



FCC PART 15.231

TEST AND MEASUREMENT REPORT

For

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FCC ID: XEQJSR-4300

Report Type: Original Report	Product Type: Remote Controller
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “*”

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1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Junshade Co., Ltd* and their product, FCC ID: XEQJSR-4300, model: *JSR-4300* or the "EUT" as referred to in this report. The EUT is a Remote Controller operates at 433.92 MHz.

According to the customer's similarity letter, models JSR-4300 (4 CH) and JSR-4300 (1 CH) are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics.

1.2 Mechanical Description

The EUT measures approximately 13 cm (L) x 4.2 cm (W) x 1.3 cm (H) weight 52g, rated input voltage: 3 VDC via a battery.

**All measurement and test data in this report was gathered from production sample serial number: B2145 (assigned by BACL).*

1.3 EUT Photo



JRS-4300 (1 CH)



JRS-4300 (4 CH)

1.4 Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4-2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.231 rules.

1.5 Related Submittal(s)/Grant(s)

No Related Submittals

1.6 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2001670.htm>

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the testing mode to represent *worst-case* results during the final qualification test.

2.2 EUT Exercise Software

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

2.3 Special Accessories

The special accessories were provided by Bay Area Compliance Laboratories Corp.

2.4 Equipment Modifications

No modifications were made to the unit tested.

2.5 Special Equipment

N/A

2.6 Local Support Equipment

N/A

2.7 EUT Internal Configuration Details

N/A

2.8 External I/O Cabling List and Details

N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description of test	Result
§15.231(a)(1)	Deactivation Testing	Compliant
§15.205, §15.209, §15.231(b)	Restricted Band of operation; Field Strength of Emissions	Compliant
§15.231(c)	Emission Bandwidth; Bandwidth of Momentary Signals	Compliant
§15.231(b)	Duty Cycle	Compliant

4 FCC §15.205, §15.209 & §15.231(b) - RADIATED EMISSIONS

4.1 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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiated emission measurement at Bay Area Compliance Laboratories Corp is ± 4.0 dB.

The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15 §15.209 and 15.231.

4.2 Radiated Emissions EUT Setup

The radiated emission tests were performed in the closed chamber 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC Subpart C limits.

The spacing between the peripherals was 10 centimeters.

The EUT was placed on the center of the back edge on the test table.

4.3 Spectrum Analyzer Setup

According to FCC, Section 15.33, the EUT was tested to 5 GHz.

During the radiated emission test, the CISPR quasi-peak detection was employed.

4.4 Test Equipment List and Detail

Manufacturer	Description	Model Number	Serial Number	Calibration Date
Hewlett Packard	Pre amplifier	8447D OPT 010	2944A07030	2009-03-03
Sunol Science Corp.	Combination Antenna	JB3 Antenna	A020106-3	2009-05-05
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2009-04-29
Sunol Science Corp.	System Controller	SC99V	122303-1	N/R
HP	Pre, Amplifier (1~18GhzGHz)	8449B	3147A00400	2009-10-22
A.R.A Inc.	Horn antenna	SAS-200-571	261	2009-09-23
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2009-04-27

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

4.5 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

According to FCC §15.231, Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emission, based on the average value of the measured emissions. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

4.6 Corrected Amplitude & Margin Calculation

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

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

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:

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

4.7 Applicable Standard Requirement

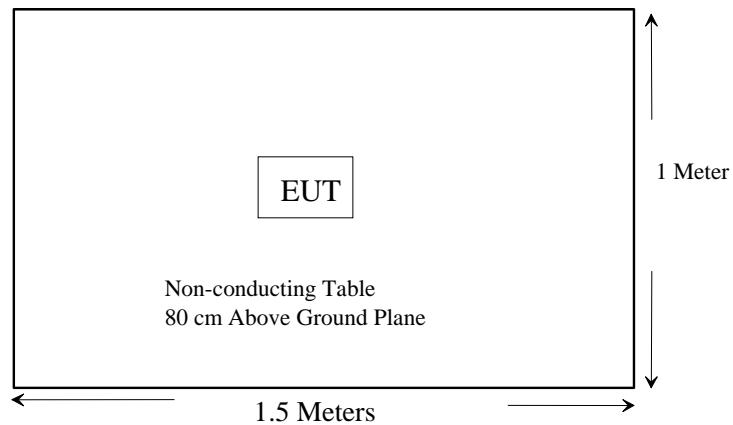
(b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	1,250 to 3,750 *	125 to 375 *
174–260	3,750	375
260–470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

*Note: *Linear interpolations*

4.8 Test Setup Block Diagram

5 meter semi-anechoic chamber



4.9 Test Environmental Conditions

Temperature:	13 °C
Relative Humidity:	50%
ATM Pressure:	102.9kPa

*The testing was performed by Jerry Wang on 2009-12-09

4.10 Summary of Test Results

According to the data in the following table, the EUT complied with the FCC 15.231 standards and had the worst margin reading of:

-10.85 dB at 433.92 MHz in the **Vertical** polarization.

4.11 Radiated Emissions Test Data

Freq. (MHz)	S.A. Reading (dBuV)	Detector (PK/AV)	Azimuth (Degrees)	Test Antenna			Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC 15.231	
				Height (m)	Polar (V/H)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
433.92	78.45	PK	206	1.0	H	17.2	2.12	28.2	0	69.57	100.83	-31.26
433.92	79.86	PK	200	1.0	V	17.2	2.12	28.2	0	70.98	100.83	-29.85
433.92	78.45	PK	206	1.0	H	17.2	2.12	28.2	-1.0	68.57	80.83	-12.26
433.92	79.86	PK	200	1.0	V	17.2	2.12	28.2	-1.0	69.98	80.83	-10.85
867.84	39.67	PK	63	1.4	H	22.5	2.32	27.84	0	36.65	80.83	-44.18
867.84	40.75	PK	203	1.57	V	22.5	2.32	27.84	0	37.73	80.83	-43.1
867.84	39.67	PK	63	1.4	H	22.5	2.32	27.84	-1.0	35.65	60.83	-25.18
867.84	40.75	PK	203	1.57	V	22.5	2.32	27.84	-1.0	36.73	60.83	-24.1

Note: (1) For Peak, Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain

(2) For Average, Correction Factor = $20 \times \lg(\text{Duty Cycle}) 20 \times \lg(0.89167) = -1.0 \text{ dB}$.

5 FCC §15.231(c) – 20 dB BANDWIDTH TESTING

5.1 Requirement

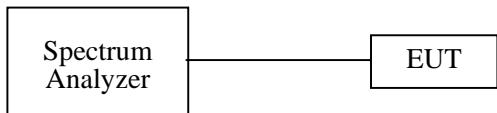
Per FCC §15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.2 Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

5.3 Test Setup Diagram



5.4 Test Procedure

With the EUT's antenna attached, the EUT's 20 dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

5.5 Test Environmental Conditions

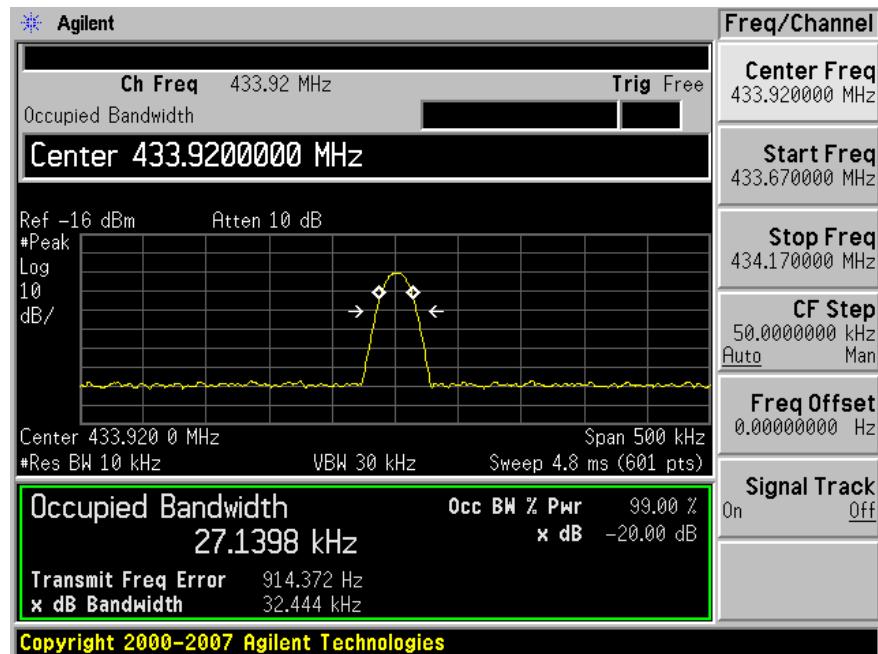
Temperature:	13 °C
Relative Humidity:	50%
ATM Pressure:	102.9kPa

* The testing was performed by Jack Liu on 2009-12-14.

Test Result: Compliant.

Frequency (MHz)	Measured 20 dB Bandwidth (kHz)	FCC Limit (kHz)	Result
433.92	32.444	1084.8	Pass

Please refer to following plot



6 FCC §15.231(b) - DUTY CYCLE

6.1 Limit

Nil (No dedicated limit specified in the Rules).

6.2 Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2009-06-29

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

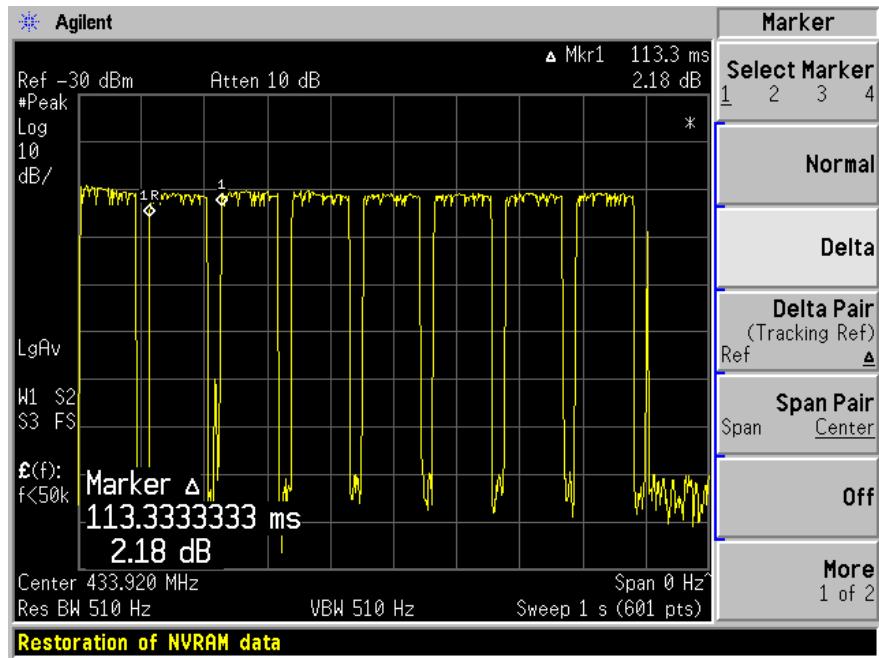
6.3 Test Procedure

- 1) Place the EUT on the table and set it in transmitting mode.
- 2) Set center frequency of spectrum analyzer=operating frequency.
- 3) Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Span= 0 Hz, Adjust Sweep=100 ms.

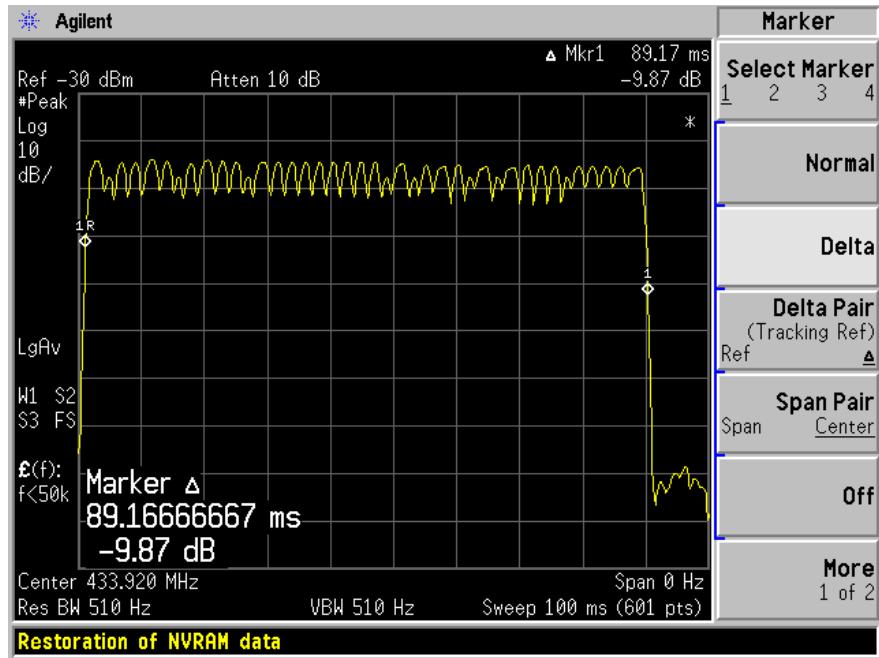
6.4 Test Environmental Conditions

Temperature:	13 °C
Relative Humidity:	50%
ATM Pressure:	102.9kPa

*The testing was performed by Jack Liu on 2009-12-14.



Cycle time is 113ms > 100ms, so zoom in to 100 ms Sweep.



So the Duty cycle = $89.167/100 * 100\% = 89.167\%$

7 FCC §15.231(a)(1) – 5 SECOND MANUAL DEACTIVEATION

7.1 Applicable Standard Requirement

(a) The provisions of this Section are restricted to periodic operation within the band 40.66 - 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

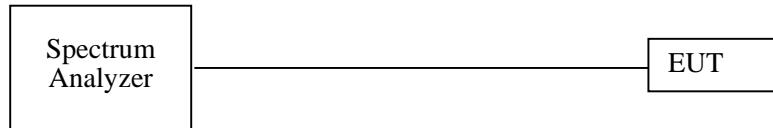
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.2 Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-07-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

7.3 Test Setup Diagram



7.4 Test Environmental Conditions

Temperature:	13 °C
Relative Humidity:	50%
ATM Pressure:	102.9kPa

The testing was performed by Jack Liu on 2009-12-14.

7.5 Test Result

Frequency (MHz)	Transmission Time Measured (Sec)	Time Limit Line (Sec)	Pass/Fail
433.92	1.4	5	Pass

Please see the following plot:

