

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.

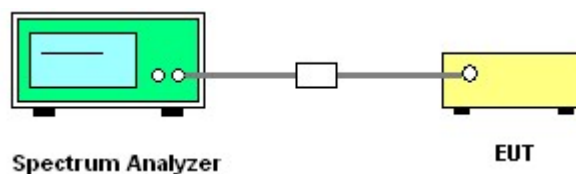
3.4.2 Measuring Instruments

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.

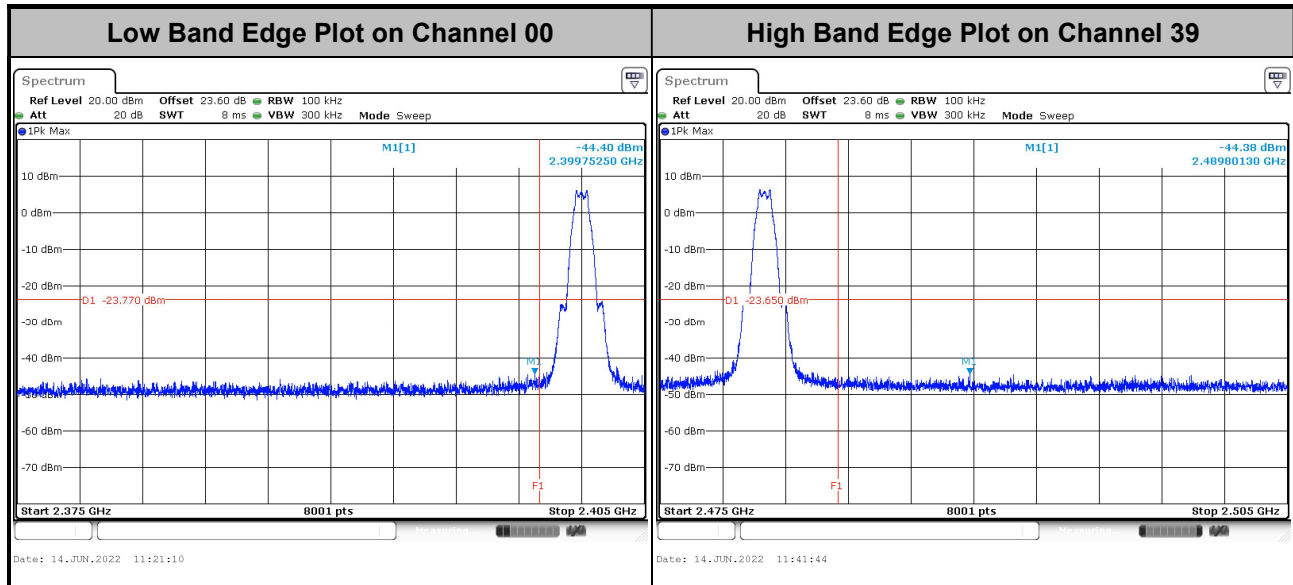
3.4.4 Test Setup



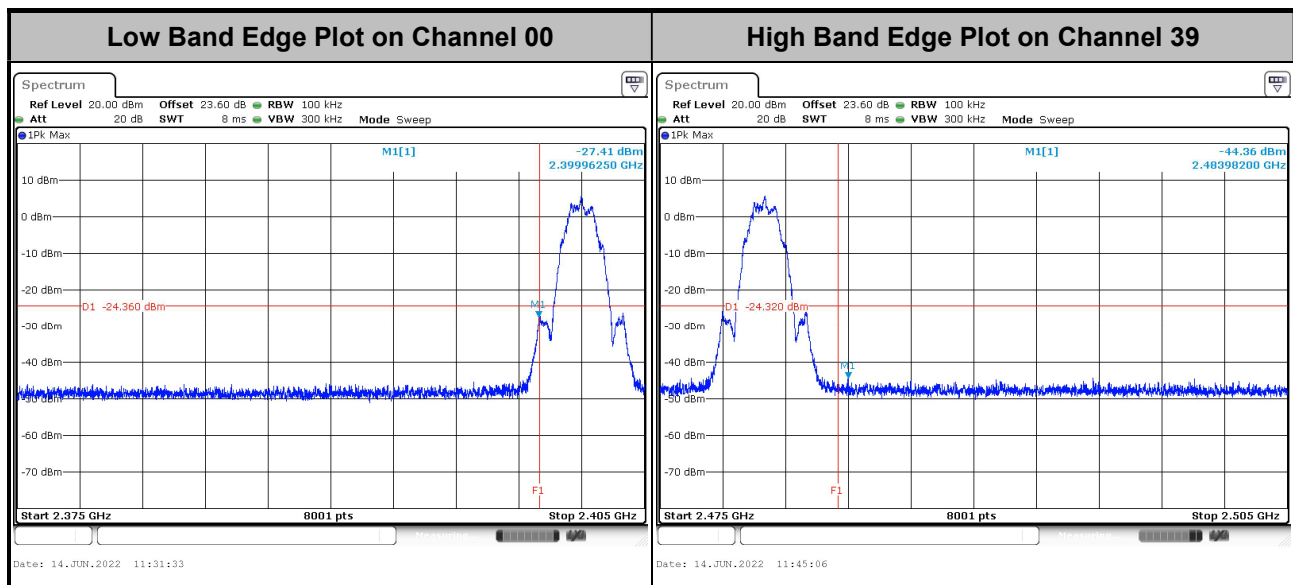


3.4.5 Test Result of Conducted Band Edges Plots

<1Mbps>



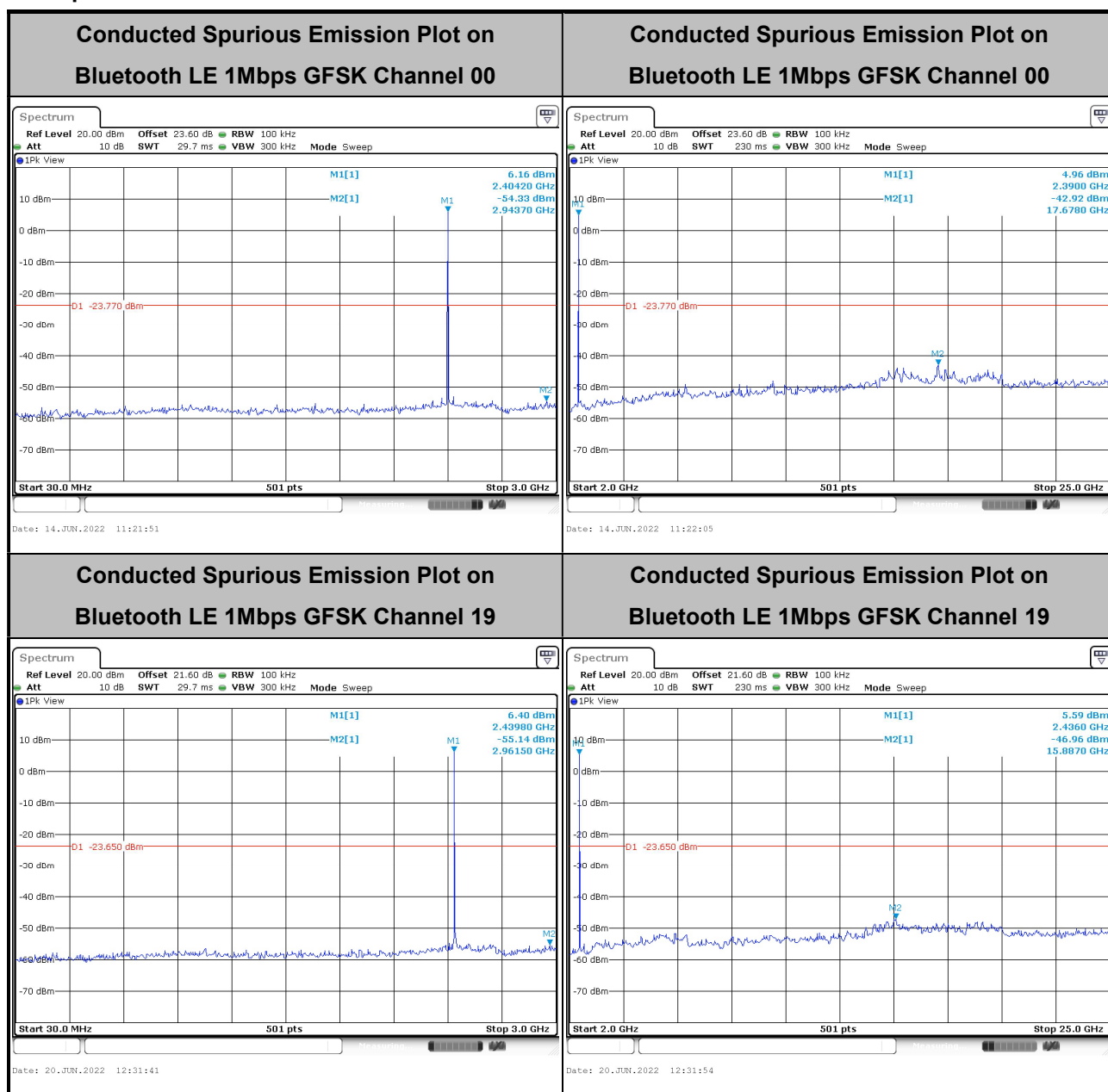
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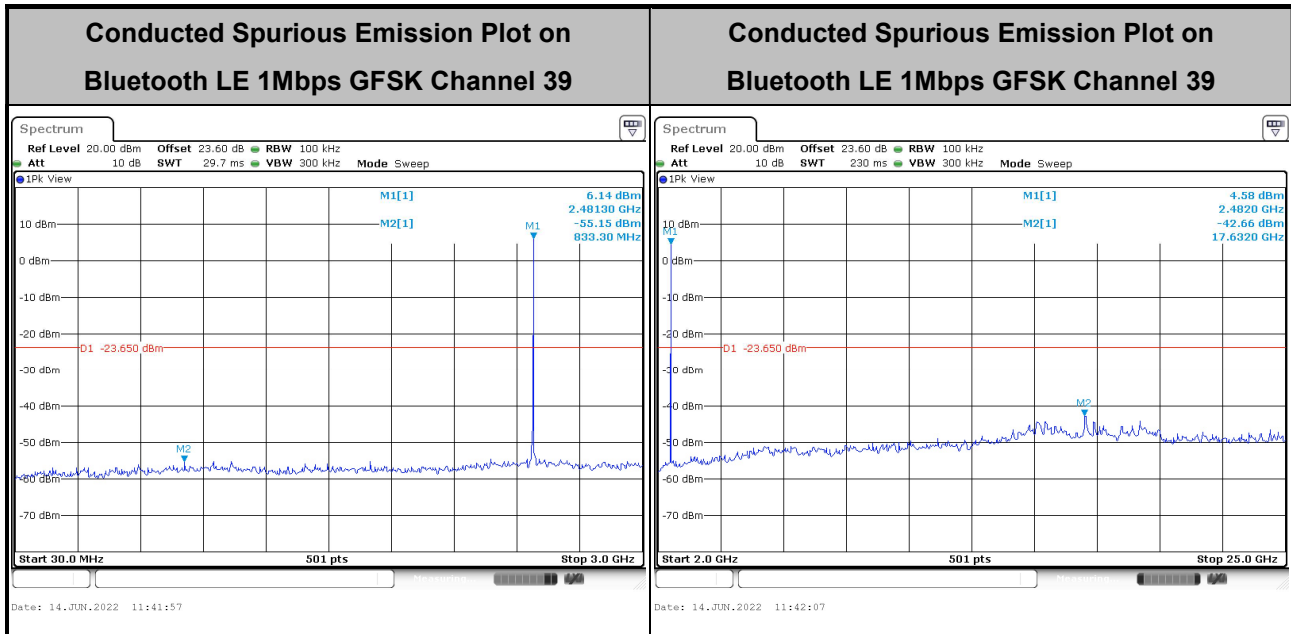




3.4.6 Test Result of Conducted Spurious Emission Plots

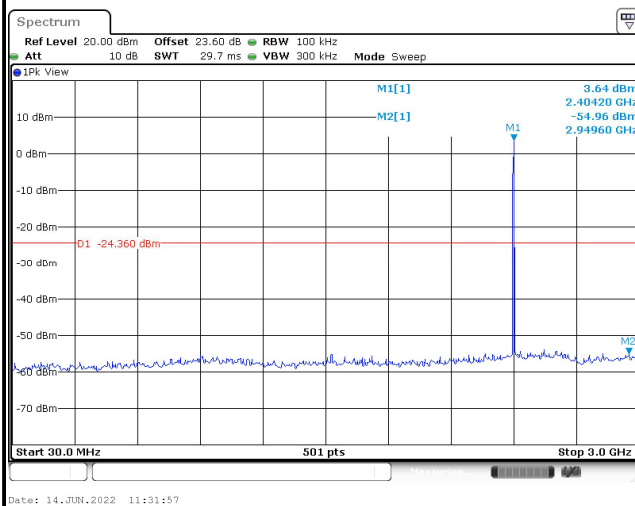
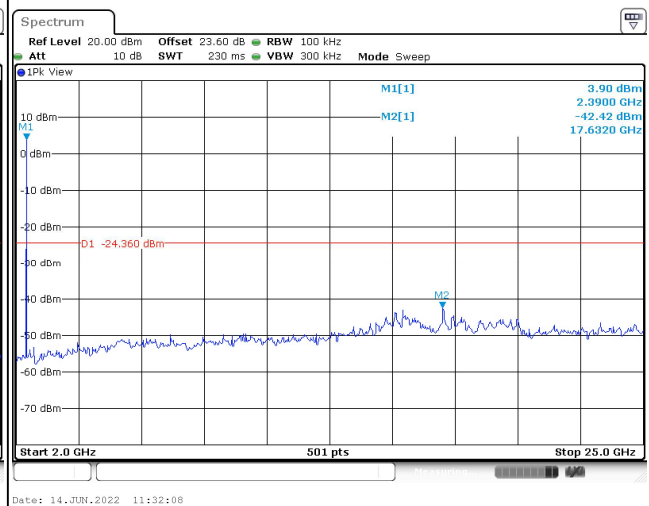
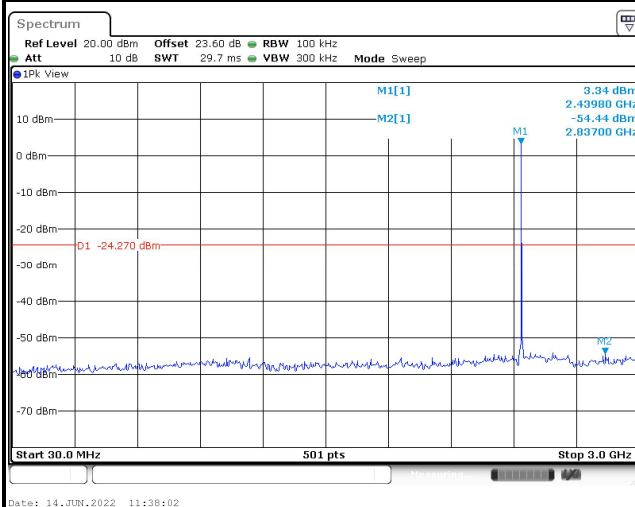
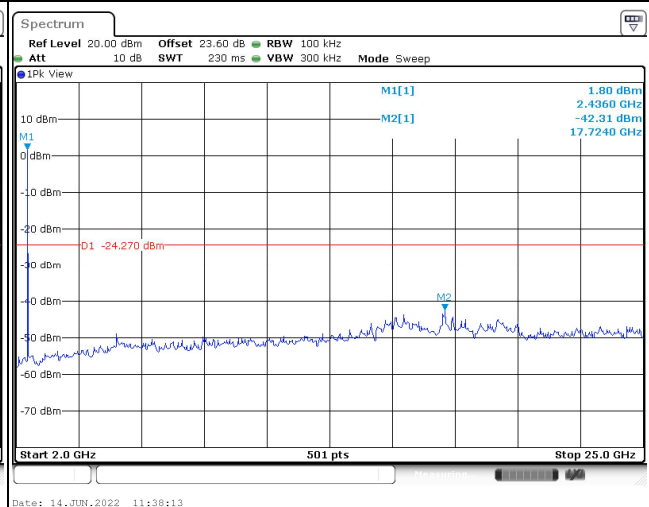
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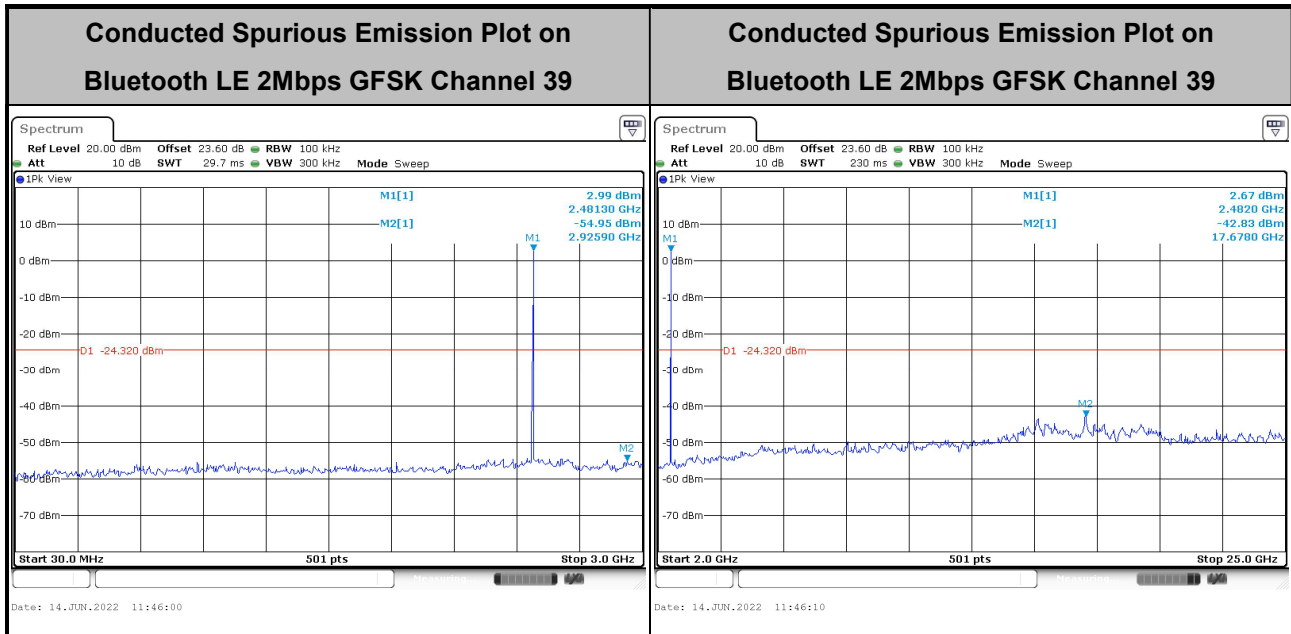






<2Mbps>

**Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 19****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 19**



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

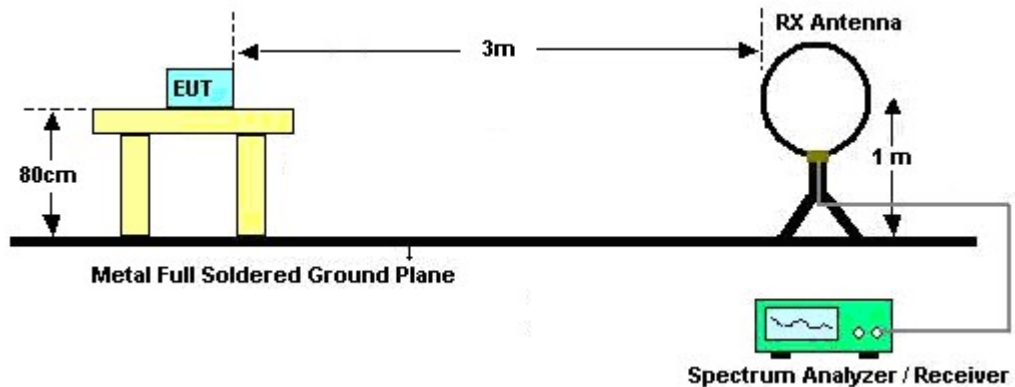
Please refer to the measuring equipment list in this test report.

3.5.3 Test Procedures

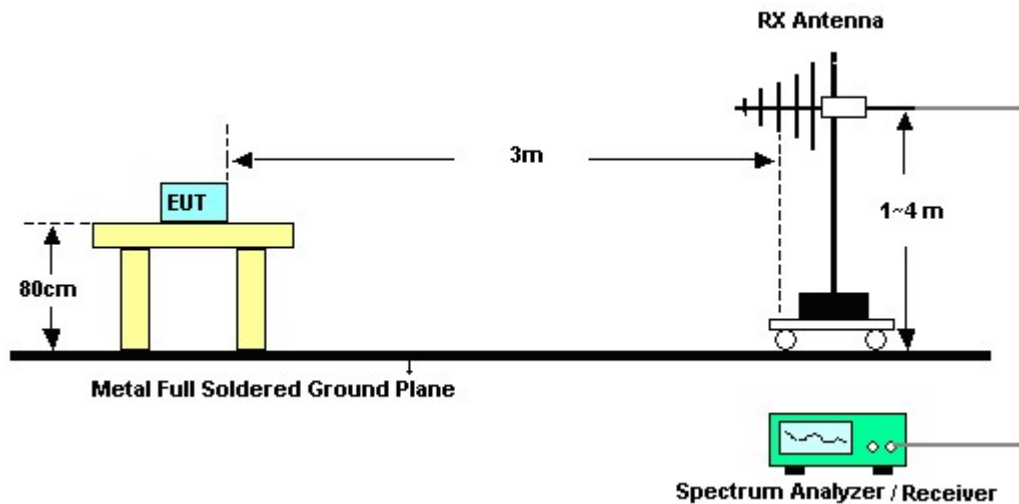
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the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

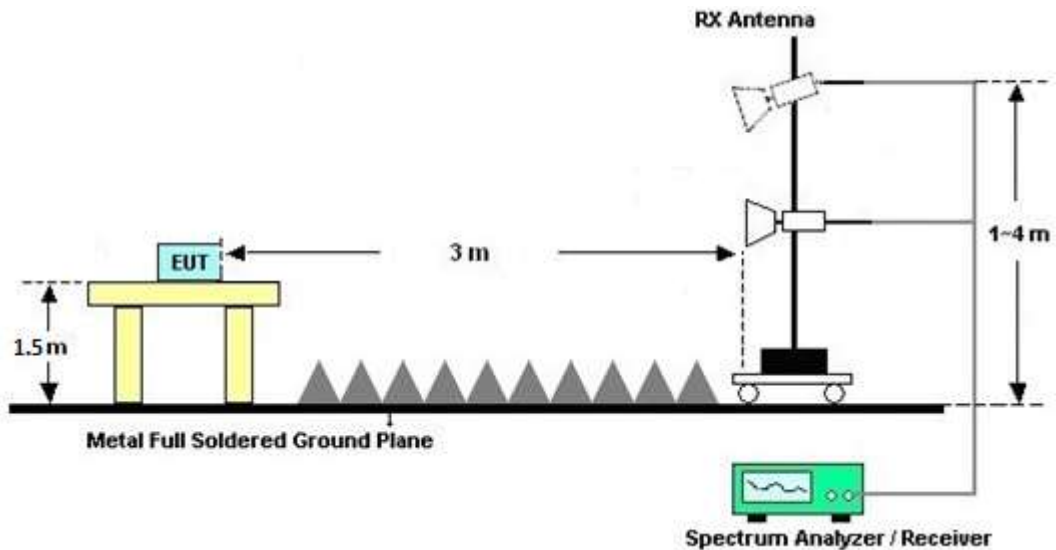
For radiated test below 30MHz



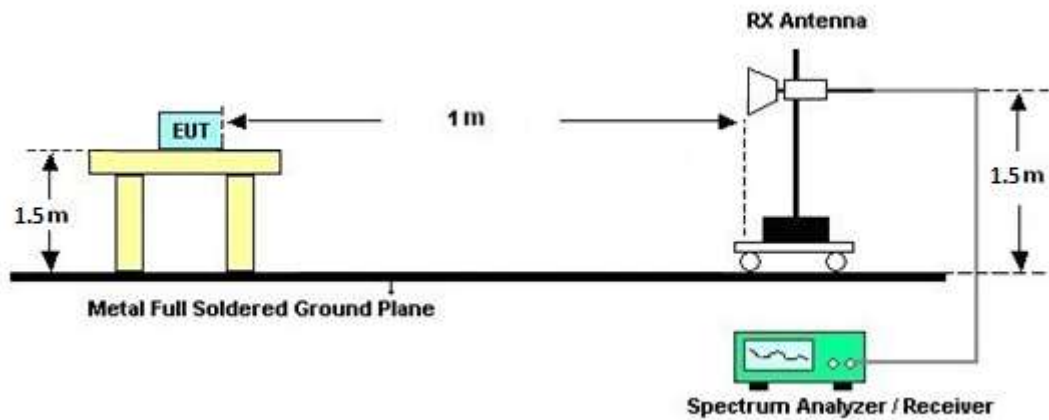
For radiated test from 30MHz to 1GHz



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.

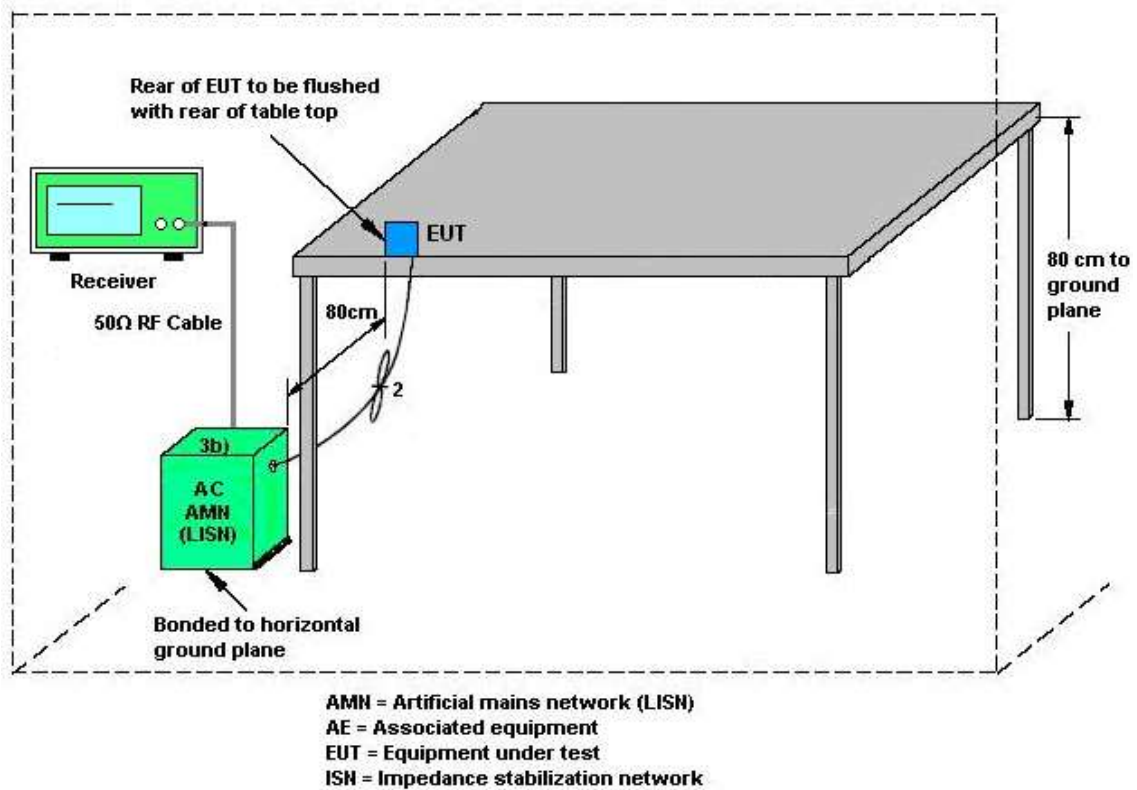
3.6.2 Measuring Instruments

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
Hygrometer	TECEP	DTM-303A	TP201996	N/A	Nov. 16, 2021	Jun. 08, 2022~ Jun. 20, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	17100015SNO 35 (NO:109)	10MHz~6GHz	Jan. 07, 2022	Jun. 08, 2022~ Jun. 20, 2022	Jan. 06, 2023	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	17100015SNO 37 (NO:167)	10MHz~6GHz	Dec. 03, 2021	Jun. 08, 2022~ Jun. 20, 2022	Dec. 02, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101909	10Hz~40GHz	Aug. 13, 2021	Jun. 08, 2022~ Jun. 20, 2022	Aug. 12, 2022	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 15, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	Jun. 15, 2022	Nov. 30, 2022	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2021	Jun. 15, 2022	Nov. 16, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 03, 2021	Jun. 15, 2022	Dec. 02, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Jun. 15, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	N/A	Jul. 28, 2021	Jun. 15, 2022	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	Jun. 15, 2022	Dec. 29, 2022	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 07, 2021	Jun. 18, 2022~ Aug. 09, 2022	Sep. 06, 2022	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	37059 & 01	30MHz~1GHz	Oct. 09, 2021	Jun. 18, 2022~ Aug. 09, 2022	Oct. 08, 2022	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Dec. 03, 2021	Jun. 18, 2022~ Aug. 09, 2022	Dec. 02, 2022	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz~40GHz	Nov. 30, 2021	Jun. 18, 2022~ Aug. 09, 2022	Nov. 29, 2022	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 23, 2022	Jun. 18, 2022~ Aug. 09, 2022	Mar. 22, 2023	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A02375	1GHz~26.5GHz	May 24, 2022	Jun. 18, 2022~ Aug. 09, 2022	May 23, 2023	Radiation (03CH12-HY)
Preamplifier	E-INSTRUMENT TECH LTD.	ERA-100M-18G -56-01-A70	EC1900270	1GHz~18GHz	Dec. 27, 2021	Jun. 18, 2022~ Aug. 09, 2022	Dec. 26, 2022	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 24, 2021	Jun. 18, 2022~ Aug. 09, 2022	Dec. 23, 2022	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Jan. 12, 2022	Jun. 18, 2022~ Aug. 09, 2022	Jan. 11, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WLKS1200-12S S	SN2	1.2GHz Low Pass Filter	Mar. 16, 2022	Jun. 18, 2022~ Aug. 09, 2022	Mar. 15, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700- 3000-18000-60 ST	SN2	3GHz High Pass Filter	Jul. 12, 2021	Jun. 18, 2022~ Jul. 09, 2022	Jul. 10, 2022	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700- 3000-18000-60 ST	SN2	3GHz High Pass Filter	Jul. 11, 2022	Jul. 11, 2022~ Aug. 09, 2022	Jul. 10, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY9837/4PE	9kHz~30MHz	Mar. 10, 2022	Jun. 18, 2022~ Aug. 09, 2022	Mar. 09, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 10, 2021	Jun. 18, 2022~ Aug. 09, 2022	Dec. 09, 2022	Radiation (03CH12-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 21, 2022	Jun. 18, 2022~ Aug. 09, 2022	Feb. 20, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 21, 2022	Jun. 18, 2022~ Aug. 09, 2022	Feb. 20, 2023	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP210090	N/A	Oct. 08, 2021	Jun. 18, 2022~ Aug. 09, 2022	Oct. 07, 2022	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Jun. 18, 2022~ Aug. 09, 2022	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jun. 18, 2022~ Aug. 09, 2022	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 18, 2022~ Aug. 09, 2022	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Jun. 18, 2022~ Aug. 09, 2022	N/A	Radiation (03CH12-HY)

5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.4 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.9 dB
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Mina Liu/Ching Chen	Temperature:	21~25	°C
Test Date:	2022/5/13-2022/6/20	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	1.043	0.734	0.50	Pass
BLE	1Mbps	1	19	2440	1.045	0.744	0.50	Pass
BLE	1Mbps	1	39	2480	1.055	0.754	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	7.90	30.00	-5.30	2.60	36.00	Pass
BLE	1Mbps	1	19	2440	7.90	30.00	-5.30	2.60	36.00	Pass
BLE	1Mbps	1	39	2480	7.80	30.00	-5.30	2.50	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	6.23	-8.39	-5.30	8.00	Pass
BLE	1Mbps	1	19	2440	6.35	-8.30	-5.30	8.00	Pass
BLE	1Mbps	1	39	2480	6.35	-8.43	-5.30	8.00	Pass

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

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.034	1.292	0.50	Pass
BLE	2Mbps	1	19	2440	2.042	1.292	0.50	Pass
BLE	2Mbps	1	39	2480	2.042	1.288	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	7.90	30.00	-5.30	2.60	36.00	Pass
BLE	2Mbps	1	19	2440	7.90	30.00	-5.30	2.60	36.00	Pass
BLE	2Mbps	1	39	2480	7.90	30.00	-5.30	2.60	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	1	0	2402	5.64	-10.42	-5.30	8.00	Pass
BLE	2Mbps	1	19	2440	5.73	-10.24	-5.30	8.00	Pass
BLE	2Mbps	1	39	2480	5.68	-10.41	-5.30	8.00	Pass

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



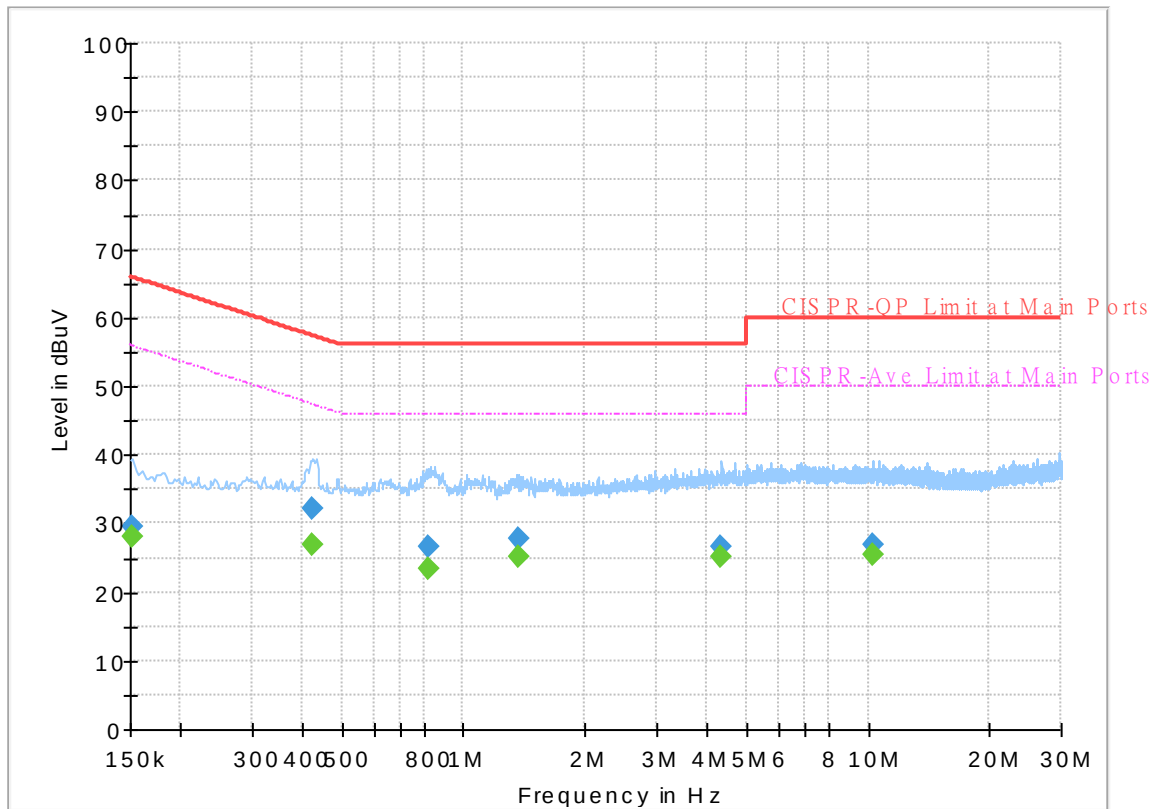
Appendix B. AC Conducted Emission Test Results

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

EUT Information

Report NO : 260301
Test Mode : Mode 2
Test Voltage : 120Vac/60Hz
Phase : Line

Full Spectrum



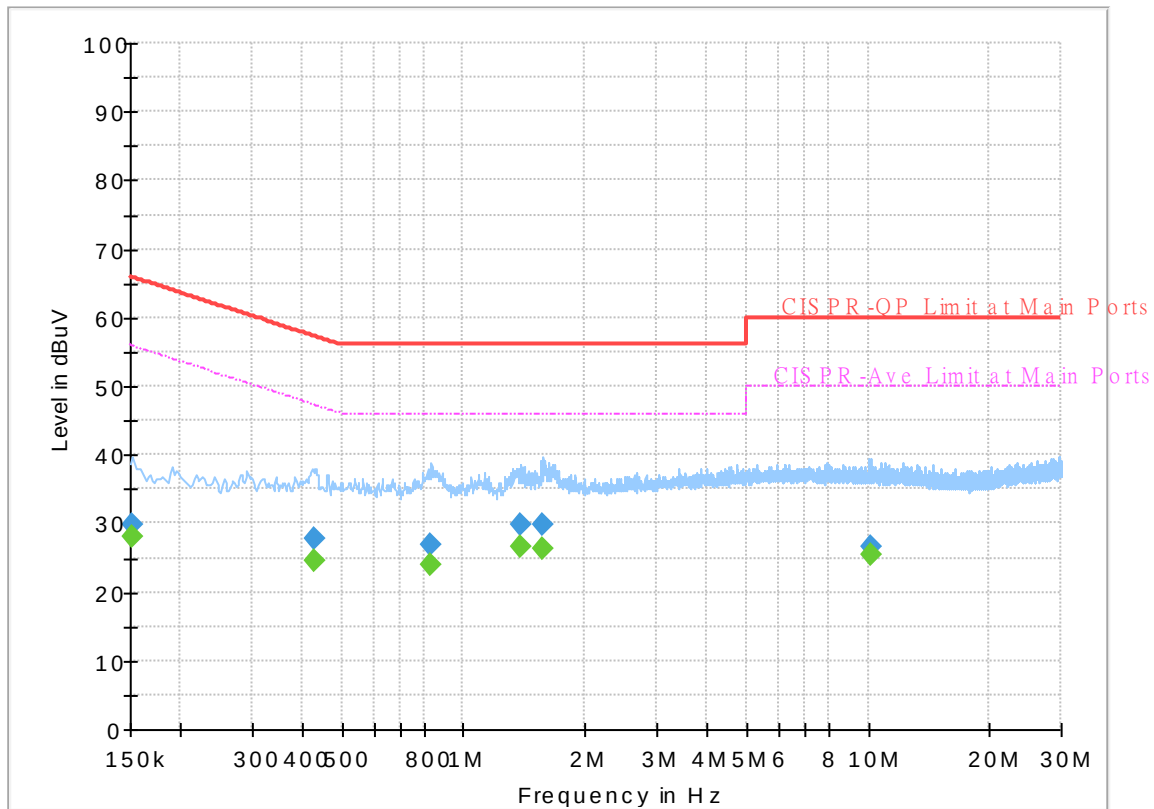
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	27.94	55.88	27.94	L1	OFF	19.6
0.152250	29.64	---	65.88	36.24	L1	OFF	19.6
0.424500	---	26.76	47.36	20.60	L1	OFF	19.6
0.424500	32.13	---	57.36	25.23	L1	OFF	19.6
0.820500	---	23.39	46.00	22.61	L1	OFF	19.6
0.820500	26.69	---	56.00	29.31	L1	OFF	19.6
1.362750	---	25.27	46.00	20.73	L1	OFF	19.7
1.362750	27.72	---	56.00	28.28	L1	OFF	19.7
4.346250	---	25.10	46.00	20.90	L1	OFF	19.8
4.346250	26.55	---	56.00	29.45	L1	OFF	19.8
10.259250	---	25.34	50.00	24.66	L1	OFF	20.1
10.259250	26.76	---	60.00	33.24	L1	OFF	20.1

EUT Information

Report NO : 260301
Test Mode : Mode 2
Test Voltage : 120Vac/60Hz
Phase : Neutral

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	28.03	55.88	27.85	N	OFF	19.6
0.152250	29.91	---	65.88	35.97	N	OFF	19.6
0.429000	---	24.66	47.27	22.61	N	OFF	19.6
0.429000	27.70	---	57.27	29.57	N	OFF	19.6
0.831750	---	23.89	46.00	22.11	N	OFF	19.6
0.831750	26.86	---	56.00	29.14	N	OFF	19.6
1.378500	---	26.47	46.00	19.53	N	OFF	19.7
1.378500	29.68	---	56.00	26.32	N	OFF	19.7
1.576500	---	26.33	46.00	19.67	N	OFF	19.7
1.576500	29.76	---	56.00	26.24	N	OFF	19.7
10.212000	---	25.34	50.00	24.66	N	OFF	20.1
10.212000	26.69	---	60.00	33.31	N	OFF	20.1



Appendix C. Radiated Spurious Emission

Test Engineer :	Jack Cheng, Wilson Wu	Temperature :	20~25°C
		Relative Humidity :	50~60%



<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2349.48	54.37	-19.63	74	43.79	27.5	16.55	33.47	178	12	P	H
		2382.87	45.13	-8.87	54	34.65	27.37	16.6	33.49	178	12	A	H
	*	2402	98.39	-	-	87.97	27.3	16.62	33.5	178	12	P	H
	*	2402	97.85	-	-	87.43	27.3	16.62	33.5	178	12	A	H
													H
													H
		2382.24	55.47	-18.53	74	45	27.37	16.59	33.49	289	74	P	V
		2380.56	45.4	-8.6	54	34.92	27.38	16.59	33.49	289	74	A	V
	*	2402	100.17	-	-	89.75	27.3	16.62	33.5	289	74	P	V
	*	2402	99.65	-	-	89.23	27.3	16.62	33.5	289	74	A	V
													V
													V
BLE CH 19 2440MHz		2355.78	55.06	-18.94	74	44.5	27.48	16.56	33.48	199	349	P	H
		2348.22	44.88	-9.12	54	34.3	27.51	16.54	33.47	199	349	A	H
	*	2440	97.89	-	-	87.51	27.22	16.68	33.52	199	349	P	H
	*	2440	97.28	-	-	86.9	27.22	16.68	33.52	199	349	A	H
		2493.56	54.29	-19.71	74	43.8	27.29	16.75	33.55	199	349	P	H
		2492.51	44.76	-9.24	54	34.27	27.29	16.75	33.55	199	349	A	H
		2332.12	56.2	-17.8	74	45.5	27.64	16.52	33.46	296	17	P	V
		2312.94	44.96	-9.04	54	34.12	27.8	16.49	33.45	296	17	A	V
	*	2440	100.24	-	-	89.86	27.22	16.68	33.52	296	17	P	V
	*	2440	99.66	-	-	89.28	27.22	16.68	33.52	296	17	A	V
		2485.09	53.97	-20.03	74	43.5	27.27	16.74	33.54	296	17	P	V
		2491.39	44.68	-9.32	54	34.2	27.28	16.75	33.55	296	17	A	V



BLE CH 39 2480MHz	*	2480	99.76	-	-	89.31	27.26	16.73	33.54	204	51	P	H
	*	2480	99.23	-	-	88.78	27.26	16.73	33.54	204	51	A	H
		2484.8	55.08	-18.92	74	44.61	27.27	16.74	33.54	204	51	P	H
		2483.52	45.8	-8.2	54	35.33	27.27	16.74	33.54	204	51	A	H
													H
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	*	2480	100.74	-	-	90.29	27.26	16.73	33.54	111	2	P	V
	*	2480	99.81	-	-	89.36	27.26	16.73	33.54	111	2	A	V
		2487.56	55.38	-18.62	74	44.9	27.28	16.74	33.54	111	2	P	V
		2483.6	46.22	-7.78	54	35.75	27.27	16.74	33.54	111	2	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)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	39.92	-34.08	74	64.59	31.21	11.08	66.96	-	-	P	H
		10965	51.01	-22.99	74	60.5	40.47	16.89	66.85	-	-	P	H
		10965	41.02	-12.98	54	50.51	40.47	16.89	66.85	-	-	A	H
		14475	52.1	-21.9	74	57.11	41.62	19.56	66.19	-	-	P	H
		14475	42.1	-11.9	54	47.11	41.62	19.56	66.19	-	-	A	H
		17985	60.66	-13.34	74	58.34	49.6	21.96	69.24	-	-	P	H
		17985	50.65	-3.35	54	48.33	49.6	21.96	69.24	-	-	A	H
													H
													H
													H
													H
													H
		4804	39.01	-34.99	74	63.68	31.21	11.08	66.96	-	-	P	V
		10860	50.29	-23.71	74	60.04	40.4	16.8	66.95	-	-	P	V
		10860	40.29	-13.71	54	50.04	40.4	16.8	66.95	-	-	A	V
		14475	53.21	-20.79	74	58.22	41.62	19.56	66.19	-	-	P	V
		14475	43.21	-10.79	54	48.22	41.62	19.56	66.19	-	-	A	V
		17985	60.68	-13.32	74	58.36	49.6	21.96	69.24	-	-	P	V
		17985	50.67	-3.33	54	48.35	49.6	21.96	69.24	-	-	A	V
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BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 19 2440MHz		4880	40.5	-33.5	74	65.1	31.18	11.1	66.88	-	-	P	H
		7320	46.3	-27.7	74	62.23	36.38	13.64	65.95	-	-	P	H
		10965	50.48	-23.52	74	59.97	40.47	16.89	66.85	-	-	P	H
		10965	40.49	-13.51	54	49.98	40.47	16.89	66.85	-	-	A	H
		14475	51.13	-22.87	74	56.14	41.62	19.56	66.19	-	-	P	H
		14475	41.13	-12.87	54	46.14	41.62	19.56	66.19	-	-	A	H
		17970	60.83	-13.17	74	58.9	49.19	21.95	69.21	-	-	P	H
		17970	50.06	-3.94	54	48.13	49.19	21.95	69.21	-	-	A	H
													H
													H
													H
													H
		4880	39.79	-34.21	74	64.39	31.18	11.1	66.88	-	-	P	V
		7320	44.26	-29.74	74	60.19	36.38	13.64	65.95	-	-	P	V
		10935	50.36	-23.64	74	59.84	40.53	16.87	66.88	-	-	P	V
		10935	40.36	-13.64	54	49.84	40.53	16.87	66.88	-	-	A	V
		14475	51.34	-22.66	74	56.35	41.62	19.56	66.19	-	-	P	V
		14475	41.34	-12.66	54	46.35	41.62	19.56	66.19	-	-	A	V
		18000	60.99	-13.01	74	58.3	50	21.97	69.28	-	-	P	V
		18000	50.68	-3.32	54	47.99	50	21.97	69.28	-	-	A	V
													V
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[illegible]

Emission above 18GHz

2.4GHz BLE (SHF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	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		23627.7	39.37	-34.63	74	41.17	38.8	12.67	53.27	-	-	P	H
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Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
				Limit	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	23.99	-16.01	40	28.19	24.67	0.77	29.64	-	-	P	H	
		175.5	27.4	-16.1	43.5	39.9	15.16	1.88	29.54	-	-	P	H	
		345.25	27.21	-18.79	46	33.48	20.29	2.69	29.25	-	-	P	H	
		615.88	29.81	-16.19	46	29.03	26	3.62	28.84	-	-	P	H	
		839.95	34.85	-11.15	46	30.15	28.87	4.24	28.41	-	-	P	H	
		978.66	36.19	-17.81	54	29.08	30.53	4.65	28.07	-	-	P	H	
													H	
													H	
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													H	
													H	
		57.16	26.3	-13.7	40	42.91	12.01	1.04	29.66	-	-	P	V	
		179.38	25.79	-17.71	43.5	38.53	14.88	1.92	29.54	-	-	P	V	
		327.79	22.35	-23.65	46	29.33	19.68	2.61	29.27	-	-	P	V	
		557.68	29.92	-16.08	46	29.19	26.12	3.46	28.85	-	-	P	V	
		846.74	34.48	-11.52	46	29.54	29.08	4.26	28.4	-	-	P	V	
		964.11	36.24	-17.76	54	28.92	30.82	4.61	28.11	-	-	P	V	
														V
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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.													



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2380.875	54.76	-19.24	74	44.28	27.38	16.59	33.49	239	44	P	H
		2378.355	44.98	-9.02	54	34.49	27.39	16.59	33.49	239	44	A	H
	*	2402	100.37	-	-	89.95	27.3	16.62	33.5	239	44	P	H
	*	2402	98.83	-	-	88.41	27.3	16.62	33.5	239	44	A	H
													H
													H
		2335.935	54.64	-19.36	74	43.96	27.61	16.53	33.46	102	354	P	V
		2310.315	44.83	-9.17	54	33.97	27.82	16.49	33.45	102	354	A	V
	*	2402	95.39	-	-	84.97	27.3	16.62	33.5	102	354	P	V
	*	2402	93.06	-	-	82.64	27.3	16.62	33.5	102	354	A	V
													V
													V
BLE CH 19 2440MHz		2337.44	55.32	-18.68	74	44.66	27.6	16.53	33.47	257	42	P	H
		2327.5	44.76	-9.24	54	34.03	27.68	16.51	33.46	257	42	A	H
	*	2440	100.04	-	-	89.66	27.22	16.68	33.52	257	42	P	H
	*	2440	98.41	-	-	88.03	27.22	16.68	33.52	257	42	A	H
		2485.58	55.05	-18.95	74	44.58	27.27	16.74	33.54	257	42	P	H
		2483.5	44.77	-9.23	54	34.3	27.27	16.74	33.54	257	42	A	H
		2344.86	55.09	-18.91	74	44.48	27.54	16.54	33.47	103	352	P	V
		2337.3	44.65	-9.35	54	33.99	27.6	16.53	33.47	103	352	A	V
	*	2440	95.96	-	-	85.58	27.22	16.68	33.52	103	352	P	V
	*	2440	94.46	-	-	84.08	27.22	16.68	33.52	103	352	A	V
		2485.3	54.15	-19.85	74	43.68	27.27	16.74	33.54	103	352	P	V
		2491.95	44.87	-9.13	54	34.39	27.28	16.75	33.55	103	352	A	V



BLE CH 39 2480MHz	*	2480	101.45	-	-	91	27.26	16.73	33.54	225	43	P	H
	*	2480	97.9	-	-	87.45	27.26	16.73	33.54	225	43	A	H
		2483.56	55.77	-18.23	74	45.3	27.27	16.74	33.54	225	43	P	H
		2483.56	45.76	-8.24	54	35.29	27.27	16.74	33.54	225	43	A	H
													H
													H
	*	2480	97.26	-	-	86.81	27.26	16.73	33.54	100	353	P	V
	*	2480	94.64	-	-	84.19	27.26	16.73	33.54	100	353	A	V
		2495.44	54.67	-19.33	74	44.18	27.29	16.75	33.55	100	353	P	V
		2483.52	45.12	-8.88	54	34.65	27.27	16.74	33.54	100	353	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)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	40.4	-33.6	74	65.07	31.21	11.08	66.96	-	-	P	H
		10950	51.24	-22.76	74	60.72	40.5	16.88	66.86	-	-	P	H
		10950	41.24	-12.76	54	50.72	40.5	16.88	66.86	-	-	A	H
		14475	52.4	-21.6	74	57.41	41.62	19.56	66.19	-	-	P	H
		14475	42.4	-11.6	54	47.41	41.62	19.56	66.19	-	-	A	H
		17955	61.71	-12.29	74	60.16	48.78	21.94	69.17	-	-	P	H
		17955	49.71	-4.29	54	48.16	48.78	21.94	69.17	-	-	A	H
													H
													H
													H
													H
													H
		4804	40.42	-33.58	74	65.09	31.21	11.08	66.96	-	-	P	V
		11160	51.08	-22.92	74	60.93	39.78	17.04	66.67	-	-	P	V
		11160	41.07	-12.93	54	50.92	39.78	17.04	66.67	-	-	A	V
		14490	52.49	-21.51	74	57.42	41.67	19.57	66.17	-	-	P	V
		14490	42.48	-11.52	54	47.41	41.67	19.57	66.17	-	-	A	V
		18000	62.24	-11.76	74	59.55	50	21.97	69.28	-	-	P	V
		18000	50.24	-3.76	54	47.55	50	21.97	69.28	-	-	A	V
													V
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BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 19 2440MHz		4880	40.67	-33.33	74	65.27	31.18	11.1	66.88	-	-	P	H
		7320	44.23	-29.77	74	60.16	36.38	13.64	65.95	-	-	P	H
		10995	50.78	-23.22	74	60.26	40.41	16.92	66.81	-	-	P	H
		10995	40.77	-13.23	54	50.25	40.41	16.92	66.81	-	-	A	H
		14475	51.99	-22.01	74	57	41.62	19.56	66.19	-	-	P	H
		14475	41.99	-12.01	54	47	41.62	19.56	66.19	-	-	A	H
		17985	60.82	-13.18	74	58.5	49.6	21.96	69.24	-	-	P	H
		17985	50.81	-3.19	54	48.49	49.6	21.96	69.24	-	-	A	H
													H
													H
													H
													H
		4880	39.93	-34.07	74	64.53	31.18	11.1	66.88	-	-	P	V
		7320	44	-30	74	59.93	36.38	13.64	65.95	-	-	P	V
		10950	50.29	-23.71	74	59.77	40.5	16.88	66.86	-	-	P	V
		10950	40.29	-13.71	54	49.77	40.5	16.88	66.86	-	-	A	V
		14475	51.96	-22.04	74	56.97	41.62	19.56	66.19	-	-	P	V
		14475	41.96	-12.04	54	46.97	41.62	19.56	66.19	-	-	A	V
		18000	60.96	-13.04	74	58.27	50	21.97	69.28	-	-	P	V
		18000	50.76	-3.24	54	48.07	50	21.97	69.28	-	-	A	V
													V
													V
													V
													V

BLE	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 39 2480MHz		4960	40.8	-33.2	74	65.13	31.34	11.12	66.79	-	-	P	H
		7440	44.91	-29.09	74	60.54	36.7	13.78	66.11	-	-	P	H
		11400	50.41	-23.59	74	59.67	40	17.21	66.47	-	-	P	H
		11400	40.41	-13.59	54	49.67	40	17.21	66.47	-	-	A	H
		14490	52.42	-21.58	74	57.35	41.67	19.57	66.17	-	-	P	H
		14490	42.41	-11.59	54	47.34	41.67	19.57	66.17	-	-	A	H
		17985	60.46	-13.54	74	58.14	49.6	21.96	69.24	-	-	P	H
		17985	50.45	-3.55	54	48.13	49.6	21.96	69.24	-	-	A	H
													H
													H
													H
													H
		4960	40.85	-33.15	74	65.18	31.34	11.12	66.79	-	-	P	V
		7440	46.12	-27.88	74	61.75	36.7	13.78	66.11	-	-	P	V
		10920	50.47	-23.53	74	59.95	40.56	16.85	66.89	-	-	P	V
		10920	40.47	-13.53	54	49.95	40.56	16.85	66.89	-	-	A	V
		14475	51.26	-22.74	74	56.27	41.62	19.56	66.19	-	-	P	V
		14475	41.26	-12.74	54	46.27	41.62	19.56	66.19	-	-	A	V
		18000	61.16	-12.84	74	58.47	50	21.97	69.28	-	-	P	V
		18000	50.86	-3.14	54	48.17	50	21.97	69.28	-	-	A	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.												
	4. 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	P eak or A verage
H/V	H orizontal or V ertical



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.
				Limit	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. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

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

For Average Limit @ 2390MHz:

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

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



Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Jack Cheng, Wilson Wu	Temperature :	20~25°C
		Relative Humidity :	50~60%

Note symbol

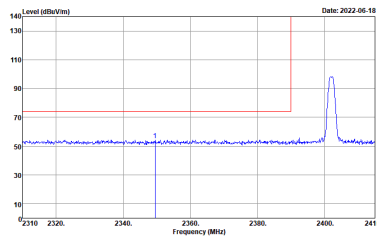
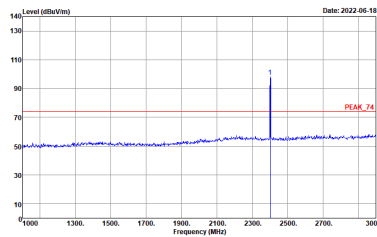
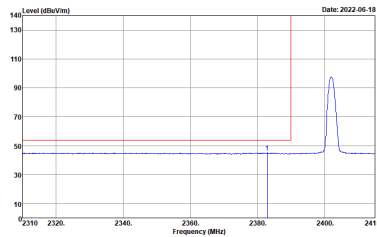
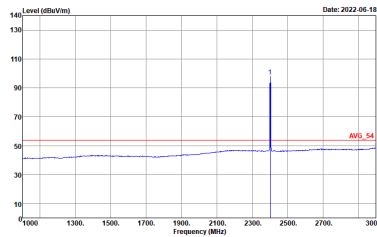
-L	Low channel location
-R	High channel location



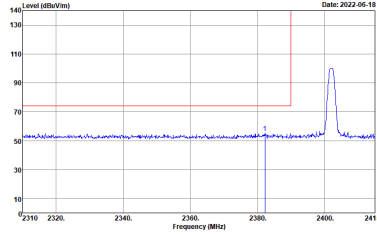
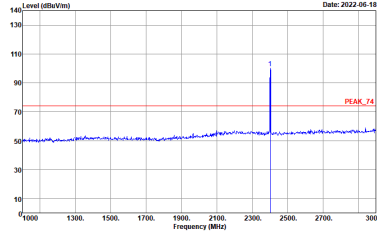
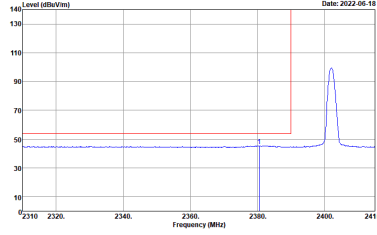
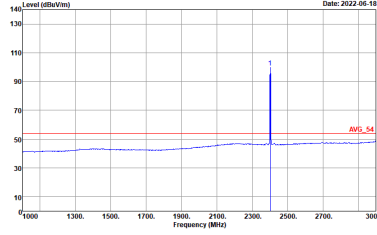
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2.4GHz 2400~2483.5MHz

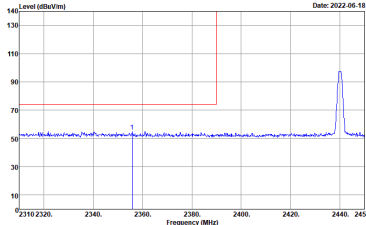
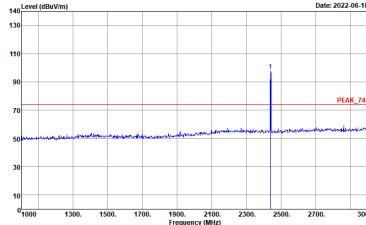
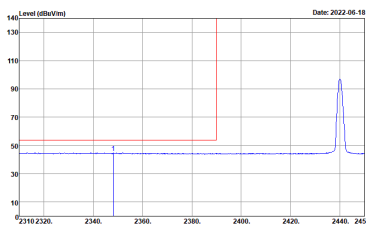
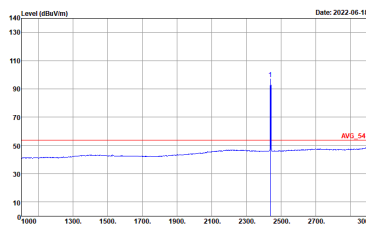
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto

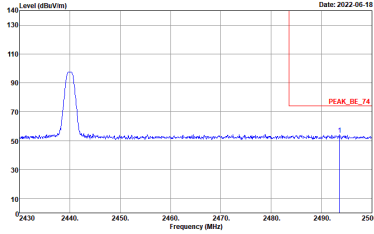
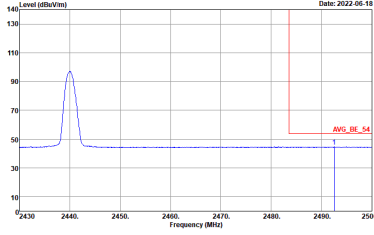


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto

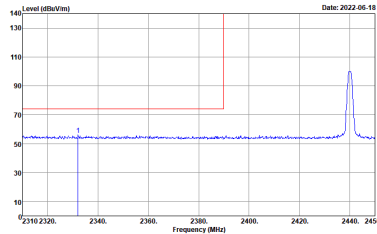
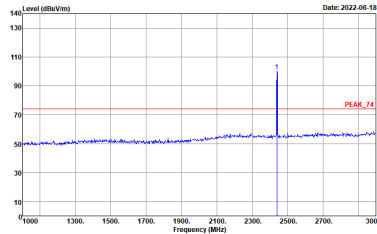
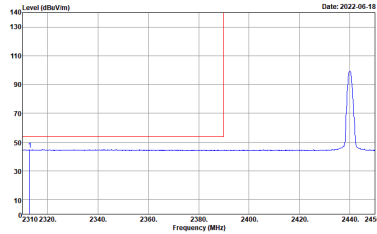
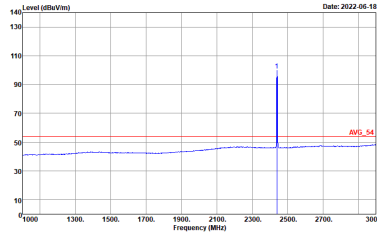


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto

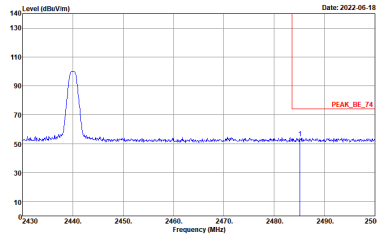
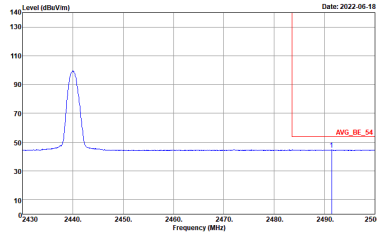


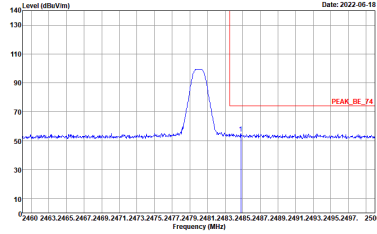
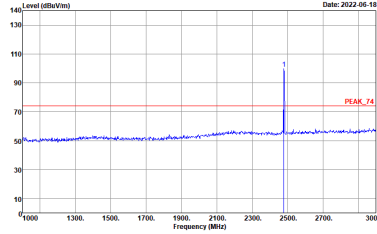
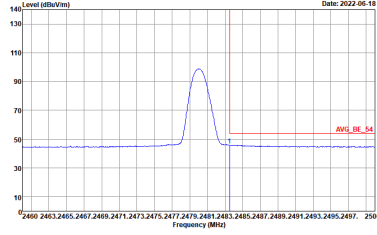
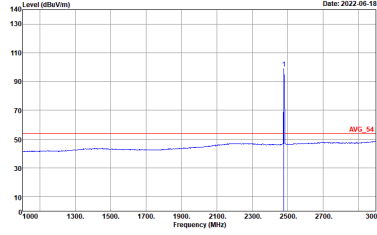
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto



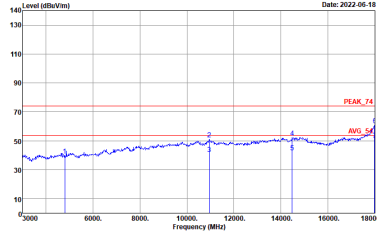
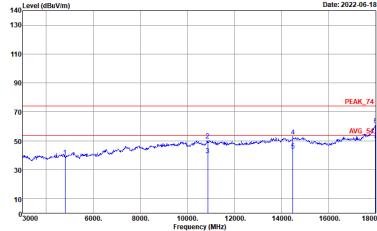
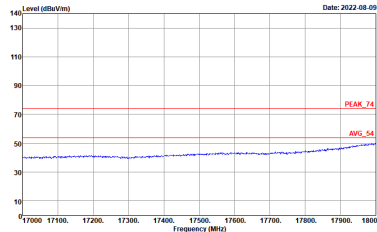
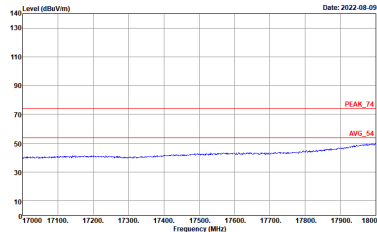
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	Left blank

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto

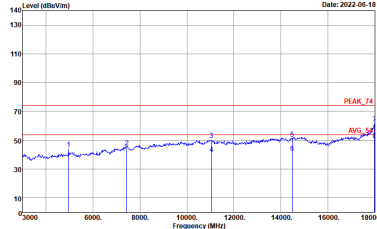
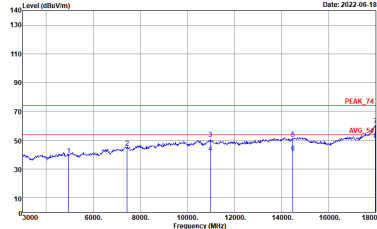
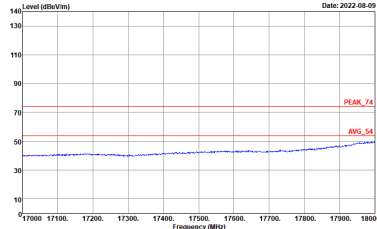
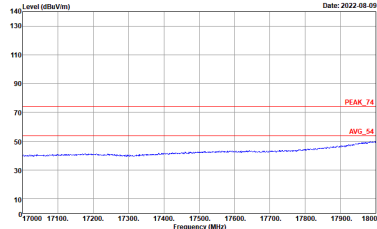
2.4GHz 2400~2483.5MHz
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL
	17GHz~18GHz	
	Horizontal	Vertical
Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL	Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL
	17GHz~18GHz	
	Horizontal	Vertical
Avg.	Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL	Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL

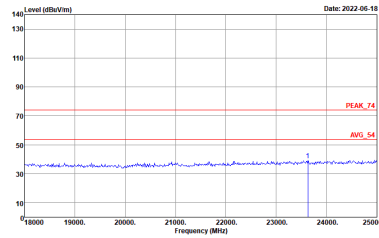
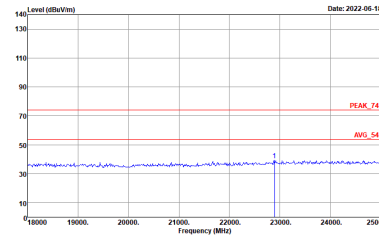


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL
	17GHz~18GHz	
	Horizontal	Vertical
Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL



Emission above 18GHz

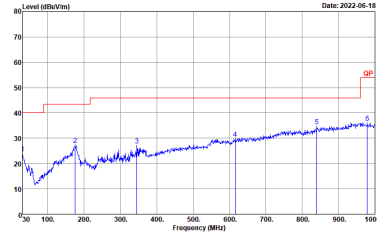
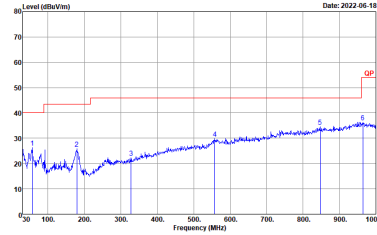
2.4GHz BLE (SHF @ 1m)

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 1m SHF HORN 88HA9170993 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 1m SHF HORN 88HA9170993 VERTICAL



Emission below 1GHz

2.4GHz BLE (LF)

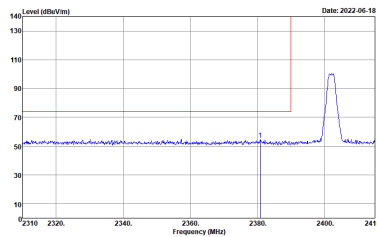
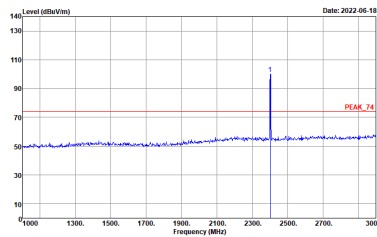
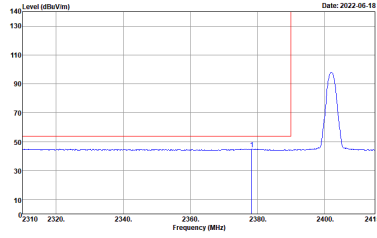
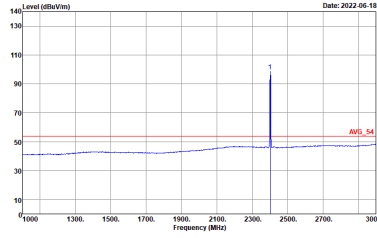
BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH12-HY Condition : QP 3m BIL06_6111D_37059 HORIZONTAL	 Site : 03CH12-HY Condition : QP 3m BIL06_6111D_37059 VERTICAL



<2Mbps>

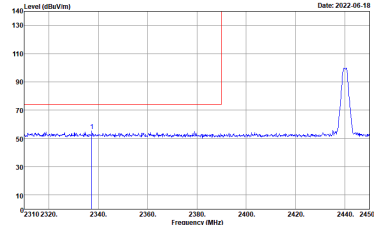
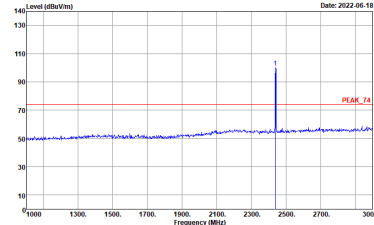
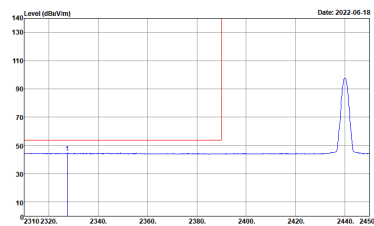
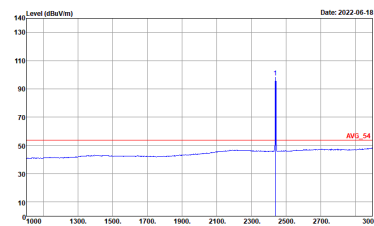
2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

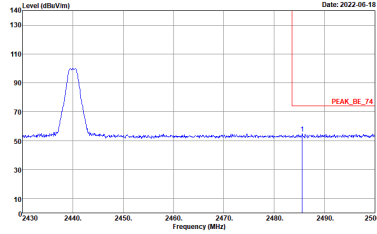
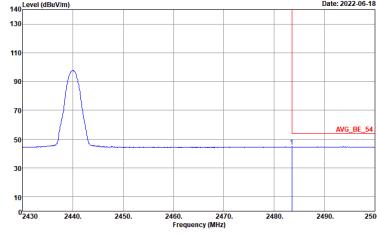
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000kHz VBW:1000kHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000kHz VBW:1000kHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg	Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	 Date: 2022-06-18 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Date: 2022-06-18 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Date: 2022-06-18 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	 Date: 2022-06-18 Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto

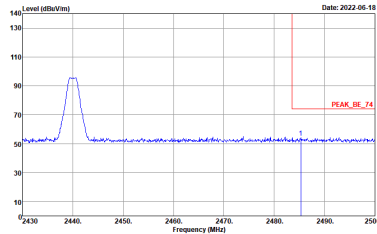
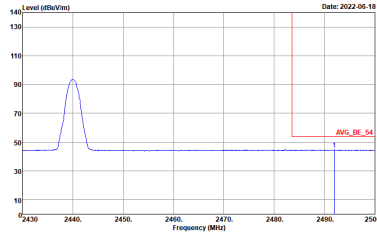


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	Left blank

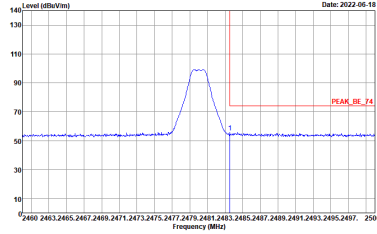
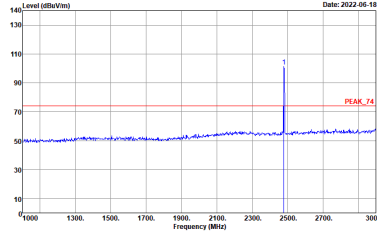
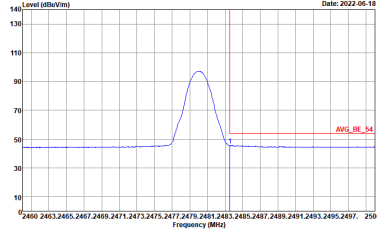
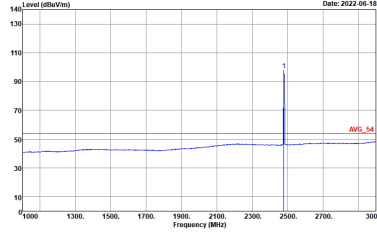


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	 Site : 03CH12-HY Condition : AVG_54 3m HORN_91200_1328 HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto

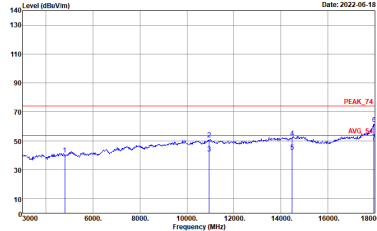
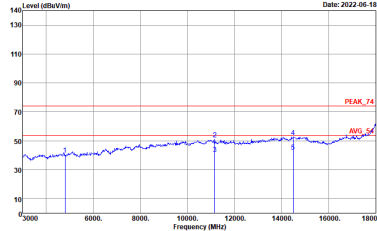
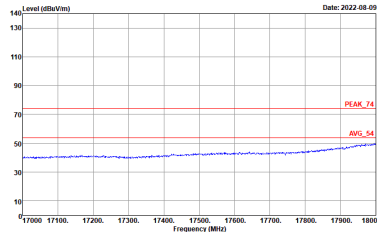
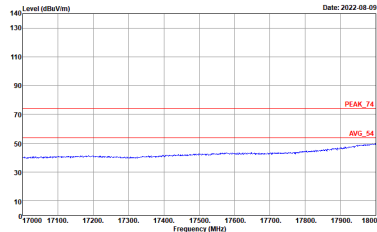


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH12-HY Condition : PEAK_F4 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto	Site : 03CH12-HY Condition : AVG_F4 3m HORN_91200_1328 VERTICAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL
	17GHz~18GHz	
	Horizontal	Vertical
Avg	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL
	17GHz~18GHz	
	Horizontal	Vertical
Avg	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL

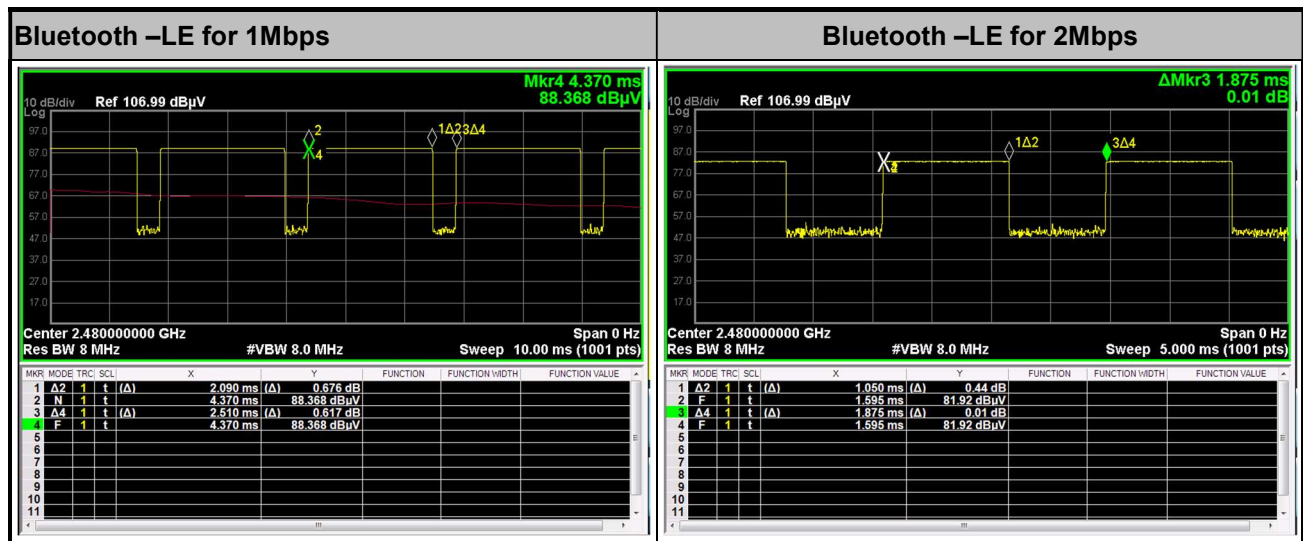


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL
	17GHz~18GHz	
	Horizontal	Vertical
Avg	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL



Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth –LE for 1Mbps	83.27	2090	0.48	1kHz
Bluetooth –LE for 2Mbps	56.00	1050	0.95	1kHz



————THE END————