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FCC RADIO EQUIPMENT CERTIFICATION TEST&MEASUREMENT REPORT

On Model Name: IP Camera

Model Numbers: GXV3615WPI_HD

Brand Name: Grandstream

FCC ID : YZZGXV3615WPI-HD

IC : 11964A-GXV3615

Prepared for Grandstream Networks, Inc.

FCC Rule Part(s): FCC 47 CFR Part 15, Subpart C

IC Specification(s): RSS-210, Issue 8, December 2010

Test Report #: SHE-1404-11142-FCC-RF

Tested by: Daomen Galanz
Daomen/Engineer Company Name

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

QC Manager: Swall Zhang ECMG
QC Manager Company Name

Test Report Released by: Swall Zhang May 8th, 2014
Swall Zhang Date

List of Attached Files

<i>Exhibit Type</i>	<i>File Description</i>	<i>File Name</i>
<i>Test Report</i>	<i>Test Report</i>	YZZGXV3615WPI-HD _ Test Report.pdf
<i>Operation Description</i>	<i>Technical Description</i>	YZZGXV3615WPI-HD _ Operation Description.pdf
<i>External Photos</i>	<i>External Photos</i>	YZZGXV3615WPI-HD _ External Photos.pdf
<i>Internal Photos</i>	<i>Internal Photos</i>	YZZGXV3615WPI-HD _ Internal Photos.pdf
<i>Block Diagram</i>	<i>Block Diagram</i>	YZZGXV3615WPI-HD _ Block Diagram.pdf
<i>Schematics</i>	<i>Circuit Diagram</i>	YZZGXV3615WPI-HD _ Schematics.pdf
<i>ID Label/Location</i>	<i>Label and Location</i>	YZZGXV3615WPI-HD _ Label & Location.pdf
<i>User Manual</i>	<i>User Manual</i>	YZZGXV3615WPI-HD _ User Manual.pdf
<i>Test Setup Photos</i>	<i>Test Setup Photos</i>	YZZGXV3615WPI-HD _ Test Setup Photos.pdf

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.
- *IC - Registration No.: 8801A*
The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 8801A.

List of Test and Measurement Instruments

No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until	Calibration Interval
01	Shielding Room	ETS	N/A	N/A	2014-10-25	1 year
02	Spectrum Analyzer(9KHz-30GHz)	R&S	FSP30	100755	2014-10-25	1 year
03	EMI Receiver	SCHAFFNER	SMR4503	11725	2014-10-25	1 year
04	LISN	ETS	4825/2	1161	2014-10-25	1 year
05	Coaxial Cable	ATC-Lab	N/A	N/A	2014-10-25	1 year
06	Double-ridged Wave guide horn	ETS	3115	6587	2014-10-25	1 year
07	Double-ridged Wave guide horn	ETS	3160	00052486	2014-10-25	1 year
08	Microwave system amplifier (0.5G-26.5G)	Agilent	83017A	MY39500438	2014-10-25	1 year
09	Band-pass Filter	Micro-Tronic	BRM50702	S/N-030	2014-10-25	1 year
10	Biconilog Antenna	ETS	3142C	00042672	2014-10-25	1 year
11	Semi-anechoic Chamber	ETS	N/A	N/A	2015-10-25	2 years
12	LISN	R&S	ESZH-Z2	N/A	2014-10-25	1 year
13	Loop Antenna	TESEQ	HLA6120	26348	2014-10-25	1 year

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

Table of Contents

DISCLAIMER NOTICE	1
REPRODUCTION CLAUSE	1
OPINIONS AND INTERPRETATIONS	1
STATEMENT OF MEASUREMENT UNCERTAINTY	1
ADMINISTRATIVE DATA	2
EUT DESCRIPTION	3
SCOPE	5
EVALUATION PROCEDURE	5
LABEL REQUIREMENTS	5
TEST SUMMARY	6
TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	7
DESCRIPTION OF AVAILABLE ANTENNAS	8
EUT EXERCISE SOFTWARE	8
EQUIPMENT MODIFICATION	8
TEST SYSTEM DETAILS	9
ATTACHMENT 1 - ANTENNA REQUIREMENT	10
ATTACHMENT 2 - CONDUCTED EMISSION TEST RESULTS	12
ATTACHMENT 3- RADIATED EMISSION TEST	17
ATTACHMENT 4 - OCCUPIED BANDWIDTH TEST	48
ATTACHMENT 5- MAXIMUM PEAK OUTPUT POWER	64
ATTACHMENT 6 - BAND EDGES TEST	73
ATTACHMENT 7 - PEAK POWER SPECTRAL DENSITY TEST	102

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Opinions and Interpretations

This test report relates to the abovementioned equipment under test (EU T). 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 : IP Camera

Model Number : GJV3615WPI_HD

Model Tested : GJV3615WPI_HD

Date Of Received : April 15th, 2014

Date Tested : April 15th to 17th, 2014

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. Tested model GXV3615WPI_HD (referred to as the EUT in this report) is an IP Camera.

The EUT is an IP Camera with IEEE 802.11.b/g/n Radio functionality. Technical specifications of the EUT are as belows:

Parameters		Ranges																												
Basic parameters	Rated voltage	DC +12V																												
	Rated Current	0.5A																												
FCC Classification	Digital Transmission System(DTS)																													
Industry Canada	Category I Equipment/Spread Spectrum/Digital Device (2400-2483.5 MHz)																													
Specifications of IEEE 802.11b/g/n	Operating band	2.400 GHz ~ 2.4835GHz (2.4 GHz ISM Band)																												
	WLAN standard	IEEE 802.11b/g/n, Wi-Fi compliant																												
	Modulation	802.11b: DBPSK,DQPSK,CCK (DSSS) ; 802.11g/n: BPSK,QPSK,16-QAM,64-QAM (OFDM).																												
	Number of Channels:	1 to 13 channels																												
	Data Transfer Rates	11n: up to 150Mbps; 11g: 54/48/36/24/18/12/9/6Mbps (Dynamic) ; 11b: 11/5.5/2/1Mbps (Dynamic)																												
	RF Output Power	11b: 17dBm±2dB; 11g(6,9,12,18M): 17dBm±2dB; 11g(24,36M): 15dBm±2dB; 11g(48,54M): 13dBm±2dB; 11n(MCS 0,1,2,3): 17dBm±2dB; 11n(MCS 4,5): 15dBm±2dB; 11n(MCS 6,7): 13dBm±2dB																												
Working Frequency of Each Channel	<table border="1"> <thead> <tr> <th>Channel No.</th> <th>Frequency (MHz)</th> <th>Channel No.</th> <th>Frequency (MHz)</th> </tr> </thead> <tbody> <tr> <td>001</td> <td>2412</td> <td>007</td> <td>2442</td> </tr> <tr> <td>002</td> <td>2417</td> <td>008</td> <td>2447</td> </tr> <tr> <td>003</td> <td>2422</td> <td>009</td> <td>2452</td> </tr> <tr> <td>004</td> <td>2427</td> <td>010</td> <td>2457</td> </tr> <tr> <td>005</td> <td>2432</td> <td>011</td> <td>2462</td> </tr> <tr> <td>006</td> <td>2437</td> <td></td> <td></td> </tr> </tbody> </table>		Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	001	2412	007	2442	002	2417	008	2447	003	2422	009	2452	004	2427	010	2457	005	2432	011	2462	006	2437		
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)																											
001	2412	007	2442																											
002	2417	008	2447																											
003	2422	009	2452																											
004	2427	010	2457																											
005	2432	011	2462																											
006	2437																													
Antenna Type	EMB Antenna Coaxial, 1T1R																													
Frequency range	2.4GHz to 2.5GHz																													

Continue on to next page...

<i>Parameter</i>		<i>Ranges</i>	
<i>Antenna spec.</i>	<i>Polarization</i>	<i>Linear</i>	
	<i>VSWR</i>	$< = 2.0$	
	<i>Gain</i>	<i>2.0 dBi</i>	
	<i>Impedance</i>	<i>50 ohm (Nominal)</i>	
	<i>Connector Type</i>	<i>U.FL-R-SMT</i>	
<i>I/O Ports</i>	<i>LAN & PC Port</i>	<i>10/100 Switch LAN port for connecting to Ethernet&PC. The indicator will be steady for connection and flashing for network activity.. It supports PoE.</i>	
	<i>Power Jack</i>	<i>12V DC power jack; UL Certified</i>	
<i>Universal power supply</i>	<i>Power Adapter #1</i>	<i>Input</i>	<i>100-240VAC 50/60Hz</i>
		<i>Output</i>	<i>12VDC, 0.5A</i>
		<i>Model</i>	<i>WCF1200050A1BA</i>
		<i>Brand name</i>	<i>Mass Power</i>
	<i>Power Adapter #2</i>	<i>Input</i>	<i>100-240VAC 50/60Hz 0.2A</i>
		<i>Output</i>	<i>12VDC, 0.5A</i>
		<i>Model</i>	<i>UE06L8-120050SPAU</i>
		<i>Brand name</i>	<i>UE</i>

Note:

1. *The EUT includes two power adapters which have been tested and only the worst-case power adapter #1 recorded in this report.*
2. *For more detailed information's or features please refer to user's manual of EUT.*

Scope

Measurement and determination of electromagnetic emissions of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the guidance provided in KDB 558074 D01v03r01 were used in the measurement of the FCC ID: YZZGXV3615WPI-HD&IC:11964A-GXV3615.

Label Requirements

Per FCC §2.1074 &§15.109 and RSS-Gen Issue 3.

Every unit of radio apparatus certified for marketing and use in Canada shall bear a permanent label on which is indelibly displayed the model number and Industry Canada certification number of the equipment model (transmitter, receiver, or inseparable combination thereof). Each model shall be identified by a unique combination of a model number and a certification number, which are assigned as described below in this section.

The label shall be securely affixed to a permanently attached part of the device, in a location where it is visible or easily accessible to the user, and shall not be readily detachable. The label shall be sufficiently durable to remain fully legible and intact on the device in all normal conditions of use throughout the device's expected lifetime. These requirements may be met either by a separate label or nameplate permanently attached to the device or by permanently imprinting or impressing the label directly onto the device.

Note:For more detailed please see attachment for FCC&IC Label&Location.

Test Summary

The Electromagnetic Compatibility requirements on tested model GJV3615WPI_HD for this test is 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.

Tested model GJV3615WPI_HD has been tested to conform to the following parts of the Part 15, Subpart C as detailed belows:

FCC Rules	RSS Section(s)	Requirement	Limits	Result	Remark
§15.247(c)(1) (i); §15.203	Rss-Ren	Antenna Requirement	Must meet requirement of §15.203	Compliant	Attachment 1
§15.207	RSS-Gen [7.2.4]	Conducted Emission	< FCC §15.207 & RSS-Gen AC Power Line Conducted limits	Compliant	Attachment 2
§15.205(a); §15.209(a)	RSS-Gen [7.2.5]&[7.2.2]	Radiated Emission& Restricted band	Emissions in restricted bands must meet the radiated limits detailed in 15.209&RSS-Gen	Compliant	Attachment 3
§15.247(b)(3)	RSS-210 [A8.4]	Maximum Peak Output Power	≤ 1Watt	Compliant	Attachment 4
§15.247(a)(2)	RSS-210 [A8.2(a)]	Occupied Bandwidth	≥ 500kHz	Compliant	Attachment 5
§15.247(d)	RSS-210 [A8.5]	Edges Measurement	≥ 20dBc(Peak)	Compliant	Attachment 6
§15.247(e)	RSS-210 [A8.2(b)]	Power Spectral Density	≤ 8dBm / 3kHz Band	Compliant	Attachment 7

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rate and antenna diversity(if any).

Regards to the frequency band over 10MHz, the Lowest, middle and Highest frequency of channel were selected to perform the test, and then shown on this report.

The following mode& channels were chosen for final test as listed belows.

For IEEE 802.11b/g mode & IEEE 802.11n HT20 mode:

Carried Frequency (MHz)	Channel Type& Number	Duty Cycle	Data Rate (Mbps)	Modulation Type
2412(CH01)	Channel Lowest	100%	IEEE 802.11b:1Mbps; IEEE 802.11g: 6Mbps; IEEE 802.11n HT20: MCS0;	Please refer to Specifications of IEEE 802.11 b/g/n
2437(CH06)	Channel Mid			
2462(CH11)	Channel Highest			

For IEEE 802.11n HT40 mode:

Carried Frequency (MHz)	Channel Type&Number	Duty Cycle	Data Rate (Mbps)	Modulation Type
2422(CH03)	Channel Low	100%	MCS6	OFDM
2437(CH06)	Channel Mid			
2452(CH09)	Channel High			

Description Of Available Antennas

The radio utilizes an EMB Antenna Coaxial , with a maximum gain of 2.0 dBi in the 2.4 GHz band.

EUT Exercise Software

During testing an exercise software which "RaUI.EXE" was provided by Grandstream Networks,Inc. runs on windows XP system and control IEEE 802.11b/g/n wireless operating on a continuous transmission mode and receive mode.

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 for this EUT intended for grant.

Test System Details

EUT			
<i>Model Number:</i>	<i>GXV3615WPI_HD</i>		
<i>Description:</i>	<i>IP Camera</i>		
<i>Manufacturer:</i>	<i>Grandstream Networks, Inc</i>		
<i>Input Voltage:</i>	<i>DC12V</i>		
Support Equipment			
<i>Description</i>	<i>Model Number</i>	<i>Serial Number</i>	<i>Manufacturer</i>
<i>Computer PC</i>	<i>ThinkPad X121e</i>	<i>---</i>	<i>Lenovo</i>

Cable Description					
<i>Description</i>	<i>From</i>	<i>To</i>	<i>Length (Meters)</i>	<i>Shielded (Y/N)</i>	<i>Ferrite (Y/N)</i>
<i>Power Adapter of EUT</i>	<i>EUT</i>	<i>Plug</i>	<i>1.8</i>	<i>N</i>	<i>N</i>
<i>Note: The "EUT" means "IP Camera".</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.

ATTACHMENT 1 - ANTENNA REQUIREMENT

§15.203 Requirements:

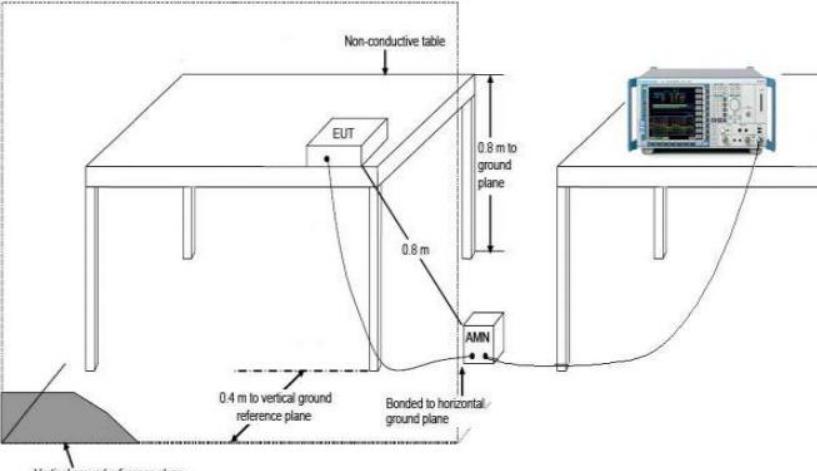
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

§15.247(c) (1)(i) Requirements:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed. Point to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

FCC Section	FCC Rules	Conclusion
<p>§15.203& §15.207 (c) (1) (i)</p>	<p><i>Described how the EUT complies with the requirements that either its antenna is permanently attached, or that it employ a unique antenna connector, for every antenna proposed for use with the EUT.</i></p> <p><i>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</i></p> <ol style="list-style-type: none"> 1. <i>The application (or intended use) of the EUT.</i> 2. <i>The installation requirements of the EUT.</i> 3. <i>The method by which the EUT will be marketed.</i> 	<p>Antenna connector is U.FL compatible Type.(The device is professionally installed and employ an unique antenna connector) and maximal gain of the antenna is 2.0 dBi.</p> <p>So the unit do meet requirement.</p>

ATTACHMENT 2 - CONDUCTED EMISSION TEST RESULTS

CLIENT:	Grandstream Networks, Inc.	TEST STANDERD:	FCC §15.207&RSS-Gen Issue 3, section 7.2.4
MODEL NUMBERS:	GXV3615WPI_HD	PRODUCT:	IP Camera
EUT MODEL:	GXV3615WPI_HD	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23 °C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	April 17, 2014
TEST REFERENCE:	ANSI C63.4: 2009&RSS-Gen Issue 3, section 7.2.4		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4:2009 &RSS-Gen Issue 3, section 7.2.4 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 Highestest significant peaks were then marked, and these signals were then quasi-peaked and averaged.		
TEST SETUP:			
DESCRIPTIONS OF TEST MODE:	Set to Wi-Fi mode, communicate with a notebook Computer by wireless router nearby.(normal operation)		
TESTED RANGE:	150kHz to 30MHz		
TEST VOLTAGE:	120VAC/60Hz		
RESULTS:	The EUT meet the requirements of test reference for conducted missions at AC input port. 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. $\pm 2 \times 10^{-7} \times$ Center Freq., Amp ± 2.6 dB		

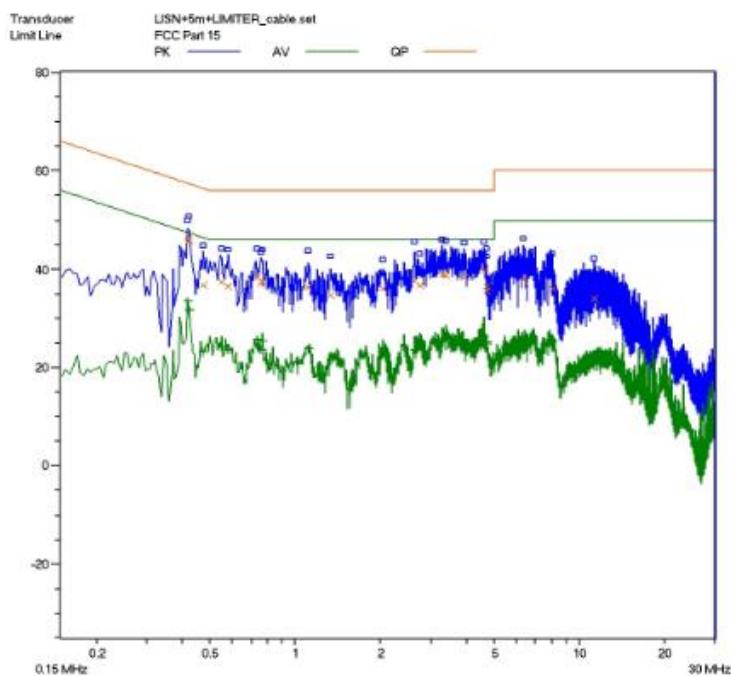
Test Report #: SHE-1404-11142-FCC-RF

Prepared for Grandstream Networks, Inc.

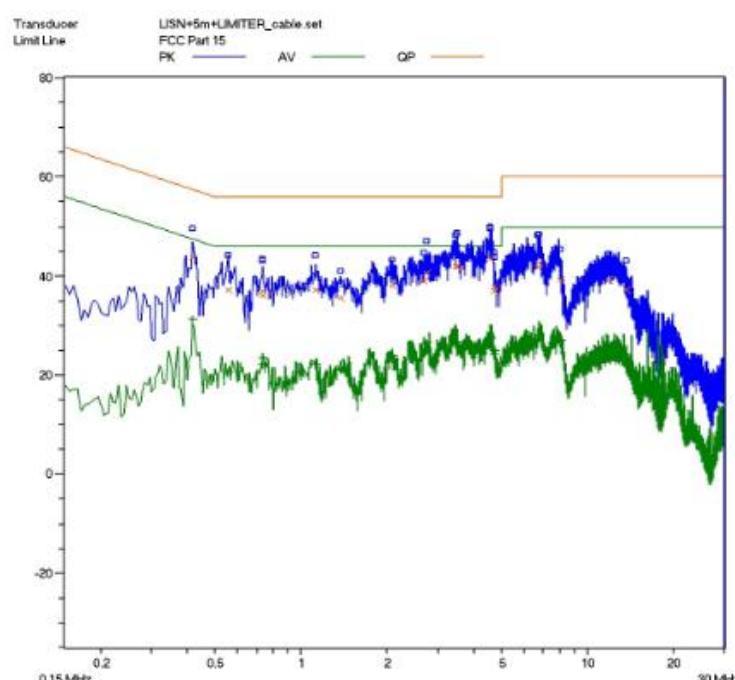
Prepared by ECMG Electronic Technical Testing Corp (Shenzhen).

Page 12 of 113

Mass power:

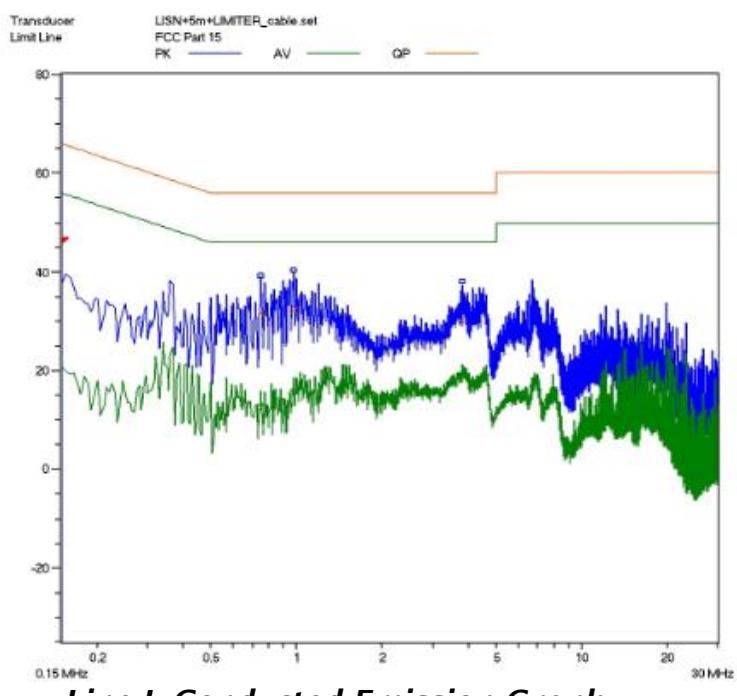


Line L Conducted Emission Graph

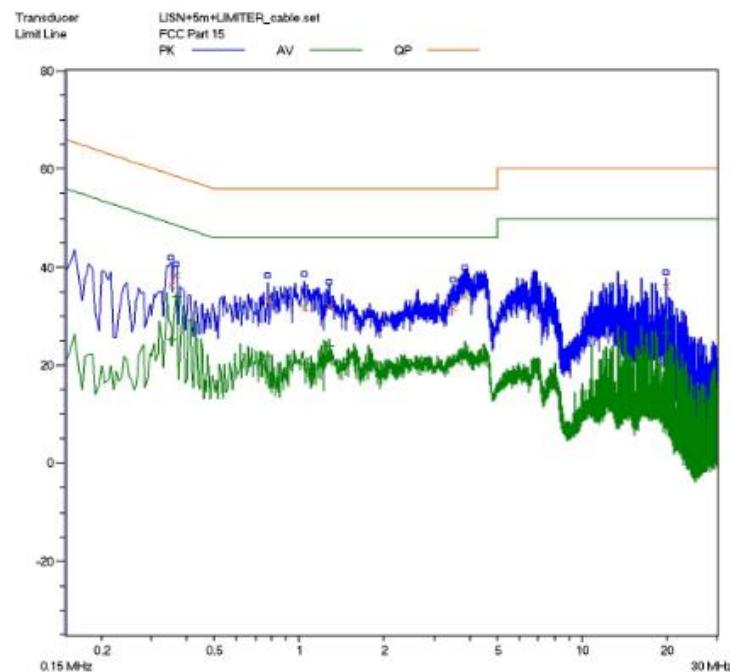


Line N Conducted Emission Graph

UE power:



Line L Conducted Emission Graph



Line N Conducted Emission Graph

Test Data:
Mass Power:

Lines	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	0.415	46.2	57.5	-11.3	0.415	33.7	47.5	-11.8
L	0.420	45.9	57.4	-11.5	0.420	31.9	47.4	-15.5
L	4.610	39.7	56	-26.3	4.610	26.3	46	-19.7
L	/	/	/	/	/	/	/	/
L	/	/	/	/	/	/	/	/
L	/	/	/	/	/	/	/	/
N	0.415	43.7	57.5	-13.8	0.415	31.3	47.5	-16.2
N	4.555	43.6	56	-12.4	4.555	27.5	46	-18.5
N	4.575	43.5	56	-13.5	4.575	27.6	46	-18.4
N	/	/	/	/	/	/	/	/
N	/	/	/	/	/	/	/	/
N	/	/	/	/	/	/	/	/

Note :

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

UE Power:

Lines	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	0.745	31.7	56	-23.3	0.745	13.0	46	-33.0
L	0.975	32.3	56	-23.7	0.975	16.1	46	-29.1
L	3.810	30.0	56	-26.0	3.810	18.9	46	-27.1
L	/	/	/	/	/	/	/	/
L	/	/	/	/	/	/	/	/
L	/	/	/	/	/	/	/	/
N	0.350	36.3	59	-22.7	0.350	25.1	49	-23.9
N	0.365	38.4	58.6	-20.2	0.365	34.0	48.6	-14.6
N	3.840	34.1	56	-21.9	3.840	22.3	46	-23.7
N	/	/	/	/	/	/	/	/
N	/	/	/	/	/	/	/	/
N	/	/	/	/	/	/	/	/

Note :

4) All readings are using a bandwidth of 9 kHz, with a 500 ms sweep time. A video filter was not used.

5) "QP" means "Quasi-Peak" values, "AV" means "Average" values.

6) The symbol "/" means other emission readings are too low against official limits that are not be recorded.

ATTACHMENT 3- RADIATED EMISSION TEST

CLIENT:	Grandstream Networks, Inc.	TEST STANDERD:	FCC §15.209(a),FCC §15.205(a)& RSS-Gen Issue 3,section 7.2.5&7.2.2
MODEL NUMBERS:	GXV3615WPI_HD	PRODUCT:	IP Camera
EUT MODEL:	GXV3615WPI_HD	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	April 17 th , 2014
TEST REFERENCE:	ANSI C63.4: 2009; KDB 558074 D01v03r01&RSS-Gen Issue 3,section 7.2		
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. Test procedure as follow:</p> <ul style="list-style-type: none"> a) The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. b) The EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. c) Maximum procedure was performed on the six Highestest emissions to ensure EUT compliance. d) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. e) Repeat above procedures until the measurements for all frequencies are complete. <p>Note: For the test Antenna: In the frequency range of 9KHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT. In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.</p>		
DESCRIPTION OF TEST MODE:	<p>Pre-Scan has been conducted to determine the worst-case from all possible combinations between available modulations, data rate and antenna ports (if EUT with antenna diversity architecture). Following channels were chosen for the final test as listed below:</p> <p>For 9KHz to 30MHz&30-1000MHz: The worst case 802.11b mode with data rate of 1Mbps was chosen for the final testing.</p> <p>For above 1GHz-25GHz: 802.11b mode with data rate of 1Mbps, 802.11g mode with data rate of 6Mbps, 802.11n HT20 mode with data rate of MCS0. and 802.11n HT40 mode with data rate of 13.5Mbps.</p>		

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Test Report #: SHE-1404-11142-FCC-RF

Prepared for Grandstream Networks, Inc.

Prepared by ECMG Electronic Technical Testing Corp (Shenzhen).

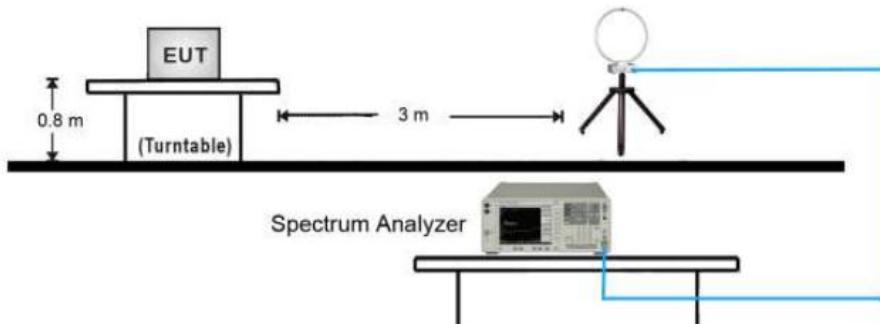
Page 17 of 113

MEASUREMENT RECEIVER SETUP:	<i>Measurement receiver shall be set as below:</i>									
	Frequency (MHz)	Receive detector	RBW	VBW	Value					
	30-1000	Quasi-peak	120KHz	300KHz	Quasi-peak					
	Above 1000	Peak	1MHz	1MHz	Peak					
RADIATED LIMITS:	<i>FCC Section 15.209 & RSS-Gen 7.2.5 limits as below:</i>									
	<i>General Field Strength Limits for Transmitters at Frequencies Below 30 MHz</i>									
	Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)						
	9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300						
	490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30						
	1.705-30 MHz	30	N/A	30						
	<i>General Field Strength Limits for Transmitters at Frequencies Above 30 MHz</i>									
	Other frequency (MHz)	Field strength								
		uV/meter	dB uV/meter							
	30-88	100	40							
	88-216	150	43.5							
	216-960	200	46							
	Above 960	500	54							
TESTED RANGE:	9KHz to 30MHz and 30MHz to 25GHz									
TEST VOLTAGE:	120VAC/60Hz									
RESULTS:	According to the data in the following, the EUT complied with the FCC Part 15.209 & 15.205 and RSS-Gen 7.2.5 limits. 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 ± 3.6 dB									

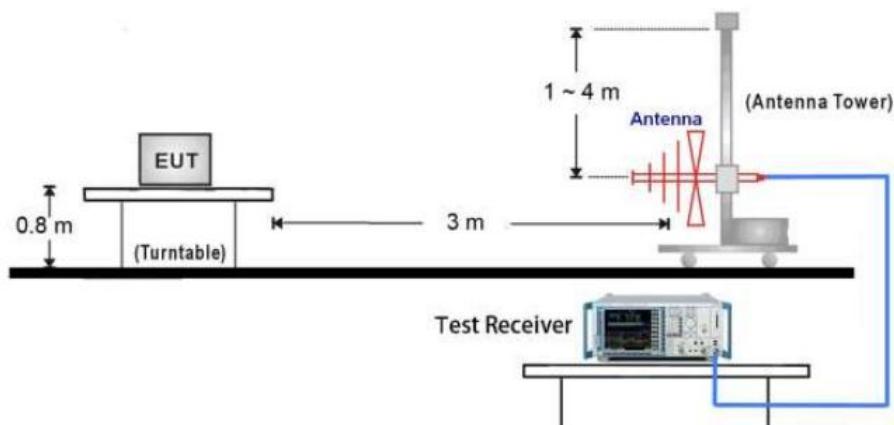
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TEST SETUP:

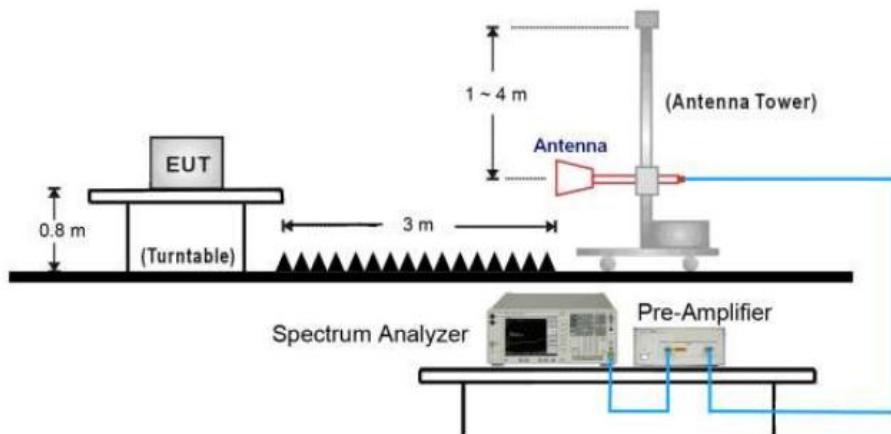
Frequency measured at 9KHz to 30MHz:



Frequency measured at 30MHz to 1000MHz:



Frequency measured at Above 1GHz:



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. The limits shown are based on quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
3. 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 (30 to 1000MHz):

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							
67.350	0.19	5.5	/	27.61	33.5	40	-6.5
271.040	0.40	12.5	/	16	28.9	46	-13.1
415.080	0.59	16.3	/	17.51	34.4	46	-11.6
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
Vertical							
31.560	0.12	23.2	/	11.38	35.7	40	-4.3
60.720	0.18	5.8	/	27.62	31.6	40	-8.4
65.320	0.19	5.6	/	26.51	33.3	40	-6.7
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/

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. Other emission levels are too Low against official limits that are not recorded.

Test Data (1 to 25GHz):
802.11b mode/Lowest Channel: 2412MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
1070.05	1.71	24.7	33.6	66.83	59.64	74	-14.36	V
3620.00	2.67	32.2	32.1	46.95	49.72	74	-24.28	V
7222.00	4.67	36.0	30.5	52.77	53.80	74	-20.20	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
1070.05	1.71	24.7	33.6	61.84	54.65	74	-19.35	H
3620.26	2.67	32.2	32.1	47.33	50.10	74	-23.90	H
7242.00	4.67	36.0	30.5	42.75	52.92	74	-21.08	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss(dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
1070.05	1.71	24.7	33.6	48.19	41.00	54	-13.00	V
3620.26	3.26	32.9	32.0	37.47	41.63	54	-12.37	V
7246.00	4.67	36.0	30.5	30.49	40.66	54	-13.34	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
1070.05	1.71	24.7	33.6	48.89	41.7	54	-12.30	H
4823.26	3.26	32.9	32.0	36.61	40.77	54	-13.23	H
7246.00	4.67	36.0	30.5	31.41	41.58	54	-12.42	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

802.11b mode/Mid Channel: 2437MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
1070.05	1.71	24.7	33.6	66.83	59.64	74	-14.36	V
4823.26	3.26	32.9	32.0	53.30	57.46	74	-30.90	V
7246.00	4.67	36.0	30.5	52.77	62.94	74	-11.06	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
1070.05	1.71	24.7	33.6	61.84	54.65	74	-19.35	H
4823.26	3.26	32.9	32.0	55.94	60.10	74	-13.90	H
7246.00	4.67	36.0	30.5	52.75	62.92	74	-11.08	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
1070.05	1.71	24.7	33.6	52.37	45.18	54	-8.82	V
4823.26	3.26	32.9	32.0	49.84	44.10	54	-9.90	V
7246.00	4.67	36.0	30.5	30.49	40.66	54	-13.34	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
1070.05	1.71	24.7	33.6	49.09	41.9	54	-12.10	H
4823.26	3.26	32.9	32.0	41.61	45.77	54	-8.23	H
7246.00	4.67	36.0	30.5	29.41	39.58	54	-14.42	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

802.11b mode/Highest Channel: 2462MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
1070.05	1.71	24.7	33.6	66.83	59.64	74	-14.36	V
4823.26	3.26	32.9	32.0	53.30	57.46	74	-30.90	V
7246.00	4.67	36.0	30.5	52.77	62.94	74	-11.06	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
1070.05	1.71	24.7	33.6	61.84	54.65	74	-19.35	H
4823.26	3.26	32.9	32.0	55.94	60.10	74	-13.90	H
7246.00	4.67	36.0	30.5	52.75	62.92	74	-11.08	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss(dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
1070.05	1.71	24.7	33.6	47.89	40.70	54	-13.30	V
4823.26	3.26	32.9	32.0	49.84	44.10	54	-9.90	V
7246.00	4.67	36.0	30.5	30.43	40.60	54	-13.40	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
1070.05	1.71	24.7	33.6	59.29	42.10	54	-11.90	H
4823.26	3.26	32.9	32.0	41.61	45.77	54	-8.23	H
7246.00	4.67	36.0	30.5	29.41	39.58	54	-14.42	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11g mode/Lowest Channel: 2412MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
1070.05	1.71	24.7	33.6	59.51	52.32	74	-21.68	V
3210.00	2.57	31.5	32.1	40.64	42.61	74	-31.39	V
4808.00	3.26	33.5	32.0	36.89	41.65	74	-32.35	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7256.00	4.10	36.20	30.5	31.32	41.12	74	-32.88	H
4808.00	3.26	33.5	32.0	38.81	43.57	74	-30.43	H
1070.05	1.71	24.7	33.6	52.92	45.73	74	-28.27	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
4908.00	3.26	33.5	32.0	24.54	29.3	54	-24.70	V
1024.00	7.2	37.8	30.0	5.62	20.62	54	-33.38	V
1070.05	1.71	24.7	33.6	41.65	34.46	54	-19.54	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
4808.00	3.26	33.5	32.0	24.41	29.17	54	-24.83	H
3210.00	2.57	31.5	32.1	27.95	29.92	54	-24.08	H
1070.05	1.71	24.7	33.6	47.89	40.70	54	-13.30	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11g mode /Mid Channel: 2437MHz

Frequency (MHz)	Cable Loss(dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
4876.00	3.26	33.5	32.0	36.35	41.11	74	-32.89	V
3006.00	2.57	31.5	32.1	39.96	41.93	74	-32.07	V
1070.05	1.71	24.7	33.6	59.69	52.50	74	-21.50	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
4876.00	3.26	33.5	32.0	37.32	42.08	74	-31.92	H
3244.00	2.57	31.5	32.1	43.13	45.10	74	-28.90	H
1070.05	1.71	24.7	33.6	58.14	50.95	74	-23.05	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
4876.00	3.26	33.5	32.0	22.89	27.65	54	-26.35	V
3006.00	2.57	31.5	32.1	27.3	29.27	54	-24.73	V
1070.05	1.71	24.7	33.6	42.77	35.58	54	-18.42	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.20	30.5	18.77	28.57	54	-25.43	H
4910.00	5.32	33.5	32.0	20.5	27.32	54	-26.68	H
1070.05	1.71	24.7	33.6	43.06	35.87	54	-24.83	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11g mode /Highest Channel: 2462MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Resding Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
4910.00	3.26	33.5	32.0	39.8	44.56	74	-29.44	V
3278.00	2.57	31.5	32.1	42.12	44.09	74	-29.91	V
1070.05	1.71	24.7	33.6	63.35	56.16	74	-17.04	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.00	30.5	30.97	40.57	74	-33.43	H
4910.00	3.26	33.5	32.0	36.65	41.41	74	-32.59	H
1070.05	1.71	24.7	33.6	54.94	47.05	74	-26.95	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
7936.00	5.32	36.00	30.5	18.09	28.91	54	-25.09	V
4910.00	3.26	33.5	32.0	24.5	29.26	54	-24.74	V
1070.05	1.71	24.7	33.6	37.23	30.04	54	-23.96	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.00	30.5	19.04	28.64	54	-25.36	H
4910.00	3.26	33.5	32.0	22.31	27.07	54	-26.93	H
1070.05	1.71	24.7	33.6	37.97	30.78	54	-23.22	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11n HT20 mode/Lowest Channel: 2412MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
7426.00	4.10	36.00	30.5	31.18	40.78	74	-33.22	V
4808.00	3.26	33.5	32.0	40.44	45.20	74	-28.80	V
1070.05	1.71	24.7	33.6	49.00	41.81	74	-32.19	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7324.00	4.10	36.00	30.5	31.69	41.29	74	-32.71	H
4808.00	3.26	33.5	32.0	39.47	44.23	74	-29.77	H
1070.05	1.71	24.7	33.6	51.57	44.38	74	-29.62	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
8140.00	4.67	35.8	29.9	17.87	28.44	54	-25.56	V
3312.00	2.57	31.5	32.1	27.1	29.07	54	-24.93	V
1070.05	1.71	24.7	33.6	42.63	35.44	54	-18.56	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
4808.00	3.26	33.5	32.0	24.68	29.44	54	-24.56	H
3210.00	2.57	31.5	32.1	27.73	29.70	54	-24.30	H
1070.05	1.71	24.7	33.6	40.28	33.09	54	-20.91	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11n HT20 mode/Mid Channel: 2437MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
4876.00	3.26	33.5	32.0	37.05	41.81	74	-32.19	V
3312.00	2.57	31.5	32.1	39.76	41.73	74	-32.27	V
1070.05	1.71	24.7	33.6	64.39	57.20	74	-16.80	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7460.00	4.10	36.00	30.5	31.77	41.37	74	-32.63	H
4876.00	3.26	33.5	32.0	38.26	43.02	74	-30.98	H
1070.05	1.71	24.7	33.6	49.75	42.56	74	-31.44	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
4876.00	3.26	33.5	32.0	24.76	29.52	54	-24.48	V
3312.00	2.57	31.5	32.1	27.24	29.21	54	-24.79	V
1070.05	1.71	24.7	33.6	44.52	37.33	54	-16.67	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.00	30.5	19.02	28.62	54	-25.38	H
4876.00	3.26	33.5	32.0	23.17	27.93	54	-26.07	H
1070.05	1.71	24.7	33.6	36.9	29.71	54	-24.29	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11n HT20 mode/Highest Channel: 2462MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
7936.00	5.32	36.0	30.5	30.52	41.34	74	-32.66	V
3210.00	2.57	31.5	32.1	39.75	41.72	74	-32.28	V
1070.05	1.71	24.7	33.6	65.71	58.52	74	-15.48	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7356.00	4.10	36.2	30.5	30.89	40.69	74	-33.31	H
5216.00	3.50	32.9	31.6	35.6	40.40	74	-33.60	H
1070.05	1.71	24.7	33.6	53.2	46.01	74	-27.99	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
7936.00	5.32	36.00	30.5	18.21	29.03	54	-24.97	V
4910.00	3.26	33.5	32.0	24.49	29.25	54	-24.75	V
1070.05	1.71	24.7	33.6	37.08	29.89	54	-24.11	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.00	30.5	19.1	28.70	54	-25.30	H
3278.00	2.57	31.5	32.1	28.59	30.56	54	-23.44	H
1070.05	1.71	24.7	33.6	40.42	33.23	54	-20.77	H
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/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11n HT40 mode/Lowest Channel: 2422MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
7426.00	4.10	36.00	30.5	31.18	41.78	74	-32.22	V
4808.00	3.26	33.5	32.0	40.44	45.80	74	-29.40	V
1070.05	1.71	24.7	33.6	39.84	41.81	74	-32.19	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7324.00	4.10	36.00	30.5	31.69	42.29	74	-31.71	H
4808.00	3.26	33.5	32.0	39.47	45.23	74	-28.77	H
1070.05	1.71	24.7	33.6	42.41	44.38	74	-29.62	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
8140.00	4.67	35.8	29.9	17.87	29.44	54	-24.56	V
3312.00	2.57	31.5	32.1	27.1	29.87	54	-24.13	V
1070.05	1.71	24.7	33.6	41.75	35.49	54	-18.61	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
4808.00	3.26	33.5	32.0	24.68	29.44	54	-24.56	H
3210.00	2.57	31.5	32.1	27.73	29.70	54	-24.30	H
1070.05	1.71	24.7	33.6	39.4	34.09	54	-19.91	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11n HT40 mode/Mid Channel: 2437MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
4876.00	3.26	33.5	32.0	38.05	42.81	74	-31.19	V
3312.00	2.57	31.5	32.1	41.76	43.73	74	-30.27	V
1070.05	1.71	24.7	33.6	65.39	58.20	74	-15.80	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7460.00	4.10	36.00	30.5	31.77	42.37	74	-31.63	H
4876.00	3.26	33.5	32.0	38.26	43.02	74	-30.98	H
1070.05	1.71	24.7	33.6	50.75	43.56	74	-30.44	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
4876.00	3.26	33.5	32.0	24.76	31.52	54	-22.48	V
3312.00	2.57	31.5	32.1	27.24	29.21	54	-24.79	V
1070.05	1.71	24.7	33.6	44.52	37.33	54	-16.67	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.00	30.5	19.02	28.62	54	-25.38	H
4876.00	3.26	33.5	32.0	23.17	29.93	54	-24.07	H
1070.05	1.71	24.7	33.6	36.9	29.71	54	-24.29	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

For 802.11n HT40 mode/Highest Channel: 2452MHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Peak Measurement								
7936.00	5.32	36.0	30.5	30.52	41.34	74	-32.66	V
3210.00	2.57	31.5	32.1	39.75	41.72	74	-32.28	V
1070.05	1.71	24.7	33.6	66.71	59.52	74	-14.48	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7356.00	4.10	36.2	30.5	30.89	40.69	74	-33.31	H
5216.00	3.50	32.9	31.6	35.6	41.40	74	-32.60	H
1070.05	1.71	24.7	33.6	53.2	46.01	74	-27.99	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Preamp Factor (dB)	Reading Level (dBuV/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization (H/V)
Average Measurement								
7936.00	5.32	36.00	30.5	18.21	31.03	54	-22.97	V
4910.00	3.26	33.5	32.0	24.49	30.25	54	-23.75	V
1070.05	1.71	24.7	33.6	37.08	29.89	54	-24.11	V
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
7426.00	4.10	36.00	30.5	19.1	28.70	54	-25.30	H
3278.00	2.57	31.5	32.1	28.59	30.56	54	-23.44	H
1070.05	1.71	24.7	33.6	42.42	35.23	54	-18.77	H
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

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. According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.
3. As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
4. The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

FCC §15.205(a) Requirements:

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

RSS-Gen section 7.2.2 Requirements:

Restricted bands, identified in Table 3, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:

- a) fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of Table 3;
- b) unwanted emissions falling into restricted bands of Table 3 shall comply with the limits specified in RSS-Gen;
- c) unwanted emissions not falling within restricted frequency bands shall either comply with the limits specified in the applicable RSS, or with those specified in RSS-Gen.

Table 3: Restricted Frequency Bands:

MHz	MHz	GHz
0.090-0.110	240-285	9.0-9.2
2.1735-2.1905	322-335.4	9.3-9.5
3.020-3.026	399.9-410	10.6-12.7
4.125-4.128	608-614	13.25-13.4
4.17725-4.17775	960-1427	14.47-14.5
4.20725-4.20775	1435-1626.5	15.35-16.2
5.677-5.683	1645.5-1646.5	17.7-21.4
6.215-6.218	1660-1710	22.01-23.12
6.26775-6.26825	1718.8-1722.2	23.6-24.0
6.31175-6.31225	2200-2300	31.2-31.8
8.291-8.294	2310-2390	36.43-36.5
8.362-8.366	2655-2900	Above 38.6
8.37625-8.38675	3260-3267	
8.41425-8.41475	3332-3339	
12.29-12.293	3345.8-3358	
12.51975-12.52025	3500-4400	
12.57675-12.57725	4500-5150	
13.36-13.41	5350-5460	
16.42-16.423	7250-7750	
16.69475-16.69525	8025-8500	
16.80425-16.80475		
25.5-25.67		
37.5-38.25		
73-74.6		
74.8-75.2		
108-138		
156.52475-156.52525		
156.7-156.9		

Note: Certain frequency bands listed in Table 3 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300- series RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.

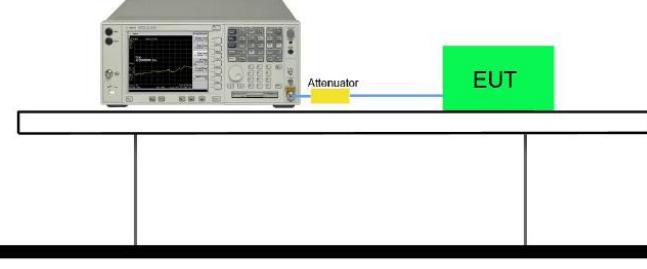
Conclusions:

The fundamental is not in a restricted band, and spurious emission in the restricted bands comply with the general emission limits of 15.209&RSS-Gen section 7.2.5.

ATTACHMENT 4 - OCCUPIED BANDWIDTH TEST

CLIENT:	Grandstream Networks, Inc.	TEST STANDERD:	FCC §15.247(a)& RSS-210,A8.2(a)
MODEL NUMBERS:	GXV3615WPI_HD	PRODUCT:	IP Camera
EUT MODEL:	GXV3615WPI_HD	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23 °C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	April 15, 2014
TEST REFERENCE:	ANSI C63.4:2009 and KDB 558074 with version D01 v03r01		
TEST PROCEDURE:	<p>The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer. The 6 dB bandwidth is defined as the total spectrum the power of which is Highest than peak power minus 6 dB. Analyzer and the attached plot were taken.</p> <p>The EUT was set up to ANSI C63.4:2009, tested to DTS test procedure of KDB 558074 D01v03r01 for compliance with FCC 47CFR 15.247 requirements.</p> <p>Spectrum analyzer setup as below:</p> <p>Set RBW = 100 kHz</p> <p>VBW $\geq 3 \times$ RBW</p> <p>Detector = Peak</p> <p>Trace mode = max hold</p> <p>Sweep = auto couple</p> <p>Allow the trace was allowed to stabilize</p>		
DESCRIPTIONS OF TEST MODE:	<p>Pre-Scan has been conducted to determine the worst-case mode from all possible Combinations between available modulations,data rates and antenna ports (if EUT with antenna diversity architecture).</p> <p>Following channels were selected for the final test as listed below:</p> <p>802.11b mode with data rate of 1Mbps, 802.11g mode with data rate of 6Mbps, 802.11n HT20 mode with data rate of MCS0 and 802.11n HT40 mode with data rate of MCS6</p>		

Continue on to next page...

TEST VOLTAGE:	120VAC/60Hz
TEST SET UP:	<p style="text-align: center;">Spectrum Analyzer</p> 
RESULTS:	The EUT meet the requirements of test reference for occupied bandwidth. 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:	$\text{Freq.} \pm 2 \times 10^{-7} \times \text{Center Freq.}$,

Test Data:**6dB Bandwidth:****For 802.11b Mode:**

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
2412	10.26	0.5	Pass
2437	10.14	0.5	Pass
2462	10.20	0.5	Pass

For 802.11g Mode:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
2412	16.50	0.5	Pass
2437	16.50	0.5	Pass
2462	16.50	0.5	Pass

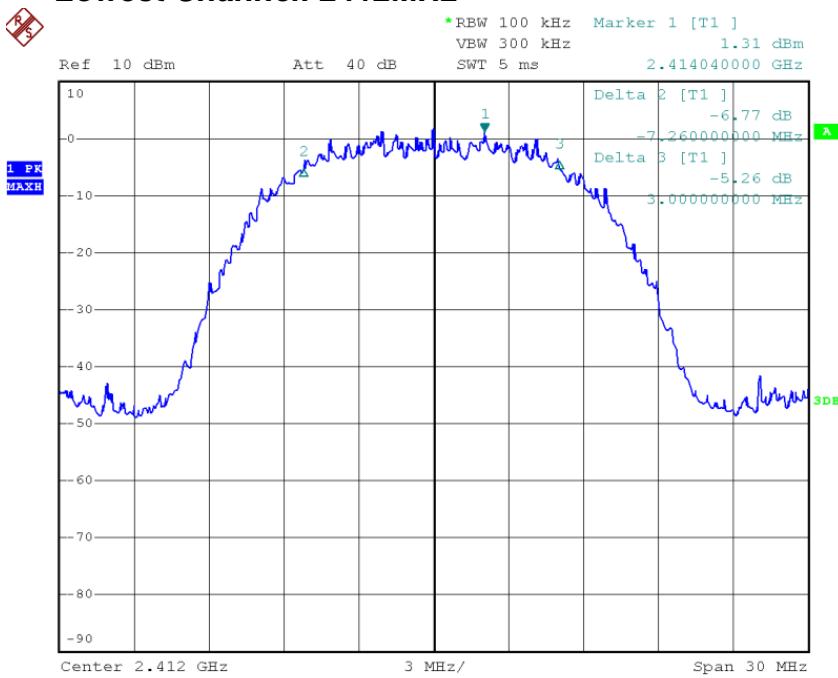
For 802.11n HT20 Mode:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
2412	17.64	0.5	Pass
2437	17.7	0.5	Pass
2462	17.64	0.5	Pass

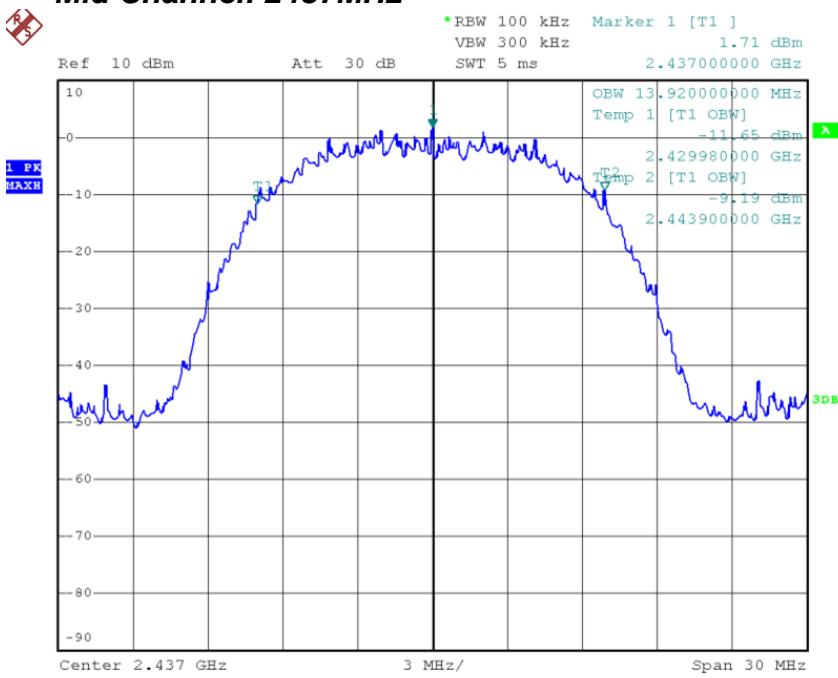
For 802.11n HT40 Mode:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
2422	36.00	0.5	Pass
2437	35.76	0.5	Pass
2452	36.14	0.5	Pass

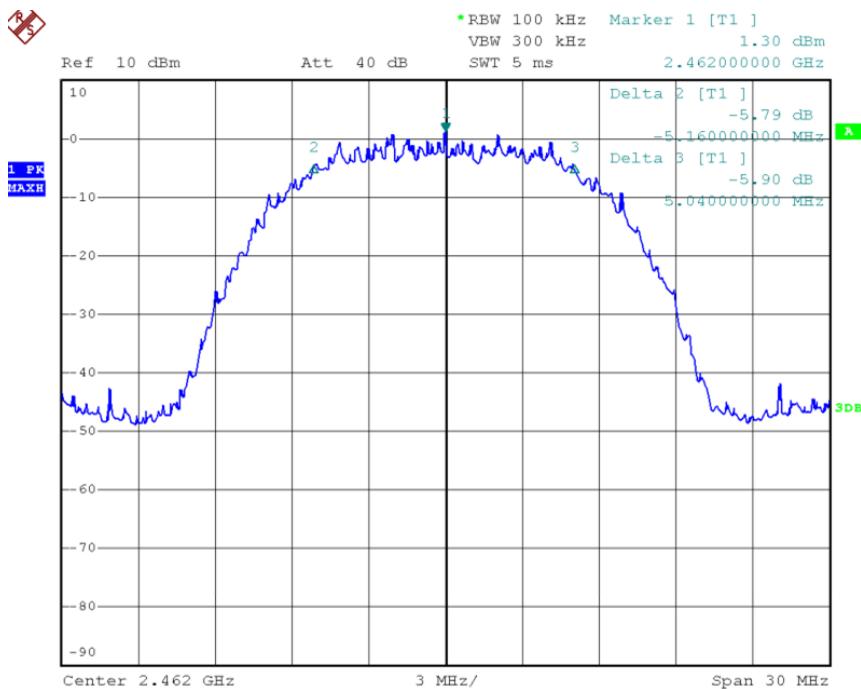
**For 802.11b Mode:
Lowest Channel: 2412MHz**



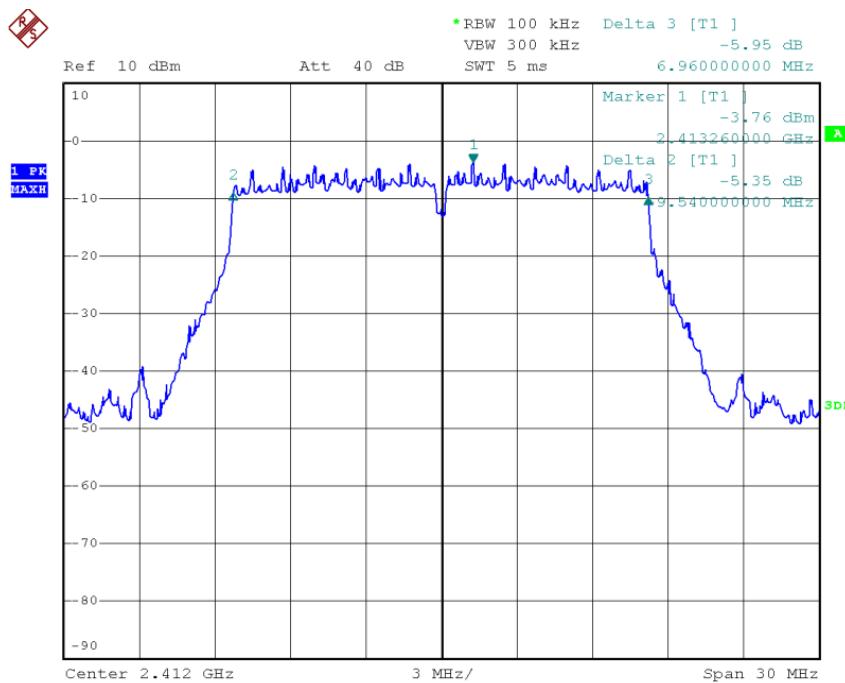
Mid Channel: 2437MHz



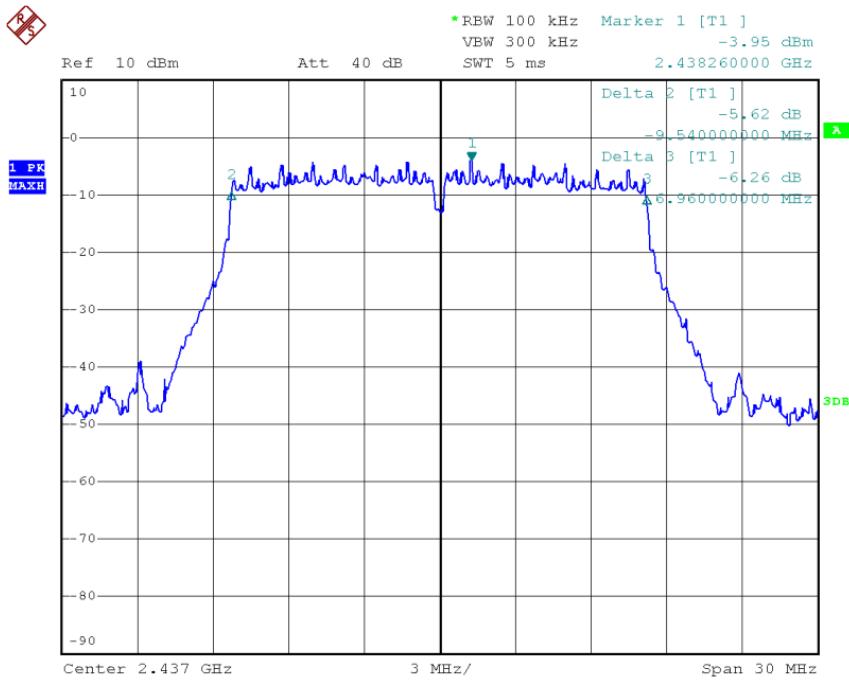
Highest Channel: 2462MHz



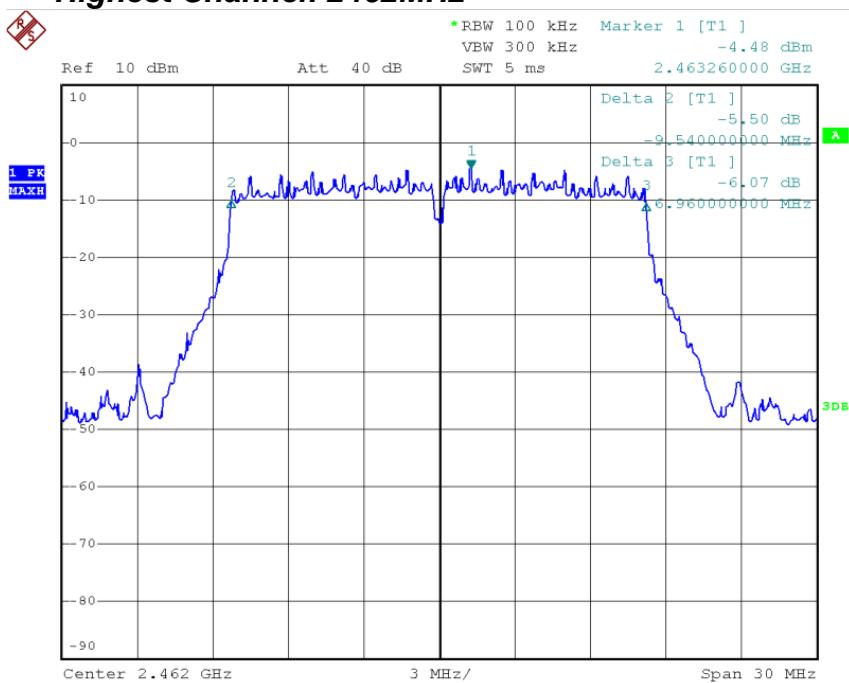
For 802.11g Mode: Lowest Channel: 2412MHz



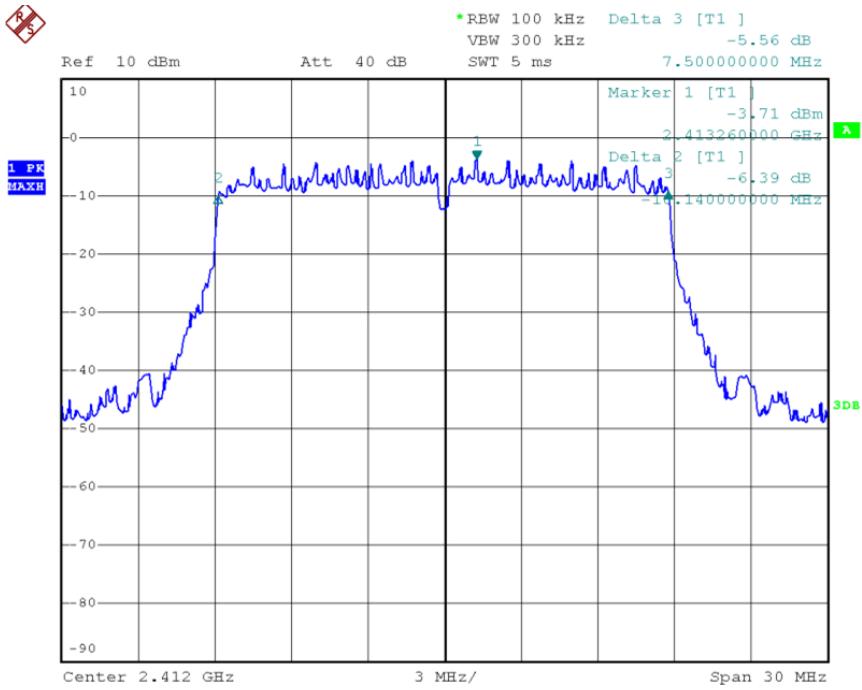
Mid Channel: 2437MHz



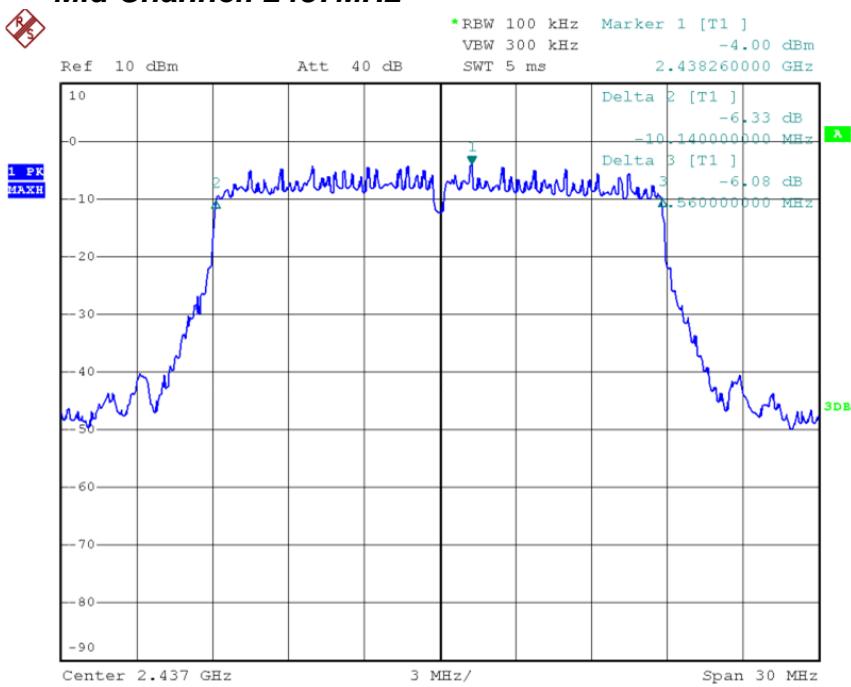
Highest Channel: 2462MHz



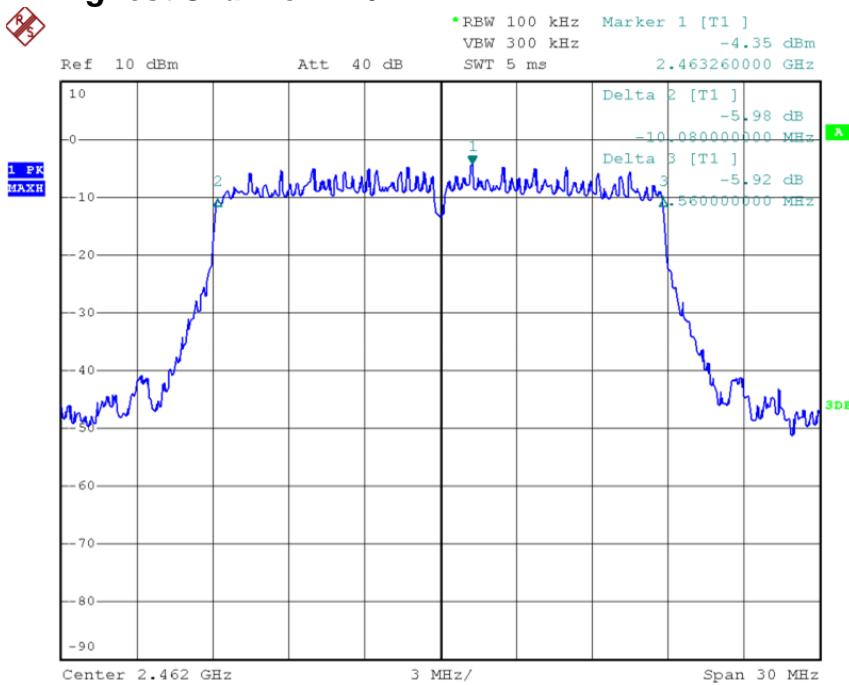
**For 802.11n HT20 Mode:
Lowest Channel: 2412MHz**



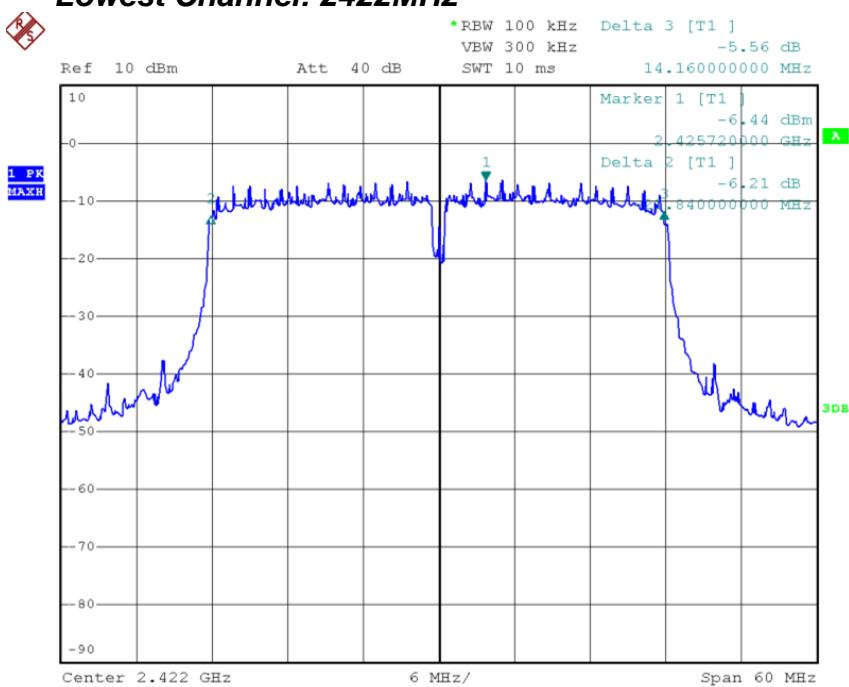
Mid Channel: 2437MHz



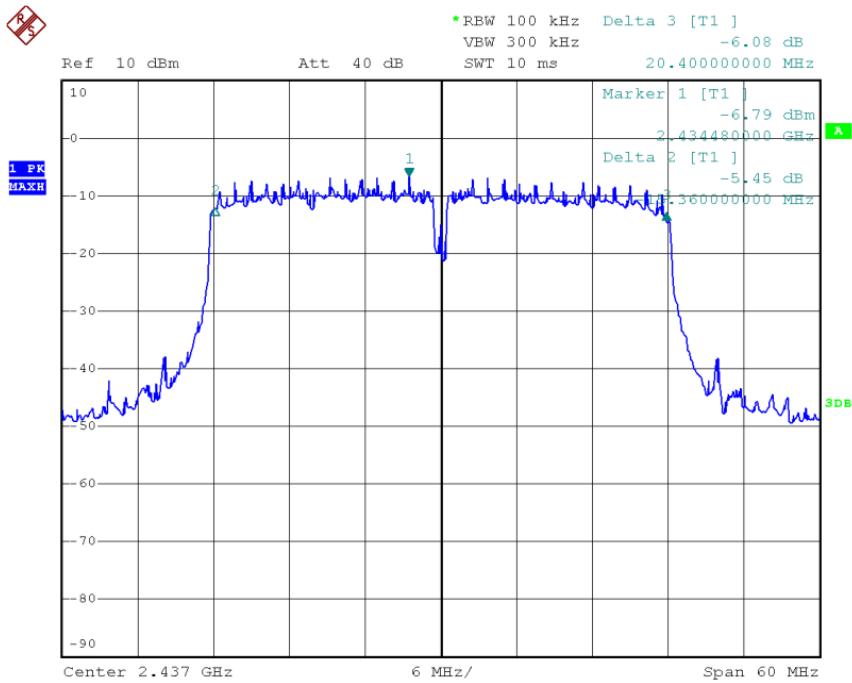
Highest Channel: 2462MHz



For 802.11n HT40 Mode: Lowest Channel: 2422MHz



Mid Channel: 2437MHz



Highest Channel: 2452MHz

