STC Test Report

Date: 2014-04-09

No. : HM169053

Applicant (SUE002): GSM LLC.
3385 ROY ORR BLVD., GRAND PRAIRIE, Texas, United States, 75050

Manufacturer: GSM LLC.
3385 ROY ORR BLVD., GRAND PRAIRIE, Texas, United States, 75050

Description of Sample(s): Submitted sample(s) said to be

Product:	Stalker 360 Remote
Brand Name:	Western Rivers
Model Number:	WRC-REMOTE-G2
FCC ID:	WGD-WRC-REM2

Date Sample(s) Received: 2014-03-25

Date Tested: 2014-04-04

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2013 and ANSI C63.4:2009 for FCC Certification.

Conclusion(s): 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.

Remark(s): ---

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.
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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

GSM LLC.
3385 ROY ORR BLVD., GRAND PRAIRIE, Texas, United States, 75050

Manufacturer

GSM LLC.
3385 ROY ORR BLVD., GRAND PRAIRIE, Texas, United States, 75050

1.3 Equipment Under Test [EUT]
Description of Sample

Submitted sample(s) said to be

Product:	Stalker 360 Remote
Manufacturer:	GSM LLC. 3385 ROY ORR BLVD., GRAND PRAIRIE, Texas, United States, 75050
Brand Name:	Western Rivers
Model Number:	WRC-REMOTE-G2
Rating:	9Vd.c. (“6F22” size battery x 1)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a GSM LLC., Stalker 360 Remote. The EUT is a 433MHz transmitter, when the buttons of EUT are pressed, a RF signal will be transmitted to Receiver.

1.4 Date of Order

2014-03-25

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2014-04-04

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 2013 and ANSI C63.4:2009 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 C63.4:2009	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2009	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 C63.4:2009
Test Date:	2014-04-04
Mode of Operation:	Tx on mode

Test Method:

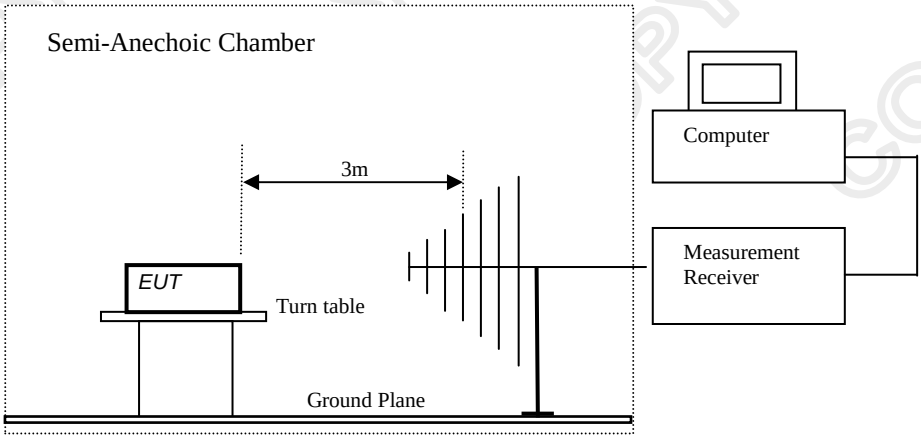
The sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration 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
Above 1GHz (Pk & Av)	RBW:	3MHz
	VBW:	3MHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

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 permitted unwanted emission level is 20 dB 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/m	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
	433.2	80.3	19.0	99.3	92257.1	109,666.8	Vertical
	866.5	17.2	26.5	43.7	153.1	10,966.7	Vertical
+	1299.5	14.3	25.0	39.3	92.3	5,000.0	Vertical
	1732.9	11.5	25.6	37.1	71.6	10,966.7	Vertical
	2166.1	4.2	27.9	32.1	40.3	10,966.7	Vertical
	2599.2	< 1.0	34.5	35.5	59.6	10,966.7	Horizontal
	3032.4	< 1.0	39.3	40.3	103.5	10,966.7	Horizontal
	3465.6	< 1.0	40.2	41.2	114.8	10,966.7	Horizontal
+	3898.8	< 1.0	40.6	41.6	120.2	5,000.0	Horizontal
+	4332.0	< 1.0	41.9	42.9	139.6	5,000.0	Horizontal

Results of Tx on mode: PASS

Field Strength of Fundamental Emissions Average Value							
	Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
	433.2	60.3	19.0	79.3	9225.7	10,966.7	Vertical
	866.5	10.6	26.5	37.1	71.6	1,096.7	Vertical
+	1299.5	2.3	25.0	27.3	23.2	500.0	Vertical
	1732.9	0.7	25.6	26.3	20.7	1,096.7	Vertical
	2166.1	0.4	27.9	28.3	26.0	1,096.7	Vertical
	2599.2	< 1.0	34.5	35.5	59.6	1,096.7	Horizontal
	3032.4	< 1.0	39.3	40.3	103.5	1,096.7	Horizontal
	3465.6	< 1.0	40.2	41.2	114.8	1,096.7	Horizontal
+	3898.8	< 1.0	40.6	41.6	120.2	500.0	Horizontal
+	4332.0	< 1.0	41.9	42.9	139.6	500.0	Horizontal

Remarks:

*: Adjusted by Duty Cycle =< 20dB

FCC Limit for Average Measurement = 41.6667(433.2MHz)-7083.3333=10,966.7µV/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 4.9dB

Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Field strength [microvolts/meter]	Measurement distance [meters]
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above960	500	3

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 (9k – 30MHz): PASS

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

Results of Tx on mode (30MHz – 1000MHz): PASS

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

Results of Tx on mode (1000MHz): PASS

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

Results of Tx on mode (Above 1000MHz): PASS

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

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 4.9dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231a
Test Method:	ANSI C63.4:2009 (Section 13.1.7)
Test Date:	2014-04-04
Mode of Operation:	Tx 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:

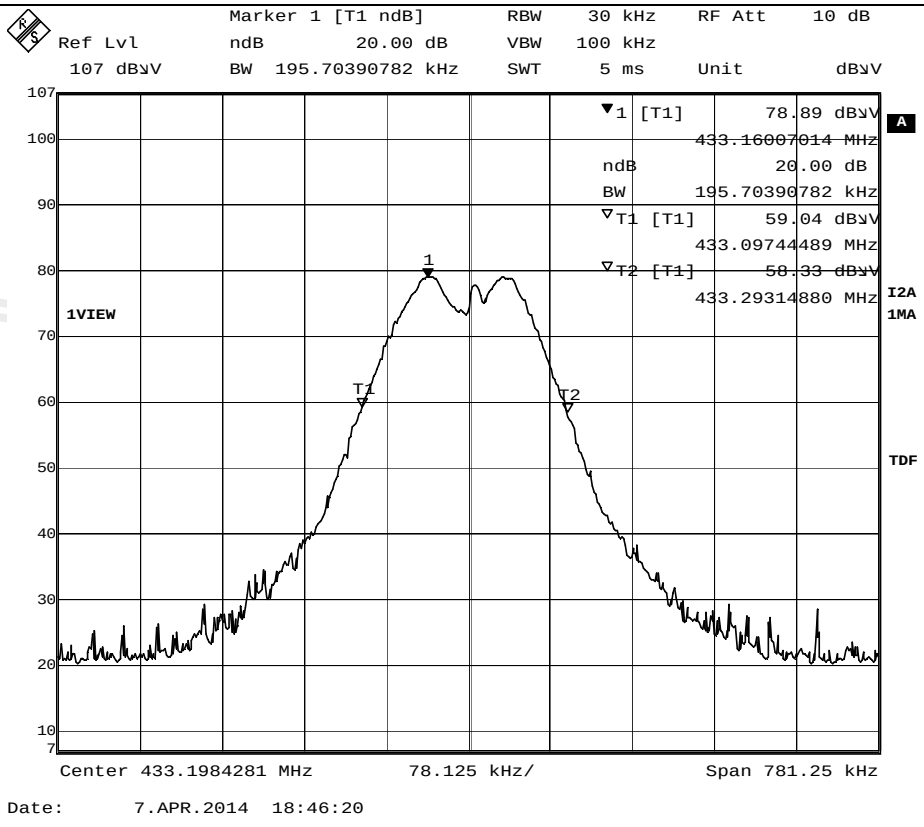
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
433.2	195.7	1083

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
= (0.0025)(433.2)
= 1083kHz

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
EM276	BROADBAND HORN ANTENNA	A-INFOMW	JXTXLB-10180-SF	J2031090903007	2013/03/23	2016/03/23
EM215	MULTIDEVICE CONTROLLER	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-LINDGREN	FACT-3	--	2013/10/02	2014/10/02
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	2013/04/25	2015/04/25
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2013/05/07	2014/05/07
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2013/09/14	2014/09/14

Remarks:-

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

Appendix B

Duty Cycle Correction During 100msec [FCC 47CFR 15.231(a)]

Each function key sends a different series of characters, but each packet period (100msec) never exceeds a series of (48x0.08ms), (3x0.20ms), (2x0.32ms), (1x0.40ms), (1x0.60ms) and (1x0.92ms) pulses. Assuming any combination of short and long pules may be obtained due to encoding the worse case transmit duty cycle would be considered 20log[(48x0.08ms + 3x0.20ms + 2x0.32ms + 1x0.40ms + 1x0.60ms + 1x0.92ms)/100]x100%=3.2% duty cycle. Figure A through C show the characteristics of the pulse train for one of these function.

Remarks:

Duty Cycle:
20log[(48x0.08ms + 3x0.20ms + 2x0.32ms + 1x0.40ms + 1x0.60ms + 1x0.92ms)/100]x100%=3.2%
Duty cycle factor = 20xlog (0.032) = -29.9dB =< 20dB

Duty Cycle Correction =-20dB, if the calculation duty cycle correction <-20dB

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

Figure A [Pulse Train]

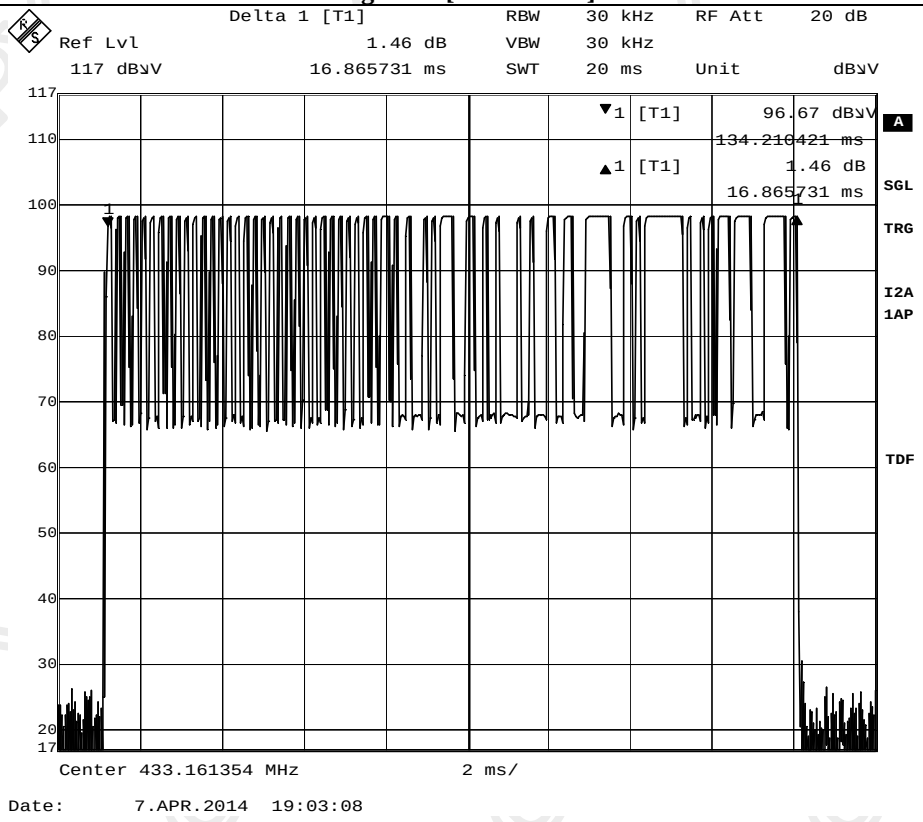


Figure B [One pulse train within 100ms]

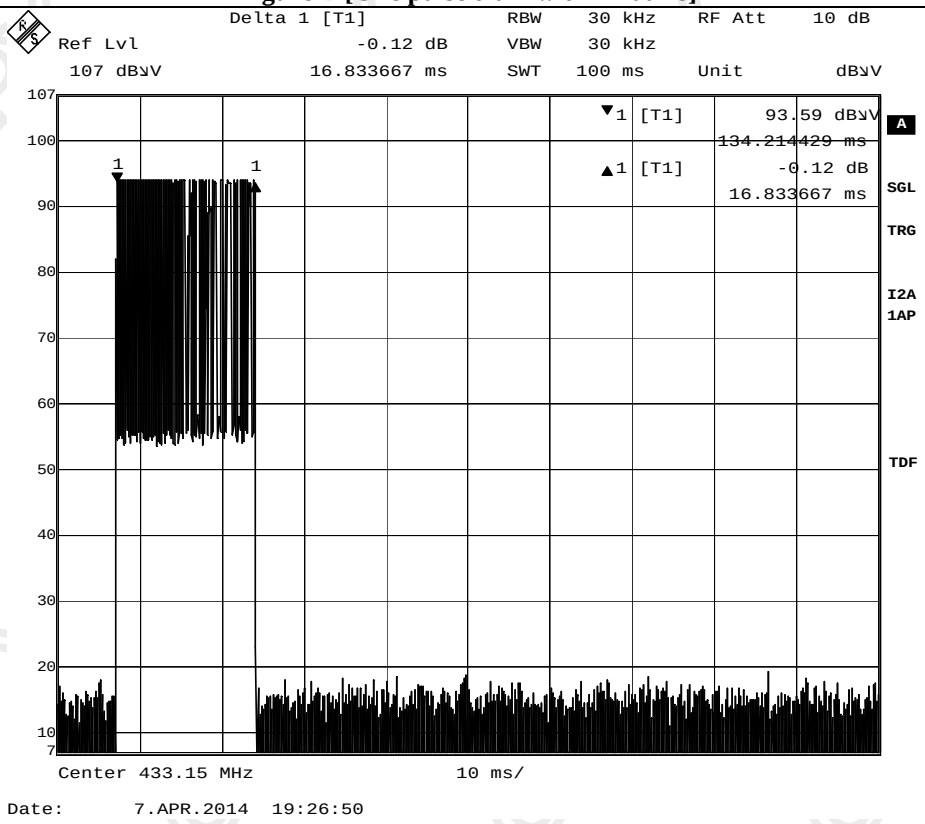


Figure C [Pulse A = 6 types of pulse width in total 56 pulses in the pulse train]

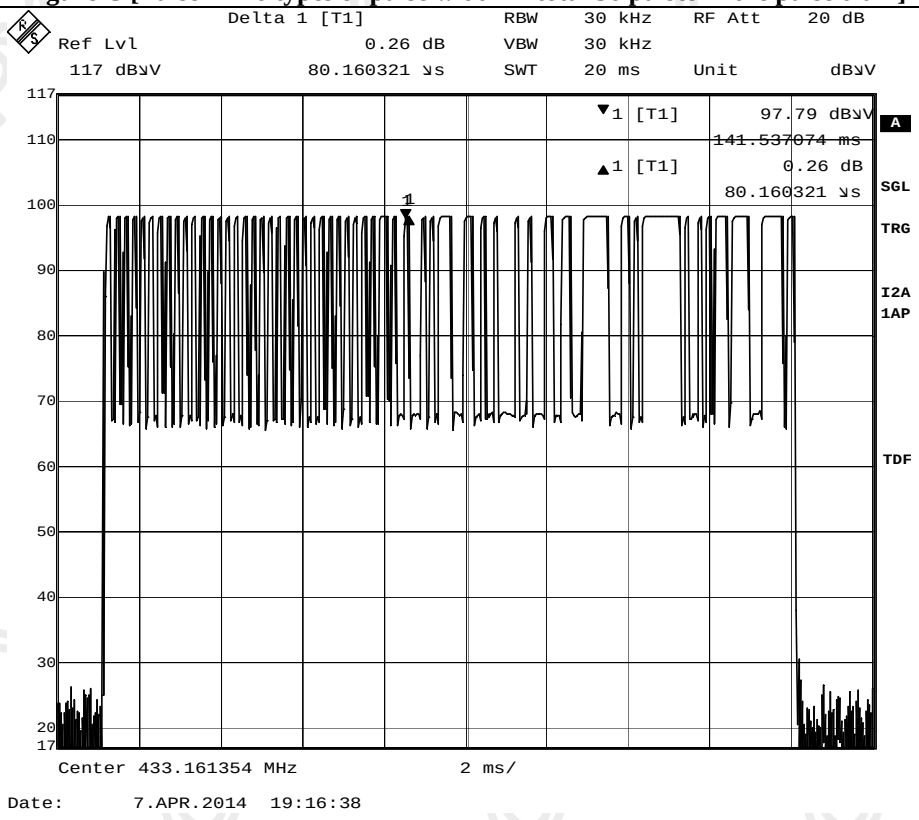


Figure D [Pulse A = pulse width: 80µs]

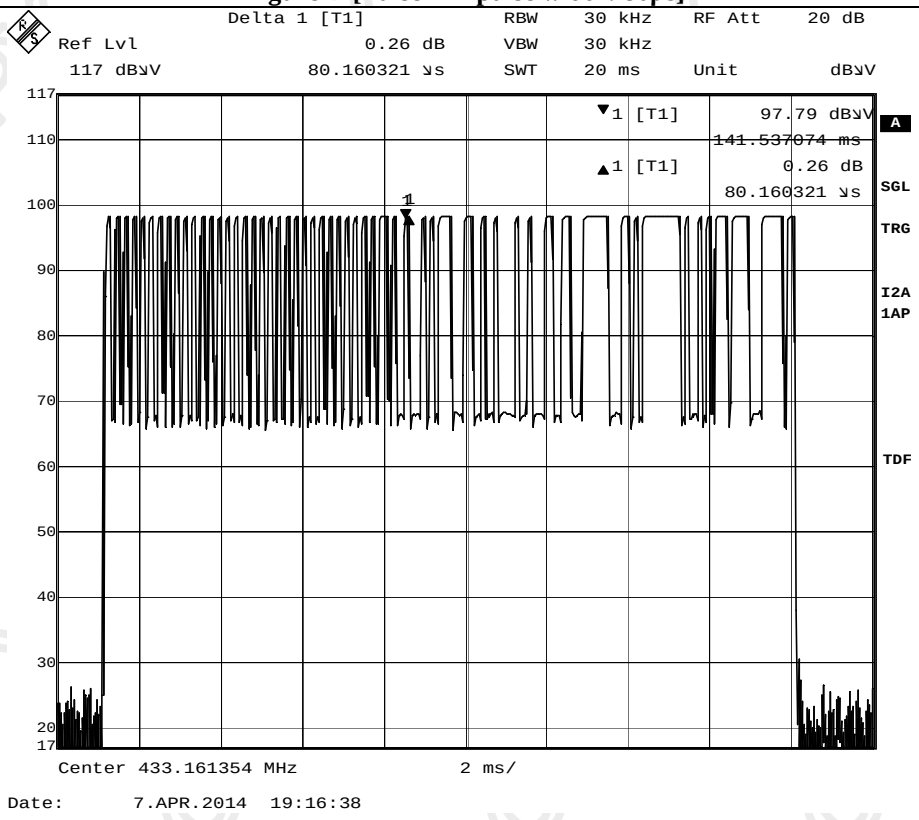


Figure E [Pulse B = pulse width: 200µs]

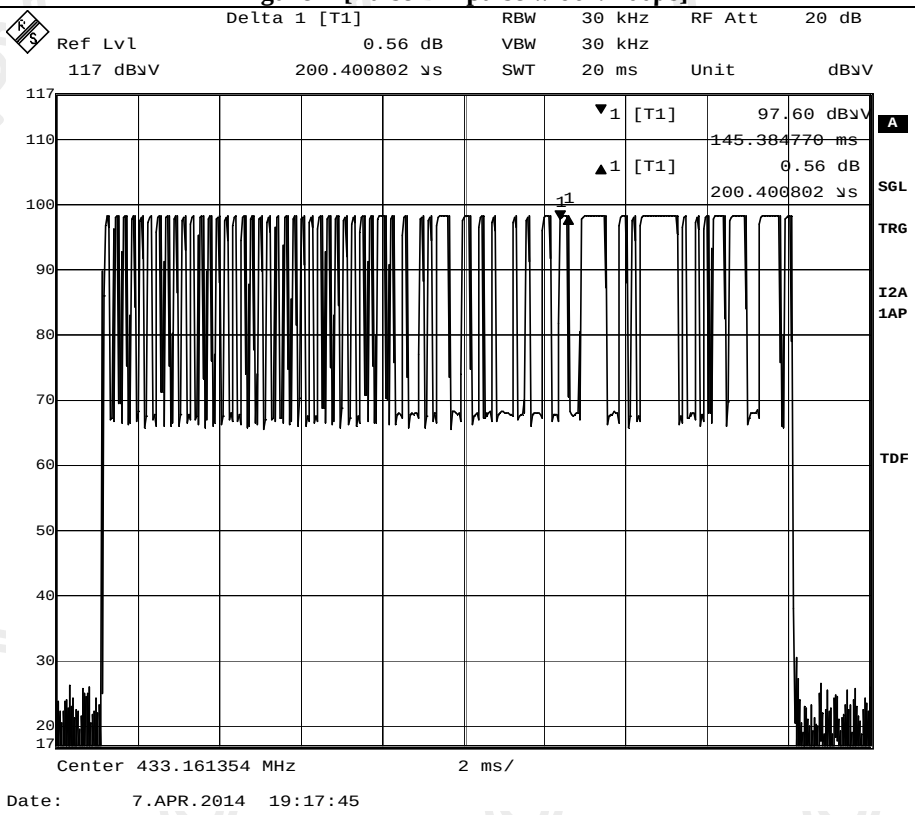


Figure F [Pulse C = pulse width: 321µs]

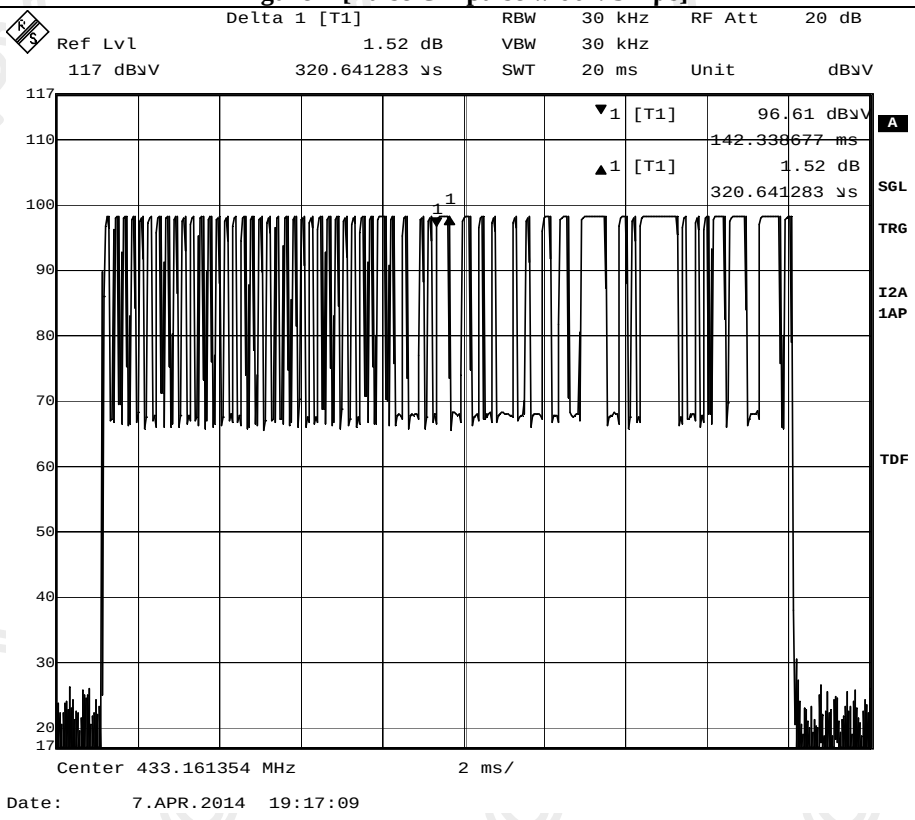


Figure G [Pulse D = pulse width: 441μs]

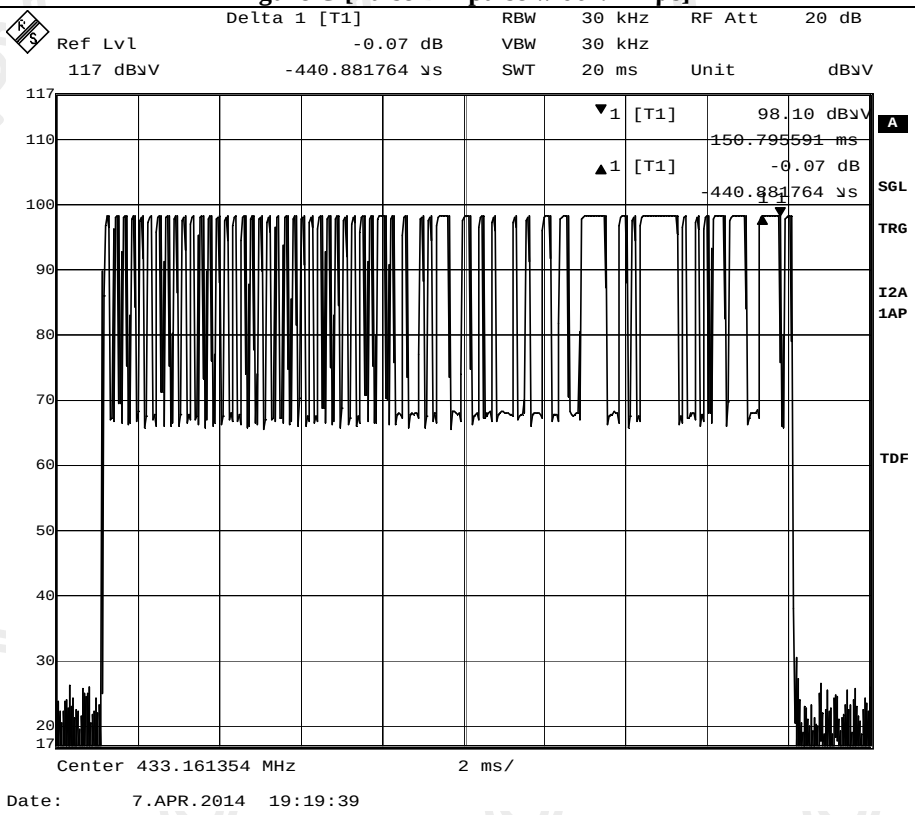


Figure H [Pulse E = pulse width: 601µs]

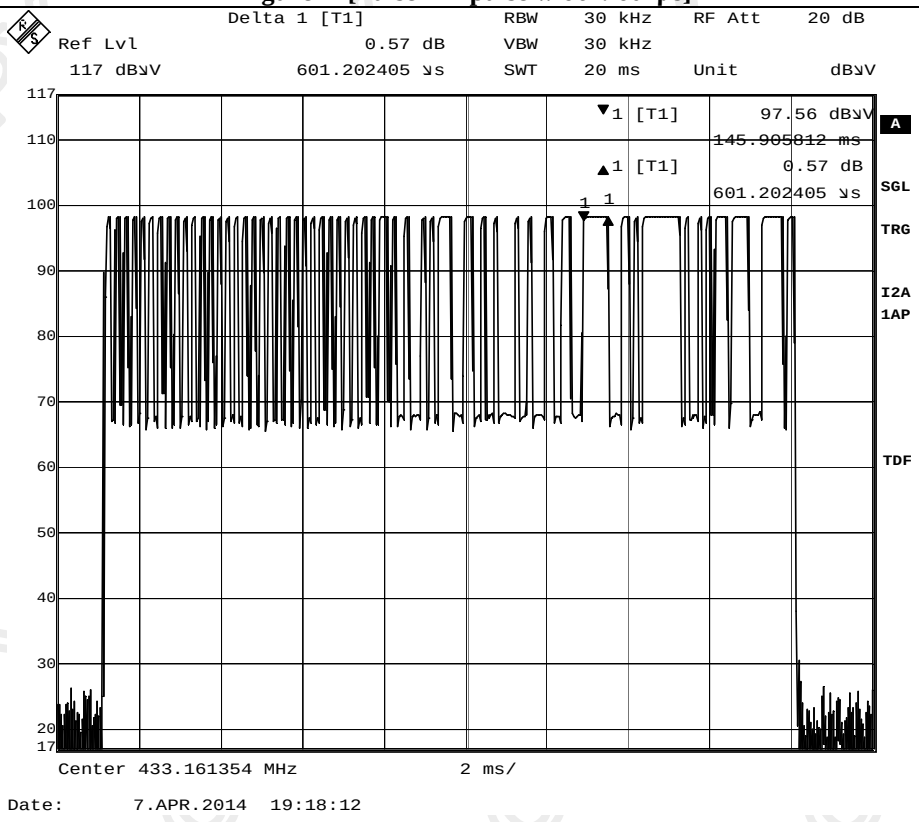
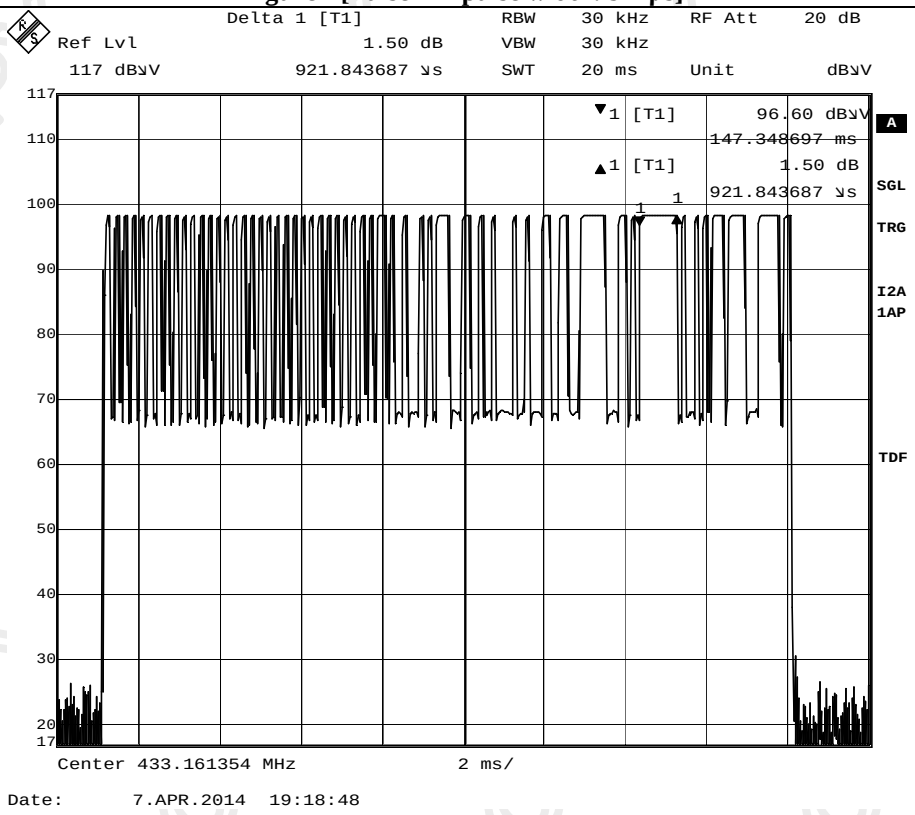


Figure I [Pulse F = pulse width: 922µs]



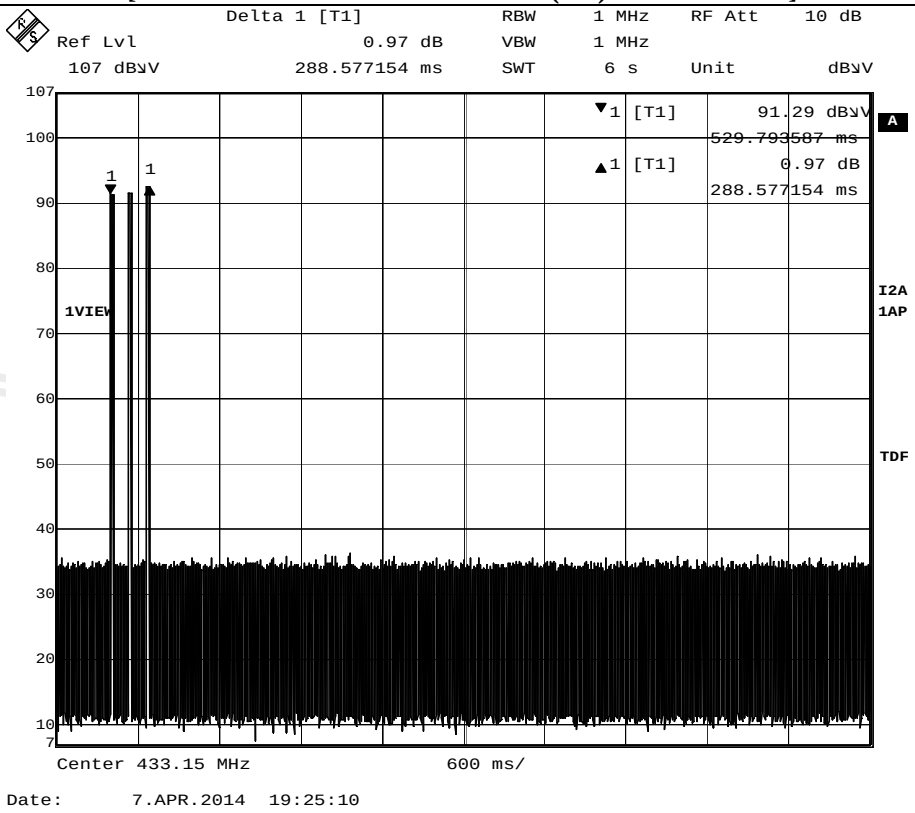
Appendix C

Manual Operation [FCC 47CFR 15.231(a)]

The EUT will cease transmission within 0.289 seconds upon being released.

Figure A

Figure A [Silent Time]
[The transmission cease within 0.289 (<5s) after activation]



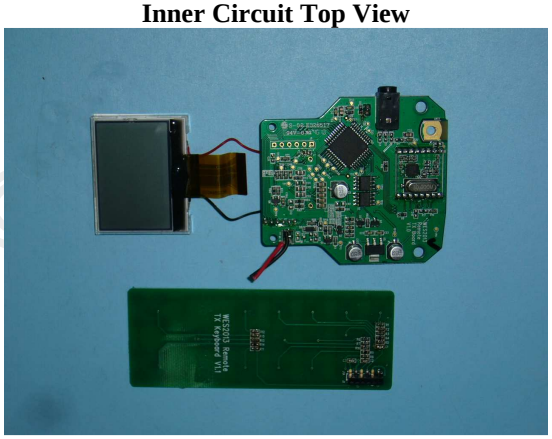
Appendix D

Photographs of EUT

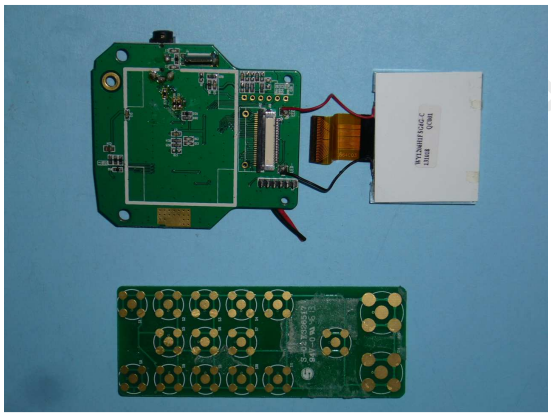
Front View of the product

Rear View of the product

Inner Circuit Top View

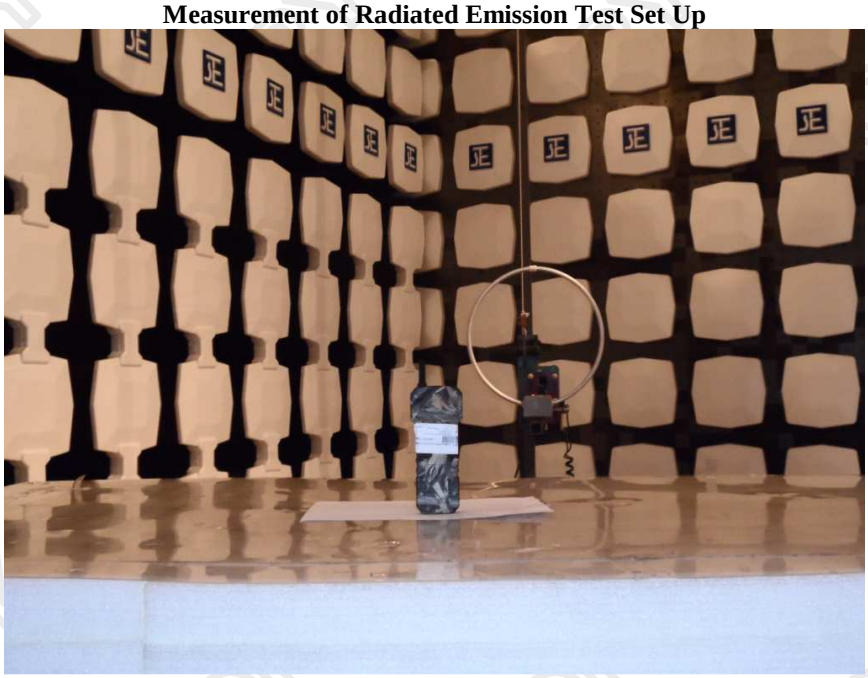


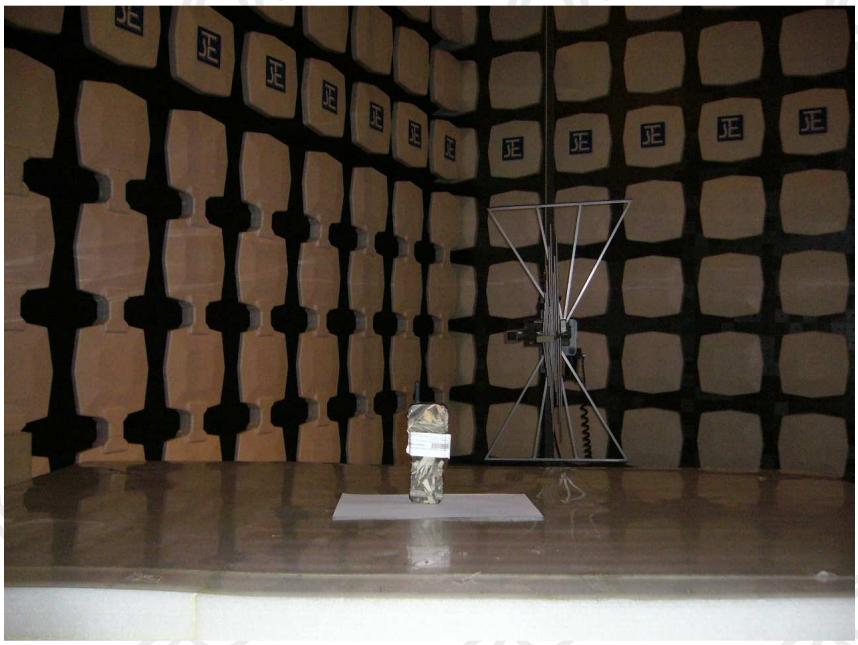
Inner Circuit Bottom View



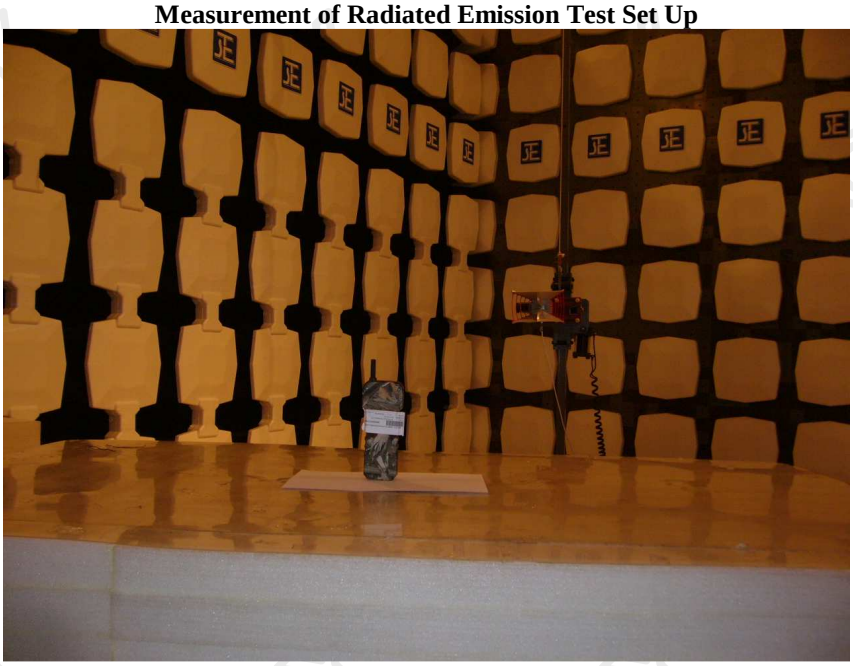
Photographs of EUT

Measurement of Radiated Emission Test Set Up





Measurement of Radiated Emission Test Set Up



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