



# FCC RADIO TEST REPORT

FCC ID : 2AFZZ117SY  
Equipment : Mobile Phone  
Brand Name : Redmi  
Model Name : 2201117SY  
Applicant : Xiaomi Communications Co., Ltd.  
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085  
Manufacturer : Xiaomi Communications Co., Ltd.  
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085  
Standard : FCC Part 15 Subpart C §15.247

The product was received on Dec. 01, 2021 and testing was performed from Dec. 09, 2021 to Dec. 21, 2021. We, Sporton International Inc. Wensan 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 from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**Sporton International Inc. Wensan Laboratory**

No. 58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan



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### History of this test report

Report No.	Version	Description	Issue Date
FR1N3028B	01	Initial issue of report	Dec. 29, 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	4.35 dB under the limit at 2491.280 MHz
3.6	15.207	AC Conducted Emission	Pass	9.50 dB under the limit at 0.161 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 product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Danny Lee**

**Report Producer: Tina Chuang**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, FM Receiver, and GNSS.

Product Feature	
Sample 1	6G+128GB with Battery 1
Sample 2	8G+128GB with Battery 2
Sample 3	6G+64GB with Battery 1
Antenna Type	WWAN: PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS/Glonass/BDS/Galileo/SBAS : PIFA Antenna NFC: Planar Antenna FM: Using earphone as Antenna

Antenna information		
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	-0.31

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

## 1.2 Modification of EUT

No modifications made to the EUT during the testing.



### 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 TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b> CO05-HY (TAF Code: 1190)
<b>Remark</b>	The Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

**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 TEL: +886-3-327-0868 FAX: +886-3-327-0855
<b>Test Site No.</b>	<b>Sporton Site No.</b> TH05-HY, 03CH16-HY

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

### 1.4 Applicable Standards

According to the specifications declared by 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 the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.



## 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

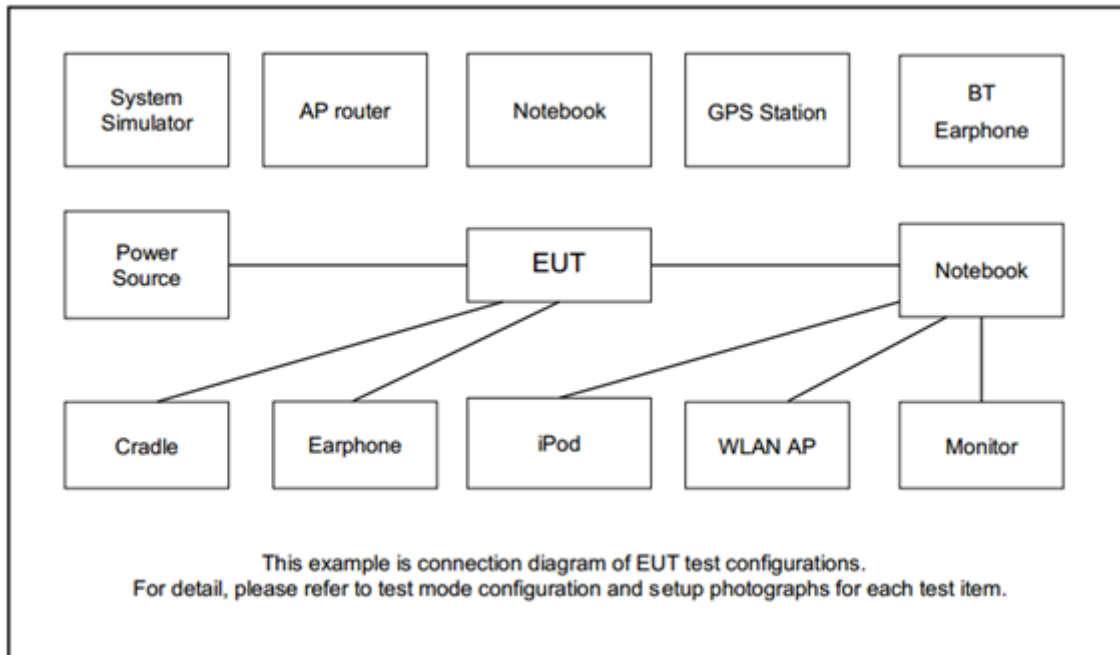
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape) and WPC Charging Mode, and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find Z plane as worst plane.
- 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 :LTE Band 4 Idle + Bluetooth Link + WLAN (2.4GHz) Link + NFC On + Earphone + USB Cable 1 (Data Link with Notebook) for Sample 1
<b>Remark:</b>	
1. For Radiated Test Cases, the tests were performed with, USB Cable 2 and Sample 1.	
2. Data Link with Notebook means data application transferred mode between EUT and Notebook.	



### 2.3 Connection Diagram of Test System



### 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.	Bluetooth Earphone	Sony Ericsson	MW600	PY700A2029	N/A	N/A
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A
5.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
7.	Earphone	MI	EM023	N/A	Unshielded, 1.2m	N/A



## 2.5 EUT Operation Test Setup

The RF test items, make the EUT (SW: 11 RP1A.200720.011) 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

Please refer to the measuring equipment list in 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 is connected to the spectrum analyzer by RF cable and attenuator. The path loss is 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

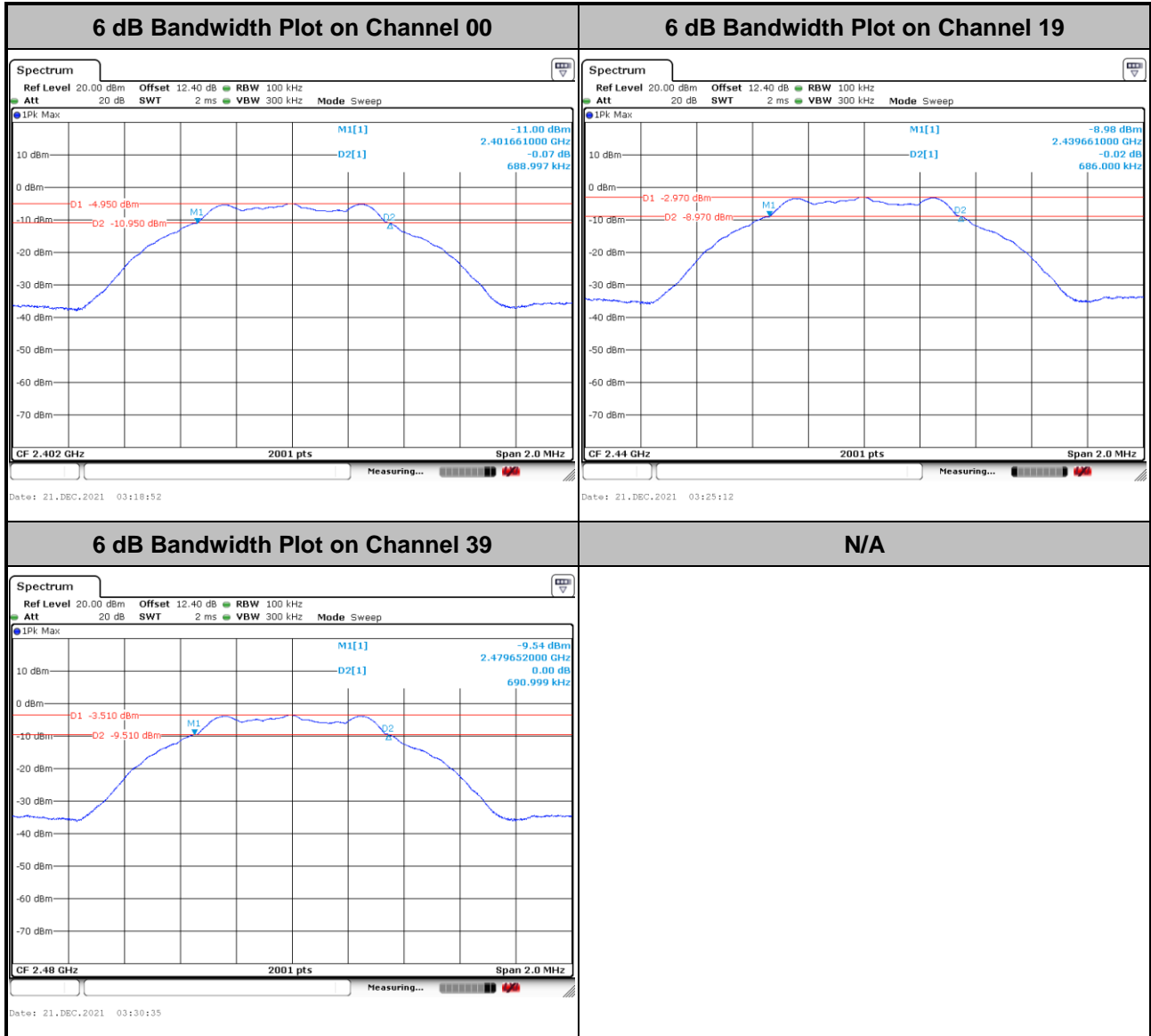




### 3.1.5 Test Result of 6dB Bandwidth

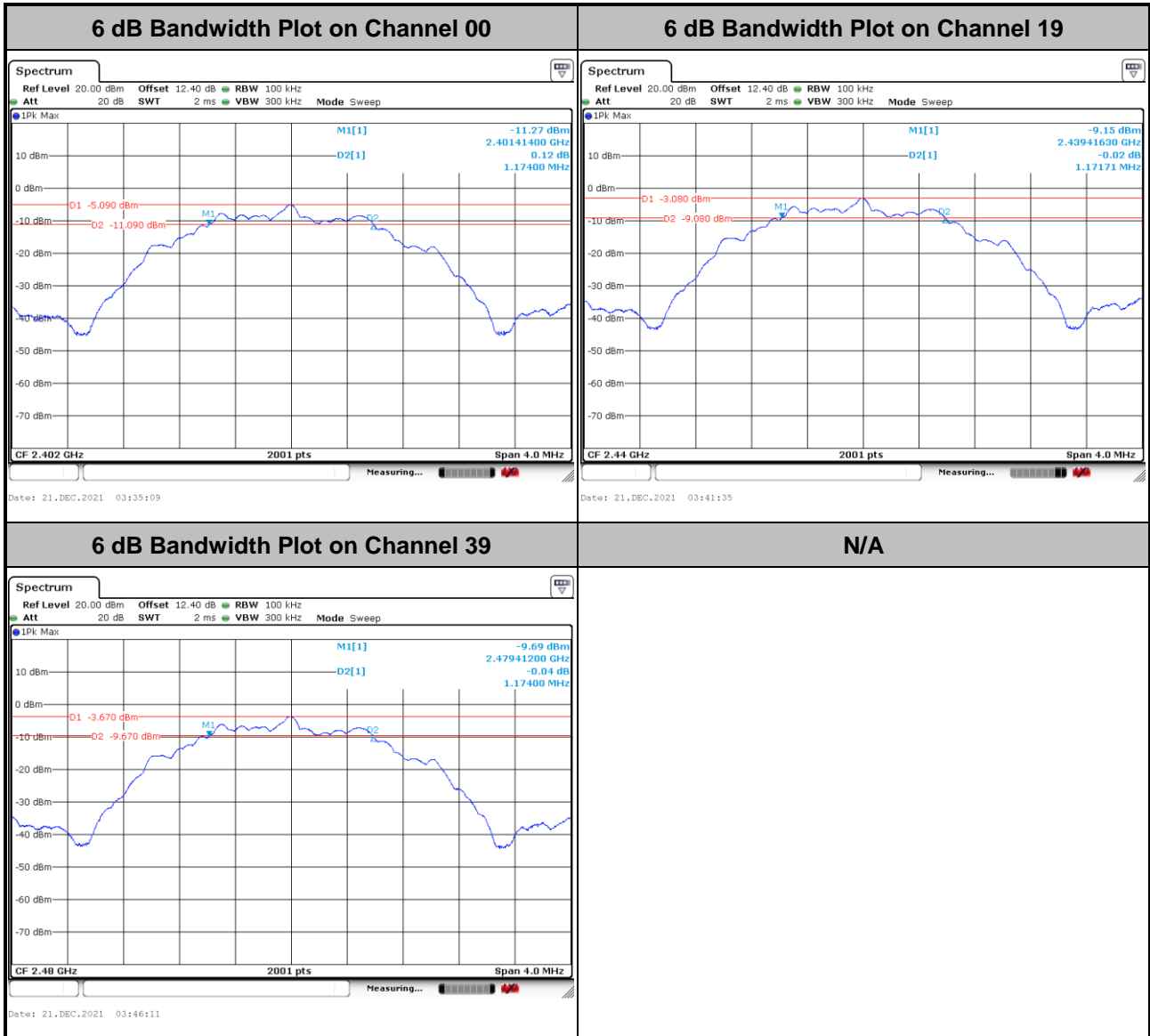
Please refer to Appendix A.

<1Mbps>





<2Mbps>

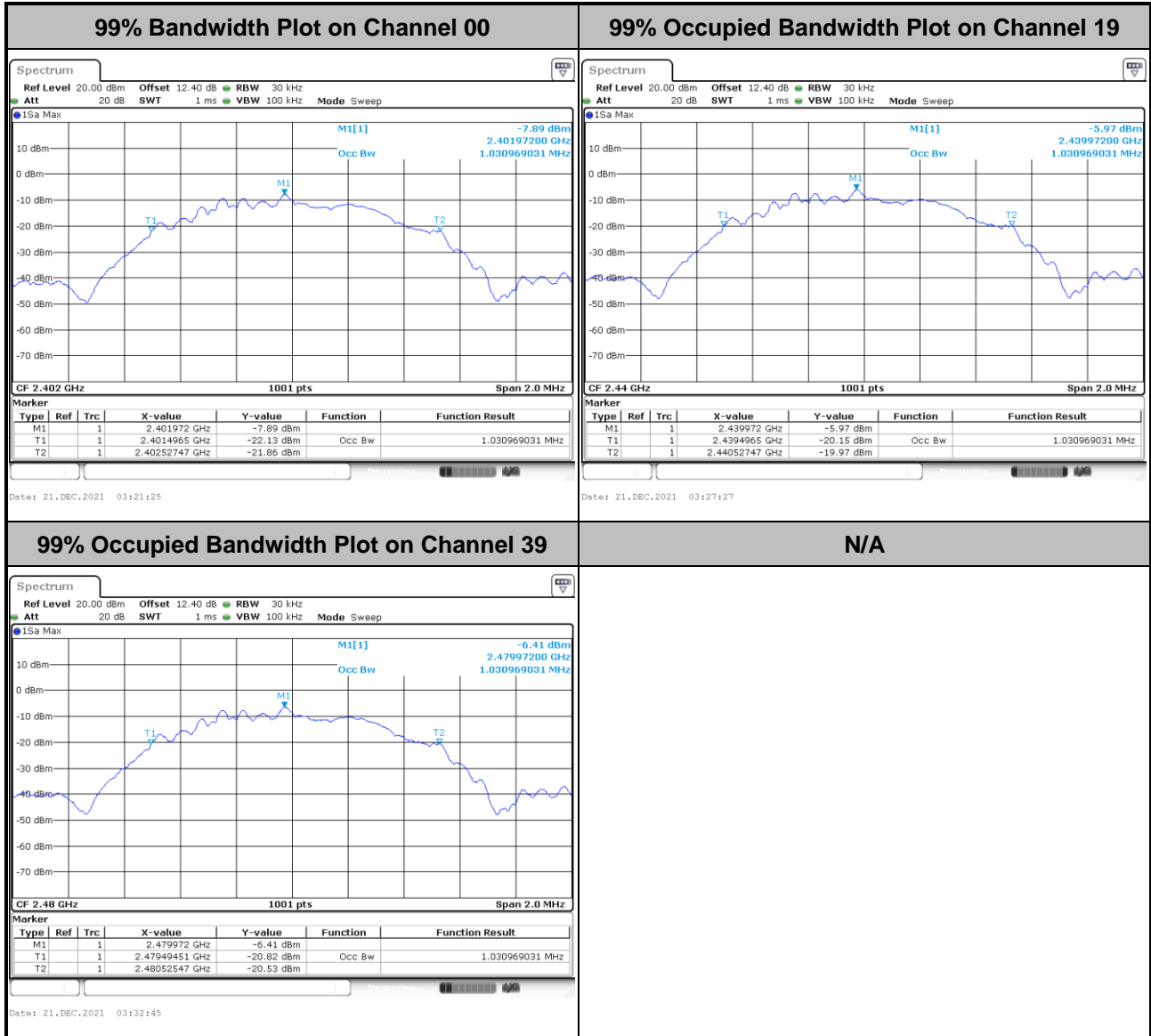




### 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

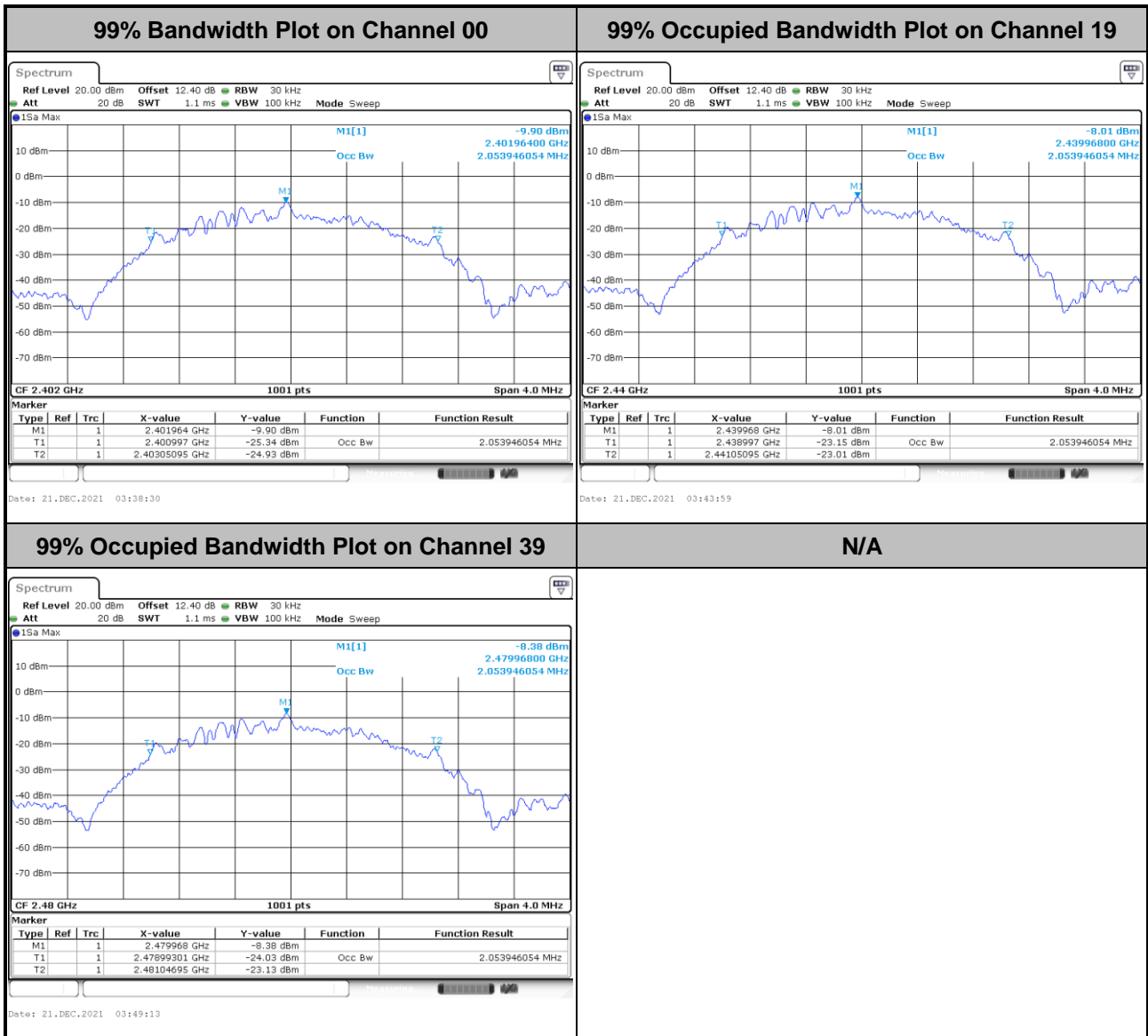
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Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



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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.

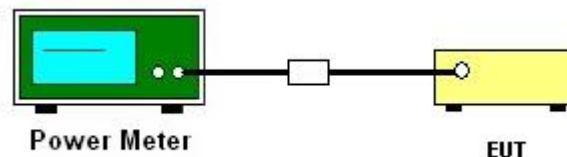
### 3.2.2 Measuring Instruments

Please refer to the measuring equipment list in 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 AVGPM-G
2. The RF output of EUT is connected to the power meter by RF cable and attenuator.
3. The path loss is 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.

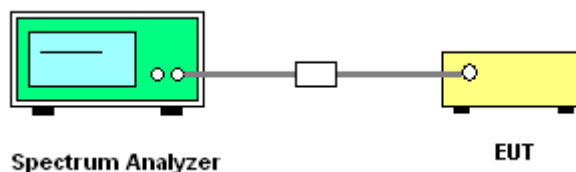
#### 3.3.2 Measuring Instruments

Please refer to the measuring equipment list in 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 is connected to the spectrum analyzer by RF cable and attenuator. The path loss is 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. (6 dB 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



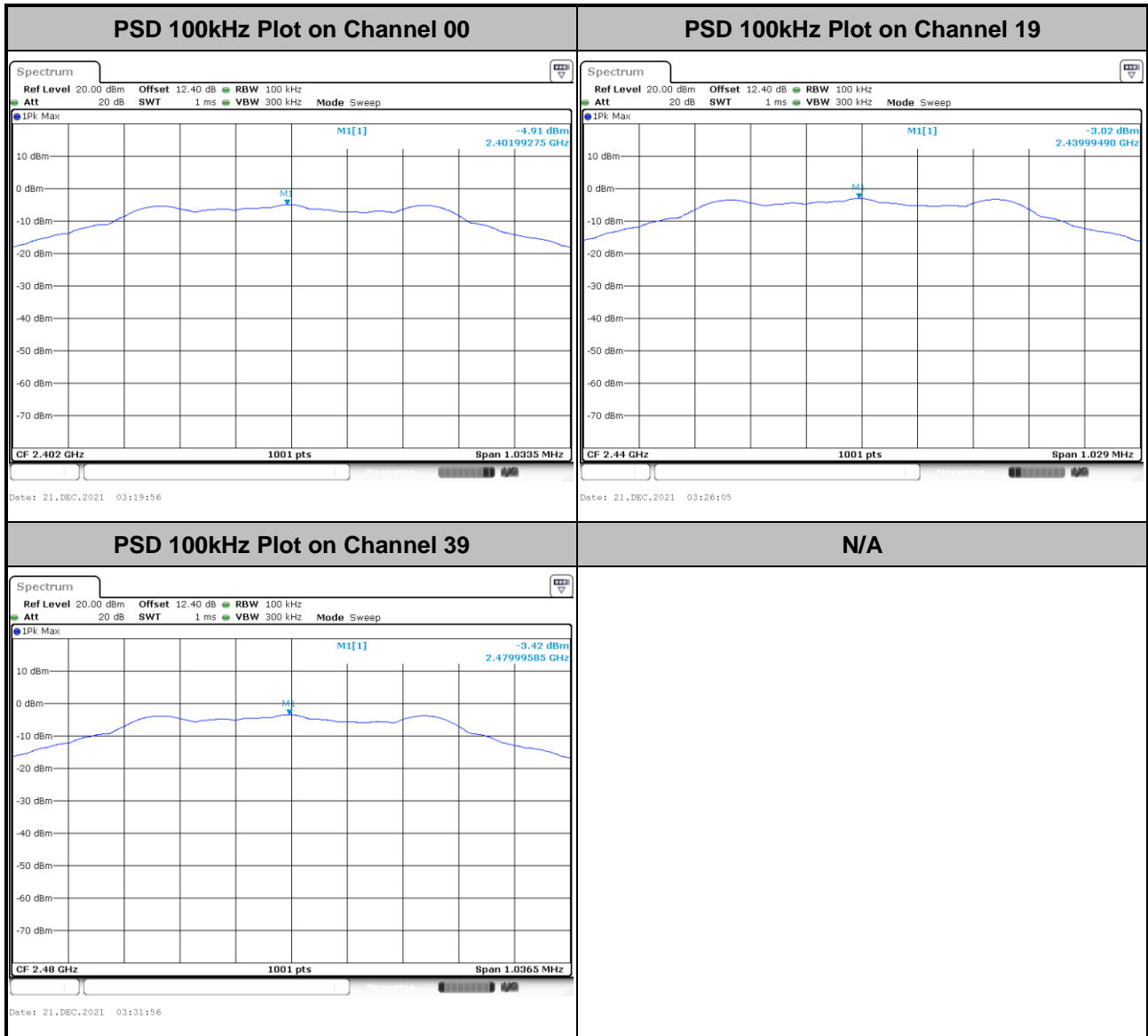
#### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



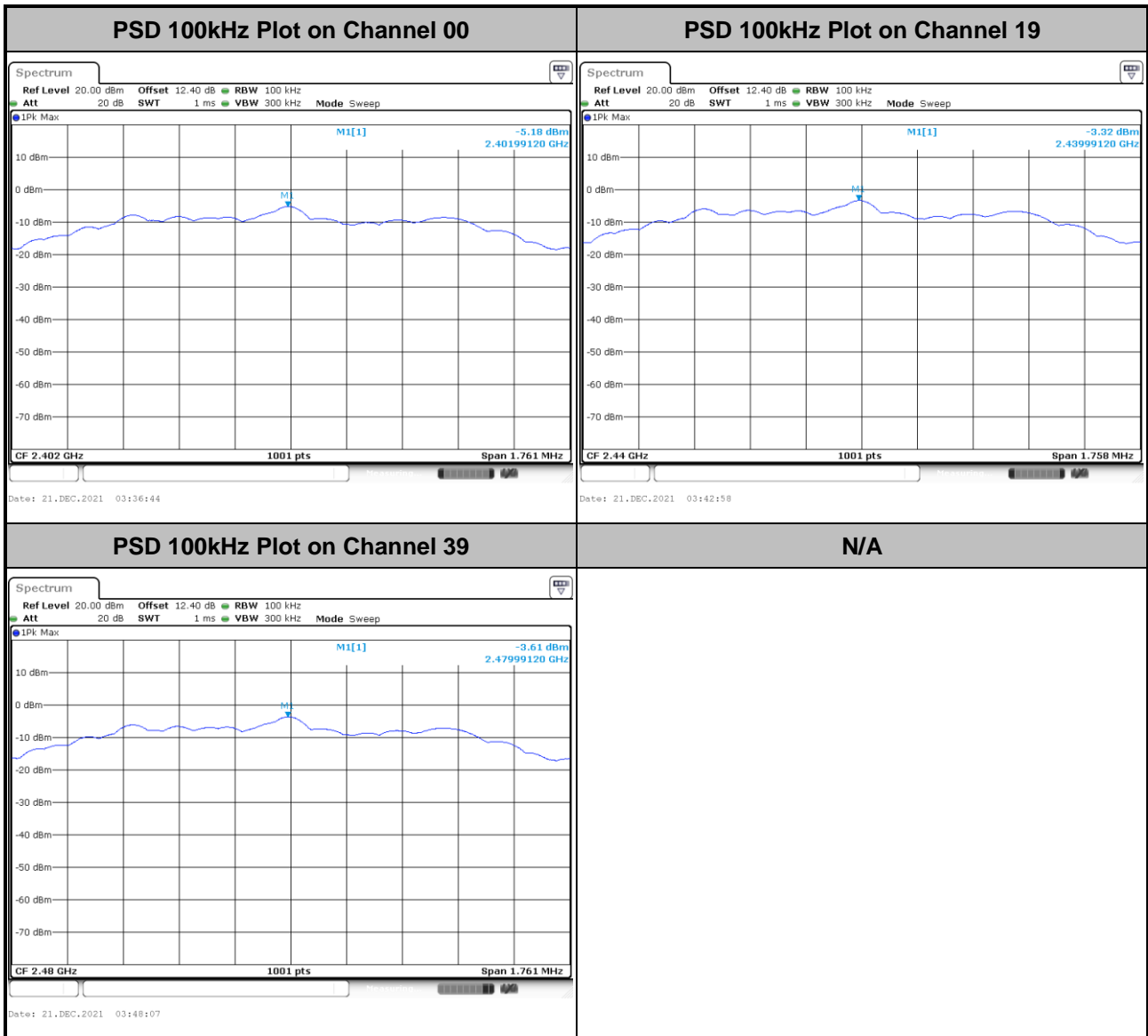
### 3.3.6 Test Result of Power Spectral Density Plots (100kHz)

<1Mbps>





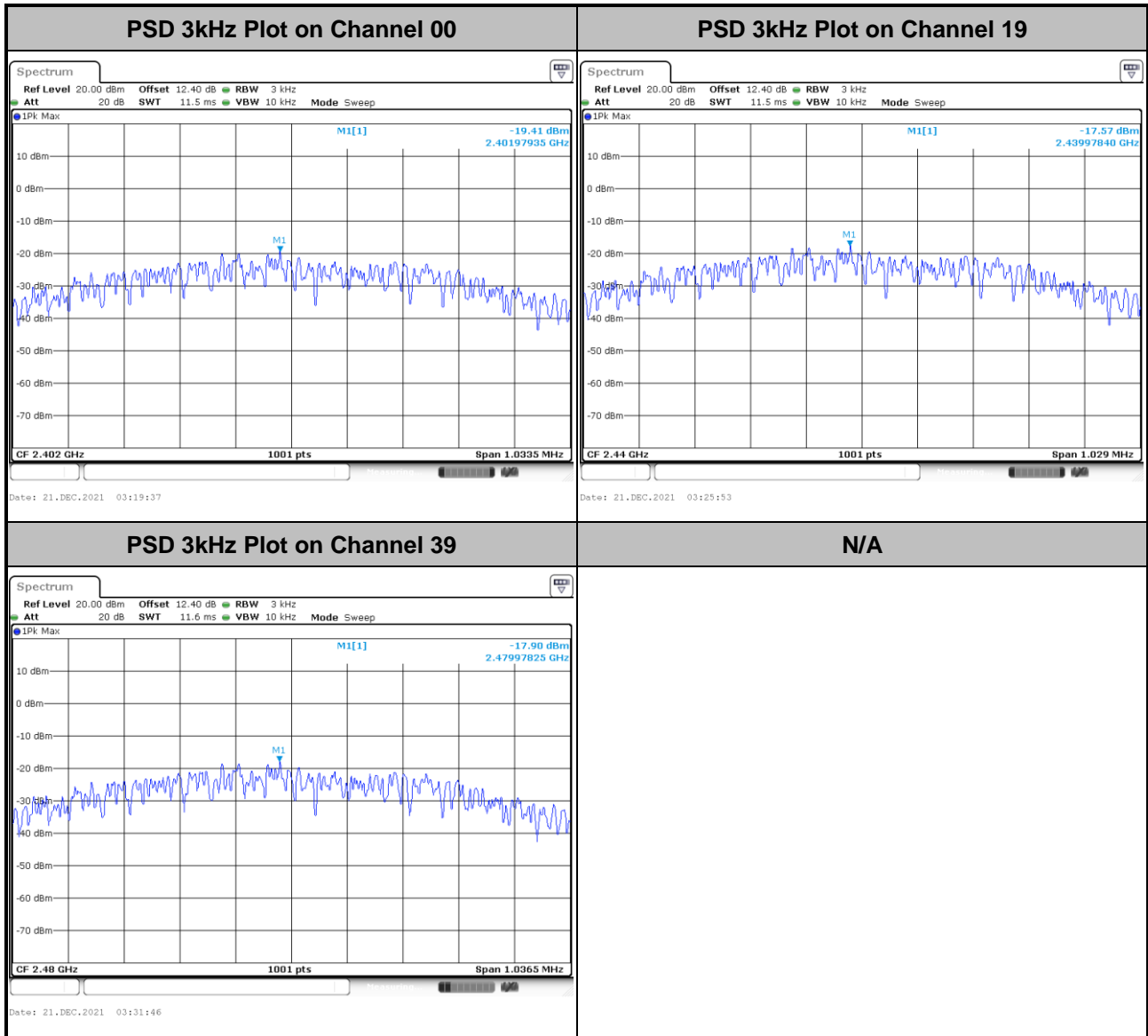
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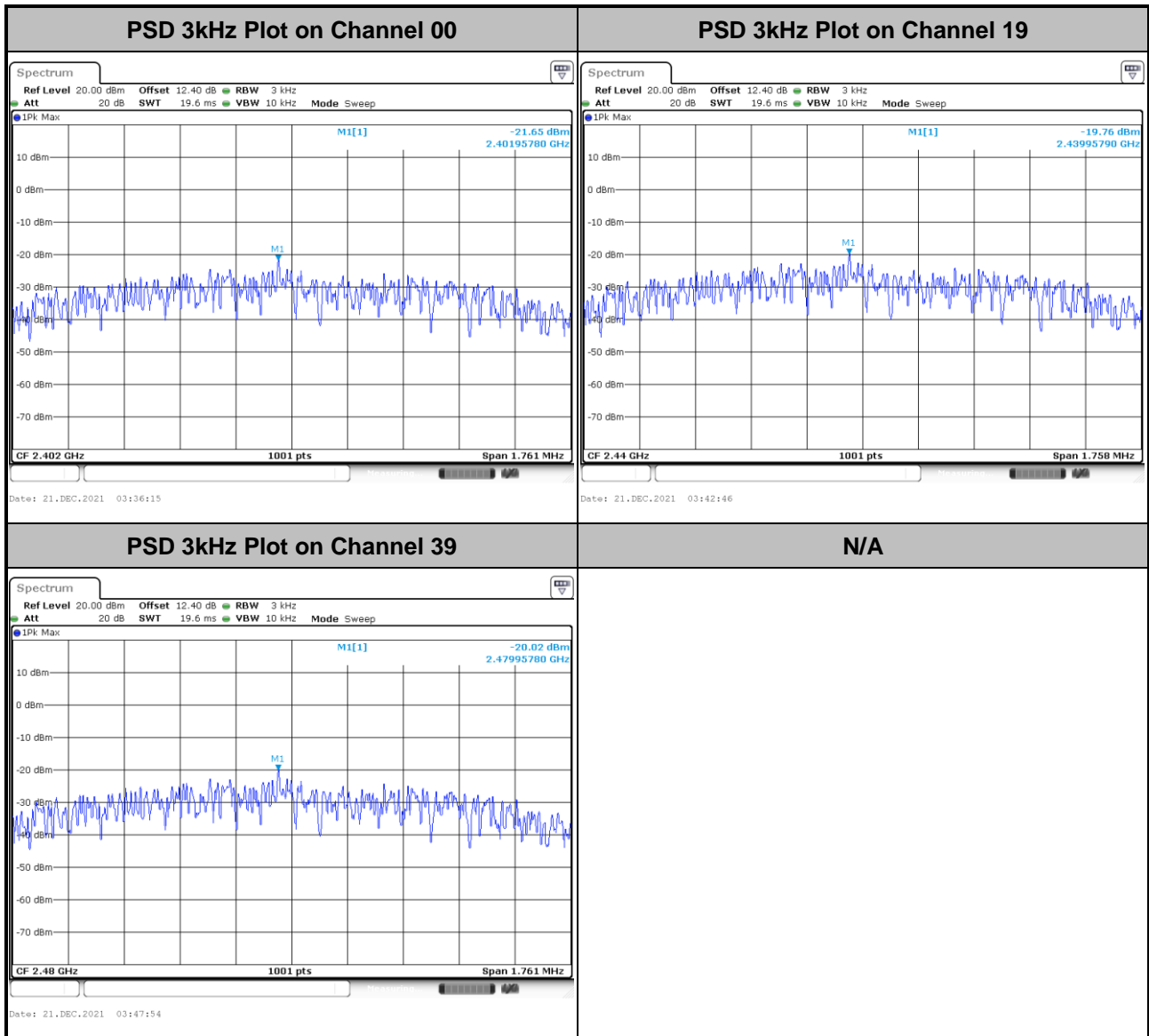
### 3.3.7 Test Result of Power Spectral Density Plots (3kHz)

<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.

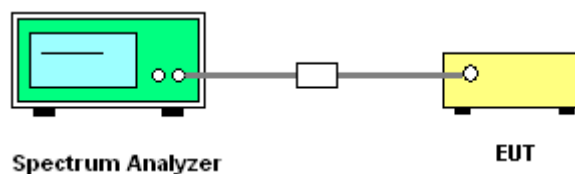
### 3.4.2 Measuring Instruments

Please refer to the measuring equipment list in 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 is connected to the spectrum analyzer by RF cable and attenuator. The path loss is 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.

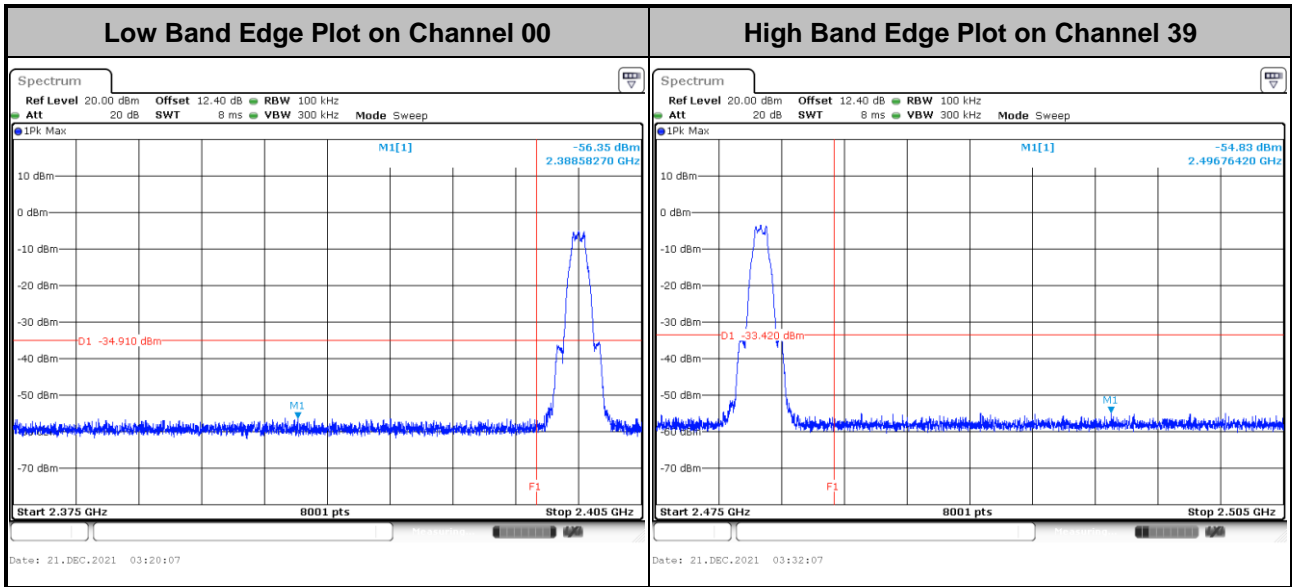
### 3.4.4 Test Setup



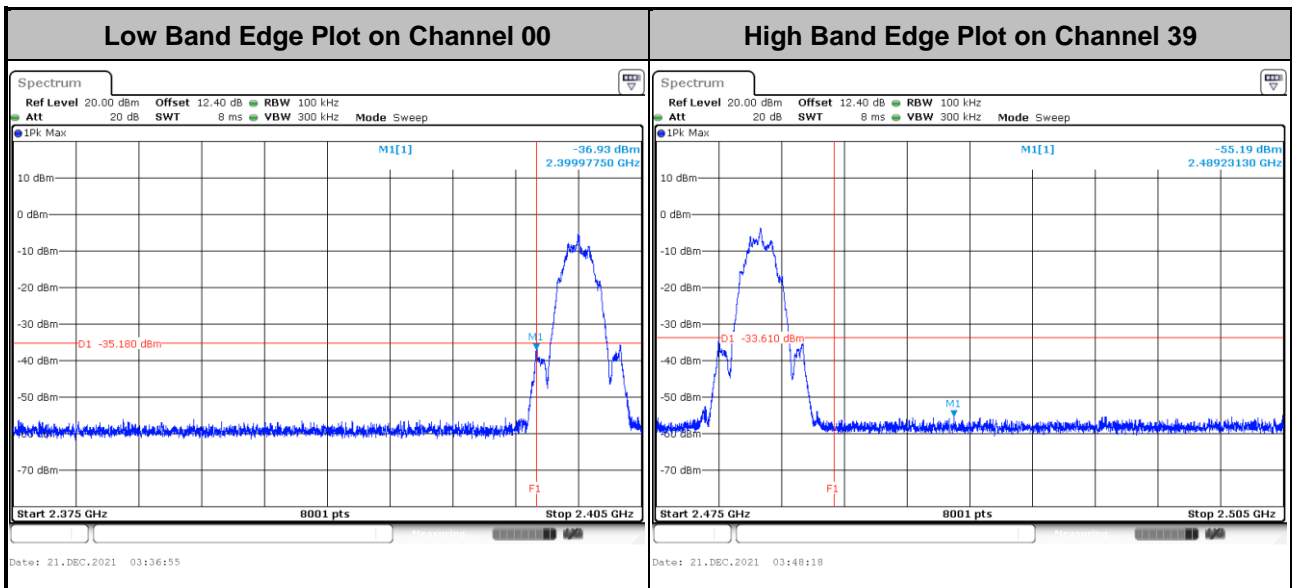


### 3.4.5 Test Result of Conducted Band Edges Plots

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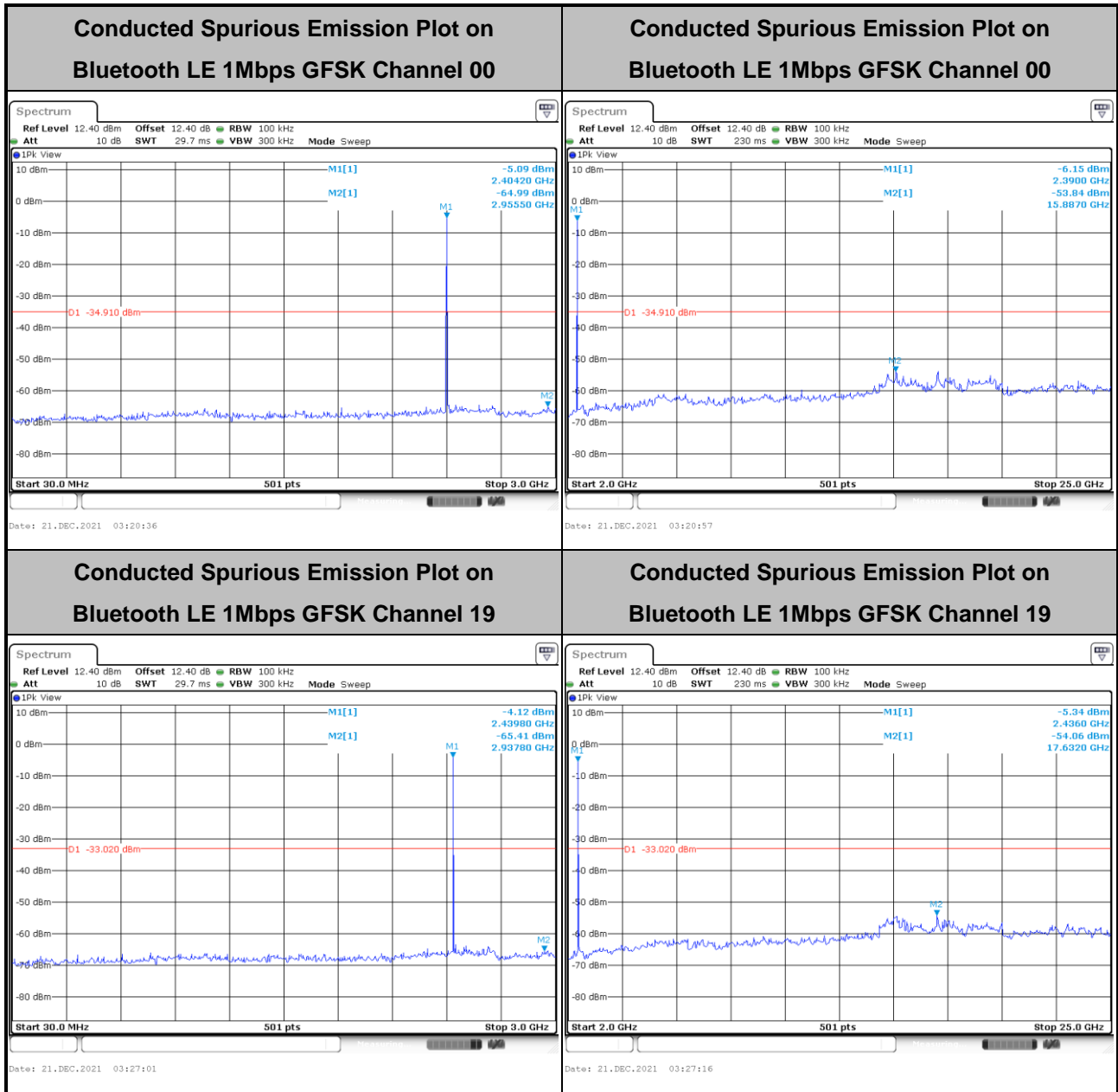
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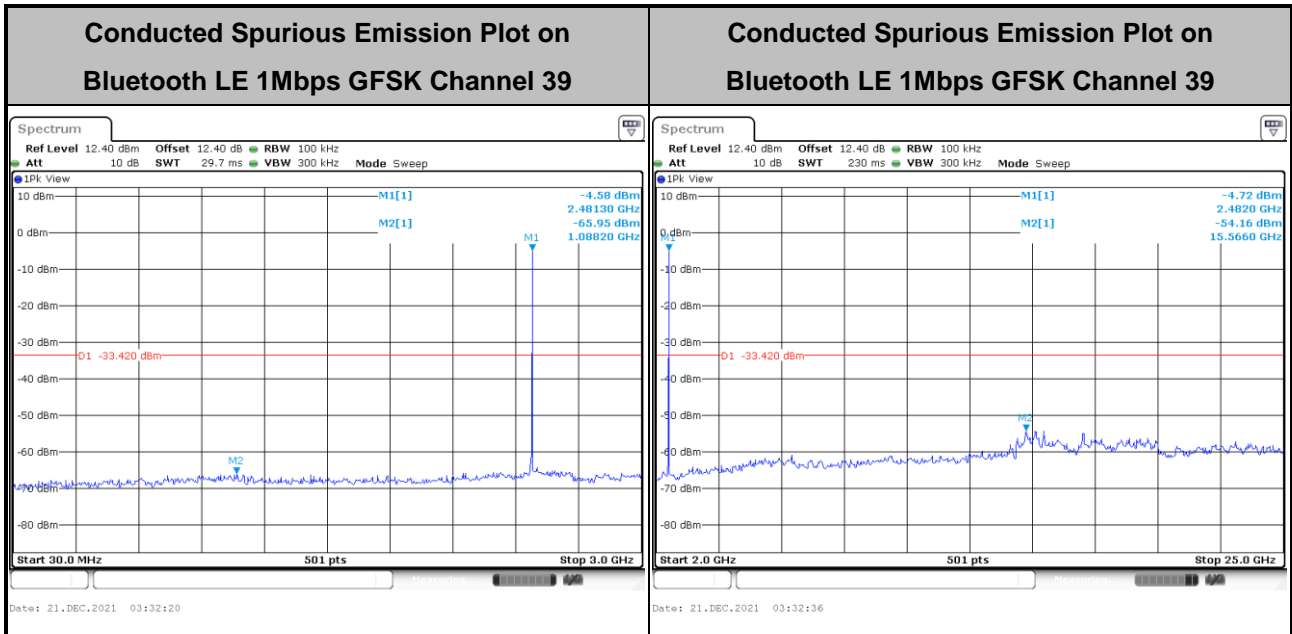


### 3.4.6 Test Result of Conducted Spurious Emission Plots

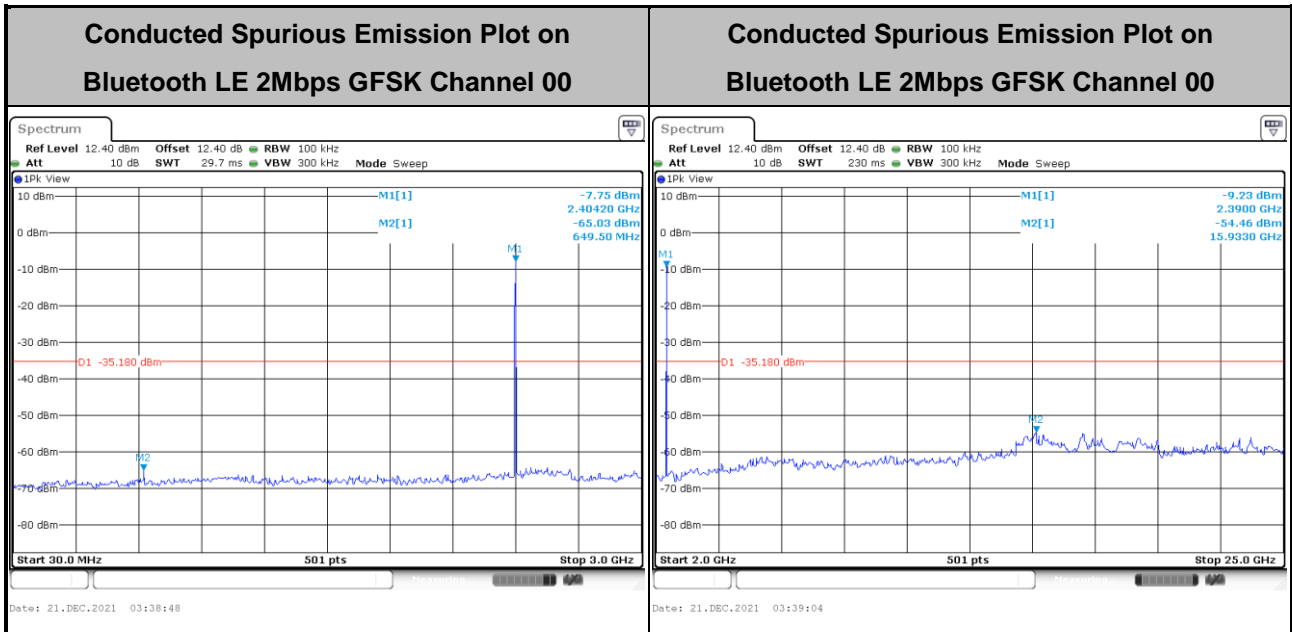
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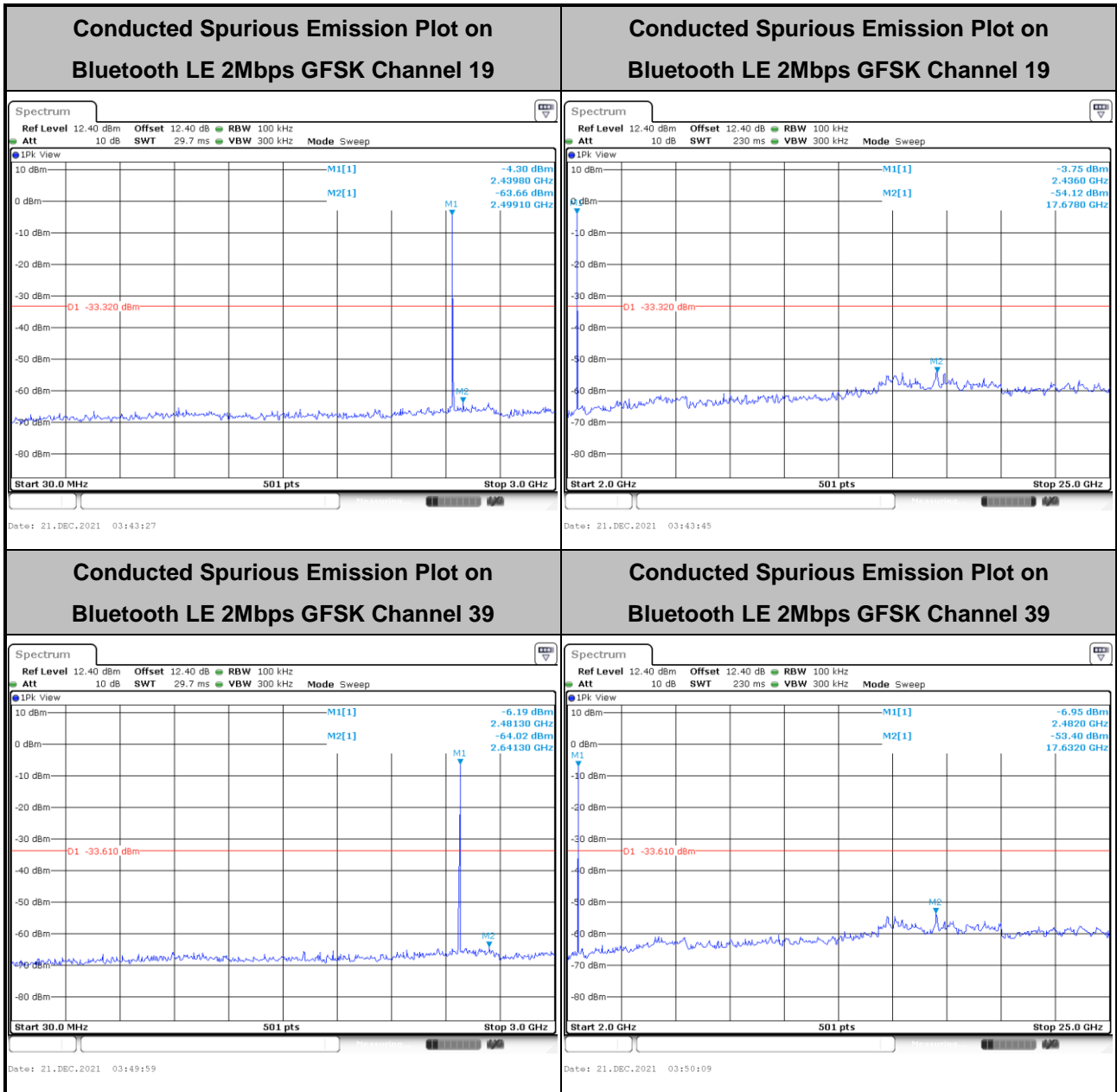






<2Mbps>







### 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 is 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

Please refer to the measuring equipment list in this test report.

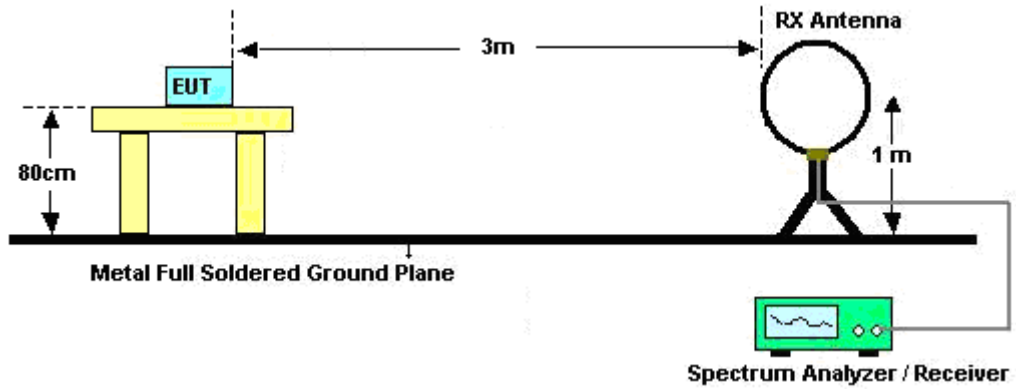


### 3.5.3 Test Procedures

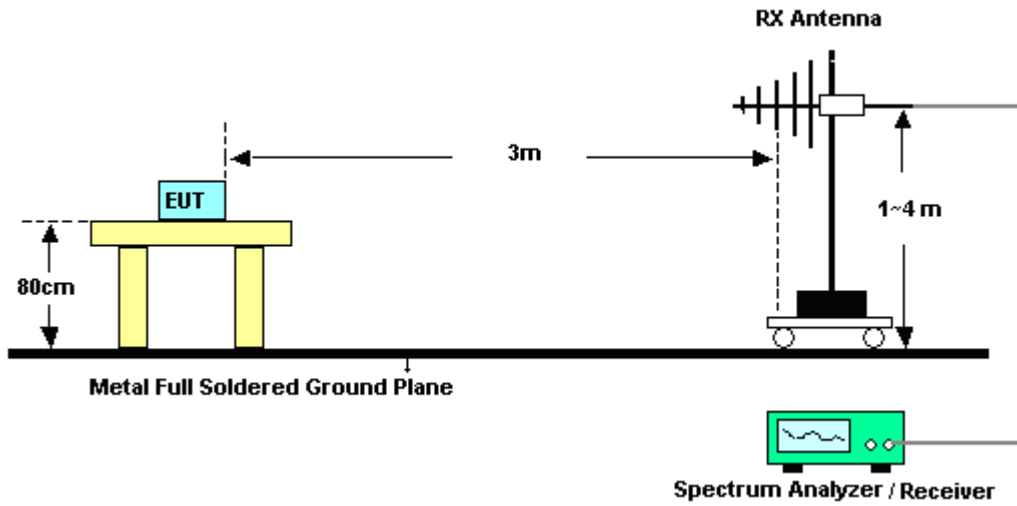
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT is 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 is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as “-“.
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as “-“.
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

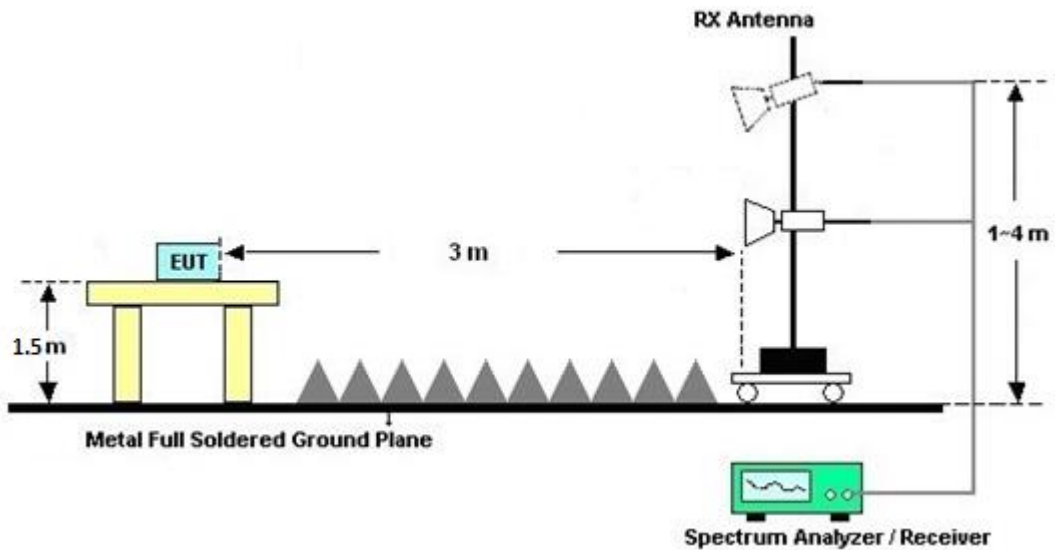
For radiated test below 30MHz



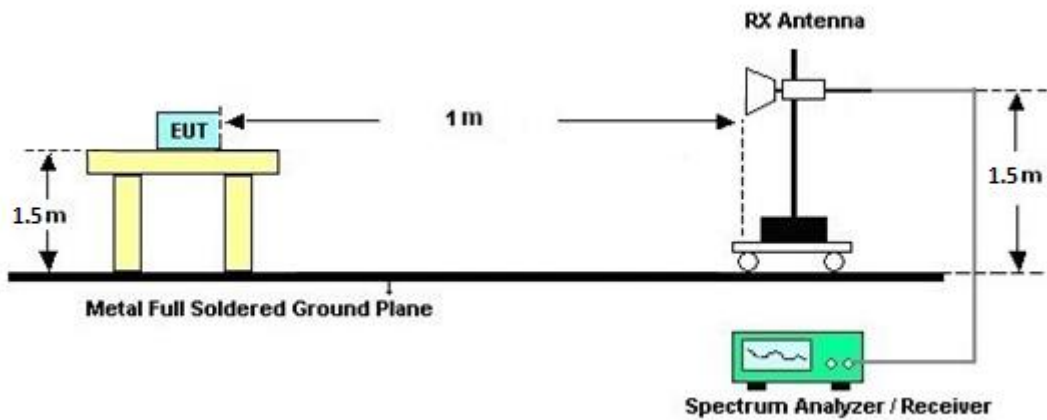
For radiated test from 30MHz to 1GHz



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 starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result comes 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 (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

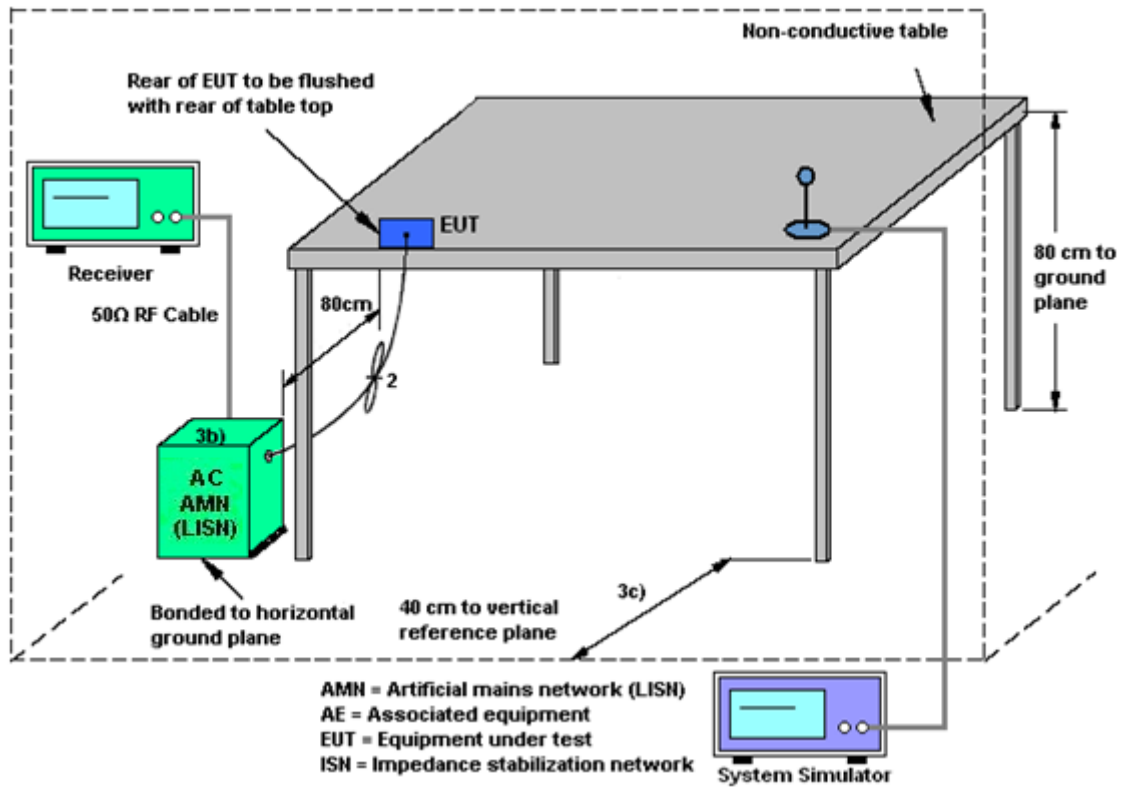
#### 3.6.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

#### 3.6.3 Test Procedures

1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is 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 Line and Neutral shall be tested in order to find out the maximum conducted emission.
7. The frequency range from 150 kHz to 30 MHz is scanned.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) 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	Sep. 07, 2021	Dec. 10, 2021~ Dec. 20, 2021	Sep. 06, 2022	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N -06	47020 & 06	30MHz to 1GHz	Oct. 09, 2021	Dec. 10, 2021~ Dec. 20, 2021	Oct. 08, 2022	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-02114	1G~18GHz	Aug. 04, 2021	Dec. 10, 2021~ Dec. 20, 2021	Aug. 03, 2022	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1522	1G~18GHz	Oct. 12, 2021	Dec. 10, 2021~ Dec. 20, 2021	Oct. 11, 2022	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	00991	18GHz ~40GHz	May 12, 2021	Dec. 10, 2021~ Dec. 20, 2021	May 11, 2022	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1G	Jul. 05, 2021	Dec. 10, 2021~ Dec. 20, 2021	Jul. 04, 2022	Radiation (03CH16-HY)
Amplifier	EMCI	EMC051845S E	980729	1-18GHz	Jul. 09, 2021	Dec. 10, 2021~ Dec. 20, 2021	Jul. 08, 2022	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	Dec. 10, 2021~ Dec. 20, 2021	Jun. 21, 2022	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 09, 2021	Dec. 10, 2021~ Dec. 20, 2021	Dec. 08, 2022	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A	MY59053012	3Hz~26.5GHz	Nov. 18, 2021	Dec. 10, 2021~ Dec. 20, 2021	Nov. 17, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11680/4P E	NA	Aug. 28, 2021	Dec. 10, 2021~ Dec. 20, 2021	Aug. 27, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11688/4P E	NA	Aug. 28, 2021	Dec. 10, 2021~ Dec. 20, 2021	Aug. 27, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5 757	NA	Aug. 28, 2021	Dec. 10, 2021~ Dec. 20, 2021	Aug. 27, 2022	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Dec. 10, 2021~ Dec. 20, 2021	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Dec. 10, 2021~ Dec. 20, 2021	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Dec. 10, 2021~ Dec. 20, 2021	N/A	Radiation (03CH16-HY)
Power Sensor	DARE	RPR3006W	13I00030SNO 31(NO:182)	10MHz~6GHz	Dec. 30, 2020	Dec. 10, 2021~ Dec. 21, 2021	Dec. 29, 2021	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	Dec. 10, 2021~ Dec. 21, 2021	Aug. 29, 2022	Conducted (TH05-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW191204 (BOX8)	N/A	Jan. 07, 2021	Dec. 10, 2021~ Dec. 21, 2021	Jan. 06, 2022	Conducted (TH05-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Dec. 09, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Oct. 21, 2021	Dec. 09, 2021	Oct. 20, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2021	Dec. 09, 2021	Nov. 15, 2022	Conduction (CO05-HY)
Four Line V-Network	TESEQ	NNB 52	36122	N/A	Feb. 01, 2021	Dec. 09, 2021	Jan. 31, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Dec. 09, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Jul. 28, 2021	Dec. 09, 2021	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Dec. 09, 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% ( $U = 2Uc(y)$ )	3.1 dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.8 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.2 dB
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.8 dB
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### Appendix A. Test Result of Conducted Test Items

Test Engineer:	Junyu Jhou	Temperature:	22.6~23.8	°C
Test Date:	2021/12/10~2021/12/21	Relative Humidity:	48.2~52.1	%

**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	1.031	0.689	0.50	Pass
BLE	1Mbps	1	19	2440	1.031	0.686	0.50	Pass
BLE	1Mbps	1	39	2480	1.031	0.691	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	-3.90	30.00	-0.31	-4.21	36.00	Pass
BLE	1Mbps	1	19	2440	-1.90	30.00	-0.31	-2.21	36.00	Pass
BLE	1Mbps	1	39	2480	-2.40	30.00	-0.31	-2.71	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	-4.91	-19.41	-0.31	8.00	Pass
BLE	1Mbps	1	19	2440	-3.02	-17.57	-0.31	8.00	Pass
BLE	1Mbps	1	39	2480	-3.42	-17.90	-0.31	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	2.054	1.174	0.50	Pass
BLE	2Mbps	1	19	2440	2.054	1.172	0.50	Pass
BLE	2Mbps	1	39	2480	2.054	1.174	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	-3.80	30.00	-0.31	-4.11	36.00	Pass
BLE	2Mbps	1	19	2440	-1.80	30.00	-0.31	-2.11	36.00	Pass
BLE	2Mbps	1	39	2480	-2.40	30.00	-0.31	-2.71	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	-5.18	-21.65	-0.31	8.00	Pass
BLE	2Mbps	1	19	2440	-3.32	-19.76	-0.31	8.00	Pass
BLE	2Mbps	1	39	2480	-3.61	-20.02	-0.31	8.00	Pass

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



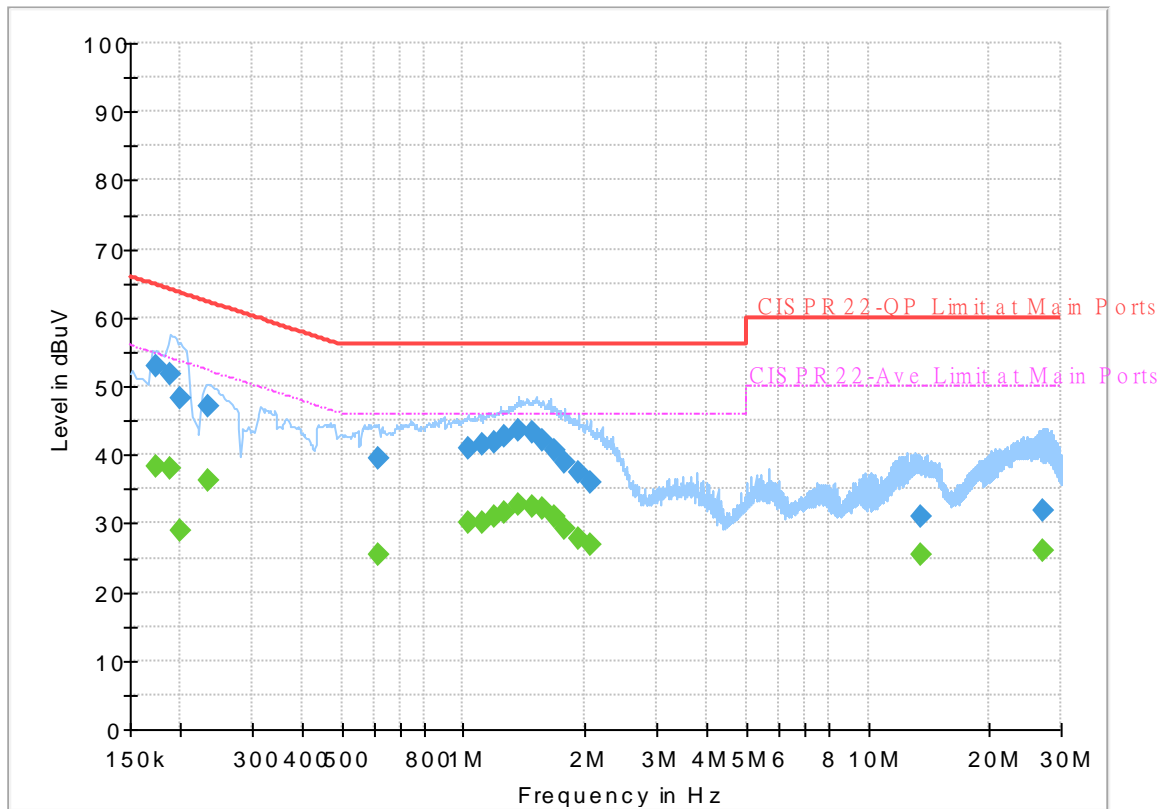
## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	Temperature :	23~26°C
		Relative Humidity :	45~55%

# EUT Information

Report NO : 1N3028  
 Test Mode : Mode 1  
 Test Voltage : Power From System  
 Phase : Line

Full Spectrum



## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.174750	---	38.31	54.73	16.42	L1	OFF	19.6
0.174750	52.84	---	64.73	11.89	L1	OFF	19.6
0.188250	---	38.06	54.11	16.05	L1	OFF	19.6
0.188250	51.64	---	64.11	12.47	L1	OFF	19.6
0.199500	---	28.83	53.63	24.80	L1	OFF	19.6
0.199500	48.37	---	63.63	15.26	L1	OFF	19.6
0.233250	---	36.16	52.33	16.17	L1	OFF	19.6
0.233250	46.94	---	62.33	15.39	L1	OFF	19.6
0.615750	---	25.57	46.00	20.43	L1	OFF	19.8
0.615750	39.36	---	56.00	16.64	L1	OFF	19.8
1.027500	---	30.12	46.00	15.88	L1	OFF	20.1
1.027500	40.84	---	56.00	15.16	L1	OFF	20.1
1.119750	---	30.21	46.00	15.79	L1	OFF	20.1
1.119750	41.44	---	56.00	14.56	L1	OFF	20.1
1.187250	---	30.90	46.00	15.10	L1	OFF	20.1
1.187250	41.93	---	56.00	14.07	L1	OFF	20.1
1.259250	---	31.69	46.00	14.31	L1	OFF	20.1
1.259250	42.58	---	56.00	13.42	L1	OFF	20.1
1.365000	---	32.88	46.00	13.12	L1	OFF	20.1
1.365000	43.61	---	56.00	12.39	L1	OFF	20.1
1.482000	---	32.47	46.00	13.53	L1	OFF	20.1

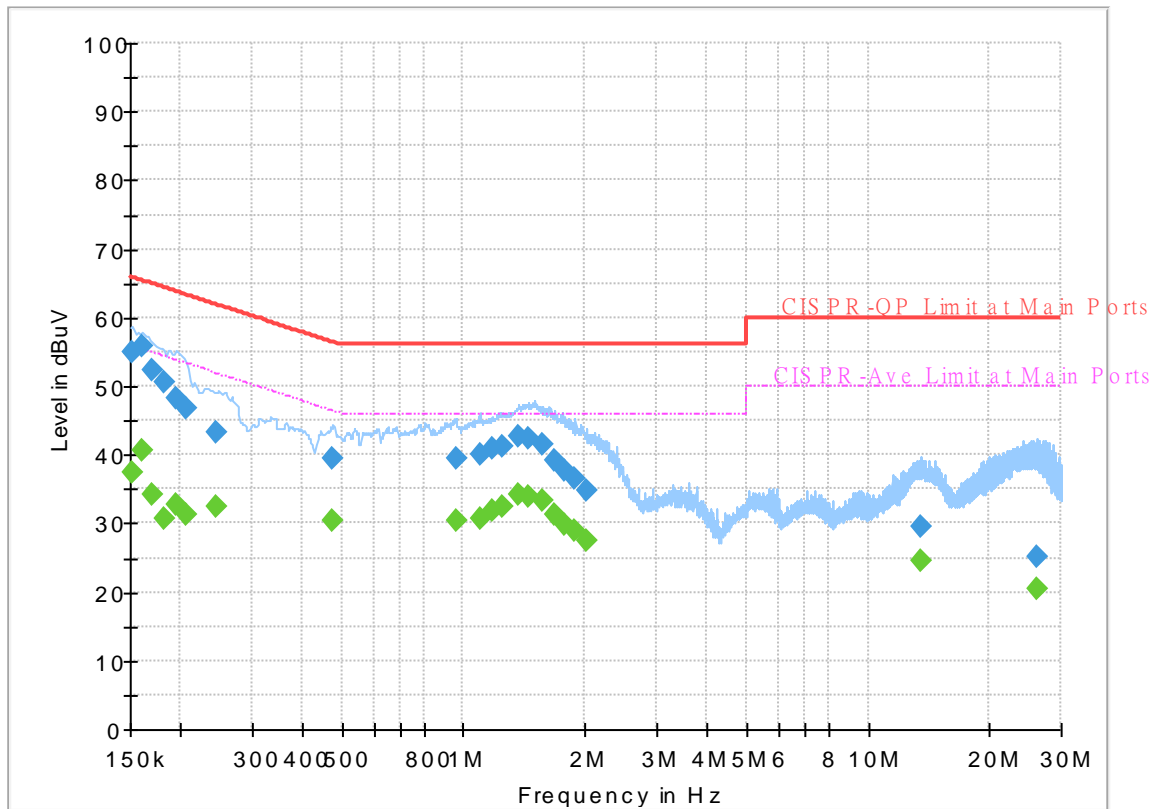


1.482000	43.18	---	56.00	12.82	L1	OFF	20.1
1.576500	---	32.09	46.00	13.91	L1	OFF	20.0
1.576500	42.10	---	56.00	13.90	L1	OFF	20.0
1.677750	---	30.94	46.00	15.06	L1	OFF	20.0
1.677750	40.67	---	56.00	15.33	L1	OFF	20.0
1.783500	---	29.10	46.00	16.90	L1	OFF	20.0
1.783500	38.94	---	56.00	17.06	L1	OFF	20.0
1.920750	---	27.80	46.00	18.20	L1	OFF	20.0
1.920750	37.32	---	56.00	18.68	L1	OFF	20.0
2.055750	---	26.76	46.00	19.24	L1	OFF	20.0
2.055750	36.01	---	56.00	19.99	L1	OFF	20.0
13.560000	---	25.37	50.00	24.63	L1	OFF	19.9
13.560000	30.88	---	60.00	29.12	L1	OFF	19.9
27.093750	---	25.99	50.00	24.01	L1	OFF	20.0
27.093750	31.88	---	60.00	28.12	L1	OFF	20.0

# EUT Information

Report NO : 1N3028  
 Test Mode : Mode 1  
 Test Voltage : Power From System  
 Phase : Neutral

Full Spectrum



## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	37.34	55.88	18.54	N	OFF	19.6
0.152250	55.03	---	65.88	10.85	N	OFF	19.6
0.161250	---	40.50	55.40	14.90	N	OFF	19.6
0.161250	55.90	---	65.40	9.50	N	OFF	19.6
0.170250	---	34.30	54.95	20.65	N	OFF	19.6
0.170250	52.47	---	64.95	12.48	N	OFF	19.6
0.181500	---	30.69	54.42	23.73	N	OFF	19.6
0.181500	50.45	---	64.42	13.97	N	OFF	19.6
0.195000	---	32.69	53.82	21.13	N	OFF	19.6
0.195000	48.15	---	63.82	15.67	N	OFF	19.6
0.206250	---	31.27	53.36	22.09	N	OFF	19.6
0.206250	46.75	---	63.36	16.61	N	OFF	19.6
0.244500	---	32.34	51.94	19.60	N	OFF	19.6
0.244500	43.32	---	61.94	18.62	N	OFF	19.6
0.474000	---	30.35	46.44	16.09	N	OFF	19.7
0.474000	39.42	---	56.44	17.02	N	OFF	19.7
0.957750	---	30.49	46.00	15.51	N	OFF	20.1
0.957750	39.53	---	56.00	16.47	N	OFF	20.1
1.097250	---	30.75	46.00	15.25	N	OFF	20.1
1.097250	39.98	---	56.00	16.02	N	OFF	20.1
1.173750	---	31.86	46.00	14.14	N	OFF	20.1

1.173750	40.80	---	56.00	15.20	N	OFF	20.1
1.254750	---	32.48	46.00	13.52	N	OFF	20.1
1.254750	41.31	---	56.00	14.69	N	OFF	20.1
1.362750	---	34.15	46.00	11.85	N	OFF	20.1
1.362750	42.79	---	56.00	13.21	N	OFF	20.1
1.448250	---	34.01	46.00	11.99	N	OFF	20.1
1.448250	42.49	---	56.00	13.51	N	OFF	20.1
1.560750	---	33.21	46.00	12.79	N	OFF	20.0
1.560750	41.56	---	56.00	14.44	N	OFF	20.0
1.675500	---	31.15	46.00	14.85	N	OFF	20.0
1.675500	39.20	---	56.00	16.80	N	OFF	20.0
1.783500	---	29.72	46.00	16.28	N	OFF	20.0
1.783500	37.66	---	56.00	18.34	N	OFF	20.0
1.889250	---	28.89	46.00	17.11	N	OFF	20.0
1.889250	36.43	---	56.00	19.57	N	OFF	20.0
2.019750	---	27.41	46.00	18.59	N	OFF	20.0
2.019750	34.69	---	56.00	21.31	N	OFF	20.0
13.560000	---	24.58	50.00	25.42	N	OFF	19.9
13.560000	29.58	---	60.00	30.42	N	OFF	19.9
26.200500	---	20.59	50.00	29.41	N	OFF	20.1
26.200500	25.02	---	60.00	34.98	N	OFF	20.1



## Appendix C. Radiated Spurious Emission

Test Engineer :	Karl Hou, Andy Yang	Temperature :	20~25°C
		Relative Humidity :	50~65%

<1Mbps>

### 2.4GHz 2400~2483.5MHz

#### BLE (Band Edge @ 3m)

BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
BLE CH 00 2402MHz		2384.235	56.07	-17.93	74	40.59	27.34	18.21	30.07	300	64	P	H	
		2384.235	46.19	-7.81	54	30.71	27.34	18.21	30.07	300	64	A	H	
	*	2402	93.94	-	-	78.36	27.41	18.24	30.07	300	64	P	H	
	*	2402	92.96	-	-	77.38	27.41	18.24	30.07	300	64	A	H	
													H	
														H
			2338.35	55.8	-18.2	74	40.59	27.18	18.12	30.09	100	118	P	V
			2377.2	46.12	-7.88	54	30.7	27.31	18.19	30.08	100	118	A	V
	*		2402	93.65	-	-	78.07	27.41	18.24	30.07	100	118	P	V
	*		2402	92.67	-	-	77.09	27.41	18.24	30.07	100	118	A	V
														V
														V
BLE CH 19 2440MHz		2370.76	56.41	-17.59	74	41.03	27.28	18.18	30.08	321	63	P	H	
		2373.56	46.22	-7.78	54	30.82	27.29	18.19	30.08	321	63	A	H	
	*	2440	96.19	-	-	80.38	27.56	18.31	30.06	321	63	P	H	
	*	2440	95.42	-	-	79.61	27.56	18.31	30.06	321	63	A	H	
			2498.67	56.67	-17.33	74	40.4	27.89	18.42	30.04	321	63	P	H
			2489.64	47.3	-6.7	54	31.1	27.84	18.4	30.04	321	63	A	H
			2363.34	56.43	-17.57	74	41.09	27.25	18.17	30.08	100	103	P	V
			2373.84	46.24	-7.76	54	30.83	27.3	18.19	30.08	100	103	A	V
	*		2440	96.09	-	-	80.28	27.56	18.31	30.06	100	103	P	V
	*		2440	95.3	-	-	79.49	27.56	18.31	30.06	100	103	A	V
			2489.64	57.12	-16.88	74	40.92	27.84	18.4	30.04	100	103	P	V
			2489.92	47.08	-6.92	54	30.88	27.84	18.4	30.04	100	103	A	V



<b>BLE CH 39 2480MHz</b>	*	2480	95.09	-	-	78.98	27.78	18.38	30.05	273	64	P	H
	*	2480	94.31	-	-	78.2	27.78	18.38	30.05	273	64	A	H
		2488.84	57.49	-16.51	74	41.3	27.83	18.4	30.04	273	64	P	H
		2496.56	47.15	-6.85	54	30.9	27.88	18.41	30.04	273	64	A	H
													H
													H
	*	2480	96.07	-	-	79.96	27.78	18.38	30.05	100	113	P	V
	*	2480	95.19	-	-	79.08	27.78	18.38	30.05	100	113	A	V
		2488.16	56.81	-17.19	74	40.62	27.83	18.4	30.04	100	113	P	V
		2491.28	47.37	-6.63	54	31.16	27.85	18.4	30.04	100	113	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	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	41.49	-32.51	74	51.97	32.41	12.35	55.24	-	-	P	H	
		11025	49.75	-24.25	74	46.63	38.9	19.57	55.35	-	-	P	H	
		11025	38.54	-15.46	54	35.42	38.9	19.57	55.35	-	-	A	H	
		14490	49.63	-24.37	74	41.55	40.4	22.01	54.33	-	-	P	H	
		14490	41.72	-12.28	54	33.64	40.4	22.01	54.33	-	-	A	H	
		17955	53.79	-20.21	74	42.68	42.64	25.04	56.57	-	-	P	H	
		17955	44.94	-9.06	54	33.83	42.64	25.04	56.57	-	-	A	H	
														H
														H
														H
														H
														H
			4804	40.61	-33.39	74	51.09	32.41	12.35	55.24	-	-	P	V
			11280	50.08	-23.92	74	46.23	39.16	19.85	55.16	-	-	P	V
			11280	37.95	-16.05	54	34.1	39.16	19.85	55.16	-	-	A	V
			14505	50.91	-23.09	74	42.83	40.39	22.02	54.33	-	-	P	V
			14505	41.85	-12.15	54	33.77	40.39	22.02	54.33	-	-	A	V
			17895	53.48	-20.52	74	42.84	42.14	25.03	56.53	-	-	P	V
			17895	44.2	-9.8	54	33.56	42.14	25.03	56.53	-	-	A	V
														V
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Over Limit ( dB )	Limit Line ( dBµV/m )	Read Level ( dBµV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
BLE CH 19 2440MHz		4880	40.16	-33.84	74	50.56	32.62	12.32	55.34	-	-	P	H	
		7320	45.7	-28.3	74	48.71	36.76	15.88	55.65	-	-	P	H	
		11235	50.21	-23.79	74	46.54	39.07	19.8	55.2	-	-	P	H	
		11235	37.25	-16.75	54	33.58	39.07	19.8	55.2	-	-	A	H	
		14505	50.86	-23.14	74	42.78	40.39	22.02	54.33	-	-	P	H	
		14505	42.06	-11.94	54	33.98	40.39	22.02	54.33	-	-	A	H	
		17970	53.85	-20.15	74	42.64	42.76	25.03	56.58	-	-	P	H	
		17970	44.63	-9.37	54	33.42	42.76	25.03	56.58	-	-	A	H	
														H
														H
														H
														H
			4880	40.64	-33.36	74	51.04	32.62	12.32	55.34	-	-	P	V
			7320	45.74	-28.26	74	48.75	36.76	15.88	55.65	-	-	P	V
			12690	49.64	-24.36	74	44.07	39.07	21	54.5	-	-	P	V
			12690	39.92	-14.08	54	34.35	39.07	21	54.5	-	-	A	V
			14490	50.54	-23.46	74	42.46	40.4	22.01	54.33	-	-	P	V
			14490	41.71	-12.29	54	33.63	40.4	22.01	54.33	-	-	A	V
			17895	55.18	-18.82	74	44.54	42.14	25.03	56.53	-	-	P	V
			17895	44.37	-9.63	54	33.73	42.14	25.03	56.53	-	-	A	V
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Over Limit ( dB )	Limit Line ( dBµV/m )	Read Level ( dBµV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
BLE CH 39 2480MHz		4960	41.28	-32.72	74	51.42	33.02	12.28	55.44	-	-	P	H	
		7440	46.23	-27.77	74	49.48	36.22	16.2	55.67	-	-	P	H	
		10800	49.24	-24.76	74	46.08	39.2	19.38	55.42	-	-	P	H	
		10800	37	-17	54	33.84	39.2	19.38	55.42	-	-	A	H	
		14505	49.43	-24.57	74	41.35	40.39	22.02	54.33	-	-	P	H	
		14505	38.74	-15.26	54	30.66	40.39	22.02	54.33	-	-	A	H	
		17895	53.76	-20.24	74	43.12	42.14	25.03	56.53	-	-	P	H	
		17895	42.47	-11.53	54	31.83	42.14	25.03	56.53	-	-	A	H	
														H
														H
														H
														H
			4960	40.15	-33.85	74	50.29	33.02	12.28	55.44	-	-	P	V
			7440	46.57	-27.43	74	49.82	36.22	16.2	55.67	-	-	P	V
			10740	50.34	-23.66	74	47.36	39.08	19.33	55.43	-	-	P	V
			10740	37.53	-16.47	54	34.55	39.08	19.33	55.43	-	-	A	V
			14505	50.3	-23.7	74	42.22	40.39	22.02	54.33	-	-	P	V
			14505	41.85	-12.15	54	33.77	40.39	22.02	54.33	-	-	A	V
			17970	54.89	-19.11	74	43.68	42.76	25.03	56.58	-	-	P	V
			17970	43.11	-10.89	54	31.9	42.76	25.03	56.58	-	-	A	V
													V	
													V	
													V	
													V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> <li>The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.</li> <li>The emission level close to 18GHz is checked that the average emission level is noise floor only.</li> </ol>													





<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
BLE CH 00 2402MHz		2375.625	56.35	-17.65	74	40.94	27.3	18.19	30.08	296	69	P	H	
		2387.7	48.02	-5.98	54	32.52	27.35	18.22	30.07	296	69	A	H	
	*	2402	92.54	-	-	76.96	27.41	18.24	30.07	296	69	P	H	
	*	2402	91.03	-	-	75.45	27.41	18.24	30.07	296	69	A	H	
													H	
													H	
			2362.605	55.95	-18.05	74	40.61	27.25	18.17	30.08	100	118	P	V
			2386.545	47.91	-6.09	54	32.42	27.35	18.21	30.07	100	118	A	V
	*		2402	94.1	-	-	78.52	27.41	18.24	30.07	100	118	P	V
	*		2402	92.62	-	-	77.04	27.41	18.24	30.07	100	118	A	V
													V	
												V		
BLE CH 19 2440MHz		2321.06	56.37	-17.63	74	41.24	27.14	18.08	30.09	253	68	P	H	
		2381.54	47.94	-6.06	54	32.49	27.33	18.2	30.08	253	68	A	H	
	*	2440	94.85	-	-	79.04	27.56	18.31	30.06	253	68	P	H	
	*	2440	93.57	-	-	77.76	27.56	18.31	30.06	253	68	A	H	
			2497.55	56.79	-17.21	74	40.52	27.89	18.42	30.04	253	68	P	H
			2486.7	48.9	-5.1	54	32.72	27.82	18.4	30.04	253	68	A	H
			2389.24	56.27	-17.73	74	40.76	27.36	18.22	30.07	100	116	P	V
			2346.4	48	-6	54	32.77	27.19	18.13	30.09	100	116	A	V
	*		2440	95.97	-	-	80.16	27.56	18.31	30.06	100	116	P	V
	*		2440	94.46	-	-	78.65	27.56	18.31	30.06	100	116	A	V
			2486.84	56.49	-17.51	74	40.31	27.82	18.4	30.04	100	116	P	V
		2498.32	49.51	-4.49	54	33.24	27.89	18.42	30.04	100	116	A	V	



<b>BLE CH 39 2480MHz</b>	*	2480	94.72	-	-	78.61	27.78	18.38	30.05	280	68	P	H
	*	2480	93.43	-	-	77.32	27.78	18.38	30.05	280	68	A	H
		2489.8	57.53	-16.47	74	41.33	27.84	18.4	30.04	280	68	P	H
		2486.92	48.81	-5.19	54	32.63	27.82	18.4	30.04	280	68	A	H
													H
													H
	*	2480	96.13	-	-	80.02	27.78	18.38	30.05	100	116	P	V
	*	2480	94.63	-	-	78.52	27.78	18.38	30.05	100	116	A	V
		2498.44	57.14	-16.86	74	40.87	27.89	18.42	30.04	100	116	P	V
		2491.28	49.65	-4.35	54	33.44	27.85	18.4	30.04	100	116	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	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	41.01	-32.99	74	51.49	32.41	12.35	55.24	-	-	P	H	
		11400	49.78	-24.22	74	45.67	39.2	19.98	55.07	-	-	P	H	
		11400	37.85	-16.15	54	33.74	39.2	19.98	55.07	-	-	A	H	
		14475	49.73	-24.27	74	41.65	40.4	22	54.32	-	-	P	H	
		14475	41.7	-12.3	54	33.62	40.4	22	54.32	-	-	A	H	
		17970	54.14	-19.86	74	42.93	42.76	25.03	56.58	-	-	P	H	
		17970	43.69	-10.31	54	32.48	42.76	25.03	56.58	-	-	A	H	
														H
														H
														H
														H
														H
														H
			4804	40.86	-33.14	74	51.34	32.41	12.35	55.24	-	-	P	V
			12525	49.64	-24.36	74	44.48	38.72	20.91	54.47	-	-	P	V
			12525	38.75	-15.25	54	33.59	38.72	20.91	54.47	-	-	A	V
			14475	49.8	-24.2	74	41.72	40.4	22	54.32	-	-	P	V
			14475	41.71	-12.29	54	33.63	40.4	22	54.32	-	-	A	V
			17985	54.54	-19.46	74	43.21	42.88	25.04	56.59	-	-	P	V
			17985	43.74	-10.26	54	32.41	42.88	25.04	56.59	-	-	A	V
													V	
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
BLE CH 19 2440MHz		4880	40.88	-33.12	74	51.28	32.62	12.32	55.34	-	-	P	H	
		7320	45.81	-28.19	74	48.82	36.76	15.88	55.65	-	-	P	H	
		12645	49.61	-24.39	74	44.2	38.93	20.97	54.49	-	-	P	H	
		12645	37.95	-16.05	54	32.54	38.93	20.97	54.49	-	-	A	H	
		14475	49.3	-24.7	74	41.22	40.4	22	54.32	-	-	P	H	
		14475	41.7	-12.3	54	33.62	40.4	22	54.32	-	-	A	H	
		17970	53.5	-20.5	74	42.29	42.76	25.03	56.58	-	-	P	H	
		17970	43	-11	54	31.79	42.76	25.03	56.58	-	-	A	H	
														H
														H
														H
														H
			4880	40.34	-33.66	74	50.74	32.62	12.32	55.34	-	-	P	V
			7320	46.18	-27.82	74	49.19	36.76	15.88	55.65	-	-	P	V
			10875	49.73	-24.27	74	46.79	38.9	19.44	55.4	-	-	P	V
			10875	36.45	-17.55	54	33.51	38.9	19.44	55.4	-	-	A	V
			14475	49.36	-24.64	74	41.28	40.4	22	54.32	-	-	P	V
			14475	40.62	-13.38	54	32.54	40.4	22	54.32	-	-	A	V
			17970	53.98	-20.02	74	42.77	42.76	25.03	56.58	-	-	P	V
			17970	42.96	-11.04	54	31.75	42.76	25.03	56.58	-	-	A	V
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
BLE CH 39 2480MHz		4960	40.42	-33.58	74	50.56	33.02	12.28	55.44	-	-	P	H	
		7440	46.5	-27.5	74	49.75	36.22	16.2	55.67	-	-	P	H	
		12555	49.67	-24.33	74	44.46	38.76	20.92	54.47	-	-	P	H	
		12555	38.76	-15.24	54	33.55	38.76	20.92	54.47	-	-	A	H	
		14475	50.37	-23.63	74	42.29	40.4	22	54.32	-	-	P	H	
		14475	41.93	-12.07	54	33.85	40.4	22	54.32	-	-	A	H	
		17985	53.88	-20.12	74	42.55	42.88	25.04	56.59	-	-	P	H	
		17985	44.78	-9.22	54	33.45	42.88	25.04	56.59	-	-	A	H	
														H
														H
														H
														H
			4960	40.64	-33.36	74	50.78	33.02	12.28	55.44	-	-	P	V
			7440	46.1	-27.9	74	49.35	36.22	16.2	55.67	-	-	P	V
			10905	49.82	-24.18	74	46.94	38.81	19.46	55.39	-	-	P	V
			10905	36.33	-17.67	54	33.45	38.81	19.46	55.39	-	-	A	V
			14490	49.47	-24.53	74	41.39	40.4	22.01	54.33	-	-	P	V
			14490	41.92	-12.08	54	33.84	40.4	22.01	54.33	-	-	A	V
			17850	53.88	-20.12	74	43.77	41.6	25.01	56.5	-	-	P	V
			17850	42.75	-11.25	54	32.64	41.6	25.01	56.5	-	-	A	V
													V	
													V	
													V	
													V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> <li>The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.</li> <li>The emission level close to 18GHz is checked that the average emission level is noise floor only.</li> </ol>													



Emission above 18GHz

2.4GHz BLE (SHF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
2.4GHz BLE SHF		19128	37.7	-36.3	74	58.48	37.95	-3.66	55.07	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
			19736	37.57	-36.43	74	58.31	37.79	-3.58	54.95	-	-	P
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> <li>The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.</li> </ol>												



Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
2.4GHz BLE LF		158.04	30.54	-12.96	43.5	43.73	16.76	2.3	32.25	-	-	P	H	
		205.57	24.65	-18.85	43.5	39.22	15.1	2.59	32.26	-	-	P	H	
		311.3	25.65	-20.35	46	35.37	19.43	3.13	32.28	-	-	P	H	
		420.91	24.33	-21.67	46	30.22	22.9	3.62	32.41	-	-	P	H	
		838.98	32.02	-13.98	46	30.01	28.94	5.09	32.02	-	-	P	H	
		947.62	34.13	-11.87	46	29.43	30.47	5.45	31.22	-	-	P	H	
														H
														H
														H
														H
														H
														H
														H
			37.76	26.02	-13.98	40	36.54	20.79	0.99	32.3	-	-	P	V
			100.81	23.92	-19.58	43.5	38.33	16.07	1.82	32.3	-	-	P	V
			186.17	25.39	-18.11	43.5	40.29	14.86	2.47	32.23	-	-	P	V
			312.27	23.77	-22.23	46	33.47	19.45	3.13	32.28	-	-	P	V
			660.5	30.67	-15.33	46	32.46	26.19	4.49	32.47	-	-	P	V
			951.5	34.07	-11.93	46	29.2	30.6	5.46	31.19	-	-	P	V
														V
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.													



**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 :	Karl Hou, Andy Yang	Temperature :	20~25°C
		Relative Humidity :	50~65%

Note symbol

-L	Low channel location
-R	High channel location



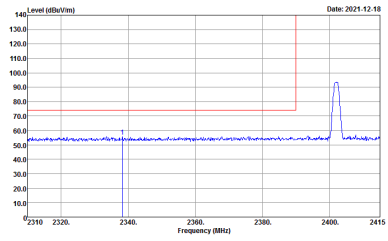
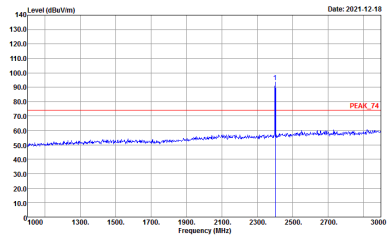
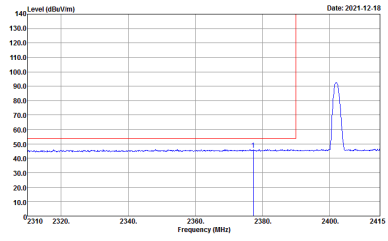
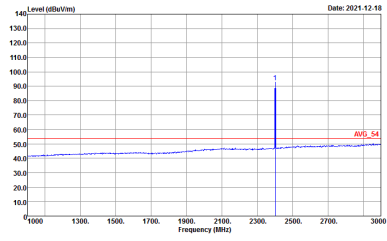
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2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH00 2402MHz		
Horizontal		Fundamental
Peak	<p>Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto</p>	<p>Site : 03CH16-HY Condition : AVG_54 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto</p>

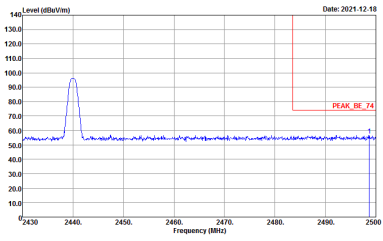
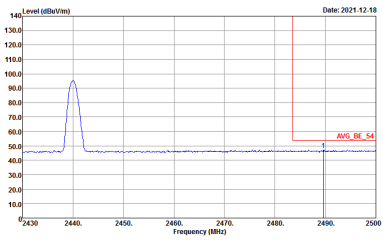


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH00 2402MHz		
	Vertical	Fundamental
<p><b>Peak</b></p>	 <p>Site : 03CH16-HY Condition : PEAK_SE_74 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH16-HY Condition : PEAK_74 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<p><b>Avg</b></p>	 <p>Site : 03CH16-HY Condition : AV6_BE_54 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto</p>	 <p>Site : 03CH16-HY Condition : AV6_54 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto</p>

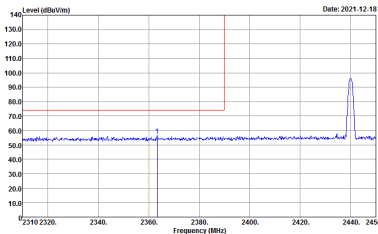
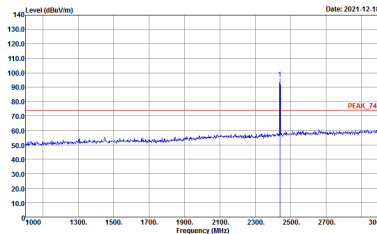
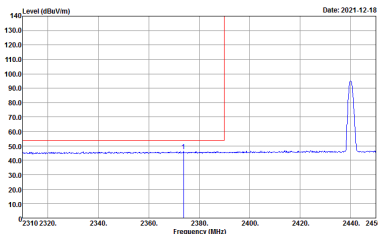
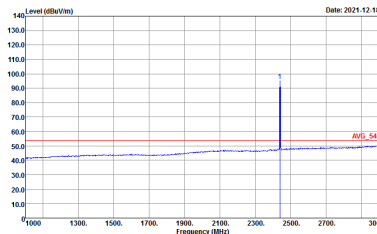


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - L		
	Horizontal	Fundamental
Peak	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : PEAK_BE_74 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : AVG_BE_54 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : AVG_54 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>

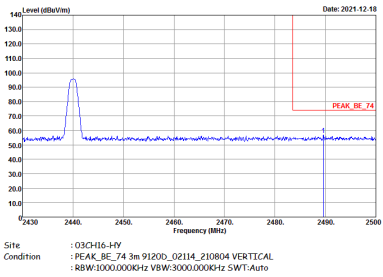
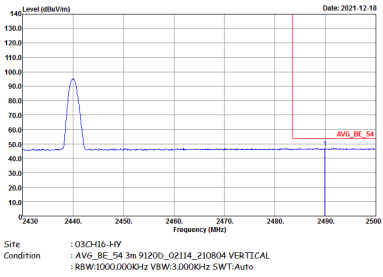


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Horizontal	Fundamental
<p><b>Peak</b></p>	 <p>Site : 03CH16-HY Condition : PEAK_BE_74 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Left blank</p>
<p><b>Avg.</b></p>	 <p>Site : 03CH16-HY Condition : AVG_BE_54 3m 9120D_02114_210804 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto</p>	<p>Left blank</p>



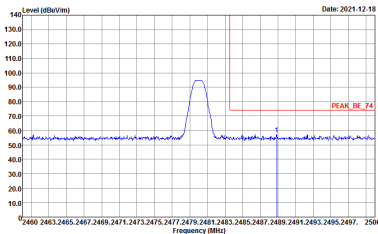
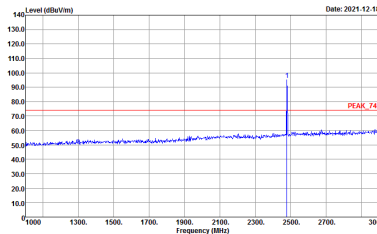
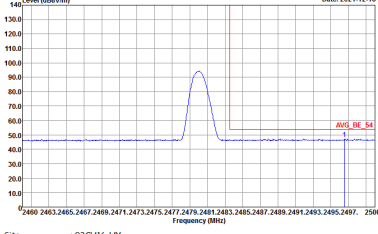
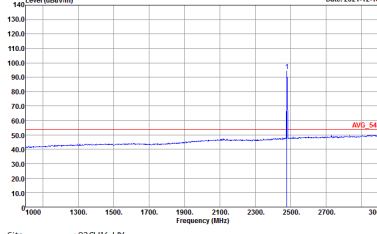
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - L		
	Vertical	Fundamental
Peak	 <p>Level (dBu/m) vs Frequency (MHz) plot showing a peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBu/m, and the x-axis ranges from 2310 to 2450 MHz. A red line indicates the peak level at approximately 100 dBu/m.</p> <p>Site : 03CH16-HY            Condition : PEAK_56_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Level (dBu/m) vs Frequency (MHz) plot showing a peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBu/m, and the x-axis ranges from 1000 to 3000 MHz. A red line indicates the peak level at approximately 80 dBu/m.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Level (dBu/m) vs Frequency (MHz) plot showing the average level. The y-axis ranges from 10.0 to 140.0 dBu/m, and the x-axis ranges from 2310 to 2450 MHz. A red line indicates the average level at approximately 50 dBu/m.</p> <p>Site : 03CH16-HY            Condition : AV6_BE_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000kHz VBW:3.000kHz SWT:Auto</p>	 <p>Level (dBu/m) vs Frequency (MHz) plot showing the average level. The y-axis ranges from 10.0 to 140.0 dBu/m, and the x-axis ranges from 1000 to 3000 MHz. A red line indicates the average level at approximately 50 dBu/m.</p> <p>Site : 03CH16-HY            Condition : AV6_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000kHz VBW:3.000kHz SWT:Auto</p>



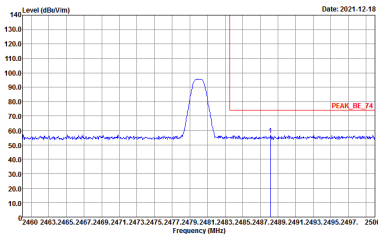
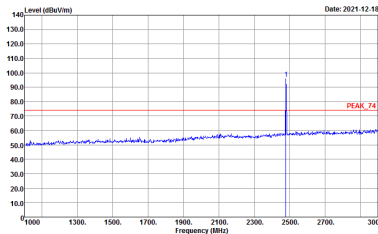
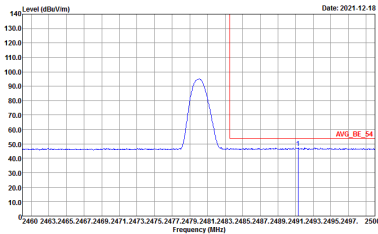
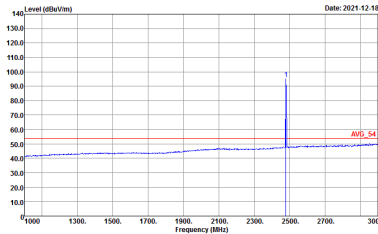
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank





BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
	Horizontal	Fundamental
Peak	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the signal. The x-axis ranges from 2460 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_BE_74 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the signal. The x-axis ranges from 2460 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average level at 2480 MHz. The average level is approximately 50 dBm/1m. The plot includes a red line indicating the average level and a blue line for the signal. The x-axis ranges from 2460 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_BE_54 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average level at 2480 MHz. The average level is approximately 50 dBm/1m. The plot includes a red line indicating the average level and a blue line for the signal. The x-axis ranges from 2460 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_54 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>

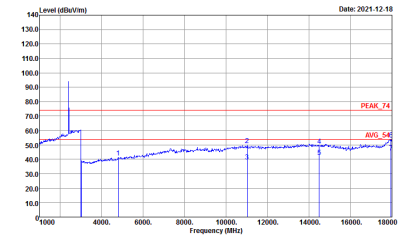
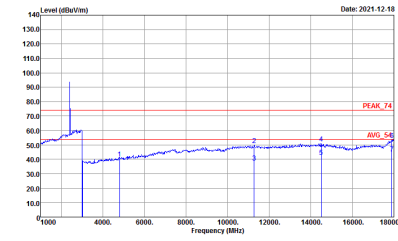


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
	Vertical	Fundamental
Peak	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the noise floor. The x-axis ranges from 2400 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_BE_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the noise floor. The x-axis ranges from 1000 to 3000 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing the average level across the band. The average level is approximately 50 dBm/1m. The plot includes a red line indicating the average level and a blue line for the noise floor. The x-axis ranges from 2400 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_BE_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing the average level across the band. The average level is approximately 50 dBm/1m. The plot includes a red line indicating the average level and a blue line for the noise floor. The x-axis ranges from 1000 to 3000 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

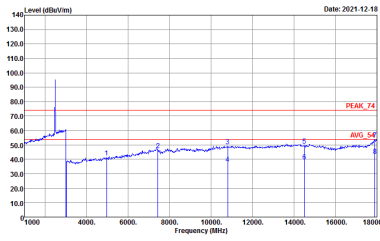
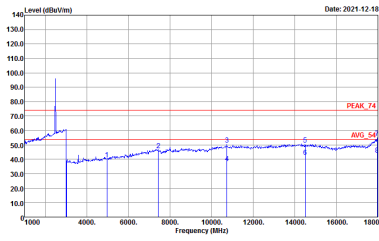
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
BLE CH00 2402MHz		
	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL Detector : Peak</p>	 <p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 VERTICAL Detector : Peak</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL Detector : Peak</p>



<b>BLE</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
	<b>BLE CH39 2480MHz</b>	
	<b>Horizontal</b>	<b>Vertical</b>
<p><b>Peak</b></p> <p><b>Avg.</b></p>	 <p>Site : 03CH16-HY          Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL          Detector : Peak</p>	 <p>Site : 03CH16-HY          Condition : PEAK_74 3m 9120D_02114_210804 VERTICAL          Detector : Peak</p>



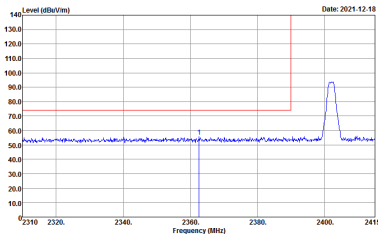
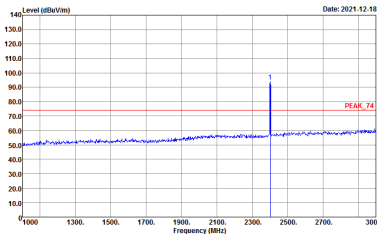
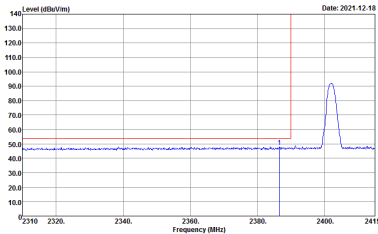
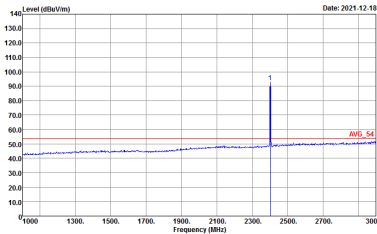
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2.4GHz 2400~2483.5MHz

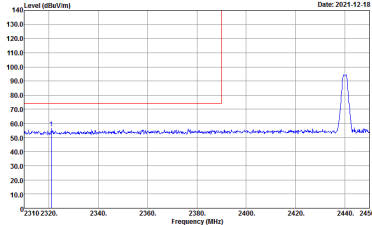
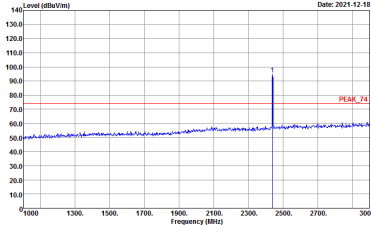
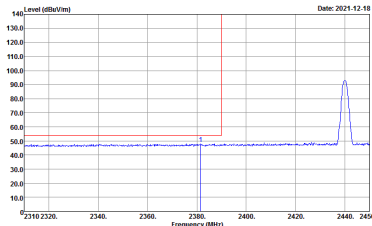
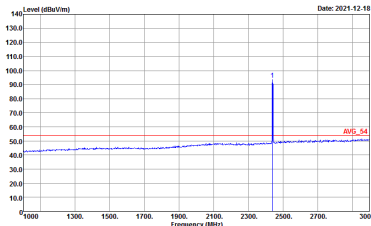
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	<p>Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:30.000KHz SWT:Auto</p>	<p>Site : 03CH16-HY Condition : AVG_54 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:30.000KHz SWT:Auto</p>



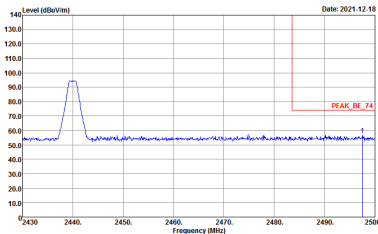
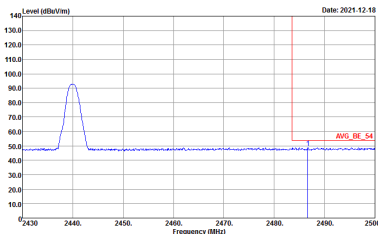
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH00 2402MHz		
	Vertical	Fundamental
Peak	 <p>Level (dB<math>\mu</math>V/m) vs Frequency (MHz) plot showing a peak at 2402 MHz. The y-axis ranges from 10.0 to 140.0 dB<math>\mu</math>V/m, and the x-axis ranges from 2310 to 2415 MHz. A red line indicates the peak level at approximately 100 dB<math>\mu</math>V/m.</p> <p>Site : 03CH16-HY            Condition : PEAK_SE_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dB<math>\mu</math>V/m) vs Frequency (MHz) plot showing a peak at 2402 MHz. The y-axis ranges from 10.0 to 140.0 dB<math>\mu</math>V/m, and the x-axis ranges from 1000 to 3000 MHz. A red line indicates the peak level at approximately 80 dB<math>\mu</math>V/m.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg	 <p>Level (dB<math>\mu</math>V/m) vs Frequency (MHz) plot showing an average level at 2402 MHz. The y-axis ranges from 10.0 to 140.0 dB<math>\mu</math>V/m, and the x-axis ranges from 2310 to 2415 MHz. A red line indicates the average level at approximately 60 dB<math>\mu</math>V/m.</p> <p>Site : 03CH16-HY            Condition : AV6_BE_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>	 <p>Level (dB<math>\mu</math>V/m) vs Frequency (MHz) plot showing an average level at 2402 MHz. The y-axis ranges from 10.0 to 140.0 dB<math>\mu</math>V/m, and the x-axis ranges from 1000 to 3000 MHz. A red line indicates the average level at approximately 50 dB<math>\mu</math>V/m.</p> <p>Site : 03CH16-HY            Condition : AV6_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBm/1m, and the x-axis ranges from 2310 to 2450 MHz. A red line indicates the peak level at approximately 100 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_BE_74 3m 9120D_02114_210804 HORIZONTAL                          : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBm/1m, and the x-axis ranges from 1900 to 3000 MHz. A red line indicates the peak level at approximately 75 dBm/1m, labeled 'PEAK_74'.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL                          : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average level at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBm/1m, and the x-axis ranges from 2310 to 2450 MHz. A red line indicates the average level at approximately 50 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AVG_BE_54 3m 9120D_02114_210804 HORIZONTAL                          : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average level at 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBm/1m, and the x-axis ranges from 1900 to 3000 MHz. A red line indicates the average level at approximately 50 dBm/1m, labeled 'AVG_54'.</p> <p>Site : 03CH16-HY            Condition : AVG_54 3m 9120D_02114_210804 HORIZONTAL                          : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>



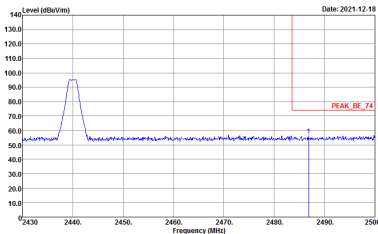
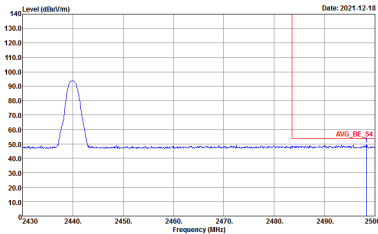


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Horizontal	Fundamental
Peak	 <p>Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank
Avg.	 <p>Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_02114_210804 HORIZONTAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>	Left blank

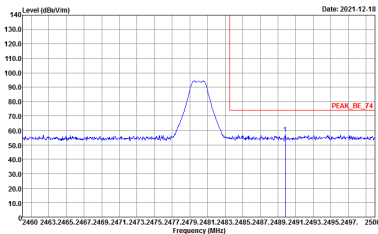
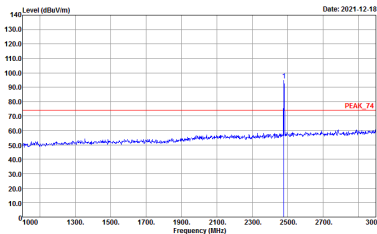
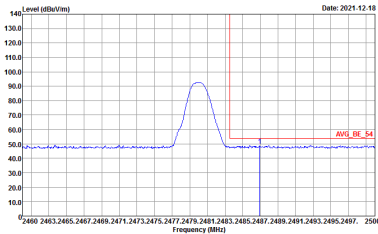
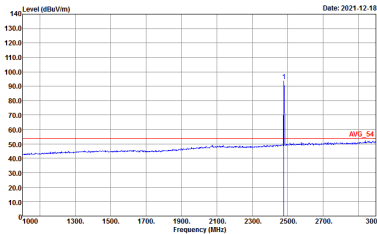


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - L		
	Vertical	Fundamental
Peak	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : PEAK_SE_74 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : PEAK_74 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : AV6_BE_54 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>	<p>Date: 2021-12-18</p> <p>Site : 03CH16-HY Condition : AV6_54 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>

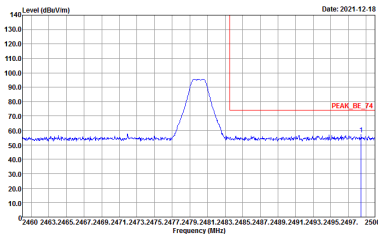
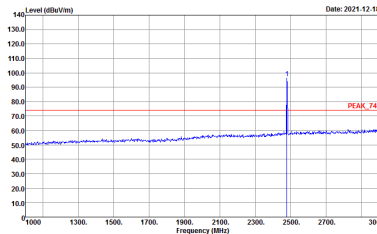
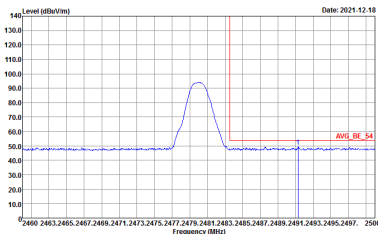
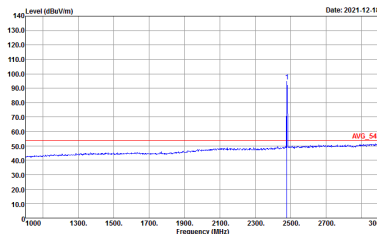


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Vertical	Fundamental
Peak	 <p>Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWF:Auto</p>	Left blank
Avg.	 <p>Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_02114_210804 VERTICAL : RBW:1000.000KHz VBW:10.000KHz SWF:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
	Horizontal	Fundamental
Peak	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the noise floor. The x-axis ranges from 2400 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_BE_74 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the noise floor. The x-axis ranges from 1000 to 3000 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average spectrum. The average level is approximately 60 dBm/1m. The plot includes a red line indicating the average level and a blue line for the noise floor. The x-axis ranges from 2400 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_BE_54 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average spectrum. The average level is approximately 60 dBm/1m. The plot includes a red line indicating the average level and a blue line for the noise floor. The x-axis ranges from 1000 to 3000 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_54 3m 91200_02114_210804 HORIZONTAL            : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
	Vertical	Fundamental
Peak	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the signal. The x-axis ranges from 2400 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_BE_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing a peak at 2480 MHz. The peak level is approximately 100 dBm/1m. The plot includes a red line indicating the peak level and a blue line for the signal. The x-axis ranges from 2400 to 3000 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : PEAK_74 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average level at 2480 MHz. The average level is approximately 60 dBm/1m. The plot includes a red line indicating the average level and a blue line for the signal. The x-axis ranges from 2400 to 2500 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_BE_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot showing an average level at 2480 MHz. The average level is approximately 60 dBm/1m. The plot includes a red line indicating the average level and a blue line for the signal. The x-axis ranges from 2400 to 3000 MHz, and the y-axis ranges from 10.0 to 140.0 dBm/1m.</p> <p>Site : 03CH16-HY            Condition : AV6_54 3m 91200_02114_210804 VERTICAL            : RBW:1000.000KHz VBW:10.000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 VERTICAL Detector : Peak</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 VERTICAL Detector : Peak</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH16-HY Condition : PEAK_74 3m 9120D_02114_210804 VERTICAL Detector : Peak</p>



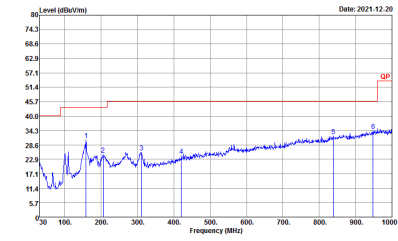
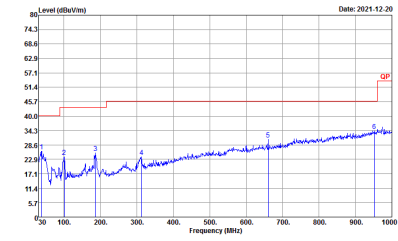


Emission above 18GHz  
2.4GHz BLE (SHF @ 1m)

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH16-HY Condition : PEAK_74 1m SHF ANT_9170_00991 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH16-HY Condition : PEAK_74 1m SHF ANT_9170_00991 VERTICAL Detector : Peak</p>



Emission below 1GHz  
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH16-HY Condition : QP 3m BIL06_47020_211009 HORIZONTAL Detector : Peak</p>	 <p>Site : 03CH16-HY Condition : QP 3m BIL06_47020_211009 VERTICAL Detector : Peak</p>



## Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth - LE for 1Mbps	60.96	381	2.62	3kHz
Bluetooth - LE for 2Mbps	31.57	197	5.08	10kHz

