

# FCC PART 15.235 TEST REPORT

For

**JM Manufacturing (HK) Ltd.**

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**FCC ID: 2AHGJJMSYZTA2-49-1**

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                                                                          | <b>Product Type:</b><br>1:24 New Race Car<br>Controller |
| <b>Report Number:</b> RSZ180927833-00                                                                                                                                                                                                                                                                                           |                                                         |
| <b>Report Date:</b> 2018-10-15                                                                                                                                                                                                                                                                                                  |                                                         |
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**Note:** This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA\* or any agency of the Federal Government. \* 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)

|                                |                   |                                     |
|--------------------------------|-------------------|-------------------------------------|
| Equipment Name                 |                   | 1:24 New Race Car Controller        |
| Tested Model Number            |                   | JMS-YZ0500-TA2                      |
| UPC Number:                    |                   | 192234003305                        |
| Radio Type                     |                   | SRD                                 |
| SRD<br>Technical<br>Parameters | Modulation Type   | FM                                  |
|                                | Working Frequency | 49.86MHz                            |
| Nominal Power Supply           |                   | DC 1.5V*2 from Battery              |
| External Dimension             |                   | 115 mm (L) x 45 mm (W) x 282 mm (H) |
| Serial Number                  |                   | 180927833                           |
| Received Date                  |                   | 2018-09-27                          |

### Objective

This Type approval report is prepared on behalf of *JM Manufacturing (HK) Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, section 15.203, 15.205, 15.209, 15.215 and 15.235 rules.

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

No Related Submittal(s)/Grant(s).

### 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 at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz, and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

### Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, 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. : 342867, the FCC Designation No. : CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

### Justification

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

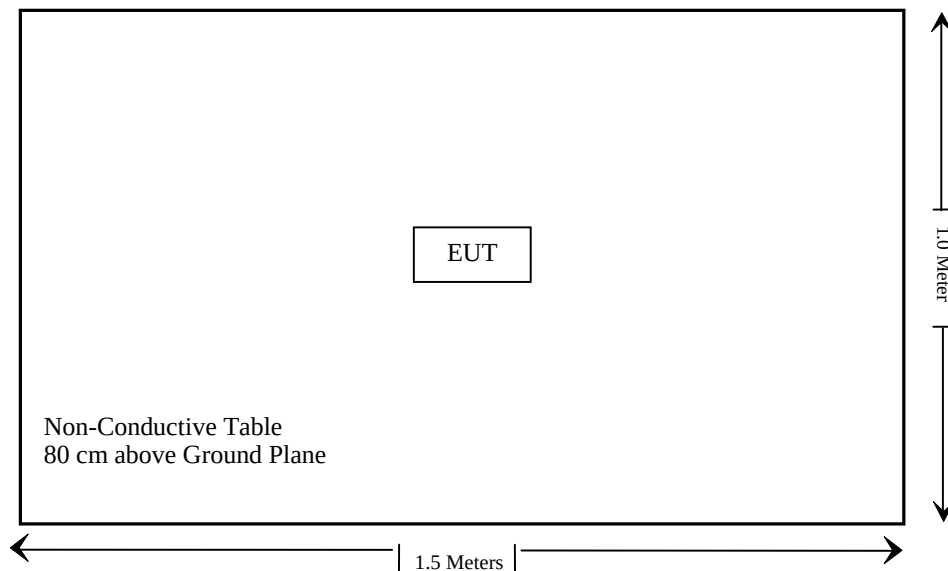
### Special Accessories

No special accessories was used

### Equipment Modifications

No modification was 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)                   | AC Line Conducted Emissions       | Not Applicable |
| §15.235(a)& 15.235(b)&15.209 | Radiated Emissions and Band Edges | Compliance     |
| §15.215                      | 20 dB bandwidth                   | Compliance     |

Not Applicable: The EUT is powered by battery.

**TEST EQUIPMENT LIST**

| Manufacturer          | Description       | Model                 | Serial Number          | Calibration Date | Calibration Due Date |
|-----------------------|-------------------|-----------------------|------------------------|------------------|----------------------|
| Sonoma instrument     | Amplifier         | 310N                  | 186238                 | 2018-05-12       | 2018-11-12           |
| Rohde & Schwarz       | EMI Test Receiver | ESCI                  | 101120                 | 2018-08-01       | 2019-02-01           |
| Sunol Sciences        | Broadband Antenna | JB1                   | A040904-1              | 2017-12-22       | 2020-12-21           |
| TDK                   | Chamber           | Chamber A             | 2#                     | 2016-12-05       | 2019-12-05           |
| Ducommun technologies | RF Cable          | UFA210A-1-4724-30050U | MFR64369<br>223410-001 | 2018-05-21       | 2018-11-19           |
| Ducommun technologies | RF Cable          | 104PEA                | 218124002              | 2018-05-21       | 2018-11-21           |

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

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## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

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.

### **Antenna Connector Construction**

The EUT has an monopole antenna arrangement, which was permanently attached and the antenna gain is 2.5 dBi; fulfill the requirement of this section. Please refer to EUT photos.

**Result:** Compliance.

## FCC §15.235(a) & 15.235 (b)&15.209 - RADIATED EMISSIONS AND BAND EDGES

### Applicable Standard

#### FCC 15.235(a)

The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

#### FCC 15.235(b)

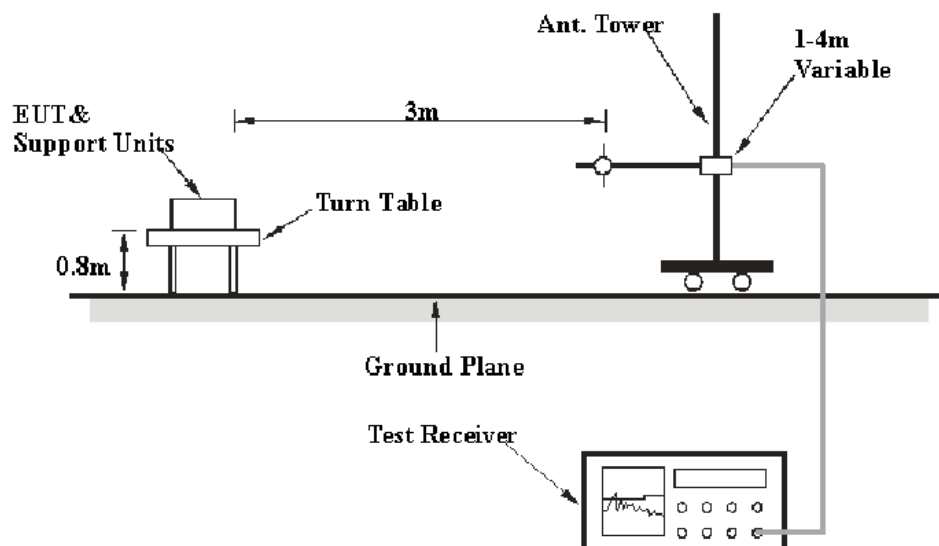
The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in §15.209, whichever permits the higher emission levels. The field strength of any emissions removed by more than 10 kHz from the band edges shall not exceed the general radiated emission limits in §15.209. All signals exceeding 20 microvolts/meter at 3 meters shall be reported in the application for certification.

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz, and it will not be taken into consideration for the test data recorded in the report.

### EUT Setup



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.235(a) & 15.235 (b) & 15.209 limits.

## EMI Test Receiver Setup

The system was investigated from 30 MHz to 1000 MHz.

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

| Frequency Range  | RBW     | Video B/W | IF B/W  | Detector   |
|------------------|---------|-----------|---------|------------|
| 30MHz – 1000 MHz | 100 kHz | 300 kHz   | 120 kHz | PK/QP/Ave. |

## Test Procedure

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

All radiated emission data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode for fundamental test.

## 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.235(a) & 15.235 (b) & 15.209

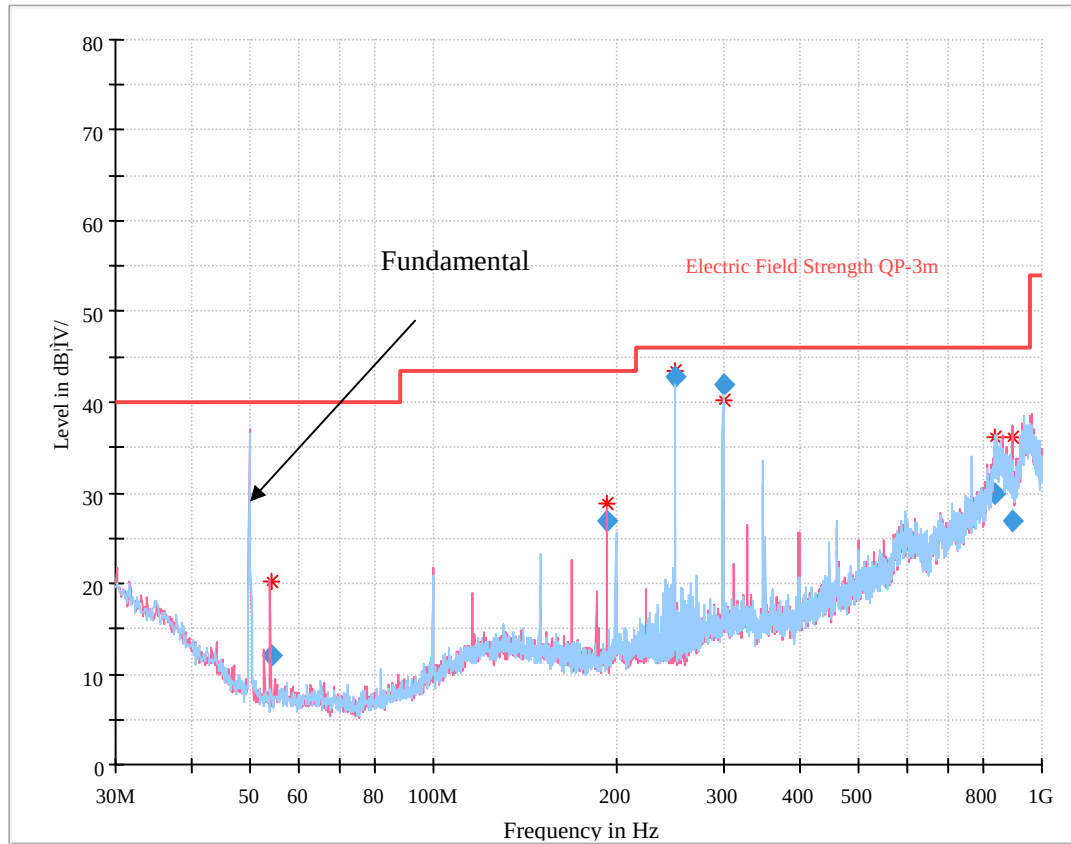
**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 50 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

The testing was performed by Haiguo Li on 2018-10-13.

Test Mode: Transmitting (Scan with X-AXIS, Y-AXIS, Z-AXIS, the worst case was recorded)

| Frequency<br>(MHz) | Receiver          |                          | Turntable<br>Degree | Rx Antenna    |                  | Corrected<br>Factor<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part 15.235(a) &<br>15.235 (b) &15.209 |                | Remark      |
|--------------------|-------------------|--------------------------|---------------------|---------------|------------------|-----------------------------|------------------------------------|--------------------------------------------|----------------|-------------|
|                    | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                     | Height<br>(m) | Polar<br>(H / V) |                             |                                    | Limit<br>(dBμV/m)                          | Margin<br>(dB) |             |
| 49.86              | 49.40             | PK                       | 65                  | 0.8           | H                | -19.60                      | 29.80                              | 100                                        | 70.20          | Fundamental |
| 49.86              | 45.80             | Ave.                     | 65                  | 0.8           | H                | -19.60                      | 26.20                              | 80                                         | 53.80          |             |
| 49.86              | 53.70             | PK                       | 216                 | 0.8           | V                | -19.60                      | 34.10                              | 100                                        | 65.90          |             |
| 49.86              | 51.00             | Ave.                     | 216                 | 0.5           | V                | -19.60                      | 31.40                              | 80                                         | 48.60          |             |

**30 MHz~1 GHz**

| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 54.323750       | 12.09                        | 108.0               | V                | 106.0                       | -19.9                    | 40.00          | 27.91       |
| 192.464375      | 26.95                        | 208.0               | V                | 123.0                       | -14.8                    | 43.50          | 16.55       |
| 249.297750      | 42.72                        | 110.0               | H                | 107.0                       | -14.1                    | 46.00          | 3.28        |
| 299.168875      | 42.04                        | 108.0               | H                | 289.0                       | -10.7                    | 46.00          | 3.96        |
| 838.521250      | 29.86                        | 270.0               | H                | 116.0                       | 5.8                      | 46.00          | 16.14       |
| 895.621625      | 26.90                        | 353.0               | V                | 50.0                        | 4.4                      | 46.00          | 19.10       |

**Note:**

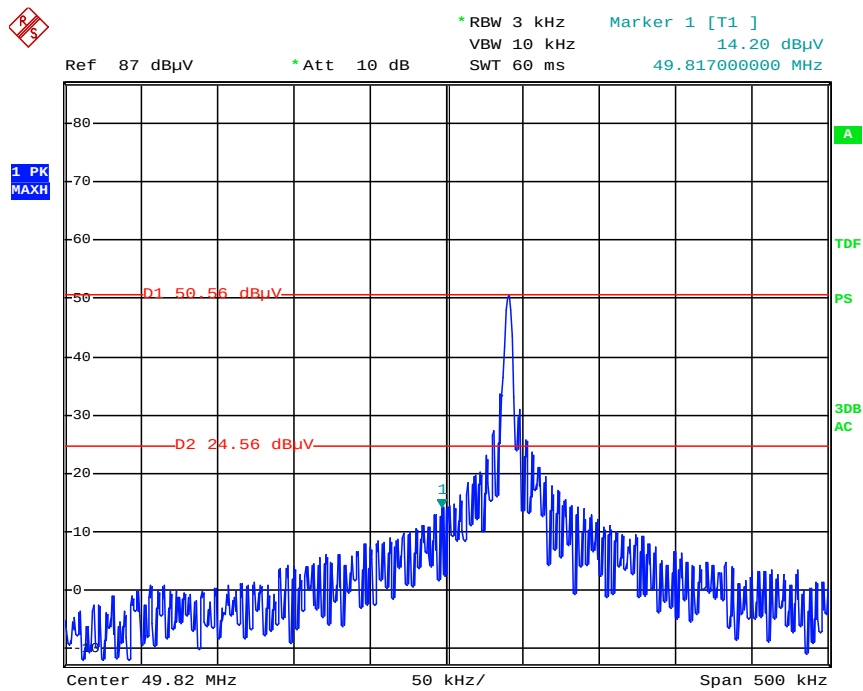
Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) +cable loss - amplifier factor

Margin = Limit- Corr. Amplitude

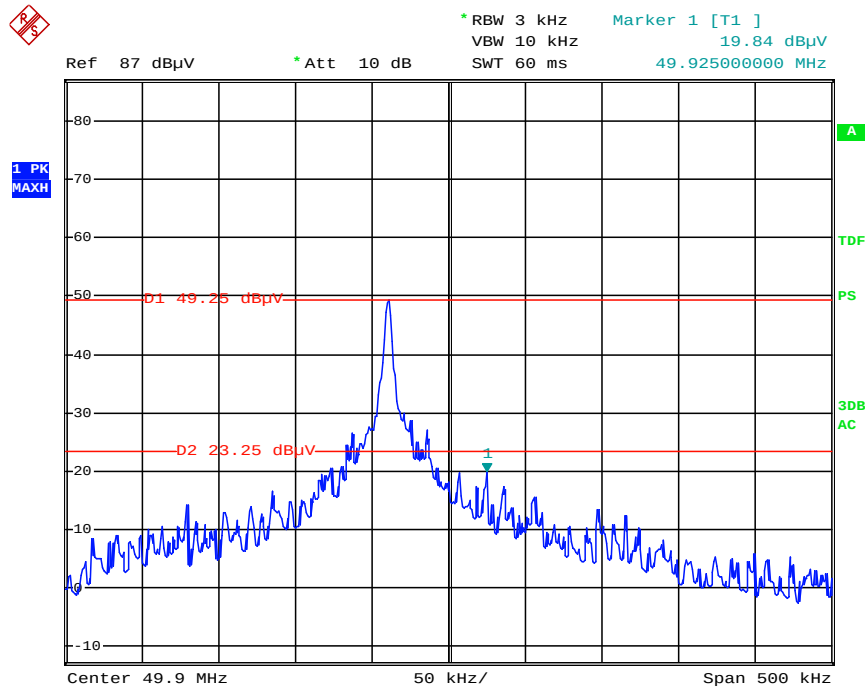
**Result:** Compliance

26 dB Band Edge-Left



EUT  
Date: 13.OCT.2018 15:55:15

### 26 dB Band Edge-Right



EUT

Date: 13.OCT.2018 15:58:28

**FCC§15.215(c) - 20dB EMISSION BANDWIDTH****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. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

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

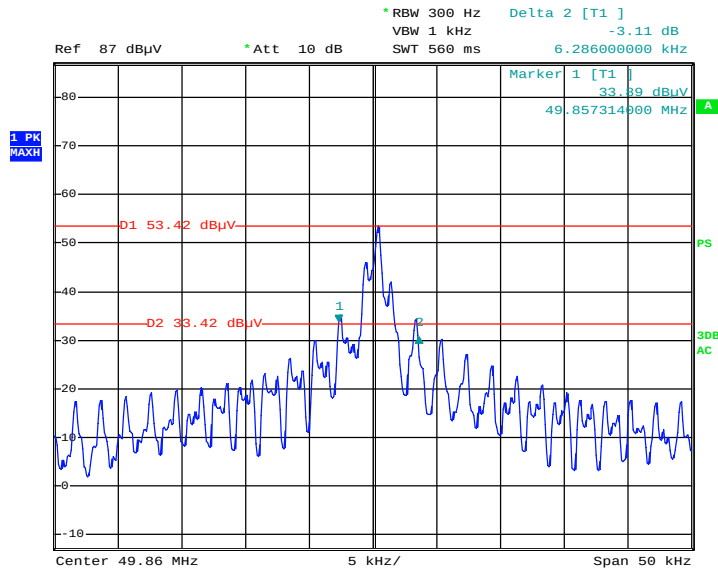
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 50 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

*The testing was performed by Haiguo Li on 2018-10-11.*

*Test Mode: Transmitting*

Please refer to following plot and table.

### 20 dB Emission Bandwidth



EUT

Date: 11.OCT.2018 14:34:09

| F <sub>i</sub> (MHz) | F <sub>h</sub> (MHz) | Permitted frequency range(MHz) | Result    |
|----------------------|----------------------|--------------------------------|-----------|
| 49.8573140           | 49.8636000           | 49.82-49.90                    | Compliant |

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