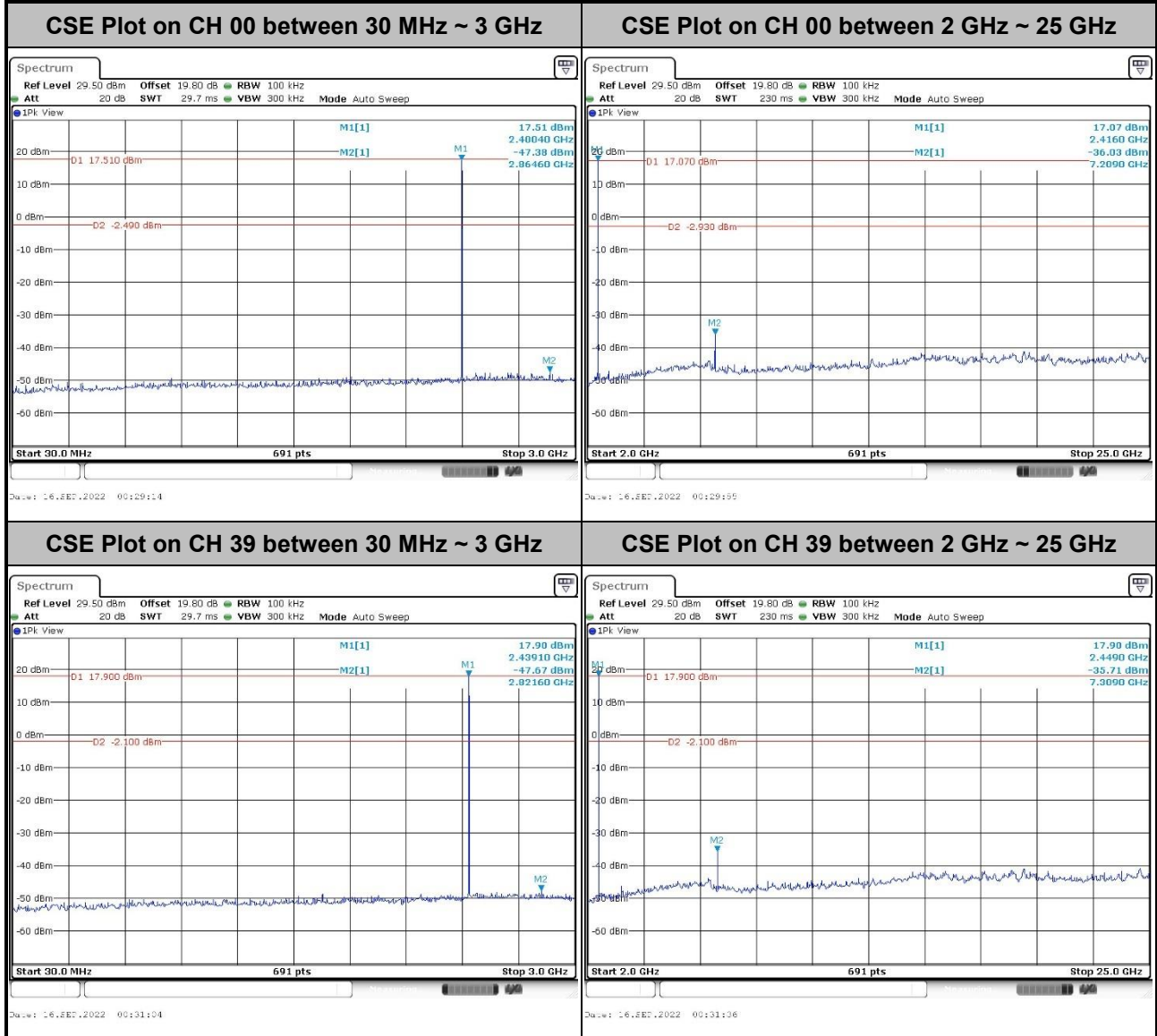


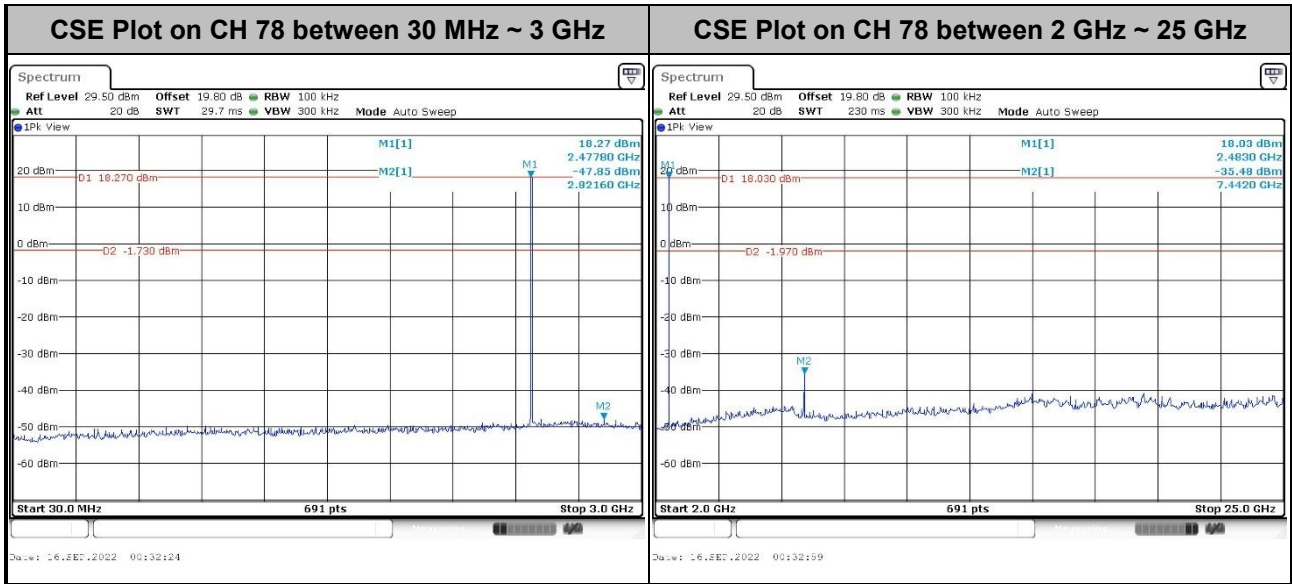


### 3.7.5 Test Result of Conducted Spurious Emission

<Ant. 4>

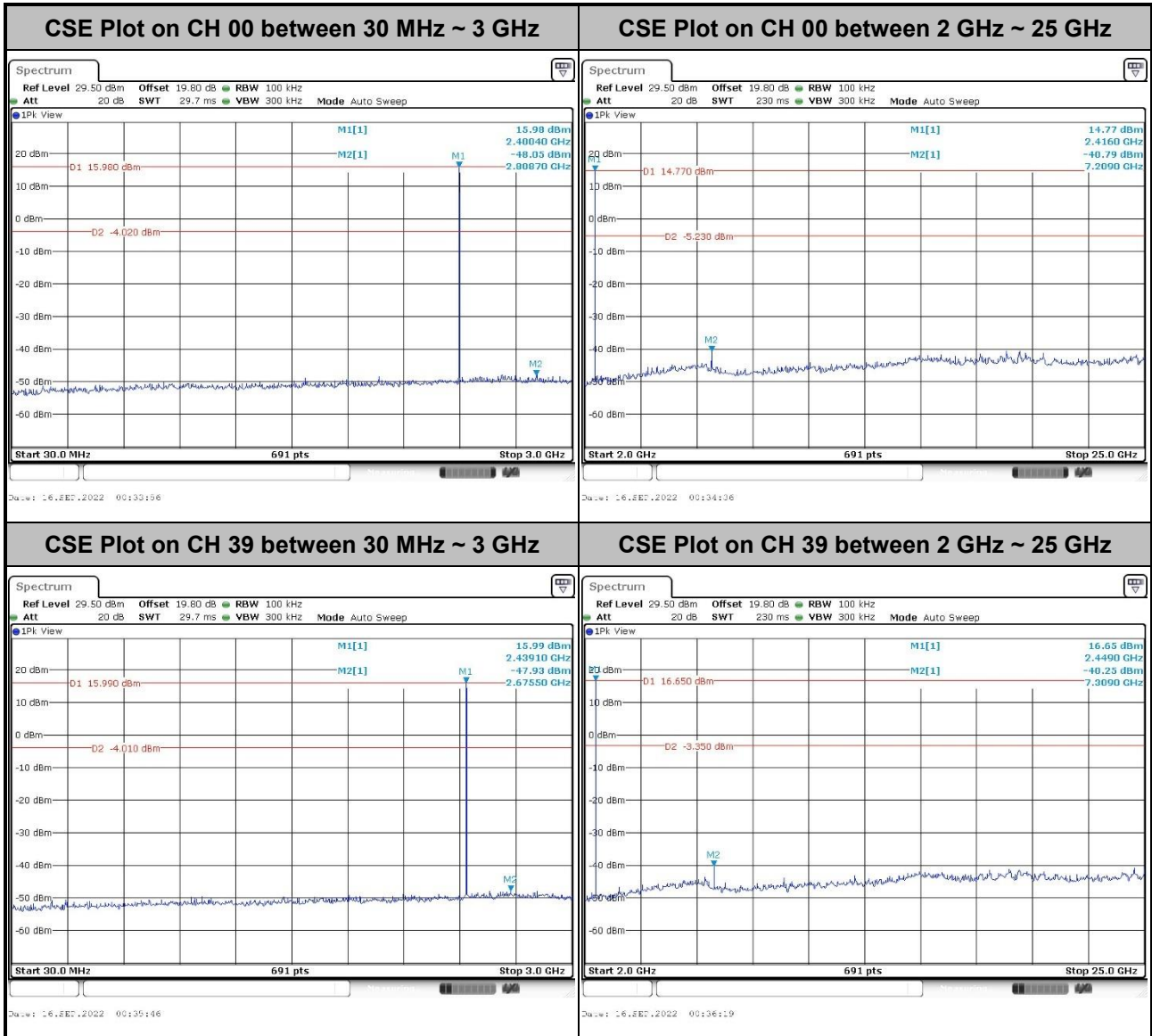
<1Mbps>

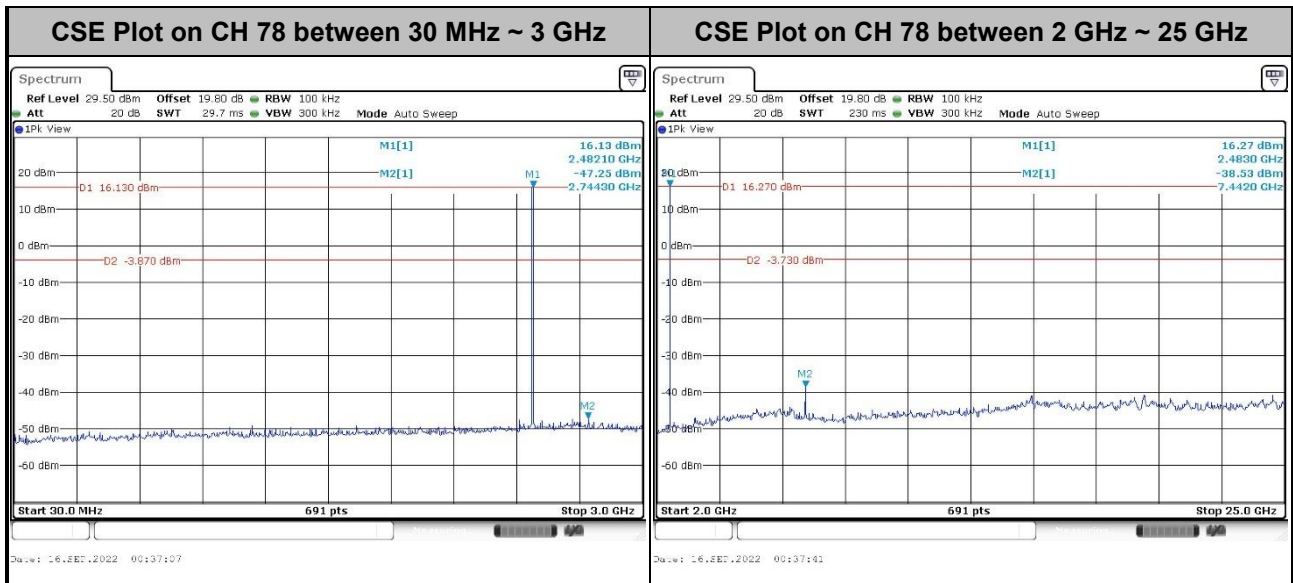






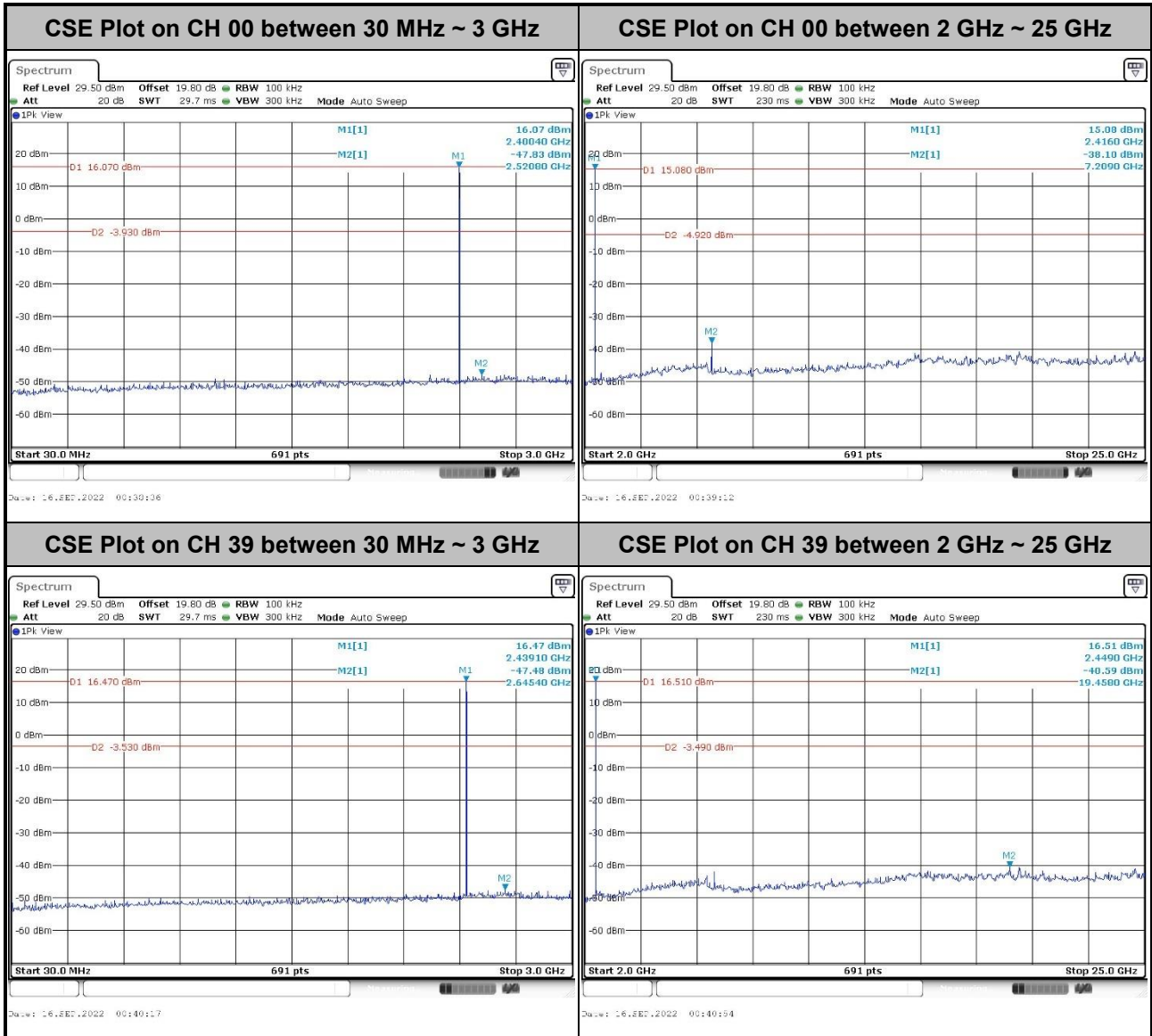
<2Mbps>

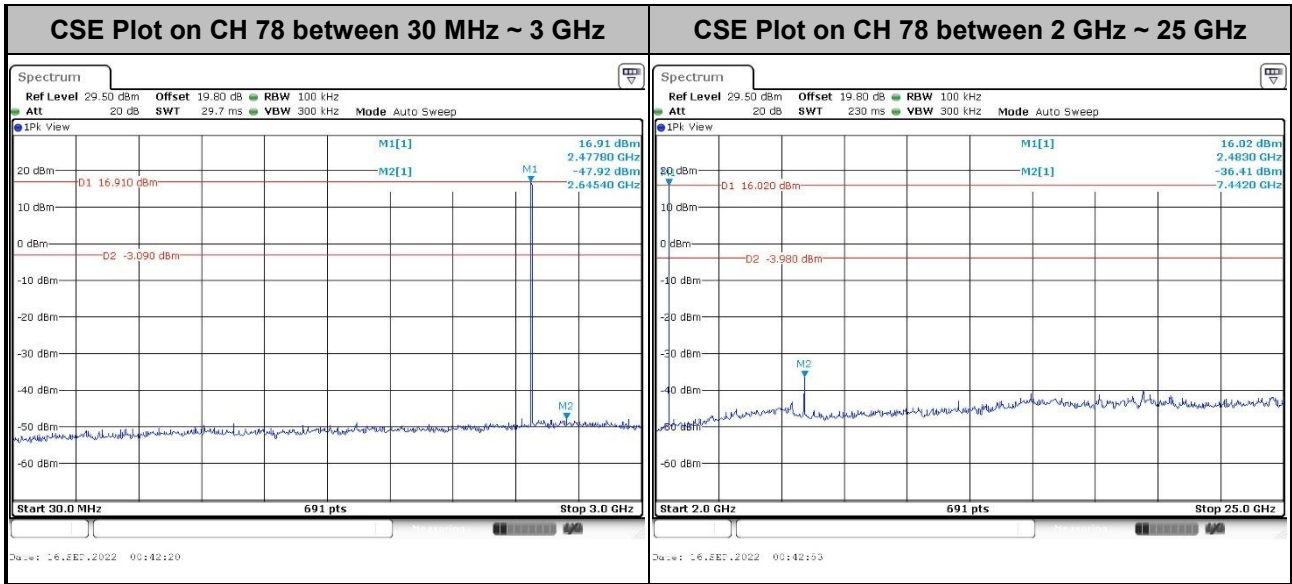






<3Mbps>

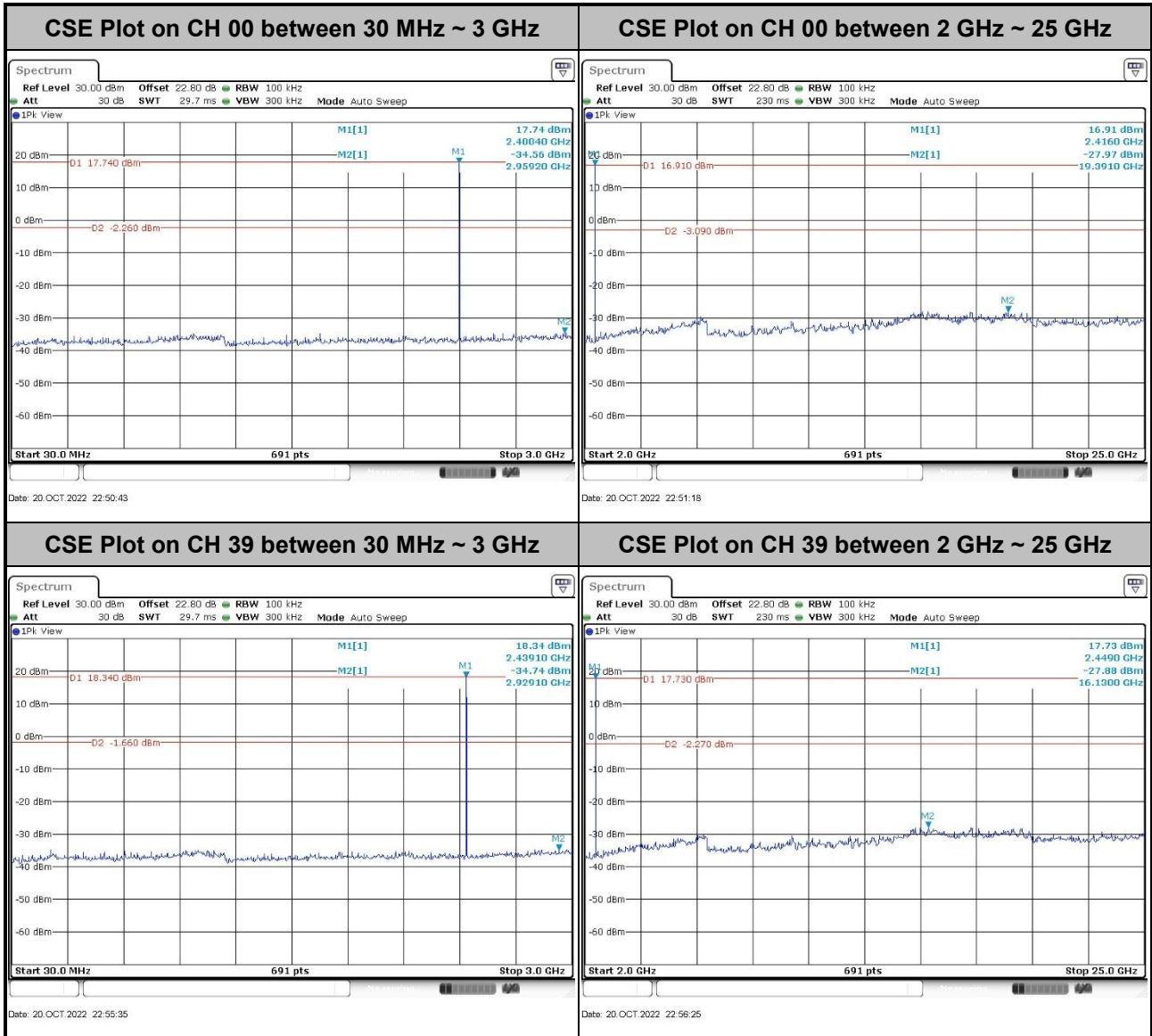


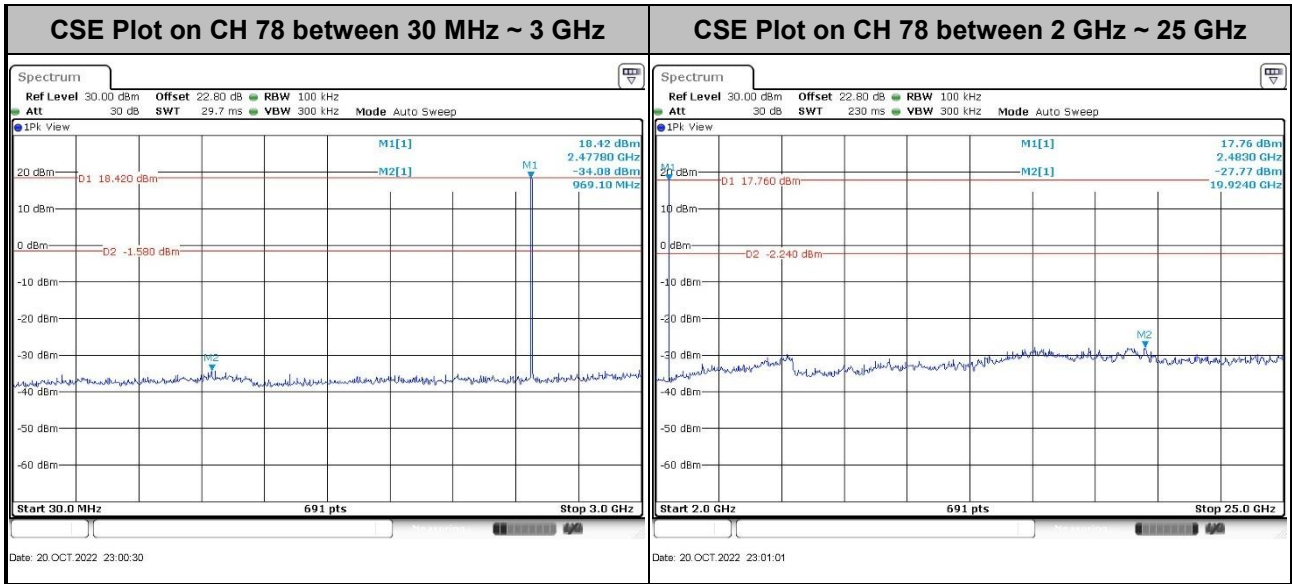




<Ant. 3>

<1Mbps>

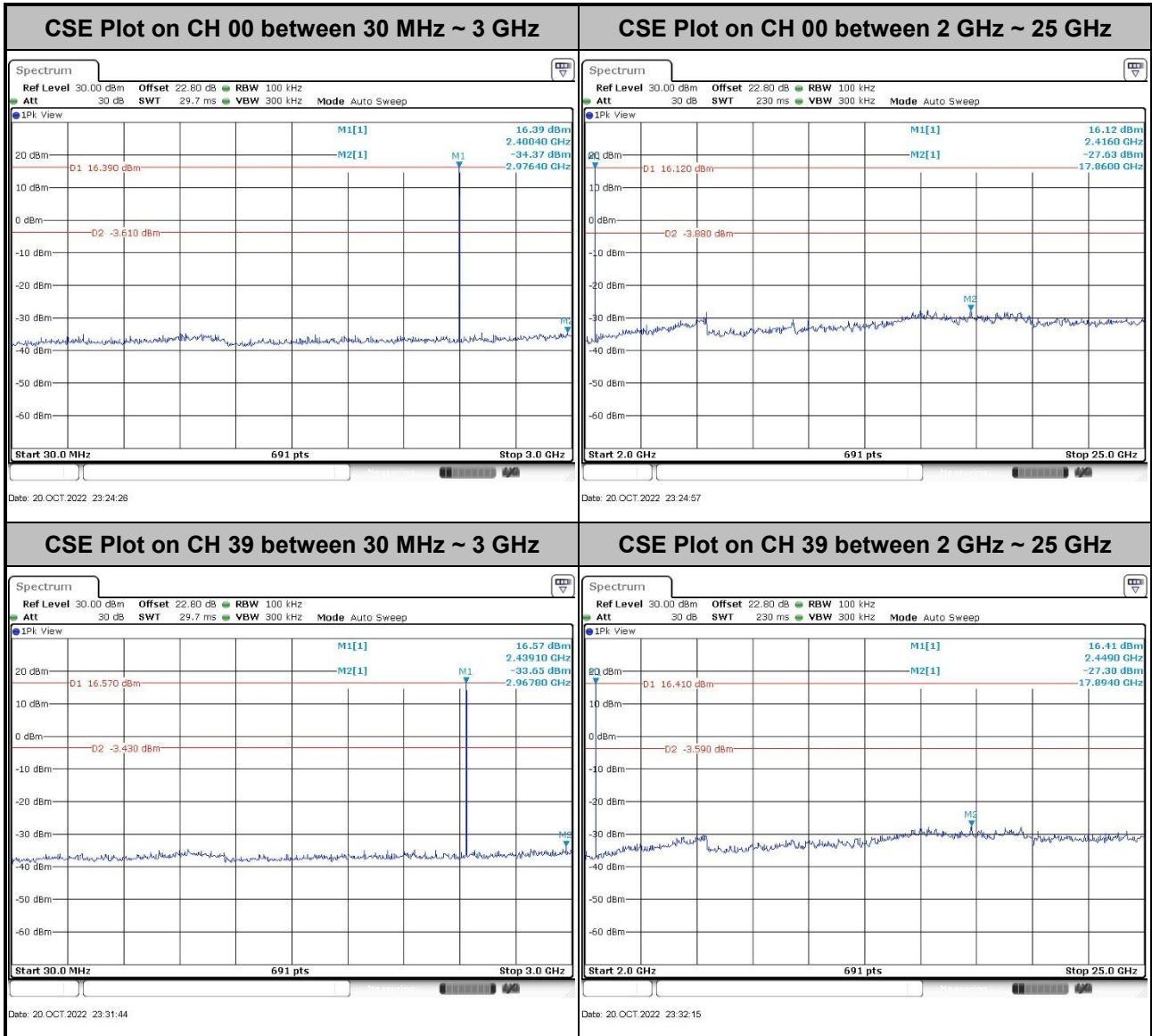


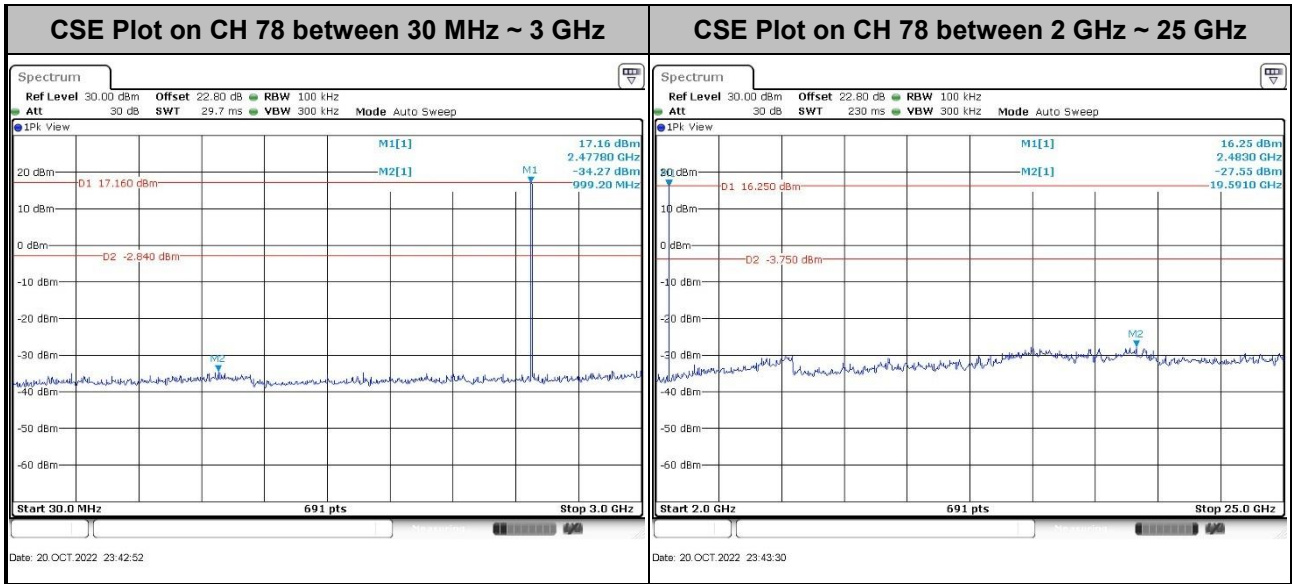






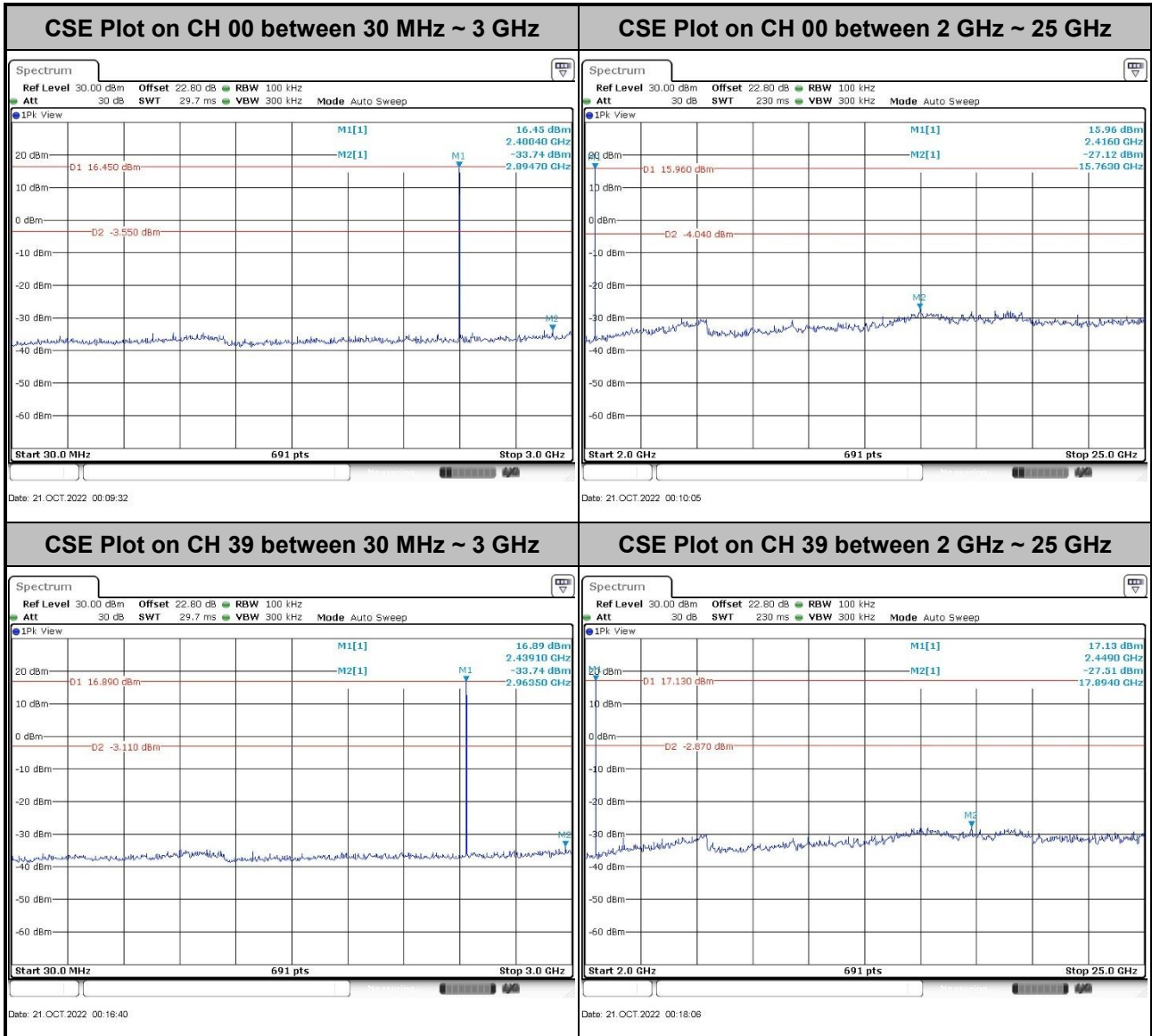
<2Mbps>

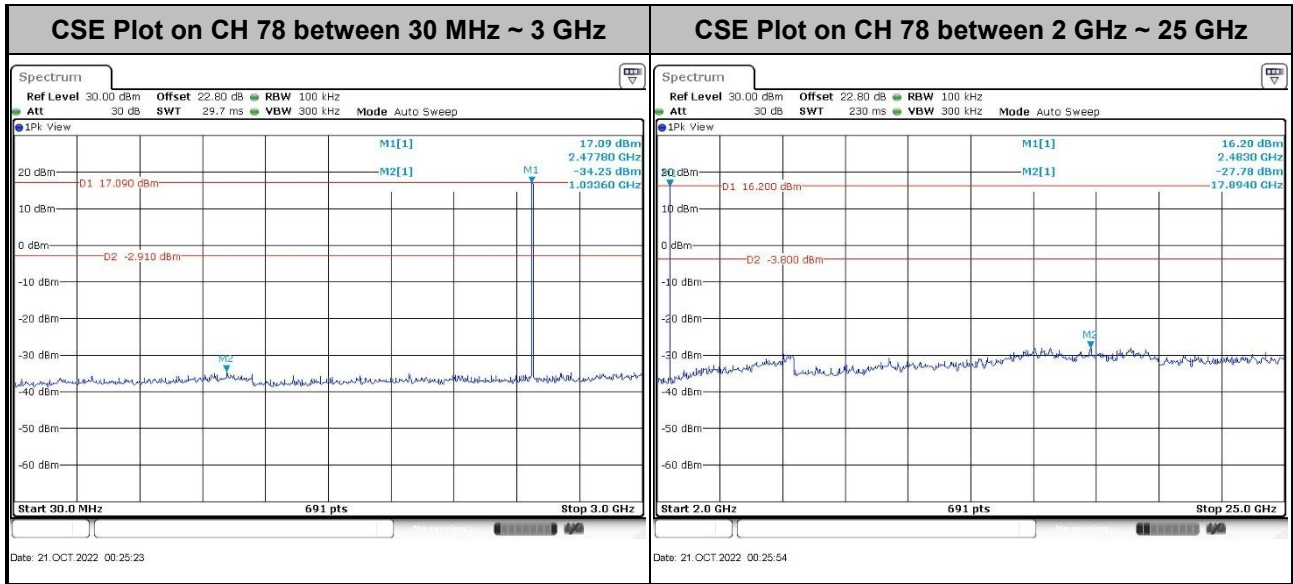






<3Mbps>







### 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.



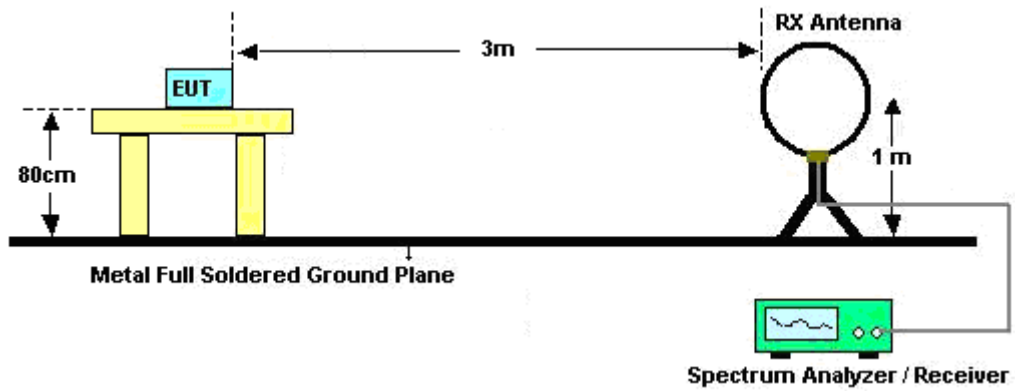
### 3.8.3 Test Procedures

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 “-“.

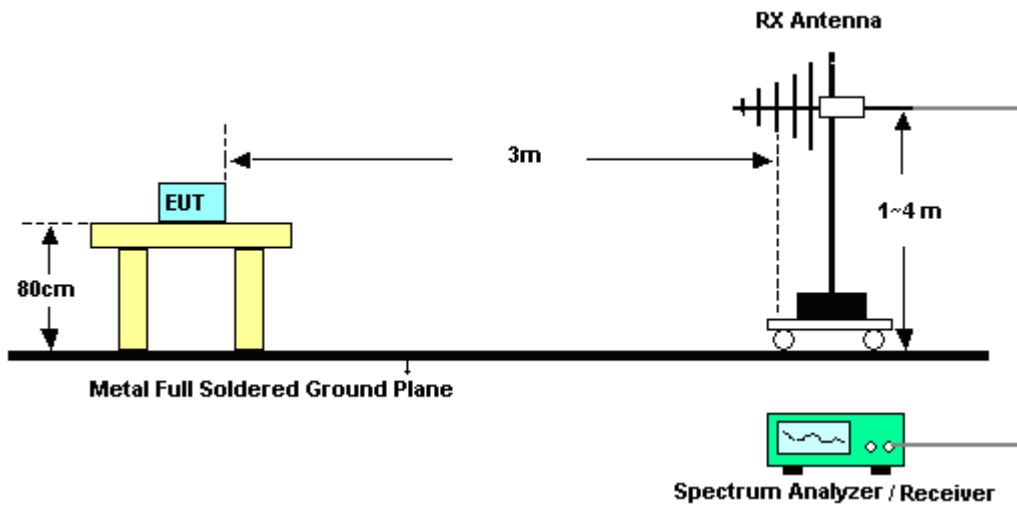
Note: The average levels are calculated from the peak level corrected with duty cycle correction factor (-24.76dB) derived from  $20 \log$  (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent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

### 3.8.4 Test Setup

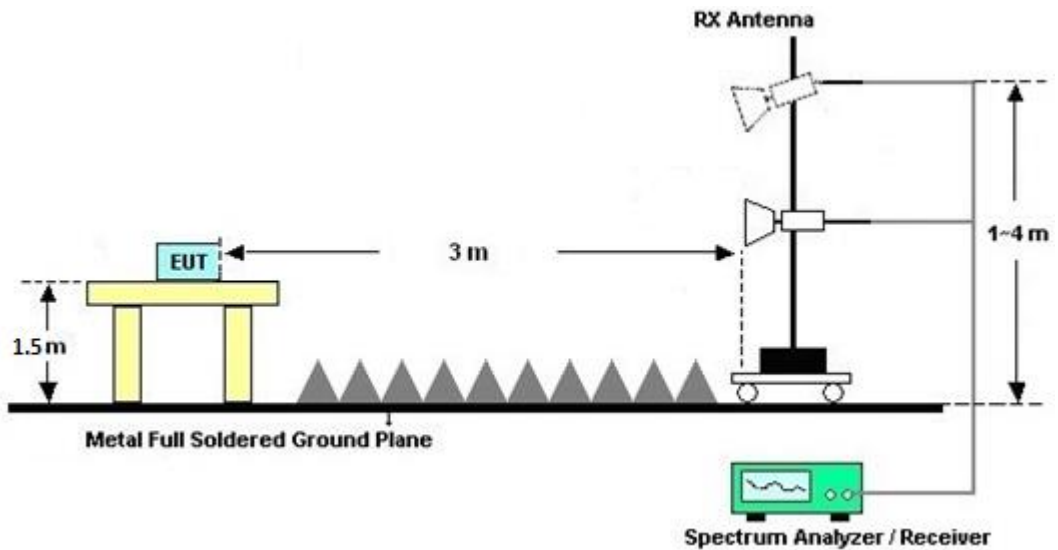
For radiated test below 30MHz



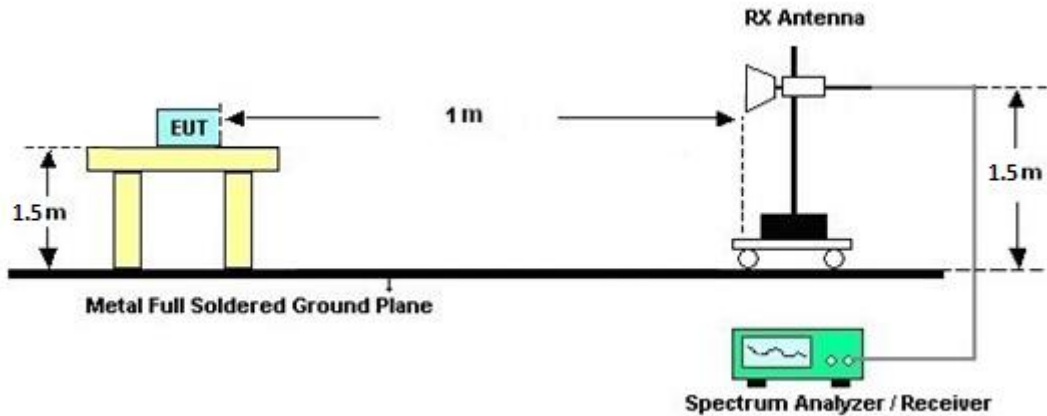
For radiated test from 30MHz to 1GHz



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.

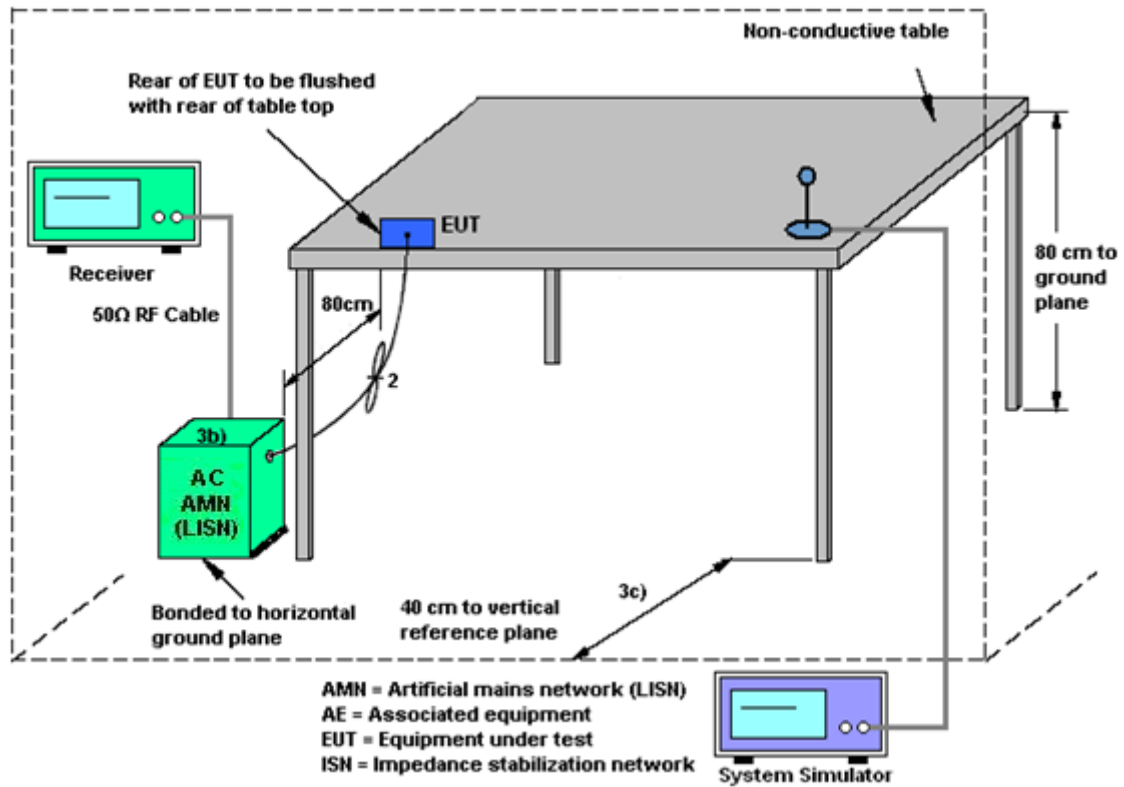
#### 3.9.2 Measuring Instruments

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**

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.



## 4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 19, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	Sep. 19, 2022	Nov. 30, 2022	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2021	Sep. 19, 2022	Nov. 16, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2021	Sep. 19, 2022	Nov. 15, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Sep. 19, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Aug. 01, 2022	Sep. 19, 2022	Jul. 31, 2023	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	Sep. 19, 2022	Dec. 29, 2022	Conduction (CO05-HY)
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 16, 2021	Aug. 11, 2022~ Oct. 21, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1036004	N/A	Aug. 08, 2022	Aug. 11, 2022~ Oct. 21, 2022	Aug. 07, 2023	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 08, 2022	Aug. 11, 2022~ Oct. 21, 2022	Aug. 07, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101905	10Hz - 40GHz(amp)	Aug. 03, 2022	Aug. 11, 2022~ Oct. 21, 2022	Aug. 02, 2023	Conducted (TH05-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	Mar. 18, 2022	Sep. 29, 2022~ Oct. 26, 2022	Mar. 17, 2023	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	41912 & 05	30MHz~1GHz	Feb. 06, 2022	Sep. 29, 2022~ Oct. 26, 2022	Feb. 05, 2023	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 27, 2021	Sep. 29, 2022~ Oct. 26, 2022	Dec. 26, 2022	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02294	1GHz~18GHz	Jun. 23, 2022	Sep. 29, 2022~ Oct. 26, 2022	Jun. 22, 2023	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	00993	18GHz~40GHz	Nov. 30, 2021	Sep. 29, 2022~ Oct. 26, 2022	Nov. 29, 2022	Radiation (03CH15-HY)
Amplifier	EMEC	EM1G18G	060837	1GHz~18GHz	Sep. 01, 2022	Sep. 29, 2022~ Oct. 26, 2022	Aug. 31, 2023	Radiation (03CH15-HY)
Preamplifier	EM Electronics	EM01G18G	060803	1GHz-18GHz	Dec. 16, 2021	Sep. 29, 2022~ Oct. 26, 2022	Dec. 15, 2022	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060802	18-40GHz	Mar. 08, 2022	Sep. 29, 2022~ Oct. 26, 2022	Mar. 07, 2023	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Oct. 21, 2021	Sep. 29, 2022~ Oct. 16, 2022	Oct. 20, 2022	Radiation (03CH15-HY)
Spectrum Analyzer	Keysight	N9010	MY54200485	10Hz~44GHz	May 07, 2022	Sep. 29, 2022~ Oct. 26, 2022	May 06, 2023	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Sep. 29, 2022~ Oct. 26, 2022	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Sep. 29, 2022~ Oct. 26, 2022	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24 (k5)	RK-000451	N/A	N/A	Sep. 29, 2022~ Oct. 26, 2022	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104, 102E	MY36980/4, MY9838/4PE, 508405/2E	30MHz~18G	Nov. 15, 2021	Sep. 29, 2022~ Oct. 26, 2022	Nov. 14, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804011/2,804012/2	30MHz-40GHz	Jan. 04, 2022	Sep. 29, 2022~ Oct. 26, 2022	Jan. 03, 2023	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 10, 2022	Sep. 29, 2022~ Oct. 26, 2022	Mar. 09, 2023	Radiation (03CH15-HY)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.10 dB
---	---------

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.20 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.40 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.60 dB
---	---------

### Appendix A. Test Result of Conducted Test Items

<Ant.4>

Test Engineer:	Hank Hsu	Temperature:	21~25	°C
Test Date:	2022/8/12~2022/10/21	Relative Humidity:	51~54	%

<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	0.874	0.799	1.146	0.5827	Pass
DH	1Mbps	1	39	2441	0.877	0.805	0.999	0.5847	Pass
DH	1Mbps	1	78	2480	0.871	0.799	1.003	0.5807	Pass
2DH	2Mbps	1	0	2402	1.263	1.166	1.298	0.8420	Pass
2DH	2Mbps	1	39	2441	1.263	1.166	0.999	0.8420	Pass
2DH	2Mbps	1	78	2480	1.263	1.166	0.999	0.8420	Pass
3DH	3Mbps	1	0	2402	1.255	1.152	0.999	0.8367	Pass
3DH	3Mbps	1	39	2441	1.250	1.149	0.999	0.8333	Pass
3DH	3Mbps	1	78	2480	1.250	1.149	1.003	0.8333	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	18.14	30.00	Pass
	39	1	18.37	30.00	Pass
	78	1	<b>19.00</b>	30.00	Pass
2DH1	0	1	18.54	20.97	Pass
	39	1	18.75	20.97	Pass
	78	1	<b>19.30</b>	20.97	Pass
3DH1	0	1	19.02	20.97	Pass
	39	1	19.26	20.97	Pass
	78	1	<b>19.76</b>	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	18.01	5.25
	39	1	18.21	5.25
	78	1	<b>18.80</b>	5.25
2DH1	0	1	16.13	5.13
	39	1	16.34	5.13
	78	1	<b>16.97</b>	5.13
3DH1	0	1	16.16	5.15
	39	1	16.37	5.15
	78	1	<b>16.96</b>	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.3>

Test Engineer:	Hank Hsu/Junyu Jhou	Temperature:	21~25	°C
Test Date:	2022/8/08~2022/10/21	Relative Humidity:	51~54	%

<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	0.875	0.802	1.003	0.5836	Pass
DH	1Mbps	1	39	2441	0.875	0.802	0.994	0.5836	Pass
DH	1Mbps	1	78	2480	0.873	0.799	0.999	0.5817	Pass
2DH	2Mbps	1	0	2402	1.265	1.166	0.990	0.8435	Pass
2DH	2Mbps	1	39	2441	1.265	1.166	0.999	0.8435	Pass
2DH	2Mbps	1	78	2480	1.265	1.166	1.003	0.8435	Pass
3DH	3Mbps	1	0	2402	1.252	1.152	1.003	0.8348	Pass
3DH	3Mbps	1	39	2441	1.257	1.152	1.307	0.8377	Pass
3DH	3Mbps	1	78	2480	1.252	1.152	1.303	0.8348	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	17.94	30.00	Pass
	39	1	18.72	30.00	Pass
	78	1	<b>18.75</b>	30.00	Pass
2DH1	0	1	18.32	20.97	Pass
	39	1	19.02	20.97	Pass
	78	1	<b>19.11</b>	20.97	Pass
3DH1	0	1	18.79	20.97	Pass
	39	1	19.43	20.97	Pass
	78	1	<b>19.68</b>	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	17.75	5.22
	39	1	18.43	5.22
	78	1	<b>18.60</b>	5.22
2DH1	0	1	15.93	5.15
	39	1	16.60	5.15
	78	1	<b>16.74</b>	5.15
3DH1	0	1	15.88	5.13
	39	1	16.60	5.13
	78	1	<b>16.74</b>	5.13

<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

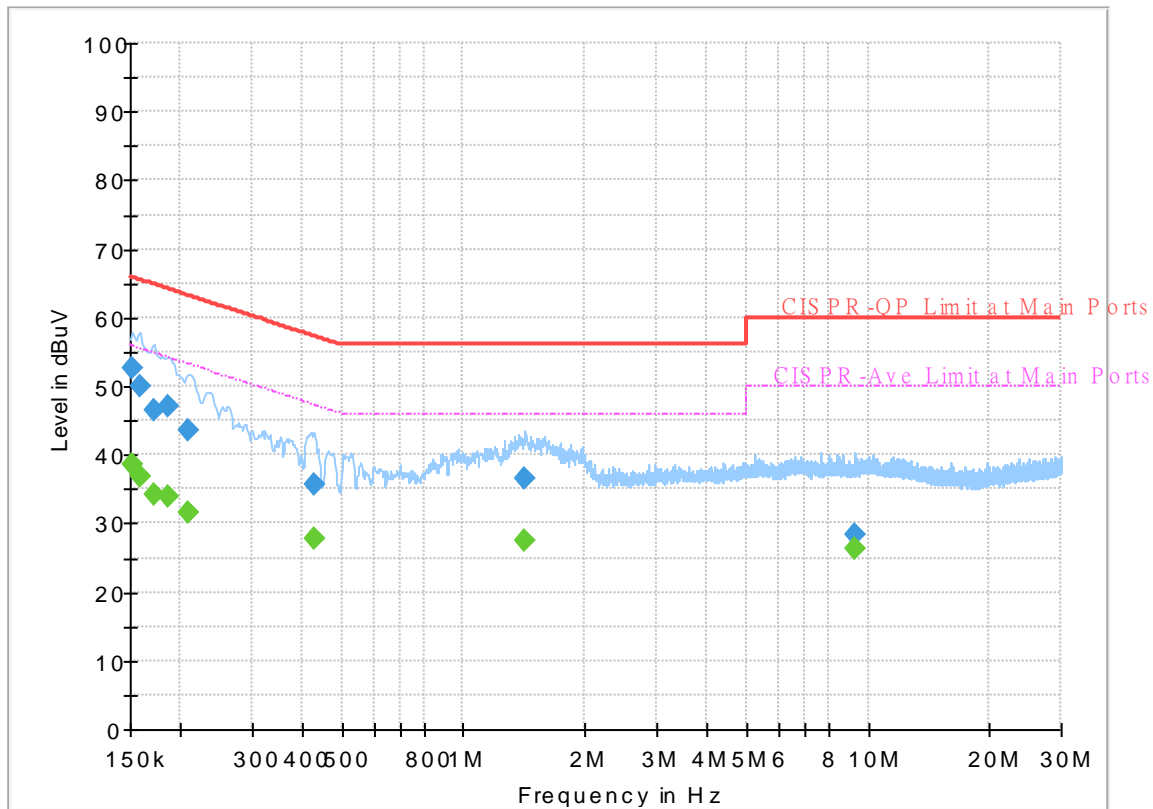
Test Engineer :	Tom Lee	Temperature :	23~26°C
		Relative Humidity :	45~55%



# EUT Information

Report NO : 241215-02  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

Full Spectrum



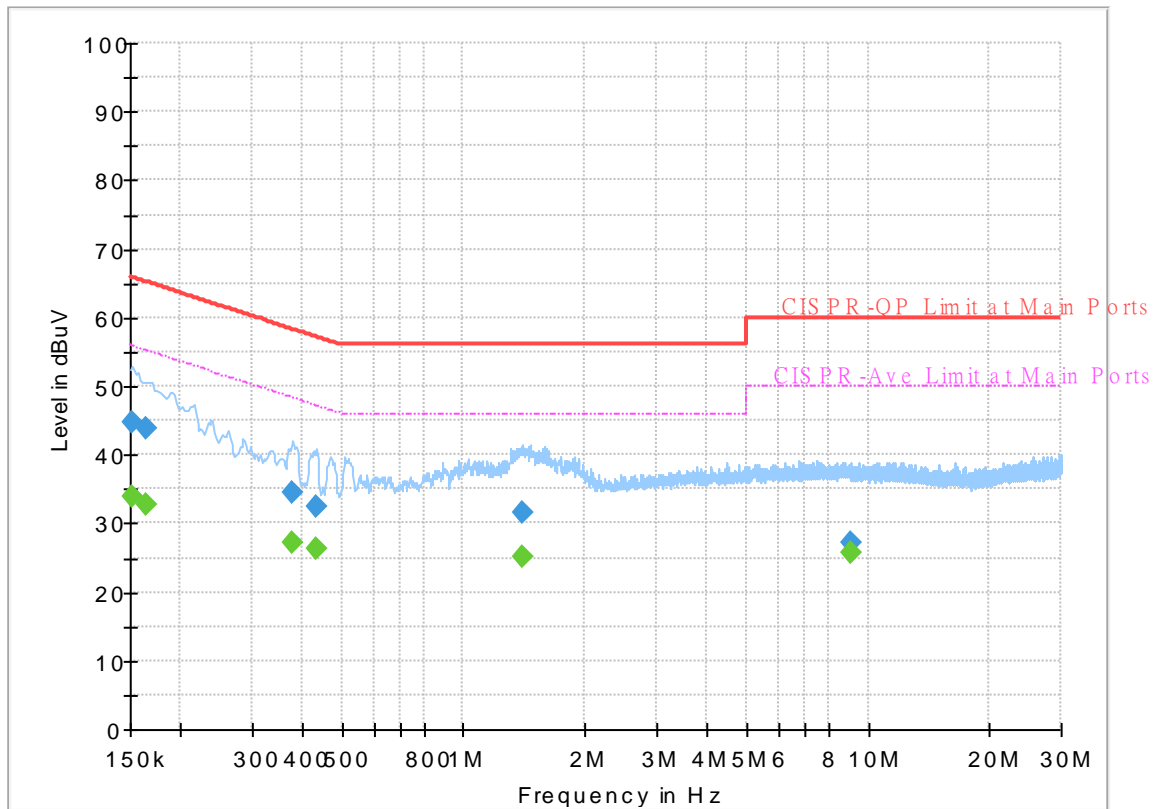
## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	38.71	55.88	17.17	L1	OFF	19.8
0.152250	52.56	---	65.88	13.32	L1	OFF	19.8
0.159000	---	36.73	55.52	18.79	L1	OFF	19.8
0.159000	49.88	---	65.52	15.64	L1	OFF	19.8
0.172500	---	34.25	54.84	20.59	L1	OFF	19.8
0.172500	46.49	---	64.84	18.35	L1	OFF	19.8
0.186000	---	33.79	54.21	20.42	L1	OFF	19.8
0.186000	47.18	---	64.21	17.03	L1	OFF	19.8
0.208500	---	31.71	53.27	21.56	L1	OFF	19.8
0.208500	43.70	---	63.27	19.57	L1	OFF	19.8
0.426750	---	27.84	47.32	19.48	L1	OFF	19.8
0.426750	35.62	---	57.32	21.70	L1	OFF	19.8
1.423500	---	27.38	46.00	18.62	L1	OFF	19.9
1.423500	36.47	---	56.00	19.53	L1	OFF	19.9
9.262500	---	26.34	50.00	23.66	L1	OFF	20.2
9.262500	28.35	---	60.00	31.65	L1	OFF	20.2

# EUT Information

Report NO : 241215-02  
 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	---	34.05	55.88	21.83	N	OFF	19.8
0.152250	44.75	---	65.88	21.13	N	OFF	19.8
0.163500	---	32.78	55.28	22.50	N	OFF	19.8
0.163500	44.00	---	65.28	21.28	N	OFF	19.8
0.379500	---	27.24	48.29	21.05	N	OFF	19.8
0.379500	34.51	---	58.29	23.78	N	OFF	19.8
0.433500	---	26.22	47.19	20.97	N	OFF	19.8
0.433500	32.57	---	57.19	24.62	N	OFF	19.8
1.405500	---	25.06	46.00	20.94	N	OFF	19.9
1.405500	31.44	---	56.00	24.56	N	OFF	19.9
9.039750	---	25.80	50.00	24.20	N	OFF	20.2
9.039750	27.11	---	60.00	32.89	N	OFF	20.2



### Appendix C. Radiated Spurious Emission

Test Engineer :	Bigshow Wang and Quentin Liu	Temperature :	21.1~23.1°C
		Relative Humidity :	49~58%

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.		
4		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
BT CH00 2402MHz		2375.835	45.45	-28.55	74	49.01	27.21	6.09	36.86	110	96	P	H	
		2375.835	20.69	-33.31	54	-	-	-	-	-	-	A	H	
	*	2402	114.77	-	-	118.09	27.41	6.13	36.86	110	96	P	H	
	*	2402	90.01	-	-	-	-	-	-	-	-	A	H	
													H	
														H
			2380.455	50.32	-23.68	74	53.85	27.24	6.09	36.86	378	315	P	V
			2380.455	25.56	-28.44	54	-	-	-	-	-	-	A	V
	*		2402	108.04	-	-	111.36	27.41	6.13	36.86	378	315	P	V
	*		2402	83.28	-	-	-	-	-	-	-	-	A	V
														V
														V
BT CH 39 2441MHz		2383.5	46.34	-27.66	74	49.83	27.27	6.1	36.86	106	93	P	H	
		2383.5	21.58	-32.42	54	-	-	-	-	-	-	A	H	
	*	2441	114.48	-	-	117.49	27.65	6.19	36.85	106	93	P	H	
	*	2441	89.72	-	-	-	-	-	-	-	-	A	H	
			2495.24	46.63	-27.37	74	49.32	27.88	6.28	36.85	106	93	P	H
			2495.24	21.87	-32.13	54	-	-	-	-	-	-	A	H
			2341.78	45.35	-28.65	74	49.18	27	6.03	36.86	359	310	P	V
			2341.78	20.59	-33.41	54	-	-	-	-	-	-	A	V
	*		2441	108.52	-	-	111.53	27.65	6.19	36.85	359	310	P	V
	*		2441	83.76	-	-	-	-	-	-	-	-	A	V
			2491.46	45.81	-28.19	74	48.52	27.87	6.27	36.85	359	310	P	V
			2491.46	21.05	-32.95	54	-	-	-	-	-	-	A	V



<b>BT CH 78 2480MHz</b>	*	2480	114.58	-	-	117.36	27.82	6.25	36.85	117	93	P	H
	*	2480	89.82	-	-	-	-	-	-	-	-	A	H
		2483.52	58.03	-15.97	74	60.79	27.83	6.26	36.85	117	93	P	H
		2483.52	33.27	-20.73	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	111.49	-	-	114.27	27.82	6.25	36.85	400	302	P	V
	*	2480	86.73	-	-	-	-	-	-	-	-	A	V
		2483.6	54.96	-19.04	74	57.72	27.83	6.26	36.85	400	302	P	V
		2483.6	30.2	-23.8	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 4	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)
BT ANT 4		4804	47.96	-26.04	74	66.92	32.32	9.42	60.7	-	-	P	H
		4804	23.2	-30.8	54	-	-	-	-	-	-	A	H
		2389.8	36.25	-17.75	54	39.68	27.32	6.11	36.86	110	96	P	H
		2389.8	11.49	-42.51	54	-	-	-	-	-	-	A	H
													H
													H
													H
													H
													H
													H
BT CH 00 2402MHz		4804	46.62	-27.38	74	65.58	32.32	9.42	60.7	-	-	P	V
		4804	21.86	-32.14	54	-	-	-	-	-	-	A	V
		2389.59	35.23	-18.77	54	38.66	27.32	6.11	36.86	378	315	P	V
		2389.59	10.47	-43.53	54	-	-	-	-	-	-	A	V
													V
													V
													V
													V
													V
													V





BT ANT 4	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 )	
BT CH 78 2480MHz		4960	50.76	-23.24	74	69.17	32.94	9.37	60.72	-	-	P	H	
		4960	26	-28	54	-	-	-	-	-	-	A	H	
		7440	47.2	-26.8	74	60.88	36.34	10.96	60.98	-	-	P	H	
		7440	22.44	-31.56	54	-	-	-	-	-	-	A	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			4960	49.3	-24.7	74	67.71	32.94	9.37	60.72	-	-	P	V
			4960	24.54	-29.46	54	-	-	-	-	-	-	A	V
			7440	51	-23	74	64.68	36.34	10.96	60.98	-	-	P	V
			7440	26.24	-27.76	54	-	-	-	-	-	-	A	V
														V
														V
														V
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.													



Emission above 18GHz

2.4GHz 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.		
4		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT SHF		39912	49.26	-24.74	74	60.78	44.5	-0.13	55.89	-	-	P	H	
		39912	39.2	-14.8	54	50.72	44.5	-0.13	55.89	-	-	A	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			39890	49.68	-24.32	74	61.24	44.5	-0.15	55.91	-	-	P	V
			39890	49.68	-4.32	54	61.24	44.5	-0.15	55.91	-	-	A	V
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against 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> </ol>													





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.		
4		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT LF		50.37	33.51	-6.49	40	51.04	14.14	0.9	32.57	-	-	P	H	
		163.86	26.14	-17.36	43.5	40.86	16.13	1.61	32.46	-	-	P	H	
		388.9	21.72	-24.28	46	30.58	21.28	2.33	32.47	-	-	P	H	
		567.38	27.9	-18.1	46	31.51	25.98	2.91	32.5	-	-	P	H	
		720.64	33.91	-12.09	46	36.21	26.82	3.23	32.35	-	-	P	H	
		903	35.43	-10.57	46	34.38	28.84	3.7	31.49	-	-	P	H	
														H
														H
														H
														H
														H
														H
			30.97	33.17	-6.83	40	40.97	24.01	0.67	32.48	-	-	P	V
			93.05	25.22	-18.28	43.5	41.62	14.86	1.2	32.46	-	-	P	V
			400.54	22.38	-23.62	46	30.82	21.68	2.36	32.48	-	-	P	V
			590.66	26.4	-19.6	46	30.39	25.55	2.97	32.51	-	-	P	V
			726.46	34.17	-11.83	46	36.13	27.12	3.26	32.34	-	-	P	V
			896.21	25.06	-20.94	46	24.16	28.76	3.68	31.54	286	164	Q	V
														V
														V
													V	
													V	
													V	
													V	
Remark	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against limit line.</li> <li>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.</li> </ol>													



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.		
3		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)	
BT CH00 2402MHz		2387.7	50.34	-23.66	74	43.87	27.3	16.03	36.86	116	71	P	H	
		2387.7	25.58	-28.42	54	-	-	-	-	-	-	A	H	
	*	2402	115.95	-	-	109.35	27.41	16.05	36.86	116	71	P	H	
	*	2402	91.19	-	-	-	-	-	-	-	-	A	H	
													H	
														H
			2384.655	50.19	-23.81	74	43.75	27.28	16.02	36.86	389	254	P	V
			2384.655	25.43	-28.57	54	-	-	-	-	-	-	A	V
	*		2402	112.14	-	-	105.54	27.41	16.05	36.86	389	254	P	V
	*		2402	87.38	-	-	-	-	-	-	-	-	A	V
														V
														V
BT CH 39 2441MHz		2375.8	50.39	-23.61	74	44.03	27.21	16.01	36.86	112	90	P	H	
		2375.8	25.63	-28.37	54	-	-	-	-	-	-	A	H	
	*	2441	116.18	-	-	109.27	27.65	16.11	36.85	112	90	P	H	
	*	2441	91.42	-	-	-	-	-	-	-	-	A	H	
			2485.51	51.58	-22.42	74	44.41	27.84	16.18	36.85	112	90	P	H
			2485.51	26.82	-27.18	54	-	-	-	-	-	-	A	H
			2358.3	50.61	-23.39	74	44.43	27.07	15.97	36.86	336	251	P	V
			2358.3	25.85	-28.15	54	-	-	-	-	-	-	A	V
	*		2441	111.39	-	-	104.48	27.65	16.11	36.85	336	251	P	V
	*		2441	86.63	-	-	-	-	-	-	-	-	A	V
			2486.91	51.17	-22.83	74	43.99	27.85	16.18	36.85	336	251	P	V
			2486.91	26.41	-27.59	54	-	-	-	-	-	-	A	V



<b>BT CH 78 2480MHz</b>	*	2480	115.42	-	-	108.28	27.82	16.17	36.85	156	89	P	H
	*	2480	90.66	-	-	-	-	-	-	-	-	A	H
		2483.52	59.27	-14.73	74	52.11	27.83	16.18	36.85	156	89	P	H
		2483.52	34.51	-19.49	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	108.84	-	-	101.7	27.82	16.17	36.85	400	272	P	V
	*	2480	84.08	-	-	-	-	-	-	-	-	A	V
		2483.68	51.67	-22.33	74	44.51	27.83	16.18	36.85	400	272	P	V
		2483.68	26.91	-27.09	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 3	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 )
BT CH 00 2402MHz		4804	46.79	-27.21	74	65.75	32.32	9.42	60.7	-	-	P	H
		4804	22.03	-31.97	54	-	-	-	-	-	-	A	H
													H
													H
													H
													H
													H
													H
													H
													H
		4804	47.26	-26.74	74	66.22	32.32	9.42	60.7	-	-	P	V
		4804	22.5	-31.5	54	-	-	-	-	-	-	A	V
													V
													V
													V
													V
													V
													V
													V
													V
													V



BT ANT 3	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 )	
BT CH 39 2441MHz		4882	47.61	-26.39	74	66.33	32.6	9.39	60.71	-	-	P	H	
		4882	22.85	-31.15	54	-	-	-	-	-	-	A	H	
		7323	45.46	-28.54	74	58.91	36.61	10.86	60.92	-	-	P	H	
		7323	20.7	-33.3	54	-	-	-	-	-	-	A	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			4882	44.82	-29.18	74	63.54	32.6	9.39	60.71	-	-	P	V
			4882	20.06	-33.94	54	-	-	-	-	-	-	A	V
			7323	49.23	-24.77	74	62.68	36.61	10.86	60.92	-	-	P	V
			7323	24.47	-29.53	54	-	-	-	-	-	-	A	V
														V
														V
														V
													V	
													V	
													V	





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.		
3		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz BT SHF		39912	49.58	-24.42	74	61.1	44.5	-0.13	55.89	-	-	P	H	
		39912	39.64	-14.36	54	51.16	44.5	-0.13	55.89	-	-	A	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			39956	49.9	-24.1	74	61.34	44.5	-0.1	55.84	-	-	P	V
			39956	39.95	-14.05	54	51.39	44.5	-0.1	55.84	-	-	A	V
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against 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> </ol>													



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.		
3		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)	
2.4GHz BT LF		50.37	33.49	-6.51	40	51.02	14.14	0.9	32.57	-	-	P	H	
		164.83	26.23	-17.27	43.5	41.02	16.05	1.62	32.46	-	-	P	H	
		405.39	21.83	-24.17	46	30.13	21.79	2.38	32.47	-	-	P	H	
		564.47	27.01	-18.99	46	30.55	26.06	2.9	32.5	-	-	P	H	
		742.95	30.08	-15.92	46	31.31	27.77	3.3	32.3	-	-	P	H	
		903.97	38.11	-7.89	46	37.04	28.86	3.7	31.49	-	-	P	H	
														H
														H
														H
														H
														H
														H
														H
														H
														H
			48.43	33.15	-6.85	40	49.79	15.05	0.88	32.57	-	-	P	V
			93.05	24.9	-18.6	43.5	41.3	14.86	1.2	32.46	-	-	P	V
			399.57	21.93	-24.07	46	30.4	21.65	2.36	32.48	-	-	P	V
			580.96	26.45	-19.55	46	30.31	25.71	2.94	32.51	-	-	P	V
			714.82	37.69	-8.31	46	40.24	26.59	3.22	32.36	-	-	P	V
		902.03	25.16	-20.84	46	24.14	28.83	3.69	31.5	292	181	Q	V	
													V	
													V	
													V	
													V	
													V	
													V	
													V	
Remark	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against limit line.</li> <li>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.</li> </ol>													





**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	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		( MHz )	( dBμV/m )	( dB )	Limit Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
					( 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

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

**For Peak Limit @ 2390MHz:**

- 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)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

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



## Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Bigshow Wang and Quentin Liu	Temperature :	21.1~23.1°C
		Relative Humidity :	49~58%

### 2.4GHz 2400~2483.5MHz

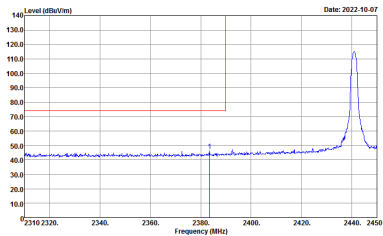
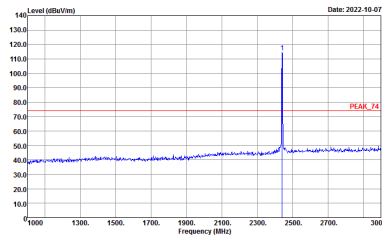
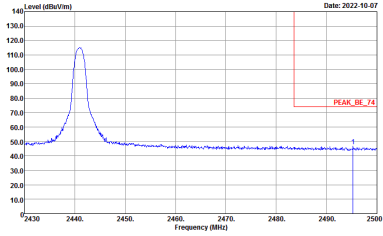
#### BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
4	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
4	Vertical	Fundamental
Peak	<p>Site : 09CH15-HY Condition : PEAK_SE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 09CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
4	Horizontal	Fundamental
Peak	 <p>Date: 2022-10-07</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2022-10-07</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	 <p>Date: 2022-10-07</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank

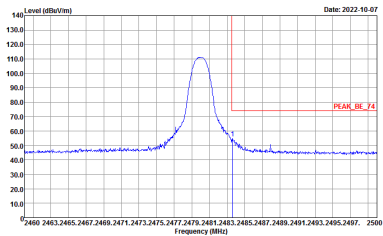
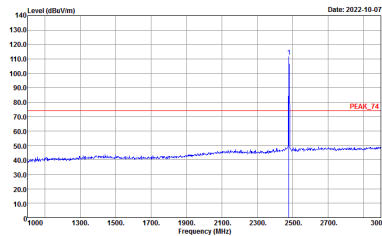


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
4	Vertical	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 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	
4	Horizontal	Fundamental
Peak	<p>Site : 09CH15-HY Condition : PEAK_BC_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 09CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4	Vertical	Fundamental
Peak	 <p>Date: 2022-10-07</p> <p>Site : 03CH15-HY Condition : PEAK_SE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2022-10-07</p> <p>Site : 03CH15-HY Condition : PEAK_SE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>





2.4GHz 2400~2483.5MHz

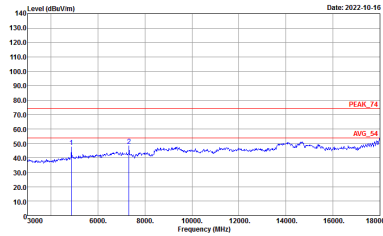
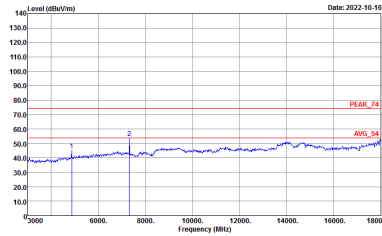
BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
4	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
4	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>

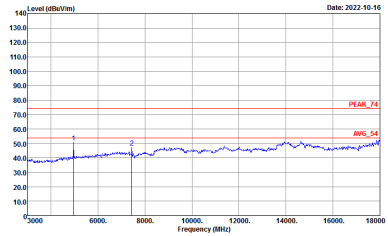
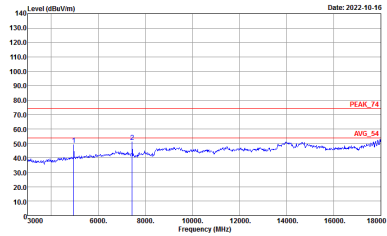


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
4	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL</p>

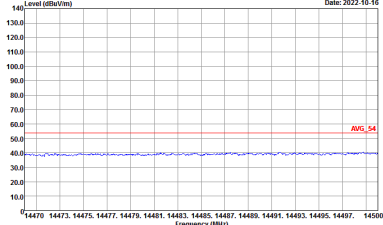
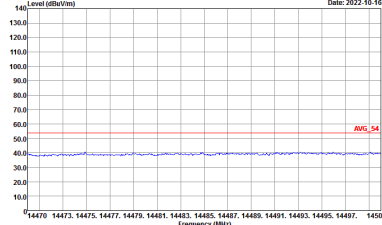
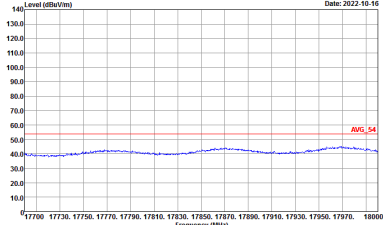
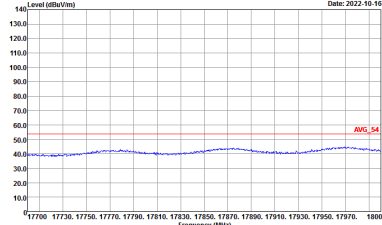


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
4	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
4	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL</p>

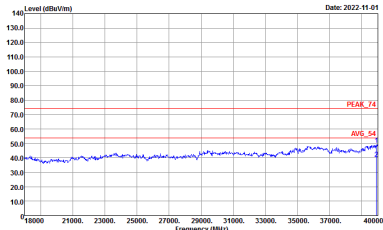
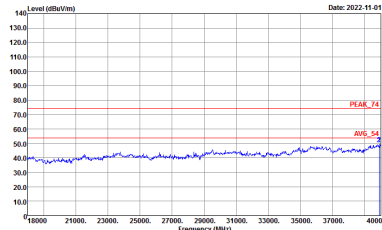


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
4	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 VERTICAL</p>
Peak Avg.	 <p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 VERTICAL</p>



Emission above 18GHz

2.4GHz BT (SHF @ 1m)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT SHF	
4	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CHI1-HY Condition : PEAK_74 1m SHF ANT_9170_00993 HORIZONTAL</p>	 <p>Site : 03CHI1-HY Condition : PEAK_74 1m SHF ANT_9170_00993 VERTICAL</p>



Emission below 1GHz

2.4GHz BT (LF)

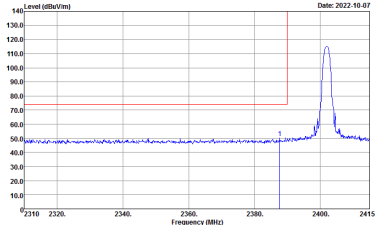
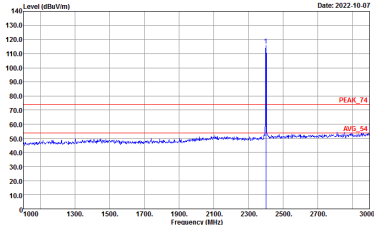
<b>BT</b>	<b>2.4GHz 2400~2483.5MHz</b>	
<b>ANT</b>	<b>BT LF</b>	
<b>4</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	<p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20220206 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20220206 VERTICAL</p>





2.4GHz 2400~2483.5MHz

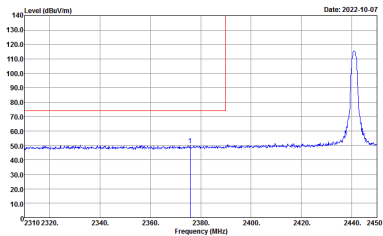
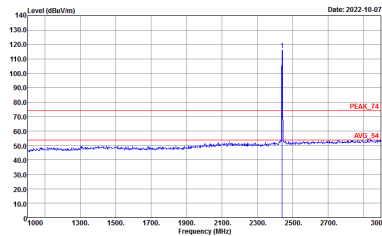
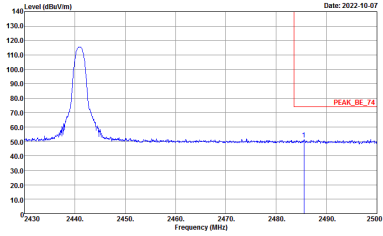
BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
3	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
3	Vertical	Fundamental
Peak	<p>Site : 09CH15-HY Condition : PEAK_SE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 09CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>

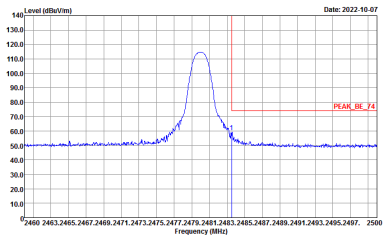
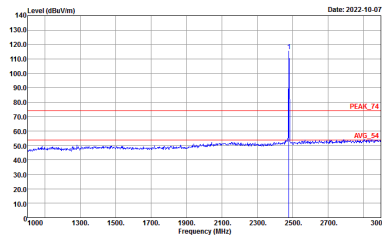


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
3	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank

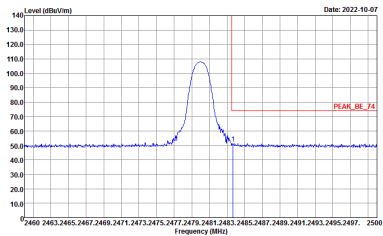
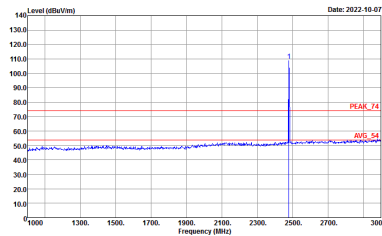


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
3	Vertical	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_02294_220623 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	
3	Horizontal	Fundamental
Peak	 <p>Site : 09CH15-HY          Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL          : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 09CH15-HY          Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL          : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>

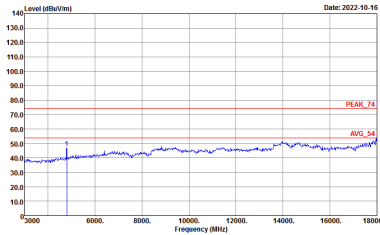
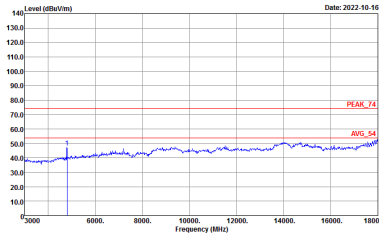


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
3	Vertical	Fundamental
Peak	 <p>Date: 2022-10-07</p> <p>Site : 09CH15-HY Condition : PEAK_SE_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2022-10-07</p> <p>Site : 09CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

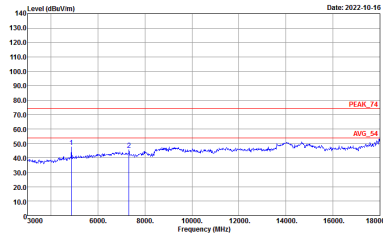
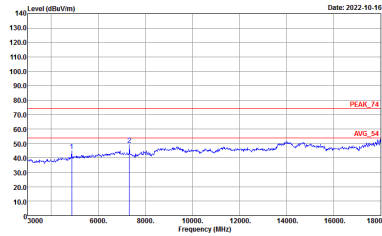
BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
3	Horizontal	Vertical
<p>Peak Avg.</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
3	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>



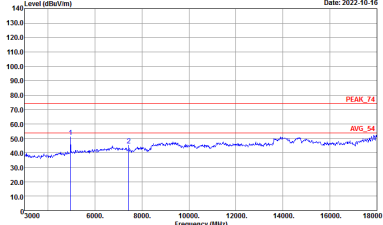
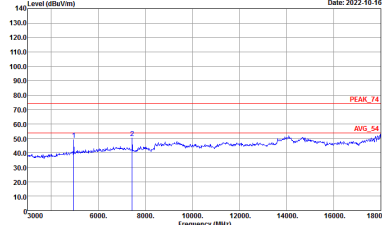


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
3	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
3	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 VERTICAL</p>
Peak Avg.	<p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AV6_54 3m 91200_02294_220623 VERTICAL</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
3	Horizontal	Vertical
<p>Peak Avg.</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 HORIZONTAL</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_02294_220623 VERTICAL</p>

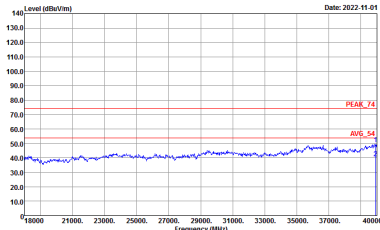
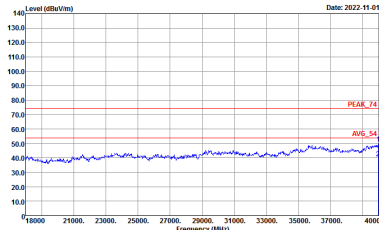


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
3	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>
Peak Avg.	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_02294_220623 VERTICAL</p>



Emission above 18GHz

2.4GHz BT (SHF @ 1m)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT SHF	
3	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH11-HY Condition : PEAK_74 1m SHF ANT_9170_00993 HORIZONTAL</p>	 <p>Site : 03CH11-HY Condition : PEAK_74 1m SHF ANT_9170_00993 VERTICAL</p>



Emission below 1GHz

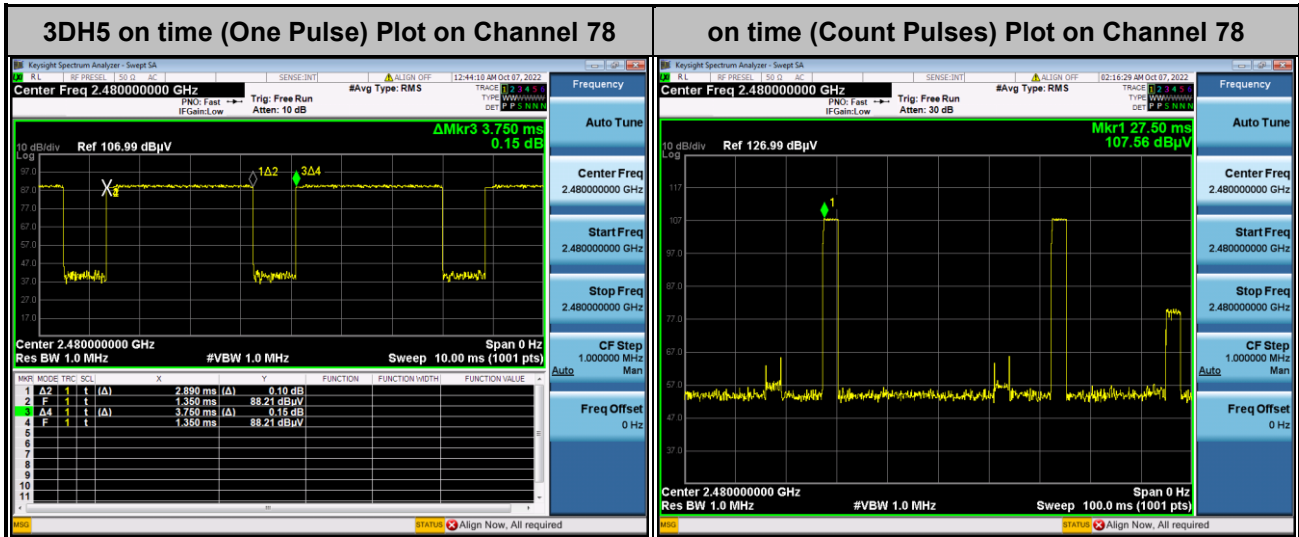
2.4GHz BT (LF)

<b>BT</b>	<b>2.4GHz 2400~2483.5MHz</b>	
<b>ANT</b>	<b>BT LF</b>	
<b>3</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>QP / Peak</b>	<p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20220206 HORIZONTAL</p>	<p>Site : 03CH15-HY Condition : QP 3m B1LOG_41912_20220206 VERTICAL</p>



# Appendix E. Duty Cycle Plots

<Ant. 4>



### Note:

1. Worst case Duty cycle = on time/100 milliseconds =  $2 * 2.89 / 100 = 5.78 \%$
2. Worst case Duty cycle correction factor =  $20 * \log(\text{Duty cycle}) = -24.76 \text{ dB}$
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:

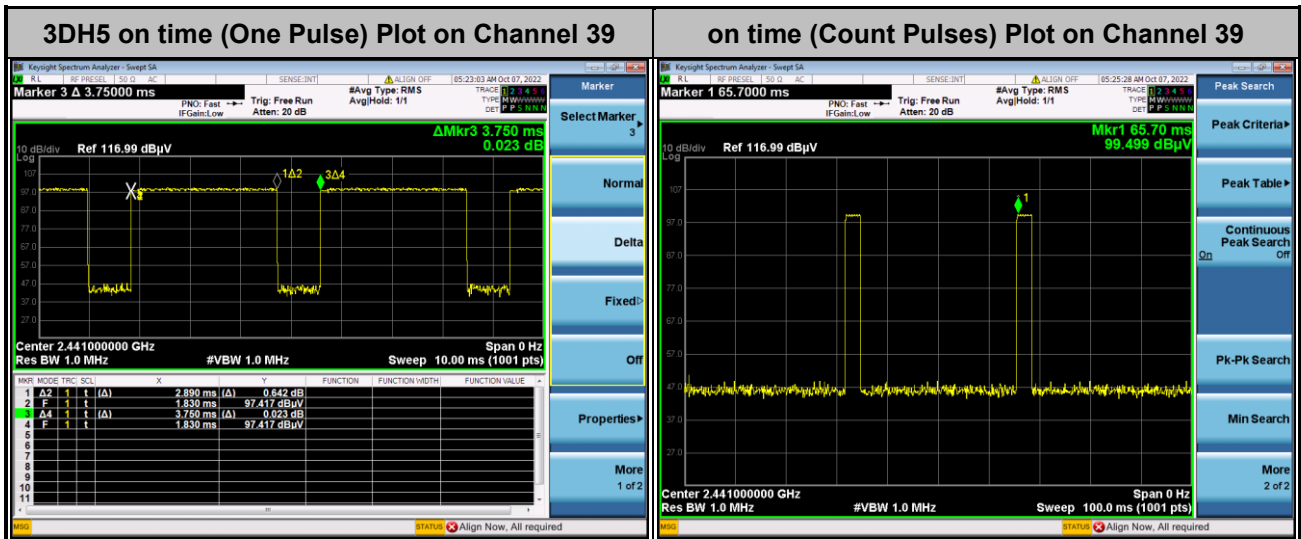
$$2.89 \text{ ms} \times 2 = 5.78 \text{ ms}$$

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

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



<Ant. 3>



Note:

- 4. Worst case Duty cycle = on time/100 milliseconds = 2 \* 2.89 / 100 = 5.78 %
- 5. Worst case Duty cycle correction factor = 20\*log(Duty cycle) = -24.76 dB
- 6. 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 ms x 20 channels = 57.8 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 / 57.8 ms ] = 2 hops

Thus, the maximum possible ON time:

2.89 ms x 2 = 5.78 ms

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

20 x log(5.78 ms/100 ms) = -24.76 dB

—THE END—