



NVLAP LAB CODE 200707-0



FCC PART 15.227 MEASUREMENT AND TEST REPORT

For

Haiboxing Toys Factory

Long Tian Guang Tou Industrial Estate, Guang Yi Street,
Cheng Hai Area, Shan Tou, China

FCC ID: SX2LS-022LCD-RC

Report Type: Original Report	Product Type: DIGITAL REMOTE DEVICE FM-3TD
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Report Number:	RSZ08090205
Report Date:	2009-03-19
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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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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Haiboxing Toys Factory's* product, model number: *LS-022-RC* or the "EUT" as referred to in this report is a *DIGITAL REMOTE DEVICE FM-3TD*. The EUT is measured approximately 18 cm L x 10 cm W x 24 cm H. rated input voltage: DC 12V battery.

** All measurement and test data in this report was gathered from production sample serial number: 0809015 (Assigned by BACL, Shenzhen). The EUT was received on 2008-09-02.*

Objective

The following test report is prepared on behalf of *Haiboxing Toys Factory* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, sec 15.203, 15.205, 15.209 and sec 15.227.

Related Submittal(s)/Grant(s)

No Related Submittals.

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test 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 November 04, 2004. 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 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.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



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The current scope of accreditations can be found at
<http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Justification

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

EUT Exercise Software

N/A

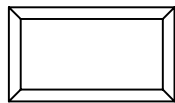
Special Accessories

The special accessories were supplied by Bay Area Compliance Laboratories Corp. (Shenzhen).

Equipment Modifications

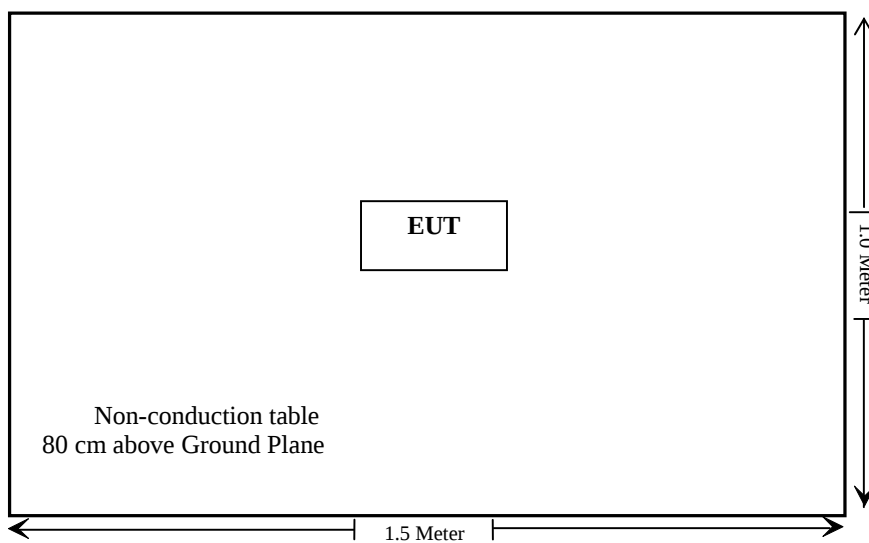
No modification was made to the unit tested.

Configuration of Test Setup



EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna requirement	Compliant
§15.205	Restricted Band of operation	Compliant
§15.207	Conducted Emissions	N/A *
§15.209	Radiated Emissions Limits	Compliant
§15.227(a)	Field Strength	Compliant
§15.227(b)	Out of band emissions	Compliant
§15.227	Duty Cycle	/

Note: * N/A, EUT is battery operation only.

CFR47 §15.203 - ANTENNA REQUIREMENT

Standard Applicable

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.

This product has a permanent antenna, fulfill the requirement of this section.

Result: Compliant.

Please refer to the EUT photos.

CFR47 §15.205, §15.209, §15.227(a) (b) - RADIATED EMISSIONS TEST**Standard Applicable**

According to §15.227

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

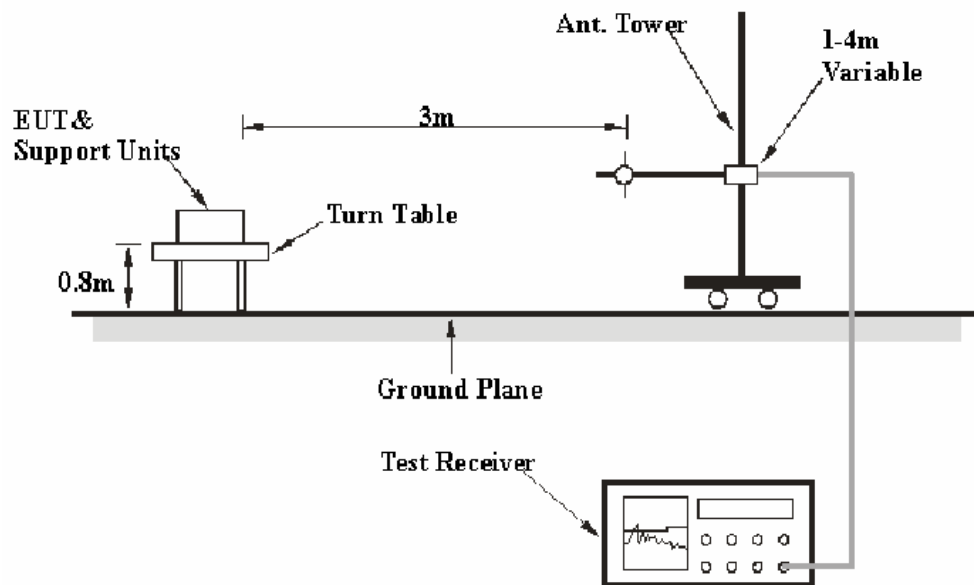
(b), the field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in §15.209.

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 NIS 81, 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.

The fundamental data was measured in average and peak detection mode: set the VBW AVE on, and then record the data.

EUT Setup

The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15.227 limits.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated from 27 to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30 MHz	10 kHz	30 kHz
30 – 1000 MHz	100 kHz	300 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-04-12	2009-04-11
EM Test	Loop Antenna	MS100	303298	2008-03-07	2009-03-07
ETS	Passive Loop Antenna	6512	00029604	2008-03-04	2009-03-04

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

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 data in the following table, the EUT complied with the FCC Part 15.227, with the worst margin reading of:

5.5 dB at 169.855600 MHz in the Horizontal polarization

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Peng on 2009-02-16.

Test mode: Transmitting

Fundamental Measurement:

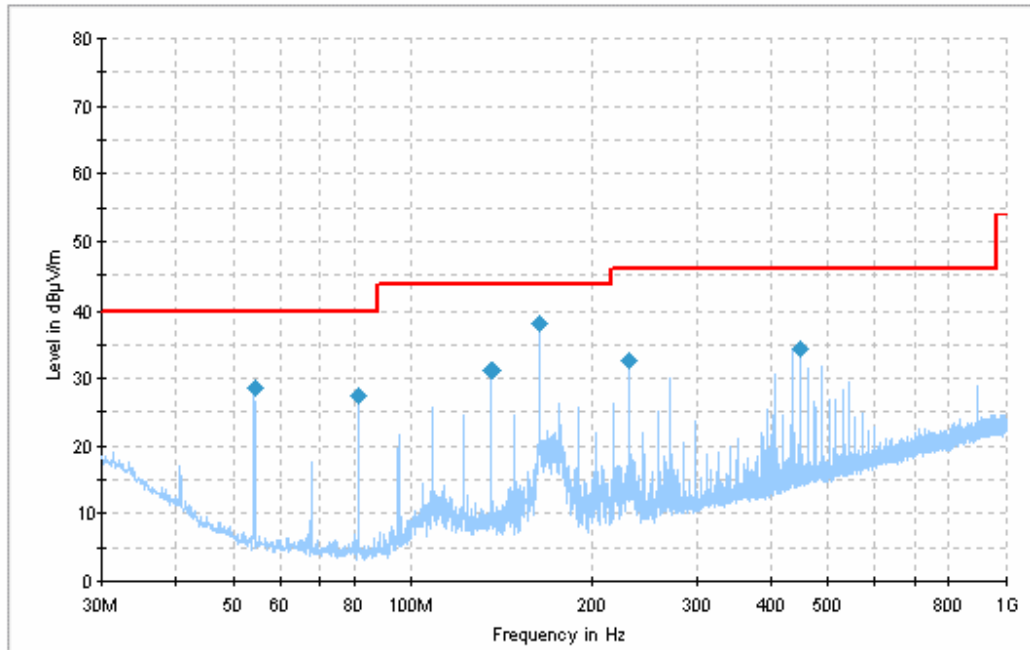
Indicated		Table Angle Deg.	Detector (PK/AV)	Test Antenna		Cable Loss (dB)	Pre-Amplifier Gain (dB)	Cord. Amp. (dBµV/m)	FCC Part 15.227	
Freq. (MHz)	S.A. Reading (dBµV)			Height (m)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
27.145	49.87	215	PK	1.85	22.69	0.25	0	72.81	100	27.19

Field Strength of Fundamental Emission (Average)					
Freq. (MHz)	Peak Measurement @ 3m (dBµV/m)	Duty Cycle Correction (dB)	Corrected Amp. (dBµV/m)	Part 15.227 Limit (dBµV/m)	Result
27.145	72.81	-5.19	67.62	80	Compliant

Note: According to CFR47 Part 15.35, the limit on the radio frequency emissions as measured using instrumentation with peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

* Duty Cycle = -5.19 dB

* The above data is the worst case in the all polarity direction.

Spurious Emission:

Frequency (MHz)	Quasi-Peak (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Cord. Factor (dB)	Limit (dBμV/m)	Margin (dB)
169.855600	38.0	233.0	H	250.0	-18.0	43.5	5.5
54.296650	28.5	400.0	H	103.0	-21.2	40.0	11.5
447.870625	34.4	104.0	H	149.0	-11.4	46.0	11.6
145.730000	31.2	286.0	H	1.0	-11.7	43.5	12.3
81.440075	27.4	353.0	H	279.0	-22.2	40.0	12.6
230.668750	32.5	400.0	H	0.0	-3.9	46.0	13.5

Note: The above data is the worst case in the all polarity direction.

CFR47 §15.227(b) – OUT OF BAND EMISSIONS

Standard Applicable

According to §15.227(b), the field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in §15.209.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
EM Test	Loop Antenna	MS100	303298	2008-03-07	2009-03-07
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-04-12	2009-04-11
HP	Preamplifier	8449B	3008A00277	2008-09-29	2009-09-29

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

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Peng on 2009-03-10.

Test mode: Transmitting

Indicated		Table Angle Deg.	Detector PK/AV	Antenna		Cable Loss (dB)	Amplifier Gain (dB)	Cord. Amp. (dBμV/m)	FCC Part 15.227/209	
Freq. (MHz)	Reading (dBμV)			Height (m)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)
33.5235	11.72	125	PK	1.8	22.9	0.25	15	19.37	40.0	20.63
25.78066	17.27	164	PK	2.0	22.40	0.25	20	19.42	49.5	30.08

CFR47 §15.227- DUTY CYCLE**Limit**

Nil (No dedicated limit specified in the Rules).

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09

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

Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer=operating frequency.
4. Set the spectrum analyzer as RBW, VBW =100kHz, Span=0Hz, Adjust Sweep=100ms.
5. Repeat above procedures until all frequency measured were complete.

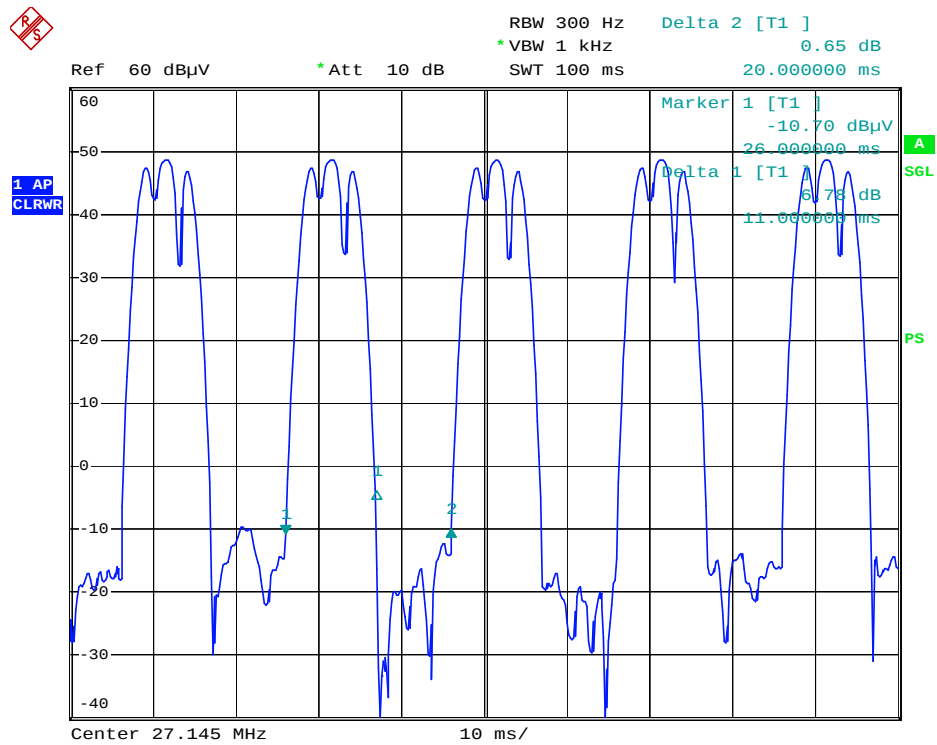
Test Data

$T_p = 20 \text{ ms}$
 $T_{on} = 11.0 \text{ ms}$

Duty cycle factor = $20 * \log (T_{on} / T_p) = 20 * \log (11/20) = -5.19 \text{ dB}$

This factor will be applied to correct the final reading for the peak measurement.

Duty Cycle



duty cycle

Date: 10.MAR.2009 18:54:22

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