# TEST REPORT

FCC Rules Part 95, Part 2

| | | |
|---|---|---|
| **Equipment Under Test** | **:** | **FRS/GMRS TRANSCEIVER** |
| **Model No.** | **:** | **LXT-300** |
| **Serial No.** | **:** | **-** |
| **Applicant** | **:** | **Midland Radio Corporation** |
| **Manufacturer** | **:** | **Daxian Telecommunication Ltd.** |
| **Date of Test(s)** | **:** | **2006. 01. 16 ~ 2006. 01.31** |
| **Date of Issue** | **:** | **2006. 02. 02** |

In the configuration tested, the EUT complied with the standards specified above.

**Remarks:**

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Testing Korea Co., Ltd. or testing done by SGS Testing Korea Co., Ltd. in connection with distribution or use of the product described in this report must be approved by SGS Testing Korea Co., Ltd. in writing.

# VERIFICATION OF COMPLIANCE

| | |
|---|---|
| **Applicant :** | Midland Radio Corporation |
| **Kind of Product :** | FRS / GMRS Transceiver |
| **Brand Name :** | MIDLAND |
| **Model Name :** | LXT-300 |
| **Model Difference :** | - |
| **Report File No. :** | STROR-06-008 |
| **Date of test :** | Jan. 16, 2006 ~ Jan. 31, 2006 |
| **Receiver EUT :** | - |

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULT** |
| FCC RULES Part 95, Part 2 | Complied |

The above equipment was tested by SGS Testing Korea Co., Ltd. for compliance with the requirements set forth in the FCC Rules Part95, Part2. The results of testing in this report apply to the product system that was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

***Tested By:***  ***Date*** **Feb. 02, 2006**

***Feel Jeong***

***Approved By***  ***Date*** **Feb. 02, 2006**

***Albert Lim***

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# 1. General Description of EUT

The Midland Radio Corporation LXT-300 FRS/GMRS Transceiver is a self-contained FRS/GMRS transceiver unit intended for use as a general communication tool. Per the FCC definition: GMRS is a land mobile radio service available to persons for short distance two-way communications to facilitate the activities of licensees and their immediate family members. The LXT-300 model has 22 channels of which channels 1-7 share the FRS channels 1-7.

# 2. General Information of EUT

### Transceiver

| ITEM | DESCRIPTION |
|---|---|
| Manufacturer | Daxian Telecommunication Ltd. |
| EUT Name | FRS/GMRS Transceiver |
| Model | LXT-300 |
| FCC ID | MMALXT300 |
| FCC Rule | Part 95 |
| Frequency Range | 462.5625 MHz to 467.7125 MHz |
| Maximum Output Power | 1 W GMRS, 0.5 W FRS |
| Modulation | FM |
| Emission Type | 11K0F3E |
| Type of Information | Voice |
| Number of Channels | 22 Total (ch 1 - ch 7 and ch 15 – ch 22: GMRS, ch 8 - ch 14 : FRS) |
| Frequency Tolerance | GMRS : <0.0005 %<br>FRS : <0.0025 % |
| Antenna Type | Permanently attached |
| Interface cables | External microphone input |
| Power Source & Voltage | 6VDC via four “AAA” batteries |

# 3. Test Procedure

The test procedure is performed following the test stands ANSI/EIA-603, if applicable.

## 3.1 Output Power Conducted (FCC 2.1046)

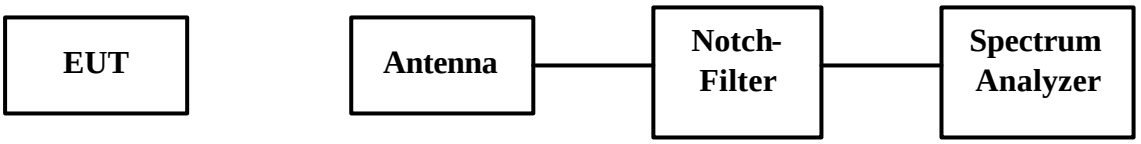
The conducted RF output power is the available power at the output terminals of the transmitter when the output terminals are corrected to the standard transmitter load. The test sample is feeding a 50 ohm coaxial attenuator which is connected to a spectrum analyzer. The power output at the transmitter antenna port is determined by adding the value of the attenuator to the spectrum analyzer reading. The test are performed at the frequency(middle of the EUT operating band) and full rated power levels of the transmitter.


## 3.2 Effective Radiated Power(FCC 2.1046)

Effective radiated power was measured using the substitution method described in TIA/EIA–603. The unit was placed on an open area test site at a test distance of 3 m. The ERP level is determined using signal substitution and is referenced to the gain of a half-wave dipole. The unit was tested in three orthogonal planes to determine the highest power.

## 3.3 Radiated Spurious Emissions (FCC 2.1053 and FCC 95.635(b))

The EUT was placed on motorized turntable for radiated testing on a 3meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The Effective Radiated Power (ERP) levels were measured and compared with the limit of FCC 95.635(b). The limit of -13 dBm is derived from the formula of 43+10LOG(P) dB per FCC 95.635(b)(7). Emissions were scanned up to the 10th harmonic of the fundamental. Worst case measurements are reported. The signal substitution method procedure as given in TIA603 was used to obtain ERP levels.



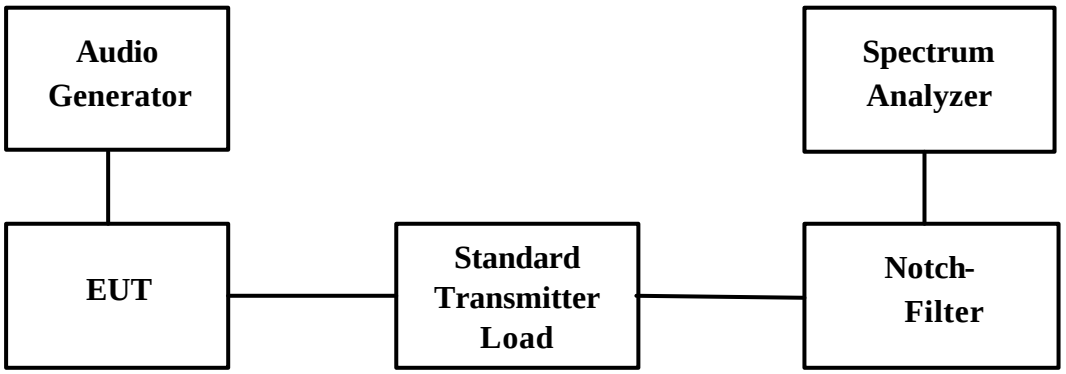

### 3.4 Conducted Spurious Emissions (FCC 2.1051 , 95.635(b))

The EUT must comply with requirements for spurious emissions at antenna terminals pre the requirements of FCC 95.635(b)(1)(3)(7). All emissions must be suppressed by:

FCC 95.635(b)(1): at least 25dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth,

FCC 95.635(b)(3): at least 35dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth,

FCC 95.635(b)(7): at least 43 + 10Log(T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%. The unit with the connector in place of the antenna was connected via an attenuator to the input of the spectrum analyzer. The conducted spurious emissions were measured through the 10th harmonic of the fundamental.

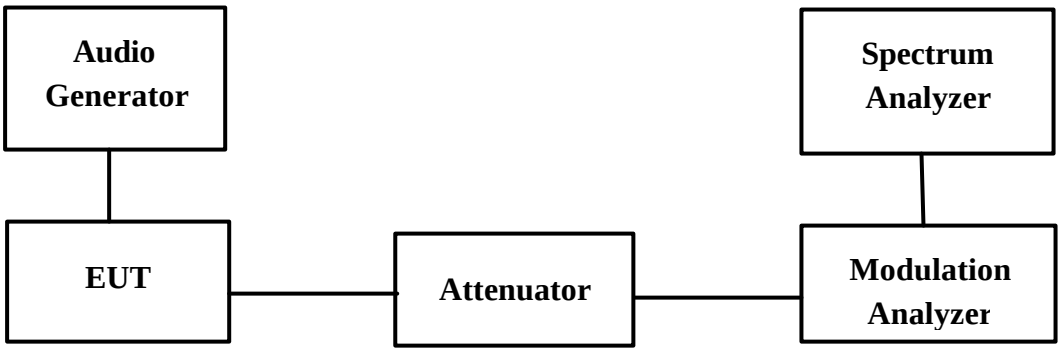



### 3.5 AC Line Conducted Emissions (FCC Part 15.107)

Not performed. The EUT is battery-powered.

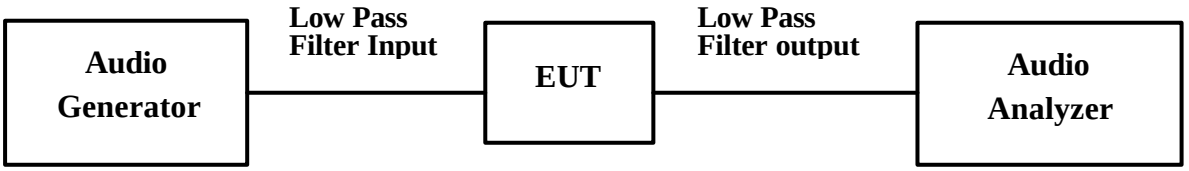
### 3.4 Audio Frequency Response (FCC 2.1047(a))

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic. The frequency response of the audio modulation part is adjusted to get 20% of the rated system deviation. The deviations obtained over the frequency range from 300 Hz to 6000 Hz are recorded and compared with the reference deviation as follows: Audio Frequency Response=20log(DEV Freq / DEVref )



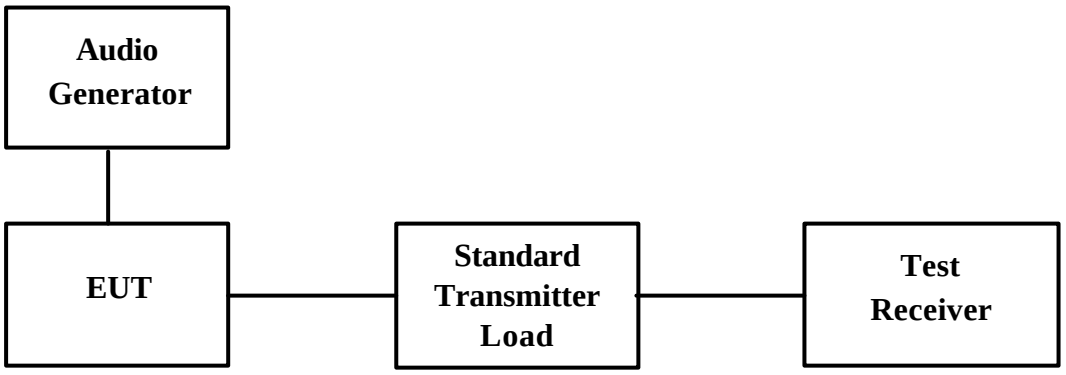

### 3.5 Audio Low Pass Filter Frequency Response (FCC 95.637(a))

The audio low pass filter response is the frequency response of the post limits low pass filter circuit above 3000Hz. It is measured form 1 kHz(reference point) to 50kHz with test set-up below.



### 3.6 Modulation Limiting (FCC 95.637(a))

Modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of rated system deviation. The modulation response is measured at certain modulation frequencies, related to 1000Hz reference signal. The basic setting is 60% of full rated deviation which will be increased the audio generator level from –20 dB to 20 dB in nine steps. Tests are perform for positive and negative modulation.

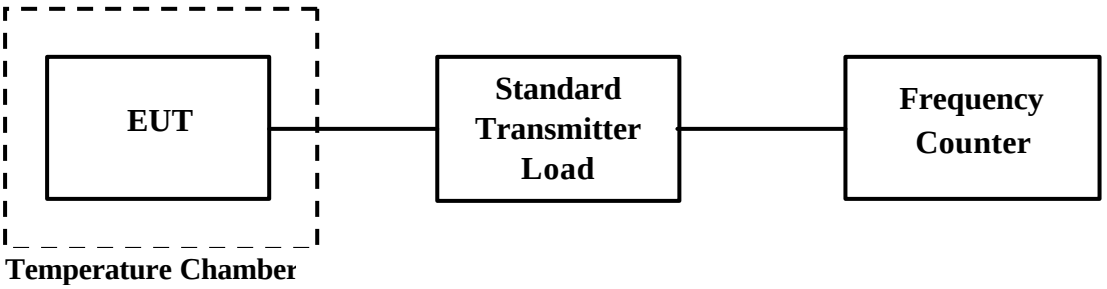



### 3.7 Occupied Bandwidth (FCC 2.1049)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. The transmitter is modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

### 3.8 Frequency stability (FCC 2.1055, FCC 95.621(b))

The carrier frequency is the stability of the transmitter to maintain an assigned carrier frequency.
The frequency stability is measured with variation of ambient temperature from -30℃to+50℃.



## 4. Test Equipment List

| EQUIPMENT | MANUFACTURER | MODEL | CAL DUE. |
|---|---|---|---|
| Spectrum Analyzer | Agilent | 8565E | Dec. 2006 |
| Spectrum Analyzer | Agilent | E4440A | May 2006 |
| Signal Generator | Agilent | E4438C | May 2006 |
| Signal Generator | Agilent | 8648D | May 2006 |
| Power Meter | Agilent | E4416A | May 2006 |
| Attenuator | Agilent | 8498A | Jun. 2006 |
| Power Sensor | Agilent | E9327A | May 2006 |
| DC Power Supply | Agilent | 6674A | May 2006 |
| Modulation Analyzer | Agilent | 8901B | Dec. 2006 |
| Audio Analyzer | Agilent | 8903B | Dec. 2006 |
| Function Generator | Agilent | 33220A | May 2006 |
| Frequency Counter | Anritsu | MF2414B | Dec. 2006 |
| Dipole Antenna | Schwarzbeck Mess | UHAP | May 2006 |
| Oscilloscope | Tektronix | TDS30548 | May 2006 |
| Horn Antenna | Schwarzbeck | BBHA9120A | Jul. 2006 |
| Horn Antenna | Schwarzbeck | BBHA9120A | Jul. 2006 |
| Biconical Antenna | Schwarzbeck | VHA9103 | Mar. 2006 |
| Log-periodic | S/B | UHALP9107 | Jun. 2006 |
| Tunable Notch Filter | Wainwright Instrument GmbH | WRCA400/500-0.01/40-6SSK | May 2006 |
| Temperature Chamber | Han-Gil Technique | HGTP-4050 | Nov. 2006 |
| Anechoic Chamber | Seo Young EMC | - | - |

# TEST RESULT

## 5. RF Power Output FCC 2.1046

### 5.1 Conducted Output Power

**Channel 17 @ 462.6000 MHz (GMRS)**

**Channel 8 @ 467.5625 MHz (FRS)**

| Channel and/or Frequency | Measured Level (dBm) | Measured Level (Watts) | Rated (Watts) | Limit (Watts) | Pass/ Fail |
|---|---|---|---|---|---|
| Channel17-462.6000 MHz (GMRS) | 28.58 | 0.72 | 1.0 | 50 | Pass |
| Channel 8-467.5625 MHz (FRS) | 26.13 | 0.41 | 0.5 | 0.5 | Pass |

### 5.2 Effective Radiated Power

**Channel 17 @ 462.6000 MHz (GMRS)**

**Channel 8 @ 467.5625 MHz (FRS)**

| Frequency (MHz) | Ant. Pol. (H/V) | S.P.A. Reading (dBuV) | Amp (dBm) | S.G Power Level (dBm) | Antenna Gain (dB/dBi) | Cable Loss (dB) | E. R. P. | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | dBm | mW |
| 462.6000 | V | 103.35 | 28.8 | 9.1 | -10.48 | 0.1 | 27.32 | 540 |
| 467.5625 | V | 100.59 | 28.6 | 6.4 | -10.50 | 0.1 | 24.40 | 275 |

# 6. Radiated Spurious Emissions FCC 2.1053(a), FCC 95.635(b)

**Channel 17 @ 462.6000 MHz (GMRS)**

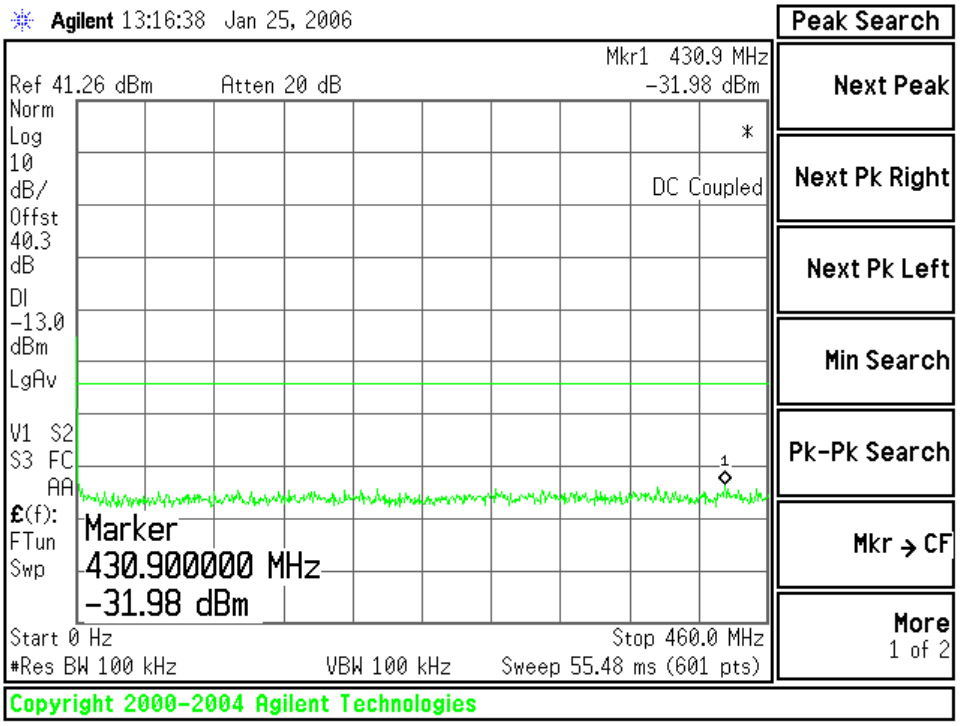
| Frequency [MHz] | Polarization | Max. Power Value [dBm] | Specification Limit [dBm] | Margin [dB] |
|---|---|---|---|---|
| 925.2000 | V | -26.4 | -13 | 13.3 |
| 1387.8000 | V | < -30 | -13 | >17 |
| 1850.4000 | H | -20.6 | -13 | 7.6 |
| 2313.0000 | H | < -30 | -13 | >17 |
| 2775.6000 | H | -16.8 | -13 | 3.8 |
| 3238.2000 | H | -17.5 | -13 | 4.5 |
| 3700.8000 | H | < -30 | -13 | >17 |
| 4163.4000 | - | - | -13 | - |
| 4626.0000 | - | - | -13 | - |

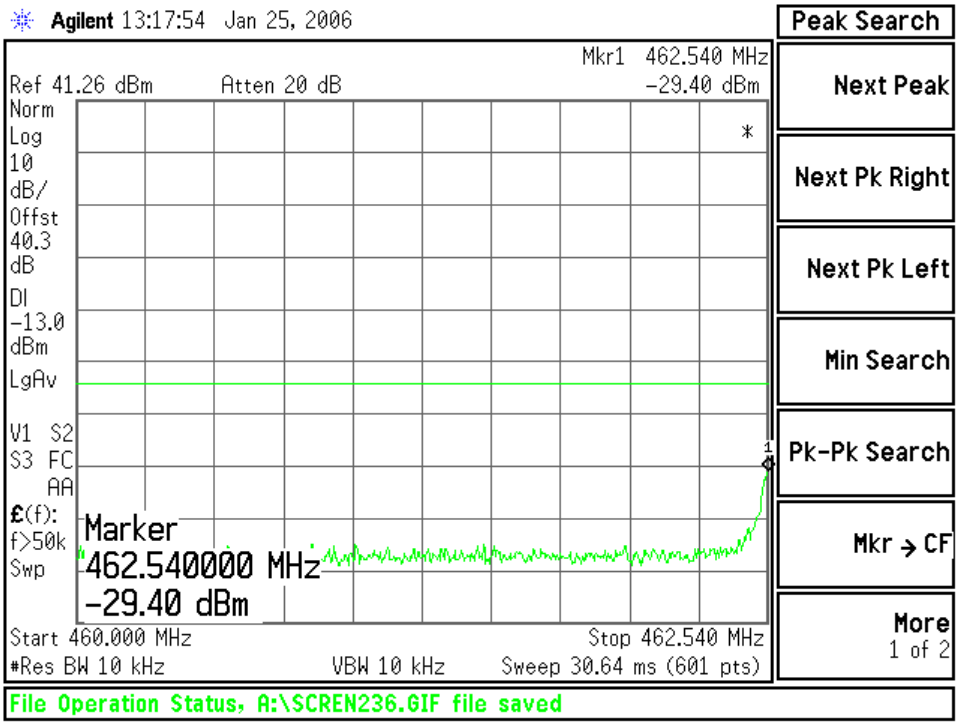
**Channel 8 @ 467.5625 MHz (FRS)**

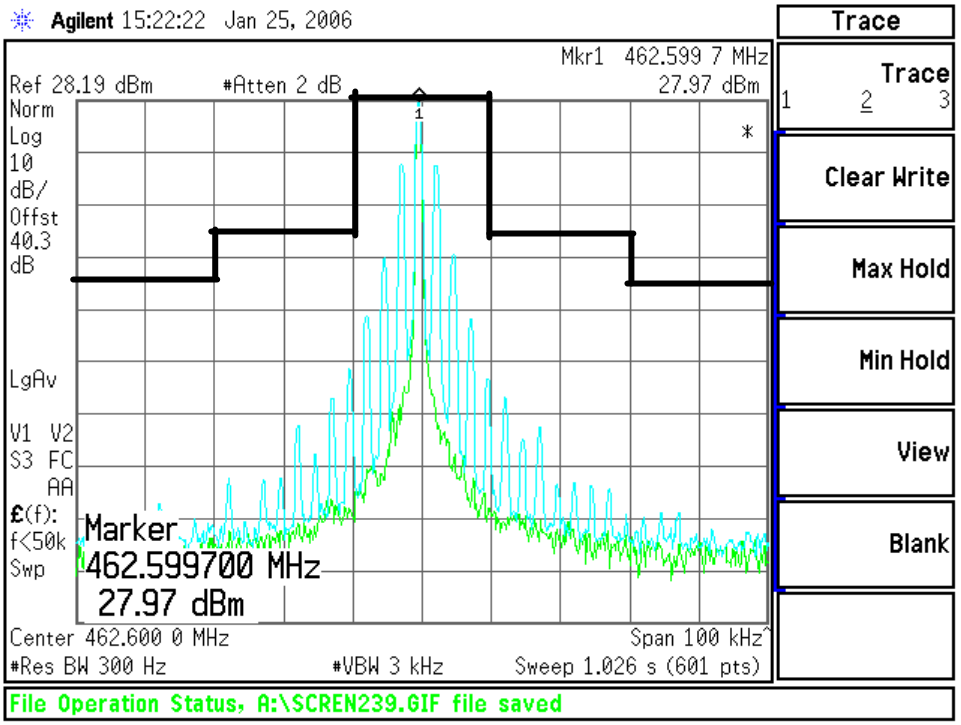
| Frequency [MHz] | Polarization | Max. Power Value [dBm] | Specification Limit [dBm] | Margin [dB] |
|---|---|---|---|---|
| 935.1250 | V | -26.5 | -13 | 13.5 |
| 1402.6875 | V | -25.7 | -13 | 12.7 |
| 1870.2500 | H | <-30 | -13 | >17 |
| 2337.8125 | H | -21.3 | -13 | 8.5 |
| 2805.3750 | H | -18.2 | -13 | 5.2 |
| 3272.9375 | V | -21.7 | -13 | 8.7 |
| 3740.5000 | H | <-30 | -13 | >17 |
| 4208.0625 | H | <-30 | -13 | >17 |
| 4675.6250 | H | -26.4 | -13 | 13.4 |

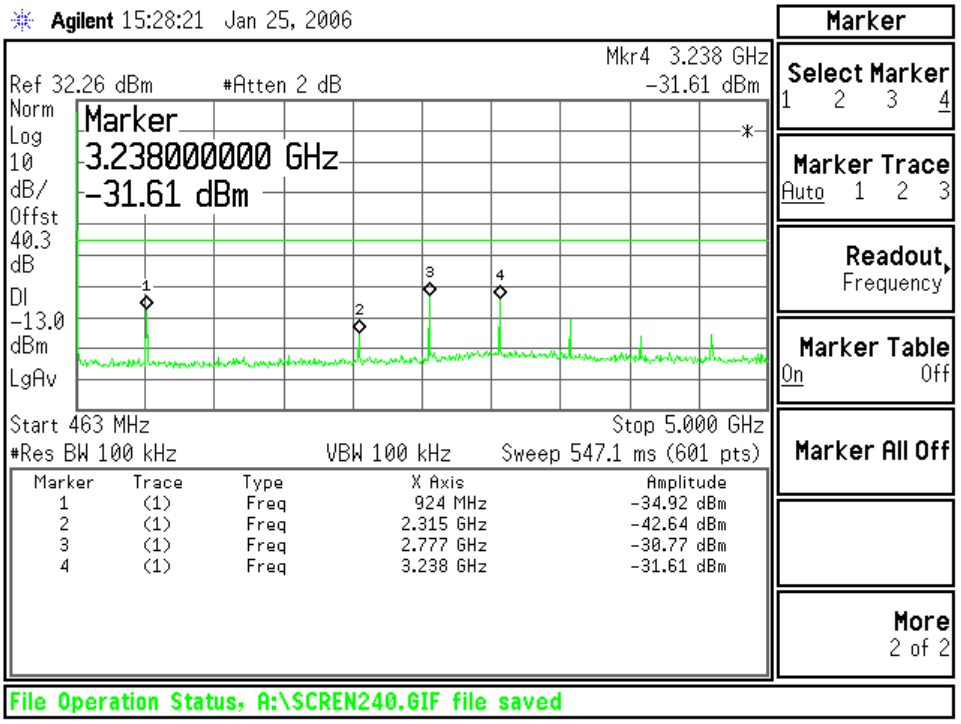
# 7. Conducted Spurious Emissions FCC 2.1051, FCC 95.635(b)

## GMRS Mode

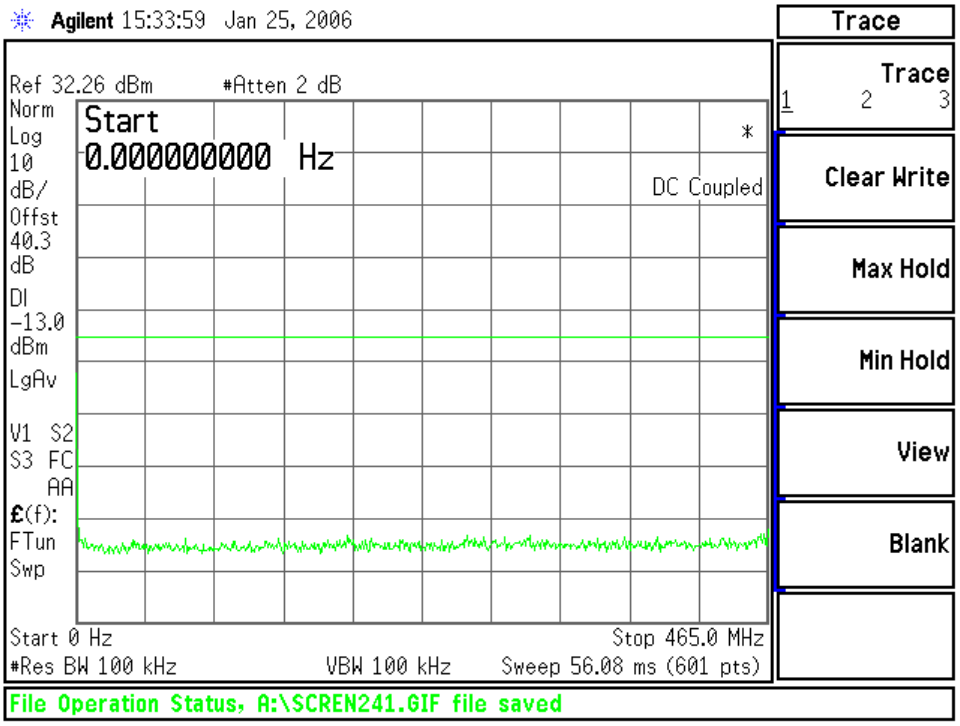


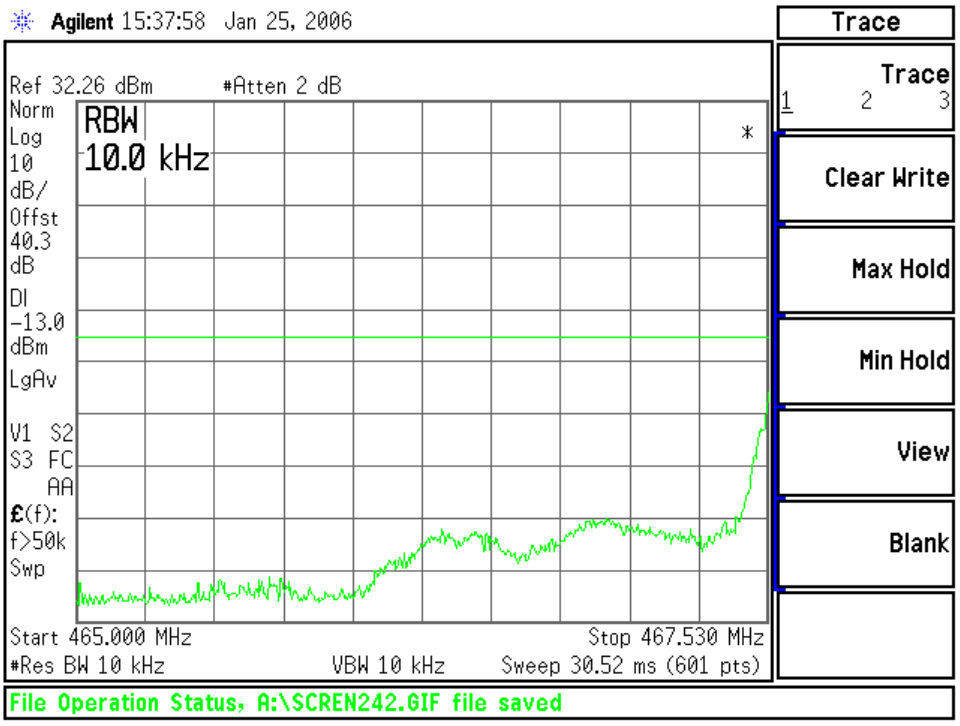



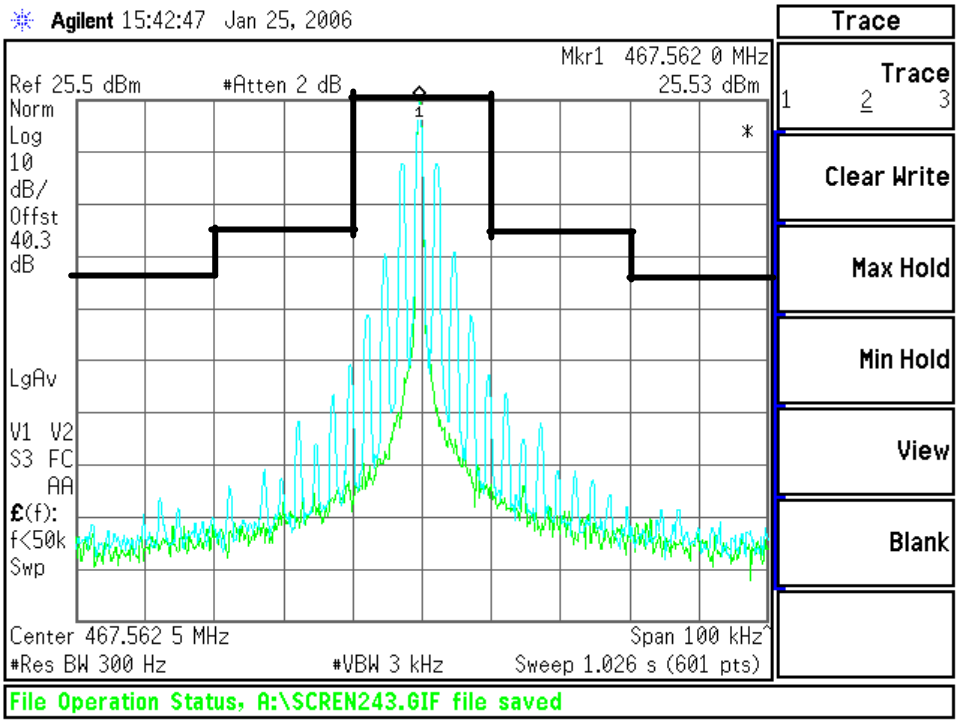


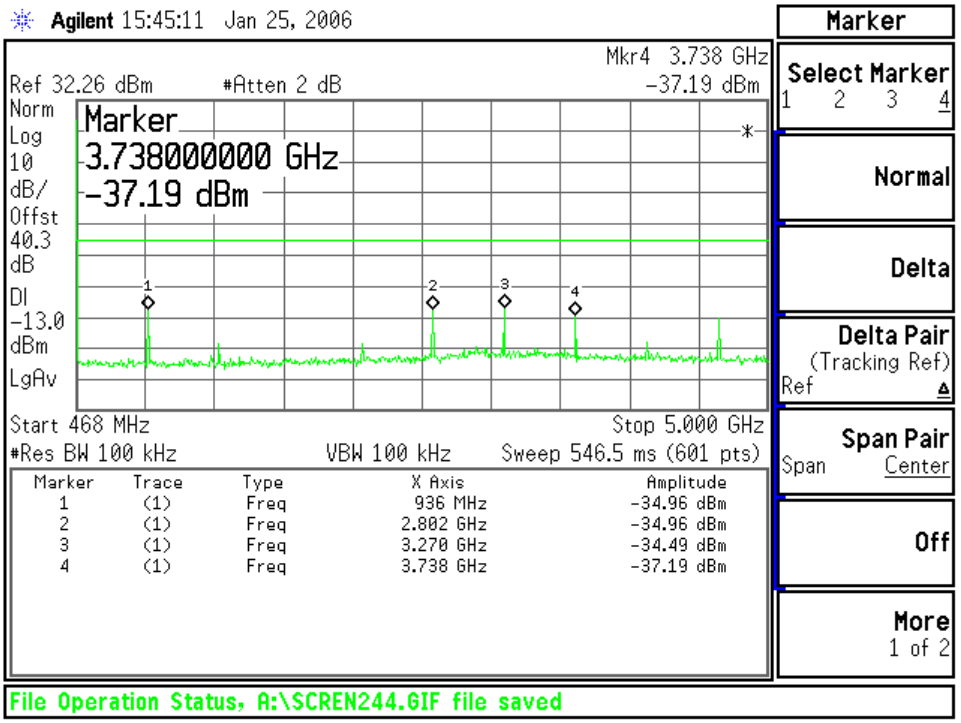



**FRS Mode**



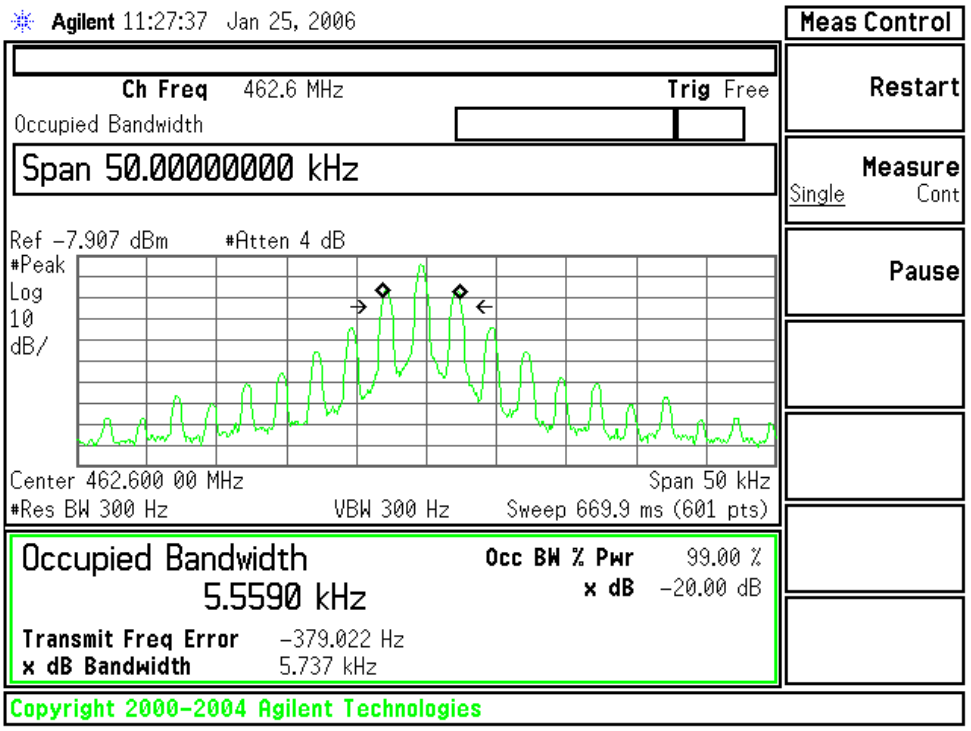





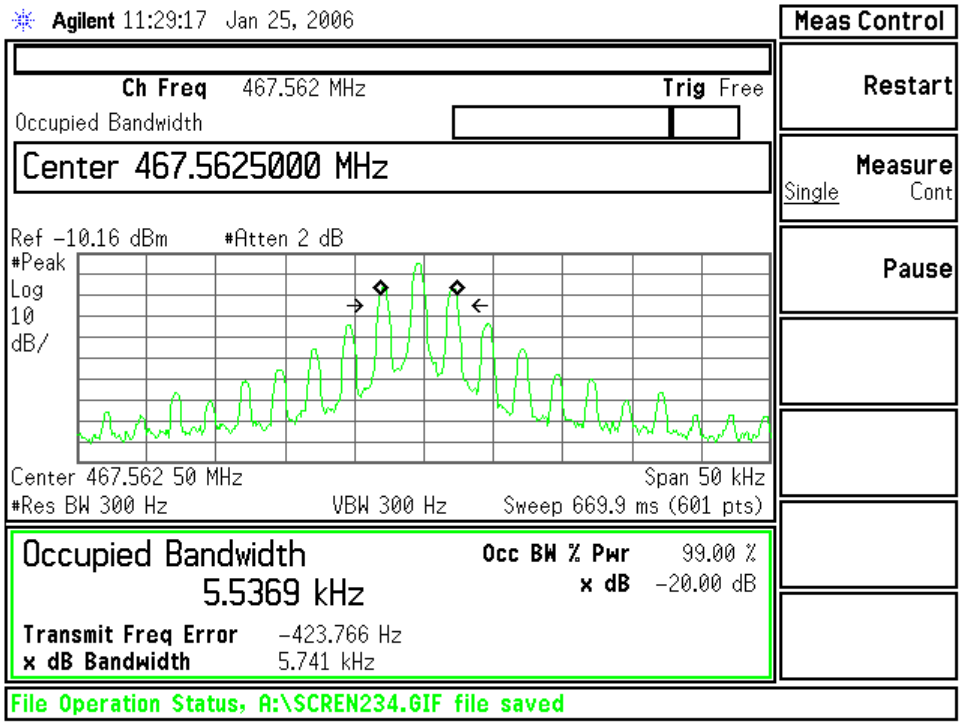



# 8. Occupied Bandwidth FCC 2.1049

## GMRS Mode




## FRS Mode



# 9. Audio Frequency Response FCC 2.1.047(a)

**Channel 8 @ 467.5625 MHz (FRS)**

| Audio frequency [Hz] | FRS | |
|---|---|---|
| | Measured Deviation [kHz] | Calculated Response [dB] |
| 300 | 0.16 | -9.74 |
| 400 | 0.23 | -6.74 |
| 500 | 0.28 | -5.07 |
| 600 | 0.33 | -3.56 |
| 700 | 0.37 | -2.64 |
| 1000 | 0.50 | 0.00 |
| 1250 | 0.55 | 0.83 |
| 2000 | 0.65 | 2.23 |
| 2250 | 0.66 | 2.46 |
| 2750 | 0.55 | 0.76 |
| 3000 | 0.53 | 0.49 |
| 4000 | 0.37 | -2.62 |
| 5000 | 0.26 | -5.55 |
| 6000 | 0.23 | -6.78 |

# 10. Audio Low Pass Filter Frequency Response FCC 2.1047(a), FCC 95.637(b)

**Channel 17 @ 462.6000 MHz (GMRS)**

| Audio frequency [Hz] | GMRS Response [dB] |
|---|---|
| 1000 | 0.00 |
| 1250 | 0.79 |
| 2000 | 0.96 |
| 2250 | 0.01 |
| 2500 | -1.03 |
| 2750 | -2.38 |
| 3000 | -3.78 |
| 4000 | -9.79 |
| 5000 | -15.64 |
| 6000 | -20.38 |
| 7000 | -24.32 |
| 8000 | -28.67 |
| 9000 | -31.97 |
| 10000 | -35.21 |
| 15000 | -46.30 |
| 20000 | -61.10 |

# 11. Modulation Limiting FCC 2.1047(b), FCC 95.637(a)

**Channel 17 @ 462.6000 MHz (GMRS)**

**Channel 8 @ 467.5625 MHz (FRS)**

| Modulation Frequency [Hz] | GMRS | FRS |
|---|---|---|
| | Response [dB] | Response [dB] |
| 100 | 0.35 | 0.34 |
| 150 | 0.66 | 0.64 |
| 200 | 1.88 | 1.87 |
| 250 | 2.05 | 2.02 |
| 300 | 2.25 | 2.24 |
| 400 | 2.27 | 2.21 |
| 500 | 2.17 | 2.15 |
| 700 | 1.90 | 1.92 |
| 750 | 1.85 | 1.82 |
| 1000 | 1.63 | 1.67 |
| 1100 | 1.58 | 1.54 |
| 1200 | 1.52 | 1.51 |
| 1300 | 1.48 | 1.46 |
| 1400 | 1.44 | 1.42 |
| 1500 | 1.40 | 1.40 |
| 1600 | 1.38 | 1.38 |
| 1700 | 1.35 | 1.30 |
| 1800 | 1.33 | 1.32 |
| 1900 | 1.32 | 1.31 |
| 2000 | 1.34 | 1.33 |
| 2100 | 1.30 | 1.30 |
| 2200 | 1.32 | 1.31 |
| 2300 | 1.31 | 1.30 |
| 2400 | 1.30 | 1.29 |
| 2500 | 1.21 | 1.20 |
| 2600 | 1.20 | 1.19 |
| 2700 | 1.24 | 1.24 |
| 2800 | 1.23 | 1.22 |
| 2900 | 1.24 | 1.21 |
| 3000 | 1.20 | 1.18 |
| 3100 | 1.21 | 1.20 |
| 3200 | 1.20 | 1.19 |
| 3300 | 1.20 | 1.17 |
| 3400 | 1.21 | 1.20 |
| 3500 | 1.20 | 1.19 |
| 4000 | 1.01 | 1.00 |
| 4500 | 1.00 | 1.02 |
| 5000 | 1.01 | 1.00 |

**Channel 8 @ 467.5625 MHz (FRS)**

| Audio input level Relative[dB] | Positive peak deviation [kHz] | | | Negative peak deviation [kHz] | | |
|---|---|---|---|---|---|---|
| | 300 Hz | 1500 Hz | 2500 Hz | 300 Hz | 1500 0Hz | 2500 Hz |
| -20 | 0.08 | 0.30 | 0.30 | 0.07 | 0.32 | 0.29 |
| -15 | 0.09 | 0.51 | 0.51 | 0.07 | 0.52 | 0.50 |
| -10 | 0.13 | 0.86 | 0.84 | 0.12 | 0.84 | 0.84 |
| -5 | 0.19 | 1.31 | 1.25 | 0.18 | 1.30 | 1.24 |
| 0 | 0.31 | 1.44 | 1.26 | 0.31 | 1.43 | 1.25 |
| 5 | 0.51 | 1.44 | 1.26 | 0.53 | 1.43 | 1.25 |
| 10 | 0.88 | 1.45 | 1.26 | 0.89 | 1.44 | 1.25 |
| 15 | 1.21 | 1.45 | 1.26 | 1.20 | 1.44 | 1.25 |
| 20 | 1.83 | 1.45 | 1.26 | 1.82 | 1.44 | 1.26 |

**Limits:**

| Channel spacing [kHz] | Rated frequency deviation [kHz] |
|---|---|
| 12,5 | 2.5 |
| 25.0 | 5.0 |

# 12. Frequency Stability FCC2.1055, FCC 95.621(b), FCC 95.627(b)

**Channel 17 @ 462600000 Hz(GMRS)**

| Voltage [%] | Voltage [V] | Temperature [deg C] | Measured Frequency [Hz] | Frequency Error [Hz] |
|---|---|---|---|---|
| 100 | 6 | -30 | 462599619 | 381 |
| 100 | 6 | -20 | 462600115 | -115 |
| 100 | 6 | -10 | 462600363 | -363 |
| 100 | 6 | 0 | 462600535 | -535 |
| 100 | 6 | 10 | 462600385 | -385 |
| 100 | 6 | 20 | 462599805 | 195 |
| 100 | 6 | 30 | 462599702 | 298 |
| 100 | 6 | 40 | 462599507 | 493 |
| 100 | 6 | 50 | 462599520 | 480 |
| 85 | 5.1 | 20 | 462599700 | 300 |
| 115 | 6.9 | 20 | 462599735 | 265 |
| Battery End Point | 2.7 | 20 | 462600162 | -162 |

**Channel 8 @ 467562500 Hz (FRS)**

| Voltage [%] | Voltage [V] | Temperature [deg C] | Measured Frequency [Hz] | Frequency Error [Hz] |
|---|---|---|---|---|
| 100 | 6 | -30 | 467562203 | 297 |
| 100 | 6 | -20 | 467562202 | 298 |
| 100 | 6 | -10 | 467562779 | -279 |
| 100 | 6 | 0 | 467563039 | -539 |
| 100 | 6 | 10 | 467562929 | -429 |
| 100 | 6 | 20 | 467562164 | 336 |
| 100 | 6 | 30 | 467562225 | 275 |
| 100 | 6 | 40 | 467562009 | 491 |
| 100 | 6 | 50 | 467562019 | 481 |
| 85 | 5.1 | 20 | 467562149 | 351 |
| 115 | 6.9 | 20 | 467562190 | 310 |
| Battery End Point | 2.7 | 20 | 467562640 | -140 |

**Limits:**

| Frequency error | Limit | Hz |
|---|---|---|
| GMRS | 0.0005 % | 2313 |
| FRS | 0.00025 % | 1169 |

## 13. The Emission Designator

The emission designator is determined from the necessary bandwidth, the type of modulation and the information conveyed in the signal.

For the subject unit, the following Emission Designator has been determined according to Section 2.201 of the FCC Rules.

- First Symbol, type of modulation of the main carrier: F-Frequency Modulation
- Second Symbol, nature of signal(s) modulating the main carrier: 3
- Third Symbol, type of information to be transmitted: E

The necessary bandwidth, Bn, is calculated as:

Bn = 2M +2DK

M = 3000

D = 2.5

K=1

Bn = (2 x 3000) + (2 x 2500) = 11k

Hence, the emission designator is: 11K0F3E

## 14. Attachment A – Photo of the test setup