

FCC PART 15 Subpart C
EMI MEASUREMENT AND TEST REPORT
For
CHINA NATIONAL ELECTRONICS IMPORT& EXPORT
SHENZHEN COMPANY

35/ F, BLOCK A, ELECTRONICS SCIENCE& TECHNOLOGY BUILDING, 2070, SHENNAN
ZHONGLU, SHENZHEN, CHINA.

FCC ID: LLRRS-680

July 2, 2003

This Report Concerns: ☒ Original Report	Equipment Type: CAR ALARM SYSTEM
Test Engineer: Jandy Su	
Report No.: RSZ03060903	
Test Date: June 9, 2003	
Reviewed By: _____	
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Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The CHINA NATIONAL ELECTRONICS IMPORT& EXPORT SHENZHEN COMPANY's product, model name: RS-680 or the "EUT" as referred to in this report is CAR ALARM SYSTEM. The EUT is a Base Transmitter, which measures approximately 10.3cmL x 8.5cmW x 3.0cmH, Alarm Speaker measures approximately 8.0cmL x 8.0cmW x 9.0cmH.

The EUT power: DC 12V battery, the battery was fresh charged before test.

** The test data was good for test sample only. It may have deviation for other product samples.*

1.2 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 - 1992.

The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.231.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 1992, 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 Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated electromagnetic disturbance and disturbance voltage measurement data is located in the No. 3 building JingHua Courtyard, Shennanzhong Rd ShenZhen, Guandong 518031, P.R. C, and 230 Commercial Street, Sunnyvale, CA 94085 USA.

Test site at Bay Area Compliance Laboratory Corporation has 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 - 1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22:1997 and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
R/S	Spectrum Analyzer	FSEM	849720/019	08/05/2004
R/S	Receiver	ESCS30	828304/014	09/05/2004
HP	Amplifier	8447D	2944A09795	08/05/2004
ETS	Log Periodic Antenna	3146	9603-4421	09/05/2004
ETS	Biconical Antenna	3110B	3360	08/05/2004
Solar Electronics	LISN	TYPE 8012-50-R-24-BNC	21162	09/05/2004
Solar Electronics	LISN	TYPE 8012-50-R-25-BNC	21163	10/05/2004

***Statement of Traceability: Bay Area Compliance Laboratory Corp.** Certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY.

1.7 External Cable

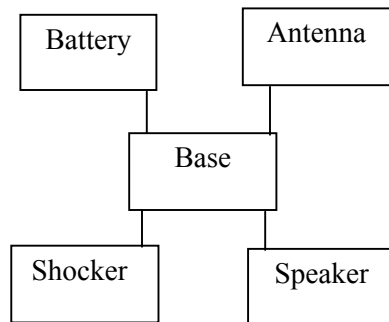
Cable Description	Length (M)	From/Port	To
Unshielded Detachable Cable	1.0	Shocker	EUT
Unshielded Detachable Cable	1.5	Antenna	EUT
Unshielded Detachable DC Cable	1.6	Battery	EUT
Unshielded Detachable Cable	1.8	Speaker	EUT

2 - SYSTEM TEST CONFIGURATION

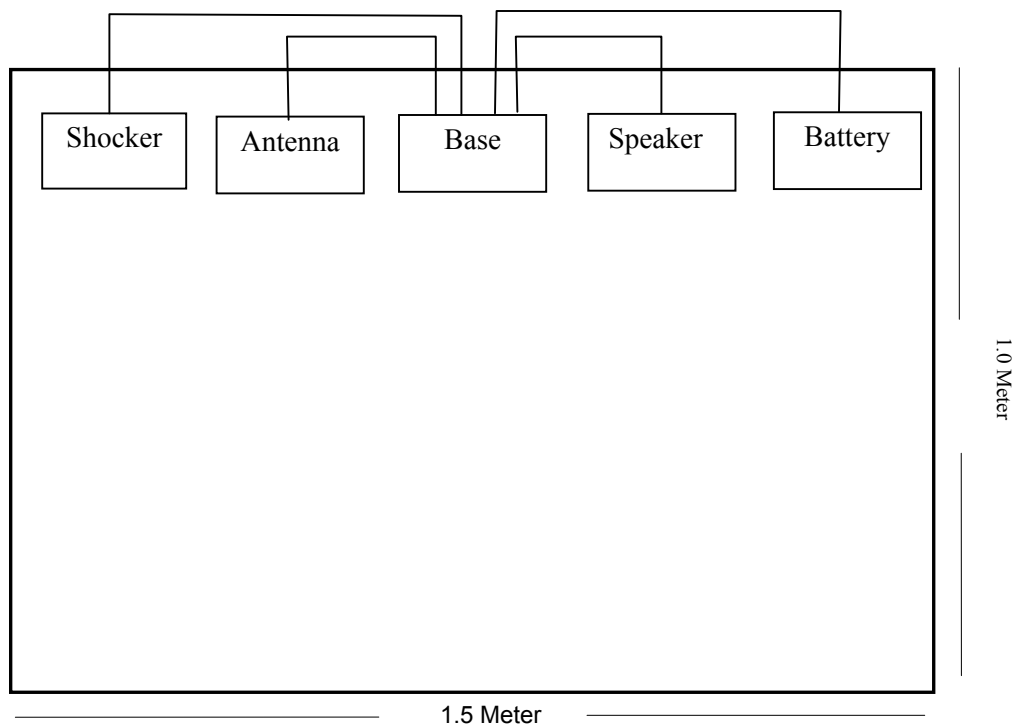
2.1 Description of Test Configuration

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

2.2 Configuration of Test System



2.3 Test Setup Block Diagram



2.4 Equipment Modifications

No modification(s) to the EUT were made by BACL to comply with the applicable limits.

3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna requirement	Pass
§ 15.205	Restricted Bands of Operation	Pass
§ 15.207	Conduct requirement	Pass
§ 15.209	Radiated requirement	Pass
§ 15.231	Periodic Operation in the band 40.66-40.7 MHz and above 70MHz	Pass

4 - CONDUCTED EMISSIONS TEST DATA

The EUT did not have AC power source, therefore conducted emissions test was not needed.

5 - RADIATED EMISSION DATA

5.1 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 radiation emissions measurement at BACL is ± 4.0 dB.

5.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4 - 1992. The specification used was the FCC 15 Subpart C 15.231 limits for transmitter.

The test modes were lie, stand, and side. Lie is the worst mode, and the worst mode test data was included in the test report.

The EUT was placed center of the test table.

5.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the system was tested from 30MHz to 5000 MHz.

The spectrum analyzer was set with the following configurations during the radiated emission test from 30MHz to 1000 MHz:

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Sweep Speed	Auto
IF Bandwidth	100 KHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth.....	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth.....	100 KHz

The spectrum analyzer was set with the following configurations during the radiated emission test from 1000MHz to 5000 MHz:

Start Frequency	1000 MHz
Stop Frequency	5000 MHz
Sweep Speed	Auto
IF Bandwidth	100 KHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth.....	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth.....	1 MHz

5.4 Test Procedure

For the radiated emissions test, since the EUT does not have AC power source, there was no connection to AC outlets.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "Qp" in the data table.

5.5 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{Applicable Limit}$$

5.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.231 after tested to 10th harmonics as required by FCC and had the worst margin of:

- 4.2 dB μ V at 433.91 MHz in the **Horizontal** polarization, **30 – 5000MHz, 3 meters (Transmitting Mode)**.
- 7.6 dB μ V at 433.945 MHz in the **Vertical** polarization, **30 – 1000MHz, 3 meters (Receiving Mode)**.

5.7 Radiated Emissions Test Result Data

Date of Test	:	June 9, 2003	Temperature	:	25°C
EUT	:	Car Alarm System	Humidity	:	70%
M/N	:	RS-680	Operating Mode	:	Transmitting Mode
S/N	:	N/A	Test Engineer	:	Jandy Su

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Frequency MHz	Ampl. dB μ V/m	Direction Degree	Height Meter	Polar H/V	Antenna dB μ V/m	Cable Loss dB μ V/m	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	Mode
433.92	82.7	120	1.0	h	16.2	1.9	25	75.8	80	-4.2	Fund (AV)
433.92	79.85	45	1.0	v	16.2	1.9	25	73.0	80	-7.1	Fund (AV)
867.84	47.16	45	1.2	h	22.8	2.5	25	47.5	60	-12.5	AV
867.84	45.67	270	1.2	v	22.8	2.5	25	46.0	60	-14.0	AV
1301.76	42.7	90	1.0	h	24.2	2.4	25	44.3	54	-9.7	AV
1301.76	41.07	60	1.2	v	24.2	2.4	25	42.7	54	-11.3	AV
1735.68	38.24	135	1.2	h	26.3	2.6	25	42.1	60	-17.9	AV
1735.68	37.66	75	1.0	v	26.3	2.6	25	41.6	60	-18.4	AV

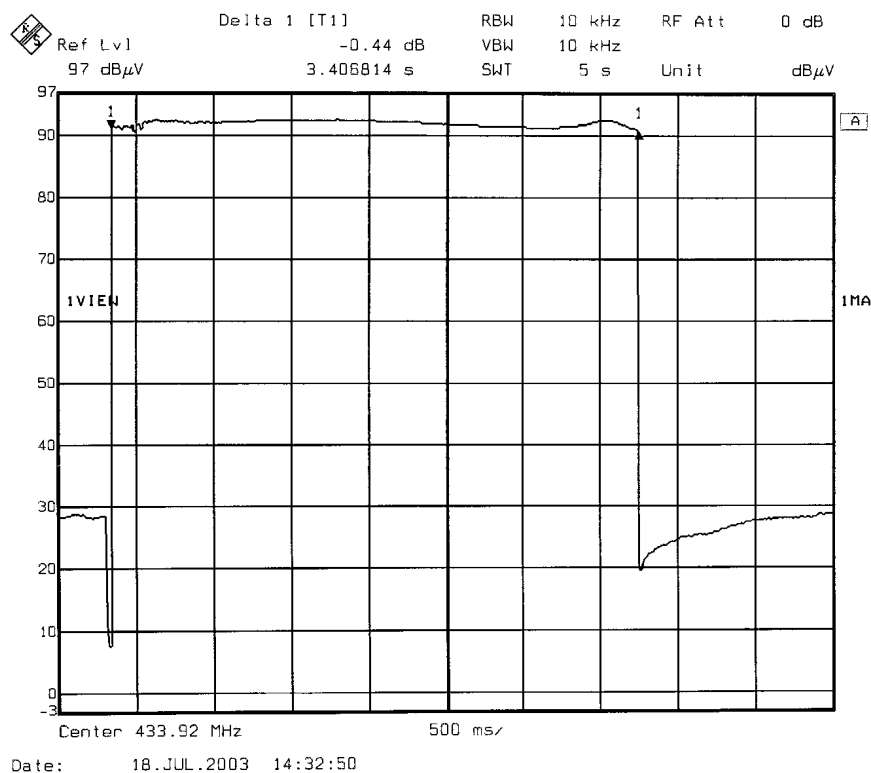
6 – Operation Times

Requirements: 15.231 (1) manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6.1 Test Results

Transmitting Time	Limit
MS	MS
3406	5000

Test Results: **Pass**



7 – BANDWIDTH TESTING

Requirements: 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. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

7.1 Test Results

From the analyzer plots, we can see the bandwidth is full filled FCC 15.231(C).

Bandwidth	Limit
MHz	MHz
0.044	1.08

Test Results: **Pass**

