



STC Test Report

Date : 2012-08-07

Page 1 of 23

No. : HM167709

Applicant (GAS003): Gatekeeper Systems (HK) Ltd.
Unit 2318-2319, Level 23, Tower 1, Metroplaza No. 223
Hing Fong Road, Kwai Fong, N.T., Hong Kong.

Manufacturer: Gatekeeper Systems (HK) Ltd.
Unit 2318-2319, Level 23, Tower 1, Metroplaza No. 223
Hing Fong Road, Kwai Fong, N.T., Hong Kong.

Description of Sample(s): Submitted sample(s) said to be
Product: Mini Central Transmitter
Brand Name: Gatekeeper Systems
Model Number: D-9129
FCC ID: W3Z-D9129

Date Sample(s) Received: 2012-06-27

Date Tested: 2012-07-30 to 2012-07-31

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2011 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.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
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STC Test Report

Date : 2012-08-07

Page 2 of 23

No. : HM167709

CONTENT:

Cover
Content

Page 1 of 23
Page 2 of 23

1.0 General Details

1.1 Equipment Under Test [EUT]
 Description of EUT operation

Page 3 of 23

1.2 Description of EUT Operation

1.3 Date of Order

Page 3 of 23

1.4 Submitted Sample

Page 3 of 23

1.5 Test Duration

Page 3 of 23

1.6 Country of Origin

Page 3 of 23

2.0 Technical Details

2.1 Investigations Requested

Page 4 of 23

2.2 Test Standards and Results Summary

Page 4 of 23

3.0 Test Results

3.1 Emission

Page 5-19 of 23

Appendix A

List of Measurement Equipment

Page 20 of 23

Appendix B

Photographs

Page 21-23 of 23

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STC Test Report

Date : 2012-08-07

Page 3 of 23

No. : HM167709

1.0 General Details

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

Product: Mini Central Transmitter
Manufacturer: Gatekeeper Systems (HK) Ltd.
Unit 2318-2319, Level 23, Tower 1, Metroplaza
No. 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong.
Brand Name: Gatekeeper Systems
Model Number: D-9129
Input Voltage: 110-240V a.c.

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Gatekeeper Systems (HK) Ltd., Mini Central Transmitter. The transmission signal is frequency hopping with channel frequency range 2402.9-2478.6MHz during normal use. The EUT was set to fixed frequency test mode before test by selecting the stored commands by turning the control knob.

1.3 Date of Order

2012-06-27

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2012-07-30 to 2012-07-31

1.6 Country of Origin

China

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STC Test Report

Date : 2012-08-07

Page 4 of 23

No. : HM167709

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2011 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC Mains Conducted Emissions	FCC 47CFR 15.207	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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STC Test Report

Date : 2012-08-07

Page 5 of 23

No. : HM167709

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

Test Requirement:	FCC 47CFR 15.249
Test Method:	ANSI C63.4:2009
Test Date:	2012-07-30
Mode of Operation:	Mode (500kbps) / Rx 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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STC Test Report

Date : 2012-08-07

Page 6 of 23

No. : HM167709

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)

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

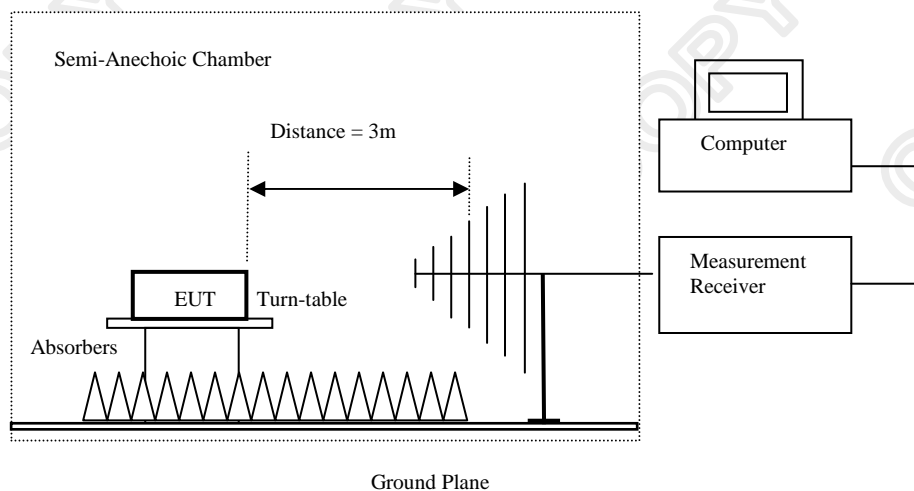
30MHz – 1GHz (QP)

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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STC Test Report

Date : 2012-08-07

Page 7 of 23

No. : HM167709

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 (Ch. 6, 500kbps): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2402.9	66.9	28.0	94.9	55,590.4	500,000	Horizontal
* 4806.5	26.8	32.9	59.7	966.1	5,000	Horizontal
7210.1	4.9	37.2	42.1	127.4	5,000	Horizontal
9611.6					5,000	Vertical
* 12014.5					5,000	Vertical
14417.4					5,000	Vertical
16820.3					5,000	Vertical
* 19223.2					5,000	Vertical
21626.1					5,000	Vertical
24029.0					5,000	Vertical

Emissions detected are more than 20 dB below the FCC Limits

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2402.9	42.9	28.0	70.9	3,507.5	50,000	Horizontal
* 4806.5	5.7	32.9	38.6	85.1	500	Horizontal
7210.1	0.7	37.2	37.9	78.5	500	Horizontal

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

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STC Test Report

Date : 2012-08-07

Page 8 of 23

No. : HM167709

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 (Ch. 128, 500kbps): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2441.6	66.7	28.0	94.7	54,325.0	500,000	Horizontal
* 4883.2	25.3	33.0	58.3	822.2	5,000	Horizontal
7325.7	4.2	37.2	41.4	117.5	5,000	Horizontal
9766.4	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12208.0					5,000	Vertical
14649.6					5,000	Vertical
17091.2					5,000	Vertical
* 19532.8					5,000	Vertical
21974.4					5,000	Vertical
24416.0					5,000	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2441.6	43.1	28.0	71.1	3,589.2	50,000	Horizontal
* 4883.2	4.8	33.0	37.8	77.6	500	Horizontal
7325.7	1.3	37.2	38.5	84.1	500	Horizontal

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

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STC Test Report

Date : 2012-08-07

Page 9 of 23

No. : HM167709

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 (Ch. 247, 500kbps): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2478.6	67.2	28.0	95.2	57,544.0	500,000	Horizontal
* 4952.2	26.6	33.1	59.7	966.1	5,000	Horizontal
7426.8	4.9	37.2	42.1	127.4	5,000	Horizontal
9914.4	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12393.0					5,000	Vertical
14871.6					5,000	Vertical
17350.2					5,000	Vertical
* 19828.8					5,000	Vertical
22307.4					5,000	Vertical
24786.0					5,000	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2478.6	45.1	28.0	73.1	4,518.6	50,000	Horizontal
* 4952.2	4.3	33.1	37.4	74.1	500	Horizontal
7426.8	1.2	37.2	38.4	83.2	500	Horizontal

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

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STC Test Report

Date : 2012-08-07

Page 10 of 23

No. : HM167709

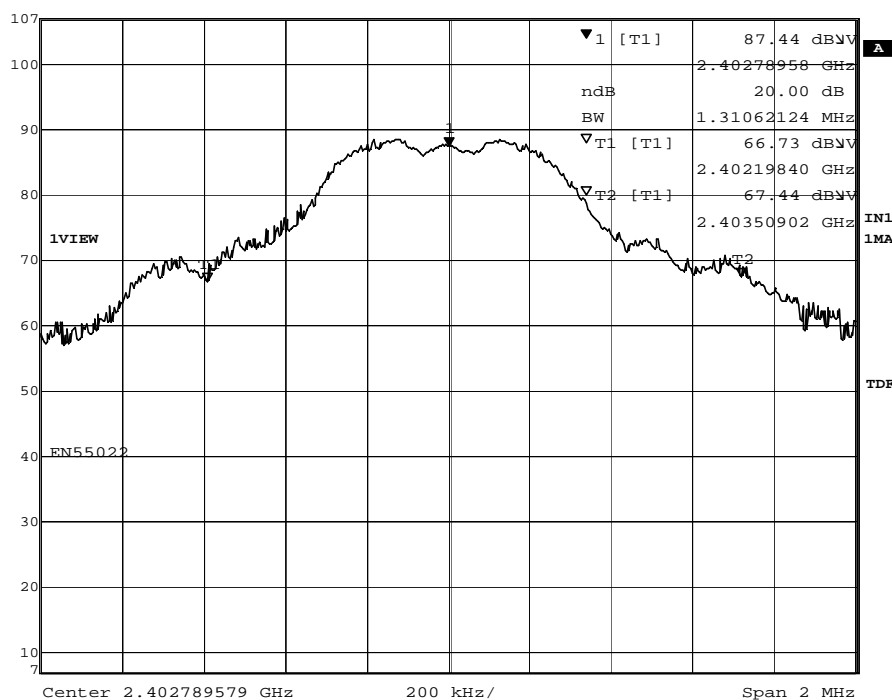
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2402.8	1.31

(Lowest Channel)

20dB Bandwidth of Fundamental Emission

Ref Lvl	Marker 1 [T1 ndB]	RBW	100 kHz	RF Att	10 dB
107 dBV	ndB	20.00 dB	VBW	300 kHz	
	BW	1.31062124 MHz	SWT	5 ms	Unit
					dBV



Date: 31.JUL.2012 21:28:00

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Date : 2012-08-07

Page 11 of 23

No. : HM167709

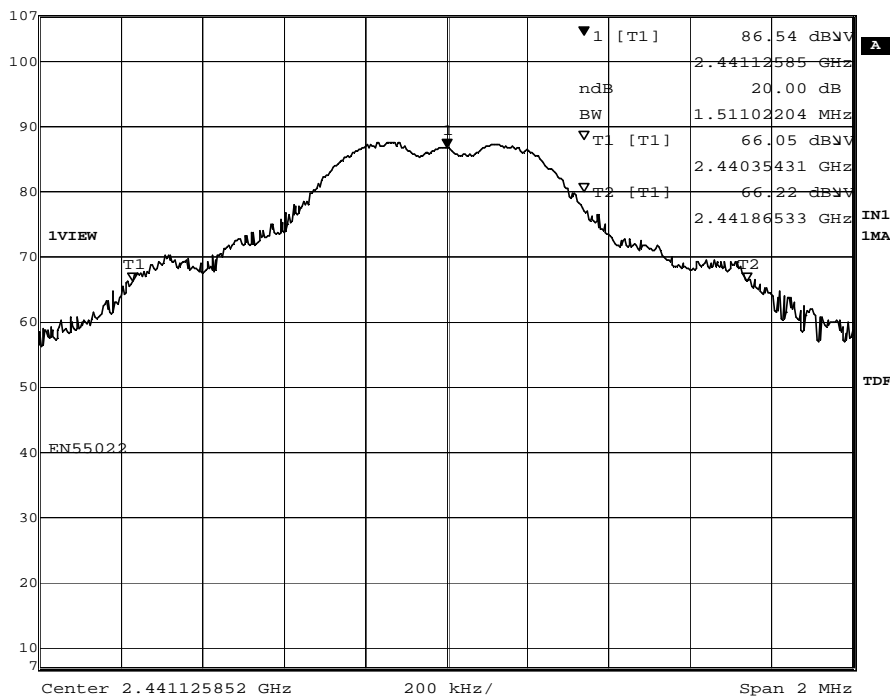
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2441.1	1.31

(Middle Channel)

20dB Bandwidth of Fundamental Emission

	Marker 1 [T1 ndB]	RBW 100 kHz	RF Att 10 dB
	ndB 20.00 dB	VBW 300 kHz	
	Ref Lvl 107 dBV	SWT 5 ms	Unit dBV
	BW 1.51102204 MHz		



Date: 31.JUL.2012 21:42:32

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Date : 2012-08-07

Page 12 of 23

No. : HM167709

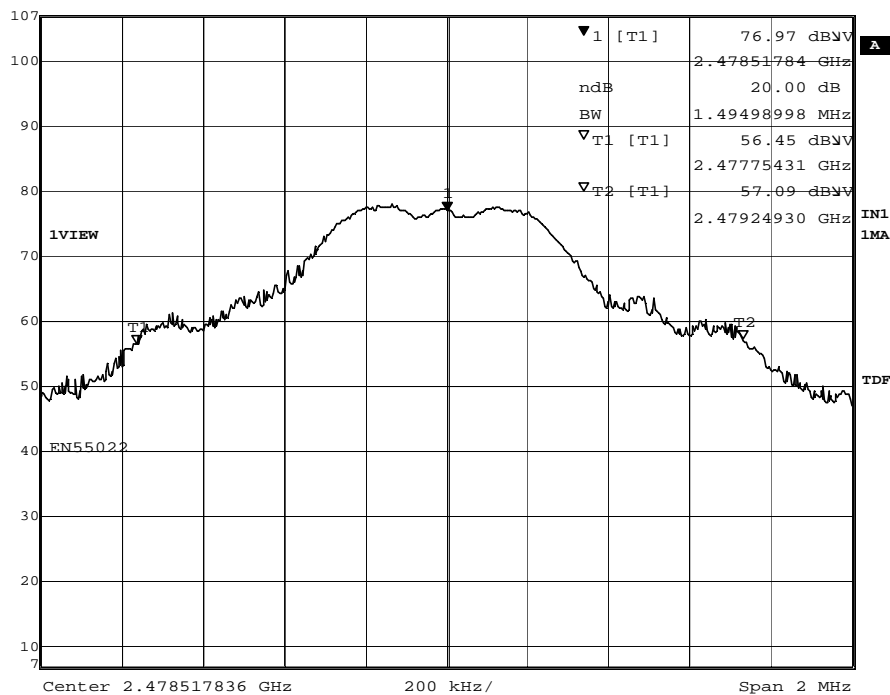
Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2478.5	1.49

(Highest Channel)

20dB Bandwidth of Fundamental Emission

Ref Lvl	Marker 1 [T1 ndB]	RBW	100 kHz	RF Att	10 dB	
107 dBV	ndB	20.00 dB	VBW	300 kHz		
	BW	1.49498998 MHz	SWT	5 ms	Unit	dBV



Date: 31.JUL.2012 21:48:50

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Page 13 of 23

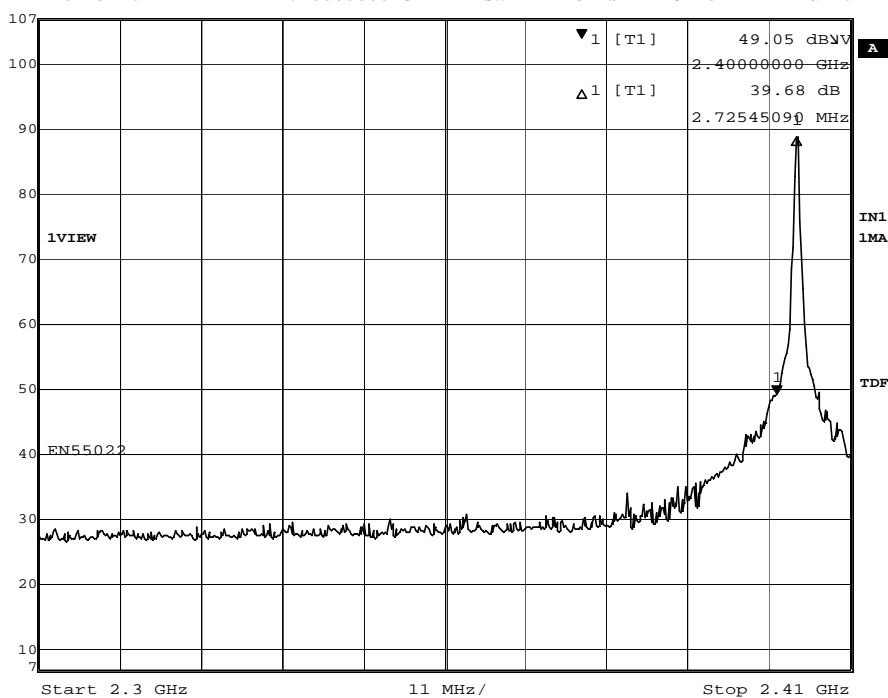
No. : HM167709

Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2402.8 – Lowest Fundamental	39.7

39.7dB Reduction at Lower Band Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	10 dB
Ref Lvl	49.05 dBV	VBW	300 kHz		
107 dBV	2.4000000 GHz	SWT	28 ms	Unit	dBV



Date: 31.JUL.2012 21:24:58

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Date : 2012-08-07

Page 14 of 23

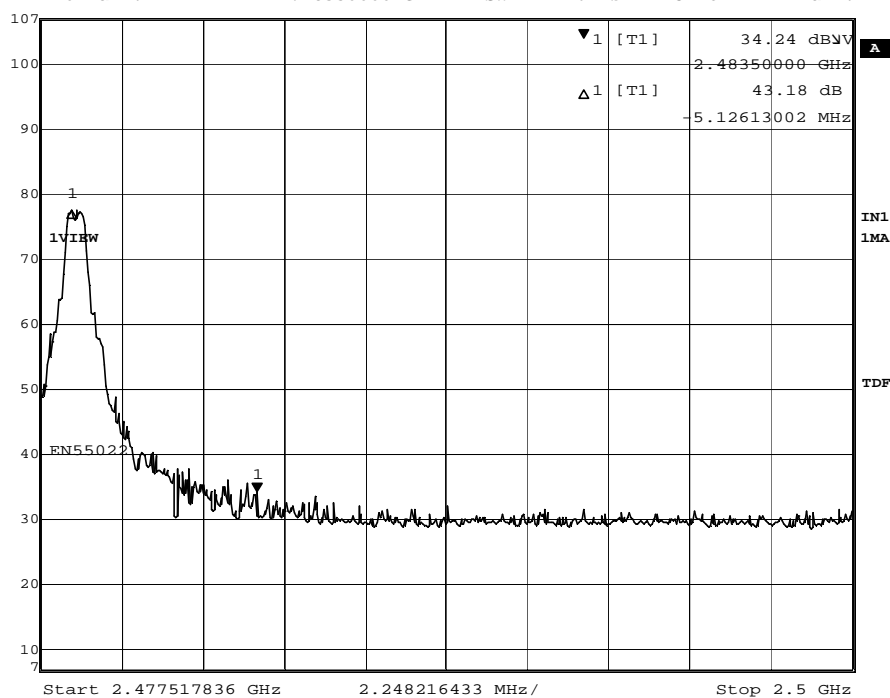
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Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2478.5 - Highest Fundamental	43.2

43.2dB Reduction at Upper Band Edge

Ref Lvl	Marker 1 [T1]	RBW	100 kHz	RF Att	10 dB
107 dBV	34.24 dBV	VBW	300 kHz		
	2.48350000 GHz	SWT	6 ms	Unit	dBV



Date: 31.JUL.2012 21:51:29

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STC Test Report

Date : 2012-08-07

Page 15 of 23

No. : HM167709

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

Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
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)

Result of Tx mode (30MHz – 1GHz): Pass

Field Strength of Spurious Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB μV	Correction Factor dB/m	Field Strength dB $\mu\text{V/m}$	Limit @3m dB $\mu\text{V/m}$	Margin dB $\mu\text{V/m}$	E-Field Polarity
137.4	8.7	9.4	18.1	43.5	-25.4	Horizontal
141.5	9.4	9.8	19.2	43.5	-24.3	Horizontal
167.8	9.1	11	20.1	43.5	-23.4	Horizontal
208.0	17.0	12.2	29.2	43.5	-14.3	Vertical
287.7	16.4	15	31.4	46.0	-14.6	Vertical
350.6	16.7	17.3	34.0	46.0	-12.0	Vertical

Result of Tx mode (1GHz – 26GHz): Pass

Emissions detected are more than 20 dB below the limit line(s)

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

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STC Test Report

Date : 2012-08-07

Page 16 of 23

No. : HM167709

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

Frequency Range [MHz]	Quasi-Peak Limits [μ V/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 Rx Mode (9kHz – 30GHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Results of Rx mode (30MHz – 25GHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

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

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STC Test Report

Date : 2012-08-07

Page 17 of 23

No. : HM167709

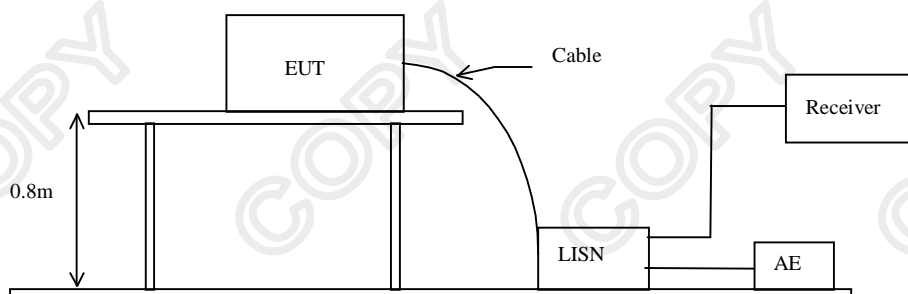
3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.207
Test Method: ANSI C63.4:2009
Test Date: 2012-07-31
Mode of Operation: On mode
Test Voltage: 117V.a.c., 60Hz

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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Date : 2012-08-07

Page 18 of 23

No. : HM167709

Limit for Conducted Emissions (FCC 47 CFR 15.207):

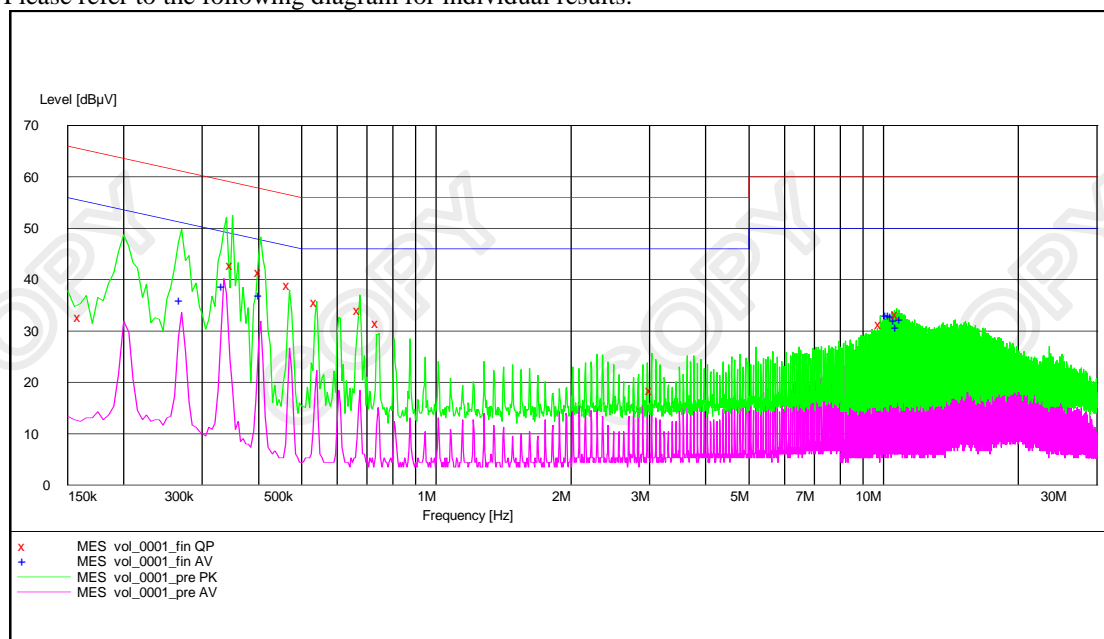
Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* 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

Please refer to the following diagram for individual results.



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STC Test Report

Date : 2012-08-07

Page 19 of 23

No. : HM167709

Results of On Mode: Pass

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.405	-*-	-*-	36.9	48.0
Neutral	0.160	32.7	66.0	-*-	-*-
Neutral	0.270	-*-	-*-	36.0	51.0
Neutral	0.335	-*-	-*-	38.8	49.0
Neutral	0.350	42.8	59.0	-*-	-*-
Neutral	0.405	41.4	58.0	-*-	-*-
Neutral	0.470	38.9	57.0	-*-	-*-
Neutral	0.540	35.5	56.0	-*-	-*-
Neutral	0.675	34.0	56.0	-*-	-*-
Neutral	0.740	31.6	56.0	-*-	-*-
Neutral	3.030	18.4	56.0	-*-	-*-
Neutral	9.895	31.4	60.0	-*-	-*-
Neutral	10.230	-*-	-*-	33.1	50.0
Neutral	10.365	-*-	-*-	33.1	50.0
Neutral	10.500	-*-	-*-	32.8	50.0
Neutral	10.635	-*-	-*-	32.1	50.0
Neutral	10.770	33.2	60.0	30.8	50.0
Neutral	10.970	-*-	-*-	32.3	50.0

Remarks:

Calculated measurement uncertainty : 3.97dB

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

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STC Test Report

Date : 2012-08-07

Page 20 of 23

No. : HM167709

Appendix A

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM276	Broadband Horn Antenna	A-INFOMW	JXTXLB-10180-SF	J2031090903007	2010/08/21	2013/08/21
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-Linggren	FACT-3	--	2011/10/25	2012/10/25
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	2011/03/01	2013/03/01
EM229	EMI Test Receiver	R&S	ESIB40	100248	2012/05/03	2013/05/03
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2010/09/07	2012/09/07

Remarks:-

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

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STC Test Report

Date : 2012-08-07

Page 21 of 23

No. : HM167709

Appendix B

Photographs of EUT

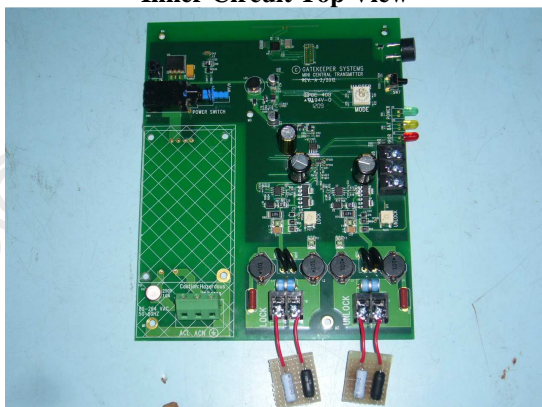
Front View of the product



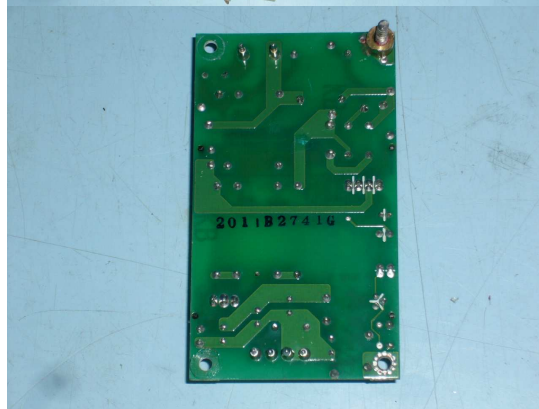
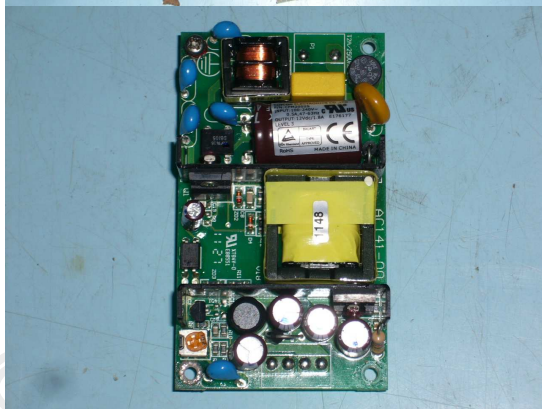
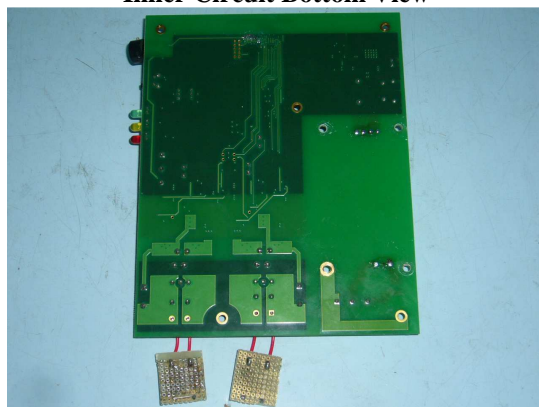
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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STC Test Report

Date : 2012-08-07

Page 22 of 23

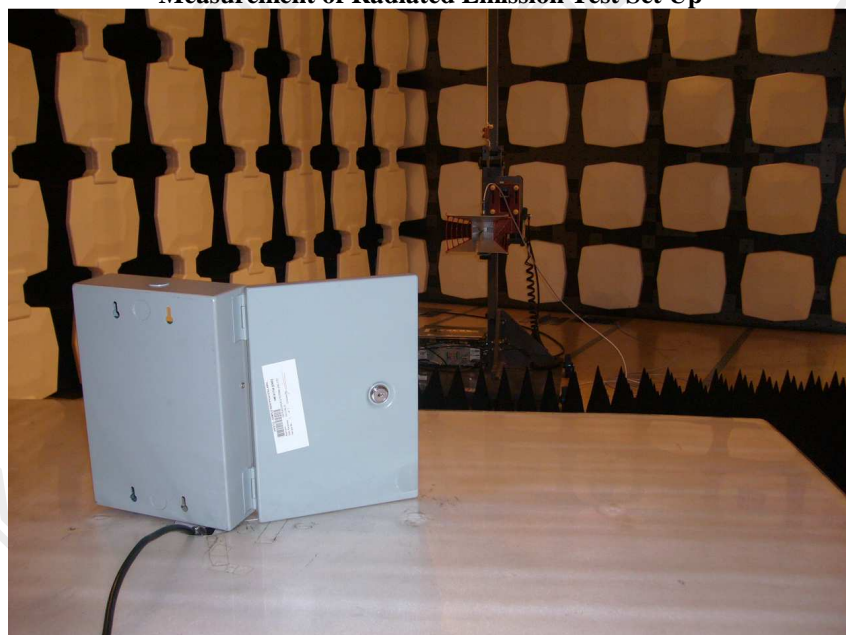
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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STC Test Report

Date : 2012-08-07

Page 23 of 23

No. : HM167709

Measurement of Radiated Emission Test Set Up



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

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