



Partial FCC RF Test Report

APPLICANT : Huawei Technologies Co.,Ltd.
EQUIPMENT : Smart Phone
BRAND NAME : honor
MODEL NAME : JAT-L41
FCC ID : QISJAT-L41
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

This is a partial report. The product was received on Jan. 14, 2019 and testing was completed on Jan. 28, 2019. 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.



Approved by: Eric Shih / Manager

Sporton International (Shenzhen) Inc.

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Guangdong Province 518055, China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR911406B	Rev. 01	Initial issue of report	Jan. 31, 2019



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.2	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.96 dB at 43.58 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 11.70 dB at 0.59 MHz
3.4	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Huawei Technologies Co.,Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.2 Manufacturer

Huawei Technologies Co.,Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	honor
Model Name	JAT-L41
FCC ID	QISJAT-L41
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+/DC-HSDPA/LTE WLAN 2.4GHz 802.11b/g/n (HT20/HT40) Bluetooth BR/EDR/LE
IMEI Code	Conducted: N/A AC Conducted Emission: 867638040015223/867638040016809 Radiated Emission: N/A
HW Version	HL1JATM
SW Version	9.0.1.108(C900E70R1P8)
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
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	-1.41 dBm (0.0007 W)
Antenna Type / Gain	Internal Antenna with gain -0.87 dBi
Type of Modulation	Bluetooth LE : GFSK



1.5 Accessories List

Specification of Accessory				
AC Adapter 1	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100B01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	Dongguan Phitek Electronics Co., Ltd		
AC Adapter 2	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100B01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD		
AC Adapter 3	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100B01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD.		
AC Adapter 4	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100E01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	Dongguan Phitek Electronics Co., Ltd.		
AC Adapter 5	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100E01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD		
AC Adapter 6	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100E01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD.		
AC Adapter 7	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100A01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	Dongguan Phitek Electronics Co., Ltd.		
AC Adapter 8	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100A01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD		
AC Adapter 9	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100A01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD.		
AC Adapter 10	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100U01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	Dongguan Phitek Electronics Co., Ltd.		
AC Adapter 11	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100U01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD		
AC Adapter 12	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050100U01
	Power Rating	I/P: 100 - 240 Vac; O/P: 5Vdc, 1.0A		
	Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD.		



Battery 1	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HB405979ECW
	Power Rating	3.82Vdc, 2920mAh	Manufacturer	Sunwoda
Battery 2	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HB405979ECW
	Power Rating	3.82Vdc, 2920mAh	Manufacturer	SCUD
Battery 3	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HB405979ECW
	Power Rating	3.82Vdc, 2920mAh	Manufacturer	Desay
USB Cable 1	Brand Name	Huawei Technologies Co., Ltd.	Model Name	L99U2013-CS-H
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 2	Brand Name	Huawei Technologies Co., Ltd.	Model Name	203-0786-0
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 3	Brand Name	Huawei Technologies Co., Ltd.	Model Name	130-26654
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 4	Brand Name	Huawei Technologies Co., Ltd.	Model Name	WA0007
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 5	Brand Name	Huawei Technologies Co., Ltd.	Model Name	L99U2017-CS-H
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 6	Brand Name	Huawei Technologies Co., Ltd.	Model Name	203-1583-0
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 7	Brand Name	Huawei Technologies Co., Ltd.	Model Name	130-26669
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 8	Brand Name	Huawei Technologies Co., Ltd.	Model Name	WA0001
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		
USB Cable 9	Brand Name	Huawei Technologies Co., Ltd.	Model Name	CUBB01M-HC304-DH
	Signal Line	1.0 meter, non-shielded cable, without ferrite core		

1.6 Modification of EUT

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



1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	TH01-KS	CN5013	630927

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	TH01-SZ CO01-SZ	CN5018	337463

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH01-SZ	CN5019	577730



1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 15 Subpart C §15.247
- ♦ FCC KDB 558074 D01 15.247 Meas Guidance v05
- ♦ 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 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
20	2442	-	-	



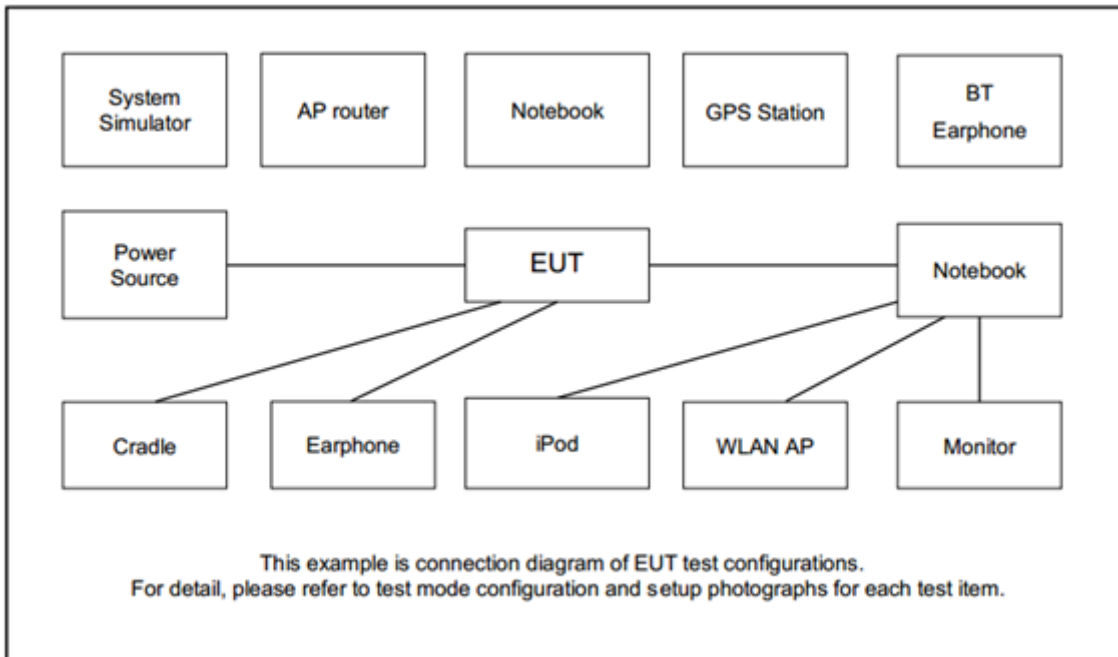
2.2 Test Mode

- 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 emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst case (Z plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

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 LE / GFSK
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1 : GSM1900 Idle + Bluetooth Link + WLAN Link + USB Cable 1(Charging from Adapter 1) + Battery 1 + Earphone + SIM 1
Remark: For Radiated Test Cases, The tests were performed with Adapter 4, USB Cable 9 and Earphone.	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded, 1.8m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
5.	Earphone	Apple	MC690ZP/A	N/A	Shielded, 1.0m	N/A

2.5 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT 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 Output Power Measurement

3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

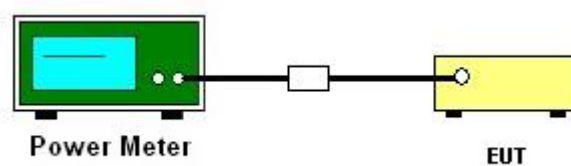
3.1.2 Measuring Instruments

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 the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 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 LE	Temperature :	21~25°C
Test Engineer :	Silent Hai	Relative Humidity :	49~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	-2.49	30.00	Pass
19	2440	-1.41	30.00	Pass
39	2480	-1.64	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 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.

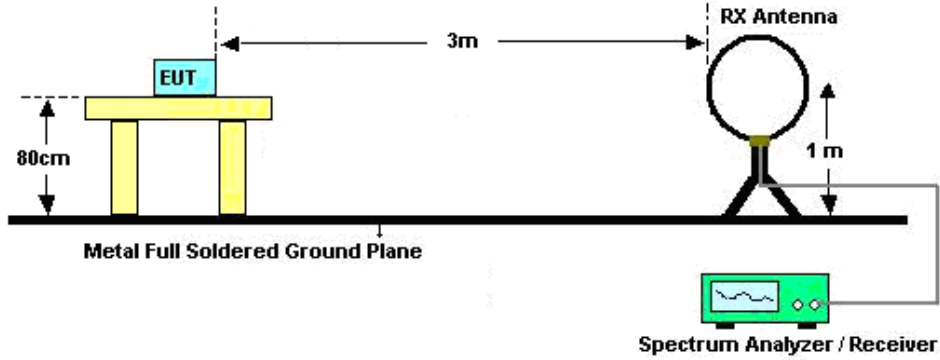


3.2.3 Test Procedures

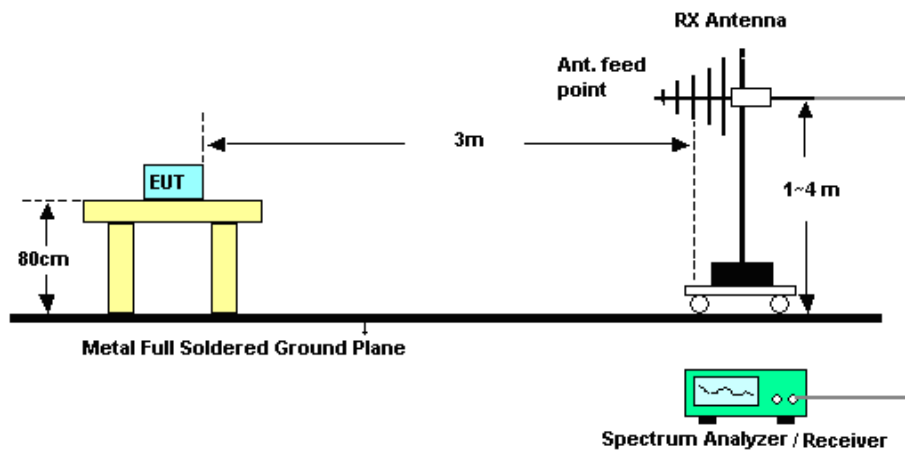
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. 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; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, 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.

3.2.4 Test Setup

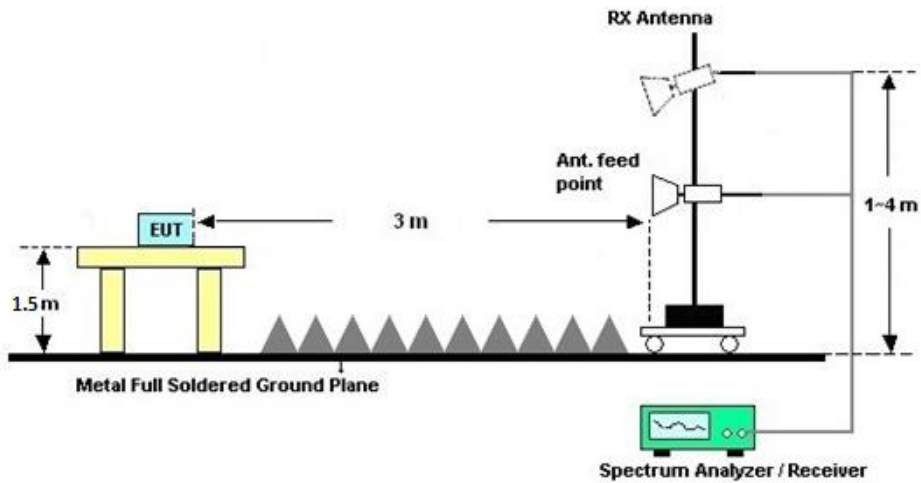
For radiated emissions below 30MHz



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 was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.2.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.



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.

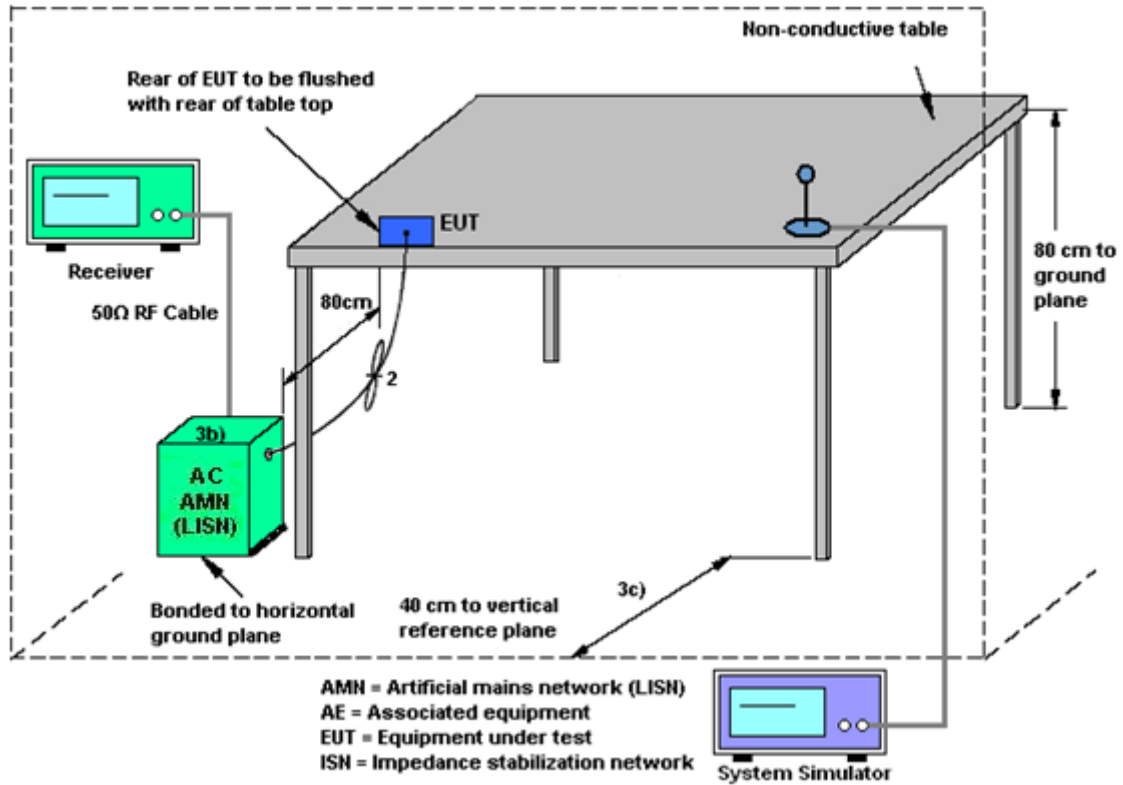
3.3.2 Measuring Instruments

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

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



3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



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 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
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Jan. 21, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Jan. 21, 2019	Jan. 13, 2020	Conducted (TH01-KS)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Aug. 30, 2018	Jan. 10, 2019~Jan. 28, 2019	Aug. 29, 2019	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 29, 2018	Jan. 10, 2019~Jan. 28, 2019	May 29, 2020	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Jun. 05, 2018	Jan. 10, 2019~Jan. 28, 2019	Jun. 04, 2019	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	119436	1GHz~18GHz	Jun. 28, 2018	Jan. 10, 2019~Jan. 28, 2019	Jun. 27, 2019	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Mar. 30, 2018	Jan. 10, 2019~Jan. 28, 2019	Mar. 29, 2019	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 20, 2018	Jan. 10, 2019~Jan. 28, 2019	Apr. 19, 2019	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1707137	1GHz~18GHz	Oct. 19, 2018	Jan. 10, 2019~Jan. 28, 2019	Oct. 18, 2019	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270104	0.5GHz~26.5GHz	Dec. 26, 2018	Jan. 10, 2019~Jan. 28, 2019	Dec. 25, 2019	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 17, 2018	Jan. 10, 2019~Jan. 28, 2019	Jul. 16, 2019	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jan. 10, 2019~Jan. 28, 2019	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 10, 2019~Jan. 28, 2019	NCR	Radiation (03CH01-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Jan. 10, 2019~Jan. 28, 2019	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 23, 2018	Jan. 25, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 18, 2018	Jan. 25, 2019	Oct. 17, 2019	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Dec. 23, 2018	Jan. 25, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 18, 2018	Jan. 25, 2019	Jul. 17, 2019	Conduction (CO01-SZ)

NCR: No Calibration Required



5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.6dB
---------------------------------------------------------------------	-------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8dB
---------------------------------------------------------------------	-------

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

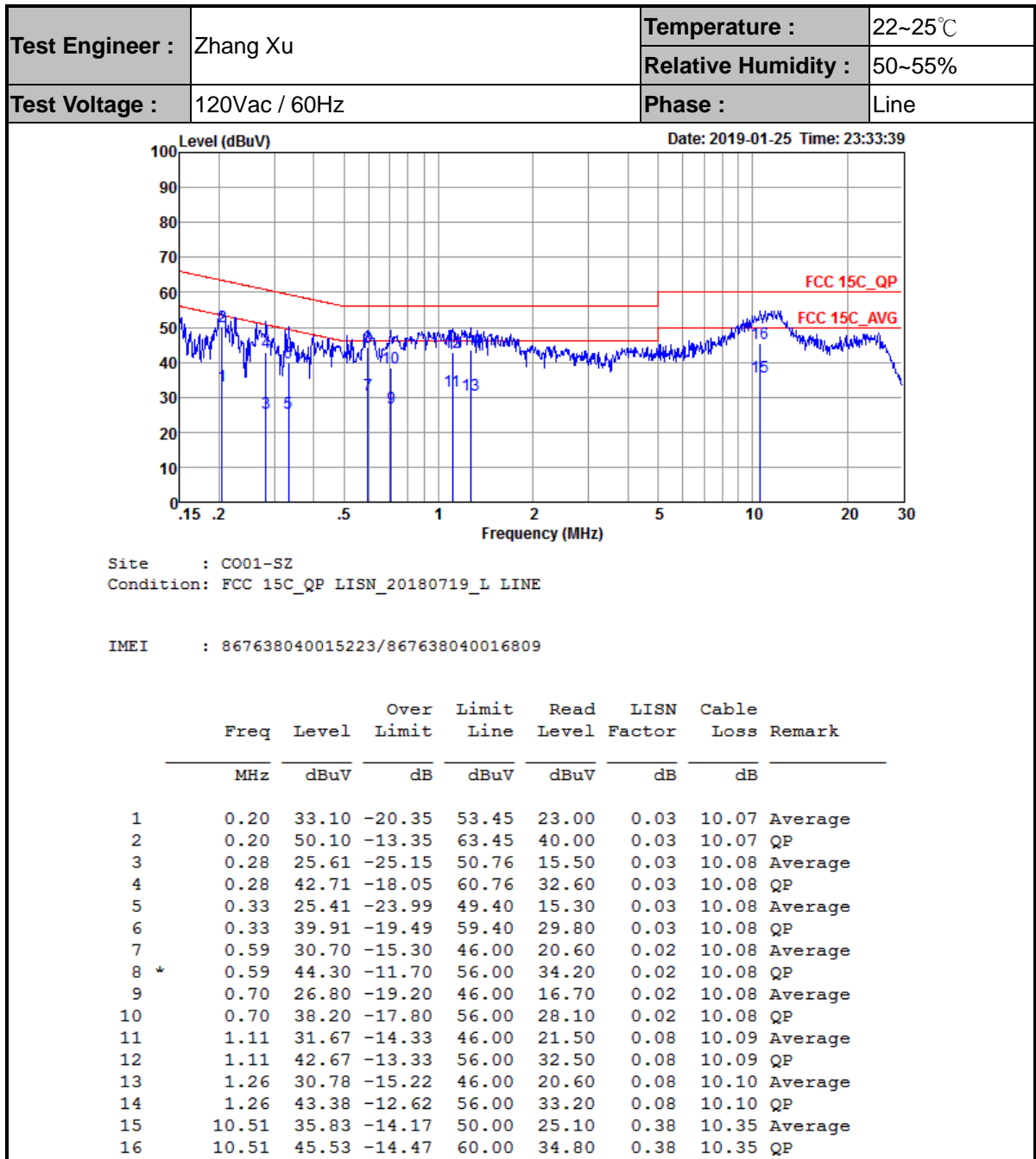
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
---------------------------------------------------------------------	-------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.3dB
---------------------------------------------------------------------	-------

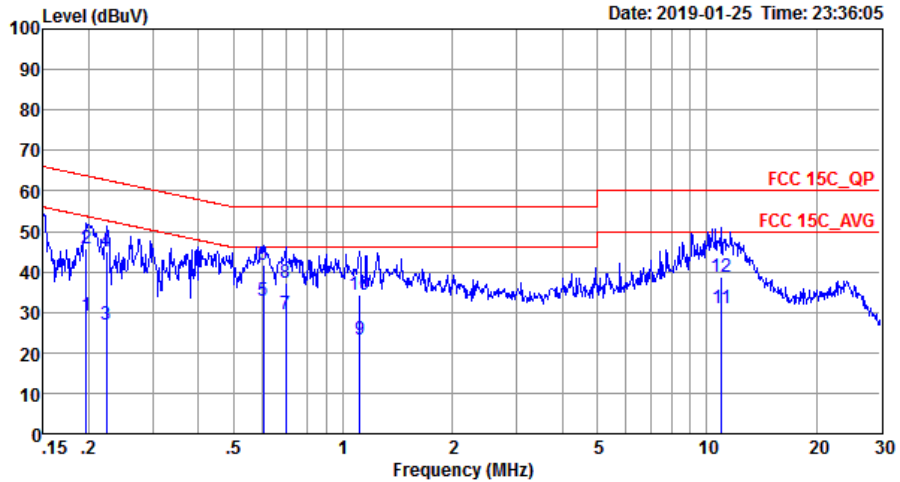


Appendix A. AC Conducted Emission Test Results





Test Engineer :	Zhang Xu	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-SZ
 Condition: FCC 15C_QP LISN_20180719_N NEUTRAL

IMEI : 867638040015223/867638040016809

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.20	29.10	-24.66	53.76	19.00	0.03	10.07	Average
2	0.20	45.60	-18.16	63.76	35.50	0.03	10.07	QP
3	0.22	27.00	-25.70	52.70	16.90	0.03	10.07	Average
4	0.22	44.90	-17.80	62.70	34.80	0.03	10.07	QP
5 *	0.60	33.00	-13.00	46.00	22.90	0.02	10.08	Average
6	0.60	41.60	-14.40	56.00	31.50	0.02	10.08	QP
7	0.70	29.40	-16.60	46.00	19.30	0.02	10.08	Average
8	0.70	37.20	-18.80	56.00	27.10	0.02	10.08	QP
9	1.11	23.34	-22.66	46.00	13.20	0.05	10.09	Average
10	1.11	34.44	-21.56	56.00	24.30	0.05	10.09	QP
11	10.96	31.15	-18.85	50.00	20.60	0.20	10.35	Average
12	10.96	38.65	-21.35	60.00	28.10	0.20	10.35	QP



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		2386.02	51.63	-22.37	74	46.32	31.5	6.81	33	145	309	P	H
		2356.52	42.01	-11.99	54	36.74	31.54	6.73	33	145	309	A	H
	*	2402	89.71	15.71	74	84.4	31.5	6.81	33	145	309	P	H
	*	2402	88.91	34.91	54	83.6	31.5	6.81	33	145	309	A	H
		2339.93	50.79	-23.21	74	45.59	31.55	6.65	33	100	86	P	V
		2387.91	41.93	-12.07	54	36.62	31.5	6.81	33	100	86	A	V
	*	2402	93.61	19.61	74	88.3	31.5	6.81	33	100	86	P	V
	*	2402	93.08	39.08	54	87.77	31.5	6.81	33	100	86	A	V
BLE CH 19 2440MHz		2340.1	51.02	-22.98	74	45.82	31.55	6.65	33	149	305	P	H
		2336.6	42.13	-11.87	54	36.93	31.55	6.65	33	149	305	A	H
	*	2440	90.27	16.27	74	84.7	31.71	6.86	33	149	305	P	H
	*	2440	89.75	35.75	54	84.18	31.71	6.86	33	149	305	A	H
		2483.76	51.76	-22.24	74	45.99	31.86	6.91	33	149	305	P	H
		2491.32	42.6	-11.4	54	36.76	31.93	6.91	33	149	305	A	H
		2333.66	51.2	-22.8	74	45.98	31.57	6.65	33	126	131	P	V
		2389.52	41.92	-12.08	54	36.61	31.5	6.81	33	126	131	A	V
	*	2440	94.61	20.61	74	89.04	31.71	6.86	33	126	131	P	V
	*	2440	93.79	39.79	54	88.22	31.71	6.86	33	126	131	A	V
		2487.05	52.46	-21.54	74	46.69	31.86	6.91	33	126	131	P	V
		2498.25	42.91	-11.09	54	37.07	31.93	6.91	33	126	131	A	V



BLE CH 39 2480MHz	*	2480	89.63	15.63	74	83.86	31.86	6.91	33	159	351	P	H
	*	2480	88.89	34.89	54	83.12	31.86	6.91	33	159	351	A	H
		2497.8	51.73	-22.27	74	45.89	31.93	6.91	33	159	351	P	H
		2493.08	42.72	-11.28	54	36.88	31.93	6.91	33	159	351	A	H
	*	2480	92.81	18.81	74	87.04	31.86	6.91	33	106	105	P	V
	*	2480	92.3	38.3	54	86.53	31.86	6.91	33	106	105	A	V
		2485.4	51.24	-22.76	74	45.47	31.86	6.91	33	106	105	P	V
		2495.4	42.5	-11.5	54	36.66	31.93	6.91	33	106	105	A	V
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. 												



2.4GHz 2400~2483.5MHz
BLE (Harmonic @ 3m)

Table with 14 columns: 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). Rows include BLE CH 00 (2402MHz) and BLE CH 19 (2440MHz) and BLE CH 39 (2480MHz).



Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		30	26.55	-13.45	40	33.22	24.4	0.23	31.3	154	194	P	H
		60.07	19.24	-20.76	40	37.85	12.5	0.49	31.6	-	-	P	H
		95.96	19.84	-23.66	43.5	34.74	15.9	0.8	31.6	-	-	P	H
		152.22	27.49	-16.01	43.5	41.03	16.53	1.32	31.39	-	-	P	H
		751.68	30.21	-15.79	46	32.28	25.57	3.47	31.11	-	-	P	H
		999.03	31.79	-22.21	54	31.41	27.39	4.2	31.21	-	-	P	H
		30	30.38	-9.62	40	37.05	24.4	0.23	31.3	-	-	P	V
		43.58	32.04	-7.96	40	46.16	16.96	0.42	31.5	164	187	P	V
		58.13	27.84	-12.16	40	46.13	12.82	0.49	31.6	-	-	P	V
		95.96	23.93	-19.57	43.5	38.83	15.9	0.8	31.6	-	-	P	V
		160.95	24.03	-19.47	43.5	38.07	15.96	1.38	31.38	-	-	P	V
		939.86	32.06	-13.94	46	32.63	26.86	3.92	31.35	-	-	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	Peak or Average
H/V	Horizontal or Vertical



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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		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. Radiated Spurious Emission Plots

Note symbol

-L	Low channel location
-R	High channel location



2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak		
Avg.		



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak		
Avg		



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak	<p>Site : 03CH01-SZ Condition : PEAK_08_74 3m HP_ANT(3117)_110436 VERTICAL</p>	<p>Site : 03CH01-SZ Condition : PEAK_74 3m HP_ANT(3117)_110436 VERTICAL</p>
Avg.	<p>Site : 03CH01-SZ Condition : AVG_08_54 3m HP_ANT(3117)_110436 VERTICAL</p>	<p>Site : 03CH01-SZ Condition : AVG_54 3m HP_ANT(3117)_110436 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak	<p>Site : 030101-SZ Condition : PEAK_BE_74 3m HP_ANT(3117)_119436 VERTICAL</p>	
Avg.	<p>Site : 030101-SZ Condition : AVG_BE_54 3m HP_ANT(3117)_119436 VERTICAL</p>	



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CMB1-SZ Condition : PEAK_BE_74 3m HP_ANT(3117)_119436 HORIZONTAL</p>	<p>Site : 03CMB1-SZ Condition : PEAK_74 3m HP_ANT(3117)_119436 HORIZONTAL</p>
Avg.	<p>Site : 03CMB1-SZ Condition : AVG_BE_54 3m HP_ANT(3117)_119436 HORIZONTAL</p>	<p>Site : 03CMB1-SZ Condition : AVG_54 3m HP_ANT(3117)_119436 HORIZONTAL</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak	<p>Site : @SCH01-SZ Condition : PEAK_BE_74 3m HP_ANT(3117)_119436 VERTICAL</p>	<p>Site : @SCH01-SZ Condition : PEAK_74 3m HP_ANT(3117)_119436 VERTICAL</p>
Avg.	<p>Site : @SCH01-SZ Condition : AVG_BE_54 3m HP_ANT(3117)_119436 VERTICAL</p>	<p>Site : @SCH01-SZ Condition : AVG_54 3m HP_ANT(3117)_119436 VERTICAL</p>



2.4GHz 2400~2483.5MHz
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CM01-SZ Condition : PEAK_74 3m HF_ANT(3117)_119436 HORIZONTAL</p>	<p>Site : 03CM01-SZ Condition : PEAK_74 3m HF_ANT(3117)_119436 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 83CH01-SZ Condition : PEAK_74 3m HF_ANT(3117)_119436 HORIZONTAL</p>	<p>Site : 83CH01-SZ Condition : PEAK_74 3m HF_ANT(3117)_119436 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	<p>Site : 03CM1-SZ Condition : PEAK_74 3m HP_ANT(31317)_119436 HORIZONTAL</p>	<p>Site : 03CM1-SZ Condition : PEAK_74 3m HP_ANT(31317)_119436 VERTICAL</p>



Emission below 1GHz
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
1	Horizontal	Vertical
QP / Peak	<p>Site Condition : 03CM01-SZ : FCC CLASS-B 3m LF_ANT(35480)_6 HORIZONTAL</p>	<p>Site Condition : 03CM01-SZ : FCC CLASS-B 3m LF_ANT(35480)_6 VERTICAL</p>



Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE	61.11	0.383	2.614	3kHz

Bluetooth LE

