STC Test Report

Date : 2009-05-18
No. : HM163553

Applicant (XLI001): X 10 (USA) Inc.
620 Naches Ave SW, Building A, Renton Washington, United States

Manufacturer: X-10 Electronics (Shenzhen) Co., Ltd.
Together Rich Industrial Park B, Sanwei Industrial District, Xixiang Town, Baoan County, Shenzhen, China

Description of Samples:

Product:	2.4GHz Wireless Camera
Brand Name:	X10
Model Number:	XC22A
FCC ID:	B4S-XC22A

Date Samples Received: 2009-05-06

Date Tested: 2009-05-15

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2008 and ANSI C63.4:2003 for FCC Certification.

Conclusions: 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.

Remarks: ----

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 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

1.2 Applicant Details

Applicant

X 10 (USA) Inc.
620 Naches Ave SW, Building A, Renton Washington, United States

Manufacturer

X-10 Electronics (Shenzhen) Co., Ltd.
Together Rich Industrial Park B, Sanwei Industrial District, Xixiang Town, Baoan County, Shenzhen, China

1.3 Equipment Under Test [EUT]

Description of Sample

Product:	2.4GHz Wireless Camera
Manufacturer:	X-10 Electronics (Shenzhen) Co., Ltd.
Brand Name:	X10
Model Number:	XC22A
Input Voltage:	9Vd.c. with jack

The AC/DC Adaptor used for the tests was provided by the applicant with the following details: Two pins (Live / Neutral) only adaptor, Model Number: XM20A, Input: 120Va.c. 60Hz 3W, Output: 9Vd.c. 120mA

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a X 10 (USA) Inc., the 2.4GHz channel frequency is controlled by pull low the three channel control pins. The transmission with channel frequency range is 2414MHz-2468MHz.

1.4 Date of Order

2009-05-06

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2009-05-15

1.7 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: 2008 Regulations 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	Fail	N/A
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.107	ANSI C63.4:2003	Class B	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

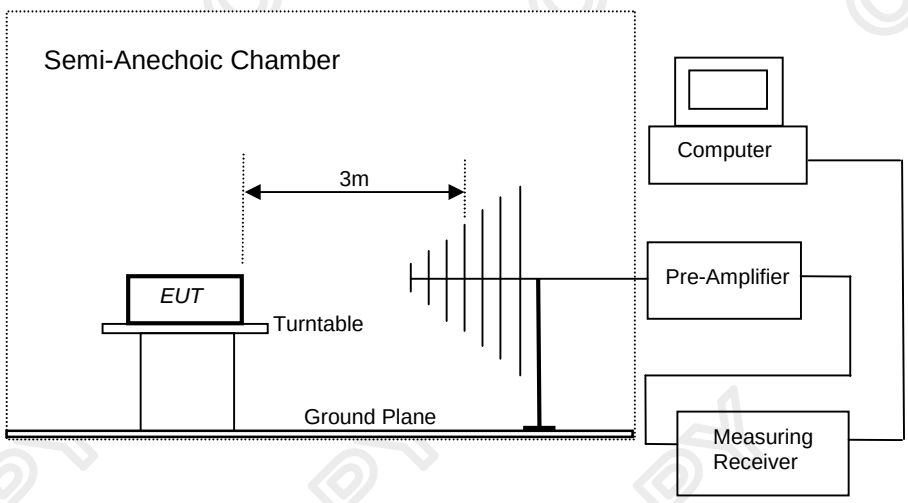
Test Requirement:	FCC 47CFR 15.249
Test Method:	ANSI C63.4:2003
Test Date:	2009-05-15
Mode of Operation:	Tx mode

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:



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	50,000 [Average]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Tx mode (Channel A): 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
2414.0	58.0	29.1	87.1	22,646.4	500,000	Vertical

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
2414.0	54.0	29.1	83.1	14,288.9	50,000	Vertical

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 : 30MHz to 1GHz 5.2dB
1GHz to 18GHz 5.1dB

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	50,000 [Average]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Tx mode (Channel C): 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
2450.0	61.1	29.5	90.6	33,884.4	500,000	Vertical

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
2450.0	57.1	29.5	86.6	21,379.6	50,000	Vertical

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 : 30MHz to 1GHz 5.2dB
1GHz to 18GHz 5.1dB

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	50,000 [Average]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Tx mode (Channel D): 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
2468.0	61.0	29.7	90.7	34,276.8	500,000	Vertical

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
2468.0	57.0	29.7	86.7	21,627.2	50,000	Vertical

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 : 30MHz to 1GHz 5.2dB
1GHz to 18GHz 5.1dB

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

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
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: 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
76.9	Horizontal	21.7	40	12.2	100

Radiated Emissions Average					
Emission Frequency MHz	E-Field Polarity	Level @3m dBμV/m	Limit @3m dBμV/m	Level @3m μV/m	Limit @3m μV/m
4830.0	Vertical	38.7	54	86.1	500
4903.0	Vertical	38.1	54	80.4	500
4937.0	Vertical	41.4	54	117.5	500

Remarks:

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

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB

1GHz to 18GHz 5.1dB

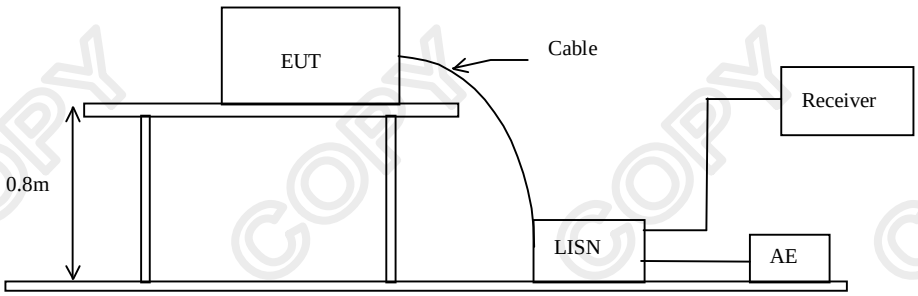
3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2003
Test Date:	2009-05-15
Mode of Operation:	On mode

Test Method:

The test was performed in accordance with ANSI C63.4: 2003, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



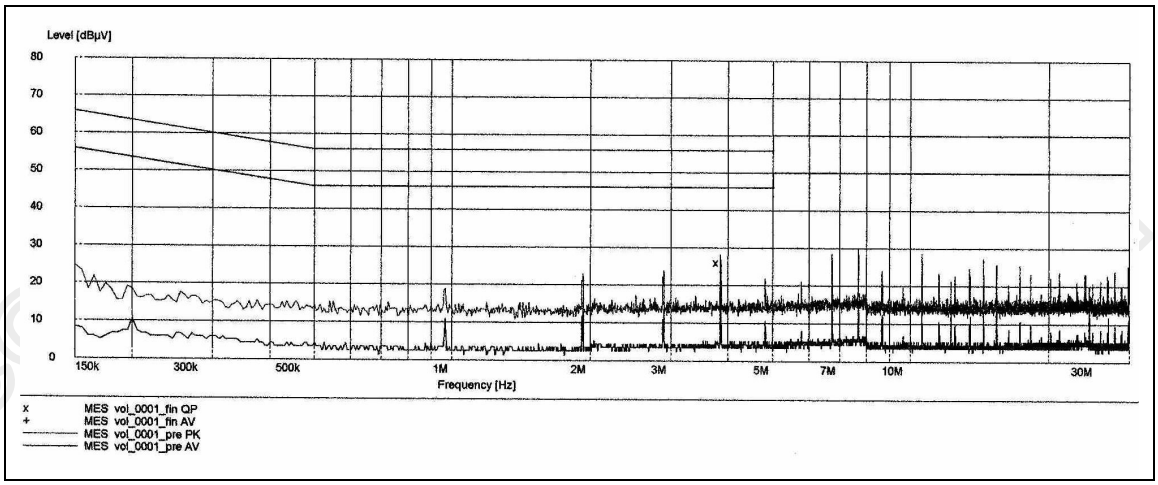
Limit for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of On mode: PASS



Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBμV	Quasi-peak Limit dBμV	Average Level μV	Average Limit μV
Neutral	3.845	26.0	56.0	-*-	-*-
Neutral	3.855	-*-	-*-	14.3	46.0

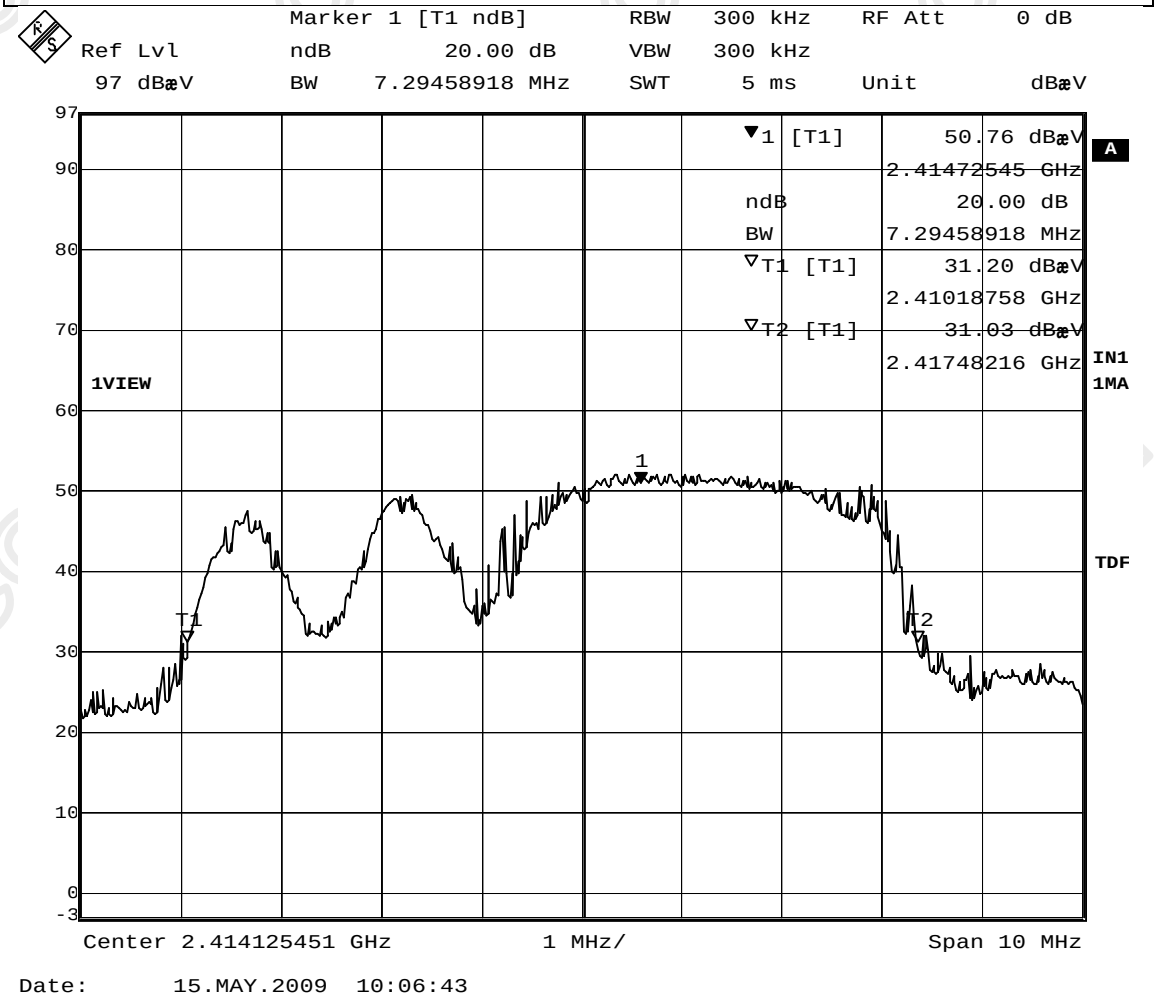
Remarks:
Calculated measurement uncertainty : 3.97dB
-*- Emission(s) that is far below the corresponding limit line.

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2414	7.29

Channel A

20dB Bandwidth of Fundamental Emission



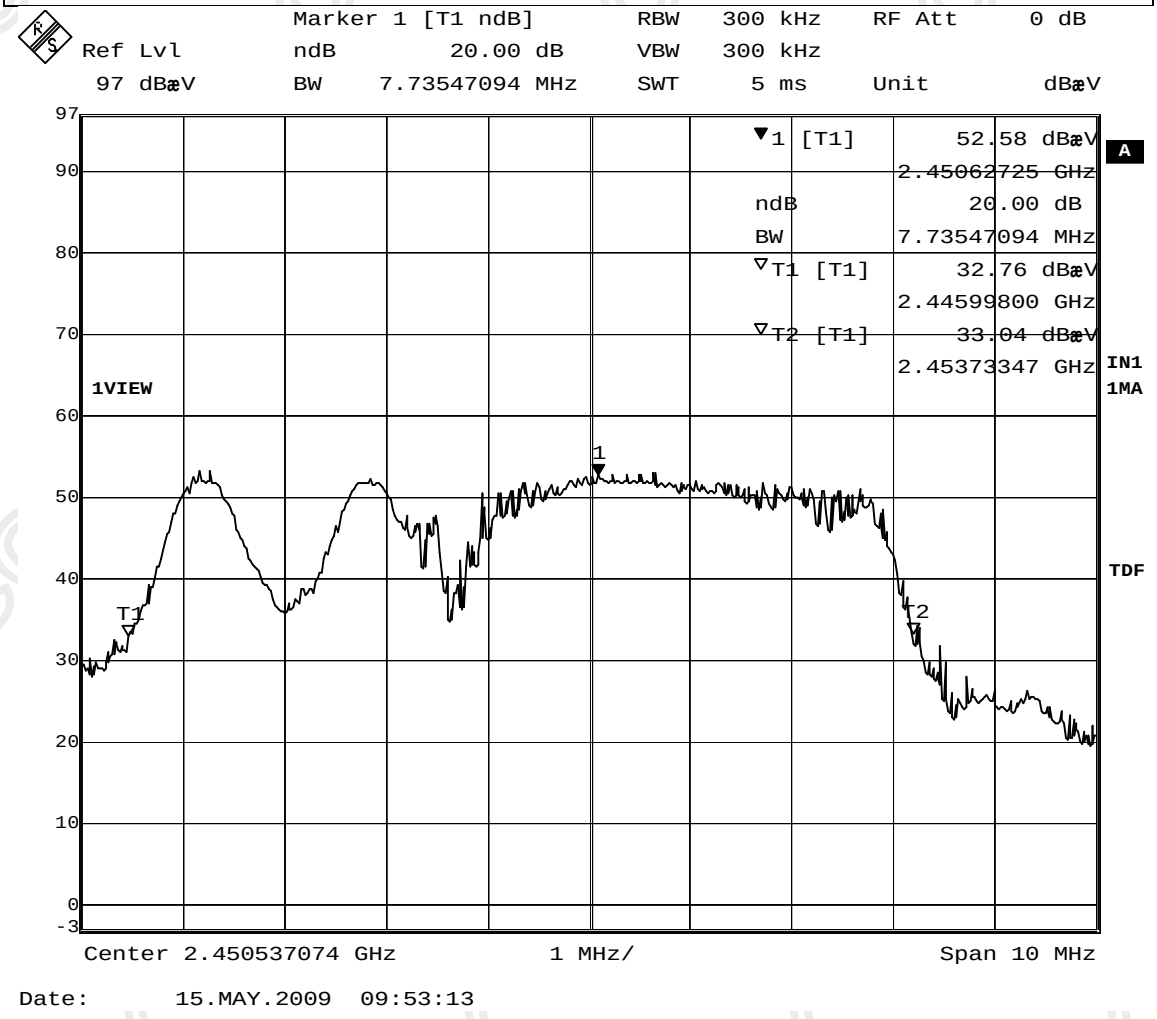
Date: 15.MAY.2009 10:06:43

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2450	7.73

Channel C

20dB Bandwidth of Fundamental Emission



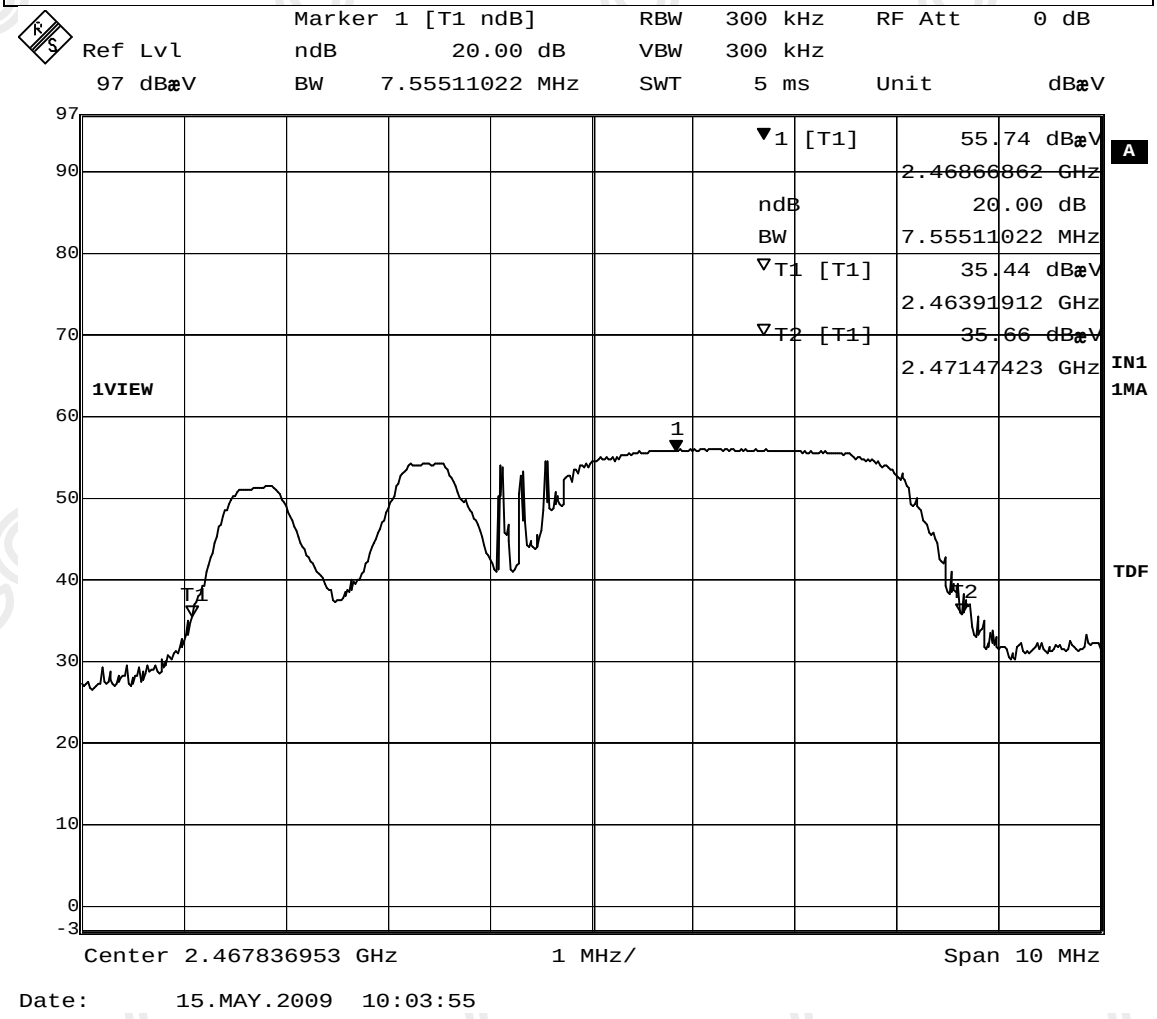
Date: 15.MAY.2009 09:53:13

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2468	7.55

Channel D

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	2006/07/11	2009/07/11
EM215	MULTIDEVICE CONTROLER	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	--	2008/12/01	2011/12/01
EM174	BICONILOG ANTENNA	EMCO	3142B	1671	2008/01/24	2010/01/24
EM194	BICONILOG	EMCO	3142B	1795	2008/09/08	2010/09/08
EM229	EMI Test Receiver	R&S	ESIB40	100248	2008/09/08	2009/09/08
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2006/07/26	2009/07/26

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM197	LISN	EMCO	4825/2	1193	2007/10/30	2009/10/30
EM229	EMI Test Receiver	R&S	ESIB40	100248	2008/09/08	2009/09/08
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2009/01/23	2010/01/23

Remarks:-

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

Appendix B

Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each pulse period (100msec) never exceeds a series of 1501 (0.042msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered 1501x0.042msec per 100msec=63% duty cycle. Figure A through B show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log (0.63) =-4dB

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

Figure A [Pulse Train]

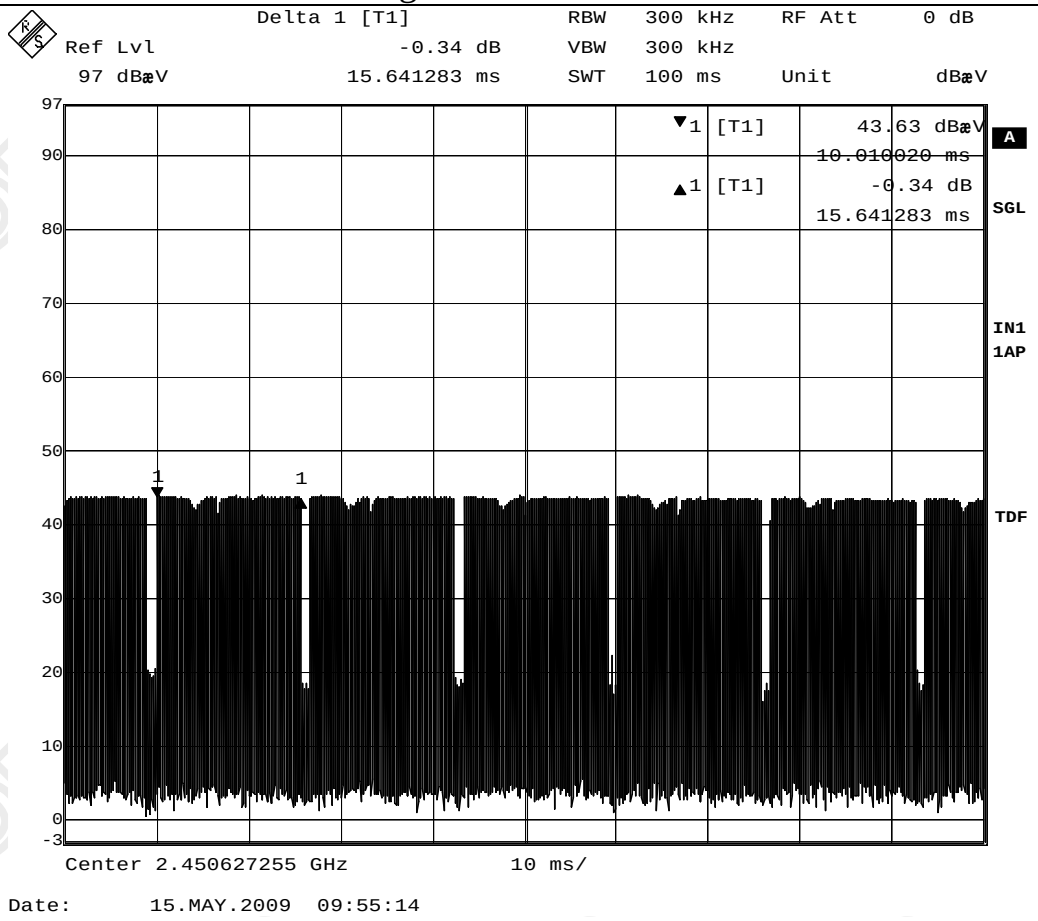
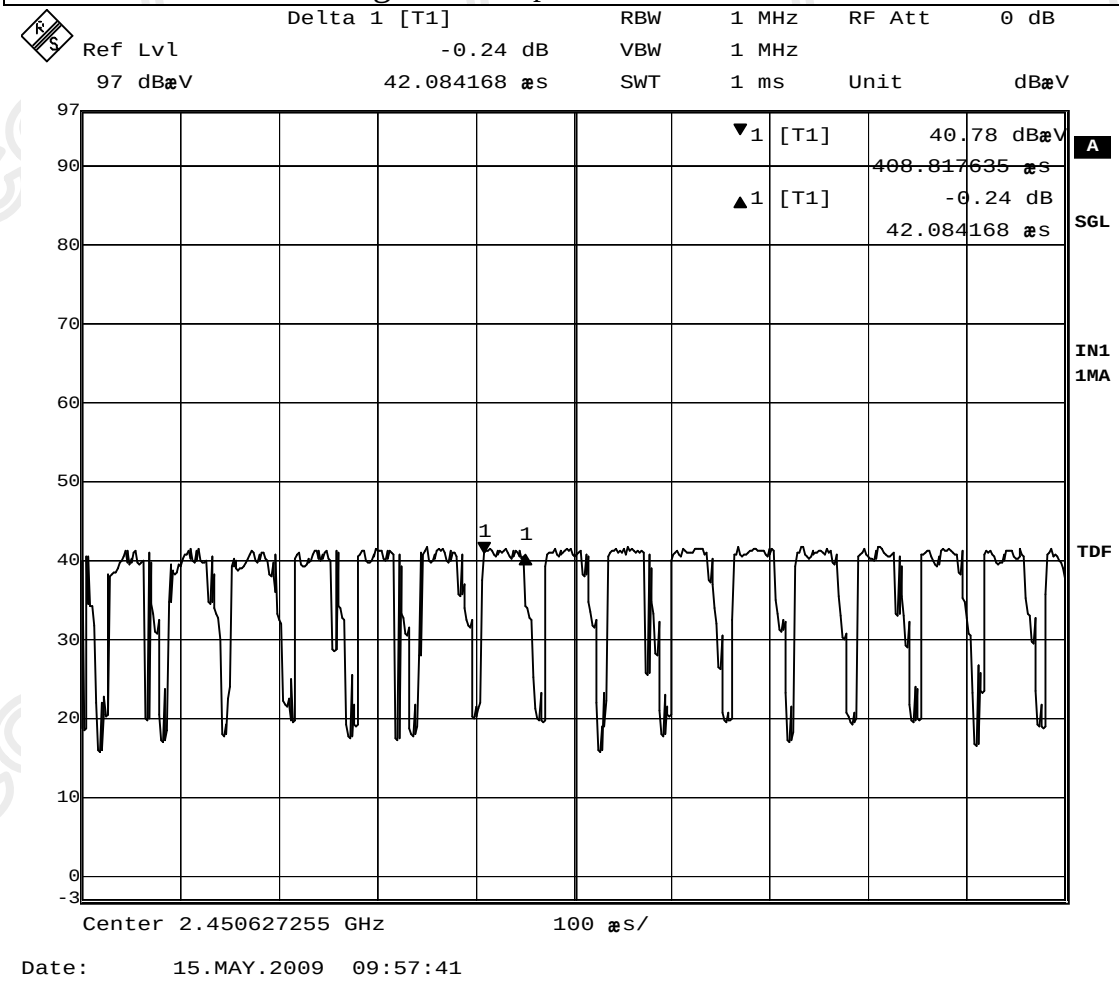


Figure B [16 pulses within 1msec]



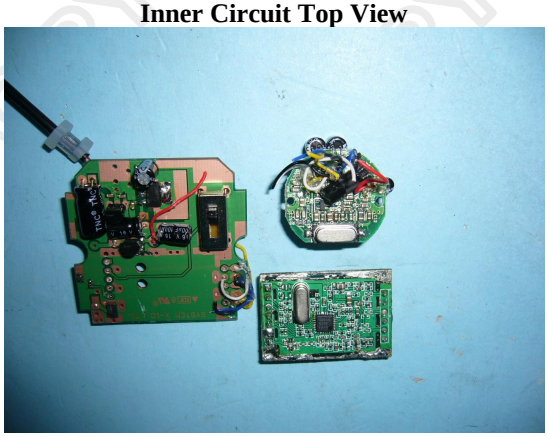
Appendix C

Photographs of EUT

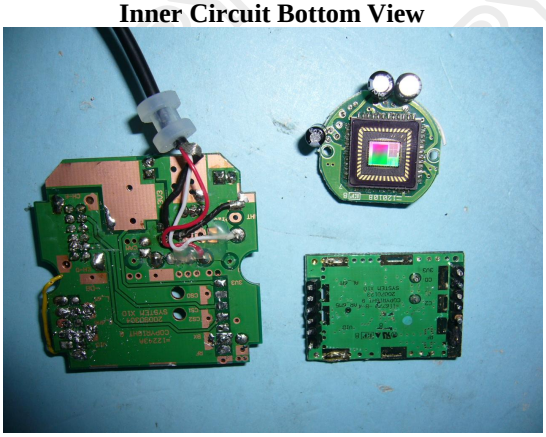
Front View of the product

Rear View of the product

Inner Circuit Top View

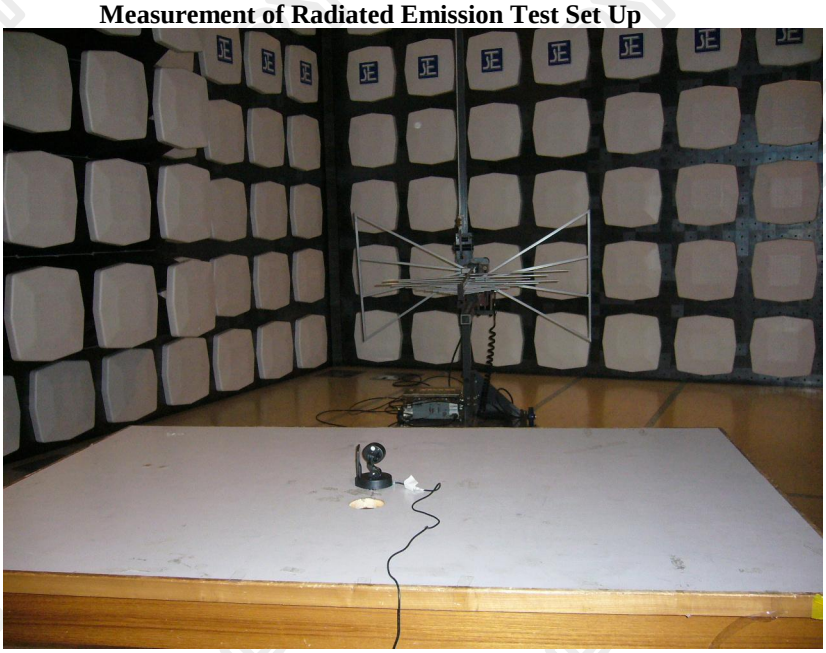


Inner Circuit Bottom View

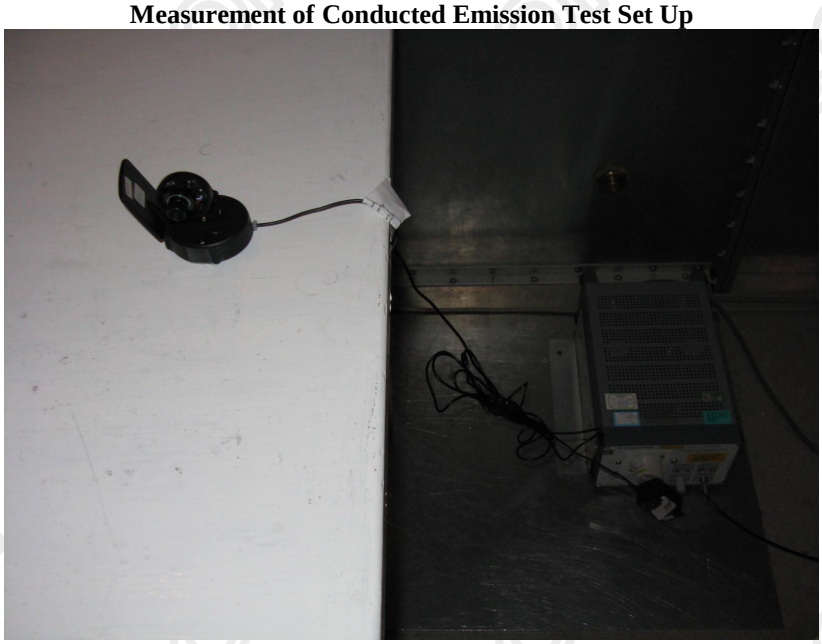


Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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