



FCC RADIO TEST REPORT

FCC ID : ZAT-2651R3SIPA
Equipment : CC2651R3SIPA SimpleLink™ Multiprotocol 2.4-GHz Wireless System-in-Package Module with Integrated Antenna & 352-KB Memory
Brand Name : Texas Instruments
Model Name : CC2651R3SIPAT0MOUR
Marketing Name : CC2651R3SIPA SimpleLink™ Multiprotocol 2.4-GHz Wireless System-in-Package Module with Integrated Antenna & 352-KB Memory
Applicant : Texas Instruments Incorporated
12500 TI BLVD., Dallas, Texas, 75243
Manufacturer : Texas Instruments Incorporated
12500 TI BLVD., Dallas, Texas, 75243
Standard : FCC Part 15 Subpart C §15.247

The product was received on Apr. 26, 2022 and testing was performed from May 02, 2022 to Jun. 13, 2022. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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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	7.82 dB under the limit at 30.000 MHz
3.6	15.207	AC Conducted Emission	Pass	7.09 dB under the limit at 0.152 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Declaration of Conformity:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".

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: Michelle Chen



1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth LE (125 kbps, 500 kbps, 1Mbps, 2Mbps) and Zigbee (OQPSK DSSS1:8, 250 kbps)

Antenna Information				
	Brand	Antenna Type	Model	2.4 GHz Gain
1	Texas Instruments	Inverted F - PCB	Custom Antenna	3.3 dBi
2		CC2651R3SIPA integrated antenna – PCB	Custom Antenna	1.5 dBi
3	Ethertronics	Dipole	1000423	-0.6dBi
4	LSR	Rubber Whip / Dipole	001-0012	2dBi
5			080-0013	2dBi
6			080-0014	2dBi
7		PIFA	001-0016	2.5dBi
8			001-0021	2.5dBi
9		Laird	PCB	CAF94504
10	CAF9405			2dBi
11	Pulse	Ceramic Chip	W3006	3.2dBi
12	ACX	Multilayer Chip	AT3216-BR2R7HAA	0.5dBi
13			AT312-T2R4PAA	1.5dBi
14	TDK	Multilayer Ceramic Chip Antenna	ANT016008LCD2442MA1	1.6dBi
15			ANT016008LCD2442MA2	2.5dBi
16	Mitsubishi	Chip Antenna	AM03DP-ST01	1.6dBi
17	Material	Antenna Unit	UB18CP-100ST01	-1.0dBi
18	Taiyo Yuden	Chip Antenna / Helical Monopole	AF216M245001	1.5dBi
19		Chip Antenna / Monopole Type	AH212M245001	1.3dBi
20			AH316M245001	1.9dBi
21	Antenna Technology	Dipole	AA2402SPU	2.0dBi
22			AA2402RSPU	2.0dBi
23			AA2402A-UFLLP	2.0dBi
24			AA2402AU-UFLLP	2.0dBi



Antenna Information				
	Brand	Antenna Type	Model	2.4 GHz Gain
25	Staf	Mono-pole	1019-016	2.14dBi
26			1019-017	2.14dBi
27			1019-018	2.14dBi
28			1019-019	2.14dBi
29	Map Electronics	Rubber Whip	MEIWX-2411SAXX-2400	2.0dBi
30			MEIWX-2411RSXX-2400	2.0dBi
31			MEIWX-282XSAXX-2400	2.0dBi
32			MEIWX-282XRSXX-2400	2.0dBi
33			MEIWF-HP01RS2X-2400	2.0dBi
34	Yageo	Chip	ANT3216A063R2400A	1.69dBi
35	Mag Layers	Chip	LTA-3216-2G4S3-A1	1dBi
36	Scientific		LTA-3216-2G4S3-A3	2dBi
37	Advantech	Rubber Whip / Dipole	AN2450-5706RS	2.38dBi
38			R-AN2400-5701RS	3.3dBi

Remark:

1. The EUT uses the PCB antenna from Texas Instruments (Antenna #2)
2. The EUT's information above 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

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. CO05-HY, 03CH07-HY

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

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	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
Test Site No.	Sporton Site No. TH05-HY (TAF Code: 3786)
Remark	The Conducted test item subcontracted to Sporton International Inc. Wensan Laboratory

FCC designation No.: TW1190 and 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 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.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

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



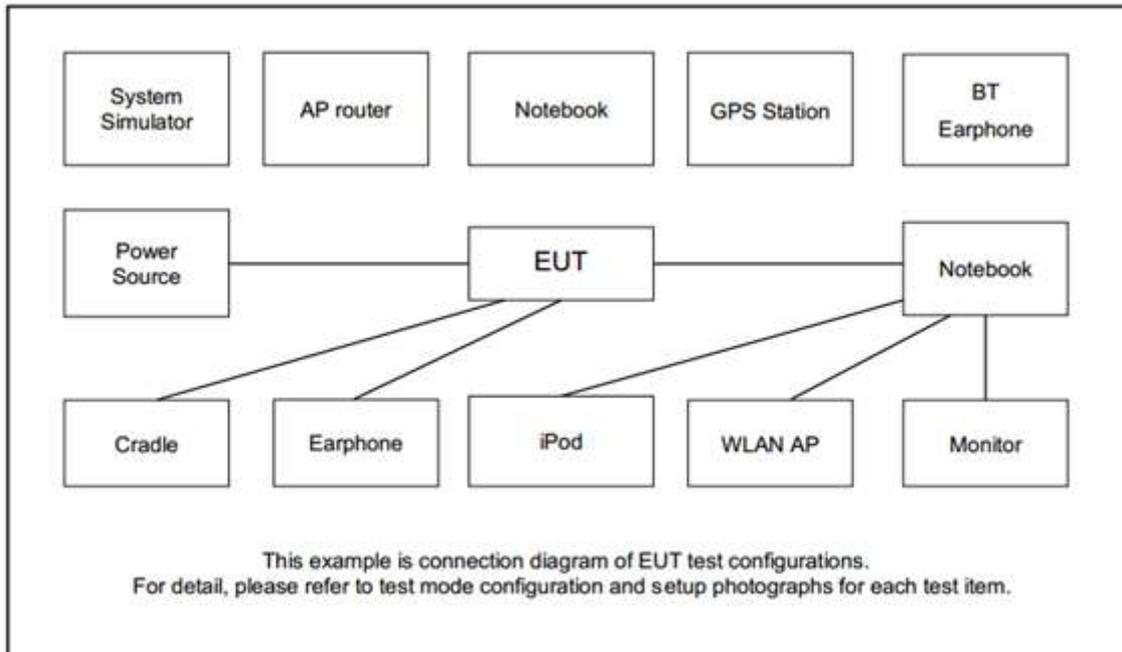
2.2 Test Mode

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, 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 adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X 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
Conducted Test Cases	Bluetooth – LE / GFSK
	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
Radiated Test Cases	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
AC Conducted Emission	Mode 1: Bluetooth - LE TX + USB Cable (Charging from Notebook)
	Mode 2: Zigbee TX + USB Cable (Charging from Notebook)
Remark:	
1. The worst case of conducted emission is mode 1; only the test data of it was reported.	
2. For Radiated Spurious Emission test on 18 GHz-40 GHz, only test BLE 1 Mbps which with highest output power and power spectral density (worst-case mode).	

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.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	Unshielded, 1.0m	Unshielded, 1.8m
2.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A
3.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	Dell	E3340	FCC DoC	Shielded, 0.3m	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m



2.5 EUT Operation Test Setup

The RF test items, utility “SmartRF Studio 7 v2.25.0” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example :

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

Offset = RF cable loss + attenuator factor.

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

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

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

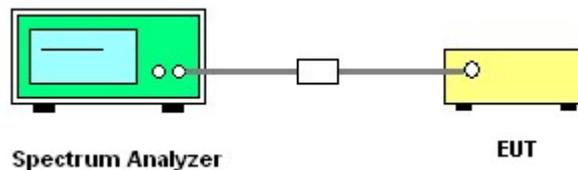
3.1.2 Measuring Instruments

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

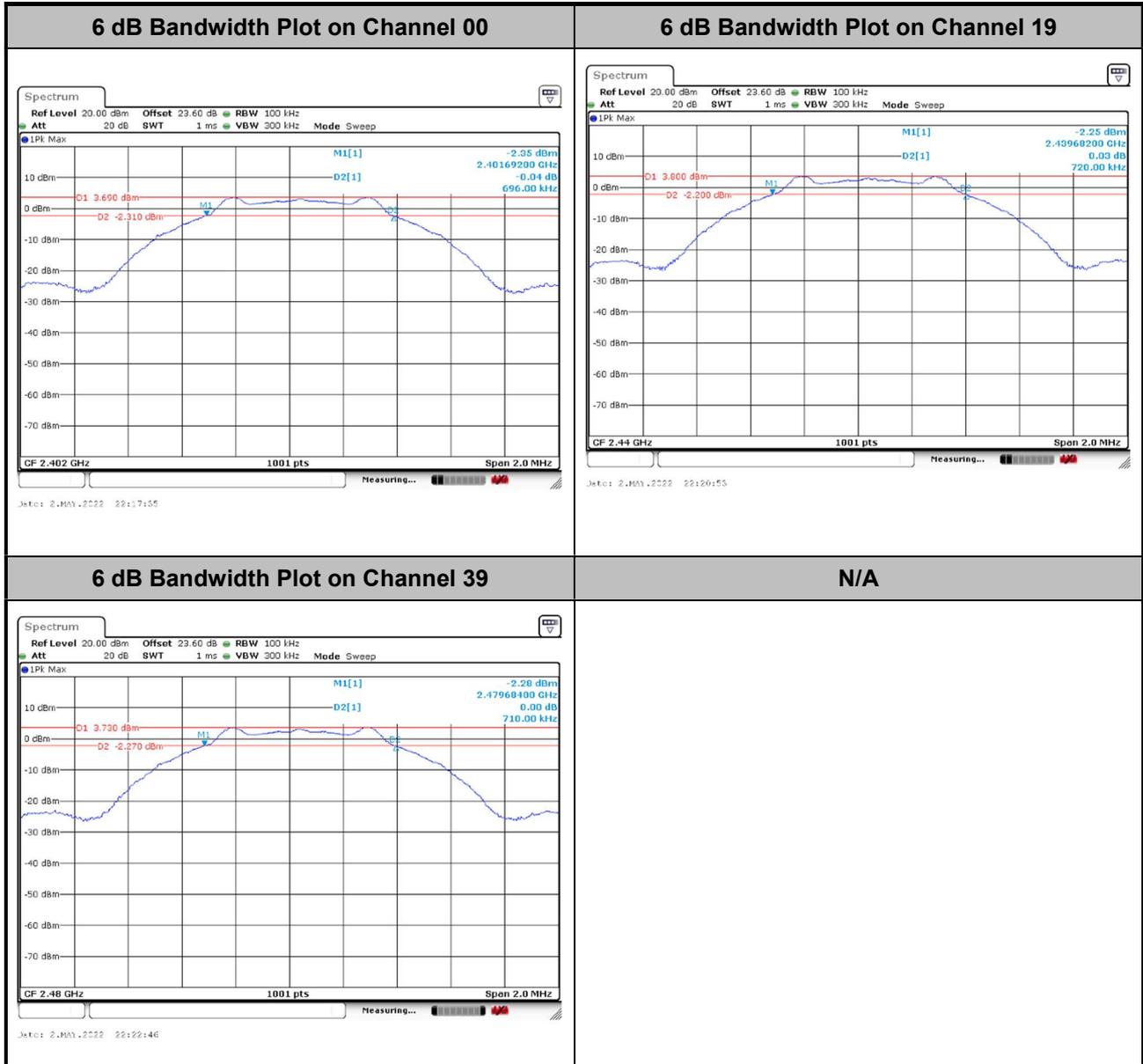




3.1.5 Test Result of 6dB Bandwidth

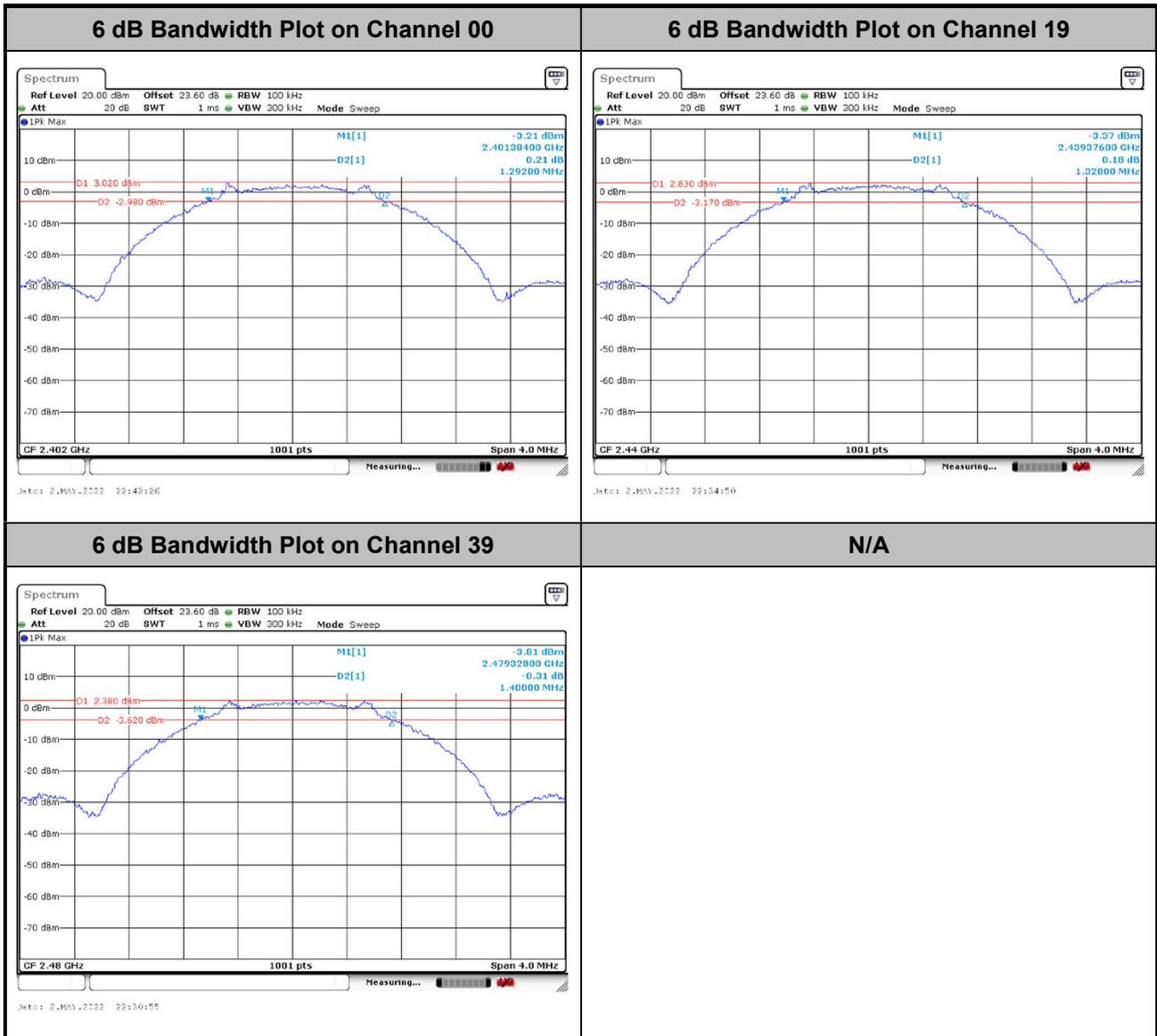
Please refer to Appendix A.

<1Mbps>





<2Mbps>

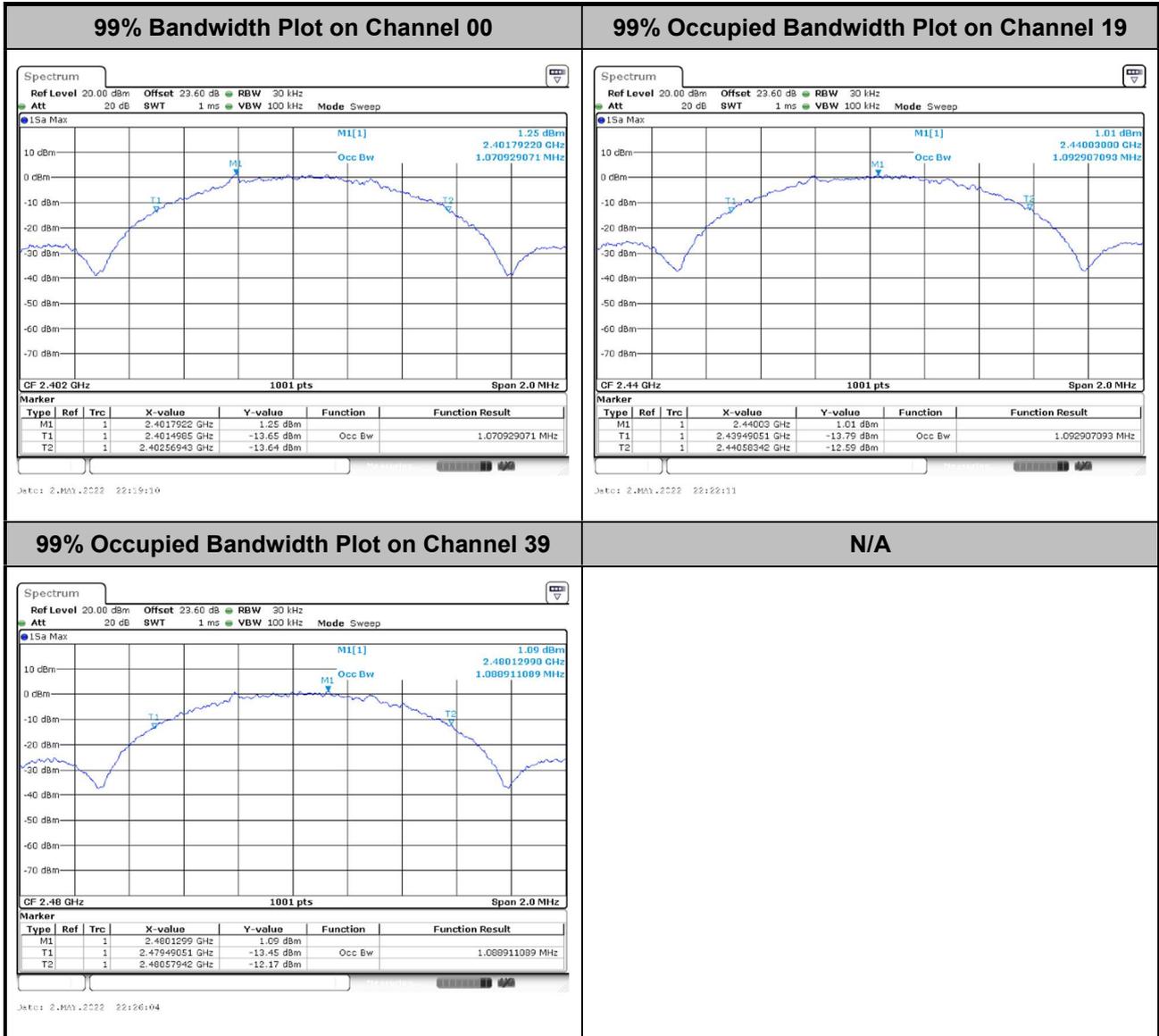




3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

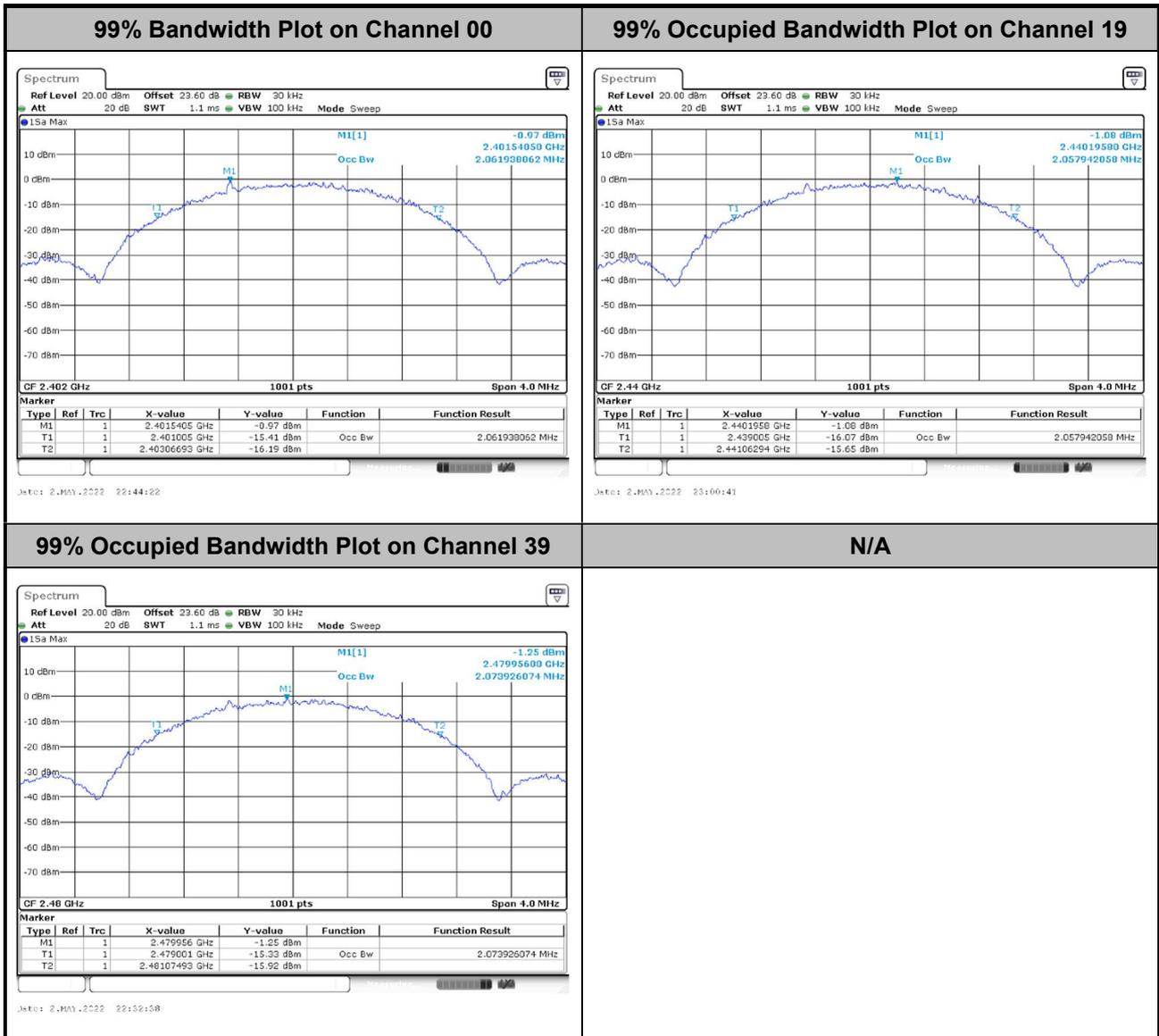
<1Mbps>



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



<2Mbps>



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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna of directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

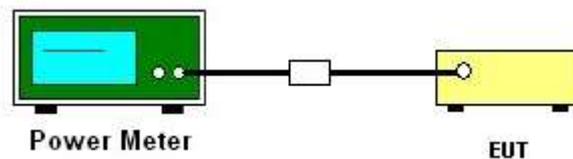
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1.
2. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
3. The RF output of EUT is connected to the power meter by RF cable and attenuator.
4. The path loss is compensated to the results for each measurement.
5. Set the maximum power setting and enable the EUT to transmit continuously.
6. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band at any time interval of continuous transmission.

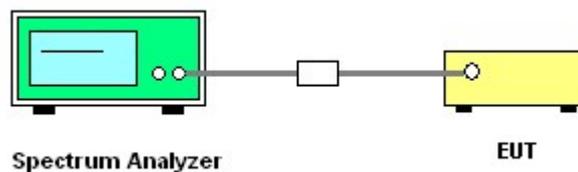
3.3.2 Measuring Instruments

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



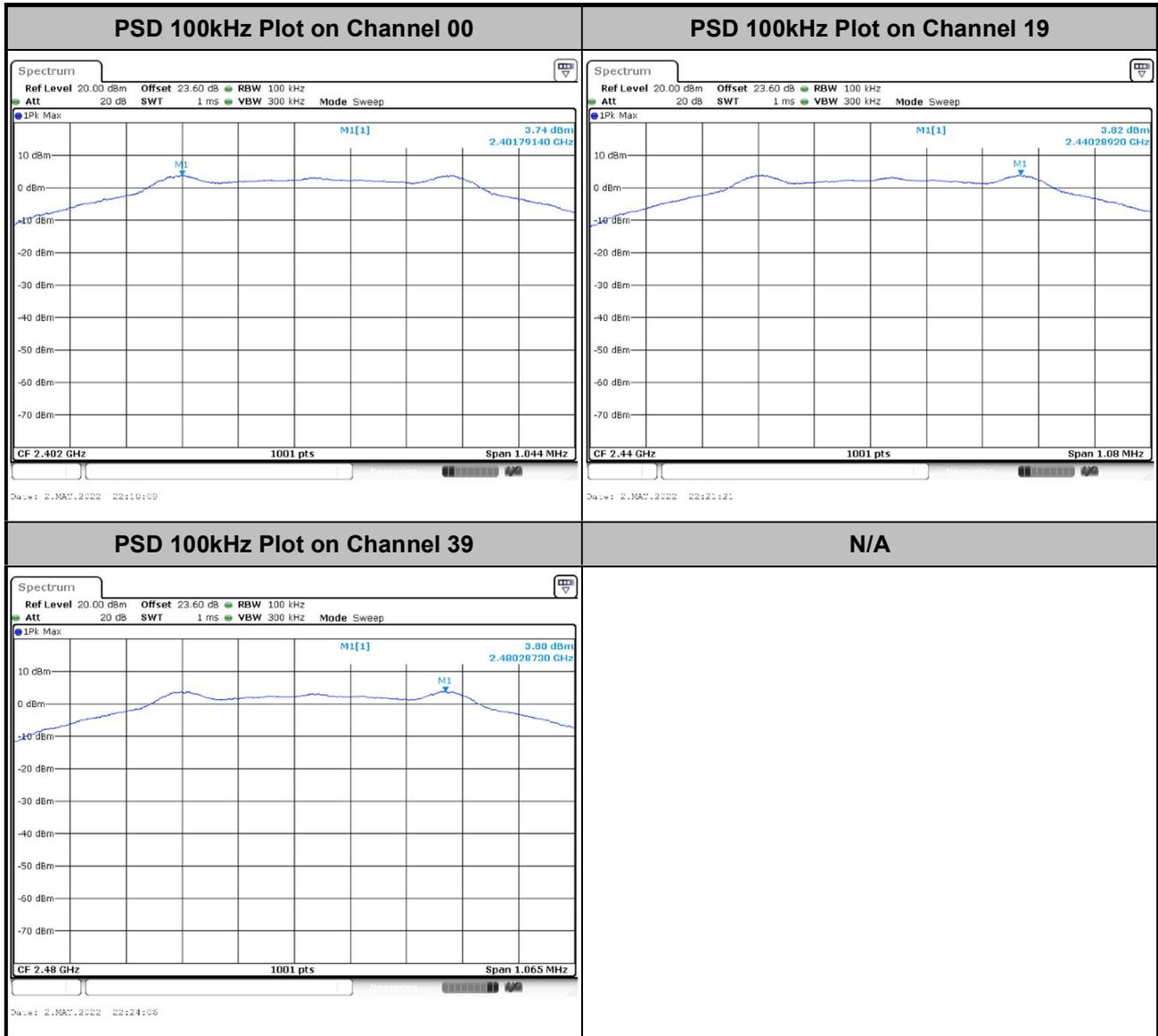
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



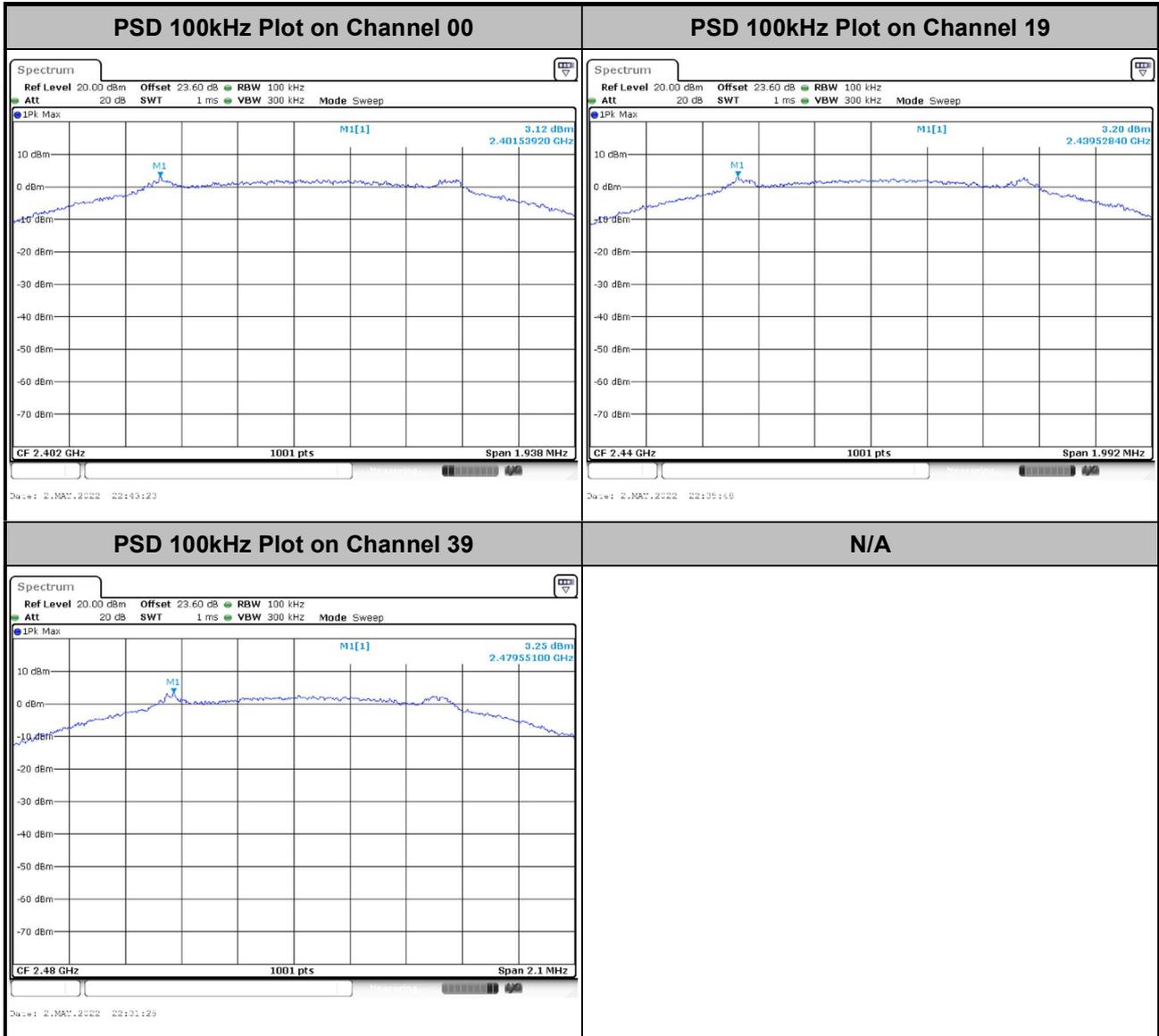
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

<1Mbps>





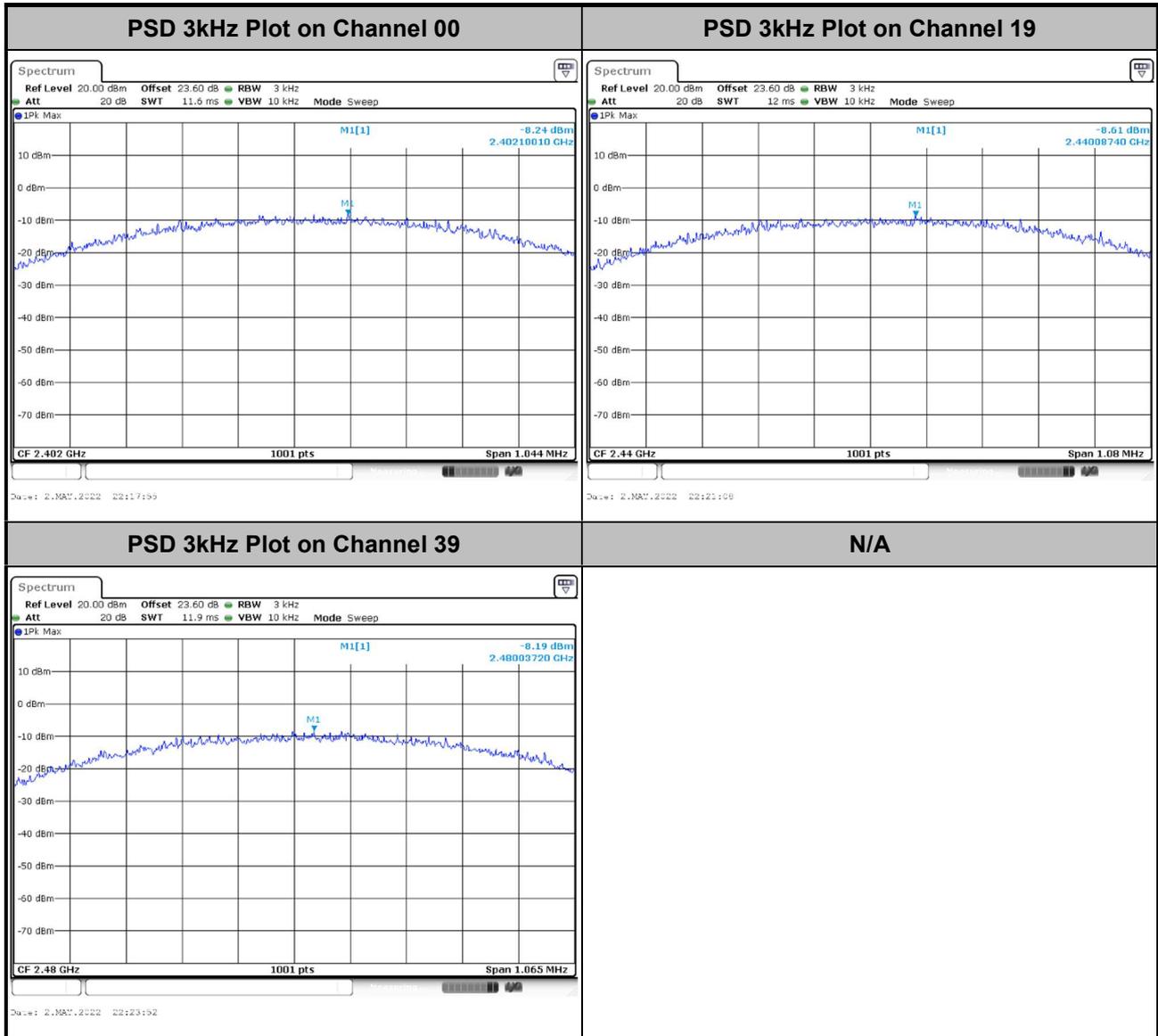
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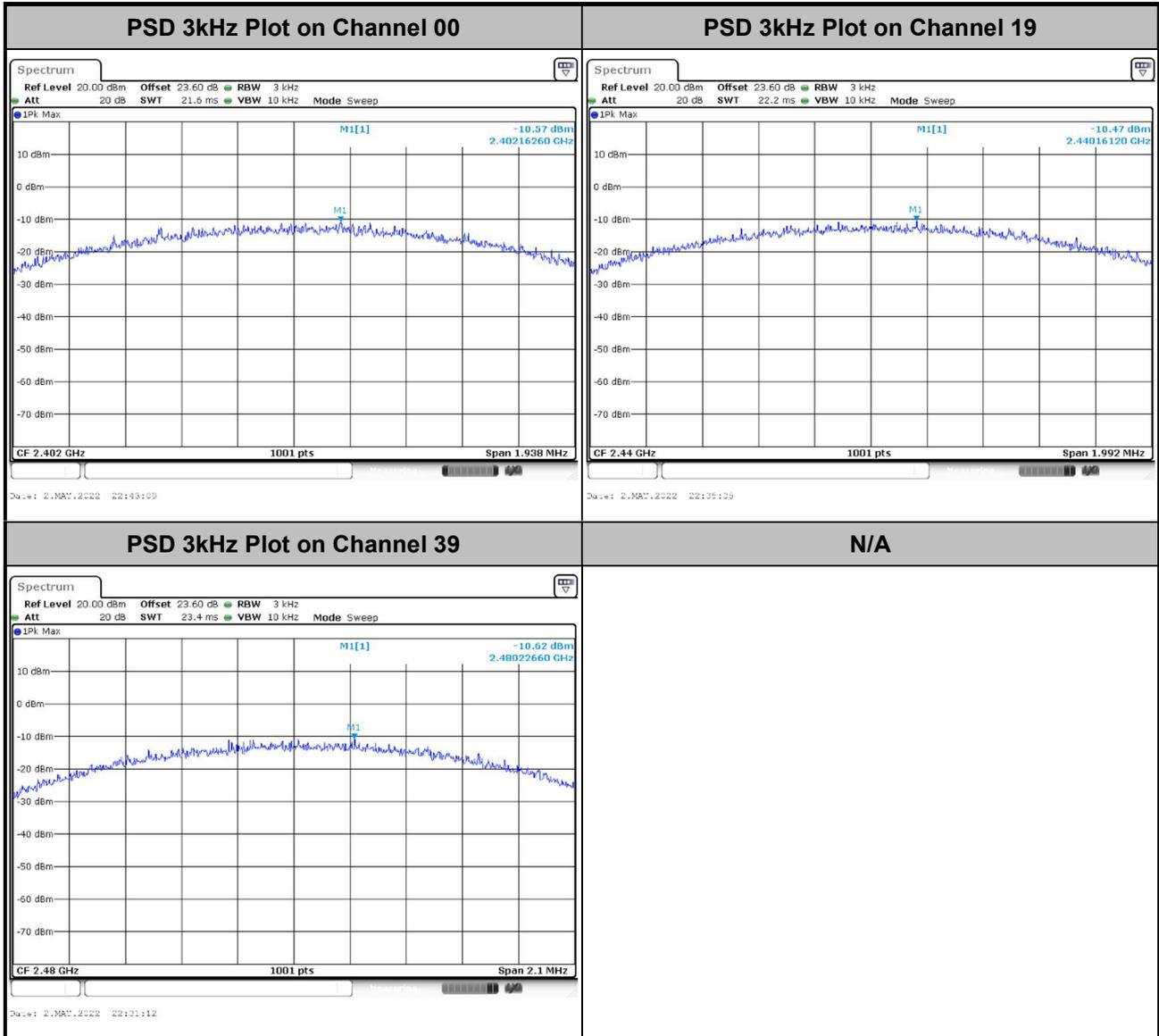
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

<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.

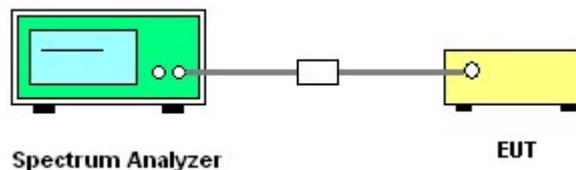
3.4.2 Measuring Instruments

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.

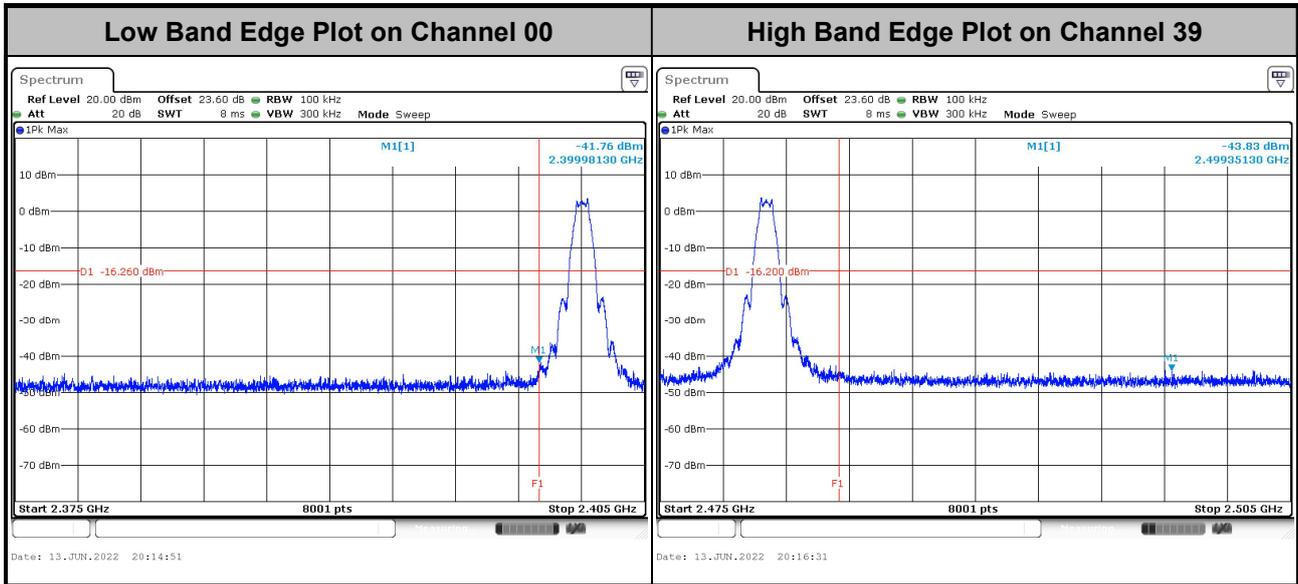
3.4.4 Test Setup



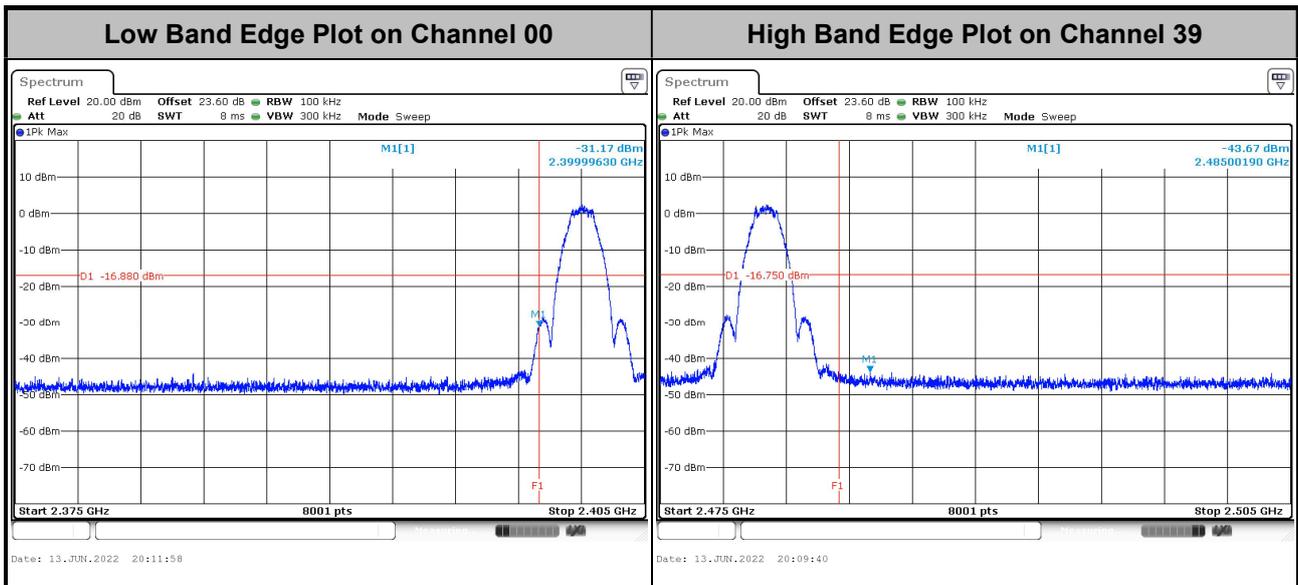


3.4.5 Test Result of Conducted Band Edges Plots

<1Mbps>



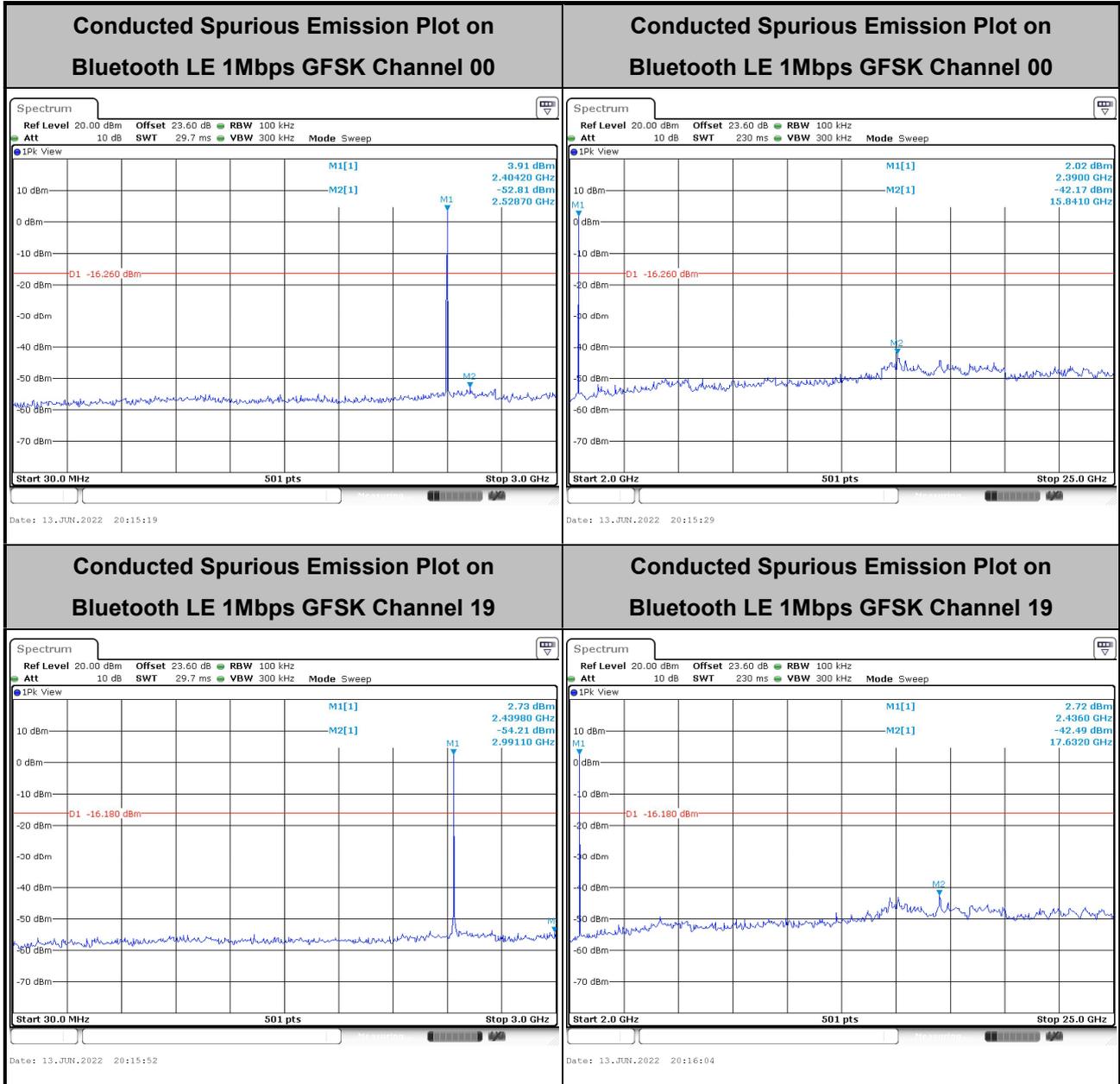
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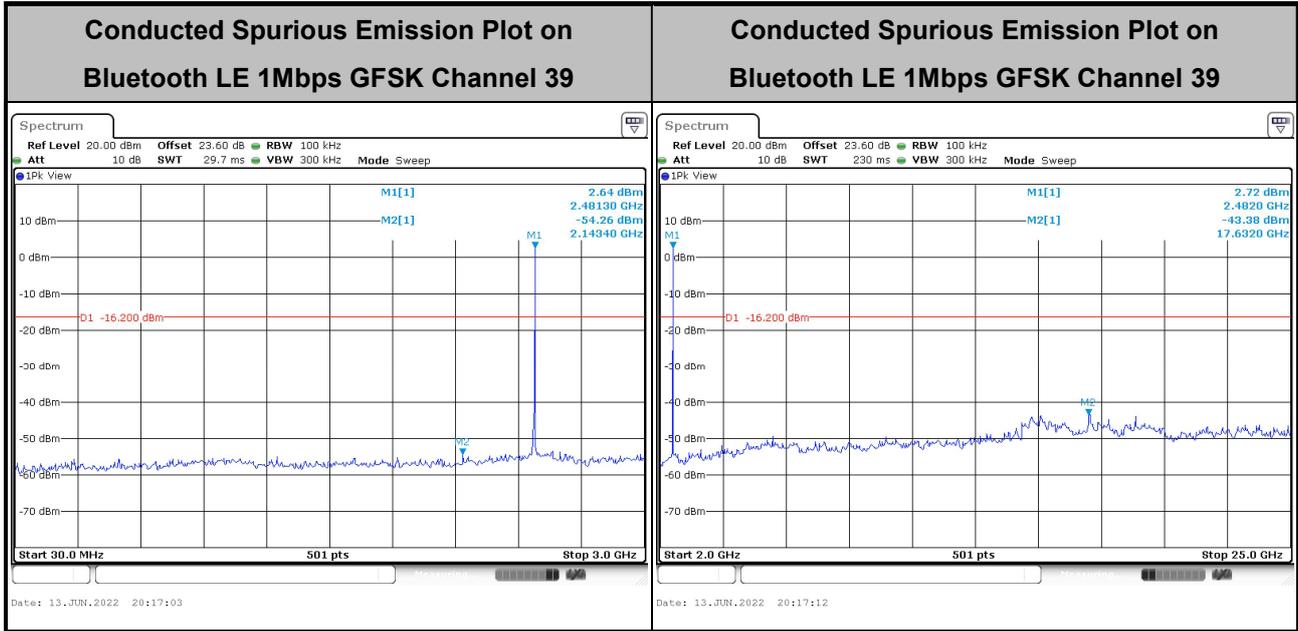




3.4.6 Test Result of Conducted Spurious Emission Plots

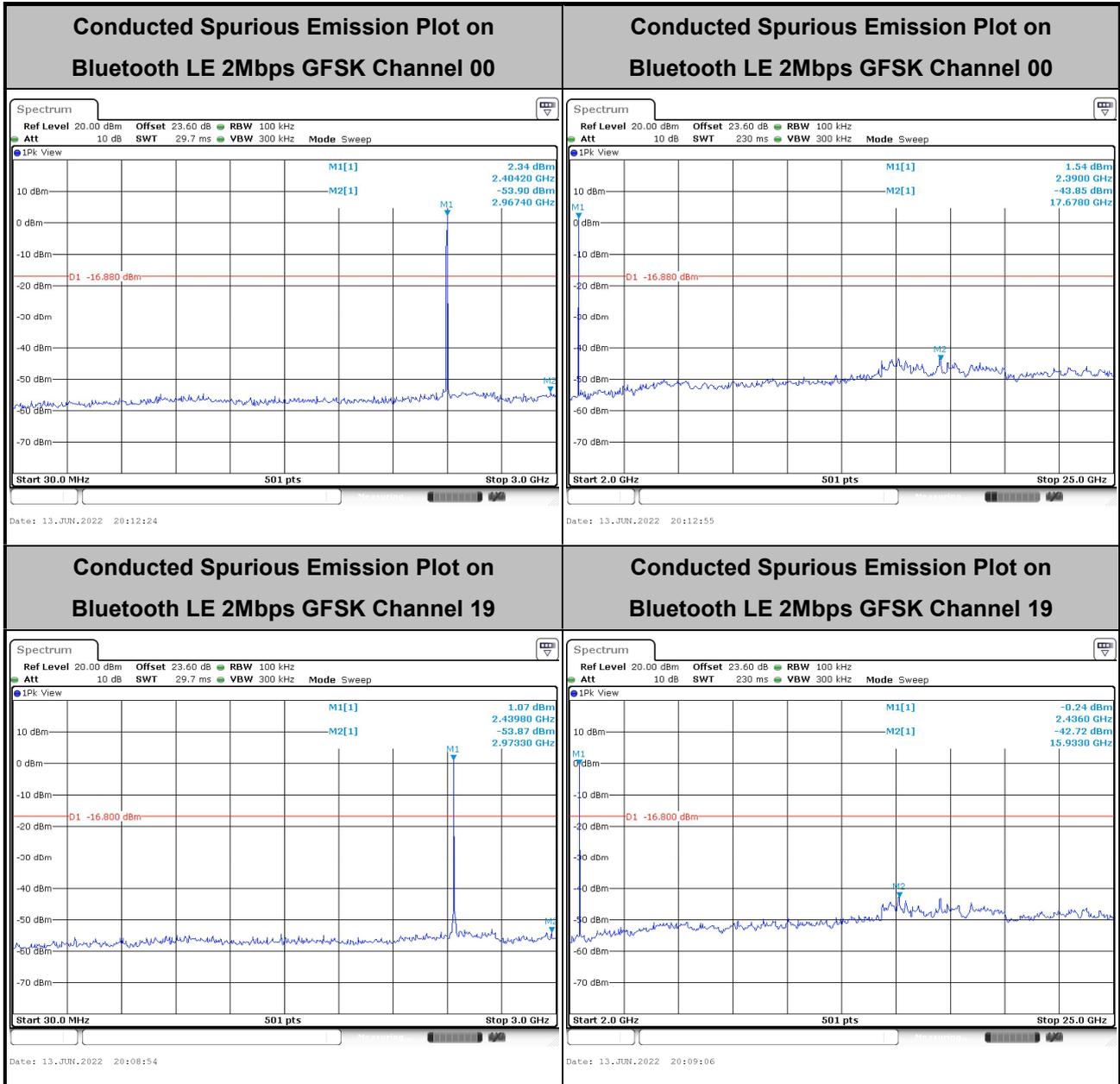
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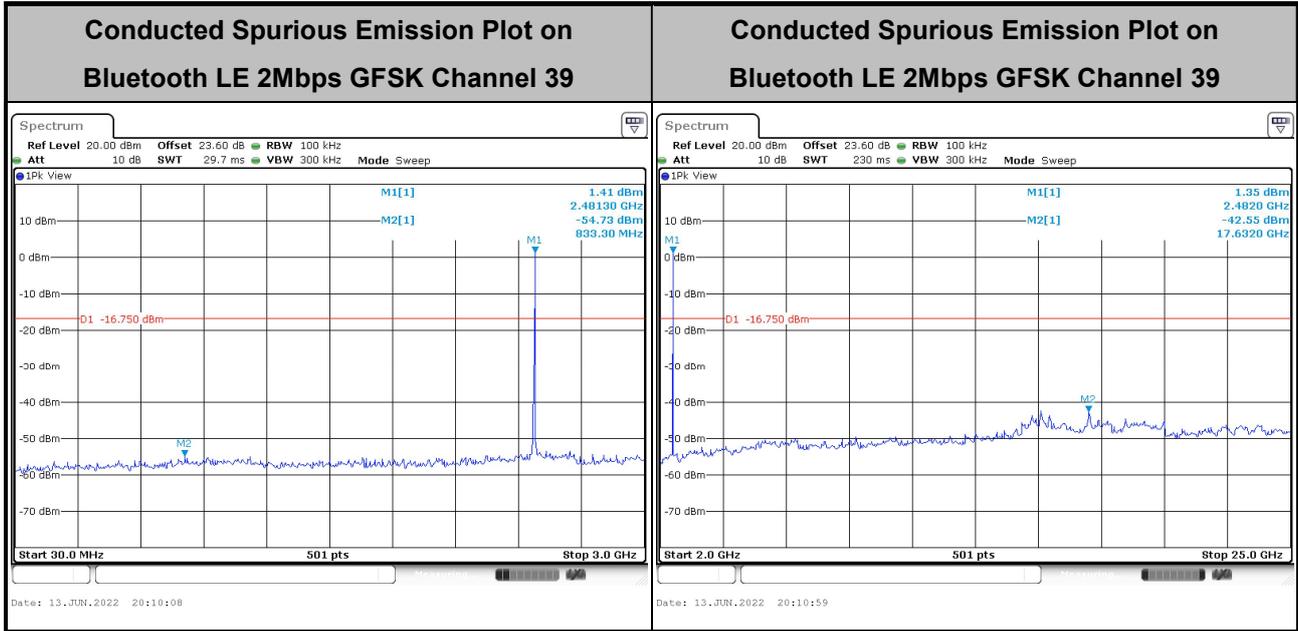






<2Mbps>







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

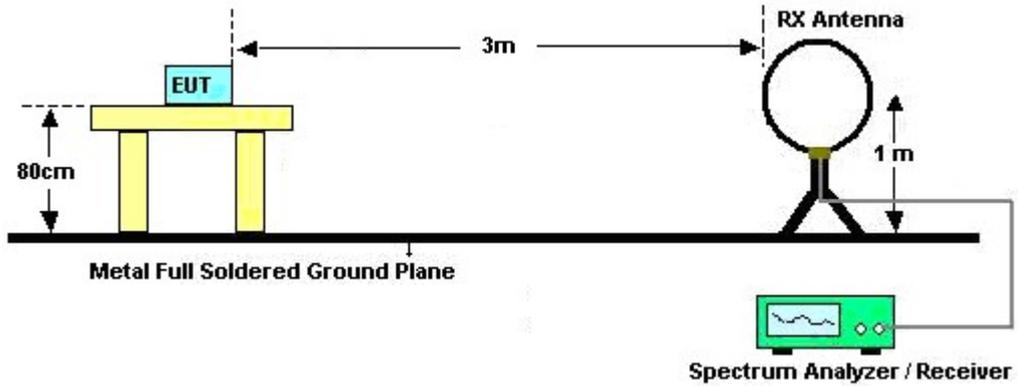
Please refer to the measuring equipment list in this test report.

**3.5.3 Test Procedures**

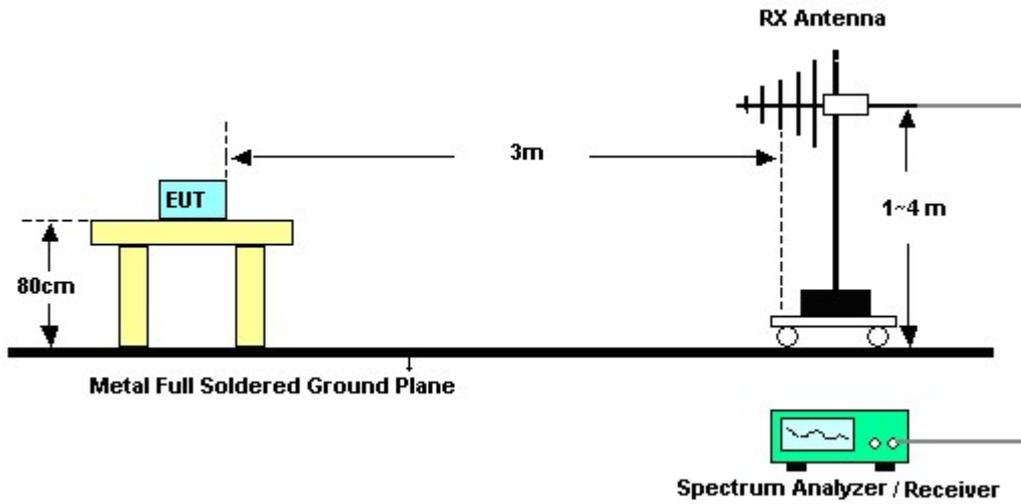
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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

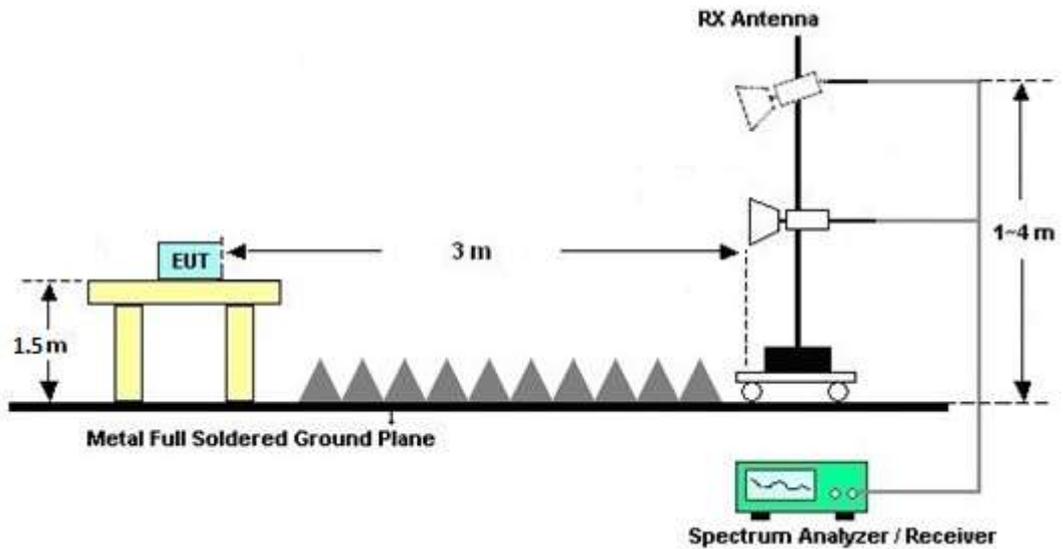
For radiated test below 30MHz



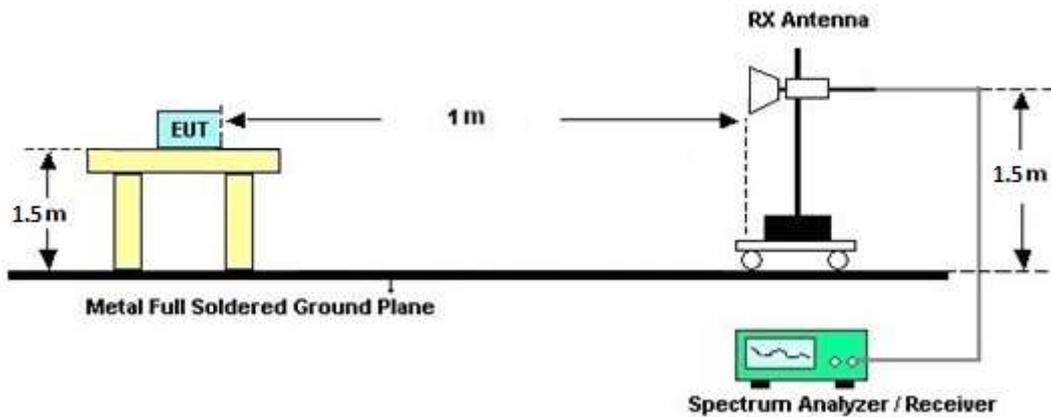
For radiated test from 30MHz to 1GHz



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 μ 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.

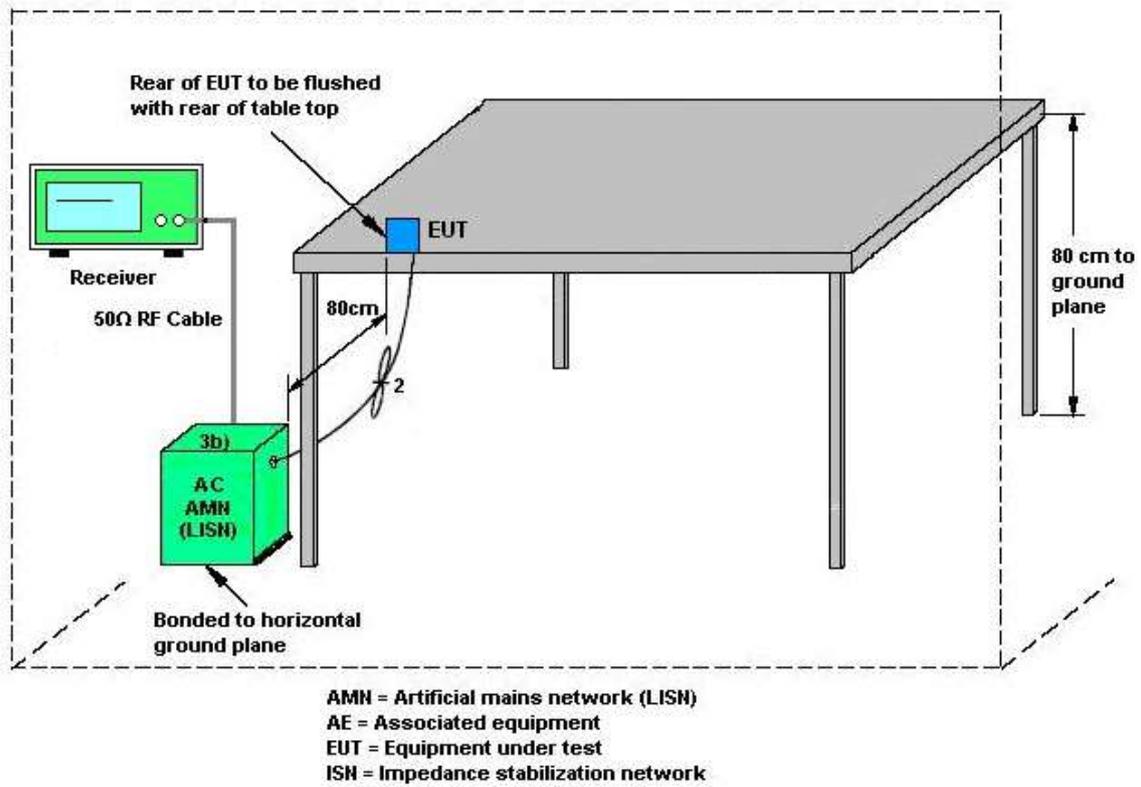
3.6.2 Measuring Instruments

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
Power Meter	Anritsu	ML2495A	932001	N/A	Sep. 30, 2021	May 02, 2022~ Jun. 13, 2022	Sep. 29, 2022	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	846202	300MHz~40GHz	Sep. 30, 2021	May 02, 2022~ Jun. 13, 2022	Sep. 29, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	May 02, 2022~ Jun. 13, 2022	Aug. 29, 2022	Conducted (TH05-HY)
Switch Control Mainframe	E-IUSTRUMENT	ETF-1405-0	EC1900067 (BOX7)	N/A	Aug. 12, 2021	May 02, 2022~ Jun. 13, 2022	Aug. 11, 2022	Conducted (TH05-HY)
Spectrum Analyzer	ROHDE & SCHWARZ	FSV40	101565	10Hz~40GHz	Dec. 29, 2021	May 11, 2022~ Jun. 13, 2022	Dec. 28, 2022	CSE (TH05-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 10, 2022	May 11, 2022~ Jun. 13, 2022	Mar. 09, 2023	CSE (TH05-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 10, 2021	May 11, 2022~ Jun. 13, 2022	Dec. 09, 2022	CSE (TH05-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 21, 2022	May 11, 2022~ Jun. 13, 2022	Feb. 20, 2023	CSE (TH05-HY)
Filter	Wainwright	WLKS1200-12SS	SN2	1.2GHz Low Pass Filter	Mar. 15, 2022	May 11, 2022~ Jun. 13, 2022	Mar. 14, 2023	CSE (TH05-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN2	3GHz High Pass Filter	Jul. 12, 2021	May 11, 2022~ Jun. 13, 2022	Jul. 11, 2022	CSE (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 07, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	Jun. 07, 2022	Nov. 30, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 03, 2021	Jun. 07, 2022	Dec. 02, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2021	Jun. 07, 2022	Nov. 15, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Jun. 07, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Jul. 28, 2021	Jun. 07, 2022	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	Jun. 07, 2022	Dec. 29, 2022	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 07, 2022	May 11, 2022~ May 12, 2022	Jan. 06, 2023	Radiation (03CH07-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35419 & 03	30MHz~1GHz	Apr. 24, 2022	May 11, 2022~ May 12, 2022	Apr. 23, 2023	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 03, 2021	May 11, 2022~ May 12, 2022	Dec. 02, 2022	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Nov. 30, 2021	May 11, 2022~ May 12, 2022	Nov. 29, 2022	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz~18GHz	Apr. 21, 2022	May 11, 2022~ May 12, 2022	Apr. 20, 2023	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	Oct. 04, 2021	May 11, 2022~ May 12, 2022	Oct. 03, 2022	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Oct. 04, 2021	May 11, 2022~ May 12, 2022	Oct. 03, 2022	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	0600789	18-40GHz	Jul. 23, 2021	May 11, 2022~ May 12, 2022	Jul. 22, 2022	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Jul. 22, 2021	May 11, 2022~ May 12, 2022	Jul. 21, 2022	Radiation (03CH07-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY15682/4	30MHz to 18GHz	Feb. 23, 2022	May 11, 2022~ May 12, 2022	Feb. 22, 2023	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4	9kHz to 18GHz	Feb. 23, 2022	May 11, 2022~ May 12, 2022	Feb. 22, 2023	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4	9kHz to 18GHz	Feb. 23, 2022	May 11, 2022~ May 12, 2022	Feb. 22, 2023	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126	532078/126E	30MHz~18GHz	Sep. 17, 2021	May 11, 2022~ May 12, 2022	Sep. 16, 2022	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2	18GHz~40GHz	Feb. 23, 2022	May 11, 2022~ May 12, 2022	Feb. 22, 2023	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801606/2	9KHz ~ 40GHz	Apr. 14, 2022	May 11, 2022~ May 12, 2022	Apr. 13, 2023	Radiation (03CH07-HY)
Antenna Mast	EMEC	AM-BS-4500E	N/A	Boresight mast 1M~4M	N/A	May 11, 2022~ May 12, 2022	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	May 11, 2022~ May 12, 2022	N/A	Radiation (03CH07-HY)
Software	Audix	E3	N/A	N/A	N/A	May 11, 2022~ May 12, 2022	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB1148	N/A	Oct. 25, 2021	May 11, 2022~ May 12, 2022	Oct. 24, 2022	Radiation (03CH07-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% ($U = 2Uc(y)$)	5.1 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.8 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.0 dB
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kai Liao	Temperature:	21~25	°C
Test Date:	2022/05/02 ~2022/06/13	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	1.070	0.696	0.50	Pass
BLE	1Mbps	1	19	2440	1.093	0.720	0.50	Pass
BLE	1Mbps	1	39	2480	1.089	0.710	0.50	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	4.98	30.00	3.30	8.28	36.00	Pass
BLE	1Mbps	1	19	2440	5.13	30.00	3.30	8.43	36.00	Pass
BLE	1Mbps	1	39	2480	4.97	30.00	3.30	8.27	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

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	4.68	30.00	3.30	7.98	36.00	Pass
BLE	1Mbps	1	19	2440	4.77	30.00	3.30	8.07	36.00	Pass
BLE	1Mbps	1	39	2480	4.66	30.00	3.30	7.96	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	3.74	-8.24	3.30	8.00	Pass
BLE	1Mbps	1	19	2440	3.82	-8.61	3.30	8.00	Pass
BLE	1Mbps	1	39	2480	3.80	-8.19	3.30	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc 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
BLE5.0	2Mbps	1	0	2402	2.062	1.292	0.50	Pass
BLE5.0	2Mbps	1	19	2440	2.058	1.328	0.50	Pass
BLE5.0	2Mbps	1	39	2480	2.074	1.400	0.50	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE5.0	2Mbps	1	0	2402	4.97	30.00	3.30	8.27	36.00	Pass
BLE5.0	2Mbps	1	19	2440	5.10	30.00	3.30	8.40	36.00	Pass
BLE5.0	2Mbps	1	39	2480	4.92	30.00	3.30	8.22	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

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
BLE5.0	2Mbps	1	0	2402	4.67	30.00	3.30	7.97	36.00	Pass
BLE5.0	2Mbps	1	19	2440	4.76	30.00	3.30	8.06	36.00	Pass
BLE5.0	2Mbps	1	39	2480	4.65	30.00	3.30	7.95	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
BLE5.0	2Mbps	1	0	2402	3.12	-10.57	3.30	8.00	Pass
BLE5.0	2Mbps	1	19	2440	3.20	-10.47	3.30	8.00	Pass
BLE5.0	2Mbps	1	39	2480	3.25	-10.62	3.30	8.00	Pass

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



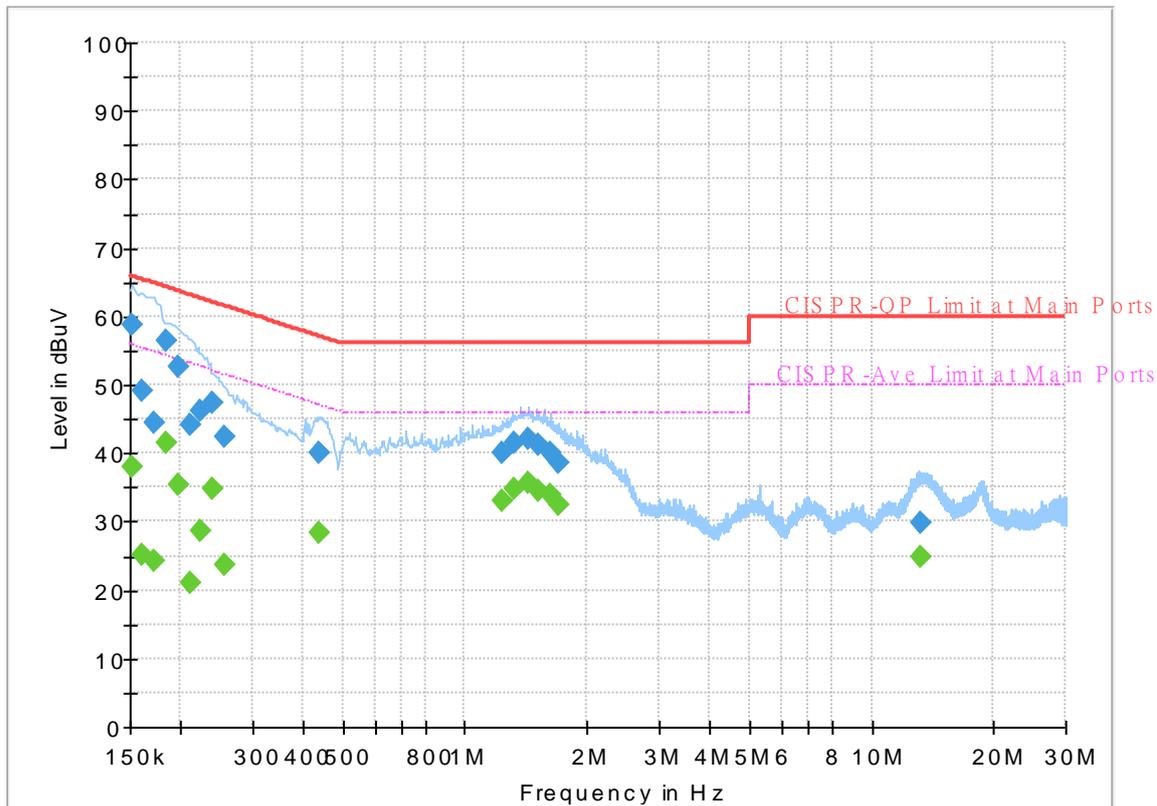
Appendix B. AC Conducted Emission Test Results

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

EUT Information

Report NO : 242614
 Test Mode : Mode 1
 Test Voltage : Power From System
 Phase : Line

Full Spectrum



Final_Result

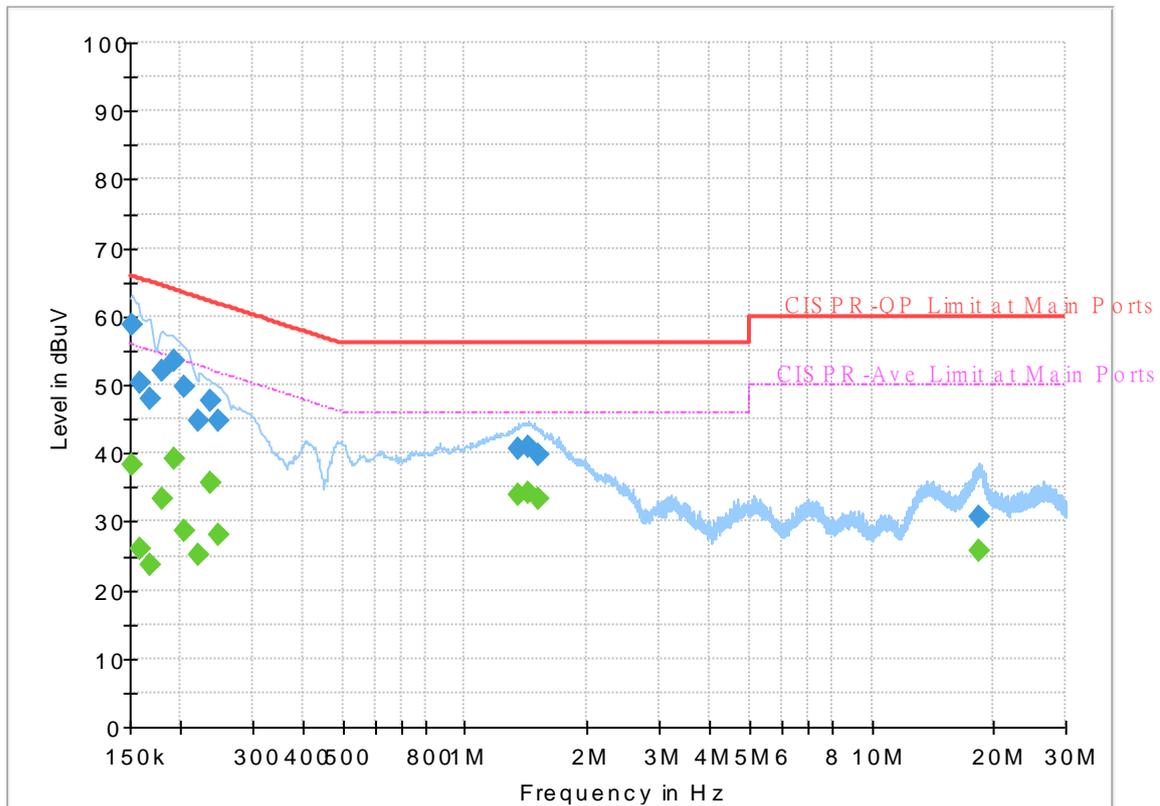
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	38.00	55.88	17.88	L1	OFF	19.6
0.152250	58.79	---	65.88	7.09	L1	OFF	19.6
0.161250	---	25.03	55.40	30.37	L1	OFF	19.6
0.161250	49.03	---	65.40	16.37	L1	OFF	19.6
0.172500	---	24.30	54.84	30.54	L1	OFF	19.6
0.172500	44.32	---	64.84	20.52	L1	OFF	19.6
0.183750	---	41.61	54.31	12.70	L1	OFF	19.6
0.183750	56.55	---	64.31	7.76	L1	OFF	19.6
0.197250	---	35.35	53.73	18.38	L1	OFF	19.6
0.197250	52.69	---	63.73	11.04	L1	OFF	19.6
0.210750	---	21.18	53.18	32.00	L1	OFF	19.6
0.210750	44.10	---	63.18	19.08	L1	OFF	19.6
0.224250	---	28.59	52.66	24.07	L1	OFF	19.6
0.224250	46.12	---	62.66	16.54	L1	OFF	19.6
0.240000	---	34.70	52.10	17.40	L1	OFF	19.6
0.240000	47.33	---	62.10	14.77	L1	OFF	19.6
0.255750	---	23.56	51.57	28.01	L1	OFF	19.6
0.255750	42.49	---	61.57	19.08	L1	OFF	19.6
0.438000	---	28.42	47.10	18.68	L1	OFF	19.6
0.438000	39.93	---	57.10	17.17	L1	OFF	19.6
1.236750	---	33.13	46.00	12.87	L1	OFF	19.6

1.236750	40.20	---	56.00	15.80	L1	OFF	19.6
1.329000	---	34.69	46.00	11.31	L1	OFF	19.6
1.329000	41.57	---	56.00	14.43	L1	OFF	19.6
1.430250	---	35.58	46.00	10.42	L1	OFF	19.6
1.430250	42.24	---	56.00	13.76	L1	OFF	19.6
1.518000	---	34.51	46.00	11.49	L1	OFF	19.6
1.518000	41.19	---	56.00	14.81	L1	OFF	19.6
1.626000	---	33.90	46.00	12.10	L1	OFF	19.6
1.626000	40.10	---	56.00	15.90	L1	OFF	19.6
1.707000	---	32.35	46.00	13.65	L1	OFF	19.6
1.707000	38.65	---	56.00	17.35	L1	OFF	19.6
13.276500	---	24.94	50.00	25.06	L1	OFF	19.8
13.276500	29.76	---	60.00	30.24	L1	OFF	19.8

EUT Information

Report NO : 242614
 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	---	38.25	55.88	17.63	N	OFF	19.6
0.152250	58.67	---	65.88	7.21	N	OFF	19.6
0.159000	---	26.15	55.52	29.37	N	OFF	19.6
0.159000	50.21	---	65.52	15.31	N	OFF	19.6
0.168000	---	23.66	55.06	31.40	N	OFF	19.6
0.168000	48.05	---	65.06	17.01	N	OFF	19.6
0.179250	---	33.23	54.52	21.29	N	OFF	19.6
0.179250	52.09	---	64.52	12.43	N	OFF	19.6
0.192750	---	39.26	53.92	14.66	N	OFF	19.6
0.192750	53.58	---	63.92	10.34	N	OFF	19.6
0.204000	---	28.59	53.45	24.86	N	OFF	19.6
0.204000	49.57	---	63.45	13.88	N	OFF	19.6
0.222000	---	25.01	52.74	27.73	N	OFF	19.6
0.222000	44.64	---	62.74	18.10	N	OFF	19.6
0.237750	---	35.78	52.17	16.39	N	OFF	19.6
0.237750	47.56	---	62.17	14.61	N	OFF	19.6
0.249000	---	27.99	51.79	23.80	N	OFF	19.6
0.249000	44.83	---	61.79	16.96	N	OFF	19.6
1.358250	---	33.83	46.00	12.17	N	OFF	19.6
1.358250	40.52	---	56.00	15.48	N	OFF	19.6
1.425750	---	34.19	46.00	11.81	N	OFF	19.6

1.425750	40.97	---	56.00	15.03	N	OFF	19.6
1.520250	---	33.19	46.00	12.81	N	OFF	19.6
1.520250	39.87	---	56.00	16.13	N	OFF	19.6
18.478500	---	25.76	50.00	24.24	N	OFF	19.9
18.478500	30.78	---	60.00	29.22	N	OFF	19.9



Appendix C. Conducted Spurious Emission

Test Engineer :	Kal Liao	Temperature :	21.2 ~ 24.7°C
		Relative Humidity :	54.4 ~ 66.8%

<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge)

BLE	Note	Frequency (MHz)	Level (dBm)	Over Limit (dB)	Limit Line (dBm)	Read Level (dBm)	Antenna Gain (dBi)	Path Loss (dB)	MIMO Factor (dB)	Ground ing Factor (dB)	Peak Avg. (P/A)
BLE CH 00 2402MHz		2363.025	-41.76	-20.56	-21.2	-46.59	3.3	1.53	0	0	P
		2388.33	-55.12	-13.92	-41.2	-59.92	3.3	1.5	0	0	A
	*	2402	11.13	-	-	6.33	3.3	1.5	0	0	P
	*	2402	9.53	-	-	4.73	3.3	1.5	0	0	A
BLE CH 19 2440MHz		2316.86	-42.09	-20.89	-21.2	-46.9	3.3	1.51	0	0	P
		2389.8	-55.91	-14.71	-41.2	-60.71	3.3	1.5	0	0	A
	*	2440	11.1	-	-	6.22	3.3	1.58	0	0	P
	*	2440	9.52	-	-	4.64	3.3	1.58	0	0	A
		2489.92	-41.03	-19.83	-21.2	-45.95	3.3	1.62	0	0	P
		2487.96	-54.89	-13.69	-41.2	-59.66	3.3	1.47	0	0	A
BLE CH 39 2480MHz	*	2480	11.14	-	-	6.37	3.3	1.47	0	0	P
	*	2480	9.64	-	-	4.87	3.3	1.47	0	0	A
		2483.48	-38.11	-16.91	-21.2	-42.88	3.3	1.47	0	0	P
		2483.48	-48.53	-7.33	-41.2	-53.3	3.3	1.47	0	0	A
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.										



2.4GHz 2400~2483.5MHz

BLE (Harmonic)

BLE	Note	Frequency (MHz)	Level (dBm)	Over Limit (dB)	Limit Line (dBm)	Read Level (dBm)	Antenna Gain (dBi)	Path Loss (dB)	MIMO Factor (dB)	Groun ding Factor (dB)	Peak Avg. (P/A)	
BLE CH 00 2402MHz		4804	-54.4	-33.2	-21.2	-60.67	3.3	2.97	0	0	P	
		7206	-54.76	-33.56	-21.2	-61.55	3.3	3.49	0	0	P	
		9608	-57.99	-36.79	-21.2	-65.22	3.3	3.93	0	0	P	
		12010	-54.46	-33.26	-21.2	-62.04	3.3	4.28	0	0	P	
		14412	-52.64	-31.44	-21.2	-62.26	3.3	6.32	0	0	P	
BLE CH 19 2440MHz		4880	-46.67	-25.47	-21.2	-52.69	3.3	2.72	0	0	P	
		7320	-59.5	-38.3	-21.2	-66.27	3.3	3.47	0	0	P	
		9760	-58.98	-37.78	-21.2	-66.26	3.3	3.98	0	0	P	
		12200	-51.53	-30.33	-21.2	-59.52	3.3	4.69	0	0	P	
		14640	-48.78	-27.58	-21.2	-57.65	3.3	5.57	0	0	P	
BLE CH 39 2480MHz		4960	-51.84	-30.64	-21.2	-57.79	3.3	2.65	0	0	P	
		7440	-53.37	-32.17	-21.2	-60.16	3.3	3.49	0	0	P	
		9920	-56.45	-35.25	-21.2	-63.82	3.3	4.07	0	0	P	
		12400	-54.87	-33.67	-21.2	-62.86	3.3	4.69	0	0	P	
		14880	-50.31	-29.11	-21.2	-59.93	3.3	6.32	0	0	P	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.											



Emission below 1GHz

BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	MIMO	Grounding	Peak
		(MHz)	(dBm)	(dB)	Limit	Level	Factor	Loss	Factor	Factor	Avg.
					(dBm)	(dBm)	(dBi)	(dB)	(dB)	(dB)	(P/A)
2.4GHz BLE LF		77.79	-80.16	-24.96	-55.2	-88.51	3.3	0.35	0	4.7	P
		156.63	-78.34	-26.64	-51.7	-86.86	3.3	0.52	0	4.7	P
		231.15	-78.35	-29.15	-49.2	-86.98	3.3	0.63	0	4.7	P
		729.1	-72.05	-22.85	-49.2	-81.24	3.3	1.19	0	4.7	P
		743.8	-64.52	-15.32	-49.2	-73.64	3.3	1.12	0	4.7	P
		840.4	-64.7	-15.5	-49.2	-74.04	3.3	1.34	0	4.7	P
Remark	1. No other spurious found. 2. All results are PASS against limit line.										



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	MIMO	Grounding	Peak
		(MHz)	(dBm)	Limit (dB)	Line (dBm)	Level (dBm)	Gain (dBi)	Loss (dB)	Factor (dB)	Factor (dB)	Avg. (P/A)
BLE CH 00 2402MHz		2385.6	-41.95	-20.75	-21.2	-46.75	3.3	1.5	0	0	P
		2388.435	-55.28	-14.08	-41.2	-60.08	3.3	1.5	0	0	A
	*	2402	10.93	-	-	6.13	3.3	1.5	0	0	P
	*	2402	7.79	-	-	2.99	3.3	1.5	0	0	A
BLE CH 19 2440MHz		2382.8	-42.04	-20.84	-21.2	-46.83	3.3	1.49	0	0	P
		2389.1	-56.02	-14.82	-41.2	-60.82	3.3	1.5	0	0	A
	*	2440	10.9	-	-	6.02	3.3	1.58	0	0	P
	*	2440	7.85	-	-	2.97	3.3	1.58	0	0	A
		2488.1	-41.21	-20.01	-21.2	-45.98	3.3	1.47	0	0	P
		2487.82	-55.05	-13.85	-41.2	-59.82	3.3	1.47	0	0	A
BLE CH 39 2480MHz	*	2480	10.92	-	-	6.15	3.3	1.47	0	0	P
	*	2480	7.94	-	-	3.17	3.3	1.47	0	0	A
		2483.55	-34.67	-13.47	-21.2	-39.44	3.3	1.47	0	0	P
		2483.48	-45.81	-4.61	-41.2	-50.58	3.3	1.47	0	0	A
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.										



2.4GHz 2400~2483.5MHz

BLE (Harmonic)

BLE	Note	Frequency (MHz)	Level (dBm)	Over Limit (dB)	Limit Line (dBm)	Read Level (dBm)	Antenna Gain (dBi)	Path Loss (dB)	MIMO Factor (dB)	Groun ding Factor (dB)	Peak Avg. (P/A)
BLE CH 00 2402MHz		4804	-55.09	-33.89	-21.2	-61.36	3.3	2.97	0	0	P
		7206	-55.28	-34.08	-21.2	-62.07	3.3	3.49	0	0	P
		9608	-57.93	-36.73	-21.2	-65.16	3.3	3.93	0	0	P
		12010	-55.38	-34.18	-21.2	-62.96	3.3	4.28	0	0	P
		14412	-52.96	-31.76	-21.2	-62.58	3.3	6.32	0	0	P
BLE CH 19 2440MHz		4880	-46.62	-25.42	-21.2	-52.64	3.3	2.72	0	0	P
		7320	-59.69	-38.49	-21.2	-66.46	3.3	3.47	0	0	P
		9760	-58.86	-37.66	-21.2	-66.14	3.3	3.98	0	0	P
		12200	-51.66	-30.46	-21.2	-59.65	3.3	4.69	0	0	P
		14640	-49.12	-27.92	-21.2	-57.99	3.3	5.57	0	0	P
BLE CH 39 2480MHz		4960	-52.13	-30.93	-21.2	-58.08	3.3	2.65	0	0	P
		7440	-53.91	-32.71	-21.2	-60.7	3.3	3.49	0	0	P
		9920	-56.78	-35.58	-21.2	-64.15	3.3	4.07	0	0	P
		12400	-54.93	-33.73	-21.2	-62.92	3.3	4.69	0	0	P
		14880	-51.02	-29.82	-21.2	-60.64	3.3	6.32	0	0	P
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.										



Note symbol

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



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

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	MIMO	Grounding	Peak
		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(dB)	(P/A)
BLE CH 00		2390	-45.8	-24.6	-21.2	-48.44	2	0.64	0	0	P
2402MHz		2390	-59.91	-18.71	-41.2	-62.58	2	0.67	0	0	A

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBm) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBm)
3. Over Limit(dB) = Level(dBm) – Limit Line(dBm)

For Peak Limit @ 2390MHz:

1. Level(dBm)
= Antenna Factor(dBi) + Path Loss(dB) + Read Level(dBm)
= 2(dBi) + 0.64(dB) - 48.44(dBm)
= -45.8 (dBm)
2. Over Limit(dB)
= Level(dBm) – Limit Line(dBm)
= -45.8(dBm) +21.2(dBm)
= -24.6(dB)

For Average Limit @ 2390MHz:

1. Level(dBm)
= Antenna Factor(dBi) + Path Loss(dB) + Read Level(dBm)
= 2(dBi) + 0.67(dB) - 62.58(dBm)
= -59.91 (dBm)
2. Over Limit(dB)
= Level(dB m) – Limit Line(dBm)
= -59.91(dBμV/m) + 41.2(dBm)
= -18.71(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix D. Conducted Spurious Emission Plots

Test Engineer :	Kal Liao	Temperature :	21.2 ~ 24.7°C
		Relative Humidity :	54.4 ~ 66.8%

Note symbol

-L	Low channel location
-R	High channel location



<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge)

BLE	2.4GHz 2400~2483.5MHz Band Edge	
	BLE CH00 2402MHz	
	CSE	Fundamental
Peak	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RBW 1000.000kHz VIEW 3000.000kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RBW 1000.000kHz VIEW 3000.000kHz</p>
Avg.	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL : RBW 1000.000kHz VIEW 0.010kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL : RBW 1000.000kHz VIEW 0.010kHz</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge	
BLE CH19 2440MHz - L		
	CSE	Fundamental
Peak	<p>Site Condition: TH05-HY FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:3000.000kHz</p>	<p>Site Condition: TH05-HY FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:3000.000kHz</p>
Avg.	<p>Site Condition: TH05-HY FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:0.010kHz</p>	<p>Site Condition: TH05-HY FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:0.010kHz</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge	
BLE CH19 2440MHz - R		
	CSE	Fundamental
Peak	<p>Site : TH05-HY Condition : FCC CLASS B_CON ANT_GAIN+3.3 HORIZONTAL : RBW: 1000.000kHz VIEW: 3000.000kHz</p>	Left blank
Avg.	<p>Site : TH05-HY Condition : FCC CLASS B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL : RBW: 1000.000kHz VIEW: 0.0100kHz</p>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge	
BLE CH39 2480MHz		
	CSE	Fundamental
Peak	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 3000.000kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 3000.000kHz</p>
Avg.	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 0.010kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 0.010kHz</p>

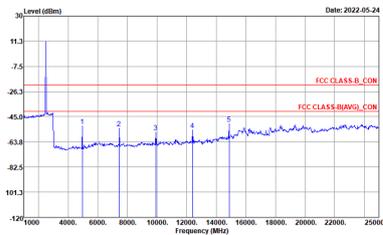


2.4GHz 2400~2483.5MHz

BLE (Harmonic)

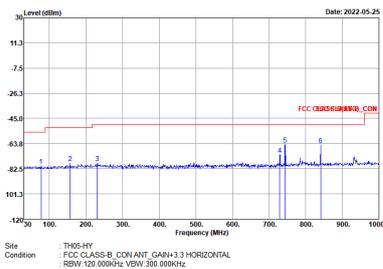
BLE	2.4GHz 2400~2483.5MHz Harmonic	
BLE		
CH00 2402MHz		CH19 2440MHz
<p>Peak Avg.</p>	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL RESW: 1000.000kHz VIEW: 3000.000kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL RESW: 1000.000kHz VIEW: 3000.000kHz</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic	
	BLE	
	CH39 2480MHz	
Peak Avg.	 <p data-bbox="430 705 813 739">Site : TH05-HY Condition : FCC CLASS B_CON ANT_GAIN=3.3 HORIZONTAL : RBW: 1000.0000MHz VIEW: 2000.0000Hz</p>	



Emission below 1GHz
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
<p>Peak</p>	 <p>Site : TH05-HY Condition : FCC CLASS-B, CDW ANT_GAIN+3.3 HORIZONTAL RESN 120.000GHz, YSPAN 300.000MHz</p>	<p>Left blank</p>



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge)

BLE	2.4GHz 2400~2483.5MHz Band Edge	
	BLE CH00 2402MHz	
	CSE	Fundamental
Peak	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 3000.000kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 3000.000kHz</p>
Avg.	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 0.0100kHz</p>	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL REW: 1000.000kHz VIEW: 0.0100kHz</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge	
BLE CH19 2440MHz - L		
	CSE	Fundamental
Peak	<p>Site Condition: TH05-HY FCC CLASS_B_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:3000.000kHz</p>	<p>Site Condition: TH05-HY FCC CLASS_B_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:3000.000kHz</p>
Avg.	<p>Site Condition: TH05-HY FCC CLASS_B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:0.010kHz</p>	<p>Site Condition: TH05-HY FCC CLASS_B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL RBW:1000.000kHz VSW:0.010kHz</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge	
BLE CH19 2440MHz - R		
	CSE	Fundamental
<p>Peak</p>	<p>Site : TH05-HY Condition : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RBW:1000.000kHz VIEW:3000.000kHz</p>	<p>Left blank</p>
<p>Avg.</p>	<p>Site : TH05-HY Condition : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL : RBW:1000.000kHz VIEW:0.0100kHz</p>	<p>Left blank</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge	
BLE CH39 2480MHz		
	CSE	Fundamental
Peak	<p>Date: 2022-05-12</p> <p>Site Condition : TH05-HY : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RBW: 1000.000kHz VIEW: 3000.000kHz</p>	<p>Date: 2022-05-11</p> <p>Site Condition : TH05-HY : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RBW: 1000.000kHz VIEW: 3000.000kHz</p>
Avg.	<p>Date: 2022-05-12</p> <p>Site Condition : TH05-HY : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL : RBW: 1000.000kHz VIEW: 0.0100kHz</p>	<p>Date: 2022-05-12</p> <p>Site Condition : TH05-HY : FCC CLASS-B(AVG)_CON ANT_GAIN+3.3 HORIZONTAL : RBW: 1000.000kHz VIEW: 0.0100kHz</p>



2.4GHz 2400~2483.5MHz

BLE (Harmonic)

BLE	2.4GHz 2400~2483.5MHz Harmonic	
BLE		
CH00 2402MHz		CH19 2440MHz
<p>Peak</p> <p>Avg.</p>	<p>Date: 2022-05-24</p> <p>Site Condition : TH05-HY : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RESW:1000.000Hz VIEW:3000.000Hz</p>	<p>Date: 2022-05-24</p> <p>Site Condition : TH05-HY : FCC CLASS-B_CON ANT_GAIN+3.3 HORIZONTAL : RESW:1000.000Hz VIEW:3000.000Hz</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic	
	BLE	
	CH39 2480MHz	
<p>Peak Avg.</p>	<p>Site : TH05-HY Condition : FCC CLASS B_CON/ANT_GAIN+3.3 HORIZONTAL RESV: 1000.0000Hz VIEW: 3000.0000Hz</p>	



Appendix E. Cabinet Radiated Spurious Emission

Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	23~26.2°C
		Relative Humidity :	55.3~61%



<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

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		2365.335	55.18	-18.82	74	40.81	31.4	18.38	35.41	391	0	P	H	
		2384.97	42.94	-11.06	54	28.52	31.4	18.43	35.41	391	0	A	H	
	*	2402	86.5	-	-	72.02	31.42	18.48	35.42	391	0	P	H	
	*	2402	85.85	-	-	71.37	31.42	18.48	35.42	391	0	A	H	
													H	
													H	
			2313.57	53.68	-20.32	74	39.3	31.55	18.22	35.39	393	246	P	V
			2382.345	42.93	-11.07	54	28.51	31.4	18.43	35.41	393	246	A	V
	*		2402	84.91	-	-	70.43	31.42	18.48	35.42	393	246	P	V
	*		2402	84.26	-	-	69.78	31.42	18.48	35.42	393	246	A	V
													V	
													V	
BLE CH 19 2440MHz		2376.08	53.74	-20.26	74	39.35	31.4	18.4	35.41	380	5	P	H	
		2389.52	42.97	-11.03	54	28.53	31.4	18.45	35.41	380	5	A	H	
	*	2440	85.25	-	-	70.42	31.72	18.54	35.43	380	5	P	H	
	*	2440	84.66	-	-	69.83	31.72	18.54	35.43	380	5	A	H	
			2489.01	54.85	-19.15	74	39.58	32.11	18.61	35.45	380	5	P	H
			2499.86	43.93	-10.07	54	28.56	32.2	18.63	35.46	380	5	A	H
			2341.36	53.37	-20.63	74	39.04	31.43	18.3	35.4	386	137	P	V
			2382.52	42.92	-11.08	54	28.5	31.4	18.43	35.41	386	137	A	V
	*		2440	83.17	-	-	68.34	31.72	18.54	35.43	386	137	P	V
	*		2440	82.51	-	-	67.68	31.72	18.54	35.43	386	137	A	V
			2489.92	53.78	-20.22	74	38.5	32.12	18.61	35.45	386	137	P	V
			2499.86	43.86	-10.14	54	28.49	32.2	18.63	35.46	386	137	A	V



BLE CH 39 2480MHz	*	2480	83.1	-	-	67.91	32.04	18.6	35.45	361	2	P	H
	*	2480	82.47	-	-	67.28	32.04	18.6	35.45	361	2	A	H
		2488.28	54.83	-19.17	74	39.57	32.11	18.6	35.45	361	2	P	H
		2497.96	43.85	-10.15	54	28.5	32.18	18.63	35.46	361	2	A	H
													H
													H
	*	2480	79.23	-	-	64.04	32.04	18.6	35.45	369	114	P	V
	*	2480	78.4	-	-	63.21	32.04	18.6	35.45	369	114	A	V
		2489.16	55.18	-18.82	74	39.91	32.11	18.61	35.45	369	114	P	V
		2500	43.84	-10.16	54	28.48	32.2	18.62	35.46	369	114	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)

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		4804	40.78	-33.22	74	53.07	34.01	12.7	59	-	-	P	H	
		14499	46.99	-27.01	74	43.25	39.6	21.66	57.52	-	-	P	H	
		15870	48.52	-25.48	74	41.36	40.84	22.52	56.2	-	-	P	H	
		15870	38.92	-15.08	54	31.76	40.84	22.52	56.2	-	-	A	H	
		17850	50.57	-23.43	74	40.57	41.5	23.62	55.12	-	-	P	H	
		17850	41.06	-12.94	54	31.06	41.5	23.62	55.12	-	-	A	H	
														H
														H
														H
														H
														H
														H
														H
			4804	43.35	-30.65	74	55.64	34.01	12.7	59	-	-	P	V
			14499	47.41	-26.59	74	43.67	39.6	21.66	57.52	-	-	P	V
			15975	49.02	-24.98	74	41.49	40.97	22.59	56.03	-	-	P	V
			15975	39.4	-14.6	54	31.87	40.97	22.59	56.03	-	-	A	V
			17925	50.78	-23.22	74	40.76	41.43	23.67	55.08	-	-	P	V
		17925	40.9	-13.1	54	30.88	41.43	23.67	55.08	-	-	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 19 2440MHz		4880	41.69	-32.31	74	53.76	34.04	12.75	58.86	-	-	P	H	
		7320	44.53	-29.47	74	51.32	35.68	15.03	57.5	-	-	P	H	
		14499	47.18	-26.82	74	43.44	39.6	21.66	57.52	-	-	P	H	
		16125	48.64	-25.36	74	40.84	41.2	22.67	56.07	-	-	P	H	
		16125	38.64	-15.36	54	30.84	41.2	22.67	56.07	-	-	A	H	
		17850	51.47	-22.53	74	41.47	41.5	23.62	55.12	-	-	P	H	
		17850	40.78	-13.22	54	30.78	41.5	23.62	55.12	-	-	A	H	
														H
														H
														H
														H
														H
														H
			4880	43.99	-30.01	74	56.06	34.04	12.75	58.86	-	-	P	V
			7320	45.83	-28.17	74	52.62	35.68	15.03	57.5	-	-	P	V
			14499	47.25	-26.75	74	43.51	39.6	21.66	57.52	-	-	P	V
			15705	48.61	-25.39	74	42.25	40.42	22.41	56.47	-	-	P	V
			15705	38.21	-15.79	54	31.85	40.42	22.41	56.47	-	-	A	V
			17925	51.05	-22.95	74	41.03	41.43	23.67	55.08	-	-	P	V
			17925	40.87	-13.13	54	30.85	41.43	23.67	55.08	-	-	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		4960	41.11	-32.89	74	52.9	34.1	12.82	58.71	-	-	P	H	
		7440	43.22	-30.78	74	49.96	35.82	15.03	57.59	-	-	P	H	
		14499	46.81	-27.19	74	43.07	39.6	21.66	57.52	-	-	P	H	
		16005	48.19	-25.81	74	40.57	41.01	22.6	55.99	-	-	P	H	
		16005	39.18	-14.82	54	31.56	41.01	22.6	55.99	-	-	A	H	
		17700	51.88	-22.12	74	42.02	41.5	23.55	55.19	-	-	P	H	
		17700	40.69	-13.31	54	30.83	41.5	23.55	55.19	-	-	A	H	
														H
														H
														H
														H
														H
			4960	43.92	-30.08	74	55.71	34.1	12.82	58.71	-	-	P	V
			7440	44.92	-29.08	74	51.66	35.82	15.03	57.59	-	-	P	V
			14499	47.38	-26.62	74	43.64	39.6	21.66	57.52	-	-	P	V
			15690	49.5	-24.5	74	43.21	40.38	22.41	56.5	-	-	P	V
			15690	38.28	-15.72	54	31.99	40.38	22.41	56.5	-	-	A	V
			17730	50.89	-23.11	74	40.97	41.53	23.56	55.17	-	-	P	V
			17730	40.75	-13.25	54	30.83	41.53	23.56	55.17	-	-	A	V
														V
													V	
													V	
													V	
													V	
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only. The emission level close to 18GHz is checked that the average emission level is noise floor only. 													



Emission above 18GHz

2.4GHz BLE (SHF)

BT	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 SHF		23635	38.49	-35.51	74	49.43	38.81	8.64	58.39	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
			23754	38.86	-35.14	74	49.59	38.88	8.69	58.3	-	-	P
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 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		87.78	26.86	-13.14	40	40.81	14.41	1.68	30.04	-	-	P	H	
		94.8	30.24	-13.26	43.5	43.23	15.26	1.73	29.98	-	-	P	H	
		234.39	36.05	-9.95	46	46.68	16.52	2.62	29.77	-	-	P	H	
		419.7	29.22	-16.78	46	32.76	22.6	3.61	29.75	-	-	P	H	
		848.8	33.85	-12.15	46	29.15	28.63	5.13	29.06	-	-	P	H	
		945.4	34.05	-11.95	46	27.25	29.92	5.54	28.66	-	-	P	H	
														H
														H
														H
														H
														H
														H
			30	32.18	-7.82	40	36.71	24.57	1.01	30.11	-	-	P	V
			65.37	31.54	-8.46	40	48.41	11.79	1.37	30.03	-	-	P	V
			82.38	31.97	-8.03	40	46.64	13.73	1.64	30.04	-	-	P	V
			755	30.13	-15.87	46	27.03	27.7	4.81	29.41	-	-	P	V
			891.5	33.05	-12.95	46	27.83	28.67	5.4	28.85	-	-	P	V
			959.4	34.97	-11.03	46	27.21	30.8	5.58	28.62	-	-	P	V
														V
														V
													V	
													V	
													V	
													V	

Remark

- No other spurious found.
- All results are PASS against limit line.
- 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		2364.39	53.68	-20.32	74	39.31	31.4	18.38	35.41	394	0	P	H	
		2384.34	42.93	-11.07	54	28.51	31.4	18.43	35.41	394	0	A	H	
	*	2402	86.54	-	-	72.06	31.42	18.48	35.42	394	0	P	H	
	*	2402	85.05	-	-	70.57	31.42	18.48	35.42	394	0	A	H	
													H	
													H	
			2377.2	53.71	-20.29	74	39.31	31.4	18.41	35.41	393	236	P	V
			2384.865	42.93	-11.07	54	28.51	31.4	18.43	35.41	393	236	A	V
	*		2402	84.83	-	-	70.35	31.42	18.48	35.42	393	236	P	V
	*		2402	83.21	-	-	68.73	31.42	18.48	35.42	393	236	A	V
													V	
													V	
BLE CH 19 2440MHz		2321.06	54.65	-19.35	74	40.29	31.52	18.23	35.39	379	3	P	H	
		2385.74	42.93	-11.07	54	28.5	31.4	18.44	35.41	379	3	A	H	
	*	2440	85.24	-	-	70.41	31.72	18.54	35.43	379	3	P	H	
	*	2440	83.78	-	-	68.95	31.72	18.54	35.43	379	3	A	H	
			2491.32	54.32	-19.68	74	39.03	32.13	18.61	35.45	379	3	P	H
			2498.88	43.85	-10.15	54	28.49	32.19	18.63	35.46	379	3	A	H
			2361.8	54.45	-19.55	74	40.09	31.4	18.36	35.4	331	259	P	V
			2385.74	42.94	-11.06	54	28.51	31.4	18.44	35.41	331	259	A	V
	*		2440	81.22	-	-	66.39	31.72	18.54	35.43	331	259	P	V
	*		2440	79.62	-	-	64.79	31.72	18.54	35.43	331	259	A	V
			2491.39	53.98	-20.02	74	38.69	32.13	18.61	35.45	331	259	P	V
			2499.09	43.88	-10.12	54	28.52	32.19	18.63	35.46	331	259	A	V



BLE CH 39 2480MHz	*	2480	83.22	-	-	68.03	32.04	18.6	35.45	361	0	P	H
	*	2480	81.63	-	-	66.44	32.04	18.6	35.45	361	0	A	H
		2492.2	54.74	-19.26	74	39.45	32.14	18.61	35.46	361	0	P	H
		2499.36	43.88	-10.12	54	28.52	32.19	18.63	35.46	361	0	A	H
													H
													H
	*	2480	79.48	-	-	64.29	32.04	18.6	35.45	362	259	P	V
	*	2480	77.75	-	-	62.56	32.04	18.6	35.45	362	259	A	V
		2487.24	54.75	-19.25	74	39.5	32.1	18.6	35.45	362	259	P	V
		2500	43.86	-10.14	54	28.5	32.2	18.62	35.46	362	259	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)

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		4804	40.99	-33.01	74	53.28	34.01	12.7	59	-	-	P	H	
		14499	47.28	-26.72	74	43.54	39.6	21.66	57.52	-	-	P	H	
		16020	48.78	-25.22	74	41.12	41.04	22.62	56	-	-	P	H	
		16020	39.13	-14.87	54	31.47	41.04	22.62	56	-	-	A	H	
		17880	50.17	-23.83	74	40.19	41.44	23.65	55.11	-	-	P	H	
		17880	40.69	-13.31	54	30.71	41.44	23.65	55.11	-	-	A	H	
														H
														H
														H
														H
														H
														H
			4804	42.91	-31.09	74	55.2	34.01	12.7	59	-	-	P	V
			14499	47.47	-26.53	74	43.73	39.6	21.66	57.52	-	-	P	V
			15840	48.46	-25.54	74	41.43	40.78	22.5	56.25	-	-	P	V
			15840	38.61	-15.39	54	31.58	40.78	22.5	56.25	-	-	A	V
			17730	51.13	-22.87	74	41.21	41.53	23.56	55.17	-	-	P	V
			17730	40.55	-13.45	54	30.63	41.53	23.56	55.17	-	-	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 19 2440MHz		4880	41.39	-32.61	74	53.46	34.04	12.75	58.86	-	-	P	H	
		7320	44.49	-29.51	74	51.28	35.68	15.03	57.5	-	-	P	H	
		14499	47.74	-26.26	74	44	39.6	21.66	57.52	-	-	P	H	
		15870	48.63	-25.37	74	41.47	40.84	22.52	56.2	-	-	P	H	
		15870	38.41	-15.59	54	31.25	40.84	22.52	56.2	-	-	A	H	
		17760	50.69	-23.31	74	40.72	41.56	23.57	55.16	-	-	P	H	
		17760	40.64	-13.36	54	30.67	41.56	23.57	55.16	-	-	A	H	
														H
														H
														H
														H
														H
														H
			4880	44.26	-29.74	74	56.33	34.04	12.75	58.86	-	-	P	V
			7320	46.37	-27.63	74	53.16	35.68	15.03	57.5	-	-	P	V
			14499	46.64	-27.36	74	42.9	39.6	21.66	57.52	-	-	P	V
			16125	48.38	-25.62	74	40.58	41.2	22.67	56.07	-	-	P	V
			16125	31.34	-22.66	54	23.54	41.2	22.67	56.07	-	-	A	V
			17760	50.69	-23.31	74	40.72	41.56	23.57	55.16	-	-	P	V
			17760	40.55	-13.45	54	30.58	41.56	23.57	55.16	-	-	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		4960	40.8	-33.2	74	52.59	34.1	12.82	58.71	-	-	P	H	
		7440	42.37	-31.63	74	49.11	35.82	15.03	57.59	-	-	P	H	
		14499	47.28	-26.72	74	43.54	39.6	21.66	57.52	-	-	P	H	
		16170	48.66	-25.34	74	40.87	41.2	22.69	56.1	-	-	P	H	
		16170	38.42	-15.58	54	30.63	41.2	22.69	56.1	-	-	A	H	
		17760	50.98	-23.02	74	41.01	41.56	23.57	55.16	-	-	P	H	
		17760	40.39	-13.61	54	30.42	41.56	23.57	55.16	-	-	A	H	
														H
														H
														H
														H
														H
														H
			4960	44.31	-29.69	74	56.1	34.1	12.82	58.71	-	-	P	V
			7440	45.7	-28.3	74	52.44	35.82	15.03	57.59	-	-	P	V
			14499	46.86	-27.14	74	43.12	39.6	21.66	57.52	-	-	P	V
			15825	48.75	-25.25	74	41.79	40.75	22.49	56.28	-	-	P	V
			15825	37.78	-16.22	54	30.82	40.75	22.49	56.28	-	-	A	V
			17715	50.75	-23.25	74	40.87	41.51	23.55	55.18	-	-	P	V
			17715	40.34	-13.66	54	30.46	41.51	23.55	55.18	-	-	A	V
													V	
													V	
													V	
													V	
													V	
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only. The emission level close to 18GHz is checked that the average emission level is noise floor only. 													



Note symbol

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



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

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix F. Cabinet Radiated Spurious Emission Plots

Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	23~26.2°C
		Relative Humidity :	55.3~61%

Note symbol

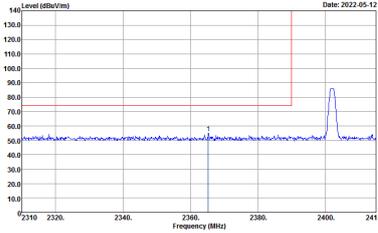
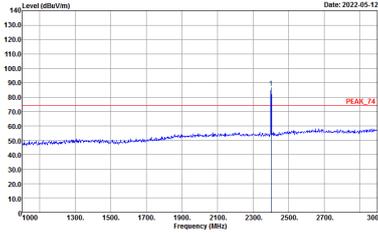
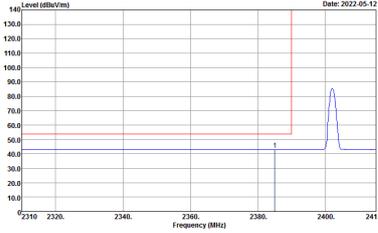
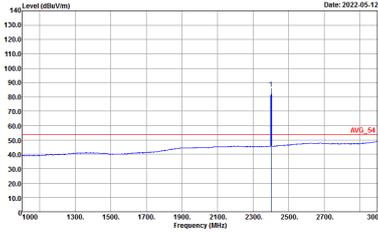
-L	Low channel location
-R	High channel location



<1Mbps>

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: 2022-05-12</p> <p>Site Condition : 03CH07-HY : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:3000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Date: 2022-05-12</p> <p>Site Condition : 03CH07-HY : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:3000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Date: 2022-05-12</p> <p>Site Condition : 03CH07-HY : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	 <p>Date: 2022-05-12</p> <p>Site Condition : 03CH07-HY : AVG_54 3m HF_ANT_00075962 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 : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00073962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00073962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg	<p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00073962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00073962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

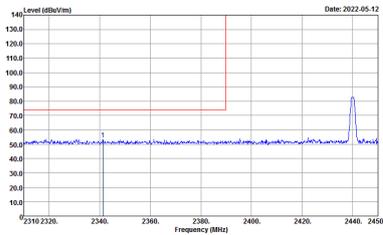
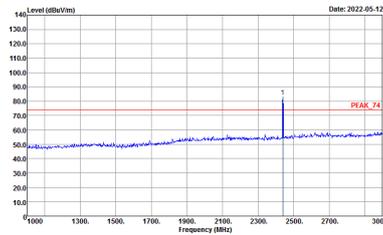
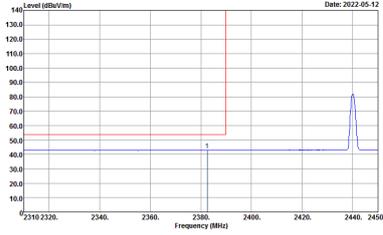
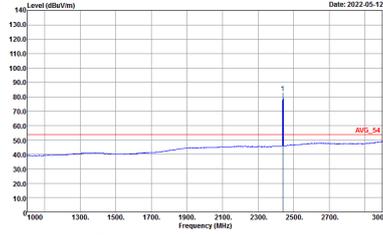


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - L		
	Horizontal	Fundamental
Peak	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : PEAK_BE_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : PEAK_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : AVG_BE_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : AVG_24 3m HF_ANT_00075962 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
Peak	<p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank
Avg.	<p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 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>Level (dBm/1m) vs Frequency (MHz) plot for Vertical Peak. The plot shows a sharp peak at approximately 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 horizontal line is drawn at approximately 75 dBm/1m. The peak is labeled '1'.</p> <p>Site : 03CH07-HY Condition : PEAK_BE_24 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Fundamental Peak. The plot shows a sharp peak at approximately 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBm/1m, and the x-axis ranges from 1000 to 3000 MHz. A red horizontal line is drawn at approximately 75 dBm/1m. The peak is labeled '1' and 'PEAK_24'.</p> <p>Site : 03CH07-HY Condition : PEAK_24 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Vertical Avg. The plot shows a sharp peak at approximately 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 horizontal line is drawn at approximately 55 dBm/1m. The peak is labeled '1'.</p> <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Fundamental Avg. The plot shows a sharp peak at approximately 2440 MHz. The y-axis ranges from 10.0 to 140.0 dBm/1m, and the x-axis ranges from 1000 to 3000 MHz. A red horizontal line is drawn at approximately 55 dBm/1m. The peak is labeled '1' and 'AVG_54'.</p> <p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 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 : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00073962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank
Avg.	<p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00073962 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>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

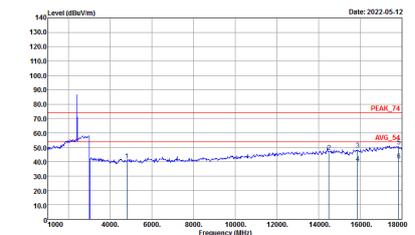
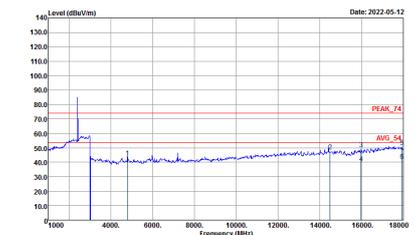


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
	Vertical	Fundamental
Peak	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWTA:Auto</p>	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWTA:Auto</p>
Avg.	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWTA:Auto</p>	<p>Date: 2022-05-12</p> <p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWTA: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 : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL</p>	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL</p>	<p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak Avg.	<p>Horizontal spectrum plot showing Level (dBuV/m) vs Frequency (MHz). The plot includes a blue signal trace and a red peak marker labeled 'PEAK_T4' at approximately 2480 MHz. An average level is indicated by a red line labeled 'AVG_S4'. The x-axis ranges from 2400 to 18000 MHz, and the y-axis ranges from 10.0 to 140.0 dBuV/m. The date is 2022-05-12.</p> <p>Site : 03CH07-HY Condition : PEAK_T4 3m HF_ANT_00075962 HORIZONTAL</p>	<p>Vertical spectrum plot showing Level (dBuV/m) vs Frequency (MHz). The plot includes a blue signal trace and a red peak marker labeled 'PEAK_T4' at approximately 2480 MHz. An average level is indicated by a red line labeled 'AVG_S4'. The x-axis ranges from 2400 to 18000 MHz, and the y-axis ranges from 10.0 to 140.0 dBuV/m. The date is 2022-05-12.</p> <p>Site : 03CH07-HY Condition : PEAK_T4 3m HF_ANT_00075962 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 Peak and Avg levels. The y-axis is Level (dBm/1m) from 10.0 to 140.0. The x-axis is Frequency (MHz) from 18000 to 25000. A red line indicates the Peak level at approximately 74 dBm/1m, and a blue line indicates the Avg level at approximately 54 dBm/1m. The plot shows a noisy signal with a distinct peak around 2400 MHz.</p>	<p>Vertical spectrum plot showing Peak and Avg levels. The y-axis is Level (dBm/1m) from 10.0 to 140.0. The x-axis is Frequency (MHz) from 18000 to 25000. A red line indicates the Peak level at approximately 74 dBm/1m, and a blue line indicates the Avg level at approximately 54 dBm/1m. The plot shows a noisy signal with a distinct peak around 2400 MHz.</p>



Emission below 1GHz
2.4GHz BLE (LF)

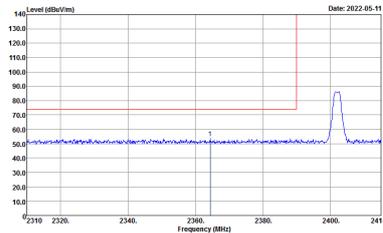
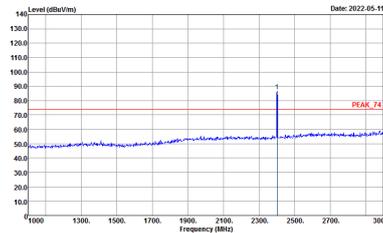
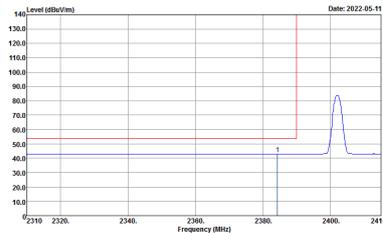
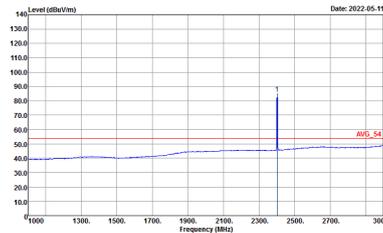
BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	<p>Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(6) HORIZONTAL</p>	<p>Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(6) VERTICAL</p>



<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 Condition : 03CH07-HY : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Site Condition : 03CH07-HY : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Site Condition : 03CH07-HY : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:5.000kHz SWT:Auto</p>	 <p>Site Condition : 03CH07-HY : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:5.000kHz SWT:Auto</p>

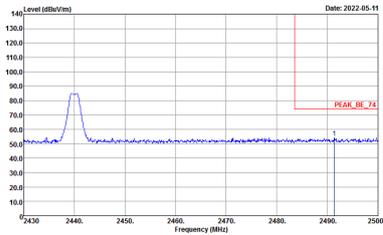
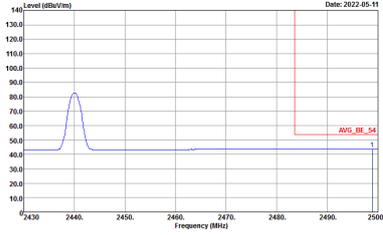


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH00 2402MHz		
	Vertical	Fundamental
Peak	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

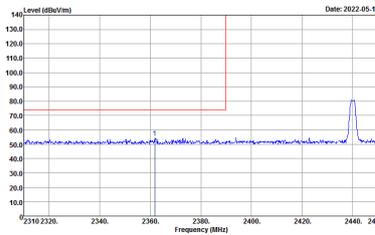
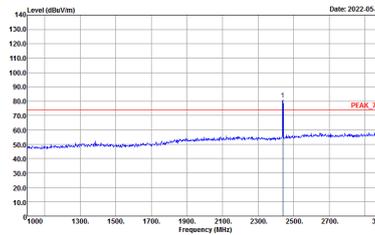
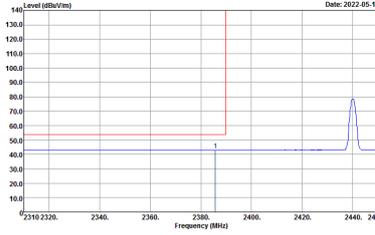
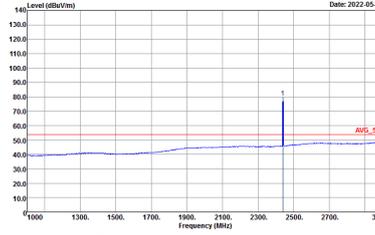


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_BE_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_BE_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_24 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>

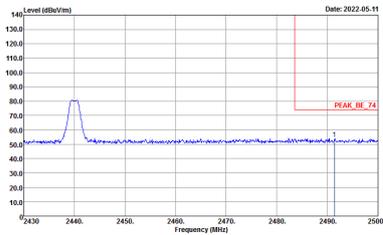
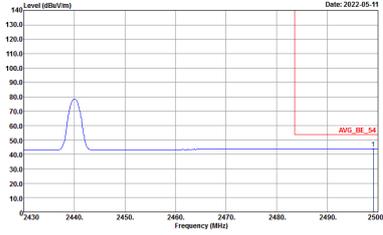


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH19 2440MHz - R		
	Horizontal	Fundamental
Peak	 <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00073962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank
Avg.	 <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00073962 HORIZONTAL : 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>Site : 03CH07-HY Condition : PEAK_BE_24 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Site : 03CH07-HY Condition : PEAK_24 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	 <p>Site : 03CH07-HY Condition : AVG_BE_24 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	 <p>Site : 03CH07-HY Condition : AVG_24 3m HF_ANT_00075962 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 : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank
Avg.	 <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 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>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTA:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTA:Auto</p>
Avg.	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWTA:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:0.010kHz SWTA:Auto</p>

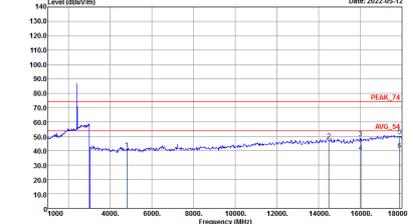
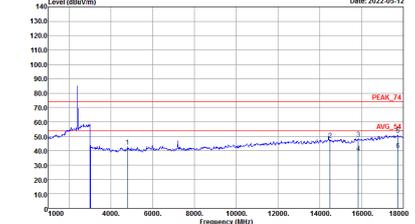


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
BLE CH39 2480MHz		
	Vertical	Fundamental
Peak	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Avg.	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>	<p>Date: 2022-05-11</p> <p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:0.010kHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

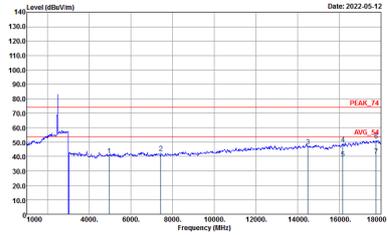
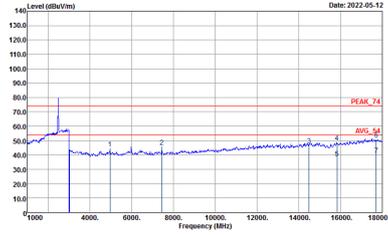
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
BLE CH00 2402MHz		
Horizontal		Vertical
Peak Avg.	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL</p>	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	<p>Horizontal spectrum plot showing Level (dBuV/m) vs Frequency (MHz). The plot includes a blue line for the signal and a red line for the average. A peak is marked at approximately 2440 MHz. The x-axis ranges from 2000 to 18000 MHz, and the y-axis ranges from 10.0 to 140.0 dBuV/m.</p> <p>Site : 03CH07-HY Condition : :PEAK_74 3m HF_ANT_00075962 HORIZONTAL</p>	<p>Vertical spectrum plot showing Level (dBuV/m) vs Frequency (MHz). The plot includes a blue line for the signal and a red line for the average. A peak is marked at approximately 2440 MHz. The x-axis ranges from 2000 to 18000 MHz, and the y-axis ranges from 10.0 to 140.0 dBuV/m.</p> <p>Site : 03CH07-HY Condition : :PEAK_74 3m HF_ANT_00075962 VERTICAL</p>

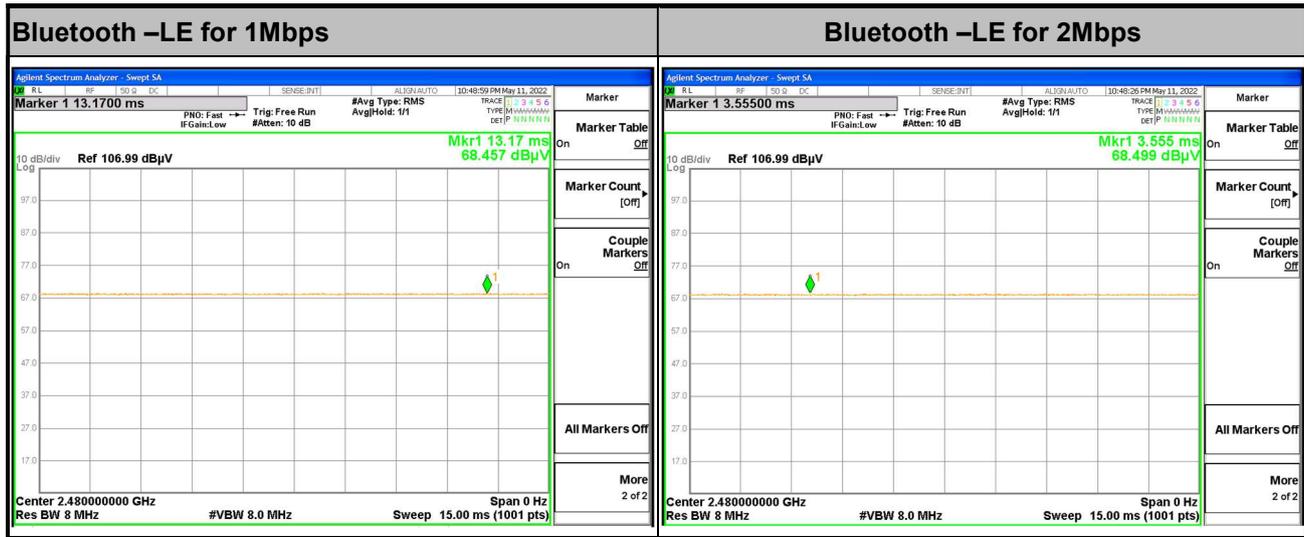


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL</p>	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL</p>



Appendix G. Duty Cycle Plots

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



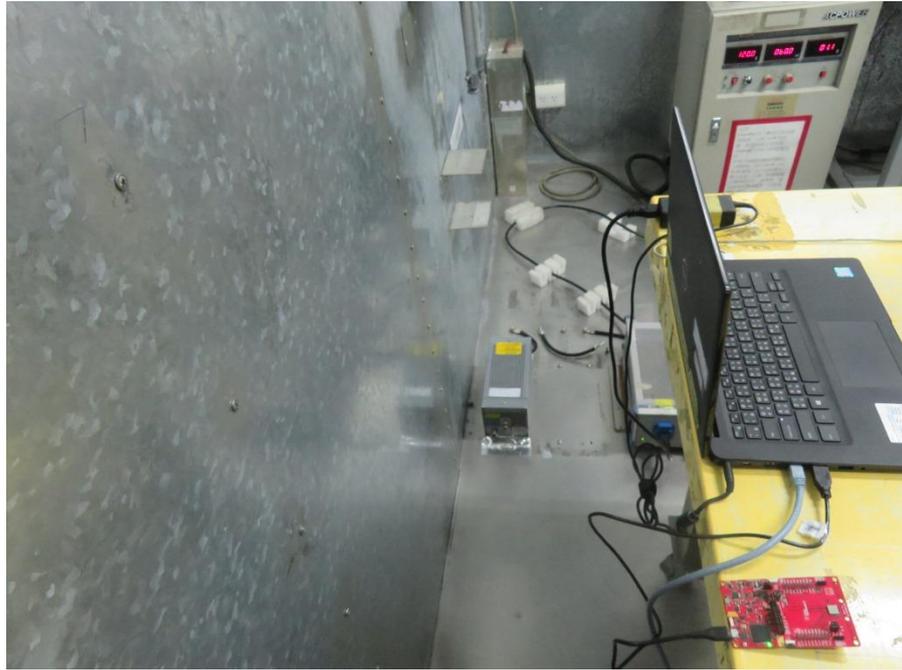
Appendix H. Setup Photographs

<Conducted Emission>

Mode 1

Remote View





Rear View



<Radiated Emission>

X Plane

LF



HF



SHF



————THE END————