STC Test Report

Date: 2013-07-01
No.: DM111680DP

Applicant (SPM001):	Spin Master Toys Far East Ltd. Room 1113, 11/F., Chinachem Golden Plaza, 77 Mody Road, Tsim Sha Tsui East, Kowloon, Hong Kong
Manufacturer:	Spin Master Toys Far East Ltd. Room 1113, 11/F., Chinachem Golden Plaza, 77 Mody Road, Tsim Sha Tsui East, Kowloon, Hong Kong
Description of Sample(s):	Submitted sample(s) said to be Product: SPG SGS Spy Gear Spike Mic Launcher Brand Name: SPY GEAR Model Number: 15202 FCC ID: PQN15202TX2G4
Date Sample(s) Received:	2013-06-24
Date Tested:	2013-06-26 to 2013-06-27
Investigation Requested:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 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 model(s) details, see page 3

LONG Yun Jian, Along
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited

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1.0 General Details

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

Product:	SPG SGS Spy Gear Spike Mic Launcher
Manufacturer:	Spin Master Toys Far East Ltd.
Brand Name:	SPY GEAR
Model Number:	15202
Additional Model Number(s):	6021510/6021515/6021652/6021809/6022329/1028950/1028957/1029129/1029336/1030045
Rating:	3.7Vd.c. (Rechargeable lithium battery x 1)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a SPG SGS Spy Gear Spike Mic Launcher of Spin Master Toys. The transmission transmitter operating in the 2.4GHz ISM frequency band. Modulation by digital data; and type is GFSK modulation.

1.3 Date of Order

2013-06-24

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2013-06-26 to 2013-06-27

1.6 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 Regulations 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	Fail	N/A
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	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 15.249 & FCC 47CFR 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2013-06-27
Mode of Operation:	Tx mode

Test Method:

The sample was placed 0.8m above the ground plane on a standard radiated emission test site. 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. In the frequency range of 9kHz to 30MHz, The center of the loop antenna shall be 1 meter above the ground and rotated loop axis for maximum reading. The emissions worst-case are shown in Test Results of the following pages.

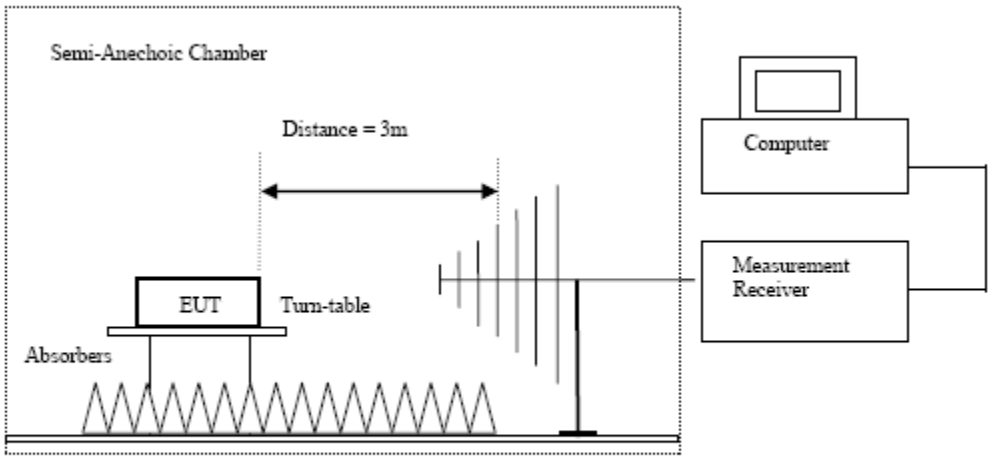
Remark: 3 orthogonal axis apply to hand-held device only.

*: Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

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:	1MHz
	VBW:	1MHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

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.

Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [microvolts/meter]	Field Strength of Harmonics Emission [microvolts/meter]
902-928	500,000 [Quasi-Peak]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Tx mode (Lowest Frequency Channel): Pass

Field Strength of Fundamental Emissions
Peak Value

Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2408.00	44.2	37.0	81.2	11,481.5	500,000	Vertical
2408.00	45.5	36.6	82.1	12,735.0	500,000	Horizontal

Field Strength of Fundamental Emissions
Average Value

Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2408.00	35.1	37.0	72.1	4,027.2	50,000	Vertical
2408.00	36.4	36.6	73.0	4,466.8	50,000	Horizontal

Field Strength of Harmonics Emission
Peak Value

Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4816.0	12.9	41.5	54.4	524.8	5,000	Vertical
4816.0	10.7	42.4	53.1	451.9	5,000	Horizontal
7224.0	8.7	45.1	53.8	489.8	5,000	Vertical
7224.0	8.4	46.2	54.6	537.0	5,000	Horizontal
9632.0	2.7	48.0	50.7	342.8	5,000	Vertical
9632.0	1.3	48.8	50.1	319.9	5,000	Horizontal
12040.0	-0.7	51.5	50.8	346.7	5,000	Vertical
12040.0	-2.1	52.4	50.3	327.3	5,000	Horizontal

Field Strength of Harmonics Emission Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4816.0	-1.0	41.5	40.5	105.9	500	Vertical
4816.0	-2.6	42.4	39.8	97.7	500	Horizontal
7224.0	-5.1	45.1	40.0	100.0	500	Vertical
7224.0	-5.9	46.2	40.3	103.5	500	Horizontal
9632.0	-12.8	48.0	35.2	57.5	500	Vertical
9632.0	-13.1	48.8	35.7	61.0	500	Horizontal
12040.0	-15.6	51.5	35.9	62.4	500	Vertical
12040.0	-16.8	52.4	35.6	60.3	500	Horizontal

Results of Tx mode (Middle Frequency Channel): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2409.00	43.1	37.0	80.1	10,115.8	500,000	Vertical
2409.00	44.7	36.6	81.3	11,614.5	500,000	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2409.00	34.0	37.0	71.0	3,548.1	50,000	Vertical
2409.00	36.2	36.6	72.8	4,365.2	50,000	Horizontal

Field Strength of Harmonics Emission Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4818.0	11.1	41.6	52.7	431.5	5,000	Vertical
4818.0	10.4	42.5	52.9	441.6	5,000	Horizontal
7227.0	5.7	45.2	50.9	350.8	5,000	Vertical
7227.0	4.4	46.3	50.7	342.8	5,000	Horizontal
9636.0	2.9	48.1	51.0	354.8	5,000	Vertical
9636.0	1.6	48.9	50.5	335.0	5,000	Horizontal
12045.0	-0.5	51.6	51.1	358.9	5,000	Vertical
12045.0	-1.8	52.5	50.7	342.8	5,000	Horizontal

Field Strength of Harmonics Emission Avarage Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4818.0	-3.1	41.6	38.5	84.1	500	Vertical
4818.0	-3.7	42.5	38.8	87.1	500	Horizontal
7227.0	-9.1	45.2	36.1	63.8	500	Vertical
7227.0	-10.3	46.3	36.0	63.1	500	Horizontal
9636.0	-11.9	48.1	36.2	64.6	500	Vertical
9636.0	-13.0	48.9	35.9	62.4	500	Horizontal
12045.0	-14.9	51.6	36.7	68.4	500	Vertical
12045.0	-17.1	52.5	35.4	58.9	500	Horizontal

Results of Tx mode (Highest Frequency Channel): Pass

Field Strength of Fundamental Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2411.00	43.5	37.0	80.5	10,592.5	500,000	Vertical
2411.00	44.8	36.6	81.4	11,749.0	500,000	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2411.00	34.4	37.0	71.4	3,715.4	50,000	Vertical
2411.00	35.7	36.6	72.3	4,121.0	50,000	Horizontal

Field Strength of Harmonics Emission Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4822.0	11.4	41.4	52.8	436.5	5,000	Vertical
4822.0	9.0	42.7	51.7	384.6	5,000	Horizontal
7233.0	6.5	45.6	52.1	402.7	5,000	Vertical
7233.0	7.3	46.5	53.8	489.8	5,000	Horizontal
9644.0	1.6	48.6	50.2	323.6	5,000	Vertical
9644.0	1.3	49.7	51.0	354.8	5,000	Horizontal
12055.0	-0.9	51.7	50.8	346.7	5,000	Vertical
12055.0	-2.2	52.7	50.5	335.0	5,000	Horizontal

Field Strength of Harmonics Emission Avarage Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4822.0	-2.4	41.4	39.0	89.1	500	Vertical
4822.0	-6.3	42.7	36.4	66.1	500	Horizontal
7233.0	-8.1	45.6	37.5	75.0	500	Vertical
7233.0	-6.5	46.5	40.0	100.0	500	Horizontal
9644.0	-13.2	48.6	35.4	58.9	500	Vertical
9644.0	-13.6	49.7	36.1	63.8	500	Horizontal
12055.0	-14.6	51.7	37.1	71.6	500	Vertical
12055.0	-16.3	52.7	36.4	66.1	500	Horizontal

Remarks:
No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz
Calculated measurement uncertainty (9KHz – 30MHz): 3.3dB
(30MHz - 1GHz): 4.6dB
1GHz - 18GHz): 4.4dB
Emissions in the vertical and horizontal polarizations have be en investigated and the worst-case test results are recorded in this report.

Duty cycle factor = - 9.1dB

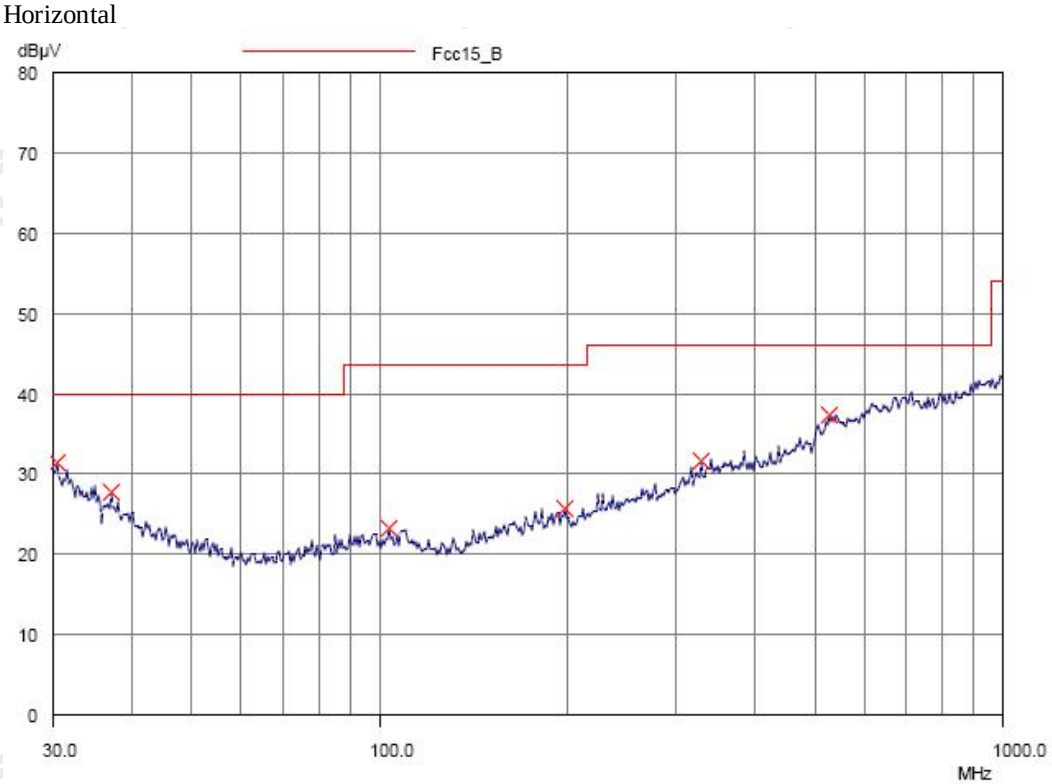
Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

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.

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

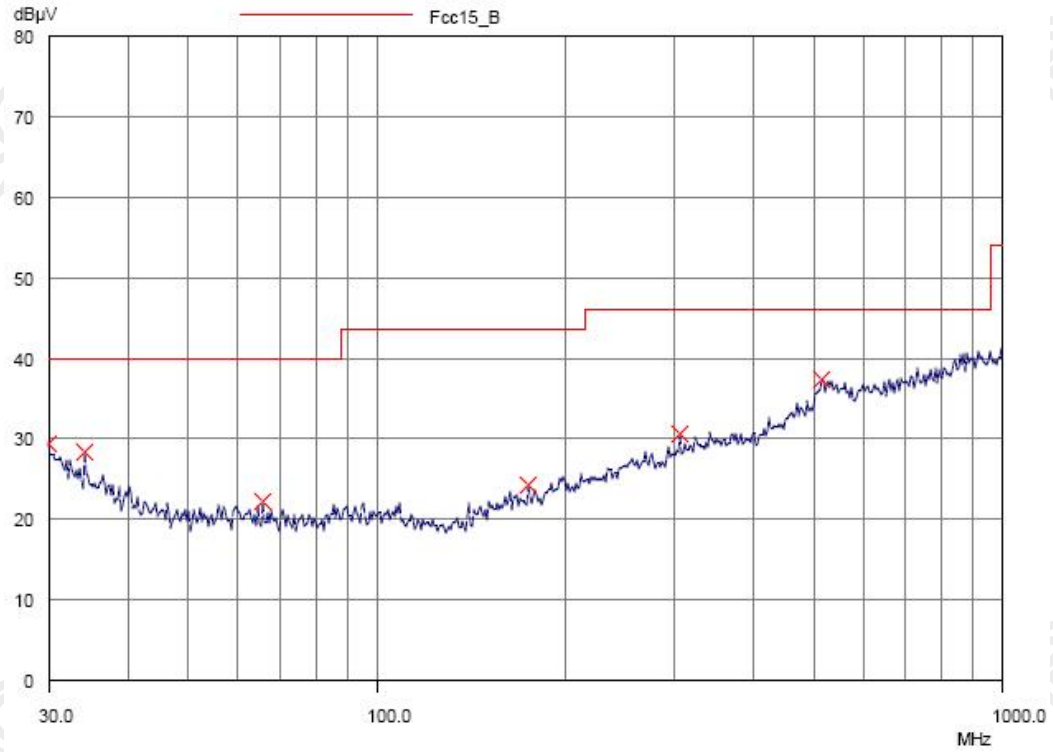
Results of Tx mode : PASS
Horizontal



Results of Tx mode : 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
30.4	Horizontal	31.4	40.0	37.2	100
37.3	Horizontal	27.9	40.0	24.8	100
103.8	Horizontal	23.2	43.5	14.5	150
197.5	Horizontal	25.8	43.5	19.5	150
327.4	Horizontal	31.7	46.0	38.5	200
527.7	Horizontal	37.4	46.0	74.1	200

Results of Tx mode : PASS
Vertical



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
30.0	Vertical	29.4	40.0	29.5	100
34.3	Vertical	28.5	40.0	26.6	100
65.8	Vertical	22.3	40.0	13.0	100
174.7	Vertical	24.4	43.5	16.6	150
305.1	Vertical	30.7	46.0	34.3	200
513.1	Vertical	37.4	46.0	74.1	200

Remarks:
Calculated measurement uncertainty (9kHz – 30MHz): 3.3dB
(30MHz - 1GHz): 4.6dB
Emissions in the vertical and horizontal polarizations 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 15.249
Test Method:	ANSI C63.4:2009
Test Date:	2013-06-26
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.

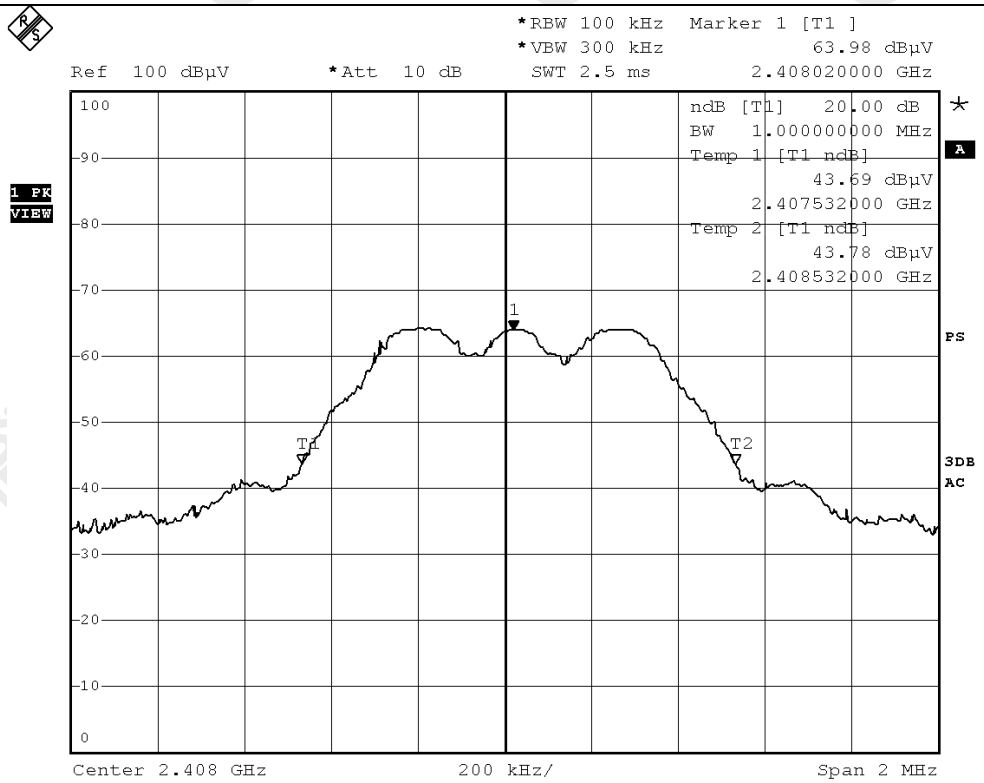
Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Limits for 20dB Bandwidth of Fundamental Emission (Low Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [kHz]
2408	1000

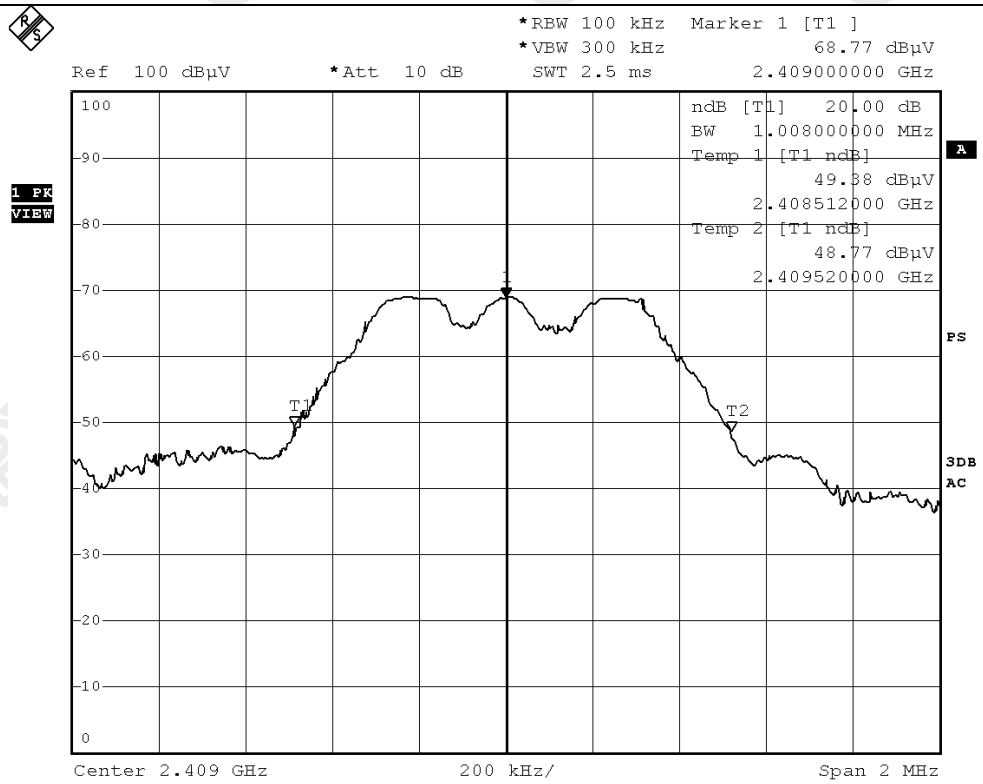
20dB Bandwidth of Fundamental Emission



Limits for 20dB Bandwidth of Fundamental Emission (Middle Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [kHz]
2409	1008

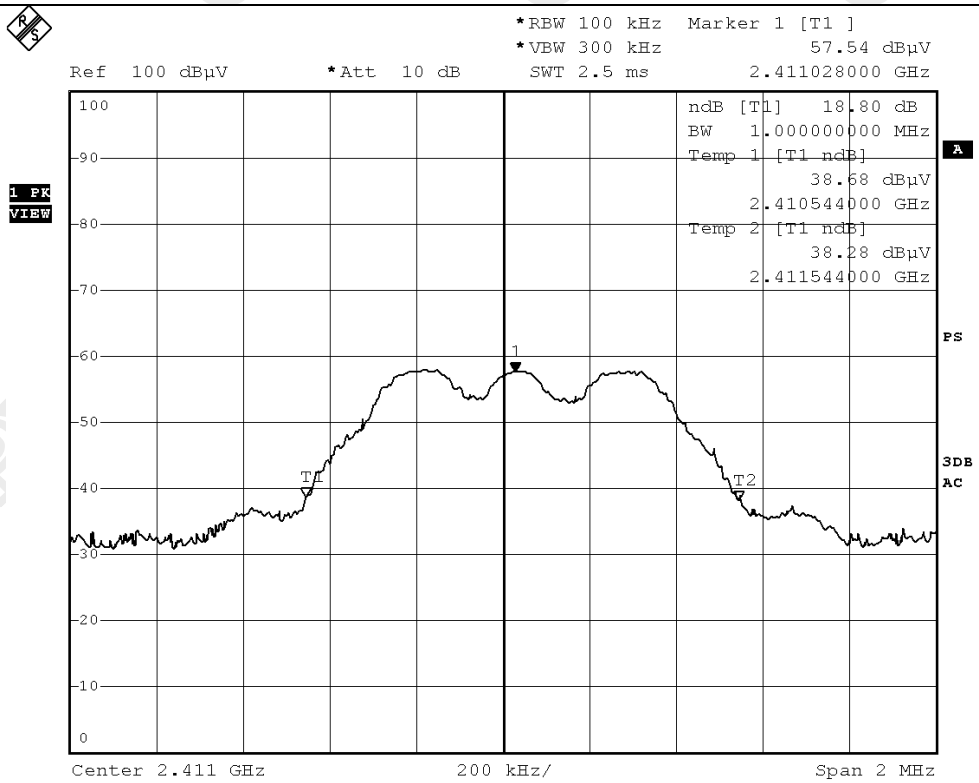
20dB Bandwidth of Fundamental Emission



Limits for 20dB Bandwidth of Fundamental Emission (High Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [kHz]
2411	1000

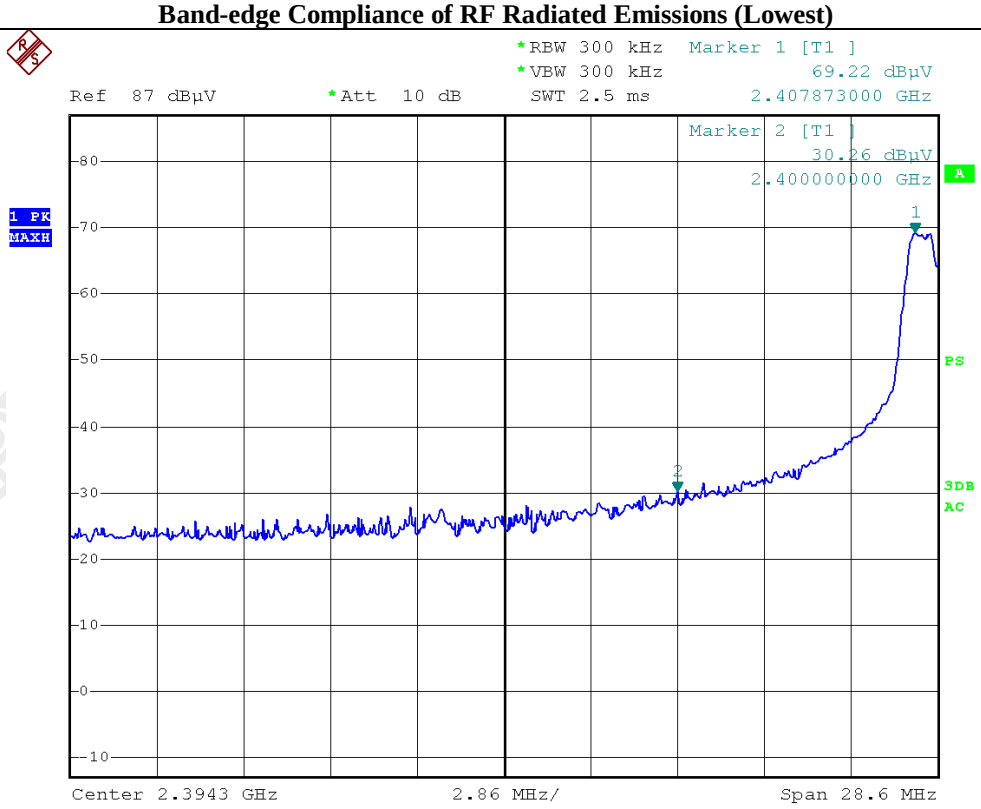
20dB Bandwidth of Fundamental Emission



Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400.0 – Lowest Fundamental (2408.0)	38.96

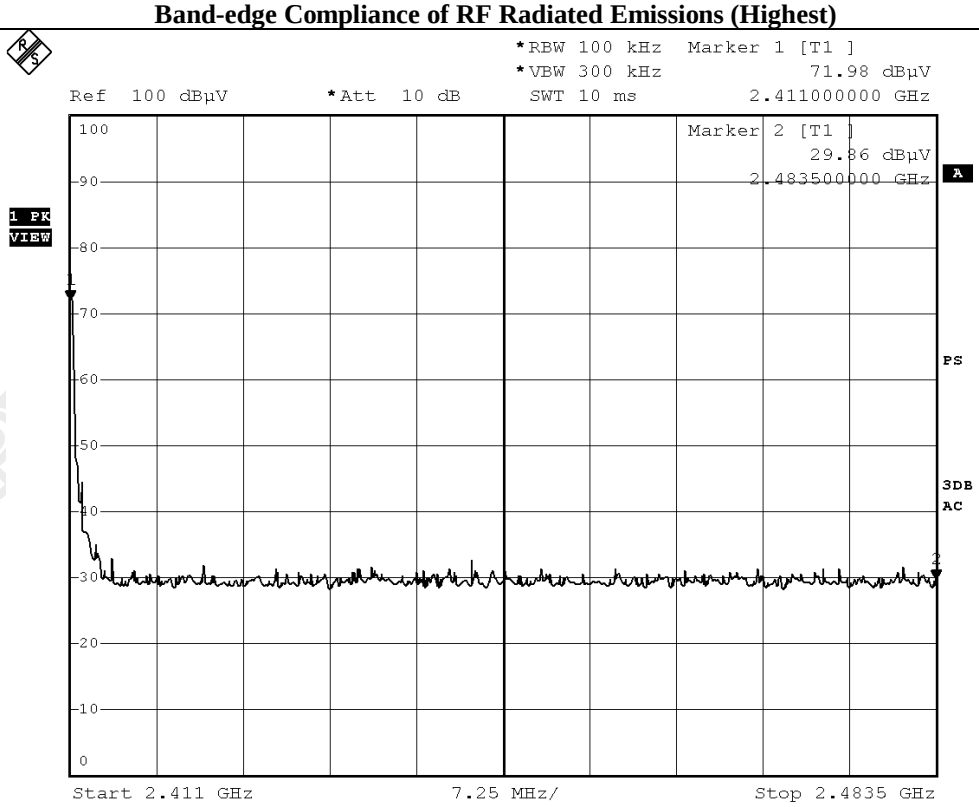
Band-edge Compliance of RF Radiated Emissions (Lowest)



Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental (2411.0) - 2483.5	42.12

Band-edge Compliance of RF Radiated Emissions (Highest)



Appendix A

List of Measurement Equipment

RADIATED EMISSION

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD015	Signal Generator	MARCONI INSTRUMENTS	2030	112191/012	2013.03.09	2014.03.08
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	100388	2012.07.06	2013.07.05
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2012.11.03	2014.11.02
EMD062	Double-Ridged Waveguide (1 – 18GHz)	ETS.LINDGREN	3117	00075933	2012.11.28	2014.11.27
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo lnstrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2012.03.26	2014.03.25
EMD131	Standard Gain Horn Antenna	Chengdu AINFO lnc.	JXTXLB-42-15-C-KF	J2021100721001	2013.01.25	2015.01.24

Remarks:-

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

Appendix B

Duty Cycle Correction During 100msec

Each sample unit sends a different series of characters, but each pulse period (100msec) never exceeds a series of 33 (1.06msec) pulses. Assuming any combination of sole pulses may be obtained due to encoding the worst case transmit duty cycle would be considered 33 x 1.06msec per 100msec=34.98% duty cycle. Figure A through B show the characteristics of the pulse train for one of these functions.

Remarks:

Duty cycle factor = 20Log [(33*1.06ms/100] = - 9.1dB
Duty Cycle Correction = -20dB, if the calculation duty cycle correction >-20dB.

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

Figure A [Pulse Train]

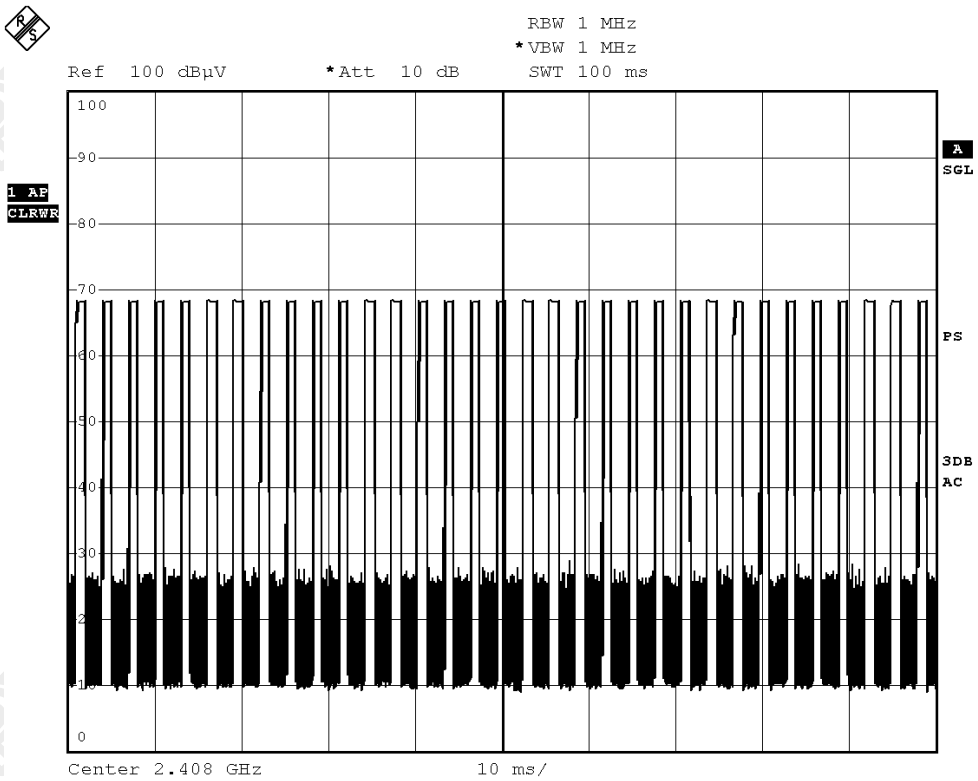
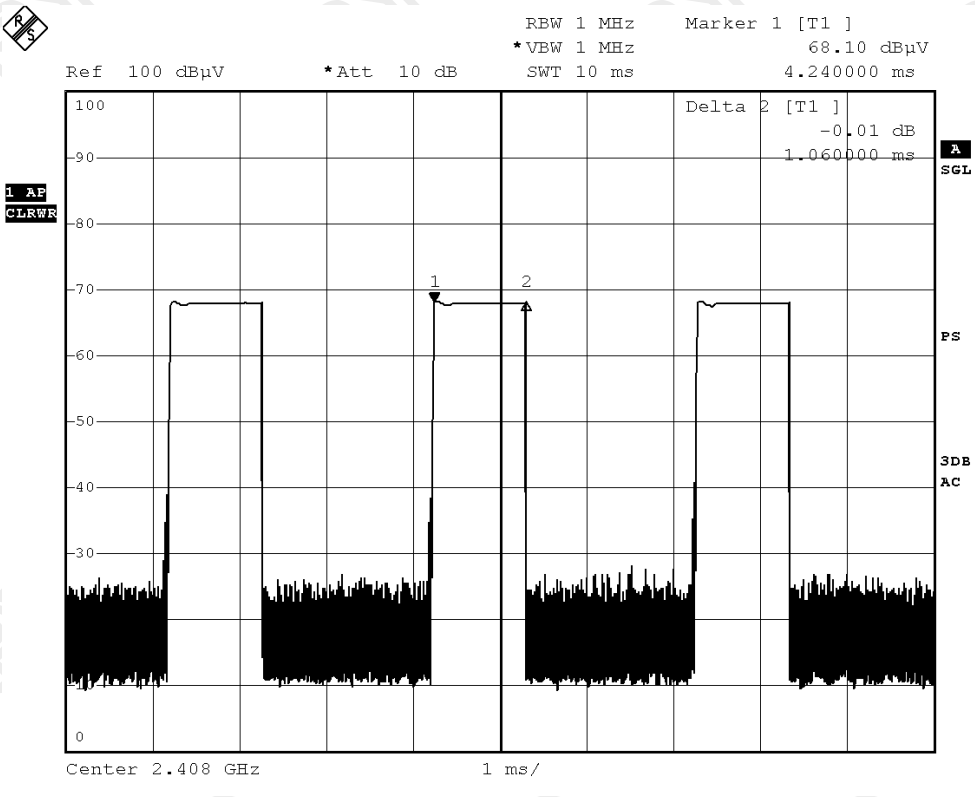


Figure B [Pulse Train]



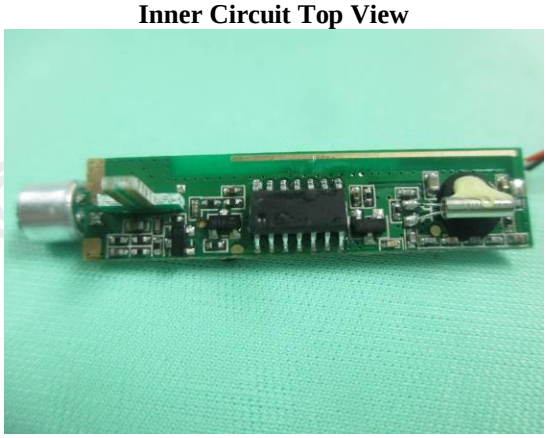
Appendix C

Photographs of EUT

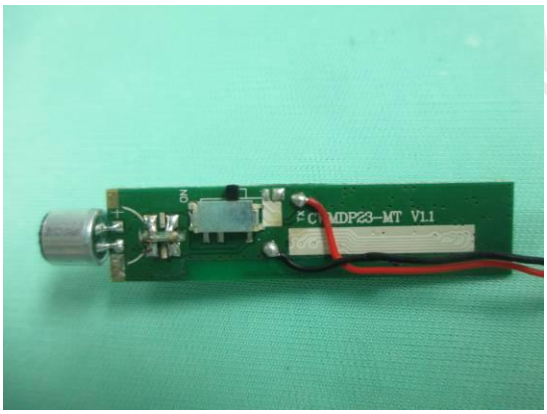
Front View of the product

Rear View of the product

Inner Circuit Top View

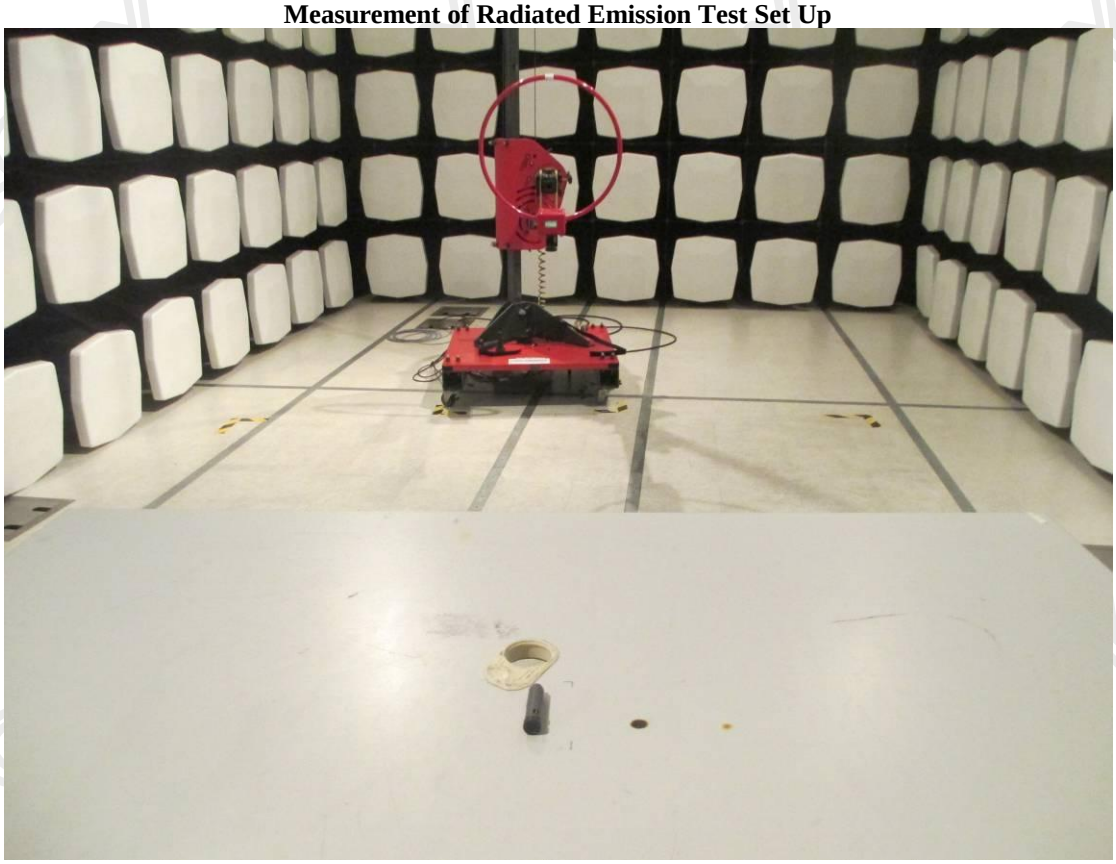


Inner Circuit Bottom View



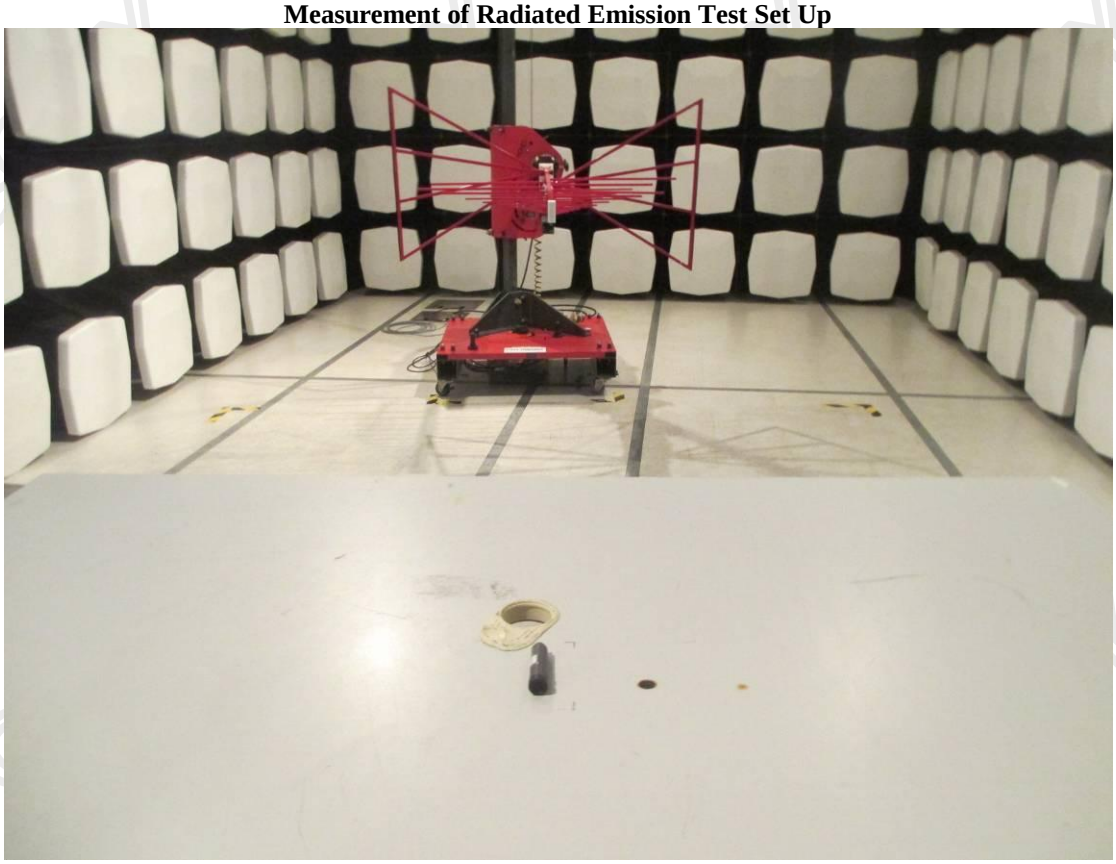
Photographs of EUT

Measurement of Radiated Emission Test Set Up



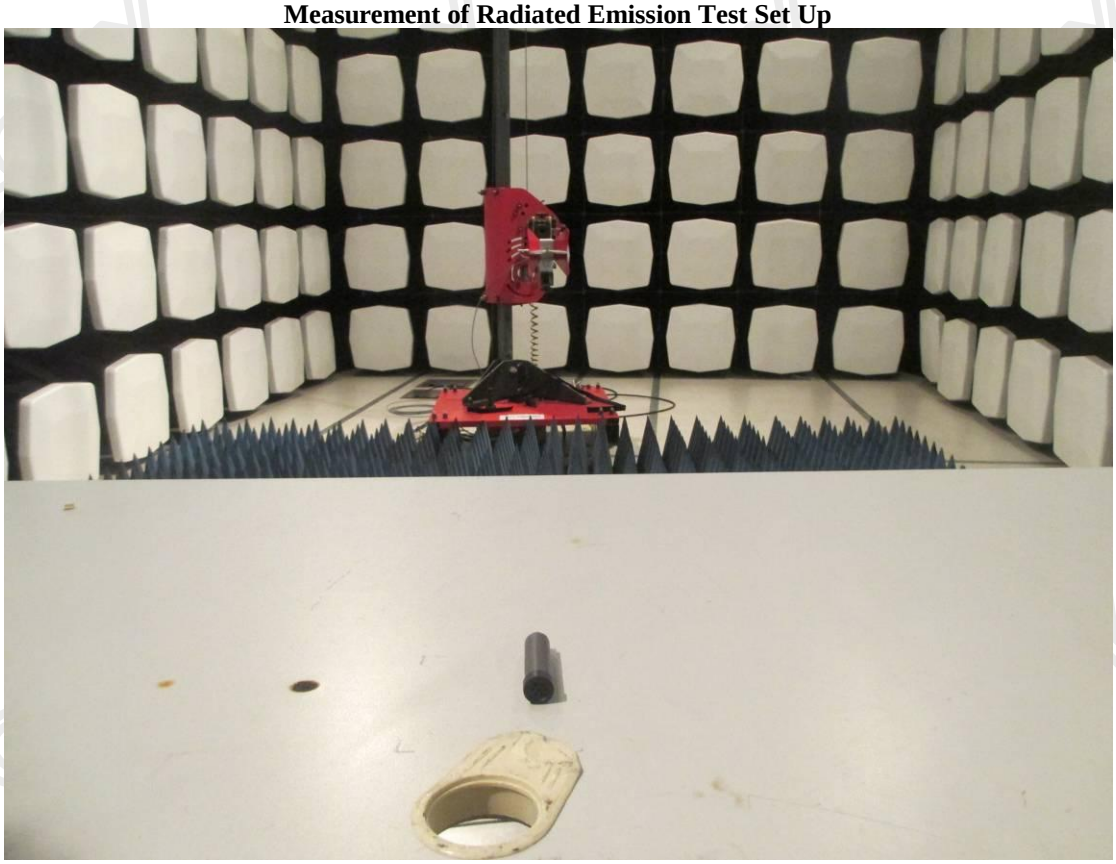
Photographs of EUT

Measurement of Radiated Emission Test Set Up



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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