Test procedure
ANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G

Test settings
Peak field strength measurements
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW ≥ (3×RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 ㎑ to 150 ㎑	200 ㎐ to 300 ㎐
0.15 ㎒ to 30 ㎒	9 ㎑ to 10 ㎑
30 ㎒ to 1 000 ㎒	100 ㎑ to 120 ㎑
> 1 000 ㎒	1 ㎒

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):
1. RBW = 1 ㎒ (unless otherwise specified).
2. VBW ≥ (3×RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or ㏈ averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:
1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 ㎒ (unless otherwise specified).
4. VBW ≥ [3 × RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

6. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
   1) If power averaging (rms) mode was used in step f), then the applicable correction factor is [10 log (1 / D)], where D is the duty cycle.
   2) If linear voltage averaging mode was used in step f), then the applicable correction factor is [20 log (1 / D)], where D is the duty cycle.
   3) If a specific emission is demonstrated to be continuous (D ≥ 98%) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

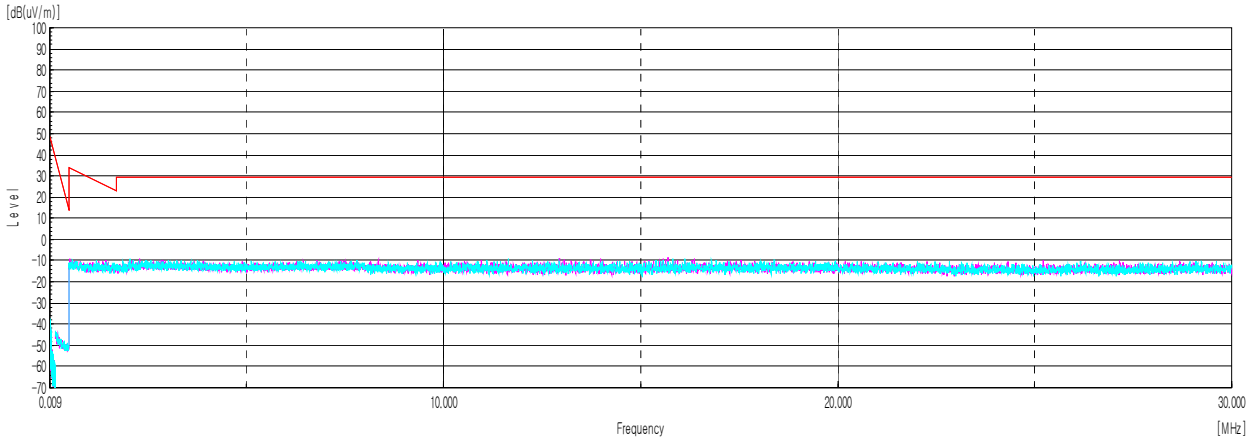
Notes:

1. *f* <30 MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/Ds)$
   f ≥30 MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/Ds)$
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. 1) means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
7. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: “No spurious emissions were detected within 20 dB of the limit.”
8. For above 1 GHz pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

Test results (Below 30 ㎒) – Worst case: 802.11a / UNII-2C 5 700 ㎒

Frequency	Pol.	Reading	Ant. Factor	Amp. +Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
No spurious emissions were detected within 20 ㏈ of the limit.									

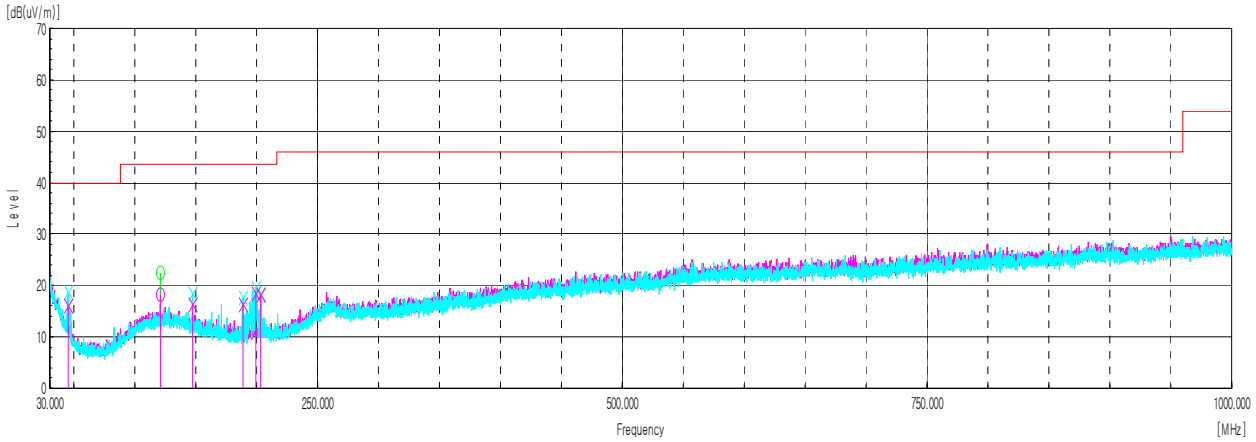
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: 802.11a / UNII-2C 5 700 ㎒

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
45.16	V	29.90	18.30	-30.10	-	18.10	40.00	21.90
120.70[1)]	H	28.60	17.17	-28.76	-	17.01	43.50	26.49
146.89	V	27.80	19.10	-28.35	-	18.55	43.50	24.95
188.60	V	28.80	16.24	-27.86	-	17.18	43.50	26.32
199.27	V	30.40	15.50	-27.70	-	18.20	43.50	25.30
203.02	V	30.10	15.56	-27.68	-	17.98	43.50	25.52

Horizontal/Vertical



Test results (Above 1 000 ㎒)

802.11a UNII-1

Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.77[1)]	V	50.14	34.17	-26.27	-	58.04	74.00	15.96
10 360.41	H	62.43	37.56	-49.97	-	50.02	68.20	18.18
16 294.41	V	56.81	40.95	-47.14	-	50.62	68.20	17.58
Average Data								
5 149.77[1)]	V	41.25	34.17	-26.27	0.14	49.29	54.00	4.71

Middle Channel (5 200 ㎒)

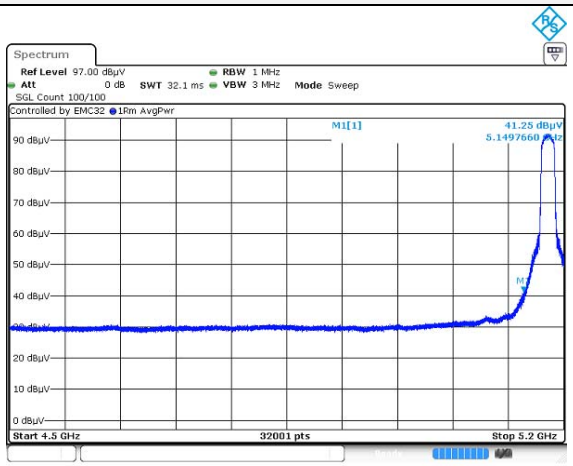
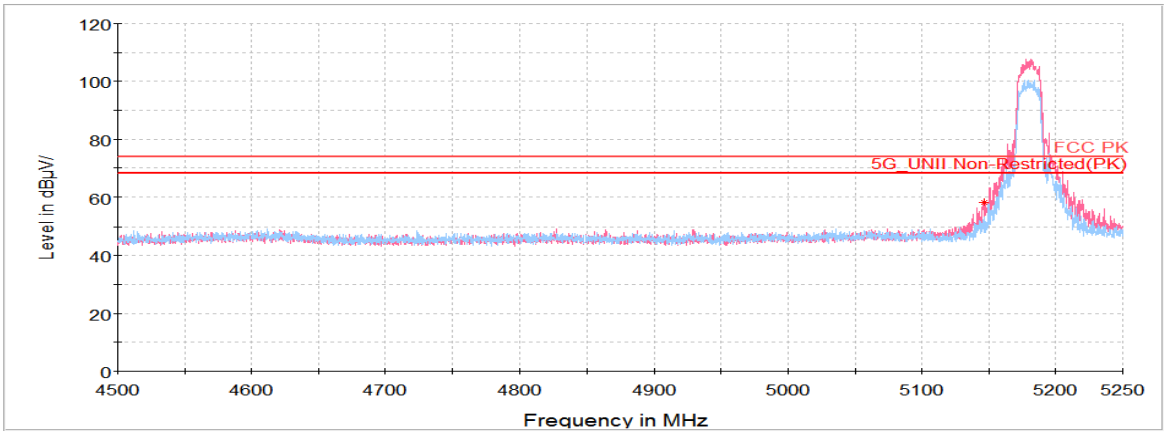
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 400.30	H	64.23	37.60	-50.01	-	51.82	68.20	16.38
15 707.91[1)]	V	55.78	39.92	-46.11	-	49.59	74.00	24.41
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 ㎒)

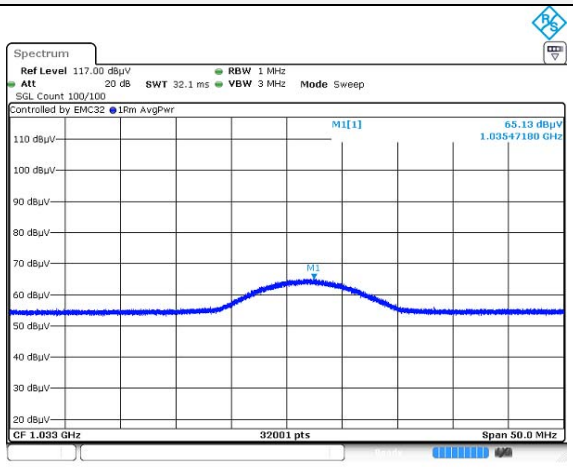
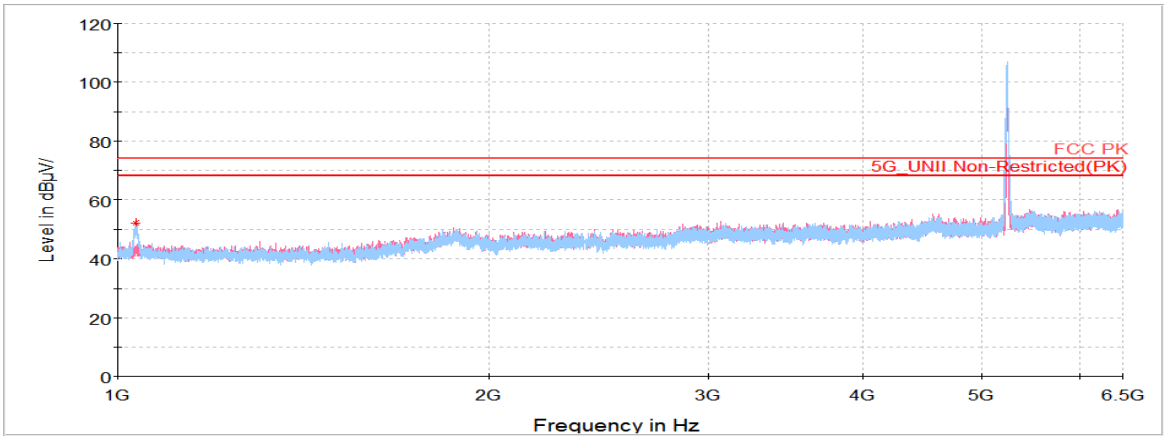
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 035.47[1)]	H	72.39	28.81	-49.00	-	52.20	74.00	21.80
10 484.75	H	61.59	37.68	-50.08	-	49.19	68.20	19.01
16 224.69	V	57.14	40.87	-46.88	-	51.13	68.20	17.07
Average Data								
1 035.47[1)]	H	65.13	28.81	-49.00	0.14	45.08	54.00	8.92

802.11a_UNII-1

Lowest Channel (5 180 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

Highest Channel (5 240 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

802.11n HT20 UNII-1

Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.96[1)]	V	54.73	34.17	-26.27	-	62.63	74.00	11.37
10 357.89	H	63.34	37.56	-49.97	-	50.93	68.20	17.27
15 567.75[1)]	V	54.87	39.97	-46.14	-	48.70	74.00	25.30
Average Data								
5 149.96[1)]	V	40.76	34.17	-26.27	0.15	48.81	54.00	5.19

Middle Channel (5 200 ㎒)

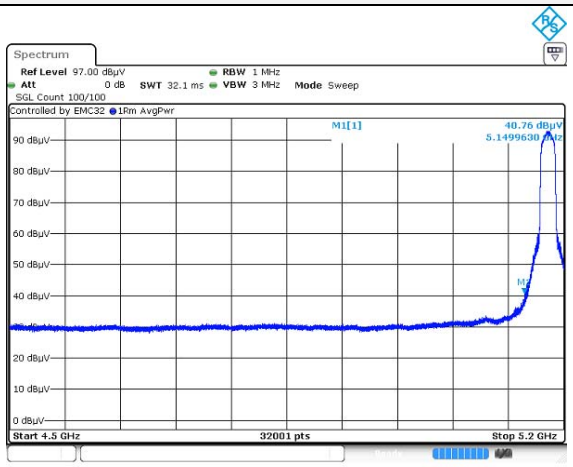
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 402.81	H	65.97	37.60	-50.01	-	53.56	68.20	14.64
15 596.50[1)]	H	54.46	39.96	-46.13	-	48.29	74.00	25.71
Average Data								
No spurious emissions were detected within 20 dB of the limit								

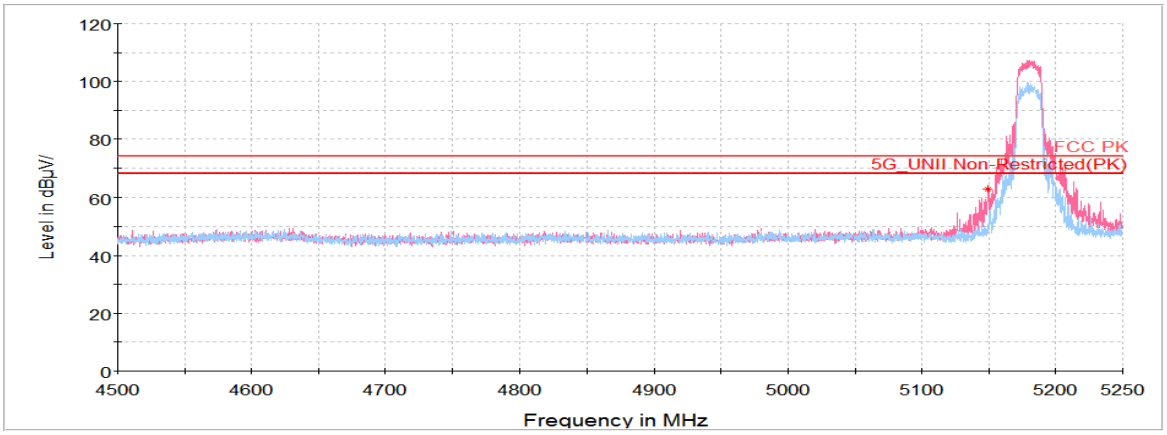
Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 034.81[1)]	H	72.23	28.81	-49.00	-	52.04	74.00	21.96
10 478.64	H	63.91	37.68	-50.07	-	51.52	68.20	16.68
15 712.22[1)]	V	54.76	39.92	-46.11	-	48.57	74.00	25.43
Average Data								
1 034.81	H	64.75	28.81	-49.00	0.15	44.71	54.00	9.29

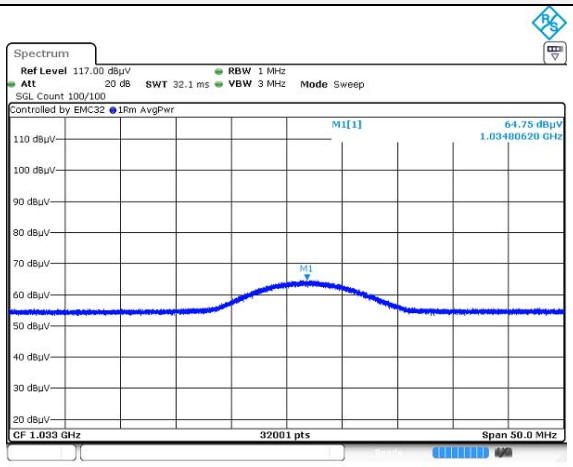
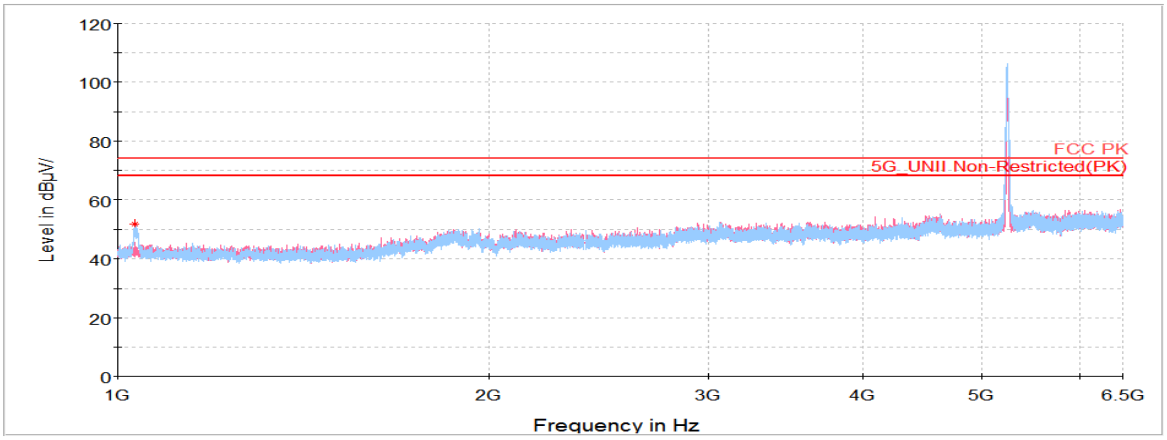
802.11n HT20 UNII-1

Lowest Channel (5 180 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


Highest Channel (5 240 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

802.11n HT40_UNII-1

Lowest Channel (5 190 ㎒)

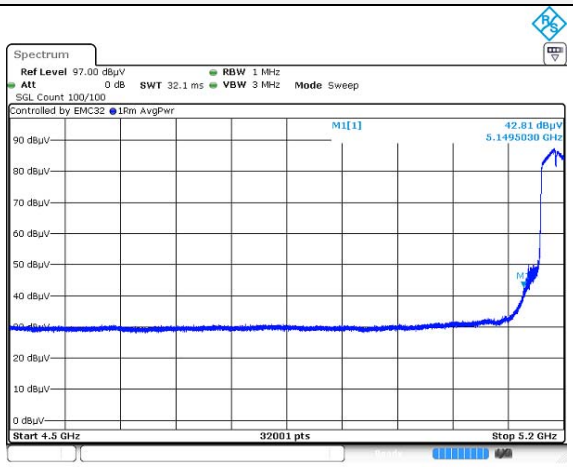
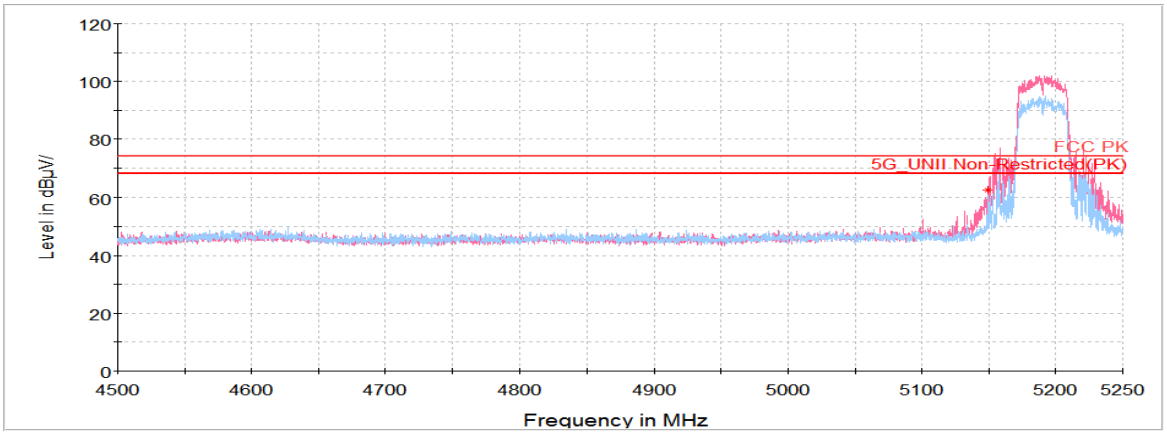
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.50[1)]	V	54.63	34.17	-26.27	-	62.53	74.00	11.47
10 385.20	H	60.34	37.59	-49.99	-	47.94	68.20	20.26
15 569.91[1)]	V	54.74	39.97	-46.14	-	48.57	74.00	25.43
Average Data								
5 149.50[1)]	V	42.81	34.17	-26.27	0.29	51.00	54.00	3.00

Highest Channel (5 230 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 024.92[1)]	H	70.05	28.80	-49.00	-	49.85	74.00	24.15
10 458.16	H	61.03	37.66	-50.05	-	48.64	68.20	19.56
15 667.30[1)]	V	55.49	39.93	-46.12	-	49.30	74.00	24.70
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT40_UNII-1

Lowest Channel (5 190 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

802.11ac VHT20 UNII-1

Lowest Channel (5 180 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.02[1)]	V	51.50	34.17	-26.28	-	59.39	74.00	14.61
10 355.02	H	60.98	37.56	-49.97	-	48.57	68.20	19.63
15 522.11[1)]	V	54.46	39.99	-46.15	-	48.30	74.00	25.70
Average Data								
5 149.02[1)]	V	38.88	34.17	-26.28	0.15	46.92	54.00	7.08

Middle Channel (5 200 ㎒)

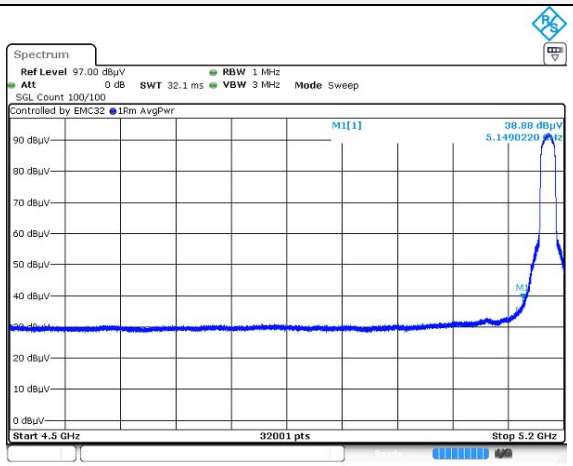
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 399.94	H	64.17	37.60	-50.01	-	51.76	68.20	16.44
15 597.58[1)]	V	55.05	39.96	-46.13	-	48.88	74.00	25.12
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit								

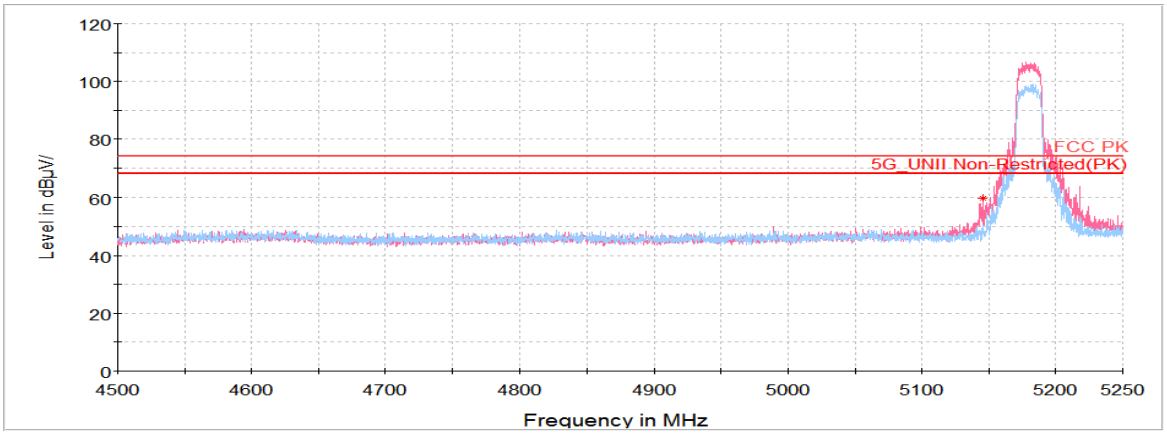
Highest Channel (5 240 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 035.63[1)]	H	72.22	28.81	-49.00	-	52.03	74.00	21.97
10 479.00	H	64.27	37.68	-50.07	-	51.88	68.20	16.32
15 721.56[1)]	V	54.67	39.91	-46.11	-	48.47	74.00	25.53
Average Data								
1 035.63[1)]	H	64.95	28.81	-49.00	0.15	44.91	54.00	9.09

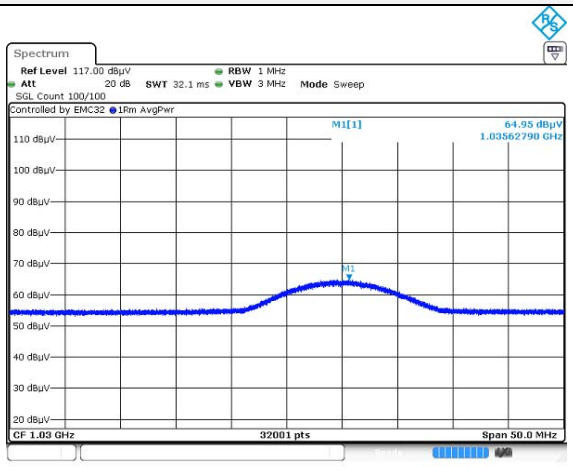
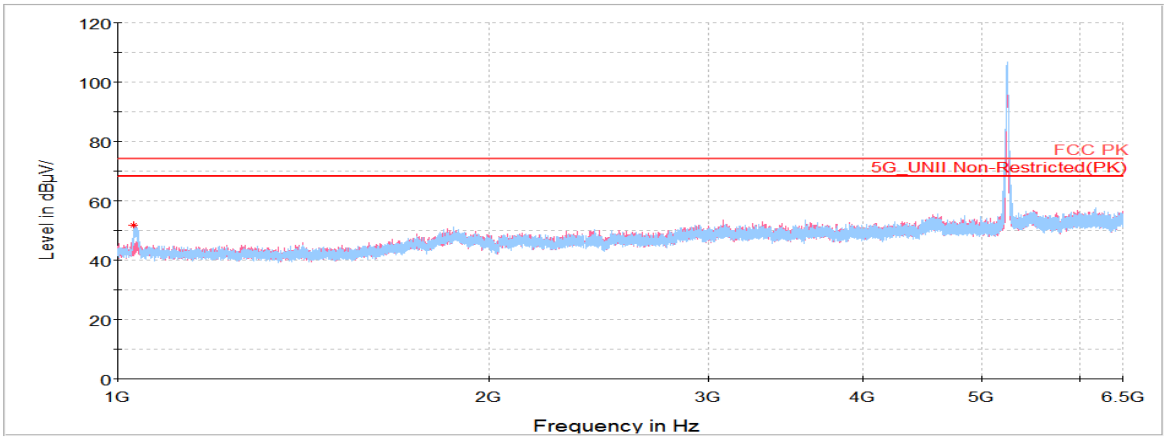
802.11ac VHT20 UNII-1

Lowest Channel (5 180 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


Highest Channel (5 240 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

802.11ac VHT40_UNII-1

Lowest Channel (5 190 ㎒)

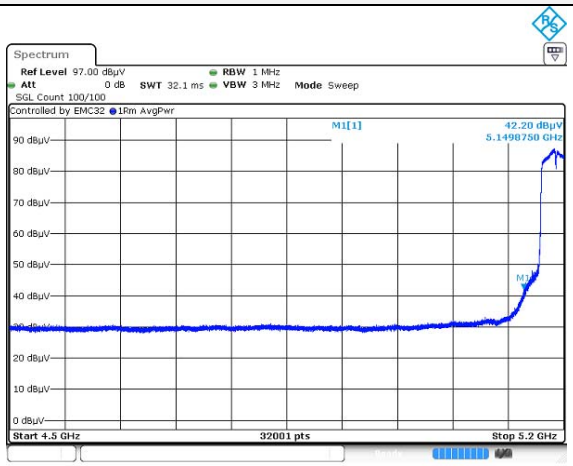
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 149.88[1)]	V	51.67	34.17	-26.27	-	59.57	74.00	14.43
10 391.31	H	61.21	37.59	-50.00	-	48.80	68.20	19.40
15 570.98[1)]	H	55.20	39.97	-46.14	-	49.03	74.00	24.97
Average Data								
5 149.88[1)]	V	42.20	34.17	-26.27	0.29	50.39	54.00	3.61

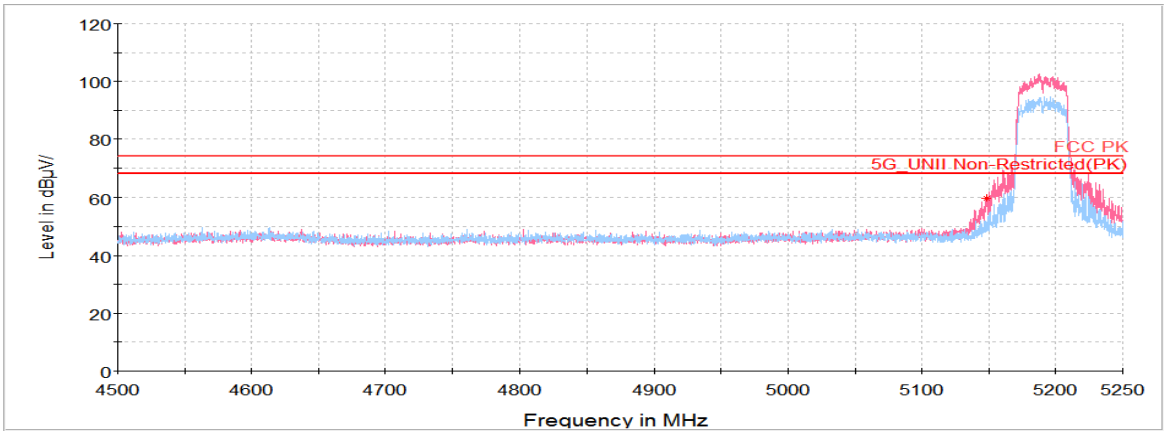
Highest Channel (5 230 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
10 462.83	H	60.45	37.66	-50.06	-	48.05	68.20	20.15
15 709.34[1)]	H	55.05	39.92	-46.11	-	48.86	74.00	25.14
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT40_UNII-1

Lowest Channel (5 190 ㎒)

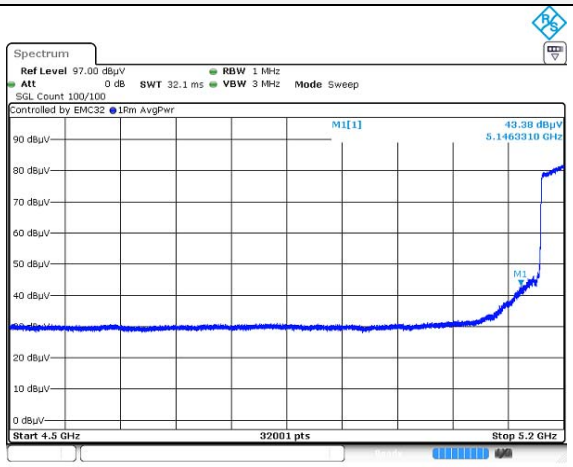
Average data	
	Blank

Horizontal/Vertical for Band-edge


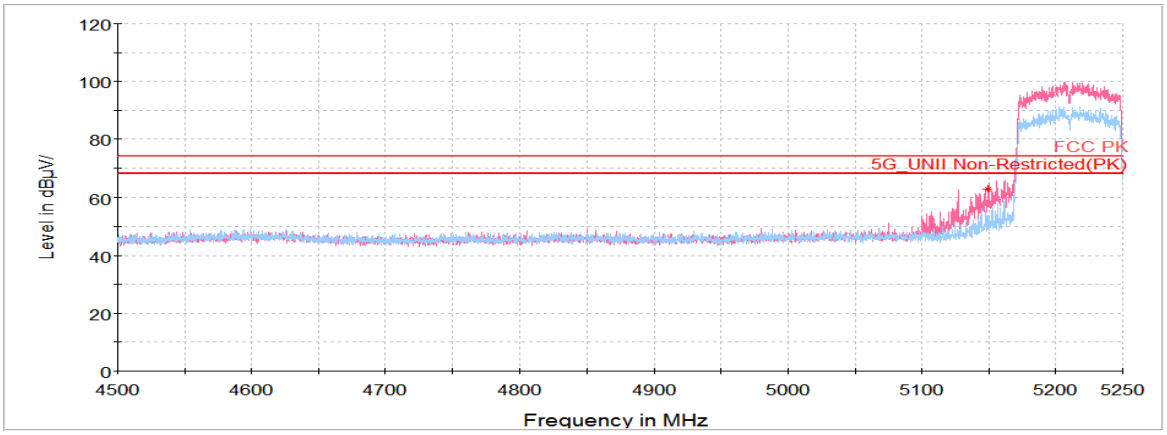
802.11ac VHT80_UNII-1

Lowest Channel (5 210 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 146.33[1)]	V	54.90	34.16	-26.31	-	62.75	74.00	11.25
10 440.55	V	58.03	37.64	-50.04	-	45.63	68.20	22.57
15 629.56[1)]	H	54.07	39.95	-46.13	-	47.89	74.00	26.11
Average Data								
5 146.33[1)]	V	43.38	34.16	-26.31	0.56	51.79	54.00	2.21

Average data	
	Blank

Horizontal/Vertical for Band-edge

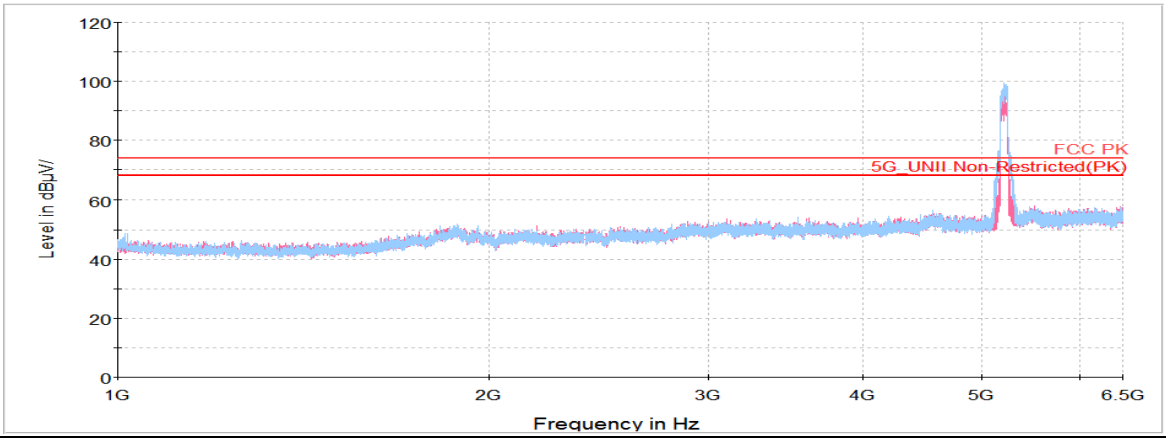


Plot of Harmonics and Spurious Emissions

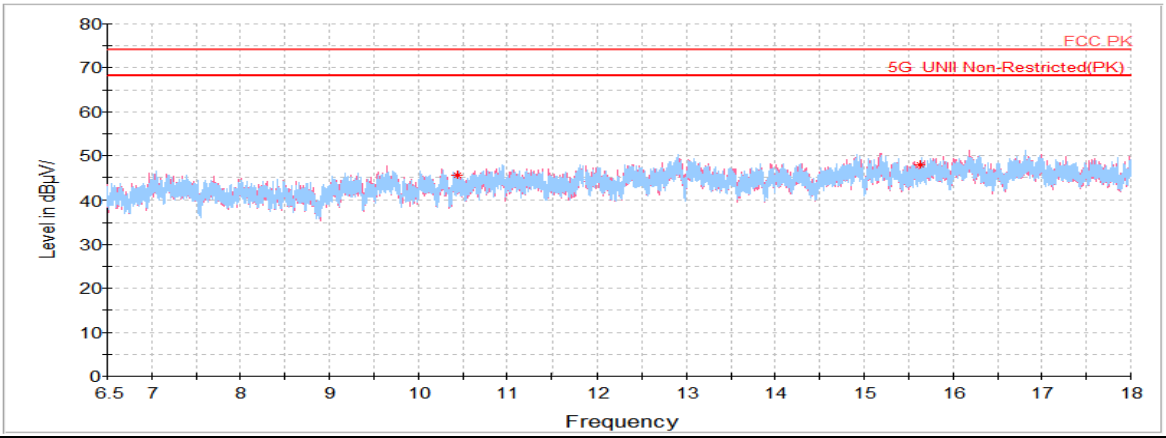
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT80_UNII-1_Lowest Channel (5 210 ㎒)

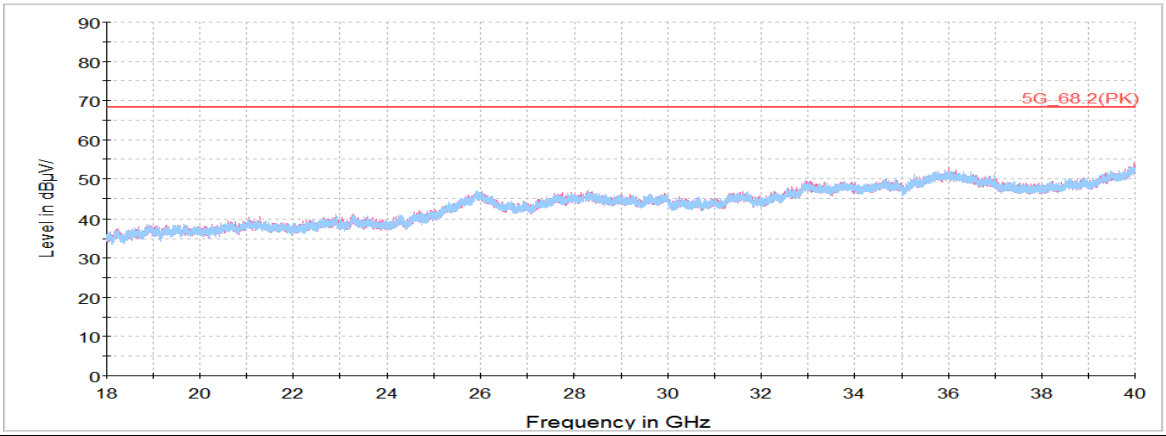
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a UNII-2A

Lowest Channel (5 260 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 055.04[1)]	H	73.15	28.81	-49.00	-	52.96	74.00	21.04
10 516.73	H	64.06	37.72	-50.04	-	51.74	68.20	16.46
15 679.52[1)]	H	55.85	39.93	-46.12	-	49.66	74.00	24.34
Average Data								
1 055.04[1)]	H	64.64	28.81	-49.00	0.14	44.59	54.00	9.41

Middle Channel (5 280 ㎒)

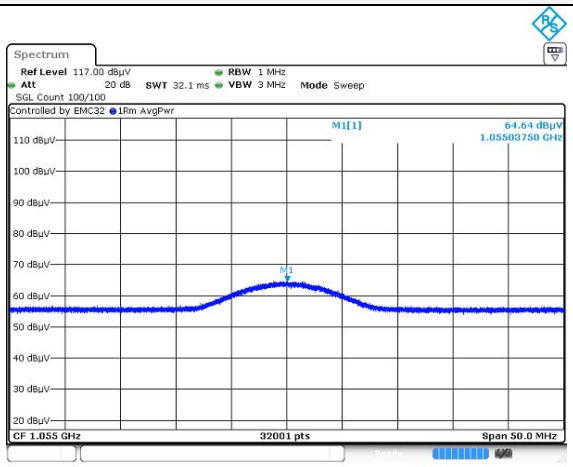
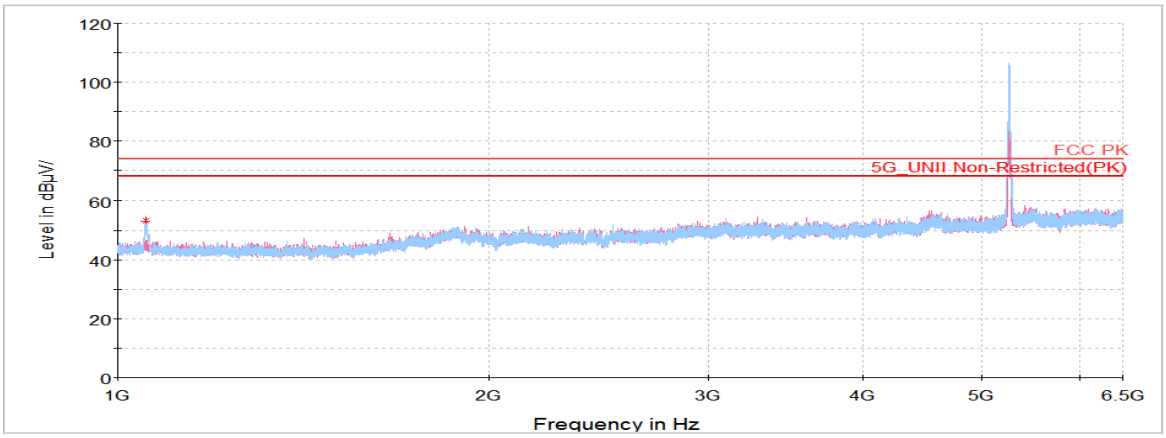
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 074.60[1)]	H	74.62	28.81	-49.00	-	54.43	74.00	19.57
10 564.89	H	63.88	37.76	-49.90	-	51.74	68.20	16.46
15 904.13[1)]	V	56.95	39.84	-46.07	-	50.72	74.00	23.28
Average Data								
1 074.60[1)]	H	64.44	28.81	-49.00	0.14	44.39	54.00	9.61

Highest Channel (5 320 ㎒)

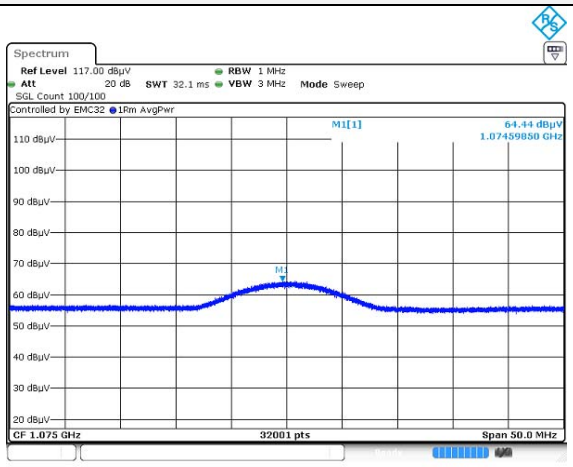
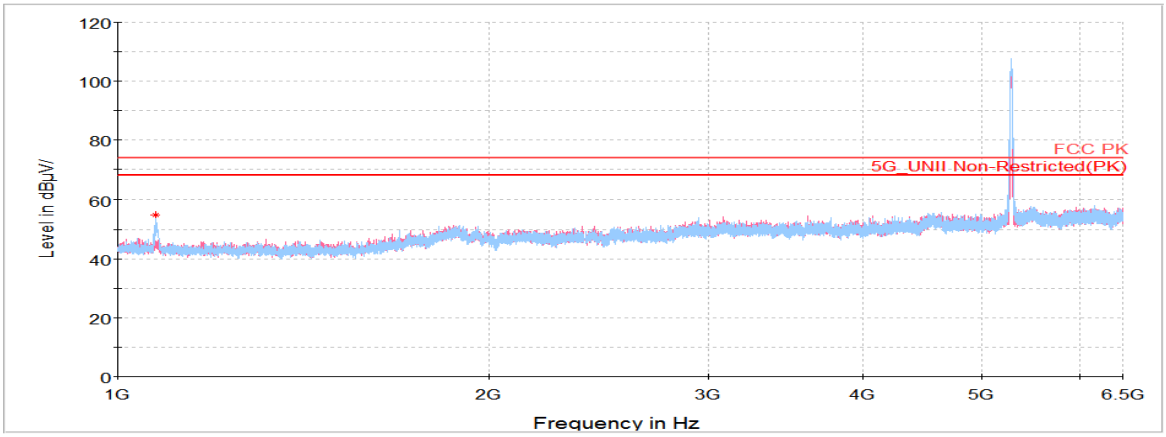
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 115.19[1)]	H	71.56	28.82	-48.98	-	51.40	74.00	22.60
5 350.40[1)]	V	51.93	34.53	-26.11	-	60.35	74.00	13.65
10 640.70[1)]	H	64.50	37.84	-49.69	-	52.65	74.00	21.35
16 207.44	H	56.79	40.85	-46.81	-	50.83	68.20	17.37
Average Data								
1 115.19[1)]	H	64.05	28.82	-48.98	0.14	44.03	54.00	9.97
5 350.40[1)]	V	41.71	34.53	-26.11	0.14	50.27	54.00	3.73
10 640.70[1)]	H	55.66	37.84	-49.69	0.14	43.95	54.00	10.05

802.11a UNII-2A

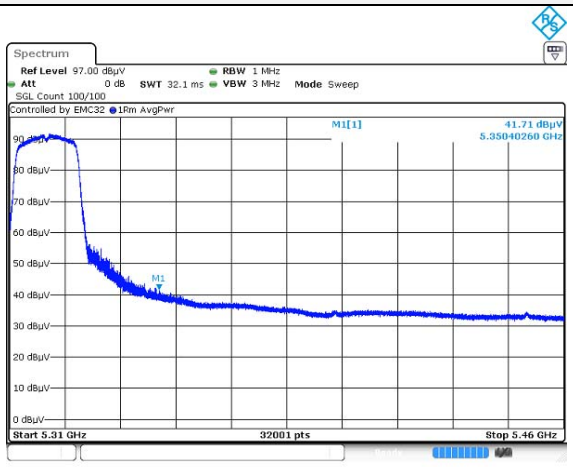
Lowest Channel (5 260 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

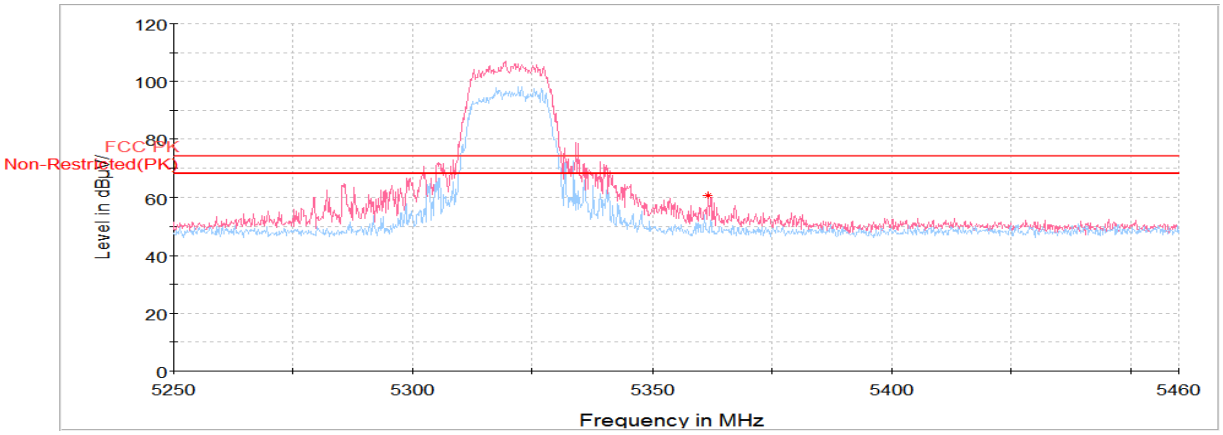
Middle Channel (5 280 ㎒)

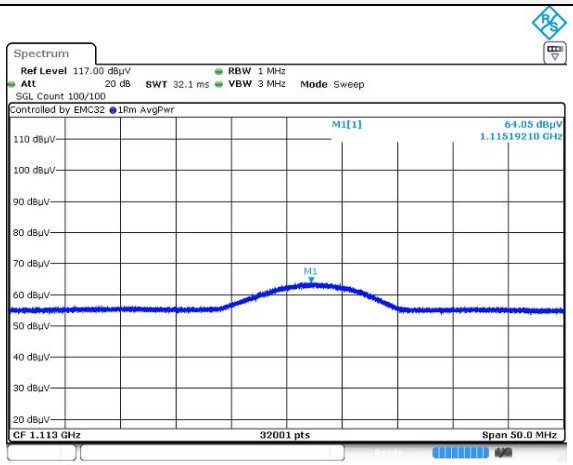
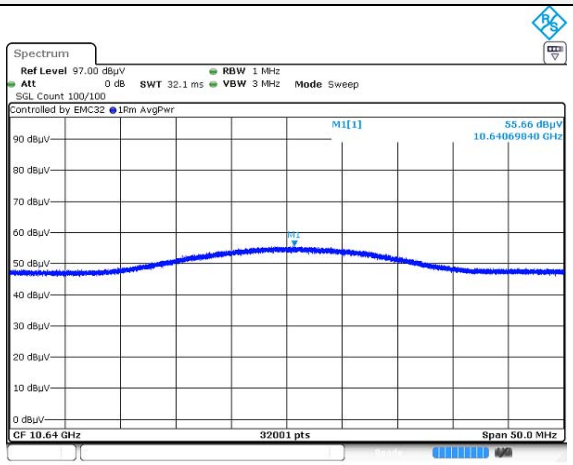
Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Highest Channel (5 320 ㎒)

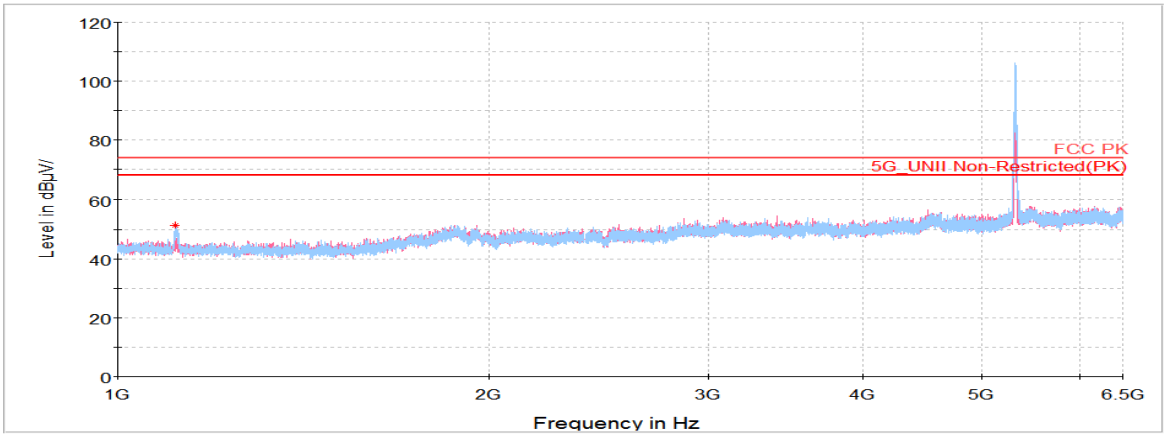
Average data	
	Blank

Horizontal/Vertical for Band-edge

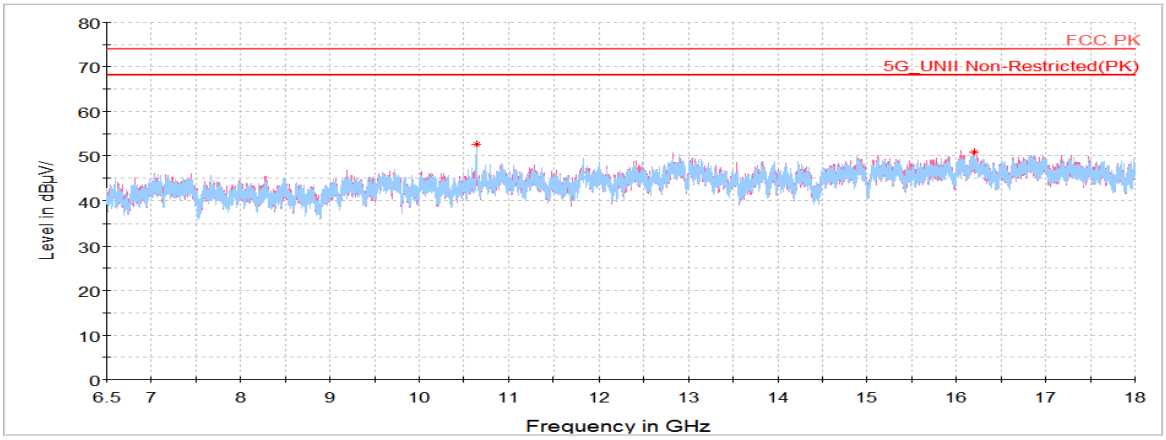


Average data	Average data
	

Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



802.11n HT20_UNII-2A

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
1 055.55[1)]	H	72.99	28.81	-49.00	-	52.80	74.00	21.20
10 515.66	H	63.24	37.72	-50.04	-	50.92	68.20	17.28
15 779.78[1)]	V	54.48	39.89	-46.10	-	48.27	74.00	25.73
Average Data								
1 055.55[1)]	H	65.35	28.81	-49.00	0.15	45.31	54.00	8.69

Middle Channel (5 280 MHz)

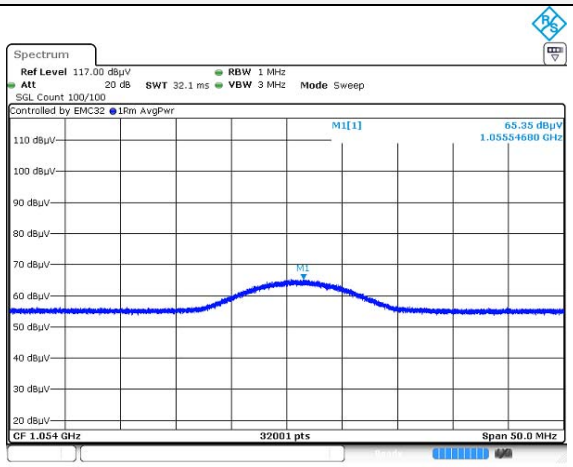
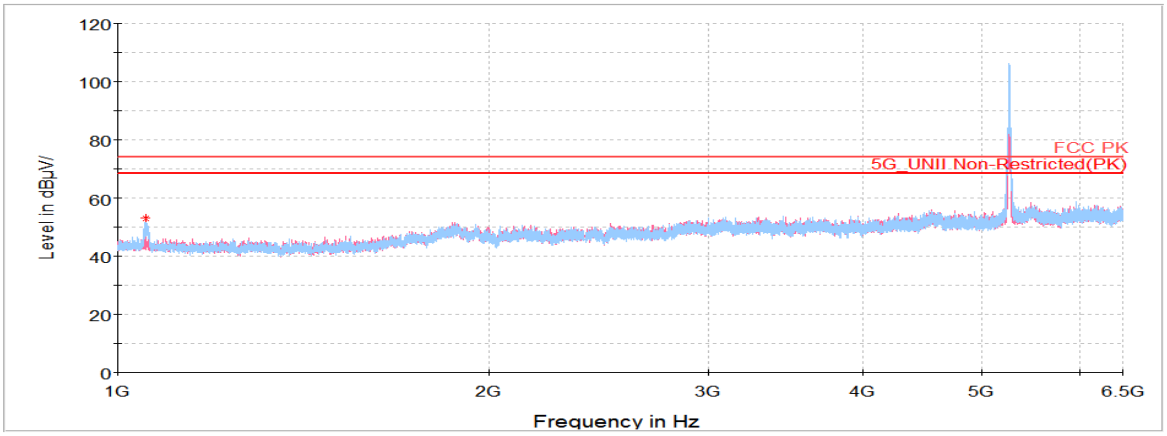
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
1 075.67[1)]	H	71.60	28.82	-49.00	-	51.42	74.00	22.58
10 554.11	H	64.79	37.75	-49.93	-	52.61	68.20	15.59
15 840.52[1)]	H	57.18	39.86	-46.08	-	50.96	74.00	23.04
Average Data								
1 075.67[1)]	H	65.65	28.82	-49.00	0.15	45.62	54.00	8.38

Highest Channel (5 320 MHz)

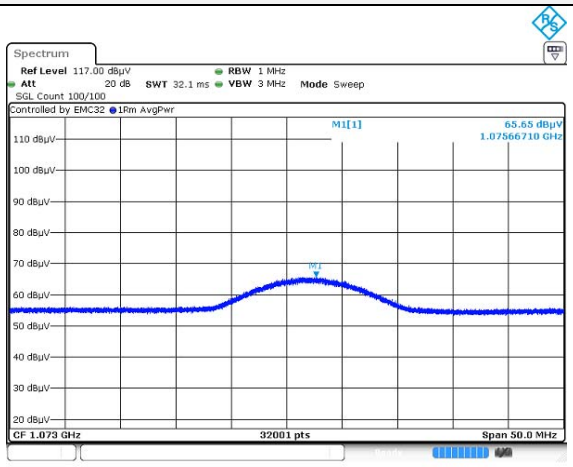
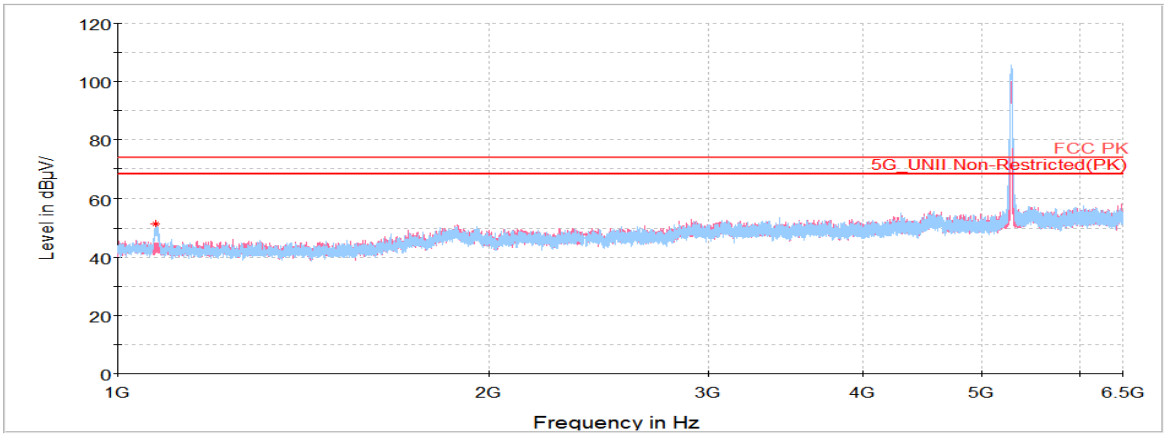
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
1 115.26[1)]	H	71.48	28.82	-48.98	-	51.32	74.00	22.68
5 350.29[1)]	V	55.06	34.53	-26.11	-	63.48	74.00	10.52
10 639.63[1)]	H	65.01	37.84	-49.69	-	53.16	74.00	20.84
15 994.33[1)]	V	54.67	39.80	-46.05	-	48.42	74.00	25.58
Average Data								
1 115.26[1)]	H	63.39	28.82	-48.98	0.15	43.38	54.00	10.62
5 350.29[1)]	V	42.56	34.53	-26.11	0.15	51.13	54.00	2.87
10 639.63[1)]	H	58.71	37.84	-49.69	0.15	47.01	54.00	6.99

802.11n HT20 UNII-2A

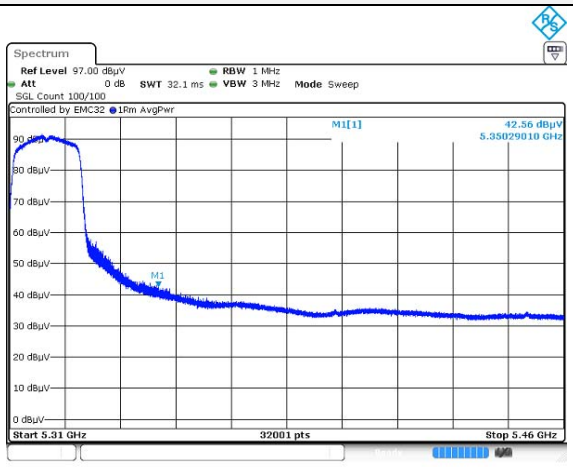
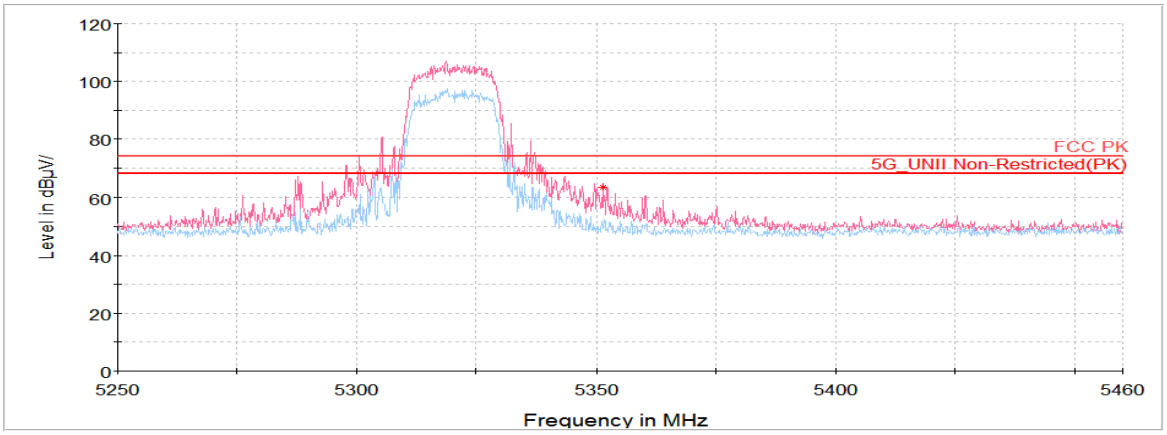
Lowest Channel (5 260 ㎒)

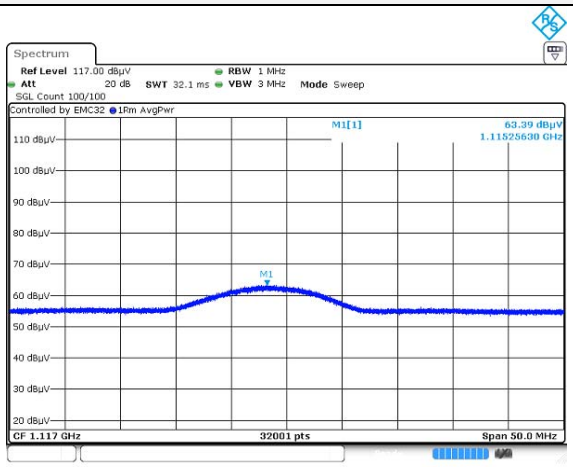
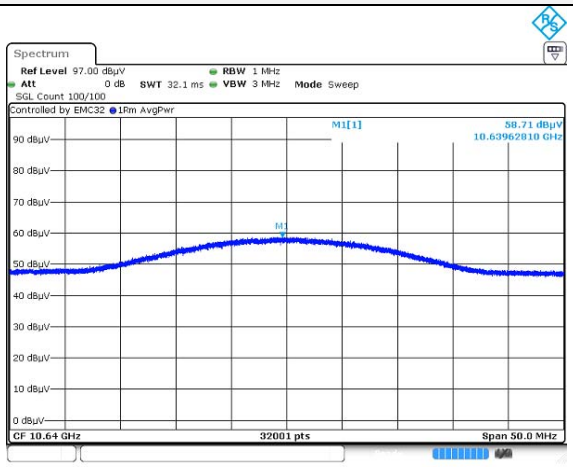
Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Middle Channel (5 280 ㎒)

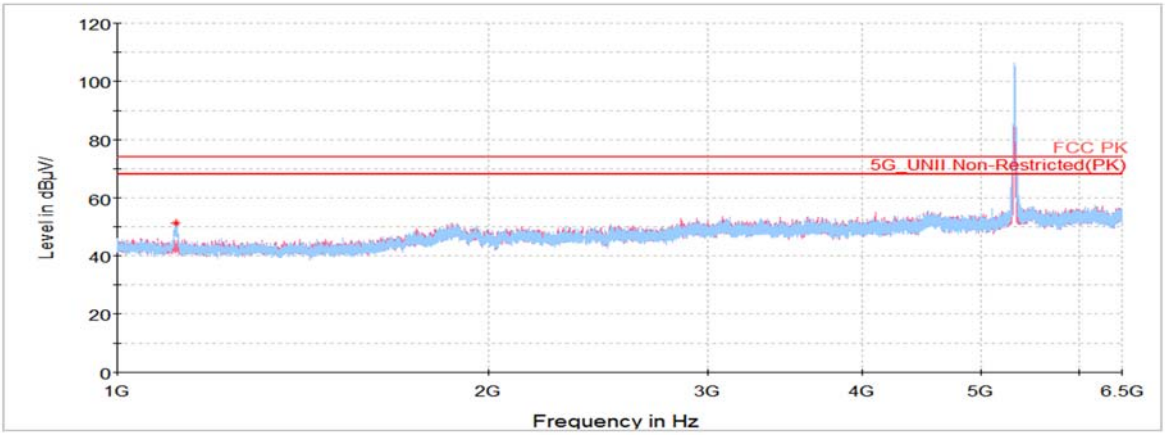
Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Highest Channel (5 320 ㎒)

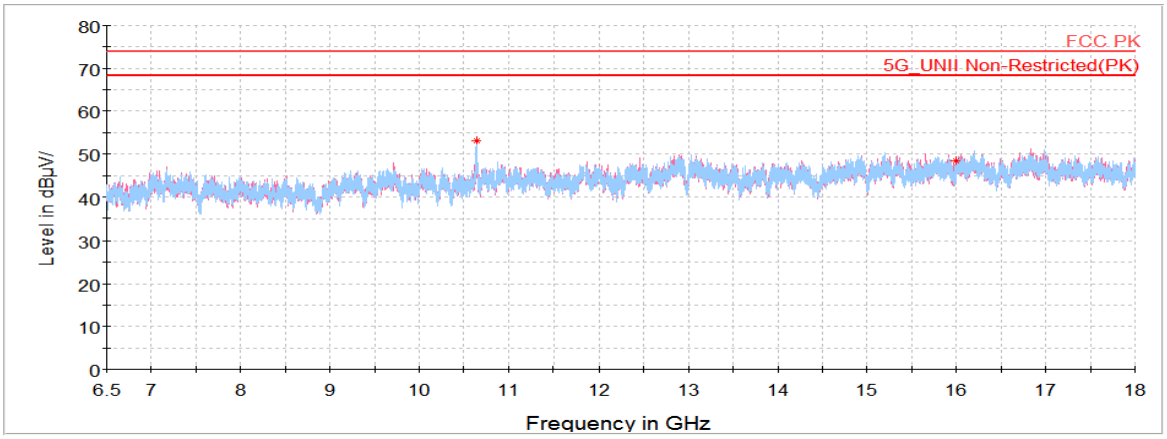
Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

Average data	Average data
	

Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



802.11n HT40_UNII-2A

Lowest Channel (5 270 ㎒)

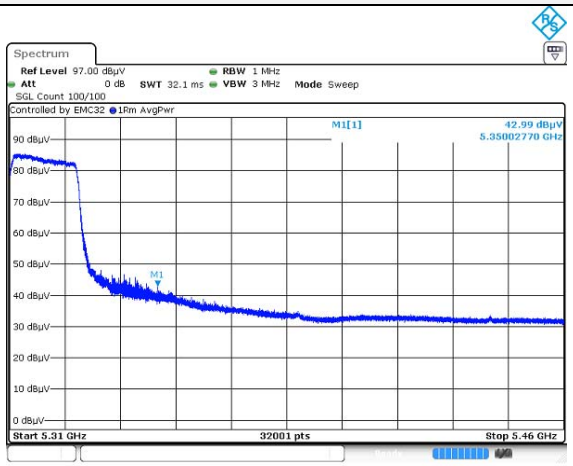
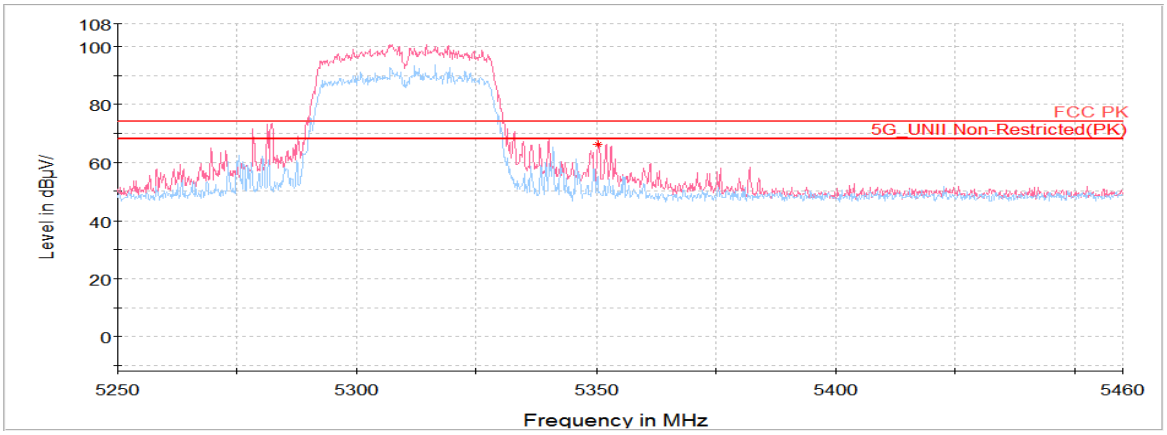
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 071.16[1)]	H	68.07	28.81	-49.00	-	47.88	74.00	26.12
10 544.05	H	60.23	37.74	-49.96	-	48.01	68.20	20.19
15 799.55[1)]	H	54.73	39.88	-46.09	-	48.52	74.00	25.48
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 310 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 104.33[1)]	H	68.21	28.82	-48.99	-	48.04	74.00	25.96
5 350.03[1)]	V	57.94	34.53	-26.11	-	66.36	74.00	7.64
10 635.33[1)]	H	62.32	37.84	-49.70	-	50.46	74.00	23.54
15 936.11[1)]	H	54.77	39.83	-46.06	-	48.54	74.00	25.46
Average Data								
5 350.03[1)]	V	42.99	34.53	-26.11	0.29	51.70	54.00	2.30

802.11n HT40_UNII-2A

Highest Channel (5 310 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

802.11ac VHT20_UNII-2A

Lowest Channel (5 260 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 055.06[1)]	H	71.77	28.81	-49.00	-	51.58	74.00	22.42
10 517.09	H	61.89	37.72	-50.04	-	49.57	68.20	18.63
15 780.50[1)]	H	55.59	39.89	-46.10	-	49.38	74.00	24.62
Average Data								
1 055.06[1)]	H	64.88	28.81	-49.00	0.15	44.84	54.00	9.16

Middle Channel (5 280 ㎒)

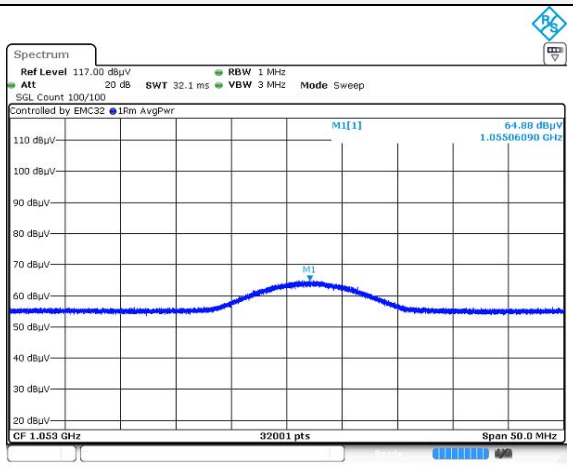
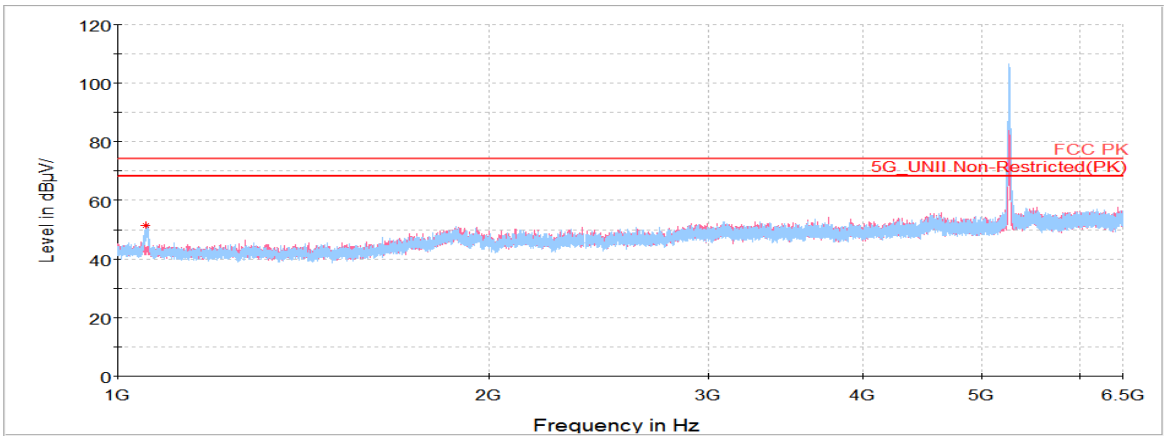
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 074.51[1)]	H	71.47	28.81	-49.00	-	51.28	74.00	22.72
10 556.27	H	63.46	37.76	-49.93	-	51.29	68.20	16.91
15 839.08[1)]	H	56.09	39.86	-46.08	-	49.87	74.00	24.13
Average Data								
1 074.51[1)]	H	65.68	28.81	-49.00	0.15	45.64	54.00	8.36

Highest Channel (5 320 ㎒)

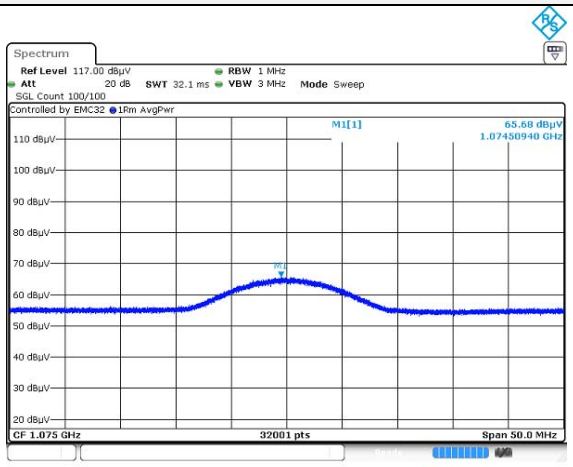
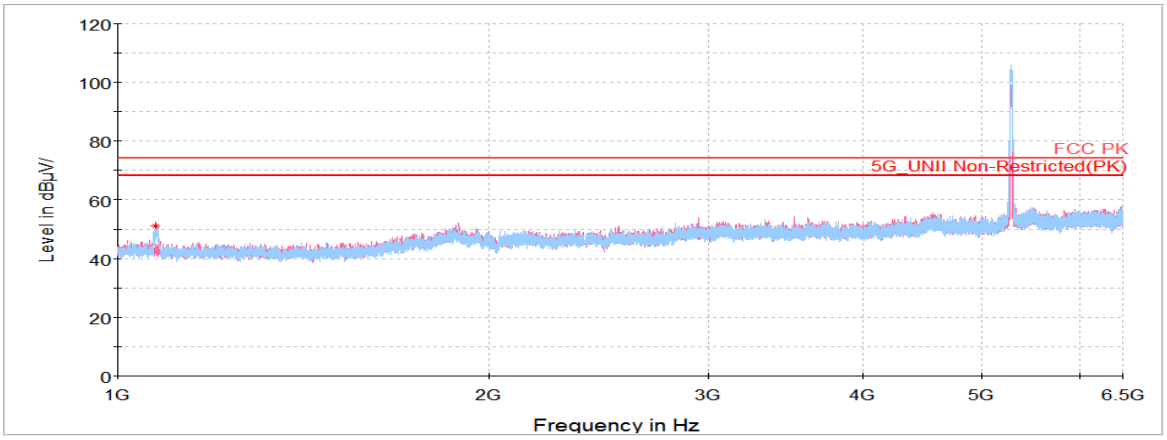
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 119.45[1)]	H	71.04	28.82	-48.98	-	50.88	74.00	23.12
5 350.96[1)]	V	51.88	34.53	-26.10	-	60.31	74.00	13.69
10 641.02[1)]	H	66.05	37.84	-49.69	-	54.20	74.00	19.80
16 018.05[1)]	H	54.86	40.62	-46.12	-	49.36	74.00	24.64
Average Data								
5 350.96[1)]	V	41.22	34.53	-26.10	0.15	49.80	54.00	4.20
10 641.02[1)]	H	58.79	37.84	-49.69	0.15	47.09	54.00	6.91

802.11ac VHT20 UNII-2A

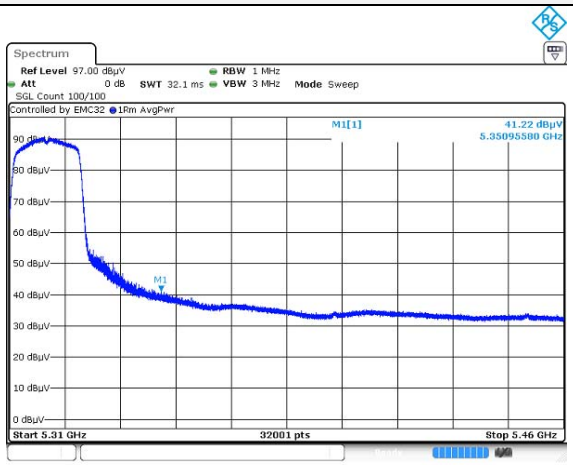
Lowest Channel (5 260 ㎒)

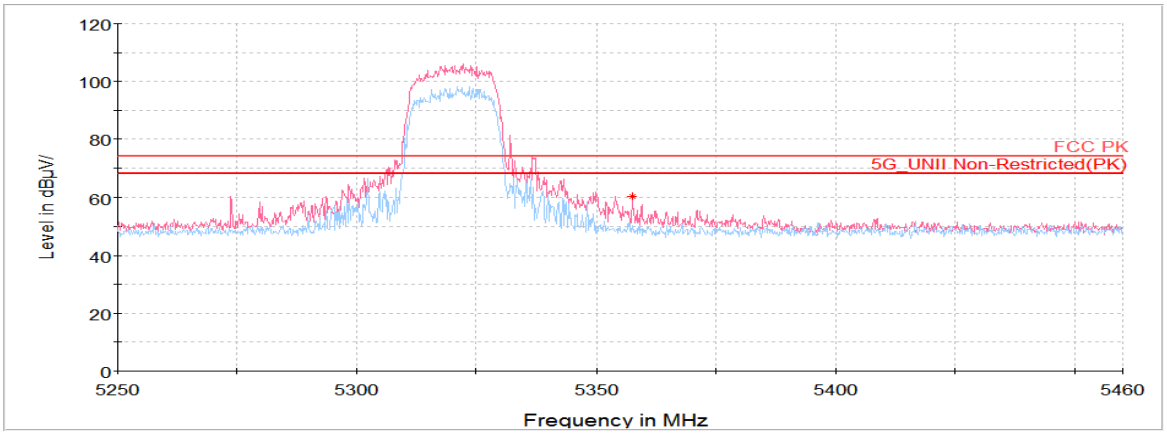
Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

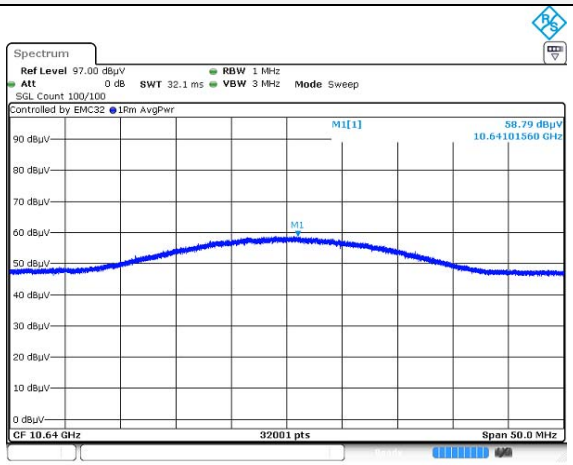
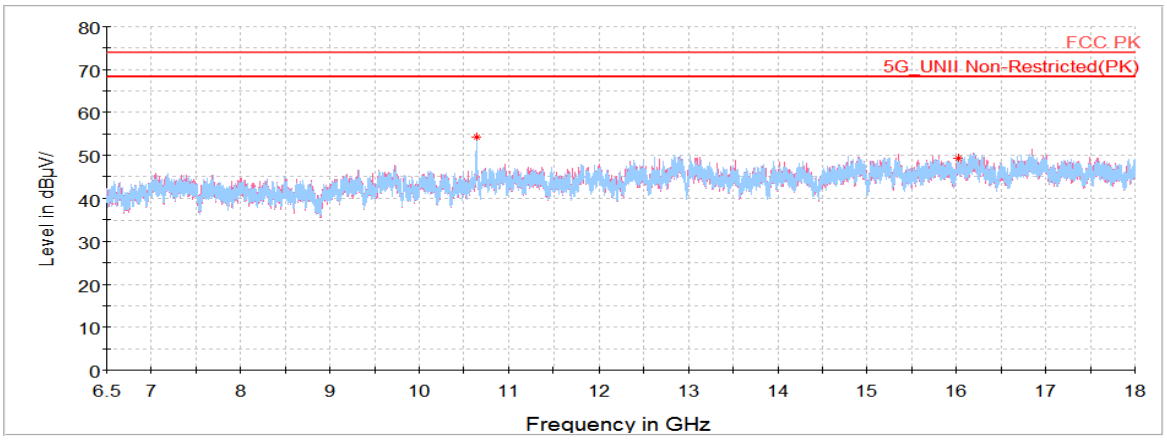
Middle Channel (5 280 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Highest Channel (5 320 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge


Average data	
	Blank
Horizontal/Vertical for 6.5 GHz ~ 18 GHz	
	

802.11ac VHT40_UNII-2A

Lowest Channel (5 270 ㎒)

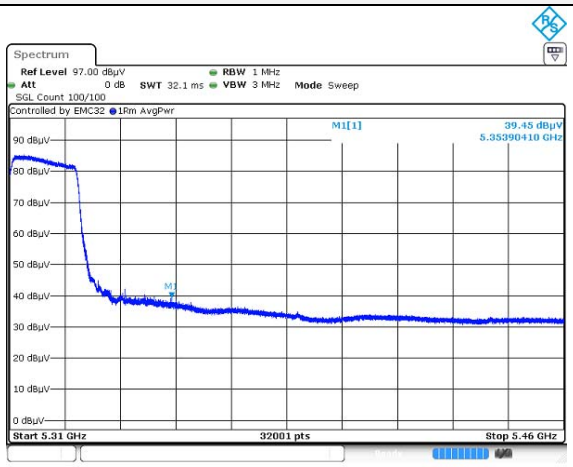
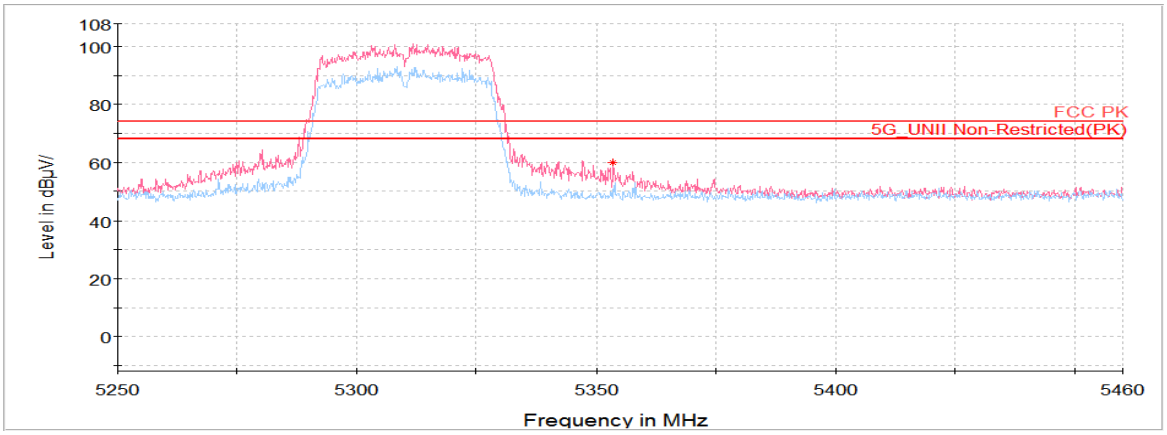
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 061.53[1)]	H	67.79	28.81	-49.00	-	47.60	74.00	26.40
10 540.81	V	56.55	37.74	-49.97	-	44.32	68.20	23.88
15 806.73[1)]	V	55.60	39.88	-46.09	-	49.39	74.00	24.61
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 310 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 110.00[1)]	H	67.45	28.82	-48.99	-	47.28	74.00	26.72
5 353.90[1)]	V	51.54	34.54	-26.08	-	60.00	74.00	14.00
10 624.19[1)]	H	61.25	37.82	-49.73	-	49.34	74.00	24.66
15 934.67[1)]	H	54.66	39.83	-46.06	-	48.43	74.00	25.57
Average Data								
5 353.90[1)]	V	39.45	34.54	-26.08	0.29	48.20	54.00	5.80

802.11ac VHT40_UNII-2A

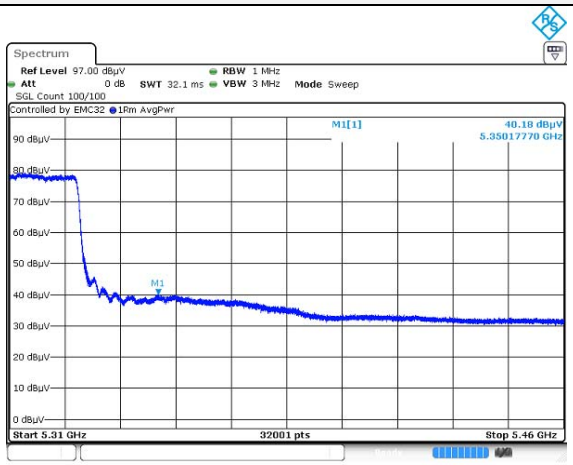
Highest Channel (5 310 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

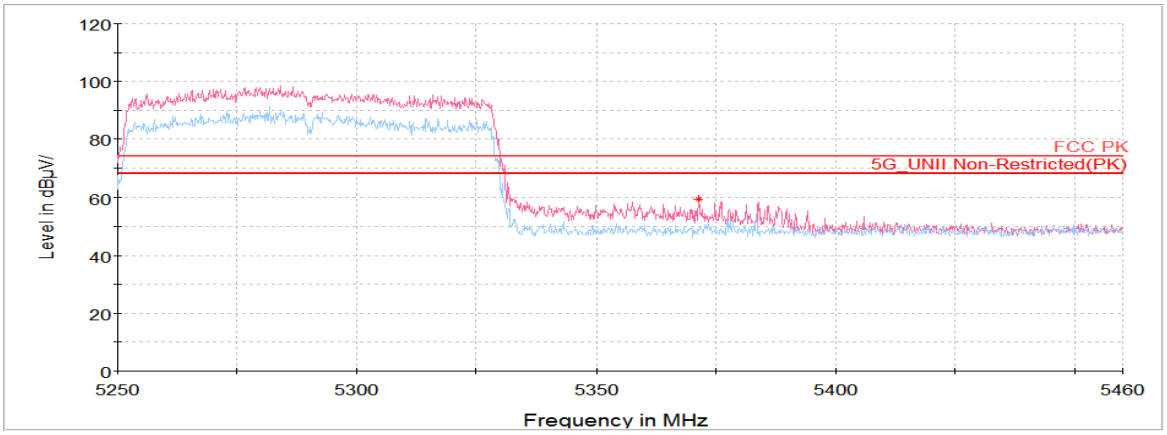
802.11ac VHT80_UNII-2A

Lowest Channel (5 290 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 350.18[1)]	V	51.58	34.53	-26.11	-	60.00	74.00	14.00
10 589.69	H	58.39	37.79	-49.83	-	46.35	68.20	21.85
15 902.33[1)]	V	54.53	39.84	-46.07	-	48.30	74.00	25.70
Average Data								
5 350.18[1)]	V	40.18	34.53	-26.11	0.56	49.16	54.00	4.84

Average data	
	Blank

Horizontal/Vertical for Band-edge

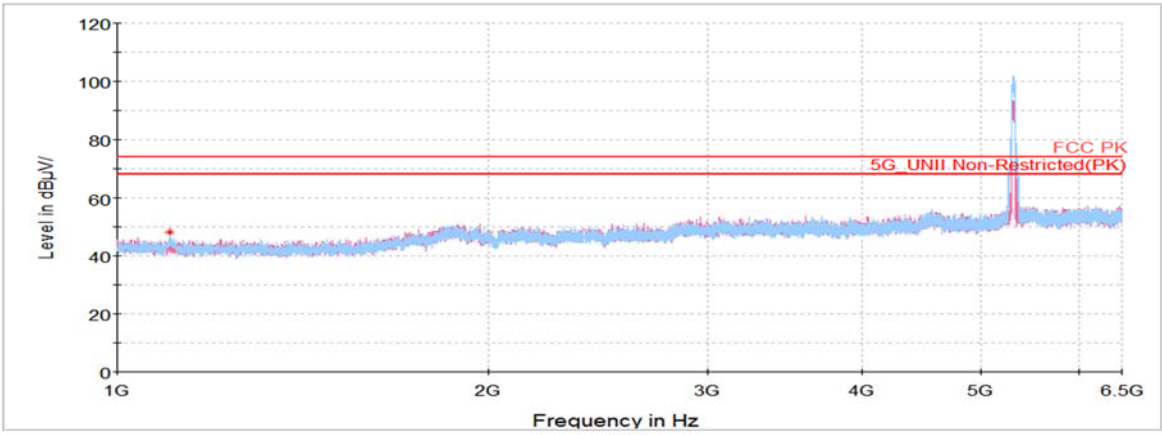


Plot of Harmonics and Spurious Emissions

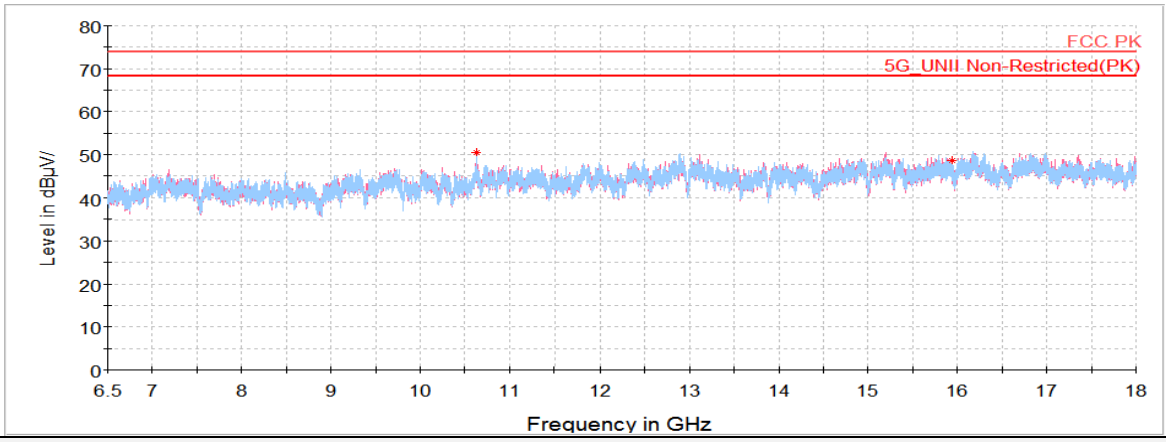
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT40_UNII-2A_Highest Channel (5 310 ㎒)

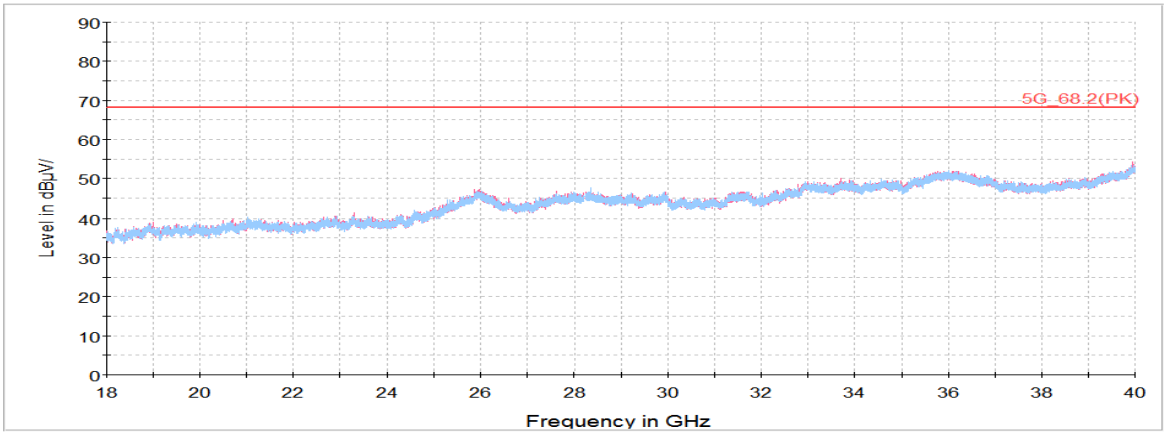
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a_UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 292.88	H	70.17	28.86	-48.57	-	50.46	68.20	17.74
5 459.15[1)]	V	50.55	34.73	-25.09	-	60.19	74.00	13.81
11 085.63[1)]	H	59.30	38.22	-48.96	-	48.56	74.00	25.44
16 501.77	V	60.04	41.00	-47.89	-	53.15	68.20	15.05
Average Data								
5 459.15[1)]	V	39.37	34.73	-25.09	0.14	49.15	54.00	4.85

Middle Channel (5 600 ㎒)

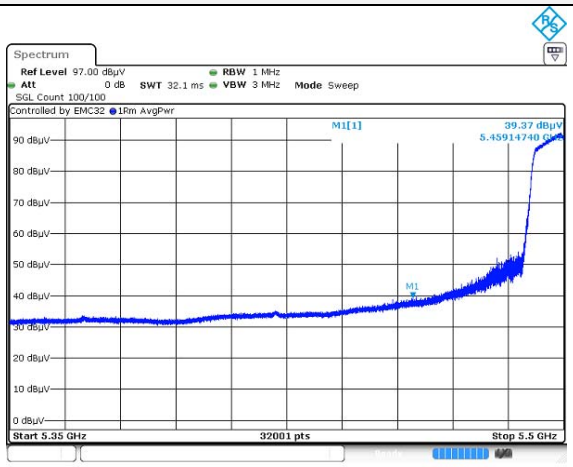
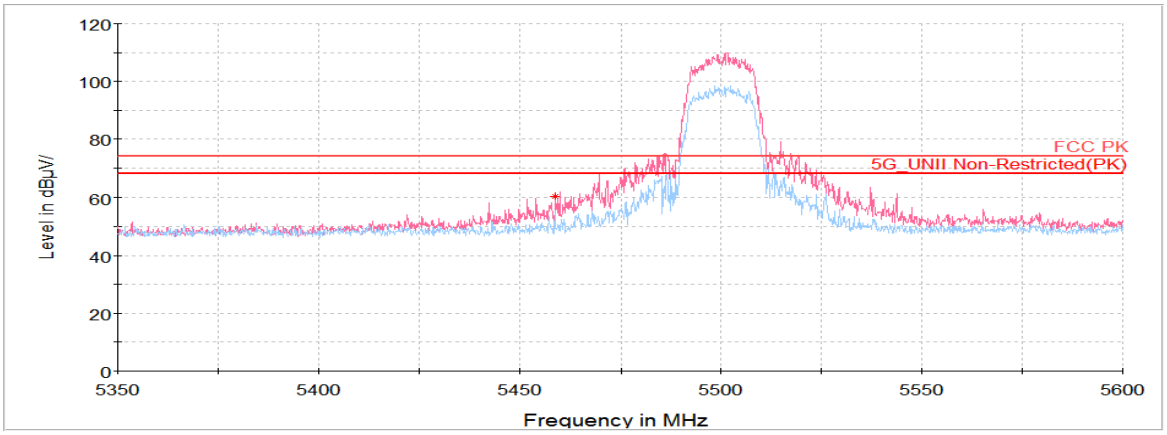
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 393.58[1)]	H	71.73	28.88	-48.55	-	52.06	74.00	21.94
11 216.08[1)]	V	57.53	38.24	-49.43	-	46.34	74.00	27.66
16 798.25	H	60.47	41.24	-47.74	-	53.97	68.20	14.23
Average Data								
1 393.58[1)]	H	64.24	28.88	-48.55	0.14	44.71	54.00	9.29

Highest Channel (5 700 ㎒)

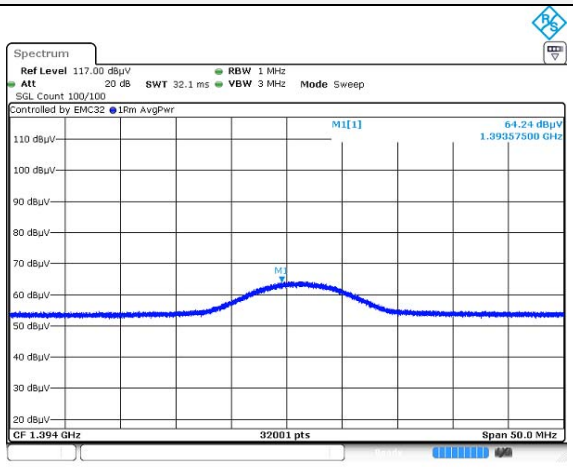
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 494.31	H	70.02	28.90	-48.16	-	50.76	74.00	23.24
5 726.56	V	52.35	35.03	-26.42	-	60.96	68.20	7.24
11 394.69	H	59.25	38.28	-50.07	-	47.46	74.00	26.54
17 003.81	H	57.22	40.70	-47.64	-	50.28	68.20	17.92
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11a_UNII-2C

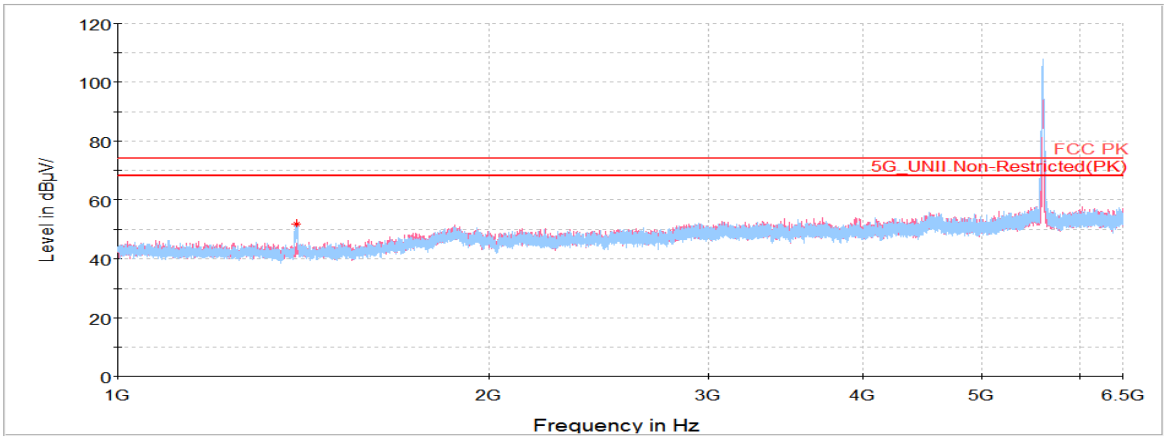
Lowest Channel (5 500 ㎒)

Average data	
	Blank
Horizontal/Vertical for Band-edge	
	

Middle Channel (5 600 ㎒)

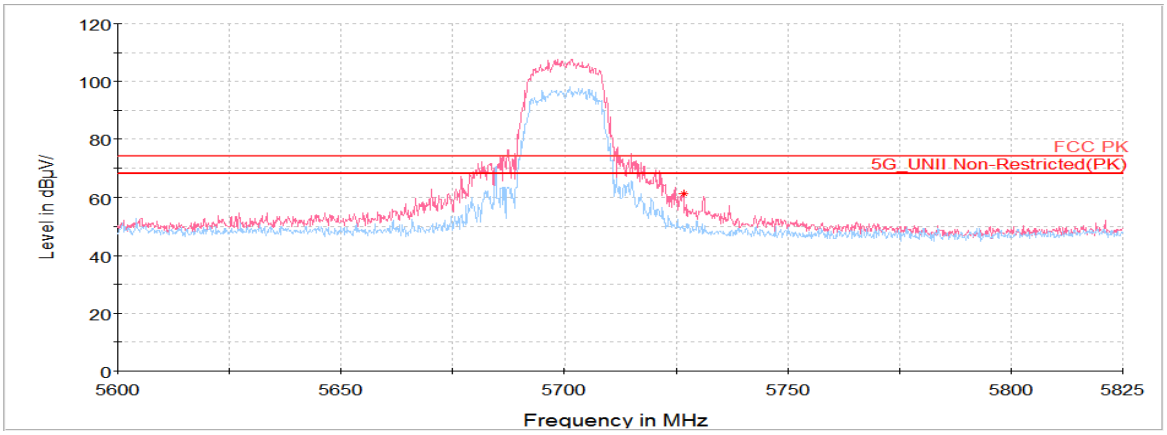
Average data	
	Blank

Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Highest Channel (5 700 ㎒)

Horizontal/Vertical for Band-edge (5 700 ㎒)



802.11n HT20_UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 293.39	H	69.60	28.86	-48.57	-	49.89	68.20	18.31
5 459.31[1)]	V	52.60	34.73	-25.09	-	62.24	74.00	11.76
11 010.88[1)]	H	60.60	38.20	-48.70	-	50.10	74.00	23.90
16 495.30	H	61.75	41.19	-47.88	-	55.06	68.20	13.14
Average Data								
5 459.31[1)]	V	39.91	34.73	-25.09	0.15	49.70	54.00	4.30

Middle Channel (5 600 ㎒)

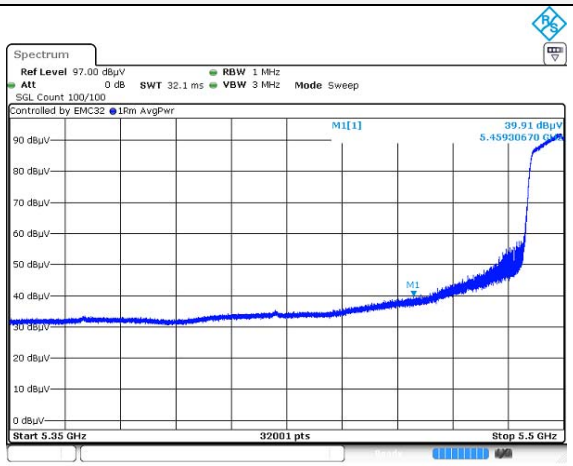
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 396.52[1)]	H	69.06	28.88	-48.55	-	49.39	74.00	24.61
11 215.00[1)]	V	58.63	38.24	-49.43	-	47.44	74.00	26.56
16 787.83	V	58.89	41.23	-47.74	-	52.38	68.20	15.82
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 700 ㎒)

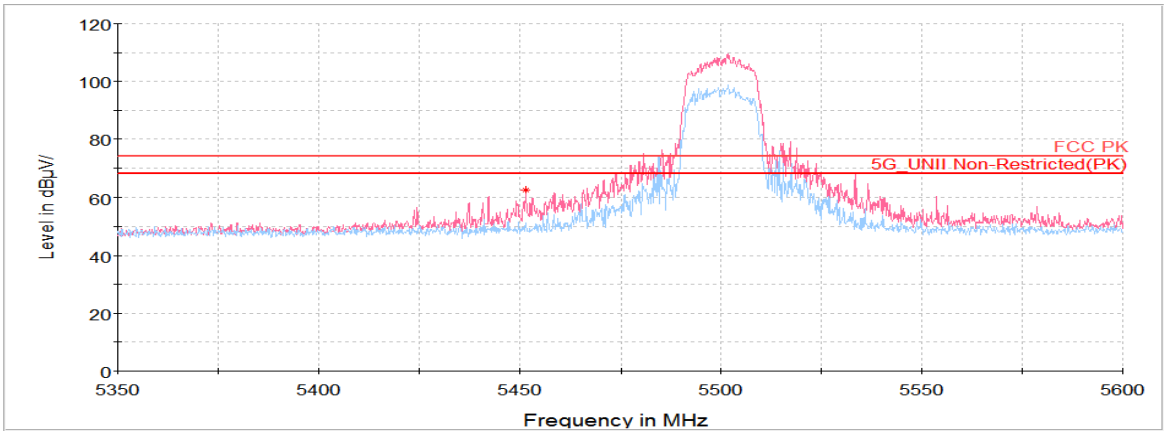
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 490.19[1)]	H	70.18	28.90	-48.17	-	50.91	74.00	23.09
5 726.73	V	51.32	35.03	-26.42	-	59.93	68.20	8.27
11 397.20[1)]	H	58.79	38.28	-50.08	-	46.99	74.00	27.01
17 101.20	H	54.93	40.64	-47.70	-	47.87	68.20	20.33
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20_UNII-2C

Lowest Channel (5 500 ㎒)

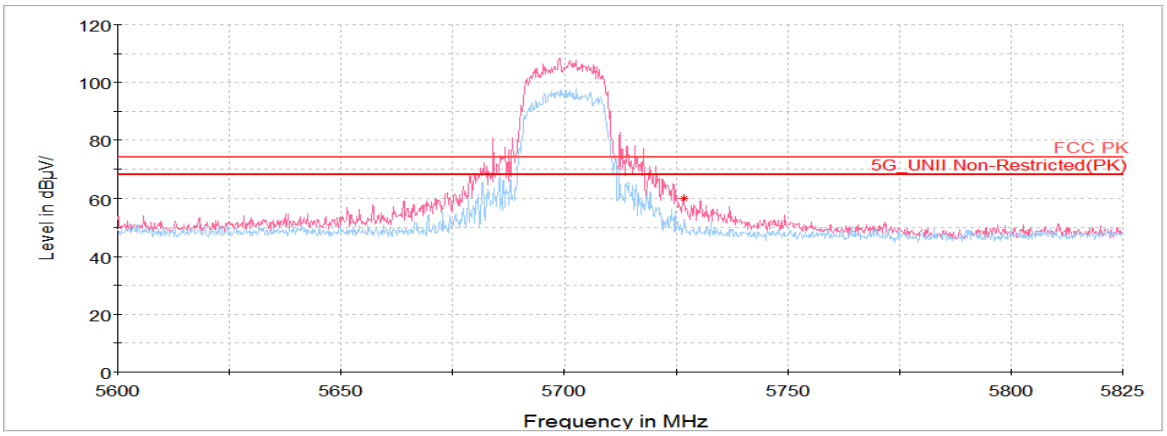
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 ㎒)

Horizontal/Vertical for Band-edge (5 700 ㎒)



802.11n HT40_UNII-2C

Lowest Channel (5 510 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 455.50[1)]	V	55.59	34.72	-25.13	-	65.18	74.00	8.82
11 020.58[1)]	H	56.98	38.20	-48.73	-	46.45	74.00	27.55
16 548.84	V	54.16	41.04	-47.87	-	47.33	68.20	20.87
Average Data								
5 455.50[1)]	V	39.17	34.72	-25.13	0.29	49.05	54.00	4.95

Middle Channel (5 590 ㎒)

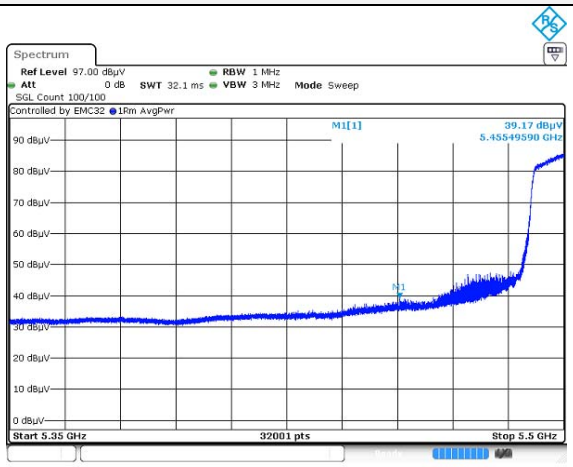
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 182.66[1)]	V	57.11	38.24	-49.31	-	46.04	74.00	27.96
16 761.23	V	56.57	41.21	-47.76	-	50.02	68.20	18.18
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 670 ㎒)

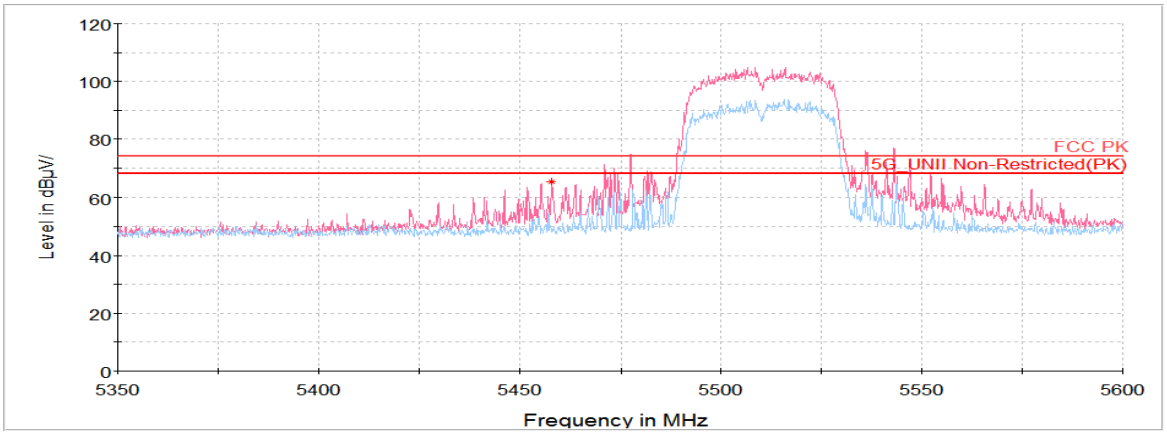
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 464.58[1)]	H	66.81	28.89	-48.28	-	47.42	74.00	26.58
5 728.28	V	45.55	35.03	-26.41	-	54.17	68.20	14.03
11 342.94[1)]	V	56.54	38.27	-49.88	-	44.93	74.00	29.07
17 169.48	V	55.10	40.60	-47.74	-	47.96	68.20	20.24
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT40 UNII-2C

Lowest Channel (5 510 ㎒)

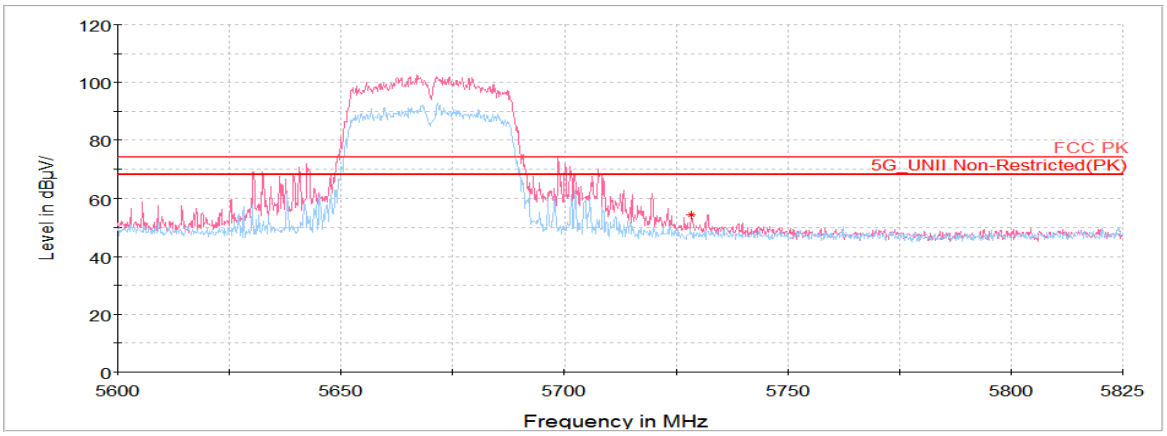
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 670 ㎒)

Horizontal/Vertical for Band-edge (5 670 ㎒)



802.11ac VHT20_UNII-2C

Lowest Channel (5 500 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 297.00	H	70.70	28.86	-48.55	-	51.01	68.20	17.19
5 459.83[1)]	V	53.07	34.73	-25.08	-	62.72	74.00	11.28
11 004.41[1)]	H	58.60	38.20	-48.67	-	48.13	74.00	25.87
16 498.53	H	59.62	41.20	-47.89	-	52.93	68.20	15.27
Average Data								
5 459.83[1)]	V	40.23	34.73	-25.08	0.15	50.03	54.00	3.97

Middle Channel (5 600 ㎒)

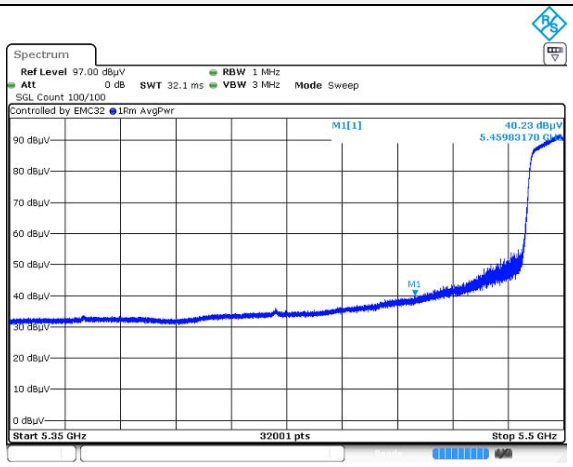
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 392.22[1)]	H	69.47	28.88	-48.55	-	49.80	74.00	24.20
11 211.41[1)]	H	58.81	38.24	-49.41	-	47.64	74.00	26.36
16 797.53	H	60.26	41.24	-47.74	-	53.76	68.20	14.44
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 700 ㎒)

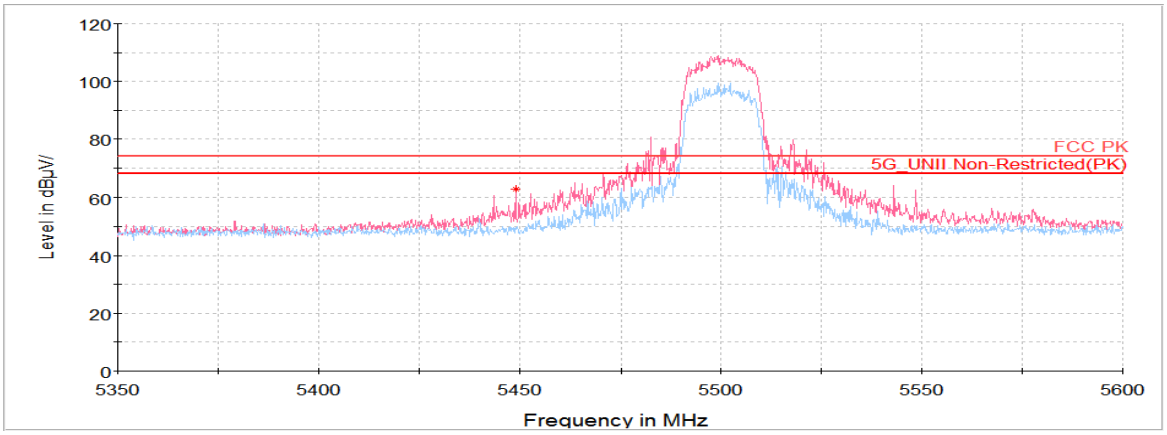
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 495.68[1)]	H	72.31	28.90	-48.15	-	53.06	74.00	20.94
5 726.73	V	56.62	35.03	-26.42	-	65.23	68.20	2.97
11 383.55[1)]	V	57.62	38.28	-50.03	-	45.87	74.00	28.13
17 098.69	H	56.72	40.64	-47.70		49.66	68.20	18.54
Average Data								
1 495.68[1)]	H	62.88	28.90	-48.15	0.15	43.78	54.00	10.22

802.11ac VHT20_UNII-2C

Lowest Channel (5 500 ㎒)

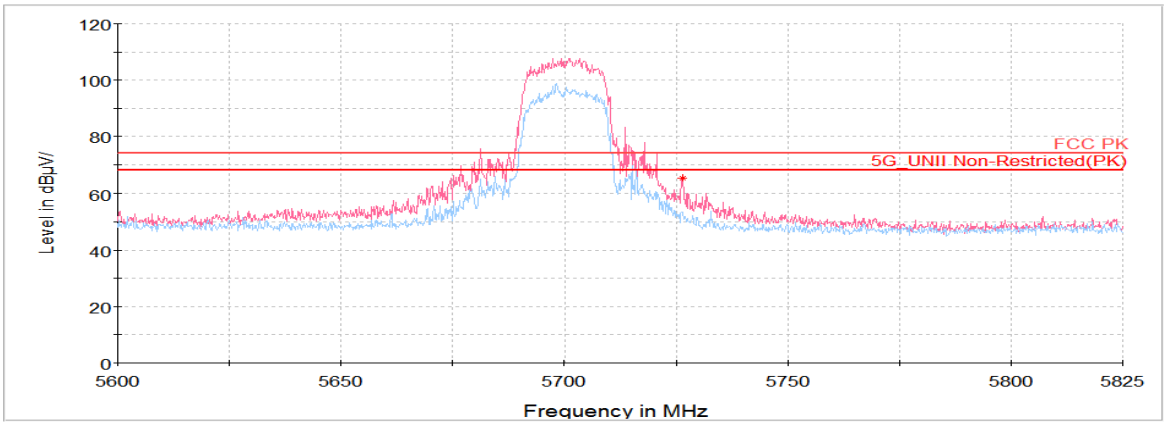
Average data	
	Blank

Horizontal/Vertical for Band-edge

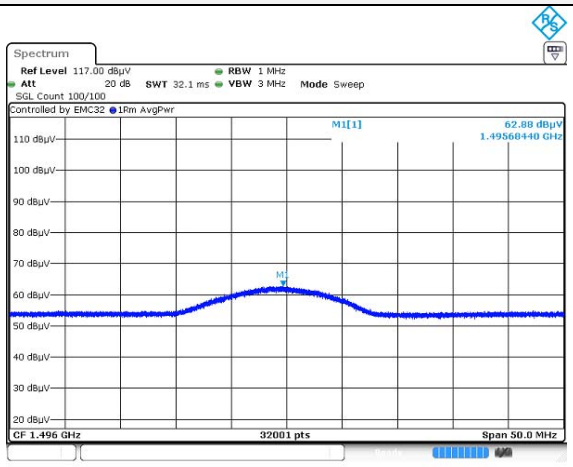


Highest Channel (5 700 ㎒)

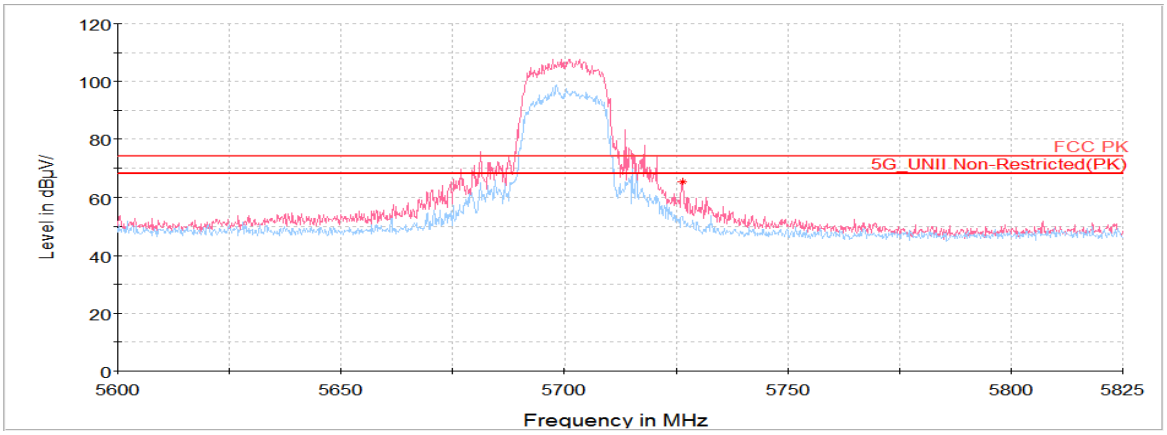
Horizontal/Vertical for Band-edge (5 700 ㎒)



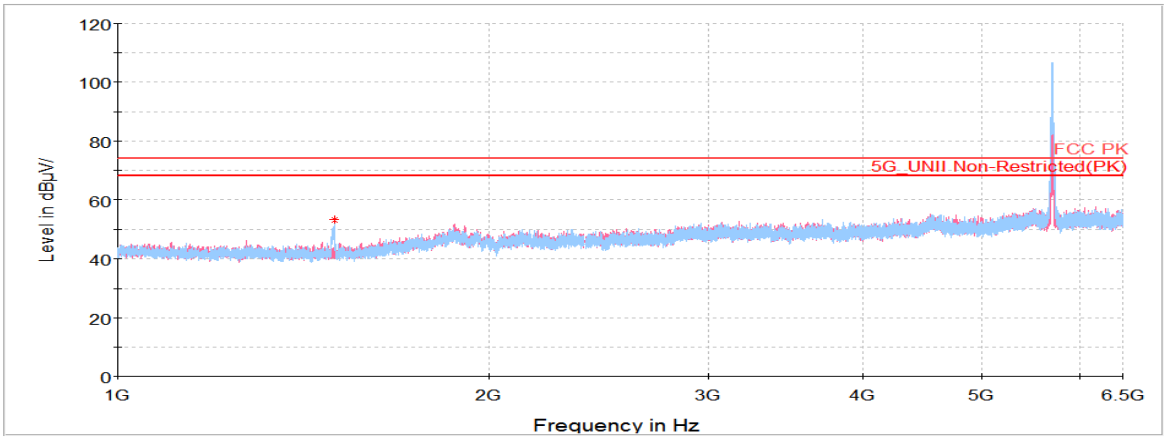
Highest Channel (5 700 ㎒)

Average data	
	Blank

Horizontal/Vertical for Band-edge (5 700 ㎒)



Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



802.11ac VHT40_UNII-2C

Lowest Channel (5 510 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 459.81[1)]	V	51.17	34.73	-25.08	-	60.82	74.00	13.18
11 021.66[1)]	H	56.79	38.20	-48.74	-	46.25	74.00	27.75
16 535.55	V	54.58	41.03	-47.87	-	47.74	68.20	20.46
Average Data								
5 459.81[1)]	V	37.95	34.73	-25.08	0.29	47.89	54.00	6.11

Middle Channel (5 590 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 207.09[1)]	V	57.61	38.24	-49.40	-	46.45	74.00	27.55
16 779.20	V	55.45	41.22	-47.75	-	48.92	68.20	19.28
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

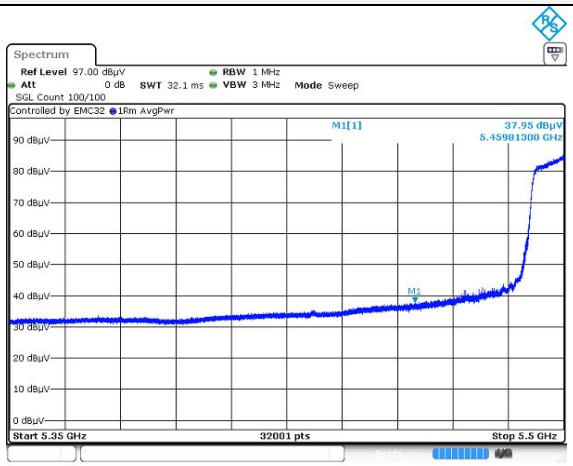
Highest Channel (5 670 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 470.25[1)]	H	67.08	28.89	-48.26	-	47.71	74.00	26.29
5 732.41	V	42.85	35.03	-26.40	-	51.48	68.20	16.72
11 327.84[1)]	V	58.05	38.27	-49.83	-	46.49	74.00	27.51
17 004.89	H	56.43	40.70	-47.64	-	49.49	68.20	18.71
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT40_UNII-2C

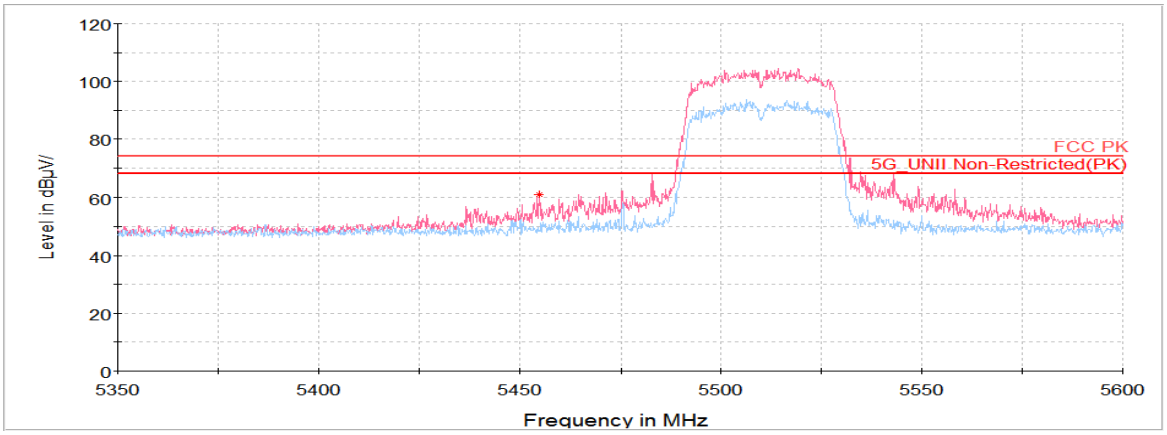
Lowest Channel (5 510 ㎒)

Average data



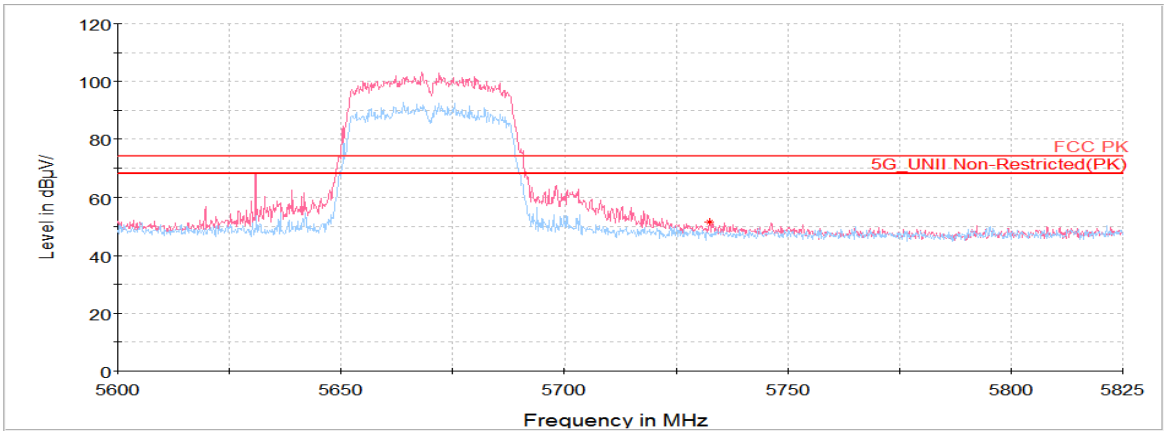
Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 670 ㎒)

Horizontal/Vertical for Band-edge (5 670 ㎒)



802.11ac VHT80_UNII-2C

Lowest Channel (5 530 ㎒)

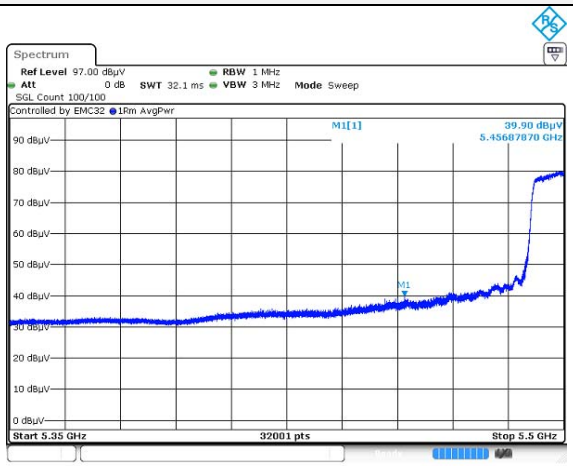
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 456.88[1)]	V	49.88	34.72	-25.11	-	59.49	74.00	14.51
11 089.94[1)]	H	58.04	38.22	-48.98	-	47.28	74.00	26.72
16 511.47	V	55.10	41.01	-47.89	-	48.22	68.20	19.98
Average Data								
5 456.88[1)]	V	39.90	34.72	-25.11	0.56	50.07	54.00	3.93

Highest Channel (5 610 ㎒)

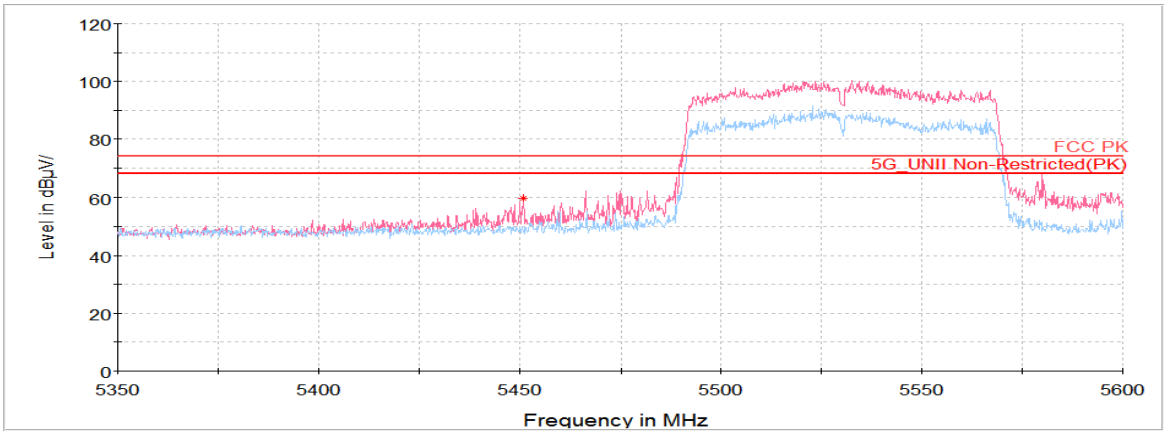
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 731.03	V	45.34	35.03	-26.40	-	53.97	68.20	14.23
11 215.36[1)]	H	58.23	38.24	-49.43	-	47.04	74.00	26.96
16 831.31	V	56.75	41.27	-47.72	-	50.30	68.20	17.90
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80_UNII-2C

Lowest Channel (5 530 ㎒)

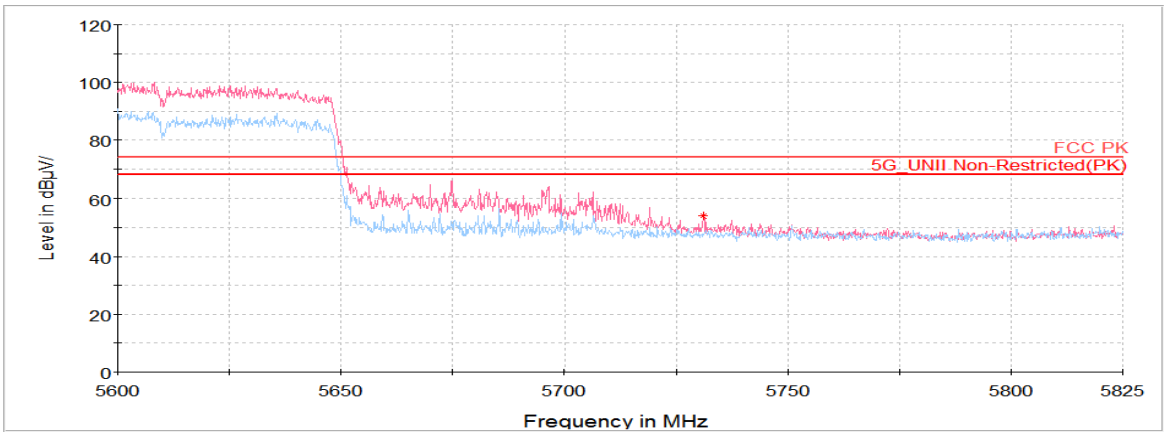
Average data	
	Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 610 ㎒)

Horizontal/Vertical for Band-edge (5 610 ㎒)

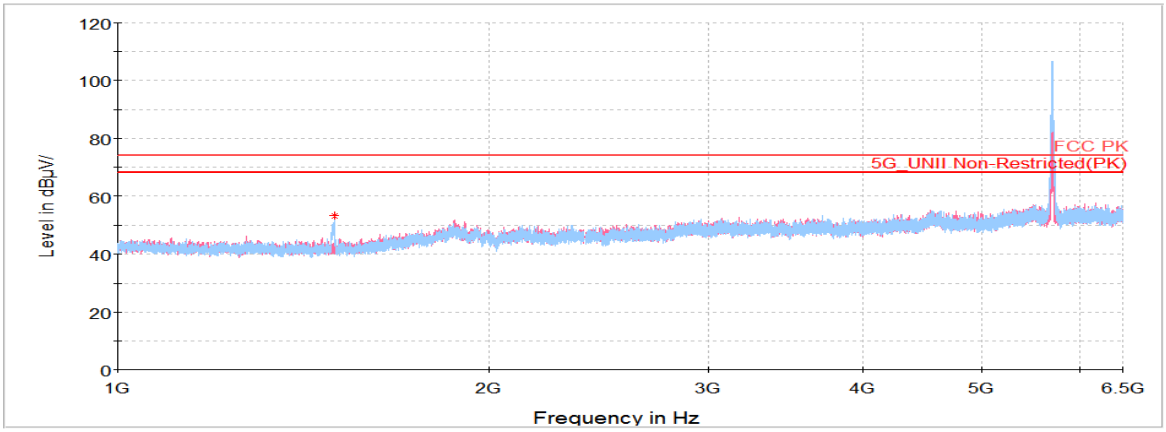


Plot of Harmonics and Spurious Emissions

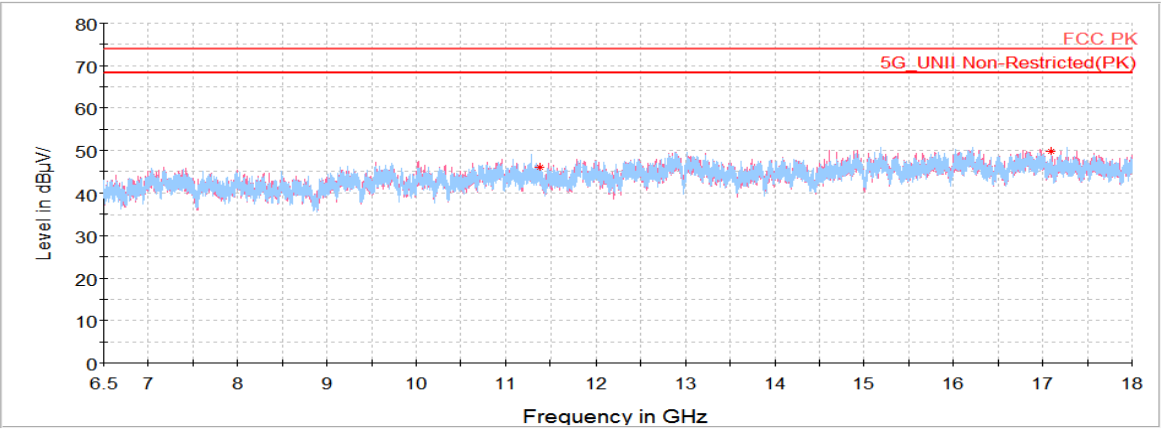
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT20_UNII-2C_Highest Channel (5 700 ㎒)

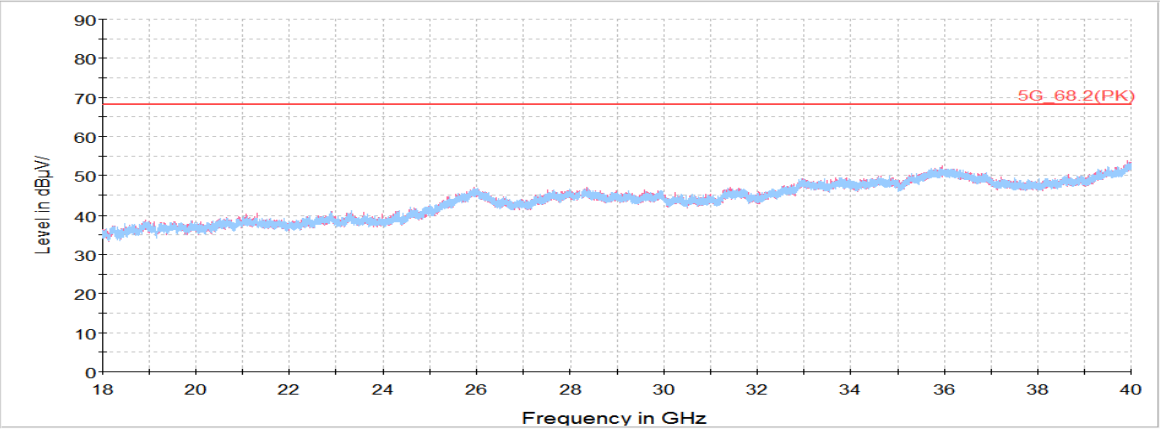
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



Straddle Channel

802.11a (5 720 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 513.22[1)]	H	70.09	28.96	-48.13	-	50.92	74.00	23.08
11 482.02[1)]	V	57.50	38.30	-50.38	-	45.42	74.00	28.58
17 165.53	H	55.85	40.60	-47.74	-	48.71	68.20	19.49
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT20 (5 720 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 514.77[1)]	H	69.86	28.97	-48.13	-	50.70	74.00	23.30
11 476.63[1)]	H	57.42	38.30	-50.36	-	45.36	74.00	28.64
17 159.78	H	55.40	40.60	-47.74	-	48.26	68.20	19.94
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11n HT40 (5 710 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 395.41[1)]	H	57.42	38.28	-50.07	-	45.63	74.00	28.37
17 163.02	V	55.02	40.60	-47.74	-	47.88	68.20	20.32
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT20 (5 720 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 514.59[1)]	H	69.68	28.97	-48.13	-	50.52	74.00	23.48
11 481.30[1)]	V	58.13	38.30	-50.38	-	46.05	74.00	27.95
17 146.13	V	55.04	40.61	-47.73	-	47.92	68.20	20.28
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT40 (5 710 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 483.09[1)]	V	59.13	38.30	-50.38	-	47.05	74.00	26.95
17 182.06	V	56.71	40.59	-47.75	-	49.55	68.20	18.65
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80 (5 690 ㎒)

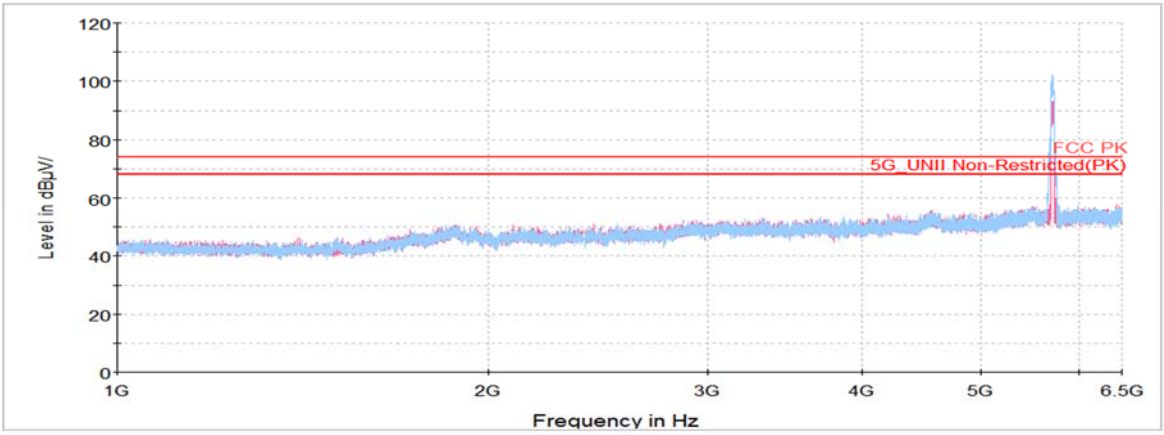
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 381.03[1)]	H	58.00	38.28	-50.02	-	46.26	74.00	27.74
17 076.41	H	54.90	40.65	-47.68	-	47.87	68.20	20.33
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Harmonics and Spurious Emissions

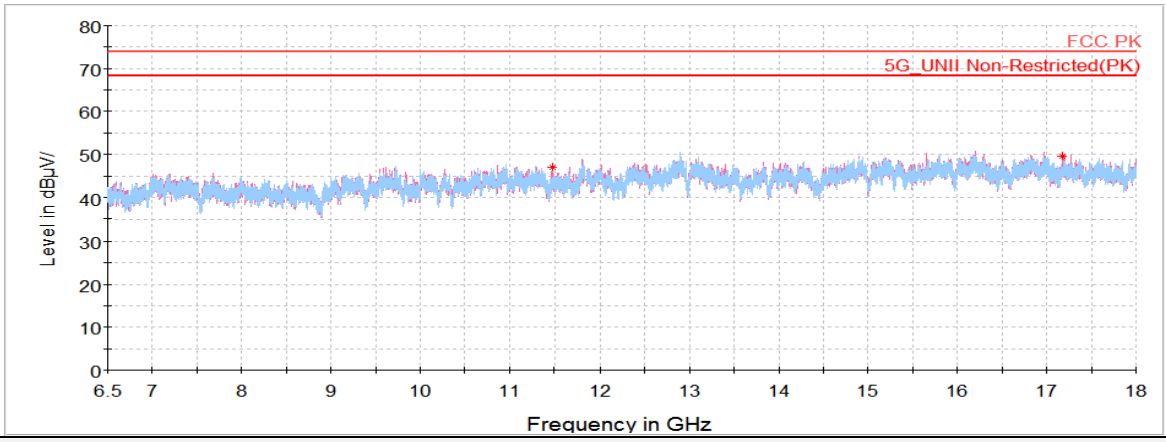
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT40_Straddle Channel (5 710 ㎒)

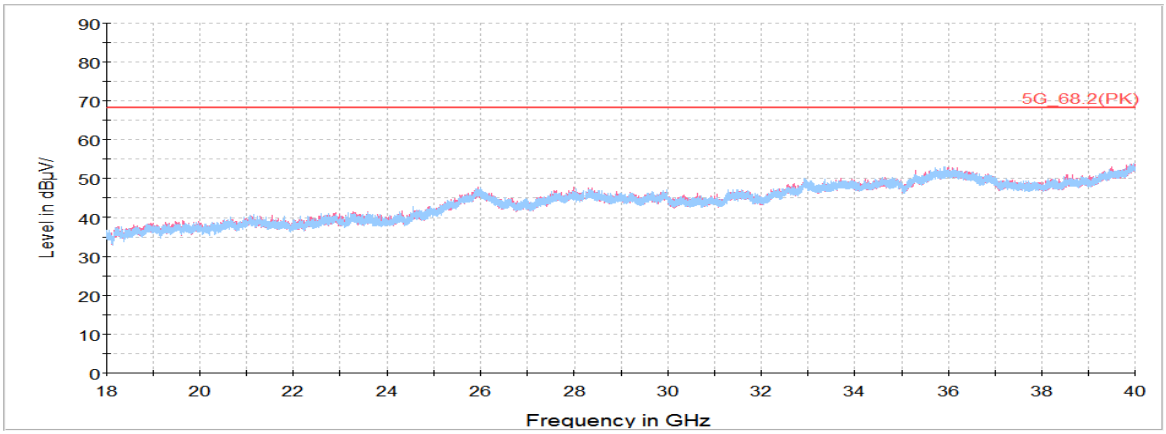
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



802.11a_UNII-3

Lowest Channel (5 745 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 540.22[1)]	H	70.90	29.09	-48.14	-	51.85	74.00	22.15
5 724.67	V	59.19	35.02	-26.43	-	67.78	121.45	53.68
11 291.91[1)]	V	59.22	38.26	-49.70	-	47.78	74.00	26.22
17 215.13	V	57.02	40.57	-47.77	-	49.82	68.20	18.38
Average Data								
1 540.22[1)]	H	63.85	29.09	-48.14	0.14	44.94	54.00	9.06

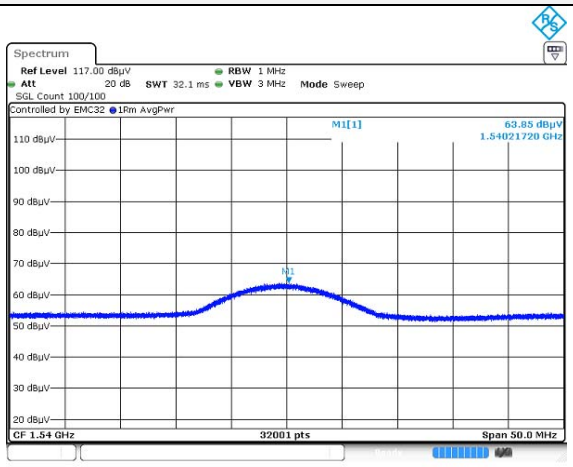
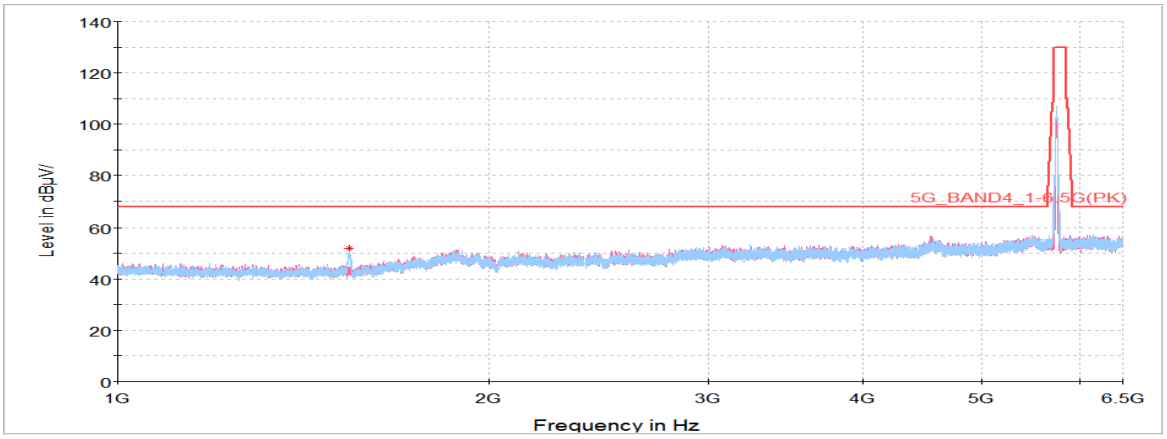
Middle Channel (5 785 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 821.63[1)]	V	60.40	38.56	-49.38	-	49.58	74.00	24.42
17 356.36	H	56.88	40.49	-47.86	-	49.51	68.20	18.69
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

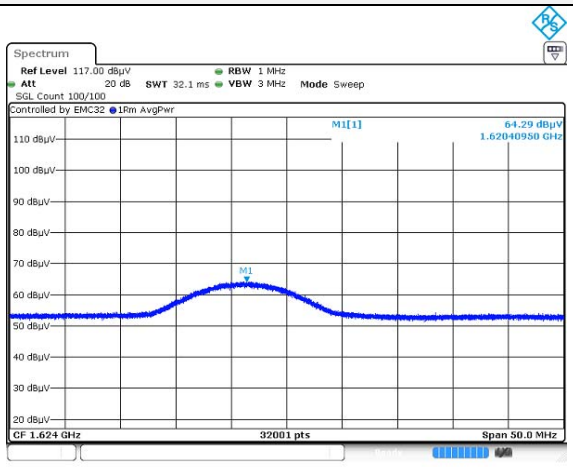
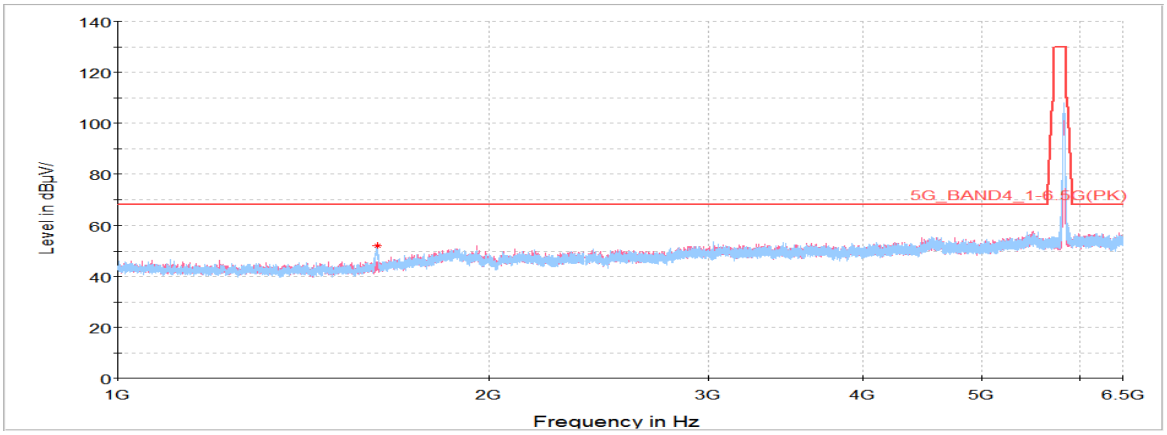
Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 620.41[1)]	H	70.33	29.48	-47.75	-	52.06	74.00	21.94
5 864.23	V	44.24	35.16	-25.20	-	54.20	108.21	54.01
11 821.63[1)]	V	59.20	38.56	-49.38	-	48.38	74.00	25.62
17 491.13	H	57.07	40.41	-47.95	-	49.53	68.20	18.67
Average Data								
1 620.41[1)]	H	64.29	29.48	-47.75	0.14	46.16	54.00	7.84

Lowest Channel (5 745 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Highest Channel (5 825 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

802.11n HT20_UNII-3

Lowest Channel (5 745 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 539.69[1)]	H	70.20	29.09	-48.14	-	51.15	74.00	22.85
5 724.84	V	63.20	35.02	-26.43	-	71.79	121.84	50.05
11 358.03[1)]	V	59.54	38.27	-49.94	-	47.87	74.00	26.13
16 201.69	V	57.15	40.84	-46.79	-	51.20	68.20	17.00
Average Data								
1 539.69	H	63.58	29.09	-48.14	0.15	44.68	54.00	9.32

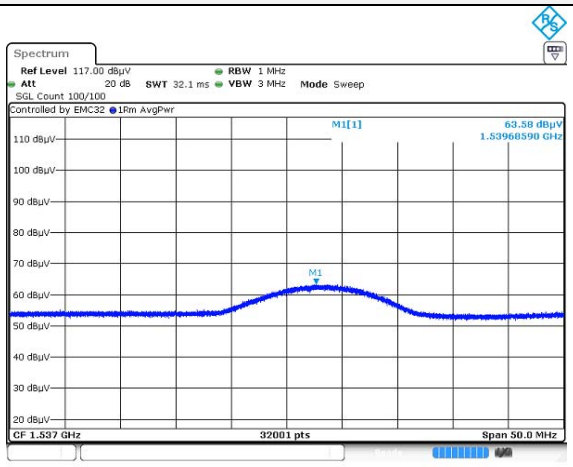
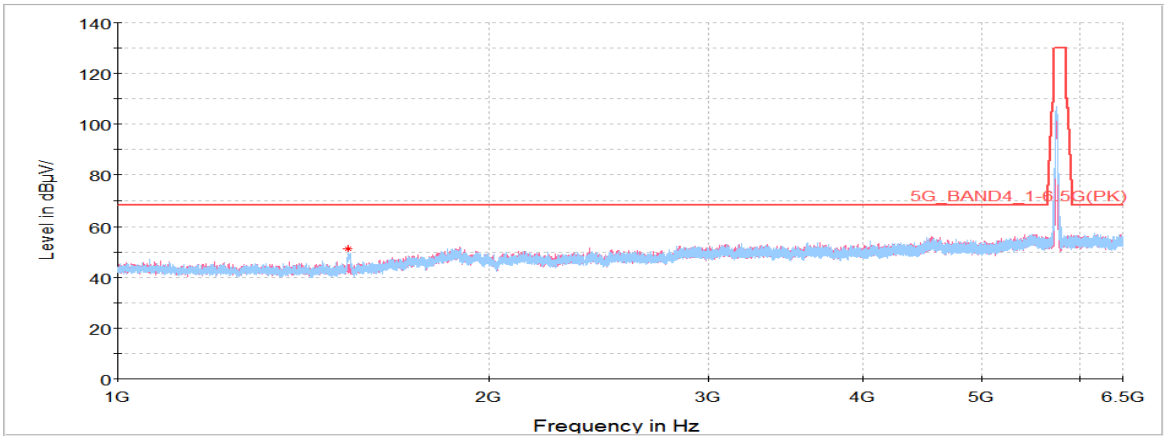
Middle Channel (5 785 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 654.52[1)]	H	57.99	38.42	-49.93	-	46.48	74.00	27.52
17 357.08	H	56.76	40.49	-47.86	-	49.39	68.20	18.81
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

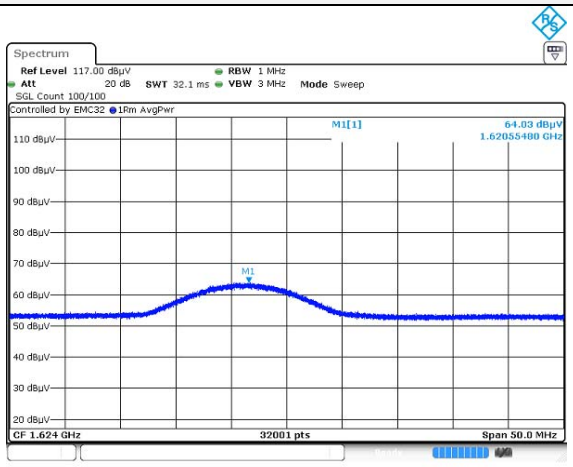
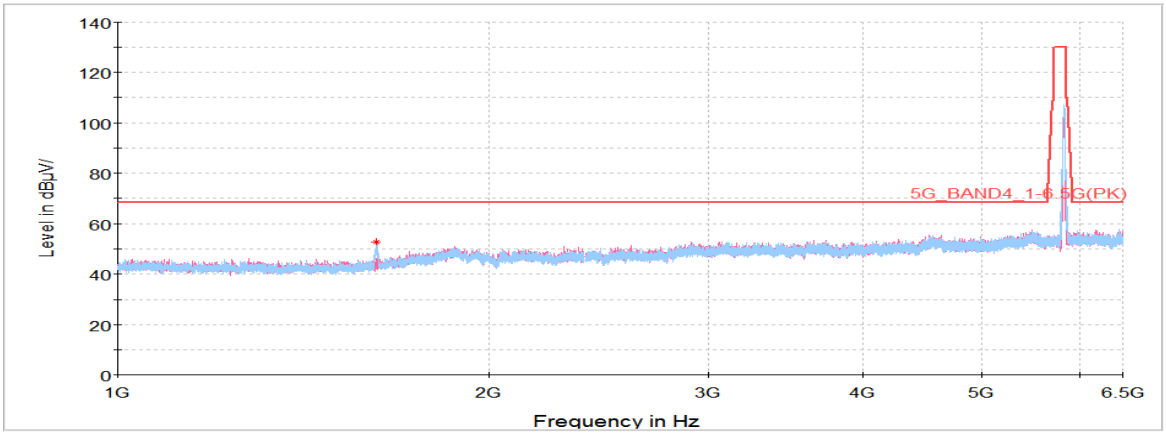
Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 620.55[1)]	H	70.96	29.48	-47.75	-	52.69	74.00	21.31
5 853.06	V	55.07	35.15	-25.36	-	64.86	115.22	50.36
11 658.11[1)]	H	58.07	38.43	-49.92	-	46.58	74.00	27.42
17 571.63	H	56.73	40.81	-48.02	-	49.52	68.20	18.68
Average Data								
1 620.55[1)]	H	64.03	29.48	-47.75	0.15	45.91	54.00	8.09

Lowest Channel (5 745 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Highest Channel (5 825 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

802.11n HT40_UNII-3

Lowest Channel (5 755 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 722.09	V	69.63	35.02	-26.44	-	78.21	115.57	37.37
11 515.44[1)]	H	58.19	38.31	-50.39	-	46.11	74.00	27.89
16 820.17	V	57.27	41.26	-47.73	-	50.80	68.20	17.40
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 795 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 860.80	V	45.78	35.16	-25.25	-	55.69	109.18	53.49
11 499.98[1)]	V	58.44	38.30	-50.44	-	46.30	74.00	27.70
17 193.92	H	57.38	40.58	-47.76	-	50.20	68.20	18.00
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT20_UNII-3

Lowest Channel (5 745 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 540.56[1)]	H	70.27	29.09	-48.14	-	51.22	74.00	22.78
5 723.64	V	62.04	35.02	-26.43	-	70.63	119.10	48.47
11 541.67[1)]	V	58.43	38.33	-50.31	-	46.45	74.00	27.55
16 200.25	V	56.47	40.84	-46.79	-	50.52	68.20	17.68
Average Data								
1 540.56[1)]	H	63.62	29.09	-48.14	0.15	44.72	54.00	9.28

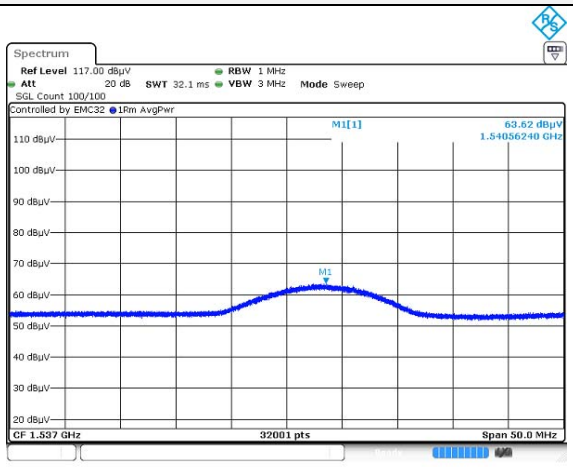
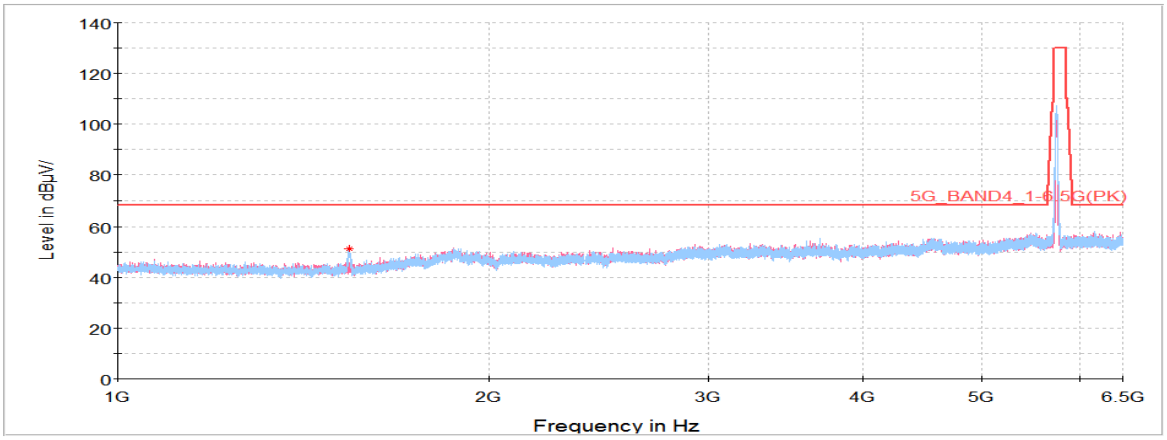
Middle Channel (5 785 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 578.36[1)]	H	67.44	29.28	-48.14	-	48.58	74.00	25.42
11 571.14[1)]	V	57.64	38.36	-50.21	-	45.79	74.00	28.21
17 351.69	V	55.98	40.49	-47.86	-	48.61	68.20	19.59
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

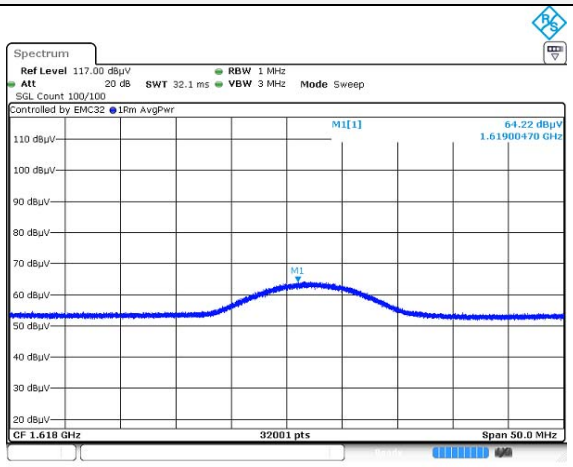
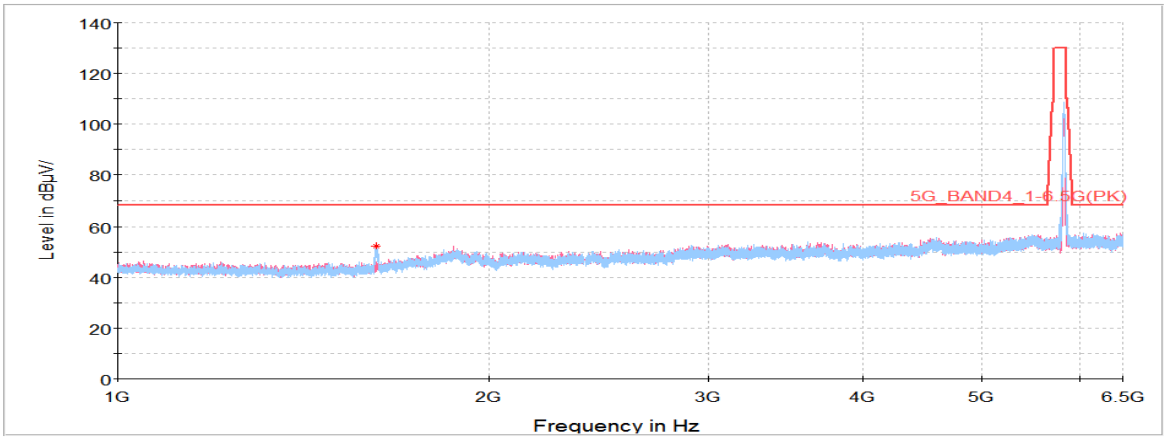
Highest Channel (5 825 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 619.00[1)]	H	70.53	29.47	-47.78	-	52.22	74.00	21.78
5 853.92	V	48.74	35.15	-25.35	-	58.54	113.26	54.72
11 650.92[1)]	V	57.69	38.42	-49.94	-	46.17	74.00	27.83
17 484.66	H	55.69	40.41	-47.94	-	48.16	68.20	20.04
Average Data								
1 619.00[1)]	H	64.22	29.47	-47.78	0.15	46.06	54.00	7.94

Lowest Channel (5 745 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

Highest Channel (5 825 ㎒)

Average data	
	Blank
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓	
	

802.11ac VHT40_UNII-3

Lowest Channel (5 755 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 718.31	V	60.64	35.02	-26.45	-	69.21	110.33	41.12
11 514.36[1)]	V	57.33	38.31	-50.40	-	45.24	74.00	28.76
17 250.70	H	56.28	40.55	-47.79	-	49.04	68.20	19.16
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Highest Channel (5 795 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 859.77	V	43.46	35.16	-25.27	-	53.35	109.47	56.12
11 577.97[1)]	H	57.68	38.36	-50.18	-	45.86	74.00	28.14
17 384.39	V	55.97	40.47	-47.88	-	48.56	68.20	19.64
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

802.11ac VHT80_UNII-3

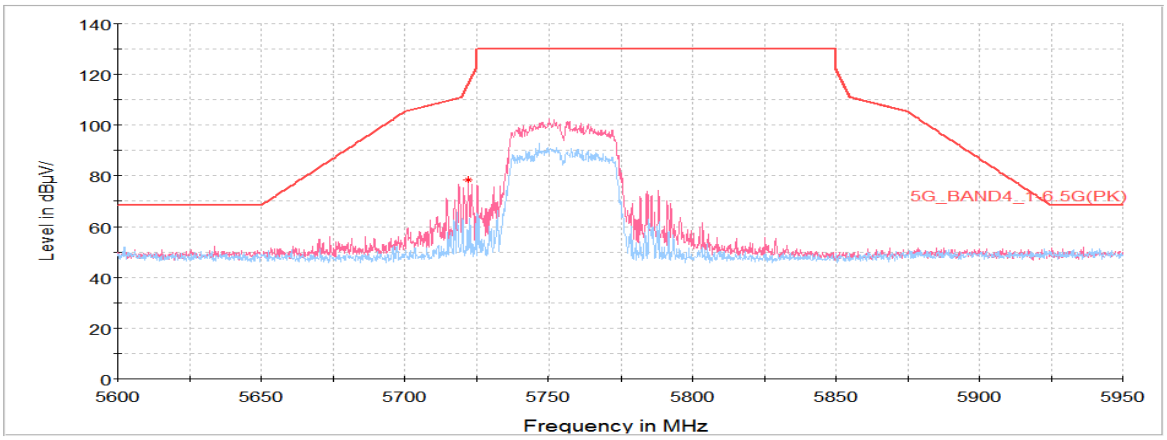
Lowest Channel (5 775 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 723.64	V	58.17	35.02	-26.43	-	66.76	119.10	52.34
5 869.39	V	52.90	35.17	-25.12	-	62.95	106.77	43.83
11 537.72[1)]	V	57.23	38.33	-50.32	-	45.24	74.00	28.76
17 359.23	V	55.84	40.48	-47.86	-	48.46	68.20	19.74
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Plot of Band-edge, Harmonics and Spurious Emissions

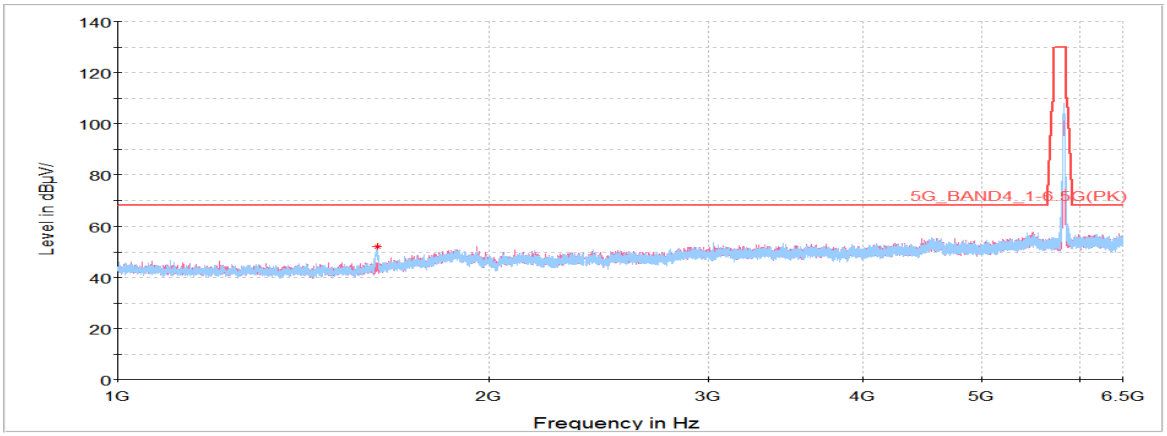
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT40_UNII-3_Lowest Channel (5 755 ㎒)

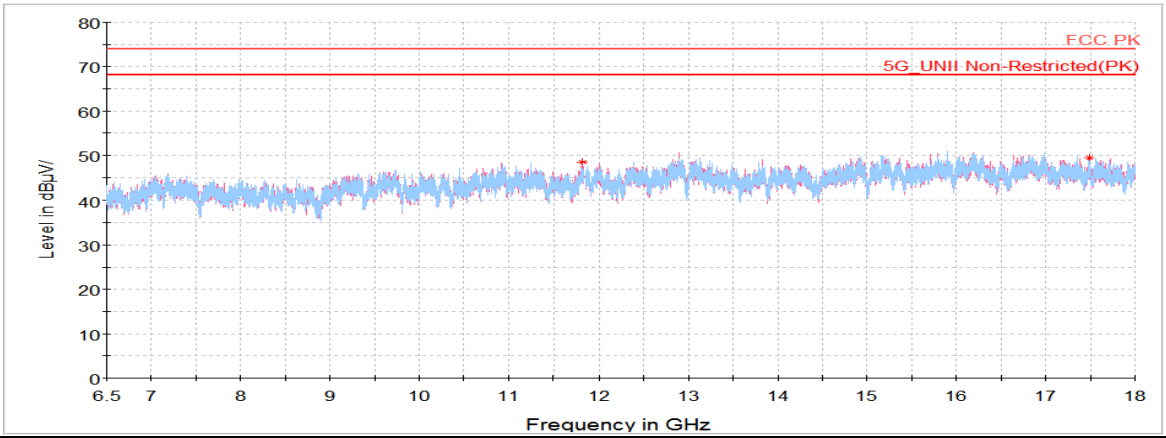
Horizontal/Vertical for Band-edge


802.11a_UNII-3_Highest Channel (5 825 ㎒)

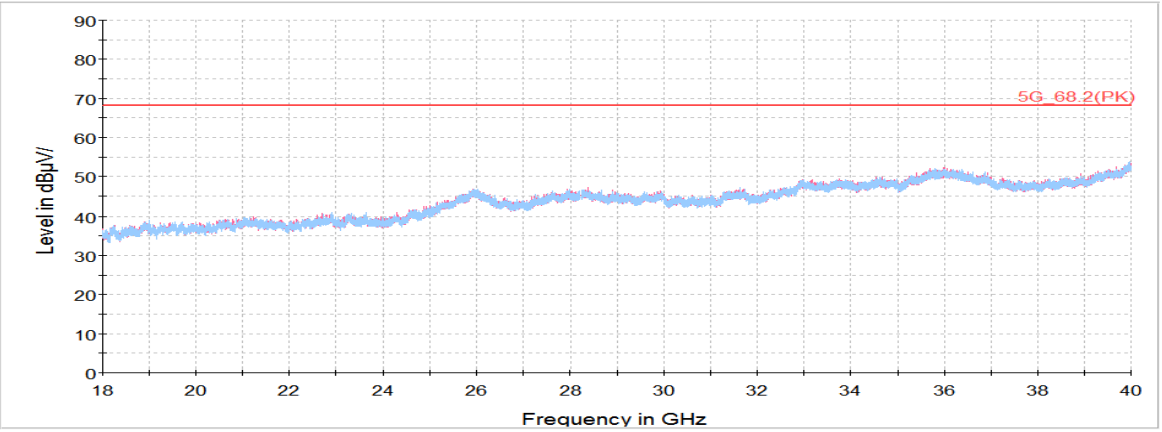
Horizontal/Vertical for 1 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



Horizontal/Vertical for 18 ㎓ ~ 40 ㎓

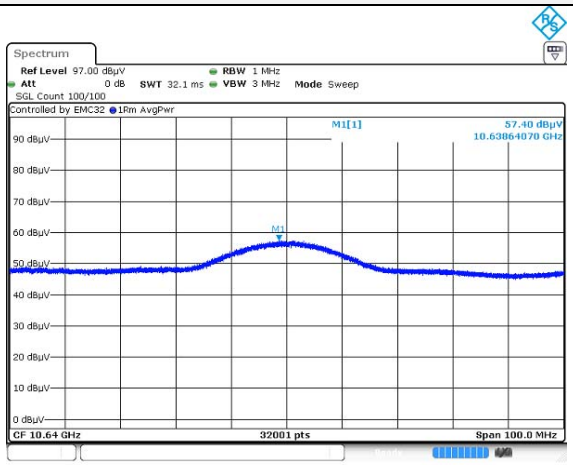


Spurious Emission for Simultaneous Tx Condition

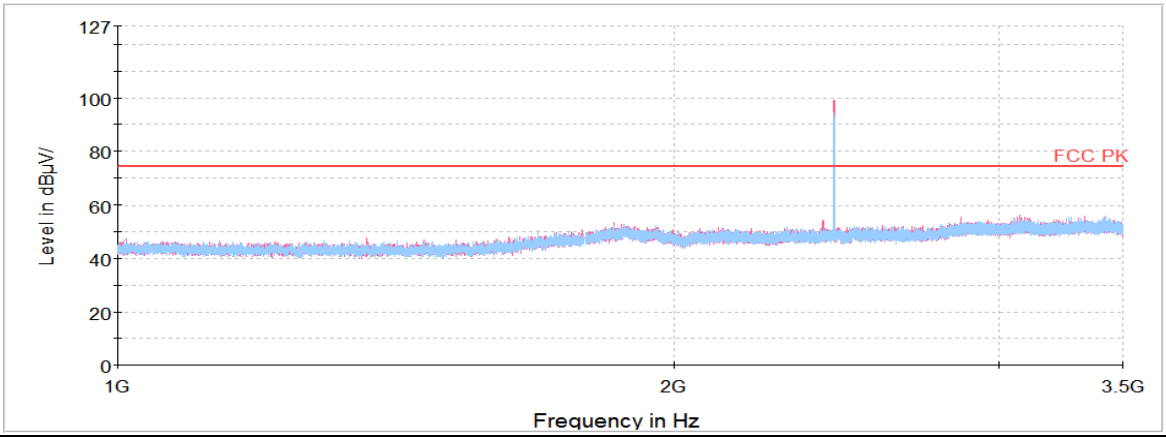
Case	WLAN 5 GHz	Bluetooth
Mode	802.11ac VHT20	EDR
Channel	64	39
Frequency	5 320	2 441
Data Rate	MCS0	3DH-1

Notes.
The lowest margin condition among the channels and modes were selected for test.

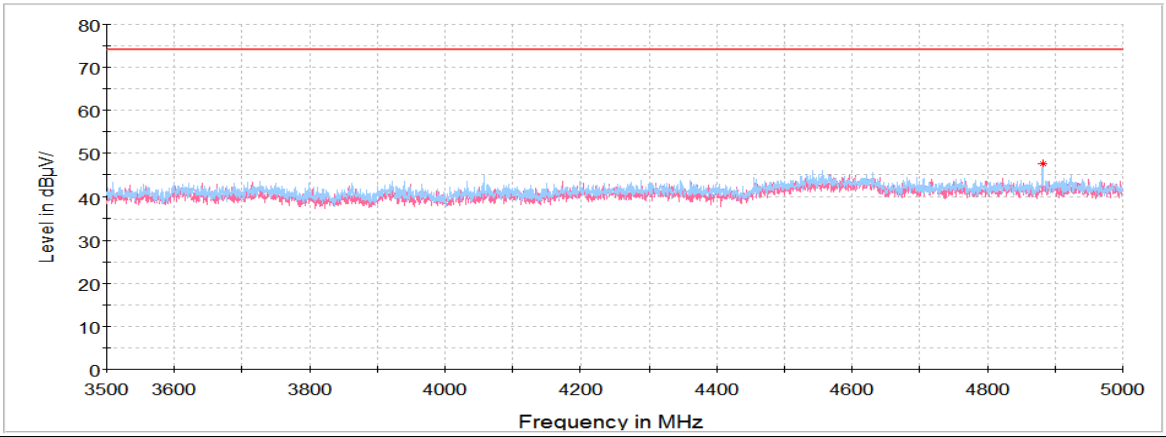
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
4 882.03[1)]	H	66.81	33.83	-53.14	-	47.50	74.00	26.50
7 332.31[1)]	V	59.24	35.30	-50.51	-	44.03	74.00	29.97
10 638.64[1)]	V	64.76	37.84	-49.69	-	52.91	74.00	21.09
15 959.11[1)]	V	54.33	39.82	-46.06	-	48.09	74.00	25.91
Average Data								
10 638.64[1)]	V	57.40	37.84	-49.69	0.15	45.70	54.00	8.30

Average data	
	Blank

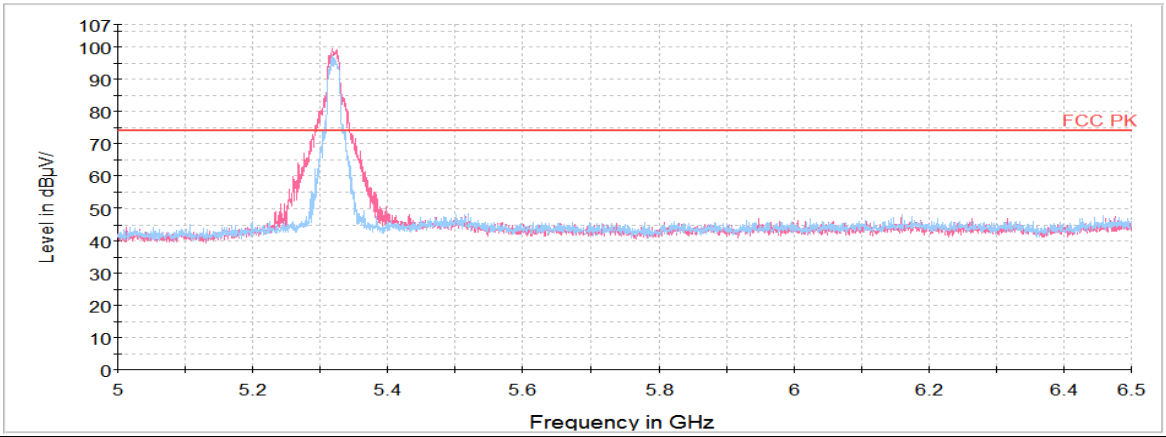
Horizontal/Vertical for 1 GHz ~ 3.5 GHz



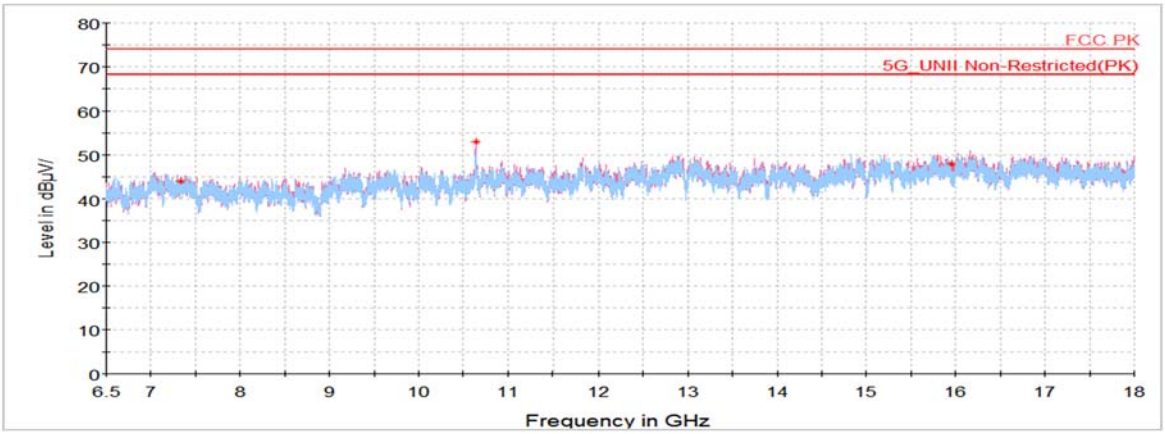
Horizontal/Vertical for 3.5 GHz ~ 5 GHz



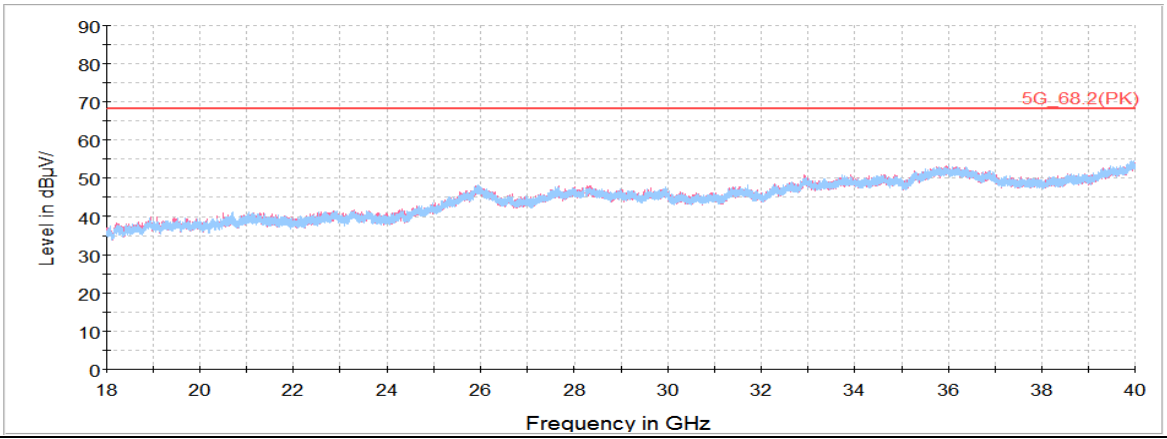
Horizontal/Vertical for 5 ㎓ ~ 6.5 ㎓



Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

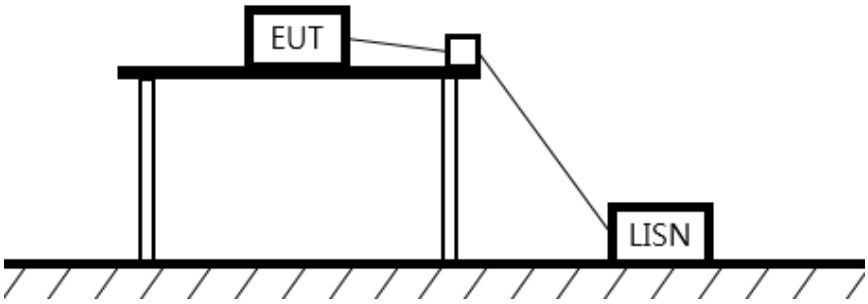


Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



7.7. AC Conducted emission

Test setup



Limit

§15.407

According to 15.207(a), for an intentional radiator 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 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

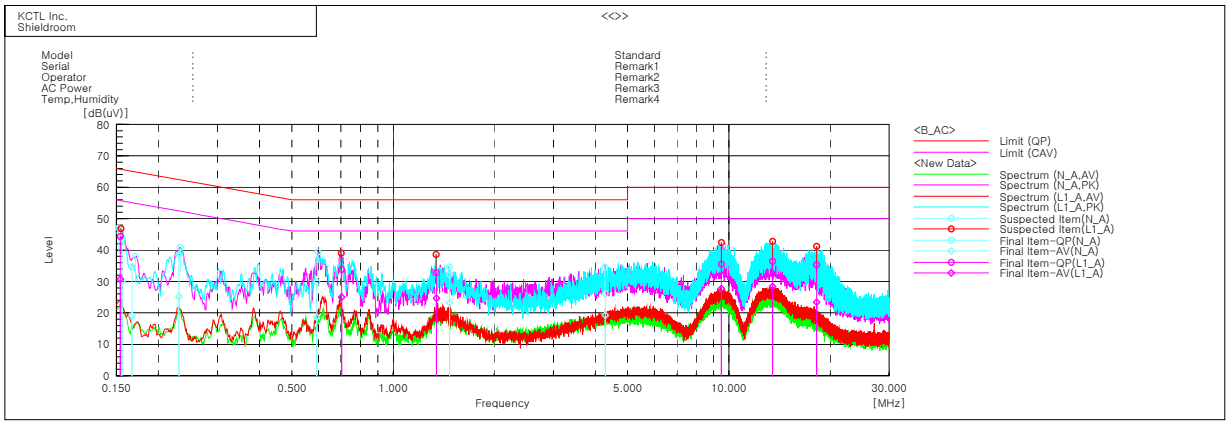
Frequency of Emission (㎒)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity ㅡ Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 ㎑ or to quasi-peak and average within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

Test results

Worst case: 802.11a / UNII-2C 5 700 ㎒



Final Result

--- N_A Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.156	33.8	20.1	10.0	43.8	30.1	65.7	55.7	21.9	25.6
2	0.16701	24.4	9.0	10.2	34.6	19.2	65.1	55.1	30.5	35.9
3	0.23043	28.7	15.4	9.8	38.5	25.2	62.4	52.4	23.9	27.2
4	0.59261	19.8	8.7	10.0	29.8	18.7	56.0	46.0	26.2	27.3
5	1.47381	22.3	13.3	9.9	32.2	23.2	56.0	46.0	23.8	22.8
6	4.28045	16.3	9.3	9.9	26.2	19.2	56.0	46.0	29.8	26.8

--- L1_A Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15408	34.3	20.8	10.0	44.3	30.8	65.8	55.8	21.5	25.0
2	0.70228	24.0	15.1	9.9	33.9	25.0	56.0	46.0	22.1	21.0
3	1.34646	22.9	14.8	9.9	32.8	24.7	56.0	46.0	23.2	21.3
4	9.50122	25.4	17.6	10.1	35.5	27.7	60.0	50.0	24.5	22.3
5	13.50092	26.1	18.1	10.4	36.5	28.5	60.0	50.0	23.5	21.5
6	18.23549	24.7	12.9	10.6	35.3	23.5	60.0	50.0	24.7	26.5

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	100807	21.07.29
Attenuator	Weinschel ENGINEERING	56-10	51395	22.01.22
Signal Generator	R&S	SMB100A	176206	22.01.20
Vector Signal Generator	R&S	SMBV100A	257566	21.07.13
DC Power Supply	Agilent	E3632A	MY40008800	21.07.28
Spectrum Analyzer	R&S	FSV40	100989	21.12.31
EMI TEST RECEIVER	R&S	ESCI3	101408	21.08.20
Bi-Log Antenna	SCHWARZBECK	VULB9168	583	22.04.23
Amplifier	SONOMA INSTRUMENT	310N	284608	21.08.20
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	22.04.23
Horn antenna	ETS.lindgren	3117	00155787	21.10.28
Horn antenna	ETS.lindgren	3116	00086632	22.01.29
Attenuator	API Inmet	40AH2W-10	12	22.05.11*
Broadband PreAmplifier	SCHWARZBECK	BBV9718	216	21.07.28
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800 -22-10P	2003683	21.08.28
AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	22.01.21
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	DT2000	79	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	DT2000	79	-
High pass Filter	WT	WT-A1698-HS	WT160411001	22.05.10
TWO-LINE V - NETWORK	R&S	ENV216	101358	21.09.29
EMI TEST RECEIVER	R&S	ESCI	100001	21.08.20

* Tests related to this equipment were progressed after the calibration was completed.

End of test report