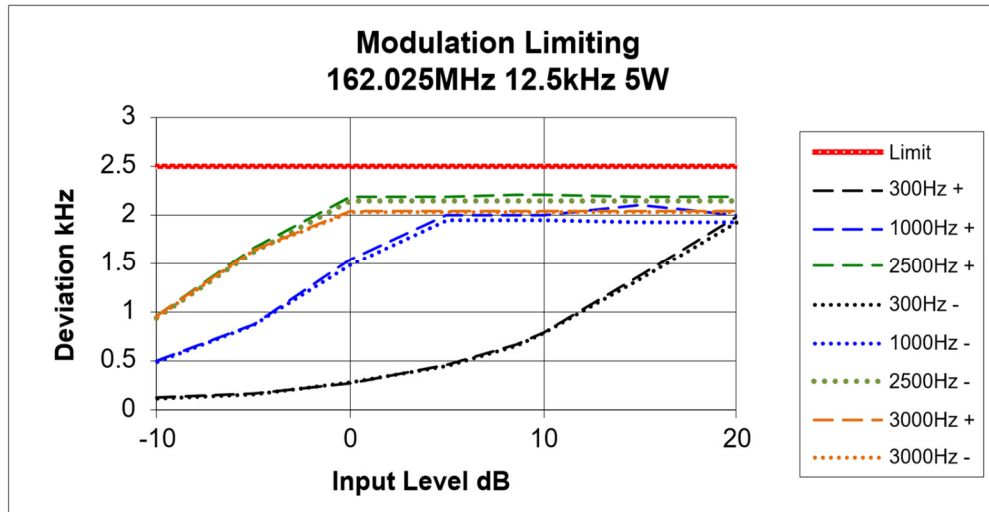


Transmitter Modulation Limiting

SPECIFICATION: FCC 47 CFR 2.1047 (b)

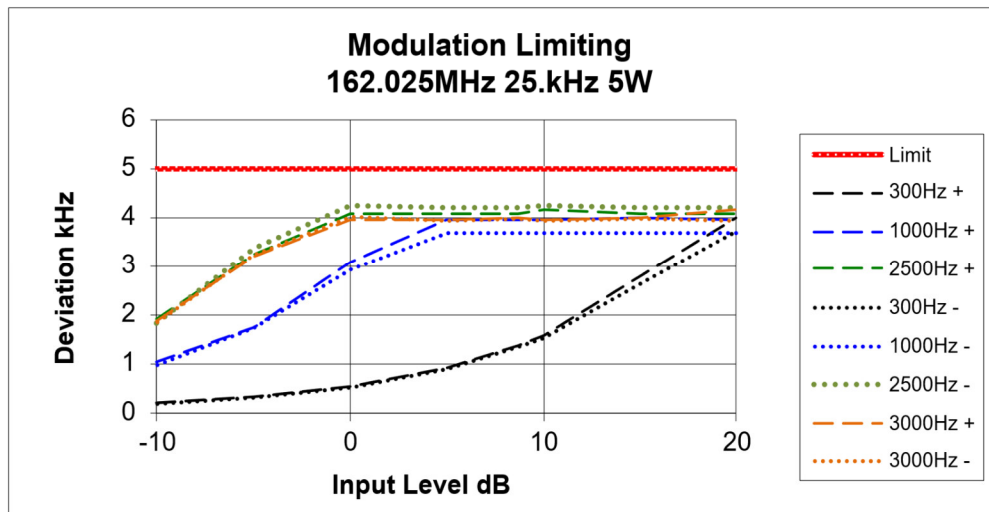
Tx FREQUENCY: 162.025 MHz

12.5 kHz Channel Spacing



Tx FREQUENCY: 162.025 MHz

25.0 kHz Channel Spacing

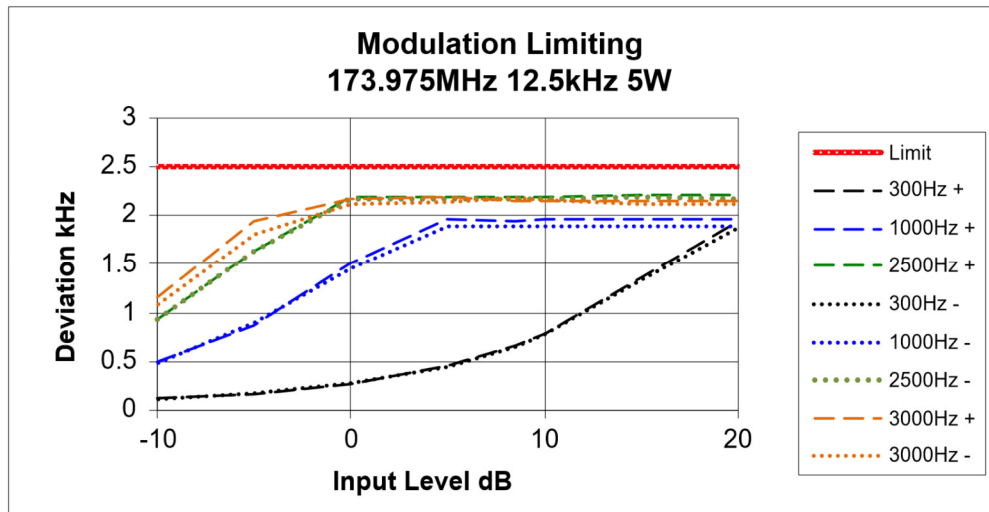


Transmitter Modulation Limiting

SPECIFICATION: FCC 47 CFR 2.1047 (b)

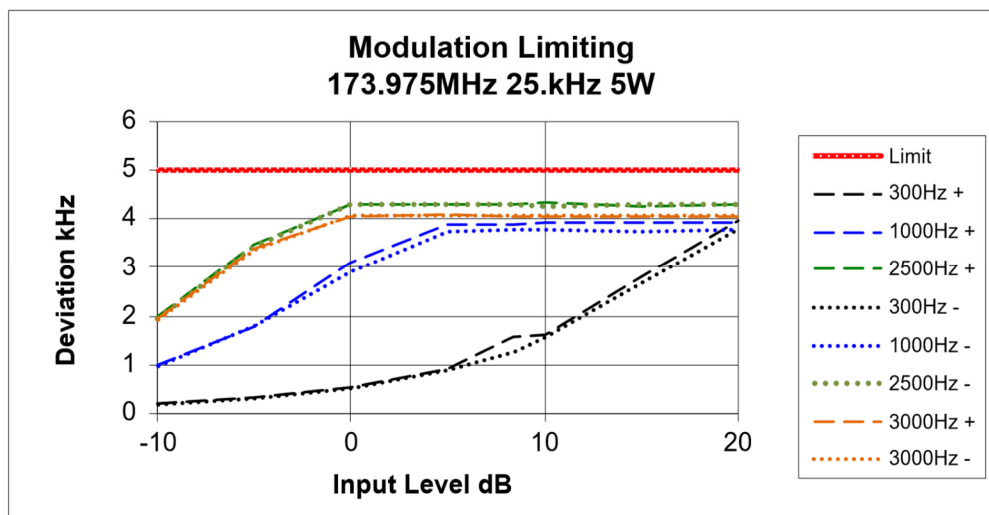
Tx FREQUENCY: 173.975 MHz

12.5 kHz Channel Spacing



Tx FREQUENCY: 173.975 MHz

25.0 kHz Channel Spacing



TRANSMITTER OCCUPIED (99%) BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1046
RSS-119 5.5

GUIDE: ANSI C63.26 5.4.4

MEASUREMENT PROCEDURE:

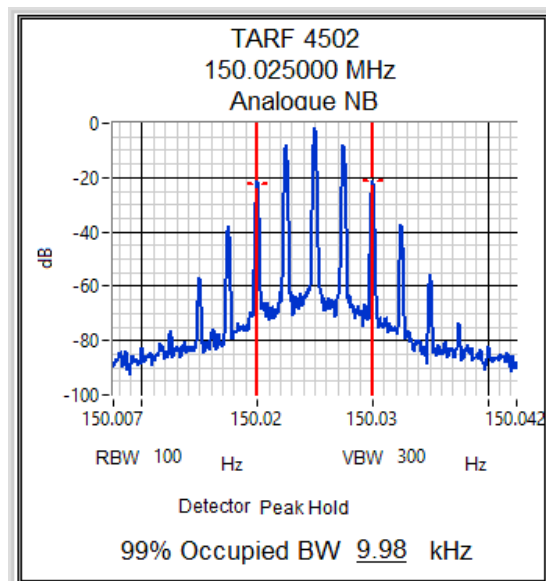
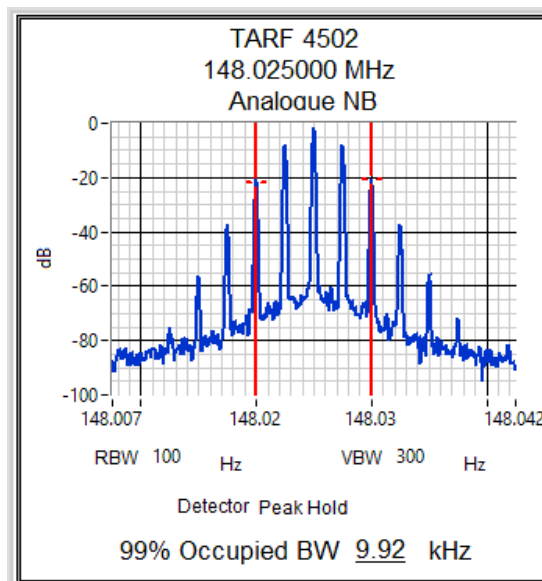
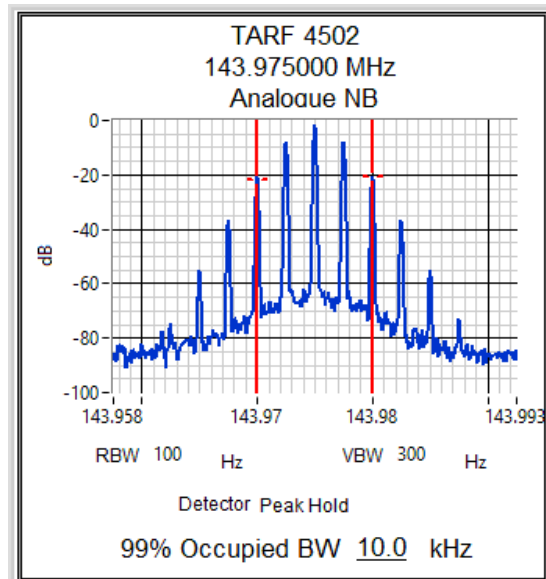
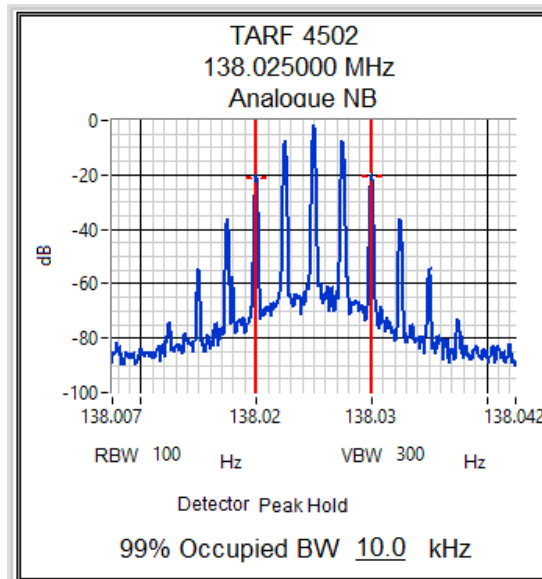
1. Refer Annex A for Equipment Set up.
2. For analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.
Resolution Bandwidth = 100 Hz, Video Bandwidth = 300 Hz

MEASUREMENT RESULTS:

Channel Frequency (MHz)	Bandwidths (kHz)		
	Analogue NB	Analogue WB	DMR
138.025 MHz	10.0	12.7	7.20
143.975 MHz	10.0	12.6	7.15
148.025 MHz	9.92	12.6	7.25
150.025 MHz	9.98	12.7	7.25
150.050 MHz	9.98	12.7	7.25
162.025 MHz	9.98	14.9	7.10
173.975 MHz	9.98	14.9	7.20
<u>Limit</u> Authorized Bandwidth 47 CFR 90.209 RSS 119 5.5	11.25	20.0	11.25
Necessary BW used in emission designator	11.0	16.0	8.0
Result	Pass	Pass	Pass

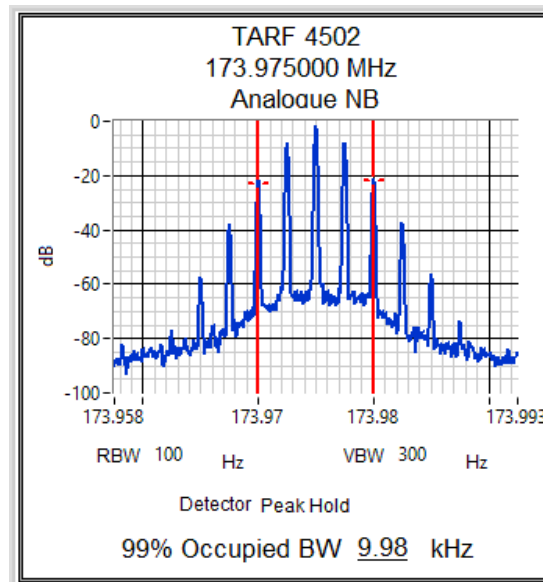
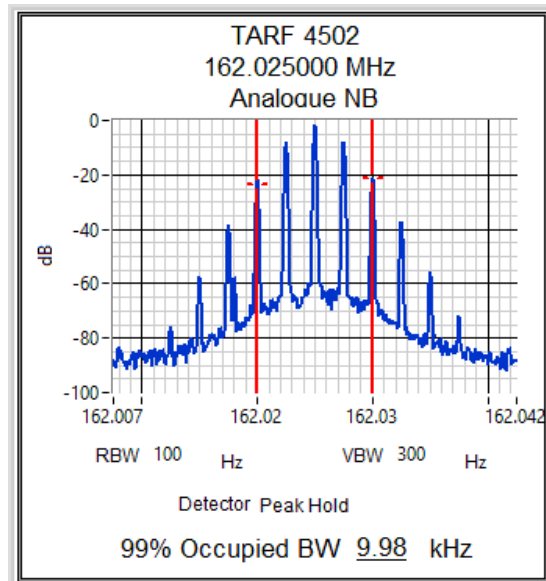
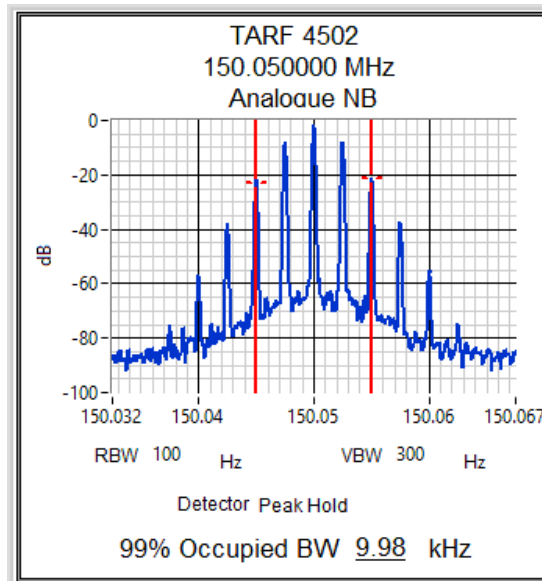
Transmitter Occupied (99%) Bandwidth

Channel 1 – 4 5 W 12.5 kHz Channel Spacing Analogue Modulation



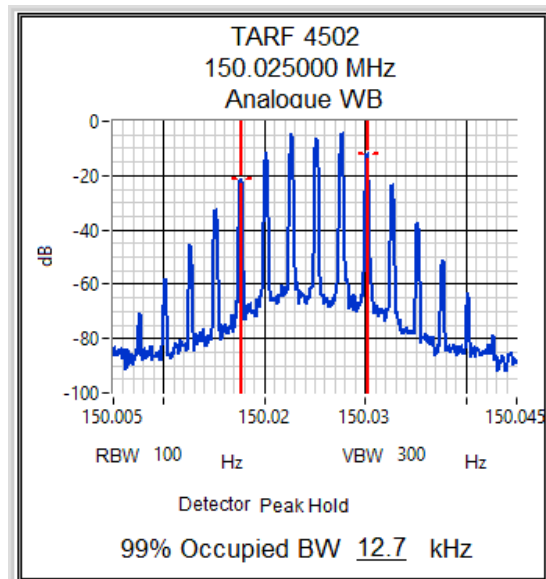
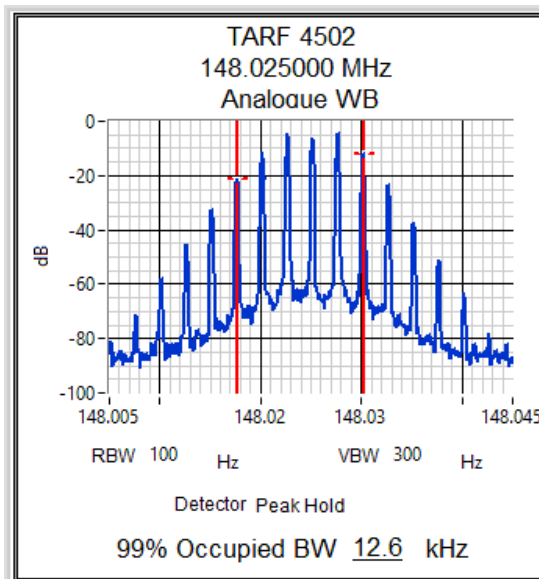
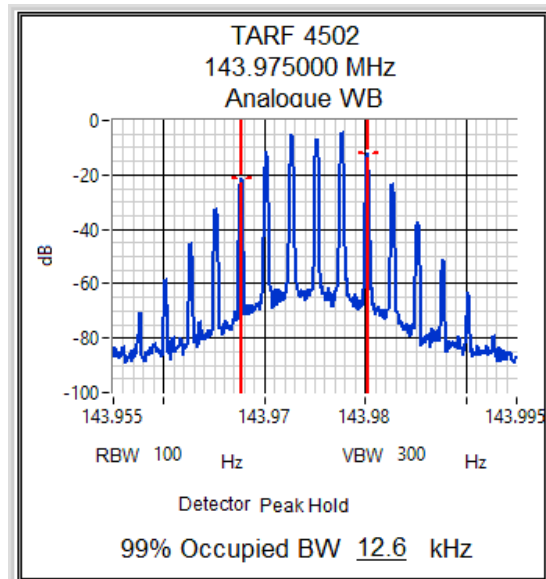
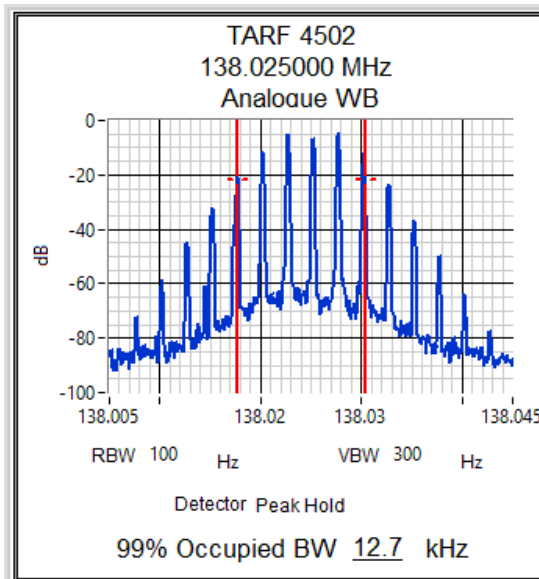
Transmitter Occupied (99%) Bandwidth

Channel 5 – 7 5 W 12.5 kHz Channel Spacing Analogue Modulation



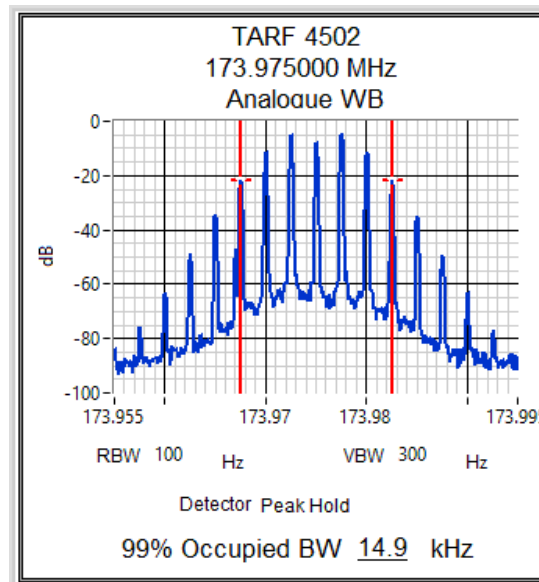
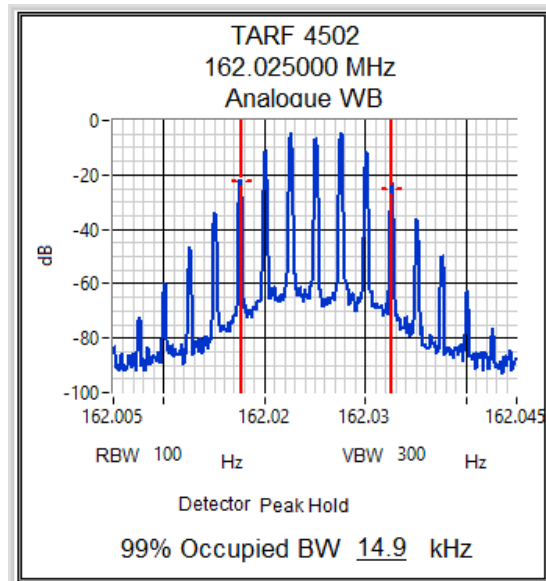
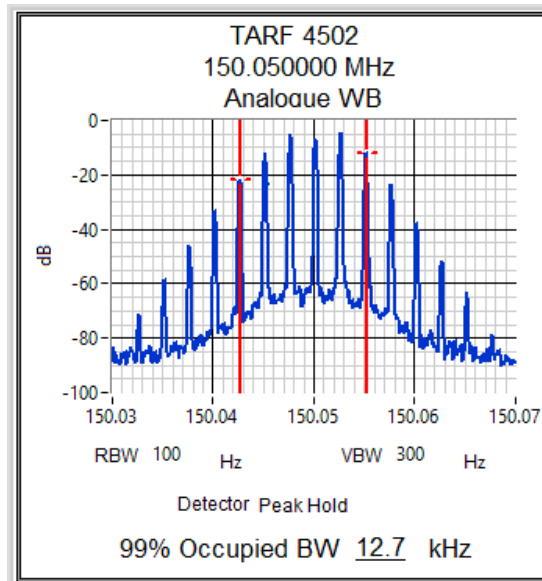
Transmitter Occupied (99%) Bandwidth

Channel 1 – 4 5 W 25.0 kHz Channel Spacing Analogue Modulation



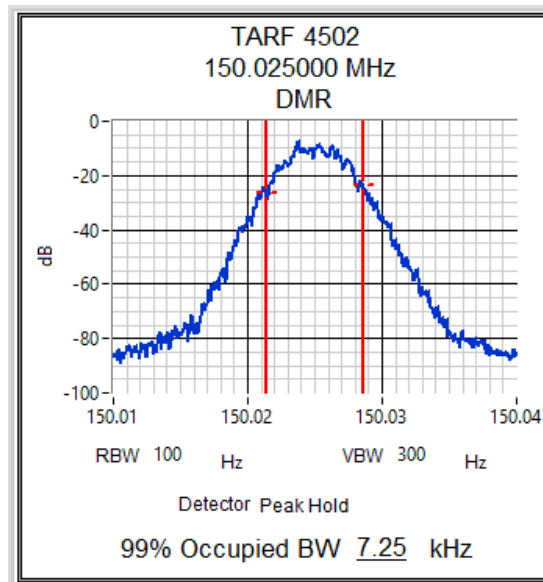
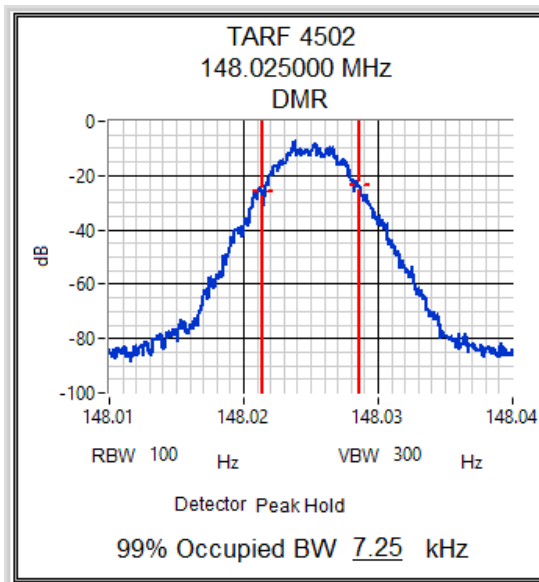
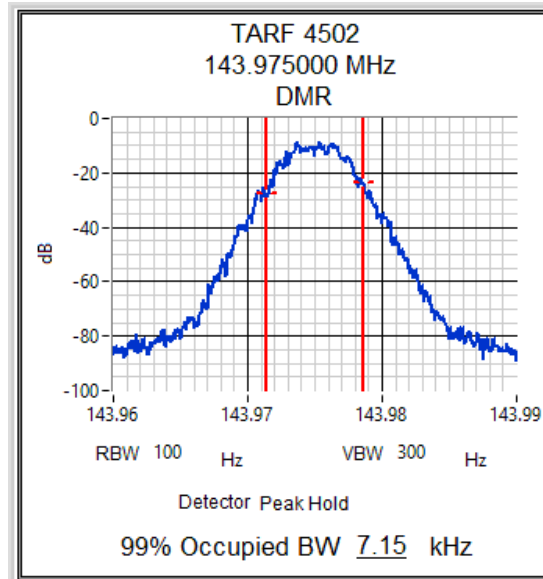
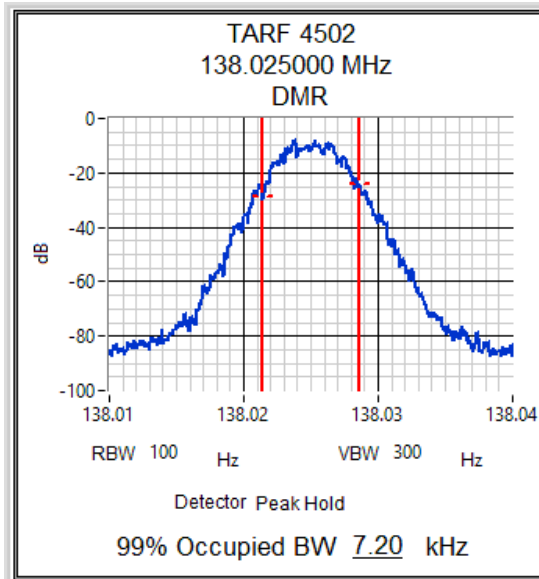
Transmitter Occupied (99%) Bandwidth

Channel 5 – 7 5 W 25.0 kHz Channel Spacing Analogue Modulation



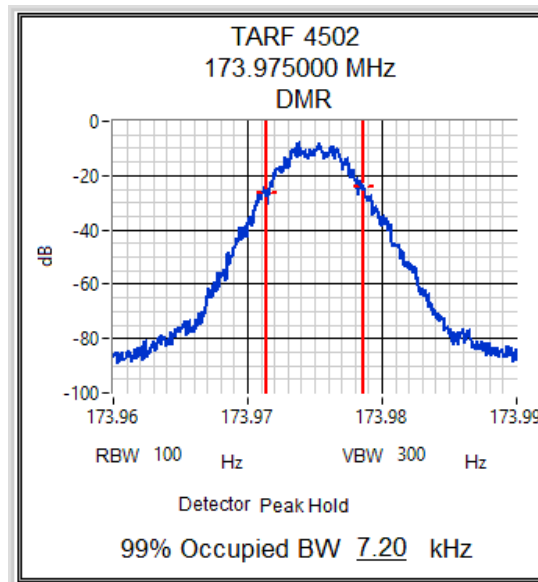
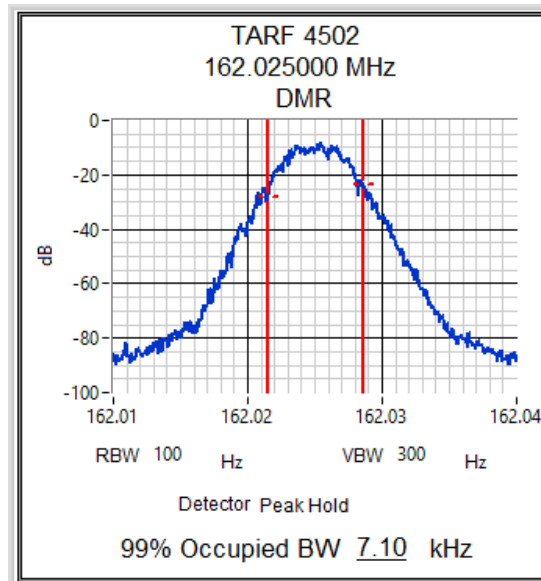
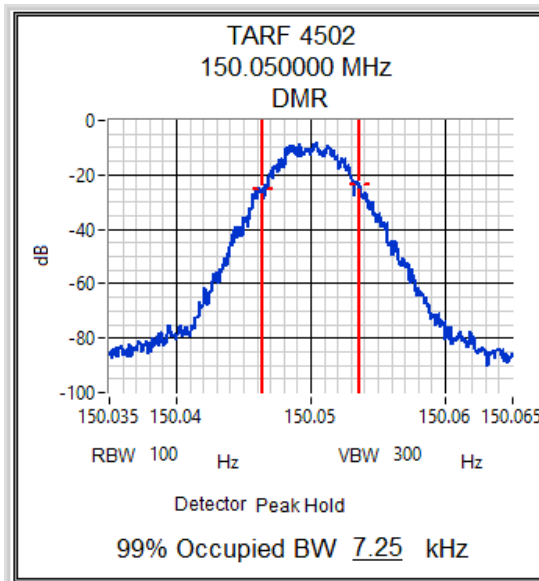
Transmitter Occupied (99%) Bandwidth

Channel 1 – 4 5 W 12.5 kHz Channel Spacing DMR Modulation



Transmitter Occupied (99%) Bandwidth

Channel 5 – 7 5 W 12.5 kHz Channel Spacing DMR Modulation



TRANSMITTER SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

GUIDE: ANSI C63.26.5.7.3

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
2. For analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The spectrum mask was measured on the Spectrum Analyser, with bandwidth settings as follows.
Emission Mask D – Resolution Bandwidth = 100 Hz, Video Bandwidth = 1 kHz
Emission Mask B – Resolution Bandwidth = 300 Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:

See the plots on the following pages.

MEASUREMENT UNCERTAINTY: 95% ± 0.65 dB

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

EMISSION MASKS

Emission Mask D	12.5 kHz Channel Spacing	Analogue NB and DMR
Emission Mask B	25.0 kHz Channel Spacing	Analogue WB

DATA SPEED

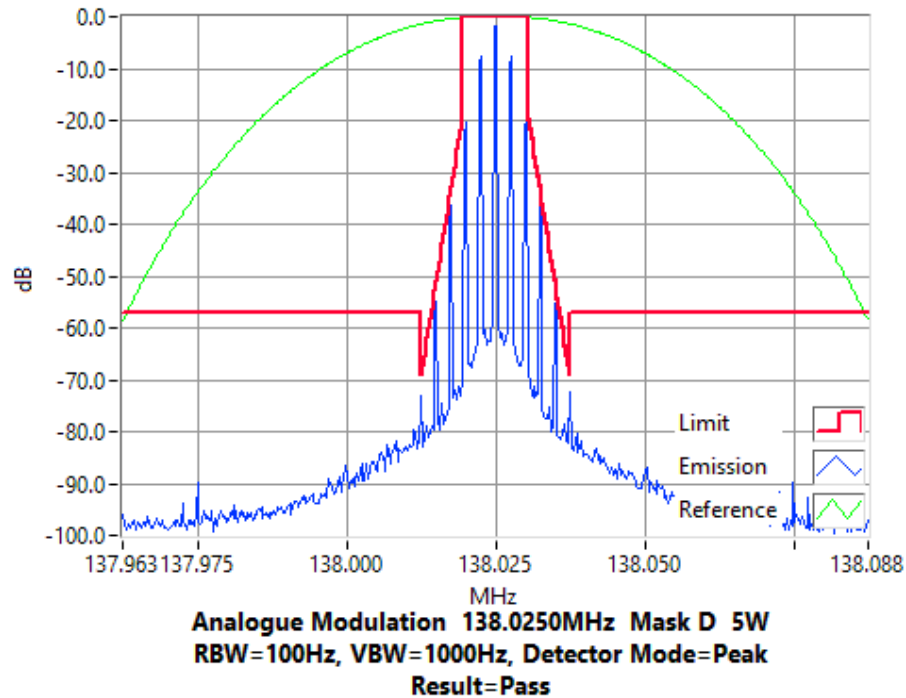
Digital Voice/Data	12.5 kHz Channel Spacing	9600 bps & 12000 bps
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Transmitter Spectrum Masks

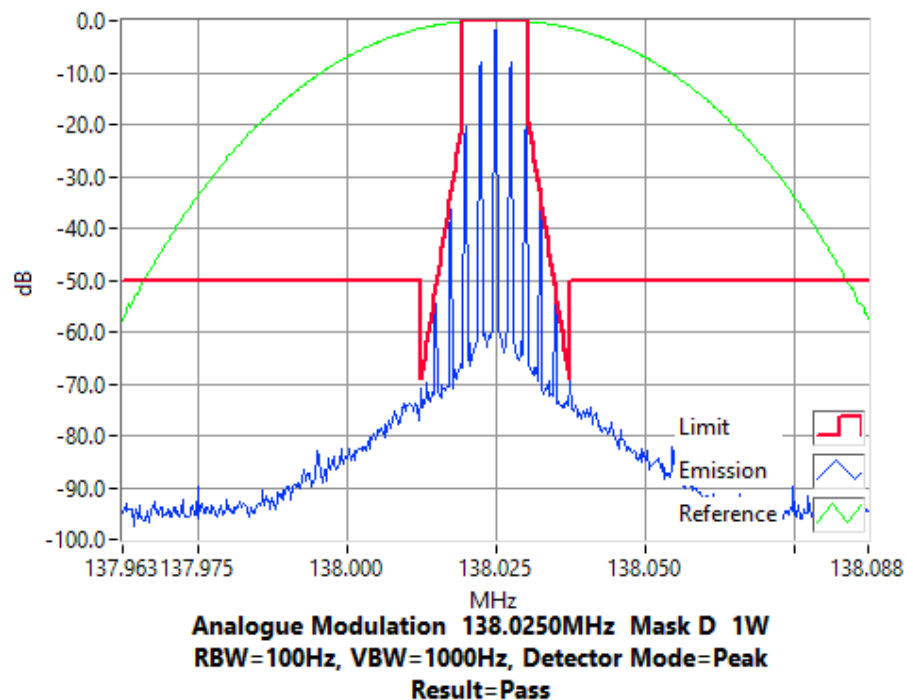
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 138.025 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 138.025 MHz 1 W 12.5 kHz Channel Spacing

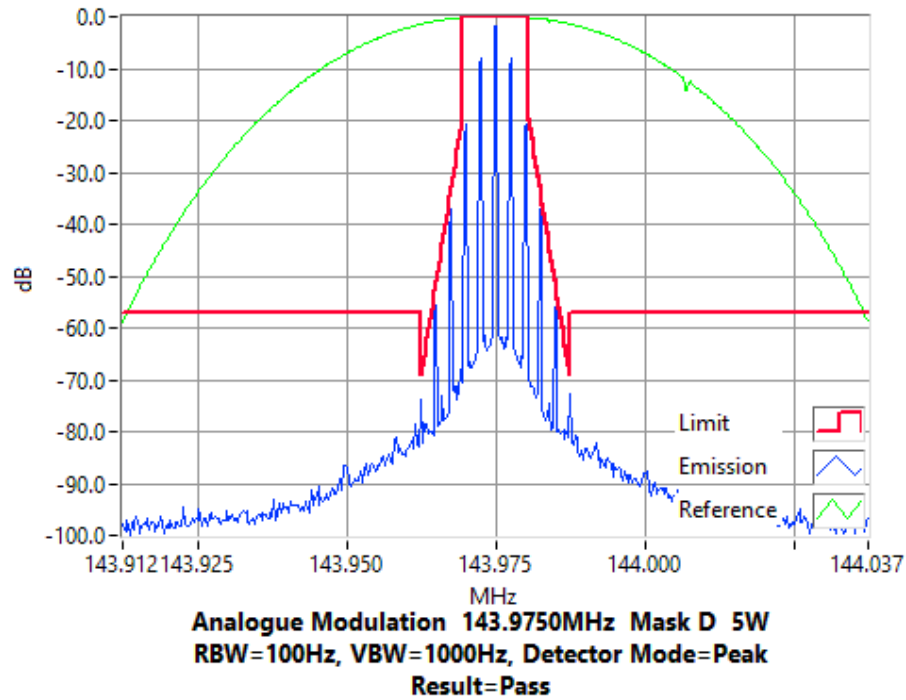


Transmitter Spectrum Masks

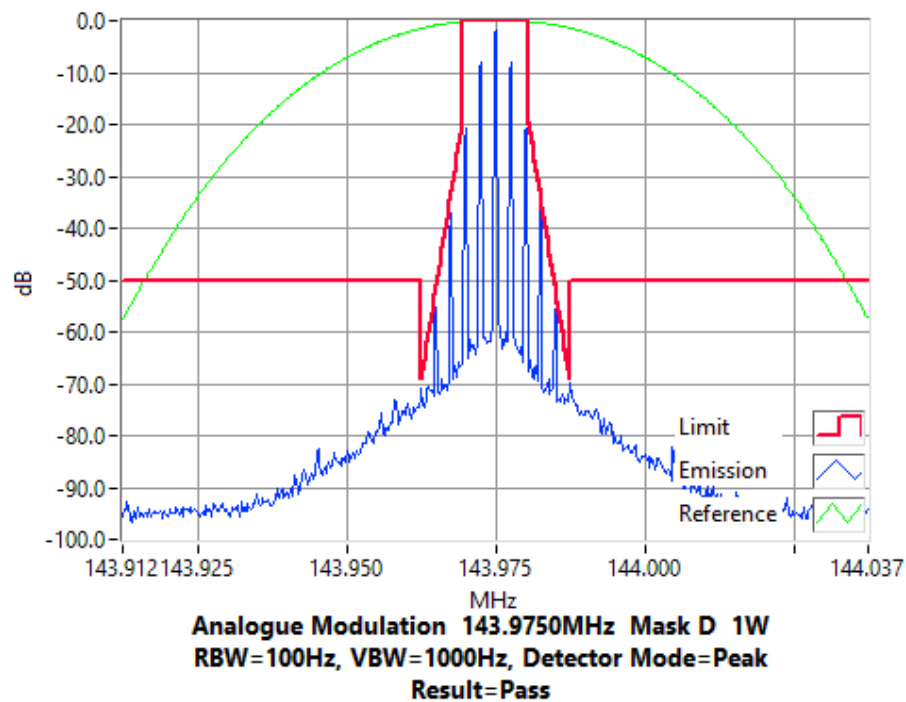
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 143.975 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 143.975 MHz 1 W 12.5 kHz Channel Spacing

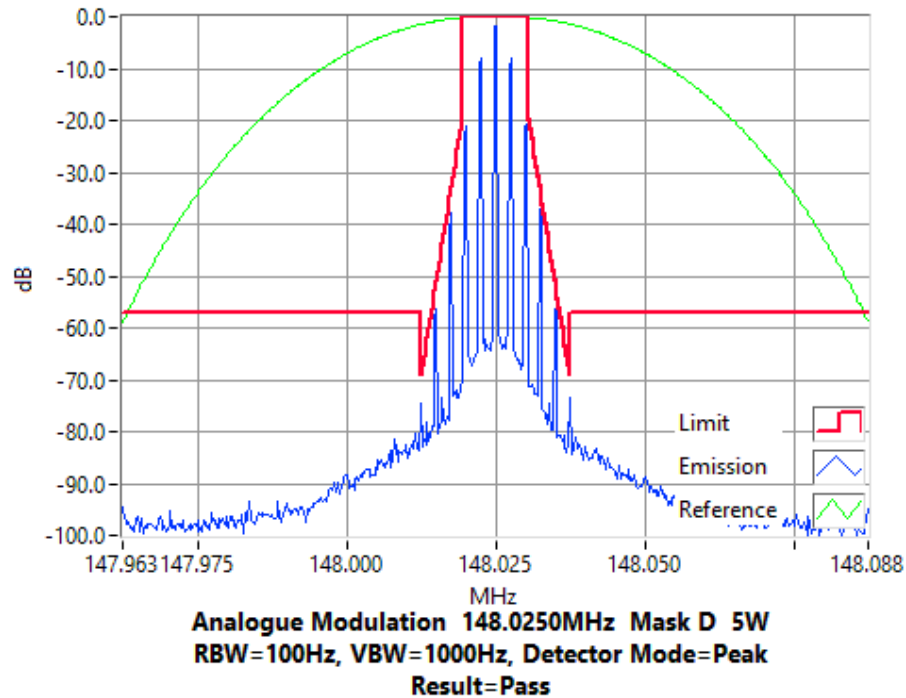


Transmitter Spectrum Masks

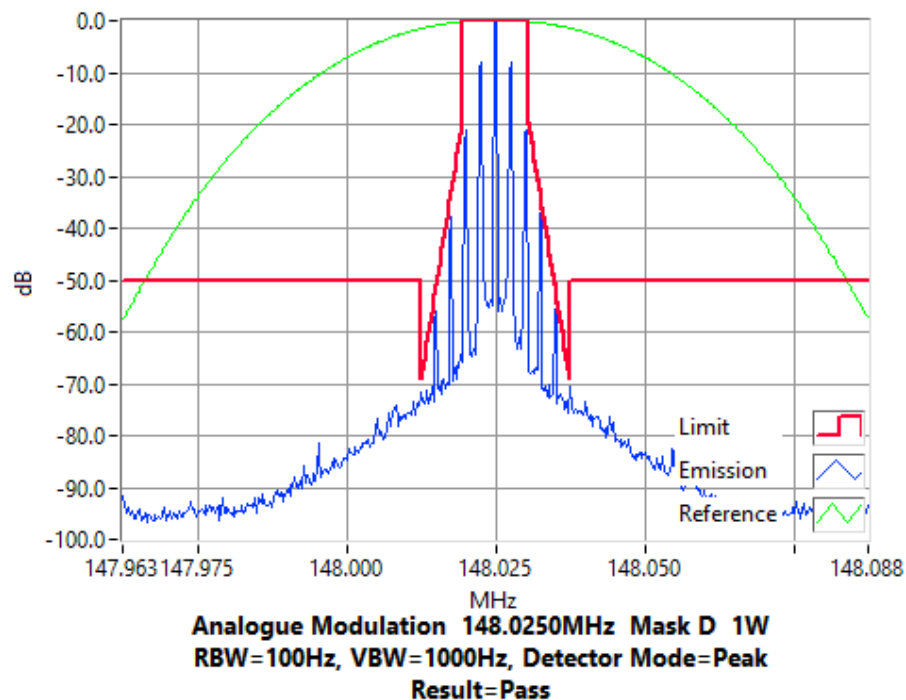
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 148.025 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 148.025 MHz 1 W 12.5 kHz Channel Spacing

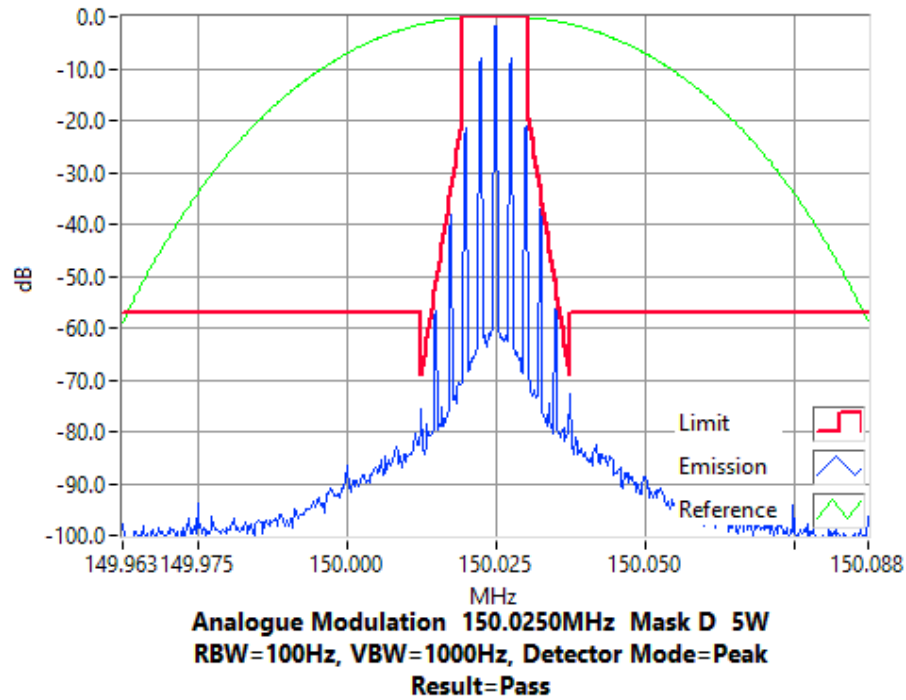


Transmitter Spectrum Masks

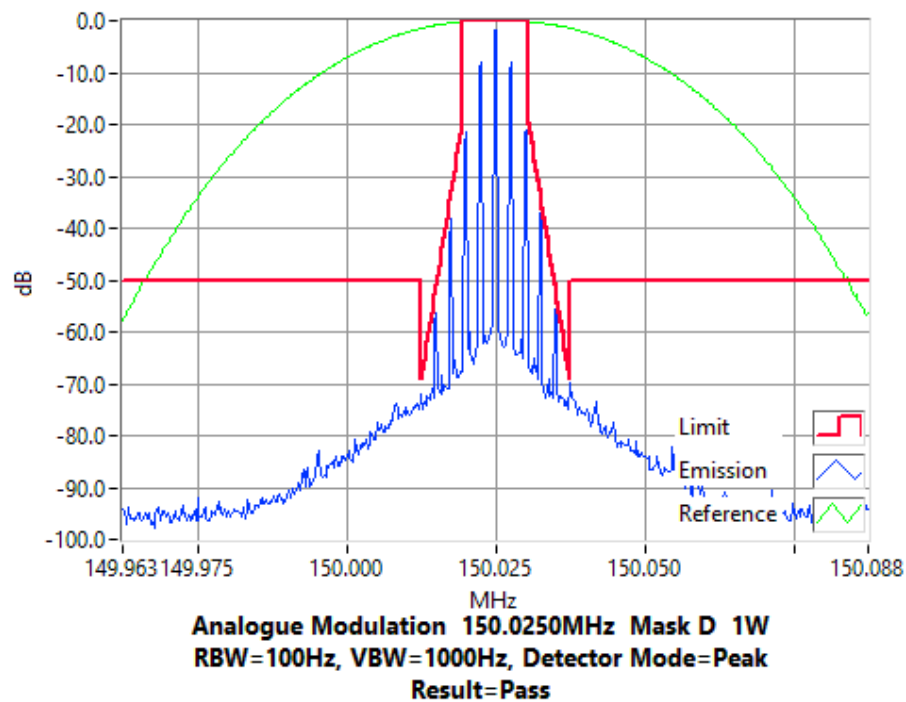
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 150.025 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 150.025 MHz 1 W 12.5 kHz Channel Spacing

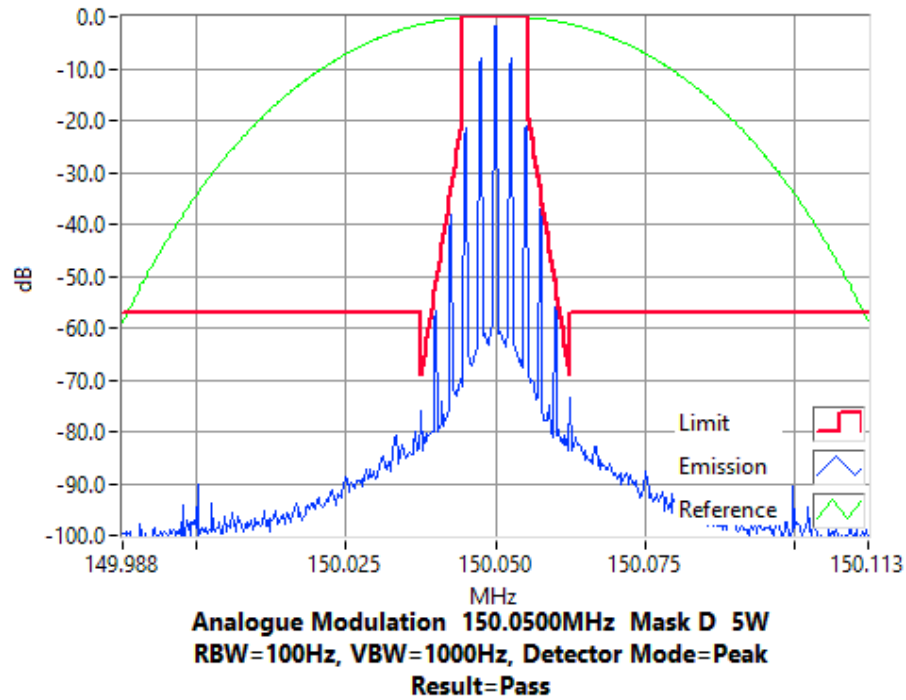


Transmitter Spectrum Masks

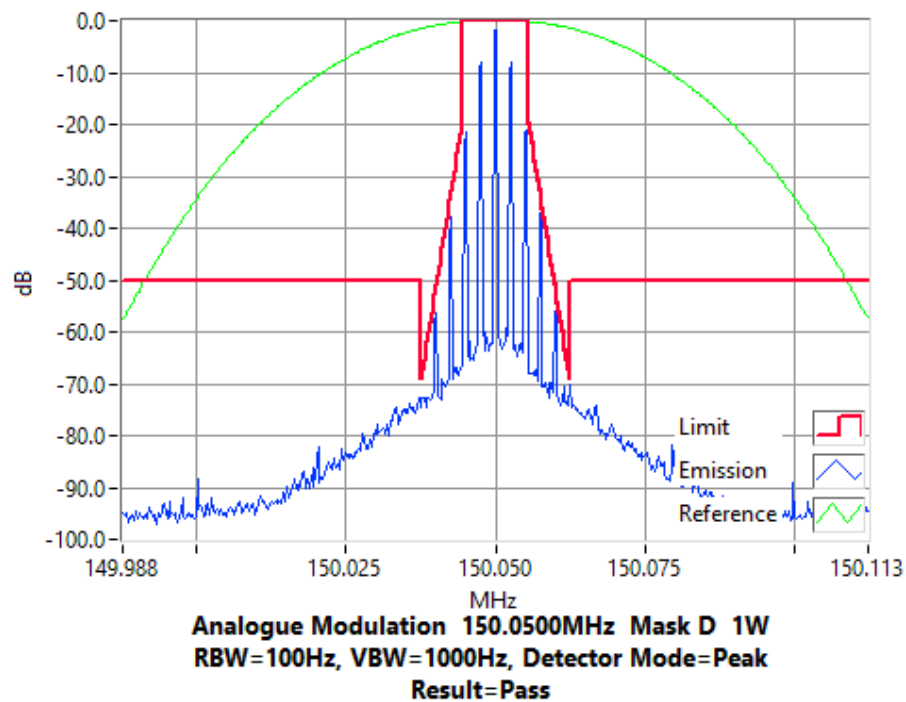
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 150.050 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 150.050 MHz 1 W 12.5 kHz Channel Spacing

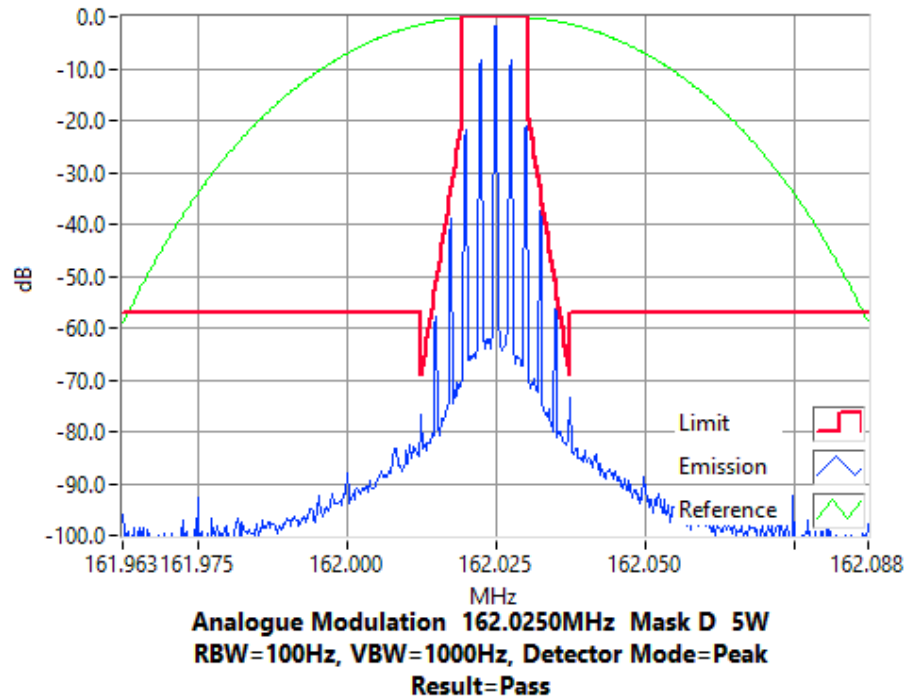


Transmitter Spectrum Masks

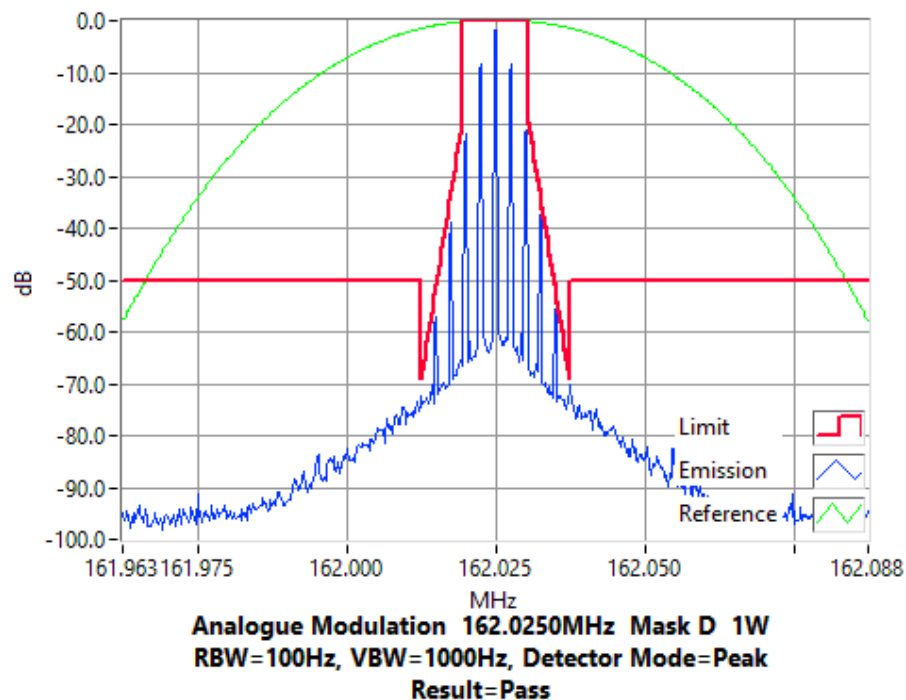
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 162.025 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 162.025 MHz 1 W 12.5 kHz Channel Spacing

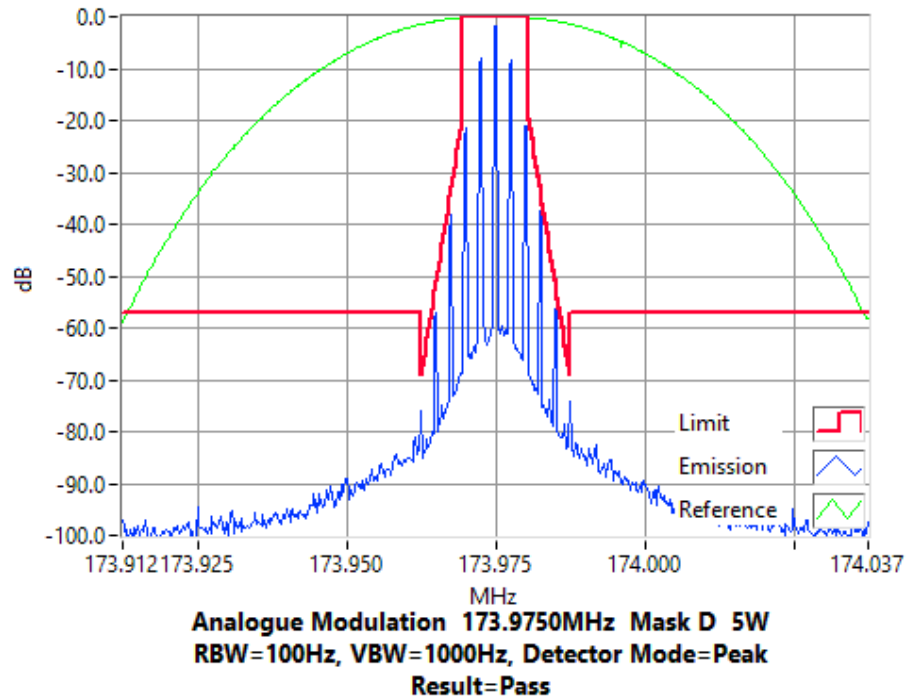


Transmitter Spectrum Masks

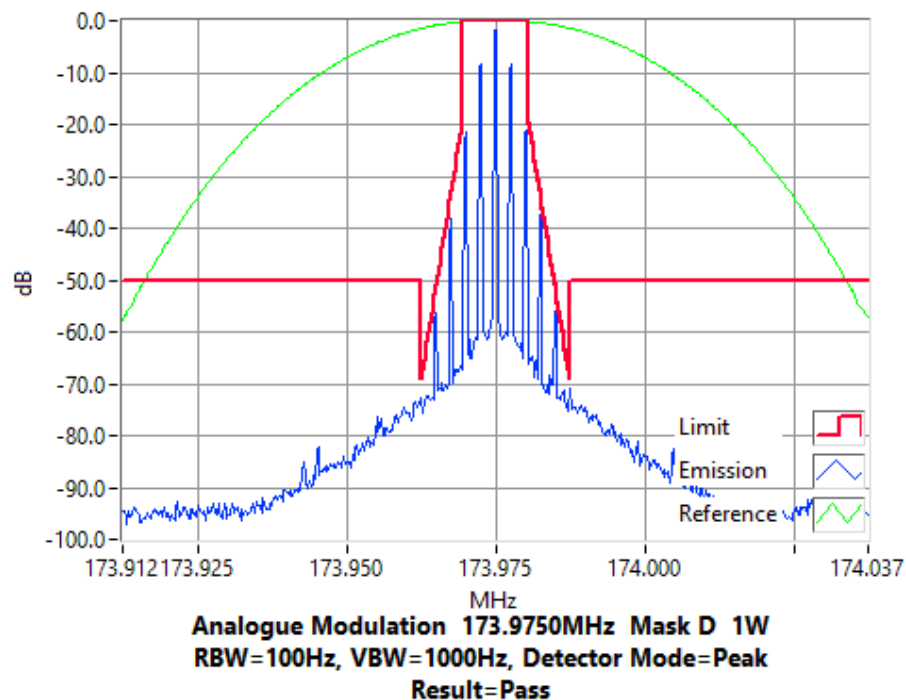
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 173.975 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 173.975 MHz 1 W 12.5 kHz Channel Spacing

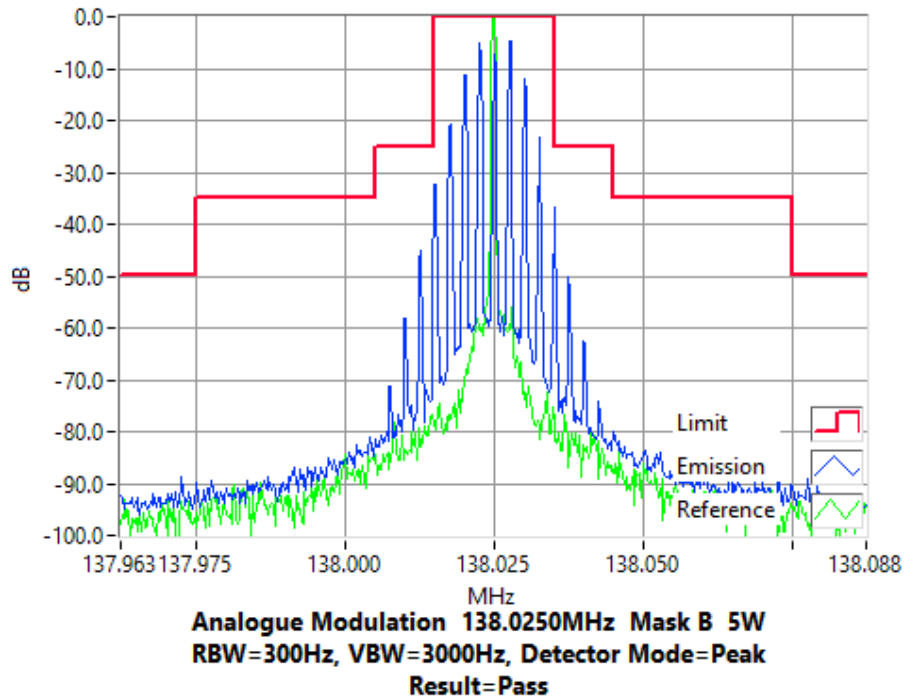


Transmitter Spectrum Masks

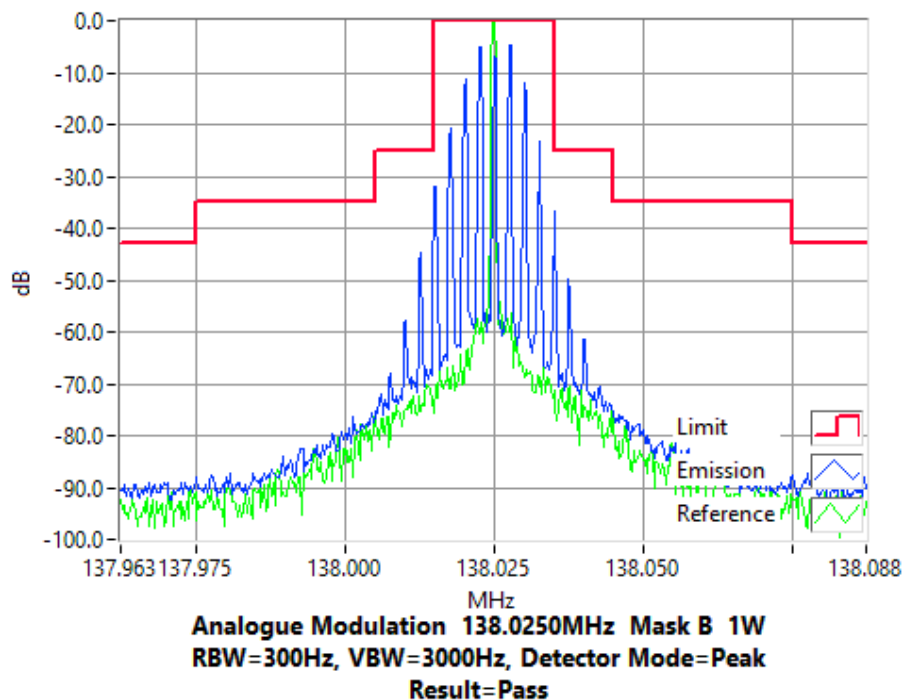
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 138.025 MHz 5 W 25.0 kHz Channel Spacing



Tx FREQUENCY: 138.025 MHz 1 W 25.0 kHz Channel Spacing

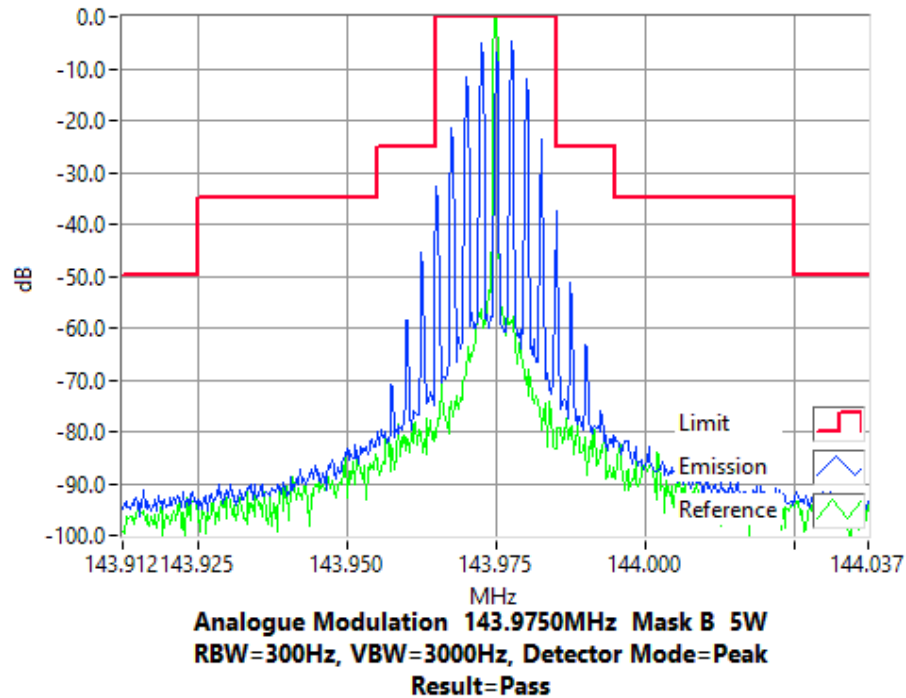


Transmitter Spectrum Masks

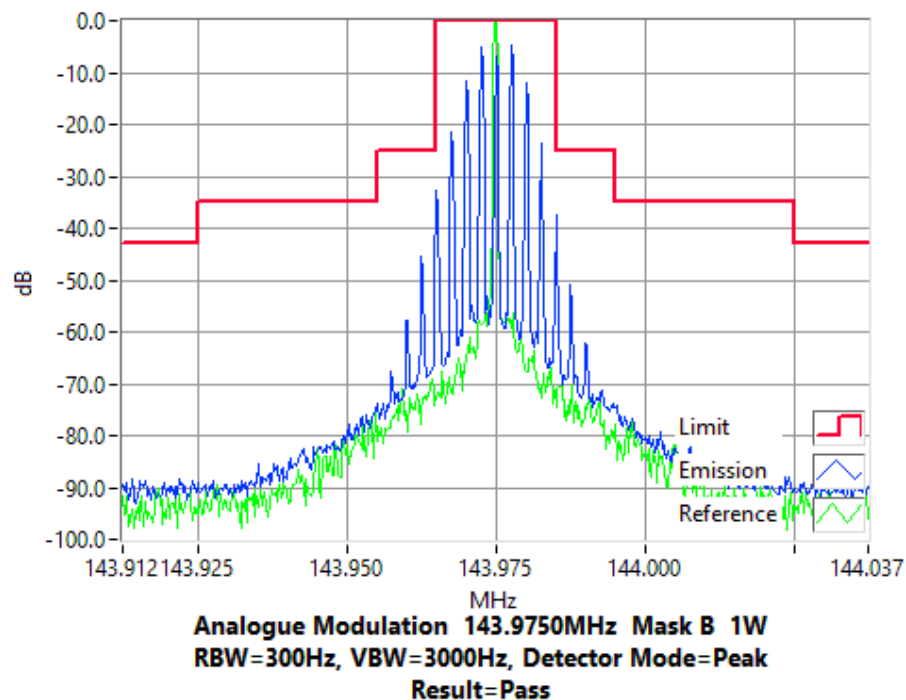
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 143.975 MHz 5 W 25.0 kHz Channel Spacing



Tx FREQUENCY: 143.975 MHz 1 W 25.0 kHz Channel Spacing

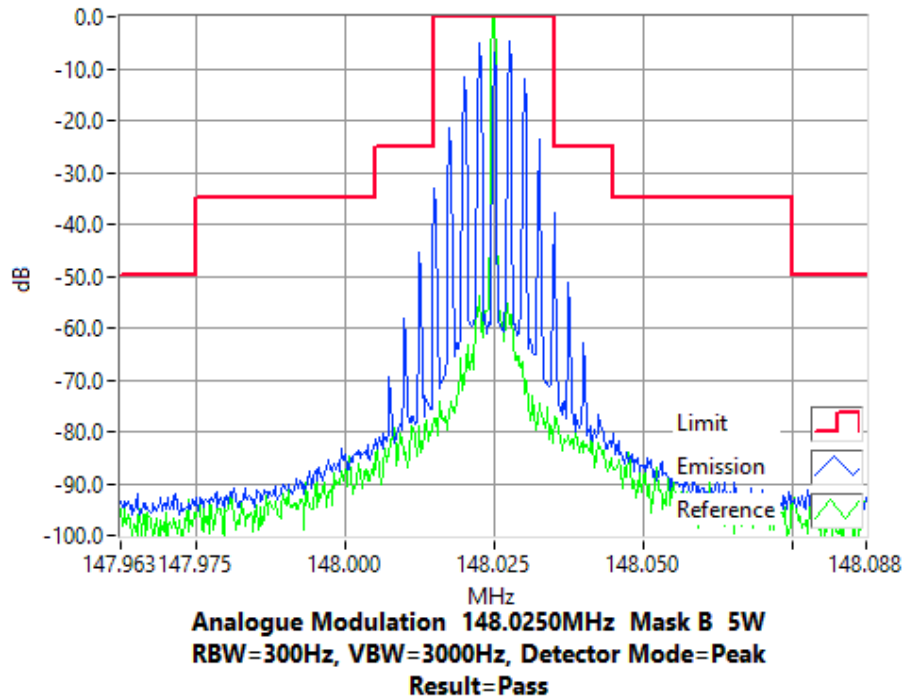


Transmitter Spectrum Masks

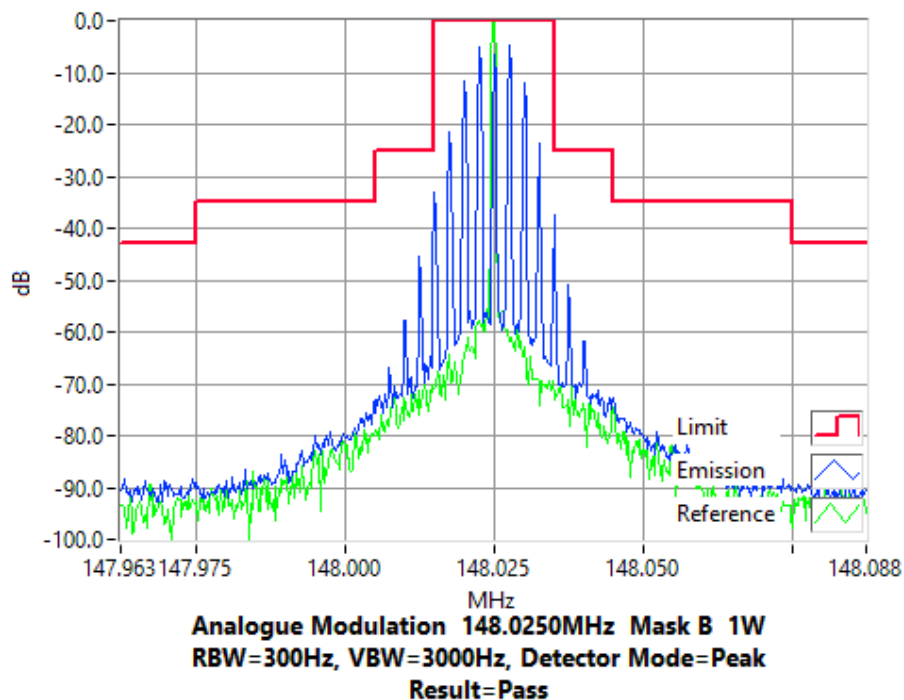
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 148.025 MHz 5 W 25.0 kHz Channel Spacing



Tx FREQUENCY: 148.025 MHz 1 W 25.0 kHz Channel Spacing

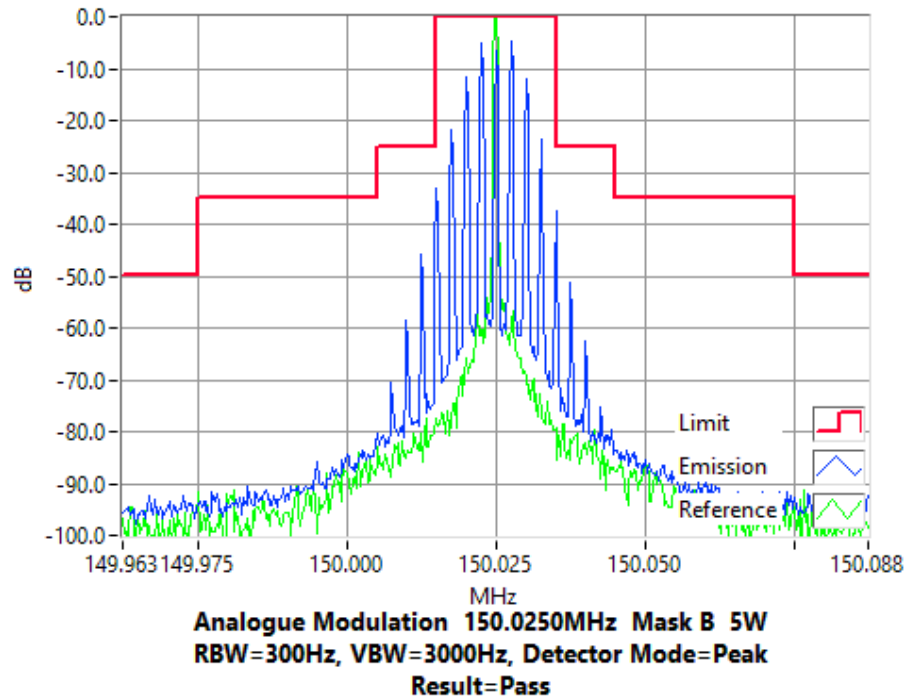


Transmitter Spectrum Masks

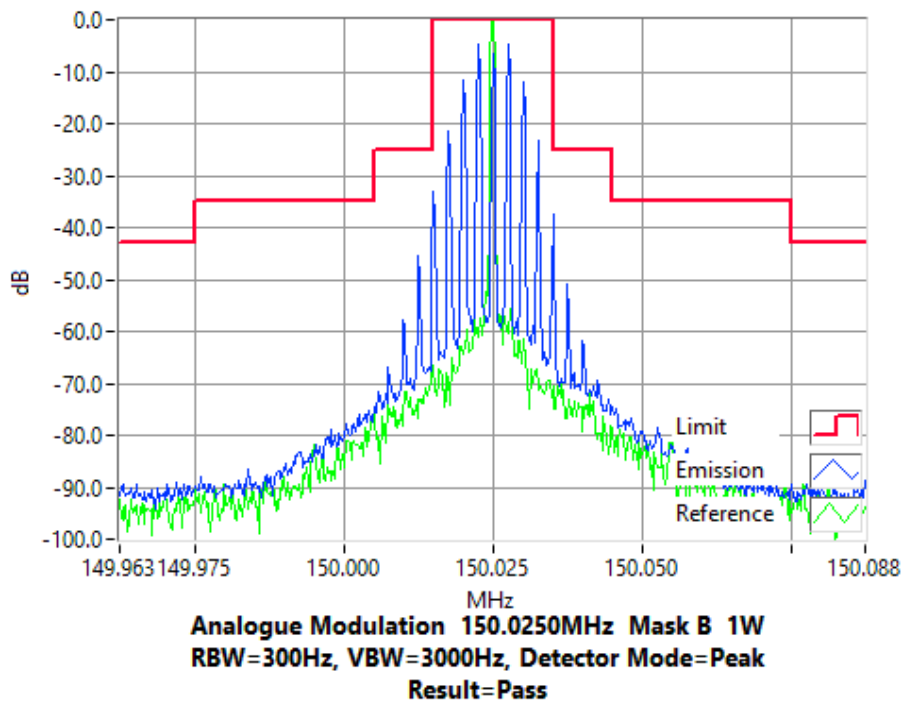
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 150.025 MHz 5 W 25.0 kHz Channel Spacing



Tx FREQUENCY: 150.025 MHz 1 W 25.0 kHz Channel Spacing

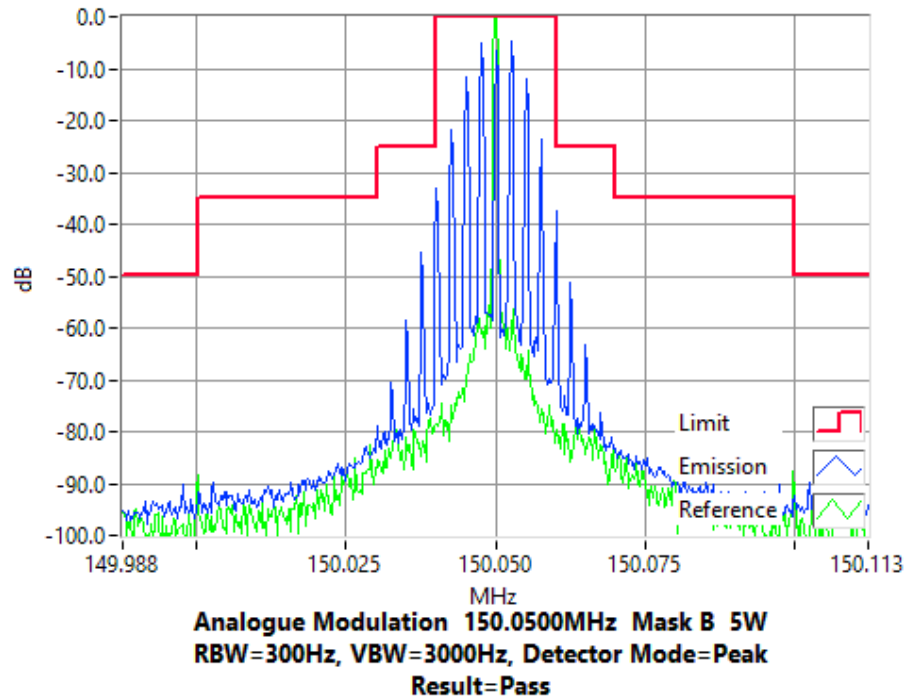


Transmitter Spectrum Masks

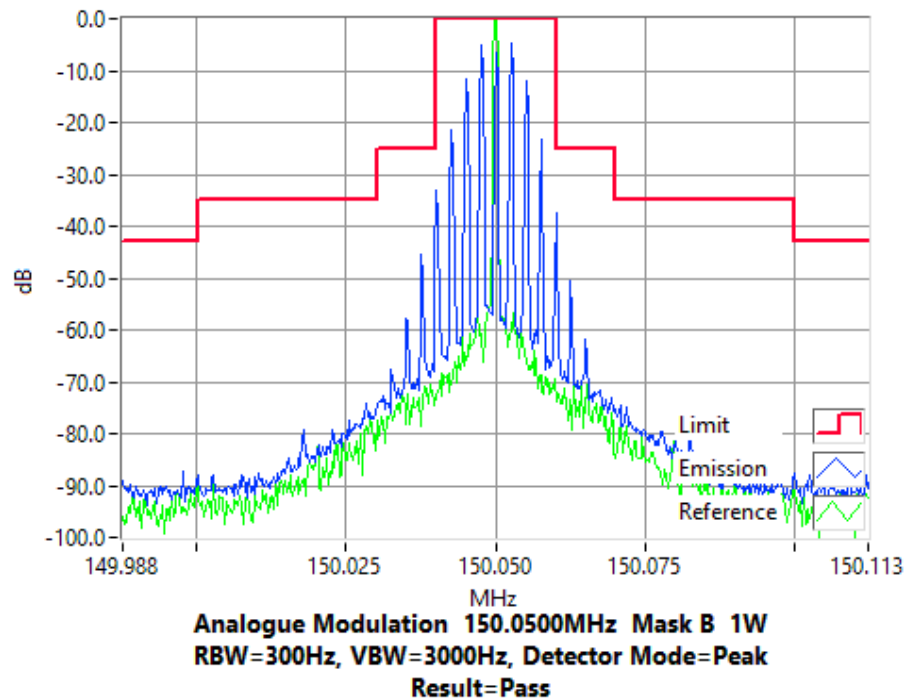
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 150.050 MHz 5 W 25.0 kHz Channel Spacing



Tx FREQUENCY: 150.050 MHz 1 W 25.0 kHz Channel Spacing

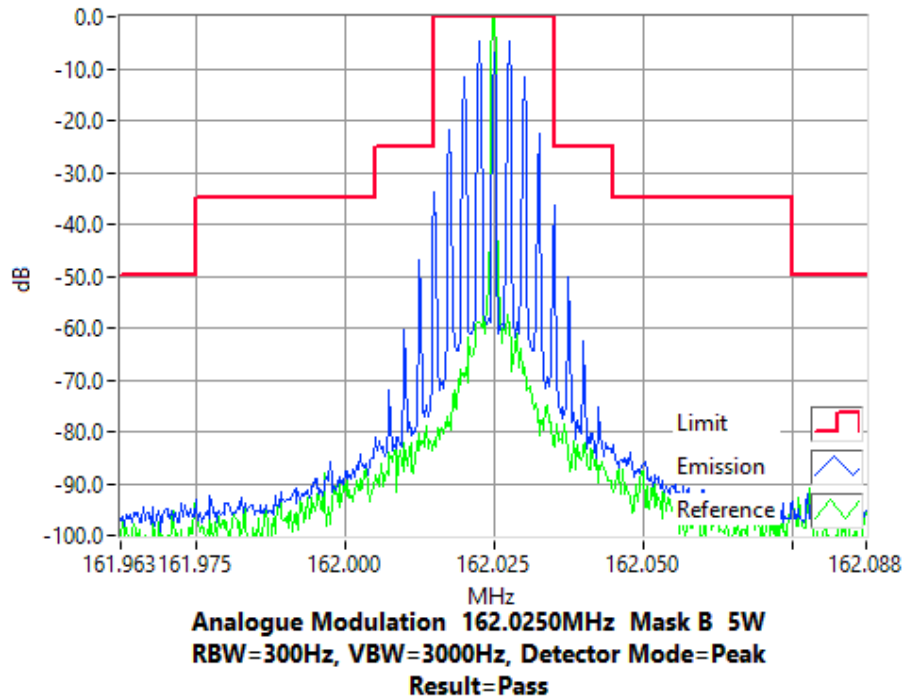


Transmitter Spectrum Masks

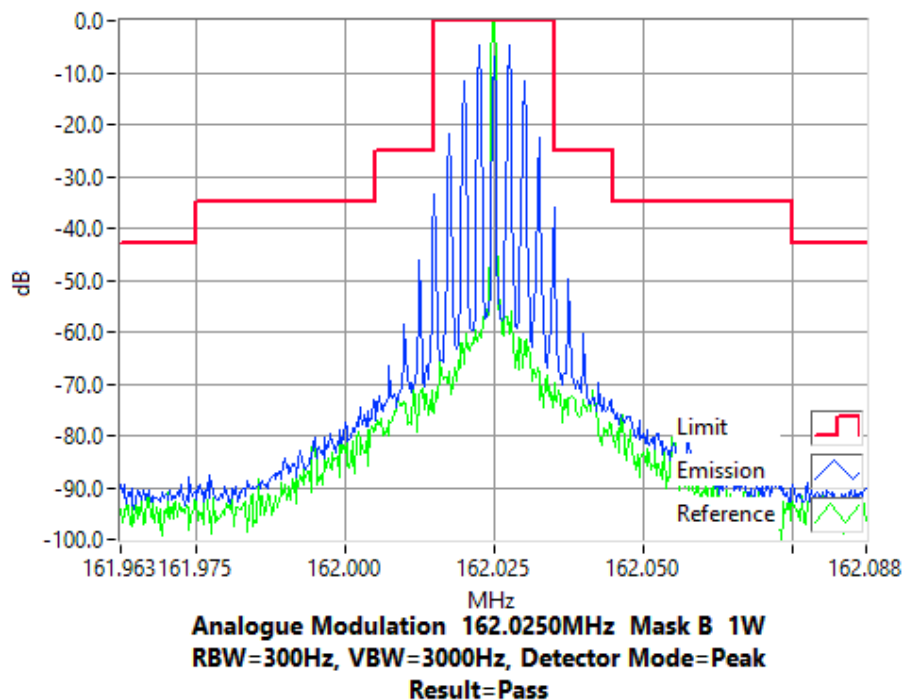
ANALOGUE VOICE

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 162.025 MHz 5 W 25.0 kHz Channel Spacing



Tx FREQUENCY: 162.025 MHz 1 W 25.0 kHz Channel Spacing

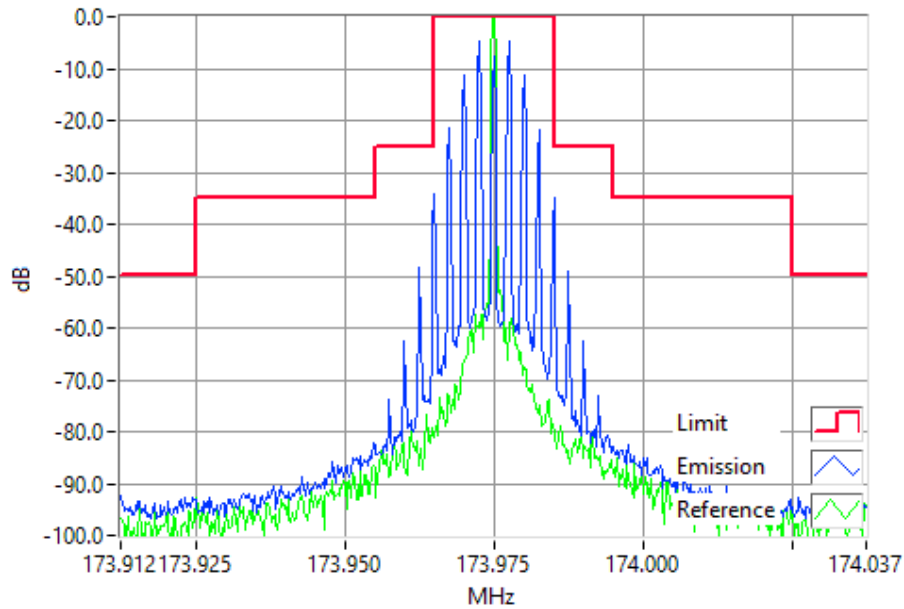


Transmitter Spectrum Masks

ANALOGUE VOICE

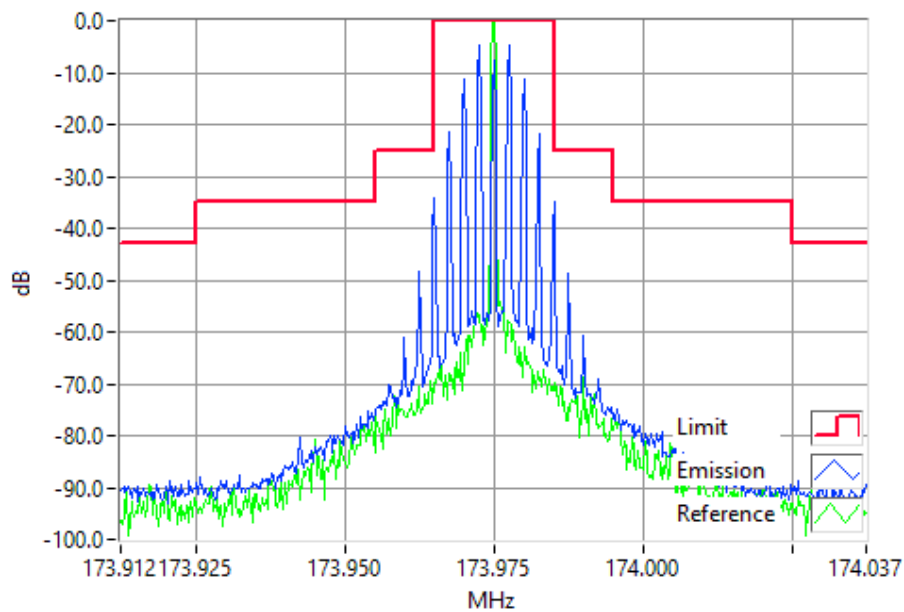
SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 173.975 MHz 5 W 25.0 kHz Channel Spacing



Analogue Modulation 173.9750MHz Mask B 5W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 173.975 MHz 1 W 25.0 kHz Channel Spacing



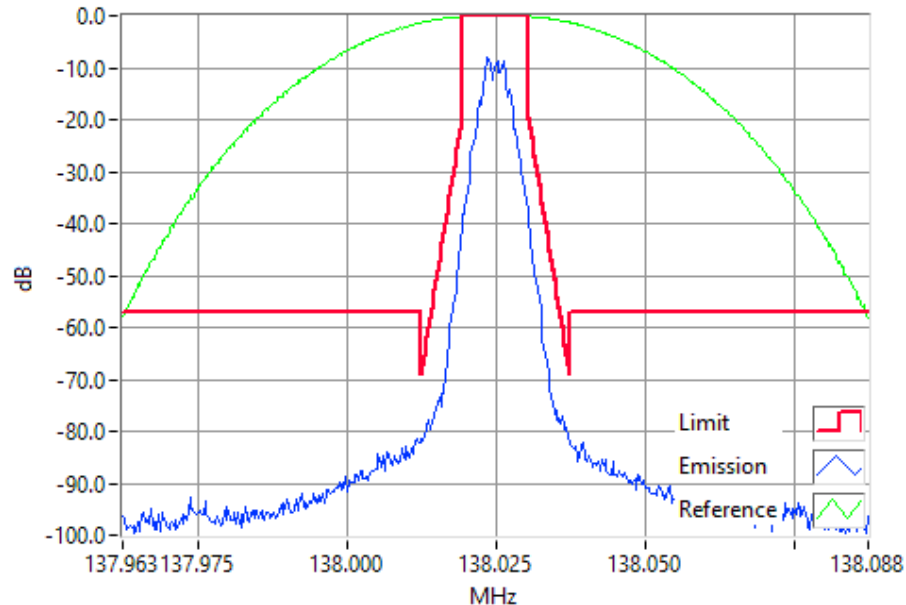
Analogue Modulation 173.9750MHz Mask B 1W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Transmitter Spectrum Masks

DMR

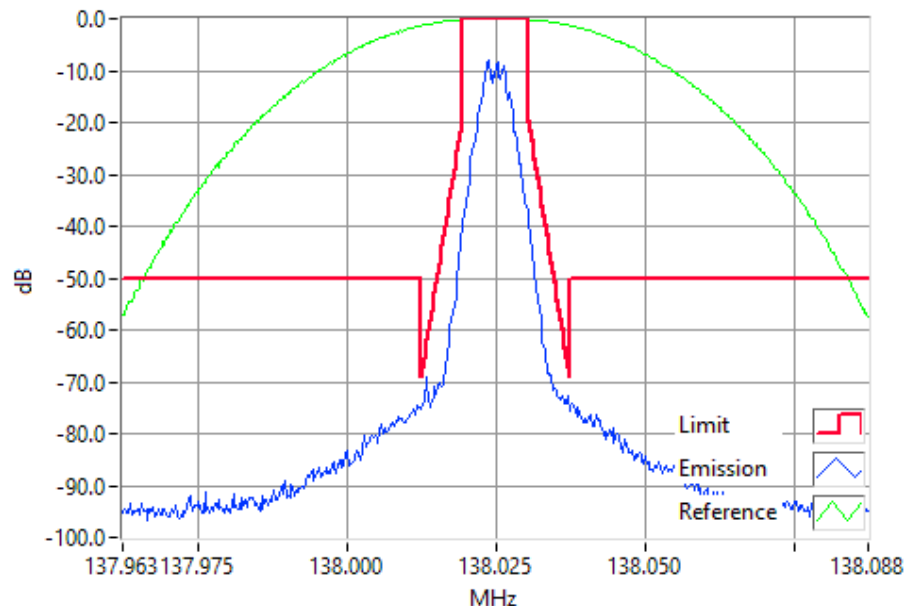
SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 138.025 MHz 5 W 12.5 kHz Channel Spacing



DMR 138.0250MHz Mask D 5W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 138.025 MHz 1 W 12.5 kHz Channel Spacing



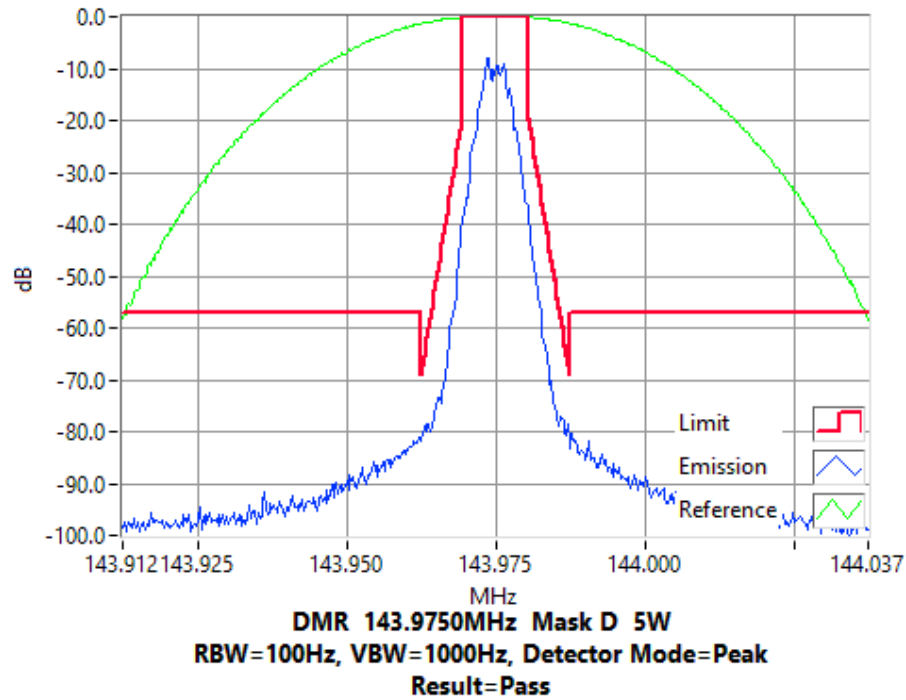
DMR 138.0250MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Transmitter Spectrum Masks

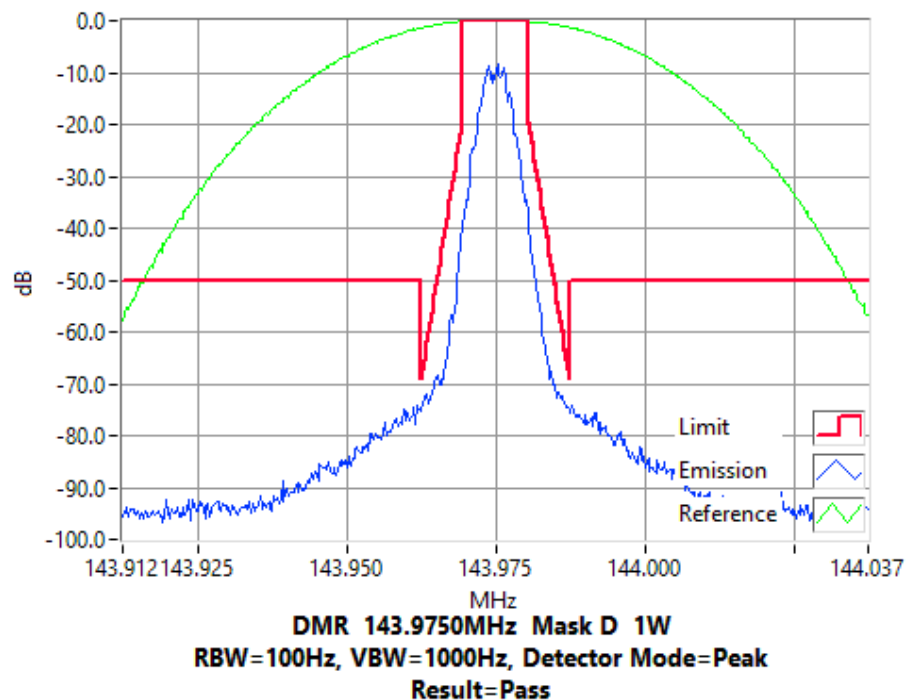
DMR

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 143.975 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 143.975 MHz 1 W 12.5 kHz Channel Spacing

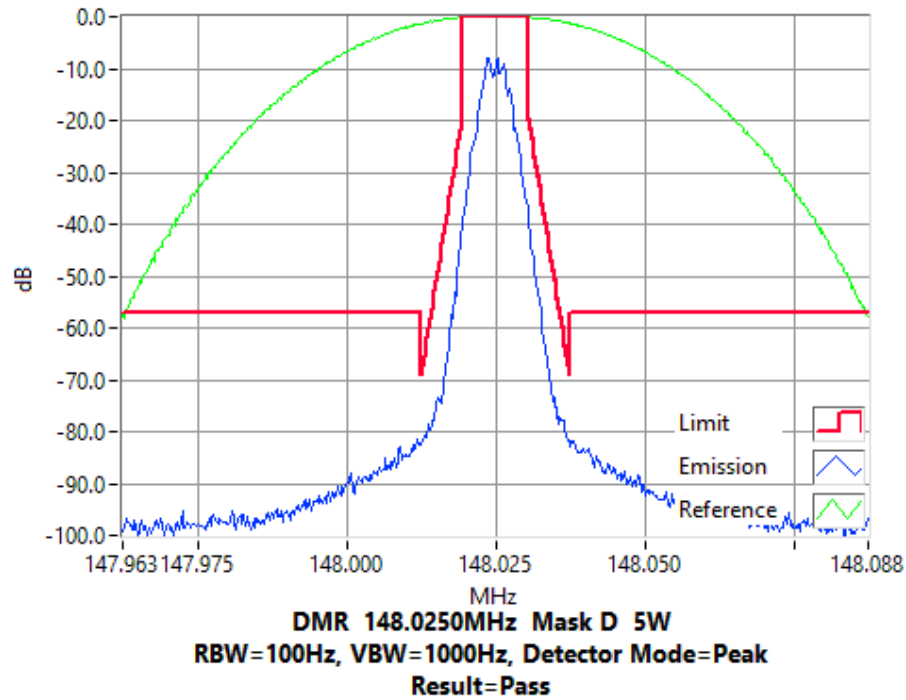


Transmitter Spectrum Masks

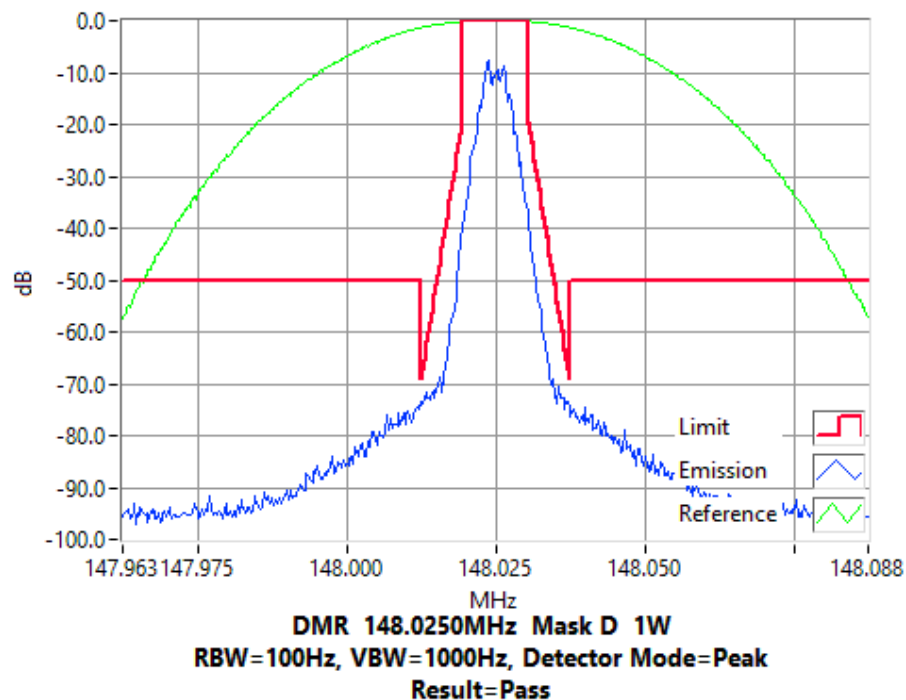
DMR

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 148.025 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 148.025 MHz 1 W 12.5 kHz Channel Spacing

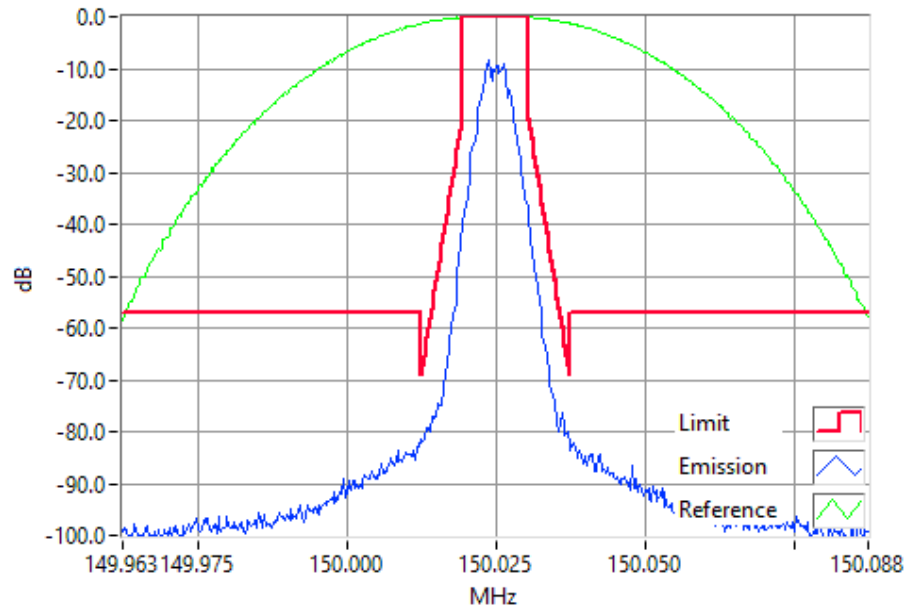


Transmitter Spectrum Masks

DMR

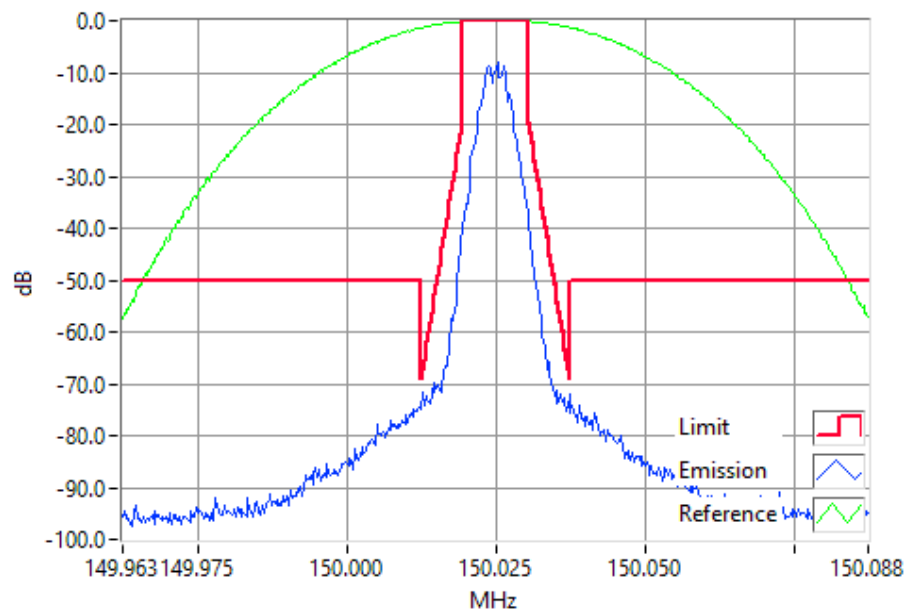
SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 150.025 MHz 5 W 12.5 kHz Channel Spacing



DMR 150.025MHz Mask D 5W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 150.025 MHz 1 W 12.5 kHz Channel Spacing



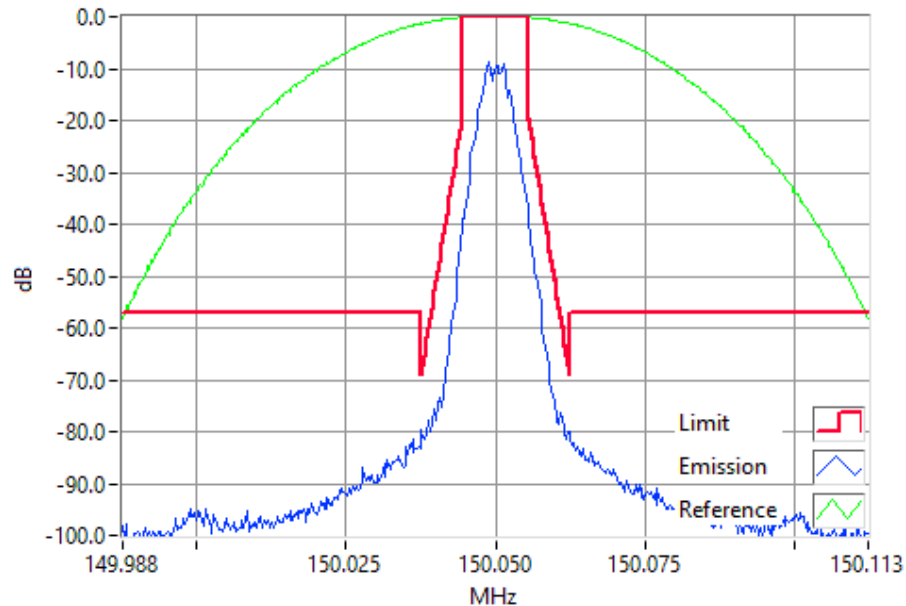
DMR 150.025MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Transmitter Spectrum Masks

DMR

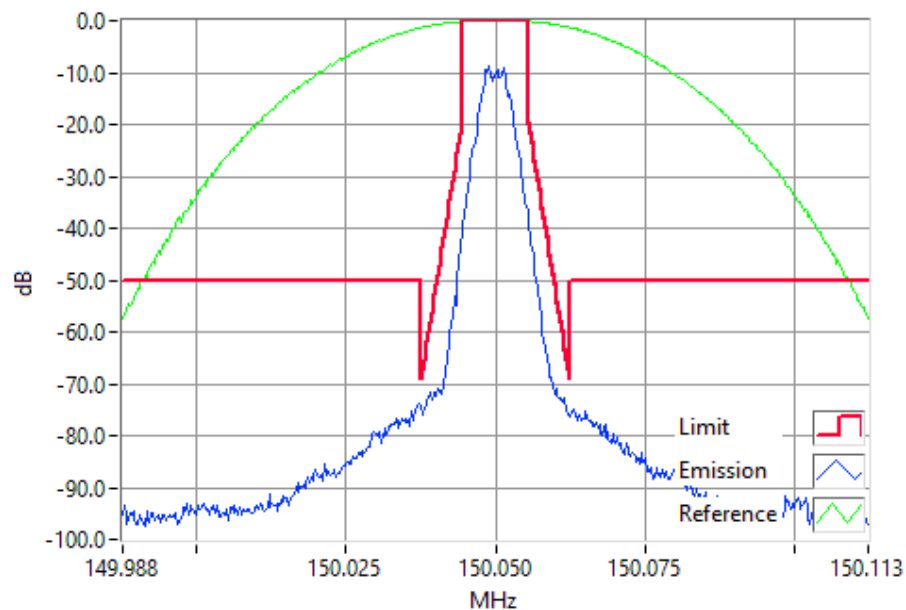
SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 150.050 MHz 5 W 12.5 kHz Channel Spacing



DMR 150.0500MHz Mask D 5W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 150.050 MHz 1 W 12.5 kHz Channel Spacing



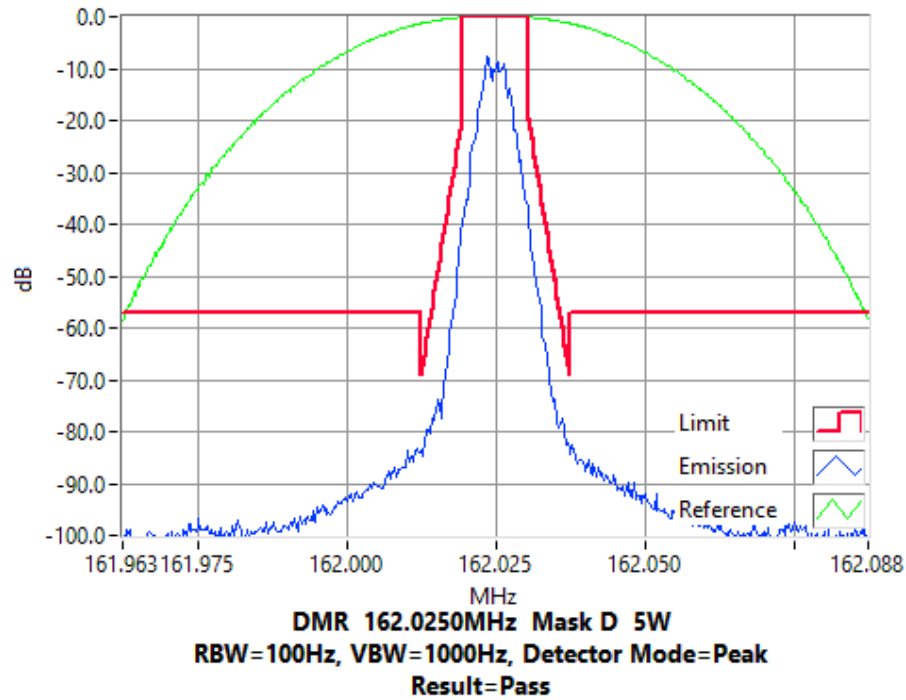
DMR 150.0500MHz Mask D 1W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Transmitter Spectrum Masks

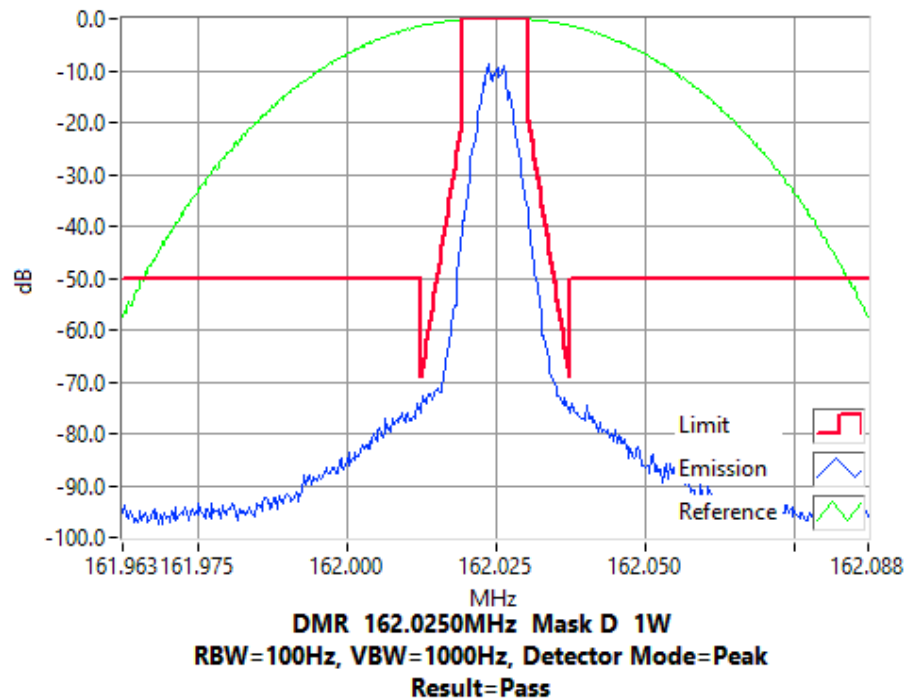
DMR

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 162.025 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 162.025 MHz 1 W 12.5 kHz Channel Spacing

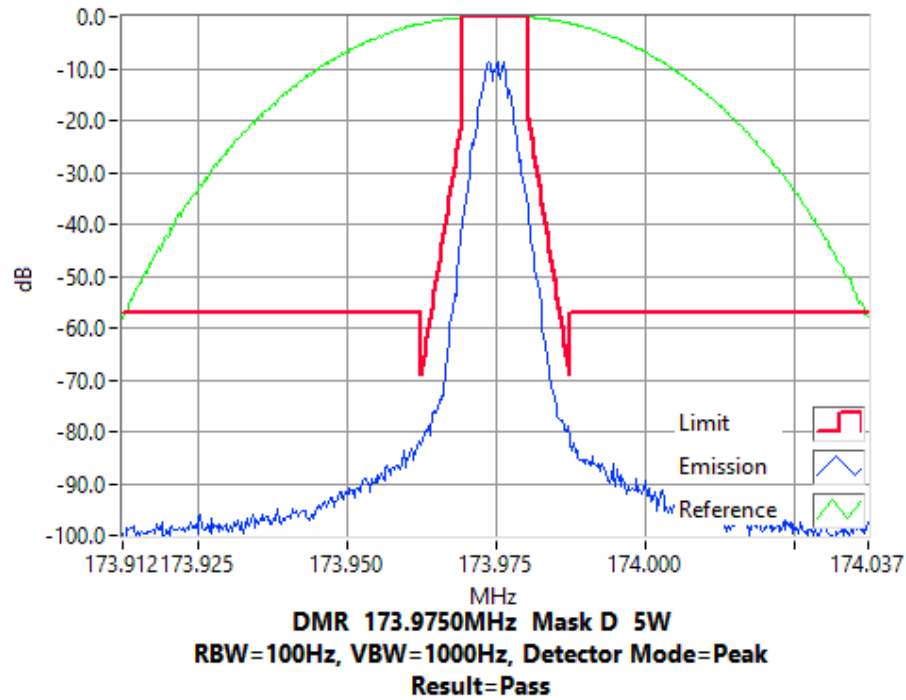


Transmitter Spectrum Masks

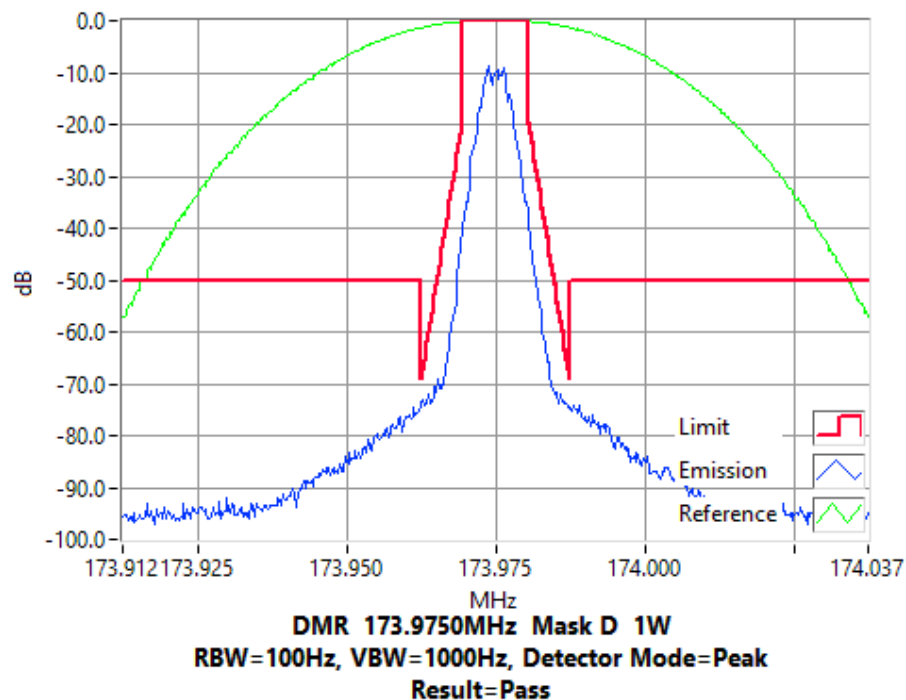
DMR

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 173.975 MHz 5 W 12.5 kHz Channel Spacing



Tx FREQUENCY: 173.975 MHz 1 W 12.5 kHz Channel Spacing



TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATIONS: FCC 47 CFR 2.1051

RSS-119 5.8

GUIDE: ANSI C63.26 5.7

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10th Harmonic:
9 kHz to Fc-BW
Fc + BW to 10Fc (1.8 GHz)
3. The EUT was set to transmit high or low power. A scan is performed with a resolution bandwidth of 100 kHz and a video bandwidth of 300 kHz for frequencies up to 1 GHz, and a resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz for frequencies above 1 GHz.
4. For frequencies close to the carrier the spectrum was measured using a resolution bandwidth of 1kHz, the results were then integrated to give measurements for 100kHz bandwidth.
5. A high-pass filter was used for frequencies from 800 MHz to 4.0 GHz.
6. For each frequency range the spectrum analyser was loaded with the appropriate calibration figures to compensate for the cables, attenuator, and filter losses, allowing the emission levels to be read directly with no further calculation.
7. The results of the various sweeps were combined programmatically to give charts for frequencies near the carrier, up to 1GHz and above 1GHz.
The calibrations are loaded as an overall reference level offset plus a set of correction factors for the required frequency band.

Spurious emissions which were attenuated by more than 20 dB below the limit were not recorded.

Example of attenuation correction: (dB)

E5023 30dB 350W CK9178	31.97	
E5015 3m Blue	0.65	
E5028 1m5 Blue	0.24	
E3382 135_175MHz HPBRF	5.63	
Total Attenuation @ 812.250 MHz	38.48	Sum of component attenuation (a)
Amplitude offset	40.91	(b)
Correction @ 276.050 MHz	-2.43	(a-b)

MEASUREMENT UNCERTAINTY: $\leq 12.75 \text{ GHz}$ $\pm 3.0 \text{ dB}$

MEASUREMENT RESULTS:

See the tables and plots on the following pages for 12.5 kHz channel spacing.

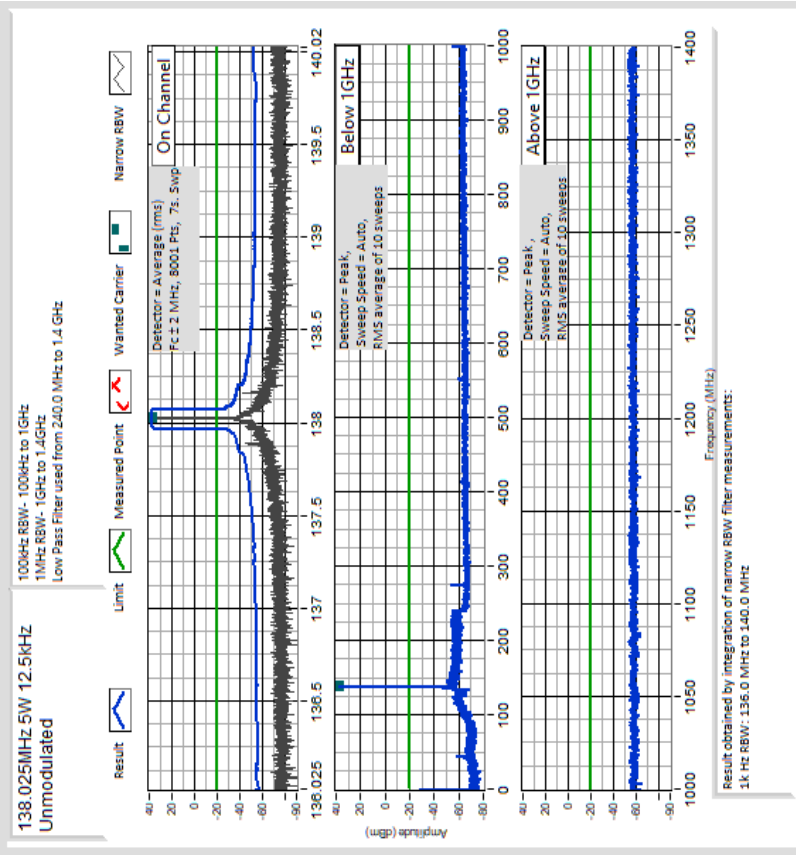
LIMIT CLAUSES: FCC 47 CFR 90.210

RSS-119 5.8

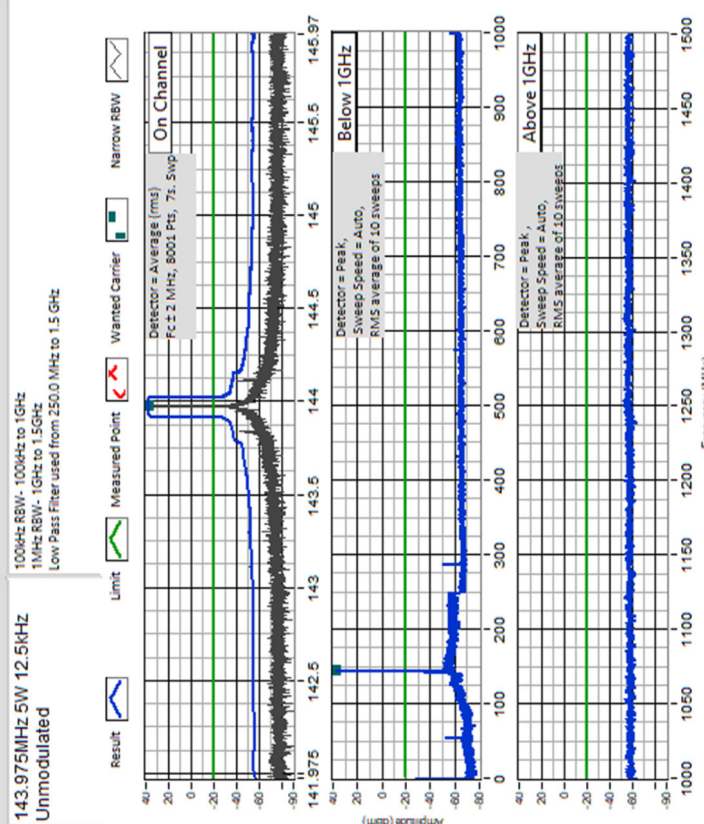
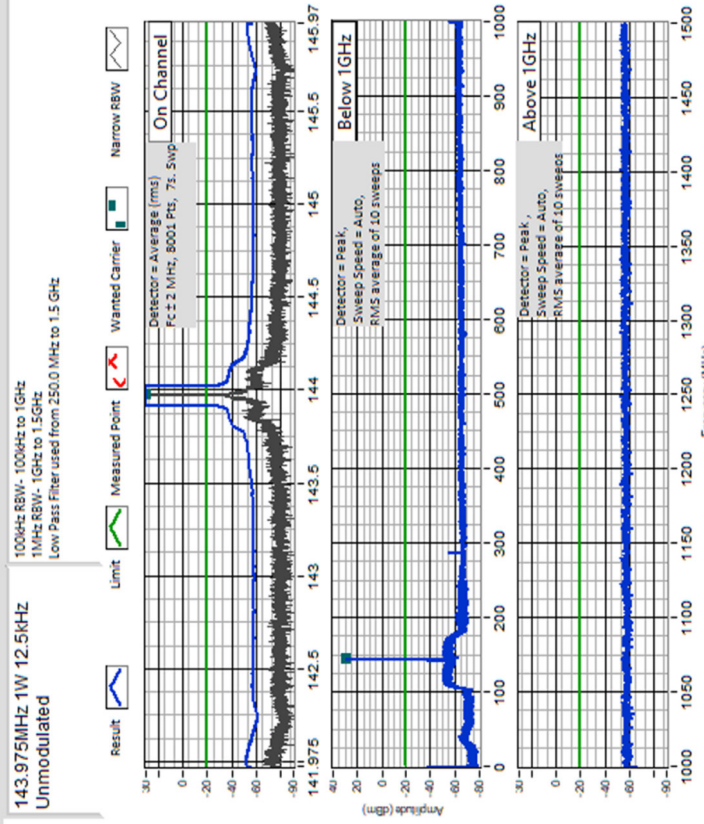
Photo: Conducted Emissions Test Setup



Spurious Emissions (Tx Conducted)

Emission Frequency (MHz)		138.025 MHz, 12.5 kHz Channel Spacing, 5 W	138.025 MHz, 12.5 kHz Channel Spacing, 1 W
		Level (dBm)	Level (dBm)
~		~	~
No emissions were detected at a level greater than 20 dB below the limit.			
		 138.025MHz 5W 12.5kHz Unmodulated 100kHz RBW, 100kHz to 1GHz 1MHz RBW, 1GHz to 1.4GHz Low Pass Filter used from 240.0 MHz to 1.4 GHz Result Limit Measured Point Wanted Carrier Narrow RBW Detector = Average (rms) Fc ± 2 MHz, 8001 Pts, 7s. Swp On Channel Detector = Peak Sweep Speed = Auto, RMS Average of 10 Sweeps Below 1GHz Above 1GHz Detector = Peak, Sweep Speed = Auto, RMS Average of 10 Sweeps Result obtained by integration of narrow RBW filter measurements: 1k Hz RBW: 136.0 MHz to 140.0 MHz	

Spurious Emissions (Tx Conducted)

Emission Frequency (MHz)		143.975 MHz, 12.5 kHz Channel Spacing, 5 W		143.975 MHz, 12.5 kHz Channel Spacing, 1 W	
		Level (dBm)	Level (dBc)	Level (dBm)	Level (dBc)
~		~	~	~	~
No emissions were detected at a level greater than 20 dB below the limit.					
143.975MHz 5W 12.5kHz Unmodulated 100kHz RBW, 100kHz to 1GHz 1MHz RBW, 1GHz to 1.5GHz Low Pass Filter used from 250.0 MHz to 1.5 GHz  Result Limit Measured Point Wanted Carrier Narrow RBW Detector = Average (ms) FC ± 2 MHz, 8001 Pts, 7s. Swp Detector = Peak, Sweep Speed = Auto, RMS Average of 10 Sweeps Detector = Peak, Sweep Speed = Auto, RMS Average of 10 Sweeps Result obtained by integration of narrow RBW filter measurements: 1k Hz RBW: 142.0 MHz to 145.0 MHz 143.975MHz 1W 12.5kHz Unmodulated 100kHz RBW, 100kHz to 1GHz 1MHz RBW, 1GHz to 1.5GHz Low Pass Filter used from 250.0 MHz to 1.5 GHz  Result Limit Measured Point Wanted Carrier Narrow RBW Detector = Average (ms) FC ± 2 MHz, 8001 Pts, 7s. Swp Detector = Peak, Sweep Speed = Auto, RMS Average of 10 Sweeps Detector = Peak, Sweep Speed = Auto, RMS Average of 10 Sweeps Result obtained by integration of narrow RBW filter measurements: 1k Hz RBW: 142.0 MHz to 145.0 MHz					

Spurious Emissions (Tx Conducted)

Emission Frequency (MHz)		148.025 MHz, 12.5 kHz Channel Spacing, 5 W	148.025 MHz, 12.5 kHz Channel Spacing, 1 W
Level (dBm)		Level (dBc)	Level (dBm)
~		~	~
No emissions were detected at a level greater than 20 dB below the limit.			
148.025MHz 5W 12.5kHz Unmodulated		148.025MHz 1W 12.5kHz Unmodulated	
