



STC Test Report

Date : 2011-06-10

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No. : HM166545

Applicant (XLT001): X 10 (USA) Inc.
620 Naches Ave SW, Building A, Renton, WA 98057,

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

Description of Sample(s): Submitted sample(s) said to be
Product: 900MHz Wireless Audio/Video Receiver
Brand Name: X10
Model Number: VR50
FCC ID: B4SVR50

Date Sample(s) Received: 2011-04-12

Date Tested: 2011-04-19 to 2011-06-10

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2010 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.

The Hong Kong Standards and Testing Centre Ltd.

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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, WA 98057,

Manufacturer

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

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

Product: 900MHz Wireless Audio/Video Receiver
Manufacturer: X-10 Electronics (Shenzhen) Co., Ltd.
Together Rich Industrial Park B, Sanwei Industrial District,
Xixiang Town, Baoan Country, Shengzhen, China
Brand Name: X10
Model Number: VR50
Input Voltage: 117Va.c.
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: SHB0500600PU, Input: 100 - 240Va.c. 50-60Hz 300mA, Output: 5Vd.c. 600mA

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an X 10 (USA) Inc. 900MHz Wireless Audio/Video Receiver. VR50A is a 900MHz receiver which use for demodulate the 900MHz RF signal into Video and stereo audio. When the EUT received infrared signal, the signal will be converted to RF signal which carrier frequency is 433.92MHz the RF signal will cease automatically after the absence of the IR signal. The modulation is FM for 900MHz. The 433MHz transmitter used to convert IR signal to 433MHz RF signal. The modulation is ASK for 433MHz.

1.4 Date of Order

2011-04-12

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2011-04-19 to 2011-06-10

1.7 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2010 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
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.231(a)	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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 15.231(a)
Test Method:	ANSI C63.4:2009
Test Date:	2011-04-21
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 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.

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Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)

RBW: 10kHz
VBW: 30kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

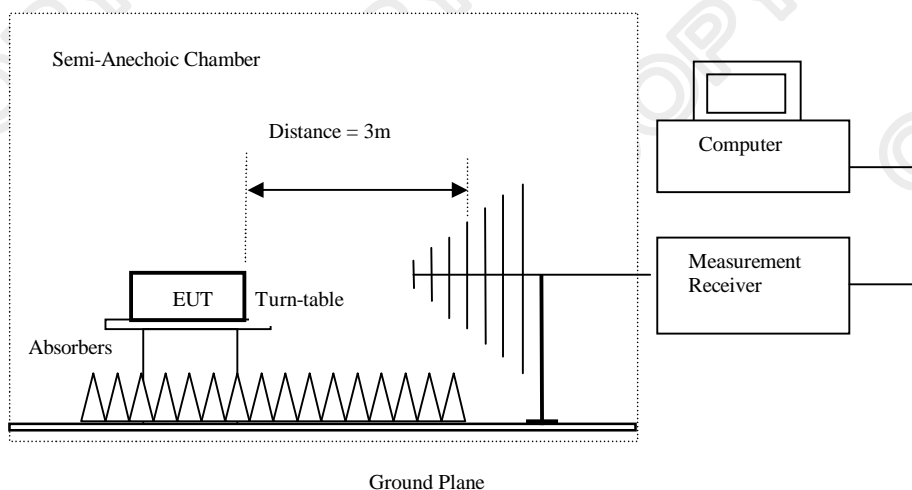
30MHz – 1GHz (QP)

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:



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

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

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	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permissible unwanted emission level is 20dB 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
433.9	72.8	18.5	91.3	36,728.2	109,958.5	Vertical

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
* 433.9	54.8	18.5	73.3	4,623.8	10,995.8	Vertical

Remarks:

FCC Limit for Fundamental Average Measurement = $41.6667(433.9) - 7083.3333 = 10,995.85 \mu\text{V/m}$

*: Adjusted by Duty Cycle = -18dB

+: 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.

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

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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
867.8	24.5	25.7	50.2	323.6	10,995.8	Vertical
1301.7	12.0	26.1	38.1	80.4	10,995.8	Vertical
1735.6	< 1.0	27.8	< 28.8	< 27.5	10,995.8	Horizontal
2169.5	< 1.0	32.0	< 33.0	< 44.7	10,995.8	Horizontal
2603.4	< 0.0	33.5	< 33.5	< 47.3	10,995.8	Horizontal
3037.3	< 1.0	5.8	< 6.8	< 2.2	10,995.8	Horizontal
3471.2	< 1.0	3.3	< 4.3	< 1.6	10,995.8	Horizontal
+ 3905.1	< 1.0	5.4	< 6.4	< 2.1	5,000.0	Horizontal
4339.00	< 1.0	6.0	< 7.0	< 2.2	10,995.8	Horizontal

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
* 867.8	6.5	25.7	32.2	40.7	1,099.6	Vertical
* 1301.7	-6.0	26.1	20.1	10.1	1,099.6	Vertical
1735.6	< 1.0	27.8	< 28.8	< 27.5	1,099.6	Horizontal
2169.5	< 1.0	32.0	< 33.0	< 44.7	1,099.6	Horizontal
2603.4	< 0.0	33.5	< 33.5	< 47.3	1,099.6	Horizontal
3037.3	< 1.0	5.8	< 6.8	< 2.2	1,099.6	Horizontal
3471.2	< 1.0	3.3	< 4.3	< 1.6	1,099.6	Horizontal
+ 3905.1	< 1.0	5.4	< 6.4	< 2.1	500.0	Horizontal
4339.00	< 1.0	6.0	< 7.0	< 2.2	1,099.6	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = $41.6667(433.9) - 7083.3333 = 10,995.85 \mu\text{V/m}$

*: Adjusted by Duty Cycle = -18dB

+: 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.

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

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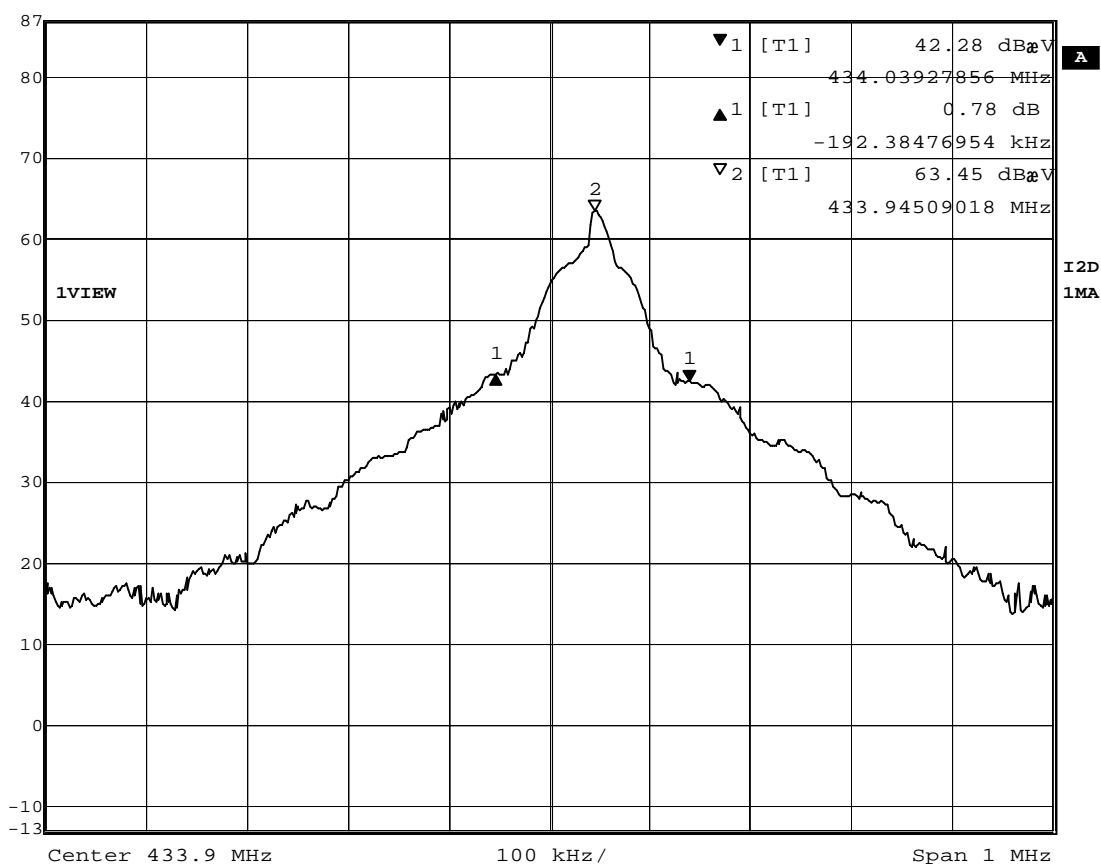
No. : HM166545

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]
433.9	192.38

20dB Bandwidth of Fundamental Emission

	Delta 1 [T1]	RBW	30 kHz	RF Att	0 dB
Ref Lvl	0.78 dB	VBW	100 kHz		
87 dB μ V	-192.38476954 kHz	SWT	5 ms	Unit	dB μ V



Date: 26.APR.2011 18:32:40

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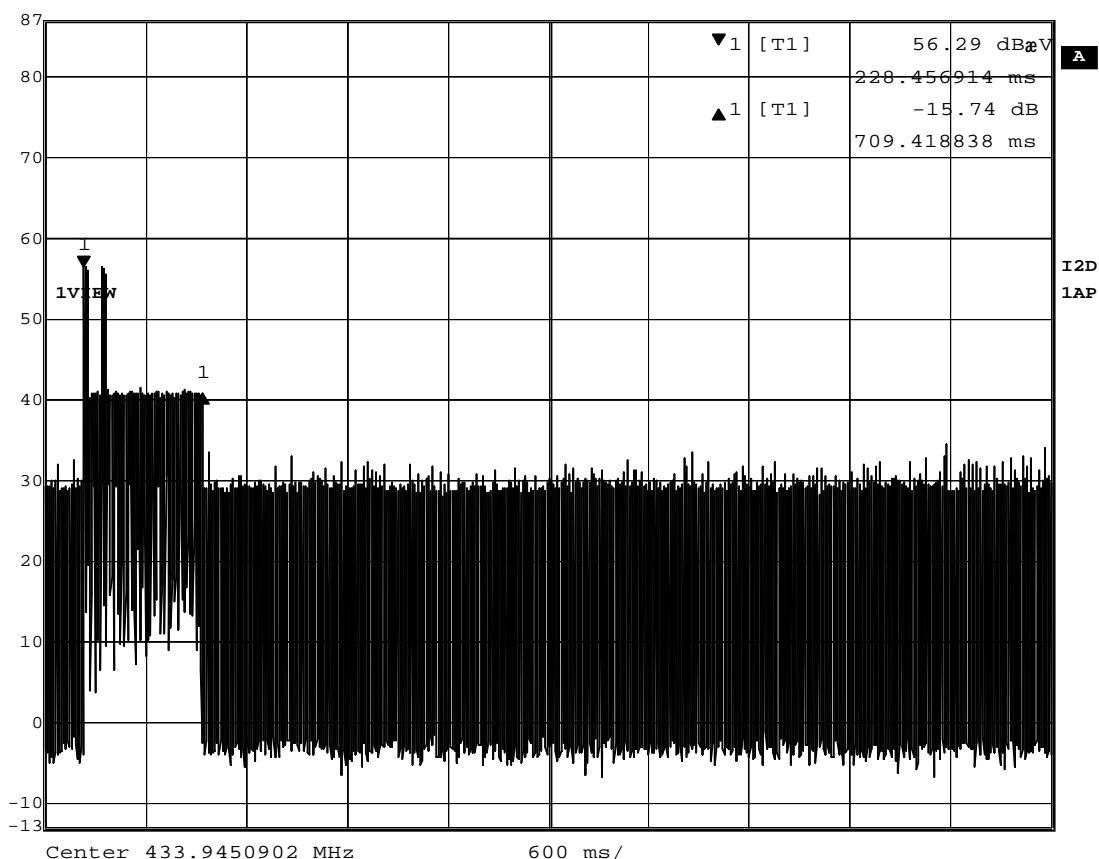
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The transmission cease within 0.71s (<5s)

	Delta 1 [T1]	RBW	300 kHz	RF Att	10 dB
Ref Lvl	-15.74 dB	VBW	300 kHz		
87 dB μ V	709.418838 ms	SWT	6 s	Unit	dB μ V



Date: 26.APR.2011 18:36:15

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Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Field strength [microvolts/meter]	Measurement distance [meters]
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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 on mode (9k – 30MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dBμV	dB/m	dBμV/m	μV/m	μV/m	
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx on mode (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dBμV	dB/m	dBμV/m	μV/m	μV/m	
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx on mode (Above 1000MHz): PASS

Field Strength of Spurious Emissions						
Peak Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dBμV	dB/m	dBμV/m	μV/m	μV/m	
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx on mode (Above 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dBμV	dB/m	dBμV/m	μV/m	μV/m	
Emissions detected are more than 20 dB below the FCC Limits						

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

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Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Field strength [microvolts/meter]	Measurement distance [meters]
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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 Rx on mode (9k – 30MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dBμV	dB/m	dBμV/m	μV/m	μV/m	
Emissions detected are more than 20 dB below the FCC Limits						

Results of Rx on mode (30MHz – 1000MHz): PASS

Field Strength of Fundamental Emissions						
Quasi-Peak Value						
Frequency	Measured	Correction	Field	Field	Limit @ 3m	E-Field
	Level @ 3m	Factor	Strength	Strength		Polarity
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m	
46.2	25.5	10.4	35.9	62.4	100	Vertical
47.2	25.8	10.2	36.0	63.1	100	Vertical
156.8	15.2	10.6	25.8	19.5	150	Horizontal
315.1	19.1	16.0	35.1	56.9	200	Horizontal
526.2	0.3	20.8	21.1	11.4	200	Horizontal
903.6	7.8	26.3	34.1	50.7	200	Horizontal

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Results of Rx on mode (Above 1000MHz): PASS

Field Strength of Spurious Emissions						
Peak Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dB μ V	dB/m	dB μ V/m	μ V/m	μ V/m	
Emissions detected are more than 20 dB below the FCC Limits						

Results of Rx on mode (Above 1000MHz): PASS

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	dB μ V	dB/m	dB μ V/m	μ V/m	μ V/m	
Emissions detected are more than 20 dB below the FCC Limits						

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

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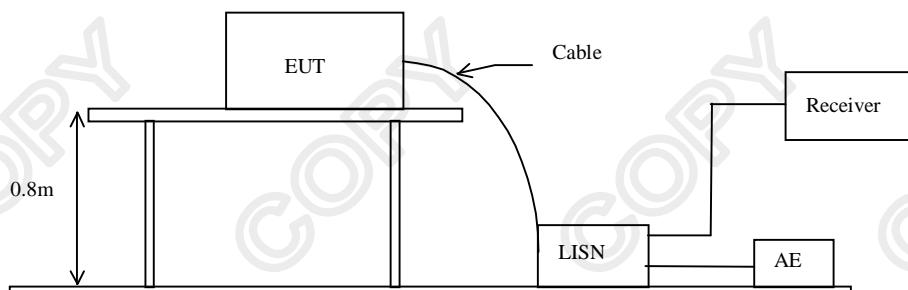
3.1.1 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.207
Test Method: ANSI C63.4:2009
Test Date: 2011-04-19
Mode of Operation: Transceiver mode

Test Method:

The test was performed in accordance with ANSI C63.4: 2009, 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:



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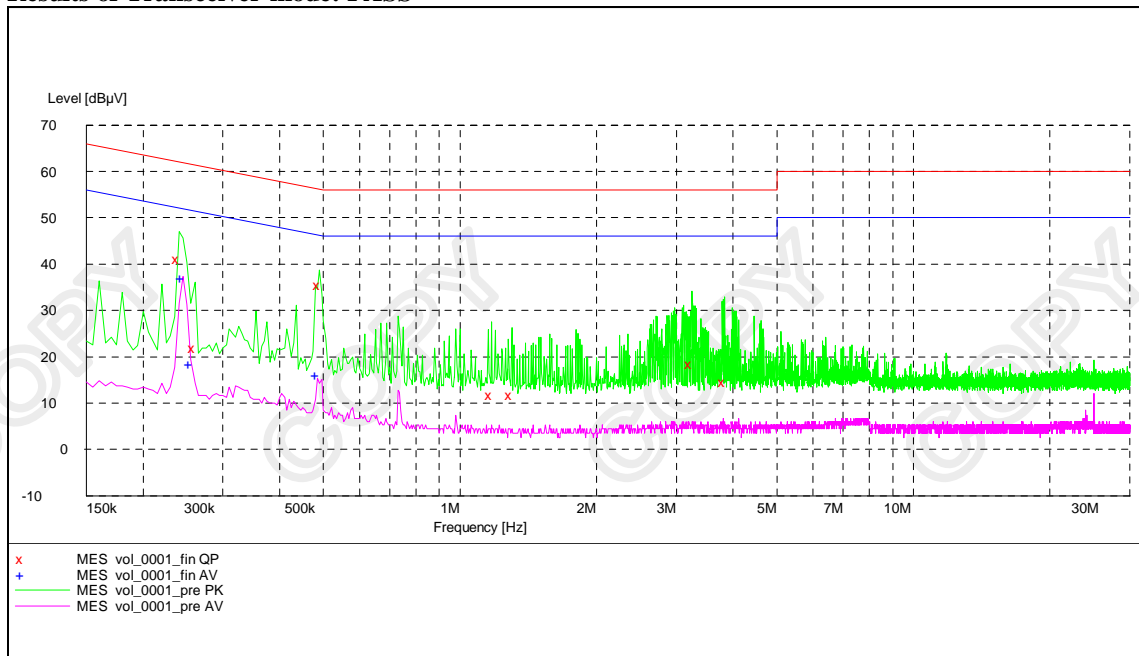
Limit for Conducted Emissions (FCC 47 CFR 15.107):

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 Transceiver mode: PASS



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Results of Transceiver mode: PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level μ V	Limit μ V
Live	0.260	21.9	61.0	-*-	-*-
Live	0.490	35.4	56.0	-*-	-*-
Live	1.175	11.7	56.0	-*-	-*-
Live	3.245	18.6	56.0	-*-	-*-
Live	3.840	14.5	56.0	-*-	-*-
Neutral	0.240	41.2	62.0	-*-	-*-
Neutral	0.245	-*-	-*-	37.1	52.0
Neutral	0.255	-*-	-*-	18.5	52.0
Neutral	0.485	-*-	-*-	16.1	46.0
Neutral	1.300	11.7	56.0	-*-	-*-

Remarks:

Calculated measurement uncertainty : 3.97dB

-*- Emission(s) that is far below the corresponding limit line.

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Appendix A

Duty Cycle Correction During 100msec [FCC 47CFR 15.231(a)]

The transmitter periodically sends a different series of characters, but each packet period (100msec) never exceeds a series of 2 long (1.784msec) and 10 short (0.902msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered $(2 \times 1.784\text{msec}) + (10 \times 0.902\text{msec})$ per 100msec = 12.59% duty cycle. Figure A through E shows the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = $20\log(0.1259) = -18.0\text{dB}$

Duty Cycle Correction = -20dB, if the calculation duty cycle correction $> -20\text{dB}$

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

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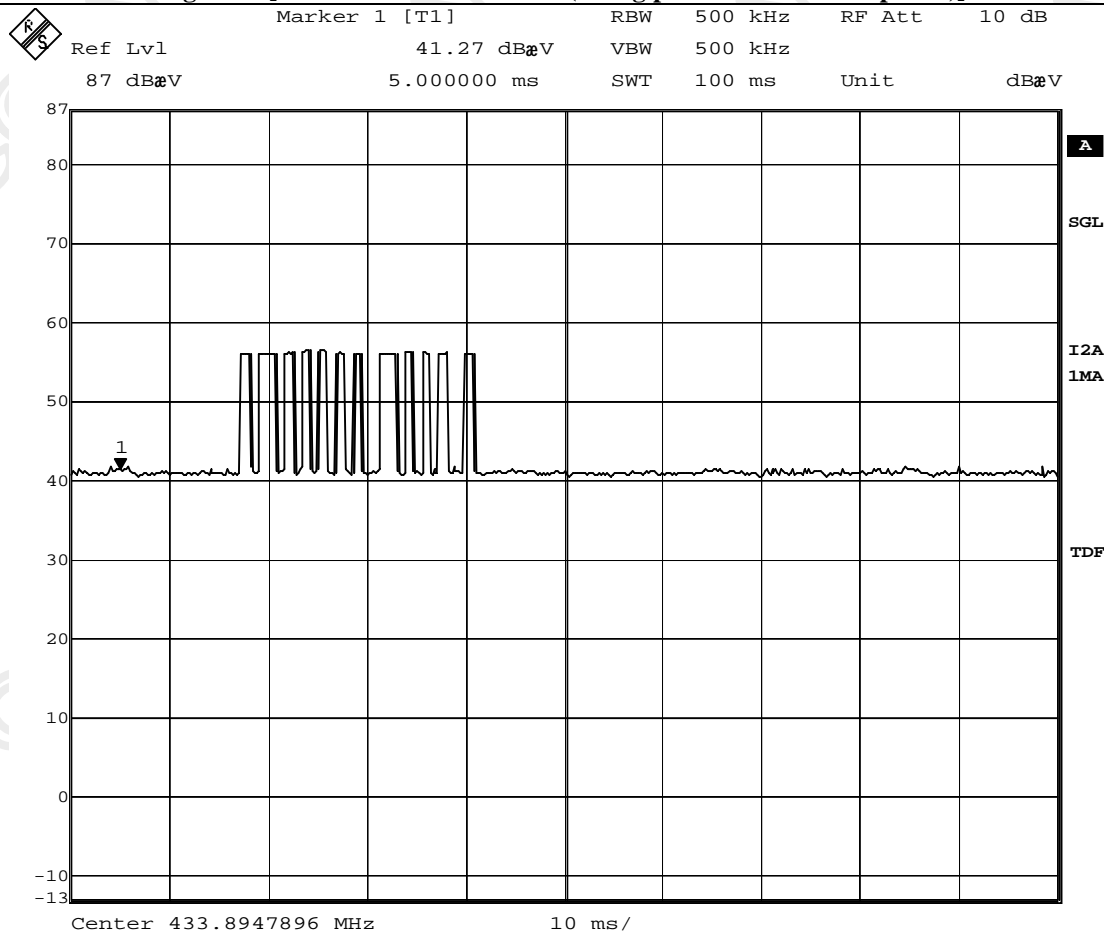
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Figure A [Pulse train within 100ms (2 long pulses and 10 short pulses)]



Date: 10.JUN.2011 13:05:41

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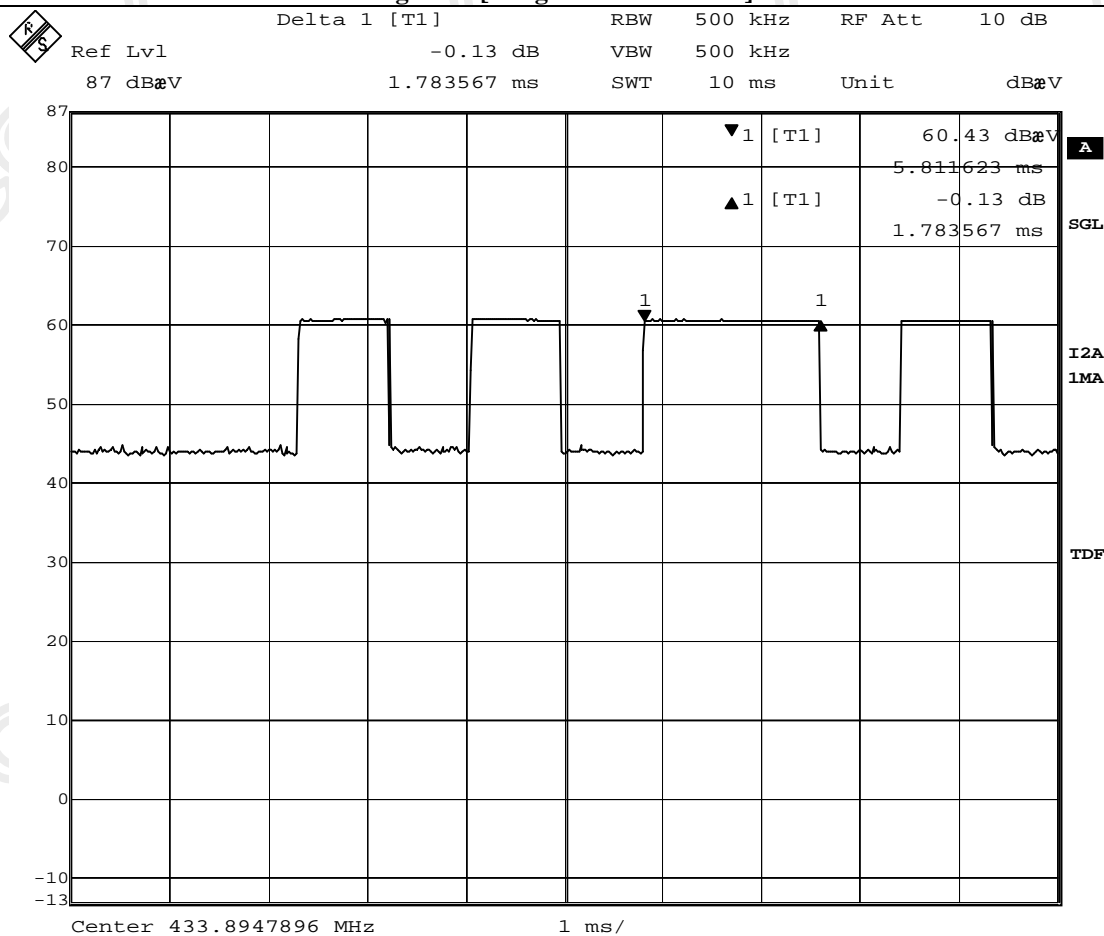
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Figure B [Long Pulse = 1.784 ms]



Date: 10.JUN.2011 13:07:19

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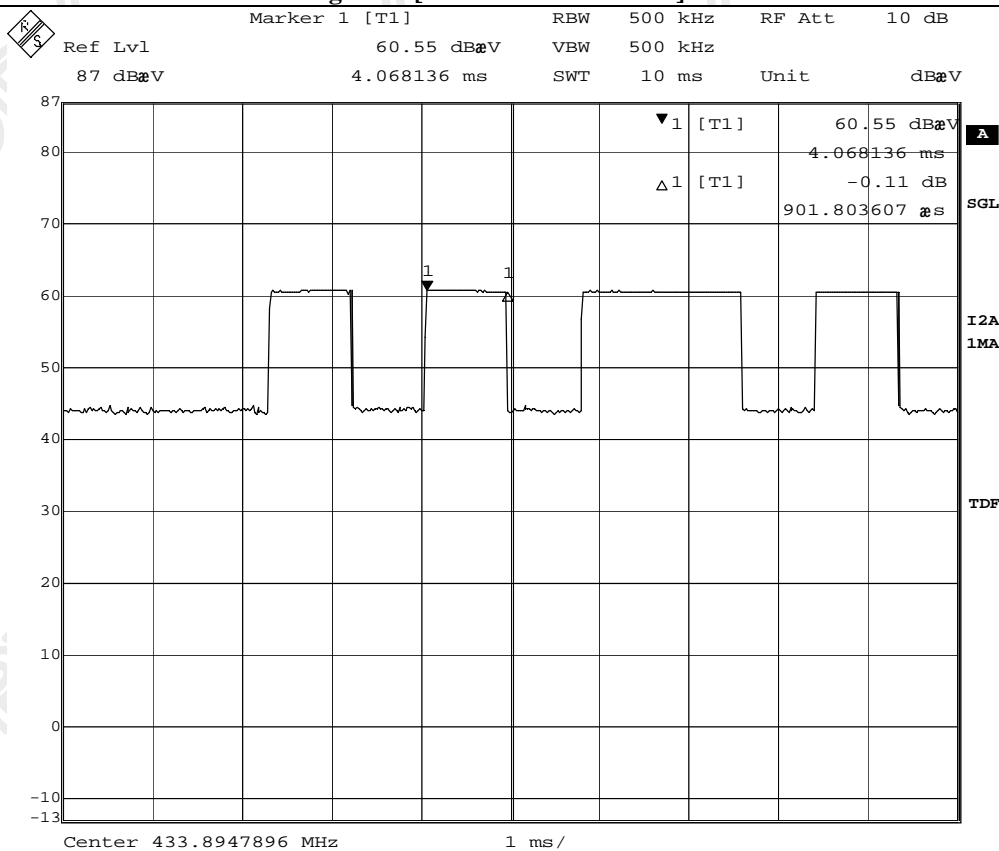
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Figure C [Short Pulse = 0.902ms]



Date: 10.JUN.2011 13:06:47

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Appendix B

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3115	4032	2009/09/02	2011/09/02
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNABLE	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	2010/02/09	2012/02/09
EM229	EMI Test Receiver	R&S	ESIB40	100248	2010/11/02	2011/11/02
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2009/07/26	2011/07/26

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM197	LISN	EMCO	4825/2	1193	2010/10/13	2011/10/13
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2010/07/01	2011/07/01
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	2011/01/23	2012/01/23

Remarks:-

CM Corrective Maintenance

N/A Not Applicable

TBD To Be Determined

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Appendix C

Photographs of EUT

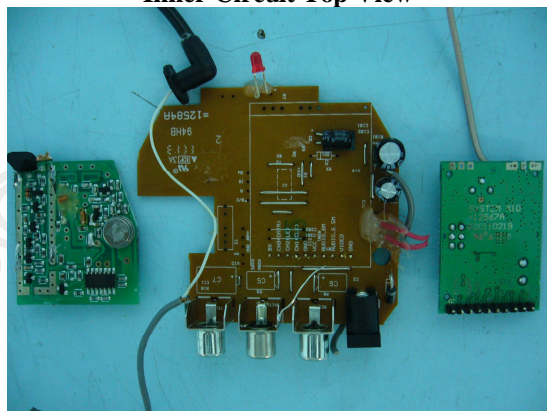
Front View of the product



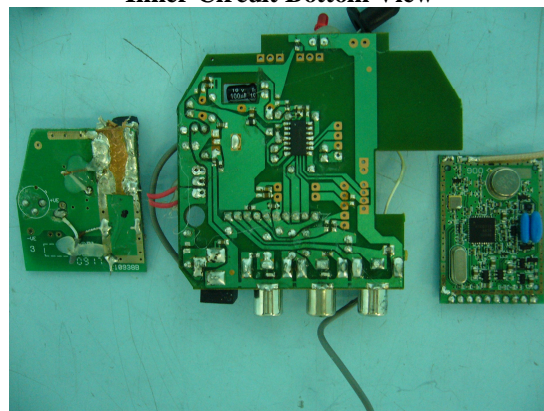
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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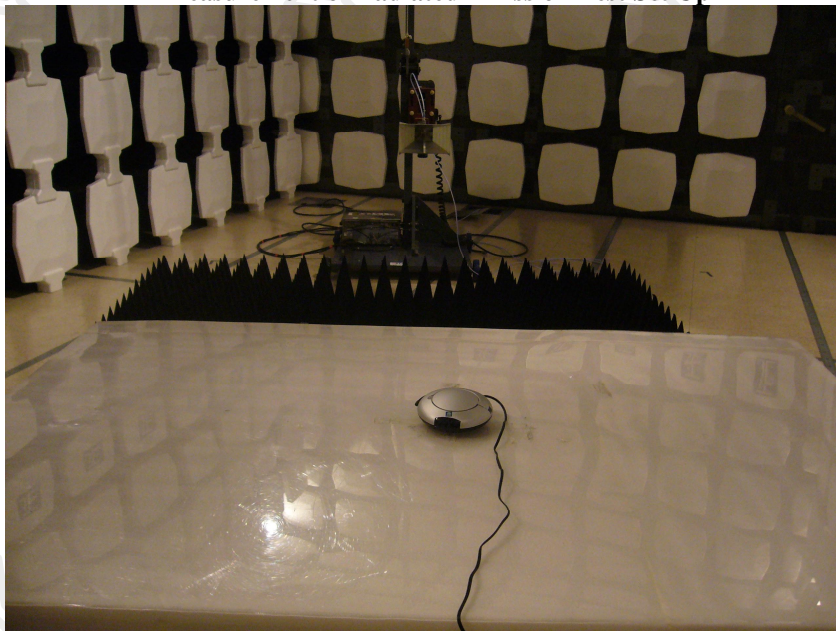
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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

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