

FCC WIRELESS EQUIPMENT TEST&MEASUREMENT REPORT

On Model Name: IP Multimedia Phone

Model Numbers: GXV3240

Brand Name: Grandstream

FCC ID Number: YZZGXV3240

Prepared for Grandstream Networks,INC

Test Specification: FCC Part 15, Subpart C

Test Report #: SHE-1402-11114-WLAN-FCC ID

Tested by: Daomen Galanz
Daomen/Engineer Company Name

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QC Manager Company Name

Test Report Released by: Swall Zhang March 19th, 2014
Swall Zhang Date

List of Attached Files

Exhibit Type	File Description	File Name
<i>Test Report</i>	<i>Test Report</i>	<i>YZZGXV3240 _Test report.pdf</i>
<i>Operation Description</i>	<i>Technical Description</i>	<i>YZZGXV3240 _Operation Description.pdf</i>
<i>External Photos</i>	<i>External Photos</i>	<i>YZZGXV3240 _External Photos.pdf</i>
<i>Internal Photos</i>	<i>Internal Photos</i>	<i>YZZGXV3240 _Internal Photos.pdf</i>
<i>Block Diagram</i>	<i>Block Diagram</i>	<i>YZZGXV3240 _Block Diagram.pdf</i>
<i>Schematics</i>	<i>Circuit Diagram</i>	<i>YZZGXV3240 _Schematics.pdf</i>
<i>ID Label/Location</i>	<i>Label and Location</i>	<i>YZZGXV3240 _Label & Location.pdf</i>
<i>User Manual</i>	<i>User Manual</i>	<i>YZZGXV3240 _User Manual.pdf</i>
<i>Test Setup Photos</i>	<i>Test Setup Photos</i>	<i>YZZGXV3240 _Test Setup Photos.pdf</i>

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

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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.

List of Test and Measurement Instruments

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

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

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Reproduction Clause

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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 Multimedia Phone*

Model Number : *GXV3240*

Model Tested : *GXV3240*

Date Of Received : *March 5, 2014*

Date Tested : *March 13 to 16, 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)-755-260146001*

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 GXV3240 (referred to as the EUT in this report) is an IP Multimedia Phone.

The EUT is an IP Multimedia Phone with IEEE 802.11.b/g/n(1T1R) and Bluetooth Radio functionalities. Technical specifications of the EUT are as belows:

Parameters		Ranges
Basic parameters	Rated voltage	DC +12V
	Rated Current	DC 1.5A
Specifications of Bluetooth	Operating band	2402-2480MHz
	Modulation Techniques	FHSS
	Number of Channels:	79 channels
	Data Rate	GFSK (1Mbps), $\pi/4$ -DQPSK (2Mbps), 8DPSK (3Mbps)
	Type of modulation:	GFSK, DPSK,DQPSK
	Antenna Gain:	Small antennas with 0~2 dBi peak gain
Specifications of IEEE 802.11b/g/n	Operating band	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
	WLAN standard	IEEE 802.11b/g/n, WiFi compliant
	Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM, 16-QAM, QPSK, BPSK
	Number of Channels:	11 channels
	Data Rate	802.11b : 1, 2, 5.5, 11Mbps; 802.11g : 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n : 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps; 802.11n : 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65,72.2Mbps
	Output Power	802.11b /11Mbps : 16 dBm $\pm$ 1.5 dB @ EVM -9dB; 802.11g /54Mbps : 15 dBm $\pm$ 1.5 dB @ EVM -25dB; 802.11n /65Mbps : 14 dBm $\pm$ 1.5 dB @ EVM -28dB
	Antenna Type	FPC Antenna, 1T1R

Continue on to next page...

IEEE 802.11b/g/n :Working Frequency of Each Channel

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		

Parameter		Ranges
I/O Ports	USB Port	USB devices may be connected via the USB port
	Handset Port	3.5mm stereo headset connector port
	RJ9 Headset Port	Connect headsets
	LAN Port	10/100/1000Mbps Ethernet port connect to LAN. It supports PoE.
	PC Port	10/100/1000Mbps Ethernet port connect to PC.
	Power Jack	12V/5A Power Jack used to connect the power adapter
	SD Card Slot	SD card could be inserted in for picture/music/video files storage
	Mini HDMI Port	Connect the display device that supports HDMI.
	Extension Port	Connect the extension board.
Universal power supply	Input	AC 100-240V 50/60Hz,0.4A
	Output	DC 12V,1.5A
	Model	SFF1200150A1BY
	Trademark	Mass power

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

Test Summary

The Electromagnetic Compatibility requirements on tested model GXV 3240 for this test is stated beLowest. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endors ement upon any other comp onent, host or subsystem used in the test set-up.

Tested model GXV3240 has been tested to conform to the folLowesting parts of the Part 15, Subpart C as detailed beLowests:

FCC Rules	Requirement	Result	Remark
§15.247(c)(1)(i); §15.203	Antenna Requirement	Compliant	Attachment 1
§15.207	Conducted Emission	Compliant	Attachment 2
§15.205(a); §15.209(a)	Radiated Emission	Compliant	Attachment 3
§15.247(b)	Maximum Peak Output Power	Compliant	Attachment 4
§15.247(a)(2)	Occupied Bandwidth	Compliant	Attachment 5
§15.247(d)	Edges Measurement	Compliant	Attachment 6
§15.247(e)	Power Spectral Density	Compliant	Attachment 7

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 below.

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	Channel Lowest	100%	IEEE 802.11b: 1Mbps; IEEE 802.11g: 6Mbps; IEEE 802.11n HT20: 6.5Mbps;	IEEE 802.11b for DSSS; IEEE 802.11g & 802.11n HT20 For OFDM
2437	Channel Mid			
2462	Channel Highest			

Description Of Available Antennas

The radio utilizes a FPC antenna, with a maximum gain of 2.0 dBi in the 2.4 GHz band.

EUT Exercise Software

The test utility software used during testing was Ampak RF Test Tool, VER:4.1.

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			
Model Number:	GXV3240		
Description:	IP Multimedia Phone		
Manufacturer:	Grandstream Networks,Inc		
Input Voltage:	DC12V		
Support Equipment			
Description	Model Number	Serial Number	Manufacturer

<i>Cable Description</i>					
<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 Multimedia Phone".</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:

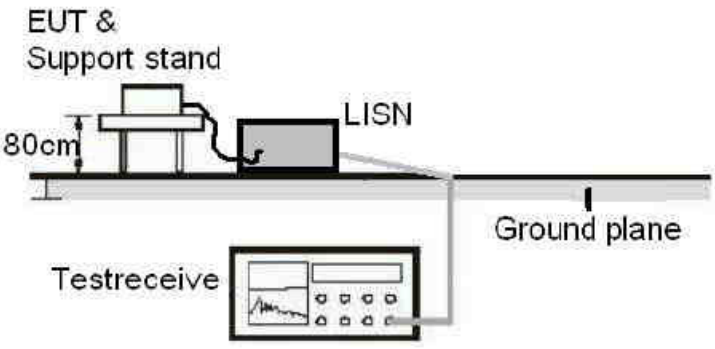
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply 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.

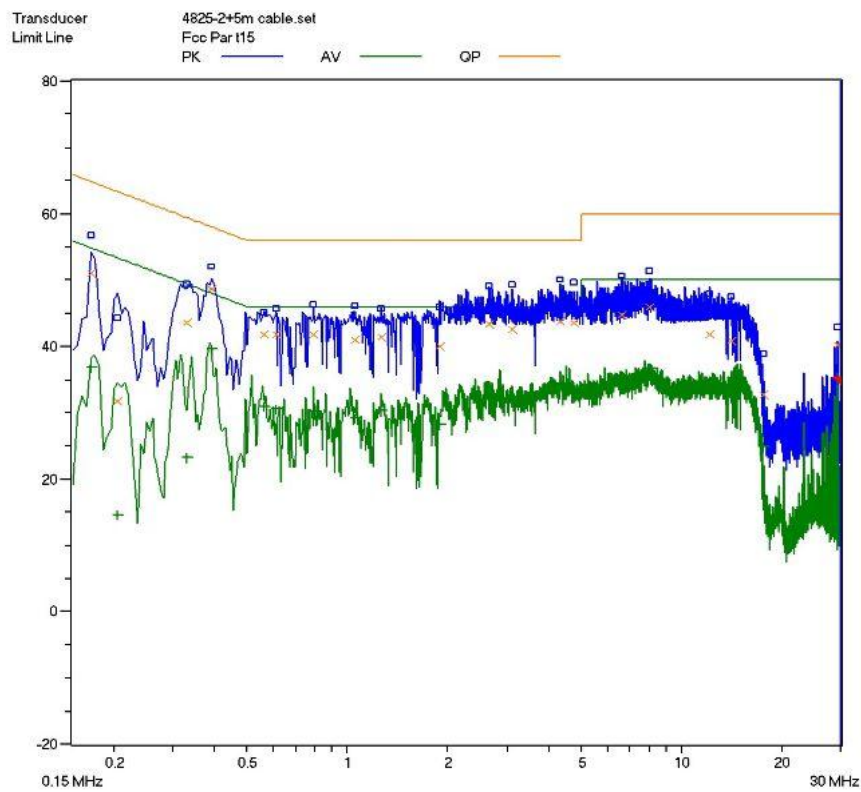
§15.247(c) (1)(i) Requirements:

(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.

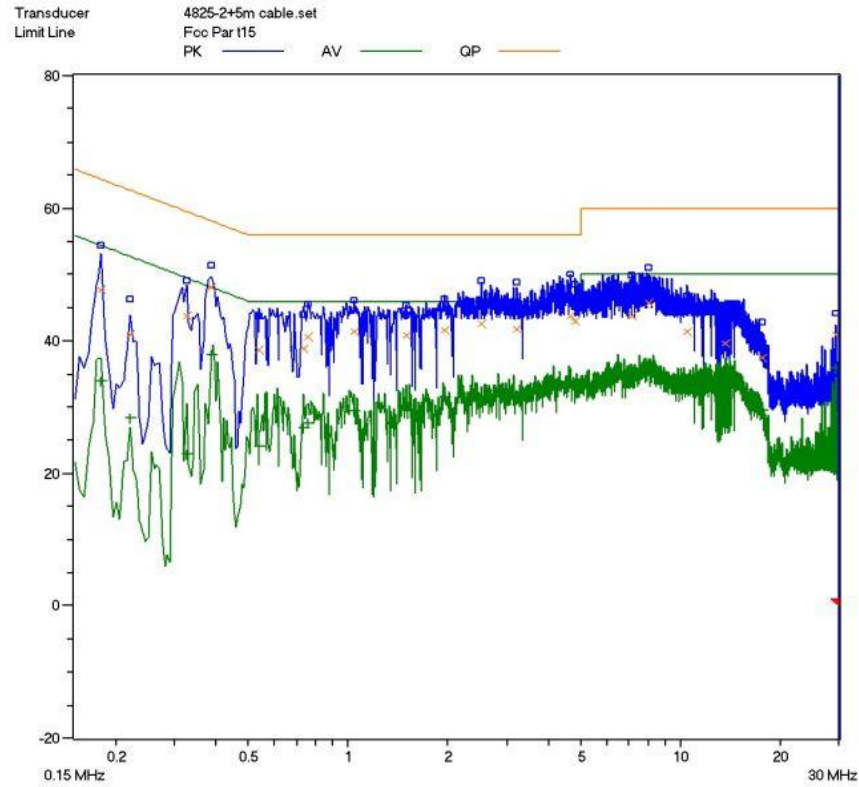
FCC Section	FCC Rules	Conclusion
§15.203& §15.207 (c) (1) (i)	<i>Described how the EUT complies with the requirements that either its antenna is permanently attached, or that it employ a unique antenna connector, for every antenna proposed for use with the EUT.</i> <i>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</i> <i>1. The application (or intended use) of the EUT.</i> <i>2. The installation requirements of the EUT.</i> <i>3. The method by which the EUT will be marketed.</i>	<i>The EUT uses a FPC antenna, maximal gain of the antenna is 2.0 dBi and was permanently soldered on PCB.</i> <i>So the unit do meet requirement.</i>

ATTACHMENT 2 - CONDUCTED EMISSION TEST RESULTS

CLIENT:	GRANDSTREAM NETWORKS,INC.	TEST STANDERD:	Section 15.207
MODEL NUMBERS:	GXV3240	PRODUCT:	IP Multimedia Phone
EUT MODEL:	GXV3240	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	March 16, 2014
TEST REFERENCE:	ANSI C63.4: 2003		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4:2003 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 PC by wireless router nearby.		
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. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		



Line L Conducted Emission Graph



Line N Conducted Emission Graph

Test Data:

<i>Lines</i>	<i>Frequency (MHz)</i>	<i>Corrected QP Level (dBuV)</i>	<i>Limits QP (dBuV)</i>	<i>Margin QP (dB)</i>	<i>Frequency (MHz)</i>	<i>Corrected AV Level (dBuV)</i>	<i>Limits AV (dBuV)</i>	<i>Margin QP (dB)</i>
L	0.170	51.1	64.9	-13.8	0.170	36.9	54.9	-18.0
L	0.390	48.0	58.0	-10.0	0.390	39.7	48.0	-8.3
L	7.890	45.9	60.0	-14.1	7.890	36.6	50.0	-13.4
L	/	/	/	/	/	/	/	/
L	/	/	/	/	/	/	/	/
L	/	/	/	/	/	/	/	/
N	0.180	47.8	64.4	-16.6	0.180	33.9	54.4	-20.5
N	0.385	48.1	58.2	-10.1	0.385	37.8	48.2	-10.4
N	7.995	45.7	60.0	-14.3	7.995	36.6	50.0	-13.4
N	/	/	/	/	/	/	/	/
N	/	/	/	/	/	/	/	/
N	/	/	/	/	/	/	/	/

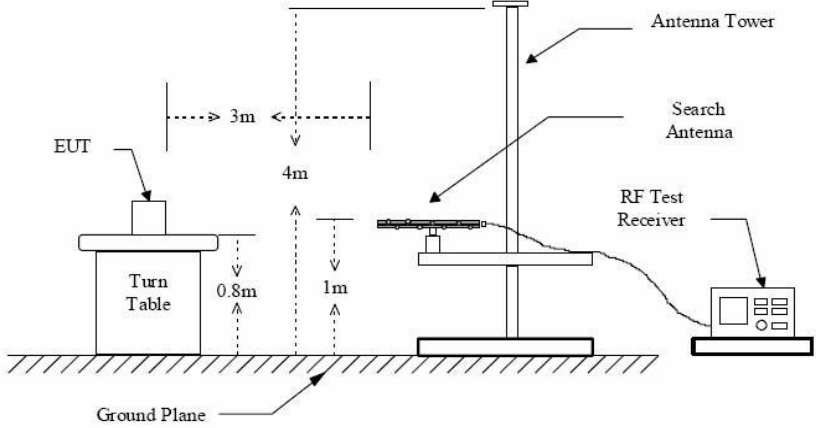
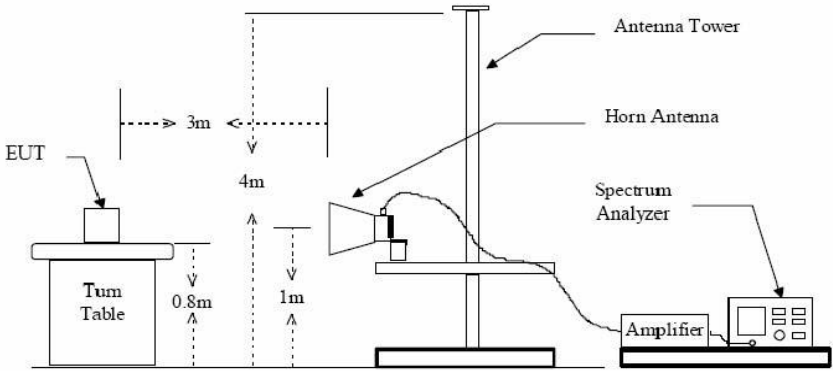
Note :

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

ATTACHMENT 3- RADIATED EMISSION TEST

CLIENT:	GRANDSTREAM NETWORKS, INC.	TEST STANDERD:	Section 15.209(a), Section 15.205(a)
MODEL NUMBERS:	GXV3240	PRODUCT:	IP Multimedia Phone
EUT MODEL:	GXV3240	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	March 16, 2014
TEST REFERENCE:	ANSI C63.4: 2003		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4: 2003 for radiated emissions. An EMI receiver peak scan was made at the frequency measurement range (pre-scan) in an Anechoic chamber. Test procedure as folLowest: 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.		
DESCRIPTION OF TEST MODE	<i>For beLowest 1GHz:</i> Set to Wi-Fi mode, pre-scan all channels of the IEEE 802.11b/g/n, and found the 801.11g mode, channel 1 with data rate of 6Mbps which is worst-case. So IEEE 802.11g mode, channel 1 with data rate of 6Mbps was chosen for the final testing and recorded in report. <i>For above 1GHz:</i> 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). FoLowesting channels were chosen for the final test as listed beLowest: 802.11b mode with data rate of 1Mbps, 802.11g mode with data rate of 6Mbps, 802.11n HT20 mode with data rate of 6.5Mbps.		

MEASUREMENT SETUP:	Measurement receiver shall be set as beLowest:				
	Frequency (MHz)	Receive detector	RBW	VBW	Value
	30-1000	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1000	Peak	1MHz	1MHz	Peak
	Above 1000	Peak	1MHz	10Hz	average
LIMITS:	Section 15.209 limits as beLowest:				
	Other Frequency (MHz)		Field strength (uV/meter) dB uV/meter		
	30-88		100	40.0	
	88-216		150	43.5	
	216-960		200	46.0	
Above 960		500	54.0		
NOTE:					
1) Field Strength (dBmV/m)= 20log Field Strength (mV/m).					
2) In the emission tables above,the tighter limit applies at the band edge.					
TESTED RANGE:	30MHz to 25GHz				
TEST VOLTAGE:	120VAC/60Hz				
RESULTS:	According to the data in the folLowesting,the EUT complied with the FCC Part 15.209 &15.205. The test results relate only to the equipment under test provided by client.				

TEST SETUP:	Figure 1 : Frequencies measured below 1 GHz configuration  Figure 2 : Frequencies measured above 1 GHz configuration 
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

Test Data (below 1GHz):**For 802.11g mode, channel 6 with data rate of 1Mbps:**

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							
40.640	0.02	16.8	/	5.88	22.7	40.0	-17.3
240.000	0.15	12.9	/	22.25	35.3	46.0	-10.7
322.960	0.16	13.4	/	12.94	26.5	46.0	-19.5
432.000	0.20	15.8	/	12.40	28.4	46.0	-17.6
720.000	0.39	20.7	/	13.61	34.7	46.0	-11.3
799.840	0.39	22.2	/	14.31	36.9	46.0	-9.1
Vertical							
30.640	0.02	16.8	/	21.1	37.9	40.0	-2.1
265.920	0.15	12.9	/	18.55	31.6	46.0	-14.4
307.920	0.16	13.7	/	7.64	21.5	46.0	-24.5
531.280	0.30	18.1	/	10.00	28.4	46.0	-17.6
584.720	0.30	19.0	/	11.40	30.7	46.0	-15.3
648.000	0.36	20.0	/	10.54	30.9	46.0	-15.1

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 (Above 1GHz):
802.11b mode/Lowest Channel: 2412MHz

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								
1656.00	1.71	26.1	33.6	65.43	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
7392.00	5.32	36.2	30.5	29.35	40.37	74	-33.63	V
8320.52	4.67	35.8	29.9	29.99	40.56	74	-33.44	V
7250.00	4.67	36.0	30.5	40.13	50.3	74	-23.70	V
1656.00	1.71	26.1	33.6	60.44	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
4808.0	3.26	32.9	32.0	45.08	49.24	74	-24.76	H
3212.0	3.26	32.2	32.1	36.94	40.30	74	-33.70	H
1272.5	1.71	23.9	33.6	55.55	47.56	74	-26.44	H

<i>Frequency (MHz)</i>	<i>Cable Loss(dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizati on (H/V)</i>
Average Measurement								
1656.00	1.71	26.1	33.6	56.75	51.00	54	-3.00	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	40.45	50.66	54	-3.34	V
7392.00	4.10	36.20	30.5	18.67	28.47	54	-25.53	V
6904.85	4.10	33.90	30.8	22.8	30.0	54	-24.00	V
5987.01	3.87	35.40	31.6	21.87	29.54	54	-24.46	V
1656.00	1.71	26.1	33.6	57.49	51.7	54	-2.30	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	39.41	49.58	54	-4.42	H
1170.00	1.39	23.9	31.6	39.63	33.32	54	-20.68	H
5672.00	3.87	35.40	31.6	22.48	30.15	54	-23.85	H
4503.34	3.26	33.5	32.0	25.74	30.50	54	-23.50	H

802.11b mode/Mid Channel: 2437MHz

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizati on (H/V)</i>
Peak Measurement								
1656.00	1.71	26.1	33.6	65.43	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
1034.00	1.39	23.9	31.6	59.18	52.87	74	-21.13	V
5320.00	3.50	32.9	31.6	40.2	45.00	74	-29.00	V
4502.30	3.26	33.5	32.0	35.45	40.21	74	-33.79	V
1656.00	1.71	26.1	33.6	60.44	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
1544.00	1.71	26.1	33.6	53.89	48.10	74	-25.90	H
5461.00	3.50	32.9	31.6	40.33	45.13	74	-28.87	H
6473.00	4.10	33.90	30.8	38.03	45.23	74	-28.77	H

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
Average Measurement								
1656.00	1.71	26.1	33.6	56.75	51.00	54	-3.00	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	40.45	50.66	54	-3.34	V
4876.00	3.26	33.5	32.0	25.12	29.88	54	-24.12	V
3554.00	2.67	32.2	32.1	22.86	25.63	54	-28.37	V
1257.00	1.39	23.9	31.6	41.32	35.01	54	-18.99	V
1631.00	1.71	26.1	33.6	57.69	51.9	54	-2.10	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	39.41	49.58	54	-4.42	H
2224.00	2.01	28.00	33.0	35.19	32.20	54	-21.80	H
3526.20	2.67	32.2	32.1	32.63	35.40	54	-18.60	H
6934.00	4.10	33.90	30.8	19.1	26.30	54	-27.70	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 Polarizat ion (H/V)
Peak Measurement								
1656.00	1.71	26.1	33.6	65.43	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
7392.00	4.10	36.20	30.5	30.54	40.34	74	-33.66	V
5320.15	3.50	32.90	31.6	33.4	38.20	74	-35.80	V
6103.00	4.02	35.00	30.8	30.88	39.10	74	-34.90	V
1656.00	1.71	26.1	33.6	60.44	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
7834.00	4.10	36.20	30.5	31.57	41.37	74	-32.63	H
6534.00	4.10	33.90	30.8	32.9	40.10	74	-33.90	H
5210.32	3.50	32.90	31.6	40.52	45.32	74	-28.68	H

<i>Frequency (MHz)</i>	<i>Cable Loss(dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizati on (H/V)</i>
Average Measurement								
1631.00	1.71	26.1	33.6	56.49	50.70	54	-3.3	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	40.45	50.66	54	-3.34	V
1170.00	1.39	23.9	31.60	40.37	34.06	54	-19.94	V
5220.00	3.50	32.9	31.60	25.3	30.10	54	-23.90	V
1232.00	1.39	23.9	31.60	41.36	35.05	54	-18.95	V
1631.00	1.71	26.1	33.6	57.89	52.10	54	-1.9	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	39.41	49.58	54	-4.42	H
7392.00	4.10	36.20	30.50	19.3	29.10	54	-24.90	H
3550.00	2.67	32.20	32.10	29.33	32.10	54	-21.90	H
6230.00	4.02	35.00	30.80	21.88	30.10	54	-23.90	H

For 802.11g mode/Lowest Channel: 2412MHz

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizati on (H/V)</i>
Peak Measurement								
1034.00	1.39	23.9	31.6	58.63	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
7120.00	4.10	36.20	30.5	30.77	40.57	74	-33.43	V
4905.00	3.26	33.5	32.0	37.8	42.56	74	-31.44	V
1250.00	1.39	23.9	31.6	61.31	55.00	74	-19.00	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
3210.00	2.57	31.5	32.1	43.76	45.73	74	-28.27	H
1544.00	1.71	26.1	33.6	56.19	50.40	74	-23.60	H
3350.12	2.57	31.5	32.1	44.53	46.50	74	-27.50	H
6825.00	4.10	33.90	30.8	33.0	40.20	74	-33.80	H

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
1170.00	1.39	23.9	31.6	40.77	34.46	54	-19.54	V
7426.00	4.10	36.20	30.5	18.66	28.46	54	-25.54	V
7500.00	5.32	36.00	30.5	16.76	27.58	54	-26.42	V
1800.00	1.71	26.1	33.6	37.99	32.20	54	-21.80	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
1660.00	1.71	26.1	33.6	56.49	50.70	54	-3.30	H
7256.00	4.10	36.20	30.5	18.35	28.15	54	-25.85	H
1860.00	1.71	26.1	33.6	40.79	35.00	54	-19.00	H
7005.00	4.10	36.20	30.5	19.2	29.00	54	-25.00	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 Polarizat ion (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
1034.00	1.39	23.9	31.6	58.81	52.50	74	-21.50	V
7460.00	4.10	36.20	30.5	30.99	40.79	74	-33.21	V
7600.50	5.32	36.00	30.5	31.68	42.50	74	-31.50	V
3260.00	2.57	31.5	32.1	40.03	42.00	74	-32.00	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
1544.00	1.71	26.1	33.6	56.74	50.95	74	-23.05	H
7324.00	4.10	36.20	30.5	31.75	41.55	74	-32.45	H
7500.25	5.32	36.00	30.5	31.68	42.50	74	-31.50	H
3500.00	2.67	32.2	32.1	43.23	46.00	74	-28.00	H

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
1170.00	1.39	23.9	31.6	41.89	35.58	54	-18.42	V
7426.00	4.10	36.20	30.5	18.46	28.26	54	-25.74	V
7620.00	5.32	36.00	30.5	16.68	27.50	54	-26.50	V
1260.00	1.39	23.9	31.6	41.81	35.50	54	-18.50	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
3278.00	2.57	31.5	32.1	27.2	29.17	54	-24.83	H
1068.00	1.39	23.9	31.6	39.35	33.04	54	-20.96	H
1170.50	1.39	23.9	31.6	41.36	35.05	54	-18.95	H
7620.00	4.10	36.00	30.5	19.7	29.30	54	-24.70	H

For 802.11g mode /Highest Channel: 2462MHz

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Resding Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
1034.00	1.39	23.9	31.6	63.27	56.96	74	-17.04	V
7936.00	5.32	36.00	30.5	31.05	41.87	74	-32.13	V
7800.25	5.32	36.00	30.5	31.68	42.50	74	-31.5	V
3560.00	2.67	32.2	32.1	42.23	45.00	74	-29.00	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
3278.00	2.57	31.5	32.1	45.08	47.05	74	-26.95	H
1102.00	1.39	23.9	31.6	56.51	50.20	74	-23.80	H
1250.00	1.39	23.9	31.6	57.51	51.20	74	-22.80	H
3560.50	2.67	32.2	32.1	42.43	45.20	74	-28.80	H

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
3278.00	2.57	31.5	32.1	28.07	30.04	54	-23.96	V
1170.00	1.39	23.9	31.6	42.02	35.71	54	-18.29	V
3562.00	2.67	32.2	32.1	29.43	32.20	54	-21.80	V
4806.00	3.26	33.5	32.0	30.24	35.00	54	-19.00	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
3278.00	2.57	31.5	32.1	28.81	30.78	54	-23.22	H
1068.00	1.39	23.9	31.6	39.63	33.32	54	-20.68	H
1253.00	1.39	23.9	31.6	40.51	34.20	54	-19.80	H
7600.50	5.32	36.00	30.5	18.18	29.00	54	-25.00	H

For 802.11n HT20 mode/Lowest Channel: 2412MHz

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
3380.00	2.57	31.5	32.1	39.84	41.81	74	-32.19	V
1306.00	1.39	23.9	31.6	60.72	54.41	74	-19.59	V
1520.00	1.71	26.1	33.6	61.29	55.50	74	-18.5	V
4900.00	3.26	33.5	32.0	41.24	46.00	74	-28.00	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
3210.00	2.57	31.5	32.1	42.41	44.38	74	-29.62	H
1544.00	1.71	26.1	33.6	56.96	51.17	74	-22.83	H
3350.20	2.57	31.5	32.1	43.23	45.20	74	-28.80	H
7520.00	5.32	36.00	30.5	31.68	42.50	74	-31.50	H

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
1170.00	1.39	23.9	31.6	41.75	35.44	54	-18.56	V
4808.00	3.26	33.5	32.0	26.14	30.90	54	-23.10	V
4940.50	3.26	33.5	32.0	27.74	32.50	54	-21.50	V
1250.00	1.39	23.9	31.6	42.51	36.20	54	-17.80	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
1306.00	1.39	23.9	31.6	39.4	33.09	54	-20.91	H
7222.00	4.10	36.00	30.5	18.74	28.34	54	-25.66	H
7534.00	5.32	36.00	30.5	18.38	29.20	54	-24.8	H
3500.20	2.67	32.2	32.1	27.38	30.15	54	-23.85	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 Polarizat ion (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
1034.00	1.39	23.9	31.6	63.51	57.20	74	-16.80	V
8140.00	4.67	35.8	29.9	30.49	41.06	74	-32.94	V
8250.00	4.67	35.8	29.9	31.93	42.50	74	-31.50	V
1259.00	1.39	23.9	31.6	64.31	58.00	74	-16.00	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
3346.00	2.57	31.5	32.1	40.59	42.56	74	-31.44	H
1306.00	1.39	23.9	31.6	55.69	49.38	74	-24.62	H
1450.00	1.39	23.9	31.6	54.66	48.35	74	-25.65	H
4874.00	3.26	33.5	32.0	40.44	45.20	74	-28.80	H

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizati on (H/V)</i>
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
1034.00	1.39	23.9	31.6	43.64	37.33	54	-16.67	V
8140.00	4.67	35.8	29.9	17.87	28.44	54	-25.56	V
8200.00	4.67	35.8	29.9	18.43	29.00	54	-25.00	V
1400.50	1.39	23.9	31.6	44.81	38.50	54	-15.50	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
3244.00	2.57	31.5	32.1	27.74	29.71	54	-24.29	H
1170.00	1.39	23.9	31.6	39.73	33.42	54	-20.58	H
1252.00	1.39	23.9	31.6	40.51	34.20	54	-19.80	H
4900.00	3.26	33.5	32.0	23.24	28.00	54	-26.00	H

For 802.11n HT20 mode/Highest Channel: 2462MHz

<i>Frequency (MHz)</i>	<i>Cable Loss (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Preamp Factor (dB)</i>	<i>Reading Level (dBuV/m)</i>	<i>Emission Level (dBuV/m)</i>	<i>Limit (dBuV/m)</i>	<i>Margin (dB)</i>	<i>Antenna Polarizat ion (H/V)</i>
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
1034.00	1.39	23.9	31.6	64.83	58.52	74	-15.48	V
4876.00	3.26	33.5	32.0	35.92	40.68	74	-33.32	V
3310.00	2.57	31.5	32.1	40.23	42.20	74	-31.80	V
1350.00	1.39	23.9	31.6	61.81	55.50	74	-18.50	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
3278.00	2.57	31.5	32.1	44.04	46.01	74	-27.99	H
1544.00	1.71	26.1	33.6	55.96	50.17	74	-23.83	H
1660.00	1.71	26.1	33.6	56.99	51.20	74	-22.80	H
3530.00	2.67	32.2	32.1	44.23	47.00	74	-27.00	H

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)
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
3278.00	2.57	31.5	32.1	27.92	29.89	54	-24.11	V
1170.00	1.39	23.9	31.6	42.56	36.25	54	-17.75	V
1250.00	1.39	23.9	31.6	41.51	35.20	54	-18.80	V
3500.50	2.67	32.2	32.1	27.43	30.20	54	-23.80	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
1170.00	1.39	23.9	31.6	39.54	33.23	54	-20.77	H
4910.00	3.26	33.5	32.0	22.97	27.73	54	-26.27	H
1250.00	1.39	23.9	31.6	40.51	34.20	54	-19.80	H
7520.00	5.32	36.00	30.5	18.18	29.00	54	-25.00	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: $\text{Emission Level} = \text{Reading Level} + \text{Antenna Factor} + \text{Cable Loss} - \text{Preamplifier Factor}$.
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 are 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 performed the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

§15.205(a) Requirement:

(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			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

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.

ATTACHMENT 4 – OCCUPIED BANDWIDTH TEST

CLIENT:	GRANDSTREAM NETWORKS,INC.	TEST STANDERD:	Section 15.247(a)								
MODEL NUMBERS:	GXV3240	PRODUCT:	IP Multimedia Phone								
EUT MODEL:	GXV3240	EUT DESIGNATION:	Digital Transmission Device								
TEMPERATURE:	23°C	HUMIDITY:	47%RH								
ATM PRESSURE:	101.0kPa	GROUNDING:	None								
TESTED BY:	Daomen	DATE OF TEST:	March 15, 2014								
TEST REFERENCE:	ANSI C63.4:2003 and 558074 D01										
TEST PROCEDURE:	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 Highester than peak power minus 6 dB. Analyzer and the attached plot were taken. The EUT was set up to ANSI C63.4-2003, tested to DTS test procedure of 558074 D01 for compliance with FCC 47CFR 15.247 requirements.										
DESCRIPTIONS OF TEST MODE:	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). FolLowesting channels were selected for the final test as listed beLowest: 802.11b mode with data rate of 1Mbps, 802.11g mode with data rate of 6Mbps, 802.11n HT20 mode with data rate of 6.5Mbps.										
EQUIPMENT SETUP	<table><tr><td>Equipment Mode</td><td>Spectrum Analyzer</td></tr><tr><td>Detector Function</td><td>Peak</td></tr><tr><td>RBW</td><td>100KHz</td></tr><tr><td>VBW</td><td>300KHz</td></tr></table>			Equipment Mode	Spectrum Analyzer	Detector Function	Peak	RBW	100KHz	VBW	300KHz
Equipment Mode	Spectrum Analyzer										
Detector Function	Peak										
RBW	100KHz										
VBW	300KHz										
TEST VOLTAGE:	120VAC/60Hz										
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:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB										

Test Data:
For 802.11b Mode:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
2412	10.38	0.5	Pass
2437	10.42	0.5	Pass
2462	10.14	0.5	Pass

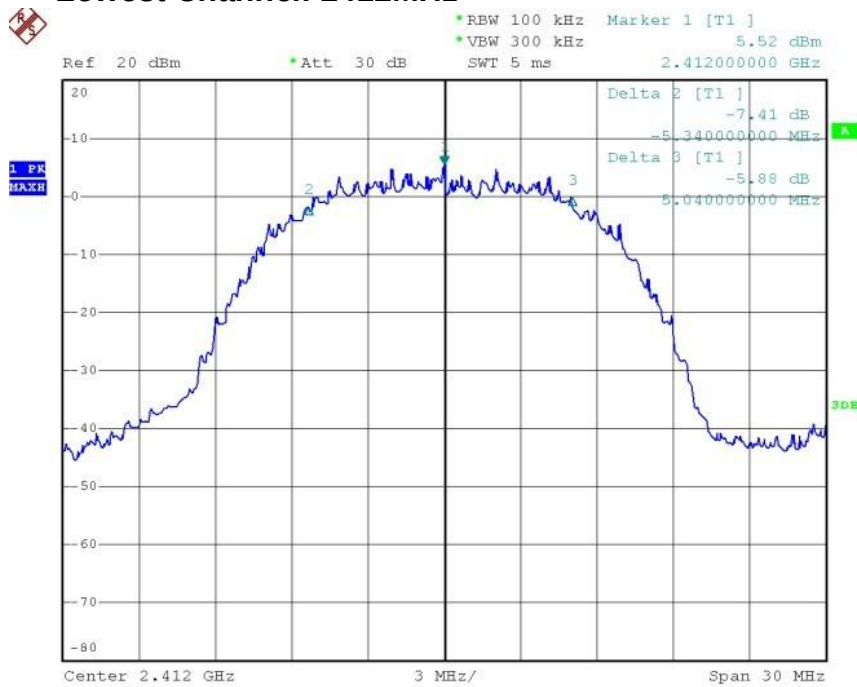
For 802.11g Mode:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
2412	16.5	0.5	Pass
2437	16.56	0.5	Pass
2462	9.41	0.5	Pass

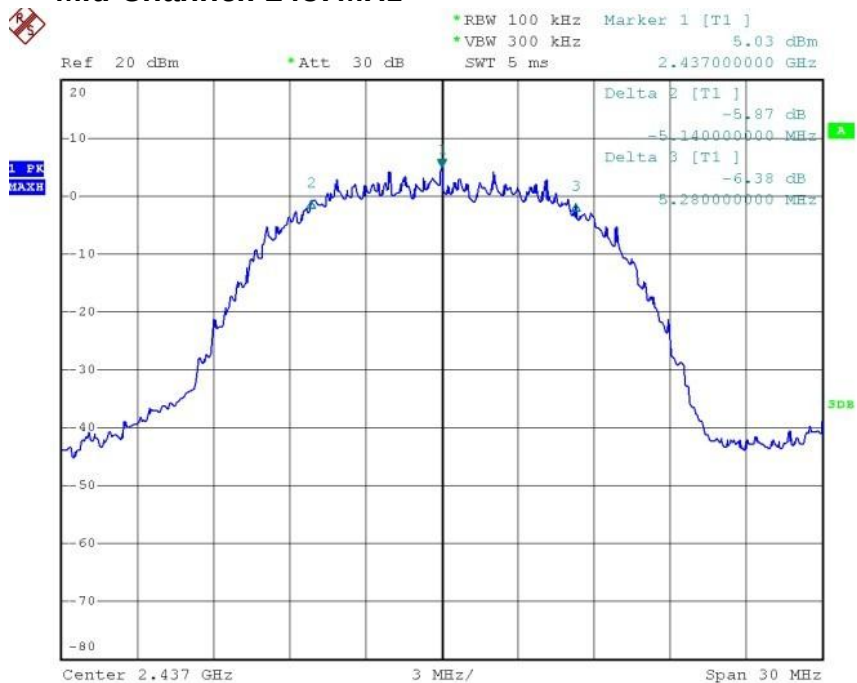
For 802.11n HT20 Mode:

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

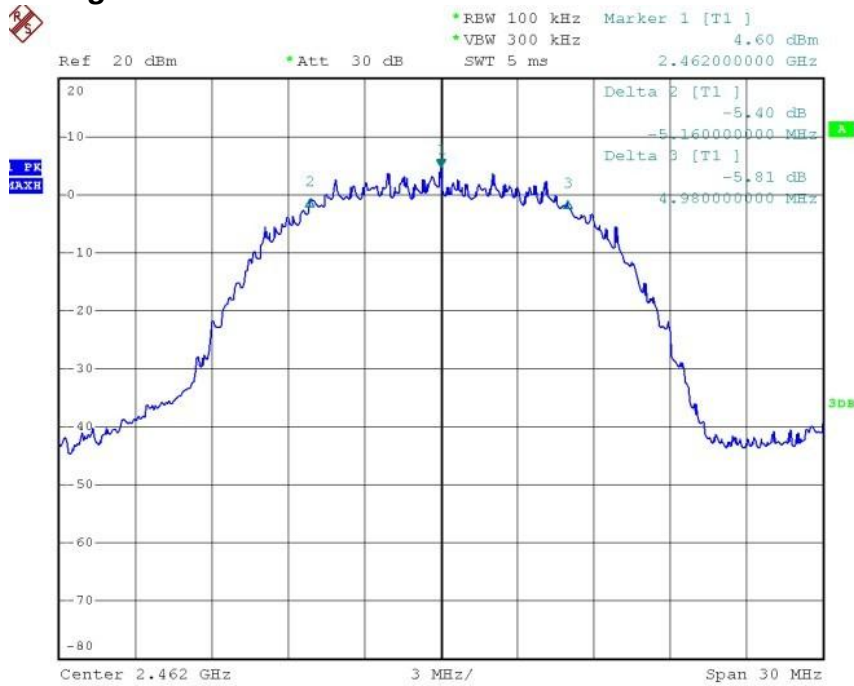
**For 802.11b Mode:
Lowest Channel: 2412MHz**



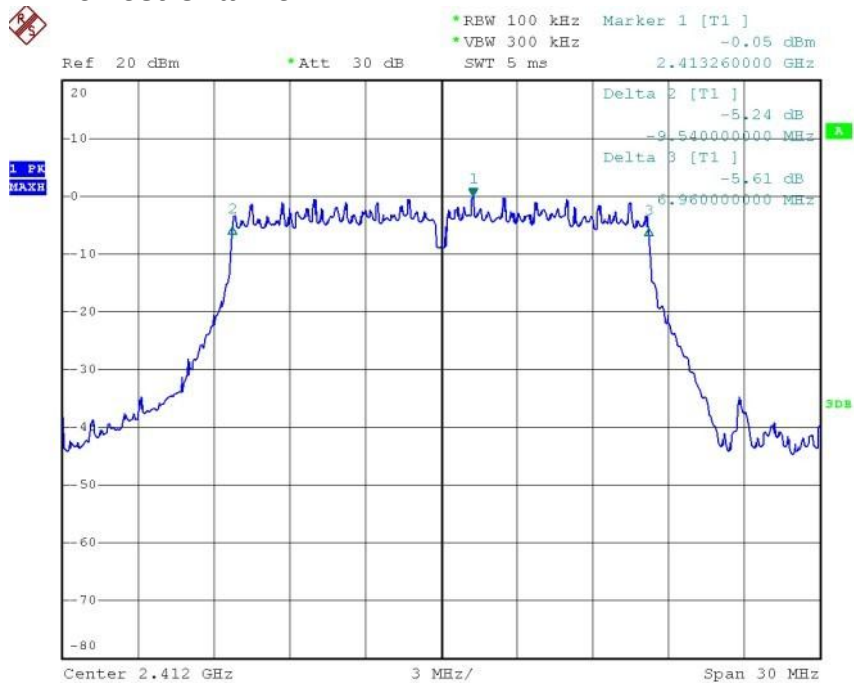
Mid Channel: 2437MHz



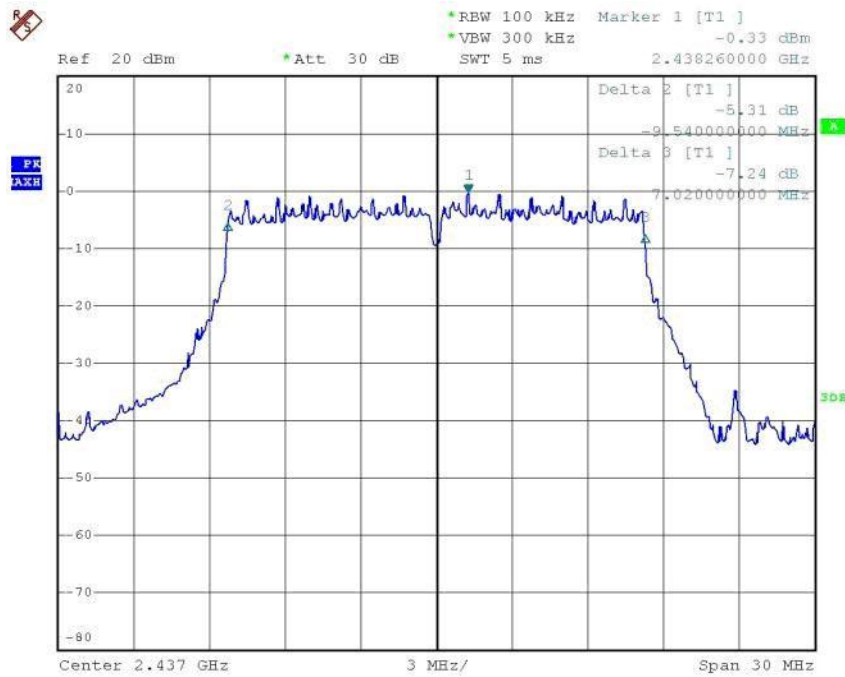
Highest Channel: 2462MHz



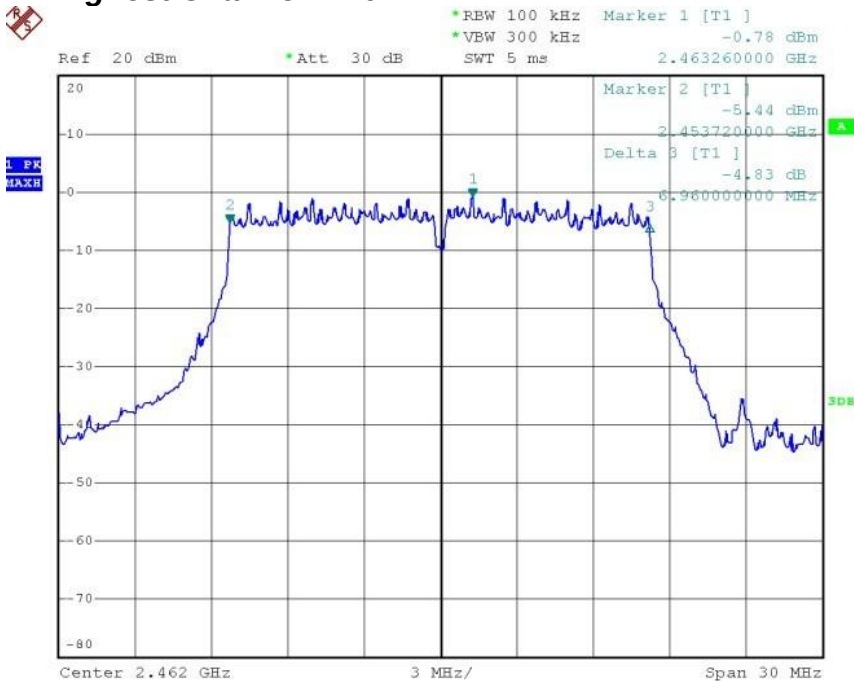
For 802.11g Mode: Lowest Channel: 2412MHz



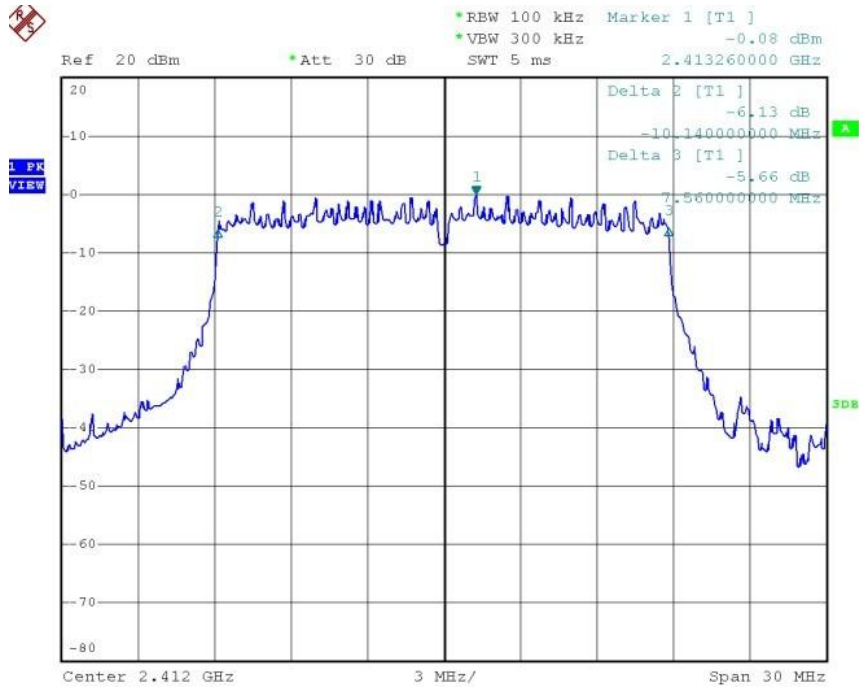
Mid Channel: 2437MHz



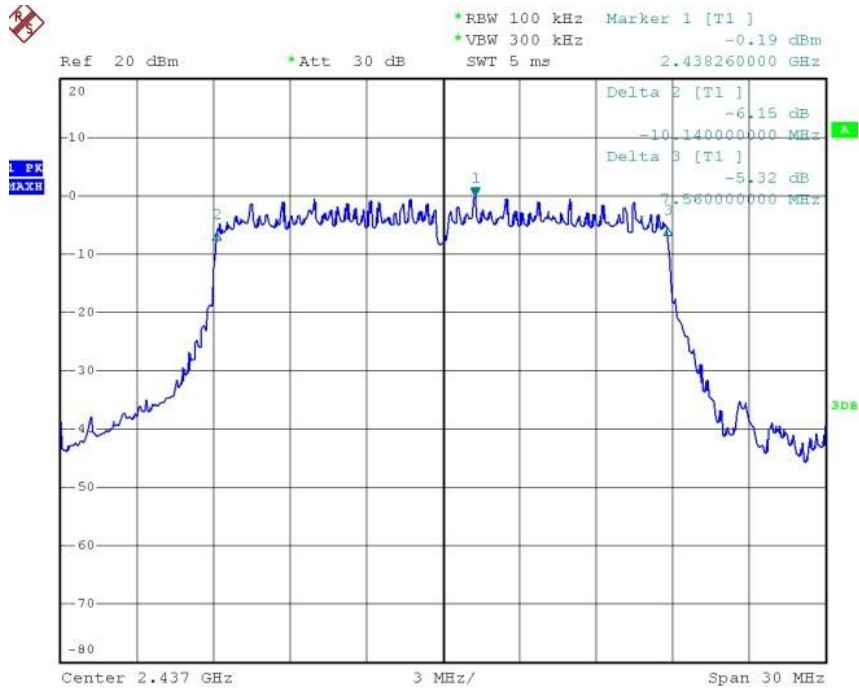
Highest Channel: 2462MHz



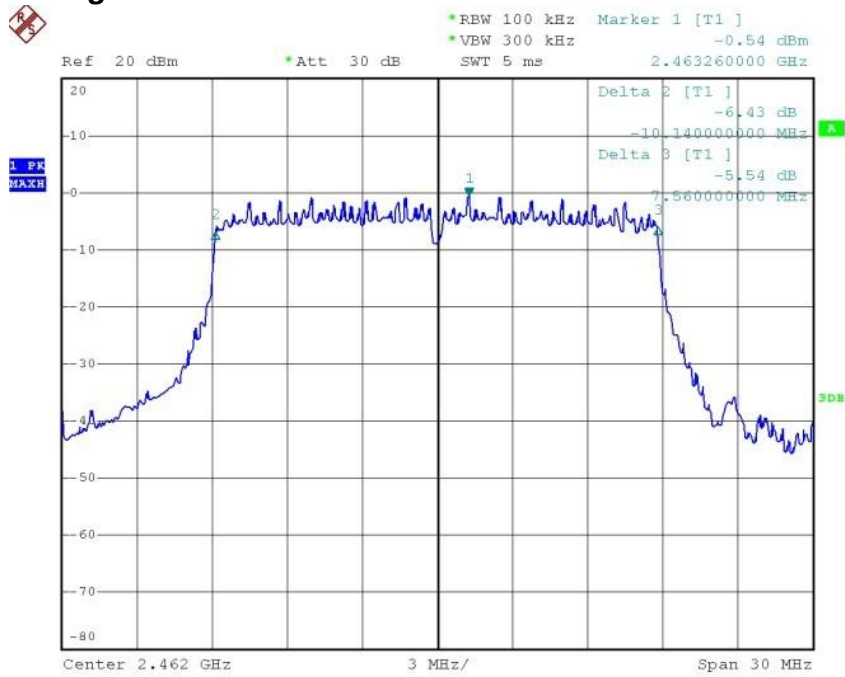
**For 802.11n HT20 Mode:
Lowest Channel: 2412MHz**



Mid Channel: 2437MHz



Highest Channel: 2462MHz



ATTACHMENT 5- MAXIMUM PEAK OUTPUT POWER

CLIENT:	GRANDSTREAM NETWORKS, INC.	TEST STANDERD:	Section 15.247(b)
MODEL NUMBERS:	GXV3240	PRODUCT:	IP Multimedia Phone
EUT MODEL:	GXV3240	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	March 16, 2012
TEST REFERENCE:	ANSI C63.4:2003 and 558074 D01		
TEST PROCEDURE:	The EUT was set-up as ANSI C63.4:2003, tested to DTS test procedure of 558074 D01 for compliance to FCC 47CFR 15.247 requirements.		
DESCRIPTIONS OF TEST MODE:	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). FolLowesting channels were selected for the final test as listed beLowest: 802.11b mode with data rate of 1Mbps, 802.11g mode with data rate of 6Mbps, 802.11n HT20 mode with data rate of 6.5Mbps.		
MEASUREMENT EQUIPMENT SET	Spectrum analyzer was set as beLowest:		
	Equipment Mode	Spectrum Analyzer	
	Detector Function	Peak	
	RBW	1MHz	
	VBW	1MHz	
TESTED RANGE:	N/A		
TEST VOLTAGE:	120VAC/60Hz		
RESULTS:	The EUT meet the requirements of test reference for maximum peak output power. the worst-case mode is 802.11b mode with data rate 1Mbps in channel 1. 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.		

Test Data:**For 802.11b Mode:**

Channel Frequency (MHz)	Peak Output Power(dBm)	Cable Loss (dB)	Power Level (dBm)	Limit	Margin
2412	17.30	2.00	19.30	30.00	-10.70
2437	17.49	2.00	19.49	30.00	-10.51
2462	17.56	2.00	19.56	30.00	-10.44

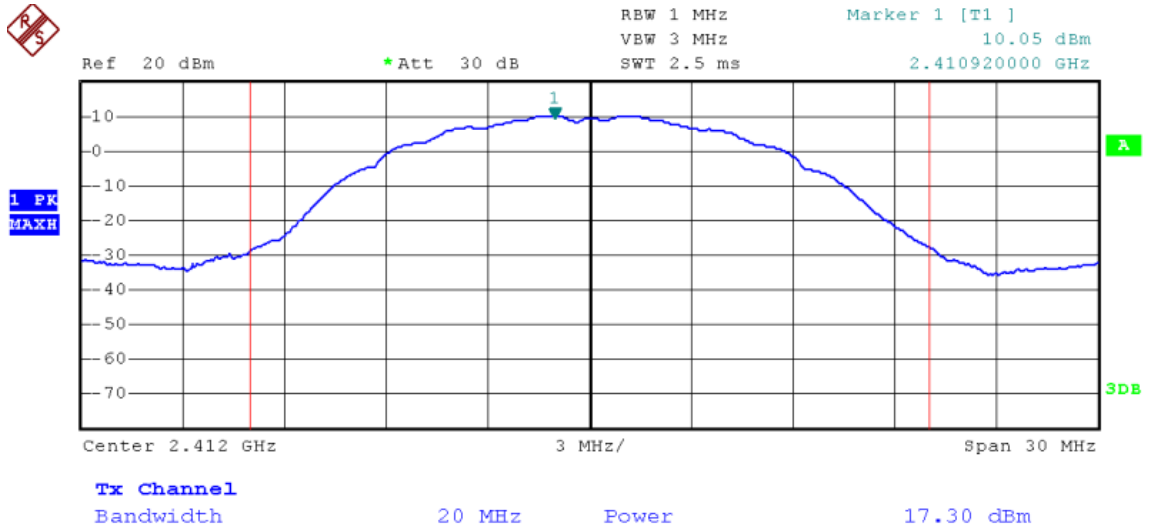
For 802.11g Mode:

Channel Frequency (MHz)	Peak Output Power(dBm)	Cable Loss (dB)	Power Level (dBm)	Limit	Margin
2412	21.28	2.00	23.28	30.00	-6.72
2437	21.28	2.00	23.28	30.00	-6.72
2462	21.15	2.00	23.15	30.00	-6.85

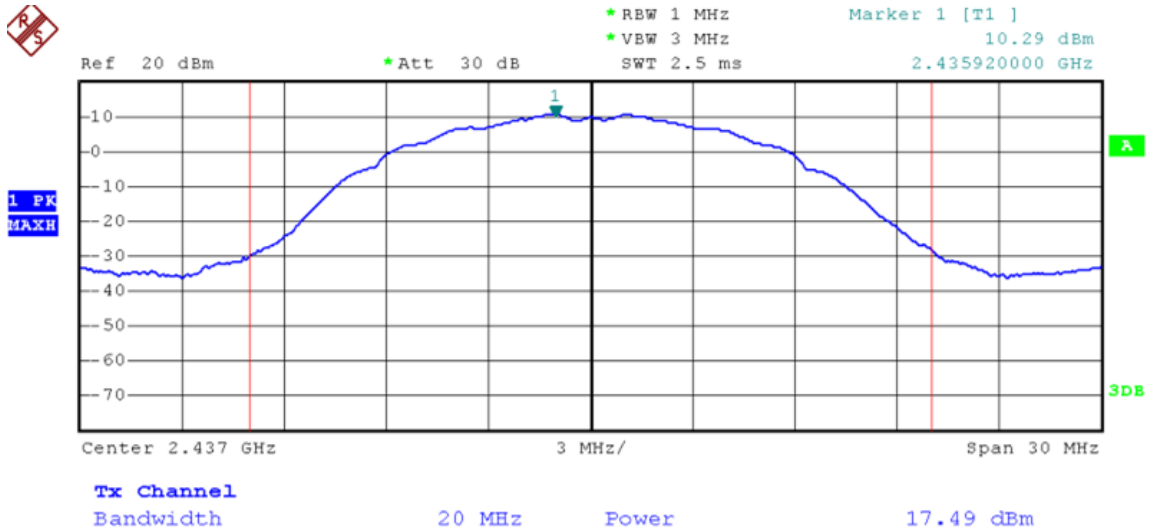
For 802.11n HT20 Mode:

Channel Frequency (MHz)	Peak Output Power(dBm)	Cable Loss (dB)	Power Level (dBm)	Limit	Margin
2412	19.98	2.00	21.98	30.00	-8.02
2437	20.15	2.00	22.15	30.00	-7.85
2462	20.07	2.00	22.07	30.00	-7.93

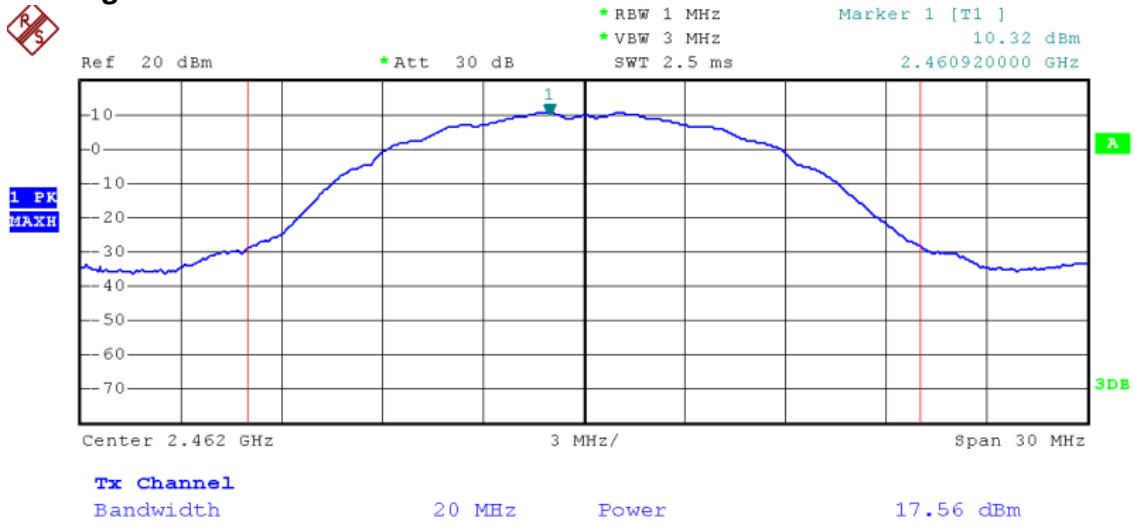
**For 802.11b Mode:
Lowest Channel: 2412MHz**



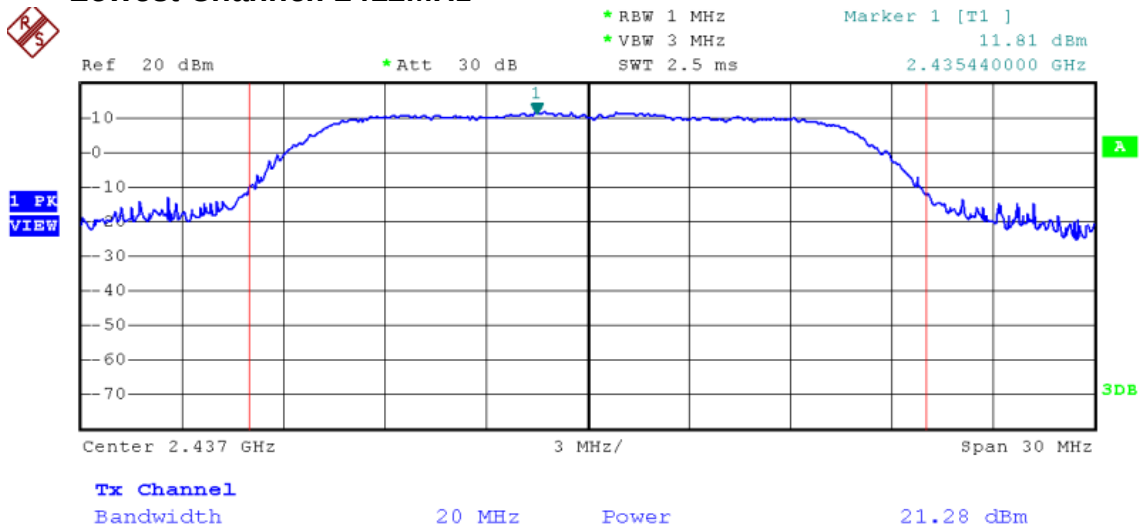
Mid Channel: 2437MHz



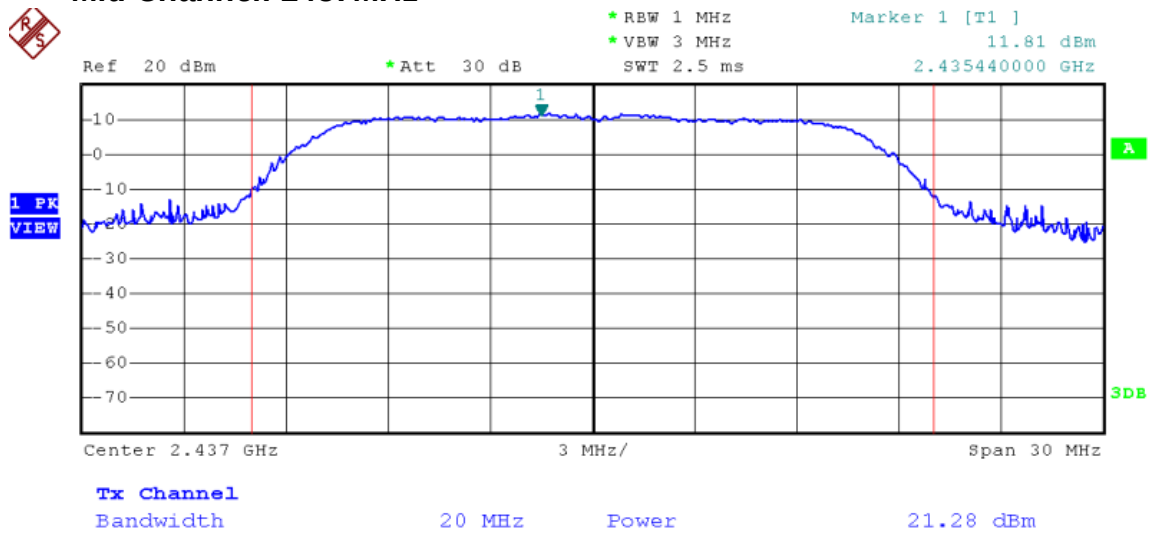
Highest Channel: 2462MHz



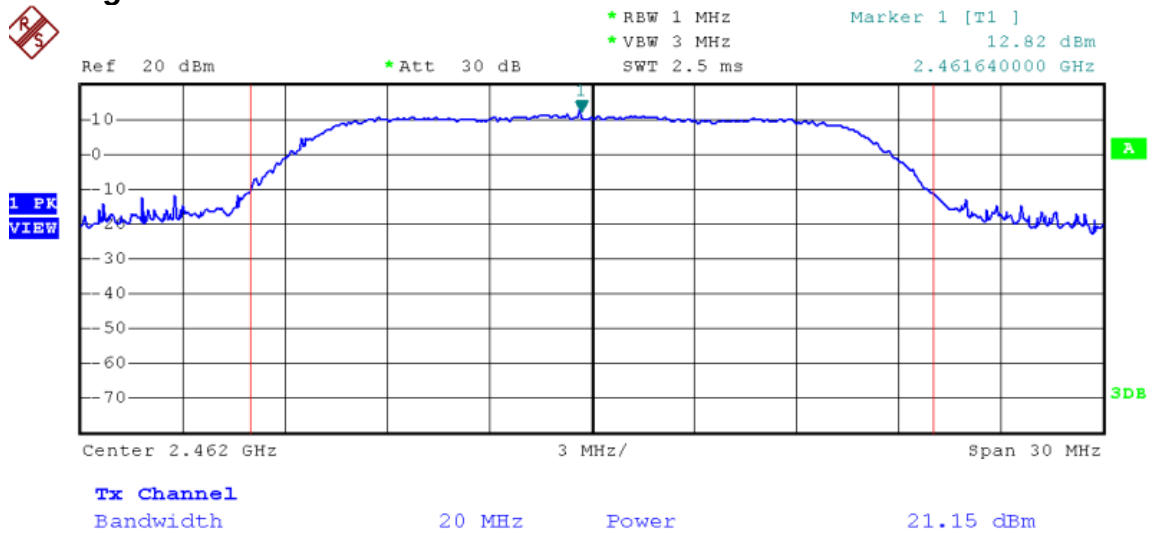
For 802.11g Mode: Lowest Channel: 2412MHz



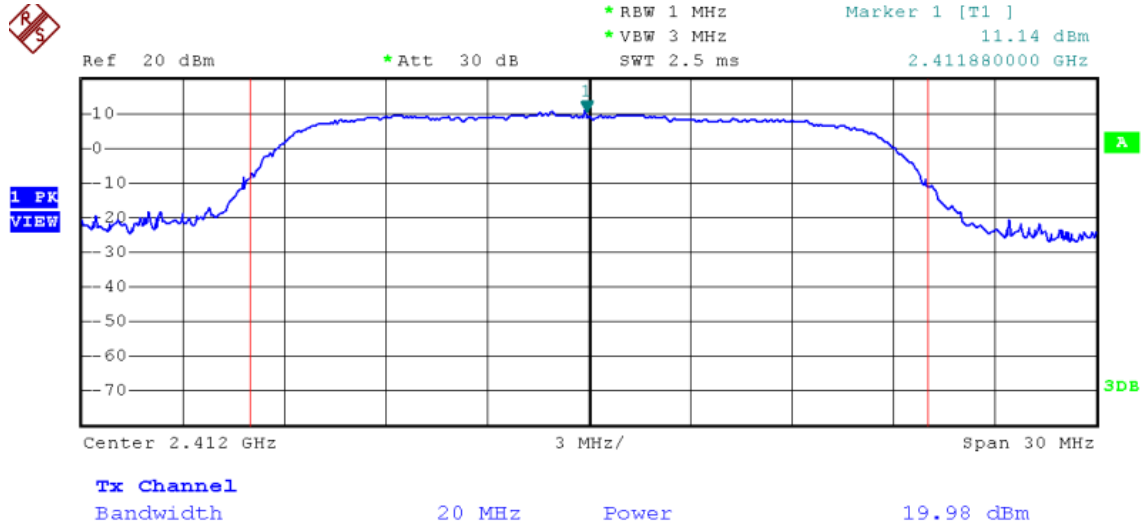
Mid Channel: 2437MHz



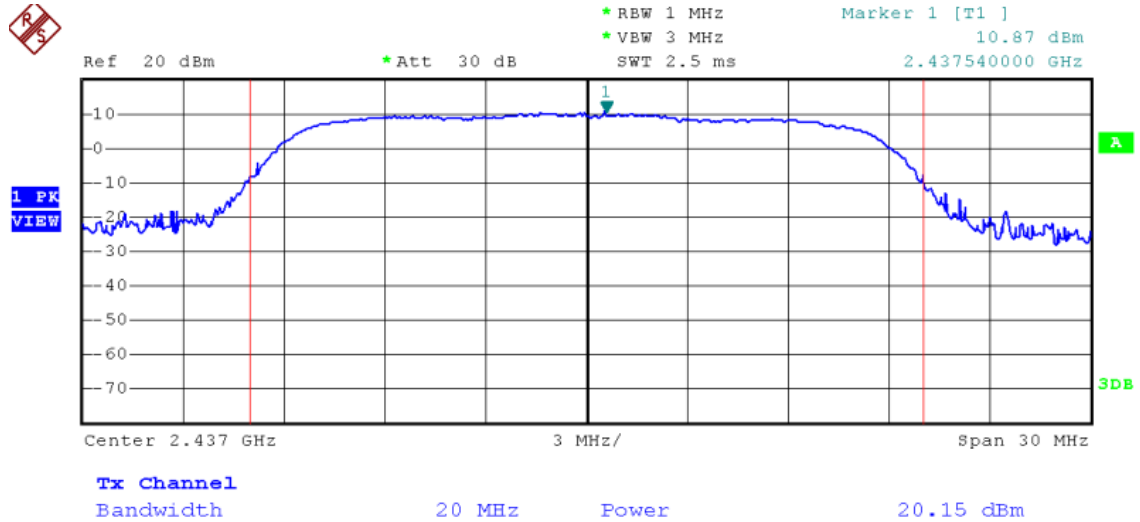
Highest Channel: 2462MHz



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

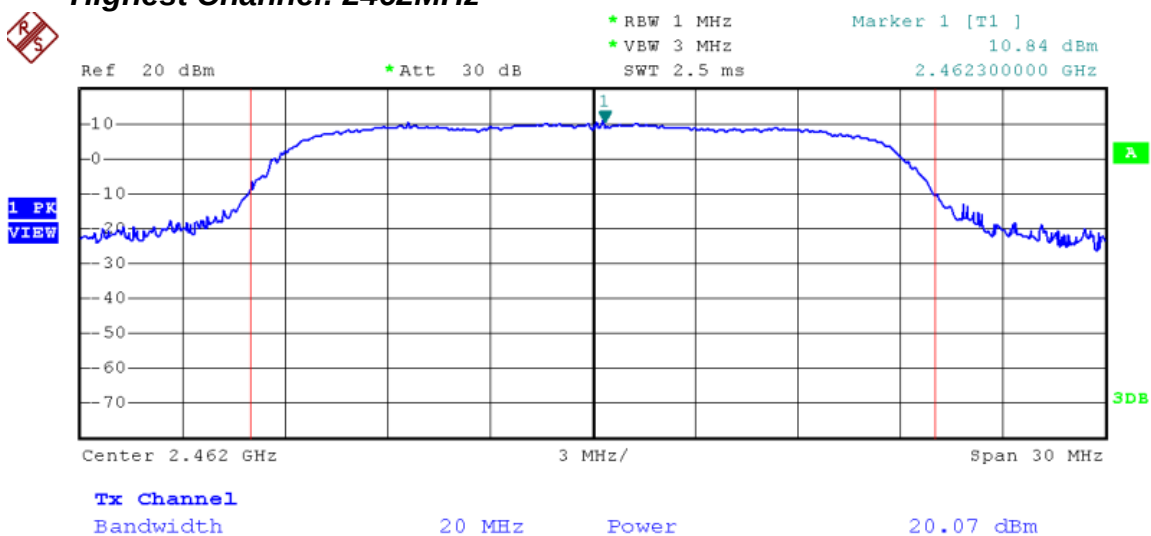


Mid Channel: 2437MHz





Highest Channel: 2462MHz

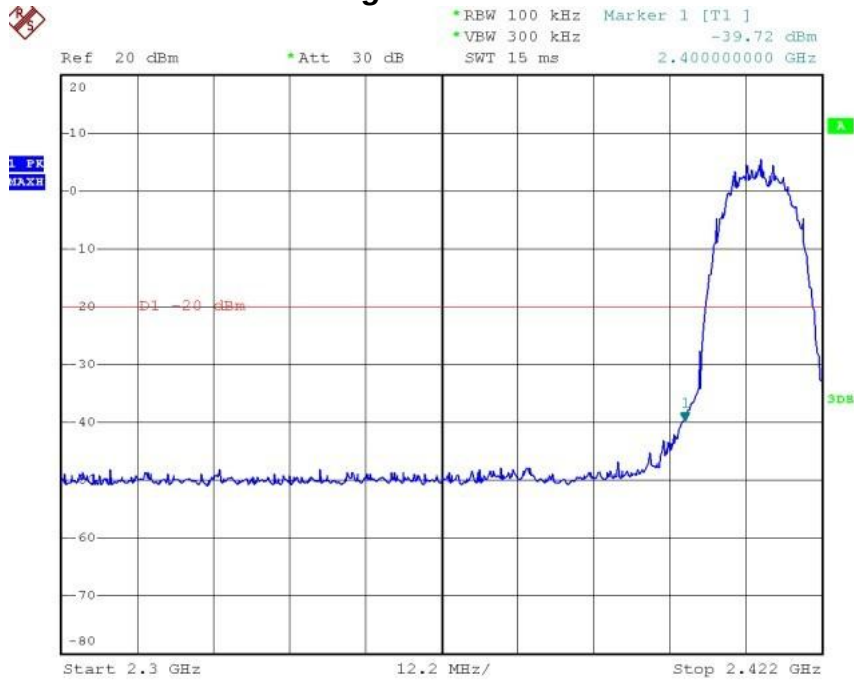


ATTACHMENT 6 – BAND EDGES TEST

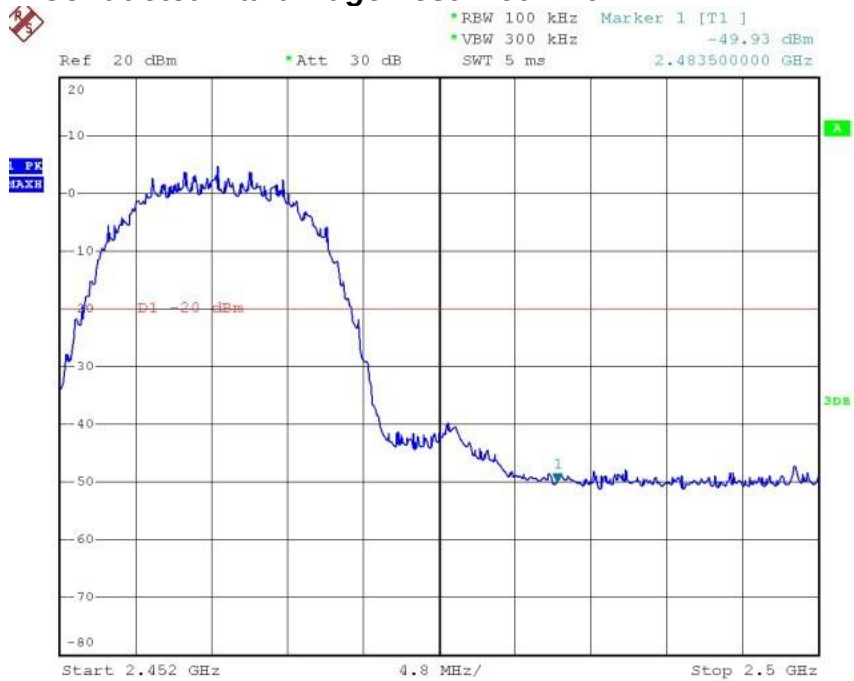
CLIENT:	GRANDSTREAM NETWORKS,INC.	TEST STANDERD:	Section 15.247(d)								
MODEL NUMBERS:	GXV3240	PRODUCT:	IP Multimedia Phone								
EUT MODEL:	GXV3240	EUT DESIGNATION:	Digital Transmission Device								
TEMPERATURE:	23°C	HUMIDITY:	47%RH								
ATM PRESSURE:	101.0kPa	GROUNDING:	None								
TESTED BY:	Daomen	DATE OF TEST:	March 14 ,2014								
TEST REFERENCE:	ANSI C63.4:2003 and 558074 D01										
TEST PROCEDURE:	Requirement: 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the Highest test level of the desired power, based on either an RF conducted or a radiated measurement. Test Procedures: The EUT was set -up as ANSI C63.4-2003, tested to DTS test procedure of 558074 D01 for compliance to FCC 47CFR 15.247 requirements.										
DESCRIPTIONS OF TEST MODE:	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). Following channels were chosen for the final test as listed below: 802.11b mode with data rate of 1Mbps, 802.11g mode with data rate of 6Mbps,802.11n HT20 mode with data rate of 6.5Mbps.										
EQUIPMENT SETUP	<i>Spectrum analyzer shall be set as below:</i> <table><tr><td>Equipment Mode</td><td>Spectrum Analyzer</td></tr><tr><td>Detector Function</td><td>Peak Mode</td></tr><tr><td>RBW</td><td>100KHz</td></tr><tr><td>VBW</td><td>300KHz</td></tr></table>			Equipment Mode	Spectrum Analyzer	Detector Function	Peak Mode	RBW	100KHz	VBW	300KHz
Equipment Mode	Spectrum Analyzer										
Detector Function	Peak Mode										
RBW	100KHz										
VBW	300KHz										
TEST VOLTAGE:	120VAC/60Hz										
RESULTS:	The EUT meet the requirements of test reference for band edges.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.										

For 802.11b Mode:

Conducted Band Edge Test Plot: 2412MHz

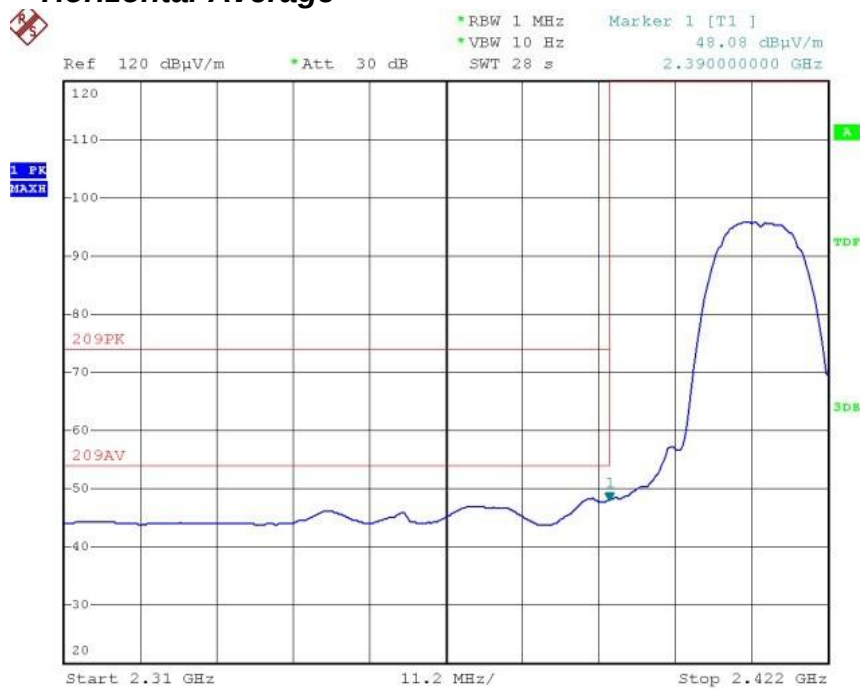


Conducted Band Edge Test Plot: 2462MHz

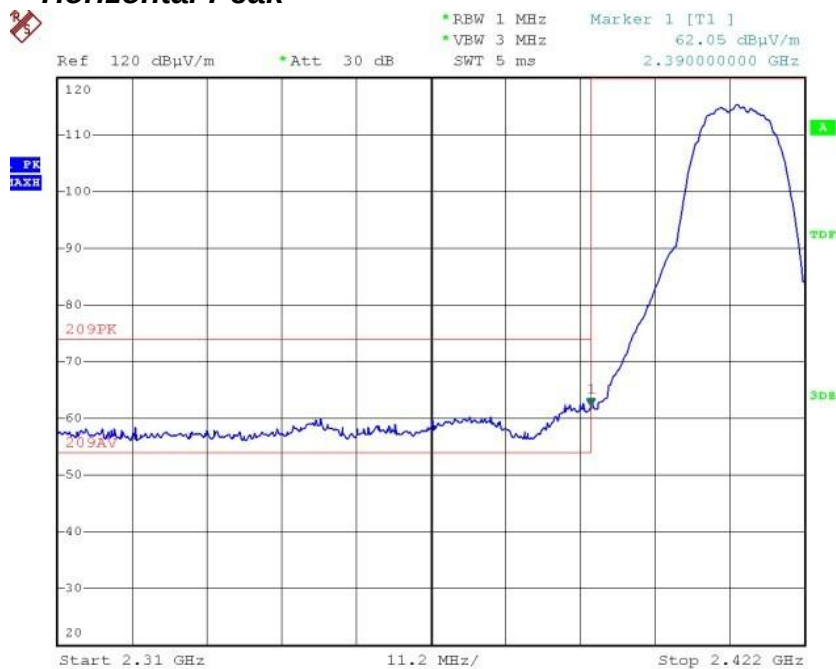


Radiated Band Edge Test Plot: 2412MHz

Horizontal-Average



Horizontal-Peak



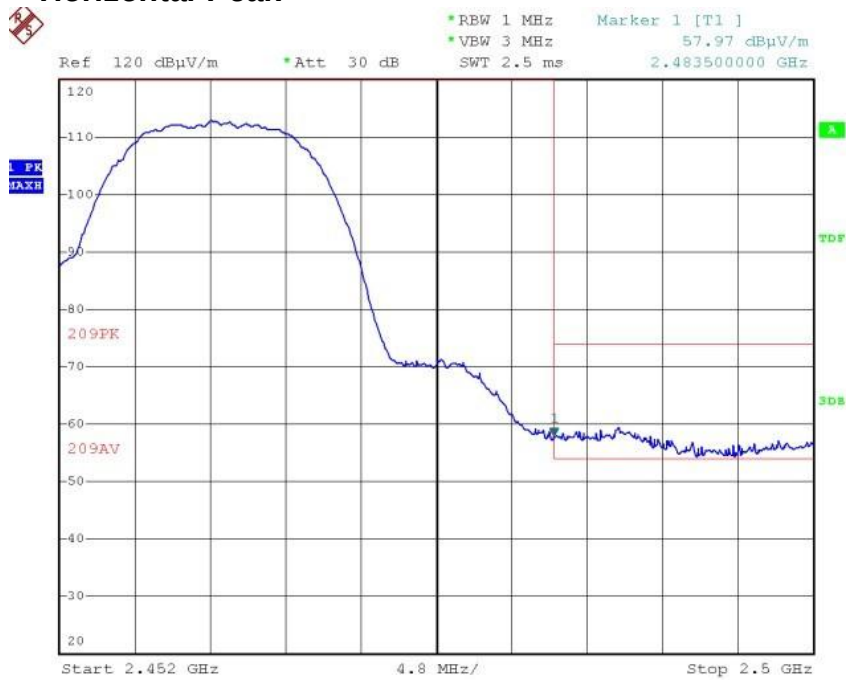


Radiated Band Edge Test Plot: 2462MHz

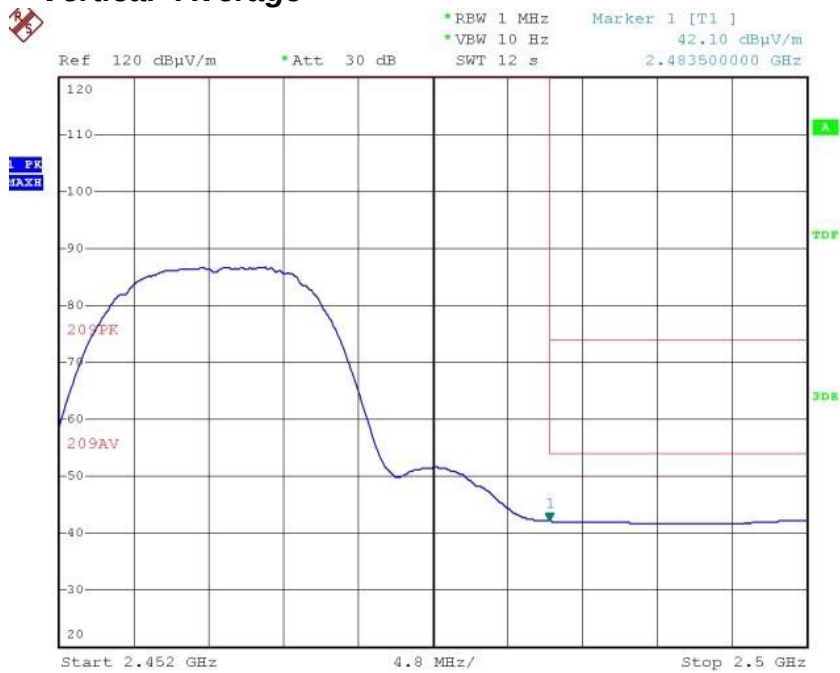
Horizontal-Average



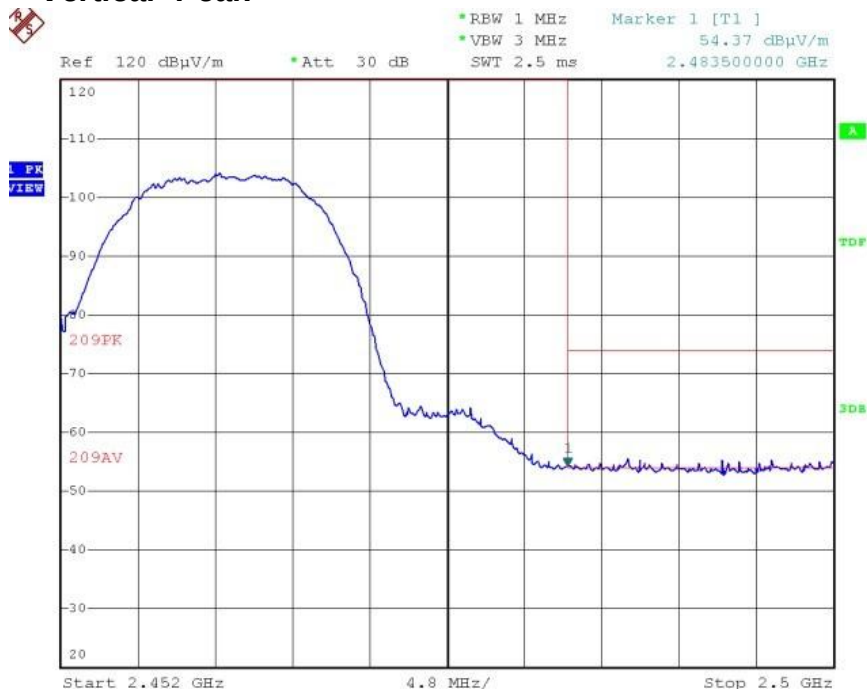
Horizontal-Peak



Vertical- Average

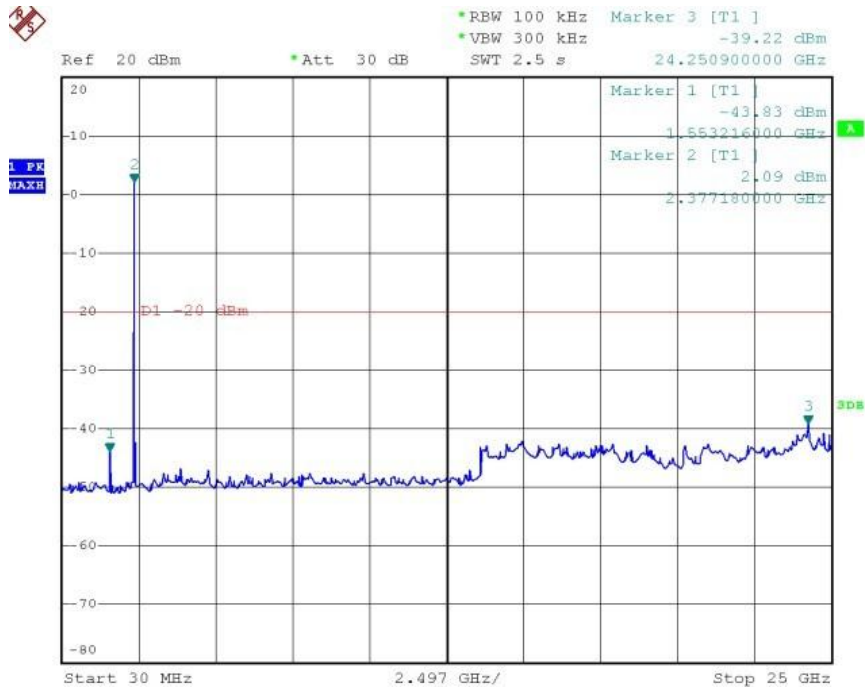


Vertical- Peak

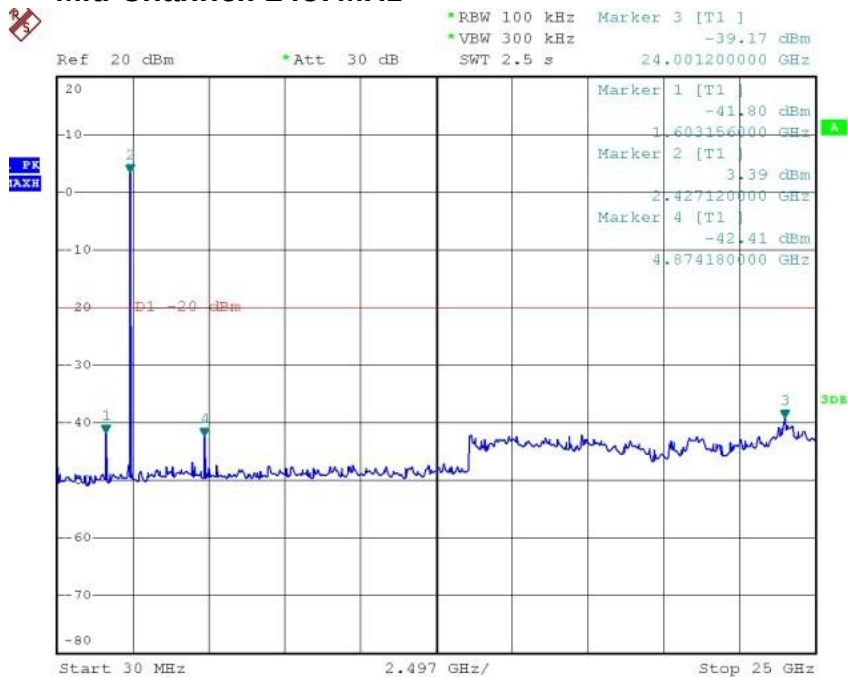


Conducted Spurious Emission Test Plot

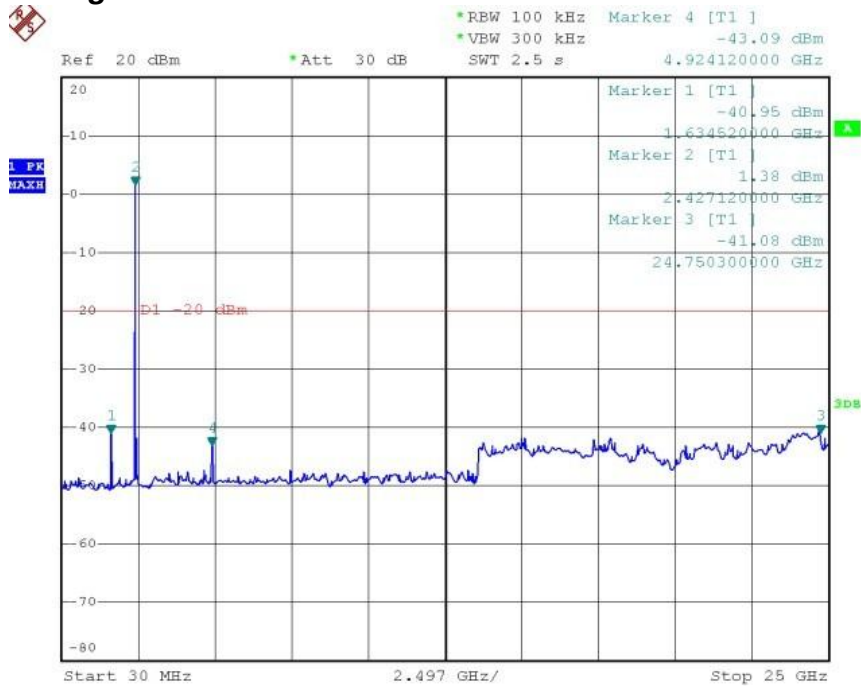
Lowest Channel: 2412MHz



Mid Channel: 2437MHz

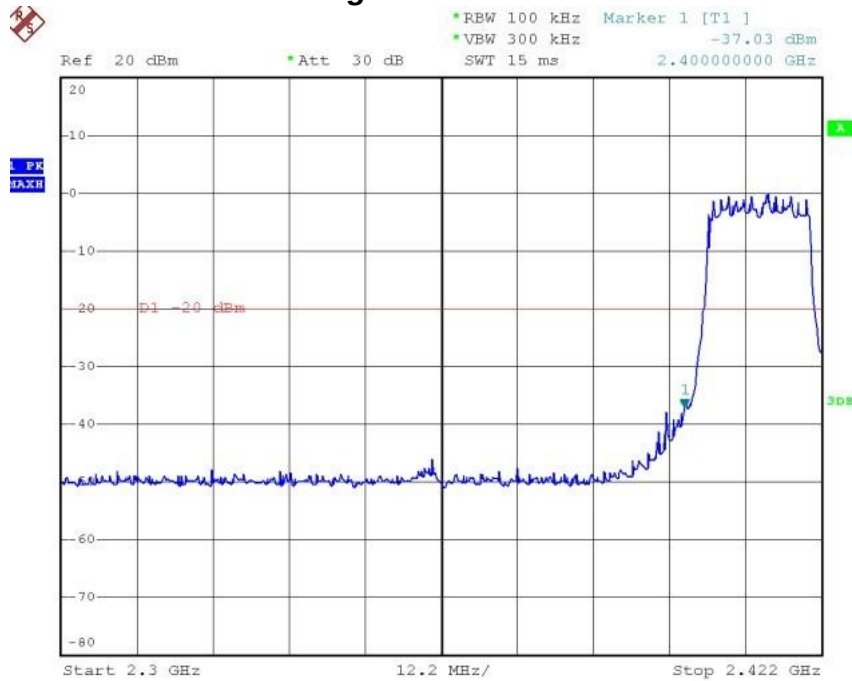


Highest Channel: 2462MHz

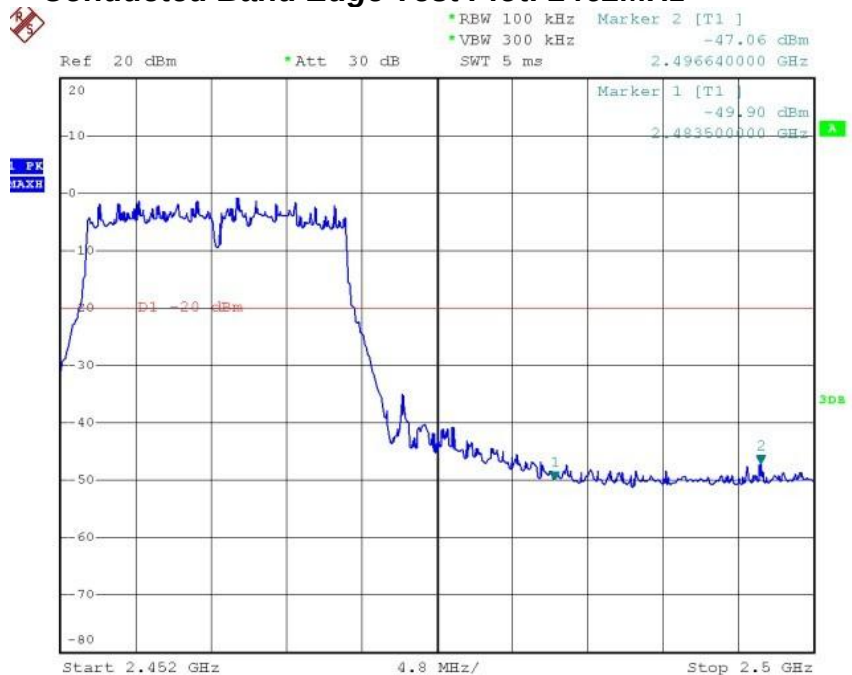


For 802.11g Mode:

Conducted Band Edge Test Plot: 2412MHz

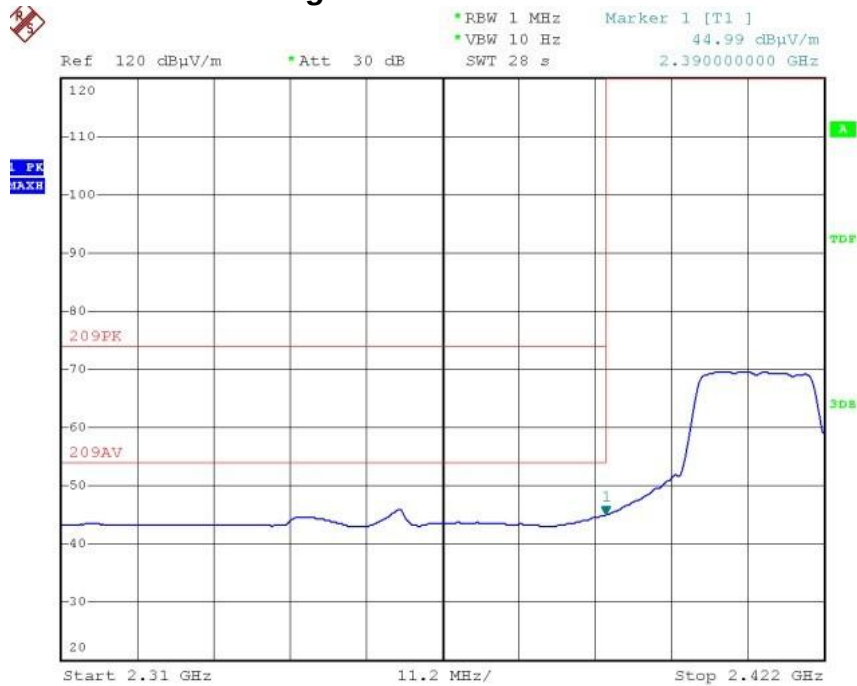


Conducted Band Edge Test Plot: 2462MHz

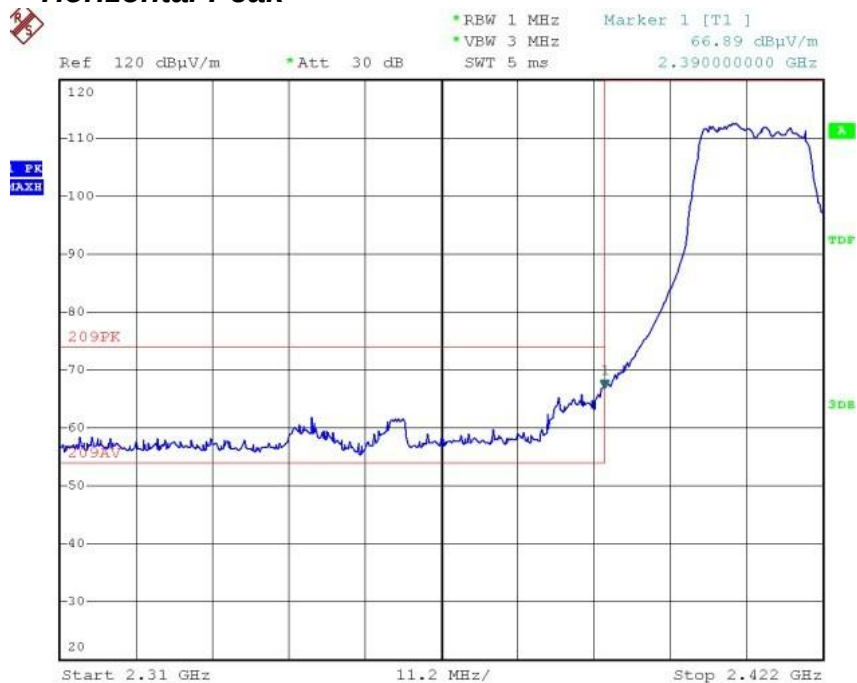


Radiated Band Edge Test Plot: 2412MHz

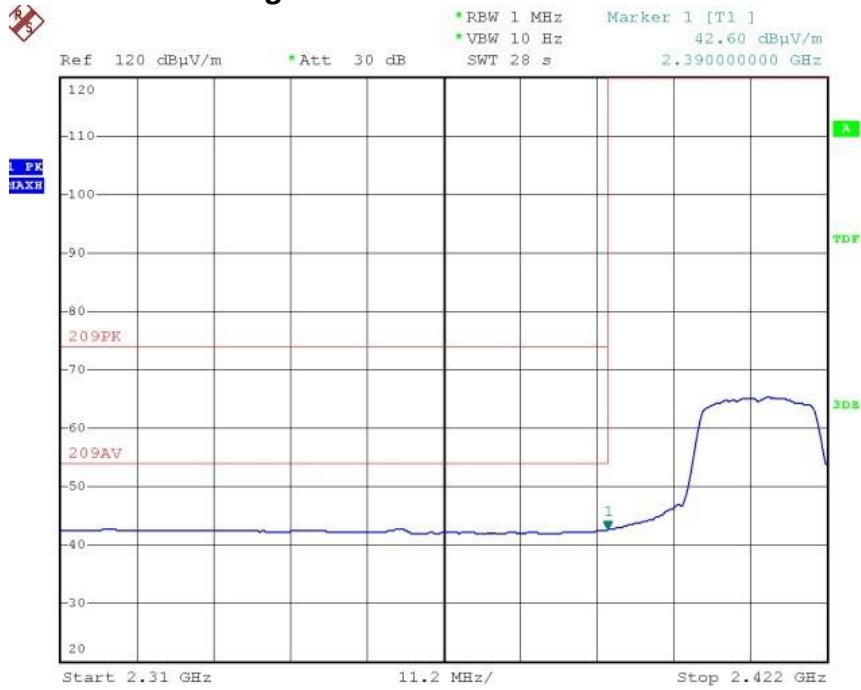
Horizontal- Average



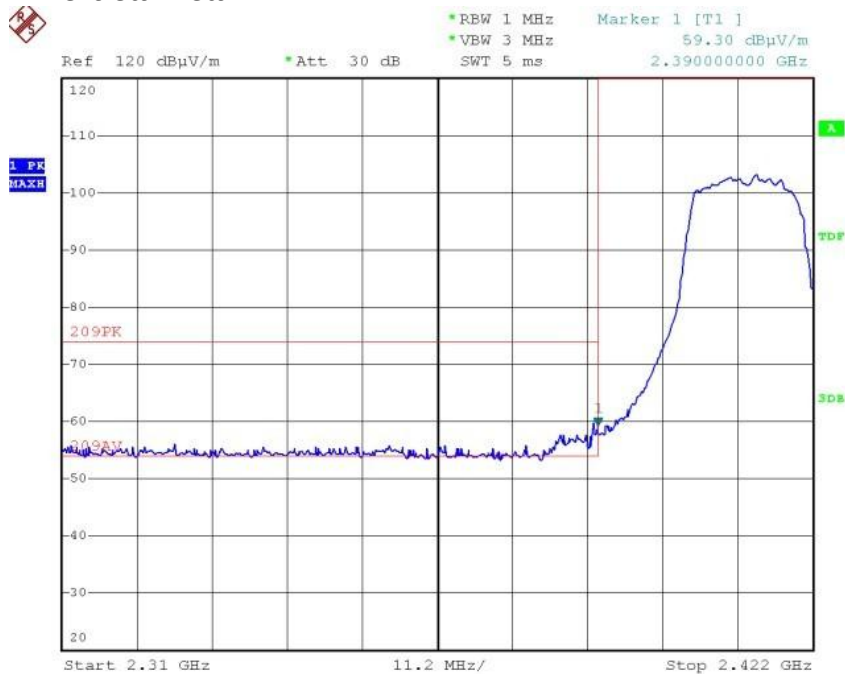
Horizontal-Peak



Vertical- Average



Vertical-Peak

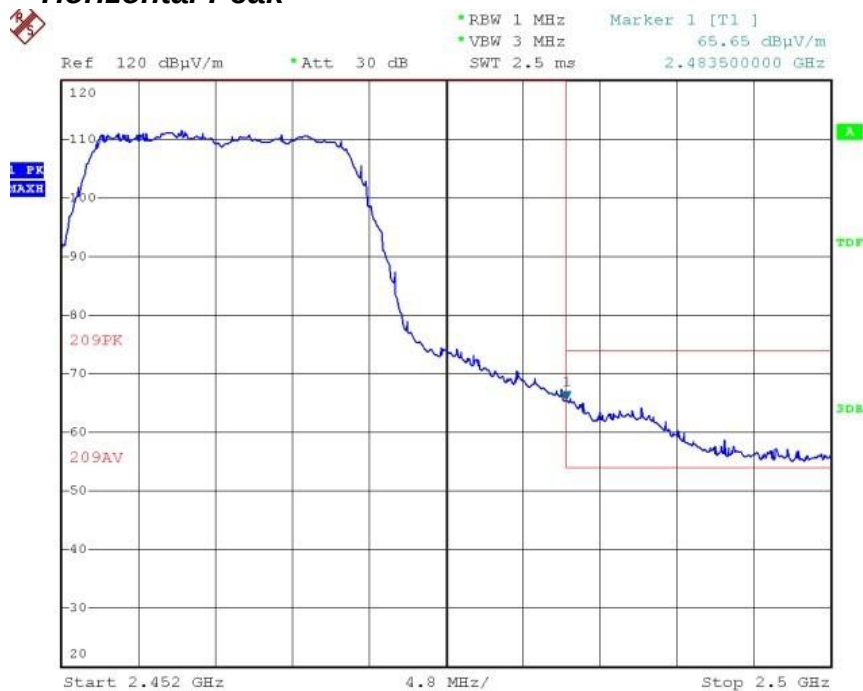


Radiated Band Edge Test Plot: 2462MHz

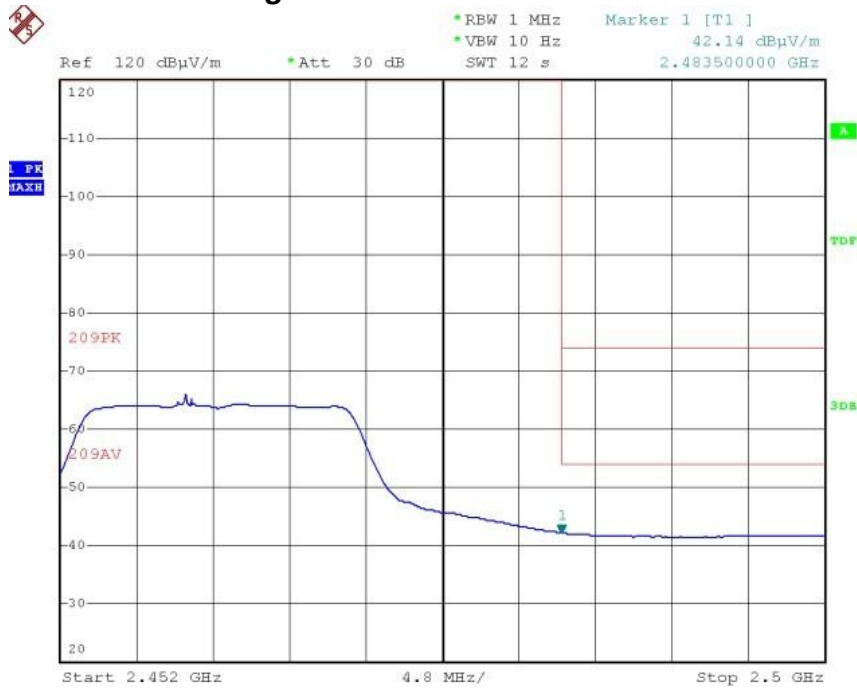
Horizontal- Average



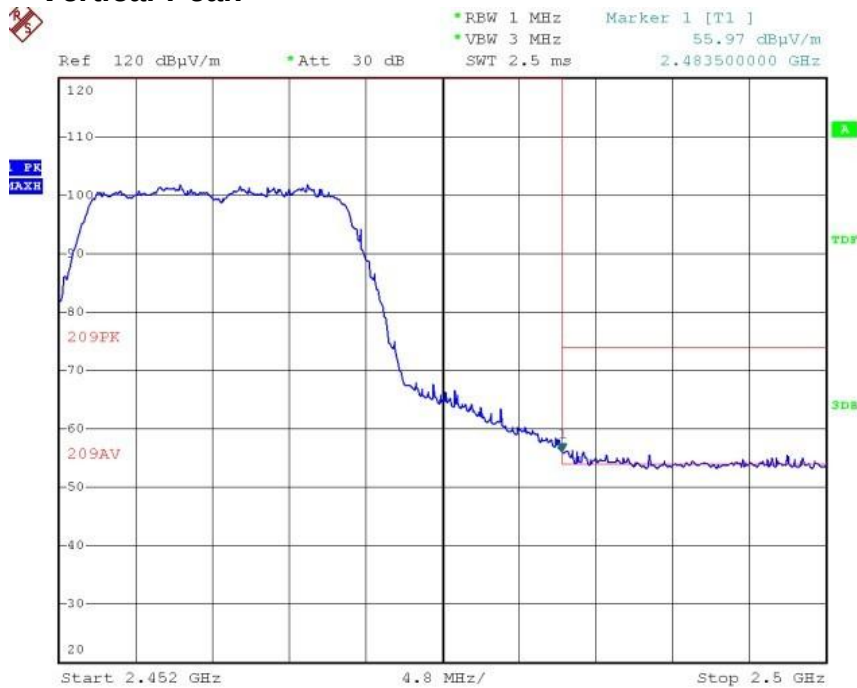
Horizontal-Peak



Vertical- Average

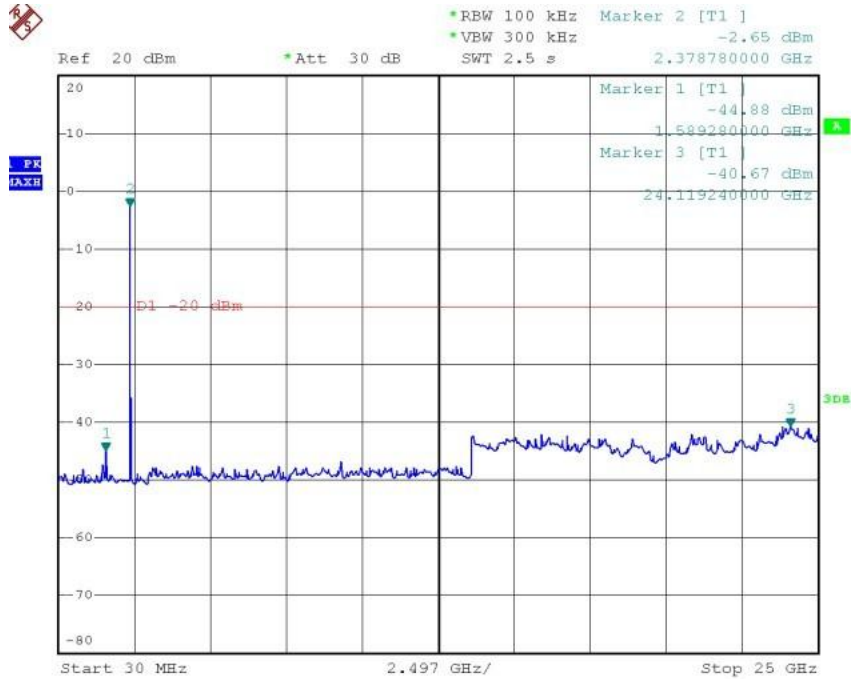


Vertical-Peak

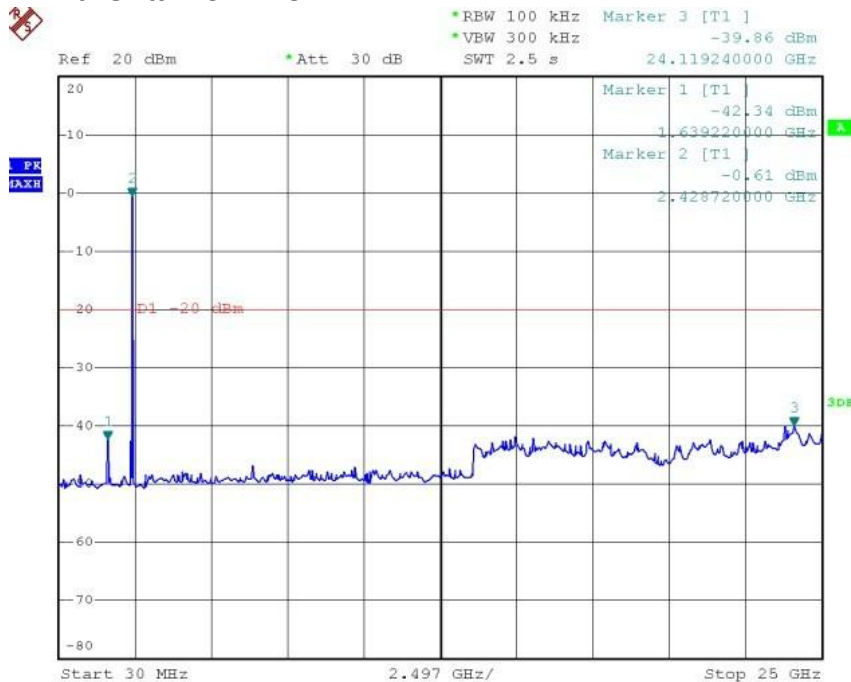


Conducted Spurious Emission Test Plot

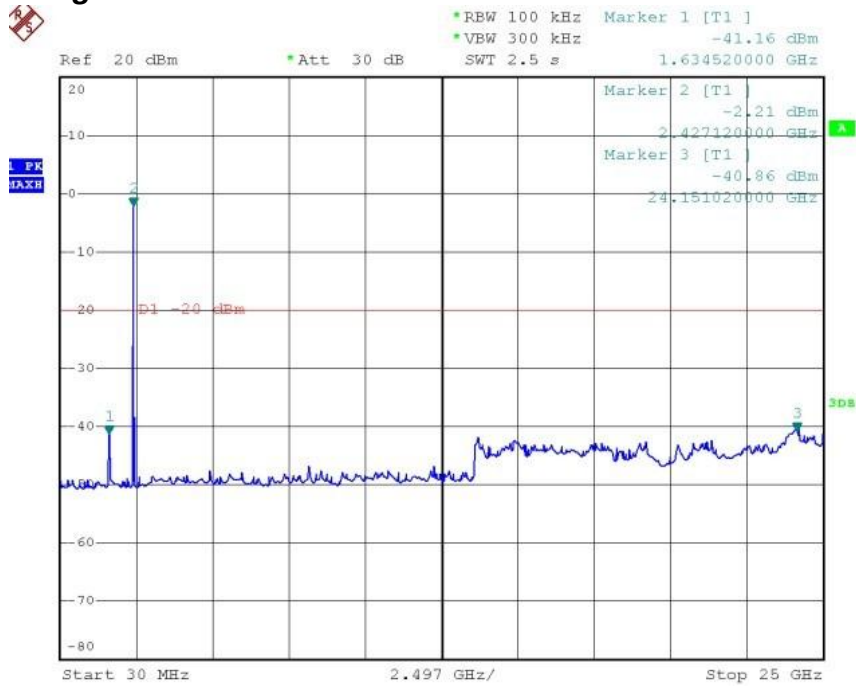
Lowest Channel: 2412MHz



Mid Channel: 2437MHz

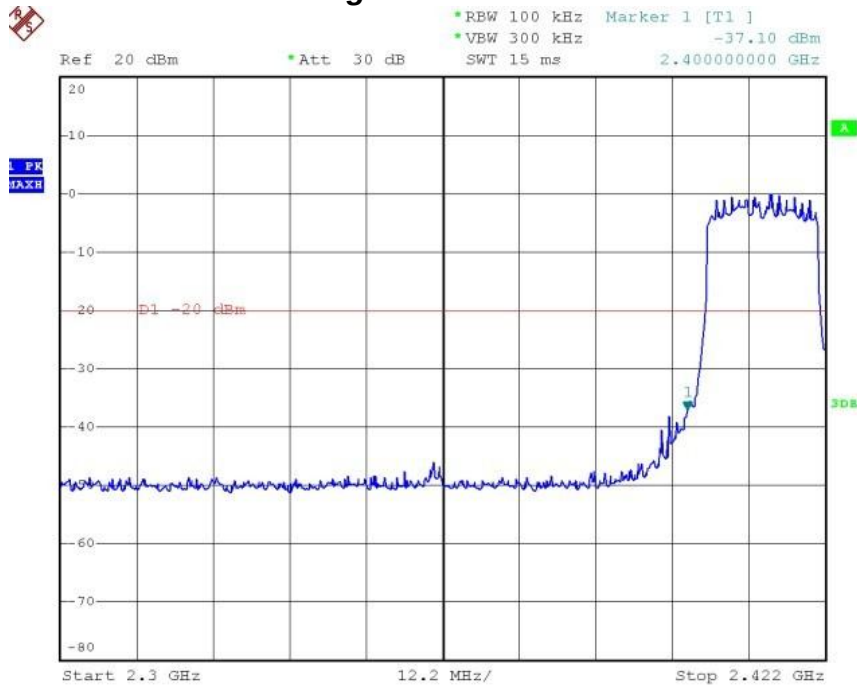


Highest Channel: 2462MHz

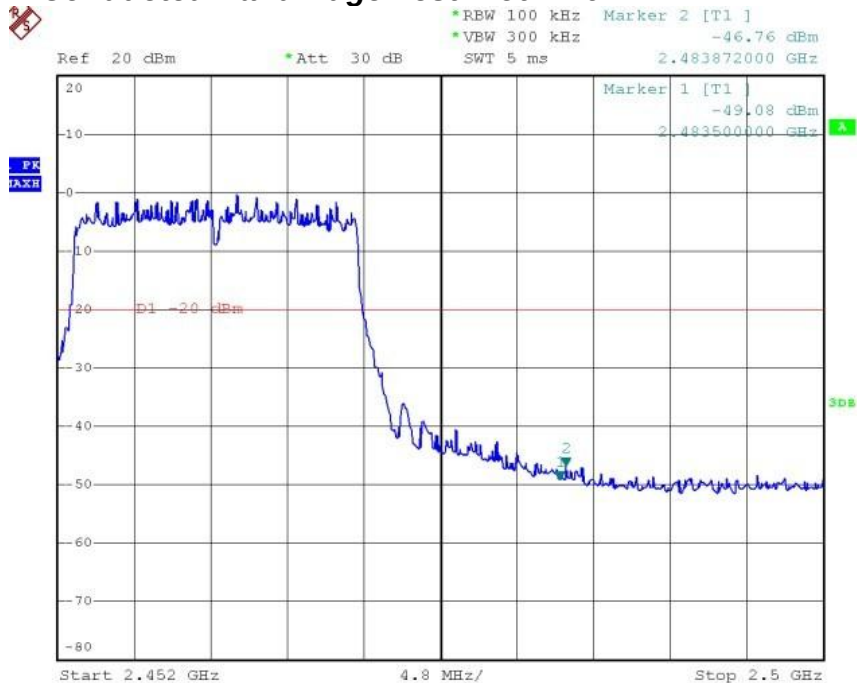


For 802.11n HT20 Mode:

Conducted Band Edge Test Plot: 2412MHz

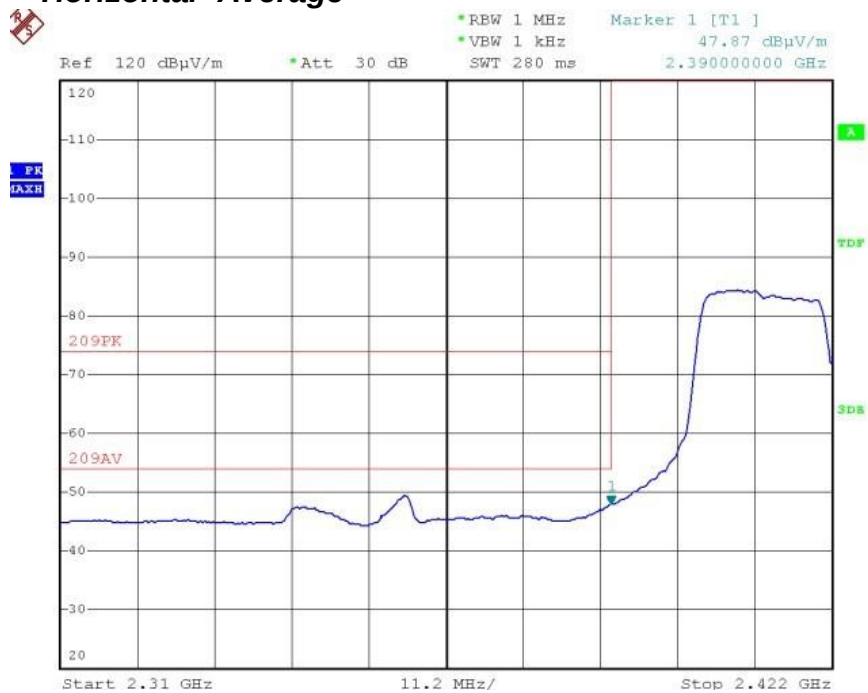


Conducted Band Edge Test Plot: 2462MHz

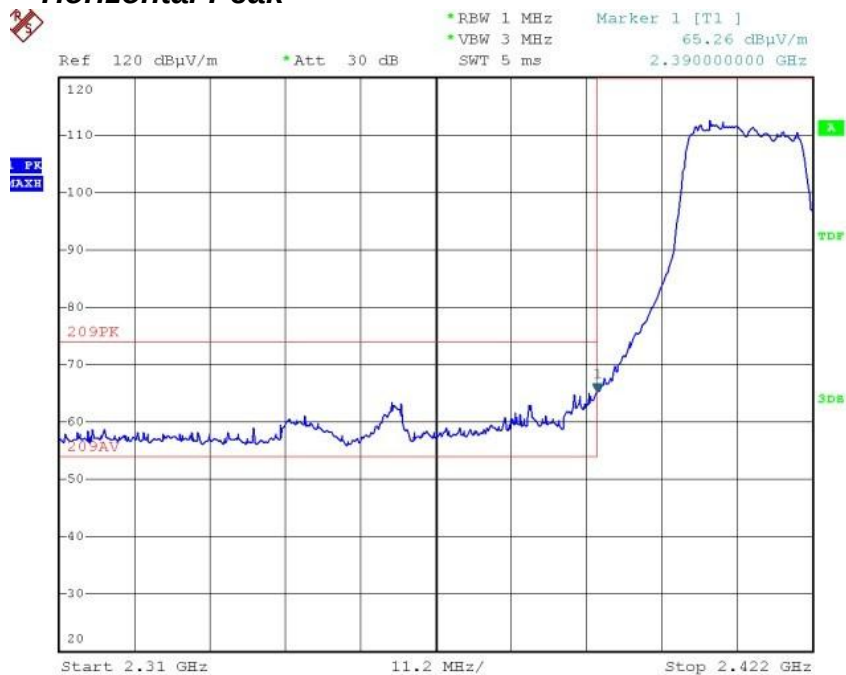


Radiated Band Edge Test Plot: 2412MHz

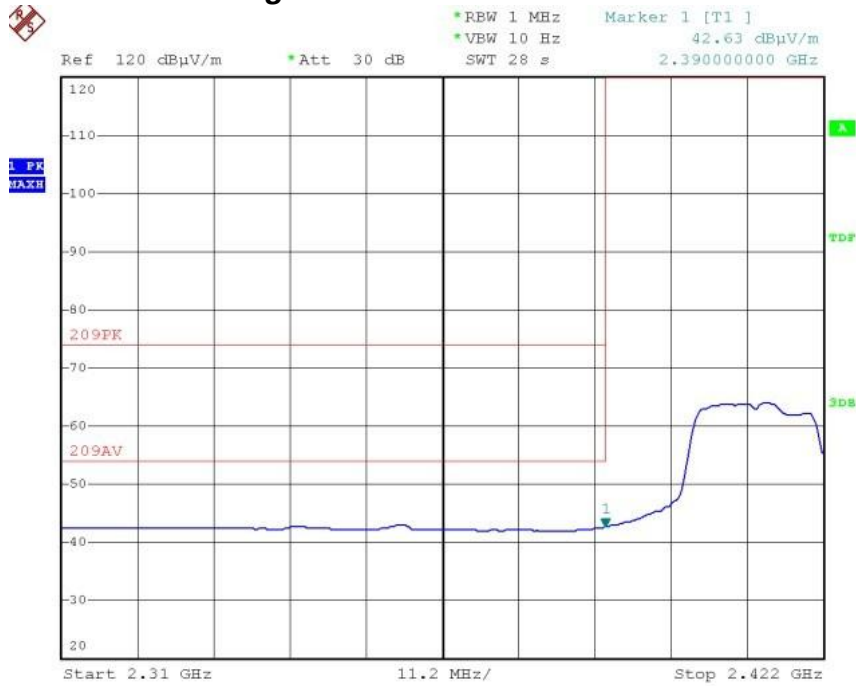
Horizontal- Average



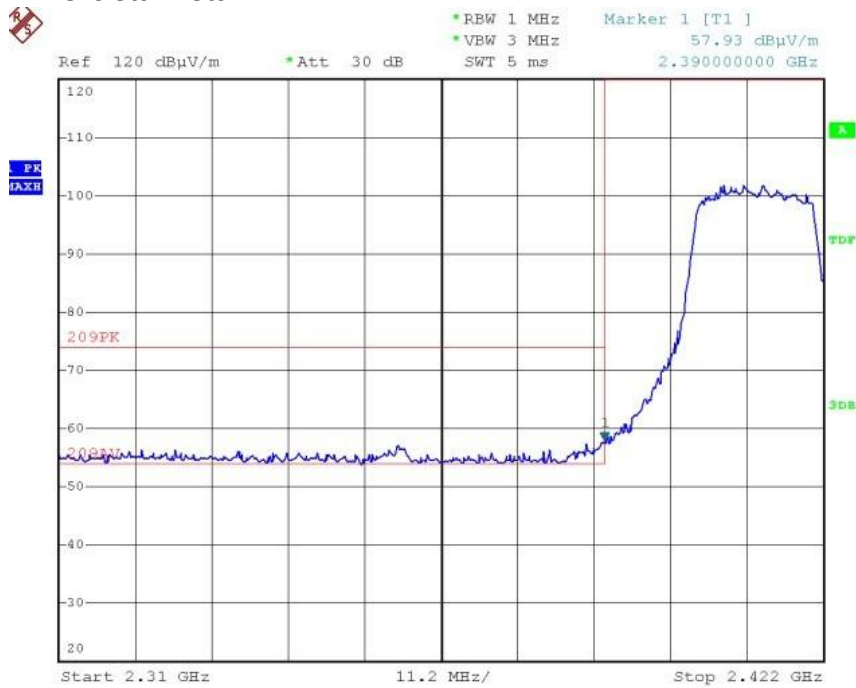
Horizontal-Peak



Vertical- Average

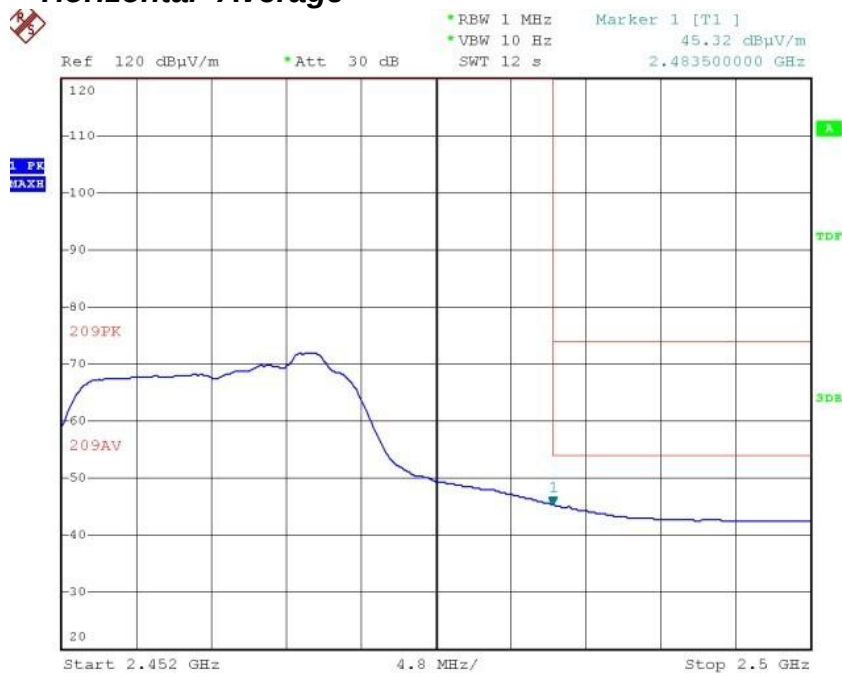


Vertical-Peak

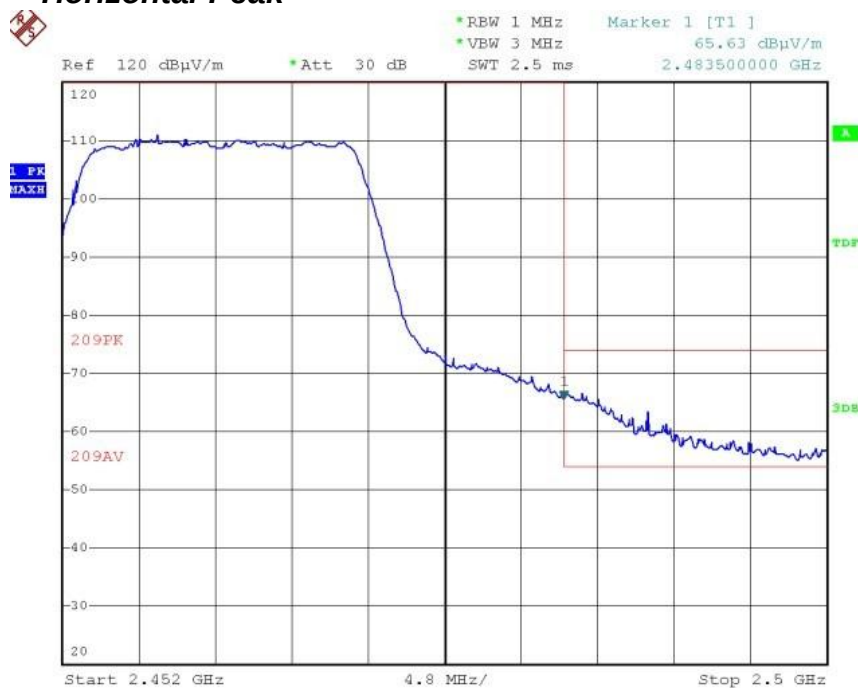


Radiated Band Edge Test Plot: 2462MHz

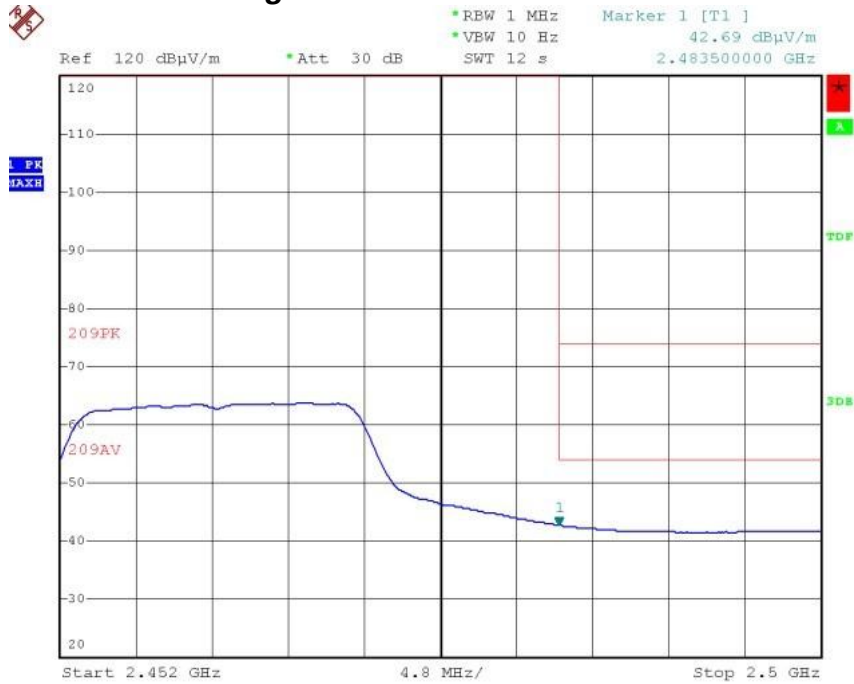
Horizontal- Average



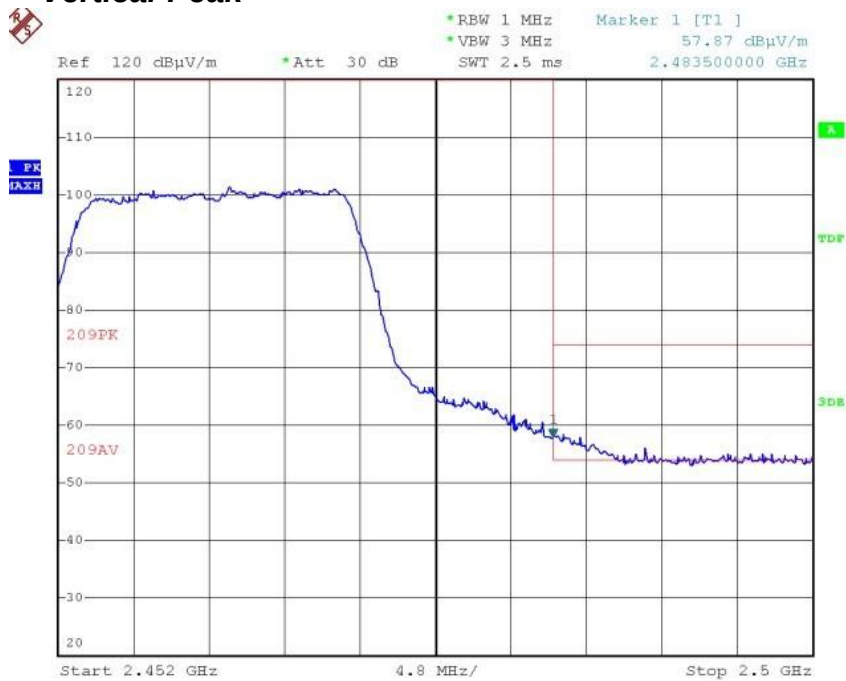
Horizontal-Peak



Vertical- Average

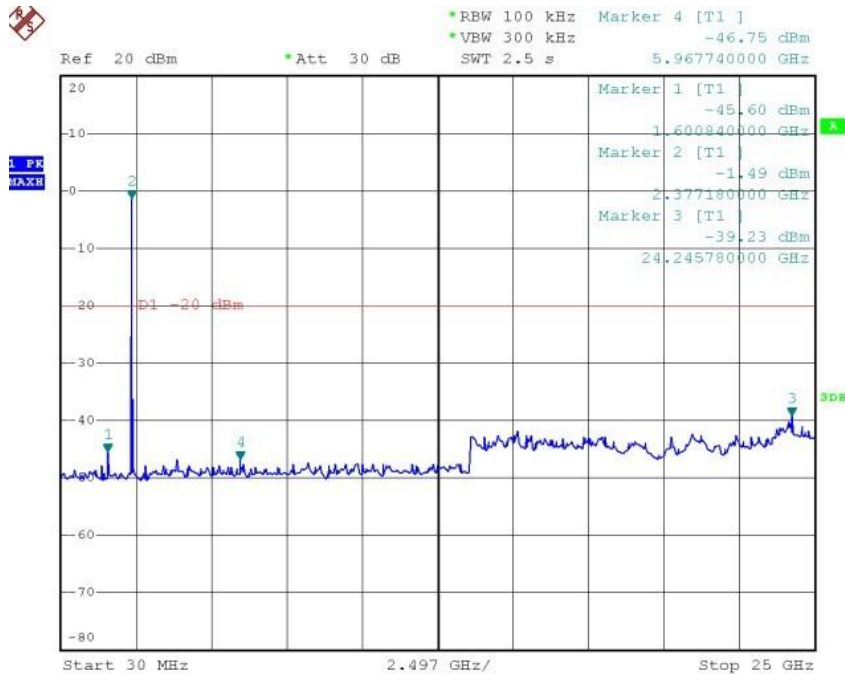


Vertical-Peak

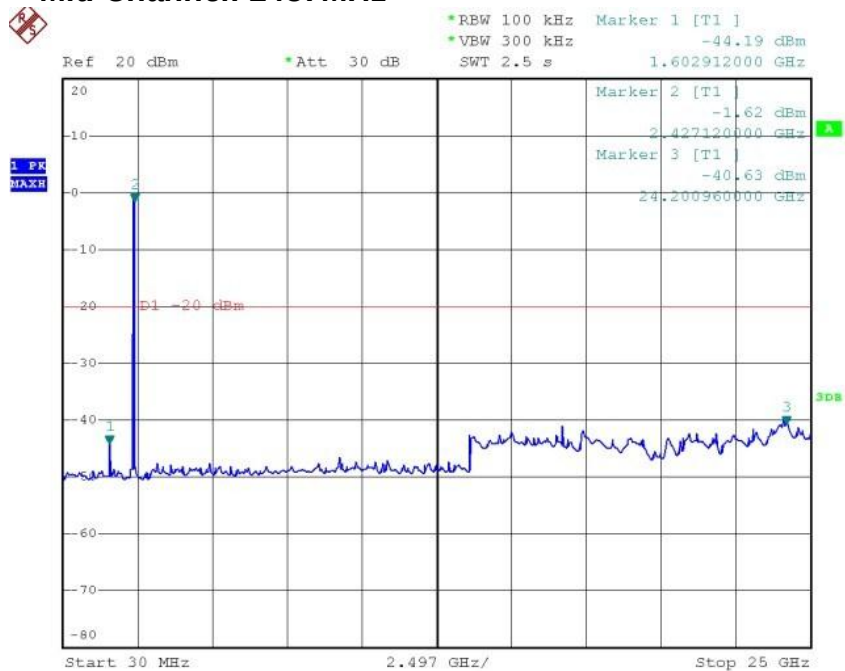


Conducted Spurious Emission Test Plot

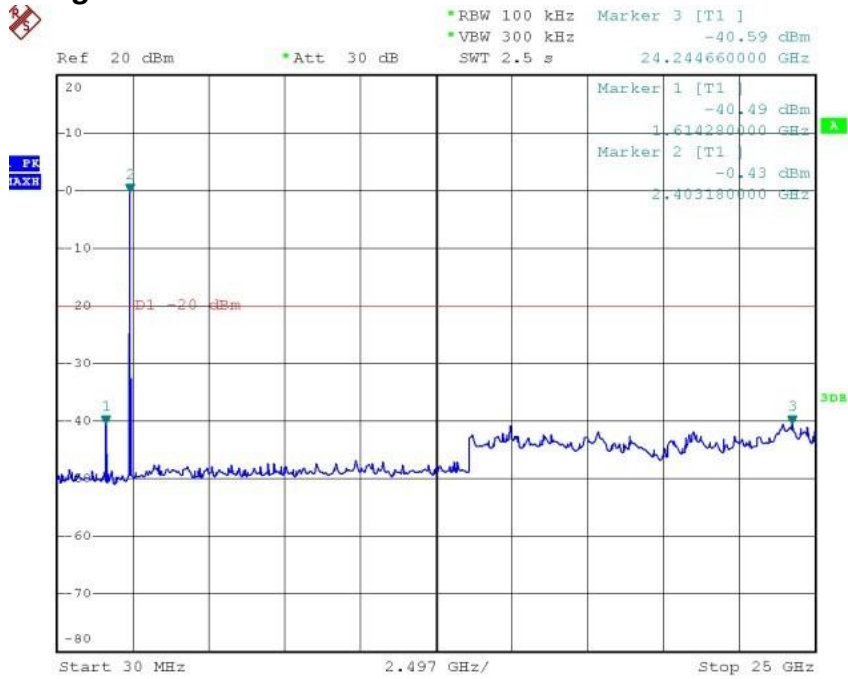
Lowest Channel: 2412MHz



Mid Channel: 2437MHz



Highest Channel: 2462MHz



ATTACHMENT 7 – PEAK POWER SPECTRAL DENSITY TEST

CLIENT:	GRANDSTREAM NETWORKS,INC.	TEST STANDERD:	Section 15.247(e)
MODEL NUMBERS:	GXV3240	PRODUCT:	IP Multimedia Phone
EUT MODEL:	GXV3240	EUT DESIGNATION:	Digital Transmission Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Daomen	DATE OF TEST:	March 16 th , 2014
TEST REFERENCE:	ANSI C63.4:2003 and KDB Publication No. 558074 D01 for DSSS.		
TEST PROCEDURE:	Regulation 15.247(e) for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.The EUT was set transmitting continuously and force selection of output power level and channel number. We'd observed that the peak levels aren't greater than +8dBm limit. The EUT was set up as ANSI C63.4: 2003, tested to DTS test procedure of 558074 D01 for compliance to FCC 47CFR 15.247 requirements.		
DESCRIPTIONS OF TEST MODE:	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). FoLowesting channels were selected for the final test as listed beLowest: 802.11b mode with data rate of 1mbps, 802.11g mode with data rate of 6mbps,802.11n ht20 mode with data rate of 6.5mbps .		
EQUIPMENT SETUP	Spectrum analyzer shall be set as beLowest:		
	Equipment Mode	Spectrum Analyzer	
	Detector Function	Peak	
	RBW	3KHz	
	VBW	10KHz	
	Span	300KHz	
	Sweep Time	100S	
TEST VOLTAGE:	120VAC/60Hz		
RESULTS:	The EUT meet the requirements of test reference for power spectral density.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. ± 2x10 ⁻⁷ x Center Freq., Amp ± 2.6 dB.		

Test Data:
For 802.11b Mode:

Channel Frequency (MHz)	Power Spectral Density (dBm)	BWCF (db)	Cable Loss (dB)	Power Spectral Density Level (dBm)	Maximum Limit (dBm)	Margin (dB)
2412	-8.87	-15.2	2.0	-22.07	8.00	-14.07
2437	-7.87	-15.2	2.0	-21.07	8.00	-13.07
2462	-7.59	-15.2	2.0	-20.79	8.00	-12.79

For 802.11g Mode:

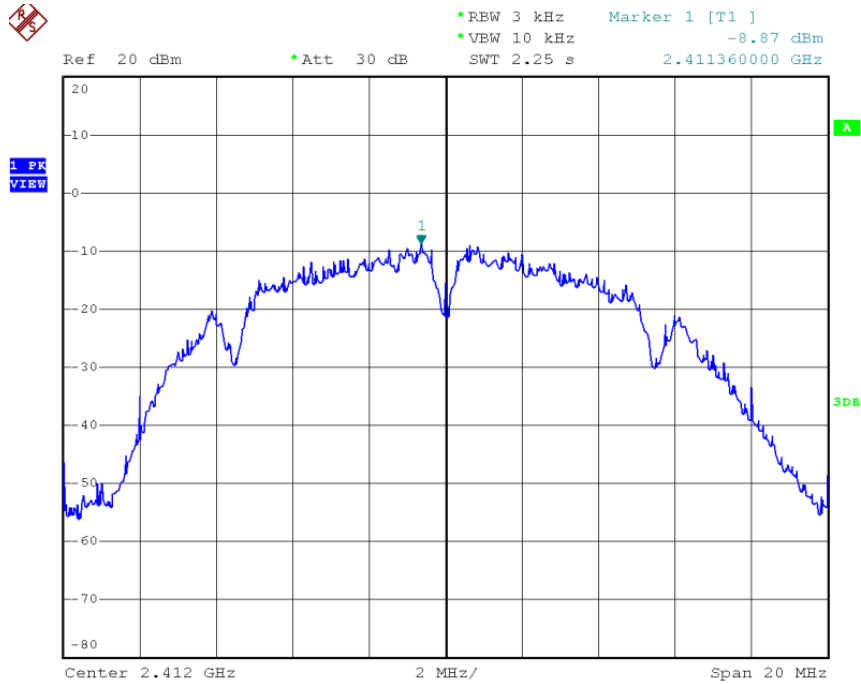
Channel Frequency (MHz)	Power Spectral Density (dBm)	BWCF (db)	Cable Loss (dB)	Power Spectral Density Level (dBm)	Maximum Limit (dBm)	Margin (dB)
2412	-11.31	-15.2	2.0	-24.51	8.00	-16.51
2437	-11.79	-15.2	2.0	-24.99	8.00	-16.99
2462	-11.57	-15.2	2.0	-24.77	8.00	-16.77

For 802.11n HT20 Mode:

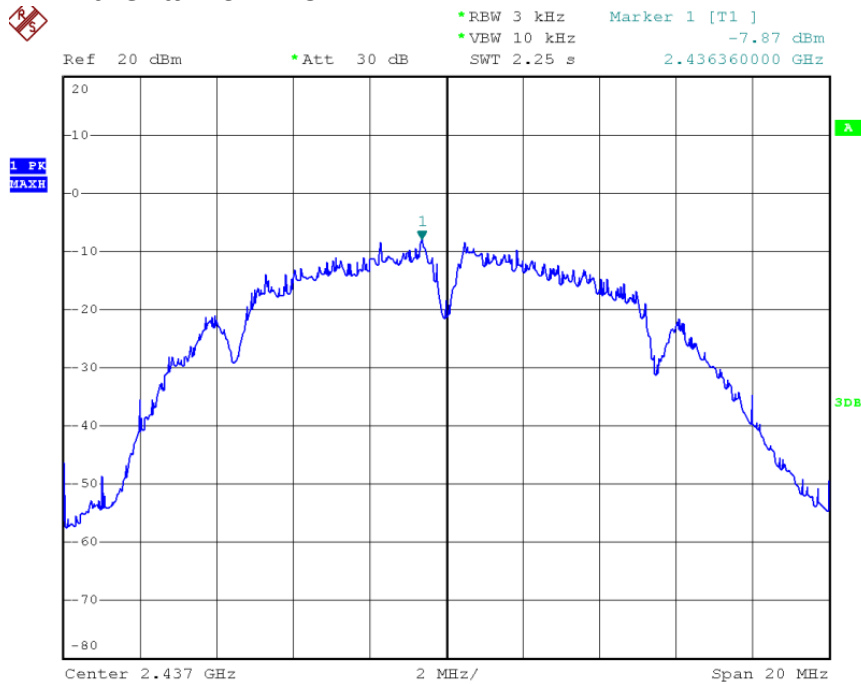
Channel Frequency (MHz)	Power Spectral Density (dBm)	BWCF (db)	Cable Loss (dB)	Power Spectral Density Level (dBm)	Maximum Limit (dBm)	Margin (dB)
2412	-12.62	-15.2	2.0	-25.82	8.00	-17.82
2437	-12.07	-15.2	2.0	-25.27	8.00	-17.27
2462	-12.07	-15.2	2.0	-25.27	8.00	-17.27

Note: BWCF = $10 \log (3 \text{ kHz}/100\text{kHz}) = -15.2 \text{ dB}$.

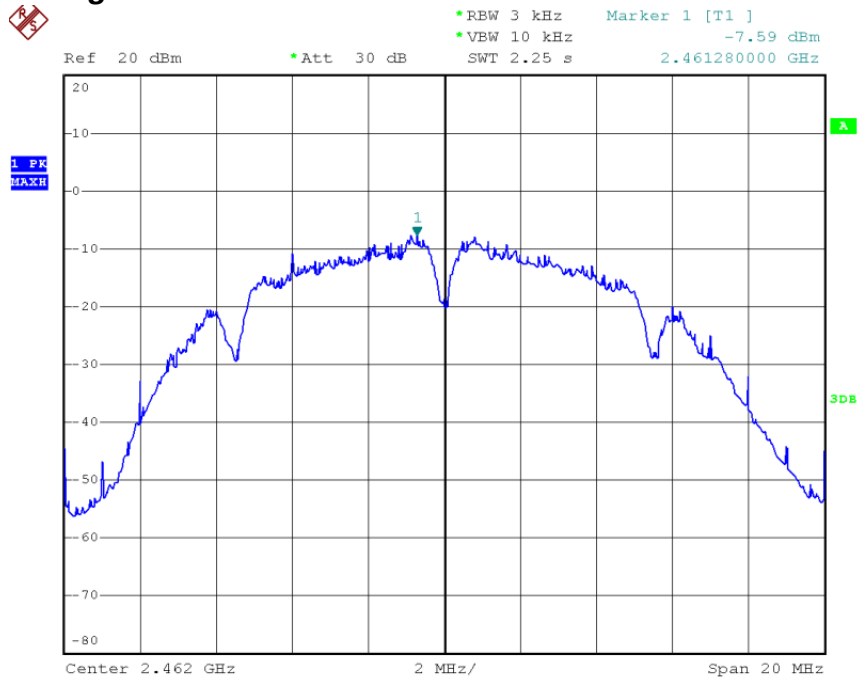
**For 802.11b Mode:
Lowest Channel: 2412MHz**



Mid Channel: 2437MHz

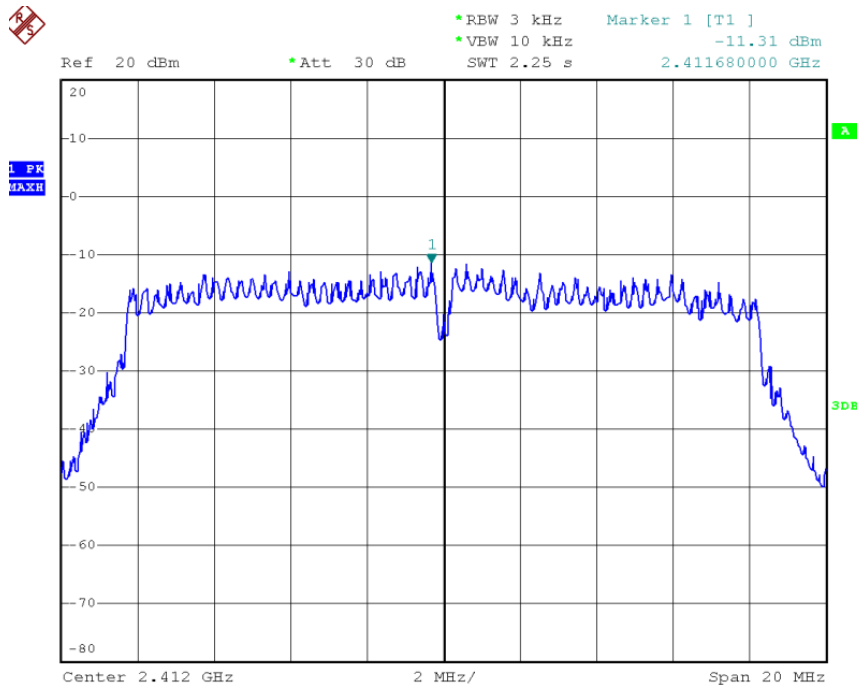


Highest Channel: 2462MHz

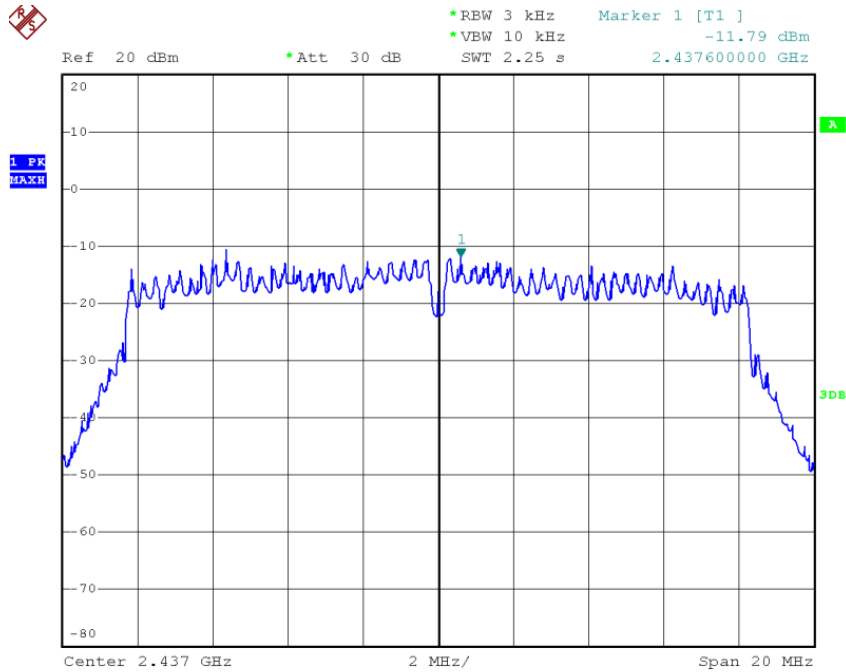


For 802.11g Mode:

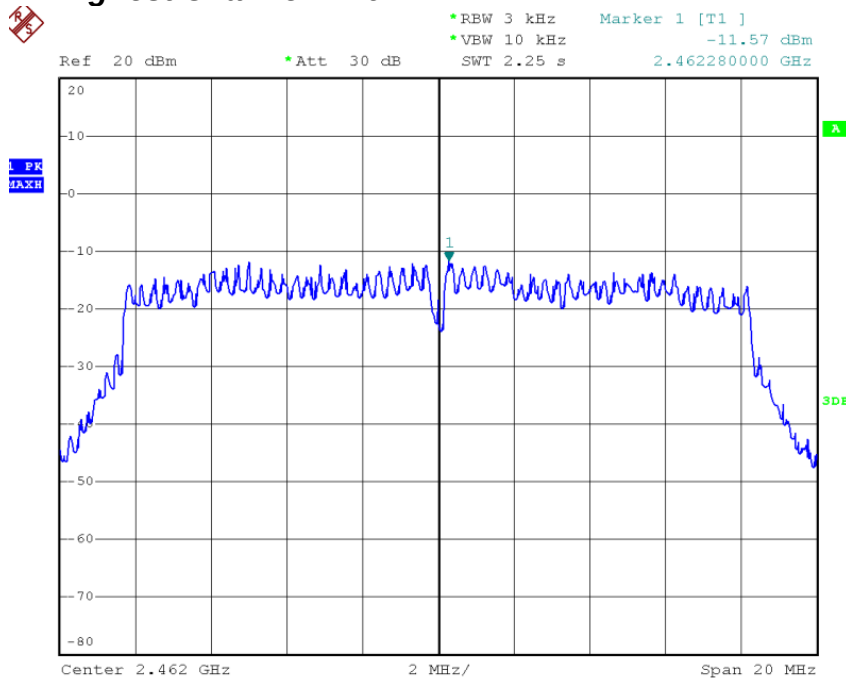
Lowest Channel: 2412MHz



Mid Channel: 2437MHz

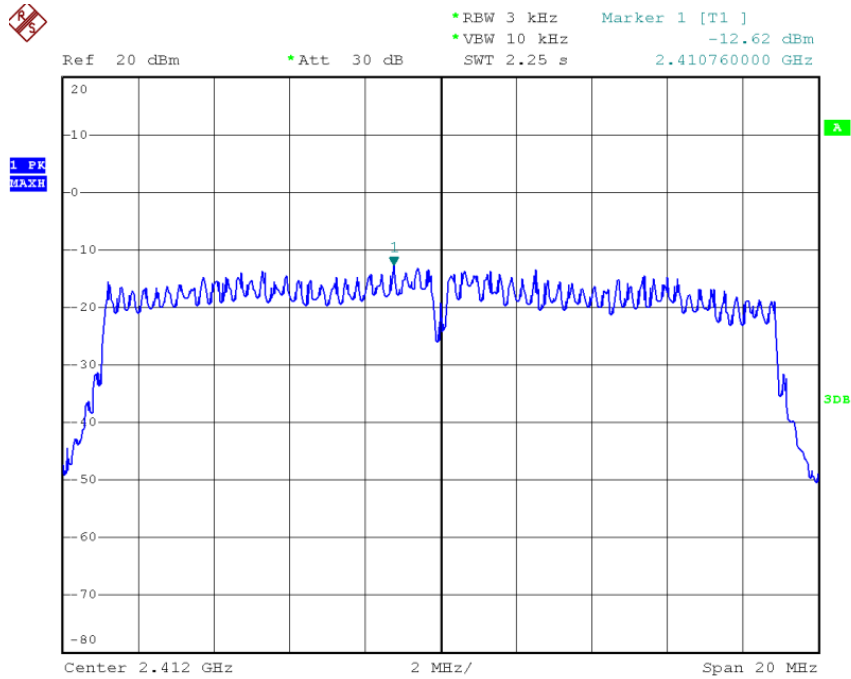


Highest Channel: 2462MHz

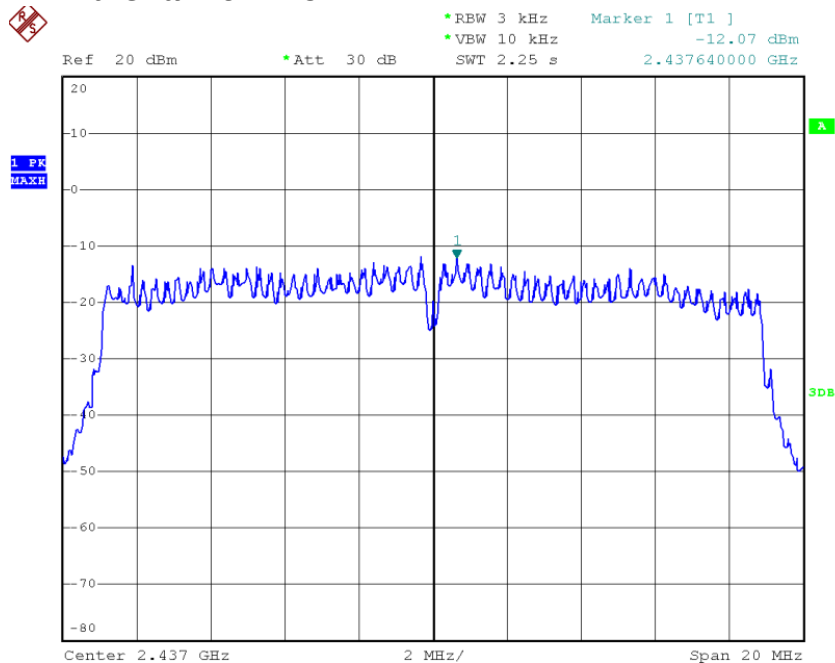


For 802.11n HT20 Mode:

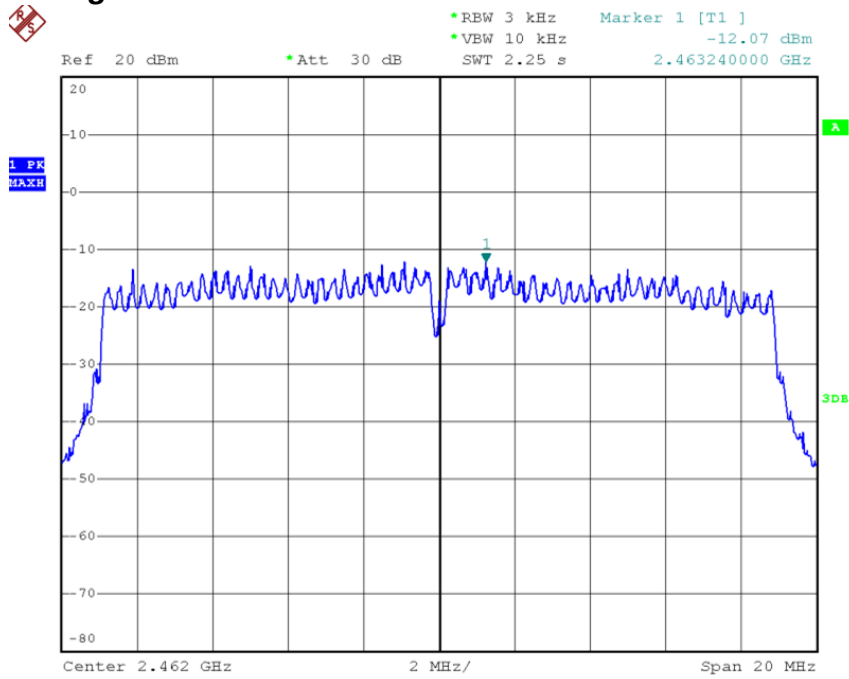
Lowest Channel: 2412MHz



Mid Channel: 2437MHz



Highest Channel: 2462MHz



Attachment: Test Set-Up Photograph



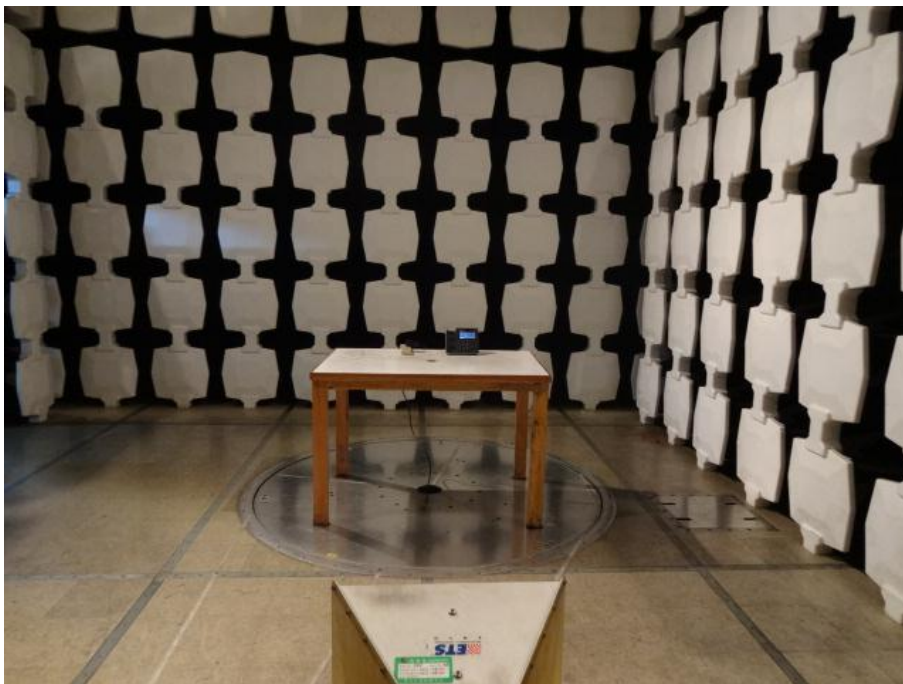
Conducted Emission Test Set-up –Front View



Conducted Emission Test Set-up –Rear View



Radiated Emission Test Set-up -below 1GHz



Radiated Emission Test Set-up - Above 1GHz