



FCC PART 15.235 TEST REPORT

For

JM Manufacturing (HK) Ltd.

Unit G, 4/F Kaiser Estate, Phase 2, No. 47-53 Man Yue Street, Hung Hom, Kowloon, Hong Kong

FCC ID: 2AHGJJMSYZA22-49-1

Report Type: Original Report	Product Type: TRANSFORMER CAR (controller)
Report Number: RSZ180801833-00	
Report Date: 2018-08-20	
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Reviewed By: RF Engineer	
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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)

The *JM Manufacturing (HK) Ltd.*'s product, model number: *JMS-YZ123A22* (FCC ID: 2AHGJJMSYZA22-49-1, UPC Number: 192234003282) or the "EUT" in this report is a transmitter of the *TRANSFORMER CAR (controller)*, which measures approximately: 25.0 cm (L) x 9.2 cm (W) x 3.9 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: 180801833 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-08-01.*

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).

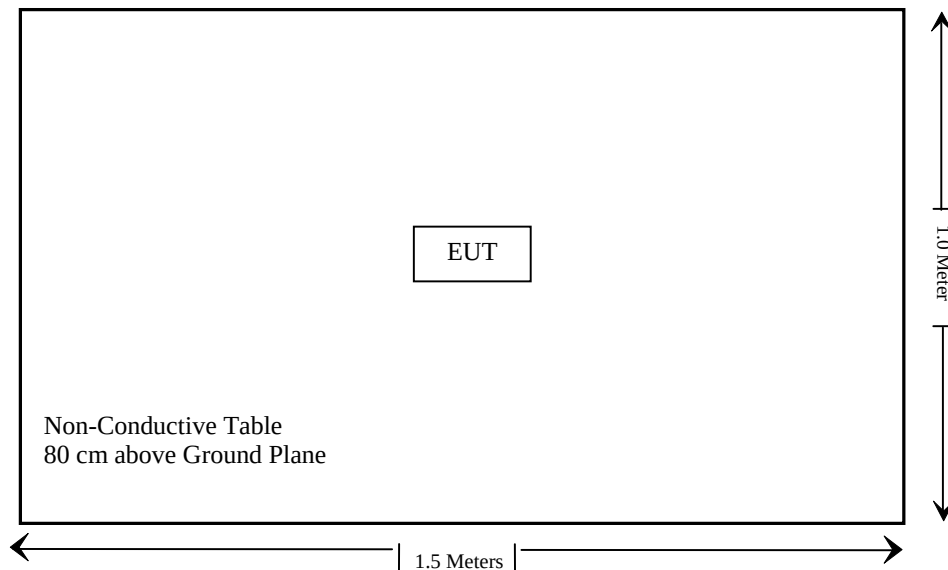
Special Accessories

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	310 N	186238	2018-05-12	2018-11-12
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
TDK	Chamber	Chamber A	2#	2016-12-05	2019-12-05
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362- 100100	MFR64639 231029-003	2018-08-01	2019-02-01
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).

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 a unique external antenna, which was permanently attached and the antenna gain is 1.5 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)

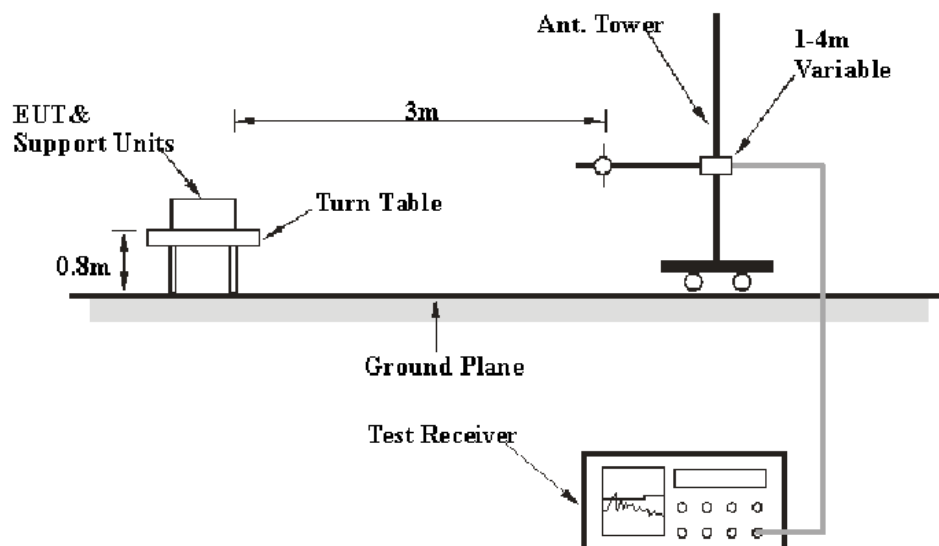
The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in §15.209, whichever permits the higher emission levels. The field strength of any 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	QP

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**

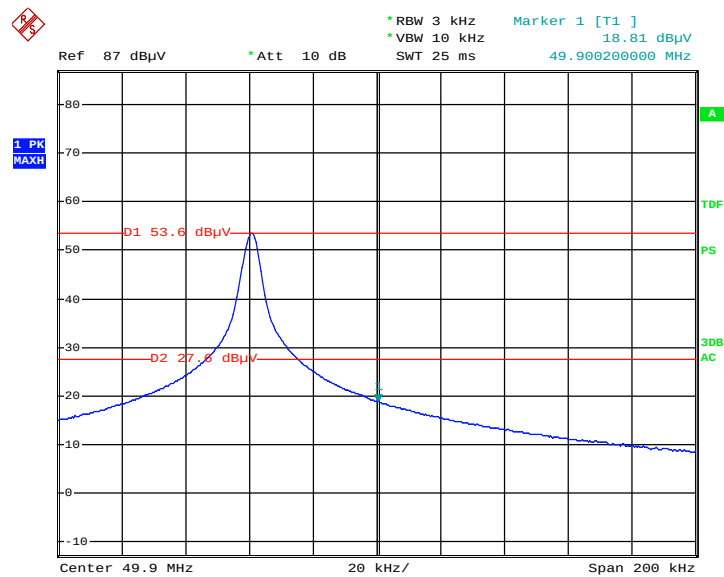
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.1 kPa

The testing was performed by Shawn Xiao on 2018-08-17.

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

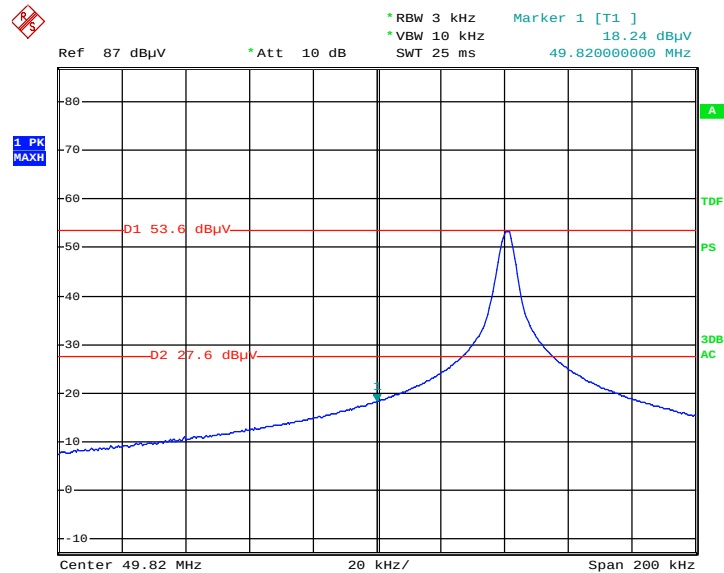
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.235(a) & 15.235 (b) & 15.209		Remark
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)	
49.86	64.10	PK	289	3.9	H	-10.9	53.2	100	46.8	Fundamental
49.86	59.80	Ave.	289	3.9	H	-10.9	48.9	80	31.1	
49.86	60.50	PK	0	2.8	V	-10.9	49.6	100	50.4	
49.86	46.10	Ave.	0	2.8	V	-10.9	35.2	80	44.8	

Band Edge, right

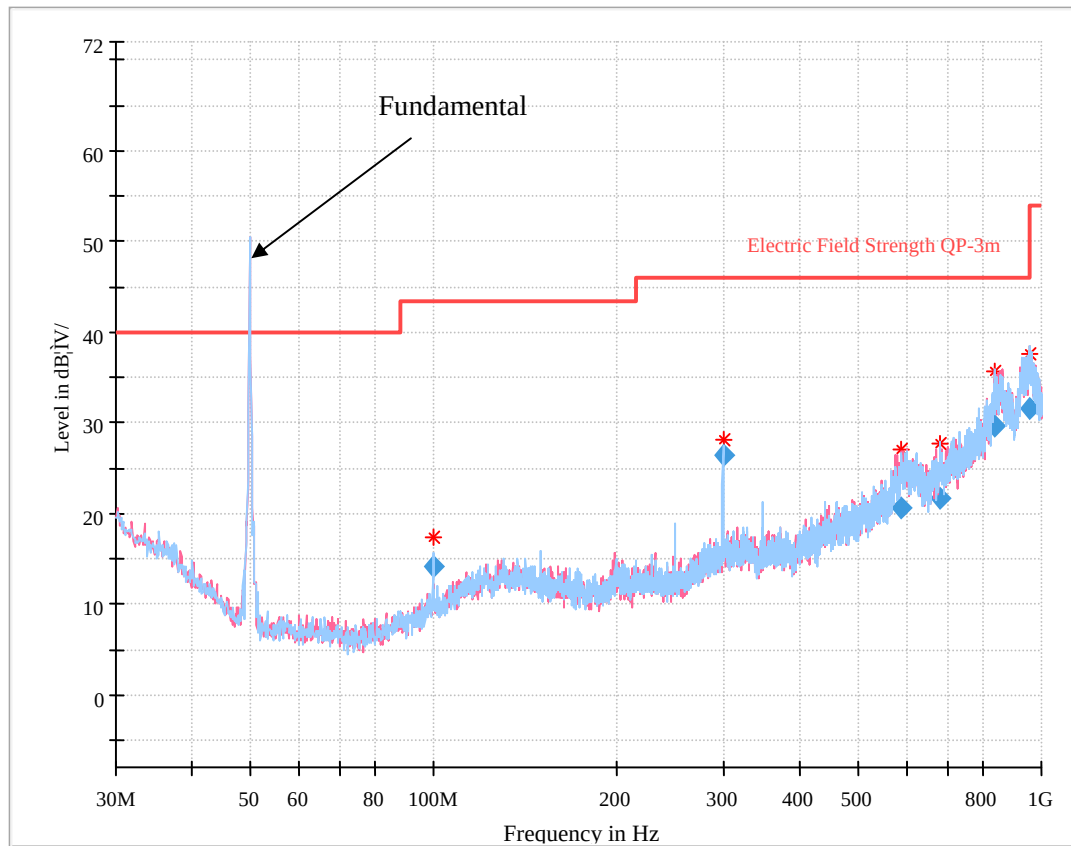


EUT
Date: 17.AUG.2018 21:41:59

Band Edge, left



EUT
Date: 17.AUG.2018 21:42:33

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)
99.698250	14.23	226.0	H	250.0	-17.3	43.50	29.27
299.176000	26.39	113.0	H	87.0	-10.7	46.00	19.61
589.605500	20.54	119.0	V	172.0	-2.4	46.00	25.46
682.777000	21.62	309.0	H	248.0	-2.0	46.00	24.38
838.320375	29.71	387.0	V	16.0	5.8	46.00	16.29
958.214375	31.47	268.0	H	275.0	9.3	46.00	14.53

Note:

Corrected Amplitude = Corrected Factor + Reading

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

Margin = Limit- Corr. Amplitude

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 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**

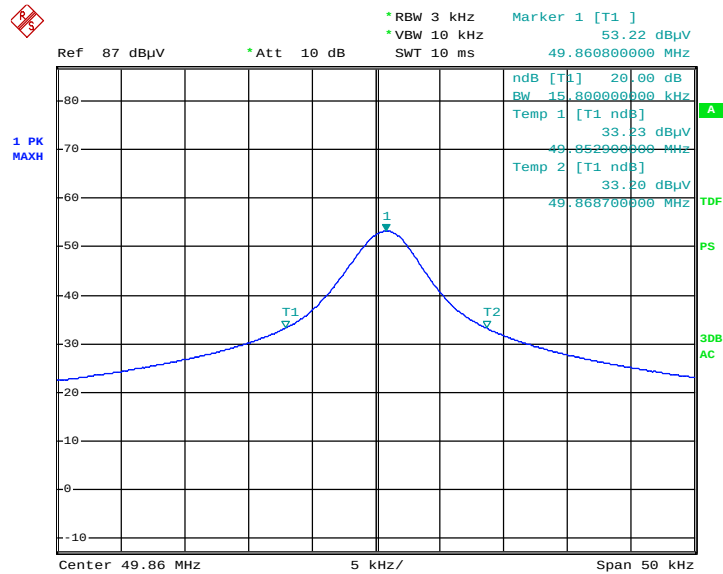
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.1 kPa

The testing was performed by Shawn Xiao on 2018-08-17.

Test Mode: Transmitting

Please refer to following plot and table.

20 dB Emission Bandwidth



EUT

Date: 17.AUG.2018 21:28:22

F _l (MHz)	F _h (MHz)	Permitted frequency range(MHz)	Result
49.852900000	49.868700000	49.82-49.90	Compliant

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