



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT1920DL
FCC ID : IHDT56XF2
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

This is a data re-used report which is only valid together with the original test report. The product was received on Mar. 23, 2018 and testing was completed on Apr. 10, 2018. 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
FR832306B	Rev. 01	Initial issue of report	May 09, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	1
-	-	99% Bandwidth	-	Pass	1
3.1	15.247(b)(3)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
-	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	1
-	15.247(d)	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	1
3.2	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 14.32 dB at 821.520 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 14.90 dB at 0.590 MHz
3.4	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

Remark: 1. All conducted related test items refer to Sporton report No.FR7D1310B.



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	XT1920DL
FCC ID	IHDT56XF2
EUT supports Radios application	CDMA/EVDO/GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth v3.0 + EDR/Bluetooth v4.0 LE Bluetooth v4.1 LE / Bluetooth v4.2 LE
IMEI/MEID Code	Conducted: NA Radiation: 35413209000676 Conduction: 354132090007199
HW Version	DVT1B
SW Version	OPP28.1
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	2.24 dBm (0.0017 W)
Antenna Type / Gain	IFA Antenna with gain 1.50 dBi
Type of Modulation	Bluetooth LE : GFSK

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter 1	Brand Name	Motorola (Acbel)	Model Name	C-P35 SPN5945A
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
AC Adapter 2	Brand Name	Motorola (Salom)	Model Name	SSW-2919UMTJ C-P35 SPN5945A
	Power Rating	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc,2000mA		
Battery	Brand Name	Motorola (SCUD)	Model Name	BL270
	Power Rating	3.85Vdc,4000mAh	Type	Li-ion, ATL426580
USB Cable	Brand Name	Motorola (Saibao)	Model Name	SLQ-A077A
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		



1.6 Re-use of Measured Data

1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT1920DL, FCC ID: IHDT56XF2) is electrically identical to the reference device: (Model: XT1922-6, XT1922-7, XT1922-9, FCC ID: IHDT56XB1) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix D (Sporton RF Report No. FR7D1310B for the reference device Model: XT1922-6, XT1922-7, XT1922-9, FCC ID: IHDT56XB1):

1.6.3 Spot Check Verification Data Section

For conducted test items, 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, conducted-Bandedge , the test result were consistent with FCC ID: IHDT56XB1 and RSE/Conduction 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.

1.6.4 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
DSS	IHDT56XB1	Part15C(FR7D1310A)	All conducted sections(except Conducted Power) applicable
DTS	IHDT56XB1	Part15C(FR7D1310B)	All conducted sections(except Conducted Power) applicable
DTS	IHDT56XB1	Part15C(FR7D1310C)	All conducted sections(except Conducted Power) applicable



1.7 Modification of EUT

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

1.8 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

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 Test Firm Registration No.
	TH01-SZ	CO01-SZ	251365

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 Test Firm Registration No.
	03CH04-SZ		577730

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
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- ♦ 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

The RF output power was recorded in the following table:

Channel	Frequency	Bluetooth LE RF Output Power
		Data Rate / Modulation
		GFSK
		1Mbps
Ch00	2402MHz	2.05 dBm
Ch19	2440MHz	2.24 dBm
Ch39	2480MHz	1.60 dBm

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (Z plane as worst plane) from all possible combinations.
- b. AC power line Conducted Emission was tested under maximum output power.

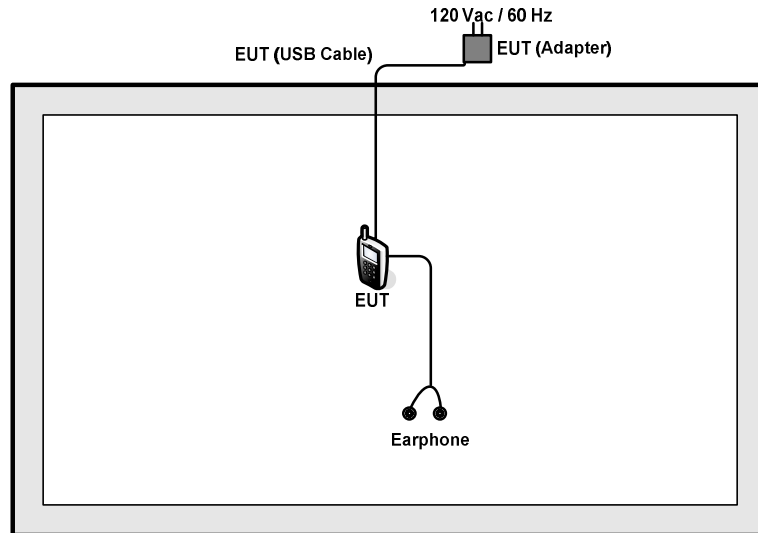
2.2 Test Mode

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

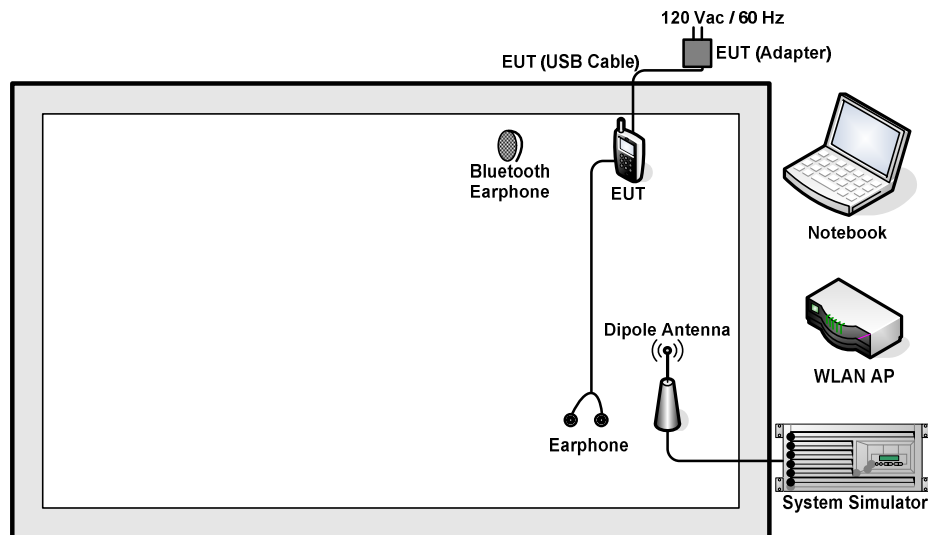
Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1 : WCDMA Band II Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter 2) + Earphone + Camera(Front) + SD card load

2.3 Connection Diagram of Test System

<Bluetooth LE Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
5.	Earphone	MOTO	Ashley ROW	N/A	Unshielded, 1.2m	N/A
6.	SD Card	N/A	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

For Bluetooth LE 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 Peak Output Power Measurement

3.1.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna 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.

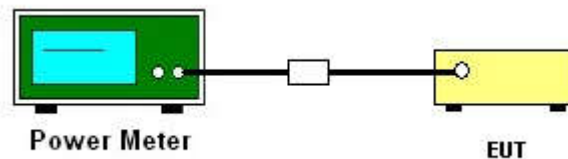
3.1.2 Measuring Instruments

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 FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.1.4 Test Setup



3.2 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

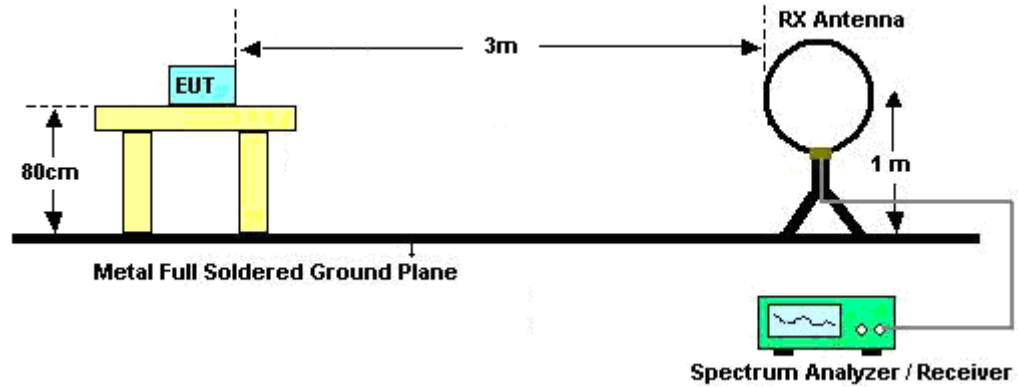
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ 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:

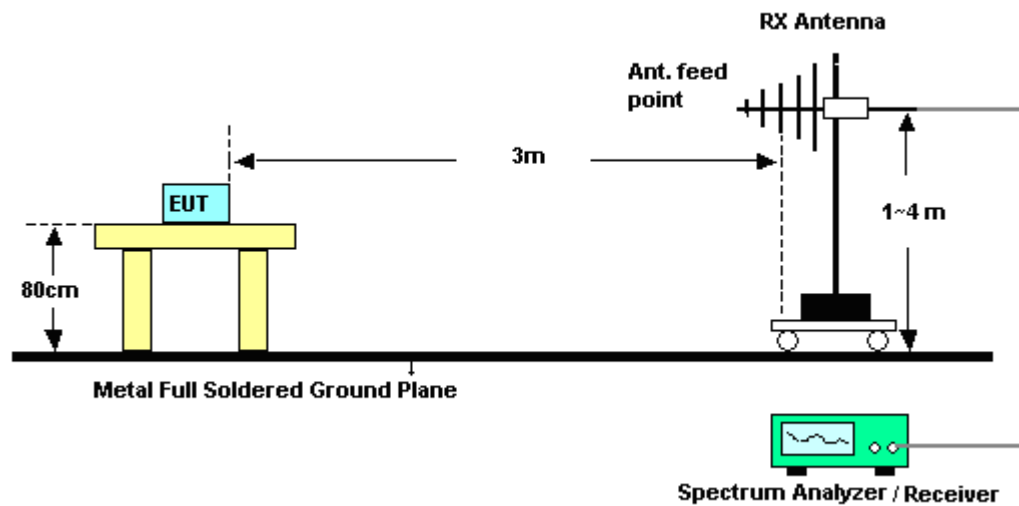
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.2.4 Test Setup

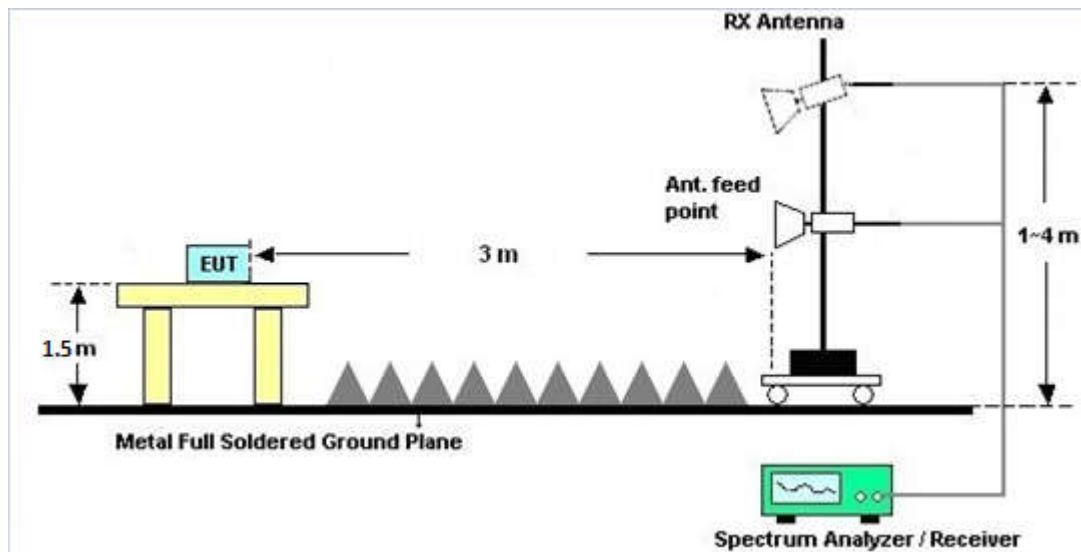
For radiated emissions below 30MHz



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.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

3.2.7 Duty Cycle

Please refer to Appendix B.

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 (dB μ V)	
	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.

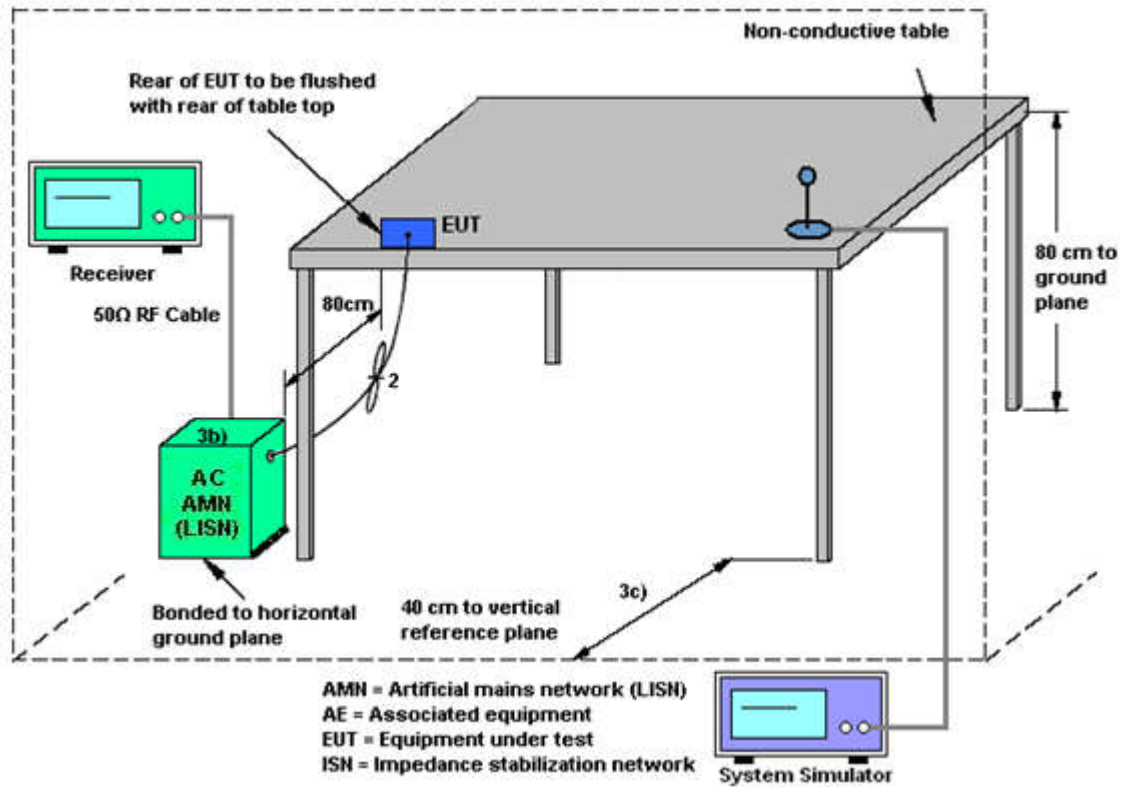
3.3.2 Measuring Instruments

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.

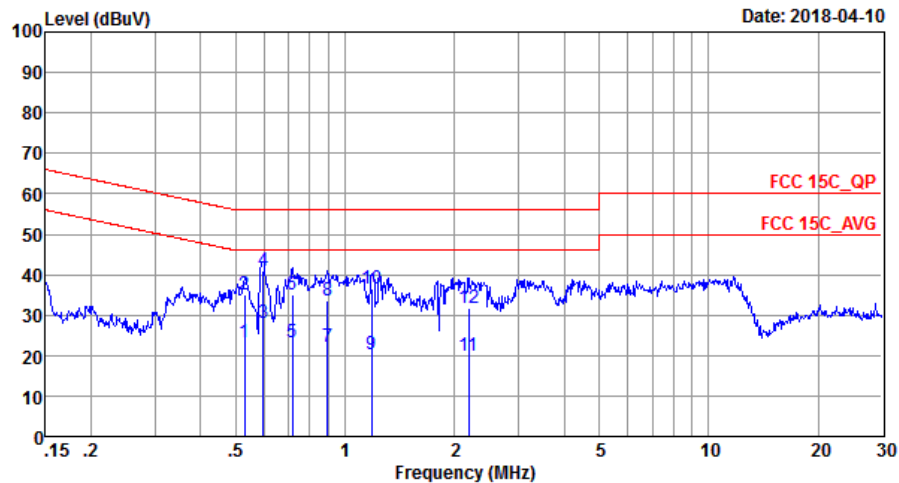
3.3.4 Test Setup





3.3.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~25°C
Test Engineer :	Lion Gao	Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter 2) + Earphone + Camera(Front) + SD card load		

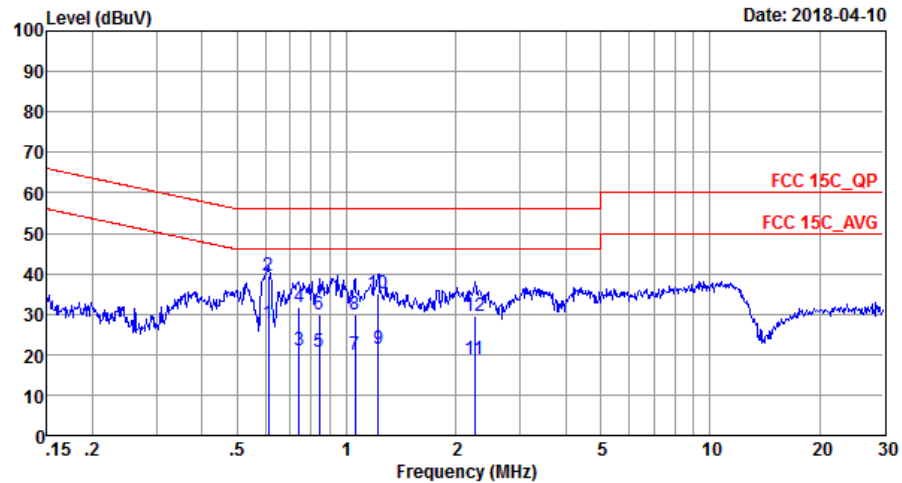


Site : C001-SZ
Condition: FCC 15C_QP LISN_20170907_L LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.53	23.30	-22.70	46.00	13.20	0.02	10.08	Average
2	0.53	34.90	-21.10	56.00	24.80	0.02	10.08	QP
3	0.59	28.10	-17.90	46.00	18.00	0.02	10.08	Average
4 *	0.59	41.10	-14.90	56.00	31.00	0.02	10.08	QP
5	0.72	23.10	-22.90	46.00	13.00	0.02	10.08	Average
6	0.72	35.00	-21.00	56.00	24.90	0.02	10.08	QP
7	0.89	22.14	-23.86	46.00	12.00	0.05	10.09	Average
8	0.89	33.74	-22.26	56.00	23.60	0.05	10.09	QP
9	1.18	20.37	-25.63	46.00	10.20	0.08	10.09	Average
10	1.18	36.57	-19.43	56.00	26.40	0.08	10.09	QP
11	2.19	19.84	-26.16	46.00	9.60	0.12	10.12	Average
12	2.19	31.74	-24.26	56.00	21.50	0.12	10.12	QP



Test Mode :	Mode 1	Temperature :	22~25°C
Test Engineer :	Lion Gao	Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter 2) + Earphone + Camera(Front) + SD card load		



Site : C001-SZ
Condition: FCC 15C QP LISN 20170907_N NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.61	27.50	-18.50	46.00	17.40	0.02	10.08	Average
2 *	0.61	39.30	-16.70	56.00	29.20	0.02	10.08	QP
3	0.74	21.01	-24.99	46.00	10.91	0.02	10.08	Average
4	0.74	31.71	-24.29	56.00	21.61	0.02	10.08	QP
5	0.84	20.82	-25.18	46.00	10.69	0.04	10.09	Average
6	0.84	29.82	-26.18	56.00	19.69	0.04	10.09	QP
7	1.05	19.84	-26.16	46.00	9.70	0.05	10.09	Average
8	1.05	29.84	-26.16	56.00	19.70	0.05	10.09	QP
9	1.22	21.24	-24.76	46.00	11.10	0.05	10.09	Average
10	1.22	35.14	-20.86	56.00	25.00	0.05	10.09	QP
11	2.25	18.96	-27.04	46.00	8.80	0.04	10.12	Average
12	2.25	29.66	-26.34	56.00	19.50	0.04	10.12	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 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	1207253	30MHz~40GHz	Dec. 26, 2017	Mar. 30, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Mar. 30, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 20, 2017	Apr. 10, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 20, 2017	Apr. 10, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2017	Apr. 10, 2018	May 13, 2018	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 16, 2017	Apr. 10, 2018	May 15, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Apr. 10, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	May 17, 2017	Apr. 10, 2018	May 16, 2018	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz~3000MHz	Oct. 19, 2017	Apr. 10, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	Apr. 10, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 27, 2017	Apr. 10, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 20, 2017	Apr. 10, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Apr. 10, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Apr. 10, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Apr. 10, 2018	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	Apr. 10, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	Apr. 10, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	Apr. 10, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	Apr. 10, 2018	Jul. 18, 2018	Conduction (CO01-SZ)

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% ($U = 2U_c(y)$)	2.6dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.1dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.8dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.1dB
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Appendix A. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2389.275	46.36	-27.64	74	42.36	27.7	4.78	28.48	118	62	P	H
		2389.8	36.58	-17.42	54	32.46	27.7	4.78	28.36	118	62	A	H
	*	2402	88.3	-	-	84.18	27.7	4.78	28.36	118	62	P	H
	*	2402	86.77	-	-	82.65	27.7	4.78	28.36	118	62	A	H
		2378.565	46.29	-27.71	74	42.33	27.72	4.72	28.48	113	75	P	V
		2387.805	36.48	-17.52	54	32.48	27.7	4.78	28.48	113	75	A	V
	*	2402	91.78	-	-	87.66	27.7	4.78	28.36	113	75	P	V
	*	2402	89.29	-	-	85.17	27.7	4.78	28.36	113	75	A	V
BLE CH 19 2440MHz		2389.24	46.24	-27.76	74	42.24	27.7	4.78	28.48	118	64	P	H
		2389.24	36.62	-17.38	54	32.62	27.7	4.78	28.48	118	64	A	H
	*	2440	91.76	-	-	87.52	27.66	4.82	28.24	118	64	P	H
	*	2440	89.08	-	-	84.84	27.66	4.82	28.24	118	64	A	H
		2497.69	47.11	-26.89	74	42.55	27.61	4.85	27.9	118	64	P	H
		2488.52	37.34	-16.66	54	32.89	27.61	4.85	28.01	118	64	A	H
		2367.12	46.99	-27.01	74	43.01	27.74	4.72	28.48	110	75	P	V
		2385.88	36.63	-17.37	54	32.63	27.7	4.78	28.48	110	75	A	V
	*	2440	93.48	-	-	89.24	27.66	4.82	28.24	110	75	P	V
	*	2440	91.97	-	-	87.73	27.66	4.82	28.24	110	75	A	V
		2494.61	46.79	-27.21	74	42.23	27.61	4.85	27.9	110	75	P	V
		2495.17	37.29	-16.71	54	32.73	27.61	4.85	27.9	110	75	A	V



BLE CH 39 2480MHz	*	2480	88.52	-	-	84.05	27.63	4.85	28.01	284	60	P	H
	*	2480	87.94	-	-	83.47	27.63	4.85	28.01	284	60	A	H
		2496.12	46.69	-27.31	74	42.13	27.61	4.85	27.9	284	60	P	H
		2487.72	37.16	-16.84	54	32.71	27.61	4.85	28.01	284	60	A	H
	*	2480	91.61	-	-	87.14	27.63	4.85	28.01	124	75	P	V
	*	2480	89.99	-	-	85.52	27.63	4.85	28.01	124	75	A	V
		2484.6	47.05	-26.95	74	42.58	27.63	4.85	28.01	124	75	P	V
		2483.52	37.2	-16.8	54	32.73	27.63	4.85	28.01	124	75	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	39.02	-34.98	74	59.97	31.72	5.55	58.22	151	219	P	H
		4804	38.09	-35.91	74	59.32	31.44	5.55	58.22	151	219	P	V
BLE CH 19 2440MHz		4880	37.91	-36.09	74	58.48	31.88	5.65	58.1	150	258	P	H
		7320	45.81	-28.19	74	59.48	36.94	7.26	57.87	152	309	P	H
		4880	38.4	-35.6	74	59.24	31.61	5.65	58.1	164	214	P	V
		7320	44.74	-29.26	74	59.16	36.19	7.26	57.87	168	336	P	V
BLE CH 39 2480MHz		4960	39.24	-34.76	74	59.16	32.08	5.96	57.96	118	289	P	H
		7440	45.71	-28.29	74	58.63	37.4	7.17	57.49	158	273	P	H
		4960	38.88	-35.12	74	59.06	31.82	5.96	57.96	120	269	P	V
		7440	44.29	-29.71	74	58.27	36.34	7.17	57.49	184	278	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		30	24.01	-15.99	40	30.83	24.9	0.25	31.97	-	-	P	H
		158.04	19.04	-24.46	43.5	32.75	16.51	1.29	31.51	-	-	P	H
		252.13	20.83	-25.17	46	31.05	19.3	1.72	31.24	-	-	P	H
		345.25	24.17	-21.83	46	32.76	20.54	2.08	31.21	-	-	P	H
		482.99	25.53	-20.47	46	30.76	23.64	2.38	31.25	-	-	P	H
		821.52	31.68	-14.32	46	30.98	28.67	3.2	31.17	100	61	P	H
		39.7	22.74	-17.26	40	34.12	20.2	0.4	31.98	-	-	P	V
		264.74	21.62	-24.38	46	31.03	20.07	1.75	31.23	-	-	P	V
		380.17	24.1	-21.9	46	31.75	21.41	2.14	31.2	-	-	P	V
		488.81	26.85	-19.15	46	31.93	23.76	2.4	31.24	-	-	P	V
		786.6	30.88	-15.12	46	30.67	28.26	3.12	31.17	100	85	P	V
		964.11	32.37	-21.63	54	30.14	30.07	3.5	31.34	-	-	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		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)

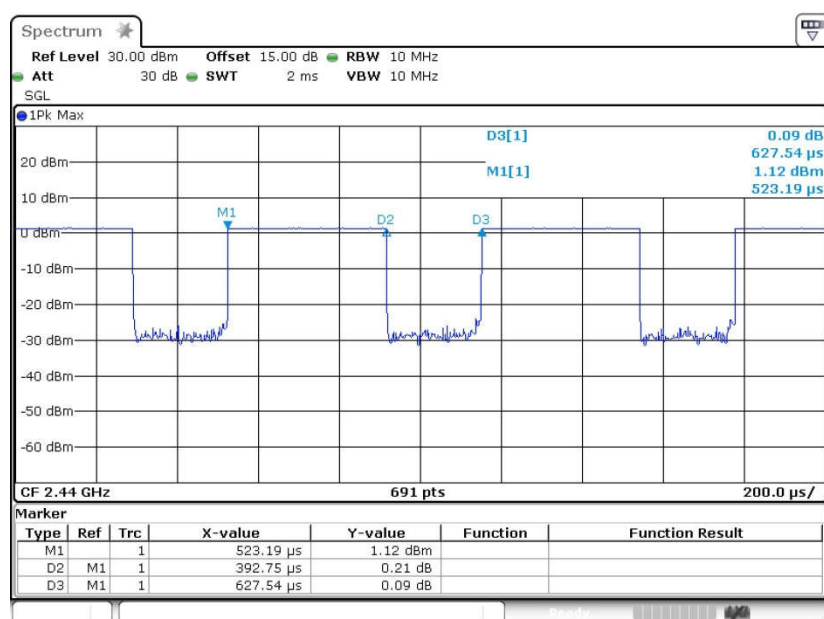
= -10.46(dB)

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

Appendix B. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE	62.59	0.393	2.546	3kHz

Bluetooth LE





Appendix D. Reference Report

Please refer to Sporton report number FR7D1310B which is issued separately.