Appendix F. Radiated Spurious Emission

Test Engineer :	Andy Yang, Karl Hou and Steven Wu	Temperature :	20~25°C
		Relative Humidity :	50~60%

<Antenna A>

Band 4 5725~5850MHz

WIFI 802.11ax HE20_Partial 26 (Harmonic@ 3m)

WIFI Ant. 5+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)
802.11ax HE20 Partial 26/4 CH 157 5785MHz		7715	51.02	-22.98	74	65.33	36.66	14.78	65.75	400	205	P	H
		7715	46.29	-7.71	54	60.6	36.66	14.78	65.75	400	205	A	H
		11570	47.42	-26.58	74	57.13	38.99	17.52	66.22	-	-	P	H
		17355	47.38	-20.82	68.2	52.95	38.76	21.7	66.03	-	-	P	H
		7715	56.13	-17.87	74	70.44	36.66	14.78	65.75	311	172	P	V
		7715	52.86	-1.14	54	67.17	36.66	14.78	65.75	311	172	A	V
		11570	47.97	-26.03	74	57.68	38.99	17.52	66.22	-	-	P	V
		17355	47.65	-20.55	68.2	53.22	38.76	21.7	66.03	-	-	P	V
802.11ax HE20 Partial 26/8 CH 165 5825MHz		7770	51.14	-17.06	68.2	65.12	36.84	14.91	65.73	-	-	P	H
		11650	47.58	-26.42	74	57.41	38.8	17.59	66.22	-	-	P	H
		17475	48.28	-19.92	68.2	53.45	38.97	21.76	65.9	-	-	P	H
													H
		7770	53.39	-14.81	68.2	67.37	36.84	14.91	65.73	-	-	P	V
		11650	47.59	-26.41	74	57.42	38.8	17.59	66.22	-	-	P	V
		17475	48.54	-19.66	68.2	53.71	38.97	21.76	65.9	-	-	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Band 4 5725~5850MHz

WIFI 802.11ax HE80_Full (Harmonic@ 3m)

WIFI Ant. 5+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)
802.11ax HE80 Full CH 155 5775MHz		7704	51.99	-22.01	74	66.36	36.62	14.76	65.75	381	174	P	H
		7704	46.61	-7.39	54	60.98	36.62	14.76	65.75	381	174	A	H
		11550	47.6	-26.4	74	57.26	39.05	17.51	66.22	-	-	P	H
		17325	48.39	-19.81	68.2	54.09	38.67	21.69	66.06	-	-	P	H
		7704	56.06	-17.94	74	70.43	36.62	14.76	65.75	311	172	P	V
		7704	53.03	-0.97	54	67.4	36.62	14.76	65.75	311	172	A	V
		11550	48.24	-25.76	74	57.9	39.05	17.51	66.22	-	-	P	V
		17325	48	-20.2	68.2	53.7	38.67	21.69	66.06	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

<Antenna C>

Band 4 5725~5850MHz

WIFI 802.11ax HE20_Partial 26 (Harmonic @ 3m)

WIFI Ant. 5+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)
802.11ax HE20 Partial 26/4 CH 157 5785MHz		7715	56.23	-17.77	74	70.54	36.66	14.78	65.75	101	281	P	H
		7715	53.39	-0.61	54	67.7	36.66	14.78	65.75	101	281	A	H
		11570	47.93	-26.07	74	57.64	38.99	17.52	66.22	-	-	P	H
		17355	47.48	-20.72	68.2	53.05	38.76	21.7	66.03	-	-	P	H
		7715	53.95	-20.05	74	68.26	36.66	14.78	65.75	304	109	P	V
		7715	50.55	-3.45	54	64.86	36.66	14.78	65.75	304	109	A	V
		11570	47.91	-26.09	74	57.62	38.99	17.52	66.22	-	-	P	V
		17355	48.54	-19.66	68.2	54.11	38.76	21.7	66.03	-	-	P	V
802.11ax HE20 Partial 26/8 CH 165 5825MHz		7770	53.55	-14.65	68.2	67.53	36.84	14.91	65.73	-	-	P	H
		11650	47.84	-26.16	74	57.67	38.8	17.59	66.22	-	-	P	H
		17475	49.3	-18.9	68.2	54.47	38.97	21.76	65.9	-	-	P	H
													H
		7770	52.46	-15.74	68.2	66.44	36.84	14.91	65.73	-	-	P	V
		11650	47.92	-26.08	74	57.75	38.8	17.59	66.22	-	-	P	V
		17475	49.88	-18.32	68.2	55.05	38.97	21.76	65.9	-	-	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Band 4 5725~5850MHz

WIFI 802.11ax HE80_Full (Harmonic @ 3m)

WIFI Ant. 5+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)
802.11ax HE80 Full CH 155 5775MHz		7704	56.2	-17.8	74	70.57	36.62	14.76	65.75	103	281	P	H
		7704	53.89	-0.11	54	68.26	36.62	14.76	65.75	103	281	A	H
		11550	47.98	-26.02	74	57.64	39.05	17.51	66.22	-	-	P	H
		17325	48.71	-19.49	68.2	54.41	38.67	21.69	66.06	-	-	P	H
		7704	54.54	-19.46	74	68.91	36.62	14.76	65.75	316	109	P	V
		7704	51.19	-2.81	54	65.56	36.62	14.76	65.75	316	109	A	V
		11550	47.97	-26.03	74	57.63	39.05	17.51	66.22	-	-	P	V
		17325	48.56	-19.64	68.2	54.26	38.67	21.69	66.06	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
5+4		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		7715	56.23	-17.77	74	70.54	36.66	14.78	65.75	101	281	P	H
		7715	53.39	-0.61	54	67.7	36.66	14.78	65.75	101	281	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Margin(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 7715MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 36.66(dB/m) + 14.78(dB) + 70.54(dBμV) – 65.75 (dB)

= 56.23 (dBμV/m)

2. Margin(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 56.23(dBμV/m) – 74(dBμV/m)

= -17.77(dB)

For Average Limit @ 7715MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 36.66(dB/m) + 14.78(dB) + 67.7(dBμV) – 65.75 (dB)

= 53.39 (dBμV/m)

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

= 53.39(dBμV/m) – 54(dBμV/m)

= -0.61(dB)

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

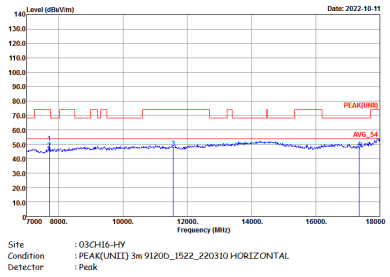
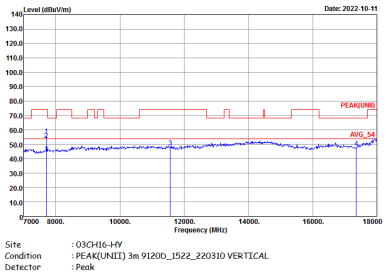
Appendix G. Radiated Spurious Emission Plots

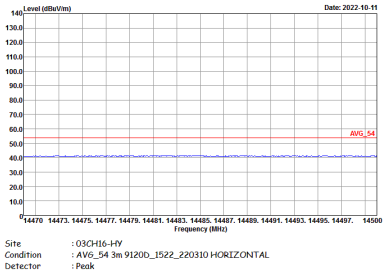
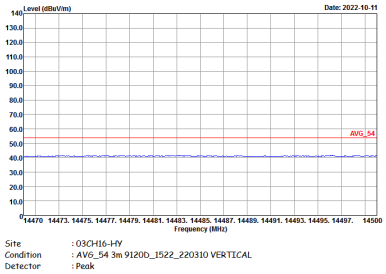
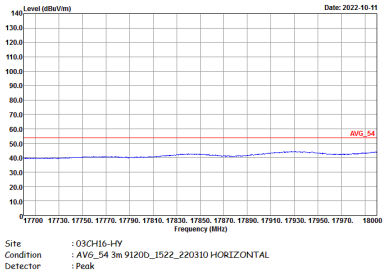
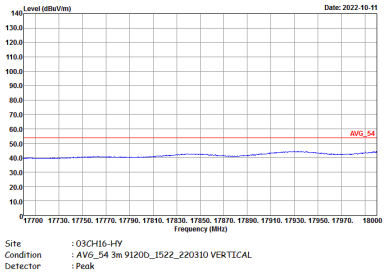
Test Engineer :	Andy Yang, Karl Hou and Steven Wu	**Temperature :**	20~25°C
		Relative Humidity :	50~60%

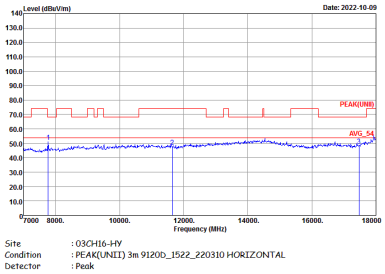
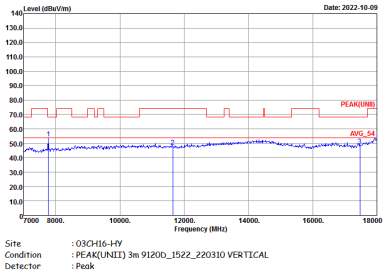
<Antenna A>

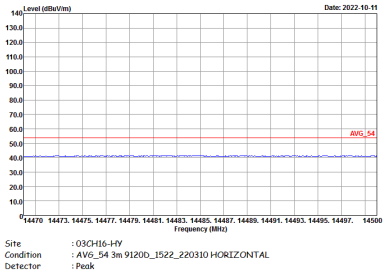
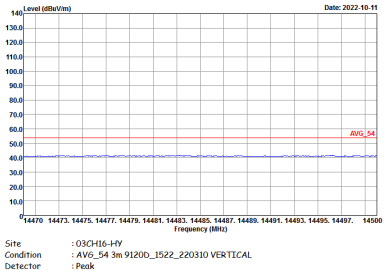
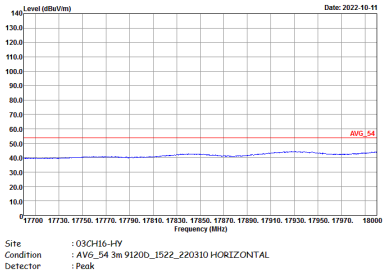
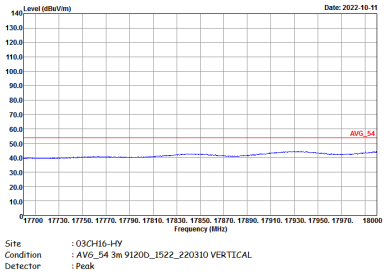
Band 4 5725~5850MHz

WIFI 802.11ax HE20 Partial 26 (Harmonic @ 3m)

WIFI	**Band 4 5725~5850MHz Harmonic @ 3m**	
ANT	**802.11ax HE20 Partial 26/4 CH157 5785MHz**	
5+4	**Horizontal**	**Vertical**
Peak **Avg.**		

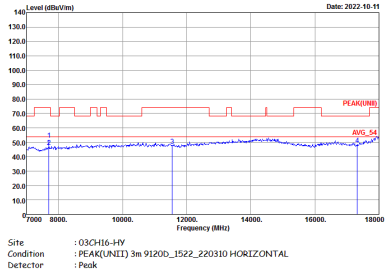
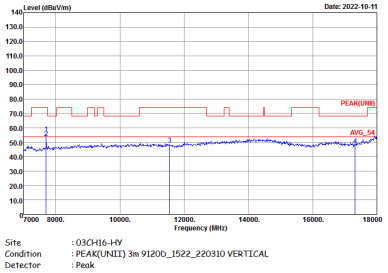
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/4 CH157 5785MHz	
5+4	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

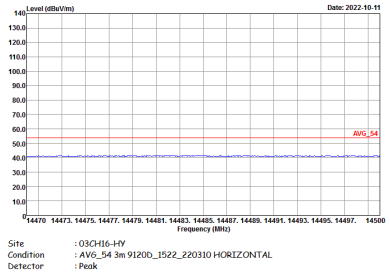
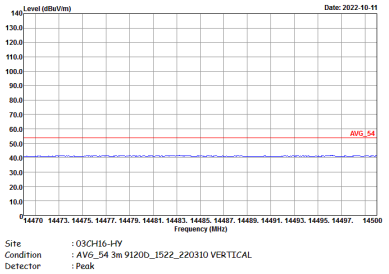
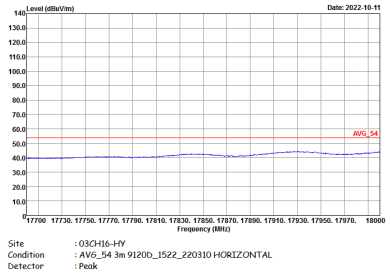
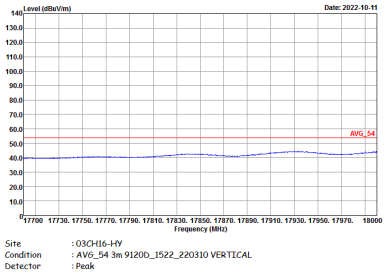
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/8 CH165 5825MHz	
5+4	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/8 CH165 5825MHz	
5+4	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

Band 4 5725~5850MHz

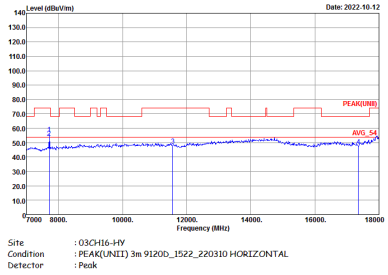
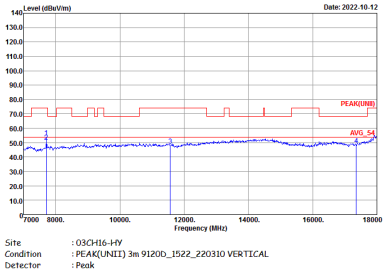
WIFI 802.11ax HE80 Full (Harmonic @ 3m)

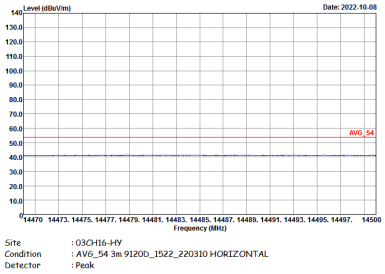
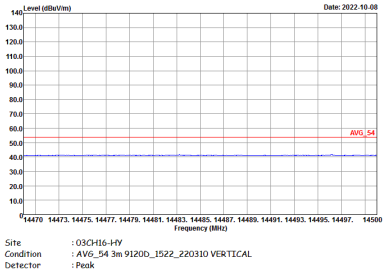
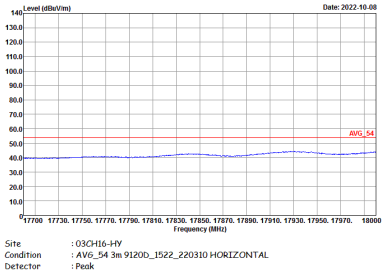
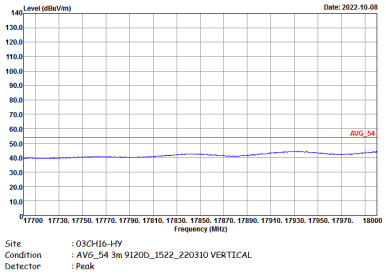
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
5+4	Horizontal	Vertical
Peak Avg.		

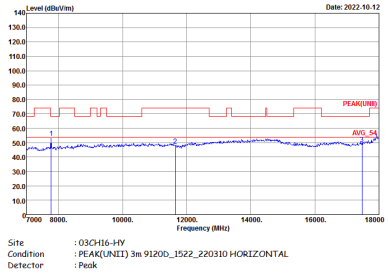
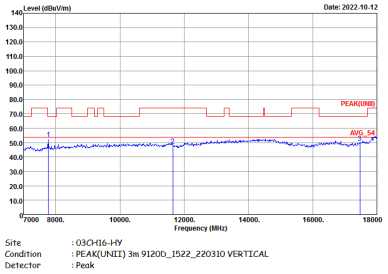
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
5+4	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

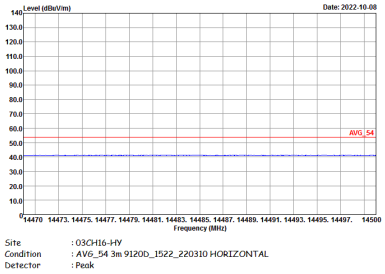
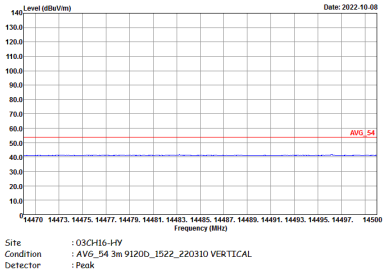
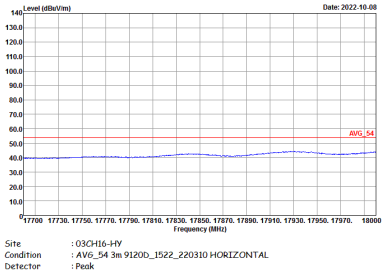
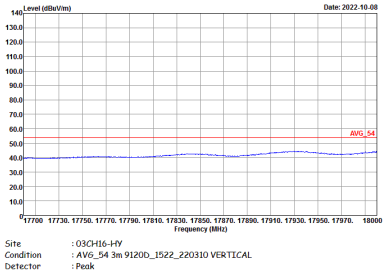
<Antenna C>

Band 4 5725~5850MHz
WIFI 802.11ax HE20 Partial 26 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/4 CH157 5785MHz	
5+4	Horizontal	Vertical
Peak Avg.		

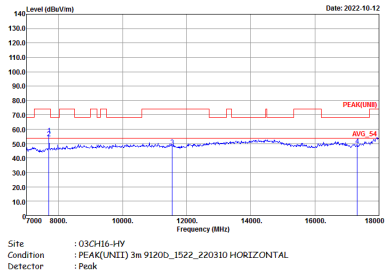
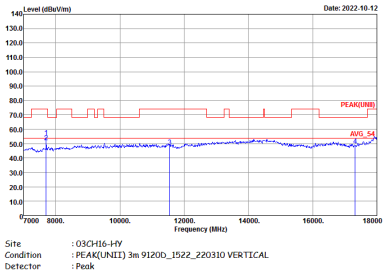
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/4 CH157 5785MHz	
5+4	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

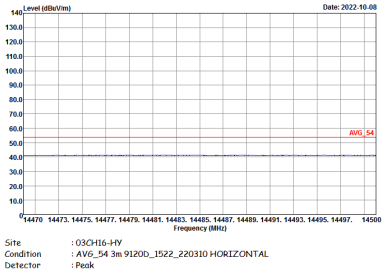
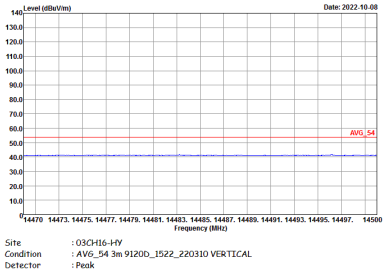
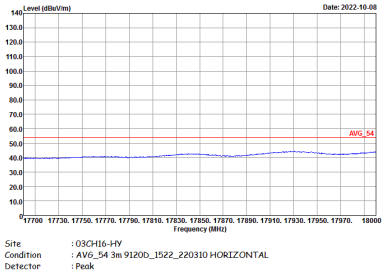
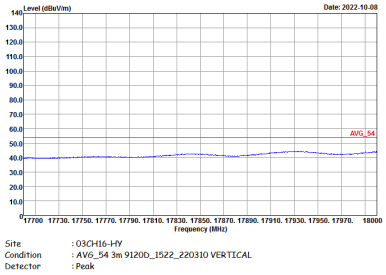
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/8 CH165 5825MHz	
5+4	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 26/8 CH165 5825MHz	
5+4	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

Band 4 5725~5850MHz

WIFI 802.11ax HE80 Full (Harmonic @ 3m)

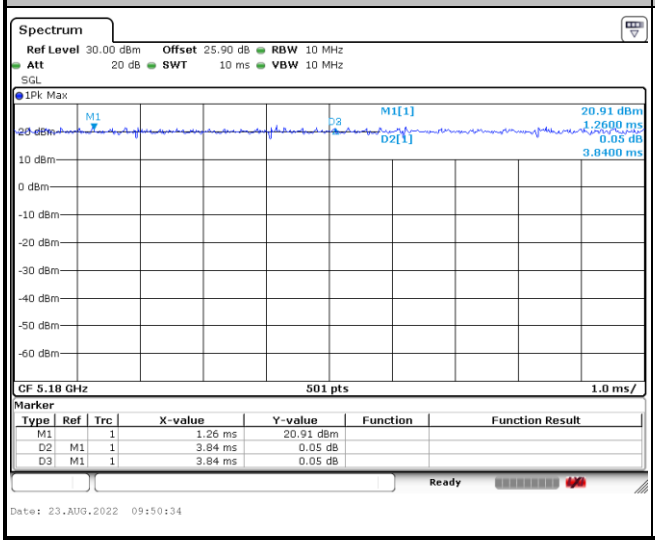
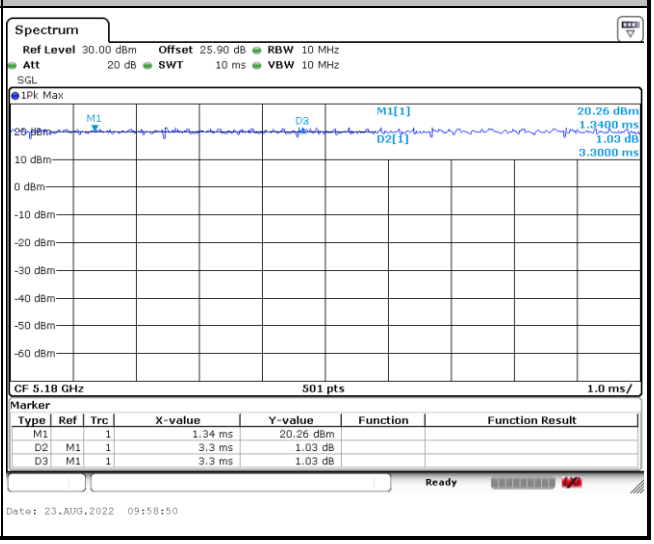
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
5+4	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE80 Full CH155 5775MHz	
5+4	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

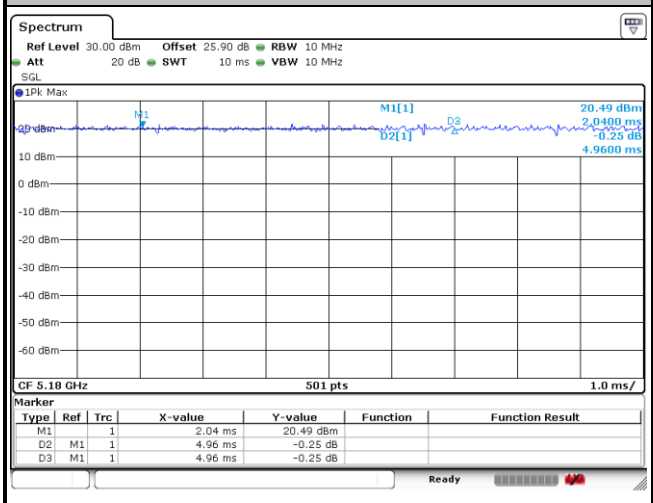
Appendix H. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
5+4	5GHz 802.11a for Ant. 5	100.00	-	-	10Hz
5+4	5GHz 802.11a for Ant. 4	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE20 Full RU for Ant. 5	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE20 Full RU for Ant. 4	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE20 26 RU for Ant. 5	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE20 26 RU for Ant. 4	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE40 Full RU for Ant. 5	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE40 Full RU for Ant. 4	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE80 Full RU for Ant. 5	100.00	-	-	10Hz
5+4	5GHz 802.11ax HE80 Full RU for Ant. 4	100.00	-	-	10Hz

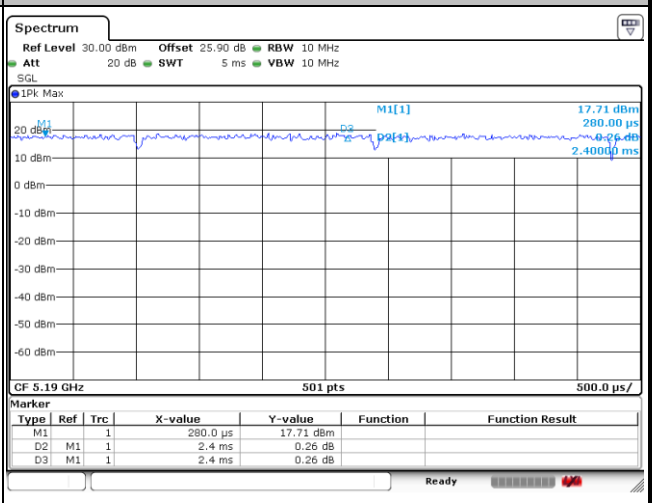
MIMO <Ant. 5>

802.11a	802.11ax HE20 Full RU
	

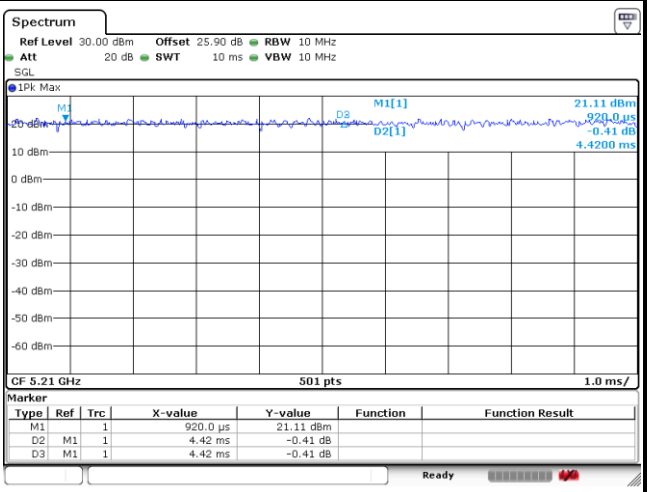
802.11ax HE20 26 RU



802.11ax HE40 Full RU

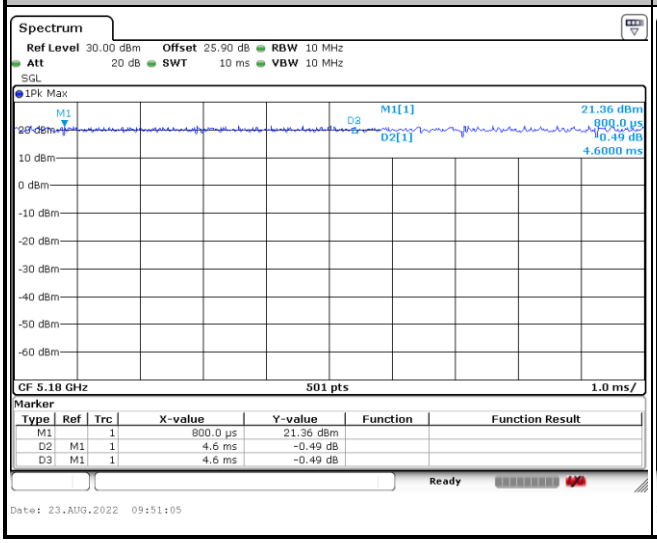


802.11ax HE80 Full RU

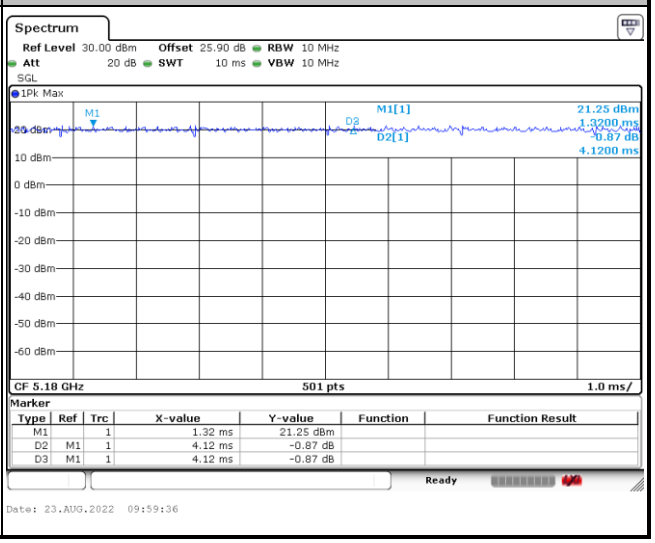


MIMO <Ant. 4>

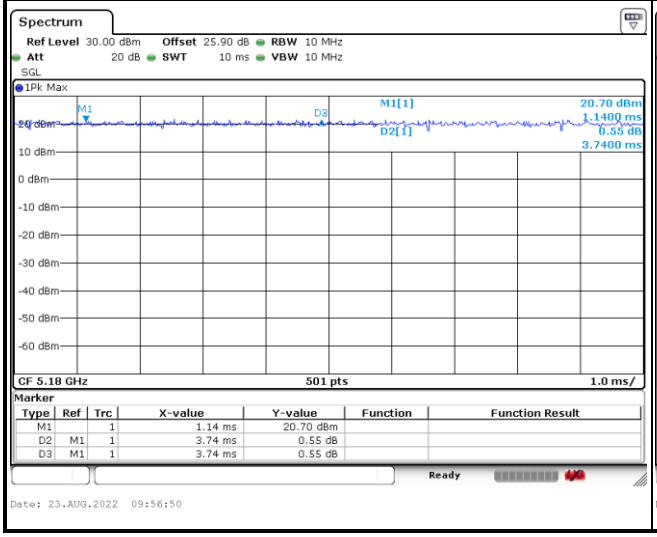
802.11a



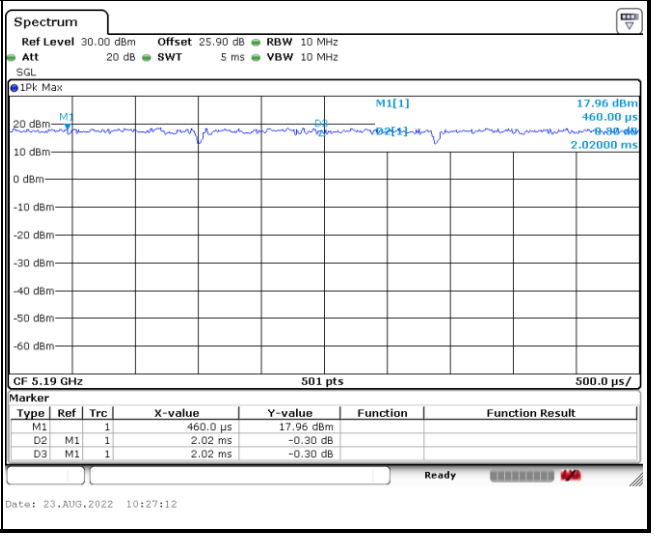
802.11ax HE20 Full RU



802.11ax HE20 26 RU



802.11ax HE40 Full RU



802.11ax HE80 Full RU