

FCC PART 15.227
MEASUREMENT AND TEST REPORT

For

JM Manufacturing Limited

Justen Centre, 1-3/F, 46-52 Wai Ching Street, Jordan Road, Kowloon, Hong Kong

FCC ID: 2AHGJJMSYZ120-T27

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|--|---|
| Report Type: Original Report | Product Type: R/C DOUBLE FACING CAR (remote control) |
| Test Engineer: <u>Bibo Zhang</u> | <i>Bibo Zhang</i> |
| Report Number: <u>RSZ160713830-00</u> | |
| Report Date: <u>2016-07-19</u> | |
| Reviewed By: <u>RF Engineer</u> | <i>Candy Li</i> |
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *JM Manufacturing Limited's* product, model number: *JMSYZ15120126-T (FCC ID: 2AHGJJMSYZ120-T27)* or the "EUT" in this report is *an R/C DOUBLE FACING CAR (remote control)*, which was measured approximately: 11.2 cm (L) x 8.9 cm (W) x 20.5 cm (H), rated input voltage: DC 1.5V*2 AA battery.

**All measurement and test data in this report was gathered from production sample serial number: 20160713 (Assigned by BAACL, Shenzhen). The EUT supplied by the applicant was received on 2016-07-13.*

Objective

This report is prepared on behalf of *JM Manufacturing Limited* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine the compliance of EUT with FCC rules, section 15.203, 15.205, 15.209 and 15.227.

Related Submittal(s)/Grant(s)

No related submittal(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 radiated and conducted emission measurement data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical mode.

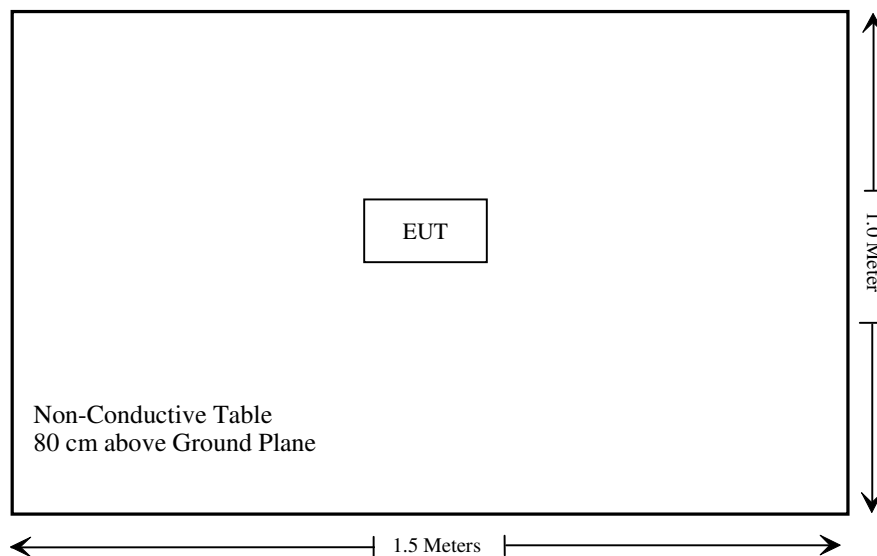
EUT Exercise Software

No exercise software was used.

Equipment Modifications

No modifications.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|----------------|
| §15.203 | Antenna requirement | Compliance |
| §15.207 | Conducted Emissions | Not Applicable |
| §15.205, §15.209, §15.227(a), §15.227(b) | Field Strength and Restricted Band Emissions | Compliance |
| §15.215(c) | 20dB Emission Bandwidth | Compliance |

Not Applicable: The EUT is powered by battery

FCC§15.203 - ANTENNA REQUIREMENT

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 integrated antenna arrangement, which was permanently attached and the antenna gain is 0 dBi; fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant.

FCC§15.205, §15.209, §15.227(a), §15.227 (b) – FIELD STRENGTH AND RESTRICTED BAND EMISSIONS

Applicable Standard

According to FCC §15.227 (a), the field strength if any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters.

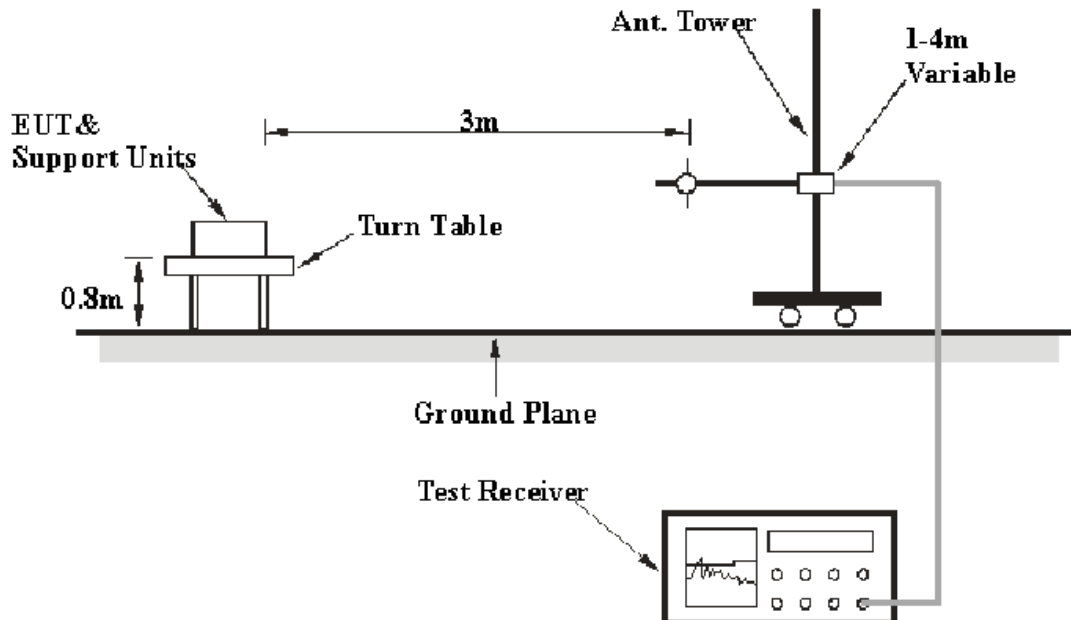
(b) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in §15.209.

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 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB.(k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for all 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 15.205 and 15.209 and 15.227 limits.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 1000 MHz.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|-------------------|-----------------------|------------------------|------------------|----------------------|
| HP | Amplifier | HP8447E | 1937A01046 | 2016-05-06 | 2017-05-06 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 101120 | 2015-12-15 | 2016-12-14 |
| Sunol Sciences | Bi-log Antenna | JB1 | A040904-2 | 2014-12-07 | 2017-12-06 |
| EM Test | Loop Antenna | MS100 | 0809-05 | 2015-11-17 | 2016-11-16 |
| Ducommun technologies | RF Cable | UFA210A-1-4724-30050U | MFR64369 223410-001 | 2016-06-15 | 2017-06-15 |

* **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).

Corrected Amplitude & Margin Calculation

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

$$\begin{aligned} \text{Corrected Amplitude} &= \text{Meter Reading} + \text{Correction Factor} \\ \text{Correction Factor} &= \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain} \end{aligned}$$

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:

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

Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 50 % |
| ATM Pressure: | 100.0 kPa |

Testing was performed by Bibo Zhang on 2016-07-15.

Test mode: Transmitting

| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Corrected Factor (dB) | Corrected Amplitude (dB μ V/m) | FCC Part 15.227&15.205&15.209 | |
|--------------------|---------------------------|--------------------------|---------------------|---------------|------------------|-----------------------------|--|----------------------------------|----------------|
| | Indicated (dB μ V) | Detector (PK/QP/Ave.) | | Height (m) | Polar (H / V) | | | Limit (dB μ V/m) | Margin (dB) |
| 27.15 | 17.56 | PK | 316 | 1.4 | / | 31.00 | 48.56 | 100 | 51.44 |
| 27.15 | 14.21 | Ave. | 316 | 1.4 | / | 31.00 | 45.21 | 80 | 34.79 |
| 25.78 | 10.05 | QP | 142 | 1.3 | / | 31.00 | 41.05 | 69.54 | 28.49 |
| 54.30 | 31.47 | QP | 133 | 2.0 | H | -13.89 | 17.58 | 40 | 22.42 |
| 54.30 | 29.28 | QP | 133 | 2.0 | V | -13.89 | 15.39 | 40 | 24.61 |

Note:

Corrected Amplitude = Corrected Factor + Reading

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

Margin = Limit- Corr. Amplitude

Other spurious mission more than 20 dB below the limit were not reported.

Result: Compliance

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 indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
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| HP | Amplifier | HP8447E | 1937A01046 | 2016-05-06 | 2017-05-06 |
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Test Data

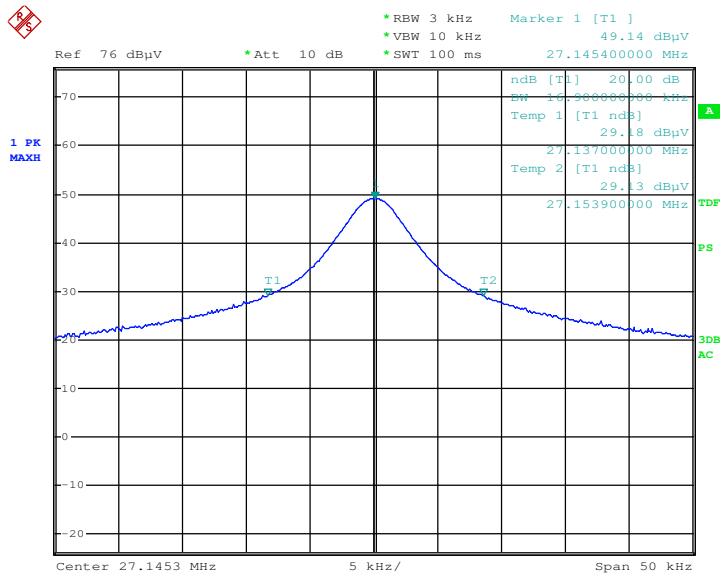
Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 50 % |
| ATM Pressure: | 100.0 kPa |

Testing was performed by Bibo Zhang on 2016-07-14.

Test Mode: Transmitting

Please refer to the following plots.



EUT
 Date: 14.JUL.2016 23:48:14

| Fl(MHz) | Fh (MHz) | Permitted frequency range(MHz) | Result |
|---------|----------|--------------------------------|-----------|
| 27.1370 | 27.1539 | 26.96-27.28 | Compliant |

****END OF REPORT****