

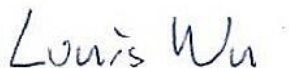


FCC RADIO TEST REPORT

FCC ID : 2ASDI-M2317E1
Equipment : Wireless Earphones
Brand Name : Redmi
Model Name : M2317E1
Applicant : Tiinlab Corporation
No. 3333, Liuxian Avenue, Tower A, 35th Floor,
Tanglang City, Nanshan District, Shenzhen, China
Manufacturer : Tiinlab Corporation
No. 3333, Liuxian Avenue, Tower A, 35th Floor,
Tanglang City, Nanshan District, Shenzhen, China
Standard : FCC Part 15 Subpart C §15.247

The product was received on Aug. 11, 2023 and testing was performed from Aug. 16, 2023 to Aug. 23, 2023. 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.



Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333



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History of this test report

Report No.	Version	Description	Issue Date
FR381034B	01	Initial issue of report	Sep. 25, 2023
FR381034B	02	1. Indicate sample difference 2. Add test mode remark 3. This report is an updated version, replacing the report issued on Sep. 25, 2023.	Nov. 06, 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	6.17 dB under the limit at 2495.76 MHz
3.6	15.207	AC Conducted Emission	Pass	4.50 dB under the limit at 0.16 MHz
3.7	15.203	Antenna Requirement	Pass	-

Note: Not required means after assessing, test items are not necessary to carry out.

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/manufacture 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: Lewis Ho

Report Producer: Michelle Chen



1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature		
General Specs Bluetooth		
Antenna Type Bluetooth: FPC Antenna		
Antenna information		
2402 MHz ~ 2480 MHz	Peak Gain (dBi)	Left Ear : -2.5 Right Ear : -2.5

Remark:

1. The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.
2. The difference between Sample 1 and Sample 2 is different color.

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 TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH02-HY, CO05-HY, 03CH07-HY

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

FCC designation No.: TW1190

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	-	-



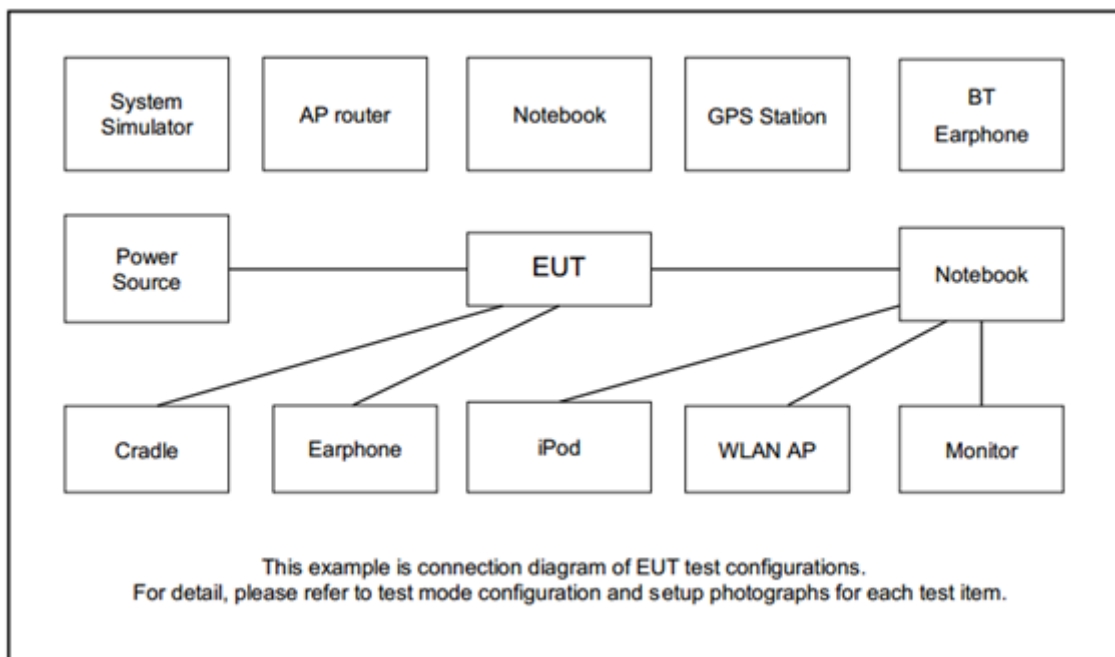
2.2 Test Mode

- 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). 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 only the worst case emissions were reported in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

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

Summary table of Test Cases	
Test Item	Data Rate / Modulation
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 CH01_2404 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH38_2478 MHz_2Mbps
Radiated Test Cases	<Left>
	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 CH01_2404 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH38_2478 MHz_2Mbps
AC Conducted Emission	<Right>
	Mode 1: Bluetooth Tx CH38_2478 MHz_2Mbps
	Mode 1 :Bluetooth-LE Link with Phone + Bluetooth Earphone (L+R) Charging via Charging Case + USB Cable (Charging from Adapter)
	Mode 2 : Bluetooth-LE Link with Phone + Bluetooth Earphone (L+R) Charging via Charging Case + USB Cable (Charging from Notebook)
Remark: - The worst case of Conducted Emission is mode 2; only the test data of it was reported. - Bluetooth-LE 2Mbps does not support primary advertising channels; it does not support channel 00 and channel 39. - 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



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	N/A	Unshielded, 1.8 m
2.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
3.	Notebook	DELL	Latitude 3420	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Mobile Phone	SAMSUNG	SM-A730F/DS	A3LSMA730F	N/A	N/A
5.	Adapter	Chenyuang	CK18W02U	E255633	N/A	N/A



2.5 EUT Operation Test Setup

The RF test items, utility “AB157x Lab Test Tool v3.6.8” 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.

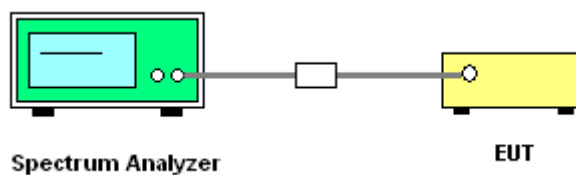
3.1.2 Measuring Instruments

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.

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.

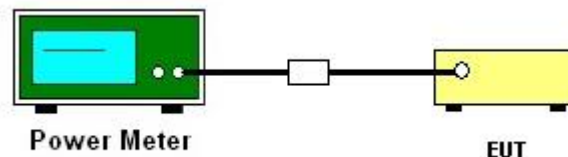
3.2.2 Measuring Instruments

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.

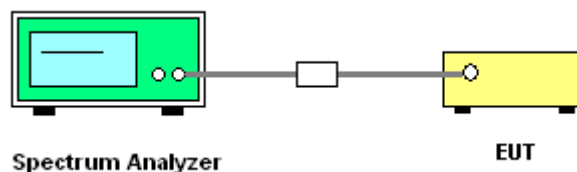
3.3.2 Measuring Instruments

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.

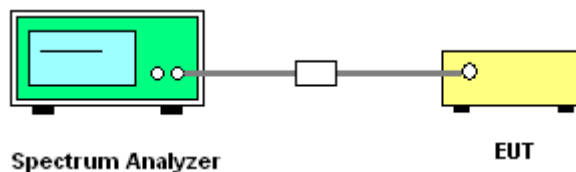
3.4.2 Measuring Instruments

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

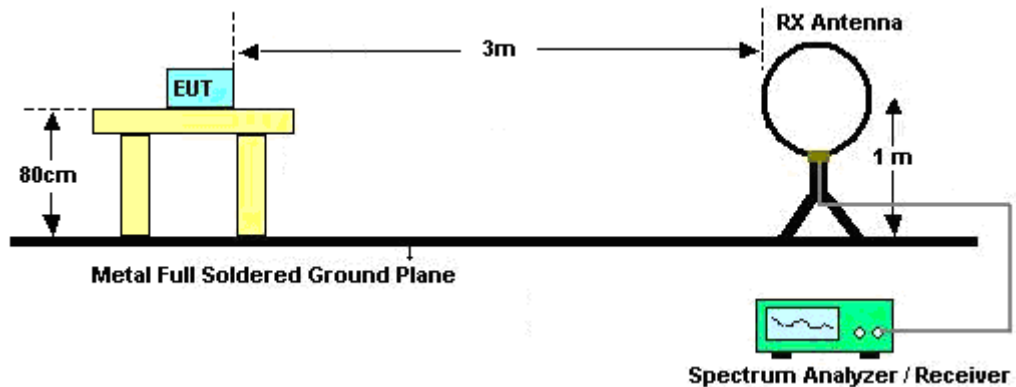
Please refer to the measuring equipment list in this test report.

3.5.3 Test Procedures

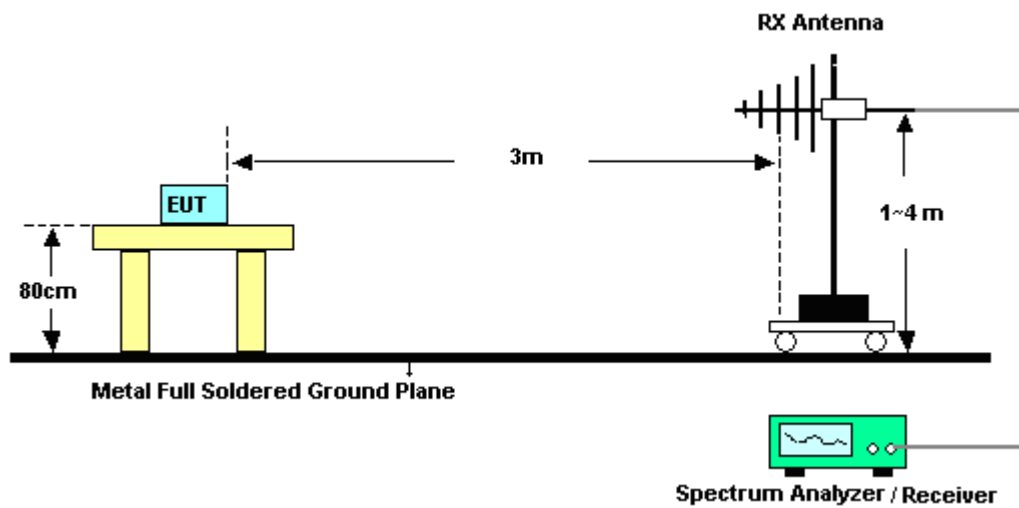
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the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

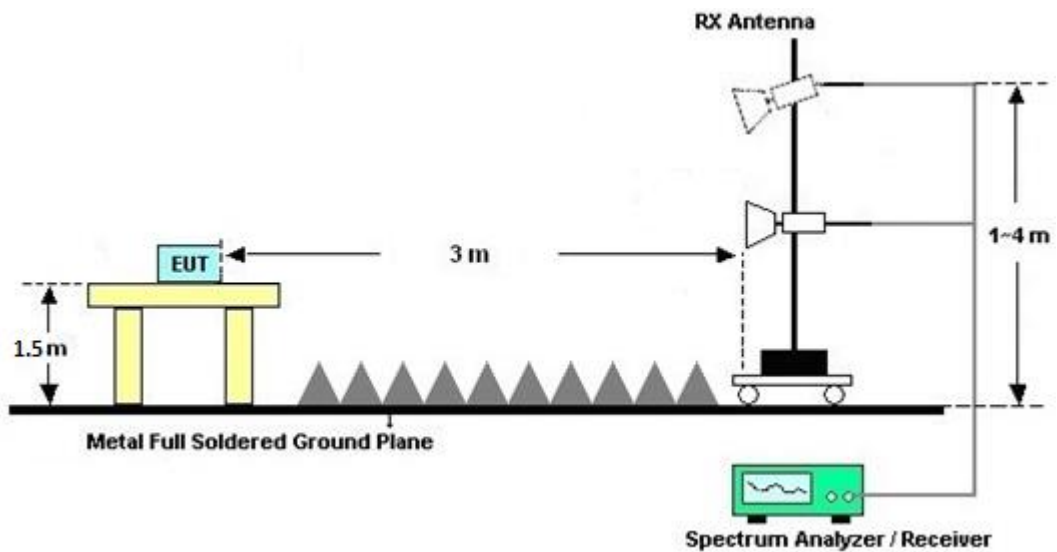
For radiated test below 30MHz



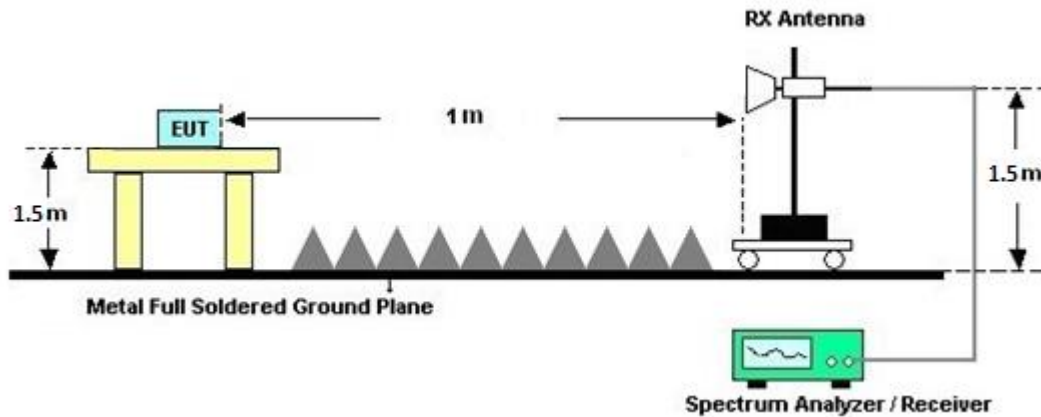
For radiated test from 30MHz to 1GHz



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 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.

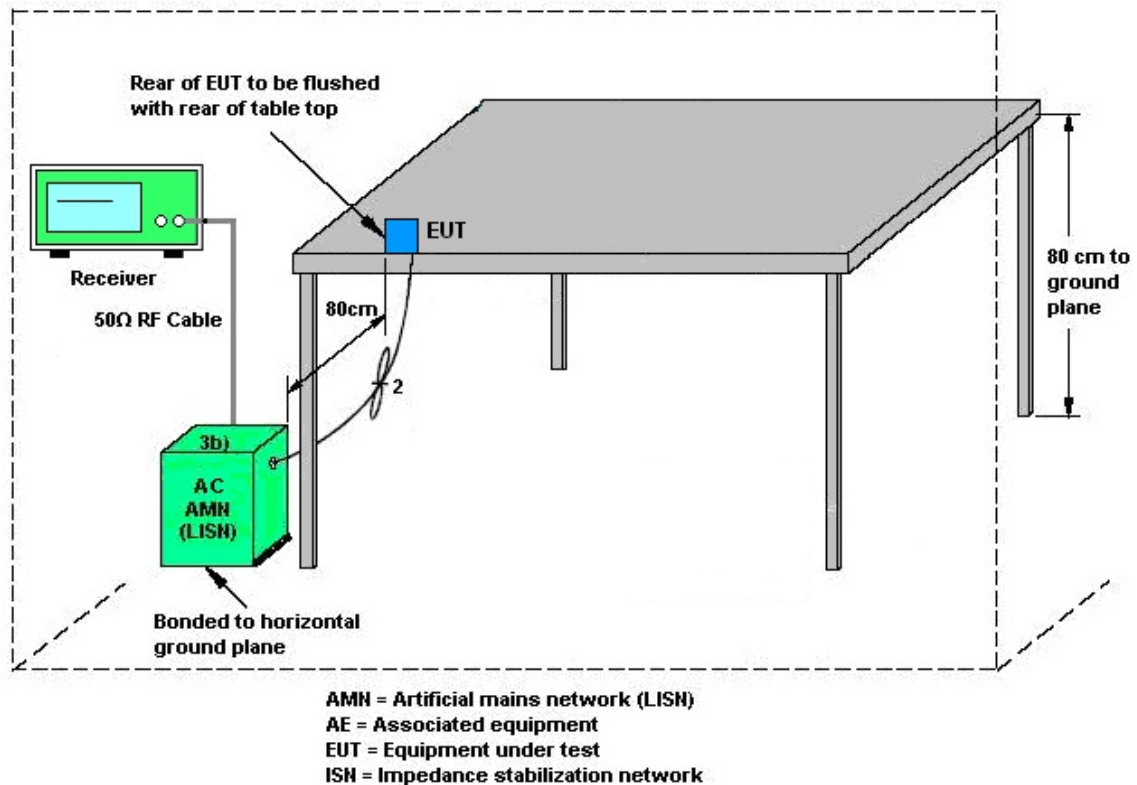
3.6.2 Measuring Instruments

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

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
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35419 & 03	30MHz~1GHz	Apr. 23, 2023	Aug. 18, 2023~ Aug. 21, 2023	Apr. 22, 2024	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 01, 2022	Aug. 18, 2023~ Aug. 21, 2023	Nov. 30, 2023	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Feb. 28, 2023	Aug. 18, 2023~ Aug. 21, 2023	Feb. 27, 2024	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz~18GHz	Apr. 20, 2023	Aug. 18, 2023~ Aug. 21, 2023	Apr. 19, 2024	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	Oct. 03, 2022	Aug. 18, 2023~ Aug. 21, 2023	Oct. 02, 2023	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Mar. 24, 2023	Aug. 18, 2023~ Aug. 21, 2023	Mar. 23, 2024	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	0600789	18-40GHz	Jul. 25, 2023	Aug. 18, 2023~ Aug. 21, 2023	Jul. 24, 2024	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Mar. 28, 2023	Aug. 18, 2023~ Aug. 21, 2023	Mar. 27, 2024	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY15682/4	30MHz to 18GHz	Feb. 22, 2023	Aug. 18, 2023~ Aug. 21, 2023	Feb. 21, 2024	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4	9kHz to 18GHz	Feb. 22, 2023	Aug. 18, 2023~ Aug. 21, 2023	Feb. 21, 2024	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4	9kHz to 18GHz	Feb. 22, 2023	Aug. 18, 2023~ Aug. 21, 2023	Feb. 21, 2024	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126	532078/126E	30MHz~18GHz	Sep. 16, 2022	Aug. 18, 2023~ Aug. 21, 2023	Sep. 15, 2023	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2	18GHz~40GHz	Feb. 22, 2023	Aug. 18, 2023~ Aug. 21, 2023	Feb. 21, 2024	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801606/2	9KHz ~ 40GHz	Apr. 20, 2023	Aug. 18, 2023~ Aug. 21, 2023	Apr. 19, 2024	Radiation (03CH07-HY)
Controller	EMEC	EM1000	N/A	Control Ant Mast	N/A	Aug. 18, 2023~ Aug. 21, 2023	N/A	Radiation (03CH07-HY)
Controller	MF	MF-7802	N/A	Control Turn table	N/A	Aug. 18, 2023~ Aug. 21, 2023	N/A	Radiation (03CH07-HY)
Antenna Mast	EMEC	AM-BS-4500E	N/A	Boresight mast 1M~4M	N/A	Aug. 18, 2023~ Aug. 21, 2023	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Aug. 18, 2023~ Aug. 21, 2023	N/A	Radiation (03CH07-HY)
Software	Audix	E3	N/A	N/A	N/A	Aug. 18, 2023~ Aug. 21, 2023	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB2495	N/A	Mar. 14, 2023	Aug. 18, 2023~ Aug. 21, 2023	Mar. 13, 2024	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Nov. 24, 2022	Aug. 18, 2023~ Aug. 21, 2023	Nov. 23, 2023	Radiation (03CH07-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECEPIL	TR-32	HE17XB2468	N/A	Mar. 28, 2023	Aug. 16, 2023~ Aug. 23, 2023	Mar. 27, 2024	Conducted (TH02-HY)
Power Sensor	DARE	RPR3006W	17100015SNO 35 (NO:109)	10MHz~6GHz	Jan. 11, 2023	Aug. 16, 2023~ Aug. 23, 2023	Jan. 10, 2024	Conducted (TH02-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101564	10Hz~40GHz	Sep. 13, 2022	Aug. 16, 2023~ Aug. 23, 2023	Sep. 12, 2023	Conducted (TH02-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 23, 2023	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2022	Aug. 23, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2022	Aug. 23, 2023	Nov. 16, 2023	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2022	Aug. 23, 2023	Nov. 30, 2023	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 17, 2022	Aug. 23, 2023	Nov. 16, 2023	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Aug. 23, 2023	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	9kHz-200MHz	Jul. 28, 2023	Aug. 23, 2023	Jul. 27, 2024	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 29, 2022	Aug. 23, 2023	Dec. 28, 2023	Conduction (CO05-HY)

5 Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.50 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.30 dB
---	---------

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.60 dB
---	---------

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.30 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.30 dB
---	---------

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Ching Chen	Temperature:	21~25	°C
Test Date:	2023/08/16-2023/08/23	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.033	0.718	0.50	Pass
BLE	1Mbps	1	19	2440	1.033	0.724	0.50	Pass
BLE	1Mbps	1	39	2480	1.031	0.722	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	8.60	30.00	-2.50	6.10	36.00	Pass
BLE	1Mbps	1	19	2440	8.80	30.00	-2.50	6.30	36.00	Pass
BLE	1Mbps	1	39	2480	8.80	30.00	-2.50	6.30	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	7.77	-6.94	-2.50	8.00	Pass
BLE	1Mbps	1	19	2440	7.85	-6.74	-2.50	8.00	Pass
BLE	1Mbps	1	39	2480	8.06	-6.63	-2.50	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	1	2404	2.058	1.268	0.50	Pass
BLE	2Mbps	1	19	2440	2.058	1.256	0.50	Pass
BLE	2Mbps	1	38	2478	2.058	1.268	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	1	2404	8.60	30.00	-2.50	6.10	36.00	Pass
BLE	2Mbps	1	19	2440	8.80	30.00	-2.50	6.30	36.00	Pass
BLE	2Mbps	1	38	2478	8.90	30.00	-2.50	6.40	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	1	2404	7.42	-8.99	-2.50	8.00	Pass
BLE	2Mbps	1	19	2440	7.46	-9.01	-2.50	8.00	Pass
BLE	2Mbps	1	38	2478	7.78	-8.71	-2.50	8.00	Pass

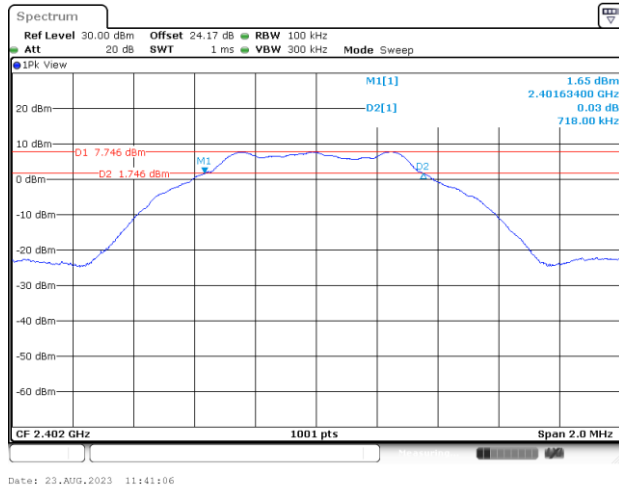
Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.



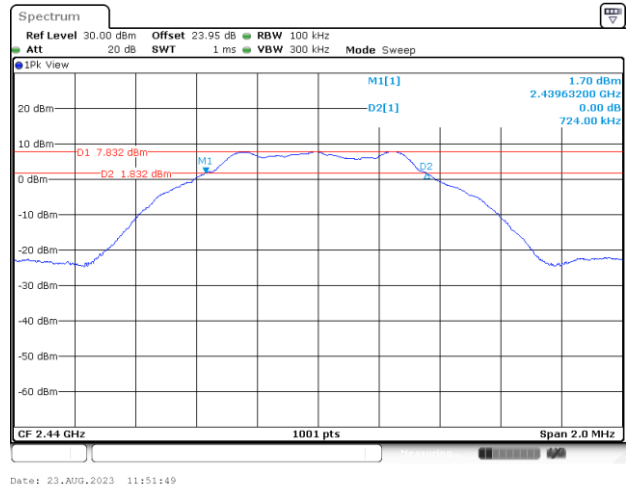
6dB Bandwidth

<1Mbps>

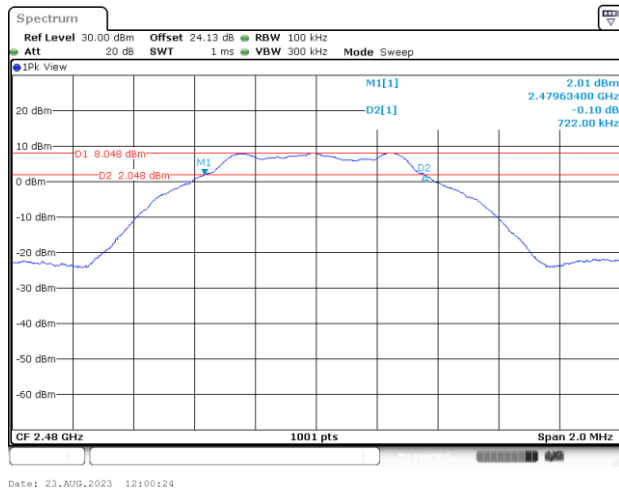
6 dB Bandwidth Plot on Channel 00



6 dB Bandwidth Plot on Channel 19



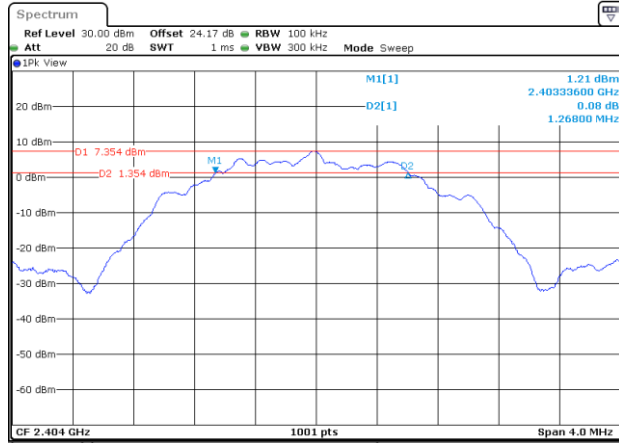
6 dB Bandwidth Plot on Channel 39



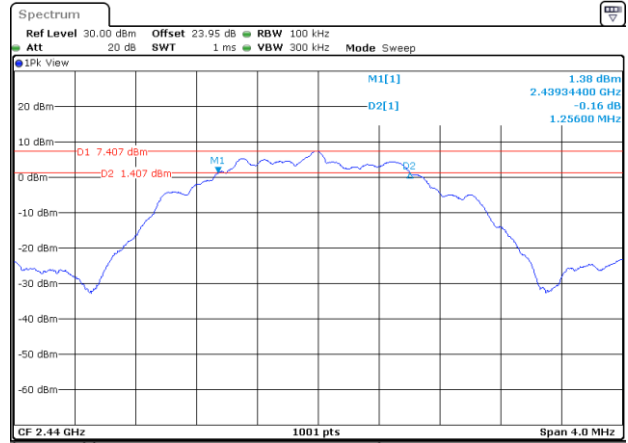


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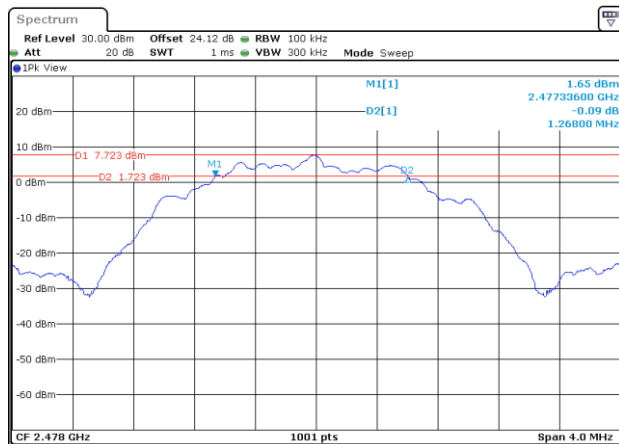
6 dB Bandwidth Plot on Channel 01



6 dB Bandwidth Plot on Channel 19



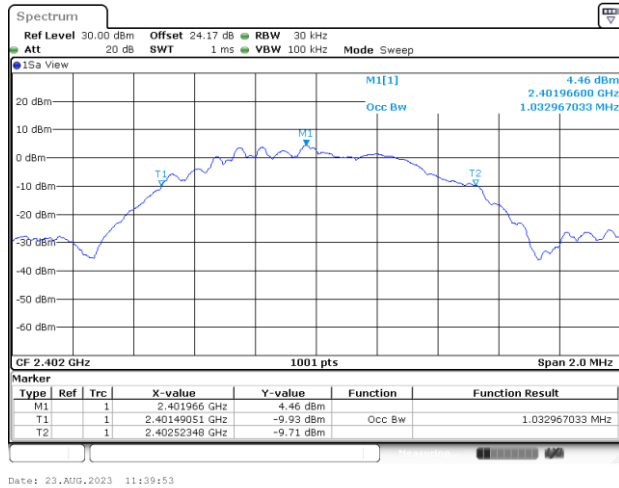
6 dB Bandwidth Plot on Channel 38



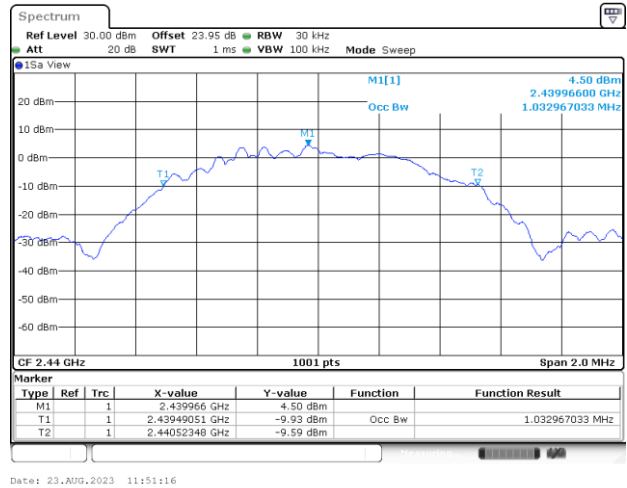
99% Occupied Bandwidth

<1Mbps>

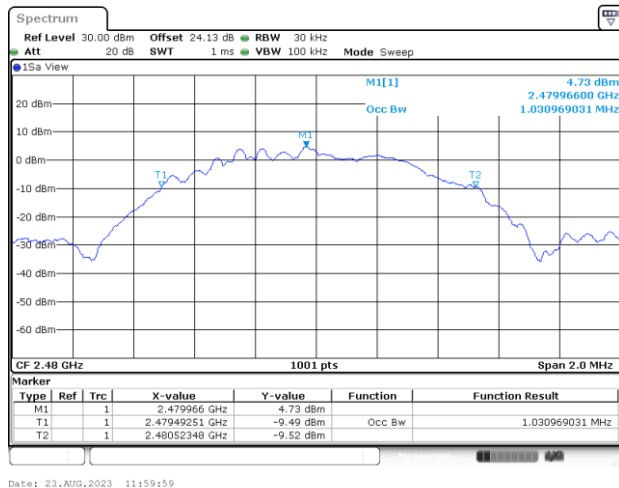
99% Occupied Bandwidth Plot on Channel 00



99% Occupied Plot Bandwidth on Channel 19



99% Occupied Bandwidth Plot on Channel 39

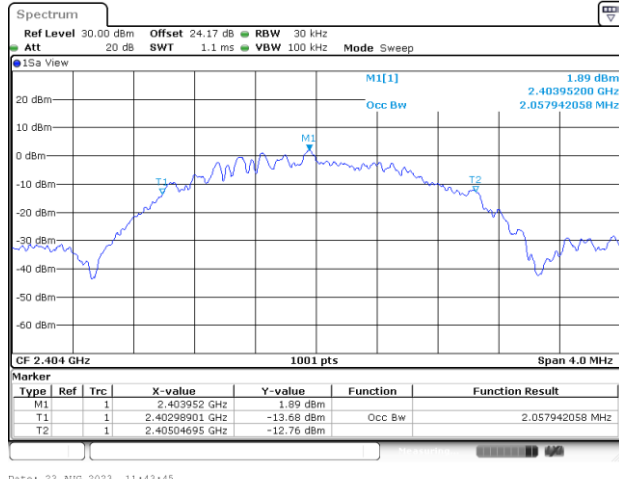


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

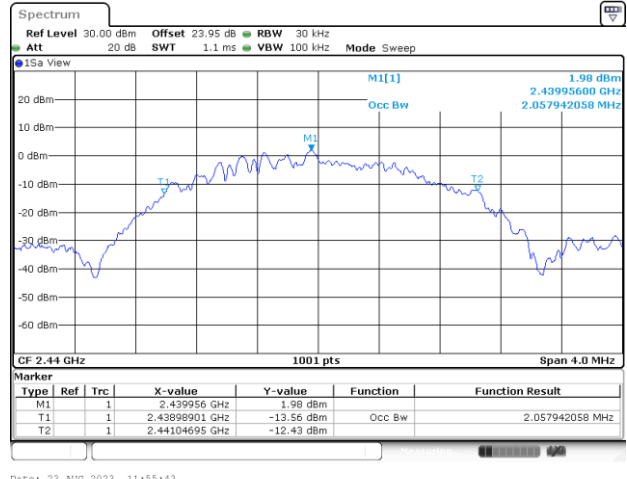


<2Mbps>

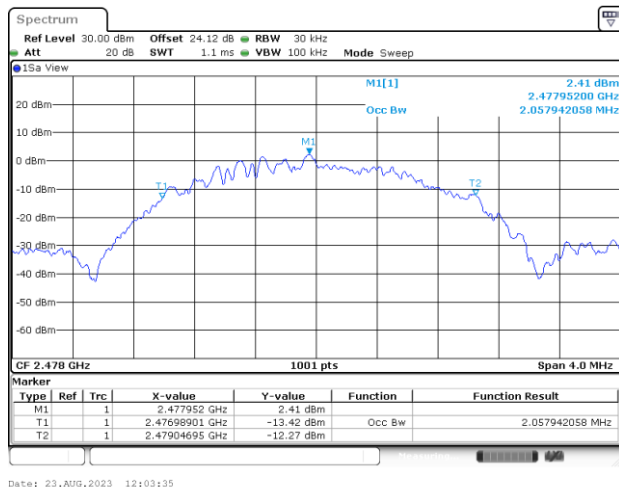
99% Occupied Bandwidth Plot on Channel 01



99% Occupied Plot Bandwidth on Channel 19



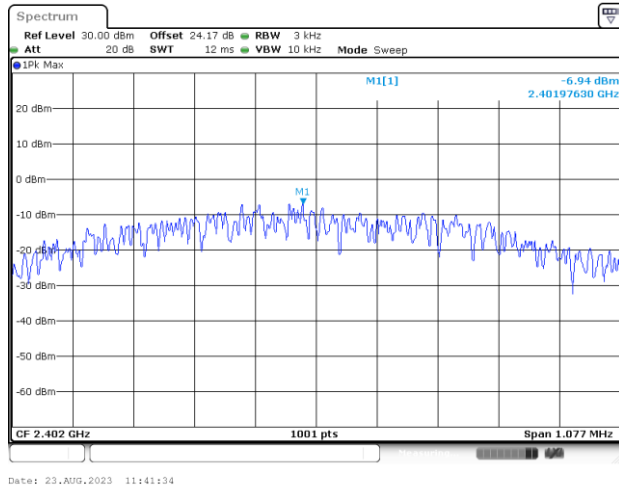
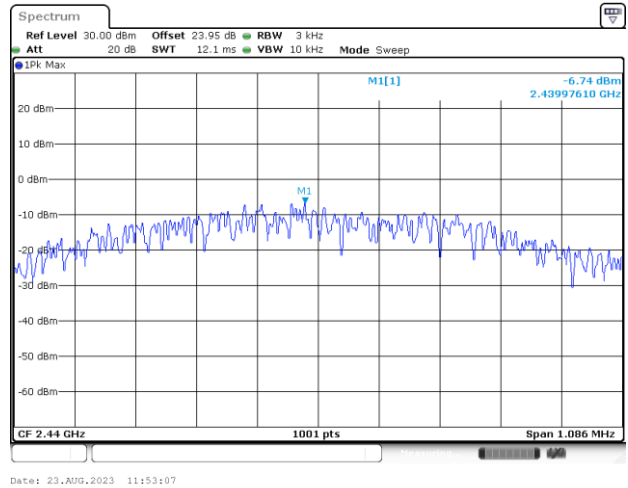
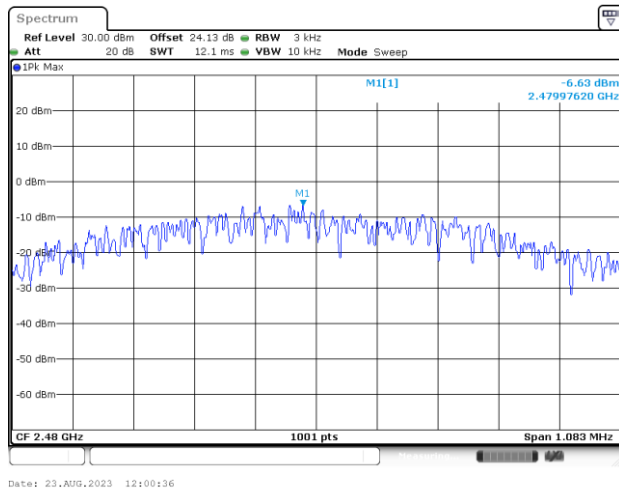
99% Occupied Bandwidth Plot on Channel 38



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

**Power Spectral Density (dBm/3kHz)**

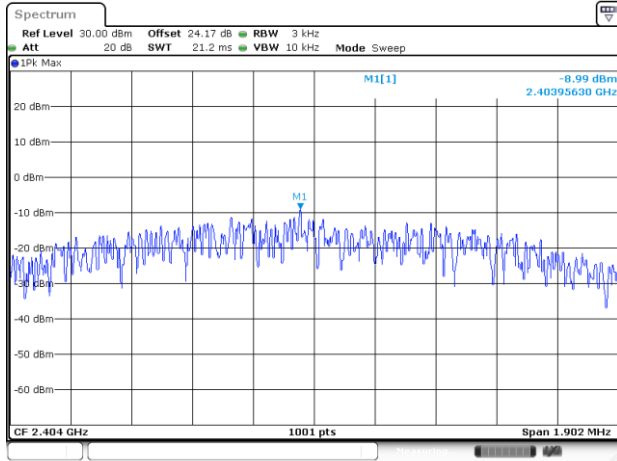
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Power Density (dBm/3kHz) Plot Channel 00**Power Density (dBm/3kHz) Plot Channel 19****Power Density (dBm/3kHz) Plot Channel 39**

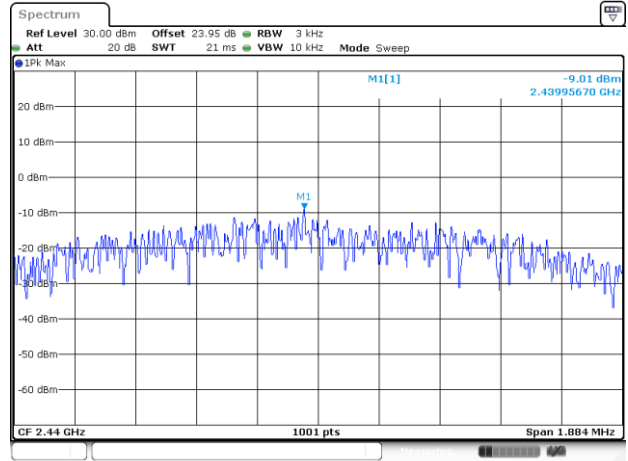


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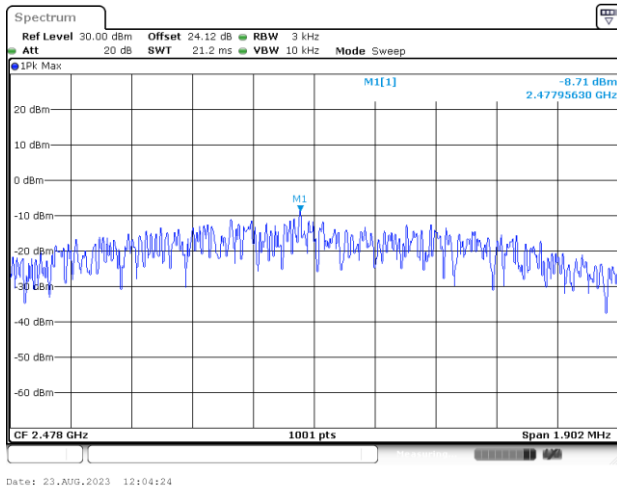
Power Density (dBm/3kHz) Plot Channel 01



Power Density (dBm/3kHz) Plot Channel 19



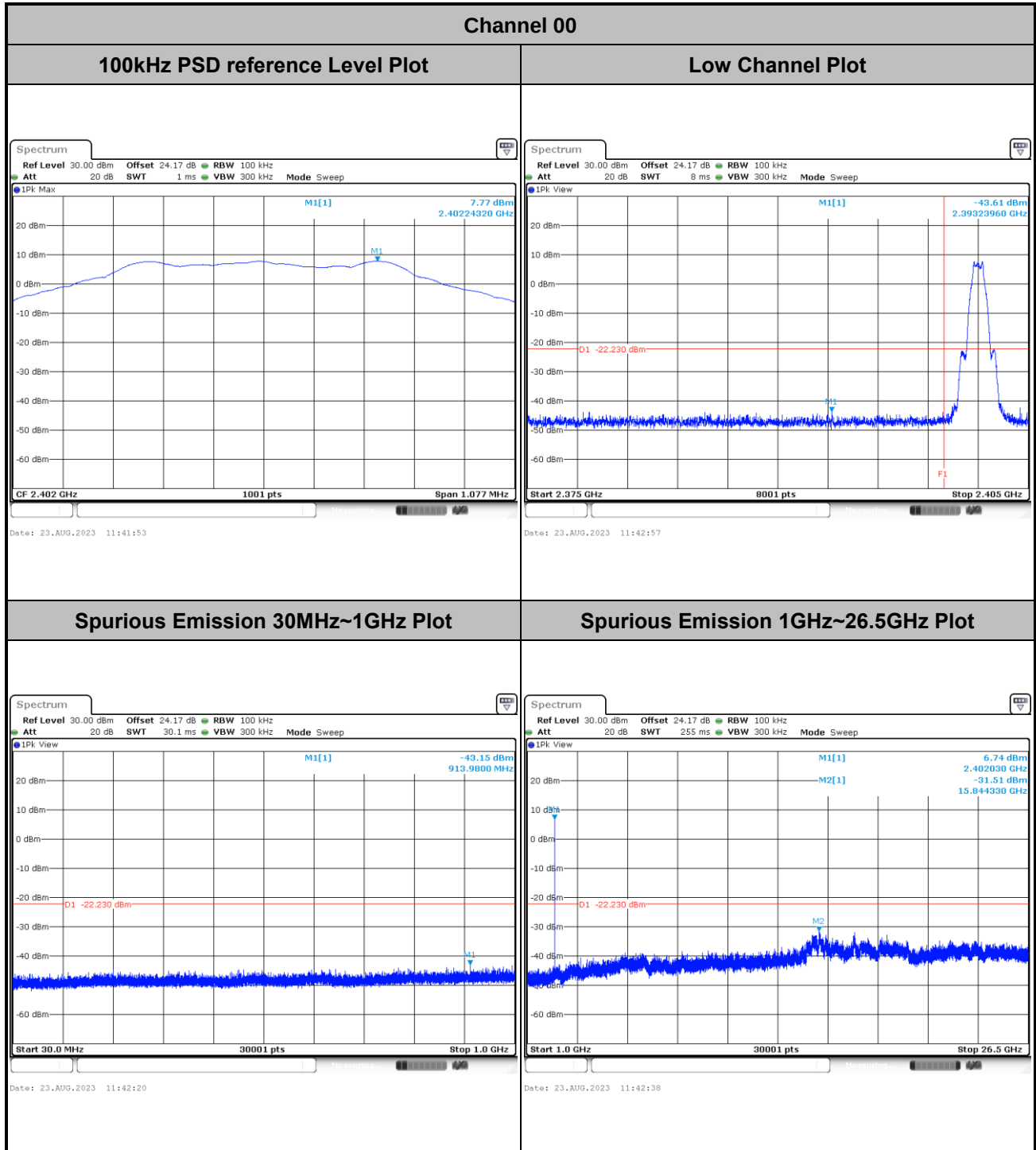
Power Density (dBm/3kHz) Plot Channel 38





Band Edge and Conducted Spurious Emission

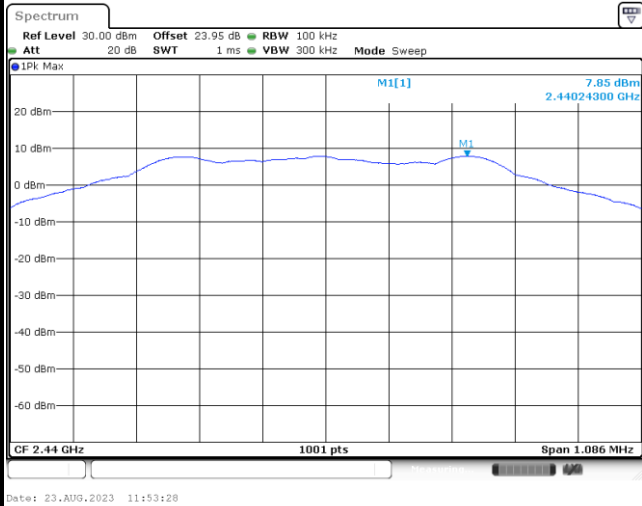
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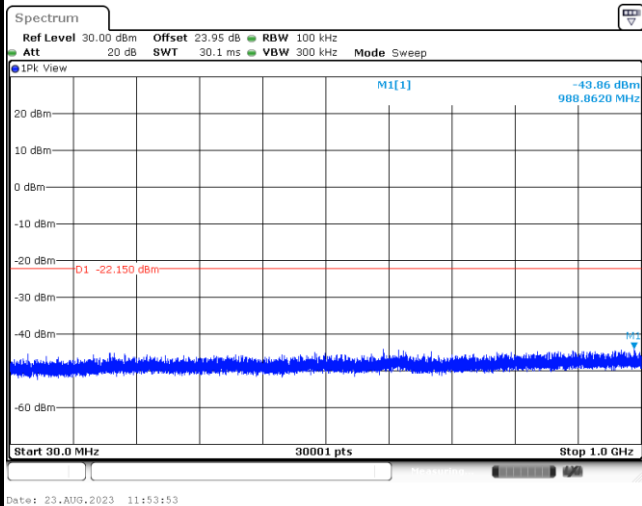
Channel 19

100kHz PSD reference Level Plot

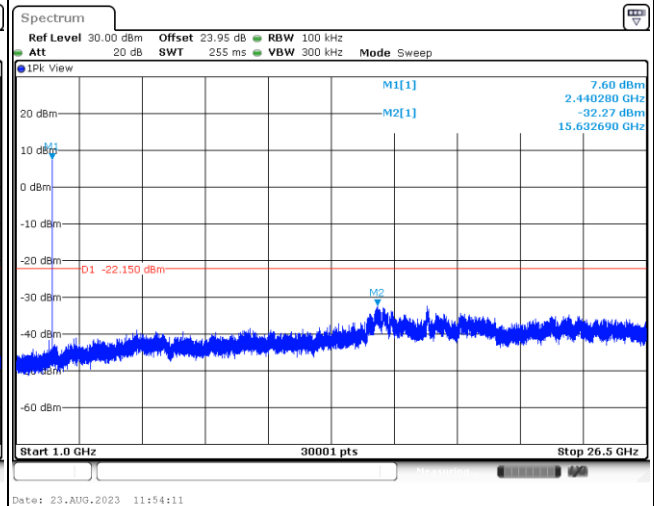


Middle Channel Plot

Spurious Emission 30MHz~1GHz Plot



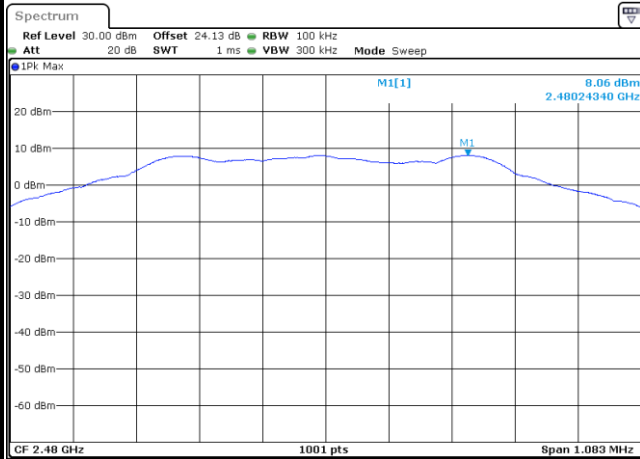
Spurious Emission 1GHz~26.5GHz Plot





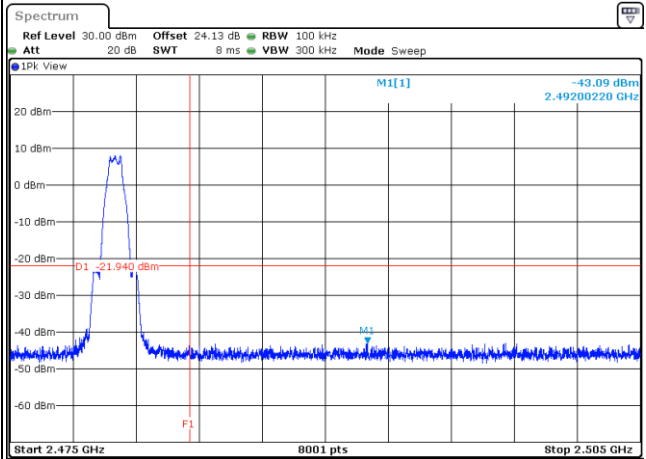
Channel 39

100kHz PSD reference Level Plot



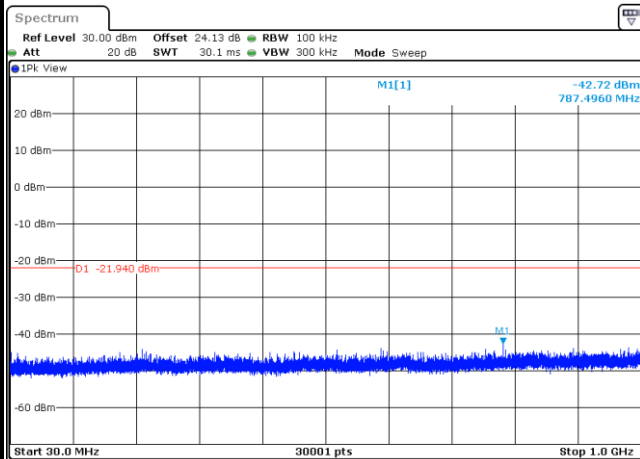
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High Channel Plot



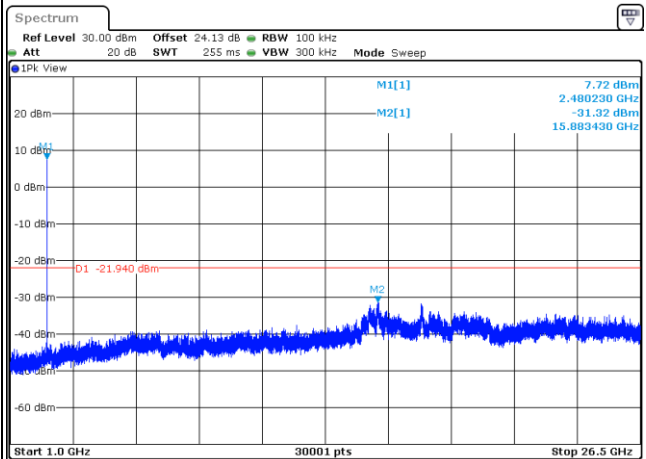
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Spurious Emission 30MHz~1GHz Plot



Date: 23.AUG.2023 12:01:30

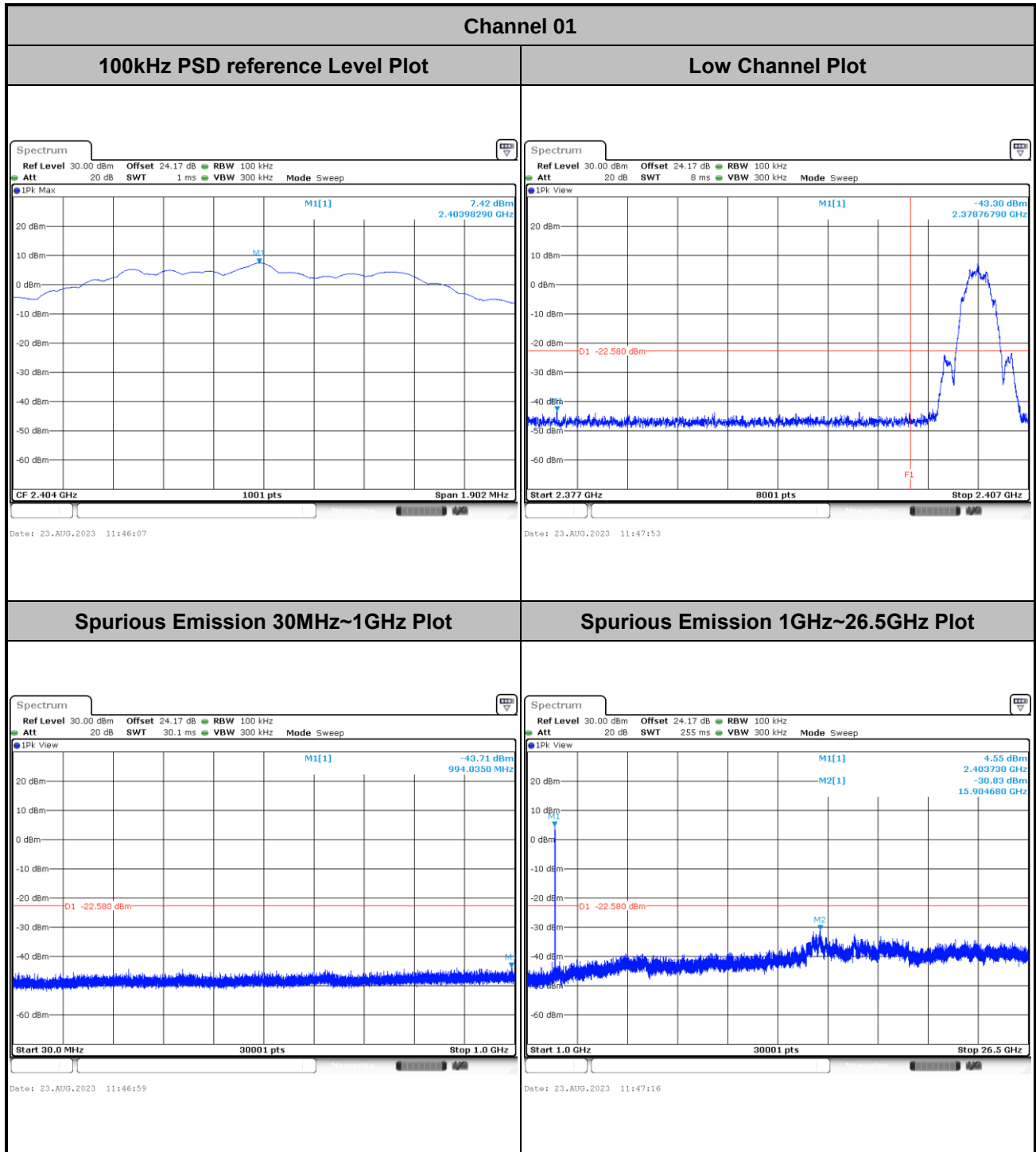
Spurious Emission 1GHz~26.5GHz Plot



Date: 23.AUG.2023 12:02:03



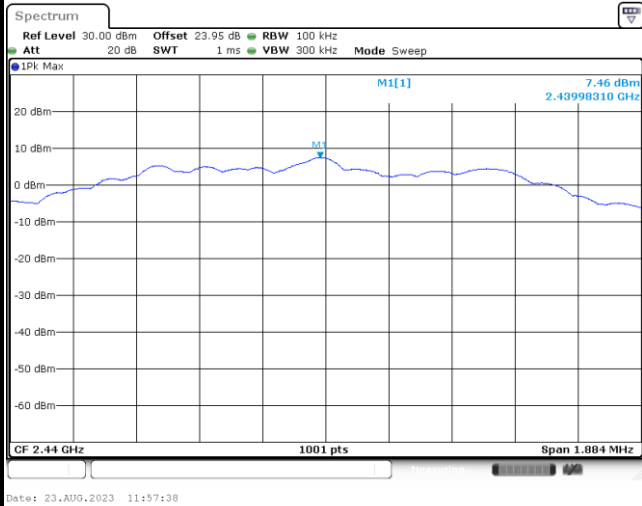
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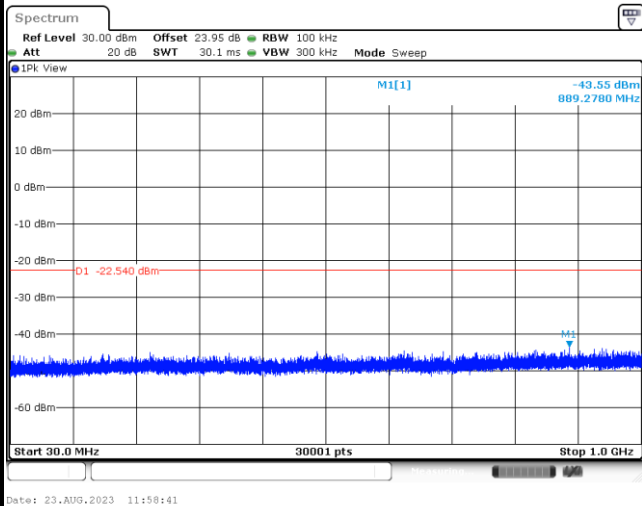
Channel 19

100kHz PSD reference Level Plot

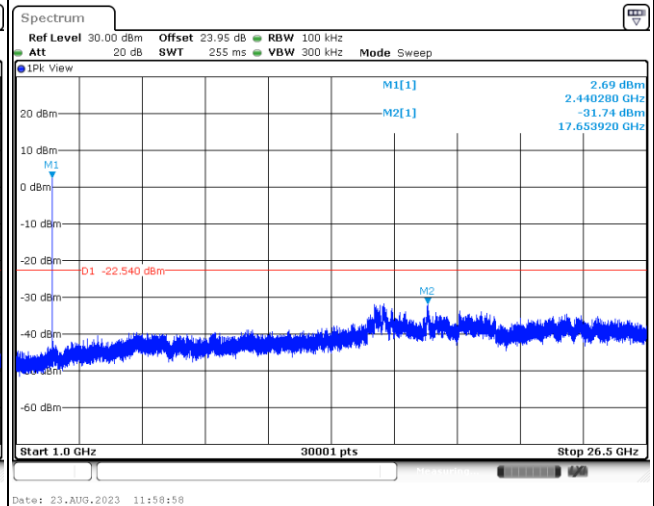


Middle Channel Plot

Spurious Emission 30MHz~1GHz Plot



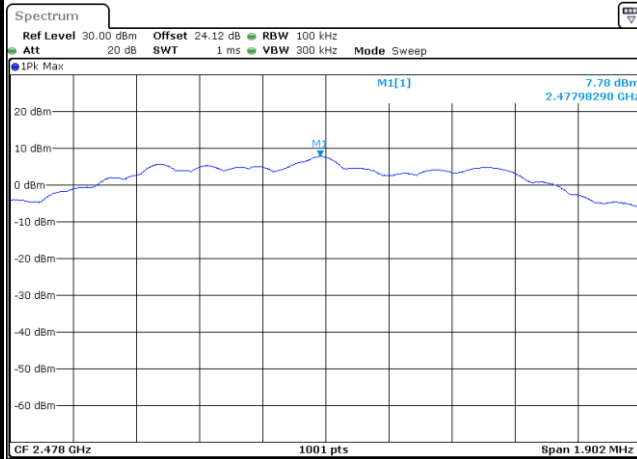
Spurious Emission 1GHz~26.5GHz Plot





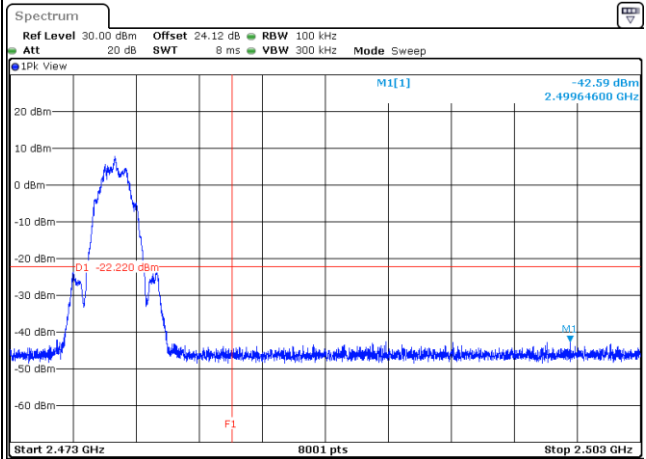
Channel 38

100kHz PSD reference Level Plot



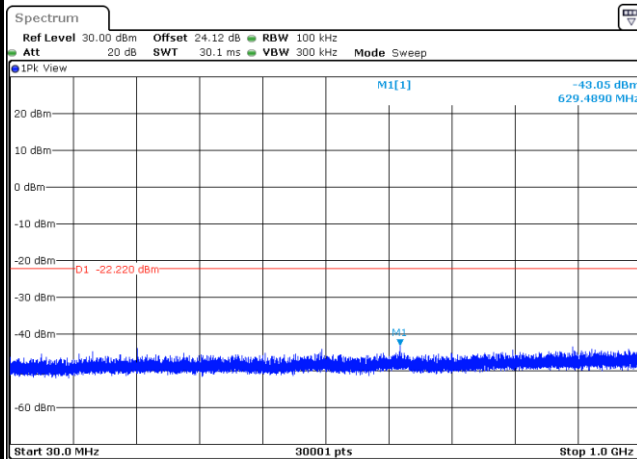
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High Channel Plot



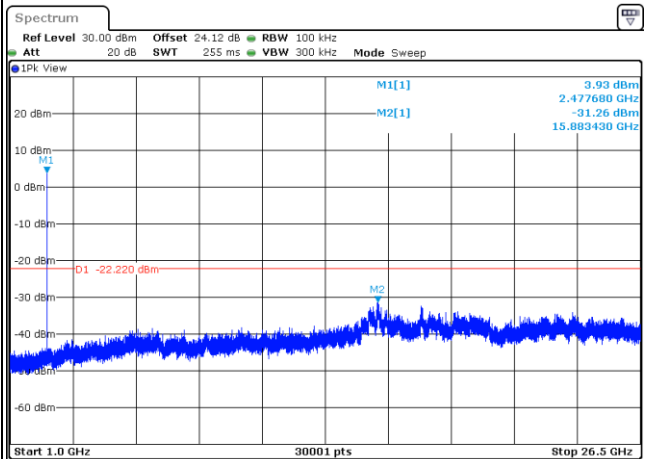
Date: 23.AUG.2023 12:06:00

Spurious Emission 30MHz~1GHz Plot



Date: 23.AUG.2023 12:05:16

Spurious Emission 1GHz~26.5GHz Plot



Date: 23.AUG.2023 12:05:32



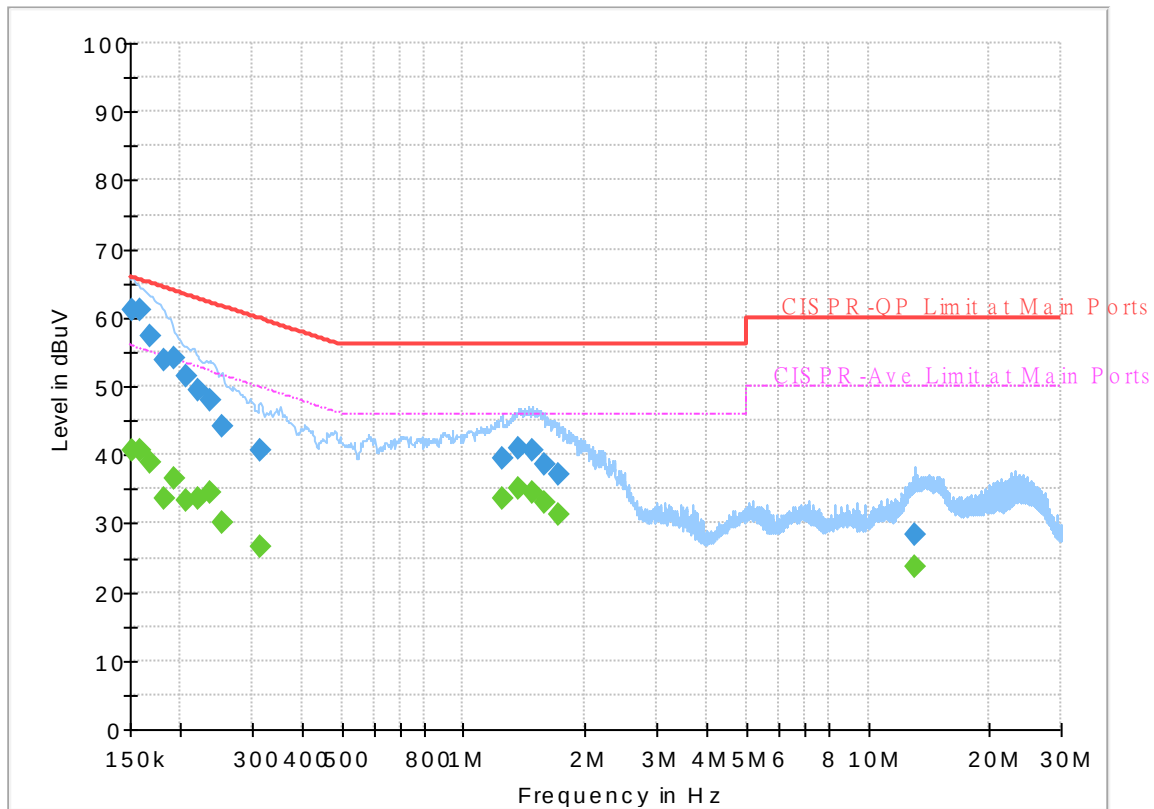
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	Temperature :	23~26°C
		Relative Humidity :	45~55%

EUT Information

Report NO : 381034
 Test Mode : Mode 2
 Test Voltage : Power From System
 Phase : Line

Full Spectrum



Final_Result

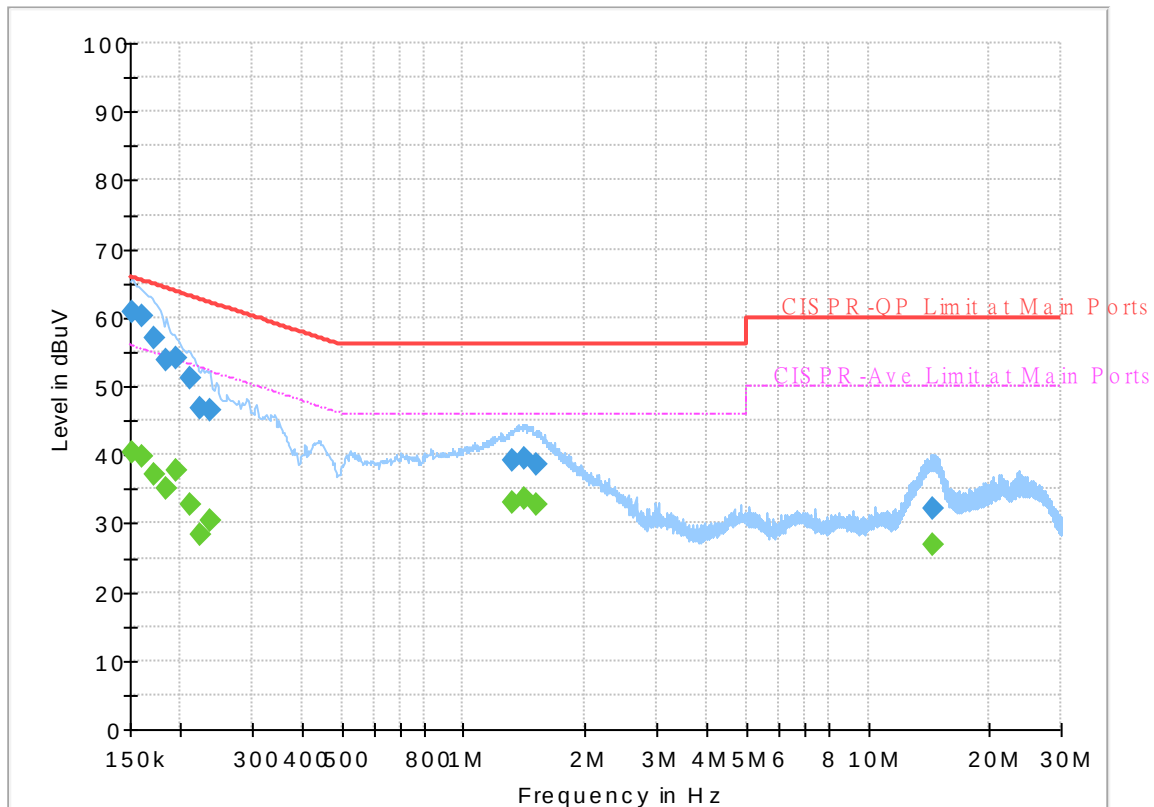
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	40.52	55.88	15.36	L1	OFF	19.8
0.152250	61.22	---	65.88	4.66	L1	OFF	19.8
0.159000	---	40.51	55.52	15.01	L1	OFF	19.8
0.159000	61.02	---	65.52	4.50	L1	OFF	19.8
0.168000	---	38.91	55.06	16.15	L1	OFF	19.8
0.168000	57.33	---	65.06	7.73	L1	OFF	19.8
0.181500	---	33.74	54.42	20.68	L1	OFF	19.8
0.181500	53.80	---	64.42	10.62	L1	OFF	19.8
0.192750	---	36.60	53.92	17.32	L1	OFF	19.8
0.192750	54.13	---	63.92	9.79	L1	OFF	19.8
0.206250	---	33.45	53.36	19.91	L1	OFF	19.8
0.206250	51.32	---	63.36	12.04	L1	OFF	19.8
0.219750	---	33.76	52.83	19.07	L1	OFF	19.8
0.219750	49.45	---	62.83	13.38	L1	OFF	19.8
0.237750	---	34.61	52.17	17.56	L1	OFF	19.8
0.237750	47.93	---	62.17	14.24	L1	OFF	19.8
0.253500	---	30.23	51.64	21.41	L1	OFF	19.8
0.253500	44.04	---	61.64	17.60	L1	OFF	19.8
0.314250	---	26.72	49.86	23.14	L1	OFF	19.8
0.314250	40.62	---	59.86	19.24	L1	OFF	19.8
1.243500	---	33.60	46.00	12.40	L1	OFF	19.8

1.243500	39.50	---	56.00	16.50	L1	OFF	19.8
1.367250	---	34.96	46.00	11.04	L1	OFF	19.8
1.367250	40.98	---	56.00	15.02	L1	OFF	19.8
1.477500	---	34.64	46.00	11.36	L1	OFF	19.9
1.477500	40.58	---	56.00	15.42	L1	OFF	19.9
1.578750	---	33.17	46.00	12.83	L1	OFF	19.9
1.578750	38.70	---	56.00	17.30	L1	OFF	19.9
1.709250	---	31.40	46.00	14.60	L1	OFF	19.9
1.709250	36.99	---	56.00	19.01	L1	OFF	19.9
13.094250	---	23.55	50.00	26.45	L1	OFF	19.9
13.094250	28.23	---	60.00	31.77	L1	OFF	19.9

EUT Information

Report NO : 381034
Test Mode : Mode 2
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	---	40.40	55.88	15.48	N	OFF	19.8
0.152250	60.93	---	65.88	4.95	N	OFF	19.8
0.161250	---	39.84	55.40	15.56	N	OFF	19.8
0.161250	60.37	---	65.40	5.03	N	OFF	19.8
0.172500	---	37.14	54.84	17.70	N	OFF	19.8
0.172500	56.88	---	64.84	7.96	N	OFF	19.8
0.183750	---	35.08	54.31	19.23	N	OFF	19.8
0.183750	53.93	---	64.31	10.38	N	OFF	19.8
0.195000	---	37.68	53.82	16.14	N	OFF	19.8
0.195000	54.10	---	63.82	9.72	N	OFF	19.8
0.210750	---	32.78	53.18	20.40	N	OFF	19.8
0.210750	51.10	---	63.18	12.08	N	OFF	19.8
0.224250	---	28.22	52.66	24.44	N	OFF	19.8
0.224250	46.76	---	62.66	15.90	N	OFF	19.8
0.235500	---	30.51	52.25	21.74	N	OFF	19.8
0.235500	46.59	---	62.25	15.66	N	OFF	19.8
1.326750	---	33.07	46.00	12.93	N	OFF	19.8
1.326750	39.07	---	56.00	16.93	N	OFF	19.8
1.419000	---	33.69	46.00	12.31	N	OFF	19.8
1.419000	39.56	---	56.00	16.44	N	OFF	19.8
1.522500	---	32.82	46.00	13.18	N	OFF	19.8

1.522500	38.56	---	56.00	17.44	N	OFF	19.8
14.451000	---	26.88	50.00	23.12	N	OFF	20.0
14.451000	32.08	---	60.00	27.92	N	OFF	20.0



Appendix C. Radiated Spurious Emission

Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	23.6~25.5°C
		Relative Humidity :	53.4~61.3%

<Left>
<1Mbps>

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

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2332.89	54.97	-19.03	74	39.12	32	18.04	34.19	354	89	P	H
		2389.905	45.95	-8.05	54	29.78	32.1	18.27	34.2	354	89	A	H
	*	2402	102.68	-	-	86.5	32.1	18.28	34.2	354	89	P	H
	*	2402	102.18	-	-	86	32.1	18.28	34.2	354	89	A	H
													H
													H
		2371.635	55.78	-18.22	74	39.71	32.1	18.16	34.19	275	80	P	V
		2331.315	46.16	-7.84	54	30.32	31.99	18.04	34.19	275	80	A	V
	*	2402	103.4	-	-	87.22	32.1	18.28	34.2	275	80	P	V
	*	2402	103.09	-	-	86.91	32.1	18.28	34.2	275	80	A	V
													V
													V
BLE CH 19 2440MHz		2379.3	55.13	-18.87	74	39.06	32.1	18.17	34.2	313	137	P	H
		2381.26	45.96	-8.04	54	29.79	32.1	18.27	34.2	313	137	A	H
	*	2440	101.76	-	-	85.61	32.02	18.34	34.21	313	137	P	H
	*	2440	101.07	-	-	84.92	32.02	18.34	34.21	313	137	A	H
		2491.67	54.37	-19.63	74	38.2	32	18.39	34.22	313	137	P	H
		2489.57	46.11	-7.89	54	29.94	32	18.39	34.22	313	137	A	H
		2342.76	54.66	-19.34	74	38.64	32.06	18.15	34.19	310	83	P	V
		2388.68	45.99	-8.01	54	29.82	32.1	18.27	34.2	310	83	A	V
	*	2440	103.69	-	-	87.54	32.02	18.34	34.21	310	83	P	V
	*	2440	103.17	-	-	87.02	32.02	18.34	34.21	310	83	A	V
		2490.2	56.14	-17.86	74	39.97	32	18.39	34.22	310	83	P	V
		2491.95	46.2	-7.8	54	30.03	32	18.39	34.22	310	83	A	V



BLE CH 39 2480MHz	*	2480	102.55	-	-	86.37	32	18.4	34.22	336	90	P	H
	*	2480	102.09	-	-	85.91	32	18.4	34.22	336	90	A	H
		2496.8	54.62	-19.38	74	38.45	32	18.39	34.22	336	90	P	H
		2484.4	46.09	-7.91	54	29.92	32	18.39	34.22	336	90	A	H
													H
													H
	*	2480	103.31	-	-	87.13	32	18.4	34.22	296	83	P	V
	*	2480	102.63	-	-	86.45	32	18.4	34.22	296	83	A	V
		2496.2	55.56	-18.44	74	39.39	32	18.39	34.22	296	83	P	V
		2492.88	45.97	-8.03	54	29.8	32	18.39	34.22	296	83	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	51.01	-22.99	74	63.02	34.02	13.01	59.04	100	296	P	H
		4804	47.12	-6.88	54	59.13	34.02	13.01	59.04	100	296	A	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		4804	47.37	-26.63	74	59.38	34.02	13.01	59.04	100	202	P	V
		4804	41.72	-12.28	54	53.73	34.02	13.01	59.04	100	202	A	V
													V
													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		4880	49.62	-24.38	74	61.36	34.14	13.03	58.91	100	60	P	H
		4880	45.45	-8.55	54	57.19	34.14	13.03	58.91	100	60	A	H
		7320	42.61	-31.39	74	49.12	35.7	15.36	57.57	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		4880	46.85	-27.15	74	58.59	34.14	13.03	58.91	380	51	P	V
		4880	41.24	-12.76	54	52.98	34.14	13.03	58.91	380	51	A	V
		7320	40.93	-33.07	74	47.44	35.7	15.36	57.57	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
													V

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 39 2480MHz		4960	49.82	-24.18	74	61.26	34.3	13.04	58.78	100	39	P	H
		4960	45.74	-8.26	54	57.18	34.3	13.04	58.78	100	39	A	H
		7440	41.14	-32.86	74	47.86	35.6	15.38	57.7	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		4960	46.59	-27.41	74	58.03	34.3	13.04	58.78	333	242	P	V
		4960	41.86	-12.14	54	53.3	34.3	13.04	58.78	333	242	A	V
		7440	40.86	-33.14	74	47.58	35.6	15.38	57.7	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
												V	
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



<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 01 2404MHz		2361.975	54.49	-19.51	74	38.42	32.1	18.16	34.19	353	89	P	H
		2373	47.48	-6.52	54	31.4	32.1	18.17	34.19	353	89	A	H
	*	2404	102.9	-	-	86.73	32.09	18.28	34.2	353	89	P	H
	*	2404	101.72	-	-	85.55	32.09	18.28	34.2	353	89	A	H
													H
													H
		2348.115	54.87	-19.13	74	38.82	32.09	18.15	34.19	280	79	P	V
		2363.76	47.57	-6.43	54	31.5	32.1	18.16	34.19	280	79	A	V
	*	2404	103.18	-	-	87.01	32.09	18.28	34.2	280	79	P	V
	*	2404	102.02	-	-	85.85	32.09	18.28	34.2	280	79	A	V
													V
													V
BLE CH 19 2440MHz		2356.34	54.79	-19.21	74	38.72	32.1	18.16	34.19	313	137	P	H
		2383.78	47.26	-6.74	54	31.09	32.1	18.27	34.2	313	137	A	H
	*	2440	101.66	-	-	85.51	32.02	18.34	34.21	313	137	P	H
	*	2440	100.51	-	-	84.36	32.02	18.34	34.21	313	137	A	H
		2490.76	54.46	-19.54	74	38.29	32	18.39	34.22	313	137	P	H
		2490.76	47.35	-6.65	54	31.18	32	18.39	34.22	313	137	A	H
		2360.82	54.48	-19.52	74	38.41	32.1	18.16	34.19	310	83	P	V
		2330.72	47.58	-6.42	54	31.75	31.98	18.04	34.19	310	83	A	V
	*	2440	103.61	-	-	87.46	32.02	18.34	34.21	310	83	P	V
	*	2440	102.29	-	-	86.14	32.02	18.34	34.21	310	83	A	V
		2484.39	54.66	-19.34	74	38.49	32	18.39	34.22	310	83	P	V
		2484.11	47.33	-6.67	54	31.16	32	18.39	34.22	310	83	A	V



BLE CH 38 2478MHz	*	2478	102.62	-	-	86.44	32	18.4	34.22	334	90	P	H
	*	2478	101.49	-	-	85.31	32	18.4	34.22	334	90	A	H
		2498.88	55.49	-18.51	74	39.32	32	18.39	34.22	334	90	P	H
		2495.76	47.83	-6.17	54	31.66	32	18.39	34.22	334	90	A	H
													H
													H
	*	2478	103.1	-	-	86.92	32	18.4	34.22	297	80	P	V
	*	2478	101.8	-	-	85.62	32	18.4	34.22	297	80	A	V
		2484.68	55.06	-18.94	74	38.89	32	18.39	34.22	297	80	P	V
		2489.44	47.65	-6.35	54	31.48	32	18.39	34.22	297	80	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 01 2404MHz		4808	49.46	-24.54	74	61.45	34.03	13.01	59.03	318	38	P	H
		4808	46.19	-7.81	54	58.18	34.03	13.01	59.03	318	38	A	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		4808	48.66	-25.34	74	60.65	34.03	13.01	59.03	300	208	P	V
		4808	44.51	-9.49	54	56.5	34.03	13.01	59.03	300	208	A	V
													V
													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		4880	49.59	-24.41	74	61.33	34.14	13.03	58.91	120	35	P	H
		4880	46.01	-7.99	54	57.75	34.14	13.03	58.91	120	35	A	H
		7320	41.38	-32.62	74	47.89	35.7	15.36	57.57	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		4880	47.18	-26.82	74	58.92	34.14	13.03	58.91	294	207	P	V
		4880	43.23	-10.77	54	54.97	34.14	13.03	58.91	294	207	A	V
		7320	41.89	-32.11	74	48.4	35.7	15.36	57.57	-	-	P	V
													V
													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 38 2478MHz		4956	50.66	-23.34	74	62.09	34.3	13.05	58.78	100	36	P	H
		4956	46.39	-7.61	54	57.82	34.3	13.05	58.78	100	36	A	H
		7434	41.06	-32.94	74	47.77	35.6	15.38	57.69	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		4956	48.16	-25.84	74	59.59	34.3	13.05	58.78	377	203	P	V
		4956	44.03	-9.97	54	55.46	34.3	13.05	58.78	377	203	A	V
		7434	40.66	-33.34	74	47.37	35.6	15.38	57.69	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
													V
												V	
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												
	3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



Emission above 18GHz

2.4GHz BLE (SHF)

[illegible]

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		30	22.42	-17.58	40	26.63	24.51	1.36	30.08	-	-	P	H
		158.79	17.65	-25.85	43.5	28.95	16.49	2.18	29.97	-	-	P	H
		284.07	19.94	-26.06	46	28.19	18.9	2.79	29.94	-	-	P	H
		851.6	30.94	-15.06	46	26.56	28.8	4.86	29.28	-	-	P	H
		925.1	31.36	-14.64	46	26.22	28.97	5.09	28.92	-	-	P	H
		955.9	32.68	-13.32	46	25.73	30.61	5.14	28.8	-	-	P	H
													H
													H
													H
													H
													H
													H
		30	32.51	-7.49	40	36.72	24.51	1.36	30.08	-	-	P	V
		39.72	20.88	-19.12	40	29.84	19.63	1.36	29.95	-	-	P	V
		263.28	19.55	-26.45	46	27.01	19.67	2.79	29.92	-	-	P	V
		860.7	31.68	-14.32	46	26.99	28.89	5.03	29.23	-	-	P	V
		939.8	32.01	-13.99	46	26.2	29.59	5.09	28.87	-	-	P	V
		958	32.57	-13.43	46	25.57	30.65	5.14	28.79	-	-	P	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 and emission level has at least 6dB margin against limit or emission is noise floor only.												



<Right>

<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 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 38 2478MHz	*	2478	100.57	-	-	84.39	32	18.4	34.22	173	282	P	H
	*	2478	99.38	-	-	83.2	32	18.4	34.22	173	282	A	H
		2486.68	54.66	-19.34	74	38.49	32	18.39	34.22	173	282	P	H
		2485.96	47.28	-6.72	54	31.11	32	18.39	34.22	173	282	A	H
													H
													H
	*	2478	98.92	-	-	82.74	32	18.4	34.22	329	143	P	V
	*	2478	97.77	-	-	81.59	32	18.4	34.22	329	143	A	V
		2497.8	54.2	-19.8	74	38.03	32	18.39	34.22	329	143	P	V
		2499.88	46.95	-7.05	54	30.78	32	18.39	34.22	329	143	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)

[illegible]

Emission above 18GHz

2.4GHz BLE (SHF)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE SHF		24937	38.74	-35.26	74	48.25	39.17	8.77	57.45	-	-	P	H
													H
													H
													H
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													H
		24930	38.53	-35.47	74	48.05	39.17	8.77	57.46	-	-	P	V
													V
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Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BLE LF		30.54	23.33	-16.67	40	27.77	24.27	1.36	30.07	-	-	P	H	
		129.09	17.11	-26.39	43.5	27.69	17.45	1.94	29.97	-	-	P	H	
		259.77	19.06	-26.94	46	26.92	19.52	2.54	29.92	-	-	P	H	
		766.9	30.18	-15.82	46	27.52	27.79	4.56	29.69	-	-	P	H	
		862.1	31.87	-14.13	46	27.2	28.86	5.03	29.22	-	-	P	H	
		958.7	32.99	-13.01	46	25.98	30.66	5.14	28.79	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
		30	32.53	-7.47	40	36.74	24.51	1.36	30.08	-	-	P	V	
		81.57	15.39	-24.61	40	30.62	13.37	1.52	30.12	-	-	P	V	
		207.93	19.76	-23.74	43.5	32.53	14.98	2.28	30.03	-	-	P	V	
		862.1	31.03	-14.97	46	26.36	28.86	5.03	29.22	-	-	P	V	
		930	31.81	-14.19	46	26.42	29.21	5.09	28.91	-	-	P	V	
		958.7	32.86	-13.14	46	25.85	30.66	5.14	28.79	-	-	P	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 and emission level has at least 6dB margin against limit or emission 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 Margin 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	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(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 :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	23.6~25.5°C
		Relative Humidity :	53.4~61.3%

Note symbol

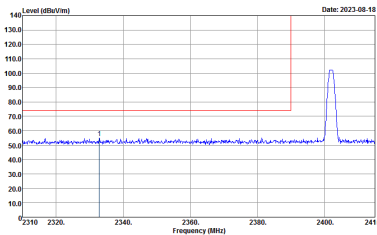
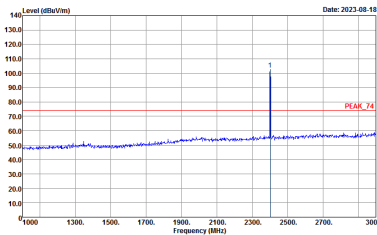
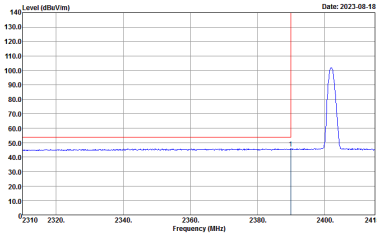
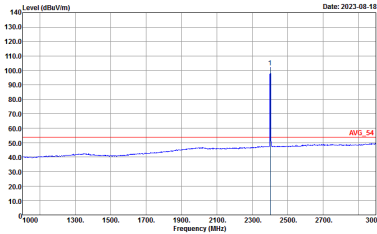
-L	Low channel location
-R	High channel location



<Left>
<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	 Site Condition : 03CH07-HY : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	 Site Condition : 03CH07-HY : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto
Avg.	 Site Condition : 03CH07-HY : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto	 Site Condition : 03CH07-HY : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto

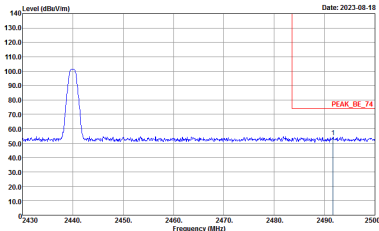
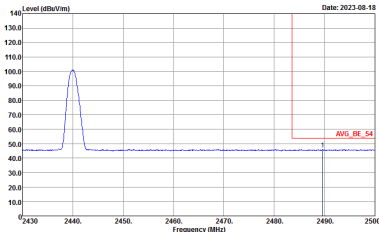


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	Site : 03CH07-HY Condition : : PEAK_RE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto
Avg	Site : 03CH07-HY Condition : : AVG_RE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto	Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto

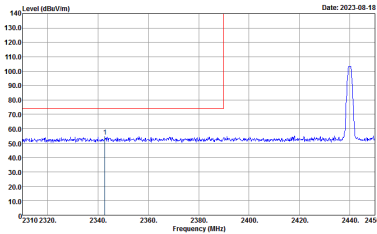
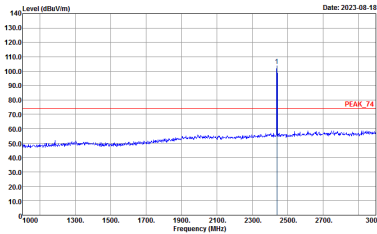
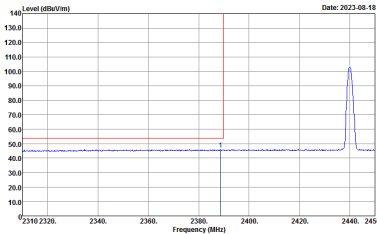
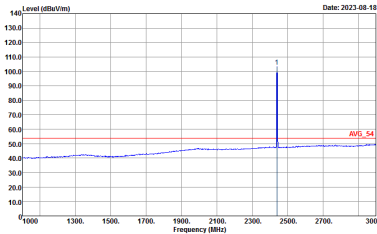


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto

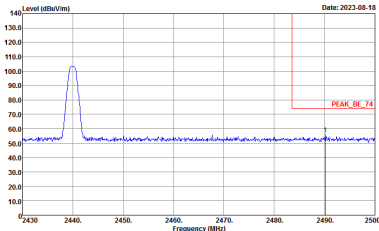
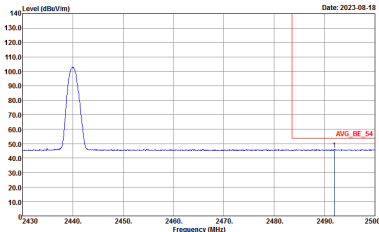


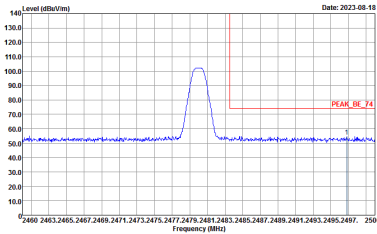
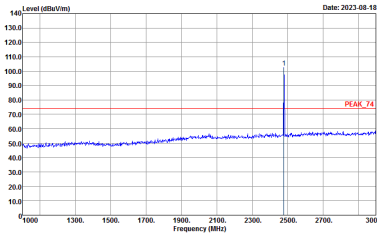
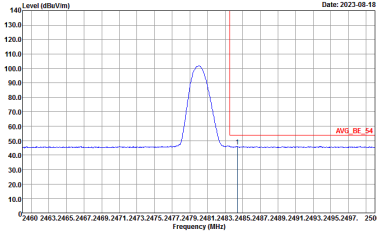
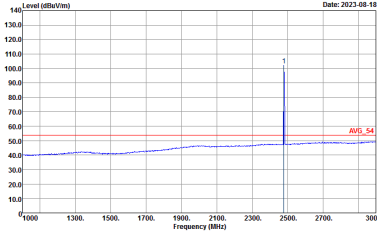
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	Left blank
Avg.	 Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto	Left blank

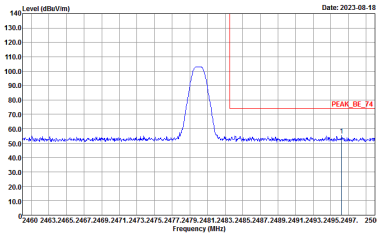
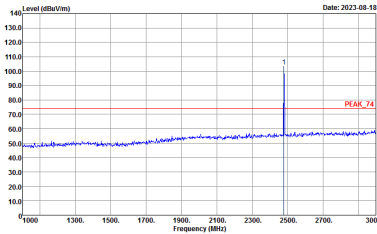
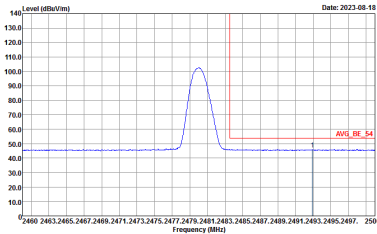
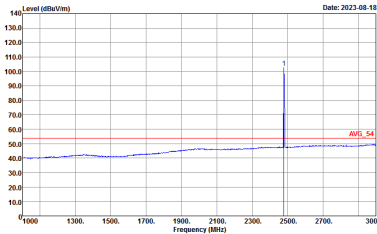


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_RE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	 Site : 03CH07-HY Condition : : PEAK_RE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto
Avg.	 Site : 03CH07-HY Condition : : AVG_RE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto	 Site : 03CH07-HY Condition : : AVG_RE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Left blank
Avg.	 Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWT:Auto	Left blank

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	 Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto
Avg.	 Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto	 Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	 Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto
Avg.	 Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto	 Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3.000kHz SWTAuto

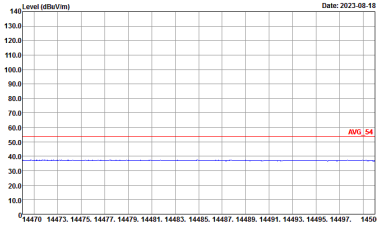
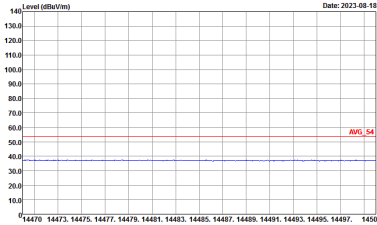
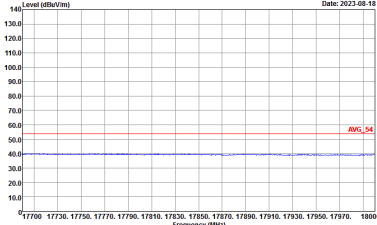
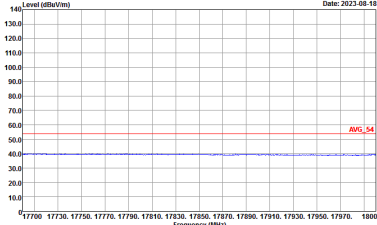


2.4GHz 2400~2483.5MHz

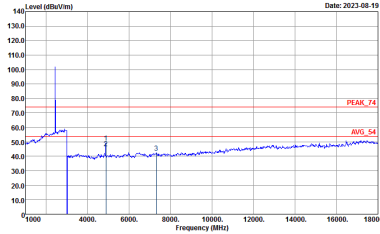
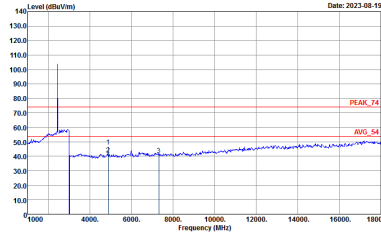
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	Level (dBu/1m) Date: 2023-08-19 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL	Level (dBu/1m) Date: 2023-08-19 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL
17.7G ~18G Avg	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL

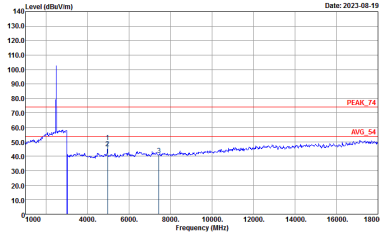
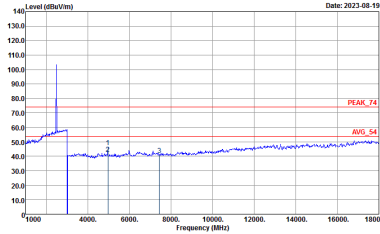


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL

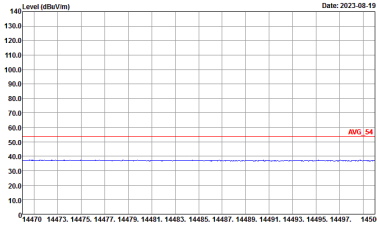
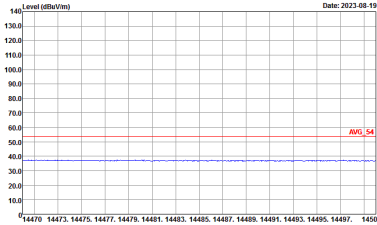
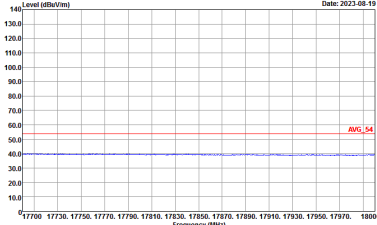
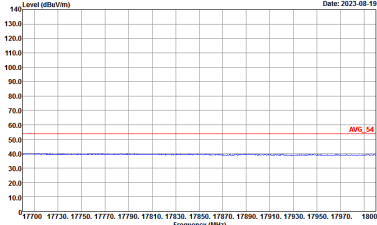


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL
17.7G ~18G Avg	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL



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



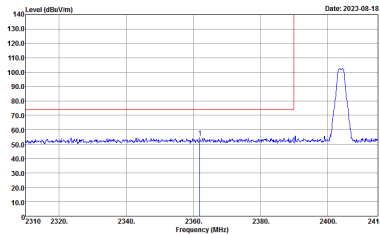
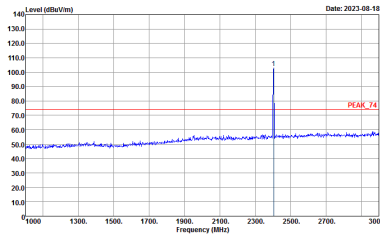
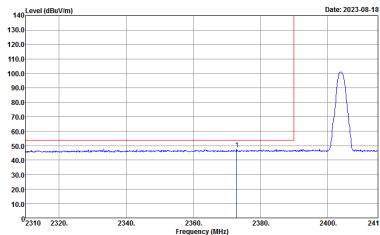
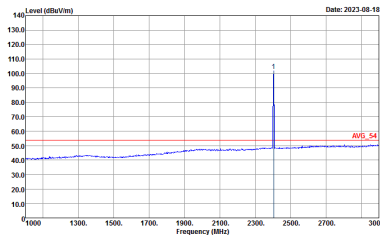
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL
17.7G ~18G Avg	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH01 2404MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWTAuto	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWTAuto
Avg.	 Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:10.000KHz SWTAuto	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000KHz VBW:10.000KHz SWTAuto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH01 2404MHz	
	Vertical	Fundamental
Peak	Site : 03CH07-HY Condition : : PEAK_RE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg	Site : 03CH07-HY Condition : : AVG_RE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto	Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto

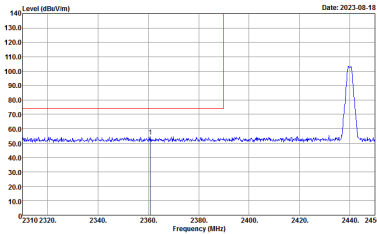
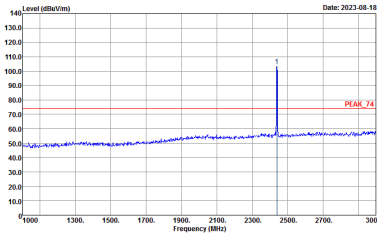
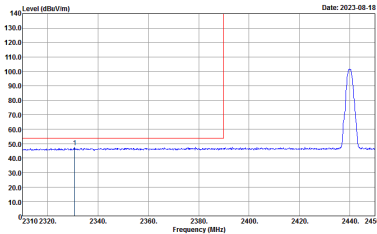
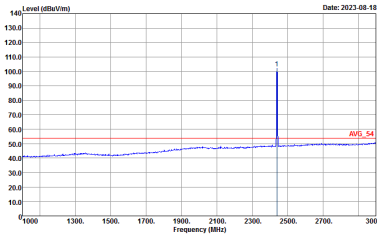


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto	Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWTAuto
Avg.	Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:10.000kHz SWTAuto	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:10.000kHz SWTAuto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Left blank
Avg.	Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:30.000kHz SWT:Auto	Left blank



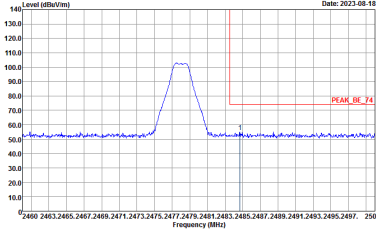
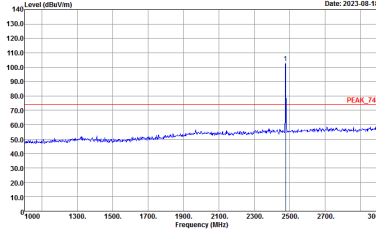
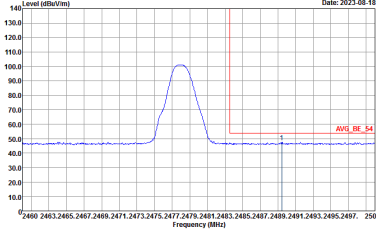
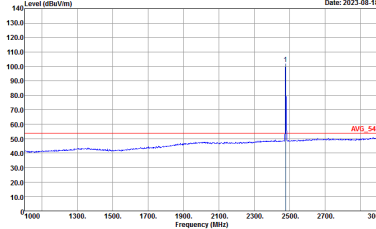
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_RE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	 Site : 03CH07-HY Condition : : AVG_RE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto	 Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Left blank
Avg.	Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:30.000kHz SWT:Auto	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH38 2478MHz	
	Horizontal	Fundamental
Peak	Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:30.000kHz SWT:Auto	Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:30.000kHz SWT:Auto

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH38 2478MHz	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	 Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:30.000kHz SWT:Auto	 Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:30.000kHz SWT:Auto

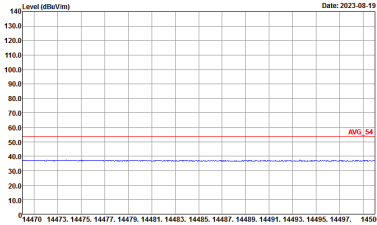
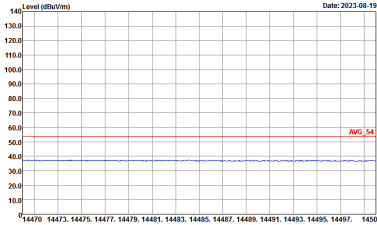
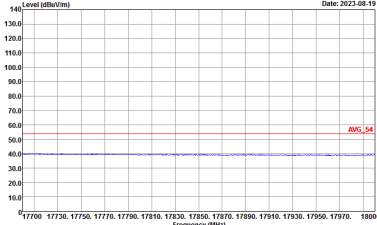
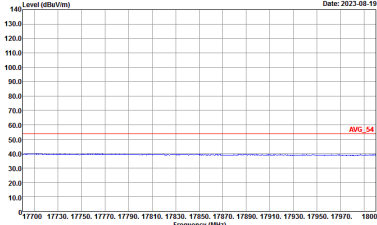


2.4GHz 2400~2483.5MHz

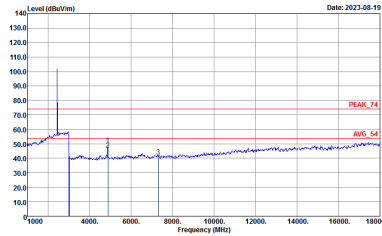
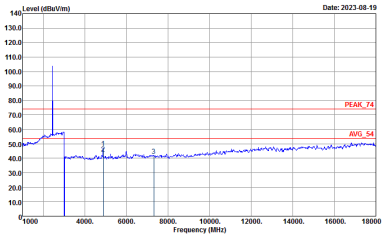
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH01 2404MHz	
	Horizontal	Vertical
Peak Avg.	Level (dBu/1m) Date: 2023-08-19 PEAK_74 Avg_54 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL	Level (dBu/1m) Date: 2023-08-19 PEAK_74 Avg_54 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL

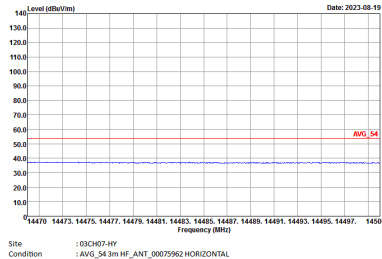
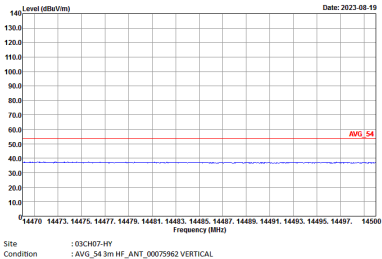
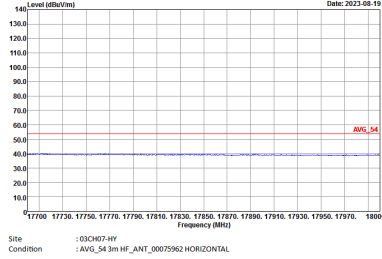
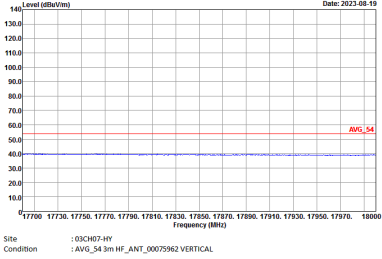


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH01 2404MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL
17.7G ~18G Avg	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL

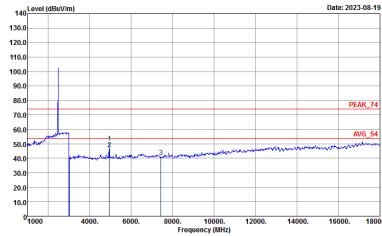
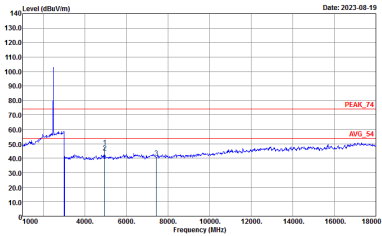


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH38 2478MHz	
	Horizontal	Vertical
Peak	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH38 2478MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL
17.7G ~18G Avg	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL



Emission above 18GHz

2.4GHz BLE (SHF @ 1m)

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
Peak Avg.	Level (dBu/1m) Date: 2023-08-21 Site : 03CH07-HY Condition : PEAK_74 1m SHF-EHF_9170251 HORIZONTAL	Level (dBu/1m) Date: 2023-08-21 Site : 03CH07-HY Condition : PEAK_74 1m SHF-EHF_9170251 VERTICAL



Emission below 1GHz

2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	Level (dBuV/m) Date: 2023-08-21 Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(s) HORIZONTAL	Level (dBuV/m) Date: 2023-08-21 Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(s) VERTICAL

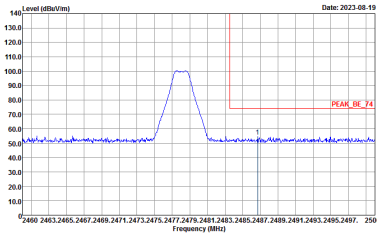
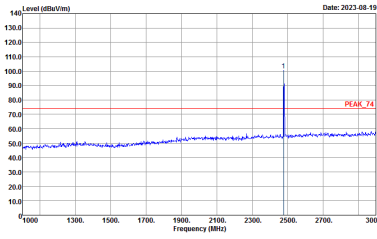
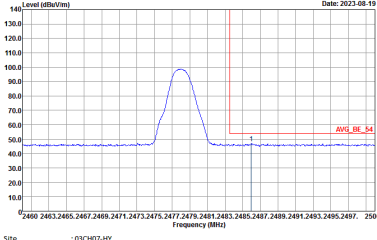
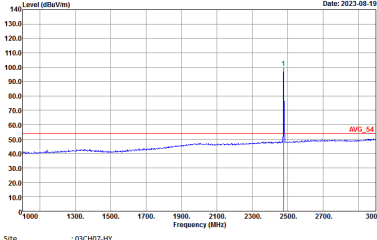


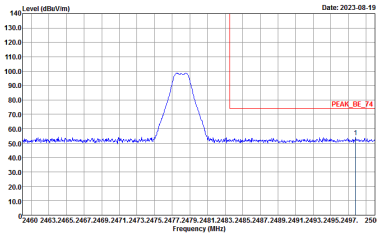
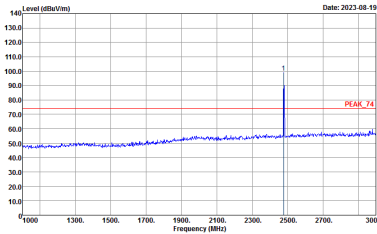
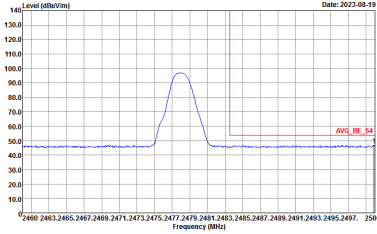
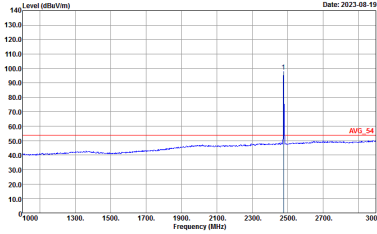
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<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH38 2478MHz	
	Horizontal	Fundamental
Peak	 Site Condition : 03CH07-HY : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site Condition : 03CH07-HY : PEAK_74 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	 Site Condition : 03CH07-HY : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto	 Site Condition : 03CH07-HY : AVG_54 3m HF_ANT_00075962 HORIZONTAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH38 2478MHz	
	Vertical	Fundamental
Peak	 Site : 03CH07-HY Condition : : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH07-HY Condition : : PEAK_74 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	 Site : 03CH07-HY Condition : : AVG_BE_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto	 Site : 03CH07-HY Condition : : AVG_54 3m HF_ANT_00075962 VERTICAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto

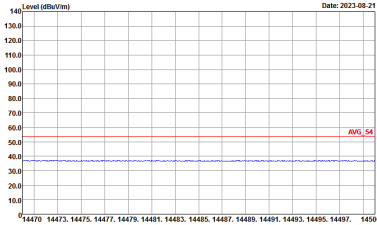
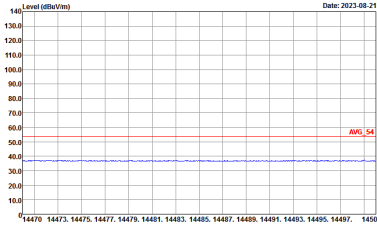
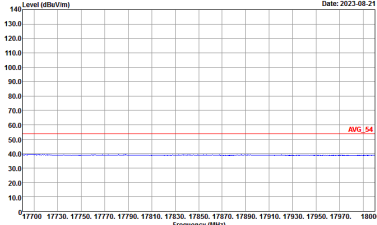
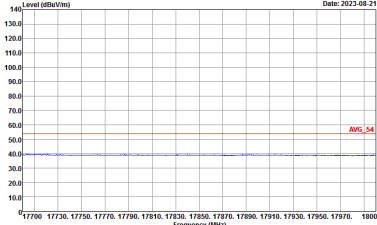


2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH38 2478MHz	
	Horizontal	Vertical
Peak	Level (dBu/1m) Date: 2023-08-21 PEAK_74 AVG_54 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL	Level (dBu/1m) Date: 2023-08-21 PEAK_74 AVG_54 Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH38 2478MHz	
	Horizontal	Vertical
14.47G ~14.5G Avg.	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL
17.7G ~18G Avg	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL	 Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL



Emission above 18GHz

2.4GHz BLE (SHF @ 1m)

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
Peak Avg.	Level (dBuV/m) Date: 2023-08-21 Site : 03CH07-HY Condition : PEAK_74 1m SHF-EHF_9170251 HORIZONTAL	Level (dBuV/m) Date: 2023-08-21 Site : 03CH07-HY Condition : PEAK_74 1m SHF-EHF_9170251 VERTICAL



Emission below 1GHz

2.4GHz BLE (LF)

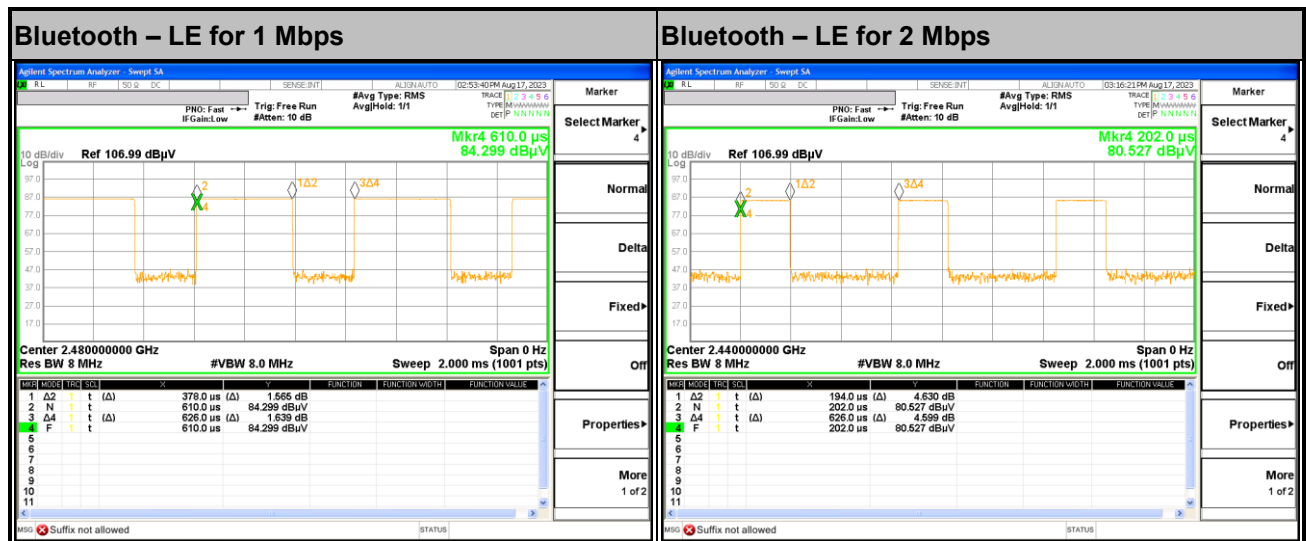
BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	Level (dBuV/m) Date: 2023-08-21 Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(s) HORIZONTAL	Level (dBuV/m) Date: 2023-08-21 Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(s) VERTICAL



Appendix E. Duty Cycle Plots

<Left>

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth - LE for 1Mbps	60.38	378	2.65	3kHz
Bluetooth - LE for 2Mbps	30.99	194	5.15	10kHz



<Right>

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth - LE for 2Mbps	31.09	194	5.15	10kHz

