FCC RF Test Report

APPLICANT	:	Amazon.com Services LLC
EQUIPMENT	:	Wireless Remote
MODEL NAME	:	K7Q3MT
FCC ID	:	2A4DH-8726
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Aug. 11, 2022 ~ Oct. 28, 2022

We, Sporton International Inc. (Kunshan), 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 Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR280206	Rev. 01	Initial issue of report	Sep. 08, 2022
FR280206	Rev. 02	Re-test Conducted test items	Oct. 28, 2022
FR280206	Rev. 03	Added the attenuator in section 4.0	Nov. 03, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Report only	-
3.2	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 8.72 dB at 2483.500 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Applicable	-
3.6	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-
Remark: Not Applicable means after assessing, test items are not necessary to carry out.					

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Amazon.com Services LLC
410 Terry Avenue N Seattle, WA 98109-5210 United States

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wireless Remote
Model Name	K7Q3MT
FCC ID	2A4DH-8726

1.3 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	Bluetooth LE 1Mbps :3.05 dBm (0.0020 W) Bluetooth LE 2Mbps :2.89 dBm (0.0019 W)
99% Occupied Bandwidth	Bluetooth LE 1Mbps : 1.027 MHz Bluetooth LE 2Mbps : 2.042 MHz
SN	Radiation: G0G2MG002306000L Conducted: G0G2MG0023060021
Antenna Type / Gain	PCB Antenna type with gain 4.6 dBi
Type of Modulation	Bluetooth LE : GFSK

1.4 Modification of EUT

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

1.5 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH06-KS TH01-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH06-KS	AUDIX	E3	6.2009-8-24al

1.7 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 v05r02
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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	-	-

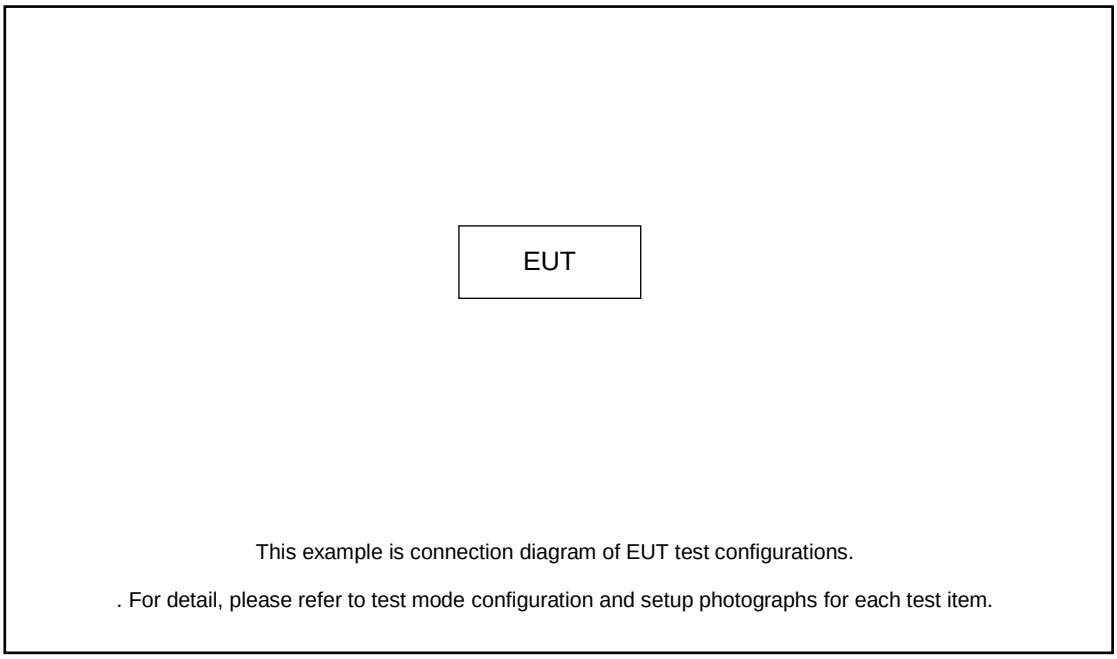
2.2 Test Mode

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:, 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 cases (Z plane) were recorded in this report.

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/2Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps/2Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps/2Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps/2Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps/2Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps/2Mbps

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT continuous transmit.

2.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor 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 6.50 dB

Offset(dB) = RF cable loss(dB)

=6.50(dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

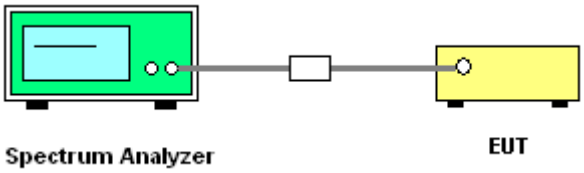
3.1.2 Measuring Instruments

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 ANSI C63.10-2013 clause 11.8
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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1% to 5% of the 99% OBW and the VBW is set to 3 times of the RBW.
6. Measure and record the results in the test report.

3.1.4 Test Setup

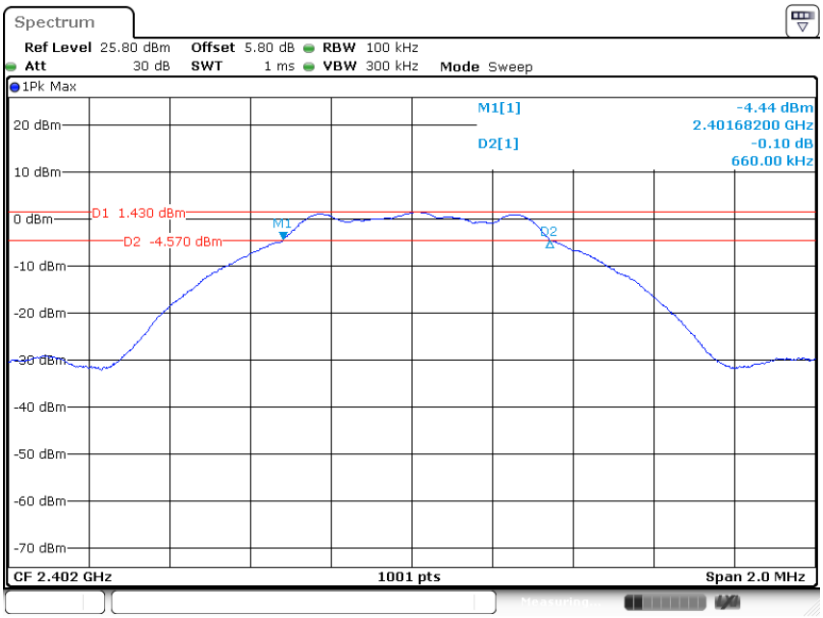


3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

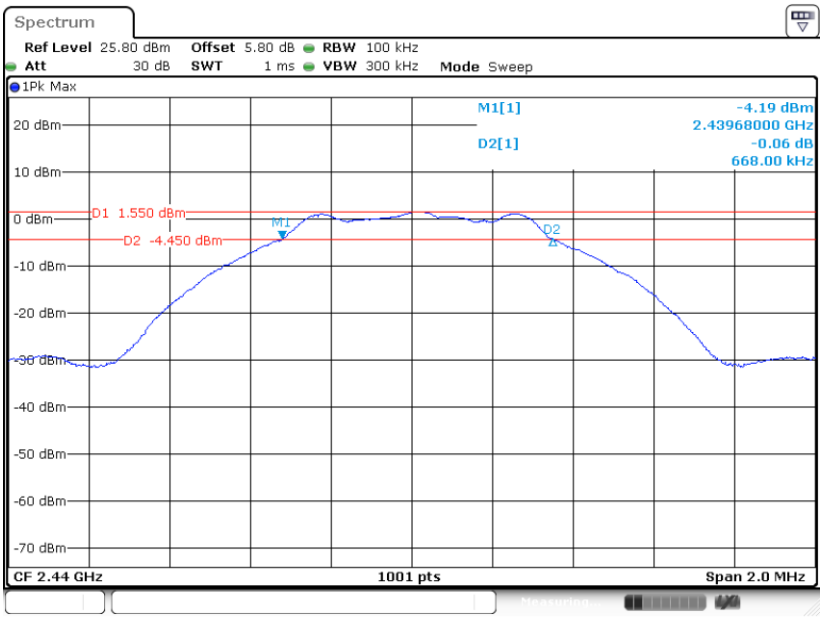
Bluetooth LE 1Mdps

6 dB Bandwidth Plot on Channel 00



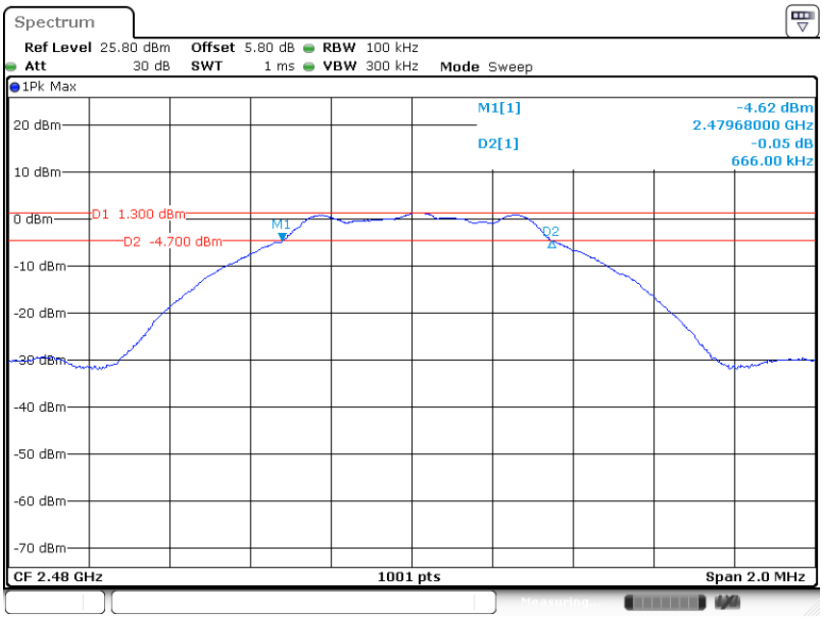
Date: 28.OCT.2022 11:13:37

6 dB Bandwidth Plot on Channel 19



Date: 28.OCT.2022 11:17:59

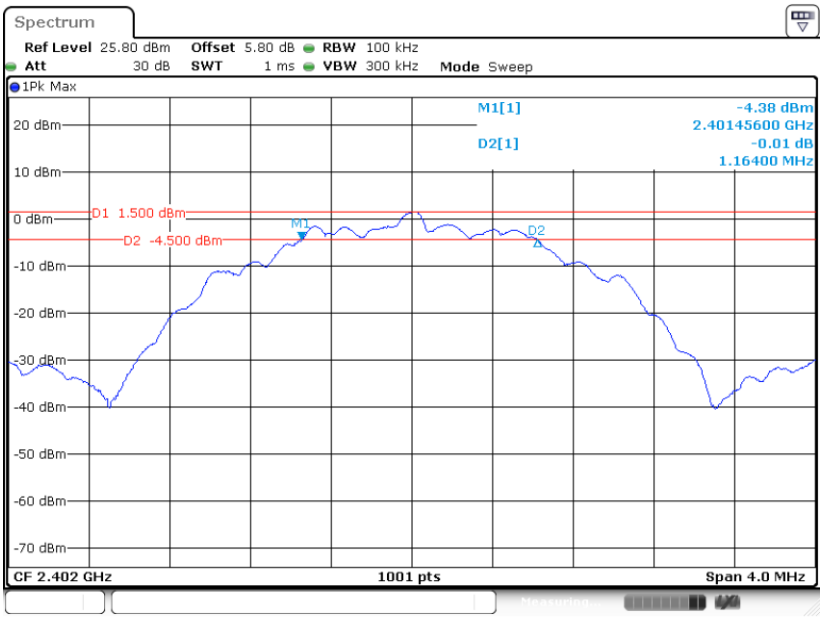
6 dB Bandwidth Plot on Channel 39



Date: 28.OCT.2022 11:20:01

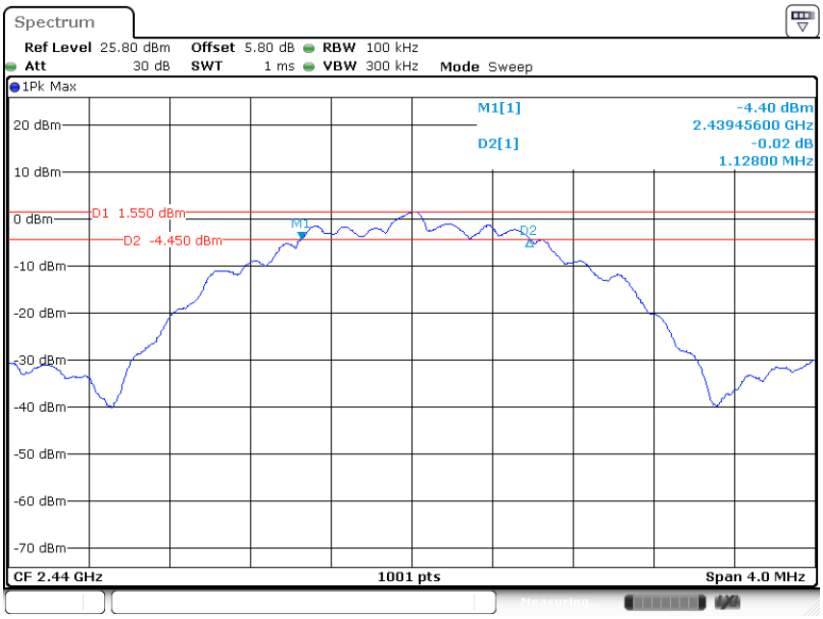
Bluetooth LE 2Mdps

6 dB Bandwidth Plot on Channel 00



Date: 28.OCT.2022 11:25:39

6 dB Bandwidth Plot on Channel 19



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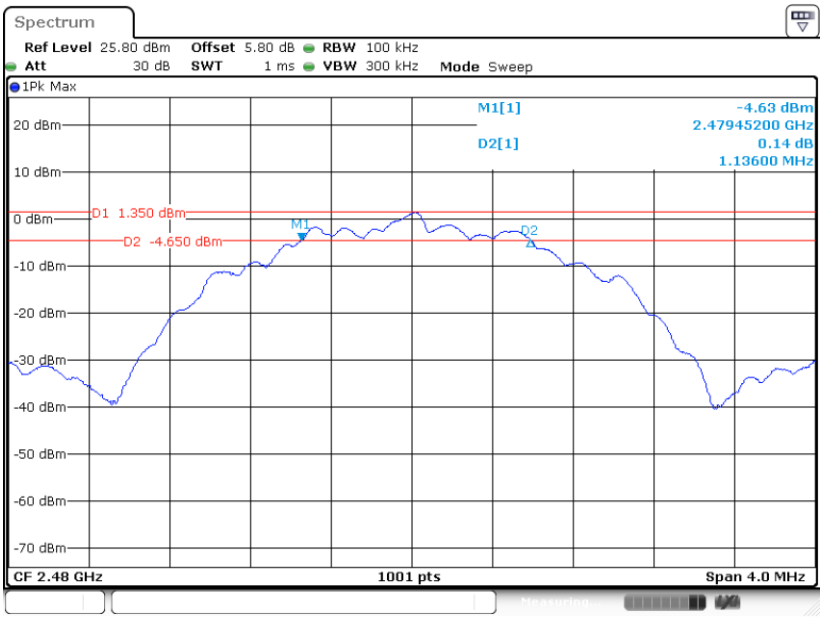
6 dB Bandwidth Plot on Channel 39



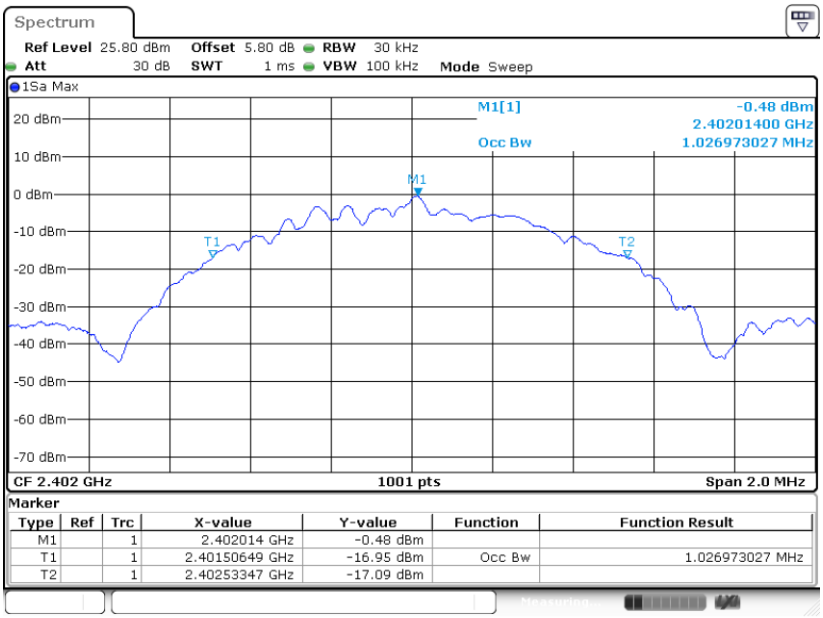
Date: 28.OCT.2022 11:31:58

3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

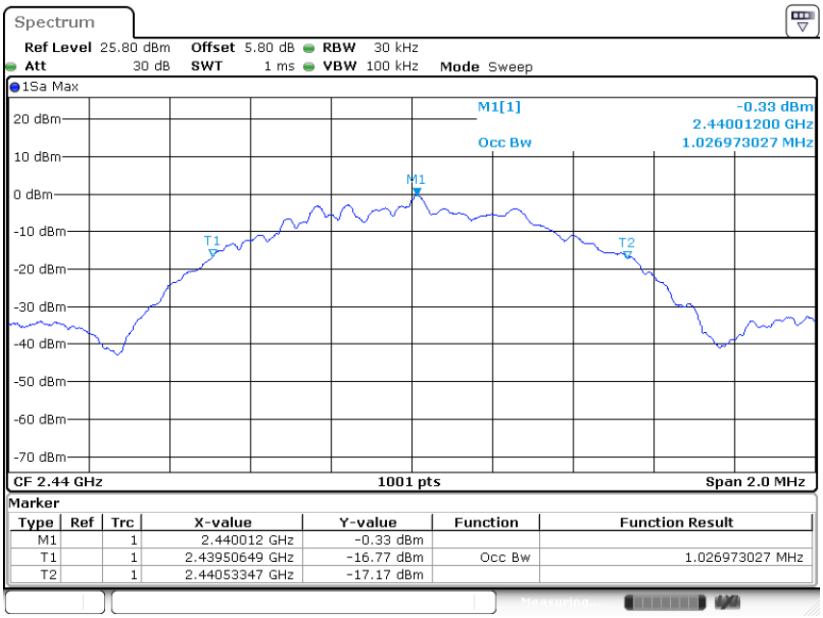
Bluetooth LE 1Mdps

99% Occupied Bandwidth Plot on Channel 00



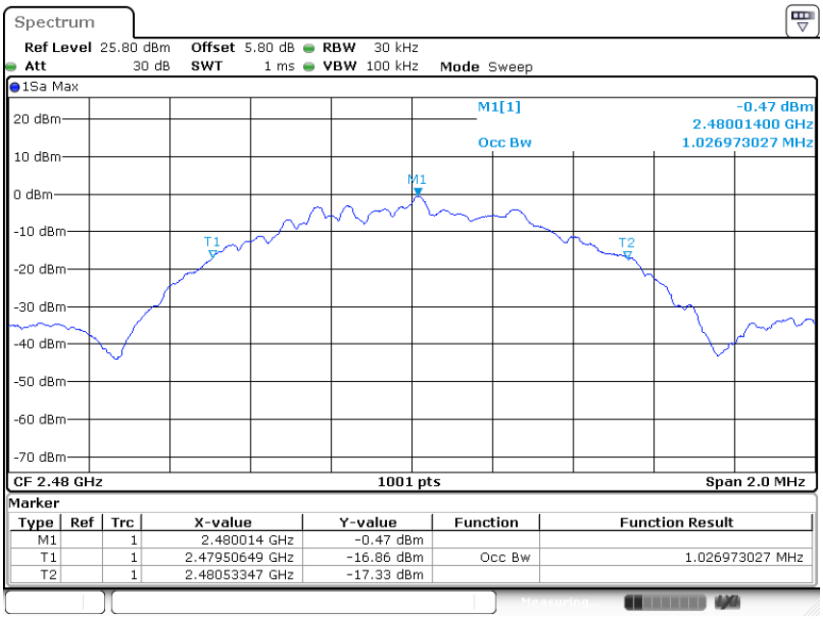
Date: 28.OCT.2022 11:15:23

99% Occupied Bandwidth Plot on Channel 19



Date: 28.OCT.2022 11:19:27

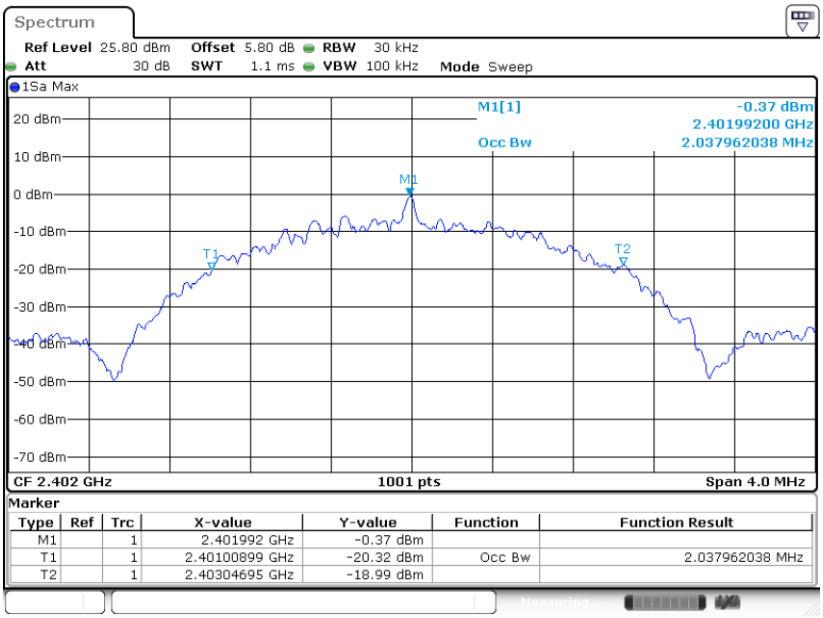
99% Occupied Bandwidth Plot on Channel 39



Date: 28.OCT.2022 11:21:48

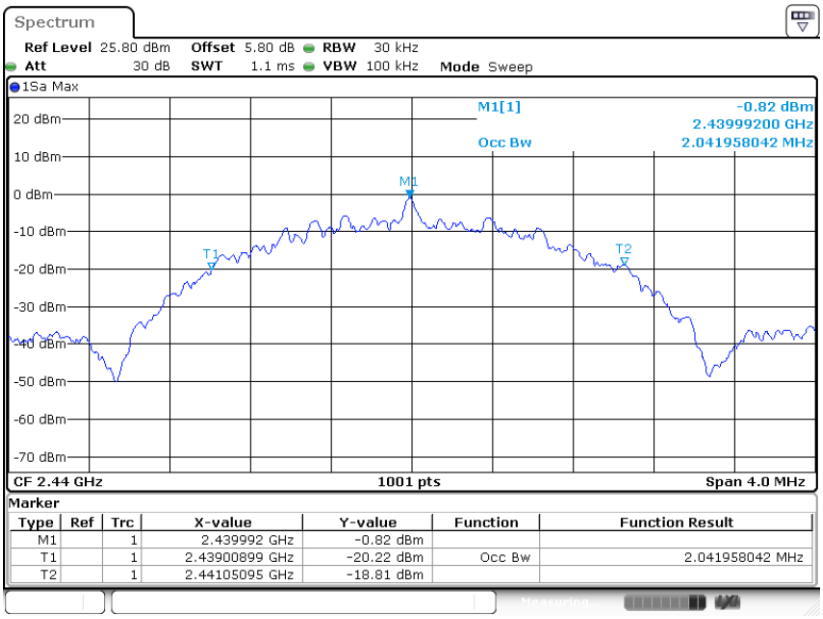
Bluetooth LE 2Mdps

99% Occupied Bandwidth Plot on Channel 00

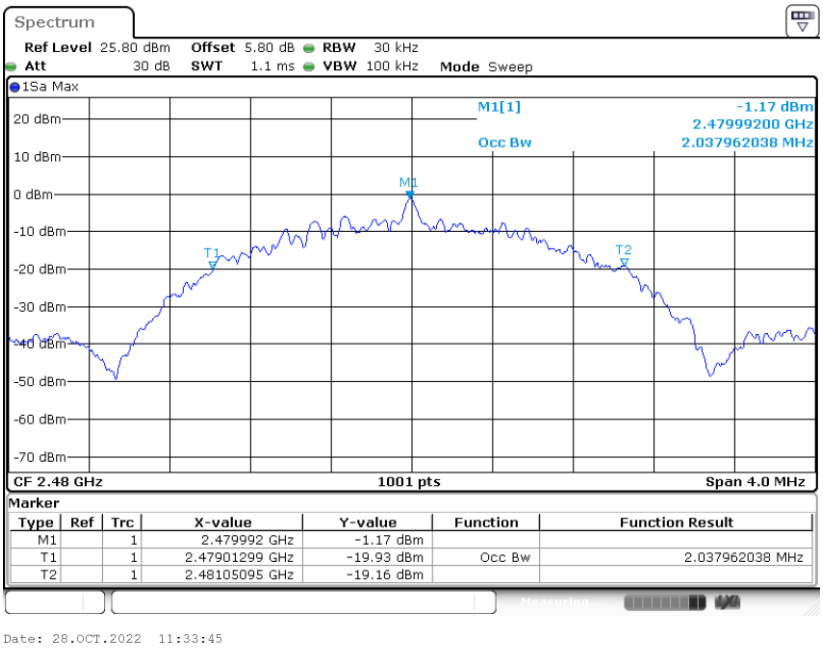


Date: 28.OCT.2022 11:27:26

99% Occupied Bandwidth Plot on Channel 19



99% Occupied Bandwidth Plot on Channel 39



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

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.

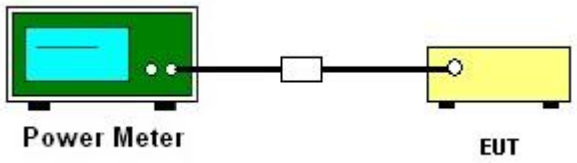
3.2.2 Measuring Instruments

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 ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter.
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.

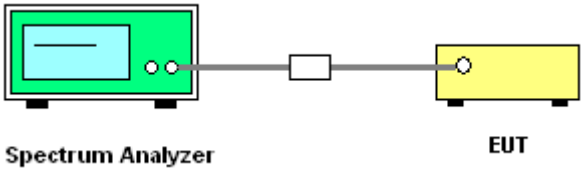
3.3.2 Measuring Instruments

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 of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
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



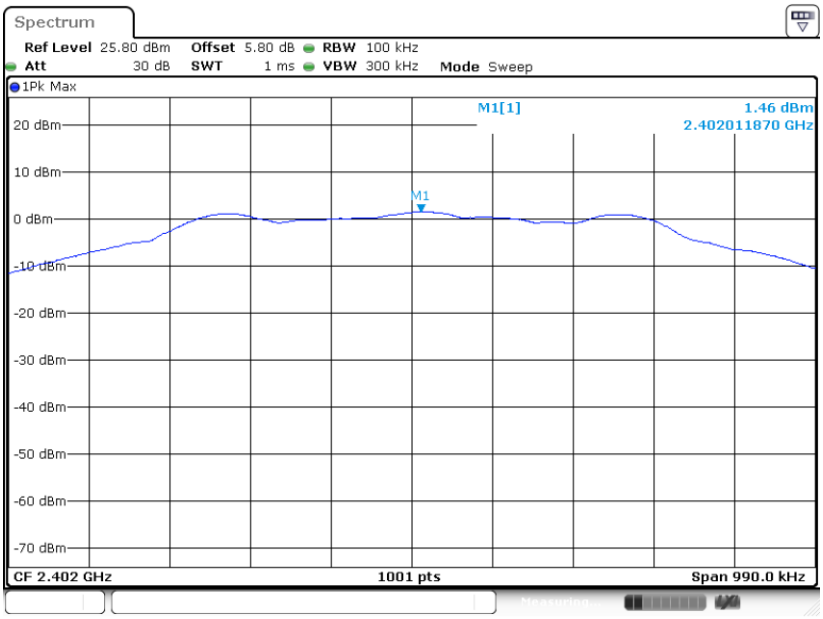
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

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

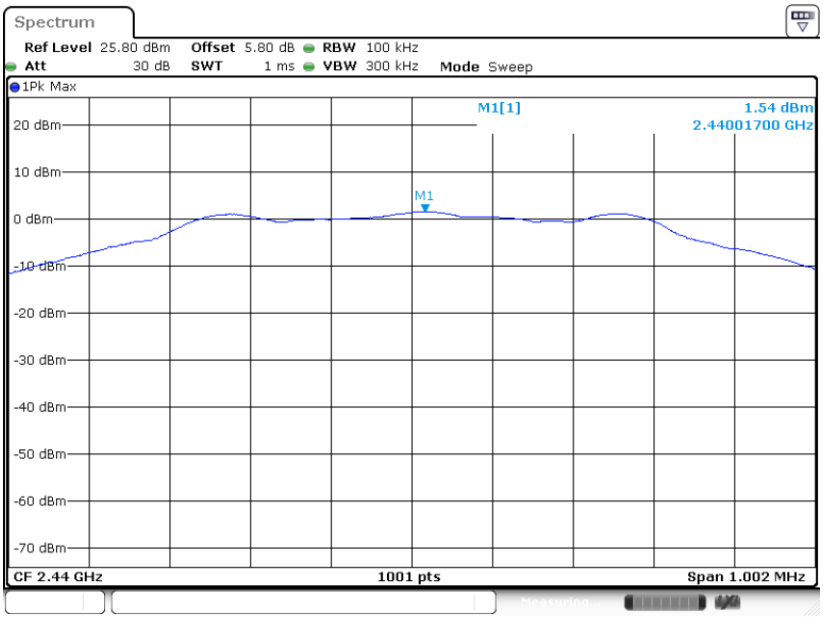
Bluetooth LE 1Mdps

PSD 100kHz Plot on Channel 00



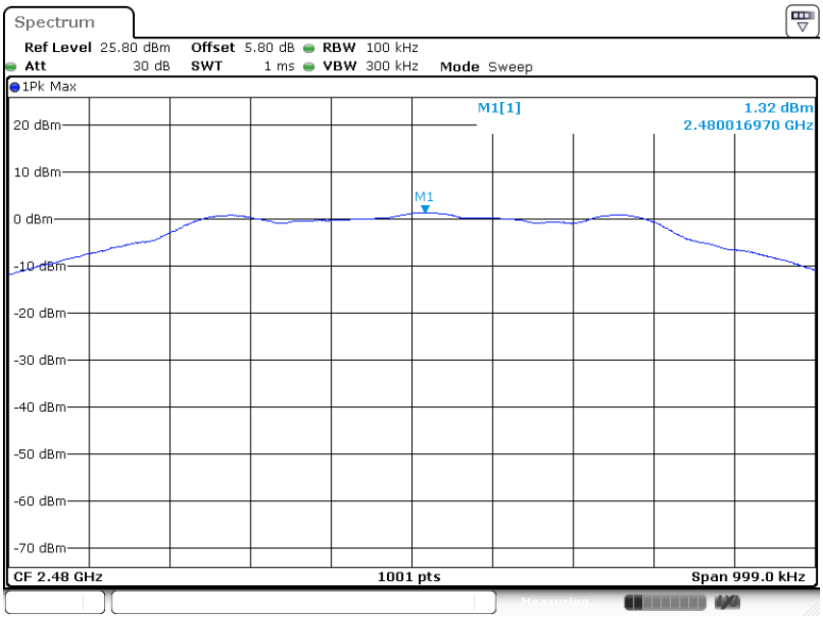
Date: 28.OCT.2022 11:14:15

PSD 100kHz Plot on Channel 19



Date: 28.OCT.2022 11:18:37

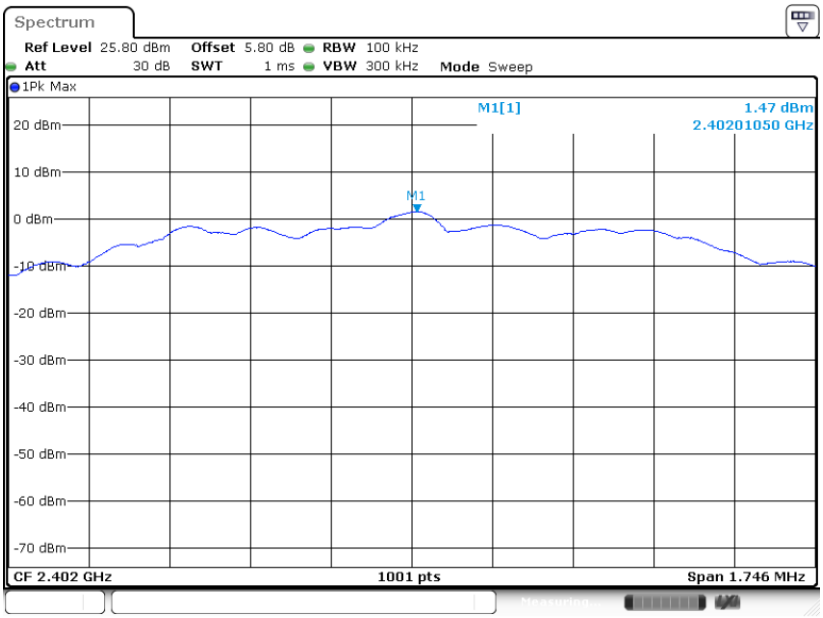
PSD 100kHz Plot on Channel 39



Date: 28.OCT.2022 11:20:40

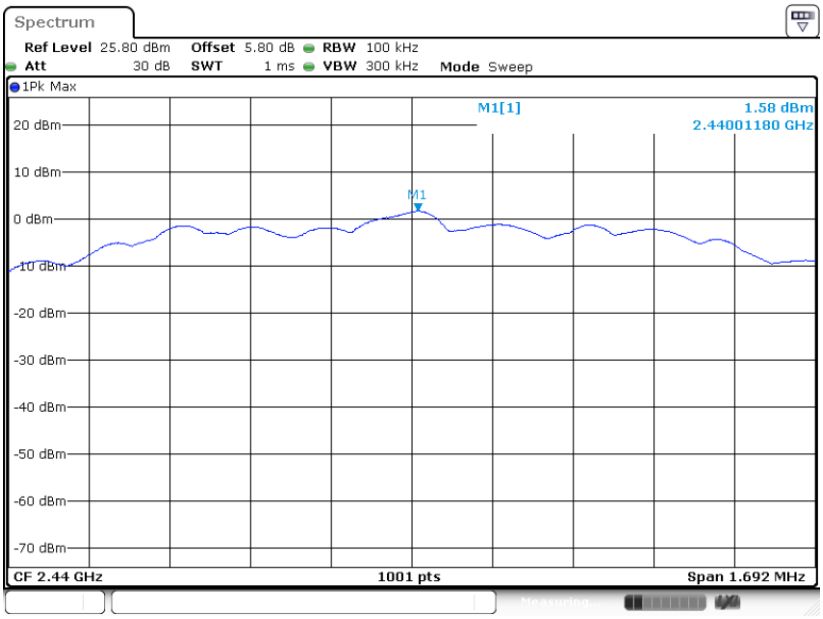
Bluetooth LE 2Mdps

PSD 100kHz Plot on Channel 00



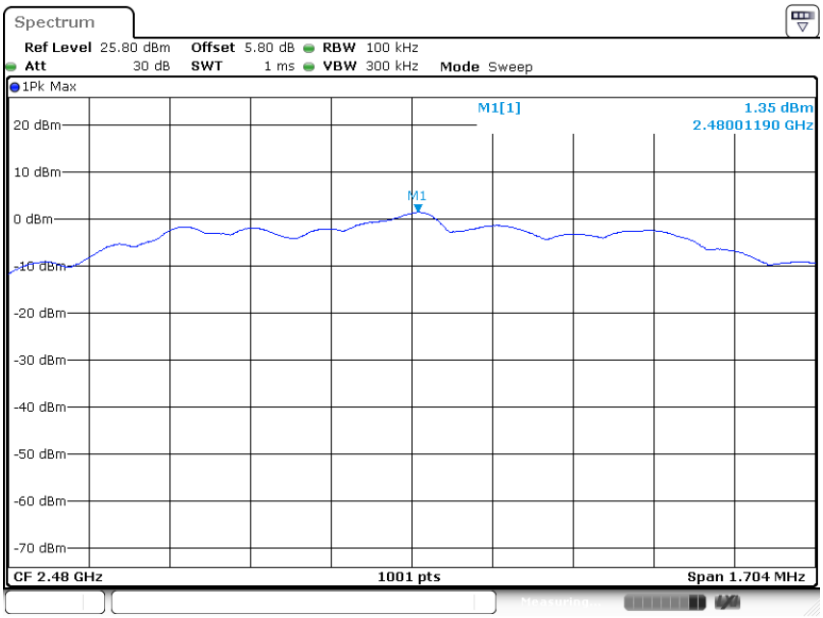
Date: 28.OCT.2022 11:26:17

PSD 100kHz Plot on Channel 19



Date: 28.OCT.2022 11:30:02

PSD 100kHz Plot on Channel 39

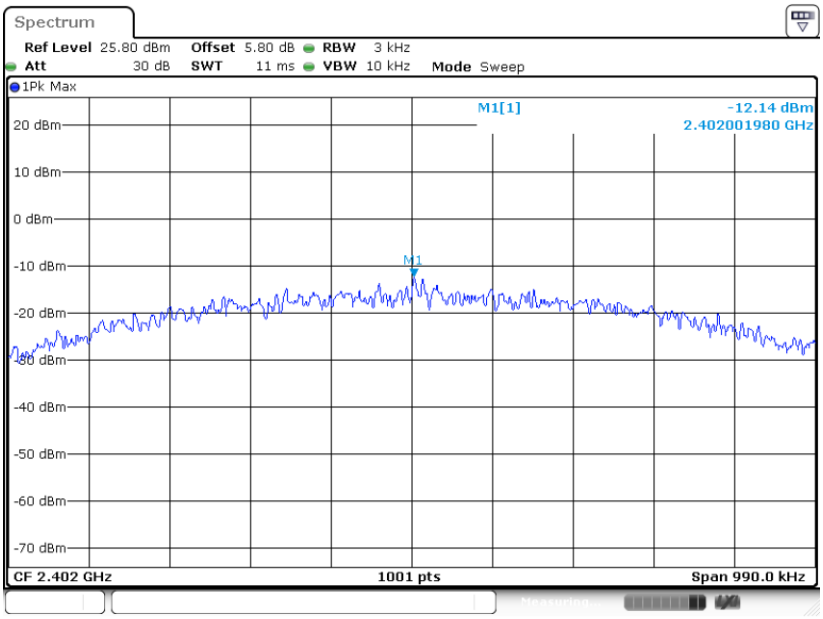


Date: 28.OCT.2022 11:32:36

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

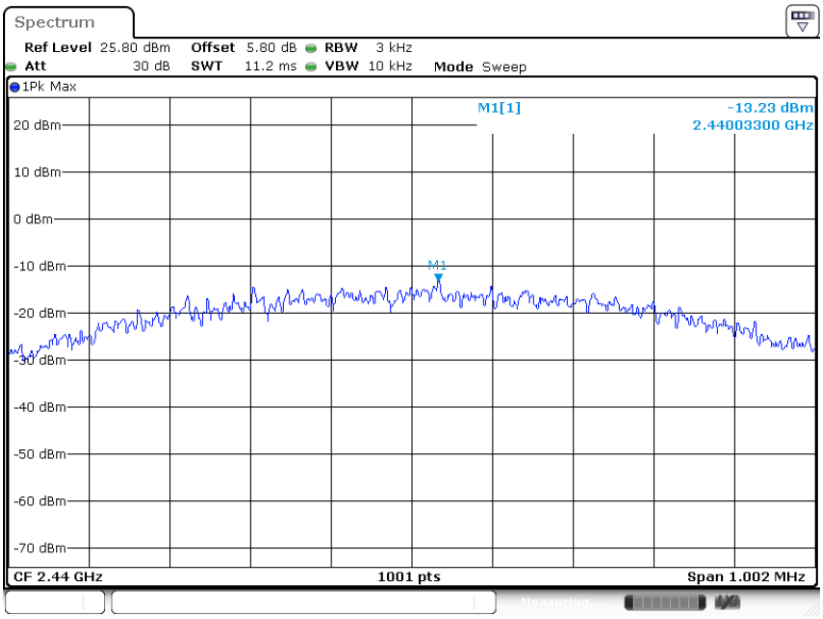
Bluetooth LE 1Mdps

PSD 3kHz Plot on Channel 00



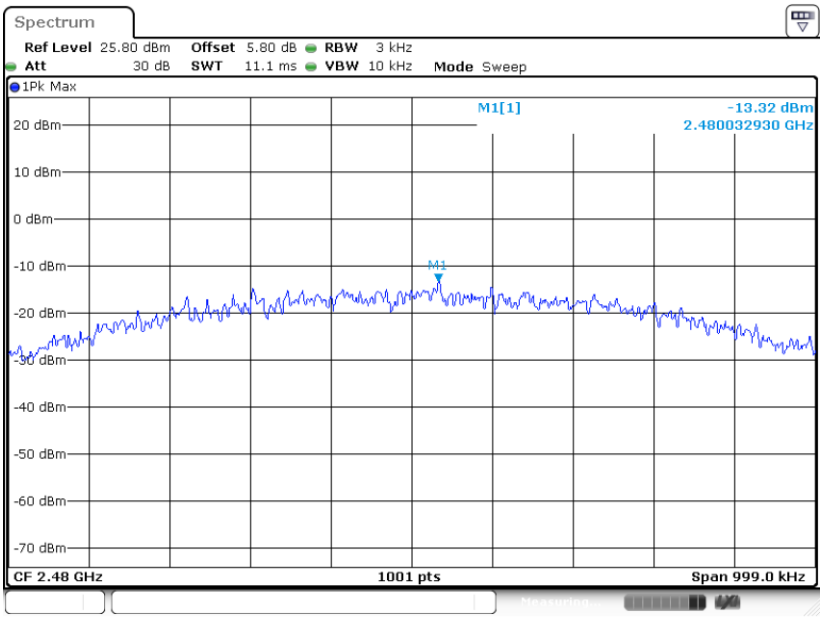
Date: 28.OCT.2022 11:13:56

PSD 3kHz Plot on Channel 19



Date: 28.OCT.2022 11:18:18

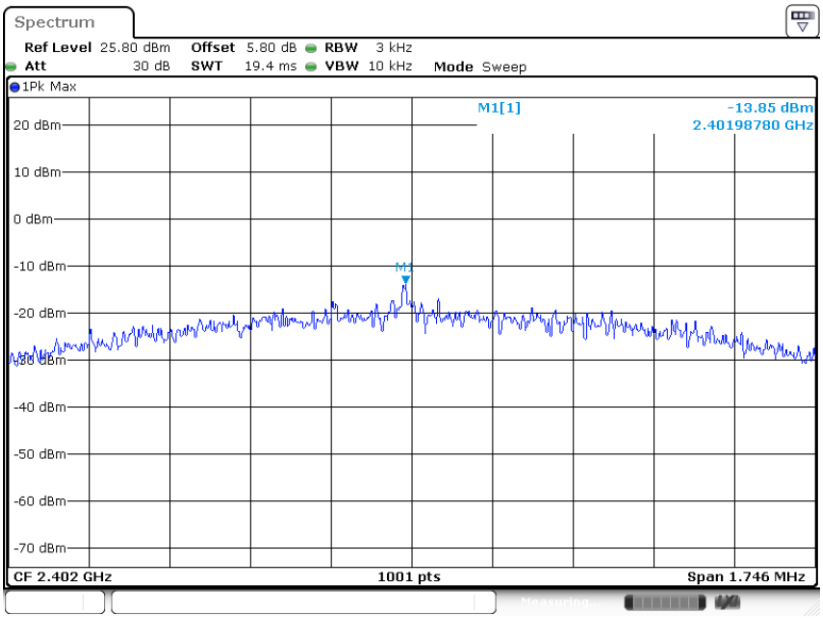
PSD 3kHz Plot on Channel 39



Date: 28.OCT.2022 11:20:21

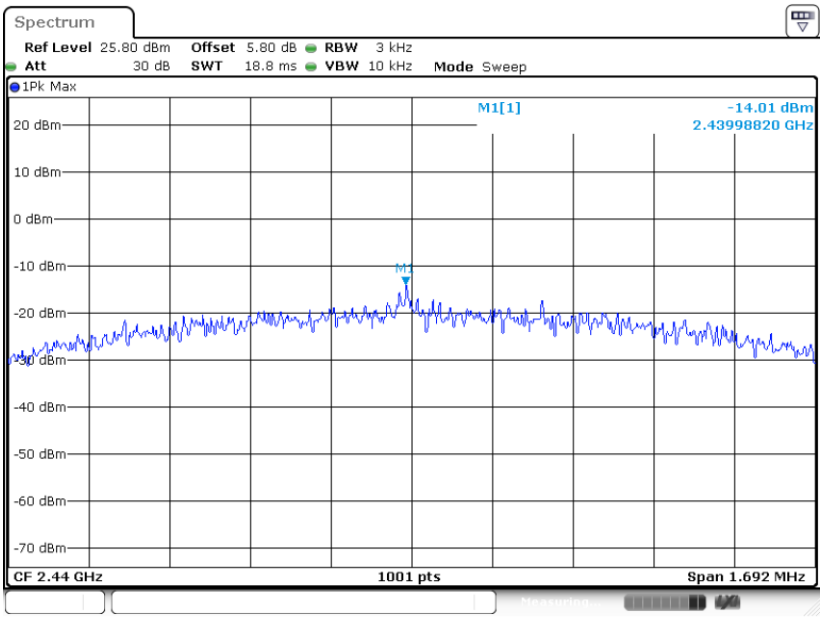
Bluetooth LE 2Mdps

PSD 3kHz Plot on Channel 00



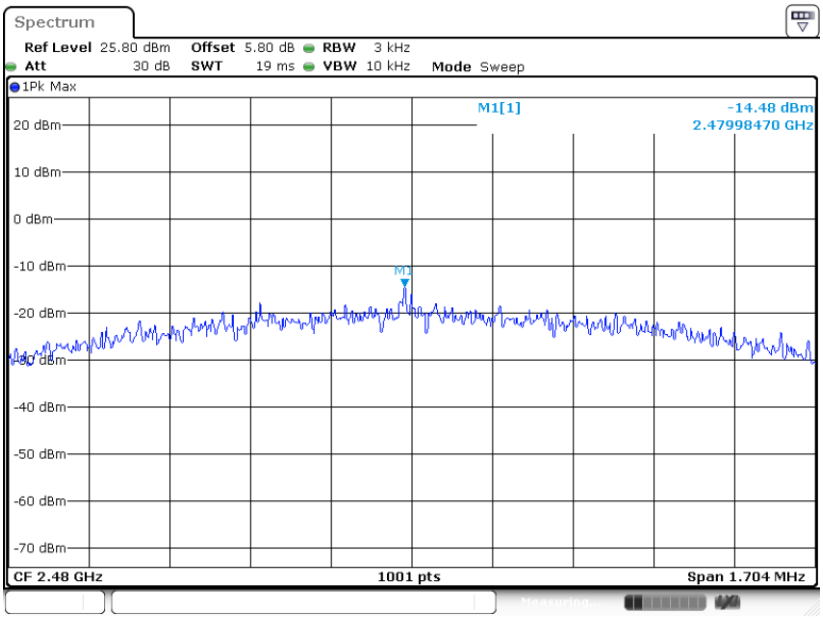
Date: 28.OCT.2022 11:25:58

PSD 3kHz Plot on Channel 19



Date: 28.OCT.2022 11:29:43

PSD 3kHz Plot on Channel 39



Date: 28.OCT.2022 11:32:17

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.

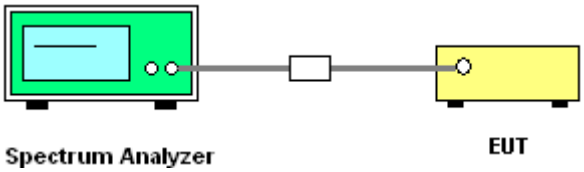
3.4.2 Measuring Instruments

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 ANSI C63.10-2013 clause 11.13
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.

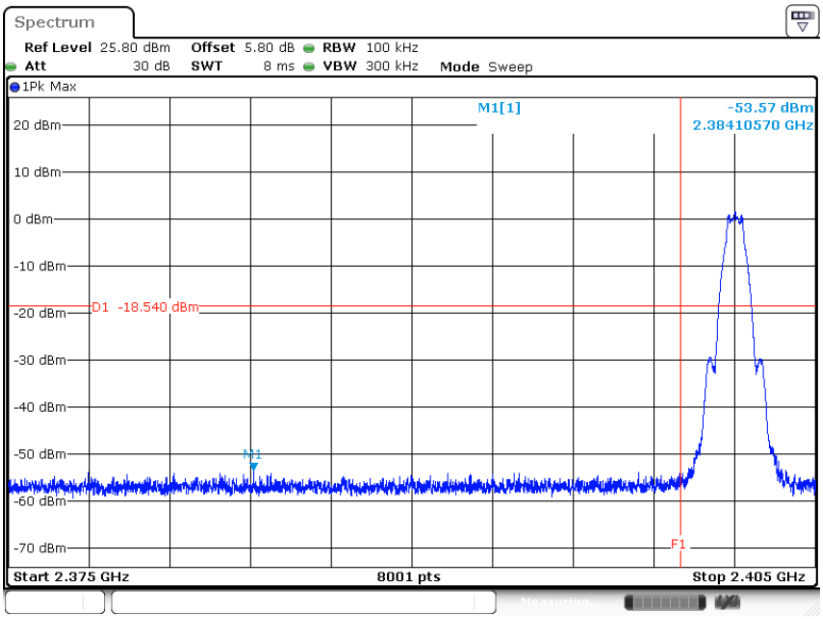
3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges Plots

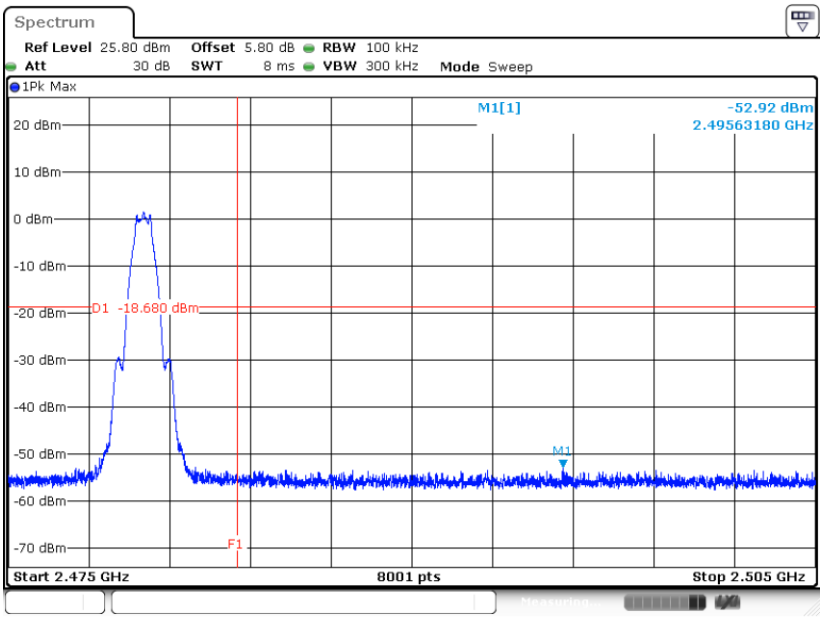
Bluetooth LE 1Mdps

Low Band Edge Plot on Channel 00



Date: 28.OCT.2022 11:16:05

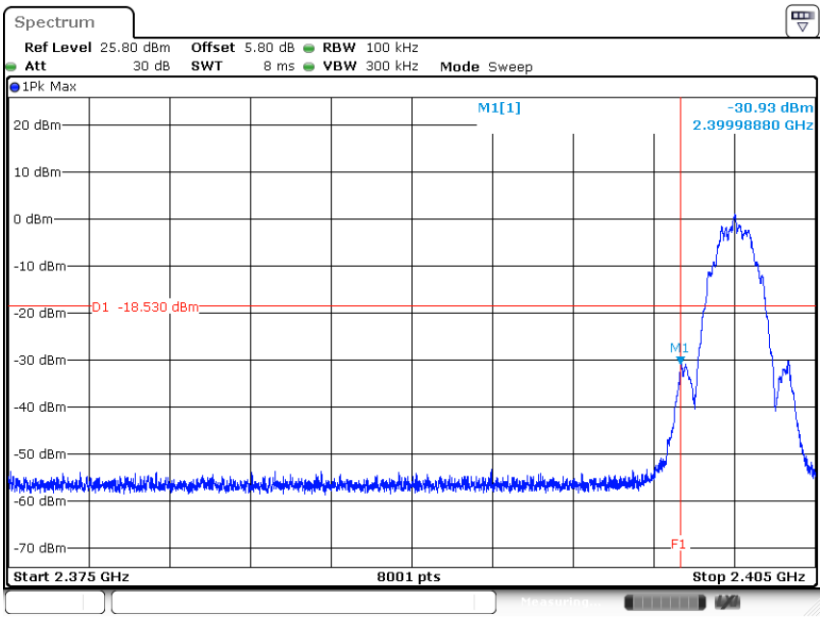
High Band Edge Plot on Channel 39



Date: 28.OCT.2022 11:20:58

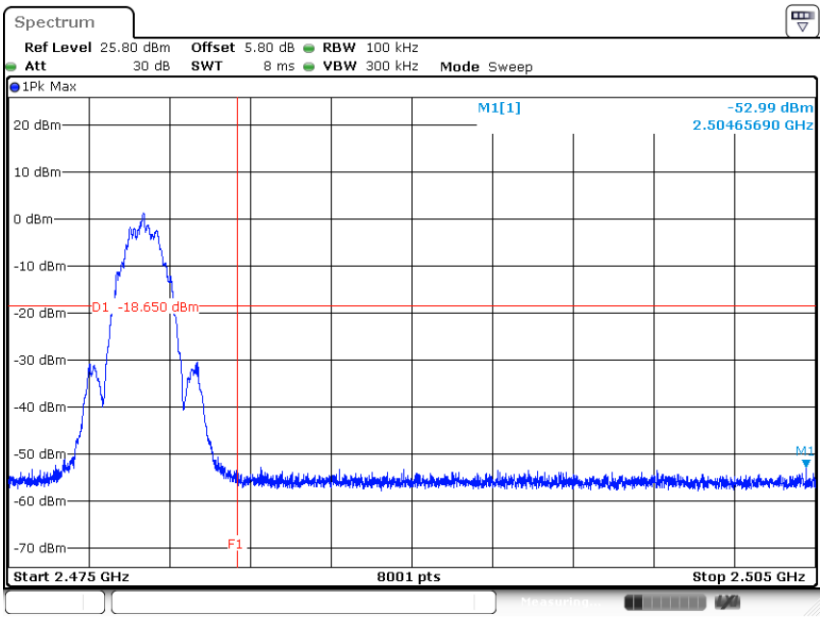
Bluetooth LE 2Mdps

Low Band Edge Plot on Channel 00



Date: 28.OCT.2022 11:26:36

High Band Edge Plot on Channel 39



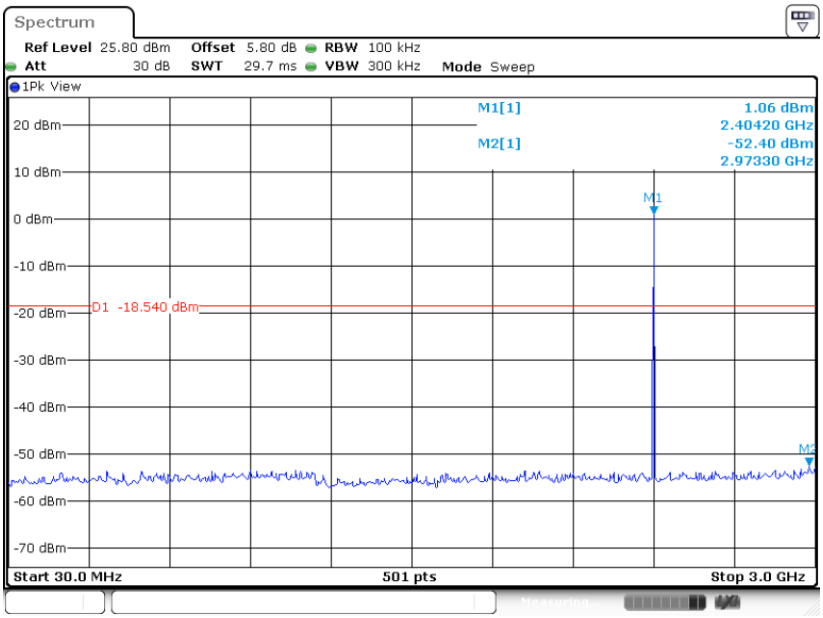
Date: 28.OCT.2022 11:32:55

3.4.6 Test Result of Conducted Spurious Emission Plots

Bluetooth LE 1Mdps

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

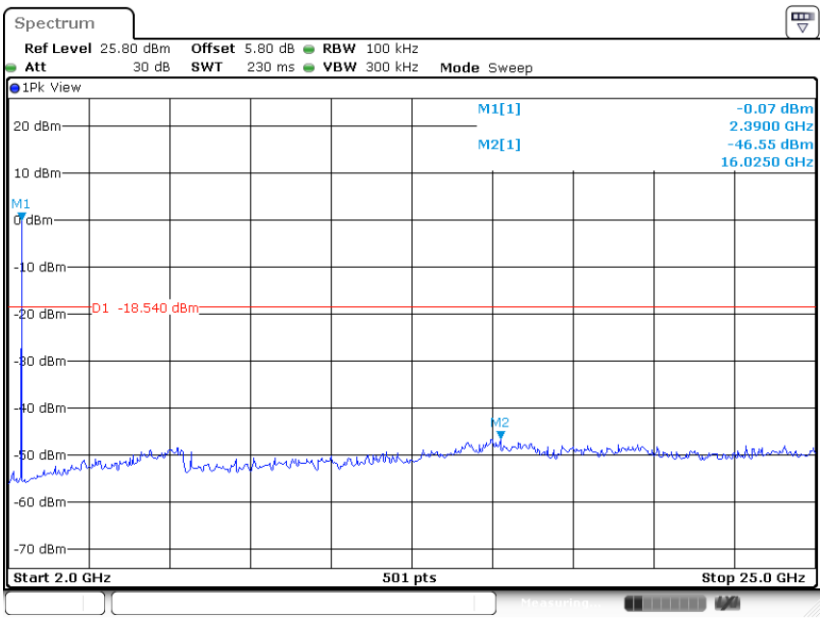
GFSK Channel 00



Date: 28.OCT.2022 11:17:07

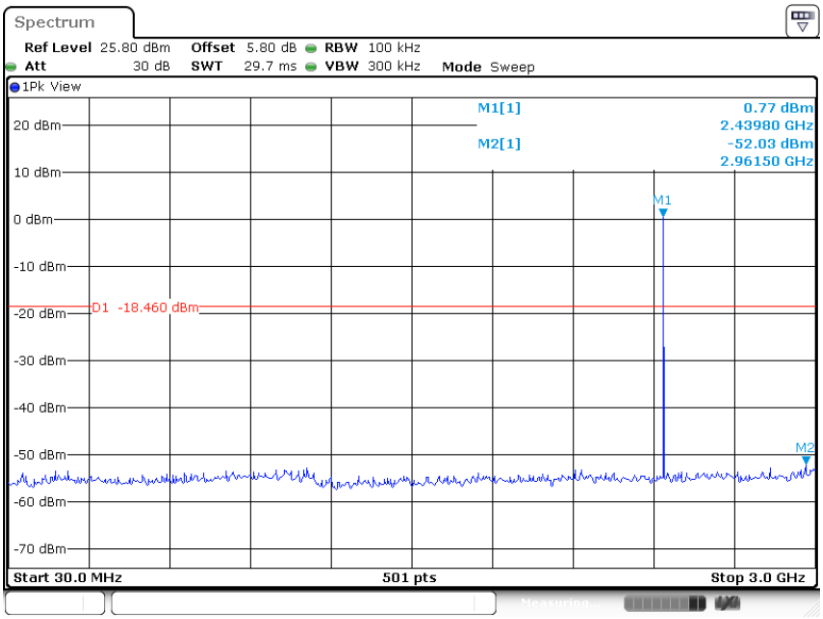
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 00



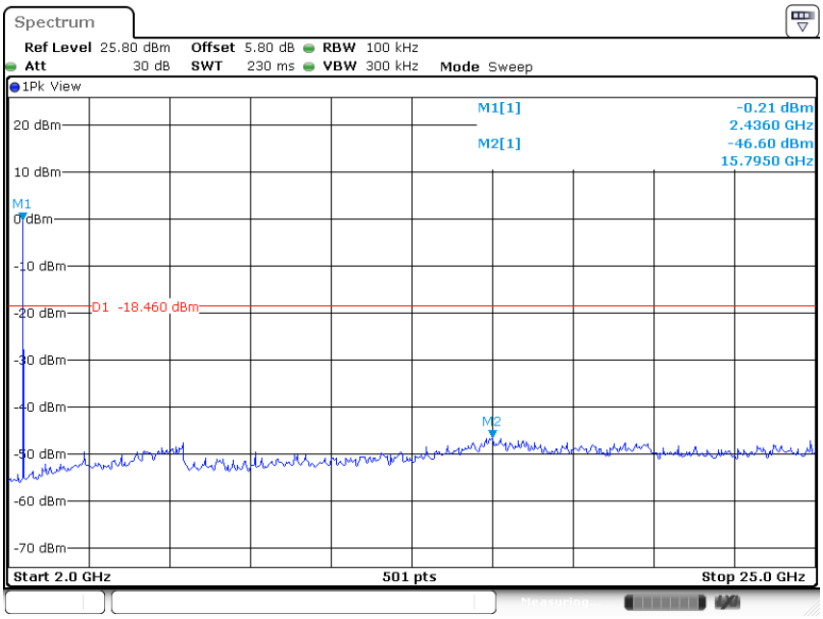
Date: 28.OCT.2022 11:17:19

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



Date: 28.OCT.2022 11:18:58

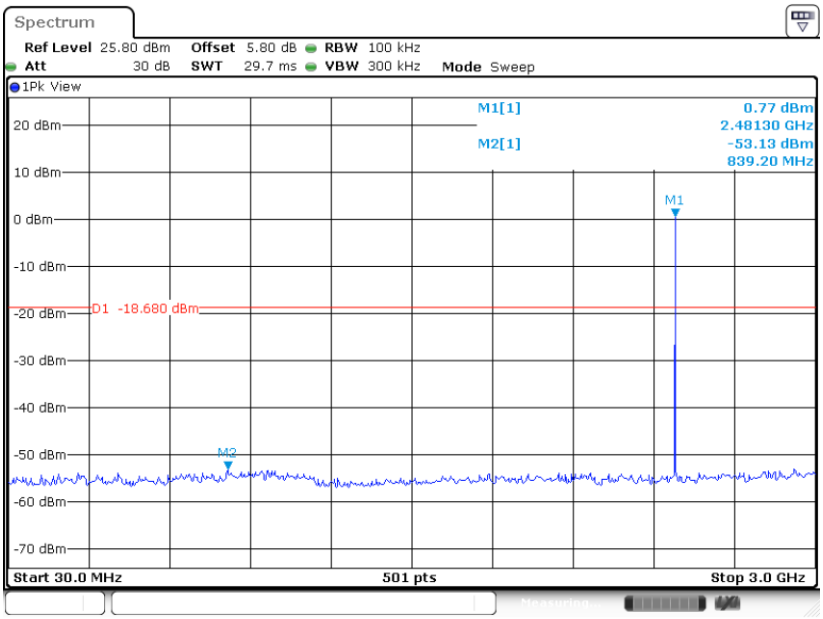
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 28.OCT.2022 11:19:18

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

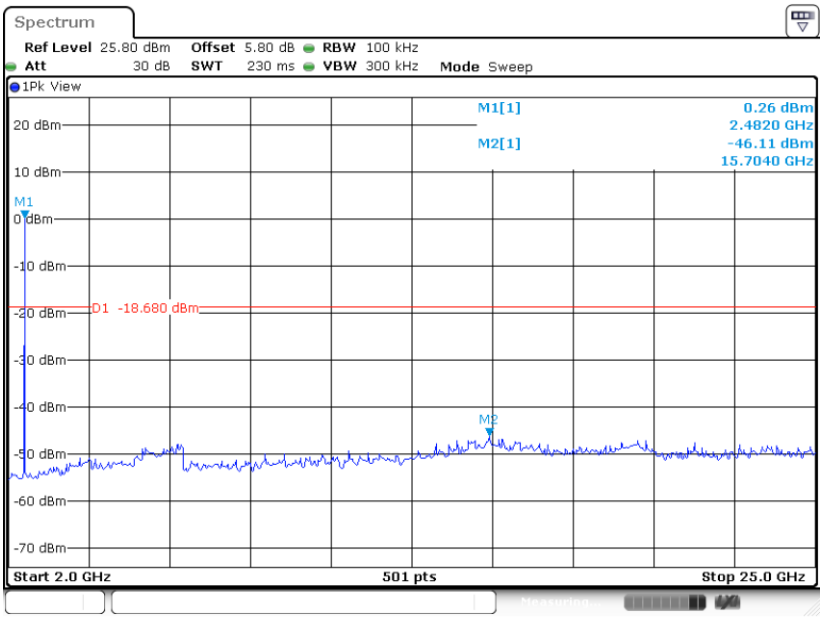
GFSK Channel 39



Date: 28.OCT.2022 11:21:19

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

GFSK Channel 39

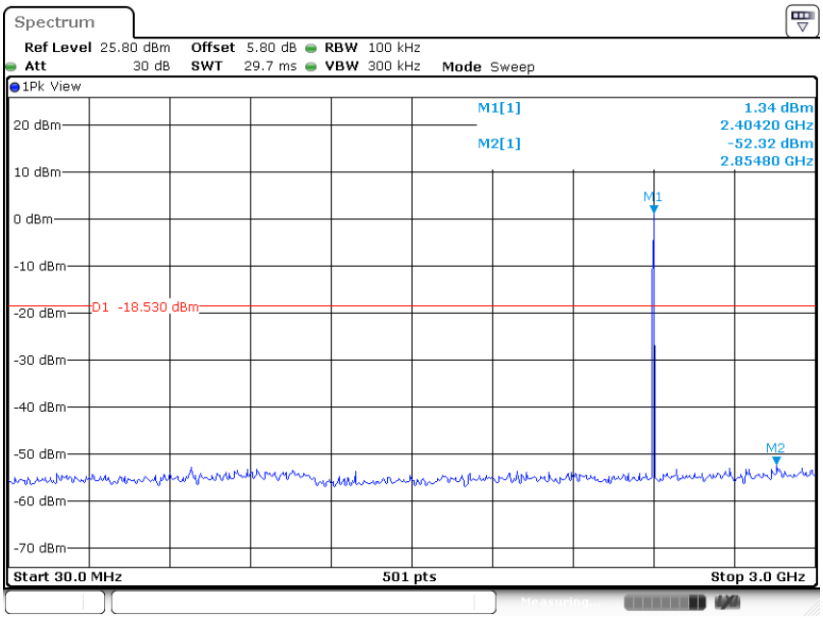


Date: 28.OCT.2022 11:21:39

Bluetooth LE 2Mdps

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

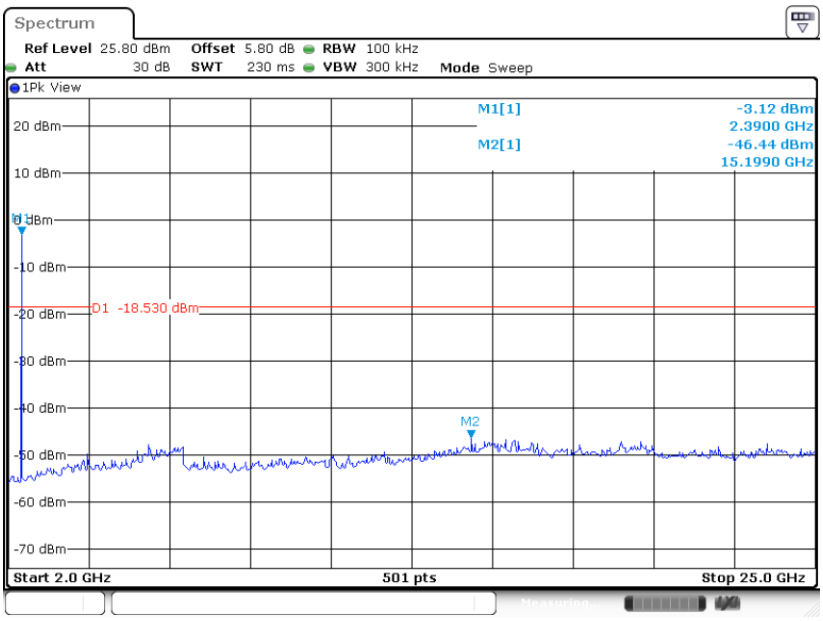
GFSK Channel 00



Date: 28.OCT.2022 11:26:57

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

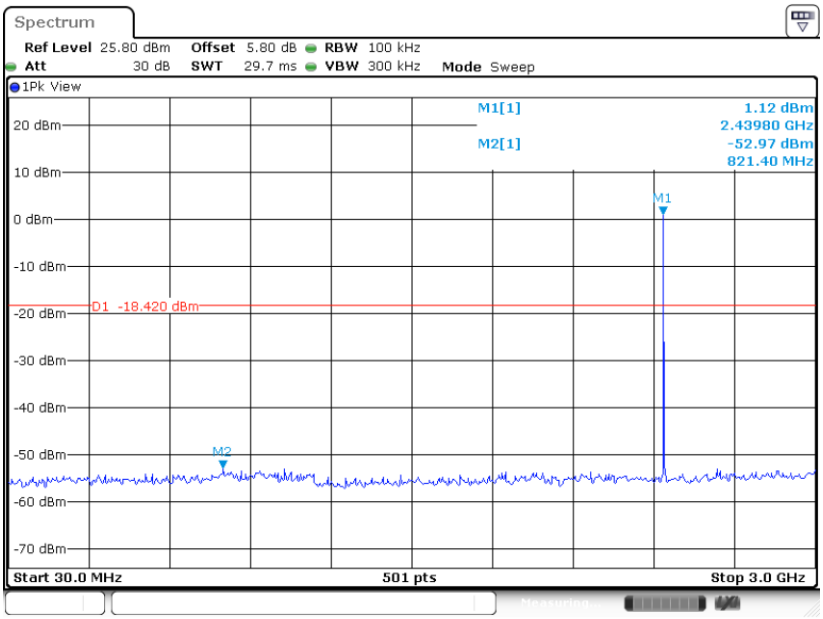
GFSK Channel 00



Date: 28.OCT.2022 11:27:17

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

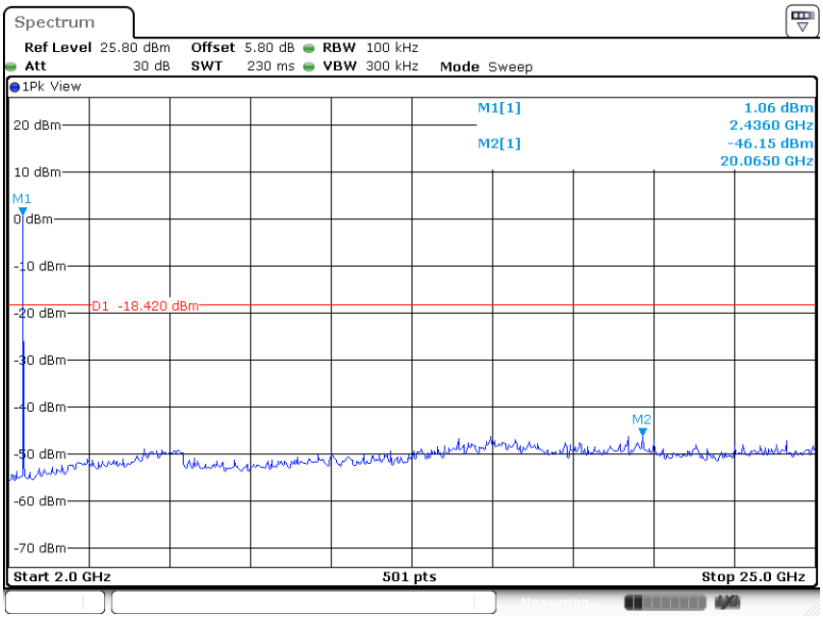
GFSK Channel 19



Date: 28.OCT.2022 11:30:23

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

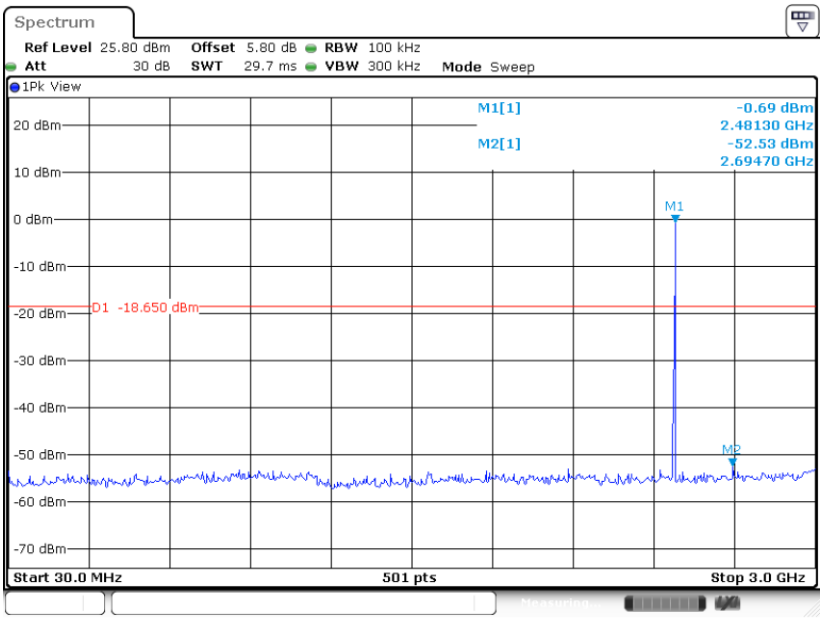
GFSK Channel 19



Date: 28.OCT.2022 11:30:43

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

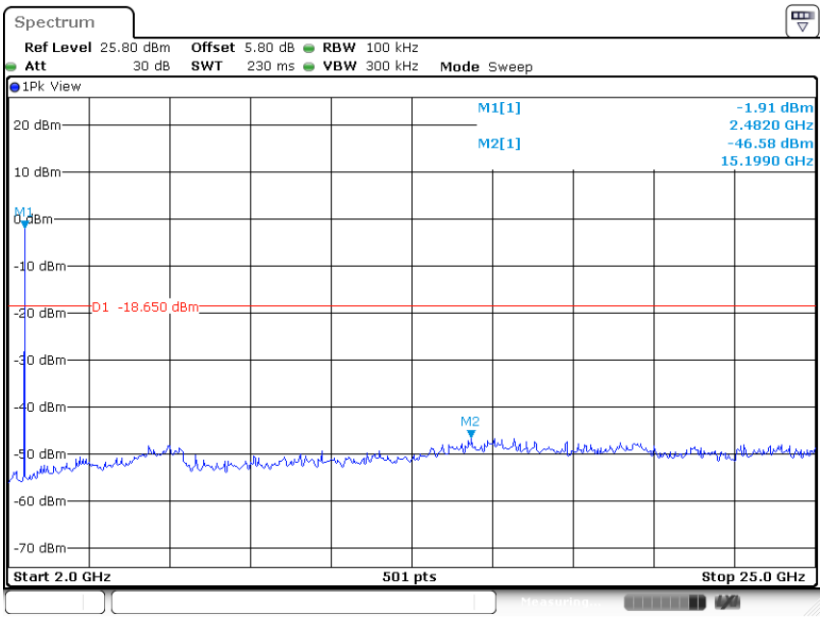
GFSK Channel 39



Date: 28.OCT.2022 11:35:42

Conducted Spurious Emission Plot on Bluetooth LE 2Mbps

GFSK Channel 39



Date: 28.OCT.2022 11:35:56

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

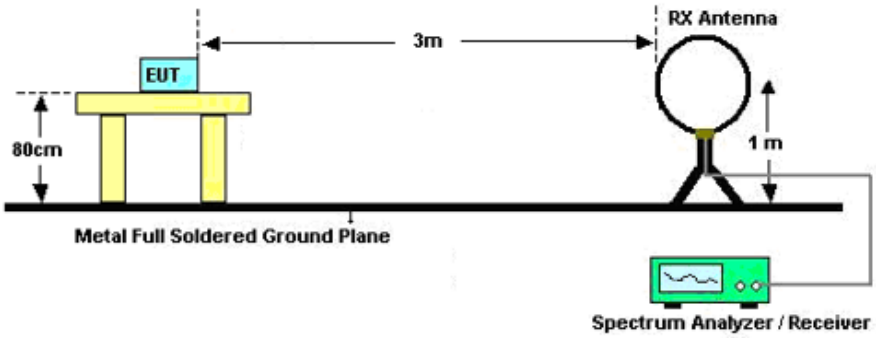
The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.5.3 Test Procedures

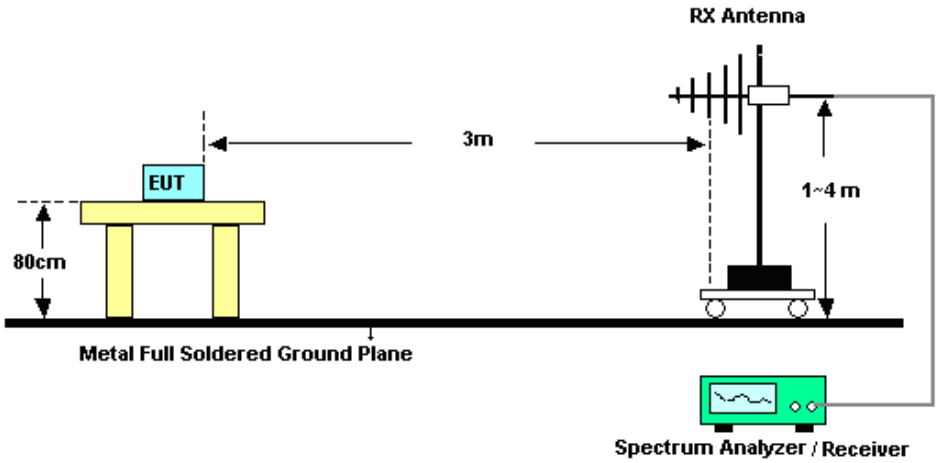
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 peak 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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

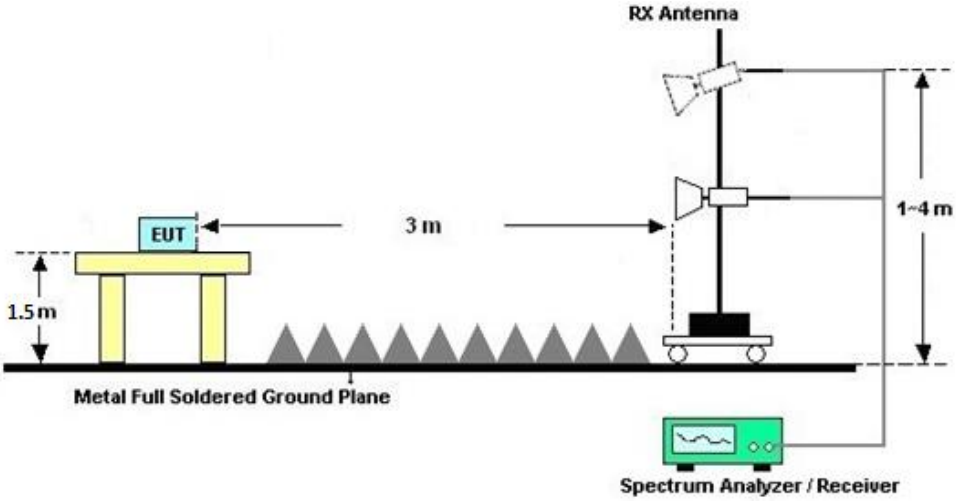
For radiated emissions below 30MHz



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& C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix B&C.

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

An embedded-in antenna design 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	Oct. 14, 2021	Aug. 18, 2022~ Oct. 28, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 13, 2022		Oct. 12, 2023	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Aug. 18, 2022~ Oct. 28, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Aug. 18, 2022~ Oct. 28, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Attenuator	Midisco	NDC9886N3-3	0148	DC~3GHz,3dB, 250W	NCR	Aug. 18, 2022~ Oct. 28, 2022	NCR	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 16, 2021	Aug. 11, 2022~ Aug. 21, 2022	Oct. 15, 2022	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY60242126	10Hz-44GHz	Oct. 26, 2021	Aug. 11, 2022~ Aug. 21, 2022	Oct. 25, 2022	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Aug. 11, 2022~ Aug. 21, 2022	Oct. 29, 2022	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz-1GHz	May 24, 2022	Aug. 11, 2022~ Aug. 21, 2022	May 23, 2023	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218642	1GHz~18GHz	Apr. 18, 2022	Aug. 11, 2022~ Aug. 21, 2022	Apr. 17, 2023	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 05, 2022	Aug. 11, 2022~ Aug. 21, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	380827	9KHz ~1GHZ	Jul. 11, 2022	Aug. 11, 2022~ Aug. 21, 2022	Jul. 10, 2023	Radiation (03CH06-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Aug. 11, 2022~ Aug. 21, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2082395	1Ghz-18Ghz	Jan. 05, 2022	Aug. 11, 2022~ Aug. 21, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270319	500MHz~26.5GHz	Oct. 14, 2021	Aug. 11, 2022~ Aug. 21, 2022	Oct. 13, 2022	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Aug. 11, 2022~ Aug. 21, 2022	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Aug. 11, 2022~ Aug. 21, 2022	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Aug. 11, 2022~ Aug. 21, 2022	NCR	Radiation (03CH06-KS)

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.

Test Item	Uncertainty
Conducted Power	**±0.56 dB**
Conducted Emissions	**±0.92 dB**
Occupied Channel Bandwidth	**±0.03 %**
Conducted Power Spectral Density	**±0.54 dB**

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

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

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))	**5.0dB**

---------- THE END ----------

Appendix A. Conducted Test Result

Report Number : FR280206

Test Engineer:	Jacob Zhang	Temperature:	20~26	°C
Test Date:	2022/8/18~2022/10/28	Relative Humidity:	40~51	%

Report Number : FR280206

Bluetooth Low Energy

Test Engineer:	Jacob Zhang	Temperature:	20~26	°C
Test Date:	2022/8/18~2022/10/28	Relative Humidity:	40~51	%

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	1.03	0.66	0.50	Pass
BLE	1Mbps	1	19	2440	1.03	0.67	0.50	Pass
BLE	1Mbps	1	39	2480	1.03	0.67	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	3.05	30.00	4.60	7.65	36.00	Pass
BLE	1Mbps	1	19	2440	2.98	30.00	4.60	7.58	36.00	Pass
BLE	1Mbps	1	39	2480	2.75	30.00	4.60	7.35	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	0.67	2.92
BLE	1Mbps	1	19	2440	0.67	2.79
BLE	1Mbps	1	39	2480	0.67	2.52

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	1.46	-12.14	4.60	8.00	Pass
BLE	1Mbps	1	19	2440	1.54	-13.23	4.60	8.00	Pass
BLE	1Mbps	1	39	2480	1.32	-13.32	4.60	8.00	Pass

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

Report Number : FR280206

Bluetooth Low Energy

Test Engineer:	Jacob Zhang	Temperature:	20~26	°C
Test Date:	2022/8/18~2022/10/28	Relative Humidity:	40~51	%

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	2Mbps	1	0	2402	2.04	1.16	0.50	Pass
BLE	2Mbps	1	19	2440	2.04	1.13	0.50	Pass
BLE	2Mbps	1	39	2480	2.04	1.14	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	2Mbps	1	0	2402	2.89	30.00	4.60	7.49	36.00	Pass
BLE	2Mbps	1	19	2440	2.88	30.00	4.60	7.48	36.00	Pass
BLE	2Mbps	1	39	2480	2.68	30.00	4.60	7.28	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	2Mbps	1	0	2402	2.35	2.72
BLE	2Mbps	1	19	2440	2.35	2.64
BLE	2Mbps	1	39	2480	2.35	2.40

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	2Mbps	1	0	2402	1.47	-13.85	4.60	8.00	Pass
BLE	2Mbps	1	19	2440	1.58	-14.01	4.60	8.00	Pass
BLE	2Mbps	1	39	2480	1.35	-14.48	4.60	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

Test Engineer :	Levi zhao	Temperature :	22~23°C
		Relative Humidity :	41~42%

Bluetooth LE 1Mbps

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path 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		2344.84	53.66	-20.34	74	47.95	32.1	6.53	32.92	113	219	P	H
		2388.26	42.9	-11.1	54	36.87	32.3	6.61	32.88	113	219	A	H
	*	2402	103.18	-	-	97.11	32.3	6.61	32.84	113	219	P	H
	*	2402	102.14	-	-	96.07	32.3	6.61	32.84	113	219	A	H
		2360.05	53.59	-20.41	74	47.78	32.17	6.56	32.92	101	354	P	V
		2369.93	42.89	-11.11	54	36.96	32.23	6.58	32.88	101	354	A	V
	*	2402	97.54	-	-	91.47	32.3	6.61	32.84	101	354	P	V
	*	2402	96.49	-	-	90.42	32.3	6.61	32.84	101	354	A	V
BLE CH 19 2440MHz		2383.45	53.73	-20.27	74	47.8	32.23	6.58	32.88	137	220	P	H
		2388.91	42.78	-11.22	54	36.75	32.3	6.61	32.88	137	220	A	H
		2488.24	54.09	-19.91	74	47.48	32.5	6.75	32.64	137	220	P	H
		2499.34	43.35	-10.65	54	36.67	32.5	6.75	32.57	137	220	A	H
	*	2440	102.44	-	-	96.23	32.3	6.68	32.77	137	220	P	H
	*	2440	101.35	-	-	95.14	32.3	6.68	32.77	137	220	A	H
		2352.9	53.08	-20.92	74	47.27	32.17	6.56	32.92	145	360	P	V
		2385.14	42.83	-11.17	54	36.9	32.23	6.58	32.88	145	360	A	V
		2499.28	54.05	-19.95	74	47.37	32.5	6.75	32.57	145	360	P	V
		2496.4	43.54	-10.46	54	36.86	32.5	6.75	32.57	145	360	A	V
	*	2440	97.26	-	-	91.05	32.3	6.68	32.77	145	360	P	V
	*	2440	96.19	-	-	89.98	32.3	6.68	32.77	145	360	A	V

BLE CH 39 2480MHz		2484.4	55.8	-18.2	74	49.28	32.43	6.73	32.64	131	145	P	H
		2483.5	43.77	-10.23	54	37.25	32.43	6.73	32.64	131	145	A	H
	*	2480	101.93	-	-	95.41	32.43	6.73	32.64	131	145	P	H
	*	2480	100.84	-	-	94.32	32.43	6.73	32.64	131	145	A	H
		2483.92	56.26	-17.74	74	49.74	32.43	6.73	32.64	345	80	P	V
		2483.74	43.45	-10.55	54	36.93	32.43	6.73	32.64	345	80	A	V
	*	2480	101.38	-	-	94.86	32.43	6.73	32.64	345	80	P	V
	*	2480	100.24	-	-	93.72	32.43	6.73	32.64	345	80	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	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path 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		4800	43.04	-30.96	74	61.09	34.3	9.45	61.8	300	0	P	H
		4800	46.61	-27.39	74	64.66	34.3	9.45	61.8	100	0	P	V
BLE CH 19 2440MHz		4875	45.1	-28.9	74	63.16	34.14	9.52	61.72	300	0	P	H
		7320	42.88	-31.12	74	57.19	35.7	11.69	61.7	300	0	P	H
		4875	46.51	-27.49	74	64.57	34.14	9.52	61.72	100	0	P	V
		7320	43.53	-30.47	74	57.84	35.7	11.69	61.7	100	0	P	V
BLE CH 39 2480MHz		4965	44.69	-29.31	74	62.55	34.1	9.61	61.57	300	0	P	H
		7440	42.15	-31.85	74	56.37	35.7	11.78	61.7	300	0	P	H
		4965	46.48	-27.52	74	64.34	34.1	9.61	61.57	100	0	P	V
		7440	41.88	-32.12	74	56.1	35.7	11.78	61.7	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Bluetooth LE 2Mbps

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

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		2373.7	53.59	-20.41	74	47.66	32.23	6.58	32.88	133	133	P	H
		2389.3	43.2	-10.8	54	37.17	32.3	6.61	32.88	133	133	A	H
	*	2402	101.37	-	-	95.3	32.3	6.61	32.84	133	133	P	H
	*	2402	99.06	-	-	92.99	32.3	6.61	32.84	133	133	A	H
		2330.8	53.63	-20.37	74	48.06	32.03	6.5	32.96	377	96	P	V
		2389.17	43.29	-10.71	54	37.26	32.3	6.61	32.88	377	96	A	V
	*	2402	100.22	-	-	94.15	32.3	6.61	32.84	377	96	P	V
	*	2402	97.93	-	-	91.86	32.3	6.61	32.84	377	96	A	V
BLE CH 19 2440MHz		2378.38	53.92	-20.08	74	47.99	32.23	6.58	32.88	111	137	P	H
		2379.29	43.81	-10.19	54	37.88	32.23	6.58	32.88	111	137	A	H
		2486.38	54.62	-19.38	74	48.1	32.43	6.73	32.64	111	137	P	H
		2497.84	44.21	-9.79	54	37.53	32.5	6.75	32.57	111	137	A	H
	*	2440	100.15	-	-	93.94	32.3	6.68	32.77	111	137	P	H
	*	2440	97.78	-	-	91.57	32.3	6.68	32.77	111	137	A	H
		2328.59	54.03	-19.97	74	48.46	32.03	6.5	32.96	363	99	P	V
		2383.32	43.38	-10.62	54	37.45	32.23	6.58	32.88	363	99	A	V
		2494.54	53.79	-20.21	74	47.11	32.5	6.75	32.57	363	99	P	V
		2492.38	43.93	-10.07	54	37.25	32.5	6.75	32.57	363	99	A	V
	*	2440	101.65	-	-	95.44	32.3	6.68	32.77	363	99	P	V
	*	2440	99.3	-	-	93.09	32.3	6.68	32.77	363	99	A	V
BLE CH 39 2480MHz		2484.1	56.33	-17.67	74	49.81	32.43	6.73	32.64	129	141	P	H
		2483.5	44.73	-9.27	54	38.21	32.43	6.73	32.64	129	141	A	H
	*	2480	100.78	-	-	94.26	32.43	6.73	32.64	129	141	P	H
	*	2480	98.48	-	-	91.96	32.43	6.73	32.64	129	141	A	H
		2484.34	56.71	-17.29	74	50.19	32.43	6.73	32.64	312	101	P	V
		2483.5	45.28	-8.72	54	38.76	32.43	6.73	32.64	312	101	A	V
	*	2480	101.62	-	-	95.1	32.43	6.73	32.64	312	101	P	V
	*	2480	99.4	-	-	92.88	32.43	6.73	32.64	312	101	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	Level	Over	Limit	Read	Antenna	Path	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		4800	44.46	-29.54	74	62.51	34.3	9.45	61.8	300	0	P	H
		4800	45.23	-28.77	74	63.28	34.3	9.45	61.8	100	0	P	V
BLE CH 19 2440MHz		4875	46.28	-27.72	74	64.34	34.14	9.52	61.72	300	0	P	H
		7320	42.56	-31.44	74	56.87	35.7	11.69	61.7	300	0	P	H
		4875	44.94	-29.06	74	63	34.14	9.52	61.72	100	0	P	V
		7320	43.89	-30.11	74	58.2	35.7	11.69	61.7	100	0	P	V
BLE CH 39 2480MHz		4965	43.45	-30.55	74	61.31	34.1	9.61	61.57	300	0	P	H
		7440	42.46	-31.54	74	56.68	35.7	11.78	61.7	300	0	P	H
		4965	46.75	-27.25	74	64.61	34.1	9.61	61.57	100	0	P	V
		7440	41.91	-32.09	74	56.13	35.7	11.78	61.7	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	Path	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		130.88	16.39	-27.11	43.5	28.64	17.34	1.81	31.4	-	-	P	H
		265.71	19.71	-26.29	46	28.78	19.71	2.62	31.4	-	-	P	H
		470.38	23.5	-22.5	46	28.35	23.17	3.47	31.49	-	-	P	H
		558.65	26.32	-19.68	46	27.85	26.15	3.77	31.45	-	-	P	H
		764.29	29.3	-16.7	46	28.16	28.05	4.41	31.32	-	-	P	H
		975.75	31.81	-22.19	54	26.53	30.6	4.98	30.3	-	-	P	H
		260.86	18.67	-27.33	46	27.53	19.94	2.6	31.4	-	-	P	V
		434.49	22.53	-23.47	46	28.31	22.36	3.33	31.47	-	-	P	V
		556.71	28.24	-17.76	46	29.9	26.02	3.77	31.45	-	-	P	V
		761.38	28.64	-17.36	46	27.49	28.06	4.41	31.32	-	-	P	V
		848.68	30.13	-15.87	46	28.04	28.94	4.65	31.5	-	-	P	V
		978.66	31.1	-22.9	54	25.79	30.61	4.99	30.29	-	-	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:

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path 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) + Path 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

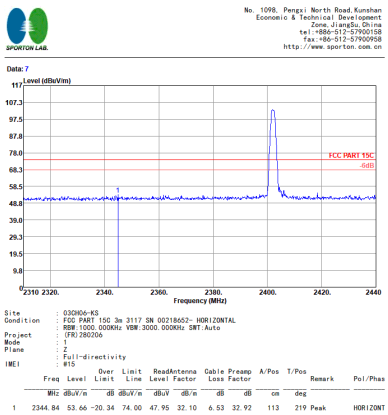
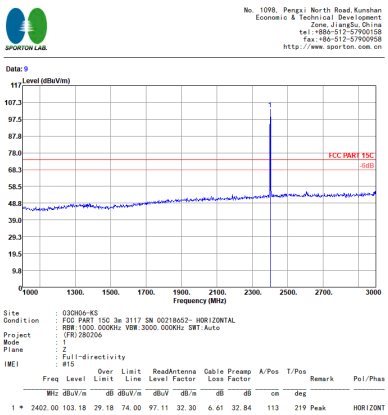
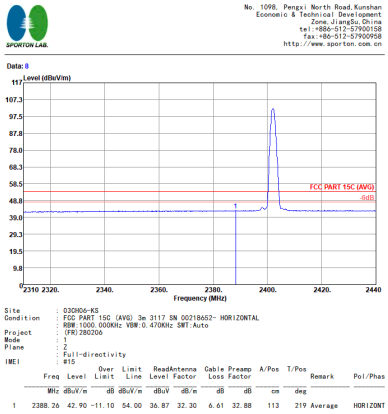
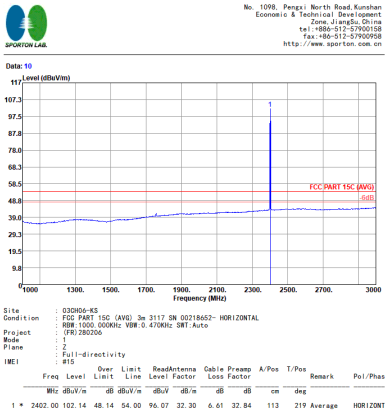
Note symbol

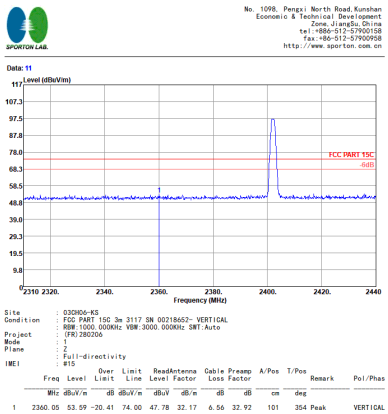
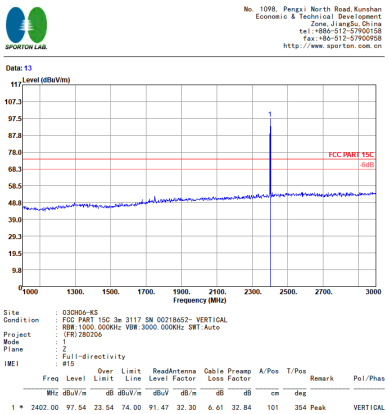
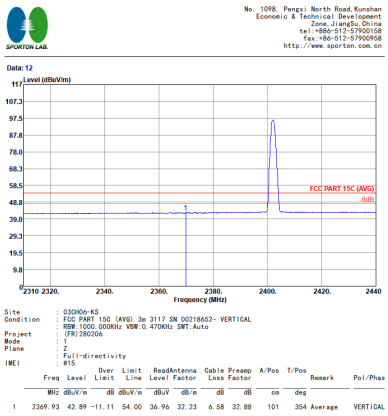
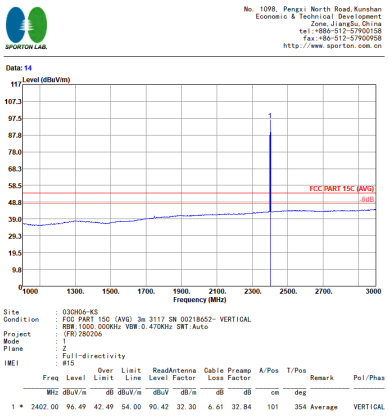
-L	**Low channel location**
-R	**High channel location**

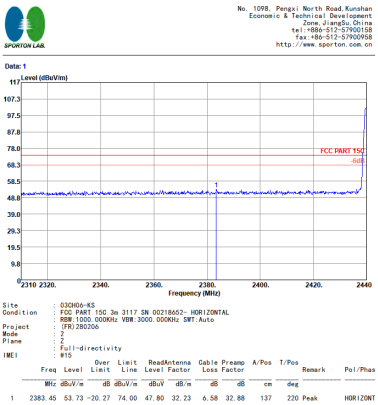
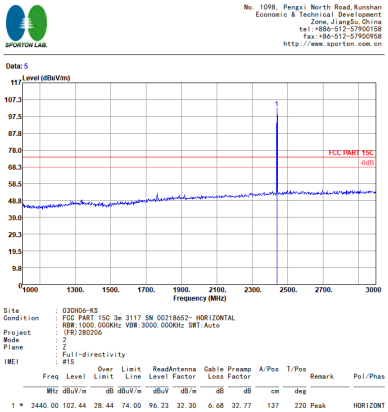
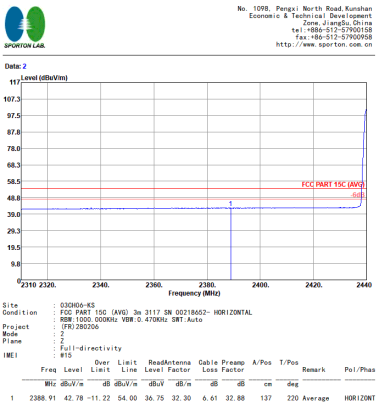
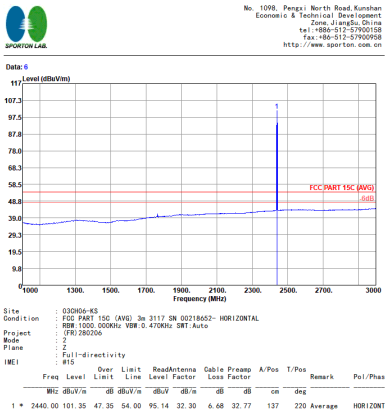
Bluetooth LE 1Mbps

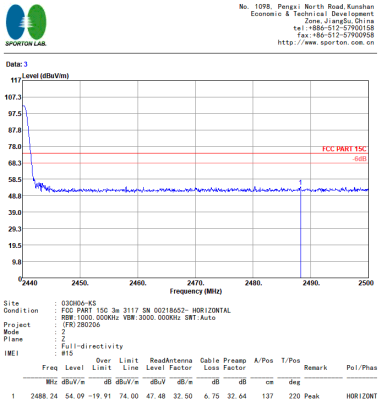
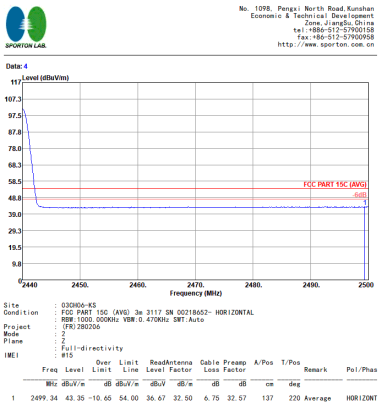
2.4GHz 2400~2483.5MHz

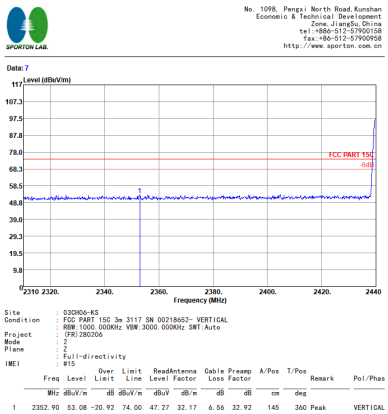
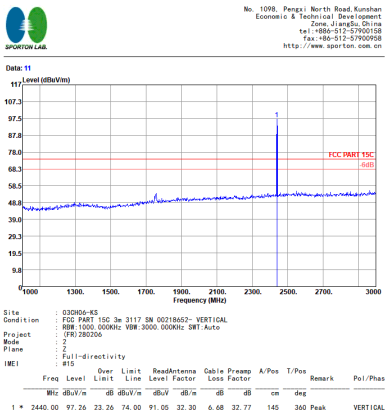
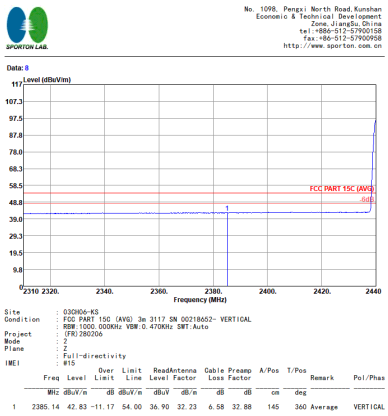
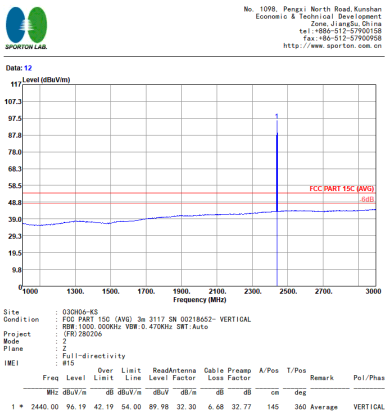
BLE (Band Edge @ 3m)

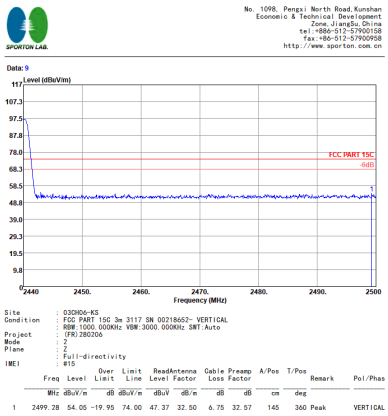
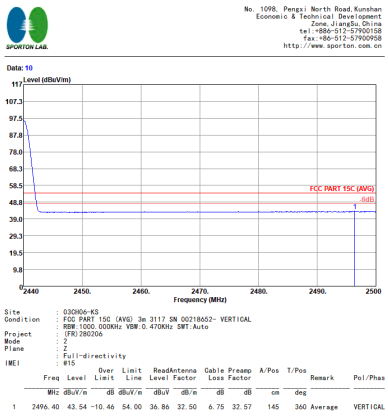
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

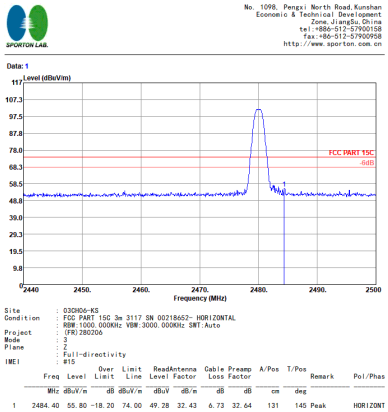
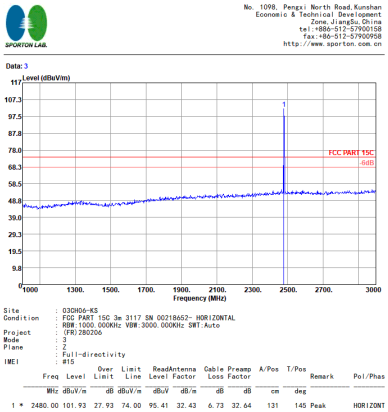
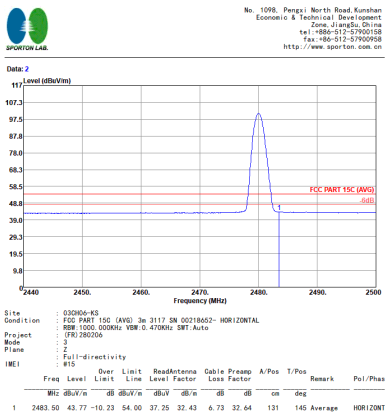
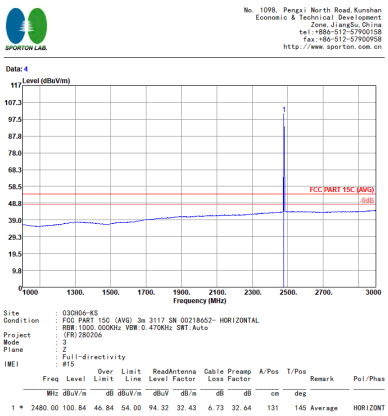
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak		
Avg		

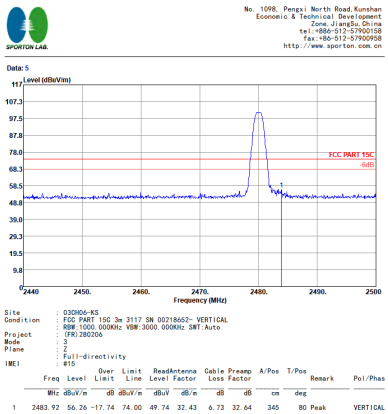
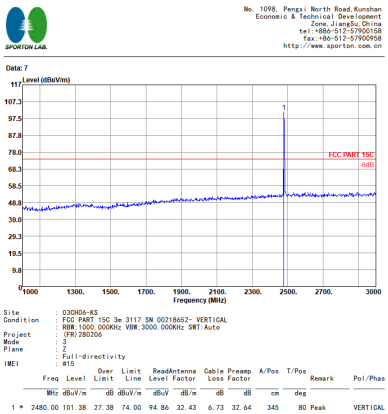
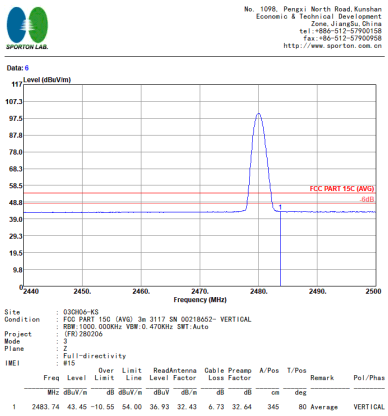
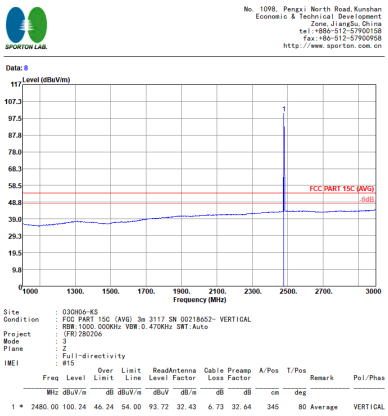
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

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

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

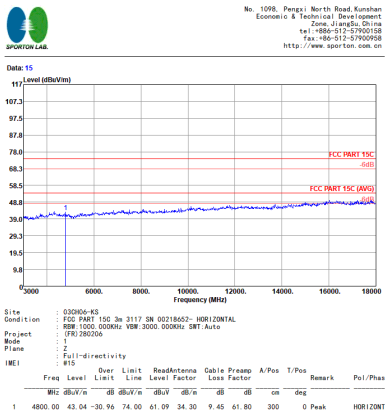
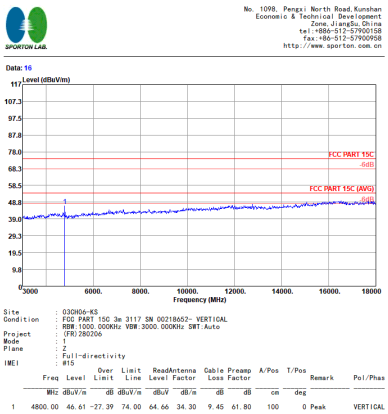
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

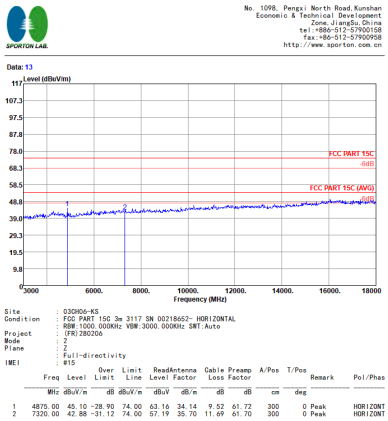
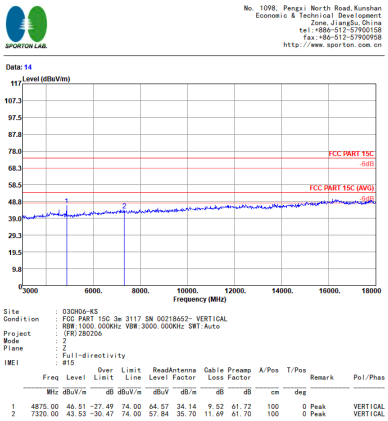
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

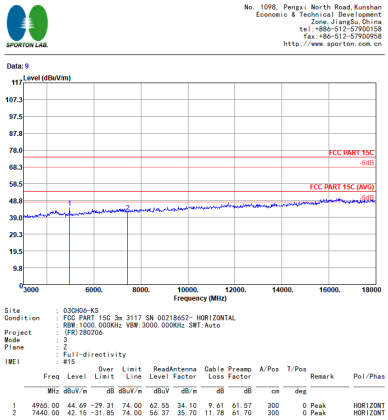
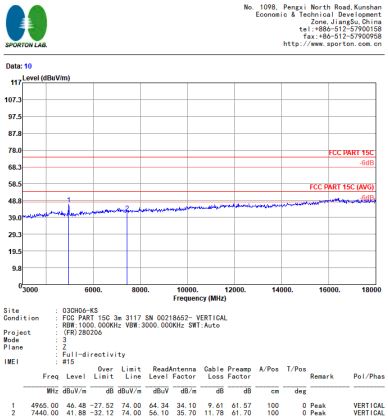
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak		
Avg.		

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.	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+86-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 15 Level (dBuV/m) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 1 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4800.00 43.04 -30.96 74.00 61.09 34.30 9.45 61.80 300 0 Peak HORIZONT	 No. 1098, Pengxi North Road,Kunshan Economic & Technical Development Zone,JiangSu,China tel:+86-512-57900158 fax:+86-512-57900958 http://www.sporton.com.cn Data: 16 Level (dBuV/m) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 1 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4800.00 46.61 -27.39 74.00 64.66 34.30 9.45 61.80 100 0 Peak VERTICAL

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.	 Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 2 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4875.00 45.10 -28.90 74.00 63.16 34.14 9.52 61.72 300 0 Peak HORIZONT 2 7320.00 42.88 -31.12 74.00 57.19 35.70 11.69 61.70 300 0 Peak HORIZONT	 Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 2 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4875.00 46.51 -27.49 74.00 64.57 34.14 9.52 61.72 100 0 Peak VERTICAL 2 7320.00 43.53 -30.47 74.00 57.84 35.70 11.69 61.70 100 0 Peak VERTICAL

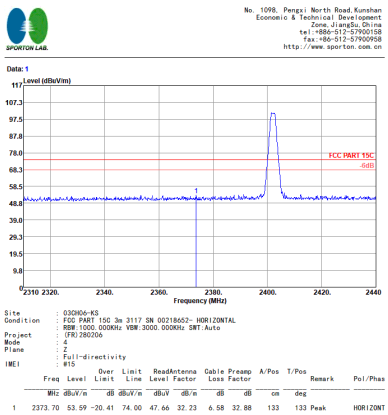
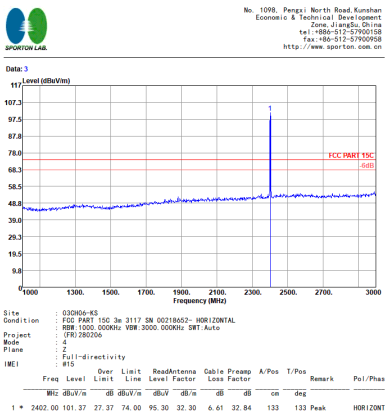
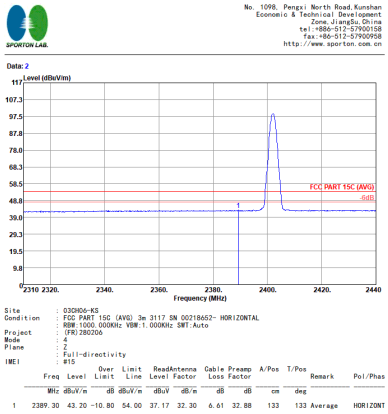
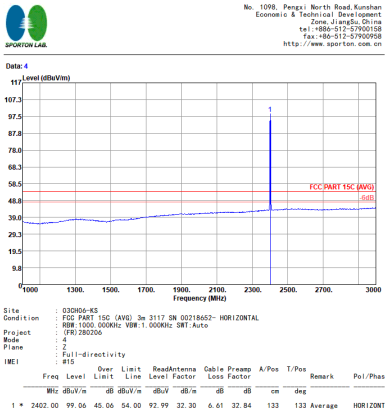
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	 Data: 9 Level (dBuV/m) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 3 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4965.00 44.69 -29.31 74.00 62.55 34.10 9.61 61.57 300 0 Peak HORIZONT 2 7440.00 42.15 -31.85 74.00 56.37 35.70 11.78 61.70 300 0 Peak HORIZONT	 Data: 10 Level (dBuV/m) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 3 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4965.00 46.48 -27.52 74.00 64.34 34.10 9.61 61.57 100 0 Peak VERTICAL 2 7440.00 41.88 -32.12 74.00 56.10 35.70 11.78 61.70 100 0 Peak VERTICAL

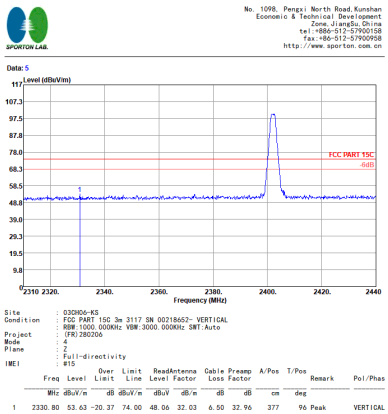
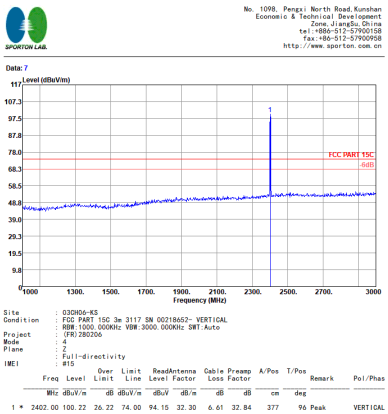
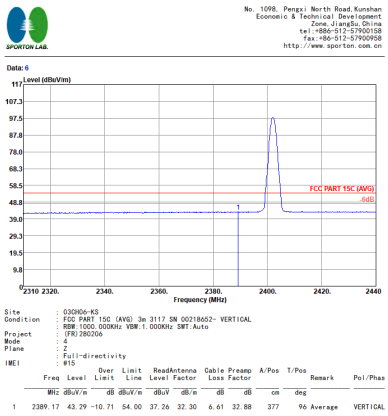
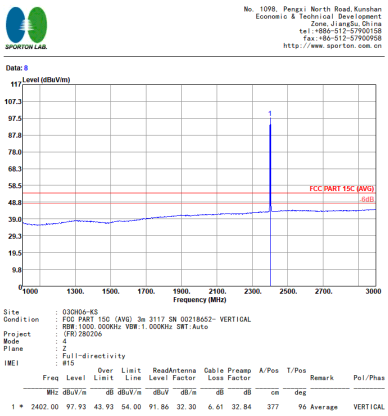
Note: Pre-scanned for 18GHz to 26GHz, there are no signals, thus only test data below 18GHz are shown in the report.

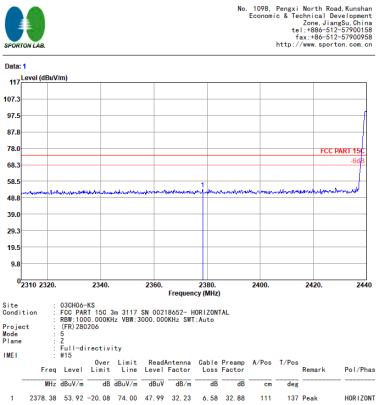
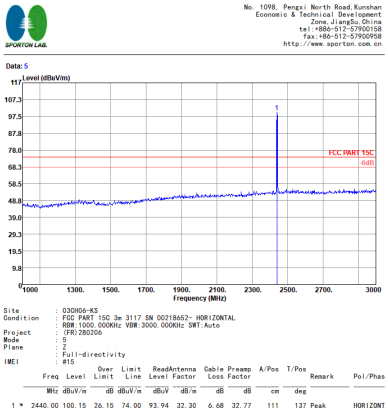
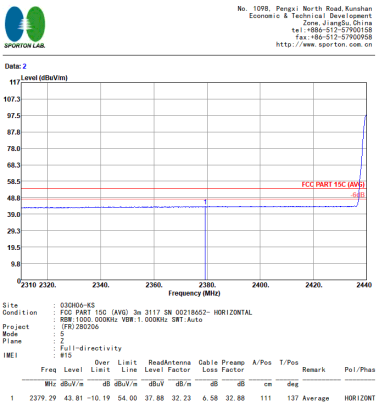
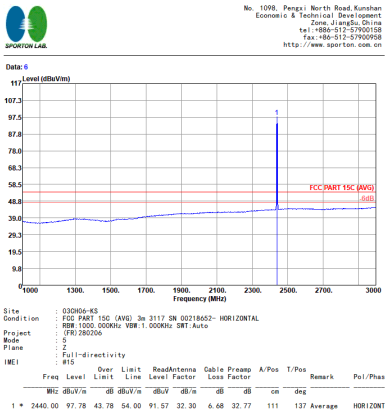
Bluetooth LE 2Mbps

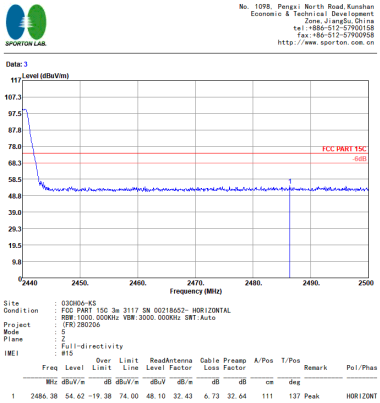
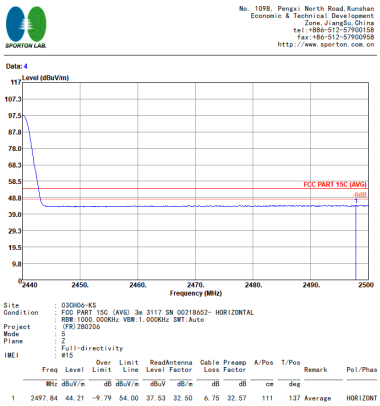
2.4GHz 2400~2483.5MHz

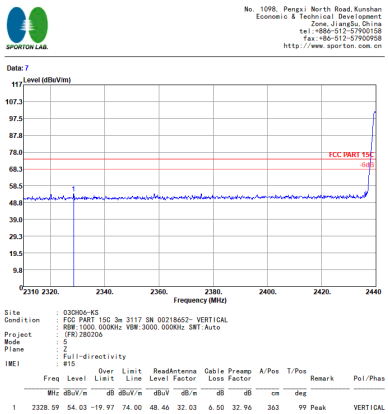
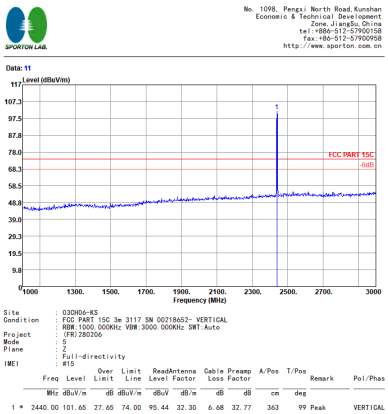
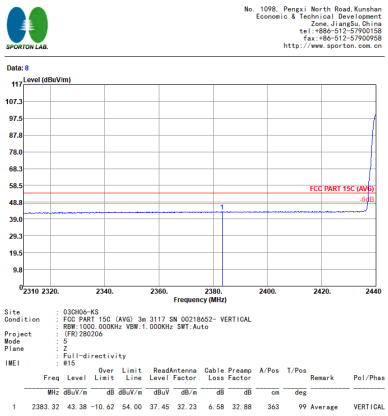
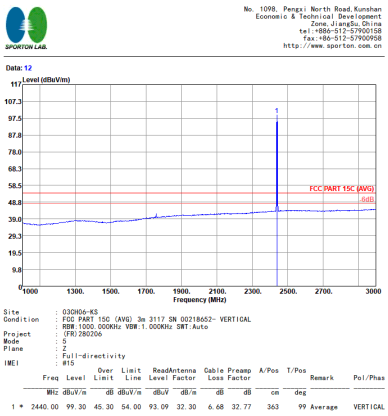
BLE (Band Edge @ 3m)

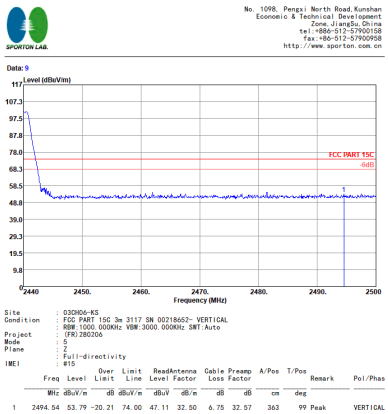
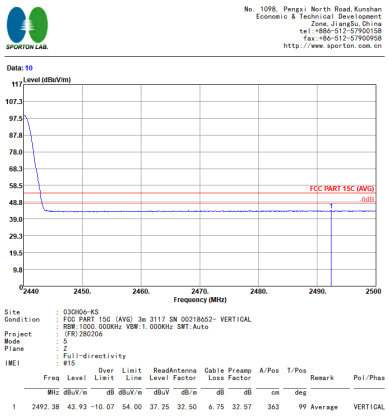
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

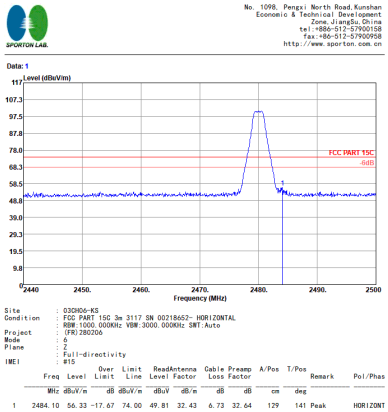
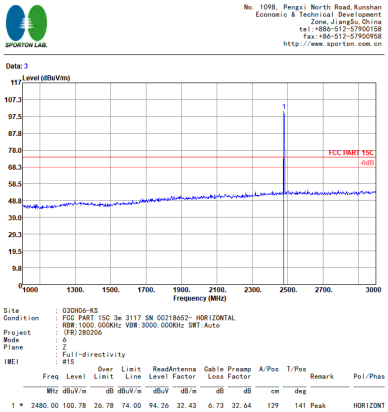
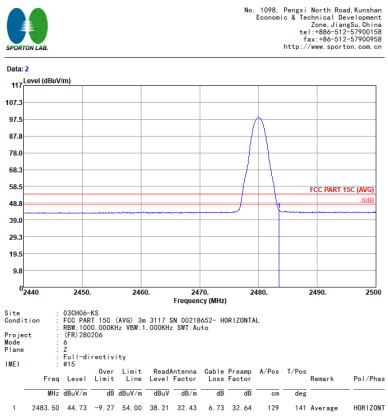
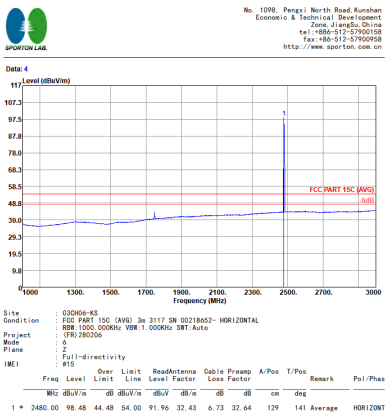
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak		
Avg		

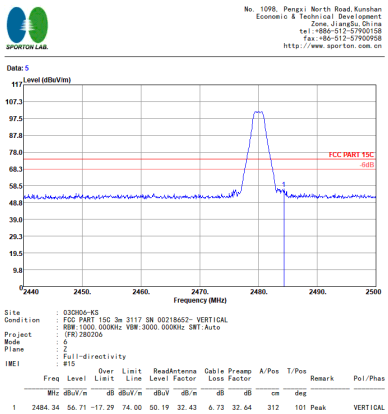
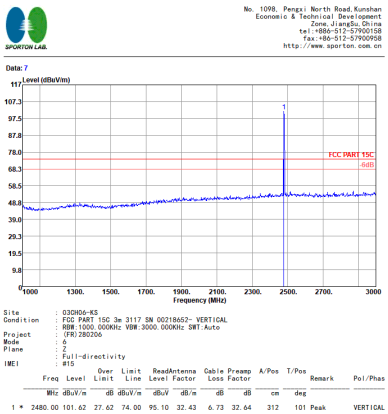
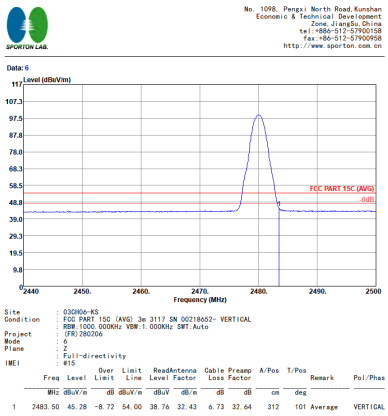
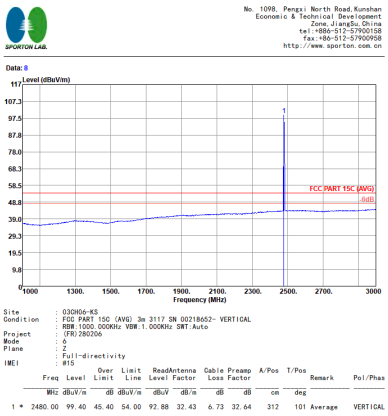
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

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

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

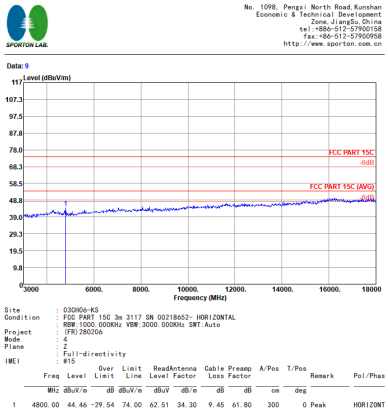
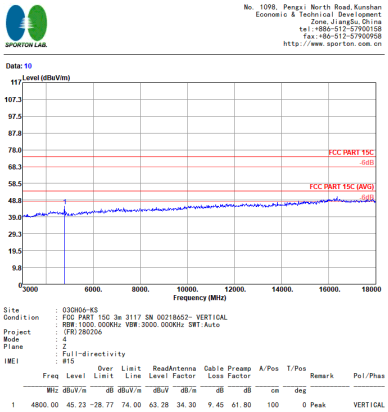
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

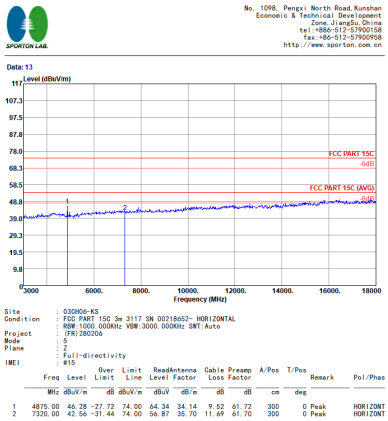
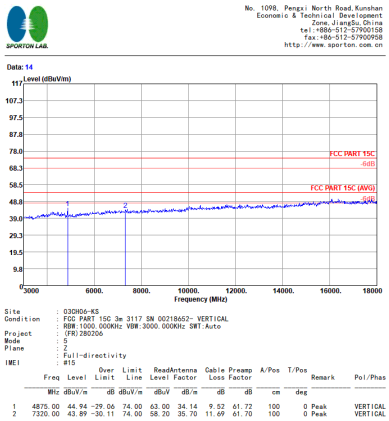
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

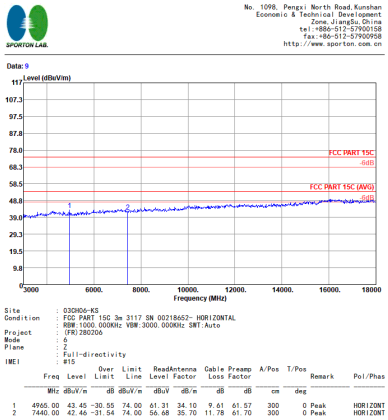
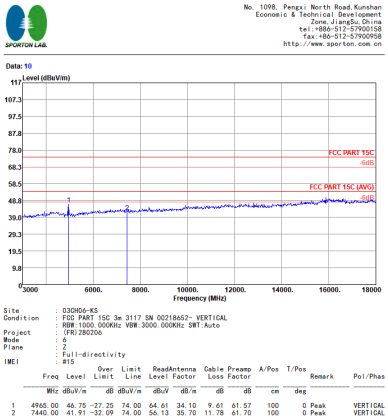
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak		
Avg.		

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.		

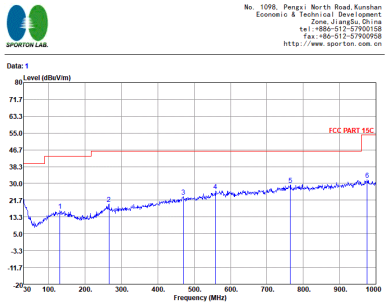
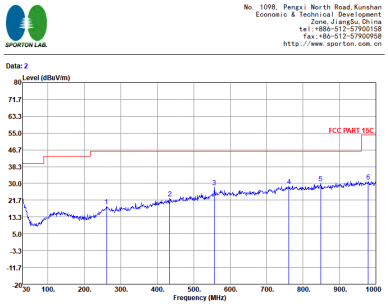
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.	 Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 5 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4875.00 46.28 -27.72 74.00 64.34 34.14 9.52 61.72 300 0 Peak HORIZONT 2 7320.00 42.56 -31.44 74.00 56.87 35.70 11.69 61.70 300 0 Peak HORIZONT	 Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : 5 Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4875.00 44.94 -29.06 74.00 63.00 34.14 9.52 61.72 100 0 Peak VERTICAL 2 7320.00 43.89 -30.11 74.00 58.20 35.70 11.69 61.70 100 0 Peak VERTICAL

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	 Data: 9 Level (dBuV/m) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : G Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4965.00 43.45 -30.55 74.00 61.31 34.10 9.61 61.57 300 0 Peak HORIZONT 2 7440.00 42.46 -31.54 74.00 56.68 35.70 11.78 61.70 300 0 Peak HORIZONT	 Data: 10 Level (dBuV/m) FCC PART 15C -6dB FCC PART 15C (AVG) -6dB Frequency (MHz) Site : 03CH06-KS Condition : FCC PART 15C 3m 3117 SN 00218652- VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : (FR)280206 Mode : G Plane : Z : Full-directivity IMEI : #15 Freq Level Over Limit Limit Line Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dBuV dB/m dB dB cm deg 1 4965.00 46.75 -27.25 74.00 64.61 34.10 9.61 61.57 100 0 Peak VERTICAL 2 7440.00 41.91 -32.09 74.00 56.13 35.70 11.78 61.70 100 0 Peak VERTICAL

Note: Pre-scanned for 18GHz to 26GHz, there are no signals, thus only test data below 18GHz are shown in the report.

Emission below 1GHz

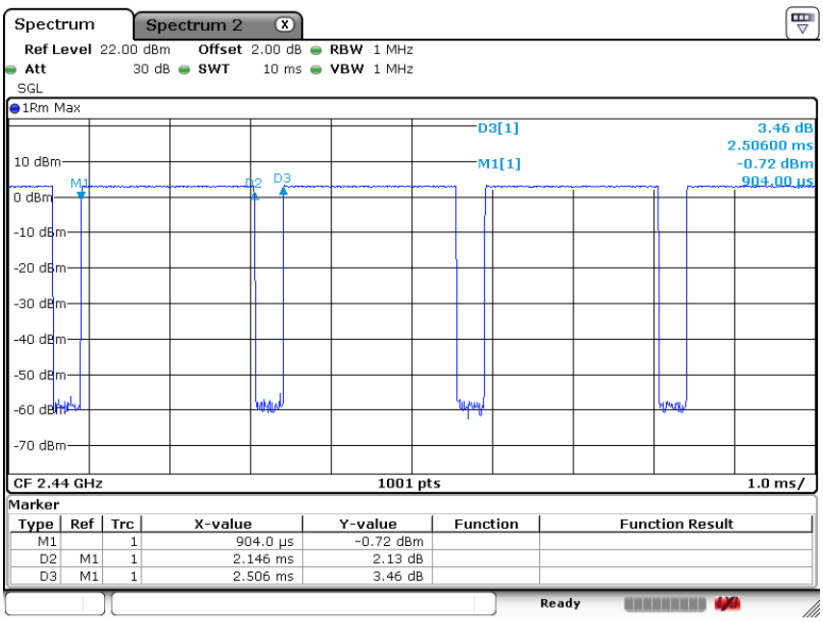
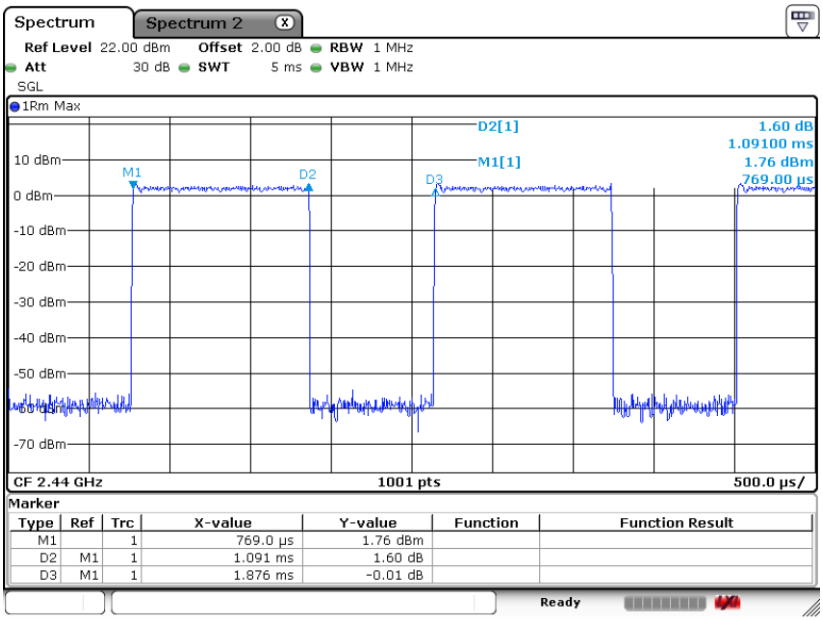
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
1	Horizontal	Vertical
QP / Peak	 Site : 03CH06-KS Condition : FCC PART 15C 3m CBL 6111D 49922 HORIZONTAL RBW:100.000KHz VBW:300.000KHz SWT:Auto Project : 280206 mode : 8 IMEI : #109 SN : Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 130.88 16.39 -27.11 43.50 28.64 17.34 1.81 31.40 --- --- Peak HORIZONT 2 265.71 19.71 -26.29 46.00 28.78 19.71 2.62 31.40 --- --- Peak HORIZONT 3 470.38 23.50 -22.50 46.00 28.35 23.17 3.47 31.49 --- --- Peak HORIZONT 4 558.65 26.32 -19.68 46.00 27.85 26.15 3.77 31.45 --- --- Peak HORIZONT 5 764.29 29.30 -16.70 46.00 28.16 28.05 4.41 31.32 --- --- Peak HORIZONT 6 975.75 31.81 -22.19 54.00 26.53 30.60 4.98 30.30 --- --- Peak HORIZONT	 Site : 03CH06-KS Condition : FCC PART 15C 3m CBL 6111D 49922 VERTICAL RBW:100.000KHz VBW:300.000KHz SWT:Auto Project : 280206 mode : 8 IMEI : #109 SN : Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Preamp Factor A/Pos T/Pos Remark Pol/Phas MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 260.86 18.67 -27.33 46.00 27.53 19.94 2.60 31.40 --- --- Peak VERTICAL 2 434.49 22.53 -23.47 46.00 28.31 22.36 3.33 31.47 --- --- Peak VERTICAL 3 556.71 28.24 -17.76 46.00 29.90 26.02 3.77 31.45 --- --- Peak VERTICAL 4 761.38 28.64 -17.36 46.00 27.49 28.06 4.41 31.32 --- --- Peak VERTICAL 5 848.68 30.13 -15.87 46.00 28.04 28.94 4.65 31.50 --- --- Peak VERTICAL 6 978.66 31.10 -22.90 54.00 25.79 30.61 4.99 30.29 --- --- Peak VERTICAL	

Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	Duty Factor (dB)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	85.63	0.67	2.146	0.466	0.47KHz
Bluetooth LE 2Mbps	58.16	2.35	1.091	0.917	1KHz

Bluetooth LE 1Mbps



Bluetooth LE 2Mbps