Test Report

Date : 2019-09-17
No. : HMD19080016

Applicant	:	RMS International (USA) Inc. 4 Gill Street, STE A Woburn, MA 01801 United States
Supplier / Manufacturer	:	RMS International (USA) Inc. 4 Gill Street, STE A Woburn, MA 01801 United States
Description of Sample(s)	:	Submitted sample(s) said to be Product: X-TREME BEASTS RC Brand Name: RMS Model No.: US4-0400/MEN1 FCC ID: 2ATYA40US40400
Date Samples Received	:	2019-08-08
Date Tested	:	2019-08-09 to 2019-09-17
Investigation Requested	:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.10: 2013 for FCC Certification.
Conclusions	:	The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.
Remarks	:	For additional model(s) details, please see page 3.

CHEUNG Chi, Kenneth
Authorized Signatory

Test Report

CONTENT:

1.0 General Details

1.1 Equipment Under Test [EUT]

Description of Sample(s)

Product:	X-TREME BEASTS RC
Manufacturer:	RMS International (USA) Inc. 4 Gill Street, STE A Woburn, MA 01801 United States
Brand Name:	RMS
Model Number:	US4-0400/MEN1
Additional Model Number:	US4-0400/MEN2
Rating:	3.0Vd.c. (AA battery*2)

1.1.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Remote control. Operating at 40.684MHz. Test was conducted under Tx mode.

1.2 RF Module Details

Module Model Number:	TX2
Module FCC ID:	N/A
Modulation:	ASK
Frequency Range:	40.684MHz

1.3 Antenna Details

Antenna Type:	Line antenna
Antenna Gain:	0dBi

1.4 Date of Order

2019-08-08

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2019-08-09 to 2019-09-17

1.7 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 Regulations and ANSI C63.10: 2013 for FCC Certification.
The device was realized by test software.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Field Strength of Fundamental	FCC 47CFR 15.229	ANSI C63.10: 2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	☒	☐	☐
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐	☐
20dB Bandwidth	FCC 47CFR 15.229	ANSI C63.10: 2013	N/A	☒	☐	☐
Frequency tolerance	FCC 47CFR 15.229	ANSI C63.10: 2013	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

Test Requirement:	FCC 47CFR 15.229
Test Method:	ANSI C63.10:2013
Test Date:	2019-08-20
Mode of Operation:	Tx mode

Ambient Temperature: 25℃ Relative Humidity: 50% Atmospheric Pressure: 101 kPa

Test Method:

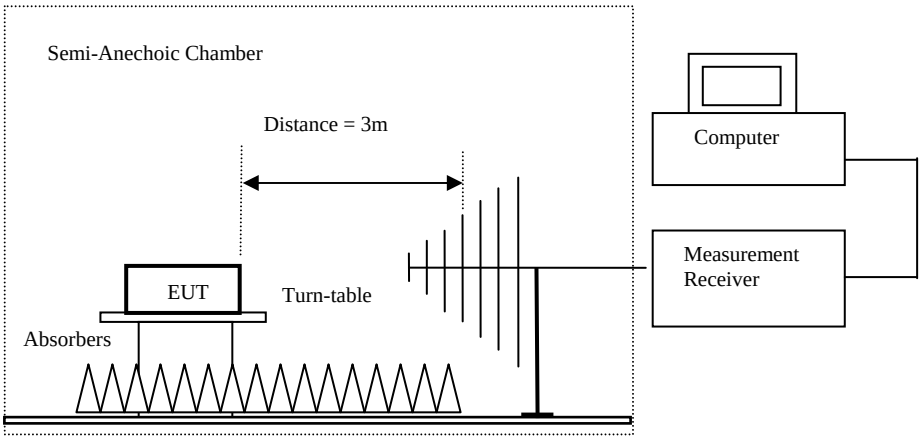
For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW:	10kHz
	VBW:	30kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
30MHz – 1GHz (QP)	RBW:	120kHz
	VBW:	120kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.229]:

Frequency Range of Fundamental [MHz]	Field Strength of Harmonics Emission [Quasi-Peak] [μV/m]
40.66-40.70	1,000

Results of Tx mode(30MHz-1GHz): PASS

Field Strength of Fundamental Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBμV/m	Limit @3m dBμV/m	Level @3m μV/m	Limit @3m μV/m
40.6	Horizontal	31.8	60.0	38.7	1000
40.6	Vertical	42.4	60.0	132.1	1000

Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Remarks:

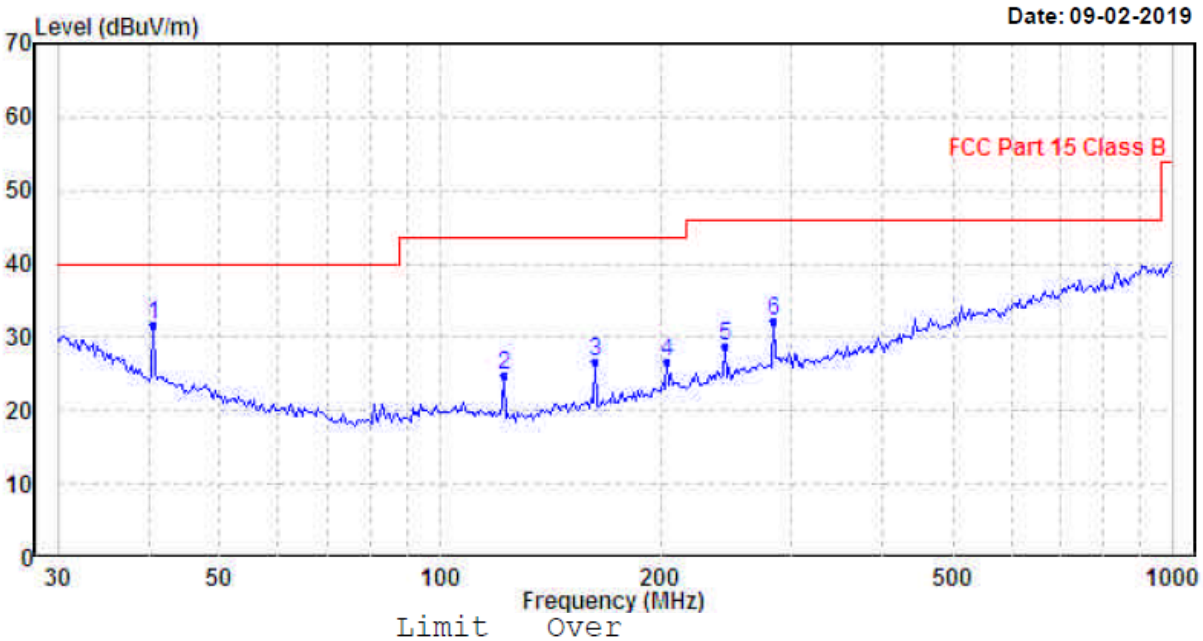
Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: (9kHz-30MHz): 2.0dB
(30MHz -1GHz): 4.9dB
(1GHz -6GHz): 4.02dB
(6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

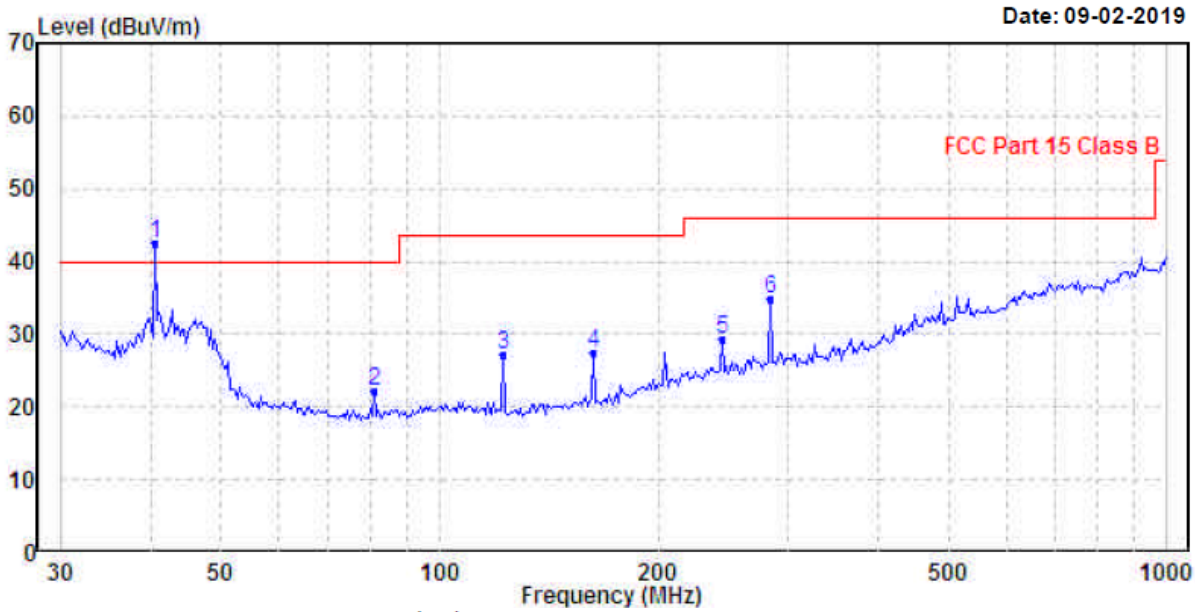
Results of TX mode (9kHz – 30MHz): PASS
Emissions detected are more than 20 dB below the limit line(s).

Results of TX mode (30MHz – 1GHz): PASS
Please refer to the following table for result details(The data is the worst cases)
Horizontal



	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	40.559	31.76	60.00	-28.24	QP	Horizontal
2	121.976	24.88	43.50	-18.62	QP	Horizontal
3	162.611	26.77	43.50	-16.73	QP	Horizontal
4	203.523	26.73	43.50	-16.77	QP	Horizontal
5	244.232	28.70	46.00	-17.30	QP	Horizontal
6	284.977	32.34	46.00	-13.66	QP	Horizontal

Results of TX mode (30MHz – 1GHz): PASS
Please refer to the following table for result details(The data is the worst cases)
Vertical



	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	40.559	42.42	60.00	-22.42	QP	Vertical
2	81.212	22.19	40.00	-17.81	QP	Vertical
3	121.976	27.15	43.50	-16.35	QP	Vertical
4	162.611	27.40	43.50	-16.10	QP	Vertical
5	244.232	29.44	46.00	-16.56	QP	Vertical
6	284.977	34.81	46.00	-11.19	QP	Vertical

3.1.2 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

This is Line antenna. The antenna gain =0dBi. User is unable to remove or changed the Antenna.

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.229
Test Method:	ANSI C63.10: 2013
Test Date:	2019-08-09
Mode of Operation:	Tx mode

Ambient Temperature: 26℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

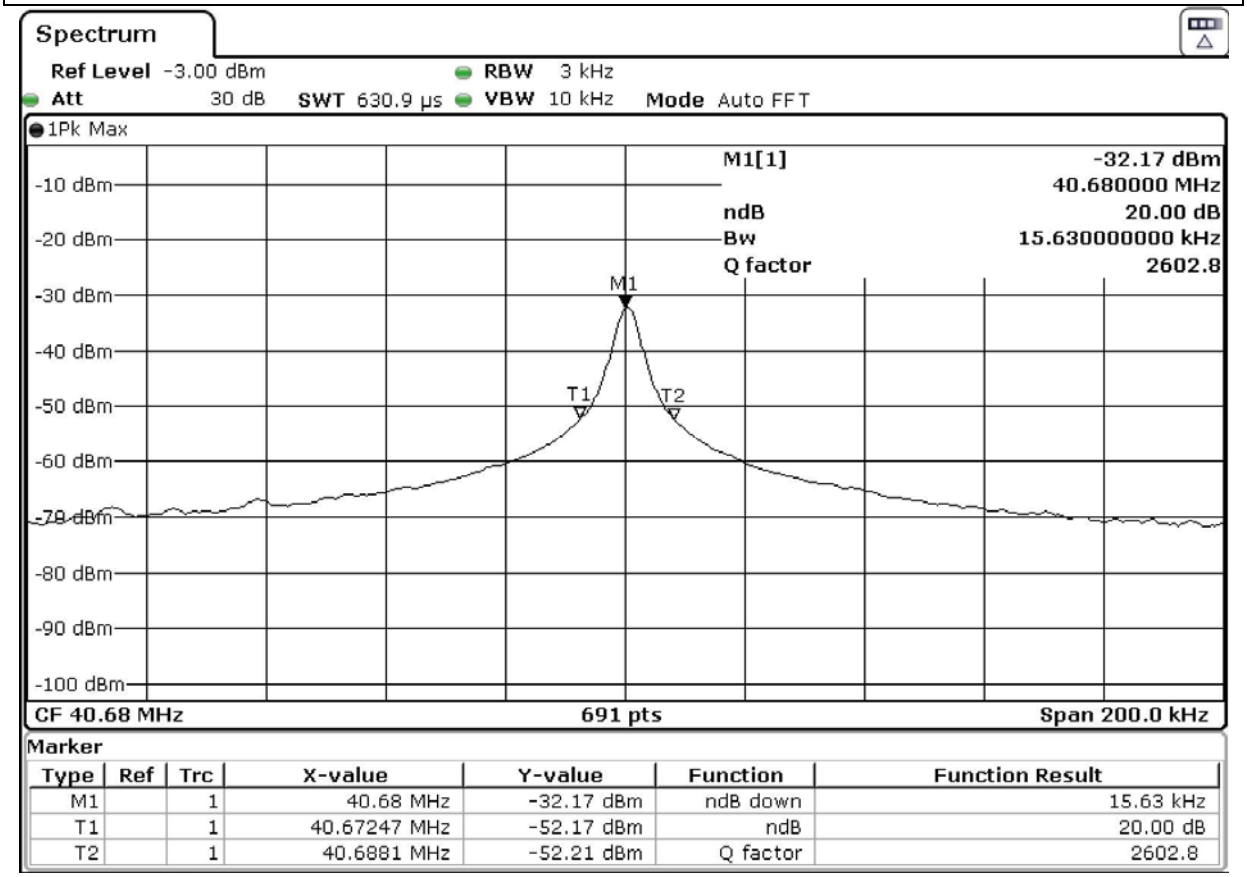
Spectrum Analyzer Setting:

RBW: 3kHz
VBW: 10kHz
Sweep: Auto
Trace: Max. hold

Limits for 20dB Bandwidth of Fundamental Emission:

Fl(MHz)	Fh(MHz)	Permitted frequency range(MHz)	Result
40.67	40.69	40.66-40.70	Compliant

20dB Bandwidth of Fundamental Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	40.68 MHz	-32.17 dBm	ndB down	15.63 kHz
T1		1	40.67247 MHz	-52.17 dBm	ndB	20.00 dB
T2		1	40.6881 MHz	-52.21 dBm	Q factor	2602.8

3.3 Frequency Tolerance

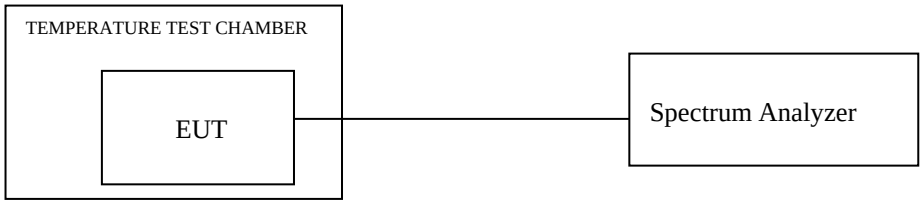
Test Requirement:	FCC 47 CFR 15.229
Test Method:	ANSI C63.10: 2013
Test Date:	2019-09-17
Mode of Operation:	Tx mode

Ambient Temperature: 26℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Method:

The temperature stability was measured with the unit in an environmental chamber used to vary the temperature of the sample. The sample was held at each temperature step to allow the temperature of the sample to stabilize. The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -20°C to +50°C. The carrier frequency was measured while the EUT was in the temperature chamber. The reference frequency of the EUT was measured at the ambient room temperature with the frequency counter. The RF carrier frequency shall not depart from the reference frequency in excess of +/- Hz. The EUT is powered by 3Vdc voltage supplied with battery(AA*2)

Test Setup:



Spectrum Analyzer Setting:

RBW: 3kHz
VBW: 10kHz
Sweep: Auto
Trace: Max. hold

Test Result:

Temperature (Centigrade)	Voltage	Frequency (MHz)	Deviation(Hz)	Limit(+/-Hz)	Pass/Fail
25(Ambient)	3Vd.c.	40.68100	-3000	4068.4	Pass
-20	3Vd.c.	40.68111	-2890	4068.4	Pass
-10	3Vd.c.	40.68101	-2990	4068.4	Pass
0	3Vd.c.	40.68107	-2930	4068.4	Pass
10	3Vd.c.	40.68103	-2970	4068.4	Pass
20	3Vd.c.	40.68112	-2880	4068.4	Pass
30	3Vd.c.	40.68104	-2960	4068.4	Pass
40	3Vd.c.	40.68117	-2830	4068.4	Pass
50	3Vd.c.	40.68110	-2900	4068.4	Pass
20	2.45Vd.c.	40.68105	-2950	4068.4	Pass
15	2.45Vd.c.	40.68108	-2920	4068.4	Pass
25	2.45Vd.c.	40.68100	-3000	4068.4	Pass

The manufacturer declared that the minimum working voltage is 2.45V d.c.

Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2018/04/20	2020/04/20
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM355	Biconilog Antenna	ETS-Lindgren	3143B	00094856	2018/05/24	2020/05/24
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2019/06/01	2020/06/01
EM276	BROADBAND HORN ANTENNA	A-INFOMW	JXTXLB-10180-SF	J203109090300 7	2018/04/27	2020/04/27
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2018/05/13	2020/05/13
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2018/05/13	2020/05/13
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2018/05/11	2020/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2018/05/11	2020/05/11
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2018/04/16	2020/04/16
EM045	POWER METER	ROHDE & SCHWARZ	NRVD	843246/028	2018/06/01	2020/06/01
EMD157	TEMPERATURE TEST CHAMBER	VOETSCH INDUSTRIECHNIK GMBH	VT 4002	5856617 6220010	2018/04/10	2020/04/09

Remarks:-

CM Corrective Maintenance
N/A Not Applicable
TBD To Be Determined

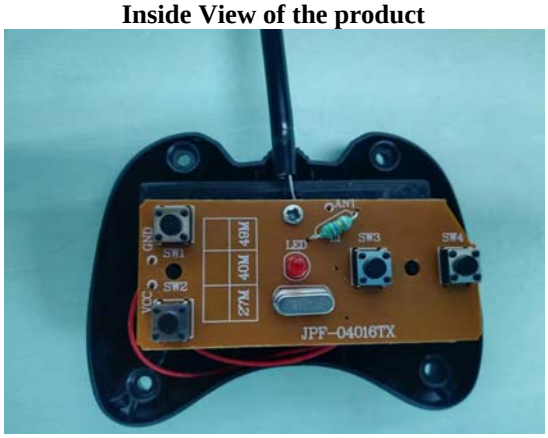
Appendix B

Photographs of EUT

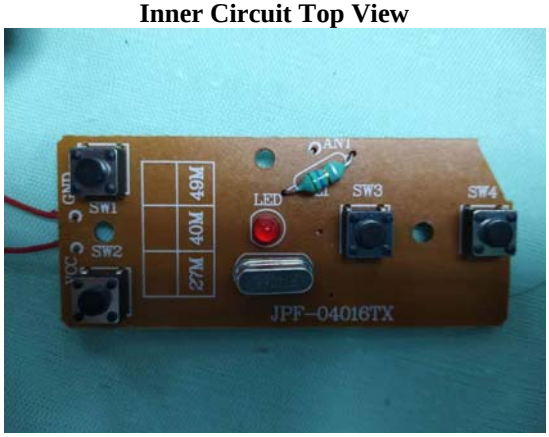
Front View of the product

Rear View of the product

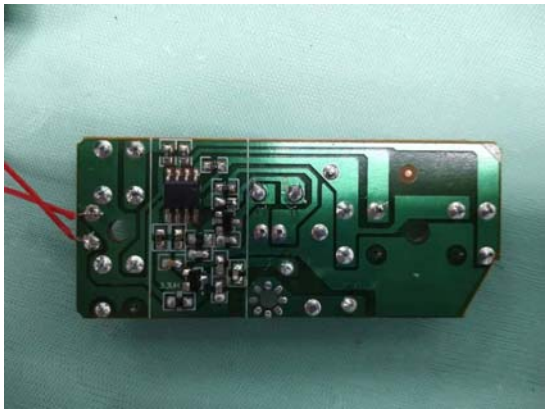
Inside View of the product



Inner Circuit Top View

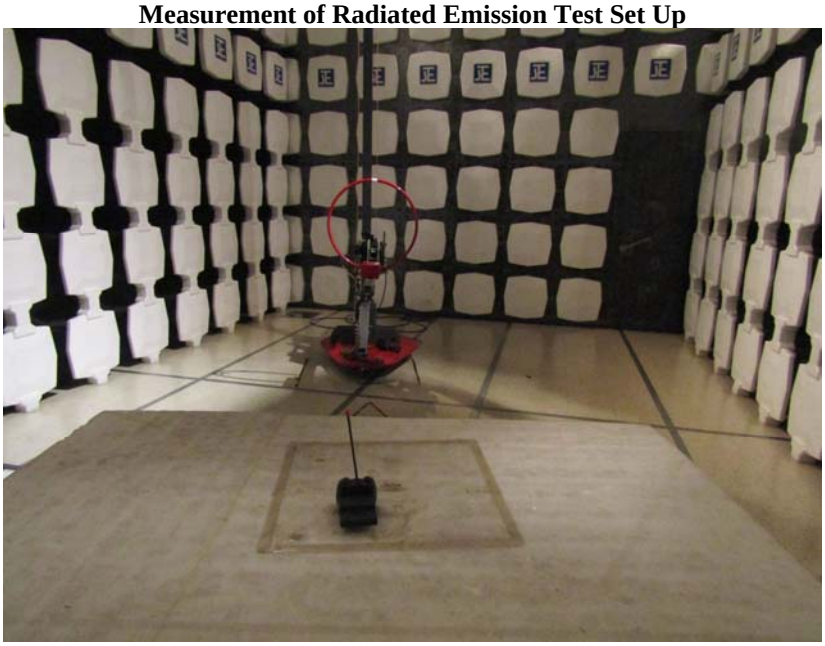


Inner Circuit Bottom View

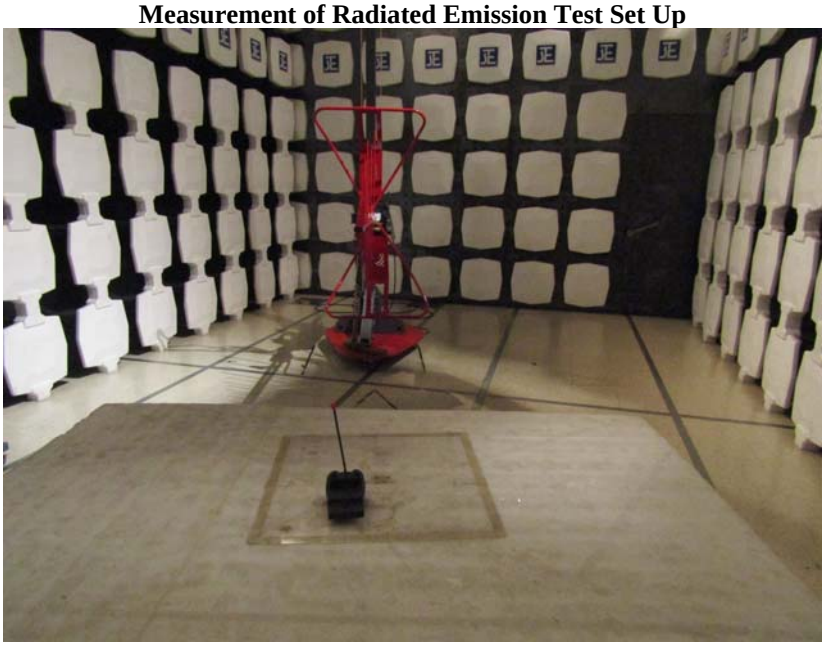


Photographs of EUT

Measurement of Radiated Emission Test Set Up

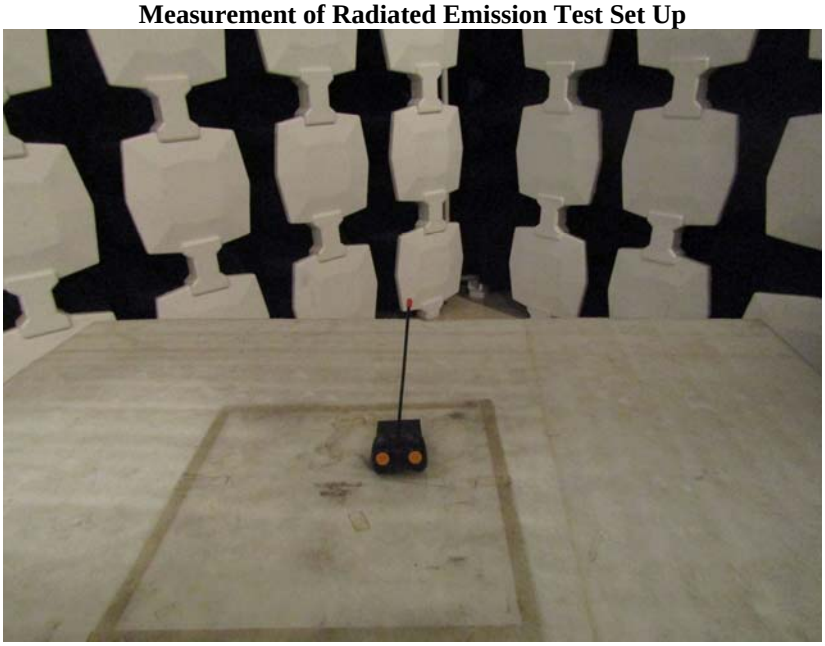


Measurement of Radiated Emission Test Set Up



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

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