



FCC RF Test Report

APPLICANT : BYD Precision Manufacture Co., Ltd.
EQUIPMENT : Trident
BRAND NAME : iRobot
MODEL NAME : AXC-Y1
FCC ID : ZW9AXCY1
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on May 29, 2018 and testing was completed on Jun. 16, 2018. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Approved by: James Huang / Manager



Sporton International (Kunshan) Inc.
No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335
China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR852902A	Rev. 01	Initial issue of report	Jun. 22, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
-	-	99% Bandwidth	-	Not Required	-
3.2	15.247(b)(3)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 10.41 dB at 2483.51 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Required	-
3.6	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-
Remark: Not required means after assessing, test items are not necessary to carry out.					

1 General Description

1.1 Applicant

BYD Precision Manufacture Co., Ltd.

No.3001, Bao He Road, Baolong Industry Zone, Longgang, Shenzhen, Guangdong Province, P.R.China

1.2 Manufacturer

Huizhou BYD Electronic Co.,Ltd.

Xiangshui River, Economic Development Zone, Daya Bay, Huizhou, Guangdong Province, P.R.China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Trident
Brand Name	iRobot
Model Name	AXC-Y1
FCC ID	ZW9AXCY1
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40/ Bluetooth v4.0 LE /Bluetooth v4.2 LE
HW Version	Trident LV
SW Version	Trident_00.00.29_20180208
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report for AXC-Y1. The product equality declaration could be referred to Appendix E. Based on the similarity between current and previous project, only the Conducted test items and worst case of Radiated Emission from original test report (Sporton Report Number FR792901-03A) were verified for the differences.

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	2.37 dBm (0.0017 W)
Antenna Type / Gain	Please see Remark 1
Type of Modulation	Bluetooth LE : GFSK

Remark:

1. The antenna provided to the EUT, please refer to the following table.
2. We only evaluate the Antenna of max Gain to test.

Antenna No.	Brand	Model	Gain(dBi)	Antenna Type	Frequency range (GHz to GHz)	Cable length (mm)
1(External)	Laird	EMN2449A 2S-25UFL	3.50	PCB dipole antenna	2.4-2.4835	250
1(External)	Laird	EMN2449A 2S-25UFL	5.75	PCB dipole antenna	5.15-5.25	250
1(External)	Laird	EMN2449A 2S-25UFL	6.26	PCB dipole antenna	5.25-5.35	250
1(External)	Laird	EMN2449A 2S-25UFL	6.24	PCB dipole antenna	5.47-5.725	250
1(External)	Laird	EMN2449A 2S-25UFL	5.18	PCB dipole antenna	5.725-5.85	250

Antenna No.	Brand	Model	Gain(dBi)	Antenna Type	Frequency range (GHz to GHz)	Cable length (mm)
2(External)	Laird	MAF94264	3.33	PCB dipole antenna	2.4-2.4835	80
2(External)	Laird	MAF94264	5.52	PCB dipole antenna	5.15-5.25	80
2(External)	Laird	MAF94264	6.14	PCB dipole antenna	5.25-5.35	80
2(External)	Laird	MAF94264	6.06	PCB dipole antenna	5.47-5.725	80
2(External)	Laird	MAF94264	5.33	PCB dipole antenna	5.725-5.85	80

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.		FCC Test Firm Registration No.
	TH01-KS	03CH02-KS	630927

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

1.7 Applicable Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance 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 Carrier Frequency Channel

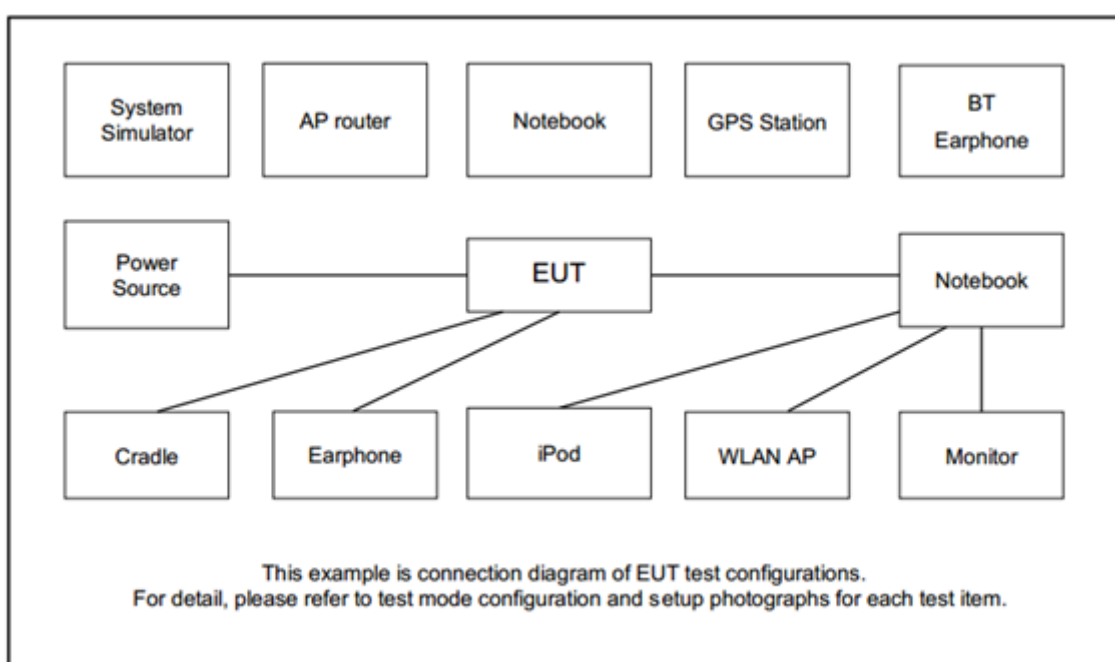
Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	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

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 CH39_2480MHz

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.	Battery	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Dell	Latitude3440	N/A	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
3.	USB Cable	N/A	N/A	N/A	Unshielded, 1.2m	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.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.8 dB.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.8 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

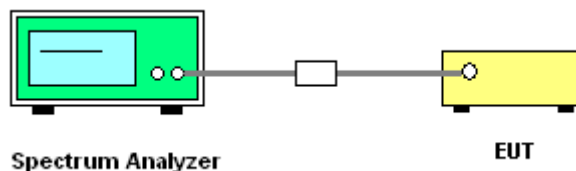
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup

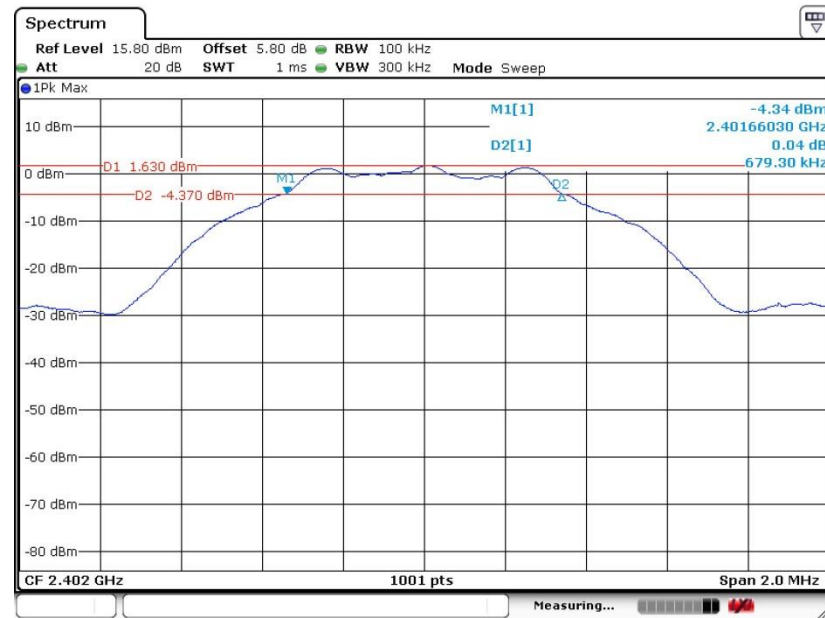




3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

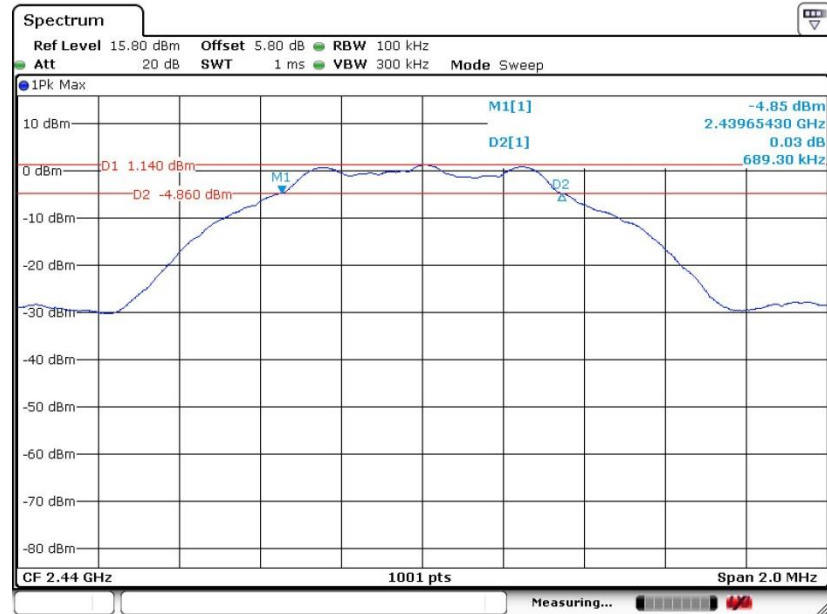
6 dB Bandwidth Plot on Channel 00



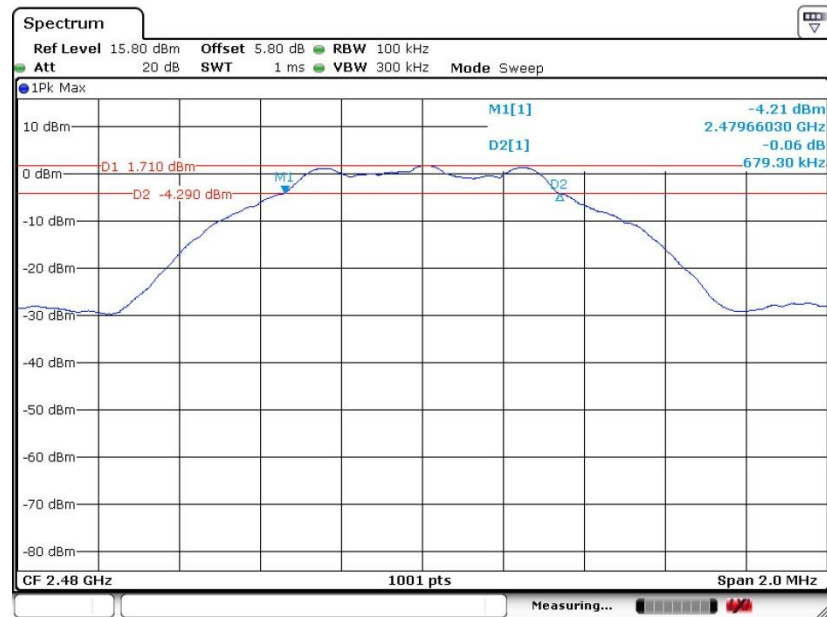
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6 dB Bandwidth Plot on Channel 19



6 dB Bandwidth Plot on Channel 39



3.2 Output Power Measurement

3.2.1 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.

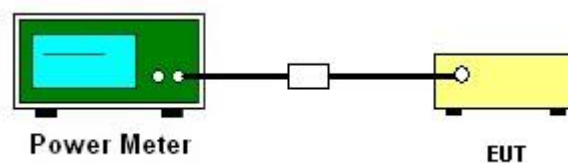
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 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.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

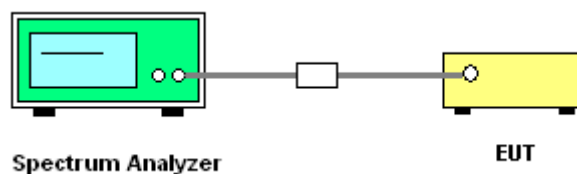
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup



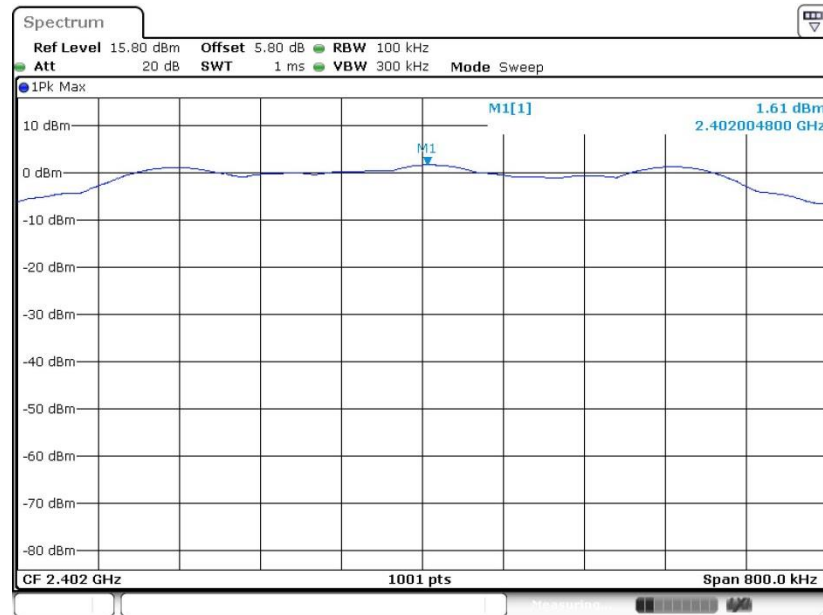
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



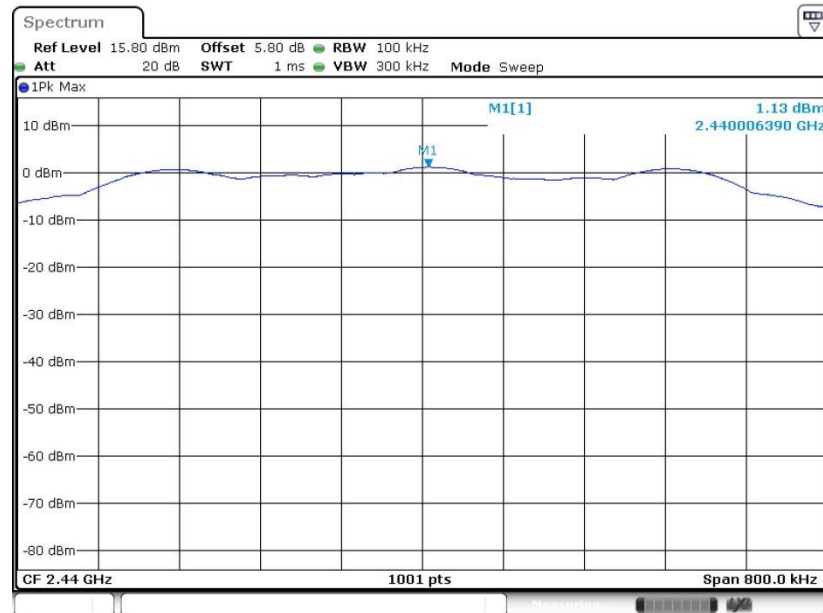
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 00



Date: 5 JUN 2018 11:43:56

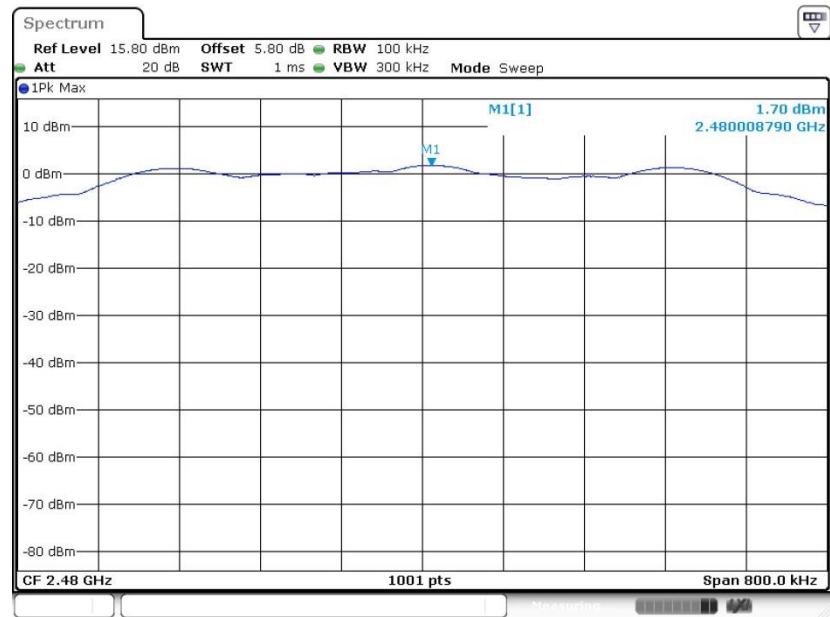
PSD 100kHz Plot on Channel 19



Date: 6 JUN 2018 11:07:52



PSD 100kHz Plot on Channel 39

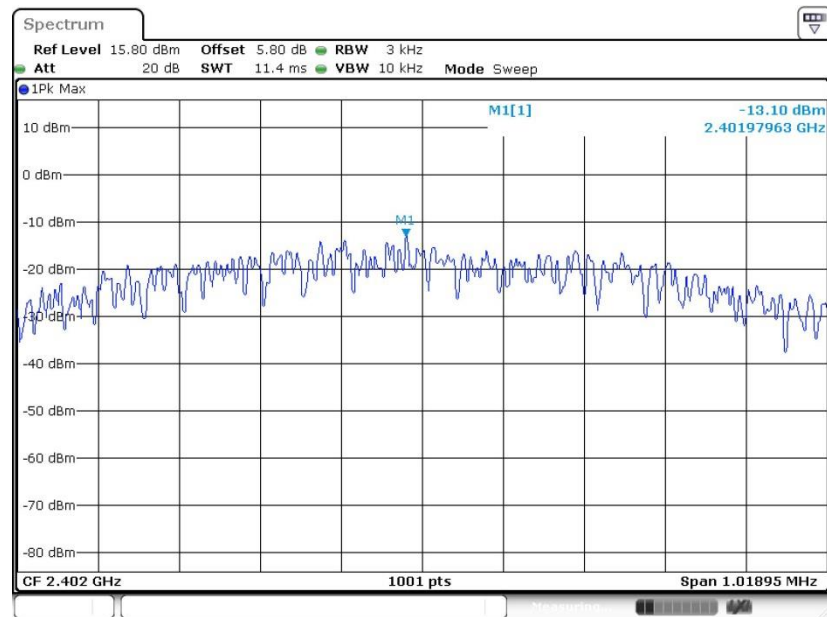


Date: 5 JUN 2018 11:55:33



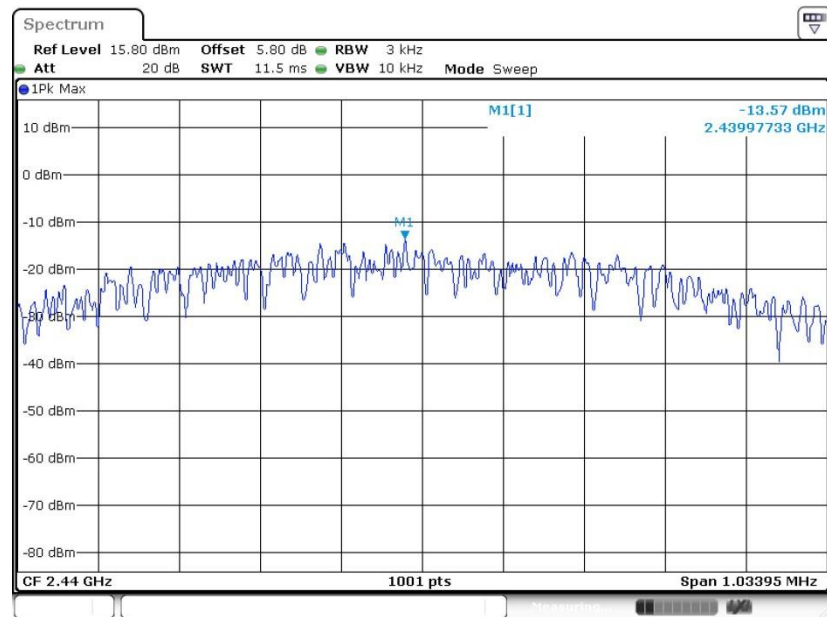
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 00



Date: 5 JUN 2018 11:42:39

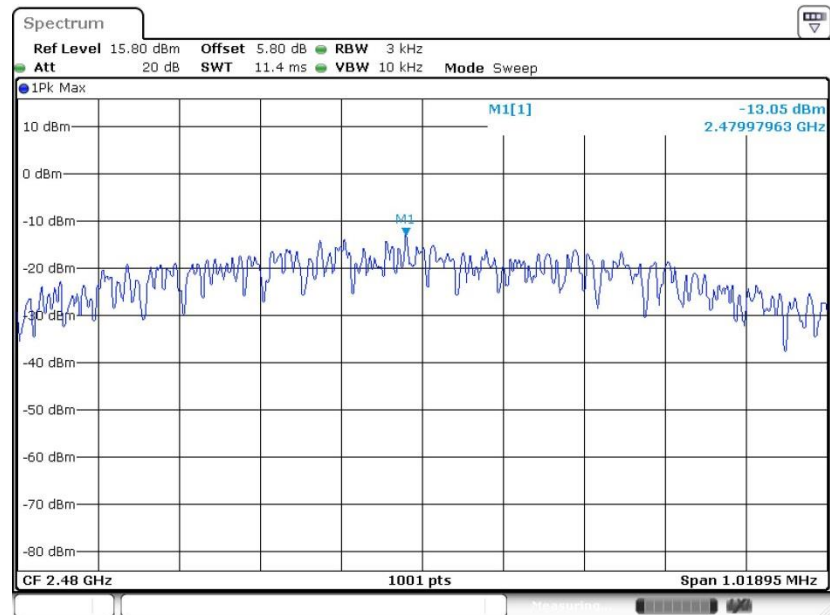
PSD 3kHz Plot on Channel 19



Date: 6 JUN 2018 11:07:32



PSD 3kHz Plot on Channel 39



Date: 5 JUN 2018 11:55:15

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

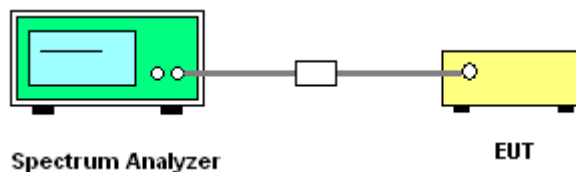
3.4.2 Measuring Instruments

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

3.4.3 Test Procedure

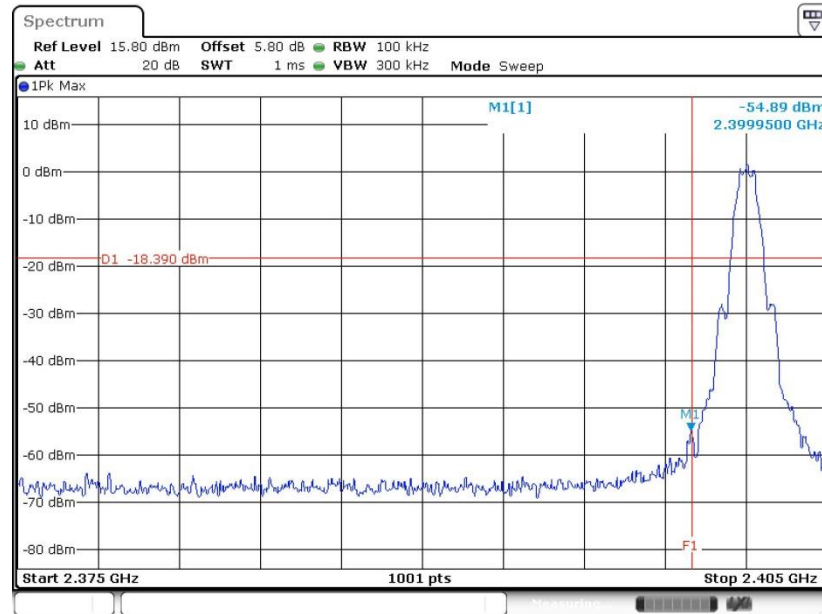
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



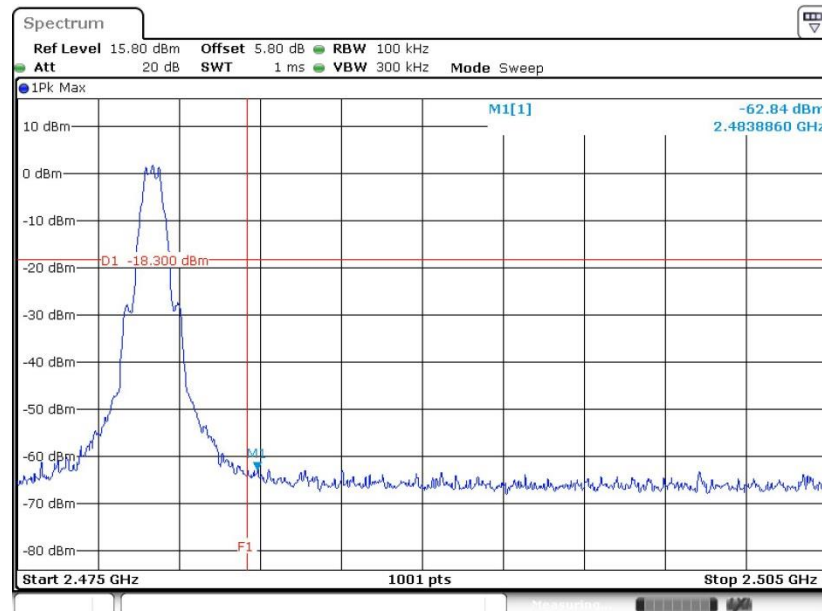
3.4.5 Test Result of Conducted Band Edges Plots

Low Band Edge Plot on Channel 00



Date: 5 JUN 2018 11:45:26

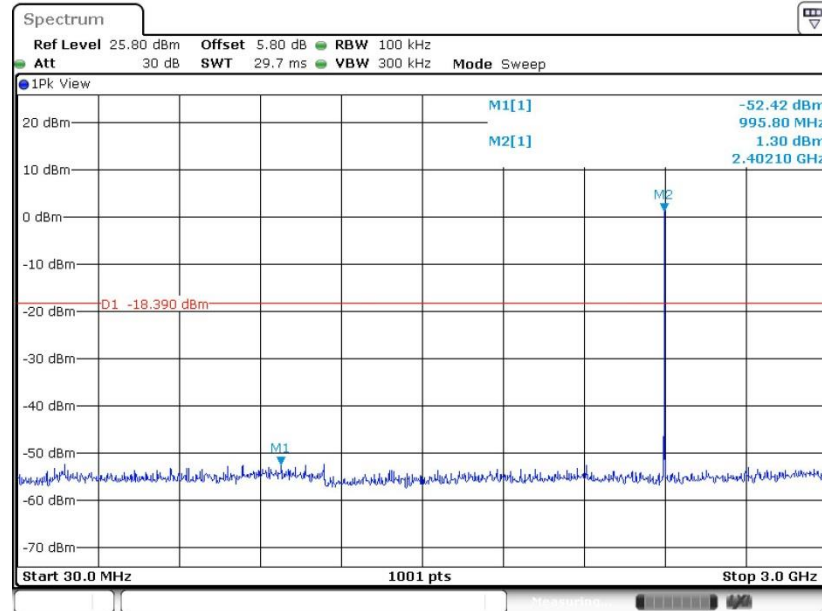
High Band Edge Plot on Channel 39



Date: 5 JUN 2018 11:55:42

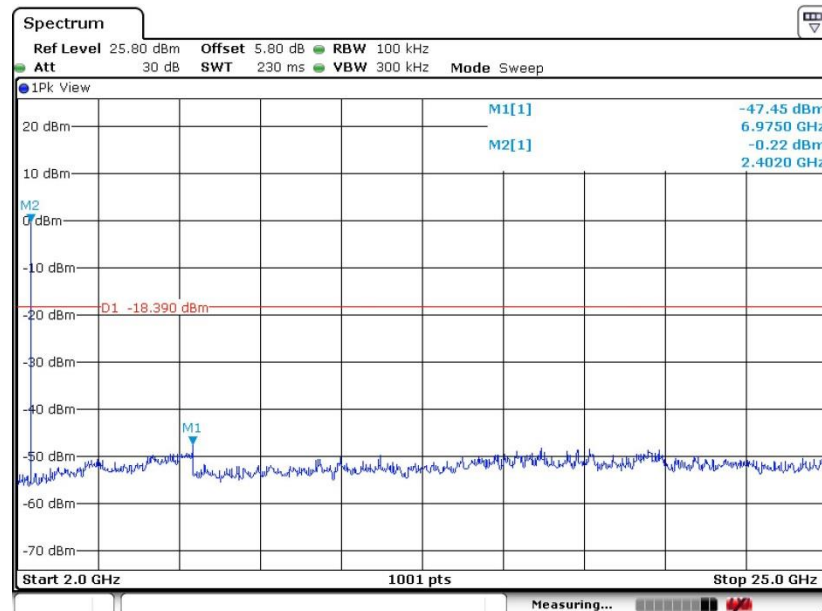
3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



Date: 5 JUN 2018 11:46:33

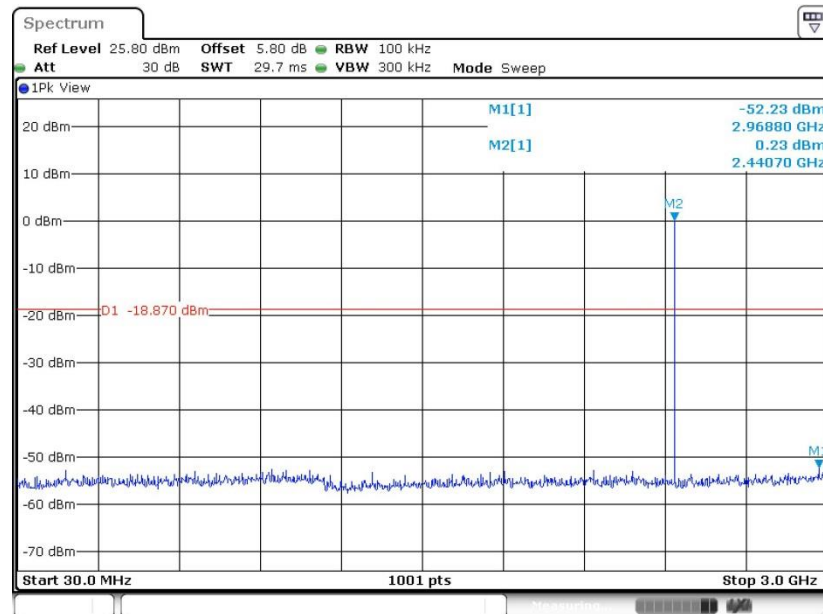
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



Date: 5 JUN 2018 11:46:59

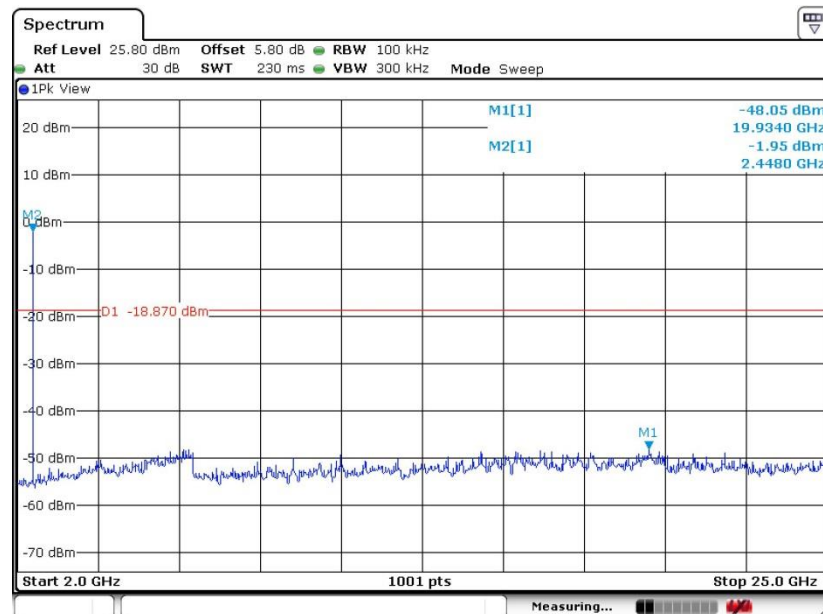


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 19



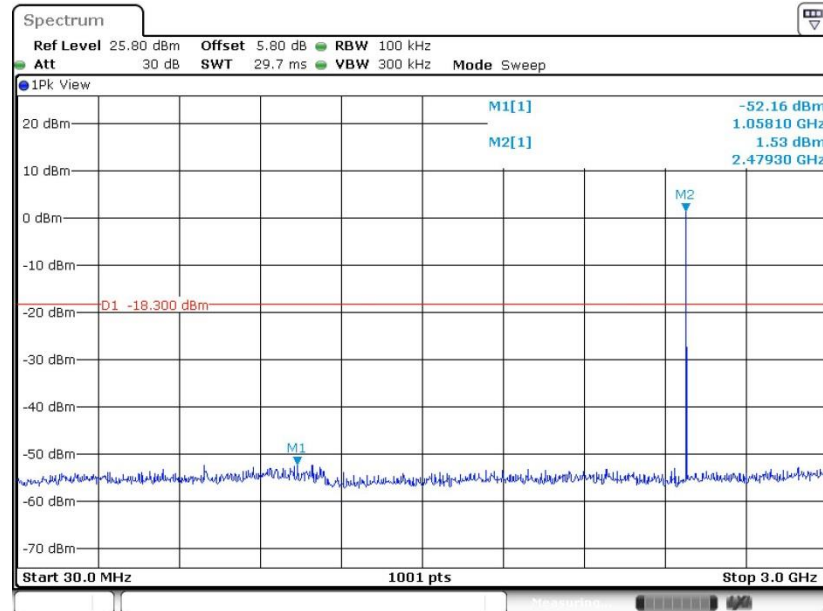
Date: 6 JUN 2018 11:08:02

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 19



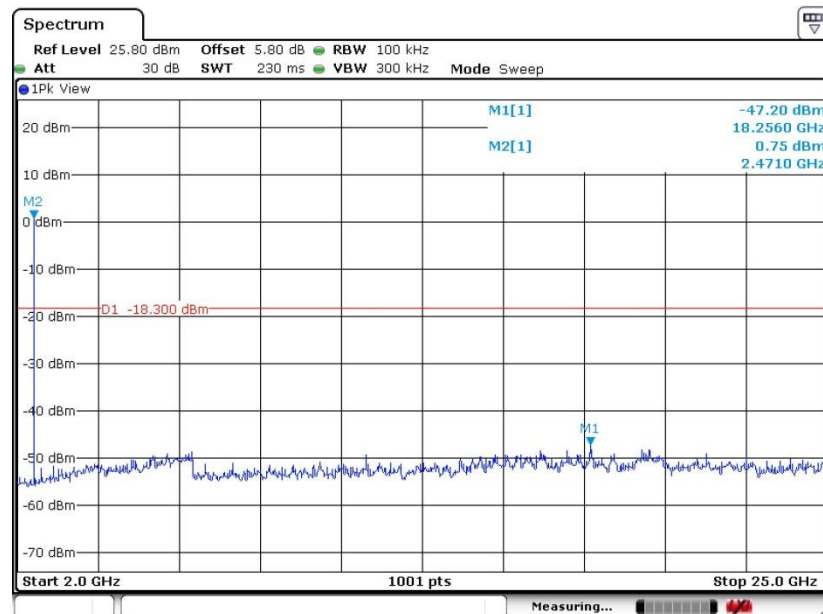
Date: 6 JUN 2018 11:08:16

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 5 JUN 2018 11:56:10

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 5 JUN 2018 11:56:27

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

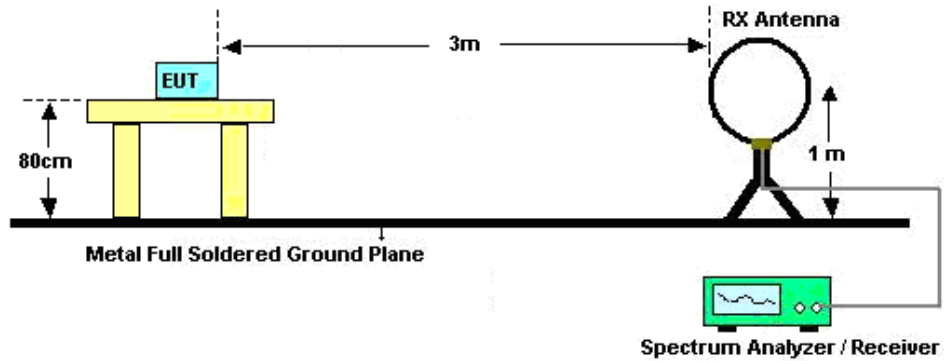
The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.5.3 Test Procedures

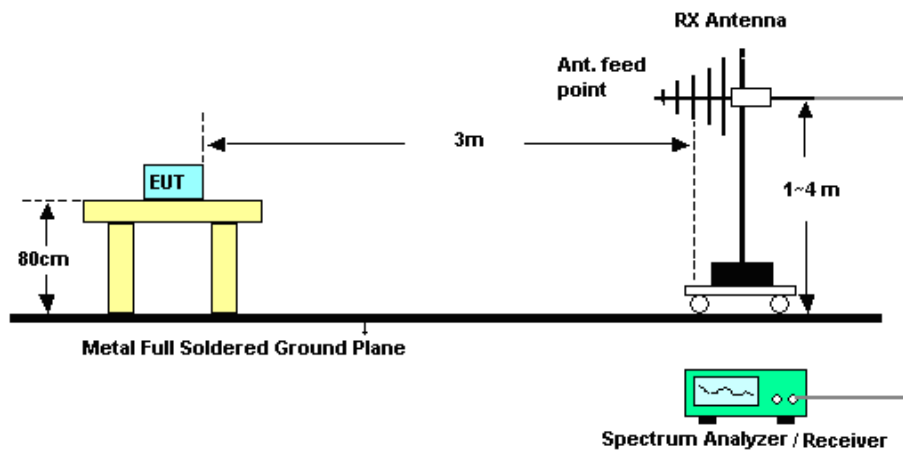
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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 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.

3.5.4 Test Setup

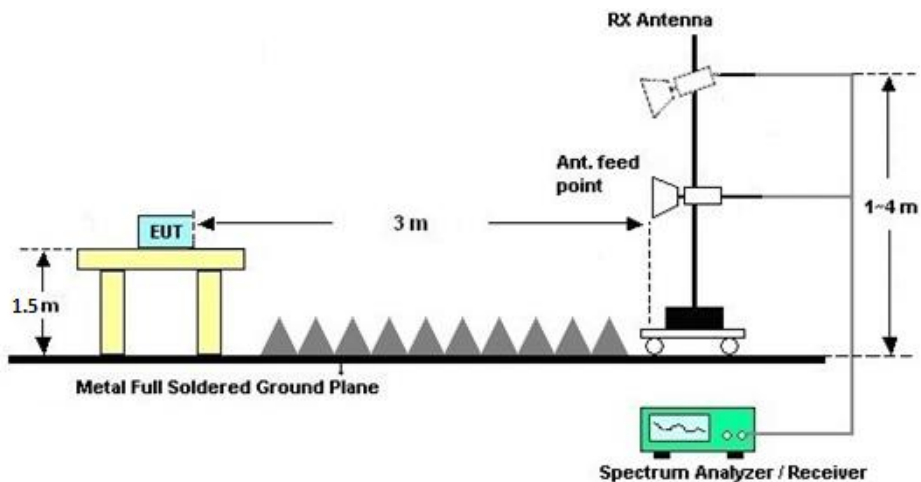
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line 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.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

3.5.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.



3.6 Antenna Requirements

3.6.1 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.

3.6.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.6.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Jun. 05, 2018~ Jun. 06, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	Jun. 05, 2018~ Jun. 06, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Jun. 05, 2018~ Jun. 06, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Aug. 08, 2017	Jun. 16, 2018	Aug. 07, 2018	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz~44GHz, MAX 30dB	Apr. 17, 2018	Jun. 16, 2018	Apr. 16, 2019	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 22, 2017	Jun. 16, 2018	Oct. 21, 2018	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz~2GHz	Jan. 29, 2018	Jun. 16, 2018	Jan. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 21, 2017	Jun. 16, 2018	Oct. 20, 2018	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Jun. 16, 2018	Feb. 06, 2019	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz~1GHz	Aug. 07, 2017	Jun. 16, 2018	Aug. 06, 2018	Radiation (03CH02-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	100MHz~18GHz	Apr. 17, 2018	Jun. 16, 2018	Apr. 16, 2019	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz	Oct. 12, 2017	Jun. 16, 2018	Oct. 11, 2018	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Oct. 12, 2017	Jun. 16, 2018	Oct. 11, 2018	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jun. 16, 2018	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jun. 16, 2018	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jun. 16, 2018	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.2dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.2dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7dB
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Appendix A. Conducted Test Results

Bluetooth Low Energy

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/6/5~2018/6/6	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	-	0.68	0.50	Pass
BLE	1Mbps	1	19	2440	-	0.69	0.50	Pass
BLE	1Mbps	1	39	2480	-	0.68	0.50	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	1.78	30.00	3.50	5.28	36.00	Pass
BLE	1Mbps	1	19	2440	2.37	30.00	3.50	5.87	36.00	Pass
BLE	1Mbps	1	39	2480	1.54	30.00	3.50	5.04	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.03	1.54
BLE	1Mbps	1	19	2440	2.03	2.05
BLE	1Mbps	1	39	2480	2.03	1.28

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.61	-13.10	3.50	8.00	Pass
BLE	1Mbps	1	19	2440	1.13	-13.57	3.50	8.00	Pass
BLE	1Mbps	1	39	2480	1.70	-13.05	3.50	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc limit.



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 39 2480MHz	*	2480	91.66	-	-	88.75	31.44	5.75	34.28	137	27	P	H
	*	2480	91.11	-	-	88.2	31.44	5.75	34.28	137	27	A	H
		2487.94	52.4	-21.6	74	49.46	31.47	5.77	34.3	137	27	P	H
		2497.72	43.06	-10.94	54	40.12	31.47	5.77	34.3	137	27	A	H
	*	2480	96.23	-	-	93.32	31.44	5.75	34.28	106	236	P	V
	*	2480	95.71	-	-	92.8	31.44	5.75	34.28	106	236	A	V
		2491.48	52.67	-21.33	74	49.73	31.47	5.77	34.3	106	236	P	V
		2483.51	43.59	-10.41	54	40.68	31.44	5.75	34.28	106	236	A	V

**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 39 2480MHz		4962	41.06	-32.94	74	62.28	35.54	7.97	64.73	100	360	P	H
		7440	41	-33	74	60.54	35.97	9.57	65.08	100	360	P	H
		4962	40.98	-33.02	74	62.2	35.54	7.97	64.73	100	0	P	V
		7440	40.79	-33.21	74	60.33	35.97	9.57	65.08	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz 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		31.94	22.2	-17.8	40	28.4	25.23	0.6	32.03	100	214	P	H
		131.85	15.4	-28.1	43.5	28.46	17.64	1.17	31.87	-	-	P	H
		412.18	24.08	-21.92	46	27.21	25.44	2.1	30.67	-	-	P	H
		500.45	26.76	-19.24	46	31.79	22.9	2.38	30.31	-	-	P	H
		641.1	25.08	-20.92	46	26.54	25.25	2.67	29.38	-	-	P	H
		937.92	27.56	-18.44	46	23.35	28.26	3.18	27.23	-	-	P	H
		39.7	25.02	-14.98	40	34.32	22.1	0.64	32.04	100	21	P	V
		130.88	16.02	-27.48	43.5	29.06	17.66	1.17	31.87	-	-	P	V
		418.97	25.26	-20.74	46	28.49	25.3	2.11	30.64	-	-	P	V
		632.37	24.3	-21.7	46	25.96	25.12	2.66	29.44	-	-	P	V
		761.38	26.52	-19.48	46	25.67	26.65	2.78	28.58	-	-	P	V
		955.38	28.65	-25.35	54	23.93	28.62	3.21	27.11	-	-	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)

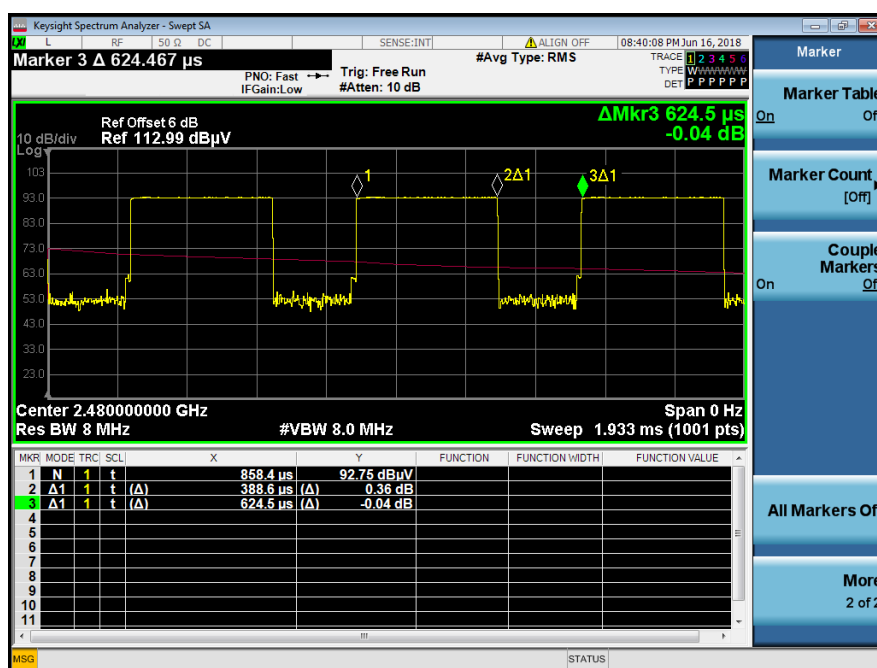
= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
Bluetooth LE	62.23	0.389	2.573	3KHz





Appendix E. Product Equality Declaration

BYD Precision Manufacture Co.,Ltd.

Add: No.3001,Bao He Road,Baolong Industry Zone,Longgang,Shenzhen,Guangdong Province,P.R.China

Product Equality Declaration

We, BYD Precision Manufacture Co.,Ltd. , declare on our sole responsibility for the product of AXC-Y1 as below:

The differences between AXC-Y1 B2.5 and LV are as below:

Category	First Supplier	Specification	Second Supplier	Specification
Crystal	KYOCERA	48MHz_±20PPM	TXC	48MHz_±20PPM
Capacitance	Eyang	10uF_±20%_10V_X5R	Murata	10uF_±20%_10V_X5R
Capacitance	TAIYO	22uF_±20%_6.3V_X5R	SAMSUNG	22uF_±20%_6.3V_X5R
Resistance	WALSIN	0Ω_±5%_1/20W	FENGHUA	0Ω_±5%_1/20W
Resistance	WALSIN	0Ω_Jumper_1/16W	FENGHUA	0Ω_±5%_1/16W
Resistance	WALSIN	0Ω_±1%_1/10W	FENGHUA	0Ω_Jumper_1/16W
Resistance	YAGEO	1Ω_±1%_1/16W	FENGHUA	1Ω_±1%_1/16W
Resistance	WALSIN	33Ω_±5%_1/20W	FENGHUA	33Ω_±5%_1/20W
Resistance	WALSIN	200Ω_±1%_1/20W	FENGHUA	200Ω_±1%_1/20W
Resistance	WALSIN	240Ω_±1%_1/20W	FENGHUA	240Ω_±1%_1/20W
Resistance	WALSIN	1KΩ_±5%_1/20W	FENGHUA	1KΩ_±5%_1/20W
Resistance	WALSIN	2.2KΩ_±1%_1/20W	FENGHUA	2.2KΩ_±1%_1/20W
Resistance	WALSIN	3.92KΩ_±1%_1/20W	FENGHUA	3.92KΩ_±1%_1/20W
Resistance	WALSIN	10KΩ_±5%_1/20W	FENGHUA	10KΩ_±5%_1/20W
Resistance	WALSIN	10KΩ_±5%_1/16W	FENGHUA	10KΩ_±5%_1/16W
Resistance	WALSIN	47KΩ_±5%_1/20W	FENGHUA	47kΩ_±5%_1/20W
Resistance	WALSIN	100KΩ_±5%_1/20W	FENGHUA	100kΩ_±5%_1/20W
Resistance	WALSIN	1MΩ_±5%_1/20W	FENGHUA	1MΩ_±5%_1/20W

Except listings above, the others are all the same as previous version.

Should you have any questions or comments regarding this matter, please have my best attention.

Sincerely yours,



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