

9.5 Radiated Unwanted Emissions

Radiated Transmitting spurious emission test result as below:

Test Method:

Radiated Mode:

1. The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned
5. Use the following spectrum analyzer settings According to C63.10:
 For Below 1GHz
 Use the following spectrum analyzer settings:
 Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 100 KHz to 120KHz, VBW \geq RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold. For Peak unwanted emissions
 For Above 1GHz:
 Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 1MHz, VBW \geq RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
 Procedures for Average Unwanted Emissions Measurements above 1000 MHz
 a) Follow the requirements in II.G.3. “General Requirements for Unwanted Emissions Measurements.”
 b) Average emission levels shall be measured using one of the following two methods. c) Method AD (Average Detection): Primary method
 (i) RBW = 1 MHz.
 (ii) VBW \geq 3 MHz.
 (iii) Detector = power averaging (rms), if span/(# of points in sweep) \leq RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak. As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
 (v) Sweep time = auto.
 (vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—rather than turning on and off with the transmit cycle, at least 100 traces shall be averaged.)

(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98%, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order 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:

If power averaging (rms) mode was used in II.G.6.c)(iv), the correction factor is $10 \log(1/x)$, where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB must be added to the measured emission levels. If linear voltage averaging mode was used in II.G.6.c)(iv), the correction factor is $20 \log(1/x)$, where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB must be added to the measured emission levels. If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

FCC Limit

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band, all emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.

For transmitters operating in the 5.47-5.725 GHz band, all emissions outside of the 5.47-5.725 GHz band shall not exceed -27 dBm/MHz e.i.r.p.

For transmitters operating solely in the 5.725-5.850 GHz band, all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. The provisions of § 15.205 apply to intentional radiators operating under this section.

ISED Limit

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

a) All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.; or

b) All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device, except devices installed in vehicles, shall be labelled or include in the user manual the following text "for indoor use only."

Emissions outside the band 5470-5600 MHz and 5650-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, devices with bandwidth overlapping the band edge of 5725

MHz can meet the emission limit of -27 dBm/MHz e.i.r.p. at 5850 MHz instead of 5725 MHz.

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

- a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;
- b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
- c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
- d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

The equipment is required to comply with the provisions in RSS-Gen with respect to emissions falling within restricted frequency bands which are listed in the same standard.

FCC §15.209 and RSS-Gen Limit:

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Note: According to C63.10, the Conversion Factors between E[dBµV/m] and EIRP[dBm] as below:

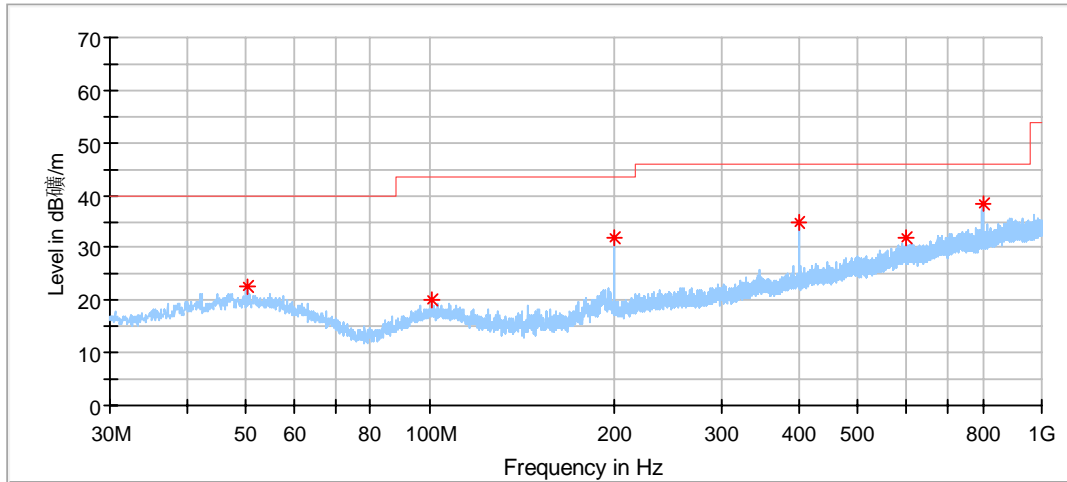
$$E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2, \text{ for } d = 3 \text{ meters.}$$

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

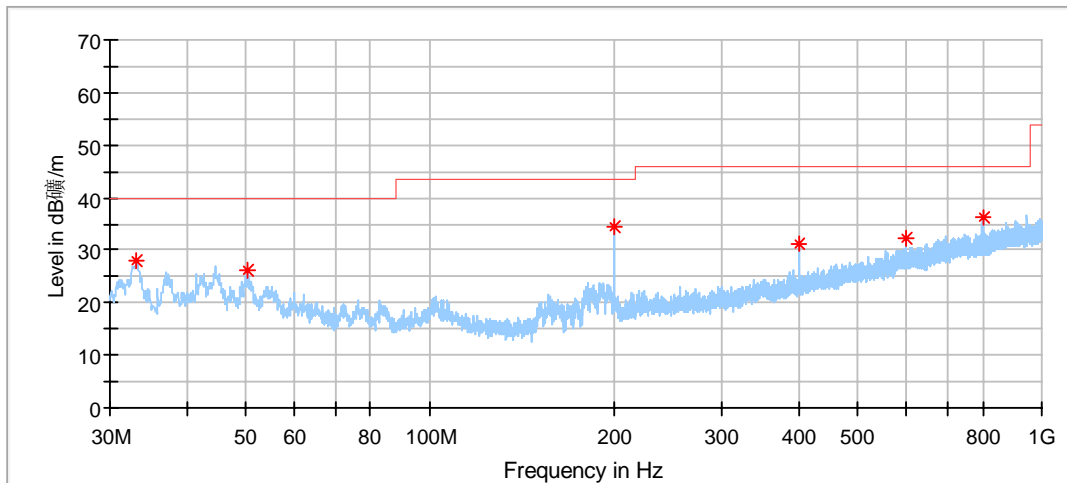
The only worse case (802.11N20 modulation) test result is listed in the report.

Transmitting spurious emission test result as below:

Below 1G:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
50.154444	22.54	40.00	17.46	200.0	H	295.0	20.90
100.810000	20.20	43.50	23.30	200.0	H	258.0	18.48
199.965556	31.80	43.50	11.70	100.0	H	74.0	18.46
400.001111	34.76	46.00	11.24	100.0	H	129.0	23.56
599.982778	31.81	46.00	14.19	200.0	H	249.0	27.55

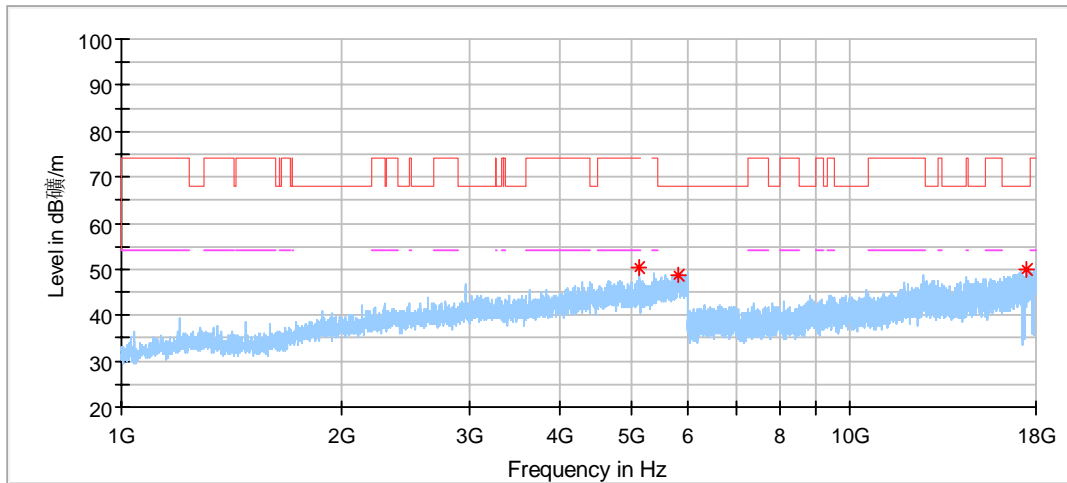


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.125556	28.08	40.00	11.92	100.0	V	120.0	16.93
50.423889	26.17	40.00	13.83	100.0	V	228.0	20.87
199.965556	34.48	43.50	9.02	100.0	V	166.0	18.46
400.001111	31.28	46.00	14.72	100.0	V	120.0	23.56
599.982778	32.42	46.00	13.58	100.0	V	228.0	27.55
800.018333	36.08	46.00	9.92	100.0	V	175.0	30.12

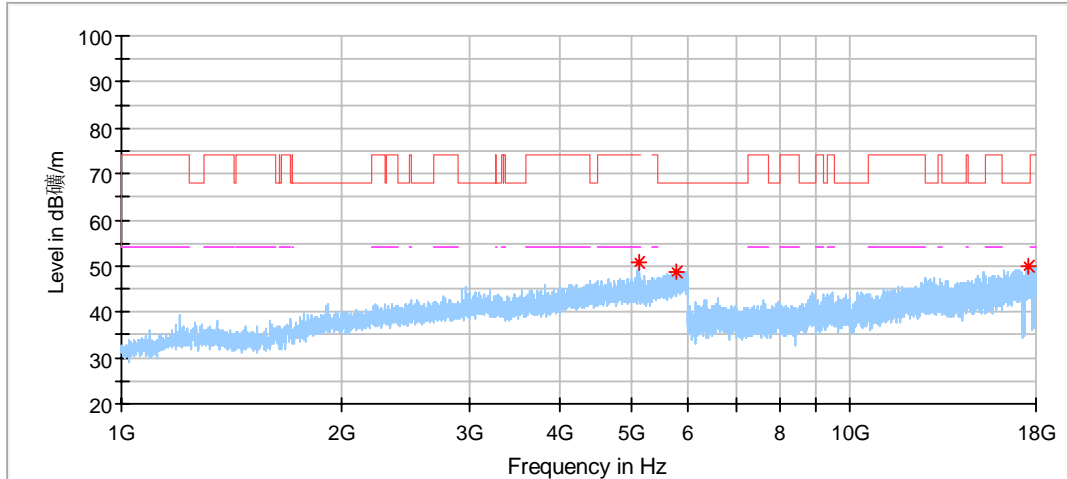
Above 1GHz:

802.11N Modulation 5180MHz Test Result



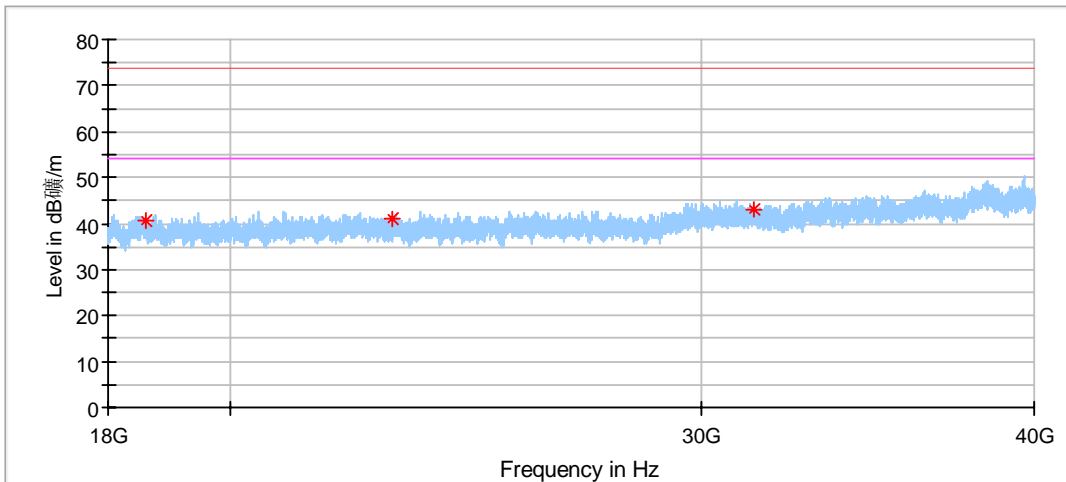
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5129.500000	50.37	74.00	23.63	150.0	H	185.0	4.73
5806.500000	48.71	68.20	19.49	150.0	H	266.0	6.15
17443.000000	50.05	68.20	18.15	150.0	H	30.0	21.84



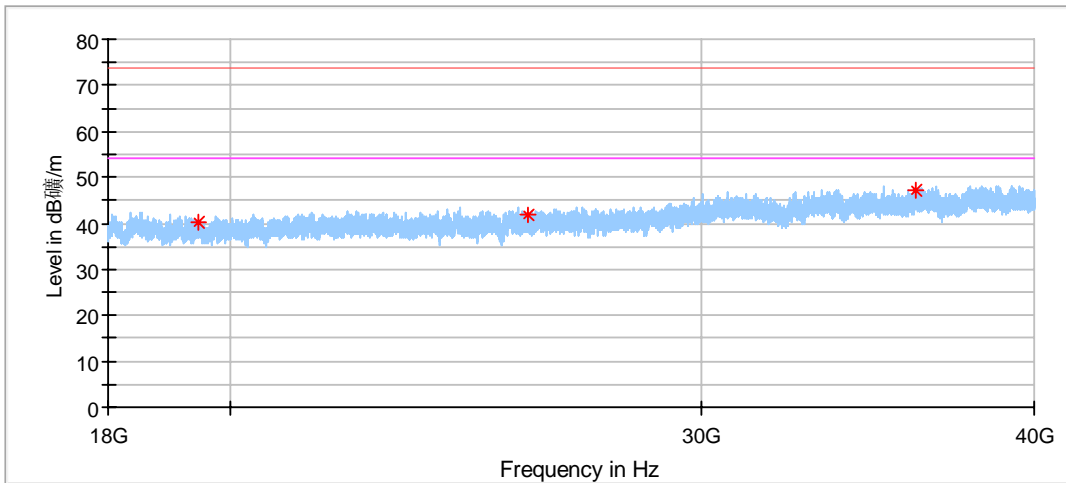
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5124.000000	50.62	74.00	23.38	150.0	V	356.0	4.70
5769.000000	48.89	68.20	19.31	150.0	V	2.0	6.03
17614.000000	49.87	68.20	18.33	150.0	V	60.0	22.07



Critical Freqs

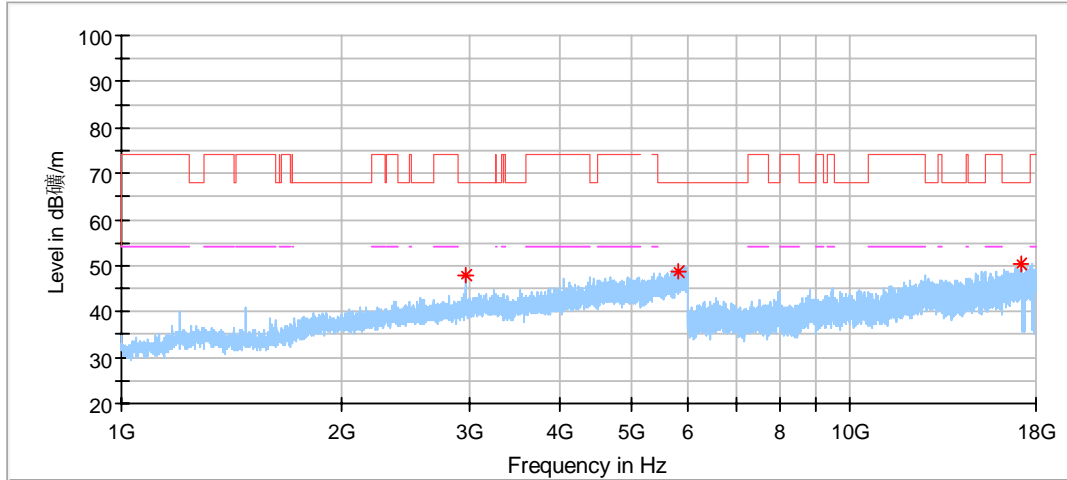
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18588.500000	40.78	74.00	33.22	150.0	H	112.0	-2.71
23014.625000	41.09	74.00	32.91	150.0	H	51.0	0.47
31398.000000	43.09	74.00	30.91	150.0	H	66.0	1.77



Critical Freqs

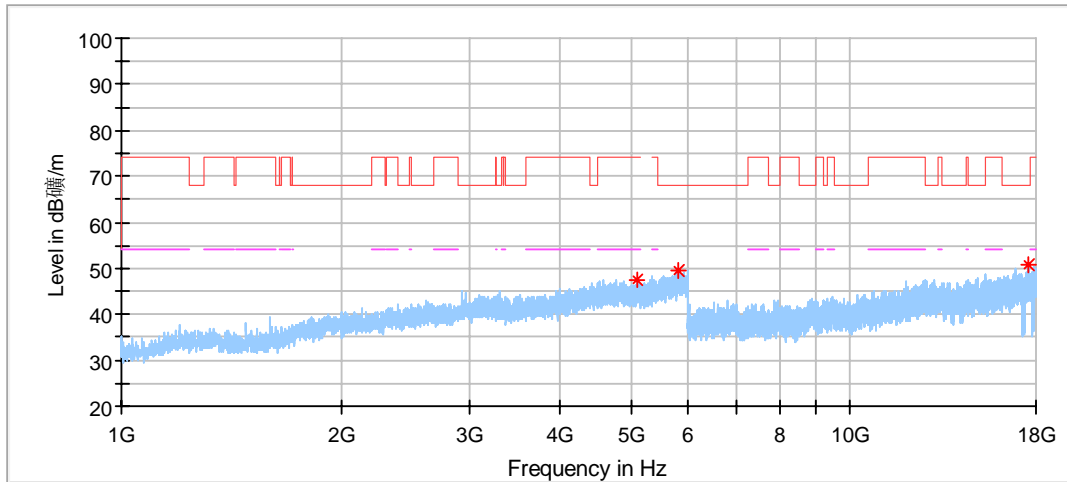
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19444.437500	40.02	74.00	33.98	150.0	V	209.0	-1.49
25866.375000	41.67	74.00	32.33	150.0	V	182.0	2.03
36116.312500	47.12	74.00	26.88	150.0	V	89.0	5.92

802.11N20 Modulation 5200MHz Test Result



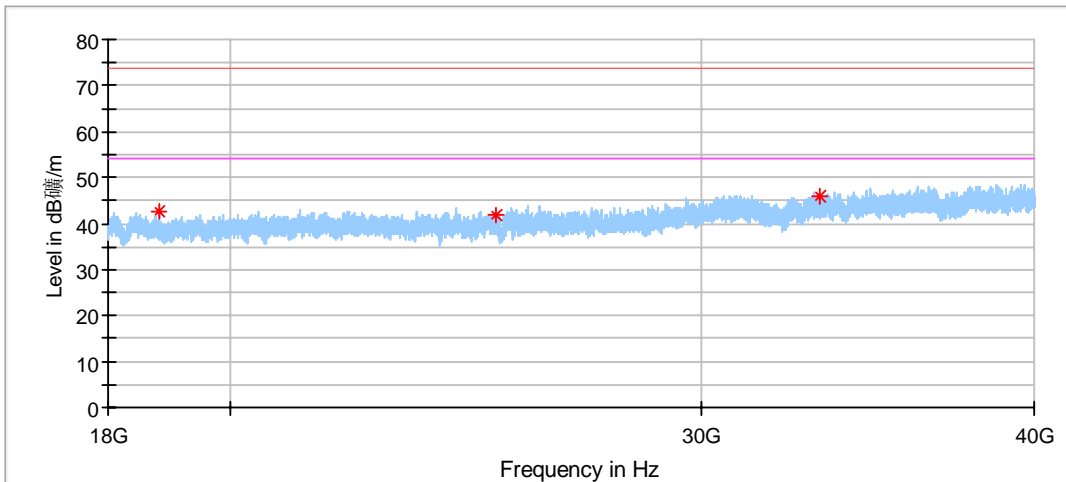
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2967.000000	47.91	68.20	20.29	150.0	H	78.0	-0.99
5816.500000	48.92	68.20	19.28	150.0	H	43.0	6.18
17130.000000	50.35	68.20	17.85	150.0	H	88.0	22.20



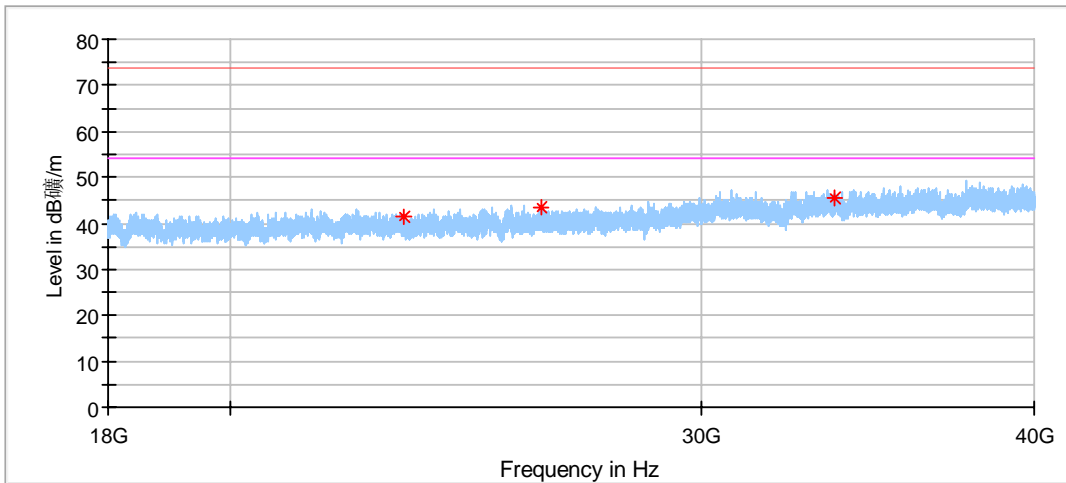
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5095.500000	47.63	74.00	26.37	150.0	V	345.0	4.46
5806.000000	49.35	68.20	18.85	150.0	V	17.0	6.15
17620.500000	50.90	68.20	17.30	150.0	V	227.0	22.07



Critical Freqs

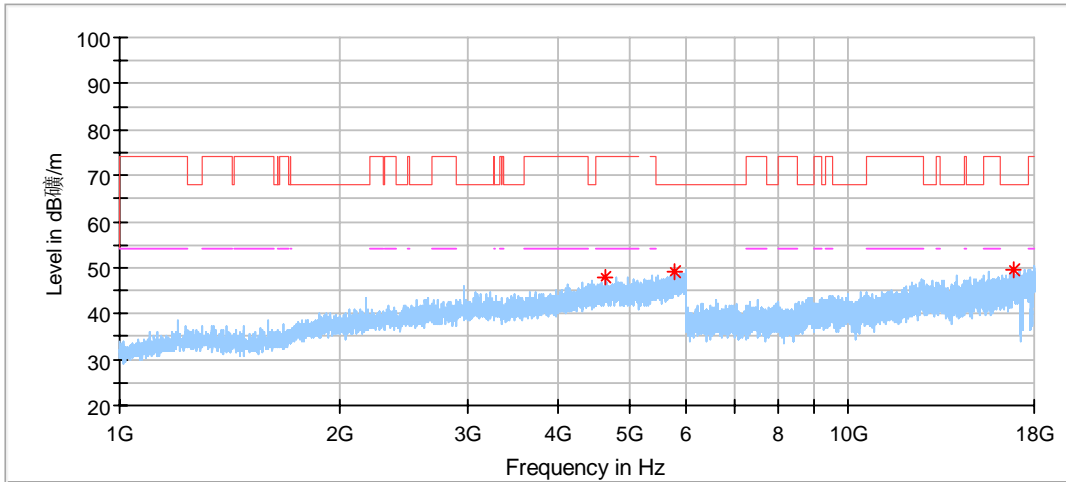
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18818.812500	42.67	74.00	31.33	150.0	H	0.0	-1.88
25152.062500	41.69	74.00	32.31	150.0	H	0.0	1.72
33222.625000	45.81	74.00	28.19	150.0	H	0.0	4.42



Critical Freqs

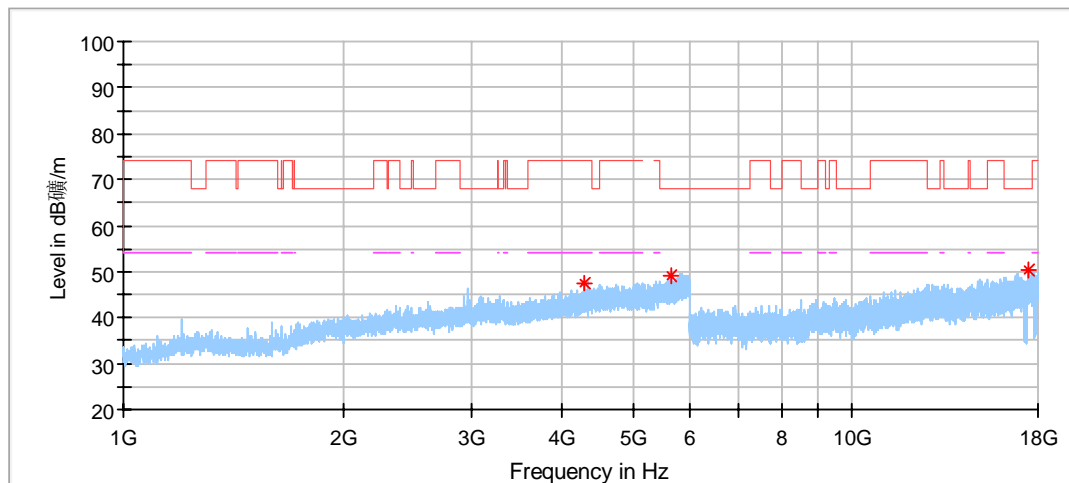
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
23205.062500	41.60	74.00	32.40	150.0	V	60.0	0.74
26154.437500	43.51	74.00	30.49	150.0	V	73.0	2.01
33655.750000	45.70	74.00	28.30	150.0	V	276.0	4.56

802.11N20 Modulation 5240MHz Test Result



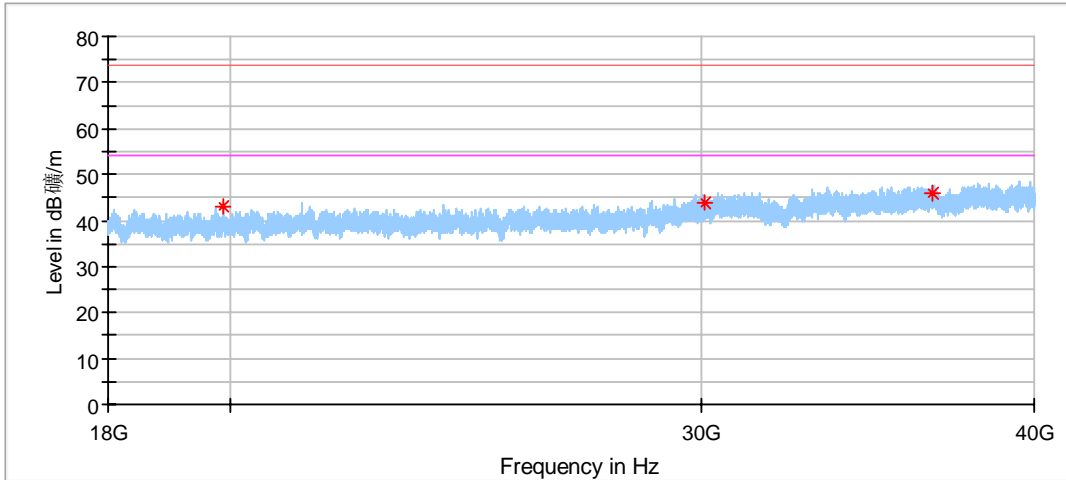
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4643.500000	47.74	74.00	26.26	150.0	H	337.0	3.49
5768.500000	49.12	68.20	19.08	150.0	H	248.0	6.03
16814.000000	49.63	68.20	18.57	150.0	H	353.0	21.76



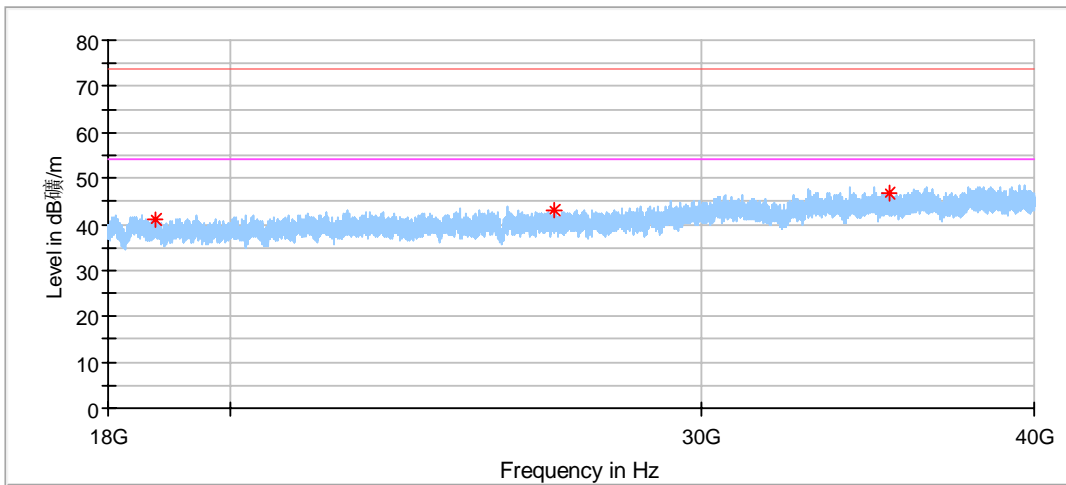
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4291.000000	47.65	74.00	26.35	150.0	V	194.0	2.40
5635.500000	49.02	68.20	19.18	150.0	V	230.0	5.38
17455.500000	50.24	68.20	17.96	150.0	V	254.0	21.86



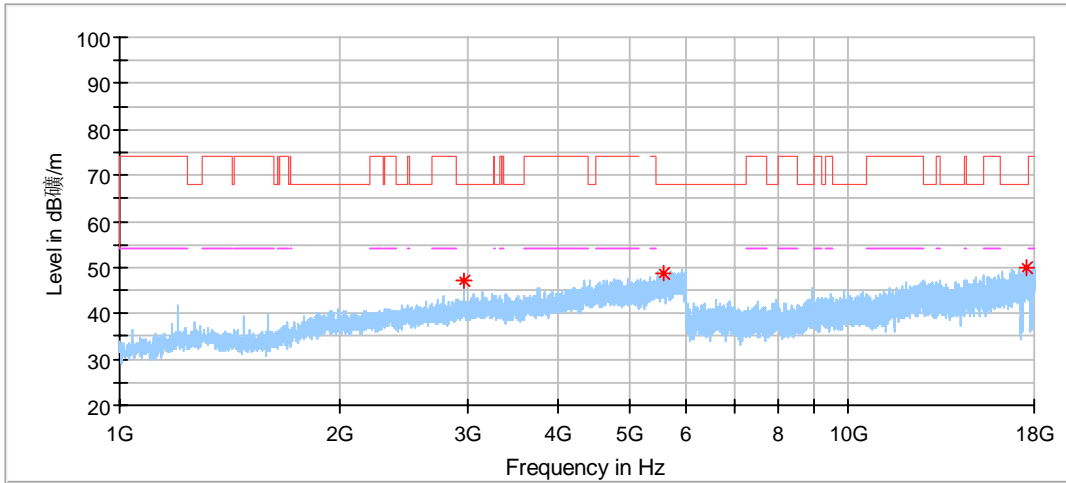
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19866.562500	42.93	74.00	31.07	150.0	H	246.0	-1.30
30086.937500	43.87	74.00	30.13	150.0	H	112.0	2.71
36653.937500	45.77	74.00	28.23	150.0	H	206.0	6.15



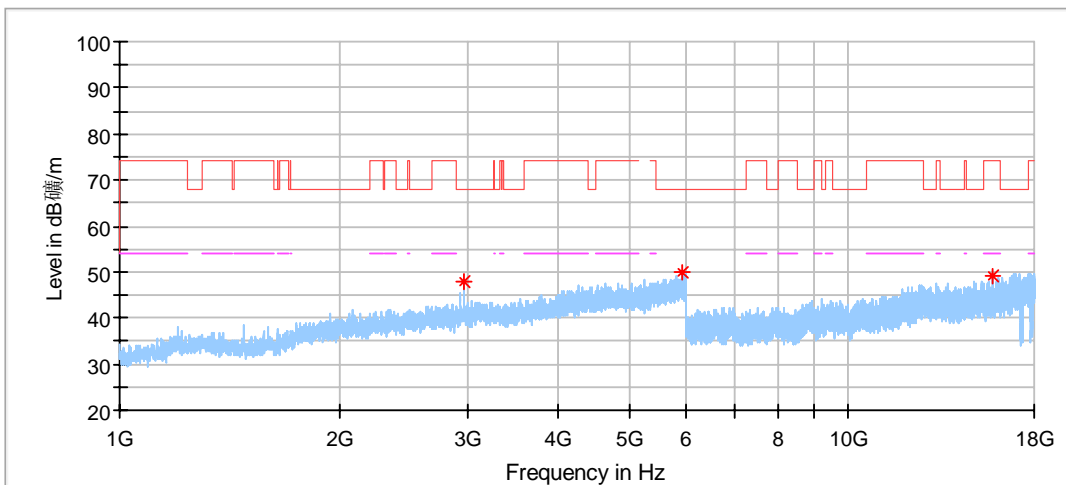
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18756.250000	41.06	74.00	32.94	150.0	V	260.0	-1.91
26436.312500	42.93	74.00	31.07	150.0	V	113.0	2.05
35276.187500	46.60	74.00	27.40	150.0	V	30.0	5.46

802.11N20 Modulation 5260MHz Test Result



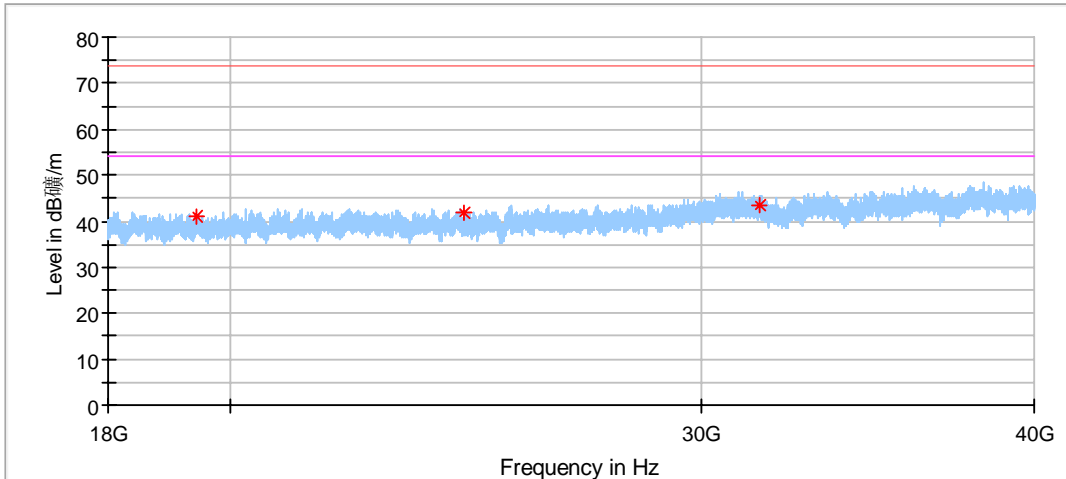
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2968.500000	47.20	68.20	21.00	150.0	H	78.0	-0.99
5583.000000	48.63	68.20	19.57	150.0	H	351.0	5.47
17526.000000	49.96	68.20	18.24	150.0	H	60.0	21.96



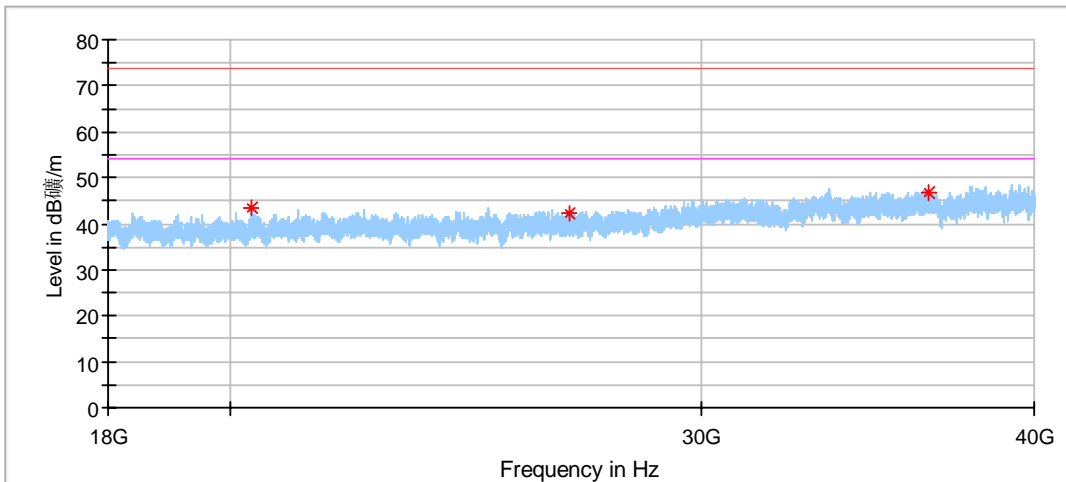
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2966.500000	47.77	68.20	20.43	150.0	V	57.0	-0.99
5906.000000	49.98	68.20	18.22	150.0	V	356.0	6.51
15815.500000	49.19	74.00	24.81	150.0	V	60.0	18.82



Critical Freqs

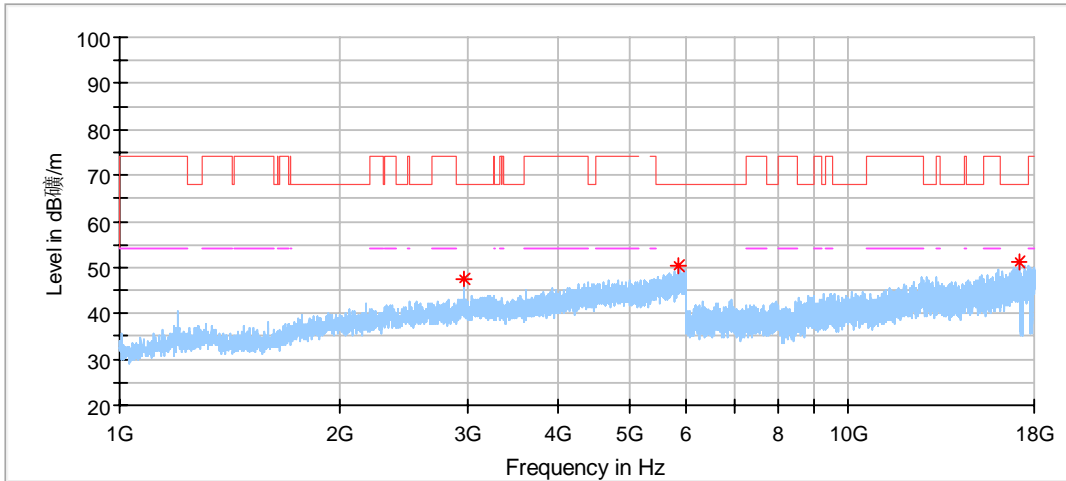
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19432.750000	41.19	74.00	32.81	150.0	H	73.0	-1.52
24461.812500	42.04	74.00	31.96	150.0	H	263.0	1.30
31571.250000	43.38	74.00	30.62	150.0	H	86.0	2.71



Critical Freqs

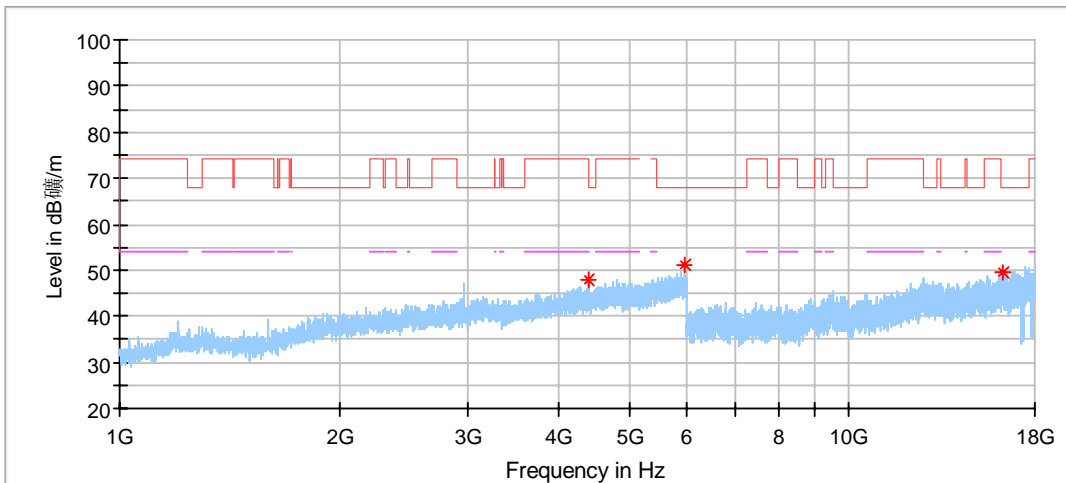
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20375.312500	43.32	74.00	30.68	150.0	V	152.0	-0.71
26804.812500	42.08	74.00	31.92	150.0	V	99.0	2.28
36526.750000	46.96	74.00	27.04	150.0	V	0.0	6.26

802.11N20 Modulation 5280MHz Test Result



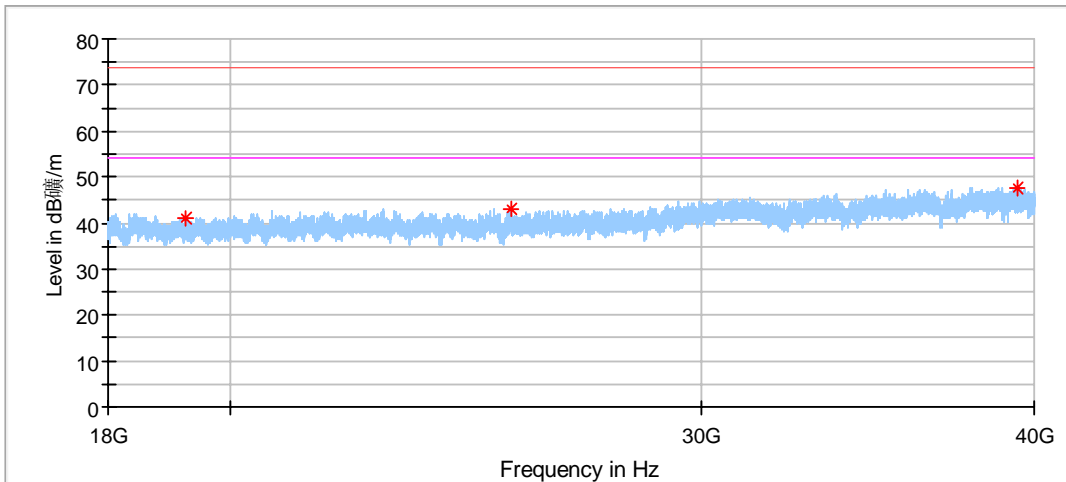
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2967.000000	47.57	68.20	20.63	150.0	H	319.0	-0.99
5863.000000	50.22	68.20	17.98	150.0	H	156.0	6.45
17157.000000	51.27	68.20	16.93	150.0	H	252.0	22.26



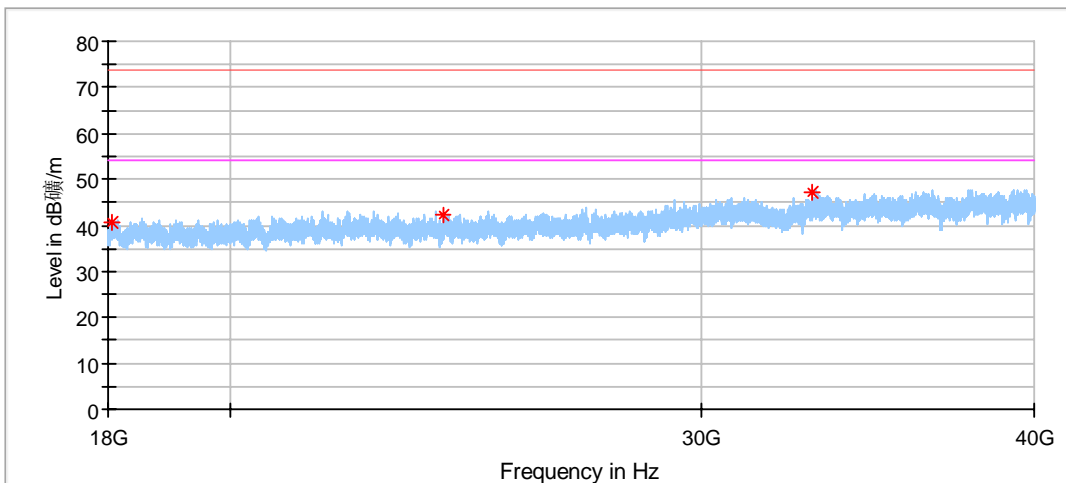
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4408.000000	47.79	68.20	20.41	150.0	V	328.0	2.91
5945.000000	51.19	68.20	17.01	150.0	V	275.0	6.52
16261.000000	49.72	68.20	18.48	150.0	V	282.0	20.07



Critical Freqs

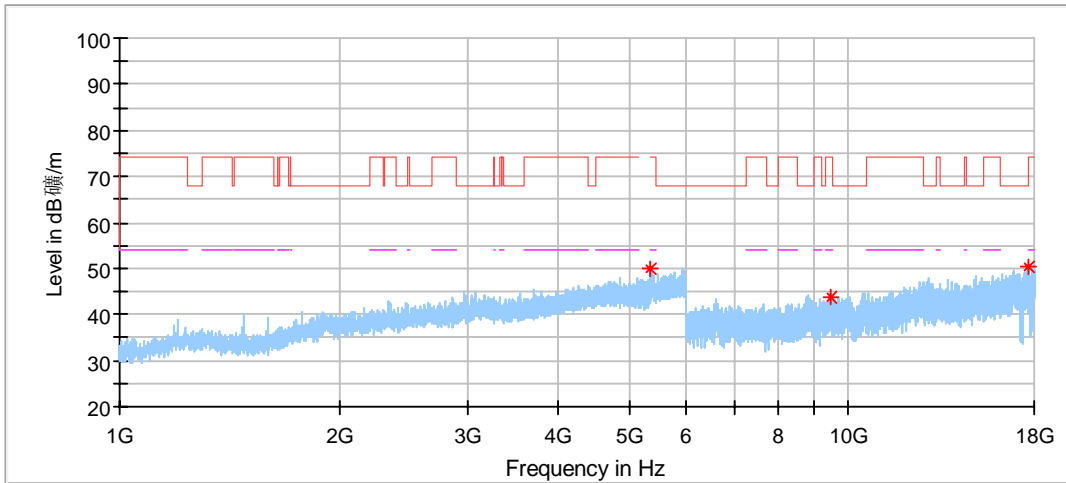
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19226.500000	41.02	74.00	32.98	150.0	H	72.0	-1.89
25478.625000	43.12	74.00	30.88	150.0	H	235.0	1.85
39398.437500	47.78	74.00	26.22	150.0	H	235.0	8.40



Critical Freqs

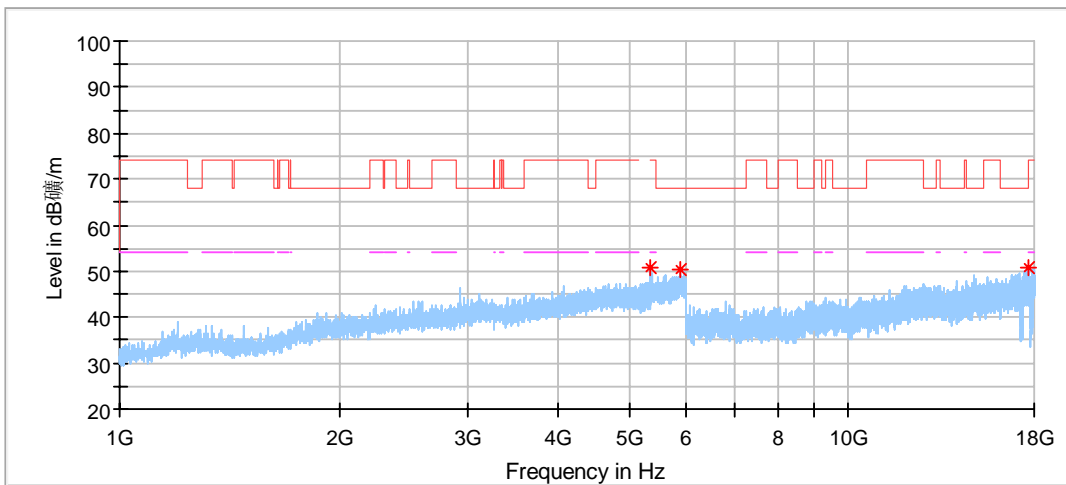
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18061.187500	40.64	74.00	33.36	150.0	V	15.0	-2.16
24045.187500	42.18	74.00	31.82	150.0	V	138.0	1.15
33043.875000	47.12	74.00	26.88	150.0	V	71.0	4.40

802.11N20 Modulation 5320MHz Test Result



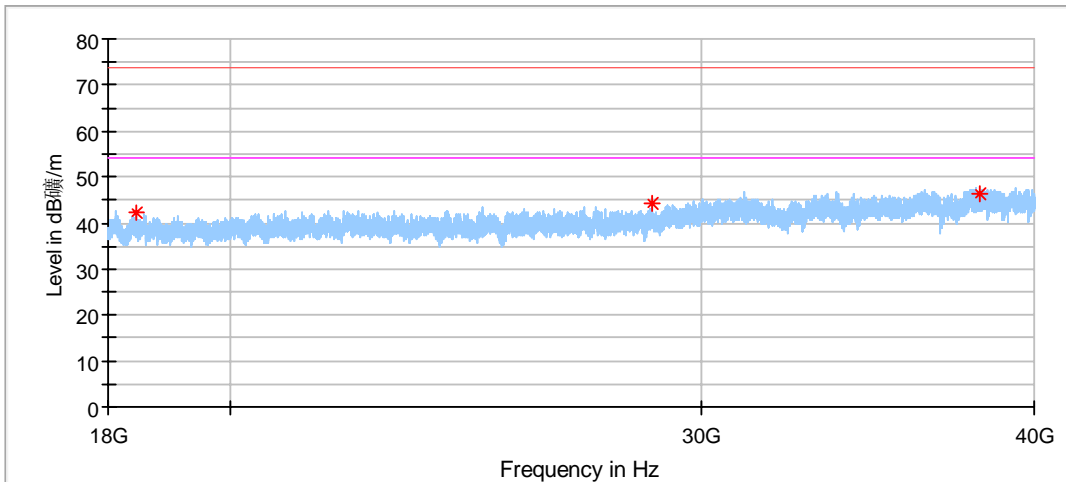
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5362.000000	49.96	74.00	24.04	150.0	H	230.0	5.12
9492.500000	44.00	74.00	30.00	150.0	H	256.0	12.90
17685.500000	50.28	68.20	17.92	150.0	H	256.0	22.10



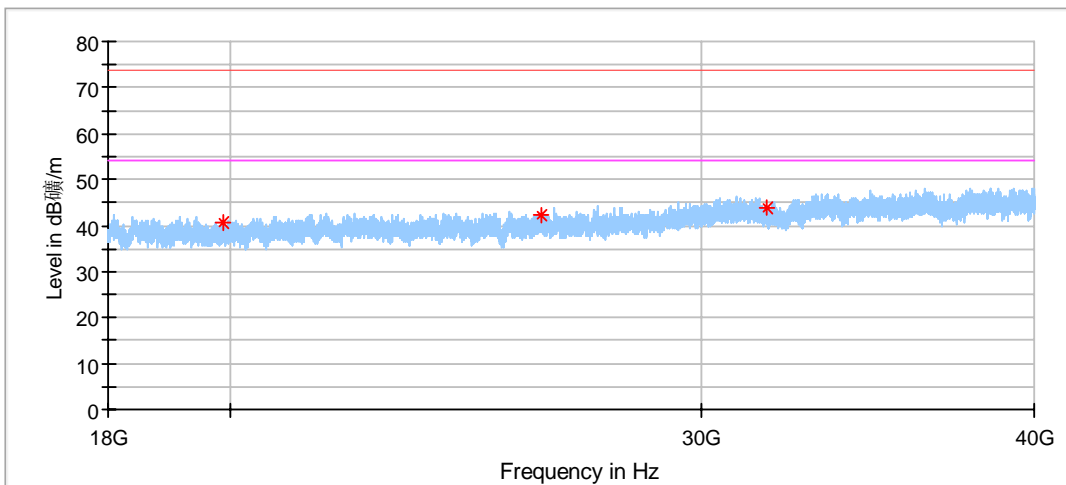
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5365.000000	50.63	74.00	23.37	150.0	V	328.0	5.13
5874.500000	50.43	68.20	17.77	150.0	V	50.0	6.51
17670.500000	50.59	68.20	17.61	150.0	V	216.0	22.10



Critical Freqs

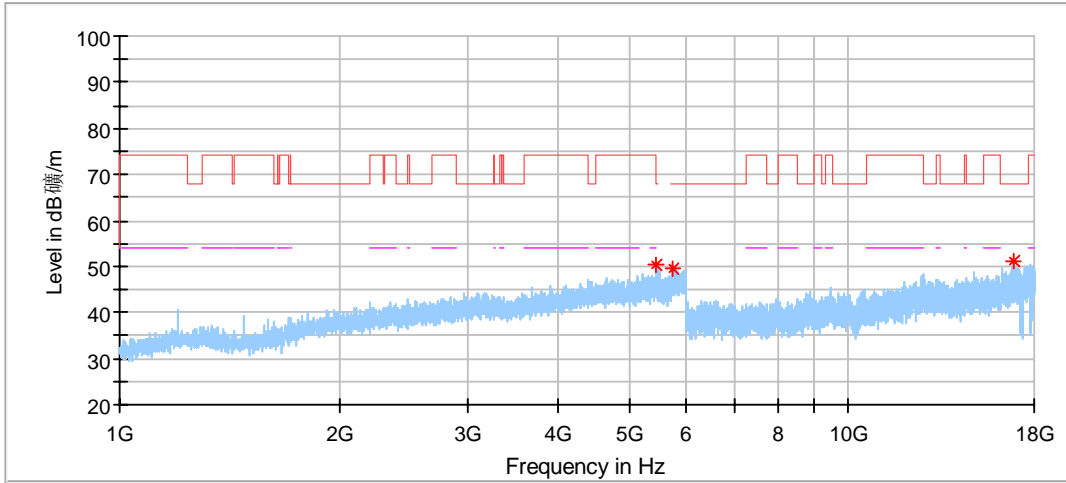
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18431.062500	42.35	74.00	31.65	150.0	H	204.0	-1.89
28758.000000	44.37	74.00	29.63	150.0	H	204.0	2.45
38141.000000	46.21	74.00	27.79	150.0	H	315.0	7.07



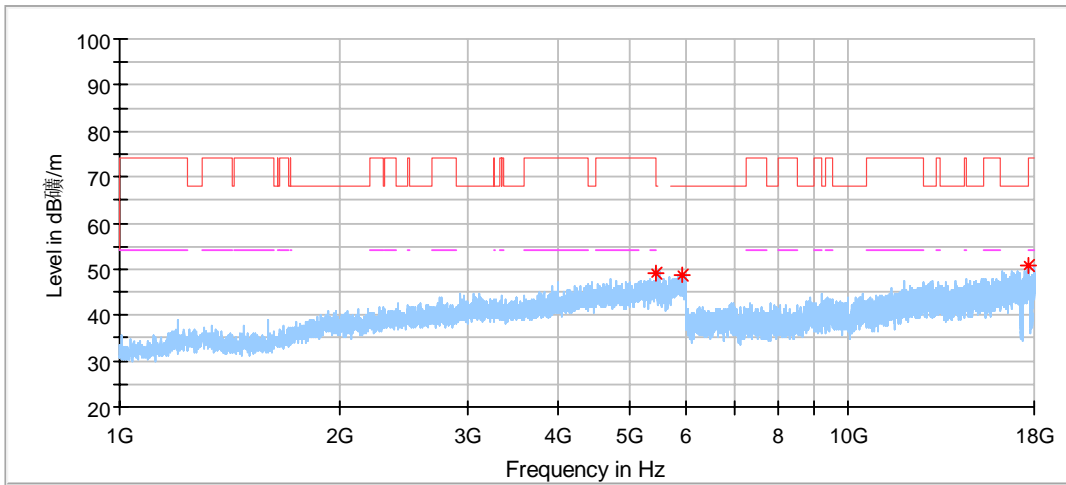
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19875.500000	40.54	74.00	33.46	150.0	V	126.0	-1.28
26148.250000	42.20	74.00	31.80	150.0	V	153.0	2.01
31776.812500	43.99	74.00	30.01	150.0	V	273.0	2.71

802.11N20 Modulation 5500MHz Test Result

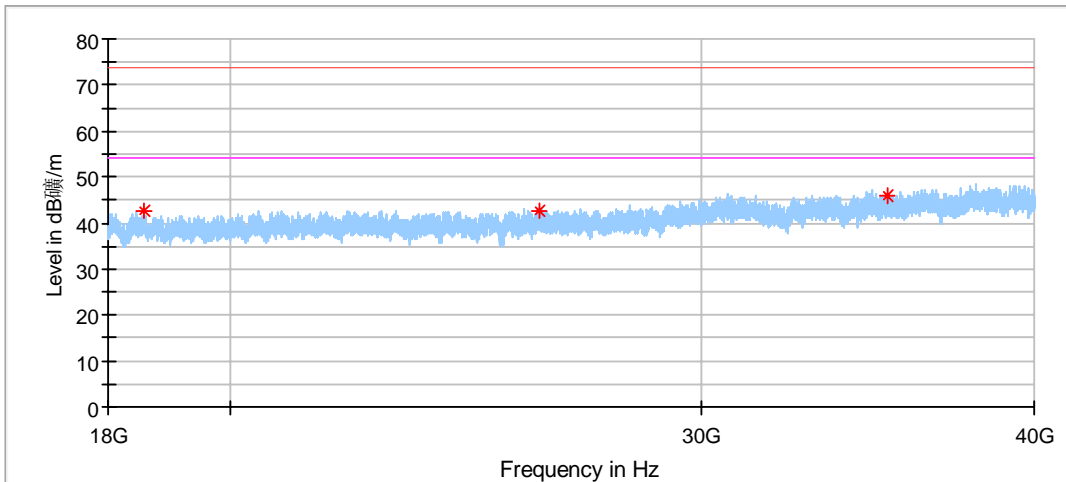


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5443.000000	50.41	74.00	23.59	150.0	H	237.0	5.23
5743.500000	49.43	68.20	18.77	150.0	H	237.0	5.91
16908.000000	51.28	68.20	16.92	150.0	H	129.0	21.87



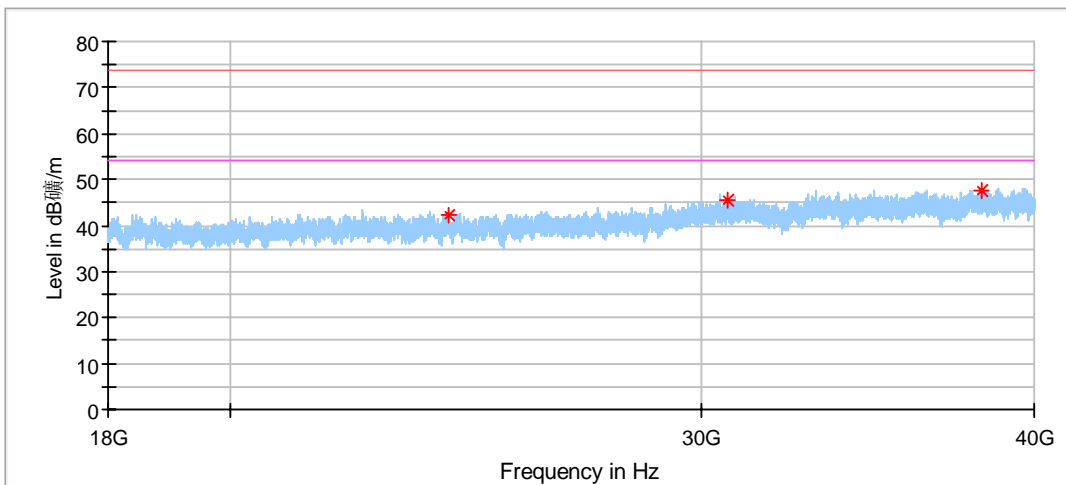
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5436.500000	49.07	74.00	24.93	150.0	V	345.0	5.20
5924.500000	48.86	68.20	19.34	150.0	V	50.0	6.49
17643.500000	50.63	68.20	17.57	150.0	V	330.0	22.08



Critical Freqs

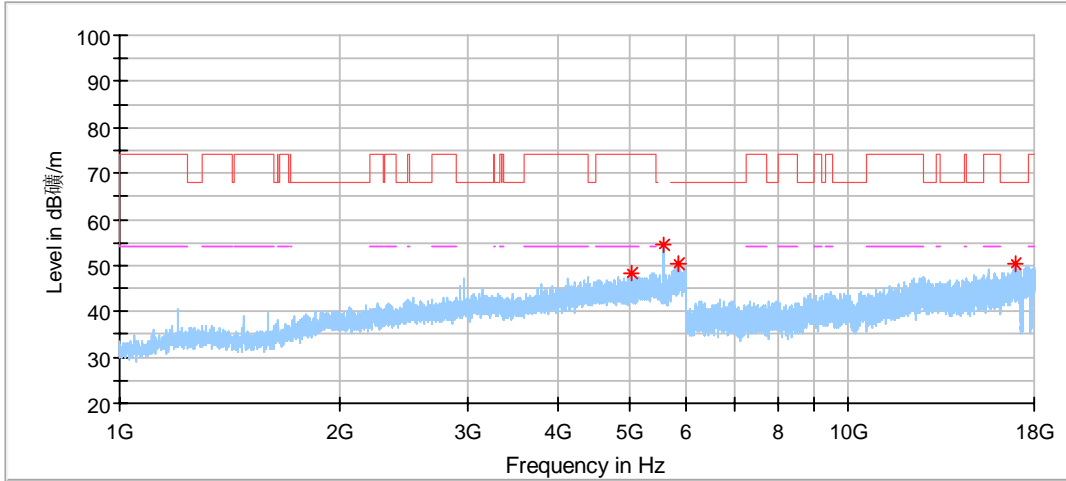
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18560.312500	42.51	74.00	31.49	150.0	H	234.0	-1.69
26100.125000	42.63	74.00	31.37	150.0	H	247.0	2.00
35216.375000	45.92	74.00	28.08	150.0	H	154.0	5.47



Critical Freqs

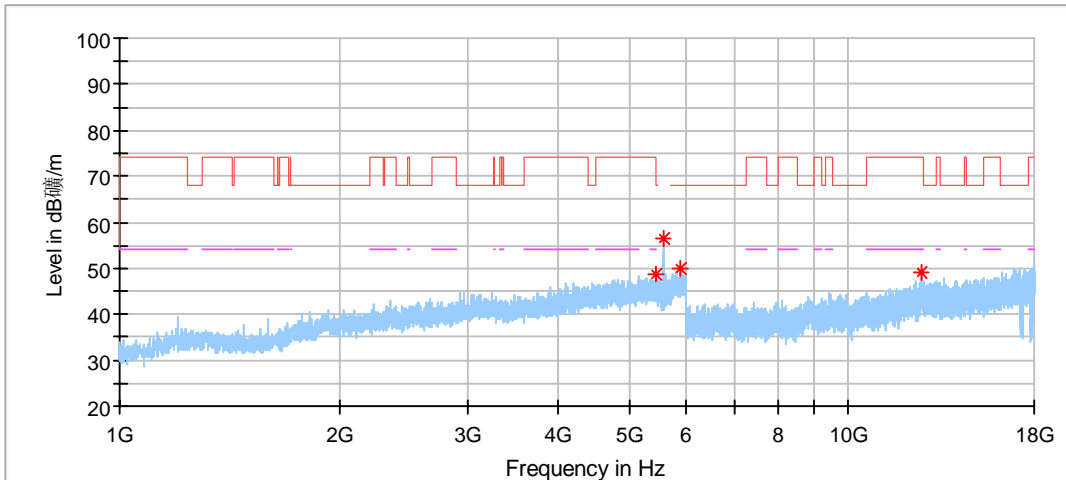
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
24139.375000	42.08	74.00	31.93	150.0	V	315.0	1.11
30705.687500	45.46	74.00	28.54	150.0	V	15.0	3.00
38217.312500	47.43	74.00	26.57	150.0	V	274.0	7.08

802.11N20 Modulation 5580MHz Test Result



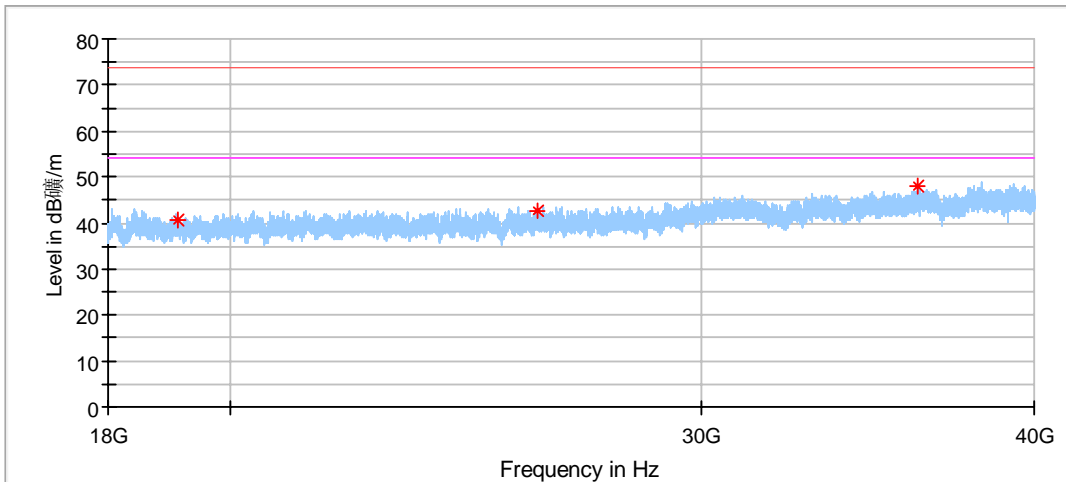
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5048.000000	48.19	74.00	25.81	150.0	H	357.0	4.08
5579.000000	54.49	---	---	150.0	H	178.0	5.45
5839.000000	50.50	68.20	17.70	150.0	H	196.0	6.31
16921.500000	50.18	68.20	18.02	150.0	H	52.0	21.89



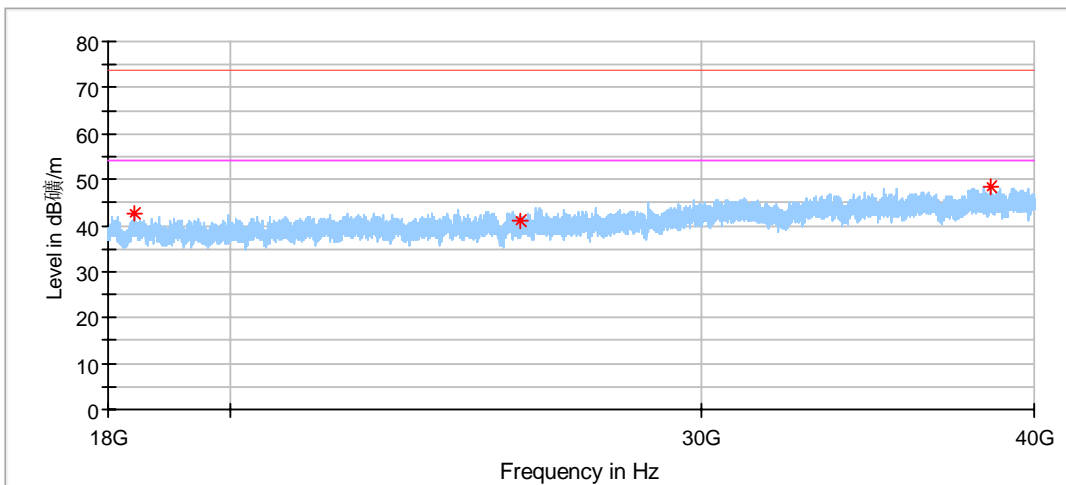
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5443.500000	48.80	74.00	25.20	150.0	V	139.0	5.23
5579.500000	56.41	---	---	150.0	V	335.0	5.46
5892.500000	49.99	68.20	18.21	150.0	V	343.0	6.52
12612.000000	49.03	74.00	24.97	150.0	V	157.0	16.39



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19119.937500	40.56	74.00	33.44	150.0	H	97.0	-1.79
26074.000000	42.86	74.00	31.14	150.0	H	111.0	2.00
36166.500000	48.14	74.00	25.86	150.0	H	7.0	5.97



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18400.812500	42.82	74.00	31.18	150.0	V	233.0	-1.95
25662.187500	41.19	74.00	32.81	150.0	V	358.0	2.00
38511.562500	48.21	74.00	25.79	150.0	V	220.0	7.02