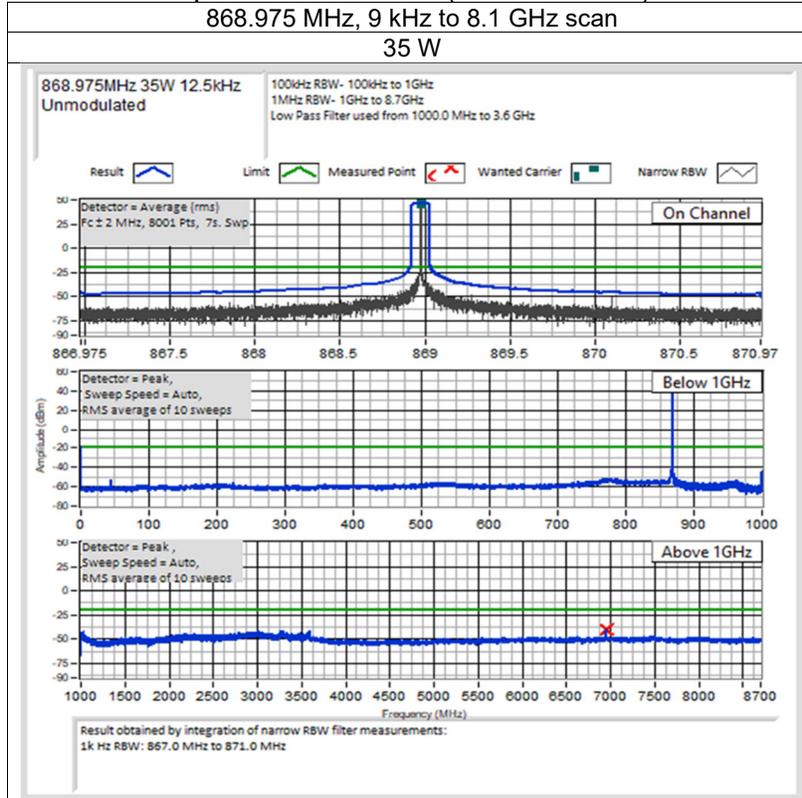


Spurious Emissions (Tx Conducted)

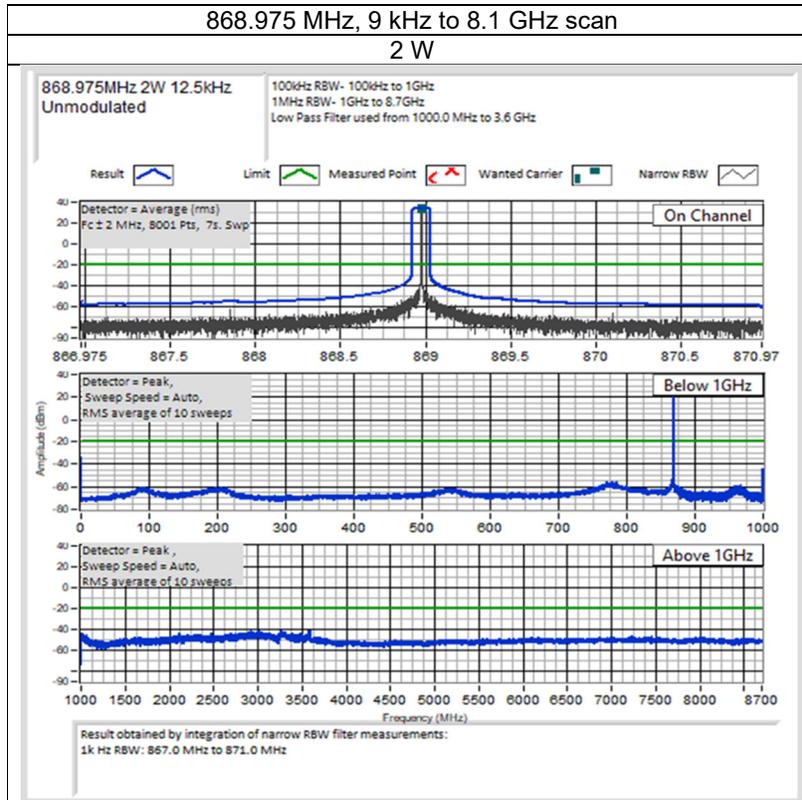
868.975 MHz, 9 kHz to 8.1 GHz scan

35 W



868.975 MHz, 9 kHz to 8.1 GHz scan

2 W



Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC 47 CFR 2.1051 RSS-119 5.8

LIMITS: FCC 47 CFR 90.210 RSS-119 5.8

Carrier Output Power	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$	
	30 W	-20 dBm
35 W	-20 dBm	-65.4 dBc
2 W	-20 dBm	-53.0 dBc

TRANSMITTER SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603E 2.2.12

MEASUREMENT PROCEDURE:

Initial Scan:

1. The EUT is placed in the S-Line TEM cell and emissions are measured from 30 MHz to 800 MHz. Any emission within 20 dB of the limit is then re-tested on the OATS.
2. The EUT is placed in the reverberation chamber and emissions are measured from 800 MHz to the upper frequency required ($10 \times F_c$). Any emission within 20 dB of the limit is then re-tested on the OATS.
3. The harmonics emissions up to the 6th harmonic of the fundamental frequency are measured on the OATS

OATS Measurement:

1. The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.
2. The test antenna is raised from 1 m to 4 m to obtain a maximum reading; the turntable is then rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions are determined by switching the EUT on and off.
3. The EUT is then replaced by a signal generator and substitution antenna to make measurements by the substitution method.

MEASUREMENT RESULTS:

See the tables on the following pages

LIMIT CLAUSE: FCC 47 CFR 90.210

Spurious Emissions (Tx Radiated) - Continued

SPECIFICATION: FCC 47 CFR 2.1053

12.5 kHz Channel Spacing 762.025 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3048.1018	-37.85	-82.62
~	~	~

12.5 kHz Channel Spacing 762.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 768.025 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3072.1030	-32.81	-77.58
~	~	~

12.5 kHz Channel Spacing 768.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 769.075 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3076.3019	-35.82	-80.59
~	~	~

12.5 kHz Channel Spacing 769.075 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Radiated) - Continued

12.5 kHz Channel Spacing 774.9 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3099.602	-36.82	-81.59
~	~	~

12.5 kHz Channel Spacing 774.9 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 775.975 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3103.9019	-31.75	-76.52
6983.777	-37.27	-82.04
~	~	~

12.5 kHz Channel Spacing 775.975 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 787.5 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3150.0019	-32.95	-77.72
~	~	~

12.5 kHz Channel Spacing 787.5 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Radiated) - Continued

12.5 kHz Channel Spacing 798.025 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

12.5 kHz Channel Spacing 798.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 799.075 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3196.3019	-30.85	-75.62
~	~	~

12.5 kHz Channel Spacing 799.075 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 804.9 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

12.5 kHz Channel Spacing 804.9 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Radiated) - Continued

12.5 kHz Channel Spacing 805.975 MHz @ 30 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3223.9017	-31.95	-76.72
~	~	~

12.5 kHz Channel Spacing 805.975 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 806.025 MHz @ 35 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3224.1031	-30.25	-75.69
~	~	~

12.5 kHz Channel Spacing 806.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 815.025 MHz @ 35 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3260.1031	-32.25	-77.69
~	~	~

12.5 kHz Channel Spacing 815.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Radiated) - Continued

12.5 kHz Channel Spacing 823.975 MHz @ 35 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~

12.5 kHz Channel Spacing 823.975 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 851.025 MHz @ 35 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3404.1027	-35.35	-80.79
~	~	~

12.5 kHz Channel Spacing 851.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 860.025 MHz @ 35 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3440.1029	-34.55	-79.99
~	~	~

12.5 kHz Channel Spacing 860.025 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

Spurious Emissions (Tx Radiated) - Continued		
--	--	--

12.5 kHz Channel Spacing 868.975 MHz @ 35 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3475.9031	-36.5	-81.94
6951.8037	-38.25	-83.69
~	~	~

12.5 kHz Channel Spacing 868.975 MHz @ 2 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
Measurement Uncertainty	± 4.6 dB	
No other emissions were detected at a level greater than 20 dB below the limit.		

LIMITS: FCC 47 CFR 2.1053

Carrier Output Power	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$	
30 W	-20 dBm	-64.8 dBc
35 W	-20 dBm	-65.4 dBc
2 W	-20 dBm	-53.0 dBc

Open Area Test Site Results:
 12.5 kHz Channel Spacing

799.075 MHz @ 30 W

Emission Mask D

Harmonics Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1598.1500	-45.8	-90.57
2397.2250	-58.2	-102.97
3196.3000	-30.85	-75.62
3995.3750	-48.4	-93.17
4794.4500	-61.7	-106.47
5593.5250	-54.5	-99.27
Measurement Uncertainty	± 4.6 dB	

Sample Calculation	Measurement					Result
	Reference	Substitution				
Emission Frequency (MHz)	Reference Level (dBm)	Sig-gen Level	Cable and Attenuator Gain	Antenna Gain (dBd)	Path and Boresight corrections	dBm
1598.15	-97	-34.0	-18.0	8.3	-2.15	-45.8
		A	B	C	D	E

Result (E) = A+B+C+D Result

OATS Setup



TRANSMITTER RADIATED EMISSIONS IN THE GNSS BAND

SPECIFICATION: FCC 47 CFR 90.543

GUIDE: TIA/EIA-603E 2.2.12

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. Spurious emissions were measured in the GNSS band. (1559 – 1610 MHz)
3. The EUT was placed on a wooden turntable at a distance of three metres from the test antenna.
4. The test antenna was raised from 1m to 4m to obtain a maximum reading; the turntable was then rotated through 360° to obtain the maximum response of each spurious emission.
5. Valid emissions were determined by switching the EUT on and off.
6. Emission measurements were made by the direct method.
7. The test was performed with a representative antennae connected to the EUT, at high output power settings on two channels operating in the required band.

799.075 MHz 30 W

Emission Frequency (1559-1610 MHz)	Antenna fitted	Antenna Polarity	Level dBW / MHz EIRP
1598.15	¼ wave	Vertical	-75.8
		Horizontal	-82.7

774.9 MHz 30 W

Emission Frequency (1559-1610 MHz)	Antenna fitted	Antenna Polarity	Level dBW / MHz EIRP
1549.8 MHz	¼ wave	Vertical	-80.2
		Horizontal	-82.7

LIMIT CLAUSE FCC 47 CFR 90.543 (f)	-70 dBW / MHz EIRP
---------------------------------------	--------------------

(f) For operations in the 763-775 MHz and 793-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Setup



TRANSMITTER CONDUCTED EMISSIONS IN THE GNSS BAND

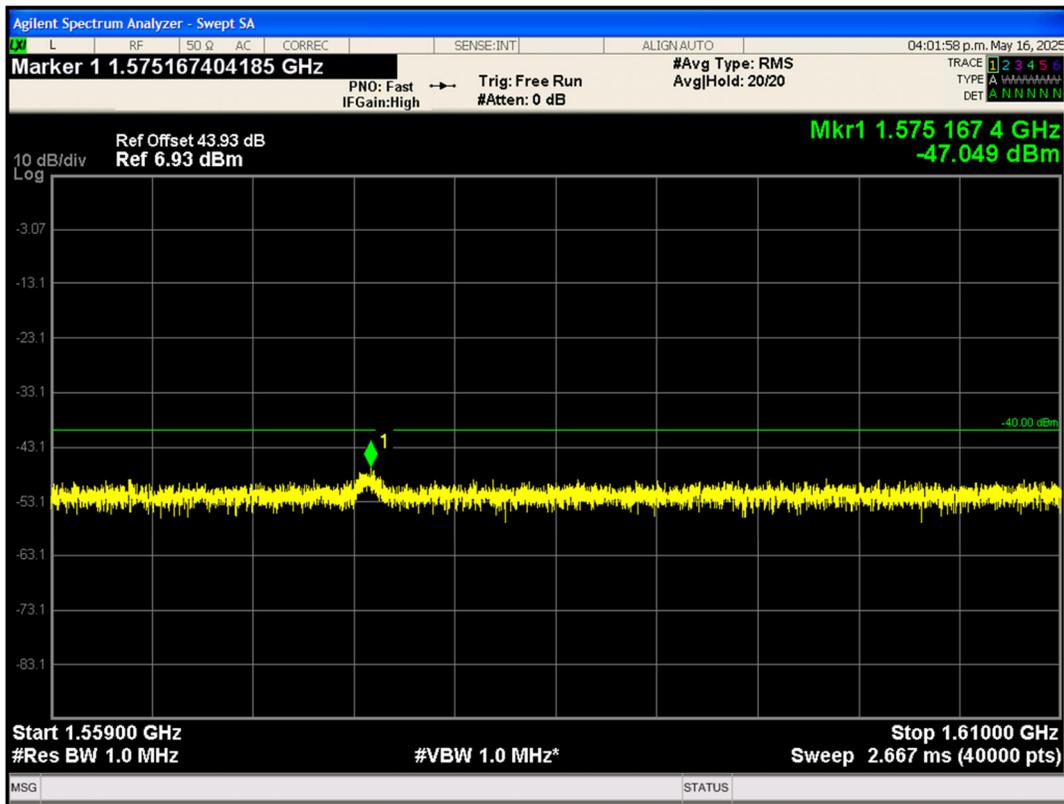
SPECIFICATION: RSS-119 5.8

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. Spurious emissions were measured in the GNSS band. (1559 – 1610 MHz)
3. The EUT was connected via an attenuator to a spectrum analyser.
4. Allowance was made for a theoretical dipole with a gain of 2.15dBm isotropic.
5. The emission at the frequency of the second harmonic was measured.
6. A Band Stop-High Pass filter was added to prevent overload of spectrum analyser by the transmitter.

787.5 MHz 30 W

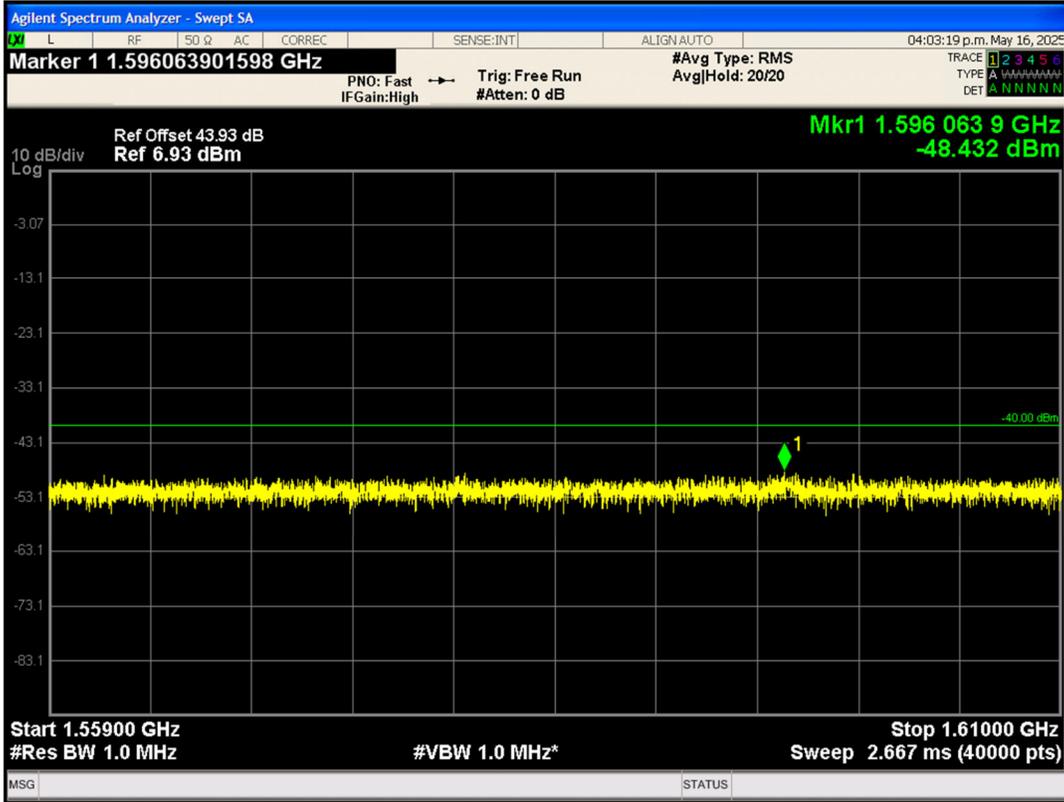
Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1575.1674 MHz	-47.049	-77.049



Transmitter Conducted Emissions in the GNSS Band - Continued

798.025 MHz 30 W

Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1596.0639 MHz	-48.432	-78.432

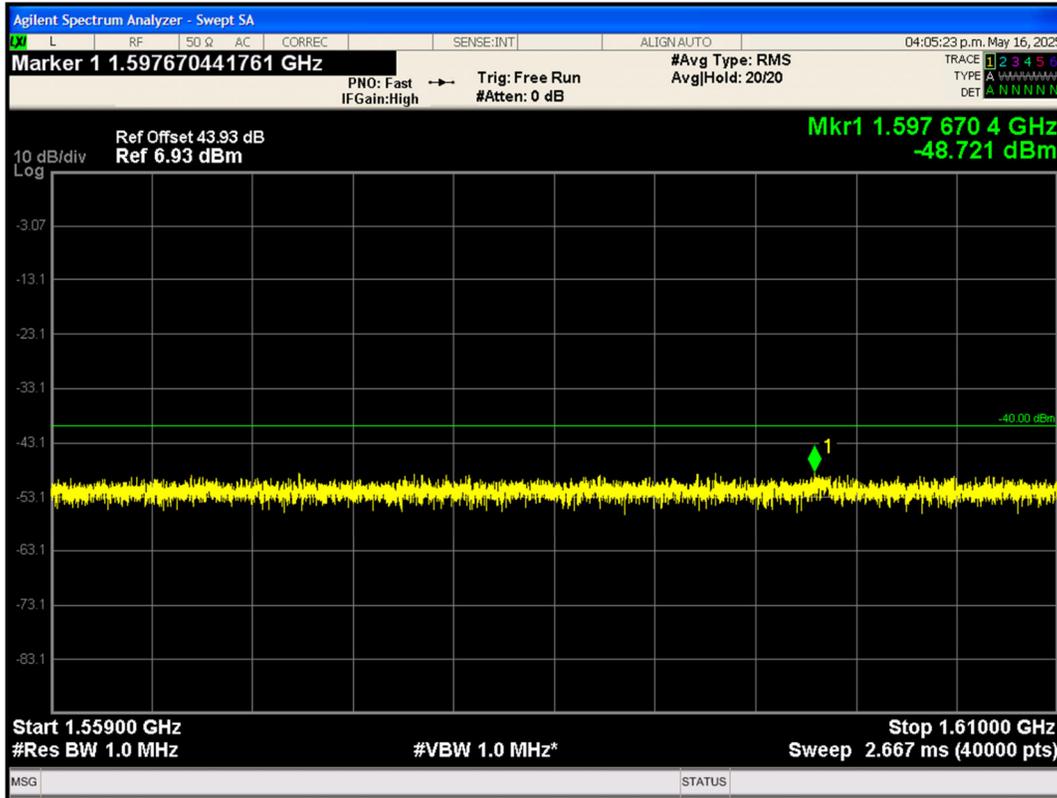


LIMIT CLAUSE RSS-119 5.8.9.2	-70 dBW / MHz EIRP
---------------------------------	--------------------

Transmitter Conducted Emissions in the GNSS Band - Continued

799.075 MHz 30 W

Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1597.6704MHz	-48.721	-78.721

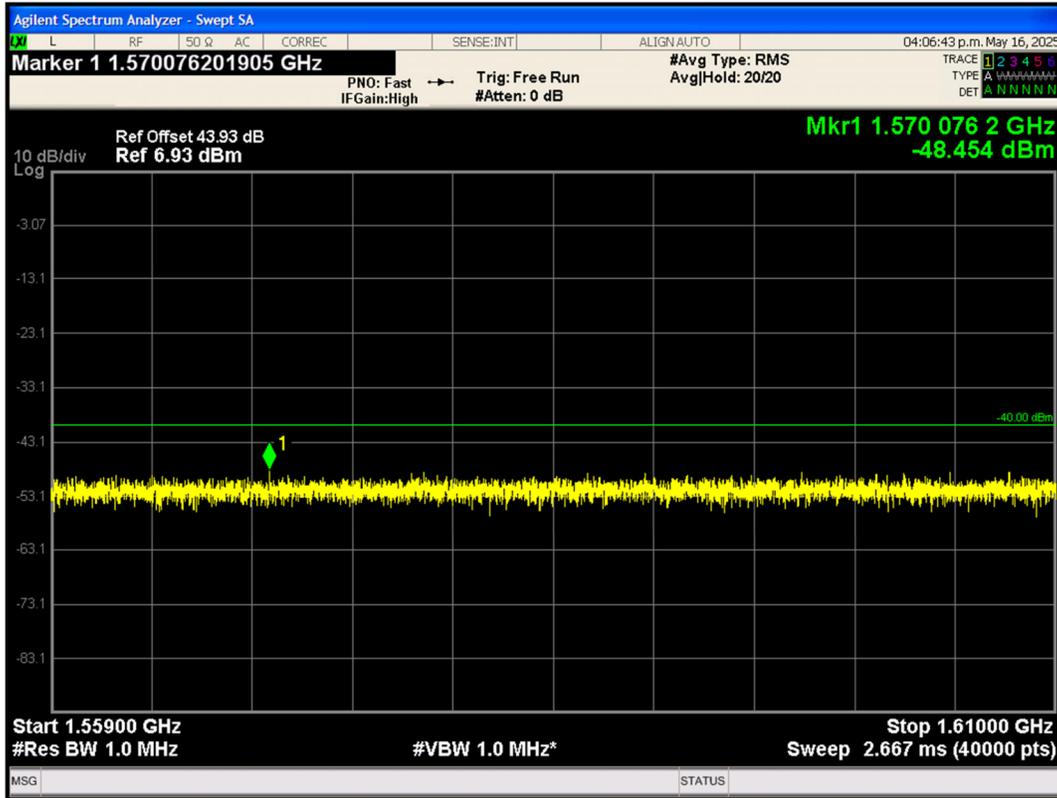


LIMIT CLAUSE RSS-119 5.8.9.2	-70 dBW / MHz EIRP
---------------------------------	--------------------

Transmitter Conducted Emissions in the GNSS Band - Continued

804.9 MHz 30 W

Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1570.0762 MHz	-48.454	-78.454



LIMIT CLAUSE RSS-119 5.8.9.2	-70 dBW / MHz EIRP
---------------------------------	--------------------

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) Part 27

SPECIFICATIONS: FCC 47 CFR 27.53 c (4) & (6)
GUIDE: TIA-102.CAAA-C 2.2.7

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from 763-775MHz and 793-805MHz.
3. A Scan is performed with a resolution and video bandwidth of 6.25 kHz

MEASUREMENT RESULTS:

See the tables and plots on the following pages.

Tx FREQUENCY: 787.5 MHz

12.5 kHz Channel Spacing 787.5 MHz @ 30 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 787.5 MHz @ 2 W

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 30 dB below the limit.		

LIMITS: FCC 47 CFR 27.53 c (4) & (6)

Carrier Output Power	$65 + 10 \text{ Log}_{10} (P_{\text{Watts}})$ (mobiles)	
30 W	-35 dBm	-80 dBc
2 W	-35 dBm	-68 dBc