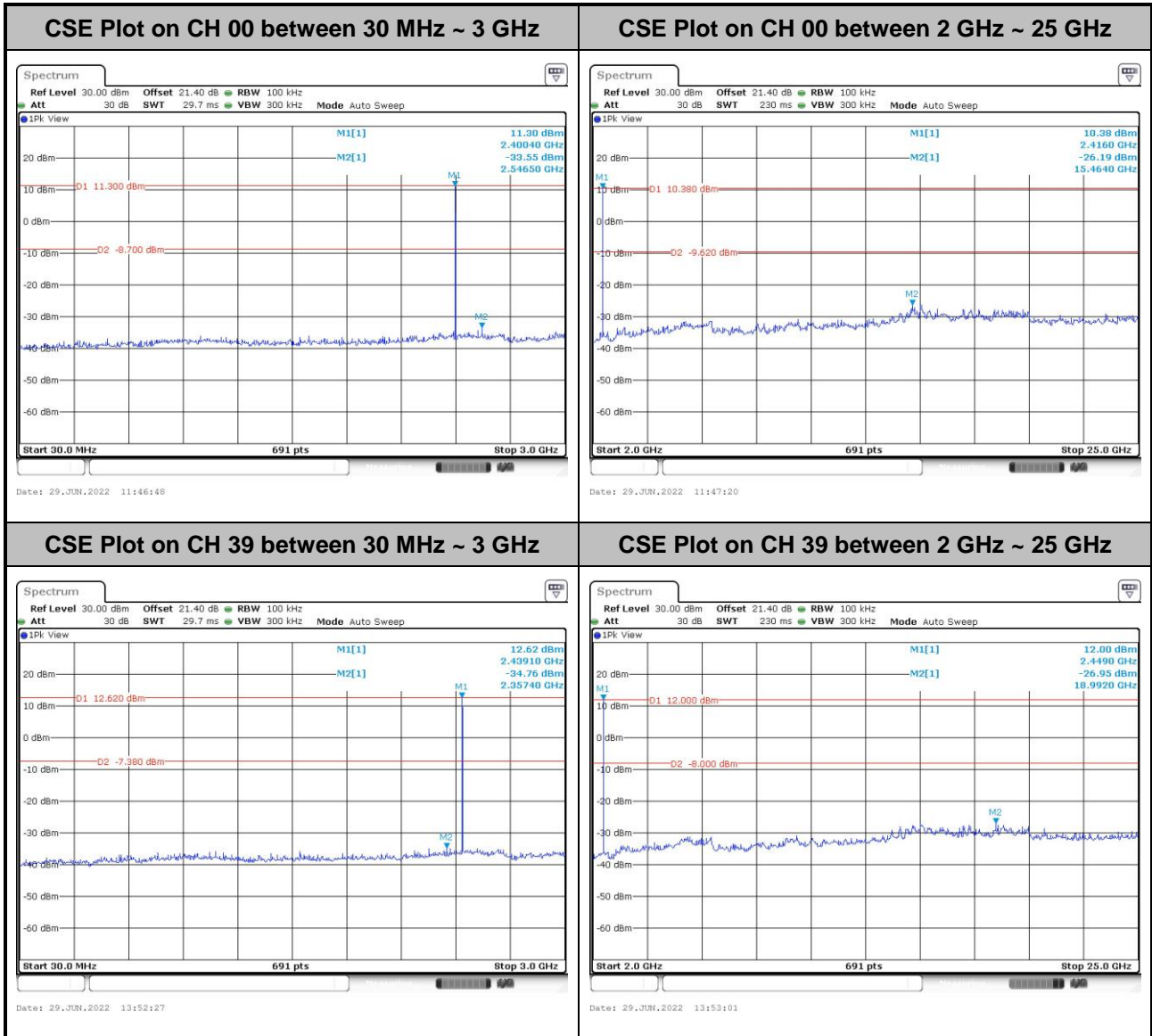
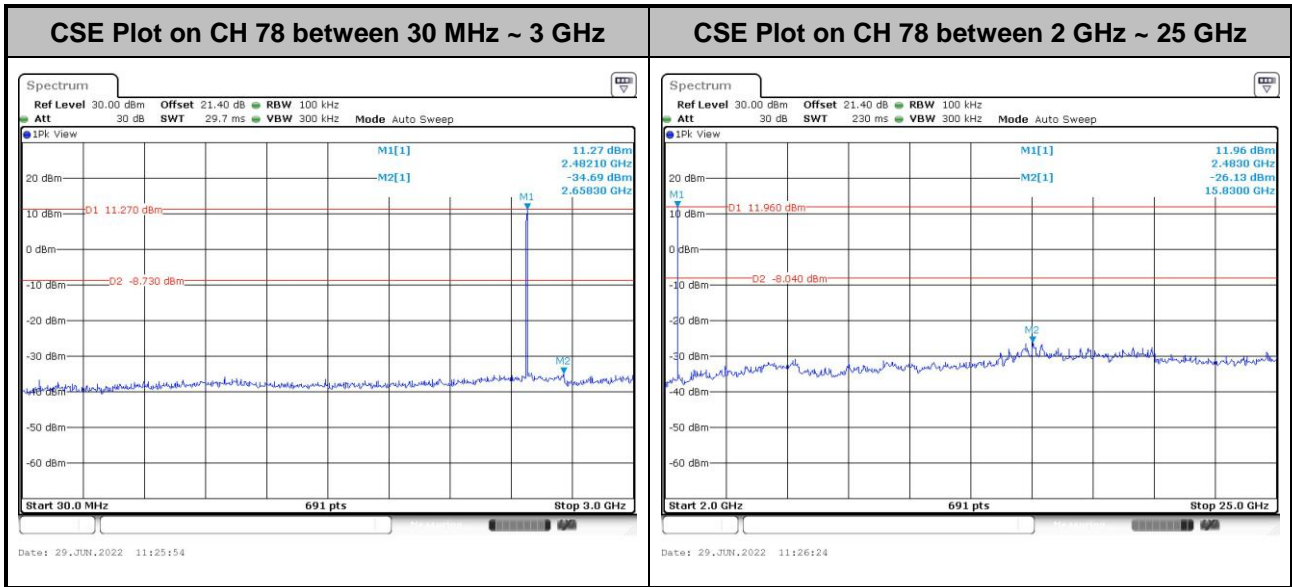




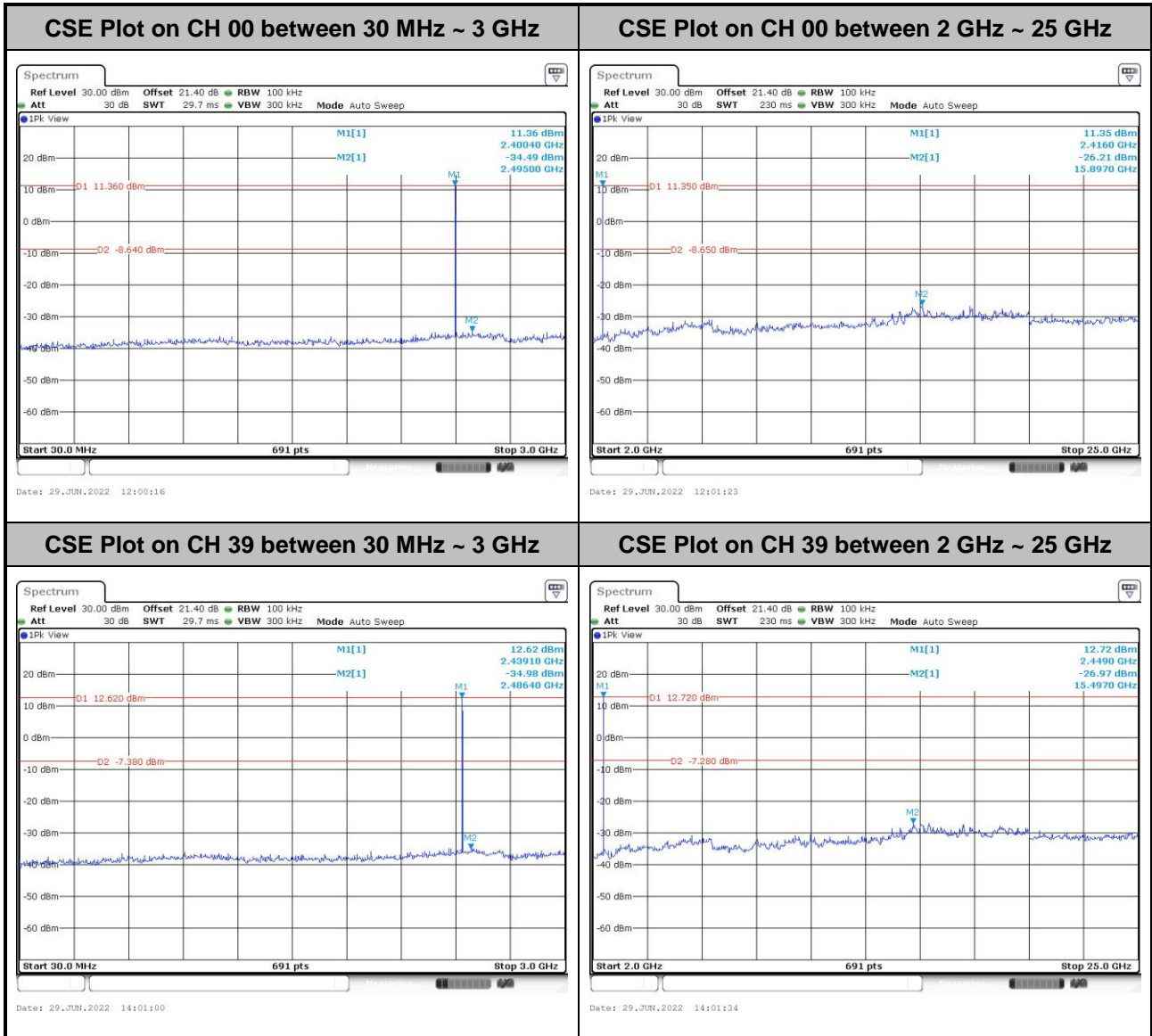
<2Mbps>

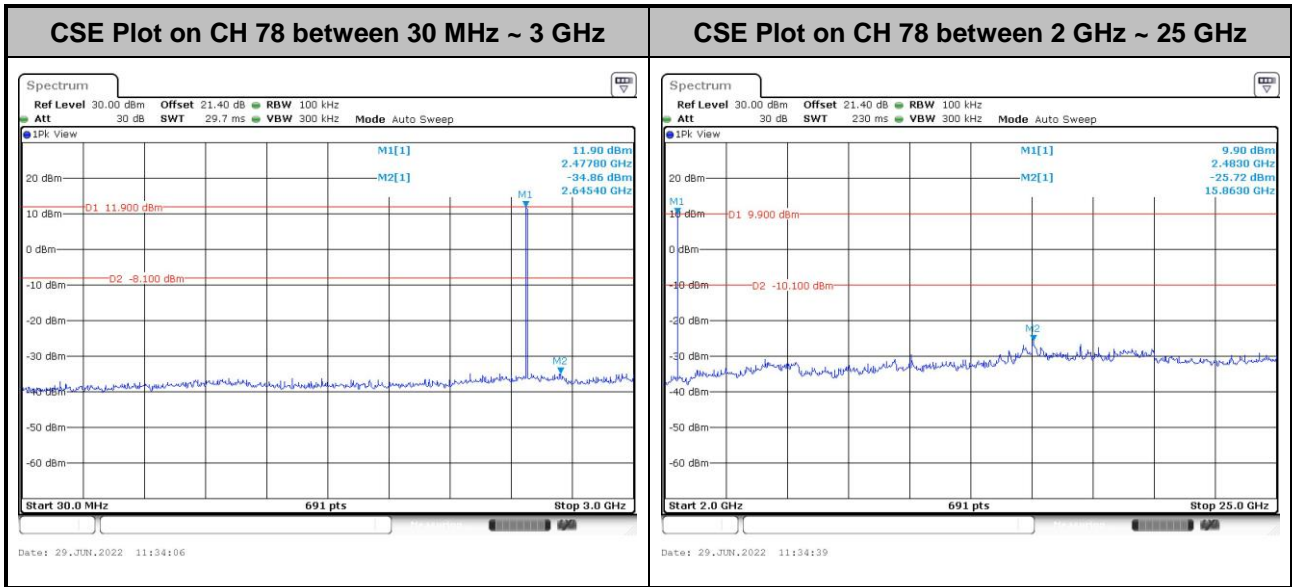






<3Mbps>







### 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.



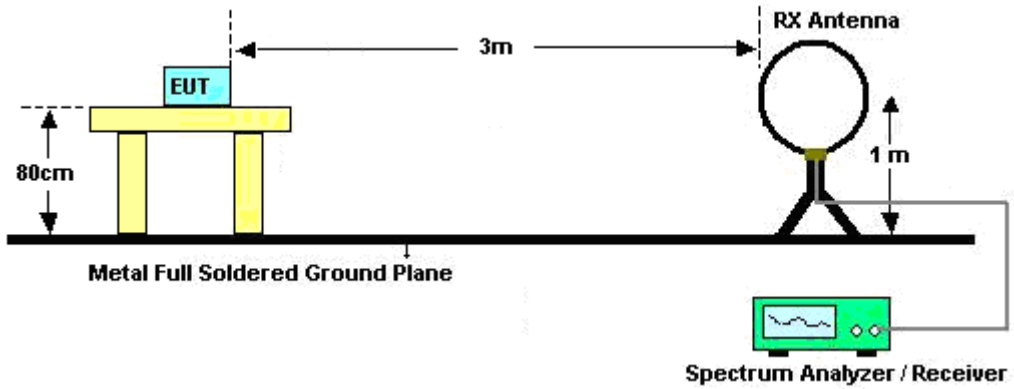
### 3.8.3 Test Procedures

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: 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)
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 “-”.

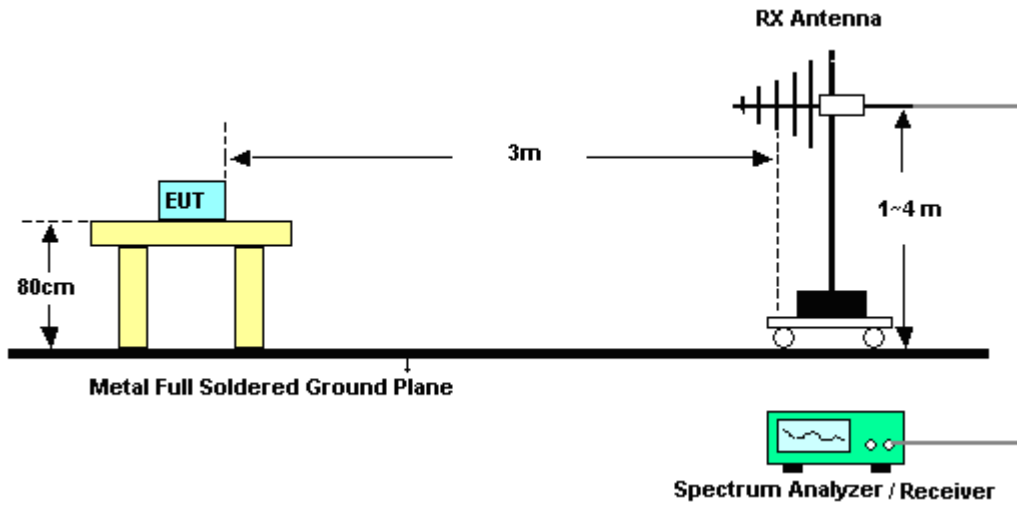
Note: The average levels are calculated from the peak level corrected with duty cycle correction factor (-24.79dB) derived from  $20 \log$  (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

### 3.8.4 Test Setup

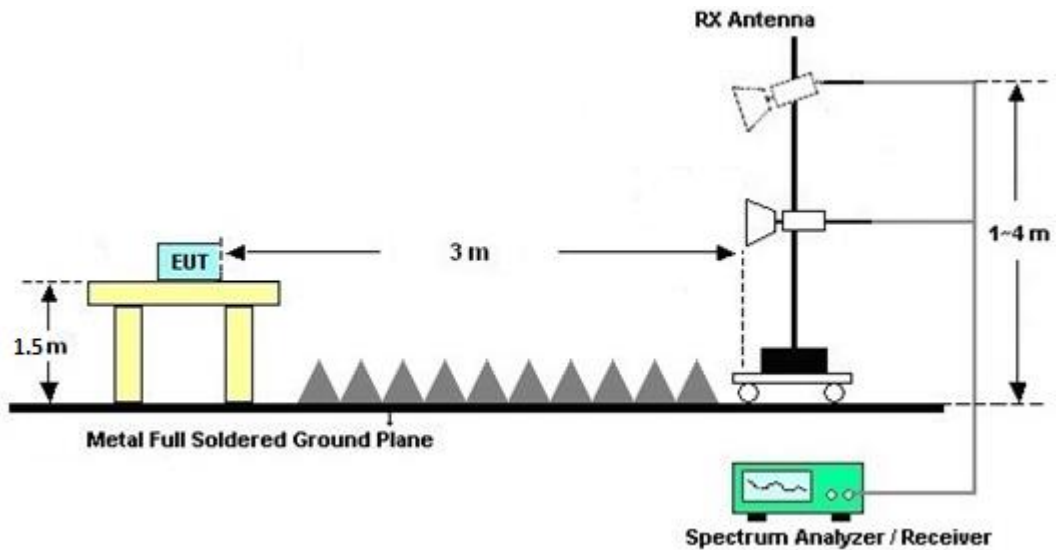
For radiated test below 30MHz



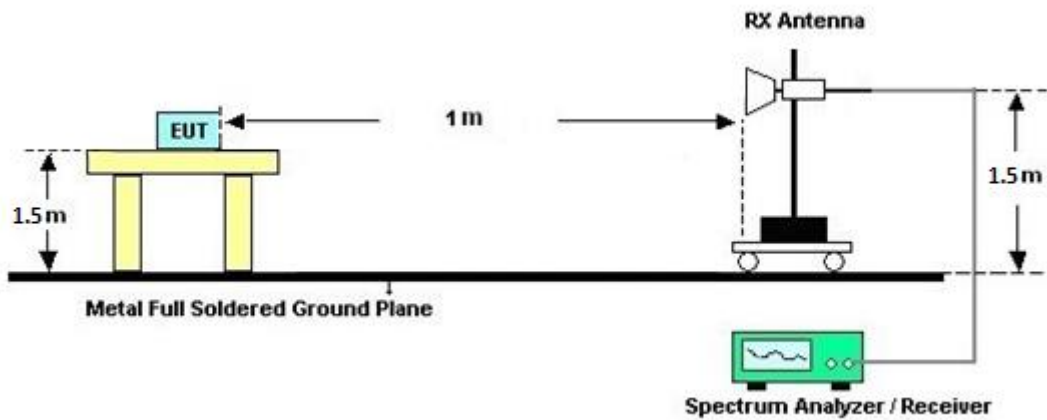
For radiated test from 30MHz to 1GHz



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 ~ 10<sup>th</sup> 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 $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

#### 3.9.2 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	100488	9 kHz~30 MHz	May 13, 2022	Jun. 21, 2022~ Jul. 14, 2022	May 12, 2023	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 09, 2021	Jun. 21, 2022~ Jul. 14, 2022	Oct. 08, 2022	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1212	1GHz ~ 18GHz	Mar. 10, 2022	Jun. 21, 2022~ Jul. 14, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA9170	00993	18GHz~40GHz	Nov. 30, 2021	Jun. 21, 2022~ Jul. 14, 2022	Nov. 29, 2022	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 10, 2021	Jun. 21, 2022~ Jul. 14, 2022	Dec. 09, 2022	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2021	Jun. 21, 2022~ Jul. 14, 2022	Nov. 09, 2022	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-30 3	17100018000 55007	1GHz~18GHz	Jun. 15, 2022	Jun. 21, 2022~ Jul. 14, 2022	Jun. 14, 2023	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 24, 2021	Jun. 21, 2022~ Jul. 14, 2022	Dec. 23, 2022	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 15, 2021	Jun. 21, 2022~ Jul. 14, 2022	Oct. 14, 2022	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY55420170	20MHz~8.4GHz	Jul. 15, 2021	Jun. 21, 2022~ Jul. 13, 2022	Jul. 14, 2022	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY57290111	20MHz~8.4GHz	Dec. 15, 2021	Jul. 14, 2022	Dec. 14, 2022	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jun. 21, 2022~ Jul. 14, 2022	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jun. 21, 2022~ Jul. 14, 2022	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jun. 21, 2022~ Jul. 14, 2022	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Jun. 21, 2022~ Jul. 14, 2022	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 10, 2022	Jun. 21, 2022~ Jul. 14, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 10, 2022	Jun. 21, 2022~ Jul. 14, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30MHz-18GHz	Mar. 10, 2022	Jun. 21, 2022~ Jul. 14, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	811852/4	30MHz-18GHz	Mar. 10, 2022	Jun. 21, 2022~ Jul. 14, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-15 30-8000-40SS	SN11	1.53G Low Pass	Sep. 13, 2021	Jun. 21, 2022~ Jul. 14, 2022	Sep. 12, 2022	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 0SS	SN3	3GHz High Pass Filter	Sep. 13, 2021	Jun. 21, 2022~ Jul. 14, 2022	Sep. 12, 2022	Radiation (03CH11-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Filter	Wainwright	WHKX8-5872.5-6750-18000-40SS	SN3	6.75GHz High Pass Filter	Sep. 13, 2021	Jun. 21, 2022~Jul. 14, 2022	Sep. 12, 2022	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-900-1000-15000-60SS	SN12	1GHz High Pass Filter	Nov. 04, 2021	Jun. 21, 2022~Jul. 14, 2022	Nov. 03, 2022	Radiation (03CH11-HY)
Hygrometer	TECEPEL	DTM-303B	TP140325	N/A	Nov. 26, 2021	Jun. 21, 2022~Jul. 14, 2022	Nov. 25, 2022	Radiation (03CH11-HY)
Hygrometer	TECEPEL	DTM-303B	TP200880	N/A	Sep. 30, 2021	Jun. 21, 2022~Jul. 14, 2022	Sep. 29, 2022	Radiation (03CH11-HY)
Hygrometer	TECEPEL	DTM-303A	TP201996	N/A	Nov. 16, 2021	May 27, 2022~Jun. 29, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO10 (NO:131)	10MHz~6GHz	Dec. 16, 2021	May 27, 2022~Jun. 29, 2022	Dec. 15, 2022	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	932001	N/A	Sep. 30, 2021	May 27, 2022	Sep. 29, 2022	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	846202	300MHz~40GHz	Sep. 30, 2021	May 27, 2022	Sep. 29, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	May 27, 2022~Jun. 29, 2022	Aug. 29, 2022	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	May 29, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	May 29, 2022	Nov. 30, 2022	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2021	May 29, 2022	Nov. 16, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 03, 2021	May 29, 2022	Dec. 02, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	May 29, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Jul. 28, 2021	May 29, 2022	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	May 29, 2022	Dec. 29, 2022	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
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

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

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

Test Engineer:	Ching Chen	Temperature:	21~25	°C
Test Date:	2022/5/27-2022/6/29	Relative Humidity:	51~54	%

<Ant. 7>

<b>TEST RESULTS DATA</b>									
<b>20dB and 99% Occupied Bandwidth and Hopping Channel Separation</b>									
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	0.877	0.805	1.003	0.5847	Pass
DH	1Mbps	1	39	2441	0.877	0.805	1.003	0.5847	Pass
DH	1Mbps	1	78	2480	0.877	0.805	0.999	0.5847	Pass
2DH	2Mbps	1	0	2402	1.268	1.166	1.003	0.8451	Pass
2DH	2Mbps	1	39	2441	1.268	1.166	0.999	0.8451	Pass
2DH	2Mbps	1	78	2480	1.263	1.166	1.003	0.8423	Pass
3DH	3Mbps	1	0	2402	1.255	1.149	1.003	0.8365	Pass
3DH	3Mbps	1	39	2441	1.255	1.149	0.999	0.8365	Pass
3DH	3Mbps	1	78	2480	1.255	1.149	1.003	0.8365	Pass

<b>TEST RESULTS DATA</b>						
<b>Dwell Time</b>						
Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time (hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH5	79	106.670	2.88	0.31	0.4	Pass
DH5 (AFH)	20	53.330	2.88	0.15	0.4	Pass

<b>TEST RESULTS DATA</b>					
<b>Peak Power Table</b>					
DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
DH1	0	1	15.77	30.00	Pass
	39	1	16.50	30.00	Pass
	78	1	16.38	30.00	Pass
2DH1	0	1	15.09	20.97	Pass
	39	1	15.95	20.97	Pass
	78	1	15.62	20.97	Pass
3DH1	0	1	15.53	20.97	Pass
	39	1	16.59	20.97	Pass
	78	1	16.13	20.97	Pass

<b>TEST RESULTS DATA</b>				
<b>Average Power Table</b>				
<b>(Reporting Only)</b>				
DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)
DH1	0	1	15.59	5.22
	39	1	16.31	5.22
	78	1	16.16	5.22
2DH1	0	1	12.67	5.12
	39	1	13.51	5.12
	78	1	13.27	5.12
3DH1	0	1	12.63	5.15
	39	1	13.70	5.15
	78	1	13.27	5.15

<b>TEST RESULTS DATA</b>			
<b>Number of Hopping Frequency</b>			
Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

<Ant. 8>

<b>TEST RESULTS DATA</b>									
<b>20dB and 99% Occupied Bandwidth and Hopping Channel Separation</b>									
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	0.877	0.805	0.999	0.5847	Pass
DH	1Mbps	1	39	2441	0.877	0.805	1.003	0.5847	Pass
DH	1Mbps	1	78	2480	0.874	0.805	1.007	0.5827	Pass
2DH	2Mbps	1	0	2402	1.263	1.166	1.003	0.8423	Pass
2DH	2Mbps	1	39	2441	1.263	1.166	1.007	0.8423	Pass
2DH	2Mbps	1	78	2480	1.263	1.166	0.999	0.8423	Pass
3DH	3Mbps	1	0	2402	1.250	1.152	1.007	0.8336	Pass
3DH	3Mbps	1	39	2441	1.255	1.152	1.003	0.8365	Pass
3DH	3Mbps	1	78	2480	1.255	1.149	0.999	0.8365	Pass

<b>TEST RESULTS DATA</b>						
<b>Dwell Time</b>						
Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time (hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH5	79	106.670	2.88	0.31	0.4	Pass
DH5 (AFH)	20	53.330	2.88	0.15	0.4	Pass

<b>TEST RESULTS DATA</b>					
<b>Peak Power Table</b>					
DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
DH1	0	1	14.77	30.00	Pass
	39	1	16.87	30.00	Pass
	78	1	15.41	30.00	Pass
2DH1	0	1	14.20	20.97	Pass
	39	1	15.74	20.97	Pass
	78	1	14.59	20.97	Pass
3DH1	0	1	14.72	20.97	Pass
	39	1	16.13	20.97	Pass
	78	1	15.09	20.97	Pass

<b>TEST RESULTS DATA</b>				
<b>Average Power Table (Reporting Only)</b>				
DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)
DH1	0	1	14.63	5.22
	39	1	16.68	5.22
	78	1	15.24	5.22
2DH1	0	1	11.80	5.12
	39	1	13.30	5.12
	78	1	12.15	5.12
3DH1	0	1	11.88	5.15
	39	1	13.21	5.15
	78	1	12.15	5.15

<b>TEST RESULTS DATA</b>			
<b>Number of Hopping Frequency</b>			
Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass





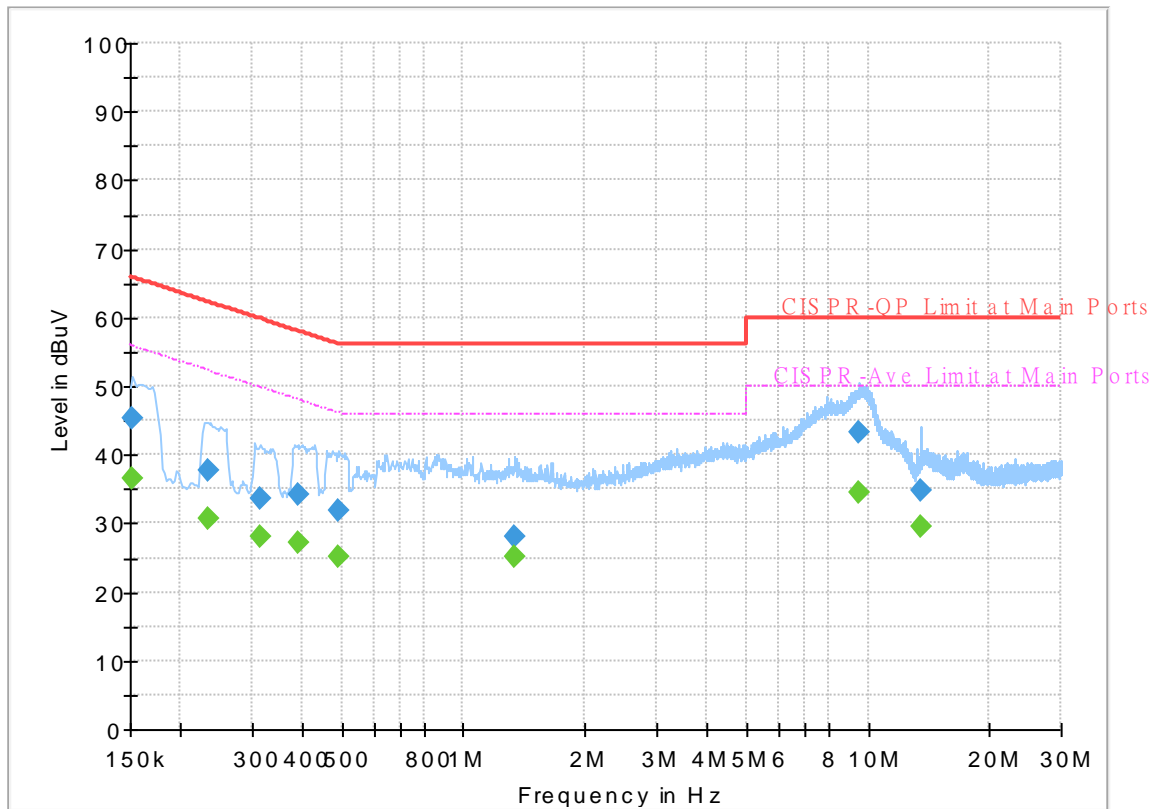
## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Howard Huang	Temperature :	23~26°C
		Relative Humidity :	45~55%

## EUT Information

Report NO : 210409  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

Full Spectrum



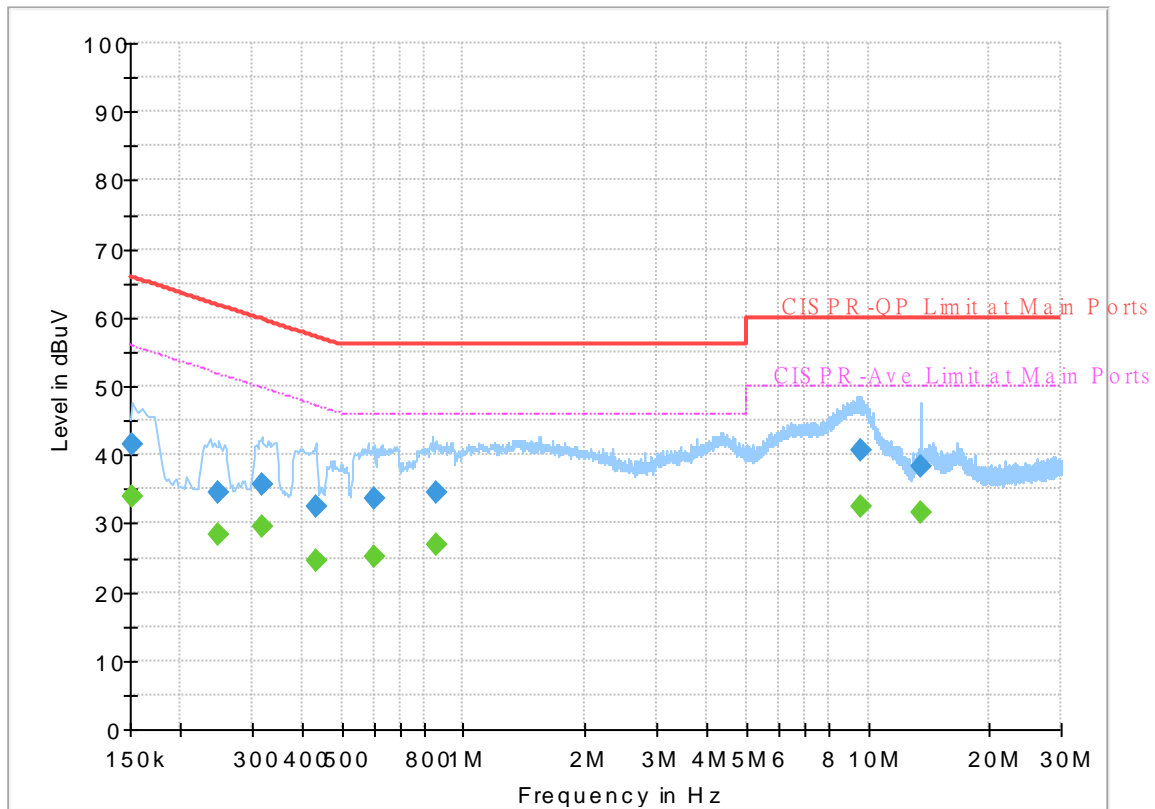
## Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	36.49	55.88	19.39	L1	OFF	19.6
0.152250	45.29	---	65.88	20.59	L1	OFF	19.6
0.233250	---	30.59	52.33	21.74	L1	OFF	19.6
0.233250	37.82	---	62.33	24.51	L1	OFF	19.6
0.314250	---	28.09	49.86	21.77	L1	OFF	19.6
0.314250	33.48	---	59.86	26.38	L1	OFF	19.6
0.388500	---	27.14	48.10	20.96	L1	OFF	19.6
0.388500	34.24	---	58.10	23.86	L1	OFF	19.6
0.492000	---	25.14	46.13	20.99	L1	OFF	19.6
0.492000	31.77	---	56.13	24.36	L1	OFF	19.6
1.338000	---	25.07	46.00	20.93	L1	OFF	19.7
1.338000	28.11	---	56.00	27.89	L1	OFF	19.7
9.543750	---	34.63	50.00	15.37	L1	OFF	20.0
9.543750	43.35	---	60.00	16.65	L1	OFF	20.0
13.560000	---	29.44	50.00	20.56	L1	OFF	20.2
13.560000	34.77	---	60.00	25.23	L1	OFF	20.2

## EUT Information

Report NO : 210409  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Neutral

Full Spectrum



## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	33.83	55.88	22.05	N	OFF	19.6
0.152250	41.64	---	65.88	24.24	N	OFF	19.6
0.249000	---	28.29	51.79	23.50	N	OFF	19.6
0.249000	34.39	---	61.79	27.40	N	OFF	19.6
0.316500	---	29.54	49.80	20.26	N	OFF	19.6
0.316500	35.65	---	59.80	24.15	N	OFF	19.6
0.431250	---	24.65	47.23	22.58	N	OFF	19.6
0.431250	32.52	---	57.23	24.71	N	OFF	19.6
0.600000	---	25.12	46.00	20.88	N	OFF	19.6
0.600000	33.57	---	56.00	22.43	N	OFF	19.6
0.854250	---	26.77	46.00	19.23	N	OFF	19.6
0.854250	34.39	---	56.00	21.61	N	OFF	19.6
9.642750	---	32.51	50.00	17.49	N	OFF	20.1
9.642750	40.63	---	60.00	19.37	N	OFF	20.1
13.560000	---	31.56	50.00	18.44	N	OFF	20.2
13.560000	38.43	---	60.00	21.57	N	OFF	20.2



### Appendix C. Radiated Spurious Emission

Test Engineer :	Daniel Lee, Fu Chen and Troye Hsieh	Temperature :	20.1~21.6°C
		Relative Humidity :	56.5~66.9%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
7		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
BT CH00 2402MHz		2361.135	42.97	-31.03	74	42.27	27.34	7.32	33.96	100	88	P	H	
		2361.135	18.18	-35.82	54	-	-	-	-	-	-	A	H	
	*	2402	107.19	-	-	106.26	27.51	7.37	33.95	100	88	P	H	
	*	2402	82.4	-	-	-	-	-	-	-	-	A	H	
													H	
														H
			2333.415	42.53	-31.47	74	41.91	27.3	7.28	33.96	400	257	P	V
			2333.415	17.74	-36.26	54	-	-	-	-	-	-	A	V
	*		2402	100.97	-	-	100.04	27.51	7.37	33.95	400	257	P	V
	*		2402	76.18	-	-	-	-	-	-	-	-	A	V
														V
														V
BT CH 39 2441MHz		2353.54	43.32	-30.68	74	42.66	27.31	7.31	33.96	100	86	P	H	
		2353.54	18.53	-35.47	54	-	-	-	-	-	-	A	H	
	*	2441	109.52	-	-	108.37	27.66	7.43	33.94	100	86	P	H	
	*	2441	84.73	-	-	-	-	-	-	-	-	A	H	
			2496.5	44.23	-29.77	74	42.85	27.79	7.51	33.92	100	86	P	H
			2496.5	19.44	-34.56	54	-	-	-	-	-	-	A	H
			2384.34	43.04	-30.96	74	42.2	27.44	7.35	33.95	400	143	P	V
			2384.34	18.25	-35.75	54	-	-	-	-	-	-	A	V
	*		2441	103.24	-	-	102.09	27.66	7.43	33.94	400	143	P	V
	*		2441	78.45	-	-	-	-	-	-	-	-	A	V
			2484.39	43.68	-30.32	74	42.33	27.77	7.5	33.92	400	143	P	V
			2484.39	18.89	-35.11	54	-	-	-	-	-	-	A	V



<b>BT CH 78 2480MHz</b>	*	2480	108.6	-	-	107.28	27.76	7.49	33.93	100	86	P	H
	*	2480	83.81	-	-	-	-	-	-	-	-	A	H
		2483.56	51.73	-22.27	74	50.38	27.77	7.5	33.92	100	86	P	H
		2483.56	26.94	-27.06	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	101.27	-	-	99.95	27.76	7.49	33.93	400	243	P	V
	*	2480	76.48	-	-	-	-	-	-	-	-	A	V
		2483.6	45.65	-28.35	74	44.3	27.77	7.5	33.92	400	243	P	V
		2483.6	20.86	-33.14	54	-	-	-	-	-	-	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BT Ant. 7	Note	Frequency ( MHz )	Level ( dBμV/m )	Margin ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		4804	39.1	-34.9	74	53.42	32.22	11.4	57.94	-	-	P	H
		4804	14.31	-39.69	54	-	-	-	-	-	-	A	H
		12135	47.56	-26.44	74	53.21	39.2	17.94	62.79	-	-	P	H
		12135	22.77	-31.23	54	-	-	-	-	-	-	A	H
		14505	48.23	-25.77	74	49.25	40.59	20.85	62.46	-	-	P	H
		14505	23.44	-30.56	54	-	-	-	-	-	-	A	H
		17895	50	-24	74	41.51	41.83	22.94	56.28	-	-	P	H
		17895	25.21	-28.79	54	-	-	-	-	-	-	A	H
													H
													H
													H
													H
BT CH 00 2402MHz		4804	39.69	-34.31	74	54.01	32.22	11.4	57.94	-	-	P	V
		4804	14.9	-39.1	54	-	-	-	-	-	-	A	V
		11070	48.89	-25.11	74	53.78	38.9	17.44	61.23	-	-	P	V
		11070	24.1	-29.9	54	-	-	-	-	-	-	A	V
		14505	48.34	-25.66	74	49.36	40.59	20.85	62.46	-	-	P	V
		14505	23.55	-30.45	54	-	-	-	-	-	-	A	V
		17925	49.96	-24.04	74	41.13	42.08	22.97	56.22	-	-	P	V
		17925	25.17	-28.83	54	-	-	-	-	-	-	A	V
													V
													V
													V
													V



BT Ant. 7	Note	Frequency ( MHz )	Level ( dBμV/m )	Margin ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		4882	40.68	-33.32	74	54.4	32.63	11.65	58	-	-	P	H
		4882	15.89	-38.11	54	-	-	-	-	-	-	A	H
		7323	42.47	-31.53	74	50.74	37.01	13.45	58.73	-	-	P	H
		7323	17.68	-36.32	54	-	-	-	-	-	-	A	H
		11430	47.49	-26.51	74	52.39	39.1	17.58	61.58	-	-	P	H
		11430	22.7	-31.3	54	-	-	-	-	-	-	A	H
		14490	48.52	-25.48	74	49.57	40.59	20.83	62.47	-	-	P	H
		14490	23.73	-30.27	54	-	-	-	-	-	-	A	H
		18000	50.63	-23.37	74	41.07	42.6	23.04	56.08	-	-	P	H
		18000	25.84	-28.16	54	-	-	-	-	-	-	A	H
													H
													H
<b>BT CH 39 2441MHz</b>		4882	41.04	-32.96	74	54.76	32.63	11.65	58	-	-	P	V
		4882	16.25	-37.75	54	-	-	-	-	-	-	A	V
		7323	42.75	-31.25	74	51.02	37.01	13.45	58.73	-	-	P	V
		7323	17.96	-36.04	54	-	-	-	-	-	-	A	V
		12585	47.44	-26.56	74	52.79	39.46	18.43	63.24	-	-	P	V
		12585	22.65	-31.35	54	-	-	-	-	-	-	A	V
		14490	49.01	-24.99	74	50.06	40.59	20.83	62.47	-	-	P	V
		14490	24.22	-29.78	54	-	-	-	-	-	-	A	V
		17925	49.51	-24.49	74	40.68	42.08	22.97	56.22	-	-	P	V
		17925	24.72	-29.28	54	-	-	-	-	-	-	A	V
													V
													V



BT Ant. 7	Note	Frequency ( MHz )	Level ( dBμV/m )	Margin ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		4960	41.03	-32.97	74	54.18	33.02	11.89	58.06	-	-	P	H
		4960	16.24	-37.76	54	-	-	-	-	-	-	A	H
		7440	41.59	-32.41	74	50.11	36.44	13.75	58.71	-	-	P	H
		7440	16.8	-37.2	54	-	-	-	-	-	-	A	H
		11235	47.39	-26.61	74	52.15	39.13	17.5	61.39	-	-	P	H
		11235	22.6	-31.4	54	-	-	-	-	-	-	A	H
		14475	48.51	-25.49	74	49.63	40.57	20.81	62.5	-	-	P	H
		14475	23.72	-30.28	54	-	-	-	-	-	-	A	H
		17925	49.7	-24.3	74	40.87	42.08	22.97	56.22	-	-	P	H
		17925	24.91	-29.09	54	-	-	-	-	-	-	A	H
													H
													H
<b>BT CH 78 2480MHz</b>		4960	41.68	-32.32	74	54.83	33.02	11.89	58.06	-	-	P	V
		4960	16.89	-37.11	54	-	-	-	-	-	-	A	V
		7440	41.06	-32.94	74	49.58	36.44	13.75	58.71	-	-	P	V
		7440	16.27	-37.73	54	-	-	-	-	-	-	A	V
		11175	47.93	-26.07	74	52.73	39.05	17.48	61.33	-	-	P	V
		11175	23.14	-30.86	54	-	-	-	-	-	-	A	V
		14490	48.79	-25.21	74	49.84	40.59	20.83	62.47	-	-	P	V
		14490	24	-30	54	-	-	-	-	-	-	A	V
		17940	49.3	-24.7	74	40.33	42.18	22.99	56.2	-	-	P	V
		17940	24.51	-29.49	54	-	-	-	-	-	-	A	V
													V
													V
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> <li>The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.</li> <li>The emission level close to 18GHz is checked that the average emission level is noise floor only.</li> </ol>												





Emission above 18GHz

2.4GHz BT (SHF)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
7		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT SHF		23352	38.04	-35.96	74	56.32	38.86	-3.05	54.09	-	-	P	H	
		24920	37.98	-36.02	74	54.8	39.14	-2.81	53.15	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			23528	38.11	-35.89	74	56.29	38.8	-2.99	53.99	-	-	P	V
			25608	38.66	-35.34	74	55.59	38.9	-2.73	53.1	-	-	P	V
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.													



Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
7		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT LF		30	24.43	-15.57	40	31.57	24.27	0.95	32.36	-	-	P	H	
		103.72	24.93	-18.57	43.5	39.54	16.2	1.58	32.39	-	-	P	H	
		172.59	23.04	-20.46	43.5	38.33	15.17	2.03	32.49	-	-	P	H	
		798.24	29.39	-16.61	46	28.69	28.11	4.35	31.76	-	-	P	H	
		858.38	30.6	-15.4	46	28.39	29.14	4.52	31.45	-	-	P	H	
		966.05	31.5	-22.5	54	26.46	31.01	4.82	30.79	-	-	P	H	
														H
														H
														H
														H
														H
														H
														H
			40.67	31.77	-8.23	40	44.4	18.89	0.91	32.43	-	-	P	V
			73.65	23.77	-16.23	40	42.49	12.42	1.3	32.44	-	-	P	V
			166.77	23.37	-20.13	43.5	38.25	15.61	1.99	32.48	-	-	P	V
			782.72	28.13	-17.87	46	27.66	28.03	4.3	31.86	-	-	P	V
			860.32	29.97	-16.03	46	27.73	29.15	4.53	31.44	-	-	P	V
			970.9	32.21	-21.79	54	27.19	30.93	4.84	30.75	-	-	P	V
														V
													V	
													V	
													V	
													V	
													V	

**Remark**

- No other spurious found.
- All results are PASS against limit line.
- The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.



2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
8		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)	
BT CH00 2402MHz		2355.885	42.64	-31.36	74	41.97	27.32	7.31	33.96	100	86	P	H	
		2355.885	17.85	-36.15	54	-	-	-	-	-	-	A	H	
	*	2402	99.98	-	-	99.05	27.51	7.37	33.95	100	86	P	H	
	*	2402	75.19	-	-	-	-	-	-	-	-	A	H	
													H	
														H
			2389.905	45.19	-28.81	74	44.32	27.46	7.36	33.95	400	121	P	V
			2389.905	20.4	-33.6	54	-	-	-	-	-	-	A	V
	*		2402	94.23	-	-	93.3	27.51	7.37	33.95	400	121	P	V
	*		2402	69.44	-	-	-	-	-	-	-	-	A	V
														V
														V
BT CH 39 2441MHz		2374.26	44.15	-29.85	74	43.36	27.4	7.34	33.95	100	84	P	H	
		2374.26	19.36	-34.64	54	-	-	-	-	-	-	A	H	
	*	2441	101.66	-	-	100.51	27.66	7.43	33.94	100	84	P	H	
	*	2441	76.87	-	-	-	-	-	-	-	-	A	H	
			2487.54	43.42	-30.58	74	42.06	27.78	7.5	33.92	100	84	P	H
			2487.54	18.63	-35.37	54	-	-	-	-	-	-	A	H
			2388.82	43.32	-30.68	74	42.45	27.46	7.36	33.95	400	227	P	V
			2388.82	18.53	-35.47	54	-	-	-	-	-	-	A	V
	*		2441	95.75	-	-	94.6	27.66	7.43	33.94	400	227	P	V
	*		2441	70.96	-	-	-	-	-	-	-	-	A	V
			2489.08	44.13	-29.87	74	42.77	27.78	7.5	33.92	400	227	P	V
			2489.08	19.34	-34.66	54	-	-	-	-	-	-	A	V



<b>BT CH 78 2480MHz</b>	*	2480	100.49	-	-	99.17	27.76	7.49	33.93	100	81	P	H
	*	2480	75.7	-	-	-	-	-	-	-	-	A	H
		2483.76	44.89	-29.11	74	43.54	27.77	7.5	33.92	100	81	P	H
		2483.76	20.1	-33.9	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	93.66	-	-	92.34	27.76	7.49	33.93	300	140	P	V
	*	2480	68.87	-	-	-	-	-	-	-	-	A	V
		2487.92	43.64	-30.36	74	42.28	27.78	7.5	33.92	300	140	P	V
		2487.92	18.85	-35.15	54	-	-	-	-	-	-	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BT Ant. 8	Note	Frequency ( MHz )	Level ( dBμV/m )	Margin ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		4804	38.68	-35.32	74	53	32.22	11.4	57.94	-	-	P	H
		4804	13.89	-40.11	54	-	-	-	-	-	-	A	H
		11235	48.51	-25.49	74	53.27	39.13	17.5	61.39	-	-	P	H
		11235	23.72	-30.28	54	-	-	-	-	-	-	A	H
		14475	48.5	-25.5	74	49.62	40.57	20.81	62.5	-	-	P	H
		14475	23.71	-30.29	54	-	-	-	-	-	-	A	H
		17940	49.61	-24.39	74	40.64	42.18	22.99	56.2	-	-	P	H
		17940	24.82	-29.18	54	-	-	-	-	-	-	A	H
													H
													H
													H
													H
BT CH 00 2402MHz		4804	42.02	-31.98	74	56.34	32.22	11.4	57.94	-	-	P	V
		4804	17.23	-36.77	54	-	-	-	-	-	-	A	V
		12180	46.87	-27.13	74	52.55	39.2	17.99	62.87	-	-	P	V
		12180	22.08	-31.92	54	-	-	-	-	-	-	A	V
		14505	48.59	-25.41	74	49.61	40.59	20.85	62.46	-	-	P	V
		14505	23.8	-30.2	54	-	-	-	-	-	-	A	V
		17925	50.11	-23.89	74	41.28	42.08	22.97	56.22	-	-	P	V
		17925	25.32	-28.68	54	-	-	-	-	-	-	A	V
													V
													V
													V
													V



BT Ant. 8	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( dB )	Limit Line ( dBµV/m )	Read Level ( dBµV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		4882	40.3	-33.7	74	54.02	32.63	11.65	58	-	-	P	H
		4882	15.51	-38.49	54	-	-	-	-	-	-	A	H
		7323	42.82	-31.18	74	51.09	37.01	13.45	58.73	-	-	P	H
		7323	18.03	-35.97	54	-	-	-	-	-	-	A	H
		12660	47.6	-26.4	74	52.64	39.56	18.5	63.1	-	-	P	H
		12660	22.81	-31.19	54	-	-	-	-	-	-	A	H
		14475	48.13	-25.87	74	49.25	40.57	20.81	62.5	-	-	P	H
		14475	23.34	-30.66	54	-	-	-	-	-	-	A	H
		17985	49.52	-24.48	74	40.11	42.49	23.03	56.11	-	-	P	H
		17985	24.73	-29.27	54	-	-	-	-	-	-	A	H
													H
													H
BT CH 39 2441MHz		4882	40.21	-33.79	74	53.93	32.63	11.65	58	-	-	P	V
		4882	15.42	-38.58	54	-	-	-	-	-	-	A	V
		7323	42.28	-31.72	74	50.55	37.01	13.45	58.73	-	-	P	V
		7323	17.49	-36.51	54	-	-	-	-	-	-	A	V
		11460	47.07	-26.93	74	51.99	39.1	17.59	61.61	-	-	P	V
		11460	22.28	-31.72	54	-	-	-	-	-	-	A	V
		14490	48.65	-25.35	74	49.7	40.59	20.83	62.47	-	-	P	V
		14490	23.86	-30.14	54	-	-	-	-	-	-	A	V
		18000	49.89	-24.11	74	40.33	42.6	23.04	56.08	-	-	P	V
		18000	25.1	-28.9	54	-	-	-	-	-	-	A	V
													V
													V



BT Ant. 8	Note	Frequency ( MHz )	Level ( dBµV/m )	Margin ( dB )	Limit Line ( dBµV/m )	Read Level ( dBµV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		4960	40.87	-33.13	74	54.02	33.02	11.89	58.06	-	-	P	H
		4960	16.08	-37.92	54	-	-	-	-	-	-	A	H
		7440	41.59	-32.41	74	50.11	36.44	13.75	58.71	-	-	P	H
		7440	16.8	-37.2	54	-	-	-	-	-	-	A	H
		12660	47.64	-26.36	74	52.68	39.56	18.5	63.1	-	-	P	H
		12660	22.85	-31.15	54	-	-	-	-	-	-	A	H
		14475	48.57	-25.43	74	49.69	40.57	20.81	62.5	-	-	P	H
		14475	23.78	-30.22	54	-	-	-	-	-	-	A	H
		17895	49.73	-24.27	74	41.24	41.83	22.94	56.28	-	-	P	H
		17895	24.94	-29.06	54	-	-	-	-	-	-	A	H
													H
													H
BT CH 78 2480MHz		4960	42.13	-31.87	74	55.28	33.02	11.89	58.06	-	-	P	V
		4960	17.34	-36.66	54	-	-	-	-	-	-	A	V
		7440	42.83	-31.17	74	51.35	36.44	13.75	58.71	-	-	P	V
		7440	18.04	-35.96	54	-	-	-	-	-	-	A	V
		11070	47.87	-26.13	74	52.76	38.9	17.44	61.23	-	-	P	V
		11070	23.08	-30.92	54	-	-	-	-	-	-	A	V
		14505	49.49	-24.51	74	50.51	40.59	20.85	62.46	-	-	P	V
		14505	24.7	-29.3	54	-	-	-	-	-	-	A	V
		17955	49.89	-24.11	74	40.78	42.28	23	56.17	-	-	P	V
		17955	25.1	-28.9	54	-	-	-	-	-	-	A	V
													V
													V

**Remark**

- No other spurious found.
- All results are PASS against Peak and Average limit line.
- The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.
- The emission level close to 18GHz is checked that the average emission level is noise floor only.



Emission above 18GHz

2.4GHz BT (SHF)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
8		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT SHF		23744	37.85	-36.15	74	55.88	38.8	-2.93	53.9	-	-	P	H	
		25672	38.39	-35.61	74	55.31	38.9	-2.72	53.1	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			22664	37.46	-36.54	74	56.77	38.43	-3.24	54.5	-	-	P	V
			24976	38.76	-35.24	74	55.49	39.18	-2.8	53.11	-	-	P	V
														V
														V
														V
														V
														V
														V
														V
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.													





Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
8		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT LF		30	22.48	-17.52	40	29.62	24.27	0.95	32.36	-	-	P	H	
		103.72	24.69	-18.81	43.5	39.3	16.2	1.58	32.39	-	-	P	H	
		178.41	21.52	-21.98	43.5	37.16	14.79	2.07	32.5	-	-	P	H	
		823.46	28.84	-17.16	46	28.08	27.98	4.41	31.63	-	-	P	H	
		864.2	29.92	-16.08	46	27.65	29.15	4.54	31.42	-	-	P	H	
		966.05	32.11	-21.89	54	27.07	31.01	4.82	30.79	-	-	P	H	
														H
														H
														H
														H
														H
														H
			41.64	32.39	-7.61	40	45.53	18.37	0.93	32.44	-	-	P	V
			109.54	20.74	-22.76	43.5	34.99	16.51	1.63	32.39	-	-	P	V
			166.77	22.3	-21.2	43.5	37.18	15.61	1.99	32.48	-	-	P	V
			881.66	29.83	-16.17	46	27.64	28.92	4.6	31.33	-	-	P	V
			958.29	30.92	-15.08	46	26.13	30.82	4.81	30.84	-	-	P	V
			976.72	32.29	-21.71	54	27.42	30.74	4.85	30.72	-	-	P	V
														V
														V
													V	
													V	
													V	
													V	

**Remark**

- No other spurious found.
- All results are PASS against limit line.
- The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.



**Note symbol**

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



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

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
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. 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)

**Peak measured complies with the limit line, so test result is “PASS”.**



## Appendix D. Radiated Spurious Emission Plots

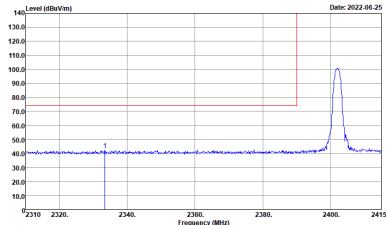
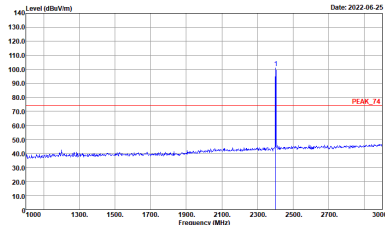
Test Engineer :	Daniel Lee, Fu Chen and Troye Hsieh	Temperature :	20.1~21.6°C
		Relative Humidity :	56.5~66.9%

### 2.4GHz 2400~2483.5MHz

#### BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
7	Horizontal	Fundamental
Peak	<p>Site : 08CHI-HY Condition : PEAK_96_74 3m 9120D_1212_220310 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 08CHI-HY Condition : PEAK_74 3m 9120D_1212_220310 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
7	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>

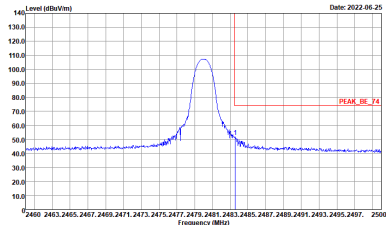
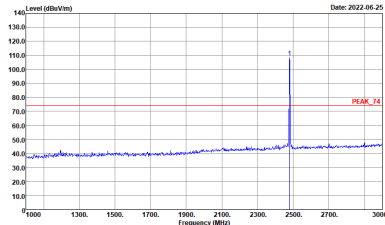


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
7	Horizontal	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank



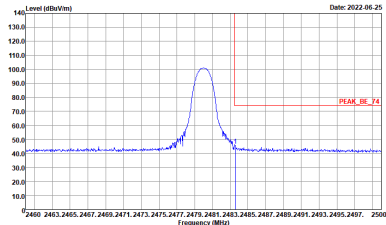
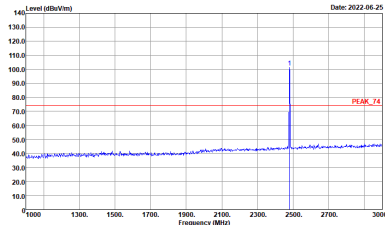
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
7	Vertical	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
7	Horizontal	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



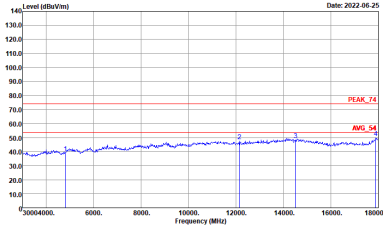
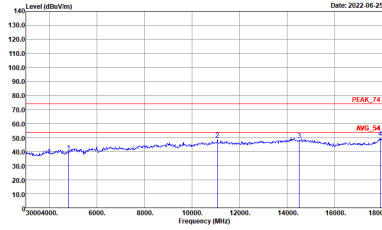


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
7	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL :RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 VERTICAL :RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
7	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH11-4Y Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL</p>	 <p>Site : 03CH11-4Y Condition : PEAK_74 3m 91200_1212_220310 VERTICAL</p>



<b>BT</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>BT CH39 2441MHz</b>	
<b>7</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b> <b>Avg.</b>	<p>Site: :03CH11-1F Condition: :PEAK_74 3m 91200_1212_220310 HORIZONTAL</p>	<p>Site: :03CH11-1F Condition: :PEAK_74 3m 91200_1212_220310 VERTICAL</p>



<b>BT</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>BT CH78 2480MHz</b>	
<b>7</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b> <b>Avg.</b>	<p>Site : :03CH11-1F Condition : :PEAK_74 3m 91200_1212_220310 HORIZONTAL</p>	<p>Site : :03CH11-1F Condition : :PEAK_74 3m 91200_1212_220310 VERTICAL</p>



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

BT	2.4GHz 2400~2483.5MHz	
ANT	BT SHF	
7	Horizontal	Vertical
Peak Avg.	<p>Site : :03C411-14Y Condition : :PEAK_74 1m SHF_00993_211130 HORIZONTAL</p>	<p>Site : :03C411-14Y Condition : :PEAK_74 1m SHF_00993_211130 VERTICAL</p>



Emission below 1GHz  
2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
7	Horizontal	Vertical
QP / Peak	<p>Site : 03CH11-HY Condition : QP 3m BU-LOG 35414-211009 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : QP 3m BU-LOG 35414-211009 VERTICAL</p>



2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
8	Horizontal	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 9120D_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9120D_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
8	Vertical	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



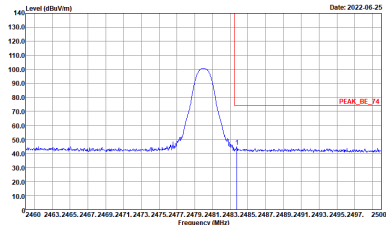
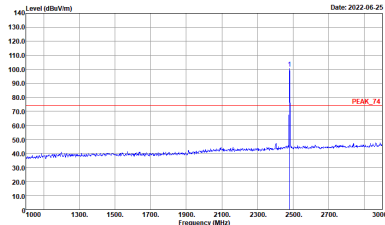


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
8	Horizontal	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	Left blank



<b>BT</b>	<b>2.4GHz 2400~2483.5MHz Band Edge @ 3m</b>	
<b>ANT</b>	<b>BT CH39 2441MHz</b>	
<b>8</b>	<b>Vertical</b>	<b>Fundamental</b>
<b>Peak</b>	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<b>Peak</b>	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<b>Left blank</b>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
8	Horizontal	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>

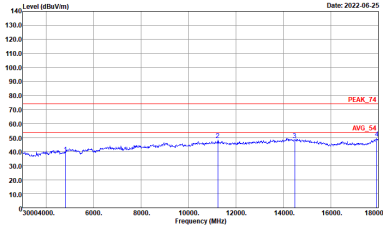
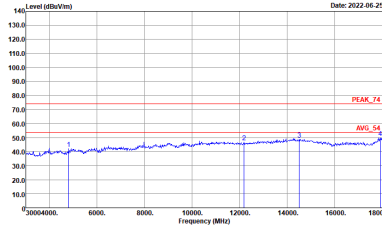


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
8	Vertical	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 91200_1212_220310 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
8	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH11-4Y Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL</p>	 <p>Site : 03CH11-4Y Condition : PEAK_74 3m 91200_1212_220310 VERTICAL</p>



<b>BT</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>BT CH39 2441MHz</b>	
<b>8</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak</b> <b>Avg.</b>	<p>Site : 03CH11-1F Condition : PEAK_74 3m 91200_1212_220310 HORIZONTAL</p>	<p>Site : 03CH11-1F Condition : PEAK_74 3m 91200_1212_220310 VERTICAL</p>



<b>BT</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>BT CH78 2480MHz</b>	
<b>8</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	<p>Horizontal spectrum plot showing Peak and Avg levels. The y-axis is Level (dBuV/m) from 0 to 140. The x-axis is Frequency (MHz) from 3000 to 18000. A blue line represents the average level (AVG_54) and a red line represents the peak level (PEAK_74). Both lines are relatively flat around 40-50 dBuV/m. Vertical blue lines are present at 91200, 1212, and 220310 MHz.</p>	<p>Vertical spectrum plot showing Peak and Avg levels. The y-axis is Level (dBuV/m) from 0 to 140. The x-axis is Frequency (MHz) from 3000 to 18000. A blue line represents the average level (AVG_54) and a red line represents the peak level (PEAK_74). Both lines are relatively flat around 40-50 dBuV/m. Vertical blue lines are present at 91200, 1212, and 220310 MHz.</p>



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

BT	2.4GHz 2400~2483.5MHz	
ANT	BT SHF	
8	Horizontal	Vertical
<b>Peak</b> <b>Avg.</b>	<p>Site : 03C-111-14Y Condition : PEAK_74 1m SHF_00993_211130 HORIZONTAL</p>	<p>Site : 03C-111-14Y Condition : PEAK_74 1m SHF_00993_211130 VERTICAL</p>





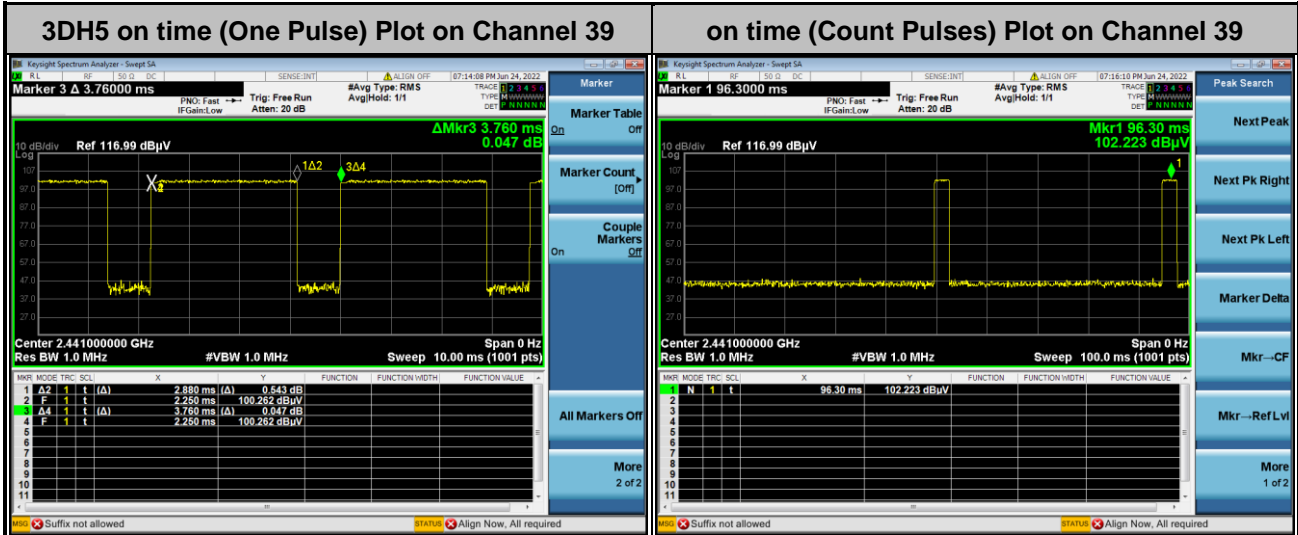
**Emission below 1GHz  
2.4GHz BT (LF)**

<b>BT</b>	<b>2.4GHz 2400~2483.5MHz</b>	
<b>ANT</b>	<b>BT LF</b>	
<b>8</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	<p>Site : 03CH11-HY Condition : QP 3m BT-LOG 35414-211009 HORIZONTAL</p>	<p>Site : 03CH11-HY Condition : QP 3m BT-LOG 35414-211009 VERTICAL</p>



# Appendix E. Duty Cycle Plots

<Ant. 7>



### 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(Duty cycle) = -24.79 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 ms / 57.6 ms] = 2 hops

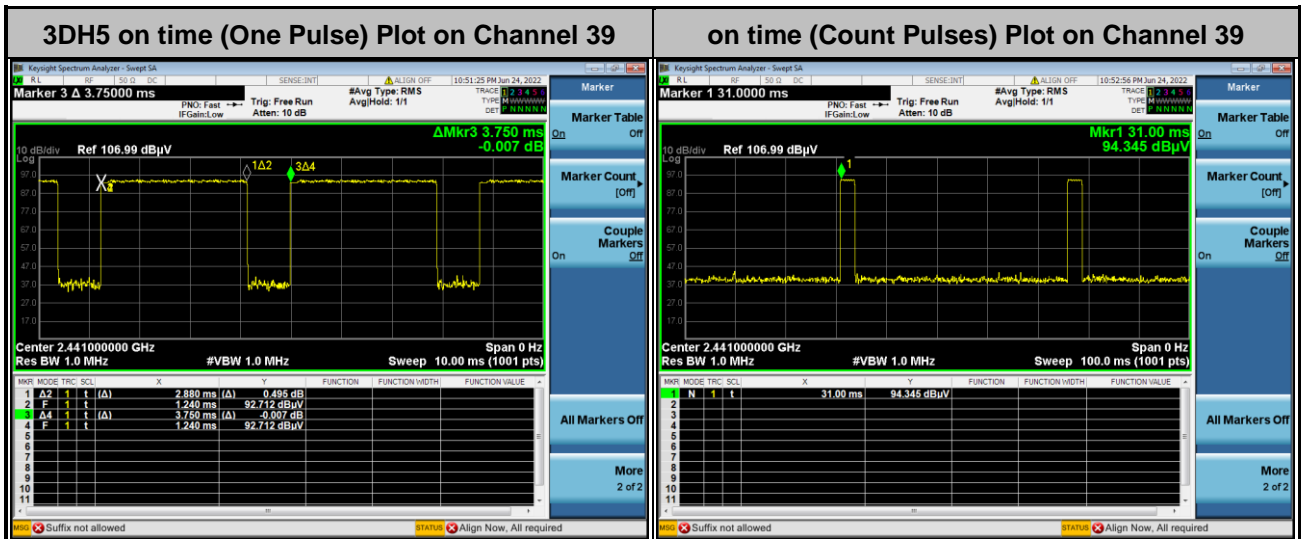
Thus, the maximum possible ON time:

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

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. 8>



**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,

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