Issuing Laboratory:
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.

HOKLAS 005
TEST

TEST REPORT

Report No.: 13061009HKG-002R1

Apple Toys Development Co., Ltd.

Application
For
Certification
(Original Grant)
(FCC ID: W89-SMARTKID-49R)

Superregenerative Receiver

This report supersedes previous report with report number 13061009HKG-002 dated August 20, 2013.

Prepared and Checked by:

Wong Cheuk Ho, Herbert
Lead Engineer

Approved by:

Chan Chi Hung, Terry
Supervisor
Date: September 2, 2013

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HOKLAS 005 TEST

GENERAL INFORMATION

Apple Toys Development Co., Ltd.
BRAND NAME: SMART KID, MODEL: 8801-1
8801-2, 8801-3, 8801-4
FCC ID: W89-SMARTKID-49R

Grantee:	Apple Toys Development Co., Ltd.
Grantee Address:	Room 515-516, Tower A, 5/F., Peninsula Centre, 67 Mody Road, Tsim Sha Tsui East, Kowloon, Hong Kong
Contact Person:	Elli Hung
Tel:	(852) 2367 6128
Fax:	(852) 2760 4861
e-mail:	N/A
Manufacturer:	Apple Toys Development Co., Ltd.
Manufacturer Address:	Room 818, Tower A, Peninsula Centre, 67 Mody Road, Tsim Sha Tsui East, Kowloon, Hong Kong.
Buyer:	RadioShack
Brand Name:	SMART KID
Model:	8801-1
Additional Model:	8801-2, 8801-3, 8801-4
Asst. No.:	6000976
Type of EUT:	Superregenerative Receiver
Description of EUT:	1:64 Mini RC Racing Car
Serial Number:	N/A
FCC ID :	W89-SMARTKID-49R
Date of Sample Submitted:	June 20, 2013
Date of Test:	July 02, 2013
Report No.:	13061009HKG-002R1
Report Date:	September 2, 2013
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

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HOKLAS 005 TEST

SUMMARY OF TEST RESULT

Apple Toys Development Co., Ltd.
BRAND NAME: SMART KID, MODEL: 8801-1
8801-2, 8801-3, 8801-4
FCC ID: W89-SMARTKID-49R

TEST SPECIFICATION	REFERENCE	RESULTS
Receiver Radiated Emissions	15.109	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2011 Edition

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the pervisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB 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.

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a super-regenerative receiver of a RC Car operating at 49.860 MHz. The EUT is powered by 1 X 1.2VDC rechargeable battery). The rechargeable battery can be charged up by transmitter. The EUT has an ON/OFF switch.

After switching ON the EUT and the transmitter of the RC Car, the EUT can be controlled to move forward, backward, left and right by the transmitter.

The Model: 8801-2, 8801-3 and 8801-4 are the same as the Model: 8801-1 in hardware aspect. The difference in model number serves in car top case design & colour as marketing strategy.

Antenna Type : External, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

The Certification procedure of transmitter (with FCC ID: W89-SMARTKID-49T) for this receiver (with FCC ID: W89-SMARTKID-49R) is being processed as the same time of this application.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site only to determine worst case modes. 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 open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

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 (2009).

The device was powered by 1 x 1.2VDC rechargeable battery

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied 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 reported 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 mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it receives the RF signal continuously.

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 Apple Toys Development Co., Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

2.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

N/A.

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3.0 **Emission Results**

Data is included of the 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 Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG - 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
AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
RR = 18.0 dBµV
LF = 9.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 50.825 MHz

For electronic filing, the worst case radiated emission configuration photographs are 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.

Judgment: Passed by 3.0 dB

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Applicant: Apple Toys Development Co., Ltd. Date of Test: July 02, 2013
Model: 8801-1
Worst-Case Operating Mode: Transmitting

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.109 Requirement

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	48.725	38.3	16	11.0	33.3	40.0	-6.7
V	49.775	40.0	16	11.0	35.0	40.0	-5.0
V	50.825	42.0	16	11.0	37.0	40.0	-3.0
V	52.050	35.5	16	11.0	30.5	40.0	-9.5
V	53.000	38.8	16	11.0	33.8	40.0	-6.2
H	99.350	37.0	16	12.0	33.0	43.5	-10.5
H	101.200	37.0	16	13.0	34.0	43.5	-9.5
H	104.350	34.1	16	13.0	31.1	43.5	-12.4
H	148.750	33.1	16	14.0	31.1	43.5	-12.4
H	150.850	35.0	16	14.0	33.0	43.5	-10.5
H	152.950	31.4	16	15.0	30.4	43.5	-13.1

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

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4.0 Equipment Photographs

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

5.0 Product Labelling

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

6.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

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.

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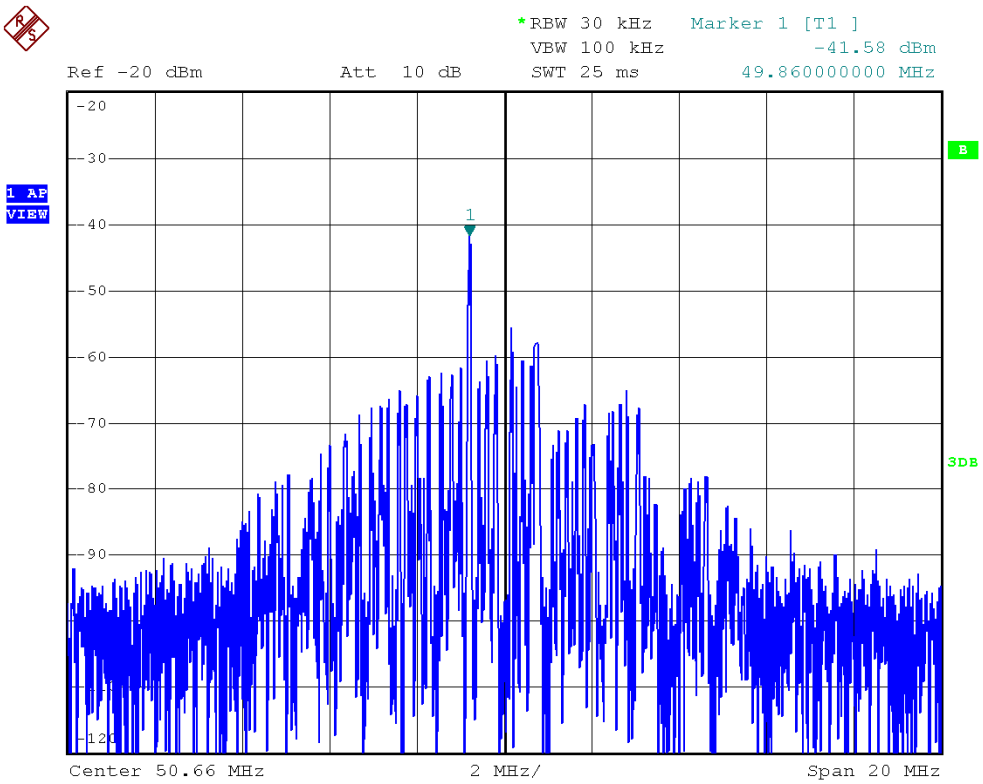
8.0 Miscellaneous Information

This miscellaneous information includes details of the stabilizing process (including a plot of the stabilized waveform), the test procedure and calculation of the factors such as pulse desensitization and averaging factor.

8.1 Stabilization Waveform

Previous to the testing, the superregenerative receiver was stabilized as outlined in the test procedure. The plot show the fundamental emission when a signal generator was used to stabilize the receiver. Please not that the antenna was placed as close as possible to the EUT for clear demonstration of the waveform and that accurate readings are not possible from this plot.



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8.2 Discussion of Pulse Desensitization

This device is a superregenerative receiver. No desensitization of the measurement equipment is required as the received signals are continuously.

8.3 Calculation of Average Factor

This device is a superregenerative receiver. It is not necessary to apply average factor to the measurement result.

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of superregenerative receivers operating under the Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 (2009). A typical or an unmodulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

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 axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

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.

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8.4 Emissions Test Procedures (cont'd)

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

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 (2009).

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth 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 8.1). 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 forbidden 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, unless otherwise reported. Measurements taken at a closer distance are so marked.

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9.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-2500	EW-2188	EW-0954
Manufacturer	R&S	AGILENTTECH	EMCO
Model No.	ESCI	E4407B	3104C
Calibration Date	Mar. 22, 2013	Nov. 05, 2012	Apr. 30, 2013
Calibration Due Date	Feb. 28, 2014	Nov. 05, 2013	Oct. 30, 2014

Equipment	Log Periodic Antenna	Signal Generator
Registration No.	EW-0447	EW-2421
Manufacturer	EMCO	AGILENTTECH
Model No.	3146	E4421B
Calibration Date	Feb. 08, 2012	Nov. 23, 2012
Calibration Due Date	Aug. 08, 2013	Nov. 23, 2013

2) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 04, 2012
Calibration Due Date	Oct. 04, 2013

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