TESTING LABORATORY
CERTIFICATE #4820.01

# FCC PART 15.249

# TEST REPORT

For

## Dongguan Couso Technology Co., Ltd.

No.26 Minye Road, Tangxia town Dongguang City, Guangdong Province China

## FCC ID: 2AMSRCM695G

| Report Type: | Product Type: |
|---|---|
| Original Report | 2.4G WIRELESS MOUSE |

| | |
|---|---|
| **Report Number:** | RDG210105800-00A |
| **Report Date:** | 2021-01-30 |
| **Reviewed By:** | Ivan Cao<br>Assistant Manager |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br>www.baclcorp.com.cn |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| **EUT Name:** | 2.4G WIRELESS MOUSE |
| **EUT Model:** | CM695G |
| **Multiple Models:** | G10,G16, G20,G30,G40,G50,G60,G70,G80,G90, V10,V20, V30,V40,V50,V60,V70,V80,V90, CM610G, CM611G, CM612G, CM613G,CM614G, CM615G, CM616G, CM617G, CM618G, CM619G, CM620G, CM621G, CM622G, CM623G, CM624G, CM625G, CM626G, CM627G, CM628G, CM628G, CM629G, CM630G, CM635G, CM640G, CM650G, CM660G, CM670G,CM675G, CM680G, CM690G, CM800G, CM810G, CM815G, CM820G, CM830G, CM840G, CM850G, CM860G, CM870G, CM880G, CM880 PLUS,CM880 PRO, CM890G, CM891G, CM892G, CM893G, CM894G, CM895G, CM896G, CM897G, CM898G, CM899G, CM899LD |
| **Operation Frequency:** | 2403.85-2479.85MHz |
| **Antenna Gain▲:** | -1.0 dBi |
| **Modulation Type:** | GFSK |
| **Rated Input Voltage:** | DC 1.5V from Battery |
| **Serial Number:** | RDG210105800-RF-S1 |
| **EUT Received Date:** | 2021.01.08 |
| **EUT Received Status:** | Good |

*Note: The series product, models CM695G, G10,G16, G20,G30,G40,G50,G60,G70,G80,G90, V10,V20, V30,V40,V50,V60,V70,V80,V90, CM610G, CM611G, CM612G, CM613G,CM614G, CM615G, CM616G, CM617G, CM618G, CM619G, CM620G, CM621G, CM622G, CM623G, CM624G, CM625G, CM626G, CM627G, CM628G, CM628G, CM629G, CM630G, CM635G, CM640G, CM650G, CM660G, CM670G, CM675G, CM680G, CM690G, CM800G, CM810G, CM815G, CM820G, CM830G, CM840G, CM850G, CM860G, CM870G, CM880G, CM880 PLUS,CM880 PRO, CM890G, CM891G, CM892G, CM893G, CM894G, CM895G, CM896G, CM897G, CM898G, CM899G, CM899LD are electrically identical, the model CM695G was fully tested. The difference between them please refer to the declaration letter for details.*

## Objective

This type approval report is prepared on behalf of ***Dongguan Couso Technology Co., Ltd.*** in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.209, 15.215 and 15.249 rules.

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

## Measurement Uncertainty

| Parameter | Measurement Uncertainty |
|---|---|
| Occupied Channel Bandwidth | ±5 % |
| Unwanted Emissions, radiated | 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical<br>200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical<br>1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB |
| Temperature | ±1℃ |
| Humidity | ±5% |
| DC and low frequency voltages | ±0.4% |
| Duty Cycle | 1% |
| AC Power Lines Conducted Emission | 3.12 dB (150 kHz to 30 MHz) |

*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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# SYSTEM TEST CONFIGURATION

## Justification

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

The device employs total 16 channels as below:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| 1 | 2403.85 | 9 | 2441.85 |
| 2 | 2407.85 | 10 | 2445.85 |
| 3 | 2414.85 | 11 | 2453.85 |
| 4 | 2419.85 | 12 | 2459.85 |
| 5 | 2422.85 | 13 | 2463.85 |
| 6 | 2426.85 | 14 | 2466.85 |
| 7 | 2436.85 | 15 | 2473.85 |
| 8 | 2439.85 | 16 | 2479.85 |

EUT was tested with channel 1, 9 and 16.

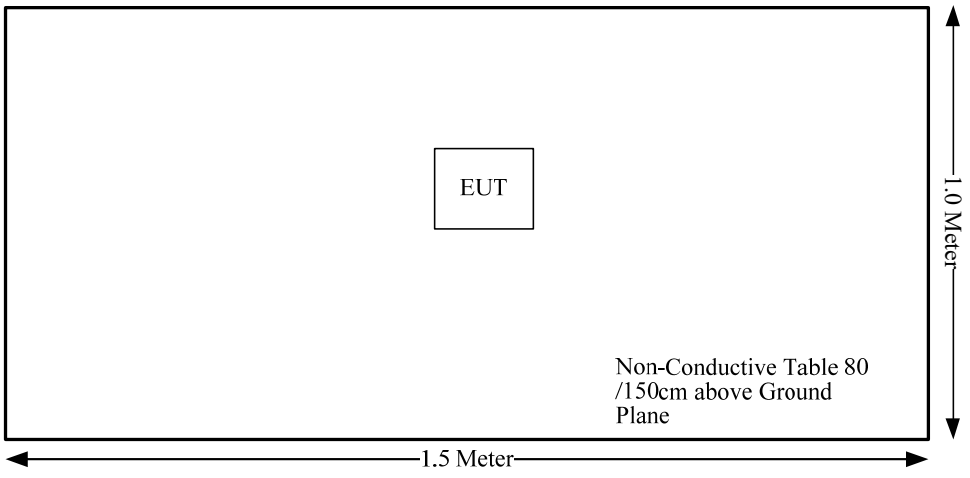
## EUT Exercise Software

No software was used in test, the device was configured to engineer mode by manufacturer, the channel was switched by keys.

## Equipment Modifications

No modifications were made to the EUT.

## Block Diagram of Test Setup



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| §15.203 | Antenna Requirement | Compliance |
| §15.207(a) | Conduction Emissions | Not Applicable |
| 15.205, §15.209, §15.249 | Radiated Emissions | Compliance |
| §15.215 (c) | 20 dB Bandwidth | Compliance |

Not Applicable: the device was powered by battery.

# FCC§15.203 - ANTENNA REQUIREMENT

## Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

## Antenna Connector Construction

The EUT has internal PCB Antenna permanently attached to the unit, the antenna gain is -1.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliant.

# FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS

## Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

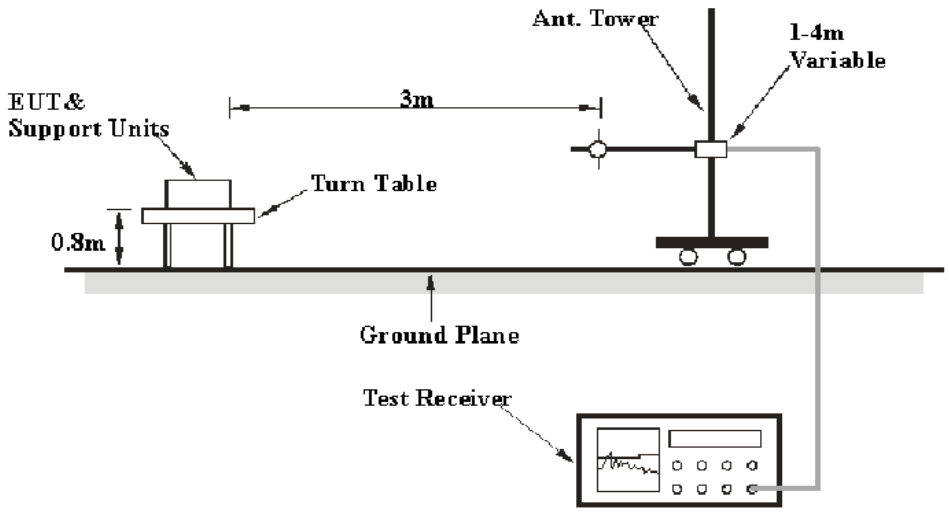
| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|---|---|---|
| 902–928 MHz | 50 | 500 |
| 2400–2483.5 MHz | 50 | 500 |
| 5725–5875 MHz | 50 | 500 |
| 24.0–24.25 GHz | 250 | 2500 |

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

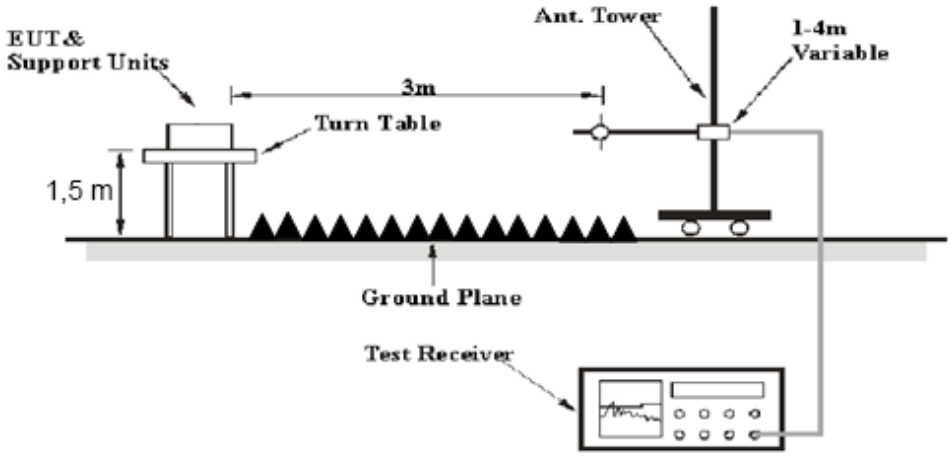
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

## EUT Setup

Below 1 GHz:



**1-25 GHz:**




The radiated emission below 1GHz tests were performed in the 10 meters chamber test site, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.249 limits.

## Test Equipment Setup

The system was investigated from 30 MHz to 25 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 | Measurement |
|---|---|---|---|---|
| 30 MHz – 1000 MHz | 120 kHz | 300 kHz | 120 kHz | QP |
| Above 1 GHz | 1MHz | 3 MHz | / | PK |
| | 1MHz | 10 Hz | / | AV |

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

## Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude 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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" 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:

Margin = Limit – Corrected Amplitude

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Radiation Below 1GHz | | | | | |
| Sunol Sciences | Antenna | JB3 | A060611-2 | 2020-08-25 | 2023-08-25 |
| R&S | EMI Test Receiver | ESCI | 100224 | 2020-09-12 | 2021-09-12 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2020-09-05 | 2021-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0400-02 | 2020-09-05 | 2021-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0530-01 | 2020-09-24 | 2021-09-24 |
| Sonoma | Amplifier | 310N | 185914 | 2020-10-13 | 2021-10-13 |
| Farad | Test Software | EZ-EMC | V1.1.4.2 | N/A | N/A |
| Radiation Above 1GHz | | | | | |
| ETS-Lindgren | Horn Antenna | 3115 | 000 527 35 | 2018-10-12 | 2021-10-12 |
| Ducommun Technolagies | Horn Antenna | ARH-4223-02 | 1007726-02 1304 | 2020-12-06 | 2021-12-05 |
| Agilent | Spectrum Analyzer | E4440A | SG43360054 | 2020-05-09 | 2021-05-09 |
| Unknown | Coaxial Cable | C-SJSJ-50 | C-0800-01 | 2020-09-05 | 2021-09-05 |
| Unknown | Coaxial Cable | C-2.4J2.4J-50 | C-0700-02 | 2020-06-27 | 2021-06-27 |
| Mini-Circuit | Amplifier | ZVA-213-S+ | 54201245 | 2020-09-05 | 2021-09-05 |
| Quinstar | Amplifier | QLW-18405536-JO | 15964001001 | 2020-06-27 | 2021-06-27 |
| Farad | Test Software | EZ-EMC | V1.1.4.2 | N/A | N/A |
| E-Microwave | Band-stop Filters | OBSF-2400-2483.5-S | OE01601525 | 2020-06-16 | 2021-06-16 |
| Micro-tronics | High Pass Filter | HPM50111 | S/N-G217 | 2020-06-16 | 2021-06-16 |

*** 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).

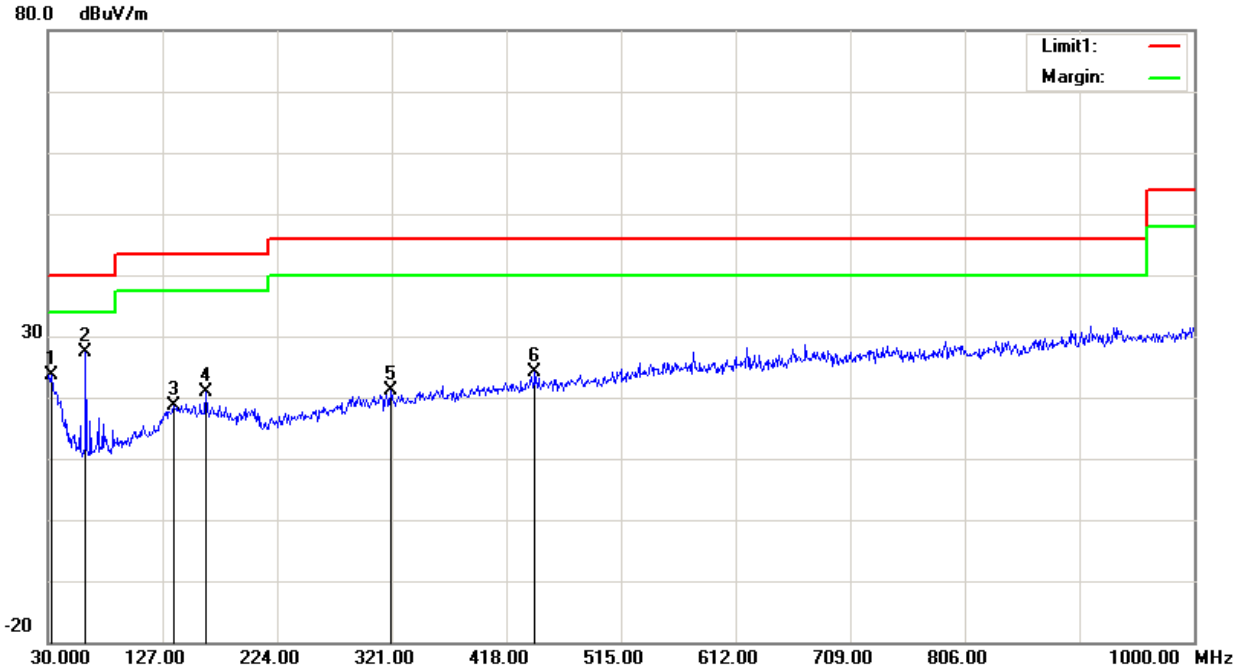
## Test Data

**Environmental Conditions**

| Test Items | Radiation Below 1GHz | Radiation Above 1GHz |
|---|---|---|
| **Temperature:** | 20.5°C | 23.8 °C |
| **Relative Humidity:** | 32 % | 50 % |
| **ATM Pressure:** | 101.5kPa | 101.2 kPa |
| **Tester:** | Leo Long | Lee Li |
| **Test Date:** | 2021-01-20 | 2021-01-26 |

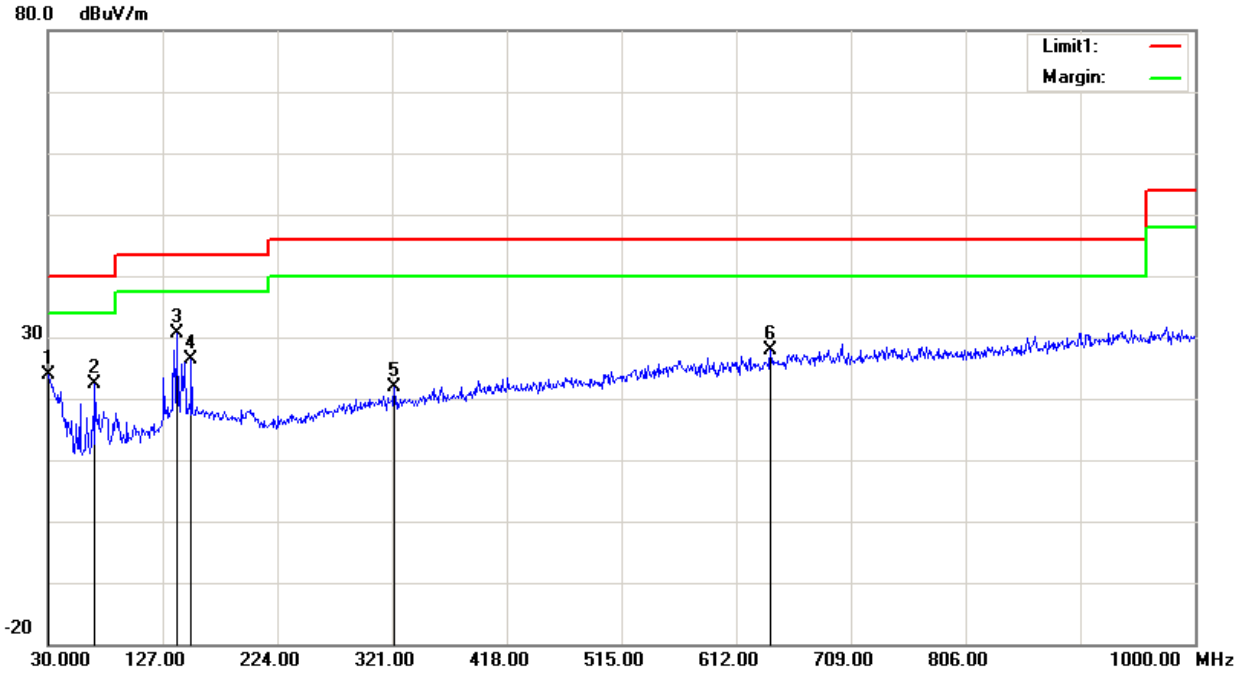
*Test Mode: Transmitting*

**1) 30MHz-1GHz**
**Horizontal:**




| Frequency (MHz) | Reading (dBµV) | Detector | Corrected (dB/m) | Result (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 32.9100 | 29.37 | peak | -5.69 | 23.68 | 40.00 | 16.32 |
| 62.0100 | 43.68 | peak | -16.40 | 27.28 | 40.00 | 12.72 |
| 136.7000 | 27.79 | peak | -9.25 | 18.54 | 43.50 | 24.96 |
| 163.8600 | 30.25 | peak | -9.28 | 20.97 | 43.50 | 22.53 |
| 320.0300 | 28.19 | peak | -7.02 | 21.17 | 46.00 | 24.83 |
| 442.2500 | 28.50 | peak | -4.45 | 24.05 | 46.00 | 21.95 |

**Vertical:**

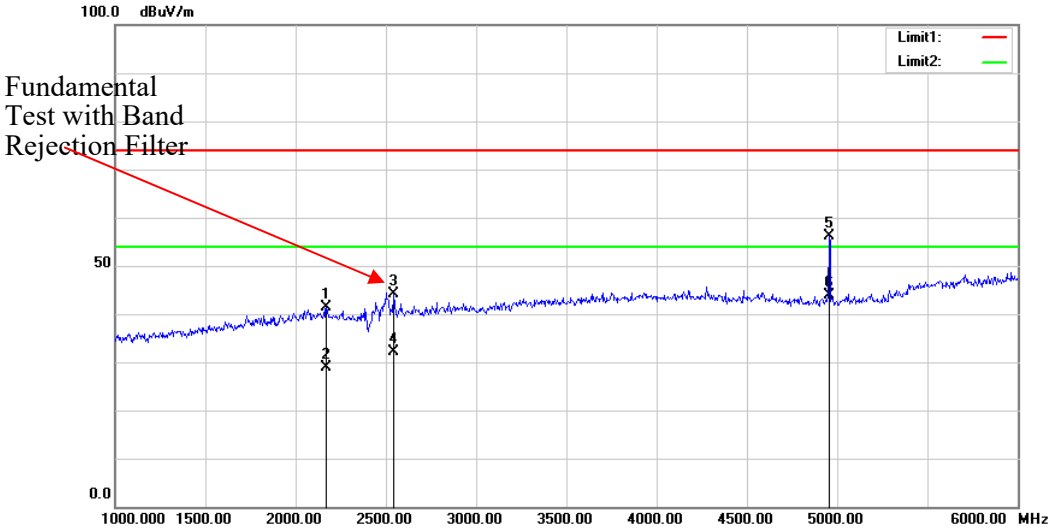


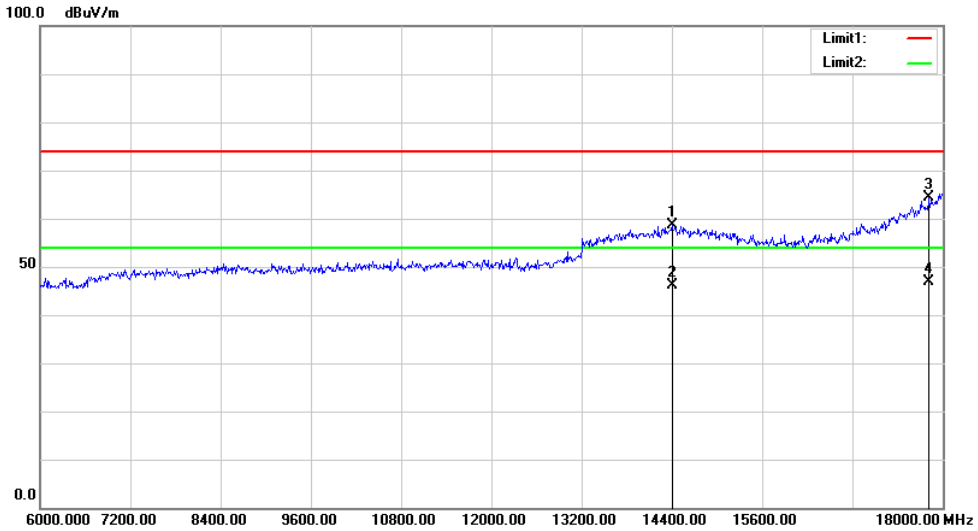

| Frequency (MHz) | Reading (dBµV) | Detector | Corrected (dB/m) | Result (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 30.9700 | 28.58 | peak | -4.66 | 23.92 | 40.00 | 16.08 |
| 69.7700 | 38.74 | peak | -16.36 | 22.38 | 40.00 | 17.62 |
| 138.6400 | 39.93 | peak | -9.22 | 30.71 | 43.50 | 12.79 |
| 151.2500 | 35.76 | peak | -9.29 | 26.47 | 43.50 | 17.03 |
| 322.9400 | 28.99 | peak | -7.02 | 21.97 | 46.00 | 24.03 |
| 641.1000 | 28.49 | peak | -0.73 | 27.76 | 46.00 | 18.24 |

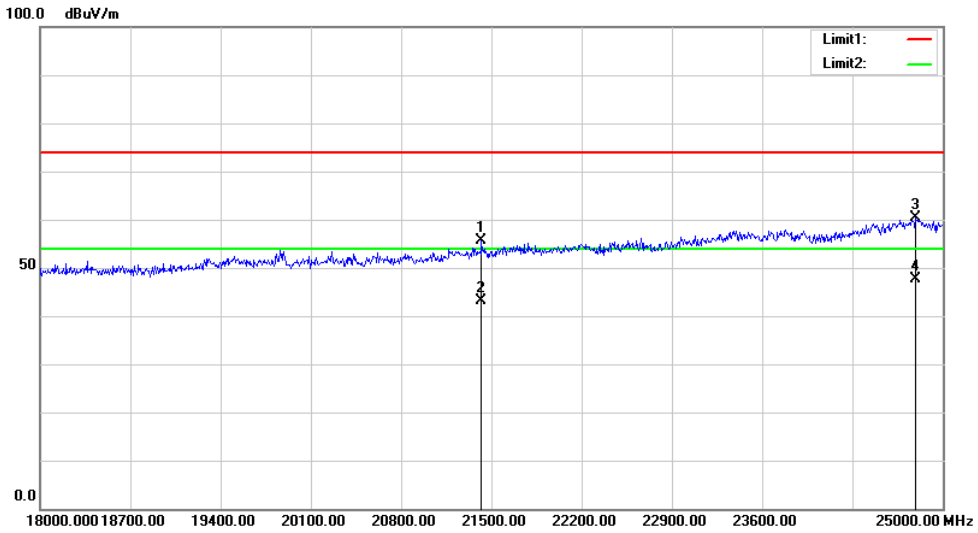
**2) 1GHz-25GHz:**

| Frequency | Receiver | | Rx Antenna | | Cable loss | Amplifier Gain | Corrected Amplitude | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | Polar | Factor | | | | | |
| MHz | dBµV | PK/QP/AV | H/V | dB/m | dB | dB | dBµV/m | dBµV/m | dB |
| Low Channel | | | | | | | | | |
| 2403.85 | 63.40 | PK | H | 28.11 | 1.80 | 0.00 | 93.31 | 113.98 | 20.67 |
| 2403.85 | 28.33 | AV | H | 28.11 | 1.80 | 0.00 | 58.24 | 93.98 | 35.74 |
| 2403.85 | 57.69 | PK | V | 28.11 | 1.80 | 0.00 | 87.60 | 113.98 | 26.38 |
| 2403.85 | 23.75 | AV | V | 28.11 | 1.80 | 0.00 | 53.66 | 93.98 | 40.32 |
| 2400.00 | 38.70 | PK | H | 28.10 | 1.80 | 0.00 | 68.60 | 74.00 | 5.40 |
| 2400.00 | 13.48 | AV | H | 28.10 | 1.80 | 0.00 | 43.38 | 54.00 | 10.62 |
| 4807.70 | 56.66 | PK | H | 32.92 | 3.17 | 25.61 | 67.14 | 74.00 | 6.86 |
| 4807.70 | 26.12 | AV | H | 32.92 | 3.17 | 25.61 | 36.60 | 54.00 | 17.40 |
| 7211.55 | 52.21 | PK | H | 35.75 | 4.81 | 25.61 | 67.16 | 74.00 | 6.84 |
| 7211.55 | 24.16 | AV | H | 35.75 | 4.81 | 25.61 | 39.11 | 54.00 | 14.89 |
| Middle Channel | | | | | | | | | |
| 2441.85 | 63.64 | PK | H | 28.18 | 1.82 | 0.00 | 93.64 | 113.98 | 20.34 |
| 2441.85 | 28.41 | AV | H | 28.18 | 1.82 | 0.00 | 58.41 | 93.98 | 35.57 |
| 2441.85 | 55.92 | PK | V | 28.18 | 1.82 | 0.00 | 85.92 | 113.98 | 28.06 |
| 2441.85 | 22.10 | AV | V | 28.18 | 1.82 | 0.00 | 52.10 | 93.98 | 41.88 |
| 4883.70 | 58.17 | PK | H | 33.07 | 3.28 | 25.66 | 68.86 | 74.00 | 5.14 |
| 4883.70 | 26.51 | AV | H | 33.07 | 3.28 | 25.66 | 37.20 | 54.00 | 16.80 |
| 7325.55 | 51.51 | PK | H | 36.05 | 4.61 | 25.73 | 66.44 | 74.00 | 7.56 |
| 7325.55 | 24.55 | AV | H | 36.05 | 4.61 | 25.73 | 39.48 | 54.00 | 14.52 |
| High Channel | | | | | | | | | |
| 2479.85 | 63.40 | PK | H | 28.26 | 1.84 | 0.00 | 93.50 | 113.98 | 20.48 |
| 2479.85 | 28.11 | AV | H | 28.26 | 1.84 | 0.00 | 58.21 | 93.98 | 35.77 |
| 2479.85 | 55.18 | PK | V | 28.26 | 1.84 | 0.00 | 85.28 | 113.98 | 28.70 |
| 2479.85 | 22.06 | AV | V | 28.26 | 1.84 | 0.00 | 52.16 | 93.98 | 41.82 |
| 2483.50 | 38.51 | PK | H | 28.27 | 1.84 | 0.00 | 68.62 | 74.00 | 5.38 |
| 2483.50 | 13.95 | AV | H | 28.27 | 1.84 | 0.00 | 44.06 | 54.00 | 9.94 |
| 4959.70 | 59.05 | PK | H | 33.22 | 3.23 | 25.63 | 69.87 | 74.00 | 4.13 |
| 4959.70 | 26.87 | AV | H | 33.22 | 3.23 | 25.63 | 37.69 | 54.00 | 16.31 |
| 7439.55 | 46.78 | PK | H | 36.34 | 4.42 | 25.85 | 61.69 | 74.00 | 12.31 |
| 7439.55 | 23.67 | AV | H | 36.34 | 4.42 | 25.85 | 38.58 | 54.00 | 15.42 |

**Test plots(High Channel was the worst):**
**Horizontal**

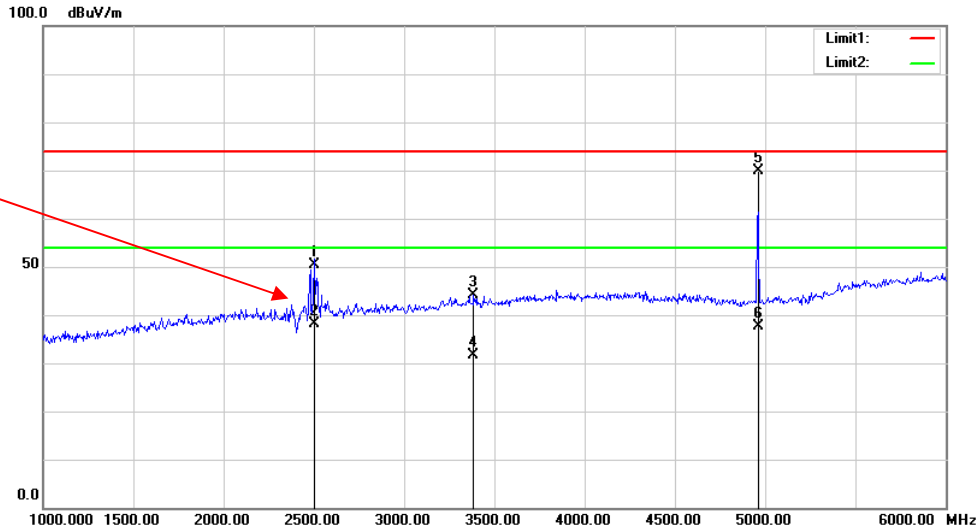


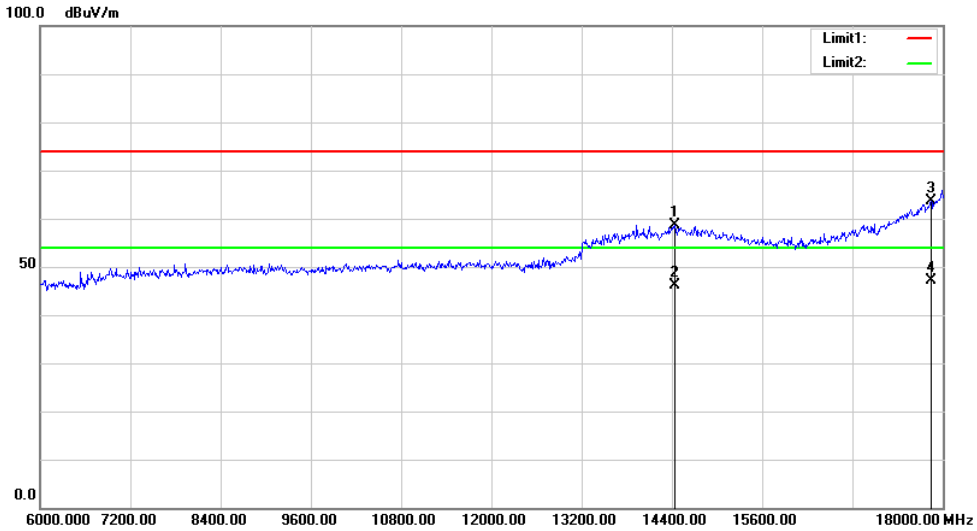



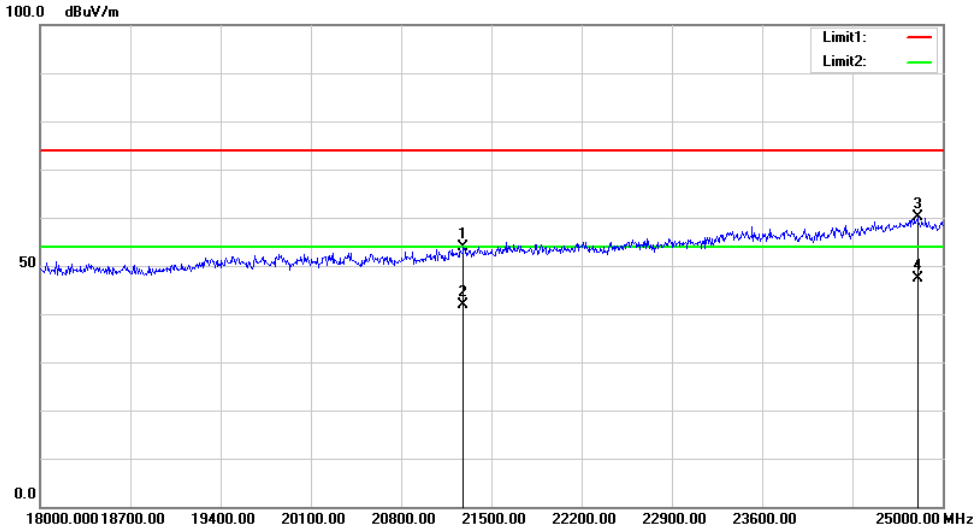



**Vertical:**

Fundamental Test with Band Rejection Filter



# FCC §15.215(c) – 20 dB BANDWIDTH TESTING

## Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

## Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. Repeat above procedures until all frequencies measured were complete.

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | Spectrum Analyzer | FSV40 | 101589 | 2020-06-24 | 2021-06-23 |
| yzjingcheng | Coaxial Cable | KTRFBU-141-50 | 41005012 | Each time | 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

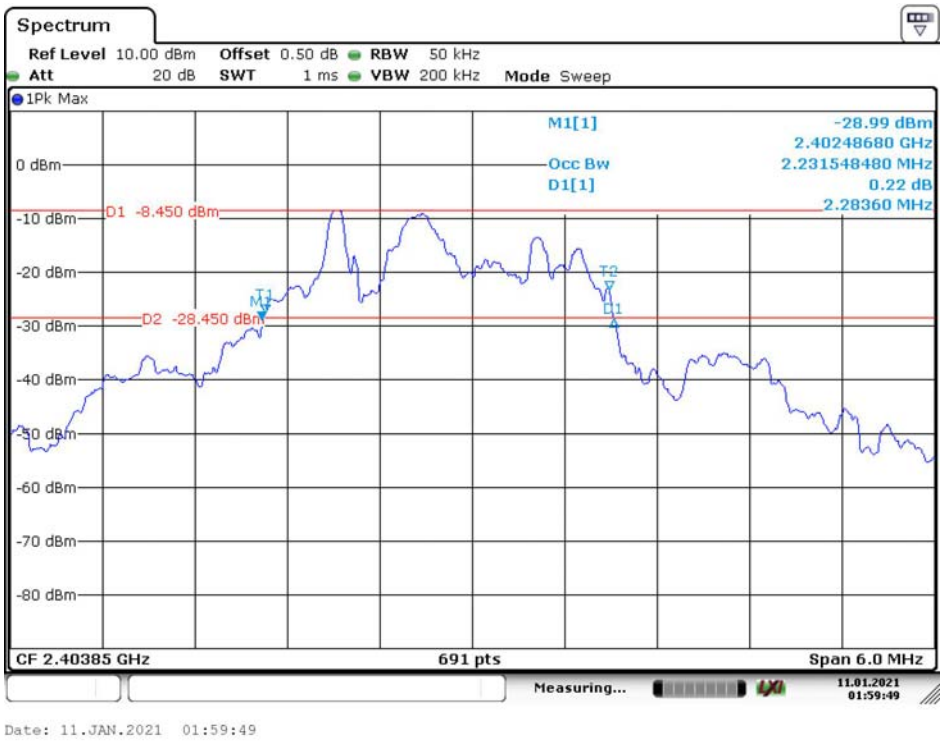
| | |
|---|---|
| **Temperature:** | 18.8 °C |
| **Relative Humidity:** | 27 % |
| **ATM Pressure:** | 102.1 kPa |
| **Tester:** | James Chen |
| **Test Date:** | 2021-01-11 |

**Test Result:** Compliant. Please refer to following tables and plots

*Test Mode: Transmitting*

| Channel | Frequency (MHz) | 20 dB Bandwidth (MHz) |
|---|---|---|
| Low | 2403.85 | 2.284 |
| Middle | 2441.85 | 2.258 |
| High | 2479.85 | 2.258 |

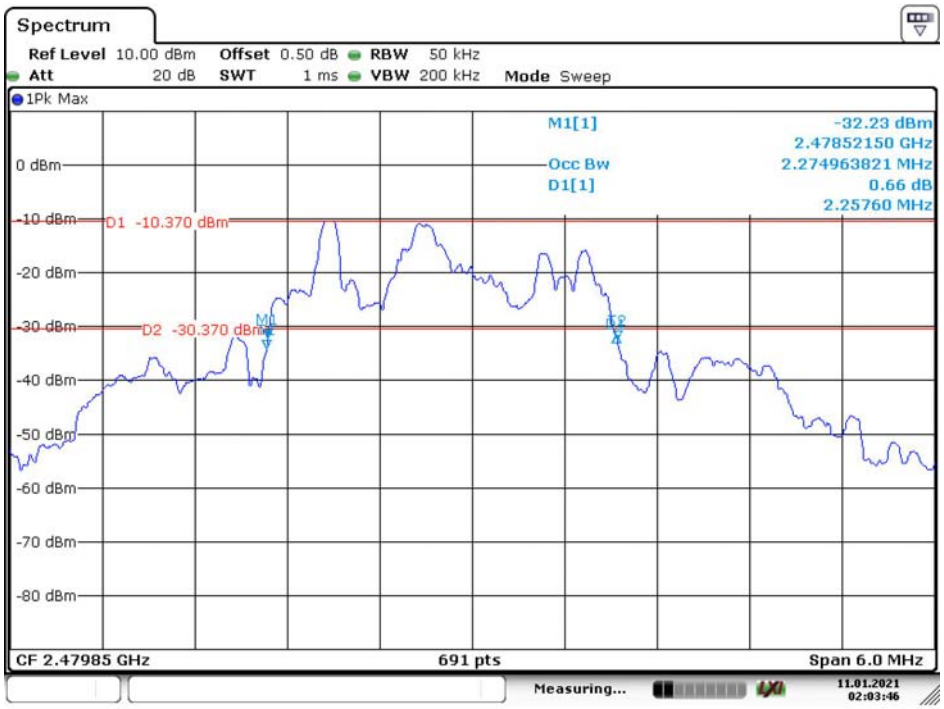
**2403.85 MHz**



**2441.85 MHz**


Date: 11.JAN.2021 02:01:18

**2479.85 MHz**

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