



## MEASUREMENT REPORT

### FCC PART 95 Walkie Talkie

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**FCC ID:** V49CP183  
**APPLICANT:** CPS Telecom Limited

**Application Type:** Certification  
**Product:** Business Radio  
**Model No.:** CP183  
**Brand Name:** CPS  
**FCC Rule Part(s):** FCC Part 95: 2013  
**Test Procedure(s):** ANSI/TIA-603-D: 2010  
**Test Date:** Jan. 25 ~ Feb. 09, 2015

Reviewed By : Robin Wu  
( Robin Wu )

Approved By : Marlin Chen  
( Marlin Chen )

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI/TIA-603-D: 2010. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

## Revision History

| Report No.   | Version | Description                         | Issue Date |
|--------------|---------|-------------------------------------|------------|
| 1501RSU01301 | Rev. 01 | Initial report                      | 2015-02-09 |
| 1501RSU01301 | Rev. 02 | Modify the issue date in first page | 2015-02-28 |

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## §2.1033 General Information

|                                |                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant:</b>              | CPS Telecom Limited                                                                                                             |
| <b>Applicant Address:</b>      | Office B, 15/F, King Palace Plaza, 55 King Yip Street, Kwun Tong, Kowloon, Hong Kong                                            |
| <b>Manufacturer:</b>           | Contrad (HuiZhou) Ltd.                                                                                                          |
| <b>Manufacturer Address:</b>   | No.2 Hwasin Road, 1 ZhongKai Hi-Tech Industrial Zone, Huizhou City, Guangdong Province, China                                   |
| <b>Test Site:</b>              | MRT Technology (Suzhou) Co., Ltd                                                                                                |
| <b>Test Site Address:</b>      | D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China                      |
| <b>MRT Registration No.:</b>   | 809388                                                                                                                          |
| <b>FCC Rule Part(s):</b>       | Part 95                                                                                                                         |
| <b>Model No.</b>               | CP183                                                                                                                           |
| <b>FCC ID:</b>                 | V49CP183                                                                                                                        |
| <b>Test Device Serial No.:</b> | N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering |
| <b>FCC Classification:</b>     | Part 95 Family Radio Face Held Transmitter (FRF)                                                                                |

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.

# 1. INTRODUCTION

## 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

## 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

|                      |                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Product Name         | Business Radio                                                                                                                   |
| Model No.            | CP183                                                                                                                            |
| Frequency Range      | 462.5625~462.7125MHz ( GMRS 1~7 channel)<br>467.5625~467.7125MHz (FRS 8~14 channel)<br>462.5500~462.7250MHz (GMRS 15~22 channel) |
| Maximum Output Power | 25.620dBm                                                                                                                        |
| Type of Modulation   | FM                                                                                                                               |
| Antenna Type         | Internal                                                                                                                         |

### 2.2. Frequency / Channel Operation

| Channel | Frequency    | Description | Channel | Frequency    | Description |
|---------|--------------|-------------|---------|--------------|-------------|
| 1       | 462.5625MHz  | GMRS        | 12      | 467.6625 MHz | FRS         |
| 2       | 462.5875 MHz | GMRS        | 13      | 467.6875 MHz | FRS         |
| 3       | 462.6125 MHz | GMRS        | 14      | 467.7125 MHz | FRS         |
| 4       | 462.6375 MHz | GMRS        | 15      | 462.5500 MHz | GMRS        |
| 5       | 462.6625 MHz | GMRS        | 16      | 462.5750 MHz | GMRS        |
| 6       | 462.6875 MHz | GMRS        | 17      | 462.6000 MHz | GMRS        |
| 7       | 462.7125 MHz | GMRS        | 18      | 462.6250 MHz | GMRS        |
| 8       | 467.5625 MHz | FRS         | 19      | 462.6500 MHz | GMRS        |
| 9       | 467.5875 MHz | FRS         | 20      | 462.6750 MHz | GMRS        |
| 10      | 467.6125 MHz | FRS         | 21      | 462.7000 MHz | GMRS        |
| 11      | 467.6375 MHz | FRS         | 22      | 462.7250 MHz | GMRS        |

### **2.3. Test Standards**

The following report is prepared on behalf of the CPS Telecom Limited in accordance with FCC Part 95, Subpart A, Subpart B, Subpart E, and FCC Part 2 of the Federal Communication Commission rules.

The objective is to determine compliance with FCC Part 95, Subpart A, Subpart B, Subpart E, and FCC Part 2 of the Federal Communication Commission rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

### **2.4. Test Methodology**

All measurements contained in this report were conducted with TIA-603-D Land Mobile FM or PM Communications Equipment Measurement and Performance Standards and Performance standards and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.



### 3. TEST EQUIPMENT CALIBRATION DATE

#### RF Output Power

| Instrument                 | Manufacturer | Type No. | Serial No. | Cali. Interval | Cal. Date  |
|----------------------------|--------------|----------|------------|----------------|------------|
| Spectrum Analyzer          | Agilent      | N9020A   | MY52090106 | 1 year         | 2015/04/23 |
| TRILOG Antenna             | Schwarzbeck  | VULB9162 | 9162-047   | 1 year         | 2015/11/08 |
| Temperature/Humidity Meter | Anymetre     | TH101B   | AC1-01     | 1 year         | 2015/11/14 |

#### Modulation Characteristics

| Instrument             | Manufacturer | Type No. | Serial No. | Cali. Interval | Cali. Due Date |
|------------------------|--------------|----------|------------|----------------|----------------|
| Audio Signal Generator | R&S          | UPV      | 101198     | 1 year         | 2016/01/09     |
| Modulation Analyzer    | HP           | 8901A    | 1205A01034 | 1 year         | 2015/07/09     |

#### Occupied Bandwidth And Emission Mask

| Instrument                 | Manufacturer | Type No. | Serial No. | Cali. Interval | Cali. Due Date |
|----------------------------|--------------|----------|------------|----------------|----------------|
| Spectrum Analyzer          | Agilent      | N9020A   | MY52090106 | 1 year         | 2015/04/23     |
| Audio Signal Generator     | R&S          | UPV      | 101198     | 1 year         | 2016/01/09     |
| Temperature/Humidity Meter | Anymetre     | TH101B   | AC1-01     | 1 year         | 2015/11/14     |

#### Unwanted Radiated Spurious Emission

| Instrument                  | Manufacturer | Type No.  | Serial No. | Cali. Interval | Cal. Due Date |
|-----------------------------|--------------|-----------|------------|----------------|---------------|
| Spectrum Analyzer           | Agilent      | N9020A    | MY52090106 | 1 year         | 2015/04/23    |
| ESG Vector Signal Generator | Agilent      | E4438C    | MY49872484 | 1 year         | 2015/12/09    |
| Preamplifier                | MRT          | AP25M01   | 1310002    | 1 year         | 2015/10/06    |
| Preamplifier                | MRT          | AP01G18   | 1310003    | 1 year         | 2015/10/06    |
| Loop Antenna                | Schwarzbeck  | FMZB1519  | 1519-041   | 1 year         | 2015/11/08    |
| TRILOG Antenna              | Schwarzbeck  | VULB9162  | 9162-047   | 1 year         | 2015/11/08    |
| Broad-Band Horn Antenna     | Schwarzbeck  | BBHA9120D | 9120D-1167 | 1 year         | 2015/11/08    |
| Broadband Horn Antenna      | Schwarzbeck  | BBHA9170  | 9170-549   | 1 year         | 2015/12/11    |
| Temperature/Humidity Meter  | Anymetre     | TH101B    | AC1-01     | 1 year         | 2015/11/14    |

#### Frequency Stability

| Instrument                     | Manufacturer | Type No.  | Serial No. | Cali. Interval | Cali. Due Date |
|--------------------------------|--------------|-----------|------------|----------------|----------------|
| Spectrum Analyzer              | Agilent      | N9020A    | MY52090106 | 1 year         | 2015/04/23     |
| Temperature & Humidity Chamber | BAOYT        | BYH-1500L | 1309W043   | 1 year         | 2015/12/10     |
| Temperature/Humidity Meter     | Anymetre     | TH101B    | TR3-01     | 1 year         | 2015/11/14     |

## Conducted Emissions

| Instrument                  | Manufacturer | Type No. | Serial No. | Cali. Interval | Cali. Due Date |
|-----------------------------|--------------|----------|------------|----------------|----------------|
| EMI Test Receiver           | R&S          | ESR7     | 101209     | 1 year         | 2015/11/07     |
| Two-Line V-Network          | R&S          | ENV216   | 101683     | 1 year         | 2015/11/07     |
| Two-Line V-Network          | R&S          | ENV216   | 101684     | 1 year         | 2015/11/07     |
| Temperature/ Meter Humidity | Anymetre     | TH101B   | SR2-01     | 1 year         | 2015/11/14     |

#### 4. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

| Radiated Emission Measurement                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>9kHz ~ 1GHz: $\pm 4.2\text{dB}$<br>1GHz ~ 40GHz: $\pm 4.8\text{dB}$ |

## 5. TEST RESULT

### 5.1. Summary

Product Name: Business Radio

FCC ID: V49CP183

Number of Channels: 22

| FCC Part Section(s) | Test Description                     | Test Result | Reference   |
|---------------------|--------------------------------------|-------------|-------------|
| 95.639              | Radiated Output Power (ERP)          | PASS        | Section 5.2 |
| 95.637              | Modulation Characteristics           | PASS        | Section 5.3 |
| 95.633              | Occupied Bandwidth and Emission Mask | PASS        | Section 5.4 |
| 95.635              | Radiated Spurious Emissions          | PASS        | Section 5.5 |
| 95.621, 95.626      | Frequency Stability                  | PASS        | Section 5.6 |

#### Notes:

- (1) All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
- (2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- (3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

## 5.2. RF Output Power

### 5.2.1. Provisions Applicable

Per FCC §2.1046 and §95.639(d): No FRS unit, under any condition of modulation, shall exceed 0.500 W effective radiated power (ERP).

Per FCC §2.1046 and §95.639(a): No GMRS transmitter, under any condition of modulation, shall exceed 50 W Carrier power (average TP during one un-modulated RF cycle) when transmitting emission type A1D, F1D, G1D, A3E, F3E or G3E.

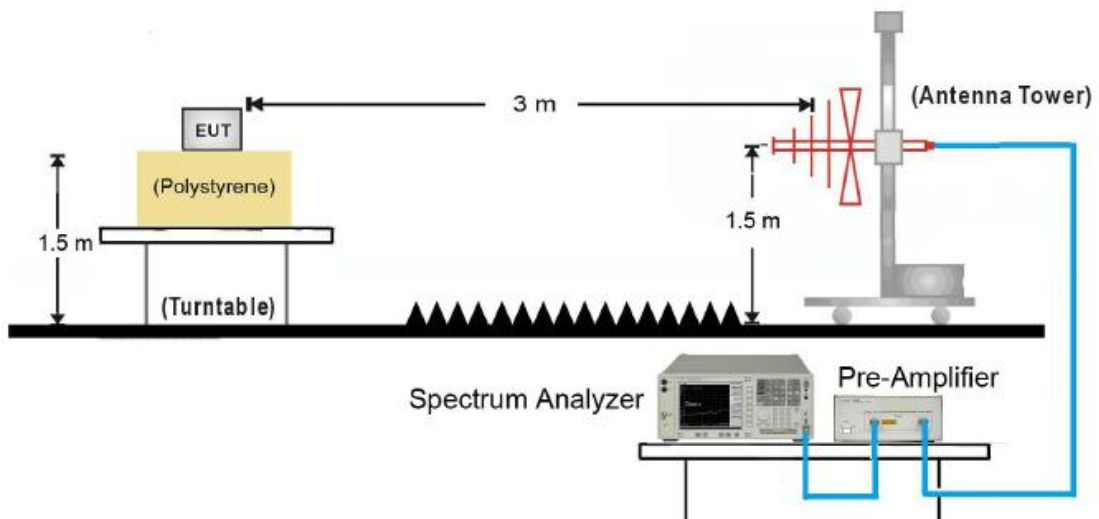
### 5.2.2. Test Procedure

1. On a test site, the EUT shall be placed at 1.6m height on a wooden turntable, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the quasi-peak detector is used for the measurement.
4. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then be rotated through 360° in the horizontal plane, until a maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a tuned dipole (substitution antenna).
10. The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.  
If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

12. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input signal to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
16. The measure of the ERP is the larger of the two levels recorded, at the input to the substitution antenna, corrected the gain of the substitution antenna if necessary.

### 5.2.3. Test Setup

#### 30MHz ~ 1GHz Test Setup:



### 5.2.4. Test Result

| Channel | Channel Description | Frequency       | Effective Radiated Power |              | Limit      | Over Limit     |
|---------|---------------------|-----------------|--------------------------|--------------|------------|----------------|
|         |                     | MHz             | dBm                      | W            | W          | W              |
| 1       | GMRS                | <b>462.5625</b> | <b>25.620</b>            | <b>0.365</b> | <b>50</b>  | <b>-49.635</b> |
| 2       |                     | 462.5875        | 24.829                   | 0.304        | 50         | -49.696        |
| 3       |                     | 462.6125        | 25.032                   | 0.319        | 50         | -49.681        |
| 4       |                     | 462.6375        | 25.174                   | 0.329        | 50         | -49.671        |
| 5       |                     | 462.6625        | 25.120                   | 0.325        | 50         | -49.675        |
| 6       |                     | 462.6875        | 25.332                   | 0.341        | 50         | -49.659        |
| 7       |                     | 462.7125        | 25.303                   | 0.339        | 50         | -49.661        |
| 8       | FRS                 | <b>467.5625</b> | <b>24.206</b>            | <b>0.263</b> | <b>0.5</b> | <b>-0.237</b>  |
| 9       |                     | 467.5875        | 23.227                   | 0.210        | 0.5        | -0.290         |
| 10      |                     | 467.6125        | 23.526                   | 0.225        | 0.5        | -0.275         |
| 11      |                     | 467.6375        | 23.715                   | 0.235        | 0.5        | -0.265         |
| 12      |                     | 467.6625        | 23.447                   | 0.221        | 0.5        | -0.279         |
| 13      |                     | 467.6875        | 24.032                   | 0.253        | 0.5        | -0.247         |
| 14      |                     | 467.7125        | 23.132                   | 0.206        | 0.5        | -0.294         |
| 15      | GMRS                | 462.5500        | 24.917                   | 0.310        | 50         | -49.690        |
| 16      |                     | 462.5750        | 24.562                   | 0.286        | 50         | -49.714        |
| 17      |                     | 462.6000        | 24.845                   | 0.305        | 50         | -49.695        |
| 18      |                     | 462.6250        | 24.773                   | 0.300        | 50         | -49.700        |
| 19      |                     | 462.6500        | 24.624                   | 0.290        | 50         | -49.710        |
| 20      |                     | 462.6750        | 24.511                   | 0.283        | 50         | -49.717        |
| 21      |                     | <b>462.7000</b> | <b>25.005</b>            | <b>0.317</b> | <b>50</b>  | <b>-49.683</b> |
| 22      |                     | 462.7250        | 24.627                   | 0.290        | 50         | -49.710        |

### **5.3. Modulation Characteristics**

#### **5.3.1. Provisions Applicable**

Per FCC §2.1047 and §95.637(a): A GMRS transmitter that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 2.5 kHz, and the audio frequency response must not exceed 3.125 kHz, the audio frequency response shall roll off before 3.125 kHz.

Each GMRS transmitter, except a mobile station transmitter with a power output of 2.5 W or less, must automatically prevent a greater than normal audio level from causing over-modulation.

The transmitter also must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of § 95.631 (without filtering.) The filter must be between the modulation limiter and the modulated stage of the transmitter. At any frequency ( $f$  in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least  $60 \log_{10}(f/3)$  dB greater than the attenuation at 1 kHz.

Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

#### **5.3.2. Test Procedure**

##### **5.3.2.1 Frequency deviation**

1. Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0dB) and vary the input level from -20 to +20dB. Record the frequency deviation obtained as a function of the input level.
2. Repeat step (1) with input frequency changing to 500, 1000, 2500 and 3125Hz in sequence.

##### **5.3.2.2 Modulation Frequency Response**

1. Configure the EUT as shown in figure 1.
2. Adjust the audio signal generator frequency to the sound pressure level 107dB SPL at the microphone of the EUT.
3. Vary the Audio frequency from 100 Hz to 5 KHz and record the frequency deviation.
4. The peak frequency deviation must not exceed 2.5 KHz.



### 5.3.2.3 Audio Low Pass Filter Response

1. Connect the equipment in figure 2.
2. Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.
3. Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.
4. Apply a 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.
5. Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV1.
6. Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.
7. Record audio spectrum analyzer levels, at the test frequency in step (6).
8. Record the dB level on the audio spectrum analyzer as LEV2. Method of Measurement for transmitters.

### 5.3.3. Test Setup

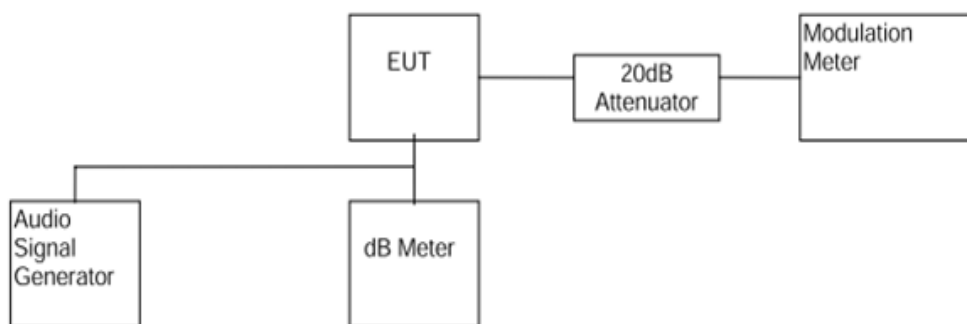


Figure 1

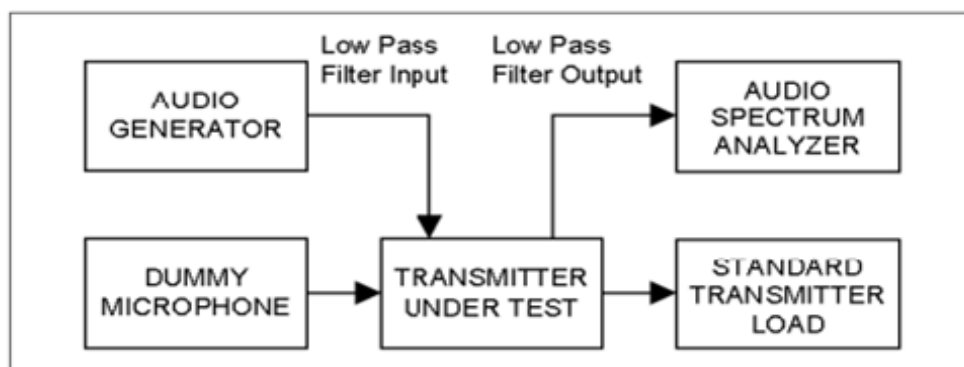
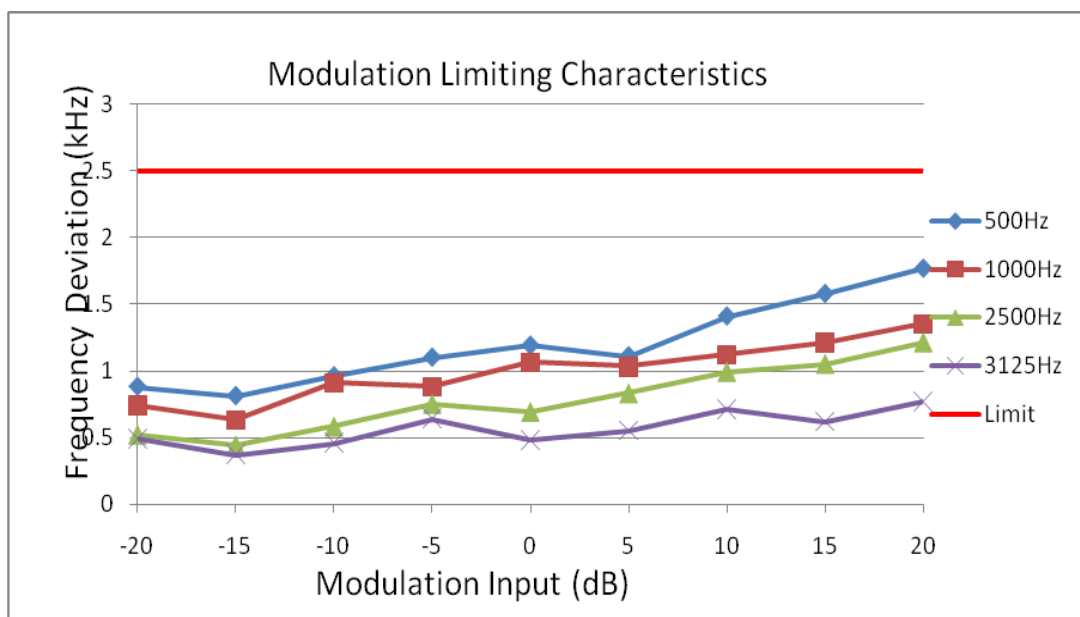


Figure 2

### 5.3.4. Test Result

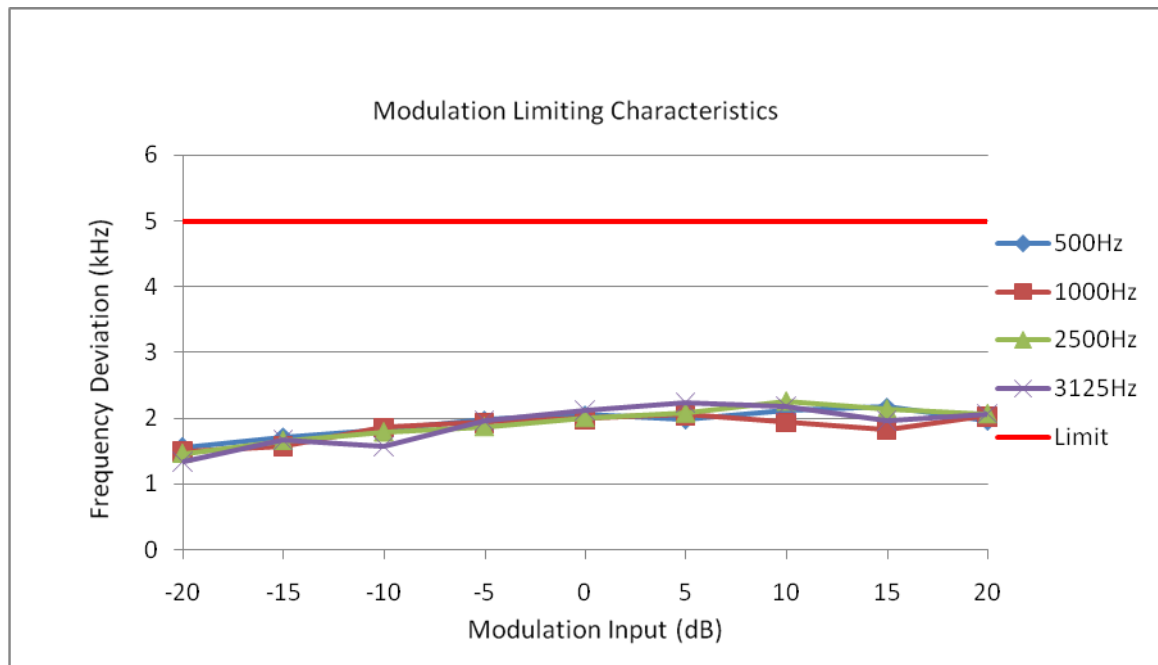
|               |                     |                   |            |
|---------------|---------------------|-------------------|------------|
| Product       | Business Radio      | Temperature       | 26°C       |
| Test Engineer | Roy Cheng           | Relative Humidity | 54%        |
| Test Item     | Frequency deviation | Date of Test      | 2015/02/01 |

| Channel 8: 467.5625MHz FRS |                                         |                                          |                                          |                                          |             |
|----------------------------|-----------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|-------------|
| Modulation Input (dB)      | Peak Frequency Deviation (kHz) at 500Hz | Peak Frequency Deviation (kHz) at 1000Hz | Peak Frequency Deviation (kHz) at 2500Hz | Peak Frequency Deviation (kHz) at 3125Hz | Limit (kHz) |
| -20.00                     | 0.88                                    | 0.74                                     | 0.52                                     | 0.49                                     | 2.50        |
| -15.00                     | 0.81                                    | 0.63                                     | 0.44                                     | 0.37                                     | 2.50        |
| -10.00                     | 0.96                                    | 0.91                                     | 0.58                                     | 0.46                                     | 2.50        |
| -5.00                      | 1.1                                     | 0.88                                     | 0.75                                     | 0.64                                     | 2.50        |
| 0.00                       | 1.19                                    | 1.06                                     | 0.69                                     | 0.48                                     | 2.50        |
| 5.00                       | 1.11                                    | 1.03                                     | 0.83                                     | 0.55                                     | 2.50        |
| 10.00                      | 1.41                                    | 1.12                                     | 0.99                                     | 0.71                                     | 2.50        |
| 15.00                      | 1.58                                    | 1.21                                     | 1.05                                     | 0.62                                     | 2.50        |
| 20.00                      | 1.77                                    | 1.35                                     | 1.21                                     | 0.77                                     | 2.50        |



|               |                     |                   |            |
|---------------|---------------------|-------------------|------------|
| Product       | Business Radio      | Temperature       | 26°C       |
| Test Engineer | Roy Cheng           | Relative Humidity | 54%        |
| Test Item     | Frequency deviation | Date of Test      | 2015/02/01 |

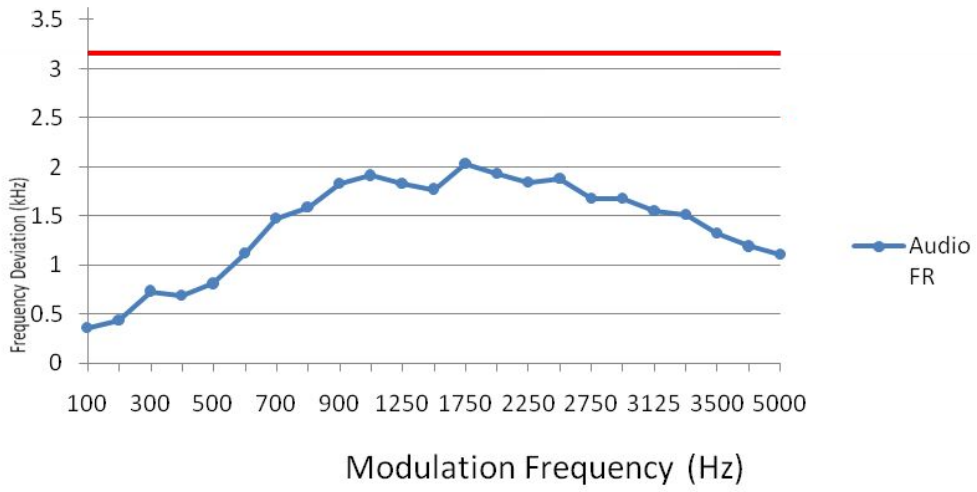
| Channel 1: 462.5625MHz GMRS |                                         |                                          |                                          |                                          |             |
|-----------------------------|-----------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|-------------|
| Modulation Input (dB)       | Peak Frequency Deviation (kHz) at 500Hz | Peak Frequency Deviation (kHz) at 1000Hz | Peak Frequency Deviation (kHz) at 2500Hz | Peak Frequency Deviation (kHz) at 3125Hz | Limit (kHz) |
| -20.00                      | 1.56                                    | 1.49                                     | 1.46                                     | 1.33                                     | 5.00        |
| -15.00                      | 1.71                                    | 1.57                                     | 1.66                                     | 1.66                                     | 5.00        |
| -10.00                      | 1.82                                    | 1.86                                     | 1.79                                     | 1.57                                     | 5.00        |
| -5.00                       | 1.97                                    | 1.93                                     | 1.87                                     | 1.95                                     | 5.00        |
| 0.00                        | 2.05                                    | 1.99                                     | 2.01                                     | 2.11                                     | 5.00        |
| 5.00                        | 1.98                                    | 2.05                                     | 2.08                                     | 2.23                                     | 5.00        |
| 10.00                       | 2.11                                    | 1.94                                     | 2.26                                     | 2.18                                     | 5.00        |
| 15.00                       | 2.17                                    | 1.82                                     | 2.14                                     | 1.96                                     | 5.00        |
| 20.00                       | 1.96                                    | 2.03                                     | 2.07                                     | 2.06                                     | 5.00        |



|               |                          |                   |            |
|---------------|--------------------------|-------------------|------------|
| Product       | Business Radio           | Temperature       | 26°C       |
| Test Engineer | Roy Cheng                | Relative Humidity | 54%        |
| Test Item     | Audio Frequency Response | Date of Test      | 2015/02/01 |

| Channel 8: 467.5625MHz FRS |                                 |             |
|----------------------------|---------------------------------|-------------|
| Modulation Frequency (Hz)  | Peak Modulation Deviation (kHz) | Limit (kHz) |
| 100                        | 0.36                            | 3.125       |
| 200                        | 0.43                            | 3.125       |
| 300                        | 0.73                            | 3.125       |
| 400                        | 0.69                            | 3.125       |
| 500                        | 0.81                            | 3.125       |
| 600                        | 1.12                            | 3.125       |
| 700                        | 1.47                            | 3.125       |
| 800                        | 1.59                            | 3.125       |
| 900                        | 1.83                            | 3.125       |
| 1000                       | 1.91                            | 3.125       |
| 1250                       | 1.83                            | 3.125       |
| 1500                       | 1.77                            | 3.125       |
| 1750                       | 2.03                            | 3.125       |
| 2000                       | 1.93                            | 3.125       |
| 2250                       | 1.84                            | 3.125       |
| 2500                       | 1.88                            | 3.125       |
| 2750                       | 1.68                            | 3.125       |
| 3000                       | 1.68                            | 3.125       |
| 3125                       | 1.55                            | 3.125       |
| 3250                       | 1.51                            | 3.125       |
| 3500                       | 1.32                            | 3.125       |
| 4000                       | 1.19                            | 3.125       |
| 5000                       | 1.11                            | 3.125       |

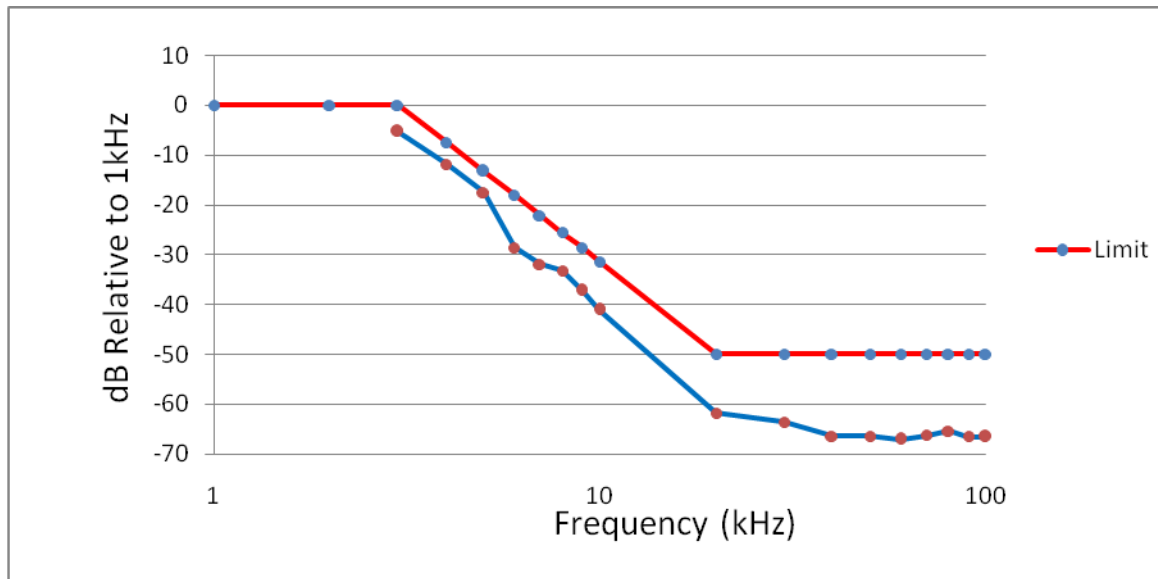
### Audio Frequency Response



|               |                                             |                   |            |
|---------------|---------------------------------------------|-------------------|------------|
| Product       | Business Radio                              | Temperature       | 26°C       |
| Test Engineer | Roy Cheng                                   | Relative Humidity | 54%        |
| Test Item     | Audio Low Pass Filter<br>Frequency Response | Date of Test      | 2015/02/01 |

| Channel 1: 462.5625MHz GMRS |                  |               |
|-----------------------------|------------------|---------------|
| Frequency<br>(kHz)          | Response<br>(dB) | Limit<br>(dB) |
| 1                           | -0.01            | 0.00          |
| 2                           | -0.01            | 0.00          |
| 3                           | -5.26            | 0.00          |
| 4                           | -11.84           | -7.50         |
| 5                           | -17.54           | -13.31        |
| 6                           | -28.62           | -18.06        |
| 7                           | -31.87           | -22.08        |
| 8                           | -33.18           | -25.56        |
| 9                           | -37.26           | -28.63        |
| 10                          | -41.11           | -31.37        |
| 20                          | -61.77           | -50.00        |
| 30                          | -63.62           | -50.00        |
| 40                          | -66.47           | -50.00        |
| 50                          | -66.49           | -50.00        |
| 60                          | -67.11           | -50.00        |
| 70                          | -66.28           | -50.00        |
| 80                          | -65.45           | -50.00        |
| 90                          | -66.54           | -50.00        |
| 100                         | -66.58           | -50.00        |

Audio Low Pass Filter Frequency Response



## 5.4. Occupied Bandwidth And Emission Mask

### 5.4.1. Provisions Applicable

According to FCC Part §95.633 (a), the authorized bandwidth for emission type F1D, G1D, F3E or G3E is 20 kHz. (c) The authorized bandwidth for emission type F3E or F2D transmitted by a FRS unit is 12.5 kHz.

Per FCC §95.635 (b) (1), at least 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.

Per FCC §95.635 (b) (3), At least 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.

Per FCC §95.635 (b) (7), At least  $43 + 10 \log_{10} (T)$  dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

### 5.4.2. Test Procedure

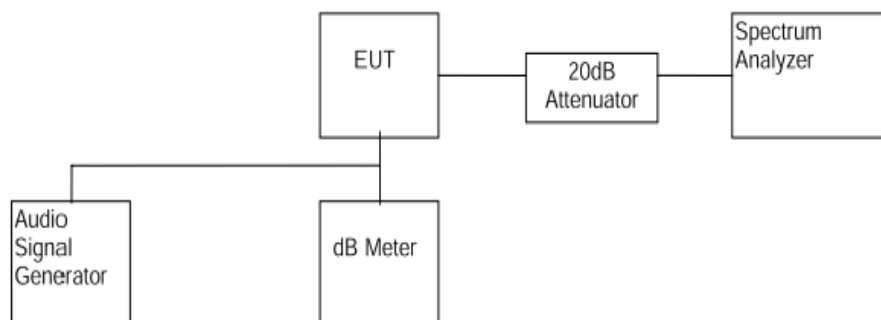
The set-up test equipment in the following configuration:

The EUT was modulated by 2.5 KHz Sine wave audio signal. The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 KHz (12.5 KHz channel spacing).

Setting the SPA Center Frequency = fundamental frequency, RBW=VBW=300 Hz, Span=20 KHz.

Setting SPA to Max hold. Mark peak -20dB.

### 5.4.3. Test Setup



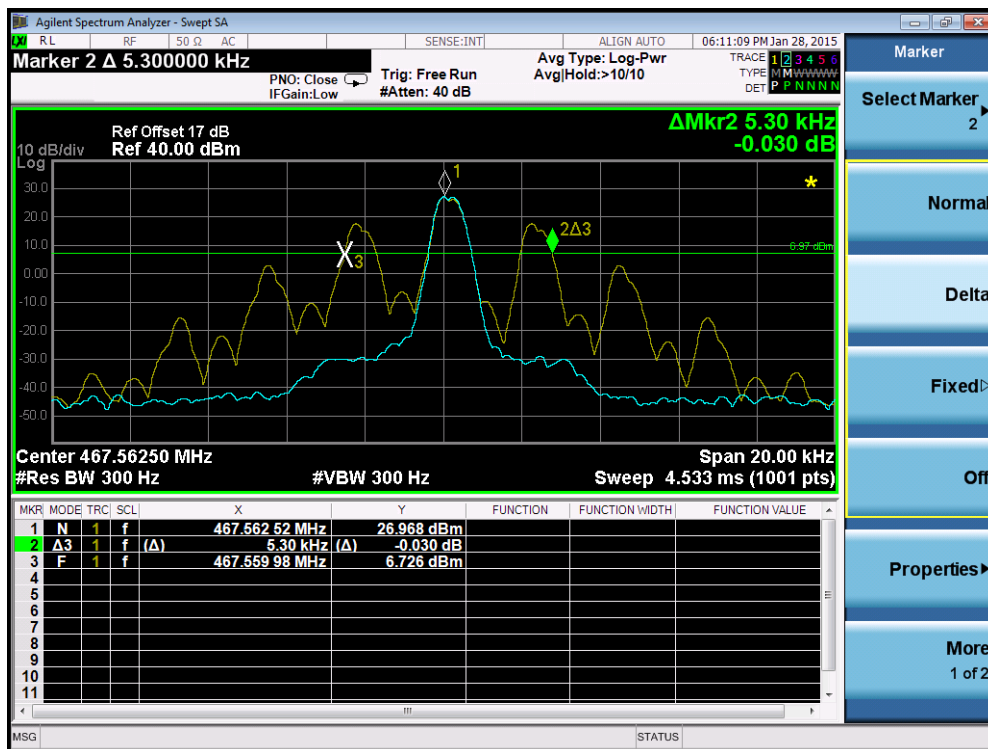


### 5.4.4. Test Result

|               |                    |                   |            |
|---------------|--------------------|-------------------|------------|
| Product       | Business Radio     | Temperature       | 26°C       |
| Test Engineer | Roy Cheng          | Relative Humidity | 54%        |
| Test Item     | Occupied Bandwidth | Date of Test      | 2015/01/28 |

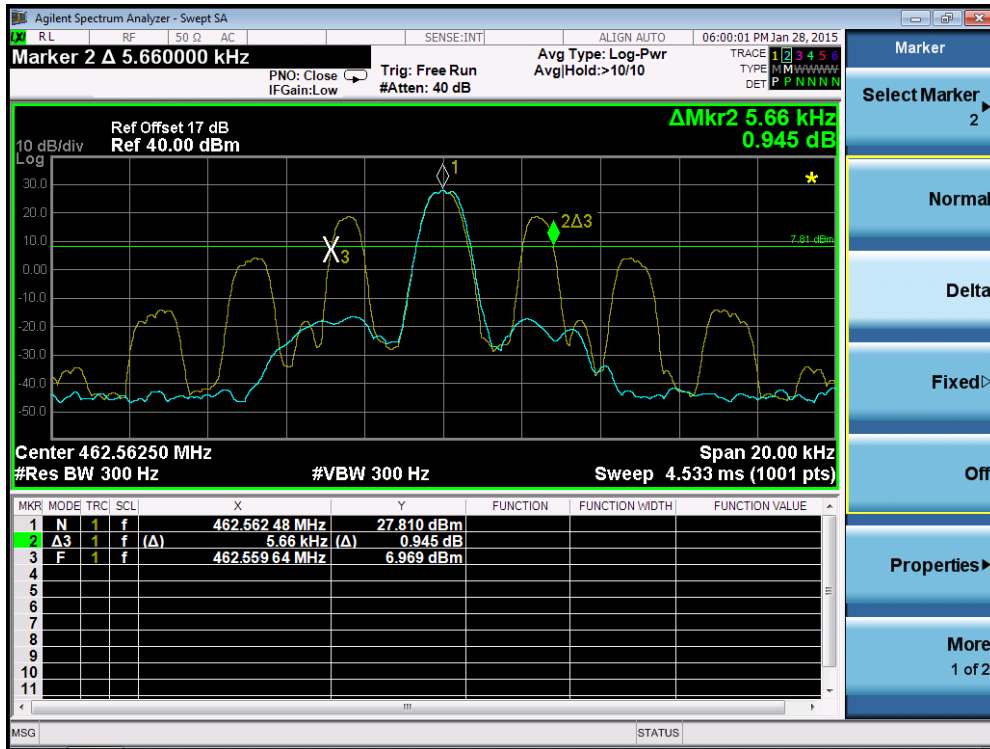
Channel 08: 467.5625MHz

The Occupied Bandwidth is measured to be 5.30kHz for FRS



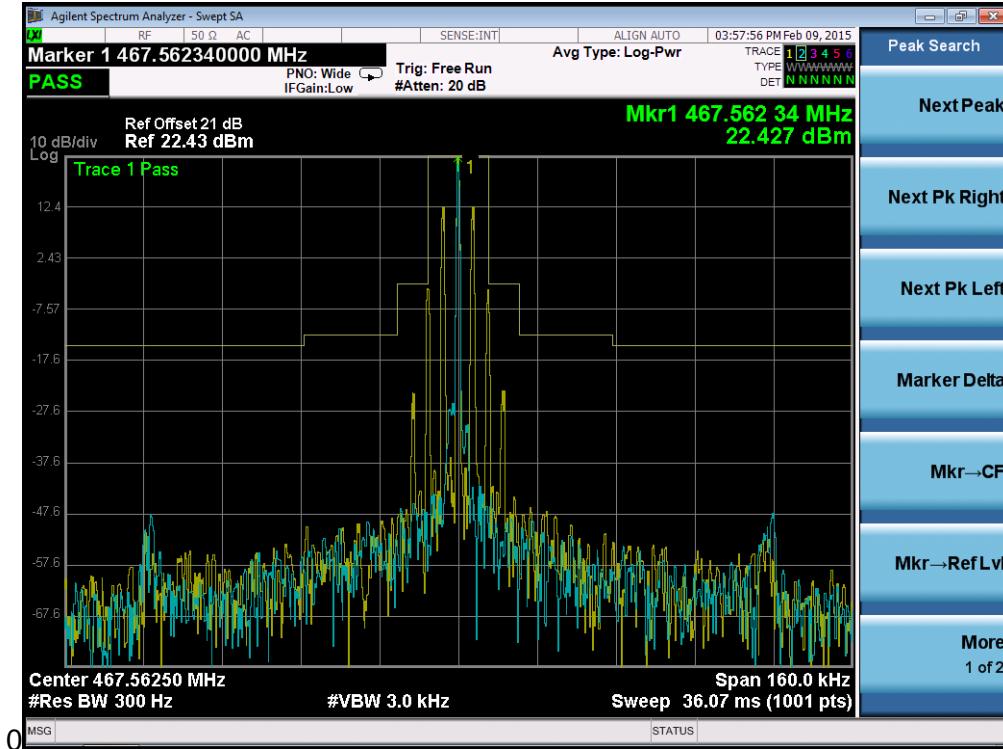
Channel 01: 462.5625MHz GMRS

The occupied Bandwidth is measured to be 5.66kHz for GMRS

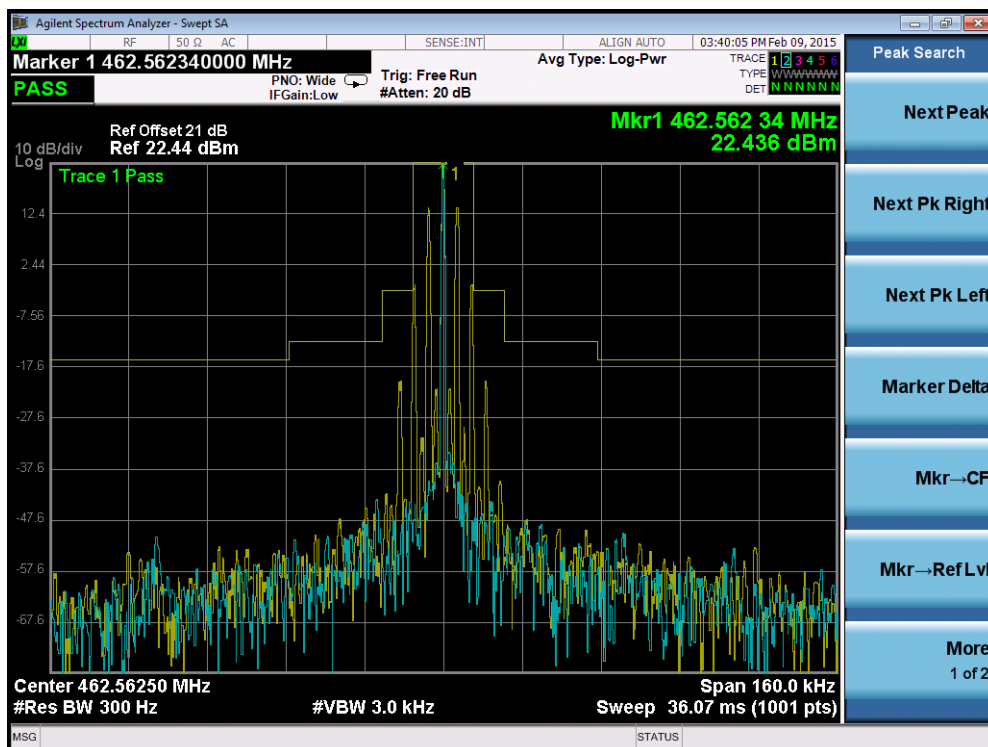


|               |                |                   |            |
|---------------|----------------|-------------------|------------|
| Product       | Business Radio | Temperature       | 26°C       |
| Test Engineer | Roy Cheng      | Relative Humidity | 54%        |
| Test Item     | Mask           | Date of Test      | 2015/02/09 |

Channel 08: 467.5625MHz FRS



Channel 01: 462.5625MHz GMRS



## 5.5. .Unwanted Radiated Spurious Emission

### 5.5.1. Provisions Applicable

According to FCC section 95.635(b7), the unwanted emission should be attenuated below TP by at least  $43+10 \log (\text{Transmit Power})$  dB.

### 5.5.2. Test Procedure

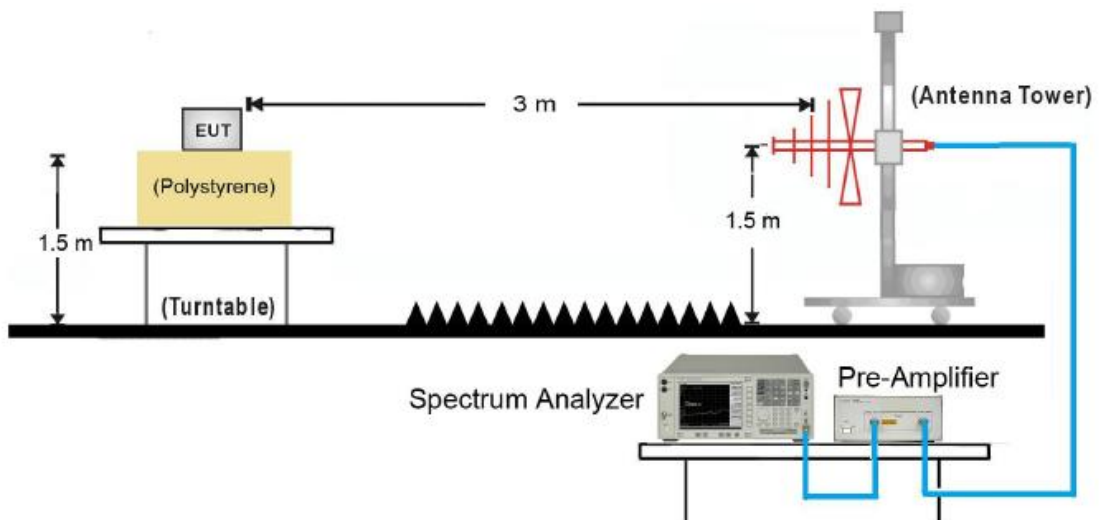
1. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
2. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
3. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
6. The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The measurement shall be repeated with the test antenna set to horizontal polarization.
10. Replace the antenna with a proper Antenna (substitution antenna).
11. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
12. The substitution antenna shall be connected to a calibrated signal generator.
13. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
14. The test antenna shall be raised and lowered through the specified range of the height to

ensure that the maximum signal is received.

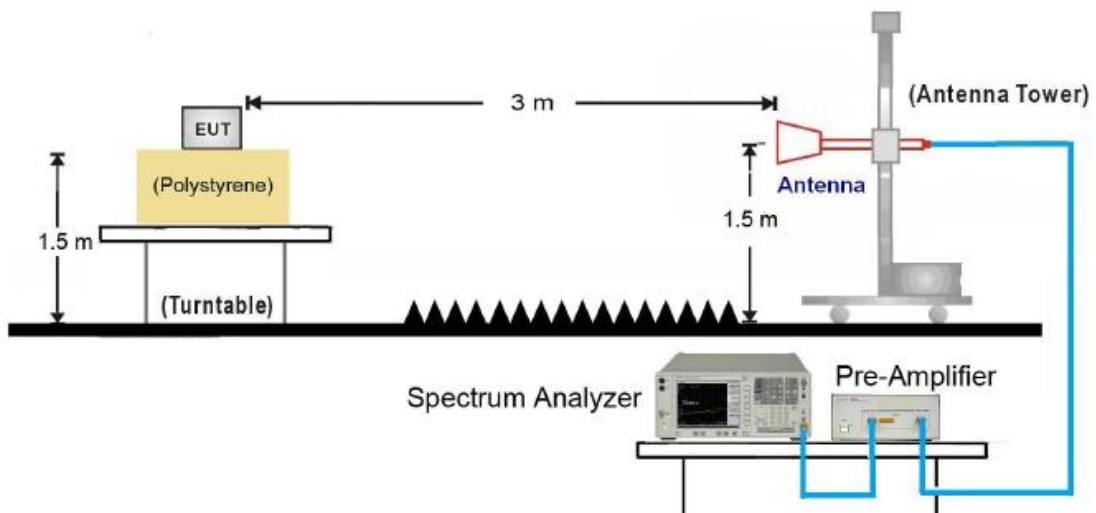
15. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
16. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
17. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

### 5.5.3. Test Setup

#### 30MHz ~ 1GHz Test Setup:



#### Above 1GHz Test Setup:



#### 5.5.4. Test Result.

|               |                |                   |      |
|---------------|----------------|-------------------|------|
| Product       | Business Radio | Temperature       | 26°C |
| Test Engineer | Roy Cheng      | Relative Humidity | 54%  |
| Test Mode     | Channel 8      | Test Site         | AC1  |

| Frequency (MHz) | Polarity (V/H) | Emission level (dBm) | FCC Part 95 Limit dBm | Over Limit (dBm) |
|-----------------|----------------|----------------------|-----------------------|------------------|
| 935.495         | V              | -37.118              | -13                   | -24.118          |
| 1402.500        | V              | -33.031              | -13                   | -20.031          |
| 1870.000        | V              | -32.963              | -13                   | -19.963          |
| 2337.500        | V              | -37.954              | -13                   | -24.954          |
| 2805.000        | V              | -44.428              | -13                   | -31.428          |
| 935.495         | H              | -34.356              | -13                   | -21.356          |
| 1402.500        | H              | -42.863              | -13                   | -29.863          |
| 1870.000        | H              | -46.119              | -13                   | -33.119          |
| 2337.500        | H              | -43.070              | -13                   | -30.070          |
| 2805.000        | H              | -33.682              | -13                   | -20.682          |

|               |                |                   |      |
|---------------|----------------|-------------------|------|
| Product       | Business Radio | Temperature       | 26°C |
| Test Engineer | Roy Cheng      | Relative Humidity | 54%  |
| Test Mode     | Channel 1      | Test Site         | AC1  |

| Frequency (MHz) | Polarity (V/H) | Emission level (dBm) | FCC Part 95 Limit (dBm) | Over Limit (dBm) |
|-----------------|----------------|----------------------|-------------------------|------------------|
| 925.310         | V              | -34.714              | -13                     | -21.714          |
| 1387.500        | V              | -31.407              | -13                     | -18.407          |
| 1850.000        | V              | -39.656              | -13                     | -26.656          |
| 2312.500        | V              | -38.623              | -13                     | -25.623          |
| 2775.000        | V              | -45.633              | -13                     | -32.633          |
| 925.310         | H              | -32.914              | -13                     | -19.914          |
| 1387.500        | H              | -41.752              | -13                     | -28.752          |
| 1850.000        | H              | -48.218              | -13                     | -35.218          |
| 2312.500        | H              | -38.710              | -13                     | -25.710          |
| 2775.000        | H              | -35.203              | -13                     | -22.203          |

## **5.6. Frequency Stability**

### **5.6.1. Provisions Applicable**

According to FCC Section 95.626, the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade. Each FRS unit must be maintained within a frequency tolerance of 0.00025%.

According to FCC Section 95.621, the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade each GMRS transmitter for mobile station, small base station and control station operation must be maintained within a frequency tolerance of 0.0005%.

### **5.6.2. Test Procedure**

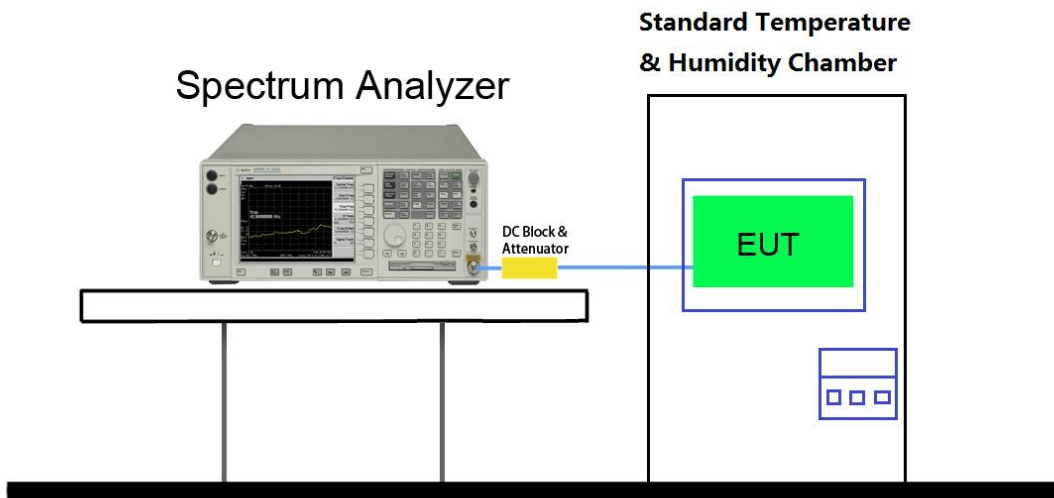
#### **5.6.2.1. Frequency stability versus environmental temperature**

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber. Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1 KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.
3. Set the temperature of chamber to 50°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, Record all measured frequencies on each temperature step.

#### **5.6.2.2. Frequency stability versus input voltage**

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15°C to 25°C. Otherwise, an environment chamber set for a temperature of 20°C shall be used. The EUT shall be powered by DC 4.5 V.
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

### 5.6.3. Test Setup





#### 5.6.4. Test Result

| Assigned Frequency (MHz)      | Temperature (°C) | Measured Frequency (MHz) | Frequency Deviation (%) | Limit (%) |
|-------------------------------|------------------|--------------------------|-------------------------|-----------|
| GMRS<br>Channel 1<br>462.5625 | -30              | 462.5618263510           | -0.0001456342           | 0.0005    |
|                               | -20              | 462.5619013724           | -0.0001294155           | 0.0005    |
|                               | -10              | 462.5626594721           | 0.0000344758            | 0.0005    |
|                               | 0                | 462.5619562174           | -0.0001175587           | 0.0005    |
|                               | 10               | 462.5617025875           | -0.0001723902           | 0.0005    |
|                               | 20               | 462.5621362744           | -0.0000786327           | 0.0005    |
|                               | 30               | 462.5617516849           | -0.0001617760           | 0.0005    |
|                               | 40               | 462.5623625487           | -0.0000297152           | 0.0005    |
|                               | 50               | 462.5625562418           | 0.0000121587            | 0.0005    |
| FRS<br>Channel 8<br>467.5625  | -30              | 467.5622953165           | -0.0000437767           | 0.00025   |
|                               | -20              | 467.5623032516           | -0.0000420796           | 0.00025   |
|                               | -10              | 467.5623334187           | -0.0000356276           | 0.00025   |
|                               | 0                | 467.5622915244           | -0.0000445878           | 0.00025   |
|                               | 10               | 467.5623152487           | -0.0000395137           | 0.00025   |
|                               | 20               | 467.5622654874           | -0.0000501564           | 0.00025   |
|                               | 30               | 467.5623025447           | -0.0000422308           | 0.00025   |
|                               | 40               | 467.5623954875           | -0.0000223526           | 0.00025   |
|                               | 50               | 467.5623251546           | -0.0000373951           | 0.00025   |

| Assigned Frequency (MHz)      | Voltage (V) | Measured Frequency (MHz) | Frequency Deviation (%) | Limit (%) |
|-------------------------------|-------------|--------------------------|-------------------------|-----------|
| GMRS<br>Channel 1<br>462.5625 | 3.6         | 462.5624595245           | -0.0000000875           | 0.0005    |
|                               | 3.7         | 462.5622136254           | -0.0000006191           | 0.0005    |
|                               | 3.8         | 462.5619051268           | -0.0000012860           | 0.0005    |
|                               | 3.9         | 462.5626138474           | 0.0000002461            | 0.0005    |
|                               | 4.0         | 462.5635164784           | 0.0000021975            | 0.0005    |
|                               | 4.1         | 462.5615625487           | -0.0000020266           | 0.0005    |
|                               | 4.2         | 462.5624151532           | -0.0000001834           | 0.0005    |
|                               | 4.3         | 462.5632647156           | 0.0000016532            | 0.0005    |
|                               | 4.4         | 462.5650362654           | 0.0000054831            | 0.0005    |
|                               | 4.5         | 462.5618254749           | -0.0000014582           | 0.0005    |
| FRS<br>Channel 8<br>467.5625  | 3.6         | 467.5622951647           | -0.0000438092           | 0.00025   |
|                               | 3.7         | 467.5622745162           | -0.0000482190           | 0.00025   |
|                               | 3.8         | 467.5626032514           | 0.0000220829            | 0.00025   |
|                               | 3.9         | 467.5626115248           | 0.0000238524            | 0.00025   |
|                               | 4.0         | 467.5623102151           | -0.0000405903           | 0.00025   |
|                               | 4.1         | 467.5622626514           | -0.0000507630           | 0.00025   |
|                               | 4.2         | 467.5623751695           | -0.0000266991           | 0.00025   |
|                               | 4.3         | 467.5623228451           | -0.0000378890           | 0.00025   |
|                               | 4.4         | 467.5623385492           | -0.0000345303           | 0.00025   |
|                               | 4.5         | 467.5626518474           | 0.0000324764            | 0.00025   |

## 6. CONCLUSION

The data collected relate only the item(s) tested and show that the **Business Radio FCC ID: V49CP183** is in compliance with Part 95 of the FCC Rules.

\_\_\_\_\_ The End \_\_\_\_\_