# TEST REPORT

| | |
|---|---|
| Applicant Name: | Shenzhen Ysair Technology Co., LTD |
| Address: | 6/F, building 6, Yunli intelligent park, No. 3, Changfa, Middle Road, Yangmei community, Bantian street, Longgang District, Shenzhen, Guangdong China |
| Report Number: | RA221031-50472E-RF-00A |
| FCC ID: | 2A3OORA86 |

**Test Standards:**

FCC Part 15, Subpart B (Class B)

**Sample Description**

| | |
|---|---|
| Product Type: | Mobile Radio |
| Model No.: | RA86 |
| Multiple Model: | N/A |
| Trade Mark: | RETEVIS |
| Date Received: | 2022/10/31 |
| Report Date: | 2022/12/02 |

| Test Result: | Pass* |
|---|---|

* In the configuration tested, the EUT complied with the standards above.

**Prepared and Checked By:**

Andy Yu
EMC Engineer

**Approved By:**

Candy Li
EMC Engineer

**Note:** This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| Frequency Range | 462MHz Main channels: 462.5500-462.7250MHz (TX/RX)<br>462MHz Interstitial channels: 462.5625-462.7125MHz(TX/RX)<br>467MHz Main channels: 467.5500-467.7250MHz(TX/RX)<br>467MHz Interstitial channels: 467.5625-467.7125MHz(RX)<br>NOAA Weather channel: 161.65-163.275MHz(RX) |
| Highest Operation Frequency | 467.7250MHz |
| Voltage Range | DC 13.8V |
| Sample number | 1O93-2 for Radiated Emissions<br>1O95-4 for RF Conducted Test<br>(Assigned by ATC) |
| Sample/EUT Status | Good condition |

## Objective

This report is in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commission's rules.
The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15, Class B device.

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Parameter | | Uncertainty |
|---|---|---|
| Occupied Channel Bandwidth | | 5% |
| RF Frequency | | $0.082*10^{-7}$ |
| RF output power, conducted | | 0.73dB |
| Unwanted Emission, conducted | | 1.6dB |
| AC Power Lines Conducted Emissions | | 2.72dB |
| Emissions, Radiated | 9kHz - 30MHz | 2.66dB |
| | 30MHz - 1GHz | 4.28dB |
| | 1GHz - 18GHz | 4.98dB |
| | 18GHz - 26.5GHz | 5.06dB |
| | 26.5GHz - 40GHz | 4.72dB |
| Temperature | | 1℃ |
| Humidity | | 6% |
| Supply voltages | | 0.4% |

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.
Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

# SYSTEM TEST CONFIGURATION

## Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Test mode 1: Receiver at GMRS channel 462.625MHz

Test mode 2: Receiver at GMRS channel 467.625MHz

Test mode 3: NOAA Receiving at 162.4750MHz

## EUT Exercise Software

No exercise software.

## Special Accessories

No special accessory was used.

## Equipment Modifications

No modification was made to the EUT tested.

## Support Equipment List and Details

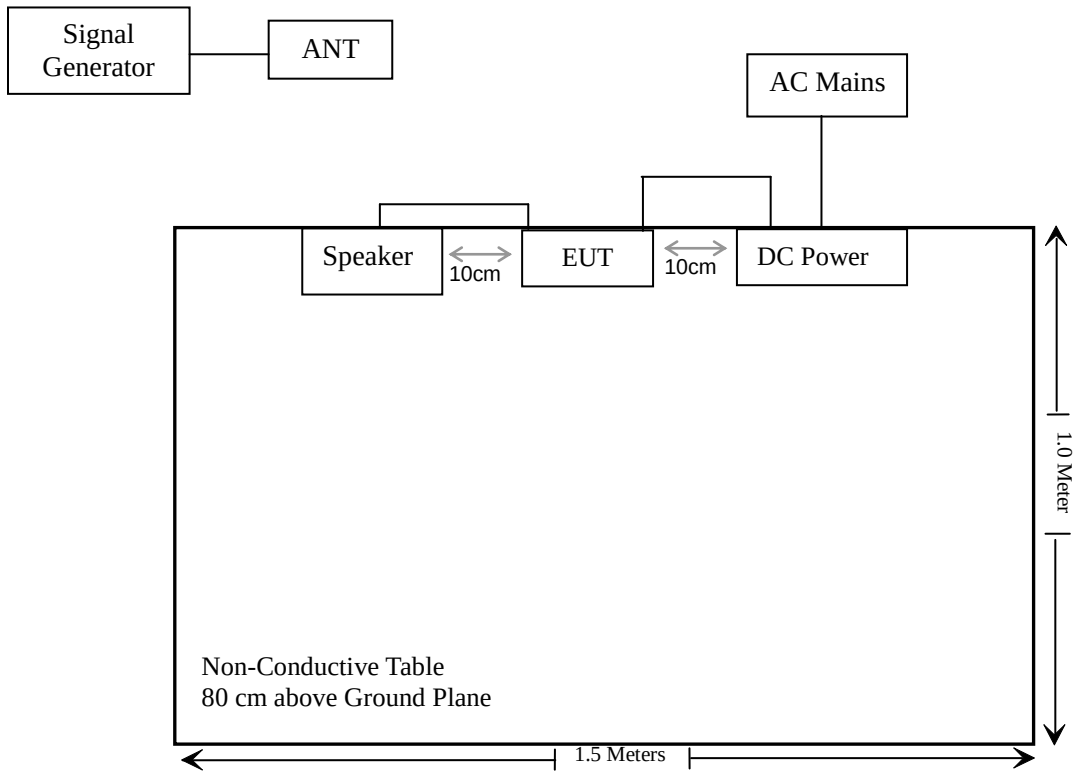
| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| UNI-T | DC Power | UTP8305M | Unknown |
| Unknown | Speaker | Unknown | Unknown |
| Rohde&Schwarz | Vector Signal Generator | SMBV100A | 260434 |

## External I/O Cable

| Cable Description | Length (m) | From Port | To Port |
|---|---|---|---|
| Unshielded detachable AC cable | 1.5 | DC Power | LISN |
| Unshielded Un-detachable DC cable | 2.5 | DC Power | EUT |
| Un-shielded detachable Audio cable | 1.0 | EUT | Speaker |

## Block Diagram of Radiated Test Setup

For radiated emission



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Results |
|---|---|---|
| §15.107 | Conducted Emissions | Not Applicable |
| §15.109 | Radiated Emissions | Compliant |
| §15.111 | Antenna Conducted Power for receivers | Compliant |

Not Applicable: the device is intended for use in vehicle.

# TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| **Radiated Emissions Test** | | | | | |
| Rohde& Schwarz | Test Receiver | ESR | 102725 | 2021/12/13 | 2022/12/12 |
| Rohde&Schwarz | Spectrum Analyzer | FSV40 | 101949 | 2021/12/13 | 2022/12/12 |
| SONOMA INSTRUMENT | Amplifier | 310 N | 186131 | 2022/11/08 | 2023/11/07 |
| A.H. Systems, inc. | Preamplifier | PAM-0118P | 135 | 2022/11/08 | 2023/11/07 |
| Schwarzbeck | Bilog Antenna | VULB9163 | 9163-323 | 2021/07/06 | 2024/07/05 |
| Schwarzbeck | Horn Antenna | BBHA9120D | 9120D-1067 | 2020/01/05 | 2023/01/04 |
| Unknown | RF Coaxial Cable | No.10 | N050 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.11 | N1000 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.12 | N040 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.13 | N300 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.14 | N800 | 2021/12/14 | 2022/12/13 |
| Radiated Emission Test Software: e3 19821b(V9) | | | | | |
| **RF Conducted Test** | | | | | |
| Rohde & Schwarz | Spectrum Analyzer | FSV-40 | 101495 | 2021/12/13 | 2022/12/12 |
| Unknown | RF Coaxial Cable | No.33 | RF-03 | Each time | |

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

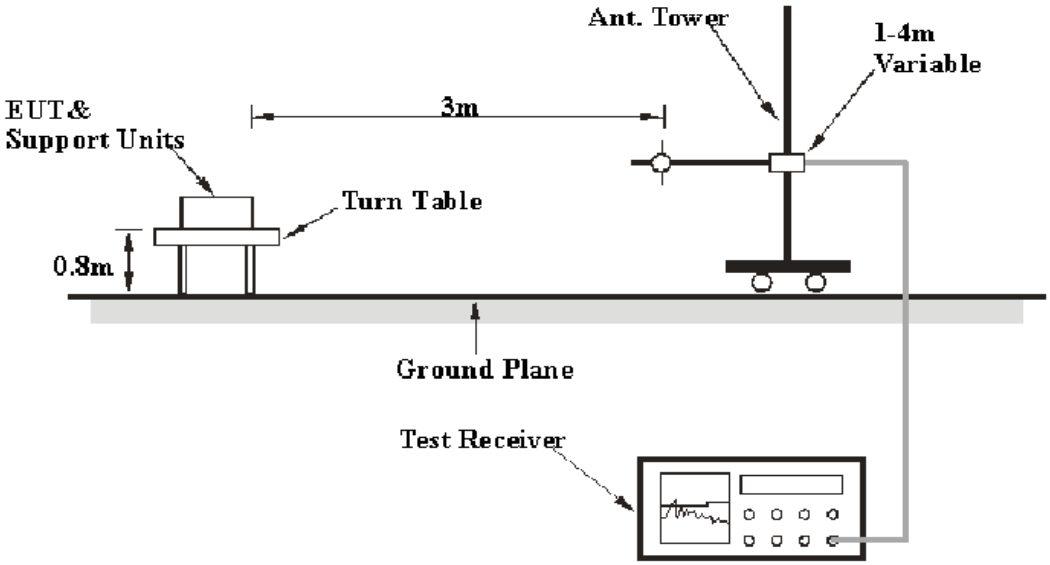
# FCC §15.109 - RADIATED EMISSIONS

## Applicable Standard

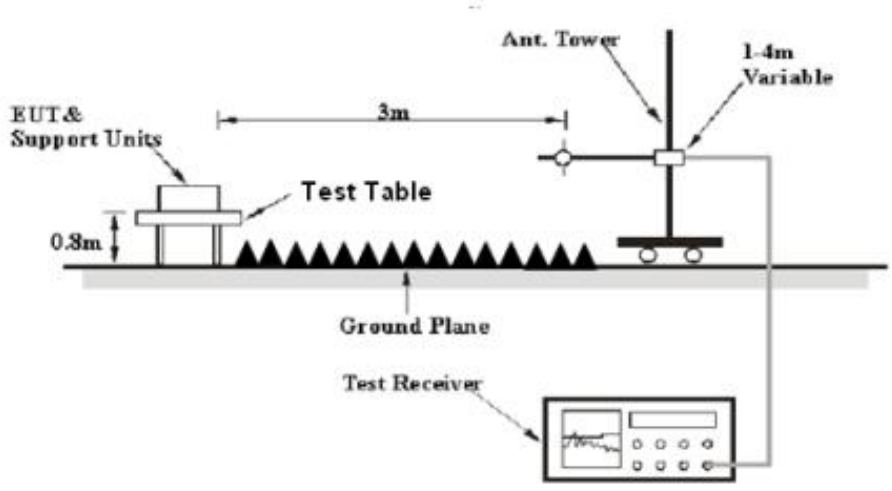
FCC §15.109

## EUT Setup

Below 1GHz:




Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range | RBW | Video B/W | IF B/W | Detector |
|---|---|---|---|---|
| 30MHz – 1000 MHz | 120 kHz | 300 kHz | 120kHz | QP |
| Above 1 GHz | 1MHz | 3 MHz | / | Peak |
| | 1MHz | 10Hz | / | AV |

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

If the maximized peak measured value complies with the limit, then it is unnecessary to perform QP/Average measurement.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

## Factor & Over Limit Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Over Limit = Level - Limit
Level = Reading + Factor

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25℃ |
| **Relative Humidity:** | 60 % |
| **ATM Pressure:** | 101kPa |

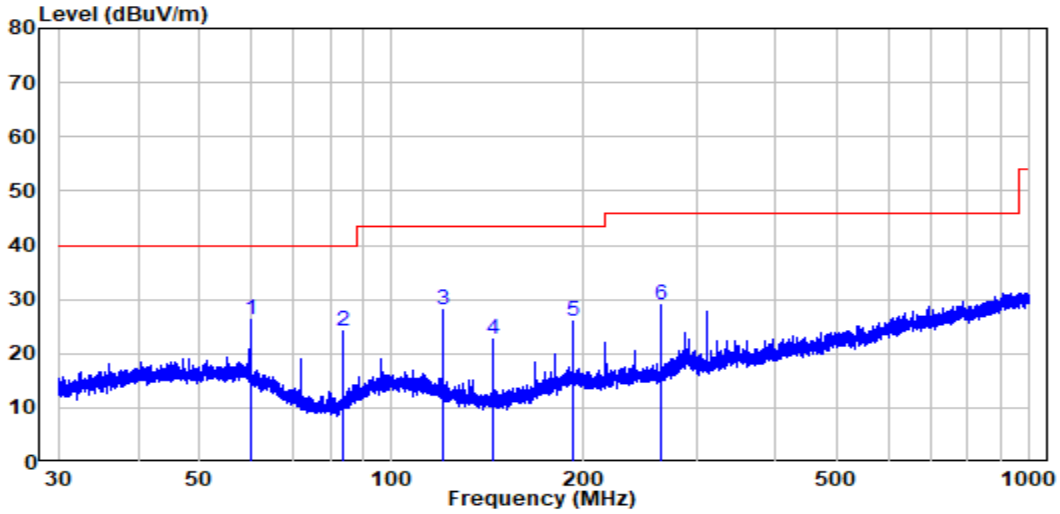
*The testing was performed by Jimi on 2022-11-29 for below 1GHz and Jeff Jiang on 2022-11-14 for above 1GHz.*

Note: Pre-scan in the X, Y and Z axes of orientation, the worst case Y-axis of orientation was recorded.

**30MHz-1GHz:**

**Test mode 1:**

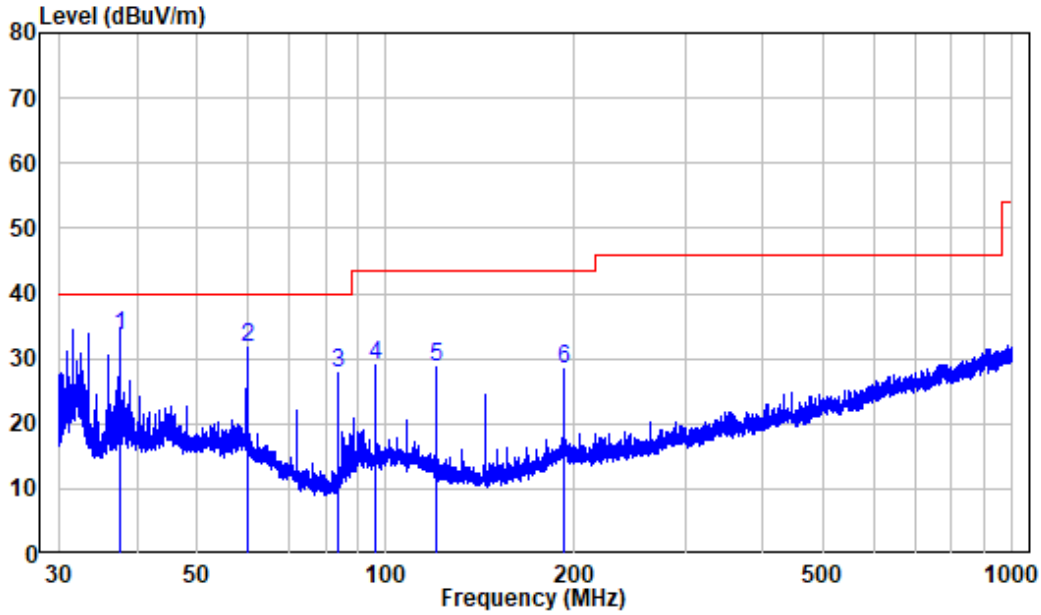
**Horizontal:**




Site : chamber
Condition: 3m HORIZONTAL
Job No. : RA221031-50472E-RF
Test Mode: Receiving

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 60.016 | -10.63 | 36.82 | 26.19 | 40.00 | -13.81 | Peak |
| 2 | 83.999 | -16.04 | 40.14 | 24.10 | 40.00 | -15.90 | Peak |
| 3 | 120.066 | -13.54 | 41.56 | 28.02 | 43.50 | -15.48 | Peak |
| 4 | 144.019 | -15.52 | 38.08 | 22.56 | 43.50 | -20.94 | Peak |
| 5 | 192.082 | -11.25 | 37.13 | 25.88 | 43.50 | -17.62 | Peak |
| 6 | 264.050 | -10.48 | 39.42 | 28.94 | 46.00 | -17.06 | Peak |

**Vertical**

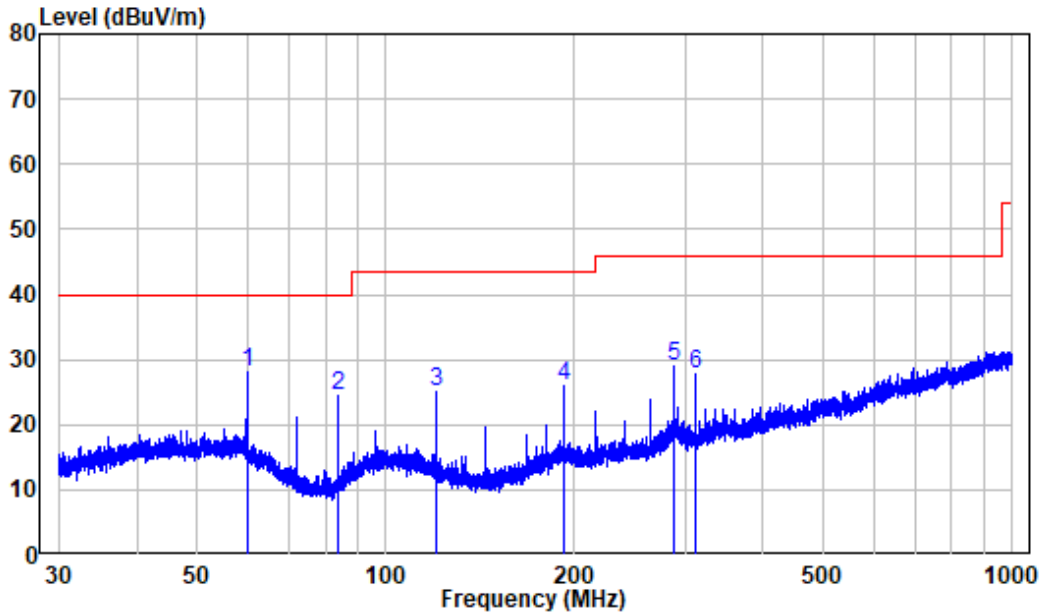



Site : chamber
Condition: 3m VERTICAL
Job No. : RA221031-50472E-RF
Test Mode: Receiving

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 37.564 | -10.90 | 44.30 | 33.40 | 40.00 | -6.60 | QP |
| 2 | 60.016 | -10.63 | 42.25 | 31.62 | 40.00 | -8.38 | Peak |
| 3 | 83.999 | -16.04 | 43.68 | 27.64 | 40.00 | -12.36 | Peak |
| 4 | 96.014 | -12.30 | 41.21 | 28.91 | 43.50 | -14.59 | Peak |
| 5 | 120.066 | -13.54 | 42.35 | 28.81 | 43.50 | -14.69 | Peak |
| 6 | 191.997 | -11.25 | 39.53 | 28.28 | 43.50 | -15.22 | Peak |

**Test mode 2:**

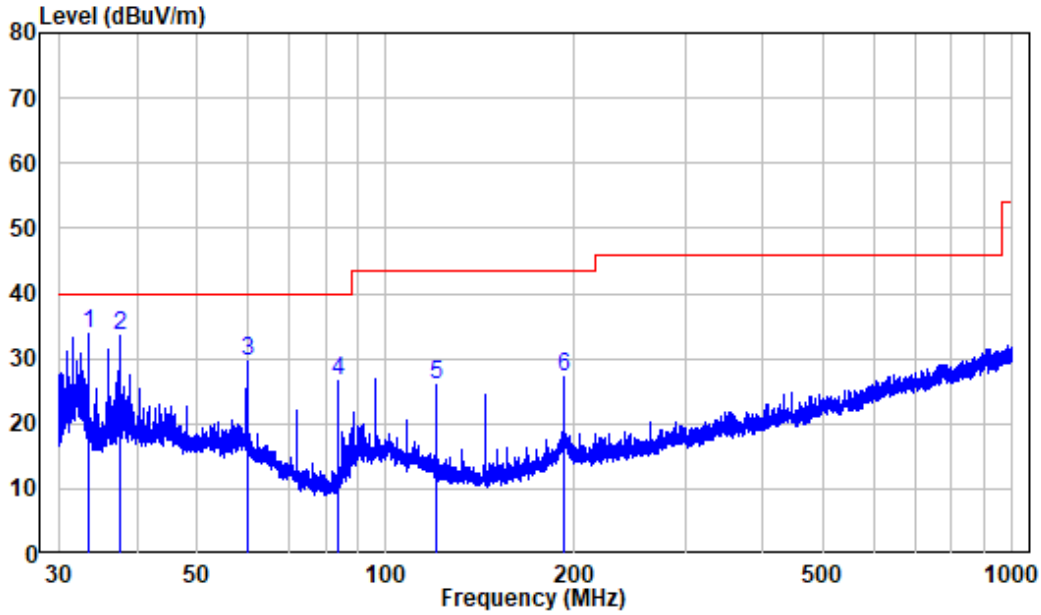
**Horizontal:**




Site : chamber
Condition: 3m HORIZONTAL
Job No. : RA221031-50472E-RF
Test Mode: Receiving

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 59.990 | -10.62 | 38.79 | 28.17 | 40.00 | -11.83 | Peak |
| 2 | 84.036 | -16.03 | 40.36 | 24.33 | 40.00 | -15.67 | Peak |
| 3 | 120.066 | -13.54 | 38.56 | 25.02 | 43.50 | -18.48 | Peak |
| 4 | 192.082 | -11.25 | 37.13 | 25.88 | 43.50 | -17.62 | Peak |
| 5 | 287.990 | -9.36 | 38.36 | 29.00 | 46.00 | -17.00 | Peak |
| 6 | 312.043 | -8.82 | 36.51 | 27.69 | 46.00 | -18.31 | Peak |

**Vertical**

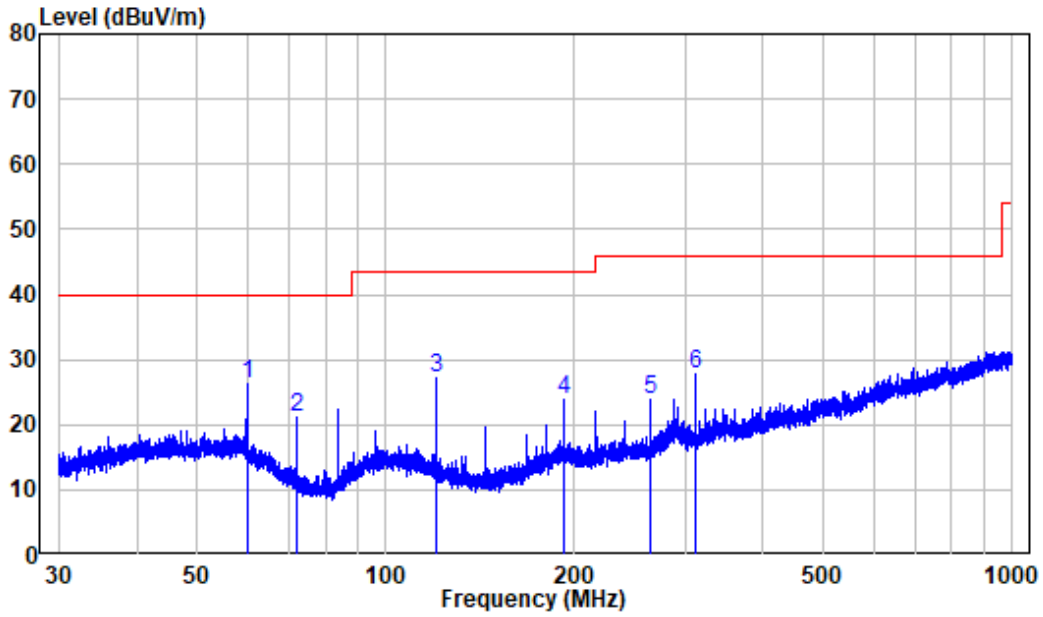



Site : chamber
Condition: 3m VERTICAL
Job No. : RA221031-50472E-RF
Test Mode: Receiving

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 33.607 | -11.92 | 45.66 | 33.74 | 40.00 | -6.26 | Peak |
| 2 | 37.564 | -10.90 | 44.48 | 33.58 | 40.00 | -6.42 | Peak |
| 3 | 60.016 | -10.63 | 40.25 | 29.62 | 40.00 | -10.38 | Peak |
| 4 | 83.999 | -16.04 | 42.68 | 26.64 | 40.00 | -13.36 | Peak |
| 5 | 120.066 | -13.54 | 39.35 | 25.81 | 43.50 | -17.69 | Peak |
| 6 | 191.997 | -11.25 | 38.53 | 27.28 | 43.50 | -16.22 | Peak |

**Test mode 3:**

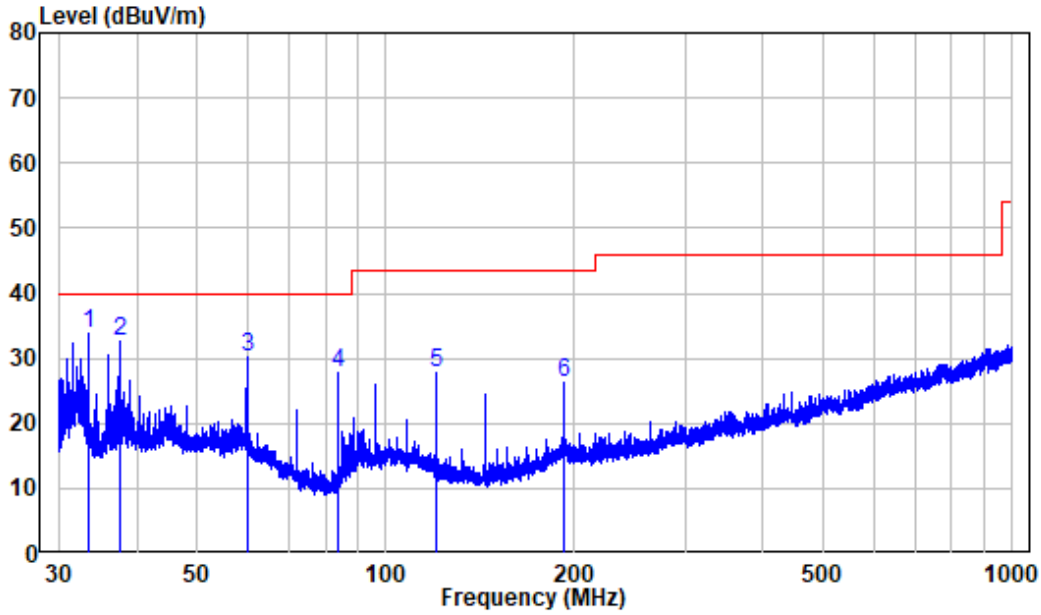
**Horizontal:**




Site : chamber
Condition: 3m HORIZONTAL
Job No. : RA221031-50472E-RF
Test Mode: Receiving

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 60.016 | -10.63 | 36.82 | 26.19 | 40.00 | -13.81 | Peak |
| 2 | 72.021 | -15.63 | 36.77 | 21.14 | 40.00 | -18.86 | Peak |
| 3 | 120.066 | -13.54 | 40.56 | 27.02 | 43.50 | -16.48 | Peak |
| 4 | 192.082 | -11.25 | 35.13 | 23.88 | 43.50 | -19.62 | Peak |
| 5 | 264.050 | -10.48 | 34.42 | 23.94 | 46.00 | -22.06 | Peak |
| 6 | 312.043 | -8.82 | 36.51 | 27.69 | 46.00 | -18.31 | Peak |

**Vertical**




Site : chamber
Condition: 3m VERTICAL
Job No. : RA221031-50472E-RF
Test Mode: Receiving

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 33.607 | -11.92 | 45.66 | 33.74 | 40.00 | -6.26 | Peak |
| 2 | 37.564 | -10.90 | 43.48 | 32.58 | 40.00 | -7.42 | Peak |
| 3 | 60.043 | -10.64 | 40.85 | 30.21 | 40.00 | -9.79 | Peak |
| 4 | 83.999 | -16.04 | 43.68 | 27.64 | 40.00 | -12.36 | Peak |
| 5 | 120.066 | -13.54 | 41.35 | 27.81 | 43.50 | -15.69 | Peak |
| 6 | 191.997 | -11.25 | 37.53 | 26.28 | 43.50 | -17.22 | Peak |

**Above 1 GHz:**

| Frequency (MHz) | Receiver | | Turntable Angle Degree | Rx Antenna | | Factor (dB/m) | Absolute Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | Reading (dBμV) | PK/Ave | | Height (m) | Polar (H/V) | | | | |
| Test mode 1 | | | | | | | | | |
| 1278.65 | 51.5 | PK | 61 | 2.1 | H | -10.17 | 41.33 | 74 | -32.67 |
| 1278.65 | 50.93 | PK | 232 | 2.4 | V | -10.17 | 40.76 | 74 | -33.24 |
| 2536.72 | 55.14 | PK | 325 | 2.4 | H | -7.00 | 48.14 | 74 | -25.86 |
| 2536.72 | 54.66 | PK | 343 | 2.1 | V | -7.00 | 47.66 | 74 | -26.34 |
| Test mode 2 | | | | | | | | | |
| 1275.86 | 50.34 | PK | 293 | 1.9 | H | -10.17 | 40.17 | 74 | -33.83 |
| 1275.86 | 50.3 | PK | 326 | 2.4 | V | -10.17 | 40.13 | 74 | -33.87 |
| 2543.65 | 53.41 | PK | 157 | 2.2 | H | -7 | 46.41 | 74 | -27.59 |
| 2543.65 | 53.15 | PK | 357 | 2.2 | V | -7 | 46.15 | 74 | -27.85 |
| Test mode 3 | | | | | | | | | |
| 1280.35 | 49.92 | PK | 157 | 1.5 | H | -10.17 | 39.75 | 74 | -34.25 |
| 1280.35 | 50.39 | PK | 61 | 1.6 | V | -10.17 | 40.22 | 74 | -33.78 |
| 2537.28 | 53.47 | PK | 352 | 2.1 | H | -7 | 46.47 | 74 | -27.53 |
| 2537.28 | 52.96 | PK | 91 | 2.2 | V | -7 | 45.96 | 74 | -28.04 |

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Absolute Level (Corrected Amplitude） = Factor + Reading
Margin = Absolute Level - Limit
The other spurious emission which is in the noise floor level was not recorded.
For above 1GHz, the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

# FCC §15.111 - ANTENNA CONDUCTED POWER FOR RECEIVERS

## Applicable Standard

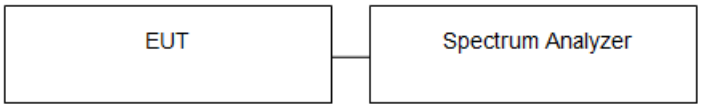
FCC §15.111

### Limit

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

| Frequency Range | Limit |
|---|---|
| 9 kHz to 5 GHz | 2.0 nW (-57 dBm) |

## EUT Setup




## Test Procedure

1. The receiver antenna terminal connected to a spectrum analyzer.

2. The test data of the worst case condition was reported on the following Data page.

## Test Data

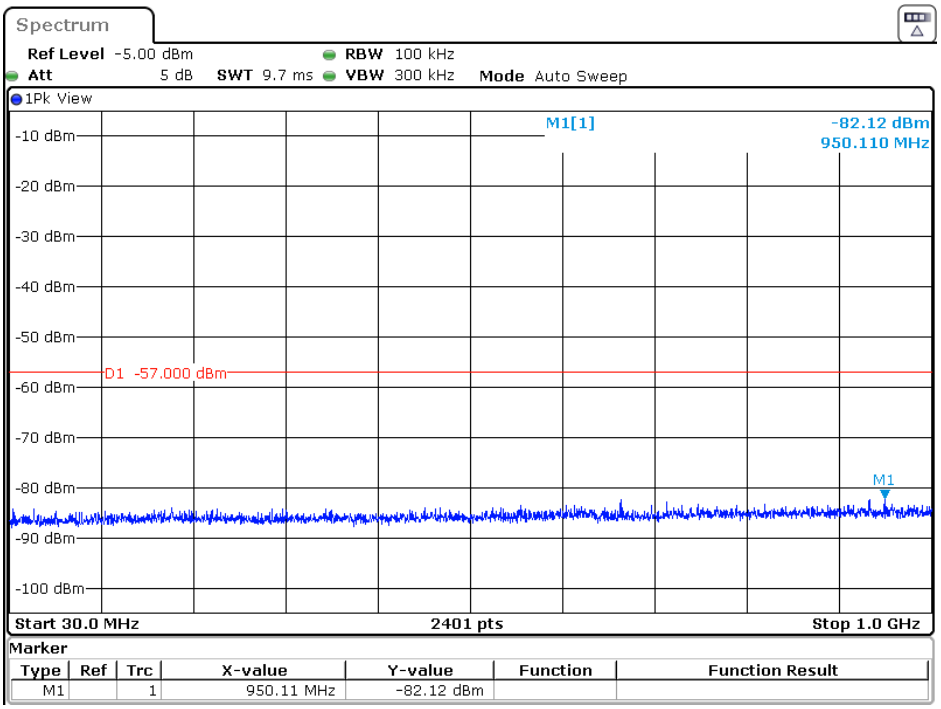
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25 ℃ |
| **Relative Humidity:** | 52 % |
| **ATM Pressure:** | 101kPa |

*The testing was performed by Glenn Jiang on 2022-12-02.*

*Test mode 1:*

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

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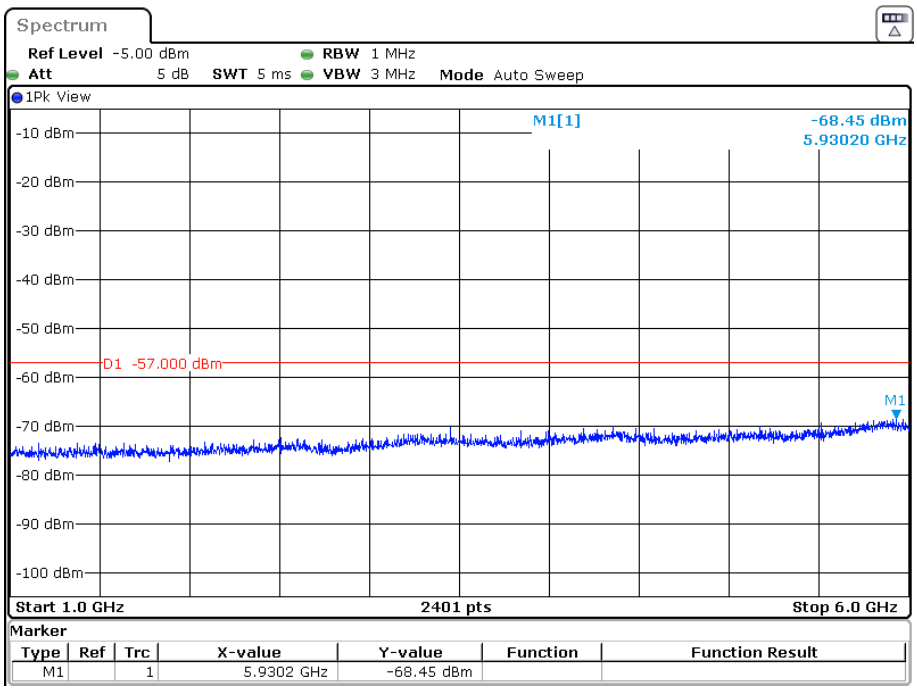
**Conducted Measurement (1GHz to 6GHz)**

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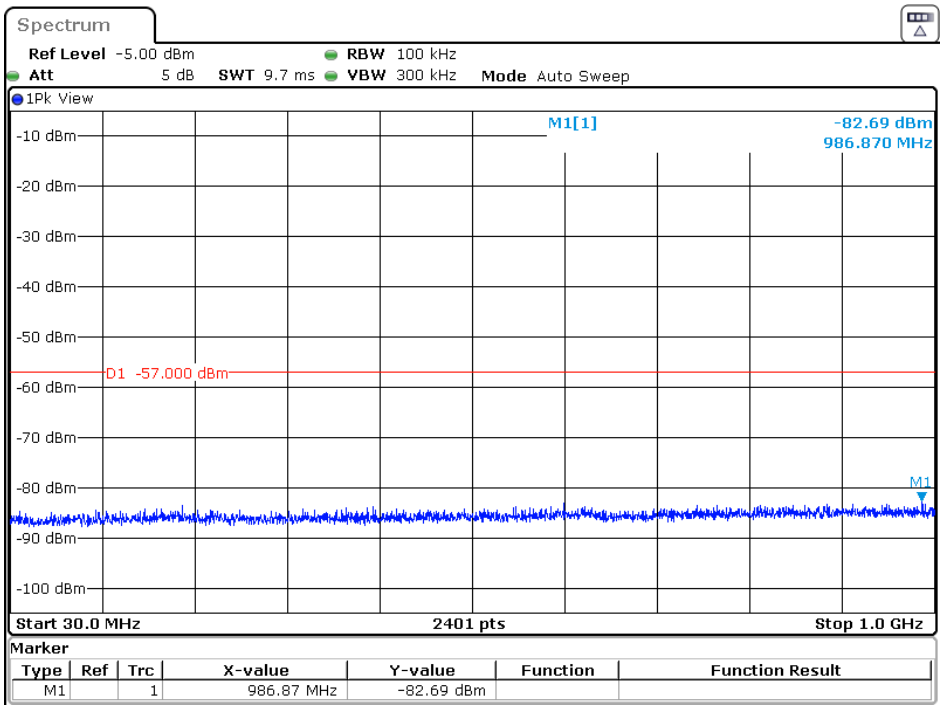
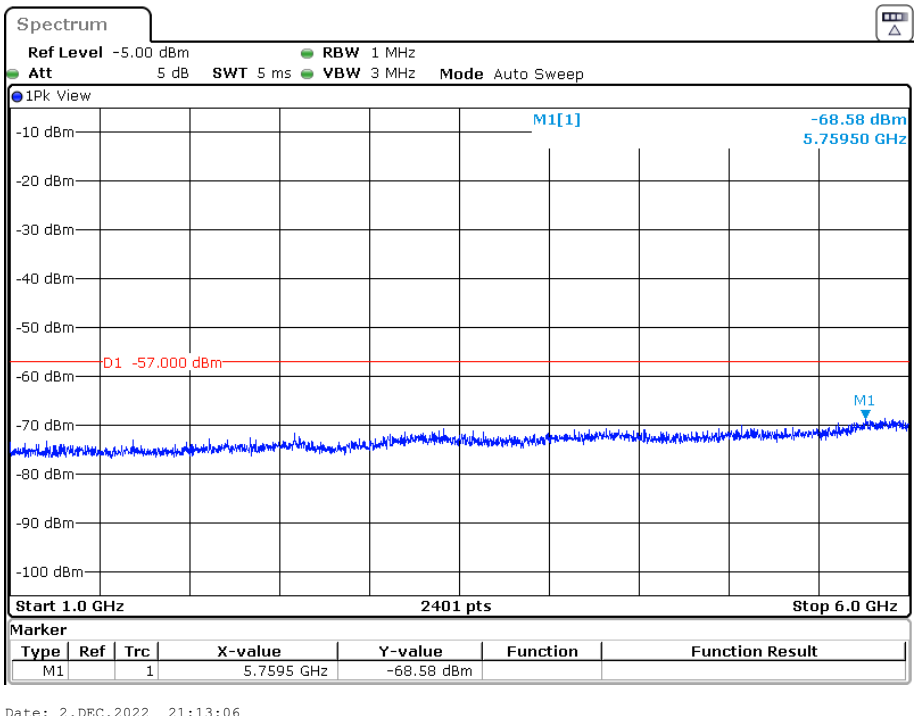
*Test mode 2:*

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

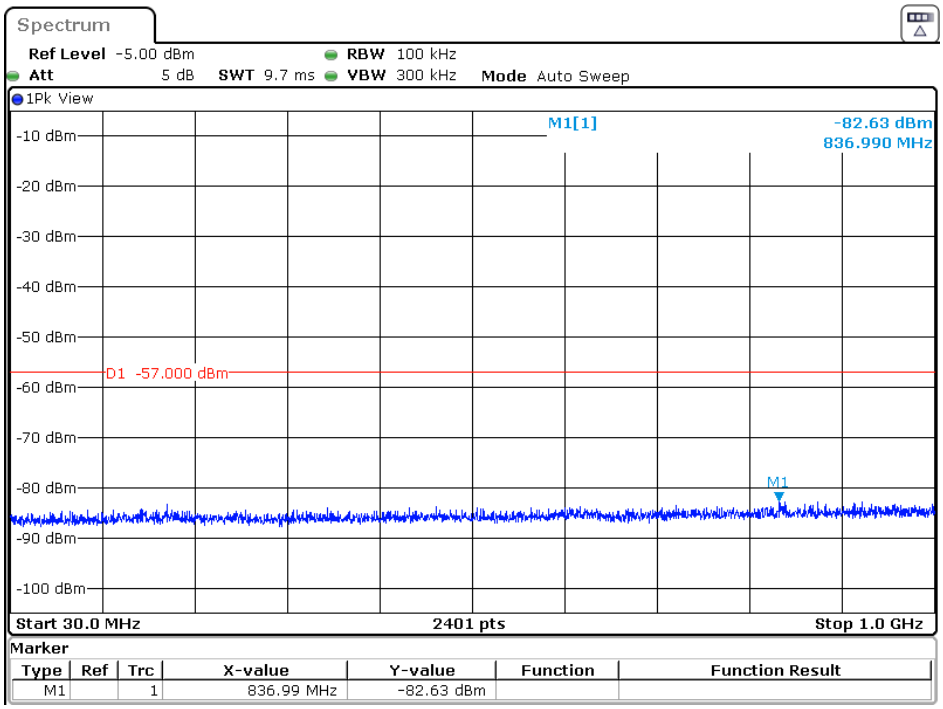



**Conducted Measurement (1GHz to 6GHz)**



*Test mode 3:*

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

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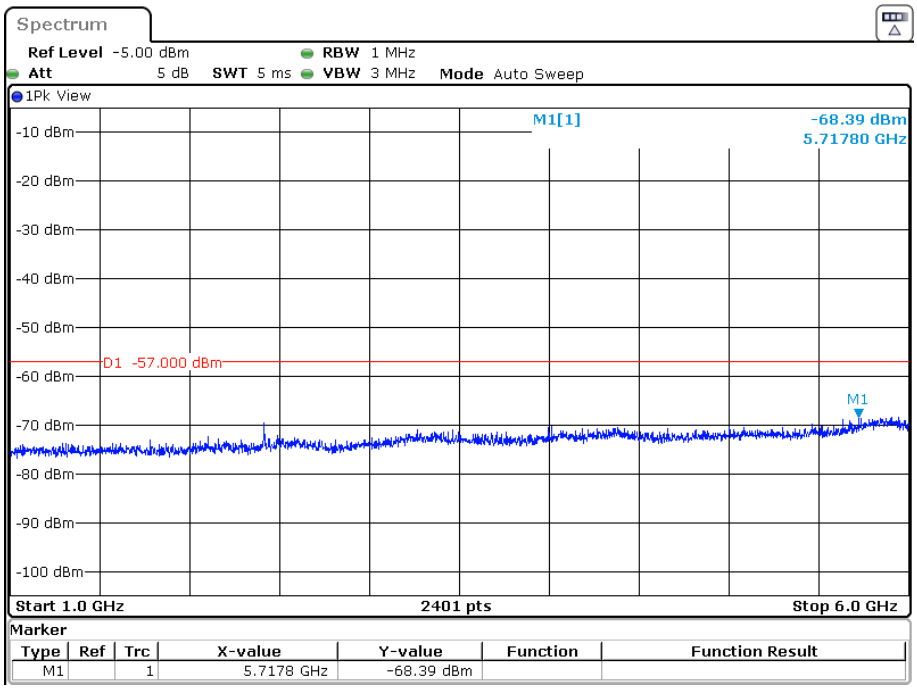
**Conducted Measurement (1GHz to 6GHz)**

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