MEASUREMENT REPORT
FCC PART 15.247 WLAN 802.11b/g/n

FCC ID:	YZZGVC3200
APPLICANT:	Grandstream Networks, Inc.

Application Type:	Certification
Product:	Full HD Video Conferencing System
Model No.:	GVC3200
Brand Name:	Grandstream
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15.247
Test Procedure(s):	ANSI C63.10-2009, KDB 558074 D01v03r04
Test Date:	January 12 ~ 20, 2016

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v03r04. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date
1601RSU00902	Rev. 01	Initial report	01-21-2016

Note: The EUT has been got the FCC certificate (FCC ID: YZZGVC3200). The EUT adds one new adapter now and we have shown the conducted emission data and radiated emission data (below 1GHz) in the DTS report.

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Description Page

§2.1033 General Information

Applicant:	Grandstream Networks, Inc.
Applicant Address:	4th Floor, Rainbow Technology Building #16 New West Rd, Nanshan Science & Technology Park (North District), Shenzhen, China 518057
Manufacturer:	Grandstream Networks, Inc.
Manufacturer Address:	4th Floor, Rainbow Technology Building #16 New West Rd, Nanshan Science & Technology Park (North District), Shenzhen, China 518057
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.247
Model No.:	GVC3200
FCC ID:	YZZGVC3200
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Digital Transmission System (DTS)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

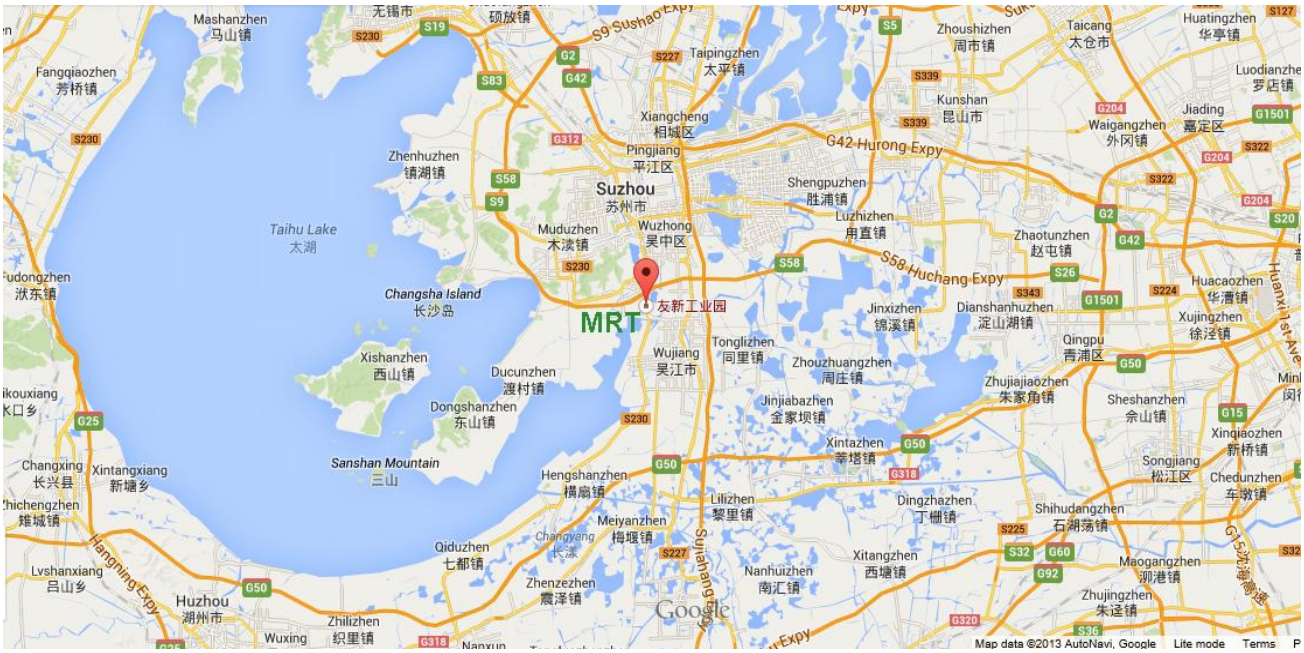
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) 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.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Full HD Video Conferencing System
Model No.	GVC3200
Brand Name	Grandstream
WLAN Specification	802.11a/b/g/n
BT Specification	v3.0 + HS, v4.0
Antenna Type	PCB Antenna
Antenna Gain	2.12dBi for 2.4GHz, 1.14dBi for 5GHz
Components	
Adapter	M/N: NBS65A120500M3 Input: AC 100-240V ~ 50/60Hz, 1.5A OUTPUT: 12Vdc, 5.0A

2.2. Product Specification Subjective to this Standard

Product Specification Subjective to this Standard	
Frequency Range	2412 ~ 2462 MHz
Number of Channels	11
Channel Spacing	5MHz
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM

Note: For other features of this EUT, test report will be issued separately.

2.3. Operation Frequency / Channel List

802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	N/A	N/A

2.4. Test Software

The test utility software used during testing was engineering order by applicant.

3. DESCRIPTION OF TEST

3.1. 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 D01v03r04 were used in the measurement of the **Full HD Video Conferencing System FCC ID: YZZGVC3200.**
Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.
The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013 at Clause 4.3.
Line conducted emissions test results are shown in Section 6.3.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB BeamWidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2016/11/03
Temperature/ Meter Humidity	Yuhuaze	N/A	MRTSUE06180	1 year	2016/12/20

Radiated Emissions - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MRTSUE06124	1 year	2016/06/23
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
TRILOG Antenna	Schwarzbeck	VULB9168	MRTSUE06172	1 year	2016/12/10
Temperature/ Meter Humidity	Mingao	ETH529	MRTSUE06170	1 year	2016/11/29

Software	**Version**	**Function**
e3	V 8.3.5	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB

6. TEST RESULT

6.1. Summary

Company Name: **Grandstream Networks, Inc.**
FCC ID: **YZZGVC3200**
FCC Classification: **Digital Transmission System (DTS)**
Data Rate(s) **1Mbps ~ 11Mbps (b); 6Mbps ~ 54Mbps (g);**
Tested: **6.5/7.2Mbps ~ 65/72.2Mbps (n-HT20)**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.209	General Field Strength Limits (Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 6.2
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 6.3

Notes: All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.

6.2. Radiated Spurious Emission Measurement

6.2.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.2.2. Test Procedure Used

KDB 558074 D01v03r04 - Section 12.2.3 (quasi-peak measurements)

KDB 558074 D01v03r04 - Section 12.2.4 (peak power measurements)

6.2.3. Test Setting

Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 D01v03r04

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold

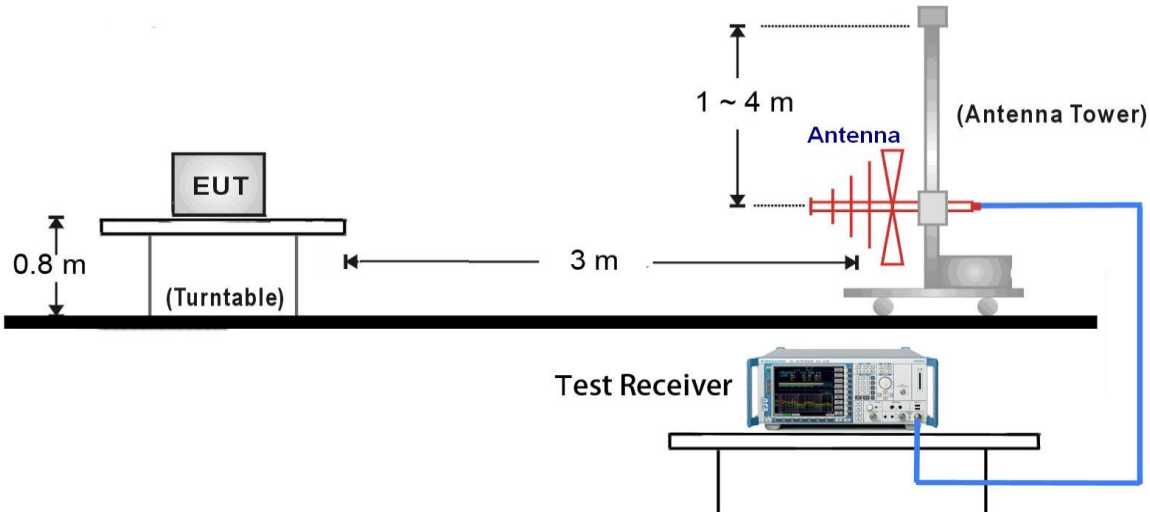
7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

6.2.4. Test Setup

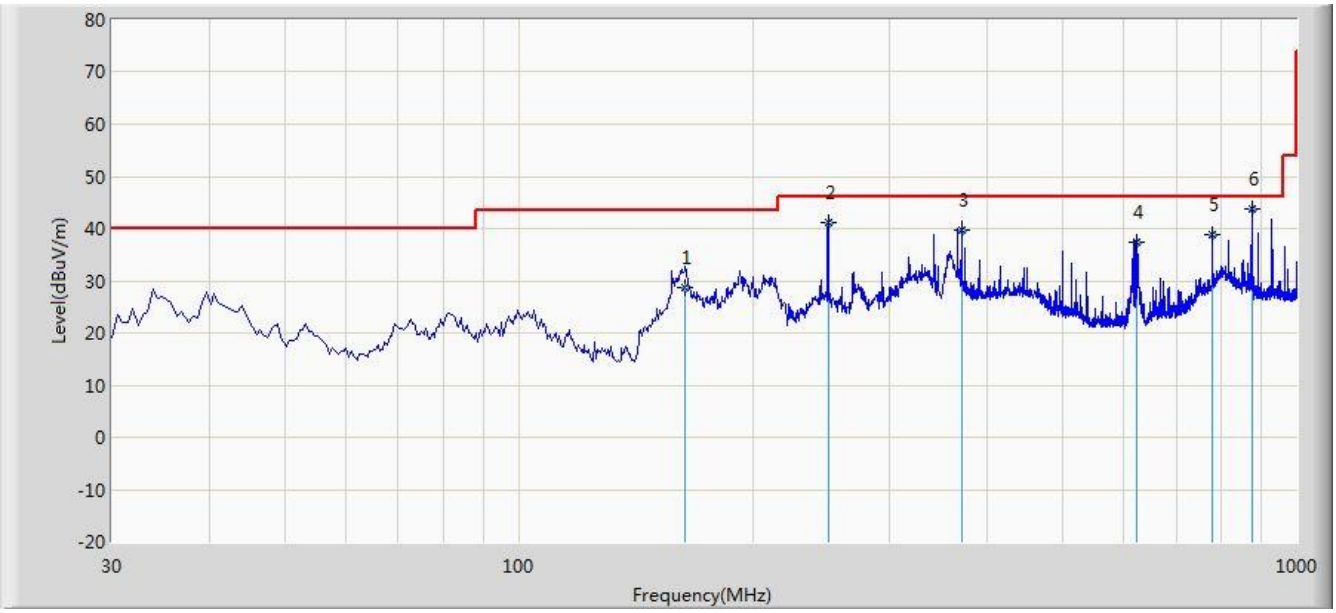
30MHz ~ 1GHz Test Setup:



6.2.5. Test Result

The worst case of Radiated Emission 30MHz ~ 1GHz:

Site: AC2	Time: 2016/01/13 - 20:11
Limit: FCC_Part15.209_RE(3m)_Class B	Engineer: Lewis Huang
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Full HD Video Conferencing System	Power: AC 120V/60Hz
Worst Case Mode: Transmit at Channel 2412MHz by 802.11b	

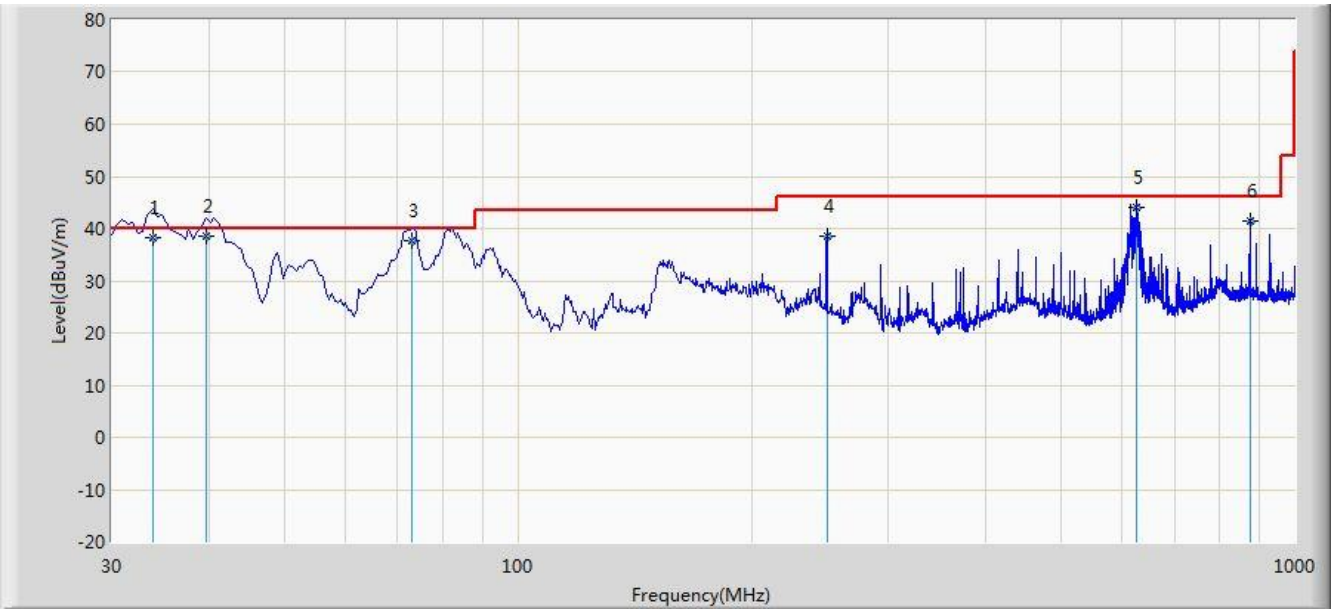


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			163.860	28.634	18.640	-14.866	43.500	9.994	QP
2			250.190	41.060	27.364	-4.940	46.000	13.696	QP
3			371.440	39.820	23.647	-6.180	46.000	16.174	QP
4			621.700	37.314	16.974	-8.686	46.000	20.340	QP
5			779.810	38.970	16.346	-7.030	46.000	22.624	QP
6		*	874.870	43.816	19.879	-2.184	46.000	23.937	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2016/01/13 - 20:11
Limit: FCC_Part15.209_RE(3m)_Class B	Engineer: Lewis Huang
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Full HD Video Conferencing System	Power: AC 120V/60Hz
Worst Case Mode: Transmit at Channel 2412MHz by 802.11b	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			33.880	38.134	25.394	-1.866	40.000	12.740	QP
2		*	39.700	38.504	24.698	-1.496	40.000	13.806	QP
3			73.165	37.808	27.648	-2.192	40.000	10.160	QP
4			250.190	38.536	24.840	-7.464	46.000	13.696	QP
5			624.610	44.064	23.690	-1.936	46.000	20.374	QP
6			874.870	41.585	17.648	-4.415	46.000	23.937	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

6.1. AC Conducted Emissions Measurement

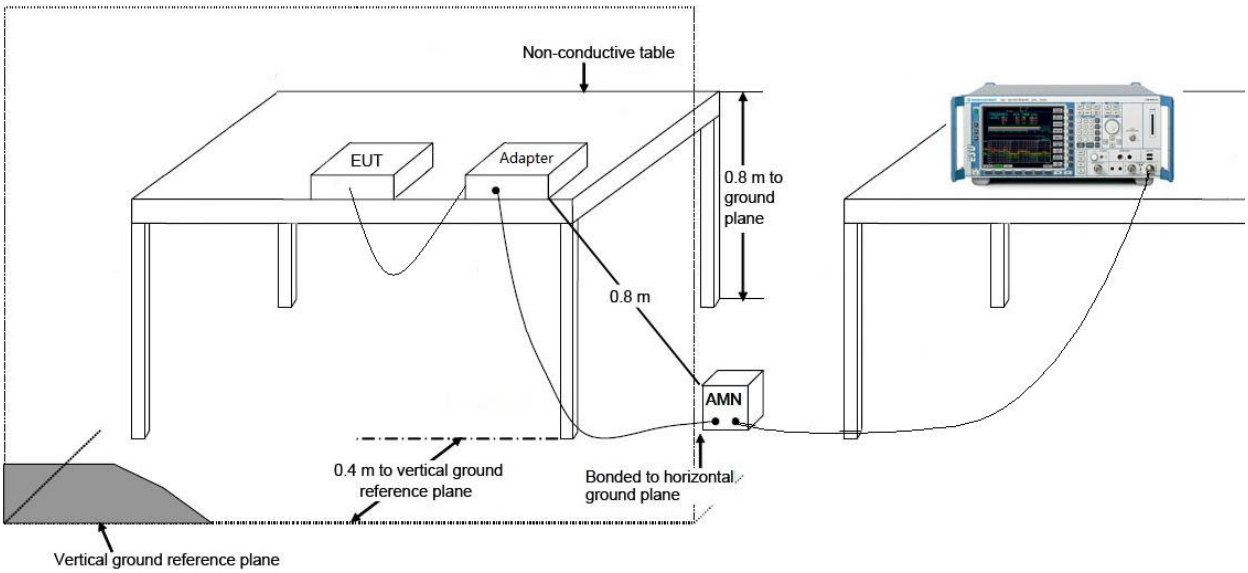
6.1.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBμV)	Average (dBμV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

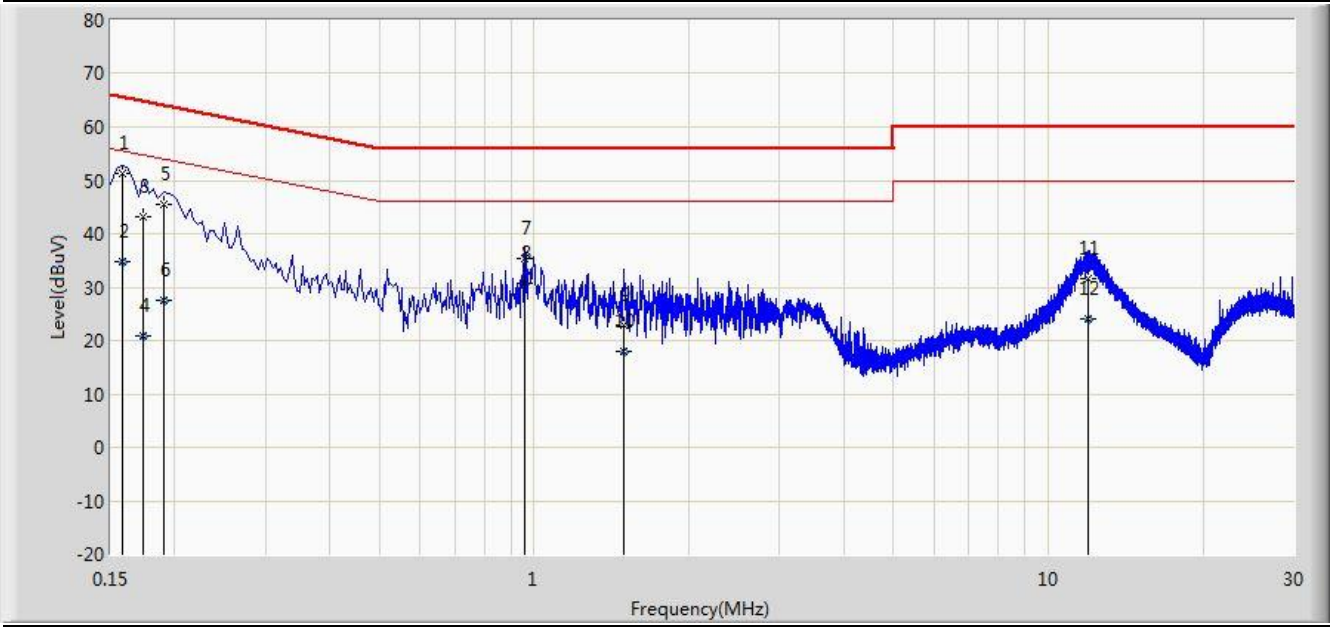
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.1.2. Test Setup



6.1.3. Test Result

Site: SR2	Time: 2016/01/12 - 20:56
Limit: FCC_Part15.207_CE_AC Power_ClassB	Engineer: Vince Yu
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Full HD Video Conferencing System	Power: AC 120V/60Hz
Test Mode: Transmit at Channel 2412MHz by 802.11b	

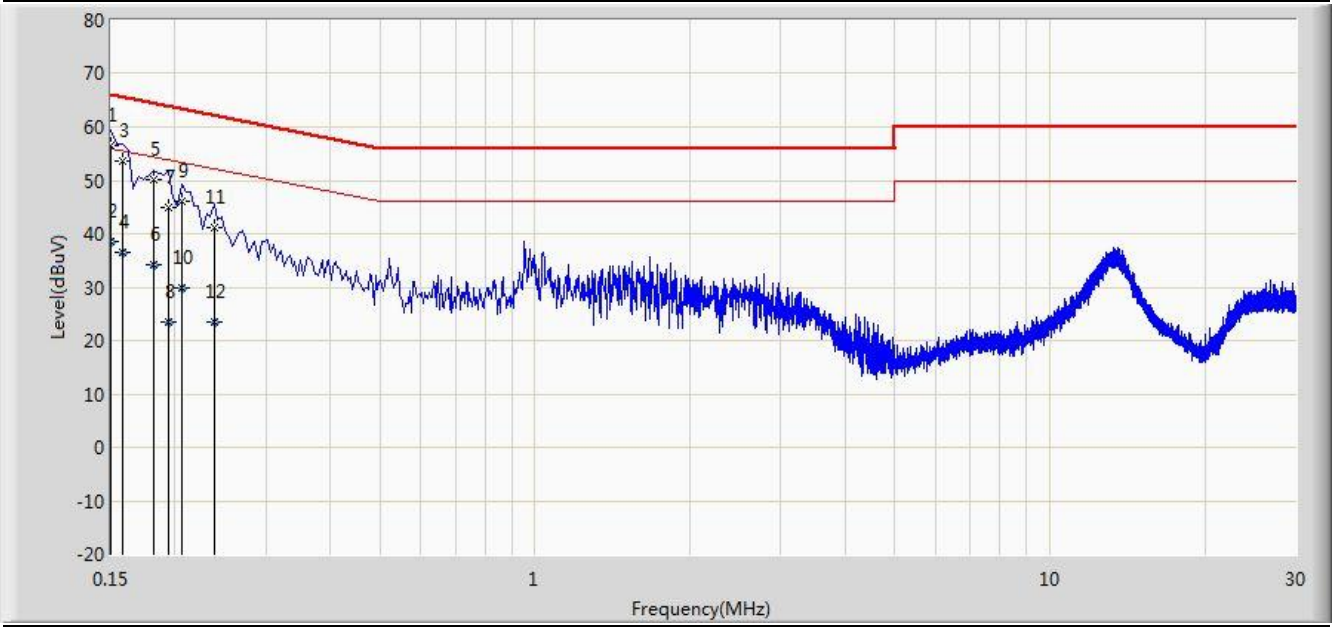


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.158	51.259	40.948	-14.310	65.568	10.311	QP
2			0.158	34.787	24.476	-20.781	55.568	10.311	AV
3			0.174	43.063	32.995	-21.704	64.767	10.068	QP
4			0.174	20.759	10.691	-34.008	54.767	10.068	AV
5			0.190	45.587	35.558	-18.450	64.037	10.029	QP
6			0.190	27.681	17.652	-26.355	54.037	10.029	AV
7			0.958	35.292	25.362	-20.708	56.000	9.930	QP
8			0.958	30.650	20.720	-15.350	46.000	9.930	AV
9			1.498	23.041	13.152	-32.959	56.000	9.889	QP
10			1.498	17.943	8.054	-28.057	46.000	9.889	AV
11			11.910	31.595	21.506	-28.405	60.000	10.090	QP
12			11.910	23.967	13.877	-26.033	50.000	10.090	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

Site: SR2	Time: 2016/01/13 - 09:07
Limit: FCC_Part15.207_CE_AC Power_ClassB	Engineer: Vince Yu
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Full HD Video Conferencing System	Power: AC 120V/60Hz
Test Mode: Transmit at Channel 2412MHz by 802.11b	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.150	56.390	45.248	-9.610	66.000	11.142	QP
2			0.150	38.534	27.392	-17.466	56.000	11.142	AV
3			0.158	53.637	43.348	-11.931	65.568	10.290	QP
4			0.158	36.524	26.235	-19.044	55.568	10.290	AV
5			0.182	50.191	40.149	-14.203	64.394	10.042	QP
6			0.182	34.283	24.240	-20.111	54.394	10.042	AV
7			0.194	44.973	34.951	-18.891	63.864	10.021	QP
8			0.194	23.414	13.393	-30.449	53.864	10.021	AV
9			0.206	46.155	36.154	-17.210	63.365	10.001	QP
10			0.206	29.906	19.905	-23.459	53.365	10.001	AV
11			0.238	41.216	31.224	-20.950	62.166	9.992	QP
12			0.238	23.365	13.373	-28.801	52.166	9.992	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Full HD Video Conferencing System FCC ID: YZZGVC3200** is in compliance with Part 15C of the FCC Rules.

The End