10. RADIATED TEST RESULTS

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, we measure the radiated emissions directly from the EUT and convert the measured field strength or received power to EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

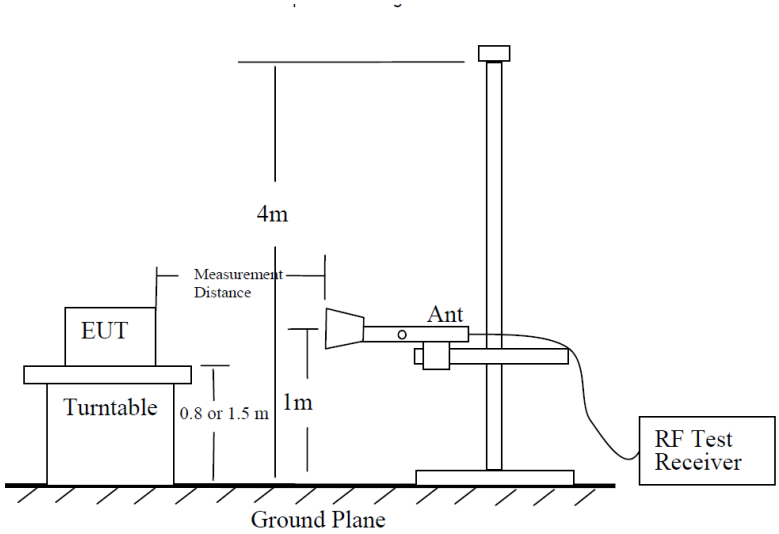


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

Radiated Power Measurement Calculation According to ANSI C63.26-2015

a) E (dBµV/m) = Measured amplitude level (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m).
b) E (dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).
c) E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.
d) EIRP (dBm) = E (dBµV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

So, from d)

The measuring distance is usually at 3m, then 20*Log (3) = 9.5424

Then, EIRP (dBm) = E (dBµV/m) + 9.5424 − 104.8 = E (dBµV/m) – 95.2576

10.1. FIELD STRENGTH OF SPURIOUS RADIATION – ANT1

LIMITS

FCC §25.202
(f) Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02r02

For each out of band emissions measurement:
- Set display line at -13 dBm (the limit of 43 + 10Log(P))
- Set RWB >= 4kHz and VBW >= 3 x RBW with peak detector for all measurements. The limit is an average limit so any emissions that exceed the limit using the peak detector are measured using rms detection with an averaging time of 2ms.

RESULTS

Plots are provided for the mid channel. Tabular data for all channels is presented. For SCS3.75kHz and SCS15kHz radiated harmonics testing1SC0 was chosen as the worst mode to test.

10.1.1. Band 23 ANT 1 (Above 1GHz) – QPSK 3.75kHz 1SC0

Low Channel: QPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4000.5	45.87	Pk	33.4	-95.2	0	-45.67	-61.6	-13	-48.6	0-360	149	H
2	* 4001	44.34	Pk	33.4	-95.2	0	-45.68	-63.14	-13	-50.14	0-360	149	V
3	6000.5	44.52	Pk	35.7	-95.2	0	-44.74	-59.72	-13	-46.72	0-360	149	H
4	6000.5	45.59	Pk	35.7	-95.2	0	-44.74	-58.65	-13	-45.65	0-360	149	V
5	8000.5	45.87	Pk	35.8	-95.2	0	-43	-56.53	-13	-43.53	0-360	149	H
6	8000.5	44.98	Pk	35.8	-95.2	0	-43	-57.42	-13	-44.42	0-360	149	V

Pk - Peak detector
* - Noise Floor

Middle Channel: QPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4021	45.03	Pk	33.4	-95.2	0	-45.46	-62.23	-13	-49.23	0-360	149	H
5	* 8040.5	43.74	Pk	35.8	-95.2	0	-43.12	-58.78	-13	-45.78	0-360	149	H
2	* 4021	46.48	Pk	33.4	-95.2	0	-45.46	-60.78	-13	-47.78	0-360	149	V
6	* 8040.5	43.82	Pk	35.8	-95.2	0	-43.12	-58.7	-13	-45.7	0-360	149	V
3	6030	44.54	Pk	35.8	-95.2	0	-44.53	-59.39	-13	-46.39	0-360	149	H
4	6030	44.76	Pk	35.8	-95.2	0	-44.53	-59.17	-13	-46.17	0-360	149	V

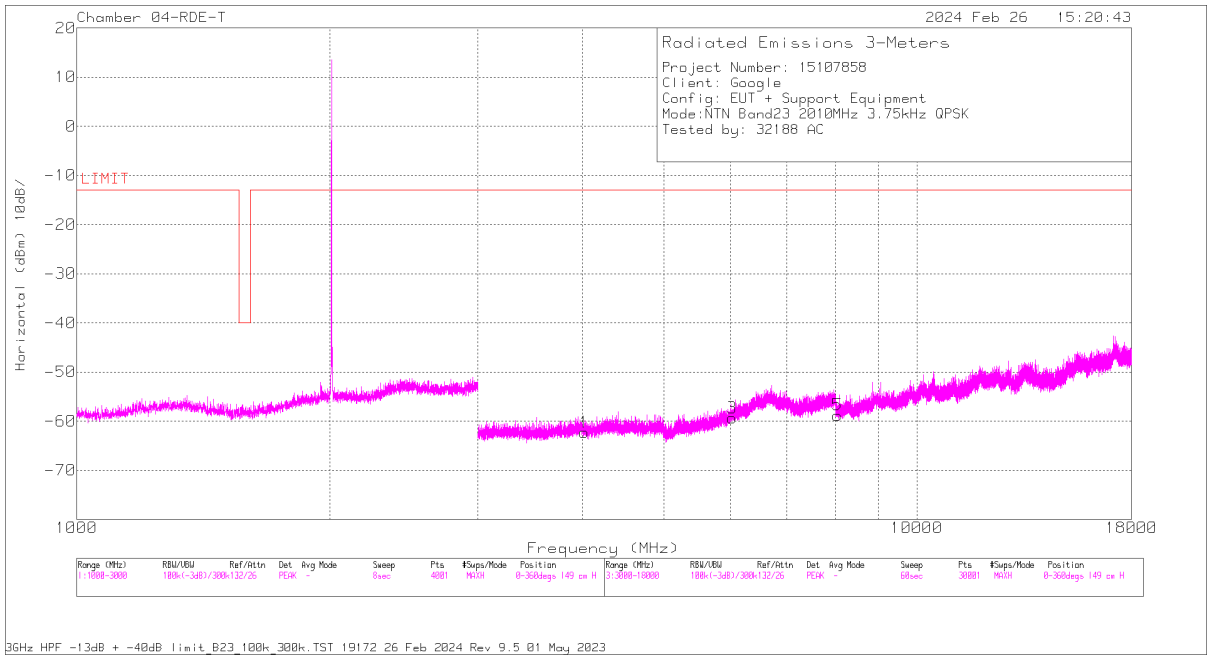
Pk - Peak detector
* - Noise Floor

High Channel: QPSK 3.75kHz 1SC0

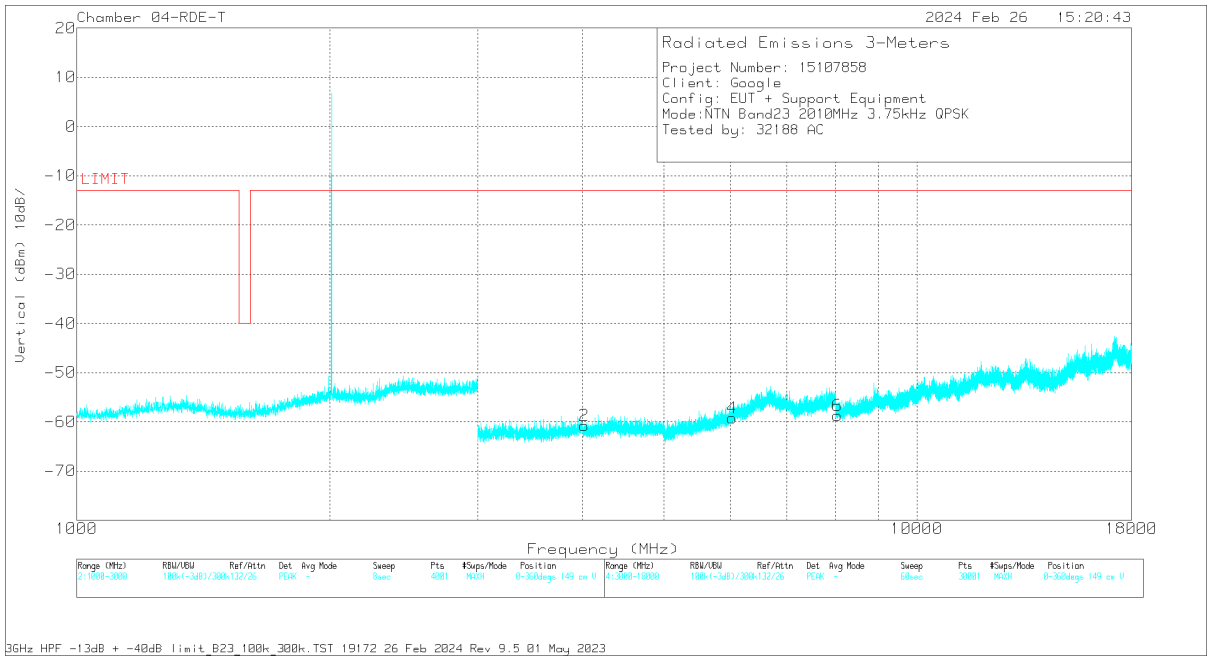
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4038	46.46	Pk	33.4	-95.2	0	-45.78	-61.12	-13	-48.12	0-360	149	H
5	* 8076.5	44.35	Pk	35.8	-95.2	0	-42.71	-57.76	-13	-44.76	0-360	149	H
2	* 4038	44.76	Pk	33.4	-95.2	0	-45.78	-62.82	-13	-49.82	0-360	149	V
6	* 8076.5	44.57	Pk	35.8	-95.2	0	-42.71	-57.54	-13	-44.54	0-360	149	V
3	6058	44.91	Pk	35.9	-95.2	0	-44.33	-58.72	-13	-45.72	0-360	149	H
4	6058	44.72	Pk	35.9	-95.2	0	-44.33	-58.91	-13	-45.91	0-360	149	V

Pk - Peak detector
* - Noise Floor

Middle Channel: QPSK 3.75kHz 1SC0



HORIZONTAL



VERTICAL

10.1.2. Band 23 ANT 1 (Above 1GHz) – QPSK 15kHz 1SC0

Low Channel: QPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4001	44.2	Pk	33.4	-95.2	0	-45.68	-63.28	-13	-50.28	0-360	149	H
2	* 4001	44.56	Pk	33.4	-95.2	0	-45.68	-62.92	-13	-49.92	0-360	149	V
3	6000	45.09	Pk	35.7	-95.2	0	-44.75	-59.16	-13	-46.16	0-360	149	H
4	6000	46.63	Pk	35.7	-95.2	0	-44.75	-57.62	-13	-44.62	0-360	149	V
5	8000.5	45.46	Pk	35.8	-95.2	0	-43	-56.94	-13	-43.94	0-360	149	H
6	8000.5	43.86	Pk	35.8	-95.2	0	-43	-58.54	-13	-45.54	0-360	149	V

Pk - Peak detector
* - Noise Floor

Middle Channel: QPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4020	45.85	Pk	33.4	-95.2	0	-45.38	-61.33	-13	-48.33	0-360	149	H
5	* 8040.5	43.5	Pk	35.8	-95.2	0	-43.12	-59.02	-13	-46.02	0-360	149	H
2	* 4020	46.09	Pk	33.4	-95.2	0	-45.38	-61.09	-13	-48.09	0-360	149	V
6	* 8040.5	44.31	Pk	35.8	-95.2	0	-43.12	-58.21	-13	-45.21	0-360	149	V
3	6031	44.42	Pk	35.8	-95.2	0	-44.54	-59.52	-13	-46.52	0-360	149	H
4	6031	46.26	Pk	35.8	-95.2	0	-44.54	-57.68	-13	-44.68	0-360	149	V

Pk - Peak detector
* - Noise Floor

High Channel: QPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4038	46.75	Pk	33.4	-95.2	0	-45.78	-60.83	-13	-47.83	0-360	149	H
5	* 8076	44.08	Pk	35.8	-95.2	0	-42.7	-58.02	-13	-45.02	0-360	149	H
2	* 4038	45.51	Pk	33.4	-95.2	0	-45.78	-62.07	-13	-49.07	0-360	149	V
6	* 8076	43.63	Pk	35.8	-95.2	0	-42.7	-58.47	-13	-45.47	0-360	149	V
3	6057.5	44.95	Pk	35.9	-95.2	0	-44.36	-58.71	-13	-45.71	0-360	149	H
4	6057.5	44.96	Pk	35.9	-95.2	0	-44.36	-58.7	-13	-45.7	0-360	149	V

Pk - Peak detector
* - Noise Floor

10.1.3. Band 23 ANT 1 (Above 1GHz) - BPSK 3.75kHz 1SC0

Low Channel: BPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4012.5	48.19	Pk	33.4	-95.2	0	-45.47	-59.08	-13	-46.08	0-360	149	H
4	* 3991.5	48.44	Pk	33.4	-95.2	0	-45.41	-58.77	-13	-45.77	0-360	149	V
5	6020	46.77	Pk	35.7	-95.2	0	-44.51	-57.24	-13	-44.24	0-360	149	V
2	6028.5	47.65	Pk	35.8	-95.2	0	-44.53	-56.28	-13	-43.28	0-360	149	H
6	7960.5	49.68	Pk	35.8	-95.2	0	-43.4	-53.12	-13	-40.12	0-360	149	V
3	7998.5	49.92	Pk	35.8	-95.2	0	-43.1	-52.58	-13	-39.58	0-360	149	H

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4015.5	47.48	Pk	33.4	-95.2	0	-45.36	-59.68	-13	-46.68	0-360	149	H
4	* 4025	48.16	Pk	33.4	-95.2	0	-45.83	-59.47	-13	-46.47	0-360	149	V
3	* 8036	46.7	Pk	35.8	-95.2	0	-43.03	-55.73	-13	-42.73	0-360	149	H
6	* 8045	46.44	Pk	35.8	-95.2	0	-43.11	-56.07	-13	-43.07	0-360	149	V
2	6051.5	47.18	Pk	35.9	-95.2	0	-44.35	-56.47	-13	-43.47	0-360	149	H
5	6079.5	47.01	Pk	36	-95.2	0	-44.28	-56.47	-13	-43.47	0-360	149	V

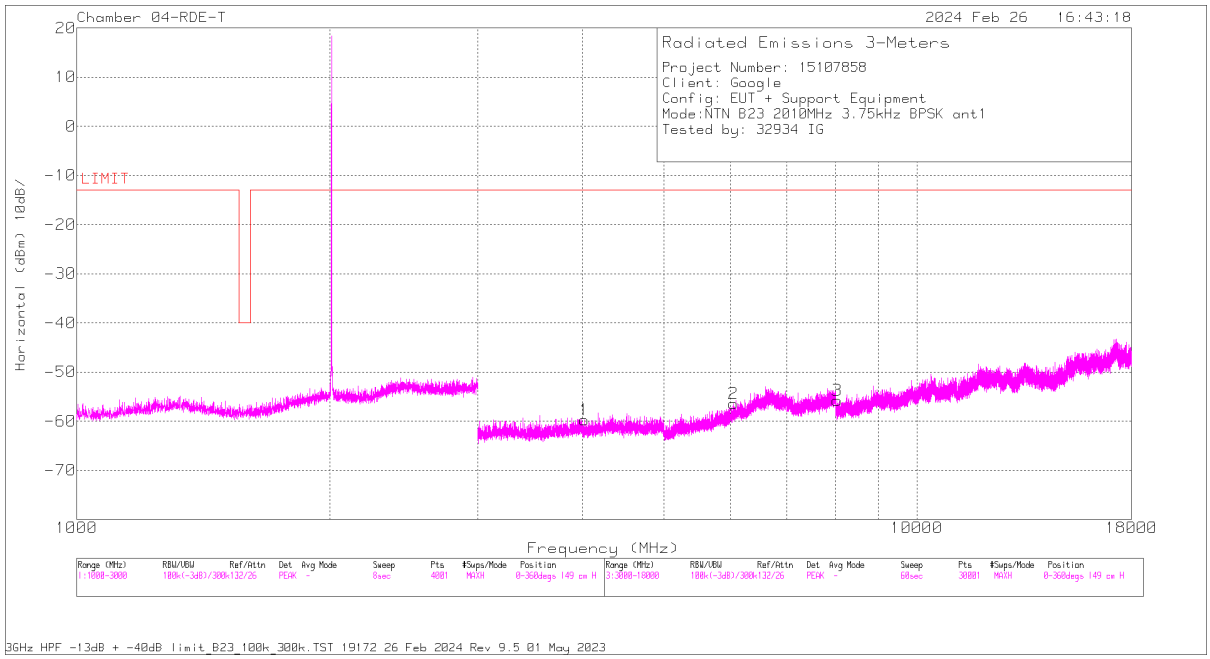
Pk - Peak detector
* - Noise Floor

High Channel: BPSK 3.75kHz 1SC0

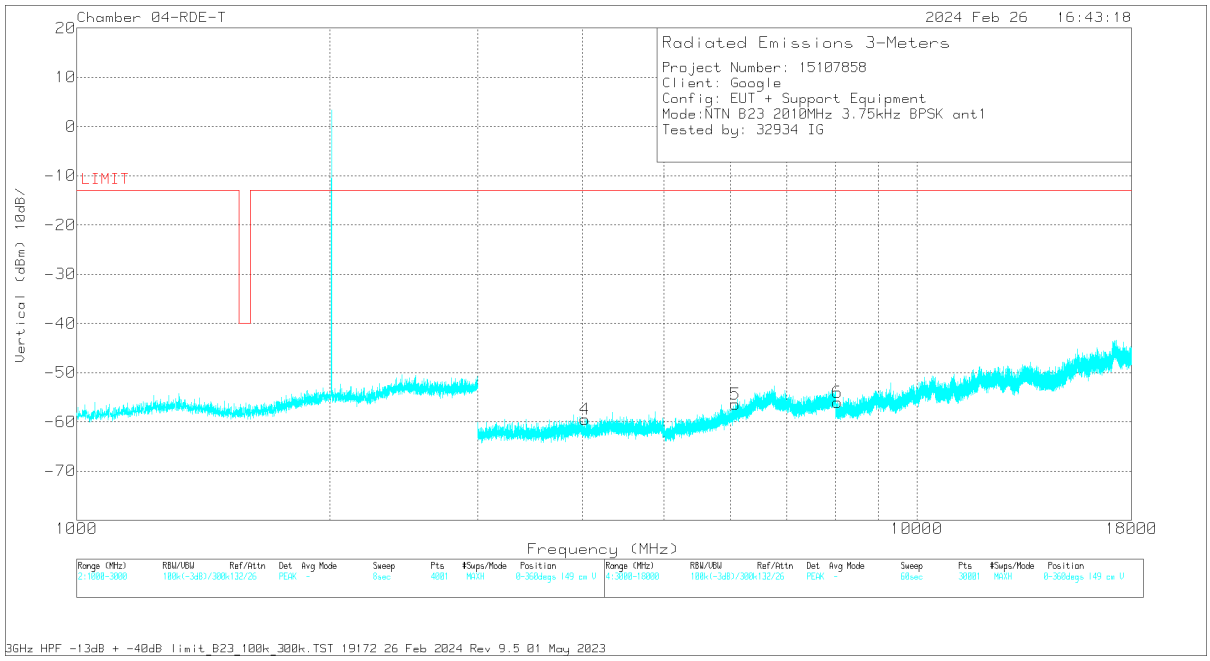
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4051.5	47.8	Pk	33.4	-95.2	0	-45.7	-59.7	-13	-46.7	0-360	149	H
3	* 8054	46.26	Pk	35.8	-95.2	0	-43.07	-56.21	-13	-43.21	0-360	149	H
4	* 4058	48.23	Pk	33.4	-95.2	0	-45.84	-59.41	-13	-46.41	0-360	149	V
6	* 8066.5	46.94	Pk	35.8	-95.2	0	-42.9	-55.36	-13	-42.36	0-360	149	V
5	6053	47.07	Pk	35.9	-95.2	0	-44.28	-56.51	-13	-43.51	0-360	149	V
2	6080.5	48.16	Pk	36	-95.2	0	-44.32	-55.36	-13	-42.36	0-360	149	H

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 3.75kHz 1SC0



HORIZONTAL



VERTICAL

10.1.4. Band 23 ANT 1 (Above 1GHz) - BPSK 15kHz 1SC0

Low Channel: BPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3989.5	47.75	Pk	33.4	-95.2	0	-45.27	-59.32	-13	-46.32	0-360	149	H
4	* 3997	47.8	Pk	33.4	-95.2	0	-45.6	-59.6	-13	-46.6	0-360	149	V
2	5979	46.67	Pk	35.6	-95.2	0	-44.77	-57.7	-13	-44.7	0-360	149	H
5	6000	47.75	Pk	35.7	-95.2	0	-44.75	-56.5	-13	-43.5	0-360	149	V
6	7989.5	49.23	Pk	35.8	-95.2	0	-43.3	-53.47	-13	-40.47	0-360	149	V
3	7999	49.2	Pk	35.8	-95.2	0	-43.11	-53.31	-13	-40.31	0-360	149	H

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 4006	47.39	Pk	33.4	-95.2	0	-45.59	-60	-13	-47	0-360	149	V
1	* 4021	47.95	Pk	33.4	-95.2	0	-45.46	-59.31	-13	-46.31	0-360	149	H
6	* 8038.5	46.83	Pk	35.8	-95.2	0	-43.13	-55.7	-13	-42.7	0-360	149	V
3	* 8051	47.23	Pk	35.8	-95.2	0	-43.19	-55.36	-13	-42.36	0-360	149	H
5	6001	47.21	Pk	35.7	-95.2	0	-44.73	-57.02	-13	-44.02	0-360	149	V
2	6003.5	47.15	Pk	35.7	-95.2	0	-44.59	-56.94	-13	-43.94	0-360	149	H

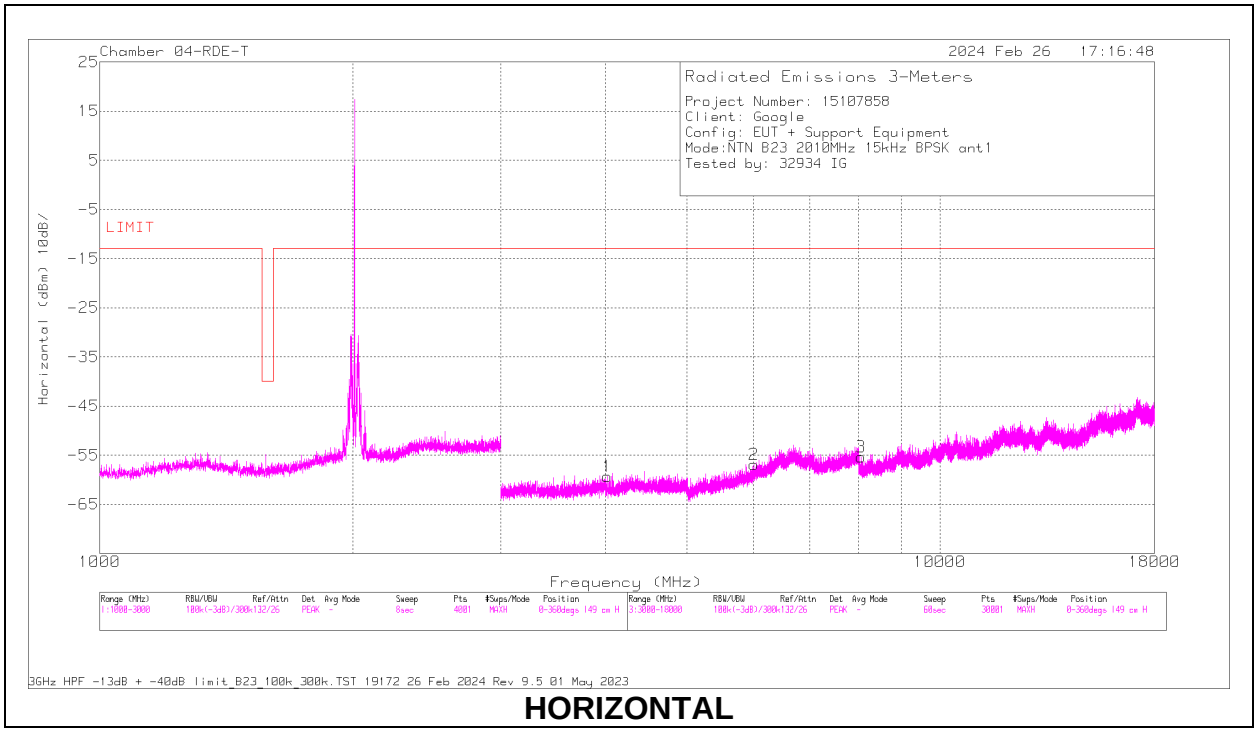
Pk - Peak detector
* - Noise Floor

High Channel: BPSK 15kHz 1SC0

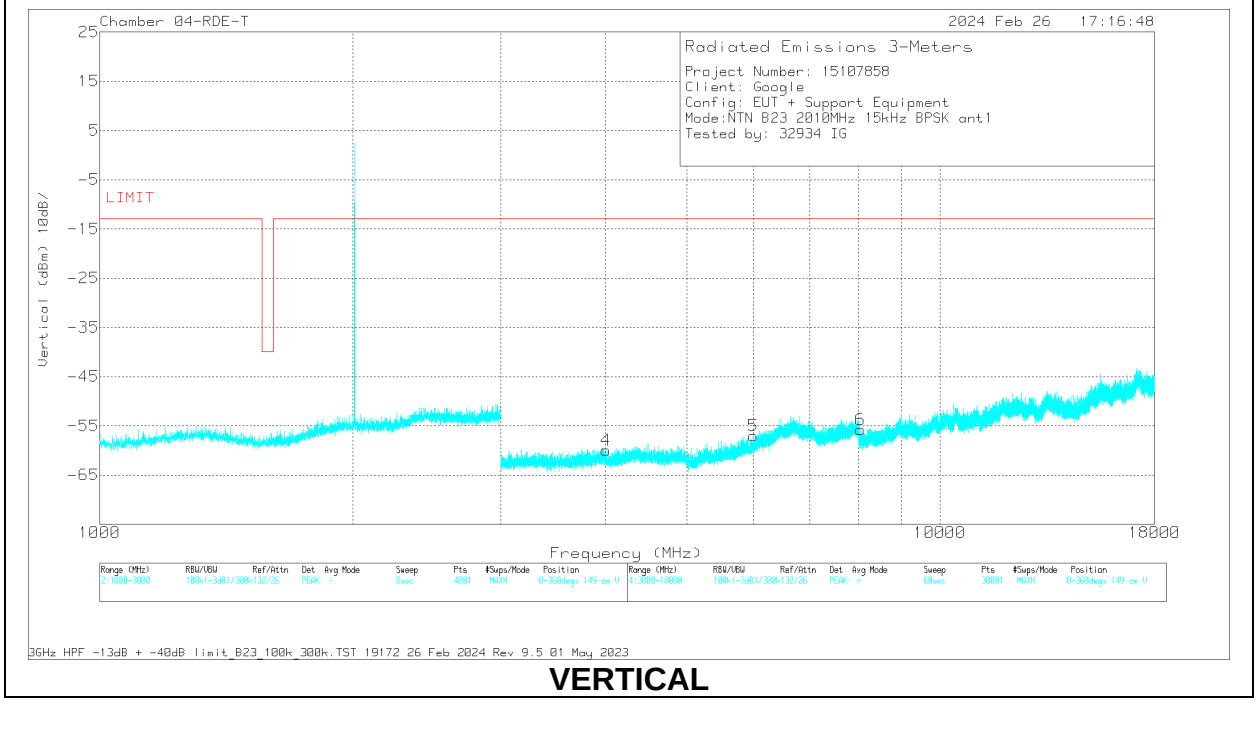
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4022.5	48.32	Pk	33.4	-95.2	0	-45.67	-59.15	-13	-46.15	0-360	149	H
3	* 8067.5	46.4	Pk	35.8	-95.2	0	-42.9	-55.9	-13	-42.9	0-360	149	H
4	* 4052	47.64	Pk	33.4	-95.2	0	-45.71	-59.87	-13	-46.87	0-360	149	V
6	* 8045.5	46.35	Pk	35.8	-95.2	0	-43.07	-56.12	-13	-43.12	0-360	149	V
5	6052.5	46.63	Pk	35.9	-95.2	0	-44.32	-56.99	-13	-43.99	0-360	149	V
2	6056.5	47.56	Pk	35.9	-95.2	0	-44.39	-56.13	-13	-43.13	0-360	149	H

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 15kHz 1SC0

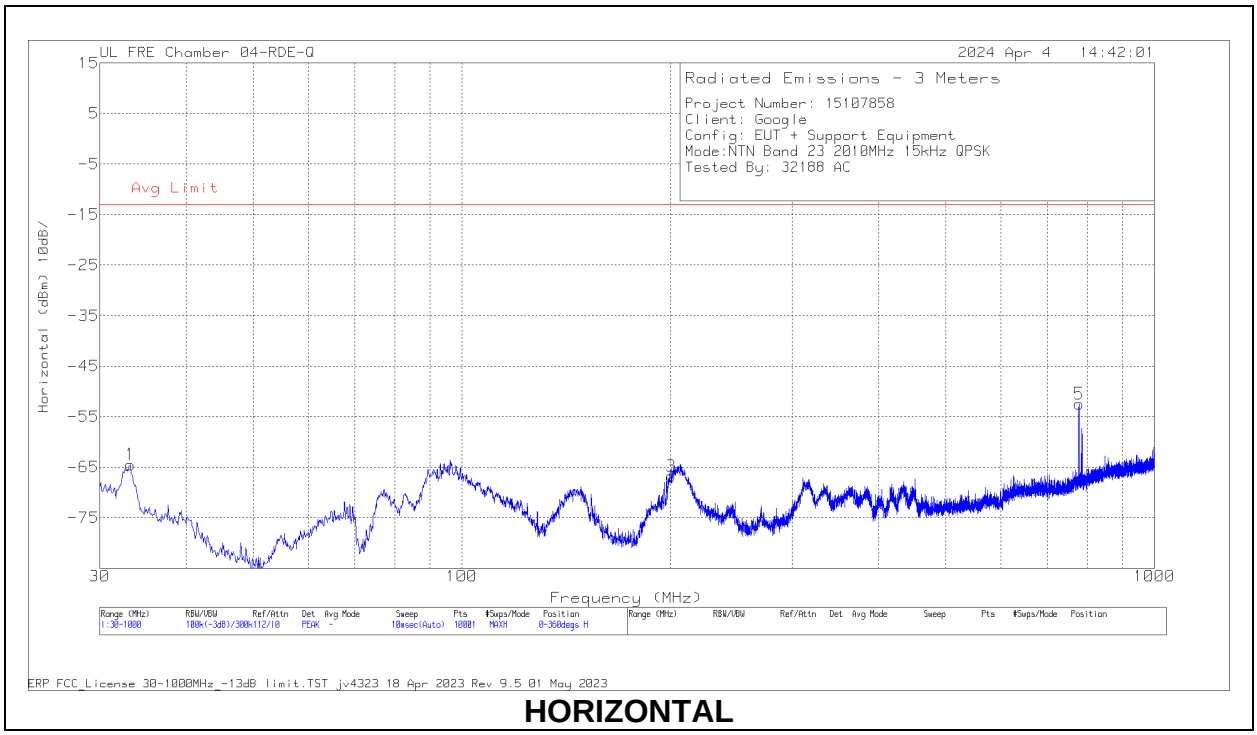


HORIZONTAL

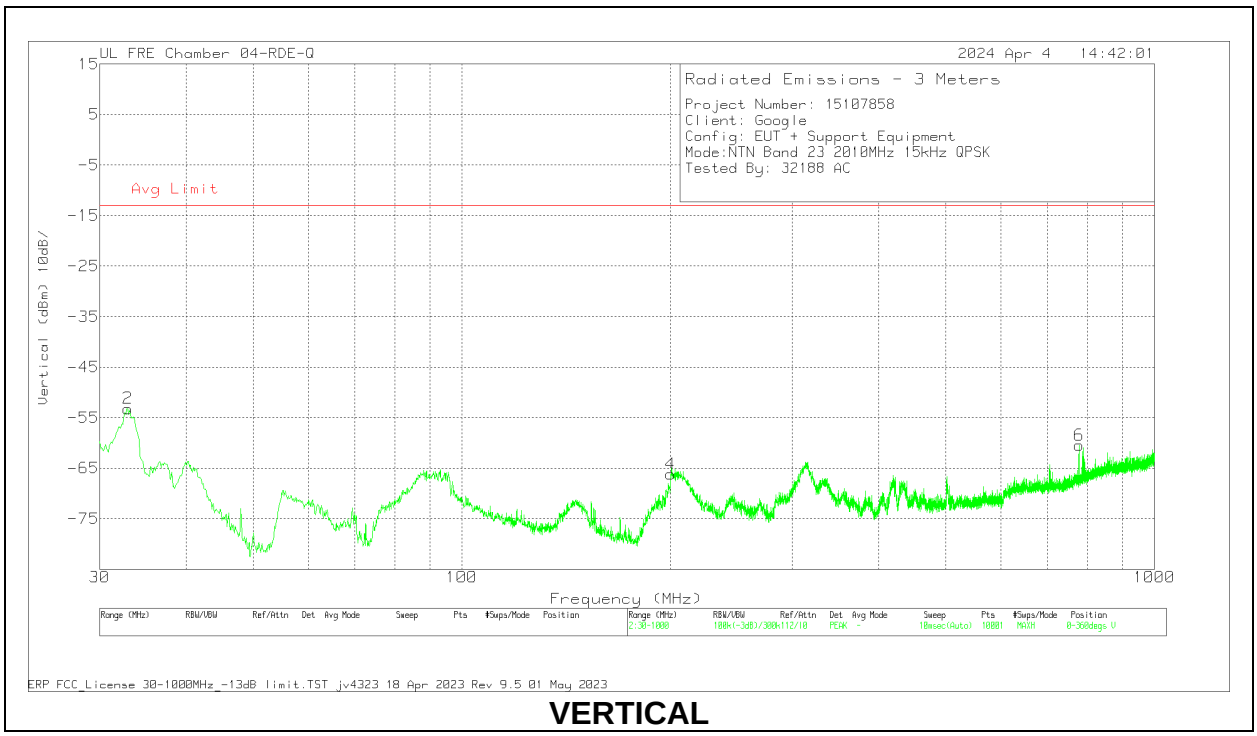


VERTICAL

10.1.5. Band 23 ANT 1 (Below 1GHz)



HORIZONTAL



VERTICAL

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	85151 ACF (dB)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	32.91	49.11	Pk	25.2	-32.3	-95.2	-53.19	-13	-40.19	0-360	99	V
1	33.201	38.11	Pk	24.9	-32.3	-95.2	-64.49	-13	-51.49	0-360	200	H
4	200.332	41.49	Pk	18.4	-30.9	-95.2	-66.21	-13	-53.21	0-360	99	V
3	200.623	41.01	Pk	18.3	-30.9	-95.2	-66.79	-13	-53.79	0-360	99	H
5	777.967	45.05	Pk	26.8	-29.1	-95.2	-52.45	-13	-39.45	0-360	200	H
6	778.84	36.59	Pk	26.9	-28.8	-95.2	-60.51	-13	-47.51	0-360	99	V

Pk - Peak detector

10.1.6. Band 255 ANT 5 (Above 1GHz) - QPSK 3.75kHz 1SC0

Low Channel: QPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4880.5	45.84	Pk	34	-95.2	-46.64	-62	-13	-49	0-360	151	H
4	* 4880.5	46.07	Pk	34	-95.2	-46.64	-61.77	-13	-48.77	0-360	151	V
1	3253.5	46.76	Pk	32.8	-95.2	-44.89	-60.53	-13	-47.53	0-360	151	H
2	3253.5	44.84	Pk	32.8	-95.2	-44.89	-62.45	-13	-49.45	0-360	151	V
5	6507	46.74	Pk	36.6	-95.2	-44.33	-56.19	-13	-43.19	0-360	151	H
6	6507	45.61	Pk	36.6	-95.2	-44.33	-57.32	-13	-44.32	0-360	151	V

Pk - Peak detector
* - Noise Floor

Middle Channel: QPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4929.5	45.92	Pk	34	-95.2	-46.64	-61.92	-13	-48.92	0-360	151	H
4	* 4929.5	46.78	Pk	34	-95.2	-46.64	-61.06	-13	-48.06	0-360	151	V
1	3286.5	46.95	Pk	32.8	-95.2	-44.94	-60.39	-13	-47.39	0-360	151	H
2	3286.5	44.57	Pk	32.8	-95.2	-44.94	-62.77	-13	-49.77	0-360	151	V
5	6573.5	46.15	Pk	36.8	-95.2	-44.31	-56.56	-13	-43.56	0-360	151	H
6	6573.5	46	Pk	36.8	-95.2	-44.31	-56.71	-13	-43.71	0-360	151	V

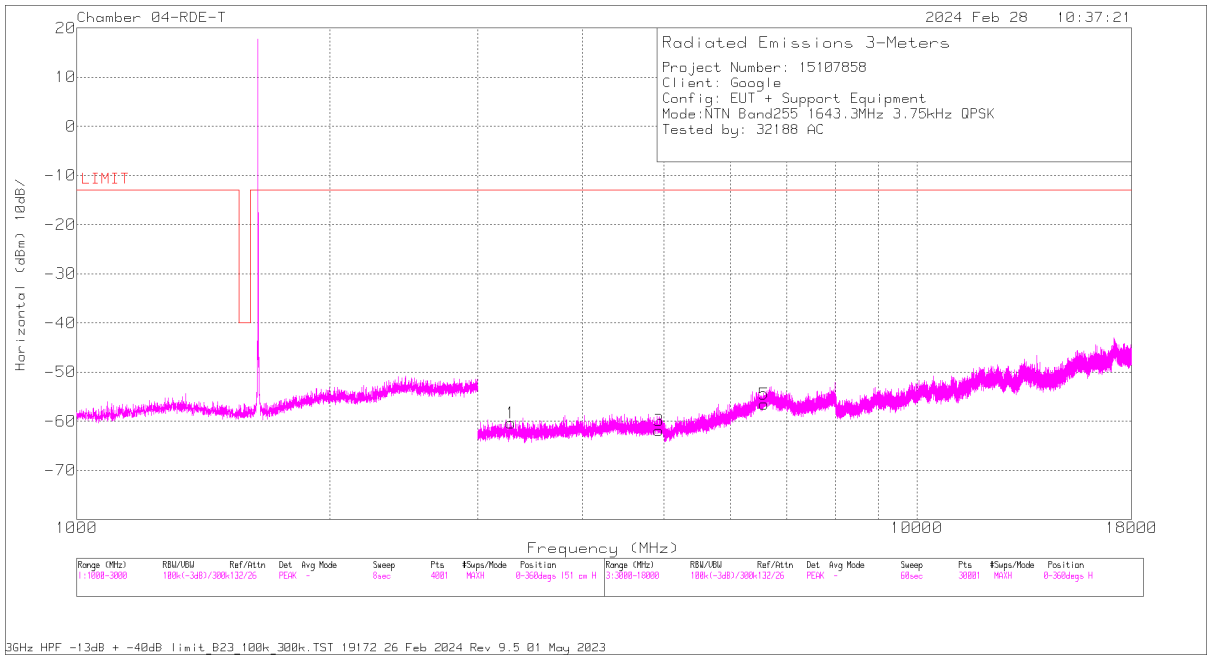
Pk - Peak detector
* - Noise Floor

High Channel: QPSK 3.75kHz 1SC0

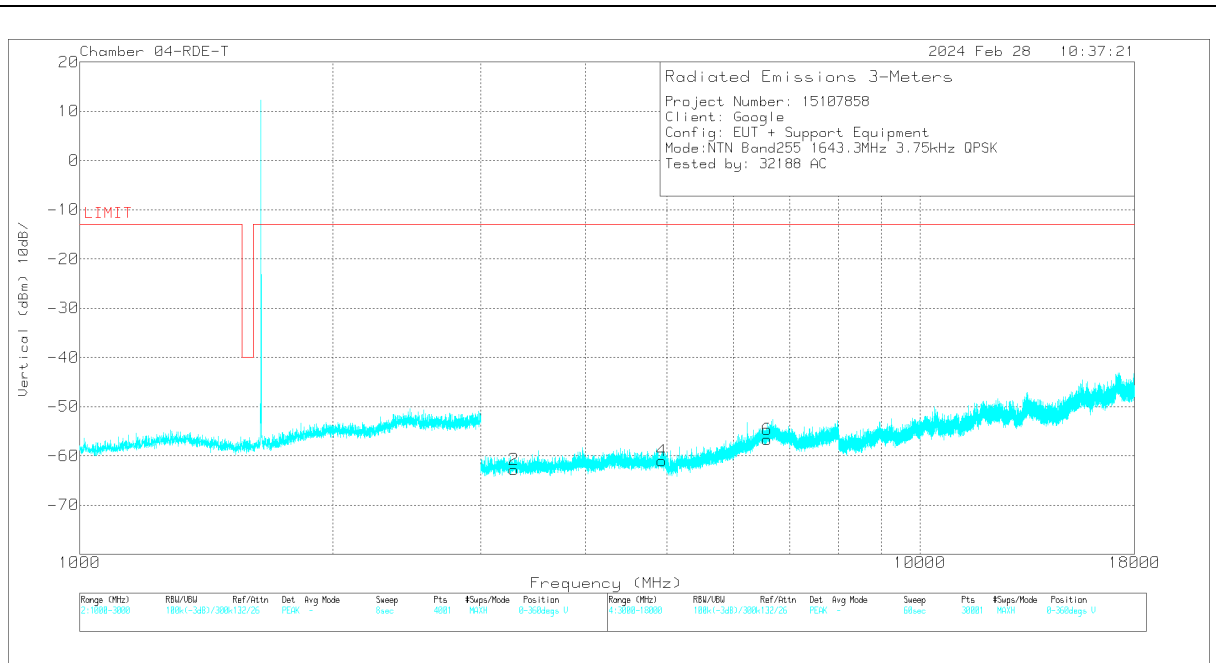
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4979	46.09	Pk	34.1	-95.2	-46.69	-61.7	-13	-48.7	0-360	151	H
4	* 4979	47.96	Pk	34.1	-95.2	-46.69	-59.83	-13	-46.83	0-360	151	V
2	3319.5	45.62	Pk	32.8	-95.2	-45.05	-61.83	-13	-48.83	0-360	151	V
1	3320	46.1	Pk	32.8	-95.2	-45.1	-61.4	-13	-48.4	0-360	151	H
5	6639.5	45.66	Pk	36.9	-95.2	-43.58	-56.22	-13	-43.22	0-360	151	H
6	6639.5	47.17	Pk	36.9	-95.2	-43.58	-54.71	-13	-41.71	0-360	151	V

Pk - Peak detector
* - Noise Floor

Middle Channel: QPSK 3.75kHz 1SC0



HORIZONTAL



VERTICAL

10.1.7. Band 255 ANT 5 (Above 1GHz) – QPSK 15kHz 1SC0

Low Channel: QPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4880.5	46.28	Pk	34	-95.2	-46.64	-61.56	-13	-48.56	0-360	151	H
4	* 4880.5	45.51	Pk	34	-95.2	-46.64	-62.33	-13	-49.33	0-360	151	V
1	3254	46.39	Pk	32.8	-95.2	-44.86	-60.87	-13	-47.87	0-360	151	H
2	3254	45.15	Pk	32.8	-95.2	-44.86	-62.11	-13	-49.11	0-360	151	V
5	6507	47.44	Pk	36.6	-95.2	-44.33	-55.49	-13	-42.49	0-360	151	H
6	6507	46.44	Pk	36.6	-95.2	-44.33	-56.49	-13	-43.49	0-360	151	V

Pk - Peak detector
* - Noise Floor

Middle Channel: QPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4930	45.3	Pk	34	-95.2	-46.63	-62.53	-13	-49.53	0-360	151	H
4	* 4930	46.81	Pk	34	-95.2	-46.63	-61.02	-13	-48.02	0-360	151	V
2	3286.5	45.16	Pk	32.8	-95.2	-44.94	-62.18	-13	-49.18	0-360	151	V
1	3287	45.95	Pk	32.8	-95.2	-45.02	-61.47	-13	-48.47	0-360	151	H
5	6574	46.59	Pk	36.8	-95.2	-44.36	-56.17	-13	-43.17	0-360	151	H
6	6574	46.83	Pk	36.8	-95.2	-44.36	-55.93	-13	-42.93	0-360	151	V

Pk - Peak detector
* - Noise Floor

High Channel: QPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4979.5	47.74	Pk	34.1	-95.2	-46.65	-60.01	-13	-47.01	0-360	151	H
4	* 4979.5	46.99	Pk	34.1	-95.2	-46.65	-60.76	-13	-47.76	0-360	151	V
1	3319	45.24	Pk	32.8	-95.2	-45	-62.16	-13	-49.16	0-360	151	H
2	3319	45.02	Pk	32.8	-95.2	-45	-62.38	-13	-49.38	0-360	151	V
5	6639.5	47.32	Pk	36.9	-95.2	-43.58	-54.56	-13	-41.56	0-360	151	H
6	6639.5	46.16	Pk	36.9	-95.2	-43.58	-55.72	-13	-42.72	0-360	151	V

Pk - Peak detector
* - Noise Floor

10.1.8. Band 255 ANT 5 (Above 1GHz) - BPSK 3.75kHz 1SC0

Low Channel: BPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4880.5	46.29	Pk	34	-95.2	-46.64	-61.55	-13	-48.55	0-360	151	H
4	* 4880.5	46.43	Pk	34	-95.2	-46.64	-61.41	-13	-48.41	0-360	151	V
1	3253.5	44.57	Pk	32.8	-95.2	-44.89	-62.72	-13	-49.72	0-360	151	H
2	3253.5	44.03	Pk	32.8	-95.2	-44.89	-63.26	-13	-50.26	0-360	151	V
5	6507	48.55	Pk	36.6	-95.2	-44.33	-54.38	-13	-41.38	0-360	151	H
6	6507	49.11	Pk	36.6	-95.2	-44.33	-53.82	-13	-40.82	0-360	151	V

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 3.75kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4929.5	46.26	Pk	34	-95.2	-46.64	-61.58	-13	-48.58	0-360	151	H
4	* 4929.5	46.77	Pk	34	-95.2	-46.64	-61.07	-13	-48.07	0-360	151	V
1	3286	45.72	Pk	32.8	-95.2	-44.85	-61.53	-13	-48.53	0-360	151	H
2	3286	44.72	Pk	32.8	-95.2	-44.85	-62.53	-13	-49.53	0-360	151	V
5	6574	46.42	Pk	36.8	-95.2	-44.36	-56.34	-13	-43.34	0-360	151	H
6	6574	46.57	Pk	36.8	-95.2	-44.36	-56.19	-13	-43.19	0-360	151	V

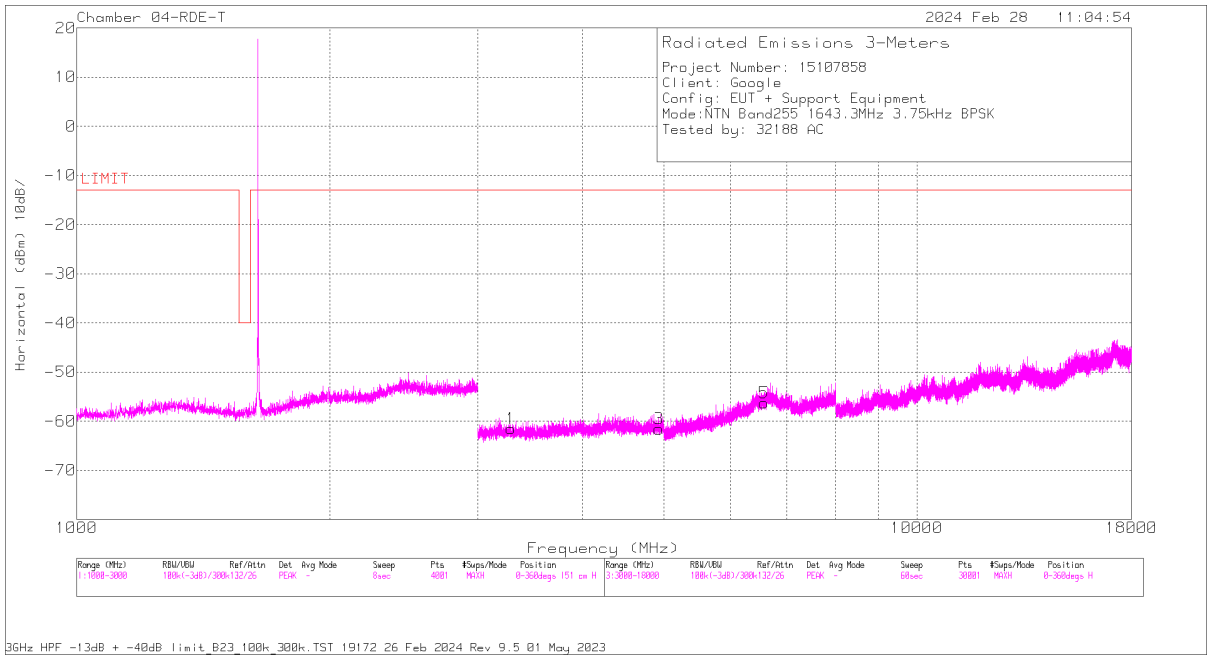
Pk - Peak detector
* - Noise Floor

High Channel: BPSK 3.75kHz 1SC0

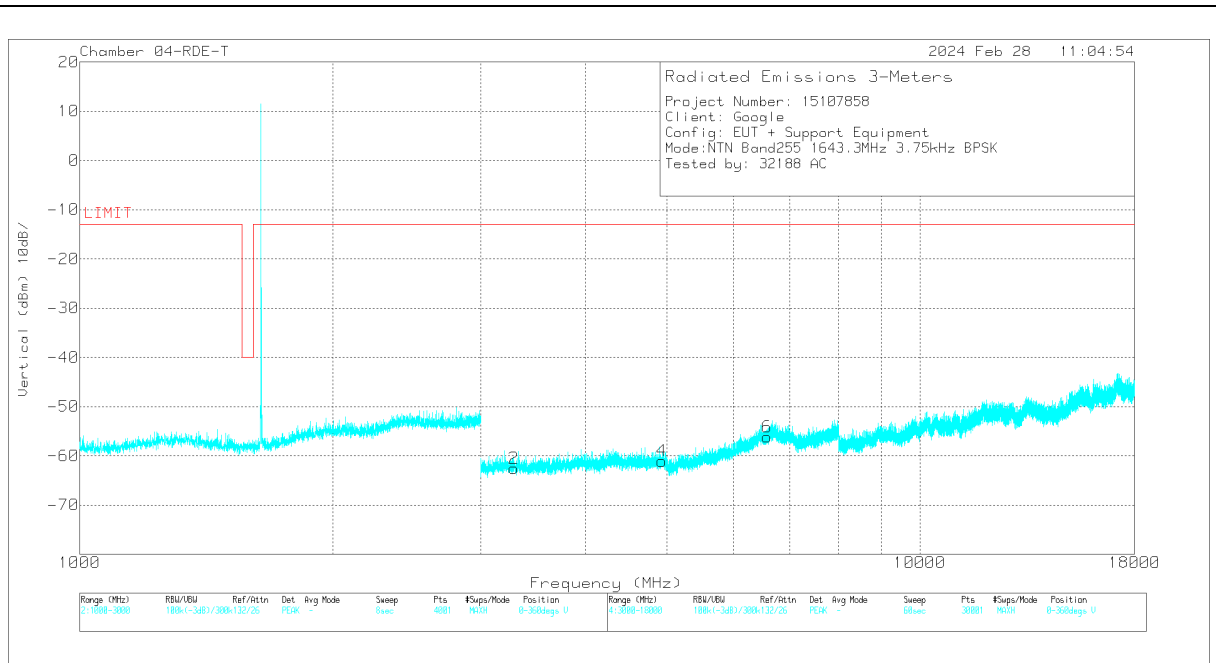
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4979.5	48.15	Pk	34.1	-95.2	-46.65	-59.6	-13	-46.6	0-360	149	H
5	* 4963	48.23	Pk	34.1	-95.2	-46.6	-59.47	-13	-46.47	0-360	149	V
4	3321	46.99	Pk	32.9	-95.2	-45.01	-60.32	-13	-47.32	0-360	149	V
1	3328	46.43	Pk	32.9	-95.2	-44.91	-60.78	-13	-47.78	0-360	149	H
3	6627	48.1	Pk	36.9	-95.2	-43.65	-53.85	-13	-40.85	0-360	149	H
6	6642.5	48.24	Pk	36.9	-95.2	-43.49	-53.55	-13	-40.55	0-360	149	V

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 3.75kHz 1SC0



HORIZONTAL



VERTICAL

10.1.9. Band 255 ANT 5 (Above 1GHz) - BPSK 15kHz 1SC0

Low Channel: BPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4880.5	46.62	Pk	34	-95.2	-46.64	-61.22	-13	-48.22	0-360	151	H
4	* 4880.5	46.21	Pk	34	-95.2	-46.64	-61.63	-13	-48.63	0-360	151	V
1	3253.5	44.42	Pk	32.8	-95.2	-44.89	-62.87	-13	-49.87	0-360	151	H
2	3253.5	44.39	Pk	32.8	-95.2	-44.89	-62.9	-13	-49.9	0-360	151	V
5	6506.5	45.68	Pk	36.6	-95.2	-44.36	-57.28	-13	-44.28	0-360	151	H
6	6506.5	46.26	Pk	36.6	-95.2	-44.36	-56.7	-13	-43.7	0-360	151	V

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 15kHz 1SC0

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4929.5	45.5	Pk	34	-95.2	-46.64	-62.34	-13	-49.34	0-360	151	H
4	* 4929.5	46.28	Pk	34	-95.2	-46.64	-61.56	-13	-48.56	0-360	151	V
1	3287	44.34	Pk	32.8	-95.2	-45.02	-63.08	-13	-50.08	0-360	151	H
2	3287	45.1	Pk	32.8	-95.2	-45.02	-62.32	-13	-49.32	0-360	151	V
5	6573.5	46.36	Pk	36.8	-95.2	-44.31	-56.35	-13	-43.35	0-360	151	H
6	6573.5	48.08	Pk	36.8	-95.2	-44.31	-54.63	-13	-41.63	0-360	151	V

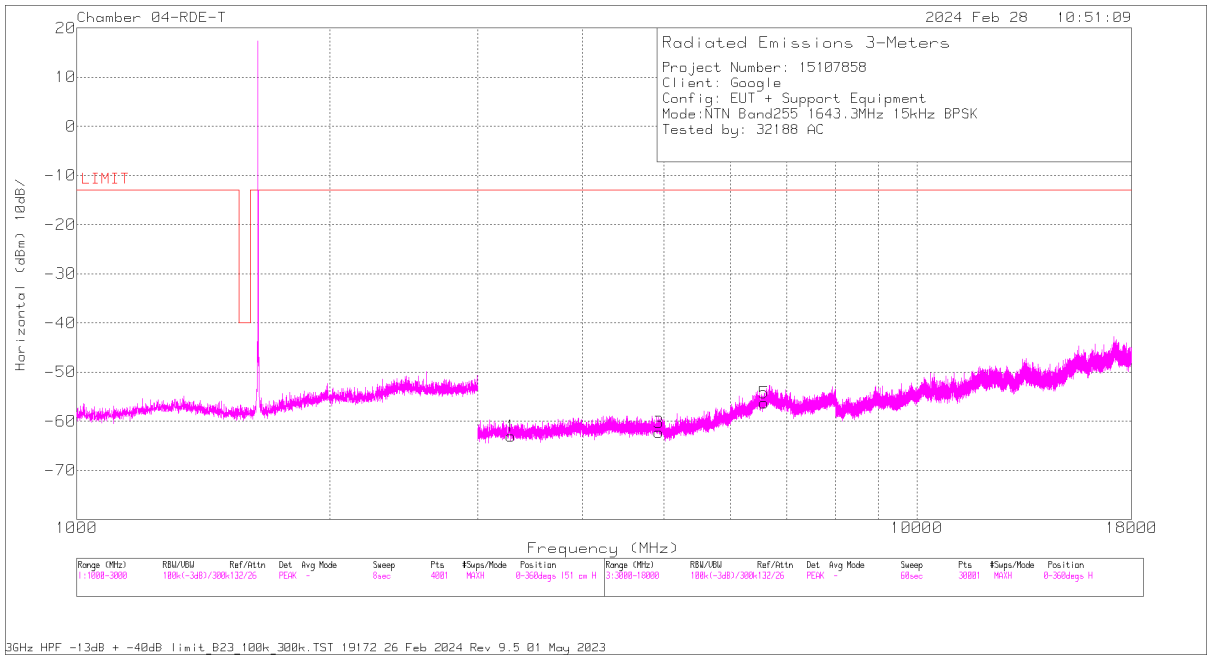
Pk - Peak detector
* - Noise Floor

High Channel: BPSK 15kHz 1SC0

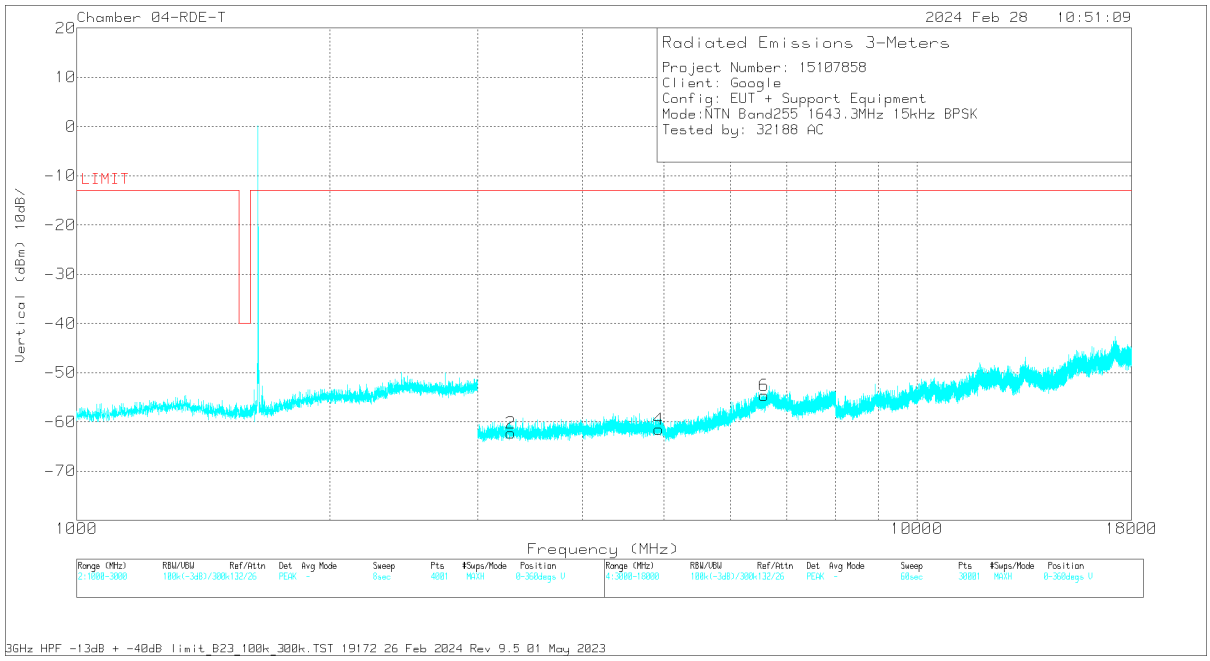
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80430 ACF (dB)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4979	46.63	Pk	34.1	-95.2	-46.69	-61.16	-13	-48.16	0-360	151	H
4	* 4979	45.76	Pk	34.1	-95.2	-46.69	-62.03	-13	-49.03	0-360	151	V
1	3319.5	44.32	Pk	32.8	-95.2	-45.05	-63.13	-13	-50.13	0-360	151	H
2	3319.5	44.75	Pk	32.8	-95.2	-45.05	-62.7	-13	-49.7	0-360	151	V
6	6638.5	46.59	Pk	36.9	-95.2	-43.54	-55.25	-13	-42.25	0-360	151	V
5	6639	46.02	Pk	36.9	-95.2	-43.54	-55.82	-13	-42.82	0-360	151	H

Pk - Peak detector
* - Noise Floor

Middle Channel: BPSK 15kHz 1SC0

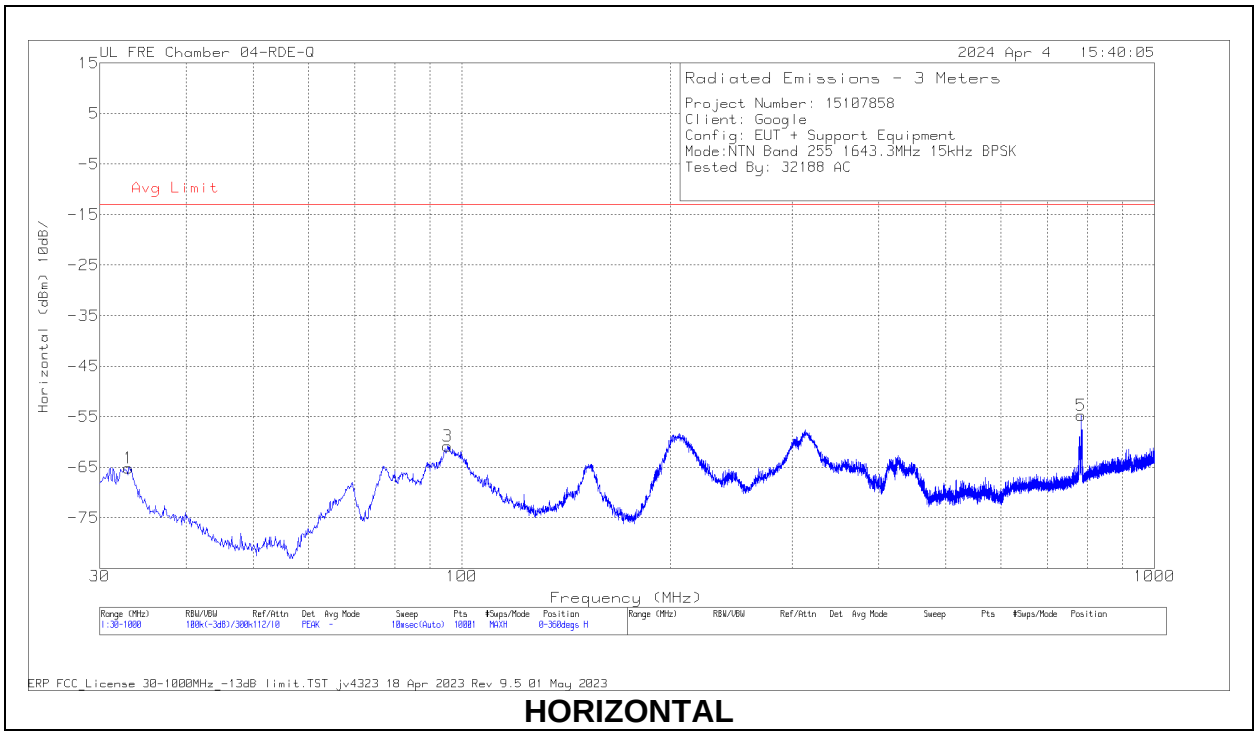


HORIZONTAL

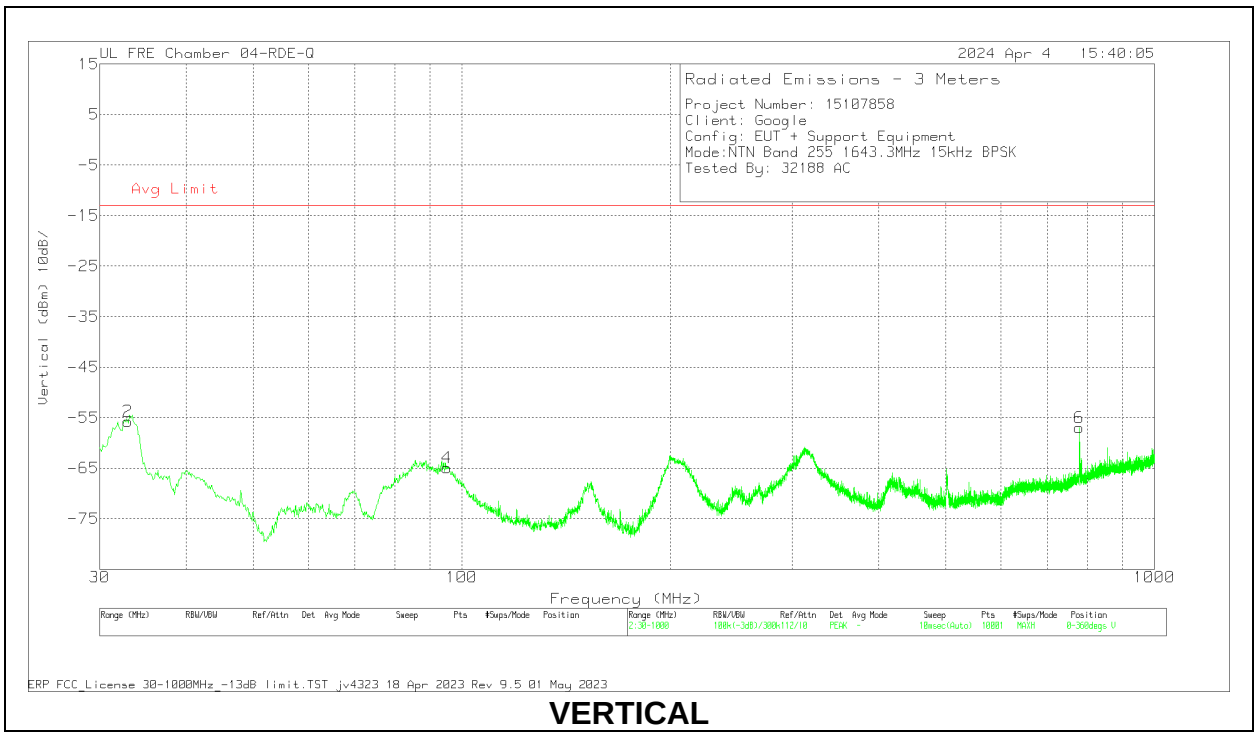


VERTICAL

10.1.10. Band 255 ANT 5 (Below 1GHz)



HORIZONTAL



VERTICAL

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80706 ACF (dB)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	32.91	46.6	Pk	25.2	-32.3	-95.2	-55.7	-13	-42.7	0-360	99	V
1	33.007	37.27	Pk	25.1	-32.3	-95.2	-65.13	-13	-52.13	0-360	200	H
4	95.087	47.23	Pk	14.8	-31.7	-95.2	-64.87	-13	-51.87	0-360	99	V
3	95.378	51.15	Pk	14.9	-31.7	-95.2	-60.85	-13	-47.85	0-360	99	H
6	779.228	40.08	Pk	26.9	-28.8	-95.2	-57.02	-13	-44.02	0-360	99	V
5	784.175	42.42	Pk	26.9	-28.9	-95.2	-54.78	-13	-41.78	0-360	200	H

Pk - Peak detector

10.2. ADDITIONAL UNWANTED EMISSION (1559MHz – 1610MHz)

LIMITS

FCC §25.216

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service

(a) The e.i.r.p. density of emissions from mobile earth stations placed in service on or before July 21, 2002 …

(b) The e.i.r.p. density of emissions from mobile earth stations placed in service on or before July 21, 2002 …

(c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed −70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559-1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed −80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559-1605 MHz band.

FCC §25.216

(g) Mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03-283 with assigned uplink frequencies in the 1610-1626.5 MHz band shall suppress the power density of emissions in the 1605-1610 MHz band-segment to an extent determined by linear interpolation from −70 dBW/MHz at 1605 MHz to −10 dBW/MHz at 1610 MHz averaged over any 2 millisecond active transmission interval. The e.i.r.p of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from −80 dBW at 1605 MHz to −20 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02r02

Measure wideband emissions using either:

RBW = 1MHz, VB = 3MHz

RBW < 1MHz, integrate over 1MHz if necessary

Measure narrowband emissions using:

RBW = 10kHz, VB = 30kHz as worst case setting

Set detector = rms, sweep time ~ number of points x 2ms, and sweep multiple times with max hold enabled. When the detector is set to rms the number of points is set to exceed the minimum number required by ANSI C63.26 for average measurements. A peak detector may be used (e.g. to avoid slow sweep times for the narrowband emissions measurements) in lieu of average rms detection as this will provide a more conservative (higher) measured value than the rms value.

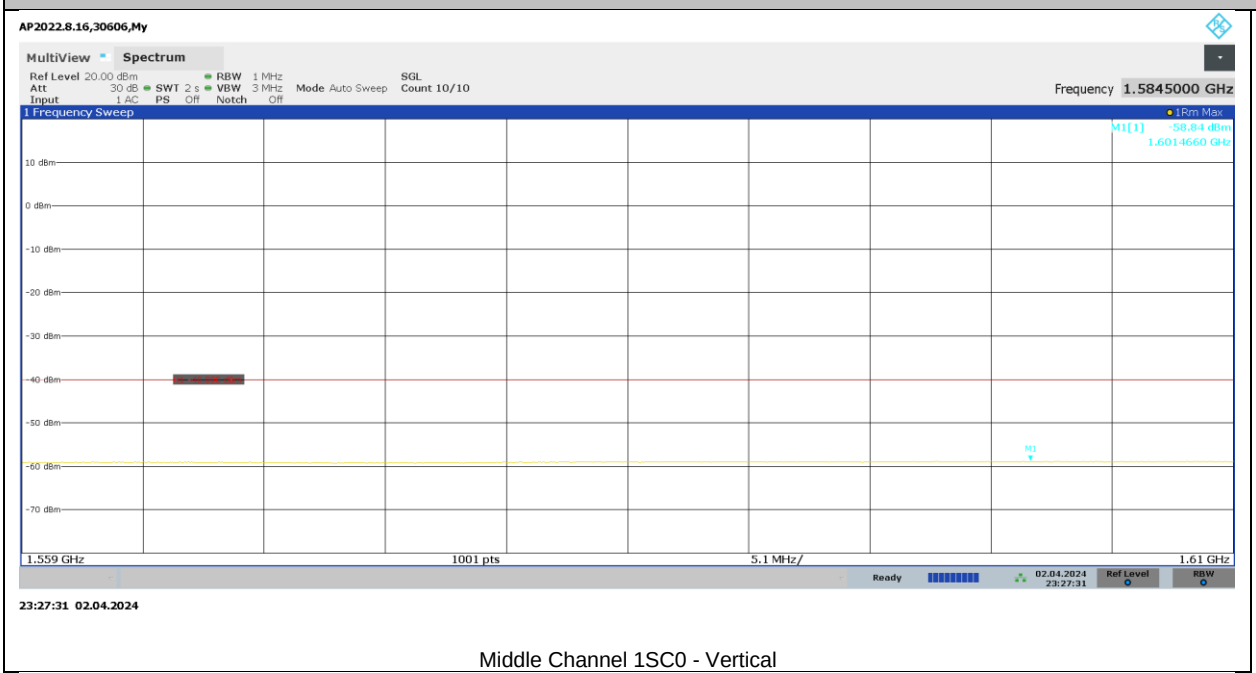
RESULTS

Both horizontal / vertical polarizations and low/ mid/ high channels were investigated on ANT 1 and ANT 5. No emissions were found on both horizontal and vertical polarization and plots for the mid channel.

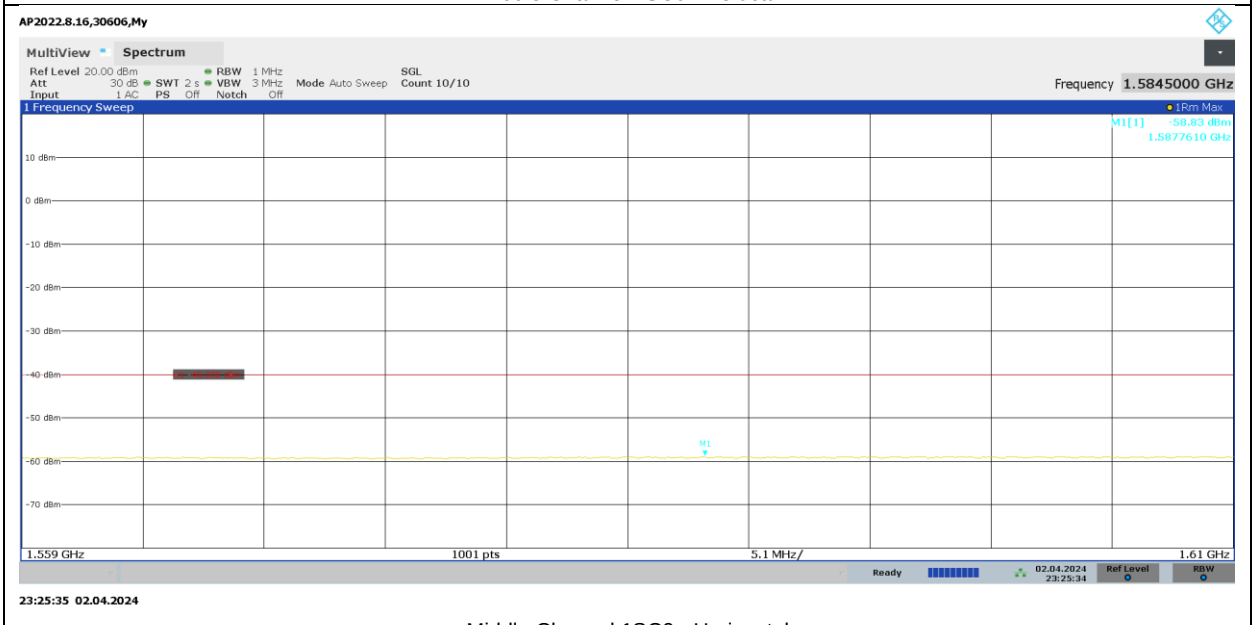
Test Engineer ID:	32188 AC	Test Date:	2024-03-22 to 2024-03-25

10.2.1. Band 23 ANT 1

Band 23 SCS 3.75kHz – QPSK

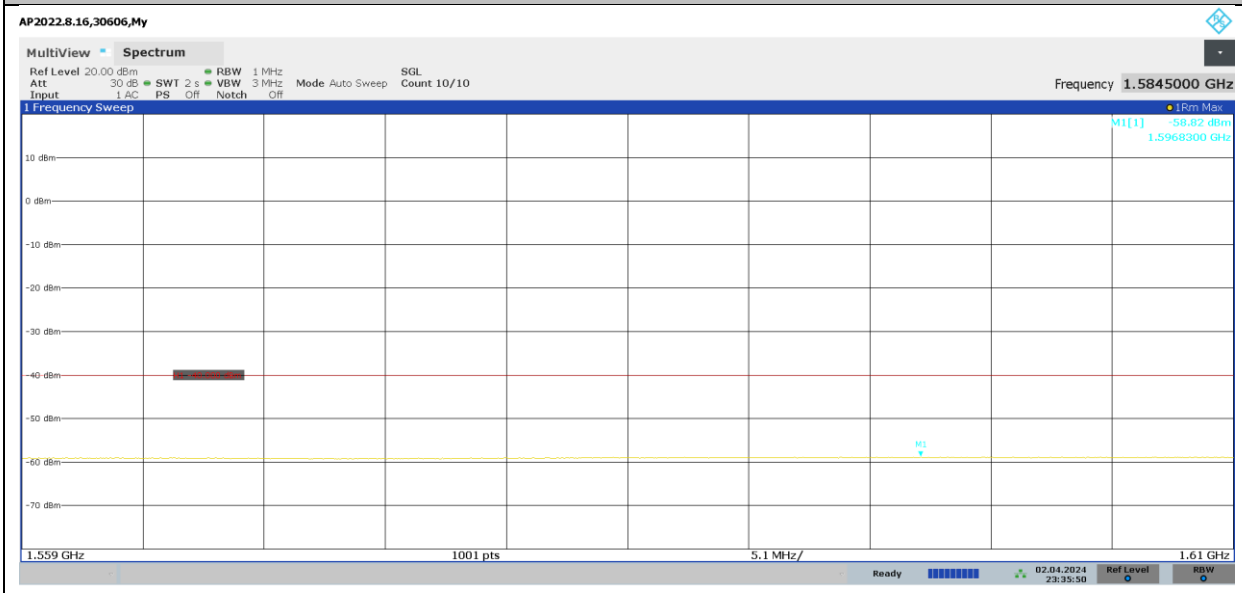


Middle Channel 1SC0 - Vertical



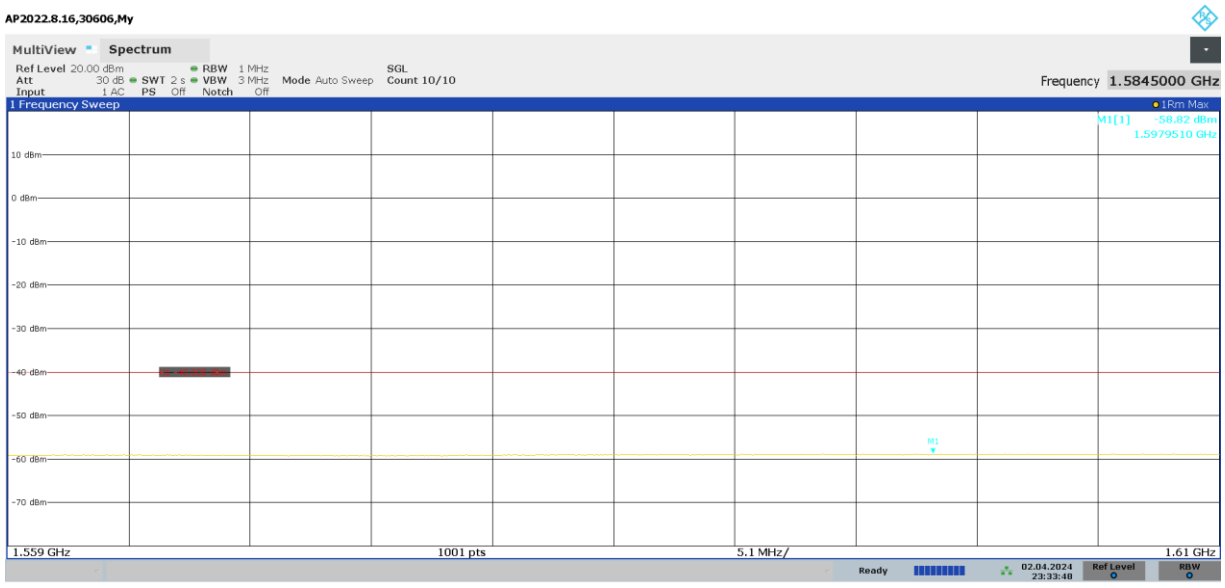
Middle Channel 1SC0 - Horizontal

Band 23 SCS 15kHz – QPSK



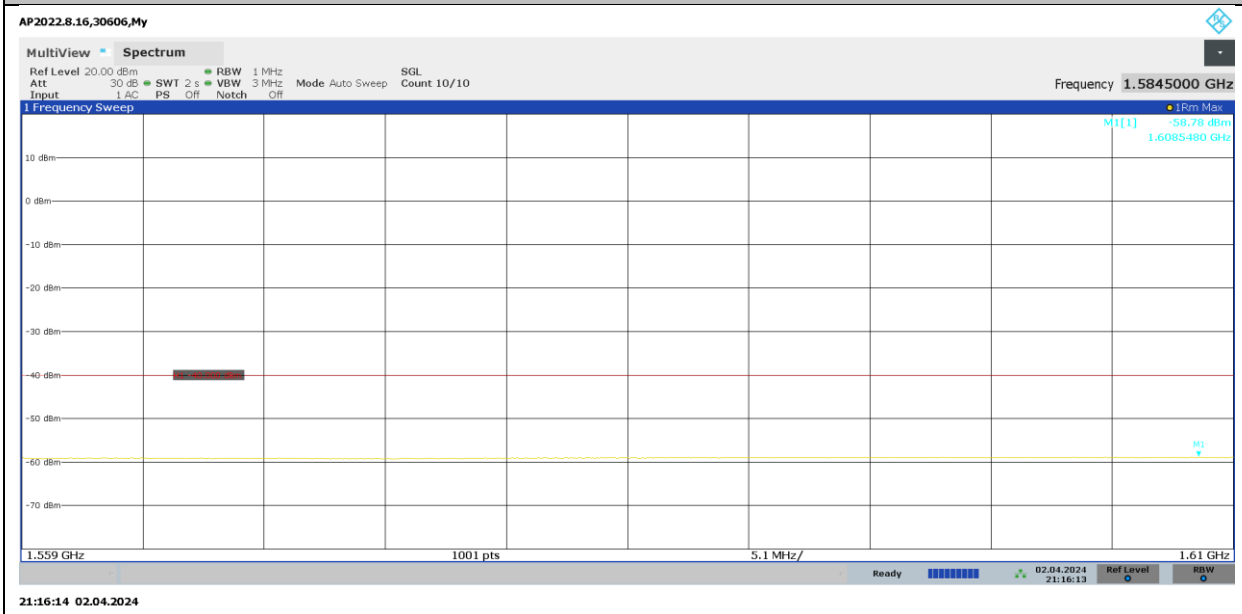
Middle Channel 1SC0 - Vertical

Middle Chan



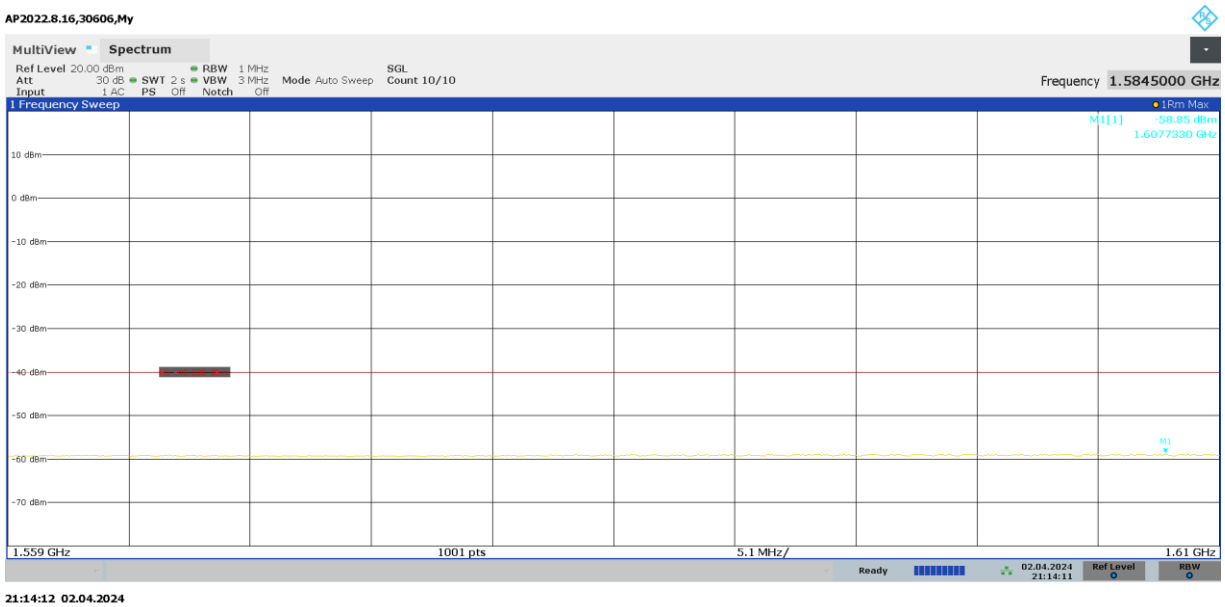
nel 1SC0 - Horizontal

Band 23 SCS 3.75kHz – BPSK



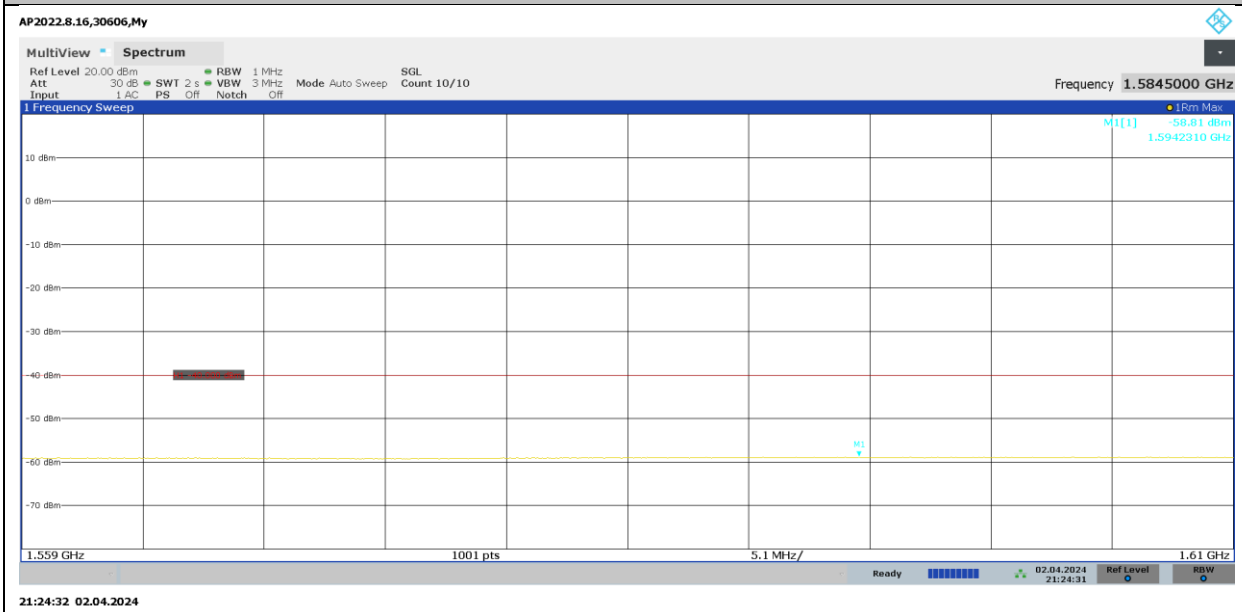
Middle Channel 1SC0 - Vertical

Middle Cha

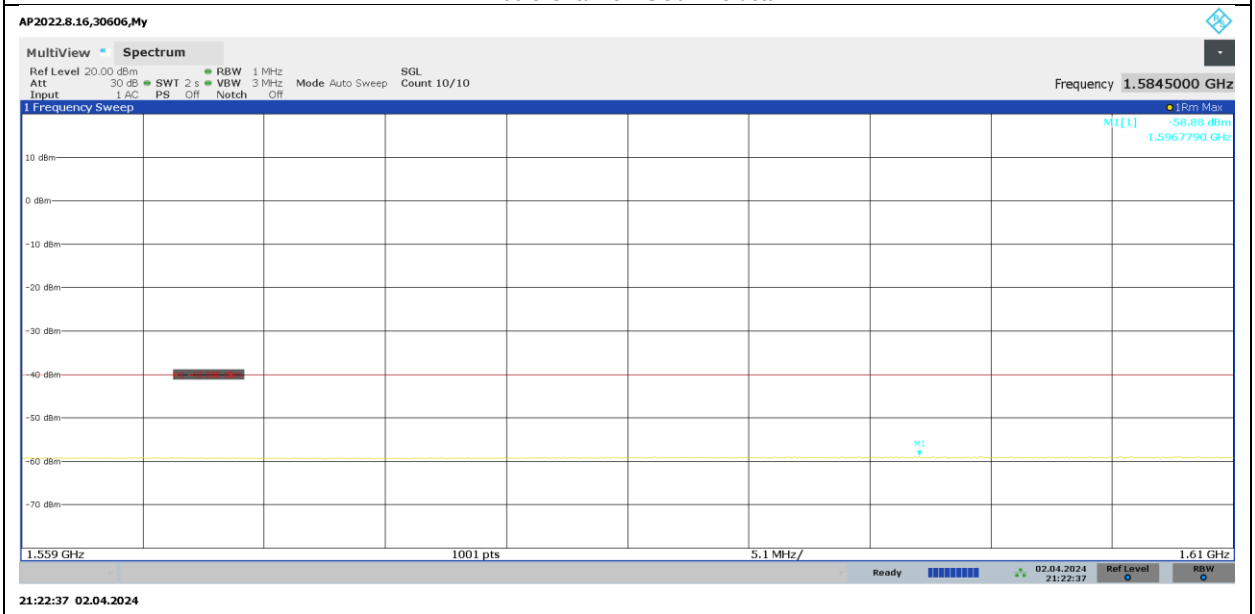


Middle 1SC0 - Horizontal

Band 23 SCS 15kHz – BPSK



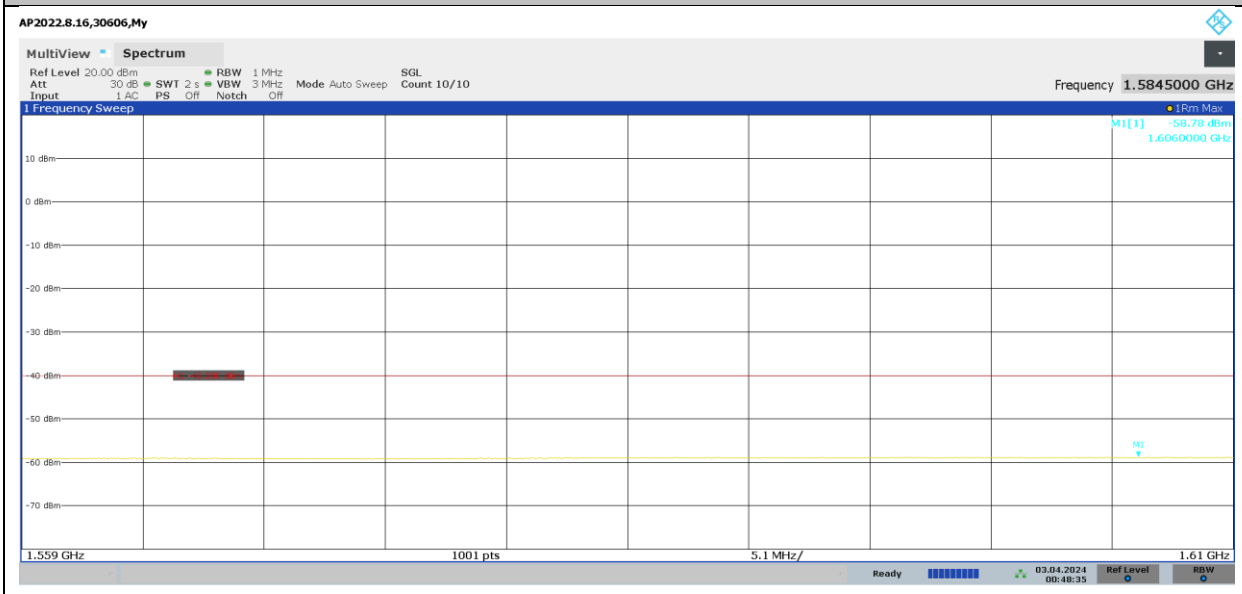
Middle Channel 1SC0 - Vertical



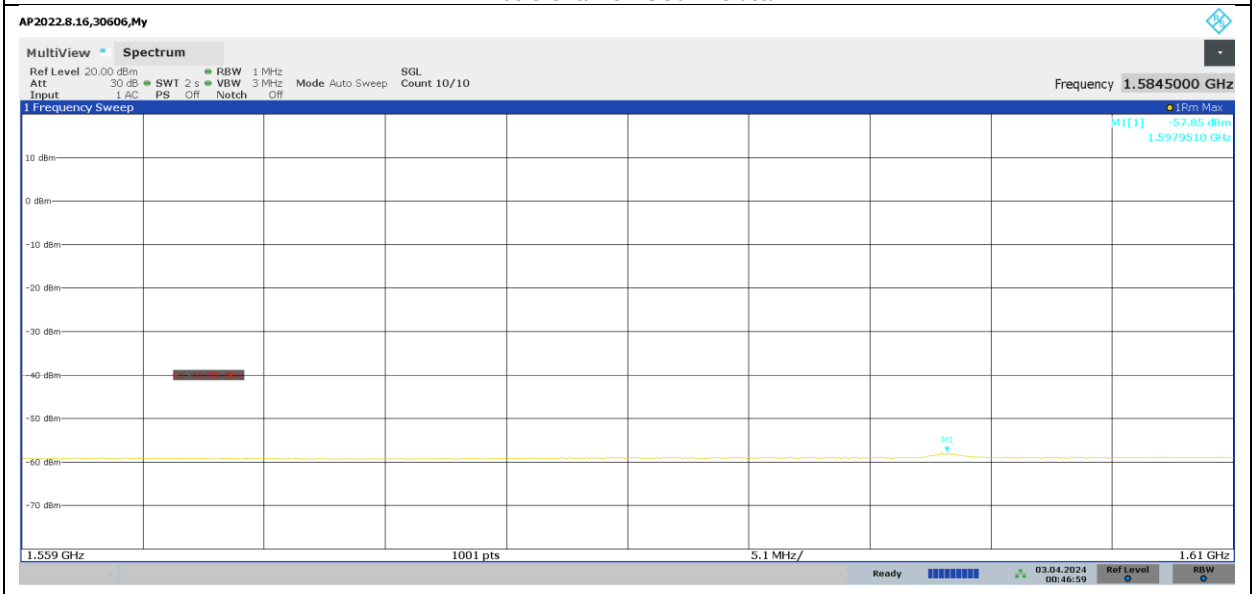
Middle Channel 1SC0 - Horizontal

10.2.2. Band 255 ANT 5

Band 23 SCS 3.75kHz – QPSK

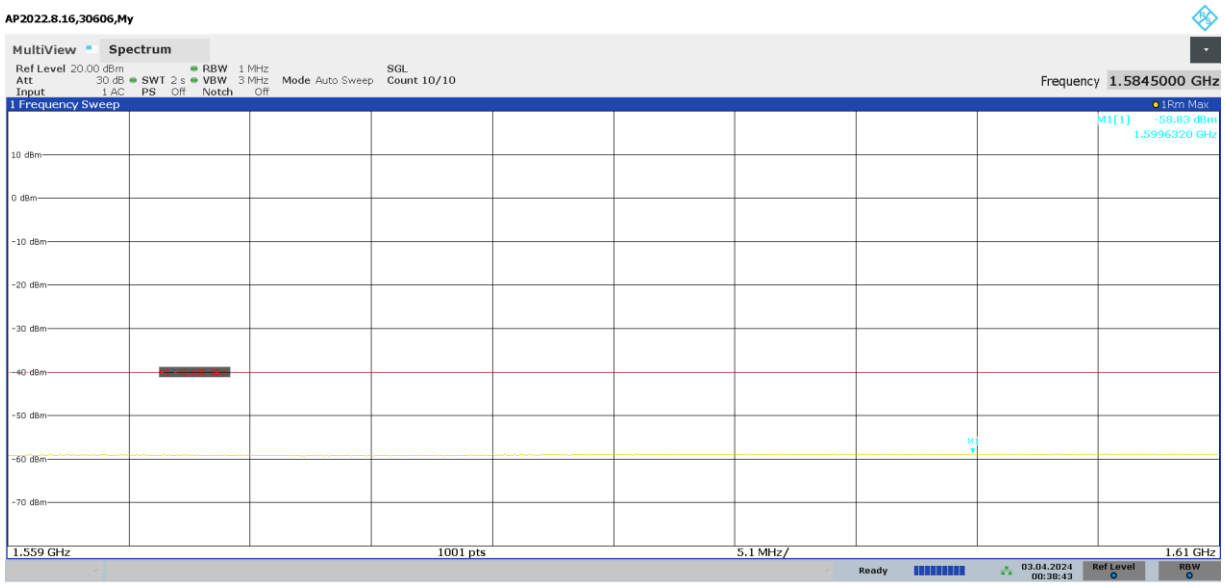


Middle Channel 1SC0 - Vertical

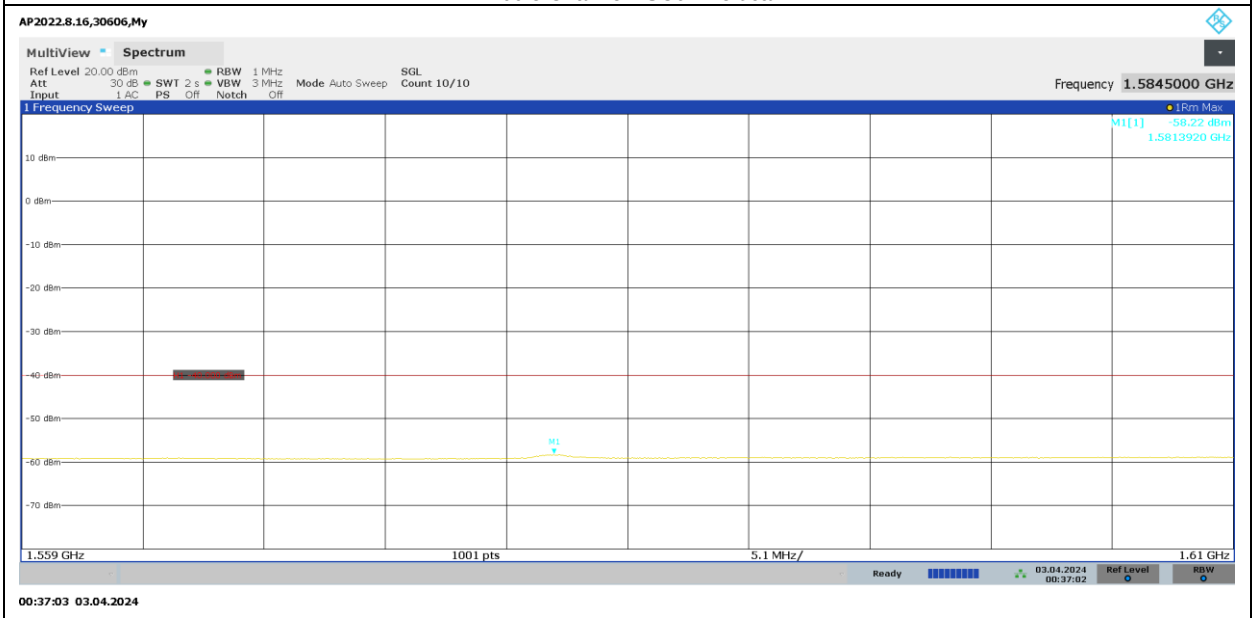


Middle Channel 1SC0 - Horizontal

Band 23 SCS 15kHz – QPSK

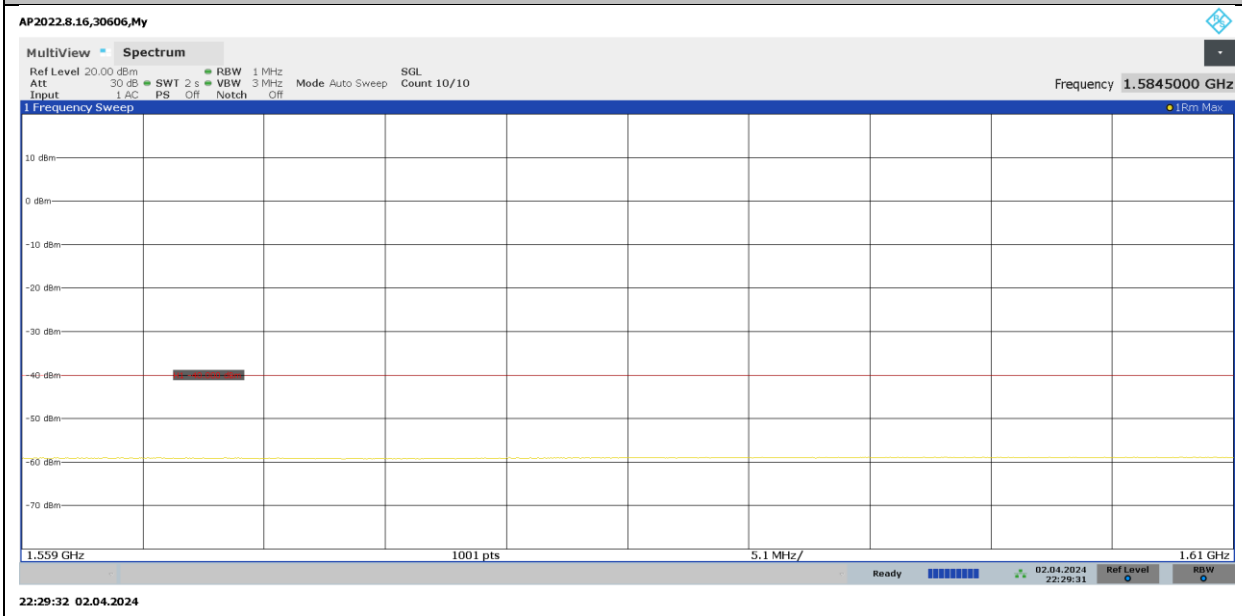


Middle Channel 1SC0 - Vertical

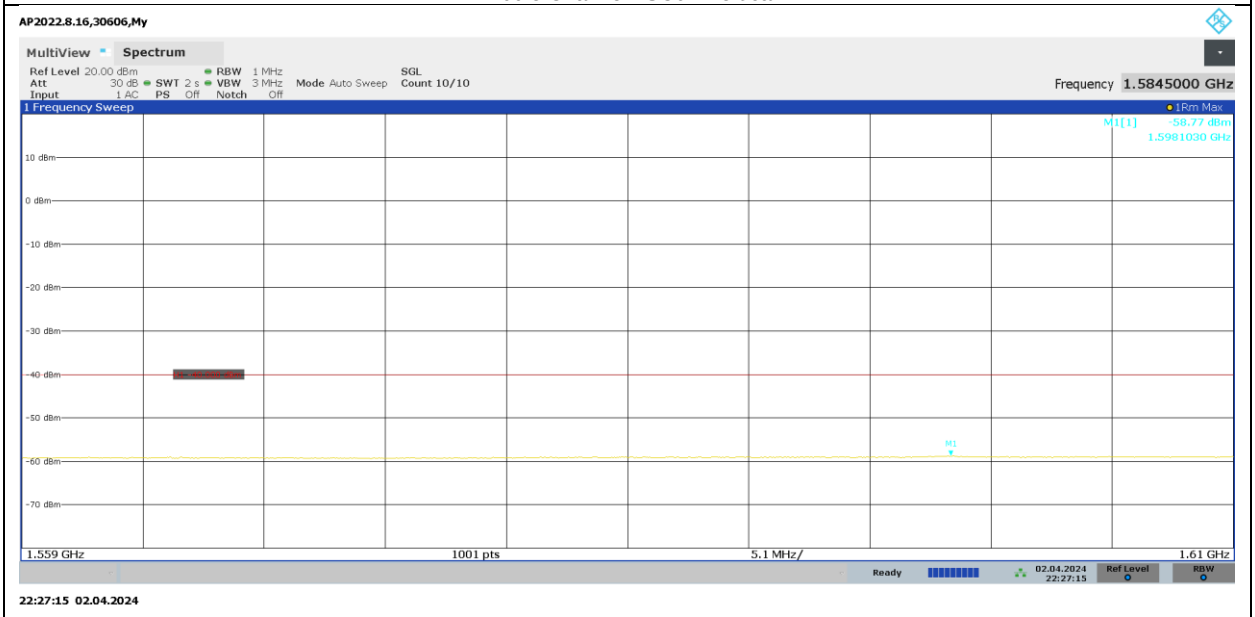


Middle Channel 1SC0 - Horizontal

Band 23 SCS 3.75kHz – BPSK

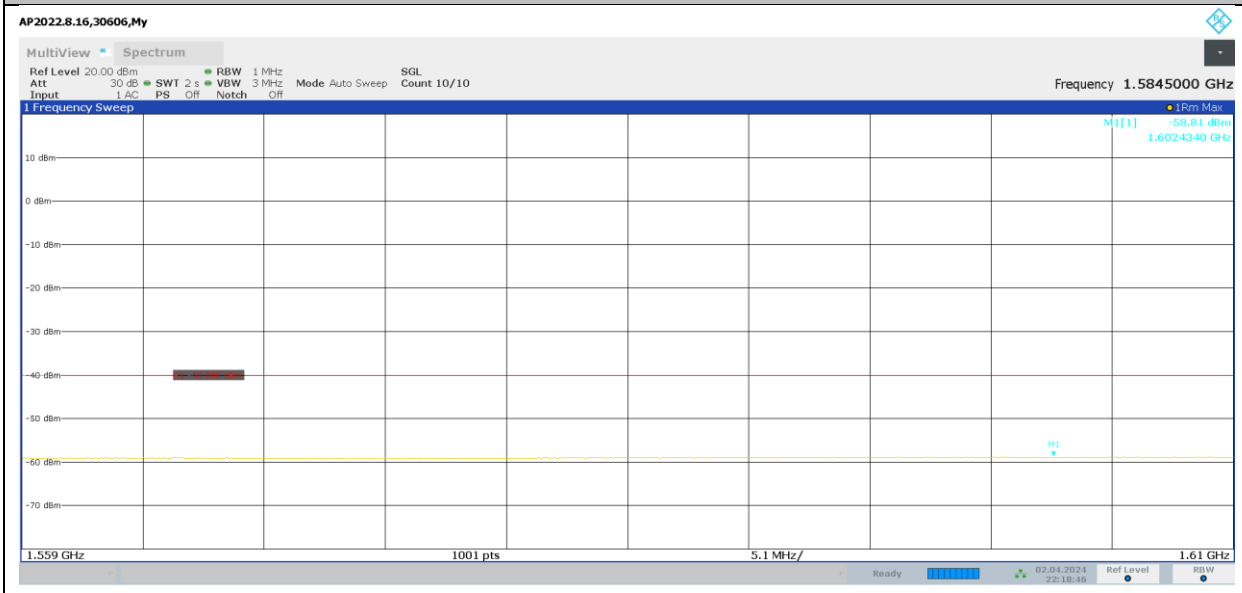


Middle Channel 1SC0 - Vertical

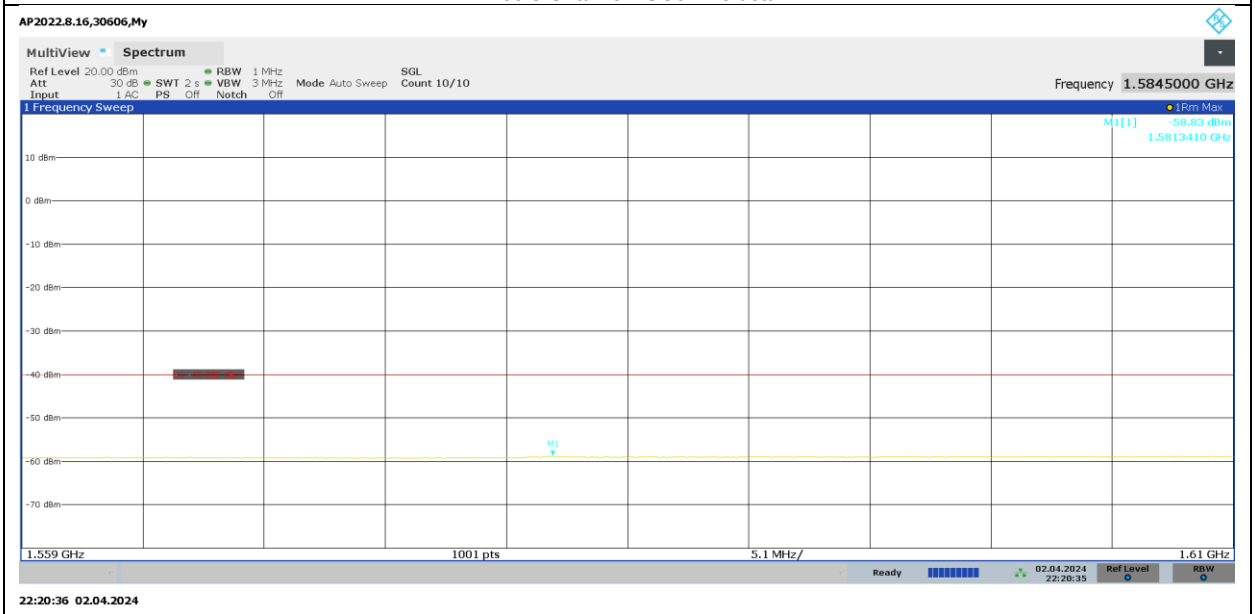


Middle Channel 1SC0 - Horizontal

Band 23 SCS 15kHz – BPSK



Middle Channel 1SC0 - Vertical



Middle Channel 1SC0 - Horizontal

10.3. CARRIER-OFF STATE EMISSIONS (1559MHz – 1610MHz)

LIMITS

FCC §25.216

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service

(i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03-283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed −80 dBW/MHz in the 1559-1610 MHz band averaged over any two millisecond interval.

TEST PROCEDURE

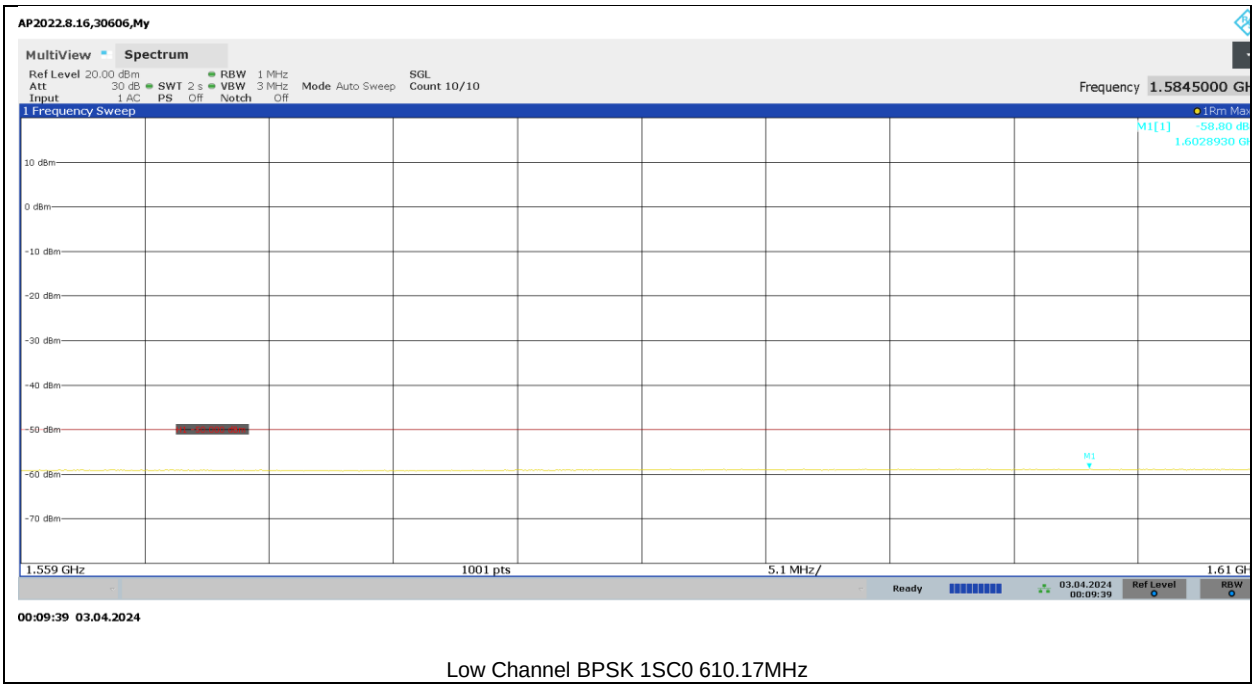
KDB 971168 D01 v03r01/D02 v02r02

Set RBW = 1MHz, VB = 3MHz, Detector = RMS, Sweep Time = Number of Points x 2ms, and sweep multiple times with Max Hold enabled.

RESULTS

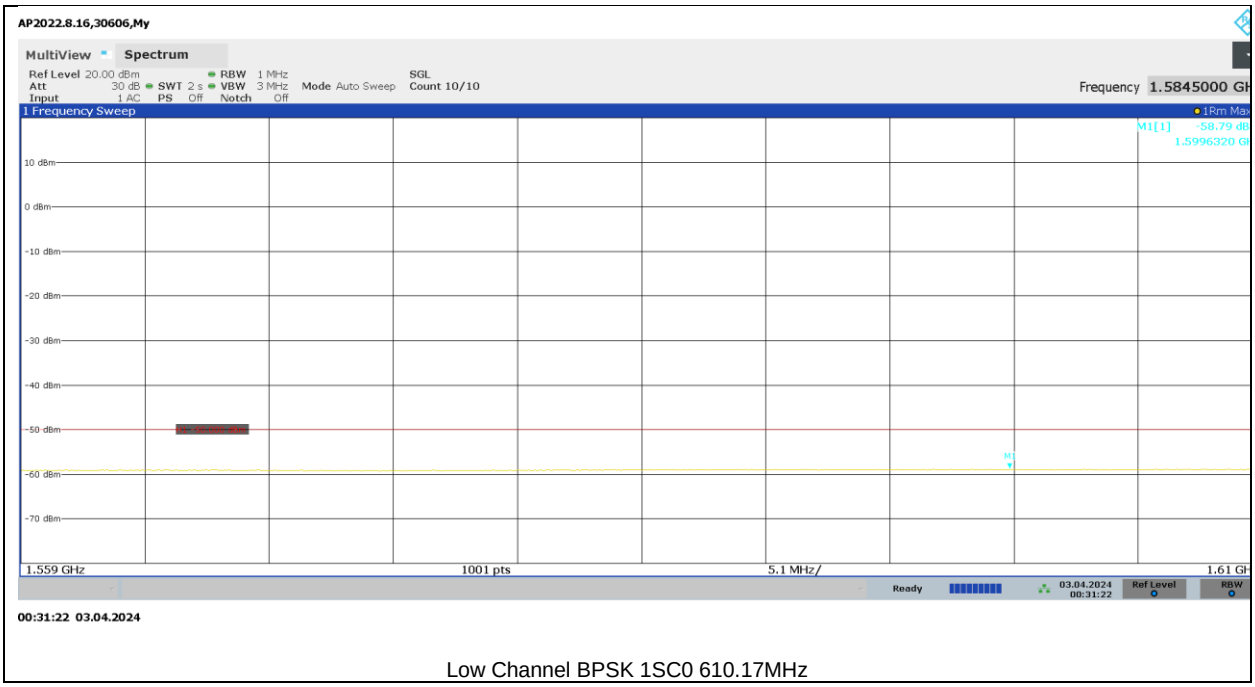
No emissions were found on both horizontal and vertical polarization for ANT 1 and ANT 5.

10.3.1. Band 23 ANT 1



Low Channel BPSK 1SC0 610.17MHz

10.3.2. Band 255 ANT 5



Low Channel BPSK 1SC0 610.17MHz

10.4. FREQUENCY STABILITY

LIMITS

FCC §25.202
(d) Frequency tolerance, Earth stations. The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

TEST PROCEDURE

Use spectrum with Frequency Error measurement capability.

- Temp. = −30°C to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
  End Voltage, 3.01VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

RESULTS

10.4.1. Band 23 ANT 1

Test Engineer ID:	32061WY	Test Date:	2024-04-02

Middle Channel / QPSK / SCS 15kHz

Frequency Reference (MHz)		2010.00000		Frequency Reading (MHz)	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -10dB BW (MHz)	F high @ -10dB BW (MHz)			
Temperature	Voltage					
Normal (20 C)	Normal	2009.857977	2010.156417	2010.007197		
Extreme (50C)		2009.847115	2010.14058	2009.993848	-13349.4	-6.64
Extreme (40C)		2009.844283	2010.145414	2009.994849	-12348.4	-6.14
Extreme (30C)		2009.842604	2010.164375	2010.00349	-3707.4	-1.84
Extreme (10C)		2009.850754	2010.158286	2010.00452	-2676.8	-1.33
Extreme (0C)		2009.855403	2010.167083	2010.011243	4046.0	2.01
Extreme (-10C)		2009.852561	2010.15839	2010.005476	-1721.1	-0.86
Extreme (-20C)		2009.852337	2010.159405	2010.005871	-1325.6	-0.66
Extreme (-30C)		2009.84883	2010.146635	2009.997732	-9464.5	-4.71
20C	15%	2009.859876	2010.162342	2010.011109	3912.1	1.95
	-15%	2009.857909	2010.157777	2010.007843	646.2	0.32
	End Point	2009.863202	2010.151181	2010.007192	-5.2	0.00

10.4.2. Band 255 ANT 5

Test Engineer ID:	32061WY	Test Date:	2024-04-03

Middle Channel / QPSK / SCS 15kHz

Frequency Reference (MHz)		1643.29509		Frequency Reading (MHz)	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -10dB BW (MHz)	F high @ -10dB BW (MHz)			
Temperature	Voltage					
Normal (20 C)	Normal	1643.186543	1643.403645	1643.295094		
Extreme (50C)		1643.183536	1643.406062	1643.294799	-295.2	-0.18
Extreme (40C)		1643.190129	1643.406587	1643.298358	3264.0	1.99
Extreme (30C)		1643.152095	1643.446584	1643.299340	4245.8	2.58
Extreme (10C)		1643.151997	1643.449816	1643.300906	5812.6	3.54
Extreme (0C)		1643.161699	1643.460371	1643.311035	15941.5	9.70
Extreme (-10C)		1643.157271	1643.458258	1643.307765	12670.8	7.71
Extreme (-20C)		1643.157671	1643.458818	1643.308244	13150.6	8.00
Extreme (-30C)		1643.144071	1643.448332	1643.296202	1107.9	0.67
20C	15%	1643.144781	1643.433204	1643.288993	-6101.0	-3.71
	-15%	1643.153258	1643.438119	1643.295688	594.6	0.36
	End Point	1643.138484	1643.43846	1643.288472	-6621.8	-4.03

11. SETUP PHOTOS

Please refer to 15107858-EP for Setup Photo Report.

END OF REPORT