

## FCC PART 95

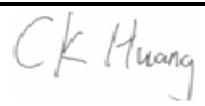
## TEST REPORT

For

### Midland Radio Corporation

5900 Parretta Drive, Kansas City, Missouri, 64120-2134, United States

**FCC ID: MMAMXT575**

|                                        |                                                                                                                                                                                                                               |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>GMRS MOBILE RADIO                                                                                                                                                                                     |
| <b>Project Engineer:</b>               | <u>CK Huang</u>                                                                                                                          |
| <b>Report Number:</b>                  | <u>RXM201206050-00A</u>                                                                                                                                                                                                       |
| <b>Report Date:</b>                    | <u>2021-01-19</u>                                                                                                                                                                                                             |
| <b>Reviewed By:</b>                    | <u>Oscar Ye</u> <br>EMC Manager                                                                                                          |
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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

|                           |                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------|
| Applicant                 | Midland Radio Corporation                                                                          |
| Tested Model              | MXT-575                                                                                            |
| Product Type              | GMRS MOBILE RADIO                                                                                  |
| Modulation Mode           | FM                                                                                                 |
| Maximum Output Power(ERP) | 462.5500-462.7250MHz: 46.89dBm<br>462.5625-462.7125MHz: 36.11dBm<br>467.5500-467.7250MHz: 46.69dBm |
| Operation Frequency       | 462.5500-462.7250MHz<br>462.5625-462.7125MHz<br>467.5500-467.7250MHz                               |
| Power Supply              | DC 13.8V                                                                                           |
| *Antenna Gain             | 2.1 dBi                                                                                            |

Note\*: The Maximum Antenna Gain was provided by manufacturer.

All measurement and test data in this report was gathered from production sample serial number: RXM201206050-1.  
(Assigned by the BACL. The EUT supplied by the applicant was received on 2020-12-06)

### Objective

This test report is prepared on behalf of *Midland Radio Corporation* in accordance with Part 2 and Part 95, Subpart A & Subpart E of the Federal Communication Commissions rules.

### Related Submittal(s)/Grant(s)

FCC Part 15B CSR Submittal with FCC ID: MMAMXT575.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart A and Subpart E of the Federal Communication Commissions rules with C63.26-2015, American National Standard for Compliance Testing of TransmittersUsed in Licensed Radio Services

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Measurement Uncertainty**

| Item                          | Uncertainty                              |
|-------------------------------|------------------------------------------|
| Occupied Channel Bandwidth    | ±5%                                      |
| RF output power, conducted    | ±0.61dB                                  |
| Unwanted Emissions, radiated  | 30MHz~1GHz: 5.85dB<br>1G~26.5GHz: 5.23dB |
| Unwanted Emissions, conducted | ±1.5dB                                   |
| Temperature                   | ±1.0°C                                   |
| Humidity                      | ±5%                                      |
| DC and low frequency voltages | ±0.4%                                    |
| Duty Cycle                    | 1%                                       |

**Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISSED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

Test channel list as below:

#### 462 MHz main channels

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1       | 462.5500        | 2       | 462.5750        |
| 3       | 462.6000        | 4       | 462.6250        |
| 5       | 462.6500        | 6       | 462.6750        |
| 7       | 462.7000        | 8       | 462.7250        |

#### 462 MHz interstitial channels

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1       | 462.5625        | 2       | 462.5875        |
| 3       | 462.6125        | 4       | 462.6375        |
| 5       | 462.6625        | 6       | 462.6875        |
| 7       | 462.7125        | 8       | /               |

#### 467 MHz main channels

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1       | 467.5500        | 2       | 467.5750        |
| 3       | 467.6000        | 4       | 467.6250        |
| 5       | 467.6500        | 6       | 467.6750        |
| 7       | 467.7000        | 8       | 467.7250        |

## Equipment Modifications

No modification was made to the EUT tested.

## Support Equipment List and Details

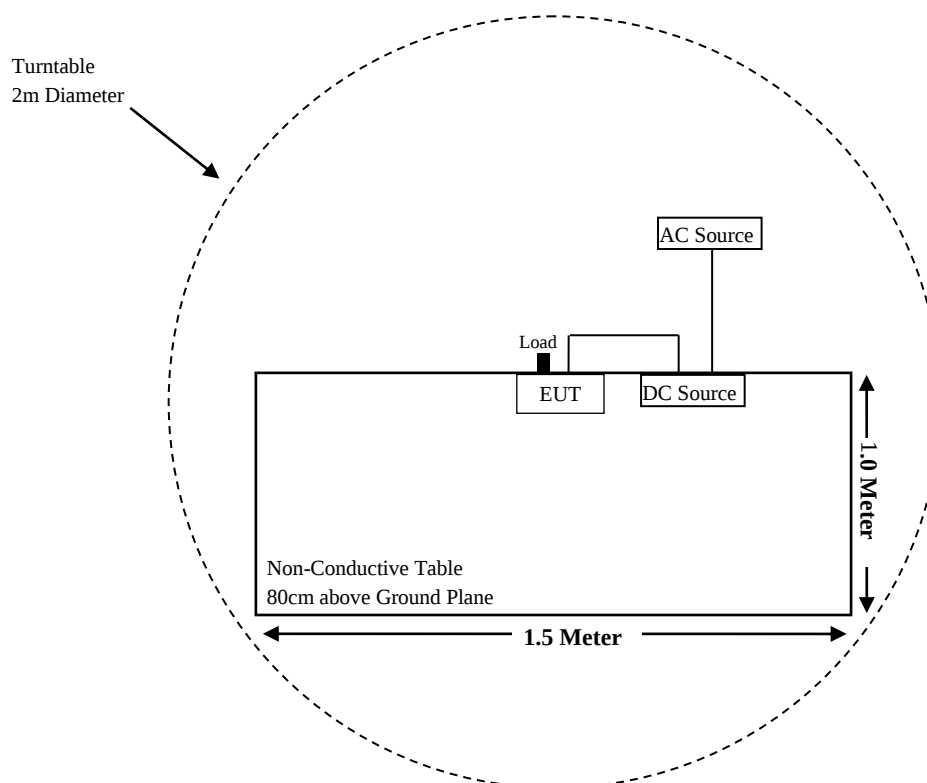
| Manufacturer | Description       | Model        | Serial Number |
|--------------|-------------------|--------------|---------------|
| EAST         | DC Source         | MCH-303D-II  | 14070562      |
| Huaxiang     | 50OhmCoaxial Load | 4.3/10TF20-8 | 17011301      |

## External I/O Cable

| Cable Description | Length (m) | From/Port | To        |
|-------------------|------------|-----------|-----------|
| Audio Cable       | 1.5        | EUT       | Earphone  |
| Power Cable       | 1.0        | EUT       | AC Source |

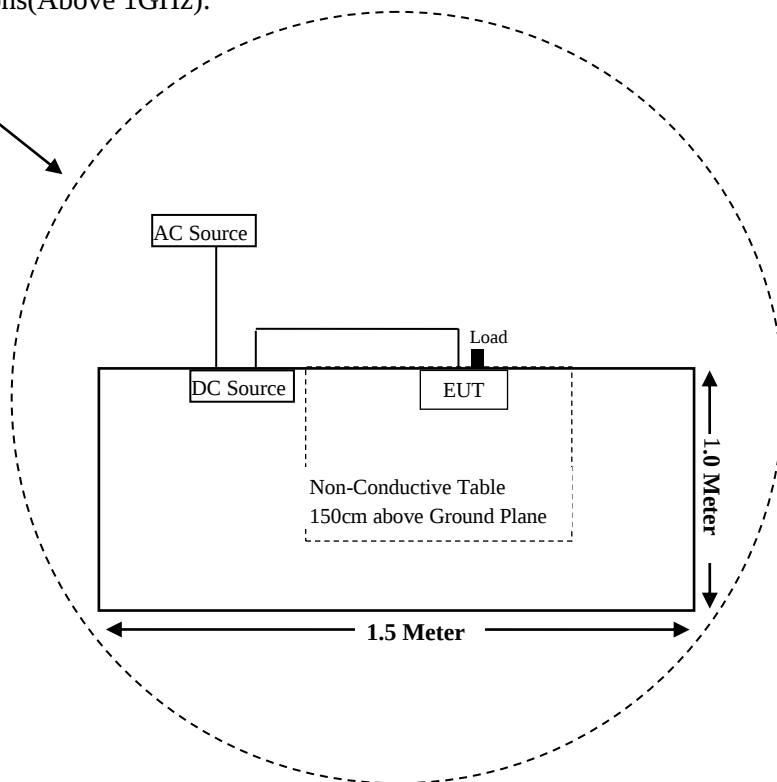
## Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):

Turntable  
2m Diameter



## SUMMARY OF TEST RESULTS

| FCC Rules                   | Description of Test                   | Results                        |
|-----------------------------|---------------------------------------|--------------------------------|
| §95.1787(a)(4)              | Antenna Requirement                   | Not Applicable<br>(See Note 1) |
| §2.1046, §95.1767           | RF Output Power                       | Compliant                      |
| §2.1047, §95.1775           | Modulation Characteristic             | Compliant                      |
| §2.1049, §95.1773, §95.1779 | Authorized Bandwidth & Emission Mask  | Compliant                      |
| §2.1051, §95.1779           | Spurious Emission at Antenna Terminal | Compliant                      |
| §2.1053, §95.1779           | Spurious Radiated Emissions           | Compliant                      |
| §2.1055(d), §95.1765        | Frequency Stability                   | Compliant                      |

Note 1: The EUT has no digital data transmissions function.

## TEST EQUIPMENT LIST

| Manufacturer                               | Description                    | Model                         | Serial Number | Calibration Date | Calibration Due Date |
|--------------------------------------------|--------------------------------|-------------------------------|---------------|------------------|----------------------|
| <b>Radiated Emission Test (Chamber 1#)</b> |                                |                               |               |                  |                      |
| Rohde & Schwarz                            | EMI Test Receiver              | ESCI                          | 100195        | 2020-11-27       | 2021-11-26           |
| Sunol Sciences                             | Broadband Antenna              | JB3                           | A090314-1     | 2020-08-05       | 2023-08-04           |
| HP                                         | Signal Generator               | N5183A                        | MY51040755    | 2020-11-27       | 2021-11-26           |
| Sonoma Instrument                          | Amplifier                      | 310N                          | 171205        | 2020-08-14       | 2021-08-13           |
| Rohde & Schwarz                            | Auto test Software             | EMC32                         | 100361        | /                | /                    |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-8                       | 008           | 2020-08-15       | 2021-08-14           |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-9                       | 009           | 2020-08-15       | 2021-08-14           |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-10                      | 010           | 2020-08-15       | 2021-08-14           |
| <b>Radiated Emission Test (Chamber 2#)</b> |                                |                               |               |                  |                      |
| HP                                         | Signal Generator               | N5183A                        | MY51040755    | 2020-11-27       | 2021-11-26           |
| Rohde & Schwarz                            | EMI Test Receiver              | ESU40                         | 100207        | 2020-04-01       | 2021-03-31           |
| ETS-LINDGREN                               | Horn Antenna                   | 3115                          | 9207-3900     | 2020-07-15       | 2023-07-14           |
| ETS-LINDGREN                               | Horn Antenna                   | 3115                          | 6229          | 2020-01-10       | 2023-01-09           |
| A.H.Systems,inc                            | Amplifier                      | PAM-0118P                     | 512           | 2020-02-20       | 2021-02-19           |
| Rohde & Schwarz                            | Auto test Software             | EMC32                         | 100361        | /                | /                    |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-6                       | 006           | 2020-12-12       | 2021-12-11           |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-11                      | 011           | 2020-08-15       | 2021-08-14           |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-12                      | 012           | 2020-08-15       | 2021-08-14           |
| MICRO-COAX                                 | Coaxial Cable                  | Cable-13                      | 013           | 2020-08-15       | 2021-08-14           |
| <b>RF Conducted Test</b>                   |                                |                               |               |                  |                      |
| Rohde & Schwarz                            | Signal Analyzer                | FSV40                         | 101116        | 2020-07-28       | 2021-07-27           |
| Narda                                      | Attenuator                     | 10dB                          | 010           | 2020-08-15       | 2021-08-14           |
| BACL                                       | Temperature & Humidity Chamber | BTH-150                       | 30023         | 2020-11-25       | 2021-11-24           |
| ZHAOXIN                                    | DC Power Supply                | RXN-605D                      | DC002         | 2020-10-10       | 2021-10-09           |
| HP                                         | RF communication test SET.     | 8920B                         | 079           | 2020-04-01       | 2021-03-31           |
| Midland Radio Corporation                  | RF Cable                       | Midland Radio Corporation C01 | C01           | Each Time        | /                    |

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## FCC §2.1046, §95.1767 - RF OUTPUT POWER

### Applicable Standard

Per FCC §2.1046, and §95.1767, 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.

(a) 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.

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

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

(b) 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.

(c) 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.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting with antenna attached, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the emissions were measured by the substitution.

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 23.5 °C   |
| Relative Humidity: | 53 %      |
| ATM Pressure:      | 101.1 kPa |

*The testing was performed by CK Huang on 2021-01-06.*

*Test Result: Compliant.*

Test Mode: Transmitting

**ERP:**

| Frequency<br>(MHz)     | Receiver<br>Reading<br>(dBuV) | Polar<br>(H/V) | Substituted                 |                       |                          | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|------------------------|-------------------------------|----------------|-----------------------------|-----------------------|--------------------------|----------------------------|----------------|----------------|
|                        |                               |                | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd) |                            |                |                |
| Frequency: 462.6250MHz |                               |                |                             |                       |                          |                            |                |                |
| 462.6250               | 116.76                        | H              | 49.16                       | 0.55                  | -1.72                    | 46.89                      | 47             | 0.11           |
| 462.6250               | 116.09                        | V              | 48.49                       | 0.55                  | -1.72                    | 46.22                      | 47             | 0.78           |
| Frequency: 462.6375MHz |                               |                |                             |                       |                          |                            |                |                |
| 462.6375               | 106.03                        | H              | 38.39                       | 0.55                  | -1.73                    | 36.11                      | 37             | 0.89           |
| 462.6375               | 105.91                        | V              | 38.27                       | 0.55                  | -1.73                    | 35.99                      | 37             | 1.01           |
| Frequency: 467.6250MHz |                               |                |                             |                       |                          |                            |                |                |
| 467.6250               | 117.10                        | H              | 49.00                       | 0.55                  | -1.76                    | 46.69                      | 47             | 0.31           |
| 467.6250               | 116.84                        | V              | 48.74                       | 0.55                  | -1.76                    | 46.43                      | 47             | 0.57           |

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level.

## FCC §2.1047, §95.1775 - MODULATION CHARACTERISTIC

### Applicable Standard

Per FCC §2.1047 and §95.1775: 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  $\pm 5$  kHz.

(b) 462 MHz interstitial channels: The peak frequency deviation for emissions to be transmitted on the 462 MHz interstitial channels must not exceed  $\pm 5$  kHz.

(c) 467 MHz interstitial channels: The peak frequency deviation for emissions to be transmitted on the 467 MHz interstitial channels must not exceed  $\pm 2.5$  kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

(d) Overmodulation. Each GMRS transmitter type, except for a mobile station transmitter type with a transmitter power output of 2.5 W or less, must automatically prevent a higher than normal audio level from causing overmodulation.

(e) Audio filter. Each GMRS transmitter type must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of §95.1779 (without filtering).

(1) The filter must be between the modulation limiter and the modulated stage of the transmitter.

(2) At any frequency ( $f$  in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least  $60 \log(f/3)$  dB more than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB more than the attenuation at 1 kHz.

### Test Procedure

ANSI C63.26:2015

### Test Data

#### Environmental Conditions

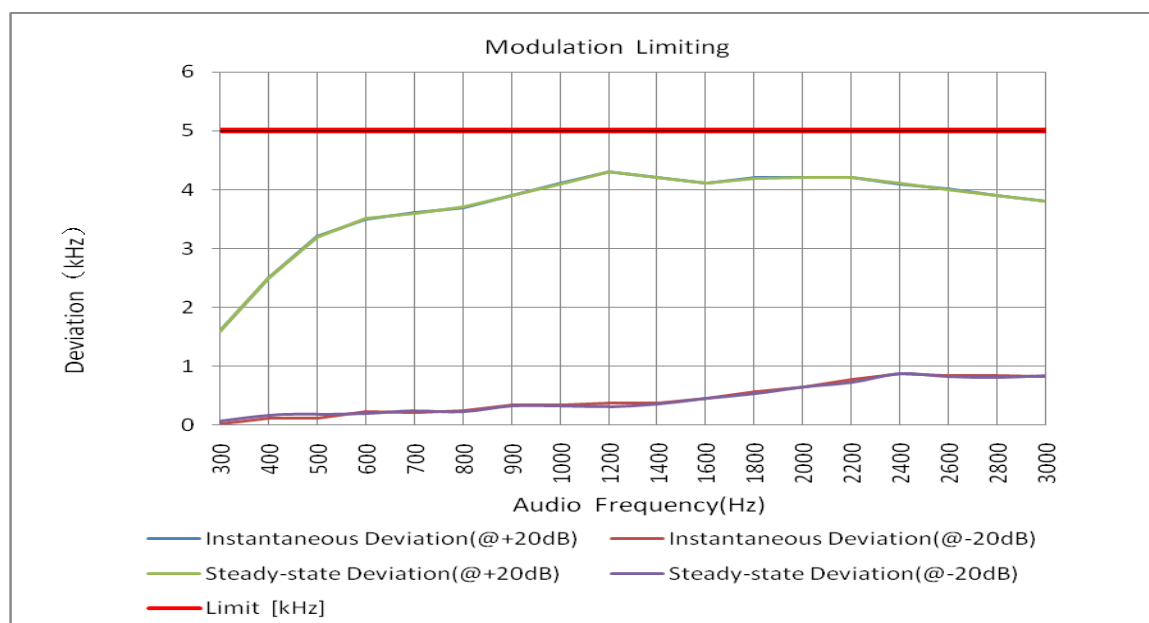
|                    |           |
|--------------------|-----------|
| Temperature:       | 23.5 °C   |
| Relative Humidity: | 53 %      |
| ATM Pressure:      | 101.1 kPa |

*The testing was performed by CK Huang on 2021-01-06.*

*Test Mode: Transmitting*

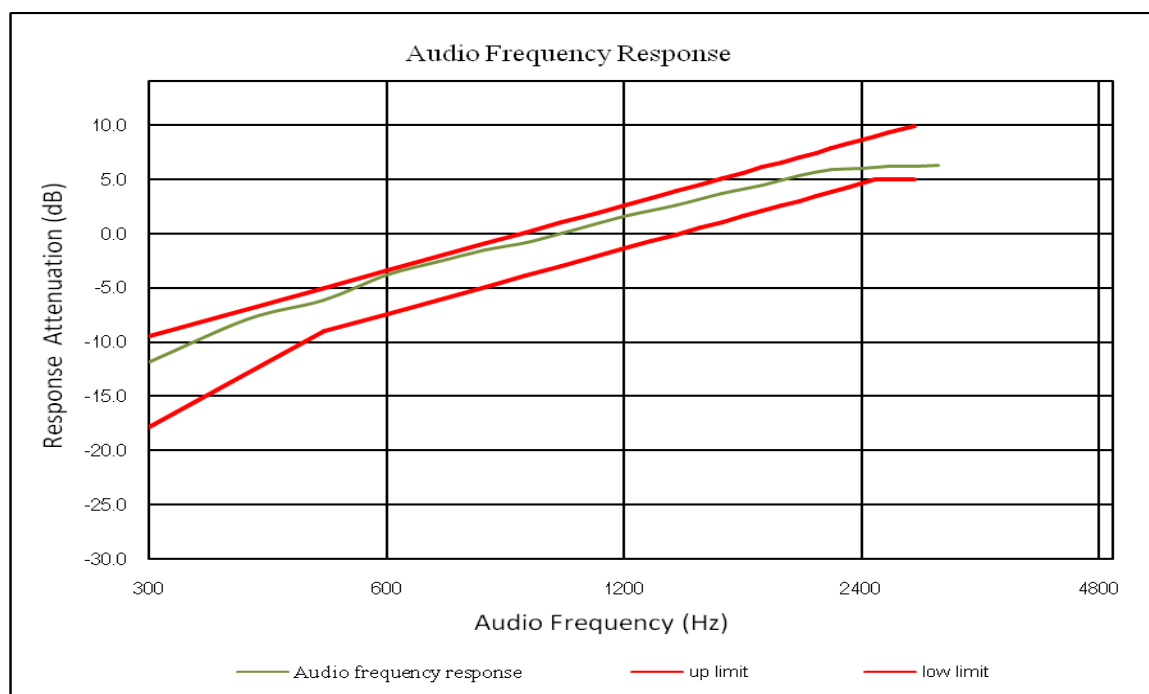
**MODULATION LIMITING**

| Carrier Frequency: 462.6250MHz |                          |                          |                          |                          |             |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
| Audio Frequency (Hz)           | Instantaneous            |                          | Steady-state             |                          | Limit (kHz) |
|                                | Deviation (@+20dB) (kHz) | Deviation (@-20dB) (kHz) | Deviation (@+20dB) (kHz) | Deviation (@-20dB) (kHz) |             |
| 300                            | 1.606                    | 0.027                    | 1.604                    | 0.065                    | 5.0         |
| 400                            | 2.504                    | 0.111                    | 2.501                    | 0.173                    | 5.0         |
| 500                            | 3.207                    | 0.122                    | 3.200                    | 0.188                    | 5.0         |
| 600                            | 3.507                    | 0.225                    | 3.509                    | 0.205                    | 5.0         |
| 700                            | 3.605                    | 0.219                    | 3.604                    | 0.241                    | 5.0         |
| 800                            | 3.700                    | 0.250                    | 3.708                    | 0.228                    | 5.0         |
| 900                            | 3.900                    | 0.348                    | 3.902                    | 0.327                    | 5.0         |
| 1000                           | 4.108                    | 0.346                    | 4.102                    | 0.326                    | 5.0         |
| 1200                           | 4.309                    | 0.369                    | 4.301                    | 0.316                    | 5.0         |
| 1400                           | 4.209                    | 0.382                    | 4.202                    | 0.363                    | 5.0         |
| 1600                           | 4.106                    | 0.459                    | 4.108                    | 0.448                    | 5.0         |
| 1800                           | 4.201                    | 0.571                    | 4.200                    | 0.530                    | 5.0         |
| 2000                           | 4.208                    | 0.650                    | 4.203                    | 0.647                    | 5.0         |
| 2200                           | 4.206                    | 0.780                    | 4.207                    | 0.725                    | 5.0         |
| 2400                           | 4.103                    | 0.875                    | 4.104                    | 0.880                    | 5.0         |
| 2600                           | 4.009                    | 0.839                    | 4.005                    | 0.824                    | 5.0         |
| 2800                           | 3.901                    | 0.840                    | 3.903                    | 0.813                    | 5.0         |
| 3000                           | 3.806                    | 0.828                    | 3.802                    | 0.844                    | 5.0         |



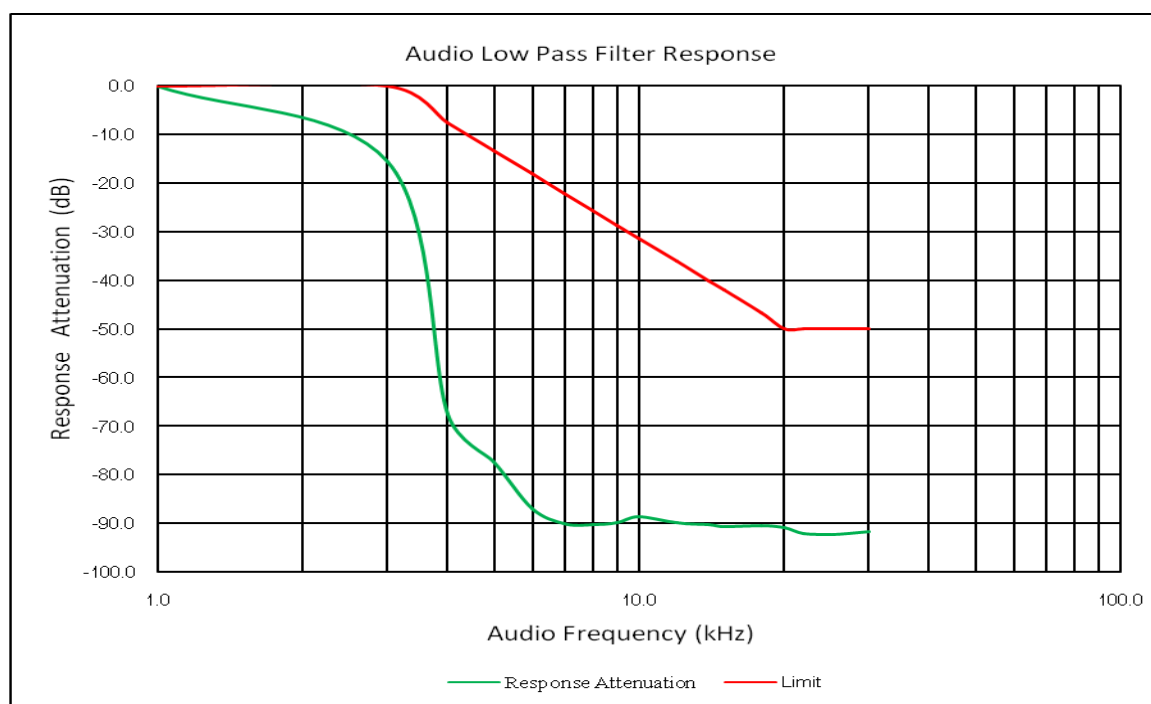
**Audio Frequency Response**

| Carrier Frequency: 462.6250MHz |                           |
|--------------------------------|---------------------------|
| Audio Frequency (Hz)           | Response Attenuation (dB) |
| 300                            | -11.85                    |
| 400                            | -7.89                     |
| 500                            | -6.12                     |
| 600                            | -3.84                     |
| 700                            | -2.62                     |
| 800                            | -1.55                     |
| 900                            | -0.86                     |
| 1000                           | 0.00                      |
| 1200                           | 1.52                      |
| 1400                           | 2.61                      |
| 1600                           | 3.72                      |
| 1800                           | 4.49                      |
| 2000                           | 5.32                      |
| 2200                           | 5.86                      |
| 2400                           | 6.03                      |
| 2600                           | 6.18                      |
| 2800                           | 6.21                      |
| 3000                           | 6.30                      |



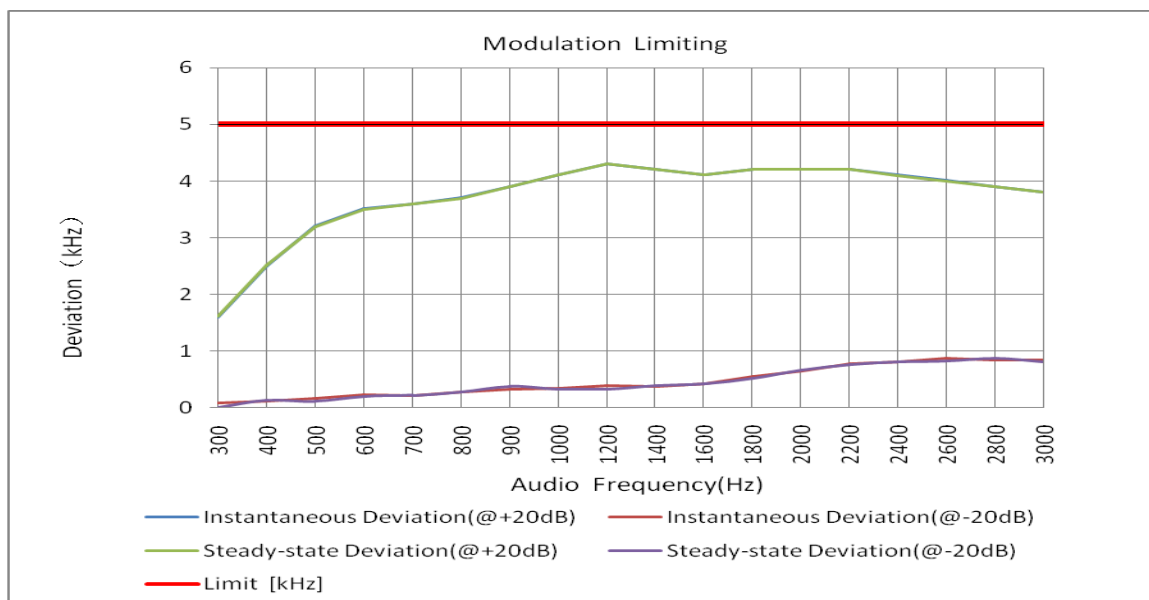
**Audio Low Pass Filter Response**

| Carrier Frequency: 462.6250MHz |                           |            |
|--------------------------------|---------------------------|------------|
| Audio Frequency (kHz)          | Response Attenuation (dB) | Limit (dB) |
| 1.0                            | 0                         | /          |
| 3.0                            | -15.6                     | 0          |
| 4.0                            | -67.5                     | -7.5       |
| 5.0                            | -77.3                     | -13.3      |
| 6.0                            | -86.9                     | -18.1      |
| 7.0                            | -90.1                     | -22.1      |
| 8.0                            | -90.3                     | -25.6      |
| 9.0                            | -89.9                     | -28.6      |
| 10.0                           | -88.5                     | -31.4      |
| 12.0                           | -89.9                     | -36.1      |
| 14.0                           | -90.2                     | -40.1      |
| 15.0                           | -90.6                     | -41.9      |
| 18.0                           | -90.4                     | -46.7      |
| 20.0                           | -90.8                     | -50.0      |
| 22.0                           | -92.0                     | -50.0      |
| 25.0                           | -92.3                     | -50.0      |
| 30.0                           | -91.7                     | -50.0      |



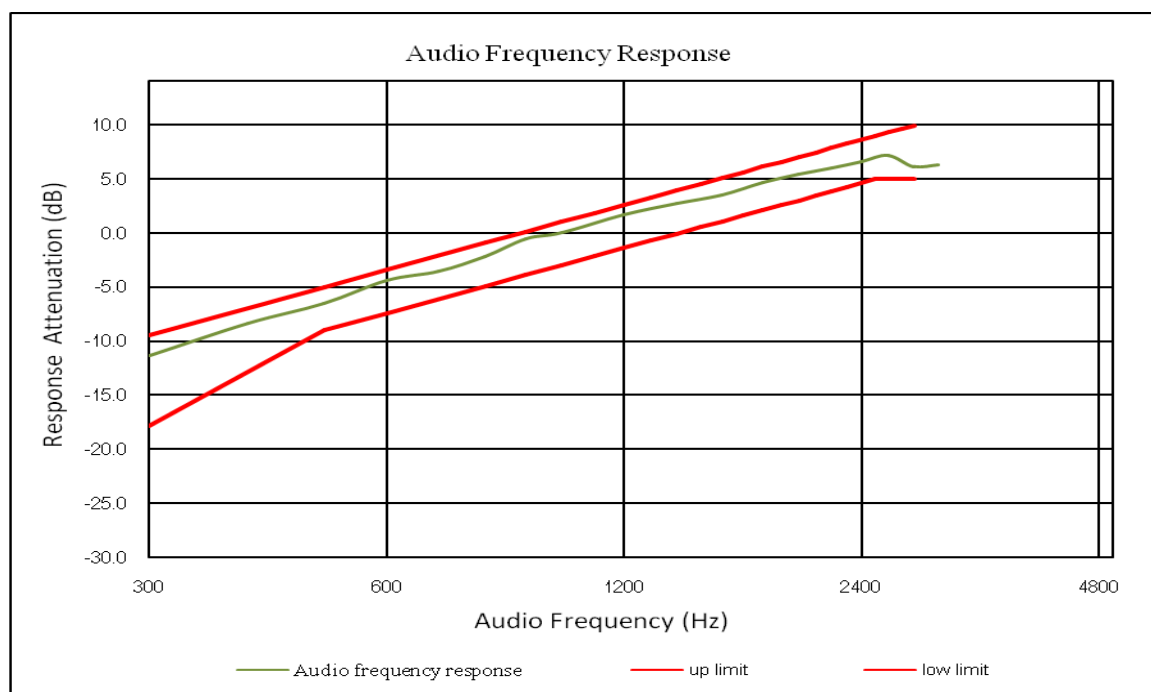
# MODULATION LIMITING

| Carrier Frequency: 462.6375MHz |                          |                          |                          |                          |             |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
| Audio Frequency (Hz)           | Instantaneous            |                          | Steady-state             |                          | Limit (kHz) |
|                                | Deviation (@+20dB) (kHz) | Deviation (@-20dB) (kHz) | Deviation (@+20dB) (kHz) | Deviation (@-20dB) (kHz) |             |
| 300                            | 1.606                    | 0.084                    | 1.608                    | 0.003                    | 5.0         |
| 400                            | 2.501                    | 0.112                    | 2.510                    | 0.136                    | 5.0         |
| 500                            | 3.203                    | 0.166                    | 3.201                    | 0.118                    | 5.0         |
| 600                            | 3.51                     | 0.225                    | 3.505                    | 0.205                    | 5.0         |
| 700                            | 3.601                    | 0.209                    | 3.601                    | 0.221                    | 5.0         |
| 800                            | 3.703                    | 0.281                    | 3.700                    | 0.285                    | 5.0         |
| 900                            | 3.908                    | 0.319                    | 3.901                    | 0.378                    | 5.0         |
| 1000                           | 4.105                    | 0.343                    | 4.107                    | 0.332                    | 5.0         |
| 1200                           | 4.301                    | 0.384                    | 4.309                    | 0.33                     | 5.0         |
| 1400                           | 4.201                    | 0.373                    | 4.205                    | 0.385                    | 5.0         |
| 1600                           | 4.11                     | 0.419                    | 4.107                    | 0.417                    | 5.0         |
| 1800                           | 4.205                    | 0.547                    | 4.202                    | 0.512                    | 5.0         |
| 2000                           | 4.208                    | 0.651                    | 4.201                    | 0.664                    | 5.0         |
| 2200                           | 4.203                    | 0.772                    | 4.207                    | 0.764                    | 5.0         |
| 2400                           | 4.105                    | 0.814                    | 4.102                    | 0.81                     | 5.0         |
| 2600                           | 4.009                    | 0.877                    | 4.000                    | 0.821                    | 5.0         |
| 2800                           | 3.905                    | 0.848                    | 3.904                    | 0.868                    | 5.0         |
| 3000                           | 3.803                    | 0.84                     | 3.808                    | 0.811                    | 5.0         |



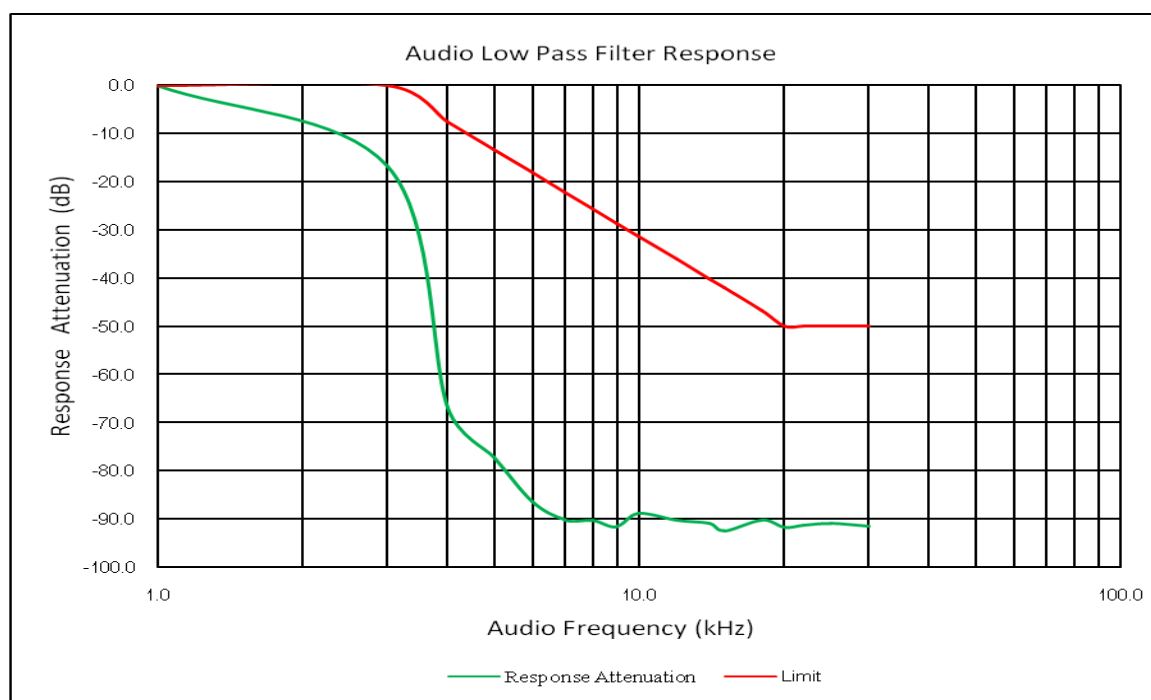
**Audio Frequency Response**

| Carrier Frequency: 462.6375MHz |                           |
|--------------------------------|---------------------------|
| Audio Frequency (Hz)           | Response Attenuation (dB) |
| 300                            | -11.35                    |
| 400                            | -8.37                     |
| 500                            | -6.56                     |
| 600                            | -4.39                     |
| 700                            | -3.57                     |
| 800                            | -2.15                     |
| 900                            | -0.53                     |
| 1000                           | 0                         |
| 1200                           | 1.66                      |
| 1400                           | 2.68                      |
| 1600                           | 3.51                      |
| 1800                           | 4.61                      |
| 2000                           | 5.38                      |
| 2200                           | 5.95                      |
| 2400                           | 6.58                      |
| 2600                           | 7.13                      |
| 2800                           | 6.12                      |
| 3000                           | 6.27                      |



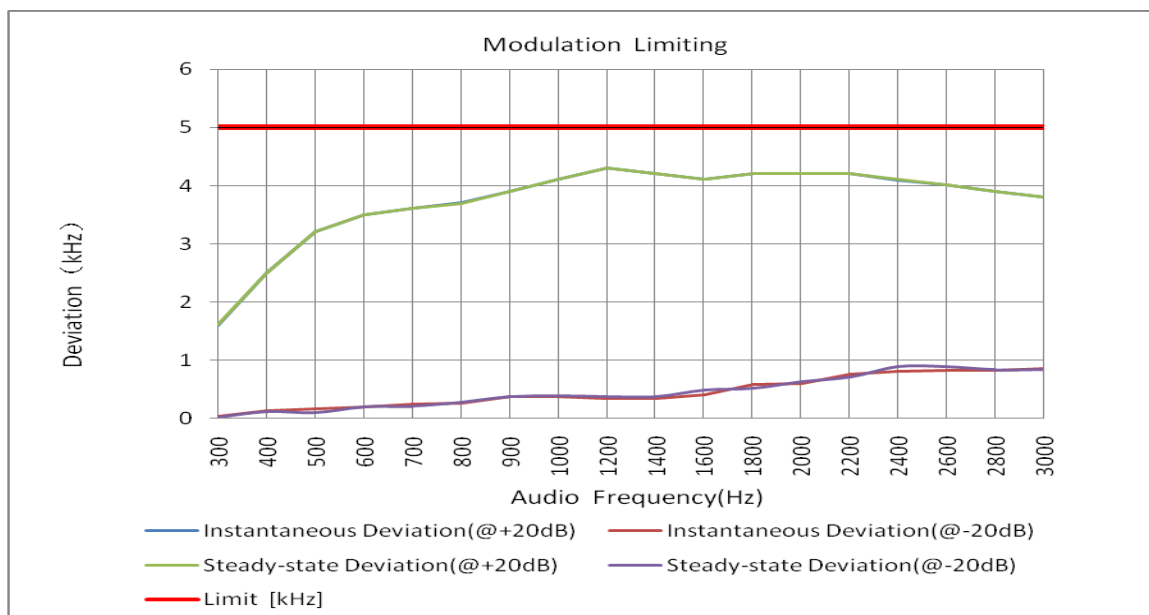
**Audio Low Pass Filter Response**

| Carrier Frequency: 462.6375MHz |                           |            |
|--------------------------------|---------------------------|------------|
| Audio Frequency (kHz)          | Response Attenuation (dB) | Limit (dB) |
| 1.0                            | 0                         | /          |
| 3.0                            | -16.9                     | 0          |
| 4.0                            | -65.7                     | -7.5       |
| 5.0                            | -76.5                     | -13.3      |
| 6.0                            | -85.4                     | -18.1      |
| 7.0                            | -89.3                     | -22.1      |
| 8.0                            | -90.2                     | -25.6      |
| 9.0                            | -90.4                     | -28.6      |
| 10.0                           | -89.8                     | -31.4      |
| 12.0                           | -90.4                     | -36.1      |
| 14.0                           | -90.9                     | -40.1      |
| 15.0                           | -91.5                     | -41.9      |
| 18.0                           | -91.4                     | -46.7      |
| 20.0                           | -91.6                     | -50        |
| 22.0                           | -91.6                     | -50        |
| 25.0                           | -91.3                     | -50        |
| 30.0                           | -91.4                     | -50        |



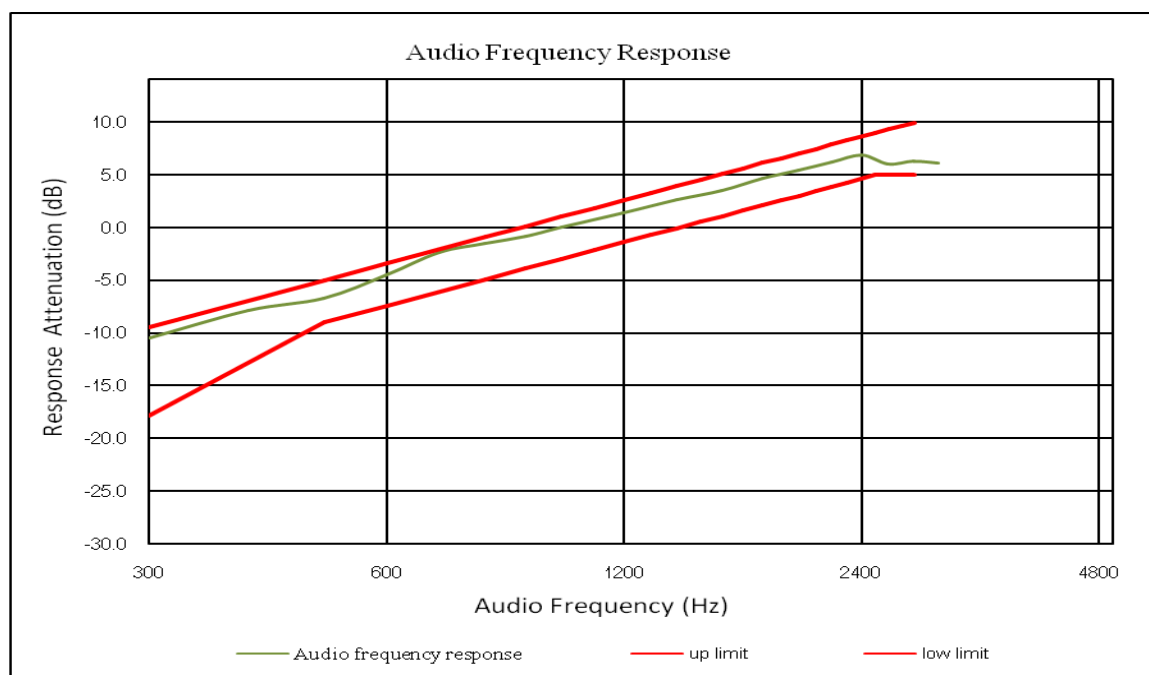
# MODULATION LIMITING

| Carrier Frequency: 467.6250MHz |                          |                          |                          |                          |             |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
| Audio Frequency (Hz)           | Instantaneous            |                          | Steady-state             |                          | Limit (kHz) |
|                                | Deviation (@+20dB) (kHz) | Deviation (@-20dB) (kHz) | Deviation (@+20dB) (kHz) | Deviation (@-20dB) (kHz) |             |
| 300                            | 1.606                    | 0.038                    | 1.608                    | 0.013                    | 5.0         |
| 400                            | 2.506                    | 0.133                    | 2.507                    | 0.116                    | 5.0         |
| 500                            | 3.209                    | 0.164                    | 3.210                    | 0.102                    | 5.0         |
| 600                            | 3.507                    | 0.204                    | 3.507                    | 0.203                    | 5.0         |
| 700                            | 3.608                    | 0.239                    | 3.609                    | 0.206                    | 5.0         |
| 800                            | 3.702                    | 0.261                    | 3.700                    | 0.284                    | 5.0         |
| 900                            | 3.906                    | 0.375                    | 3.901                    | 0.369                    | 5.0         |
| 1000                           | 4.107                    | 0.38                     | 4.110                    | 0.387                    | 5.0         |
| 1200                           | 4.301                    | 0.346                    | 4.304                    | 0.381                    | 5.0         |
| 1400                           | 4.202                    | 0.342                    | 4.203                    | 0.378                    | 5.0         |
| 1600                           | 4.106                    | 0.407                    | 4.104                    | 0.49                     | 5.0         |
| 1800                           | 4.207                    | 0.587                    | 4.205                    | 0.515                    | 5.0         |
| 2000                           | 4.201                    | 0.606                    | 4.207                    | 0.626                    | 5.0         |
| 2200                           | 4.204                    | 0.759                    | 4.205                    | 0.708                    | 5.0         |
| 2400                           | 4.101                    | 0.81                     | 4.109                    | 0.888                    | 5.0         |
| 2600                           | 4.009                    | 0.824                    | 4.010                    | 0.886                    | 5.0         |
| 2800                           | 3.904                    | 0.824                    | 3.900                    | 0.839                    | 5.0         |
| 3000                           | 3.805                    | 0.864                    | 3.806                    | 0.845                    | 5.0         |



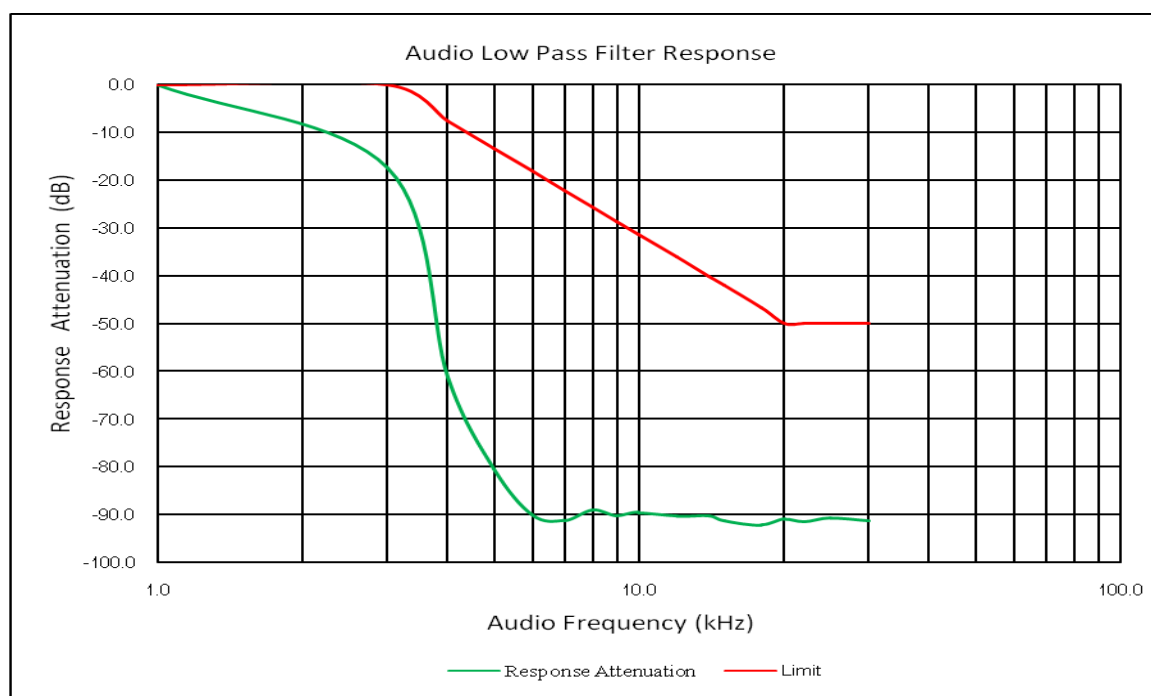
**Audio Frequency Response**

| Carrier Frequency: 467.6250MHz |                           |
|--------------------------------|---------------------------|
| Audio Frequency (Hz)           | Response Attenuation (dB) |
| 300                            | -10.51                    |
| 400                            | -7.85                     |
| 500                            | -6.69                     |
| 600                            | -4.52                     |
| 700                            | -2.38                     |
| 800                            | -1.57                     |
| 900                            | -0.82                     |
| 1000                           | 0                         |
| 1200                           | 1.39                      |
| 1400                           | 2.59                      |
| 1600                           | 3.47                      |
| 1800                           | 4.61                      |
| 2000                           | 5.38                      |
| 2200                           | 6.15                      |
| 2400                           | 6.83                      |
| 2600                           | 5.98                      |
| 2800                           | 6.24                      |
| 3000                           | 6.11                      |



**Audio Low Pass Filter Response**

| Carrier Frequency: 467.6250MHz |                           |            |
|--------------------------------|---------------------------|------------|
| Audio Frequency (kHz)          | Response Attenuation (dB) | Limit (dB) |
| 1.0                            | 0                         | /          |
| 3.0                            | -17.4                     | 0          |
| 4.0                            | -61.2                     | -7.5       |
| 5.0                            | -80.3                     | -13.3      |
| 6.0                            | -90.1                     | -18.1      |
| 7.0                            | -91.2                     | -22.1      |
| 8.0                            | -88.9                     | -25.6      |
| 9.0                            | -90.2                     | -28.6      |
| 10.0                           | -89.5                     | -31.4      |
| 12.0                           | -90.3                     | -36.1      |
| 14.0                           | -90.2                     | -40.1      |
| 15.0                           | -91.3                     | -41.9      |
| 18.0                           | -92.1                     | -46.7      |
| 20.0                           | -90.9                     | -50        |
| 22.0                           | -91.5                     | -50        |
| 25.0                           | -90.7                     | -50        |
| 30.0                           | -91.2                     | -50        |



## FCC §2.1049, §95.1773, §95.1779 - AUTHORIZED BANDWIDTH AND EMISSION MASK

### Applicable Standard

According to §95.1773. Each GMRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the channels used. Operation of GMRS stations must also be in compliance with these requirements.

(a) Main channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz main channels (see §95.1763(a)) or any of the 467 MHz main channels (see §95.1763(c)).

(b) Interstitial channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz interstitial channels (see §95.1763(b)) and is 12.5 kHz for GMRS transmitters operating on any of the 467 MHz interstitial channels (see §95.1763(d)).

(c) Digital data transmissions. Digital data transmissions are limited to the 462 MHz main channels and interstitial channels in the 462 MHz and 467 MHz bands.

According to §95.1779. Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(a) Emission masks. Emission masks applicable to transmitting equipment in the GMRS are defined by the requirements in the following table. The numbers in the attenuation requirements column refer to rule paragraph numbers under paragraph (b) of this section.

| Emission types filter                               | Attenuation requirements |
|-----------------------------------------------------|--------------------------|
| A1D, A3E, F1D, G1D, F2D, F3E, G3E with audio filter | (1), (2), (7)            |
| A1D, A3E, F1D, G1D, F3E, G3E without audio filter   | (3), (4), (7)            |
| H1D, J1D, R1D, H3E, J3E, R2E                        | (5), (6), (7)            |

(1) Filtering noted for GMRS transmitters refers to the requirement in §95.1775(e).

(2) Unwanted emission power may be measured as either mean power or peak envelope power, provided that the transmitter output power is measured the same way.

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

(2) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

(7)  $43 + 10 \log (P)$  dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b)(5) of this section is measured with a reference bandwidth of at least 30 kHz.

**Test Procedure**

C63.26-2015, section 2.2.11

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 23.5 °C   |
| <b>Relative Humidity:</b> | 53 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

*The testing was performed by CK Huang on 2021-01-06.**Test Mode: Transmitting*

| <b>Modulation</b> | <b>fc<br/>(MHz)</b> | <b>99% Occupied<br/>Bandwidth<br/>(kHz)</b> | <b>26dB<br/>Bandwidth<br/>(kHz)</b> | <b>Limit<br/>(kHz)</b> |
|-------------------|---------------------|---------------------------------------------|-------------------------------------|------------------------|
| FM                | 462.6250            | 14.616                                      | 15.490                              | 20                     |
|                   | 462.6375            | 14.616                                      | 15.630                              | 20                     |
|                   | 467.6250            | 14.472                                      | 15.630                              | 20                     |

Note: Emission bandwidth was based on calculation method instead of measurement.

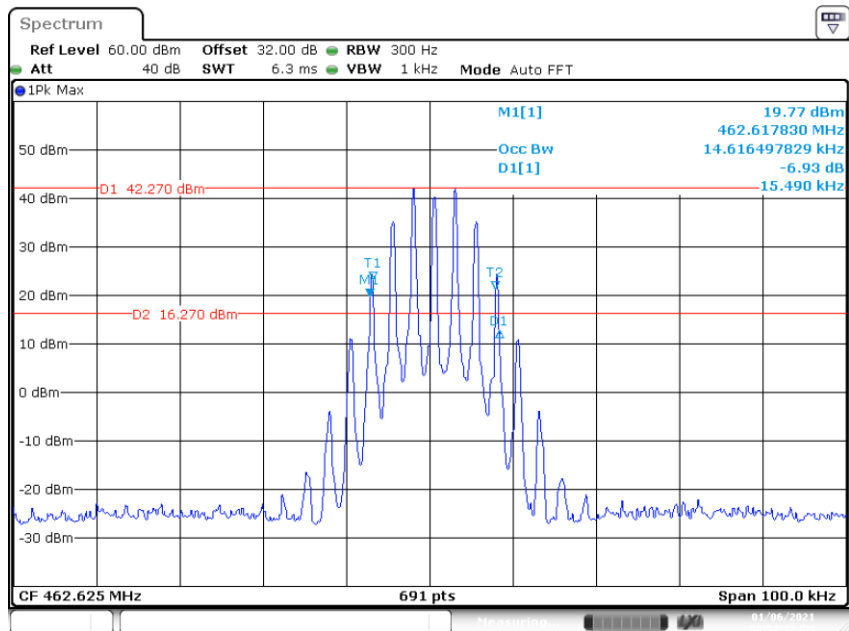
**Emission Designator**Per CFR 47 §2.201& §2.202,  $BW = 2M + 2D$ 

The maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

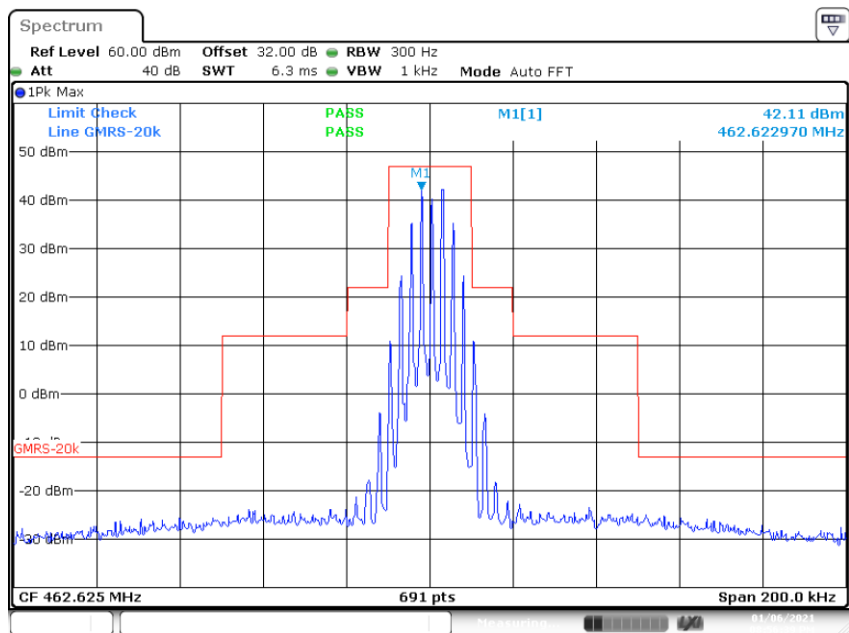
 $BW = 2(M+D) = 2*(3.0 \text{ kHz} + 5.0 \text{ kHz}) = 16 \text{ kHz} \rightarrow 16K0$ 

F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

## 462.6250 MHz

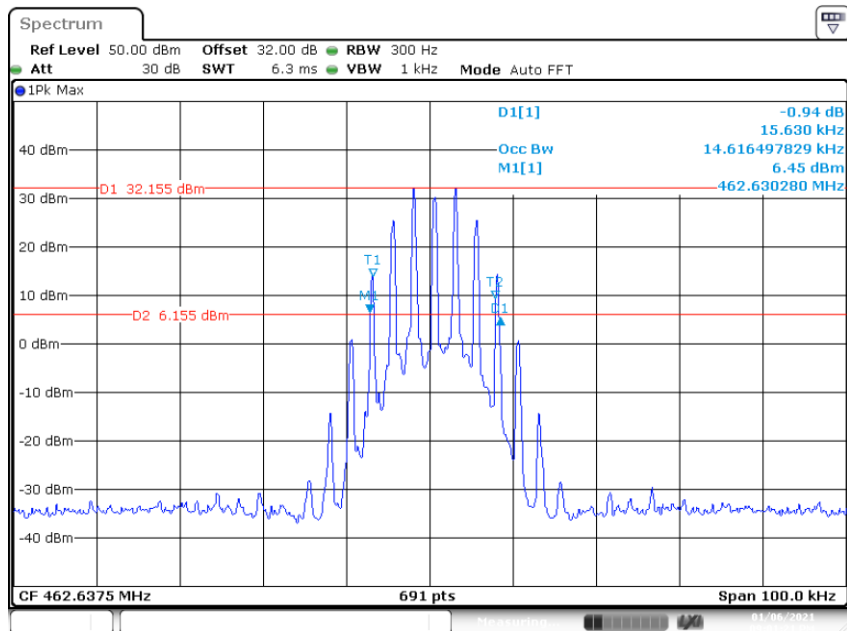


Date: 6 JAN 2021 20:54:32

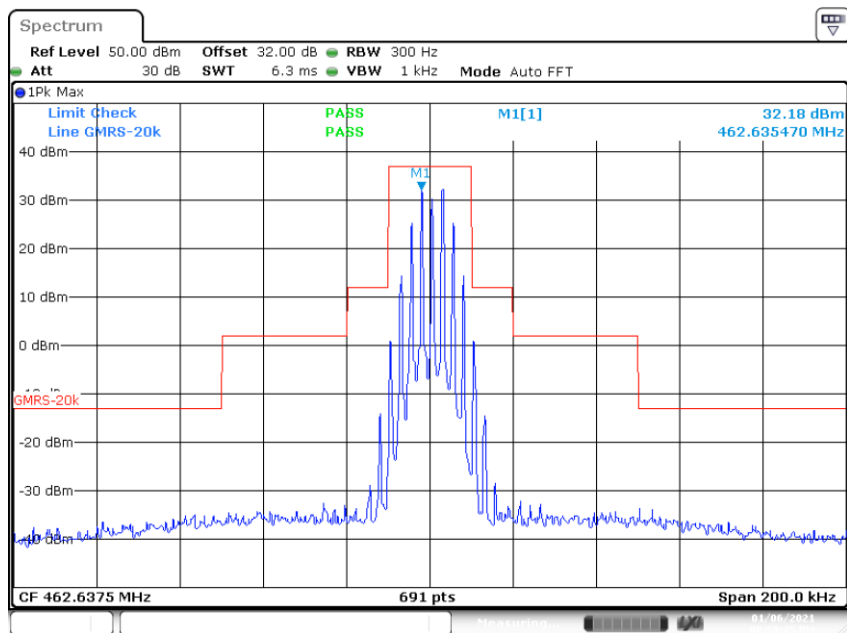


Date: 6 JAN 2021 20:56:40

# 462.6375 MHz

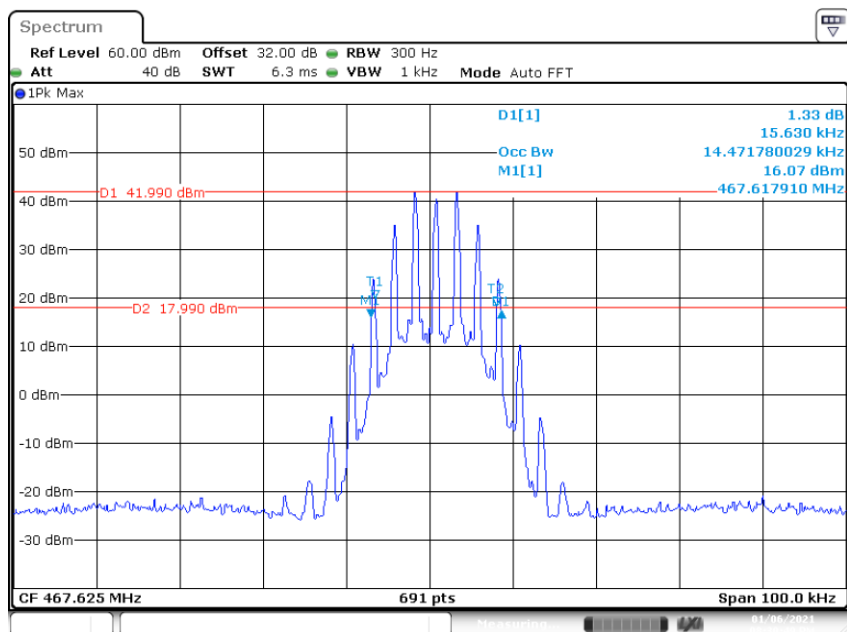


Date: 6 JAN 2021 21:01:21

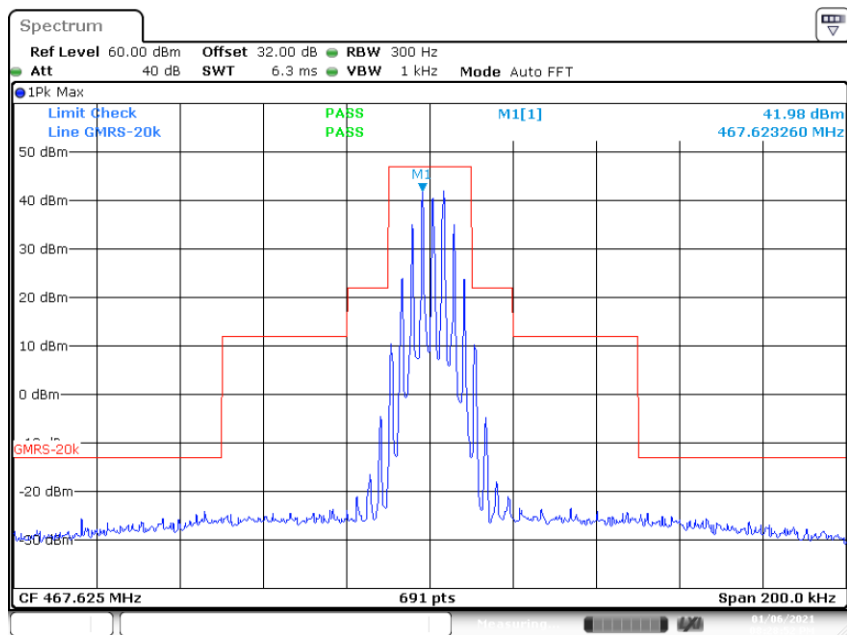


Date: 6 JAN 2021 20:59:25

# 467.6250 MHz



Date: 6 JAN 2021 20:30:49



Date: 6 JAN 2021 20:28:53

## FCC §2.1051 & §95.1779 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Applicable Standard

According to §95.1779. Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

(2) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

(7)  $43 + 10 \log (P)$  dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b)(5) of this section is measured with a reference bandwidth of at least 30 kHz.

(d) Measurement conditions. The requirements in this section apply to each GMRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone, power cord and/or antenna.

### Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz, and 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### Test Data

#### Environmental Conditions

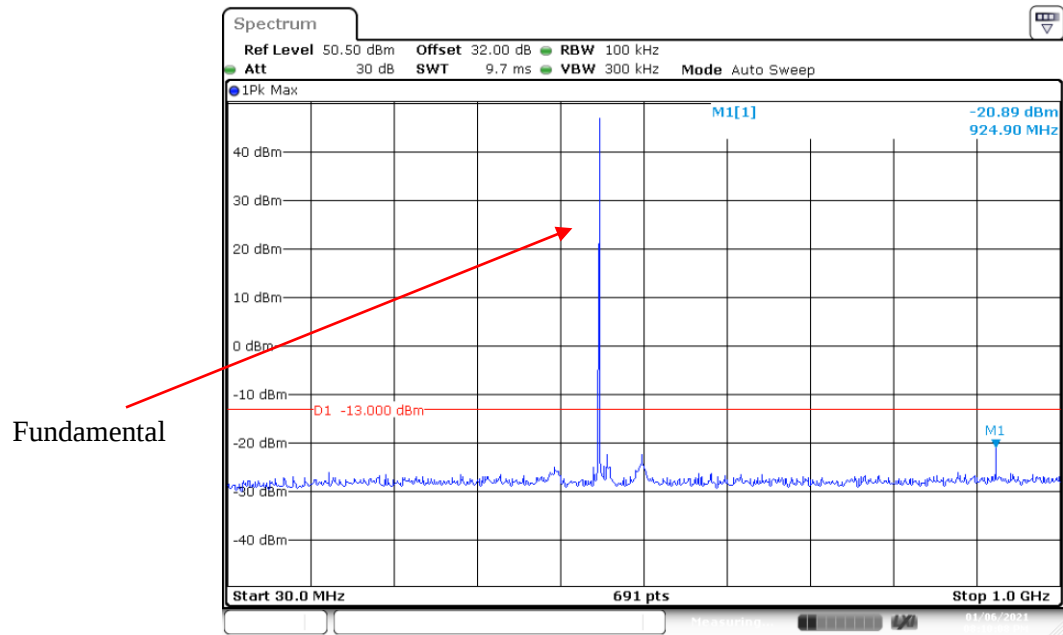
|                    |           |
|--------------------|-----------|
| Temperature:       | 23.5 °C   |
| Relative Humidity: | 53 %      |
| ATM Pressure:      | 101.1 kPa |

*The testing was performed by CK Huang on 2021-01-06.*

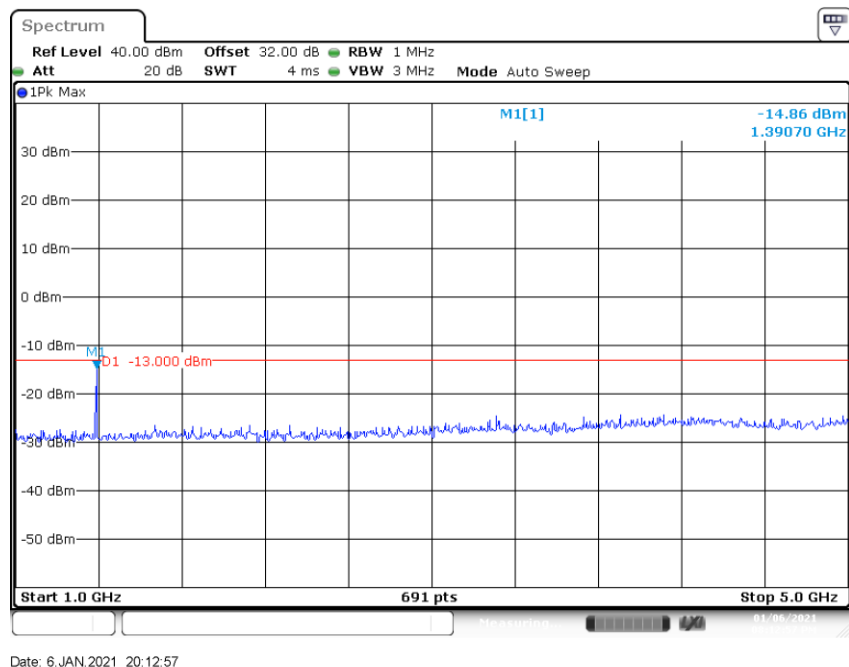
*Test Mode: Transmitting*

Please refer to the following plots.

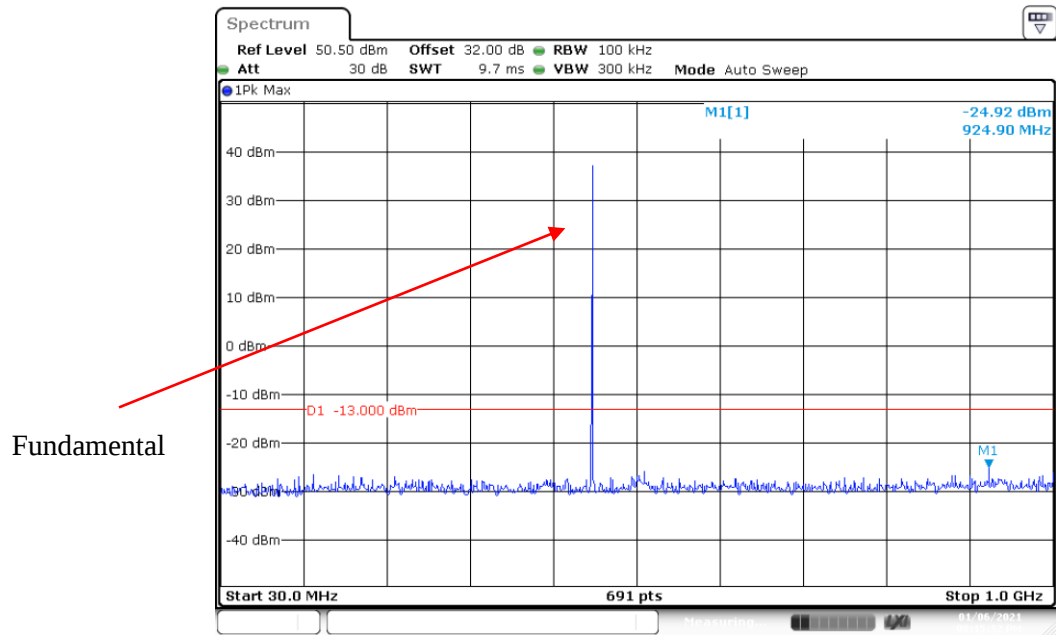
### 462.6250 MHz, 30 MHz – 1 GHz



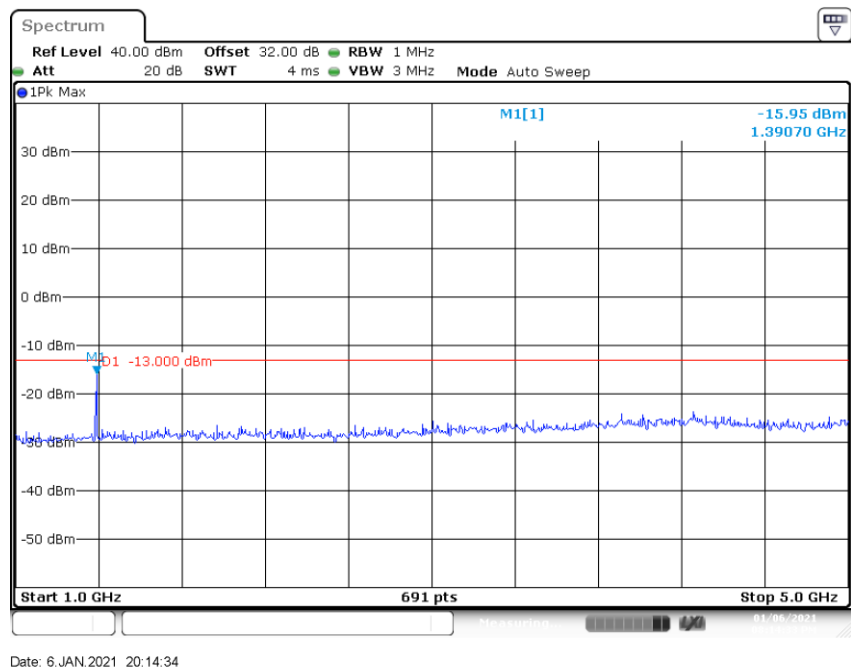
### 462.6250 MHz, 1 GHz - 5 GHz



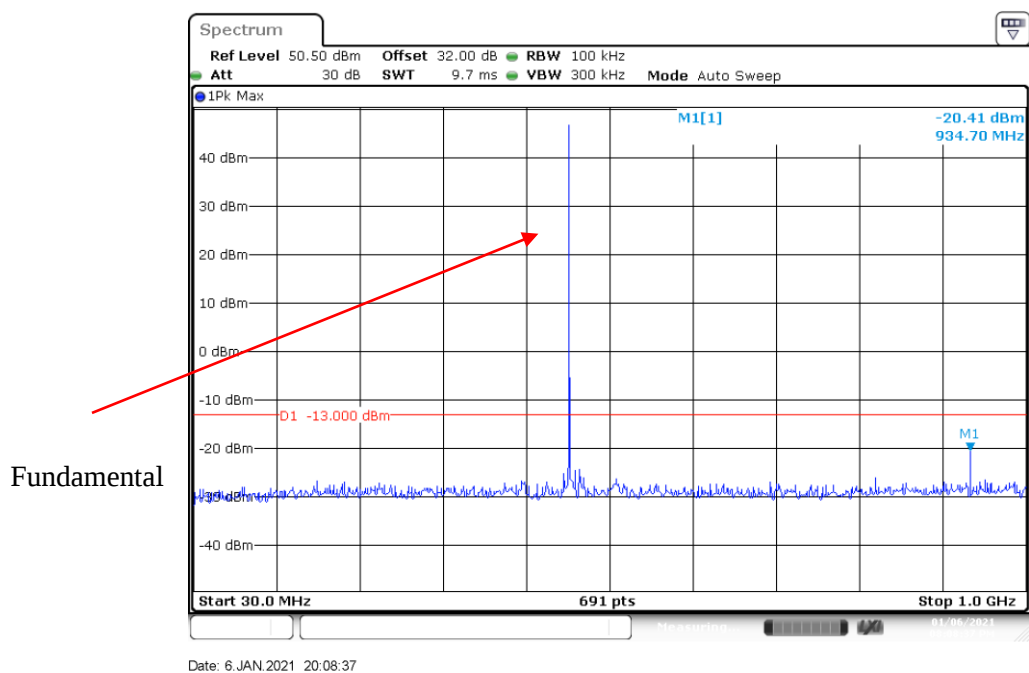
### 462.6375 MHz, 30 MHz – 1 GHz



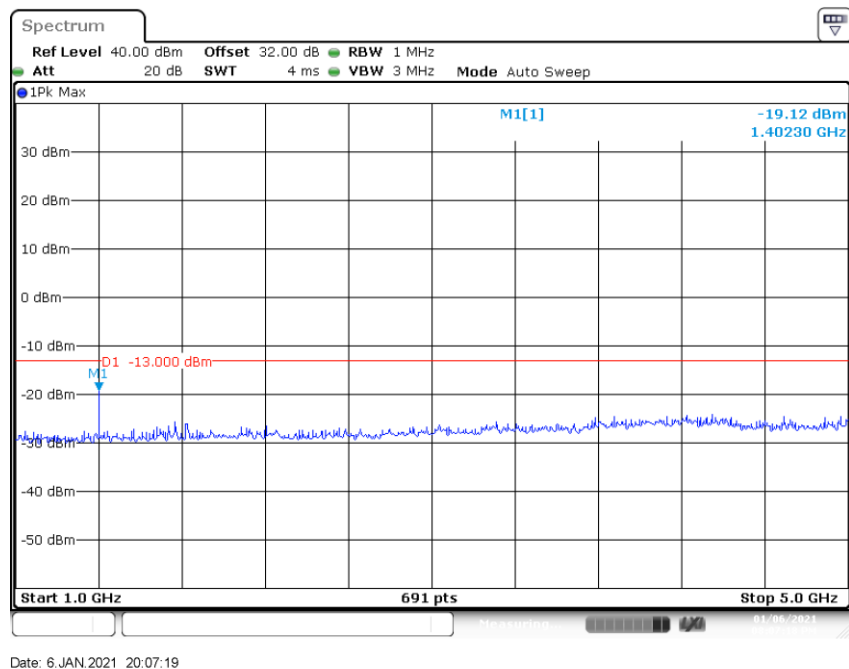
### 462.6375 MHz, 1 GHz - 5 GHz



467.6250 MHz, 30 MHz – 1 GHz



467.6250 MHz, 1 GHz - 5 GHz



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## FCC §2.1053 & §95.1779 - RADIATED SPURIOUS EMISSION

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### Applicable Standard

FCC §2.1053 and §95.1779. Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

(2) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

(7)  $43 + 10 \log (P)$  dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b)(5) of this section is measured with a reference bandwidth of at least 30 kHz.

(d) Measurement conditions. The requirements in this section apply to each GMRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone, power cord and/or antenna.

### Test Procedure

The transmitter was placed on a wooden turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg (\text{TXpwr in Watts}/0.001)$  - the absolute level

Spurious attenuation limit in dB =  $43 + 10 \lg (\text{power out in Watts})$

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 23.5 °C   |
| <b>Relative Humidity:</b> | 53 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

The testing was performed by CK Huang on 2021-01-06.

Test Mode: Transmitting

**30MHz-5GHz:**

| Frequency<br>(MHz)         | Receiver<br>Reading<br>(dBuV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                            |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| FM, Frequency: 462.6250MHz |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 925.250                    | 81.69                         | 88                           | 100            | H              | -15.97                      | 0.64                  | -1.05                        | -17.66                     | -13            | 4.66           |
| 925.250                    | 81.39                         | 340                          | 100            | V              | -16.27                      | 0.64                  | -1.05                        | -17.96                     | -13            | 4.96           |
| 1387.875                   | 90.68                         | 232                          | 150            | H              | -23.46                      | 0.82                  | 7.88                         | -16.4                      | -13            | 3.40           |
| 1387.875                   | 90.19                         | 117                          | 150            | V              | -23.95                      | 0.82                  | 7.88                         | -16.89                     | -13            | 3.89           |
| 1850.500                   | 79.97                         | 187                          | 150            | H              | -31.98                      | 0.84                  | 8.76                         | -24.06                     | -13            | 11.06          |
| 1850.500                   | 78.92                         | 181                          | 150            | V              | -33.03                      | 0.84                  | 8.76                         | -25.11                     | -13            | 12.11          |
| FM, Frequency: 462.6375MHz |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 925.275                    | 82.39                         | 279                          | 150            | H              | -15.27                      | 0.64                  | -1.05                        | -16.96                     | -13            | 3.96           |
| 925.275                    | 82.29                         | 37                           | 150            | V              | -15.37                      | 0.64                  | -1.05                        | -17.06                     | -13            | 4.06           |
| 1387.913                   | 89.97                         | 215                          | 150            | H              | -24.17                      | 0.82                  | 7.88                         | -17.11                     | -13            | 4.11           |
| 1387.913                   | 90.10                         | 121                          | 100            | V              | -24.04                      | 0.82                  | 7.88                         | -16.98                     | -13            | 3.98           |
| 1850.550                   | 79.07                         | 32                           | 100            | H              | -32.88                      | 0.84                  | 8.76                         | -24.96                     | -13            | 11.96          |
| 1850.550                   | 78.37                         | 135                          | 100            | V              | -33.58                      | 0.84                  | 8.76                         | -25.66                     | -13            | 12.66          |
| FM, Frequency: 467.6250MHz |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 935.250                    | 81.64                         | 215                          | 150            | H              | -16.12                      | 0.64                  | -1.09                        | -17.85                     | -13            | 4.85           |
| 935.250                    | 81.93                         | 209                          | 150            | V              | -15.83                      | 0.64                  | -1.09                        | -17.56                     | -13            | 4.56           |
| 1402.875                   | 89.73                         | 312                          | 150            | H              | -24.44                      | 0.82                  | 7.93                         | -17.33                     | -13            | 4.33           |
| 1402.875                   | 90.08                         | 289                          | 150            | V              | -24.09                      | 0.82                  | 7.93                         | -16.98                     | -13            | 3.98           |
| 1870.500                   | 77.75                         | 22                           | 150            | V              | -34.06                      | 0.84                  | 8.79                         | -26.11                     | -13            | 13.11          |
| 1870.500                   | 78.40                         | 194                          | 150            | V              | -33.41                      | 0.84                  | 8.79                         | -25.46                     | -13            | 12.46          |

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level.

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## FCC§2.1055 (d), §95.1765 - FREQUENCY STABILITY

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### Applicable Standard

According to FCC §2.1055(a) (1), the frequency stability shall be measured with variation of ambient temperature from –30 °C to +50 °C, and according to FCC 2.1055(d) (2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.1765, Each GMRS transmitter type must be designed to comply with the frequency accuracy requirements in this section under normal operating conditions. Operators of GMRS stations must also ensure compliance with these requirements.

(a) The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth greater than 12.5 kHz must remain within 5 parts-per-million (ppm) of the channel center frequencies listed in §95.1763 under normal operating conditions.

(b) The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth of 12.5 kHz or less must remain within 2.5 ppm of the channel center frequencies listed in §95.1763 under normal operating conditions.

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Frequency Counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Frequency Counter.

Frequency Stability vs. Voltage (item 1 or item 2 will be chosen according to different condition):

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

The output frequency was recorded for each voltage.

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 23.5 °C   |
| <b>Relative Humidity:</b> | 53 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

The testing was performed by CK Huang on 2021-01-06.

Test Mode: Transmitting

| FM,Reference Frequency:462.6250MHz |                            |               |                       |             |
|------------------------------------|----------------------------|---------------|-----------------------|-------------|
| Temperature (°C)                   | Voltage (V <sub>DC</sub> ) | Reading (MHz) | Frequency Error (ppm) | Limit (ppm) |
| -30                                | 13.8                       | 462.62537     | 0.80                  | ± 2.5       |
| -20                                |                            | 462.62536     | 0.78                  |             |
| -10                                |                            | 462.62564     | 1.38                  |             |
| 0                                  |                            | 462.62557     | 1.23                  |             |
| 10                                 |                            | 462.62513     | 0.28                  |             |
| 20                                 |                            | 462.62501     | 0.02                  |             |
| 30                                 |                            | 462.62536     | 0.78                  |             |
| 40                                 |                            | 462.62584     | 1.82                  |             |
| 50                                 |                            | 462.62557     | 1.23                  |             |
| 60                                 |                            | 462.62595     | 2.05                  |             |
| 25                                 | 15.2                       | 462.62533     | 0.71                  |             |
| 25                                 | 12.4                       | 462.6251      | 0.22                  |             |

| FM,Reference Frequency:462.6375MHz |                            |               |                       |             |
|------------------------------------|----------------------------|---------------|-----------------------|-------------|
| Temperature (°C)                   | Voltage (V <sub>DC</sub> ) | Reading (MHz) | Frequency Error (ppm) | Limit (ppm) |
| -30                                | 13.8                       | 462.63788     | 0.82                  | ±2.5        |
| -20                                |                            | 462.63800     | 1.08                  |             |
| -10                                |                            | 462.63732     | -0.39                 |             |
| 0                                  |                            | 462.63799     | 1.06                  |             |
| 10                                 |                            | 462.63777     | 0.58                  |             |
| 20                                 |                            | 462.63758     | 0.17                  |             |
| 30                                 |                            | 462.63719     | -0.67                 |             |
| 40                                 |                            | 462.63702     | -1.04                 |             |
| 50                                 |                            | 462.63718     | -0.69                 |             |
| 60                                 |                            | 462.63720     | -0.65                 |             |
| 25                                 | 15.2                       | 462.63736     | -0.30                 |             |
| 25                                 | 12.4                       | 462.63788     | 0.82                  |             |

| FM,Reference Frequency:467.6250MHz |                            |               |                       |             |
|------------------------------------|----------------------------|---------------|-----------------------|-------------|
| Temperature (°C)                   | Voltage (V <sub>DC</sub> ) | Reading (MHz) | Frequency Error (ppm) | Limit (ppm) |
| -30                                | 13.8                       | 467.62571     | 1.52                  | ±2.5        |
| -20                                |                            | 467.62521     | 0.45                  |             |
| -10                                |                            | 467.62579     | 1.69                  |             |
| 0                                  |                            | 467.62567     | 1.43                  |             |
| 10                                 |                            | 467.62537     | 0.79                  |             |
| 20                                 |                            | 467.62517     | 0.36                  |             |
| 30                                 |                            | 467.62554     | 1.15                  |             |
| 40                                 |                            | 467.62546     | 0.98                  |             |
| 50                                 |                            | 467.62569     | 1.48                  |             |
| 60                                 |                            | 467.62590     | 1.92                  |             |
| 25                                 | 15.2                       | 467.62506     | 0.13                  |             |
| 25                                 | 12.4                       | 467.62507     | 0.15                  |             |

### Declarations

- 1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '\*'. Customer model name, addresses, names, trademarks etc. are not considered data.
- 2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
- 3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
- 4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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**\*\*\*\*\* END OF REPORT\*\*\*\*\***