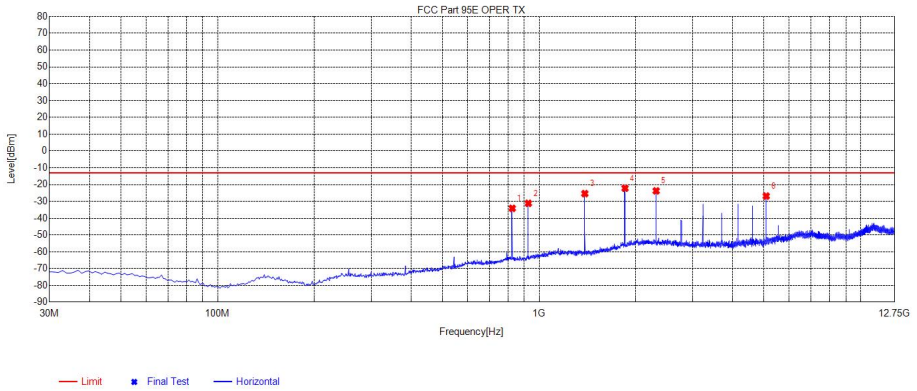
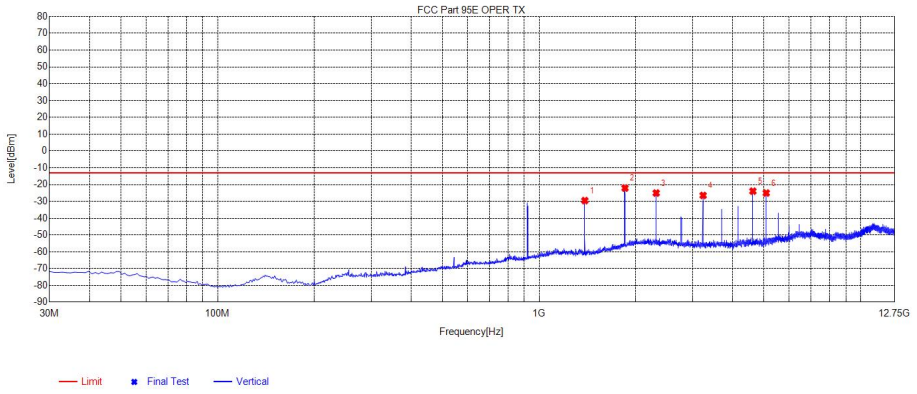
| Test Mode: | TX-CH19-25kHz-50W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 825.4 | -71.54 | -34.13 | -13.00 | 21.13 | 37.41 | 48 | Horizontal |
| 2 | 926.28 | -69.19 | -31.14 | -13.00 | 18.14 | 38.05 | 298 | Horizontal |
| 3 | 1387.7888 | -21.27 | -25.38 | -13.00 | 12.38 | -4.11 | 137 | Horizontal |
| 4 | 1850.7851 | -22.35 | -22.17 | -13.00 | 9.17 | 0.18 | 298 | Horizontal |
| 5 | 2313.7814 | -26.08 | -23.74 | -13.00 | 10.74 | 2.34 | 137 | Horizontal |
| 6 | 5089.4089 | -31.96 | -26.84 | -13.00 | 13.84 | 5.12 | 148 | Horizontal |

| Test Mode: | TX-CH19-25kHz-50W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 1387.7888 | -25.43 | -29.54 | -13.00 | 16.54 | -4.11 | 322 | Vertical |
| 2 | 1850.7851 | -22.26 | -22.08 | -13.00 | 9.08 | 0.18 | 332 | Vertical |
| 3 | 2313.7814 | -27.38 | -25.04 | -13.00 | 12.04 | 2.34 | 135 | Vertical |
| 4 | 3238.5989 | -28.35 | -26.46 | -13.00 | 13.46 | 1.89 | 341 | Vertical |
| 5 | 4626.4126 | -28.49 | -23.92 | -13.00 | 10.92 | 4.57 | 124 | Vertical |
| 6 | 5089.4089 | -30.13 | -25.01 | -13.00 | 12.01 | 5.12 | 124 | Vertical |

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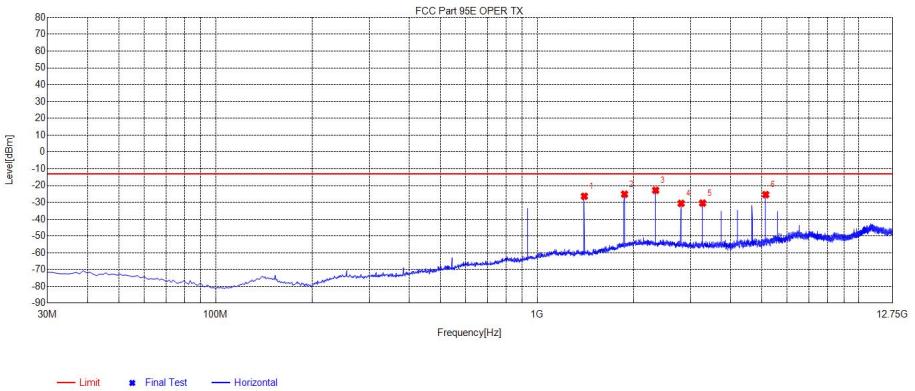
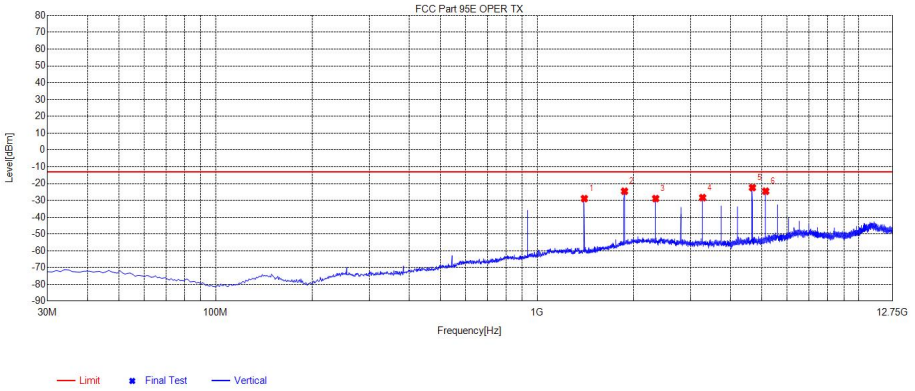
| Test Mode: | TX-CH27-25kHz-50W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 1403.0653 | -22.25 | -26.36 | -13.00 | 13.36 | -4.11 | 130 | Horizontal |
| 2 | 1870.7621 | -25.55 | -25.12 | -13.00 | 12.12 | 0.43 | 290 | Horizontal |
| 3 | 2338.4588 | -25.19 | -22.82 | -13.00 | 9.82 | 2.37 | 120 | Horizontal |
| 4 | 2806.1556 | -32.50 | -30.59 | -13.00 | 17.59 | 1.91 | 250 | Horizontal |
| 5 | 3273.8524 | -32.36 | -30.42 | -13.00 | 17.42 | 1.94 | 1 | Horizontal |
| 6 | 5144.6395 | -30.59 | -25.38 | -13.00 | 12.38 | 5.21 | 58 | Horizontal |

| Test Mode: | TX-CH27-25kHz-50W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 1403.0653 | -24.84 | -28.95 | -13.00 | 15.95 | -4.11 | 342 | Vertical |
| 2 | 1870.7621 | -25.00 | -24.57 | -13.00 | 11.57 | 0.43 | 322 | Vertical |
| 3 | 2338.4588 | -31.31 | -28.94 | -13.00 | 15.94 | 2.37 | 161 | Vertical |
| 4 | 3273.8524 | -30.30 | -28.36 | -13.00 | 15.36 | 1.94 | 342 | Vertical |
| 5 | 4676.9427 | -27.03 | -22.41 | -13.00 | 9.41 | 4.62 | 141 | Vertical |
| 6 | 5144.6395 | -29.75 | -24.54 | -13.00 | 11.54 | 5.21 | 212 | Vertical |

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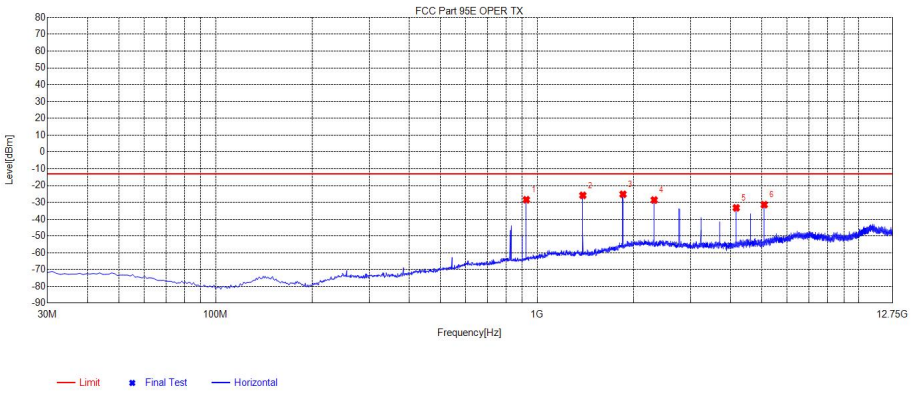
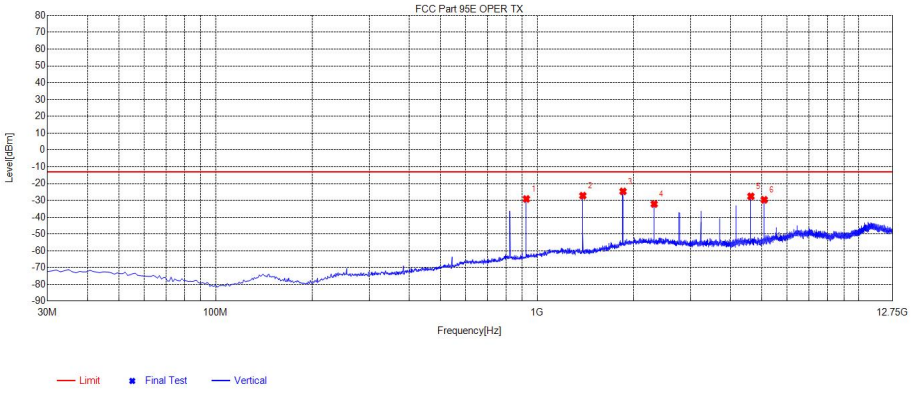
| Test Mode: | TX-CH19-25kHz-25W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 926.28 | -66.49 | -28.44 | -13.00 | 15.44 | 38.05 | 316 | Horizontal |
| 2 | 1387.7888 | -21.71 | -25.82 | -13.00 | 12.82 | -4.11 | 120 | Horizontal |
| 3 | 1850.7851 | -25.37 | -25.19 | -13.00 | 12.19 | 0.18 | 295 | Horizontal |
| 4 | 2313.7814 | -30.94 | -28.60 | -13.00 | 15.60 | 2.34 | 120 | Horizontal |
| 5 | 4164.5915 | -36.39 | -33.25 | -13.00 | 20.25 | 3.14 | 141 | Horizontal |
| 6 | 5089.4089 | -36.50 | -31.38 | -13.00 | 18.38 | 5.12 | 141 | Horizontal |

| Test Mode: | TX-CH19-25kHz-25W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 926.28 | -67.22 | -29.17 | -13.00 | 16.17 | 38.05 | 323 | Vertical |
| 2 | 1387.7888 | -23.09 | -27.20 | -13.00 | 14.20 | -4.11 | 350 | Vertical |
| 3 | 1850.7851 | -24.84 | -24.66 | -13.00 | 11.66 | 0.18 | 3 | Vertical |
| 4 | 2313.7814 | -34.52 | -32.18 | -13.00 | 19.18 | 2.34 | 135 | Vertical |
| 5 | 4626.4126 | -32.14 | -27.57 | -13.00 | 14.57 | 4.57 | 156 | Vertical |
| 6 | 5089.4089 | -34.78 | -29.66 | -13.00 | 16.66 | 5.12 | 145 | Vertical |

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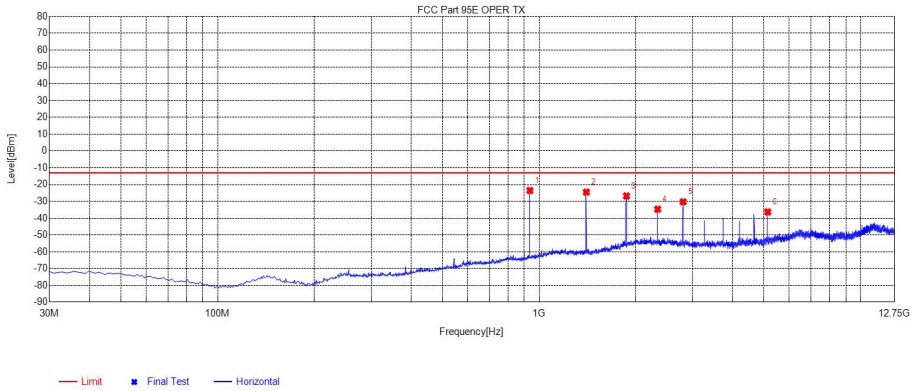
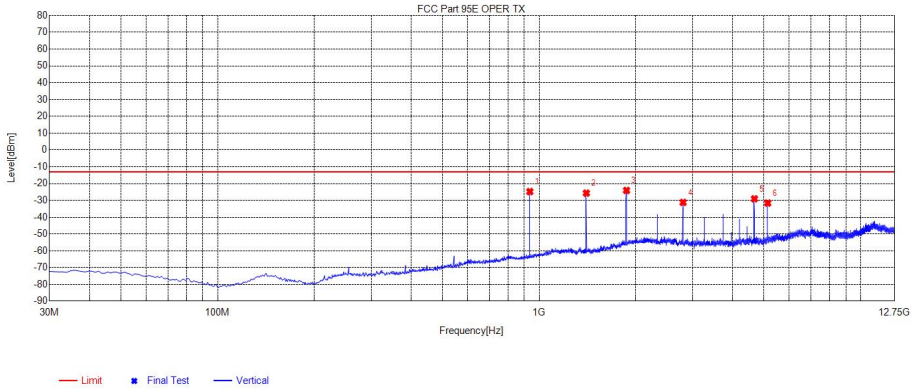
| Test Mode: | TX-CH27-25kHz-25W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 935.98 | -61.76 | -23.52 | -13.00 | 10.52 | 38.24 | 312 | Horizontal |
| 2 | 1403.0653 | -20.35 | -24.46 | -13.00 | 11.46 | -4.11 | 178 | Horizontal |
| 3 | 1870.7621 | -27.20 | -26.77 | -13.00 | 13.77 | 0.43 | 302 | Horizontal |
| 4 | 2338.4588 | -36.99 | -34.62 | -13.00 | 21.62 | 2.37 | 120 | Horizontal |
| 5 | 2806.1556 | -32.16 | -30.25 | -13.00 | 17.25 | 1.91 | 250 | Horizontal |
| 6 | 5144.6395 | -41.48 | -36.27 | -13.00 | 23.27 | 5.21 | 147 | Horizontal |

| Test Mode: | TX-CH27-25kHz-25W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 935.98 | -63.01 | -24.77 | -13.00 | 11.77 | 38.24 | 323 | Vertical |
| 2 | 1403.0653 | -21.58 | -25.69 | -13.00 | 12.69 | -4.11 | 334 | Vertical |
| 3 | 1870.7621 | -24.52 | -24.09 | -13.00 | 11.09 | 0.43 | 342 | Vertical |
| 4 | 2806.1556 | -33.11 | -31.20 | -13.00 | 18.20 | 1.91 | 271 | Vertical |
| 5 | 4676.9427 | -33.70 | -29.08 | -13.00 | 16.08 | 4.62 | 168 | Vertical |
| 6 | 5144.6395 | -36.81 | -31.60 | -13.00 | 18.60 | 5.21 | 115 | Vertical |

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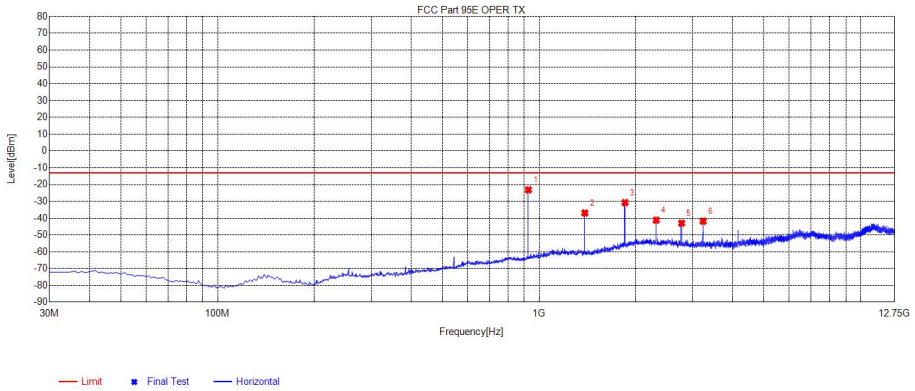
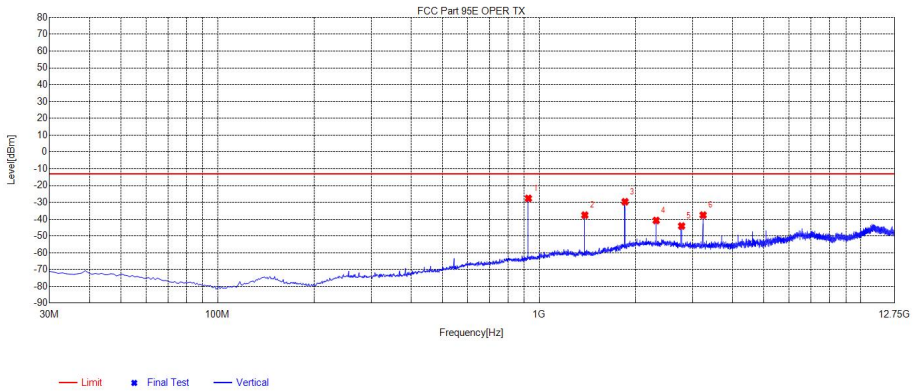
| Test Mode: | TX-CH4-25kHz-5W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 926.28 | -61.19 | -23.14 | -13.00 | 10.14 | 38.05 | 306 | Horizontal |
| 2 | 1387.7888 | -32.78 | -36.89 | -13.00 | 23.89 | -4.11 | 285 | Horizontal |
| 3 | 1850.7851 | -30.94 | -30.76 | -13.00 | 17.76 | 0.18 | 296 | Horizontal |
| 4 | 2313.7814 | -43.50 | -41.16 | -13.00 | 28.16 | 2.34 | 120 | Horizontal |
| 5 | 2775.6026 | -44.92 | -42.95 | -13.00 | 29.95 | 1.97 | 285 | Horizontal |
| 6 | 3238.5989 | -43.69 | -41.80 | -13.00 | 28.80 | 1.89 | 130 | Horizontal |

| Test Mode: | TX-CH4-25kHz-5W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 926.28 | -65.67 | -27.62 | -13.00 | 14.62 | 38.05 | 208 | Vertical |
| 2 | 1387.7888 | -33.49 | -37.60 | -13.00 | 24.60 | -4.11 | 156 | Vertical |
| 3 | 1850.7851 | -29.81 | -29.63 | -13.00 | 16.63 | 0.18 | 322 | Vertical |
| 4 | 2313.7814 | -43.12 | -40.78 | -13.00 | 27.78 | 2.34 | 188 | Vertical |
| 5 | 2775.6026 | -46.04 | -44.07 | -13.00 | 31.07 | 1.97 | 350 | Vertical |
| 6 | 3238.5989 | -39.45 | -37.56 | -13.00 | 24.56 | 1.89 | 146 | Vertical |

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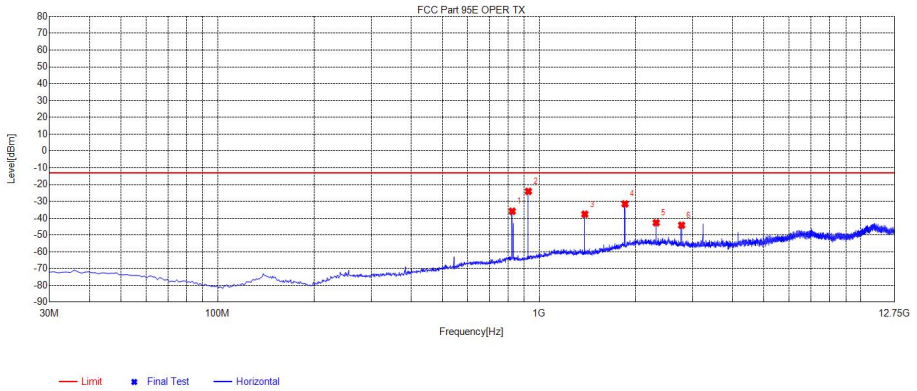
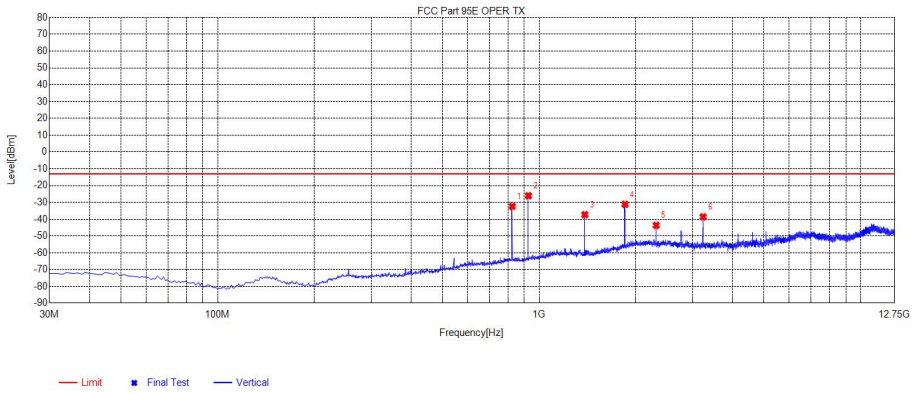
| Test Mode: | TX-CH19-25kHz-5W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 825.4 | -73.29 | -35.88 | -13.00 | 22.88 | 37.41 | 10 | Horizontal |
| 2 | 926.28 | -62.07 | -24.02 | -13.00 | 11.02 | 38.05 | 311 | Horizontal |
| 3 | 1387.7888 | -33.52 | -37.63 | -13.00 | 24.63 | -4.11 | 147 | Horizontal |
| 4 | 1850.7851 | -31.67 | -31.49 | -13.00 | 18.49 | 0.18 | 301 | Horizontal |
| 5 | 2313.7814 | -45.06 | -42.72 | -13.00 | 29.72 | 2.34 | 136 | Horizontal |
| 6 | 2775.6026 | -46.16 | -44.19 | -13.00 | 31.19 | 1.97 | 250 | Horizontal |

| Test Mode: | TX-CH19-25kHz-5W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 825.4 | -69.80 | -32.39 | -13.00 | 19.39 | 37.41 | 254 | Vertical |
| 2 | 926.28 | -64.08 | -26.03 | -13.00 | 13.03 | 38.05 | 323 | Vertical |
| 3 | 1387.7888 | -33.19 | -37.30 | -13.00 | 24.30 | -4.11 | 161 | Vertical |
| 4 | 1850.7851 | -31.31 | -31.13 | -13.00 | 18.13 | 0.18 | 333 | Vertical |
| 5 | 2313.7814 | -46.00 | -43.66 | -13.00 | 30.66 | 2.34 | 181 | Vertical |
| 6 | 3238.5989 | -40.51 | -38.62 | -13.00 | 25.62 | 1.89 | 342 | Vertical |

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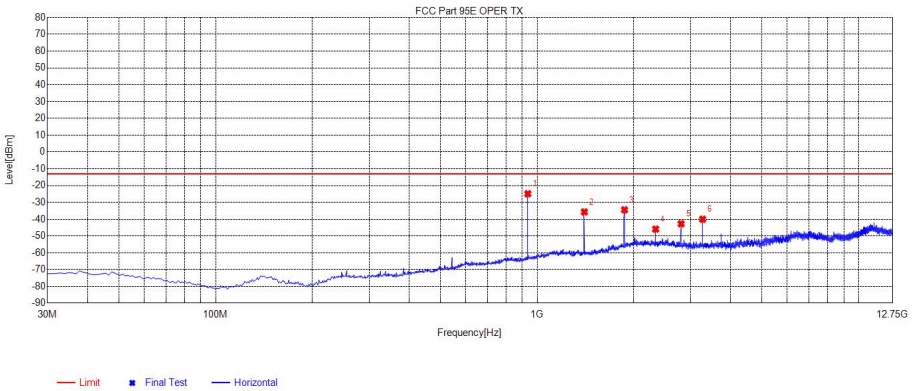
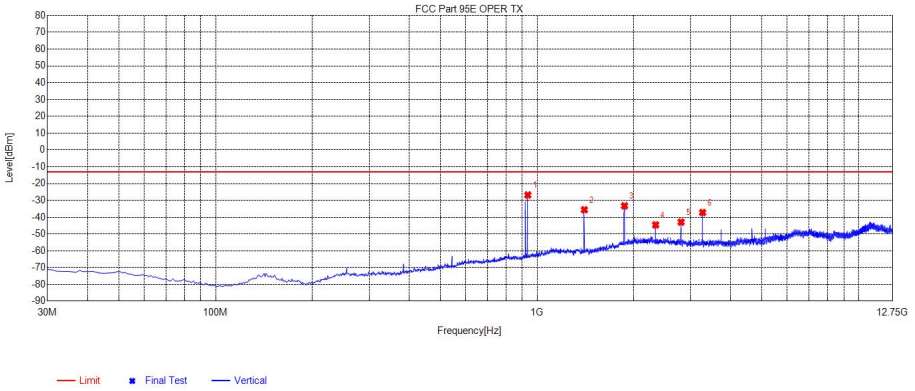
| Test Mode: | TX-CH27-25kHz-5W | Polarity: | Horizontal |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 935.98 | -63.12 | -24.88 | -13.00 | 11.88 | 38.24 | 306 | Horizontal |
| 2 | 1403.0653 | -31.59 | -35.70 | -13.00 | 22.70 | -4.11 | 223 | Horizontal |
| 3 | 1870.7621 | -34.88 | -34.45 | -13.00 | 21.45 | 0.43 | 28 | Horizontal |
| 4 | 2338.4588 | -48.30 | -45.93 | -13.00 | 32.93 | 2.37 | 142 | Horizontal |
| 5 | 2806.1556 | -44.65 | -42.74 | -13.00 | 29.74 | 1.91 | 18 | Horizontal |
| 6 | 3273.8524 | -41.96 | -40.02 | -13.00 | 27.02 | 1.94 | 28 | Horizontal |

| Test Mode: | TX-CH27-25kHz-5W | Polarity: | Vertical |
|---|---|---|---|




| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 935.98 | -65.04 | -26.80 | -13.00 | 13.80 | 38.24 | 323 | Vertical |
| 2 | 1403.0653 | -31.49 | -35.60 | -13.00 | 22.60 | -4.11 | 158 | Vertical |
| 3 | 1870.7621 | -33.70 | -33.27 | -13.00 | 20.27 | 0.43 | 323 | Vertical |
| 4 | 2338.4588 | -46.97 | -44.60 | -13.00 | 31.60 | 2.37 | 199 | Vertical |
| 5 | 2806.1556 | -44.83 | -42.92 | -13.00 | 29.92 | 1.91 | 350 | Vertical |
| 6 | 3273.8524 | -39.16 | -37.22 | -13.00 | 24.22 | 1.94 | 302 | Vertical |

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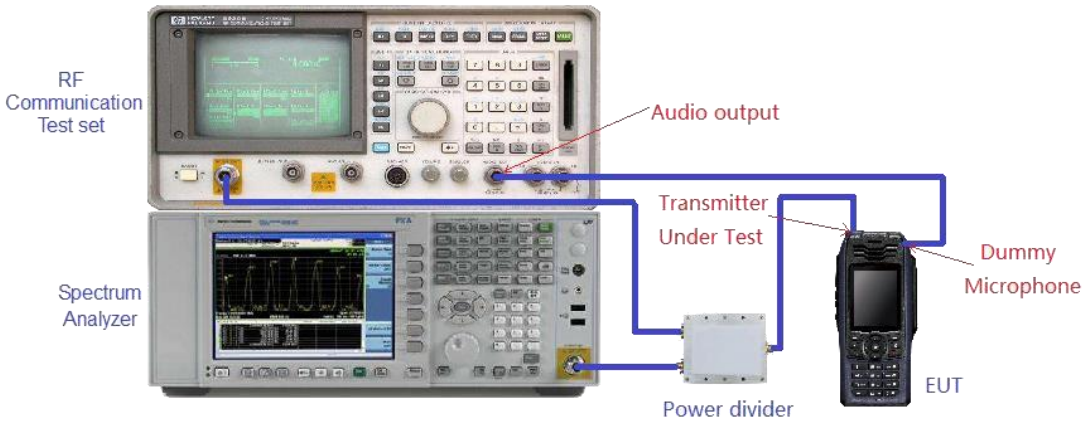
**8.5 Emission Mask Measurement Part**

The detailed procedure employed for Emission Mask measurements are specified as following:

-Connect the equipment as illustrated.

-Spectrum set as follow:

1. Centre frequency = fundamental frequency, Span=150kHz for 12.5kHz and 25kHz channel spacing, RBW=300Hz, VBW=1000Hz for 12.5kHz, RBW=300Hz, VBW=1000Hz for 25kHz, Sweep = auto, Detector function = peak, Trace = max hold
2. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0dB reference for the measurement.
3. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation (Rated system deviation is 2.5 kHz for 12.5kHz channel spacing). The input level shall be established at the frequency of maximum response of the audio modulating circuit.
4. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.
5. Measure and record the results in the test report.

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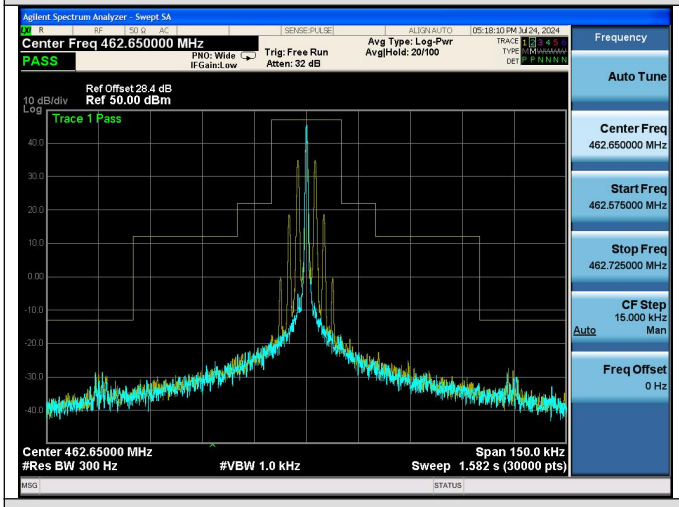
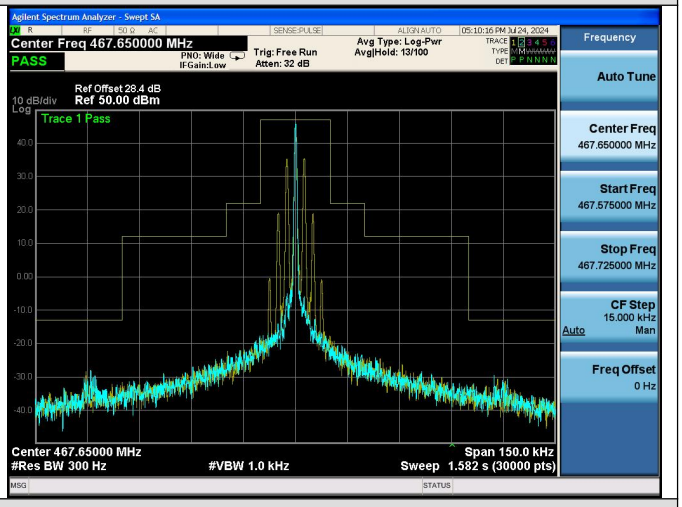
Test plot as follows:

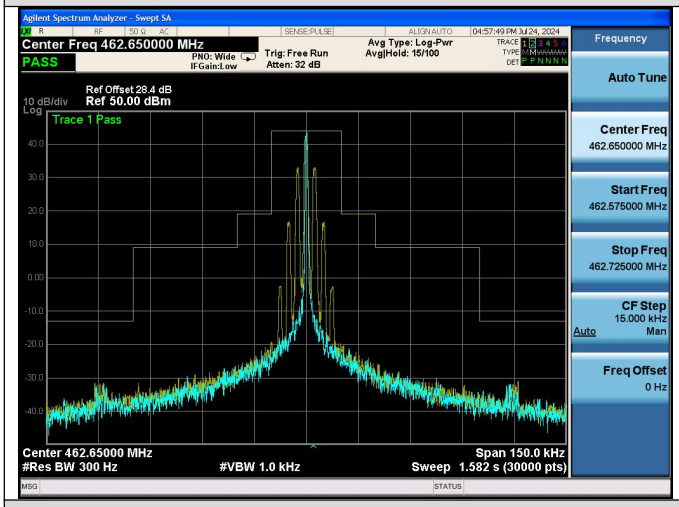
Emission Mask @ 462.6500MHz-12.5 kHz-50W



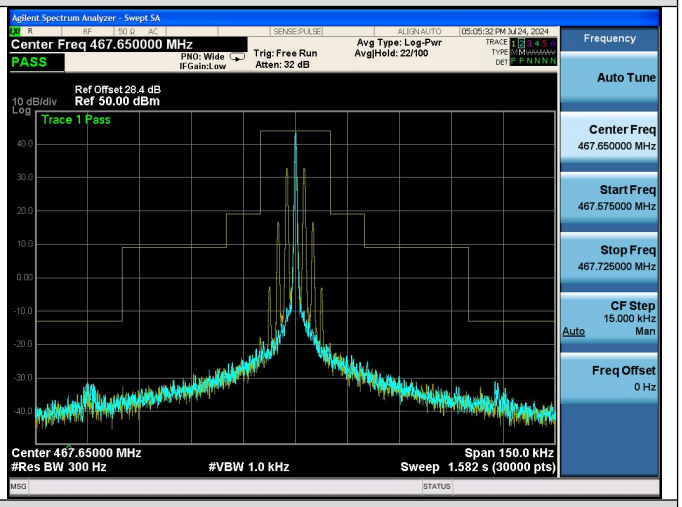

Emission Mask @ 467.6500MHz-12.5 kHz-50W



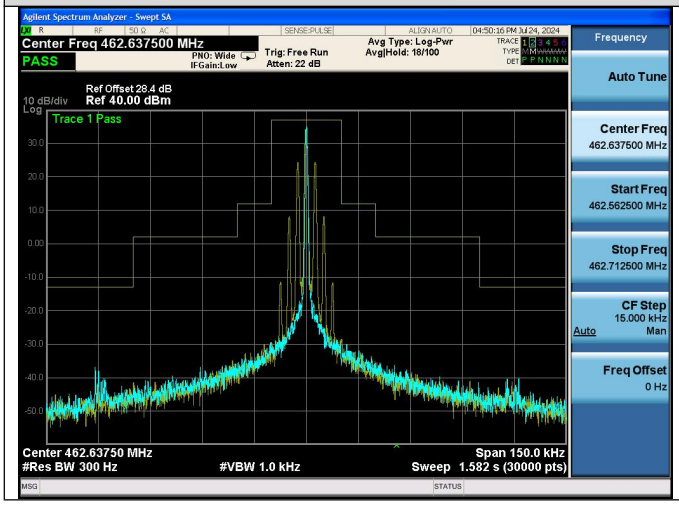

Emission Mask @ 462.6500MHz-12.5 kHz-25W



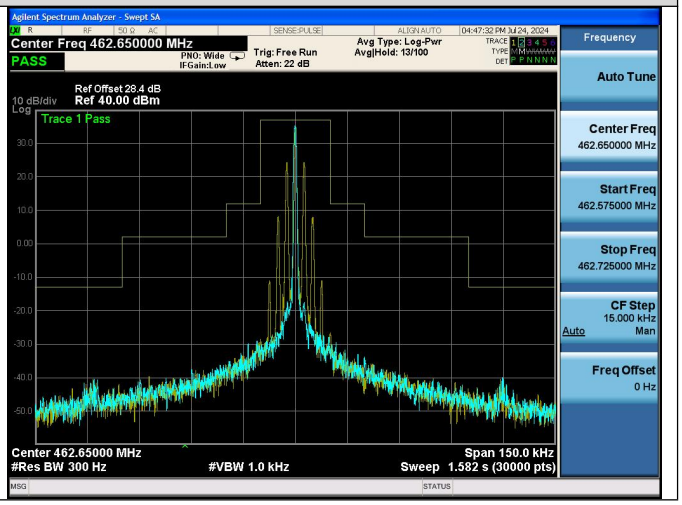

Emission Mask @ 467.6500MHz-12.5 kHz-25W




Emission Mask @ 462.6375MHz-12.5 kHz-5W




Emission Mask @ 462.6500MHz-12.5 kHz-5W

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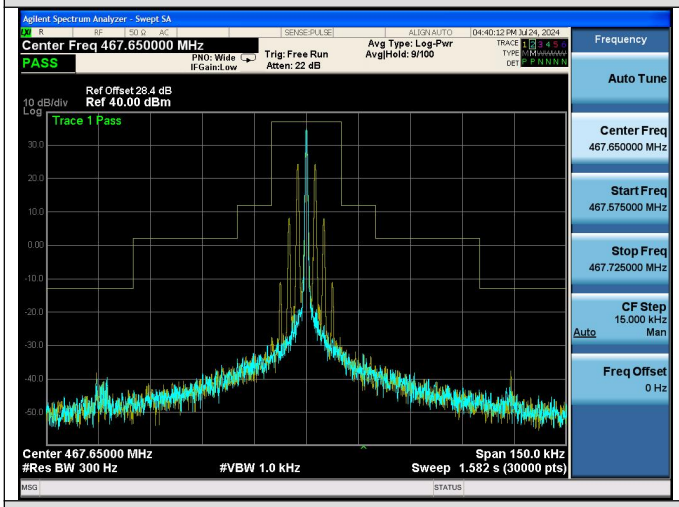
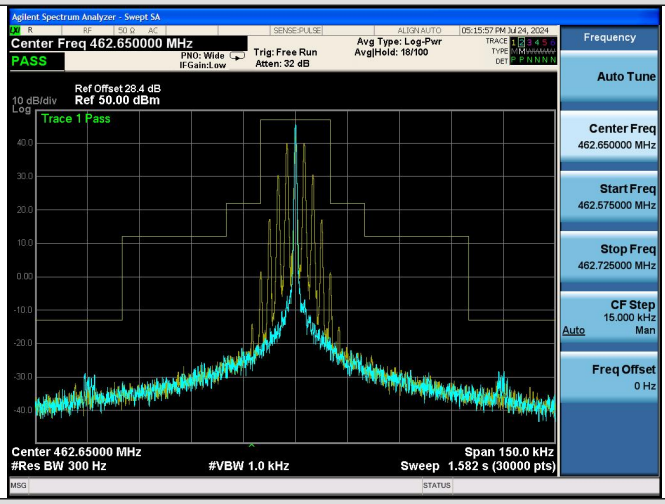
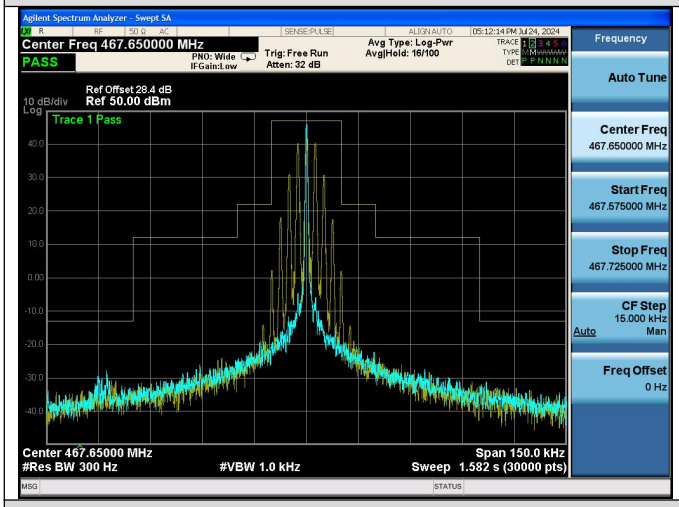
Emission Mask @ 467.6500MHz-12.5 kHz-5W



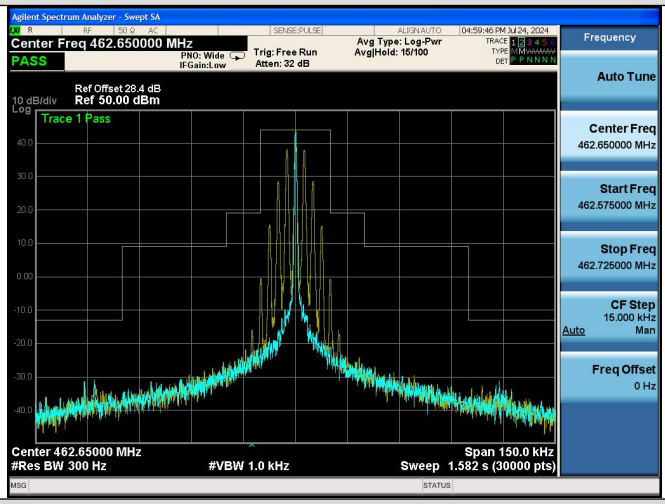

Emission Mask @ 462.6500MHz-25 kHz-50W



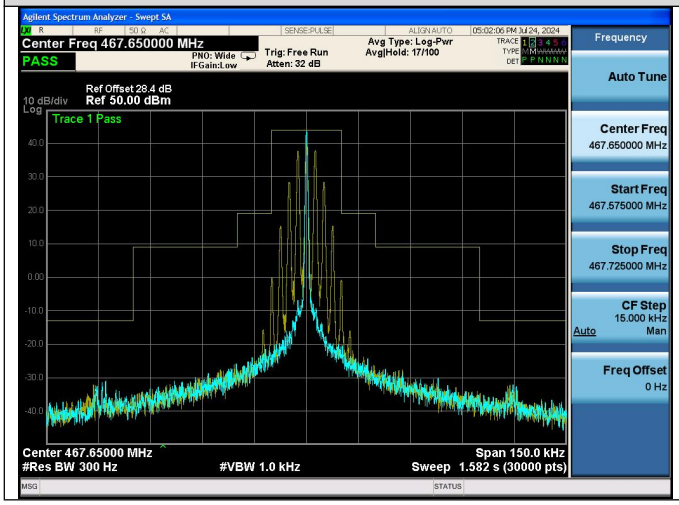

Emission Mask @ 467.6500MHz-25 kHz-50W



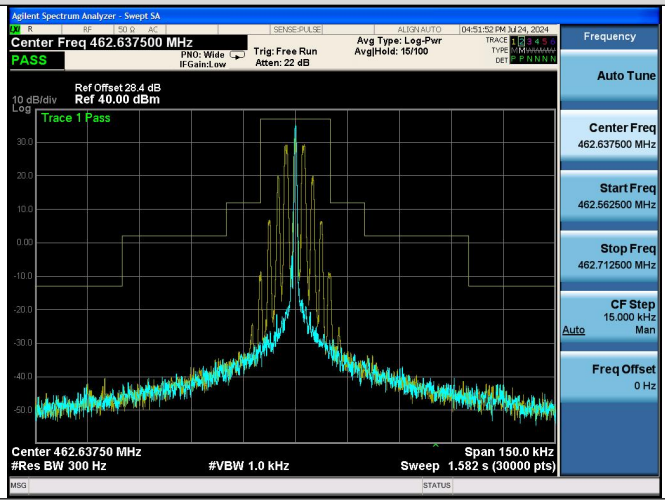

Emission Mask @ 462.6500MHz-25 kHz-25W




Emission Mask @ 467.6500MHz-25 kHz-25W




Emission Mask @ 462.6375MHz-25 kHz-5W

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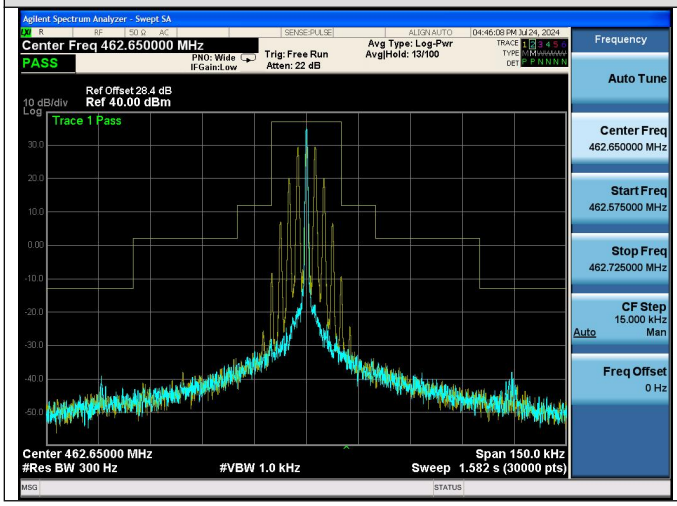
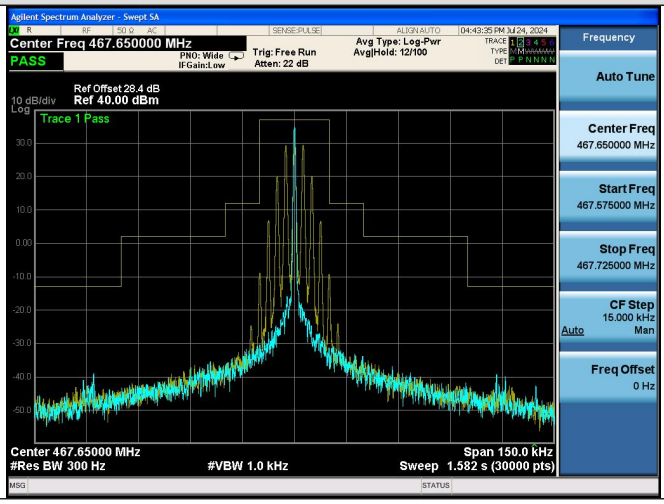
| Emission Mask @ 462.6500MHz-12.5 kHz-5W | Emission Mask @ 467.6500MHz-25 kHz-5W |
|---|---|
|  |  |





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# 9. Modulation Characteristics

## 9.1 Provisions Applicable

According to FCC§2.1047 and §95.1775, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.
Each GMRS transmitter type must be designed to satisfy the modulation requirements in this section. Operation of GMRS stations must also be in compliance with these requirements.
(a) Main channels. The peak frequency deviation for emissions to be transmitted on the main channels must not exceed ± 5 kHz.
(b) 462 MHz interstitial channels. The peak frequency deviation for emissions to be transmitted on the 462 MHz interstitial channels must not exceed ± 5 kHz.
(c) 467 MHz interstitial channels. The peak frequency deviation for emissions to be transmitted on the 467 MHz interstitial channels must not exceed ± 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

## 9.2 Measurement Procedure

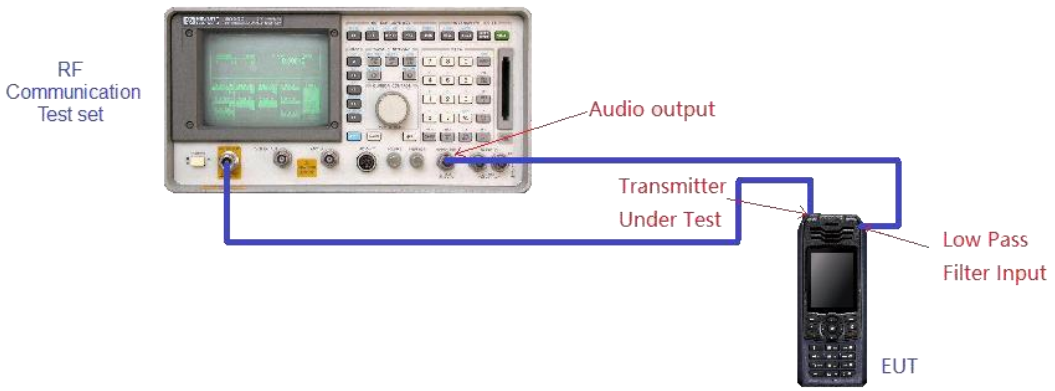
- **Modulation Limit**

1. Test layout and build equipment as shown below.
2. adjust the audio input for 60% of rated system deviation at 1kHz using this level as a reference (0dB).
3. Vary the input level from –20 to +20dB.
4. Record the frequency deviation obtained as a function of the input level.
5. Repeat step 2 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

- **Audio Frequency Response**

1. Test layout and build equipment as shown below.
2. Adjust the audio input for 20% of rated system deviation at 1 kHz using this level as a reference (0 dB).
3. Vary the Audio frequency from 100 Hz to 10 kHz and record the frequency deviation.
4. Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 kHz reference).

## 9.3 Measurement Setup

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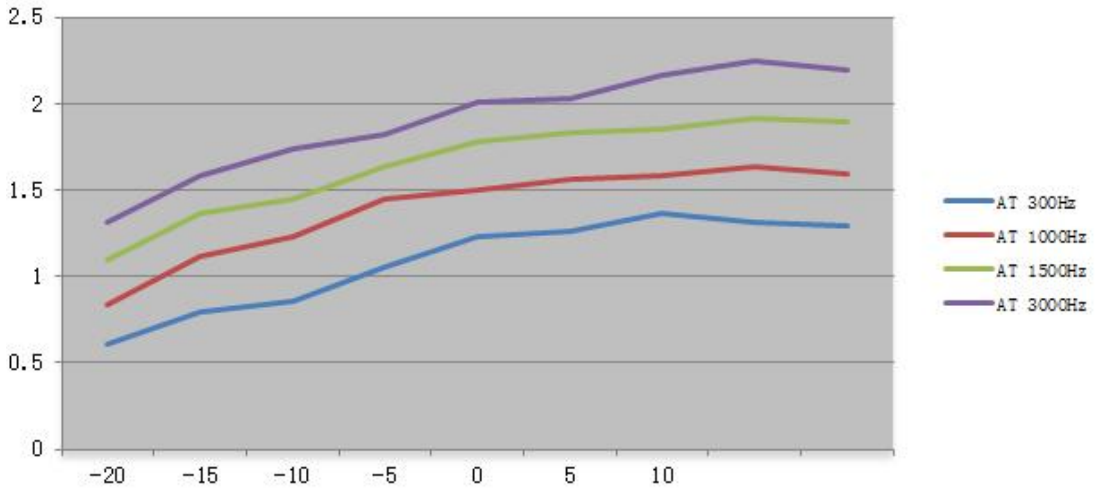
### 9.4 Measurement Result

### A. Modulation Limit:

| 12.5kHz, FM modulation, Assigned Frequency:462.6500MHz-50W | | | | |
|---|---|---|---|---|
| Modulation Level (dB) | Peak Freq. Deviation At 300 Hz (kHz) | Peak Freq. Deviation At 1000 Hz (kHz) | Peak Freq. Deviation At 1500 Hz (kHz) | Peak Freq. Deviation At 3000 Hz (kHz) |
| -20 | 0.61 | 0.84 | 1.09 | 1.31 |
| -15 | 0.79 | 1.12 | 1.36 | 1.58 |
| -10 | 0.86 | 1.23 | 1.45 | 1.74 |
| -5 | 1.05 | 1.45 | 1.63 | 1.82 |
| 0 | 1.23 | 1.5 | 1.78 | 2.01 |
| +5 | 1.26 | 1.56 | 1.83 | 2.03 |
| +10 | 1.36 | 1.58 | 1.85 | 2.16 |
| +15 | 1.31 | 1.63 | 1.91 | 2.25 |
| +20 | 1.29 | 1.59 | 1.89 | 2.19 |




Note: All the modes had been tested, but only the worst data recorded in the report

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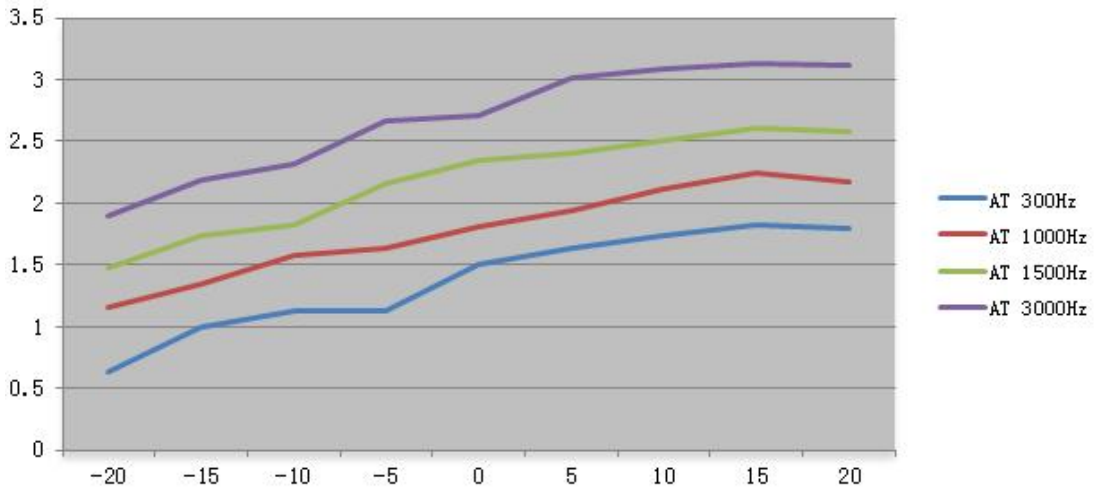
| 25kHz, FM modulation, Assigned Frequency:462.6500MHz-50W | | | | |
|---|---|---|---|---|
| Modulation Level (dB) | Peak Freq. Deviation At 300 Hz (kHz) | Peak Freq. Deviation At 1000 Hz (kHz) | Peak Freq. Deviation At 1500 Hz (kHz) | Peak Freq. Deviation At 3000 Hz (kHz) |
| -20 | 0.63 | 1.16 | 1.48 | 1.89 |
| -15 | 0.99 | 1.35 | 1.74 | 2.19 |
| -10 | 1.12 | 1.58 | 1.82 | 2.31 |
| -5 | 1.12 | 1.64 | 2.16 | 2.67 |
| 0 | 1.51 | 1.81 | 2.35 | 2.71 |
| +5 | 1.63 | 1.94 | 2.41 | 3.01 |
| +10 | 1.74 | 2.12 | 2.51 | 3.09 |
| +15 | 1.82 | 2.25 | 2.61 | 3.13 |
| +20 | 1.79 | 2.17 | 2.58 | 3.11 |




Note: All the modes had been tested, but only the worst data recorded in the report

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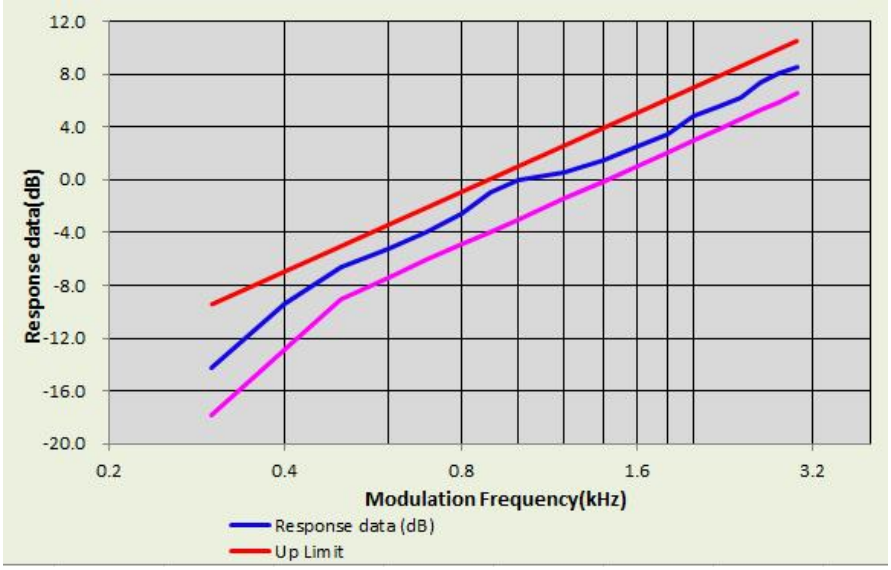
**Audio Frequency Response:**

| 12.5kHz, Analog modulation, Assigned Frequency:462.6500MHz-50W | | |
|---|---|---|
| Frequency (Hz) | Deviation (kHz) | Audio Frequency Response(dB) |
| 100 | -- | -- |
| 200 | -- | -- |
| 300 | 0.15 | -14.21 |
| 400 | 0.26 | -9.43 |
| 500 | 0.36 | -6.60 |
| 600 | 0.42 | -5.26 |
| 700 | 0.49 | -3.93 |
| 800 | 0.57 | -2.61 |
| 900 | 0.69 | -0.95 |
| 1000 | **0.77** | 0.00 |
| 1200 | 0.82 | 0.55 |
| 1400 | 0.91 | 1.45 |
| 1600 | 1.03 | 2.53 |
| 1800 | 1.15 | 3.48 |
| 2000 | 1.34 | 4.81 |
| 2400 | 1.45 | 5.50 |
| 2500 | 1.58 | 6.24 |
| 2800 | 1.81 | 7.42 |
| 3000 | 1.96 | 8.12 |

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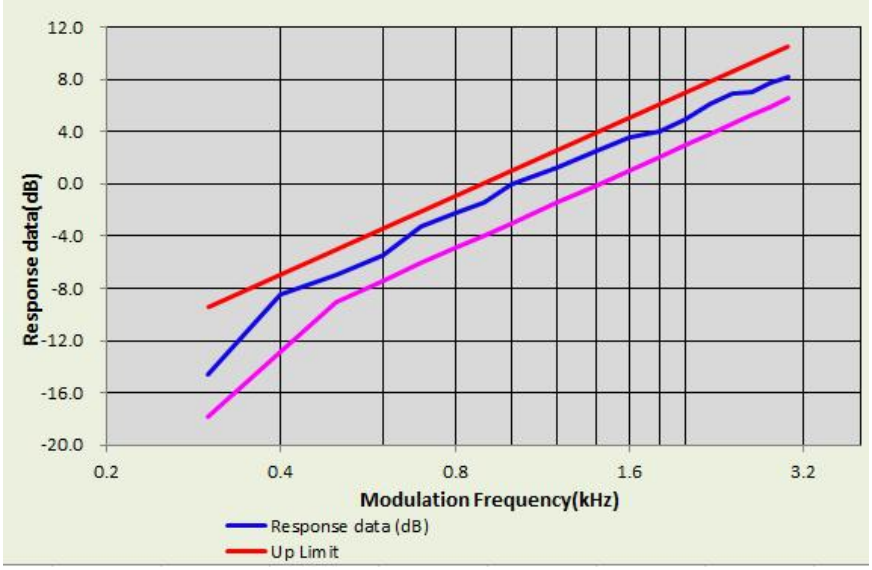
| 25kHz, Analog modulation, Assigned Frequency:462.6500MHz-50W | | |
|---|---|---|
| Frequency (Hz) | Deviation (kHz) | Audio Frequency Response(dB) |
| 100 | -- | -- |
| 200 | -- | -- |
| 300 | 0.18 | -14.54 |
| 400 | 0.36 | -8.52 |
| 500 | 0.43 | -6.98 |
| 600 | 0.51 | -5.49 |
| 700 | 0.66 | -3.25 |
| 800 | 0.74 | -2.26 |
| 900 | 0.82 | -1.37 |
| 1000 | **0.96** | 0.00 |
| 1200 | 1.11 | 1.26 |
| 1400 | 1.29 | 2.57 |
| 1600 | 1.45 | 3.58 |
| 1800 | 1.52 | 3.99 |
| 2000 | 1.69 | 4.91 |
| 2400 | 1.94 | 6.11 |
| 2500 | 2.13 | 6.92 |
| 2800 | 2.15 | 7.00 |
| 3000 | 2.34 | 7.74 |

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## 10. Maximum Transmitter Power

### 10.1 Provisions Applicable

FCC Part 95.1767 For GMRS, the maximum permissible transmitter output power effective radiated power (E.R.P.) as follows.

This section contains transmitting power limits for GMRS stations. The maximum transmitting power depends on which channels are being used and the type of station.

462/467 MHz main channels. The limits in this paragraph apply to stations transmitting on any of the 462 MHz main channels or any of the 467 MHz main channels. Each GMRS transmitter type must be capable of operating within the allowable power range. GMRS licensees are responsible for ensuring that their GMRS stations operate in compliance with these limits.

The transmitter output power of mobile, repeater and base stations must not exceed 50 Watts.

The transmitter output power of fixed stations must not exceed 15 Watts.

462 MHz interstitial channels. The effective radiated power (ERP) of mobile, hand-held portable and base stations transmitting on the 462 MHz interstitial channels must not exceed 5 Watts.

(467 MHz interstitial channels. The effective radiated power (ERP) of hand-held portable units transmitting on the 467 MHz interstitial channels must not exceed 0.5 Watt. Each GMRS transmitter type capable of transmitting on these channels must be designed such that the ERP does not exceed 0.5 Watt.

### 10.2 Measurement Procedure

1. EUT was placed on a 0.8 or 1.5meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made. The radiated emission measurements of all transmit frequencies in all channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver

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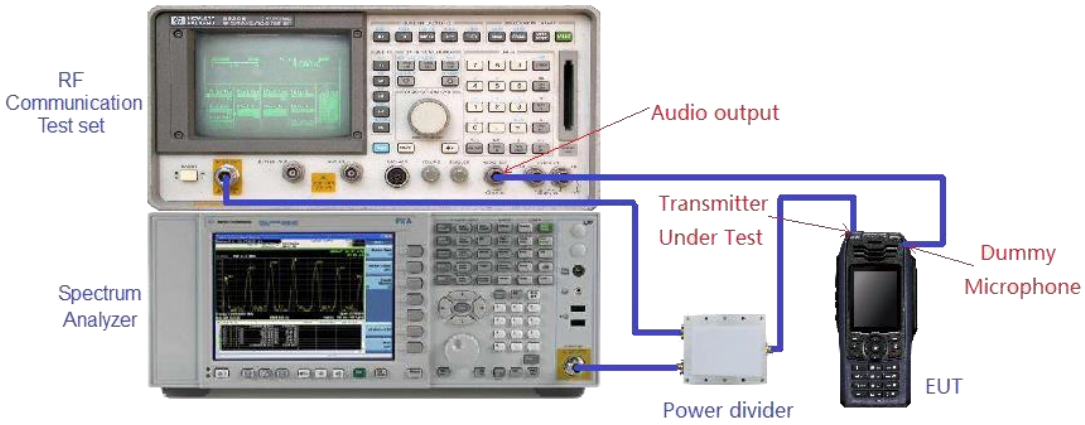
reach the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ($P_{cl}$) ,the Substitution Antenna Gain ($G_a$) and the Amplifier Gain ($P_{Ag}$) should be recorded after test
6. The measurement results are obtained as described below: Power(EIRP)=$P_{Mea}$- $P_{Ag}$ - $P_{cl}$ - $G_a$ The measurement results are amend as described below:Power(EIRP)=$P_{Mea}$- $P_{cl}$ - $G_a$
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
9. Test the EUT in the lowest channel, the middle channel the Highest channel

### 10.3 Measurement Setup

☒ Conducted Output Power:




☒ Effective Radiated Power:

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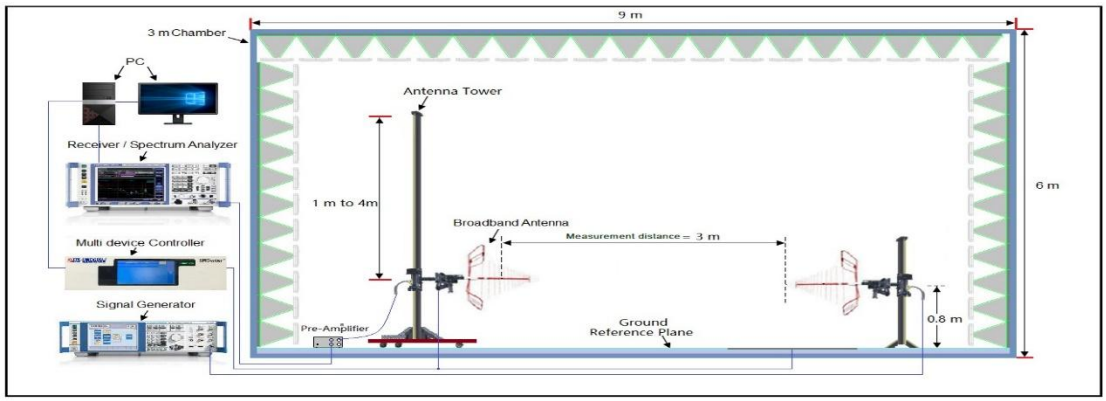
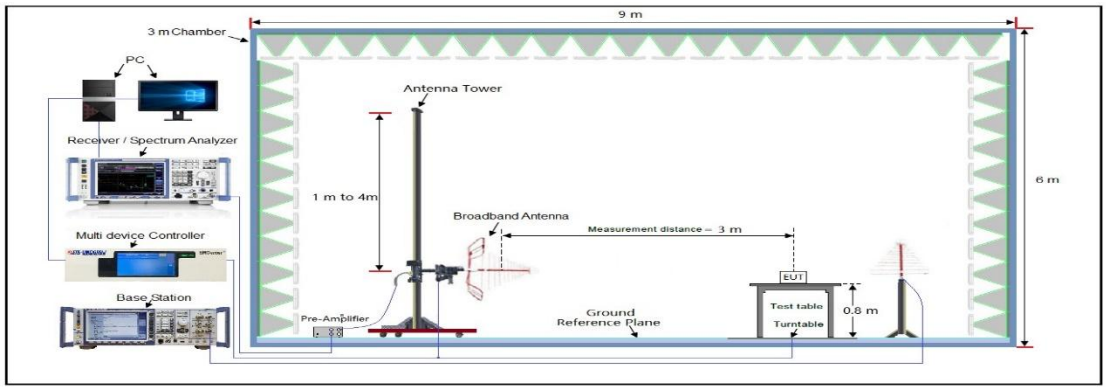
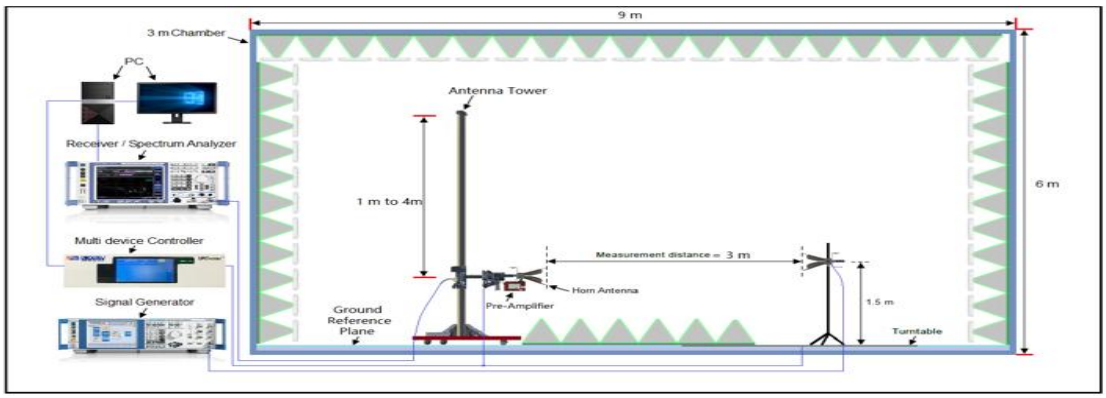
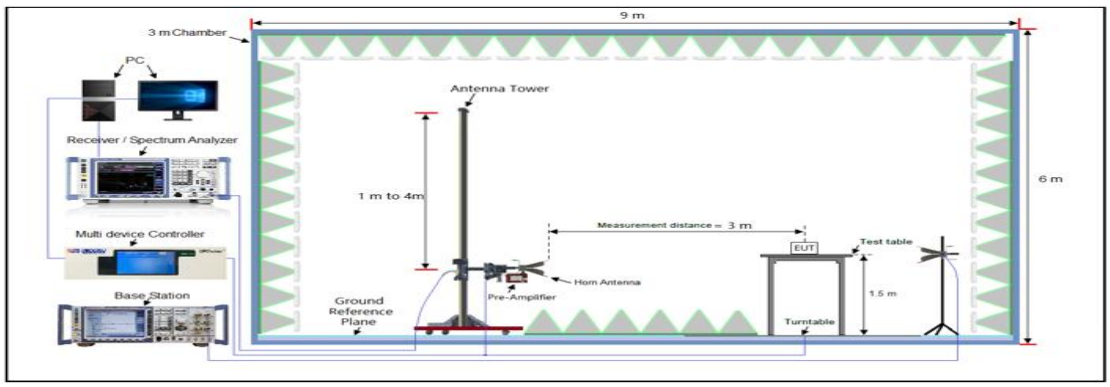
## Radiated Below 1GHz




## Radiated Above 1 GHz

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### 10.4 Measurement Result

- **ERP Result:**

| Frequency | Reading Level | Antenna | S.G. | Cable Loss | Ant.Gain | ERP Level | ERP Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBμV/m) | Polarization | (dBm) | (dB) | (dBi) | (dBm) | (W) | (W) | (W) |
| Channel Separation:12.5kHz-50W | | | | | | | | | |
| 462.6500 | 115.25 | V | 40.05 | 0.38 | 6.6 | 46.27 | 42.36 | 50 | 7.64 |
| 462.6500 | 115.17 | H | 39.97 | 0.38 | 6.6 | 46.19 | 41.59 | 50 | 8.41 |
| 467.6500 | 115.36 | V | 40.16 | 0.38 | 6.6 | 46.38 | 43.45 | 50 | 6.55 |
| 467.6500 | 115.23 | H | 40.03 | 0.38 | 6.6 | 46.25 | 42.17 | 50 | 7.83 |
| Channel Separation:12.5kHz-25W | | | | | | | | | |
| 462.6500 | 112.63 | V | 37.43 | 0.38 | 6.6 | 43.65 | 23.17 | 50 | 26.83 |
| 462.6500 | 112.57 | H | 37.37 | 0.38 | 6.6 | 43.59 | 22.86 | 50 | 27.14 |
| 467.6500 | 112.60 | V | 37.40 | 0.38 | 6.6 | 43.62 | 23.01 | 50 | 26.99 |
| 467.6500 | 112.53 | H | 37.33 | 0.38 | 6.6 | 43.55 | 22.65 | 50 | 27.35 |
| Channel Separation:12.5kHz-5W | | | | | | | | | |
| 462.6375 | 105.00 | V | 29.80 | 0.38 | 6.6 | 36.02 | 4.00 | 5 | 1.00 |
| 462.6375 | 104.89 | H | 29.69 | 0.38 | 6.6 | 35.91 | 3.90 | 5 | 1.10 |
| 462.6500 | 105.10 | V | 29.90 | 0.38 | 6.6 | 36.12 | 4.09 | 50 | 45.91 |
| 462.6500 | 105.01 | H | 29.81 | 0.38 | 6.6 | 36.03 | 4.01 | 50 | 45.99 |
| 467.6500 | 105.06 | V | 29.86 | 0.38 | 6.6 | 36.08 | 4.06 | 50 | 45.94 |
| 467.6500 | 104.94 | H | 29.74 | 0.38 | 6.6 | 35.96 | 3.94 | 50 | 46.06 |

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| Frequency | Reading Level | Antenna | S.G. | Cable Loss | Ant.Gain | ERP Level | ERP Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBμV/m) | Polarization | (dBm) | (dB) | (dBi) | (dBm) | (W) | (W) | (W) |
| Channel Separation:25kHz-50W | | | | | | | | | |
| 462.6500 | 115.30 | V | 40.10 | 0.38 | 6.6 | 46.32 | 42.85 | 50 | 7.15 |
| 462.6500 | 115.24 | H | 40.04 | 0.38 | 6.6 | 46.26 | 42.27 | 50 | 7.73 |
| 467.6500 | 115.38 | V | 40.18 | 0.38 | 6.6 | 46.40 | 43.65 | 50 | 6.35 |
| 467.6500 | 115.32 | H | 40.12 | 0.38 | 6.6 | 46.34 | 43.05 | 50 | 6.95 |
| Channel Separation:25kHz-25W | | | | | | | | | |
| 462.6500 | 112.61 | V | 37.41 | 0.38 | 6.6 | 43.63 | 23.07 | 50 | 26.93 |
| 462.6500 | 112.54 | H | 37.34 | 0.38 | 6.6 | 43.56 | 22.70 | 50 | 27.30 |
| 467.6500 | 112.58 | V | 37.38 | 0.38 | 6.6 | 43.60 | 22.91 | 50 | 27.09 |
| 467.6500 | 112.52 | H | 37.32 | 0.38 | 6.6 | 43.54 | 22.59 | 50 | 27.41 |
| Channel Separation:25kHz-5W | | | | | | | | | |
| 462.6375 | 105.06 | V | 29.86 | 0.38 | 6.6 | 36.08 | 4.06 | 5 | 0.94 |
| 462.6375 | 104.87 | H | 29.67 | 0.38 | 6.6 | 35.89 | 3.88 | 5 | 1.12 |
| 462.6500 | 105.09 | V | 29.89 | 0.38 | 6.6 | 36.11 | 4.08 | 50 | 45.92 |
| 462.6500 | 105.01 | H | 29.81 | 0.38 | 6.6 | 36.03 | 4.01 | 50 | 45.99 |
| 467.6500 | 105.07 | V | 29.87 | 0.38 | 6.6 | 36.09 | 4.06 | 50 | 45.94 |
| 467.6500 | 105.00 | H | 29.80 | 0.38 | 6.6 | 36.02 | 4.00 | 50 | 46.00 |

**Note:**
1. Calculation Formula: Emission Level(dBm) = S.G. (dBm)- Cable Loss(dB)+ Ant.Gain(dBi)
2. The Ant. Gain including the correct factor 2.15
3. Margin (dB) = Limit(dBm)- Emission Level(dBm)

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- **Conducted Power Result:**

The maximum Power (CP) for GMRS is
Analog: 50W/25W/5W for 12.5 kHz /25 kHz Channel Separation
Calculation Formula: CP = R + A + L
* Note:
CP: The final Conducted Power
R : The reading value from spectrum analyzer
A : The attenuation value of the used attenuator
L : The loss of all connection cables

| Conducted Power Measurement Results | | | |
|---|---|---|---|
| Mode | Channel Separation | Test Channel | Measurement Result (dBm) 50W(46.99dBm) |
| GMRS TX | 12.5 kHz | 462.6500 MHz | 46.57 |
| | | 467.6500 MHz | 46.68 |
| Mode | Channel Separation | Test Channel | Measurement Result (dBm) 25W(43.98dBm) |
| GMRS TX | 12.5 kHz | 462.6500 MHz | 43.97 |
| | | 467.6500 MHz | 43.95 |
| Mode | Channel Separation | Test Channel | Measurement Result (dBm) 5W(36.99dBm) |
| GMRS TX | 12.5 kHz | 462.6375 MHz | 36.33 |
| | | 462.6500 MHz | 36.41 |
| | | 467.6500 MHz | 36.39 |

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| Conducted Power Measurement Results | | | |
|---|---|---|---|
| Mode | Channel Separation | Test Channel | Measurement Result (dBm)<br>50W(46.99dBm) |
| GMRS TX | 25 kHz | 462.6500 MHz | 46.62 |
| | | 467.6500 MHz | 46.70 |
| Mode | Channel Separation | Test Channel | Measurement Result (dBm)<br>25W(43.98dBm) |
| GMRS TX | 25 kHz | 462.6500 MHz | 43.96 |
| | | 467.6500 MHz | 43.95 |
| Mode | Channel Separation | Test Channel | Measurement Result (dBm)<br>5W(36.99dBm) |
| GMRS TX | 25 kHz | 462.6375 MHz | 36.37 |
| | | 462.6500 MHz | 36.43 |
| | | 467.6500 MHz | 36.38 |

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# 11. Spurious Emission on Antenna Port

## 11.1 Provisions Applicable

Please refer to FCC 47 CFR 2.1051, 2.1057, 22.359 & 90.210 for specification details.
Emissions shall be attenuated below the mean output power of the transmitter as follows:

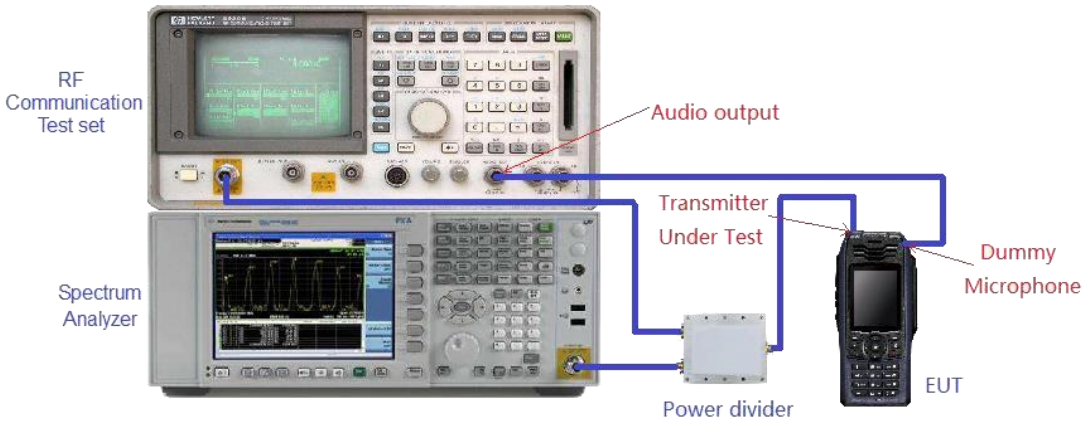
| FCC Rules | Attenuation Limit (dBc) |
|---|---|
| § 95.1779 | At least 43 + 10 log (P) dB |

43 + 10 log ($P_{watts}$)
Calculation: Limit (dBm) =EL-43-10log10 (TP)
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P( dBm).
Limit (dBm) = P( dBm)-43-10 log ($P_{watts}$) = -13 dBm

## 11.2 Measurement Procedure

1. The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to
3. Show any out of band emission up to 10th . Harmonic for the lower and the highest frequency range.
4. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set
5. RBW=1MHz.VBW=3MHz from the 1GHz to 10th Harmonic.
6. The audio input was set the unmodulated carrier, the resulting picture is print out for each channel separation.

## 11.3 Measurement Setup

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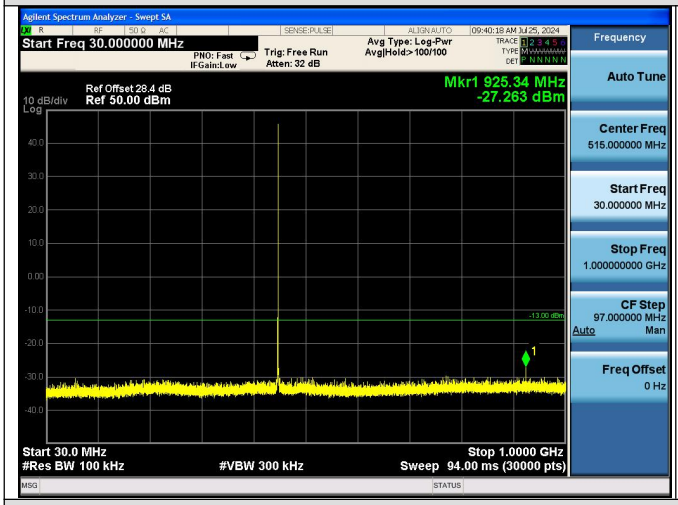
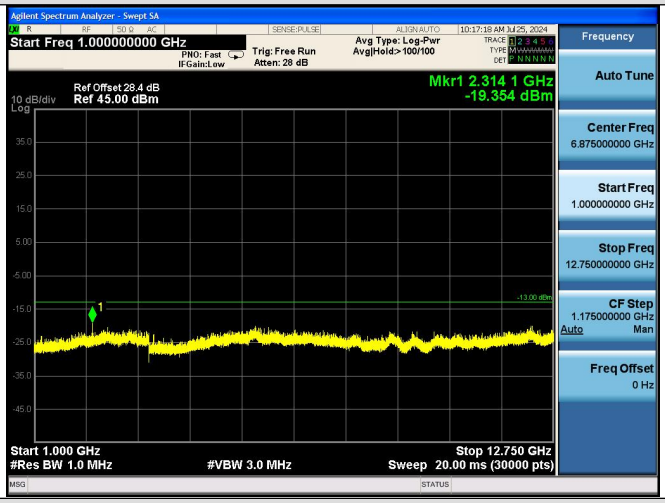
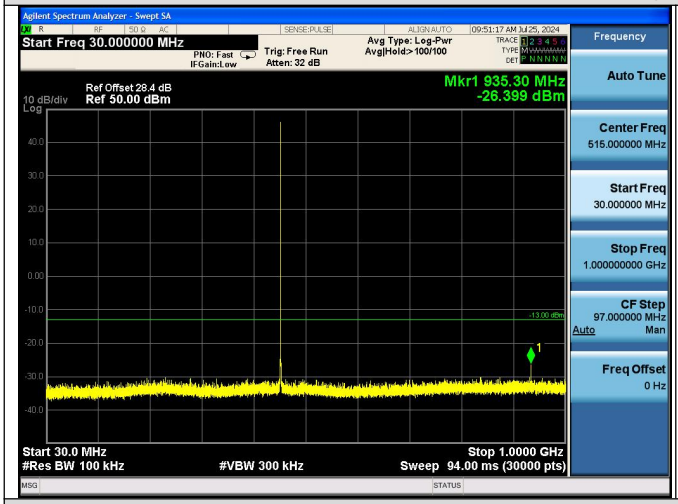
## 11.4 Measurement Result

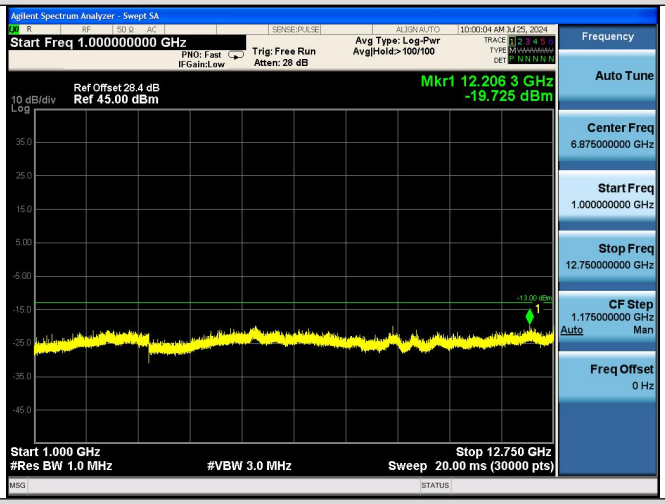
12.5kHz, FM modulation, Assigned Frequency:462.6500MHz, 50W



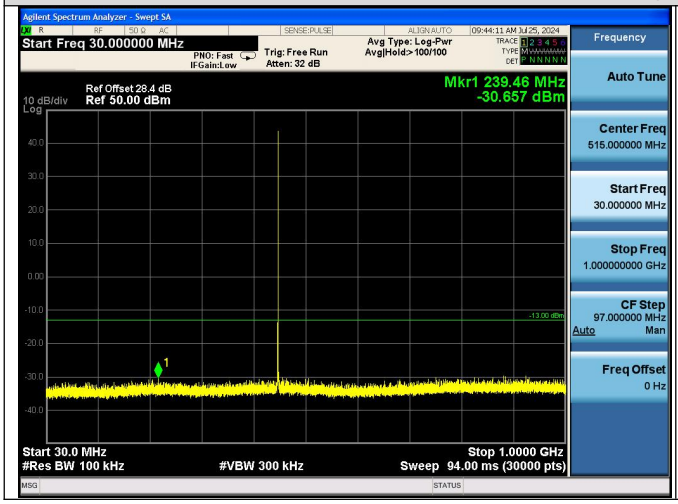



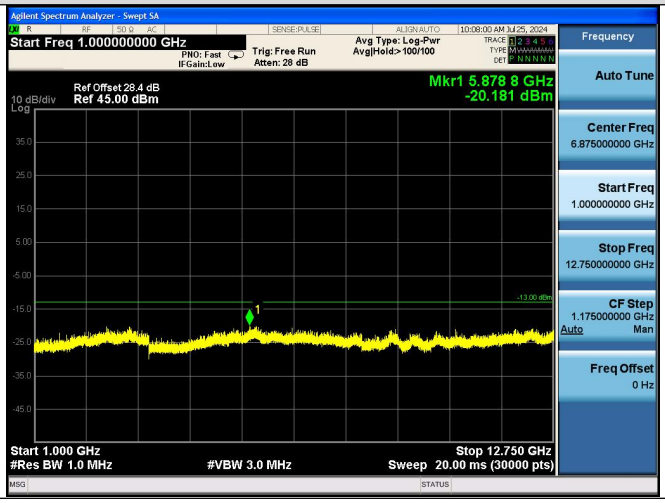

12.5kHz, FM modulation, Assigned Frequency:467.6500MHz, 50W




12.5kHz, FM modulation, Assigned Frequency:462.6500MHz, 25W

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