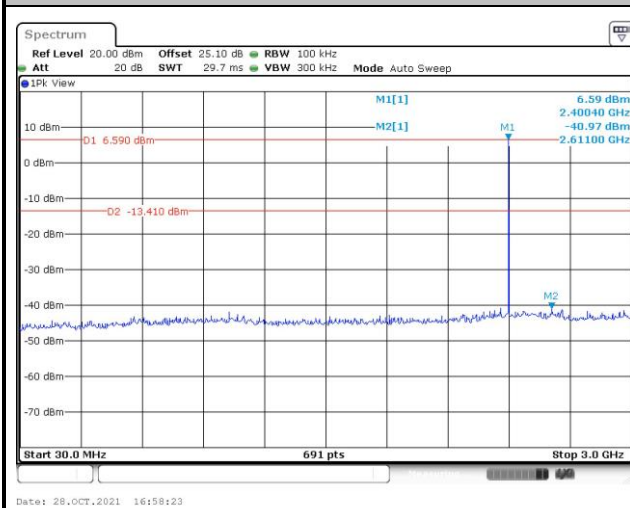




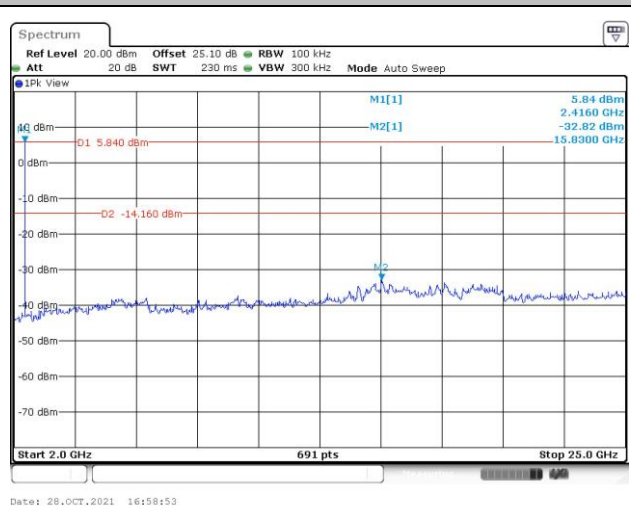
<Ant. 2>

<1Mbps>

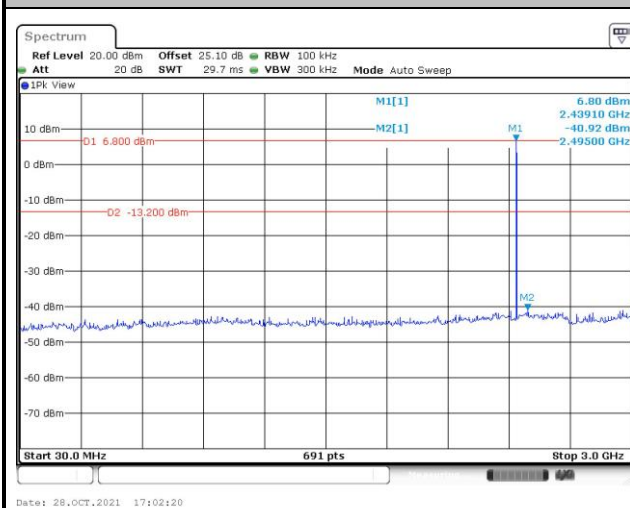
CSE Plot on CH 00 between 30 MHz ~ 3 GHz



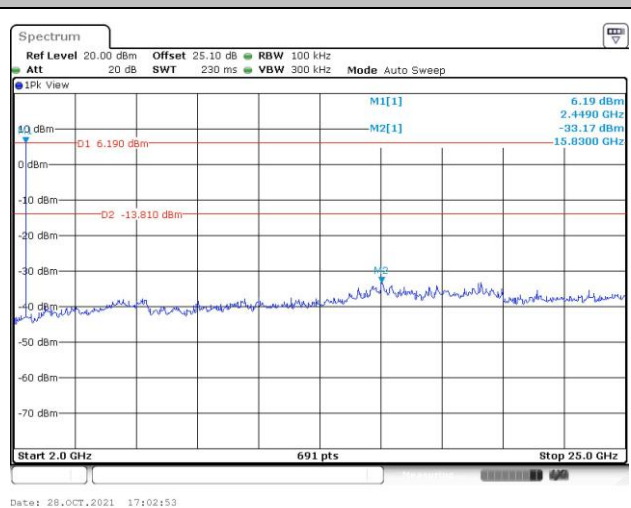
CSE Plot on CH 00 between 2 GHz ~ 25 GHz

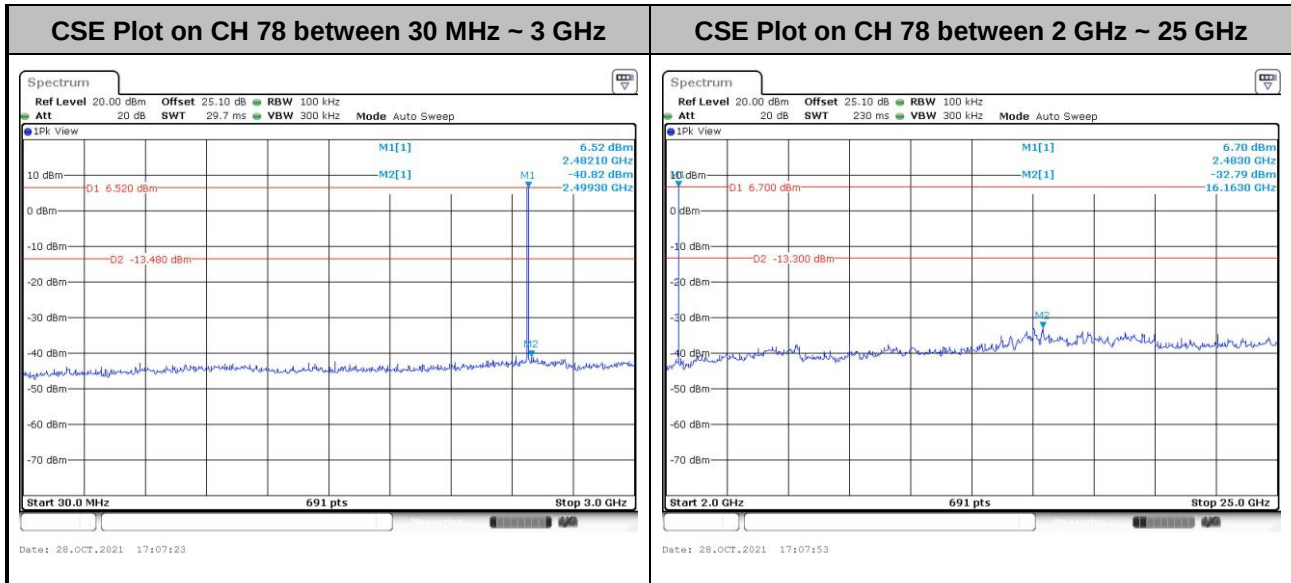


CSE Plot on CH 39 between 30 MHz ~ 3 GHz



CSE Plot on CH 39 between 2 GHz ~ 25 GHz

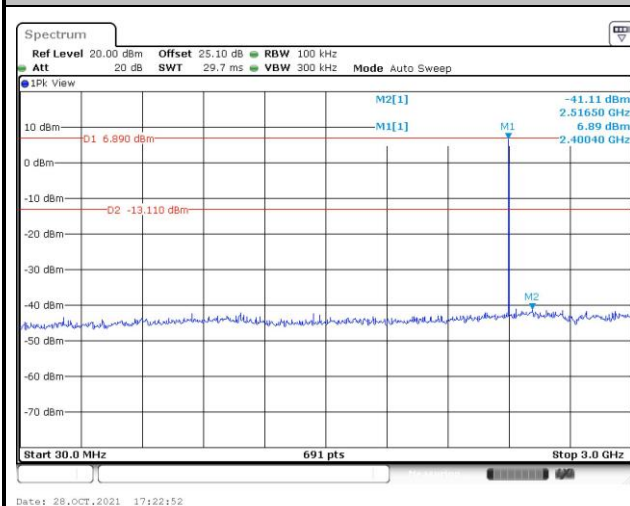




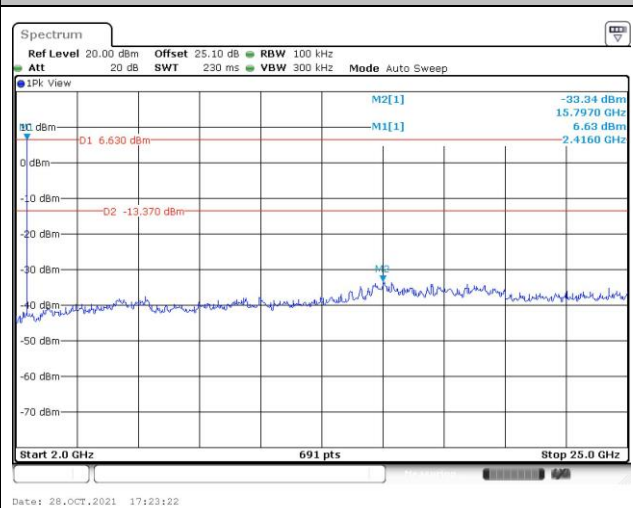


<2Mbps>

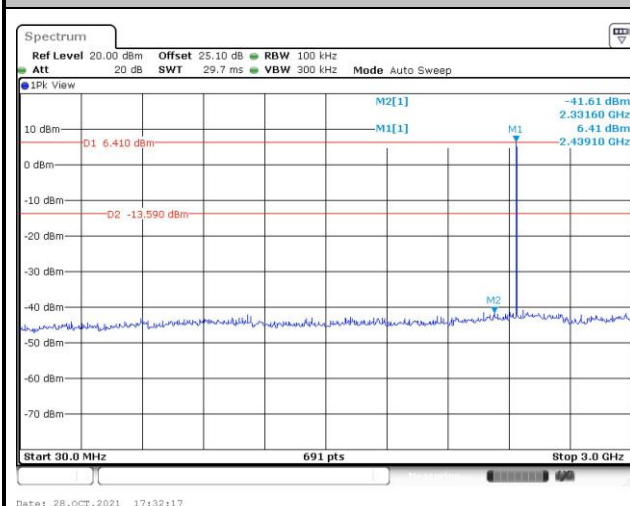
CSE Plot on CH 00 between 30 MHz ~ 3 GHz



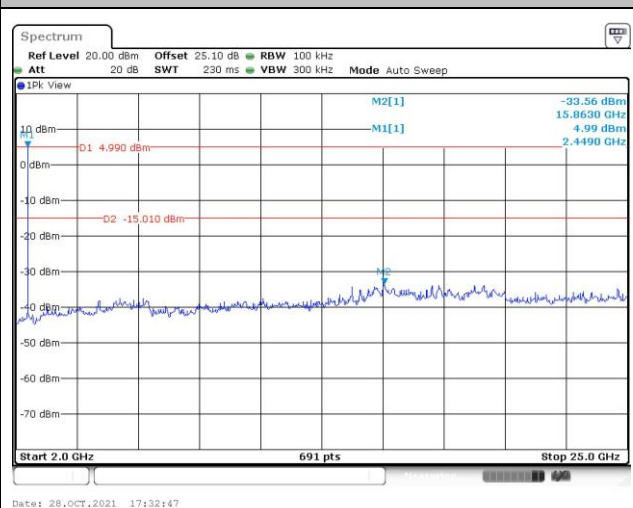
CSE Plot on CH 00 between 2 GHz ~ 25 GHz

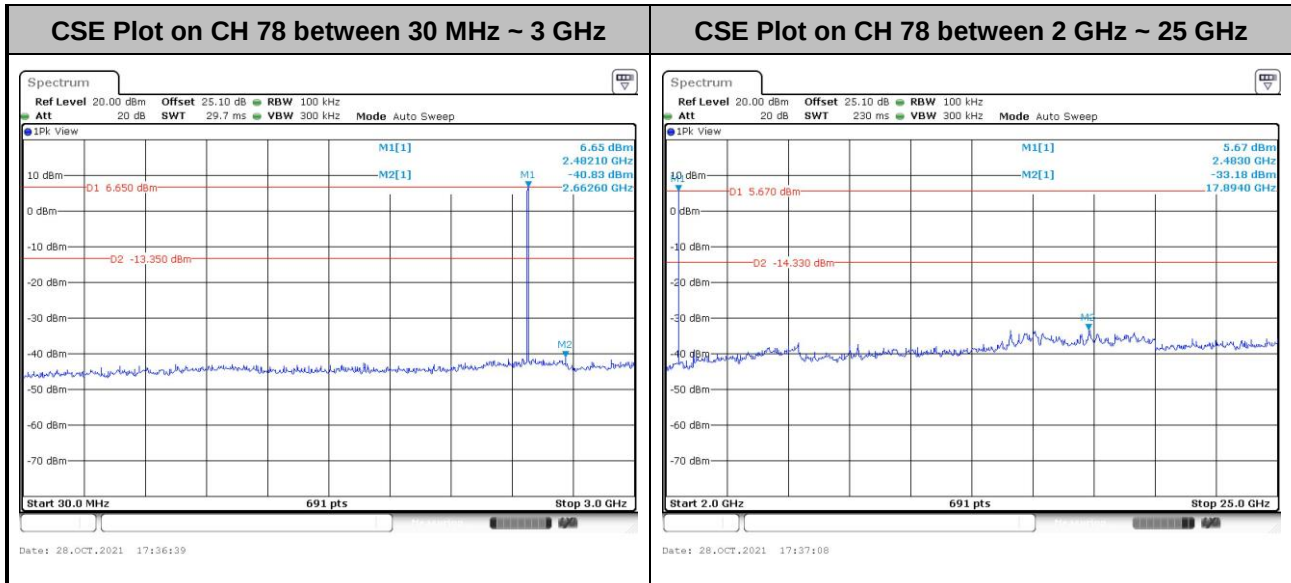


CSE Plot on CH 39 between 30 MHz ~ 3 GHz



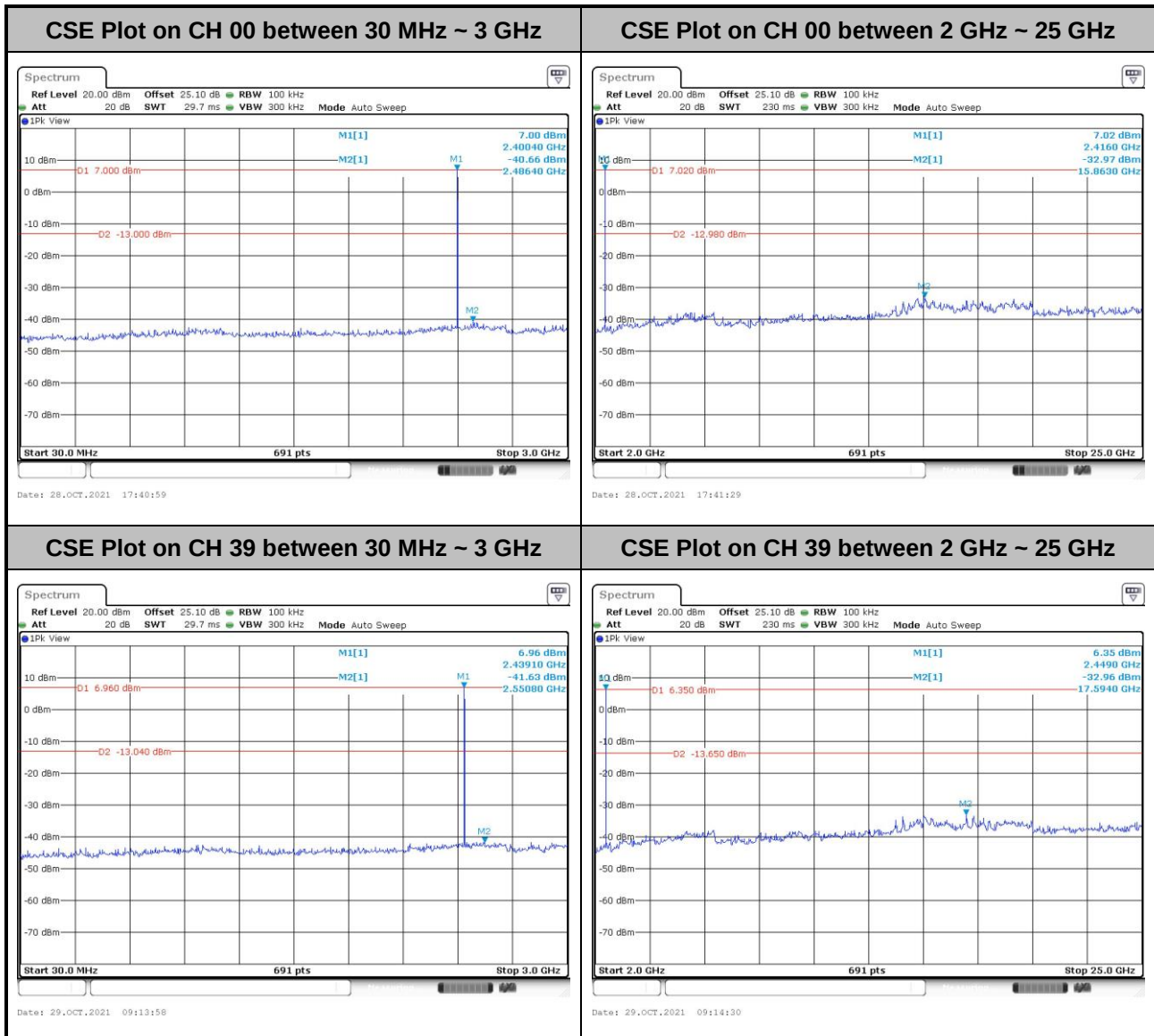
CSE Plot on CH 39 between 2 GHz ~ 25 GHz

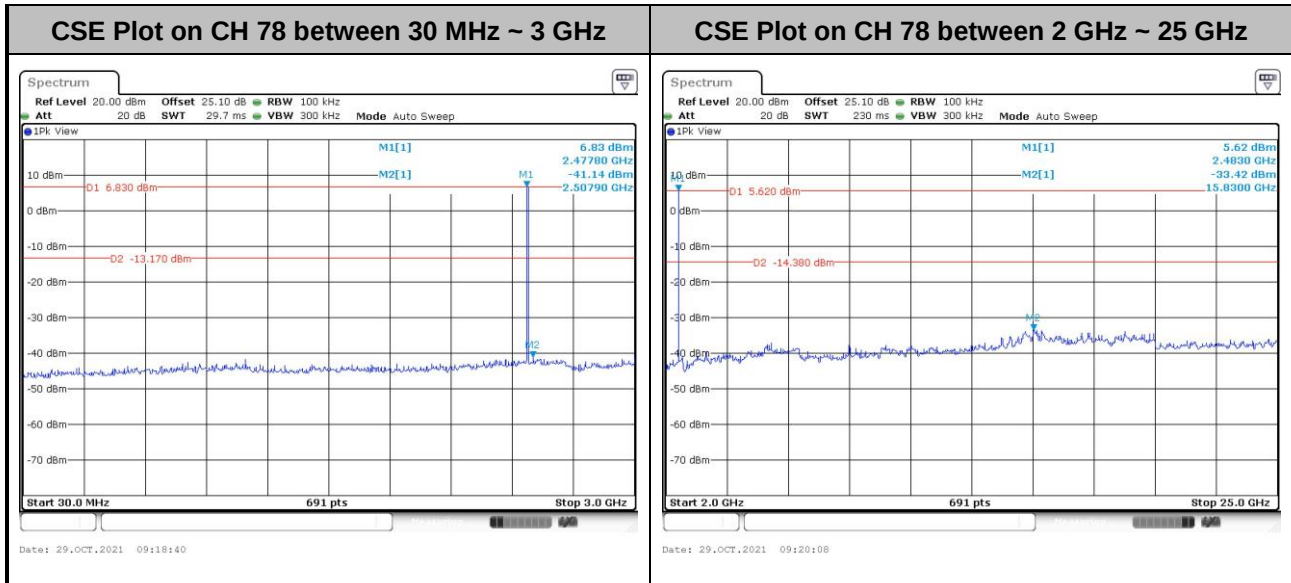






<3Mbps>





3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 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. 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

3.8.2 Measuring Instruments

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

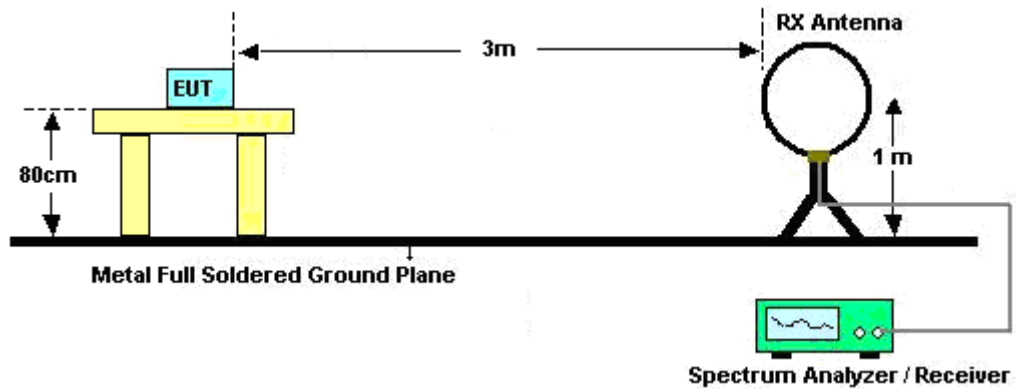
3.8.3 Test Procedures

1. 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.
2. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
3. For each suspected emission, 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 to comply with the guidelines.
4. Set the maximum power setting and enable the EUT to transmit continuously.
5. 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, RBW = 1 MHz for $f > 1$ GHz ; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement (Bluetooth signal): use duty cycle correction factor method per 15.35(c).
Duty cycle = On time/100 milliseconds
On time = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$
Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
Average Emission Level = Peak Emission Level + $20 * \log$ (Duty cycle)
 - (4) For average measurement (Background noise): VBW = 10 Hz, Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz.
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. 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 “-”.
8. 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 “-”.

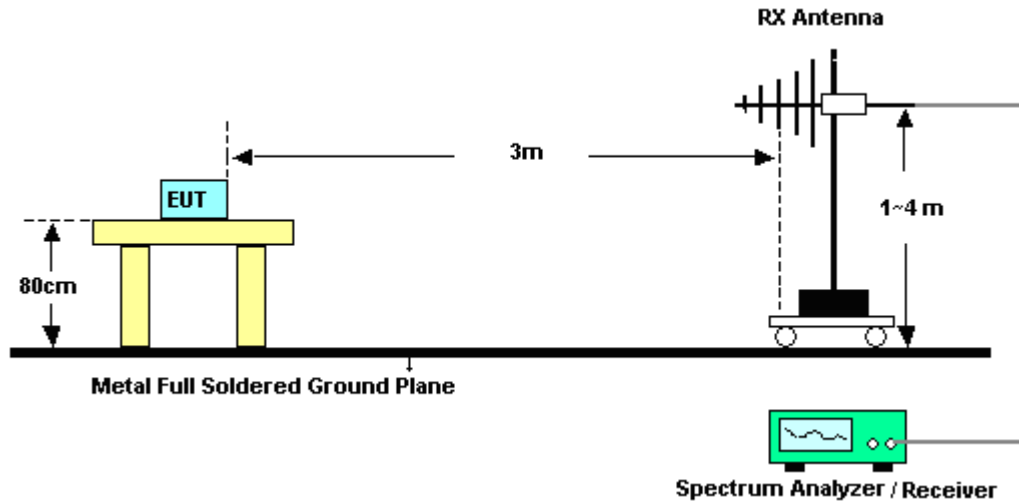
Note: The average levels are calculated from the peak level corrected with duty cycle correction factor (-24.76dB) derived from $20\log(\text{dwell time}/100\text{ms})$. This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.8.4 Test Setup

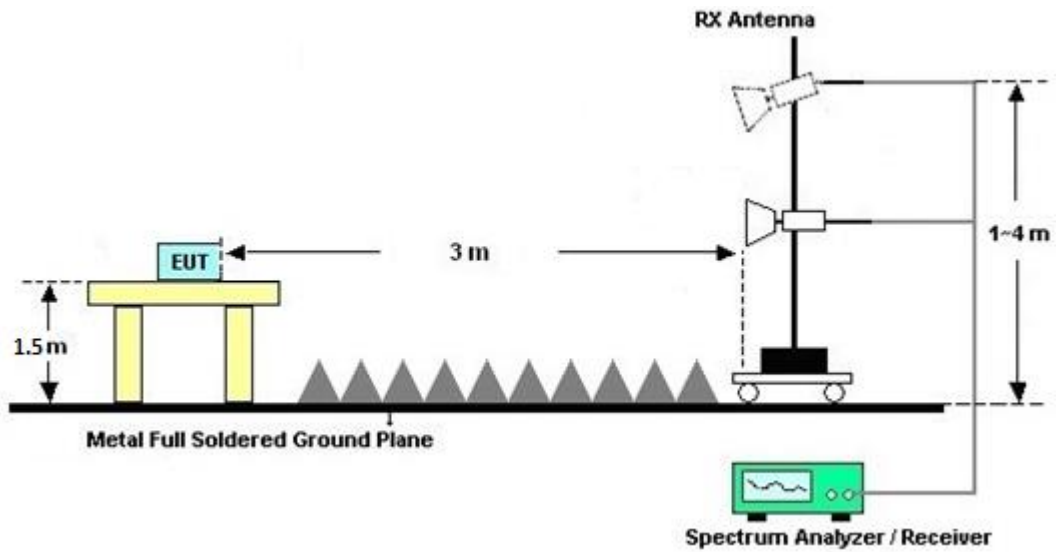
For radiated test below 30MHz



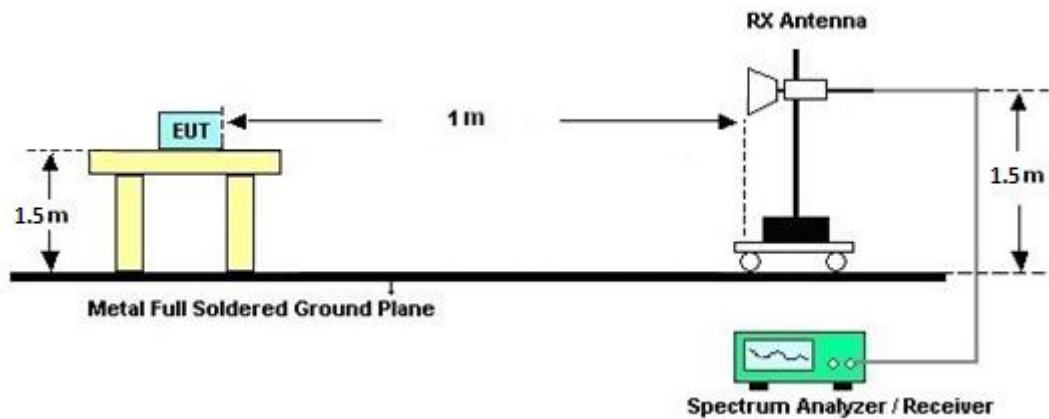
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz





3.8.5 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.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.8.7 Duty Cycle

Please refer to Appendix E.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

3.9 AC Conducted Emission Measurement

3.9.1 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.

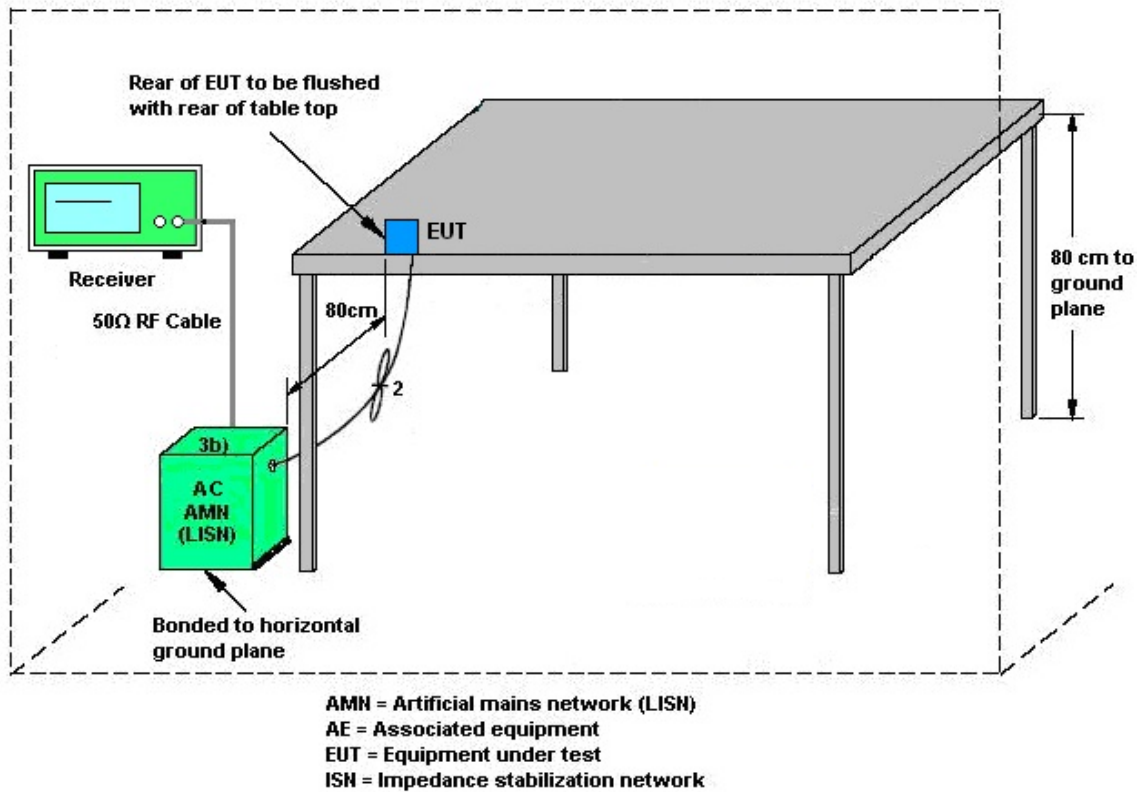
3.9.2 Measuring Instruments

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

3.9.3 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.

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.10 Antenna Requirements

3.10.1 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.

3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 04, 2021	Oct. 12, 2021~ Nov. 05, 2021	Jan. 03, 2022	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	41912 & 05	30MHz~1GHz	Oct. 08, 2021	Oct. 12, 2021~ Nov. 05, 2021	Oct. 07, 2022	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Nov. 23, 2020	Oct. 12, 2021~ Nov. 05, 2021	Nov. 22, 2021	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	00993	18GHz~40GHz	Nov. 19, 2020	Oct. 12, 2021~ Nov. 05, 2021	Nov. 18, 2021	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 24, 2021	Oct. 12, 2021~ Nov. 05, 2021	Mar. 23, 2022	Radiation (03CH12-HY)
Preamplifier	Keysight	8449B	3008A02375	1GHz~26.5GHz	May 25, 2021	Oct. 12, 2021~ Nov. 05, 2021	May 24, 2022	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-30 3K	17100018000 54002	1GHz~18GHz	Jun. 16, 2021	Oct. 12, 2021~ Nov. 05, 2021	Jun. 15, 2022	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 11, 2020	Oct. 12, 2021~ Nov. 05, 2021	Dec. 10, 2021	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Jan. 15, 2021	Oct. 12, 2021~ Nov. 05, 2021	Jan. 14, 2022	Radiation (03CH12-HY)
Filter	Wainwright	WLKS1200-12 SS	SN2	1.2GHz Low Pass Filter	Mar. 17, 2021	Oct. 12, 2021~ Nov. 05, 2021	Mar. 16, 2022	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 OST	SN2	3GHz High Pass Filter	Jul. 12, 2021	Oct. 12, 2021~ Nov. 05, 2021	Jul. 11, 2022	Radiation (03CH12-HY)
Filter	Wainwright	WHKX8-5872. 5-6750-18000- 40ST	SN2	6.75GHz High Pass Filter	Mar. 17, 2021	Oct. 12, 2021~ Nov. 05, 2021	Mar. 16, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 11, 2021	Oct. 12, 2021~ Nov. 05, 2021	Mar. 10, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 11, 2020	Oct. 12, 2021~ Nov. 05, 2021	Dec. 10, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 22, 2021	Oct. 12, 2021~ Nov. 05, 2021	Feb. 21, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 22, 2021	Oct. 12, 2021~ Nov. 05, 2021	Feb. 21, 2022	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP140349	N/A	Sep. 30, 2021	Oct. 12, 2021~ Nov. 05, 2021	Sep. 29, 2022	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Oct. 12, 2021~ Nov. 05, 2021	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Oct. 12, 2021~ Nov. 05, 2021	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Oct. 12, 2021~ Nov. 05, 2021	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Oct. 12, 2021~ Nov. 05, 2021	N/A	Radiation (03CH12-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 01, 2021	Oct. 08, 2021~ Oct. 27, 2021	Feb. 28, 2022	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO 12	10MHz~6GHz	Dec. 16, 2020	Oct. 08, 2021~ Oct. 27, 2021	Dec. 15, 2021	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101565	10Hz ~ 40GHz	Nov. 13, 2020	Oct. 08, 2021~ Oct. 27, 2021	Nov. 12, 2021	Conducted (TH05-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW200302	N/A	Mar. 17, 2021	Oct. 08, 2021~ Oct. 27, 2021	Mar. 16, 2022	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Oct. 12, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	Oct. 12, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	Oct. 12, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2020	Oct. 12, 2021	Nov. 30, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2020	Oct. 12, 2021	Nov. 15, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Oct. 12, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Jul. 28, 2021	Oct. 12, 2021	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Oct. 12, 2021	Dec. 30, 2021	Conduction (CO05-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.1 dB
--	--------

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.8 dB
--	--------

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.3 dB
--	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.9 dB
--	--------

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Mina Liu	Temperature:	21~25	°C
Test Date:	2021/10/8~2021/10/28	Relative Humidity:	51~54	%

<Ant. 1>

TEST RESULTS DATA**20dB and 99% Occupied Bandwidth and Hopping Channel Separation**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.906	0.857	1.003	0.6039	Pass
DH	1Mbps	1	39	2441	0.903	0.863	1.003	0.6020	Pass
DH	1Mbps	1	78	2480	0.906	0.860	1.003	0.6039	Pass
2DH	2Mbps	1	0	2402	1.255	1.161	0.999	0.8365	Pass
2DH	2Mbps	1	39	2441	1.246	1.161	0.999	0.8307	Pass
2DH	2Mbps	1	78	2480	1.255	1.161	0.999	0.8365	Pass
3DH	3Mbps	1	0	2402	1.237	1.155	0.999	0.8249	Pass
3DH	3Mbps	1	39	2441	1.242	1.155	1.003	0.8278	Pass
3DH	3Mbps	1	78	2480	1.242	1.155	0.960	0.8278	Pass

TEST RESULTS DATA**Dwell Time**

Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Nomal	79	106.67	2.88	0.31	0.4	Pass
AFH	20	53.33	2.88	0.15	0.4	Pass

TEST RESULTS DATA**Peak Power Table**

DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
DH1	0	1	8.42	20.97	Pass
	39	1	8.32	20.97	Pass
	78	1	8.05	20.97	Pass
2DH1	0	1	10.20	20.97	Pass
	39	1	10.02	20.97	Pass
	78	1	9.65	20.97	Pass
3DH1	0	1	10.43	20.97	Pass
	39	1	10.30	20.97	Pass
	78	1	10.00	20.97	Pass

TEST RESULTS DATA**Average Power Table****(Reporting Only)**

DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)
DH1	0	1	7.60	5.17
	39	1	7.57	5.17
	78	1	7.13	5.17
2DH1	0	1	7.52	5.14
	39	1	7.44	5.14
	78	1	7.04	5.14
3DH1	0	1	7.59	5.12
	39	1	7.48	5.12
	78	1	7.10	5.12

TEST RESULTS DATA**Number of Hopping Frequency**

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

<Ant. 2>

TEST RESULTS DATA**20dB and 99% Occupied Bandwidth and Hopping Channel Separation**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.903	0.863	0.999	0.6020	Pass
DH	1Mbps	1	39	2441	0.906	0.860	0.999	0.6039	Pass
DH	1Mbps	1	78	2480	0.903	0.863	0.999	0.6020	Pass
2DH	2Mbps	1	0	2402	1.259	1.161	0.999	0.8393	Pass
2DH	2Mbps	1	39	2441	1.259	1.161	1.003	0.8393	Pass
2DH	2Mbps	1	78	2480	1.255	1.161	0.999	0.8365	Pass
3DH	3Mbps	1	0	2402	1.237	1.155	0.960	0.8249	Pass
3DH	3Mbps	1	39	2441	1.237	1.155	0.999	0.8249	Pass
3DH	3Mbps	1	78	2480	1.242	1.155	1.003	0.8278	Pass

TEST RESULTS DATA**Dwell Time**

Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Nomal	79	106.67	2.88	0.31	0.4	Pass
AFH	20	53.33	2.88	0.15	0.4	Pass

TEST RESULTS DATA**Peak Power Table**

DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
DH1	0	1	9.03	20.97	Pass
	39	1	8.86	20.97	Pass
	78	1	8.85	20.97	Pass
2DH1	0	1	10.37	20.97	Pass
	39	1	10.15	20.97	Pass
	78	1	10.10	20.97	Pass
3DH1	0	1	10.55	20.97	Pass
	39	1	10.42	20.97	Pass
	78	1	10.38	20.97	Pass

TEST RESULTS DATA**Average Power Table
(Reporting Only)**

DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)
DH1	0	1	7.55	5.15
	39	1	7.40	5.15
	78	1	7.28	5.15
2DH1	0	1	7.49	5.17
	39	1	7.37	5.17
	78	1	7.17	5.17
3DH1	0	1	7.54	5.15
	39	1	7.38	5.15
	78	1	7.23	5.15

TEST RESULTS DATA**Number of Hopping Frequency**

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass



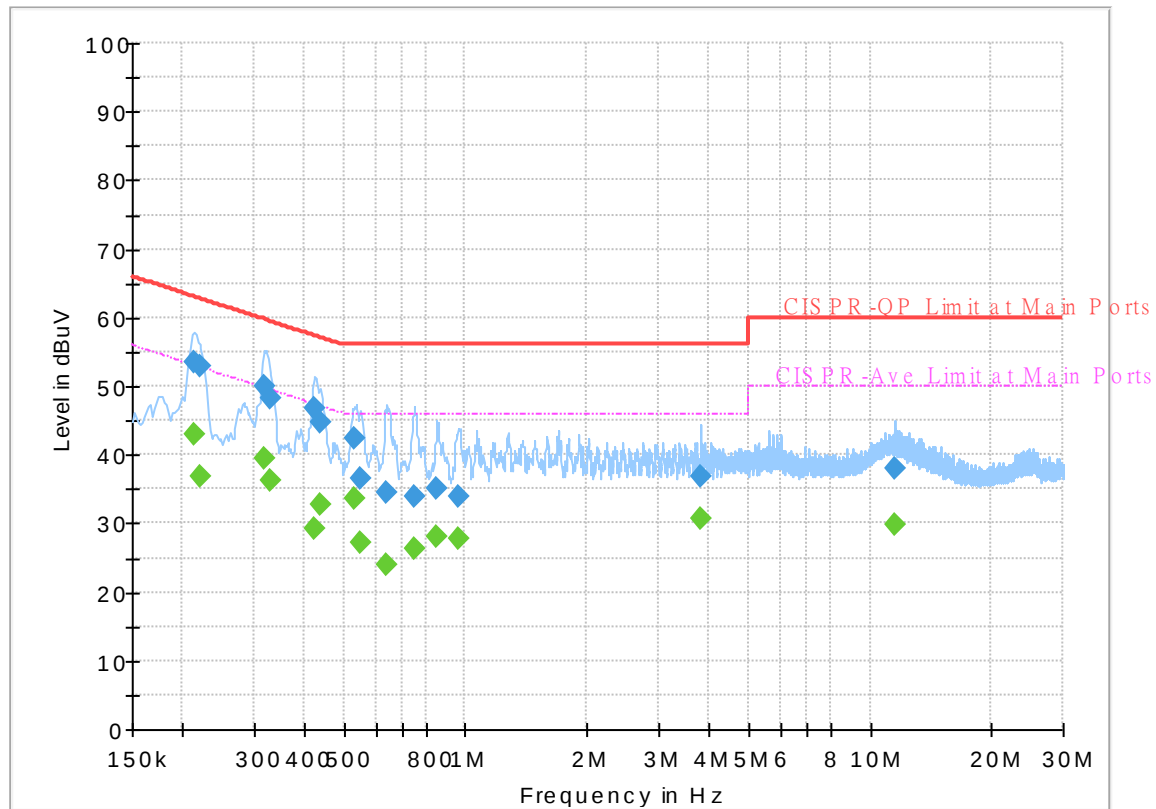
Appendix B. AC Conducted Emission Test Results

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

EUT Information

Test Voltage : 120Vac/60Hz
Phase : Line

Full Spectrum



Final_Result

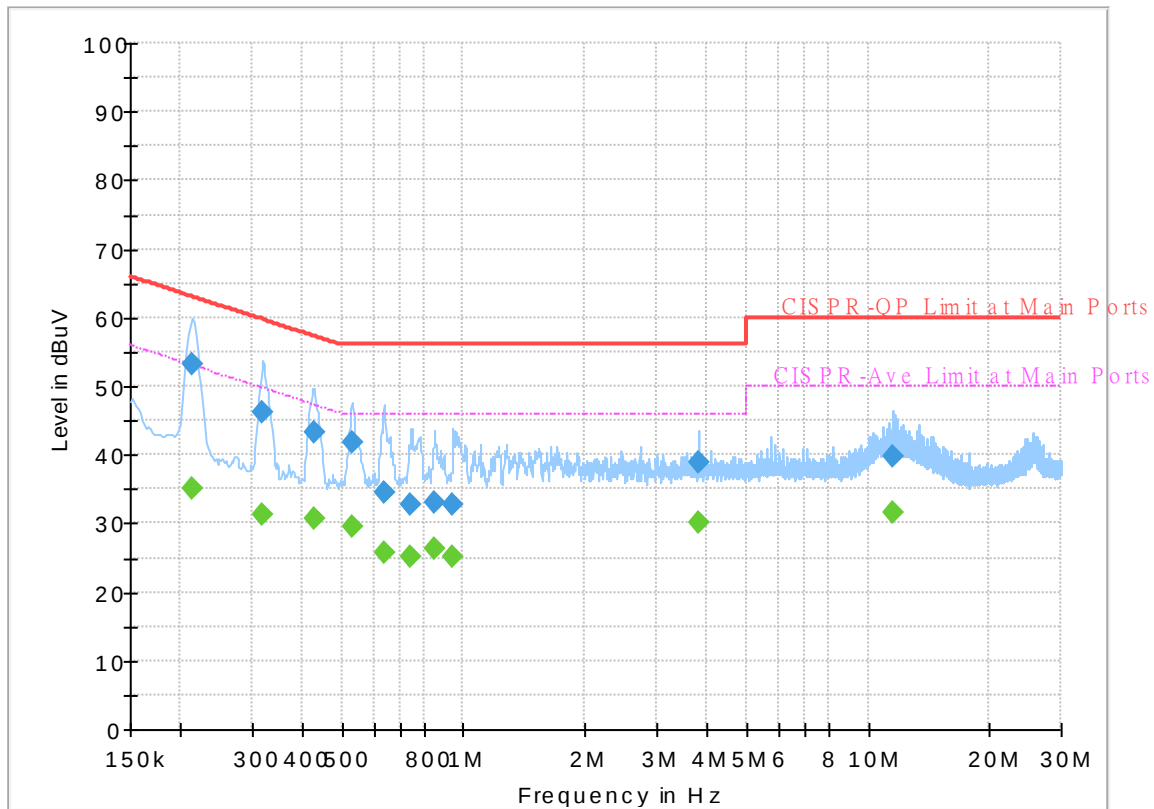
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.213000	---	42.87	53.09	10.22	L1	OFF	19.7
0.213000	53.54	---	63.09	9.55	L1	OFF	19.7
0.219750	---	36.83	52.83	16.00	L1	OFF	19.7
0.219750	53.00	---	62.83	9.83	L1	OFF	19.7
0.318750	---	39.54	49.74	10.20	L1	OFF	19.7
0.318750	50.02	---	59.74	9.72	L1	OFF	19.7
0.330000	---	36.24	49.45	13.21	L1	OFF	19.7
0.330000	48.16	---	59.45	11.29	L1	OFF	19.7
0.424500	---	29.23	47.36	18.13	L1	OFF	19.7
0.424500	46.66	---	57.36	10.70	L1	OFF	19.7
0.438000	---	32.88	47.10	14.22	L1	OFF	19.7
0.438000	44.74	---	57.10	12.36	L1	OFF	19.7
0.532500	---	33.77	46.00	12.23	L1	OFF	19.8
0.532500	42.36	---	56.00	13.64	L1	OFF	19.8
0.550500	---	27.15	46.00	18.85	L1	OFF	19.9
0.550500	36.59	---	56.00	19.41	L1	OFF	19.9
0.640500	---	24.02	46.00	21.98	L1	OFF	19.9
0.640500	34.47	---	56.00	21.53	L1	OFF	19.9
0.748500	---	26.31	46.00	19.69	L1	OFF	20.0
0.748500	33.79	---	56.00	22.21	L1	OFF	20.0
0.847500	---	28.03	46.00	17.97	L1	OFF	20.1

0.847500	34.97	---	56.00	21.03	L1	OFF	20.1
0.955500	---	27.80	46.00	18.20	L1	OFF	20.2
0.955500	34.06	---	56.00	21.94	L1	OFF	20.2
3.819750	---	30.76	46.00	15.24	L1	OFF	20.0
3.819750	36.72	---	56.00	19.28	L1	OFF	20.0
11.460750	---	29.95	50.00	20.05	L1	OFF	20.2
11.460750	38.03	---	60.00	21.97	L1	OFF	20.2

EUT Information

Test Voltage : 120Vac/60Hz
Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.213000	---	34.98	53.09	18.11	N	OFF	19.7
0.213000	53.18	---	63.09	9.91	N	OFF	19.7
0.318750	---	31.24	49.74	18.50	N	OFF	19.7
0.318750	46.15	---	59.74	13.59	N	OFF	19.7
0.426750	---	30.72	47.32	16.60	N	OFF	19.7
0.426750	43.19	---	57.32	14.13	N	OFF	19.7
0.530250	---	29.60	46.00	16.40	N	OFF	19.8
0.530250	41.80	---	56.00	14.20	N	OFF	19.8
0.636000	---	25.88	46.00	20.12	N	OFF	19.9
0.636000	34.49	---	56.00	21.51	N	OFF	19.9
0.741750	---	25.29	46.00	20.71	N	OFF	20.0
0.741750	32.81	---	56.00	23.19	N	OFF	20.0
0.847500	---	26.18	46.00	19.82	N	OFF	20.1
0.847500	32.94	---	56.00	23.06	N	OFF	20.1
0.942000	---	25.23	46.00	20.77	N	OFF	20.2
0.942000	32.80	---	56.00	23.20	N	OFF	20.2
3.819750	---	30.19	46.00	15.81	N	OFF	20.0
3.819750	38.81	---	56.00	17.19	N	OFF	20.0
11.458500	---	31.70	50.00	18.30	N	OFF	20.2
11.458500	39.83	---	60.00	20.17	N	OFF	20.2



Appendix C. Radiated Spurious Emission

Test Engineer :	Jack Cheng, Lance Chiang, and Chuan Chu	Temperature :	23.8~26.2°C
		Relative Humidity :	56.5~68.6%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2373	47.21	-26.79	74	46.37	27.7	6.69	33.55	303	64	P	H
		2373	22.42	-31.58	54	-	-	-	-	-	-	A	H
	*	2402	106.84	-	-	105.97	27.7	6.73	33.56	303	64	P	H
	*	2402	82.05	-	-	-	-	-	-	-	-	A	H
													H
													H
		2317.455	45.61	-28.39	74	44.74	27.77	6.61	33.51	303	38	P	V
		2317.455	20.82	-33.18	54	-	-	-	-	-	-	A	V
	*	2402	100.19	-	-	99.32	27.7	6.73	33.56	303	38	P	V
	*	2402	75.4	-	-	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		2340.94	51.27	-22.73	74	50.44	27.72	6.64	33.53	293	61	P	H
		2340.94	26.48	-27.52	54	-	-	-	-	-	-	A	H
	*	2441	106.52	-	-	105.71	27.62	6.78	33.59	293	61	P	H
	*	2441	81.73	-	-	-	-	-	-	-	-	A	H
		2484.46	47.63	-26.37	74	46.94	27.46	6.84	33.61	293	61	P	H
		2484.46	22.84	-31.16	54	-	-	-	-	-	-	A	H
		2340.52	47.61	-26.39	74	46.78	27.72	6.64	33.53	298	36	P	V
		2340.52	22.82	-31.18	54	-	-	-	-	-	-	A	V
	*	2441	100.99	-	-	100.18	27.62	6.78	33.59	298	36	P	V
	*	2441	76.2	-	-	-	-	-	-	-	-	A	V
		2494.47	46.65	-27.35	74	46	27.42	6.85	33.62	298	36	P	V
		2494.47	21.86	-32.14	54	-	-	-	-	-	-	A	V



BT CH 78 2480MHz	*	2480	106.73	-	-	106.03	27.48	6.83	33.61	293	62	P	H
	*	2480	81.94	-	-	-	-	-	-	-	-	A	H
		2483.52	55.87	-18.13	74	55.17	27.47	6.84	33.61	293	62	P	H
		2483.52	31.08	-22.92	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	100.63	-	-	99.93	27.48	6.83	33.61	282	86	P	V
	*	2480	75.84	-	-	-	-	-	-	-	-	A	V
		2483.84	51.1	-22.9	74	50.41	27.46	6.84	33.61	282	86	P	V
		2483.84	26.31	-27.69	54	-	-	-	-	-	-	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

BT (Harmonic @ 3m)

BT Ant. 1	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)
BT CH 00 2402MHz		4804	38.28	-35.72	74	55.48	31	11.56	59.76	-	-	P	H
		17940	58.38	-15.62	74	46.11	48.66	20.77	57.16	-	-	P	H
		17940	48.29	-5.71	54	36.02	48.66	20.77	57.16	-	-	A	H
		4804	38.28	-35.72	74	55.48	31	11.56	59.76	-	-	P	V
		17940	58.38	-15.62	74	46.11	48.66	20.77	57.16	-	-	P	V
		17940	48.39	-5.61	54	36.12	48.66	20.77	57.16	-	-	A	V
BT CH 39 2441MHz		2340.94	51.27	-22.73	74	50.44	27.72	6.64	33.53	293	61	P	H
		2340.94	26.48	-27.52	54	-	-	-	-	-	-	A	H
		4882	38.69	-35.31	74	56.16	31	11.31	59.78	-	-	P	H
		7323	44.07	-29.93	74	54.63	36.25	13.27	60.08	-	-	P	H
		17895	57.08	-16.92	74	46.23	47.38	20.74	57.27	-	-	P	H
		17895	47.4	-6.6	54	36.55	47.38	20.74	57.27	-	-	A	H
		2340	46.76	-27.24	74	45.93	27.72	6.64	33.53	298	36	P	V
		4882	40.42	-33.58	74	57.89	31	11.31	59.78	-	-	P	V
		7323	44.35	-29.65	74	54.91	36.25	13.27	60.08	-	-	P	V
		17865	56.91	-17.09	74	46.87	46.66	20.73	57.35	-	-	P	V
		17865	47.37	-6.63	54	37.33	46.66	20.73	57.35	-	-	A	V



BT CH 78 2480MHz		2378	54.82	-19.18	74	53.97	27.7	6.7	33.55	301	62	P	H
		2378	30.03	-23.97	54	-	-	-	-	-	-	A	H
		4960	39.17	-34.83	74	56.67	31.24	11.05	59.79	-	-	P	H
		7440	43.41	-30.59	74	53.75	36.28	13.34	59.96	-	-	P	H
		17940	58.6	-15.4	74	46.33	48.66	20.77	57.16	-	-	P	H
		17940	48.37	-5.63	54	36.1	48.66	20.77	57.16	-	-	A	H
		4960	38.62	-35.38	74	56.12	31.24	11.05	59.79	-	-	P	V
		7440	43.49	-30.51	74	53.83	36.28	13.34	59.96	-	-	P	V
		17940	59.4	-14.6	74	47.13	48.66	20.77	57.16	-	-	P	V
		17940	48.93	-5.07	54	36.66	48.66	20.77	57.16	-	-	A	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.												

**Emission above 18GHz****2.4GHz BT (SHF)**

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT SHF		38746	47.18	-26.82	74	39.62	44	19.16	55.6	-	-	P	H
													H
													H
													H
		34390	43.07	-25.13	68.2	40.32	41.08	17.29	55.62	-	-	P	V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		30	24.59	-15.41	40	28.22	25.2	0.81	29.64	-	-	P	H
		206.54	34.45	-9.05	43.5	46.62	15.2	2.12	29.49	-	-	P	H
		375.32	35.73	-10.27	46	41.09	21.01	2.85	29.22	-	-	P	H
		704.15	35.55	-10.45	46	33.46	26.7	3.94	28.55	-	-	P	H
		897.18	36.45	-9.55	46	31.24	28.84	4.57	28.2	-	-	P	H
		947.62	36.63	-9.37	46	29.34	30.76	4.67	28.14	-	-	P	H
		80.44	26.92	-13.08	40	41.79	13.5	1.3	29.67	-	-	P	V
		211.39	32.64	-10.86	43.5	44.86	15.12	2.14	29.48	-	-	P	V
		474.26	31.01	-14.99	46	33.32	23.5	3.23	29.04	-	-	P	V
		729.37	34.66	-11.34	46	31.54	27.66	4.05	28.59	-	-	P	V
		888.45	32.95	-13.05	46	27.74	28.9	4.55	28.24	-	-	P	V
		951.5	36.59	-9.41	46	29.13	30.93	4.67	28.14	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2331.42	47.08	-26.92	74	46.23	27.74	6.63	33.52	302	66	P	H
		2331.42	22.32	-31.68	54	-	-	-	-	-	-	A	H
	*	2402	106.72	-	-	105.85	27.7	6.73	33.56	302	66	P	H
	*	2402	81.96	-	-	-	-	-	-	-	-	A	H
													H
													H
		2319.45	45.71	-28.29	74	44.86	27.76	6.61	33.52	300	42	P	V
		2319.45	20.92	-33.08	54	-	-	-	-	-	-	A	V
	*	2402	100.33	-	-	99.46	27.7	6.73	33.56	300	42	P	V
	*	2402	75.57	-	-	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		2340.94	51.2	-22.8	74	50.37	27.72	6.64	33.53	305	66	P	H
		2340.94	26.44	-27.56	54	-	-	-	-	-	-	A	H
	*	2441	106.71	-	-	105.9	27.62	6.78	33.59	305	66	P	H
	*	2441	81.95	-	-	-	-	-	-	-	-	A	H
		2497.69	47.59	-26.41	74	46.94	27.41	6.86	33.62	305	66	P	H
		2497.69	22.83	-31.17	54	-	-	-	-	-	-	A	H
		2340.66	46.71	-27.29	74	45.88	27.72	6.64	33.53	297	84	P	V
		2340.66	21.95	-32.05	54	-	-	-	-	-	-	A	V
	*	2441	100.92	-	-	100.11	27.62	6.78	33.59	297	84	P	V
	*	2441	76.16	-	-	-	-	-	-	-	-	A	V
		2492.79	46.43	-27.57	74	45.77	27.43	6.85	33.62	297	84	P	V
		2492.79	21.67	-32.33	54	-	-	-	-	-	-	A	V



BT CH 78 2480MHz	*	2480	106.69	-	-	105.99	27.48	6.83	33.61	289	61	P	H
	*	2480	81.93	-	-	-	-	-	-	-	-	A	H
		2483.6	55.54	-18.46	74	54.84	27.47	6.84	33.61	289	61	P	H
		2483.6	30.78	-23.22	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	100.03	-	-	99.33	27.48	6.83	33.61	295	78	P	V
	*	2480	75.27	-	-	-	-	-	-	-	-	A	V
		2483.56	50.84	-23.16	74	50.14	27.47	6.84	33.61	295	78	P	V
		2483.56	26.08	-27.92	54	-	-	-	-	-	-	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****BT (Harmonic @ 3m)**

BT Ant. 2	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)
BT CH 00 2402MHz		2340	48.8	-25.2	74	47.97	27.72	6.64	33.53	302	66	P	H
		2340	24.04	-29.96	54	-	-	-	-	-	-	A	H
		2496	50.72	-23.28	74	50.07	27.42	6.85	33.62	302	66	P	H
		2496	25.96	-28.04	54	-	-	-	-	-	-	A	H
		4804	38.43	-35.57	74	55.63	31	11.56	59.76	-	-	P	H
		17955	59.06	-14.94	74	46.3	49.1	20.78	57.12	-	-	P	H
		17955	49.31	-4.69	54	36.55	49.1	20.1	57.12	-	-	A	H
		4804	38.12	-35.88	74	55.32	31	11.56	59.76	-	-	P	V
		17955	59.37	-14.63	74	46.61	49.1	20.78	57.12	-	-	P	V
		17955	48.97	-5.03	54	36.21	49.1	20.78	57.12	-	-	A	V
BT CH 39 2441MHz		2346	49.57	-24.43	74	48.74	27.71	6.65	33.53	305	66	P	H
		2346	24.81	-29.19	54	-	-	-	-	-	-	A	H
		4882	38.77	-35.23	74	56.24	31	11.31	59.78	-	-	P	H
		7323	44.48	-29.52	74	55.04	36.25	13.27	60.08	-	-	P	H
		17955	58.68	-15.32	74	45.92	49.1	20.78	57.12	-	-	P	H
		17955	49.08	-4.92	54	36.32	49.1	20.78	57.12	-	-	A	H
		4882	38.81	-35.19	74	56.28	31	11.31	59.78	-	-	P	V
		7323	44.03	-29.97	74	54.59	36.25	13.27	60.08	-	-	P	V
		17955	59.03	-14.97	74	46.27	49.1	20.78	57.12	-	-	P	V
		17955	49.46	-4.54	54	36.7	49.1	20.78	57.12	-	-	A	V



BT CH 78 2480MHz		2378	50.46	-23.54	74	49.61	27.7	6.7	33.55	289	61	P	H
		2378	25.70	-28.30	54	-	-	-	-	-	-	A	H
		4960	38.69	-35.31	74	56.19	31.24	11.05	59.79	-	-	P	H
		7440	43.76	-30.24	74	54.1	36.28	13.34	59.96	-	-	P	H
		17970	59.6	-14.4	74	46.36	49.53	20.79	57.08	-	-	P	H
		17970	49.44	-4.56	54	36.2	49.53	20.79	57.08	-	-	A	H
		4960	39.56	-34.44	74	57.06	31.24	11.05	59.79	-	-	P	V
		7440	43.32	-30.68	74	53.66	36.28	13.34	59.96	-	-	P	V
		17970	59.63	-14.37	74	46.39	49.53	20.79	57.08	-	-	P	V
		17970	49.76	-4.24	54	36.52	49.53	20.79	57.08	-	-	A	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.												



Emission above 18GHz

2.4GHz BT (SHF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT SHF		39637	48.19	-25.81	74	39.02	44.95	19.23	55.01	-	-	P	H
													H
													H
													H
		39648	48.35	-25.65	74	39.15	44.96	19.23	54.99	-	-	P	V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		61.04	26.08	-13.92	40	42.7	11.89	1.15	29.66	-	-	P	H
		210.42	33.7	-9.8	43.5	45.87	15.17	2.14	29.48	-	-	P	H
		363.68	33.02	-12.98	46	38.68	20.77	2.81	29.24	-	-	P	H
		709.97	35.73	-10.27	46	33.62	26.7	3.97	28.56	-	-	P	H
		746.83	37.09	-8.91	46	33.31	28.27	4.12	28.61	-	-	P	H
		948.59	36.01	-9.99	46	28.66	30.82	4.67	28.14	-	-	P	H
		80.44	26.56	-13.44	40	41.43	13.5	1.3	29.67	-	-	P	V
		211.39	29.8	-13.7	43.5	42.02	15.12	2.14	29.48	-	-	P	V
		219.15	30.89	-15.11	46	42.94	15.23	2.18	29.46	-	-	P	V
		476.2	33.34	-12.66	46	35.62	23.52	3.24	29.04	-	-	P	V
		774.96	33.45	-12.55	46	29.41	28.4	4.18	28.54	-	-	P	V
		896.21	38.22	-7.78	46	33.04	28.82	4.57	28.21	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



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:

BT	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)
BT 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

$$1. \text{ Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)}$$

$$2. \text{ Level(dBμV/m) =}$$

$$\text{Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)}$$

$$3. \text{ Over Limit(dB) = Level(dBμV/m) - Limit Line(dBμV/m)}$$

For Peak Limit @ 2390MHz:

$$1. \text{ Level(dBμV/m)}$$

$$= \text{Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)}$$

$$= 32.22(\text{dB/m}) + 4.58(\text{dB}) + 54.51(\text{dBμV}) - 35.86(\text{dB})$$

$$= 55.45(\text{dBμV/m})$$

$$2. \text{ Over Limit(dB)}$$

$$= \text{Level(dBμV/m) - Limit Line(dBμV/m)}$$

$$= 55.45(\text{dBμV/m}) - 74(\text{dBμV/m})$$

$$= -18.55(\text{dB})$$

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

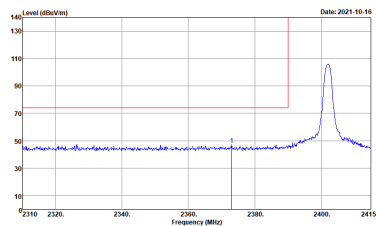
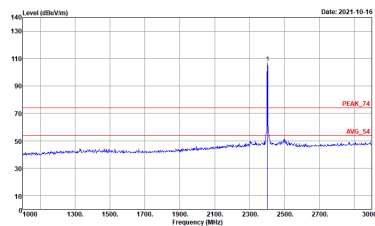


Appendix D. Radiated Spurious Emission Plots

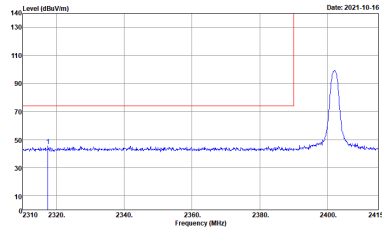
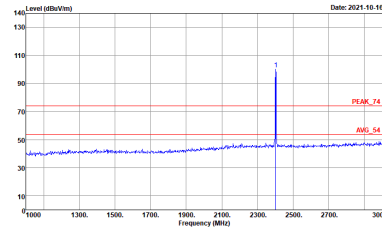
Test Engineer :	Jack Cheng, Lance Chiang, and Chuan Chu	Temperature :	23.8~26.2°C
		Relative Humidity :	56.5~68.6%

2.4GHz 2400~2483.5MHz

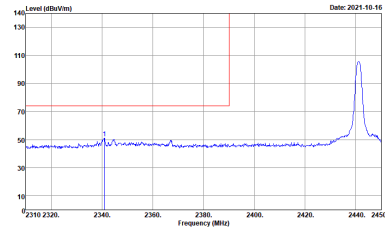
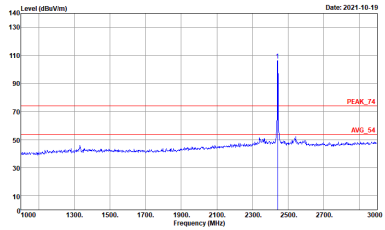
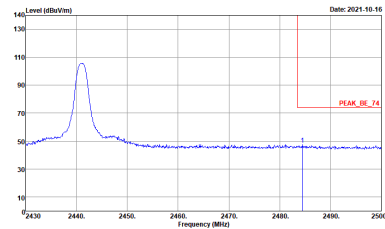
BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	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



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	Left blank

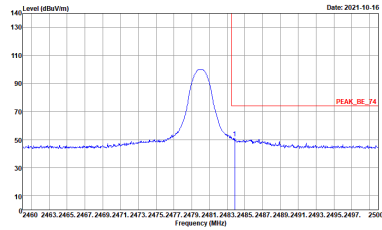
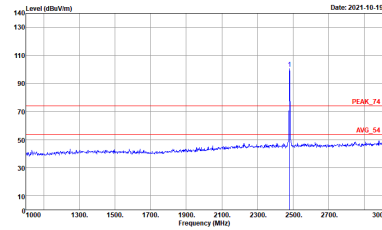


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Vertical	Fundamental
Peak	Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Fundamental
Peak	Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto	Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto

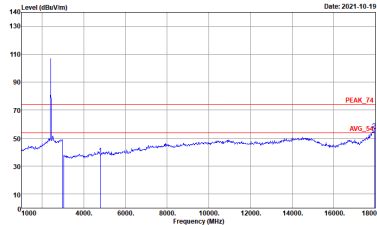
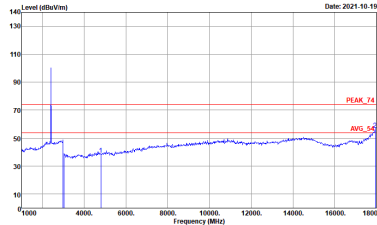


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto

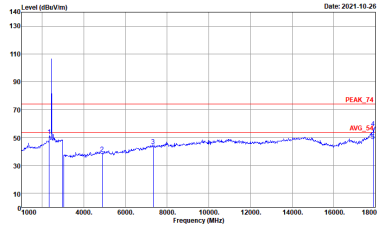
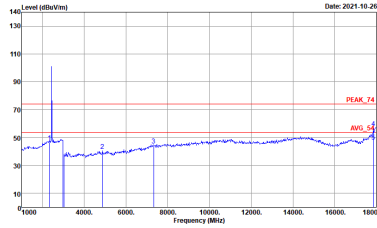


2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

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



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak

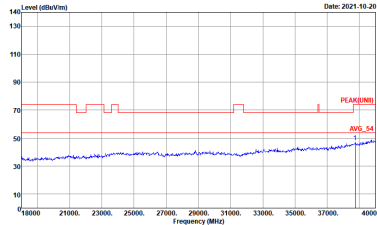
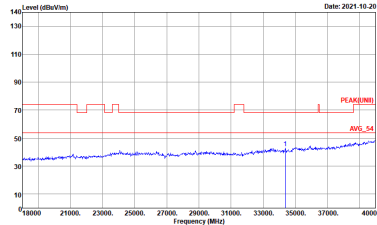


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
Peak Avg.	Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL Detector : Peak	Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL Detector : Peak

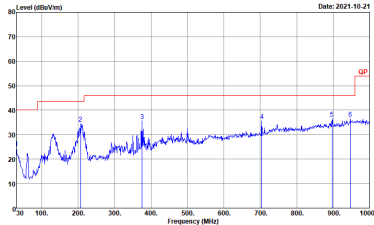
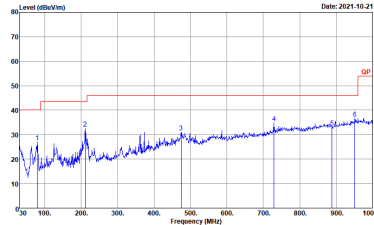


Emission above 18GHz

2.4GHz BT (SHF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT SHF	
1	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK(UNIT) 1m SHF HORN BBHA9170584 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : PEAK(UNIT) 1m SHF HORN BBHA9170584 VERTICAL Detector : Peak

Emission below 1GHz
2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
1	Horizontal	Vertical
QP / Peak	 Site : 03CH12-HY Condition : QP 3m BILOG_6111D_41912 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : QP 3m BILOG_6111D_41912 VERTICAL Detector : Peak

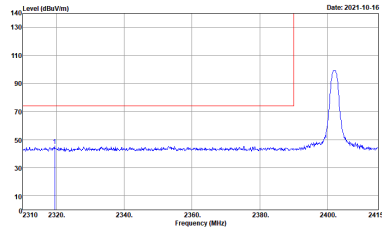
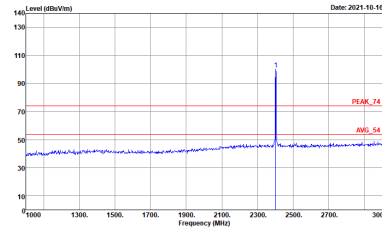


2.4GHz 2400~2483.5MHz

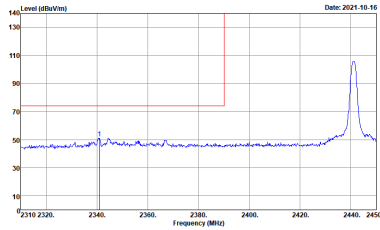
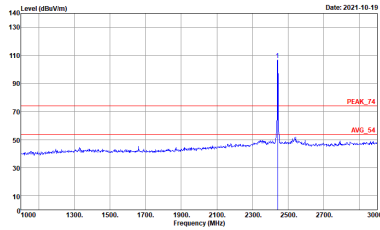
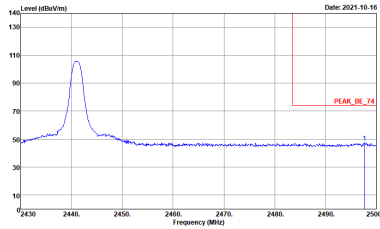
BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
2	Horizontal	Fundamental
Peak	Site : 03CH12-HY Condition : PEAK_9C_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

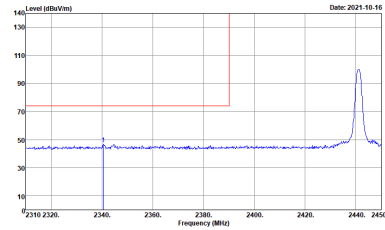
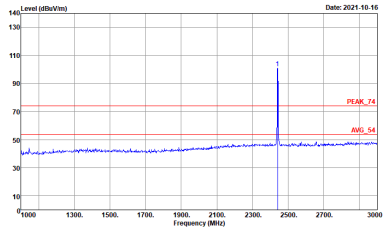
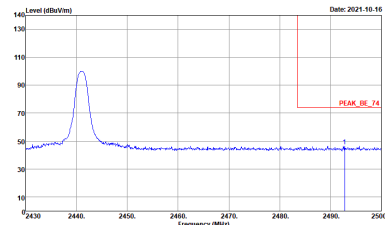


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
2	Vertical	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto

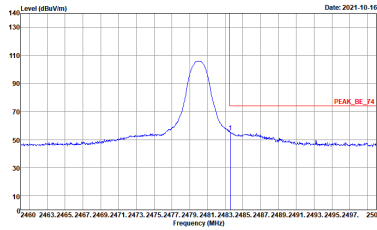
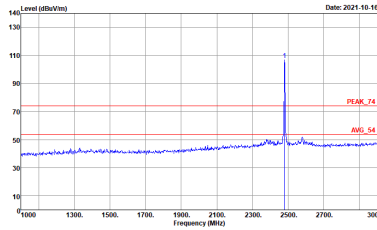


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
2	Horizontal	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

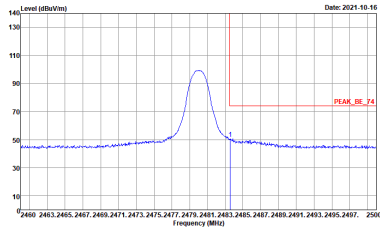
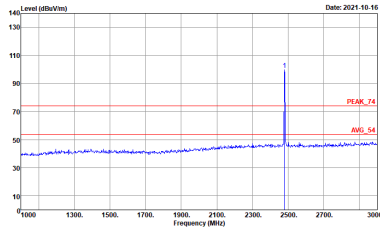


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
2	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
2	Horizontal	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 HORIZONTAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto

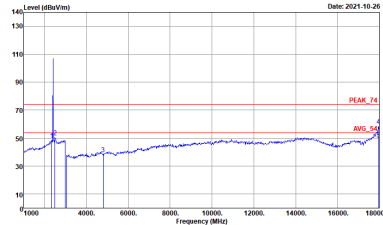
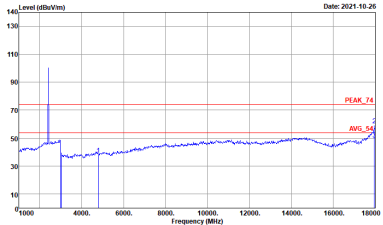


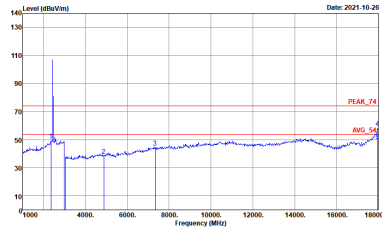
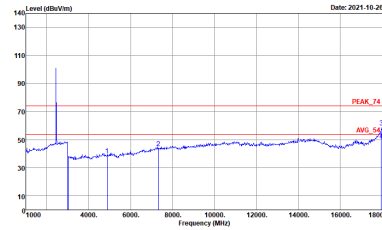
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
2	Vertical	Fundamental
Peak	 Site : 03CH12-HV Condition : PEAK_BE_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH12-HV Condition : PEAK_74 3m HORN_91200_1328 VERTICAL RBW:3000.000kHz VBW:3000.000kHz SWT:Auto



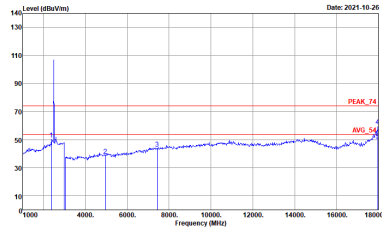
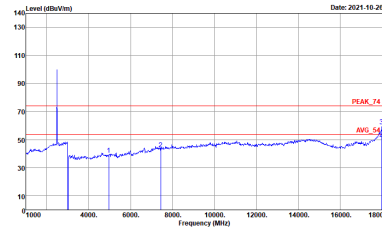
2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

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

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
2	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL Detector : Peak

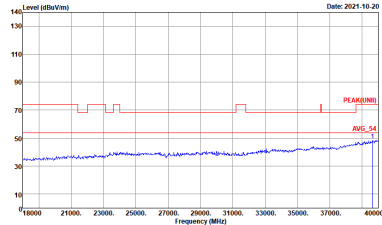
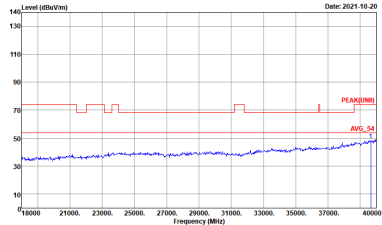


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
2	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_91200_1328 VERTICAL Detector : Peak

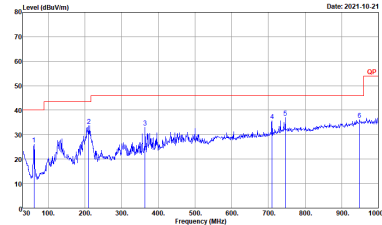
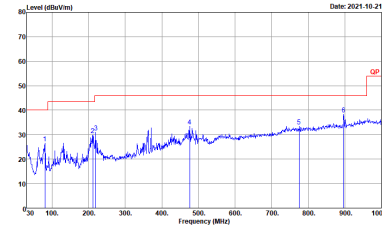


Emission above 18GHz

2.4GHz BT (SHF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT SHF	
2	Horizontal	Vertical
Peak Avg.	 Site : 03CH12-HY Condition : PEAK(UNIT) 1m SHF HORN 88HA9170584 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : PEAK(UNIT) 1m SHF HORN 88HA9170584 VERTICAL Detector : Peak

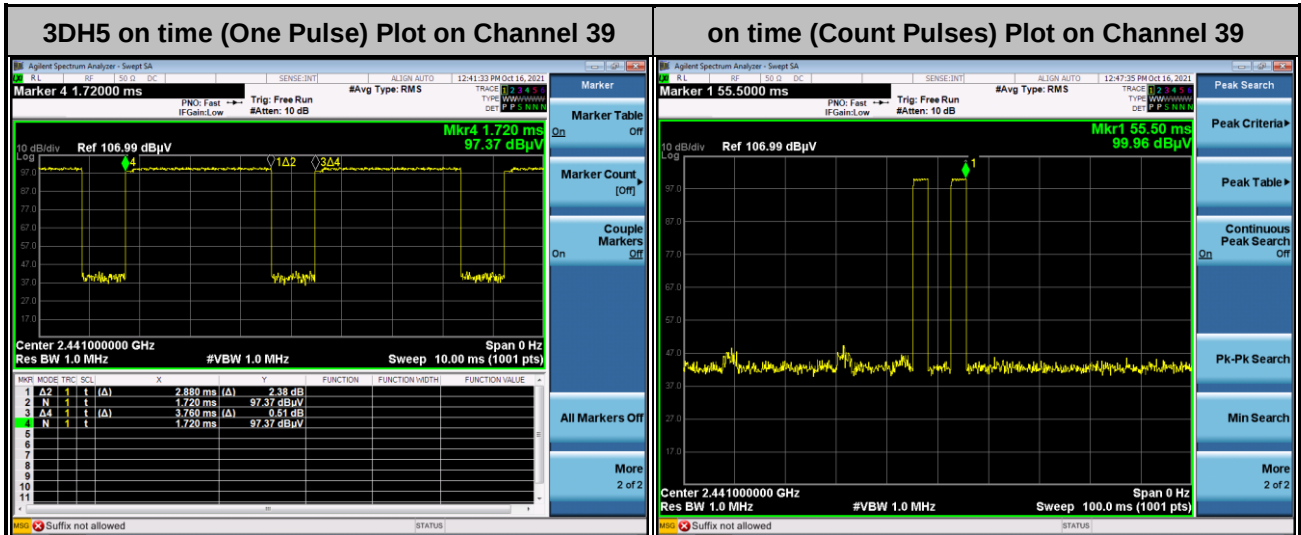
Emission below 1GHz
2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
2	Horizontal	Vertical
QP / Peak	 Site : 03CH12-HY Condition : QP 3m BILOG_6111D_41912 HORIZONTAL Detector : Peak	 Site : 03CH12-HY Condition : QP 3m BILOG_6111D_41912 VERTICAL Detector : Peak



Appendix E. Duty Cycle Plots

<Ant. 1>



Note:

1. Worst case Duty cycle = on time/100 milliseconds = $2 * 2.88 / 100 = 5.76 \%$
2. Worst case Duty cycle correction factor = $20 * \log(\text{Duty cycle}) = -24.79 \text{ dB}$
3. 3DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the on time period to have DH5 packet completing one hopping sequence is

$$2.88 \text{ ms} \times 20 \text{ channels} = 57.6 \text{ ms}$$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. $[100 \text{ ms} / 57.6 \text{ ms}] = 2 \text{ hops}$

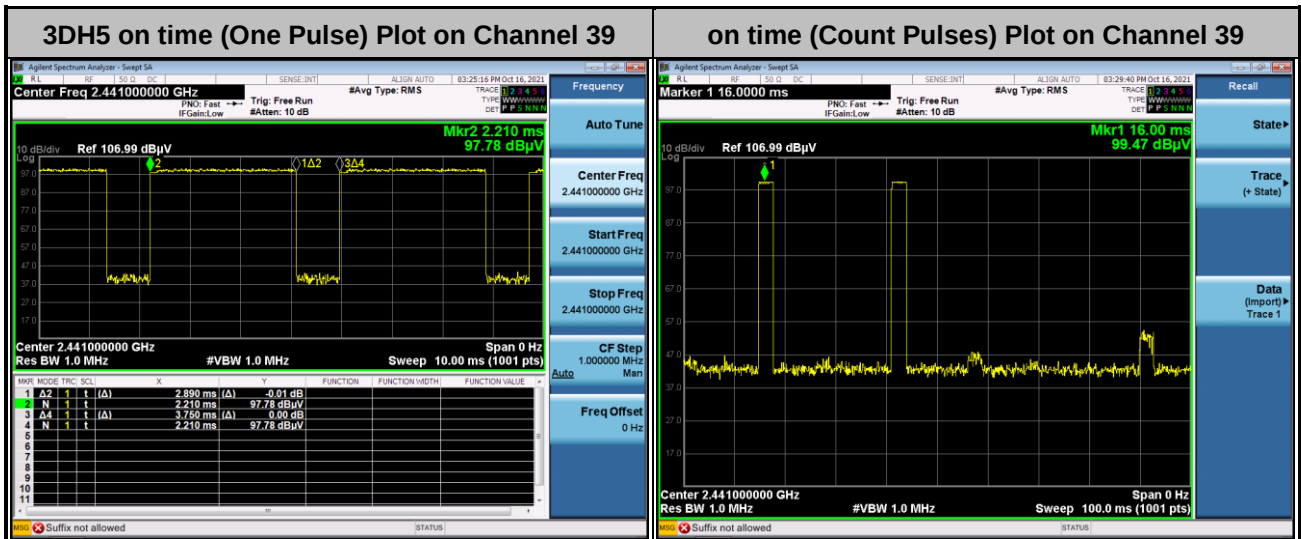
Thus, the maximum possible ON time:

$$2.88 \text{ ms} \times 2 = 5.76 \text{ ms}$$

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

$$20 \times \log(5.76 \text{ ms}/100 \text{ ms}) = -24.79 \text{ dB}$$

<Ant. 2>



Note:

1. Worst case Duty cycle = on time/100 milliseconds = $2 \times 2.89 / 100 = 5.78 \%$
2. Worst case Duty cycle correction factor = $20 \times \log(\text{Duty cycle}) = -24.76 \text{ dB}$
3. 3DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the on time period to have DH5 packet completing one hopping sequence is

$$2.89 \text{ ms} \times 20 \text{ channels} = 57.8 \text{ ms}$$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. $[100 \text{ ms} / 57.8 \text{ ms}] = 2 \text{ hops}$

Thus, the maximum possible ON time:

$$2.89 \text{ ms} \times 2 = 5.78 \text{ ms}$$

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

$$20 \times \log(5.78 \text{ ms}/100 \text{ ms}) = -24.76 \text{ dB}$$

—————THE END—————