

EMI TEST REPORT

On Model Name: VoIP Gateway

Model Number: GXW4232, GXW4224

Brand Name: Grandstream

Prepared for Grandstream Networks, INC

FCC ID Number: YZZGXW42XX

According to FCC 47 CFR Part 15(2012), Subpart B

Test Report #: SHE-1205-10825-FCC

Tested by: Daomen Galanz
Daomen /Engineer Company Name

Reviewed by: Jawen Yin ECMG
Jawen Yin/ Senior Engineer Company Name

QC Manager: Swall Zhang ECMG
Swall Zhang/QC Manager Company Name

Test Report Released by: Swall Zhang November 23rd, 2012
Swall Zhang Date

Test Location

Tests performed in a Certified ANSI Semi-Anechoic Chamber and Shielded Room.

Test Site Location : Galanz

*25 South Ronggui Rd., Shunde,
Foshan, Guangdong, China*

Tel : (86)-757-23612785

Fax : (86)-757-23612537

Test Facility

The test facility was recognized, certified, or accredited by the following organizations:

- *CNAL – LAB Code: L2244*

Galanz EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- *FCC – Registration No.: 580210*

Galanz EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC was maintained in our files.

Table of Contents

<i>GOVERNMENT DISCLAIMER NOTICE</i>	<i>2</i>
<i>REPRODUCTION CLAUSE</i>	<i>2</i>
<i>OPINIONS AND INTERPRETATIONS</i>	<i>2</i>
<i>STATEMENT OF MEASUREMENT UNCERTAINTY</i>	<i>2</i>
<i>ADMINISTRATIVE DATA</i>	<i>3</i>
<i>EUT DESCRIPTION</i>	<i>4</i>
<i>EUT MODEL DERIVED</i>	<i>5</i>
<i>TEST SUMMARY</i>	<i>8</i>
<i>TEST MODE JUSTIFICATION</i>	<i>7</i>
<i>EUT EXERCISE SOFTWARE</i>	<i>7</i>
<i>EQUIPMENT MODIFICATION</i>	<i>7</i>
<i>EUT SAMPLE PHOTOS FOR MODEL GXW4232</i>	<i>9</i>
<i>TEST SYSTEM DETAILS</i>	<i>15</i>
<i>ATTACHMENT 1 - CONDUCTED EMISSION TEST RESULTS</i>	<i>18</i>
<i>ATTACHMENT 2 - RADIATED EMISSION MEASUREMENT</i>	<i>22</i>

List Attached Files

<i>Exhibit Type</i>	<i>File Description</i>	<i>File Name</i>
<i>Test Report</i>	<i>Test Report</i>	<i>YZZGXW42XX _Test report.pdf</i>
<i>Operation Description</i>	<i>Technical Description</i>	<i>YZZGXW42XX_operation description.pdf</i>
<i>External Photos</i>	<i>External Photos</i>	<i>YZZGXW42XX_External Photos</i>
<i>Internal Photos</i>	<i>Internal Photos</i>	<i>YZZGXW42XX_Internal Photos</i>
<i>Block Diagram</i>	<i>Block Diagram</i>	<i>YZZGXW42XX_Block Diagram.pdf</i>
<i>Schematics</i>	<i>Circuit Diagram</i>	<i>YZZGXW42XX _Schematics.pdf</i>
<i>ID Label/Location</i>	<i>Label and Location</i>	<i>YZZGXW42XX _Label & Location.pdf</i>
<i>User Manual</i>	<i>User Manual</i>	<i>YZZGXW42XX _User Manual.pdf</i>
<i>Test set-up photos</i>	<i>Test set-up photos</i>	<i>YZZGXW42XX _Test Set-up Photos</i>

Government Disclaimer Notice

When government drawing, specification, or other data are used for any purpose other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawing, specifications, or other data, is not to be regarded by implication or otherwise in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell patented invention that may in any way be related thereto. This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

Reproduction Clause

Any reproduction of this document must be done in full. No single part of this document may be reproduced without permission from ECMG Electronic Technical Testing Corp (Shenzhen).

Opinions and Interpretations

This test report relates to the abovementioned equipment under test (EUT). Without the permission of ECMG Electronic Technical Testing Corp (Shenzhen) Test Lab this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. The manufacturer has sole responsibility of continued compliance of the device.

Statement of Measurement Uncertainty

The data and results referenced in the document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

Administrative Data

Test Sample : VoIP Gateway

Model Numbers : GXW4232, GXW4224

Model Tested : GXW4232

Receipt Date : June 10th, 2012

Date Tested : June 11th to 21st, 2012

Applicant : Grandstream Networks, INC

Address : 5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park, Shenzhen, China

Telephone : (86)-755-26014600

Fax : (86)-755-26014601

Manufacturer : Grandstream Networks, INC

Address : 5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park, Shenzhen, China

Telephone : (86)-755-26014600

Fax : (86)-755-26014601

Factory : Grandstream Networks, INC

Address : 5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park, Shenzhen, China

Telephone : (86)-755-26014600

Fax : (86)-755-26014601

EUT Description

Grandstream Networks, INC., model tested GXW4232 (referred to as the EUT in this report) is an VoIP Gateway.

Technical specifications of the EUT are as follows:

Parameter		Range
<i>Basic parameters</i>	<i>Rated voltage</i>	12VDC
	<i>Rated Current</i>	5A
<i>I/O Ports</i>	<i>Ethernet Port</i>	<i>Connect to the internal LAN network,router or PC.</i>
	<i>RESET</i>	<i>Factory Reset button. Press for 7 seconds to reset factory default settings.</i>
	<i>DC 12V</i>	<i>Power adapter connection</i>
	<i>Analog Ports</i>	<i>Connect to analog phones / fax machines with an RJ21 to RJ11 cable</i>
	<i>FXS Ports</i>	<i>FXS port to be connected to analog phones / fax machines.</i>
<i>Power Adapter</i>	<i>Input</i>	100-240VAC 50/60Hz 1.3A
	<i>Output</i>	12VDC,5A
	<i>Model</i>	SKF1200500X1BA
	<i>Brand name</i>	Mass

NOTE: For more detailed informations or features please refer to user's manual of EUT.

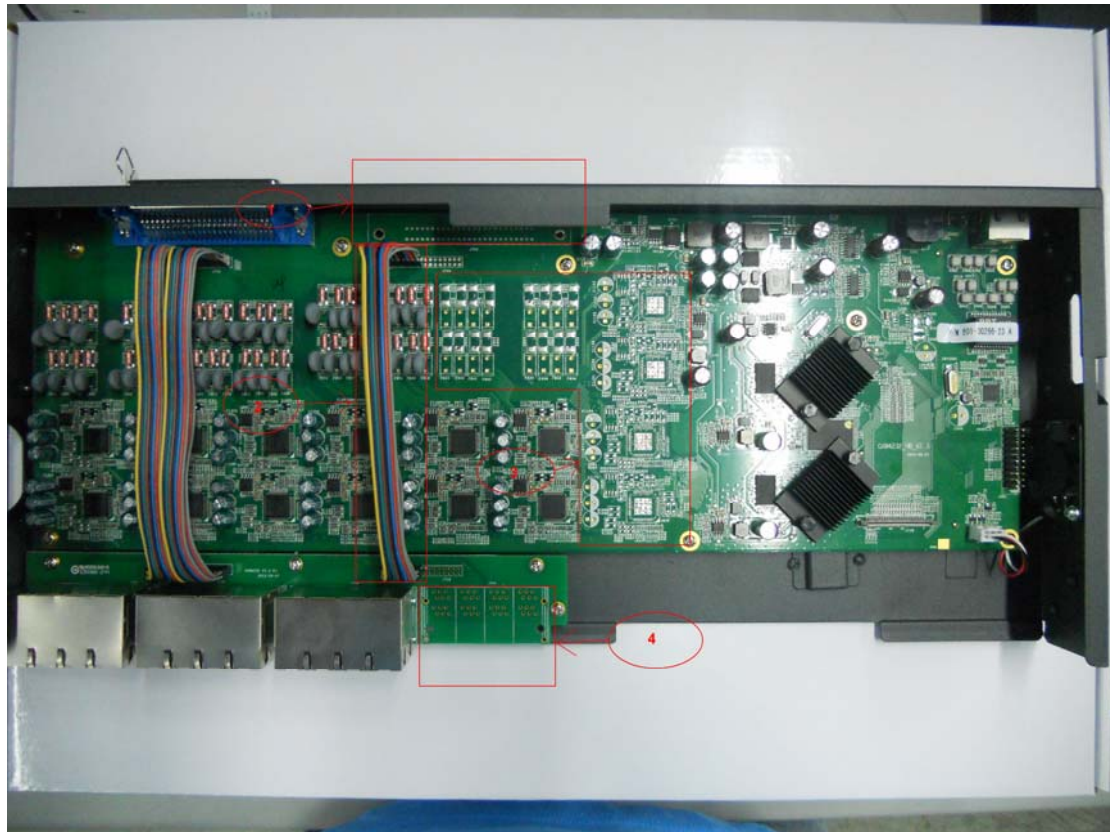
EUT Model Derived

Models GXW4232 and GXW4224 are a series of product, they have the same circuit principle&PCB layout, differences between these two models are as follows:

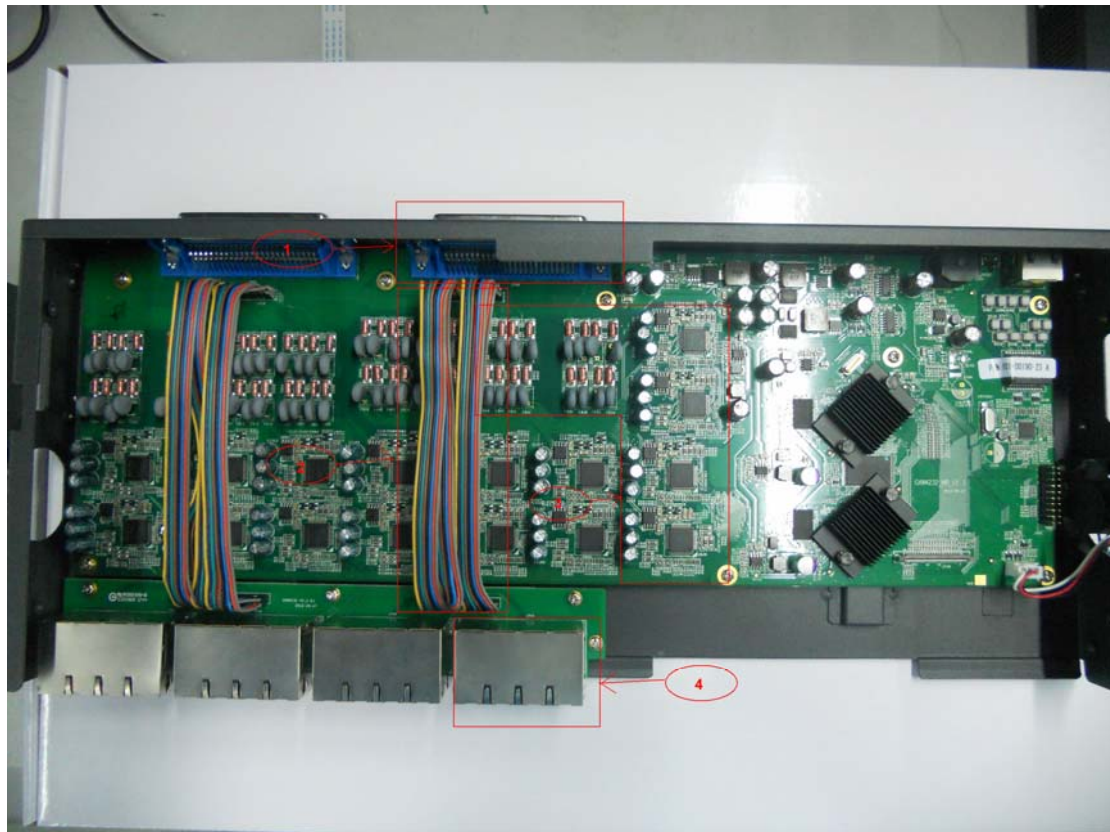
<i>Item</i>	<i>Differences</i>	<i>GXW4224</i>	<i>GXW4232</i>
<i>1</i>	<i>Telecom Connector</i>	<i>Removed</i>	<i>Mounted</i>
<i>2</i>	<i>Dupont Lines</i>	<i>2*8PIN</i>	<i>2*16PIN</i>
<i>3</i>	<i>Components</i>	<i>Removed</i>	<i>Mounted</i>
<i>4</i>	<i>RJ11 Connector</i>	<i>Removed</i>	<i>Mounted</i>

Note:Pre-scan has been conducted to determine the worst-case between these two models,model GXW4232 was selected for the final testing.

Model number: GXW4224



Model number: GXW4232



Test Mode Justification

The EUT shall be configured and operated in a manner which tends to maximize its emission characteristics in a typical application. Connected to PC mode was selected for the final testing as described belows:

Connected to PC:

Connected a notebook PC to Ethernet port of the EUT by an RJ-45 cable and ping "192. 168.0.160 -t" to EUT, also connected two analog phones to any two FXS ports and established a call link between them and measured it.

EUT Exercise Software

No test software support this test.

Equipment Modification

Any modifications installed previous to testing by Grandstream Networks, INC., will be incorporated in each production model sold or leased in United States.

There were no modifications installed by ECMG Electronic Technical Testing Corp (Shenzhen). test personnel.

Test Summary

The Electromagnetic Compatibility requirements on model GXW4232 for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

Emission Tests				
Specifications	Description	Test Results	Test Point	Remark
<i>FCC Part 15.107 ANSI C63.4 -2009</i>	<i>Conducted Emission</i>	<i>Passed</i>	<i>AC Input Port</i>	<i>Attachment 1</i>
<i>FCC Part 15.109 ANSI C63.4 -2009</i>	<i>Radiated Emission</i>	<i>Passed</i>	<i>Enclosure</i>	<i>Attachment 2</i>

EUT Sample Photos for model GXW4232



EUT- Front View



EUT- Rear View

FCC Test Report #: SHE-1205-10825-FCC

Prepared for Grandstream Networks, INC

Prepared by ECMG Electronic Technical Testing Corp (Shenzhen)

Page 9 of 31



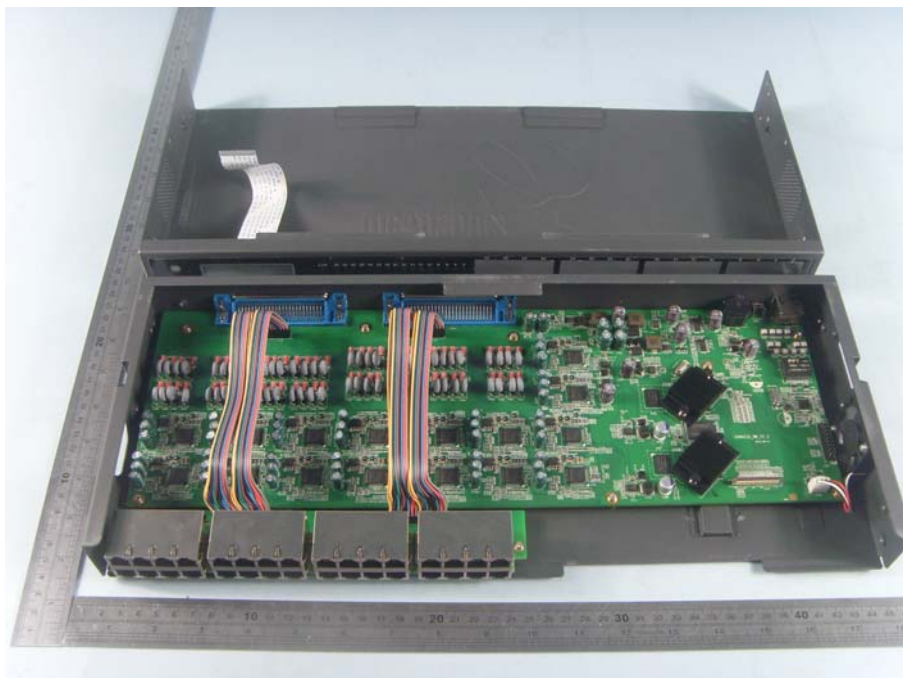
Earth Terminal View



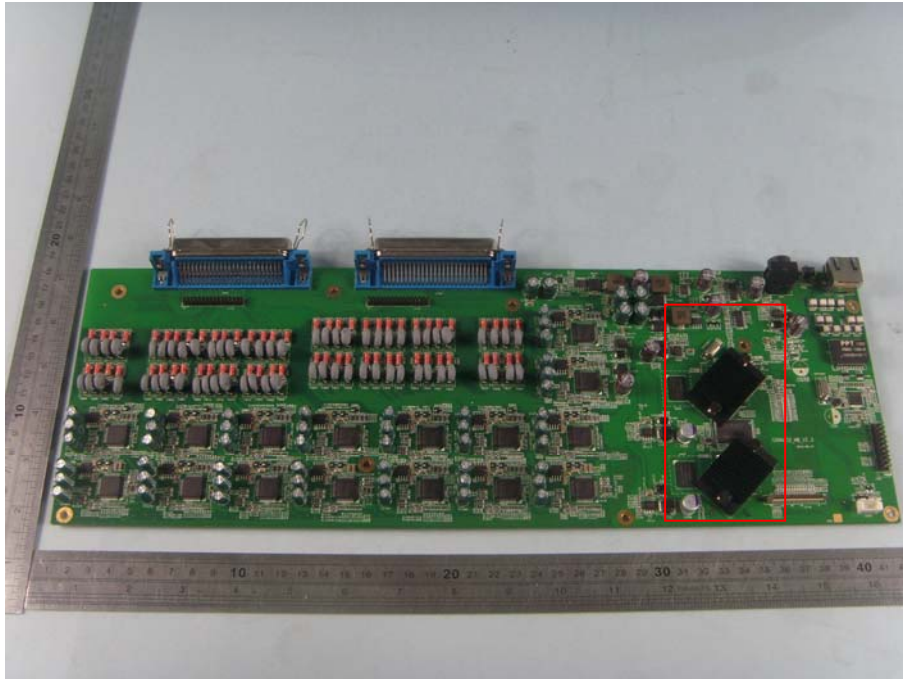
EUT- Right side View



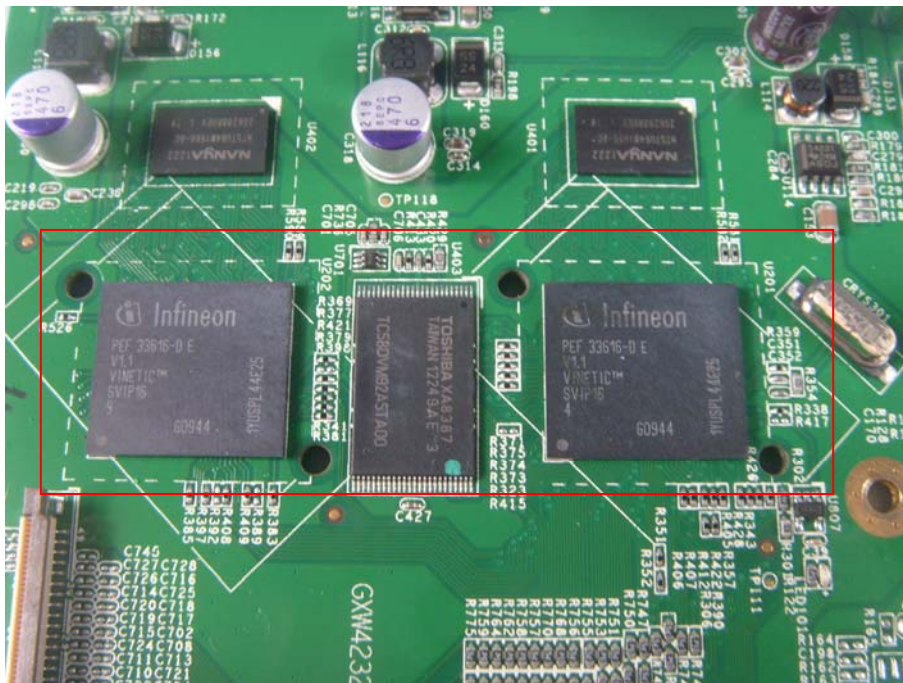
EUT- Left side View



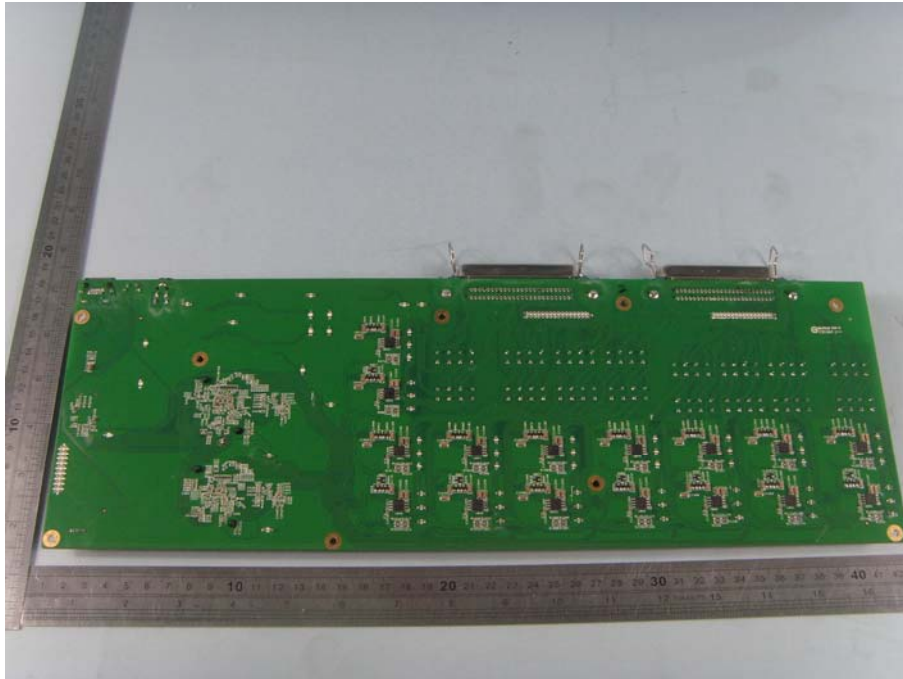
EUT-Uncovered View



Mainboard- Top View #1



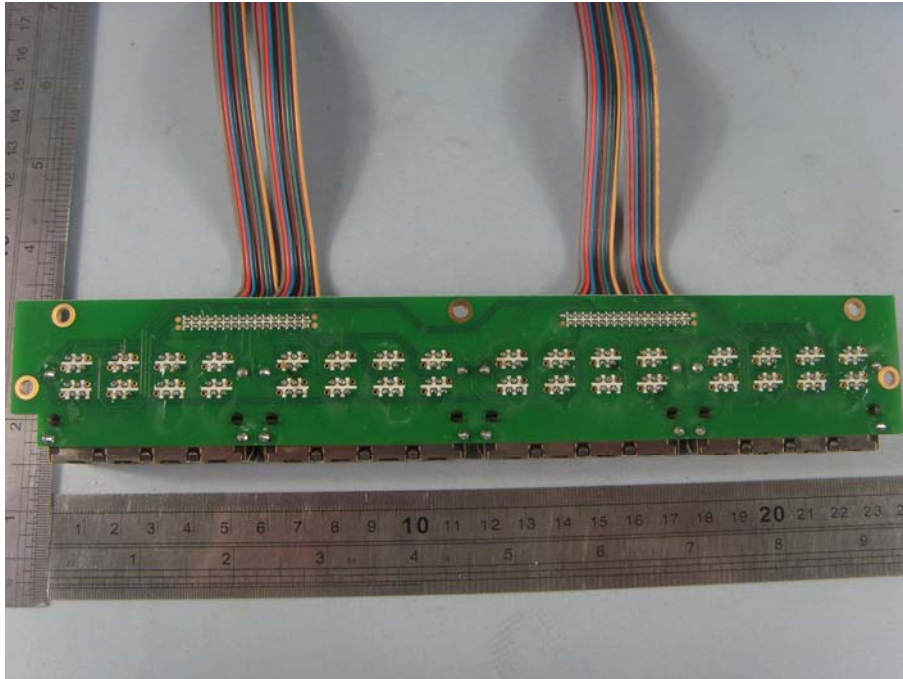
Mainboard- Top View #2



Mainboard- Bottom View



Interface board- Top View



Interface board - Bottom View



Power adaptor View (Manufacturer: Mass Power)

Test System Details

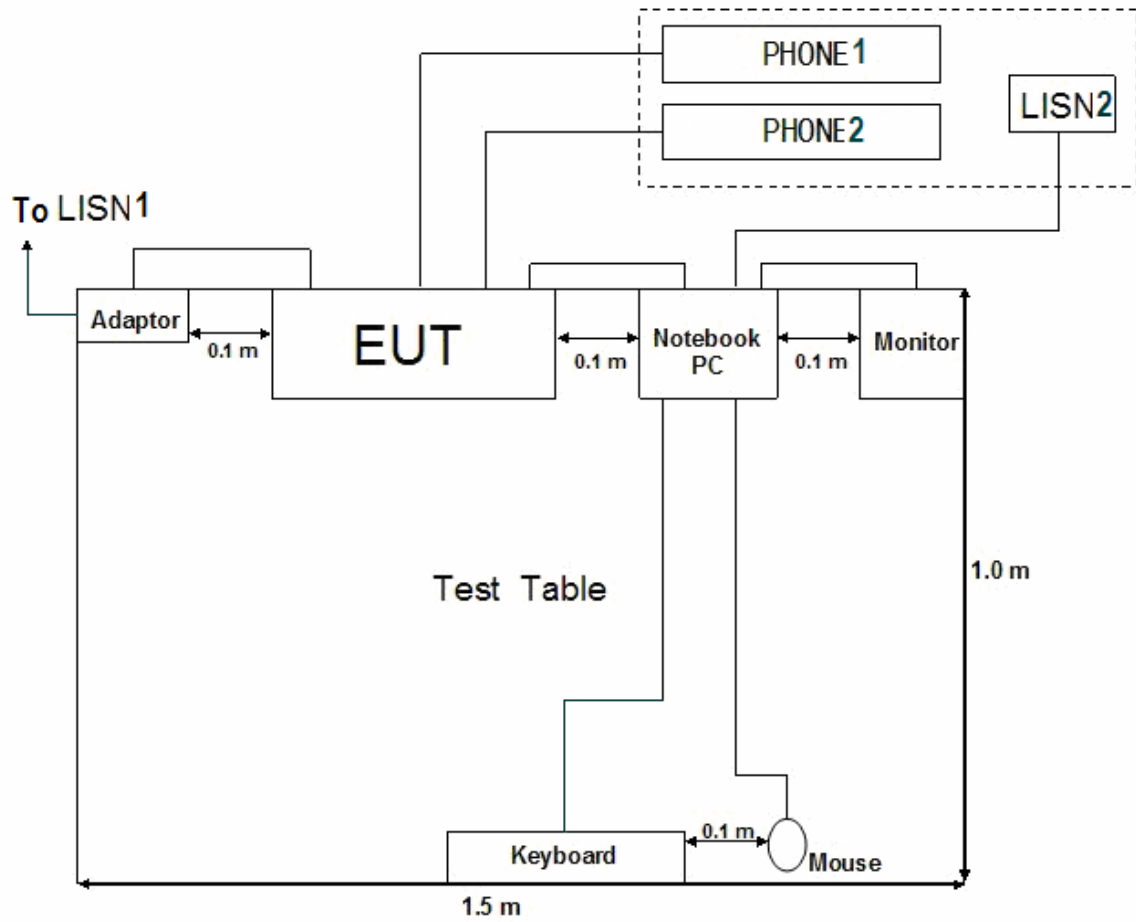
EUT			
Model Number:	GXW4232,GXW4224		
Model Tested:	GXW4232		
Description:	VoIP Gateway		
Input:	AC 120V/60Hz		
Manufacturer:	Grandstream Networks, INC		
Support Equipment			
Description	Model Number	Serial Number	Manufacturer
Notebook PC	ThinkPad X121e	---	Lenovo
Adapter Of Notebook PC	ThinkPad 57Y4614	---	Lenovo
Keyboard	SK-1788	---	LENOVO
Mouse	MO32B0	23-033131	IBM
Monitor	TFT1780PS	B8879HA021638	AOC
Analog phone x2(pcs)	HCD129P/TSDL 2975E	---	Daerxun

Continue on to next page...

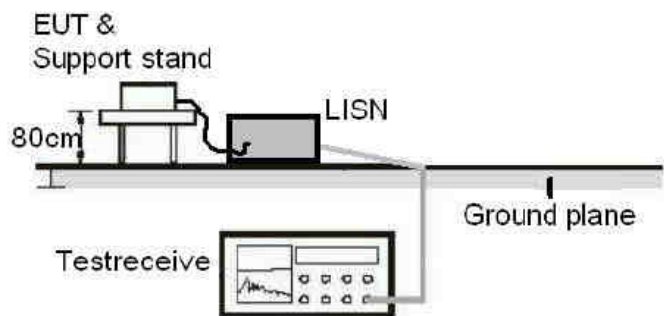
Cable Description					
Description	From	To	Length (Meters)	Shielded (Y/N)	Ferrite (Y/N)
<i>Power Cord Of Notebook PC</i>	<i>Adapter</i>	<i>Notebook PC</i>	<i>1.6</i>	<i>N</i>	<i>Y</i>
	<i>Adapter</i>	<i>Plug</i>	<i>1.2</i>	<i>N</i>	<i>Y</i>
<i>Mouse cord</i>	<i>Mouse</i>	<i>Plug</i>	<i>1.2</i>	<i>N</i>	<i>Y</i>
<i>Keyboard cord</i>	<i>keyboard</i>	<i>Plug</i>	<i>1.2</i>	<i>N</i>	<i>Y</i>
<i>VGA Cord</i>	<i>Monitor</i>	<i>PC</i>	<i>1.2</i>	<i>Y</i>	<i>Y</i>
<i>RJ-45 Cord</i>	<i>EUT</i>	<i>Notebook PC</i>	<i>1.5</i>	<i>N</i>	<i>N</i>
<i>Power Adapter cord of EUT</i>	<i>Adapter</i>	<i>EUT</i>	<i>1.0</i>	<i>N</i>	<i>N</i>
	<i>Adapter</i>	<i>Plug</i>	<i>1.2</i>	<i>N</i>	<i>N</i>
<i>Note: The "EUT" means "VoIP Gateway".</i>					

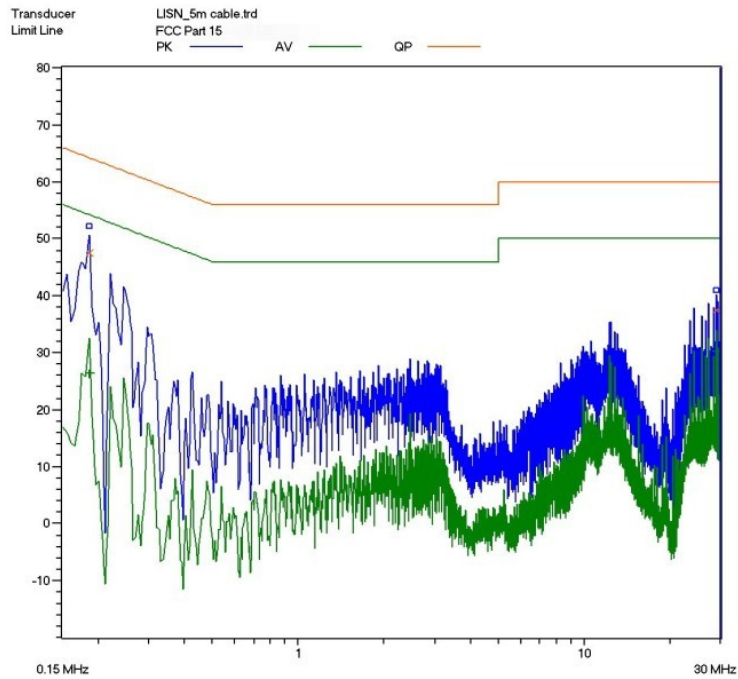
NOTE: The EUT has been tested as an independent unit together with other necessary accessories or support units. The above support units or accessories were used to form a representative test configuration during the test tests.

Configuration of Tested System

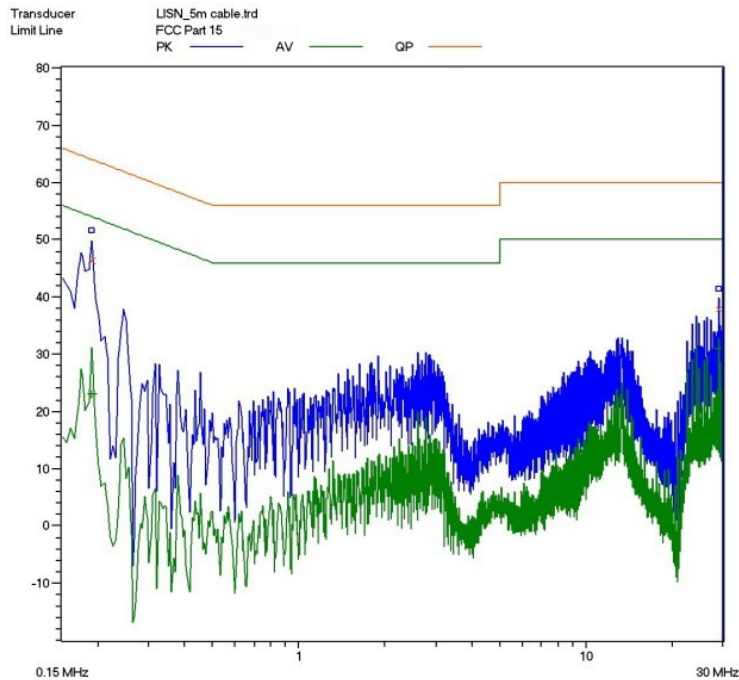


ATTACHMENT 1 - CONDUCTED EMISSION TEST RESULTS

CLIENT:	Grandstream Networks, INC	TEST STANDERD:	FCC Part 15, Subpart B, Section 15.107
MODEL NUMBERS:	GXW4232,GXW4224	PRODUCT:	VoIP Gateway
MODEL TESTED:	GXW4232	EUT DESIGNATION:	Home or Office
TEMPERATURE:	23°C	HUMIDITY:	51%
ATM PRESSURE:	103kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	June 12 th , 2012
TEST REFERENCE:	ANSI C63.4 -2009		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4 -2009 for conducted emissions. The measurement was using a AMN on each line and an EMI receiver peak scan was made at the frequency measurement range. The six highest significant peaks were then marked, and these signals were then quasi-peaked and averaged. The frequency range investigated was from 150KHz to 30MHz.		
DESCRIPTION OF TEST MODE	Connected to PC		
TEST SET UP	 <p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a support stand at a height of 80cm. The EUT is connected to a LISN (Line Impedance Stabilization Network). The LISN is connected to a Test receiver, which is also connected to a Ground plane.</p>		
TESTED RANGE:	150kHz to 30MHz		
TEST VOLTAGE:	AC 120V/60Hz		
RESULTS:	The EUT meets the requirements of test reference for Conducted Emissions. The test results relate only to the equipment under test provided by client.		
Changes or Modifications:	There were no modifications installed by ECMG Electronic Technical Testing Corp (Shenzhen). test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		



Line L Conducted Emission Graph



Line N Conducted Emission Graph

Test Data:

Lines (L/N)	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Margin QP (dB)	Frequency (MHz)	Corrected AV Level (dBuV)	Limits AV (dBuV)	Margin QP (dB)
L	0.185	47.5	64.3	-16.8	0.185	26.4	54.3	-27.9
L	0.210	40.2	63.1	-22.9	0.210	20.7	53.1	-32.4
L	0.255	35.7	61.5	-25.8	0.255	17.3	51.5	-34.2
N	0.165	50.1	65.1	-15	0.165	30.0	55.1	-25.1
N	0.210	40.0	63.1	-23.1	0.210	20.4	53.1	-32.7
N	0.255	35.4	61.5	-26.1	0.255	17.3	51.5	-34.2


Note :

- 1) All readings are using a bandwidth of 9 kHz, with a 500 ms sweep time. A video filter was not use.
- 2) "QP" means "Quasi-Peak" values, "AV" means "Average" values.
- 3) The other reading are too low against official limits that are not be recorded.

Test Equipment List:

Test Equipment	Model No.	Manufacturer	Serial No.	Last Cal.	Cal. Interval
Receiver	SMR4503	SCHAFFNER	11725	2012.07.08	2013.07.08
Line impedance stabilization network	4825/2	ETS	1161	2012.07.08	2013.07.08

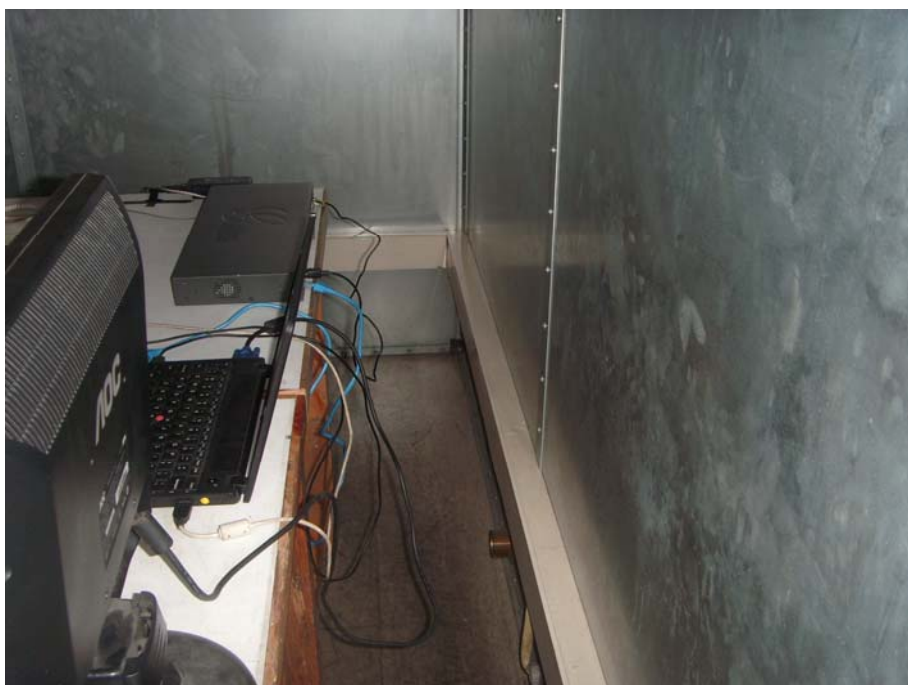
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.

TESTED BY:  GALANZ
ENGINEER COMPANY NAME

REVIEWED BY:  ECMG
SENIOR ENGINEER COMPANY NAME



Conducted Emission Test Set-up- Front view



Conducted Emission Test Set-up- Back view

ATTACHMENT 2 - RADIATED EMISSION MEASUREMENT

CLIENT:	Grandstream Networks, INC	TEST STANDERD:	FCC Part 15,Subpart B, Section 15.109
MODEL NUMBERS:	GXW4232,GXW4224	PRODUCT:	VoIP Gateway
EUT MODEL:	GXW4232	EUT DESIGNATION:	Home or Office
TEMPERATURE:	23°C	HUMIDITY:	49%RH
ATM PRESSURE:	103.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	June 12 th , 2012
TEST REFERENCE:	ANSI C63.4 -2009		
TEST PROCEDURE:	<p>The EUT was set up according to the guidelines of ANSI C63.4 -2009 for radiated emissions. An EMI receiver peak scan was made at the frequency measurement range (pre-scan) in an Anechoic chamber.signal discrimination was then performed and the significant peaks marked.these peaks were then quasi-peaked in the frequency range of 30 MHz to 1GHz and average and peak in the frequency range of 1GHz to 3GHz at an anechoic chamber.</p> <p>The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor are given as follows:</p> <p>FS= RA + AF + CF - AG</p> <p>Where: FS = Field Strength</p> <p>RA = Receiver Amplitude</p> <p>AF = Antenna Factor</p> <p>CF = Cable Attenuation Factor</p> <p>AG = Amplifier Gain</p>		
TEST MODE	Connected to PC		
TESTED RANGE:	9K-30MHz and 30MHz to 5GHz		
TEST VOLTAGE:	AC 120V/60Hz		
RESULTS:	The EUT meet the requirements of test reference for radiated emissions. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Electronic Technical Testing Corp (Shenzhen). Test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Continue on to next page...

TEST SET-UP:

Frequency measured at 9KHz to 30MHz:

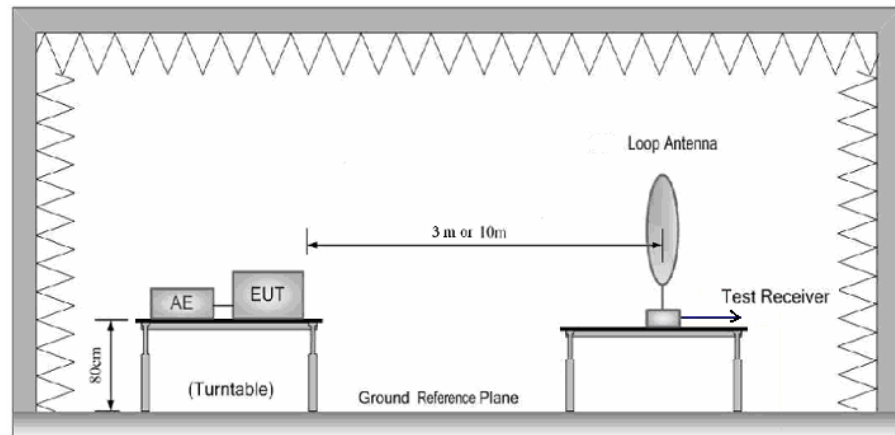


Figure 1 : Frequencies measured below 1 GHz configuration

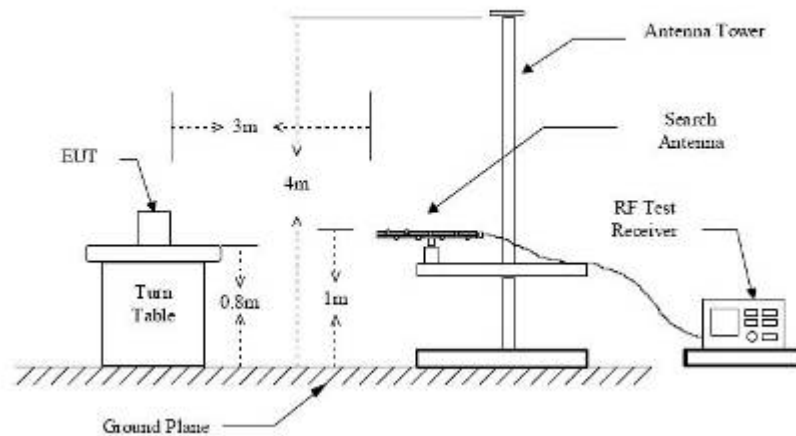
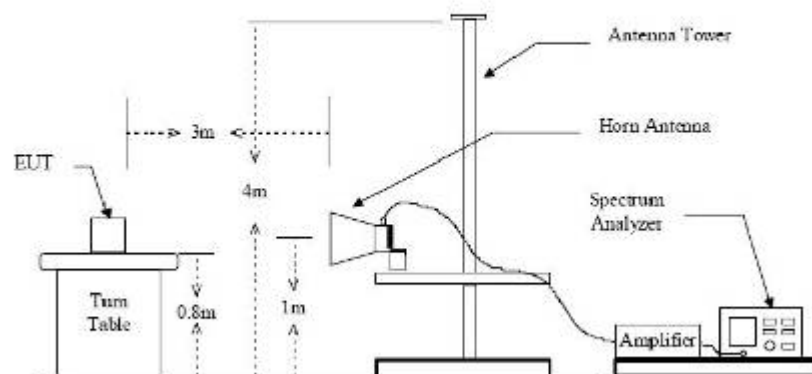
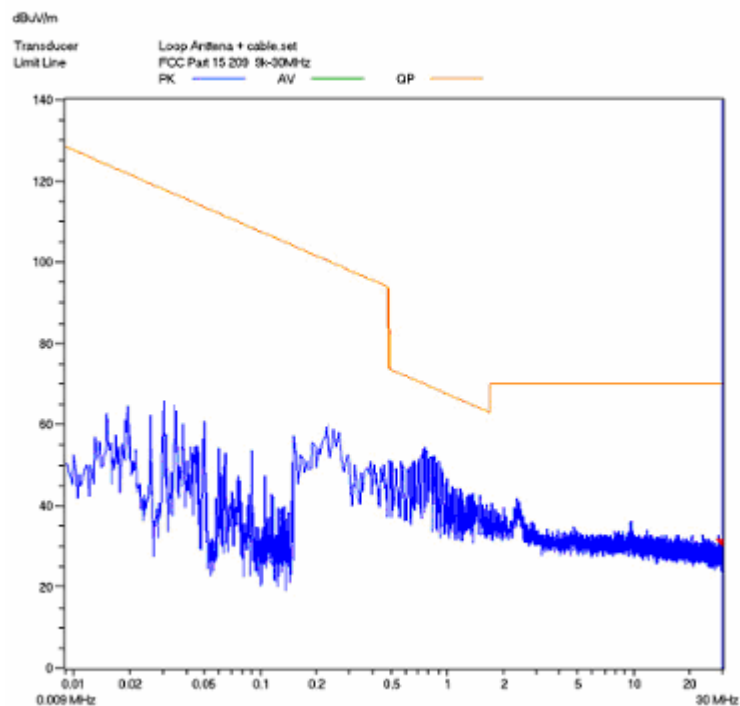
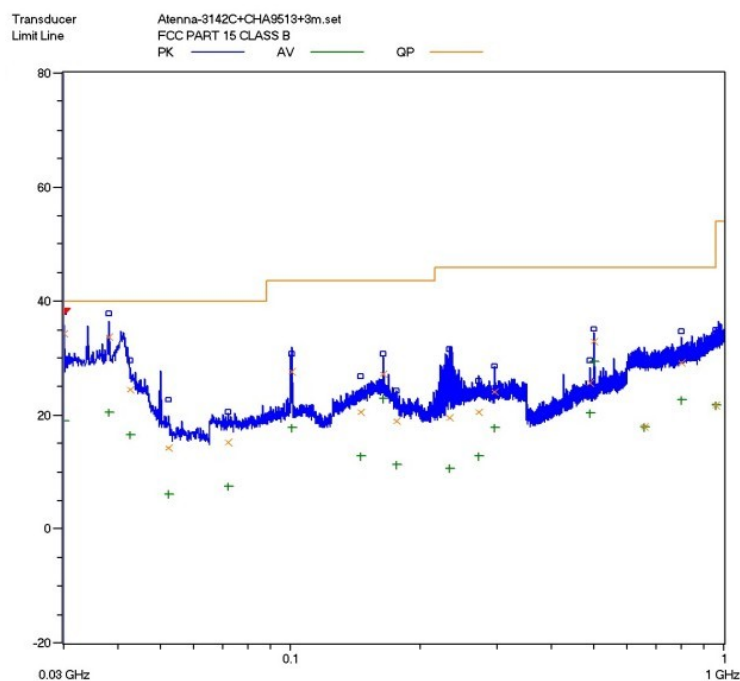


Figure 2 : Frequencies measured above 1 GHz configuration

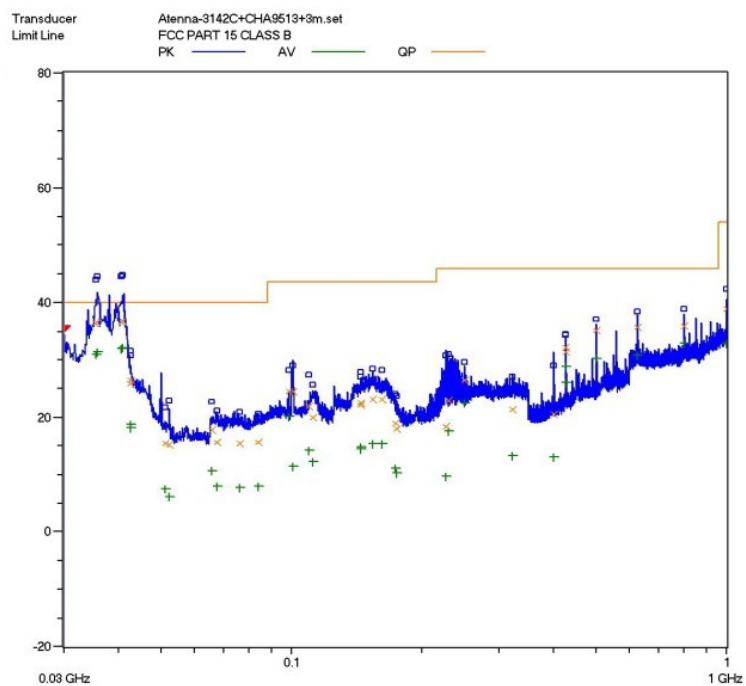




Radiated Filed Strength Emission Test Plot(9KHz-30MHz)



Horizontal: Radiated Emission Test Plot (30-1000MHz)



Test Data:
9KHz to 30MHz:

Test No. #:	Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Reading Level QP (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	/	/	/	/	/	/	/
2	/	/	/	/	/	/	/
3	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/
5	/	/	/	/	/	/	/
6	/	/	/	/	/	/	/

Note:

1. The field strength is calculated by adding the antenna factor, cable factor. The basic equation with a sample calculation is as follows:
Emission Level = Reading Level + Antenna Factor + Cable Loss.
2. For band in 9KHz to 30MHz, Pre-scan has been conducted to determine the worst-case from apaptor #1, apaptor #2 and apaptor #3. Apaptor #1 was selected for the fina testing.
3. The limits shown are based on quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. the bandwidth of Test Receiver was set at 200Hz in frequency range of 9KHz to 150KHz, 9kHz in the frequency range of 150KHz to 30MHz.
4. All emission levels in the frequency range of 9KHz to 30MHz are 20dB below the official limits that are not reported.

Test Data:
Below 1GHz:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level QP (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Horizontal							
163.840	0.02	10	/	28.68	38.7	43.5	-4.8
229.360	0.12	10.1	/	24.18	34.4	46	-11.6
250.000	0.12	11.8	/	25.78	37.7	46	-8.3
294.880	0.16	13.2	/	19.04	32.4	46	-13.6
426.000	0.20	15.8	/	21.6	37.6	46	-8.4
624.000	0.36	20.2	/	12.84	33.4	46	-12.6
Vertical							
35.600	0.02	18.4	/	17.28	35.7	40	-4.3
35.760	0.02	18.4	/	17.48	35.9	40	-4.1
40.480	0.02	16.8	/	19.58	36.4	40	-3.6
40.800	0.02	16.8	/	19.88	36.7	40	-3.3
500.000	0.20	17.4	/	17.4	35.0	46	-11.0
624.960	0.36	20.2	/	15.04	35.6	46	-10.4

Note:

1. All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 60 s sweep time. A video filter was not used.
2. The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Emission Level = Reading Level + Antenna Factor + Cable Loss - Preamplifier Factor.
3. The other emission levels are 20dB below the official limits that are not reported.

Above 1GHz:


<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margi n (dB)</i>	<i>Antenna Polariza tion (H/V)</i>
Peak Measurement								
1.060	1.40	24.1	33.6	59.79	51.69	74	-22.31	H
1.330	1.53	25.1	33.6	61.45	54.48	74	-19.52	H
1.600	1.80	27.0	33.6	56.08	51.28	74	-22.72	H
1.076	1.40	24.1	33.6	56.8	48.70	74	-25.3	V
1.330	1.53	25.1	33.6	58.08	51.11	74	-22.89	V
1.390	1.56	25.3	33.6	62.36	55.62	74	-18.38	V
Average Measurement								
1.060	1.40	24.1	33.6	40.49	32.39	54	-21.61	H
1.330	1.53	25.1	33.6	41.17	34.20	54	-19.8	H
1.600	1.80	27.0	33.6	40.76	35.96	54	-18.04	H
1.076	1.40	24.1	33.6	41.86	33.76	54	-20.24	V
1.330	1.53	25.1	33.6	38.08	31.11	54	-22.89	V
1.390	1.56	25.3	33.6	43.46	36.72	54	-17.28	V

Note:

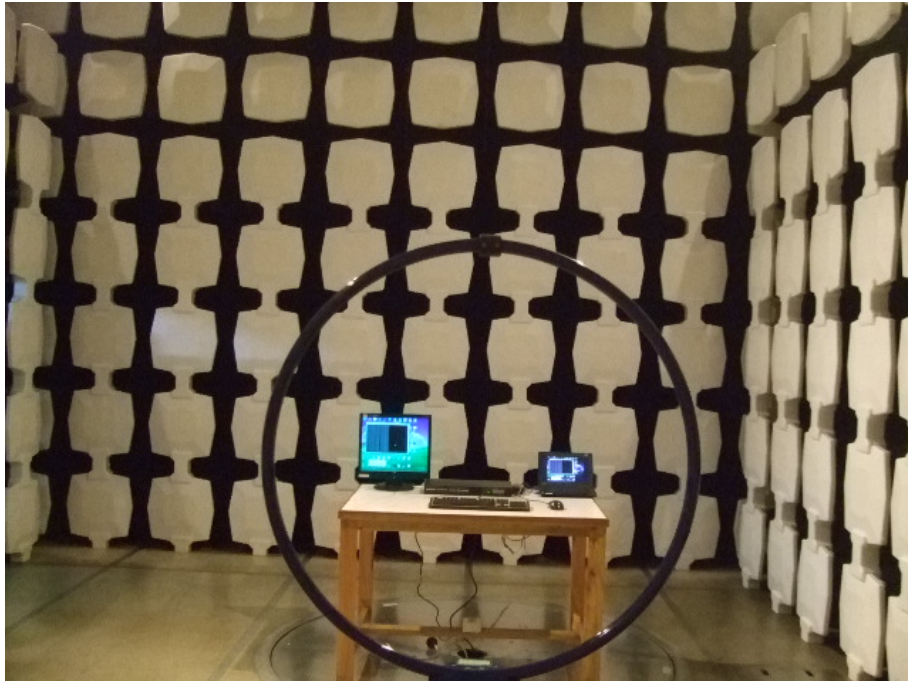
1. The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Emission Level = Reading Level + Antenna Factor + Cable Loss - Preamplifier Factor.
2. The limits shown are based on Peak value and Average value detector above 1GHz, the bandwidth of Test Receiver was set at 1MHz above 1GHz.
3. The other emission levels are 20dB below the official limits that are not reported.

Test Equipment List:

Test Equipment	Model No.	Manufacturer	Serial No.	Last Cal.	Cal. Due
Receiver	SMR4503	SCHAFFNER	11725	2012.07.08	2013.07.07
HF Loop Antenna	HLA6120	TESEQ	26348	2012.09.27	2013.09.26
Double-ridged Wave guide horn	3115	ETS	6587	2012.08.02	2013.08.01
Microwave system amplifier	83017A	Agilent	MY39500438	2012.07.11	2013.07.10
Biconilog Antenna	3142C	ETS	00042672	2012.09.28	2013.09.27
Band-pass Filter	BRM50702	Micro-Tronic	S/N-030	2011.11.30	2012.11.29
Spectrum Analyzer	FSP30	R&S	100755	2011.11.30	2012.11.29
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

TESTED BY:  GALANZ
ENGINEER COMPANY NAME

REVIEWED BY:  ECMG
SENIOR ENGINEER COMPANY NAME



Radiated Emission Test Set-up (9KHz-30MHz)



Radiated Emission Test Set-up (Below 1GHz)



Radiated Emission Test Set-up (Above 1GHz)