

FCC PART 15.239

TEST REPORT

For

Wuxi Roidmi Information Technology Co., Ltd.

Layer4,Building C8,No.1699,Huishan Avenue,HuishanEconomic Development District,Wuxi City,
China

FCC ID: 2AIS7-2016Q3BFQ04RM

Report Type: Original Report	Product Type: Smart Car Charger 3S (Full Compatible Edition)
Test Engineer: <u>Peter Jiang</u>	
Report Number: <u>RKS161103002-00F</u>	
Report Date: <u>2016-12-20</u>	
Reviewed By: <u>Jesse Huang</u> EMC Manager	
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EQUIPMENT MODIFICATIONS	5
EUT EXERCISE SOFTWARE	5
MODULATION AUDIO SIGNAL	5
SUPPORT EQUIPMENT LIST AND DETAILS	6
EXTERNAL I/O CABLE.....	6
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS.....	7
FCC §15.203 - ANTENNA REQUIREMENT.....	8
APPLICABLE STANDARD	8
ANTENNA CONNECTOR CONSTRUCTION	8
FCC §15.209, §15.205 & §15.239 - SPURIOUS EMISSIONS	9
APPLICABLE STANDARD	9
MEASUREMENT UNCERTAINTY.....	9
EUT SETUP.....	9
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	10
TEST PROCEDURE	10
TEST EQUIPMENT LIST AND DETAILS.....	11
CORRECTED AMPLITUDE & MARGIN CALCULATION	11
TEST RESULTS SUMMARY	11
TEST DATA	12
FCC §15.215– 20 dB EMISSION BANDWIDTH.....	17
APPLICABLE STANDARD	17
TEST PROCEDURE	17
TEST EQUIPMENT LIST AND DETAILS.....	17
TEST DATA	18

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Wuxi Roidmi Information Technology Co., Ltd.'s product, model number: BFQ04RM, trademark: ROIDMI (FCC ID: 2AIS7-2016Q3BFQ04RM) or the "EUT" in this report was a Smart Car Charger 3S (Full Compatible Edition), which was measured approximately: 26.5 mm (L) x 26.5 mm (W) x 61.5 mm(H). Rated input voltage: 12 V_{DC}.

**All measurement and test data in this report was gathered from production sample serial number: 20161009009. (Assigned by the BACL. The EUT supplied by the applicant was received on 2016-10-09)*

Objective

This report is prepared on behalf of Wuxi Roidmi Information Technology Co., Ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.239 rules.

Related Submittal(s)/Grant(s)

FCC part 15.247 DSS & DTS submission with FCC ID: 2AIS7-2016Q3BFQ04RM.

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. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with RF radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95 dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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 November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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

Description of Test Configuration

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	88.1	...	...
2	88.2	...	...
...	...	...	...
...	...	...	...
...	...	198	107.8
...	...	199	107.9

EUT was tested with channel 1, 100 and 199

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Roidmi APP

Modulation audio signal

2.5 kHz 100dBSPL (16 dB higher than that required to produce a frequency deviation of 75 kHz)

Support Equipment List and Details

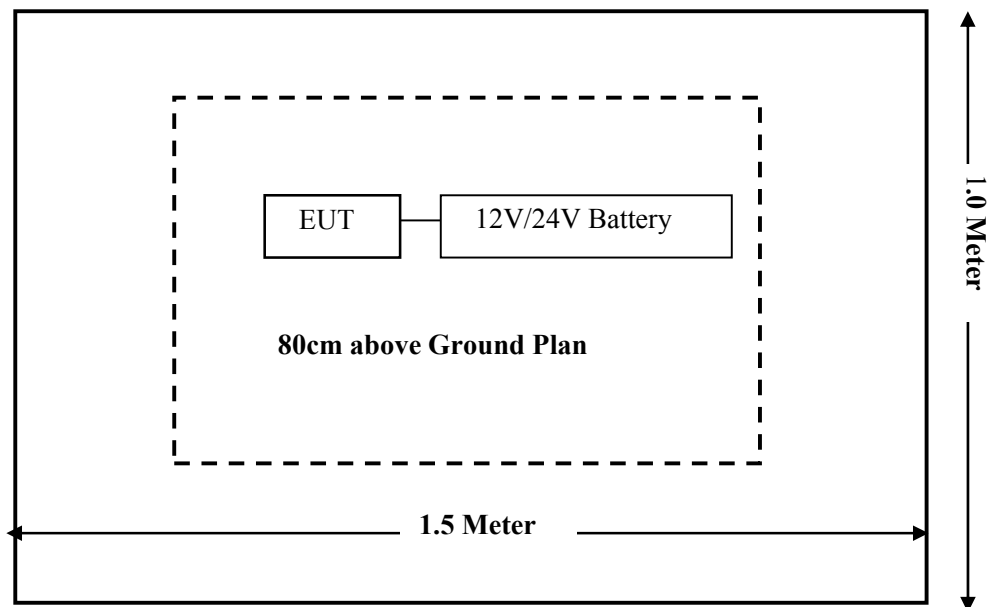
Manufacturer	Description	Model	Serial Number
BACL	Resistor	/	/
EAST	DC Power Supply	MCH-303D-II	14070562

External I/O Cable

Cable Description	Length (m)	From Port	To
DC Cable	0.8	DC Power Supply	EUT
USB Cable	0.8	EUT	Resistor

Block Diagram of Test Setup

From 30M-1GHz



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not applicable*
§15.205, §15.209, §15.239	Radiated Spurious Emissions	Compliance
15.215	20 dB Bandwidth	Compliance

Note:

(1) Not Applicable – This device is used in vehicle.

(2) All of the tests are powered by DC12V and DC24V, only the worst case (DC 12V) was recorded.

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.

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 a monopole antenna arrangement for FM, which the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.209, §15.205 & §15.239 - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.239; §15.209; §15.205

§15.239 (a) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

§15.239 (c) The field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in §15.209.

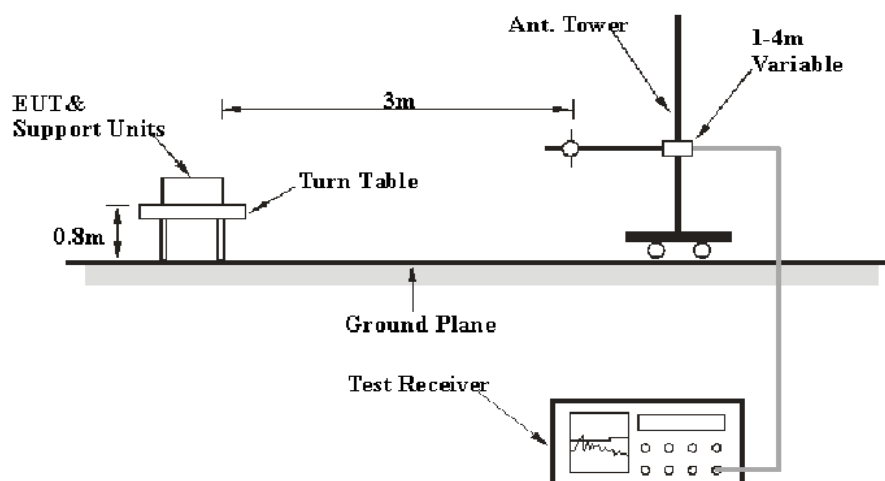
Measurement Uncertainty

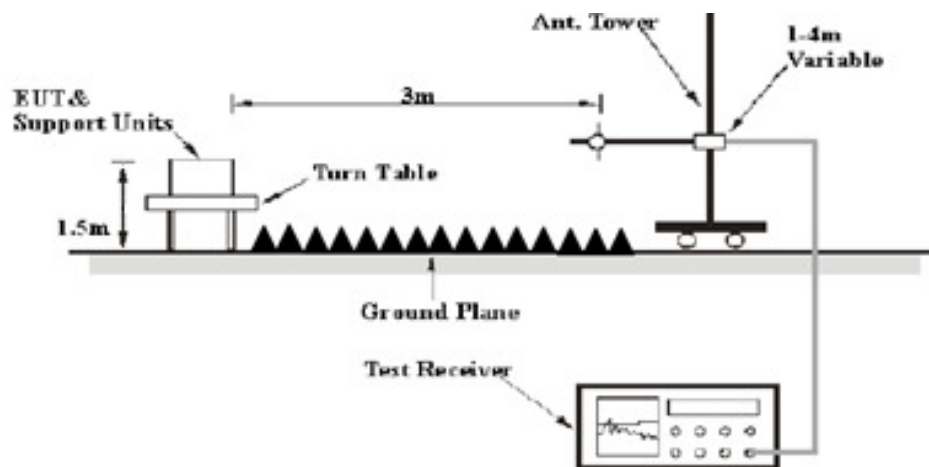
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency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

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 8.3-2013. The specification used was the FCC 15.209, and FCC 15.239 limits.

EMI Test Receiver & Spectrum Analyzer 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	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	1 Hz	/	Ave.

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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	330	171377	2016-10-21	2017-10-21
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-12	2017-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
Champrotek	Chamber	Chamber A	1#	2016-09-17	2017-09-17
R&S	Auto test Software	EMC32	V 09.10.0	/	/
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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 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 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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.239.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(L_m)} \leq L_{\text{lim}} + U_{\text{cisp}}r$$

In BACL, $U_{(L_m)}$ is less than $U_{\text{cisp}}r$, if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data**Environmental Conditions**

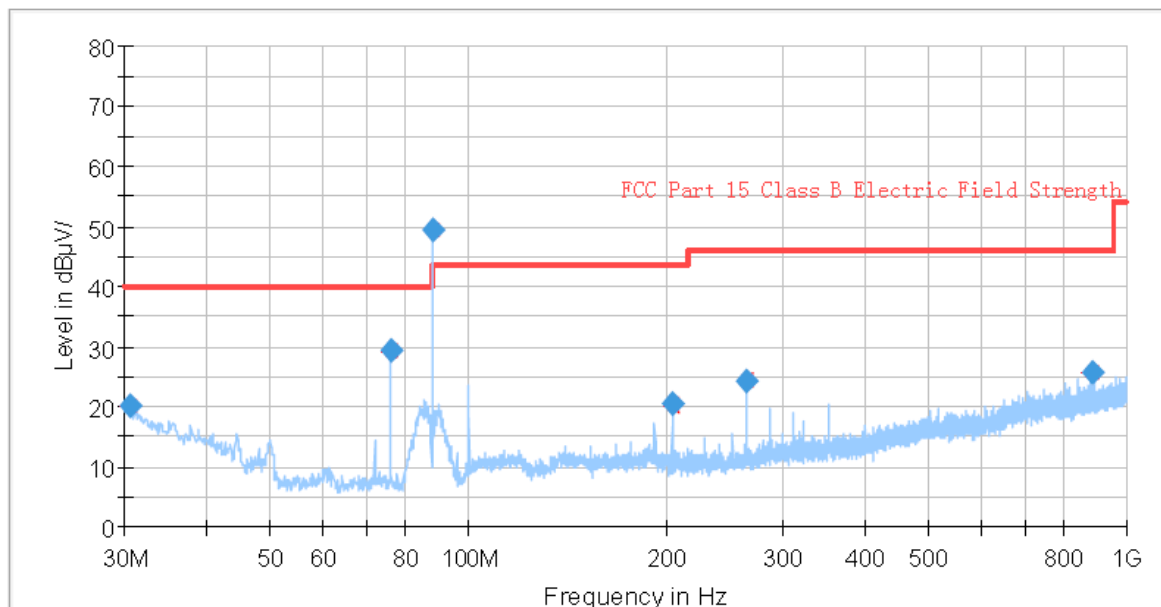
Temperature:	25.1 °C
Relative Humidity:	54 %
ATM Pressure:	101.2kPa

The testing was performed by Peter Jiang on 2016-12-06.

30 MHz-1 GHz:

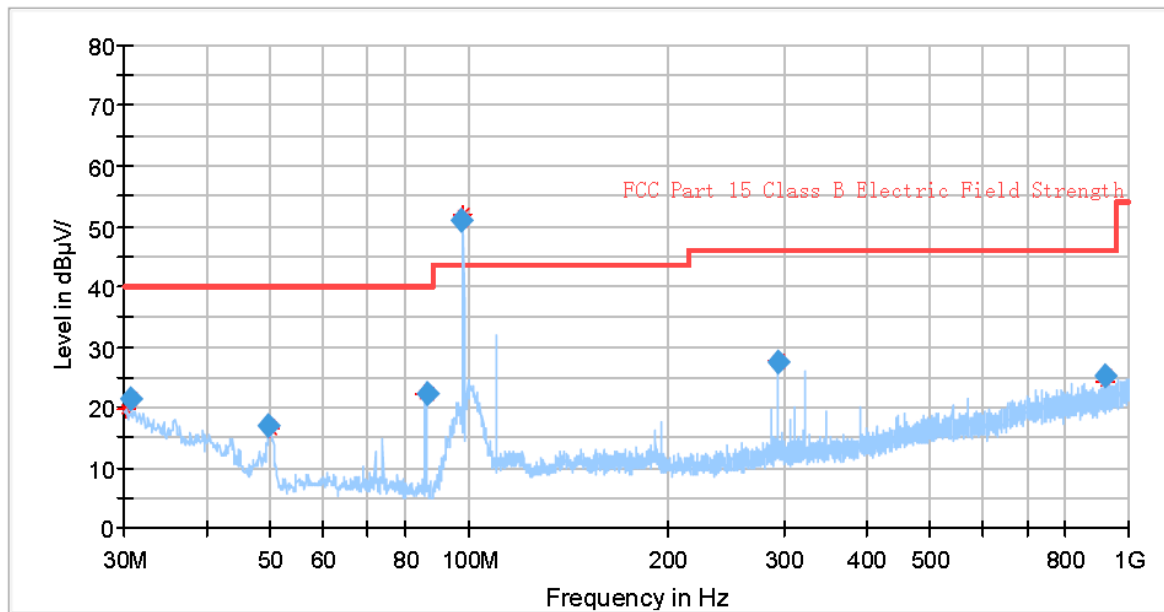
EUT operation mode: Transmitting

FM 88.1MHz



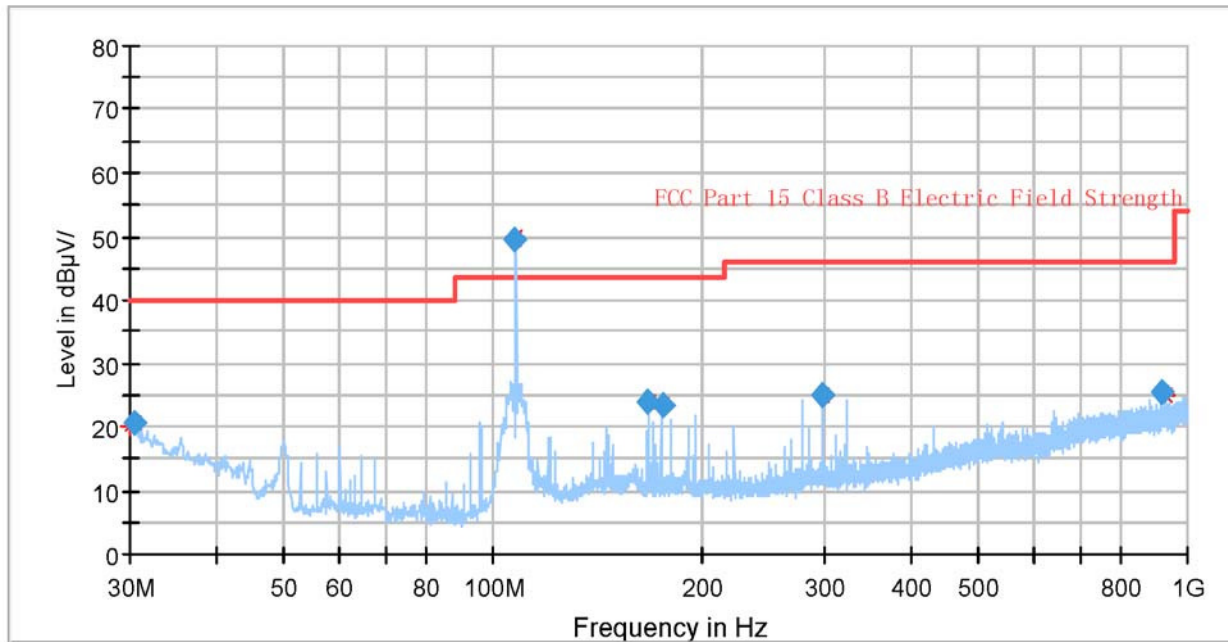
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.239/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μV/m)	Margin (dB)
88.078750	66.46	PK	182.0	150.0	V	-17.00	49.46	68.00	18.54
88.078750	62.21	Ave	182.0	150.0	V	-17.00	45.21	48.00	2.79
30.485000	25.17	QP	163.0	100.0	V	-5.30	19.87	40.00	14.13
879.962500	26.51	QP	172.0	100.0	V	-1.00	25.51	46.00	20.49
76.075000	46.34	QP	172.0	100.0	V	-17.10	29.24	40.00	10.76
203.872500	32.50	QP	148.0	100.0	V	-12.50	20.00	43.50	23.50
264.376250	35.84	QP	120.0	100.0	H	-11.40	24.44	46.00	21.56

FM 98.0MHz



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.239/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μV/m)	Margin (dB)
922.763750	29.04	QP	111.0	100.0	V	-0.50	24.04	46.00	21.96
49.885000	31.15	QP	295.0	100.0	V	-16.40	16.55	40.00	23.45
30.242500	36.50	QP	30.0	100.0	V	-5.10	19.70	40.00	20.30
98.021250	67.94	PK	116.0	100.0	V	-15.00	50.94	68.00	17.06
98.021250	63.37	Ave	116.0	100.0	V	-15.00	46.37	48.00	1.63
85.896250	37.12	QP	111.0	100.0	V	-17.00	22.12	40.00	17.88
293.961250	42.74	QP	246.0	100.0	H	-10.50	27.74	46.00	18.26

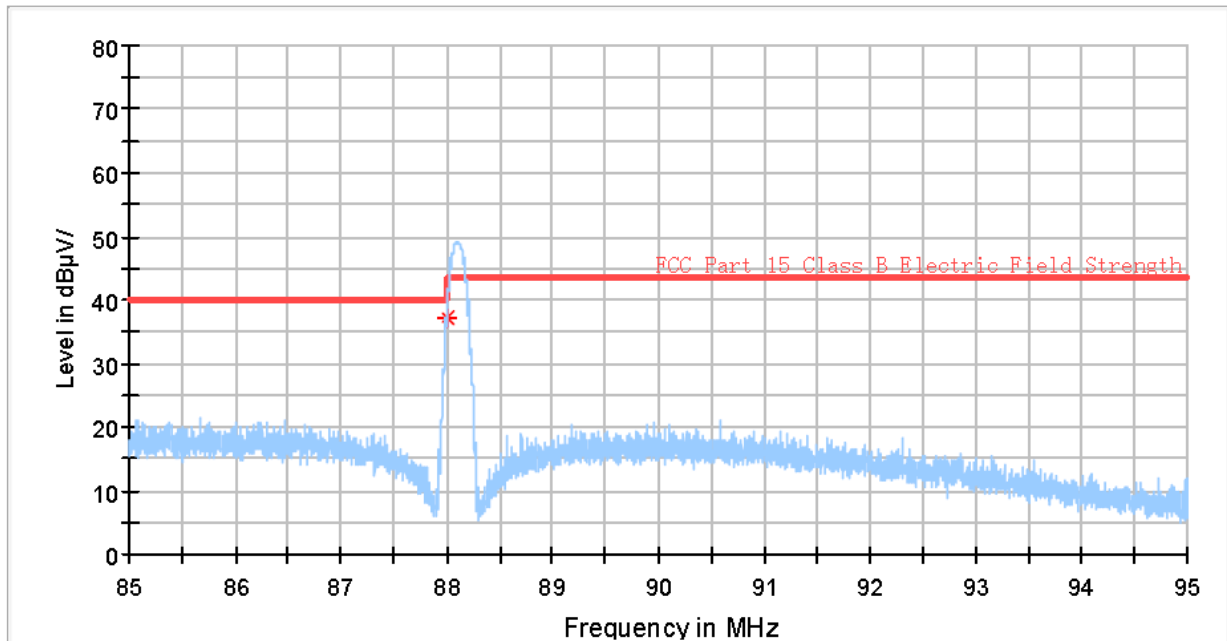
FM 107.9MHz



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.239/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μV/m)	Margin (dB)
30.000000	25.13	QP	274	100	V	-5.00	20.13	40.00	19.87
298.932500	35.36	QP	329	100	H	-10.40	24.96	46.00	21.04
167.497500	36.06	QP	315	100	V	-12.20	23.86	43.50	19.64
107.842500	62.13	PK	240	100	V	-13.00	49.13	68.00	18.87
107.842500	58.27	Ave	240	100	V	-13.00	45.27	48.00	2.73
174.651250	35.44	QP	100	100	V	-12.10	23.34	43.50	20.16
930.887500	25.49	QP	100	100	V	-0.50	24.99	46.00	21.01

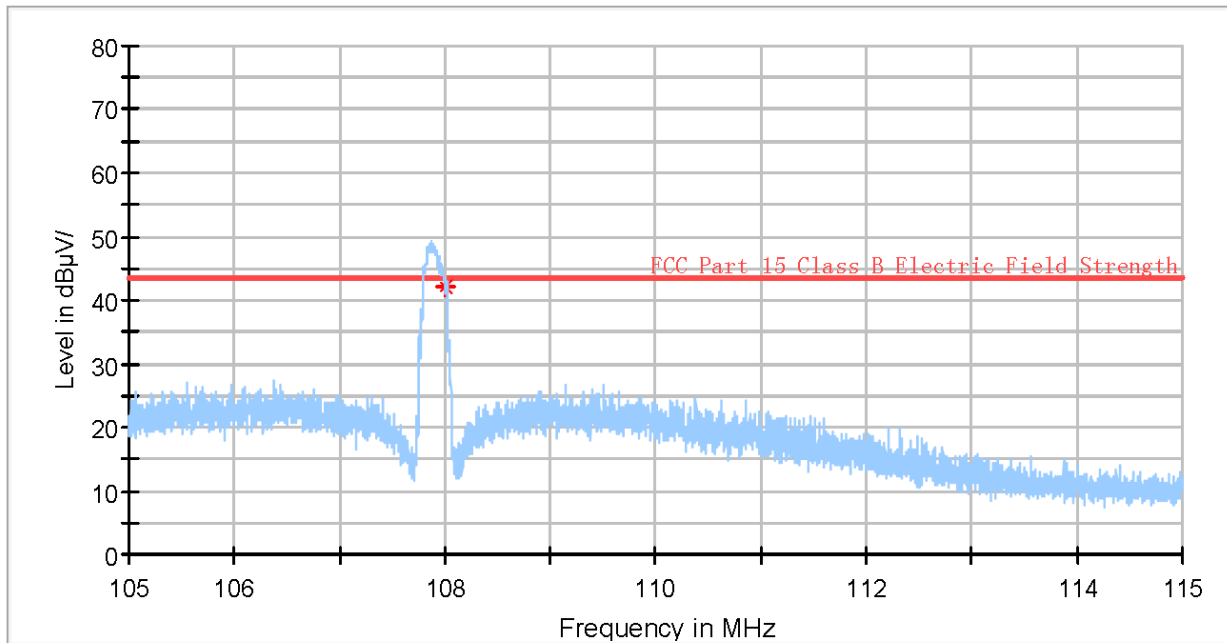
Band edge:

Left Band



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.239/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)
88.000000	54.21	QP	71.0	100	V	-17.0	37.21	40.00	2.79

Right Band



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.239/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μV/m)	Margin (dB)
108.000000	54.76	QP	299.0	100	V	-12.9	41.86	43.50	1.64

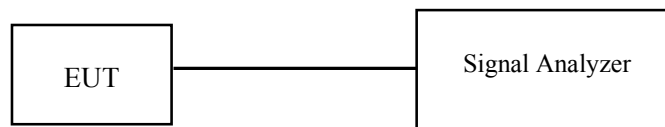
FCC §15.215– 20 dB EMISSION BANDWIDTH

Applicable Standard

§15.215 (c) 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

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 6 dB from the reference level. Record the frequency difference as the emission 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
Sonoma Instrunent	Amplifier	330	171377	2016-10-21	2017-10-21
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-12	2017-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2017-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
champrotek	Chamber	Chamber A	1#	2016-09-17	2017-09-17
R&S	Auto test Software	EMC32	V 09.10.0	/	/
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15

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

Test Data**Environmental Conditions**

Temperature:	27 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

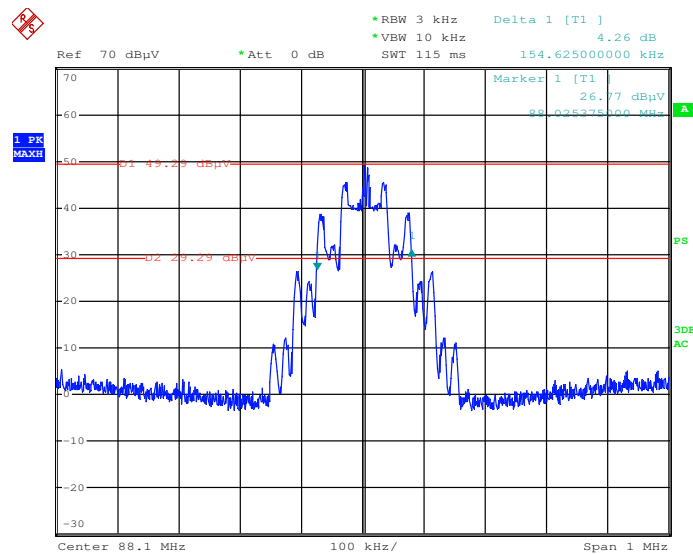
The testing was performed by Peter Jiang on 2016-12-06.

Test Result: Pass.

Please refer to the following tables and plots.

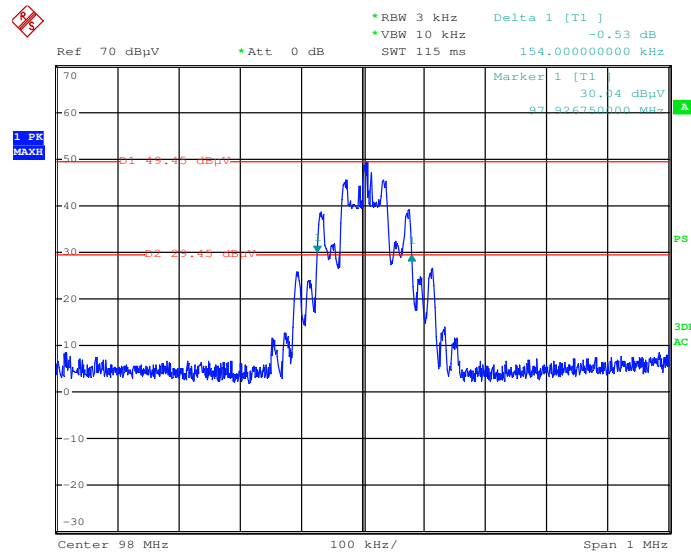
EUT operation mode: Transmitting

Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)
Low	88.1	154.6
Middle	98.0	154.0
High	107.9	156.0

Low Channel

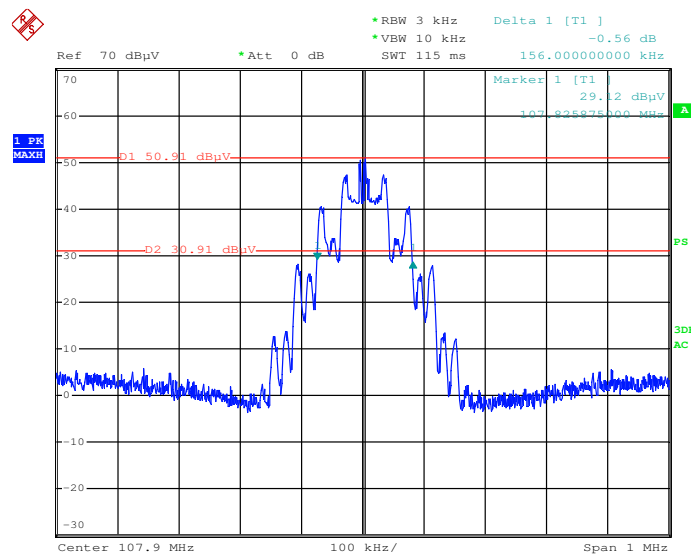
Date: 6.DEC.2016 08:12:57

Middle Channel



Date: 6.DEC.2016 08:07:19

High Channel



Date: 6.DEC.2016 08:20:19

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