




# FCC RADIO TEST REPORT

**FCC ID** : TVE-111T17

**Equipment** : Network Security Gateway

**Brand Name** : FORTINET 

**Model Name** : FortiGate 90Gxxxxxxxxxx, FG-90Gxxxxxxxxxx, FORTIGATE-90Gxxxxxxxxxx, FortiGate 91Gxxxxxxxxxx, FG-91Gxxxxxxxxxx, FORTIGATE-91Gxxxxxxxxxx  
(where "x" can be "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)

**Marketing Name** : FortiGate 90G, FortiGate 91G

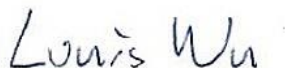
**Applicant** : Fortinet, Inc.  
899 KIFER RD  
SUNNYVALE CA 94086  
UNITED STATES

**Manufacturer** : Fortinet, Inc.  
899 KIFER RD  
SUNNYVALE CA 94086  
UNITED STATES

**Standard** : FCC Part 15 Subpart C §15.247

The product was received on May 10, 2023 and testing was performed from May 12, 2023 to Jun. 01, 2023. 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.



Approved by: Louis Wu

**Sporton International Inc. Wensan Laboratory**

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issue Date
FR341401	01	Initial issue of report	Jun. 19, 2023



### 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) 15.247(b)(4)	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	1.08 dB under the limit at 7440.000 MHz
3.6	15.207	AC Conducted Emission	Pass	6.43 dB under the limit at 0.502 MHz
3.7	15.203	Antenna Requirement	Pass	-

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Yun Huang**

**Report Producer: Lea Yu**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Product Feature	
<b>General Specs</b>	
125 kbps (LE coded)	
500 kbps (LE coded)	
Bluetooth-LE(1M)	
Bluetooth-LE(2M)	
<b>Antenna Type</b>	
Bluetooth-LE: Monopole Antenna	

Antenna information		
2402 MHz ~ 2480 MHz	Peak Gain (dBi)	1.53

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

Specification of Accessory		
DC Power Adapter	Brand Name	FSP
	Model Name	FSP036-RHBN3

## 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. 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> TH05-HY, CO07-HY, 03CH22-HY

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

FCC designation No.: TW3786



## 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 15.247 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).
- b. AC power line Conducted Emission was tested under maximum output power.

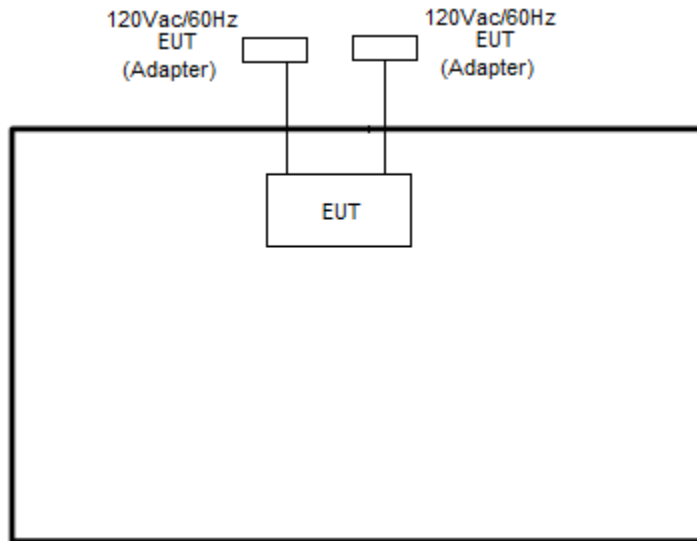
The following summary table is showing all test modes to demonstrate in compliance with the standard.

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
	Mode 7: Bluetooth Tx CH00_2402 MHz_125kbps
	Mode 8: Bluetooth Tx CH19_2440 MHz_125kbps
	Mode 9: Bluetooth Tx CH39_2480 MHz_125kbps
	Mode 10: Bluetooth Tx CH00_2402 MHz_500kbps
	Mode 11: Bluetooth Tx CH19_2440 MHz_500kbps
	Mode 12: Bluetooth Tx CH39_2480 MHz_500kbps
<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: Bluetooth-LE TX + adapter*2
<b>Remark:</b> For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.	

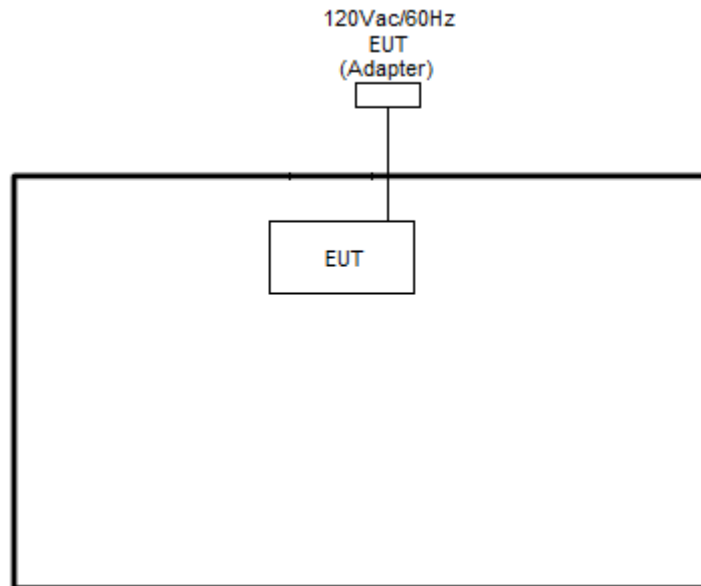


## 2.3 Connection Diagram of Test System

### <AC Conducted Emission Mode>



### <Bluetooth-LE Tx Mode>





## 2.4 EUT Operation Test Setup

The RF test items, utility “SmartRF Version 8.0.0.12 ALPHA” 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.

## 2.5 Measurement Results Explanation Example

**For all conducted test items:**

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

Example :

The spectrum analyzer offset is derived from RF cable loss 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.

##### 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

## 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.

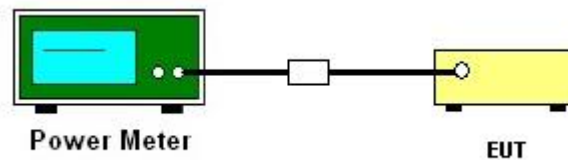
### 3.2.2 Measuring Instruments

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.

## 3.4 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 30 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

Please refer to Appendix A.

### 3.4.6 Test Result of Conducted Spurious Emission Plots

Please refer to Appendix A.



### 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.

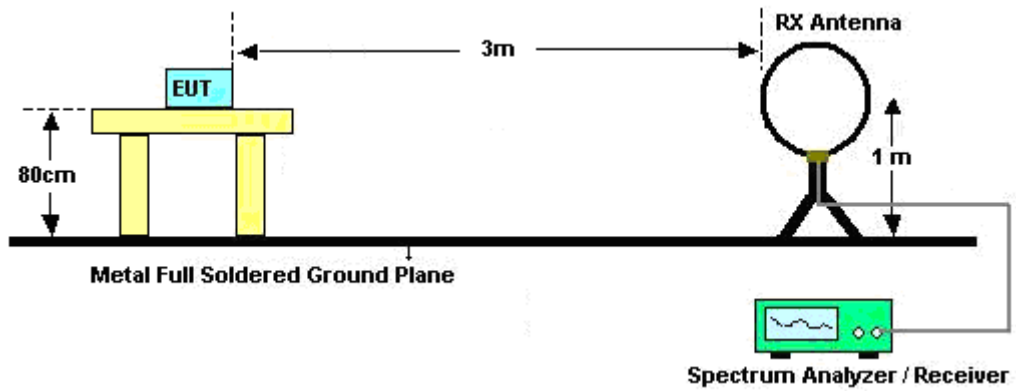
**3.5.3 Test Procedures**

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.

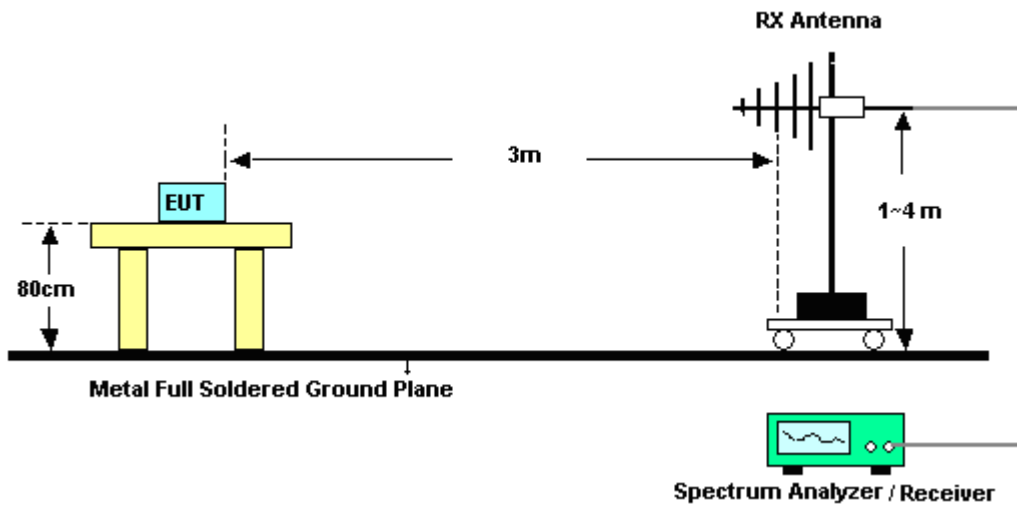


### 3.5.4 Test Setup

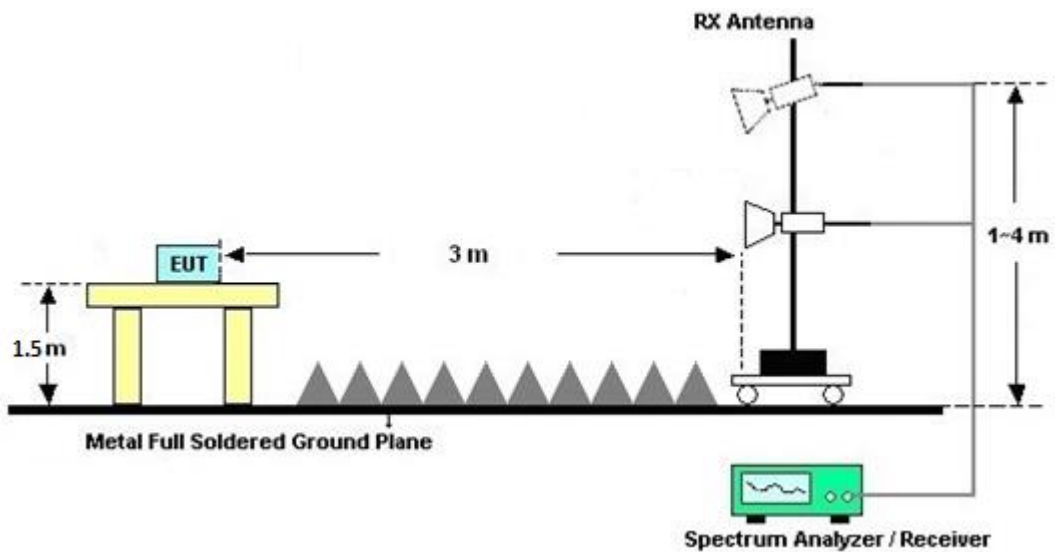
For radiated test below 30MHz



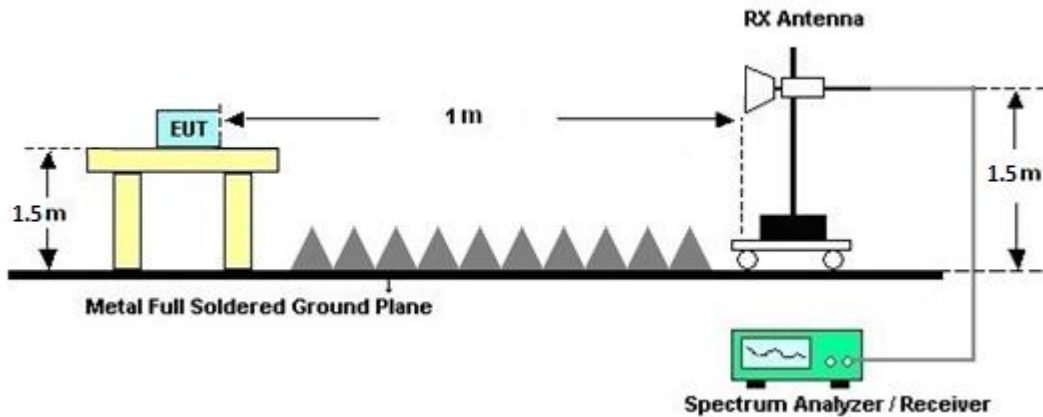
For radiated test from 30MHz to 1GHz



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**

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.



## 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. 20, 2022	May 12, 2023~ May 27, 2023	Sep. 19, 2023	Radiation (03CH22-HY)
Bilog Antenna with 6dB pad	TESEQ & WOKEN	CBL 6111D & 00802N1D-06	63304 & 002	N/A	Oct. 04, 2022	May 12, 2023~ May 27, 2023	Oct. 03, 2023	Radiation (03CH22-HY)
Amplifier	SONOMA	310N	421581	N/A	Jul. 16, 2022	May 12, 2023~ May 27, 2023	Jul. 15, 2023	Radiation (03CH22-HY)
Double Ridged Guide Horn Antenna	RFSPIN	DRH18-E	LE2C05A18E N	1GHz~18GHz	Jul. 06, 2022	May 12, 2023~ May 27, 2023	Jul. 05, 2023	Radiation (03CH22-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	1223	18GHz-40GHz	Jul. 05, 2022	May 12, 2023~ May 27, 2023	Jul. 04, 2023	Radiation (03CH22-HY)
Amplifier	EMEC	EM01G18GA	060877	N/A	Sep. 29, 2022	May 12, 2023~ May 27, 2023	Sep. 28, 2023	Radiation (03CH22-HY)
Preamplifier	EMEC	EM18G40G	060872	18-40GHz	Sep. 28, 2022	May 12, 2023~ May 27, 2023	Sep. 27, 2023	Radiation (03CH22-HY)
Signal Analyzer	Keysight	N9010B	MY60241058	N/A	Jul. 07, 2022	May 12, 2023~ May 27, 2023	Jul. 06, 2023	Radiation (03CH22-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Nov. 07, 2022	May 12, 2023~ May 27, 2023	Nov. 06, 2023	Radiation (03CH22-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	May 12, 2023~ May 27, 2023	N/A	Radiation (03CH22-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	May 12, 2023~ May 27, 2023	N/A	Radiation (03CH22-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	May 12, 2023~ May 27, 2023	N/A	Radiation (03CH22-HY)
Software	Audix	E3 6.09824_2019 122	RK-002347	N/A	N/A	May 12, 2023~ May 27, 2023	N/A	Radiation (03CH22-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9kHz~30MHz	Mar. 07, 2023	May 12, 2023~ May 27, 2023	Mar. 06, 2024	Radiation (03CH22-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804390/2,804 611/2,804615/ 2	N/A	Oct. 25, 2022	May 12, 2023~ May 27, 2023	Oct. 24, 2023	Radiation (03CH22-HY)
Filter	Wainwright	WLK4-1000-15 30-8000-40SS	SN11	1.53GHz Low Pass Filter	Sep. 12, 2022	May 12, 2023~ May 27, 2023	Sep. 11, 2023	Radiation (03CH22-HY)
AC Power Source	ACPOWER	AFC-11003G	F317040033	N/A	N/A	May 17, 2023	N/A	Conduction (CO07-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	May 17, 2023	N/A	Conduction (CO07-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	9561-F N00373	9kHz-200MHz	Nov. 01, 2022	May 17, 2023	Oct. 31, 2023	Conduction (CO07-HY)
RF Cable	HUBER + SUHNER	RG 214/U	1358175	9kHz~30MHz	Mar. 15, 2023	May 17, 2023	Mar. 14, 2024	Conduction (CO07-HY)
Two-Line V-Network	TESEQ	NNB 51	45051	N/A	Mar. 05, 2023	May 17, 2023	Mar. 04, 2024	Conduction (CO07-HY)
Four-Line V-Network	TESEQ	NNB 52	36122	N/A	Mar. 13, 2023	May 17, 2023	Mar. 12, 2024	Conduction (CO07-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Oct. 06, 2022	May 17, 2023	Oct. 05, 2023	Conduction (CO07-HY)
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 17, 2022	May 18, 2023~ Jun. 01, 2023	Nov. 16, 2023	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO 12 (NO:113)	10MHz~6GHz	Dec. 13, 2022	May 18, 2023~ Jun. 01, 2023	Dec. 12, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101905	10Hz - 40GHz(amp)	Aug. 03, 2022	May 18, 2023~ Jun. 01, 2023	Aug. 02, 2023	Conducted (TH05-HY)



## 5 Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.46 dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.92 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.42 dB
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### Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.40 dB
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.38 dB
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**Appendix A. Test Result of Conducted Test Items**

Test Engineer:	Mina Liu	Temperature:	21~25	°C
Test Date:	2023/5/18~2023/6/1	Relative Humidity:	51~54	%

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.069	0.700	0.50	Pass
BLE	1Mbps	1	19	2440	1.067	0.704	0.50	Pass
BLE	1Mbps	1	39	2480	1.057	0.718	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	4.10	30.00	1.53	5.63	36.00	Pass
BLE	1Mbps	1	19	2440	4.10	30.00	1.53	5.63	36.00	Pass
BLE	1Mbps	1	39	2480	3.90	30.00	1.53	5.43	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	3.62	-8.93	1.53	8.00	Pass
BLE	1Mbps	1	19	2440	3.81	-8.03	1.53	8.00	Pass
BLE	1Mbps	1	39	2480	3.67	-8.23	1.53	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	2.070	1.352	0.50	Pass
BLE	2Mbps	1	19	2440	2.058	1.392	0.50	Pass
BLE	2Mbps	1	39	2480	2.066	1.432	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	4.10	30.00	1.53	5.63	36.00	Pass
BLE	2Mbps	1	19	2440	4.10	30.00	1.53	5.63	36.00	Pass
BLE	2Mbps	1	39	2480	3.90	30.00	1.53	5.43	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	2.56	-11.50	1.53	8.00	Pass
BLE	2Mbps	1	19	2440	3.24	-10.92	1.53	8.00	Pass
BLE	2Mbps	1	39	2480	2.39	-11.31	1.53	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**  
**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	125kbps	1	0	2402	3.90	30.00	1.53	5.43	36.00	Pass
BLE	125kbps	1	19	2440	3.90	30.00	1.53	5.43	36.00	Pass
BLE	125kbps	1	39	2480	3.90	30.00	1.53	5.43	36.00	Pass

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

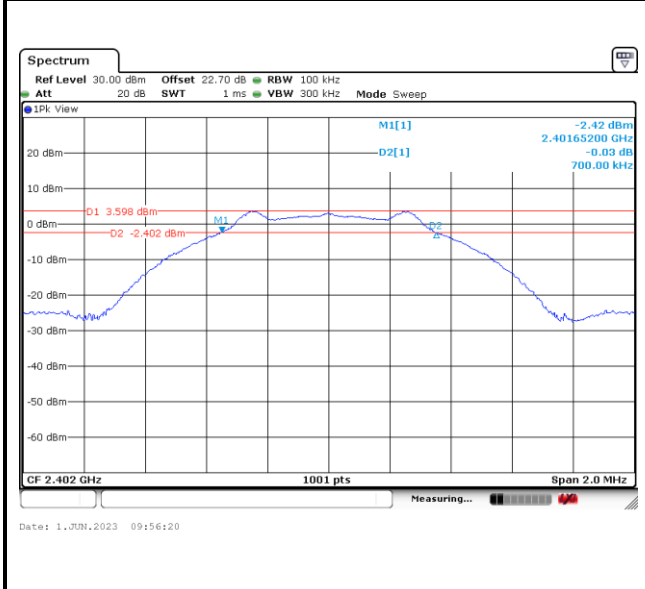
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	500kbps	1	0	2402	3.90	30.00	1.53	5.43	36.00	Pass
BLE	500kbps	1	19	2440	3.90	30.00	1.53	5.43	36.00	Pass
BLE	500kbps	1	39	2480	3.90	30.00	1.53	5.43	36.00	Pass



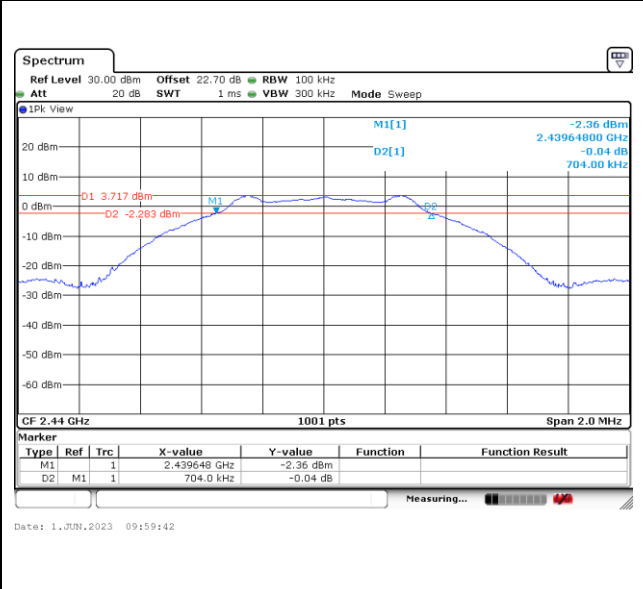
6dB Bandwidth

<1Mbps>

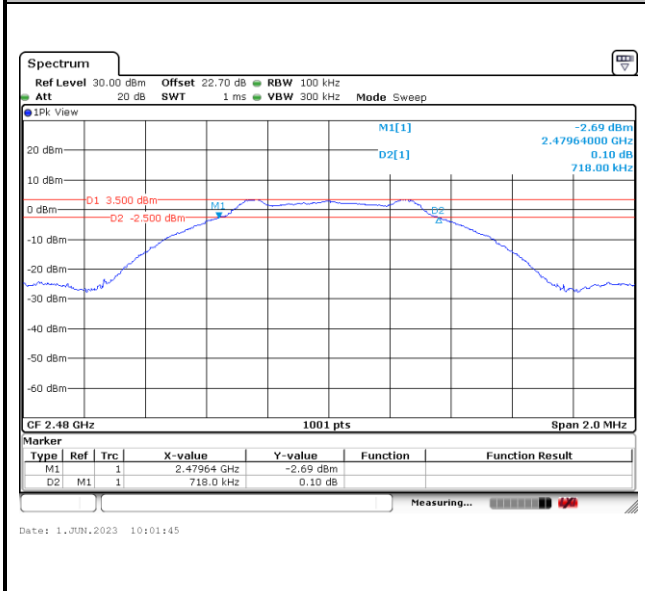
6 dB Bandwidth Plot on Channel 00



6 dB Bandwidth Plot on Channel 19



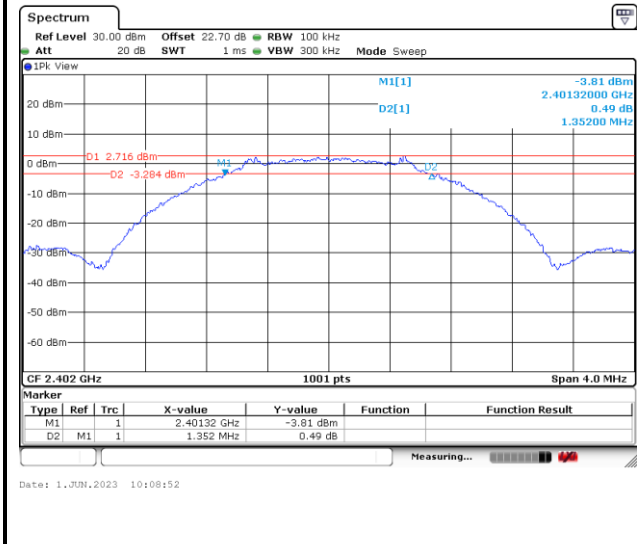
6 dB Bandwidth Plot on Channel 39



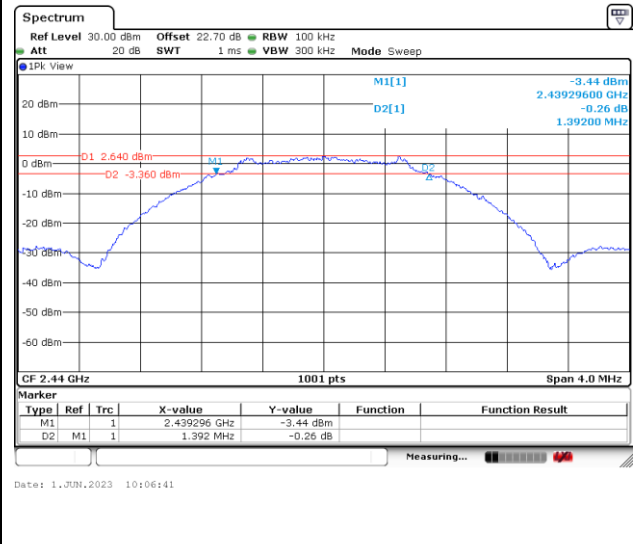


<2Mbps>

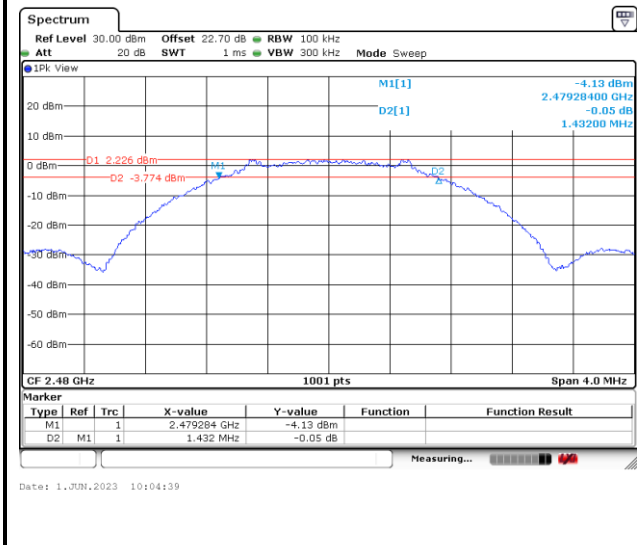
6 dB Bandwidth Plot on Channel 00



6 dB Bandwidth Plot on Channel 19



6 dB Bandwidth Plot on Channel 39

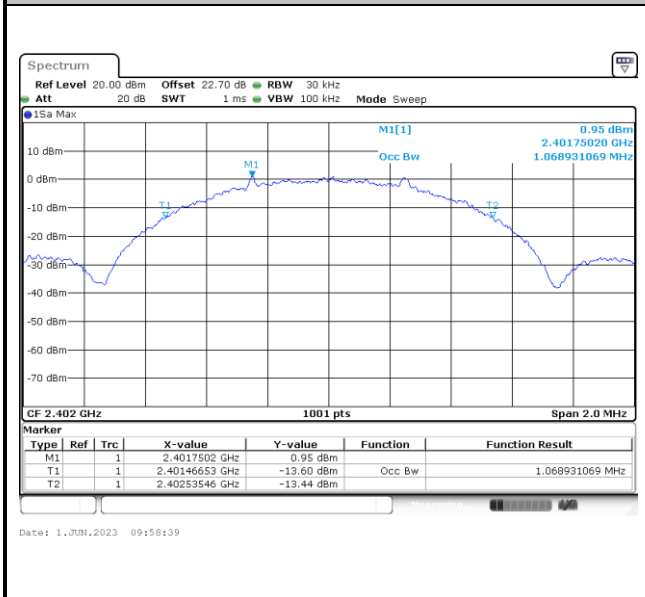




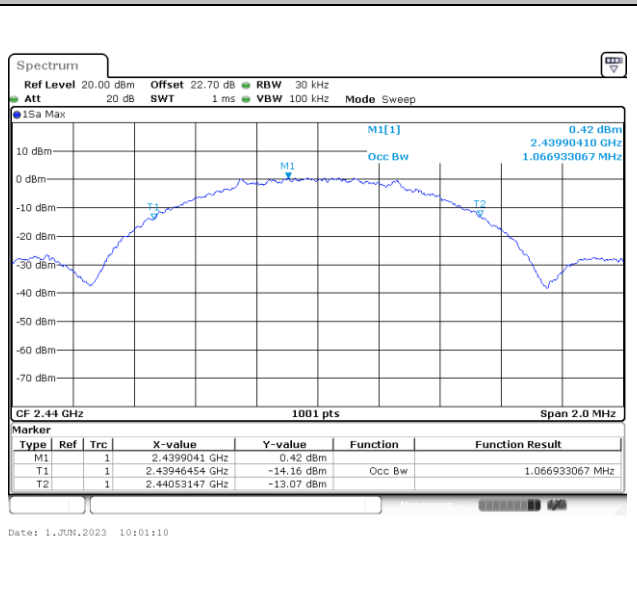
**99% Occupied Bandwidth**

<1Mbps>

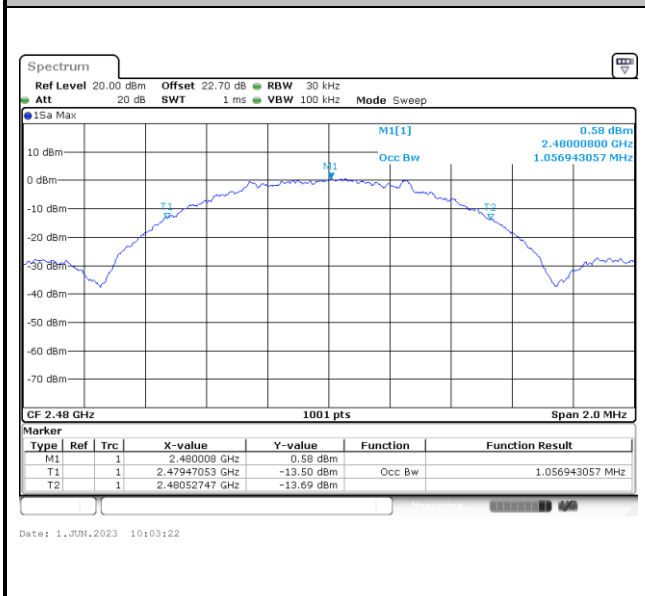
**99% Occupied Bandwidth Plot on Channel 00**



**99% Occupied Plot Bandwidth on Channel 19**



**99% Occupied Bandwidth Plot on Channel 39**

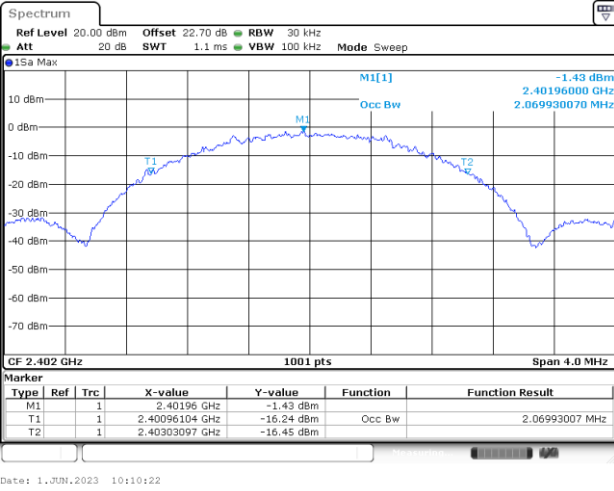


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

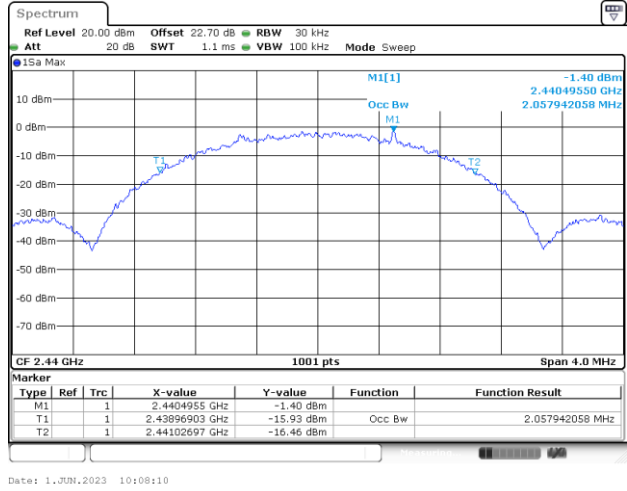


<2Mbps>

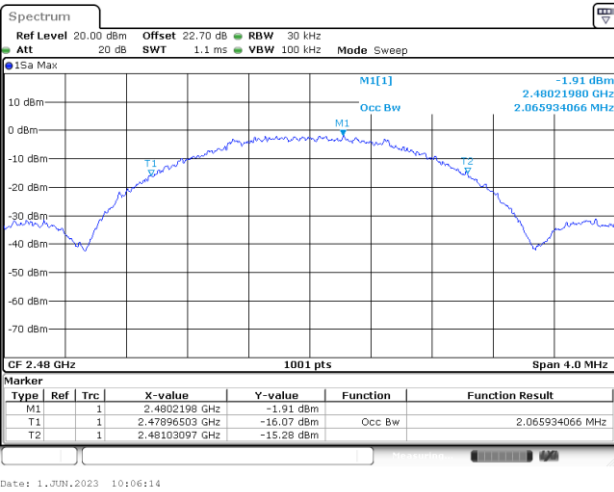
99% Occupied Bandwidth Plot on Channel 00



99% Occupied Plot Bandwidth on Channel 19



99% Occupied Bandwidth Plot on Channel 39

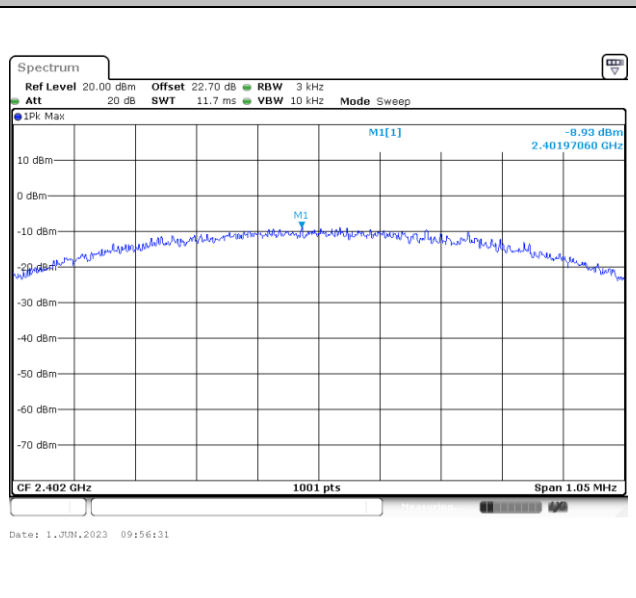




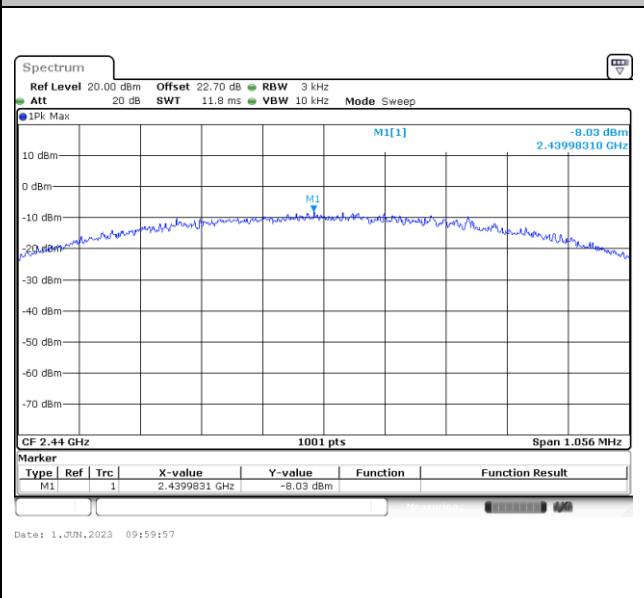
# Power Spectral Density (dBm/3kHz)

<1Mbps>

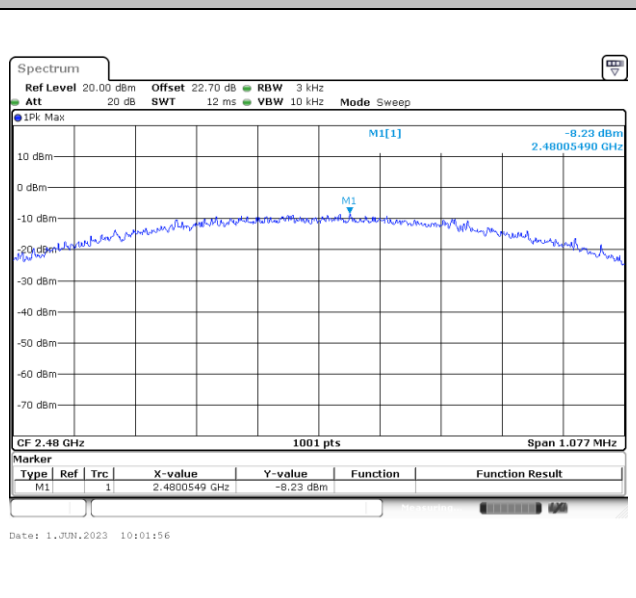
### Power Density (dBm/3kHz) Plot Channel 00



### Power Density (dBm/3kHz) Plot Channel 19



### Power Density (dBm/3kHz) Plot Channel 39

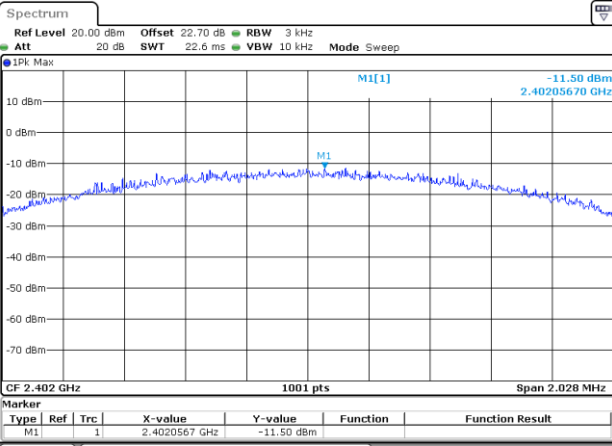






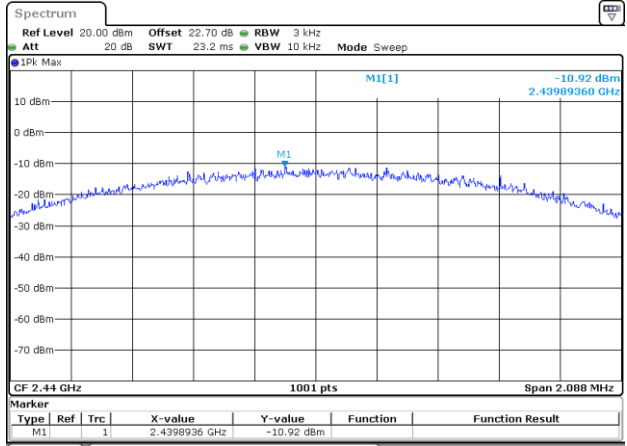
<2Mbps>

Power Density (dBm/3kHz) Plot Channel 00



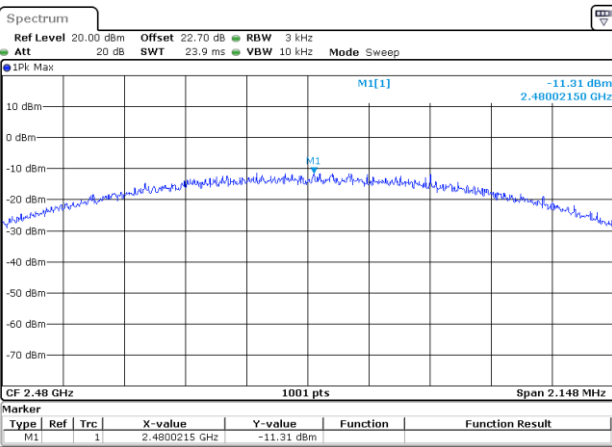
Date: 1.JUN.2023 10:09:03

Power Density (dBm/3kHz) Plot Channel 19



Date: 1.JUN.2023 10:06:59

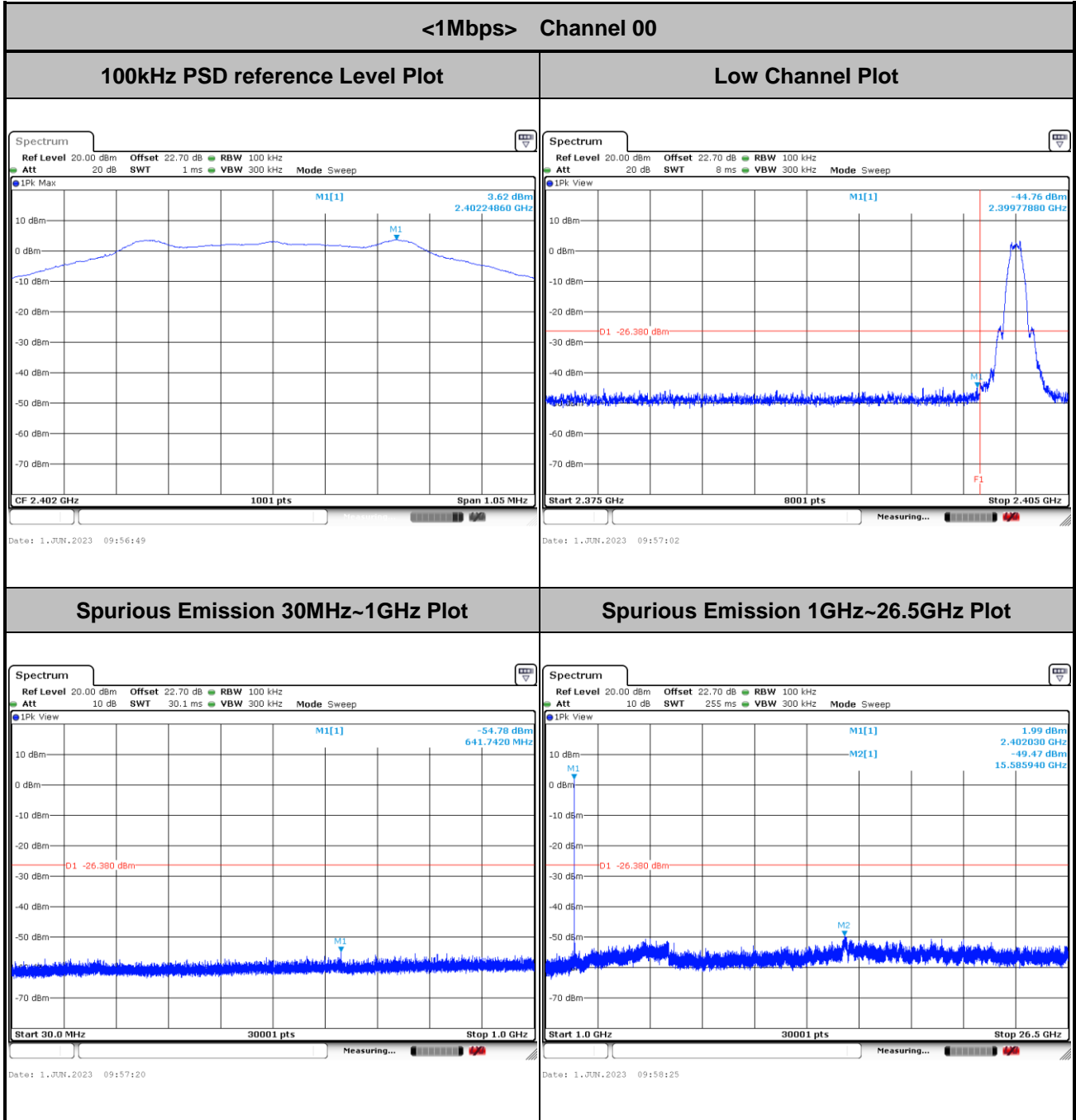
Power Density (dBm/3kHz) Plot Channel 39



Date: 1.JUN.2023 10:04:52



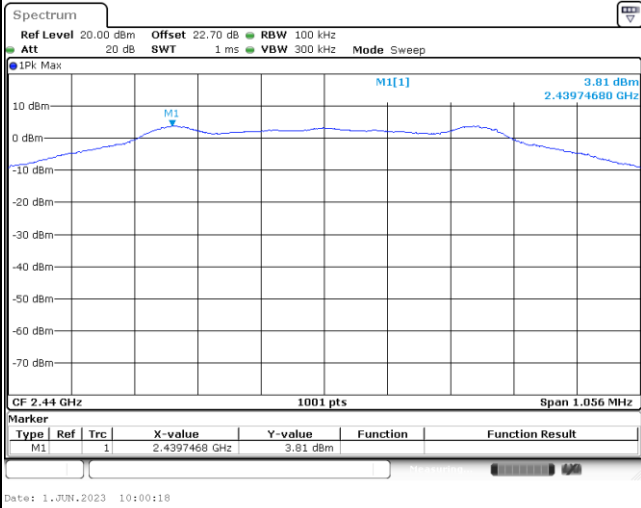
# Band Edge and Spurious Emission





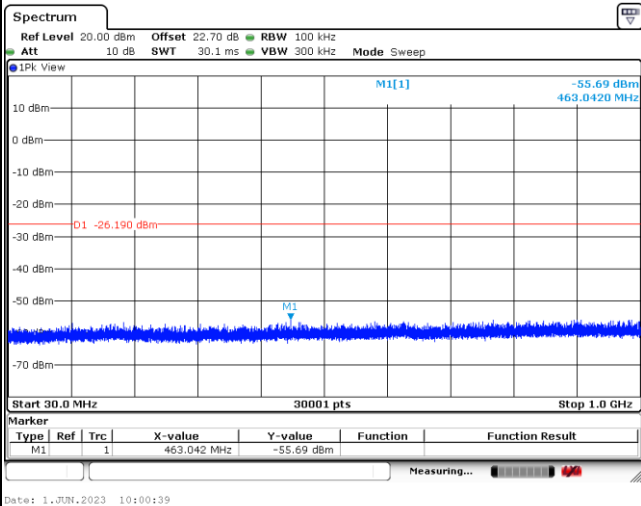
<1Mbps> Channel 19

100kHz PSD reference Level Plot

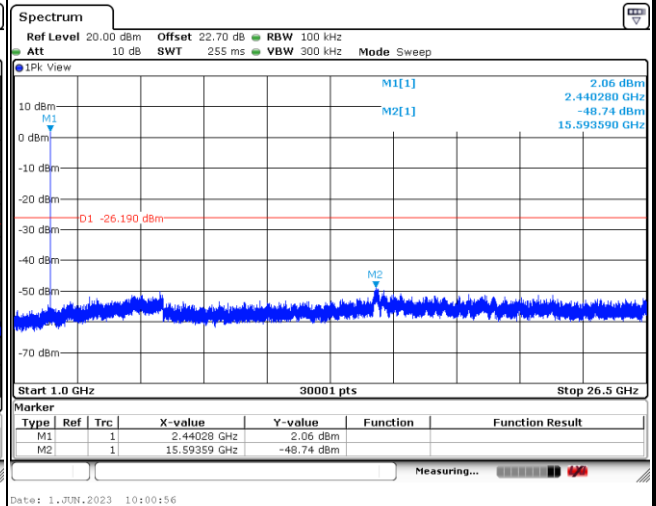


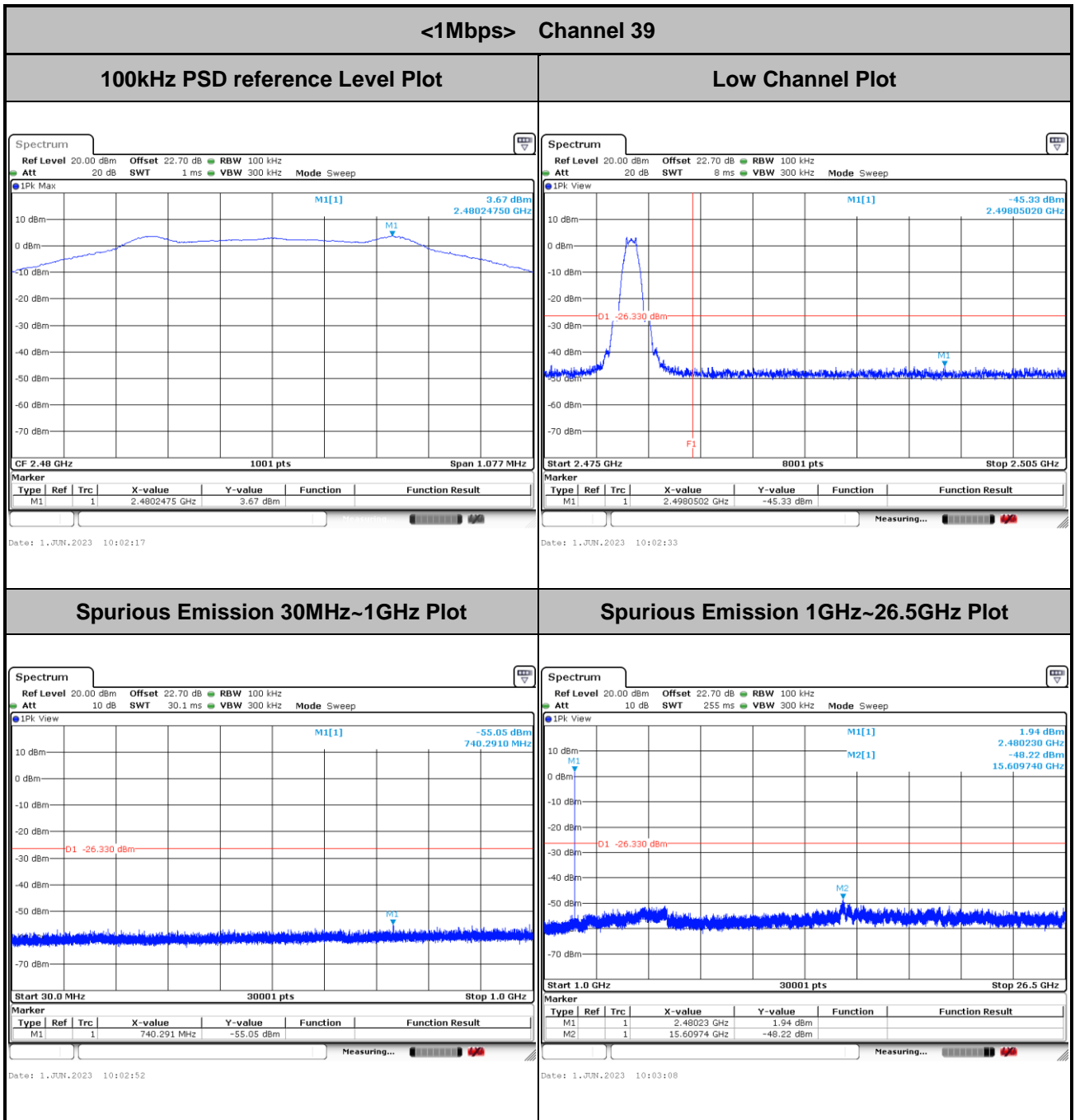
Low Channel Plot

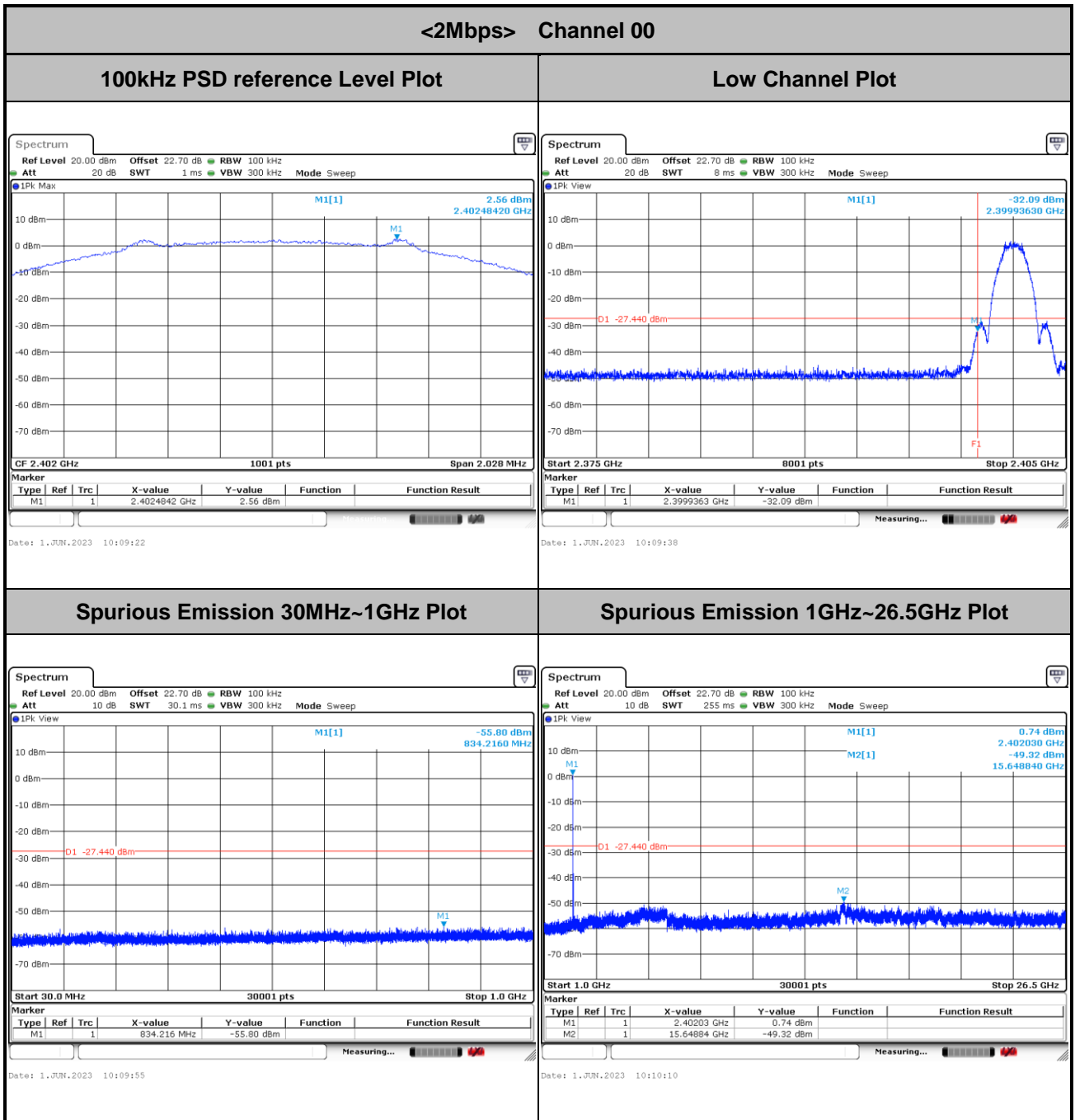
Spurious Emission 30MHz~1GHz Plot



Spurious Emission 1GHz~26.5GHz Plot



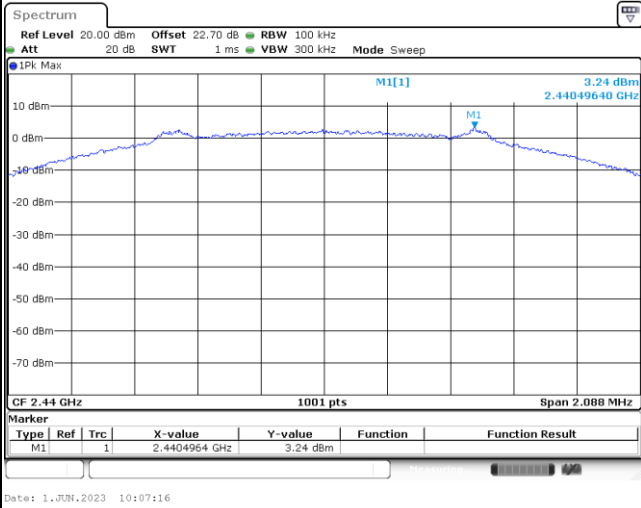






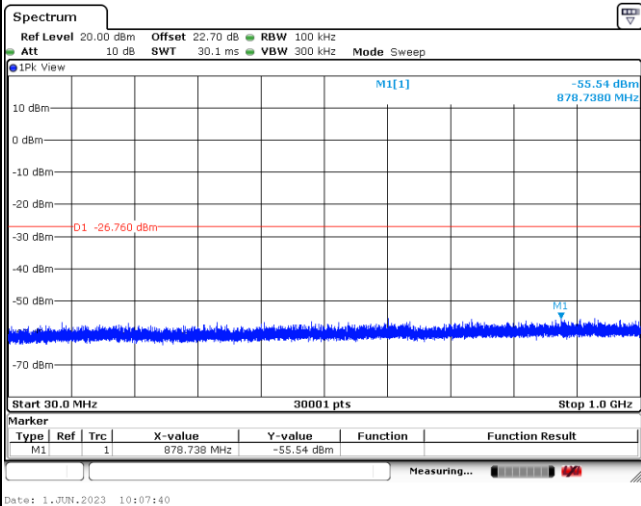
<2Mbps> Channel 19

100kHz PSD reference Level Plot

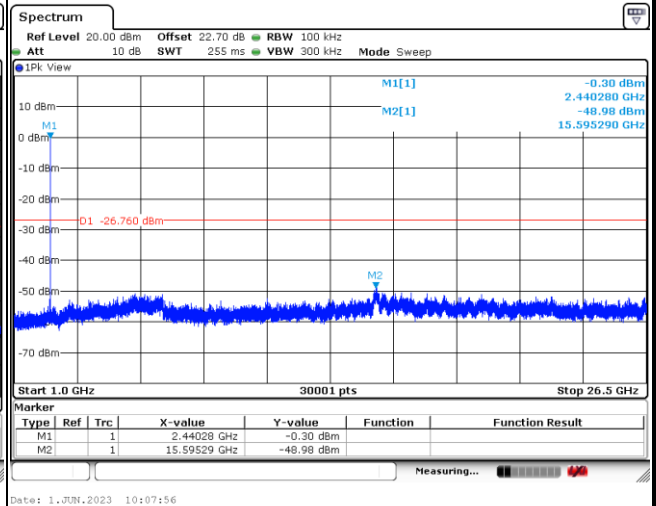


Low Channel Plot

Spurious Emission 30MHz~1GHz Plot



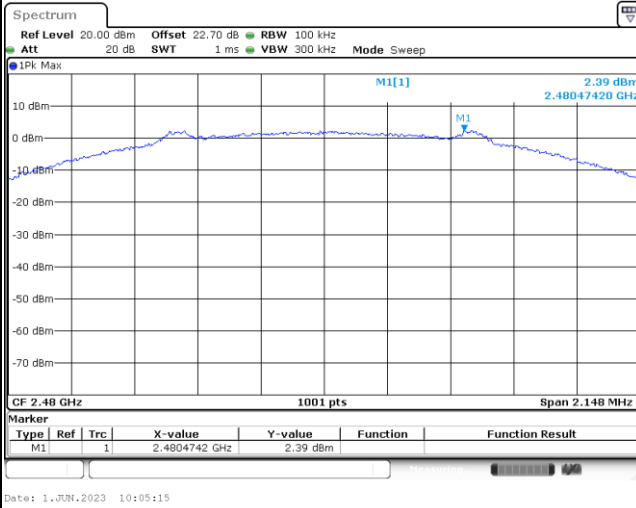
Spurious Emission 1GHz~26.5GHz Plot



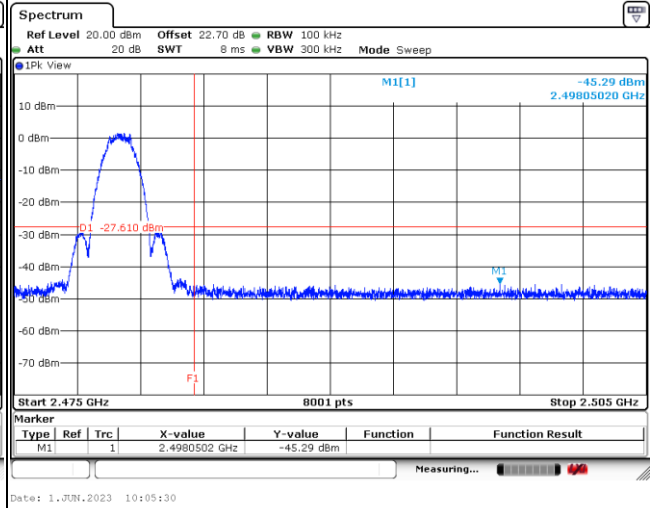


<2Mbps> Channel 39

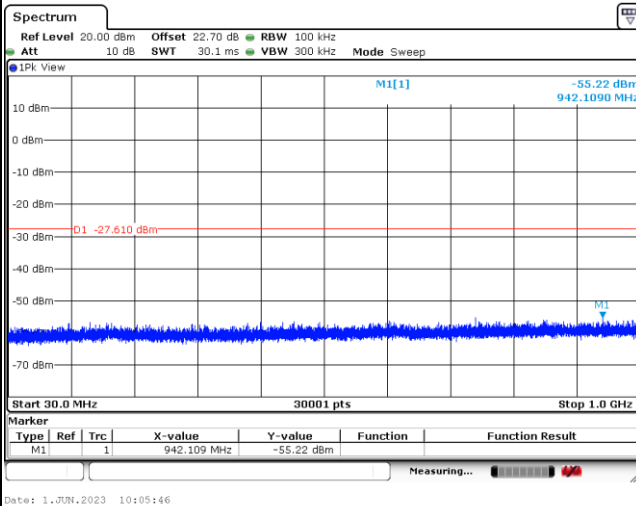
100kHz PSD reference Level Plot



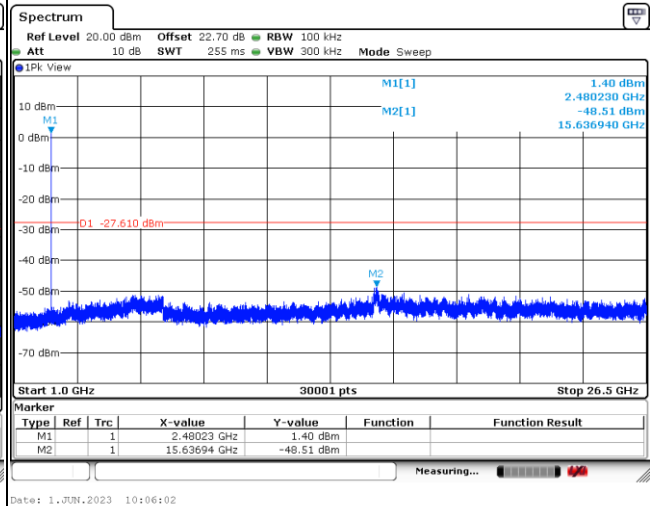
Low Channel Plot



Spurious Emission 30MHz~1GHz Plot



Spurious Emission 1GHz~26.5GHz Plot





## Appendix B. AC Conducted Emission Test Results

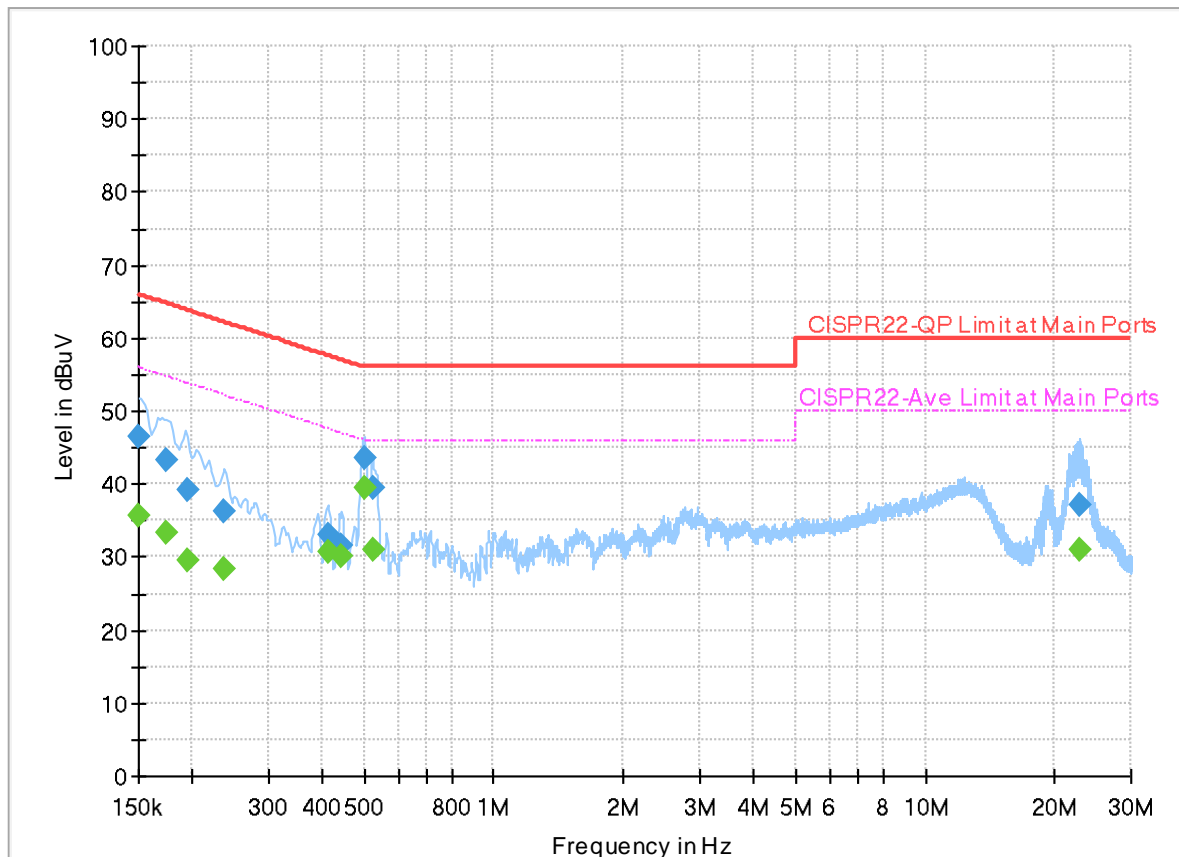
Test Engineer :	Louis Chung	Temperature :	21.4~24°C
		Relative Humidity :	60~67.2%



## EUT Information

Report NO : 341401  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

Full Spectrum



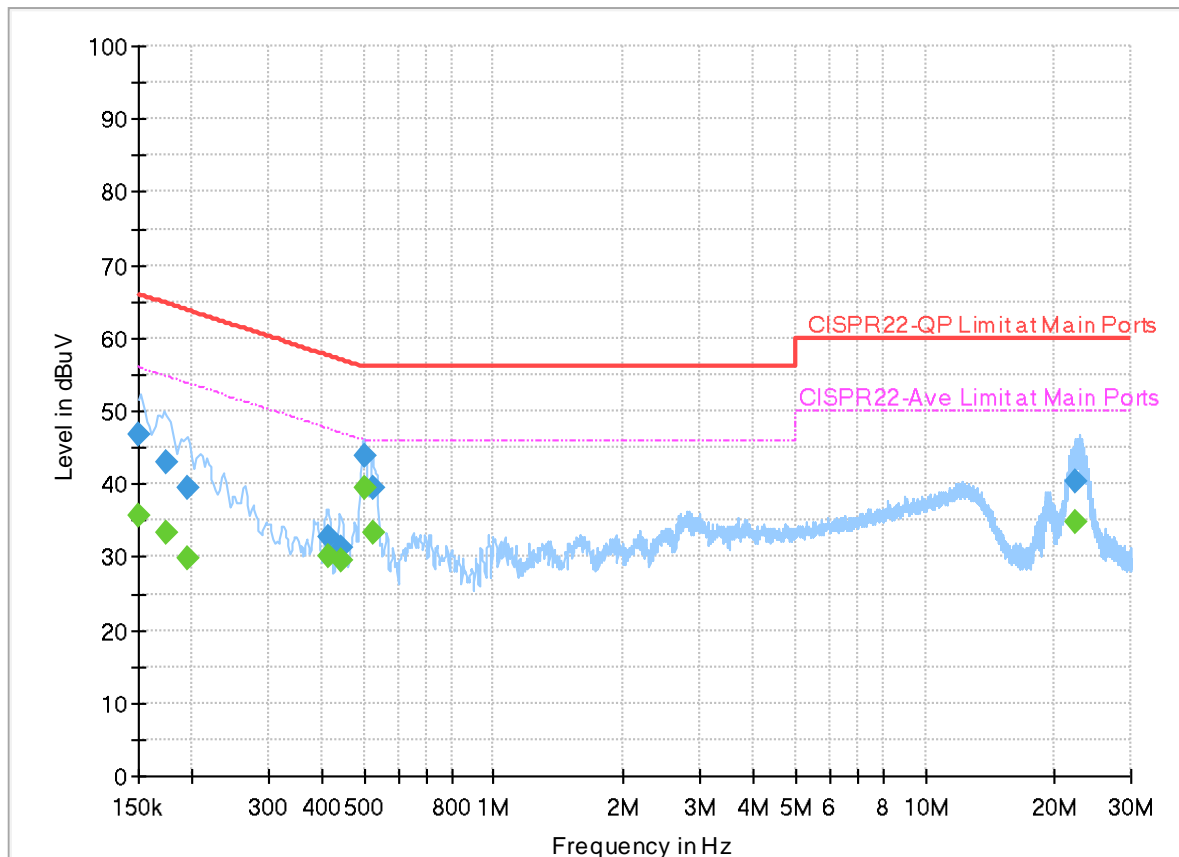
## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150473	---	35.55	55.97	20.42	L1	OFF	19.9
0.150473	46.62	---	65.97	19.35	L1	OFF	19.9
0.174390	---	33.39	54.75	21.36	L1	OFF	19.9
0.174390	43.26	---	64.75	21.49	L1	OFF	19.9
0.195720	---	29.61	53.79	24.18	L1	OFF	19.9
0.195720	39.19	---	63.79	24.60	L1	OFF	19.9
0.235590	---	28.41	52.25	23.84	L1	OFF	20.0
0.235590	36.19	---	62.25	26.06	L1	OFF	20.0
0.413700	---	30.74	47.57	16.83	L1	OFF	20.0
0.413700	32.90	---	57.57	24.67	L1	OFF	20.0
0.442680	---	30.13	47.01	16.88	L1	OFF	20.0
0.442680	31.53	---	57.01	25.48	L1	OFF	20.0
0.501720	---	39.57	46.00	6.43	L1	OFF	20.0
0.501720	43.58	---	56.00	12.42	L1	OFF	20.0
0.523320	---	30.96	46.00	15.04	L1	OFF	20.0
0.523320	39.52	---	56.00	16.48	L1	OFF	20.0
22.722000	---	31.11	50.00	18.89	L1	OFF	20.2
22.722000	37.01	---	60.00	22.99	L1	OFF	20.2

## EUT Information

Report NO : 341401  
 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)
0.150000	---	35.80	56.00	20.20	N	OFF	20.0
0.150000	46.74	---	66.00	19.26	N	OFF	20.0
0.174300	---	33.35	54.75	21.40	N	OFF	20.0
0.174300	42.85	---	64.75	21.90	N	OFF	20.0
0.194370	---	29.75	53.85	24.10	N	OFF	20.0
0.194370	39.46	---	63.85	24.39	N	OFF	20.0
0.412080	---	30.11	47.61	17.50	N	OFF	20.0
0.412080	32.74	---	57.61	24.87	N	OFF	20.0
0.443850	---	29.55	46.99	17.44	N	OFF	20.0
0.443850	31.43	---	56.99	25.56	N	OFF	20.0
0.500010	---	39.40	46.00	6.60	N	OFF	20.0
0.500010	43.82	---	56.00	12.18	N	OFF	20.0
0.525750	---	33.39	46.00	12.61	N	OFF	20.0
0.525750	39.36	---	56.00	16.64	N	OFF	20.0
22.275510	---	34.84	50.00	15.16	N	OFF	20.2
22.275510	40.41	---	60.00	19.59	N	OFF	20.2



## Appendix C. Radiated Spurious Emission

Test Engineer :	Wen-Kai Lu, Michael Liu and Bank Lin	Temperature :	18.1~23.5°C
		Relative Humidity :	55.8~70.3%



<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Margin	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		2384.13	51.49	-22.51	74	38.08	26.9	18.97	32.46	118	119	P	H	
		2374.995	39.97	-14.03	54	26.57	26.9	18.95	32.45	118	119	A	H	
	*	2402	100.88	-	-	87.45	26.9	19	32.47	118	119	P	H	
	*	2402	100.32	-	-	86.89	26.9	19	32.47	118	119	A	H	
													H	
													H	
			2367.75	51.24	-22.76	74	37.85	26.9	18.94	32.45	400	53	P	V
			2390	40.09	-13.91	54	26.68	26.9	18.98	32.47	400	53	A	V
	*		2402	103.31	-	-	89.88	26.9	19	32.47	400	53	P	V
	*		2402	102.78	-	-	89.35	26.9	19	32.47	400	53	A	V
													V	
												V		
BLE CH 39 2480MHz	*	2480	100.06	-	-	86.49	26.94	19.16	32.53	107	116	P	H	
	*	2480	99.5	-	-	85.93	26.94	19.16	32.53	107	116	A	H	
			2483.64	51.8	-22.2	74	38.24	26.93	19.16	32.53	107	116	P	H
			2483.52	41.75	-12.25	54	28.19	26.93	19.16	32.53	107	116	A	H
													H	
													H	
	*		2480	102.22	-	-	88.65	26.94	19.16	32.53	372	42	P	V
	*		2480	101.69	-	-	88.12	26.94	19.16	32.53	372	42	A	V
			2483.72	53.44	-20.56	74	39.88	26.93	19.16	32.53	372	42	P	V
			2483.52	42.77	-11.23	54	29.21	26.93	19.16	32.53	372	42	A	V
													V	
												V		
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.													



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

Table with 14 columns: BLE, Note, Frequency (MHz), Level (dBμV/m), Margin (dB), Limit Line (dBμV/m), Read Level (dBμV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for BLE CH 00 2402MHz at various frequencies like 3000, 3060, 3255, etc.



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( 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		3000	46.63	-27.37	74	38.59	28.3	12.34	32.6	101	200	P	H	
		3060	54.45	-19.55	74	46.71	28.2	12.21	32.67	122	228	P	H	
		3195	42.63	-31.37	74	35.43	28.1	11.92	32.82	100	88	P	H	
		3255	46.72	-27.28	74	39.66	28	11.95	32.89	107	178	P	H	
		4880	45.78	-28.22	74	32.29	32.6	14.46	33.57	-	-	P	H	
		7320	58.86	-15.14	74	40.29	37.94	16.58	35.95	101	107	P	H	
		7320	52.68	-1.32	54	34.11	37.94	16.58	35.95	101	107	A	H	
														H
														H
														H
														H
														H
														H
			3000	45.15	-28.85	74	37.11	28.3	12.34	32.6	100	201	P	V
			3060	55.37	-18.63	74	47.63	28.2	12.21	32.67	121	235	P	V
			3180	44.7	-29.3	74	37.45	28.1	11.95	32.8	106	198	P	V
			3255	48.29	-25.71	74	41.23	28	11.95	32.89	101	256	P	V
			4880	47.44	-26.56	74	33.95	32.6	14.46	33.57	-	-	P	V
			7320	55.56	-18.44	74	36.99	37.94	16.58	35.95	400	168	P	V
			7320	47.56	-6.44	54	28.99	37.94	16.58	35.95	400	168	A	V
													V	
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( 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		3000	46.45	-27.55	74	38.41	28.3	12.34	32.6	108	197	P	H	
		3060	54.57	-19.43	74	46.83	28.2	12.21	32.67	119	248	P	H	
		3255	45.17	-28.83	74	38.11	28	11.95	32.89	101	177	P	H	
		4960	47.55	-26.45	74	34.01	32.7	14.4	33.56	-	-	P	H	
		7440	58.9	-15.1	74	40.24	37.82	16.88	36.04	101	108	P	H	
		7440	52.92	-1.08	54	34.26	37.82	16.88	36.04	101	108	A	H	
														H
														H
														H
														H
														H
														H
														H
			3000	45.31	-28.69	74	37.27	28.3	12.34	32.6	105	207	P	V
			3060	56.3	-17.7	74	48.56	28.2	12.21	32.67	122	201	P	V
			3255	47.69	-26.31	74	40.63	28	11.95	32.89	106	264	P	V
			4960	47.24	-26.76	74	33.7	32.7	14.4	33.56	-	-	P	V
			7440	55.38	-18.62	74	36.72	37.82	16.88	36.04	245	71	P	V
			7440	47.43	-6.57	54	28.77	37.82	16.88	36.04	245	71	A	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 above 18GHz

2.4GHz BLE (SHF)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		( MHz )	( dBμV/m )	( dB )	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
					( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BLE SHF		20002	53.93	-20.07	74	60.95	37.9	18.08	63	192	230	P	H	
		20002	51.81	-2.19	54	58.83	37.9	18.08	63	192	230	A	H	
		20625	44.66	-29.34	74	50.51	38.4	18.27	62.52	-	-	P	H	
		21997	48.95	-25.05	74	52.68	38.7	18.77	61.2	-	-	P	H	
		22060	45.78	-28.22	74	49.38	38.63	18.89	61.12	-	-	P	H	
		22998	46.67	-27.33	74	47.56	39	20.81	60.7	-	-	P	H	
		23061	48.34	-25.66	74	49.13	38.98	20.83	60.6	-	-	P	H	
														H
														H
														H
														H
														H
			20002	51.25	-22.75	74	58.27	37.9	18.08	63	204	26	P	V
			20002	47.83	-6.17	54	54.85	37.9	18.08	63	204	26	A	V
			20625	44.98	-29.02	74	50.83	38.4	18.27	62.52	-	-	P	V
			21997	47.5	-26.5	74	51.23	38.7	18.77	61.2	-	-	P	V
			22060	43.58	-30.42	74	47.18	38.63	18.89	61.12	-	-	P	V
			22998	46.81	-27.19	74	47.7	39	20.81	60.7	-	-	P	V
			23061	46.6	-27.4	74	47.39	38.98	20.83	60.6	-	-	P	V
														V
													V	
													V	
													V	
													V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.													





Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		( MHz )	( dBµV/m )	( dB )	( dBµV/m )	( dBµV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BLE LF		31.94	22.07	-17.93	40	29.85	23.94	1.05	32.77	-	-	P	H	
		199.75	20.18	-23.32	43.5	34.95	14.95	2.99	32.71	-	-	P	H	
		369.5	25.58	-20.42	46	33.92	20.59	3.87	32.8	-	-	P	H	
		574.17	28.61	-17.39	46	30.87	25.85	4.84	32.95	-	-	P	H	
		777.87	31.98	-14.02	46	31.05	28.04	5.56	32.67	-	-	P	H	
		950.53	35.62	-10.38	46	30.01	31.02	6.1	31.51	-	-	P	H	
														H
														H
														H
														H
														H
														H
			30	25.21	-14.79	40	31.75	25.2	1.03	32.77	-	-	P	V
			73.65	22.76	-17.24	40	40.96	12.57	1.95	32.72	-	-	P	V
			93.05	22.33	-21.17	43.5	37.58	15.3	2.15	32.7	-	-	P	V
			559.62	28.96	-17.04	46	30.94	26.18	4.78	32.94	-	-	P	V
			755.56	32.14	-13.86	46	31.29	28.1	5.47	32.72	-	-	P	V
			957.32	36.21	-9.79	46	30.27	31.25	6.14	31.45	-	-	P	V
														V
														V
													V	
													V	
													V	
													V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.													



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Margin	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		2363.445	50.8	-23.2	74	37.42	26.9	18.93	32.45	119	119	P	H	
		2374.995	40.03	-13.97	54	26.63	26.9	18.95	32.45	119	119	A	H	
	*	2402	101.4	-	-	87.97	26.9	19	32.47	119	119	P	H	
	*	2402	99.98	-	-	86.55	26.9	19	32.47	119	119	A	H	
													H	
													H	
			2320.395	50.97	-23.03	74	37.64	26.9	18.85	32.42	400	50	P	V
			2389.695	40.1	-13.9	54	26.68	26.9	18.98	32.46	400	50	A	V
	*		2402	103.6	-	-	90.17	26.9	19	32.47	400	50	P	V
	*		2402	102.21	-	-	88.78	26.9	19	32.47	400	50	A	V
													V	
													V	
BLE CH 19 2440MHz		2385.04	50.96	-23.04	74	37.55	26.9	18.97	32.46	105	111	P	H	
		2390	39.65	-14.35	54	26.24	26.9	18.98	32.47	105	111	A	H	
	*	2440	99.86	-	-	86.3	26.98	19.08	32.5	105	111	P	H	
	*	2440	98.47	-	-	84.91	26.98	19.08	32.5	105	111	A	H	
			2498	51.07	-22.93	74	37.52	26.9	19.19	32.54	105	111	P	H
			2499.92	40.18	-13.82	54	26.63	26.9	19.19	32.54	105	111	A	H
			2384.72	50.67	-23.33	74	37.26	26.9	18.97	32.46	343	43	P	V
			2374.96	39.82	-14.18	54	26.42	26.9	18.95	32.45	343	43	A	V
	*		2440	102.57	-	-	89.01	26.98	19.08	32.5	343	43	P	V
	*		2440	101.2	-	-	87.64	26.98	19.08	32.5	343	43	A	V
			2486.16	52.01	-21.99	74	38.44	26.93	19.17	32.53	343	43	P	V
			2499.92	41.19	-12.81	54	27.64	26.9	19.19	32.54	343	43	A	V



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( 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)
<b>BLE CH 39 2480MHz</b>	*	2480	99.34	-	-	85.77	26.94	19.16	32.53	107	121	P	H
	*	2480	97.96	-	-	84.39	26.94	19.16	32.53	107	121	A	H
		2483.52	53.39	-20.61	74	39.83	26.93	19.16	32.53	107	121	P	H
		2483.52	44.63	-9.37	54	31.07	26.93	19.16	32.53	107	121	A	H
													H
													H
	*	2480	102.46	-	-	88.89	26.94	19.16	32.53	370	43	P	V
	*	2480	101.12	-	-	87.55	26.94	19.16	32.53	370	43	A	V
		2483.56	54.92	-19.08	74	41.36	26.93	19.16	32.53	370	43	P	V
		2483.52	46.76	-7.24	54	33.2	26.93	19.16	32.53	370	43	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 )	Margin ( 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		3000	47.69	-26.31	74	39.65	28.3	12.34	32.6	103	241	P	H	
		3060	55.59	-18.41	74	47.85	28.2	12.21	32.67	119	201	P	H	
		3255	45.48	-28.52	74	38.42	28	11.95	32.89	105	209	P	H	
		4804	45.79	-28.21	74	32.45	32.42	14.51	33.59	-	-	P	H	
		7206	59.26	-14.74	74	41.18	37.54	16.41	35.87	100	106	P	H	
														H
														H
														H
														H
														H
														H
														H
			3000	45.62	-28.38	74	37.58	28.3	12.34	32.6	100	231	P	V
			3060	55.86	-18.14	74	48.12	28.2	12.21	32.67	121	211	P	V
			3255	47.29	-26.71	74	40.23	28	11.95	32.89	103	223	P	V
			4804	45.63	-28.37	74	32.29	32.42	14.51	33.59	-	-	P	V
			7206	55.7	-18.3	74	37.62	37.54	16.41	35.87	225	74	P	V
														V
														V
														V
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( 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		3000	47.81	-26.19	74	39.77	28.3	12.34	32.6	100	211	P	H	
		3060	55.56	-18.44	74	47.82	28.2	12.21	32.67	113	202	P	H	
		3180	44.61	-29.39	74	37.36	28.1	11.95	32.8	103	110	P	H	
		3255	46	-28	74	38.94	28	11.95	32.89	101	200	P	H	
		4880	47	-27	74	33.51	32.6	14.46	33.57	-	-	P	H	
		7320	58.95	-15.05	74	40.38	37.94	16.58	35.95	100	106	P	H	
		7320	52.04	-1.96	54	33.47	37.94	16.58	35.95	100	106	A	H	
														H
														H
														H
														H
														H
														H
			3000	46.95	-27.05	74	38.91	28.3	12.34	32.6	101	233	P	V
			3060	56.3	-17.7	74	48.56	28.2	12.21	32.67	121	233	P	V
			3255	47.29	-26.71	74	40.23	28	11.95	32.89	100	210	P	V
			4880	46.79	-27.21	74	33.3	32.6	14.46	33.57	-	-	P	V
			7320	55.54	-18.46	74	36.97	37.94	16.58	35.95	400	169	P	V
			7320	46.74	-7.26	54	28.17	37.94	16.58	35.95	400	169	A	V
														V
													V	
													V	
													V	
													V	
													V	



BLE	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( 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		3000	48.3	-25.7	74	40.26	28.3	12.34	32.6	103	222	P	H	
		3060	55.55	-18.45	74	47.81	28.2	12.21	32.67	100	202	P	H	
		3255	45.73	-28.27	74	38.67	28	11.95	32.89	101	212	P	H	
		4960	46.92	-27.08	74	33.38	32.7	14.4	33.56	-	-	P	H	
		7440	59.27	-14.73	74	40.61	37.82	16.88	36.04	100	107	P	H	
		7440	52.56	-1.44	54	33.9	37.82	16.88	36.04	100	107	A	H	
														H
														H
														H
														H
														H
														H
														H
			3000	47.61	-26.39	74	39.57	28.3	12.34	32.6	113	109	P	V
			3060	56.71	-17.29	74	48.97	28.2	12.21	32.67	132	77	P	V
			3180	45.04	-28.96	74	37.79	28.1	11.95	32.8	100	232	P	V
			3255	47.42	-26.58	74	40.36	28	11.95	32.89	127	111	P	V
			4960	46.11	-27.89	74	32.57	32.7	14.4	33.56	-	-	P	V
			7440	55.46	-18.54	74	36.8	37.82	16.88	36.04	235	69	P	V
			7440	47.16	-6.84	54	28.5	37.82	16.88	36.04	235	69	A	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 above 18GHz

2.4GHz BLE (SHF)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		( MHz )	( dBμV/m )	( dB )	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
					( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BLE SHF		20002	53.46	-20.54	74	60.48	37.9	18.08	63	192	231	P	H	
		20002	51.92	-2.08	54	58.94	37.9	18.08	63	192	231	A	H	
		20625	44.38	-29.62	74	50.23	38.4	18.27	62.52	-	-	P	H	
		21997	49.65	-24.35	74	53.38	38.7	18.77	61.2	-	-	P	H	
		22060	43.79	-30.21	74	47.39	38.63	18.89	61.12	-	-	P	H	
		22998	46.58	-27.42	74	47.47	39	20.81	60.7	-	-	P	H	
		23061	47.97	-26.03	74	48.76	38.98	20.83	60.6	-	-	P	H	
														H
														H
														H
														H
														H
														H
			20002	51.43	-22.57	74	58.45	37.9	18.08	63	201	29	P	V
			20002	47.77	-6.23	54	54.79	37.9	18.08	63	201	29	A	V
			20625	44.87	-29.13	74	50.72	38.4	18.27	62.52	-	-	P	V
			21997	47.03	-26.97	74	50.76	38.7	18.77	61.2	-	-	P	V
			22060	44.52	-29.48	74	48.12	38.63	18.89	61.12	-	-	P	V
			22998	48.5	-25.5	74	49.39	39	20.81	60.7	-	-	P	V
			23061	47.66	-26.34	74	48.45	38.98	20.83	60.6	-	-	P	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 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	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		( MHz )	( dBµV/m )	( dB )	( dBµV/m )	( dBµV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BLE LF		30.97	23.27	-16.73	40	30.38	24.62	1.04	32.77	-	-	P	H	
		199.75	20.37	-23.13	43.5	35.14	14.95	2.99	32.71	-	-	P	H	
		555.74	28.74	-17.26	46	30.96	25.94	4.77	32.93	-	-	P	H	
		703.18	30.29	-15.71	46	31.41	26.5	5.22	32.84	-	-	P	H	
		878.75	34.49	-11.51	46	31.77	28.95	5.91	32.14	-	-	P	H	
		952.47	35.32	-10.68	46	29.61	31.1	6.11	31.5	-	-	P	H	
														H
														H
														H
														H
														H
														H
			30	25.76	-14.24	40	32.3	25.2	1.03	32.77	-	-	P	V
			92.08	22.03	-21.47	43.5	37.58	15.02	2.13	32.7	-	-	P	V
			385.99	23.01	-22.99	46	30.71	21.16	3.95	32.81	-	-	P	V
			568.35	28.92	-17.08	46	30.92	26.13	4.81	32.94	-	-	P	V
			815.7	32.12	-13.88	46	31.11	27.8	5.73	32.52	-	-	P	V
			959.26	35.99	-10.01	46	29.98	31.29	6.15	31.43	-	-	P	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 limit line.</li> <li>The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.</li> </ol>													





**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>Margin</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	Margin	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. Margin(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. Margin(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. Margin(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 :	Wen-Kai Lu, Michael Liu and Bank Lin	Temperature :	18.1~23.5°C
		Relative Humidity :	55.8~70.3%

### Note symbol

-L	Low channel location
-R	High channel location



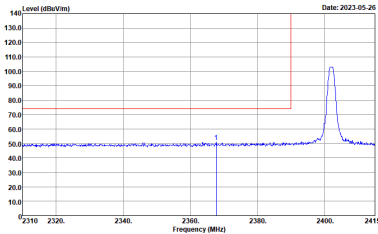
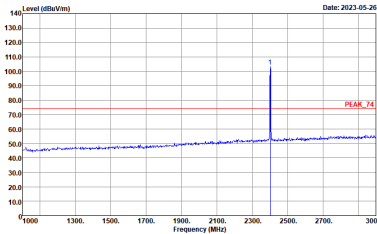
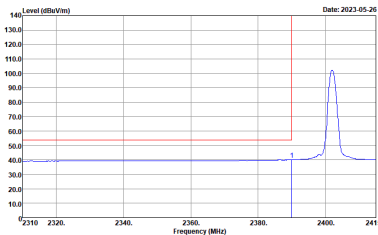
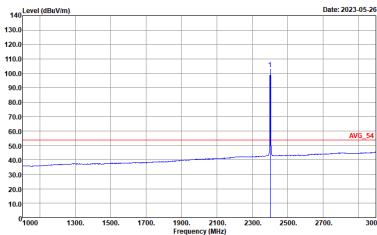
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2.4GHz 2400~2483.5MHz

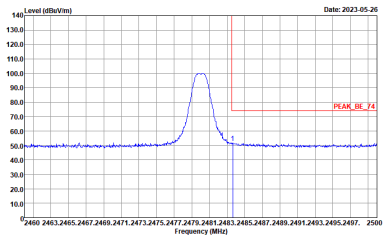
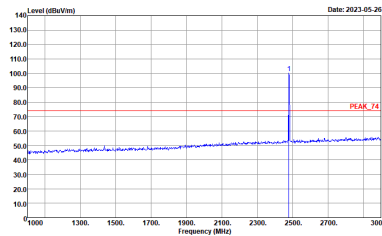
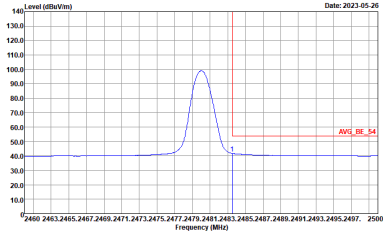
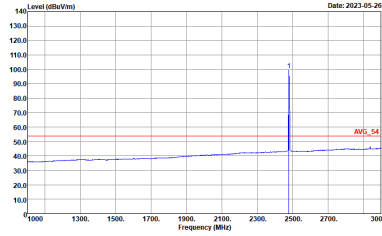
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	<p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	<p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

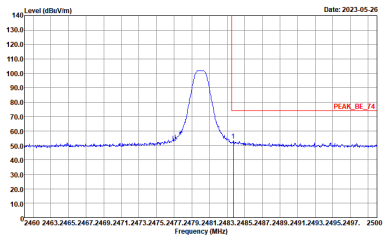
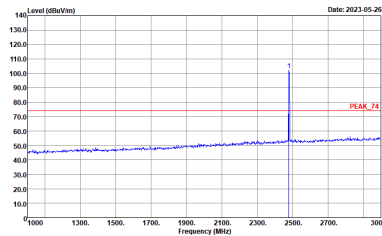
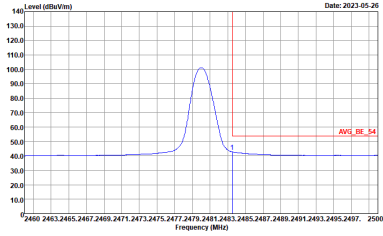
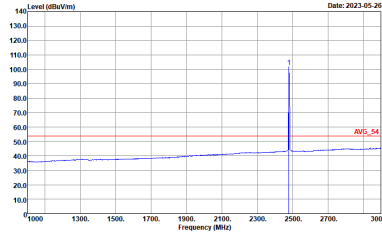


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH00 2402MHz		
Vertical		Fundamental
Peak	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
Horizontal		Fundamental
Peak	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

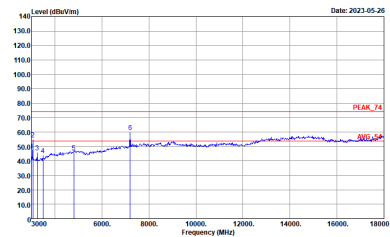
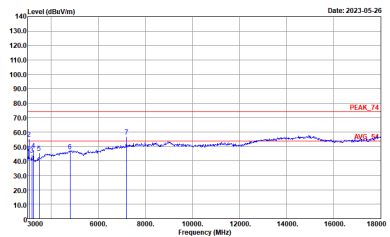


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



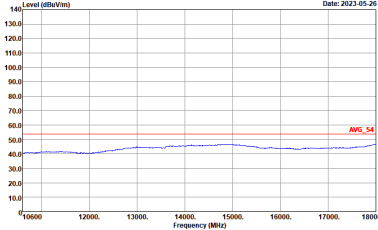
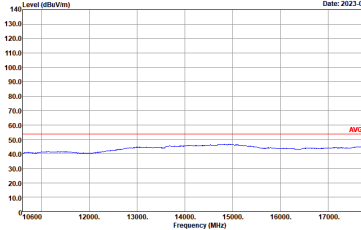
2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 HORIZONTAL</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 VERTICAL</p>



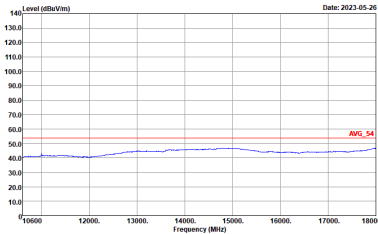
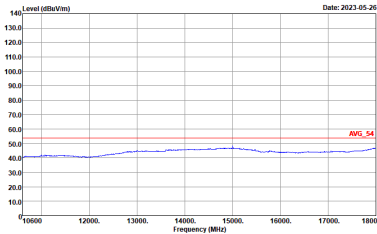


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
<p>10.6G ~18G Avg.</p>	<p data-bbox="432 454 810 470">Date: 2023-05-26</p>  <p data-bbox="432 689 710 719">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 HORIZONTAL</p>	<p data-bbox="906 454 1268 470">Date: 2023-05-26</p>  <p data-bbox="906 689 1168 719">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 VERTICAL</p>

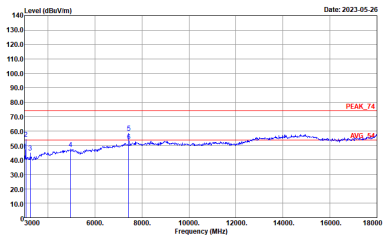
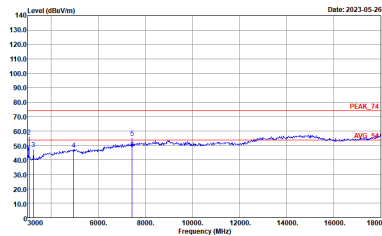


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 HORIZONTAL</p>	<p>Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 VERTICAL</p>

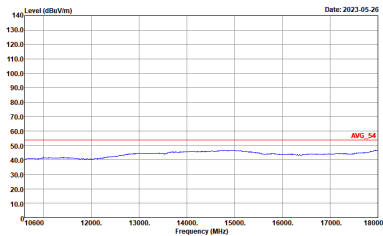
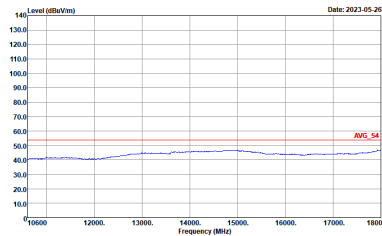


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
BLE CH19 2440MHz		
	Horizontal	Vertical
<p>10.6G ~18G Avg.</p>	<p data-bbox="432 450 810 470">Date: 2023-05-26</p>  <p data-bbox="432 685 710 712">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 HORIZONTAL</p>	<p data-bbox="906 450 1284 470">Date: 2023-05-26</p>  <p data-bbox="906 685 1168 712">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak	 <p data-bbox="430 683 813 728">Date: 2023-05-26 Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 HORIZONTAL</p>	 <p data-bbox="901 683 1284 728">Date: 2023-05-26 Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
BLE CH39 2480MHz		
Horizontal		Vertical
<p>10.6G ~18G Avg.</p>	 <p>Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 HORIZONTAL</p>	 <p>Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 VERTICAL</p>



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

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH22-HY Condition : PEAK_74 1m SHF_1223_220705 HORIZONTAL</p>	<p>Site : 03CH22-HY Condition : PEAK_74 1m SHF_1223_220705 VERTICAL</p>



Emission below 1GHz

2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	<p>Site : 03CH22-1Y Condition : QP 3m BIL06_63304_221004 HORIZONTAL</p>	<p>Site : 03CH22-1Y Condition : QP 3m BIL06_63304_221004 VERTICAL</p>



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

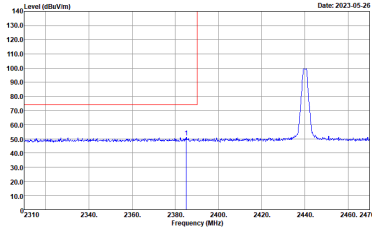
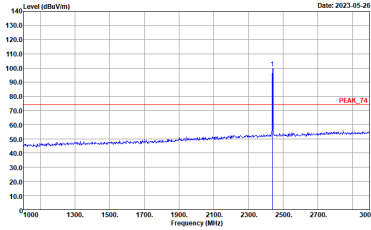
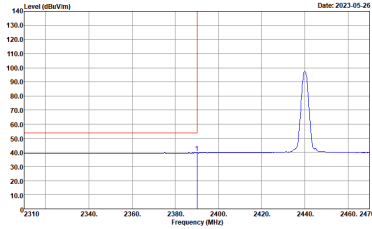
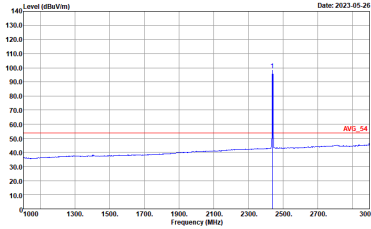
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH00 2402MHz		
	Horizontal	Fundamental
Peak	<p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	<p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



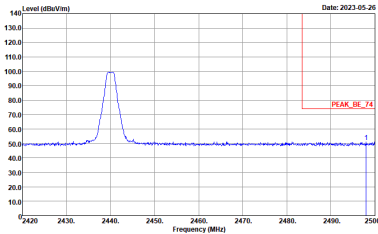
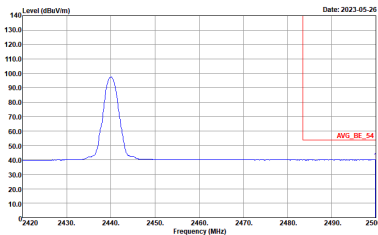


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	<p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg	<p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	<p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

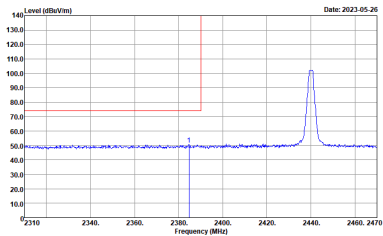
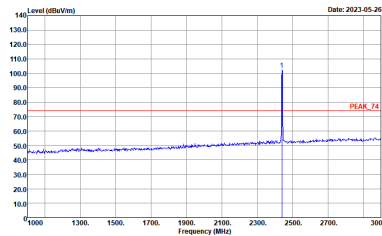
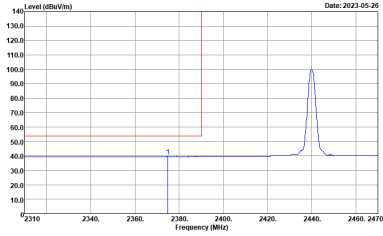
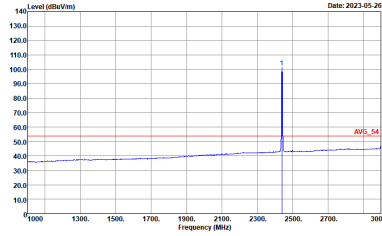


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - L		
Horizontal		Fundamental
Peak	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LE2004A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : PEAK_74 3m LE2004A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LE2004A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : AVG_54 3m LE2004A18EN_220706 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

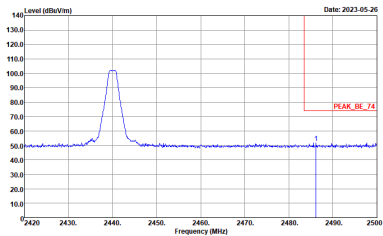
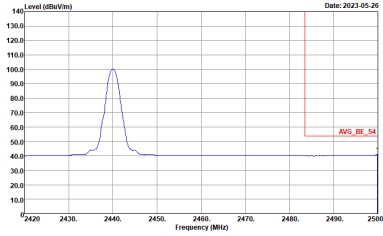


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Horizontal	Fundamental
<b>Peak</b>	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A1BEN_220706 HORIZONTAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank
<b>Avg.</b>	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A1BEN_220706 HORIZONTAL RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	Left blank

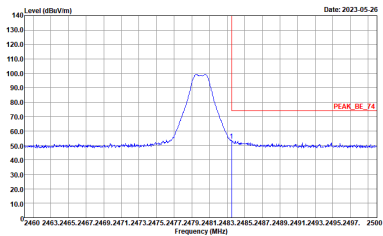
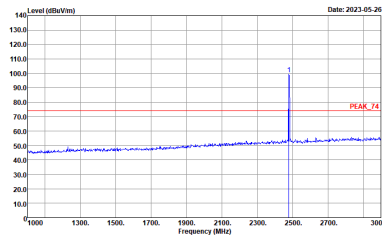
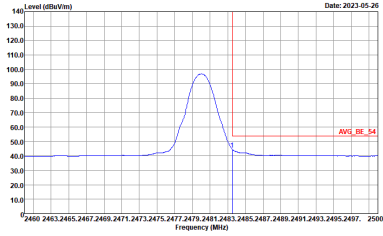
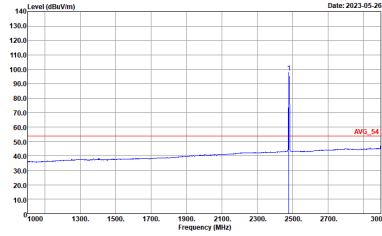


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - L		
Vertical		Fundamental
Peak	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	 <p>Date: 2023-05-26</p> <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

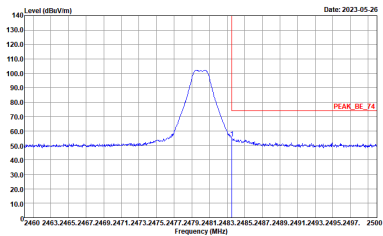
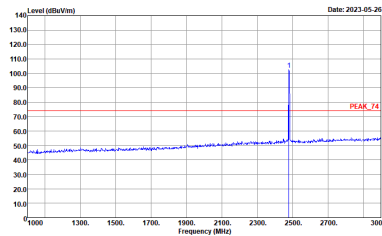
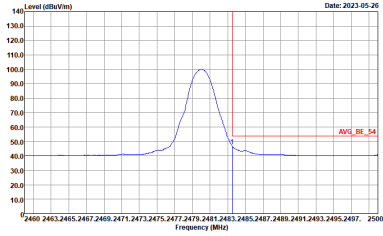
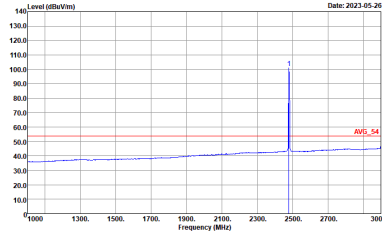


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Vertical	Fundamental
Peak	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZCO4A1BEN_220706 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank
Avg.	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZCO4A1BEN_220706 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
Vertical		Fundamental
Peak	 <p>Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_220706 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



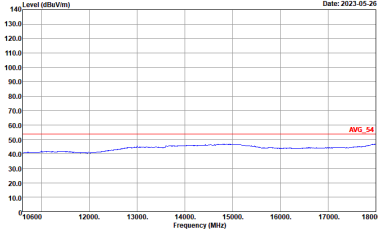
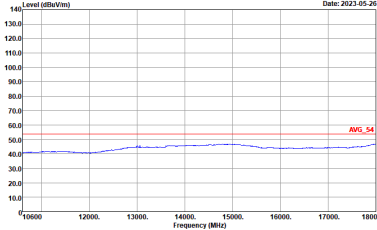
2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

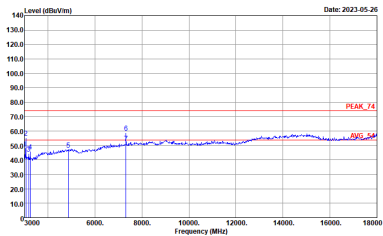
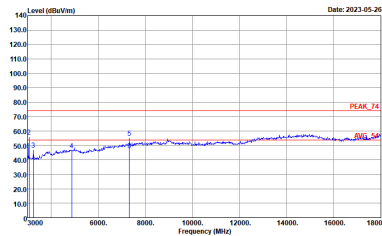
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH22-HY Condition : PEAK_74 3m LE2CD4A18EN_220706 HORIZONTAL</p>	<p>Site : 03CH22-HY Condition : PEAK_74 3m LE2CD4A18EN_220706 VERTICAL</p>



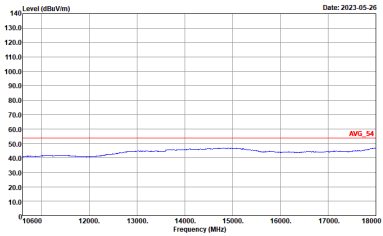
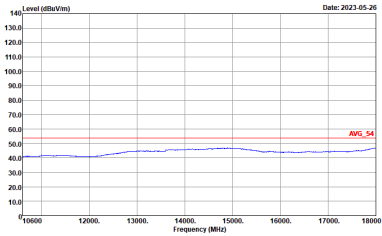


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
<p>10.6G ~18G Avg.</p>	<p data-bbox="432 454 810 470">Date: 2023-05-26</p>  <p data-bbox="432 689 710 719">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 HORIZONTAL</p>	<p data-bbox="906 454 1284 470">Date: 2023-05-26</p>  <p data-bbox="906 689 1168 719">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 VERTICAL</p>

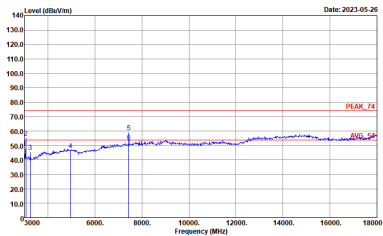
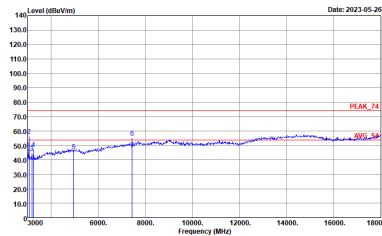


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
BLE CH19 2440MHz		
Horizontal		Vertical
Peak Avg.	 <p data-bbox="430 683 813 728">Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 HORIZONTAL</p>	 <p data-bbox="901 683 1284 728">Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 VERTICAL</p>

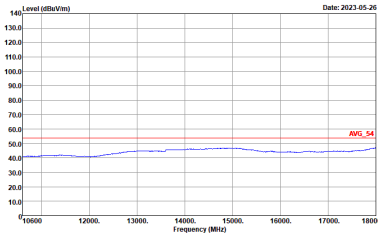
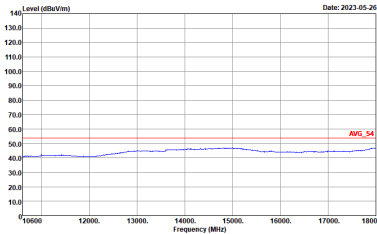


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
BLE CH19 2440MHz		
Horizontal		Vertical
<b>10.6G</b> <b>~18G</b> <b>Avg.</b>	 <p>Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 HORIZONTAL</p>	 <p>Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
<b>Peak</b>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 HORIZONTAL</p>	 <p>Site : 03CH22-HY Condition : PEAK_74 3m LE2C04A1BEN_220706 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
<p>10.6G ~18G Avg.</p>	<p data-bbox="432 450 810 470">Date: 2023-05-26</p>  <p data-bbox="432 685 710 712">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 HORIZONTAL</p>	<p data-bbox="906 450 1284 470">Date: 2023-05-26</p>  <p data-bbox="906 685 1168 712">Site : 03CH22-HY Condition : AV6_54 3m LE2C04A18EN_220706 VERTICAL</p>



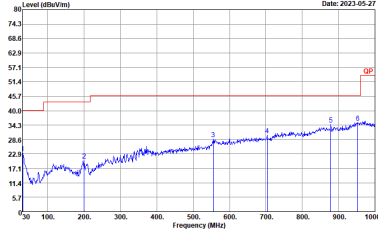
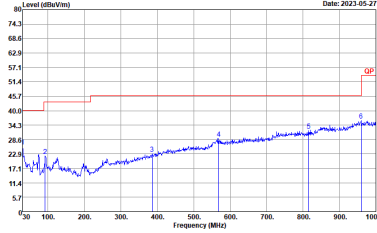
Emission above 18GHz  
2.4GHz BLE (SHF @ 1m)

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
Peak Avg.	<p>Horizontal spectrum plot showing Level (dBuV/m) vs Frequency (MHz) with markers for PEAK_74 and AVG_54. Site: 03CH22-1HY, Condition: PEAK_74 1m SHF_1223_220705 VERTICAL.</p>	<p>Vertical spectrum plot showing Level (dBuV/m) vs Frequency (MHz) with markers for PEAK_74 and AVG_54. Site: 03CH22-1HY, Condition: PEAK_74 1m SHF_1223_220705 HORIZONTAL.</p>



Emission below 1GHz

2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH22-1Y Condition : QP 3m BIL06_63304_221004 HORIZONTAL</p>	 <p>Site : 03CH22-1Y Condition : QP 3m BIL06_63304_221004 VERTICAL</p>



## Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth - LE for 1Mbps	100.00	-	-	10Hz
Bluetooth - LE for 2Mbps	100.00	-	-	10Hz

