STC Test Report

Date : 2009-05-11
No. : HM163365

Applicant (XLT001): X 10 (USA) Inc
Blackriver Corporate Park 620 Naches Avenue SW, Building A, Renton, WA 98057, U.S.A.

Manufacturer: X-10 Electronics (Shenzhen) Co. Ltd.
Together Rich Industrial Park B, Sanwei Industrial District, Xixiang Town, Baoan County, Shenzhen, China.

Description of Samples:

Product:	Sonoro Remote Control
Brand Name:	Sonoro
Model Number:	RC-3
FCC ID:	B4SRC-3

Date Samples Received: 2009-04-08

Date Tested: 2009-04-14

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2008 and ANSI C63.4:2003 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: ----

Dr. LEE Kam Chuen,
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

The Hong Kong Standards and Testing Centre Ltd.
10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

STC Test Report

CONTENT:

The Hong Kong Standards and Testing Centre Ltd.
10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Applicant Details

Applicant

X 10 (USA) Inc
Blackriver Corporate Park 620 Naches Avenue SW,
Building A, Renton, WA 98057, U.S.A.

Manufacturer

X-10 Electronics (Shenzhen) Co. Ltd.
Together Rich Industrial Park B, Sanwei Industrial District,
Xixiang Town, Baoan County, Shenzhen, China.

1.3 Equipment Under Test [EUT]
Description of Sample

Product:	Sonoro Remote Control
Manufacturer:	X-10 Electronics (Shenzhen) Co. Ltd.
Brand Name:	Sonoro
Model Number:	RC-3
Rating:	3Vd.c. ("CR2032" button cell x 1)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an X 10 (USA) Inc., Sonoro Remote Control. The EUT is a button transmitter. Modulation by IC; and type is pulse modulation.

1.4 Date of Order

2009-04-08

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2009-04-14

1.7 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 2008 and ANSI C63.4:2003 for FCC Certification.

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 Emissions & Spurious Emissions	FCC 47CFR 15.231a	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

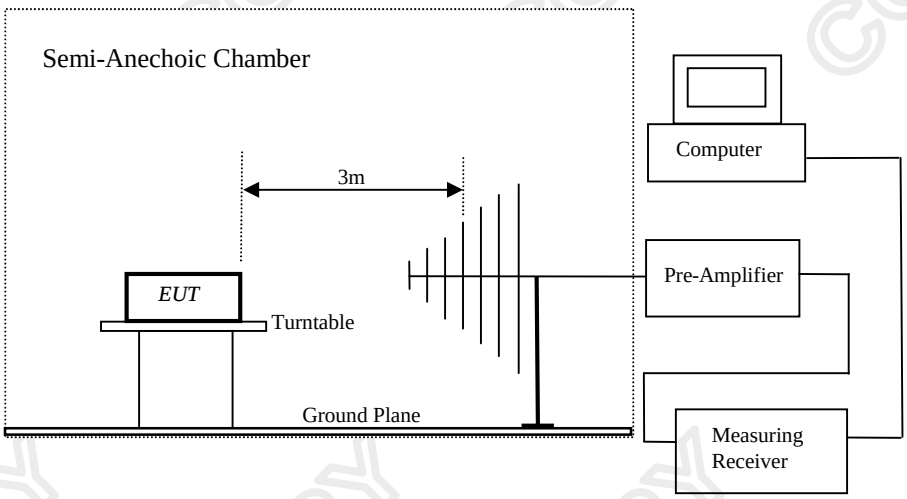
Test Requirement:	FCC 47CFR 15.231a
Test Method:	ANSI C63.4:2003
Test Date:	2009-04-14
Mode of Operation:	Tx on mode

Test Method:

The sample was placed 0.8m 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.

Test Setup:



Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231a]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [μV/m]	Field Strength of Spurious Emission [Average] [μV/m]
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,μV/m at 3 meters=56.81818(F)-6136.3636; for the band 260-470 MHz, μV/m at 3 meters =41.6667(F)-7083.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

Results of Tx on mode: PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
433.90	58.0	18.5	76.5	6683.4	109,958.5	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
433.90	48.7	18.5	67.2	2290.9	10,995.8	Horizontal

Results of Tx on mode with adaptor: PASS

	Field Strength of Spurious Emissions Quasi-Peak						
	Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
	867.80	30.4	25.9	56.3	653.1	1,100.8	Horizontal
+	1302.60	< 1.0	26.7	< 27.7	< 24.3	500.0	Vertical
	1736.80	< 1.0	32.2	< 33.2	< 45.7	1,100.8	Vertical
	2171.00	< 1.0	38.8	< 39.8	< 97.7	1,100.8	Vertical
	2605.20	< 1.0	17.4	< 18.4	< 8.3	1,100.8	Vertical
	3039.40	< 1.0	17.2	< 18.2	< 8.1	1,100.8	Vertical
	3473.60	< 1.0	18.8	< 19.8	< 9.8	1,100.8	Vertical
+	3907.80	< 1.0	19.7	< 20.7	< 10.8	500.0	Vertical
+	4342.00	< 1.0	20.6	< 21.6	< 12.0	500.0	Vertical

Remarks:

*: Adjusted by Duty Cycle = -9.3dB

FCC Limit for Fundamental Average Measurement = 41.6667(433.9)-7083.3333=10,995.8μV/m

+: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB

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.

Results of Tx on mode: PASS

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30MHz

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231a
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2009-04-14
Mode of Operation:	On mode

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:

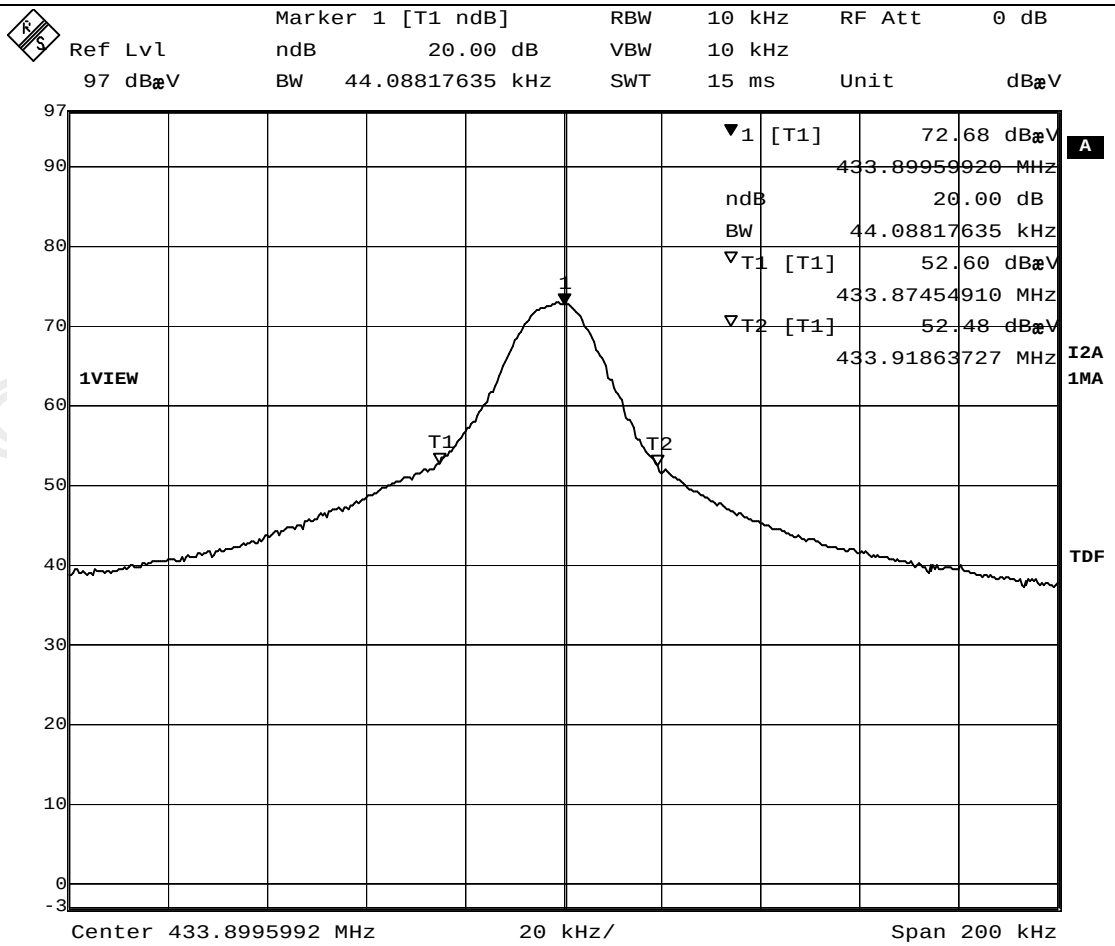
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits * [KHz]
433.9	44.1	1084.75

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
=(0.0025)(433.9)
= 1084.75KHz

20dB Bandwidth of Fundamental Emission



Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3115	4032	2006/07/11	2009/07/11
EM215	MULTIDEVICE CONTROLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2008/12/01	2011/12/01
EM174	BICONILOG ANTENNA	EMCO	3142B	1671	2008/01/24	2010/01/24
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2008/06/16	2009/06/16
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2006/07/26	2009/07/26

Remarks:-
CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

Appendix B

Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each packet period (100msec) never exceeds a series of 3 long (2.766msec) and 50 short (0.321msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (3x2.766)+(50x0.521)msec per 100msec=34.3% duty cycle. Figure A through D show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log(0.343) =-9.3dB

The following figures [Figure A to Figure D] showed the characteristics of the pulse train for one of these functions.

Figure A [Pulse Train]

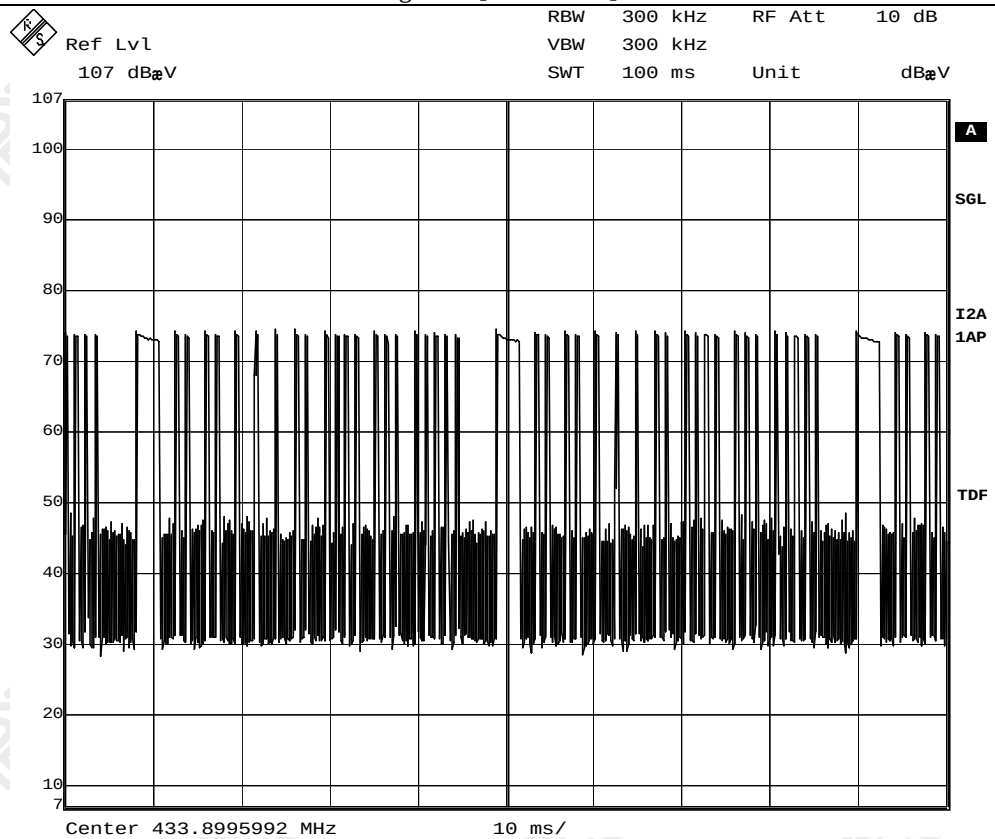


Figure B [Long pulses]

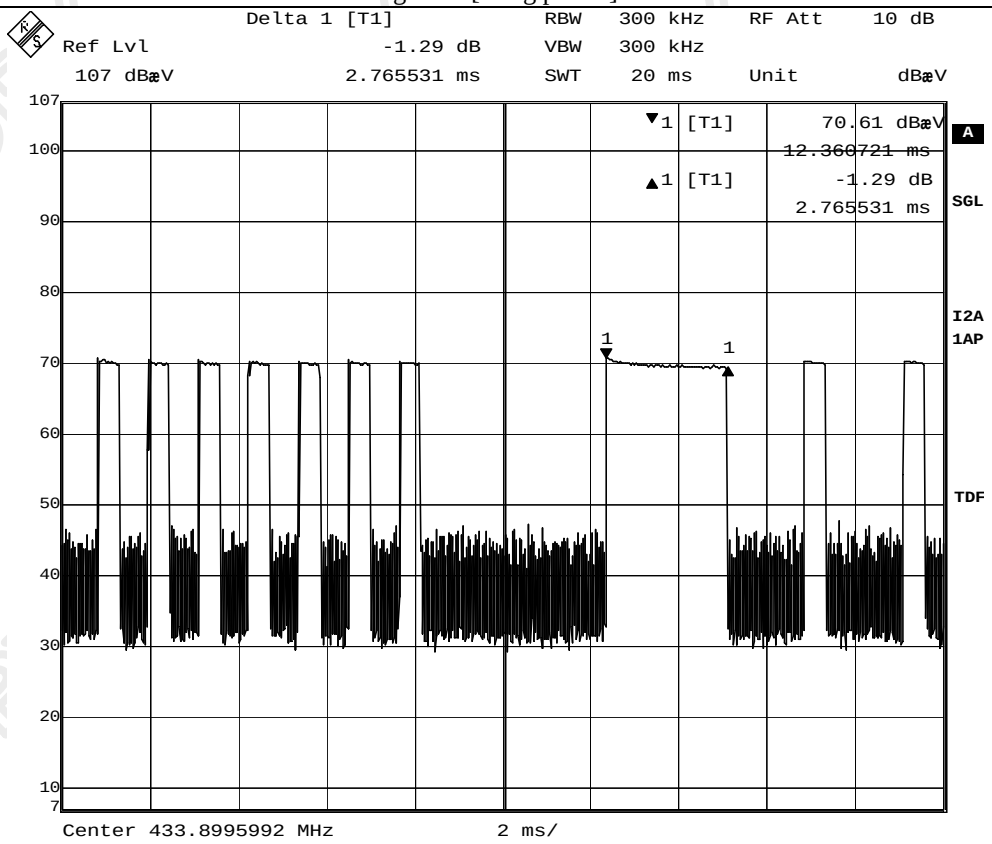


Figure C [Short pulses]

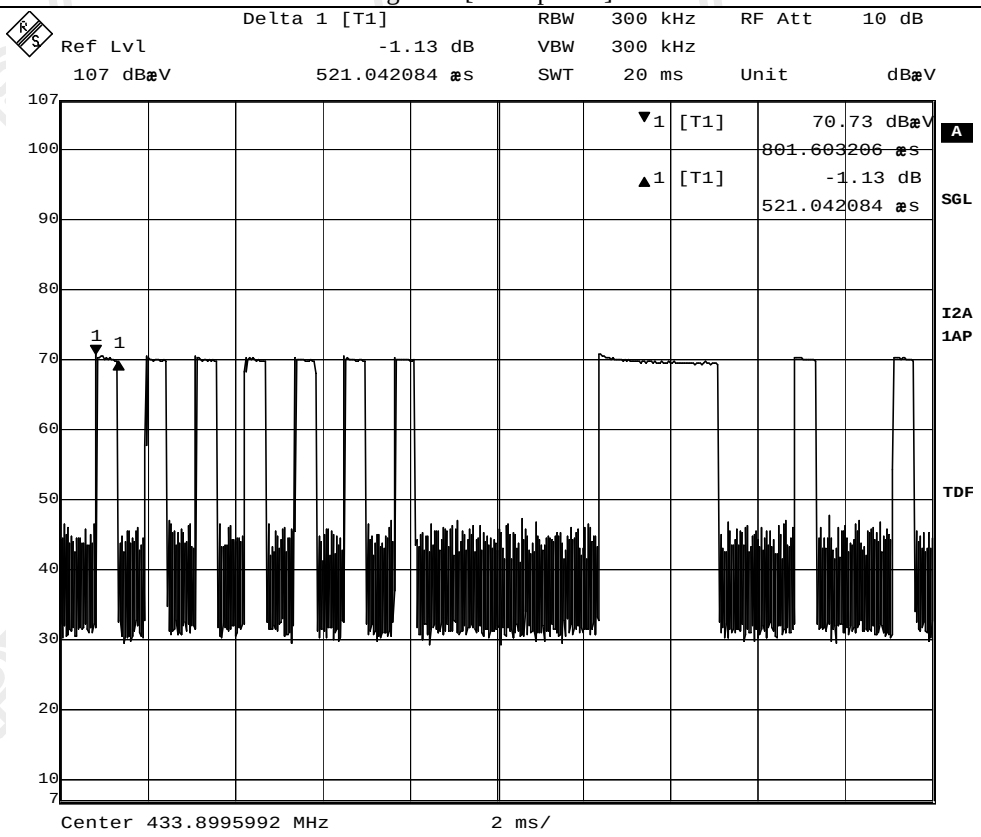
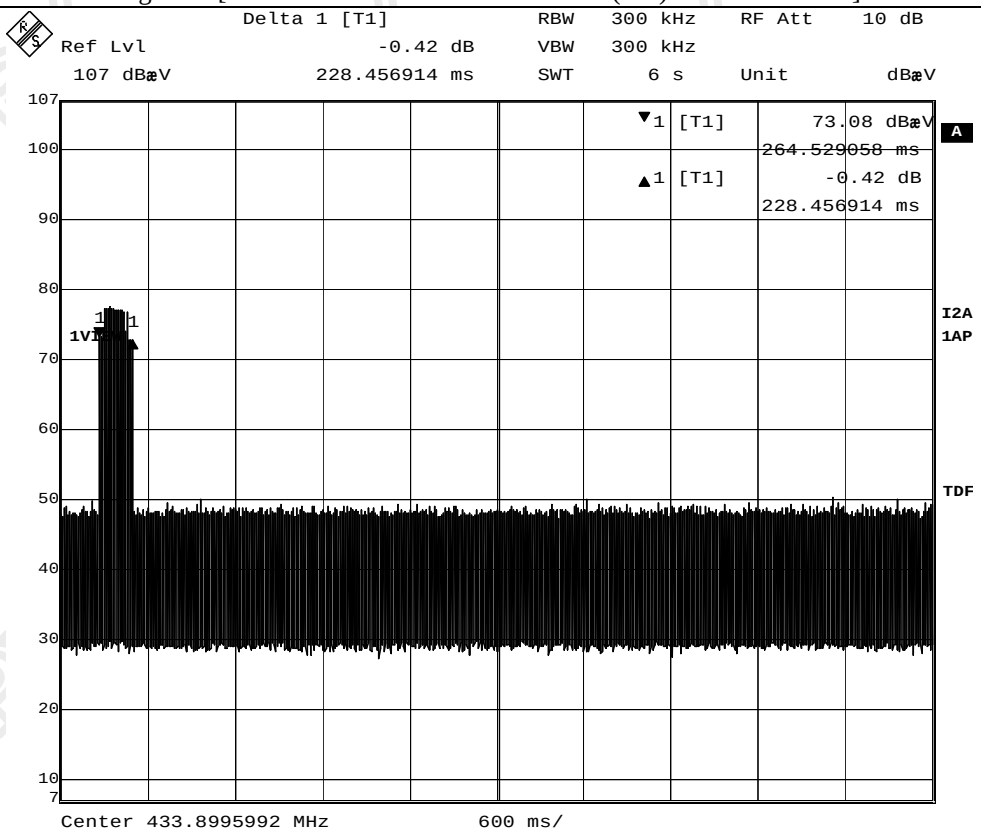


Figure D [Transmission cease within 228.5ms (<5s) after deactivated]



Appendix C

Periodic Operation [FCC 47CFR 15.231(a2)]

According to FCC 47CFR15.231 (a2). A transmitter automatically activated must automatically deactivate within not more than 5 seconds of being released. The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.

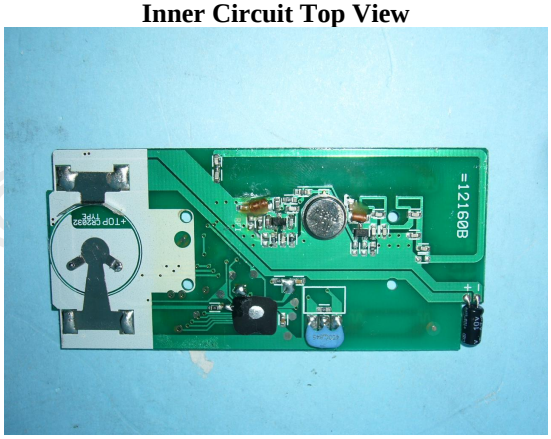
Appendix D

Photographs of EUT

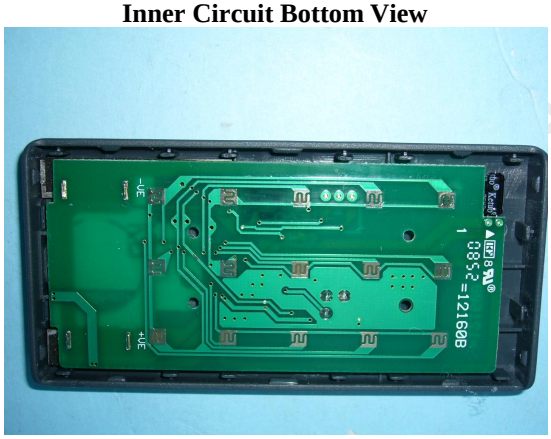
Front View of the product

Rear View of the product

Inner Circuit Top View

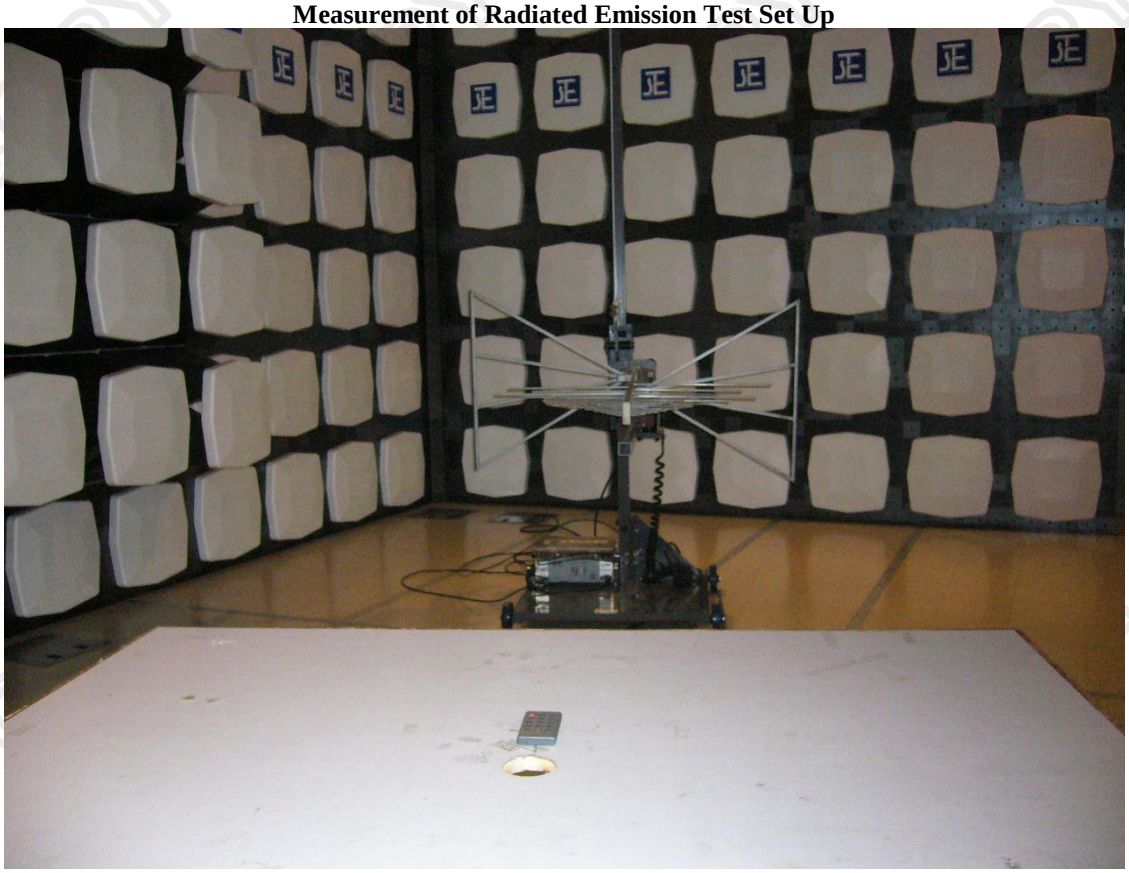


Inner Circuit Bottom View



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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