



STC Test Report

Date: 2014-10-16

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No. : MH190720

Applicant: Digital Gallery Global Limited
Flat 20, 11/F, BLK A, Hoi Luen Industrial Centre, 55 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong

Description of Sample(s): Submitted sample(s) said to be
Product: Atomic Wall Clock
Brand Name: N/A
Model Number: SPC1038
FCC ID: P5FSPC1038

Date Sample(s) Received: 2014-10-10

Date Tested: 2014-10-14

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.



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1.0 General Details

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

Submitted sample(s) said to be

Product:	Atomic Wall Clock
Manufacturer:	Nosanky Electronic Technology Co., Ltd 3/F, No.12 Silianhuamao Industrial Zone, Henggang Street, Longgang District, Shenzhen, China
Brand Name:	N/A
Model Number:	SPC1038
Rating:	3Vd.c. ("AAA" size battery x 2)

1.1.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Atomic Wall Clock of Digital Gallery Global Limited
The transmitter used a master chip which included low-voltage detection, temperature & humidity detection of the current environment, ASK/OOK transmit module. When the main IC connected to power, the temperature & humidity sensor will detect the current temperature / humidity data, then encode this data to OOK format and transfer the signal by 433.92MHz transmitter module.

1.2 Date of Order

2014-10-10

1.3 Submitted Sample(s):

1 Sample

1.4 Test Duration

2014-10-14

1.5 Country of Origin

China

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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 15.231e	ANSI C63.4:2009	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	☒	☐	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

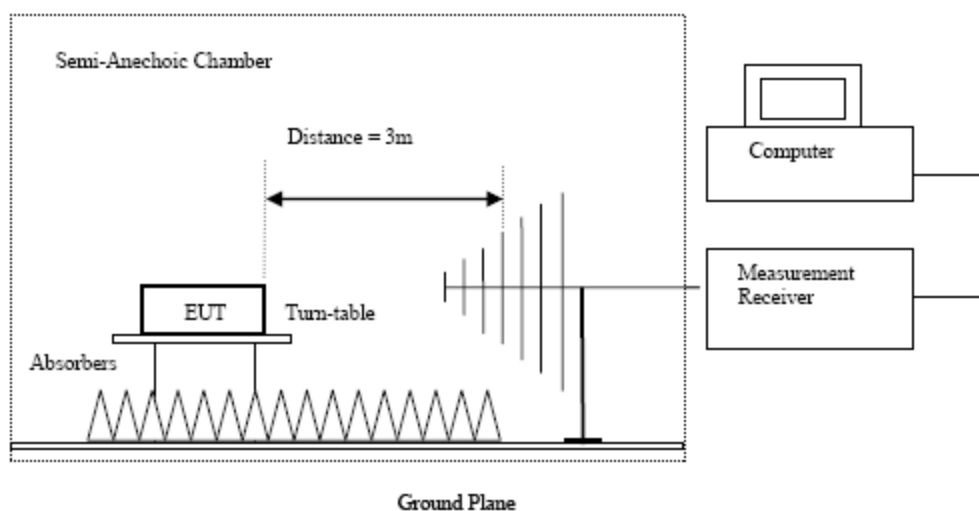
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:2009
Test Date:	2014-10-14
Mode of Operation:	Tx mode

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:



- 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.

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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

¹Linear interpolations.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Results of Tx mode (CH1, Worst case): 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	70.0	19.3	89.3	29174.3	43,983.3	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
867.80	21.5	26.2	47.7	242.7	4,400.0	Vertical
+ 1301.70	17.8	28.7	46.5	211.3	4,400.0	Vertical
1735.60	16.2	30.9	47.1	226.5	4,400.0	Vertical

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Results of Tx mode (CH1, Worst case): PASS

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
* 433.90	53.5	19.3	72.8	4365.2	4,398.3	Vertical

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
867.80	5.0	26.2	31.2	36.3	440.0	Vertical
+ 1301.70	1.3	28.7	30.0	31.6	440.0	Vertical
1735.60	-0.3	30.9	30.6	33.9	440.0	Vertical

Remarks:

*: Adjusted by Duty Cycle = -16.5dB

+: 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.

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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).

Results of Tx mode (CH1, Worst case) (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
30.2	Horizontal	31.3	40.0	36.7	100
155.8	Horizontal	23.6	43.5	15.1	150
694.7	Horizontal	39.5	46.0	94.4	200
30.2	Vertical	29.8	40.0	30.9	100
57.6	Vertical	23.4	40.0	14.8	100
613.8	Vertical	38.1	46.0	80.4	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.

CH1, 2, 3 have been investigated and the worst-case test results are recorded in this report.

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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:	2014-10-14
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.

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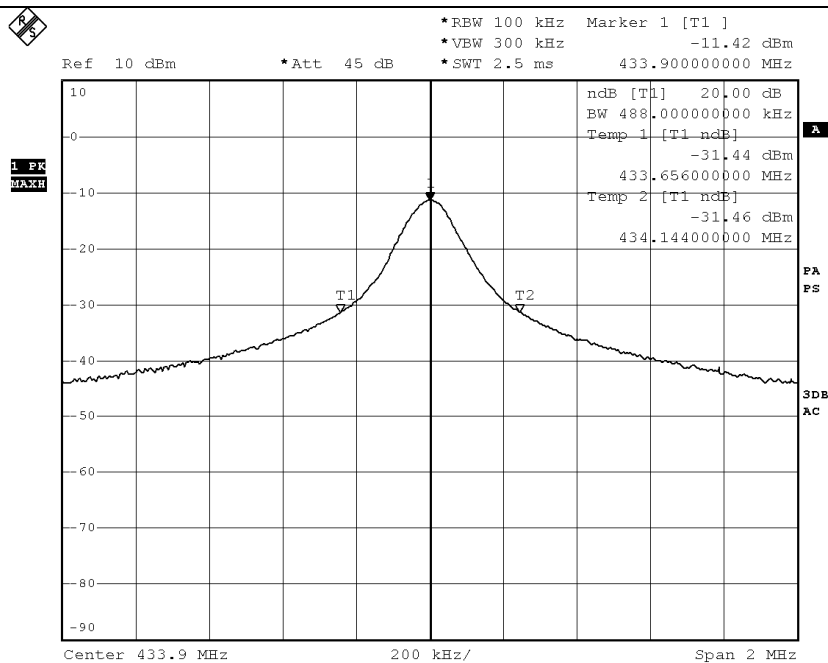
No. : MH190720

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
433.9	488.0	1008.4

*: FCC Limit for Bandwidth measurement
= (0.25%)(Center Frequency)
= (0.0025)(433.9)
= 1084.8kHz

20dB Bandwidth of Fundamental Emission



Date: 14.OCT.2014 12:02:46



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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	JTXLB-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	--	2014/09/29	2015/09/29
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	2013/04/25	2015/04/25
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2014/01/15	2016/01/15

Remarks:-

N/A Not Applicable

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Appendix B

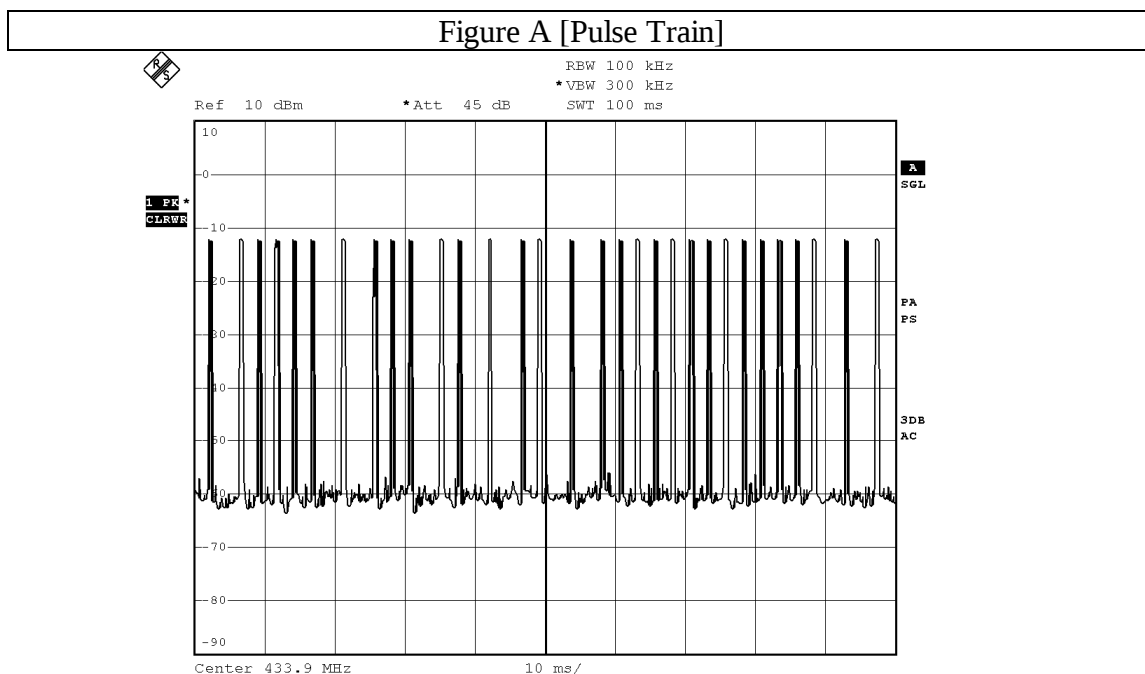
Duty Cycle Correction During 100msec

Each packet period (100msec) never exceeds a series of 29 (0.48msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered $(31 \times 0.48) \text{ msec per } 100\text{msec} = 14.88\%$ duty cycle. Figure A through D shows the characteristics of the pulses train for one of these functions.

Remarks:

Duty cycle = $20\text{Log} [(0.48 \times 31)/100] = -16.5\text{dB}$

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



Date: 14.OCT.2014 11:56:52



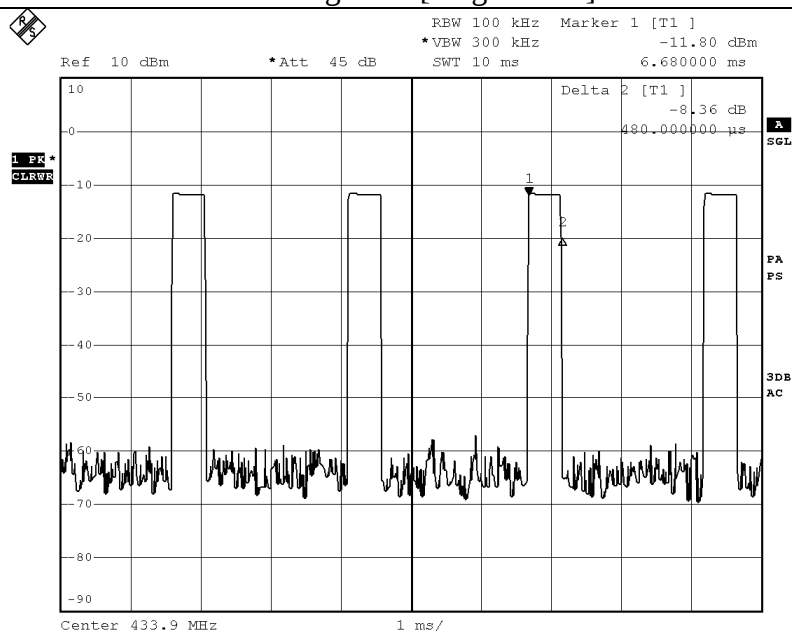
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Figure B [Single Pulse]



Date: 14.OCT.2014 11:58:30



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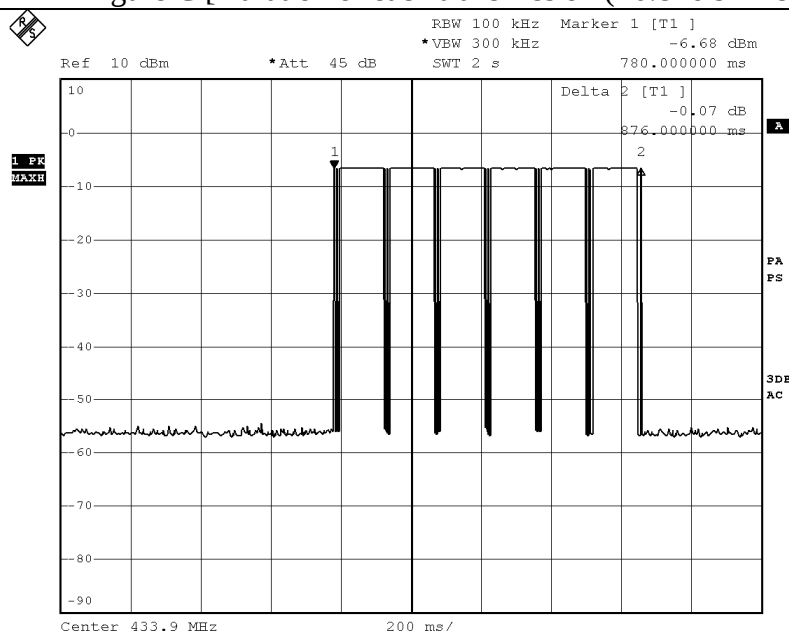
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Appendix C

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 C [Duration of each transmission ($=0.876\text{ s} < 1\text{ s}$)]



Date: 14.OCT.2014 11:25:58



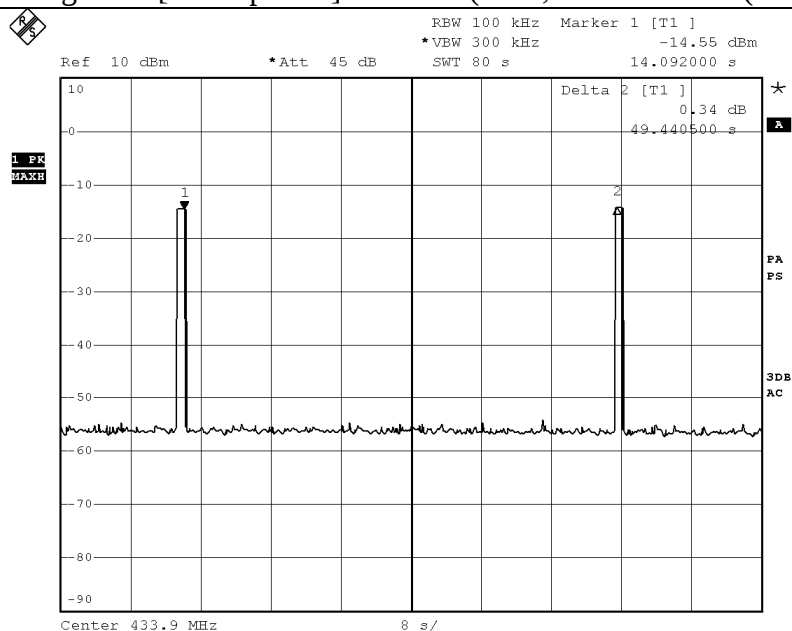
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Figure D [Silent period] = 49.44s (>10s, and >30*0.876(26.28s))



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Appendix D

Photographs of EUT

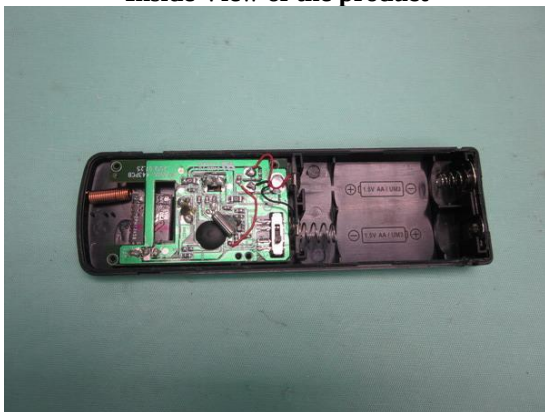
Front View of the product



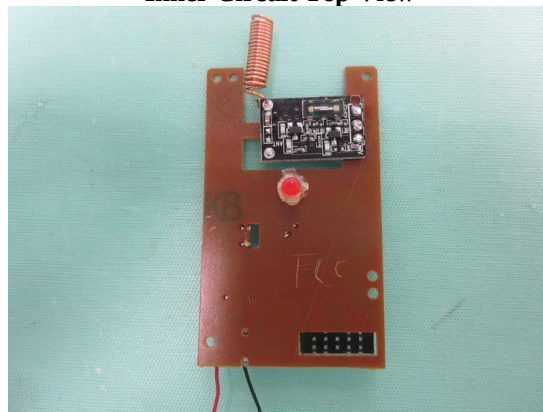
Rear View of the product



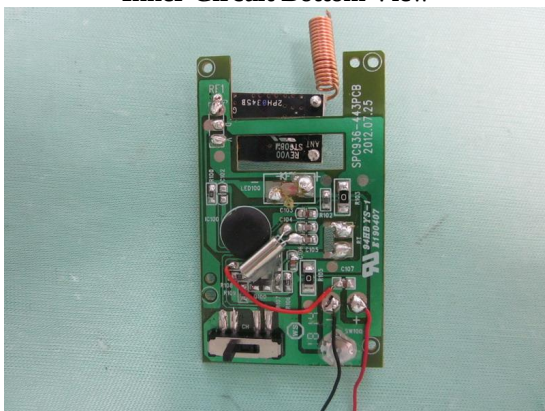
Inside View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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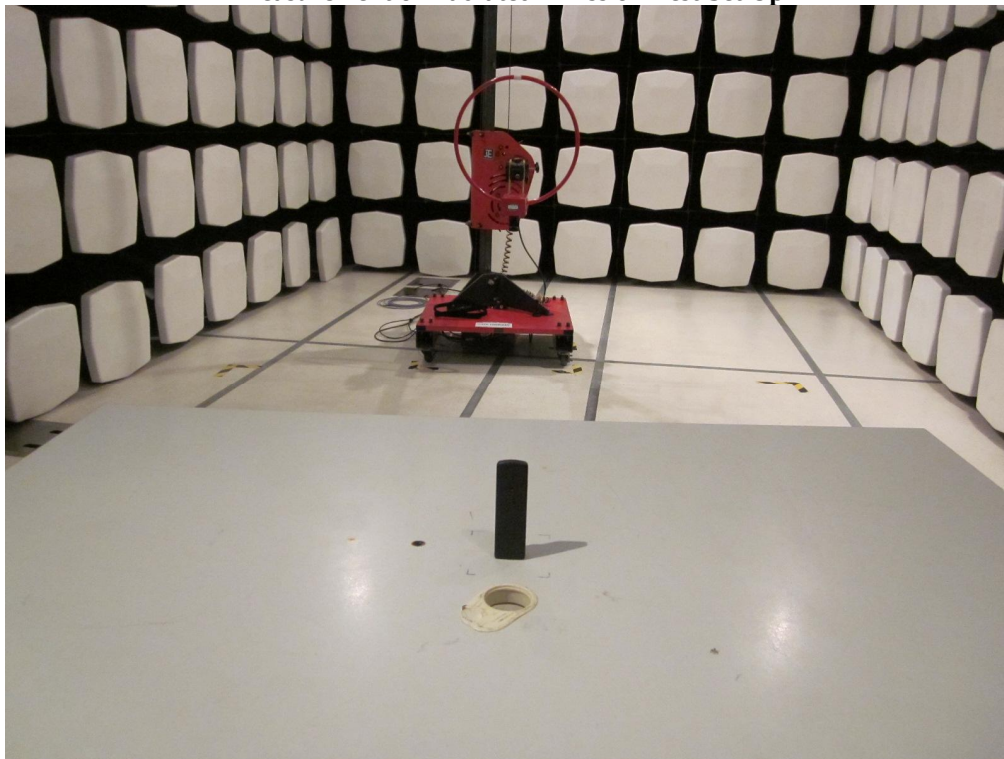
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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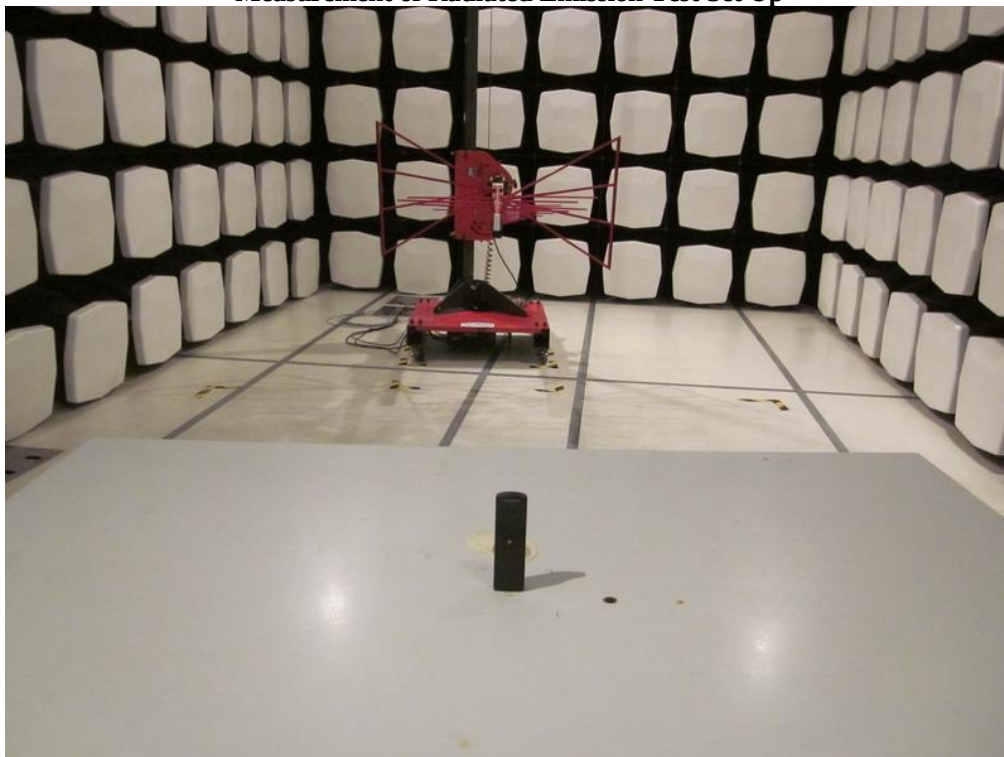
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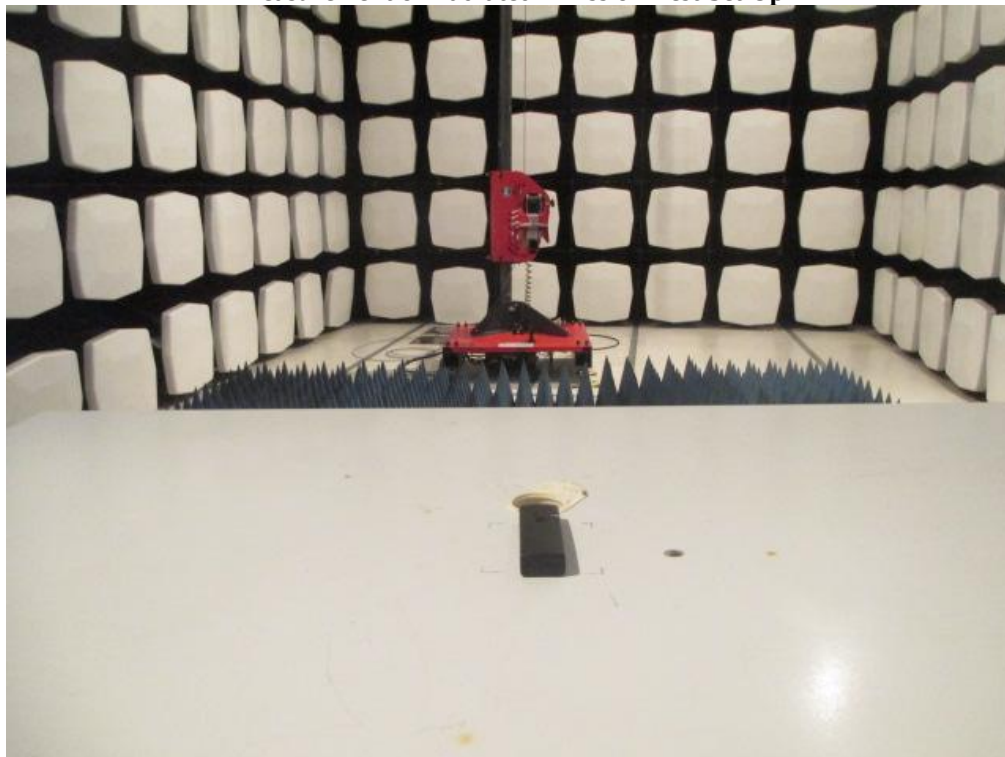
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Measurement of Radiated Emission Test Set Up



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