

4.5.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$FS = RA + AF + CF - AG$; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB(μ V); AF = Antenna Factor in dB(1/m)

CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

RA = 52.0 dB(μ V)

AF = 7.4 dB(1/m)

CF = 1.6 dB

AG = 29.0 dB

$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32 \text{ dB}(\mu\text{V/m})$.

Level in μ V/m = Common Antilogarithm $[(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$.

4.5.4 Test Results

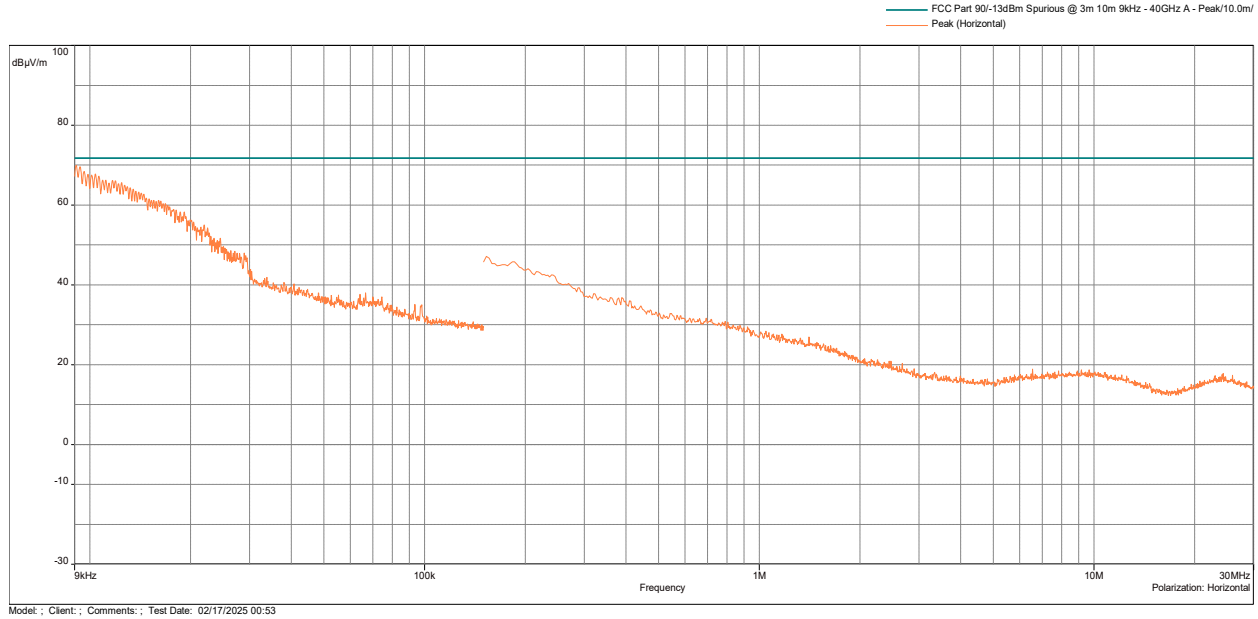
All testing in this section were performed by radiated measurements.

Tested By	Test Date	Results
Arjun Mukherjea	February 16 – 18, 2025	Complies

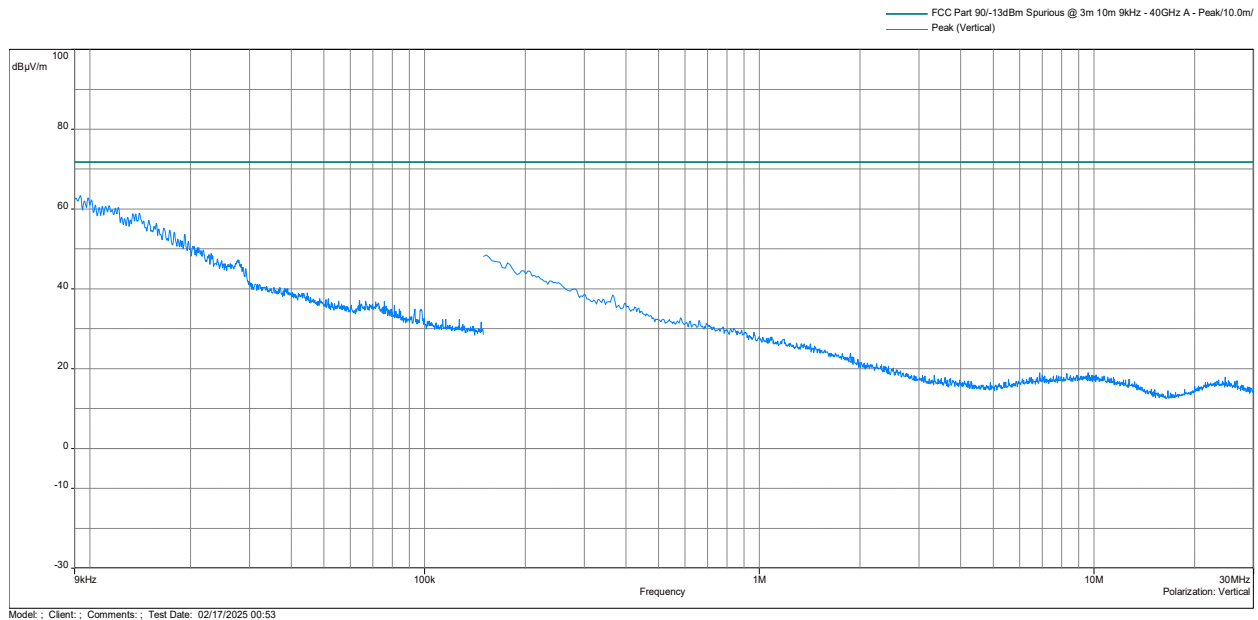
Out-of-Band Radiated Spurious Emissions

Test Results: Radiated Spurious Emissions Low Channel, Tx at 809.1025MHz

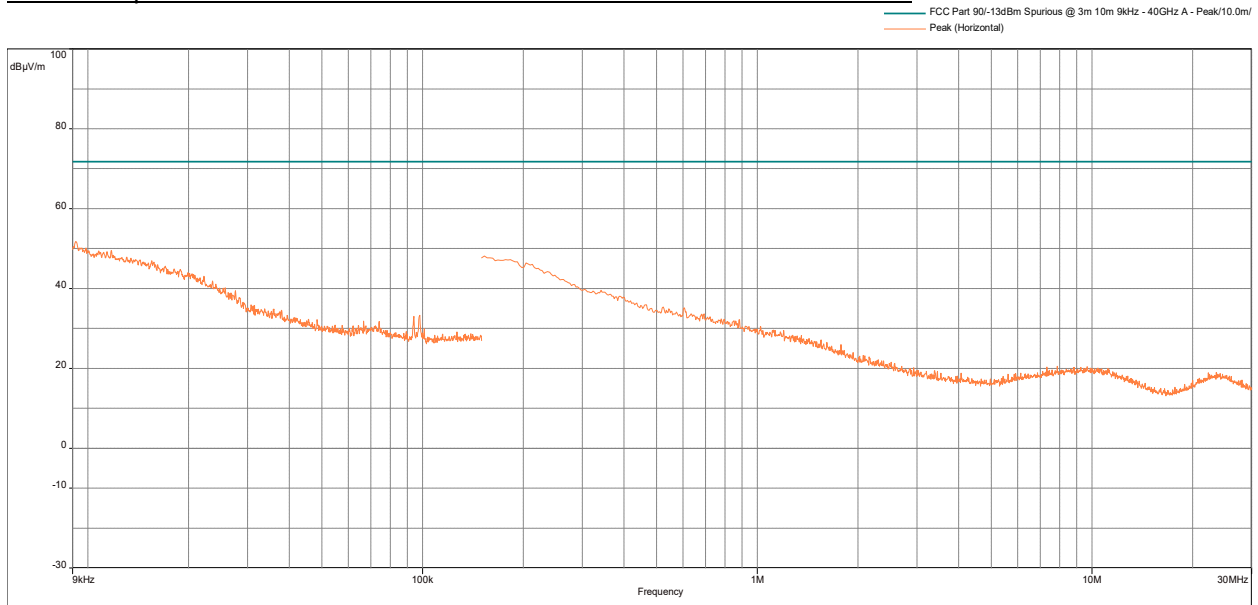
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



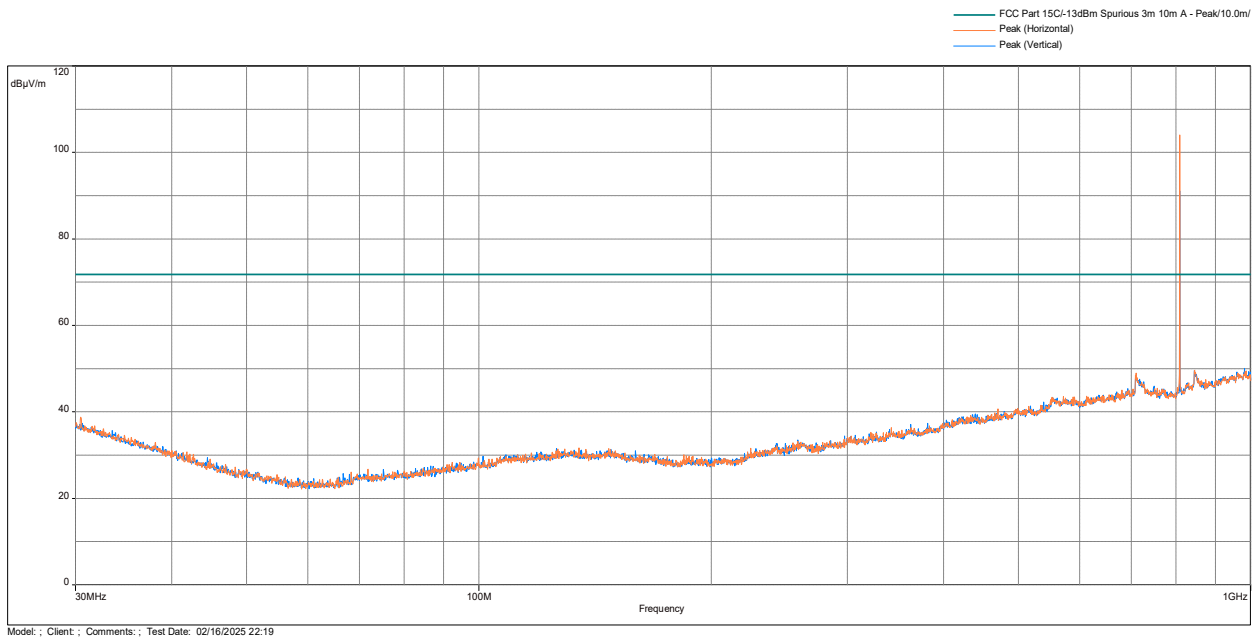
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization

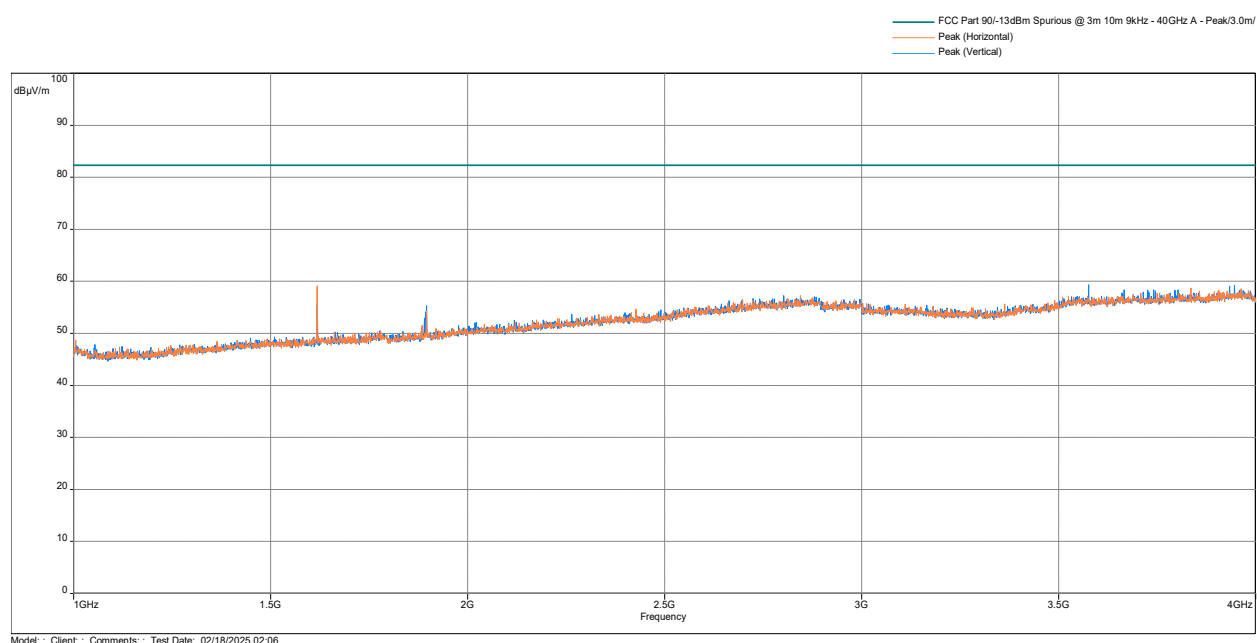


Radiated Spurious Emissions 30 MHz - 1000 MHz

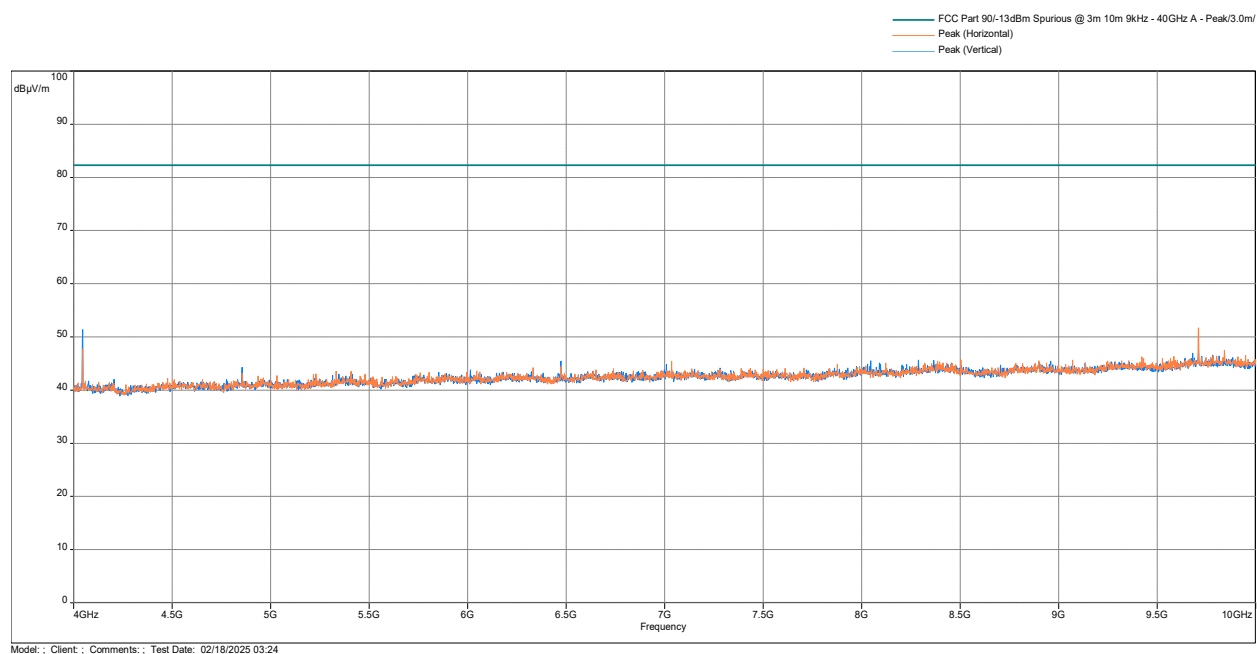


Frequency (MHz)	FS (dB μ V/m)	Limit (dB(uV/m))	Margin (dB)	Azimuth (deg)	Height (m)	Polarity	Correction (dB)
552.6037	43.37	71.8	-28.43	222.5	2	Horizontal	27.78
554.0263	43.42	71.8	-28.38	153.5	2	Vertical	27.89
709	47.72	71.8	-24.08	45.5	4	Vertical	29.16
710.1963	48.98	71.8	-22.82	310.75	1	Horizontal	29.2
845.2527	49.59	71.8	-22.21	17.5	2	Vertical	31.71
846.3843	49.65	71.8	-22.15	205.5	4	Horizontal	31.7

Radiated Spurious Emissions 1 – 4 GHz, Peak Scan



Radiated Spurious Emissions 4 – 10 GHz, Peak Scan

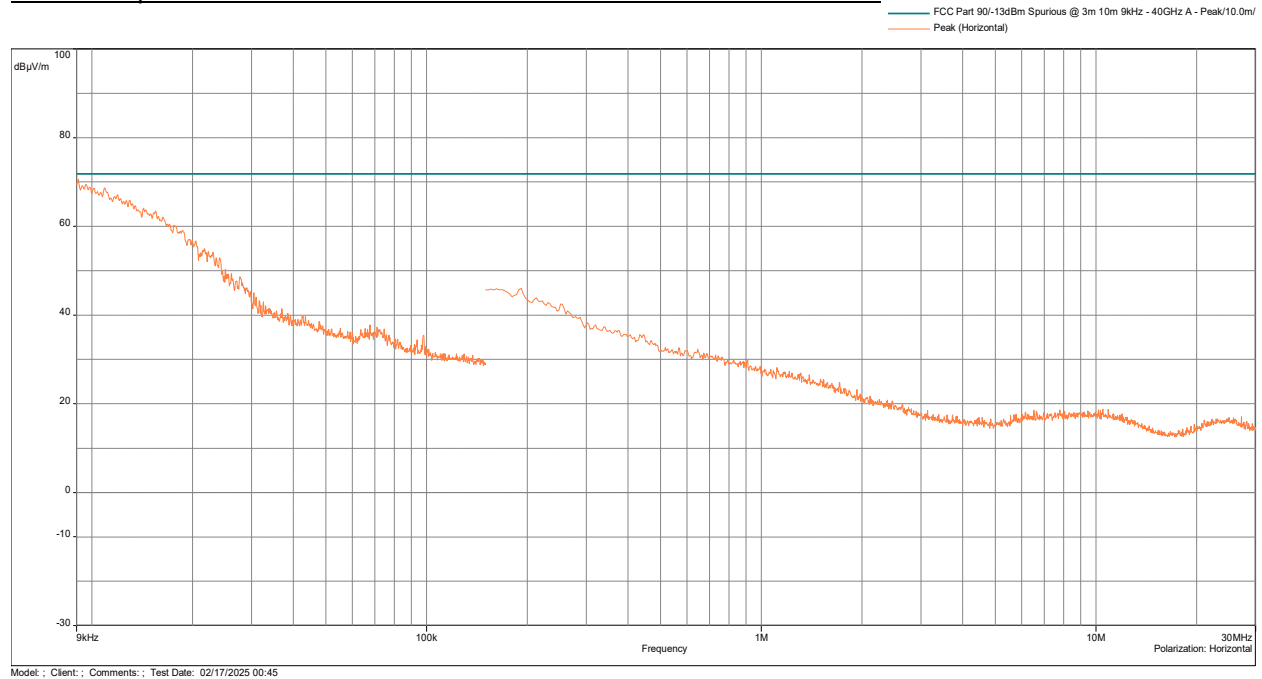


Results

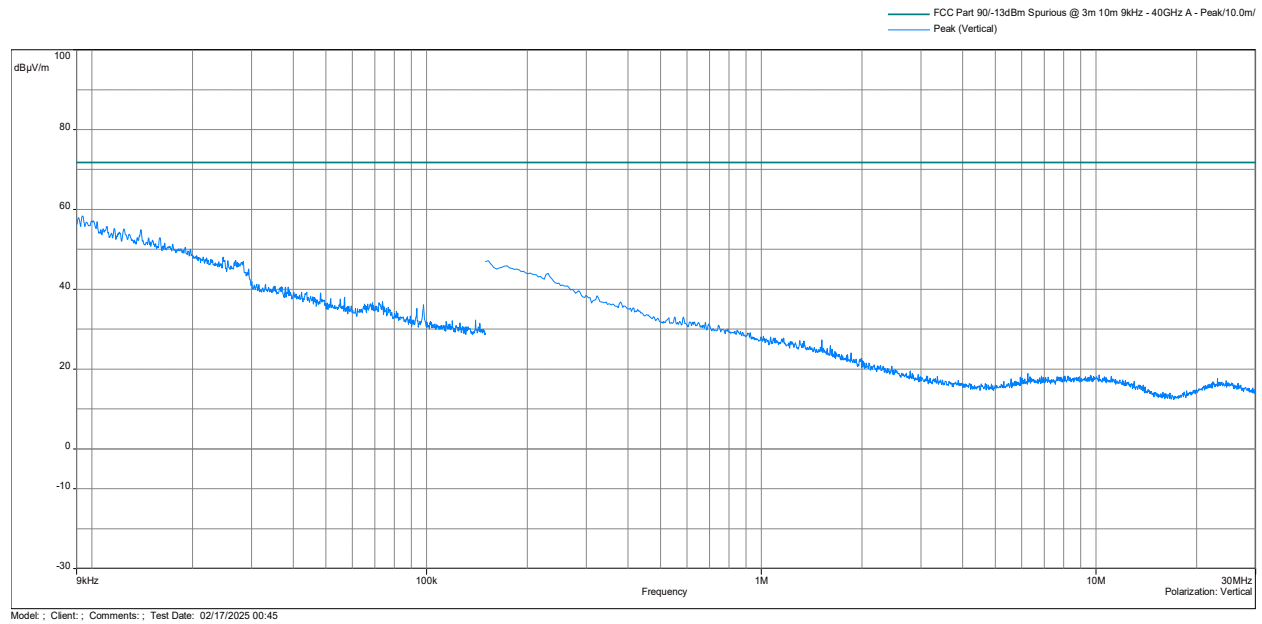
Complies

Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 813.1125 MHz

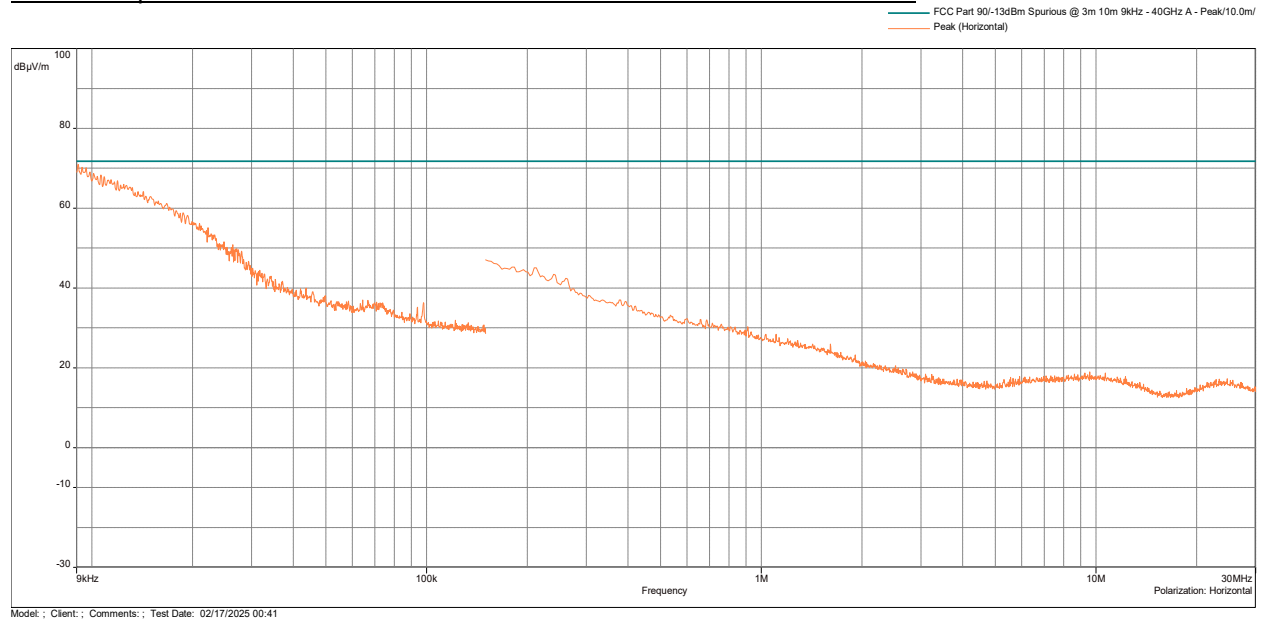
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



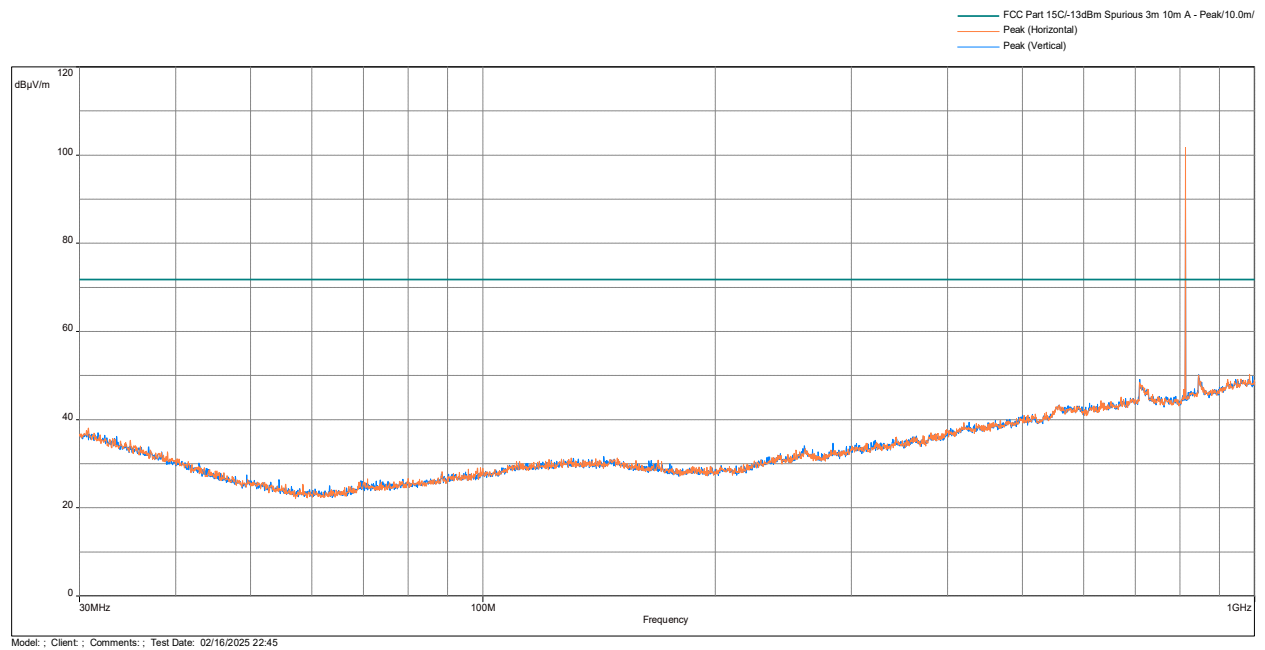
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization

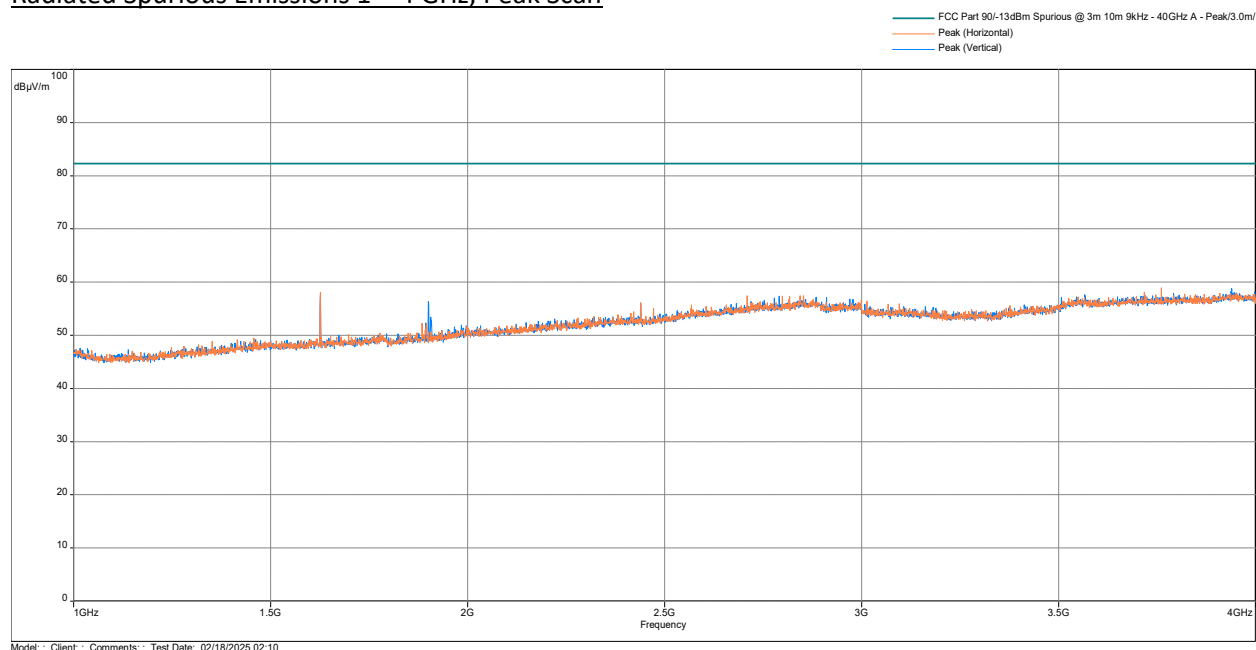


Radiated Spurious Emissions 30 MHz - 1000 MHz

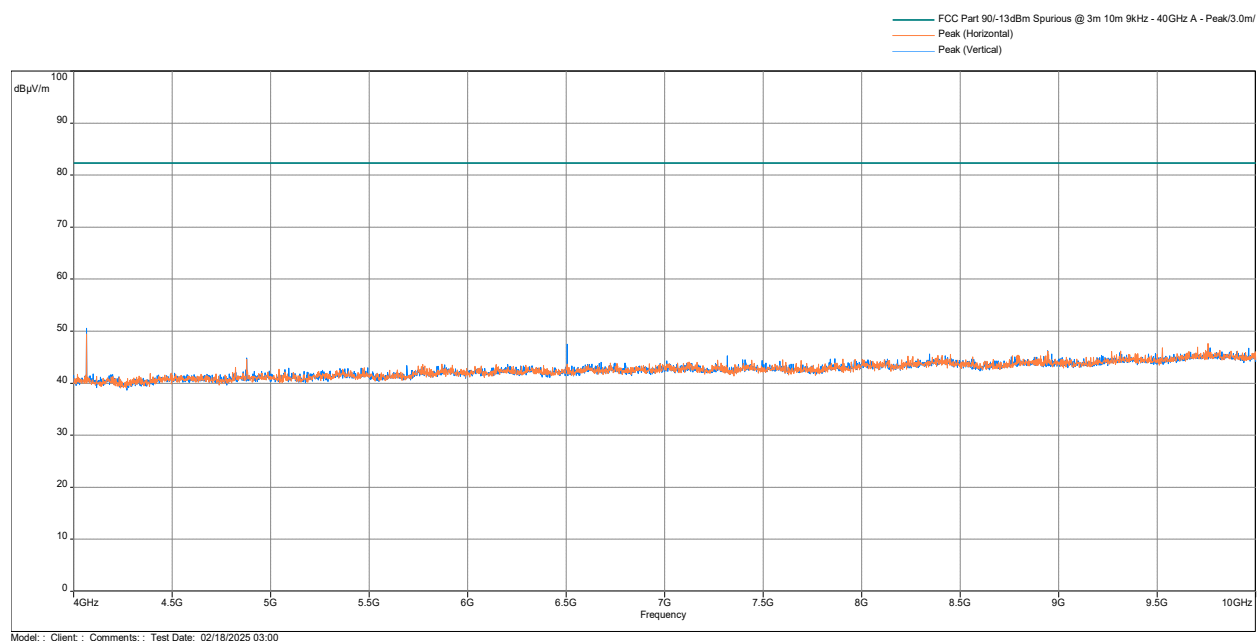


Frequency (MHz)	FS (dBμV/m)	Limit (dB(uV/m))	Margin (dB)	Azimuth (deg)	Height (m)	Polarity	Correction (dB)
284.14	34.64	71.8	-37.16	103.25	3	Vertical	19.48
419.9723	39.33	71.8	-32.47	137.75	2	Horizontal	23.92
709.1617	48.42	71.8	-23.38	271.25	3	Horizontal	29.17
709.7437	49.12	71.8	-22.68	179.75	1	Vertical	29.18
845.8993	50.19	71.8	-21.61	154.25	2	Vertical	31.7
846.3843	50.12	71.8	-21.68	221.25	4	Horizontal	31.7

Radiated Spurious Emissions 1 – 4 GHz, Peak Scan



Radiated Spurious Emissions 4 – 10 GHz, Peak Scan

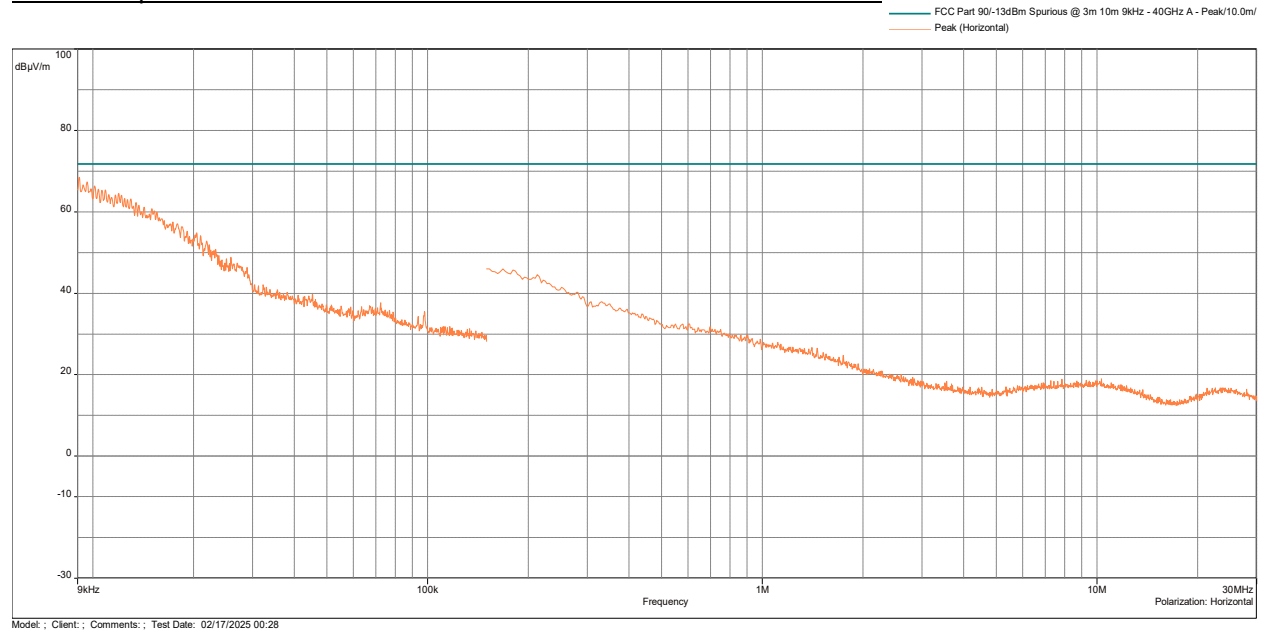


Results

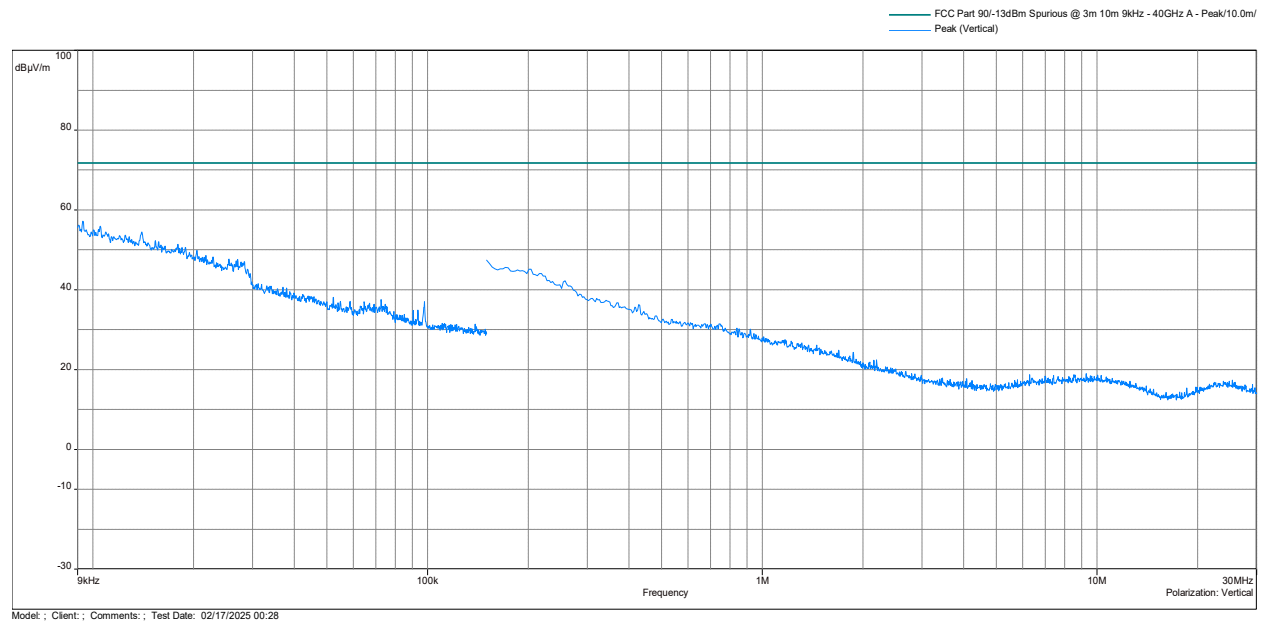
Complies

Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 816.9875MHz

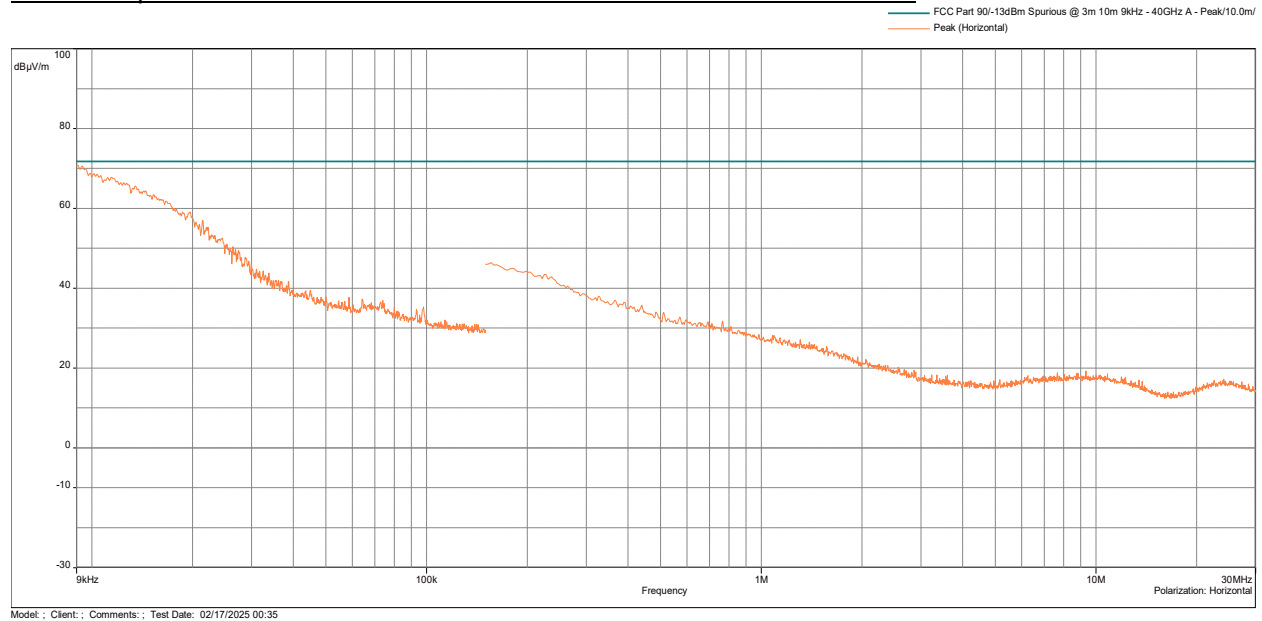
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



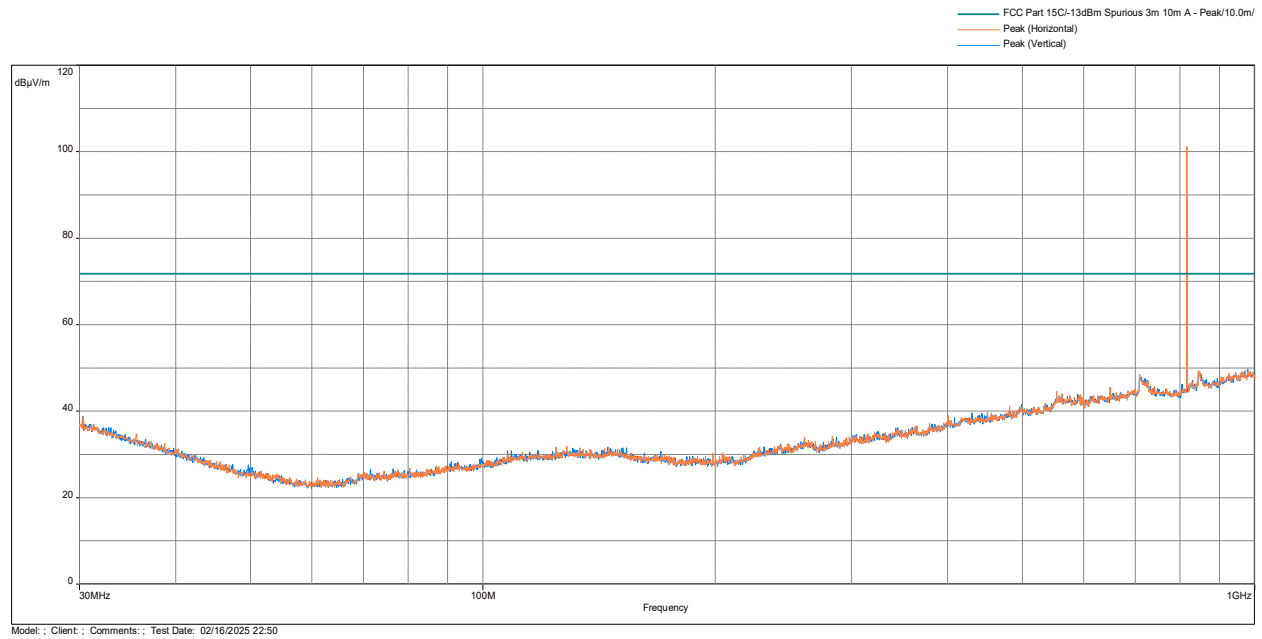
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization

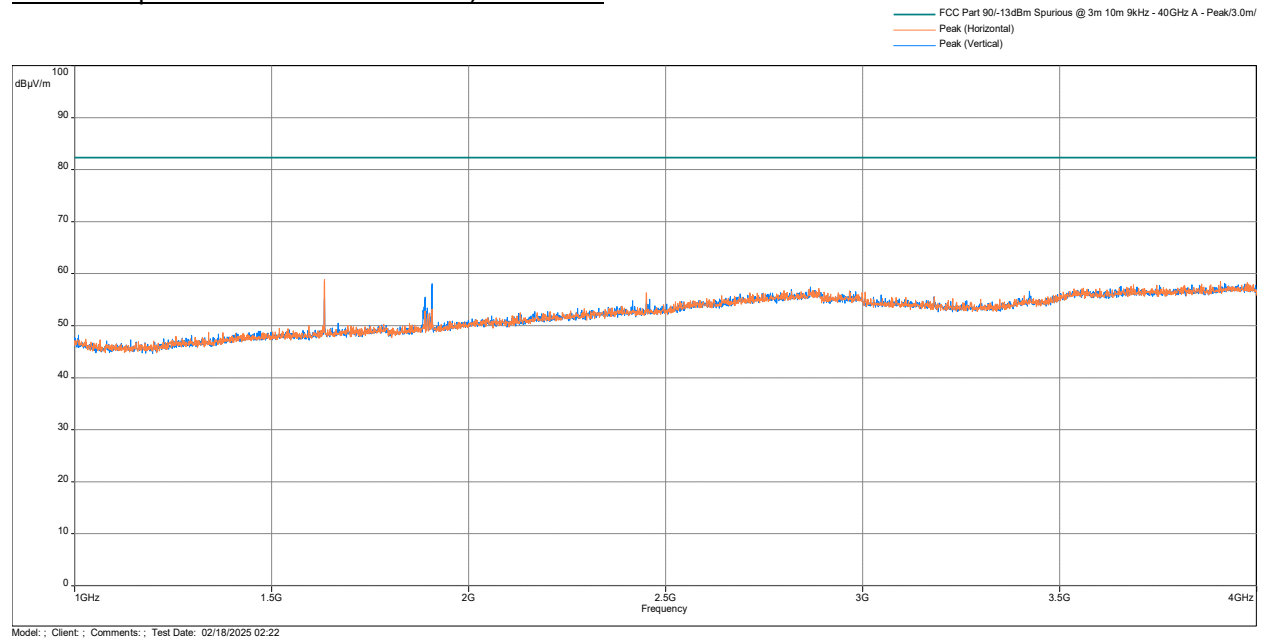


Radiated Spurious Emissions 30 MHz - 1000 MHz

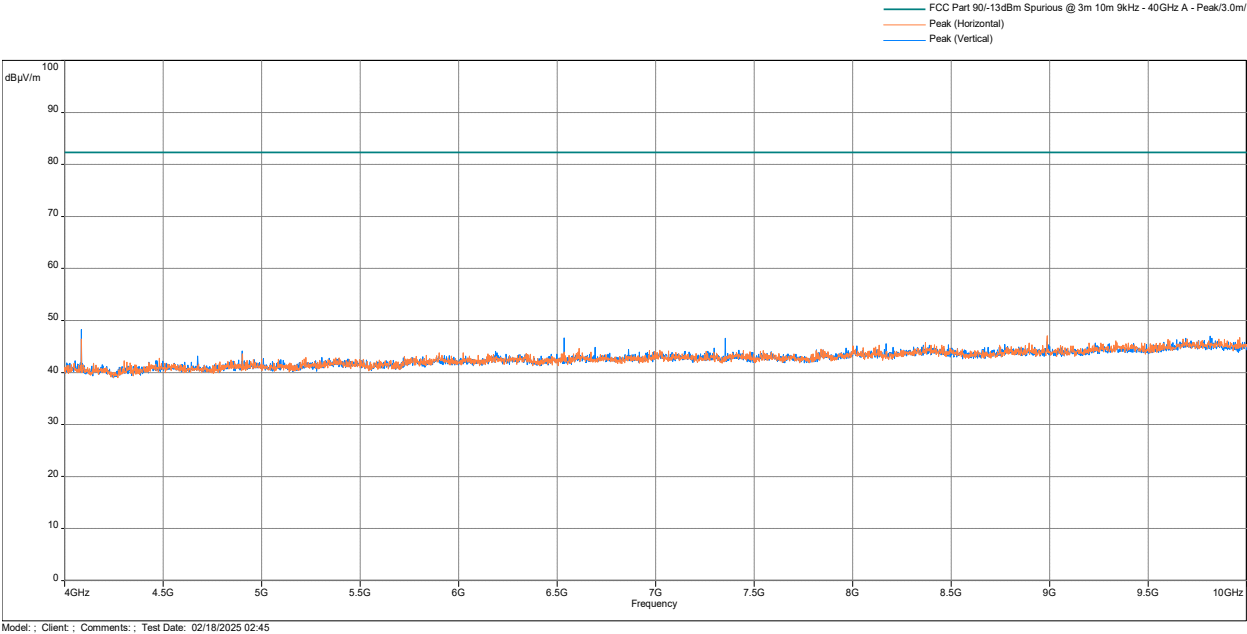


Frequency (MHz)	FS (dBμV/m)	Limit (dB(uV/m))	Margin (dB)	Azimuth (deg)	Height (m)	Polarity	Correction (dB)
649.4097	45.59	71.8	-26.21	352.75	2	Horizontal	28.31
709.97	48.59	71.8	-23.21	98.25	4	Horizontal	29.19
846.643	49.17	71.8	-22.63	330.75	3	Horizontal	31.7
429.8663	39.63	71.8	-32.17	338.25	1	Vertical	24
709.1617	48.24	71.8	-23.56	155.75	2	Vertical	29.17
845.1557	49.28	71.8	-22.52	324.75	3	Vertical	31.71

Radiated Spurious Emissions 1 – 4 GHz, Peak Scan



Radiated Spurious Emissions 4 - 10 GHz, Peak Scan



Results

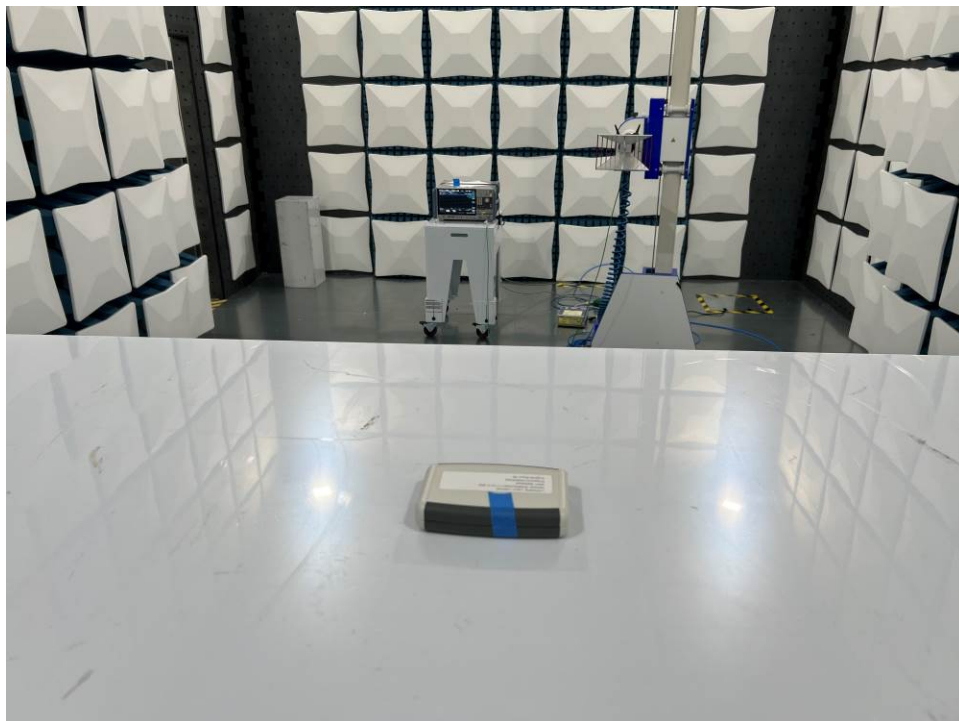
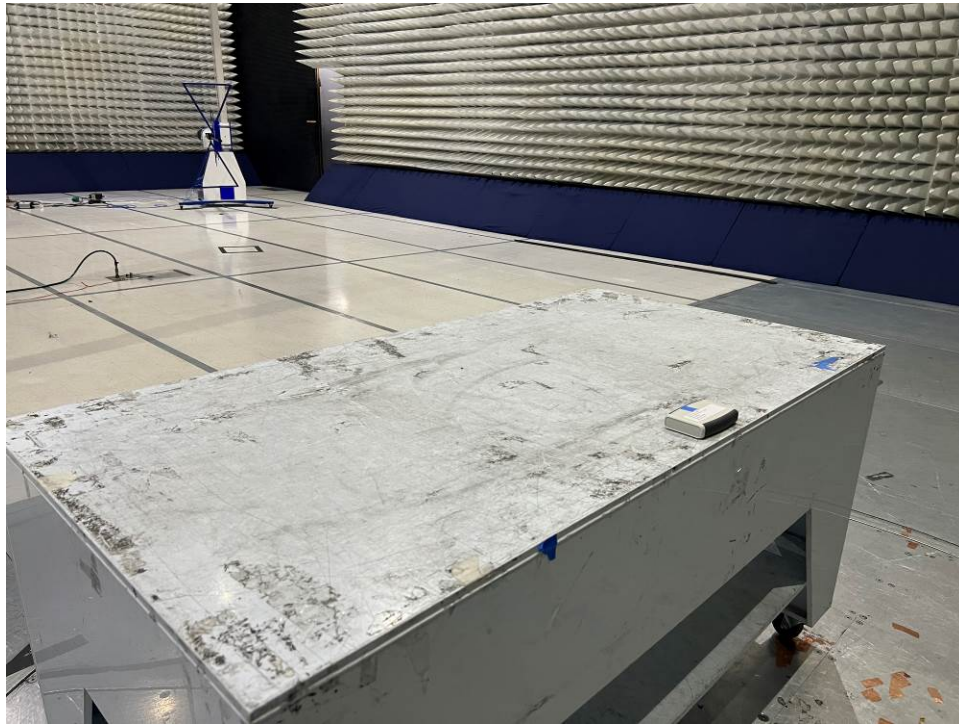
Complies

4.5.5 Test Setup Configuration

The following photographs show the testing configurations used.



4.5.5 Test Setup Configuration (Continued)



4.6 Frequency Stability FCC: 90.213

4.6.1 Requirement

For Mobile Stations in the range of 809-824MHz, the Minimum Frequency Stability must be lower than 2.5 parts per million (ppm).

4.6.2 Procedure

Procedures were done according to ANSI c63.26: 2015.

4.6.3 Test Result

	Frequency (MHz)			
Temperature (°C)	3Vdc	2Vdc	Δf (Hz)	ppm
50	809.10269583		126	0.155728044
40	809.10271380		108.0300001	0.133518259
30	809.10273183		90	0.111234317
20	809.10282183	809.10282183	0	0
10	809.10323780		415.9699999	0.514112655
0	809.10312983		307.9999999	0.380668552
-10	809.10305683		235	0.290445162
-20	809.10285783		35.99999991	0.044493727
-30	809.10302083		199	0.245951435

Note: Per the client, the DC cutoff voltage is 2 Vdc.

5.0 List of Test Equipment

Measurement equipment used for compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
EMI Receiver	Rohde and Schwarz	ESW44	ITS 02016	12	05/30/2025
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	04/26/2025
Horn Antenna (1-18GHz)	RF Spin	DRH18-E	ITS 02114	12	10/02/2025
1-18 Preamplifier	EMC Instruments	EMC118A45SE	ITS 02113	12	10/02/2025
9kHz-30MHz Passive Loop Antenna	ETS Lindgren	6512	ITS 01573	12	12/02/2025
RF Motion 30MHz-2GHz Bi-Log Antenna	SunAR	JB1	ITS 01577	12	02/29/2025
9kHz-1GHz Pre-amplifier	Sonoma Instruments	310N	ITS 01714	12	11/27/2025
1-40GHz SMA RF Cable 0.5 Meter	Absolute EMC	50586-39	ITS 02098	12	08/19/2025
1-40GHz SMA RF Cable 3 Meter	Absolute EMC	50586-197	ITS 02099	12	08/19/2025
Notch Filter	MICRO-TRONICS	BRM50702	ITS 01919	12	01/20/2026
Temperature and Humidity Chamber	ESPEC CORP	BTX-475	ITS 01436	12	10/10/2025

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.20.0.23
RS Commander	Rohde Schwarz	1.6.4

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0 / G105602545	AM	AC	May 12, 2025	Original document

END OF REPORT