

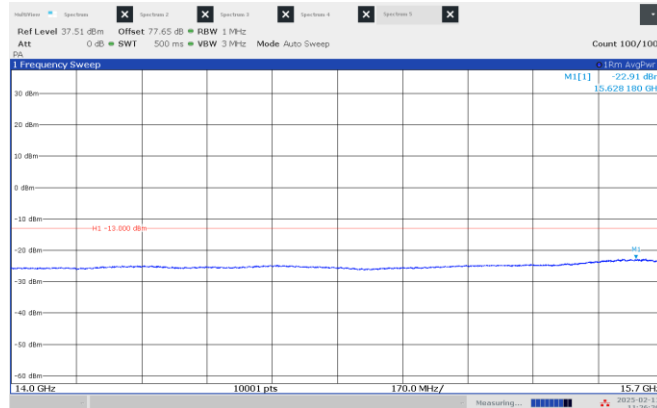


Figure 8.4-55: Emission mask, beyond $\pm 250\%$ of BW (low frequency range), Low channel: 15.85 GHz, shortest pulse. (100 MHz BW)

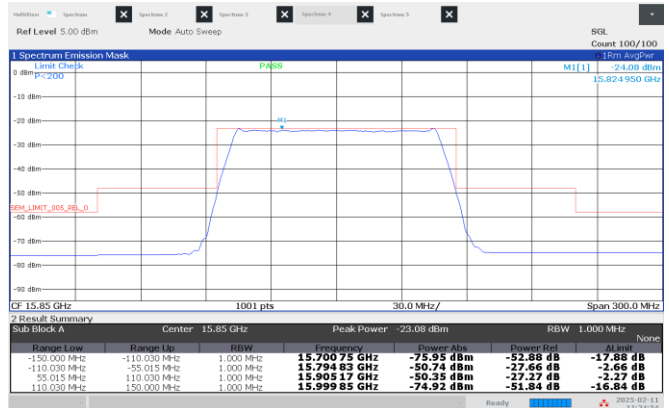


Figure 8.4-56: Emission mask, Low channel: 15.85 GHz, shortest pulse. (100 MHz BW)

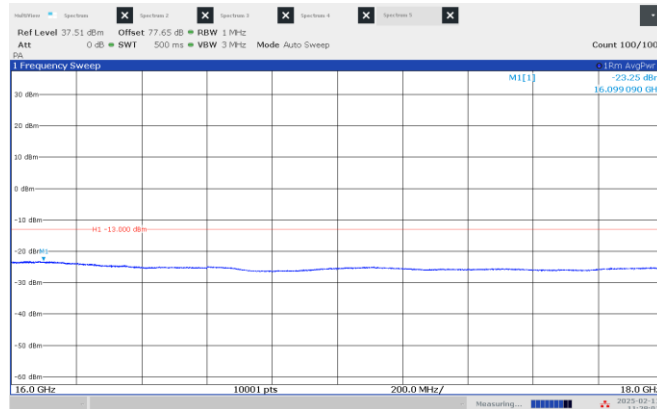


Figure 8.4-57: Emission mask, beyond $\pm 250\%$ of BW (high frequency range), Low channel: 15.85 GHz, shortest pulse. (100 MHz BW)

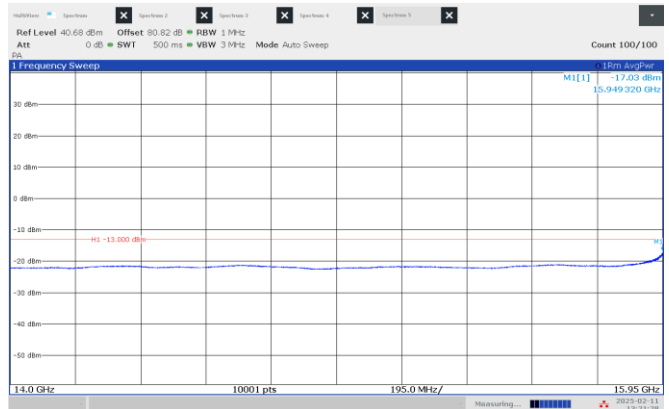


Figure 8.4-58: Emission mask, beyond $\pm 250\%$ of BW (low frequency range), Middle channel: 16.15 GHz, shortest pulse. (100 MHz BW)



Figure 8.4-59: Emission mask, Middle channel: 16.15 GHz, shortest pulse. (100 MHz BW)

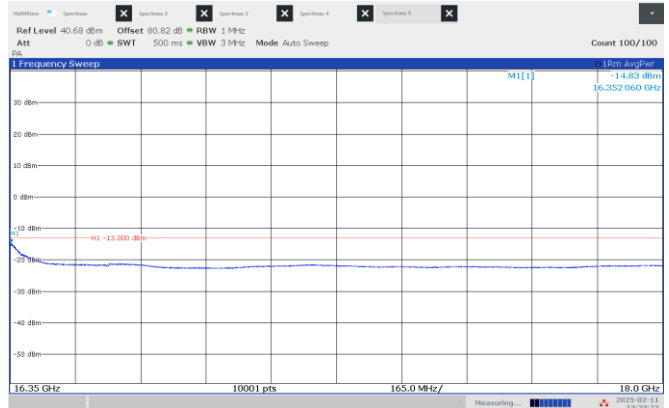


Figure 8.4-60: Emission mask, beyond $\pm 250\%$ of BW (high frequency range), Middle channel: 16.15 GHz, shortest pulse. (100 MHz BW)

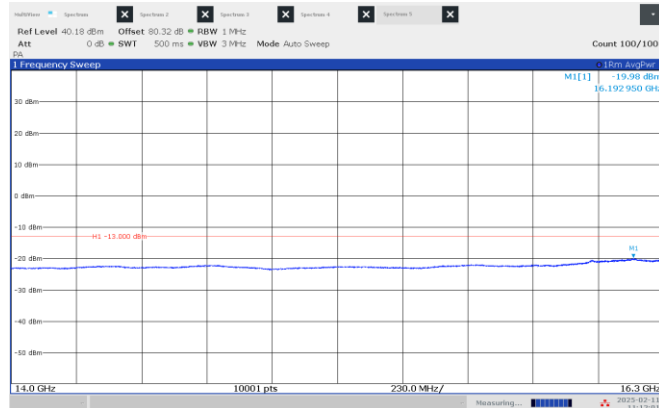


Figure 8.4-61: Emission mask, beyond $\pm 250\%$ of BW (low frequency range), High channel: 16.45 GHz, shortest pulse. (100 MHz BW)

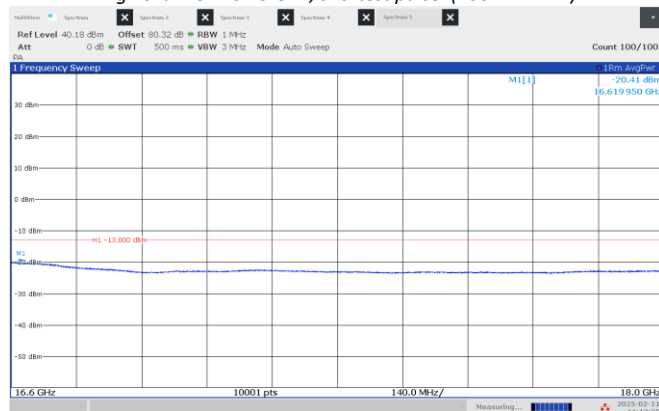


Figure 8.4-63: Emission mask, beyond $\pm 250\%$ of BW (high frequency range), High channel: 16.45 GHz, shortest pulse. (100 MHz BW)

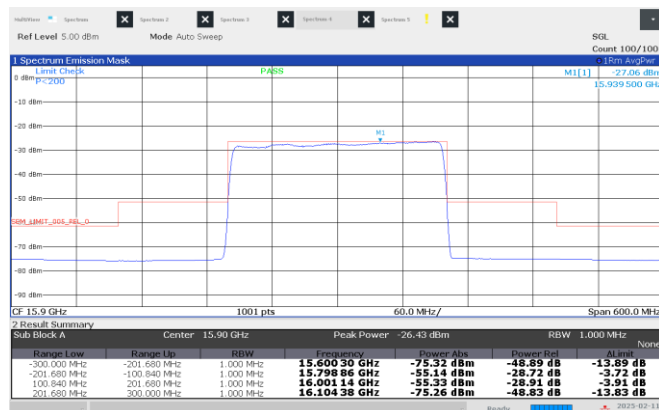


Figure 8.4-65: Emission mask, Low channel: 15.90 GHz, shortest pulse. (200 MHz BW)

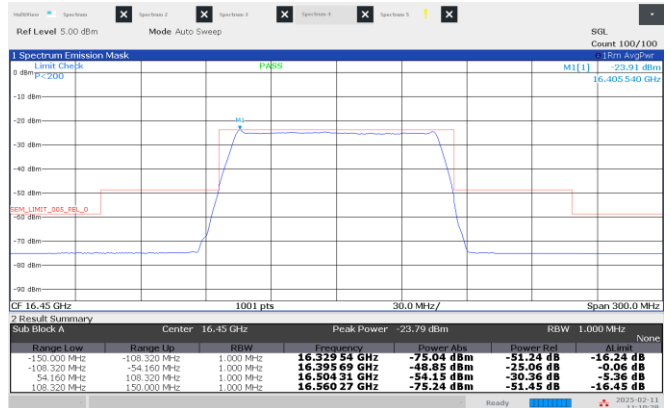


Figure 8.4-62: Emission mask, High channel: 16.45 GHz, shortest pulse. (100 MHz BW)

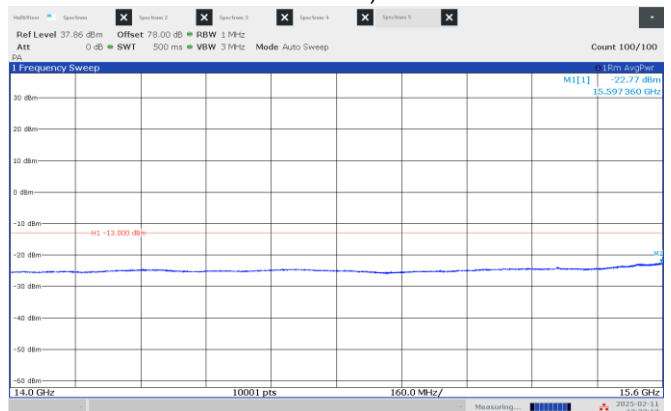


Figure 8.4-64: Emission mask, beyond $\pm 250\%$ of BW (low frequency range), Low channel: 15.90 GHz, shortest pulse. (200 MHz BW)

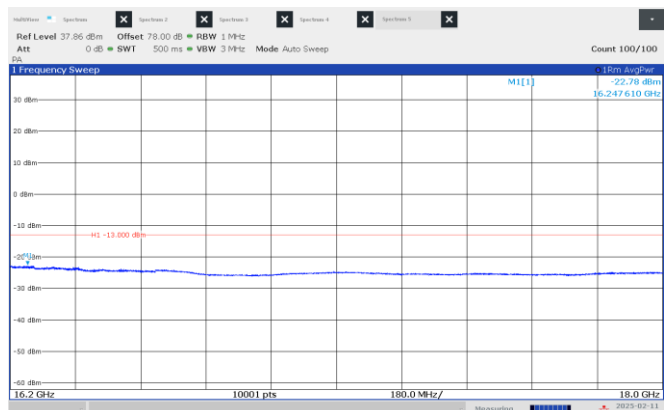


Figure 8.4-66: Emission mask, beyond $\pm 250\%$ of BW (high frequency range), Low channel: 15.90 GHz, shortest pulse. (200 MHz BW)

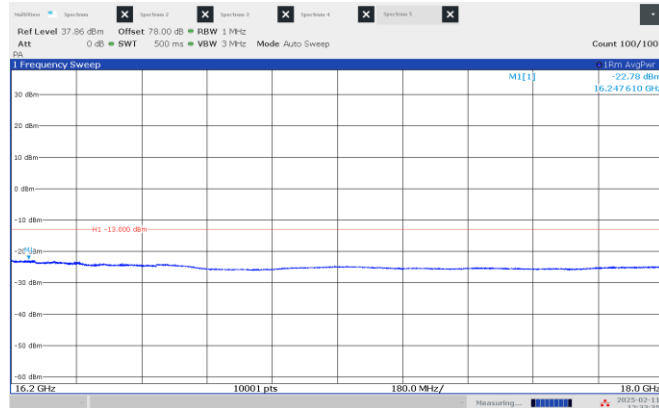


Figure 8.4-67: Emission mask, beyond $\pm 250\%$ of BW (low frequency range), Middle channel: 16.15 GHz, shortest pulse. (200 MHz BW)

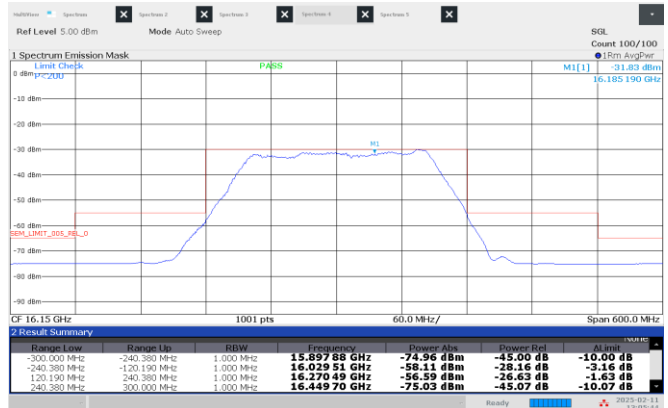


Figure 8.4-68: Emission mask, Middle channel: 16.15 GHz, shortest pulse. (200 MHz BW)

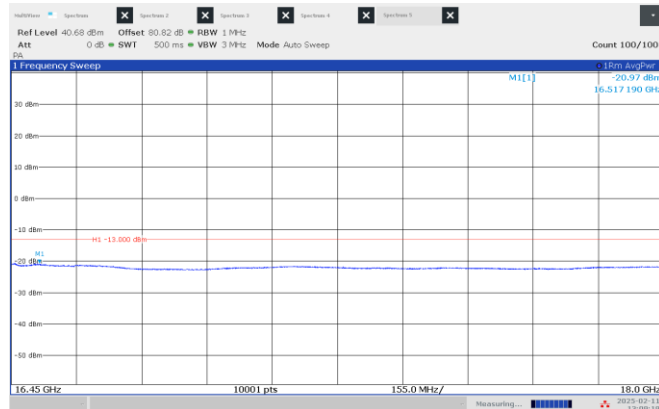


Figure 8.4-69: Emission mask, beyond $\pm 250\%$ of BW (high frequency range), Middle channel: 16.15 GHz, shortest pulse. (200 MHz BW)

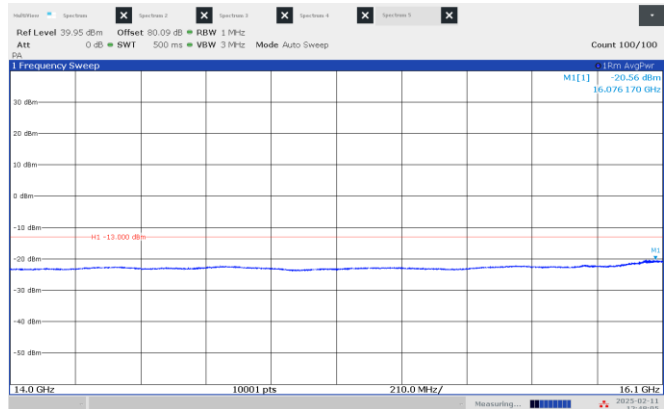


Figure 8.4-70: Emission mask, beyond $\pm 250\%$ of BW (low frequency range), High channel: 16.40 GHz, shortest pulse. (200 MHz BW)



Figure 8.4-71: Emission mask, High channel: 16.40 GHz, shortest pulse. (200 MHz BW)

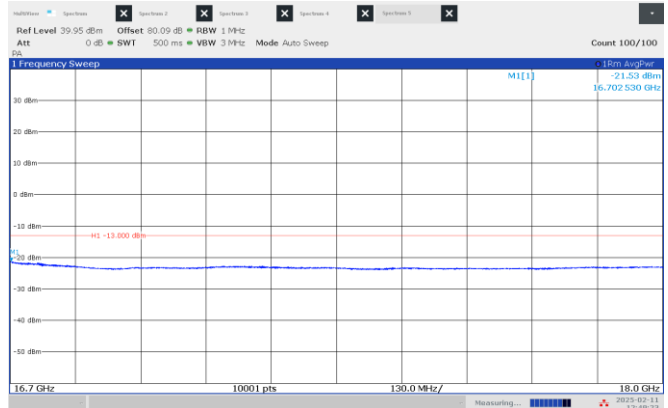


Figure 8.4-72: Emission mask, beyond $\pm 250\%$ of BW (high frequency range), High channel: 16.40 GHz, shortest pulse. (200 MHz BW)

8.5 Transmitter spurious emissions

8.5.1 References and limits

- FCC 47 CFR Part 90: §90.210
- Test method: ANSI C63.26-2015 (5.5)
 - (a) Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435–1525 MHz, 2345–2395 MHz, or 5091–5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

- FCC 47 CFR Part 2: §2.1057

(a) In all of the measurements set forth in §§ 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(2) If the equipment operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

8.5.2 Test summary

Verdict	Pass		
Test date	September 9, 2024; September 10, 2024; September 11, 2024	Temperature	20°C; 18°C 20°C
Test engineer	Chenhao Ma, Wireless Test Technician	Air pressure	1002mbar; 1001mbar; 1001mbar
Test location	☐ Wireless bench ☒ Other: 3M Chamber	Relative humidity	59%; 56%; 58%

8.5.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power. Max power found it in table 8.3-2 was selected as the representative case for this testing (wors case). Low, middle, and high channels were tested using the longest pulse and the 200 MHz declared bandwidth.

Due to the high power emitted by the EUT, several considerations were made to execute accuracy testing but avoiding the damage of the receiver system:

- 1) In the range from 1-18 GHz two low-pass filters in cascade were inserted between the receiving antenna a power amplifier with the purpose of attenuating the signal and maintaining the linearity of the power amplifier. The 1 dB cut frequency of these filters is at 14 GHz gaining attenuation at the interest frequencies around 100 dB and preserving an insertion loss of 2 dB average in the frequency range under investigation. The suppressed frequencies in this section were investigated previously in section 8.4.5 where the filter was not aggregated (frequency range from 14-18 GHz).
- 2) In the range from 18-40 GHz two high-pass filters in cascade were inserted between the receiving antenna a power amplifier with the purpose of attenuating the signal and maintaining the linearity of the power amplifier. The cut frequency of these filters is at 18 GHz, attenuating the interest frequencies signals with around 87 dB (minimum) and preserving an insertion loss of 2.5 dB average in the frequency range under investigation.
- 3) In the range above 40 GHz ranges no filters or amplifiers were used. Waveguide antennas provide enough carrier attenuation.

After calculation -13dBm=84.38dBμV/m below 1GHz
-13dBm=82.23dBμV/m above 1GHz

8.5.4 Setup details

EUT power input during test	28 V DC
EUT setup configuration	☒ Table-top (Above 1 GHz: 1.5 m) ☐ Floor standing ☒ Other: Tripod mounted (Below 1 GHz: 80 cm)
Antenna height variation	1–4 m
Turn table position	0–360°
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated, and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver settings (below 1 GHz):

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	Peak (preview measurements) Quasi-peak (final measurements)
Trace mode	Max Hold
Measurement time	5000 ms (final measurements)

Receiver settings (from 1 -40 GHz):

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Average (final measurements)
Trace mode	Max Hold
Measurement time	5000 ms (final measurements)

Spectrum analyzer settings (above 40 GHz):

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Average
Trace mode	Max Hold

8.5.5 Test data

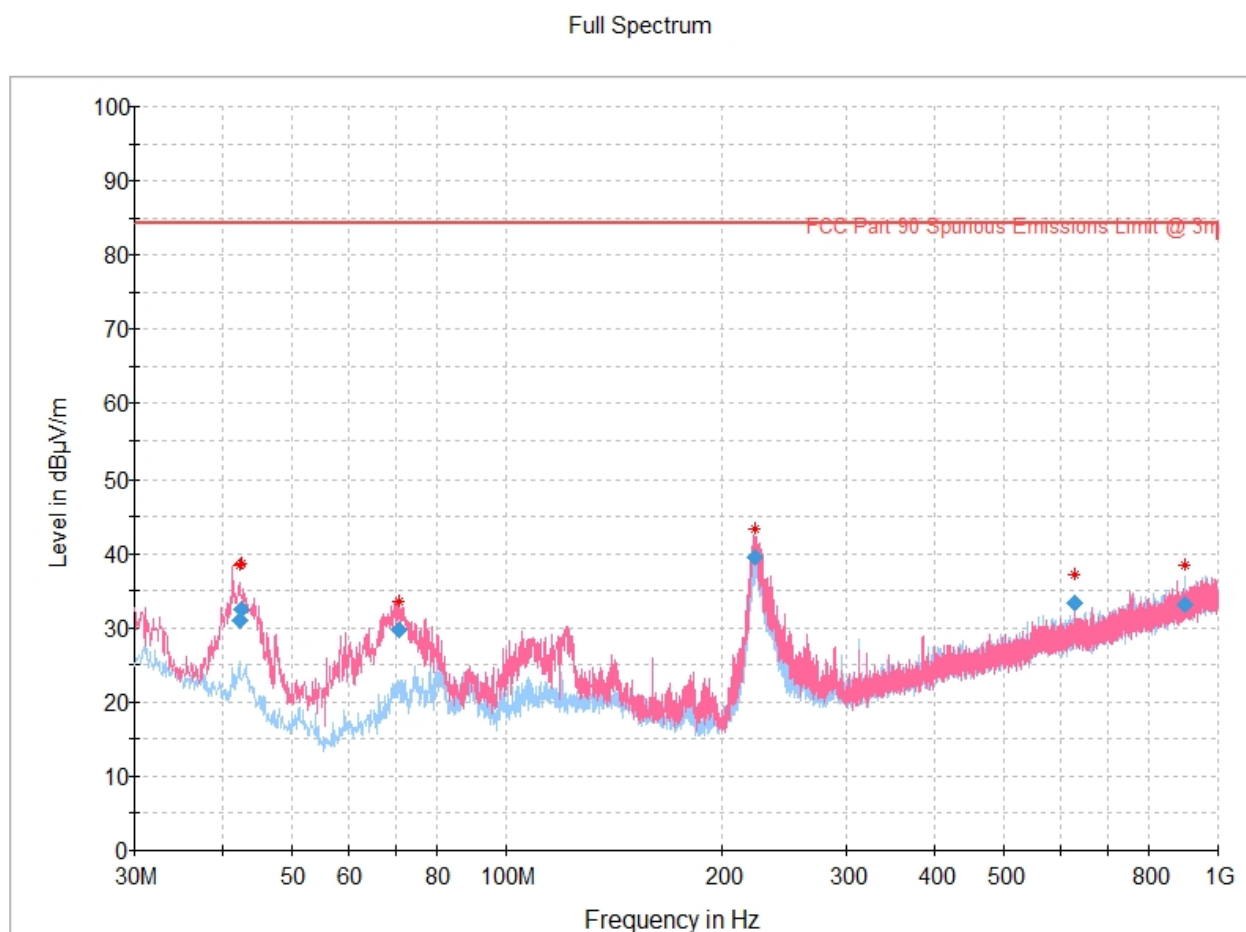


Figure 8.5-1: Radiated emissions spectral plot (30 MHz - 1 GHz) low channel

Table 8.5-1: Radiated emissions results

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.147000	31.01	84.38	53.37	5000.0	120.000	101.0	V	172.0	20.0
42.412000	32.54	84.38	51.84	5000.0	120.000	101.0	V	194.0	19.9
70.627000	29.68	84.38	54.70	5000.0	120.000	148.0	V	282.0	13.8
222.980000	39.41	84.38	44.97	5000.0	120.000	114.0	V	122.0	18.4
630.002000	33.40	84.38	50.98	5000.0	120.000	341.0	V	53.0	30.0
896.432000	33.17	84.38	51.21	5000.0	120.000	399.0	H	221.0	33.4

Notes:

¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

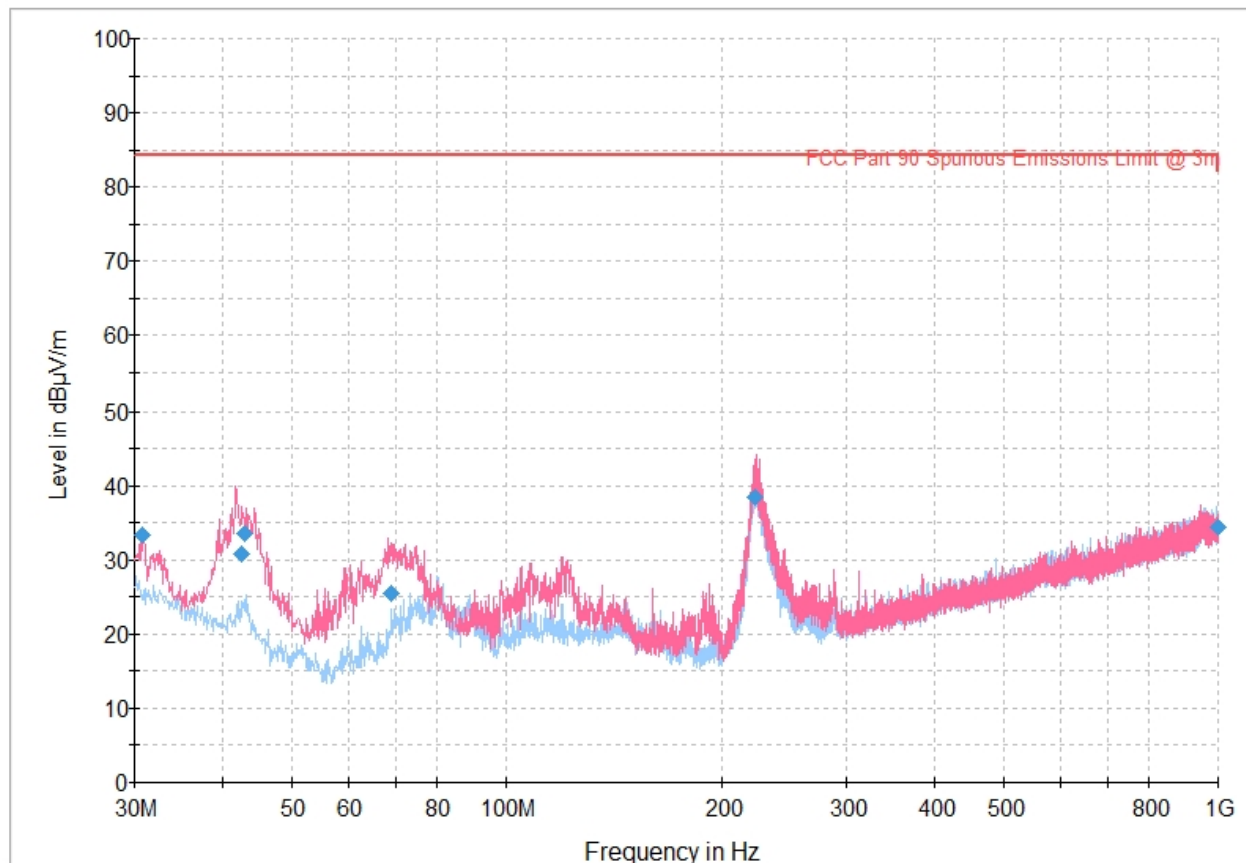


Figure 8.5-2: Radiated emissions spectral plot (30 MHz - 1 GHz) mid channel

Table 8.5-2: Radiated emissions results

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.720000	33.33	84.38	51.05	5000.0	120.000	202.0	V	356.0	26.2
42.480000	30.87	84.38	53.51	5000.0	120.000	169.0	V	108.0	19.9
42.939000	33.61	84.38	50.77	5000.0	120.000	101.0	V	74.0	19.6
68.858000	25.52	84.38	58.86	5000.0	120.000	108.0	V	0.0	13.5
222.794000	38.52	84.38	45.86	5000.0	120.000	111.0	V	96.0	18.4
999.720000	34.45	84.38	49.93	5000.0	120.000	342.0	V	206.0	34.8

Notes:

¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

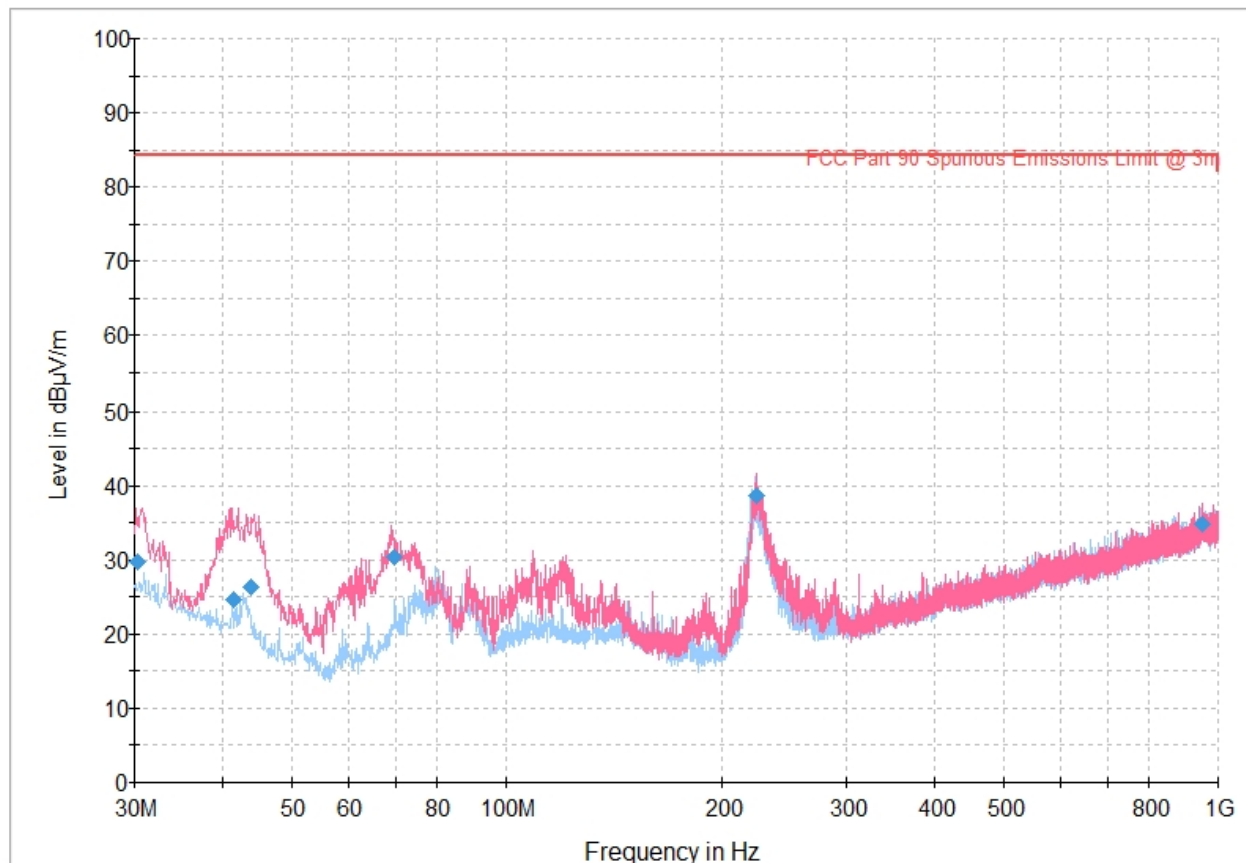


Figure 8.5-3: Radiated emissions spectral plot (30 MHz - 1 GHz) high channel

Table 8.5-3: Radiated emissions results

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.360000	29.69	84.38	54.69	5000.0	120.000	252.0	V	64.0	26.4
41.411000	24.55	84.38	59.83	5000.0	120.000	176.0	V	0.0	20.5
43.859000	26.38	84.38	58.00	5000.0	120.000	121.0	V	130.0	19.1
69.771000	30.30	84.38	54.08	5000.0	120.000	111.0	V	276.0	13.7
224.297000	38.67	84.38	45.71	5000.0	120.000	118.0	V	118.0	18.5
949.305000	34.74	84.38	49.64	5000.0	120.000	334.0	V	216.0	35.0

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

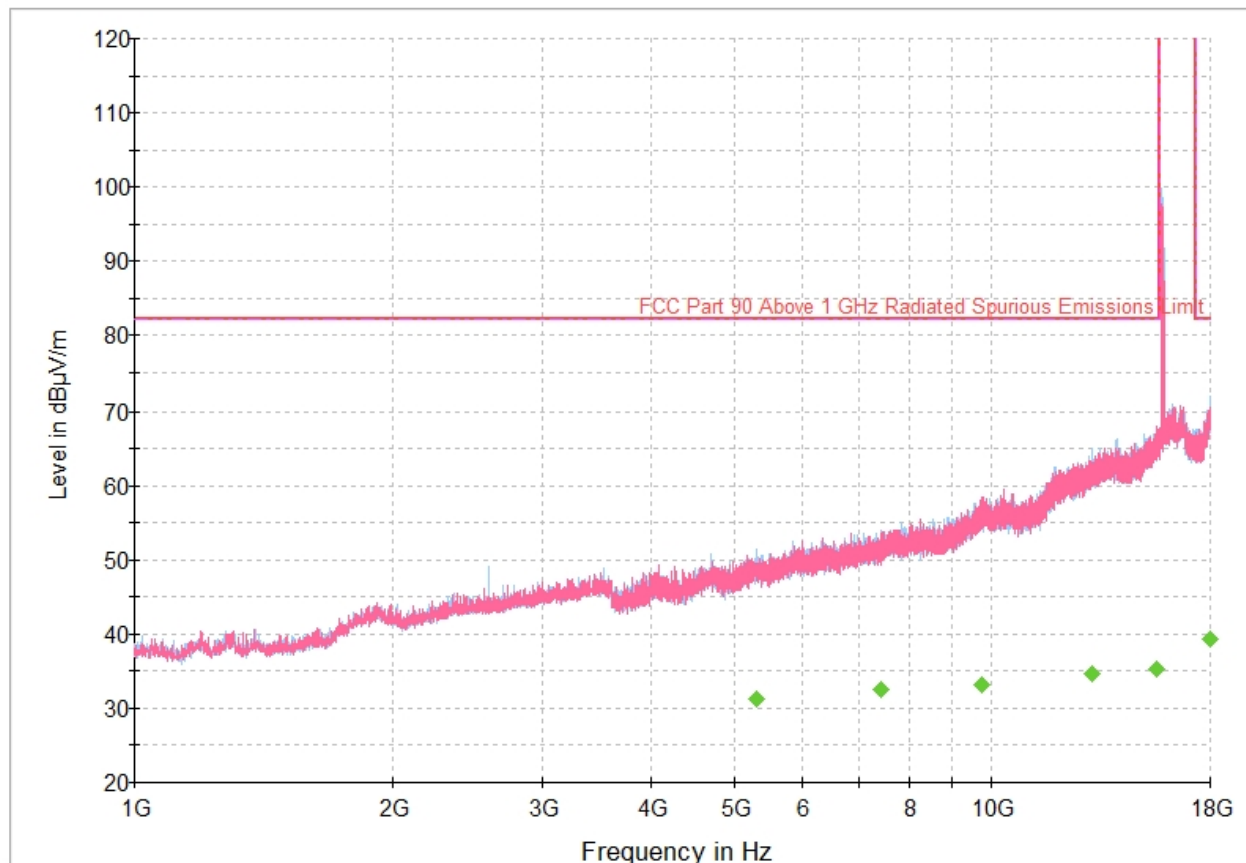


Figure 8.5-4: Radiated emissions spectral plot (1 GHz - 18 GHz) low channel

Table 8.5-4: Radiated emissions results

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5318.044444	31.19	82.23	51.04	5000.0	1000.000	358.0	H	350.0	3.5
7428.655556	32.59	82.23	49.64	5000.0	1000.000	399.0	H	196.0	6.3
9724.711111	33.07	82.23	49.16	5000.0	1000.000	286.0	V	309.0	10.7
13088.522222	34.68	82.23	47.55	5000.0	1000.000	198.0	H	0.0	17.0
15563.588889	35.19	82.23	47.04	5000.0	1000.000	323.0	V	162.0	20.4
17994.911111	39.42	82.23	42.81	5000.0	1000.000	342.0	H	165.0	24.8

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

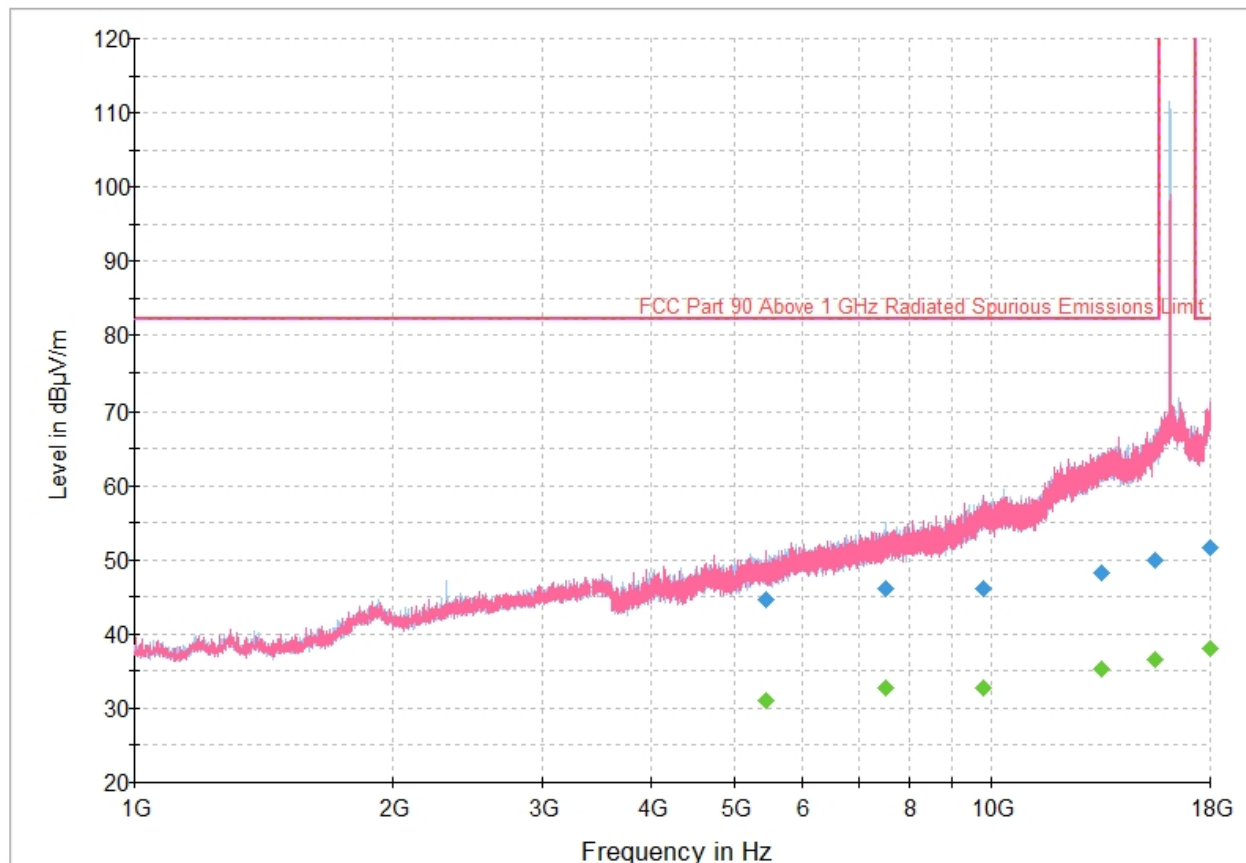


Figure 8.5-5: Radiated emissions spectral plot (1 GHz - 18 GHz) mid channel

Table 8.5-5: Radiated emissions results

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5437.033333	---	30.99	82.23	51.24	5000.0	1000.000	105.0	V	161.0	3.3
5437.033333	44.70	---	82.23	37.53	5000.0	1000.000	105.0	V	161.0	3.3
7530.722222	---	32.67	82.23	49.56	5000.0	1000.000	281.0	H	160.0	6.7
7530.722222	46.11	---	82.23	36.12	5000.0	1000.000	281.0	H	160.0	6.7
9774.977778	---	32.77	82.23	49.46	5000.0	1000.000	399.0	V	87.0	10.9
9774.977778	46.20	---	82.23	36.03	5000.0	1000.000	399.0	V	87.0	10.9
13437.033333	---	35.24	82.23	46.99	5000.0	1000.000	236.0	H	258.0	17.4
13437.033333	48.24	---	82.23	33.99	5000.0	1000.000	236.0	H	258.0	17.4
15491.911111	---	36.63	82.23	45.60	5000.0	1000.000	249.0	H	326.0	20.0
15491.911111	49.94	---	82.23	32.29	5000.0	1000.000	249.0	H	326.0	20.0
17978.755556	---	38.15	82.23	44.08	5000.0	1000.000	175.0	V	312.0	24.3
17978.755556	51.71	---	82.23	30.52	5000.0	1000.000	175.0	V	312.0	24.3

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

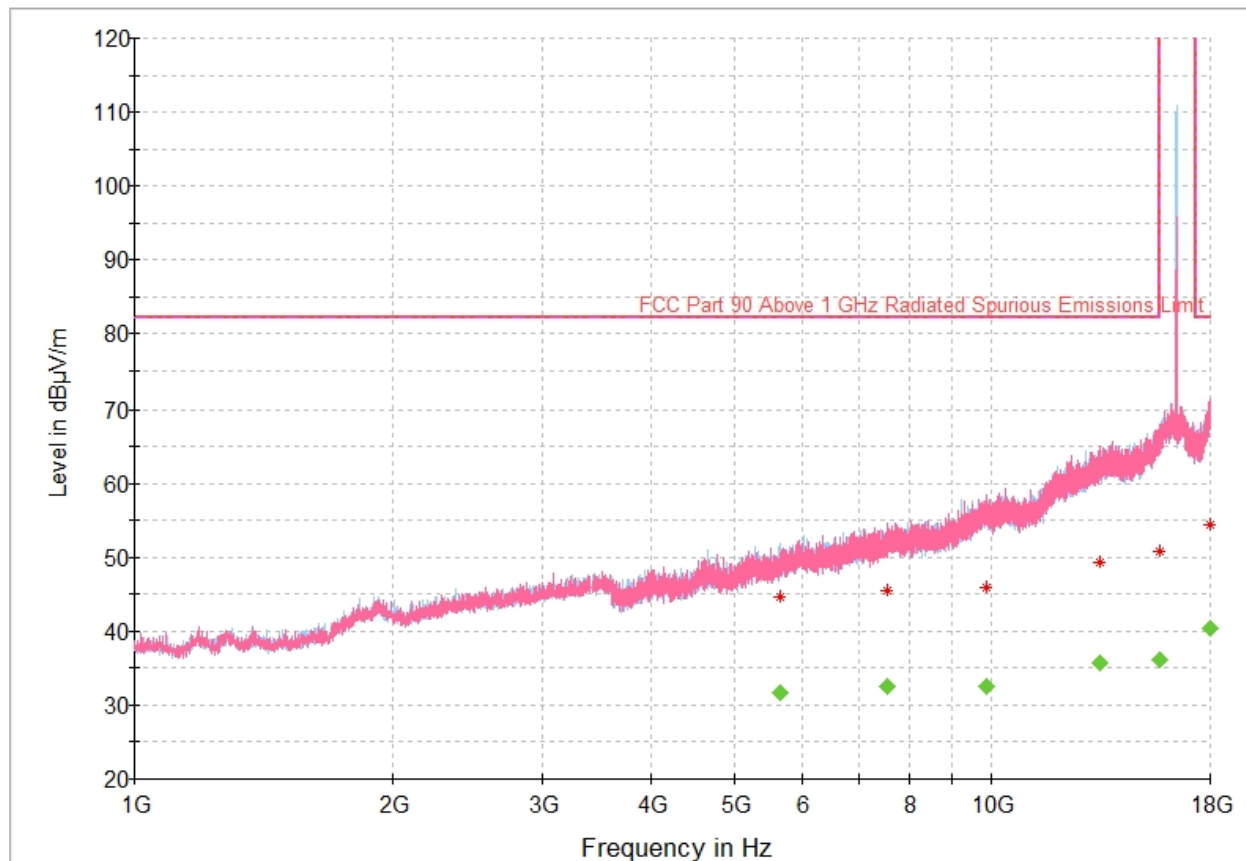


Figure 8.5-6: Radiated emissions spectral plot (1 GHz - 18 GHz) high channel

Table 8.5-6: Radiated emissions results

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5654.588889	31.65	82.23	50.58	5000.0	1000.000	385.0	H	117.0	3.7
7553.066667	32.61	82.23	49.62	5000.0	1000.000	140.0	V	246.0	6.8
9851.366667	32.63	82.23	49.60	5000.0	1000.000	157.0	V	224.0	11.1
13366.777778	35.68	82.23	46.55	5000.0	1000.000	114.0	V	310.0	17.3
15696.322222	36.03	82.23	46.20	5000.0	1000.000	159.0	V	316.0	20.8
17999.388889	40.34	82.23	41.89	5000.0	1000.000	382.0	V	278.0	25.0

Notes:

¹ Field strength (dBμV/m) = receiver/spectrum analyzer value (dBμV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

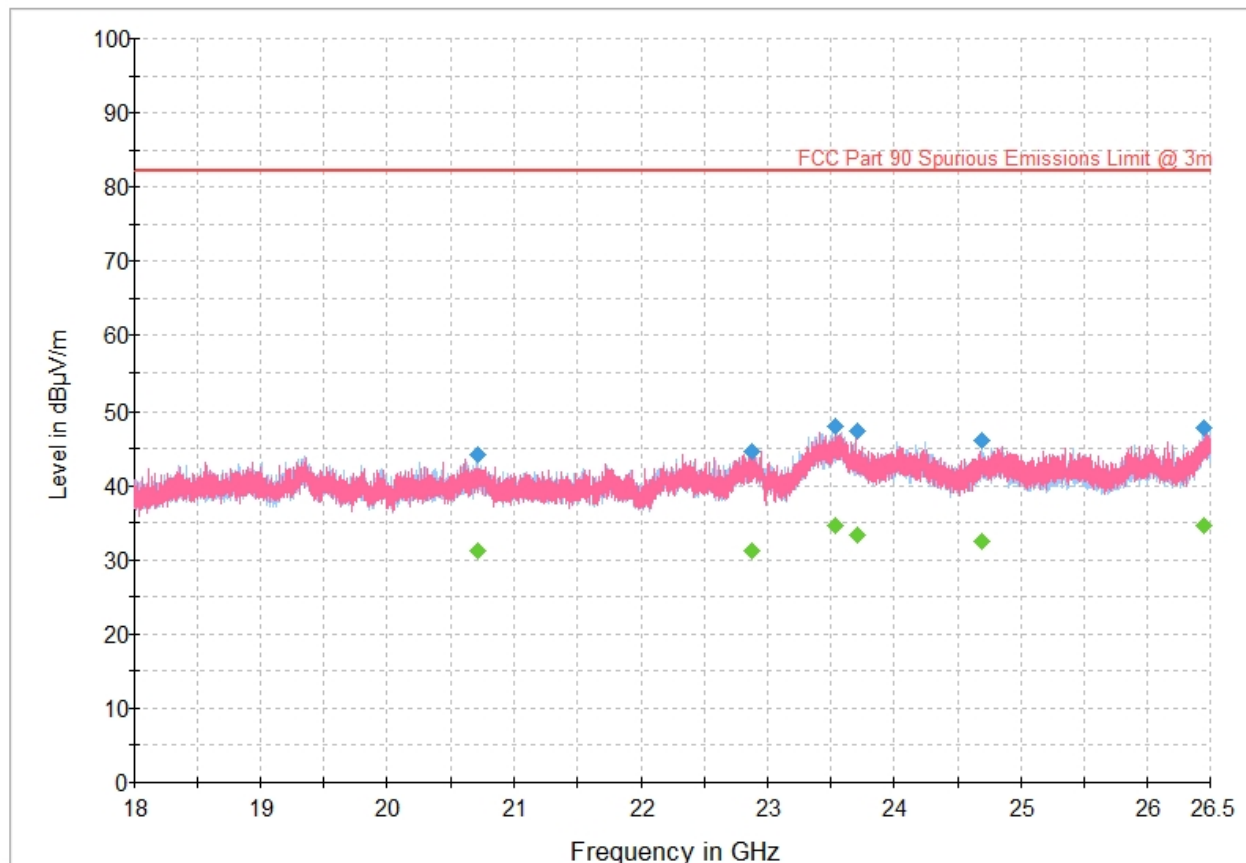


Figure 8.5-7: Radiated emissions spectral plot (18 GHz - 26.5 GHz) low channel

Table 8.5-7: Radiated emissions results

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20715.843750	44.15	---	82.23	38.08	5000.0	1000.000	343.0	H	0.0	16.8
20715.843750	---	31.28	82.23	50.95	5000.0	1000.000	343.0	H	0.0	16.8
22874.975000	---	31.14	82.23	51.09	5000.0	1000.000	101.0	H	316.0	19.2
22874.975000	44.68	---	82.23	37.55	5000.0	1000.000	101.0	H	316.0	19.2
23532.643750	47.88	---	82.23	34.35	5000.0	1000.000	173.0	V	340.0	22.9
23532.643750	---	34.63	82.23	47.60	5000.0	1000.000	173.0	V	340.0	22.9
23705.950000	47.44	---	82.23	34.79	5000.0	1000.000	370.0	V	186.0	22.3
23705.950000	---	33.34	82.23	48.89	5000.0	1000.000	370.0	V	186.0	22.3
24696.200000	---	32.48	82.23	49.75	5000.0	1000.000	137.0	H	295.0	20.7
24696.200000	45.99	---	82.23	36.24	5000.0	1000.000	137.0	H	295.0	20.7
26454.862500	47.67	---	82.23	34.56	5000.0	1000.000	210.0	H	278.0	24.2
26454.862500	---	34.70	82.23	47.53	5000.0	1000.000	210.0	H	278.0	24.2

Notes: ¹ Field strength (dBμV/m) = receiver/spectrum analyzer value (dBμV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

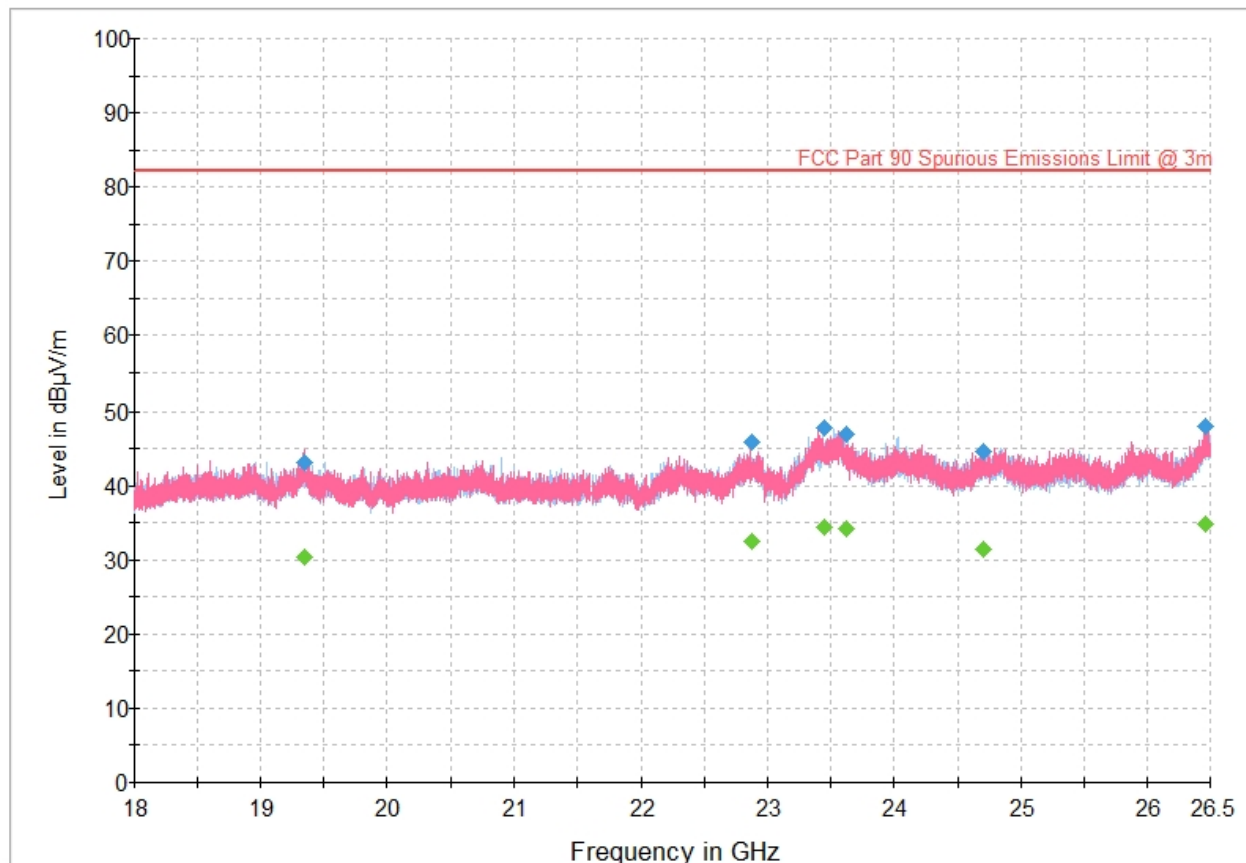


Figure 8.5-8: Radiated emissions spectral plot (18 GHz - 26.5 GHz) mid channel

Table 8.5-8: Radiated emissions results

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19342.268750	43.19	---	82.23	39.04	5000.0	1000.000	117.0	V	33.0	14.7
19342.268750	---	30.27	82.23	51.96	5000.0	1000.000	117.0	V	33.0	14.7
22870.193750	---	32.38	82.23	49.85	5000.0	1000.000	399.0	V	144.0	19.2
22870.193750	45.86	---	82.23	36.37	5000.0	1000.000	399.0	V	144.0	19.2
23444.200000	47.70	---	82.23	34.53	5000.0	1000.000	372.0	H	33.0	22.4
23444.200000	---	34.40	82.23	47.83	5000.0	1000.000	372.0	H	33.0	22.4
23625.018750	46.97	---	82.23	35.26	5000.0	1000.000	121.0	H	208.0	22.9
23625.018750	---	34.10	82.23	48.13	5000.0	1000.000	121.0	H	208.0	22.9
24708.712500	44.56	---	82.23	37.67	5000.0	1000.000	388.0	H	229.0	20.7
24708.712500	---	31.48	82.23	50.75	5000.0	1000.000	388.0	H	229.0	20.7
26457.031250	---	34.81	82.23	47.42	5000.0	1000.000	291.0	V	229.0	24.2
26457.031250	48.04	---	82.23	34.19	5000.0	1000.000	291.0	V	229.0	24.2

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

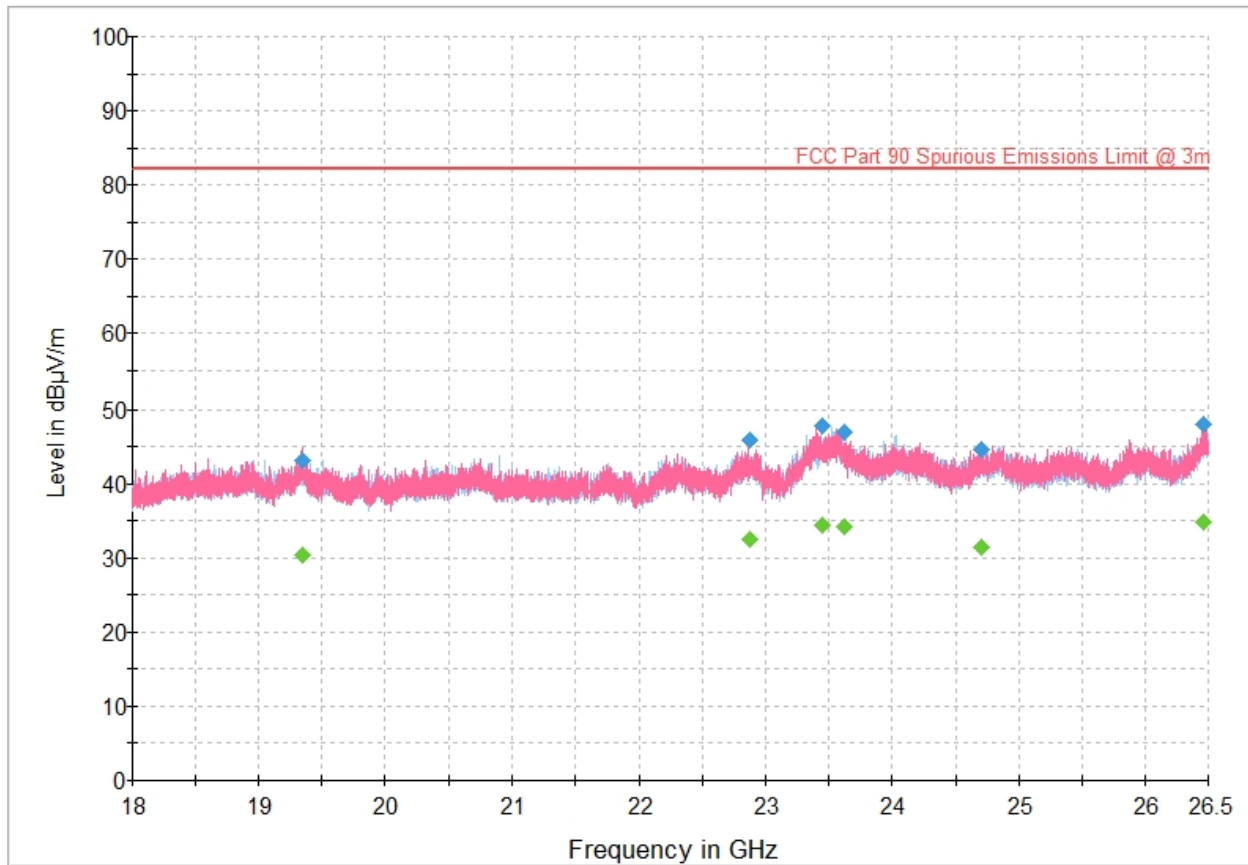


Figure 8.5-9: Radiated emissions spectral plot (18 GHz - 26.5 GHz) high channel

Table 8.5-9: Radiated emissions results

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19342.268750	43.19	---	82.23	39.04	5000.0	1000.000	117.0	V	33.0	14.7
19342.268750	---	30.27	82.23	51.96	5000.0	1000.000	117.0	V	33.0	14.7
22870.193750	---	32.38	82.23	49.85	5000.0	1000.000	399.0	V	144.0	19.2
22870.193750	45.86	---	82.23	36.37	5000.0	1000.000	399.0	V	144.0	19.2
23444.200000	47.70	---	82.23	34.53	5000.0	1000.000	372.0	H	33.0	22.4
23444.200000	---	34.40	82.23	47.83	5000.0	1000.000	372.0	H	33.0	22.4
23625.018750	46.97	---	82.23	35.26	5000.0	1000.000	121.0	H	208.0	22.9
23625.018750	---	34.10	82.23	48.13	5000.0	1000.000	121.0	H	208.0	22.9
24708.712500	44.56	---	82.23	37.67	5000.0	1000.000	388.0	H	229.0	20.7
24708.712500	---	31.48	82.23	50.75	5000.0	1000.000	388.0	H	229.0	20.7
26457.031250	---	34.81	82.23	47.42	5000.0	1000.000	291.0	V	229.0	24.2
26457.031250	48.04	---	82.23	34.19	5000.0	1000.000	291.0	V	229.0	24.2

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

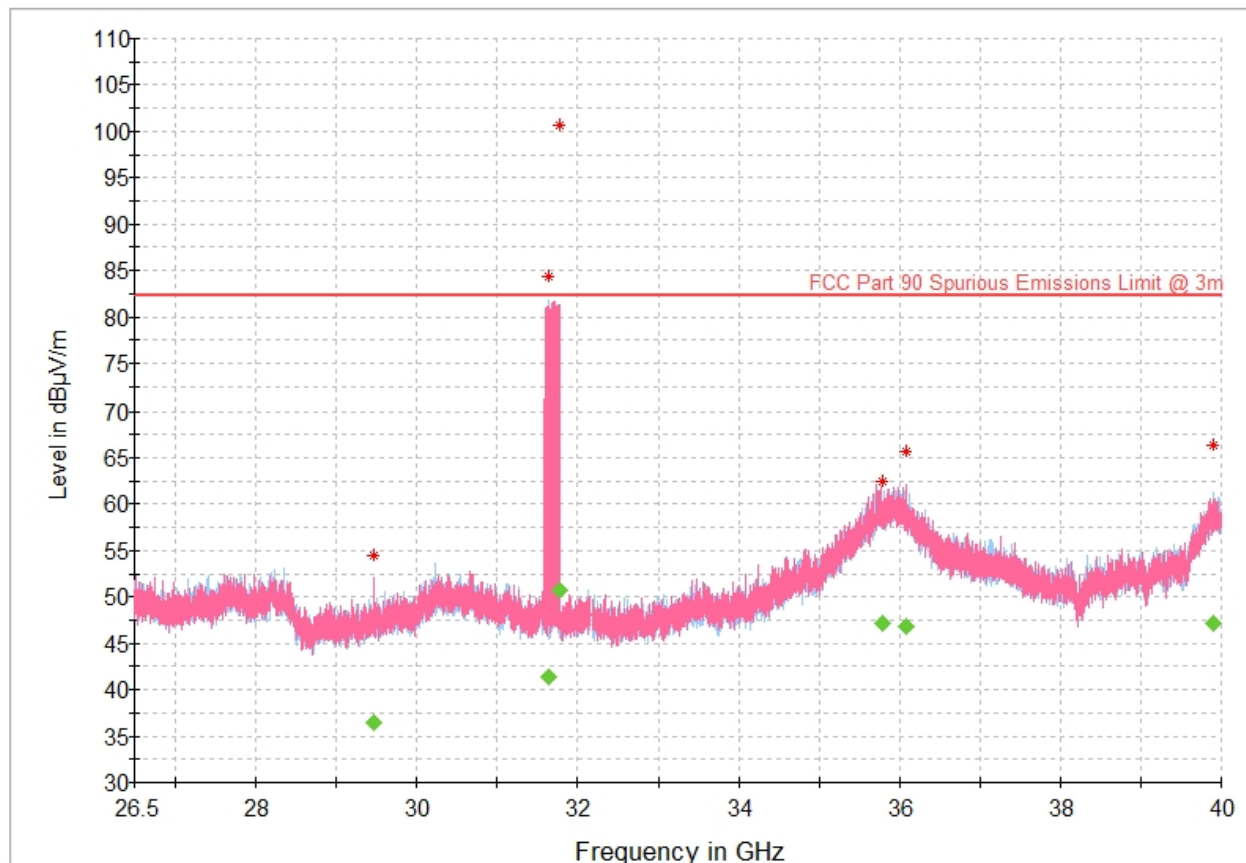


Figure 8.5-10: Radiated emissions spectral plot (26.5 GHz - 40 GHz) low channel

Table 8.5-10: Radiated emissions results

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
29485.975000	36.39	82.23	45.84	5000.0	1000.000	171.0	V	286.0	10.2
31652.000000	41.34	82.23	40.89	5000.0	1000.000	155.0	H	20.0	10.4
31790.556250	50.72	82.23	31.51	5000.0	1000.000	165.0	V	0.0	10.5
35790.943750	47.20	82.23	35.03	5000.0	1000.000	157.0	H	11.0	20.2
36080.462500	46.77	82.23	35.46	5000.0	1000.000	175.0	V	0.0	19.8
39900.837500	47.10	82.23	35.13	5000.0	1000.000	183.0	H	0.0	18.3

Notes: ¹ Field strength (dBμV/m) = receiver/spectrum analyzer value (dBμV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

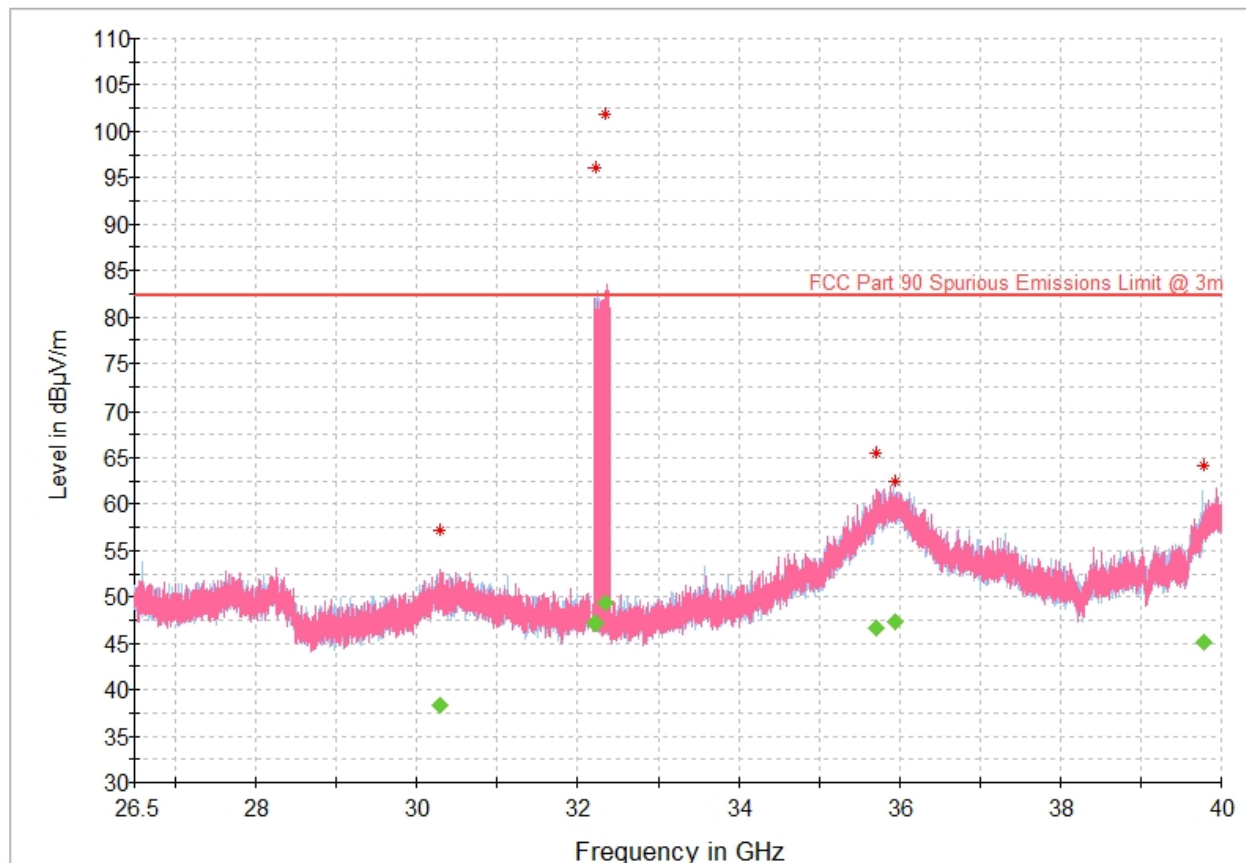


Figure 8.5-11: Radiated emissions spectral plot (26.5 GHz - 40 GHz) mid channel

Table 8.5-11: Radiated emissions results

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30307.600000	38.38	82.23	43.85	5000.0	1000.000	134.0	V	6.0	11.3
32228.837500	47.17	82.23	35.06	5000.0	1000.000	147.0	H	0.0	10.6
32335.975000	49.34	82.23	32.89	5000.0	1000.000	181.0	V	0.0	10.7
35707.975000	46.71	82.23	35.52	5000.0	1000.000	162.0	V	257.0	19.7
35938.037500	47.39	82.23	34.84	5000.0	1000.000	154.0	H	11.0	20.4
39778.337500	45.13	82.23	37.10	5000.0	1000.000	171.0	H	218.0	16.7

Notes:

¹ Field strength (dBμV/m) = receiver/spectrum analyzer value (dBμV) + correction factor (dB)

² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

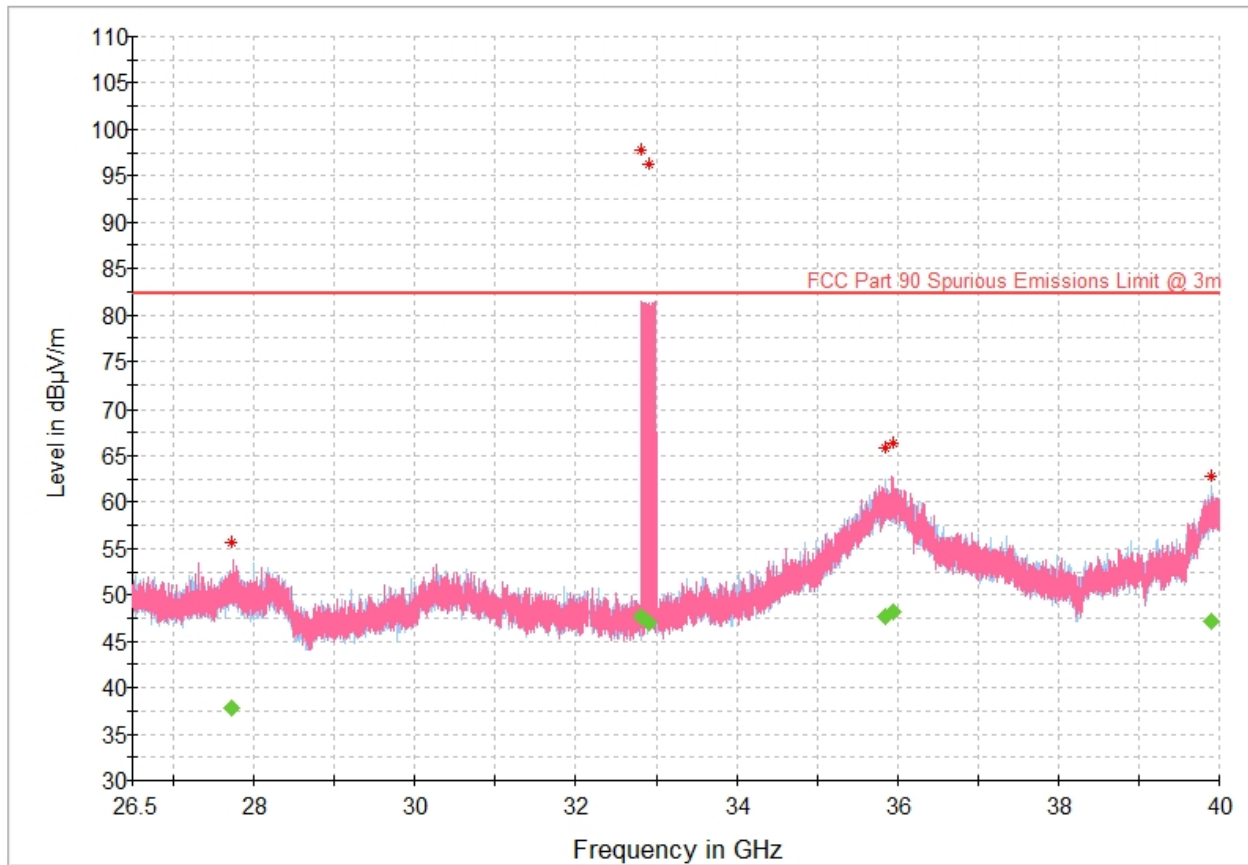


Figure 8.5-12: Radiated emissions spectral plot (26.5 GHz - 40 GHz) high channel

Table 8.5-12: Radiated emissions results

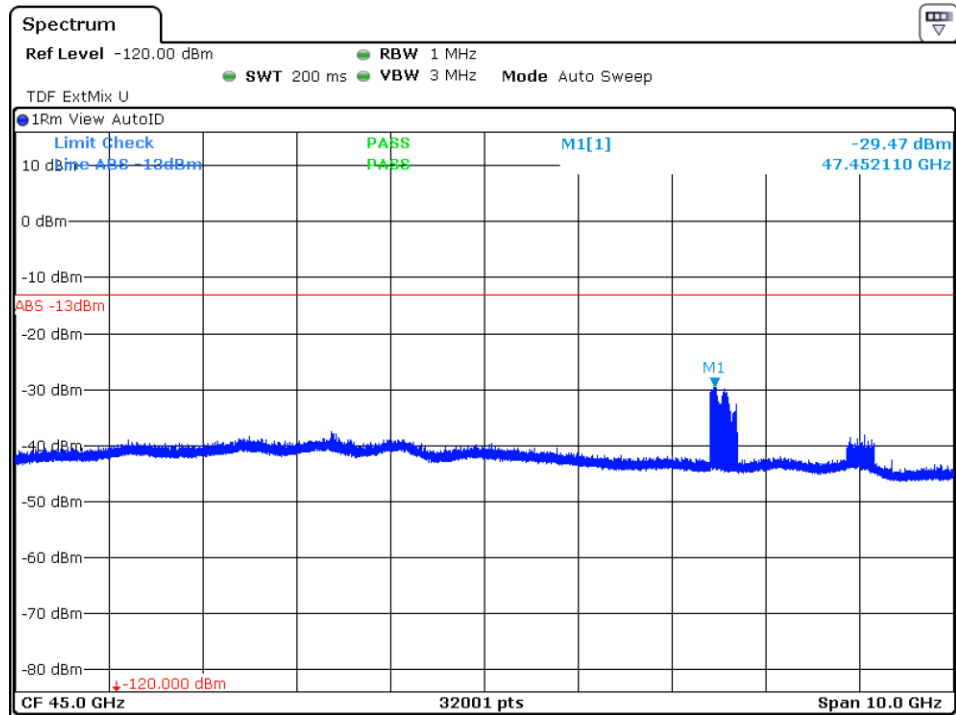
Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27739.131250	37.81	82.23	44.42	5000.0	1000.000	134.0	V	3.0	11.4
32809.937500	47.60	82.23	34.63	5000.0	1000.000	175.0	V	0.0	10.2
32906.237500	46.99	82.23	35.24	5000.0	1000.000	167.0	V	0.0	10.2
35846.856250	47.73	82.23	34.50	5000.0	1000.000	171.0	H	346.0	20.3
35947.487500	48.10	82.23	34.13	5000.0	1000.000	147.0	V	11.0	20.4
39909.737500	47.10	82.23	35.13	5000.0	1000.000	147.0	H	96.0	18.2

Notes:

¹ Field strength (dBμV/m) = receiver/spectrum analyzer value (dBμV) + correction factor (dB)

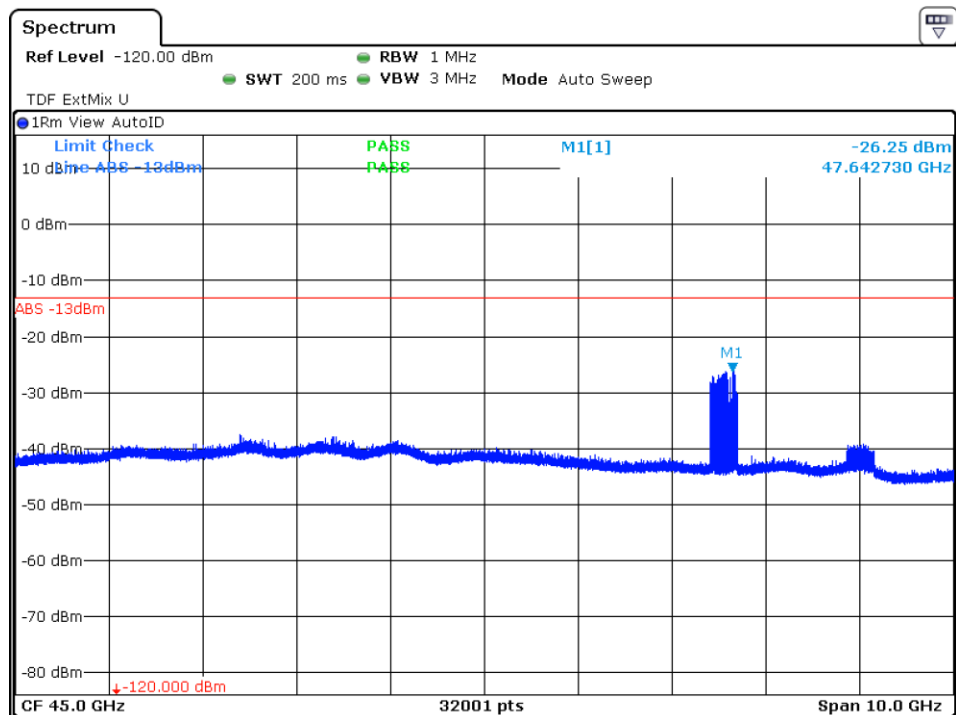
² Correction factors = antenna factor ACF (dB) + cable loss (dB)

³ Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.



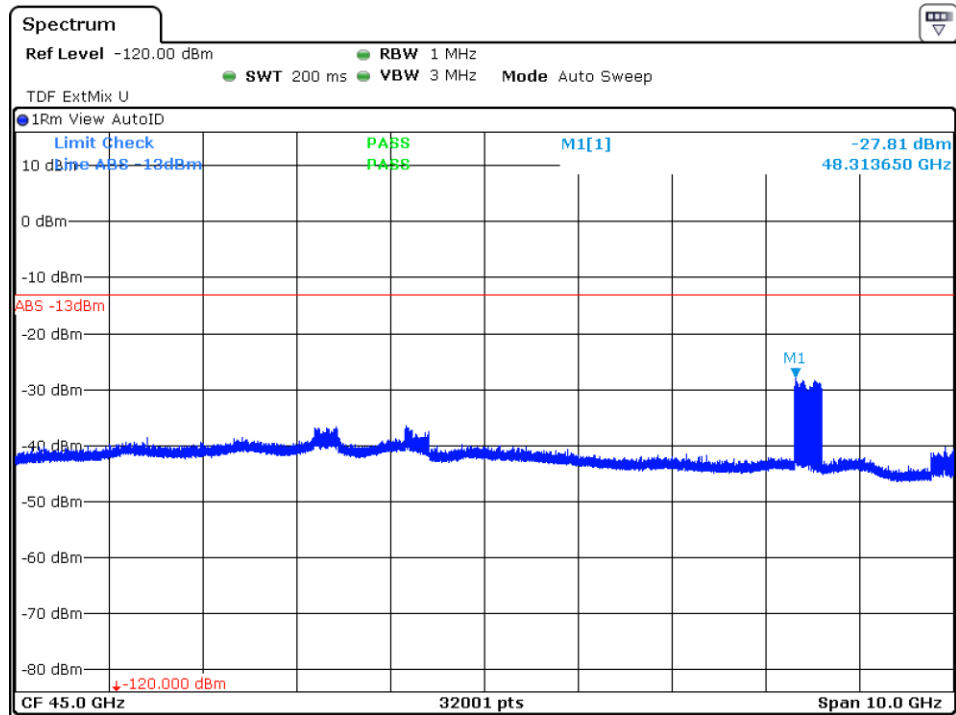
Date: 12.FEB.2025 15:43:58

Figure 8.5-13: Radiated emissions spectral plot (40 GHz - 50 GHz) low channel horizontal



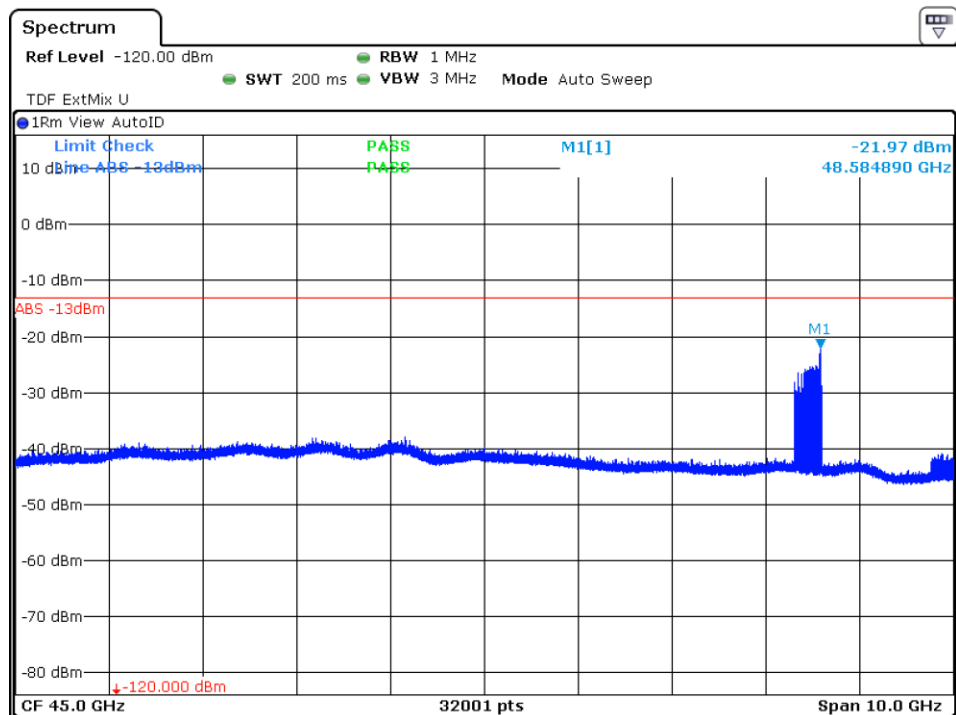
Date: 12.FEB.2025 15:36:01

Figure 8.5-14: Radiated emissions spectral plot (40 GHz - 50 GHz) low channel vertical



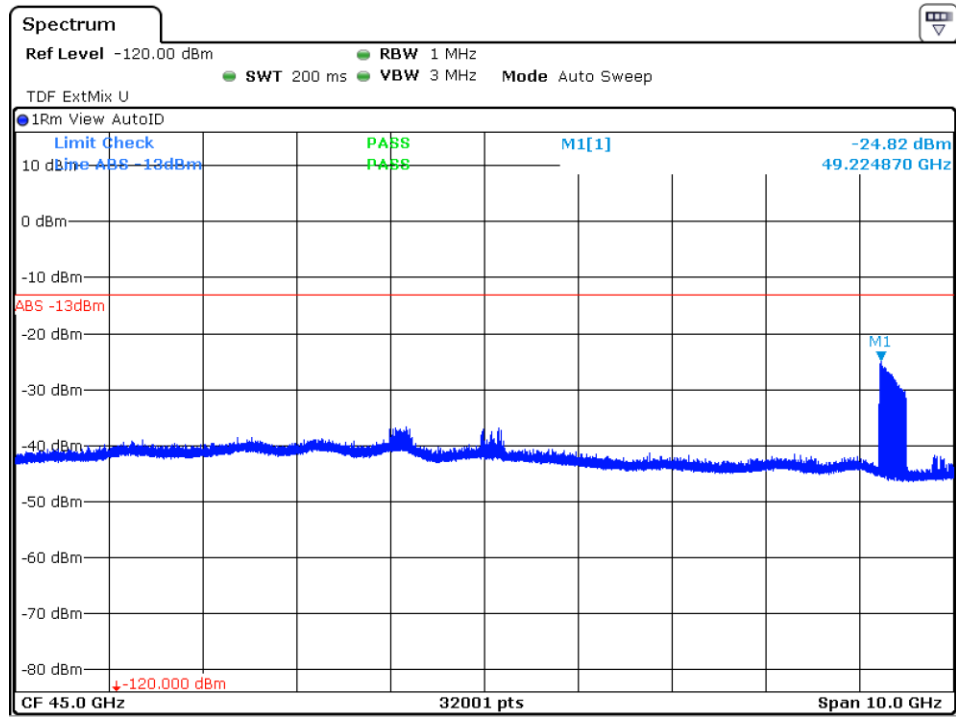
Date: 13.FEB.2025 08:25:29

Figure 8.5-15: Radiated emissions spectral plot (40 GHz - 50 GHz) mid channel horizontal



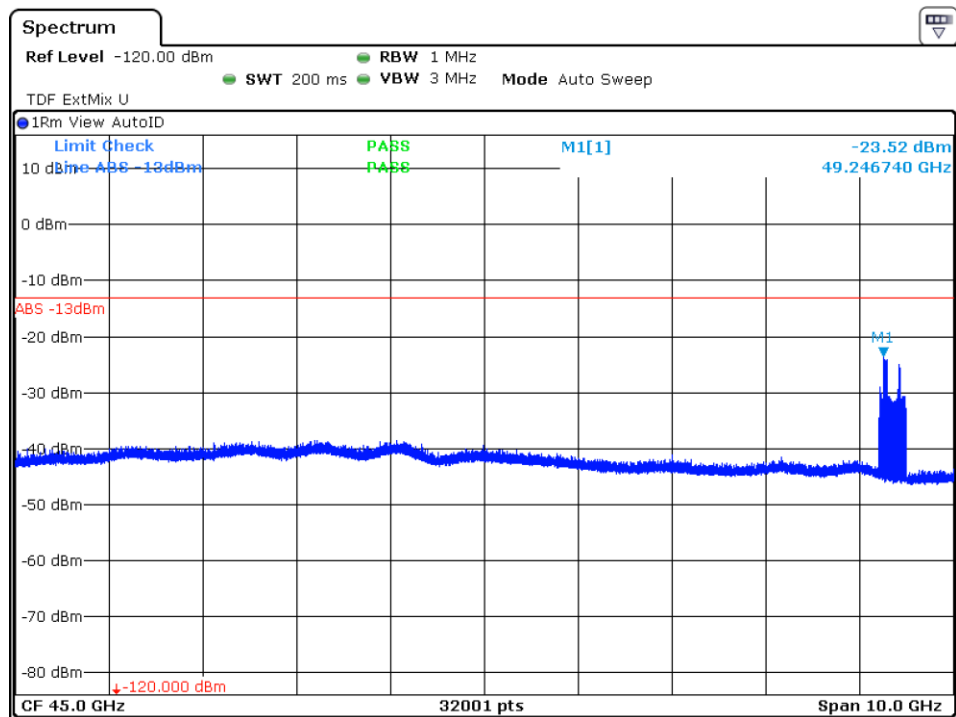
Date: 13.FEB.2025 08:16:55

Figure 8.5-16: Radiated emissions spectral plot (40 GHz - 50 GHz) mid channel vertical



Date: 13.FEB.2025 08:33:21

Figure 8.5-17: Radiated emissions spectral plot (40 GHz - 50 GHz) high channel horizontal



Date: 13.FEB.2025 08:41:09

Figure 8.5-18: Radiated emissions spectral plot (40 GHz - 50 GHz) high channel vertical

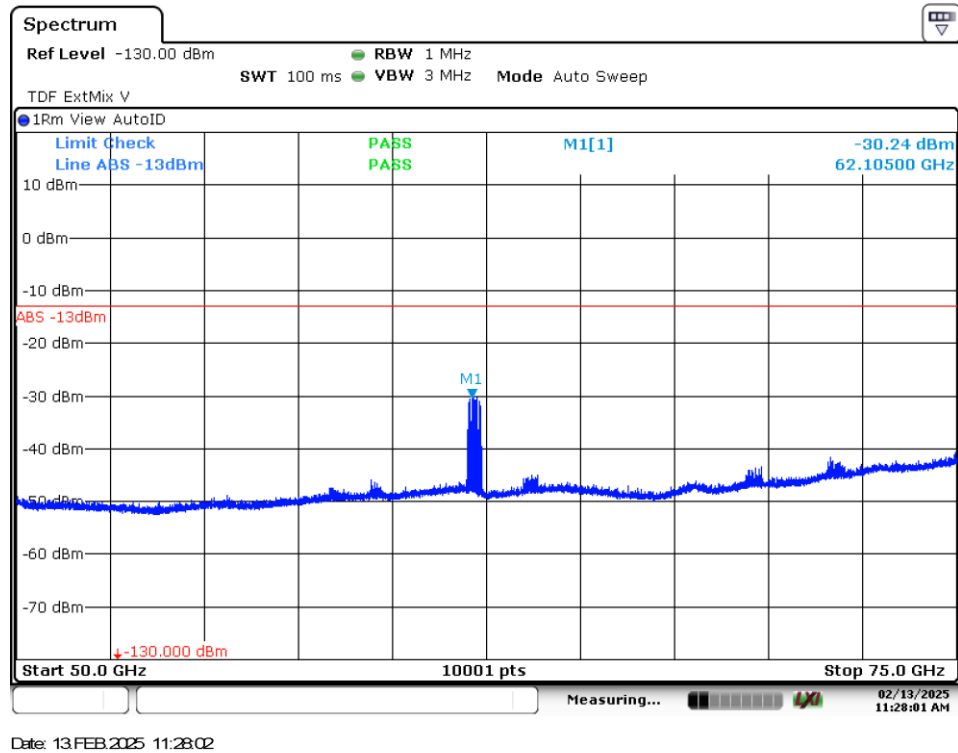


Figure 8.5-19: Radiated emissions spectral plot (50 GHz - 75 GHz) low channel horizontal

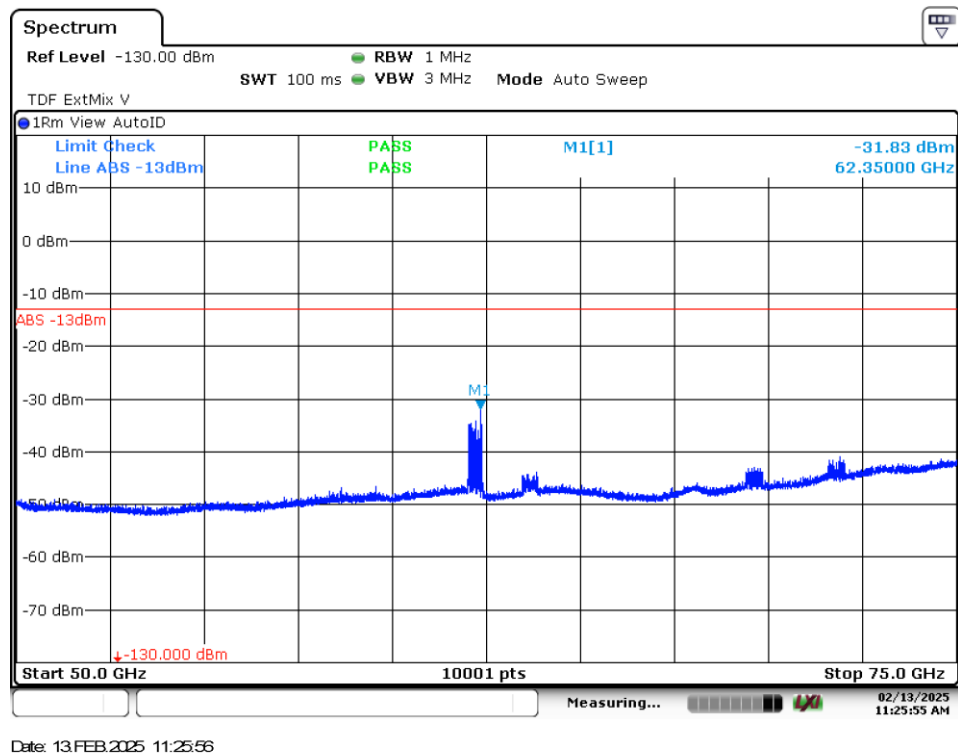


Figure 8.5-20: Radiated emissions spectral plot (50 GHz - 75 GHz) low channel vertical

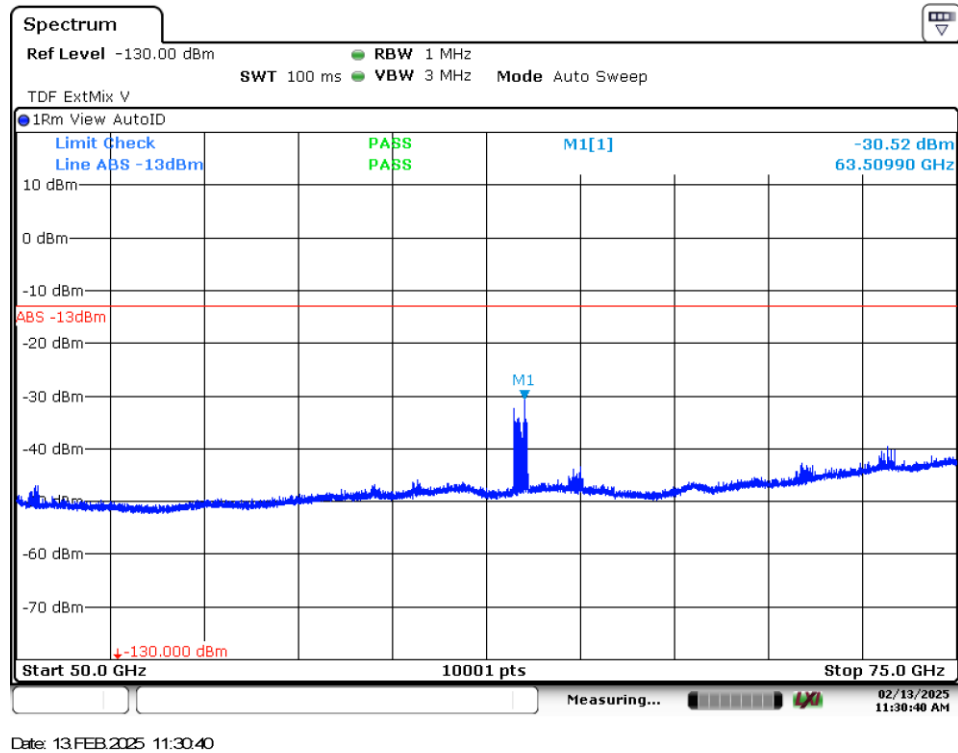


Figure 8.5-21: Radiated emissions spectral plot (50 GHz - 75 GHz) mid channel horizontal

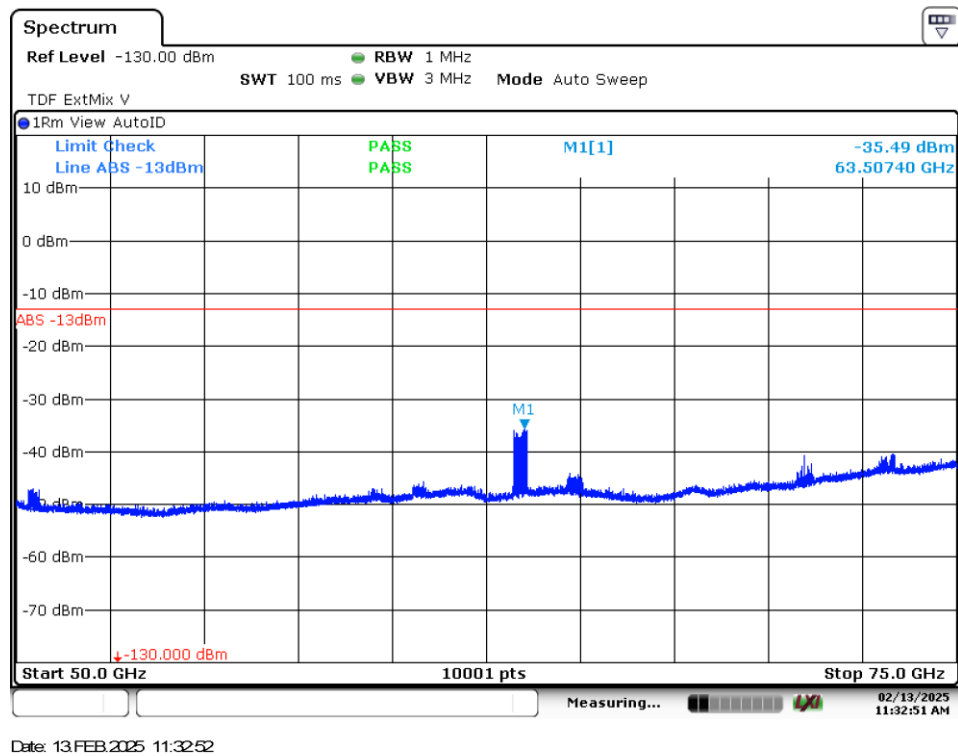


Figure 8.5-22: Radiated emissions spectral plot (50 GHz - 75 GHz) mid channel vertical

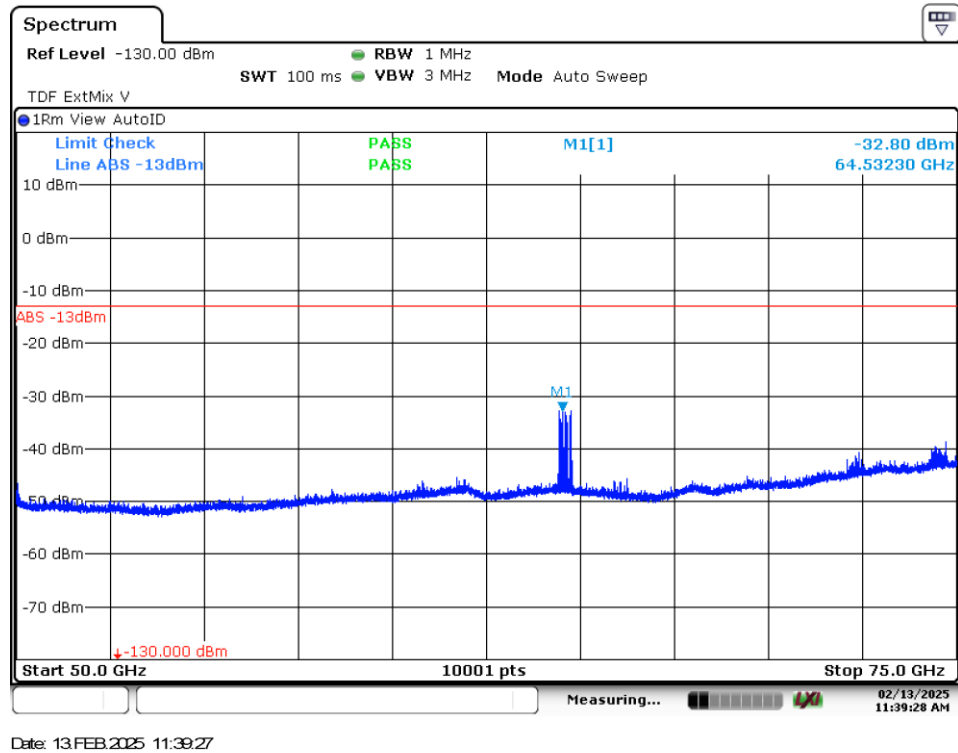


Figure 8.5-23: Radiated emissions spectral plot (50 GHz - 75 GHz) high channel horizontal

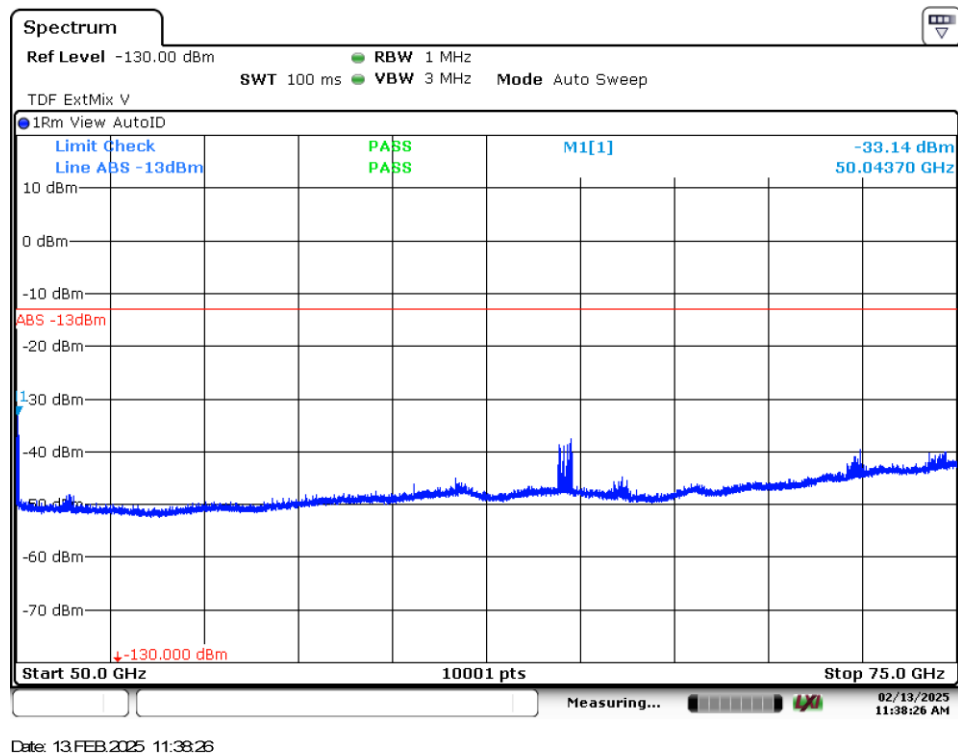


Figure 8.5-24: Radiated emissions spectral plot (50 GHz - 75 GHz) high channel vertical

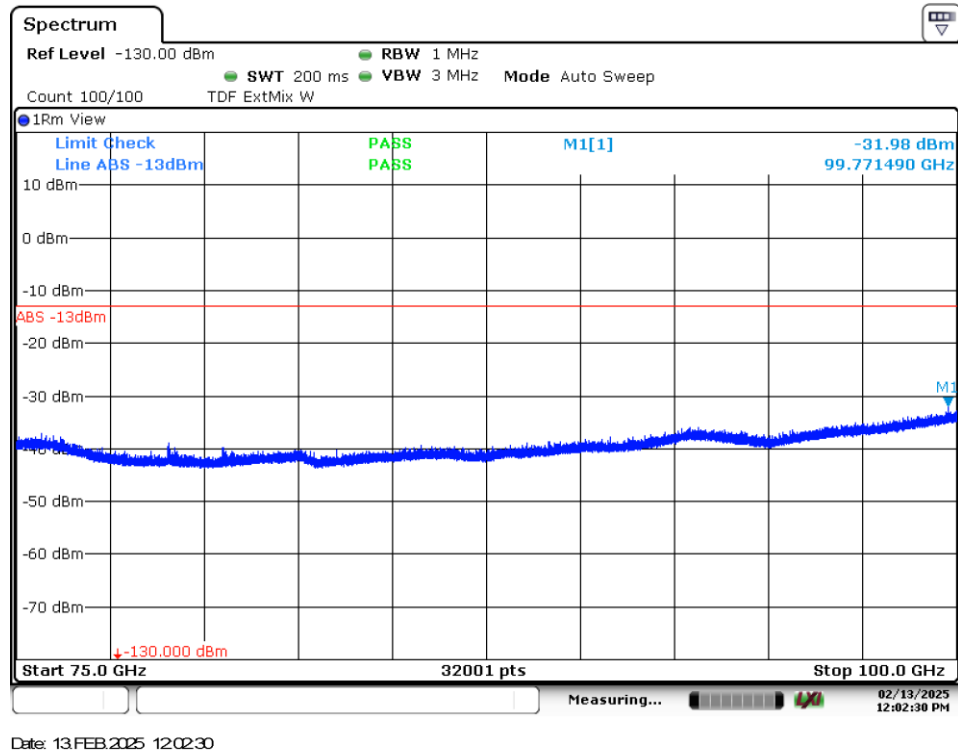


Figure 8.5-25: Radiated emissions spectral plot (75 GHz - 100 GHz) low channel horizontal

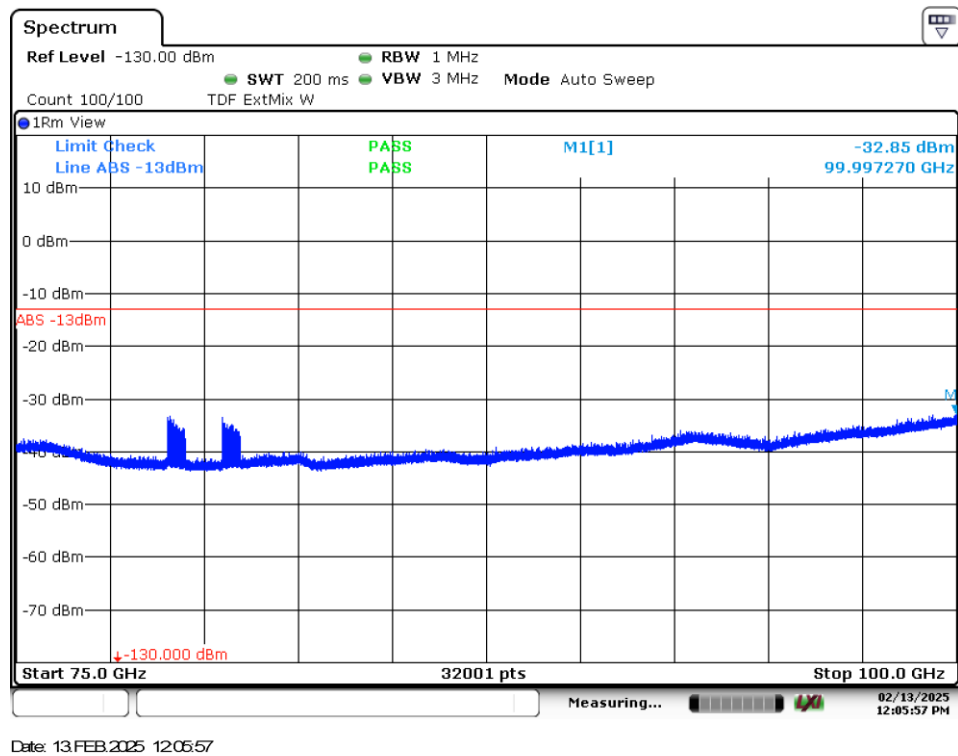


Figure 8.5-26: Radiated emissions spectral plot (75 GHz - 100 GHz) low channel vertical

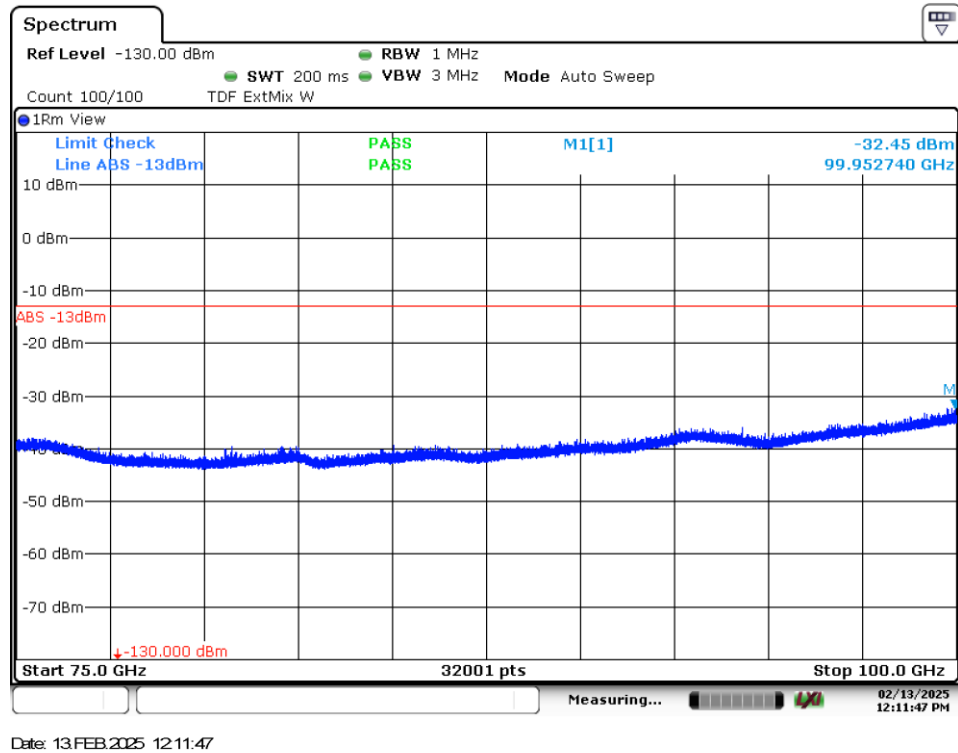


Figure 8.5-27: Radiated emissions spectral plot (75 GHz - 100 GHz) mid channel horizontal

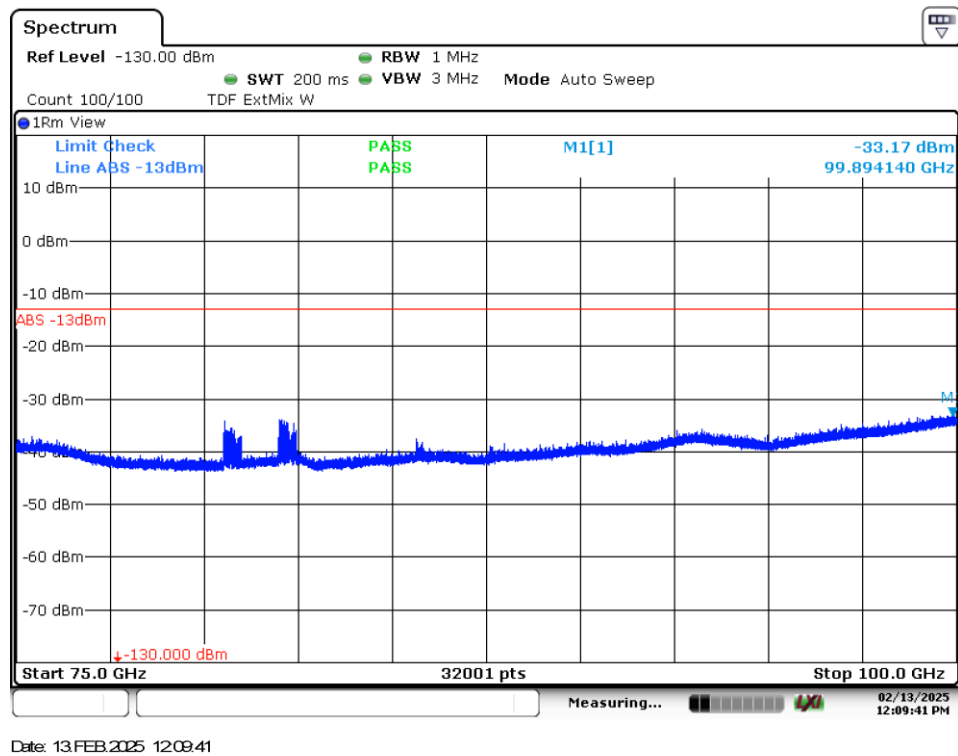


Figure 8.5-28: Radiated emissions spectral plot (75 GHz - 100 GHz) mid channel vertical

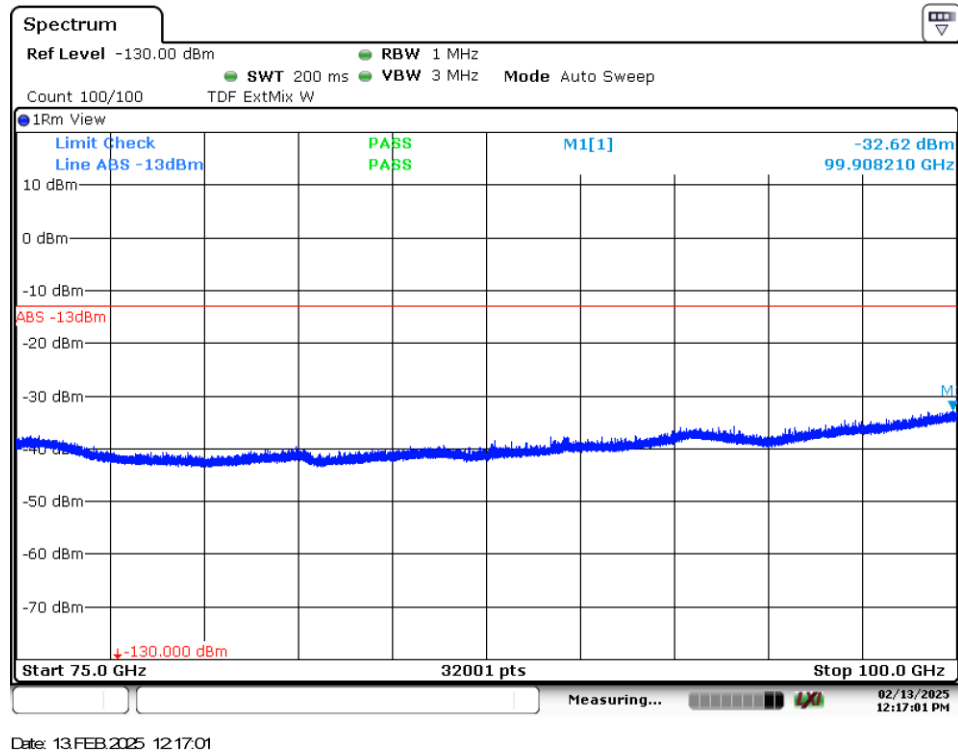


Figure 8.5-29: Radiated emissions spectral plot (75 GHz - 100 GHz) high channel horizontal

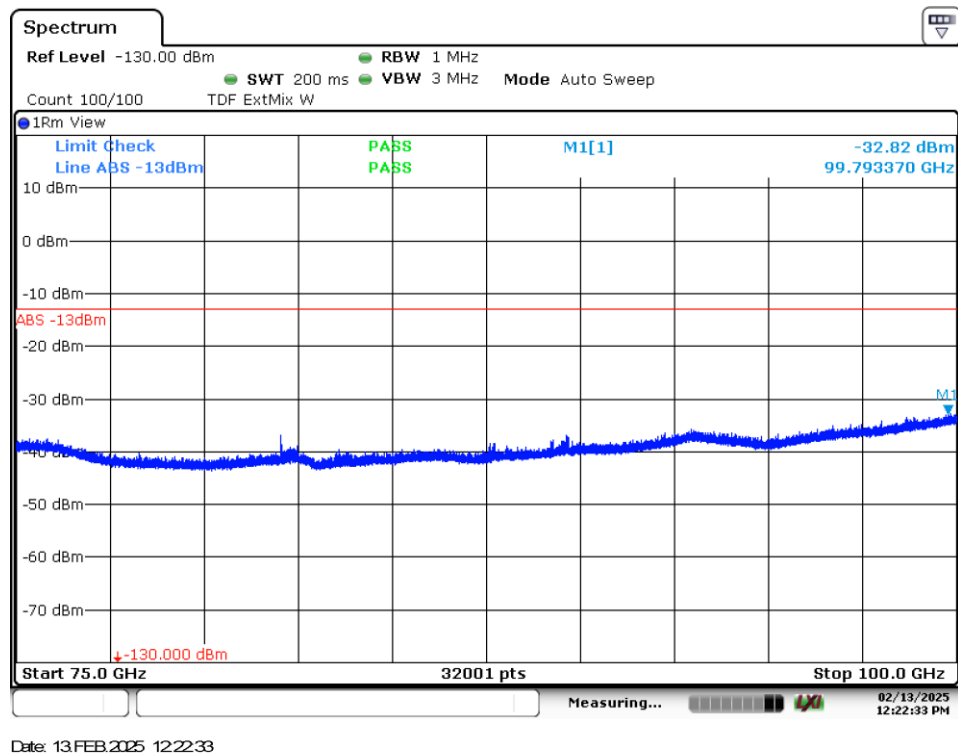


Figure 8.5-30: Radiated emissions spectral plot (75 GHz - 100 GHz) low channel vertical

8.6 Frequency stability

8.6.1 References and limits

- FCC 47 CFR Part 90: §90.213
- Test method: ANSI C63.26-2015 (5.6.3)
 - (a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Above 2450 ¹⁰			

¹⁰Frequency stability for DSRCS equipment in the 5895–5925 MHz band is specified in subpart M of this part. For all other equipment, frequency stability is to be specified in the station authorization.

8.6.2 Test summary

Verdict	Pass		
Test date	February 14, 2025	Temperature	18°C
Test engineer	Chenhao Ma, Wireless Test Technician	Air pressure	1006mbar
Test location	☐ Wireless bench ☐ 10 m semi-anechoic chamber ☐ 3 m semi-anechoic chamber ☒ Other: Environmental chamber	Relative humidity	51 %

8.6.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power. An unmodulated signal with a frequency center in the middle channel was selected for this test (16.15 GHz).

8.6.4 Setup details

EUT power input during test	28 V DC
EUT setup configuration	☐ Table-top ☐ Floor standing ☒ Other: Mounted on a fixture provided by client

Spectrum analyzer settings:

Resolution bandwidth	30 kHz
Video bandwidth	3 MHz
Detector mode	Peak
Trace mode	Max Hold

8.6.5 Test data

Table 8.6-1: Frequency stability results.

Voltage	Temperature	Channel frequency (Hz)	Measured frequency (Hz)
28 V	-40°C	1615000000	1615000000
28 V	-30°C	1615000000	1615000000
28 V	-20°C	1615000000	1615000000
28 V	-10°C	1615000000	1615000000
28 V	0°C	1615000000	1615000000
28 V	+10°C	1615000000	1615000000
28 V	+20°C	1615000000	1615000000
23.8 V (-15%)	+20°C	1615000000	1615000000
32.2 V (+15%)	+20°C	1615000000	1615000000
28 V	+30°C	1615000000	1615000000
28 V	+40°C	1615000000	1615000000
28 V	+50°C	1615000000	1615000000
28 V	+60°C	1615000000	1615000000
28 V	+65°C	1615000000	1615000000

End of test report