STC Test Report

Date : 2011-05-05

No. : HM166582

Applicant (FUS002): Fuzhou Swell Electronic Co., Ltd.
Fl. 3rd Bldg. A1, No. 56, Jinyan Road, Jinshan Industrial Zone, Fuzhou, Fujian, China

Manufacturer: Fuzhou Swell Electronic Co., Ltd.
Fl. 3rd Bldg. A1, No. 56, Jinyan Road, Jinshan Industrial Zone, Fuzhou, Fujian, China

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

Product:	Wireless Weather Station
Brand Name:	CRAIG
Model Number:	CS1203
FCC ID:	ZJQCS1203

Date Sample(s) Received: 2011-04-18

Date Tested: 2011-05-03

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2010 and ANSI C63.4:2003 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): For additional brand name and model details, see page 4.

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

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CONTENT:

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1.0 General Details

1.1 Equipment Under Test [EUT]
Description of Sample

Submitted sample(s) said to be

Product:	Wireless Weather Station
Manufacturer:	Fuzhou Swell Electronic Co., Ltd.
Brand Name:	CRAIG
Additional Brand Name(s):	SWELL
Model Number:	CS1203
Additional Model Number(s):	CS1201, CS1202, S3308B, S004B, S3607B, S3332B, S521B, S3318B, S3338B
Rating:	3Vd.c. (“AAA” size battery x 2)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Fuzhou Swell Electronic Co., Ltd..., Wireless Weather Station. The EUT is a portable sensor that detects weather conditions and sent it periodically to an associated weather station. A telegram (~ 870 ms) consisting of a control signal and data is transmitted periodically every 34 seconds.
To avoid disturbances different channels (in fact there are codes) can be selected.

1.3 Date of Order

2011-04-18

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2011-05-03

1.6 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 2010 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 15.231e	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emission	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

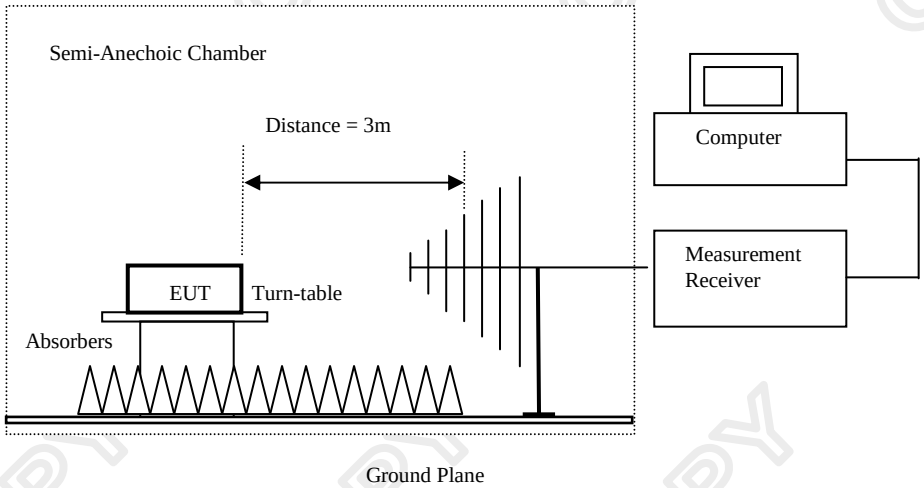
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:2003
Test Date:	2011-05-03
Mode of Operation:	Tx on mode

Test Method:

The sample was placed 0.8m above the ground plane of OATS*. 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.

*: OATS [Open Area Test Site] located at the roof of Hong Kong Standards & Testing Centre with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 568301.

Test Setup:



Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

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

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	1,000	100
70-130	500	50
130-174	500 to 1,500 **	50 to 150 **
174-260	1,500	150
260-470	1,500 to 5,000 **	150 to 500 **
Above 470	5,000	500

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 = 22.72727(F) - 2454.545; for the band 260-470 MHz, μV/m at 3 meters = 16.6667(F) - 2833.3333. 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	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
	433.9	66.5	20.5	87.0	22,387.2	43,983.5	Vertical
	867.8	26.7	28.8	55.5	595.7	4,398.3	Horizontal
+	1301.9	57.9	-5.8	52.1	402.7	5,000.0	Horizontal
	1735.9	47.3	-2.7	44.6	169.8	5,000.0	Horizontal
	2170.5	27.6	-1.0	26.6	21.4	5,000.0	Horizontal
	2603.9	42.3	-0.9	41.4	117.5	5,000.0	Horizontal
	3037.3	< 1.0	5.8	< 6.8	< 2.2	5,000.0	Horizontal
	3471.8	49.8	3.9	53.7	484.2	5,000.0	Horizontal
+	3905.9	50.3	4.7	55.0	562.3	5,000.0	Horizontal
+	4339.8	43.0	5.9	48.9	278.6	5,000.0	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 16.6667(433.9)-2833.3333=4,398.35μV/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 5.1dB

Results of Tx on mode: PASS

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
*	433.9	49.2	20.5	69.7	3,054.9	4,398.3	Vertical
*	867.8	9.4	28.8	38.2	81.3	439.8	Horizontal
+*	1301.9	40.6	-5.8	34.8	55.0	500.0	Horizontal
*	1735.9	30.0	-2.7	27.3	23.2	500.0	Horizontal
*	2170.5	10.3	-1.0	9.3	2.9	500.0	Horizontal
*	2603.9	25.0	-0.9	24.1	16.0	500.0	Horizontal
	3037.3	< 1.0	5.8	< 6.8	< 2.2	500.0	Horizontal
*	3471.8	32.5	3.9	36.4	66.1	500.0	Horizontal
+*	3905.9	33.0	4.7	37.7	76.7	500.0	Horizontal
+*	4339.8	25.7	5.9	31.6	< 38.0	500.0	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 16.6667(433.9)-2833.3333=4,398.35μV/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.

*: Adjusted by Duty Cycle Correction =-17.3dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
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.

Result of Tx on mode (9kHz – 30MHz): PASS
Emissions detected are more than 20 dB below the FCC Limits

Result of Tx on mode (30MHz – 5GHz): PASS
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
Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB
1GHz to 18GHz 5.1dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231e
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2011-05-03
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:

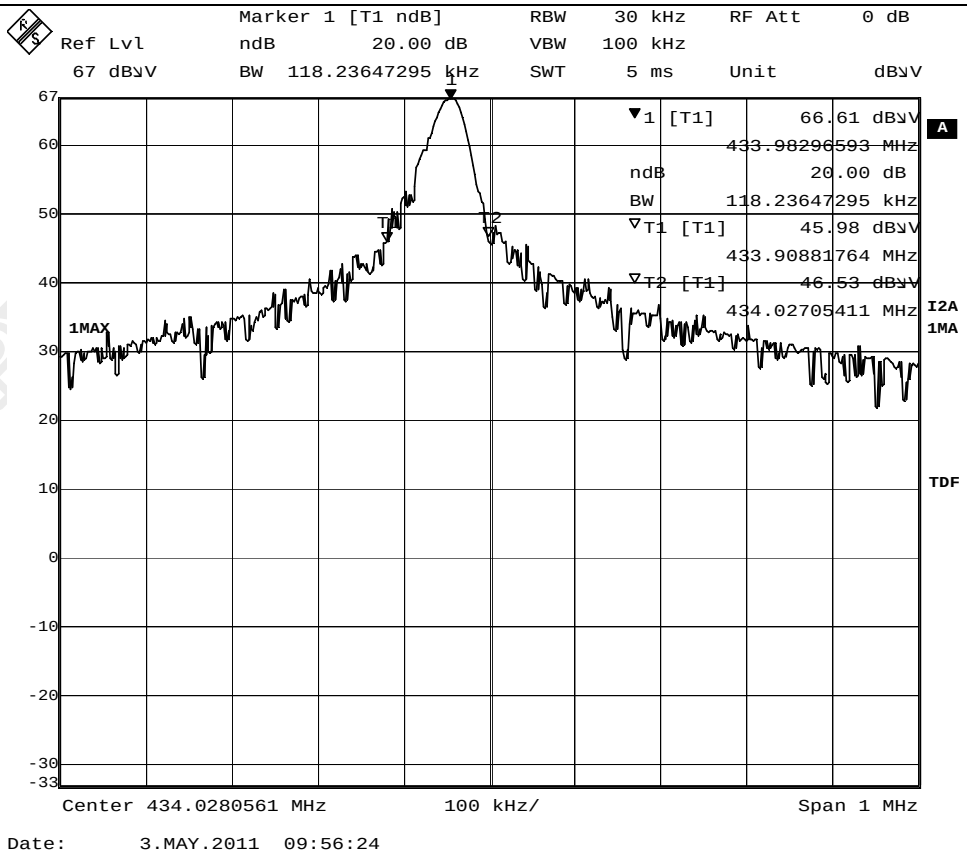
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
433.9	1084.75	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	2009/09/02	2011/09/02
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-Linggren	FACT-3	--	2010/10/25	2011/10/25
EM194	BICONILOG ANTENNA	EMCO	3142B	1795	2010/10/06	2012/10/06
EM229	EMI Test Receiver	R&S	ESIB40	100248	2010/11/02	2011/11/02
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2009/09/07	2011/09/07

Remarks:-

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

Appendix B

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

The transmitter periodically sends a different series of characters, but each packet period (100msec) never exceeds a series of 31 long (0.44088msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (31x0.44088msec) per 100msec=13.667% duty cycle. Figure A through E show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20log (0.13667)=-17.3dB

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

Figure A [Pulses Train]

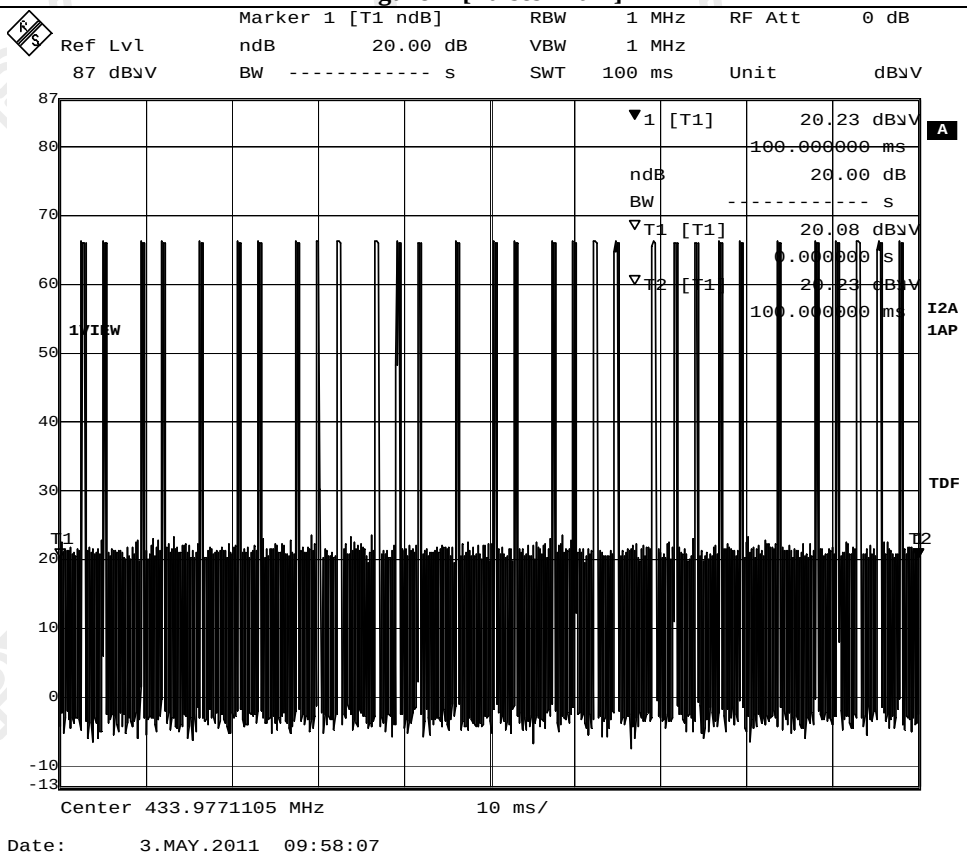


Figure B [Closer Look on pulse train]

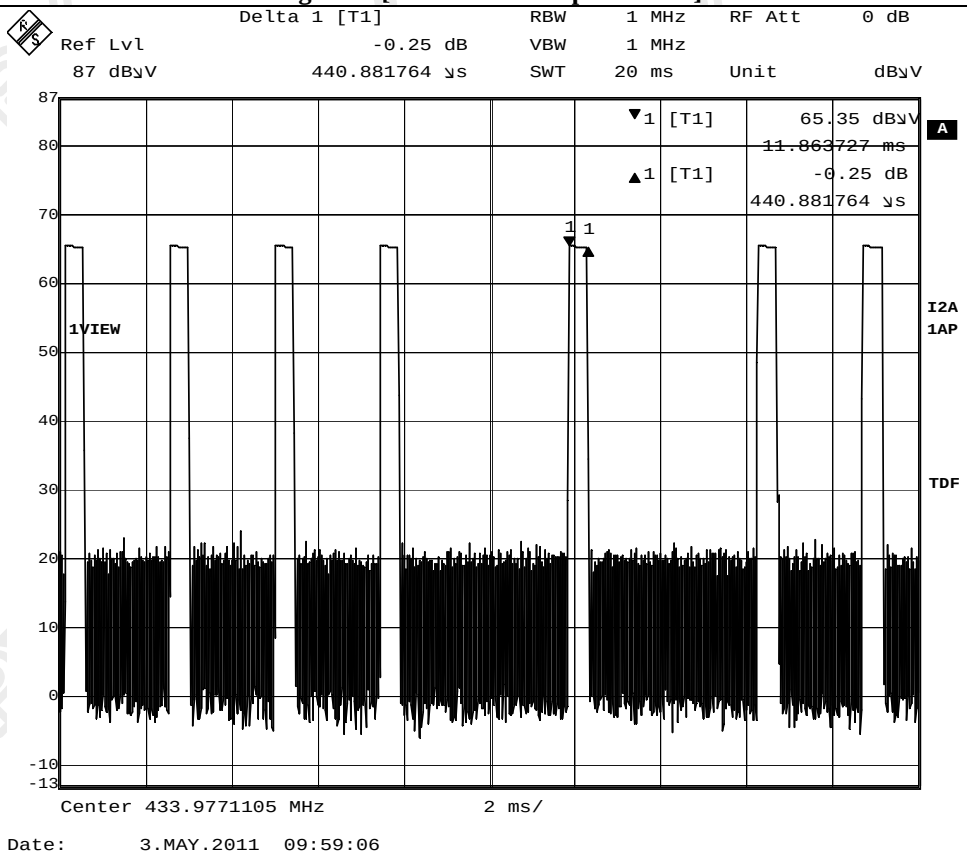


Figure C [Long pulse]

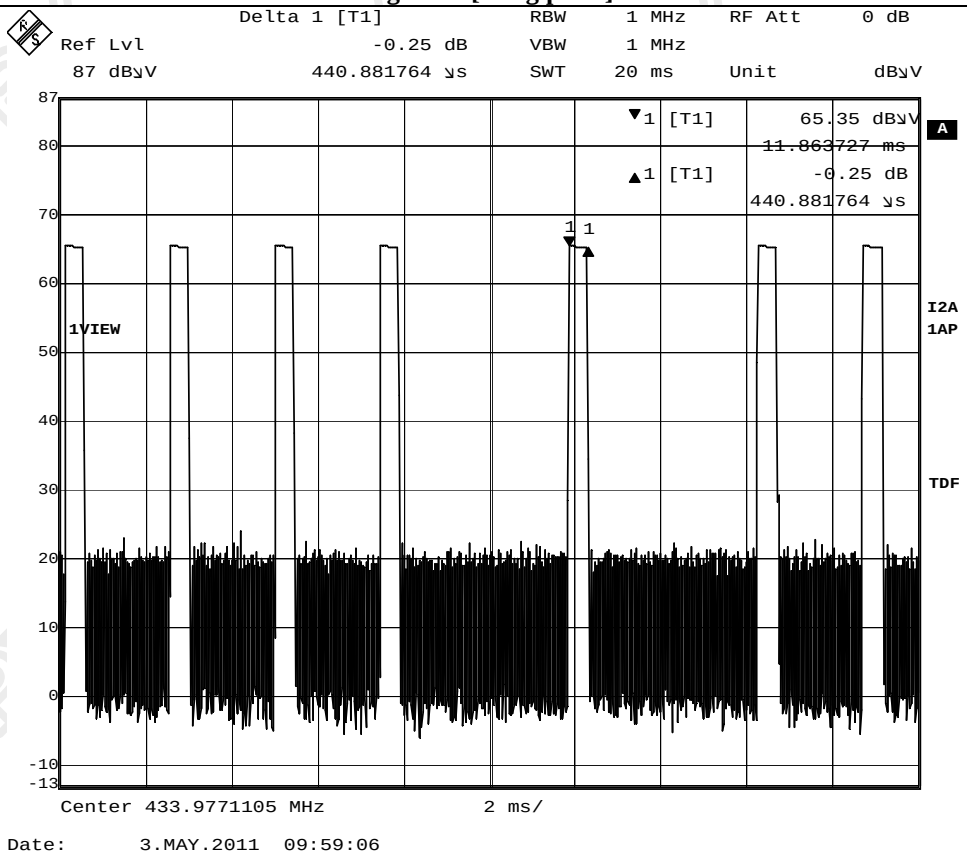


Figure D [Each Transmission period]

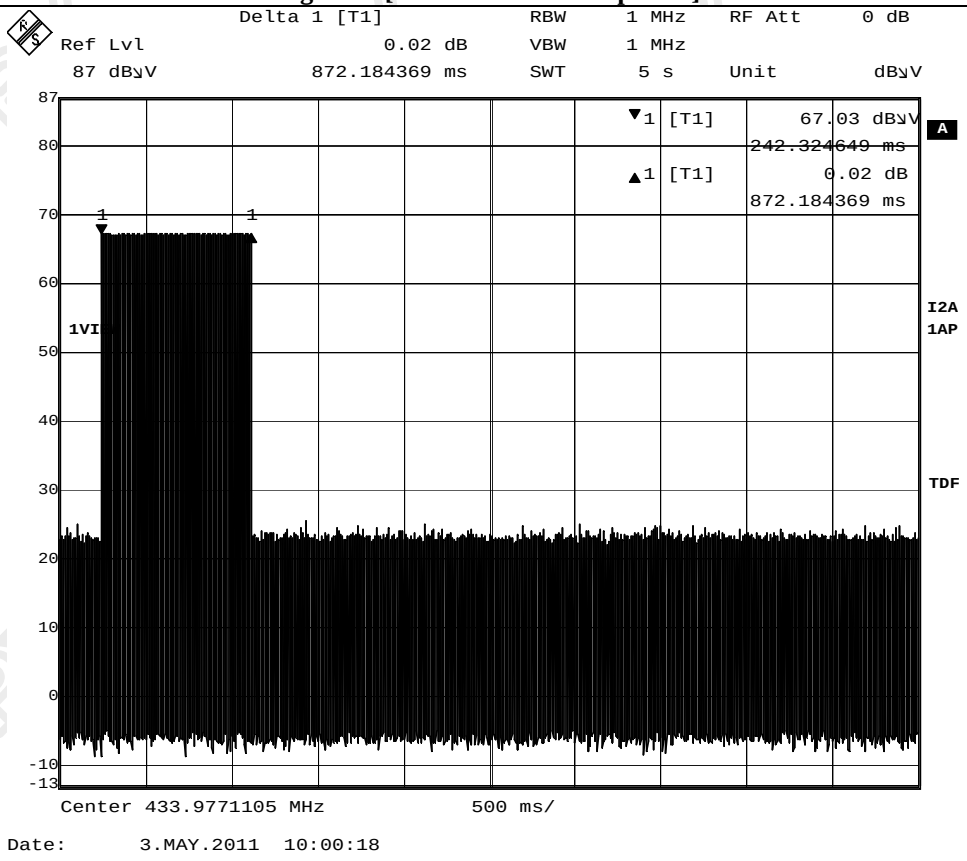
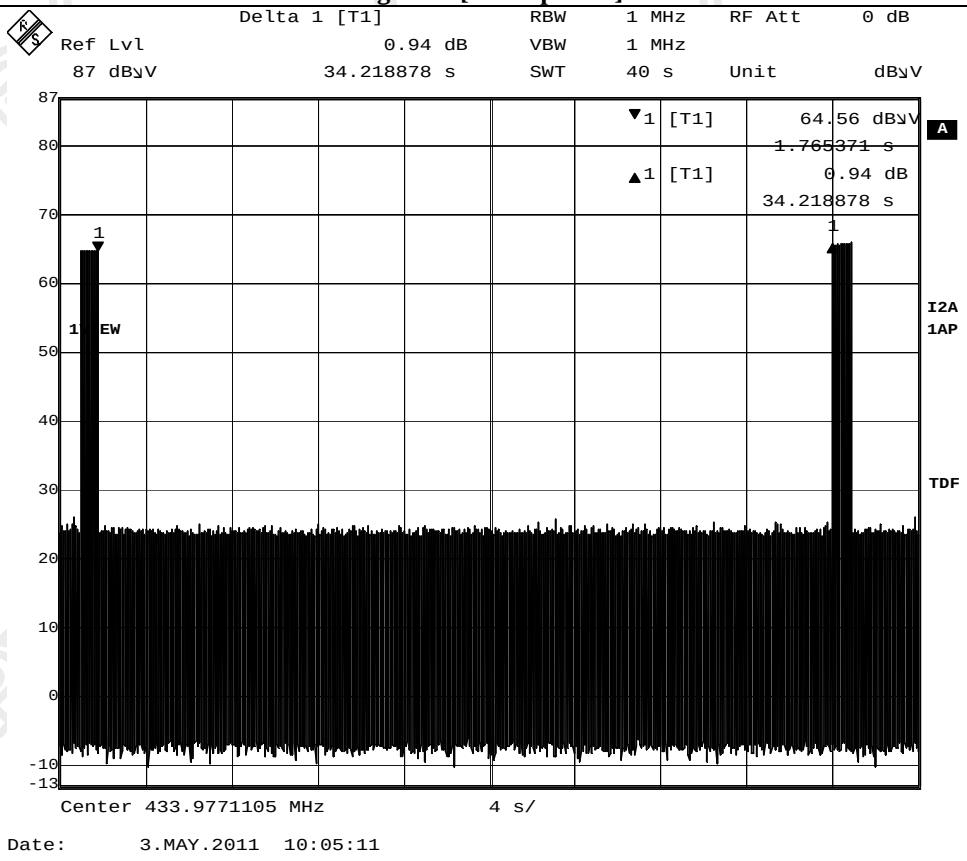


Figure E [Silent period]



Appendix C

Periodic Operation [FCC 47CFR 15.231(e)]

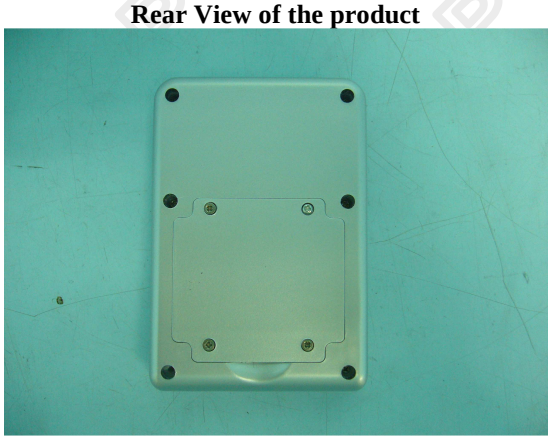
According to FCC 47CFR15.231 (e). A periodic transmitter shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Appendix D

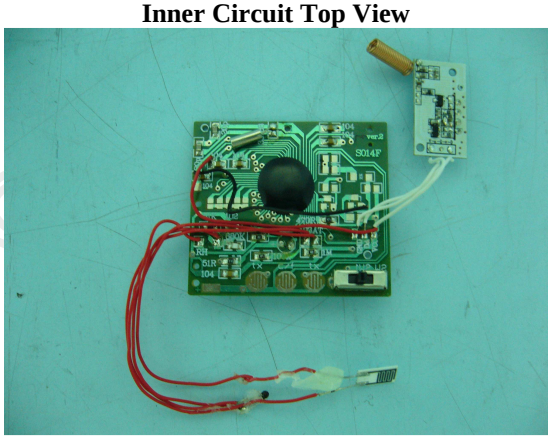
Photographs of EUT

Front View of the product

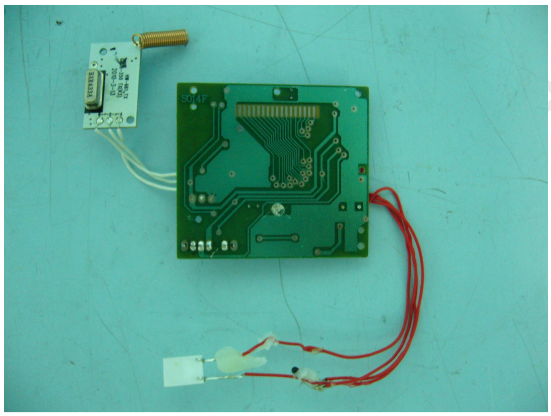
Rear View of the product



Inner Circuit Top View

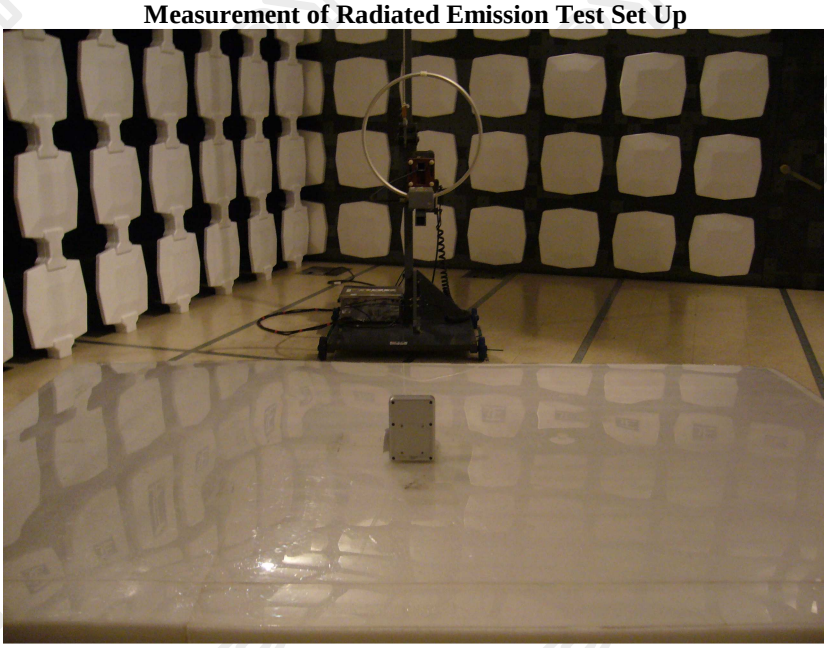


Inner Circuit Bottom View

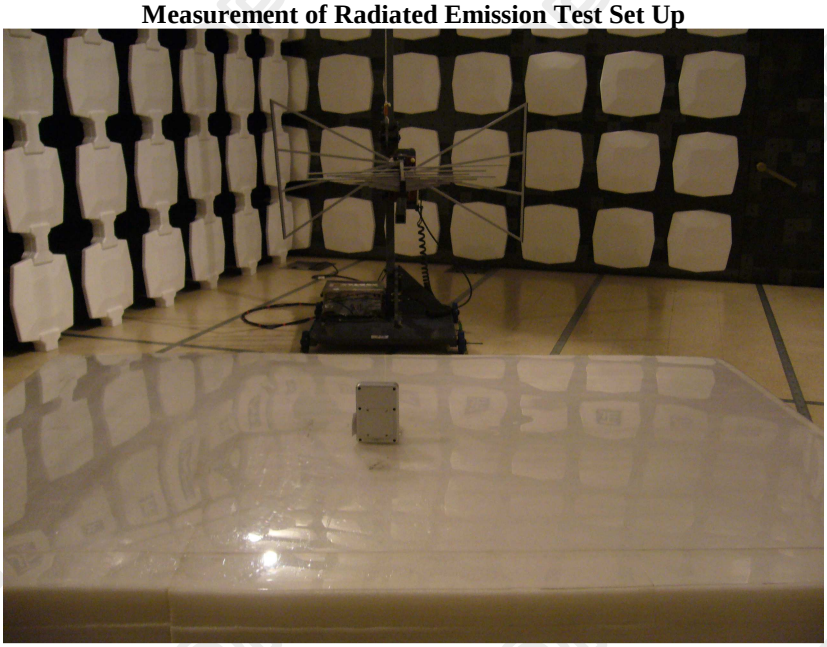


Photographs of EUT

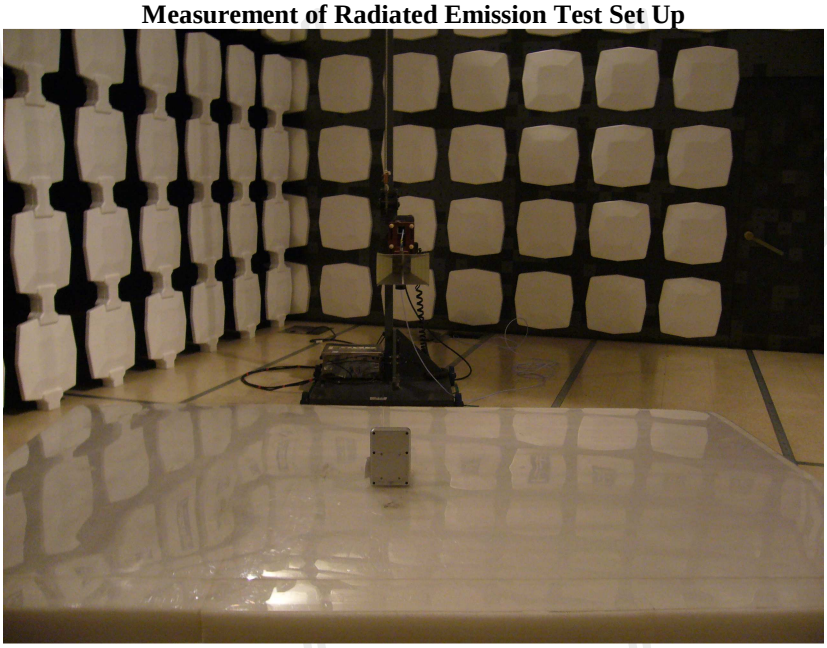
Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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