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# FCC Test Report

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Report No.: AGC02931221204FE08

**FCC ID** : 2AWYH-G1  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : GMRS TRANSCEIVER  
**BRAND NAME** : Rugged Radios  
**MODEL NAME** : G1  
**APPLICANT** : Rugged Radios  
**DATE OF ISSUE** : Jan. 15, 2023  
**STANDARD(S)** : FCC Part 15 Rules  
**REPORT VERSION** : V 1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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**REPORT REVISE RECORD**

| Report Version | Revise Time | Issued Date   | Valid Version | Notes           |
|----------------|-------------|---------------|---------------|-----------------|
| V1.0           | /           | Jan. 15, 2023 | Valid         | Initial Release |

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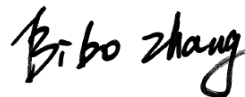
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## 1. VERIFICATION OF COMPLIANCE

|                                     |   |
|-------------------------------------|---|
| <b>Applicant:</b>                   | Rugged Radios   |
| <b>Address:</b>                     | 509 Traffic Way, Arroyo Grande, California 93420, United States |
| <b>Manufacturer:</b>                | Rugged Radios   |
| <b>Address:</b>                     | 509 Traffic Way, Arroyo Grande, California 93420, United States |
| <b>Factory:</b>                     | Rugged Radios   |
| <b>Address:</b>                     | 509 Traffic Way, Arroyo Grande, California 93420, United States |
| <b>Product Designation:</b>         | GMRS TRANSCEIVER  |
| <b>Brand Name:</b>                  | Rugged Radios   |
| <b>Test Model:</b>                  | G1  |
| <b>Measurement Procedure:</b>       | ANSI C63.4: 2014  |
| <b>Deviation:</b>                   | No any deviation from the test method.                          |
| <b>Date of receipt of test item</b> | Dec. 26, 2022   |
| <b>Date of Test:</b>                | Dec. 26, 2022~Jan. 15, 2023                                     |
| <b>Condition of Test Sample:</b>    | Normal  |
| <b>Test Result:</b>                 | Pass  |
| <b>Report Template:</b>             | AGCRT-US-PTT/EMC  |

The above equipment was tested by Attestation Of Global Compliance (Shenzhen) Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2014. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements. The test results of this report relate only to the tested sample identified in this report.

Prepared By



Bibo Zhang  
(Project Engineer)

Jan. 15, 2023

Reviewed By



Calvin Liu  
(Reviewer)

Jan. 15, 2023

Approved By



Max Zhang  
Authorized Officer

Jan. 15, 2023

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## 2. PRODUCT INFORMATION

The EUT is a **GMRS TRANSCEIVER** designed for voice communication. It is designed by way of utilizing the F3E modulation achieves the system operating.

A major technical description of EUT is described as following:

|                            |                                 |
|----------------------------|---------------------------------|
| <b>Communication Type</b>  | Voice / Tone only               |
| <b>Modulation</b>          | FM                              |
| <b>RX Frequency Range</b>  | 400-480 MHz (Scanning Receiver) |
| <b>Emission Type</b>       | F3E                             |
| <b>Antenna Designation</b> | Detachable Antenna              |
| <b>Antenna Gain</b>        | 0dBi (Typical), 5dBi (Max)      |
| <b>Hardware Version</b>    | V1.3.5                          |
| <b>Software Version</b>    | V1.02                           |
| <b>Power Supply</b>        | DC 13.8V                        |

### I/O Port Information (☒ Applicable ☐ Not Applicable)

| I/O Port of EUT      |      |       |             |
|----------------------|------|-------|-------------|
| I/O Port Type        | Q'TY | Cable | Tested with |
| Antenna Port         | 1    | -     | 1           |
| Hand microphone Port | 1    | -     | 1           |

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### 3. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

|                                   |  |
|-----------------------------------|--|
| Test Site                         | Attestation of Global Compliance (Shenzhen) Co., Ltd   |
| Location                          | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| Designation Number                | CN1259   |
| FCC Test Firm Registration Number | 975832   |
| A2LA Cert. No.                    | 5054.02  |
| Description                       | Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA  |

#### List of Test Equipment:

##### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

| Equipment     | Manufacturer | Model                           | S/N    | Cal. Date     | Cal. Due      |
|---------------|--------------|---------------------------------|--------|---------------|---------------|
| TEST RECEIVER | R&S          | ESPI                            | 101206 | May 09, 2022  | May 08, 2023  |
| LISN          | R&S          | ESH2-Z5                         | 100086 | Jun. 08, 2022 | Jun. 07, 2023 |
| TEST SOFTWARE | FARA         | EZ-EMC<br>(Ver.AGC-C<br>ON03A1) | N/A    | N/A           | N/A           |

##### TEST EQUIPMENT OF RADIATED EMISSION TEST

| Equipment                 | Manufacturer | Model                | S/N         | Cal. Date     | Cal. Due      |
|---------------------------|--------------|----------------------|-------------|---------------|---------------|
| TEST RECEIVER             | R&S          | ESPI                 | 101206      | May 09, 2022  | May 08, 2023  |
| ANTENNA                   | SCHWARZBECK  | VULB9168             | 494         | Jan. 08, 2021 | Jan. 07, 2023 |
| ANTENNA                   | SCHWARZBECK  | VULB9168             | D69250      | Apr. 28, 2021 | Apr. 27, 2023 |
| Broadband Preamplifier    | ETS LINDGREN | 3117PA               | 00225134    | Sep. 01, 2022 | Aug. 31, 2023 |
| POSITIONING CONTROLLER    | MF           | MF-7802              | MF780208285 | --            | --            |
| HORN ANTENNA              | ETS LINDGREN | 3117                 | 00034609    | Apr. 23, 2021 | Apr. 22, 2023 |
| RF Communication Test Set | HP           | 8920B                | US35010161  | Aug. 03, 2022 | Aug. 02, 2023 |
| EXA Signal Analyzer       | Agilent      | N9020A               | MY53300860  | Jun. 08, 2022 | Jun. 07, 2023 |
| Attenuator                | Schaffner    | 58-30-33             | ML030       | Oct. 22, 2022 | Oct. 21, 2023 |
| Test software             | Tonscend     | JS32-RE<br>(Ver.2.5) | N/A         | N/A           | N/A           |

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#### 4. SUPPORT EQUIPMENT LIST

| Device Type     | Manufacturer | Model Name | Serial No. | Data Cable | Power Cable     |
|-----------------|--------------|------------|------------|------------|-----------------|
| Hand microphone | -            | N/A        | -          | -          | 1.9m Unshielded |

#### 5. SYSTEM DESCRIPTION

##### EUT TEST PROCEDURE:

1. Connect EUT and peripheral devices.
2. Power on the EUT, the EUT begins to work.
3. Make sure the EUT normal working.

##### EMC TEST MODE:

| No. | TEST MODES   |
|-----|--|
| 1   | Scanning mode  |
| 2   | Scanning stopped/Receiving at low channel of 400 MHz to 480 MHz    |
| 3   | Scanning stopped/Receiving at middle channel of 400 MHz to 480 MHz |
| 4   | Scanning stopped/Receiving at high channel of 400 MHz to 480 MHz   |

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

## 6. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission,  $U_c = \pm 3.1$  dB
- Uncertainty of Radiated Emission below 1GHz,  $U_c = \pm 4.0$  dB
- Uncertainty of Radiated Emission above 1GHz,  $U_c = \pm 4.8$  Db

## 7. SUMMARY OF TEST RESULTS

| FCC RULES  | DESCRIPTION OF TEST  | RESULT         |
|------------|--|----------------|
| §15.107    | Conduction Emission  | Not applicable |
| §15.109    | Radiated Emission  | Compliant      |
| §15.111    | Antenna Conducted Power for receivers                                    | Compliant      |
| §15.121(b) | Scanning receivers and frequency converters used with scanning receivers | Compliant      |

NOTE: The device under test is a DC power supply device, and the conducted disturbance test is not applicable.

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## 8. FCC RADIATED EMISSION TEST

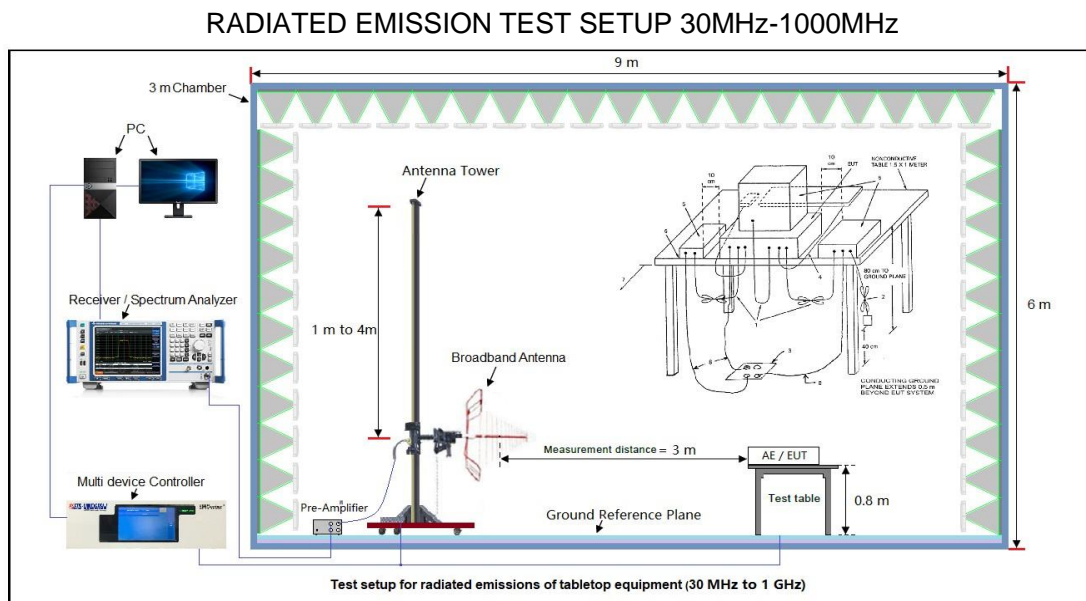
### 8.1 PROVISIONS APPLICABLE

FCC CFR Title 47 Part 15 Subpart B Section 15.109:

| Frequency     | Limit (dBuV/m @3m) | Value      |
|---------------|--------------------|------------|
| 30MHz-88MHz   | 40.00              | Quasi-peak |
| 88MHz-216MHz  | 43.50              | Quasi-peak |
| 216MHz-960MHz | 46.00              | Quasi-peak |
| 960MHz-1GHz   | 54.00              | Quasi-peak |
| Above 1GHz    | 54.00              | Average    |
|               | 74.00              | Peak       |

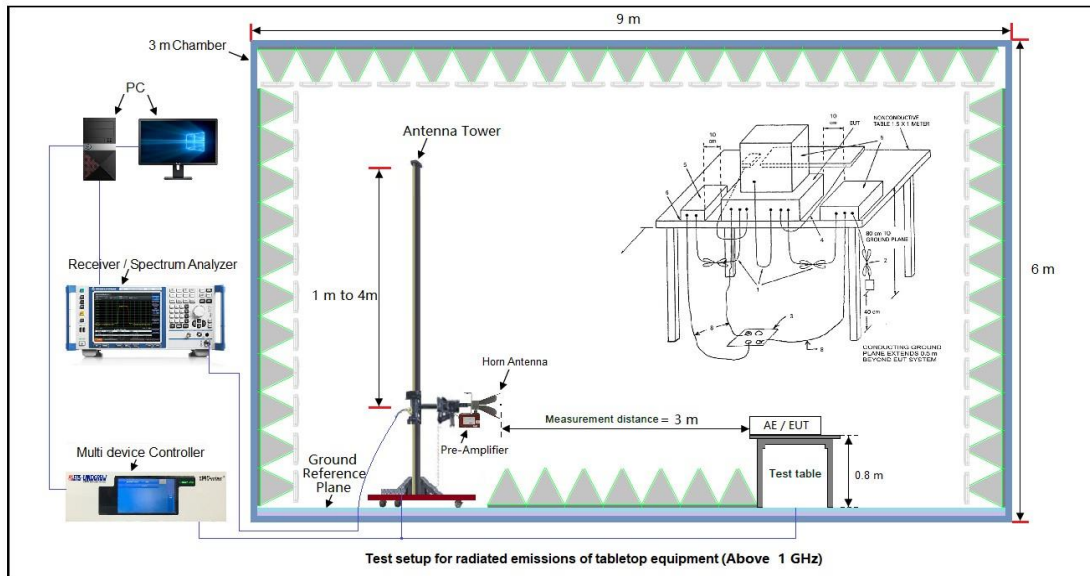
Note: The lower limit shall apply at the transition frequency. Because the EUT RX frequency range up to 480 MHz, so the upper frequency range up to 2 GHz.

### 8.2 TEST SETUP BLOCK DIAGRAM



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### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



### EMI TEST RECEIVER SETUP:

During the radiated emission test, the EMI test receiver was set with the following configurations:

| Frequency Range   | RBW     | Video B/W | IF B/W  | Measurement |
|-------------------|---------|-----------|---------|-------------|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz   | 120 kHz | QP          |
| Above 1 GHz       | 1MHz    | 3 MHz     | /       | PK          |
|                   | 1MHz    | 10 Hz     | /       | Ave.        |

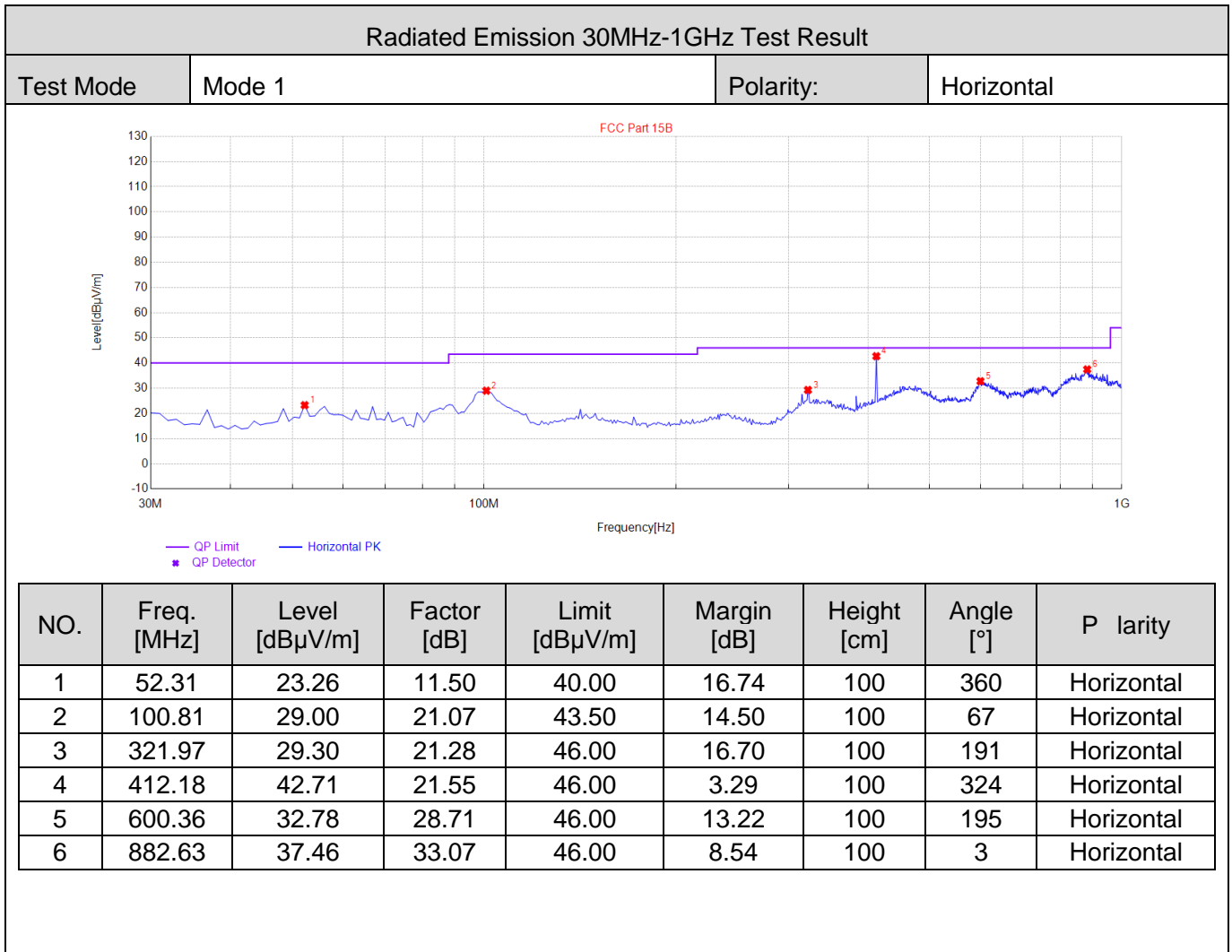
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### 8.3 TEST PROCEDURE

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 by 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. For emissions below 1GHz, use 120KHz RBW and VBW $\geq$ 3RBW for QP reading.
9. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
11. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
12. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
13. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
14. The test data of the worst case condition (mode 1) was reported on the following Data page.

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## 8.4 TEST RESULT

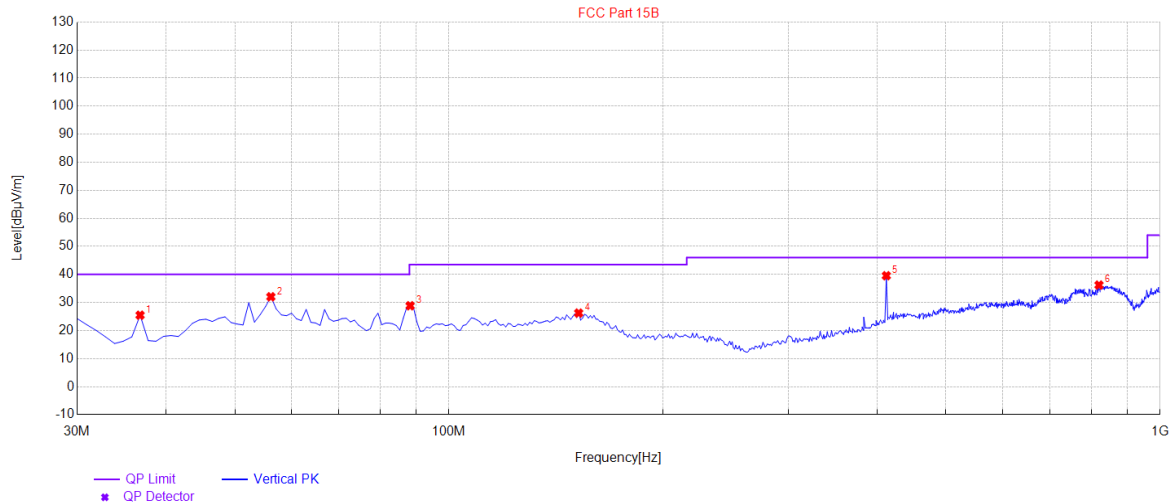


**RESULT: PASS**

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### Radiated Emission 30MHz-1GHz Test Result

|           |        |           |          |
|-----------|--------|-----------|----------|
| Test Mode | Mode 1 | Polarity: | Vertical |
|-----------|--------|-----------|----------|



| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 36.79       | 25.46          | 11.12       | 40.00          | 14.54       | 100         | 143       | Vertical |
| 2   | 56.19       | 32.03          | 14.30       | 40.00          | 7.97        | 100         | 282       | Vertical |
| 3   | 88.2        | 28.83          | 12.45       | 43.50          | 14.67       | 100         | 0         | Vertical |
| 4   | 152.22      | 26.22          | 21.12       | 43.50          | 17.28       | 100         | 163       | Vertical |
| 5   | 412.18      | 39.54          | 20.63       | 46.00          | 6.46        | 100         | 183       | Vertical |
| 6   | 820.55      | 36.21          | 31.61       | 46.00          | 9.79        | 100         | 199       | Vertical |

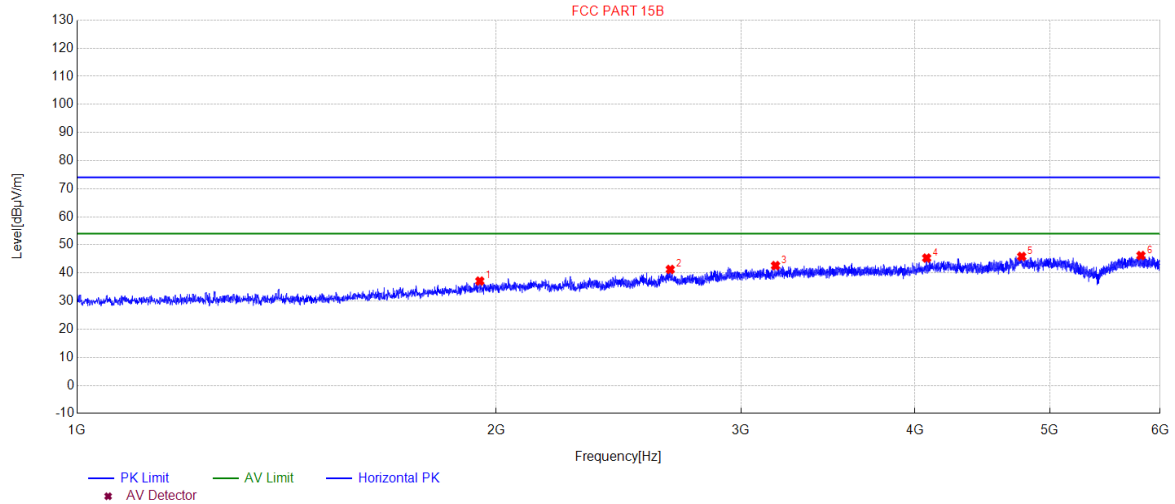
**RESULT: PASS**

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### Radiated Emission Above 1GHz Test Result

|           |        |           |            |
|-----------|--------|-----------|------------|
| Test Mode | Mode 1 | Polarity: | Horizontal |
|-----------|--------|-----------|------------|



| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | [dB]  | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|----------------|-------------|----------------|-------|-------------|-----------|------------|
| 1   | 1947.0947   | 37.12          | -16.43      | 74.00          | 36.88 | 100         | 280       | Horizontal |
| 2   | 2668.1668   | 41.25          | -12.48      | 74.00          | 32.75 | 100         | 230       | Horizontal |
| 3   | 3175.7176   | 42.61          | -10.69      | 74.00          | 31.39 | 100         | 260       | Horizontal |
| 4   | 4077.8078   | 45.30          | -8.01       | 74.00          | 28.70 | 100         | 160       | Horizontal |
| 5   | 4772.3772   | 45.86          | -6.86       | 74.00          | 28.14 | 100         | 330       | Horizontal |
| 6   | 5812.9813   | 46.20          | -5.52       | 74.00          | 27.80 | 100         | 290       | Horizontal |

**RESULT: PASS**

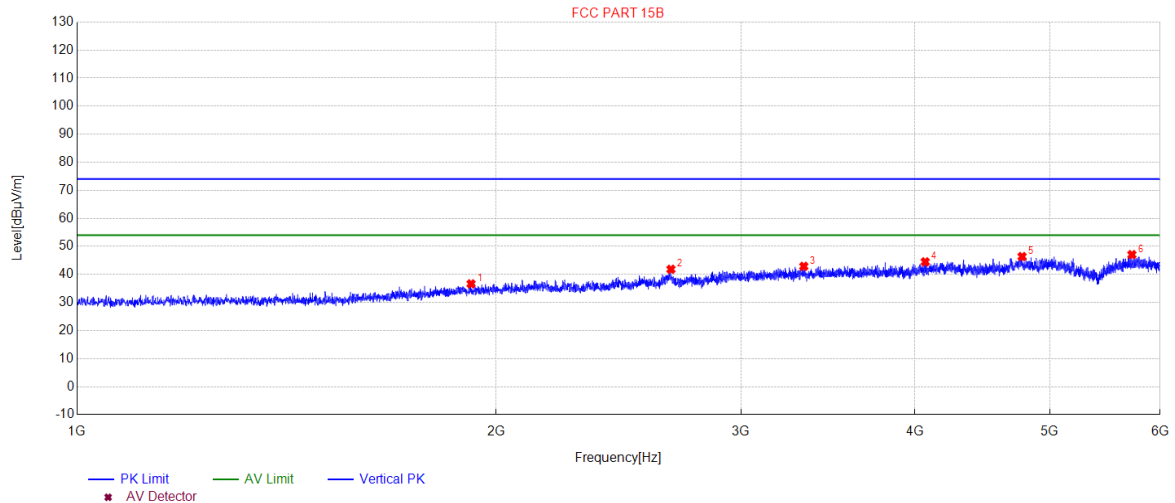
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### Radiated Emission Above 1GHz Test Result

|           |        |           |          |
|-----------|--------|-----------|----------|
| Test Mode | Mode 1 | Polarity: | Vertical |
|-----------|--------|-----------|----------|



| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 1919.0919   | 36.64          | -16.65      | 74.00          | 37.36       | 100         | 100       | Vertical |
| 2   | 2671.1671   | 41.83          | -12.47      | 74.00          | 32.17       | 100         | 140       | Vertical |
| 3   | 3327.7328   | 42.88          | -10.23      | 74.00          | 31.12       | 100         | 140       | Vertical |
| 4   | 4068.3068   | 44.48          | -8.02       | 74.00          | 29.52       | 100         | 150       | Vertical |
| 5   | 4775.3775   | 46.36          | -6.85       | 74.00          | 27.64       | 100         | 70        | Vertical |
| 6   | 5726.9727   | 47.05          | -5.82       | 74.00          | 26.95       | 100         | 170       | Vertical |

### RESULT: PASS

- Note:** 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Measurement.  
 2. The “Factor” value can be calculated automatically by software of measurement system.

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## 9. FCC CONDUCTED EMISSION TEST

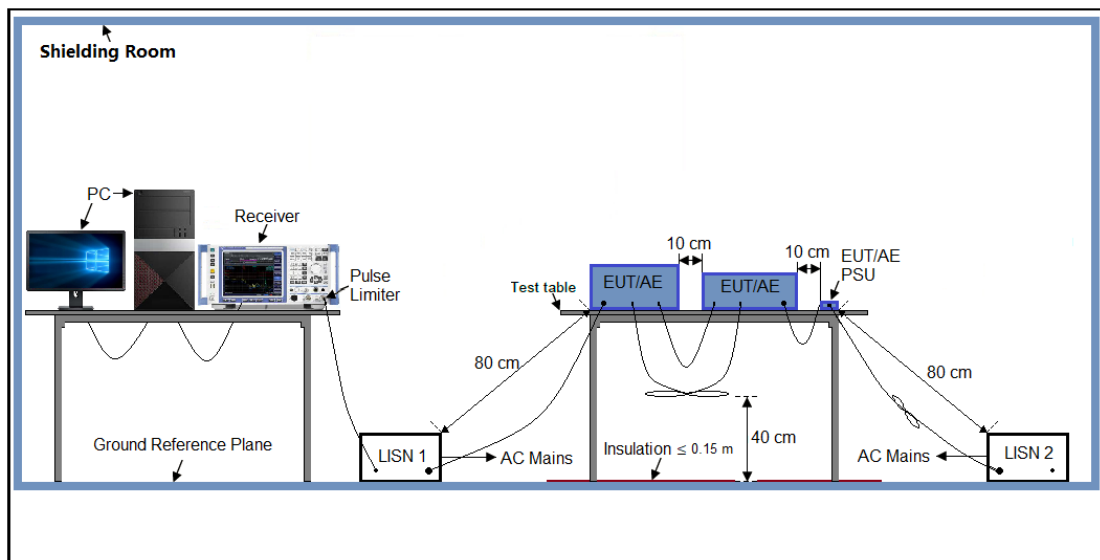
### 9.1 PROVISIONS APPLICABLE

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the, the radio frequency voltage that is conducted back onto the AC power line on any frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

| Frequency of Emission (MHz) | Conducted Limit(dBuV) |            |
|-----------------------------|-----------------------|------------|
|                             | Quasi-Peak            | Average    |
| 0.15 – 0.5                  | 66 to 56 *            | 56 to 46 * |
| 0.5 – 5                     | 56                    | 46         |
| 5 – 30                      | 60                    | 50         |

\* Decreases with the logarithm of the frequency.

### 9.2 TEST SETUP BLOCK DIAGRAM



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### 9.3 TEST PROCEDURE

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 table with a height of 0.8 meters is used and 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 a 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 AC 120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test data of the worst case condition (mode 1) was reported on the following Data page.

### 9.4 TEST RESULT

Note: Not applicable.

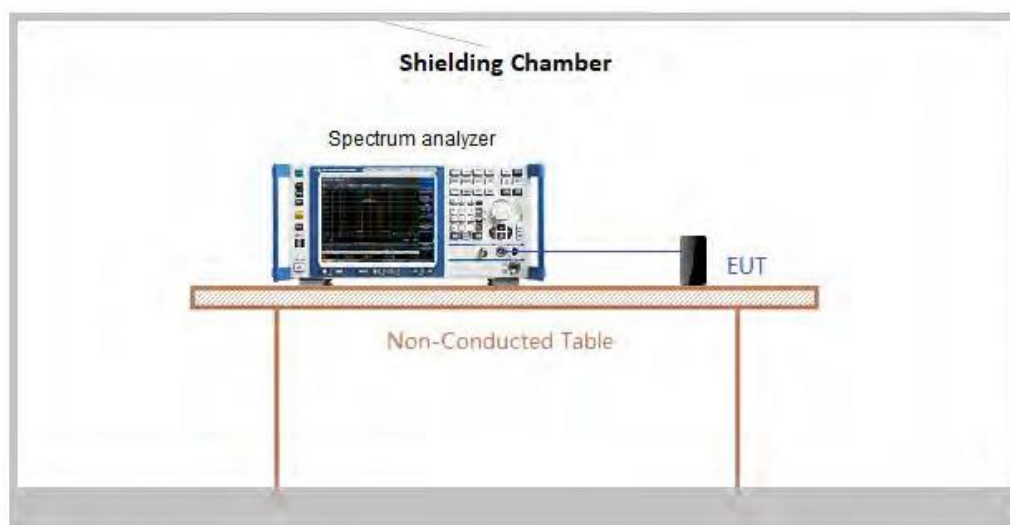
## 10. ANTENNA CONDUCTED POWER FOR RECEIVERS

### 10.1 PROVISIONS APPLICABLE

The antenna conducted power of the receiver as defined in §15.111 shall not exceed the values given in the following tables

| Frequency Range | 9 KHz to 2GHz     |
|-----------------|-------------------|
| Limit           | 2.0 nW (-57 dBm ) |

### 10.2 TEST SETUP BLOCK DIAGRAM



### 10.3 TEST PROCEDURE

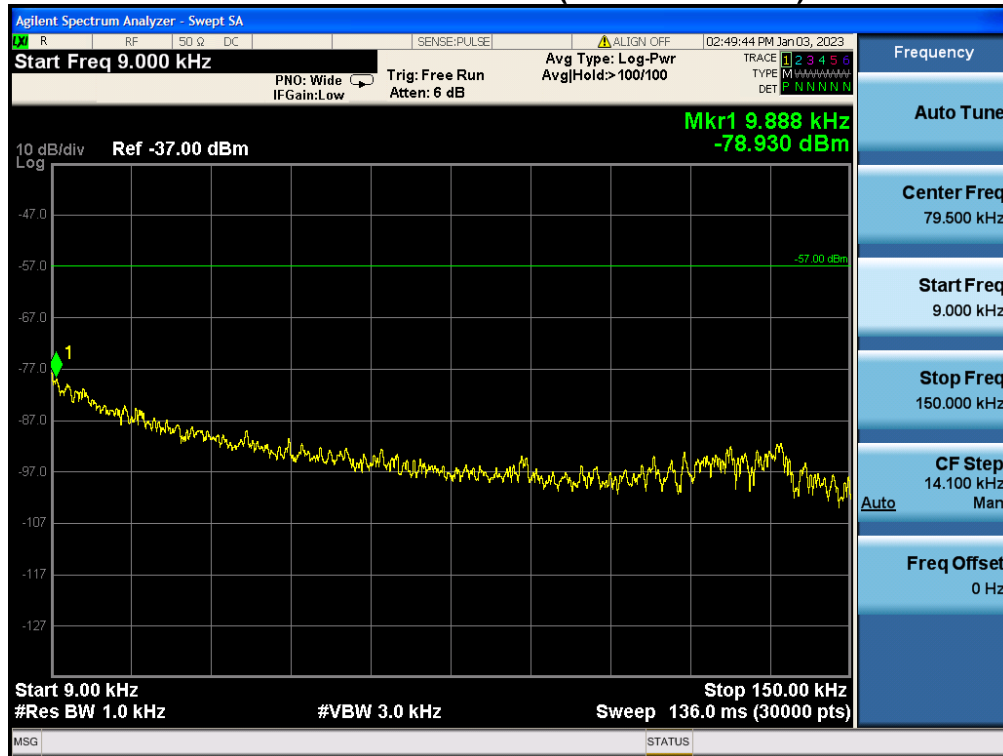
1. The receiver antenna terminal connected to a spectrum analyzer.
2. Receiver set as follow:

| Frequency range     | RBW (kHz) | VBW (kHz) |
|---------------------|-----------|-----------|
| 9 kHz ~ 150 kHz     | 1         | 3         |
| 150 kHz ~ 30 MHz    | 10        | 30        |
| 30 MHz ~ 1000 MHz   | 100       | 300       |
| 1000 MHz ~ 3000 MHz | 1000      | 3000      |

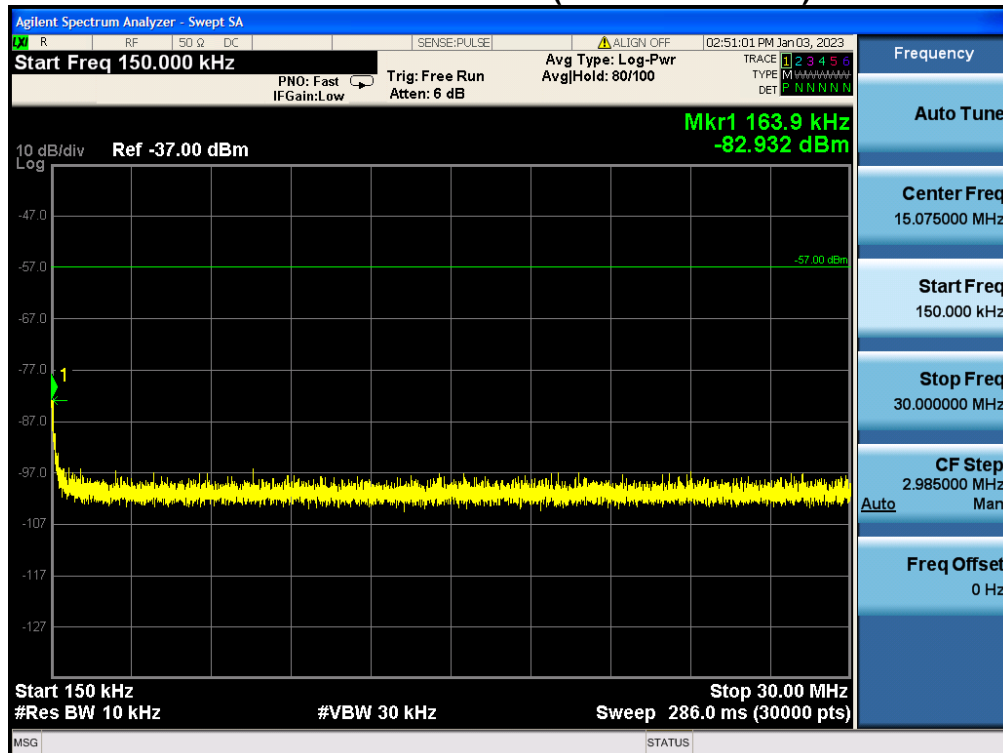
The test data of the worst case condition (mode 1) was reported on the following Data page.

## 10.4 TEST RESULT

### Conducted Measurement (9 KHz to 150 KHz)

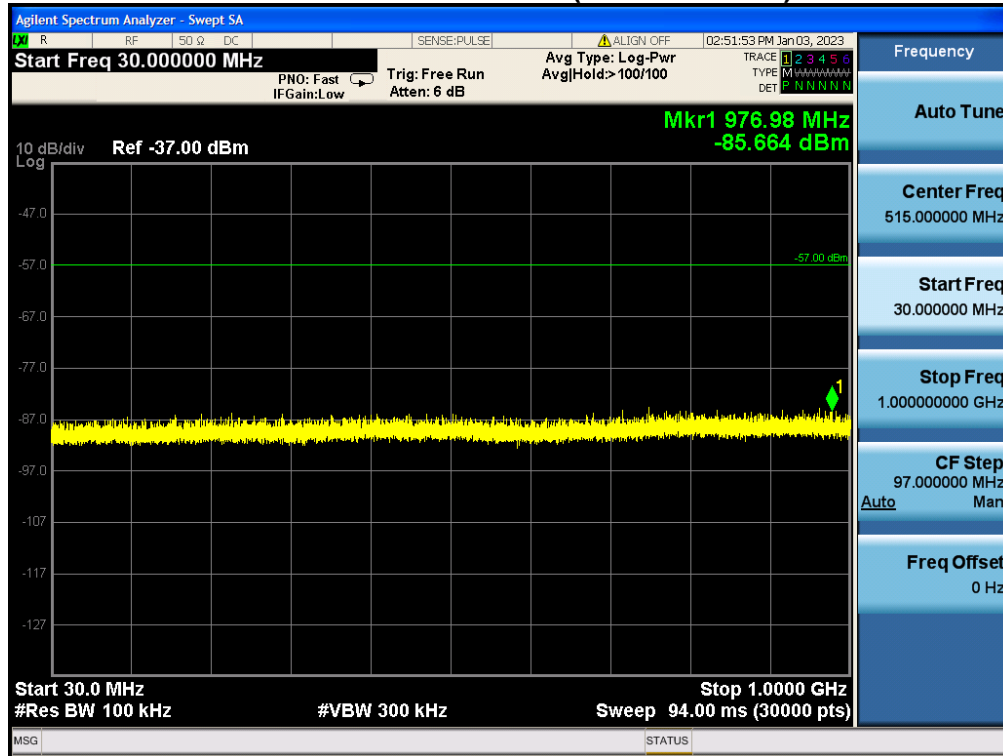


### Conducted Measurement (150 KHz to 30MHz)

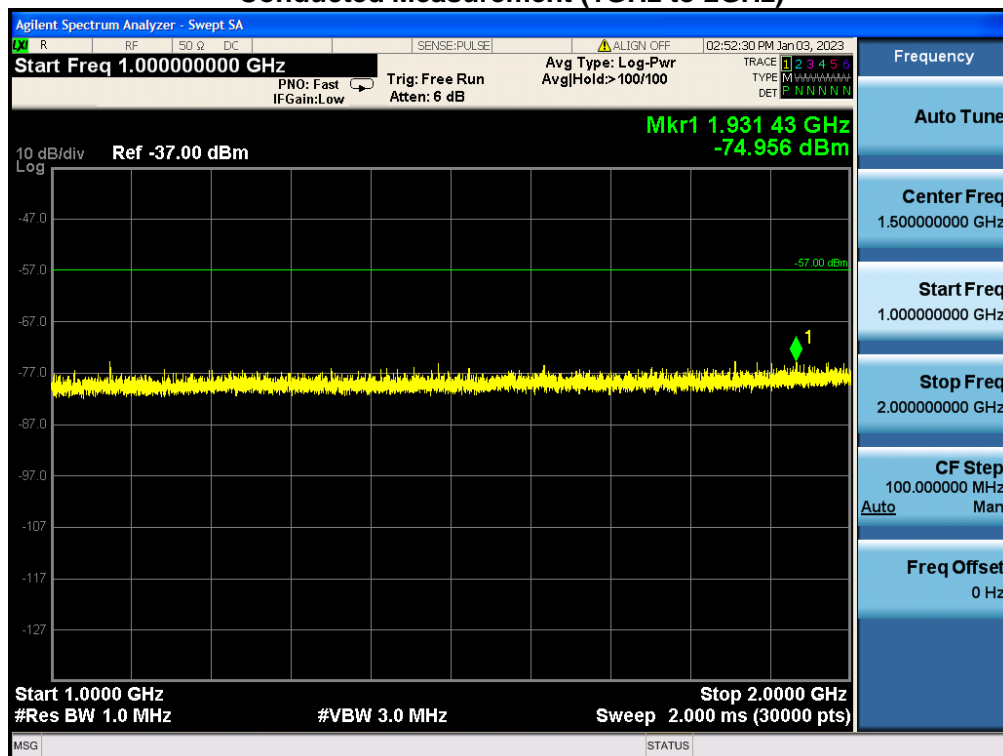


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### Conducted Measurement (30MHz to 1GHz)



### Conducted Measurement (1GHz to 2GHz)



## RESULT:PASS

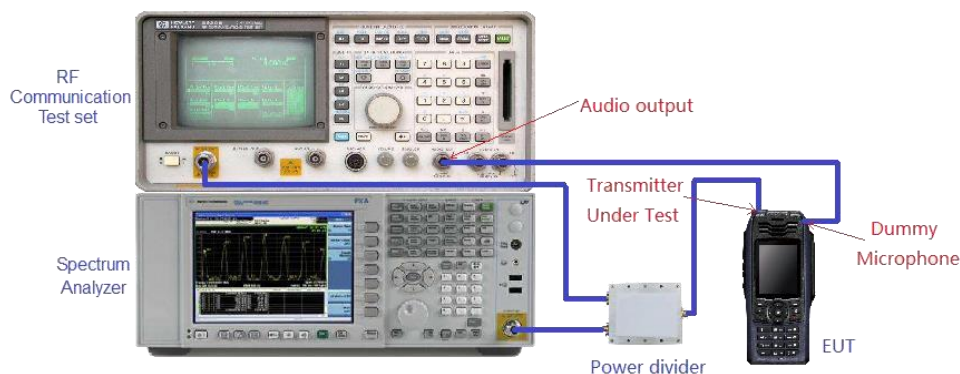
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## 11. SCANNING RECEIVERS AND FREQUENCY CONVERTERS USED WITH SCANNING RECEIVERS

### 11.1 PROVISIONS APPLICABLE

Except as provided in paragraph (c) of this section, scanning receivers shall reject any signals from the Cellular Radiotelephone Service frequency bands that are 38 dB or lower based upon a 12 dB SINAD measurement, which is considered the threshold where a signal can be clearly discerned from any interference that may be present.

### 11.2 TEST SETUP BLOCK DIAGRAM



### 11.3 TEST PROCEDURE

1. Connected the EUT as shown in the above block diagram.
2. Apply a RF signal to the receiver input port at lowest, middle and highest channel frequencies of receiver operation band.
3. Adjust the audio output level of the receiver to it's rated value with the distortion less than 10%.
4. Adjust the RF Signal Generator Output Power to produce 12 dB SINAD without the audio output power dropping by more than 3 dB. This output level of the RF SG at each channel frequency is the sensitivity of the receiver.
5. Select the lowest or worse-case sensitivity level for all of the bands as the reference sensitivity.
6. Adjust the RF Signal Generator output to a level of +60 dB above the reference sensitivity obtained in step 5) and its frequency to the frequency points in the cellular band.
7. Set the Receiver squelch to threshold, the signal required to open the squelch must be lower than the reference sensitivity level.
8. Set the receiver in a scanning mode and allow it to scan through it's complete receiving range.
9. If the receiver unsquelched or stopped on any frequency, receiving at this frequency, then adjust the signal generator output level until 12 dB SINAD is produced, this level is the spurious value and the difference between the reference sensitivity and the spurious value is the rejection ratio and must be at least 38dB.
10. Repeat above procedure at the frequencies 824.5, 836.0, and 848.5 MHz for the mobile band, and 869.1, 881.5, and 893.5MHz for the cellular base band.

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#### 11.4 TEST RESULT

| Scanning Frequency Band (MHz) | Test Frequency of Cellular Band (MHz) | Spurious Value of Cellular Frequency (dBm) | Reference Sensitivity (dBm) | Measurement Result (dB) | Limit (dB) |
|-------------------------------|---------------------------------------|--|-----------------------------|-------------------------|------------|
| 400-480                       | 824.5/836.0/848.5                     | >-43                                       | -106                        | <-63                    | <-38       |
| 400-480                       | 869.1/881.5/893.5                     | >-43                                       | -106                        | <-63                    | <-38       |

**NOTE:**1. Measurement Result = Rejection Ratio

2. Reference Sensitivity is the recorded value when the signal-to-noise ratio is 12dB.

3. Measurement Result = Reference Sensitivity- Spurious Value.

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## **APPENDIX I PHOTOGRAPHS OF TEST SETUP**

Refer to the Report No.: AGC02931221204AP02

## **APPENDIX II: PHOTOGRAPHS OF Test EUT**

Refer to the Report No.: AGC02931221204AP03

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

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9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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