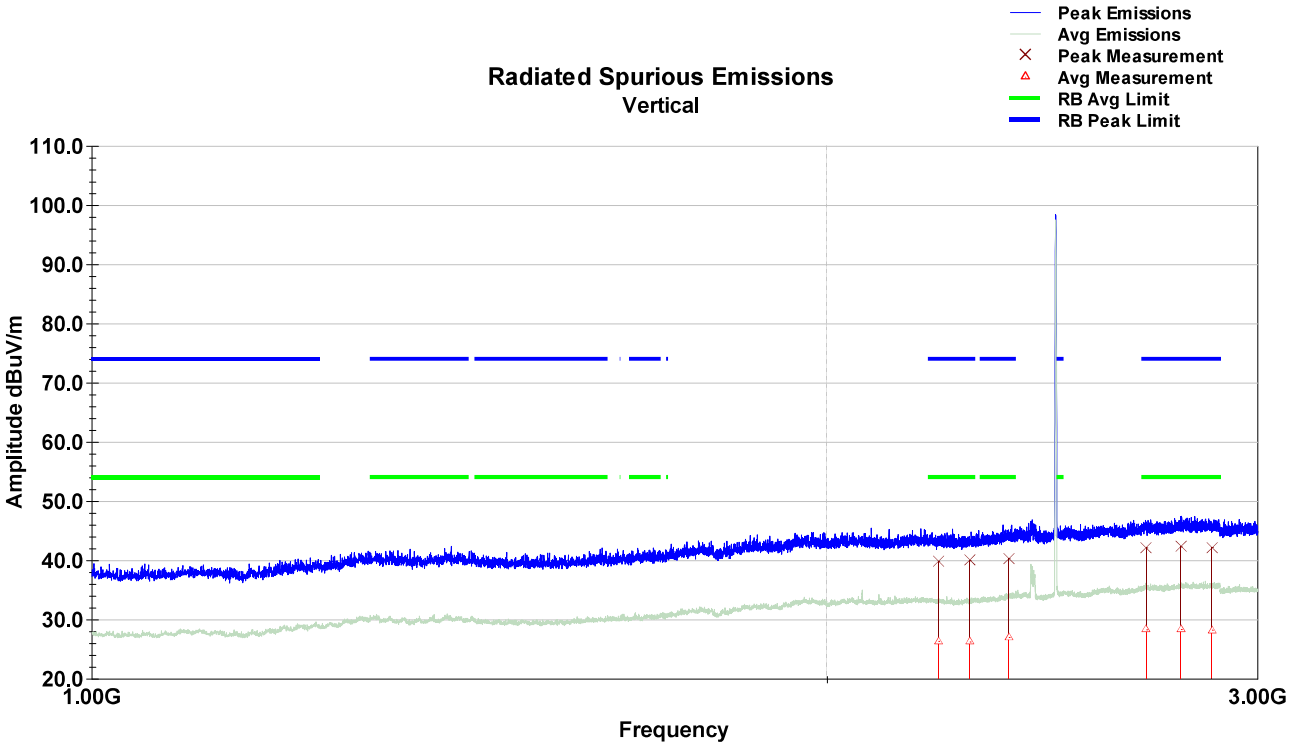
9kHz-30MHz – High Channel

- This frequency range does not show any significant difference between different chains, channels and/or orientation. Worst case plot shown on Low Channel – Ch 0.

30MHz-1000MHz – High Channel

- This frequency range does not show any significant difference between different chains, channels and/or orientation. Worst case plot shown on Low Channel – Ch 0.

1-3GHz – Vertical Plot- High Channel



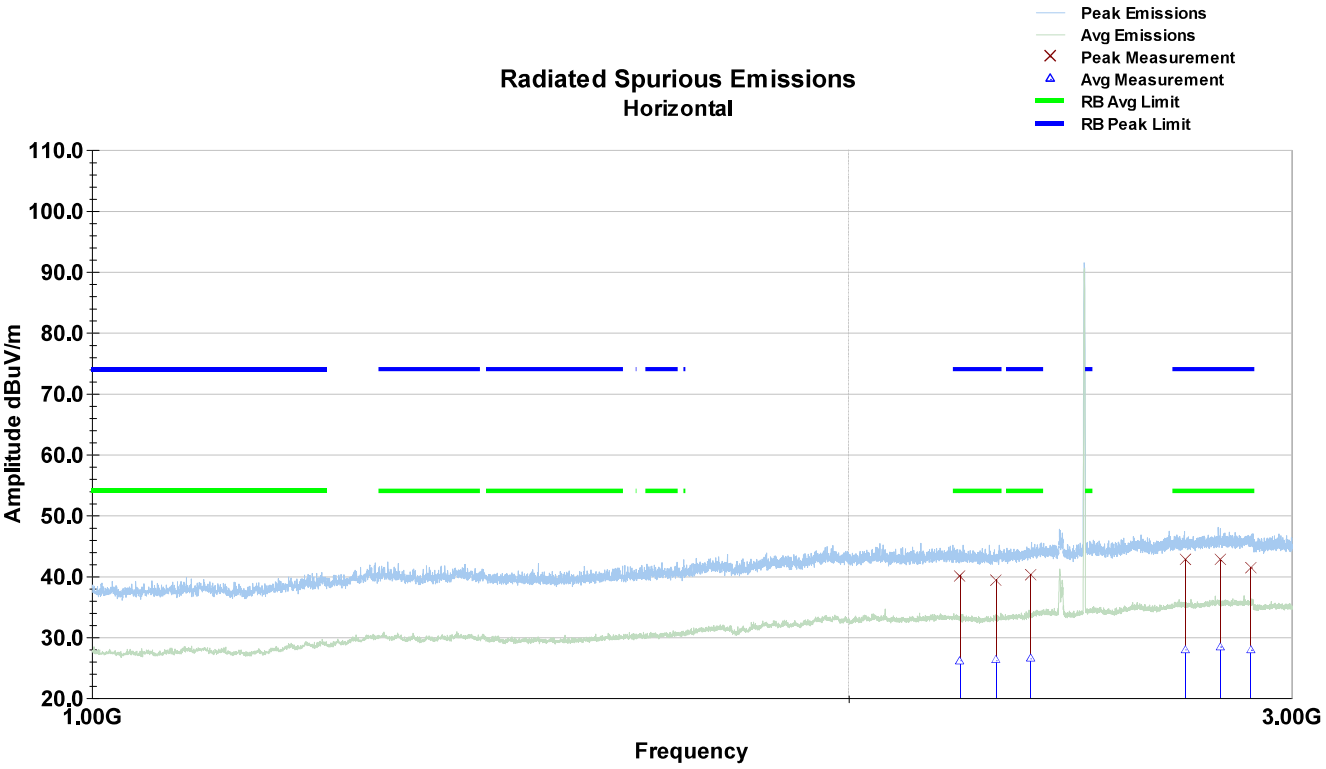
Peak

Frequency MHz	Raw Pk (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	DCF (dB)	Amp (dB)	Final Pk (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2228.12	41.0	V	0.0	184.0	31.3	1.9	0.0	34.5	39.7	74.0	-34.3
2363.88	40.7	V	78.0	111.0	31.6	2.0	0.0	34.5	39.8	74.0	-34.2
2493.40	41.8	V	345.0	138.0	31.9	2.0	0.0	34.2	41.5	74.0	-32.5
2701.24	41.4	V	336.0	182.0	32.4	2.1	0.0	34.0	41.8	74.0	-32.2
2802.20	43.0	V	104.0	169.0	32.5	2.1	0.0	34.1	43.5	74.0	-30.5
2862.80	42.5	V	3.0	226.0	32.4	2.2	0.0	34.4	42.6	74.0	-31.4
Final Pk = Raw Pk + AF + Loss + DCF - Amp											
Margin = Final Pk - Limit											

Average

Frequency MHz	Raw Avg dBuV	Polarity V/H	Azimuth degrees	Height cm	AF dB/m	Loss dB	DCF dB	Amp dB	Final Avg dBuV/m	Limit dBuV/m	Margin dB
2228.12	27.7	V	0.0	184.0	31.3	1.9	0.0	34.5	26.4	54.0	-27.6
2363.88	27.7	V	78.0	111.0	31.6	2.0	0.0	34.5	26.7	54.0	-27.3
2493.40	27.6	V	345.0	138.0	31.9	2.0	0.0	34.2	27.4	54.0	-26.6
2701.24	27.9	V	336.0	182.0	32.4	2.1	0.0	34.0	28.4	54.0	-25.6
2802.20	29.7	V	104.0	169.0	32.5	2.1	0.0	34.1	30.2	54.0	-23.8
2862.80	28.1	V	3.0	226.0	32.4	2.2	0.0	34.4	28.3	54.0	-25.7
Final Avg = Raw Avg + AF + Loss + DCF - Amp											
Margin = Final Avg - Limit											

1-3GHz – Horizontal Plot- High Channel



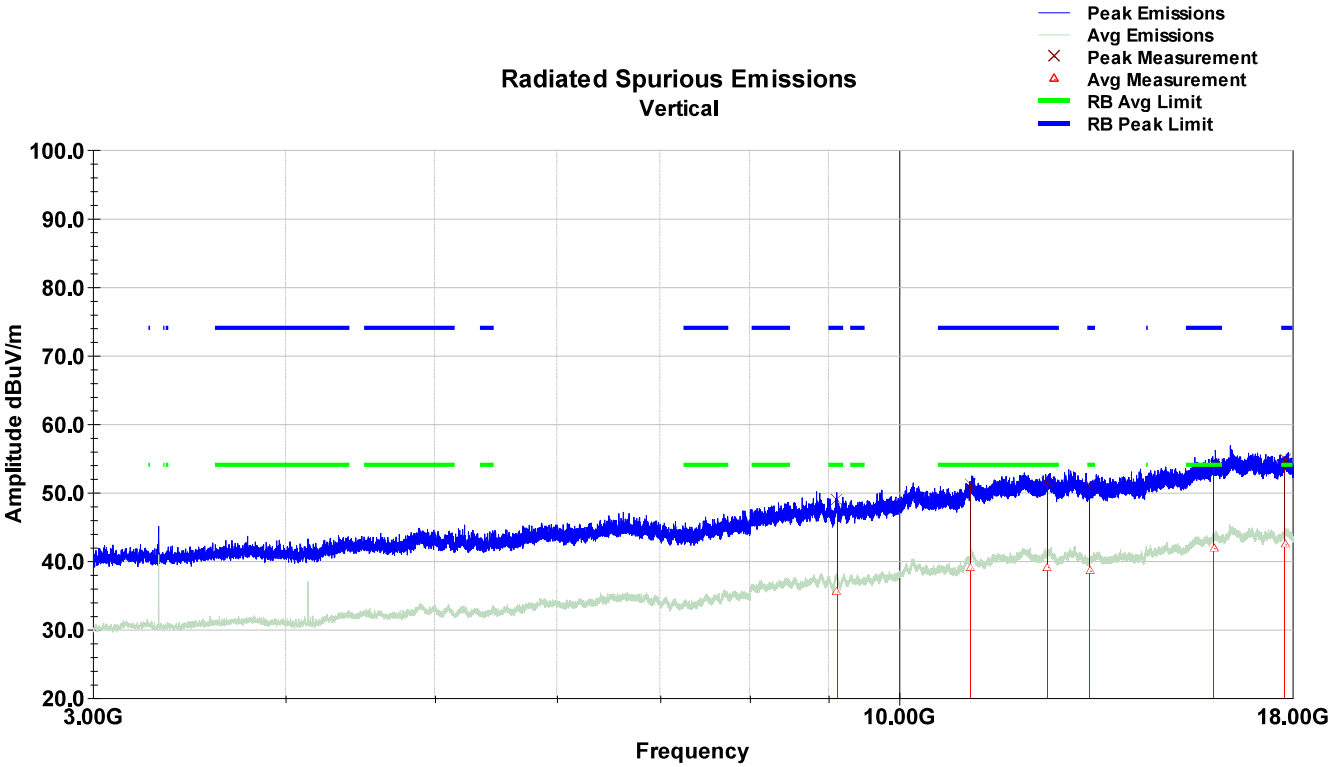
Peak

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	DCF dB	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
2279.00	41.4	H	211.0	196.0	31.1	1.9	0.0	34.4	40.1	74.0	-33.9
2370.00	41.4	H	151.0	112.0	31.7	2.0	0.0	34.5	40.5	74.0	-33.5
2490.00	41.1	H	91.0	100.0	31.9	2.0	0.0	34.2	40.8	74.0	-33.2
2690.00	40.5	H	241.0	217.0	32.4	2.1	0.0	34.1	40.9	74.0	-33.1
2790.00	40.9	H	358.0	196.0	32.5	2.1	0.0	34.2	41.3	74.0	-32.7
2880.00	41.9	H	219.0	190.0	32.4	2.2	0.0	34.4	42.1	74.0	-31.9
Final Pk = Raw Pk + AF + Loss + DCF - Amp											
Margin = Final Pk - Limit											

Average

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	DCF dB	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
2279.00	27.6	H	211.0	196.0	31.1	1.9	0.0	34.4	26.3	54.0	-27.7
2370.00	27.6	H	151.0	112.0	31.7	2.0	0.0	34.5	26.8	54.0	-27.2
2490.00	27.5	H	91.0	100.0	31.9	2.0	0.0	34.2	27.2	54.0	-26.7
2690.00	27.4	H	241.0	217.0	32.4	2.1	0.0	34.1	27.7	54.0	-26.3
2790.00	27.9	H	358.0	196.0	32.5	2.1	0.0	34.2	28.4	54.0	-25.6
2880.00	28.0	H	219.0	190.0	32.4	2.2	0.0	34.4	28.2	54.0	-25.8
Final Avg = Raw Avg + AF + Loss + DCF - Amp											
Margin = Final Avg - Limit											

3-18GHz – Vertical Plot- High Channel



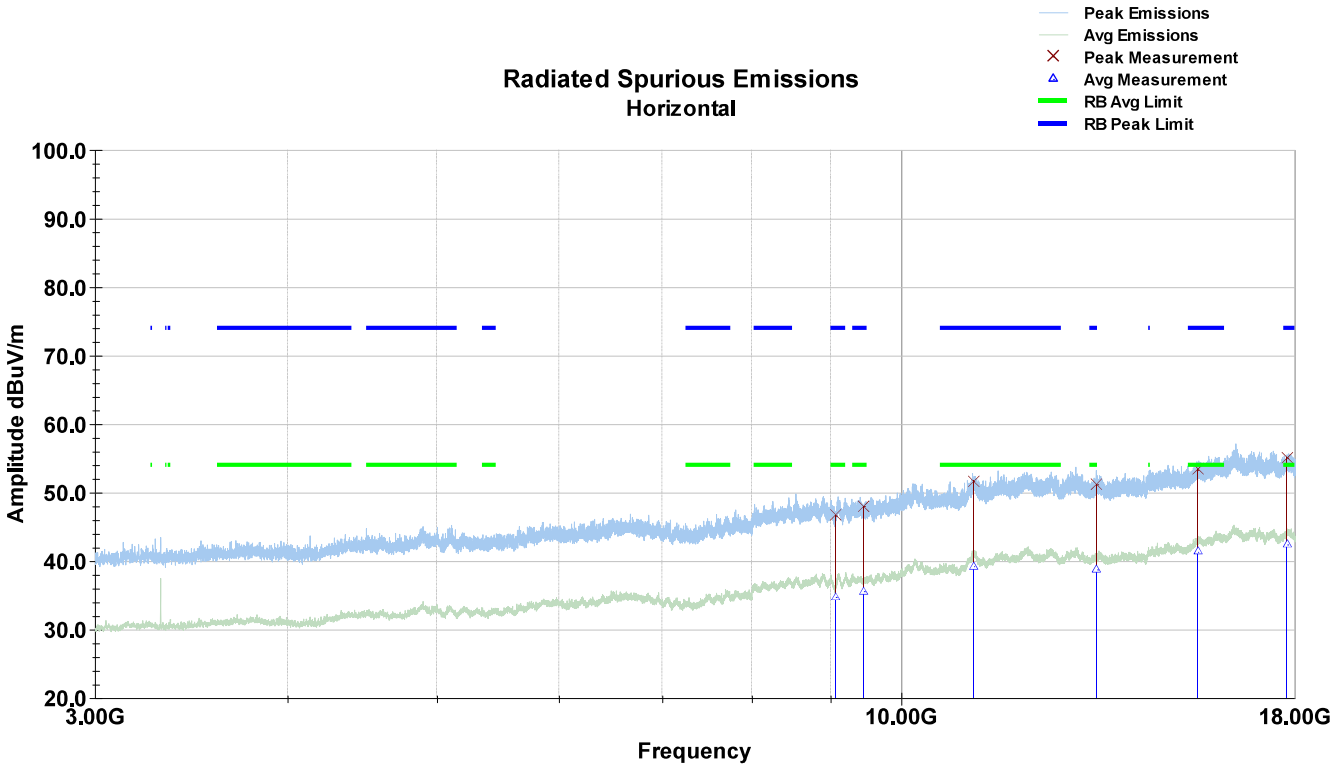
Peak

Frequency MHz	Raw Pk (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	DCF (dB)	Amp (dB)	Final Pk (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9118.60	43.4	V	315.0	226.0	36.4	3.6	0.0	34.5	48.9	74.0	-25.1
11130.28	43.6	V	278.0	182.0	38.6	4.3	0.0	35.2	51.3	74.0	-22.7
12487.16	43.4	V	45.0	100.0	39.2	4.4	0.0	35.6	51.4	74.0	-22.6
13296.08	43.3	V	41.0	114.0	39.2	4.5	0.0	36.0	51.1	74.0	-22.9
16000.40	43.9	V	178.0	126.0	40.9	5.1	0.0	35.9	54.0	74.0	-20.0
17799.08	45.1	V	-1.0	111.0	41.0	5.3	0.0	36.6	54.8	74.0	-19.2
Final Pk = Raw Pk + AF + Loss + DCF - Amp											
Margin = Final Pk - Limit											

Average

Frequency MHz	Raw Avg dBuV	Polarity V/H	Azimuth degrees	Height cm	AF dB/m	Loss dB	DCF dB	Amp dB	Final Avg dBuV/m	Limit dBuV/m	Margin dB
9118.60	30.1	V	315.0	226.0	36.4	3.6	0.0	34.5	35.6	54.0	-18.4
11130.28	31.2	V	278.0	182.0	38.6	4.3	0.0	35.2	38.9	54.0	-15.0
12487.16	31.1	V	45.0	100.0	39.2	4.4	0.0	35.6	39.1	54.0	-14.9
13296.08	30.8	V	41.0	114.0	39.2	4.5	0.0	36.0	38.6	54.0	-15.4
16000.40	31.8	V	178.0	126.0	40.9	5.1	0.0	35.9	41.9	54.0	-12.1
17799.08	32.7	V	-1.0	111.0	41.0	5.3	0.0	36.6	42.4	54.0	-11.5
Final Avg = Raw Avg + AF + Loss + DCF - Amp											
Margin = Final Avg - Limit											

3-18GHz – Horizontal Plot- High Channel



Peak

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	DCF dB	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
9070.00	41.8	H	214.0	186.0	36.4	3.3	0.0	34.8	46.6	74.0	-27.4
9460.00	42.5	H	299.0	159.0	36.7	3.6	0.0	34.9	48.0	74.0	-26.0
11150.00	43.8	H	71.0	241.0	38.6	4.3	0.0	35.0	51.7	74.0	-22.3
13400.00	43.6	H	210.0	168.0	39.2	4.5	0.0	36.2	51.2	74.0	-22.8
15580.00	44.1	H	0.0	244.0	40.6	4.9	0.0	36.2	53.3	74.0	-20.7
17800.00	45.4	H	319.0	168.0	41.0	5.3	0.0	36.6	55.1	74.0	-18.9
Final Pk = Raw Pk + AF + Loss + DCF - Amp											
Margin = Final Pk - Limit											

Average

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	DCF dB	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
9070.00	29.9	H	214.0	186.0	36.4	3.3	0.0	34.8	34.8	54.0	-19.2
9460.00	30.1	H	299.0	159.0	36.7	3.6	0.0	34.9	35.6	54.0	-18.4
11150.00	31.3	H	71.0	241.0	38.6	4.3	0.0	35.0	39.3	54.0	-14.7
13400.00	31.2	H	210.0	168.0	39.2	4.5	0.0	36.2	38.8	54.0	-15.2
15580.00	32.2	H	0.0	244.0	40.6	4.9	0.0	36.2	41.4	54.0	-12.6
17800.00	32.7	H	319.0	168.0	41.0	5.3	0.0	36.6	42.4	54.0	-11.6
Final Avg = Raw Avg + AF + Loss + DCF - Amp											
Margin = Final Avg - Limit											

18-26GHz – High Channel

- This frequency range does not show any significant difference between different chains, channels and/or orientation. Worst case plot shown on Mid Channel – Ch 19.

8 Emissions in Restricted Frequency Bands

8.1 *Test Result*

Test Description	Test Specification		Test Result
Restricted Band Emissions	15.205 / 15.209	RSS-GEN S8.9 / 8.10	Compliant

8.2 *Test Method*

Field strength measurements were performed at the restricted band edges of 2390MHz and 2483.5MHz for each modulation. Measurements were made using the conducted methods defined in ANSI C63.10, Section 11.12.2.

8.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.52 °C
Relative Humidity:	48.3 %
Atmospheric Pressure:	99.12 kPa

8.4 *Test Equipment*

Test End Date: 26-Mar-2025 Tester: SGM

Equipment	Manufacturer	Model	Asset Number	Cal Date	Cal Due Date
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM MICROWAVE	20108	20-Mar-24	20-Apr-2025
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	3-Jan-2024	3-Jan-2025
TSTPASS SWITCHBOX	SB2	TSTPASS	23009	8-Apr-2024	8-Apr-2025

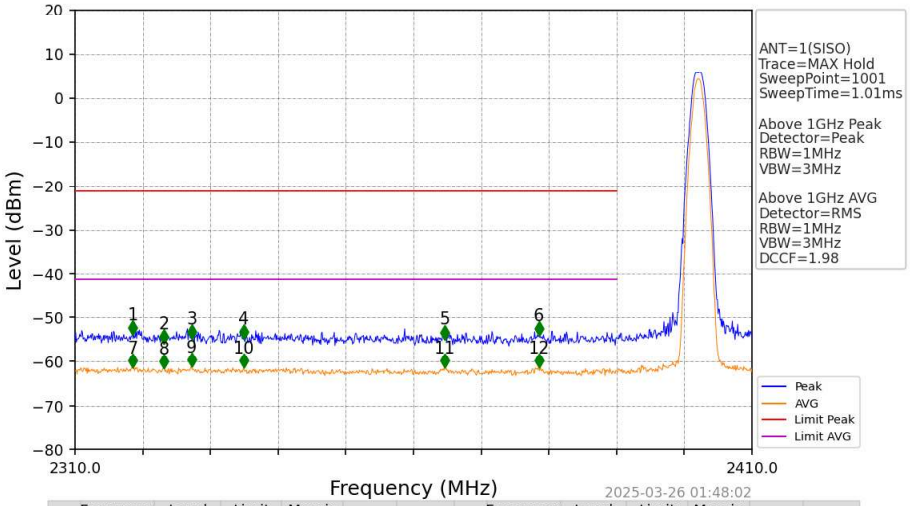
Test End Date: 15-May-2025 Tester: SGM

Equipment	Manufacturer	Model	Asset Number	Cal Date	Cal Due Date
RF CABLE SMA TO SMA, 0.01-40GHZ	TELEDYNE STORM MICROWAVE	084-0505-059	20108	3-Apr-2025	3-Apr-2026
RF CABLE SMA TO SMA, 0.01-40GHZ	TELEDYNE STORM MICROWAVE	084-0505-059	20109	3-Apr-2025	3-Apr-2026
TSTPASS SWITCHBOX	TSTPASS	SB2	23009	4-Apr-2025	4-Apr-2026
SIGNAL ANALYZER (TS8997)	ROHDE & SCHWARZ	FSV30	B085749	4-Mar-2025	4-Mar-2026

8.5 *Test Data*

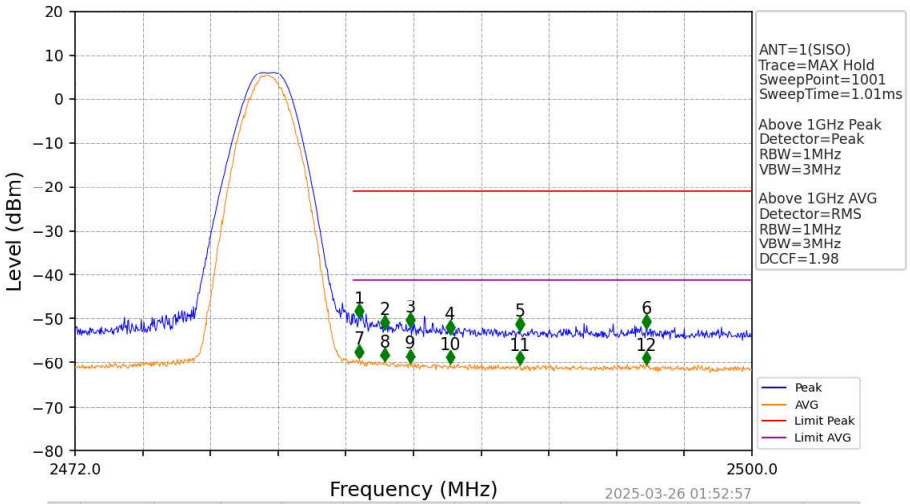
Antenna 1

1M_LCH_2402MHz_Ant1_NTNV



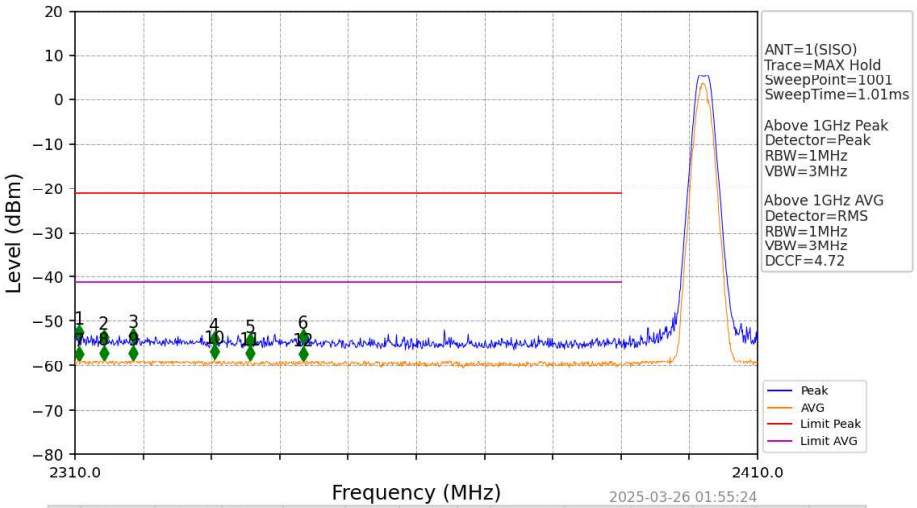
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2318.500	-53.95	-21.20	32.75	Pass	Peak	7	2318.500	-61.37	-41.20	20.17	Pass	AVG
2	2323.100	-55.83	-21.20	34.63	Pass	Peak	8	2323.100	-61.49	-41.20	20.29	Pass	AVG
3	2327.200	-54.89	-21.20	33.69	Pass	Peak	9	2327.200	-61.13	-41.20	19.93	Pass	AVG
4	2334.900	-54.79	-21.20	33.59	Pass	Peak	10	2334.900	-61.44	-41.20	20.24	Pass	AVG
5	2364.600	-54.90	-21.20	33.70	Pass	Peak	11	2364.600	-61.36	-41.20	20.16	Pass	AVG
6	2378.500	-54.07	-21.20	32.87	Pass	Peak	12	2378.500	-61.36	-41.20	20.16	Pass	AVG

1M_HCH_2480MHz_Ant1_NTNV



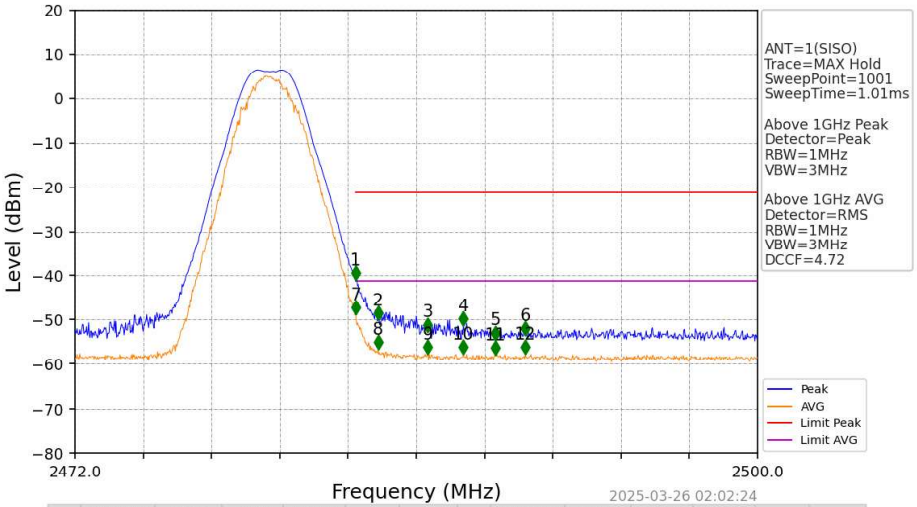
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2483.760	-49.89	-21.20	28.69	Pass	Peak	7	2483.760	-59.06	-41.20	17.86	Pass	AVG
2	2484.824	-52.36	-21.20	31.16	Pass	Peak	8	2484.824	-59.66	-41.20	18.46	Pass	AVG
3	2485.860	-51.92	-21.20	30.72	Pass	Peak	9	2485.860	-60.00	-41.20	18.80	Pass	AVG
4	2487.512	-53.52	-21.20	32.32	Pass	Peak	10	2487.512	-60.31	-41.20	19.11	Pass	AVG
5	2490.396	-52.76	-21.20	31.56	Pass	Peak	11	2490.396	-60.50	-41.20	19.30	Pass	AVG
6	2495.632	-52.33	-21.20	31.13	Pass	Peak	12	2495.632	-60.38	-41.20	19.18	Pass	AVG

2M_LCH_2402MHz_Ant1_NTNV



No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2310.600	-54.10	-21.20	32.90	Pass	Peak	7	2310.600	-58.79	-41.20	17.59	Pass	AVG
2	2314.200	-55.19	-21.20	33.99	Pass	Peak	8	2314.200	-58.61	-41.20	17.41	Pass	AVG
3	2318.500	-54.80	-21.20	33.60	Pass	Peak	9	2318.500	-58.69	-41.20	17.49	Pass	AVG
4	2330.400	-55.50	-21.20	34.30	Pass	Peak	10	2330.400	-58.35	-41.20	17.15	Pass	AVG
5	2335.600	-55.91	-21.20	34.71	Pass	Peak	11	2335.600	-58.66	-41.20	17.46	Pass	AVG
6	2343.400	-55.06	-21.20	33.86	Pass	Peak	12	2343.400	-58.76	-41.20	17.56	Pass	AVG

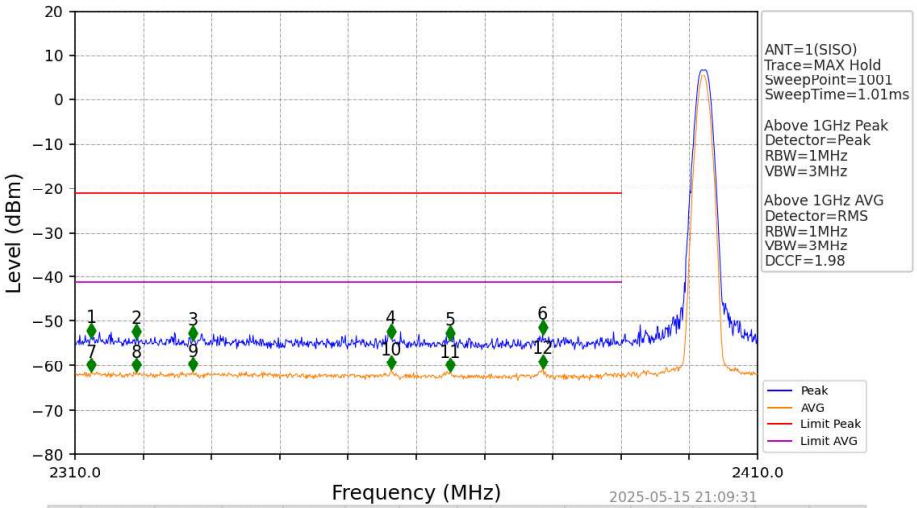
2M_HCH_2480MHz_Ant1_NTNV



No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2483.508	-41.00	-21.20	19.80	Pass	Peak	7	2483.508	-48.74	-41.20	7.54	Pass	AVG
2	2484.432	-50.10	-21.20	28.90	Pass	Peak	8	2484.432	-56.67	-41.20	15.47	Pass	AVG
3	2486.476	-52.71	-21.20	31.51	Pass	Peak	9	2486.476	-57.69	-41.20	16.49	Pass	AVG
4	2487.932	-51.35	-21.20	30.15	Pass	Peak	10	2487.932	-57.77	-41.20	16.57	Pass	AVG
5	2489.248	-54.54	-21.20	33.34	Pass	Peak	11	2489.248	-57.82	-41.20	16.62	Pass	AVG
6	2490.480	-53.57	-21.20	32.37	Pass	Peak	12	2490.480	-57.78	-41.20	16.58	Pass	AVG

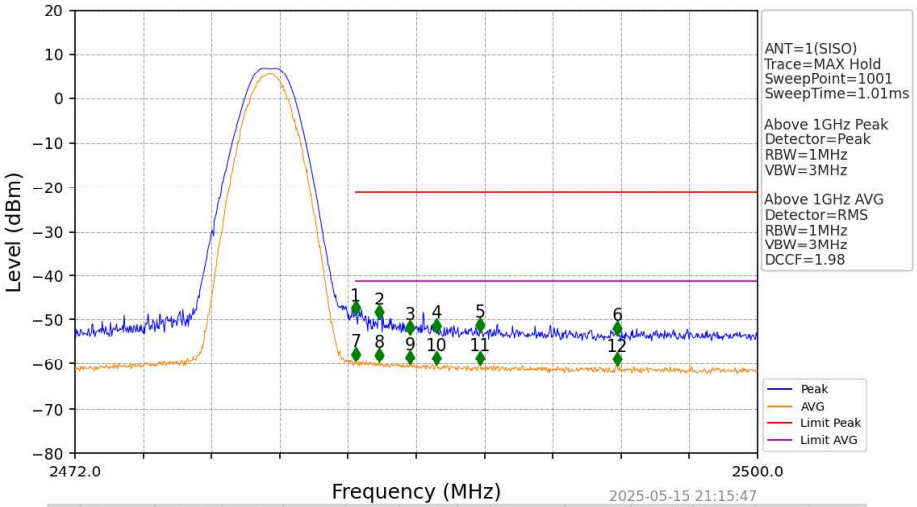
Antenna 2

1M_LCH_2402MHz_Ant2_NTNV



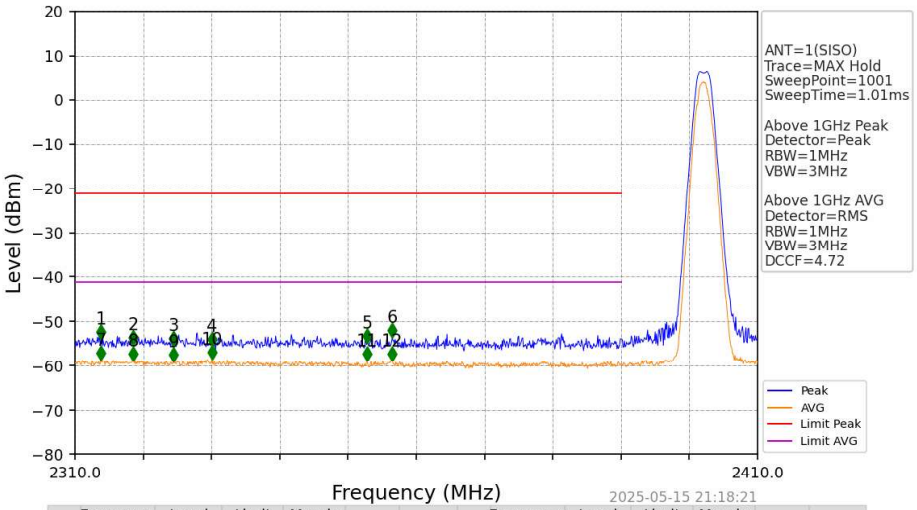
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2312.400	-53.74	-21.20	32.54	Pass	Peak	7	2312.400	-61.44	-41.20	20.24	Pass	AVG
2	2319.000	-53.92	-21.20	32.72	Pass	Peak	8	2319.000	-61.39	-41.20	20.19	Pass	AVG
3	2327.300	-54.25	-21.20	33.05	Pass	Peak	9	2327.300	-61.20	-41.20	20.00	Pass	AVG
4	2356.300	-53.88	-21.20	32.68	Pass	Peak	10	2356.300	-60.81	-41.20	19.61	Pass	AVG
5	2365.000	-54.29	-21.20	33.09	Pass	Peak	11	2365.000	-61.32	-41.20	20.12	Pass	AVG
6	2378.500	-53.00	-21.20	31.80	Pass	Peak	12	2378.500	-60.55	-41.20	19.35	Pass	AVG

1M_HCH_2480MHz_Ant2_NTNV



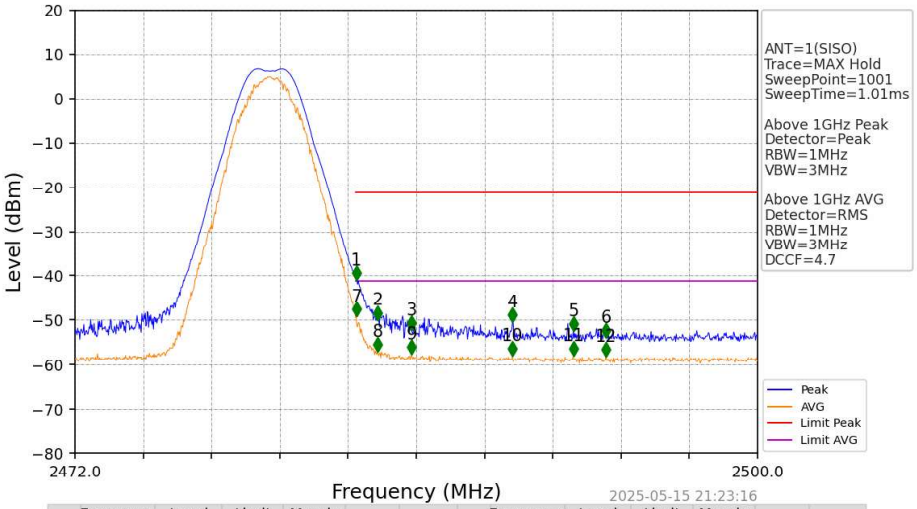
No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2483.508	-49.03	-21.20	27.83	Pass	Peak	7	2483.508	-59.40	-41.20	18.20	Pass	AVG
2	2484.488	-49.88	-21.20	28.68	Pass	Peak	8	2484.488	-59.55	-41.20	18.35	Pass	AVG
3	2485.748	-53.33	-21.20	32.13	Pass	Peak	9	2485.748	-60.10	-41.20	18.90	Pass	AVG
4	2486.840	-52.94	-21.20	31.74	Pass	Peak	10	2486.840	-60.25	-41.20	19.05	Pass	AVG
5	2488.604	-52.85	-21.20	31.65	Pass	Peak	11	2488.604	-60.32	-41.20	19.12	Pass	AVG
6	2494.232	-53.58	-21.20	32.38	Pass	Peak	12	2494.232	-60.38	-41.20	19.18	Pass	AVG

2M_LCH_2402MHz_Ant2_NTNV



No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2313.800	-53.96	-21.20	32.76	Pass	Peak	7	2313.800	-58.66	-41.20	17.46	Pass	AVG
2	2318.500	-55.18	-21.20	33.98	Pass	Peak	8	2318.500	-58.84	-41.20	17.64	Pass	AVG
3	2324.400	-55.31	-21.20	34.11	Pass	Peak	9	2324.400	-58.95	-41.20	17.75	Pass	AVG
4	2330.100	-55.46	-21.20	34.26	Pass	Peak	10	2330.100	-58.47	-41.20	17.27	Pass	AVG
5	2352.800	-54.79	-21.20	33.59	Pass	Peak	11	2352.800	-58.86	-41.20	17.66	Pass	AVG
6	2356.500	-53.52	-21.20	32.32	Pass	Peak	12	2356.500	-58.83	-41.20	17.63	Pass	AVG

2M_HCH_2480MHz_Ant2_NTNV



No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark	No	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Status	Remark
1	2483.536	-40.99	-21.20	19.79	Pass	Peak	7	2483.536	-49.12	-41.20	7.92	Pass	AVG
2	2484.404	-49.98	-21.20	28.78	Pass	Peak	8	2484.404	-56.92	-41.20	15.72	Pass	AVG
3	2485.804	-52.25	-21.20	31.05	Pass	Peak	9	2485.804	-57.46	-41.20	16.26	Pass	AVG
4	2489.948	-50.39	-21.20	29.19	Pass	Peak	10	2489.948	-57.94	-41.20	16.74	Pass	AVG
5	2492.440	-52.46	-21.20	31.26	Pass	Peak	11	2492.440	-57.97	-41.20	16.77	Pass	AVG
6	2493.784	-53.84	-21.20	32.64	Pass	Peak	12	2493.784	-58.03	-41.20	16.83	Pass	AVG

9 Antenna Requirement

9.1 *Result*

Test Description	Test Specification		Test Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.203	RSS-GEN S8.3	Compliant

9.2 *Requirement*

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.3 *Conclusion*

The Device utilizes an internal PCB antenna that is not accessible and cannot be disconnected. This meets the requirements of the standard.

10 Measurement Uncertainty

The measurement uncertainty figures are be calculated in accordance with TR 100 028-1 [2] and correspond to an expansion factor (coverage factor) k = 2 (which provide confidence levels of 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

	Expanded Uncertainty for Normal k factor equal to 2	
Parameter	Required	Laboratory Actual
Radio Frequency	±1 x 10-5	±9.8 x 10-8
total RF power, conducted	±1.5 dB	±1.2 dB
RF power density, conducted	±3 dB	±0.7 dB
spurious emissions, conducted	±3 dB	±2.1 dB
all emissions, radiated	±6 dB	±4.8 dB
temperature	±1°C	±0.5°C
humidity	±5 %	±3.5%
DC and low frequency voltages	±3 %	±0.4%

11 Revision History

Revision Level	Description of changes	Revision Date
DRAFT	Draft Release	14 January 2025
DRAFT 1	Updated sections to include second antenna data. Updated Equipment under test description.	14 May 2025
Draft 2	Updated Data for Antenna Chain 2 after BLE update	19 May 2025
0	Initial Release	28 May 2025
1	Corrected Standard date for ANSI C63.4:2013 to 2020.	29 May 2025
2	Updated test equipment cal dates used March 2025.Changed standard version to most recent for 558074 D01 15.247 Meas Guidance v05r02	06 June 2025
3	Added EIRP data to Max output section in section 4.5	20 June 2025
4	Additional measurement points added for ISED requirement	18 July 2025