FCC RF Test Report

APPLICANT	:	**AzureWave Technologies, Inc.**
EQUIPMENT	:	**IEEE 802.11 2x2 MIMO a/b/g/n/ac Wireless LAN + Bluetooth + NFC NGFF Module**
BRAND NAME	:	**AzureWave**
MODEL NAME	:	**AW-CM389NF**
FCC ID	:	**TLZ-CM389NF**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DSS) Spread Spectrum Transmitter**

The product was installed into ChromeBook (Brand Name: Hisense, CTL, POIN2, BITLAND, edugear; Model Name: C11, C12, J2, J4, LT0101-01, B800, K2, K4) during test.

The product was received on Mar. 03, 2015 and testing was completed on Mar. 30, 2015. We, SPORTON INTERNATIONAL (SHENZHEN) 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
2353

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APPENDIX A. RADIATED SPURIOUS EMISSION

APPENDIX B. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR530302-01A	Rev. 01	This project is a C2PC application, the detail difference with original application FCC ID: TLZ-CM389NF which the grant issued on 04/09/2015 list as below: 1. Added three samples, the difference can refer section 1.3 2. Added adapter 3 and adapter 4 just different brand name. 3. Added two batteries. Since the test result is not affected, all the test cases were quoted from original report (Sporton Report Number FR530302A).	Jul. 09, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(b)(1)	RSS-210 A8.1(b)	Peak Output Power	≤ 125 mW	Pass	-
3.2	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.51 dB at 124.090 MHz
3.3	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 12.20 dB at 0.180 MHz
3.4	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

AzureWave Technologies, Inc.
8F., No.94, Baozhong Rd., Xindian, Taipei, Taiwan 231

1.2 Manufacturer

AzureWave Technologies, Inc..
8F., No.94, Baozhong Rd., Xindian, Taipei, Taiwan 231

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	IEEE 802.11 2x2 MIMO a/b/g/n/ac Wireless LAN + Bluetooth + NFC NGFF Module
Brand Name	AzureWave
Model Name	AW-CM389NF
FCC ID	TLZ-CM389NF
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth v2.1 + EDR/Bluetooth v4.0 LE

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

Host Feature & Specification	
Host	ChromeBook
Brand Name	Hisense, CTL, POIN2, BITLAND, edugear
Model Name	C11, C12, J2, J4, LT0101-01, B800, K2, K4
HW Version	1.3
SW Version	google chrome
EUT Stage	Production Unit

Note: There are four types of EUT sample 1, sample 2, sample 3 and sample 4, the difference between sample 1 and sample 2 is only for touch panel, and sample 1/2 with sample 3, sample 4 are with different EMMC, LCD panel and RAM can refer the list below. According to the difference, we evaluate is not affect RF performance, so only choose sample 1 to perform RF test.

Component	Sample 1/Sample 2	Sample 3	Sample 4
LCD Panel	IVO_M116NWR1 LCD 11.6"	Reyken_RK116IWX2T30 LCD 11.6"	Reyken_RK116IWX2T30 LCD 11.6"
EMMC	Sandisk 16G	Toshiba 16G	Sandisk 32G
RAM	Samsung 2G	Hynix 4G	Hynix 4G

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	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Maximum Output Power to Antenna	Bluetooth BR(1Mbps) : 3.22 dBm (0.00210 W) Bluetooth EDR (2Mbps) : 2.84 dBm (0.00192 W) Bluetooth EDR (3Mbps) : 3.15 dBm (0.00207 W)
Antenna Type	PIFA Antenna with gain 1.81 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 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	**Sporton Site No.**	
	TH01-SZ	CO01-SZ

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755- 3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Registration No.**
	03CH02-SZ	831040

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 Public Notice DA 00-705
- ANSI C63.10-2013
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 4
- NOTICE 2012-DRS0126

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.
4. Per the section 2.2.3 of Notice of 2012-DRS0126, " Receivers Excluded from Industry Canada Requirements", only radiocommunication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to Industry Canada requirements.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Preliminary tests were performed in different data rates and recorded the RF output power in the following table:

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	**3.22 dBm**	2.84 dBm	3.15 dBm
Ch39	2441MHz	3.12 dBm	2.61 dBm	2.98 dBm
Ch78	2480MHz	3.05 dBm	2.50 dBm	2.78 dBm

Remark:

1. All the test data for each data rate were verified, but only the worst case was reported.
2. The data rate was set in 1Mbps for all the test items due to the highest RF output power.

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.

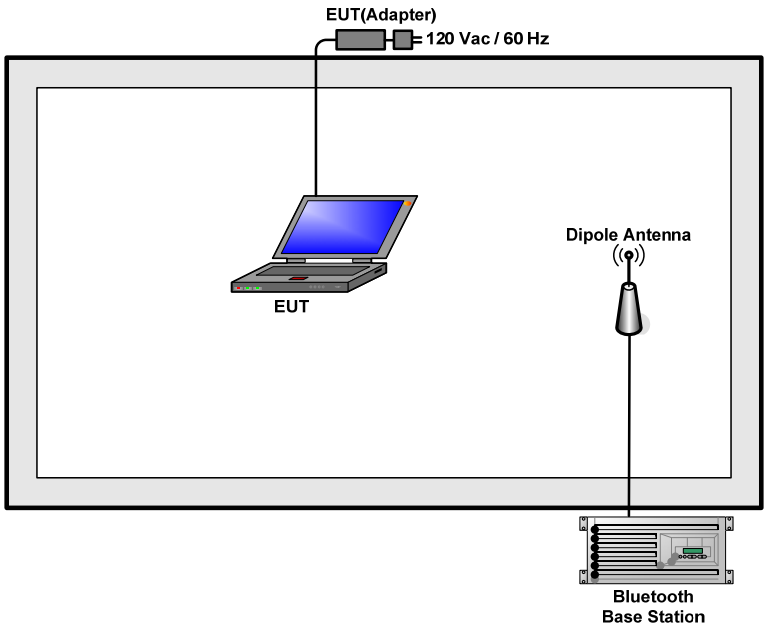
Summary table of Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth BR 1Mbps GFSK	**Bluetooth EDR 2Mbps π/4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted Test Cases	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated Test Cases	**Bluetooth BR 1Mbps GFSK**		
	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz		
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN (2.4G) Link + Earphone + Battery + Adapter 2		

Remark:

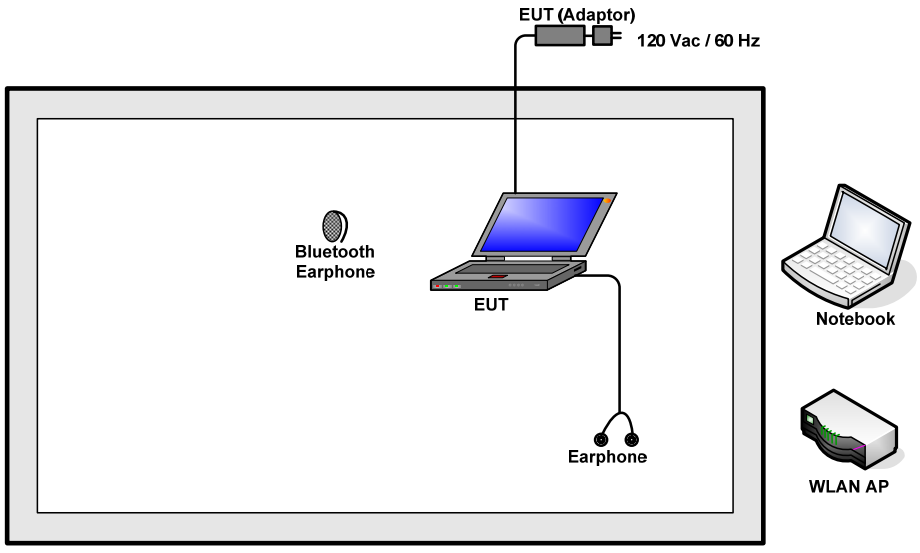
1. For radiated test cases, the worst mode data rate 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and no other significantly frequencies found in conducted spurious emission.
2. For Radiated Test Cases, The tests were performance with Adapter 1, Battery.

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.	Bluetooth Base Station	R&S	CBT	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-815	KA2IR815A1	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-108	PYAHS-107W	N/A	N/A
4.	Earphone	Lenovo	SH100	N/A	N/A	N/A
5.	Notebook	Lenovo	G480	N/A	N/A	Unshielded, 1.8 m

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 Peak Output Power Measurement

3.1.1 Limit of Peak Output Power

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

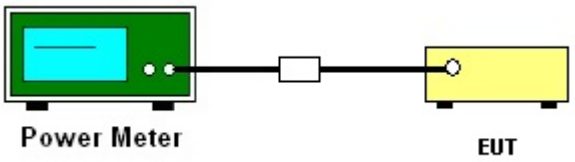
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
1. 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.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power with cable loss and record the results in the test report.
4. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	3.22	20.97	Pass
39	2441	3.12	20.97	Pass
78	2480	3.05	20.97	Pass

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		π/4-DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	2.84	20.97	Pass
39	2441	2.61	20.97	Pass
78	2480	2.50	20.97	Pass

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	3.15	20.97	Pass
39	2441	2.98	20.97	Pass
78	2480	2.78	20.97	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. 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 measuring equipment is listed in the section 4 of this test report.

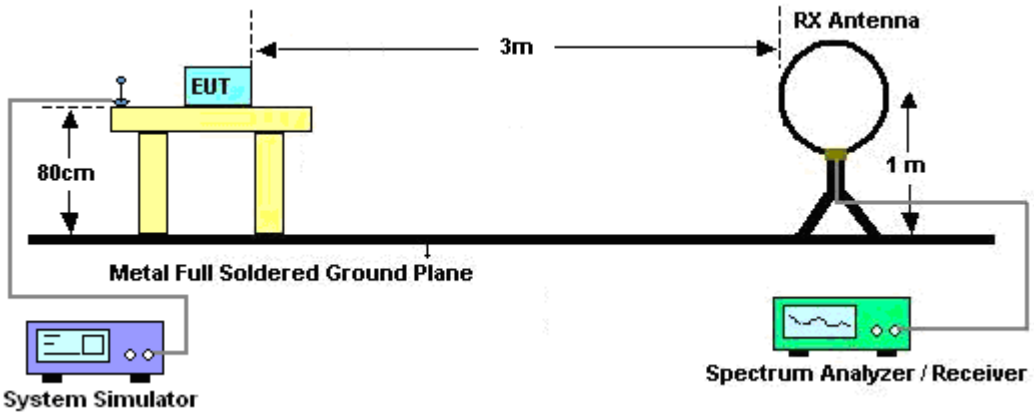
3.2.3 Test Procedures

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. 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.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. 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.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. 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)
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

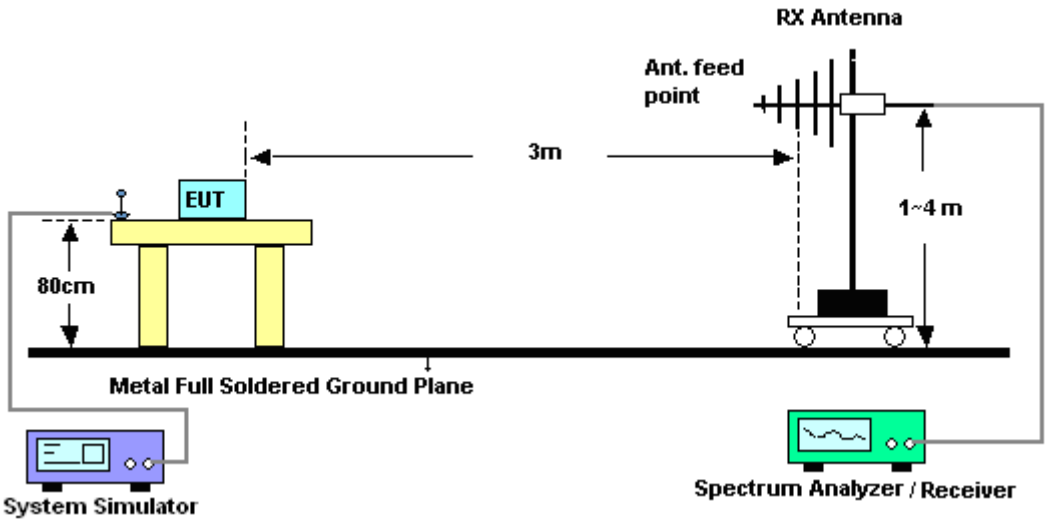
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.79dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.2.4 Test Setup

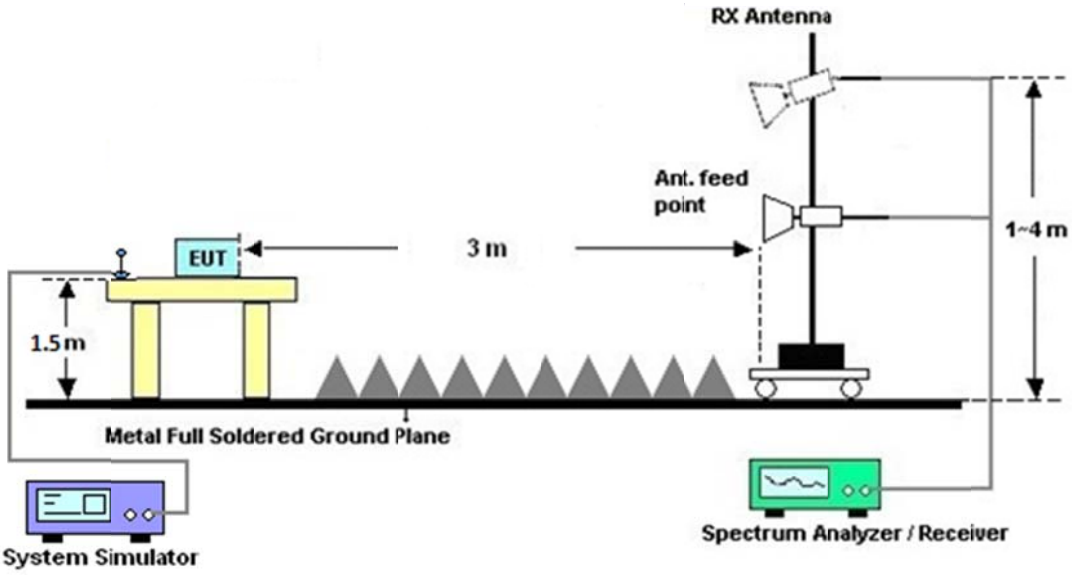
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

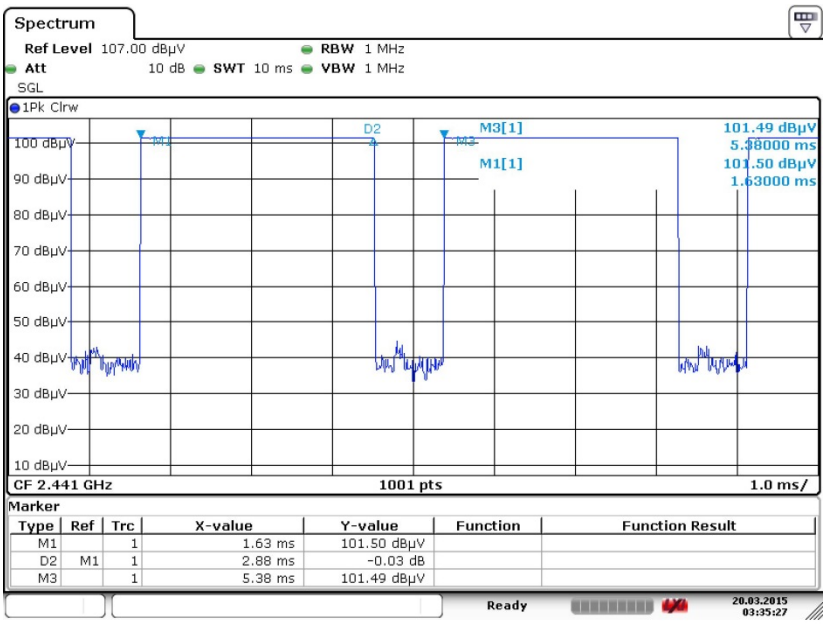


3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

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 Duty cycle correction factor for average measurement

DH5 on time (One Pulse) Plot on Channel 39



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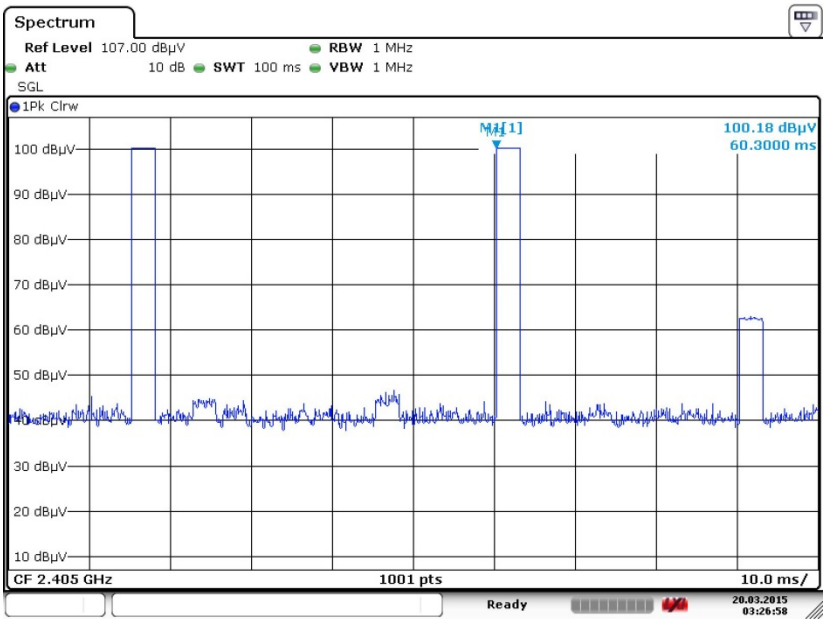
DH5 on time (Count Pulses) Plot on Channel 39



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Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.76 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
3. DH5 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 = 57.6 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 / 57.6ms] = 2 hops

Thus, the maximum possible ON time:

2.88 ms x 2 = 5.76 ms

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

20 x log(5.76 ms/100ms) = -24.79 dB

3.2.7 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

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

Please refer to Appendix A.

3.3 AC Conducted Emission Measurement

3.3.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

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

*Decreases with the logarithm of the frequency.

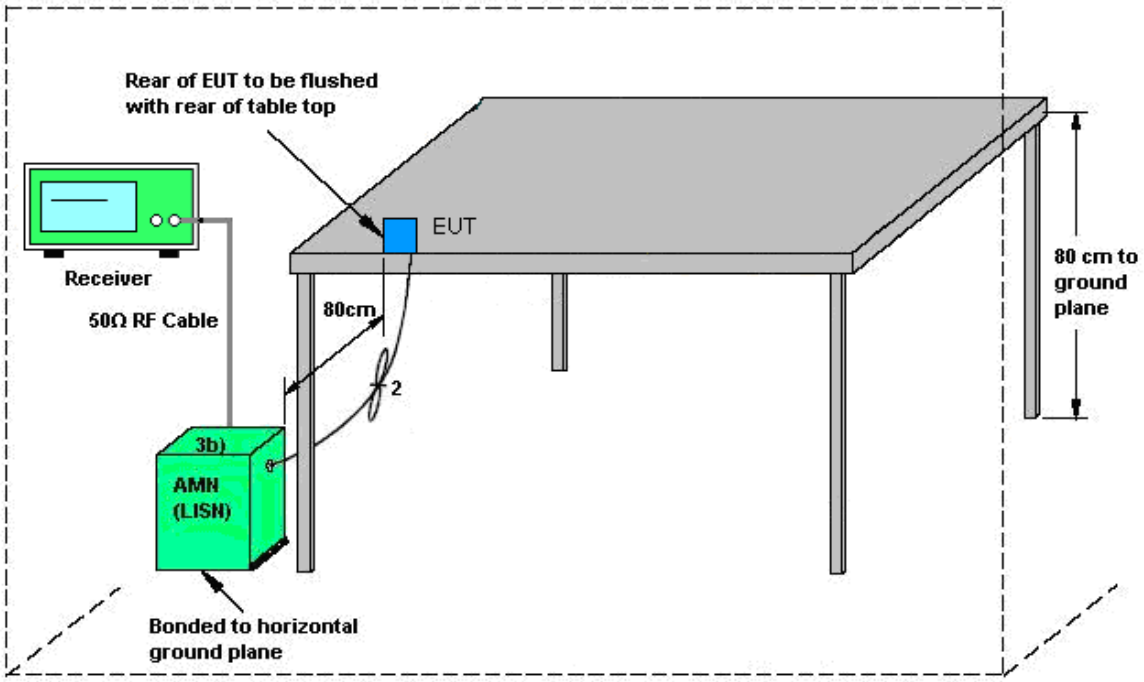
3.3.2 Measuring Instruments

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

3.3.3 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.

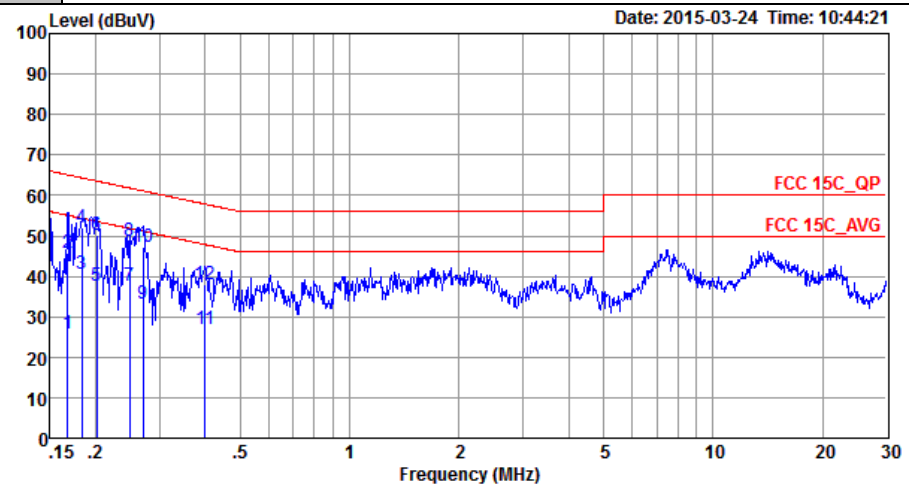
3.3.4 Test Setup



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

3.3.5 Test Result of AC Conducted Emission

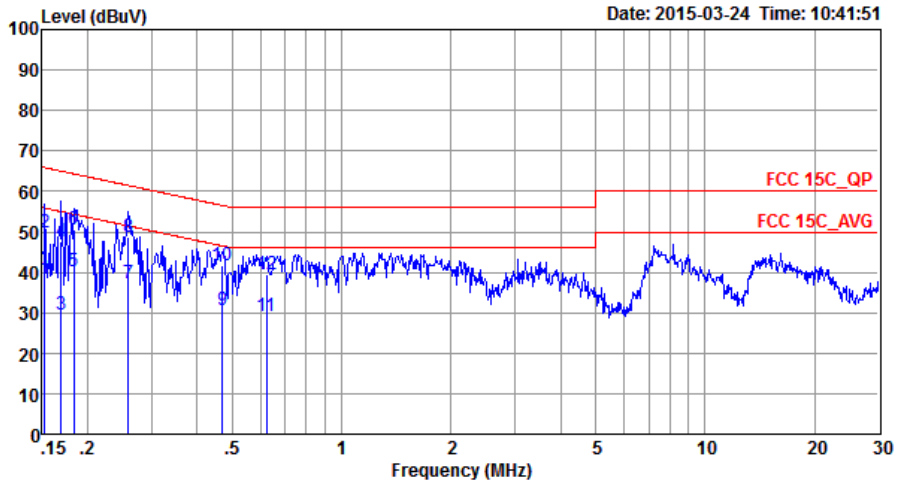
Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Jack Tian	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (2.4G) Link + Earphone + Battery + Adapter 2		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_L_20140304 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.17	25.65	-29.43	55.08	15.10	0.22	10.33	Average
2		0.17	45.65	-19.43	65.08	35.10	0.22	10.33	QP
3		0.18	40.53	-13.80	54.33	30.00	0.22	10.31	Average
4	*	0.18	52.13	-12.20	64.33	41.60	0.22	10.31	QP
5		0.20	37.71	-15.83	53.54	27.20	0.22	10.29	Average
6		0.20	50.01	-13.53	63.54	39.50	0.22	10.29	QP
7		0.25	37.58	-14.24	51.82	27.10	0.24	10.24	Average
8		0.25	48.88	-12.94	61.82	38.40	0.24	10.24	QP
9		0.27	33.17	-17.95	51.12	22.70	0.25	10.22	Average
10		0.27	47.27	-13.85	61.12	36.80	0.25	10.22	QP
11		0.40	27.05	-20.81	47.86	16.60	0.28	10.17	Average
12		0.40	38.05	-19.81	57.86	27.60	0.28	10.17	QP

Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Jack Tian	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (2.4G) Link + Earphone + Battery + Adapter 2		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_N_20140304 NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.15	38.49	-17.38	55.87	27.80	0.33	10.36	Average
2		0.15	49.79	-16.08	65.87	39.10	0.33	10.36	QP
3		0.17	29.56	-25.43	54.99	18.90	0.33	10.33	Average
4		0.17	47.56	-17.43	64.99	36.90	0.33	10.33	QP
5		0.18	40.14	-14.19	54.33	29.51	0.32	10.31	Average
6		0.18	50.44	-13.89	64.33	39.81	0.32	10.31	QP
7		0.26	37.28	-14.19	51.47	26.70	0.35	10.23	Average
8	*	0.26	48.78	-12.69	61.47	38.20	0.35	10.23	QP
9		0.47	30.76	-15.73	46.49	20.20	0.40	10.16	Average
10		0.47	41.66	-14.83	56.49	31.10	0.40	10.16	QP
11		0.62	29.06	-16.94	46.00	18.60	0.31	10.15	Average
12		0.62	39.56	-16.44	56.00	29.10	0.31	10.15	QP

3.4 Antenna Requirements

3.4.1 Standard Applicable

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

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1218010	10Hz~40GHz	Jan. 28, 2015	Mar. 30, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Power Sensor	Anritsu	MA2411B	1207253	0.3GHz~40GHz	Jan. 28, 2015	Mar. 30, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
EMI TEST Receiver	R&S	ESCI7	100768	9kHz~3GHz	May 04, 2014	Mar. 20, 2015~ Mar. 25, 2015	May 03, 2015	Radiation (03CH02-SZ)
Spectrum Analyzer	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2014	Mar. 20, 2015~ Mar. 25, 2015	May 25, 2015	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 09, 2014	Mar. 20, 2015~ Mar. 25, 2015	May 08, 2015	Radiation (03CH02-SZ)
Bilog Antenna	TESEQ	CBL 6112D	37877	30MHz~2GHz	Oct. 15, 2014	Mar. 20, 2015~ Mar. 25, 2015	Oct. 14, 2015	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Jan. 20, 2015	Mar. 20, 2015~ Mar. 25, 2015	Jan. 19, 2016	Radiation (03CH02-SZ)
Double Ridged Horn Antenna	COM-POWER	AH-840	101071	18GHz~40GHz	Sep. 04, 2014	Mar. 20, 2015~ Mar. 25, 2015	Sep. 03, 2015	Radiation (03CH02-SZ)
Amplifier	com-power	PA-103A	161069	1~1000MHz	May 04, 2014	Mar. 20, 2015~ Mar. 25, 2015	May 03, 2015	Radiation (03CH02-SZ)
Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 29, 2014	Mar. 20, 2015~ Mar. 25, 2015	Oct. 28, 2015	Radiation (03CH02-SZ)
AC Source(AVR)	CHROMA	61601ACSOURCE	616010002470	100Vac~240Vac	NCR	Mar. 20, 2015~ Mar. 25, 2015	NCR	Radiation (03CH02-SZ)
Turn Table	Qiangdian	3000	N/A	0~360 degree	NCR	Mar. 20, 2015~ Mar. 25, 2015	NCR	Radiation (03CH02-SZ)
Antenna Mast	Qiangdian	3000	N/A	1 m~4 m	NCR	Mar. 20, 2015~ Mar. 25, 2015	NCR	Radiation (03CH02-SZ)
EMI TEST Receiver	R&S	ESCI7	100768	9kHz~3GHz	May 04, 2014	Mar. 24, 2015	May 03, 2015	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Feb. 02, 2015	Mar. 24, 2015	Feb. 01, 2016	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Feb. 02, 2015	Mar. 24, 2015	Feb. 01, 2016	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Sep. 29, 2014	Mar. 24, 2015	Sep. 28, 2015	Conduction (CO01-SZ)

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))	**4.5dB**

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		2389.56	42.53	-31.47	74	45.7	27.25	6.04	36.46	150	356	P	H
		2389.56	17.74	-36.26	54	-	-	-	-	150	356	A	H
	*	2402	96.27	-	-	99.44	27.25	6.04	36.46	150	356	P	H
	*	2402	71.48	-	-	-	-	-	-	150	356	A	H
		2346.14	43.49	-30.51	74	46.92	27.07	5.96	36.46	286	277	P	V
		2346.14	18.7	-35.3	54	-	-	-	-	286	277	A	V
	*	2402	97.83	-	-	101	27.25	6.04	36.46	286	277	P	V
	*	2402	73.04	-	-	-	-	-	-	286	277	A	V
BT CH 39 2441MHz		2383.15	41.55	-32.45	74	44.78	27.19	6.04	36.46	180	313	P	H
		2383.15	16.76	-37.24	54	-	-	-	-	180	313	A	H
	*	2441	96.35	-	-	99.29	27.42	6.09	36.45	180	313	P	H
	*	2441	71.56	-	-	-	-	-	-	180	313	A	H
		2498.48	43.46	-30.54	74	46.13	27.6	6.17	36.44	180	313	P	H
		2498.48	18.67	-35.33	54	-	-	-	-	180	313	A	H
		2383.53	42.8	-31.2	74	46.03	27.19	6.04	36.46	282	277	P	V
		2383.53	18.01	-35.99	54	-	-	-	-	282	277	A	V
	*	2441	98.89	-	-	101.83	27.42	6.09	36.45	282	277	P	V
	*	2441	74.1	-	-	-	-	-	-	282	277	A	V
		2498.67	44.7	-29.3	74	47.37	27.6	6.17	36.44	282	277	P	V
		2498.67	19.91	-34.09	54	-	-	-	-	282	277	A	V

BT CH 78 2480MHz	*	2480	96.17	-	-	98.91	27.54	6.17	36.45	195	313	P	H
	*	2480	71.38	-	-	-	-	-	-	195	313	A	H
		2487.82	45.9	-28.1	74	48.58	27.6	6.17	36.45	195	313	P	H
		2487.82	21.11	-32.89	54	-	-	-	-	195	313	A	H
	*	2480	97.57	-	-	100.31	27.54	6.17	36.45	286	277	P	V
	*	2480	72.78	-	-	-	-	-	-	286	277	A	V
		2488.52	45.66	-28.34	74	48.34	27.6	6.17	36.45	286	277	P	V
		2488.52	20.87	-33.13	54	-	-	-	-	286	277	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		4804	44.83	-29.17	74	41.36	31.22	8.2	35.95	151	219	P	H
		4804	20.04	-33.96	54					151	219	A	H
		4804	44.23	-29.77	74	40.76	31.22	8.2	35.95	151	219	P	V
		4804	19.44	-34.56	54					151	219	A	V
BT CH 39 2441MHz		4882	45.39	-28.61	74	41.66	31.36	8.29	35.92	115	258	P	H
		4882	20.6	-33.4	54					115	258	A	H
		7323	49.53	-24.47	74	39.81	35.98	10.29	36.55	152	309	P	H
		7323	24.74	-29.26	54					152	309	A	H
		4882	45.42	-28.58	74	41.69	31.36	8.29	35.92	115	258	P	V
		4882	20.63	-33.37	54					115	258	A	V
		7323	48.4	-25.6	74	38.68	35.98	10.29	36.55	152	309	P	V
		7323	23.61	-30.39	54					152	309	A	V
BT CH 78 2480MHz		4960	45.12	-28.88	74	41.13	31.53	8.35	35.89	118	289	P	H
		4960	20.33	-33.67	54					118	289	A	H
		7440	49.5	-24.5	74	39.61	36.16	10.38	36.65	158	273	P	H
		7440	24.71	-29.29	54					158	273	A	H
		4960	45.65	-28.35	74	41.66	31.53	8.35	35.89	118	289	P	V
		4960	20.86	-33.14	54					118	289	A	V
		7440	48.77	-25.23	74	38.88	36.16	10.38	36.65	158	273	P	V
		7440	23.98	-30.02	54					158	273	A	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		124.09	38.99	-4.51	43.5	54.97	12.78	1.74	30.5	163	214	P	H
		273.47	32.12	-13.88	46	46.42	13.67	2.35	30.32			P	H
		507.24	23.67	-22.33	46	32.73	17.98	2.89	29.93			P	H
		633.34	21.94	-24.06	46	28.89	19.47	3.31	29.73			P	H
		832.19	23.68	-22.32	46	27.9	21.38	3.76	29.36			P	H
		945.68	24.24	-21.76	46	27.32	22.15	3.93	29.16			P	H
		54.25	34.93	-5.07	40	56.54	7.62	1.33	30.56	155	231	P	V
		179.38	28.81	-14.69	43.5	46	11.33	1.92	30.44			P	V
		284.14	21.67	-24.33	46	35.86	13.76	2.35	30.3			P	V
		422.85	20.23	-25.77	46	31.26	16.27	2.78	30.08			P	V
		685.72	23.67	-22.33	46	30.13	19.78	3.43	29.67			P	V
		837.04	25.81	-20.19	46	29.96	21.44	3.76	29.35			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".