



FCC RF Test Report

APPLICANT : Espressif Systems (Shanghai) Co.,Ltd.
EQUIPMENT : 2.4GHz Wi-Fi & BT IoT Module
BRAND NAME : ESPRESSIF
MODEL NAME : ESP32-S3-WROOM-2
FCC ID : 2AC7Z-ESPS3WROOM2
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Jan. 11, 2022 ~ Mar. 10, 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.

Reviewed by: Jason Jia / Supervisor

Approved by: Alex Wang / Manager



Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



TABLE OF CONTENTS

REVISION HISTORY.....3

SUMMARY OF TEST RESULT4

1 GENERAL DESCRIPTION.....5

 1.1 Applicant5

 1.2 Manufacturer.....5

 1.3 Product Feature of Equipment Under Test.....5

 1.4 Product Specification of Equipment Under Test.....5

 1.5 Modification of EUT5

 1.6 Testing Location6

 1.7 Test Software.....6

 1.8 Applicable Standards.....6

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST.....7

 2.1 Carrier Frequency Channel7

 2.2 Test Mode.....8

 2.3 Connection Diagram of Test System.....9

 2.4 Support Unit used in test configuration and system9

 2.5 EUT Operation Test Setup9

 2.6 Measurement Results Explanation Example.....10

3 TEST RESULT11

 3.1 6dB Bandwidth Measurement11

 3.2 Output Power Measurement.....16

 3.3 Power Spectral Density Measurement17

 3.4 Conducted Band Edges and Spurious Emission Measurement26

 3.5 Radiated Band Edges and Spurious Emission Measurement37

 3.6 AC Conducted Emission Measurement.....41

 3.7 Antenna Requirements.....43

4 LIST OF MEASURING EQUIPMENT.....44

5 UNCERTAINTY OF EVALUATION.....46

APPENDIX A. CONDUCTED TEST RESULTS

APPENDIX B. AC CONDUCTED EMISSION TEST RESULT

APPENDIX C. RADIATED SPURIOUS EMISSION

APPENDIX D. RADIATED SPURIOUS EMISSION PLOTS

APPENDIX E. DUTY CYCLE PLOTS

APPENDIX F. SETUP PHOTOGRAPHS



REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|------------|---------|-------------------------|---------------|
| FR1D1703A | Rev. 01 | Initial issue of report | Mar. 25, 2022 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |



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 | - |
| 3.1 | - | 99% Bandwidth | - | Report only | - |
| 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 2.32 dB at 2483.500 MHz |
| 3.6 | 15.207 | AC Conducted Emission | 15.207(a) | Pass | Under limit 12.75 dB at 0.161 MHz |
| 3.7 | 15.203 & 15.247(b) | Antenna Requirement | 15.203 & 15.247(b) | Pass | - |

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

Espressif Systems (Shanghai) Co.,Ltd.

Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China

1.2 Manufacturer

Espressif Systems (Shanghai) Co.,Ltd.

Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China

1.3 Product Feature of Equipment Under Test

| Product Feature | |
|-----------------|------------------------------|
| Equipment | 2.4GHz Wi-Fi & BT IoT Module |
| Brand Name | ESPRESSIF |
| Model Name | ESP32-S3-WROOM-2 |
| FCC ID | 2AC7Z-ESPS3WROOM2 |
| HW Version | V1.2 |
| SW Version | V1.1.3.0 |
| EUT Stage | Production Unit |

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

1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|--|
| Tx/Rx Frequency Range | 2402 MHz ~ 2480 MHz |
| Number of Channels | 40 |
| Carrier Frequency of Each Channel | 40 Channel(37 hopping + 3 advertising channel) |
| Maximum Output Power to Antenna | Bluetooth LE 1Mbps : 10.76dBm (0.0119 W) Bluetooth LE 2Mbps : 11.62dBm (0.0145 W) |
| Antenna Type / Gain | PCB Antenna type with gain 3.26 dBi |
| Type of Modulation | Bluetooth LE : GFSK |

1.5 Modification of EUT

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



1.6 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. |
| | CO01-KS 03CH05-KS TH01-KS | CN1257 | 314309 |

1.7 Test Software

| Item | Site | Manufacturer | Name | Version |
|------|-----------|--------------|------|---------------|
| 1. | 03CH05-KS | AUDIX | E3 | 6.2009-8-24a1 |
| 2. | CO01-KS | AUDIX | E3 | 6.2009-8-24 |

1.8 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

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



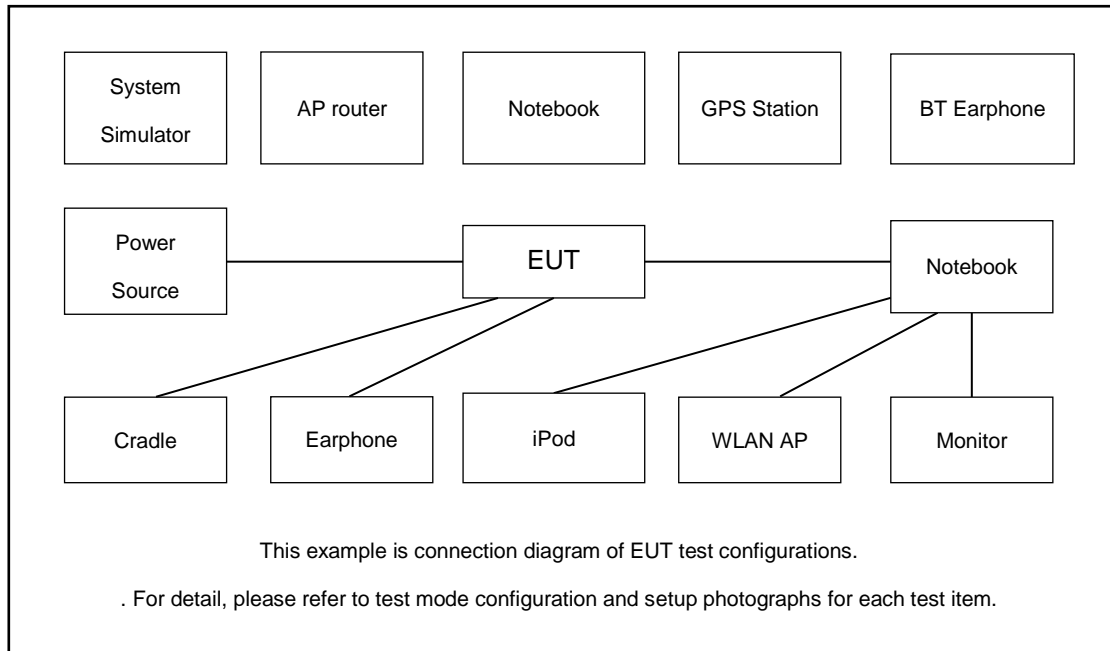
2.2 Test Mode

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

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

| Summary table of Test Cases | |
|-----------------------------|---|
| Test Item | Data Rate / Modulation |
| | Bluetooth LE / GFSK |
| Conducted TCs | Mode 1: Bluetooth 1Mbps Tx CH00_2402 MHz |
| | Mode 2: Bluetooth 1Mbps Tx CH19_2440 MHz |
| | Mode 3: Bluetooth 1Mbps Tx CH39_2480 MHz |
| | Mode 4: Bluetooth 2Mbps Tx CH00_2402 MHz |
| | Mode 5: Bluetooth 2Mbps Tx CH19_2440 MHz |
| | Mode 6: Bluetooth 2Mbps Tx CH38_2478 MHz |
| | Mode 7: Bluetooth 2Mbps Tx CH39_2480 MHz z |
| Radiated TCs | Mode 1: Bluetooth 1Mbps Tx CH00_2402 MHz |
| | Mode 2: Bluetooth 1Mbps Tx CH19_2440 MHz |
| | Mode 3: Bluetooth 1Mbps Tx CH39_2480 MHz |
| | Mode 4: Bluetooth 2Mbps Tx CH00_2402 MHz |
| | Mode 5: Bluetooth 2Mbps Tx CH19_2440 MHz |
| | Mode 6: Bluetooth 2Mbps Tx CH38_2478 MHz |
| | Mode 7: Bluetooth 2Mbps Tx CH39_2480 MHz z |
| AC Conducted Emission | Mode 1: Bluetooth Link + WLAN(2.4GHz) Link + Powered by Notebook charging |

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. | WLAN AP | D-link | DIR-655 | KA21R655B1 | N/A | Unshielded, 1.8m |
| 2. | Notebook | Lenovo | V130-15IKB005 | N/A | N/A | AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m |

2.5 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.



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 5.30 dB.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.30 \text{ (dB)} \end{aligned}$$

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.

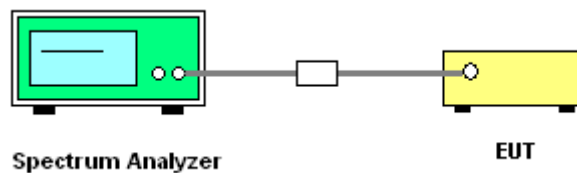
3.1.2 Measuring Instruments

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 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. Measure and record the results in the test report.

3.1.4 Test Setup



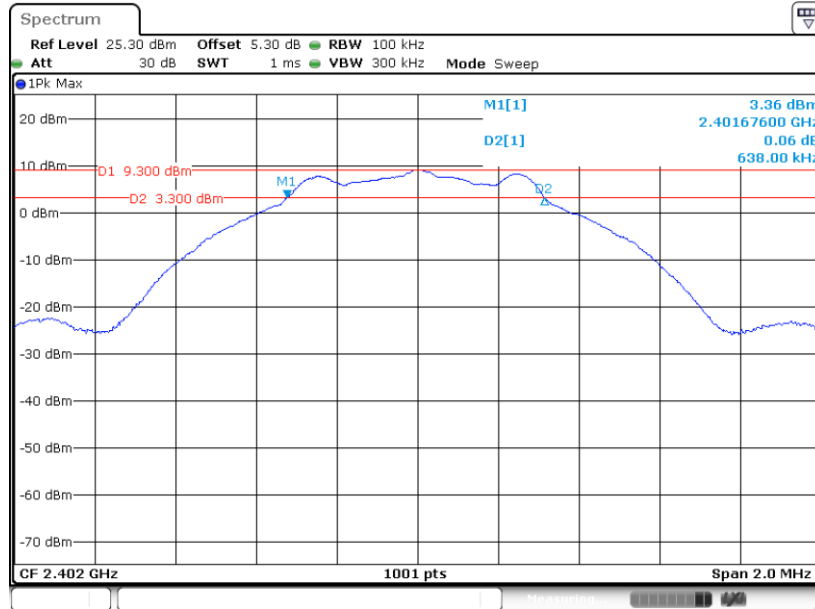


3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

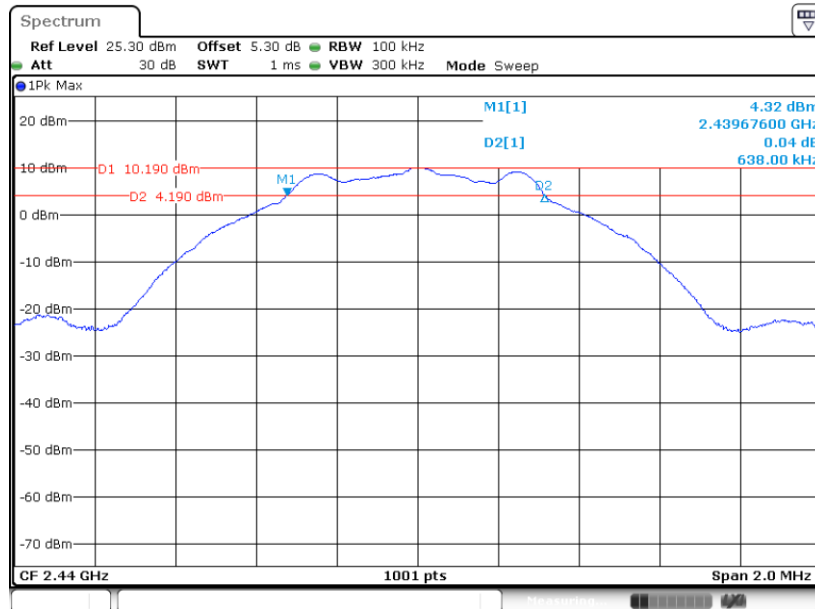
Bluetooth LE 1Mbps

6 dB Bandwidth Plot on Channel 00



Date: 11.JAN.2022 21:36:57

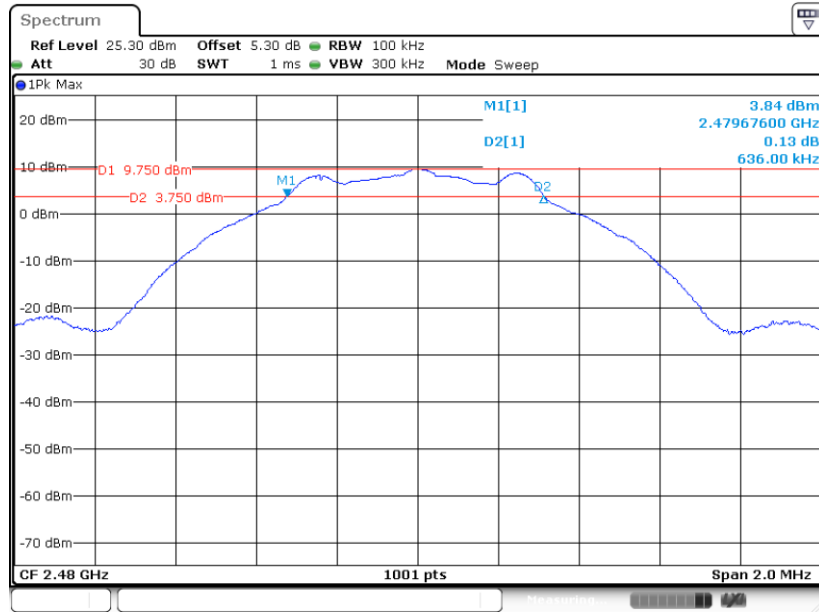
6 dB Bandwidth Plot on Channel 19



Date: 11.JAN.2022 21:41:21



6 dB Bandwidth Plot on Channel 39

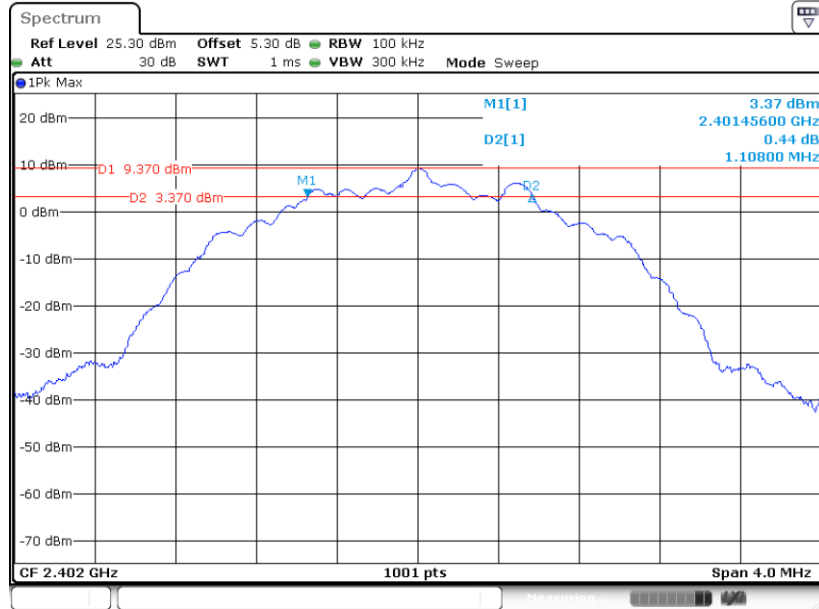


Date: 11.JAN.2022 21:45:52



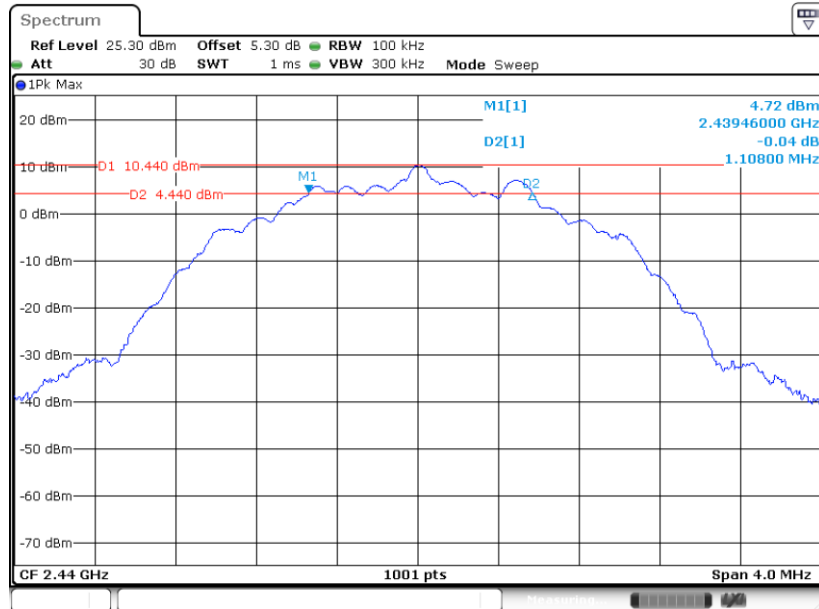
Bluetooth LE 2Mbps

6 dB Bandwidth Plot on Channel 00



Date: 11.JAN.2022 22:08:03

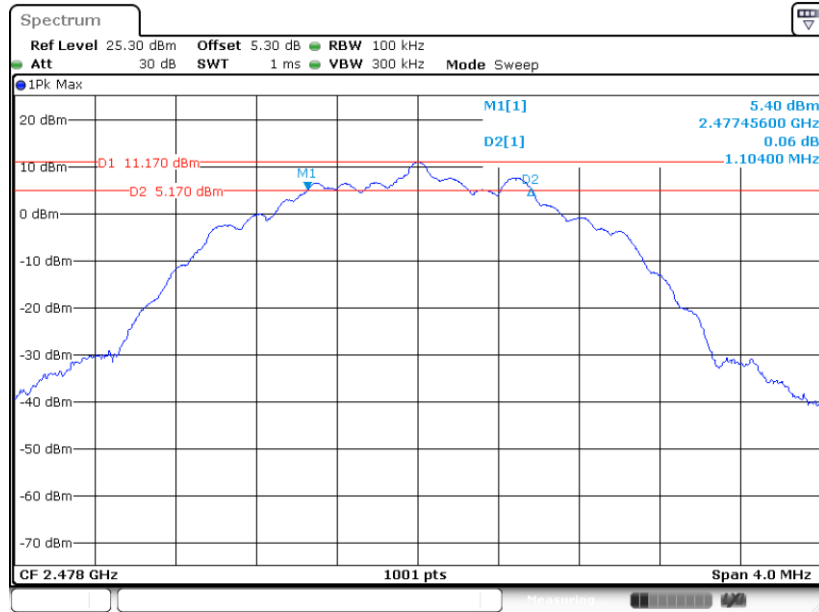
6 dB Bandwidth Plot on Channel 19



Date: 11.JAN.2022 22:11:40

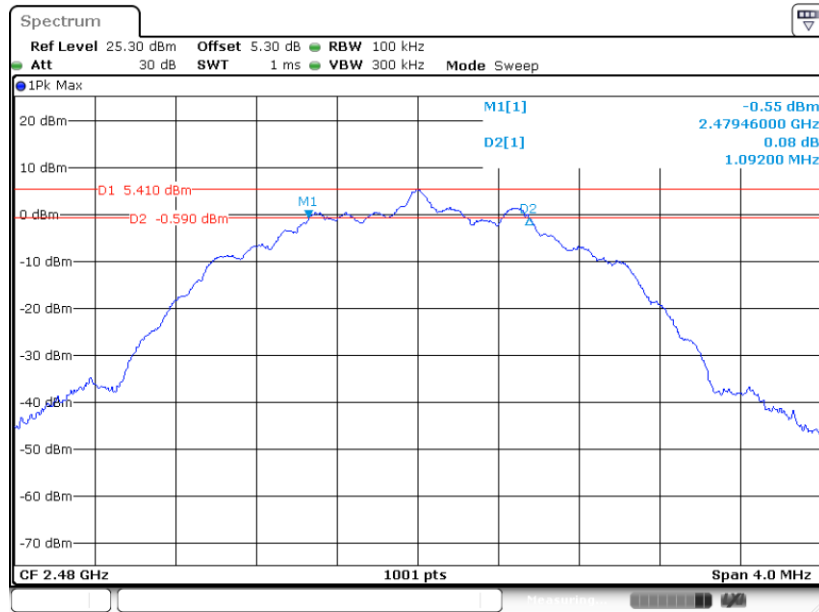


6 dB Bandwidth Plot on Channel 38



Date: 10.MAR.2022 10:42:07

6 dB Bandwidth Plot on Channel 39



Date: 7.FEB.2022 15:22:23

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.

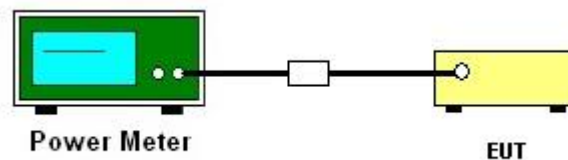
3.2.2 Measuring Instruments

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 or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM 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.

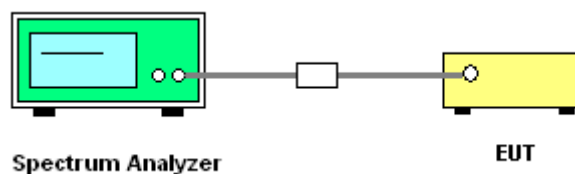
3.3.2 Measuring Instruments

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 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

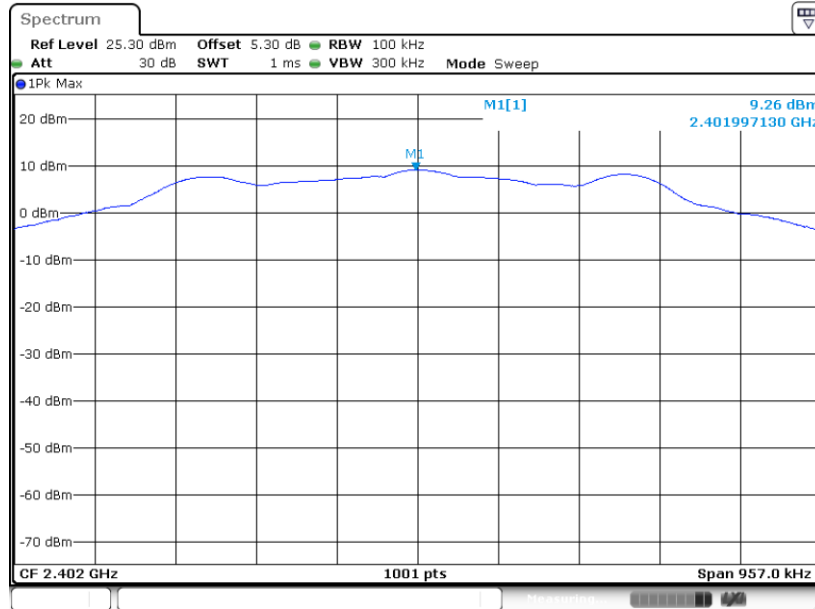
Please refer to Appendix A.



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

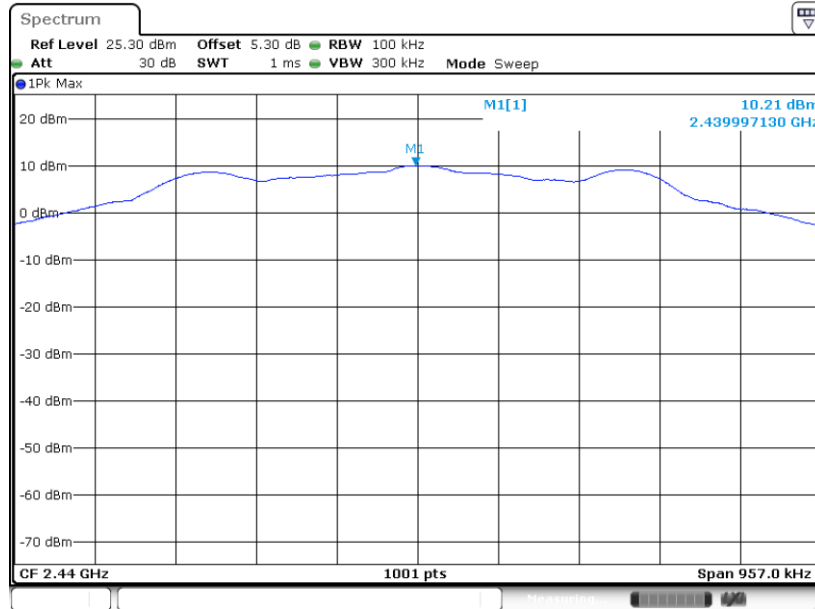
Bluetooth LE 1Mbps

PSD 100kHz Plot on Channel 00



Date: 11.JAN.2022 21:37:36

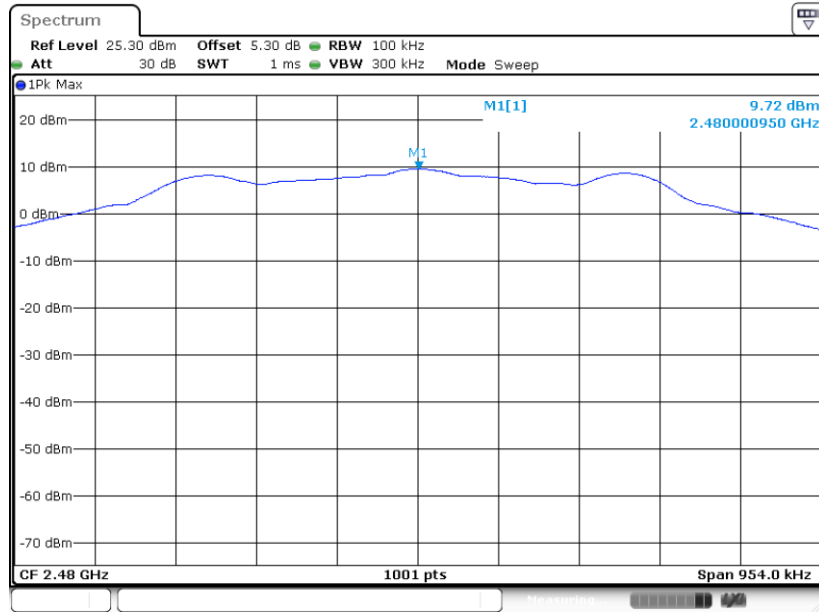
PSD 100kHz Plot on Channel 19



Date: 11.JAN.2022 21:41:59



PSD 100kHz Plot on Channel 39

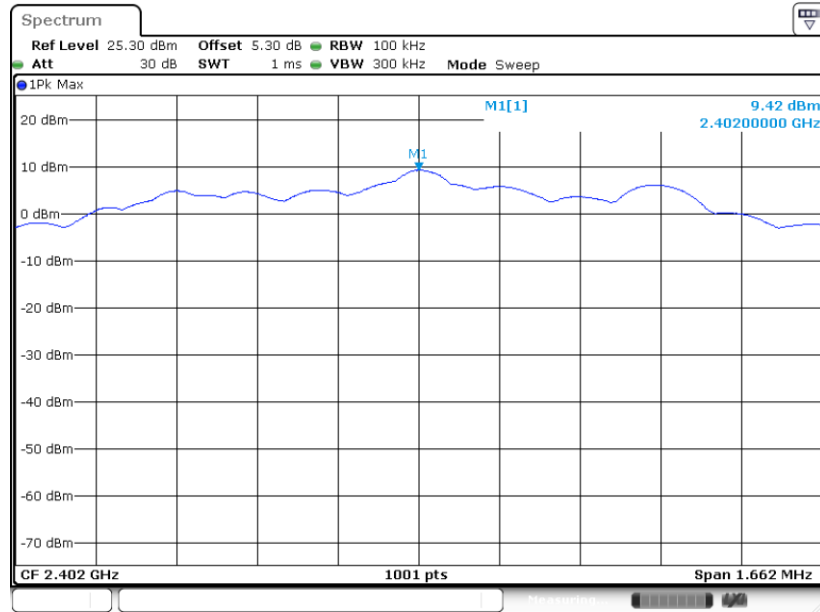


Date: 11.JAN.2022 21:46:31



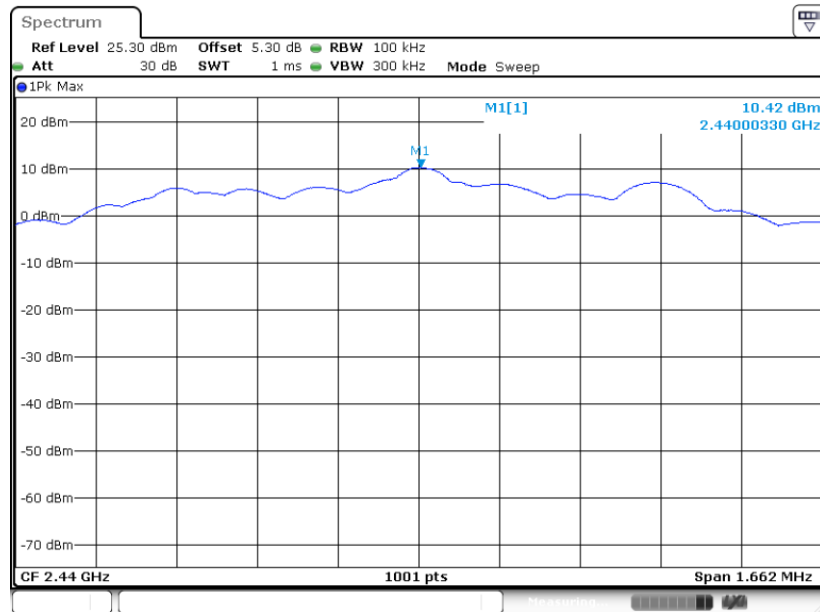
Bluetooth LE 2Mbps

PSD 100kHz Plot on Channel 00



Date: 11.JAN.2022 22:08:42

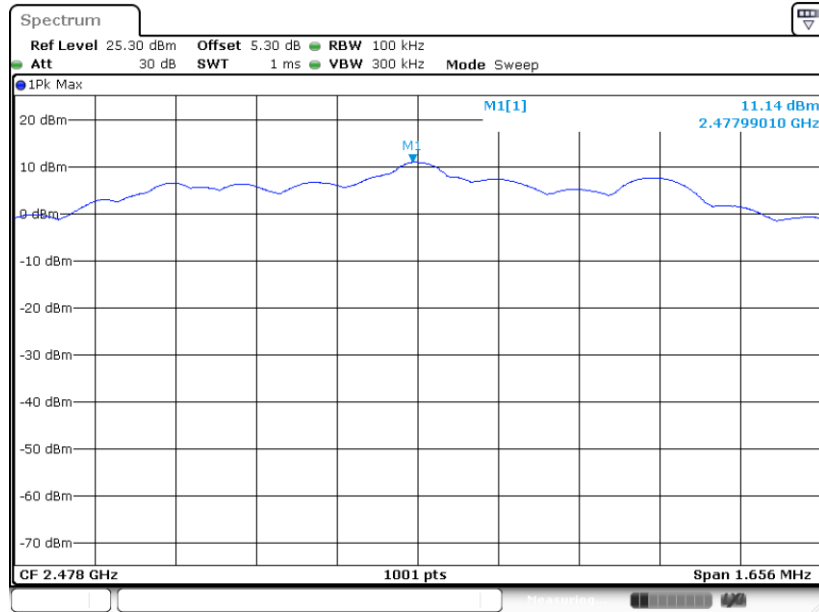
PSD 100kHz Plot on Channel 19



Date: 11.JAN.2022 22:12:19

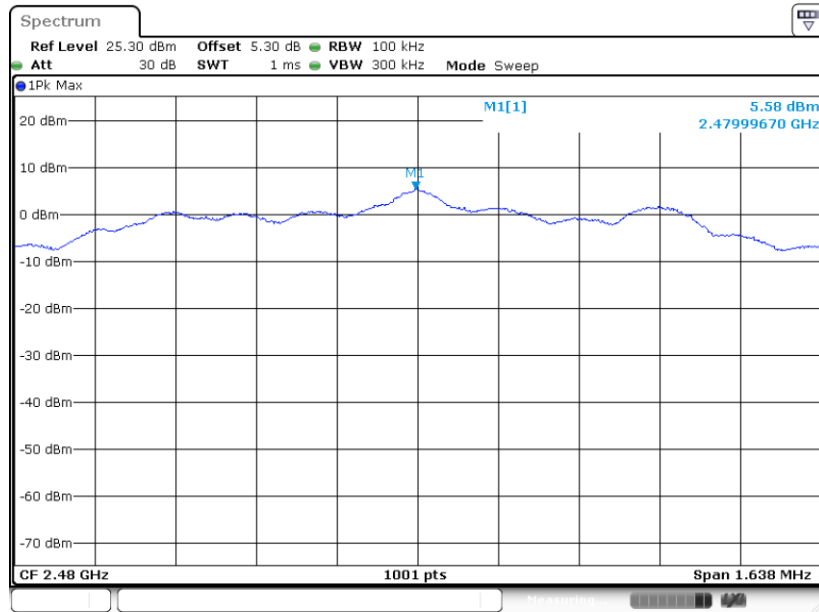


PSD 100kHz Plot on Channel 38



Date: 10.MAR.2022 10:42:44

PSD 100kHz Plot on Channel 39



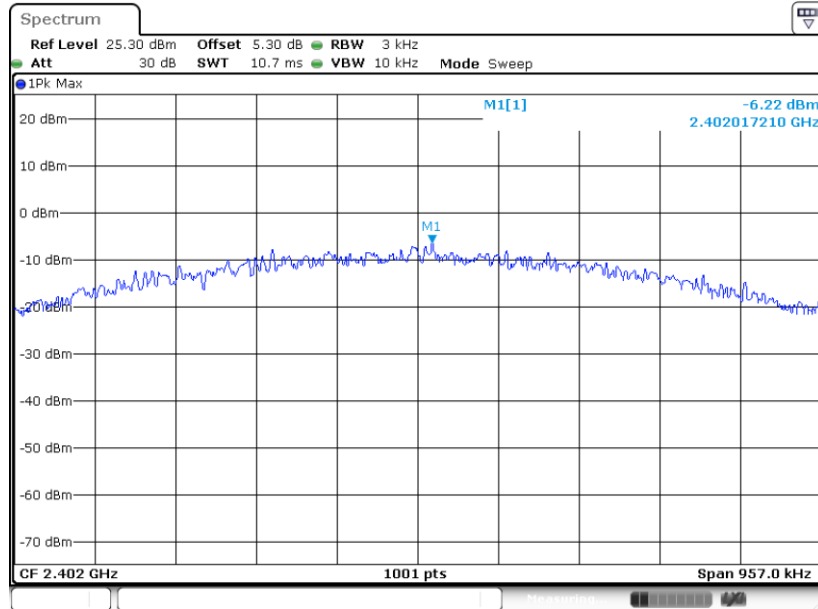
Date: 7.FEB.2022 15:23:01



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

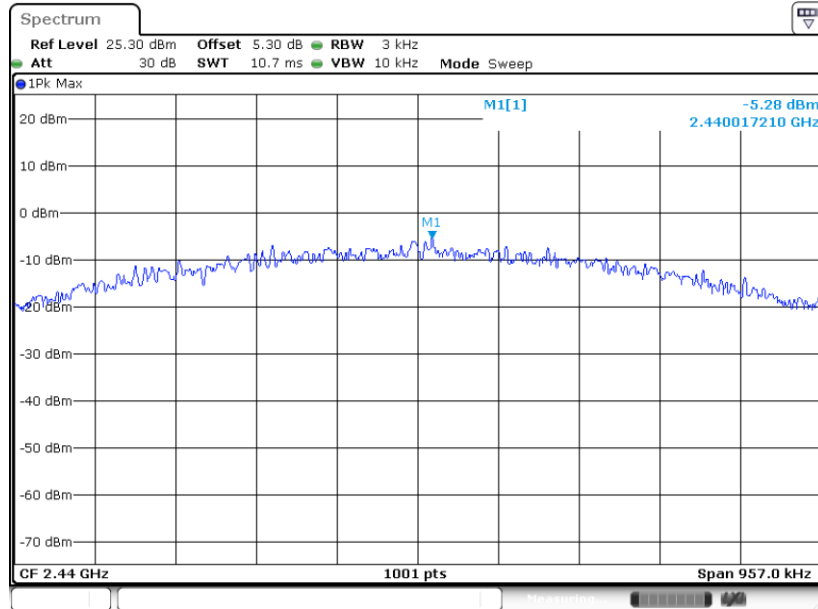
Bluetooth LE 1Mbps

PSD 3kHz Plot on Channel 00



Date: 11.JAN.2022 21:37:17

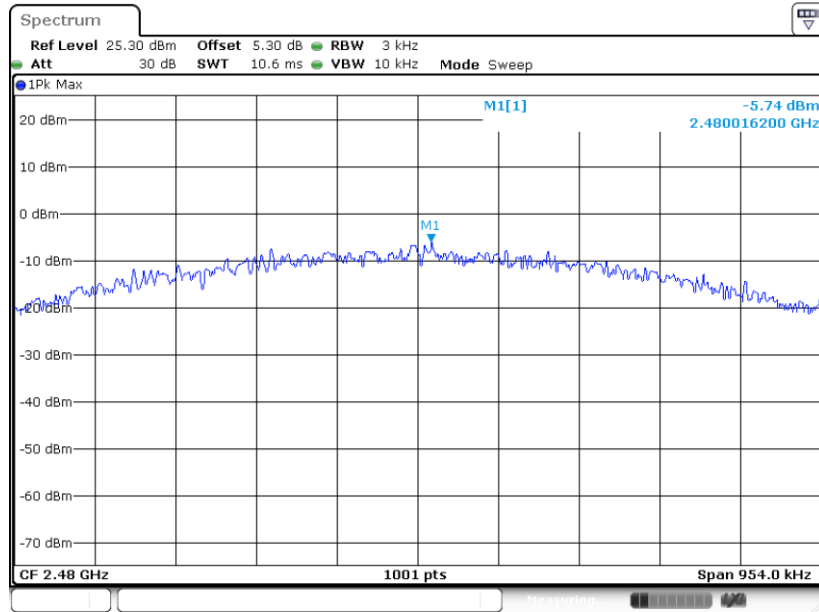
PSD 3kHz Plot on Channel 19



Date: 11.JAN.2022 21:41:40



PSD 3kHz Plot on Channel 39

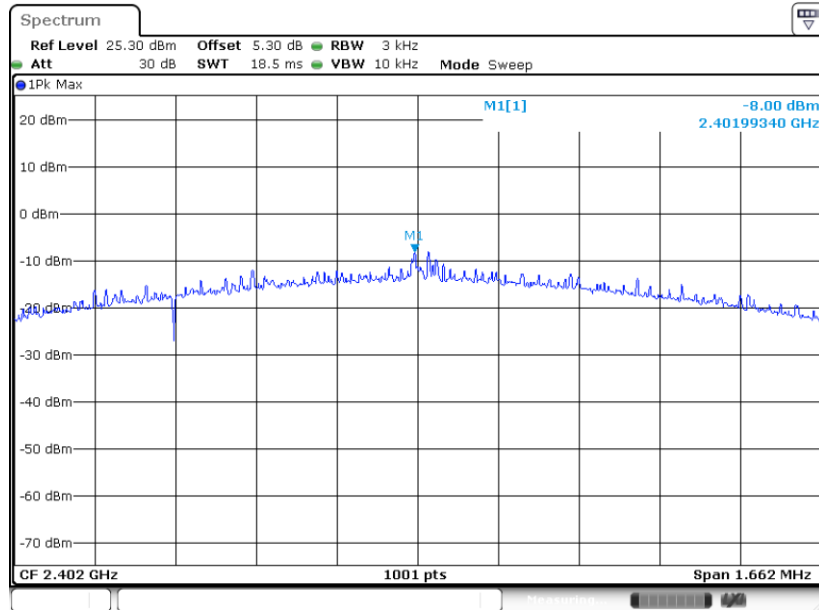


Date: 11.JAN.2022 21:46:12



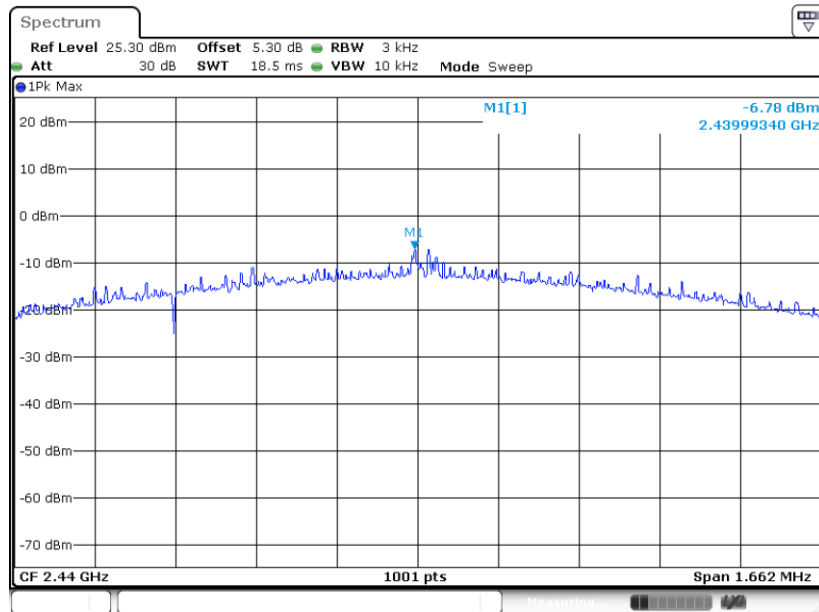
Bluetooth LE 2Mbps

PSD 3kHz Plot on Channel 00



Date: 11.JAN.2022 22:10:24

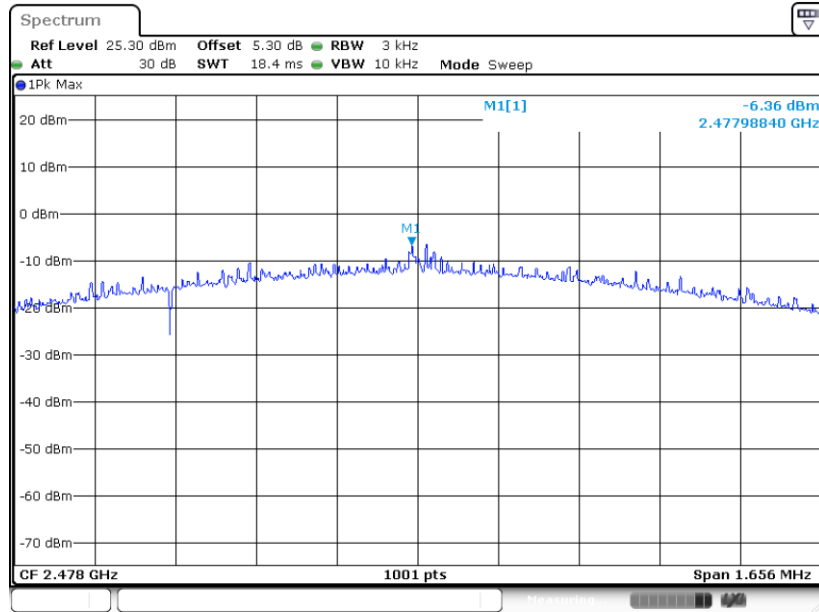
PSD 3kHz Plot on Channel 19



Date: 11.JAN.2022 22:12:00

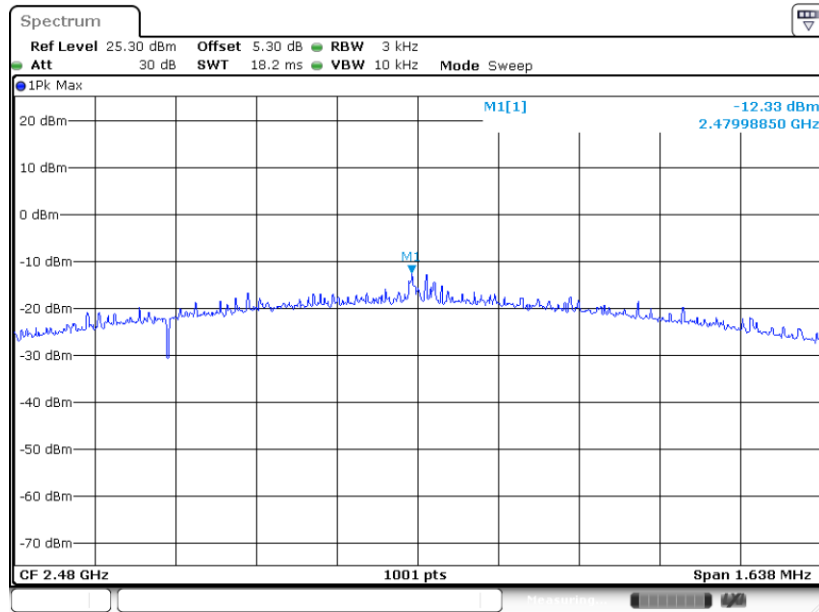


PSD 3kHz Plot on Channel 38



Date: 10.MAR.2022 10:42:26

PSD 3kHz Plot on Channel 39



Date: 7.FEB.2022 15:27:00

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.

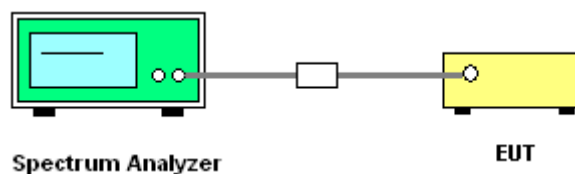
3.4.2 Measuring Instruments

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

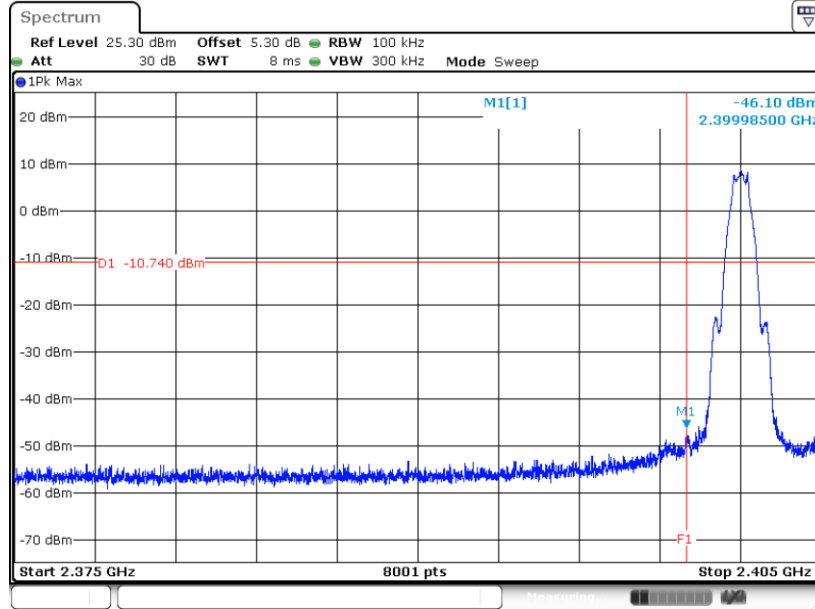




3.4.5 Test Result of Conducted Band Edges Plots

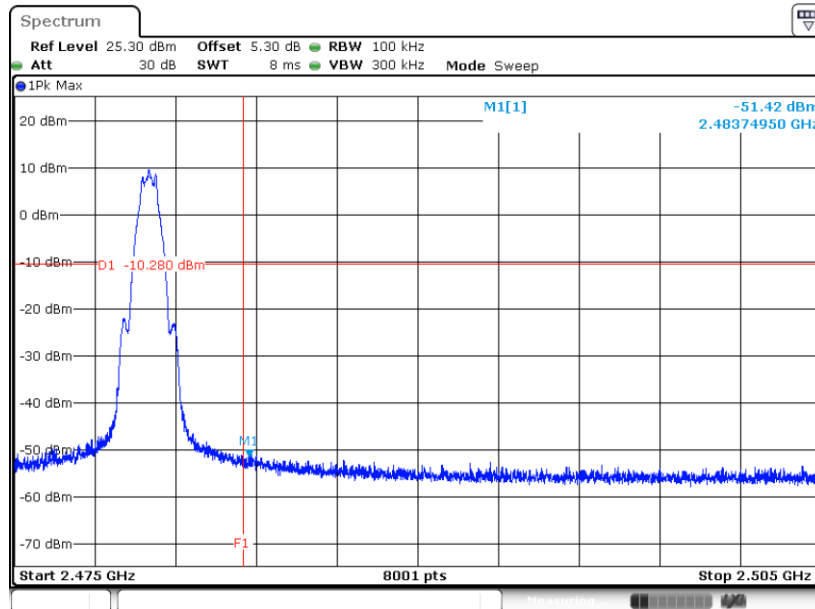
Bluetooth LE 1Mbps

Low Band Edge Plot on Channel 00



Date: 11.JAN.2022 21:39:42

High Band Edge Plot on Channel 39

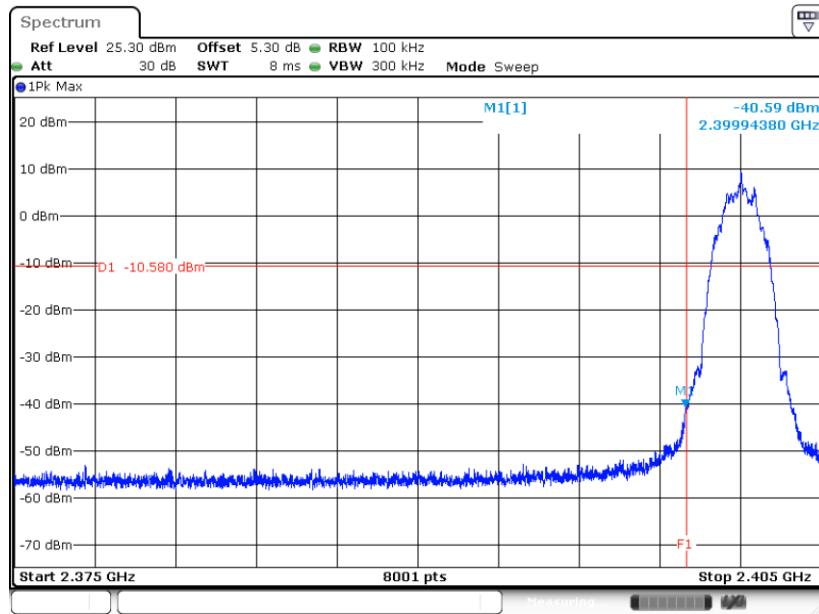


Date: 11.JAN.2022 21:46:50



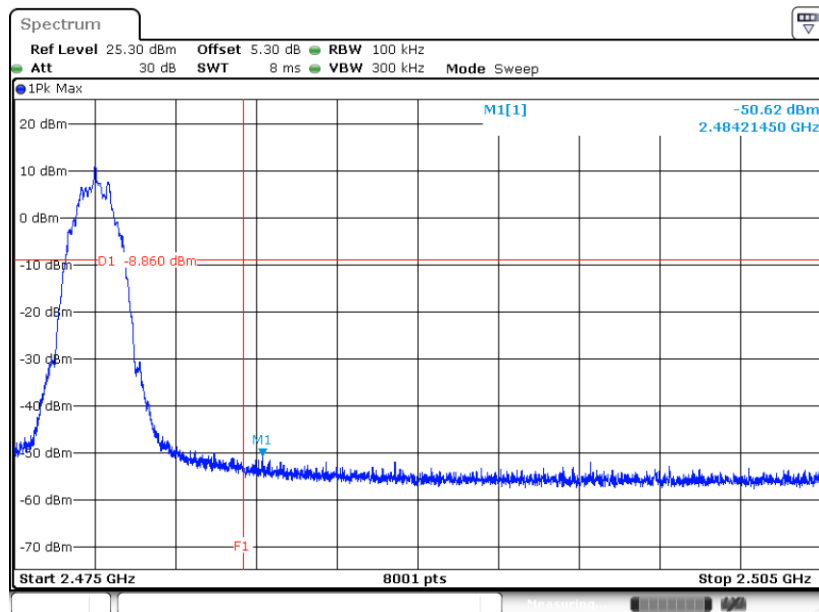
Bluetooth LE 2Mbps

Low Band Edge Plot on Channel 00



Date: 11.JAN.2022 22:09:02

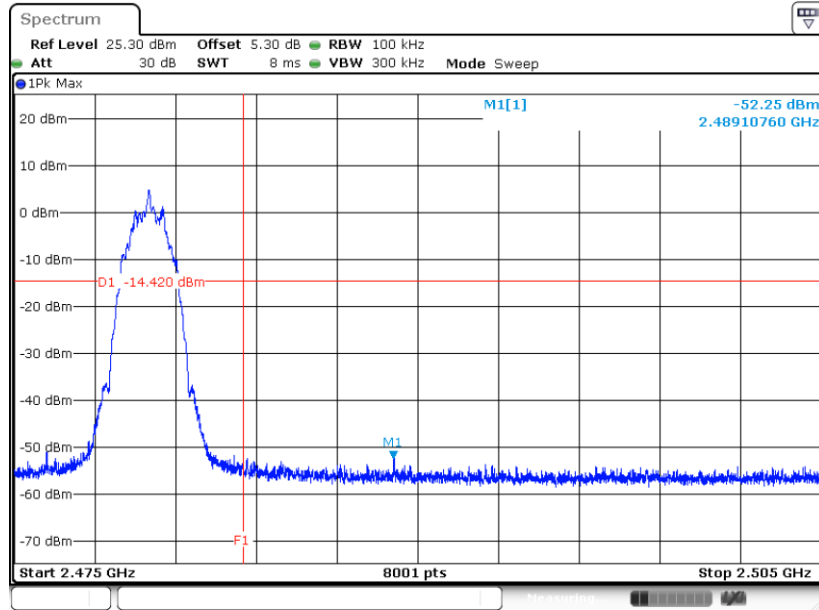
High Band Edge Plot on Channel 38



Date: 10.MAR.2022 10:46:32



High Band Edge Plot on Channel 39



Date: 7.FEB.2022 15:23:20

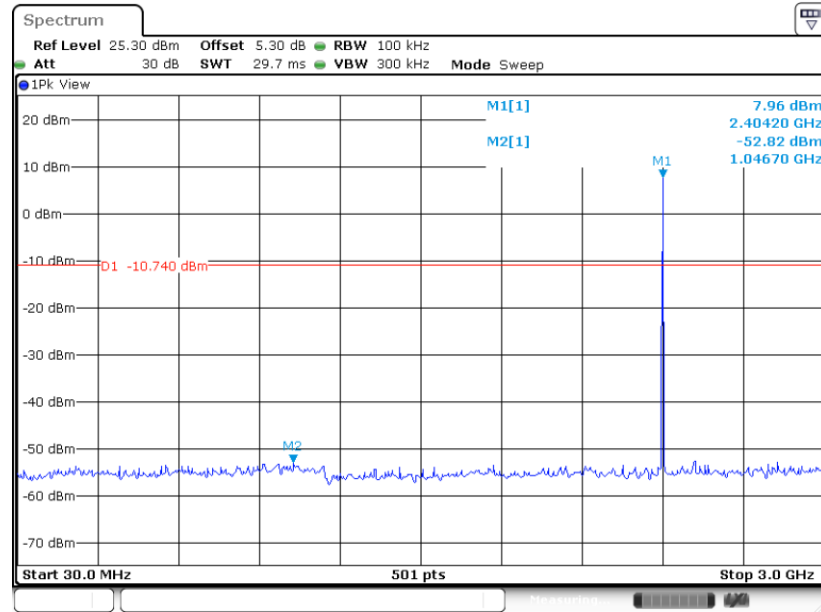


3.4.6 Test Result of Conducted Spurious Emission Plots

Bluetooth LE 1Mbps

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

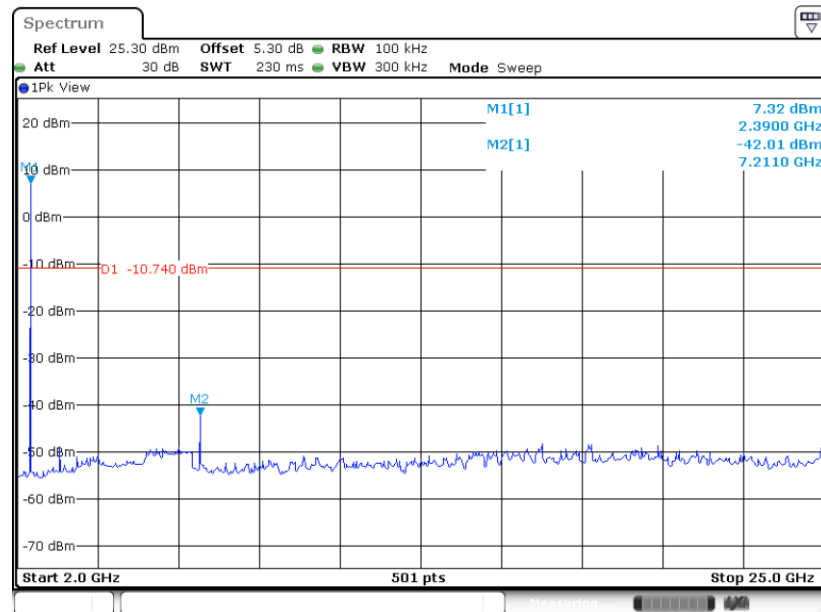
GFSK Channel 00



Date: 11.JAN.2022 21:38:16

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps

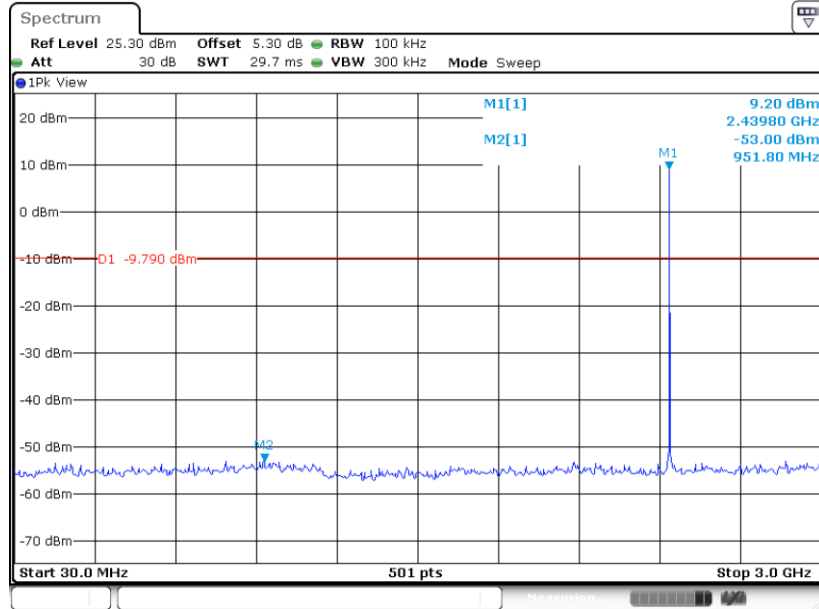
GFSK Channel 00



Date: 11.JAN.2022 21:38:37

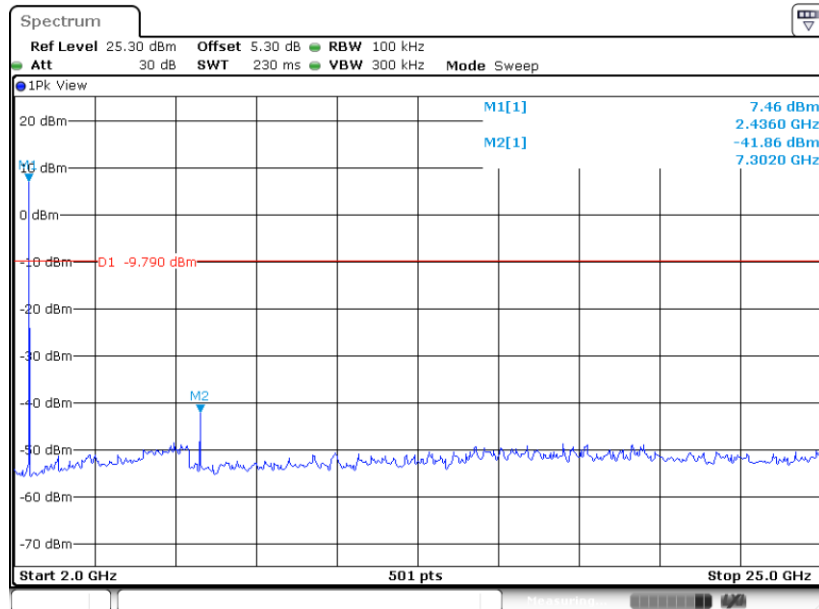


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 11.JAN.2022 21:42:21

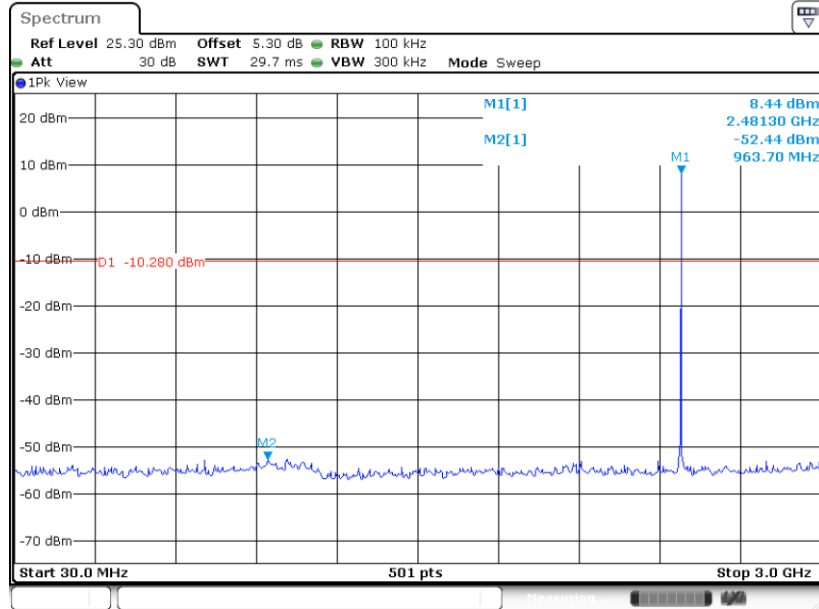
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 11.JAN.2022 21:42:41

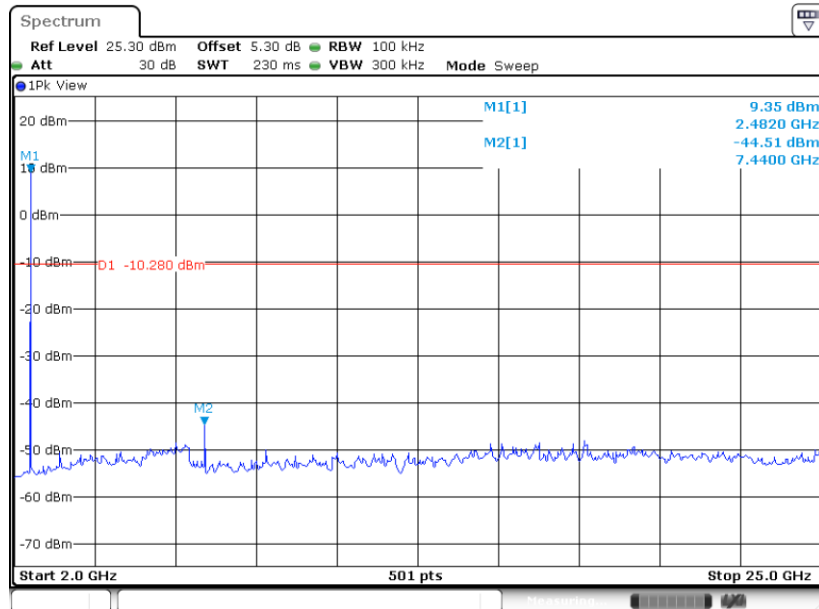


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 11.JAN.2022 21:47:12

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

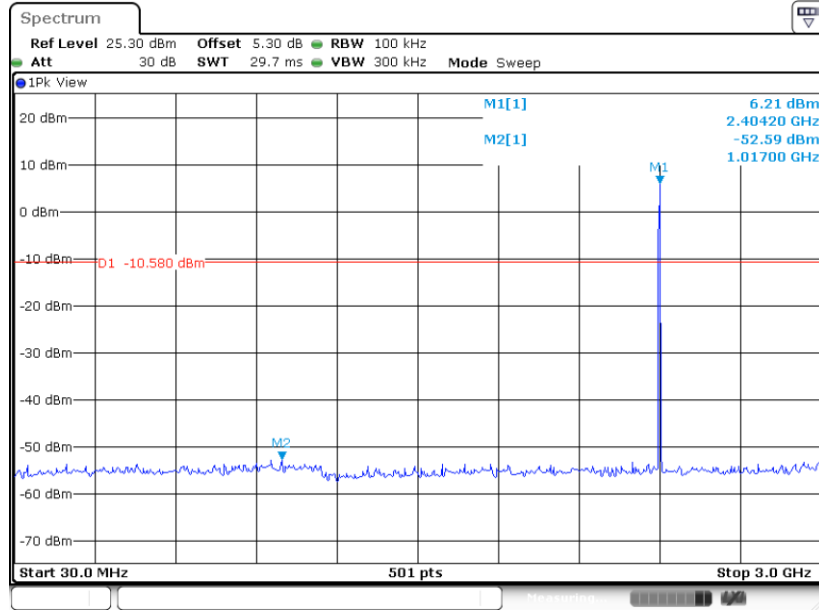


Date: 11.JAN.2022 21:47:32

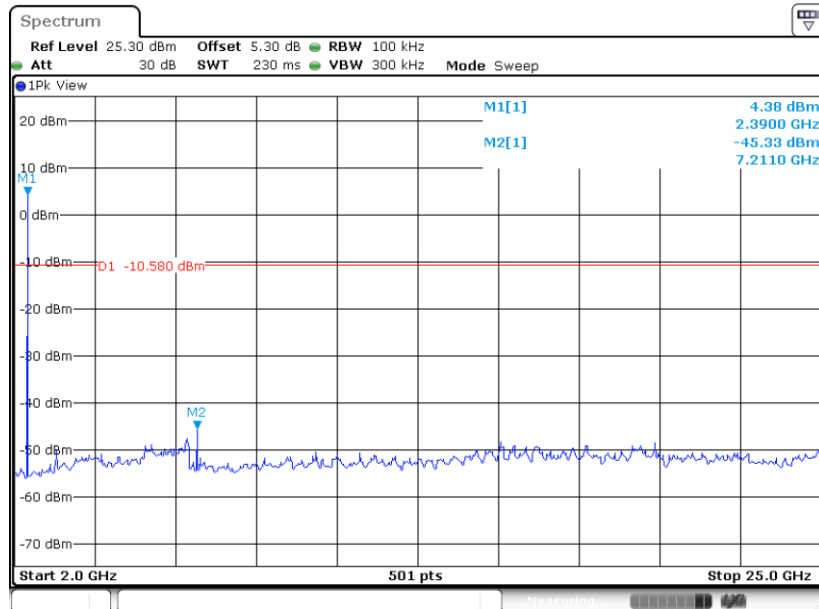


Bluetooth LE 2Mbps

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

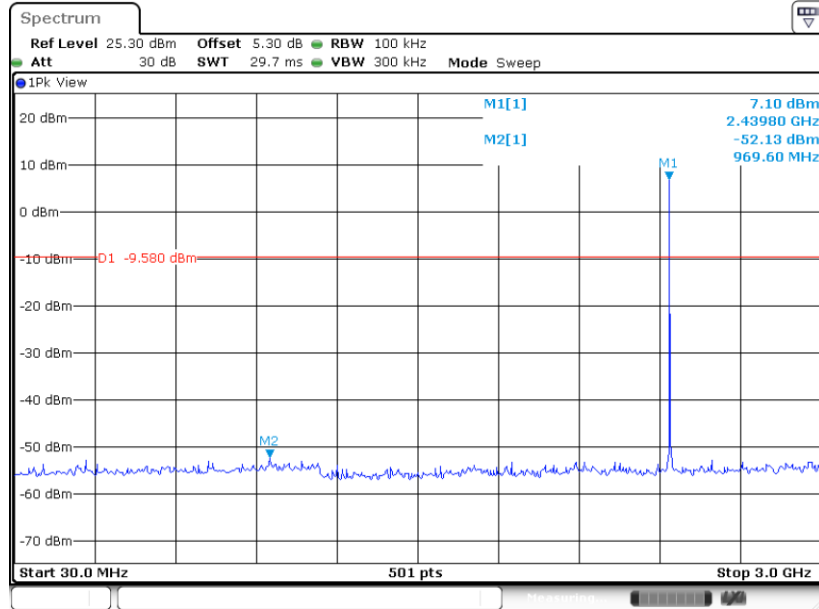


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 00



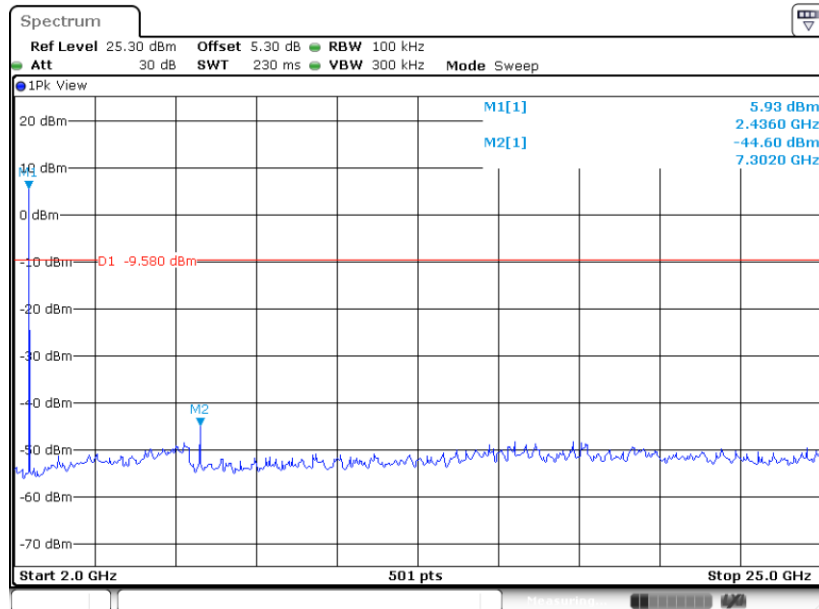


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 11.JAN.2022 22:14:23

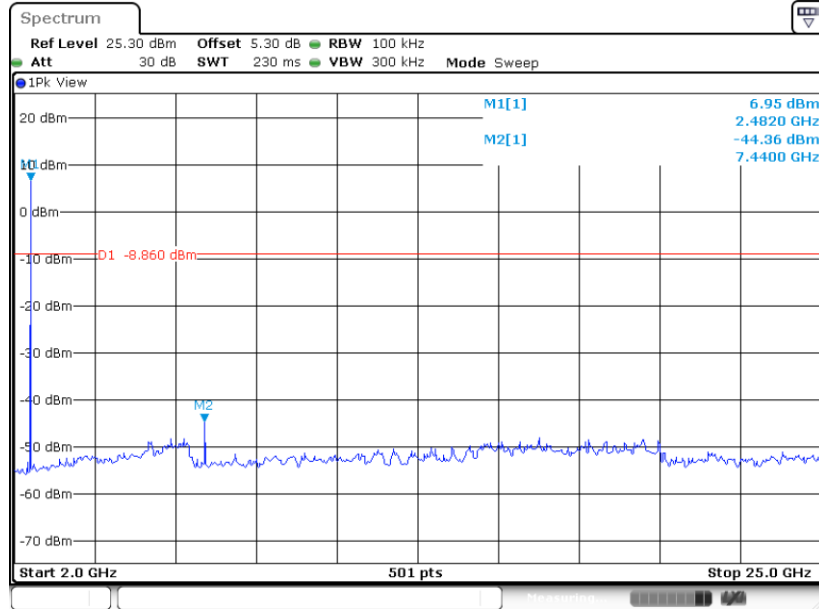
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 11.JAN.2022 22:14:36

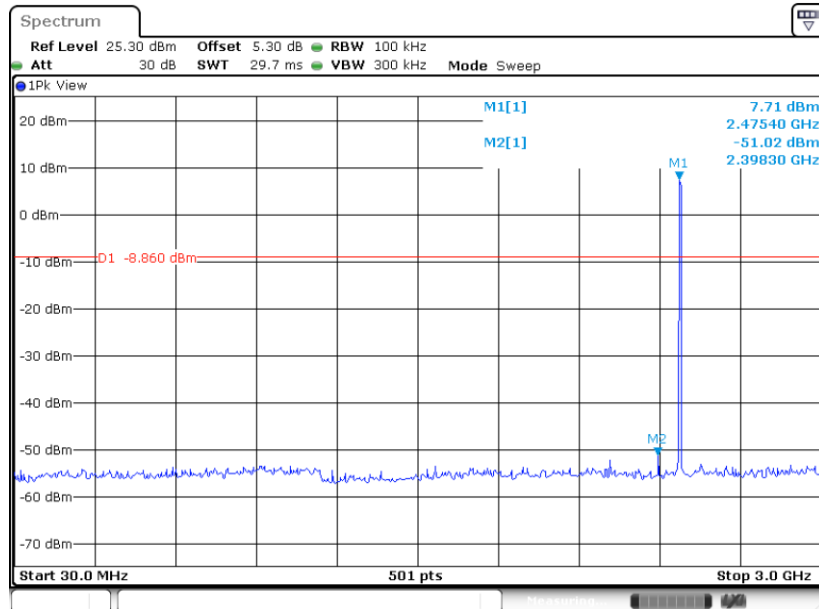


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 38



Date: 10.MAR.2022 10:43:44

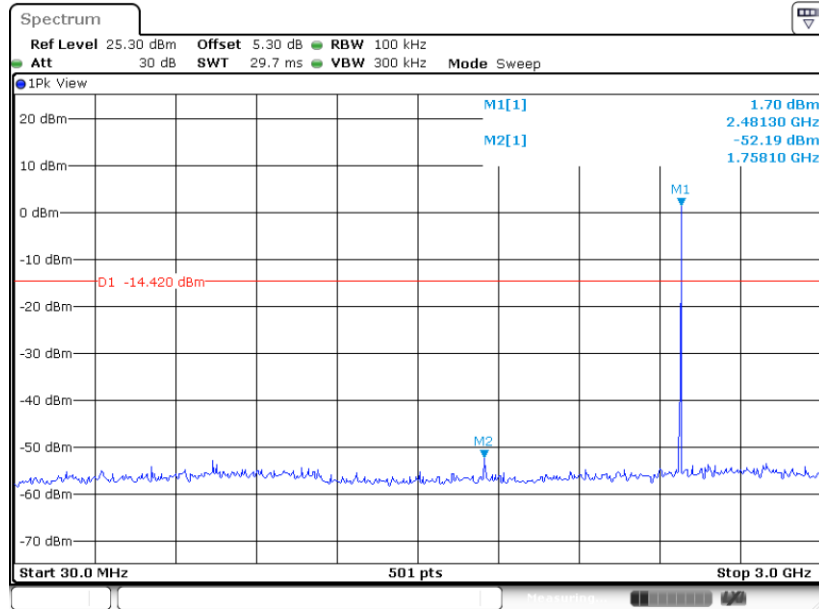
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 38



Date: 10.MAR.2022 10:43:24

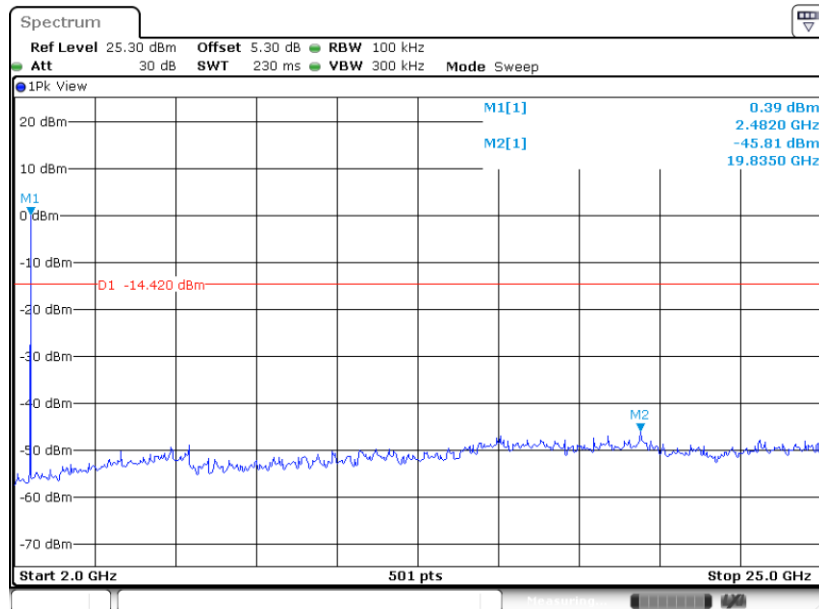


Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 7.FEB.2022 15:25:52

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



Date: 7.FEB.2022 15:26:04



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.

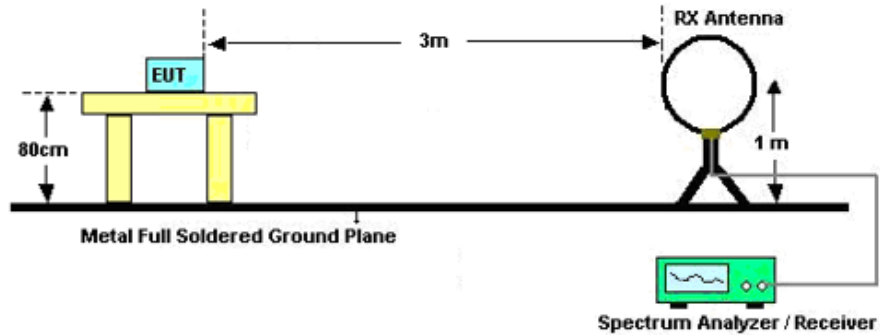


3.5.3 Test Procedures

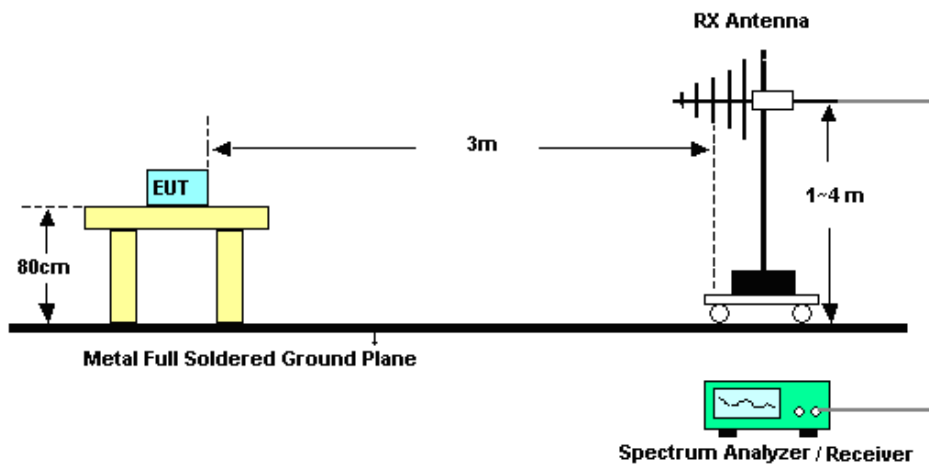
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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; $VBW \geq RBW$; 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

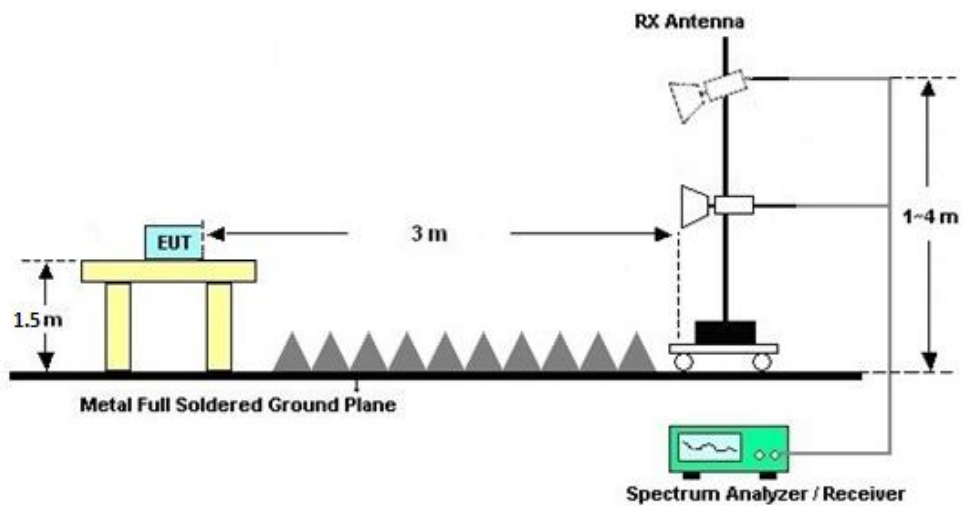
For radiated emissions below 30MHz



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 C and Appendix D.

3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and Appendix D.



3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

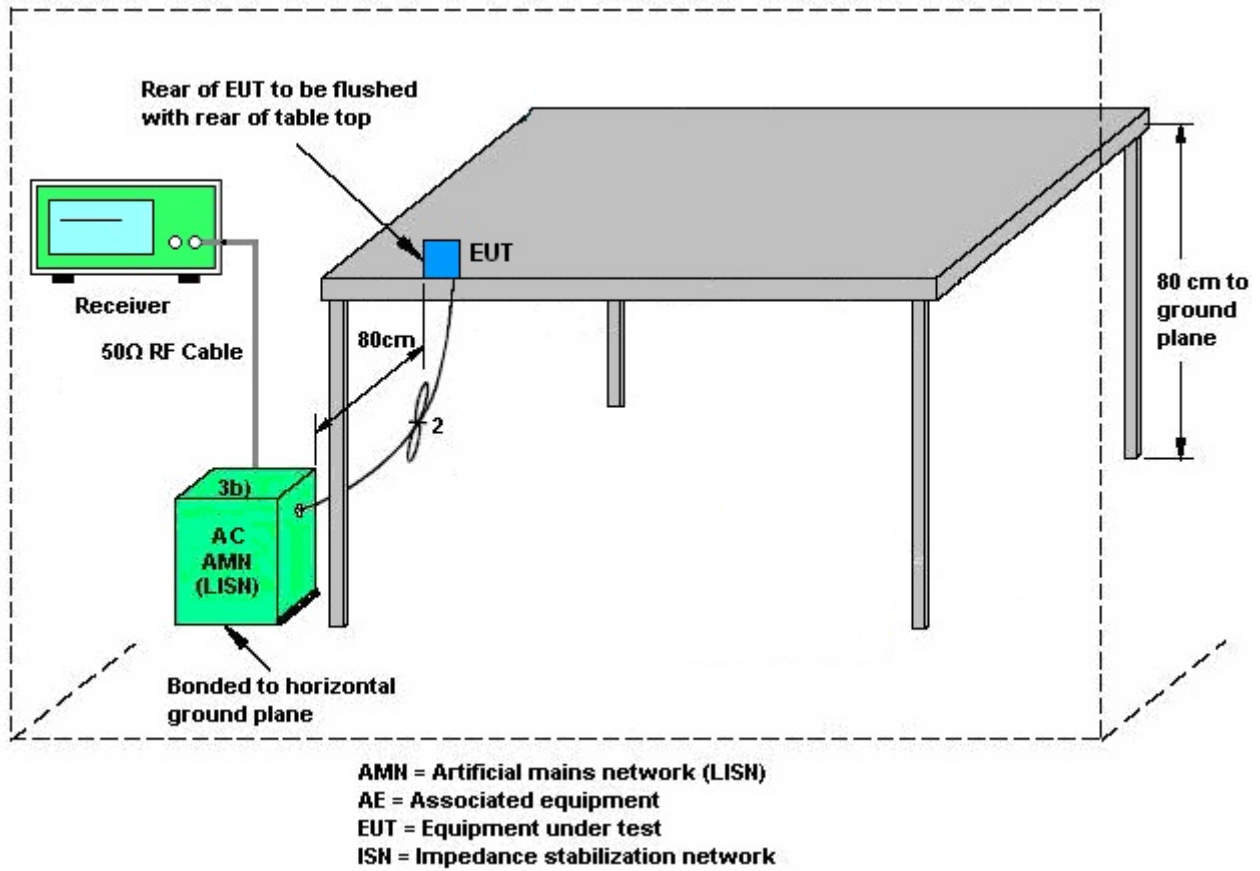
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.7 Antenna Requirements

3.7.1 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.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 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 | Jan. 11, 2022~ Mar. 10, 2022 | Oct. 13, 2022 | Conducted (TH01-KS) |
| Pulse Power Sensor | Anritsu | MA2411B | 0917070 | 300MHz~40GHz | Jan. 05, 2022 | Jan. 11, 2022~ Mar. 10, 2022 | Jan. 04, 2023 | Conducted (TH01-KS) |
| Power Meter | Anritsu | ML2495A | 1005002 | 50MHz Bandwidth | Jan. 05, 2022 | Jan. 11, 2022~ Mar. 10, 2022 | Jan. 04, 2023 | Conducted (TH01-KS) |
| EMI Test Receiver | R&S | ESR7 | 101403 | 9kHz~7GHz;Max 30dBm | Oct. 16, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 15, 2022 | Radiation (03CH02-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55370528 | 10Hz-44G,MAX 30dB | Oct. 16, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 15, 2022 | Radiation (03CH02-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Oct. 30, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 29, 2022 | Radiation (03CH02-KS) |
| Bilog Antenna | TeseQ | CBL6111D | 44483 | 30MHz-1GHz | Dec. 22, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Dec. 21, 2022 | Radiation (03CH02-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 75957 | 1GHz~18GHz | Oct. 30, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 29, 2022 | Radiation (03CH02-KS) |
| high gain Amplifier | MITEQ | AMF-7D-001 01800-30-10 P | 2025788 | 1Ghz-18Ghz | Jul. 30, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Jul. 29, 2023 | Radiation (03CH02-KS) |
| SHF-EHF Horn | Com-power | AH-840 | 101070 | 18GHz~40GHz | Jan. 05, 2022 | Feb. 11, 2022~ Mar. 09, 2022 | Jan. 04, 2023 | Radiation (03CH02-KS) |
| Amplifier | SONOMA | 310N | 187289 | 9KHz-1GHz | Apr. 13, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Apr. 12, 2022 | Radiation (03CH02-KS) |
| Amplifier | Keysight | 83017A | MY53270316 | 500MHz~26.5GHz | Oct. 16, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 15, 2022 | Radiation (03CH02-KS) |
| Amplifier | MITEQ | EM18G40GG A | 060728 | 18~40GHz | Jan. 05, 2022 | Feb. 11, 2022~ Mar. 09, 2022 | Jan. 04, 2023 | Radiation (03CH02-KS) |
| AC Power Source | Chroma | 61601 | 616010002 473 | N/A | NCR | Feb. 11, 2022~ Mar. 09, 2022 | NCR | Radiation (03CH02-KS) |
| Turn Table | MF | MF7802 | N/A | 0~360 degree | NCR | Feb. 11, 2022~ Mar. 09, 2022 | NCR | Radiation (03CH02-KS) |
| Antenna Mast | MF | MF7802 | N/A | 1 m~4 m | NCR | Feb. 11, 2022~ Mar. 09, 2022 | NCR | Radiation (03CH02-KS) |
| EMI Test Receiver | Keysight | N9038A | MY56400004 | 3Hz~8.5GHz;Max 30dBm | Oct. 16, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 15, 2022 | Radiation (03CH05-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55150244 | 10Hz-44G,MAX 30dB | Apr.13, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Apr. 12, 2022 | Radiation (03CH05-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Oct. 30, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 29, 2022 | Radiation (03CH05-KS) |
| Bilog Antenna | TeseQ | CBL6111D | 49922 | 30MHz-1GHz | Jun. 04, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Jun. 03, 2022 | Radiation (03CH05-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 00218652 | 1GHz~18GHz | Apr. 24, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Apr. 23, 2022 | Radiation (03CH05-KS) |
| SHF-EHF Horn | Com-power | AH-840 | 101070 | 18GHz~40GHz | Jan. 05, 2022 | Feb. 11, 2022~ Mar. 09, 2022 | Jan. 04, 2023 | Radiation (03CH05-KS) |
| Amplifier | SONOMA | 310N | 187289 | 9KHz-1GHz | Apr. 12, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Apr. 11, 2022 | Radiation (03CH05-KS) |
| Amplifier | MITEQ | EM18G40GG A | 060728 | 18~40GHz | Jan. 05, 2022 | Feb. 11, 2022~ Mar. 09, 2022 | Jan. 04, 2023 | Radiation (03CH05-KS) |
| high gain Amplifier | MITEQ | AMF-7D-001 01800-30-10 P | 2012228 | 1Ghz-18Ghz | Oct. 16, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 15, 2022 | Radiation (03CH05-KS) |
| Amplifier | Keysight | 83017A | MY53270316 | 500MHz~26.5GHz | Oct. 16, 2021 | Feb. 11, 2022~ Mar. 09, 2022 | Oct. 15, 2022 | Radiation (03CH05-KS) |
| AC Power Source | Chroma | 61601 | F104090004 | N/A | NCR | Feb. 11, 2022~ Mar. 09, 2022 | NCR | Radiation (03CH05-KS) |
| Turn Table | ChamPro | EM 1000-T | 060762-T | 0~360 degree | NCR | Feb. 11, 2022~ Mar. 09, 2022 | NCR | Radiation (03CH05-KS) |
| Antenna Mast | ChamPro | EM 1000-A | 060762-A | 1 m~4 m | NCR | Feb. 11, 2022~ Mar. 09, 2022 | NCR | Radiation (03CH05-KS) |
| EMI Receiver | R&S | ESCI7 | 100768 | 9kHz~7GHz; | Apr. 21, 2021 | Mar. 05, 2022 | Apr. 20, 2022 | Conduction (CO01-KS) |



| | | | | | | | | |
|---|---------|--------|------------------|----------------------------|---------------|---------------|---------------|-------------------------|
| AC LISN (for auxiliary equipment) | MessTec | AN3016 | 060103 | 9kHz~30MHz | Oct. 14, 2021 | Mar. 05, 2022 | Oct. 13, 2022 | Conduction (CO01-KS) |
| AC LISN | R&S | ENV216 | 100334 | 9kHz~30MHz | Apr. 13, 2021 | Mar. 05, 2022 | Apr. 12, 2022 | Conduction (CO01-KS) |
| AC Power Source | Chroma | 61602 | ABP00000 0811 | AC 0V~300V, 45Hz~1000Hz | Oct. 14, 2021 | Mar. 05, 2022 | Oct. 13, 2022 | Conduction (CO01-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.

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

| | |
|---|--------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 2.94dB |
|---|--------|

03CH02:

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

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 4.9dB |
|---|-------|

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)) | 5.1dB |
|---|-------|

03CH05:

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 Results

Bluetooth Low Energy

| | | | | |
|----------------|---------------------|--------------------|-------|----|
| Test Engineer: | Jacob Zhang | Temperature: | 20~26 | °C |
| Test Date: | 2022/1/11~2022/3/10 | 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 | 1.02 | 0.64 | 0.50 | Pass |
| BLE | 1Mbps | 1 | 19 | 2440 | 1.02 | 0.64 | 0.50 | Pass |
| BLE | 1Mbps | 1 | 39 | 2480 | 1.02 | 0.64 | 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 | 9.58 | 30.00 | 3.26 | 12.84 | 36.00 | Pass |
| BLE | 1Mbps | 1 | 19 | 2440 | 10.76 | 30.00 | 3.26 | 14.02 | 36.00 | Pass |
| BLE | 1Mbps | 1 | 39 | 2480 | 10.31 | 30.00 | 3.26 | 13.57 | 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 | 0.77 | 8.48 |
| BLE | 1Mbps | 1 | 19 | 2440 | 0.77 | 9.82 |
| BLE | 1Mbps | 1 | 39 | 2480 | 0.77 | 9.40 |

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 | 1Mbps | 1 | 0 | 2402 | 9.26 | -6.22 | 3.26 | 8.00 | Pass |
| BLE | 1Mbps | 1 | 19 | 2440 | 10.21 | -5.28 | 3.26 | 8.00 | Pass |
| BLE | 1Mbps | 1 | 39 | 2480 | 9.72 | -5.74 | 3.26 | 8.00 | Pass |

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

Bluetooth Low Energy

| | | | | |
|----------------|---------------------|--------------------|-------|----|
| Test Engineer: | Jacob Zhang | Temperature: | 20~26 | °C |
| Test Date: | 2022/1/11~2022/3/10 | 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 | 2.01 | 1.11 | 0.50 | Pass |
| BLE | 2Mbps | 1 | 19 | 2440 | 2.01 | 1.11 | 0.50 | Pass |
| BLE | 2Mbps | 1 | 38 | 2478 | 2.12 | 1.10 | 0.50 | Pass |
| BLE | 2Mbps | 1 | 39 | 2480 | 2.01 | 1.09 | 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 | 9.75 | 30.00 | 3.26 | 13.01 | 36.00 | Pass |
| BLE | 2Mbps | 1 | 19 | 2440 | 11.03 | 30.00 | 3.26 | 14.29 | 36.00 | Pass |
| BLE | 2Mbps | 1 | 38 | 2478 | 11.62 | 30.00 | 3.26 | 14.88 | 36.00 | Pass |
| BLE | 2Mbps | 1 | 39 | 2480 | 5.94 | 30.00 | 3.26 | 9.20 | 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 | 2.49 | 8.75 |
| BLE | 2Mbps | 1 | 19 | 2440 | 2.49 | 9.93 |
| BLE | 2Mbps | 1 | 38 | 2478 | 2.49 | 10.32 |
| BLE | 2Mbps | 1 | 39 | 2480 | 2.49 | 4.11 |

TEST RESULTS DATA
Peak Power Density

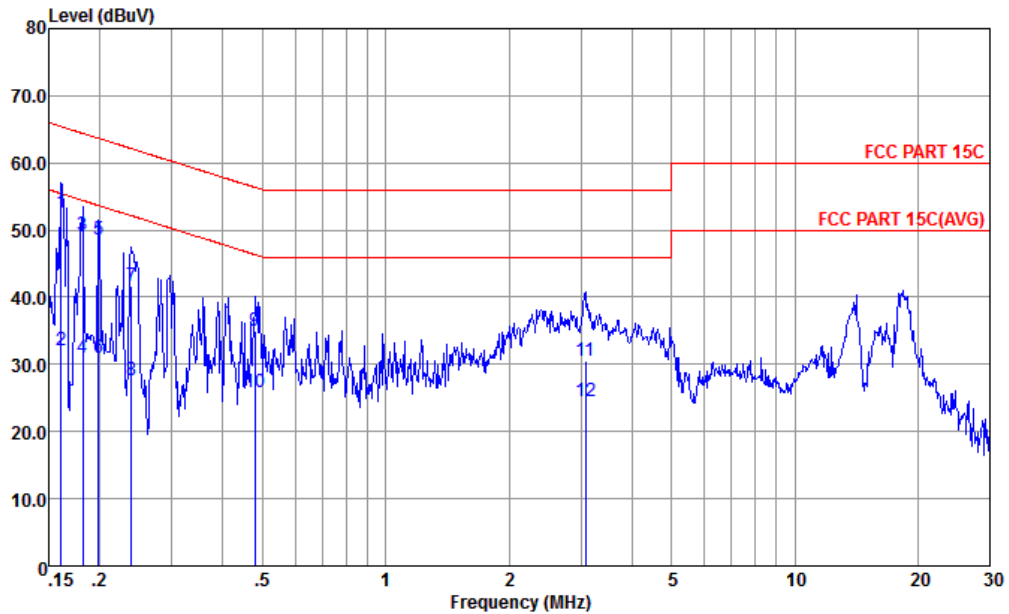
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Peak PSD (dBm /100kHz) | Peak PSD (dBm /3kHz) | DG (dBi) | Peak PSD Limit (dBm /3kHz) | Pass/Fail |
|------|-----------|-----|-----|-------------|------------------------|----------------------|----------|----------------------------|-----------|
| BLE | 2Mbps | 1 | 0 | 2402 | 9.42 | -8.00 | 3.26 | 8.00 | Pass |
| BLE | 2Mbps | 1 | 19 | 2440 | 10.42 | -6.78 | 3.26 | 8.00 | Pass |
| BLE | 2Mbps | 1 | 38 | 2478 | 11.14 | -6.36 | 3.26 | 8.00 | Pass |
| BLE | 2Mbps | 1 | 39 | 2480 | 5.58 | -12.33 | 3.26 | 8.00 | Pass |

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



Appendix B. AC Conducted Emission Test Results

| | | | |
|-----------------|---|---------------------|-------------|
| Test Engineer : | Amos Zhang | Temperature : | 25.3~26.2°C |
| | | Relative Humidity : | 38~40% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Line |
| Remark : | All emissions not reported here are more than 10 dB below the prescribed limit. | | |

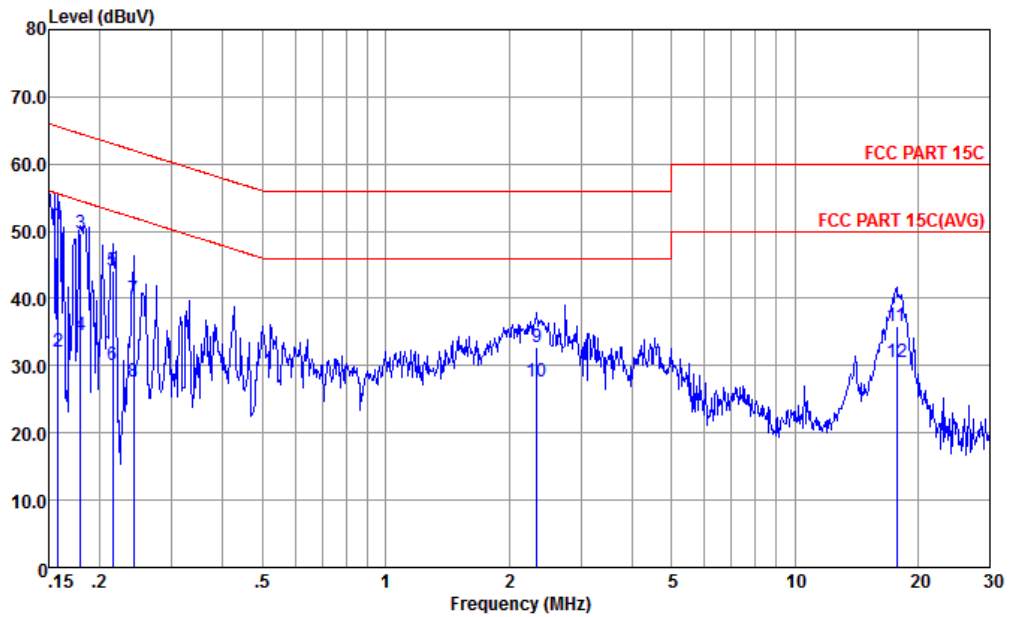


Site : CO01-KS
 Condition : FCC PART 15C LISN-060105-L LINE

| | Freq | Level | Over | Limit | Read | LISN | Cable | Remark |
|-----|-------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 * | 0.161 | 52.68 | -12.75 | 65.43 | 42.21 | 0.02 | 10.45 | QP |
| 2 | 0.161 | 32.08 | -23.35 | 55.43 | 21.61 | 0.02 | 10.45 | Average |
| 3 | 0.182 | 49.34 | -15.08 | 64.42 | 38.91 | 0.03 | 10.40 | QP |
| 4 | 0.182 | 31.04 | -23.38 | 54.42 | 20.61 | 0.03 | 10.40 | Average |
| 5 | 0.199 | 48.61 | -15.06 | 63.67 | 38.20 | 0.04 | 10.37 | QP |
| 6 | 0.199 | 31.01 | -22.66 | 53.67 | 20.60 | 0.04 | 10.37 | Average |
| 7 | 0.239 | 41.59 | -20.54 | 62.13 | 31.20 | 0.05 | 10.34 | QP |
| 8 | 0.239 | 27.59 | -24.54 | 52.13 | 17.20 | 0.05 | 10.34 | Average |
| 9 | 0.479 | 34.94 | -21.42 | 56.36 | 24.60 | 0.10 | 10.24 | QP |
| 10 | 0.479 | 25.84 | -20.52 | 46.36 | 15.50 | 0.10 | 10.24 | Average |
| 11 | 3.074 | 30.59 | -25.41 | 56.00 | 20.20 | 0.15 | 10.24 | QP |
| 12 | 3.074 | 24.59 | -21.41 | 46.00 | 14.20 | 0.15 | 10.24 | Average |



| | | | |
|-----------------|---|---------------------|-------------|
| Test Engineer : | Amos Zhang | Temperature : | 25.3~26.2°C |
| | | Relative Humidity : | 38~40% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |
| Remark : | All emissions not reported here are more than 10 dB below the prescribed limit. | | |



Site : CO01-KS
 Condition : FCC PART 15C LISN-060105-N NEUTRAL

| | Freq | Level | Over | Limit | Read | LISN | Cable | Remark |
|-----|--------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 * | 0.158 | 51.07 | -14.49 | 65.56 | 40.50 | 0.11 | 10.46 | QP |
| 2 | 0.158 | 32.17 | -23.39 | 55.56 | 21.60 | 0.11 | 10.46 | Average |
| 3 | 0.180 | 49.71 | -14.79 | 64.50 | 39.20 | 0.10 | 10.41 | QP |
| 4 | 0.180 | 34.61 | -19.89 | 54.50 | 24.10 | 0.10 | 10.41 | Average |
| 5 | 0.215 | 44.05 | -18.96 | 63.01 | 33.60 | 0.10 | 10.35 | QP |
| 6 | 0.215 | 30.05 | -22.96 | 53.01 | 19.60 | 0.10 | 10.35 | Average |
| 7 | 0.242 | 39.94 | -22.10 | 62.04 | 29.50 | 0.10 | 10.34 | QP |
| 8 | 0.242 | 27.74 | -24.30 | 52.04 | 17.30 | 0.10 | 10.34 | Average |
| 9 | 2.346 | 32.68 | -23.32 | 56.00 | 22.31 | 0.14 | 10.23 | QP |
| 10 | 2.346 | 27.58 | -18.42 | 46.00 | 17.21 | 0.14 | 10.23 | Average |
| 11 | 17.755 | 35.98 | -24.02 | 60.00 | 25.10 | 0.43 | 10.45 | QP |
| 12 | 17.755 | 30.58 | -19.42 | 50.00 | 19.70 | 0.43 | 10.45 | Average |

Note:

- Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



Appendix C. Radiated Spurious Emission

| | | | |
|-----------------|----------|---------------------|---------|
| Test Engineer : | Henry LI | Temperature : | 21~22°C |
| | | Relative Humidity : | 43~45% |

| Band | | | Power setting |
|--------|------|-------|---------------|
| BLE Tx | CH00 | 1Mbps | 11 |
| BLE Tx | CH19 | 1Mbps | 11 |
| BLE Tx | CH39 | 1Mbps | 11 |
| BLE Tx | CH00 | 2Mbps | 11 |
| BLE Tx | CH19 | 2Mbps | 11 |
| BLE Tx | CH38 | 2Mbps | 11 |
| BLE Tx | CH39 | 2Mbps | 9 |



2.4GHz 2400~2483.5MHz

BLE—1Mbps (Band Edge @ 3m)

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Path | Preamp | Ant | Table | Peak | Pol. |
|-------------------------|---|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| BLE CH 00 2402MHz | | 2384.62 | 49.76 | -24.24 | 74 | 49.05 | 30.48 | 7.1 | 36.87 | 195 | 1 | P | H |
| | | 2389.82 | 39.94 | -14.06 | 54 | 39.2 | 30.5 | 7.1 | 36.86 | 195 | 1 | A | H |
| | * | 2402 | 108.9 | - | - | 108.13 | 30.5 | 7.13 | 36.86 | 195 | 1 | P | H |
| | * | 2402 | 107.68 | - | - | 106.91 | 30.5 | 7.13 | 36.86 | 195 | 1 | A | H |
| | | 2317.41 | 49.08 | -24.92 | 74 | 48.6 | 30.41 | 6.98 | 36.91 | 249 | 335 | P | V |
| | | 2389.3 | 37.59 | -16.41 | 54 | 36.85 | 30.5 | 7.1 | 36.86 | 249 | 335 | A | V |
| | * | 2402 | 98.25 | - | - | 97.48 | 30.5 | 7.13 | 36.86 | 249 | 335 | P | V |
| | * | 2402 | 97.06 | - | - | 96.29 | 30.5 | 7.13 | 36.86 | 249 | 335 | A | V |
| BLE CH 39 2480MHz | * | 2480 | 109.75 | - | - | 108.46 | 30.86 | 7.25 | 36.82 | 267 | 0 | P | H |
| | * | 2480 | 108.44 | - | - | 107.15 | 30.86 | 7.25 | 36.82 | 267 | 0 | A | H |
| | | 2483.92 | 58.15 | -15.85 | 74 | 56.86 | 30.86 | 7.25 | 36.82 | 267 | 0 | P | H |
| | | 2483.5 | 51.68 | -2.32 | 54 | 50.39 | 30.86 | 7.25 | 36.82 | 267 | 0 | A | H |
| | * | 2480 | 101.81 | - | - | 100.52 | 30.86 | 7.25 | 36.82 | 300 | 16 | P | V |
| | * | 2480 | 100.57 | - | - | 99.28 | 30.86 | 7.25 | 36.82 | 300 | 16 | A | V |
| | | 2483.62 | 51.29 | -22.71 | 74 | 50 | 30.86 | 7.25 | 36.82 | 300 | 16 | P | V |
| | | 2483.5 | 44.36 | -9.64 | 54 | 43.07 | 30.86 | 7.25 | 36.82 | 300 | 16 | 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—1Mbps (Harmonic @ 3m)

Table with 14 columns: BLE, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include BLE CH 00 2402MHz, BLE CH 19 2440MHz, BLE CH 39 2480MHz, and a Remark section.



2.4GHz 2400~2483.5MHz

BLE—2Mbps (Band Edge @ 3m)

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Path | Preamp | Ant | Table | Peak | Pol. |
|-------------------------|---|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| BLE CH 00 2402MHz | | 2389.43 | 59.1 | -14.9 | 74 | 58.36 | 30.5 | 7.1 | 36.86 | 194 | 0 | P | H |
| | | 2389.82 | 40.44 | -13.56 | 54 | 39.7 | 30.5 | 7.1 | 36.86 | 194 | 0 | A | H |
| | * | 2402 | 109.03 | - | - | 108.26 | 30.5 | 7.13 | 36.86 | 194 | 0 | P | H |
| | * | 2402 | 107.06 | - | - | 106.29 | 30.5 | 7.13 | 36.86 | 194 | 0 | A | H |
| | | 2361.35 | 48.68 | -25.32 | 74 | 48.03 | 30.46 | 7.07 | 36.88 | 100 | 219 | P | V |
| | | 2381.5 | 37.81 | -16.19 | 54 | 37.1 | 30.48 | 7.1 | 36.87 | 100 | 219 | A | V |
| | * | 2402 | 97.37 | - | - | 96.6 | 30.5 | 7.13 | 36.86 | 100 | 219 | P | V |
| | * | 2402 | 95.33 | - | - | 94.56 | 30.5 | 7.13 | 36.86 | 100 | 219 | A | V |
| BLE CH 38 2478MHz | | 2483.8 | 62.99 | -11.01 | 74 | 61.7 | 30.86 | 7.25 | 36.82 | 100 | 89 | P | H |
| | | 2483.5 | 43.7 | -10.3 | 54 | 42.41 | 30.86 | 7.25 | 36.82 | 100 | 89 | A | H |
| | * | 2478 | 107.84 | - | - | 106.55 | 30.86 | 7.25 | 36.82 | 100 | 89 | P | H |
| | * | 2478 | 105.96 | - | - | 104.67 | 30.86 | 7.25 | 36.82 | 100 | 89 | A | H |
| | | 2483.5 | 58.83 | -15.17 | 74 | 57.54 | 30.86 | 7.25 | 36.82 | 370 | 123 | P | V |
| | | 2483.56 | 41 | -13 | 54 | 39.71 | 30.86 | 7.25 | 36.82 | 370 | 123 | A | V |
| | * | 2478 | 103.99 | - | - | 102.7 | 30.86 | 7.25 | 36.82 | 370 | 123 | P | V |
| | * | 2478 | 102.01 | - | - | 100.72 | 30.86 | 7.25 | 36.82 | 370 | 123 | A | V |
| BLE CH 39 2480MHz | | 2483.5 | 67.1 | -6.9 | 74 | 65.81 | 30.86 | 7.25 | 36.82 | 268 | 0 | P | H |
| | | 2483.5 | 50.89 | -3.11 | 54 | 49.6 | 30.86 | 7.25 | 36.82 | 268 | 0 | A | H |
| | * | 2480 | 105 | - | - | 103.71 | 30.86 | 7.25 | 36.82 | 268 | 0 | P | H |
| | * | 2480 | 103.02 | - | - | 101.73 | 30.86 | 7.25 | 36.82 | 268 | 0 | A | H |
| | | 2483.56 | 59.67 | -14.33 | 74 | 58.38 | 30.86 | 7.25 | 36.82 | 263 | 14 | P | V |
| | | 2483.5 | 43.76 | -10.24 | 54 | 42.47 | 30.86 | 7.25 | 36.82 | 263 | 14 | A | V |
| | * | 2480 | 96.56 | - | - | 95.27 | 30.86 | 7.25 | 36.82 | 263 | 14 | P | V |
| | * | 2480 | 94.69 | - | - | 93.4 | 30.86 | 7.25 | 36.82 | 263 | 14 | 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—2Mbps (Harmonic @ 3m)

Table with 14 columns: BLE, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include BLE CH 00 (2402MHz), BLE CH 19 (2440MHz), BLE CH 38 (2478MHz), and BLE CH 39 (2480MHz).

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. |
|---------------------|--|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| 2.4GHz BLE LF | | 30 | 20.68 | -19.32 | 40 | 27.17 | 25.5 | 0.71 | 32.7 | - | - | P | H |
| | | 148.34 | 29.77 | -13.73 | 43.5 | 43.21 | 17.52 | 1.84 | 32.8 | - | - | P | H |
| | | 233.7 | 39.05 | -6.95 | 46 | 51.43 | 18.39 | 2.33 | 33.1 | - | - | P | H |
| | | 277.35 | 33.15 | -12.85 | 46 | 43.76 | 19.84 | 2.54 | 32.99 | - | - | P | H |
| | | 444.19 | 31.99 | -14.01 | 46 | 37.98 | 23.5 | 3.22 | 32.71 | - | - | P | H |
| | | 527.61 | 36.59 | -9.41 | 46 | 40.5 | 25.27 | 3.51 | 32.69 | - | - | P | H |
| | | 166.77 | 29.43 | -14.07 | 43.5 | 43.26 | 17.1 | 1.97 | 32.9 | - | - | P | V |
| | | 242.43 | 32.98 | -13.02 | 46 | 44.78 | 18.92 | 2.38 | 33.1 | - | - | P | V |
| | | 261.83 | 30.71 | -15.29 | 46 | 41.7 | 19.59 | 2.47 | 33.05 | - | - | P | V |
| | | 318.09 | 31.33 | -14.67 | 46 | 40.87 | 20.64 | 2.72 | 32.9 | - | - | P | V |
| | | 498.51 | 32.17 | -13.83 | 46 | 37.09 | 24.47 | 3.41 | 32.8 | - | - | P | V |
| | 640.13 | 32.97 | -13.03 | 46 | 35.95 | 25.82 | 3.86 | 32.66 | - | - | P | V | |
| Remark | 1. No other spurious found. 2. All results are PASS against limit line. | | | | | | | | | | | | |



Note symbol

| | |
|-----|--|
| * | Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| ! | Test result is over limit line. |
| P/A | Peak or Average |
| H/V | Horizontal or Vertical |



A calculation example for radiated spurious emission is shown as below:

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Path | Preamp | Ant | Table | Peak | Pol. |
|-------------------------|------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| | | (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 D. Radiated Spurious Emission Plots

Note symbol

| | |
|----|-----------------------|
| -L | Low channel location |
| -R | High channel location |



2.4GHz 2400~2483.5MHz
BLE—1Mbps (Band Edge @ 3m)

| BLE | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|---|-------------|--------------|-------------|--------------|--------|----------|--------|----------|-----|---------|------------|--------|-----|-----|----|-----|---|---------|-------|--------|-------|-------|-------|------|-------|-----|---|---------|------------|---|------|-------|-------------|--------------|-------|-------|--------|----------|-----|--------|--------|--------|-----|-----|----|-----|---|---------|--------|-------|-------|--------|-------|------|-------|-----|---|---------|------------|
| ANT | BLE CH39 2480MHZ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Horizontal | Fundamental | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak | <p>No. 1098, Pengji North Road, Kunshan Economic & Technical Development Zone, Jiangsu, China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 032005-KS Condition : FCC PART 15C 3m 3117 00218652 HORIZONTAL Project : RRM 1000.0000Hz VBR 3000.0000Hz SRT:Auto Mode : (FR) 1D1703 Plane : Z Full-directivity Power setting : #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm</th> <th>deg</th> <th>on</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2483.92</td> <td>58.15</td> <td>-15.85</td> <td>74.00</td> <td>56.86</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>267</td> <td>0</td> <td>Peak</td> <td>HORIZONTAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | 1 | 2483.92 | 58.15 | -15.85 | 74.00 | 56.86 | 30.86 | 7.25 | 36.82 | 267 | 0 | Peak | HORIZONTAL | <p>No. 1098, Pengji North Road, Kunshan Economic & Technical Development Zone, Jiangsu, China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 032005-KS Condition : FCC PART 15C 3m 3117 00218652 HORIZONTAL Project : RRM 1000.0000Hz VBR 3000.0000Hz SRT:Auto Mode : (FR) 1D1703 Plane : Z Full-directivity Power setting : #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm</th> <th>deg</th> <th>on</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2480.00</td> <td>109.75</td> <td>35.75</td> <td>74.00</td> <td>108.66</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>267</td> <td>0</td> <td>Peak</td> <td>HORIZONTAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | 1 | 2480.00 | 109.75 | 35.75 | 74.00 | 108.66 | 30.86 | 7.25 | 36.82 | 267 | 0 | Peak | HORIZONTAL |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2483.92 | 58.15 | -15.85 | 74.00 | 56.86 | 30.86 | 7.25 | 36.82 | 267 | 0 | Peak | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2480.00 | 109.75 | 35.75 | 74.00 | 108.66 | 30.86 | 7.25 | 36.82 | 267 | 0 | Peak | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Avg. | <p>No. 1098, Pengji North Road, Kunshan Economic & Technical Development Zone, Jiangsu, China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 032005-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 HORIZONTAL Project : RRM 1000.0000Hz VBR 0.010000 SRT:Auto Mode : (FR) 1D1703 Plane : Z Full-directivity Power setting : #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm</th> <th>deg</th> <th>on</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2483.50</td> <td>51.68</td> <td>-2.32</td> <td>54.00</td> <td>50.39</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>267</td> <td>0</td> <td>Average</td> <td>HORIZONTAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | 1 | 2483.50 | 51.68 | -2.32 | 54.00 | 50.39 | 30.86 | 7.25 | 36.82 | 267 | 0 | Average | HORIZONTAL | <p>No. 1098, Pengji North Road, Kunshan Economic & Technical Development Zone, Jiangsu, China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 032005-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 HORIZONTAL Project : RRM 1000.0000Hz VBR 0.010000 SRT:Auto Mode : (FR) 1D1703 Plane : Z Full-directivity Power setting : #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm/Vm</th> <th>dBm</th> <th>deg</th> <th>on</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2480.00</td> <td>108.44</td> <td>54.44</td> <td>54.00</td> <td>107.15</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>267</td> <td>0</td> <td>Average</td> <td>HORIZONTAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | 1 | 2480.00 | 108.44 | 54.44 | 54.00 | 107.15 | 30.86 | 7.25 | 36.82 | 267 | 0 | Average | HORIZONTAL |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2483.50 | 51.68 | -2.32 | 54.00 | 50.39 | 30.86 | 7.25 | 36.82 | 267 | 0 | Average | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dBm/Vm | dBm/Vm | dBm | deg | on | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2480.00 | 108.44 | 54.44 | 54.00 | 107.15 | 30.86 | 7.25 | 36.82 | 267 | 0 | Average | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| BLE | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|-------------|-------------|--------------|-------------|--------------|--------|----------|--------|----------|---------|----------|----|-------|----|----|----|-----|--|---|---------|-------|--------|-------|-------|-------|------|-------|-----|----|---------|----------|--|------|------|-------|-------------|--------------|-------|-------|--------|----------|-----|-------|----|-------|----|----|----|-----|--|---|---------|--------|-------|-------|--------|-------|------|-------|-----|----|---------|----------|
| ANT | BLE CH39 2480MHZ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Vertical | Fundamental | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030905-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL Project : RRM 1000.000kHz VBR 3000.000kHz SRT:Auto Mode : (FR) 1D1703 Plane : 3 Full-directivity IME1 : 11 Powersetting : 41</p> <table border="1"> <thead> <tr> <th>IME1</th> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBV/m</th> <th>dB</th> <th>dBV/m</th> <th>dB</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2483.62</td> <td>51.29</td> <td>-22.71</td> <td>74.00</td> <td>50.00</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>300</td> <td>16</td> <td>Peak</td> <td>VERTICAL</td> </tr> </tbody> </table> | IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | 1 | 2483.62 | 51.29 | -22.71 | 74.00 | 50.00 | 30.86 | 7.25 | 36.82 | 300 | 16 | Peak | VERTICAL | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030905-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL Project : RRM 1000.000kHz VBR 3000.000kHz SRT:Auto Mode : (FR) 1D1703 Plane : 3 Full-directivity IME1 : 11 Powersetting : 41</p> <table border="1"> <thead> <tr> <th>IME1</th> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBV/m</th> <th>dB</th> <th>dBV/m</th> <th>dB</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2480.00</td> <td>101.81</td> <td>27.81</td> <td>74.00</td> <td>100.52</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>300</td> <td>16</td> <td>Peak</td> <td>VERTICAL</td> </tr> </tbody> </table> | IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | 1 | 2480.00 | 101.81 | 27.81 | 74.00 | 100.52 | 30.86 | 7.25 | 36.82 | 300 | 16 | Peak | VERTICAL |
| IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2483.62 | 51.29 | -22.71 | 74.00 | 50.00 | 30.86 | 7.25 | 36.82 | 300 | 16 | Peak | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2480.00 | 101.81 | 27.81 | 74.00 | 100.52 | 30.86 | 7.25 | 36.82 | 300 | 16 | Peak | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Avg. | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030905-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 VERTICAL Project : RRM 1000.000kHz VBR 0.5100kHz SRT:Auto Mode : (FR) 1D1703 Plane : 3 Full-directivity IME1 : 11 Powersetting : 41</p> <table border="1"> <thead> <tr> <th>IME1</th> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBV/m</th> <th>dB</th> <th>dBV/m</th> <th>dB</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2483.50</td> <td>44.36</td> <td>-9.64</td> <td>54.00</td> <td>43.07</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>300</td> <td>16</td> <td>Average</td> <td>VERTICAL</td> </tr> </tbody> </table> | IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | 1 | 2483.50 | 44.36 | -9.64 | 54.00 | 43.07 | 30.86 | 7.25 | 36.82 | 300 | 16 | Average | VERTICAL | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030905-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 VERTICAL Project : RRM 1000.000kHz VBR 0.5100kHz SRT:Auto Mode : (FR) 1D1703 Plane : 3 Full-directivity IME1 : 11 Powersetting : 41</p> <table border="1"> <thead> <tr> <th>IME1</th> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBV/m</th> <th>dB</th> <th>dBV/m</th> <th>dB</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2480.00</td> <td>100.57</td> <td>46.57</td> <td>54.00</td> <td>99.28</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>300</td> <td>16</td> <td>Average</td> <td>VERTICAL</td> </tr> </tbody> </table> | IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | 1 | 2480.00 | 100.57 | 46.57 | 54.00 | 99.28 | 30.86 | 7.25 | 36.82 | 300 | 16 | Average | VERTICAL |
| IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2483.50 | 44.36 | -9.64 | 54.00 | 43.07 | 30.86 | 7.25 | 36.82 | 300 | 16 | Average | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IME1 | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBV/m | dB | dBV/m | dB | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2480.00 | 100.57 | 46.57 | 54.00 | 99.28 | 30.86 | 7.25 | 36.82 | 300 | 16 | Average | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



2.4GHz 2400~2483.5MHz
BLE—1Mbps (Harmonic @ 3m)

| BLE | 2.4GHz 2400~2483.5MHz Harmonic @ 3m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|---|-------------|-------------|-------------|--------|--------|--------|----------|----------|----------|-------|------|------------|--------|------|--------|--------|----|-----|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|------------|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|------------|---|------|-------|-------------|-------|--------|-------|-------|--------|----------|-------|------|-------|--------|------|--------|--------|----|-----|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|----------|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|----------|
| ANT | BLE CH39 2480MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Horizontal | Vertical | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak | <p>Site : 03D05-KS Condition : FCC PART 15C 3m 3117.00218653 HORIZONTAL Project : RSM 1000.000KHz VBR 3000.000KHz SRT Auto Mode : FREQ 101703 Plane : Z Polar : Full-directivity IMEI : #1 Power setting : 11</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable</th> <th>Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Level</th> <th>Line</th> <th>Level</th> <th>Factor</th> <th>Loss</th> <th>Factor</th> <th>Factor</th> <th>dB</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>49.65</td> <td>00</td> <td>43.39</td> <td>-30.71</td> <td>74.00</td> <td>63.53</td> <td>34.82</td> <td>10.41</td> <td>65.47</td> <td>300</td> <td>0</td> <td>Peak</td> <td>HORIZONTAL</td> </tr> <tr> <td>2</td> <td>74.40</td> <td>00</td> <td>43.66</td> <td>-30.34</td> <td>74.00</td> <td>60.56</td> <td>36.62</td> <td>12.79</td> <td>66.31</td> <td>300</td> <td>0</td> <td>Peak</td> <td>HORIZONTAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Level | Line | Level | Factor | Loss | Factor | Factor | dB | deg | 1 | 49.65 | 00 | 43.39 | -30.71 | 74.00 | 63.53 | 34.82 | 10.41 | 65.47 | 300 | 0 | Peak | HORIZONTAL | 2 | 74.40 | 00 | 43.66 | -30.34 | 74.00 | 60.56 | 36.62 | 12.79 | 66.31 | 300 | 0 | Peak | HORIZONTAL | <p>Site : 03D05-KS Condition : FCC PART 15C 3m 3117.00218653 VERTICAL Project : RSM 1000.000KHz VBR 3000.000KHz SRT Auto Mode : FREQ 101703 Plane : X Polar : Full-directivity IMEI : #1 Power setting : 11</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable</th> <th>Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Level</th> <th>Line</th> <th>Level</th> <th>Factor</th> <th>Loss</th> <th>Factor</th> <th>Factor</th> <th>dB</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>49.65</td> <td>00</td> <td>44.21</td> <td>-29.79</td> <td>74.00</td> <td>64.65</td> <td>34.82</td> <td>10.41</td> <td>65.47</td> <td>100</td> <td>0</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>2</td> <td>74.40</td> <td>00</td> <td>44.16</td> <td>-29.84</td> <td>74.00</td> <td>61.00</td> <td>36.62</td> <td>12.79</td> <td>66.31</td> <td>100</td> <td>0</td> <td>Peak</td> <td>VERTICAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Level | Line | Level | Factor | Loss | Factor | Factor | dB | deg | 1 | 49.65 | 00 | 44.21 | -29.79 | 74.00 | 64.65 | 34.82 | 10.41 | 65.47 | 100 | 0 | Peak | VERTICAL | 2 | 74.40 | 00 | 44.16 | -29.84 | 74.00 | 61.00 | 36.62 | 12.79 | 66.31 | 100 | 0 | Peak | VERTICAL |
| | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level | Line | Level | Factor | Loss | Factor | Factor | dB | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 49.65 | 00 | 43.39 | -30.71 | 74.00 | 63.53 | 34.82 | 10.41 | 65.47 | 300 | 0 | Peak | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 74.40 | 00 | 43.66 | -30.34 | 74.00 | 60.56 | 36.62 | 12.79 | 66.31 | 300 | 0 | Peak | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level | Line | Level | Factor | Loss | Factor | Factor | dB | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 49.65 | 00 | 44.21 | -29.79 | 74.00 | 64.65 | 34.82 | 10.41 | 65.47 | 100 | 0 | Peak | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 74.40 | 00 | 44.16 | -29.84 | 74.00 | 61.00 | 36.62 | 12.79 | 66.31 | 100 | 0 | Peak | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



2.4GHz 2400~2483.5MHz
BLE—2Mbps (Band Edge @ 3m)

| BLE | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|--|-------------|--------------|-------------|--------------|--------|----------|--------|-----------|----------|-------|------|--------------|-------------|--|--|--|-----|--------|----|------|----|----|----|-----|-------------|--------|-------|-------|--------|-------|------|-------|-----|-----------|----------|--|------|-------|-------------|--------------|-------|-------|--------|----------|------|-------|------|--------------|-------------|--|--|--|-----|--------|----|------|----|----|----|-----|-----------|-------|-------|-------|-------|-------|------|-------|-----|-----------|----------|
| ANT | BLE CH39 2480MHZ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Horizontal | Fundamental | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak | <p>Site : 032005-KS Condition : FCC PART 15C 3m 3117 00218652 HORIZONTAL Project : RRM 1000.000000 VSW 3.0000 000000 SRT:Auto Mode : (FR) 101703 Plane : 0 P : X Full-directivity : Full-directivity Powersetting : #1 #1 #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Freq</th> <th>Level</th> <th>Line</th> <th>Level Factor</th> <th>Loss Factor</th> <th></th> <th></th> <th></th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dB</th> <th>dB/V</th> <th>dB</th> <th>dB</th> <th>cn</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1 * 2480.00</td> <td>105.00</td> <td>31.00</td> <td>74.00</td> <td>103.71</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>268</td> <td>0 Peak</td> <td>HORIZONT</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Freq | Level | Line | Level Factor | Loss Factor | | | | MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | 1 * 2480.00 | 105.00 | 31.00 | 74.00 | 103.71 | 30.86 | 7.25 | 36.82 | 268 | 0 Peak | HORIZONT | <p>Site : 032005-KS Condition : FCC PART 15C 3m 3117 00218652 HORIZONTAL Project : RRM 1000.000000 VSW 3.0000 000000 SRT:Auto Mode : (FR) 101703 Plane : 0 P : X Full-directivity : Full-directivity Powersetting : #1 #1 #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Freq</th> <th>Level</th> <th>Line</th> <th>Level Factor</th> <th>Loss Factor</th> <th></th> <th></th> <th></th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dB</th> <th>dB/V</th> <th>dB</th> <th>dB</th> <th>cn</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1 2483.50</td> <td>67.10</td> <td>-6.90</td> <td>74.00</td> <td>65.81</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>268</td> <td>0 Peak</td> <td>HORIZONT</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Freq | Level | Line | Level Factor | Loss Factor | | | | MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | 1 2483.50 | 67.10 | -6.90 | 74.00 | 65.81 | 30.86 | 7.25 | 36.82 | 268 | 0 Peak | HORIZONT |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Freq | Level | Line | Level Factor | Loss Factor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 * 2480.00 | 105.00 | 31.00 | 74.00 | 103.71 | 30.86 | 7.25 | 36.82 | 268 | 0 Peak | HORIZONT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Freq | Level | Line | Level Factor | Loss Factor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 2483.50 | 67.10 | -6.90 | 74.00 | 65.81 | 30.86 | 7.25 | 36.82 | 268 | 0 Peak | HORIZONT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Avg. | <p>Site : 032005-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 HORIZONTAL Project : RRM 1000.000000 VSW 1.000000 SRT:Auto Mode : (FR) 101703 Plane : 0 P : X Full-directivity : Full-directivity Powersetting : #1 #1 #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Freq</th> <th>Level</th> <th>Line</th> <th>Level Factor</th> <th>Loss Factor</th> <th></th> <th></th> <th></th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dB</th> <th>dB/V</th> <th>dB</th> <th>dB</th> <th>cn</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1 * 2480.00</td> <td>103.02</td> <td>49.02</td> <td>54.00</td> <td>101.73</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>268</td> <td>0 Average</td> <td>HORIZONT</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Freq | Level | Line | Level Factor | Loss Factor | | | | MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | 1 * 2480.00 | 103.02 | 49.02 | 54.00 | 101.73 | 30.86 | 7.25 | 36.82 | 268 | 0 Average | HORIZONT | <p>Site : 032005-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 HORIZONTAL Project : RRM 1000.000000 VSW 1.000000 SRT:Auto Mode : (FR) 101703 Plane : 0 P : X Full-directivity : Full-directivity Powersetting : #1 #1 #1</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Freq</th> <th>Level</th> <th>Line</th> <th>Level Factor</th> <th>Loss Factor</th> <th></th> <th></th> <th></th> </tr> <tr> <th>MHz</th> <th>dBm/Vm</th> <th>dB</th> <th>dB/V</th> <th>dB</th> <th>dB</th> <th>cn</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1 2483.50</td> <td>50.89</td> <td>-3.11</td> <td>54.00</td> <td>49.60</td> <td>30.86</td> <td>7.25</td> <td>36.82</td> <td>268</td> <td>0 Average</td> <td>HORIZONT</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Freq | Level | Line | Level Factor | Loss Factor | | | | MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | 1 2483.50 | 50.89 | -3.11 | 54.00 | 49.60 | 30.86 | 7.25 | 36.82 | 268 | 0 Average | HORIZONT |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Freq | Level | Line | Level Factor | Loss Factor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 * 2480.00 | 103.02 | 49.02 | 54.00 | 101.73 | 30.86 | 7.25 | 36.82 | 268 | 0 Average | HORIZONT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Freq | Level | Line | Level Factor | Loss Factor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/Vm | dB | dB/V | dB | dB | cn | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 2483.50 | 50.89 | -3.11 | 54.00 | 49.60 | 30.86 | 7.25 | 36.82 | 268 | 0 Average | HORIZONT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| BLE | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|--|-------------|--------------|--------------|--------------|------------|-------------------------|----------|----------|-----|-----|-----|----|----|-----|--|--|-------------|-------|-------|-------|-------|-------|------------|-------------------------|---|------|-------|-------------|--------------|-------|-------|--------|----------|-----|-----|-----|----|----|-----|--|--|-----------|-------|--------|-------|-------|-------|------------|-------------------------|
| ANT | BLE CH39 2480MHZ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Vertical | Fundamental | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Peak</p> | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030805-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL Project : RSM-1000.000MHz VBR-3000.000MHz SRT-Auto Mode : (FR)1D1703 Plane : 0 Full-directivity : Full-directivity IMEI : 81 Powersetting : 9</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm</th> <th>dBm</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1 * 2480.00</td> <td>96.56</td> <td>22.56</td> <td>74.00</td> <td>95.27</td> <td>30.86</td> <td>7.25 36.82</td> <td>263 14 Peak VERTICAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm | dBm | dB | cm | deg | | | 1 * 2480.00 | 96.56 | 22.56 | 74.00 | 95.27 | 30.86 | 7.25 36.82 | 263 14 Peak VERTICAL | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030805-KS Condition : FCC PART 15C 3m 3117 00218652 VERTICAL Project : RSM-1000.000MHz VBR-3000.000MHz SRT-Auto Mode : (FR)1D1703 Plane : 0 Full-directivity : Full-directivity IMEI : 81 Powersetting : 9</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm</th> <th>dBm</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1 2483.56</td> <td>59.67</td> <td>-14.33</td> <td>74.00</td> <td>58.38</td> <td>30.86</td> <td>7.25 36.82</td> <td>263 14 Peak VERTICAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm | dBm | dB | cm | deg | | | 1 2483.56 | 59.67 | -14.33 | 74.00 | 58.38 | 30.86 | 7.25 36.82 | 263 14 Peak VERTICAL |
| | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm | dBm | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 * 2480.00 | 96.56 | 22.56 | 74.00 | 95.27 | 30.86 | 7.25 36.82 | 263 14 Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm | dBm | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 2483.56 | 59.67 | -14.33 | 74.00 | 58.38 | 30.86 | 7.25 36.82 | 263 14 Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Avg.</p> | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030805-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 VERTICAL Project : RSM-1000.000MHz VBR-1.000MHz SRT-Auto Mode : (FR)1D1703 Plane : 0 Full-directivity : Full-directivity IMEI : 81 Powersetting : 9</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm</th> <th>dBm</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1 * 2480.00</td> <td>94.69</td> <td>40.69</td> <td>54.00</td> <td>93.40</td> <td>30.86</td> <td>7.25 36.82</td> <td>263 14 Average VERTICAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm | dBm | dB | cm | deg | | | 1 * 2480.00 | 94.69 | 40.69 | 54.00 | 93.40 | 30.86 | 7.25 36.82 | 263 14 Average VERTICAL | <p>No. 1098, Pengzi North Road, Kunshan Economic & Technical Development Zone, Jiangsu China tel: +86-512-57900158 fax: +86-512-57900958 http://www.sporton.com.cn</p> <p>Site : 030805-KS Condition : FCC PART 15C (AVG) 3m 3117 00218652 VERTICAL Project : RSM-1000.000MHz VBR-1.000MHz SRT-Auto Mode : (FR)1D1703 Plane : 0 Full-directivity : Full-directivity IMEI : 81 Powersetting : 9</p> <table border="1"> <thead> <tr> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm</th> <th>dBm</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1 2483.50</td> <td>43.76</td> <td>-10.24</td> <td>54.00</td> <td>42.47</td> <td>30.86</td> <td>7.25 36.82</td> <td>263 14 Average VERTICAL</td> </tr> </tbody> </table> | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm | dBm | dB | cm | deg | | | 1 2483.50 | 43.76 | -10.24 | 54.00 | 42.47 | 30.86 | 7.25 36.82 | 263 14 Average VERTICAL |
| | Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm | dBm | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 * 2480.00 | 94.69 | 40.69 | 54.00 | 93.40 | 30.86 | 7.25 36.82 | 263 14 Average VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over | Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm | dBm | dB | cm | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 2483.50 | 43.76 | -10.24 | 54.00 | 42.47 | 30.86 | 7.25 36.82 | 263 14 Average VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



2.4GHz 2400~2483.5MHz
BLE—2Mbps (Harmonic @ 3m)

| BLE | 2.4GHz 2400~2483.5MHz Harmonic @ 3m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|---|--------------|--------------|--------------|--------|----------|----------|----------|-------|-------|-------|------|------------|----|----|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|------------|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|------------|---|------------|-------------|--------------|-------|-------|--------|----------|-------|-------|-------|------|--------|----|----|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|----------|---|-------|----|-------|--------|-------|-------|-------|-------|-------|-----|---|------|----------|
| ANT | BLE CH39 2480MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Horizontal | Vertical | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak | <p>Site : 03D05-KS Condition : FCC PART 15C 3m 3117.00218653 HORIZONTAL Project : RSM 1000.000KHz VBR 3000.000KHz SRT Auto Mode : 0 Plane : X Polarization : Full-directivity Power setting : 0</p> <table border="1"> <thead> <tr> <th>Over Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Level</th> <th>Level</th> <th>Level</th> <th>Loss</th> <th>Factor</th> <th>dB</th> <th>dB</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>49.65</td> <td>00</td> <td>42.18</td> <td>-31.82</td> <td>74.00</td> <td>62.42</td> <td>34.82</td> <td>10.41</td> <td>65.47</td> <td>300</td> <td>0</td> <td>Peak</td> <td>HORIZONTAL</td> </tr> <tr> <td>2</td> <td>74.40</td> <td>00</td> <td>44.94</td> <td>-29.56</td> <td>74.00</td> <td>61.84</td> <td>36.62</td> <td>12.79</td> <td>66.31</td> <td>300</td> <td>0</td> <td>Peak</td> <td>HORIZONTAL</td> </tr> </tbody> </table> | Over Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Level | Level | Level | Loss | Factor | dB | dB | 1 | 49.65 | 00 | 42.18 | -31.82 | 74.00 | 62.42 | 34.82 | 10.41 | 65.47 | 300 | 0 | Peak | HORIZONTAL | 2 | 74.40 | 00 | 44.94 | -29.56 | 74.00 | 61.84 | 36.62 | 12.79 | 66.31 | 300 | 0 | Peak | HORIZONTAL | <p>Site : 03D05-KS Condition : FCC PART 15C 3m 3117.00218653 VERTICAL Project : RSM 1000.000KHz VBR 3000.000KHz SRT Auto Mode : 0 Plane : X Polarization : Full-directivity Power setting : 0</p> <table border="1"> <thead> <tr> <th>Over Limit</th> <th>ReadAntenna</th> <th>Cable Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>Level</th> <th>Level</th> <th>Level</th> <th>Loss</th> <th>Factor</th> <th>dB</th> <th>dB</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>49.65</td> <td>00</td> <td>42.18</td> <td>-31.82</td> <td>74.00</td> <td>62.42</td> <td>34.82</td> <td>10.41</td> <td>65.47</td> <td>100</td> <td>0</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>2</td> <td>74.40</td> <td>00</td> <td>44.45</td> <td>-29.55</td> <td>74.00</td> <td>61.30</td> <td>36.62</td> <td>12.79</td> <td>66.31</td> <td>100</td> <td>0</td> <td>Peak</td> <td>VERTICAL</td> </tr> </tbody> </table> | Over Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | Level | Level | Level | Loss | Factor | dB | dB | 1 | 49.65 | 00 | 42.18 | -31.82 | 74.00 | 62.42 | 34.82 | 10.41 | 65.47 | 100 | 0 | Peak | VERTICAL | 2 | 74.40 | 00 | 44.45 | -29.55 | 74.00 | 61.30 | 36.62 | 12.79 | 66.31 | 100 | 0 | Peak | VERTICAL |
| | Over Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level | Level | Level | Loss | Factor | dB | dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 49.65 | 00 | 42.18 | -31.82 | 74.00 | 62.42 | 34.82 | 10.41 | 65.47 | 300 | 0 | Peak | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 74.40 | 00 | 44.94 | -29.56 | 74.00 | 61.84 | 36.62 | 12.79 | 66.31 | 300 | 0 | Peak | HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Over Limit | ReadAntenna | Cable Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level | Level | Level | Loss | Factor | dB | dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 49.65 | 00 | 42.18 | -31.82 | 74.00 | 62.42 | 34.82 | 10.41 | 65.47 | 100 | 0 | Peak | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 74.40 | 00 | 44.45 | -29.55 | 74.00 | 61.30 | 36.62 | 12.79 | 66.31 | 100 | 0 | Peak | VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Emission below 1GHz
2.4GHz BLE (LF)

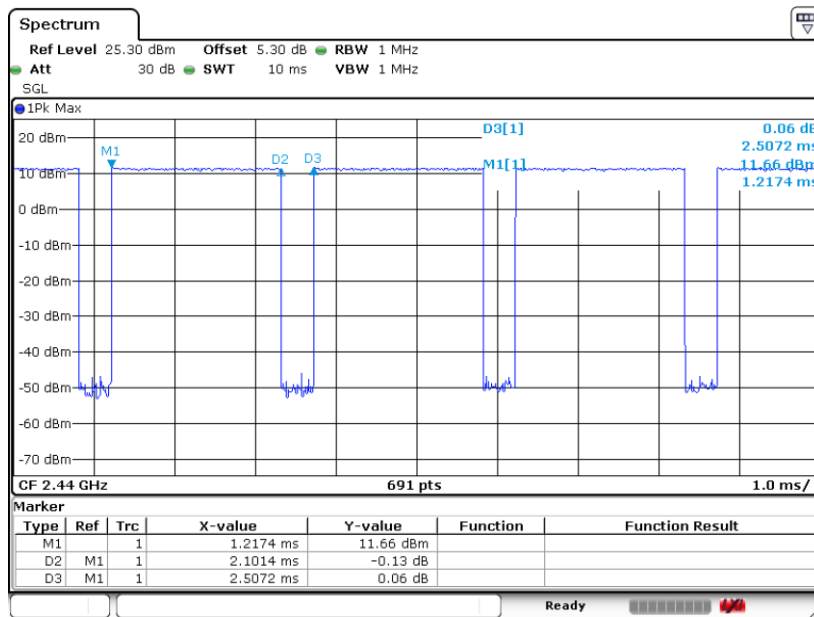
| BLE | 2.4GHz 2400~2483.5MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|---|----------|----------|-------------|-------------|-------------|--------|--------|--------|-----------------|----------|----------|-----|----------|----|----------|-----|----|----|----|----|----|-----|---|-------|-------|--------|-------|-------|-------|------|-------|-----|-----------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|-----------------|---|--------|-------|-------|-------|-------|-------|------|-------|-----|-----------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|-----------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|-----------------|---|--------|-------|-------|-------|-------|-------|------|-------|-----|-----------------|--|-----|-------|------|-------|-------------|-------|--------|-------|-------|--------|----------|-----|----------|----|----------|-----|----|----|----|----|----|-----|---|--------|-------|--------|-------|-------|-------|------|-------|-----|---------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|---------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|---------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|---------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|---------------|---|--------|-------|--------|-------|-------|-------|------|-------|-----|---------------|
| ANT | BLE LF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Horizontal | Vertical | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QP / Peak | <p>Site : 030602-K5 Condition : FCC PART 15C 3m CBL1110 SN3188 HORIZONTAL Project : FR1D1703 Mode : 2 Plane : E Full-directivity IMEI : #1</p> <table border="1"> <thead> <tr> <th>Frq</th> <th>Level</th> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable</th> <th>Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm/100m</th> <th>dB</th> <th>dBm/100m</th> <th>dBm</th> <th>dB</th> <th>dB</th> <th>dB</th> <th>dB</th> <th>dB</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>30.00</td> <td>20.68</td> <td>-19.32</td> <td>40.00</td> <td>27.17</td> <td>25.50</td> <td>0.71</td> <td>32.70</td> <td>---</td> <td>Peak HORIZONTAL</td> </tr> <tr> <td>2</td> <td>148.34</td> <td>29.77</td> <td>-12.73</td> <td>43.00</td> <td>43.21</td> <td>17.52</td> <td>1.84</td> <td>33.80</td> <td>---</td> <td>Peak HORIZONTAL</td> </tr> <tr> <td>3</td> <td>233.70</td> <td>39.50</td> <td>-6.95</td> <td>46.00</td> <td>51.43</td> <td>18.97</td> <td>2.33</td> <td>33.10</td> <td>---</td> <td>Peak HORIZONTAL</td> </tr> <tr> <td>4</td> <td>277.35</td> <td>33.15</td> <td>-12.85</td> <td>46.00</td> <td>43.76</td> <td>19.84</td> <td>2.54</td> <td>32.99</td> <td>---</td> <td>Peak HORIZONTAL</td> </tr> <tr> <td>5</td> <td>444.19</td> <td>31.99</td> <td>-14.01</td> <td>46.00</td> <td>37.98</td> <td>22.50</td> <td>3.72</td> <td>32.71</td> <td>---</td> <td>Peak HORIZONTAL</td> </tr> <tr> <td>6</td> <td>527.61</td> <td>36.09</td> <td>-9.41</td> <td>46.00</td> <td>40.50</td> <td>25.27</td> <td>3.51</td> <td>32.69</td> <td>---</td> <td>Peak HORIZONTAL</td> </tr> </tbody> </table> | Frq | Level | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm/100m | dB | dBm/100m | dBm | dB | dB | dB | dB | dB | deg | 1 | 30.00 | 20.68 | -19.32 | 40.00 | 27.17 | 25.50 | 0.71 | 32.70 | --- | Peak HORIZONTAL | 2 | 148.34 | 29.77 | -12.73 | 43.00 | 43.21 | 17.52 | 1.84 | 33.80 | --- | Peak HORIZONTAL | 3 | 233.70 | 39.50 | -6.95 | 46.00 | 51.43 | 18.97 | 2.33 | 33.10 | --- | Peak HORIZONTAL | 4 | 277.35 | 33.15 | -12.85 | 46.00 | 43.76 | 19.84 | 2.54 | 32.99 | --- | Peak HORIZONTAL | 5 | 444.19 | 31.99 | -14.01 | 46.00 | 37.98 | 22.50 | 3.72 | 32.71 | --- | Peak HORIZONTAL | 6 | 527.61 | 36.09 | -9.41 | 46.00 | 40.50 | 25.27 | 3.51 | 32.69 | --- | Peak HORIZONTAL | <p>Site : 030602-K5 Condition : FCC PART 15C 3m CBL1110 SN3188 VERTICAL Project : FR1D1703 Mode : 2 Plane : E Full-directivity IMEI : #1</p> <table border="1"> <thead> <tr> <th>Frq</th> <th>Level</th> <th>Over</th> <th>Limit</th> <th>ReadAntenna</th> <th>Cable</th> <th>Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> <th>Pol/Phas</th> </tr> <tr> <th>MHz</th> <th>dBm/100m</th> <th>dB</th> <th>dBm/100m</th> <th>dBm</th> <th>dB</th> <th>dB</th> <th>dB</th> <th>dB</th> <th>dB</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>166.77</td> <td>29.43</td> <td>-14.07</td> <td>43.50</td> <td>43.36</td> <td>17.10</td> <td>1.97</td> <td>32.90</td> <td>---</td> <td>Peak VERTICAL</td> </tr> <tr> <td>2</td> <td>242.43</td> <td>32.90</td> <td>-13.02</td> <td>46.00</td> <td>44.78</td> <td>18.92</td> <td>2.28</td> <td>33.10</td> <td>---</td> <td>Peak VERTICAL</td> </tr> <tr> <td>3</td> <td>261.83</td> <td>30.71</td> <td>-15.29</td> <td>46.00</td> <td>41.70</td> <td>18.99</td> <td>2.47</td> <td>33.05</td> <td>---</td> <td>Peak VERTICAL</td> </tr> <tr> <td>4</td> <td>218.09</td> <td>31.33</td> <td>-14.67</td> <td>46.00</td> <td>40.87</td> <td>20.64</td> <td>2.72</td> <td>32.90</td> <td>---</td> <td>Peak VERTICAL</td> </tr> <tr> <td>5</td> <td>498.01</td> <td>32.17</td> <td>-13.83</td> <td>46.00</td> <td>37.09</td> <td>26.42</td> <td>3.41</td> <td>32.80</td> <td>---</td> <td>Peak VERTICAL</td> </tr> <tr> <td>6</td> <td>640.13</td> <td>32.97</td> <td>-13.03</td> <td>46.00</td> <td>35.95</td> <td>25.82</td> <td>3.86</td> <td>32.66</td> <td>---</td> <td>Peak VERTICAL</td> </tr> </tbody> </table> | Frq | Level | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | MHz | dBm/100m | dB | dBm/100m | dBm | dB | dB | dB | dB | dB | deg | 1 | 166.77 | 29.43 | -14.07 | 43.50 | 43.36 | 17.10 | 1.97 | 32.90 | --- | Peak VERTICAL | 2 | 242.43 | 32.90 | -13.02 | 46.00 | 44.78 | 18.92 | 2.28 | 33.10 | --- | Peak VERTICAL | 3 | 261.83 | 30.71 | -15.29 | 46.00 | 41.70 | 18.99 | 2.47 | 33.05 | --- | Peak VERTICAL | 4 | 218.09 | 31.33 | -14.67 | 46.00 | 40.87 | 20.64 | 2.72 | 32.90 | --- | Peak VERTICAL | 5 | 498.01 | 32.17 | -13.83 | 46.00 | 37.09 | 26.42 | 3.41 | 32.80 | --- | Peak VERTICAL | 6 | 640.13 | 32.97 | -13.03 | 46.00 | 35.95 | 25.82 | 3.86 | 32.66 | --- | Peak VERTICAL |
| | Frq | Level | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/100m | dB | dBm/100m | dBm | dB | dB | dB | dB | dB | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 30.00 | 20.68 | -19.32 | 40.00 | 27.17 | 25.50 | 0.71 | 32.70 | --- | Peak HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 148.34 | 29.77 | -12.73 | 43.00 | 43.21 | 17.52 | 1.84 | 33.80 | --- | Peak HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 233.70 | 39.50 | -6.95 | 46.00 | 51.43 | 18.97 | 2.33 | 33.10 | --- | Peak HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 277.35 | 33.15 | -12.85 | 46.00 | 43.76 | 19.84 | 2.54 | 32.99 | --- | Peak HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 444.19 | 31.99 | -14.01 | 46.00 | 37.98 | 22.50 | 3.72 | 32.71 | --- | Peak HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 527.61 | 36.09 | -9.41 | 46.00 | 40.50 | 25.27 | 3.51 | 32.69 | --- | Peak HORIZONTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frq | Level | Over | Limit | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark | Pol/Phas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MHz | dBm/100m | dB | dBm/100m | dBm | dB | dB | dB | dB | dB | deg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 166.77 | 29.43 | -14.07 | 43.50 | 43.36 | 17.10 | 1.97 | 32.90 | --- | Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 242.43 | 32.90 | -13.02 | 46.00 | 44.78 | 18.92 | 2.28 | 33.10 | --- | Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 261.83 | 30.71 | -15.29 | 46.00 | 41.70 | 18.99 | 2.47 | 33.05 | --- | Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 218.09 | 31.33 | -14.67 | 46.00 | 40.87 | 20.64 | 2.72 | 32.90 | --- | Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 498.01 | 32.17 | -13.83 | 46.00 | 37.09 | 26.42 | 3.41 | 32.80 | --- | Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 640.13 | 32.97 | -13.03 | 46.00 | 35.95 | 25.82 | 3.86 | 32.66 | --- | Peak VERTICAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Appendix E. Duty Cycle Plots

| Band | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|--------------------|---------------|-------|----------|-------------|
| Bluetooth LE 1Mbps | 83.81 | 2.101 | 0.476 | 0.51KHz |
| Bluetooth LE 2Mbps | 56.37 | 1.058 | 0.945 | 1KHz |

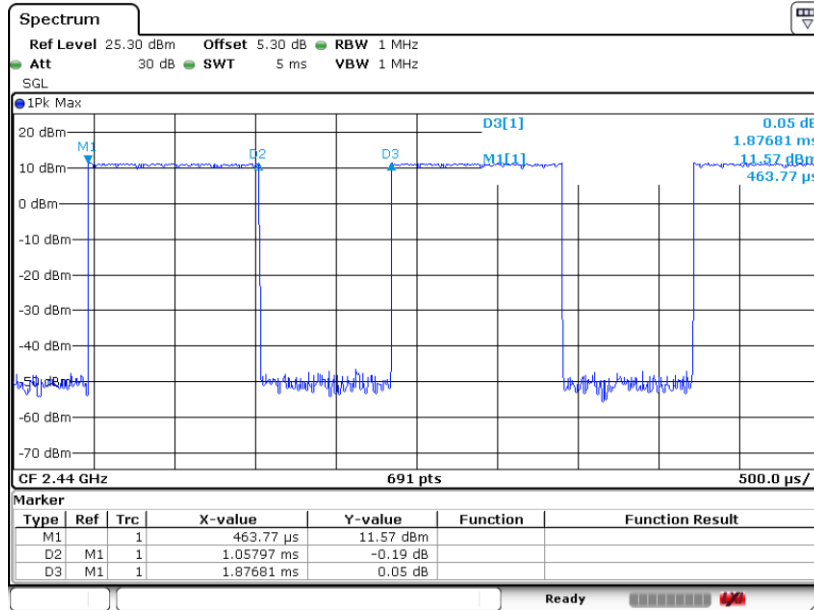
Bluetooth LE 1Mbps



Date: 11.JAN.2022 13:19:09



Bluetooth LE 2Mbps



Date: 11.JAN.2022 13:28:27