



# FCC RADIO TEST REPORT

**FCC ID** : PY7-45256F  
**Equipment** : GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS and NFC  
**Brand Name** : Sony  
**Applicant** : Sony Corporation  
1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan  
**Manufacturer** : Sony Corporation  
1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan  
**Standard** : FCC Part 15 Subpart C §15.247

The product was received on Mar. 24, 2021 and testing was started from Mar. 30, 2021 and completed on Apr. 13, 2021. We, Sporton International Inc. EMC & Wireless Communications Laboratory, 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. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**Sporton International Inc. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



# Table of Contents

**History of this test report..... 3**

**Summary of Test Result..... 4**

**1 General Description..... 5**

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

    1.2 Modification of EUT ..... 5

    1.3 Testing Location ..... 6

    1.4 Applicable Standards..... 6

**2 Test Configuration of Equipment Under Test ..... 7**

    2.1 Carrier Frequency Channel ..... 7

    2.2 Test Mode..... 8

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

    2.4 Support Unit used in test configuration and system ..... 10

    2.5 EUT Operation Test Setup ..... 10

    2.6 Measurement Results Explanation Example..... 10

**3 Test Result..... 11**

    3.1 6dB and 99% Bandwidth Measurement ..... 11

    3.2 Output Power Measurement..... 20

    3.3 Power Spectral Density Measurement ..... 21

    3.4 Conducted Band Edges and Spurious Emission Measurement ..... 30

    3.5 Radiated Band Edges and Spurious Emission Measurement ..... 41

    3.6 AC Conducted Emission Measurement..... 45

    3.7 Antenna Requirements..... 47

**4 List of Measuring Equipment ..... 48**

**5 Uncertainty of Evaluation ..... 50**

**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**



### History of this test report

Report No.	Version	Description	Issued Date
FR132425B	01	Initial issue of report	Apr. 23, 2021



## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)(3)	Output Power	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	Pass	Under limit 3.33 dB at 18000.000 MHz
3.6	15.207	AC Conducted Emission	Pass	Under limit 11.39 dB at 0.335 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	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.

**Reviewed by: Wii Chang**

**Report Producer: Vivian Hsu**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, DTS/UNII a/b/g/n/ac/ax, NFC, and GNSS.

Product Specification subjective to this standard	
Antenna Type / Gain	<Ant. 0>: Loop Type Antenna with gain -2.3 dBi <Ant. 1>: Loop Type Antenna with gain -7.0 dBi

**Remark:** The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

EUT Information List			
HW Version	SW Version	S/N	Performed Test Item
A	0.325	QV7200A968	RF conducted measurement
	0.325	QV7200NJ7E	Radiated Spurious Emission
	0.747	QV7200P17E	AC Conducted Emission

Accessory List	
AC Adapter	Model Name : XQZ-UC1
	S/N : 0020W51300039 (for Radiated Spurious Emission) 0020W51300096 (for Conducted Emission)
Earphone	Model Name : MH750
	S/N : N/A
Bluetooth Earphone	Model Name : SBH82D
	S/N : N/A
USB Cable	Model Name : XQZ-UB1
	S/N : N/A

**Note:**

1. Above EUT list used are electrically identical per declared by manufacturer.
2. Above the accessories list are used to exercise the EUT during test, and the serial number of each type of accessories is listed in each section of this report.
3. For other wireless features of this EUT, test report will be issued separately.

## 1.2 Modification of EUT

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



### 1.3 Testing Location

<b>Test Site</b>	Sporton International Inc. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b> TH02-HY, CO05-HY

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

<b>Test Site</b>	Sporton International Inc. Wensan Laboratory
<b>Test Site Location</b>	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
<b>Test Site No.</b>	<b>Sporton Site No.</b> 03CH15-HY (TAF Code: 3786)
<b>Remark</b>	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory

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

FCC designation No.: TW1190 and TW3786

### 1.4 Applicable Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ 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. The TAF code is not including all the FCC KDB listed without accreditation.
3. 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 (Y Plane for Ant. 0 ; Z Plane for Ant. 1) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

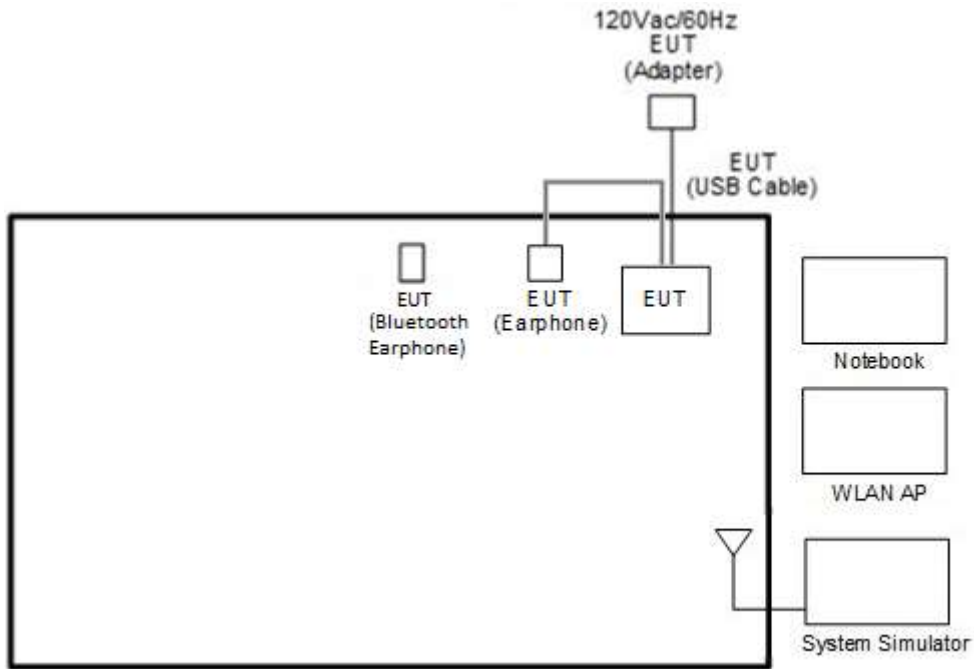
The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
<b>Conducted Test Cases</b>	<b>Bluetooth – LE / GFSK</b>
	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
	Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps
<b>Radiated Test Cases</b>	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
	Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps
<b>AC Conducted Emission</b>	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Earphone + USB Cable (Charging from AC Adapter) + Battery

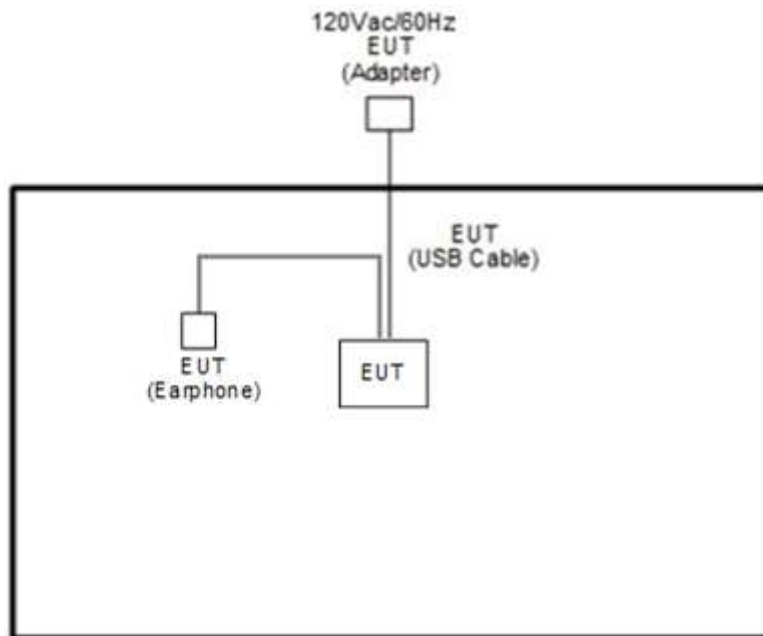


## 2.3 Connection Diagram of Test System

<AC Conducted Emission>



<Bluetooth-LE Tx Mode>





## 2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	Notebook	Dell	Latitude 3400	FCC DOC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
4.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

## 2.5 EUT Operation Test Setup

The RF test items, utility “FTMC\_bridge V\_0.39” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

## 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 and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 6dB and 99% Bandwidth Measurement

##### 3.1.1 Limit of 6dB and 99% Bandwidth

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

##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
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 the maximum power setting and enable the EUT to 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 6dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\geq 3 * RBW$ .
6. Measure and record the results in the test report.

##### 3.1.4 Test Setup



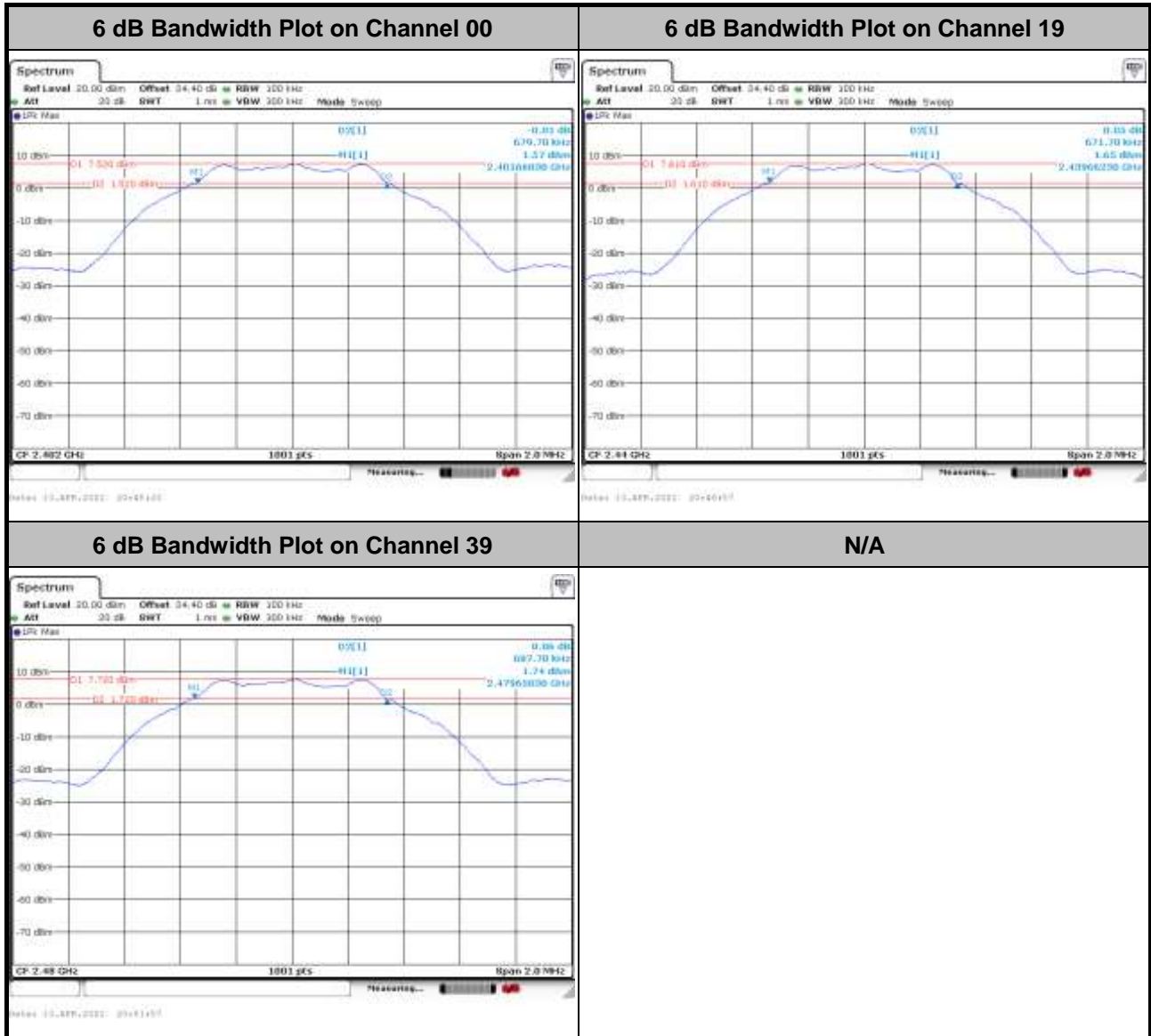


### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

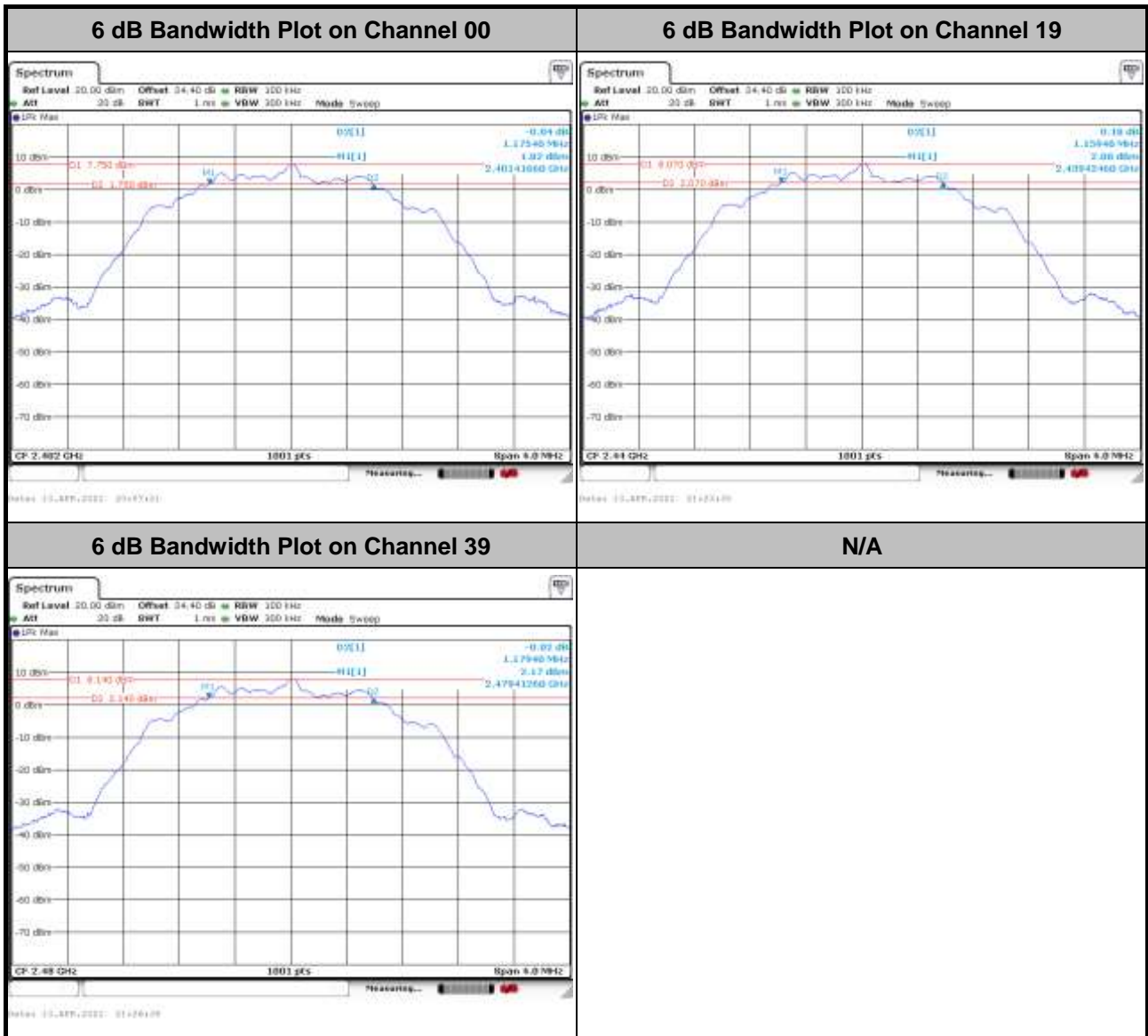
<Ant. 0>

<1Mbps>





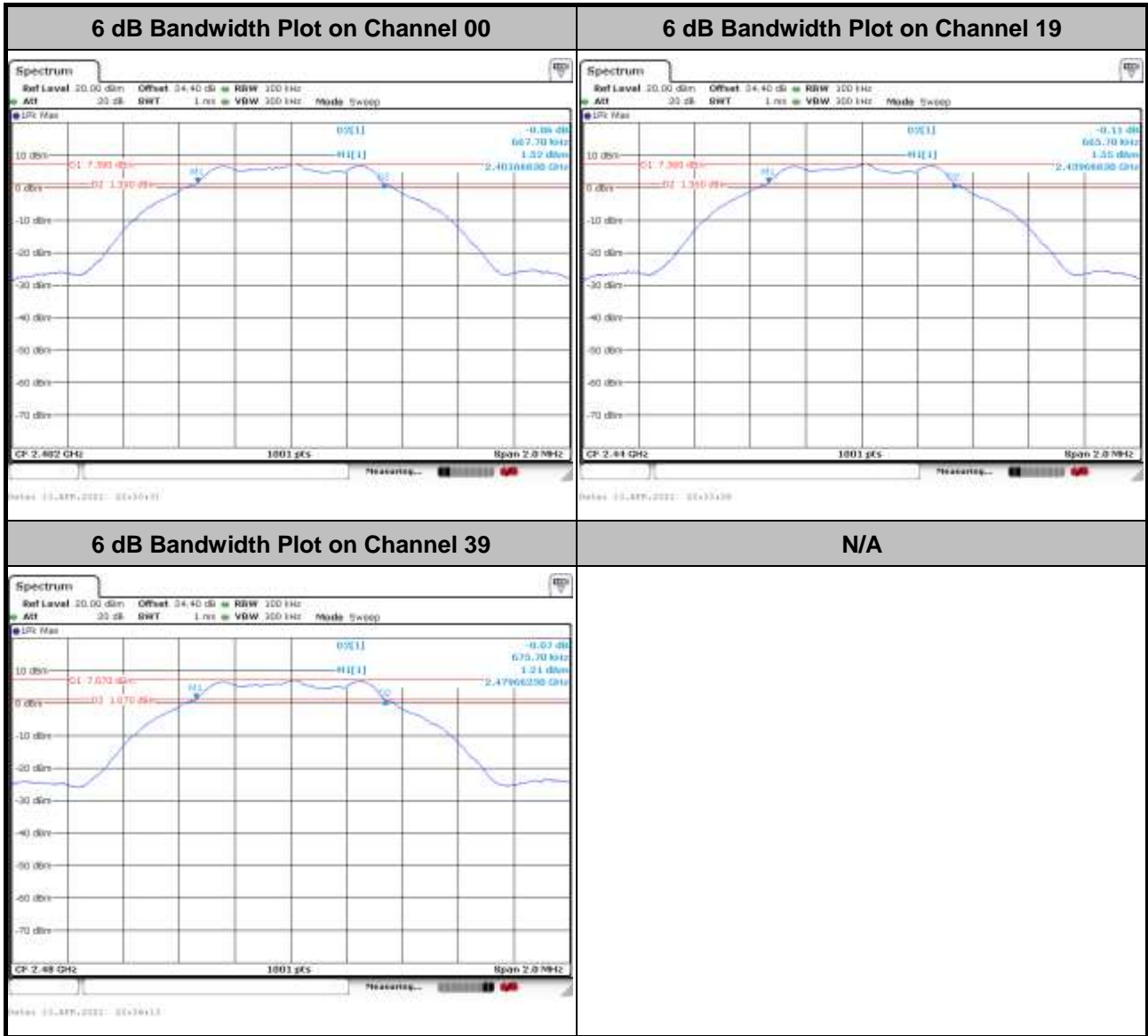
<2Mbps>





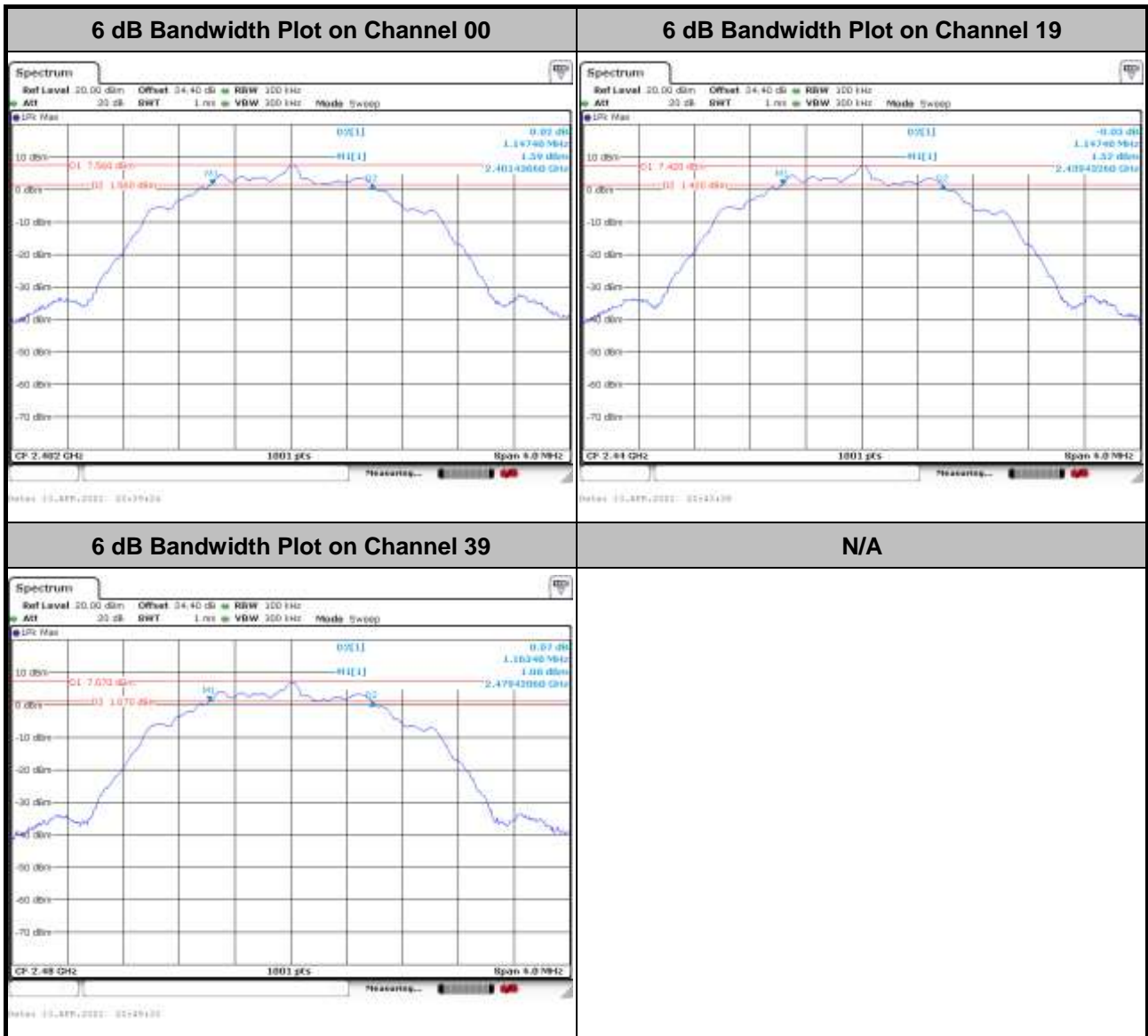
<Ant. 1>

<1Mbps>





<2Mbps>



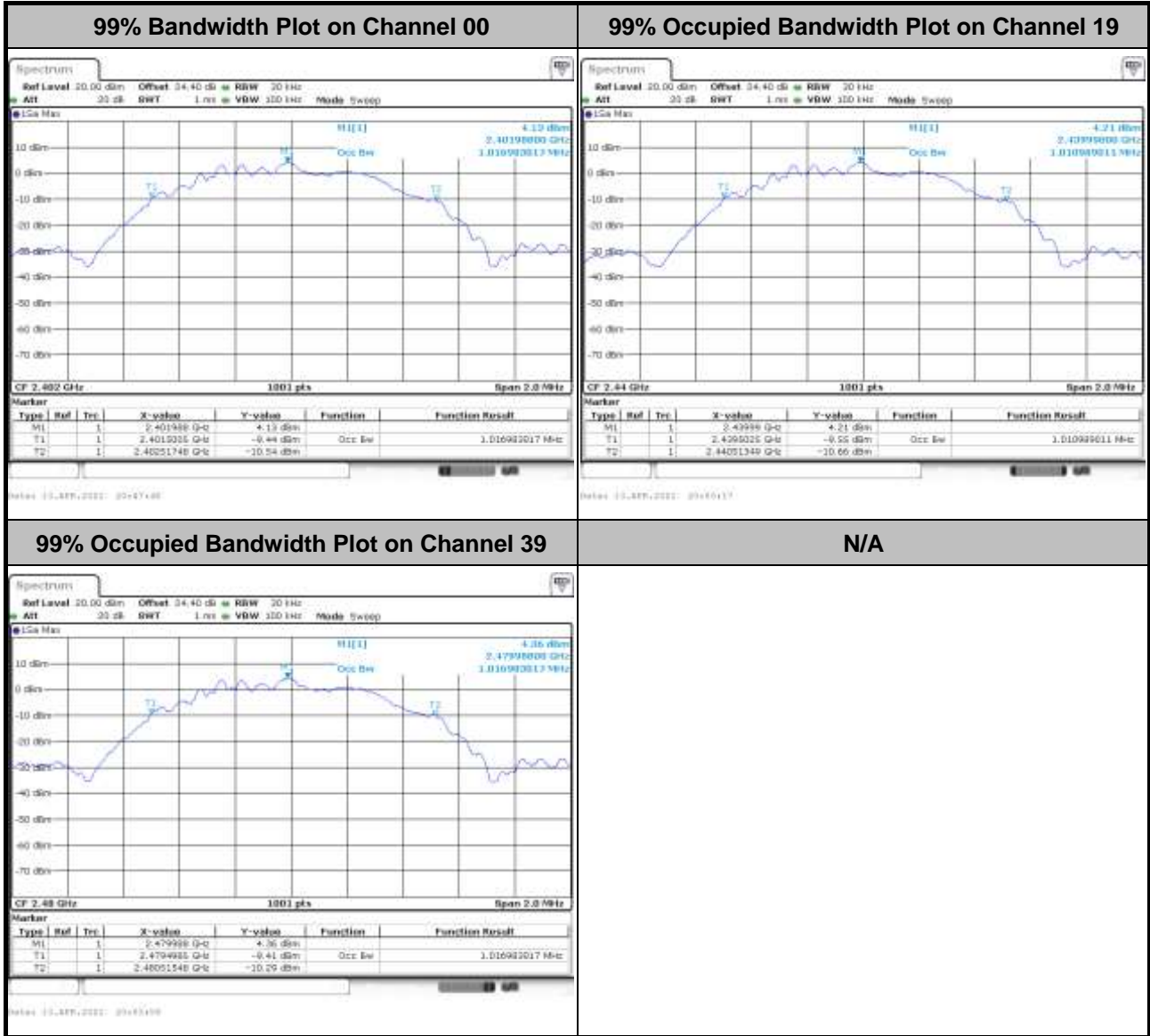


### 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

<Ant. 0>

<1Mbps>

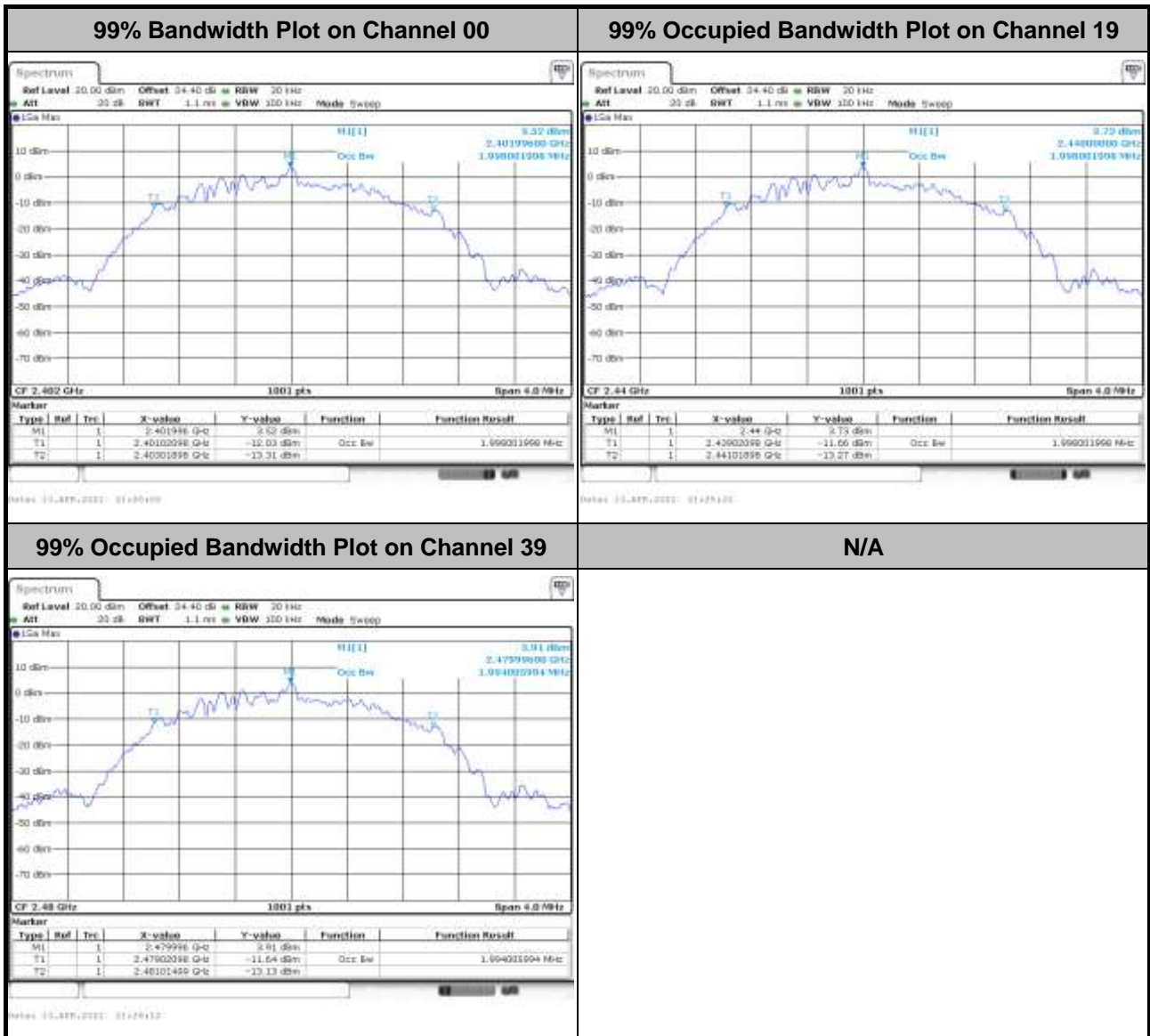


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.





<2Mbps>

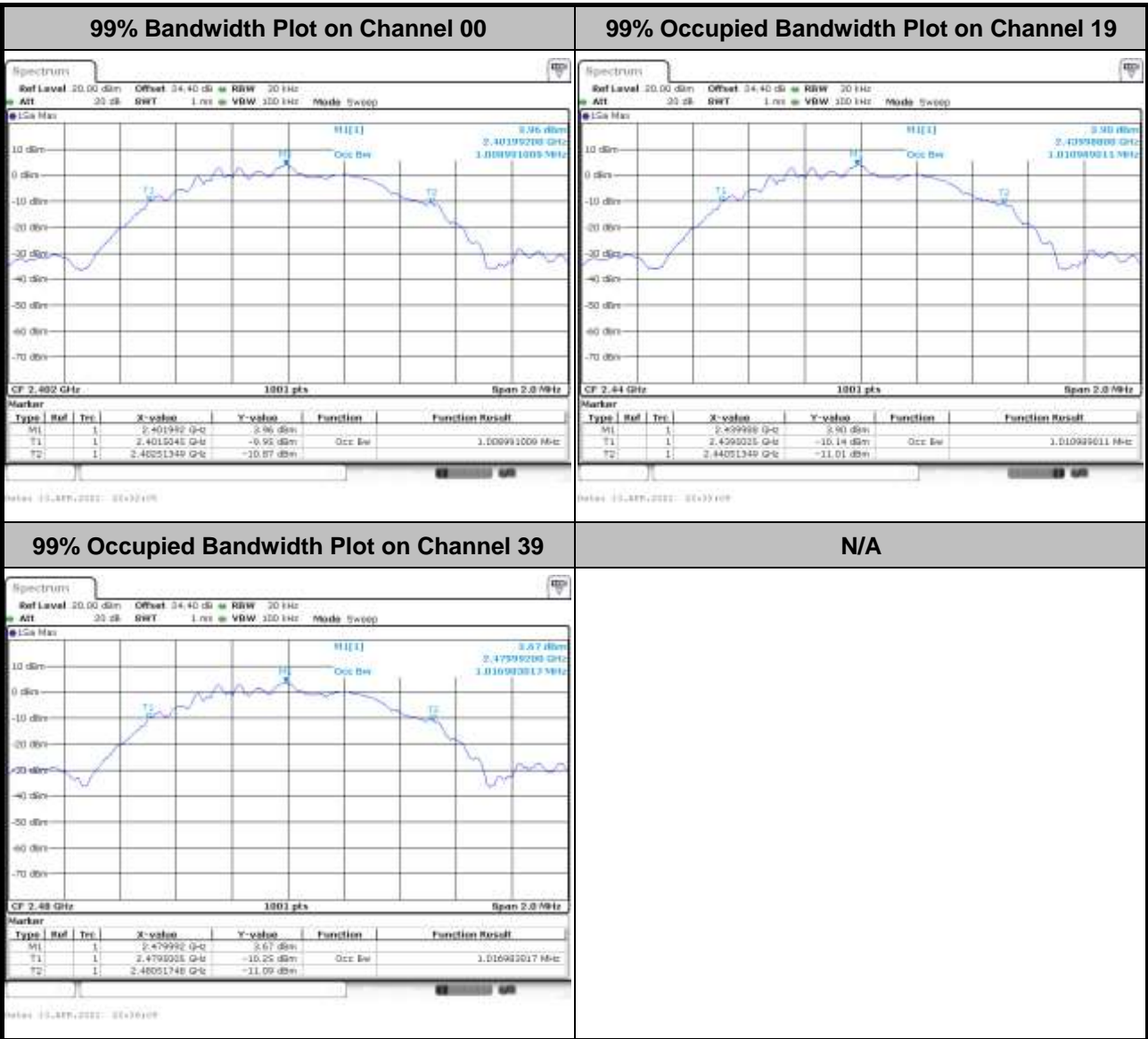


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



<Ant. 1>

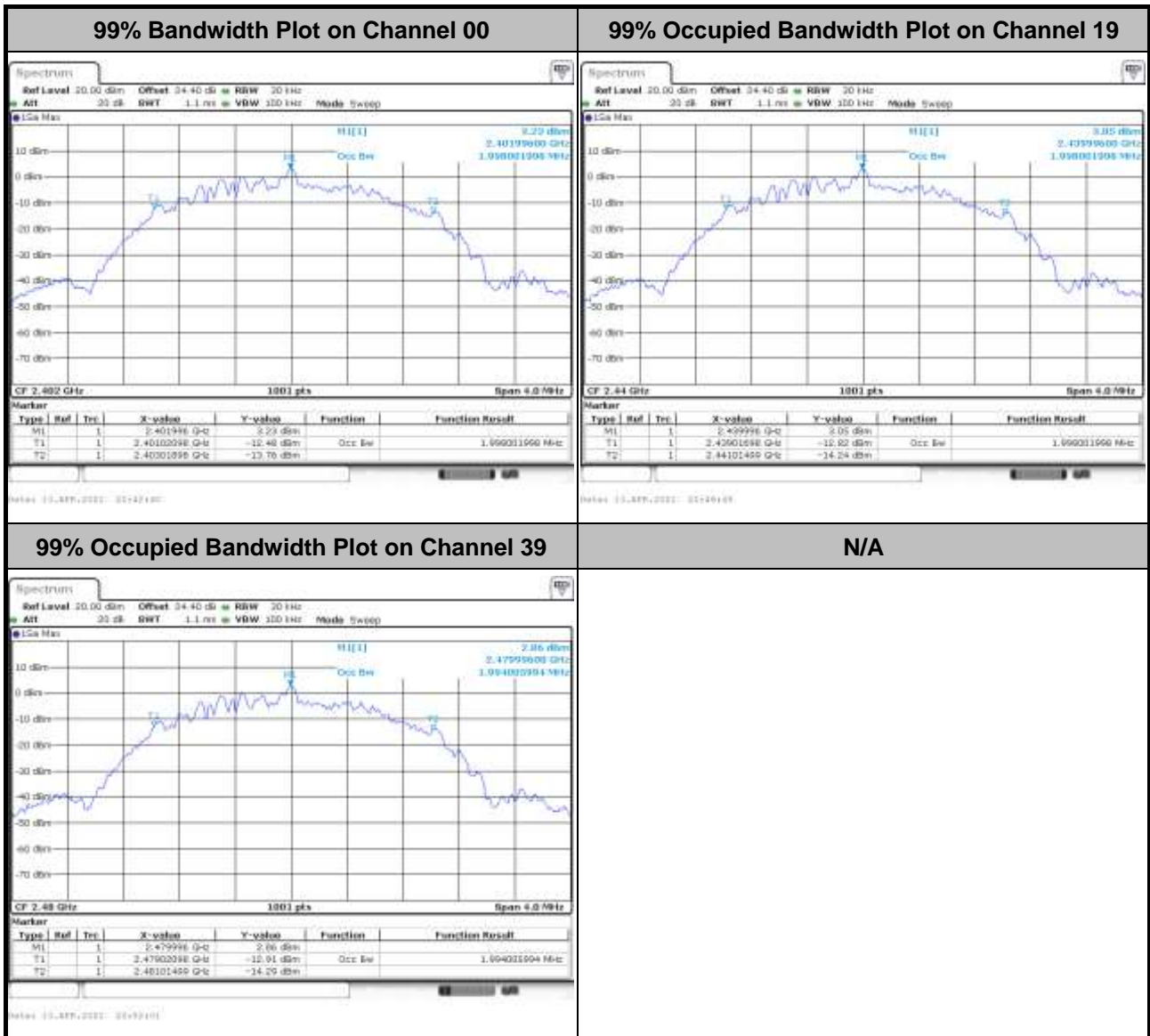
<1Mbps>



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



<2Mbps>



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

## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna of directional gain greater than 6 dBi 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 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

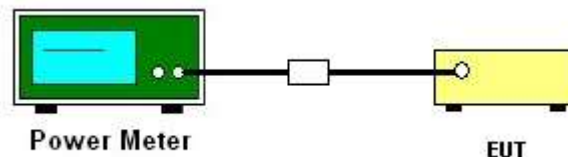
### 3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

### 3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGP-M-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator.
3. The path loss was compensated to the results for each measurement.
4. Set the maximum power setting and enable the EUT to transmit continuously.
5. Measure the conducted output power and record the results in the test report.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Average Output Power

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 8 dBm in any 3 kHz band at any time interval of continuous transmission.

#### 3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

#### 3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 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 the maximum power setting and enable the EUT to 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)/ 100 kHz is a reference level and is used as 20 dBc 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

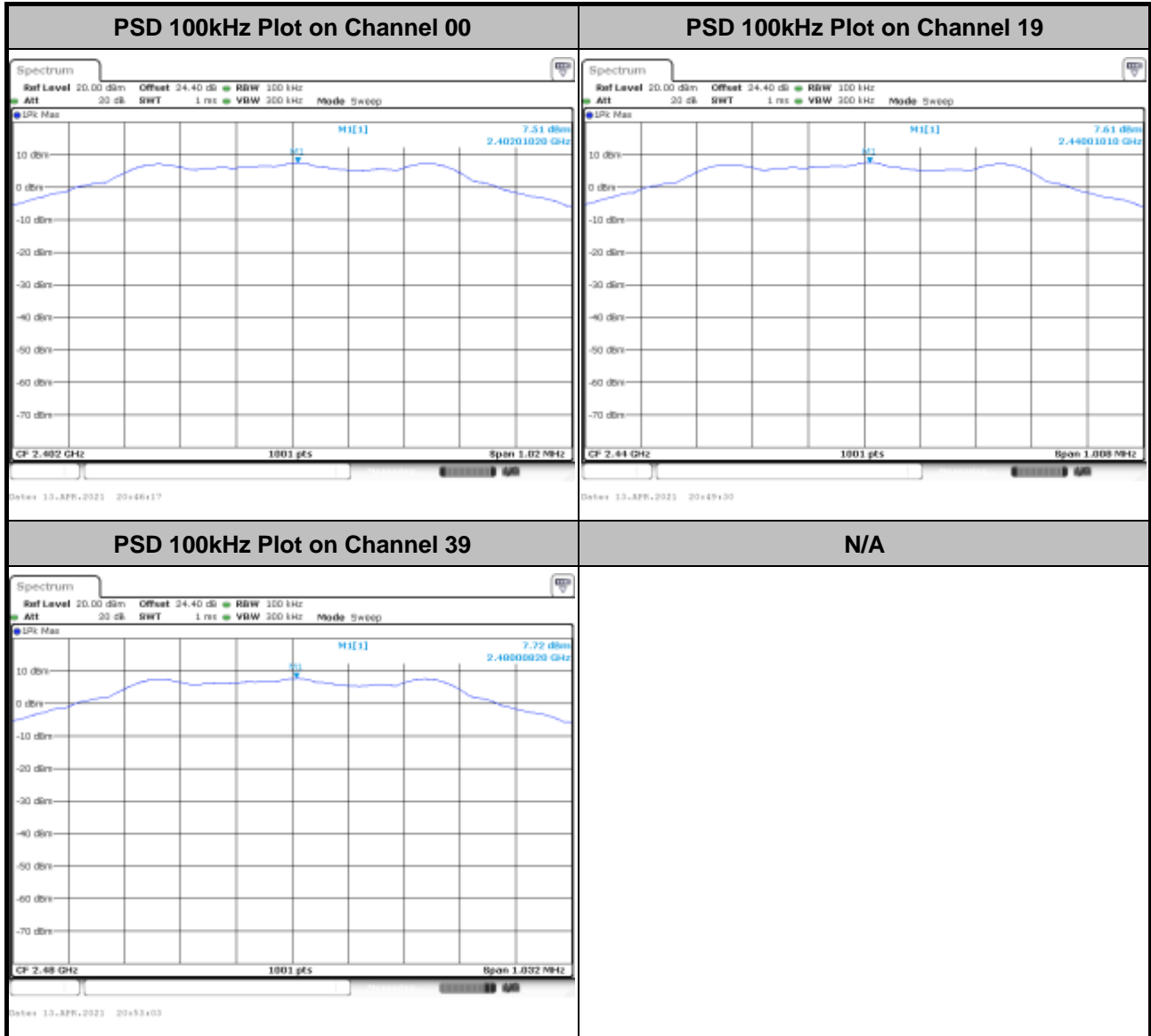
Please refer to Appendix A.



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

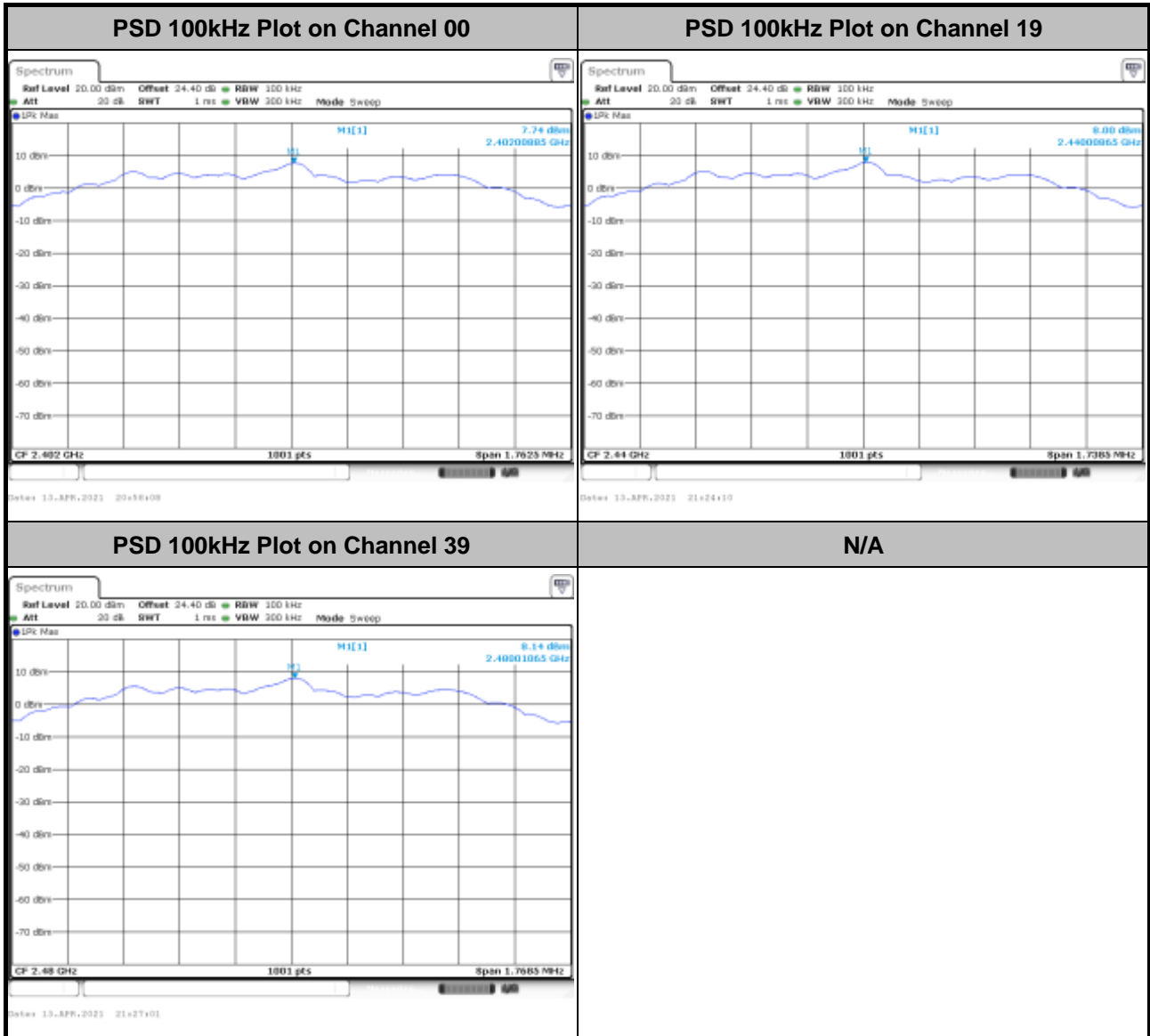
<Ant. 0>

<1Mbps>





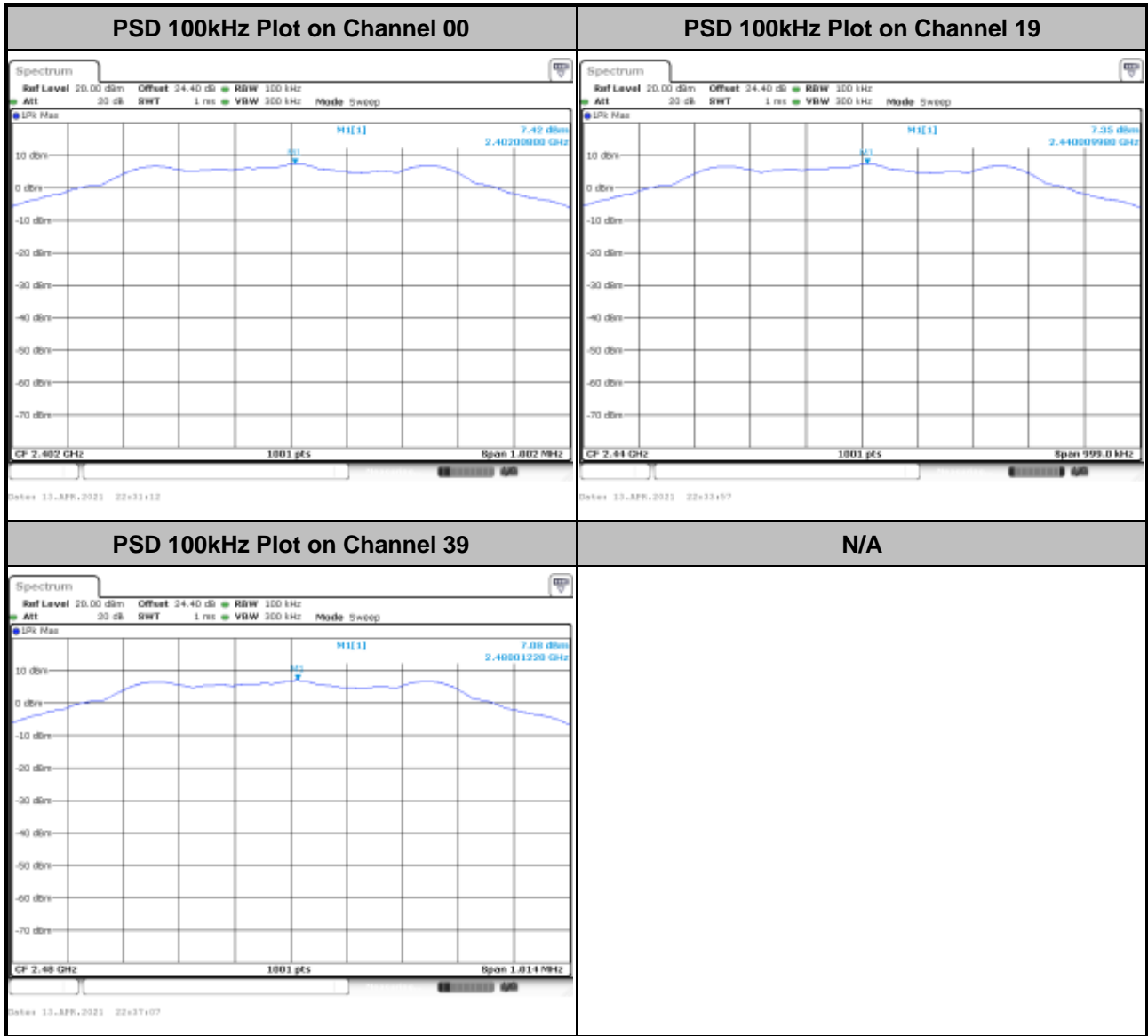
<2Mbps>





<Ant. 1>

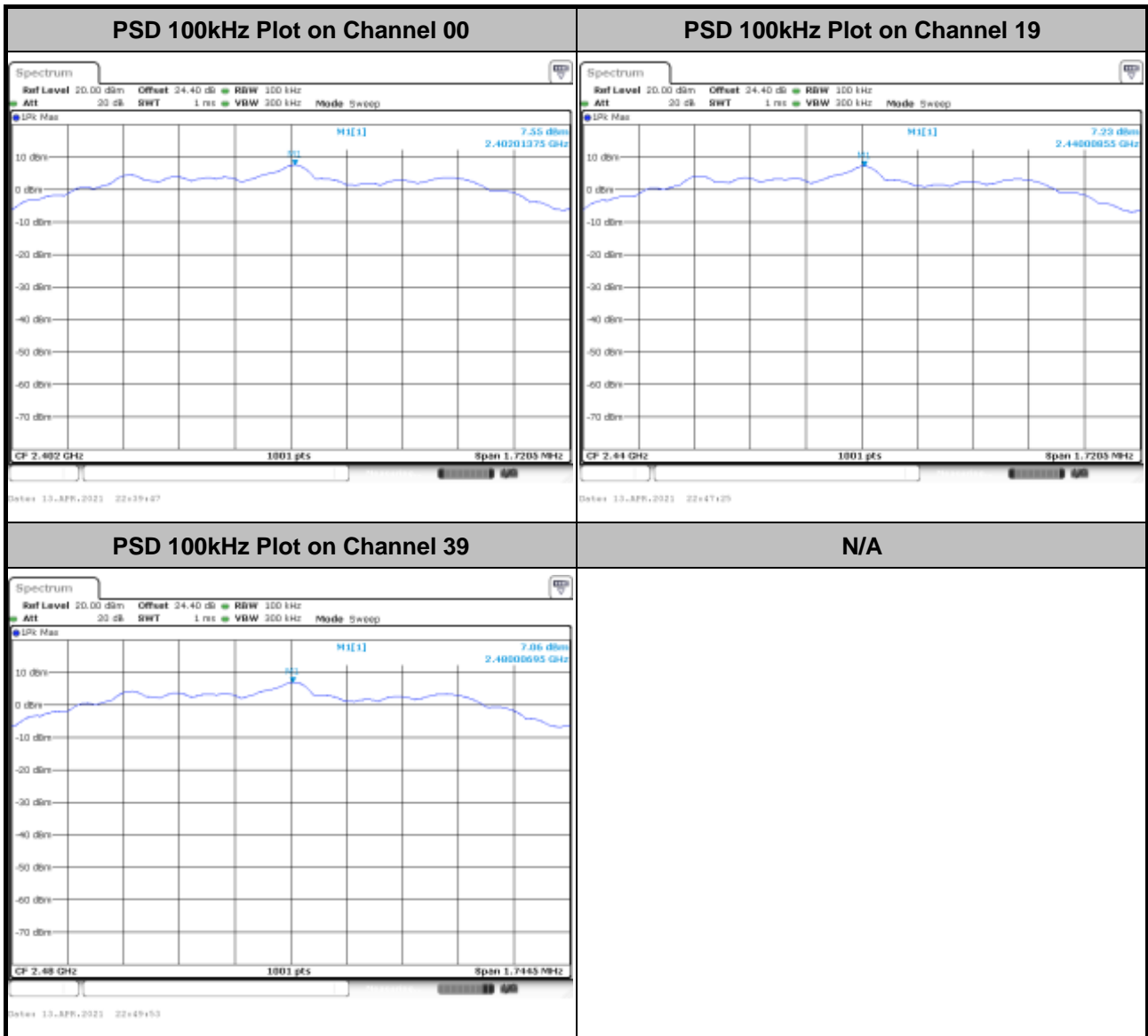
<1Mbps>







<2Mbps>

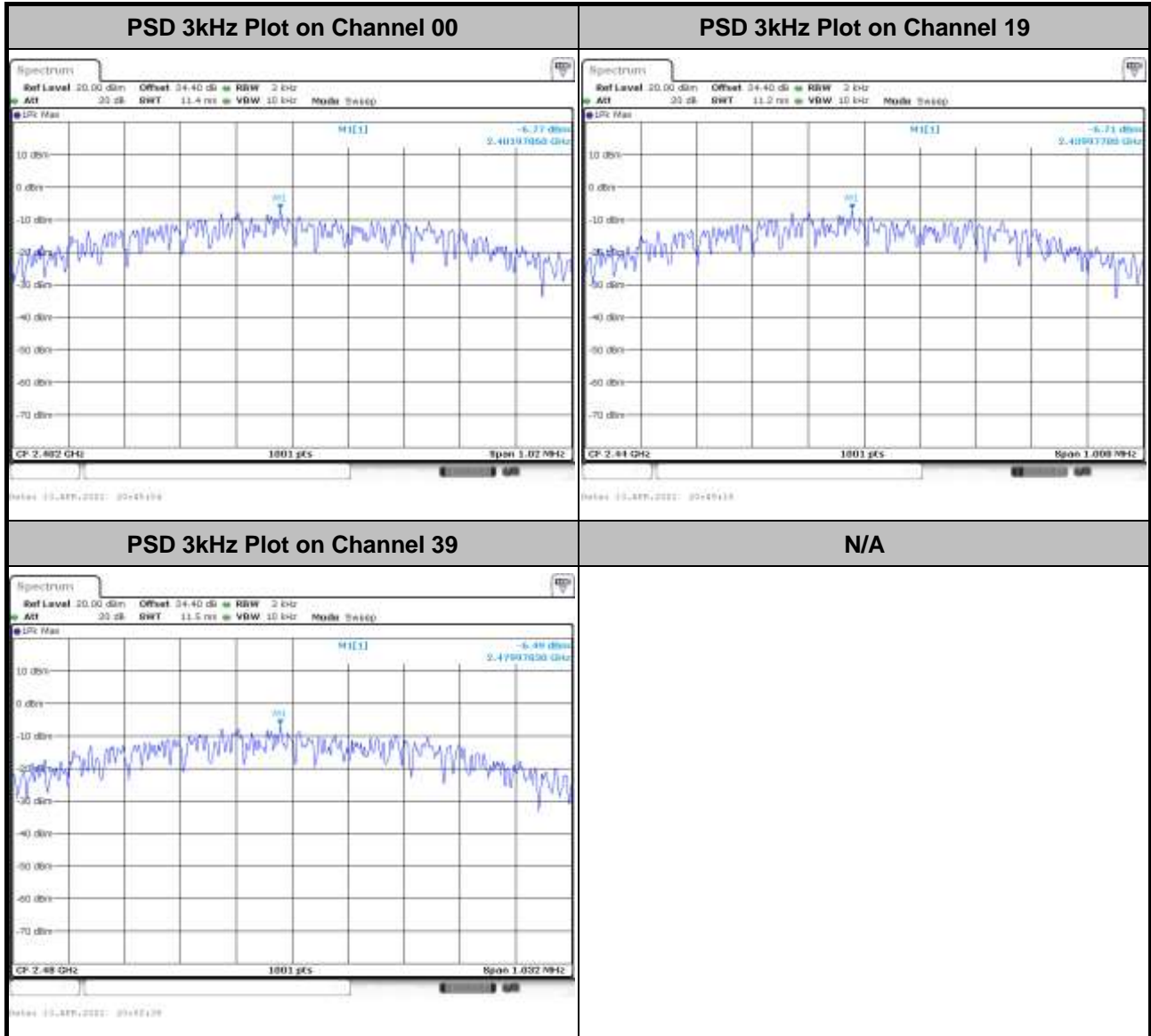




### 3.3.7 Test Result of Power Spectral Density Plots (3kHz)

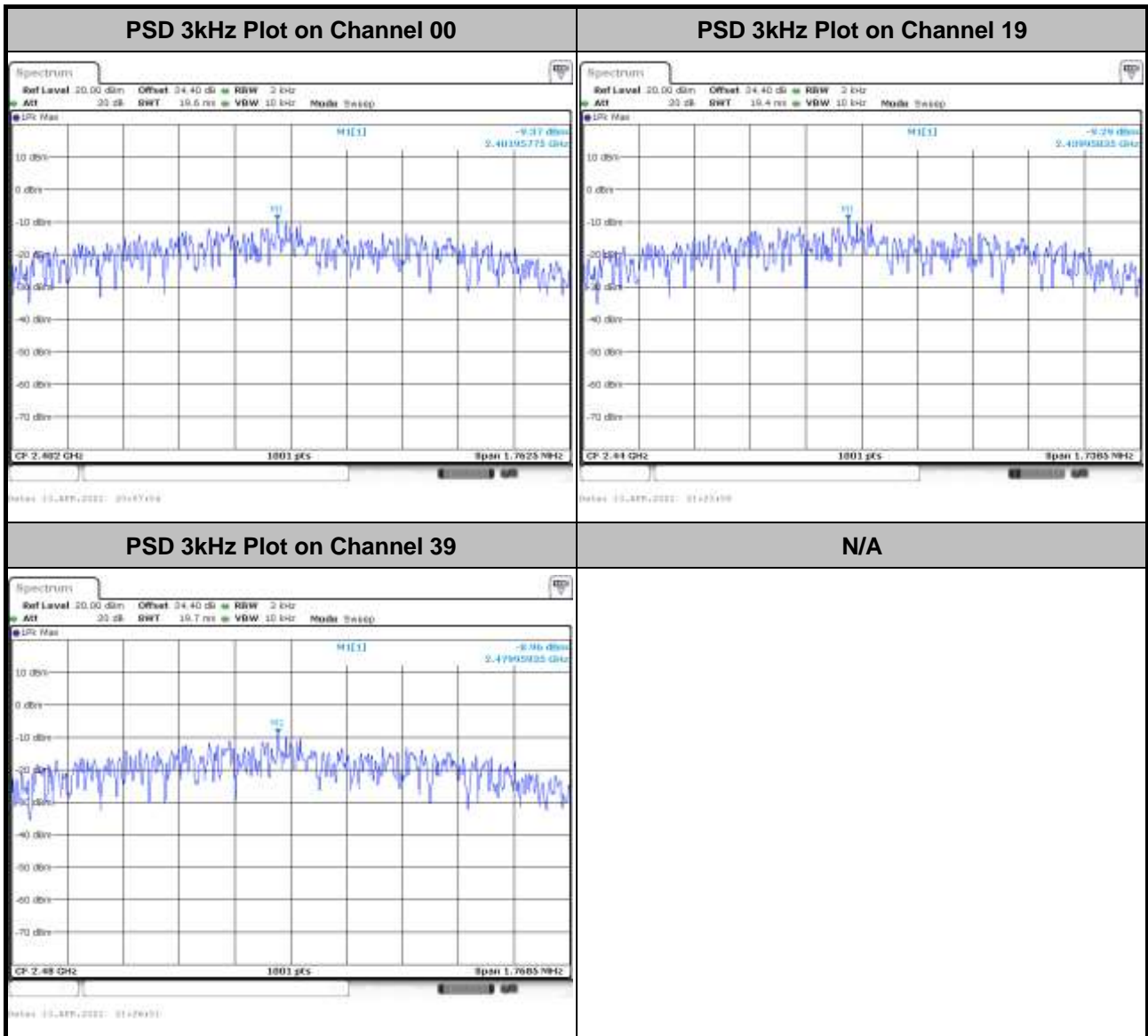
<Ant. 0>

<1Mbps>





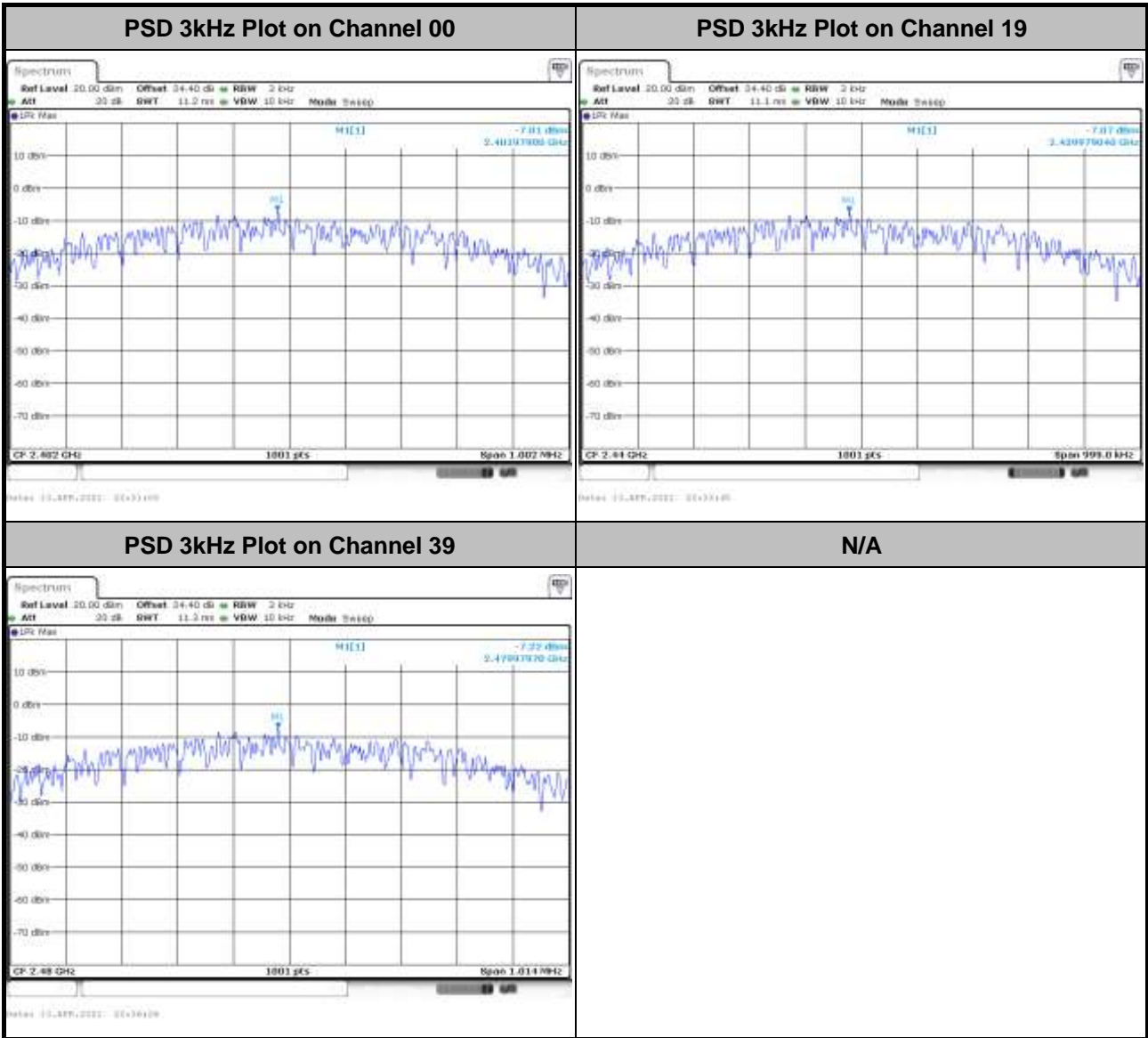
<2Mbps>





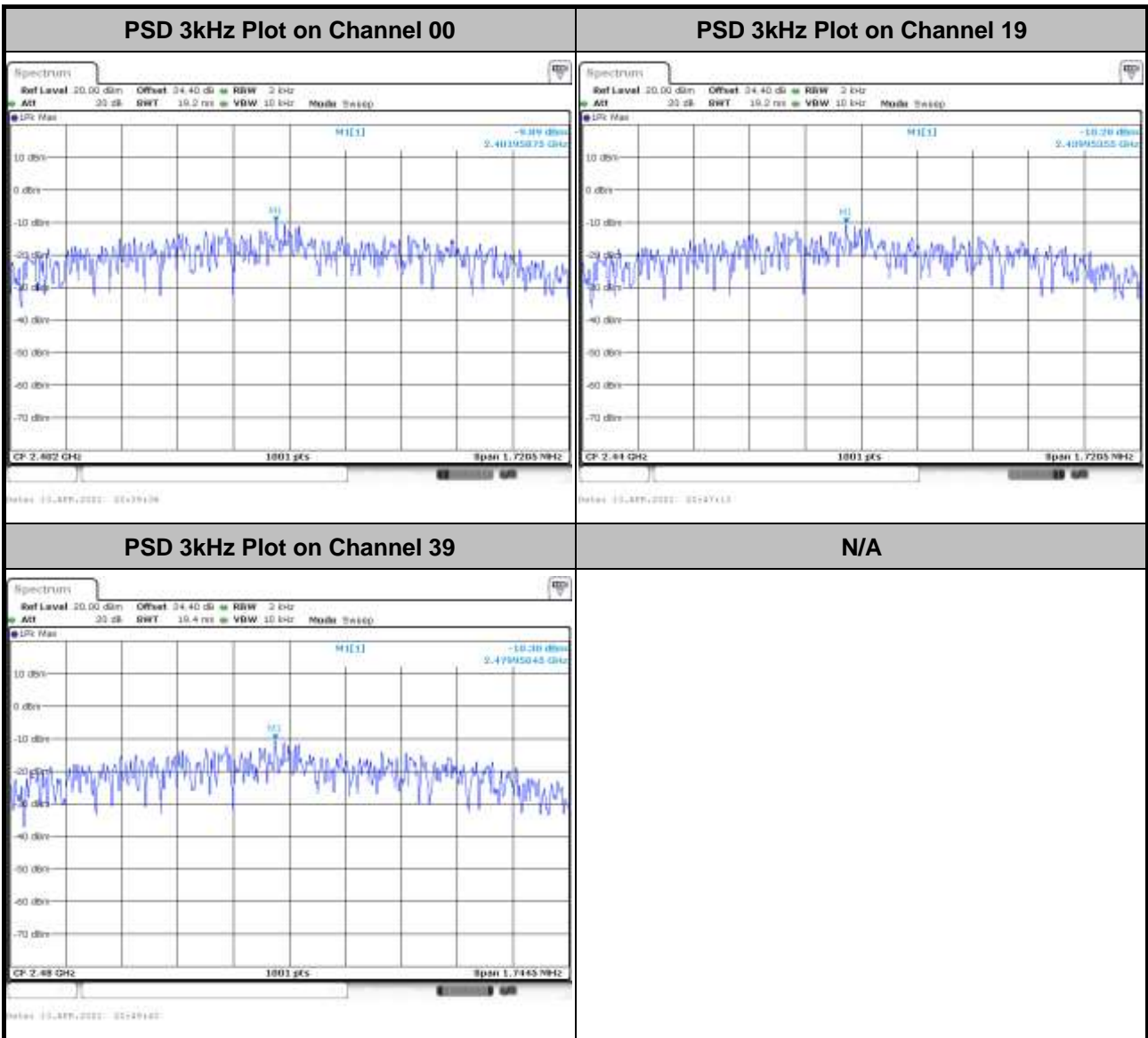
<Ant. 1>

<1Mbps>





<2Mbps>



## **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.

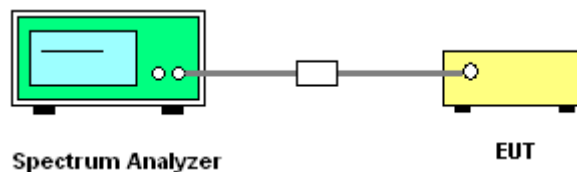
### **3.4.2 Measuring Instruments**

See list of measuring equipment of this test report.

### **3.4.3 Test Procedure**

1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
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 the maximum power setting and enable the EUT to 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**

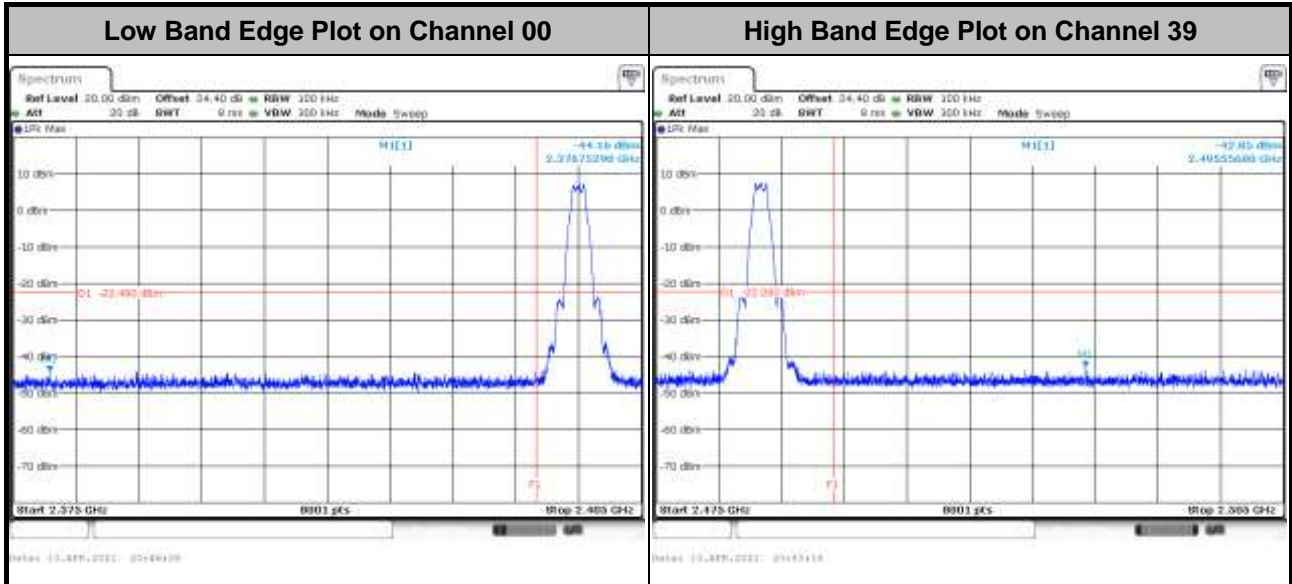




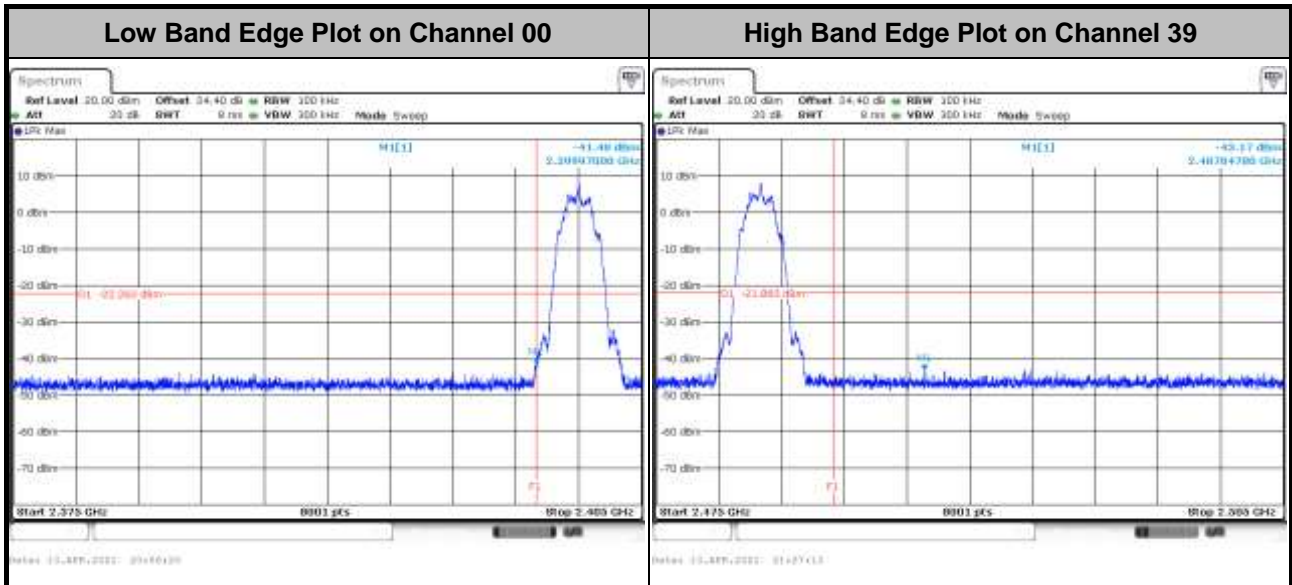
### 3.4.5 Test Result of Conducted Band Edges Plots

<Ant. 0>

<1Mbps>



<2Mbps>

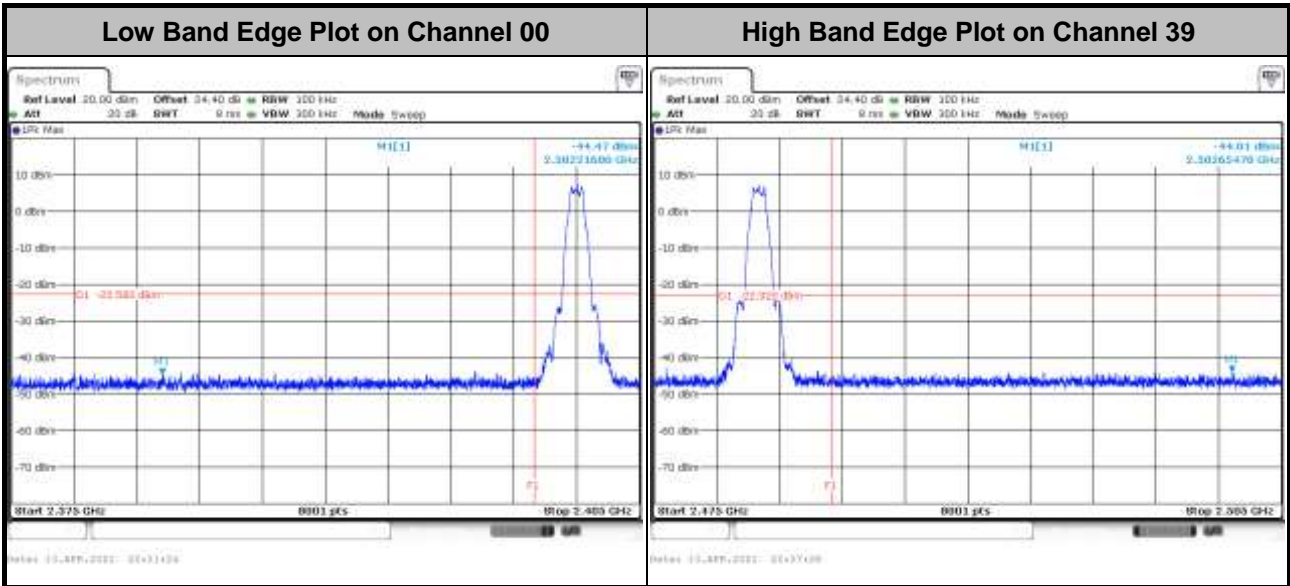




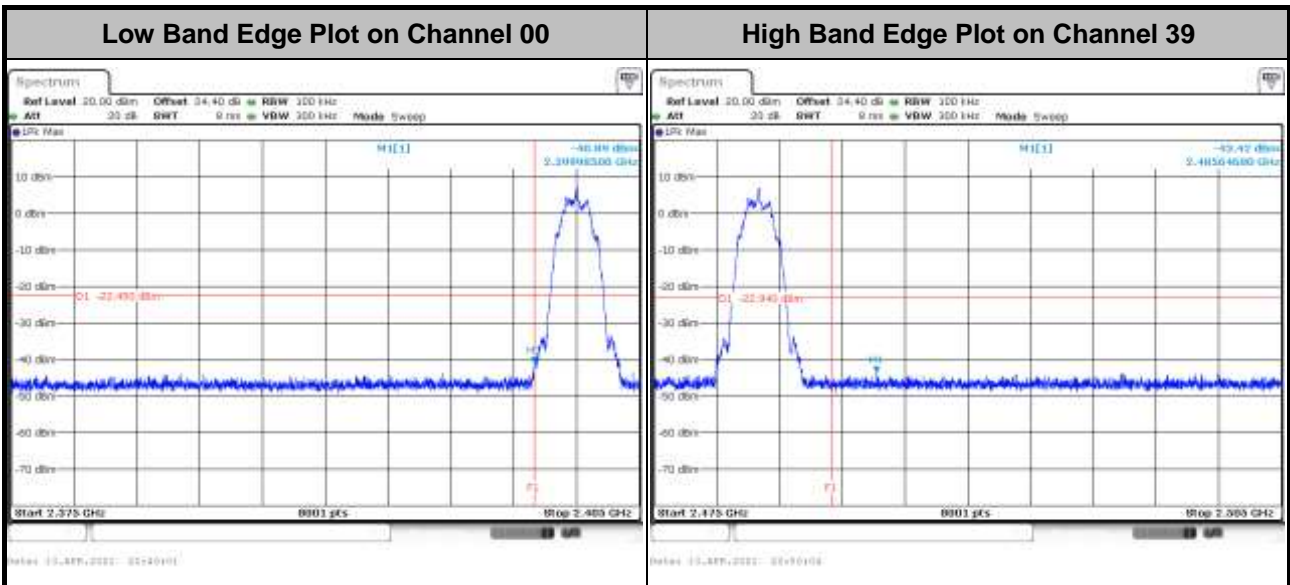


<Ant. 1>

<1Mbps>



<2Mbps>



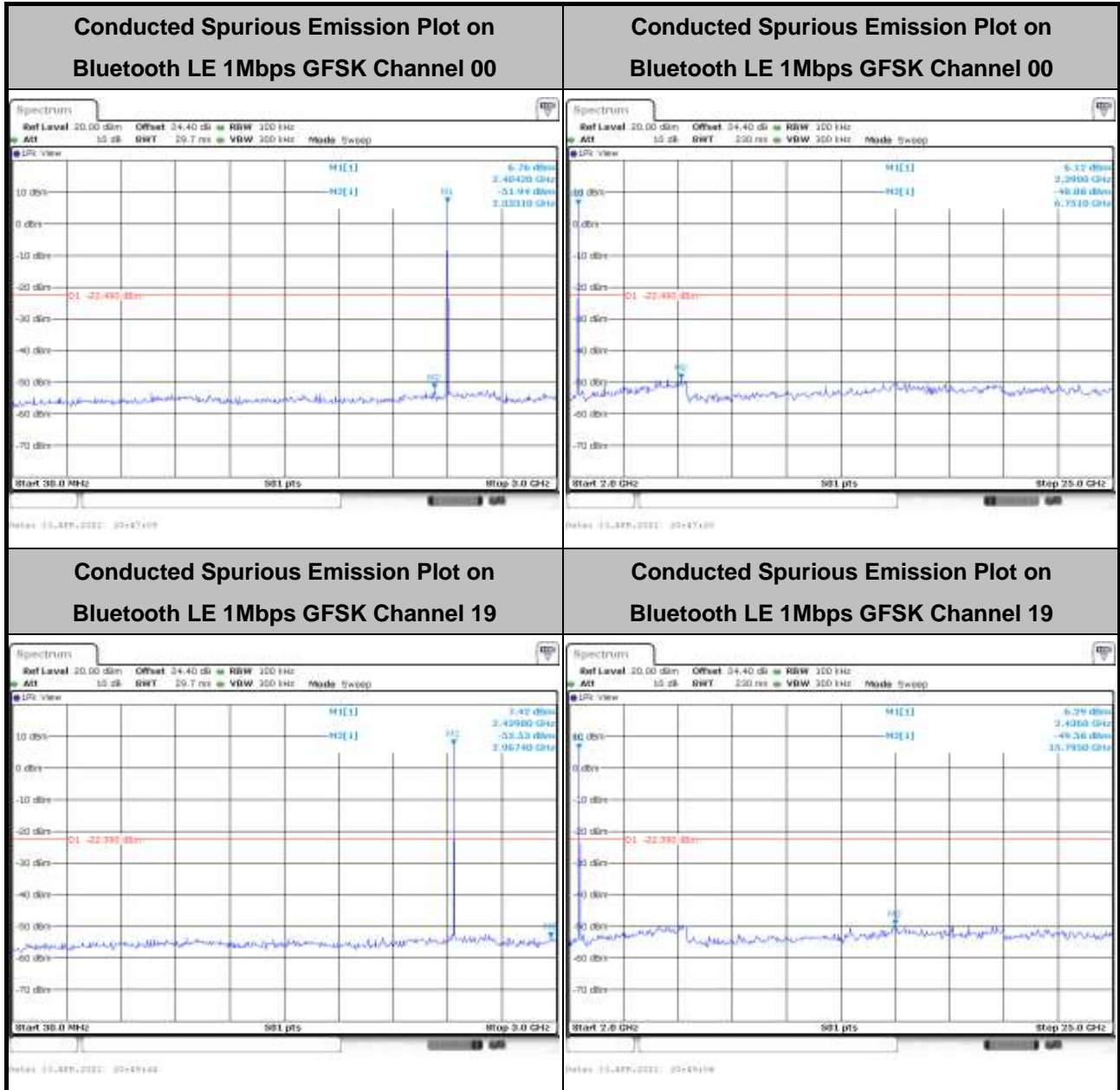


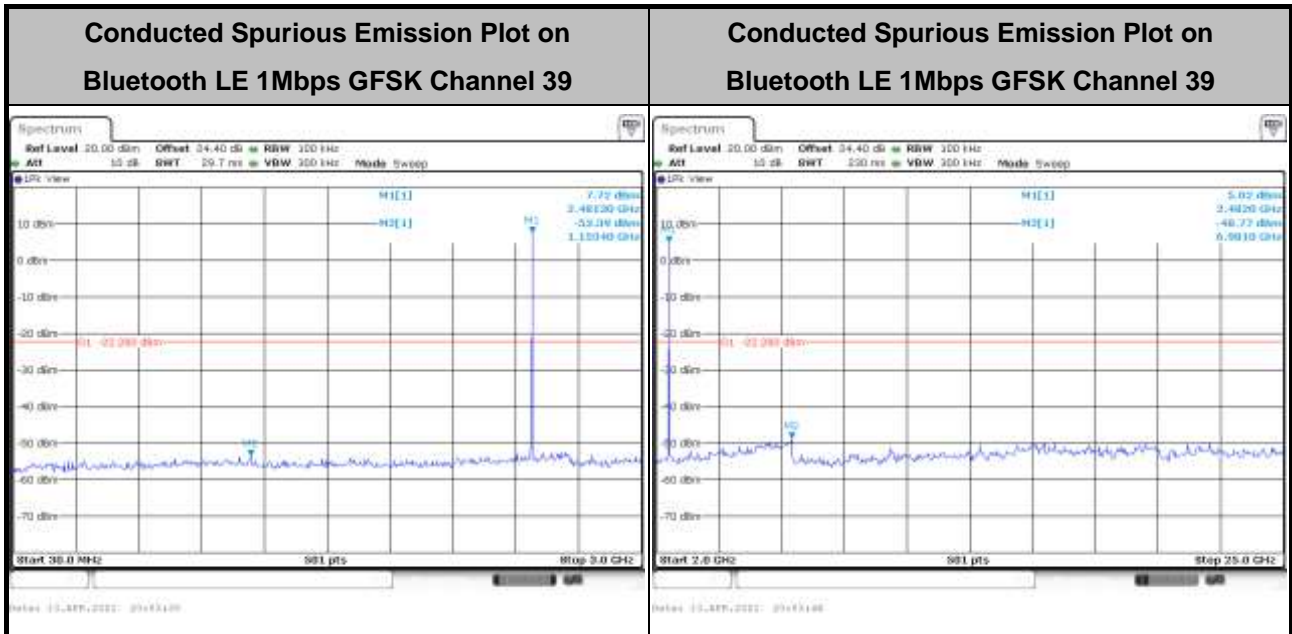


### 3.4.6 Test Result of Conducted Spurious Emission Plots

<Ant. 0>

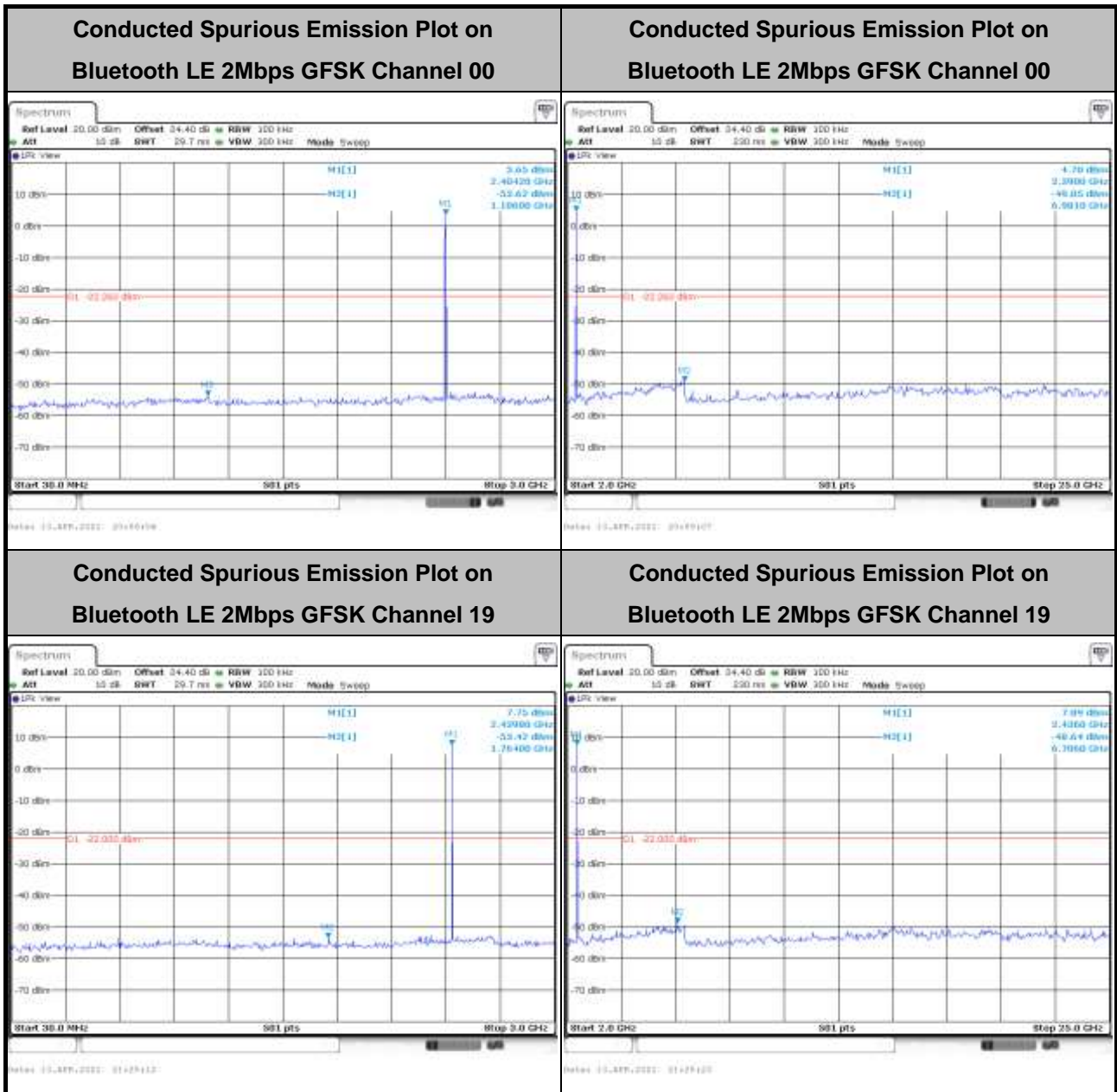
<1Mbps>

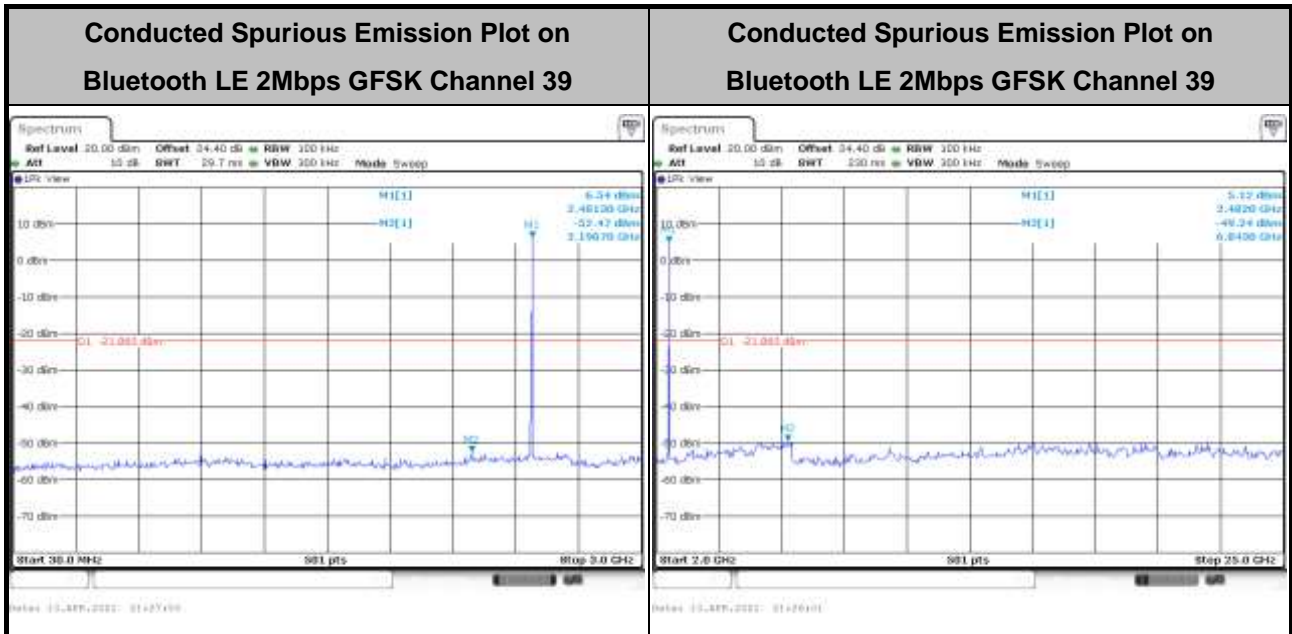






<2Mbps>

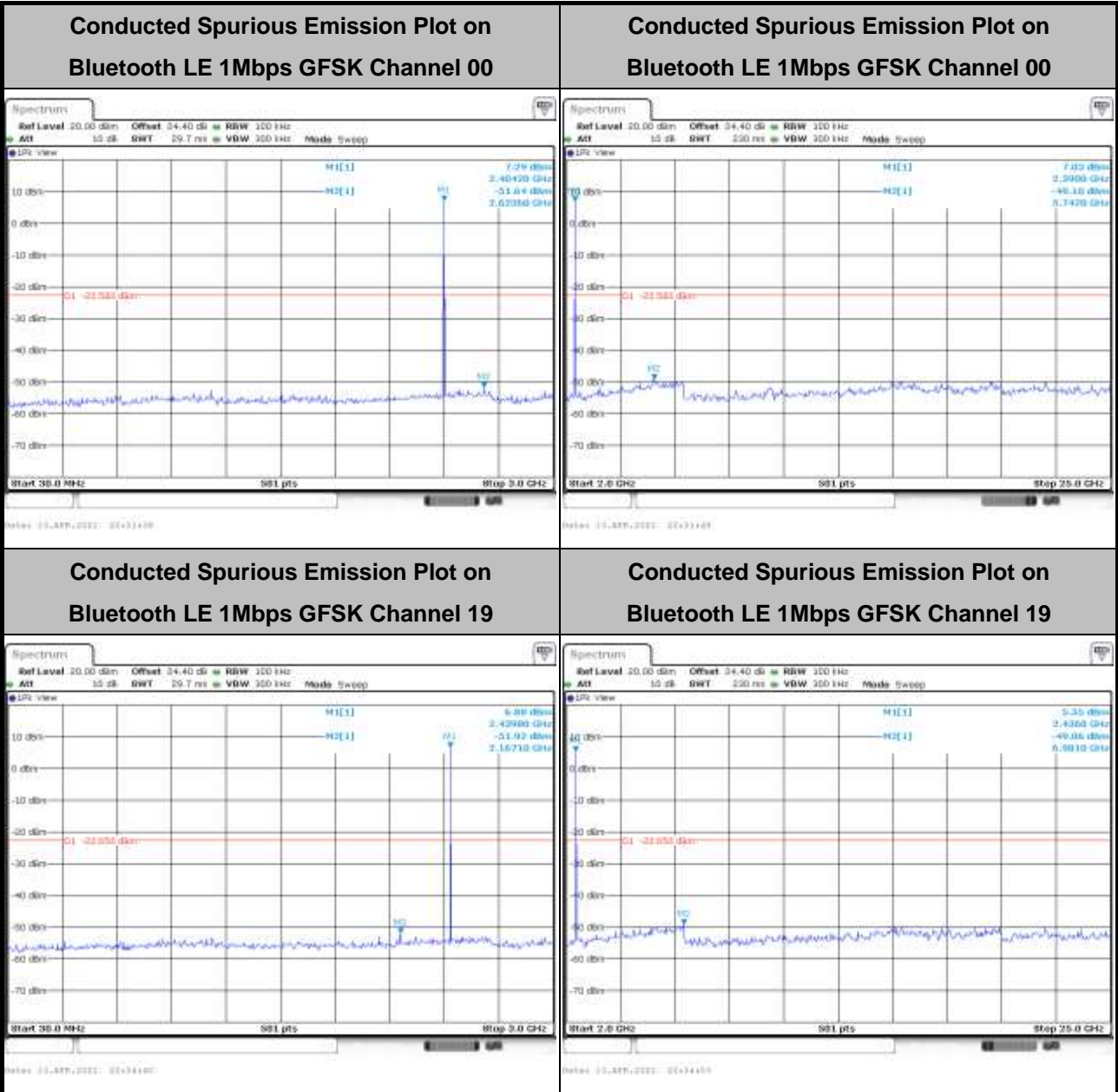


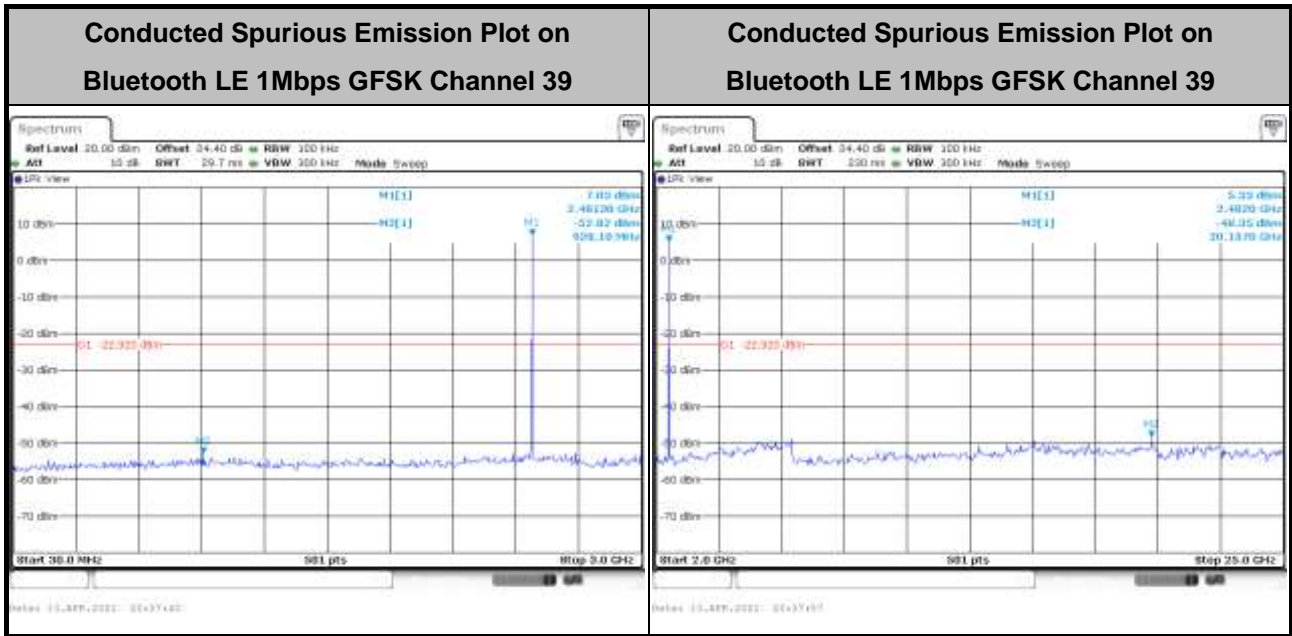




<Ant. 1>

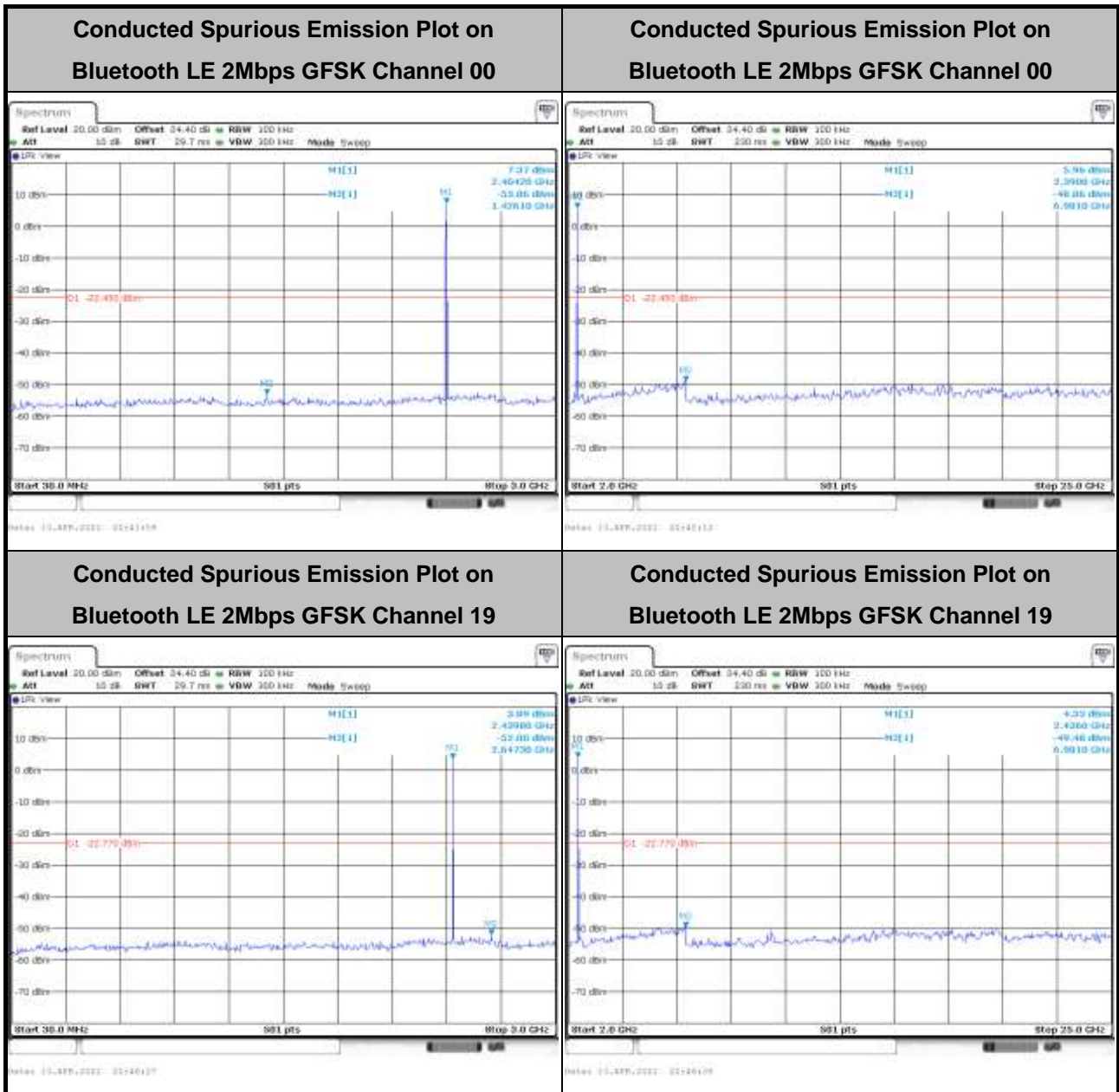
<1Mbps>



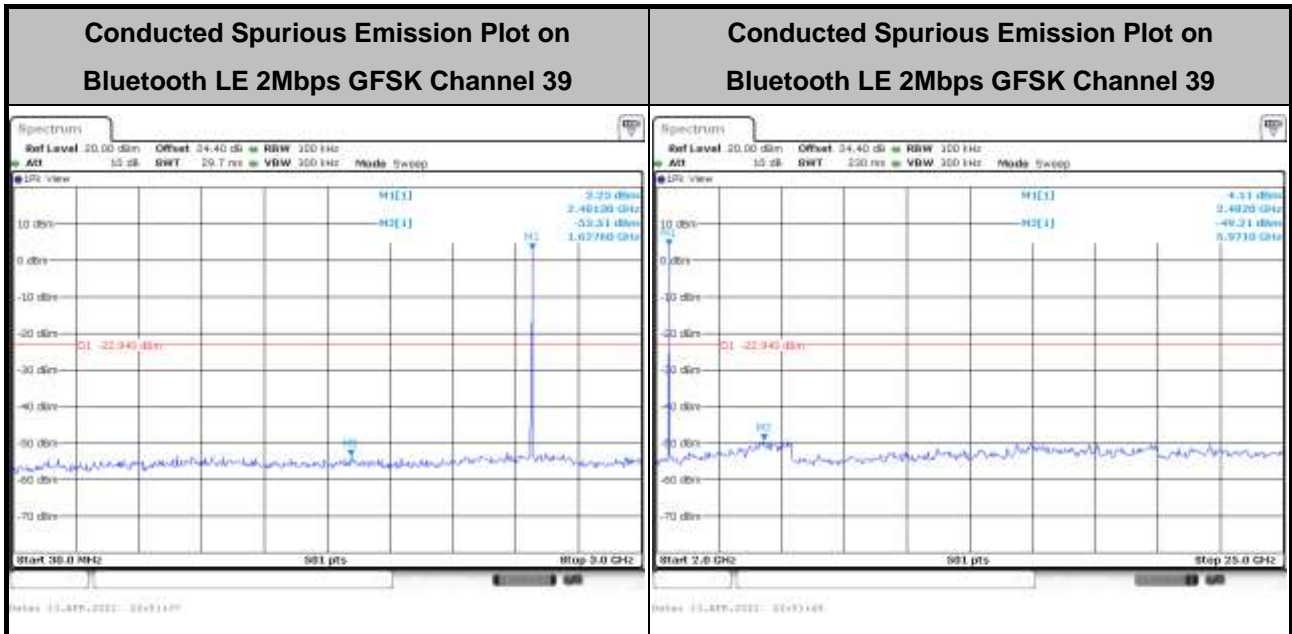




<2Mbps>











### 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

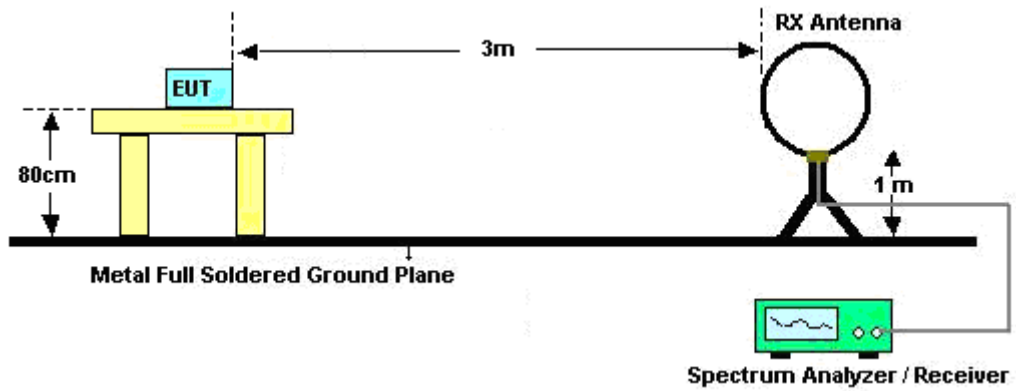
See list of measuring equipment of this test report.

**3.5.3 Test Procedures**

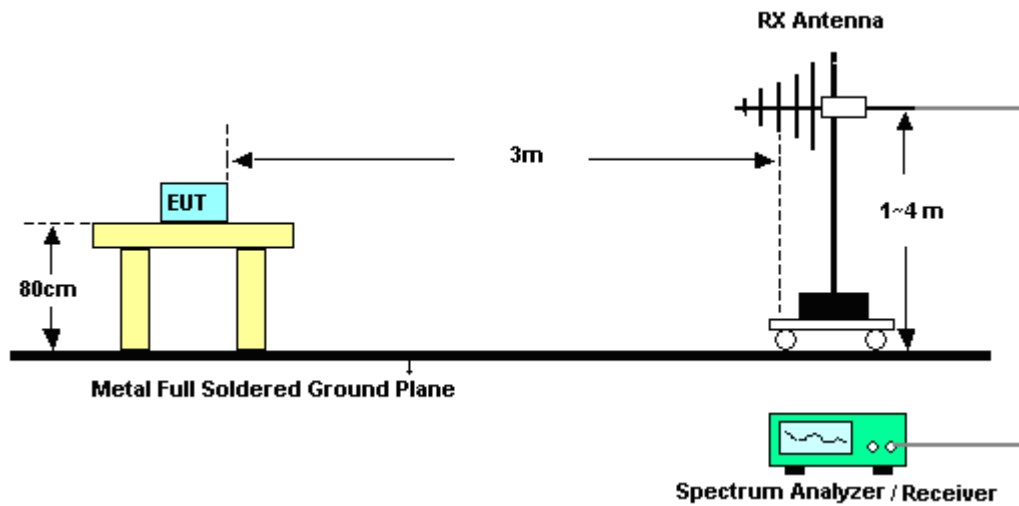
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz 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 1 GHz, 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 be reported.
7. For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and be 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 = 3 MHz 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

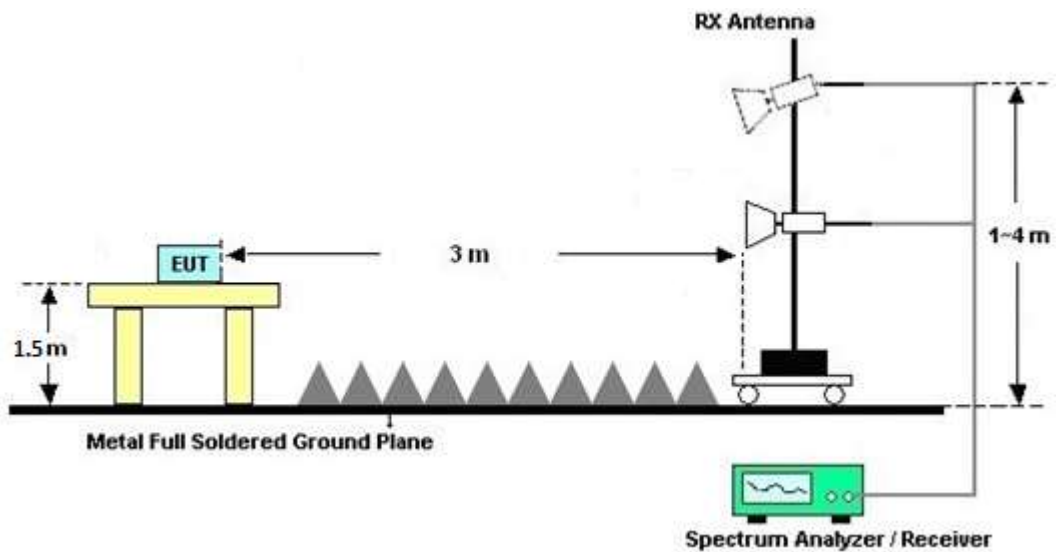
For radiated test below 30MHz



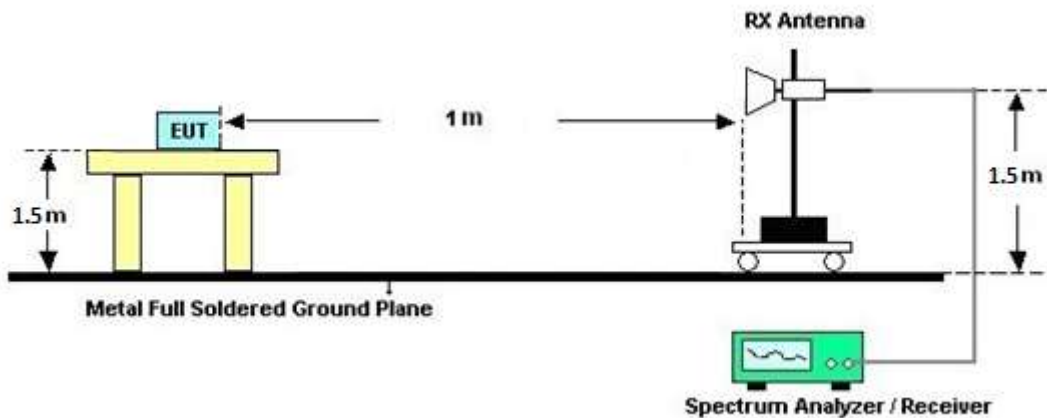
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



### 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 alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

### 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

### 3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and 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.

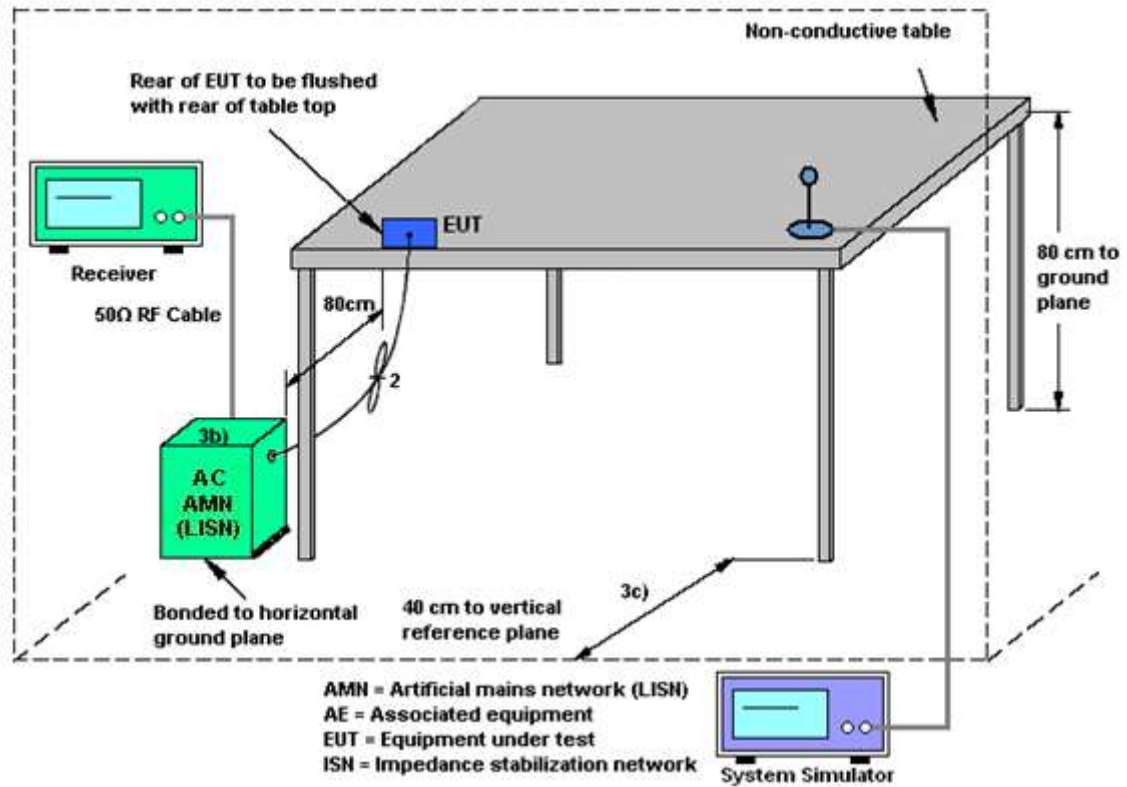
#### 3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

#### 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 shall 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 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. 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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jul. 14, 2020	Apr. 08, 2021~ Apr. 13, 2021	Jul. 13, 2021	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	41912 & 05	30MHz~1GHz	Feb. 08, 2021	Apr. 08, 2021~ Apr. 13, 2021	Feb. 07, 2022	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2020	Apr. 08, 2021~ Apr. 13, 2021	Dec. 27, 2021	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-016 20	1GHz~18GHz	Nov. 03, 2020	Apr. 08, 2021~ Apr. 13, 2021	Nov. 02, 2021	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 251	18GHz~40GHz	Dec. 02, 2020	Apr. 08, 2021~ Apr. 13, 2021	Dec. 01, 2021	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0055006	1GHz~18GHz	May 07, 2020	Apr. 08, 2021~ Apr. 13, 2021	May 06, 2021	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY532701 95	1GHz~26.5GHz	Aug. 21, 2020	Apr. 08, 2021~ Apr. 13, 2021	Aug. 20, 2021	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	0600789	18-40GHz	Oct. 27, 2020	Apr. 08, 2021~ Apr. 13, 2021	Oct. 26, 2021	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY541300 85	20MHz~8.4GHz	Nov. 02, 2020	Apr. 08, 2021~ Apr. 13, 2021	Nov. 01, 2021	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY501801 36	3Hz~44GHz	May 04, 2020	Apr. 08, 2021~ Apr. 13, 2021	May 03, 2021	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Apr. 08, 2021~ Apr. 13, 2021	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Apr. 08, 2021~ Apr. 13, 2021	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24 (k5)	RK-00045 1	N/A	N/A	Apr. 08, 2021~ Apr. 13, 2021	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104, 102E	MY36980/ 4, MY9838/4 PE,508405 /2E	30MHz~18G	Nov. 16, 2020	Apr. 08, 2021~ Apr. 13, 2021	Nov. 15, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 22, 2021	Apr. 08, 2021~ Apr. 13, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 22, 2021	Apr. 08, 2021~ Apr. 13, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	9kHz~30MHz	Mar. 11, 2021	Apr. 08, 2021~ Apr. 13, 2021	Mar. 10, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WLJ4-1000-1 530-6000-40S T	SN4	1.53GHz Low Pass Filter	Jul. 03, 2020	Apr. 08, 2021~ Apr. 13, 2021	Jul. 02, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60ST	SN4	3GHz High Pass Filter	Sep. 16, 2020	Apr. 08, 2021~ Apr. 13, 2021	Sep. 15, 2021	Radiation (03CH15-HY)





Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2021	Mar. 30, 2021~ Apr. 13, 2021	Mar. 01, 2022	Conducted (TH02-HY)
Power Sensor	DARE	RPR3006W	16100054SN O12	10MHz~6GHz	Dec. 16, 2020	Mar. 30, 2021~ Apr. 13, 2021	Dec. 15, 2021	Conducted (TH02-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz ~ 40GHz	Jul. 22, 2020	Mar. 30, 2021~ Apr. 13, 2021	Jul. 21, 2021	Conducted (TH02-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW200302	N/A	Mar. 17,2021	Mar. 30, 2021~ Apr. 13, 2021	Mar. 16,2022	Conducted (TH02-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Apr. 08, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	Apr. 08, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	Apr. 08, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2020	Apr. 08, 2021	Nov. 30, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2020	Apr. 08, 2021	Nov. 15, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Apr. 08, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Feb. 25, 2021	Apr. 08, 2021	Feb. 24, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Apr. 08, 2021	Dec. 30, 2021	Conduction (CO05-HY)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.3
---	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.7
---	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.3
---	-----

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

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

**Appendix A. Test Result of Conducted Test Items**

Test Engineer:	Eason Huang	Temperature:	21~25	°C
Test Date:	2021/3/30~04/13	Relative Humidity:	51~54	%

&lt;Ant. 0&gt;

**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	1.016	0.680	0.50	Pass
BLE	1Mbps	1	19	2440	1.010	0.672	0.50	Pass
BLE	1Mbps	1	39	2480	1.016	0.688	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	8.80	30.00	-2.30	6.50	36.00	Pass
BLE	1Mbps	1	19	2440	8.80	30.00	-2.30	6.50	36.00	Pass
BLE	1Mbps	1	39	2480	8.90	30.00	-2.30	6.60	36.00	Pass

**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	7.51	-6.77	-2.30	8.00	Pass
BLE	1Mbps	1	19	2440	7.61	-6.71	-2.30	8.00	Pass
BLE	1Mbps	1	39	2480	7.72	-6.49	-2.30	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

**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	1.998	1.175	0.50	Pass
BLE	2Mbps	1	19	2440	1.998	1.159	0.50	Pass
BLE	2Mbps	1	39	2480	1.994	1.179	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	8.90	30.00	-2.30	6.60	36.00	Pass
BLE	2Mbps	1	19	2440	8.90	30.00	-2.30	6.60	36.00	Pass
BLE	2Mbps	1	39	2480	9.00	30.00	-2.30	6.70	36.00	Pass

**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	7.74	-9.37	-2.30	8.00	Pass
BLE	2Mbps	1	19	2440	8.00	-9.29	-2.30	8.00	Pass
BLE	2Mbps	1	39	2480	8.14	-8.96	-2.30	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

&lt;Ant. 1&gt;

**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	1.009	0.668	0.50	Pass
BLE	1Mbps	1	19	2440	1.110	0.666	0.50	Pass
BLE	1Mbps	1	39	2480	1.017	0.676	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	8.80	30.00	-7.00	1.80	36.00	Pass
BLE	1Mbps	1	19	2440	8.80	30.00	-7.00	1.80	36.00	Pass
BLE	1Mbps	1	39	2480	8.90	30.00	-7.00	1.90	36.00	Pass

**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	7.42	-7.01	-7.00	8.00	Pass
BLE	1Mbps	1	19	2440	7.35	-7.07	-7.00	8.00	Pass
BLE	1Mbps	1	39	2480	7.08	-7.22	-7.00	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

**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	1.998	1.147	0.50	Pass
BLE	2Mbps	1	19	2440	1.998	1.147	0.50	Pass
BLE	2Mbps	1	39	2480	1.994	1.163	0.50	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	8.90	30.00	-7.00	1.90	36.00	Pass
BLE	2Mbps	1	19	2440	8.90	30.00	-7.00	1.90	36.00	Pass
BLE	2Mbps	1	39	2480	9.00	30.00	-7.00	2.00	36.00	Pass

**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	7.55	-9.89	-7.00	8.00	Pass
BLE	2Mbps	1	19	2440	7.23	-10.28	-7.00	8.00	Pass
BLE	2Mbps	1	39	2480	7.06	-10.30	-7.00	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.



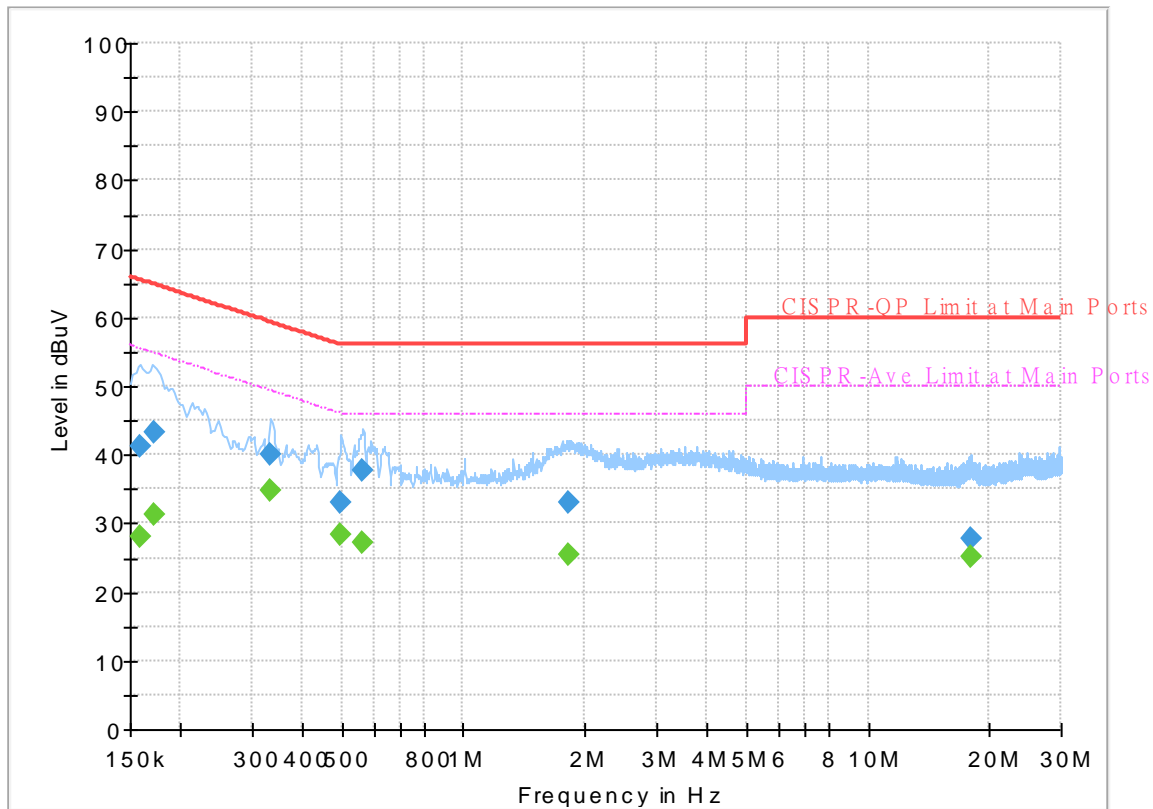
## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	Temperature :	23~26°C
		Relative Humidity :	40~50%

# EUT Information

Report NO : 132425  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

Full Spectrum



## Final\_Result

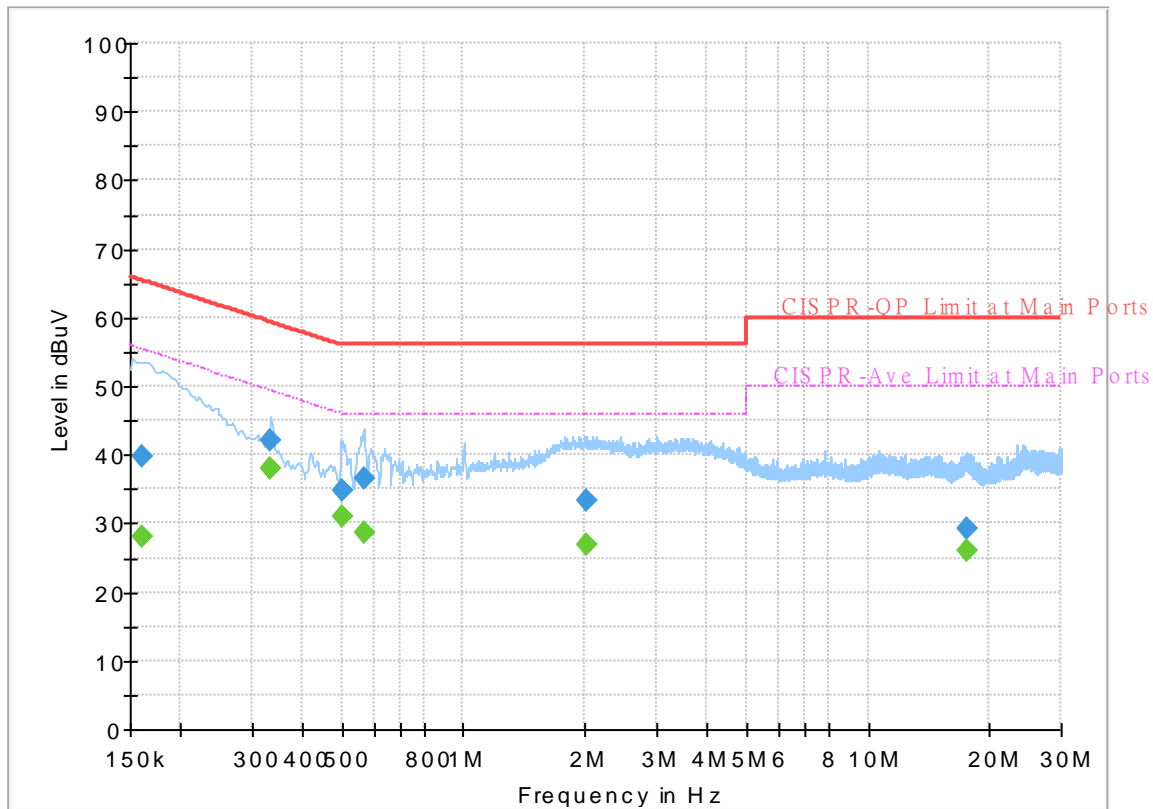
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	28.19	55.52	27.33	L1	OFF	19.7
0.159000	41.09	---	65.52	24.43	L1	OFF	19.7
0.172500	---	31.35	54.84	23.49	L1	OFF	19.7
0.172500	43.17	---	64.84	21.67	L1	OFF	19.7
0.334500	---	34.71	49.34	14.63	L1	OFF	19.7
0.334500	39.96	---	59.34	19.38	L1	OFF	19.7
0.498750	---	28.49	46.02	17.53	L1	OFF	19.9
0.498750	33.08	---	56.02	22.94	L1	OFF	19.9
0.564000	---	27.34	46.00	18.66	L1	OFF	19.9
0.564000	37.64	---	56.00	18.36	L1	OFF	19.9
1.826250	---	25.53	46.00	20.47	L1	OFF	20.2
1.826250	33.18	---	56.00	22.82	L1	OFF	20.2
18.044250	---	25.13	50.00	24.87	L1	OFF	20.5
18.044250	27.68	---	60.00	32.32	L1	OFF	20.5



# EUT Information

Report NO : 132425  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Neutral

Full Spectrum



## Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161250	---	27.98	55.40	27.42	N	OFF	19.7
0.161250	39.79	---	65.40	25.61	N	OFF	19.7
0.334500	---	37.95	49.34	11.39	N	OFF	19.8
0.334500	42.19	---	59.34	17.15	N	OFF	19.8
0.501000	---	30.95	46.00	15.05	N	OFF	19.9
0.501000	34.86	---	56.00	21.14	N	OFF	19.9
0.566250	---	28.76	46.00	17.24	N	OFF	20.0
0.566250	36.64	---	56.00	19.36	N	OFF	20.0
2.008500	---	26.86	46.00	19.14	N	OFF	20.2
2.008500	33.46	---	56.00	22.54	N	OFF	20.2
17.553750	---	26.15	50.00	23.85	N	OFF	20.6
17.553750	29.15	---	60.00	30.85	N	OFF	20.6



### Appendix C. Radiated Spurious Emission

Test Engineer :	Leo Lee, Mancy Chou and Bigshow Wang	Temperature :	22.5~23.5°C
		Relative Humidity :	45~55%

<Ant. 0>  
<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE Ant.	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz		2351.685	54.75	-19.25	74	41.49	27.69	16.5	30.93	318	172	P	H
		2331.84	44.91	-9.09	54	31.64	27.74	16.47	30.94	318	172	A	H
	*	2402	95.75	-	-	82.58	27.5	16.58	30.91	318	172	P	H
	*	2402	94.93	-	-	81.76	27.5	16.58	30.91	318	172	A	H
		2387.07	54.66	-19.34	74	41.47	27.55	16.56	30.92	281	89	P	V
		2311.995	44.93	-9.07	54	31.67	27.78	16.43	30.95	281	89	A	V
	*	2402	97.13	-	-	83.96	27.5	16.58	30.91	281	89	P	V
	*	2402	96.32	-	-	83.15	27.5	16.58	30.91	281	89	A	V
BLE CH 19 2440MHz		2385.68	54.49	-19.51	74	41.29	27.56	16.56	30.92	264	352	P	H
		2319.44	44.87	-9.13	54	31.61	27.76	16.45	30.95	264	352	A	H
	*	2440	96.21	-	-	82.97	27.5	16.64	30.9	264	352	P	H
	*	2440	95.41	-	-	82.17	27.5	16.64	30.9	264	352	A	H
		2498.2	54.41	-19.59	74	41.15	27.4	16.73	30.87	264	352	P	H
		2495.59	44.89	-9.11	54	31.62	27.41	16.73	30.87	264	352	A	H
		2336.88	55.13	-18.87	74	41.86	27.73	16.48	30.94	338	76	P	V
		2345.52	44.81	-9.19	54	31.54	27.71	16.49	30.93	338	76	A	V
	*	2440	98.26	-	-	85.02	27.5	16.64	30.9	338	76	P	V
	*	2440	97.48	-	-	84.24	27.5	16.64	30.9	338	76	A	V
		2497.75	54.43	-19.57	74	41.17	27.4	16.73	30.87	338	76	P	V
		2489.11	44.82	-9.18	54	31.55	27.42	16.72	30.87	338	76	A	V



<b>BLE CH 39 2480MHz</b>	*	2480	97.38	-	-	84.12	27.44	16.7	30.88	300	358	P	H
	*	2480	96.8	-	-	83.54	27.44	16.7	30.88	300	358	A	H
		2494.8	54.64	-19.36	74	41.37	27.41	16.73	30.87	300	358	P	H
		2493.24	44.86	-9.14	54	31.6	27.41	16.72	30.87	300	358	A	H
													H
													H
	*	2480	100.14	-	-	86.88	27.44	16.7	30.88	300	88	P	V
	*	2480	99.5	-	-	86.24	27.44	16.7	30.88	300	88	A	V
		2487.28	54.34	-19.66	74	41.07	27.43	16.72	30.88	300	88	P	V
		2496.16	44.82	-9.18	54	31.55	27.41	16.73	30.87	300	88	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BLE Ant. 0	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz		4804	38.53	-35.47	74	56.46	31.1	10.05	59.08	100	0	P	H
		17985	59.11	-14.89	74	49.42	48.73	18.88	57.92	100	325	P	H
		17985	49.33	-4.67	54	39.64	48.73	18.88	57.92	100	325	A	H
													H
		4804	37.88	-36.12	74	55.81	31.1	10.05	59.08	100	0	P	V
		17985	58.95	-15.05	74	49.26	48.73	18.88	57.92	100	126	P	V
		17985	48.95	-5.05	54	39.26	48.73	18.88	57.92	100	126	A	V
BLE CH 19 2440MHz		4880	37.3	-36.7	74	55.28	31.04	10.11	59.13	100	0	P	H
		7320	43.99	-30.01	74	53.92	36.3	12.32	58.55	100	0	P	H
		17985	59.9	-14.1	74	50.21	48.73	18.88	57.92	300	214	P	H
		17985	50.11	-3.89	54	40.42	48.73	18.88	57.92	300	214	A	H
		4880	38.27	-35.73	74	56.25	31.04	10.11	59.13	100	0	P	V
		7320	44.38	-29.62	74	54.31	36.3	12.32	58.55	100	0	P	V
		18000	58.9	-15.1	74	48.91	49	18.89	57.9	100	127	P	V
		18000	48.79	-5.21	54	38.8	49	18.89	57.9	100	127	A	V
BLE CH 39 2480MHz		4960	38.82	-35.18	74	56.61	31.22	10.17	59.18	100	0	P	H
		7440	44.79	-29.21	74	54.48	36.3	12.39	58.38	100	0	P	H
		18000	58.96	-15.04	74	48.97	49	18.89	57.9	300	264	P	H
		18000	48.78	-5.22	54	38.79	49	18.89	57.9	300	264	A	H
		4960	38.91	-35.09	74	56.7	31.22	10.17	59.18	100	0	P	V
		7440	46.08	-27.92	74	55.77	36.3	12.39	58.38	100	0	P	V
		18000	59.88	-14.12	74	49.89	49	18.89	57.9	100	136	P	V
		18000	49.96	-4.04	54	39.97	49	18.89	57.9	100	136	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.	
0		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
BLE CH 00 2402MHz		2354.31	54.44	-19.56	74	41.19	27.68	16.5	30.93	318	171	P	H	
		2353.785	44.98	-9.02	54	31.73	27.68	16.5	30.93	318	171	A	H	
	*	2402	95.69	-	-	82.52	27.5	16.58	30.91	318	171	P	H	
	*	2402	93.63	-	-	80.46	27.5	16.58	30.91	318	171	A	H	
													H	
													H	
			2317.35	55.31	-18.69	74	42.05	27.77	16.44	30.95	317	78	P	V
			2316.93	44.99	-9.01	54	31.73	27.77	16.44	30.95	317	78	A	V
	*		2402	97.92	-	-	84.75	27.5	16.58	30.91	317	78	P	V
	*		2402	96.23	-	-	83.06	27.5	16.58	30.91	317	78	A	V
														V
														V
BLE CH 19 2440MHz		2358	54.3	-19.7	74	41.05	27.67	16.51	30.93	272	354	P	H	
		2359.76	45.04	-8.96	54	31.8	27.66	16.51	30.93	272	354	A	H	
	*	2440	96.5	-	-	83.26	27.5	16.64	30.9	272	354	P	H	
	*	2440	94.76	-	-	81.52	27.5	16.64	30.9	272	354	A	H	
			2496.67	54.39	-19.61	74	41.12	27.41	16.73	30.87	272	354	P	H
			2487.58	44.87	-9.13	54	31.61	27.42	16.72	30.88	272	354	A	H
			2317.68	55.6	-18.4	74	42.35	27.76	16.44	30.95	300	75	P	V
			2326.48	44.78	-9.22	54	31.51	27.75	16.46	30.94	300	75	A	V
	*		2440	98.57	-	-	85.33	27.5	16.64	30.9	300	75	P	V
	*		2440	96.92	-	-	83.68	27.5	16.64	30.9	300	75	A	V
			2487.13	54.23	-19.77	74	40.96	27.43	16.72	30.88	300	75	P	V
			2495.5	45.17	-8.83	54	31.9	27.41	16.73	30.87	300	75	A	V



<b>BLE CH 39 2480MHz</b>	*	2480	96.94	-	-	83.68	27.44	16.7	30.88	300	351	P	H
	*	2480	95.32	-	-	82.06	27.44	16.7	30.88	300	351	A	H
		2498.28	54.62	-19.38	74	41.36	27.4	16.73	30.87	300	351	P	H
		2487.16	44.9	-9.1	54	31.63	27.43	16.72	30.88	300	351	A	H
													H
													H
	*	2480	100.5	-	-	87.24	27.44	16.7	30.88	300	87	P	V
	*	2480	98.93	-	-	85.67	27.44	16.7	30.88	300	87	A	V
		2486.52	55.14	-18.86	74	41.88	27.43	16.71	30.88	300	87	P	V
		2483.96	44.89	-9.11	54	31.63	27.43	16.71	30.88	300	87	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BLE Ant. 0	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz		4804	38.45	-35.55	74	56.38	31.1	10.05	59.08	100	0	P	H
		17985	58.74	-15.26	74	49.05	48.73	18.88	57.92	300	263	P	H
		17985	48.96	-5.04	54	39.27	48.73	18.88	57.92	300	263	A	H
													H
		4804	38.11	-35.89	74	56.04	31.1	10.05	59.08	100	0	P	V
		17985	58.83	-15.17	74	49.14	48.73	18.88	57.92	100	147	P	V
		17985	49.1	-4.9	54	39.41	48.73	18.88	57.92	100	147	A	V
BLE CH 19 2440MHz		4880	38.38	-35.62	74	56.36	31.04	10.11	59.13	100	0	P	H
		7320	43.72	-30.28	74	53.65	36.3	12.32	58.55	100	0	P	H
		18000	59.21	-14.79	74	49.22	49	18.89	57.9	300	247	P	H
		18000	49.4	-4.6	54	39.41	49	18.89	57.9	300	247	A	H
		4880	39.29	-34.71	74	57.27	31.04	10.11	59.13	100	0	P	V
		7320	44.44	-29.56	74	54.37	36.3	12.32	58.55	100	0	P	V
		18000	59.64	-14.36	74	49.65	49	18.89	57.9	100	157	P	V
		18000	49.75	-4.25	54	39.76	49	18.89	57.9	100	157	A	V
BLE CH 39 2480MHz		4960	39.19	-34.81	74	56.98	31.22	10.17	59.18	100	0	P	H
		7440	44.85	-29.15	74	54.54	36.3	12.39	58.38	100	0	P	H
		18000	60.46	-13.54	74	50.47	49	18.89	57.9	300	217	P	H
		18000	50.67	-3.33	54	40.68	49	18.89	57.9	300	217	A	H
		4960	39.32	-34.68	74	57.11	31.22	10.17	59.18	100	0	P	V
		7440	45.04	-28.96	74	54.73	36.3	12.39	58.38	100	0	P	V
		17985	59.65	-14.35	74	49.96	48.73	18.88	57.92	100	124	P	V
		17985	49.46	-4.54	54	39.77	48.73	18.88	57.92	100	124	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission above 18GHz

2.4GHz BLE (SHF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
0		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
2.4GHz BLE SHF		22000	39.45	-34.55	74	43.59	38.4	12.16	54.7	150	0	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
			22160	39.66	-34.34	74	43.47	38.62	12.21	54.64	150	0	P
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												





Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
0		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BLE LF		44.55	23.32	-16.68	40	38.01	17.06	0.84	32.59	-	-	P	H	
		105.66	31.31	-12.19	43.5	45.87	16.48	1.47	32.51	-	-	P	H	
		141.55	27.11	-16.39	43.5	40.49	17.42	1.7	32.5	-	-	P	H	
		221.09	22.74	-23.26	46	37.77	15.25	2.14	32.42	-	-	P	H	
		429.64	25.45	-20.55	46	32.15	22.91	2.8	32.41	-	-	P	H	
		733.25	38.13	-7.87	46	39.4	27.5	3.68	32.45	100	0	P	H	
														H
														H
														H
														H
														H
														H
			43.58	33.77	-6.23	40	48.05	17.47	0.83	32.58	100	0	P	V
			103.72	23.67	-19.83	43.5	38.44	16.28	1.46	32.51	-	-	P	V
			135.73	24.29	-19.21	43.5	37.65	17.49	1.66	32.51	-	-	P	V
			174.53	25.01	-18.49	43.5	40.34	15.24	1.92	32.49	-	-	P	V
			220.12	22.38	-23.62	46	37.48	15.18	2.14	32.42	-	-	P	V
			717.73	36.05	-9.95	46	38.11	26.76	3.63	32.45	-	-	P	V
														V
														V
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



<Ant. 1>

<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
BLE CH 00 2402MHz		2320.29	55.51	-18.49	74	42.25	27.76	16.45	30.95	270	318	P	H	
		2338.56	44.85	-9.15	54	31.59	27.72	16.48	30.94	270	318	A	H	
	*	2402	94.27	-	-	81.1	27.5	16.58	30.91	270	318	P	H	
	*	2402	93.53	-	-	80.36	27.5	16.58	30.91	270	318	A	H	
													H	
													H	
			2336.775	55.13	-18.87	74	41.86	27.73	16.48	30.94	100	32	P	V
			2370.375	44.95	-9.05	54	31.72	27.62	16.53	30.92	100	32	A	V
	*		2402	98.19	-	-	85.02	27.5	16.58	30.91	100	32	P	V
	*		2402	97.42	-	-	84.25	27.5	16.58	30.91	100	32	A	V
													V	
													V	
BLE CH 19 2440MHz		2327.12	55.31	-18.69	74	42.04	27.75	16.46	30.94	117	151	P	H	
		2333.84	44.88	-9.12	54	31.62	27.73	16.47	30.94	117	151	A	H	
	*	2440	95.33	-	-	82.09	27.5	16.64	30.9	117	151	P	H	
	*	2440	94.47	-	-	81.23	27.5	16.64	30.9	117	151	A	H	
			2487.67	55.02	-18.98	74	41.76	27.42	16.72	30.88	117	151	P	H
			2498.56	44.79	-9.21	54	31.53	27.4	16.73	30.87	117	151	A	H
			2332.08	55.03	-18.97	74	41.76	27.74	16.47	30.94	150	31	P	V
			2319.76	44.98	-9.02	54	31.72	27.76	16.45	30.95	150	31	A	V
	*		2440	99.02	-	-	85.78	27.5	16.64	30.9	150	31	P	V
	*		2440	98.17	-	-	84.93	27.5	16.64	30.9	150	31	A	V
			2485.87	54.3	-19.7	74	41.04	27.43	16.71	30.88	150	31	P	V
			2496.49	44.84	-9.16	54	31.57	27.41	16.73	30.87	150	31	A	V



<b>BLE CH 39 2480MHz</b>	*	2480	93.76	-	-	80.5	27.44	16.7	30.88	400	309	P	H
	*	2480	93.07	-	-	79.81	27.44	16.7	30.88	400	309	A	H
		2489.88	55.09	-18.91	74	41.82	27.42	16.72	30.87	400	309	P	H
		2496.4	44.81	-9.19	54	31.54	27.41	16.73	30.87	400	309	A	H
													H
													H
	*	2480	96.68	-	-	83.42	27.44	16.7	30.88	100	29	P	V
	*	2480	95.82	-	-	82.56	27.44	16.7	30.88	100	29	A	V
		2486.84	55	-19	74	41.74	27.43	16.71	30.88	100	29	P	V
		2493	44.82	-9.18	54	31.56	27.41	16.72	30.87	100	29	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BLE Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz		4804	39.48	-34.52	74	57.41	31.1	10.05	59.08	100	0	P	H
		18000	59.99	-14.01	74	50	49	18.89	57.9	100	136	P	H
		18000	50.2	-3.8	54	40.21	49	18.89	57.9	100	136	A	H
													H
		4804	38.3	-35.7	74	56.23	31.1	10.05	59.08	100	0	P	V
		17985	59.69	-14.31	74	50	48.73	18.88	57.92	300	302	P	V
		17985	49.47	-4.53	54	39.78	48.73	18.88	57.92	300	302	A	V
													V
BLE CH 19 2440MHz		4880	39.6	-34.4	74	57.58	31.04	10.11	59.13	100	0	P	H
		7320	45.48	-28.52	74	55.41	36.3	12.32	58.55	100	0	P	H
		18000	60.02	-13.98	74	50.03	49	18.89	57.9	100	127	P	H
		18000	50.21	-3.79	54	40.22	49	18.89	57.9	100	127	A	H
		4880	39.45	-34.55	74	57.43	31.04	10.11	59.13	100	0	P	V
		7320	45.83	-28.17	74	55.76	36.3	12.32	58.55	100	0	P	V
		18000	59.31	-14.69	74	49.32	49	18.89	57.9	300	326	P	V
		18000	49.49	-4.51	54	39.5	49	18.89	57.9	300	326	A	V
BLE CH 39 2480MHz		4960	40.17	-33.83	74	57.96	31.22	10.17	59.18	100	0	P	H
		7440	46.31	-27.69	74	56	36.3	12.39	58.38	100	0	P	H
		18000	59.77	-14.23	74	49.78	49	18.89	57.9	100	127	P	H
		18000	49.95	-4.05	54	39.96	49	18.89	57.9	100	127	A	H
		4960	39.46	-34.54	74	57.25	31.22	10.17	59.18	100	0	P	V
		7440	45.15	-28.85	74	54.84	36.3	12.39	58.38	100	0	P	V
		18000	60.34	-13.66	74	50.35	49	18.89	57.9	300	317	P	V
		18000	50.52	-3.48	54	40.53	49	18.89	57.9	300	317	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
BLE CH 00 2402MHz		2315.46	55.03	-18.97	74	41.77	27.77	16.44	30.95	270	324	P	H	
		2325.015	44.79	-9.21	54	31.52	27.75	16.46	30.94	270	324	A	H	
	*	2402	94.34	-	-	81.17	27.5	16.58	30.91	270	324	P	H	
	*	2402	92.61	-	-	79.44	27.5	16.58	30.91	270	324	A	H	
													H	
													H	
			2313.36	54.97	-19.03	74	41.71	27.77	16.44	30.95	100	32	P	V
			2359.77	45.05	-8.95	54	31.81	27.66	16.51	30.93	100	32	A	V
	*		2402	98.4	-	-	85.23	27.5	16.58	30.91	100	32	P	V
	*		2402	96.75	-	-	83.58	27.5	16.58	30.91	100	32	A	V
													V	
													V	
BLE CH 19 2440MHz		2369.04	55.2	-18.8	74	41.98	27.62	16.53	30.93	113	154	P	H	
		2315.92	44.91	-9.09	54	31.65	27.77	16.44	30.95	113	154	A	H	
	*	2440	94.92	-	-	81.68	27.5	16.64	30.9	113	154	P	H	
	*	2440	93.32	-	-	80.08	27.5	16.64	30.9	113	154	A	H	
			2489.83	54.04	-19.96	74	40.77	27.42	16.72	30.87	113	154	P	H
			2484.79	44.79	-9.21	54	31.53	27.43	16.71	30.88	113	154	A	H
			2329.04	54.83	-19.17	74	41.57	27.74	16.46	30.94	152	31	P	V
			2386.8	45.06	-8.94	54	31.87	27.55	16.56	30.92	152	31	A	V
	*		2440	99.28	-	-	86.04	27.5	16.64	30.9	152	31	P	V
	*		2440	97.55	-	-	84.31	27.5	16.64	30.9	152	31	A	V
			2496.49	54.52	-19.48	74	41.25	27.41	16.73	30.87	152	31	P	V
			2490.55	44.88	-9.12	54	31.61	27.42	16.72	30.87	152	31	A	V



<b>BLE CH 39 2480MHz</b>	*	2480	94.58	-	-	81.32	27.44	16.7	30.88	361	305	P	H
	*	2480	93.03	-	-	79.77	27.44	16.7	30.88	361	305	A	H
		2486.8	54.95	-19.05	74	41.69	27.43	16.71	30.88	361	305	P	H
		2490.8	44.87	-9.13	54	31.6	27.42	16.72	30.87	361	305	A	H
													H
													H
	*	2480	97.06	-	-	83.8	27.44	16.7	30.88	100	32	P	V
	*	2480	95.47	-	-	82.21	27.44	16.7	30.88	100	32	A	V
		2498.2	54.52	-19.48	74	41.26	27.4	16.73	30.87	100	32	P	V
		2495.04	44.86	-9.14	54	31.59	27.41	16.73	30.87	100	32	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BLE Ant. 1	Note	Frequency ( MHz )	Level ( dBµV/m )	Over Limit ( dB )	Limit Line ( dBµV/m )	Read Level ( dBµV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BLE CH 00 2402MHz		4804	38.53	-35.47	74	56.46	31.1	10.05	59.08	100	0	P	H
		17985	59.11	-14.89	74	49.42	48.73	18.88	57.92	100	125	P	H
		17985	49.3	-4.7	54	39.61	48.73	18.88	57.92	100	125	A	H
													H
		4804	37.88	-36.12	74	55.81	31.1	10.05	59.08	100	0	P	V
		17985	58.95	-15.05	74	49.26	48.73	18.88	57.92	300	209	P	V
		17985	49.13	-4.87	54	39.44	48.73	18.88	57.92	300	209	A	V
BLE CH 19 2440MHz		4880	38.22	-35.78	74	56.2	31.04	10.11	59.13	100	0	P	H
		7320	43.75	-30.25	74	53.68	36.3	12.32	58.55	100	0	P	H
		18000	60.33	-13.67	74	50.34	49	18.89	57.9	100	120	P	H
		18000	50.42	-3.58	54	40.43	49	18.89	57.9	100	120	A	H
		4880	39.15	-34.85	74	57.13	31.04	10.11	59.13	100	0	P	V
		7320	44.56	-29.44	74	54.49	36.3	12.32	58.55	100	0	P	V
		18000	58.82	-15.18	74	48.83	49	18.89	57.9	300	234	P	V
		18000	48.91	-5.09	54	38.92	49	18.89	57.9	300	234	A	V
BLE CH 39 2480MHz		4960	38.35	-35.65	74	56.14	31.22	10.17	59.18	100	0	P	H
		7440	46.34	-27.66	74	56.03	36.3	12.39	58.38	100	0	P	H
		17985	59.52	-14.48	74	49.83	48.73	18.88	57.92	100	104	P	H
		17985	49.63	-4.37	54	39.94	48.73	18.88	57.92	100	104	A	H
		4960	38.4	-35.6	74	56.19	31.22	10.17	59.18	100	0	P	V
		7440	44.85	-29.15	74	54.54	36.3	12.39	58.38	100	0	P	V
		17985	58.79	-15.21	74	49.1	48.73	18.88	57.92	300	249	P	V
		17985	49	-5	54	39.31	48.73	18.88	57.92	300	249	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission above 18GHz

2.4GHz BLE (SHF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	(dBμV)	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)
2.4GHz BLE SHF		22392	39.29	-34.71	74	42.61	38.95	12.27	54.54	150	0	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
			21768	39.36	-34.64	74	43.77	38.35	11.94	54.7	150	0	P
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against limit line.												





Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	(dBμV)	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)	
2.4GHz BLE LF		42.61	27.15	-12.85	40	40.91	18	0.82	32.58	100	0	P	H	
		104.69	29.53	-13.97	43.5	44.18	16.39	1.47	32.51	-	-	P	H	
		154.16	24.86	-18.64	43.5	38.74	16.84	1.78	32.5	-	-	P	H	
		204.6	25	-18.5	43.5	40.22	15.15	2.07	32.44	-	-	P	H	
		746.83	32.76	-13.24	46	33.62	27.88	3.71	32.45	-	-	P	H	
		786.6	32.5	-13.5	46	32.81	28.08	3.85	32.24	-	-	P	H	
														H
														H
														H
														H
														H
														H
			43.58	32.34	-7.66	40	46.62	17.47	0.83	32.58	100	130	Q	V
			66.86	21.07	-18.93	40	40.53	11.96	1.12	32.54	-	-	P	V
			104.69	29.16	-14.34	43.5	43.81	16.39	1.47	32.51	-	-	P	V
			135.73	24.65	-18.85	43.5	38.01	17.49	1.66	32.51	-	-	P	V
			179.38	25.01	-18.49	43.5	40.57	14.97	1.95	32.48	-	-	P	V
			430.61	25.07	-20.93	46	31.77	22.91	2.8	32.41	-	-	P	V
														V
														V
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



**Note symbol**

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



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

Test Engineer :	Leo Lee, Mancy Chou and Bigshow Wang	Temperature :	22.5~23.5°C
		Relative Humidity :	45~55%

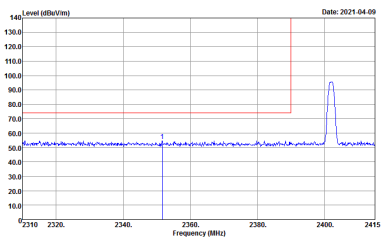
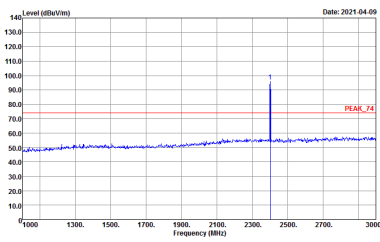
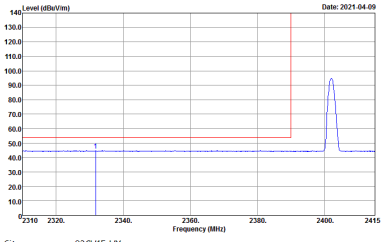
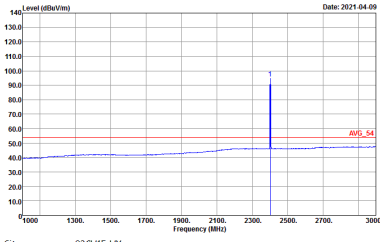
### Note symbol

-L	Low channel location
-R	High channel location

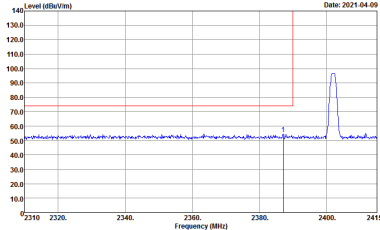
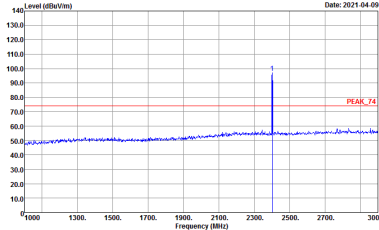


<Ant. 0>  
<1Mbps>

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

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
0	Horizontal	Fundamental
<b>Peak</b>	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<b>Avg.</b>	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

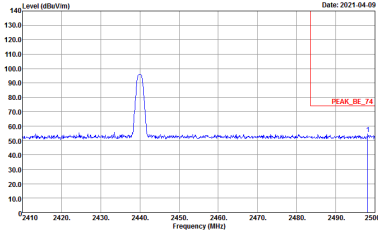
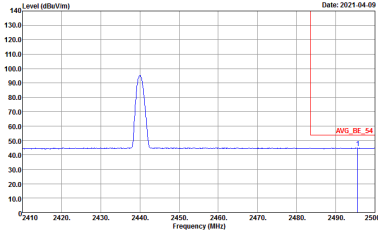


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
0	Vertical	Fundamental
Peak	 <p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg	 <p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	 <p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



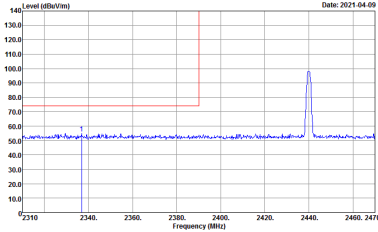
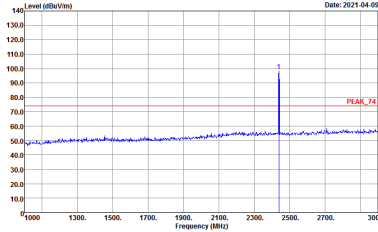
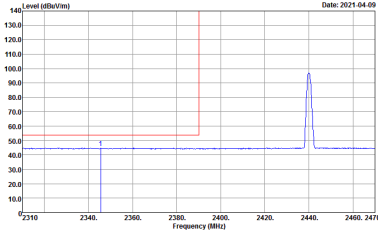
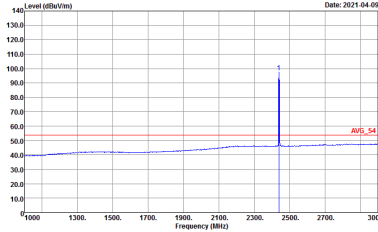
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
0	Horizontal	Fundamental
Peak	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



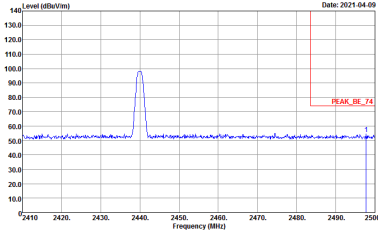
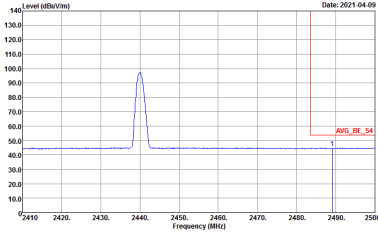
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
0	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	Left blank
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWF:Auto</p>	Left blank





BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
0	Vertical	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
0	Vertical	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	Left blank
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWF:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
0	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
0	Vertical	Fundamental
Peak	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH00 2402MHz</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
Ant.	BLE CH19 2440MHz	
0	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH39 2480MHz</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

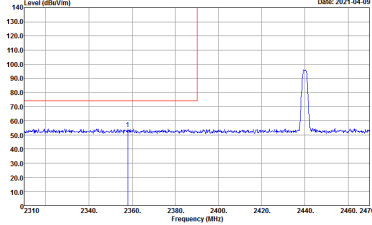
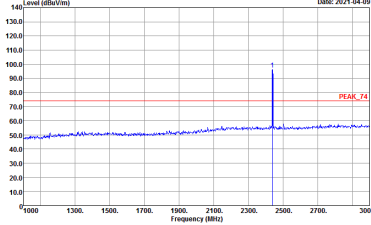
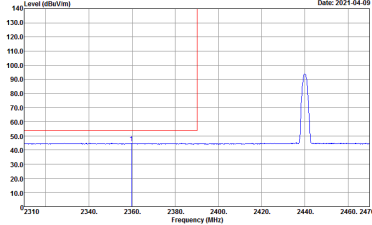
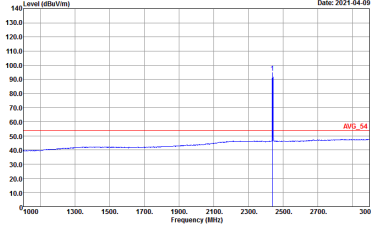
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
0	Horizontal	Fundamental
Peak	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



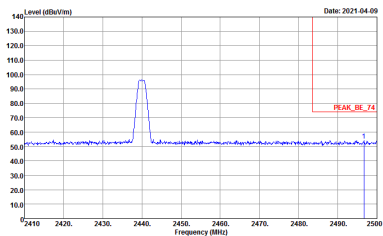
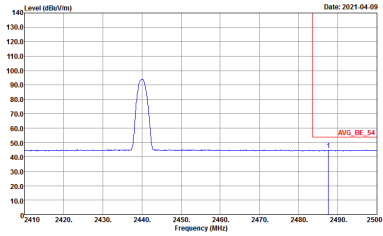


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
0	Vertical	Fundamental
Peak	<p>Level (dBuV/m) vs Frequency (MHz) for Vertical polarization. The plot shows a sharp peak at approximately 2402 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 2310 to 2415 MHz. A red box highlights the peak area.</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Level (dBuV/m) vs Frequency (MHz) for Fundamental polarization. The plot shows a sharp peak at approximately 2402 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 1000 to 3000 MHz. A red box highlights the peak area.</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
	<p>Level (dBuV/m) vs Frequency (MHz) for Vertical polarization. The plot shows a sharp peak at approximately 2402 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 2310 to 2415 MHz. A red box highlights the peak area.</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Level (dBuV/m) vs Frequency (MHz) for Fundamental polarization. The plot shows a sharp peak at approximately 2402 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 1000 to 3000 MHz. A red box highlights the peak area.</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
0	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Band Edge @ 3m</b>	
<b>Ant.</b>	<b>BLE CH19 2440MHz - R</b>	
<b>0</b>	<b>Horizontal</b>	<b>Fundamental</b>
<b>Peak</b>	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	<b>Left blank</b>
<b>Avg.</b>	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWF:Auto</p>	<b>Left blank</b>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
0	Vertical	Fundamental
Peak	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Date: 2021-04-09</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
0	Vertical	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz, VBW:3000.000KHz, SWF:Auto</p>	Left blank
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz, VBW:1000KHz, SWT:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
0	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000kHz VBW:1000kHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000kHz VBW:1000kHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
0	Vertical	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000kHz VBW:1000kHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000kHz VBW:1000kHz SWT:Auto</p>



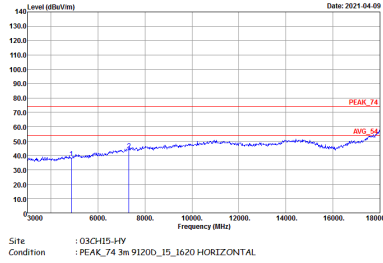
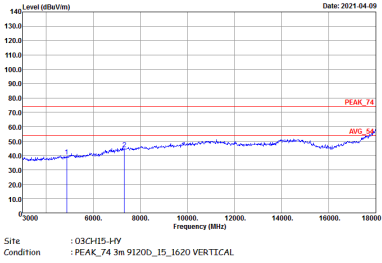
2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH00 2402MHz</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>





<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH19 2440MHz</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b>		
<b>Avg.</b>		



<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH39 2480MHz</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



Emission above 18GHz

2.4GHz BLE (SHF)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz</b>	
<b>Ant.</b>	<b>BLE SHF</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	<p>Site : 03CH16-HY Condition : PEAK_74_1M 1m SHF HORN BBH49170576 HORIZONTAL</p>	<p>Site : 03CH16-HY Condition : PEAK_74_1M 1m SHF HORN BBH49170576 VERTICAL</p>



Emission below 1GHz

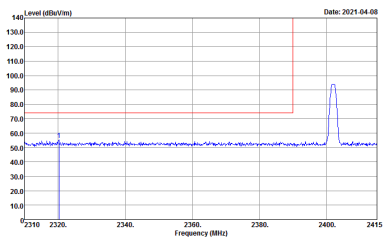
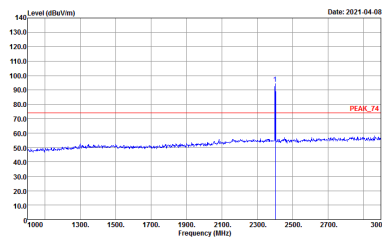
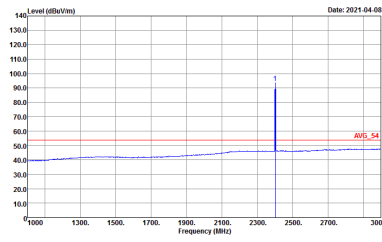
2.4GHz BLE (LF)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz</b>	
<b>Ant.</b>	<b>BLE LF</b>	
<b>0</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	<p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20210208 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20210208 VERTICAL</p>

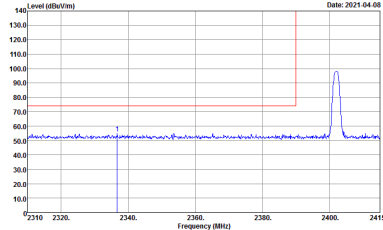
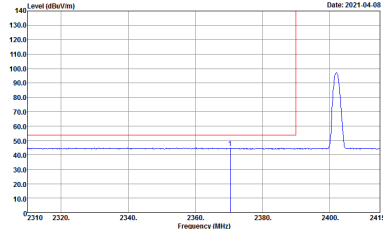
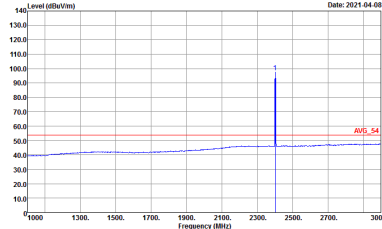


<Ant. 1>  
<1Mbps>

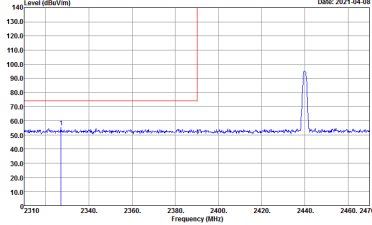
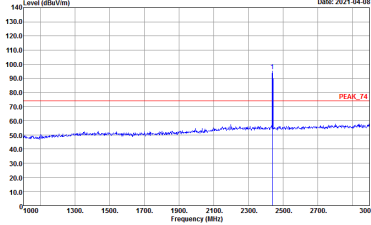
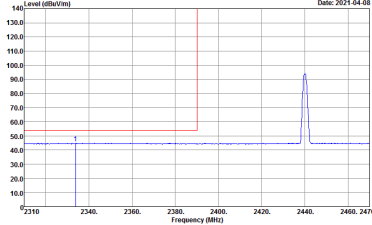
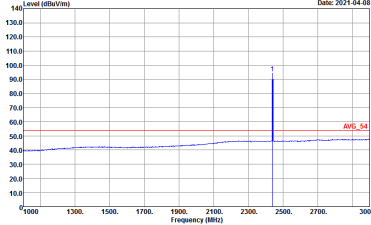
2.4GHz 2400~2483.5MHz  
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
1	Horizontal	Fundamental
<b>Peak</b>	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<b>Avg.</b>	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



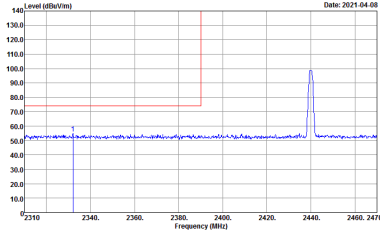
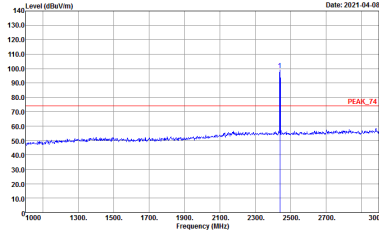
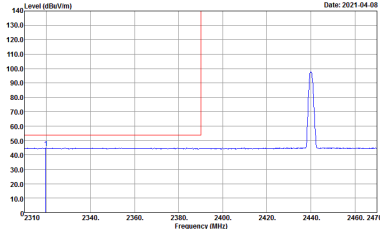
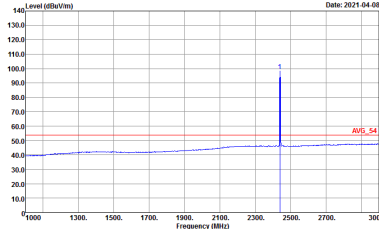
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



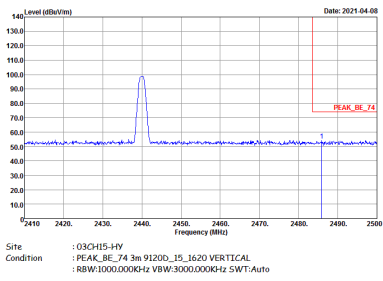
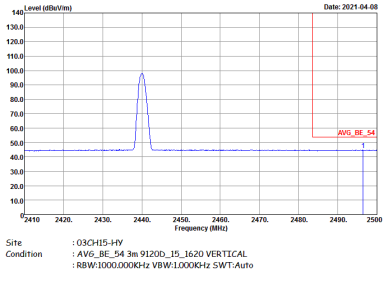
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	Left blank
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWF:Auto</p>	Left blank





BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	Left blank
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:1000KHz SWF:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH00 2402MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
Ant.	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
Ant.	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



<2Mbps>

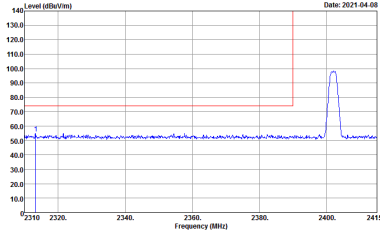
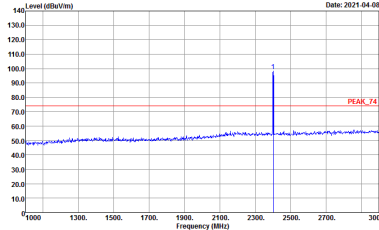
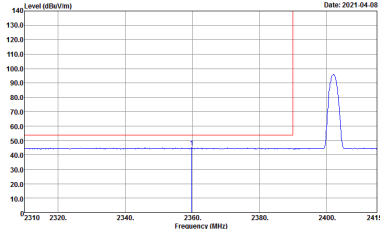
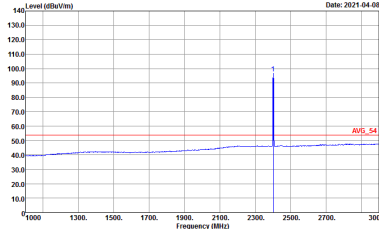
2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH15-HY Condition : AV6_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : AV6_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



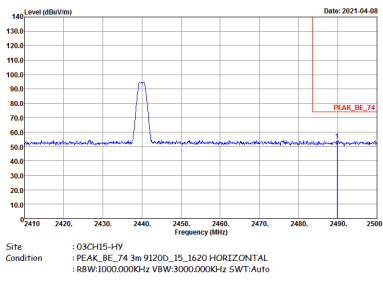
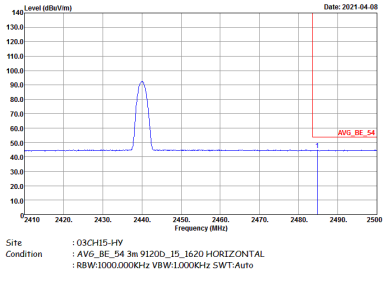


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	 <p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>

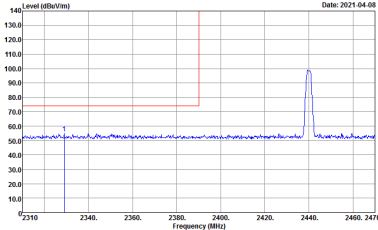
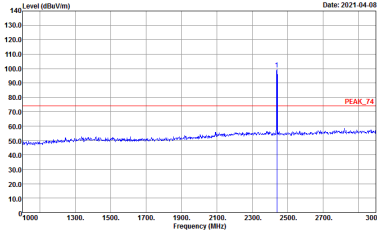
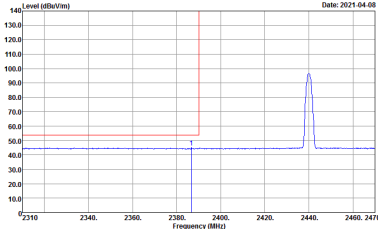
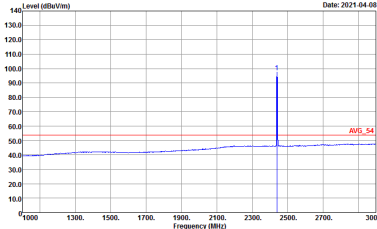


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

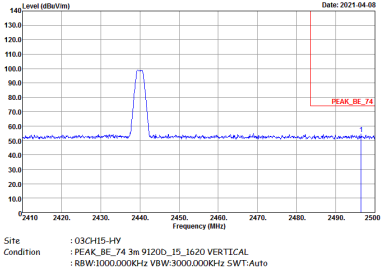
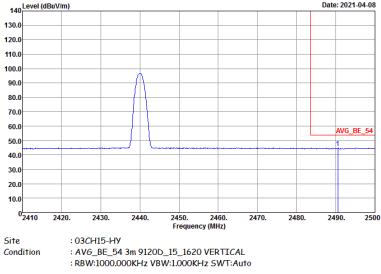


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	Left blank
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWF:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak	 <p>Level (dBuV/m) vs Frequency (MHz) plot for Peak Vertical. The plot shows a sharp peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 2310 to 2470 MHz. A red vertical line marks the peak at 2440 MHz. The date is 2021-04-08.</p> <p>Site : 03CH15-HY            Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBuV/m) vs Frequency (MHz) plot for Peak Fundamental. The plot shows a sharp peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 1000 to 3000 MHz. A red vertical line marks the peak at 2440 MHz. The date is 2021-04-08.</p> <p>Site : 03CH15-HY            Condition : PEAK_74 3m 91200_15_1620 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Level (dBuV/m) vs Frequency (MHz) plot for Avg Vertical. The plot shows a peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 2310 to 2470 MHz. A red vertical line marks the peak at 2440 MHz. The date is 2021-04-08.</p> <p>Site : 03CH15-HY            Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL            : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	 <p>Level (dBuV/m) vs Frequency (MHz) plot for Avg Fundamental. The plot shows a peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBuV/m, and the x-axis ranges from 1000 to 3000 MHz. A red vertical line marks the peak at 2440 MHz. The date is 2021-04-08.</p> <p>Site : 03CH15-HY            Condition : AVG_54 3m 91200_15_1620 VERTICAL            : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000kHz VBW:3000.000kHz SWF:Auto</p>	Left blank
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000kHz VBW:10000kHz SWF:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
Ant.	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>	<p>Date: 2021-04-08</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH00 2402MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>





BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
Ant.	BLE CH19 2440MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>Ant.</b>	<b>BLE CH39 2480MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b>	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL</p>	<p>Site : 03CH15-1Y Condition : PEAK_74 3m 91200_15_1620 VERTICAL</p>



Emission above 18GHz

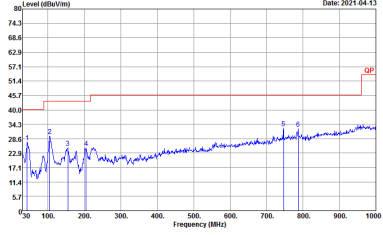
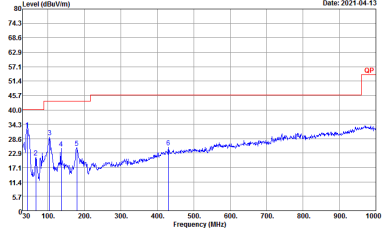
2.4GHz BLE (SHF)

<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz</b>	
<b>Ant.</b>	<b>BLE SHF</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	<p>Site : 03CH16-HY Condition : PEAK_74_1M 1m SHF HORN BBH49170576 HORIZONTAL</p>	<p>Site : 03CH16-HY Condition : PEAK_74_1M 1m SHF HORN BBH49170576 VERTICAL</p>



Emission below 1GHz

2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
Ant.	BLE LF	
1	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20210208 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20210208 VERTICAL</p>

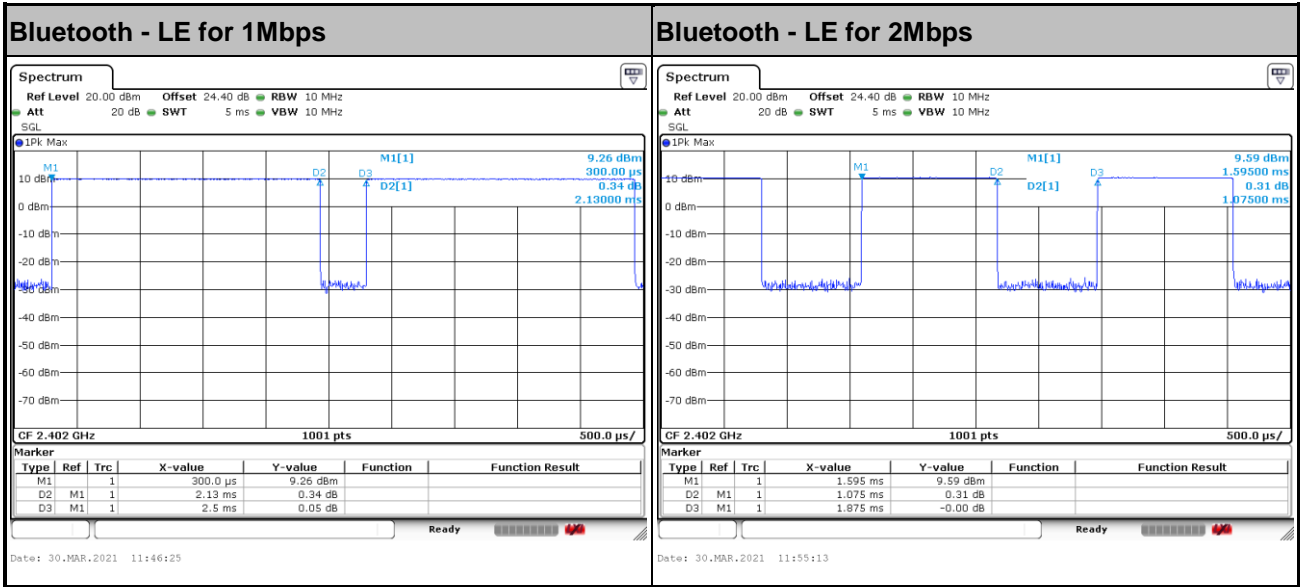


### Appendix E. Duty Cycle Plots

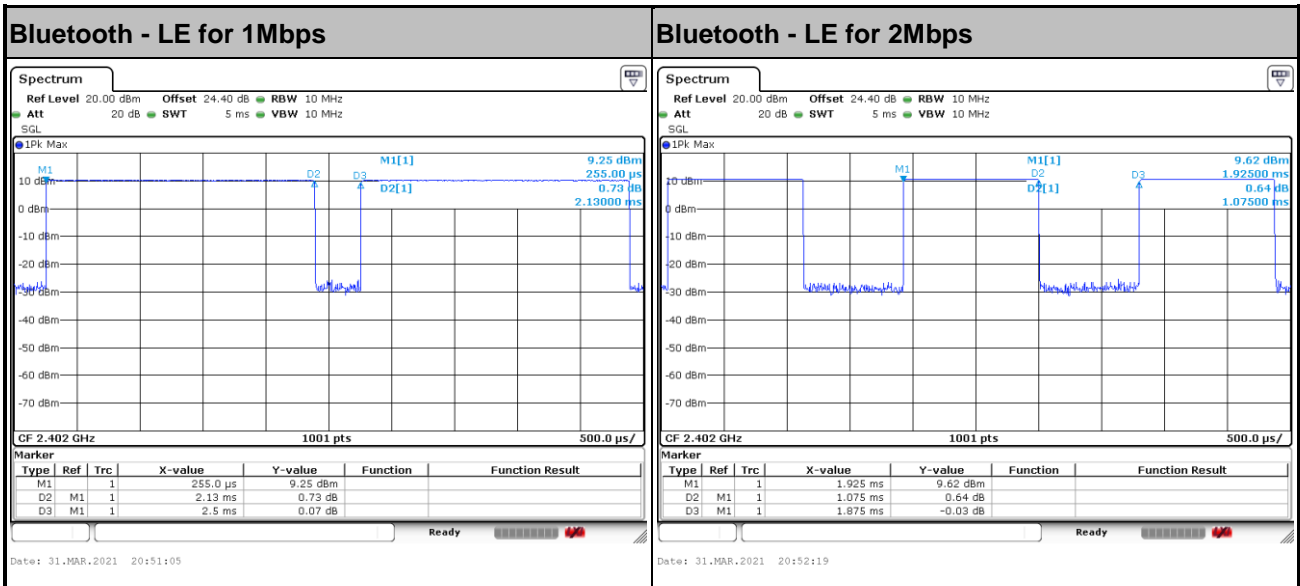
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
0	Bluetooth - LE for 1Mbps	85.20	2130	0.47	1kHz	0.70
0	Bluetooth - LE for 2Mbps	57.33	1075	0.93	1kHz	2.42
1	Bluetooth - LE for 1Mbps	85.20	2130	0.47	1kHz	0.70
1	Bluetooth - LE for 2Mbps	57.33	1075	0.93	1kHz	2.42



<Ant. 0>



<Ant. 1>



—THE END—