



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0018462(0) Date : April 10, 2018

Application No. : LW005216(3)

Applicant : Toy Shock International Limited
Unit 302-303, 3/F, Tower B,
New Mandarin Plaza, 14 Science Museum Road,
Tsim Sha Tsui East, Kowloon,
Hong Kong

Sample Description : One(1) item of submitted sample stated to be:

Sample Description	Model No.
Sea Racer	300001A
Sea Runner	300002A

Radio Frequency : 2406 – 2479MHz

Rating : 1 x 9V battery

No. of submitted sample : Two (2) piece (s)

Sample registration No. : RW009223

Date Received : February 13, 2018

Test Period : March 3, 2018 – March 28, 2018

Test Requested : FCC 47CFR Part 15 Certification.

Test Method : 47 CFR Part 15 (10-1-17 Edition)
ANSI C63.10 – 2013

Test Result : See attached sheet(s) from page 2 to 17.

Conclusion : The submitted sample was found to comply with requirement of FCC 47CFR Part 15 Subpart C.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

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FCC ID: 2AHUVNQT6024



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1 General Information

1.1 General Description

The equipment under test (EUT) model 300001A is a remote controlled toys. It operates at frequency band 2406 - 2479MHz for transmitter. The oscillation of radio control is generated by a 16 MHz crystal for RF IC, MX5323. The EUT is powered by one 9V battery. The EUT contains two control lever to control moving direction and a ON/OFF switch.

Model: 300002A is identical as model: 300001A on the remote control unit (transmitter). The difference is only on the model number and the housing of the receiver.

The wire antenna is used in EUT and the radio output power is unable to adjust.

The brief circuit description is listed as follows:

-U2	and its associated circuit act as RF IC
-K1, K2	and its associated circuit act as control lever
-Y2, C6, C7	and its associated circuit act as oscillation clock
-L1, C9, 10	and its associated circuit act as matching network



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1.2 Location of the test site

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2014. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2014. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

FCC Accredited Lab (Designation Number: HK0004)
ISED Wireless Test Site (ISED Assigned Code: 4093A)



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1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	Rohde & Schwarz	ESCS30	100001	01 Feb 2019	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCI	100152	07 Dec 2018	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	100964	08 Feb 2019	1 Year
Broadband Antenna	Schaffner	CBL6112B	2692	29 Mar 2018	2 Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2020	2 Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	21 Dec 2018	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	21 Dec 2018	2 Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	02 Aug 2018	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	02 Aug 2018	2 Years
Coaxial Cable	Schaffner	RG 213/U	N/A	18 May 2018	1 Year
Coaxial Cable	Suhner	RG 214/U	N/A	18 May 2018	1 Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	21 Dec 2018	1 Year
LISN	Rohde & Schwarz	ENV216	101323	16 Jan 2019	1 Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	24 Oct 2018	1 Year



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1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Radiated emissions

Frequency	Uncertainty (U _{lab})
30MHz ~ 200MHz (Horizontal)	4.59dB
30MHz ~ 200MHz (Vertical)	4.49dB
200MHz ~1000MHz (Horizontal)	4.94dB
200MHz ~1000MHz (Vertical)	4.97dB
1GHz ~ 6GHz	4.52dB

1.5 Test Summary

TEST ITEM	FCC REFERANCE	RESULT
Radiated emission	15.249(a)	Comply
Out-band emission	15.249(d)	Comply
Peak Limit	15.249(e)	Comply
Bandwidth	15.215©	Comply



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2 Description of the radiated emission test

2.1 Test Procedure

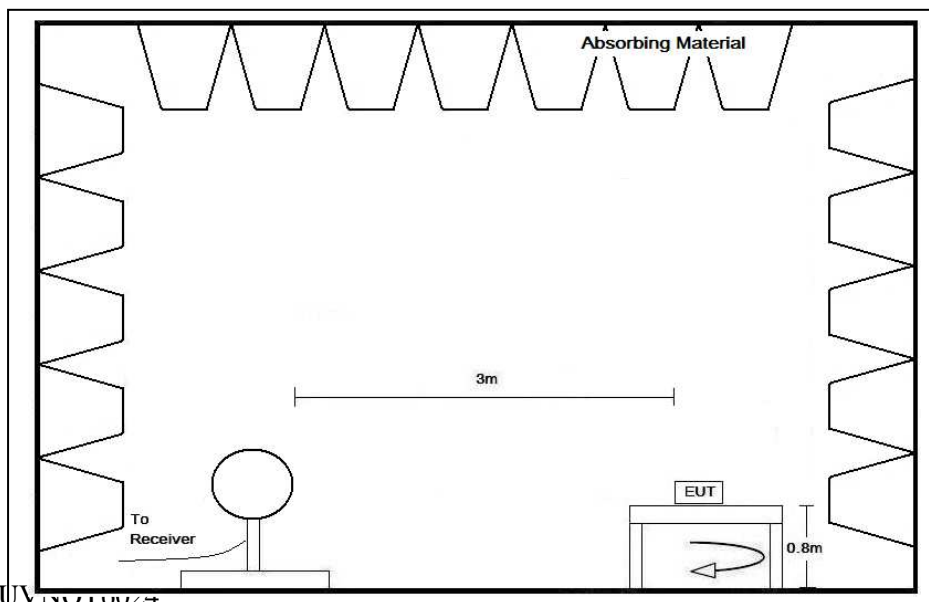
Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013.

A non-conductive turntable with dimensions of 1.5m x 0.4m x 0.8m (L x W x H) placed above the reference ground plane. The equipment under test (EUT) was placed at 0.8m height for below 1GHz measurement and 1.5m height for above 1GHz measurement. The test distance is 3m between EUT and receiving antenna. A broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated. Additional absorbing material will be placed between the EUT and receiving antenna for above 1GHz measurement.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement.

2.2 Test Setup





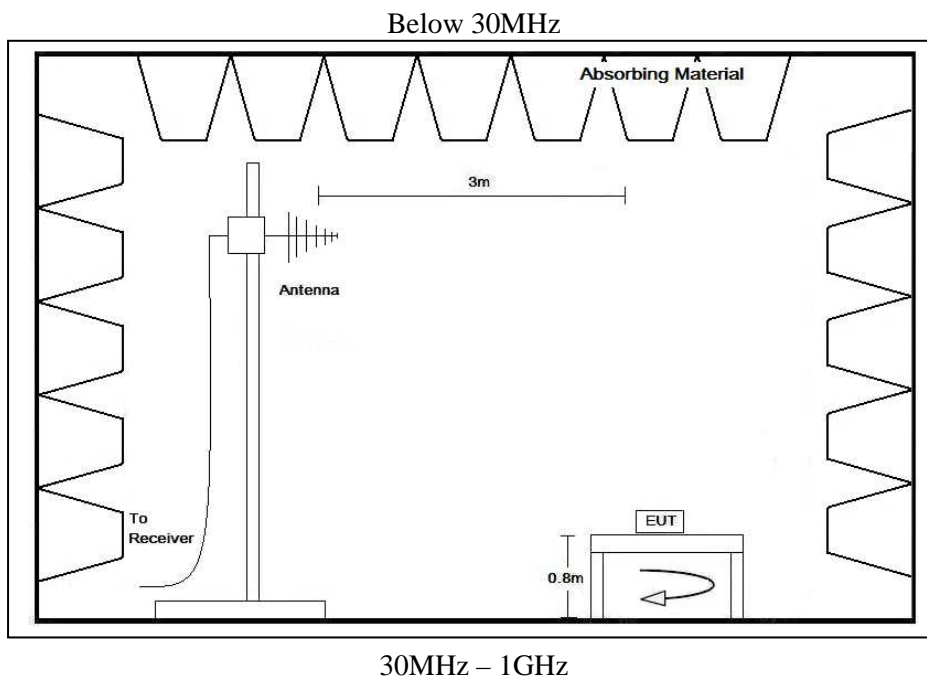
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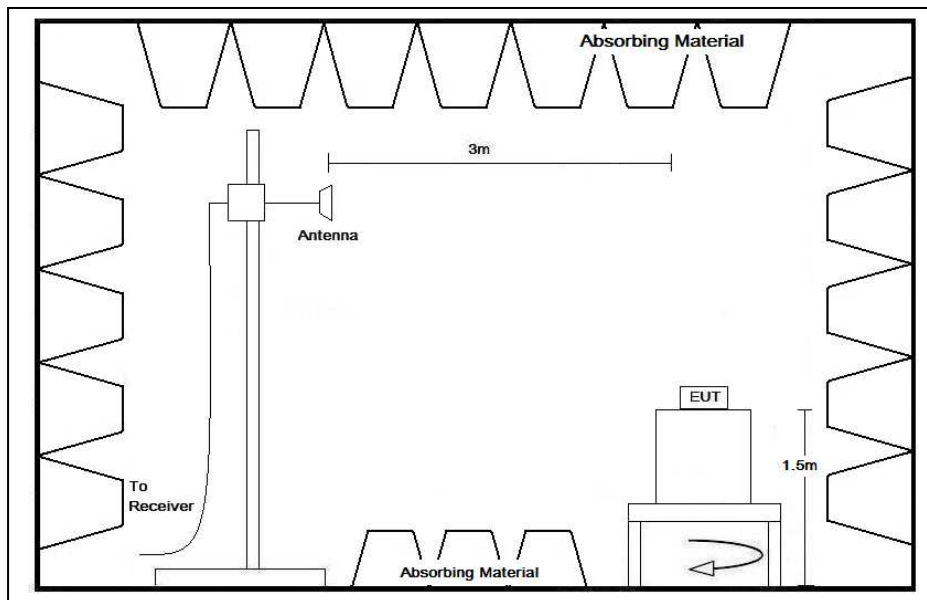
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2.2 Test Setup



Above 1GHz



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2.3 Test Result

Peak Detector data was measured unless otherwise stated.

The radiated emissions are measured from 9kHz to 26GHz (the tenth harmonics)

The worst case configuration is shown on the worst case configuration of test setup photo.

“#” means emissions appearing within the restricted bands of 47 CFR Part 15 section 15.205 and “*” means emission appearing within the restricted band of RSS-GEN section 8.10.

The frequencies from fundamental up to tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next pages.

The EUT has been tested in Transmission mode.

It was found that the EUT meet the FCC requirement.



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2.4 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value
Ambient temperature:	24.5 °C
Relative humidity:	69.2 %

Channel: 2406MHz

Polarization	Frequency (MHz)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector Type
H	2405.510	83.3	-4.7	78.6	94.0	-15.4	Peak
V	2405.692	83.5	-4.7	78.8	94.0	-15.2	Peak
H	2380.351	65.7	-6.7	59.0	74.0	-15.0	Peak
H	2380.351	26.2	-6.7	19.5	54.0	-34.5	Average
V	2390.000	46.0	-6.7	39.3	54.0	-14.7	Peak
V	2400.000	44.0	-4.7	39.3	54.0	-14.7	Peak
V	4811.372	50.2	2.3	52.5	54.0	-1.5	Peak
H	7217.040	42.5	9.6	52.1	54.0	-1.9	Peak

Remark: 1) The peak detector value is below the average limit except emission of 2380.351MHz, so no additional average measurement is done.



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Channel: 2443 MHz

Polarization	Frequency (MHz)	Reading at 3m (dB μ V)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)	Detector Type
H	2442.676	82.8	-4.7	78.1	94.0	-15.9	Peak
V	2442.538	81.8	-4.7	77.1	94.0	-16.9	Peak
V	4885.304	47.6	2.3	49.9	54.0	-4.1	Peak
H	7327.644	42.3	9.6	51.9	54.0	-2.1	Peak

Remark: 1) The peak detector value is below the average limit, so no additional average measurement is done.

Channel: 2479MHz

Polarization	Frequency (MHz)	Reading at 3m (dB μ V)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)	Detector Type
H	2478.681	82.0	-4.7	77.3	94.0	-16.7	Peak
V	2478.774	81.5	-4.7	76.8	94.0	-17.2	Peak
V	2483.500	55.9	-4.7	51.2	54.0	-2.8	Peak
V	2500.000	48.8	-4.7	44.1	54.0	-9.9	Peak
H	2502.020	62.3	-4.7	57.6	74.0	-16.4	Peak
H	2502.020	24.5	-4.7	19.8	54.0	-34.2	Average
V	4957.452	44.9	2.8	47.7	54.0	-6.3	Peak
H	7436.036	41.6	9.6	51.2	54.0	-2.8	Peak

Remark: 1) The peak detector value is below the average limit except emission of 2502.020MHz, so no additional average measurement is done.



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3 Description of the Line-conducted Test

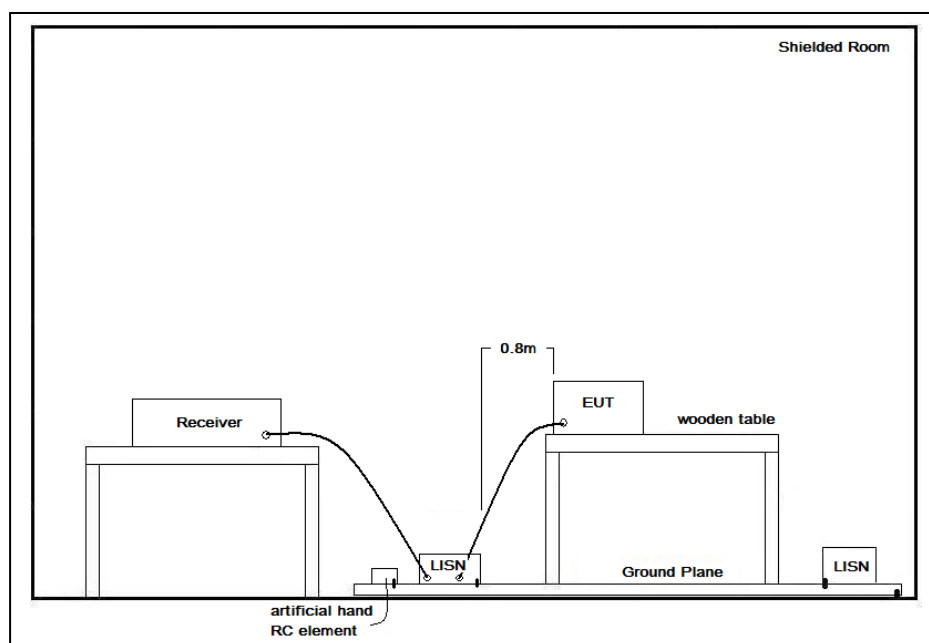
3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

No measurement is required as the EUT is a battery-operated product.

3.3 Test Setup



3.4 Graph and Table of Conducted Emission Measurement Data

Not Applicable



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4 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

Document	Filename
ID Label/Location	Label Artwork and Location.pdf
Block Diagram	Block Diagram.pdf
Schematic Diagram	Schematic.pdf
Users Manual	User Manual.pdf
Operational Description	Operation Description.pdf

4.1 Bandwidth

Appendices A1 is shown the fundamental emission is confined in the specified band. 20dB bandwidth is 1.65MHz. It also shows that the EUT met the FCC Part 15.215(c).



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5 Appendices

A1. Bandwidth Plot 1 page(s)



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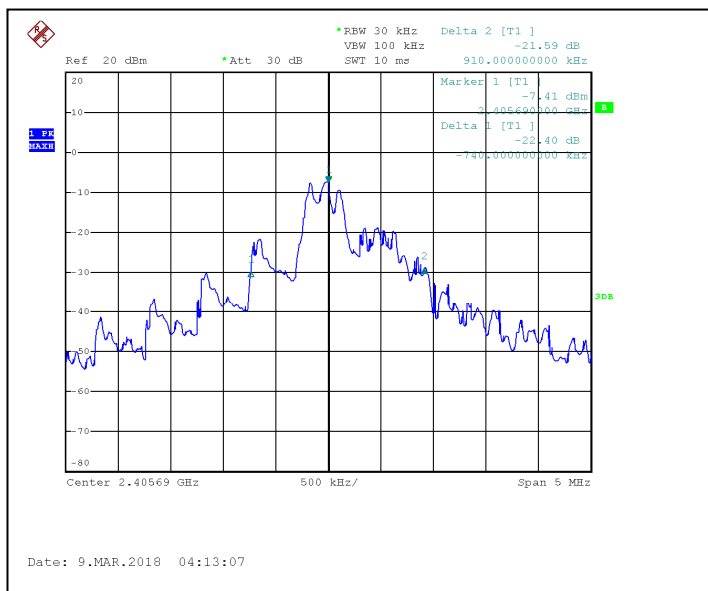
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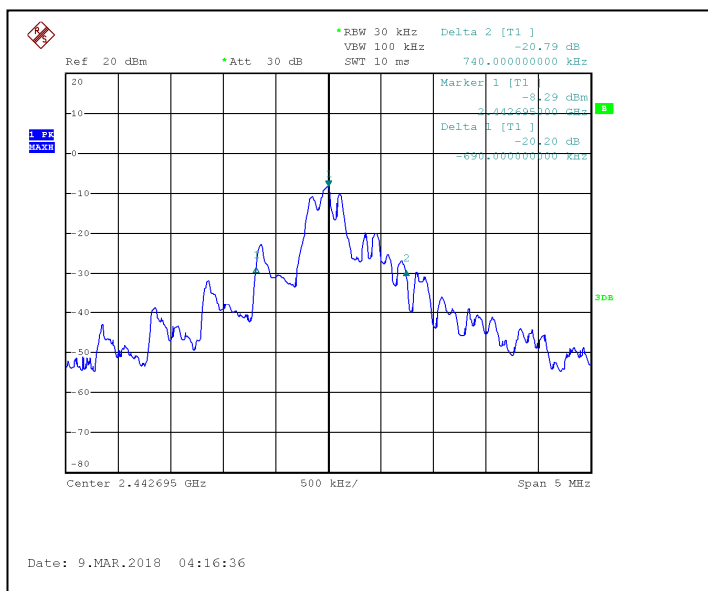
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A1. 20dB Bandwidth Plot



Channel: 2406MHz



Channel: 2443MHz



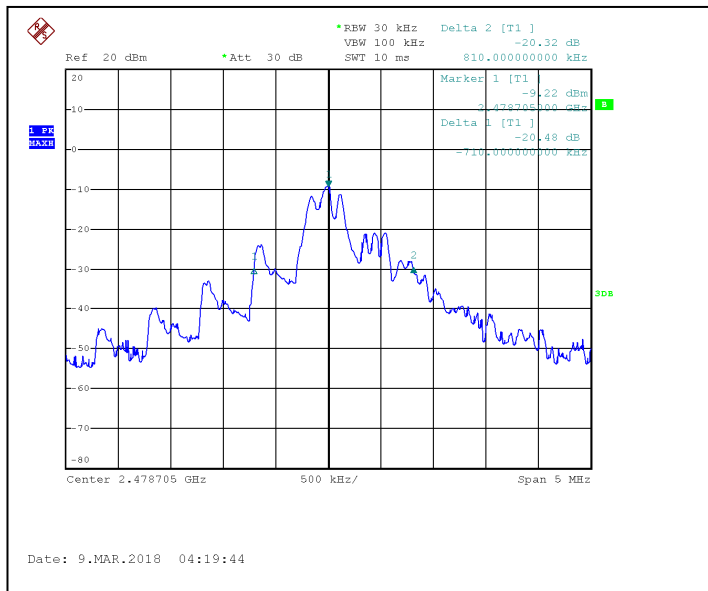
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Channel: 2479MHz

***** End of Report *****