测试

# MEASUREMENT REPORT

## FCC PART 95 Walkie Talkie

| | |
|---|---|
| **FCC ID:** | V49CP226 |
| **APPLICANT:** | CPS Telecom Limited |

| | |
|---|---|
| **Application Type:** | Certification |
| **Product:** | Walkie Talkie |
| **Model No.:** | CP226 |
| **Brand Name:** | CPS |
| **FCC Rule Part(s):** | FCC Part 95 Subpart B |
| **Test Procedure(s):** | ANSI/TIA-603-E: 2016 |
| **Test Date:** | May 02 ~ June 20, 2018 |

Reviewed By : ( Kevin Guo )

Approved By : ( Robin Wu )

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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-E:2016. 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 | Note |
|---|---|---|---|---|
| 1801RSU015-U1 | Rev. 01 | Initial report | 07-02-2018 | Valid |
| | | | | |

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## §2.1033 General Information

| | |
|---|---|
| **Applicant:** | CPS Telecom Limited |
| **Applicant Address:** | 15B Floor, King Palace Plaza, 55 King Yip Street Kwun Tong, Kowloon, Hong Kong |
| **Manufacturer:** | CPS Telecom Limited |
| **Manufacturer Address:** | 15B Floor, King Palace Plaza, 55 King Yip Street Kwun Tong, Kowloon, Hong Kong |
| **Test Site:** | MRT Technology (Suzhou) Co., Ltd |
| **Test Site Address:** | D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China |
| **FCC Registration No.:** | 893164 |
| **FCC designation No.:** | CN1166 |
| **Test Device Serial No.:** | N/A ☐ Production ☒ Pre-Production ☐ Engineering |

### 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. 893164) 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-20025, G-20034, C-20020, T-20020) 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.**

Accredited Laboratory
A2LA has accredited
MRT TECHNOLOGY (SUZHOU) CO., LTD.
Suzhou, Jiangsu, People's Republic of China
for technical competence in the field of
Electrical Testing

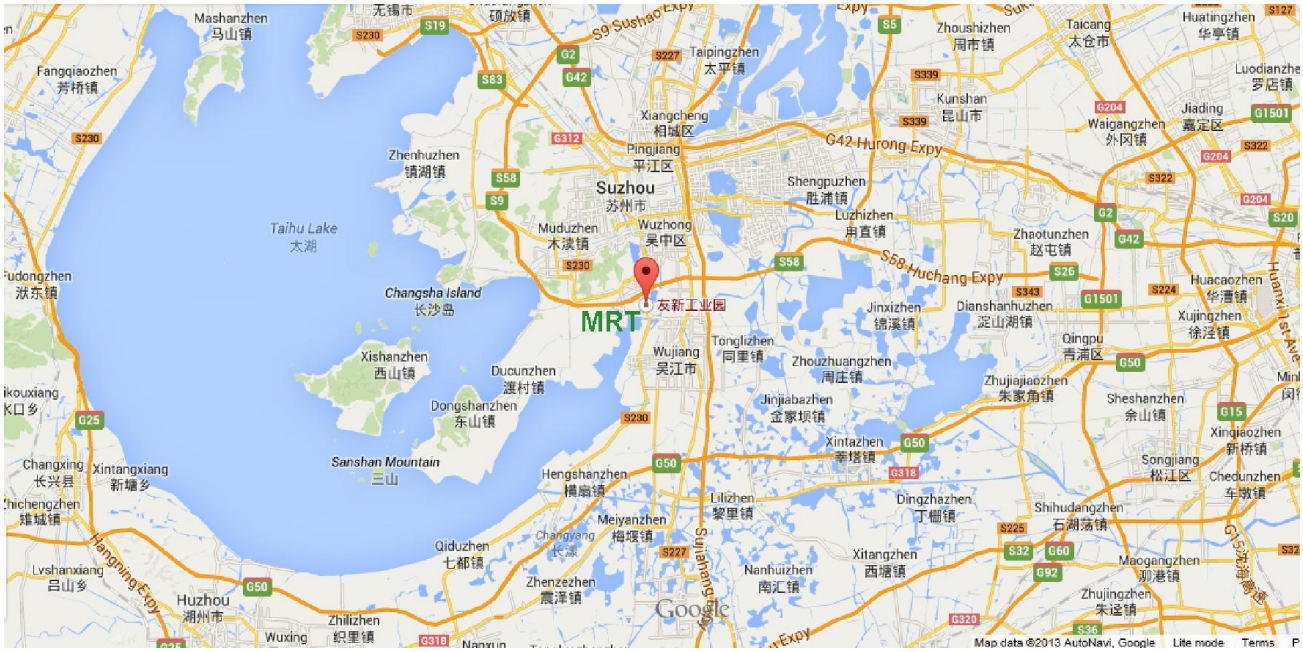
# 1. INTRODUCTION

## 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 | Walkie Talkie |
| Model No. | CP226 |
| Frequency Range | 462.5625~462.7125MHz (1~7 channel)<br>467.5625~467.7125MHz (8~14 channel)<br>462.5500~462.7250MHz (15~22 channel) |
| Maximum Radiated Output Power | 20.775 dBm |
| Type of Modulation | FM |
| Antenna Type | Fixed external |

## 2.2. Frequency Operation / Channel List

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

## 2.3. Test Channels

| Channel | Frequency |
|---|---|
| 1 | 462.5625MHz |
| 8 | 467.5625MHz |
| 22 | 462.7250MHz |

## 2.4. Applicable standards

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

## 2.5. Test Methodology

All measurements contained in this report were conducted with TIA-603-E-2016 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards and ANSI C63.4-2014, 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. Antenna Requirements

**Excerpt from §95.587 of the FCC Rules/Regulations:**

The antenna of each FRS transmitter type must meet the following requirements.

(1) The antenna must be a non-removable integral part of the FRS transmitter type.

(2) The gain of the antenna must not exceed that of a half-wave dipole antenna.

(3) The antenna must be designed such that the electric field of the emitted waves is vertically polarized when the unit is operated in the normal orientation.

- The antenna of the **device** is **permanently attached.**
- There are no provisions for connection to an external antenna.

**Conclusion:**

The **device** unit complies with the requirement of §15.203.

# 4. TEST EQUIPMENT CALIBRATION DATE

Conducted Test – TR3

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Power Meter | Agilent | U2021XA | MRTSUE06030 | 1 year | 2018/12/06 |
| Temperature Humidity Chamber | BAOYT | BYH-150CL | MRTSUE06051 | 1 year | 2018/12/06 |
| EXA Signal Analyzer | Agilent | N9020A | MRTSUE06106 | 1 year | 2019/04/20 |
| Audio Analyzer | Agilent | U8903B | MRTSUE06143 | 1 year | 2018/08/11 |
| Modulation Analyzer | HP | 8901A | MRTSUE06210 | 1 year | 2018/07/08 |
| Temperature/Humidity Meter | Testo | 608-H1 | MRTSUE06401 | 1 year | 2018/08/14 |

Unwanted Radiated Spurious – AC1

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| PXA Signal Analyzer | Keysight | 9030B | MRTSUE06395 | 1 year | 2018/09/13 |
| EMI Test Receiver | R&S | ESR7 | MRTSUE06001 | 1 year | 2018/08/18 |
| Loop Antenna | Schwarzbeck | FMZB 1519 | MRTSUE06025 | 1 year | 2018/11/20 |
| EXA Signal Analyzer | Agilent | N9020A | MRTSUE06106 | 1 year | 2019/04/20 |
| Microwave System Amplifier | Agilent | 83017A | MRTSUE06076 | 1 year | 2018/11/17 |
| Bilog Period Antenna | Schwarzbeck | VULB 9168 | MRTSUE06172 | 1 year | 2018/11/18 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA9120D | MRTSUE06023 | 1 year | 2018/10/21 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA 9170 | MRTSUE06024 | 1 year | 2018/12/14 |
| Amplifier | Schwarzbeck | BBV 9721 | MRTSUE06121 | 1 year | 2019/06/13 |
| Hygrothermograph | Testo | 608-H1 | MRTSUE06403 | 1 year | 2018/08/14 |
| Anechoic Chamber | TDK | Chamber-AC1 | MRTSUE06212 | 1 year | 2019/05/02 |

# 5. 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: ± 4.2dB<br>1GHz ~ 40GHz: ± 4.8dB |

# 6. TEST RESULT

## 6.1. Summary

**Product Name:** **Walkie Talkie**
**FCC ID:** **V49CP226**
**Number of Channels:** **22**

| FCC Part Section(s) | Test Description | Test Result | Reference |
|---|---|---|---|
| §2.1055, §95.565 | Frequency Stability | Pass | Section 6.2 |
| §2.1046, §95.567 | Radiated Output Power (ERP) | Pass | Section 6.3 |
| §2.1049, §95.573 | Authorized Bandwidth | Pass | Section 6.4 |
| §2.1049, §95.579 | Emission Mask | Pass | Section 6.5 |
| §2.1047, §95.575 | Modulation Characteristics | Pass | Section 6.6 |
| §2.1053, §95.579 | Radiated Spurious Emissions | Pass | Section 6.7 |

**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.

## 6.2. Frequency Stability

### 6.2.1. Provisions Applicable

Each FRS transmitter type must be designed such that the carrier frequencies remain within ±2.5 parts-per-million of the channel center frequencies specified in §95.563 during normal operating conditions.

### 6.2.2. Test Procedure

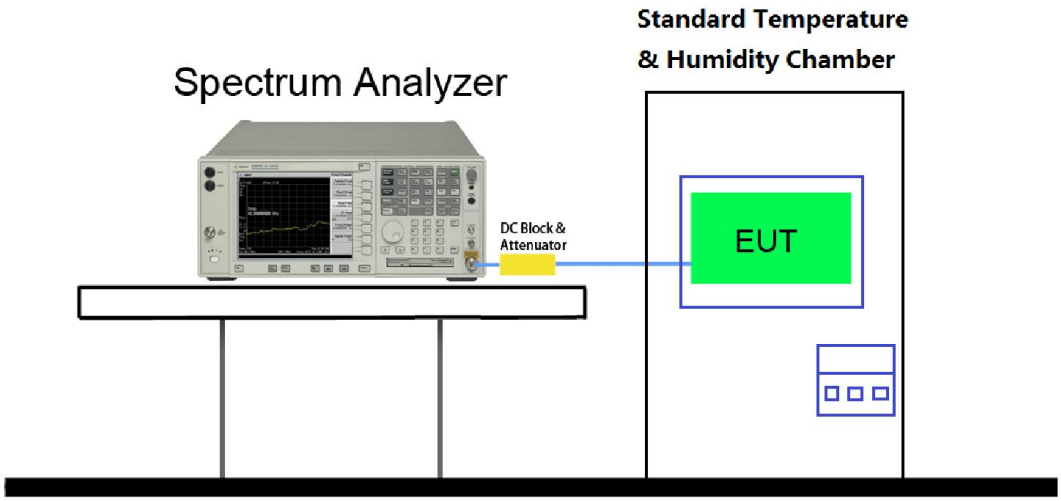
#### 6.2.2.1. Frequency stability versus environmental temperature

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.

#### 6.2.2.2. Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within15°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 3.7 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.

### 6.2.3. Test Setup



### 6.2.4. Test Result

| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 25°C |
| Test Engineer | Lewis Huang | Relative Humidity | 54% |
| Test Site | TR3 | Test Date | 2018/05/02 |

| Assigned Frequency (MHz) | Test Voltage (V) | Test Temperature (°C) | Measured Frequency (MHz) | Frequency Deviation (%) | Limit (%) |
|---|---|---|---|---|---|
| Channel 1 462.5625 | 3.7 | -30 | 462.562520 | 0.0000043 | 0.00025 |
| | | -20 | 462.562523 | 0.0000050 | 0.00025 |
| | | -10 | 462.562519 | 0.0000041 | 0.00025 |
| | | 0 | 462.562520 | 0.0000043 | 0.00025 |
| | | 10 | 462.562516 | 0.0000035 | 0.00025 |
| | | 20 | 462.562521 | 0.0000045 | 0.00025 |
| | | 30 | 462.562520 | 0.0000043 | 0.00025 |
| | | 40 | 462.562518 | 0.0000039 | 0.00025 |
| | | 50 | 462.562521 | 0.0000045 | 0.00025 |
| | 3.3 | 25 | 462.562567 | 0.0000145 | 0.00025 |
| | 4.0 | 25 | 462.562502 | 0.0000004 | 0.00025 |
| Channel 8 467.5625 | 3.7 | -30 | 467.562506 | 0.0000013 | 0.00025 |
| | | -20 | 467.562507 | 0.0000015 | 0.00025 |
| | | -10 | 467.562510 | 0.0000021 | 0.00025 |
| | | 0 | 467.562509 | 0.0000019 | 0.00025 |
| | | 10 | 467.562503 | 0.0000006 | 0.00025 |
| | | 20 | 467.562506 | 0.0000013 | 0.00025 |
| | | 30 | 467.562501 | 0.0000002 | 0.00025 |
| | | 40 | 467.562506 | 0.0000013 | 0.00025 |
| | | 50 | 467.562507 | 0.0000015 | 0.00025 |
| | 3.3 | 25 | 467.562506 | 0.0000013 | 0.00025 |
| | 4.0 | 25 | 467.562507 | 0.0000015 | 0.00025 |

Note: Frequency Deviation= (Measured Frequency–Declared Frequency) / Declared Frequency*100.

| Assigned Frequency (MHz) | Test Voltage (V) | Test Temperature (°C) | Measured Frequency (MHz) | Frequency Deviation (%) | Limit (%) |
|---|---|---|---|---|---|
| Channel 22 462.7250 | 3.7 | -30 | 462.725021 | 0.0000045 | 0.00025 |
| | | -20 | 462.725019 | 0.0000041 | 0.00025 |
| | | -10 | 462.725022 | 0.0000048 | 0.00025 |
| | | 0 | 462.725020 | 0.0000043 | 0.00025 |
| | | 10 | 462.725018 | 0.0000039 | 0.00025 |
| | | 20 | 462.725019 | 0.0000041 | 0.00025 |
| | | 30 | 462.725019 | 0.0000041 | 0.00025 |
| | | 40 | 462.725020 | 0.0000043 | 0.00025 |
| | | 50 | 462.725019 | 0.0000041 | 0.00025 |
| | 3.3 | 25 | 462.725018 | 0.0000039 | 0.00025 |
| | 4.0 | 25 | 462.725016 | 0.0000035 | 0.00025 |

Note: Frequency Deviation= (Measured Frequency–Declared Frequency)/ Declared Frequency*100.

## 6.3. RF Output Power

### 6.3.1. Provisions Applicable

Each FRS transmitter type must be designed such that the effective radiated power (ERP) on channels 8 through 14 does not exceed 0.5 Watts and the ERP on channels 1 through 7 and 15 through 22 does not exceed 2.0 Watts.

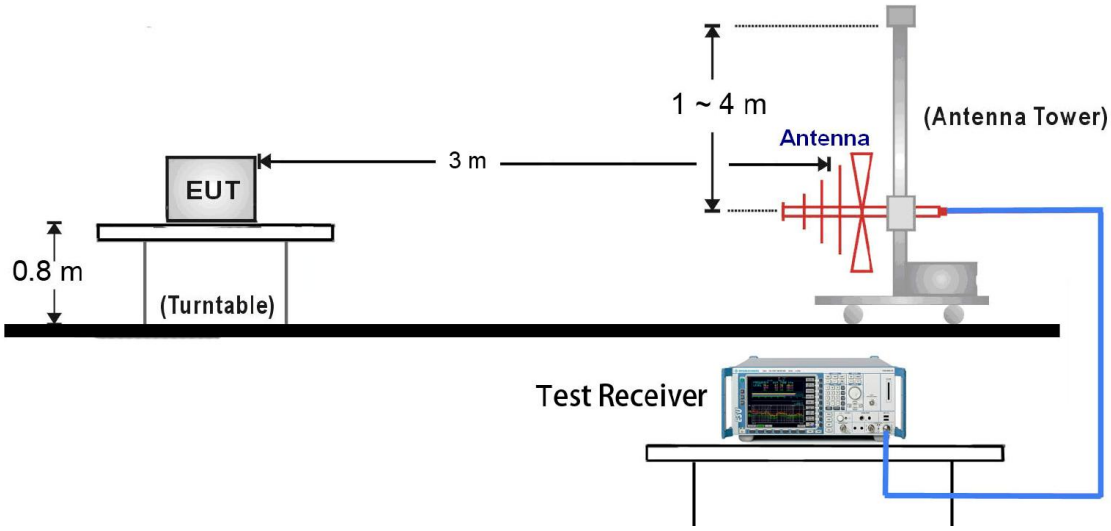
### 6.3.2. Test Procedure

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.

### 6.3.3. Test Setup



### 6.3.4. Test Result

| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Lewis Huang | Relative Humidity | 54% |
| Test Site | TR3 & AC1 | Test Date | 2018/05/02 |

**Transmitter Output Power**

| Channel | Channel Description | Frequency | Output Power | |
|---|---|---|---|---|
| | | MHz | dBm | W |
| 1 | FRS | 462.5625 | 27.663 | 0.5838 |
| 2 | | 462.5875 | 27.692 | 0.5878 |
| 3 | | 462.6125 | 27.689 | 0.5874 |
| 4 | | 462.6375 | 27.722 | 0.5918 |
| 5 | | 462.6625 | 27.674 | 0.5853 |
| 6 | | 462.6875 | 27.710 | 0.5902 |
| 7 | | 462.7125 | 27.704 | 0.5894 |
| 8 | FRS | 467.5625 | 27.508 | 0.5634 |
| 9 | | 467.5875 | 27.546 | 0.5683 |
| 10 | | 467.6125 | 27.514 | 0.5642 |
| 11 | | 467.6375 | 27.584 | 0.5733 |
| 12 | | 467.6625 | 27.549 | 0.5687 |
| 13 | | 467.6875 | 27.531 | 0.5664 |
| 14 | | 467.7125 | 27.481 | 0.5599 |
| 15 | FRS | 462.5500 | 27.701 | 0.5890 |
| 16 | | 462.5750 | 27.675 | 0.5855 |
| 17 | | 462.6000 | 27.654 | 0.5826 |
| 18 | | 462.6250 | 27.666 | 0.5843 |
| 19 | | 462.6500 | 27.663 | 0.5838 |
| 20 | | 462.6750 | 27.636 | 0.5802 |
| 21 | | 462.7000 | 27.651 | 0.5822 |
| 22 | | 462.7250 | 27.647 | 0.5817 |

**Effective Radiated Power (e.r.p)**

| Channel | Channel Description | Frequency | SG Reading | Cable Loss | Substitute Antenna Gain | Effective Radiated Power (e.r.p) | |
|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBd | dBm | W |
| 1 | FRS | 462.5625 | 13.025 | 0.44 | 7.76 | 20.345 | 0.1083 |
| 4 | | 462.6375 | 13.349 | 0.44 | 7.76 | 20.669 | 0.1167 |
| 7 | | 462.7125 | 13.455 | 0.44 | 7.76 | 20.775 | 0.1195 |
| 8 | FRS | 467.5625 | 12.865 | 0.44 | 7.76 | 20.185 | 0.1044 |
| 11 | | 467.6375 | 12.819 | 0.44 | 7.76 | 20.139 | 0.1033 |
| 14 | | 467.7125 | 12.653 | 0.44 | 7.76 | 19.973 | 0.0994 |
| 15 | FRS | 462.5500 | 12.777 | 0.44 | 7.76 | 20.097 | 0.1023 |
| 19 | | 462.6500 | 12.779 | 0.44 | 7.76 | 20.099 | 0.1023 |
| 22 | | 462.7250 | 12.795 | 0.44 | 7.76 | 20.115 | 0.1027 |

Note: ERP (dBm) = SG Reading (dBm) - Cable Loss (dB) + Substitute Antenna Gain (dBd)

## 6.4. Authorized Bandwidth

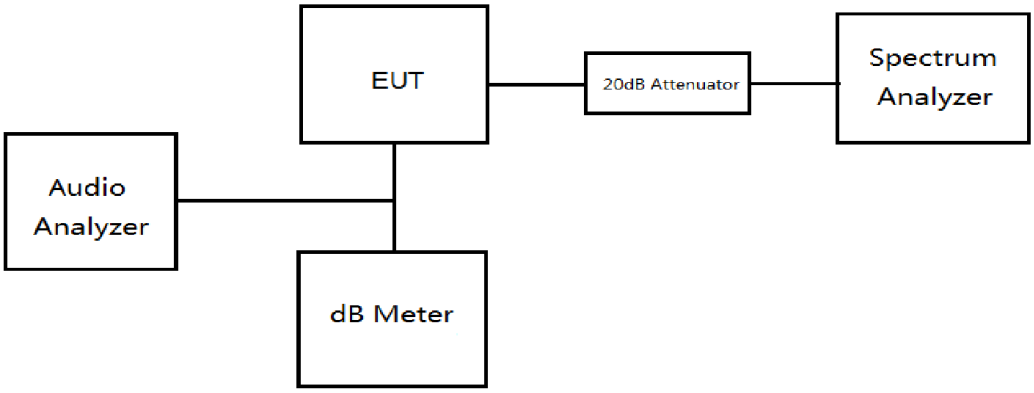
### 6.4.1. Provisions Applicable

Each FRS transmitter type must be designed such that the occupied bandwidth does not exceed 12.5 kHz.

### 6.4.2. Test Procedure

1. The set-up test equipment in the following configuration:
2. 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).
3. Setting the SPA Center Frequency = fundamental frequency, RBW=300 Hz, VBW≥ 3*RBW, Span=20 KHz.
4. Setting SPA to Max hold. Mark peak -20dB.

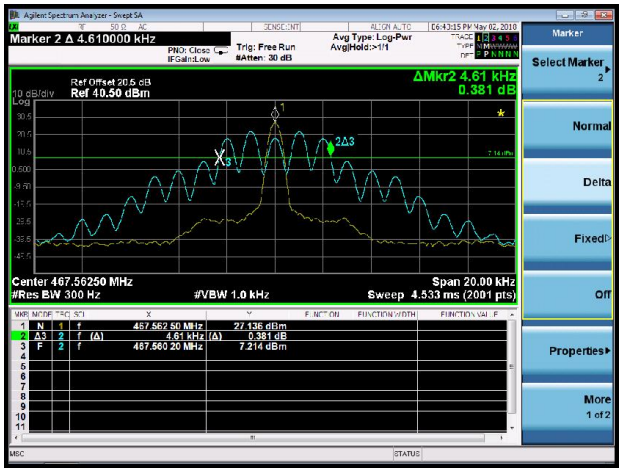
### 6.4.3. Test Setup



### 6.4.4. Test Result

| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Lewis Huang | Relative Humidity | 54% |
| Test Site | TR3 | Test Date | 2018/05/02 |

| Test Mode | Channel No. | Frequency (MHz) | Authorized Bandwidth (KHz) | Limit (KHz) | Result |
|---|---|---|---|---|---|
| FRS | 01 | 462.5625 | 4.62 | ≤12.5 | Pass |
| | 08 | 467.5625 | 4.61 | ≤12.5 | Pass |
| | 22 | 462.7250 | 4.62 | ≤12.5 | Pass |

| Authorized Bandwidth | |
|---|---|
| Channel 01 (462.5625MHz) | Channel 08 (462.5625MHz) |
| |  |
| Channel 22 (462.7250MHz) | |
| | |

## 6.5. Unwanted Emissions Mask

### 6.5.1. Provisions Applicable

Each FRS transmitter type must be designed to satisfy the applicable unwanted emissions limits in this paragraph.

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

(1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.

(2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.

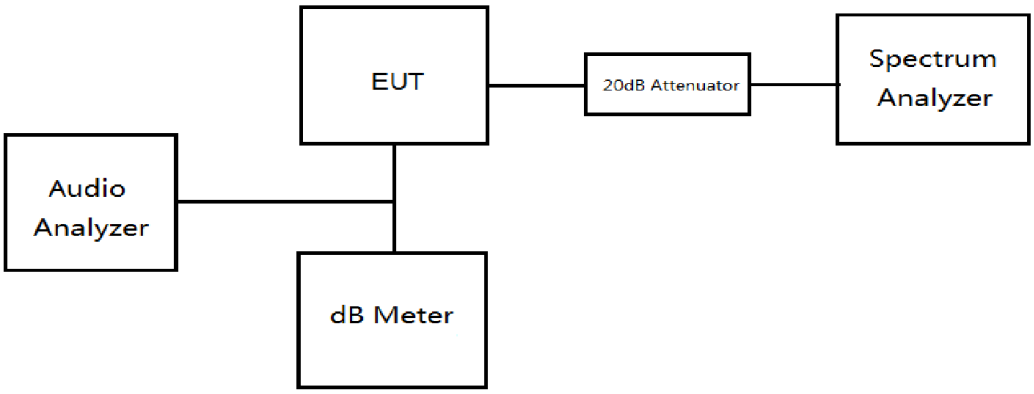
(3) 43 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 31.25 kHz

### 6.5.2. Test Procedure

1. Connect a signal generator to the input of the EUT.
2. Configure the signal generator to transmit the applicable radio service signal.
3. Configure the signal level to be just below the AGC threshold.
4. Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.
5. Set the spectrum analyzer center frequency to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between 2 × OBW and 5 × OBW.
6. The nominal RBW shall be 300 Hz for 16K0F3E and 100 Hz for all other emissions types.
7. Set the reference level of the spectrum analyzer to level as f0.
8. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
9. Confirm the signal is within the appropriate emissions mask.
10. Capture the emissions mask plot for inclusion in the test report.
11. Repeat step d) to step j) with input signal amplitude set at 3 dB above the AGC threshold
12. Repeat step b) to step k) for all operational bands and emissions types.

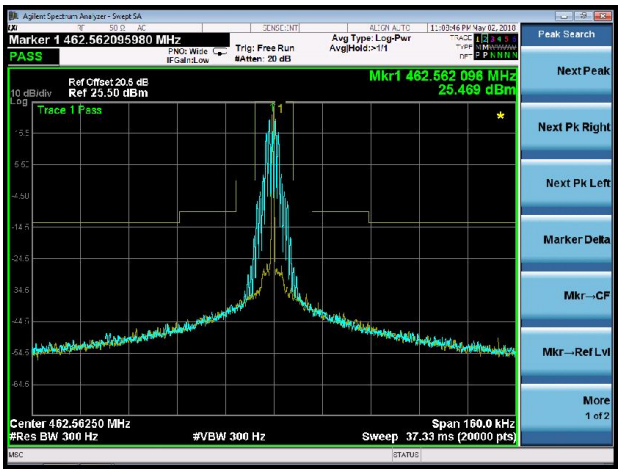
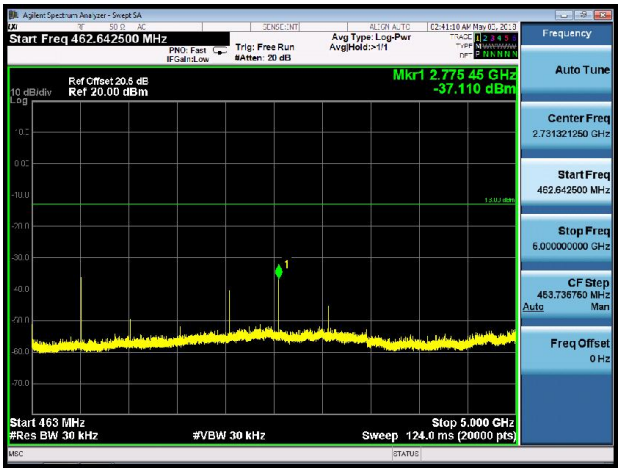
13. Measure the input signal for all operational bands and emission types and include results in the test report.

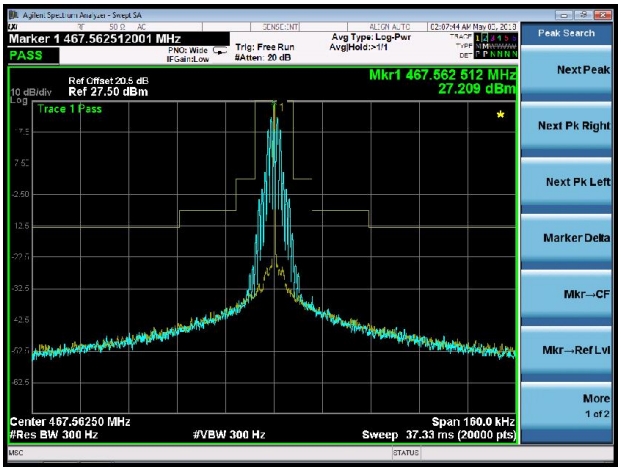
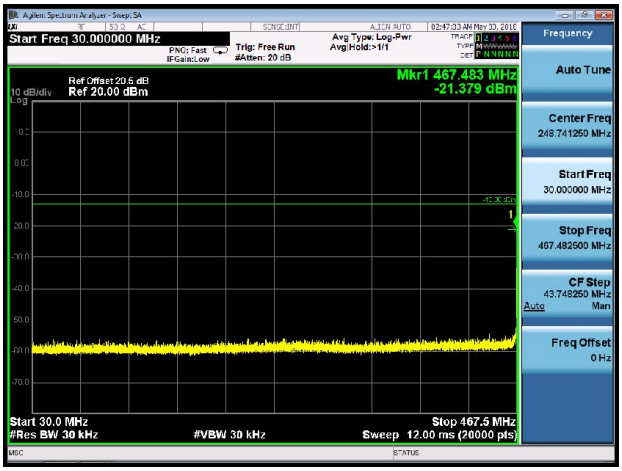
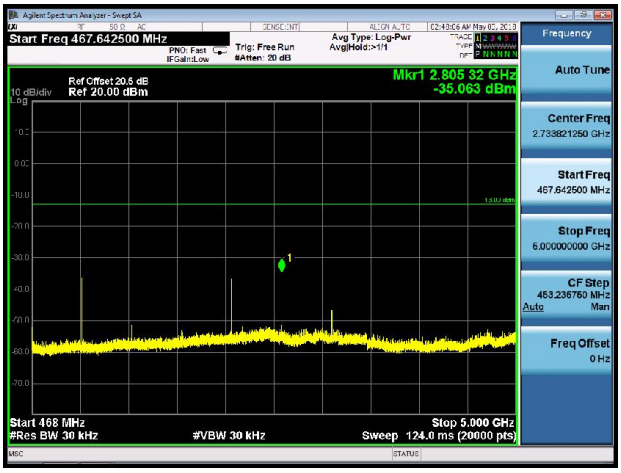
### 6.5.3. Test Setup

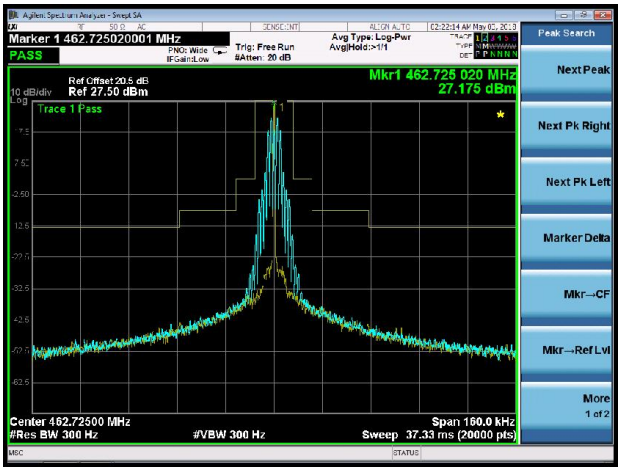
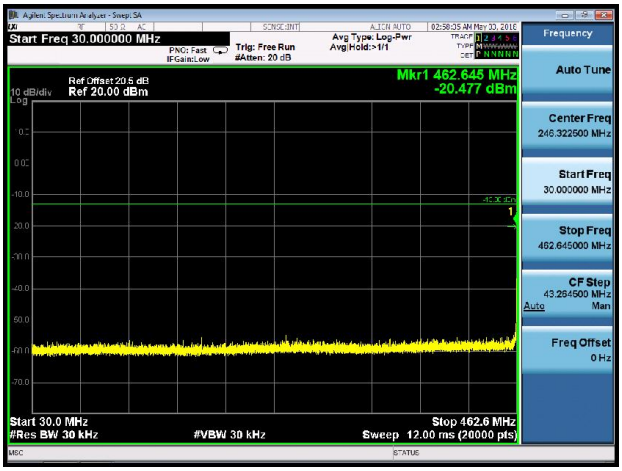
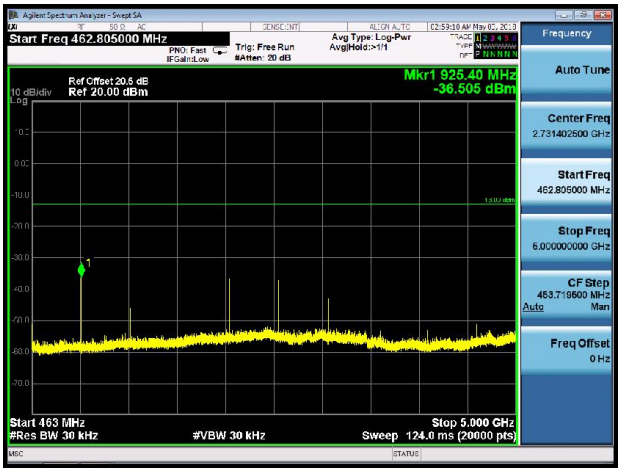


### 6.5.4. Test Result

| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Lewis Huang | Relative Humidity | 54% |
| Test Site | TR3 | Test Date | 2018/05/02 |

| Channel 01 (462.5625MHz) | |
|---|---|
| Mask | Spurious Emission |
|   | |
| Spurious Emission | |
|   | |

| Channel 08 (467.5625MHz) | |
|---|---|
| Mask | Spurious Emission |
|  |  |
| Spurious Emission | |
|  | |

| Channel 22 (462.7250MHz) | |
|---|---|
| Mask | Spurious Emission |
|  |  |
| Spurious Emission | |
|  | |

## 6.6. Modulation Characteristics

### 6.6.1. Provisions Applicable

Each FRS transmitter type must be designed such that the peak frequency deviation does not exceed 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

### 6.6.2. Test Procedure

#### 6.6.2.1. 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.

#### 6.6.2.2. Modulation Frequency Response

1. Configure the EUT as shown in figure 1.
2. Adjust the audio signal generator frequency to the sound pressure level 107dBSPL 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.

#### 6.6.2.3. 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.

### 6.6.3. Test Setup

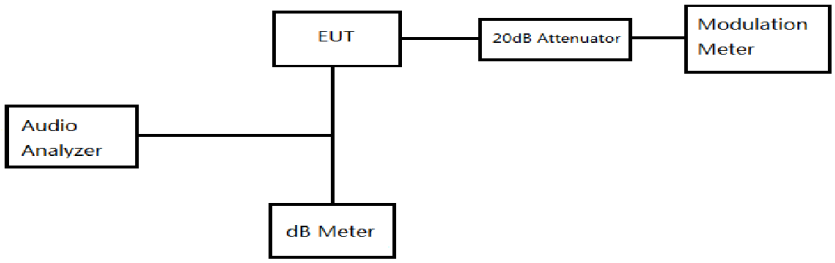



Figure 1

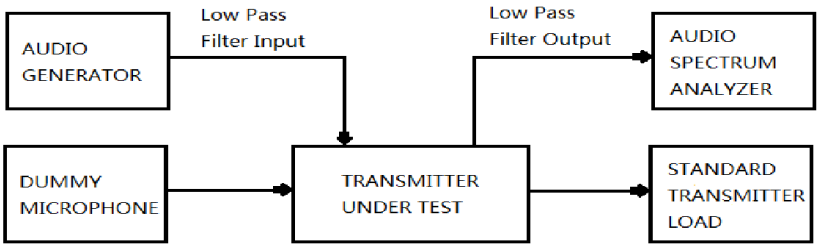
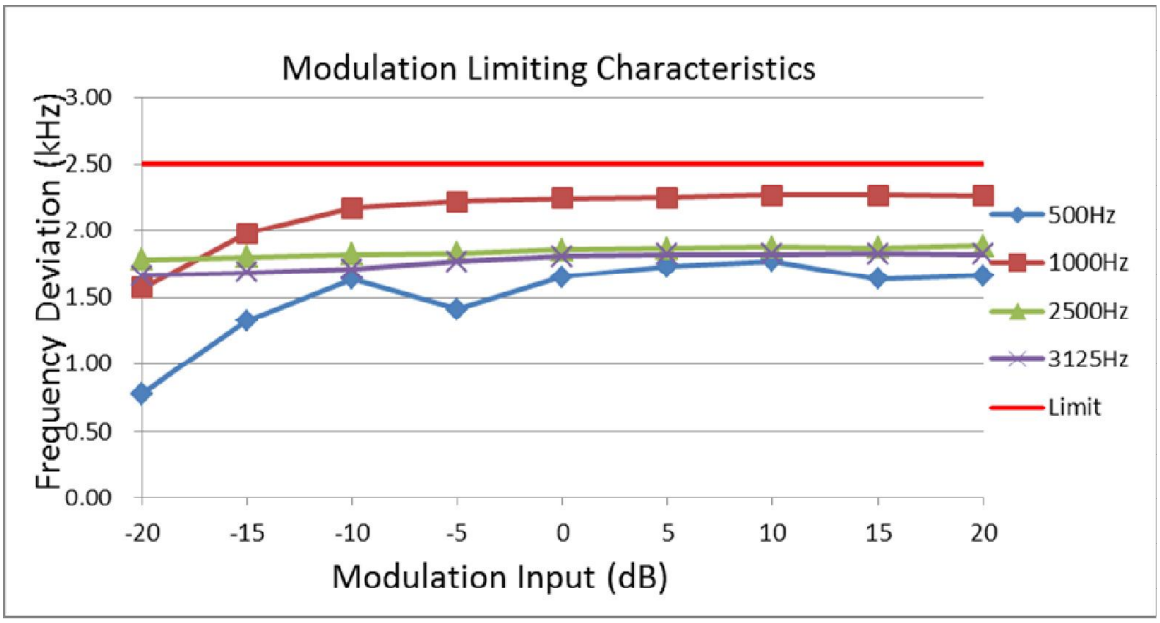



Figure 2

### 6.6.4. Test Result

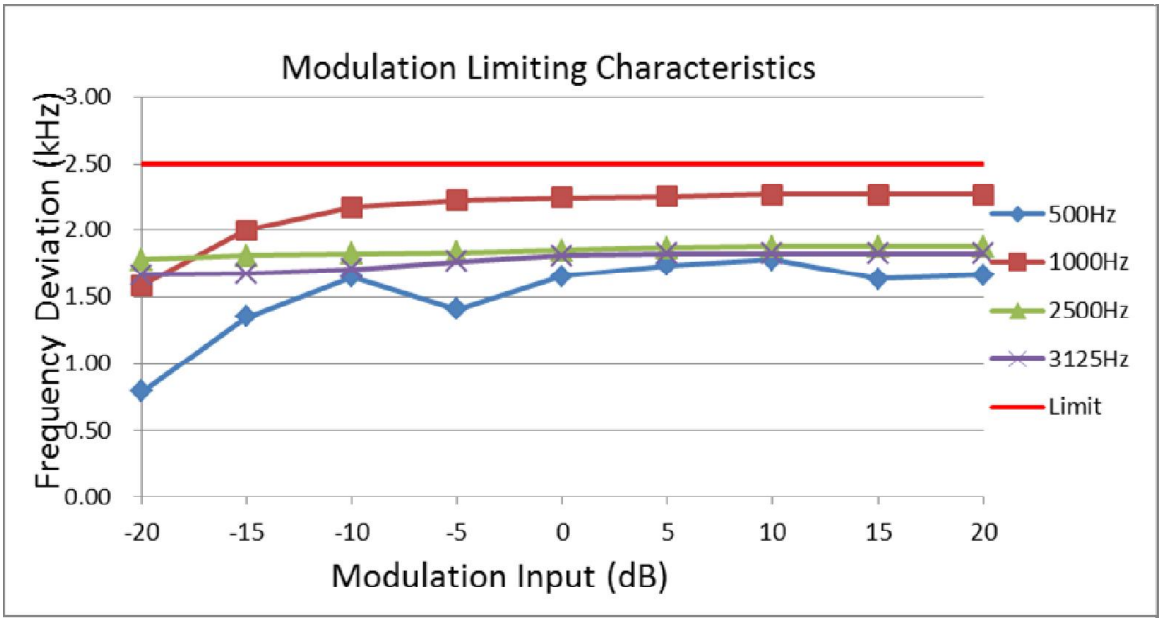
| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Jone Zhang | Relative Humidity | 54% |
| Test Item | Frequency Deviation | Date of Test | 2018/05/02 |

| Channel 01: 462.5625MHz 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 | 0.78 | 1.57 | 1.79 | 1.66 | 2.5 |
| -15.00 | 1.33 | 1.98 | 1.80 | 1.69 | 2.5 |
| -10.00 | 1.64 | 2.18 | 1.83 | 1.71 | 2.5 |
| -5.00 | 1.41 | 2.22 | 1.83 | 1.77 | 2.5 |
| 0.00 | 1.66 | 2.25 | 1.86 | 1.81 | 2.5 |
| 5.00 | 1.73 | 2.25 | 1.87 | 1.82 | 2.5 |
| 10.00 | 1.78 | 2.27 | 1.88 | 1.82 | 2.5 |
| 15.00 | 1.64 | 2.27 | 1.87 | 1.83 | 2.5 |
| 20.00 | 1.67 | 2.27 | 1.88 | 1.82 | 2.5 |



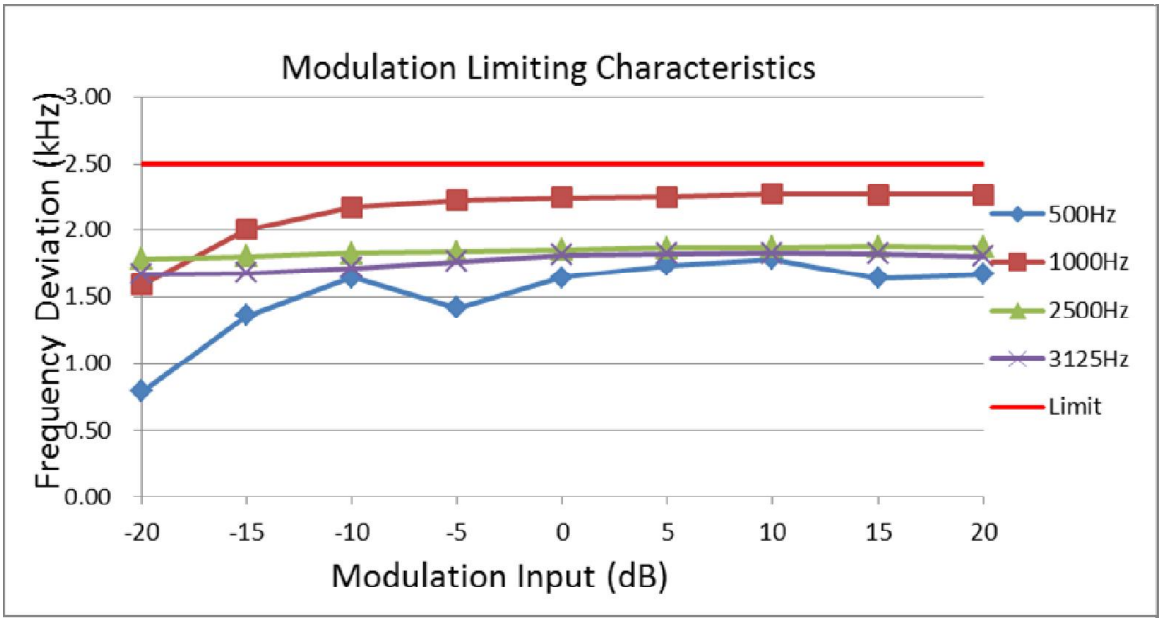
| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Jone Zhang | Relative Humidity | 54% |
| Test Item | Frequency Deviation | Date of Test | 2018/05/02 |

| Channel 08: 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 | 0.80 | 1.59 | 1.78 | 1.66 | 2.50 |
| -15.00 | 1.35 | 2.00 | 1.81 | 1.67 | 2.50 |
| -10.00 | 1.65 | 2.17 | 1.82 | 1.71 | 2.50 |
| -5.00 | 1.41 | 2.23 | 1.83 | 1.77 | 2.50 |
| 0.00 | 1.65 | 2.25 | 1.85 | 1.81 | 2.50 |
| 5.00 | 1.74 | 2.26 | 1.87 | 1.82 | 2.50 |
| 10.00 | 1.78 | 2.27 | 1.88 | 1.83 | 2.50 |
| 15.00 | 1.64 | 2.27 | 1.87 | 1.82 | 2.50 |
| 20.00 | 1.66 | 2.27 | 1.88 | 1.83 | 2.50 |



| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Jone Zhang | Relative Humidity | 54% |
| Test Item | Frequency Deviation | Date of Test | 2018/05/02 |

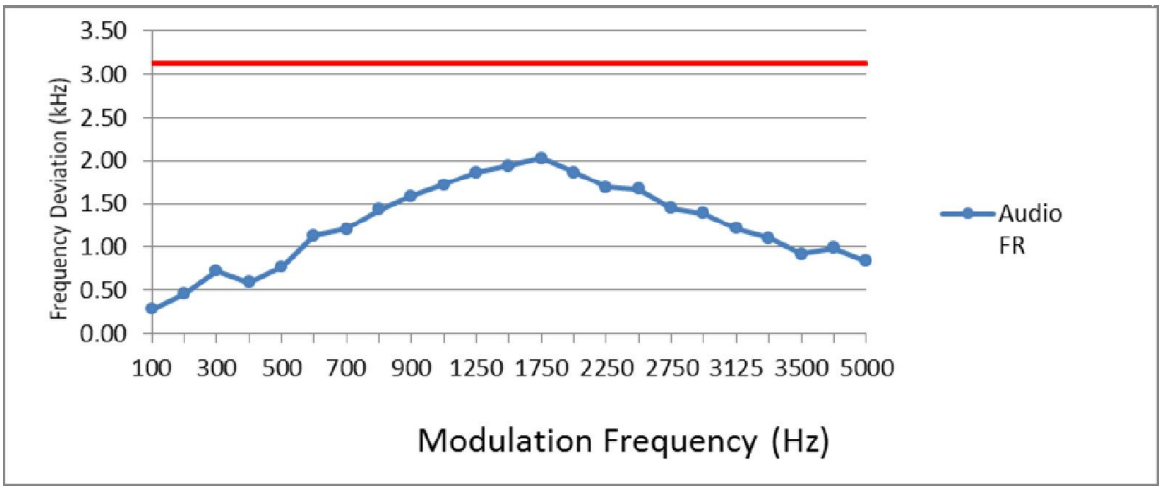
| Channel 22: 462.7250MHz FRS | | | | | |
|---|---|---|---|---|---|
| Modulation Input (dB) | Peak Frequency Deviation (kHz) at 500Hz | Peak Frequency Deviation (kHz) at 1000Hz | Peak Frequency Deviation (kHz) at 2500Hz | Peak Frequency Deviation (kHz) at 3125Hz | Limit (kHz) |
| -20.00 | 0.79 | 1.59 | 1.79 | 1.67 | 2.50 |
| -15.00 | 1.36 | 2.00 | 1.80 | 1.68 | 2.50 |
| -10.00 | 1.65 | 2.18 | 1.83 | 1.72 | 2.50 |
| -5.00 | 1.42 | 2.23 | 1.84 | 1.76 | 2.50 |
| 0.00 | 1.65 | 2.25 | 1.85 | 1.81 | 2.50 |
| 5.00 | 1.73 | 2.25 | 1.87 | 1.82 | 2.50 |
| 10.00 | 1.78 | 2.28 | 1.87 | 1.83 | 2.50 |
| 15.00 | 1.64 | 2.27 | 1.88 | 1.83 | 2.50 |
| 20.00 | 1.67 | 2.27 | 1.87 | 1.81 | 2.50 |



| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Jone Zhang | Relative Humidity | 54% |
| Test Item | Audio Frequency Response | Date of Test | 2018/05/02 |

| Channel 01: 462.5625MHz FRS | | |
|---|---|---|
| Modulation Frequency (Hz) | Peak Modulation Deviation (kHz) | Limit (kHz) |
| 100 | 0.28 | 3.125 |
| 200 | 0.46 | 3.125 |
| 300 | 0.72 | 3.125 |
| 400 | 0.59 | 3.125 |
| 500 | 0.77 | 3.125 |
| 600 | 1.13 | 3.125 |
| 700 | 1.20 | 3.125 |
| 800 | 1.43 | 3.125 |
| 900 | 1.59 | 3.125 |
| 1000 | 1.72 | 3.125 |
| 1250 | 1.87 | 3.125 |
| 1500 | 1.94 | 3.125 |
| 1750 | 2.03 | 3.125 |
| 2000 | 1.87 | 3.125 |
| 2250 | 1.69 | 3.125 |
| 2500 | 1.67 | 3.125 |
| 2750 | 1.45 | 3.125 |
| 3000 | 1.39 | 3.125 |
| 3125 | 1.21 | 3.125 |
| 3250 | 1.10 | 3.125 |
| 3500 | 0.92 | 3.125 |
| 4000 | 0.99 | 3.125 |
| 5000 | 0.84 | 3.125 |

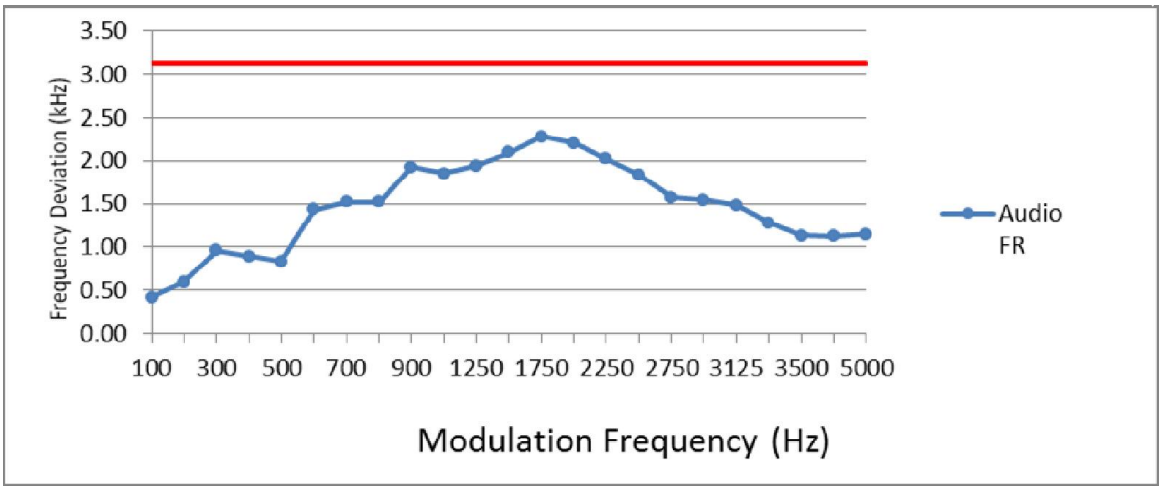
Audio Frequency Response



| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Jone Zhang | Relative Humidity | 54% |
| Test Item | Audio Frequency Response | Date of Test | 2018/05/02 |

| Channel 08: 467.5625MHz FRS | | |
|---|---|---|
| Modulation Frequency (Hz) | Peak Modulation Deviation (kHz) | Limit (kHz) |
| 100 | 0.42 | 3.125 |
| 200 | 0.60 | 3.125 |
| 300 | 0.96 | 3.125 |
| 400 | 0.89 | 3.125 |
| 500 | 0.83 | 3.125 |
| 600 | 1.43 | 3.125 |
| 700 | 1.52 | 3.125 |
| 800 | 1.52 | 3.125 |
| 900 | 1.93 | 3.125 |
| 1000 | 1.85 | 3.125 |
| 1250 | 1.94 | 3.125 |
| 1500 | 2.10 | 3.125 |
| 1750 | 2.28 | 3.125 |
| 2000 | 2.21 | 3.125 |
| 2250 | 2.02 | 3.125 |
| 2500 | 1.84 | 3.125 |
| 2750 | 1.57 | 3.125 |
| 3000 | 1.54 | 3.125 |
| 3125 | 1.48 | 3.125 |
| 3250 | 1.28 | 3.125 |
| 3500 | 1.13 | 3.125 |
| 4000 | 1.12 | 3.125 |
| 5000 | 1.14 | 3.125 |

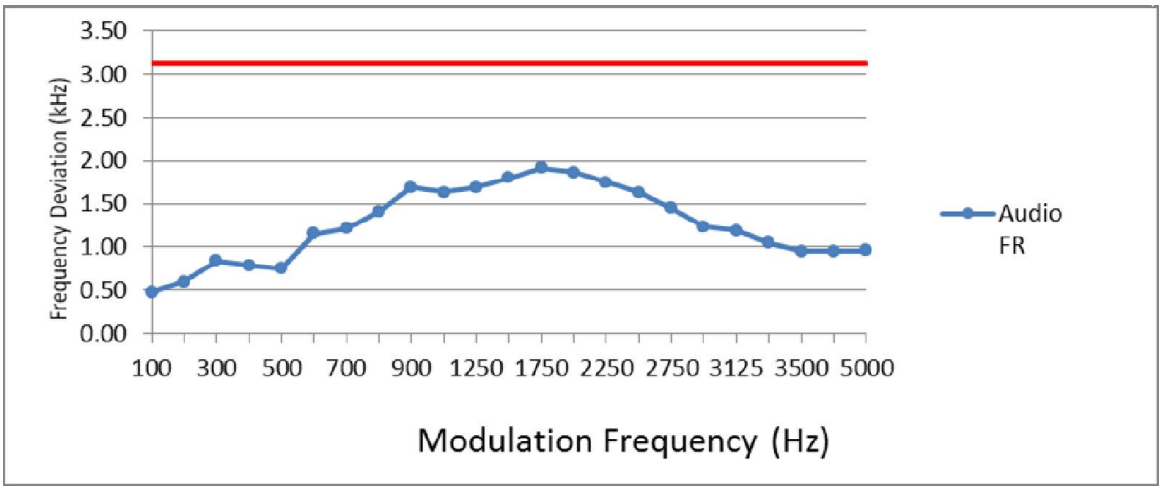
Audio Frequency Response



| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Jone Zhang | Relative Humidity | 54% |
| Test Item | Audio Frequency Response | Date of Test | 2018/05/02 |

| Channel 22: 462.7250MHz FRS | | |
|---|---|---|
| Modulation Frequency (Hz) | Peak Modulation Deviation (kHz) | Limit (kHz) |
| 100 | 0.48 | 3.125 |
| 200 | 0.60 | 3.125 |
| 300 | 0.84 | 3.125 |
| 400 | 0.79 | 3.125 |
| 500 | 0.75 | 3.125 |
| 600 | 1.15 | 3.125 |
| 700 | 1.21 | 3.125 |
| 800 | 1.41 | 3.125 |
| 900 | 1.69 | 3.125 |
| 1000 | 1.63 | 3.125 |
| 1250 | 1.69 | 3.125 |
| 1500 | 1.80 | 3.125 |
| 1750 | 1.92 | 3.125 |
| 2000 | 1.87 | 3.125 |
| 2250 | 1.75 | 3.125 |
| 2500 | 1.63 | 3.125 |
| 2750 | 1.45 | 3.125 |
| 3000 | 1.23 | 3.125 |
| 3125 | 1.19 | 3.125 |
| 3250 | 1.05 | 3.125 |
| 3500 | 0.95 | 3.125 |
| 4000 | 0.95 | 3.125 |
| 5000 | 0.96 | 3.125 |

Audio Frequency Response



## 6.7. Unwanted Emissions Radiated

### 6.7.1. Provisions Applicable

The unwanted emission should be attenuated below TP by at least 43+10 log (Transmit Power) dB.

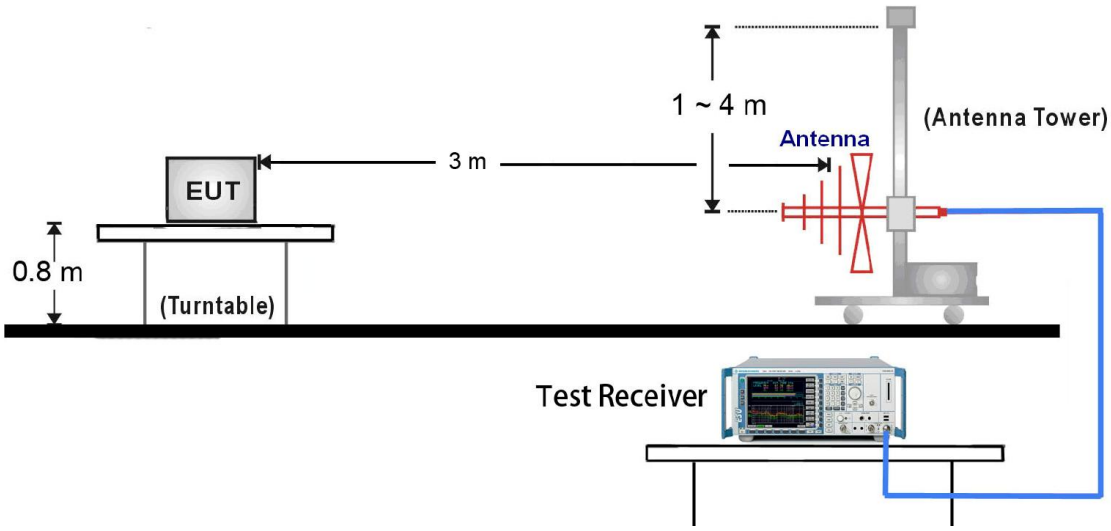
### 6.7.2. Test Procedure

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.

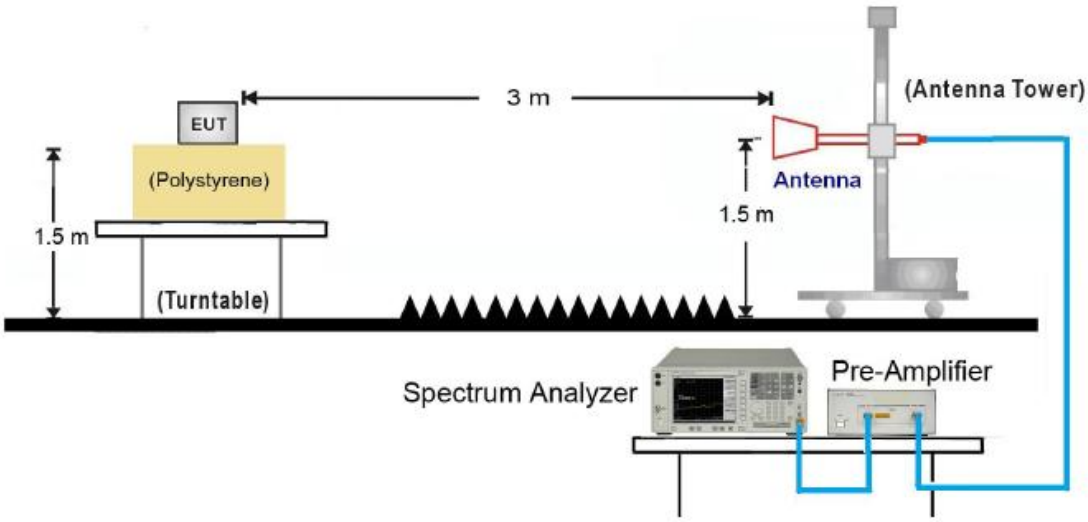
13. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
14. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
15. The 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.

### 6.7.3. Test Setup

30MHz ~ 1GHz Test Setup:



Above 1GHz Test Setup:



### 6.7.4. Test Result

| | | | |
|---|---|---|---|
| Product | Walkie Talkie | Temperature | 26°C |
| Test Engineer | Danny Li | Relative Humidity | 54% |
| Test Site | AC1 | Test Date | 2018/06/12 |
| Test Mode | Channel 01/08/22 | | |

| Frequency (MHz) | Ant. Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Substitute Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| **Channel 01 (462.5625MHz)** | | | | | | | |
| 2309.00 | H | -54.99 | 1.26 | 9.70 | -46.55 | -13.00 | -33.55 |
| 3235.50 | H | -58.57 | 1.49 | 12.35 | -47.71 | -13.00 | -34.71 |
| 2309.00 | V | -54.88 | 1.25 | 9.70 | -46.43 | -13.00 | -33.43 |
| 2776.50 | V | -55.87 | 1.45 | 11.19 | -46.13 | -13.00 | -33.13 |
| **Channel 08 (467.5625MHz)** | | | | | | | |
| 2334.50 | H | -63.72 | 0.99 | 9.84 | -54.87 | -13.00 | -41.87 |
| 2802.00 | H | -59.85 | 1.27 | 11.26 | -49.86 | -13.00 | -36.86 |
| 2334.50 | V | -58.04 | 1.27 | 9.84 | -49.47 | -13.00 | -36.47 |
| 2802.00 | V | -57.26 | 1.40 | 11.26 | -47.40 | -13.00 | -34.40 |
| **Channel 22 (462.7250MHz)** | | | | | | | |
| 2317.50 | H | -55.11 | 1.29 | 9.75 | -46.65 | -13.00 | -33.65 |
| 3235.50 | H | -59.39 | 1.46 | 12.35 | -48.50 | -13.00 | -35.50 |
| 2317.50 | V | -59.96 | 1.00 | 9.75 | -51.21 | -13.00 | -38.21 |
| 2776.50 | V | -60.05 | 1.29 | 11.19 | -50.15 | -13.00 | -37.15 |

Notes:

1. Spurious emissions within 30-1000MHz were found more than 20dB below limit line.
2. ERP (dBm) = SG Reading (dBm) - Cable Loss (dB) + Substitute Antenna Gain (dBd)

# 7. CONCLUSION

The data collected relate only the item(s) tested and show that the device is in compliance with Part 95 of the FCC Rules.

The End