Test Report

Date : 2017-07-28
No. : HM170650

Applicant:	Elexa Consumer Products Inc. Suite 333, 2275 Half Day Road, Bannockburn, IL 60015, USA
Manufacturer:	Zmartgears Limited 4/F, Building A3, Digital Tech Park, Gaoxin South 7th Rd. Science Park, Nanshan District, SZ 518057, GD, CN
Description of Sample(s):	Product: Door/Window Sensor Brand Name: DOME Model Number: DMDP1 FCC ID: VII-DMDP1
Date Sample(s) Received:	2017-03-08
Date Tested:	2017-03-22 to 2017-07-12
Investigation Requested:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2016 and ANSI C63.10:2013 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):	This Laboratory Report supersedes our previous Test Reports No. HM170650 issued on 2017-07-14, 2017-07-25 and 2017-07-27 which are hereby deemed null and void.

CHEUNG, Chi Kenneth
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

Test Report

CONTENT:

1.0 General Details

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

Product:	Door/Window Sensor
Manufacturer:	Zmartgears Limited 4/F, Building A3, Digital Tech Park, Gaoxin South 7th Rd. Science Park, Nanshan District, SZ 518057, GD, CN
Brand Name:	Dome
Model Number:	DMDP1
Rating:	3.6Vd.c. ("ER14505" Lithium Battery x 1)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Door/Window Sensor of Zmartgears Limited, it consists of one 900MHz transmitter that is able to transmit RF signal either in 908.4MHz or 916MHz carrier frequency while the EUT has been triggered (open-close-open mode), after that the EUT will transmit RF signal once in every hour (sanity check mode).

1.3 Date of Order

2017-03-09

1.4 Submitted Sample(s):

2 Sample(s)

1.5 Test Duration

2017-03-22 to 2017-07-24

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: 2016 Regulations and ANSI C63.10:2013 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
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.231	ANSI C63.10:2013	N/A	☒	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Field Strength of Fundamental & Harmonics Emissions

Test Requirement:	FCC 47CFR 15.231, (a) (1) FCC 47CFR 15.231, (a) (3)
Test Method:	ANSI C63.10:2013
Test Date:	2017-03-22
Mode of Operation:	Tx Test Mode (operating continuously for Radiated emission test) Open-close-open mode (15.231, (a) (1)) Sanity check mode (15.231, (a) (3))

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.

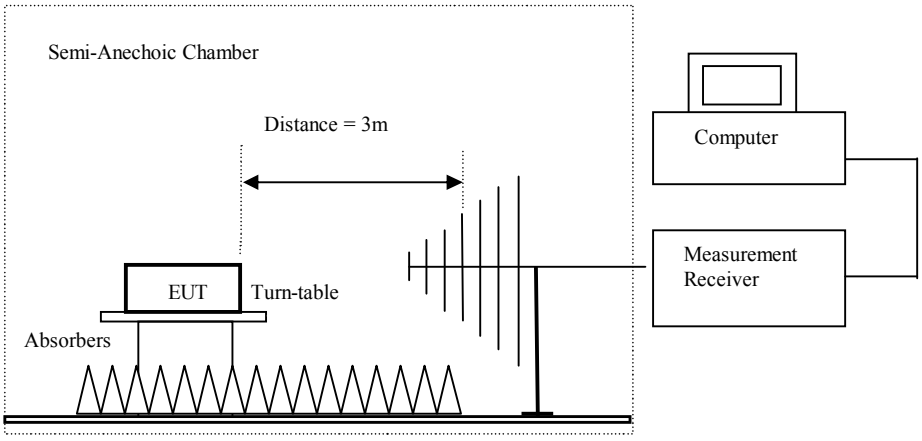
Remark: 3 orthogonal axis apply to hand-held device only.

*: Semi-anechoic chamber located on the 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:



Ground Plane

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

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

Fundamental frequency [MHz]	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3,750 [1]	125 to 375 [1]
174-260	3,750	375
260-470	3,750 to 12,500 [1]	375 to 1250 [1]
Above 470	12,500	1250

[1] Linear interpolations

Result of Tx Test Mode, (Lowest Channel): Pass

Field Strength of Fundamental and Harmonics 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
908.4	67.3	24.3	91.6	38,018.9	125,000	Vertical
1816.8	19.0	24.6	43.6	151.4	12,500	Vertical
* 2752.2	12.8	29.3	42.1	127.4	5,000	Vertical
* 3633.6	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 4542.0					5,000	Vertical
* 5450.4					5,000	Vertical
6358.8					5,000	Vertical
* 7267.2					5,000	Vertical
* 8175.6					5,000	Vertical
* 9084.0					5,000	Vertical

Field Strength of Fundamental and Harmonics 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
908.4	56.1	24.3	80.4	10,471.3	12,500	Vertical
1816.8	7.8	24.6	32.4	41.7	1,250	Vertical
* 2752.2	1.6	24.3	25.9	19.7	500	Vertical
* 3633.6	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 4542.0					500	Vertical
* 5450.4					500	Vertical
6358.8					500	Vertical
* 7267.2					500	Vertical
* 8175.6					500	Vertical
* 9084.0					500	Vertical

Note: Field Strength adjusted by Duty Cycle Correction Factor

Result of Tx Test Mode, (Highest Channel): Pass

Field Strength of Fundamental and Harmonics 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
916.0	66.7	24.6	91.3	36,728.2	125,000	Horizontal
1832.0	18.4	24.8	43.2	144.5	12,500	Horizontal
2748.0	14.3	29.3	43.6	151.4	5,000	Horizontal
* 3664.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Horizontal
4580.0					5,000	Horizontal
5496.0					5,000	Horizontal
6412.0					5,000	Horizontal
* 7328.0					5,000	Horizontal
8244.0					5,000	Horizontal
9160.0					5,000	Horizontal

Field Strength of Fundamental and Harmonics 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
916.0	55.5	24.6	80.1	10,115.8	12,500	Horizontal
1832.0	7.2	24.8	32.0	39.8	1,250	Horizontal
2748.0	3.1	29.3	32.4	41.7	500	Horizontal
* 3664.0	Emissions detected are more than 20 dB below the FCC Limits				500	Horizontal
4580.0					500	Horizontal
5496.0					500	Horizontal
6412.0					500	Horizontal
* 7328.0					500	Horizontal
8244.0					500	Horizontal
9160.0					500	Horizontal

Note: Field Strength adjusted by Duty Cycle Correction Factor

Remarks:

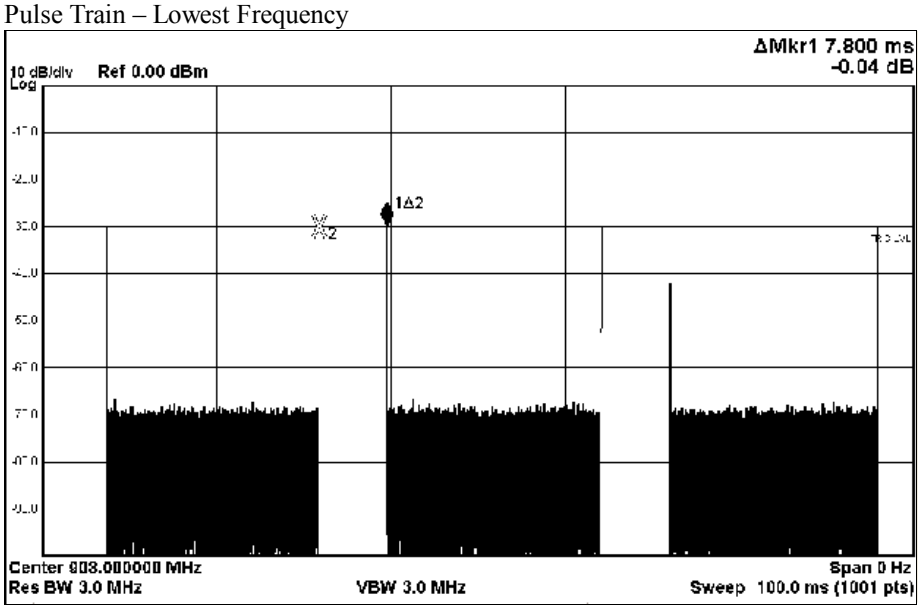
No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

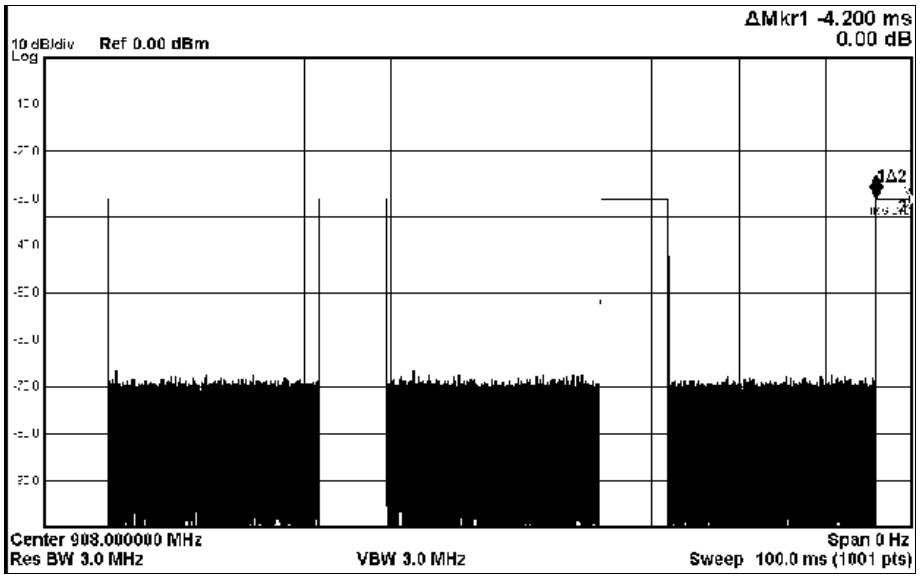
*: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty	:	9kHz to 30MHz	3.7dB
		30MHz to 18GHz	5.0dB

Pulse Averaging Measurement

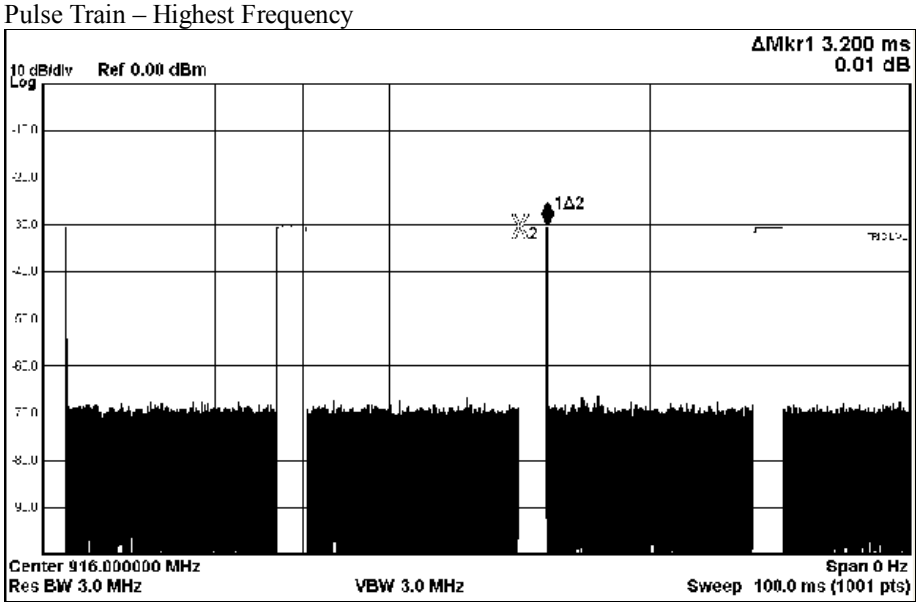
Pulse Train – Lowest Frequency





3.54 pulse within 100ms
Duty cycle of TX = ((7.8 x3) + 4.2)/100 = 0.276
Duty cycle correction factor = 20 log (0.276) = -11.2dB

Pulse Train – Highest Frequency



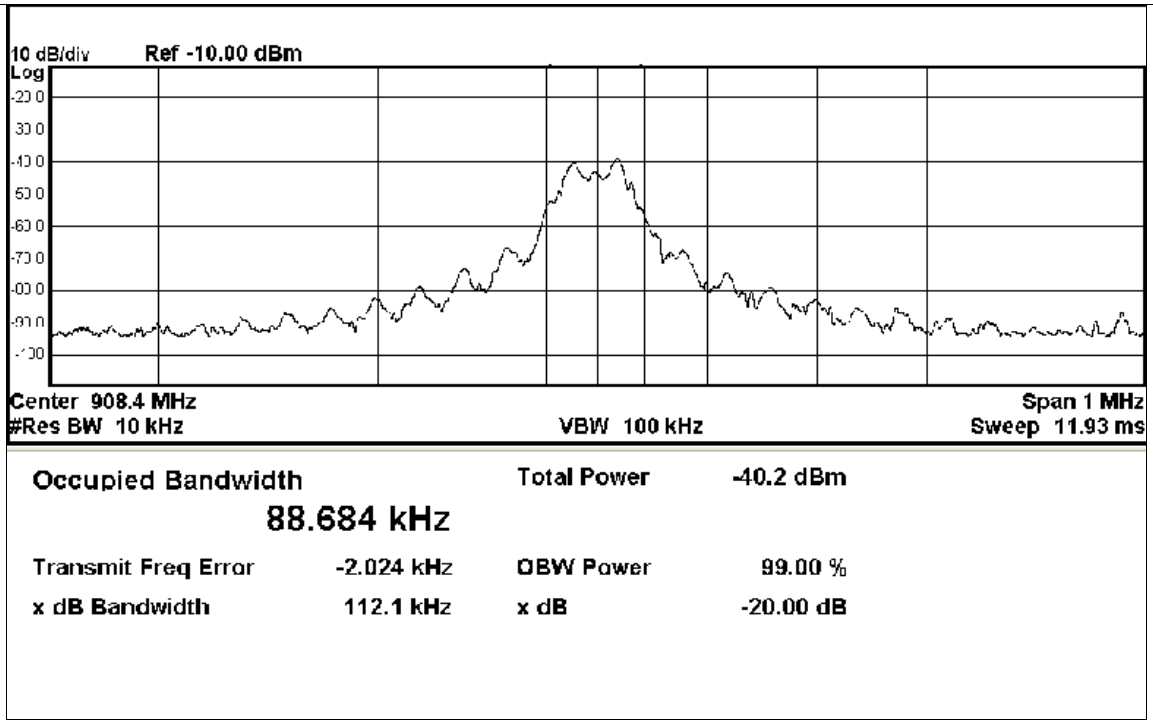
4 pulses within 100ms
Duty cycle of TX = (3.2 x 4)/100 = 0.128
Duty cycle correction factor = 20 log (0.128) = -17.9dB

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency [MHz]	20dB Bandwidth [kHz]	Limit [kHz]
908.4	112.1	0.5%*908.4 MHz = 4542.0

Tx mode – Lowest Channel

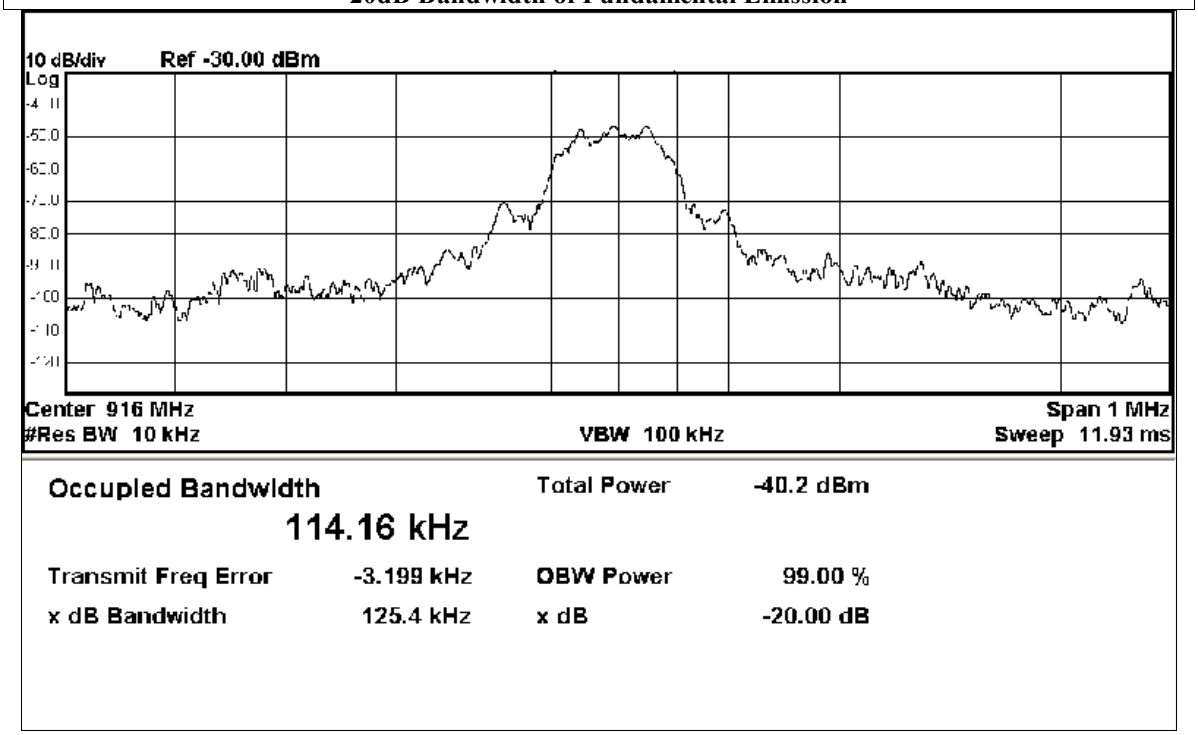
20dB Bandwidth of Fundamental Emission



Frequency [MHz]	20dB Bandwidth [kHz]	Limit [kHz]
916.0	125.4	0.5%*916.0 MHz = 4580.0

Tx mode – Highest Channel

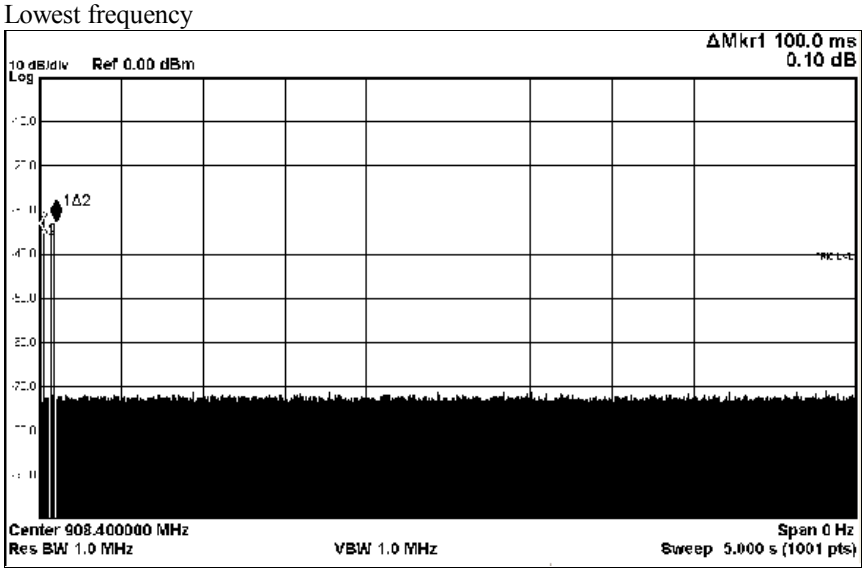
20dB Bandwidth of Fundamental Emission

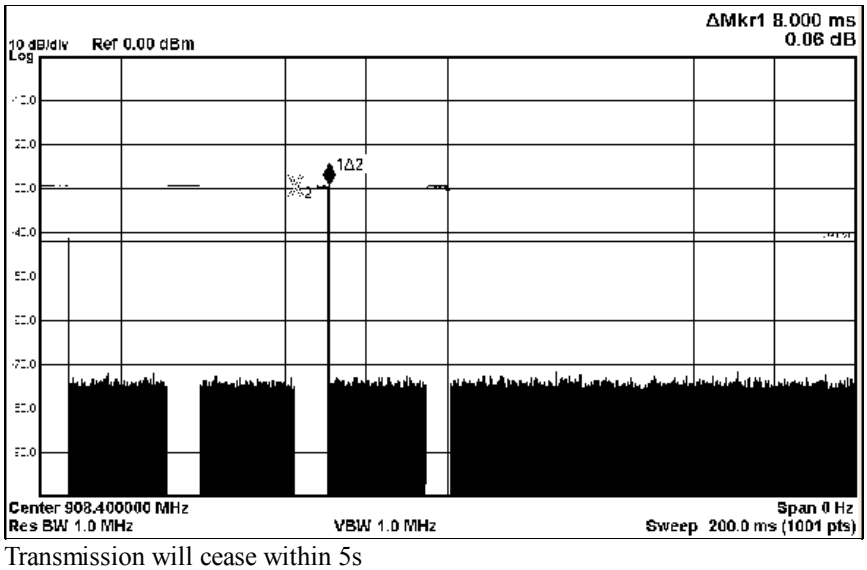


Transmitter deactivation Measurement:

Devices operated under the 15.231(a)(1) , a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

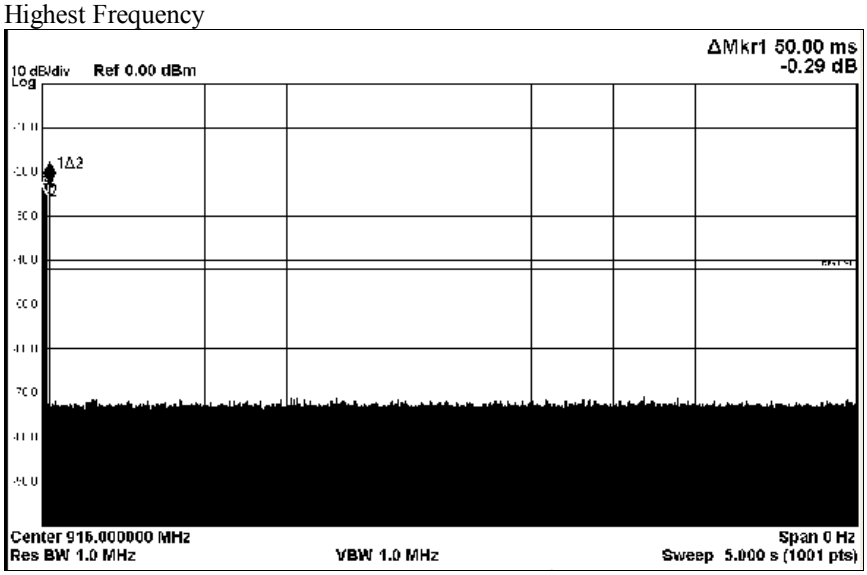
Lowest frequency

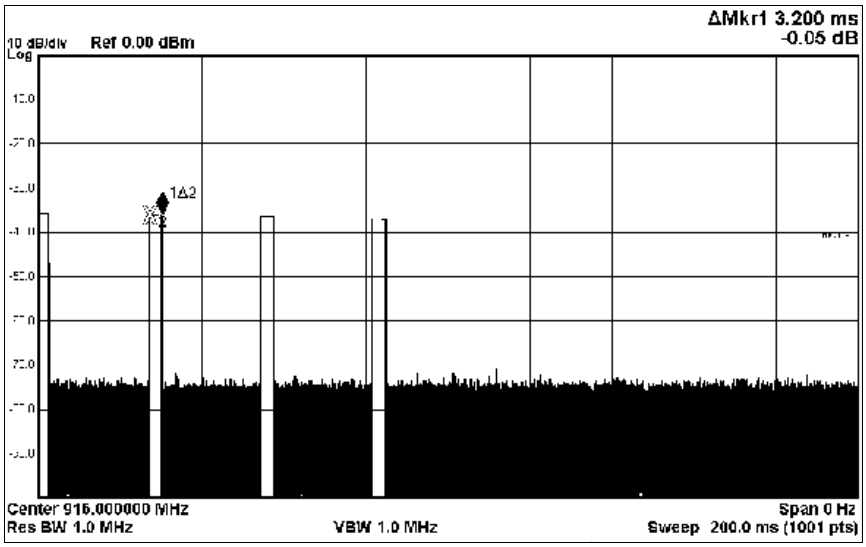




Transmission will cease within 5s

Highest Frequency



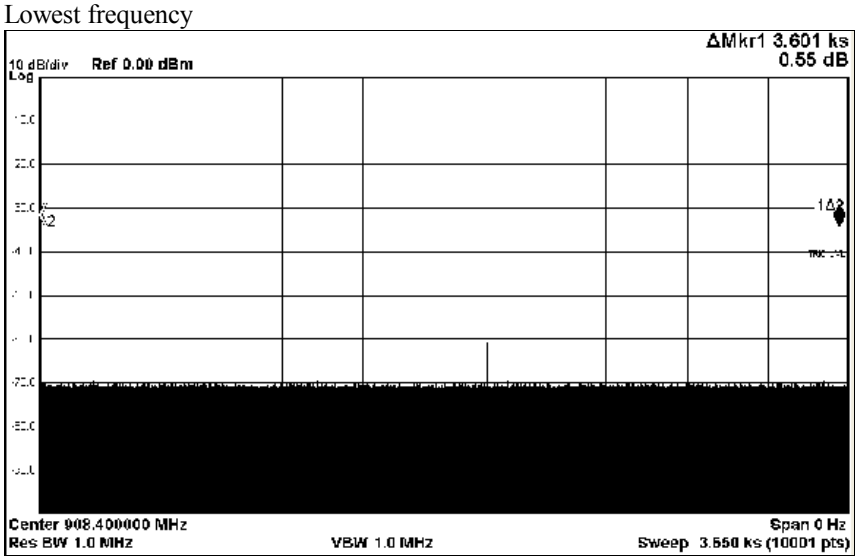


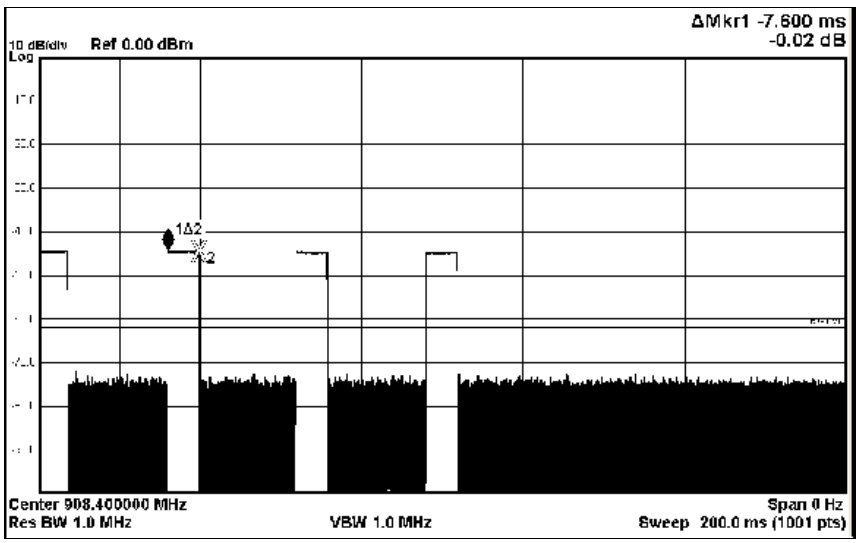
Transmission will cease within 5s

Transmitter deactivation Measurement:

Devices operated under the 15.231(a)(3), periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

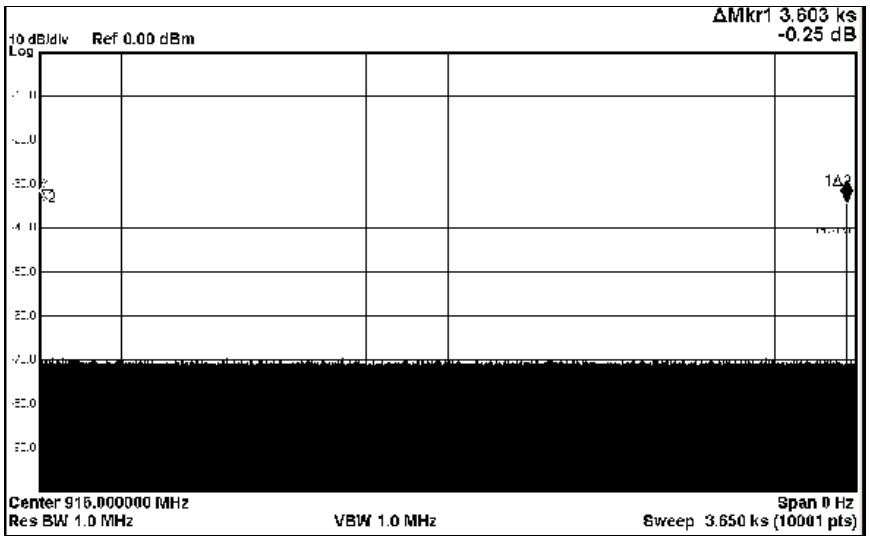
Lowest frequency

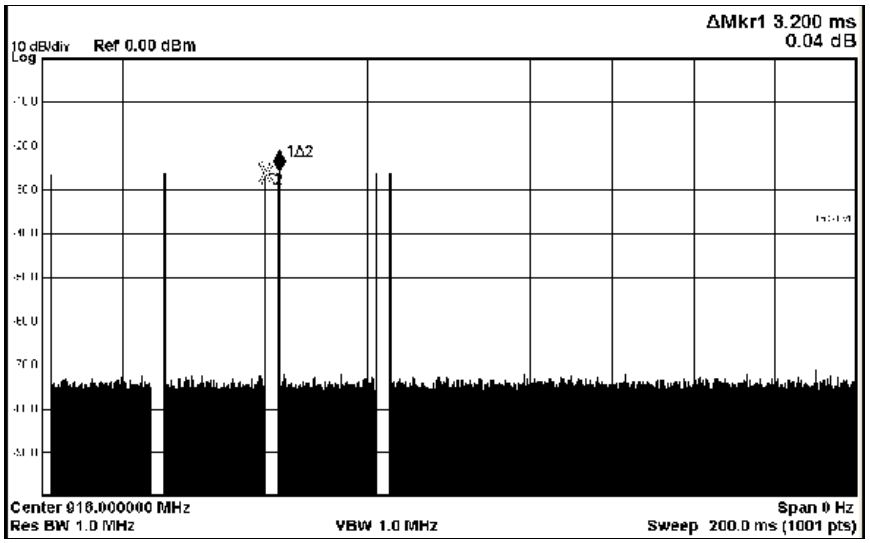




Total Transmission time = 7.6 x 4 = 30.4ms

Highest Frequency





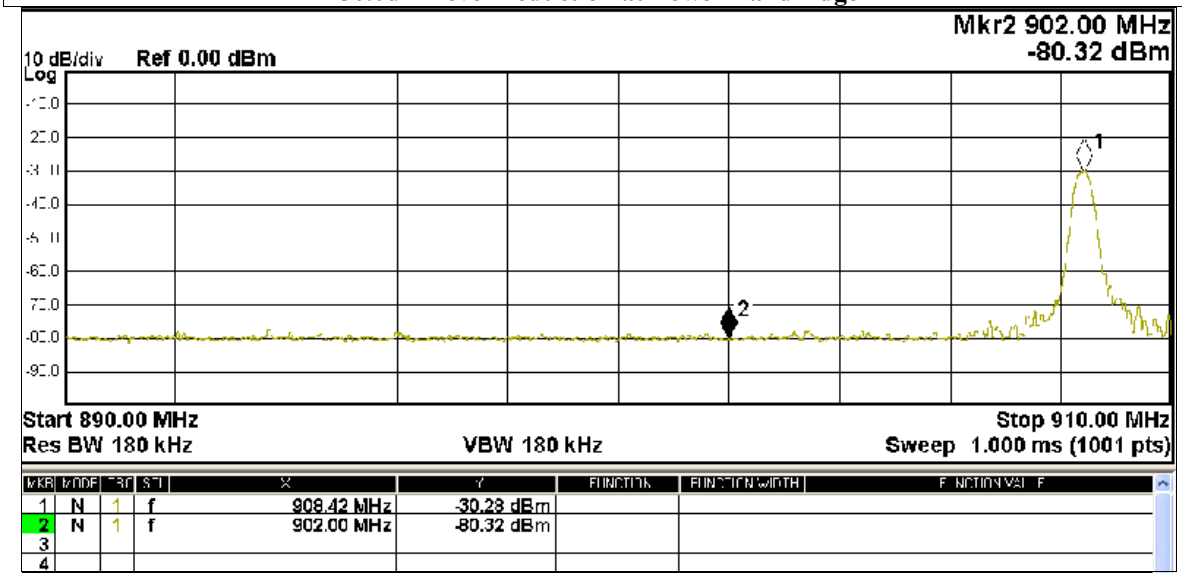
Transmission period = 3.2 x 4 = 12.8ms

Total transmit time < 2s in 1 hour observed period

Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
908.4 – Lowest Fundamental	50.0

50.0dB Level Reduction at Lower Band Edge

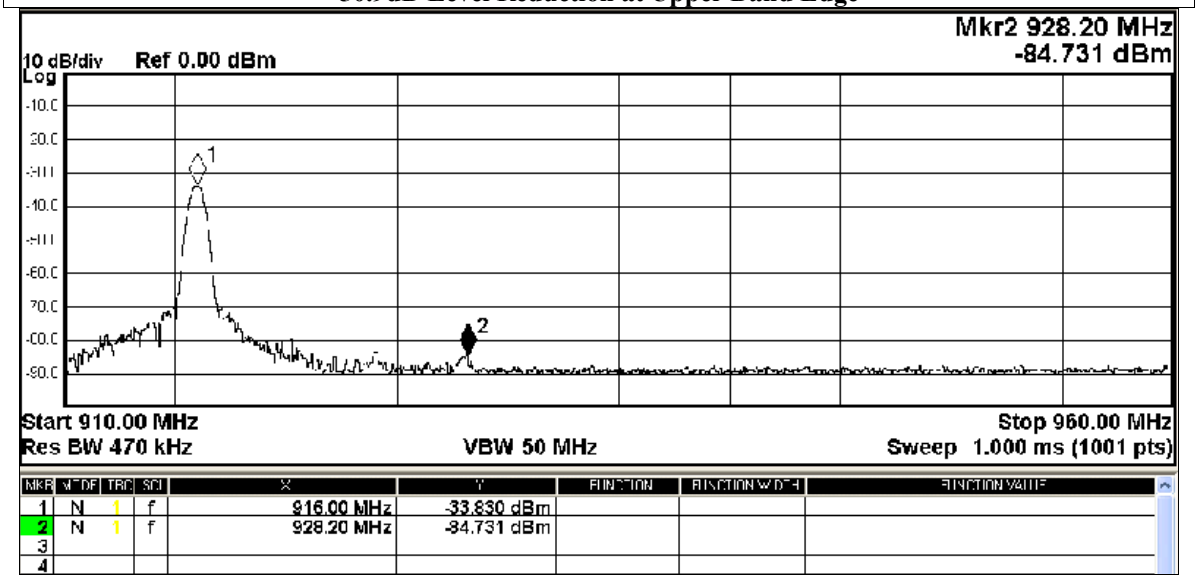


Field Strength of Fundamental and Harmonics Emissions Quasi-Peak Value						
Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
901.8	6.3	24.3	30.6	33.9	200	Vertical

Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
916.0 – Highest Fundamental	50.9

50.9dB Level Reduction at Upper Band Edge



Field Strength of Fundamental and Harmonics Emissions Quasi-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
928.2	9.3	24.3	33.6	47.9	200	Vertical

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 Test Mode, (9kHz – 30MHz): PASS
Emissions detected are more than 20 dB below the FCC Limits

Result of Tx Test Mode, (30MHz – 1GHz): PASS

Field Strength of Fundamental and Harmonics Emissions Quasi-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
63.1	0.3	9.2	9.5	3.0	100	Vertical
101.7	0.1	10.3	10.4	3.3	150	Vertical
210.4	0.2	14.0	14.2	5.1	150	Horizontal
246.5	0.7	15.7	16.4	6.6	200	Horizontal
337.9	0.5	18.6	19.1	9.0	200	Horizontal
421.3	0.5	21.1	21.6	12.0	200	Horizontal

Result of Tx Test Mode, (1GHz – 18GHz): PASS
Emissions detected are more than 20 dB below the FCC Limits

Appendix A

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2017/04/21	2018/04/21
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM354	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00142073	2016/02/29	2018/02/29
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2017/06/15	2018/06/15
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2016/03/16	2018/03/16

Remarks:

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

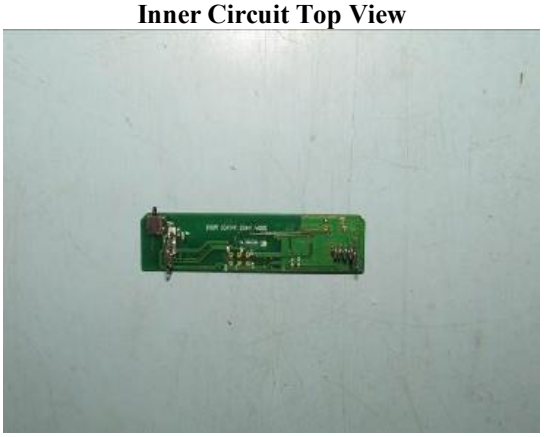
Appendix B

Photographs of EUT

Front View of the product

Rear View of the product

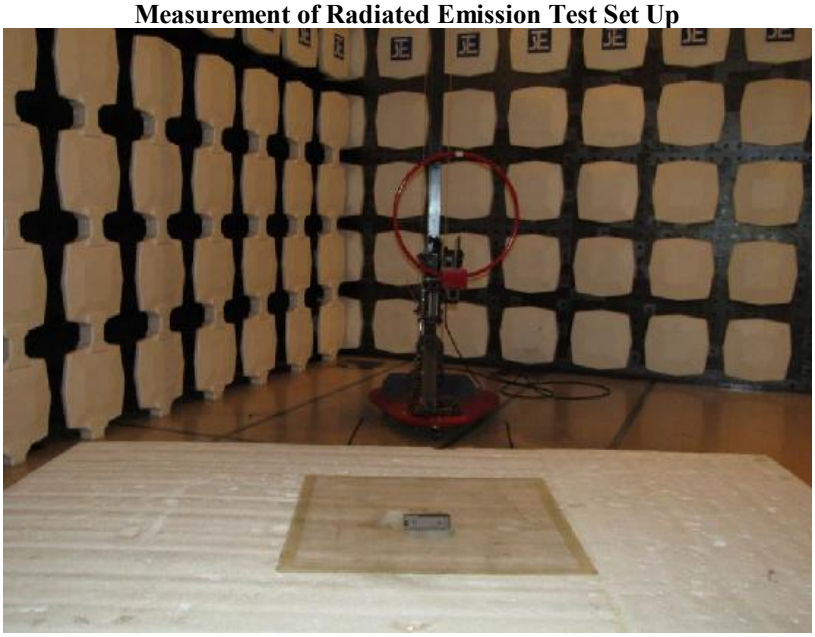
Inner Circuit Top View



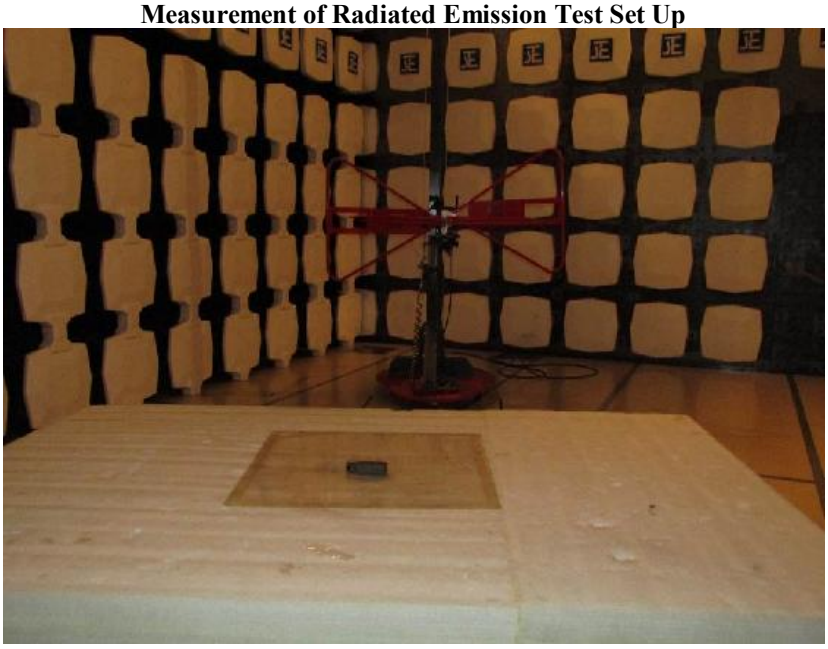
Inner Circuit Bottom View

Photographs of EUT

Measurement of Radiated Emission Test Set Up

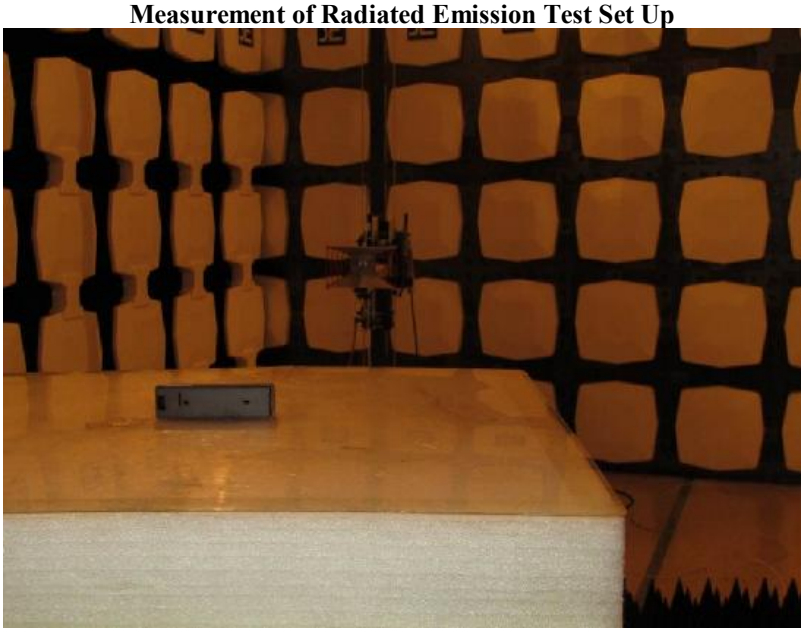


Measurement of Radiated Emission Test Set Up



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by The Hong Kong Standards & Testing Centre Limited (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The Company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by the Company as a result of this application for testing service (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to his customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The Report refers only to the sample tested and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.

5. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

10. Issuance records of the Report are available on the internet at www.stc-group.org. Further enquiry of validity or verification of the Reports should be addressed to the Company.