# FCC Part 95 Rules
# Test Report

Report No.: AGC09900170601FE10

| | | |
|---|---|---|
| **FCC ID** | : | 2AGND-MURS-V1 |
| **BRAND NAME** | : | BTECH |
| **MODEL NAME** | : | MURS-V1 |
| **CLIENT** | : | BTECH (BAOFENG TECH) |
| **DATE OF ISSUE** | : | Jul, 08,2017 |
| **STANDARD(S)** | : | FCC Part 95 Rules |
| **REPORT VERSION** | : | V 1.0 |

***A***ttestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

**Report Revise Record**

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Jul, 08,2017 | Valid | Original Report |

## VERIFICATION OF COMPLIANCE

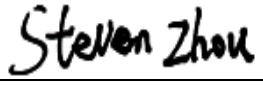
| | |
|---|---|
| **Applicant:** | BTECH (BAOFENG TECH) |
| | 702 N Industrial Ave Arlington South Dakota United States 57212 |
| **Manufacturer:** | BTECH (BAOFENG TECH) |
| | 702 N Industrial Ave Arlington South Dakota United States 57212 |
| **Product Designation:** | MURS TRANSCEIVER |
| **Brand Name:** | BTECH |
| **Test Model** | MURS-V1 |
| **Date of Test:** | Jul.03, 2017 to Jul, 08,2017 |

## WE HEREBY CERTIFY THAT:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA 603. The sample tested as described in this report is in compliance with the FCC Rules Part 95 requirements

The test results of this report relate only to the tested sample identified in this report.

Tested by

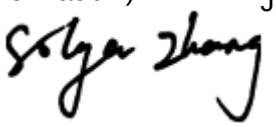


Steven Zhou(Zhou Pengyun) Jul, 08,2017

Reviewed by

Bart Xie(Xie Xiaobin) Jul, 08,2017

Approved by



Solger Zhang(Zhang Hongyi) Jul, 08,2017
Authorized Officer

**TABLE OF CONTENTS**

# 1. GENERAL INFORMATION

## 1.1 PRODUCT DESCRIPTION

The EUT is a **ANALOG RADIO** designed for voice communication. It is designed by way of utilizing the FM modulation achieves the system operating.

A major technical description of EUT is described as following:

| | |
|---|---|
| Hardware Version | USM2402 |
| Software Version | V15.12.30 |
| Modulation | FM |
| Channel Separation | 12.5KHz, 25KHz |
| Emission Type | 15K79F3E |
| Emission Bandwidth | 6.750 KHz(0.5W-12.5KHz),11.828 KHz(0.5W-25KHz)<br>6.748 KHz(2W-12.5KHz),11.831 KHz(2W-25KHz) |
| Maximum Transmitter Power | 26.91 dBm (0.5W-12.5KHz),26.72 dBm (0.5W-25KHz)<br>32.58 dBm (2W-12.5KHz),32.56 dBm (2W-25KHz) |
| Output power Modification | 2W/0.5W<br>(It was fixed by the manufacturer, any individual can’t arbitrarily change it.) |
| Antenna Designation | Detachable |
| Power Supply | 7.4V 1800mAh |
| Limiting Voltage | DC 6.29V-8.51V |
| Operation Frequency Range and Channel | Frequency Range:<br>151.820MHz, 151.880MHz, 151.940MHz, 154.570MHz, 154.600MHz |
| | Bottom Channel: 151.820MHz<br>Middle Channel: 151.940MHz<br>Top Channel: 154.600MHz |
| Frequency Tolerance | 1.323ppm |

### 1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: 2AGND-MURS-V1, filing to comply with the FCC Part 95 requirements.

### 1.3 TEST METHODOLOGY.

The radiated emission testing was performed according to the procedures of TIA/EIA 603.

### 1.4 TEST FACILITY

| | |
|---|---|
| **Site** | Dongguan Precise Testing Service Co., Ltd. |
| **Location** | Building D, Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China. |
| **Description** | The test site is constructed and calibrated to meet the FCC requirements in documents TIA/EIA 603 |
| **FCC Registration No.** | 371540 |

### 1.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

### 1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

# 2. SYSTEM TEST CONFIGURATION

## 2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

## 2.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

## 2.3 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System


Table 2-1 Equipment Used in Tested System

| Item | Equipment | Model No. | Identifier | Note |
|---|---|---|---|---|
| 1 | MURS TRANSCEIVER | MURS-V1 | FCC ID: 2AGND-MURS-V1 | EUT |

# 3. SUMMARY OF TEST RESULTS

| FCC Rules | Description Of Test | Result |
|---|---|---|
| § 15.109 | Receiver Radiated Spurious Emission | Compliant |
| § 15.109 | Receiver Conducted Spurious Emission | Compliant |
| § 95.639 | Maximum Transmitter Power | Compliant |
| § 95.632 | Occupied Bandwidth | Compliant |
| § 95.632 | Emission Mask | Compliant |
| § 95.632 | Frequency Stability | Compliant |
| § 95.635 | Transmitter Radiated Spurious Emission | Compliant |
| § 95.635 | Spurious Emission On Antenna Port | Compliant |

**LIST OF EQUIPMENTS USED**

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NO. | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| CLIMATE CHAMBER | EXPERY | TN-400 | TN2007SR038 | 2017.06.20 | 2018.06.19 |
| ATTENUATOR | WEINSCHEL CORP | 58-30-33 | ML030 | 2017.06.20 | 2018.06.19 |
| DC POWER SUPPLY | ZHAOXIN | RXN-605D | N/A | 2017.06.20 | 2018.06.19 |
| MODULATION ANALYZER | HP | 8920B | 3104A03367 | 2017.06.20 | 2018.06.19 |
| SIGNAL GENERATOR | AGILENT | E4421B | 122501288 | 2017.07.02 | 2018.07.01 |
| SIGNAL GENERATOR | R&S | SMT03 | A0304261 | 2017.07.02 | 2018.07.01 |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101417 | 2017.07.02 | 2018.07.01 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9160 | 9160-3355 | 2017.07.02 | 2018.07.01 |
| Substitution Antenna | SCHWARZBECK | VULB9160 | 9168-494 | 2017.07.02 | 2018.07.01 |
| Signal Amplifier | SCHWARZBECK | BBV 9475 | 9745-0013 | 2017.07.02 | 2018.07.01 |
| RF Cable | SCHWARZBECK | AK9515E | 96221 | 2017.07.02 | 2018.07.01 |
| 3m Anechoic Chamber | CHENGYU | 966 | PTS-001 | 2017.06.02 | 2018.06.01 |
| MULTI-DEVICE Positioning Controller | Max-Full | MF-7802 | MF780208339 | N/A | N/A |
| Active loop antenna (9K-30MHz) | Schwarzbeck | FMZB1519 | 1519-038 | 2017.06.02 | 2018.06.01 |
| Spectrum analyzer | Agilent | E4407B | MY46185649 | 2017.06.02 | 2018.06.01 |
| Double-Ridged Waveguide Horn | ETS LINDGREN | 3117 | 00034609 | 2017.06.02 | 2018.06.01 |
| Substitution ANTENNA | EM | EM-AH-10180 | 67 | 2017.06.02 | 2018.06.01 |
| Modulation Domain Analyzer | HP | 53310A | 3121A02467 | 2017.06.02 | 2018.06.01 |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101417 | 2017.06.02 | 2018.06.01 |
| RF Cable | SCHWARZBECK | AK9515E | 96222 | 2017.06.02 | 2018.06.01 |
| Shielded Room | CHENGYU | 843 | PTS-002 | 2017.06.02 | 2018.06.01 |

Note: 8920B can generate audio modulation frequency.

## 4. DESCRIPTION OF TEST MODES

### RF TEST MODES

The EUT (MURS TRANSCEIVER ) has been tested under normal operating condition. (The top channel, the middle channel and the bottom channel) are chosen for testing at each channel separation.

| No. | FREQUENCY | CHANNEL SEPARATION |
|---|---|---|
| 1 | 151.820MHz | 12.5 KHz |
| 2 | 151.880MHz | 12.5 KHz |
| 3 | 151.940MHz, | 12.5 KHz |
| 4 | 154.570MHz | 25 KHz |
| 5 | 154.600MHz | 25 KHz |

**Note:** Only the result of the worst case was recorded in the report.

# 5. FREQUENCY TOLERANCE

## 5.1 PROVISIONS APPLICABLE

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30℃ to +50℃ centigrade.

b). According to FCC Part 2 Section 2.1055(d)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacturer.

c). According to §95.632, MURS transmitters must maintain a frequency stability of 5.0 ppm, or 2.0 ppm if designed to operate with a 6.25 kHz bandwidth.

## 5.2 MEASUREMENT PROCEDURE

### 5.2.1 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 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 50℃. 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℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

### 5.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 7.4V.
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.

**5.3 TEST SETUP BLOCK DIAGRAM**

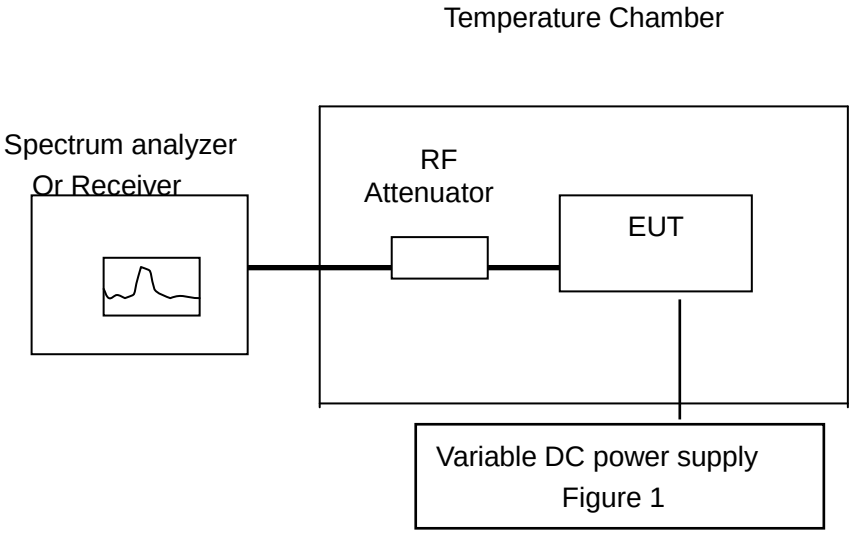



Figure 1

## 5.4 TEST RESULT

**2W：**

(1) Frequency stability versus input voltage (Supply nominal voltage is 7.40V)

| Environment | Power | Reference Frequency | | | Limit: |
|---|---|---|---|---|---|
| Temperature(℃) | (V) | 151.820MHz | 151.940MHz | 154.600MHz | ppm |
| 50 | DC 7.40 | 0.831 | 0.575 | 0.687 | 5 |
| 40 | DC 7.40 | 0.606 | 0.506 | 0.982 | |
| 30 | DC 7.40 | 0.865 | 0.543 | 0.477 | |
| 20 | DC 7.40 | 0.358 | 0.732 | 0.648 | |
| 10 | DC 7.40 | 0.831 | 0.630 | 0.418 | |
| 0 | DC 7.40 | 0.631 | 0.697 | 0.890 | |
| -10 | DC 7.40 | 0.855 | 0.874 | 0.765 | |
| -20 | DC 7.40 | 0.626 | 0.729 | 0.608 | |
| -30 | DC 7.40 | 0.480 | 0.520 | 0.543 | |
| Result | Pass | | | | |

(2) Frequency stability versus input voltage (Battery limiting voltage is 6.29V)

| Environment | Power | Reference Frequency | | | Limit: |
|---|---|---|---|---|---|
| Temperature(℃) | (V) | 151.820MHz | 151.940MHz | 154.600MHz | ppm |
| 50 | DC 6.29 | 0.938 | 0.817 | 0.730 | 5 |
| 40 | DC 6.29 | 0.500 | 0.593 | 0.855 | |
| 30 | DC 6.29 | 0.543 | 0.637 | 0.532 | |
| 20 | DC 6.29 | 0.887 | 0.981 | 0.750 | |
| 10 | DC 6.29 | 0.626 | 0.634 | 0.735 | |
| 0 | DC 6.29 | 0.925 | 0.835 | 0.184 | |
| -10 | DC 6.29 | 0.541 | 1.323 | 0.783 | |
| -20 | DC 6.29 | 0.861 | 0.532 | 0.675 | |
| -30 | DC 6.29 | 0.657 | 0.622 | 0.732 | |
| Result | Pass | | | | |

(3) Frequency stability versus input voltage (Battery Fully Charged voltage is 8.51V)

| Environment | Power | Reference Frequency | | | Limit: |
|---|---|---|---|---|---|
| Temperature(℃) | (V) | 151.820MHz | 151.940MHz | 154.600MHz | ppm |
| 50 | DC 8.51 | 0.551 | 0.761 | 0.924 | 5 |
| 40 | DC 8.51 | 0.737 | 0.966 | 0.846 | |
| 30 | DC 8.51 | 0.671 | 0.540 | 0.876 | |
| 20 | DC 8.51 | 0.711 | 0.647 | 0.494 | |
| 10 | DC 8.51 | 0.594 | 0.489 | 0.644 | |
| 0 | DC 8.51 | 0.527 | 0.536 | 0.537 | |
| -10 | DC 8.51 | 0.887 | 0.651 | 0.941 | |
| -20 | DC 8.51 | 0.915 | 0.964 | 0.409 | |
| -30 | DC 8.51 | 0.748 | 0.603 | 0.619 | |
| Result | Pass | | | | |

**0.5W：**

(1) Frequency stability versus input voltage (Supply nominal voltage is 7.40V)

| Environment | Power | Reference Frequency | | | Limit: |
|---|---|---|---|---|---|
| Temperature(℃) | (V) | 151.820MHz | 151.940MHz | 154.600MHz | ppm |
| 50 | DC 7.40 | 0.546 | 0.744 | 0.844 | 5 |
| 40 | DC 7.40 | 0.844 | 0.840 | 0.574 | |
| 30 | DC 7.40 | 0.535 | 0.598 | 0.663 | |
| 20 | DC 7.40 | 0.490 | 0.610 | 0.595 | |
| 10 | DC 7.40 | 0.854 | 0.603 | 0.678 | |
| 0 | DC 7.40 | 0.852 | 0.754 | 0.721 | |
| -10 | DC 7.40 | 0.646 | 0.891 | 0.525 | |
| -20 | DC 7.40 | 0.666 | 0.584 | 0.879 | |
| -30 | DC 7.40 | 0.891 | 0.796 | 0.667 | |
| Result | Pass | | | | |

(2) Frequency stability versus input voltage (Battery limiting voltage is 6.29V)

| Environment | Power | Reference Frequency | | | Limit: |
|---|---|---|---|---|---|
| Temperature(℃) | (V) | 151.820MHz | 151.940MHz | 154.600MHz | ppm |
| 50 | DC 6.29 | 0.920 | 0.651 | 0.500 | 5 |
| 40 | DC 6.29 | 0.658 | 0.854 | 0.472 | |
| 30 | DC 6.29 | 0.658 | 0.733 | 0.886 | |
| 20 | DC 6.29 | 0.840 | 0.549 | 0.791 | |
| 10 | DC 6.29 | 0.623 | 0.688 | 0.882 | |
| 0 | DC 6.29 | 0.925 | 0.548 | 0.351 | |
| -10 | DC 6.29 | 0.988 | 0.806 | 0.654 | |
| -20 | DC 6.29 | 0.811 | 0.604 | 0.722 | |
| -30 | DC 6.29 | 0.803 | 0.429 | 0.603 | |
| Result | Pass | | | | |

(3) Frequency stability versus input voltage (Battery Fully Charged voltage is 8.51V)

| Environment | Power | Reference Frequency | | | Limit: |
|---|---|---|---|---|---|
| Temperature(℃) | (V) | 151.820MHz | 151.940MHz | 154.600MHz | ppm |
| 50 | DC 8.51 | 0.510 | 0.504 | 0.727 | 5 |
| 40 | DC 8.51 | 0.862 | 0.763 | 0.885 | |
| 30 | DC 8.51 | 0.607 | 0.909 | 0.673 | |
| 20 | DC 8.51 | 0.818 | 0.970 | 0.648 | |
| 10 | DC 8.51 | 0.979 | 0.789 | 0.661 | |
| 0 | DC 8.51 | 0.923 | 0.499 | 0.808 | |
| -10 | DC 8.51 | 0.852 | 0.970 | 0.952 | |
| -20 | DC 8.51 | 0.427 | 0.907 | 0.529 | |
| -30 | DC 8.51 | 0.522 | 0.863 | 0.844 | |
| Result | Pass | | | | |

# 6. EMISSION BANDWIDTH

## 6.1 PROVISIONS APPLICABLE

Occupied Bandwidth: The EUT was connected to the audio signal generator and the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer.

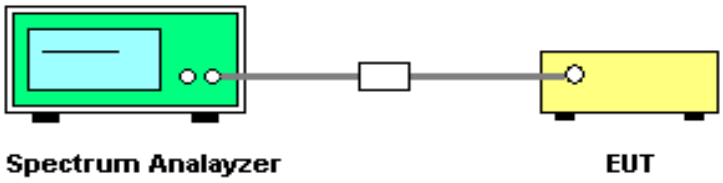
## 6.2 MEASUREMENT PROCEDURE

1). 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).

2). Set SPA Center Frequency = fundamental frequency, RBW=100Hz.VBW= 300 Hz, Span =50 KHz.

3). Set SPA Max hold. Mark peak, -26 dB.

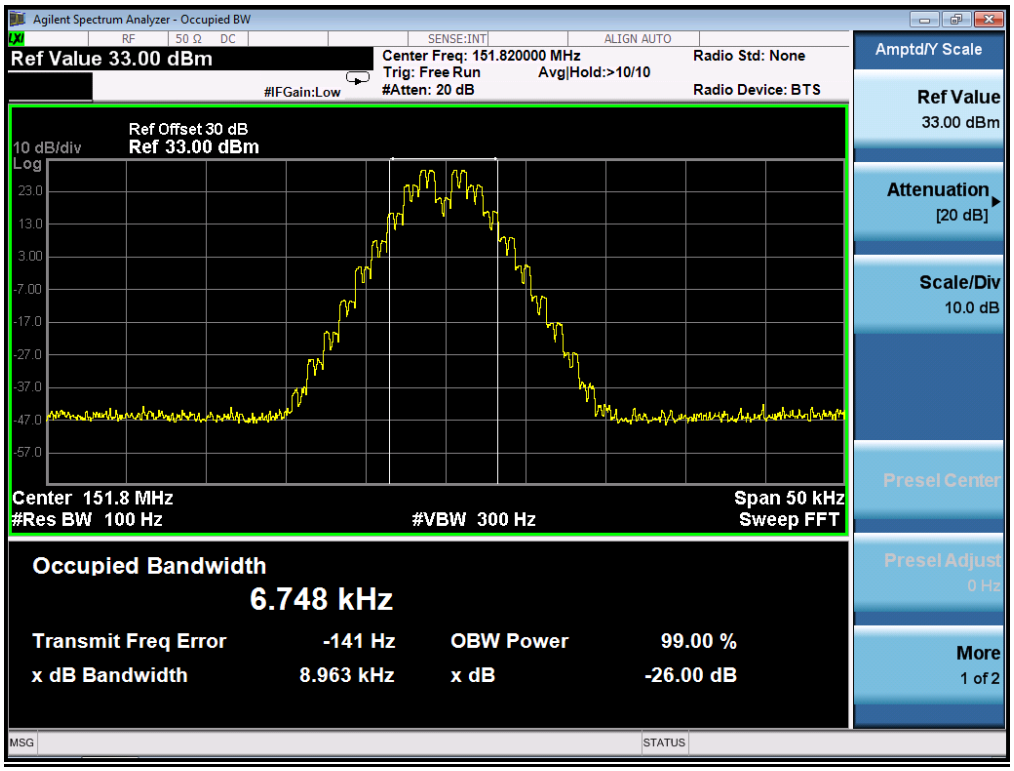
## 6.3 TEST SETUP BLOCK DIAGRAM



## 6.4 MEASUREMENT RESULT

| 99% Bandwidth Measurement Result | | | |
|---|---|---|---|
| Operating Frequency | 12.5 KHz Channel Separation-**2W** | | |
| | Test Data | Limits | Result |
| 151.820MHz | 6.748KHz | 11.25 KHz | Pass |
| 151.940MHz | 6.739KHz | 11.25 KHz | Pass |

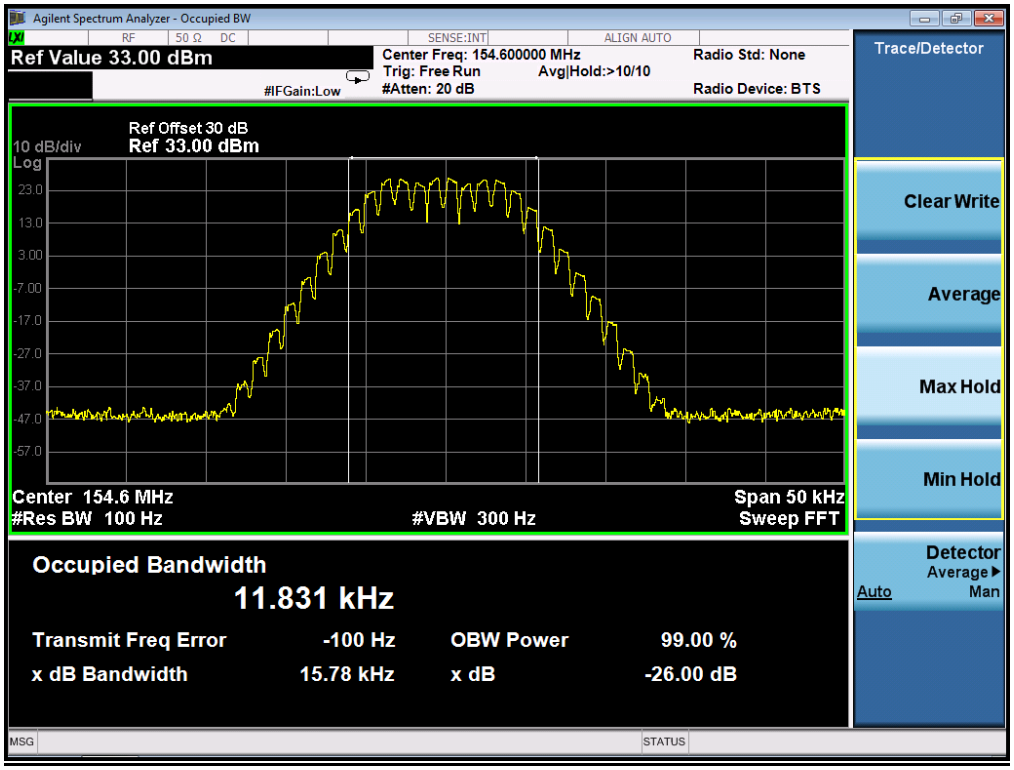
**Occupied bandwidth of Bottom Channel (Maximum)**




***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

| 99% Bandwidth Measurement Result | | | |
|---|---|---|---|
| Operating Frequency | 25 KHz Channel Separation-**2W** | | |
| | Test Data | Limits | Result |
| 154.600MHz | 11.831KHz | 20 KHz | Pass |

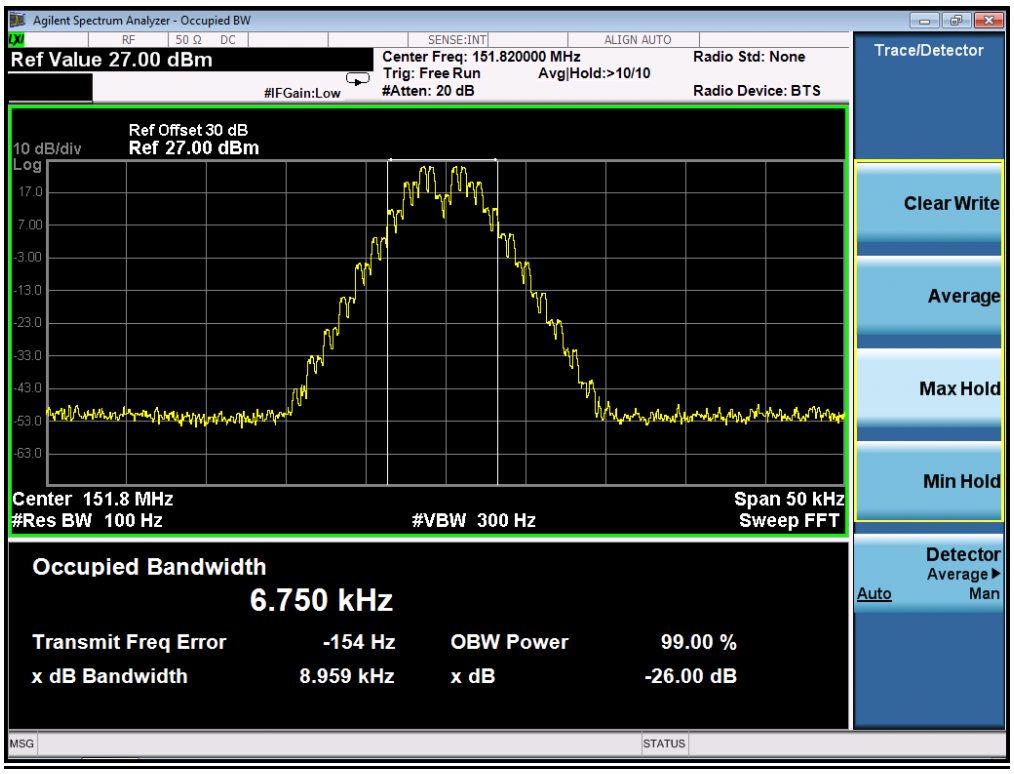
**Occupied bandwidth of Top Channel (Maximum)**




***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

| 99% Bandwidth Measurement Result | | | |
|---|---|---|---|
| Operating Frequency | 12.5 KHz Channel Separation-**0.5W** | | |
| | Test Data | Limits | Result |
| 151.820MHz | 6.750KHz | 11.25 KHz | Pass |
| 151.940MHz | 6.742KHz | 11.25 KHz | Pass |

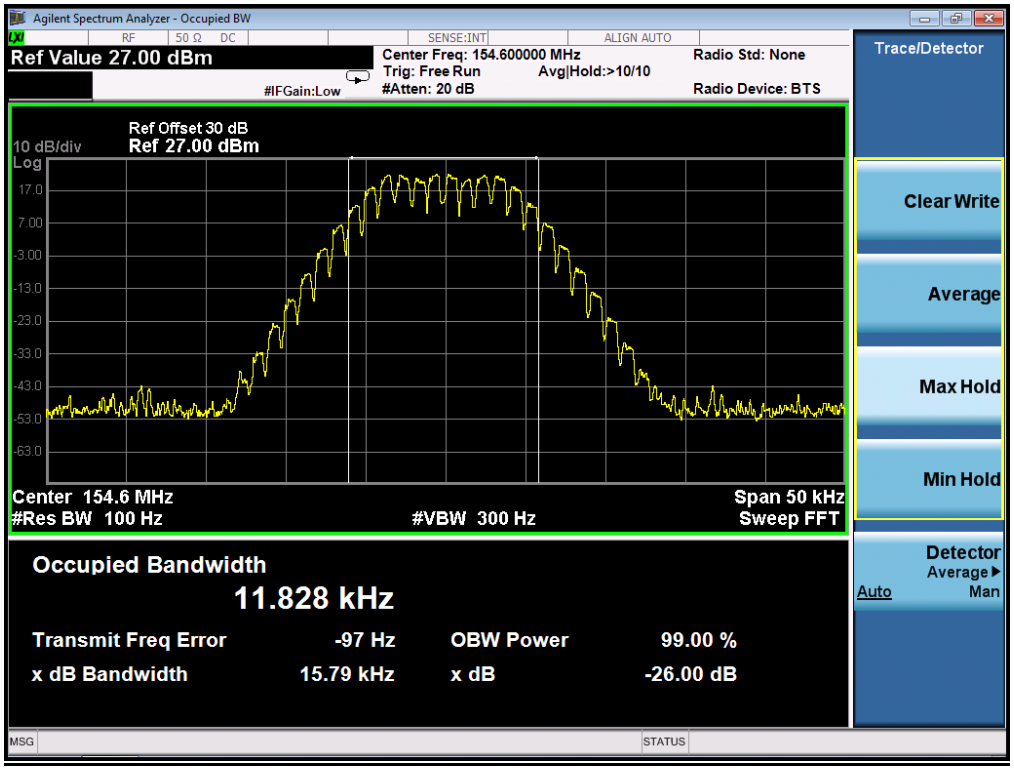
**Occupied bandwidth of Bottom Channel (Maximum)**




***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

| 99% Bandwidth Measurement Result | | | |
|---|---|---|---|
| Operating Frequency | 25 KHz Channel Separation-**0.5W** | | |
| | Test Data | Limits | Result |
| 154.600MHz | 11.828KHz | 20 KHz | Pass |

**Occupied bandwidth of Top Channel (Maximum)**




***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

# 7. UNWANTED RADIATION

## 7.1 PROVISIONS APPLICABLE

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1).On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB.

(2).On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz) fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27(fd-2.88 KHz) dB

(3).On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz)fo of more than 12.5 KHz: At least 50+10 log(P) dB or 70 dB, whichever is lesser attenuation.

## 7.2 MEASUREMENT 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.

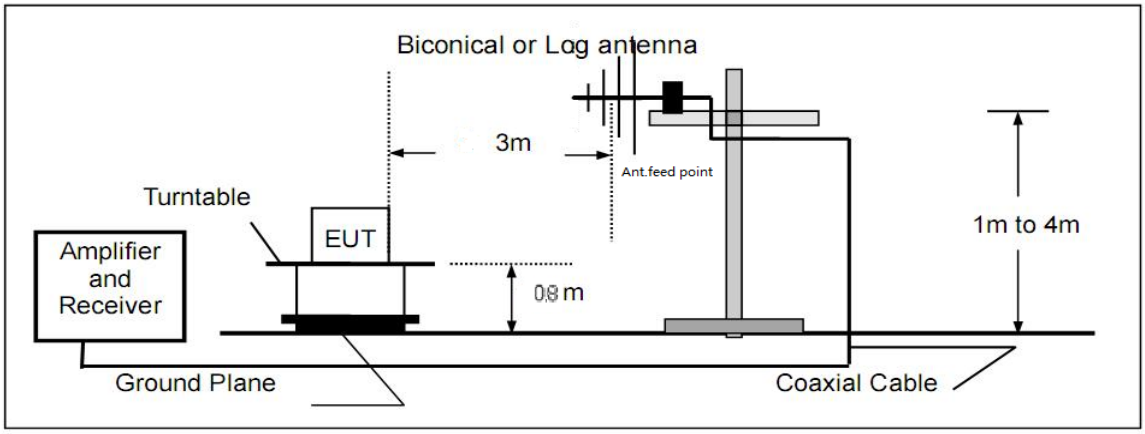
(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

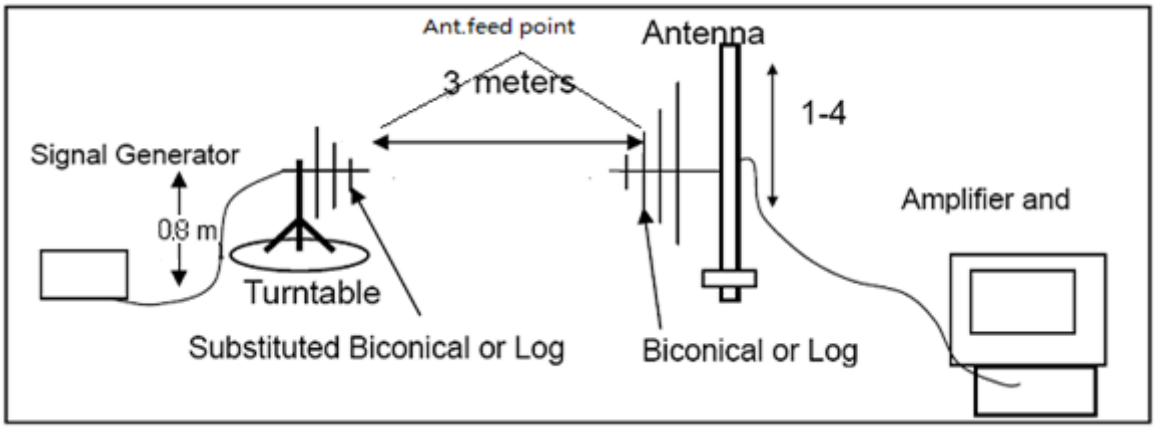
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

## 7.3 TEST SETUP BLOCK DIAGRAM

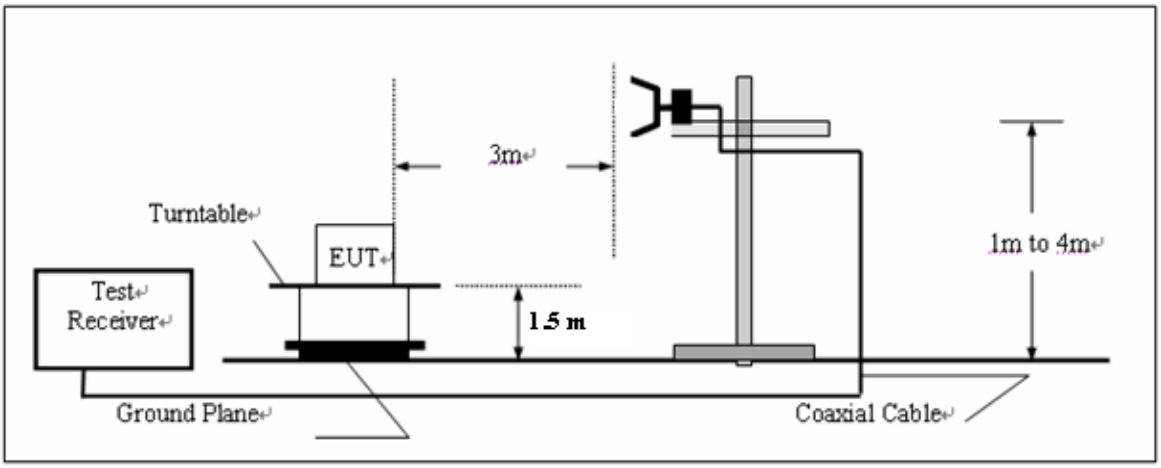
### SUBSTITUTION METHOD: (Radiated Emissions)

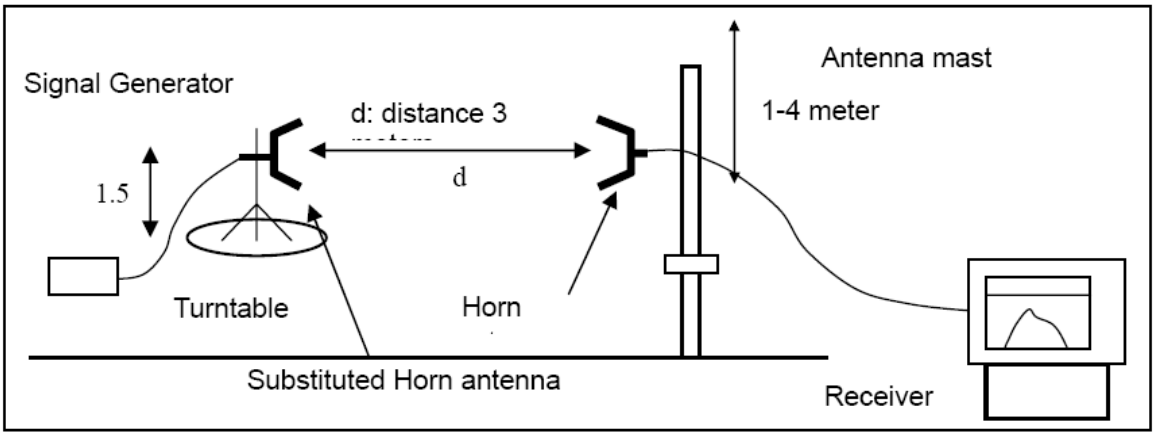
**Radiated Below1GHz**




**Radiated Above 1 GHz**




**7.4 MEASUREMENT RESULTS:**

**Measurement Result for 12.5 KHz Channel Separation**

On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz)for of more than 12.5 KHz: at least 50+10 log(P) dB or 70 dB, whichever is lesser attenuation.

**Limit: At least 50+10 log (P) =50+10log (0.5) =47 (dBc)**
**At least 50+10 log (P) =50+10log (2) =53 (dBc)**

Measurement Result for 12.5/25 KHz Channel Separation-2W/0.5W

Limit is at least 60dB below the mean power of the fundamental. For a transmitter having a mean power of 25W or less, the mean power of any spurious emissions supplied to the antenna transmission line must not exceed 25uW and must be at least 40dB below the mean power of the fundamental emission.

**TEST RESULTS**

**0.5W:**

**Measurement Result for 12.5 KHz Channel Separation @ 151.820MHz-0.5W**

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.820 | H | 0 | | pass |
| 303.640 | H | 76.6 | 47 | pass |
| 455.460 | H | 75.4 | 47 | pass |
| 607.280 | H | 75.5 | 47 | pass |
| 759.100 | H | 75.9 | 47 | pass |
| 910.920 | H | 75.8 | 47 | pass |
| 1062.740 | H | 76.3 | 47 | pass |
| 1214.560 | H | 77.4 | 47 | pass |
| 1366.380 | H | 78.6 | 47 | pass |
| 1518.200 | H | 78.9 | 47 | pass |

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.820 | V | 0 | | pass |
| 303.640 | V | 75.2 | 47 | pass |
| 455.460 | V | 75.8 | 47 | pass |
| 607.280 | V | 76.6 | 47 | pass |
| 759.100 | V | 77.4 | 47 | pass |
| 910.920 | V | 78.3 | 47 | pass |
| 1062.740 | V | 77.5 | 47 | pass |
| 1214.560 | V | 78.6 | 47 | pass |
| 1366.380 | V | 78.9 | 47 | pass |
| 1518.200 | V | 78.5 | 47 | pass |

**Measurement Result for 12.5 KHz Channel Separation @ 151.940MHz-0.5W**

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.940 | H | 0 | | pass |
| 303.880 | H | 75.3 | 47 | pass |
| 455.820 | H | 76.9 | 47 | pass |
| 607.760 | H | 75.3 | 47 | pass |
| 759.700 | H | 75.5 | 47 | pass |
| 911.640 | H | 76.6 | 47 | pass |
| 1063.580 | H | 76.8 | 47 | pass |
| 1215.520 | H | 77.5 | 47 | pass |
| 1367.460 | H | 78.7 | 47 | pass |
| 1519.400 | H | 79.3 | 47 | pass |

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.940 | V | 0 | | pass |
| 303.880 | V | 75.3 | 47 | pass |
| 455.820 | V | 75.6 | 47 | pass |
| 607.760 | V | 75.2 | 47 | pass |
| 759.700 | V | 76.6 | 47 | pass |
| 911.640 | V | 76.1 | 47 | pass |
| 1063.580 | V | 77.5 | 47 | pass |
| 1215.520 | V | 78.3 | 47 | pass |
| 1367.460 | V | 78.5 | 47 | pass |
| 1519.400 | V | 78.8 | 47 | pass |

**Measurement Result for 25 KHz Channel Separation @ 154.600MHz-0.5W**

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 154.560 | H | 0 | | pass |
| 309.120 | H | 75.5 | 47 | pass |
| 463.680 | H | 75.4 | 47 | pass |
| 618.240 | H | 76.6 | 47 | pass |
| 772.800 | H | 75.8 | 47 | pass |
| 927.360 | H | 76.5 | 47 | pass |
| 1081.920 | H | 76.2 | 47 | pass |
| 1236.480 | H | 77.4 | 47 | pass |
| 1391.040 | H | 78.2 | 47 | pass |
| 1545.600 | H | 77.6 | 47 | pass |

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 154.560 | V | 0 | | pass |
| 309.120 | V | 75.1 | 47 | pass |
| 463.680 | V | 75.8 | 47 | pass |
| 618.240 | V | 75.3 | 47 | pass |
| 772.800 | V | 76.7 | 47 | pass |
| 927.360 | V | 76.2 | 47 | pass |
| 1081.920 | V | 77.5 | 47 | pass |
| 1236.480 | V | 78.8 | 47 | pass |
| 1391.040 | V | 78.3 | 47 | pass |
| 1545.600 | V | 78.5 | 47 | pass |

**2W:**

**Measurement Result for 12.5 KHz Channel Separation @ 151.820MHz-2W**

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.820 | H | 0 | | pass |
| 303.640 | H | 74.1 | 53 | pass |
| 455.460 | H | 74.8 | 53 | pass |
| 607.280 | H | 74.2 | 53 | pass |
| 759.100 | H | 75.3 | 53 | pass |
| 910.920 | H | 75.5 | 53 | pass |
| 1062.740 | H | 76.4 | 53 | pass |
| 1214.560 | H | 76.2 | 53 | pass |
| 1366.380 | H | 77.7 | 53 | pass |
| 1518.200 | H | 77.3 | 53 | pass |

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.820 | V | 0 | | pass |
| 303.640 | V | 73.9 | 53 | pass |
| 455.460 | V | 74.1 | 53 | pass |
| 607.280 | V | 74.3 | 53 | pass |
| 759.100 | V | 75.1 | 53 | pass |
| 910.920 | V | 74.9 | 53 | pass |
| 1062.740 | V | 75.3 | 53 | pass |
| 1214.560 | V | 75.6 | 53 | pass |
| 1366.380 | V | 76.2 | 53 | pass |
| 1518.200 | V | 76.3 | 53 | pass |

**Measurement Result for 12.5 KHz Channel Separation @ 151.940MHz-2W**

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.940 | H | 0 | | pass |
| 303.880 | H | 74.0 | 53 | pass |
| 455.820 | H | 74.8 | 53 | pass |
| 607.760 | H | 75.3 | 53 | pass |
| 759.700 | H | 75.5 | 53 | pass |
| 911.640 | H | 76.7 | 53 | pass |
| 1063.580 | H | 77.2 | 53 | pass |
| 1215.520 | H | 76.6 | 53 | pass |
| 1367.460 | H | 76.5 | 53 | pass |
| 1519.400 | H | 76.8 | 53 | pass |

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 151.940 | V | 0 | | pass |
| 303.880 | V | 74.9 | 53 | pass |
| 455.820 | V | 75.1 | 53 | pass |
| 607.760 | V | 74.7 | 53 | pass |
| 759.700 | V | 75.3 | 53 | pass |
| 911.640 | V | 75.5 | 53 | pass |
| 1063.580 | V | 76.2 | 53 | pass |
| 1215.520 | V | 76.4 | 53 | pass |
| 1367.460 | V | 76.7 | 53 | pass |
| 1519.400 | V | 77.5 | 53 | pass |

**Measurement Result for 25 KHz Channel Separation @ 154.600MHz-2W**

| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 154.560 | H | 0 | | pass |
| 309.120 | H | 74.1 | 53 | pass |
| 463.680 | H | 74.7 | 53 | pass |
| 618.240 | H | 75.5 | 53 | pass |
| 772.800 | H | 75.3 | 53 | pass |
| 927.360 | H | 76.5 | 53 | pass |
| 1081.920 | H | 76.8 | 53 | pass |
| 1236.480 | H | 77.2 | 53 | pass |
| 1391.040 | H | 76.1 | 53 | pass |
| 1545.600 | H | 77.8 | 53 | pass |

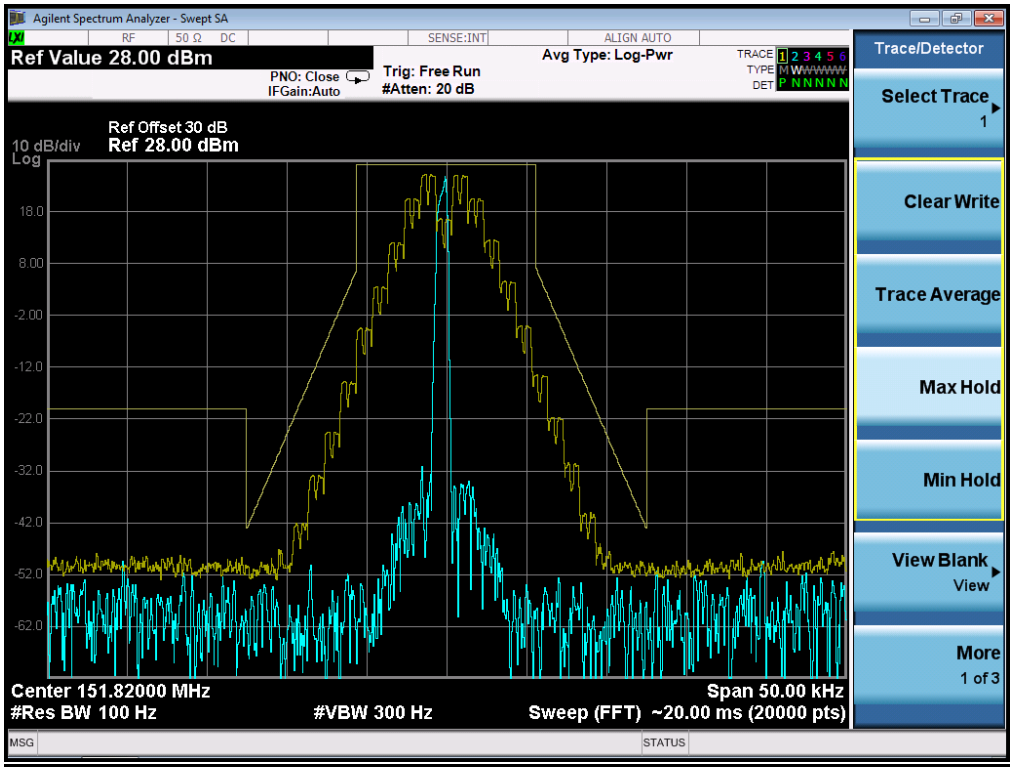
| Emission Frequency (MHz) | Ant. Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit below carrier(dBc) | Result(P/F) |
|---|---|---|---|---|
| 154.560 | V | 0 | | pass |
| 309.120 | V | 73.5 | 53 | pass |
| 463.680 | V | 74.6 | 53 | pass |
| 618.240 | V | 75.2 | 53 | pass |
| 772.800 | V | 76.8 | 53 | pass |
| 927.360 | V | 76.6 | 53 | pass |
| 1081.920 | V | 76.4 | 53 | pass |
| 1236.480 | V | 76.6 | 53 | pass |
| 1391.040 | V | 77.8 | 53 | pass |
| 1545.600 | V | 77.4 | 53 | pass |

## 7.5 EMISSION MASK PLOT

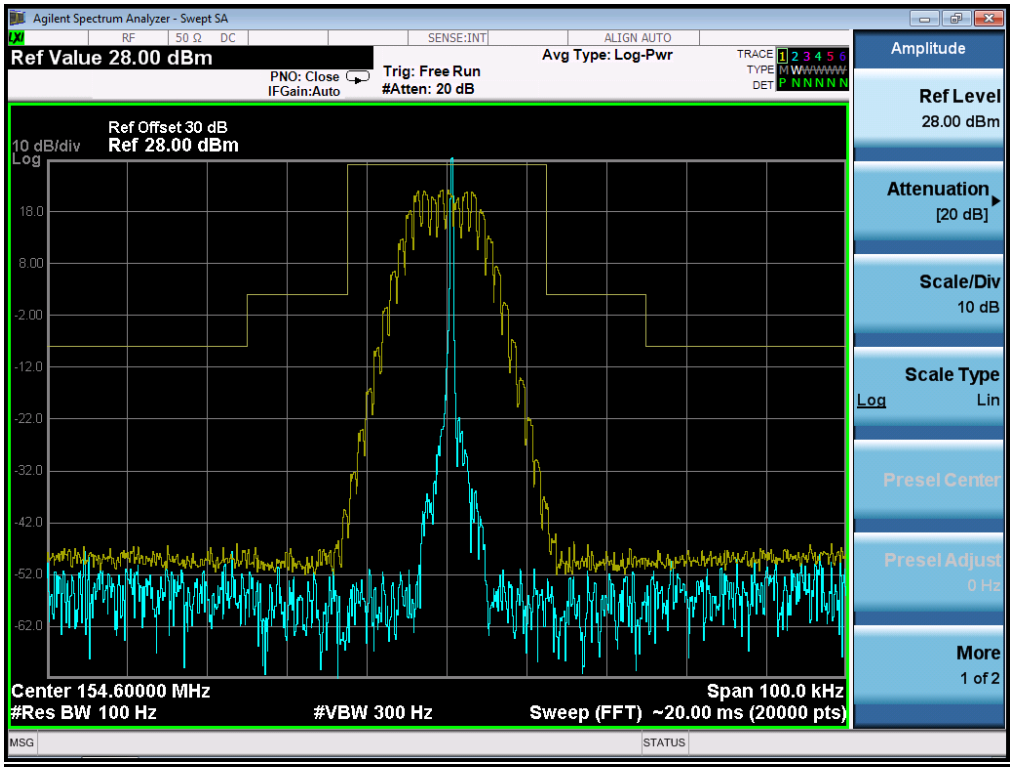
The detailed procedure employed for Emission Mask measurements are specified as following:

- The transmitter shall be modulated by a 2.5 kHz 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.

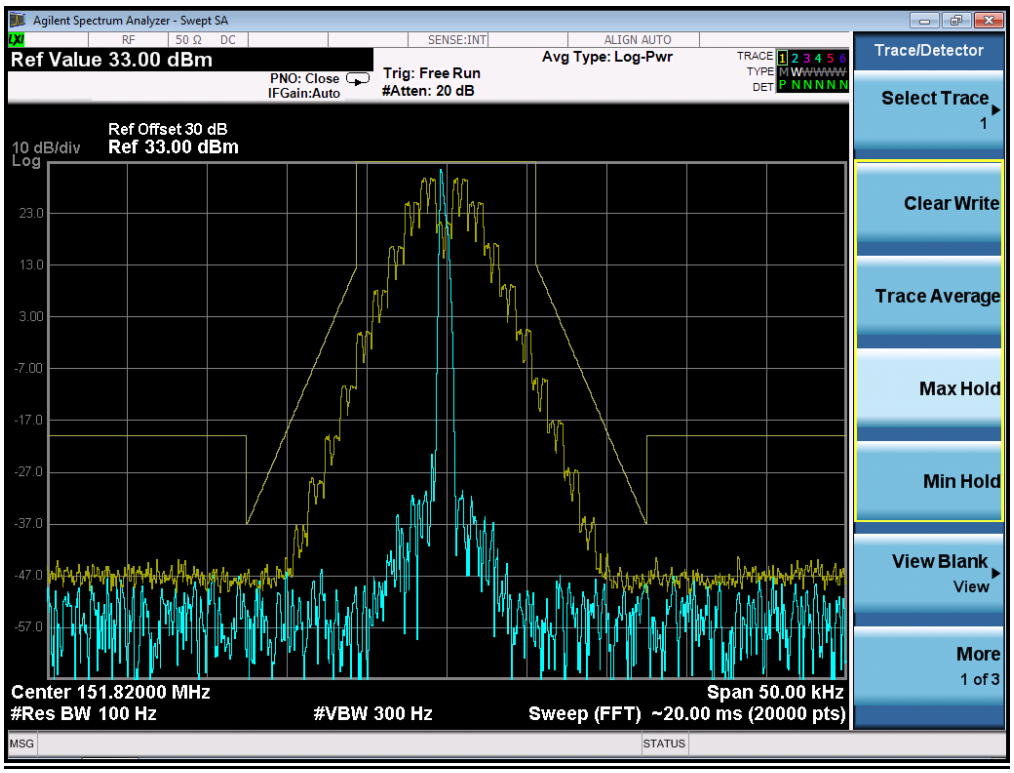
**The Worst Emission Mask for 12.5 KHz bottom channel Separation –0.5W**



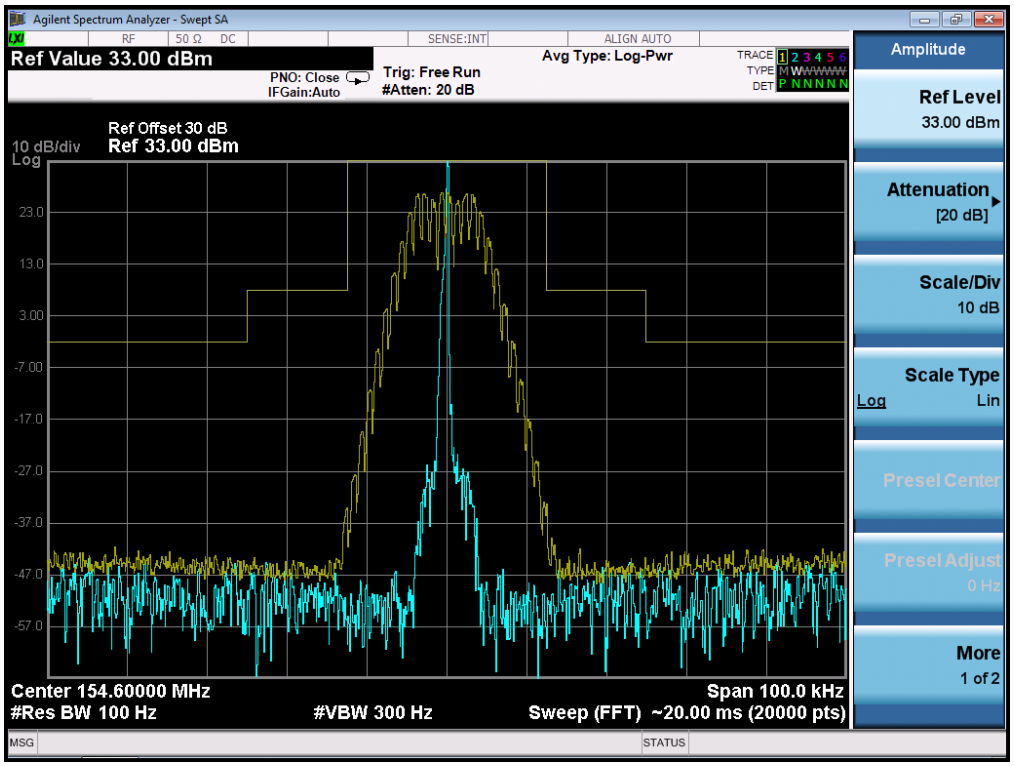
## The Worst Emission Mask for 25 KHz top channel Separation-0.5W




## The Worst Emission Mask for 12.5 KHz bottom channel Separation-2W



**The Worst Emission Mask for 25 KHz top channel Separation-2W**




***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

# 8. MAXIMUMN TRANSMITTER POWER

## 8.1 PROVISIONS APPLICABLE

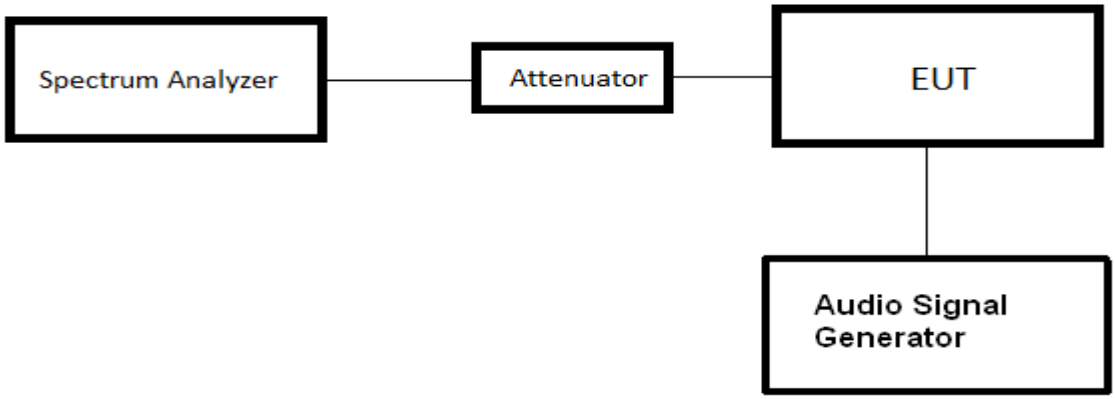
Per FCC §2.1046 and §95.639(h): Maximum ERP is dependent upon the station's antenna HAAT and required service area.

## 8.2 TEST PROCEDURE

The RF output of Two-way Radio was conducted to a spectrum analyzer through an appropriate attenuator.

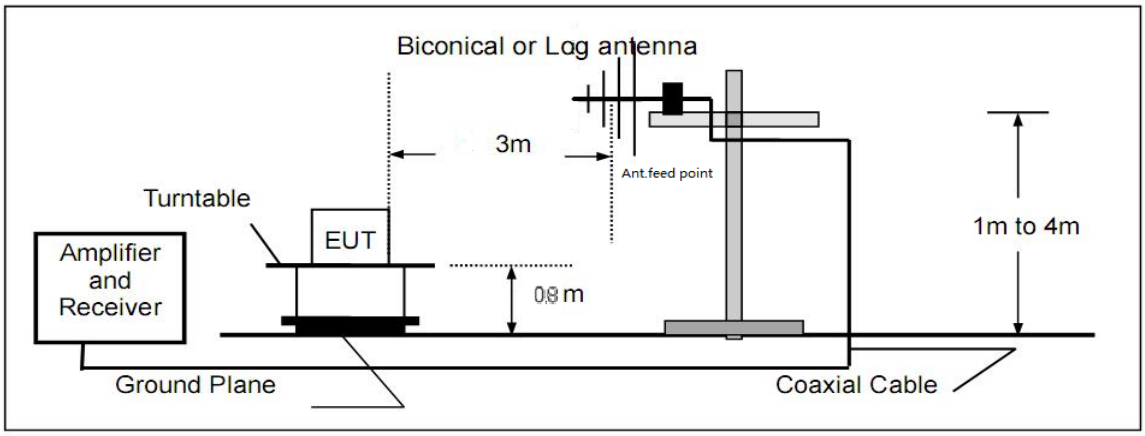
## 8.3 TEST CONFIGURATION

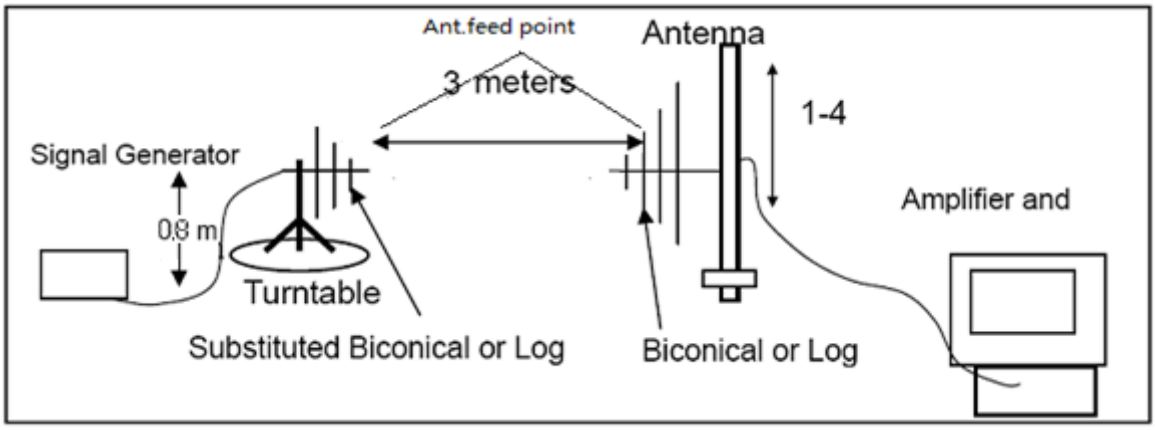
**Conducted Output Power:**



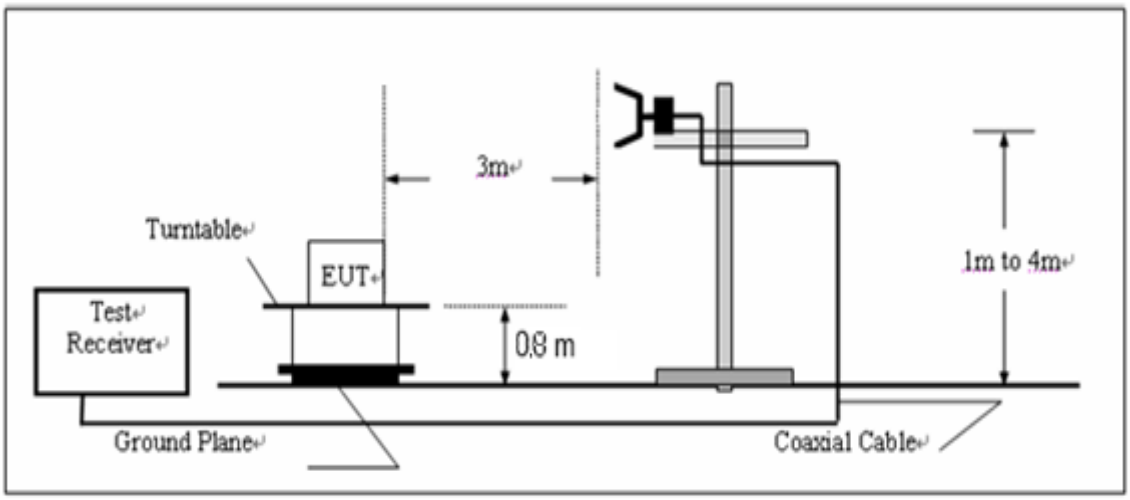

**Effective Radiated Power**

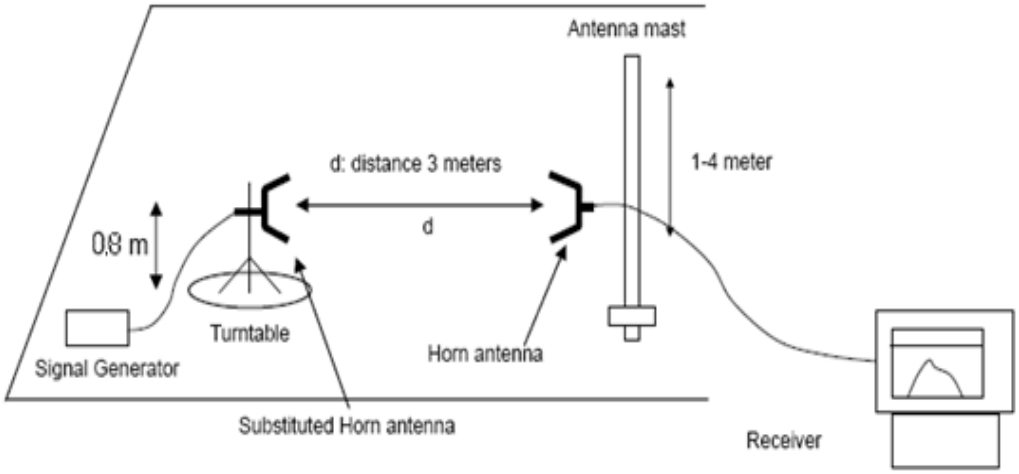
**Radiated Below1GHz**






**Radiated Above 1 GHz**



**8.4 TEST RESULT**

The maximum Conducted Power (CP) for VHF is

Analog: 2W / 0.5W for 12.5 KHz / 25 KHz Channel Separation

Calculation Formula: CP = R + A + L

***** Note:

CP: The final Conducted Power

R : The reading value from spectrum analyzer

A : The attenuation value of the used attenuator

L : The loss of all connection cables

| Conducted Power Measurement Results | | |
|---|---|---|
| **Channel Separation** | **Channel** | **Measurement Result (dBm)** |
| | | **For 26.99dBm(0.5W)** |
| 12.5 KHz | 151.820MHz | 26.85 |
| | 151.880MHz | 26.91 |
| | 151.940MHz, | 26.90 |
| 25 KHz | 154.570MHz | 26.68 |
| | 154.600MHz | 26.72 |

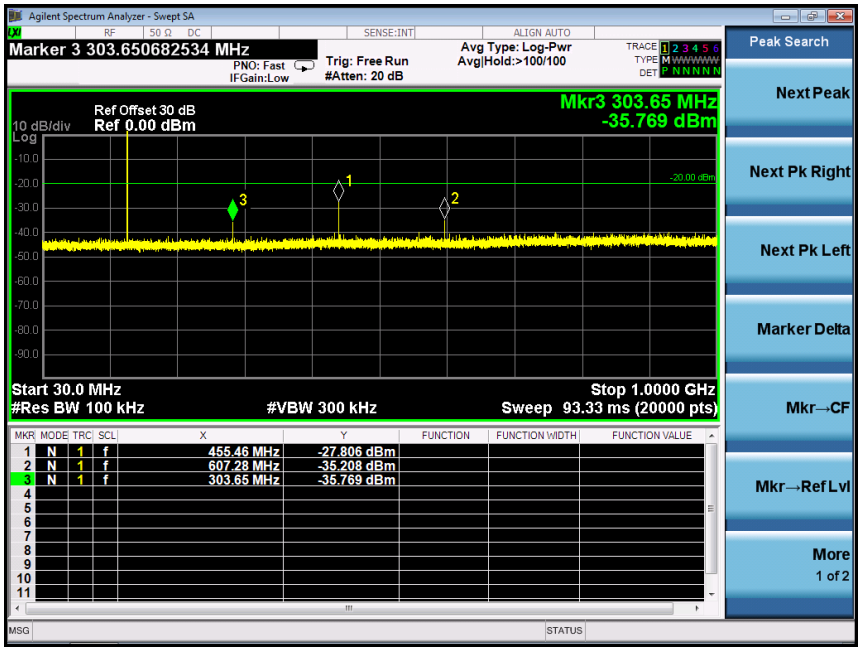
| Conducted Power Measurement Results | | |
|---|---|---|
| **Channel Separation** | **Channel** | **Measurement Result (dBm)** |
| | | **For 33dBm(2W)** |
| 12.5 KHz | 151.820MHz | 32.58 |
| | 151.880MHz | 32.53 |
| | 151.940MHz, | 32.53 |
| 25 KHz | 154.570MHz | 32.75 |
| | 154.600MHz | 32.54 |

## 8.5 CONDUCT SPURIOUS PLOT

**0.5W:**

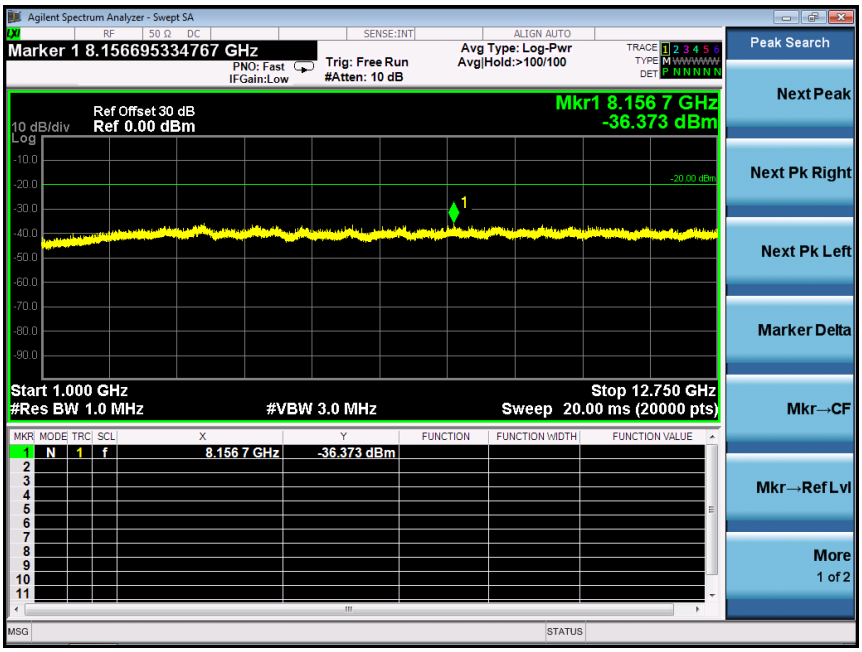
**Conducted Spurious Emission (worst) @151.820MHz With 12.5 KHz Channel Separation**

30MHz-1GHz




**Conduct Spurious Emission (worst) @ 151.820MHz With 12.5 KHz Channel Separation**

1GHz-12.75GHz

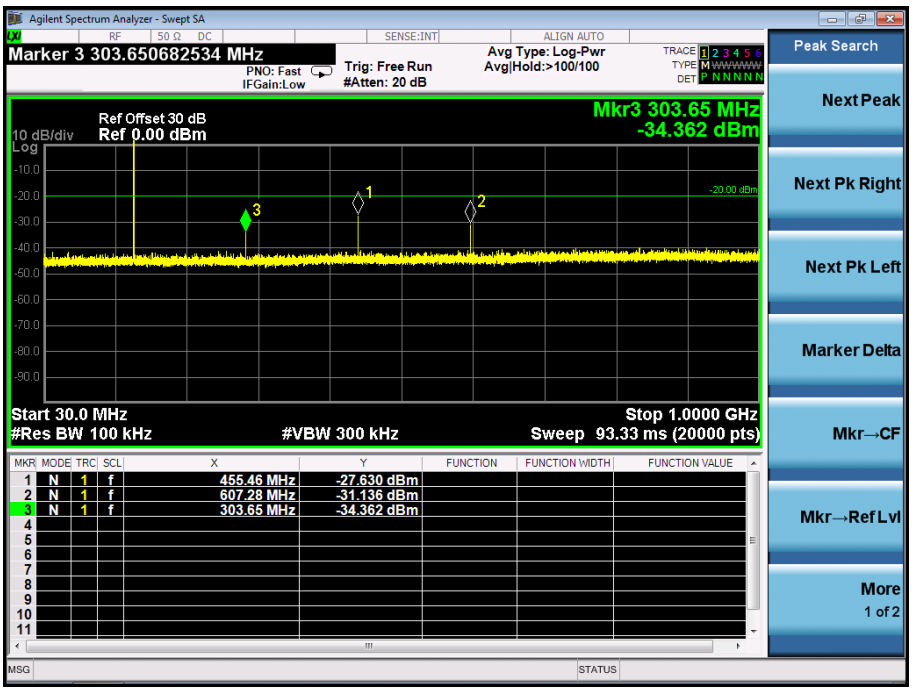



***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

**2W:**

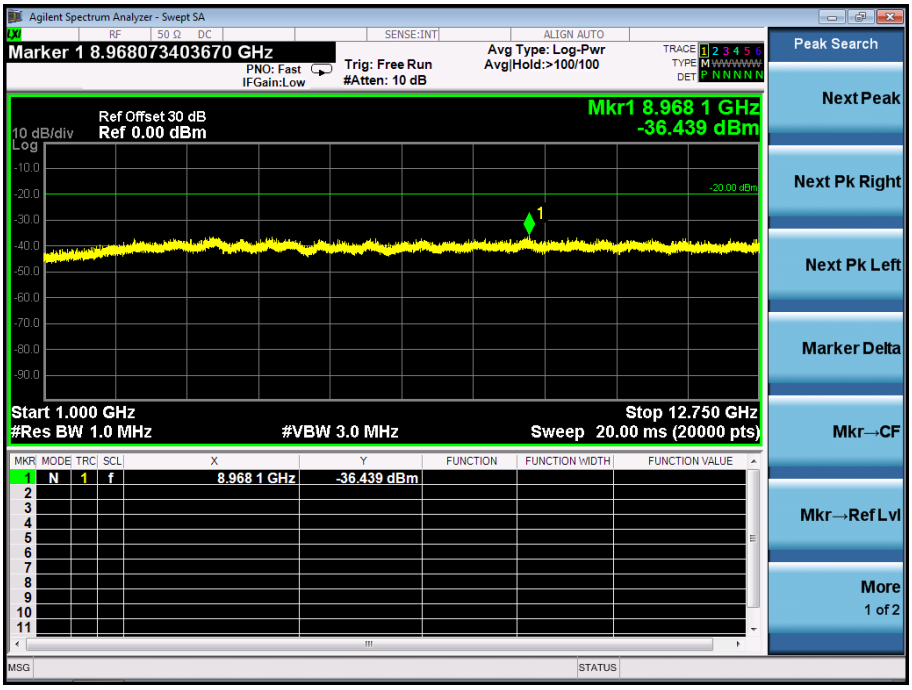
**Conducted Spurious Emission (worst) @ 151.940MHz With 12.5 KHz Channel Separation**

30MHz-1GHz




**Conduct Spurious Emission (worst) @ 151.940MHz With 12.5 KHz Channel Separation**

1GHz-12.75GHz




***Note**: All the test frequencies was tested, but only the worst data be recorded in this part.*

# 9. RECEIVER CONDUCTED SPURIOUS EMISSION

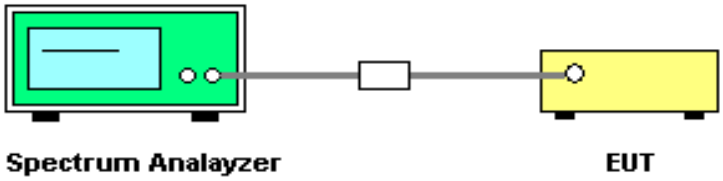
## 9.1TEST APPLICABLE

The same as Section 4.3

## 9.2TEST PROCEDURE

The spectrum analyzer was connected to the RF output power of the EUT, the EUT was setup in receiving mode; The RBW of the spectrum analyzer was set to 100 kHz and the VBW set to 300 KHz below 1GHz.

## 9.3TEST CONFIGURATION




## 9.4LIMIT

The power at the antenna terminal shall not exceed 2.0 nanowatts (-57dBm).

The Receiver Conducted Spurious Emission Measurement is performed to the one channel, and the EUT shall be scanned from 30 MHz to the 12.75 GHz.

## 9.5 TEST RESULT:

| Frequency(MHz) | Polarization | Spurious emissions level (dBm) |
|---|---|---|
| No | Peak | Found |
| Measurement uncertainty (± 3dB)<br>Remark: All spurious emission less than –75dBm does not be mentioned in the report. | | |

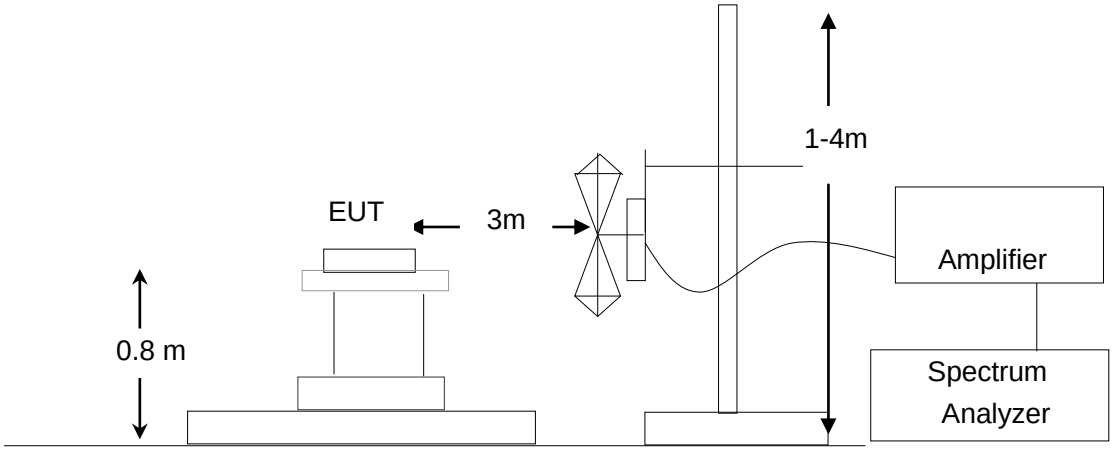
# 10. FCC RADIATED EMISSION TEST

## 10.1 LIMITS OF RADIATED EMISSION TEST

| Frequency (MHz) | Distance (m) | Maximum Field Strength Limit (dBuV/m/ Q.P.) |
|---|---|---|
| 30~88 | 3 | 40.0 |
| 88~216 | 3 | 43.5 |
| 216~960 | 3 | 46.0 |
| Above 960 | 3 | 54.0 |

**Note: The lower limit shall apply at the transition frequency.

## 10.2 BLOCK DIAGRAM OF RADIATED EMISSION TEST

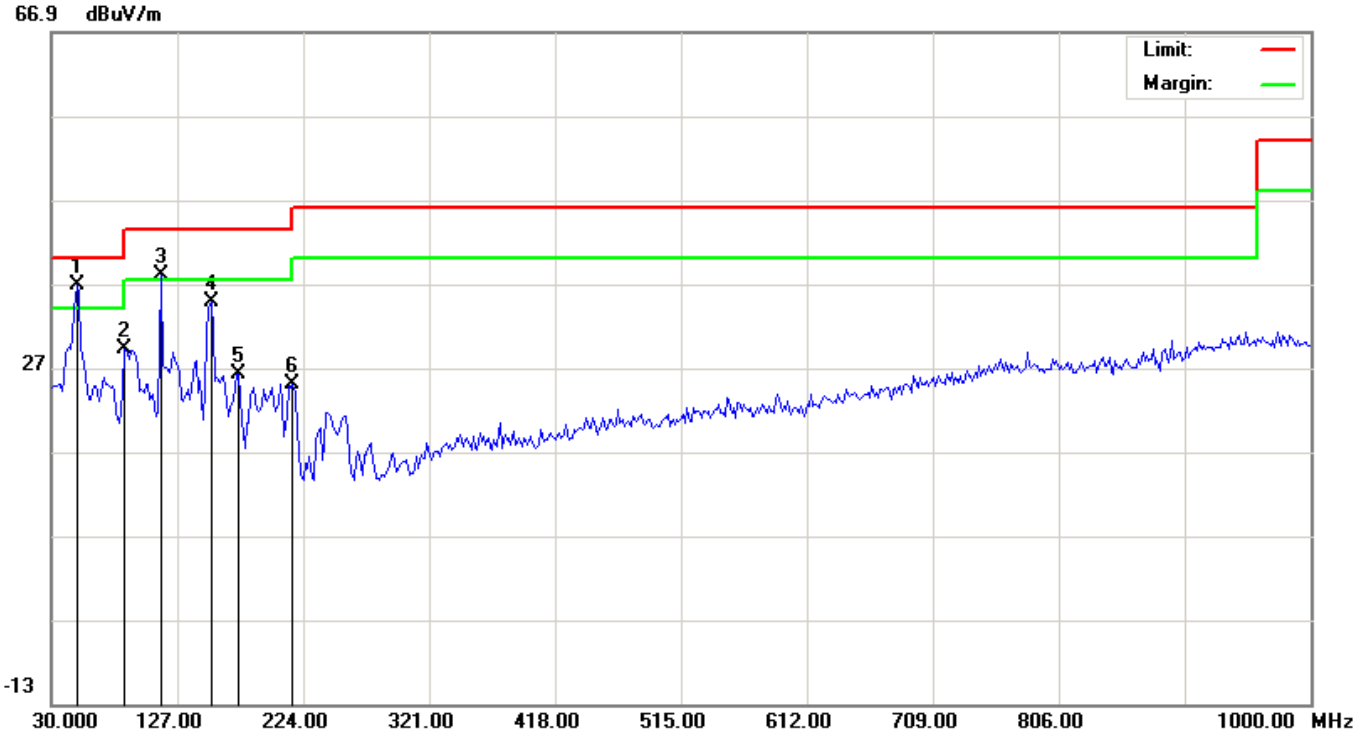


**10.3 PROCEDURE OF RADIATED EMISSION TEST**

1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2) Support equipment, if needed, was placed as per ANSI C63.4.
3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4) The EUT received power AC.120V/60Hz.
5) The antenna was placed at 3 meter away from the EUT as stated in FCC Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
7) The test mode(s) were scanned during the test:
8) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented.
   The test data of the worst case condition (mode 1) was reported on the following Data page

## 10.4 TEST RESULT OF RADIATED EMISSION TEST

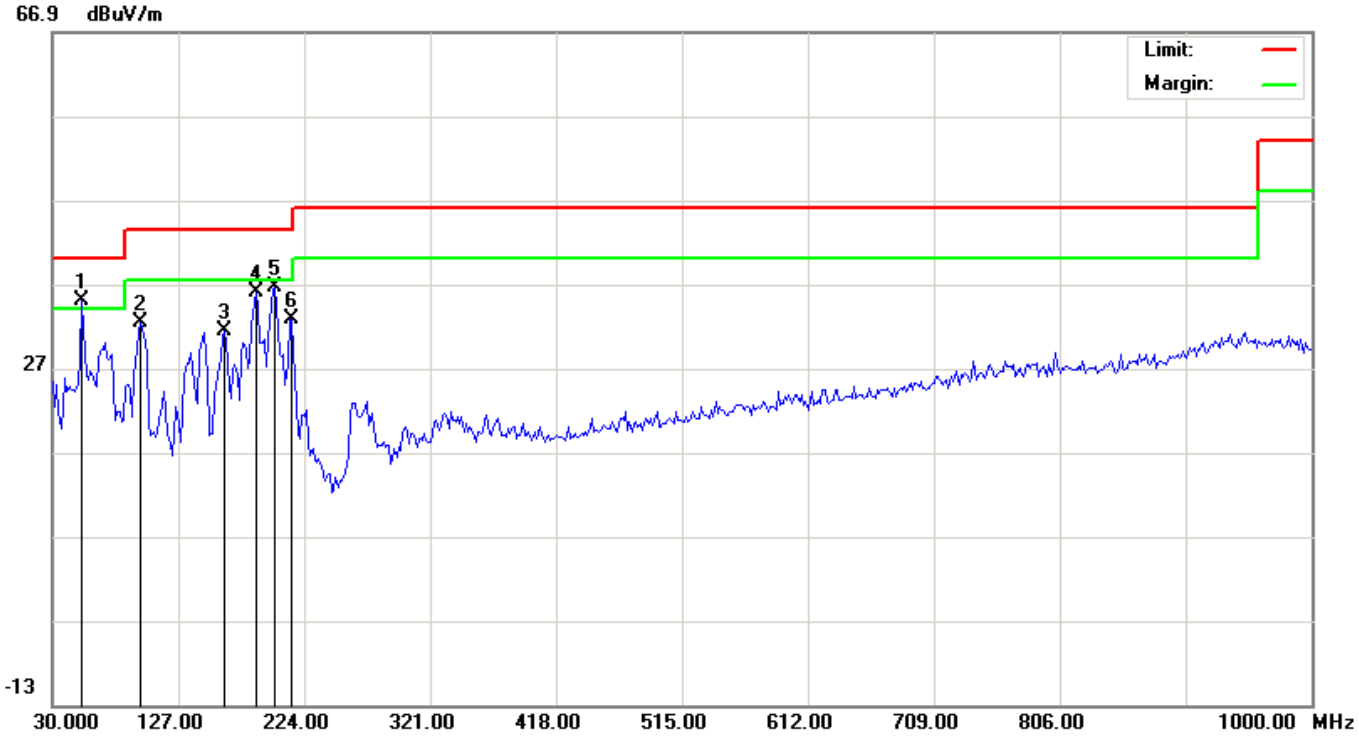
Radiated Emission Test –Horizontal -3m Below 1G




| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | * | 49.4000 | 28.52 | 8.28 | 36.80 | 40.00 | -3.20 | peak | | | |
| 2 | | 86.5833 | 24.98 | 4.16 | 29.14 | 40.00 | -10.86 | peak | | | |
| 3 | ! | 114.0667 | 34.01 | 3.91 | 37.92 | 43.50 | -5.58 | peak | | | |
| 4 | | 152.8667 | 19.61 | 15.28 | 34.89 | 43.50 | -8.61 | peak | | | |
| 5 | | 173.8833 | 11.80 | 14.46 | 26.26 | 43.50 | -17.24 | peak | | | |
| 6 | | 215.9167 | 14.37 | 10.56 | 24.93 | 43.50 | -18.57 | peak | | | |

**RESULT: PASS**

Radiated Emission Test –Vertical -3m Below 1G



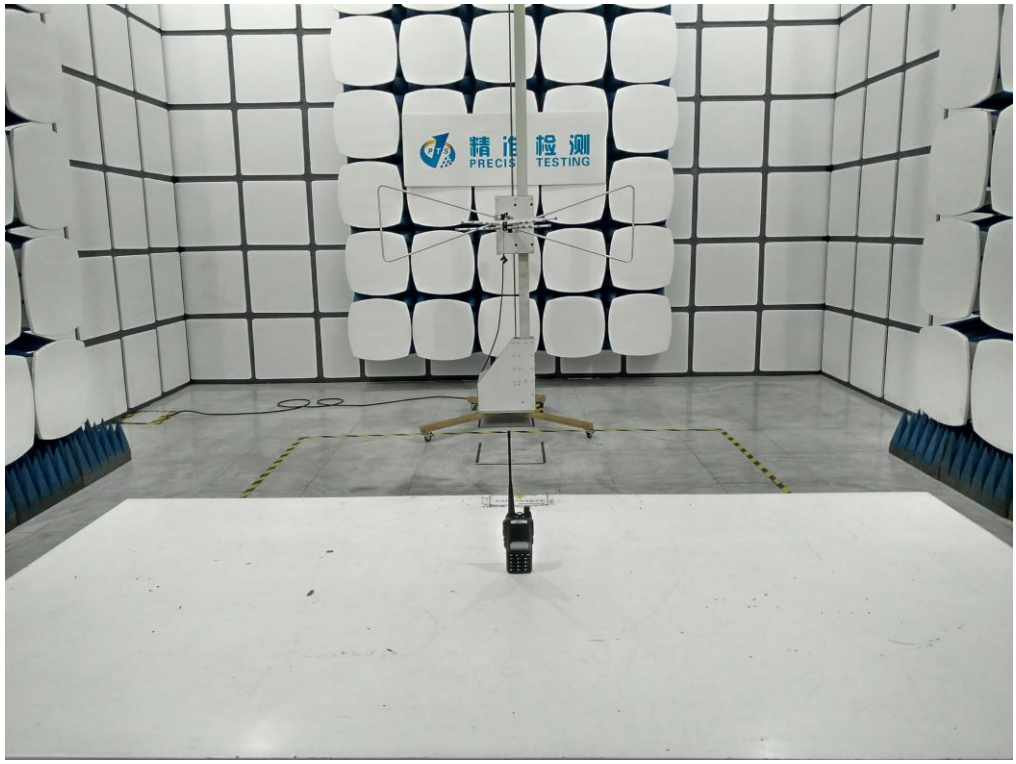

| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | * | 52.6333 | 26.56 | 8.41 | 34.97 | 40.00 | -5.03 | peak | | | |
| 2 | | 97.9000 | 24.05 | 8.38 | 32.43 | 43.50 | -11.07 | peak | | | |
| 3 | | 162.5667 | 21.03 | 10.42 | 31.45 | 43.50 | -12.05 | peak | | | |
| 4 | | 186.8167 | 24.63 | 11.39 | 36.02 | 43.50 | -7.48 | peak | | | |
| 5 | | 201.3667 | 24.82 | 11.86 | 36.68 | 43.50 | -6.82 | peak | | | |
| 6 | | 214.3000 | 22.31 | 10.54 | 32.85 | 43.50 | -10.65 | peak | | | |

**RESULT: PASS**

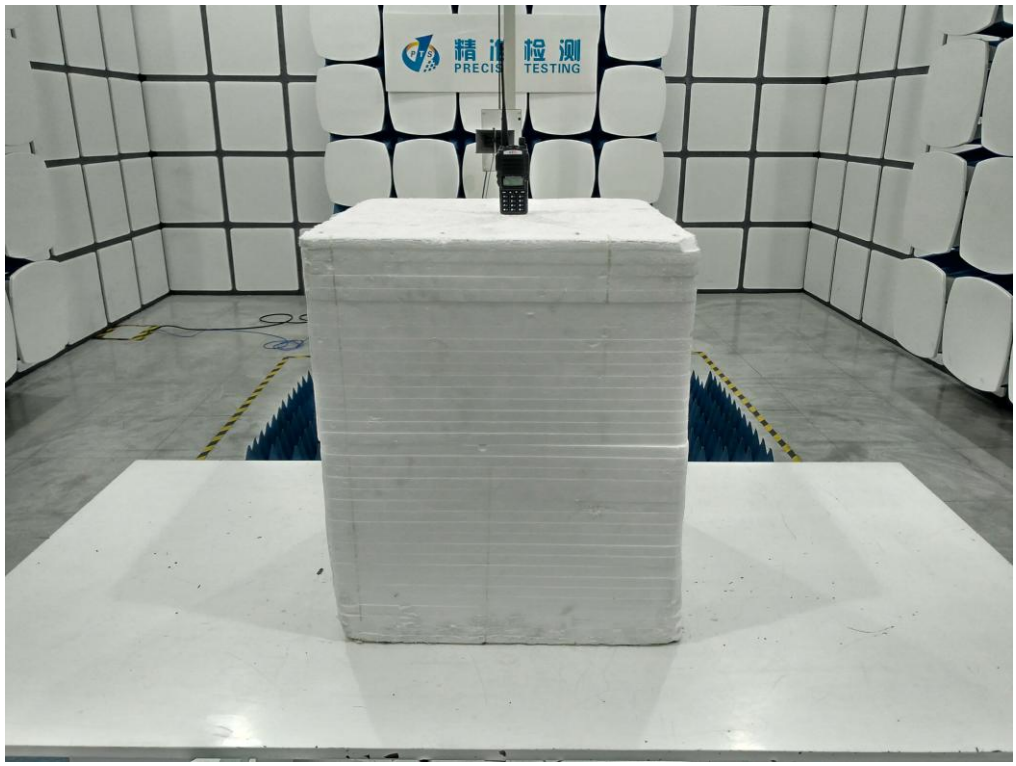
**Note:** 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. Emissions range from 1GHz to 12.5GHz have 20dB margin. No recording in the test report.
4. Only the data of the worst case would be record in this test report.

# APPENDIX I: PHOTOGRAPHS OF SETUP

RADIATED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP



# APPENDIX II: EXTERNAL VIEW OF EUT

TOTAL VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT


FRONT VIEW OF EUT

BACK VIEW OF EUT

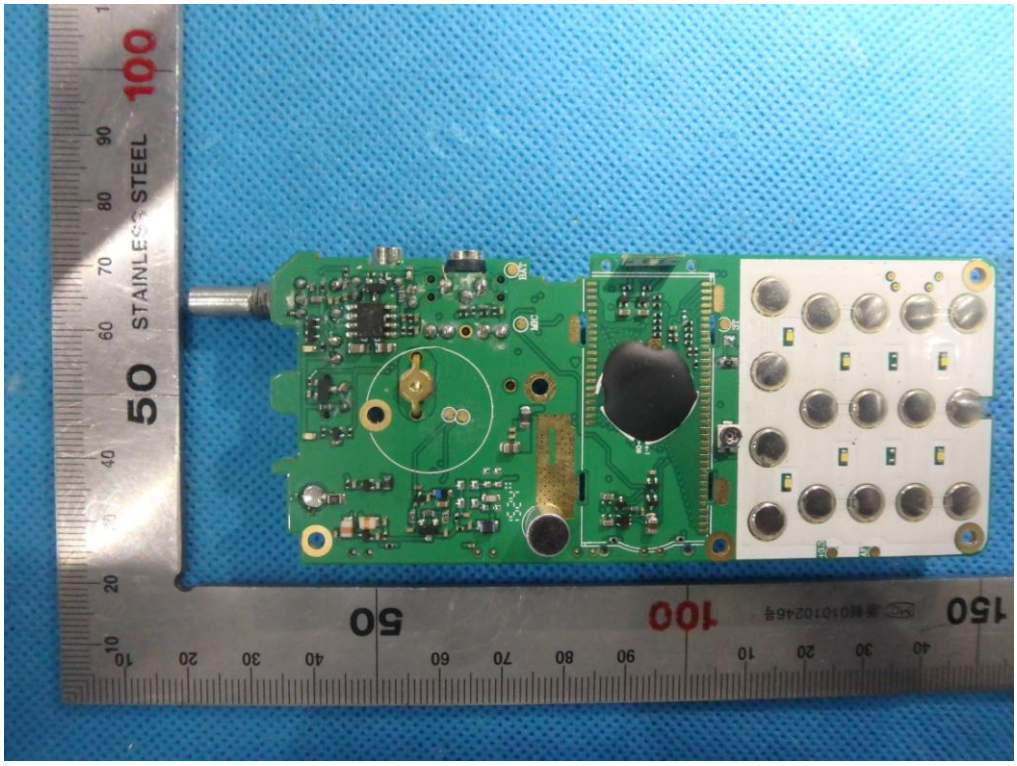
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

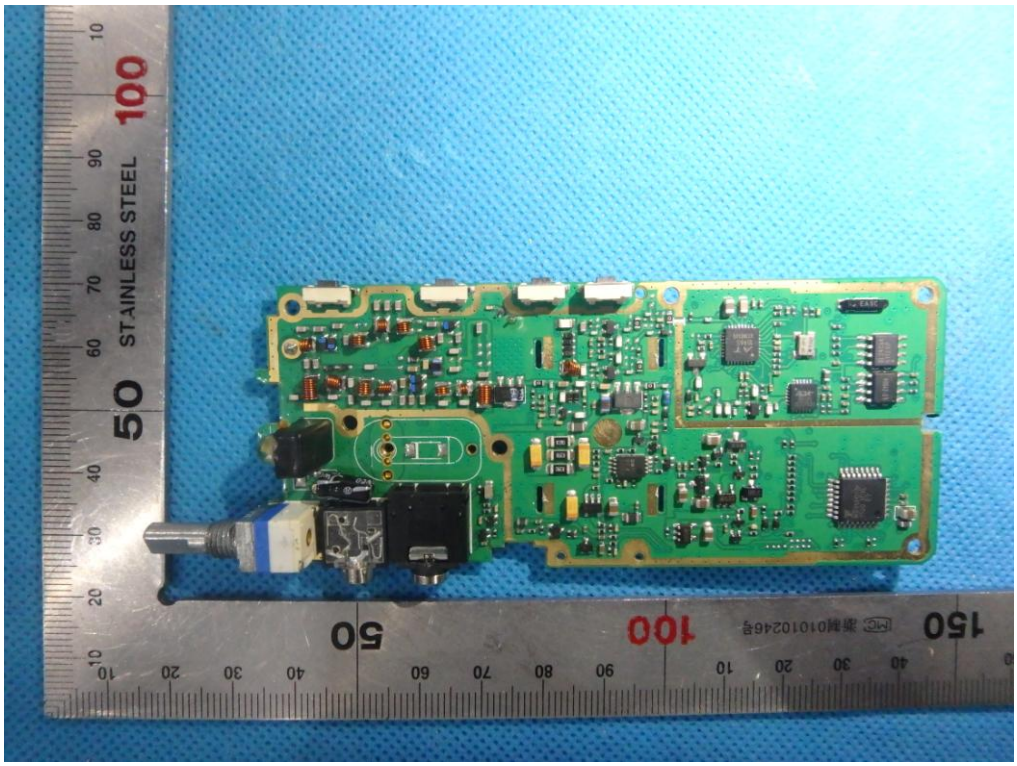
OPEN VIEW-1 OF EUT

OPEN VIEW-2 OF EUT


INTERNAL VIEW-1 OF EUT



INTERNAL VIEW-2 OF EUT




**----END OF REPORT----**