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# FCC Test Report

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Report No.: AGC02931241101FR01

**FCC ID** : 2BLTR-RPT1V

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : DMR Repeater

**BRAND NAME** : TYTECH

**MODEL NAME** : MD-7500

**APPLICANT** : Quanzhou RadioBoss Technology Co., Ltd

**DATE OF ISSUE** : Nov. 20, 2024

**STANDARD(S)** : FCC Part 90 Subpart I

**REPORT VERSION** : V1.0

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**Report Revise Record**

| Report Version | Revise Time | Issued Date   | Valid Version | Notes           |
|----------------|-------------|---------------|---------------|-----------------|
| V1.0           | /           | Nov. 20, 2024 | Valid         | Initial Release |

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**1. General Information**

|                              |                                                                                           |
|------------------------------|-------------------------------------------------------------------------------------------|
| Applicant                    | Quanzhou RadioBoss Technology Co., Ltd                                                    |
| Address                      | No.8, Chuangzao Road, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian |
| Manufacturer                 | Quanzhou RadioBoss Technology Co., Ltd                                                    |
| Address                      | No.8, Chuangzao Road, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian |
| Factory                      | Quanzhou RadioBoss Technology Co., Ltd                                                    |
| Address                      | No.8, Chuangzao Road, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian |
| Product Designation          | DMR Repeater                                                                              |
| Brand Name                   | TYTECH                                                                                    |
| Test Model                   | MD-7500                                                                                   |
| Series Model(s)              | N/A                                                                                       |
| Difference Description       | N/A                                                                                       |
| Date of receipt of test item | Oct. 11, 2024                                                                             |
| Date of Test                 | Oct. 11, 2024~Nov. 20, 2024                                                               |
| Deviation from Standard      | No any deviation from the test method                                                     |
| Condition of Test Sample     | Normal                                                                                    |
| Test Result                  | Pass                                                                                      |
| Test Report Form No          | AGCER-FCC-PMR-V1                                                                          |

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

Prepared By

Bibo Zhang  
(Project Engineer)

Nov. 20, 2024

Reviewed By

Calvin Liu  
(Reviewer)

Nov. 20, 2024

Approved By

Angela Li  
(Authorized Officer)

Nov. 20, 2024

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## 2. Product Information

### 2.1 Product Technical Description

|                           |                                                                                        |                              |
|---------------------------|----------------------------------------------------------------------------------------|------------------------------|
| Communication Type        | Voice / Data (Voice /Tone only)                                                        |                              |
| Operation Frequency Range | From 136MHz to 174MHz                                                                  |                              |
| Hardware Version          | V2.0                                                                                   |                              |
| Software Version          | V1.0.0.56                                                                              |                              |
| Modulation Type           | Analog Voice:                                                                          | FM                           |
|                           | Digital (Voice+Data):                                                                  | 4FSK                         |
| Digital Type              | DMR                                                                                    |                              |
| Channel Separation        | Analog Voice:                                                                          | 12.5 kHz                     |
|                           | Digital (Voice+Data):                                                                  | 12.5 kHz                     |
| Support Data Rate         | 9600bps                                                                                |                              |
| Emission Designator       | Analog Voice:                                                                          | 11K0F3E                      |
|                           | Digital (Voice+Data):                                                                  | 7K73F1D/7K73F1W for VHF band |
| Rated Output Power        | 50W<br>(It was fixed by the manufacturer, any individual can't arbitrarily change it.) |                              |
| Maximum Transmitter Power | Analog:46.551dBm                                                                       |                              |
|                           | Digital:46.541dBm                                                                      |                              |
| Antenna Designation       | Detachable Antenna                                                                     |                              |
| Antenna Gain              | 0dBi                                                                                   |                              |
| Frequency Tolerance       | 1.096ppm                                                                               |                              |
| Power Supply              | AC 120V 60Hz&DC 13.8V, 12A                                                             |                              |

**Note:**

The product has the same digital working characters when operating in both two digitized voice/data mode. So only one set of test results for digital modulation modes are provided in this test report.

This equipment is capable of supporting a minimum data rate of 4800 bits per second per 6.25 kHz of channel bandwidth. DMR interphone's bandwidth is 12.5 kHz, and it has a double time slot, one is the speech time slot, one is the data time slot, just language sequence is satisfied with 4800 bps/6.25 kHz BW.

## 2.2 Test Frequency List

| Operation mode  | Channel Separation | Operation Frequency Range | Test channel | Test Frequency |
|-----------------|--------------------|---------------------------|--------------|----------------|
| Analog/ Digital | 12.5 kHz           | 136-174MHz                | Bottom       | 136.025 MHz    |
|                 | 12.5 kHz           | 136-174MHz                | Middle       | 155.025 MHz    |
|                 | 12.5 kHz           | 136-174MHz                | Top          | 173.975 MHz    |

**Note:**

In section KDB 634817 D01 Sections II) (f) (1) and (2):

Test at least one frequency in each band for each rule part applied under and ensure the device is capable of operating on the frequency under each rule part. This requirement may result in testing on multiple frequencies. Testing on one frequency may be acceptable if multiple listed bands for a rule part with a continuous frequency range are split to remove a conflict with other rules and the technical requirements in the split bands are the same. Additional requirements for RF exposure may apply.

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## 2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: **2BLTR-RPT1V**, filing to comply with Part 2, Part 90 of the Federal Communication Commission rules.

## 2.4 Test Methodology

The tests were performed according to following standards:

| No. | Identity            | Document Title                                                                                    |
|-----|---------------------|---------------------------------------------------------------------------------------------------|
| 1   | FCC 47 CFR Part 90  | Private Land Mobile Radio Services                                                                |
| 2   | FCC 47 CFR Part 2   | Frequency allocations and radio treaty matters; general rules and regulations                     |
| 3   | ANSI TIA-102.CAAA-E | Project 25 Digital C4FM/CQPSK Transceiver Measurement Methods                                     |
| 4   | ANSI C63.26-2015    | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services |
| 5   | KDB 971168 D01      | KDB 971168 D01 Power Meas License Digital Systems v03r01                                          |
| 6   | KDB 579009 D03      | KDB 579009 D03 Applications Part 90 Refarming Bands v01                                           |
| 7   | KDB 634817 D01      | KDB 634817 D01 Freq Range Listing for Grants v04r01                                               |

## 2.5 Calculation of Emission Indicators

FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth

### For FM Mode (Channel Spacing: 12.5kHz)

Emission Designator 11K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

$$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} = 11K0$$

F3E portion of the designator represents an FM voice transmission.

Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

### For Digital Mode (Channel Spacing: 12.5 kHz)

Emission Designator 7K60F1D and 7K60F1W

The 99% energy rule was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.60 kHz.

F1D and F1W portion of the designator indicates digital information.

Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1W.

## 2.6 Special Accessories

Not available for this EUT intended for grant.

## 2.7 Equipment Modifications

Not available for this EUT intended for grant.

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### 3. Test Environment

#### 3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L5488**

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

##### **A2LA-Lab Cert. No.: 5054.02**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 975832**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

##### **IC-Registration No.: 24842(CAB identifier: CN0063)**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

### 3.3 Environmental Conditions

|                         | Normal Conditions | Extreme Conditions        |
|-------------------------|-------------------|---------------------------|
| Temperature range (°C)  | 15 - 35           | -20 - 50                  |
| Relative humidity range | 20 % - 75 %       | 20 % - 75 %               |
| Pressure range (kPa)    | 86 - 106          | 86 - 106                  |
| Power supply            | AC 120V           | LV AC 102V/HV AC 138V     |
|                         | DC 13.8V          | LV DC 11.73V/HV DC 15.87V |

Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.

### 3.4 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

| Test Items                              | Measurement Uncertainty |
|-----------------------------------------|-------------------------|
| Frequency stability                     | $\pm 0.5\%$             |
| Transmitter power conducted             | $\pm 0.8\text{dB}$      |
| Transmitter power Radiated              | $\pm 1.3\text{dB}$      |
| Conducted spurious emission 9kHz-40 GHz | $\pm 2.7\text{dB}$      |
| Conducted Emission                      | $\pm 3.2\text{ dB}$     |
| Radiated Emission below 1GHz            | $\pm 3.9\text{ dB}$     |
| Radiated Emission above 1GHz            | $\pm 4.8\text{ dB}$     |
| Occupied Channel Bandwidth              | $\pm 2\%$               |
| FM deviation                            | $\pm 2\%$               |
| Audio level                             | $\pm 0.98\text{dB}$     |
| Low Pass Filter Response                | $\pm 0.65\text{dB}$     |
| Modulation Limiting                     | 0.42 %                  |
| Transient Frequency Behavior            | 6.8 %                   |

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### 3.5 List of Equipment Used

| ● RF Conducted Test System          |               |                              |              |           |            |                           |                           |
|-------------------------------------|---------------|------------------------------|--------------|-----------|------------|---------------------------|---------------------------|
| Used                                | Equipment No. | Test Equipment               | Manufacturer | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| <input checked="" type="checkbox"/> | AGC-ER-E086   | Spectrum Analyzer            | KEYSIGHT     | N9020A    | MY53300860 | 2024-05-23                | 2025-05-22                |
| <input checked="" type="checkbox"/> | AGC-EM-E002   | Wireless Connectivity Tester | HP           | 8920B     | US35010161 | 2024-05-24                | 2025-05-23                |
| <input type="checkbox"/>            | AGC-EM-E001   | Digital Connectivity Tester  | Aeroflex     | 3920B     | N/A        | 2023-05-11                | 2025-05-10                |
| <input checked="" type="checkbox"/> | AGC-ER-E059   | Signal Generator             | Agilent      | N5182B    | MY53050647 | 2024-02-01                | 2025-01-31                |
| <input checked="" type="checkbox"/> | AGC-ER-E037   | Signal Generator             | Agilent      | N5182A    | MY50140530 | 2024-05-23                | 2025-05-22                |
| <input checked="" type="checkbox"/> | AGC-ER-E075   | Small Environmental Tester   | SH-242       | ESPEC     | 93008290   | 2024-07-24                | 2026-07-23                |
| <input checked="" type="checkbox"/> | AGC-EM-A007   | 30dB Attenuator              | Weinachel    | 58-30-33  | ML030      | 2023-06-01                | 2025-05-31                |
| <input checked="" type="checkbox"/> | AGC-EM-E040   | Directional coupler          | Werlatone    | C5571-10  | 99463      | 2024-02-01                | 2026-01-31                |
| <input checked="" type="checkbox"/> | --            | RF Connection Cable          | N/A          | 1#        | N/A        | Each time                 | N/A                       |
| <input checked="" type="checkbox"/> | --            | RF Connection Cable          | N/A          | 2#        | N/A        | Each time                 | N/A                       |

| ● Radiated Spurious Emission        |               |                                      |              |              |              |                           |                           |
|-------------------------------------|---------------|--------------------------------------|--------------|--------------|--------------|---------------------------|---------------------------|
| Used                                | Equipment No. | Test Equipment                       | Manufacturer | Model No.    | Serial No.   | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| <input checked="" type="checkbox"/> | AGC-EM-E046   | EMI Test Receiver                    | R&S          | ESCI         | 10096        | 2024-02-01                | 2025-01-31                |
| <input checked="" type="checkbox"/> | AGC-EM-E061   | Spectrum Analyzer                    | Agilent      | N9010A       | MY53470504   | 2024-05-28                | 2025-05-27                |
| <input checked="" type="checkbox"/> | AGC-ER-E032   | Universal Radio Communication Tester | R&S          | CMW500       | 120909       | 2024-05-28                | 2025-05-27                |
| <input checked="" type="checkbox"/> | AGC-EM-E086   | Loop Antenna                         | ZHINAN       | ZN30900C     | 18051        | 2024-03-05                | 2026-03-04                |
| <input checked="" type="checkbox"/> | AGC-EM-E001   | Wideband Antenna                     | SCHWARZBECK  | VULB9168     | D69250       | 2023-05-11                | 2025-05-10                |
| <input checked="" type="checkbox"/> | AGC-EM-E005   | Wideband Antenna                     | SCHWARZBECK  | VULB9168     | VULB9168-494 | 2023-01-05                | 2025-01-04                |
| <input checked="" type="checkbox"/> | AGC-EM-E029   | Broadband Ridged Horn Antenna        | ETS          | 3117         | 00034609     | 2024-03-31                | 2025-03-30                |
| <input checked="" type="checkbox"/> | AGC-EM-E102   | Broadband Ridged Horn Antenna        | ETS          | 3117         | 00154520     | 2023-06-03                | 2025-06-02                |
| <input type="checkbox"/>            | AGC-EM-E082   | Horn Antenna                         | SCHWARZBECK  | BBHA 9170    | #768         | 2023-09-24                | 2025-09-23                |
| <input checked="" type="checkbox"/> | AGC-EM-E146   | Pre-amplifier                        | ETS          | 3117-PA      | 00246148     | 2024-07-24                | 2026-07-23                |
| <input type="checkbox"/>            | AGC-EM-E021   | Pre-amplifier                        | MITEQ        | AM-4A-000115 | 1465421      | 2024-05-28                | 2026-05-27                |
| <input checked="" type="checkbox"/> | AGC-ER-E037   | Signal Generator                     | Agilent      | N5182A       | MY50140530   | 2024-05-23                | 2025-05-22                |
| <input type="checkbox"/>            | AGC-EM-A139   | 6dB Attenuator                       | Eeatsheep    | LM-XX-6-2W   | N/A          | 2023-06-09                | 2025-06-08                |
| <input type="checkbox"/>            | AGC-EM-A088   | UHF Filter                           | N/A          | N/A          | N/A          | 2024-05-23                | 2025-05-22                |
| <input checked="" type="checkbox"/> | AGC-EM-A089   | VHF Filter                           | N/A          | N/A          | N/A          | 2024-05-23                | 2025-05-22                |

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| ● Test Software                     |               |                |              |                                 |                     |
|-------------------------------------|---------------|----------------|--------------|---------------------------------|---------------------|
| Used                                | Equipment No. | Test Equipment | Manufacturer | Model No.                       | Version Information |
| <input checked="" type="checkbox"/> | AGC-EM-S004   | RE Test System | Tonscend     | TS <sup>+</sup> Ver2.1(JS32-RE) | 4.0.0.0             |

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## 4. System Test Configuration

### 4.1 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.

### 4.2 EUT Exercise

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

### 4.3 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

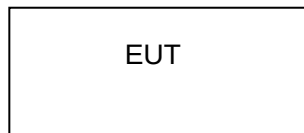


Table 2-1 Equipment Used in Tested System

### 4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

| No. | Equipment  | Model No. | Manufacturer | Specification Information | Cable |
|-----|------------|-----------|--------------|---------------------------|-------|
| 1   | 50ohm Load | N/A       | Amphenol     | DC-3G, Max.50W            | N/A   |

☒ Test Accessories Come From The Manufacturer

| No. | Equipment            | Model No. | Manufacturer | Specification Information | Cable           |
|-----|----------------------|-----------|--------------|---------------------------|-----------------|
| 1   | AC Power Cable       | N/A       | TYT          | N/A                       | 0.6m Unshielded |
| 2   | Write frequency line | N/A       | TYT          | N/A                       | 0.6m Shielded   |
| 3   | Hand microphone      | N/A       | N/A          | N/A                       | 0.8m Shielded   |

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#### 4.5 Summary of Test Results

| Item | FCC Rules          | Description Of Test                                | Result |
|------|--------------------|----------------------------------------------------|--------|
| 1    | 47 CFR FCC PART 90 | Antenna Equipment                                  | Pass   |
| 2    | §90.205& 2.1046    | Maximum Transmitter Power                          | Pass   |
| 3    | §90.207& 2.1047    | Modulation Characteristic                          | Pass   |
| 4    | §2.1047            | Audio Low Pass Filter Response                     | Pass   |
| 5    | §90.209& 2.1049    | 26dB Emission Bandwidth and 99% Occupied Bandwidth | Pass   |
| 6    | §90.210& 2.1049    | Emission Mask                                      | Pass   |
| 7    | §90.213& 2.1055    | Frequency Tolerance                                | Pass   |
| 8    | §90.214            | Transmitter Frequency Behavior                     | Pass   |
| 9    | §90.210& 2.1051    | Spurious Emission on Antenna Port                  | Pass   |
| 10   | §90.210& 2.1053    | Spurious Radiated Emission                         | Pass   |

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## 5. Description of Test Modes

The EUT (**DMR Repeater**) 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. | Test Mode Description          | Channel Separation |
|-----|--------------------------------|--------------------|
| 1   | TX Bottom channel-VHF_AC 120V  | 12.5 kHz           |
| 2   | TX Middle channel-VHF_AC 120V  | 12.5 kHz           |
| 3   | TX Top channel-VHF_AC 120V     | 12.5 kHz           |
| 4   | TX Bottom channel-VHF_DC 13.8V | 12.5 kHz           |
| 5   | TX Middle channel-VHF_DC 13.8V | 12.5 kHz           |
| 6   | TX Top channel-VHF_DC 13.8V    | 12.5 kHz           |

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
4. Manufacturers use computer PC programming software to switch and operate frequency points, refer to the instructions for details

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## 6. Frequency Stability

### 6.1 Provisions Applicable

- According to FCC §2.1055, §90.213, the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade.
- 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.
- According to FCC Part 90 Section 90.213, the frequency tolerance must be maintained within 0.00025% for 12.5 kHz channel separation and 0.0001% for 6.25 kHz channel separation.

### 6.2 Measurement Procedure

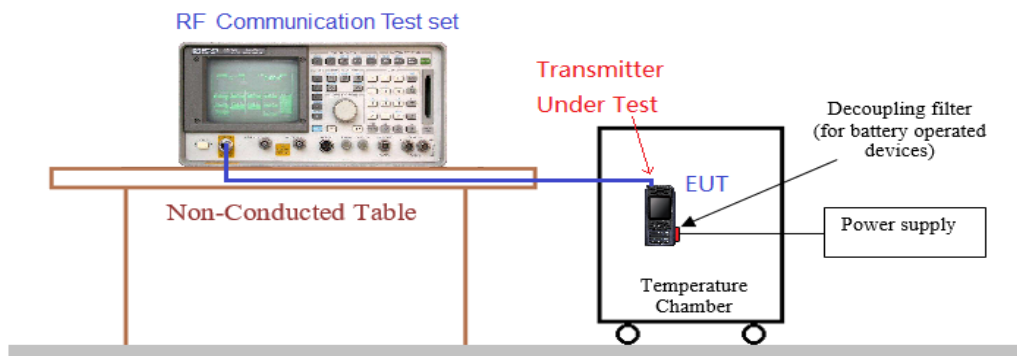
#### 6.2.1 Frequency stability versus environmental temperature

- Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
- 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.
- Set the temperature of chamber to  $50^{\circ}\text{C}$ . 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.
- Repeat step 2 with a  $10^{\circ}\text{C}$  decreased per stage until the lowest temperature  $-30^{\circ}\text{C}$  is measured, record all measured frequencies on each temperature step.

#### 6.2.2 Frequency stability versus input voltage

- Setup the configuration per figure 1 for frequencies measured at temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environment chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. The EUT shall be powered by AC 120V/DC 13.8V.
- 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.
- Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

### 6.3 Measurement Setup



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#### 6.4 Measurement Result

| 12.5 kHz Channel Separation, Analog modulation, Assigned Frequency-50W |           |                       |          |         |             |        |
|------------------------------------------------------------------------|-----------|-----------------------|----------|---------|-------------|--------|
| Test conditions                                                        |           | Frequency error (ppm) |          |         | Limit (ppm) | Result |
| Voltage (V)                                                            | Temp (°C) | Test Frequency (MHz)  |          |         |             |        |
|                                                                        |           | 136.025               | 155.7525 | 173.975 |             |        |
| 120                                                                    | -30       | 0.853                 | 0.760    | 0.922   | 2.5         | Pass   |
|                                                                        | -20       | 0.728                 | 0.687    | 0.637   |             |        |
|                                                                        | -10       | 0.966                 | 0.551    | 0.841   |             |        |
|                                                                        | 0         | 0.735                 | 0.625    | 0.832   |             |        |
|                                                                        | 10        | 0.594                 | 0.880    | 0.674   |             |        |
|                                                                        | 20        | 0.929                 | 0.769    | 0.615   |             |        |
|                                                                        | 30        | 1.070                 | 0.715    | 1.018   |             |        |
|                                                                        | 40        | 1.016                 | 0.901    | 0.525   |             |        |
|                                                                        | 50        | 1.036                 | 0.631    | 1.060   |             |        |
| 138                                                                    | 20        | 0.910                 | 0.938    | 0.961   |             |        |
| 102                                                                    | 20        | 0.862                 | 0.553    | 1.017   |             |        |

| 12.5 kHz Channel Separation, Analog modulation, Assigned Frequency-50W |           |                       |              |         |             |        |
|------------------------------------------------------------------------|-----------|-----------------------|--------------|---------|-------------|--------|
| Test conditions                                                        |           | Frequency error (ppm) |              |         | Limit (ppm) | Result |
| Voltage (V)                                                            | Temp (°C) | Test Frequency (MHz)  |              |         |             |        |
|                                                                        |           | 136.025               | 155.7525     | 173.975 |             |        |
| 13.8                                                                   | -30       | 0.559                 | <b>1.096</b> | 0.629   | 2.5         | Pass   |
|                                                                        | -20       | 0.553                 | 0.685        | 0.741   |             |        |
|                                                                        | -10       | 0.715                 | 0.516        | 1.016   |             |        |
|                                                                        | 0         | 0.633                 | 0.710        | 0.644   |             |        |
|                                                                        | 10        | 0.595                 | 0.576        | 0.730   |             |        |
|                                                                        | 20        | 0.819                 | 0.794        | 0.511   |             |        |
|                                                                        | 30        | 0.685                 | 0.507        | 0.753   |             |        |
|                                                                        | 40        | 0.704                 | 0.593        | 1.011   |             |        |
|                                                                        | 50        | 0.880                 | 0.634        | 0.703   |             |        |
| 15.87                                                                  | 20        | 0.509                 | 0.576        | 0.995   |             |        |
| 11.73                                                                  | 20        | 0.703                 | 0.712        | 1.035   |             |        |

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## 7. 26dB Emission Bandwidth and 99% Occupied Bandwidth

### 7.1 Provisions Applicable

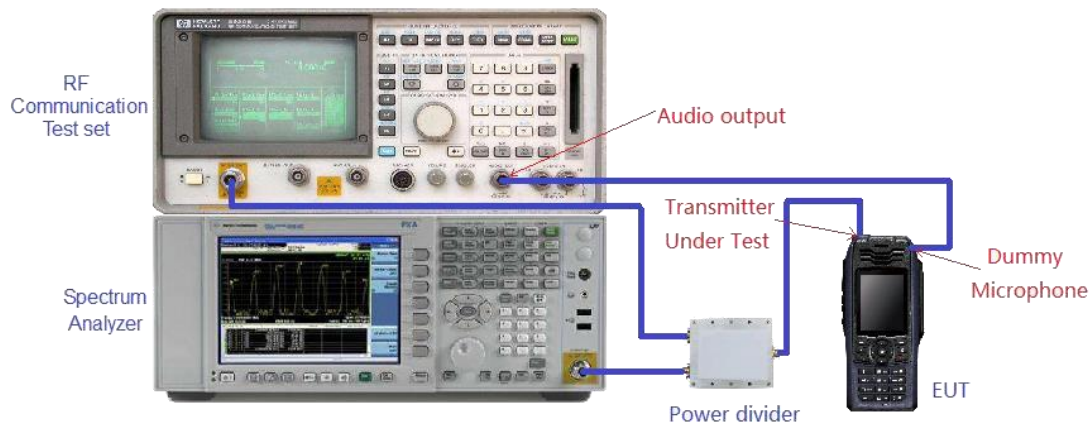
FCC Part 90.209 & FCC Part 2.1049:

The authorized bandwidth shall be 11.25 kHz for 12.5 kHz channel separation and 6 kHz for 6.25 kHz channel separation.

### 7.2 Measurement Procedure

1. The EUT was modulated by 2.5kHz sine wave audio signal; the level of the audio signal employed is 16dB greater than that necessary to produce 50% of rated system deviation.
2. Rated system deviation is 2.5 kHz for 12.5kHz channel spacing.
3. Spectrum set as follow:
4. Centre frequency = fundamental frequency.
5. Span=50kHz for 12.5kHz channel spacing.
6. RBW=100Hz, VBW=300Hz, Sweep = auto.
7. Detector function = peak, Trace = max hold.
8. Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.
9. Measure and record the results in the test report.

### 7.3 Measurement Setup



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## 7.4 Measurement Result

Measurement Power Supply: DC 13.8V

| Measurement Result of VHF-Analog Modulation-50W |                             |                    |           |        |
|-------------------------------------------------|-----------------------------|--------------------|-----------|--------|
| Operating Frequency                             | 12.5 kHz Channel Separation |                    |           |        |
|                                                 | Occupied Bandwidth          | Emission Bandwidth | Limits    | Result |
| 136.025MHz                                      | 9.852 kHz                   | 10.46 kHz          | 11.25 kHz | Pass   |
| 155.7525MHz                                     | 9.831 kHz                   | 10.45 kHz          | 11.25 kHz | Pass   |
| 173.975MHz                                      | 9.841 kHz                   | 10.45 kHz          | 11.25 kHz | Pass   |

| Measurement Result of VHF-Digital Modulation-50W |                             |                    |           |        |
|--------------------------------------------------|-----------------------------|--------------------|-----------|--------|
| Operating Frequency                              | 12.5 kHz Channel Separation |                    |           |        |
|                                                  | Occupied Bandwidth          | Emission Bandwidth | Limits    | Result |
| 136.025MHz                                       | 7.729 kHz                   | 9.640 kHz          | 11.25 kHz | Pass   |
| 155.7525MHz                                      | 7.555 kHz                   | 9.752 kHz          | 11.25 kHz | Pass   |
| 173.975MHz                                       | 7.509 kHz                   | 9.338 kHz          | 11.25 kHz | Pass   |

Measurement Power Supply: AC 120V

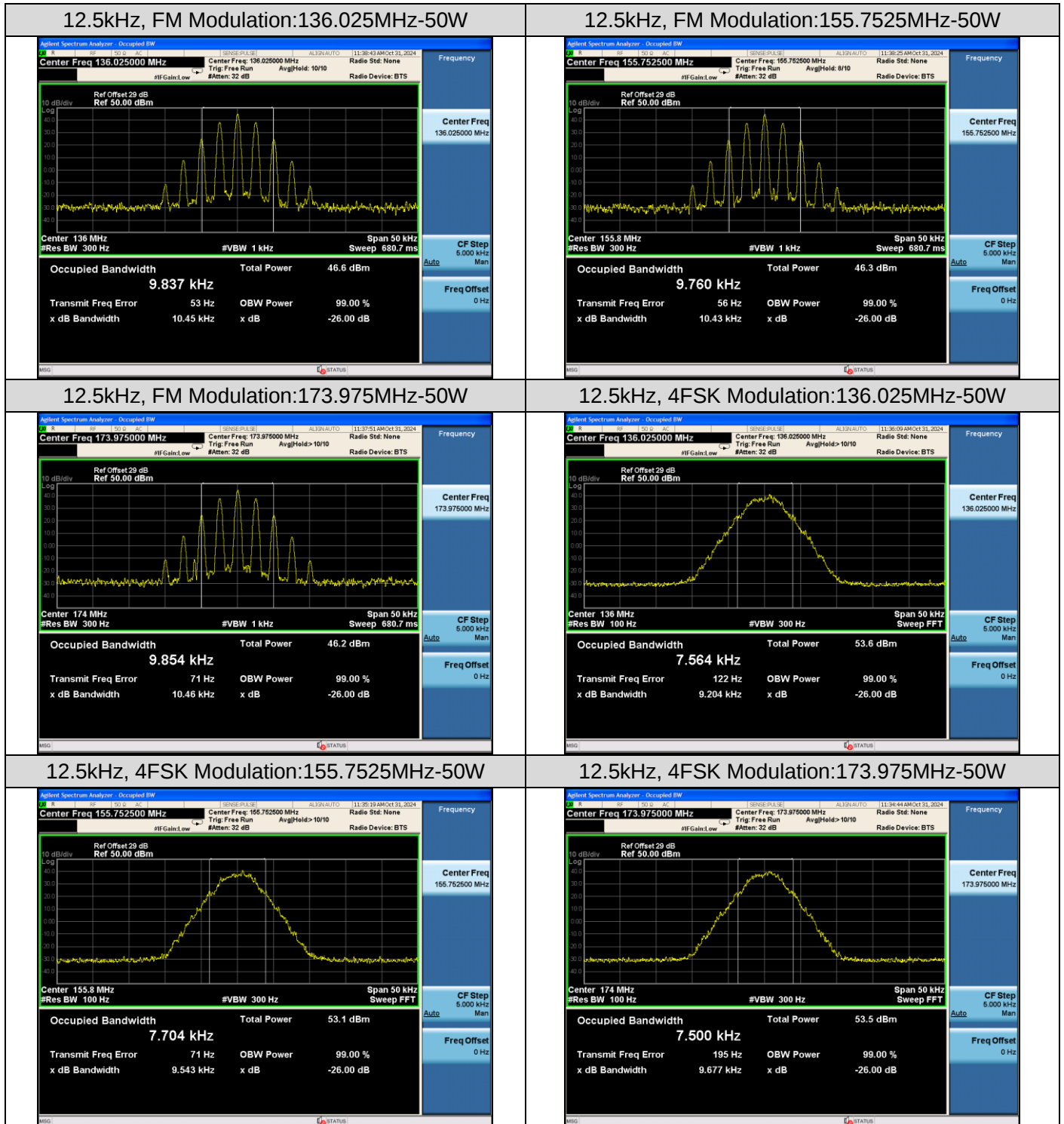
| Measurement Result of VHF-Analog Modulation-50W |                             |                    |           |        |
|-------------------------------------------------|-----------------------------|--------------------|-----------|--------|
| Operating Frequency                             | 12.5 kHz Channel Separation |                    |           |        |
|                                                 | Occupied Bandwidth          | Emission Bandwidth | Limits    | Result |
| 136.025MHz                                      | 9.837 kHz                   | 10.45 kHz          | 11.25 kHz | Pass   |
| 155.7525MHz                                     | 9.760 kHz                   | 10.43 kHz          | 11.25 kHz | Pass   |
| 173.975MHz                                      | 9.854 kHz                   | 10.46 kHz          | 11.25 kHz | Pass   |

| Measurement Result of VHF-Digital Modulation-50W |                             |                    |           |        |
|--------------------------------------------------|-----------------------------|--------------------|-----------|--------|
| Operating Frequency                              | 12.5 kHz Channel Separation |                    |           |        |
|                                                  | Occupied Bandwidth          | Emission Bandwidth | Limits    | Result |
| 136.025MHz                                       | 7.564 kHz                   | 9.204 kHz          | 11.25 kHz | Pass   |
| 155.7525MHz                                      | 7.704 kHz                   | 9.543 kHz          | 11.25 kHz | Pass   |
| 173.975MHz                                       | 7.500 kHz                   | 9.677 kHz          | 11.25 kHz | Pass   |

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Measurement Power Supply: AC 120V

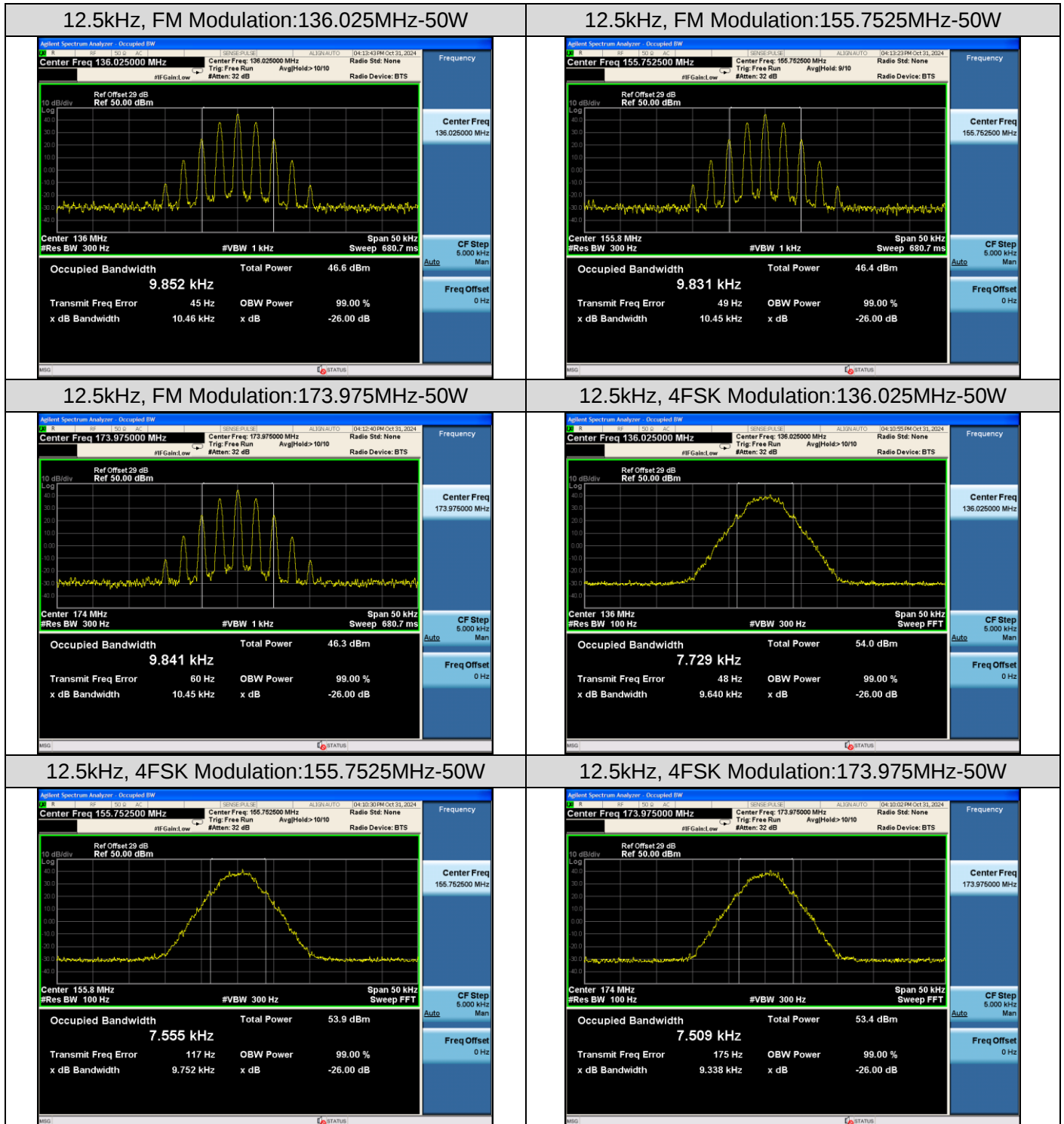
Test plot as follows:



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Measurement Power Supply: DC 13.8V

Test plot as follows:



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## 8. Spurious Radiated Emission

### 8.1 Provisions Applicable

According to FCC §2.1053 and §90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with each channel separation.

Emission Mask D -for 12.5 kHz Channel Separation:

- (1) On any frequency removed from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement Frequency ( $f_d$  in kHz)  $f_0$  of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement Frequency ( $f_d$  in kHz)  $f_0$  of more than 12.5 kHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is lesser attenuation.

### 8.2 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 then 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.

### 8.3 MEASUREMENT SETUP

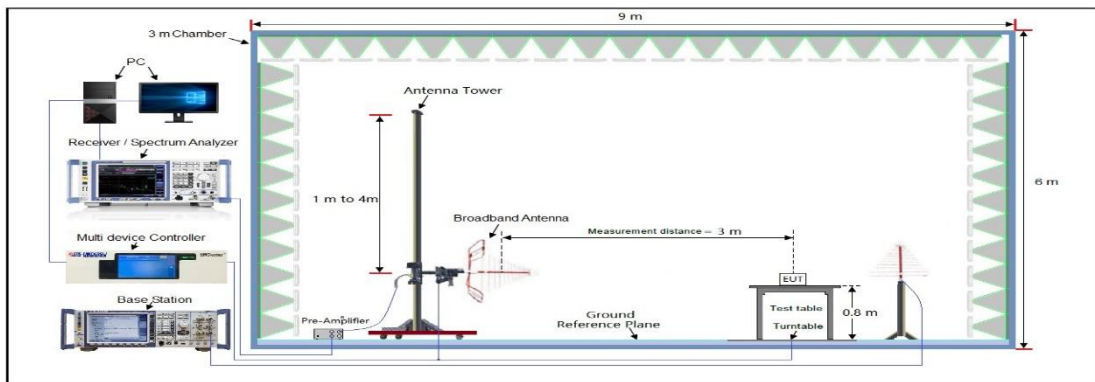
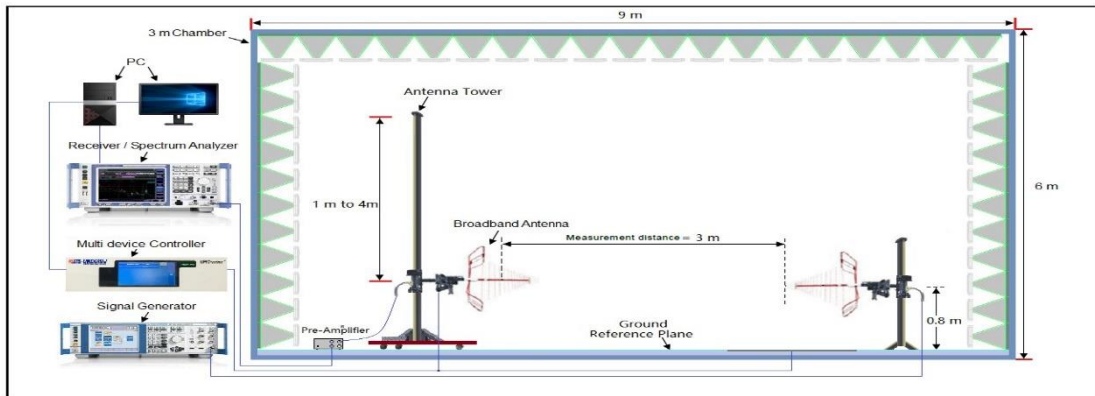
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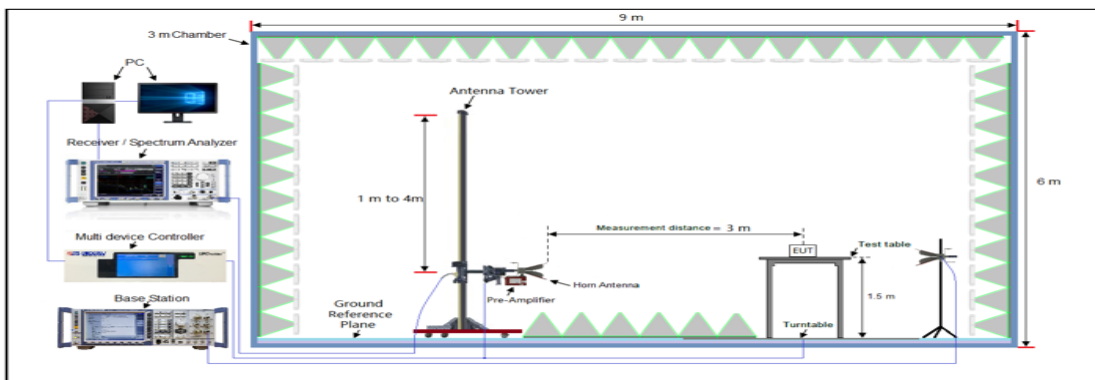
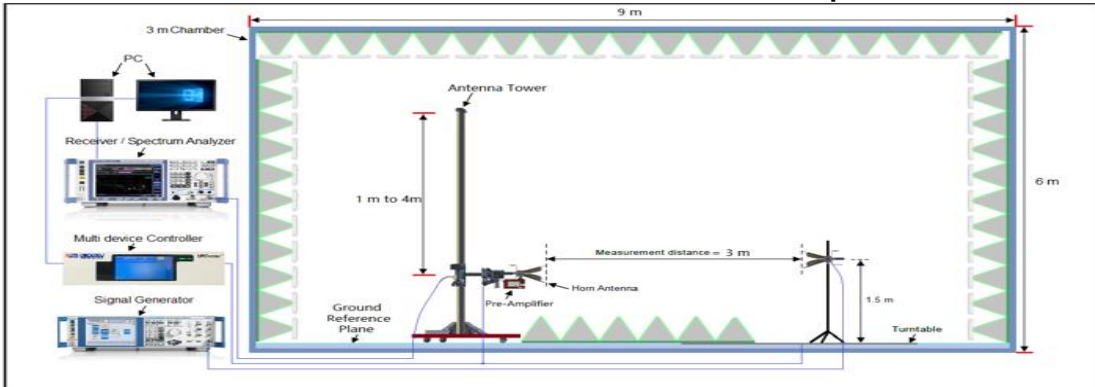
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### Radiated Emissions 30MHz to 1GHz Test setup



### Radiated Emissions Above 1GHz Test setup



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#### 8.4 Measurement Result

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10 harmonic.

In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The "Read Value" is the spectrum reading of maximum power value.

The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.

EIRP = "Read Value" + Measured substitution value + 2.15.

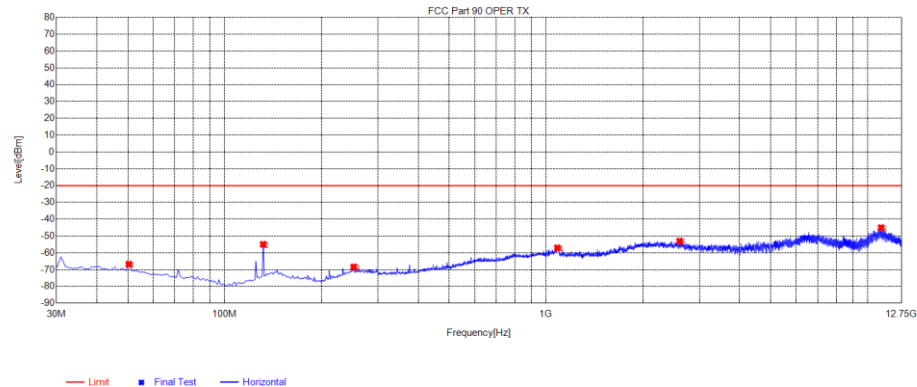
Test limit calculation:

| Preliminary calculation                                    | Final Result                                                |
|------------------------------------------------------------|-------------------------------------------------------------|
| At least $50 + 10 \log(P) = 50 + 10 \log(50) = 66.99$ (dB) | Limit=P- Preliminary calculation= $46.99 - 66.99 = -20$ dBm |

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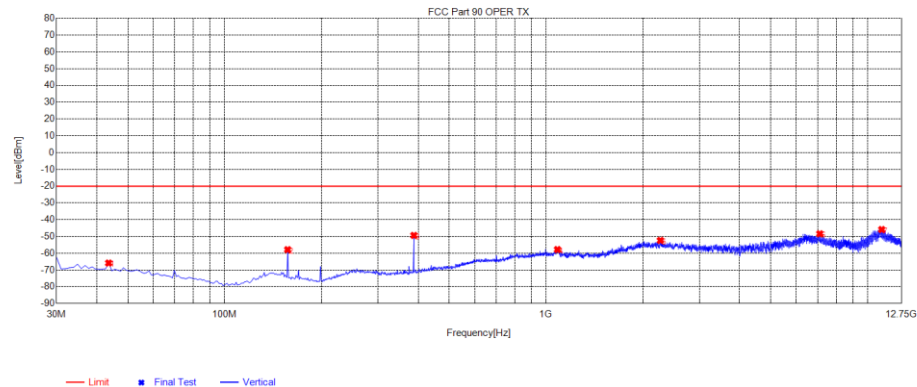
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|            |                         |           |            |
|------------|-------------------------|-----------|------------|
| Test Mode: | TX:136.025MHz-FM-AC120V | Polarity: | Horizontal |
|------------|-------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 50.37       | -95.42        | -66.82      | -20.00      | 46.82       | 28.60       | 39        | Horizontal |
| 2   | 131.85      | -80.39        | -54.97      | -20.00      | 34.97       | 25.42       | 350       | Horizontal |
| 3   | 252.13      | -97.10        | -68.45      | -20.00      | 48.45       | 28.65       | 359       | Horizontal |
| 4   | 1084.6085   | -53.02        | -57.08      | -20.00      | 37.08       | -4.06       | 57        | Horizontal |
| 5   | 2604.0354   | -55.41        | -53.09      | -20.00      | 33.09       | 2.32        | 92        | Horizontal |
| 6   | 11029.628   | -58.85        | -45.06      | -20.00      | 25.06       | 13.79       | 137       | Horizontal |

|            |                         |           |          |
|------------|-------------------------|-----------|----------|
| Test Mode: | TX:136.025MHz-FM-AC120V | Polarity: | Vertical |
|------------|-------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 43.58       | -95.06        | -65.87      | -20.00      | 45.87       | 29.19       | 360       | Vertical |
| 2   | 157.07      | -82.96        | -57.88      | -20.00      | 37.88       | 25.08       | 336       | Vertical |
| 3   | 387.93      | -78.75        | -49.40      | -20.00      | 29.40       | 29.35       | 360       | Vertical |
| 4   | 1084.6085   | -53.76        | -57.82      | -20.00      | 37.82       | -4.06       | 168       | Vertical |
| 5   | 2267.9518   | -54.67        | -52.38      | -20.00      | 32.38       | 2.29        | 360       | Vertical |
| 6   | 7102.3852   | -56.57        | -48.43      | -20.00      | 28.43       | 8.14        | 266       | Vertical |
|     | 11071.9322  | -59.67        | -45.90      | -20.00      | 25.90       | 13.77       | 80        |          |

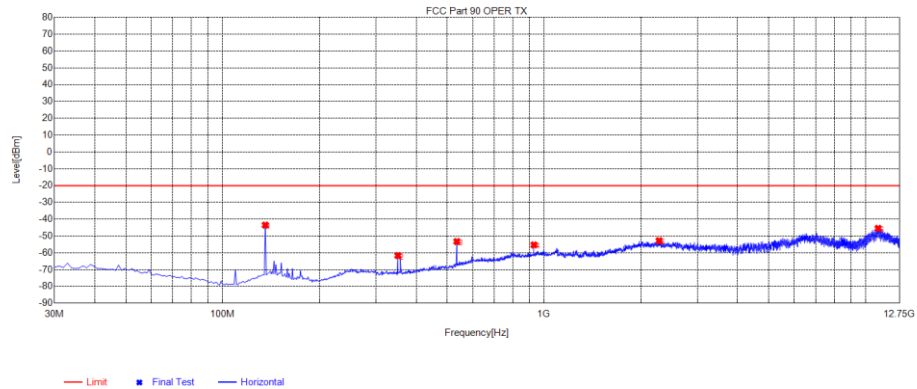
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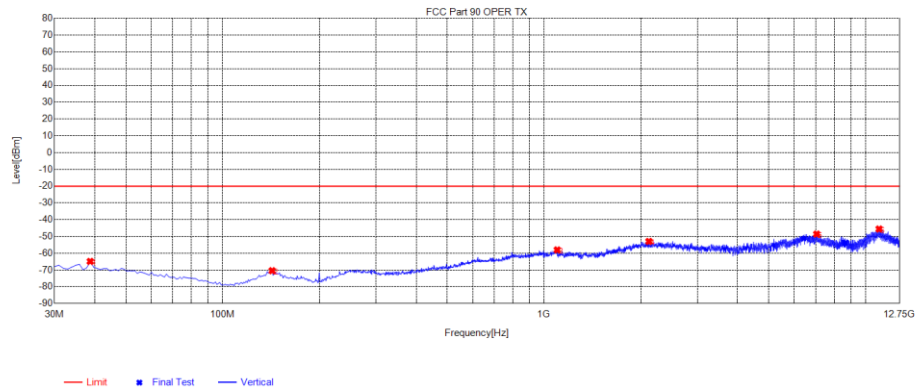
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                          |           |            |
|------------|--------------------------|-----------|------------|
| Test Mode: | TX:155.7525MHz-FM-AC120V | Polarity: | Horizontal |
|------------|--------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 135.73      | -69.86        | -43.53      | -20.00      | 23.53       | 26.33       | 359       | Horizontal |
| 2   | 351.07      | -89.99        | -61.64      | -20.00      | 41.64       | 28.35       | 359       | Horizontal |
| 3   | 535.37      | -85.81        | -53.28      | -20.00      | 33.28       | 32.53       | 148       | Horizontal |
| 4   | 930.16      | -93.44        | -55.31      | -20.00      | 35.31       | 38.13       | 148       | Horizontal |
| 5   | 2279.703    | -55.09        | -52.79      | -20.00      | 32.79       | 2.30        | 218       | Horizontal |
| 6   | 10946.1946  | -59.09        | -45.45      | -20.00      | 25.45       | 13.64       | 156       | Horizontal |

|            |                          |           |          |
|------------|--------------------------|-----------|----------|
| Test Mode: | TX:155.7525MHz-FM-AC120V | Polarity: | Vertical |
|------------|--------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 38.73       | -94.30        | -64.89      | -20.00      | 44.89       | 29.41       | 224       | Vertical |
| 2   | 142.52      | -97.51        | -70.42      | -20.00      | 50.42       | 27.09       | 360       | Vertical |
| 3   | 1098.7099   | -53.97        | -58.03      | -20.00      | 38.03       | -4.06       | 100       | Vertical |
| 4   | 2119.887    | -55.13        | -52.99      | -20.00      | 32.99       | 2.14        | 329       | Vertical |
| 5   | 7047.1547   | -56.82        | -48.60      | -20.00      | 28.60       | 8.22        | 20        | Vertical |
| 6   | 11024.9275  | -59.38        | -45.58      | -20.00      | 25.58       | 13.80       | 46        | Vertical |

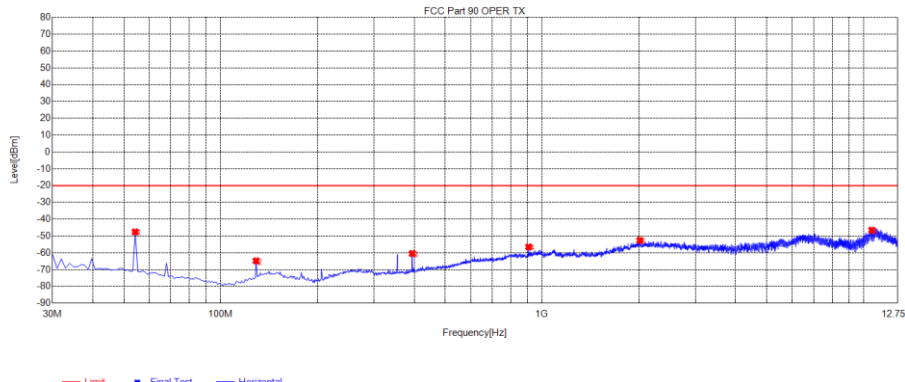
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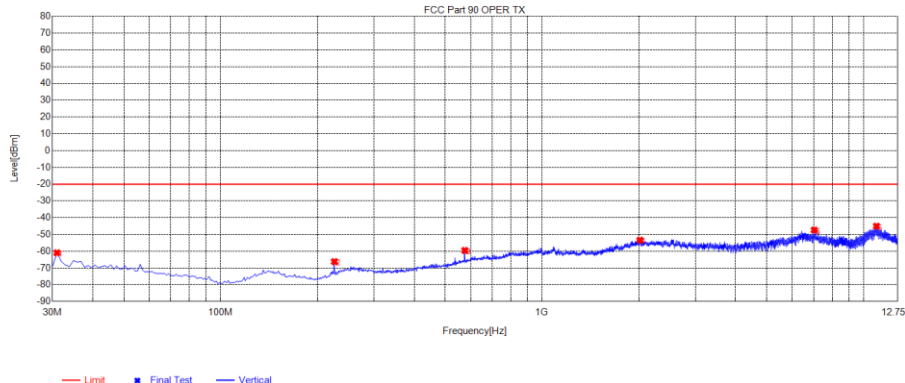
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                         |           |            |
|------------|-------------------------|-----------|------------|
| Test Mode: | TX:173.975MHz-FM-AC120V | Polarity: | Horizontal |
|------------|-------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 54.25       | -75.24        | -47.54      | -20.00      | 27.54       | 27.70       | 340       | Horizontal |
| 2   | 128.94      | -89.48        | -64.76      | -20.00      | 44.76       | 24.72       | 350       | Horizontal |
| 3   | 394.72      | -89.94        | -60.42      | -20.00      | 40.42       | 29.52       | 305       | Horizontal |
| 4   | 908.82      | -94.21        | -56.50      | -20.00      | 36.50       | 37.71       | 66        | Horizontal |
| 5   | 2015.3015   | -54.66        | -52.62      | -20.00      | 32.62       | 2.04        | 127       | Horizontal |
| 6   | 10610.111   | -59.07        | -46.54      | -20.00      | 26.54       | 12.53       | 127       | Horizontal |

|            |                         |           |          |
|------------|-------------------------|-----------|----------|
| Test Mode: | TX:173.975MHz-FM-AC120V | Polarity: | Vertical |
|------------|-------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 30.97       | -90.04        | -60.94      | -20.00      | 40.94       | 29.10       | 97        | Vertical |
| 2   | 225.94      | -92.33        | -66.23      | -20.00      | 46.23       | 26.10       | 53        | Vertical |
| 3   | 575.14      | -93.38        | -59.55      | -20.00      | 39.55       | 33.83       | 124       | Vertical |
| 4   | 2017.6518   | -55.45        | -53.42      | -20.00      | 33.42       | 2.03        | 115       | Vertical |
| 5   | 7023.6524   | -55.69        | -47.43      | -20.00      | 27.43       | 8.26        | 360       | Vertical |
| 6   | 10974.3974  | -58.79        | -45.06      | -20.00      | 25.06       | 13.73       | 360       | Vertical |

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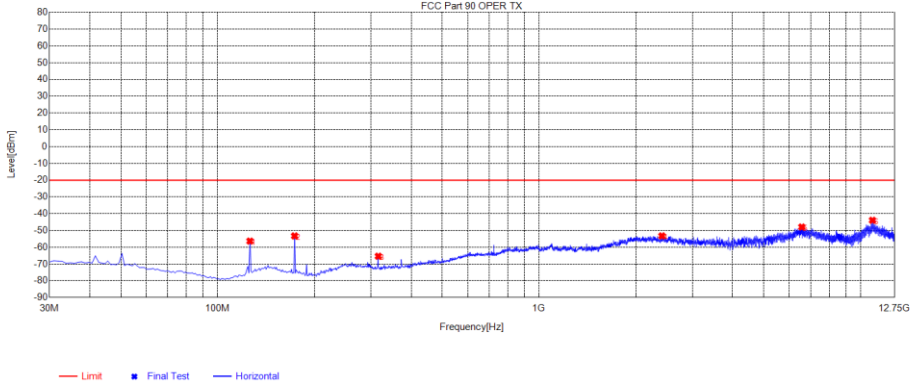
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Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                           |           |            |
|------------|---------------------------|-----------|------------|
| Test Mode: | TX:136.025MHz-4FSK-AC120V | Polarity: | Horizontal |
|------------|---------------------------|-----------|------------|



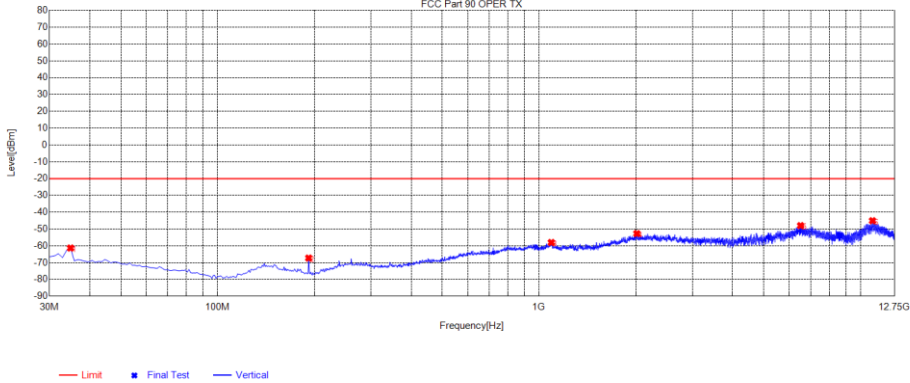
  

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 126.03      | -80.40        | -56.36      | -20.00      | 36.36       | 24.04       | 86        | Horizontal |
| 2   | 173.56      | -77.91        | -53.28      | -20.00      | 33.28       | 24.63       | 86        | Horizontal |
| 3   | 316.15      | -93.47        | -65.37      | -20.00      | 45.37       | 28.10       | 350       | Horizontal |
| 4   | 2410.141    | -55.70        | -53.27      | -20.00      | 33.27       | 2.43        | 51        | Horizontal |
| 5   | 6566.5317   | -55.72        | -47.97      | -20.00      | 27.97       | 7.75        | 359       | Horizontal |
| 6   | 10890.9641  | -57.41        | -43.95      | -20.00      | 23.95       | 13.46       | 325       | Horizontal |

|            |                           |           |          |
|------------|---------------------------|-----------|----------|
| Test Mode: | TX:136.025MHz-4FSK-AC120V | Polarity: | Vertical |
|------------|---------------------------|-----------|----------|

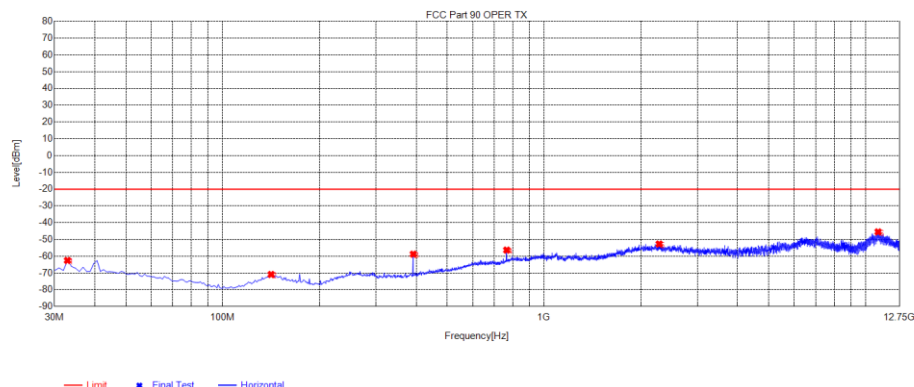


| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 34.85       | -90.58        | -61.32      | -20.00      | 41.32       | 29.26       | 294       | Vertical |
| 2   | 191.99      | -90.49        | -67.30      | -20.00      | 47.30       | 23.19       | 197       | Vertical |
| 3   | 1091.6592   | -53.99        | -58.05      | -20.00      | 38.05       | -4.06       | 20        | Vertical |
| 4   | 2014.1264   | -54.77        | -52.74      | -20.00      | 32.74       | 2.03        | 347       | Vertical |
| 5   | 6510.126    | -55.68        | -48.00      | -20.00      | 28.00       | 7.68        | 126       | Vertical |
| 6   | 10894.4894  | -58.56        | -45.09      | -20.00      | 25.09       | 13.47       | 153       | Vertical |

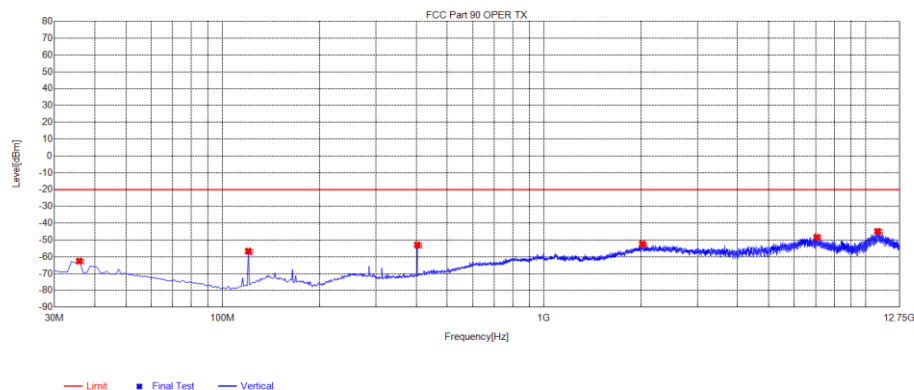
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|            |                            |           |            |
|------------|----------------------------|-----------|------------|
| Test Mode: | TX:155.7525MHz-4FSK-AC120V | Polarity: | Horizontal |
|------------|----------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 32.91       | -91.72        | -62.54      | -20.00      | 42.54       | 29.18       | 359       | Horizontal |
| 2   | 141.55      | -98.07        | -70.89      | -20.00      | 50.89       | 27.18       | 0         | Horizontal |
| 3   | 391.81      | -88.23        | -58.79      | -20.00      | 38.79       | 29.44       | 296       | Horizontal |
| 4   | 765.26      | -92.62        | -56.35      | -20.00      | 36.35       | 36.27       | 0         | Horizontal |
| 5   | 2280.8781   | -55.03        | -52.73      | -20.00      | 32.73       | 2.30        | 22        | Horizontal |
| 6   | 10942.6693  | -59.12        | -45.49      | -20.00      | 25.49       | 13.63       | 0         | Horizontal |

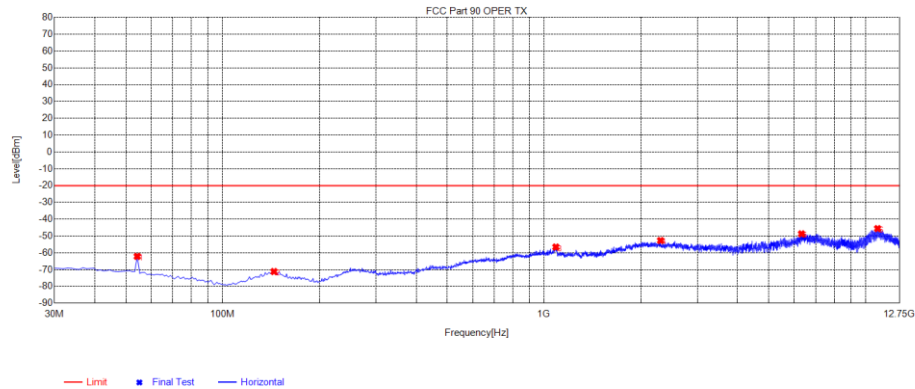
|            |                            |           |          |
|------------|----------------------------|-----------|----------|
| Test Mode: | TX:155.7525MHz-4FSK-AC120V | Polarity: | Vertical |
|------------|----------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 35.82       | -91.85        | -62.57      | -20.00      | 42.57       | 29.28       | 46        | Vertical |
| 2   | 120.21      | -79.32        | -56.65      | -20.00      | 36.65       | 22.67       | 46        | Vertical |
| 3   | 403.45      | -82.72        | -52.96      | -20.00      | 32.96       | 29.76       | 197       | Vertical |
| 4   | 2022.3522   | -54.43        | -52.39      | -20.00      | 32.39       | 2.04        | 73        | Vertical |
| 5   | 7051.8552   | -56.58        | -48.36      | -20.00      | 28.36       | 8.22        | 360       | Vertical |
| 6   | 10895.6646  | -58.37        | -44.90      | -20.00      | 24.90       | 13.47       | 1         | Vertical |

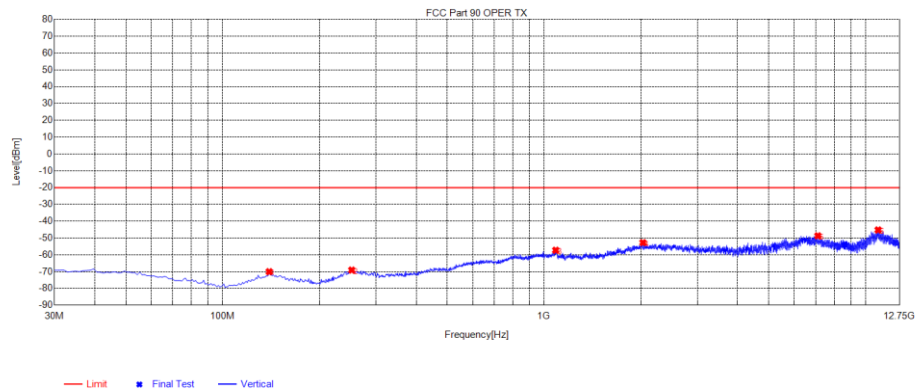
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|            |                           |           |            |
|------------|---------------------------|-----------|------------|
| Test Mode: | TX:173.975MHz-4FSK-AC120V | Polarity: | Horizontal |
|------------|---------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 54.25       | -89.82        | -62.12      | -20.00      | 42.12       | 27.70       | 359       | Horizontal |
| 2   | 144.46      | -98.05        | -71.16      | -20.00      | 51.16       | 26.89       | 128       | Horizontal |
| 3   | 1088.1338   | -52.53        | -56.60      | -20.00      | 36.60       | -4.07       | 119       | Horizontal |
| 4   | 2303.2053   | -55.04        | -52.71      | -20.00      | 32.71       | 2.33        | 252       | Horizontal |
| 5   | 6323.2823   | -56.04        | -48.72      | -20.00      | 28.72       | 7.32        | 359       | Horizontal |
| 6   | 10906.2406  | -59.10        | -45.59      | -20.00      | 25.59       | 13.51       | 110       | Horizontal |

|            |                           |           |          |
|------------|---------------------------|-----------|----------|
| Test Mode: | TX:173.975MHz-4FSK-AC120V | Polarity: | Vertical |
|------------|---------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 139.61      | -97.31        | -70.05      | -20.00      | 50.05       | 27.26       | 187       | Vertical |
| 2   | 252.13      | -97.76        | -69.11      | -20.00      | 49.11       | 28.65       | 142       | Vertical |
| 3   | 1086.9587   | -53.24        | -57.30      | -20.00      | 37.30       | -4.06       | 187       | Vertical |
| 4   | 2030.5781   | -54.84        | -52.79      | -20.00      | 32.79       | 2.05        | 124       | Vertical |
| 5   | 7107.0857   | -56.82        | -48.70      | -20.00      | 28.70       | 8.12        | 360       | Vertical |
| 6   | 10946.1946  | -58.86        | -45.22      | -20.00      | 25.22       | 13.64       | 133       | Vertical |

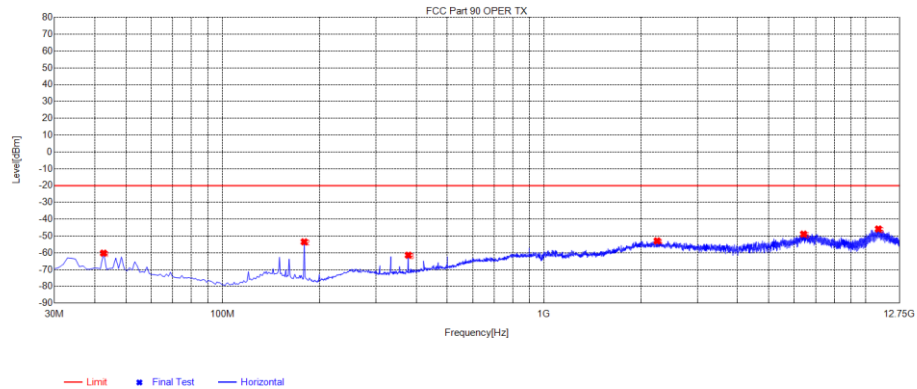
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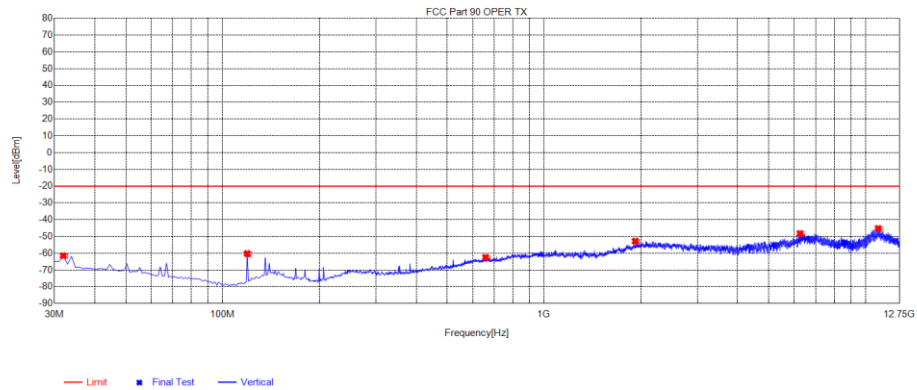
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                          |           |            |
|------------|--------------------------|-----------|------------|
| Test Mode: | TX:136.025MHz-FM-DC13.8V | Polarity: | Horizontal |
|------------|--------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 42.61       | -89.45        | -60.20      | -20.00      | 40.20       | 29.25       | 350       | Horizontal |
| 2   | 179.38      | -78.04        | -53.48      | -20.00      | 33.48       | 24.56       | 138       | Horizontal |
| 3   | 378.23      | -90.49        | -61.42      | -20.00      | 41.42       | 29.07       | 14        | Horizontal |
| 4   | 2247.9748   | -55.21        | -52.94      | -20.00      | 32.94       | 2.27        | 59        | Horizontal |
| 5   | 6417.2917   | -56.40        | -48.90      | -20.00      | 28.90       | 7.50        | 340       | Horizontal |
| 6   | 10968.5219  | -59.55        | -45.83      | -20.00      | 25.83       | 13.72       | 0         | Horizontal |

|            |                          |           |          |
|------------|--------------------------|-----------|----------|
| Test Mode: | TX:136.025MHz-FM-DC13.8V | Polarity: | Vertical |
|------------|--------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 31.94       | -90.67        | -61.54      | -20.00      | 41.54       | 29.13       | 239       | Vertical |
| 2   | 119.24      | -82.69        | -60.23      | -20.00      | 40.23       | 22.46       | 1         | Vertical |
| 3   | 657.59      | -97.32        | -62.56      | -20.00      | 42.56       | 34.76       | 18        | Vertical |
| 4   | 1921.2921   | -53.86        | -52.81      | -20.00      | 32.81       | 1.05        | 222       | Vertical |
| 5   | 6255.1255   | -55.44        | -48.26      | -20.00      | 28.26       | 7.18        | 169       | Vertical |
| 6   | 10948.5449  | -58.93        | -45.28      | -20.00      | 25.28       | 13.65       | 311       | Vertical |

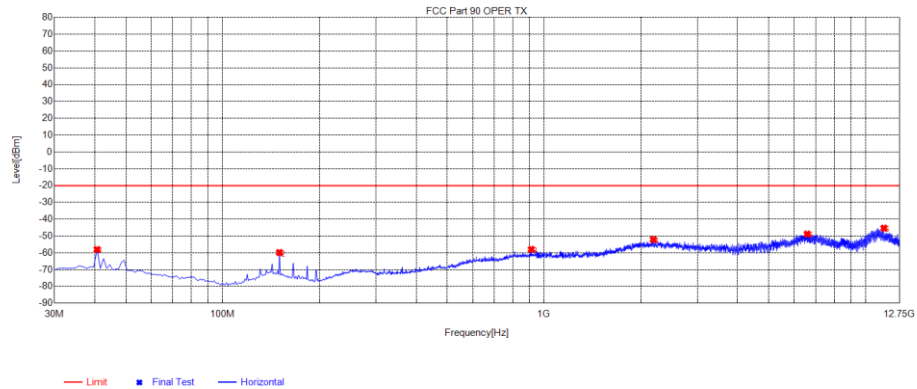
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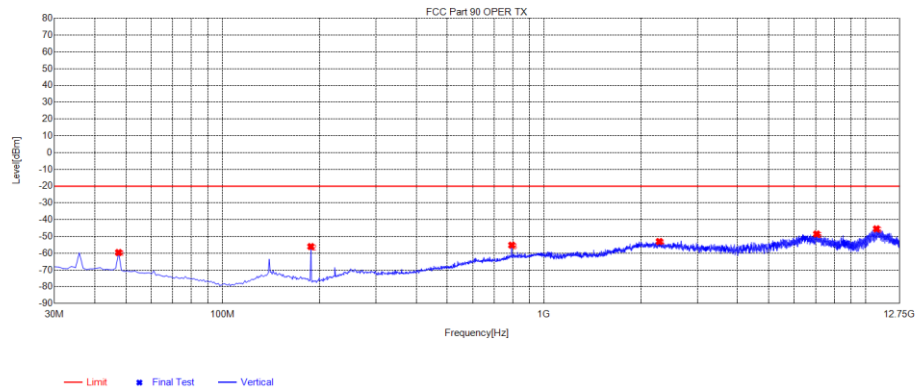
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|            |                           |           |            |
|------------|---------------------------|-----------|------------|
| Test Mode: | TX:155.7525MHz-FM-DC13.8V | Polarity: | Horizontal |
|------------|---------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 40.67       | -87.45        | -58.04      | -20.00      | 38.04       | 29.41       | 324       | Horizontal |
| 2   | 150.28      | -86.11        | -59.84      | -20.00      | 39.84       | 26.27       | 324       | Horizontal |
| 3   | 912.7       | -95.72        | -57.94      | -20.00      | 37.94       | 37.78       | 351       | Horizontal |
| 4   | 2185.6936   | -54.35        | -52.13      | -20.00      | 32.13       | 2.22        | 0         | Horizontal |
| 5   | 6585.3335   | -56.58        | -48.81      | -20.00      | 28.81       | 7.77        | 333       | Horizontal |
| 6   | 11409.1909  | -58.82        | -45.33      | -20.00      | 25.33       | 13.49       | 49        | Horizontal |

|            |                           |           |          |
|------------|---------------------------|-----------|----------|
| Test Mode: | TX:155.7525MHz-FM-DC13.8V | Polarity: | Vertical |
|------------|---------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 47.46       | -88.49        | -59.60      | -20.00      | 39.60       | 28.89       | 294       | Vertical |
| 2   | 188.11      | -79.43        | -56.02      | -20.00      | 36.02       | 23.41       | 89        | Vertical |
| 3   | 793.39      | -92.65        | -55.21      | -20.00      | 35.21       | 37.44       | 89        | Vertical |
| 4   | 2283.2283   | -55.36        | -53.05      | -20.00      | 33.05       | 2.31        | 35        | Vertical |
| 5   | 7045.9796   | -56.81        | -48.58      | -20.00      | 28.58       | 8.23        | 284       | Vertical |
| 6   | 10818.1068  | -58.72        | -45.50      | -20.00      | 25.50       | 13.22       | 116       | Vertical |

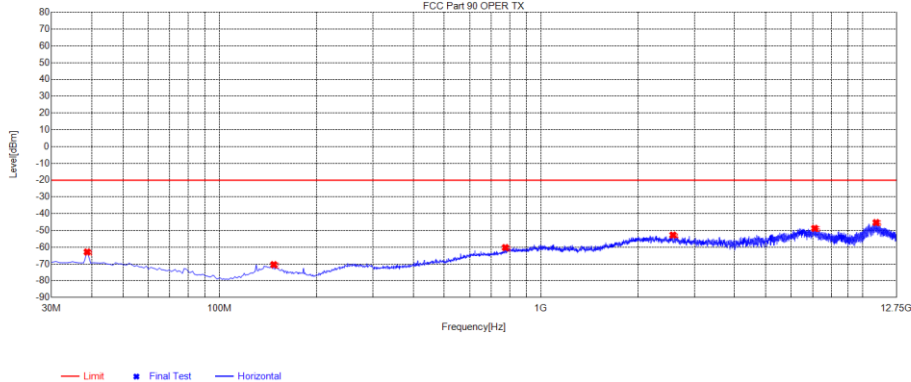
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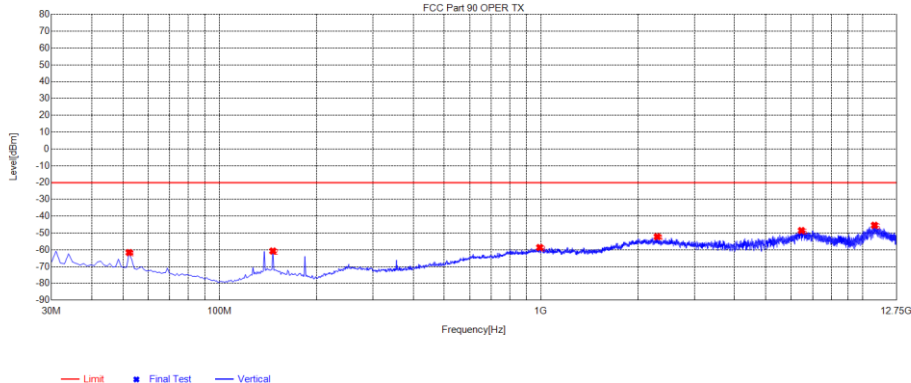
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                          |           |            |
|------------|--------------------------|-----------|------------|
| Test Mode: | TX:173.975MHz-FM-DC13.8V | Polarity: | Horizontal |
|------------|--------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 38.73       | -92.27        | -62.86      | -20.00      | 42.86       | 29.41       | 136       | Horizontal |
| 2   | 147.37      | -96.97        | -70.39      | -20.00      | 50.39       | 26.58       | 332       | Horizontal |
| 3   | 773.99      | -96.88        | -60.24      | -20.00      | 40.24       | 36.64       | 340       | Horizontal |
| 4   | 2572.3072   | -55.16        | -52.78      | -20.00      | 32.78       | 2.38        | 323       | Horizontal |
| 5   | 7098.8599   | -56.89        | -48.75      | -20.00      | 28.75       | 8.14        | 359       | Horizontal |
| 6   | 11023.7524  | -59.11        | -45.31      | -20.00      | 25.31       | 13.80       | 225       | Horizontal |

|            |                          |           |          |
|------------|--------------------------|-----------|----------|
| Test Mode: | TX:173.975MHz-FM-DC13.8V | Polarity: | Vertical |
|------------|--------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 52.31       | -89.79        | -61.64      | -20.00      | 41.64       | 28.15       | 10        | Vertical |
| 2   | 146.4       | -87.41        | -60.72      | -20.00      | 40.72       | 26.69       | 337       | Vertical |
| 3   | 990.3       | -97.39        | -58.62      | -20.00      | 38.62       | 38.77       | 354       | Vertical |
| 4   | 2298.5048   | -54.52        | -52.19      | -20.00      | 32.19       | 2.33        | 168       | Vertical |
| 5   | 6456.0706   | -56.12        | -48.55      | -20.00      | 28.55       | 7.57        | 168       | Vertical |
| 6   | 10894.4894  | -58.88        | -45.41      | -20.00      | 25.41       | 13.47       | 360       | Vertical |

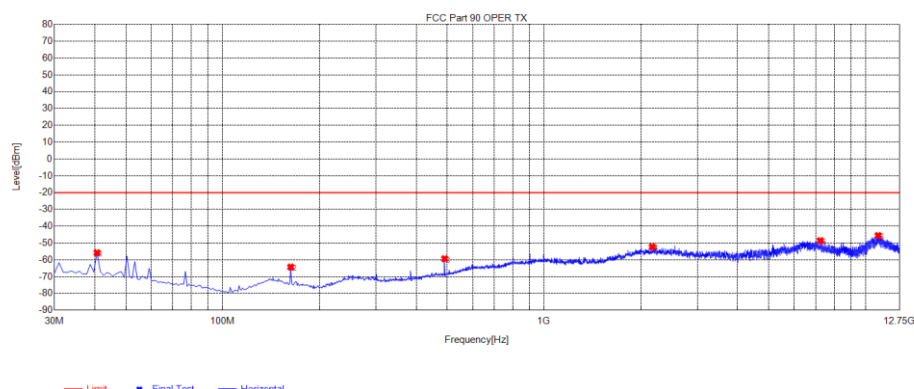
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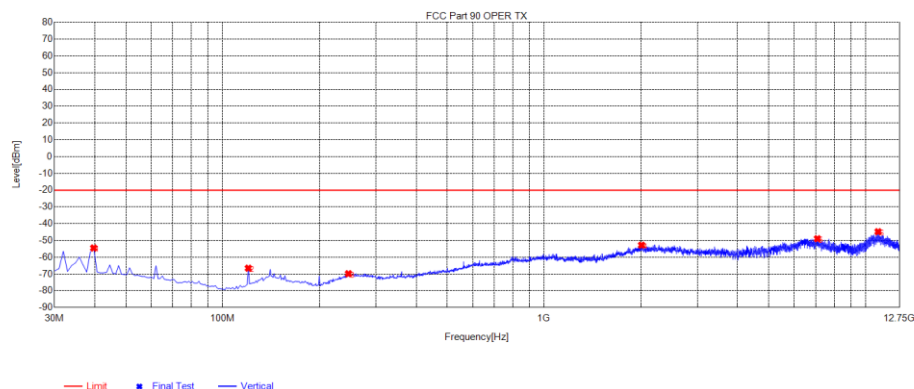
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                            |           |            |
|------------|----------------------------|-----------|------------|
| Test Mode: | TX:136.025MHz-4FSK-DC13.8V | Polarity: | Horizontal |
|------------|----------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 40.67       | -85.24        | -55.83      | -20.00      | 35.83       | 29.41       | 296       | Horizontal |
| 2   | 162.89      | -88.90        | -64.30      | -20.00      | 44.30       | 24.60       | 50        | Horizontal |
| 3   | 490.75      | -91.06        | -59.37      | -20.00      | 39.37       | 31.69       | 0         | Horizontal |
| 4   | 2170.417    | -54.51        | -52.31      | -20.00      | 32.31       | 2.20        | 6         | Horizontal |
| 5   | 7232.8233   | -56.51        | -48.61      | -20.00      | 28.61       | 7.90        | 50        | Horizontal |
| 6   | 10948.5449  | -59.26        | -45.61      | -20.00      | 25.61       | 13.65       | 6         | Horizontal |

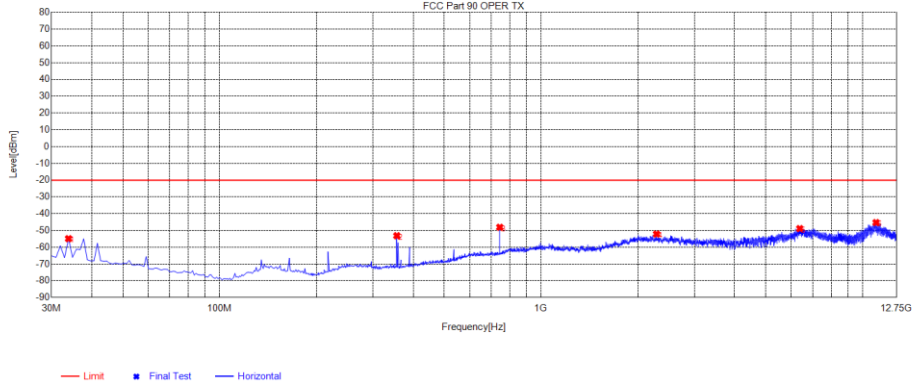
|            |                            |           |          |
|------------|----------------------------|-----------|----------|
| Test Mode: | TX:136.025MHz-4FSK-DC13.8V | Polarity: | Vertical |
|------------|----------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 39.7        | -83.95        | -54.50      | -20.00      | 34.50       | 29.45       | 283       | Vertical |
| 2   | 120.21      | -89.22        | -66.55      | -20.00      | 46.55       | 22.67       | 20        | Vertical |
| 3   | 246.31      | -98.13        | -69.85      | -20.00      | 49.85       | 28.28       | 160       | Vertical |
| 4   | 2010.6011   | -54.88        | -52.84      | -20.00      | 32.84       | 2.04        | 124       | Vertical |
| 5   | 7087.1087   | -57.12        | -48.96      | -20.00      | 28.96       | 8.16        | 230       | Vertical |
| 6   | 10942.6693  | -58.43        | -44.80      | -20.00      | 24.80       | 13.63       | 354       | Vertical |

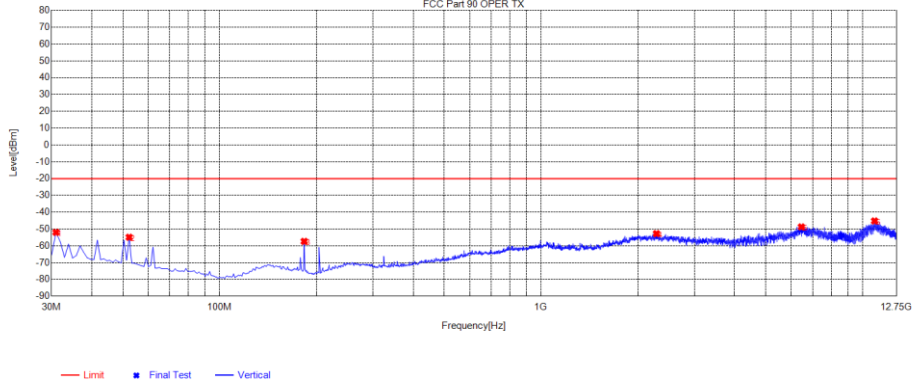
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|            |                             |           |            |
|------------|-----------------------------|-----------|------------|
| Test Mode: | TX:155.7525MHz-4FSK-DC13.8V | Polarity: | Horizontal |
|------------|-----------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 33.88       | -84.10        | -54.89      | -20.00      | 34.89       | 29.21       | 165       | Horizontal |
| 2   | 355.92      | -81.65        | -53.16      | -20.00      | 33.16       | 28.49       | 41        | Horizontal |
| 3   | 743.92      | -83.68        | -48.13      | -20.00      | 28.13       | 35.55       | 165       | Horizontal |
| 4   | 2286.7537   | -54.48        | -52.16      | -20.00      | 32.16       | 2.32        | 350       | Horizontal |
| 5   | 6378.5129   | -56.31        | -48.89      | -20.00      | 28.89       | 7.42        | 245       | Horizontal |
| 6   | 11019.0519  | -59.12        | -45.32      | -20.00      | 25.32       | 13.80       | 298       | Horizontal |

|            |                             |           |          |
|------------|-----------------------------|-----------|----------|
| Test Mode: | TX:155.7525MHz-4FSK-DC13.8V | Polarity: | Vertical |
|------------|-----------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 30.97       | -81.11        | -52.01      | -20.00      | 32.01       | 29.10       | 338       | Vertical |
| 2   | 52.31       | -83.07        | -54.92      | -20.00      | 34.92       | 28.15       | 18        | Vertical |
| 3   | 183.26      | -81.47        | -57.37      | -20.00      | 37.37       | 24.10       | 196       | Vertical |
| 4   | 2285.5786   | -55.09        | -52.77      | -20.00      | 32.77       | 2.32        | 329       | Vertical |
| 5   | 6454.8955   | -56.33        | -48.76      | -20.00      | 28.76       | 7.57        | 311       | Vertical |
| 6   | 10899.1899  | -58.72        | -45.23      | -20.00      | 25.23       | 13.49       | 355       | Vertical |

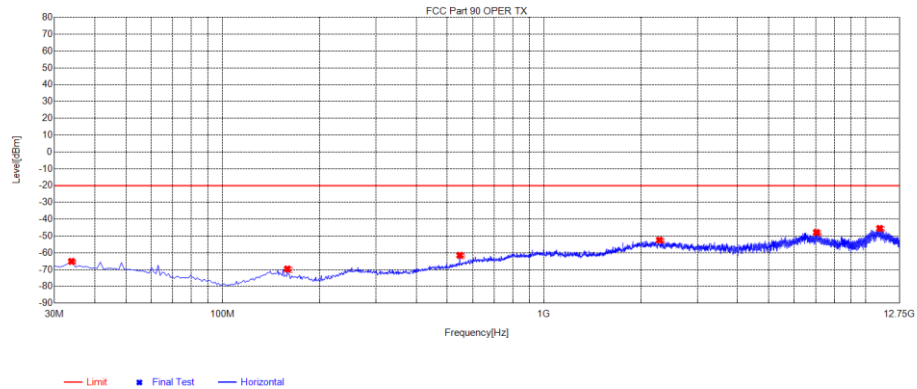
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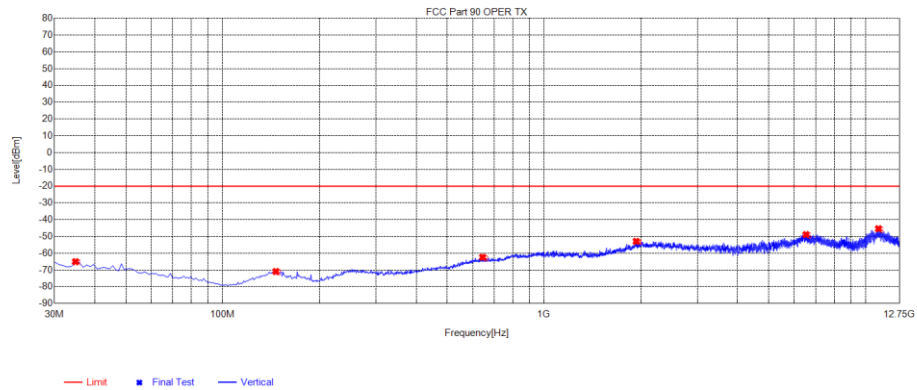
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/

|            |                            |           |            |
|------------|----------------------------|-----------|------------|
| Test Mode: | TX:173.975MHz-4FSK-DC13.8V | Polarity: | Horizontal |
|------------|----------------------------|-----------|------------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|------------|
| 1   | 33.88       | -94.33        | -65.12      | -20.00      | 45.12       | 29.21       | 340       | Horizontal |
| 2   | 159.01      | -94.38        | -69.63      | -20.00      | 49.63       | 24.75       | 0         | Horizontal |
| 3   | 547.01      | -94.23        | -61.47      | -20.00      | 41.47       | 32.76       | 127       | Horizontal |
| 4   | 2285.5786   | -54.78        | -52.46      | -20.00      | 32.46       | 2.32        | 145       | Horizontal |
| 5   | 7035.4035   | -56.14        | -47.89      | -20.00      | 27.89       | 8.25        | 234       | Horizontal |
| 6   | 11069.582   | -59.23        | -45.47      | -20.00      | 25.47       | 13.76       | 0         | Horizontal |

|            |                            |           |          |
|------------|----------------------------|-----------|----------|
| Test Mode: | TX:173.975MHz-4FSK-DC13.8V | Polarity: | Vertical |
|------------|----------------------------|-----------|----------|



| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Angle [°] | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|-----------|----------|
| 1   | 34.85       | -94.33        | -65.07      | -20.00      | 45.07       | 29.26       | 267       | Vertical |
| 2   | 146.4       | -97.60        | -70.91      | -20.00      | 50.91       | 26.69       | 360       | Vertical |
| 3   | 644.01      | -97.17        | -62.43      | -20.00      | 42.43       | 34.74       | 196       | Vertical |
| 4   | 1935.3935   | -54.19        | -52.97      | -20.00      | 32.97       | 1.22        | 10        | Vertical |
| 5   | 6530.103    | -56.58        | -48.89      | -20.00      | 28.89       | 7.69        | 45        | Vertical |
| 6   | 10975.5726  | -59.14        | -45.40      | -20.00      | 25.40       | 13.74       | 284       | Vertical |

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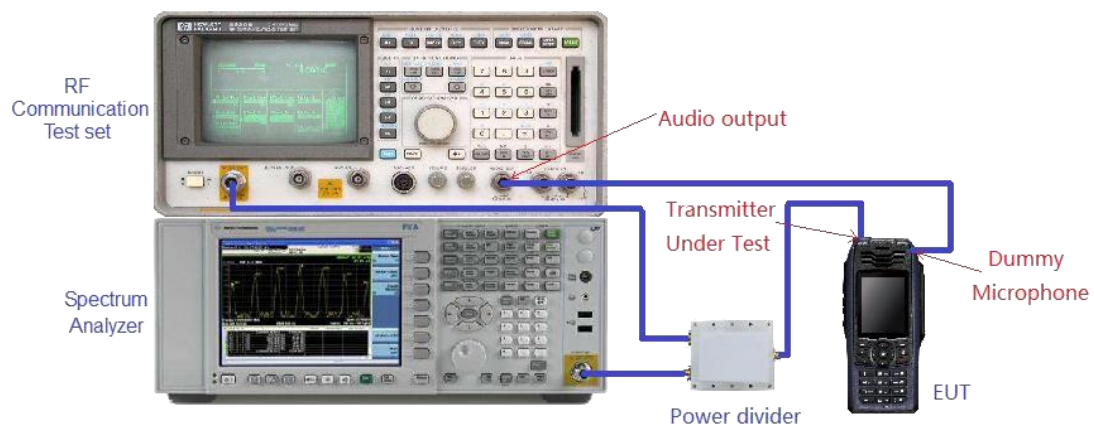
## 8.5 Emission Mask Measurement Part

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

-Connect the equipment as illustrated.

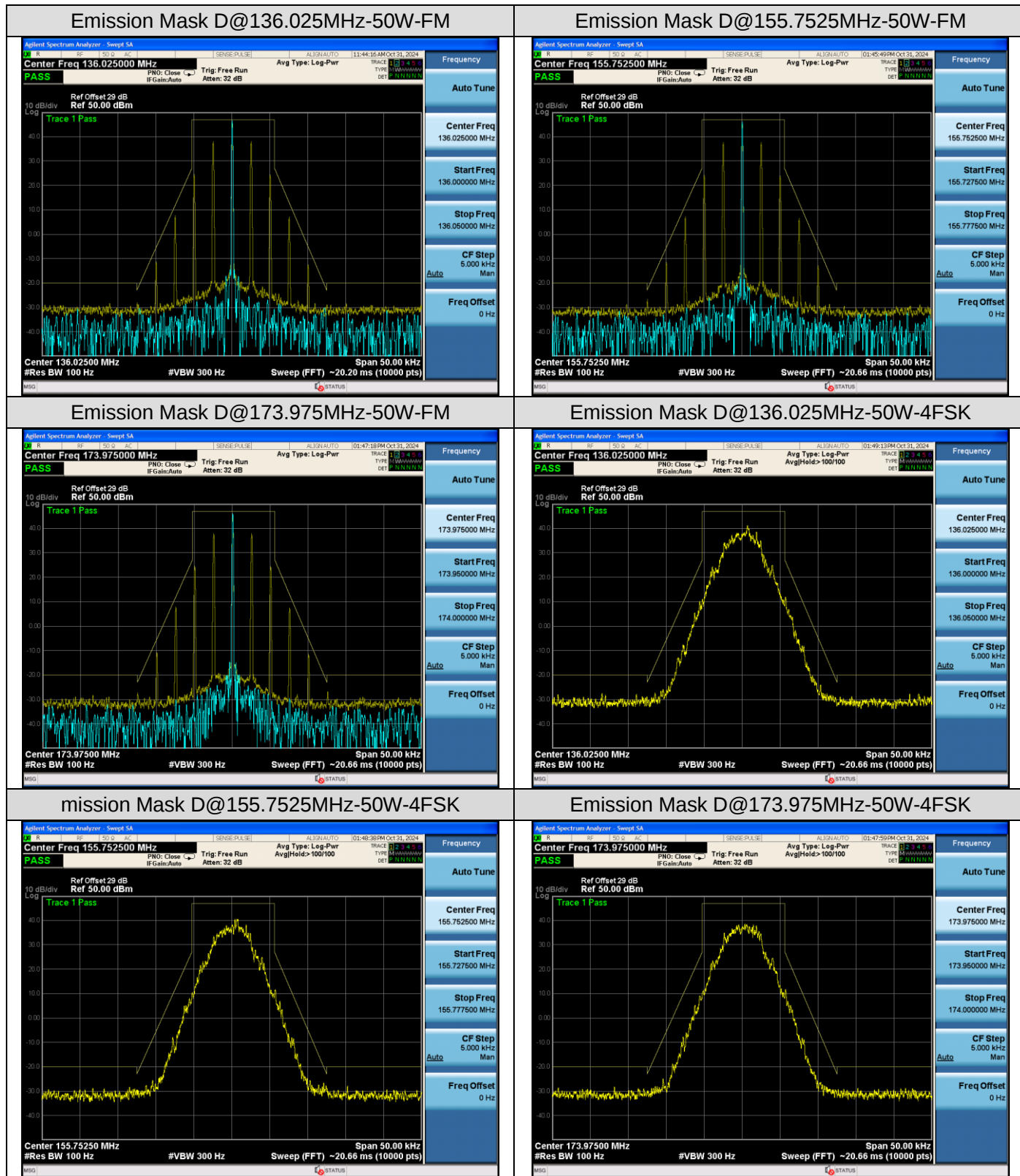
-Spectrum set as follow:

1. Centre frequency = fundamental frequency, Span=50kHz for 12.5kHz channel spacing, RBW=100Hz, VBW=300Hz for 12.5kHz, Sweep = auto, Detector function = peak, Trace = max hold
2. Key the transmitter, and set the level of the unmodulated carrier to a fullscale reference line. This is the 0dB reference for the measurement.
3. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation (Rated system deviation is 2.5 kHz for 12.5kHz channel spacing). The input level shall be established at the frequency of maximum response of the audio modulating circuit.
4. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.
5. Measure and record the results in the test report.



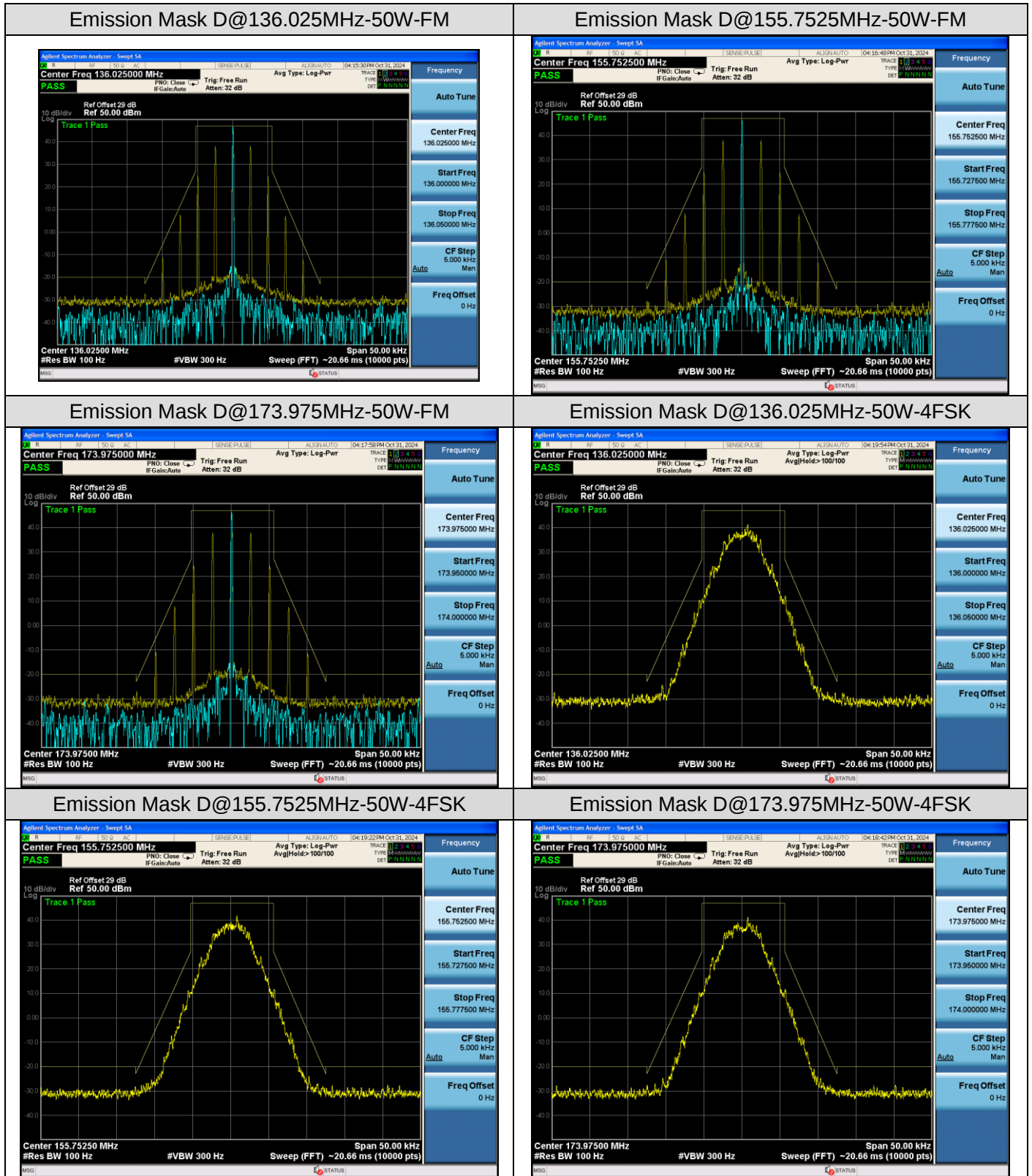
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Test plot as follows: Measurement Power Supply: AC 120V



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Test plot as follows: Measurement Power Supply: DC 13.8V



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## 9. Modulation Characteristics

### 9.1 Provisions Applicable

According to FCC§2.1047 and §90.207, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

### 9.2 Measurement Procedure

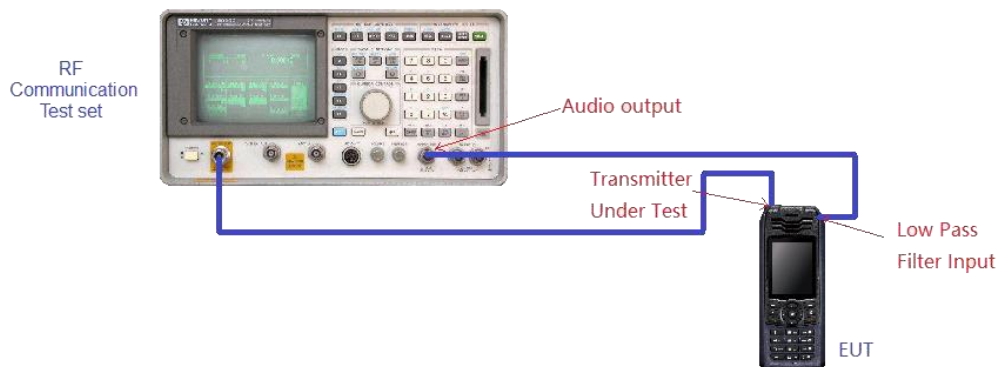
#### ● Modulation Limit

1. Test layout and build equipment as shown below.
2. adjust the audio input for 60% of rated system deviation at 1kHz using this level as a reference (0dB).
3. Vary the input level from –20 to +20dB.
4. Record the frequency deviation obtained as a function of the input level.
5. Repeat step 2 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

#### ● Audio Frequency Response

1. Test layout and build equipment as shown below.
2. Adjust the audio input for 20% of rated system deviation at 1 kHz using this level as a reference (0 dB).
3. Vary the Audio frequency from 100 Hz to 10 kHz and record the frequency deviation.
4. Audio Frequency Response =  $20\log_{10} (\text{Deviation of test frequency} / \text{Deviation of 1 kHz reference})$ .

### 9.3 Measurement Setup



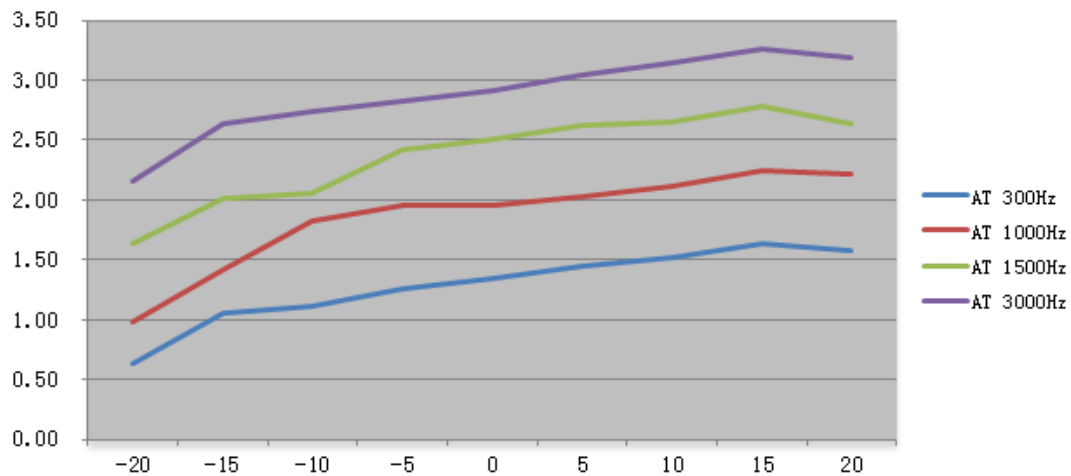
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## 9.4 Measurement Result

Measurement Power Supply: AC 120V

### A. Modulation Limit:

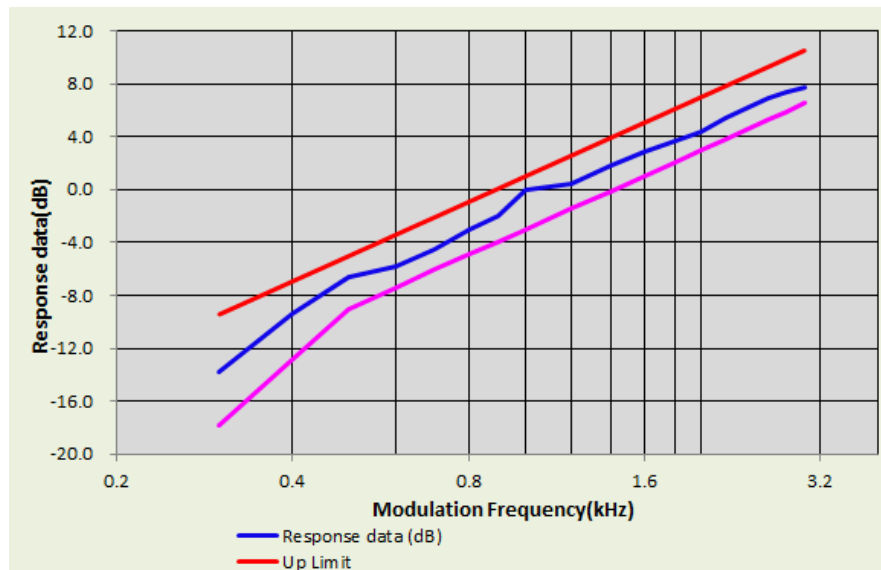
| 12.5kHz, Analog modulation, Assigned Frequency:136.025MHz-50W |                                      |                                       |                                       |                                       |
|---------------------------------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Modulation Level (dB)                                         | Peak Freq. Deviation At 300 Hz (kHz) | Peak Freq. Deviation At 1000 Hz (kHz) | Peak Freq. Deviation At 1500 Hz (kHz) | Peak Freq. Deviation At 3000 Hz (kHz) |
| -20                                                           | 0.63                                 | 0.98                                  | 1.63                                  | 2.16                                  |
| -15                                                           | 1.06                                 | 1.41                                  | 2.01                                  | 2.63                                  |
| -10                                                           | 1.11                                 | 1.82                                  | 2.05                                  | 2.74                                  |
| -5                                                            | 1.26                                 | 1.95                                  | 2.42                                  | 2.82                                  |
| 0                                                             | 1.34                                 | 1.96                                  | 2.51                                  | 2.91                                  |
| +5                                                            | 1.45                                 | 2.02                                  | 2.62                                  | 3.04                                  |
| +10                                                           | 1.52                                 | 2.12                                  | 2.65                                  | 3.15                                  |
| +15                                                           | 1.63                                 | 2.25                                  | 2.78                                  | 3.26                                  |
| +20                                                           | 1.58                                 | 2.21                                  | 2.63                                  | 3.19                                  |



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## B. Audio Frequency Response:

| 12.5kHz, Analog modulation, Assigned Frequency:136.025MHz-50W |                 |                              |
|---------------------------------------------------------------|-----------------|------------------------------|
| Frequency (Hz)                                                | Deviation (kHz) | Audio Frequency Response(dB) |
| 100                                                           | --              | --                           |
| 200                                                           | --              | --                           |
| 300                                                           | 0.18            | -13.78                       |
| 400                                                           | 0.3             | -9.35                        |
| 500                                                           | 0.41            | -6.63                        |
| 600                                                           | 0.45            | -5.83                        |
| 700                                                           | 0.52            | -4.57                        |
| 800                                                           | 0.62            | -3.04                        |
| 900                                                           | 0.7             | -1.99                        |
| 1000                                                          | <b>0.88</b>     | 0.00                         |
| 1200                                                          | 0.93            | 0.48                         |
| 1400                                                          | 1.09            | 1.86                         |
| 1600                                                          | 1.22            | 2.84                         |
| 1800                                                          | 1.35            | 3.72                         |
| 2000                                                          | 1.46            | 4.40                         |
| 2400                                                          | 1.63            | 5.35                         |
| 2500                                                          | 1.81            | 6.26                         |
| 2800                                                          | 1.94            | 6.87                         |
| 3000                                                          | 2.06            | 7.39                         |



Note: All the modes had been tested, but only the worst data recorded in the report.

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