Intertek

August 1, 2008

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

Dear Dong Yuan Kong,

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: SX2LS-013TX-RC).

For your reference, TCB review normally takes 1 week. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

Shawn Xing
Assistant Manager

Enclosure

HAIBOXING TOYS FACTORY

Application
For
Certification
(FCC ID: SX2LS-013TX-RC)

Transmitter

Sample Description : DIGITAL SCALL R/C SYSTEM(AM-103BL)
Model: LS-4025
Additional Model: LS-4050 / LS-4100 / LS-4150 / LS-4200 / LS-4300 / LS-4350 / LS-013-T / LS-103-R / LS-M6010

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [20-9-2007]

GZ08060220-1
Billy Li
August 1, 2008

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
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Tel: (8620) 8213 9688 Fax: (8620) 3205 7538

LIST OF EXHIBITS

MEASUREMENT/TECHNICAL REPORT

HAIBOXING TOYS FACTORY - MODEL: LS-4025
FCC ID: SX2LS-013TX-RC

August 1, 2008

This report concerns (check one:) Original Grant ___X___ Class II Change _____

Equipment Type: Low Power Transmitter (example: computer, printer, modem, etc.)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No ___X

If yes, defer until: ____________________
date

Company Name agrees to notify the Commission by: ______________________________
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No ___X

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [09-20-07 Edition] provision.

Report prepared by:

Shawn Xing
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Table of Contents

List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Report	Bandwidth Plot	bw.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	fcc label.pdf
User Manual	User Manual	manual.pdf
Test Report	Average Factor	af.pdf
Cover Letter	Letter of Agency	agency.pdf

EXHIBIT 1

GENERAL DESCRIPTION

1.0 **General Description**

1.1 Product Description

The equipment under test (EUT) is a transmitter for RC car operating at 26.975 MHz, 26.995 MHz, 27.025 MHz, 27.045 MHz, 27.075 MHz, 27.095 MHz, 27.125 MHz, 27.145 MHz, 27.175 MHz, 27.195 MHz, 27.225 MHz and 27.245MHz which is operated by a crystal, one of the crystal was installed in each transmitter by the manufacturer during production and it cannot be access by the user. The EUT is powered by 8 AA batteries or 8 rechargeable batteries. The EUT has a Power Switch, a Control Wheel, a Control Trigger, a Steering Dual Rate Control Dial, a Steering Reverse Switch, a Throttle Reverse Switch, three Power Indicators, a Steering Trim, a Throttle Trim, four EPA Adjustment Switches and a Charging Socket. When the EUT is switched ON, the control wheel is used to control the RC Car turning left and right directions. The control trigger is used to control the RC Car moving forward and brake. The Steering Dual Rate Control Dial is used to adjust the overall travel of the steering servo. The Steering Reverse Switch is used to change the direction of the servo. The Throttle Reverse Switch is used to change the throttle operate. The three Power Indicators check the battery level. The Steering Trim is used to fine tune the servos' centre. The Throttle Trim is used to set the throttles' neutral point. The four EPA Adjustment Switches are used to EPA adjustment for the vehicle. The Charging Socket is used to charging the 8 rechargeable batteries. The transmitter can not be operated while charging.

The Models: LS-4050 / LS-4100 / LS-4150 / LS-4200 / LS-4300 / LS-4350 / LS-013-T / LS-103-R / LS-M6010 are the same as the Model: LS-4025 in TX. Different model numbers represent different receivers. The operation frequency of the EUT is 26.975MHz, 26.995MHz, 27.025MHz, 27.045MHz, 27.075MHz, 27.095MHz, 27.125MHz, 27.145MHz, 27.175 MHz, 27.195 MHz, 27.225MHz and 27.245 MHz. Since the transmitter have the same design, except the crystal installed, the transmitter operated at 27.095MHz was tested for radiated emission and average factor measurements. The transmitter operated at 26.975MHz (the least channel) and 27.245MHz (the highest channel) were tested for bandwidth and bandedge emission measurements.

The brief circuit description is saved with file name: descri.pdf

1.2 Related Submittal(s) Grants

The receiver for this transmitter is exempted from the Part 15 technical rules per 15.101(b).

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated Emission measurement was performed in a Semi-chamber. Preliminary scans were performed in the Semi-chamber only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

1.4 Test Facility

The Semi-chamber facility used to collect the radiated data is **Interterk Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC.

EXHIBIT 2

SYSTEM TEST CONFIGURATION

2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered by 8 new AA batteries and 8 fully charged batteries during test. The transmitter can not be operated while charging.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was va ried from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, and the Antenna of EUT was fully extended, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

For simplicity of testing, the unit was wired to transmit continuously.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Equipment Modification

Any modifications installed previous to testing by HAIBOXING TOYS FACTORY will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

2.5 Measurement Uncertainty

When determining the test conclusion, the measurement uncertainty of test has been considered.

2.6 Support Equipment List and Description

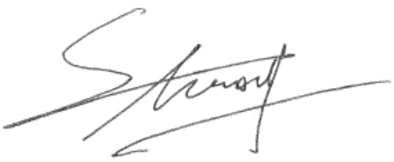
This product was tested in the following configuration:

8 Rechargeable batteries (Brand: Energizer Type:NH15-AA 1.2V Capacity:2650mAh)

All the items listed under section 2.0 of this report are

Confirmed by:

Shawn Xing
Assistant Manager
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Agent for HAIBOXING TOYS FACTORY



______________________________ *Signature*

August 1, 2008 *Date*

EXHIBIT 3

EMISSION RESULTS

3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where
FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB

AV = -10 dB

FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

27.095 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 3.0 dB

TEST PERSONNEL:

____
Signature

Billy Li, Engineer
Typed/Printed Name

August 1, 2008
Date

Applicant: HAIBOXING TOYS FACTORY Date of Test: July 24, 2008
Model: LS-4025
Mode: Transmit (8 AA batteries DC 12.0V)
Sample: 1/1

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Vertical	27.095	68.3	0.0	9.2	0.5	77.0	80.0	-3.0
Vertical	54.190	43.9	20.0	8.4	--	32.3	40.0	-7.7
Vertical	81.285	34.2	20.0	8.2	--	22.4	40.0	-17.6
Vertical	108.380	37.2	20.0	9.1	--	26.3	43.5	-17.2
Vertical	135.162	42.9	20.0	8.5	--	31.4	43.5	-12.1
Vertical	289.657	34.3	20.0	11.0	--	25.3	46.0	-20.7
Horizontal	27.095	52.3	0.0	9.2	0.5	61.0	80.0	-19.0

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3 meter distance were measured at 0.3 meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3 meter.
3. Negative value in the margin column shows emission below limit.
4. Loop antenna is used for the emissions below 30 MHz.

*Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and peak detector data with average factor for frequencies over 1000 MHz.

Test Engineer: Billy Li

Applicant: HAIBOXING TOYS FACTORY　　Date of Test: July 24, 2008
Model: LS-4025
Mode: Transmit (8 rechargeable batteries DC 9.6V)
Sample: 1/1

Table 2

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Vertical	27.095	67.2	0.0	9.2	0.5	75.9	80.0	-4.1
Vertical	54.190	43.2	20.0	8.4	--	31.6	40.0	-8.4
Vertical	81.285	33.7	20.0	8.2	--	21.9	40.0	-18.1
Vertical	108.380	36.7	20.0	9.1	--	25.8	43.5	-17.7
Vertical	135.162	41.9	20.0	8.5	--	30.4	43.5	-13.1
Vertical	289.657	33.1	20.0	11.0	--	24.1	46.0	-21.9
Horizontal	27.095	51.0	0.0	9.2	0.5	59.7	80.0	-20.3

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3 meter distance were measured at 0.3 meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3 meter.

3. Negative value in the margin column shows emission below limit.

4. Loop antenna is used for the emissions below 30 MHz.

*Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and peak detector data with average factor for frequencies over 1000 MHz.

Test Engineer: Billy Li

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename:
external photos.pdf and internal photos.pdf

EXHIBIT 5

PRODUCT LABELLING

5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: fcc label.pdf

EXHIBIT 6

TECHNICAL SPECIFICATIONS

6.0 **Technical Specifications**

For electronic filing, the block diagram and schematics are saved with filename: block.pdf and circuit.pdf

EXHIBIT 7

INSTRUCTION MANUAL

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.

EXHIBIT 8

MISCELLANEOUS INFORMATION

8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and averaging factor.

8.1 **Measured Bandwidth**

The plot saved in bw.pdf which shows the fundamental emission is confined in the specified band. And it also shows that the emission is at least 14.5 dB below the carrier level at the band edge (26.96 and 27.28 MHz). It meets the requirement of Section 15.227(b).

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Figure 8.1 Bandwidth

8.2 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

The effective period (T_{eff}) was approximately 1120 µs for a digital "1" bit, as shown in the plots of Exhibit 8.3. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB.

8.3 Calculation of Average Factor

Averaging factor in dB = 20 log (duty cycle)

The specification for output field strengths in accordance with the FCC rules specifies measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

A plot of the worst-case duty cycle as detected in this manner are saved with filename: af.pdf

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 16.36ms
Effective period of the cycle = 1.12ms + 1.44ms + 12.84ms
= 15.4ms

DC = 15.4ms / 16.36ms = 0.94132 or 94.132%

Therefore, the averaging factor is found by 20 $\log_{10}$ 0.94132 = -0.5 dB

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where transmissions of short enough pulse duration warrant, a greater bandwidth pulsed is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.