




FCC PART 95  
MEASUREMENT AND TEST REPORT

For

**Shenzhen Freetalker Industry Co., Ltd.**

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Shenzhen, China

**FCC ID: 2AHJLRD-866**

|                                        |                                                                                                                                                                                                                                                             |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>walkie talkie                                                                                                                                                                                                                       |
| <b>Report Number:</b>                  | SZ5210908-48992E-00A                                                                                                                                                                                                                                        |
| <b>Report Date:</b>                    | 2021-09-13                                                                                                                                                                                                                                                  |
| <b>Reviewed By:</b>                    | Ivan Cao<br>Assistant Manager                                                                                                                                          |
| <b>Test Laboratory:</b>                | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.12, Pulong East 1 <sup>st</sup> Road, Tangxia Town, Dongguan,<br>Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br><a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a> |

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## GENERAL INFORMATION

### Product Description for Equipment Under Test (EUT)

|                                        |                                                                    |
|----------------------------------------|--------------------------------------------------------------------|
| <b>EUT Name:</b>                       | walkie talkie                                                      |
| <b>EUT Model:</b>                      | RD866                                                              |
| <b>Multiple Model:</b>                 | T388, T-388C, Q8, R8, R7, R5, R9, RD633                            |
| <b>Model difference:</b>               | Refer to the DoS letter                                            |
| <b>Trademark:</b>                      | FREETALKER                                                         |
| <b>Operation Frequency:</b>            | 462.5500-462.7250MHz<br>467.5625-467.7125MHz                       |
| <b>Modulation Mode:</b>                | FM                                                                 |
| <b>Channel Spacing:</b>                | 12.5kHz                                                            |
| <b>Emission Designator:</b>            | 11K0F3E                                                            |
| <b>Maximum Output Power:<br/>(ERP)</b> | 462.5500-462.7250MHz: 25.05 dBm<br>467.5625-467.7125MHz: 26.78 dBm |
| <b>Rated Input Voltage:</b>            | DC 3.6V from Battery                                               |
| <b>Adapter Information</b>             | <b>Model:</b> TEKA-UCA10US                                         |
|                                        | <b>Input:</b> 100~240V 50/60Hz 0.2A                                |
|                                        | <b>Output:</b> 5.0V 1.0A                                           |
| <b>Serial Number:</b>                  | SZ5210908-48992E-RF-S1                                             |
| <b>EUT Received Date:</b>              | 2021.09.08                                                         |
| <b>EUT Received Status:</b>            | Good                                                               |

### Objective

This report is prepared on behalf of *Shenzhen Freetalker Industry Co., Ltd.* in accordance with Part 2 and Part 95, Subpart A and B of the Federal Communication Commissions rules.

### Related Submittal(s)/Grant(s)

N/A

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with:

The Code of federal Regulations Title 47, Part 2, Part 95 Subpart A and Subpart B

TIA-603-E-2016, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Parameter                     | Measurement Uncertainty                      |
|-------------------------------|----------------------------------------------|
| Occupied Channel Bandwidth    | ±5 %                                         |
| RF output power, conducted    | ±0.61dB                                      |
| Unwanted Emissions, radiated  | 30MHz ~ 1GHz: 5.85 dB<br>1G~26.5GHz: 5.23 dB |
| Unwanted Emissions, conducted | ±1.5 dB                                      |
| Temperature                   | ±1 °C                                        |
| Humidity                      | ±5%                                          |
| DC and low frequency voltages | ±0.4%                                        |
| Duty Cycle                    | 1%                                           |

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

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

## Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

## SYSTEM TEST CONFIGURATION

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### Description of Test Configuration

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

The device uses total 22 FRS channels as below:

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|
| 1           | 462.5625        | 12          | 467.6625        |
| 2           | 462.5875        | 13          | 467.6875        |
| 3           | 462.6125        | 14          | 467.7125        |
| 4           | 462.6375        | 15          | 462.5500        |
| 5           | 462.6625        | 16          | 462.5750        |
| 6           | 462.6875        | 17          | 462.6000        |
| 7           | 462.7125        | 18          | 462.6250        |
| 8           | 467.5625        | 19          | 462.6500        |
| 9           | 467.5875        | 20          | 462.6750        |
| 10          | 467.6125        | 21          | 462.7000        |
| 11          | 467.6375        | 22          | 462.7250        |

### Equipment Modifications

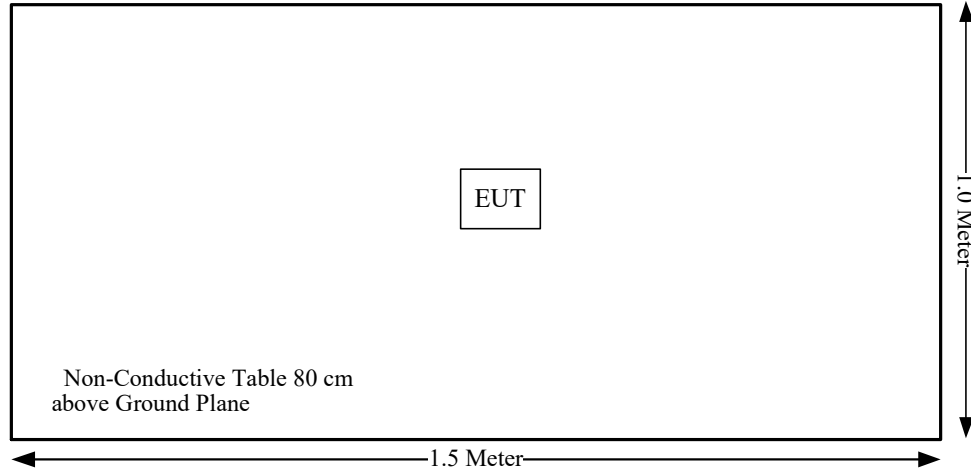
No modification was made to the EUT tested.

### EUT Exercise Software

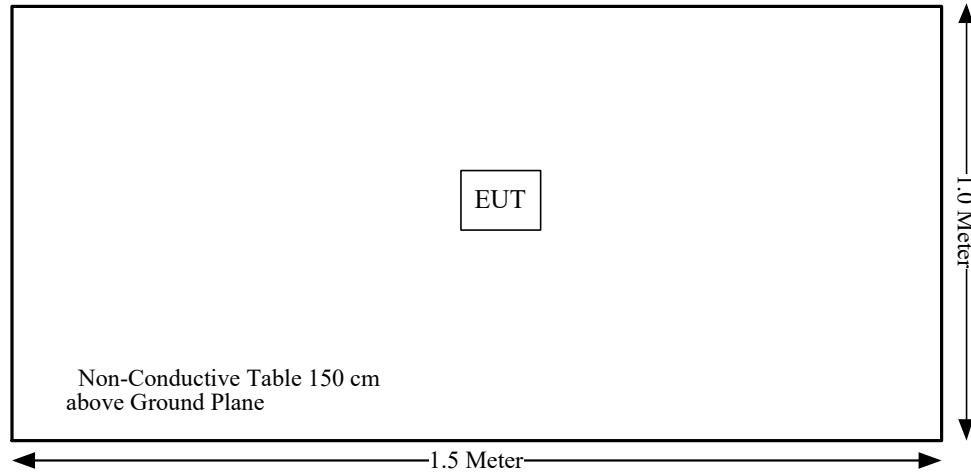
No software was used during test.

### Block Diagram of Test Setup

Radiation Below 1GHz:



Radiation Above 1GHz:



**SUMMARY OF TEST RESULTS**

| <b>FCC Rules</b>          | <b>Description of Test</b>           | <b>Results</b> |
|---------------------------|--------------------------------------|----------------|
| §2.1093                   | RF Exposure                          | Compliance     |
| §2.1046, §95.567          | RF Output Power                      | Compliance     |
| §2.1047, §95.575          | Modulation Characteristic            | Compliance     |
| §2.1049, §95.573, §95.579 | Authorized Bandwidth & Emission Mask | Compliance     |
| §2.1053, §95.579          | Spurious Radiated Emissions          | Compliance     |
| §2.1055(d), §95.565       | Frequency Stability                  | Compliance     |

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## **FCC §2.1093 - RF EXPOSURE INFORMATION**

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### **Applicable Standard**

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

### **Test Result**

Please refer to SAR Report Number: SZ5210908-48992E-20.



## FCC §2.1046, §95.567 - RF OUTPUT POWER

### Applicable Standard

According to FCC §95.567

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

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the emissions were measured by the substitution.

### Test Equipment List and Details

| Manufacturer   | Description               | Model     | Serial Number | Calibration Date | Calibration Due Date |
|----------------|---------------------------|-----------|---------------|------------------|----------------------|
| Sunol Sciences | Antenna                   | JB3       | A060611-1     | 2020-11-10       | 2023-11-10           |
| R&S            | EMI Test Receiver         | ESR3      | 102453        | 2020-09-23       | 2021-09-22           |
| Unknown        | Coaxial Cable             | C-NJNJ-50 | C-0075-01     | 2021-07-19       | 2022-07-18           |
| Unknown        | Coaxial Cable             | C-NJNJ-50 | C-0400-01     | 2021-07-19       | 2022-07-18           |
| Unknown        | Coaxial Cable             | C-NJNJ-50 | C-1400-01     | 2021-07-19       | 2022-07-18           |
| Sonoma         | Amplifier                 | 310N      | 372193        | 2021-07-18       | 2022-07-17           |
| EMCO           | Adjustable Dipole Antenna | 3121C     | 9109-753      | N/A              | N/A                  |
| Unknown        | Coaxial Cable             | C-NJNJ-50 | C-0200-02     | 2021-09-05       | 2022-09-05           |
| Agilent        | Signal Generator          | E8247C    | MY43321350    | 2020-12-09       | 2021-12-08           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |            |
|---------------------------|------------|
| <b>Temperature:</b>       | 22.4 °C    |
| <b>Relative Humidity:</b> | 26 %       |
| <b>ATM Pressure:</b>      | 101.8kPa   |
| <b>Test by:</b>           | Joker Chen |
| <b>Test Date:</b>         | 2021.09.09 |

**Test Mode:** Transmitting**Test Result:** Compliance. Please refer to following table.**ERP:**

| Frequency (MHz)              | Polar (H/V) | Receiver Reading (dB $\mu$ V) | Substituted Method      |                        |                 | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|------------------------------|-------------|-------------------------------|-------------------------|------------------------|-----------------|----------------------|-------------|-------------|
|                              |             |                               | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) |                      |             |             |
| <b>Frequency:462.6375MHz</b> |             |                               |                         |                        |                 |                      |             |             |
| 462.6375                     | H           | 105.81                        | 24.48                   | 0                      | 0.67            | 23.81                | 33.00       | 9.19        |
| 462.6375                     | V           | 104.1                         | 25.72                   | 0                      | 0.67            | 25.05                | 33.00       | 7.95        |
| <b>Frequency:467.6375MHz</b> |             |                               |                         |                        |                 |                      |             |             |
| 467.6375                     | H           | 106.43                        | 25.23                   | 0                      | 0.68            | 24.55                | 27.00       | 2.45        |
| 467.6375                     | V           | 105.69                        | 27.46                   | 0                      | 0.68            | 26.78                | 27.00       | 0.22        |

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

Note 2:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

**Test Result:** Compliance.

## FCC §2.1047 & §95.575 - MODULATION CHARACTERISTIC

### Applicable Standard

Per FCC §2.1047 and §95.575:

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

### Test Equipment List and Details

| Manufacturer | Description                | Model No.     | Serial No. | Calibration Date | Calibration Due Date |
|--------------|----------------------------|---------------|------------|------------------|----------------------|
| yzjingcheng  | Coaxial Cable              | KTRFBU-141-50 | 41005012   | Each Time        | /                    |
| E-Microwave  | Blocking Control           | EMDCB-00036   | 0E01201047 | Each Time        | /                    |
| E-Microwave  | Coaxial Attenuators        | EMCA10-5RN-6  | OE01203239 | Each Time        | /                    |
| HP           | RF Communications Test Set | 8920A         | 3438A05201 | 2021-07-22       | 2022-07-21           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

Test Method: ANSI C63.26-2015

### Test Data

#### Environmental Conditions

|                           |            |
|---------------------------|------------|
| <b>Temperature:</b>       | 23 °C      |
| <b>Relative Humidity:</b> | 28 %       |
| <b>ATM Pressure:</b>      | 101.8 kPa  |
| <b>Test by:</b>           | James Chen |
| <b>Test Date:</b>         | 2021.9.10  |

Please refer to the following tables and plots.

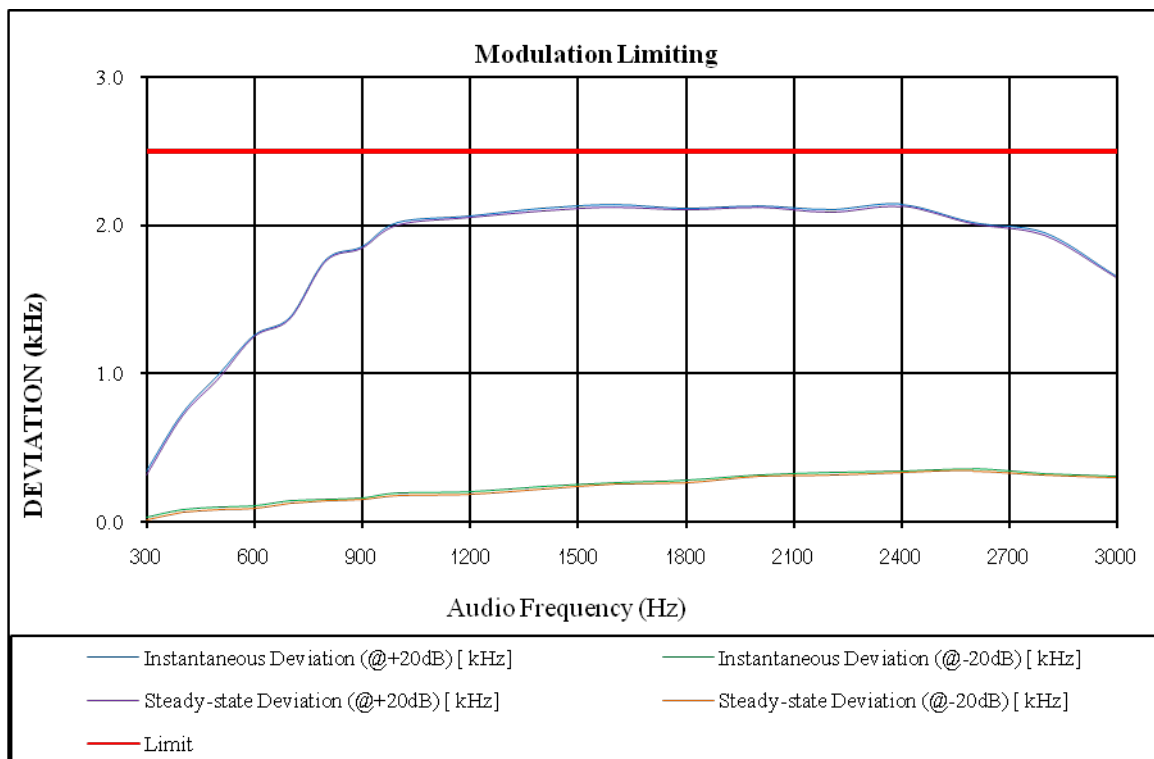
#### Test Mode: Transmitting

**Test Result: Compliance.** Please refer to following table.

**MODULATION LIMITING**

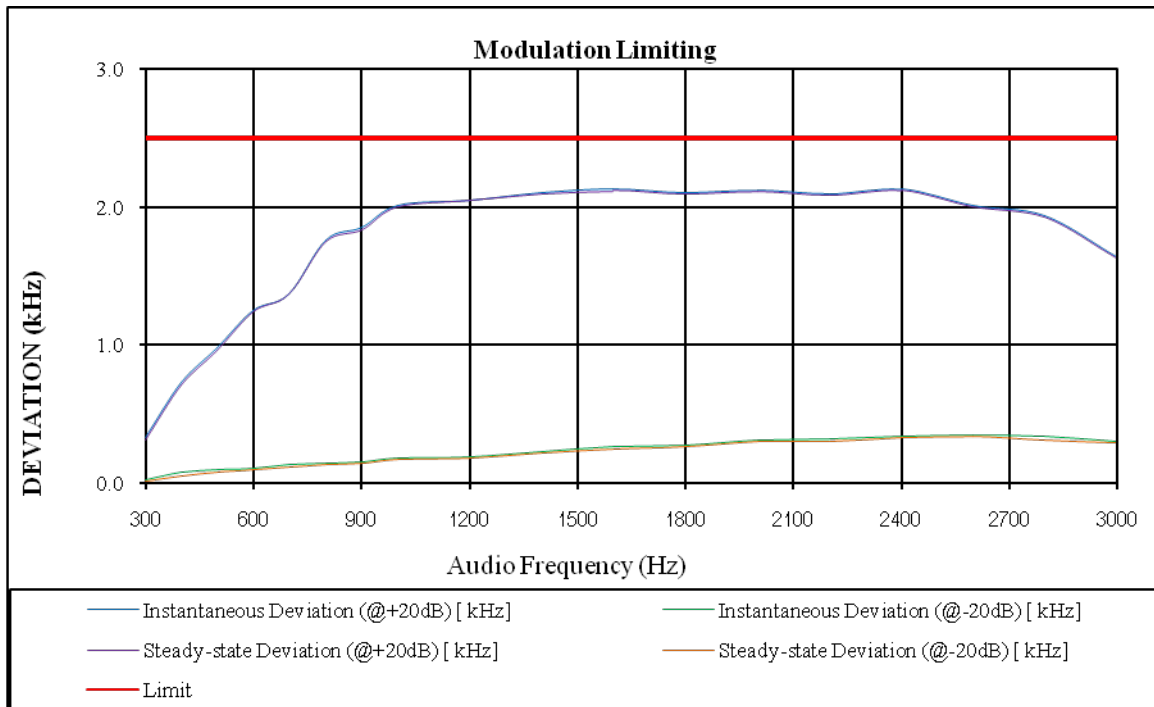
Carrier Frequency: 462.6375 MHz

| Audio Frequency (Hz) | Instantaneous            |                          | Steady-state             |                          | Limit [kHz] |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
|                      | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] |             |
| 300                  | 0.336                    | 0.025                    | 0.310                    | 0.013                    | 2.5         |
| 400                  | 0.730                    | 0.079                    | 0.712                    | 0.058                    | 2.5         |
| 500                  | 0.985                    | 0.099                    | 0.963                    | 0.081                    | 2.5         |
| 600                  | 1.254                    | 0.107                    | 1.247                    | 0.088                    | 2.5         |
| 700                  | 1.377                    | 0.135                    | 1.368                    | 0.118                    | 2.5         |
| 800                  | 1.766                    | 0.149                    | 1.754                    | 0.136                    | 2.5         |
| 900                  | 1.853                    | 0.158                    | 1.841                    | 0.144                    | 2.5         |
| 1000                 | 2.018                    | 0.189                    | 2.002                    | 0.172                    | 2.5         |
| 1200                 | 2.060                    | 0.198                    | 2.051                    | 0.183                    | 2.5         |
| 1400                 | 2.110                    | 0.234                    | 2.095                    | 0.220                    | 2.5         |
| 1600                 | 2.134                    | 0.264                    | 2.122                    | 0.251                    | 2.5         |
| 1800                 | 2.112                    | 0.276                    | 2.100                    | 0.263                    | 2.5         |
| 2000                 | 2.130                    | 0.312                    | 2.118                    | 0.300                    | 2.5         |
| 2200                 | 2.101                    | 0.327                    | 2.090                    | 0.308                    | 2.5         |
| 2400                 | 2.142                    | 0.342                    | 2.125                    | 0.329                    | 2.5         |
| 2600                 | 2.018                    | 0.354                    | 2.011                    | 0.342                    | 2.5         |
| 2800                 | 1.945                    | 0.324                    | 1.927                    | 0.312                    | 2.5         |
| 3000                 | 1.656                    | 0.302                    | 1.643                    | 0.295                    | 2.5         |



Carrier Frequency: 467.6375 MHz

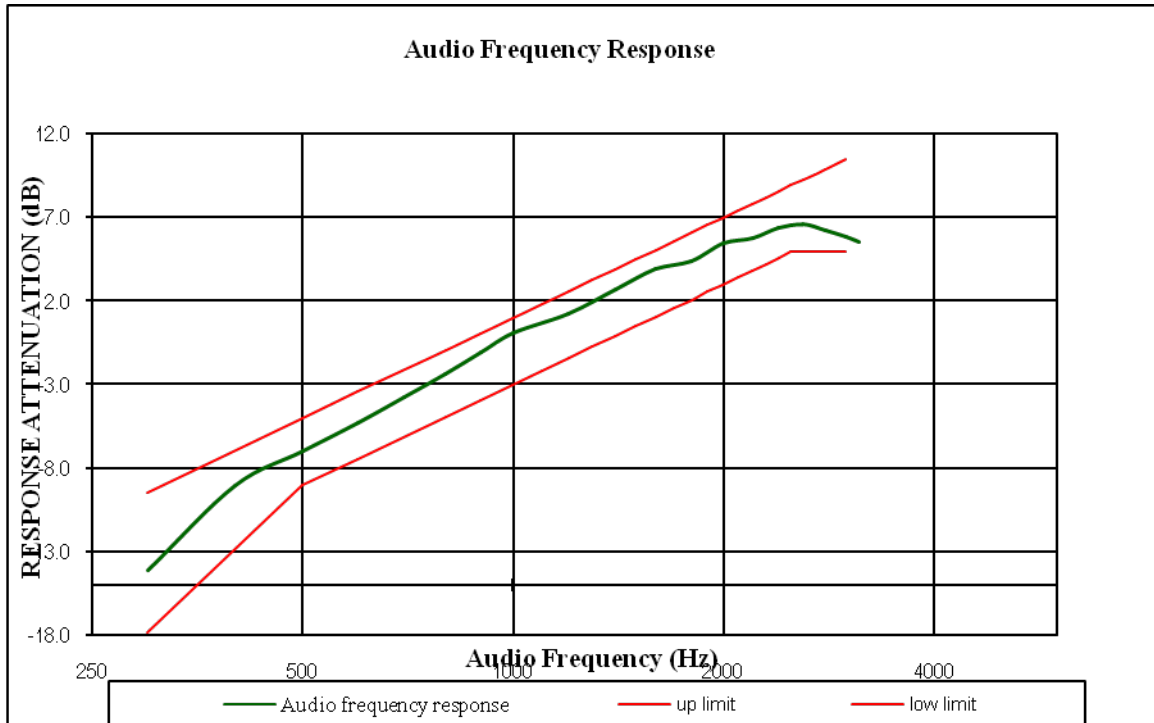
| Audio Frequency (Hz) | Instantaneous            |                          | Steady-state             |                          | Limit [kHz] |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
|                      | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] |             |
| 300                  | 0.335                    | 0.024                    | 0.309                    | 0.012                    | 2.5         |
| 400                  | 0.728                    | 0.077                    | 0.710                    | 0.056                    | 2.5         |
| 500                  | 0.982                    | 0.098                    | 0.962                    | 0.083                    | 2.5         |
| 600                  | 1.253                    | 0.105                    | 1.245                    | 0.094                    | 2.5         |
| 700                  | 1.369                    | 0.133                    | 1.368                    | 0.117                    | 2.5         |
| 800                  | 1.764                    | 0.146                    | 1.752                    | 0.134                    | 2.5         |
| 900                  | 1.852                    | 0.157                    | 1.839                    | 0.142                    | 2.5         |
| 1000                 | 2.016                    | 0.186                    | 2.001                    | 0.168                    | 2.5         |
| 1200                 | 2.049                    | 0.194                    | 2.048                    | 0.181                    | 2.5         |
| 1400                 | 2.105                    | 0.232                    | 2.093                    | 0.217                    | 2.5         |
| 1600                 | 2.132                    | 0.263                    | 2.119                    | 0.248                    | 2.5         |
| 1800                 | 2.109                    | 0.275                    | 2.097                    | 0.262                    | 2.5         |
| 2000                 | 2.125                    | 0.311                    | 2.116                    | 0.298                    | 2.5         |
| 2200                 | 2.098                    | 0.324                    | 2.086                    | 0.305                    | 2.5         |
| 2400                 | 2.133                    | 0.340                    | 2.122                    | 0.327                    | 2.5         |
| 2600                 | 2.015                    | 0.352                    | 2.007                    | 0.341                    | 2.5         |
| 2800                 | 1.942                    | 0.341                    | 1.926                    | 0.309                    | 2.5         |
| 3000                 | 1.643                    | 0.299                    | 1.632                    | 0.291                    | 2.5         |



**Audio Frequency Response**

Carrier Frequency: 462.6375 MHz

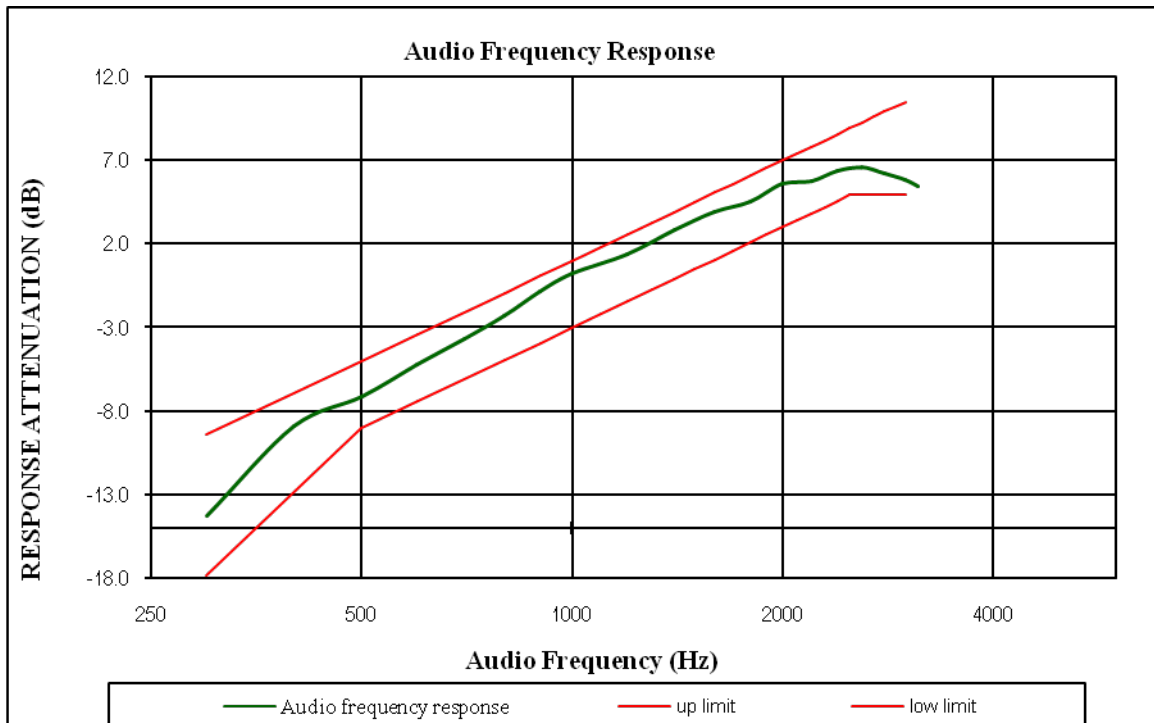
| Audio Frequency (Hz) | Response Attenuation (dB) |
|----------------------|---------------------------|
| 300                  | -14.07                    |
| 400                  | -9.02                     |
| 500                  | -6.97                     |
| 600                  | -5.26                     |
| 700                  | -3.74                     |
| 800                  | -2.34                     |
| 900                  | -1.07                     |
| 1000                 | 0.10                      |
| 1200                 | 1.27                      |
| 1400                 | 2.70                      |
| 1600                 | 3.91                      |
| 1800                 | 4.42                      |
| 2000                 | 5.47                      |
| 2200                 | 5.79                      |
| 2400                 | 6.38                      |
| 2600                 | 6.62                      |
| 2800                 | 6.24                      |
| 3000                 | 5.86                      |
| 3125                 | 5.51                      |



**Audio Frequency Response**

Carrier Frequency: 467.6375 MHz

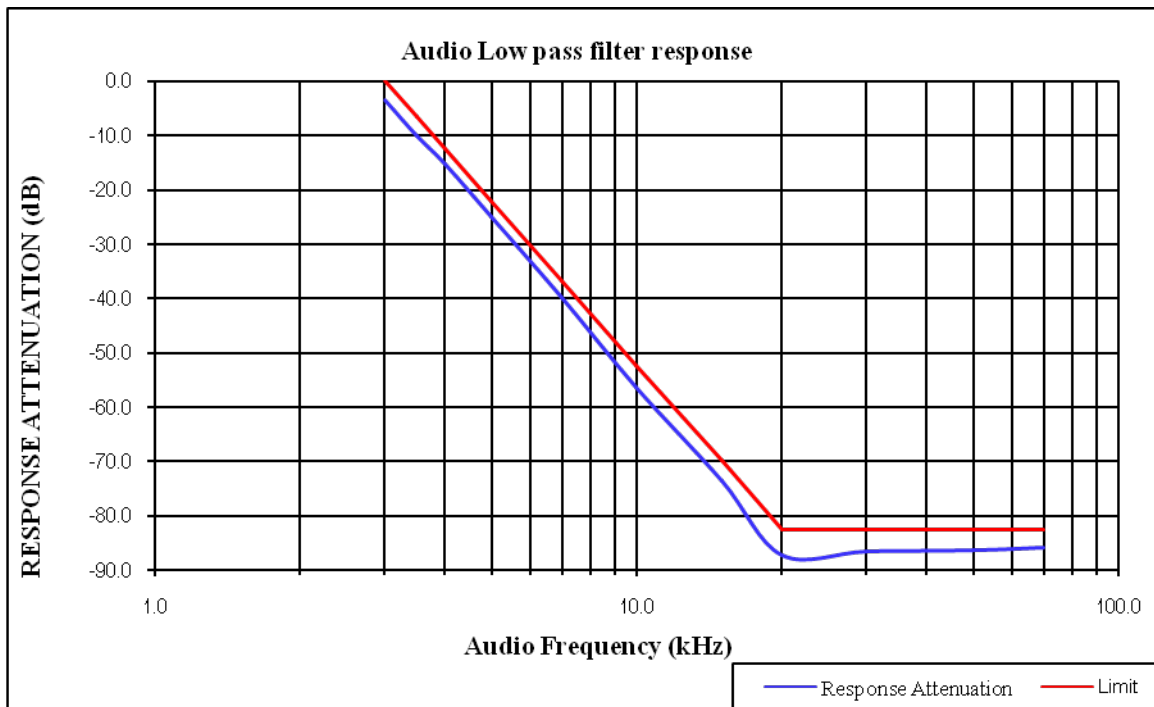
| Audio Frequency (Hz) | Response Attenuation (dB) |
|----------------------|---------------------------|
| 300                  | -14.24                    |
| 400                  | -8.92                     |
| 500                  | -7.09                     |
| 600                  | -5.19                     |
| 700                  | -3.64                     |
| 800                  | -2.29                     |
| 900                  | -0.82                     |
| 1000                 | 0.22                      |
| 1200                 | 1.39                      |
| 1400                 | 2.81                      |
| 1600                 | 3.93                      |
| 1800                 | 4.52                      |
| 2000                 | 5.58                      |
| 2200                 | 5.79                      |
| 2400                 | 6.40                      |
| 2600                 | 6.58                      |
| 2800                 | 6.20                      |
| 3000                 | 5.83                      |
| 3125                 | 5.42                      |



**Audio Low Pass Filter Response**

Carrier Frequency: 462.6375 MHz

| Audio Frequency (kHz) | Response Attenuation (dB) | Limit (dB) |
|-----------------------|---------------------------|------------|
| 3.0                   | -3.5                      | 0.0        |
| 3.5                   | -10.2                     | -6.7       |
| 4.0                   | -15.3                     | -12.5      |
| 5.0                   | -25.0                     | -22.2      |
| 7.0                   | -39.8                     | -36.8      |
| 10.0                  | -56.4                     | -52.3      |
| 15.0                  | -73.5                     | -69.9      |
| 20.0                  | -87.3                     | -82.5      |
| 30.0                  | -86.6                     | -82.5      |
| 50.0                  | -86.4                     | -82.5      |
| 70.0                  | -85.8                     | -82.5      |

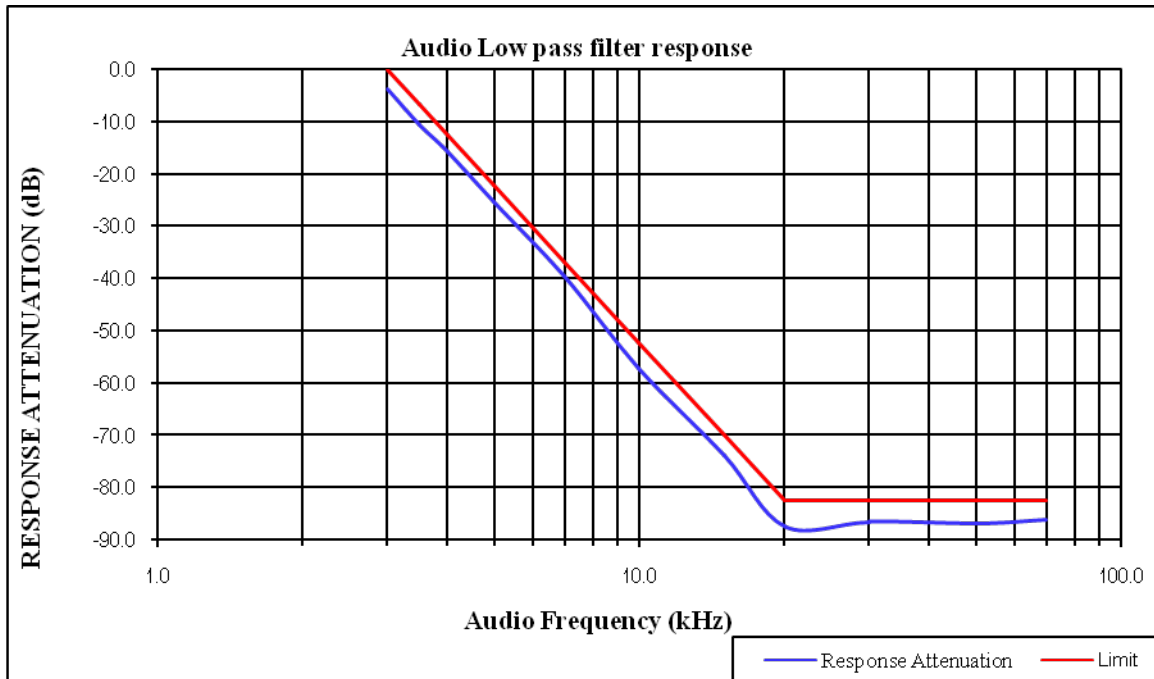




### Audio Low Pass Filter Response

Carrier Frequency: 467.6375 MHz

| Audio Frequency (kHz) | Response Attenuation (dB) | Limit (dB) |
|-----------------------|---------------------------|------------|
| 3.0                   | -3.8                      | 0.0        |
| 3.5                   | -10.6                     | -6.7       |
| 4.0                   | -15.7                     | -12.5      |
| 5.0                   | -25.4                     | -22.2      |
| 7.0                   | -39.6                     | -36.8      |
| 10.0                  | -57.1                     | -52.3      |
| 15.0                  | -73.8                     | -69.9      |
| 20.0                  | -87.3                     | -82.5      |
| 30.0                  | -86.5                     | -82.5      |
| 50.0                  | -86.9                     | -82.5      |
| 70.0                  | -86.2                     | -82.5      |



## FCC §2.1049, §95.573, §95.579 - AUTHORIZED BANDWIDTH AND EMISSION MASK

### Applicable Standard

According to §95.573

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

According to §95.579

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

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

- (1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.
- (2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.
- (3)  $43 + 10 \log (P)$  dB in any frequency band removed from the channel center frequency by more than 31.25 kHz.

### Test Procedure

Test Method: ANSI C63.26-2015

### Test Equipment List and Details

| Manufacturer | Description                | Model No.     | Serial No. | Calibration Date | Calibration Due Date |
|--------------|----------------------------|---------------|------------|------------------|----------------------|
| R&S          | Spectrum Analyzer          | FSV40         | 101474     | 2021-07-22       | 2022-07-21           |
| yzjingcheng  | Coaxial Cable              | KTRFBU-141-50 | 41005012   | Each Time        | /                    |
| Weinschel    | Coaxial Attenuators        | 53-20-34      | LN749      | Each Time        | /                    |
| HP           | RF Communications Test Set | 8920A         | 3438A05201 | 2021-07-22       | 2022-07-21           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |            |
|---------------------------|------------|
| <b>Temperature:</b>       | 23 °C      |
| <b>Relative Humidity:</b> | 28 %       |
| <b>ATM Pressure:</b>      | 101.8 kPa  |
| <b>Test by:</b>           | James Chen |
| <b>Test Date:</b>         | 2021.9.10  |

Test Mode: Transmitting

| <b>fc<br/>(MHz)</b> | <b>99% Occupied<br/>Bandwidth<br/>(kHz)</b> | <b>Limit<br/>(kHz)</b> |
|---------------------|---------------------------------------------|------------------------|
| 462.6375            | 9.88                                        | 12.50                  |
| 467.6375            | 9.98                                        | 12.50                  |

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator

Per CFR 47 §2.201& §2.202,  $BW = 2M + 2D$

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

Emission Designator 11K0F3E

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

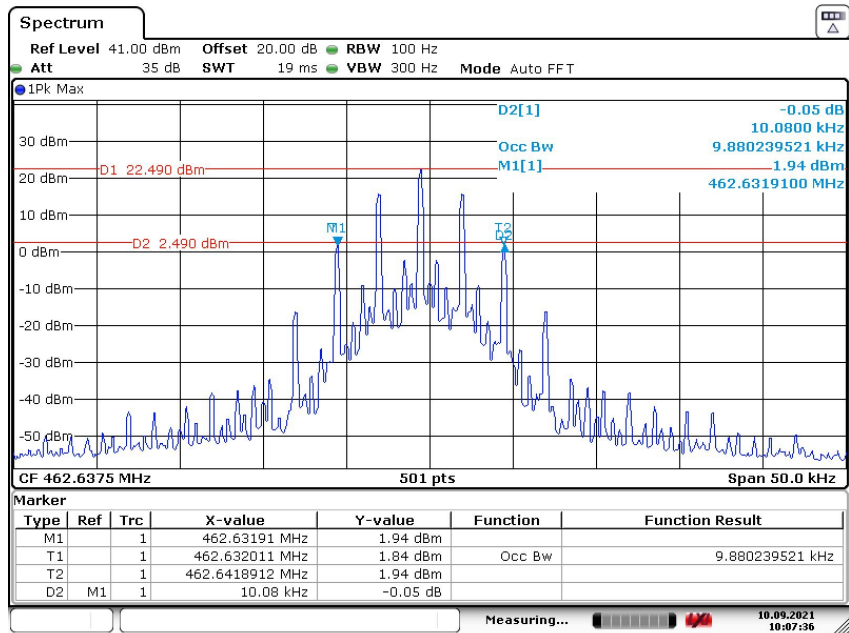
$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} = 11K0$

F3E portion of the designator represents an FM voice transmission

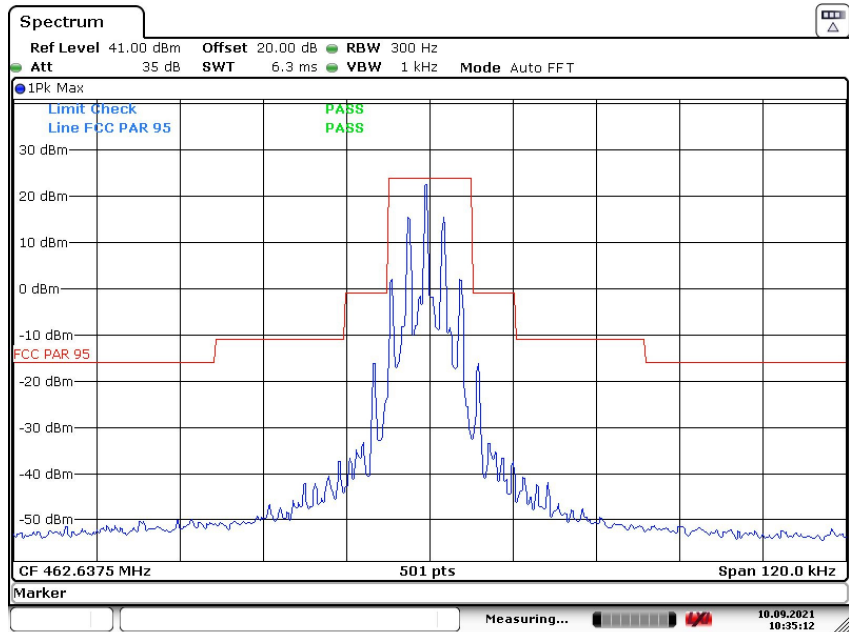
Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

FM:

462.6375 MHz

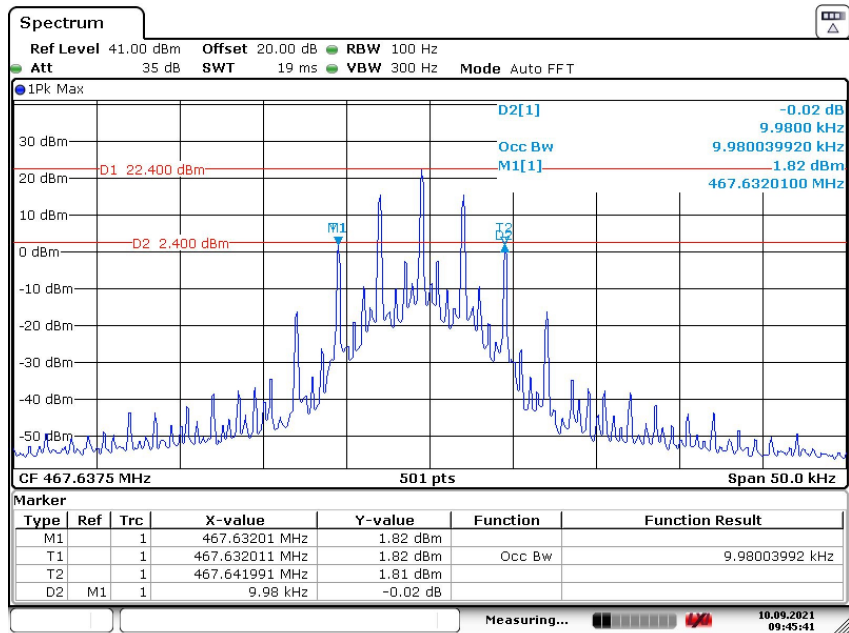


Date: 10.SEP.2021 10:07:36

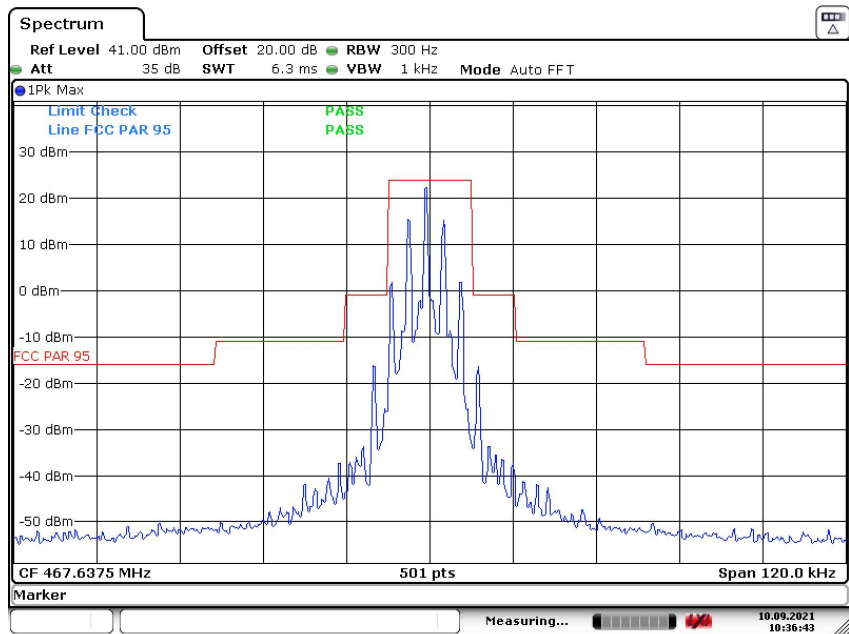


Date: 10.SEP.2021 10:35:12

467.6375 MHz



Date: 10.SEP.2021 09:45:41



Date: 10.SEP.2021 10:36:43

## FCC §2.1053 & §95.579 - RADIATED SPURIOUS EMISSION

### Applicable Standard

FCC §2.1053 and §95.579

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 43+10 Log<sub>10</sub> (power out in Watts)

### Test Equipment List and Details

| Manufacturer   | Description               | Model      | Serial Number | Calibration Date | Calibration Due Date |
|----------------|---------------------------|------------|---------------|------------------|----------------------|
| Sunol Sciences | Antenna                   | JB3        | A060611-1     | 2020-11-10       | 2023-11-10           |
| R&S            | EMI Test Receiver         | ESR3       | 102453        | 2020-09-23       | 2021-09-22           |
| Unknown        | Coaxial Cable             | C-NJNJ-50  | C-0075-01     | 2021-07-19       | 2022-07-18           |
| Unknown        | Coaxial Cable             | C-NJNJ-50  | C-0400-01     | 2021-07-19       | 2022-07-18           |
| Unknown        | Coaxial Cable             | C-NJNJ-50  | C-1400-01     | 2021-07-19       | 2022-07-18           |
| Sonoma         | Amplifier                 | 310N       | 372193        | 2021-07-18       | 2022-07-17           |
| EMCO           | Adjustable Dipole Antenna | 3121C      | 9109-753      | N/A              | N/A                  |
| Unknown        | Coaxial Cable             | C-NJNJ-50  | C-0200-02     | 2021-09-05       | 2022-09-05           |
| Agilent        | Signal Generator          | E8247C     | MY43321350    | 2020-12-09       | 2021-12-08           |
| ETS-Lindgren   | Horn Antenna              | 3115       | 000 527 35    | 2018-10-12       | 2021-10-12           |
| TDK RF         | Horn Antenna              | HRN-0118   | 130 084       | 2018-10-12       | 2021-10-12           |
| Agilent        | Spectrum Analyzer         | E4440A     | SG43360054    | 2021-07-22       | 2022-07-21           |
| Unknown        | Coaxial Cable             | C-SJSJ-50  | C-0800-01     | 2021-09-04       | 2022-09-03           |
| Mini-Circuit   | Amplifier                 | ZVA-213-S+ | 54201245      | 2021-09-04       | 2022-09-03           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

| Test Items         | Radiation Below 1GHz | Radiation Above 1GHz |
|--------------------|----------------------|----------------------|
| Temperature:       | 21.9 °C              | 23.5 °C              |
| Relative Humidity: | 26 %                 | 26 %                 |
| ATM Pressure:      | 101.8kPa             | 101.8 kPa            |
| Tester:            | Joker Chen           | Lee Li               |
| Test Date:         | 2021.09.09           | 2021.09.09           |

*Test Mode: Transmitting*

| Frequency (MHz)                  | Polar (H/V) | Receiver Reading (dB $\mu$ V) | Substituted Method      |                        |                 | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|----------------------------------|-------------|-------------------------------|-------------------------|------------------------|-----------------|----------------------|-------------|-------------|
|                                  |             |                               | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) |                      |             |             |
| <b>FM, frequency:462.6375MHz</b> |             |                               |                         |                        |                 |                      |             |             |
| 925.27                           | H           | 78.83                         | -17.26                  | 0.00                   | 0.97            | -18.23               | -13.00      | 5.23        |
| 925.27                           | V           | 82.68                         | -15.24                  | 0.00                   | 0.97            | -16.21               | -13.00      | 3.21        |
| 1387.91                          | H           | 53.95                         | -49.49                  | 8.92                   | 1.20            | -41.77               | -13.00      | 28.77       |
| 1387.91                          | V           | 57.93                         | -46.15                  | 8.92                   | 1.20            | -38.43               | -13.00      | 25.43       |
| 1850.55                          | H           | 48.38                         | -55.17                  | 11.45                  | 0.85            | -44.57               | -13.00      | 31.57       |
| 1850.55                          | V           | 53.24                         | -50.76                  | 11.45                  | 0.85            | -40.16               | -13.00      | 27.16       |
| 2313.19                          | H           | 48.1                          | -54.09                  | 11.35                  | 1.24            | -43.98               | -13.00      | 30.98       |
| 2313.19                          | V           | 52.17                         | -49.96                  | 11.35                  | 1.24            | -39.85               | -13.00      | 26.85       |
| <b>FM, frequency:467.6375MHz</b> |             |                               |                         |                        |                 |                      |             |             |
| 935.27                           | H           | 78.59                         | -17.08                  | 0.00                   | 0.94            | -18.02               | -13.00      | 5.02        |
| 935.27                           | V           | 82.32                         | -15.11                  | 0.00                   | 0.94            | -16.05               | -13.00      | 3.05        |
| 1402.91                          | H           | 54.83                         | -48.6                   | 9.01                   | 1.20            | -40.79               | -13.00      | 27.79       |
| 1402.91                          | V           | 58.67                         | -45.35                  | 9.01                   | 1.20            | -37.54               | -13.00      | 24.54       |
| 1870.55                          | H           | 49.44                         | -53.81                  | 11.59                  | 0.92            | -43.14               | -13.00      | 30.14       |
| 1870.55                          | V           | 53.61                         | -50.03                  | 11.59                  | 0.92            | -39.36               | -13.00      | 26.36       |
| 2338.19                          | H           | 48.33                         | -53.94                  | 11.62                  | 1.25            | -43.57               | -13.00      | 30.57       |
| 2338.19                          | V           | 52.23                         | -50.05                  | 11.62                  | 1.25            | -39.68               | -13.00      | 26.68       |

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

Note 2:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

## FCC§2.1055 (d), §95.565- FREQUENCY STABILITY

### Applicable Standard

According to FCC §2.1055(a) (1),

The frequency stability shall be measured with variation of ambient temperature from  $-30\text{ }^{\circ}\text{C}$  to  $+50\text{ }^{\circ}\text{C}$ , and according to FCC 2.1055(d) (2), 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 §95.565

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

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Frequency Counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Frequency Counter.

Frequency Stability vs. Voltage:

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

The output frequency was recorded for each voltage.

### Test Equipment List and Details

| Manufacturer   | Description                | Model No.     | Serial No. | Calibration Date | Calibration Due Date |
|----------------|----------------------------|---------------|------------|------------------|----------------------|
| yzjingcheng    | Coaxial Cable              | KTRFBU-141-50 | 41005012   | Each Time        | /                    |
| E-Microwave    | Blocking Control           | EMDCB-00036   | 0E01201047 | Each Time        | /                    |
| E-Microwave    | Coaxial Attenuators        | EMCA10-5RN-6  | OE01203239 | Each Time        | /                    |
| HP             | RF Communications Test Set | 8920A         | 3438A05201 | 2021-07-22       | 2022-07-21           |
| UNI-T          | Multimeter                 | UT39A         | M130199938 | 2021-07-23       | 2022-07-23           |
| BACL           | TEMP&HUMI Test Chamber     | BTH-150       | 30022      | 2021-02-24       | 2022-02-23           |
| Pro instrument | DC Power Supply            | pps3300       | 3300012    | N/A              | N/A                  |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).



**Test Data**

**Environmental Conditions**

|                           |            |
|---------------------------|------------|
| <b>Temperature:</b>       | 24 °C      |
| <b>Relative Humidity:</b> | 45 %       |
| <b>ATM Pressure:</b>      | 101.8 kPa  |
| <b>Test by:</b>           | James Chen |
| <b>Test Date:</b>         | 2021.09.09 |

Test Mode: Transmitting

| Reference Frequency: 462.6375 MHz |                 |            |                 |       |
|-----------------------------------|-----------------|------------|-----------------|-------|
| Temperature                       | Voltage         | Reading    | Frequency Error | Limit |
| °C                                | V <sub>DC</sub> | MHz        | ppm             | ppm   |
| -30                               | 3.6             | 462.636953 | -1.182          | 2.5   |
| -20                               |                 | 462.636948 | -1.193          |       |
| -10                               |                 | 462.636959 | -1.169          |       |
| 0                                 |                 | 462.636936 | -1.219          |       |
| 10                                |                 | 462.636943 | -1.204          |       |
| 20                                |                 | 462.636935 | -1.221          |       |
| 30                                |                 | 462.636954 | -1.180          |       |
| 40                                |                 | 462.636911 | -1.273          |       |
| 50                                |                 | 462.636918 | -1.258          |       |
| 20                                |                 | 4.0        | 462.636932      |       |
| 20                                | 3.2             | 462.636936 | -1.219          |       |

| Reference Frequency: 467.6375 MHz |                 |            |                 |       |
|-----------------------------------|-----------------|------------|-----------------|-------|
| Temperature                       | Voltage         | Reading    | Frequency Error | Limit |
| °C                                | V <sub>DC</sub> | MHz        | ppm             | ppm   |
| -30                               | 3.6             | 467.637025 | -1.016          | 2.5   |
| -20                               |                 | 467.637018 | -1.031          |       |
| -10                               |                 | 467.637014 | -1.039          |       |
| 0                                 |                 | 467.637032 | -1.001          |       |
| 10                                |                 | 467.637011 | -1.046          |       |
| 20                                |                 | 467.637023 | -1.020          |       |
| 30                                |                 | 467.637029 | -1.007          |       |
| 40                                |                 | 467.637018 | -1.031          |       |
| 50                                |                 | 467.637013 | -1.041          |       |
| 20                                |                 | 4.0        | 467.637022      |       |
| 20                                | 3.2             | 467.637025 | -1.016          |       |

Note: The extreme voltage was declared by applicant.

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