94	43.5	38.52	17.6	1.22	30.78	-	-	P	V
		355.92	26.17	-19.83	46	34.25	21.36	2.06	31.5	-	-	P	V
		368.53	26.59	-19.41	46	34.28	21.72	2.09	31.5	-	-	P	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. Reference Report

Please refer to Sporton report number FR7D0507A which is issued separately.