STC Test Report

Date: 2015-06-03

No. : MH191563

Applicant: Ewig Industries Macao Commercial Offshore Limited
Avenida Da Praia Grande No. 619, EDF. Comercial Si Toi L6, Macau

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

Product:	Wireless Kitchen Thermometer
Brand Name:	Maverick
Model Number:	MAV233
FCC ID:	N9ZMAV233

Date Sample(s) Received: 2015-05-27

Date Tested: 2015-06-01 to 2015-06-03

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 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): For additional brand name 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.

CONTENT:

1.0 General Details

1.1 Equipment Under Test [EUT]
Description of Sample(s)

Submitted sample(s) said to be

Product:	Wireless Kitchen Thermometer
Additional Product:	Remote BBQ Thermometer
Manufacturer:	Dong Guan Q&S Electronic Manufacturing Company Limited Yin Shan Industrial District, Fu Gang Village, Xiang Mang West Road, Qing Xi Town, Dongguan City, Guang Dong Province, China
Brand Name:	Maverick
Additional Brand Name:	Ivation, RediChek
Model Number:	MAV233
Additional Model Number:	ET-738 TX, IVAWT738 TX
Rating:	3.0Vd.c. (“AAA” size battery x 2)

1.1.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Wireless Kitchen Thermometer of Ewig Industries Macao Commercial Offshore Limited. The transmitter is a periodically operated transmitter. It is pulse transmitter. The RF signal was modulated by IC, the type of modulation used is ASK.

1.2 Date of Order

2015-05-27

1.3 Submitted Sample(s):

1 Sample

1.4 Test Duration

2015-06-01 to 2015-06-03

1.5 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: 2014 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 15.231e	ANSI C63.4:2009	N/A	☒	☐	☐
Radiated Emissions	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

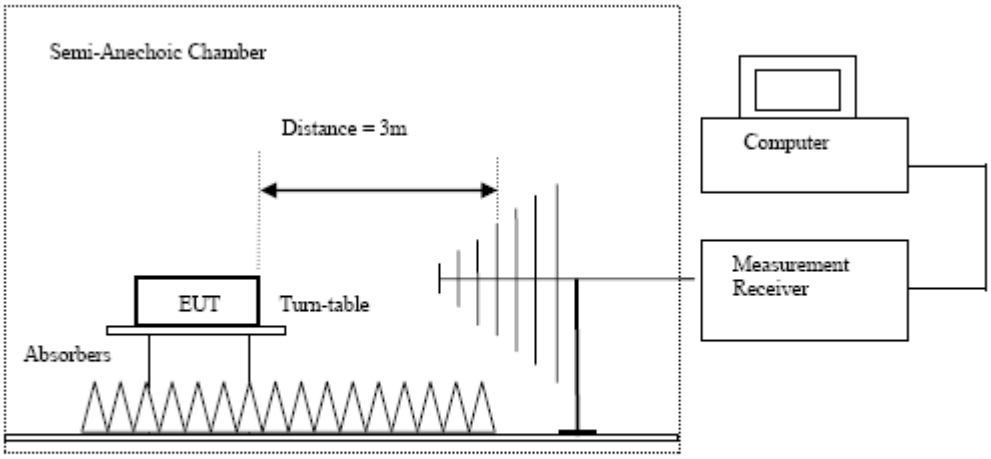
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:2009
Test Date:	2015-06-03
Mode of Operation:	Tx mode

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:



Ground Plane

- 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.

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[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

[1]Linear interpolations.
The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Results of Tx 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
433.92	58.5	19.3	77.8	7762.5	43,986.7	Vertical

Field Strength of Spurious 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
+ 1735.68	11.6	35.1	46.7	215.8	4,400.0	Vertical
2603.52	15.5	37.0	52.5	421.7	4,400.0	Vertical

Results of Tx 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
*	433.92	47.5	19.3	66.8	2187.8	4,398.7	Vertical

Field Strength of Spurious 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
+	1735.68	2.6	35.1	37.7	76.7	440.0	Vertical
	2603.52	4.5	37.0	41.5	118.9	440.0	Vertical

Remarks:

*: Adjusted by Duty Cycle = -10.98dB

+: 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.

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 mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s).

Result of Tx mode (30MHz – 1GHz): PASS

Radiated 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
32.7	Vertical	28.7	40.0	27.2	100
523.4	Vertical	37.4	46.0	74.1	200
30.3	Horizontal	30.1	40.0	32.0	200
683.3	Horizontal	36.8	46.0	69.2	200

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty (30MHz – 1GHz): 4.9dB
(1GHz – 18GHz): 4.0dB
Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231e
Test Method:	ANSI C63.4:2009 (Section 13.1.7)
Test Date:	2015-06-01
Mode of Operation:	Tx 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:

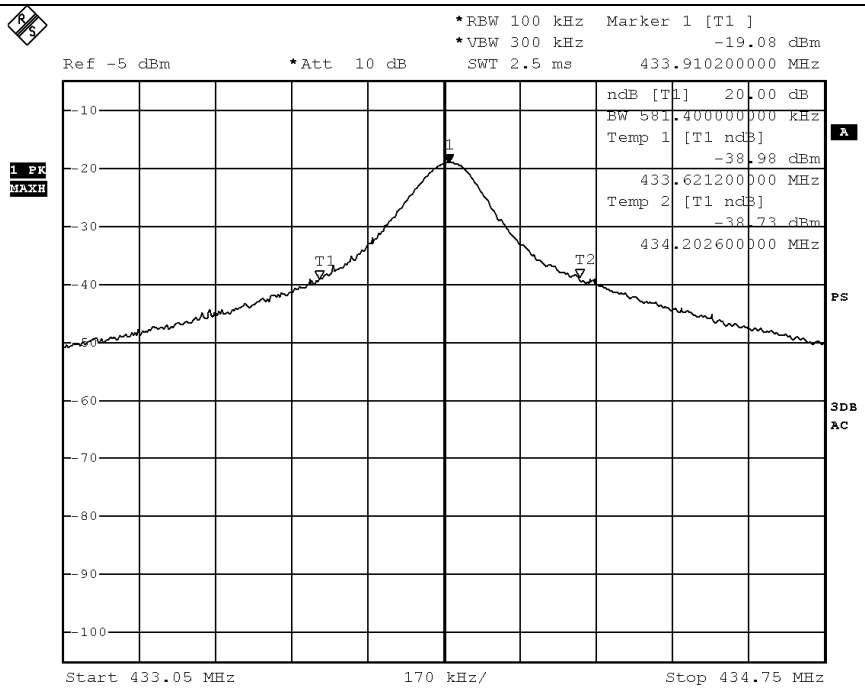
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
433.9	581.40	1084.95

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
= (0.0025)(433.98)
= 1084.95kHz

20dB Bandwidth of Fundamental Emission



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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2014/01/15	2016/01/25
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2014/01/23	2016/01/23
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	--	2014/09/29	2015/09/29
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	2013/04/25	2016/04/25
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2014/01/15	2016/01/15
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2015/06/01	2016/06/01

Remarks:-
N/A Not Applicable

Appendix B

Duty Cycle Correction During 68.8msec

Each packet period (100msec) never exceeds a series of 40 (0.52msec) long and 31 (0.24msec) short pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (0.52 x 40+0.24 x 31) msec per 100msec = 28.24% duty cycle. Figure A through E shows the characteristics of the pulses train for one of these functions.

Remarks:

Duty cycle = 20Log [(0.52*40)+ (0.24*31)/100]= -10.98dB

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

Figure A [Pulse Train]

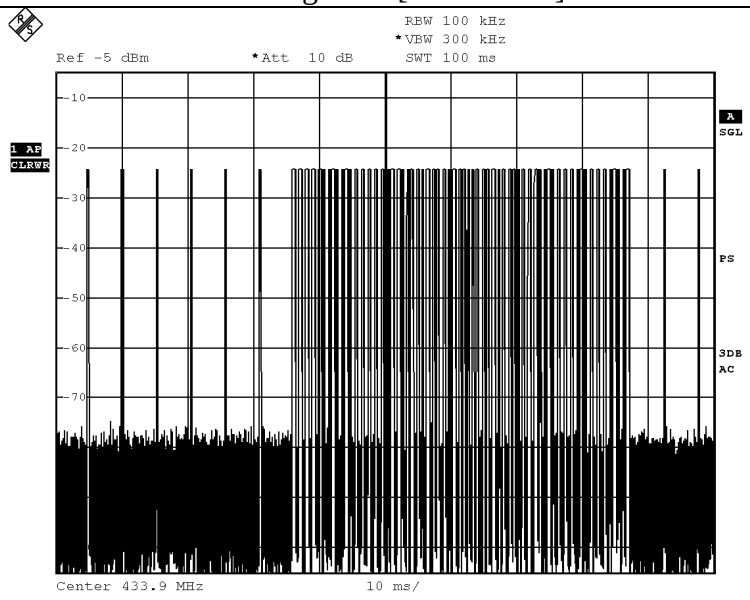

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Figure B [Long Pulse]

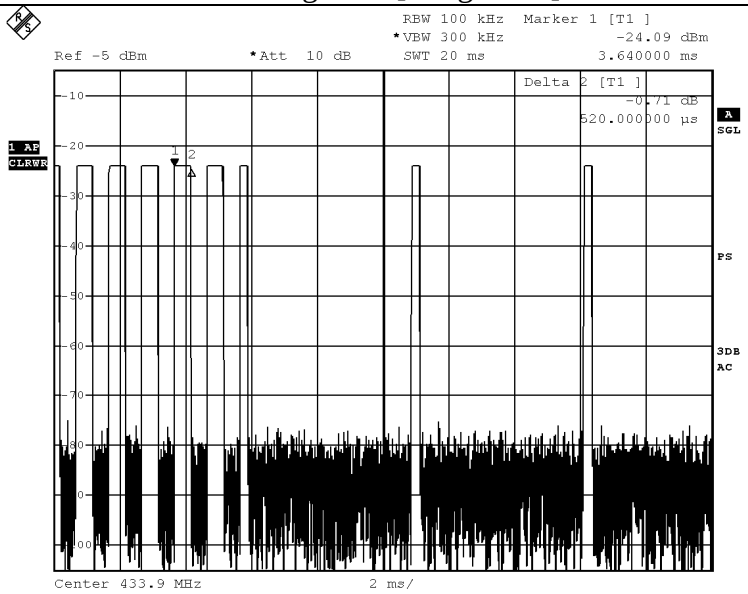

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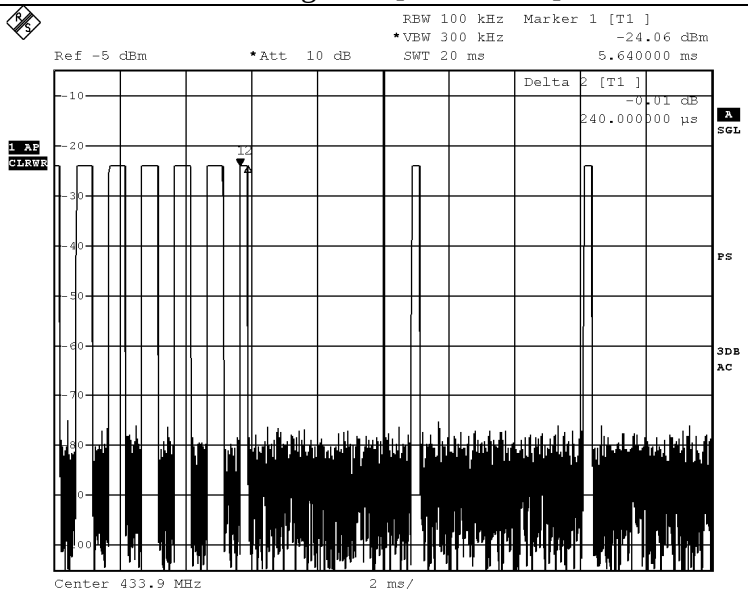
Figure C [Short Pulse]



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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.

Figure D [Duration of each transmission (=0.381 s < 1s)]

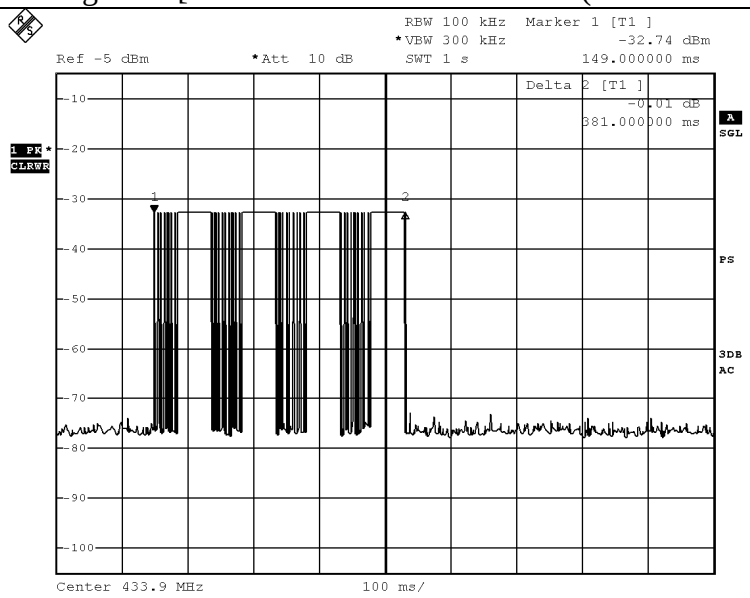

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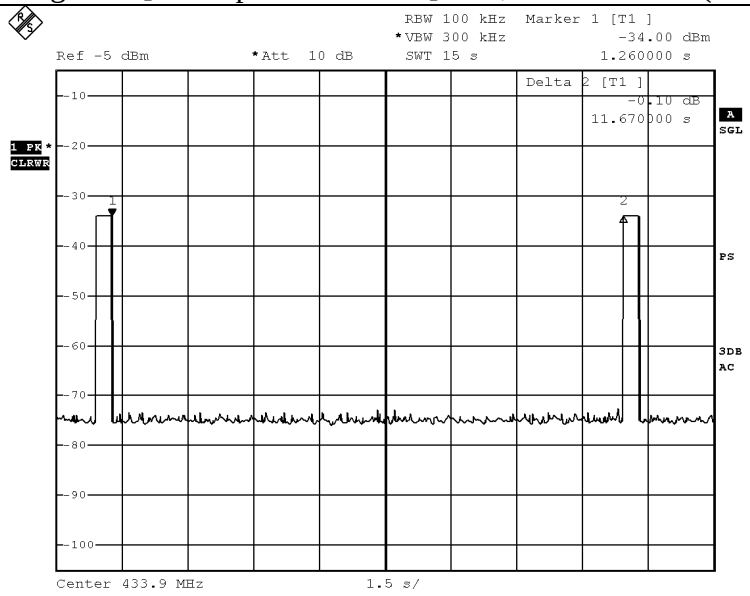
Figure E [Silent period=11.67s [>10s, and>30*0.381(11.43s)]



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Appendix D

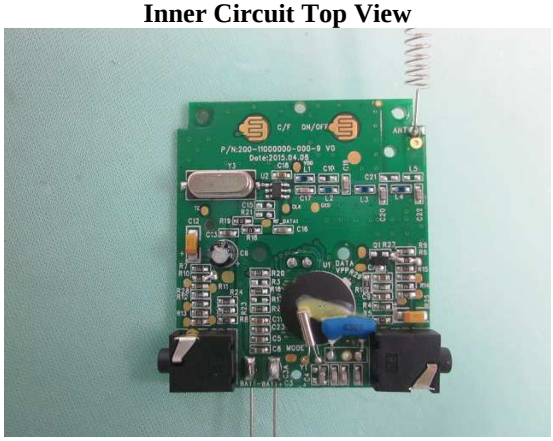
Photographs of EUT

Front View of the product

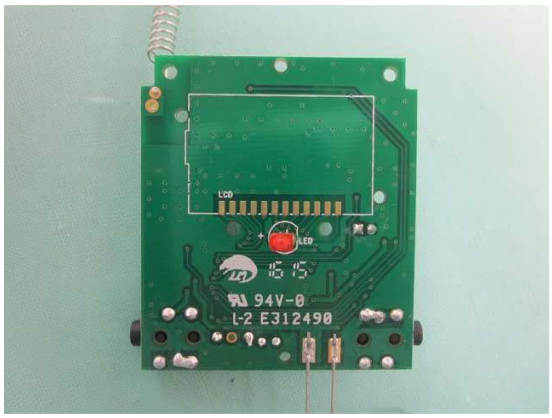
Rear View of the product

Inside View of the product

Inner Circuit Top View

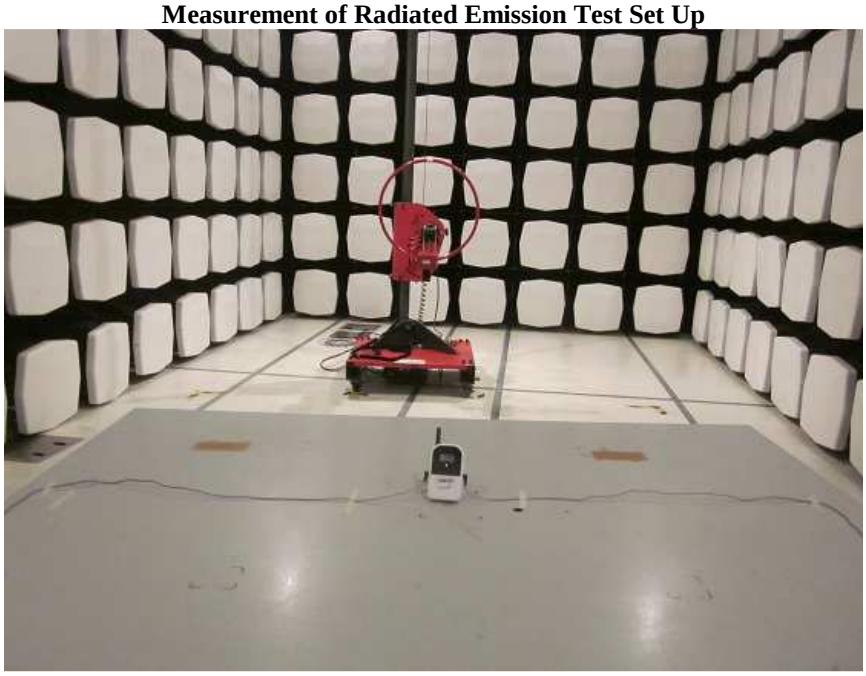


Inner Circuit Bottom View

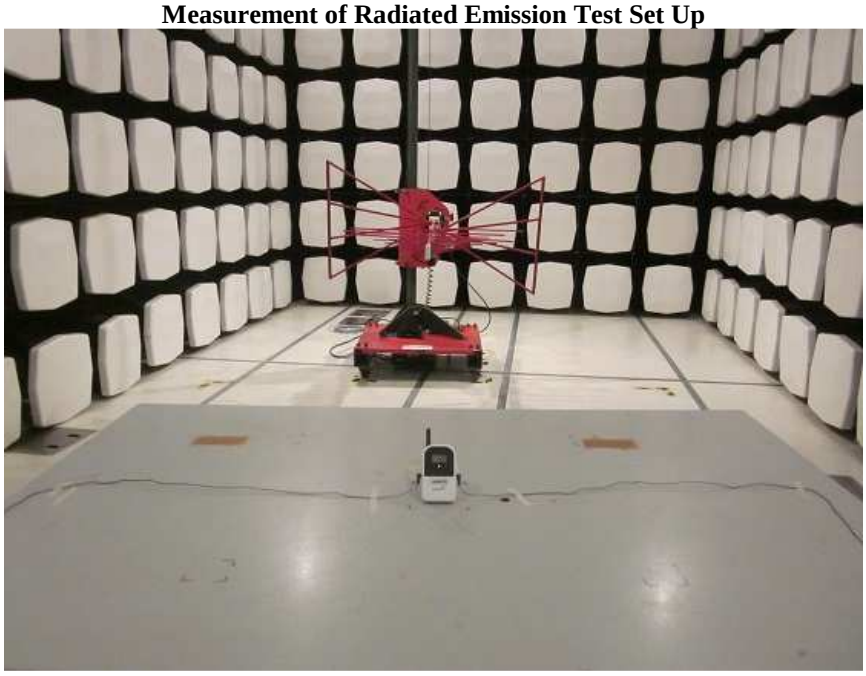


Photographs of EUT

Measurement of Radiated Emission Test Set Up

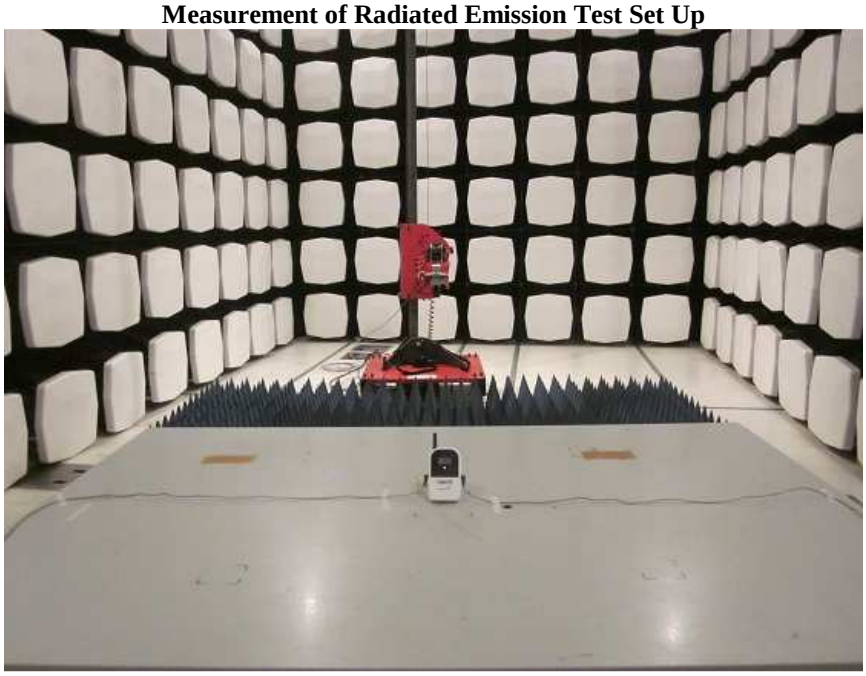


Measurement of Radiated Emission Test Set Up



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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