

EMI TEST REPORT

On Model Name: VoIP Gateway

Model Number: GXW4216

Brand Name: Grandstream

Prepared for Grandstream Networks, INC

FCC ID Number: YZZGXW4216

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

Test Report #: SHE-1211-10912-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 30th, 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.

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List Attached Files

<i>Exhibit Type</i>	<i>File Description</i>	<i>File Name</i>
<i>Test Report</i>	<i>Test Report</i>	<i>YZZGXW4216 _Test report.pdf</i>
<i>Operation Description</i>	<i>Technical Description</i>	<i>YZZGXW4216_operation description.pdf</i>
<i>External Photos</i>	<i>External Photos</i>	<i>YZZGXW4216_External Photos</i>
<i>Internal Photos</i>	<i>Internal Photos</i>	<i>YZZGXW4216_Internal Photos</i>
<i>Block Diagram</i>	<i>Block Diagram</i>	<i>YZZGXW4216_Block Diagram.pdf</i>
<i>Schematics</i>	<i>Circuit Diagram</i>	<i>YZZGXW4216 _Schematics.pdf</i>
<i>ID Label/Location</i>	<i>Label and Location</i>	<i>YZZGXW4216 _Label & Location.pdf</i>
<i>User Manual</i>	<i>User Manual</i>	<i>YZZGXW4216 _User Manual.pdf</i>
<i>Test set-up photos</i>	<i>Test set-up photos</i>	<i>YZZGXW4216 _Test Set-up Photos</i>

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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 : GXW4216

Model Tested : GXW4216

Receipt Date : November 15th, 2012

Date Tested : November 16th to 26th, 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 GXW4216 (referred to as the EUT in this report) is an VoIP Gateway.

Technical specifications of the EUT are as below:

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 or router.</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.

Test Summary

The Electromagnetic Compatibility requirements on model GXW4216 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>

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.

EUT Sample Photos for model GXW4216



EUT- Front View



EUT- Rear View with earth terminal



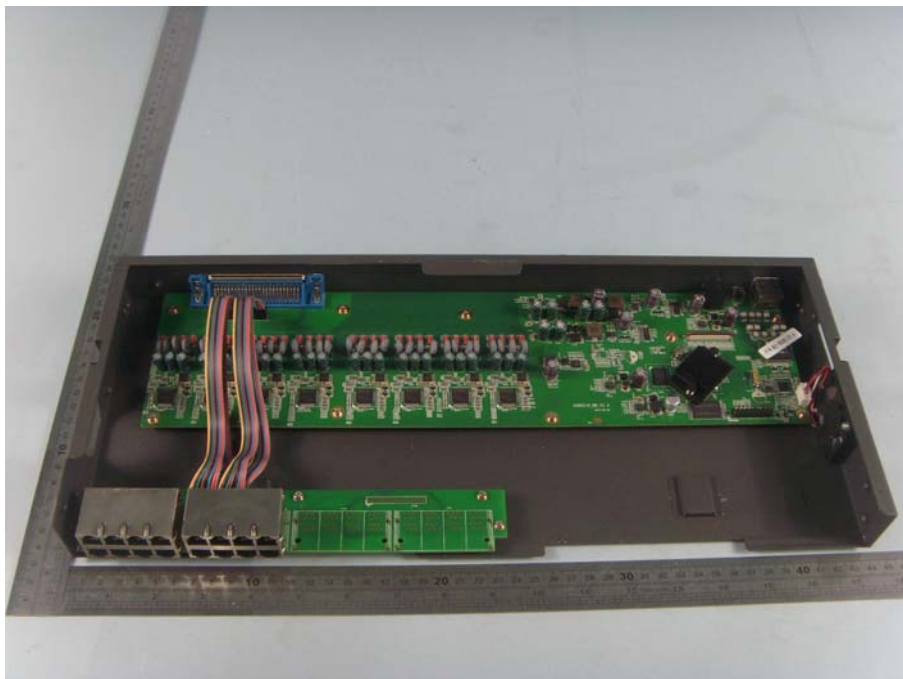
EUT- Right View



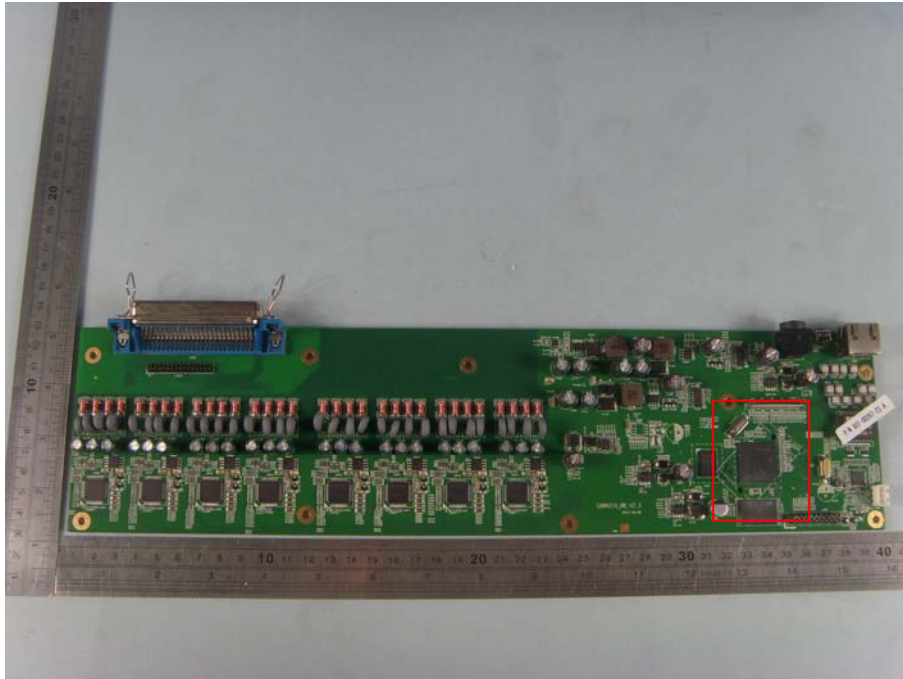
EUT- Left View



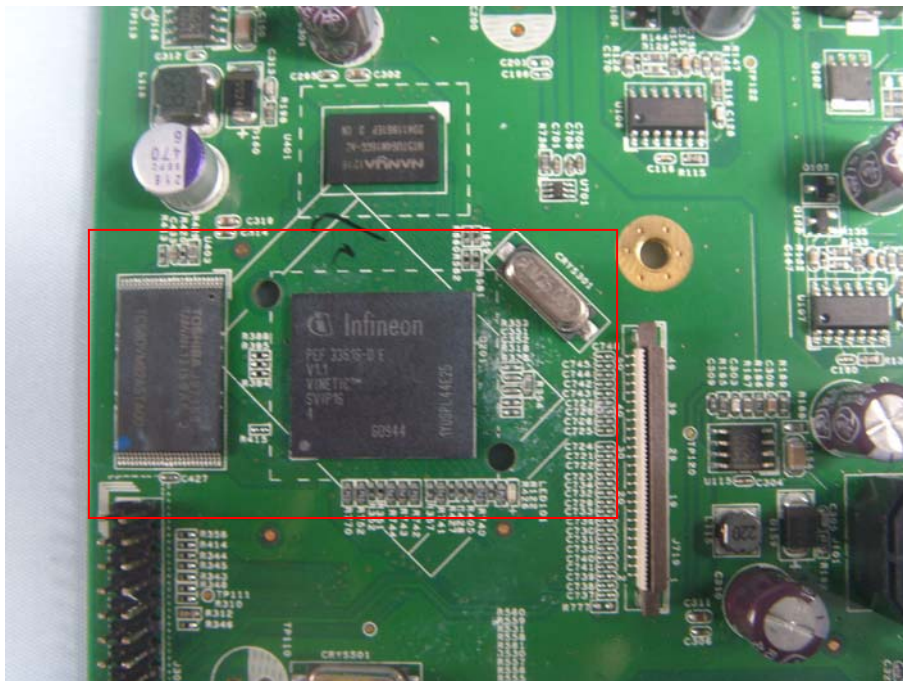
Power Adaptor View (Manufacturer: Mass Power)



EUT-Uncovered View



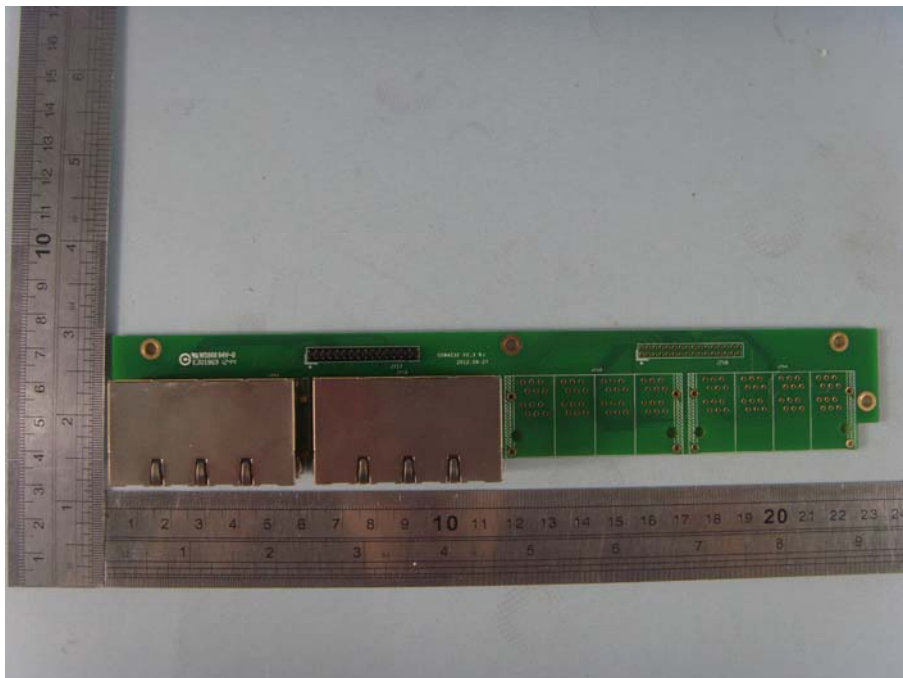
Mainboard- Top View #1



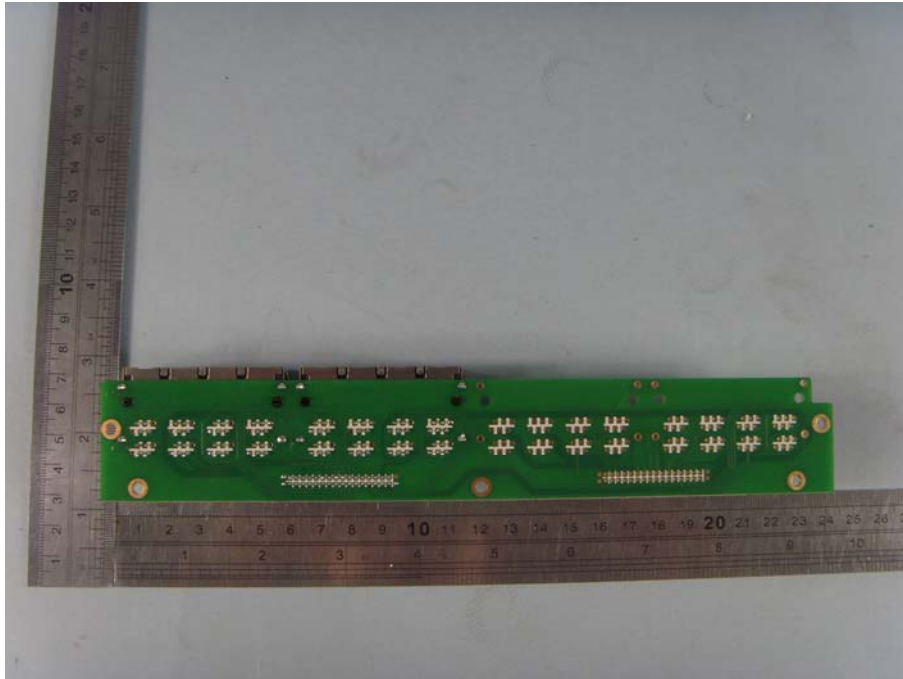
Mainboard- Top View #2



Mainboard- Bottom View



Interface board - Top View



Interface board - Bottom View

Test System Details

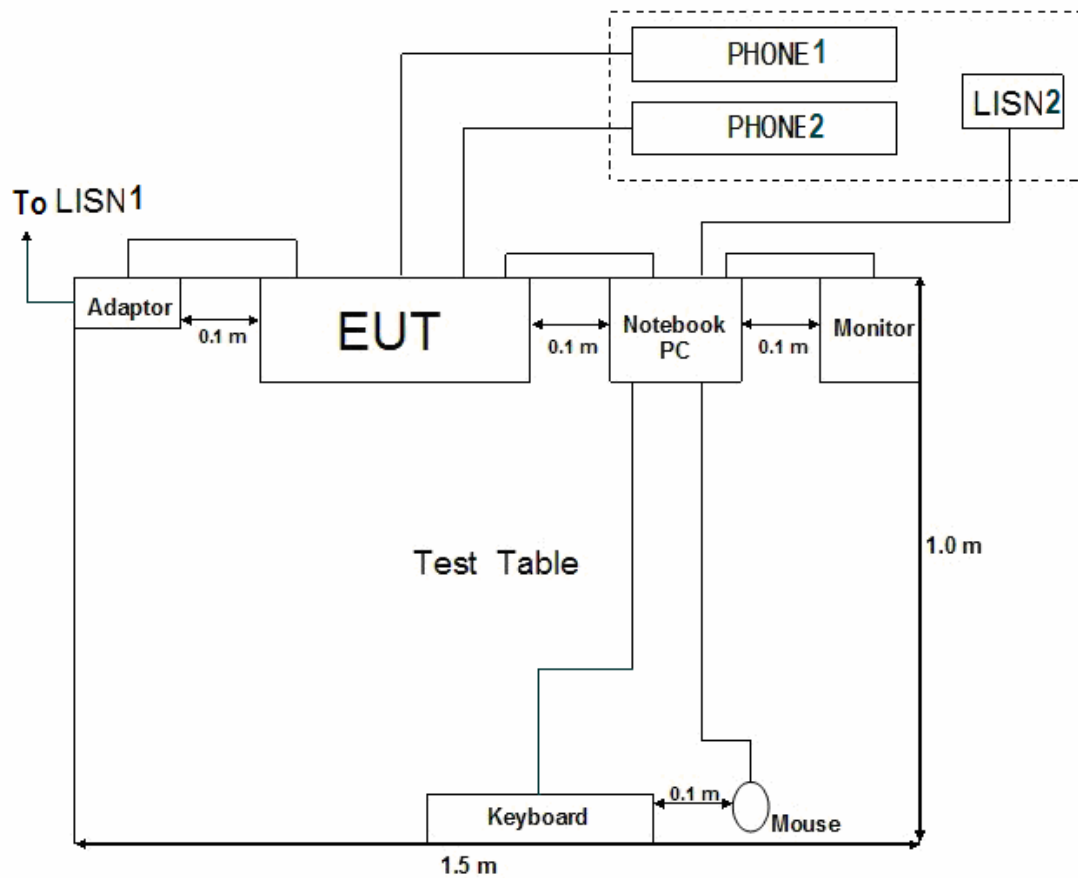
EUT			
Model Number:	GXW4216		
Model Tested:	GXW4216		
Description:	VoIP Gateway		
Input:	AC 120V/60Hz		
Manufacturer:	Grandstream Networks, INC		
Support Equipment			
Description	Model Number	Serial Number	Manufacturer
Notebook PC	ThinkPad X121e	---	Lenovo
Adapter Of Notebook PC	ThinkPad 57Y4614	---	Lenovo
Keyboard	SK-1788	---	LENOVO
Mouse	MO32B0	23-033131	IBM
Monitor	TFT1780PS	B8879HA021638	AOC
Analog phone x2(pcs)	HCD129P/TSDL 2975E	---	Daerxun

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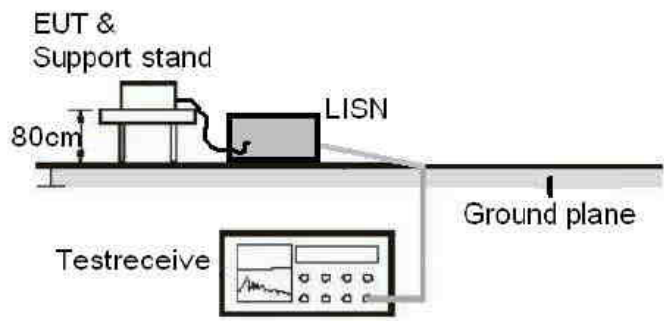
Cable Description					
Description	From	To	Length (Meters)	Shielded (Y/N)	Ferrite (Y/N)
<i>Power Cord Of Notebook PC</i>	<i>Adapter</i>	<i>Notebook PC</i>	<i>1.6</i>	<i>N</i>	<i>Y</i>
	<i>Adapter</i>	<i>Plug</i>	<i>1.2</i>	<i>N</i>	<i>Y</i>
<i>Mouse cord</i>	<i>Mouse</i>	<i>Plug</i>	<i>1.2</i>	<i>N</i>	<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>					

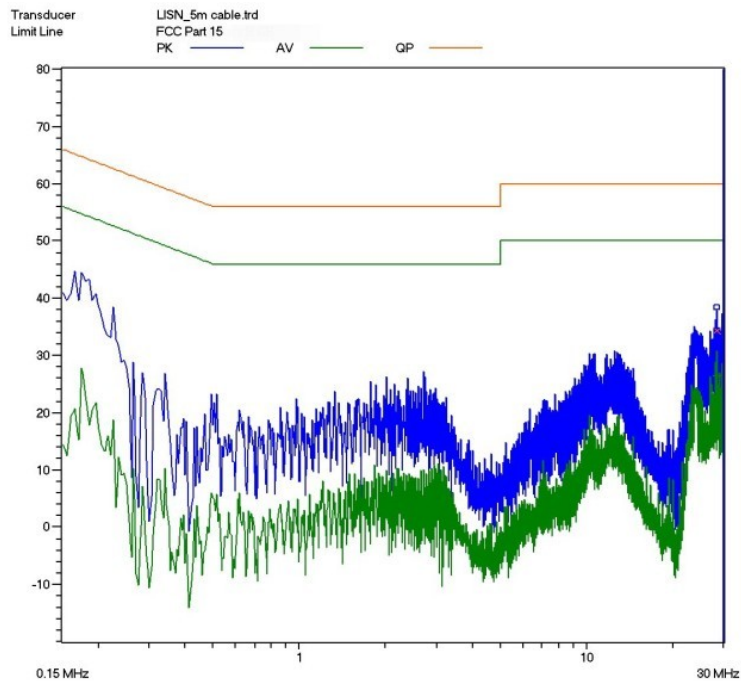
NOTE: The EUT has been tested as an independent unit together with other necessary accessories or support units. The above support units or accessories were used to form a representative test configuration during the test tests.

Configuration of Tested System

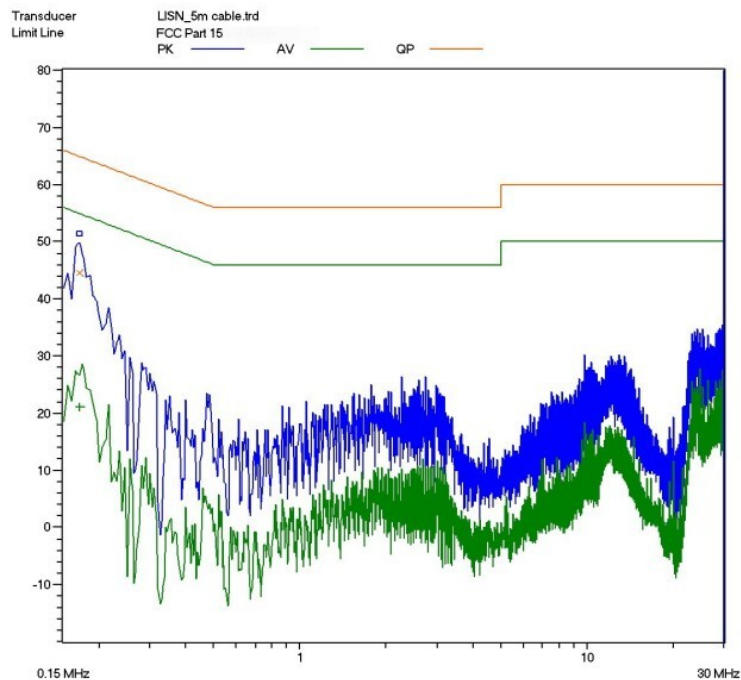


ATTACHMENT 1 - CONDUCTED EMISSION TEST RESULTS

CLIENT:	Grandstream Networks, INC	TEST STANDERD:	FCC Part 15, Subpart B, Section 15.107
MODEL NUMBERS:	GXW4216	PRODUCT:	VoIP Gateway
MODEL TESTED:	GXW4216	EUT DESIGNATION:	Home or Office
TEMPERATURE:	23°C	HUMIDITY:	51%
ATM PRESSURE:	103kPa	GROUNDING:	Through AC power cord and EUT Enclosure to ground
TESTED BY:	Daomen	DATE OF TEST:	November 16 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 & Support stand is positioned at a height of 80cm. It is connected to a LISN (Line Impedance Stabilization Network). The LISN is connected to a Testreceive unit, which is in turn 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	0.157	43.2	65.6	-22.4	0.157	32.1	55.6	-22.4
L	0.210	42.6	63.2	-20.6	0.210	30.5	53.2	-20.6
L	28.590	34.4	60	-25.6	28.590	26.6	50	-25.6
N	0.170	44.6	65	-20.4	0.170	21.2	55	-20.4
N	0.185	40.1	64.3	-24.2	0.185	22.8	54.3	-24.2
N	0.190	39.7	64	-24.3	0.190	23.1	54	-24.3


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

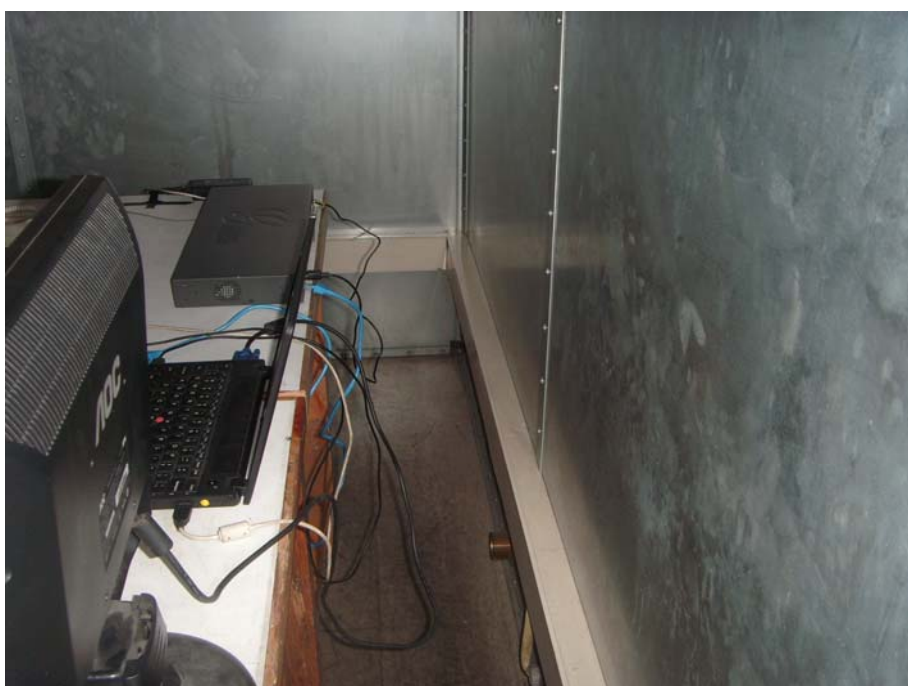
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.

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:	GXW4216	PRODUCT:	VoIP Gateway
EUT MODEL:	GXW4216	EUT DESIGNATION:	Home or Office
TEMPERATURE:	23°C	HUMIDITY:	49%RH
ATM PRESSURE:	103.0kPa	GROUNDING:	Through AC power cord and EUT Enclosure to ground
TESTED BY:	Daomen	DATE OF TEST:	November 19 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		

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TEST SET-UP:

Frequency measured at 9KHz to 30MHz:

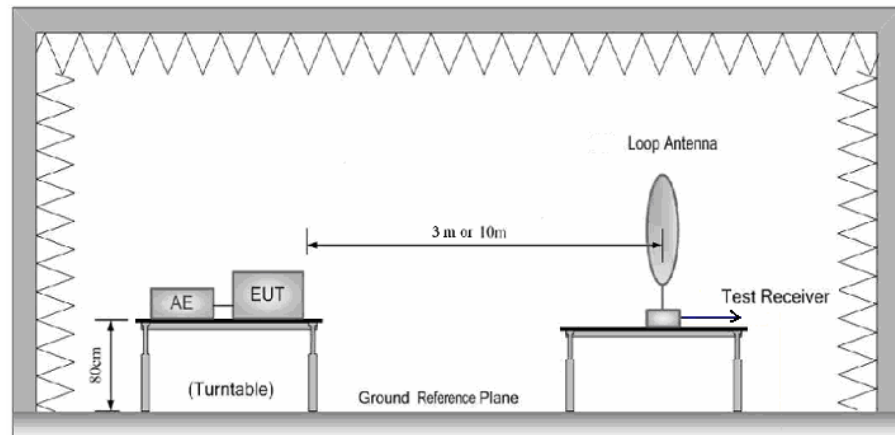


Figure 1 : Frequencies measured below 1 GHz configuration

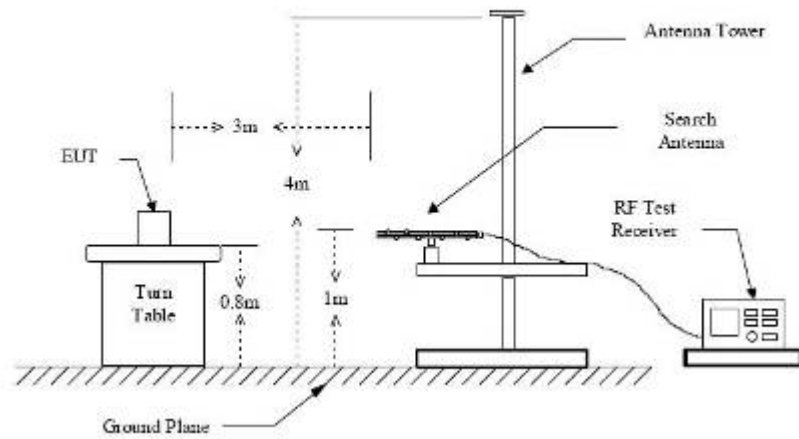
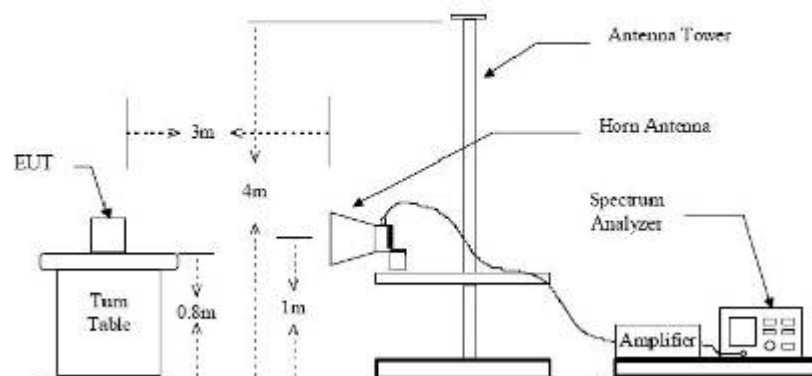
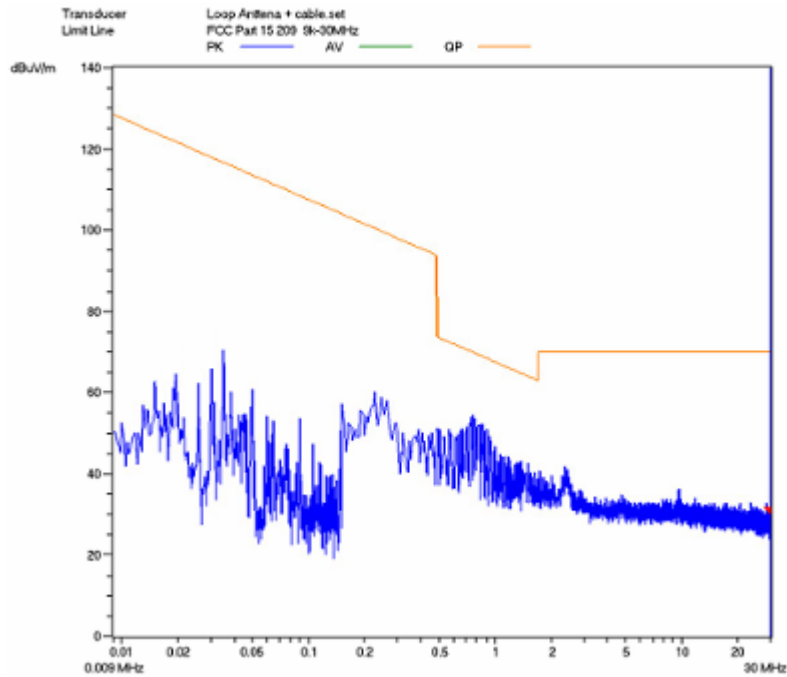
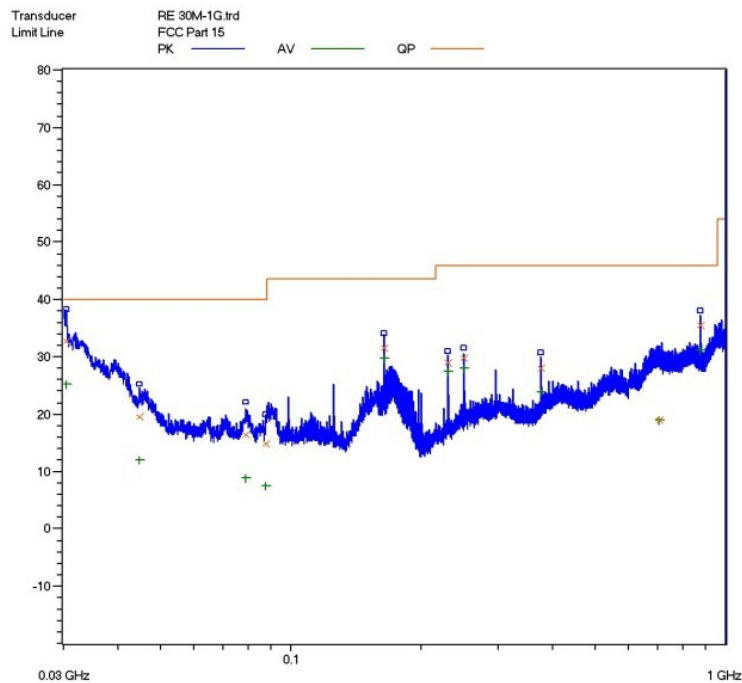


Figure 2 : Frequencies measured above 1 GHz configuration

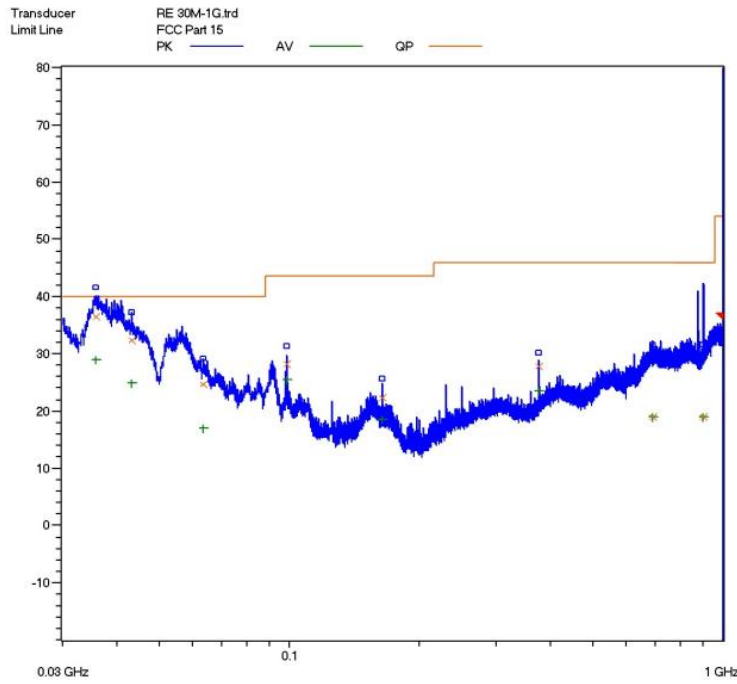




Radiated Filed Strength Emission Test Plot (9 KHz-30MHz)



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



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

Test Data:**9 KHz 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:
$$\text{Emission Level} = \text{Reading Level} + \text{Antenna Factor} + \text{Cable Loss}.$$
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:**

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level QP (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>
Horizontal							
30.360	0.02	16.7	/	15.98	32.7	40	-7.3
163.840	0.02	10	/	21.58	31.6	43.5	-11.9
229.360	0.12	10.1	/	18.88	29.1	46	-16.9
250.000	0.12	11.8	/	17.98	29.9	46	-16.1
375.000	0.16	13.7	/	14.24	28.1	46	-17.9
874.980	0.42	22.4	/	12.78	35.6	46	-10.4
Vertical							
35.600	0.02	18.4	/	18.18	36.6	40	-3.4
43.140	0.02	15.4	/	16.98	32.4	40	-7.6
63.180	0.02	5	/	19.58	24.6	40	-15.4
98.280	0.02	7.7	/	20.38	28.1	43.5	-15.4
163.800	0.02	10	/	12.38	22.4	43.5	-21.1
375.000	0.16	13.7	/	14.04	27.9	46	-18.1

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:


Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamplifier Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
1.246	1.42	24.8	33.6	51.13	43.75	74	-30.25	H
3.270	2.59	31.8	32.1	46.31	48.60	74	-25.4	H
3.900	3.00	33.5	32	46.51	51.01	74	-22.99	H
1.236	1.40	24.5	33.6	54.76	47.06	74	-26.94	V
3.300	2.60	31.9	32.1	46.1	48.50	74	-25.5	V
3.890	2.96	33.1	32	46.27	50.33	74	-23.67	V
Average Measurement								
1.246	1.42	24.8	33.6	42.08	34.7	54	-19.3	H
3.270	2.59	31.8	32.1	28.51	30.8	54	-23.2	H
3.900	3.00	33.5	32	33.1	37.6	54	-16.4	H
1.236	1.40	24.5	33.6	40.2	32.5	54	-21.5	V
3.300	2.60	31.9	32.1	29.2	31.6	54	-22.4	V
3.890	2.96	33.1	32	29.84	33.9	54	-20.1	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	2012.11.30	2013.11.29
Spectrum Analyzer	FSP30	R&S	100755	2012.11.30	2013.11.29
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

TESTED BY:  GALANZ
ENGINEER COMPANY NAME

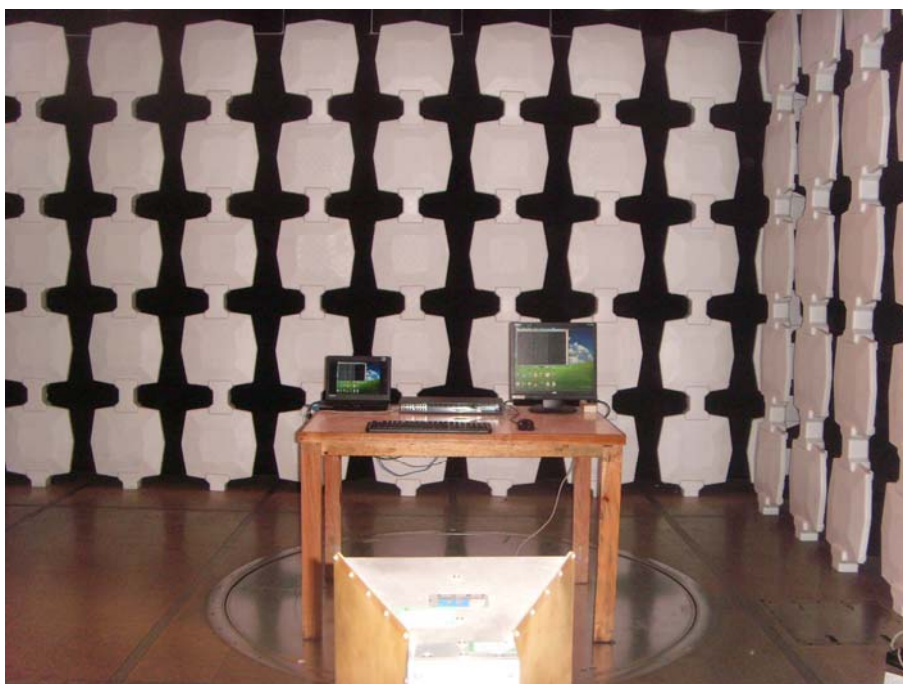
REVIEWED BY:  ECMG
SENIOR ENGINEER COMPANY NAME



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



Radiated Emission Test Set-up (Below 1GHz)



Radiated Emission Test Set-up (Above 1GHz)