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Report No.: SZEM120300121201  
Page: 1 of 58

## FCC REPORT

**Application No:** SZEM1203001212RF  
**Applicant:** Shenzhen CASTEL Wireless Telecommunications Co., Ltd.  
**Product Name:** 3G Vehicle Multimedia  
**Model No.(EUT):** VMID-950  
**FCC ID:** XDV950  
**Standards:** FCC CFR Title 47 Part 15 (2010)  
**Date of Receipt:** 2012-03-22  
**Date of Test:** 2012-04-06 to 2012-05-09  
**Date of Issue:** 2012-05-15

<b>Test Result:</b>	<b>PASS *</b>
---------------------	---------------

. \* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang  
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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## 2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	FCC CFR Title 47 Part 15C Section 15.203/15.247 (c)	ANSI C63.10 (2009)	PASS
Conducted Peak Output Power	FCC CFR Title 47 Part 15C Section 15.247 (b)(3)	ANSI C63.10(2009)	PASS
6dB Occupied Bandwidth	FCC CFR Title 47 Part 15C Section 15.247 (a)(2)	ANSI C63.10(2009)	PASS
Power Spectral Density	FCC CFR Title 47 Part 15C Section 15.247 (e)	ANSI C63.10(2009)	PASS
Band-edge for RF Conducted Emissions	FCC CFR Title 47 Part 15C Section 15.247(d)	ANSI C63.10(2009)	PASS
RF Conducted Spurious Emissions	FCC CFR Title 47 Part 15C Section 15.247(d)	ANSI C63.10(2009)	PASS
Radiated Spurious Emissions	FCC CFR Title 47 Part 15C Section 15.205/15.209	ANSI C63.10(2009)	PASS
Band Edge (Radiated Emission)	FCC CFR Title 47 Part 15C Section 15.205/15.209	ANSI C63.10 (2009)	PASS

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## 4 General Information

### 4.1 Client Information

Applicant:	Shenzhen CASTEL Wireless Telecommunications Co., Ltd.
Address of Applicant:	5/F, 5th Building, Software Park, No.2 Gaoxin C. 3rd Road, Hi-Tech. Industrial Park, Nanshan, Shenzhen, Guangdong, China

### 4.2 General Description of EUT

Product Name:	3G Vehicle Multimedia
Model No.:	VMID-950
Trade Mark:	CASTEL
Operation Frequency:	IEEE 802.11b/g: 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK)
Sample Type:	Mobile production
Test Power Grade:	12(manufacturer declare )
Test Software of EUT:	WiFiFCCTool.exe (manufacturer declare )
Antenna Type and Gain:	Type: Temporary Gain: 2.5dBi
Power Supply:	DC 14.4V

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Operation Frequency each of channel(802.11b/g)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11b/g:

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz



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### 4.3 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	1006 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

### 4.4 Description of Support Units

The EUT has been tested independent unit.

### 4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.

518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

## 4.6 Test Facility

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

- **CNAS (No. CNAS L2929)**  
CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.
- **VCCI**  
The 3m Semi-anechoic chamber, Full-anechoic Chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197, G-416, T-1153 and C-2383 respectively.
- **FCC – Registration No.: 556682**  
SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.
- **Industry Canada (IC)**  
The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

## 4.7 Deviation from Standards

None.

## 4.8 Abnormalities from Standard Conditions

None.

## 4.9 Other Information Requested by the Customer

None.



4.10 Test Instruments List

RE in Chamber					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2012-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2012-05-26
3	EMI Test software	AUDIX	E3	SEL0050	N/A
4	Coaxial cable	SGS	N/A	SEL0028	2012-05-29
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2012-10-29
6	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2012-10-29
7	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2012-10-29
8	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2012-05-26
9	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2012-10-26
11	Band filter	Amindeon	82346	SEL0094	2012-05-26

RF conducted					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Spectrum Analyzer	Rohde & Schwarz	FSP 30	SEL0154	2012-10-23
2	Coaxial cable	SGS	N/A	SEL0028	2012-05-29

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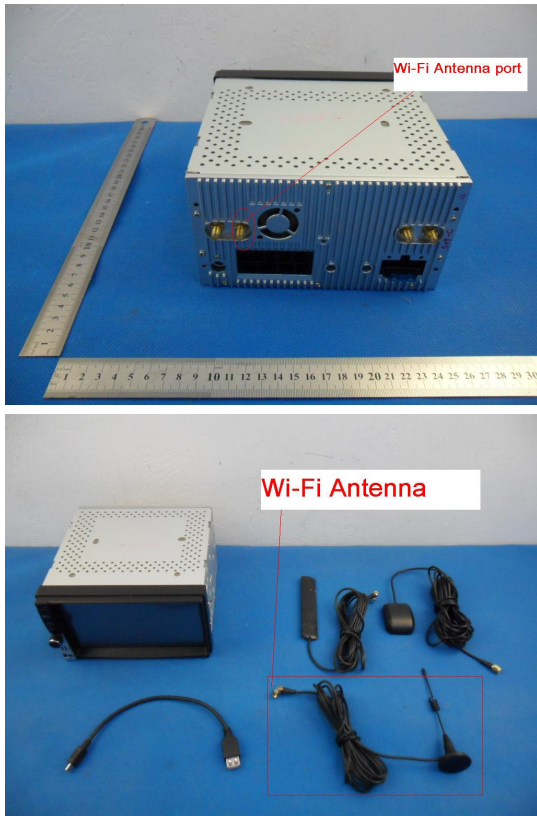


General used equipment					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0102 to SEL0103	2012-10-27
2	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0101	2012-10-27
3	Barometer	ChangChun	DYM3	SEL0088	2012-05-18

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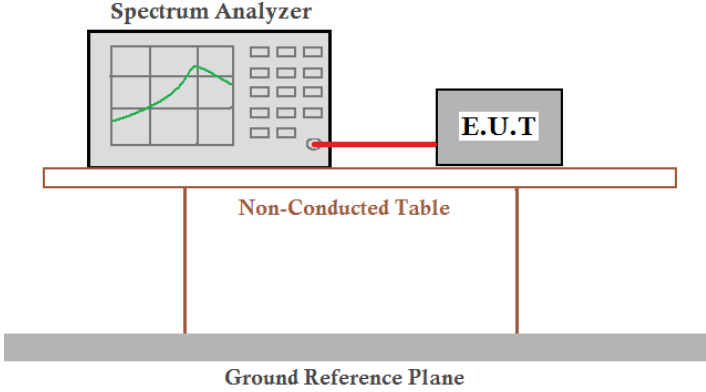
## 5 Test results and Measurement Data

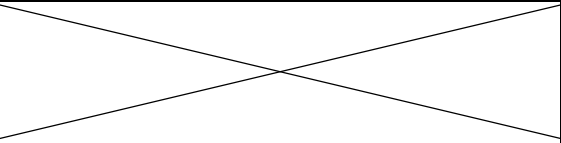
### 5.1 Antenna Requirement

<p><b>Standard requirement:</b></p>	<p>FCC Part15 C Section 15.203 /247(c)</p>
<p>15.203 requirement: 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, 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.</p> <p>15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<p><b>EUT Antenna:</b></p>	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.5dBi.</p>	

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### 5.2 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p><i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Test Instruments:	Refer to section 4.10 for details
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Limit:	30dBm
Test Results:	Pass

Pre-scan under all rate at lowest channel 1								
Mode	802.11b							
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
Power (dBm)	15.34	15.08	14.86	14.67				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Through Pre-scan, 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.								

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Measurement Data

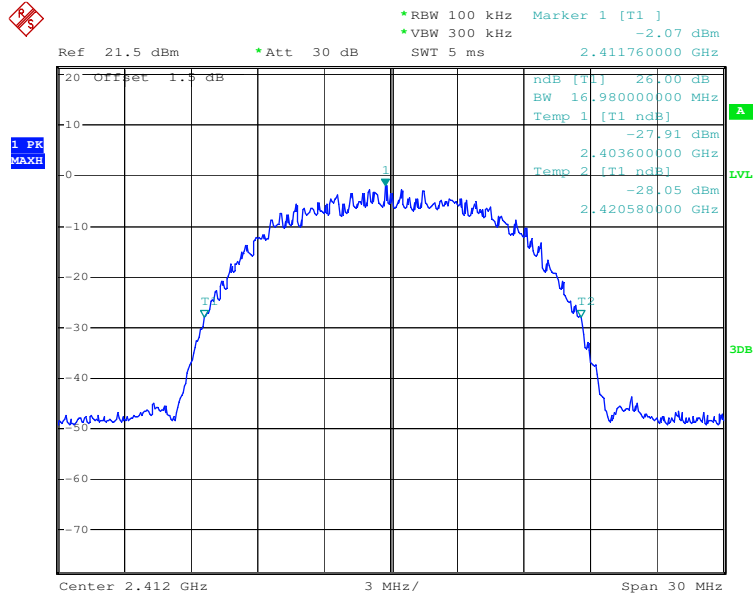
802.11b mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	15.26	30.00	Pass
Middle	14.83	30.00	Pass
Highest	14.56	30.00	Pass
802.11g mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	15.34	30.00	Pass
Middle	14.76	30.00	Pass
Highest	14.30	30.00	Pass

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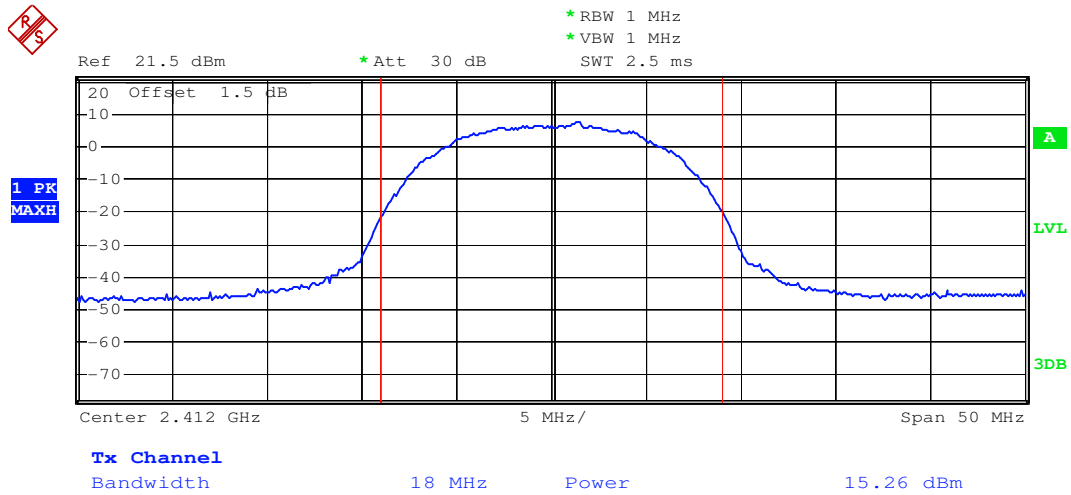


Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest	-26 bandwidth
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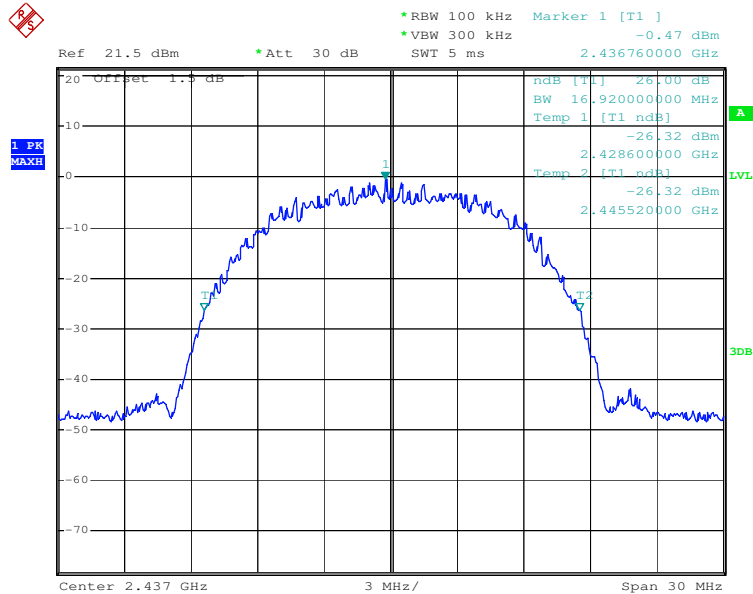
Test mode:	802.11b	Test channel:	Lowest
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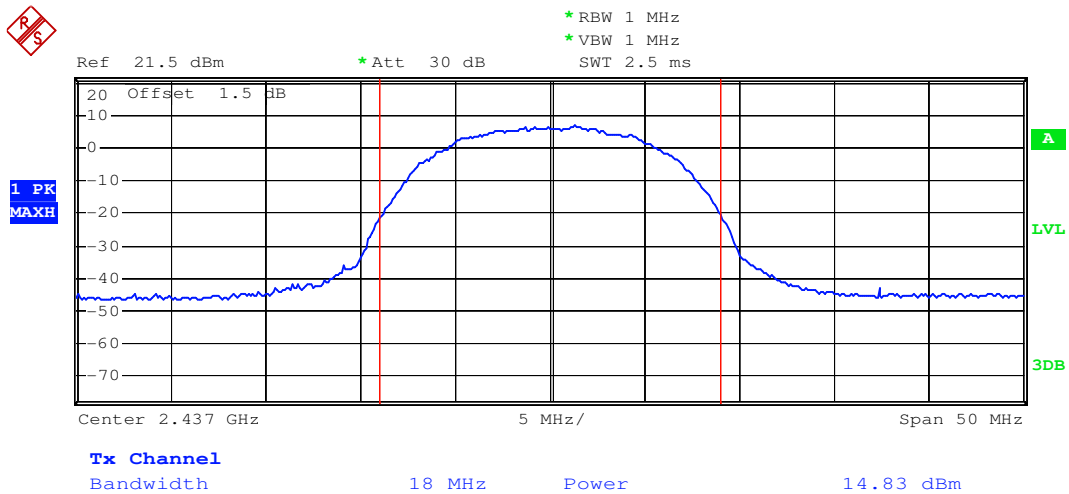
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Test mode:	802.11b	Test channel:	Middle	-26 bandwidth
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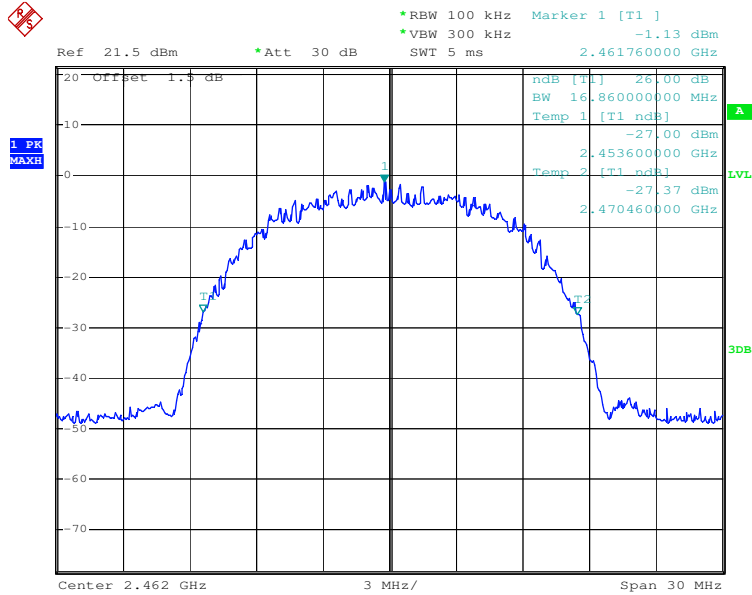
Test mode:	802.11b	Test channel:	Middle
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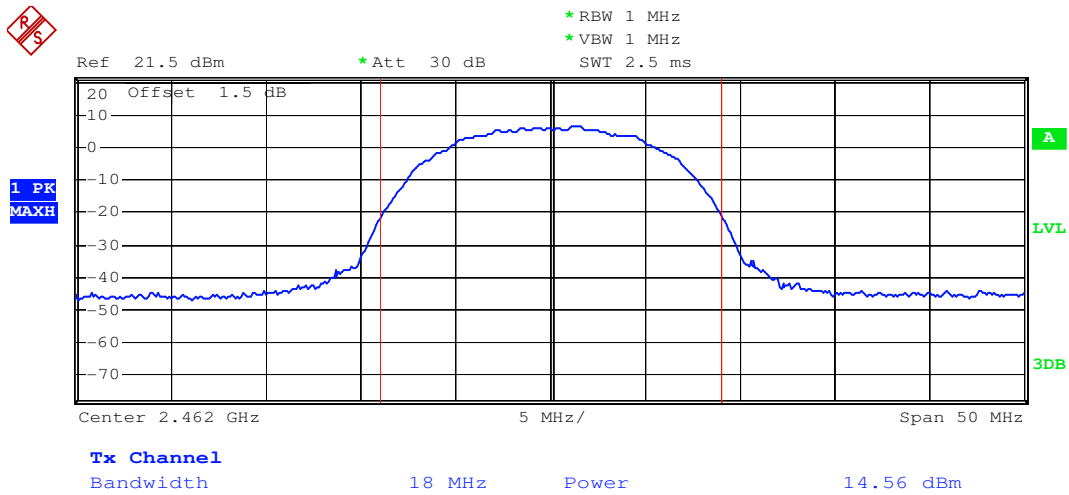
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Test mode:	802.11b	Test channel:	Highest	-26 bandwidth
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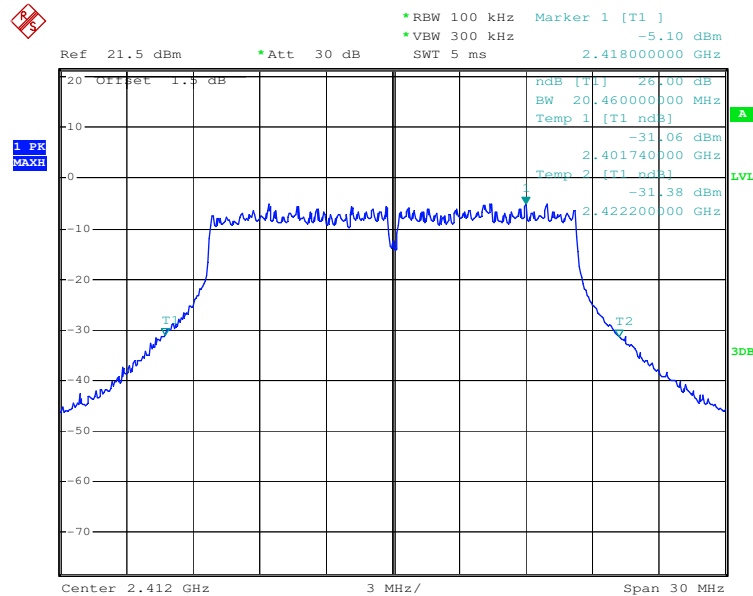
Test mode:	802.11b	Test channel:	Highest
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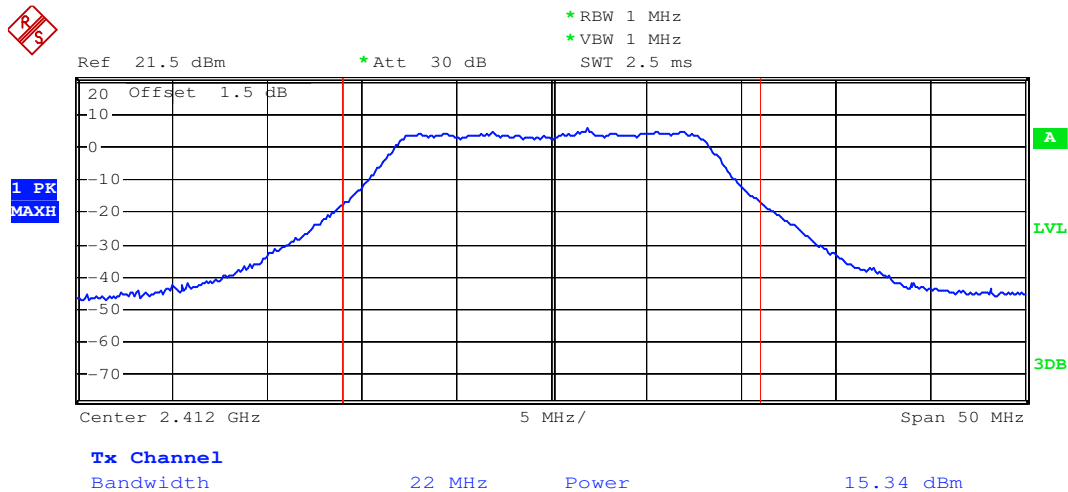
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Test mode:	802.11g	Test channel:	Lowest	-26 bandwidth
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Test mode:	802.11g	Test channel:	Lowest
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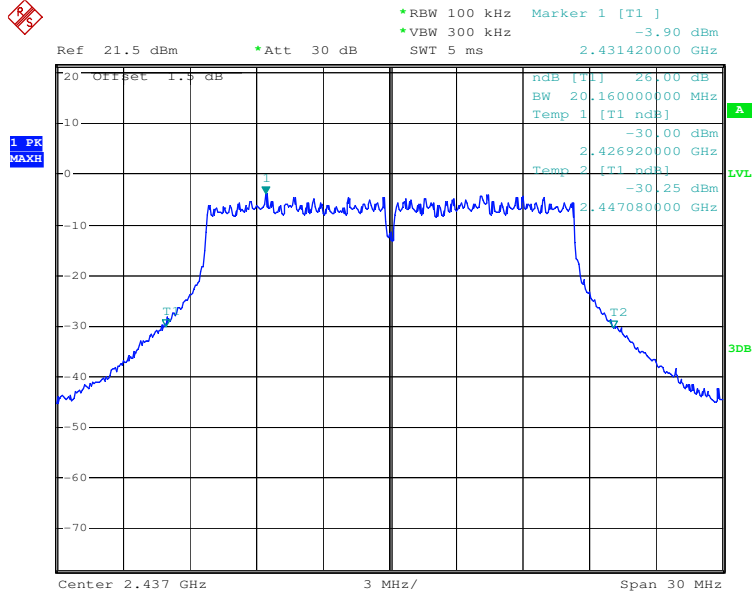


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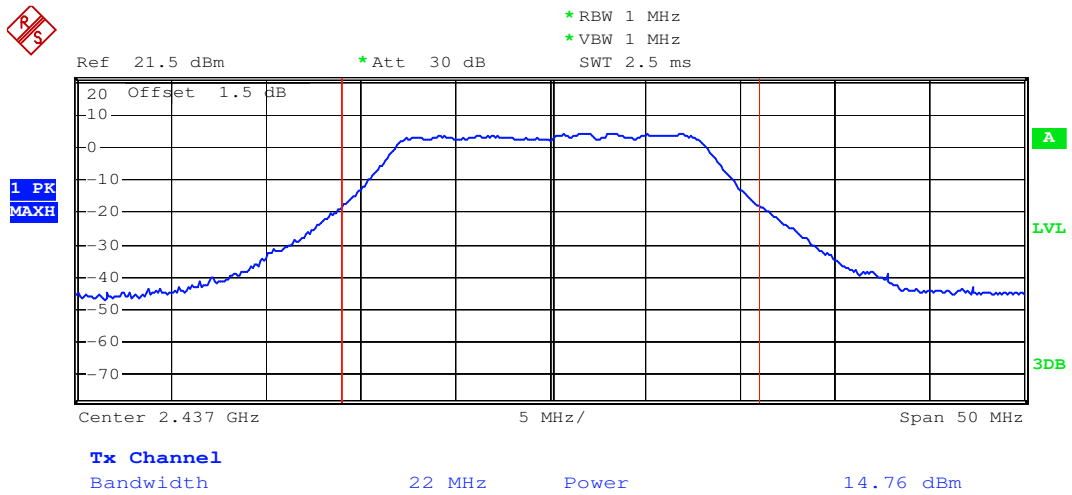




Test mode:	802.11g	Test channel:	Middle	-26 bandwidth
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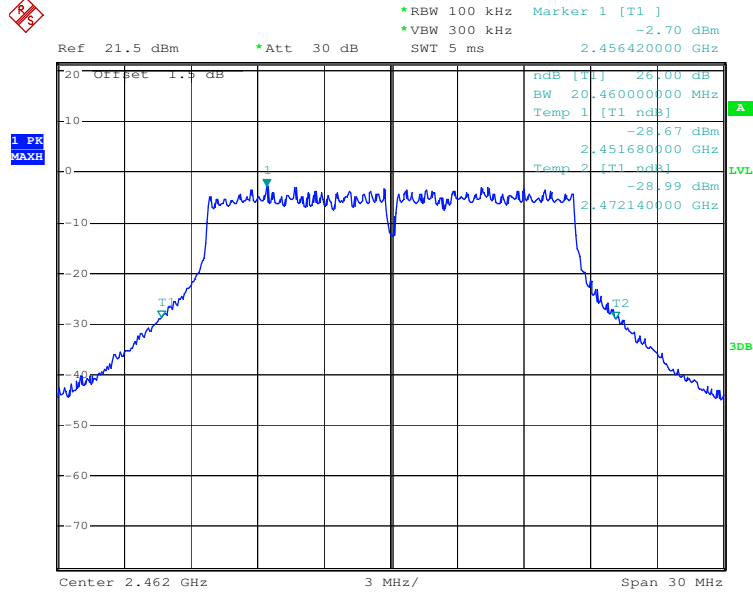
Test mode:	802.11g	Test channel:	Middle
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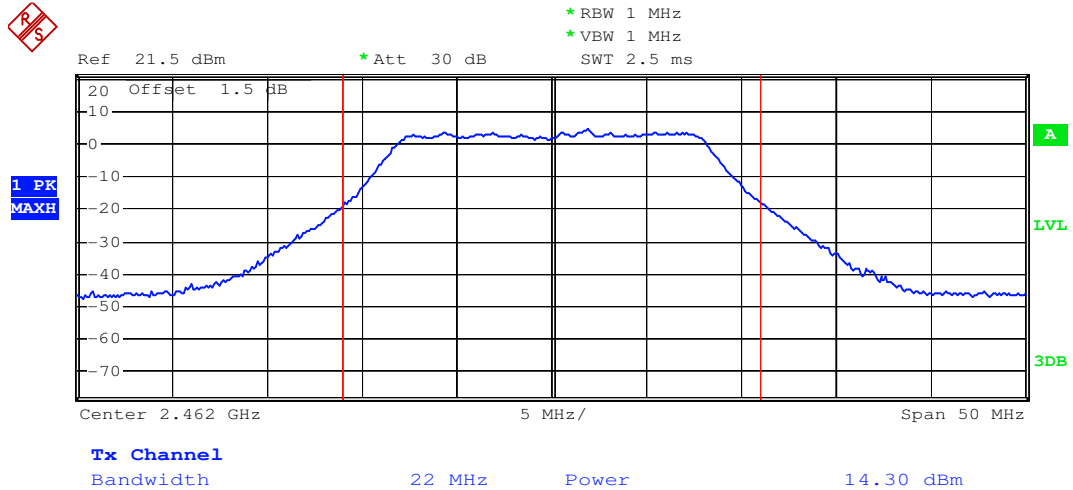
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Test mode:	802.11g	Test channel:	Highest	-26 bandwidth
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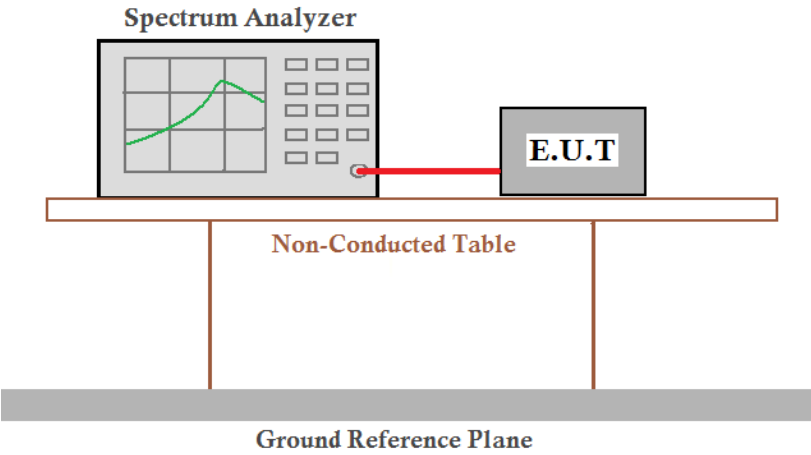


Test mode:	802.11g	Test channel:	Highest
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### 5.3 6dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Instruments Used:	Refer to section 4.10 for details
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Limit:	$\geq 500$ KHz
Test Results:	Pass

#### Measurement Data

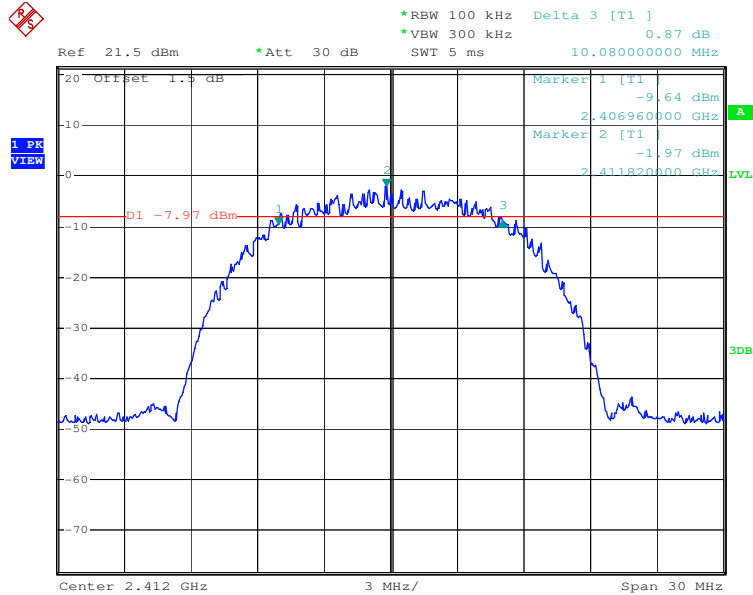
802.11b mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (KHz)	Result
Lowest	10.08	$\geq 500$	Pass
Middle	10.02	$\geq 500$	Pass
Highest	10.02	$\geq 500$	Pass
802.11g mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (KHz)	Result
Lowest	16.62	$\geq 500$	Pass
Middle	16.68	$\geq 500$	Pass
Highest	16.62	$\geq 500$	Pass

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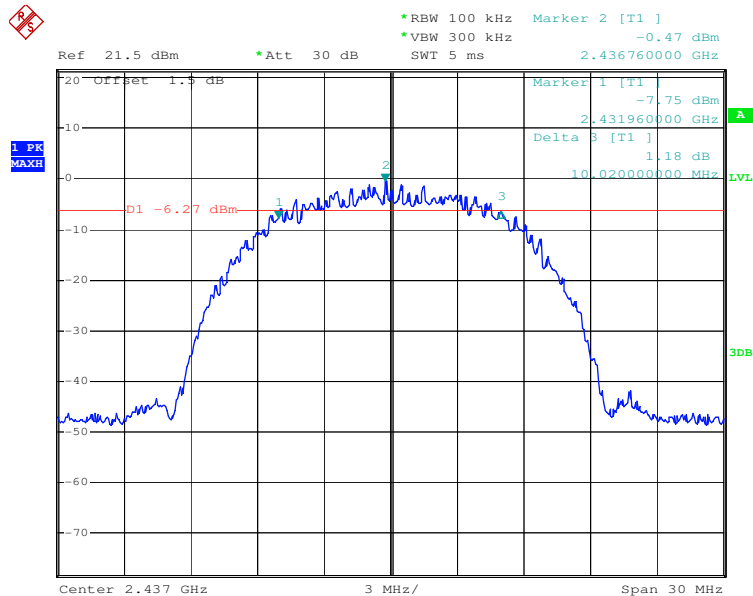


Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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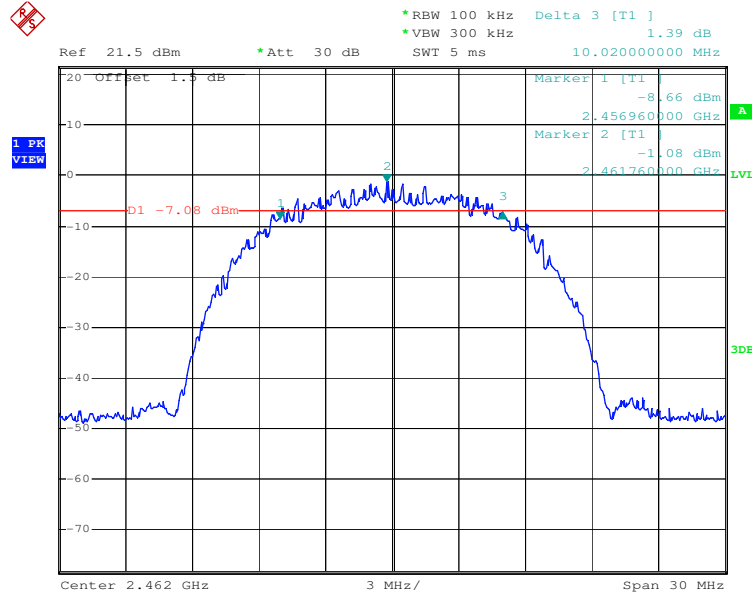
Test mode:	802.11b	Test channel:	Middle
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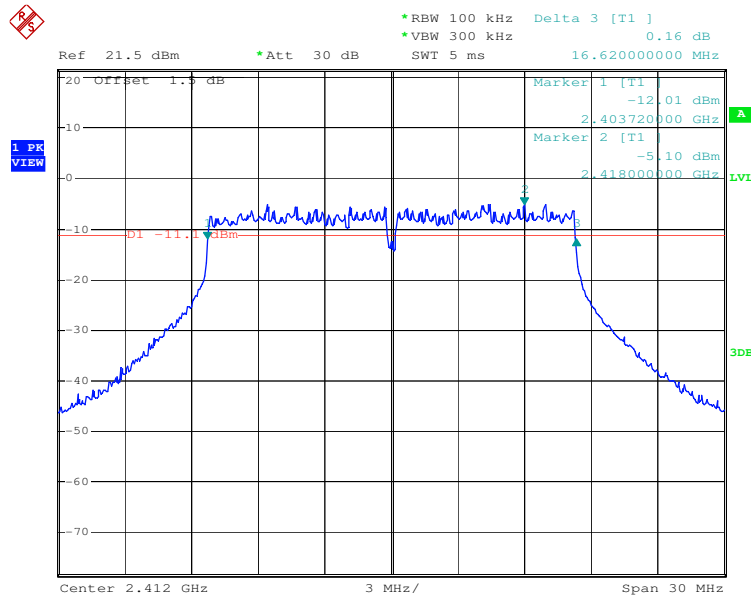
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Test mode:	802.11b	Test channel:	Highest
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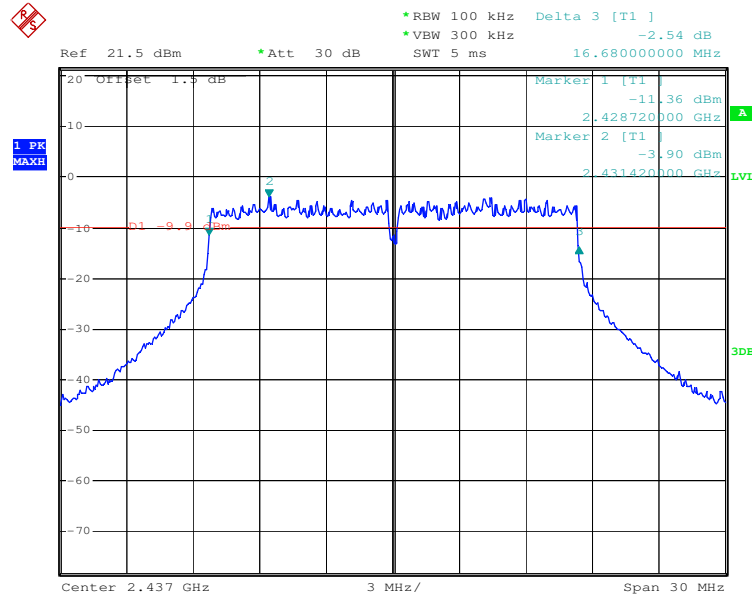
Test mode:	802.11g	Test channel:	Lowest
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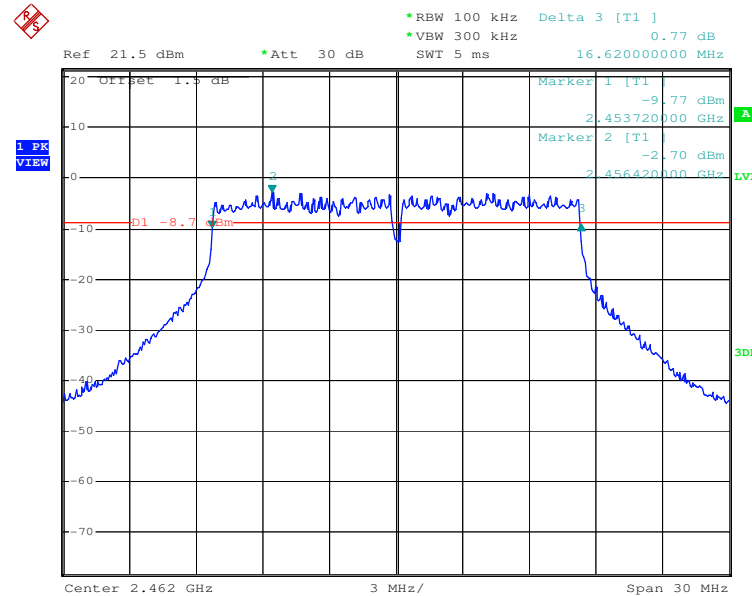
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Test mode:	802.11g	Test channel:	Middle
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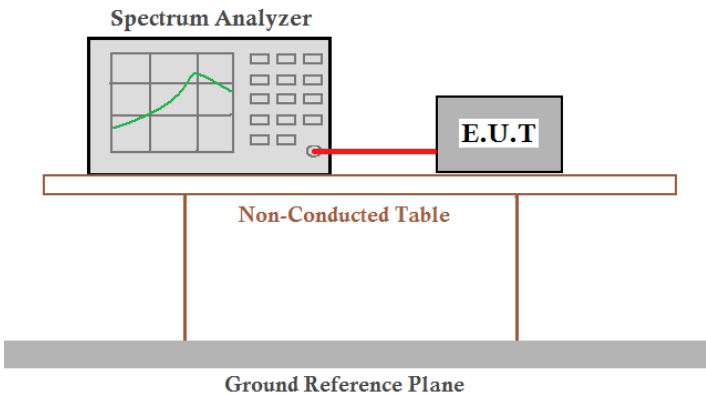


Test mode:	802.11g	Test channel:	Highest
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### 5.4 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p><i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Test Instruments:	Refer to section 4.10 for details
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Limit:	≤8.00dBm
Test Results:	Pass

#### Measurement Data

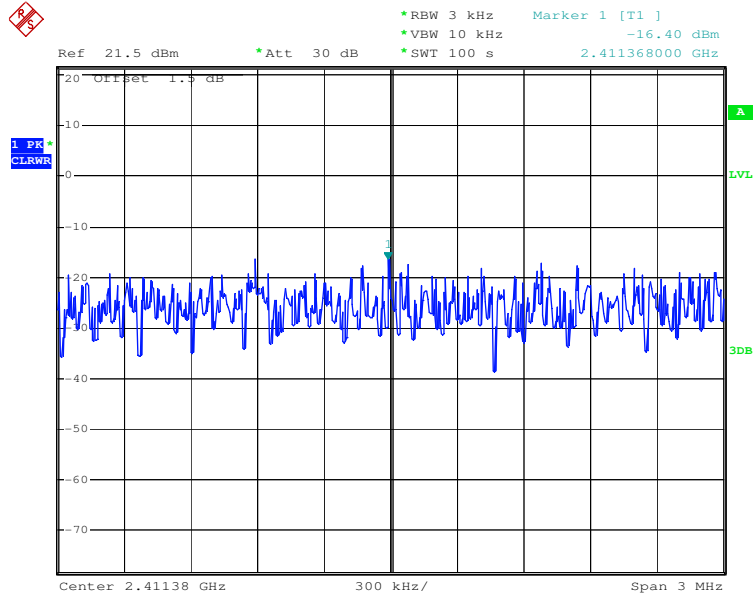
802.11b mode			
Test channel	Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-16.40	≤8.00	Pass
Middle	-19.21	≤8.00	Pass
Highest	-15.65	≤8.00	Pass
802.11g mode			
Test channel	Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-19.00	≤8.00	Pass
Middle	-18.19	≤8.00	Pass
Highest	-16.89	≤8.00	Pass

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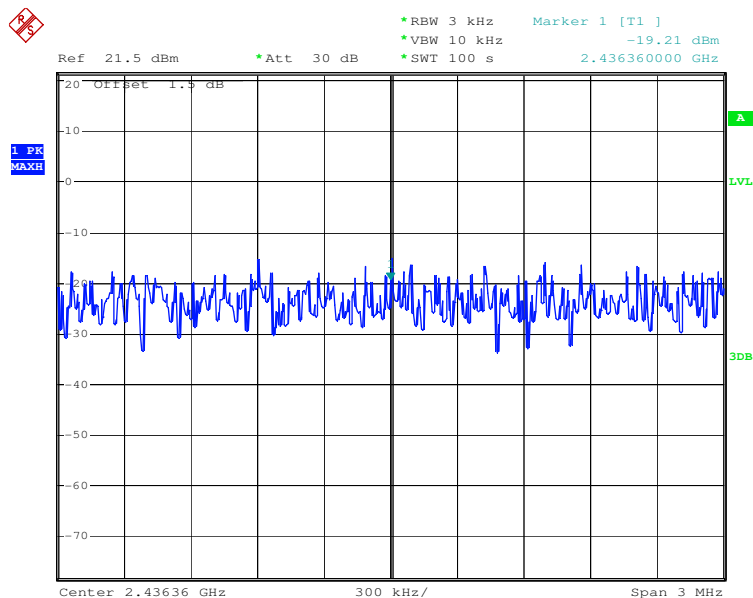


Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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Test mode:	802.11b	Test channel:	Middle
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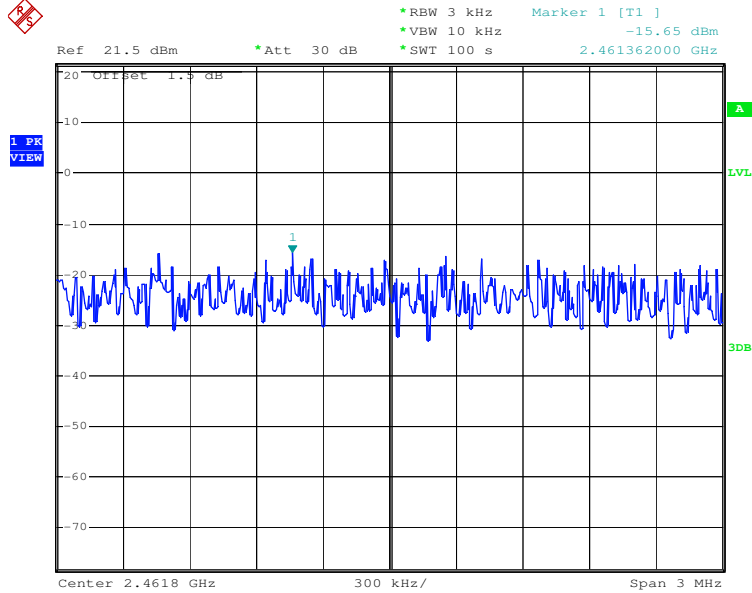


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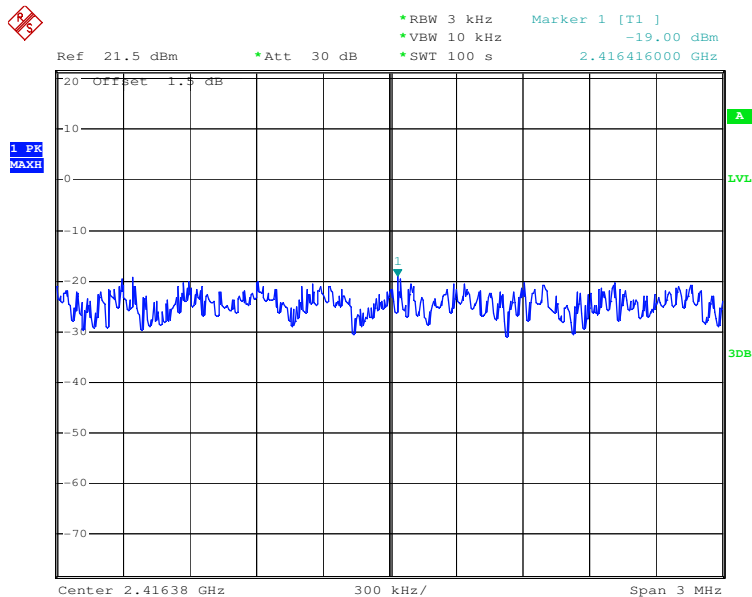




Test mode:	802.11b	Test channel:	Highest
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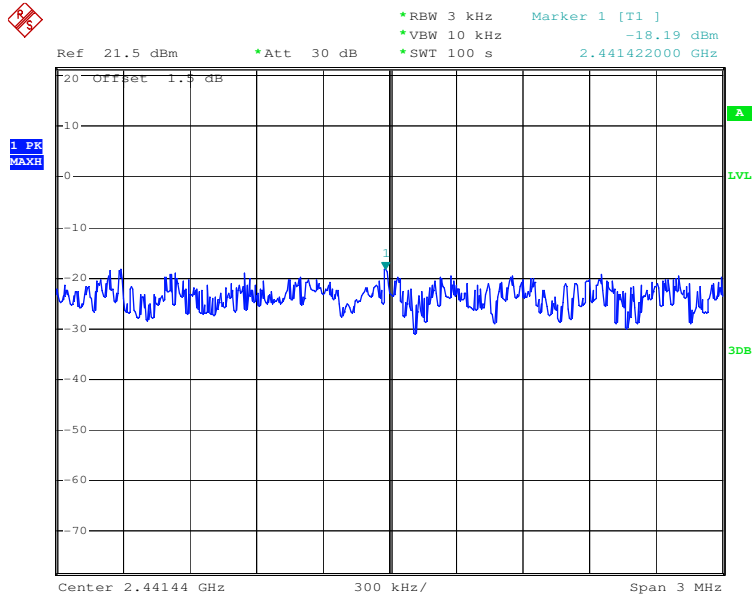
Test mode:	802.11g	Test channel:	Lowest
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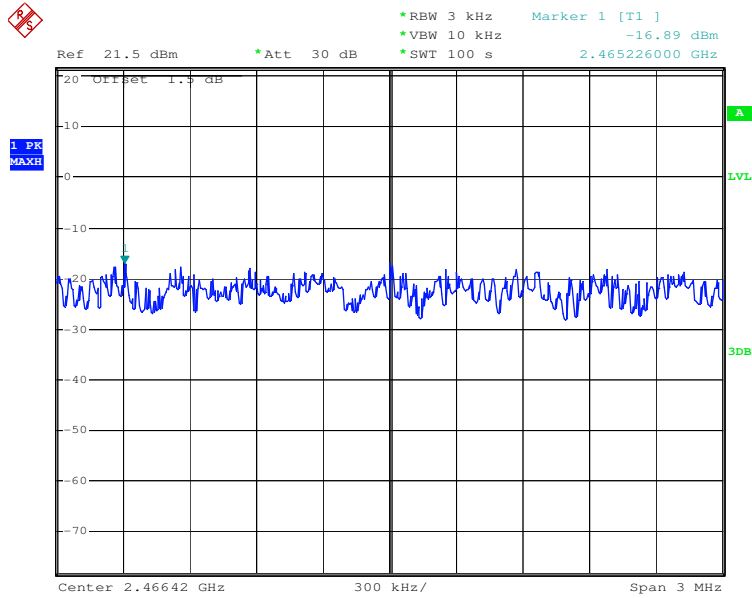
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Test mode:	802.11g	Test channel:	Middle
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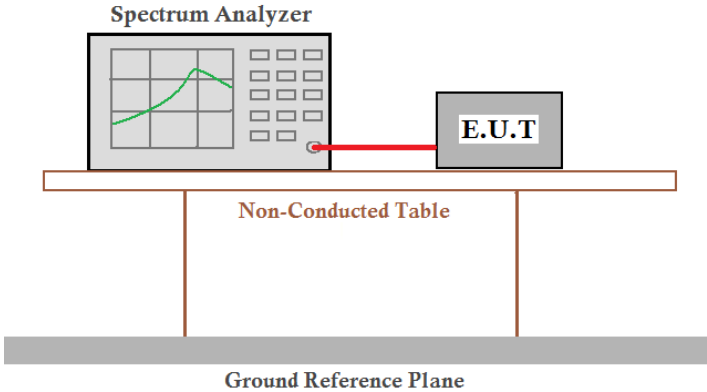


Test mode:	802.11g	Test channel:	Highest
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### 5.5 Band-edge for RF Conducted Emissions

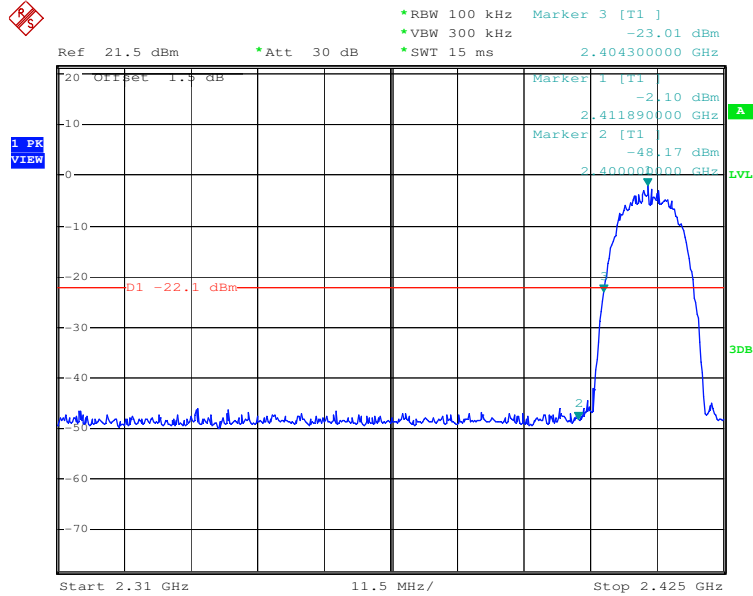
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p><i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Limit:	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 level of the desired power, based on either an RF conducted or a radiated measurement.
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

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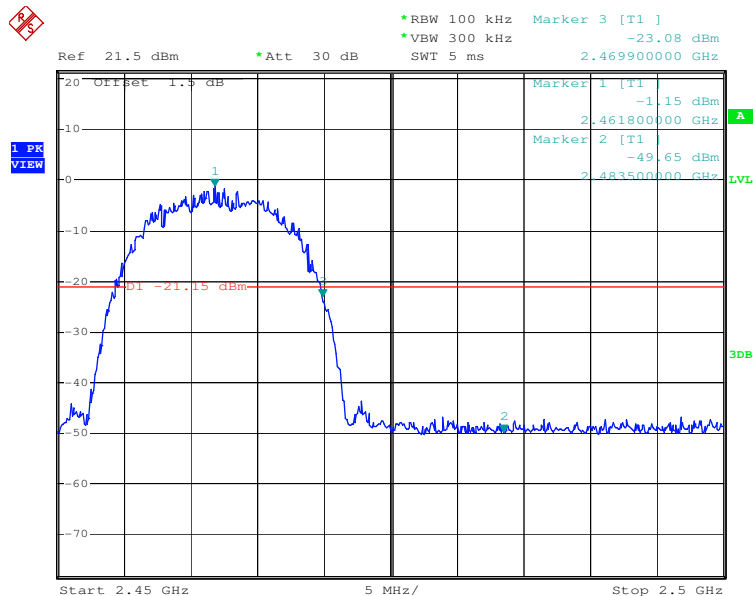


Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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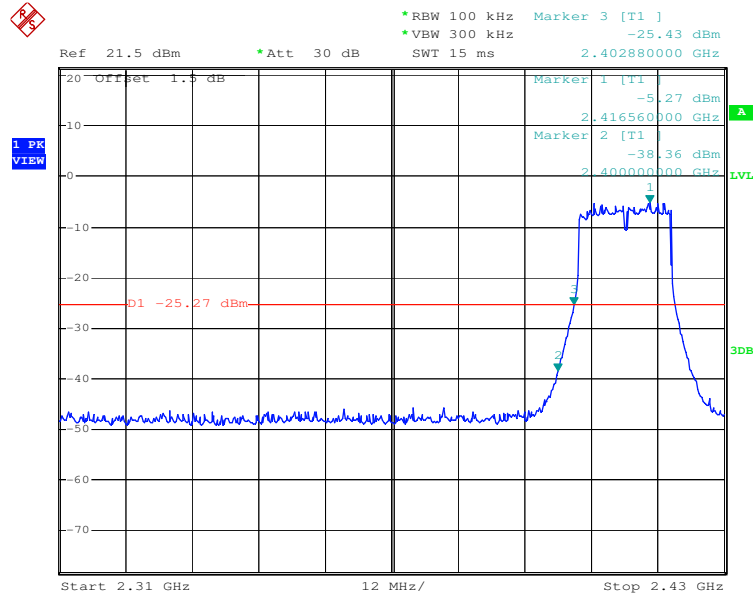
Test mode:	802.11b	Test channel:	Highest
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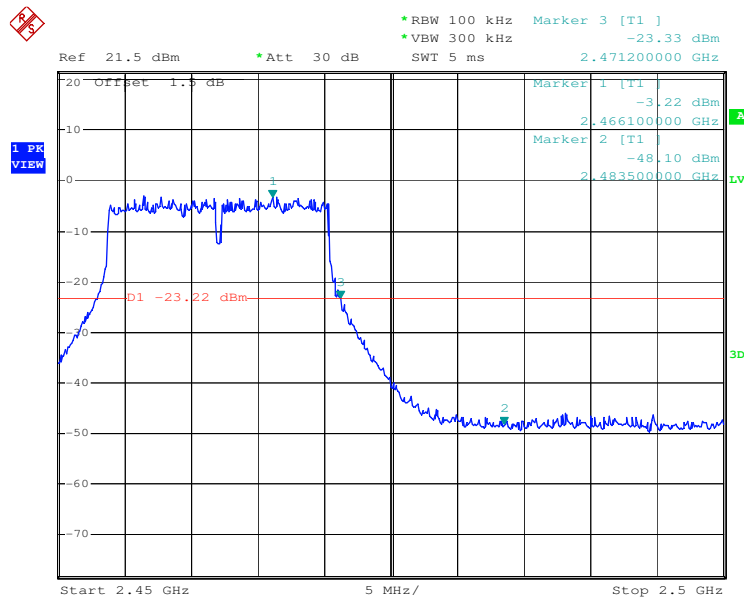
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Test mode:	802.11g	Test channel:	Lowest
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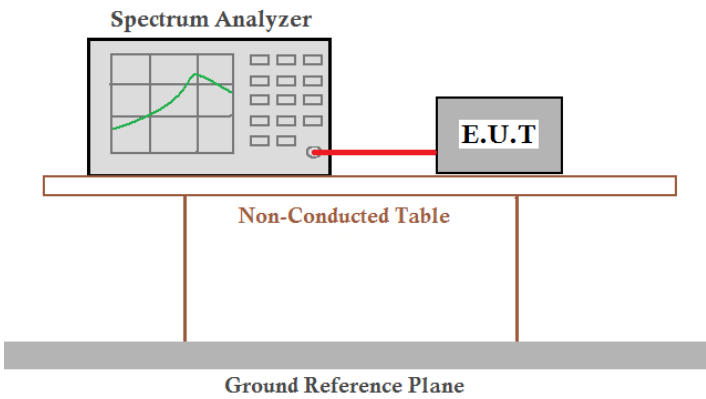


Test mode:	802.11g	Test channel:	Highest
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### 5.6 RF Conducted Spurious Emissions

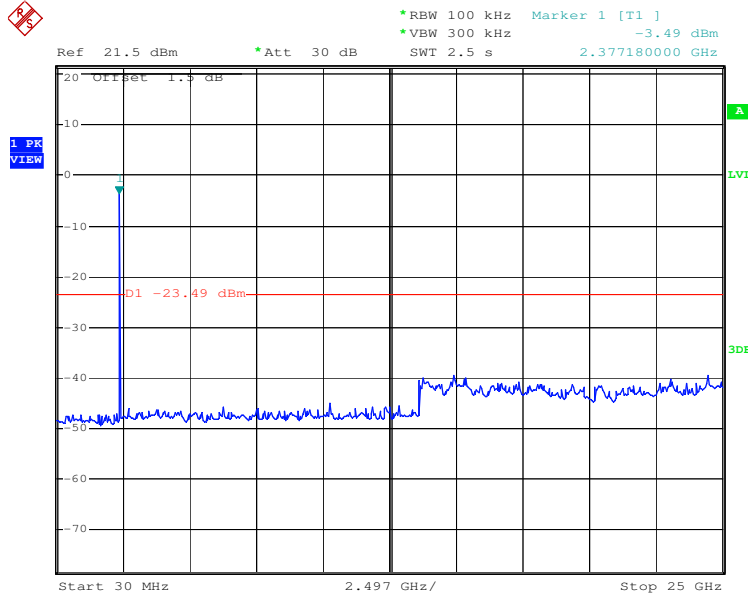
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p><i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Limit:	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 level of the desired power, based on either an RF conducted or a radiated measurement.
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

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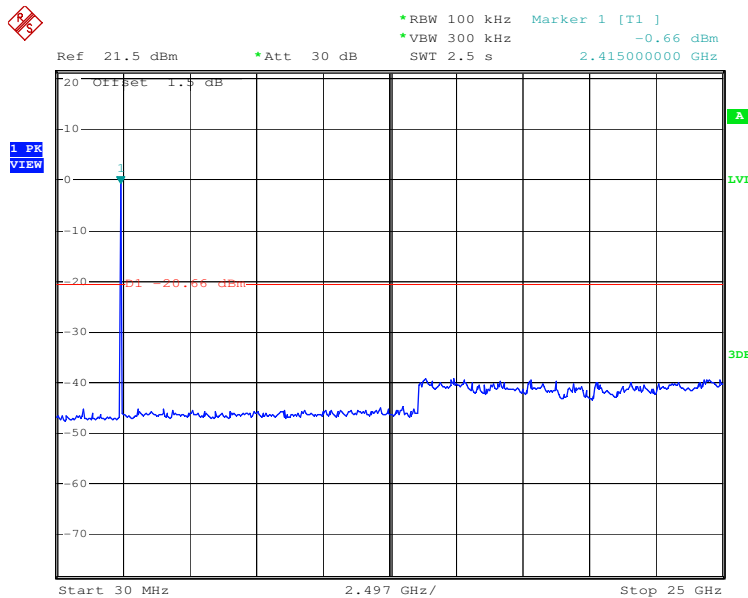


Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
------------	---------	---------------	--------



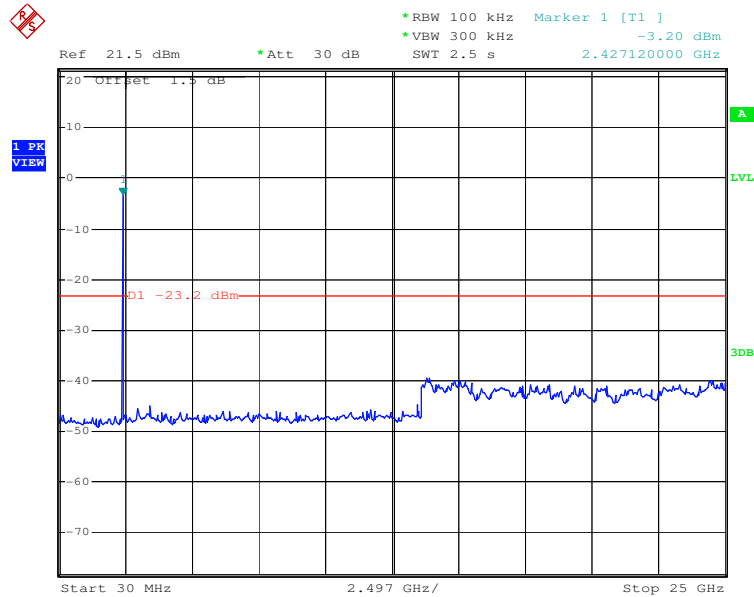
Test mode:	802.11b	Test channel:	Middle
------------	---------	---------------	--------



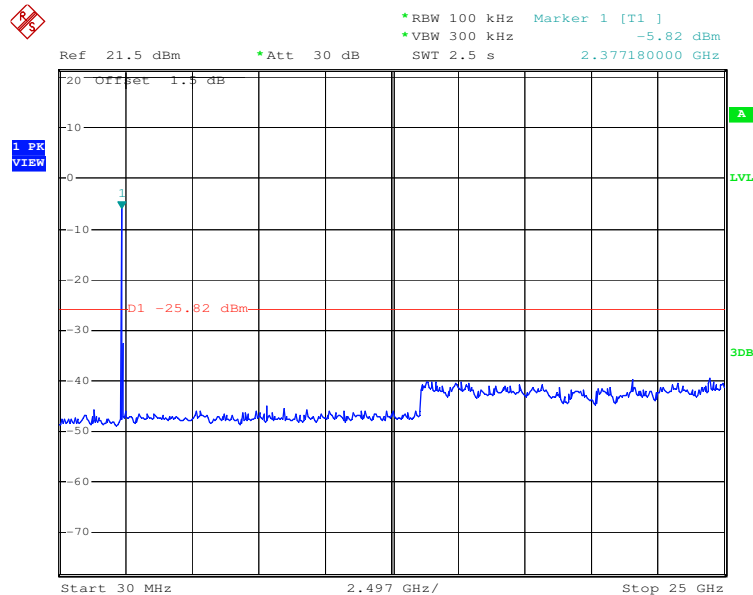
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Test mode:	802.11b	Test channel:	Highest
------------	---------	---------------	---------



Test mode:	802.11g	Test channel:	Lowest
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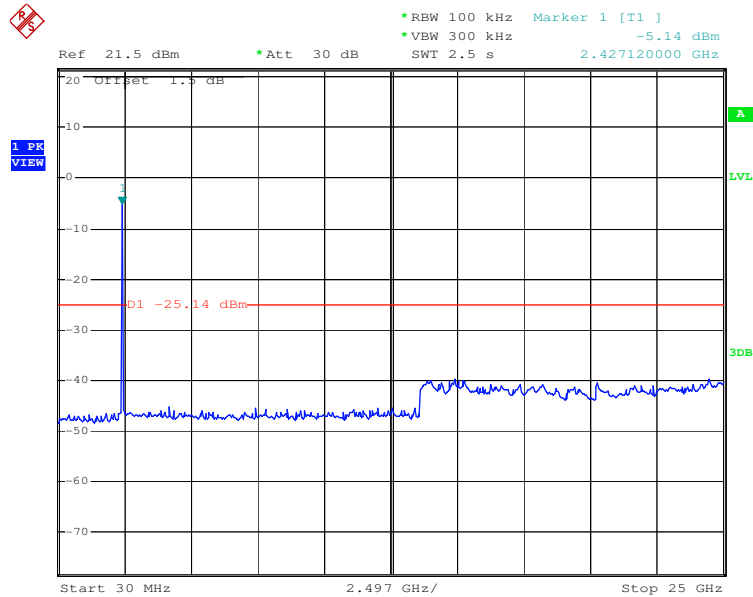


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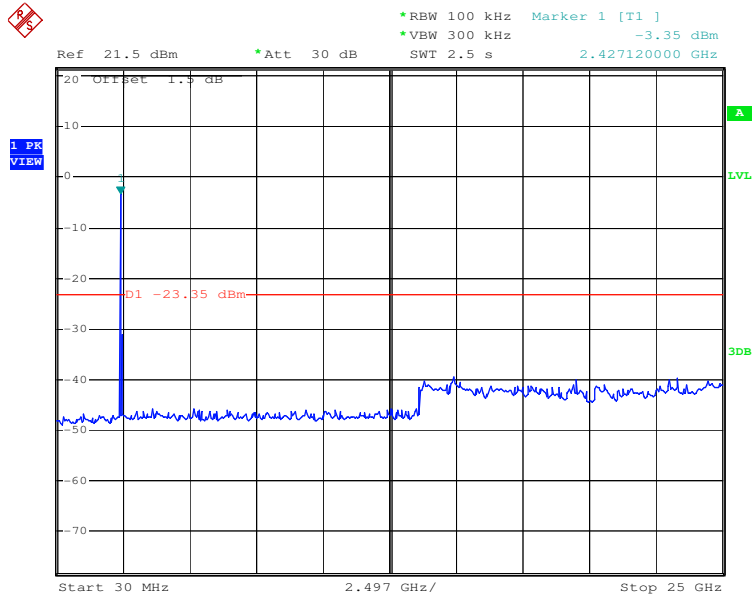




Test mode:	802.11g	Test channel:	Middle
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Test mode:	802.11g	Test channel:	Highest
------------	---------	---------------	---------



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### 5.7 Radiated Spurious Emissions

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2009				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
74.0		Peak Value			
Test Setup:					

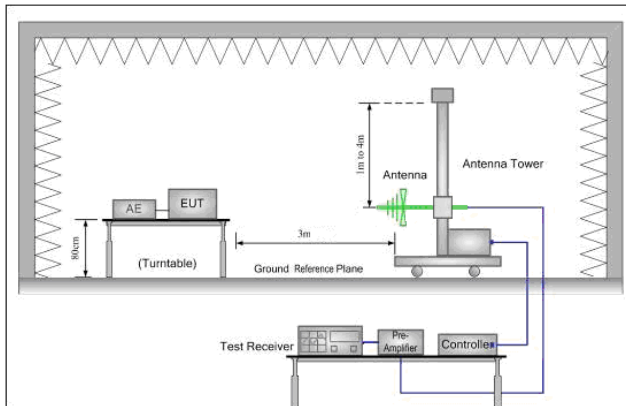


Figure 1. 30MHz to 1GHz

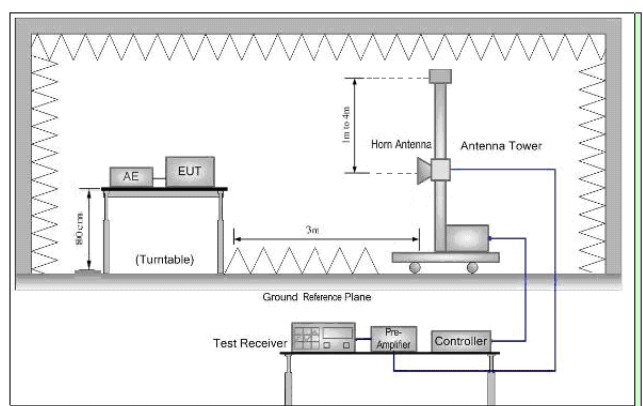


Figure 2. Above 1 GHz

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Test Procedure:	<ul style="list-style-type: none"> <li>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>g. Test the EUT in the lowest channel, the middle channel, the Highest channel</li> <li>h. Repeat above procedures until all frequencies measured was complete.</li> </ul>
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

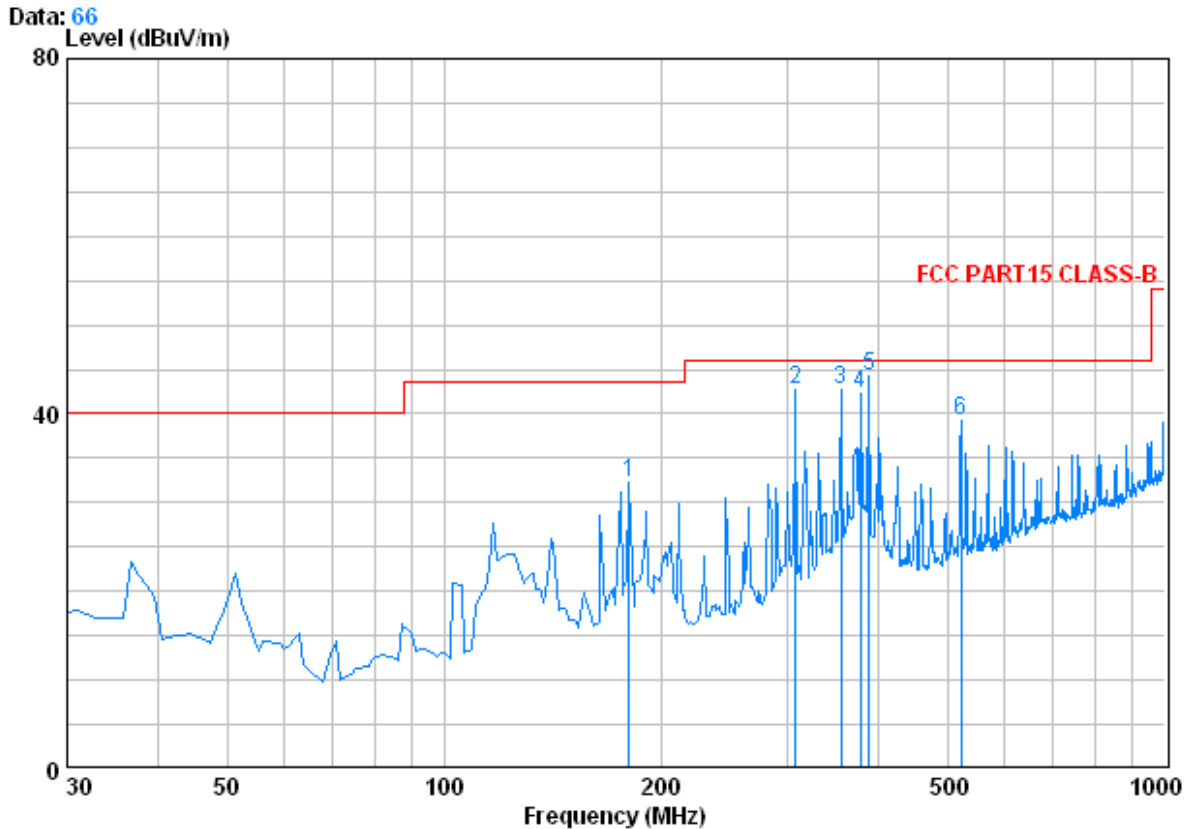


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5.7.1 Radiated emission below 1GHz

30MHz~1GHz (QP)		
Test mode:	Transmitting	Vertical



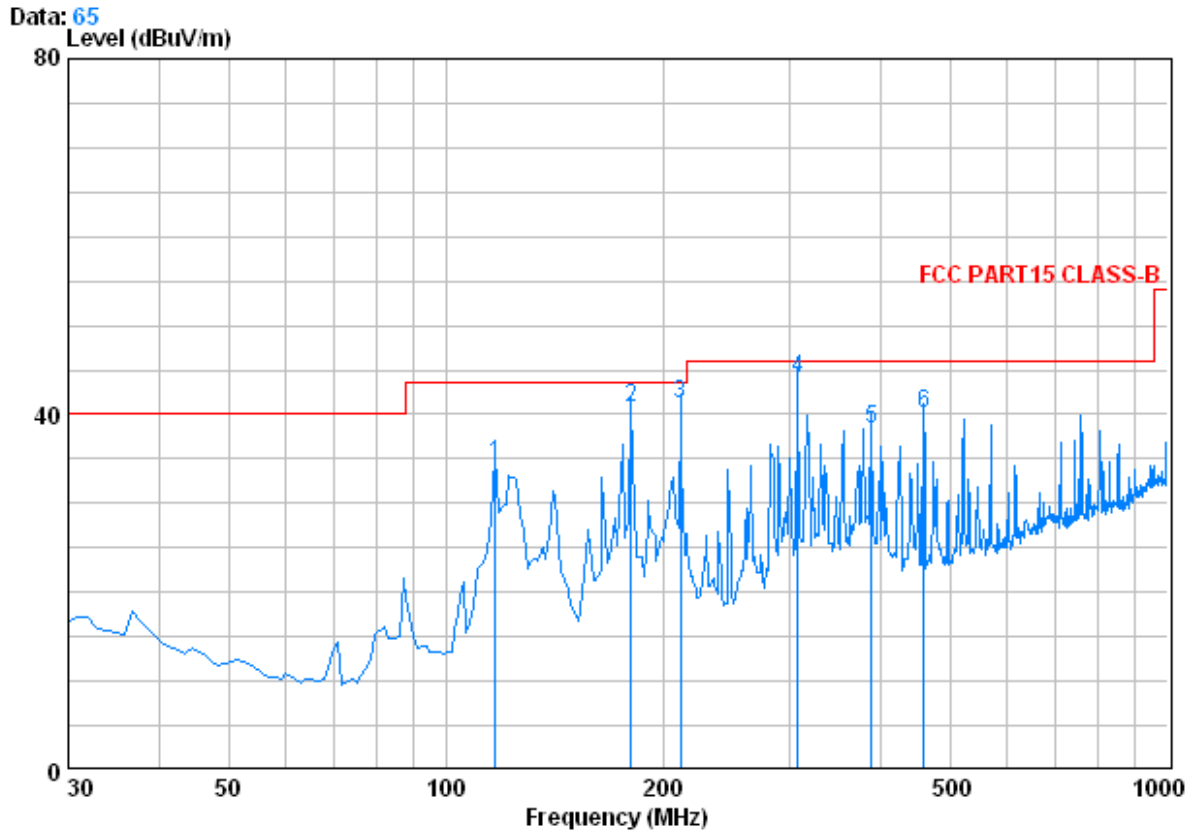
Condition : FCC PART15 CLASS-B 3m 0042673 VERTICAL  
 Job No. : 1212RF  
 test mode : Wi-Fi TX SE

	Freq	CableAntenna Loss	Antenna Factor	Preamplifier	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	180.350	1.37	9.91	26.77	47.78	32.29	43.50	-11.21
2	307.420	1.93	14.16	26.46	53.05	42.67	46.00	-3.33
3	354.950	2.08	15.53	26.83	52.03	42.80	46.00	-3.20
4	378.230	2.14	16.03	26.99	51.02	42.21	46.00	-3.79
5 @	388.900	2.17	16.17	27.07	52.92	44.19	46.00	-1.81
6	520.820	2.62	18.39	27.66	45.99	39.35	46.00	-6.65

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Test mode:	Transmitting	Horizontal
------------	--------------	------------



Condition : FCC PART15 CLASS-B 3m 0042673 HORIZONTAL  
 Job No. : 1212RF  
 test mode : Wi-Fi TX SE

	Freq	CableAntenna Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	117.300	1.25	8.08	27.09	52.29	34.53	43.50	-8.97
2	180.350	1.37	9.91	26.77	56.29	40.80	43.50	-2.70
3	211.390	1.47	10.81	26.66	55.57	41.19	43.50	-2.31
4 @	307.420	1.93	14.16	26.46	54.40	44.02	46.00	-1.98
5	388.900	2.17	16.17	27.07	47.16	38.43	46.00	-7.57
6	459.710	2.45	17.22	27.50	48.03	40.20	46.00	-5.80

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5.7.2 Transmitter emission above 1GHz

Test mode:		802.11b		Test channel:		Lowest		Remark:		Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
1593.340	2.58	28.84	39.39	48.87	40.90	74.00	-33.10	Vertical		
3700.260	3.91	33.45	40.81	48.69	45.24	74.00	-28.76	Vertical		
5230.963	4.86	34.63	41.58	49.30	47.21	74.00	-26.79	Vertical		
6611.326	5.28	36.20	40.40	49.18	50.26	74.00	-23.74	Vertical		
8441.459	6.18	36.18	38.80	47.24	50.80	74.00	-23.20	Vertical		
11056.090	6.23	38.49	37.88	46.20	53.04	74.00	-20.96	Vertical		
1593.340	2.58	28.84	39.39	46.93	38.96	74.00	-35.04	Horizontal		
3983.750	4.14	33.80	41.02	47.83	44.75	74.00	-29.25	Horizontal		
5689.360	5.02	35.20	41.19	48.99	48.02	74.00	-25.98	Horizontal		
7470.558	6.08	35.99	39.64	48.14	50.57	74.00	-23.43	Horizontal		
9834.406	5.98	37.54	37.60	46.44	52.36	74.00	-21.64	Horizontal		
11370.050	6.31	38.43	38.02	46.26	52.98	74.00	-21.02	Horizontal		
Test mode:		802.11b		Test channel:		Middle		Remark:		Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
1378.143	2.44	27.88	39.30	46.97	37.99	74.00	-36.01	Vertical		
3709.691	3.91	33.45	40.83	48.60	45.13	74.00	-28.87	Vertical		
5689.360	5.02	35.20	41.19	49.66	48.69	74.00	-25.31	Vertical		
8042.903	6.20	36.01	39.15	48.47	51.53	74.00	-22.47	Vertical		
10087.960	5.99	37.82	37.48	45.38	51.71	74.00	-22.29	Vertical		
11486.410	6.34	38.40	38.06	46.86	53.54	74.00	-20.46	Vertical		
1450.122	2.49	28.01	39.33	46.95	38.12	74.00	-35.88	Horizontal		
1837.456	2.73	30.57	39.50	46.66	40.46	74.00	-33.54	Horizontal		
4536.000	4.52	35.14	41.43	48.51	46.74	74.00	-27.26	Horizontal		
6347.466	5.22	36.12	40.63	48.48	49.19	74.00	-24.81	Horizontal		
8441.459	6.18	36.18	38.80	47.35	50.91	74.00	-23.09	Horizontal		
11084.270	6.24	38.48	37.90	45.96	52.78	74.00	-21.22	Horizontal		

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Test mode:		802.11b		Test channel:		Highest		Remark:		Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
1601.472	2.58	28.84	39.40	47.26	39.28	74.00	-34.72	Vertical		
3291.385	3.56	33.28	40.52	47.83	44.15	74.00	-29.85	Vertical		
4594.102	4.55	35.06	41.47	49.54	47.68	74.00	-26.32	Vertical		
6428.771	5.24	36.20	40.55	48.99	49.88	74.00	-24.12	Vertical		
8104.559	6.20	36.04	39.10	47.97	51.11	74.00	-22.89	Vertical		
10999.950	6.22	38.50	37.86	46.69	53.55	74.00	-20.45	Vertical		
1378.143	2.44	27.88	39.30	49.24	40.26	74.00	-33.74	Horizontal		
4107.316	4.23	34.13	41.12	49.54	46.78	74.00	-27.22	Horizontal		
5806.408	5.06	35.40	41.09	49.79	49.16	74.00	-24.84	Horizontal		
7566.249	6.19	36.00	39.56	48.60	51.23	74.00	-22.77	Horizontal		
9859.472	5.98	37.56	37.58	46.04	52.00	74.00	-22.00	Horizontal		
11692.920	6.39	38.59	38.15	46.85	53.68	74.00	-20.32	Horizontal		

Test mode:		802.11g		Test channel:		Lowest		Remark:		Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
1724.166	2.66	29.83	39.45	47.73	40.77	74.00	-33.23	Vertical		
3516.592	3.75	33.22	40.67	48.56	44.86	74.00	-29.14	Vertical		
4501.492	4.49	35.20	41.40	48.75	47.04	74.00	-26.96	Vertical		
6156.505	5.17	35.88	40.79	49.24	49.50	74.00	-24.50	Vertical		
7961.425	6.21	36.00	39.23	48.83	51.81	74.00	-22.19	Vertical		
10243.220	6.03	38.00	37.54	46.30	52.79	74.00	-21.21	Vertical		
1514.252	2.52	28.22	39.36	47.90	39.28	74.00	-34.72	Horizontal		
3709.691	3.91	33.45	40.83	48.94	45.47	74.00	-28.53	Horizontal		
5034.994	4.79	34.43	41.76	49.75	47.21	74.00	-26.79	Horizontal		
6696.010	5.31	36.11	40.31	49.98	51.09	74.00	-22.91	Horizontal		
8377.241	6.19	36.15	38.87	47.93	51.40	74.00	-22.60	Horizontal		
10560.940	6.11	38.32	37.68	46.77	53.52	74.00	-20.48	Horizontal		

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Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
1557.252	2.56	28.59	39.38	46.75	38.52	74.00	-35.48	Vertical		
3588.939	3.81	33.30	40.73	48.14	44.52	74.00	-29.48	Vertical		
5034.994	4.79	34.43	41.76	48.44	45.90	74.00	-28.10	Vertical		
6696.010	5.31	36.11	40.31	48.55	49.66	74.00	-24.34	Vertical		
8637.084	6.17	36.31	38.64	47.17	51.01	74.00	-22.99	Vertical		
11140.850	6.26	38.47	37.92	46.57	53.38	74.00	-20.62	Vertical		
1711.050	2.65	29.70	39.44	46.26	39.17	74.00	-34.83	Horizontal		
3709.691	3.91	33.45	40.83	48.22	44.75	74.00	-29.25	Horizontal		
4501.492	4.49	35.20	41.40	48.21	46.50	74.00	-27.50	Horizontal		
5806.408	5.06	35.40	41.09	48.65	48.02	74.00	-25.98	Horizontal		
7547.013	6.17	36.00	39.57	48.18	50.78	74.00	-23.22	Horizontal		
10062.310	5.99	37.78	37.47	45.55	51.85	74.00	-22.15	Horizontal		

Test mode:		802.11g		Test channel:		Highest		Remark:		Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
1724.166	2.66	29.83	39.45	47.66	40.70	74.00	-33.30	Vertical		
3625.669	3.84	33.34	40.76	48.03	44.45	74.00	-29.55	Vertical		
4536.000	4.52	35.14	41.43	48.60	46.83	74.00	-27.17	Vertical		
5674.896	5.01	35.18	41.20	49.58	48.57	74.00	-25.43	Vertical		
7394.878	6.00	35.96	39.71	48.74	50.99	74.00	-23.01	Vertical		
10427.370	6.08	38.22	37.62	45.67	52.35	74.00	-21.65	Vertical		
1728.561	2.66	29.83	39.45	46.27	39.31	74.00	-34.69	Horizontal		
4399.537	4.42	34.92	41.33	47.97	45.98	74.00	-28.02	Horizontal		
6283.164	5.20	36.04	40.68	49.17	49.73	74.00	-24.27	Horizontal		
7566.249	6.19	36.00	39.56	48.64	51.27	74.00	-22.73	Horizontal		
9370.083	6.05	37.03	37.99	46.22	51.31	74.00	-22.69	Horizontal		
11341.140	6.30	38.43	38.00	46.52	53.25	74.00	-20.75	Horizontal		

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

2) As shown in this section, for frequencies above 1GHz, the 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. So, only the peak measurements were shown in the report.

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### 5.8 Band Edge (Radiated Emission)

Test Requirement:	FCC Part15 C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2009		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test Setup:

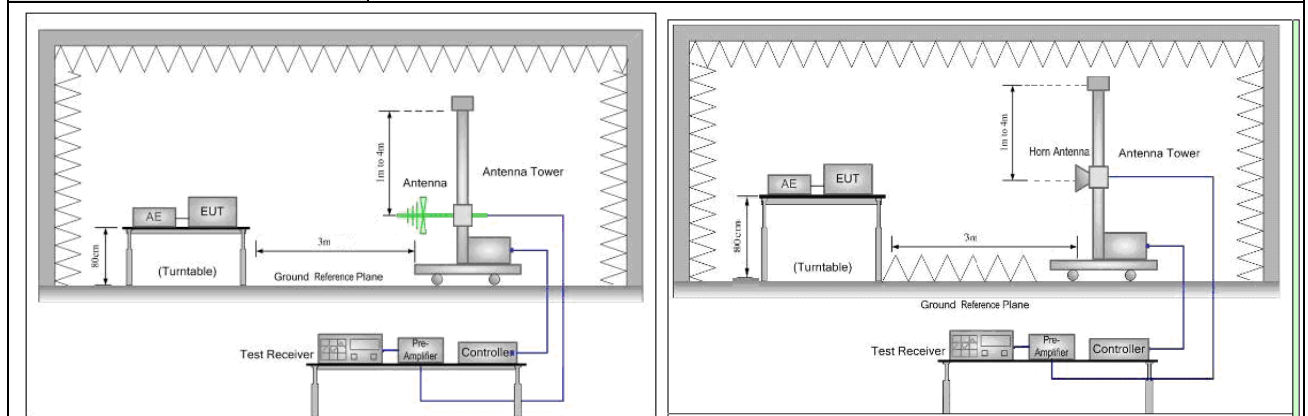


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz

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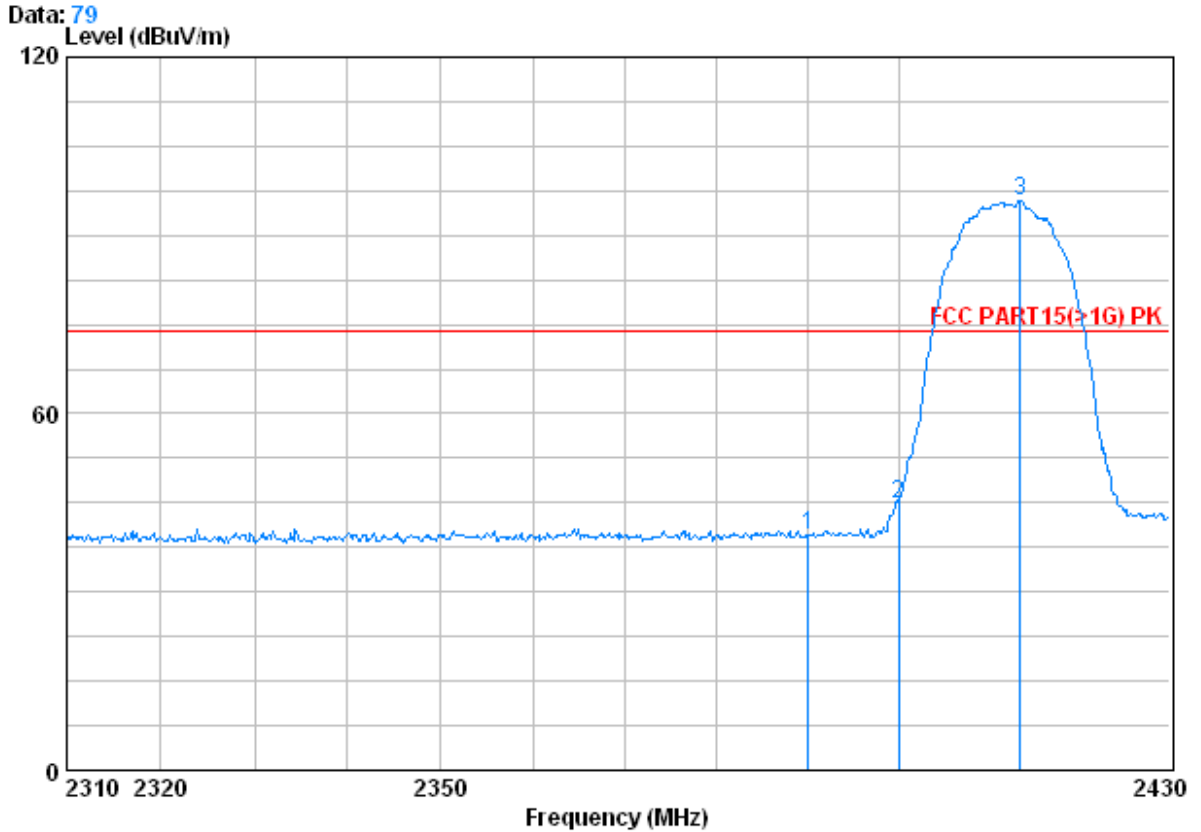


Test Procedure:	<ul style="list-style-type: none"><li>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li><li>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li><li>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li><li>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li><li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li><li>f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</li><li>g. Test the EUT in the lowest channel , the Highest channel</li><li>h. Repeat above procedures until all frequencies measured was complete.</li></ul>
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g.
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

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Test mode:	802.11b	Test channel:	Lowest	Remark:	Peak	Vertical
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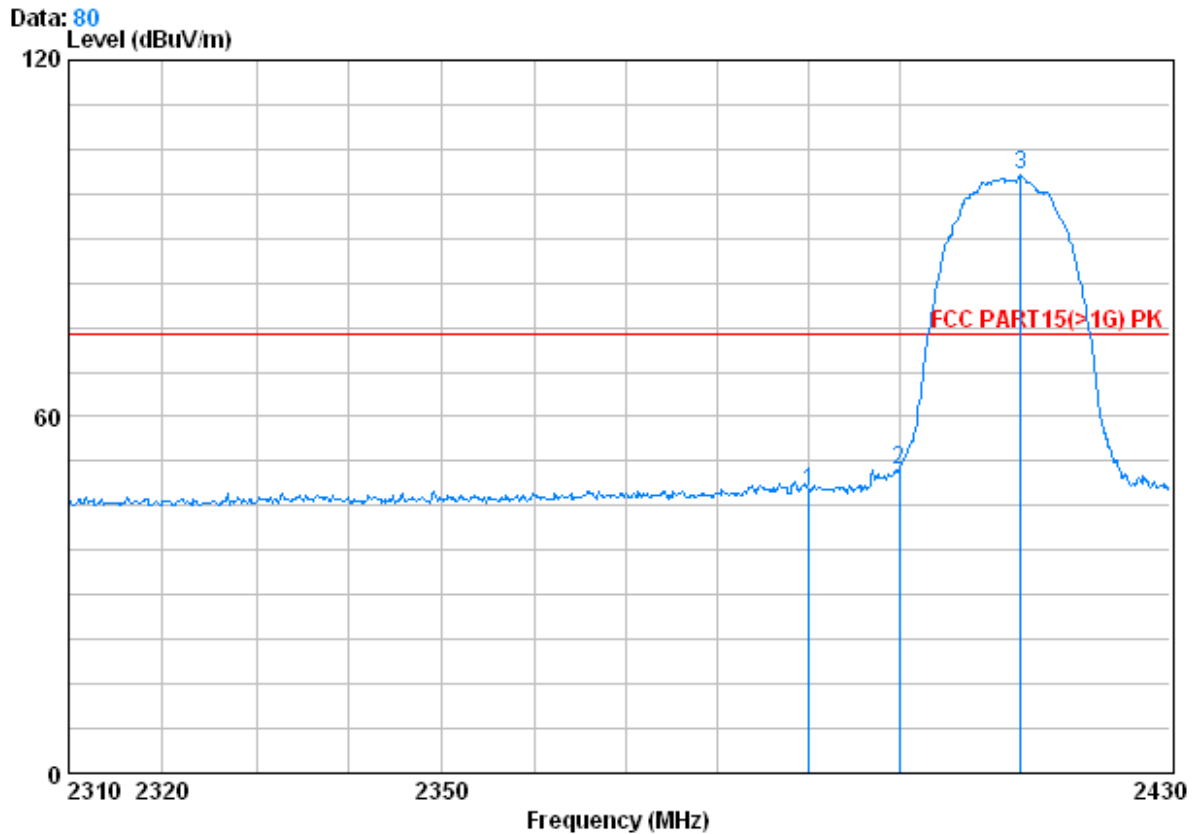
Condition : FCC PART15(>1G) PK 3m VERTICAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	43.99	39.63	74.00	-34.37	Peak
2	2400.000	2.98	32.51	39.86	49.27	44.91	74.00	-29.09	Peak
3 X	2413.440	2.99	32.54	39.86	100.20	95.87	74.00	21.87	Peak

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Test mode:	802.11b	Test channel:	Lowest	Remark:	Peak	Horizontal
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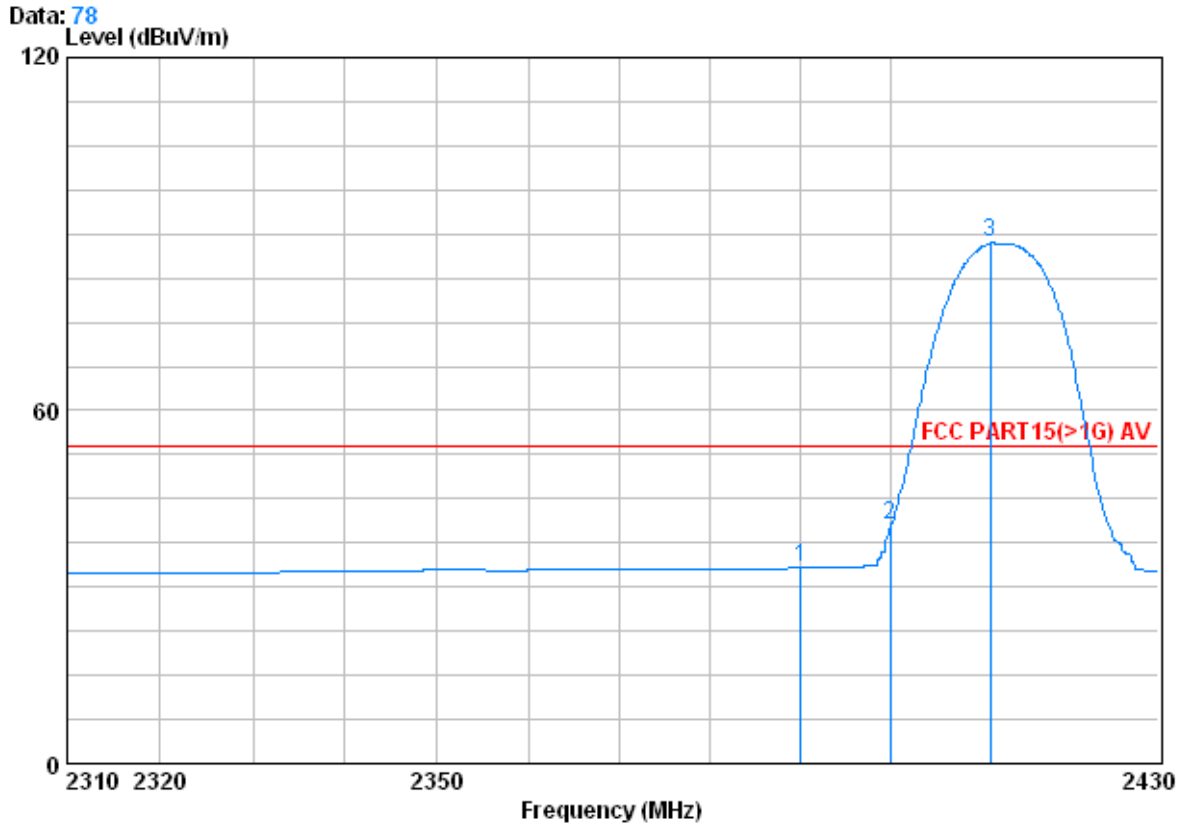
Condition : FCC PART15(>1G) PK 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	CableAntenna Loss	Antenna Factor	Preamplifier	Read Level	Limit	Over	Remark
	MHz	dB	dB/m	Factor	dBuV	Line	Limit	
				dB	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	51.76	74.00	-26.60	Peak
2	2400.000	2.98	32.51	39.86	55.49	74.00	-22.88	Peak
3 X	2413.440	2.99	32.54	39.86	104.99	74.00	26.66	Peak

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Test mode:	802.11b	Test channel:	Lowest	Remark:	Average	Vertical
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Condition : FCC PART15(>1G) AV 3m VERTICAL  
Job No. : 1212RF  
test mode : low channel

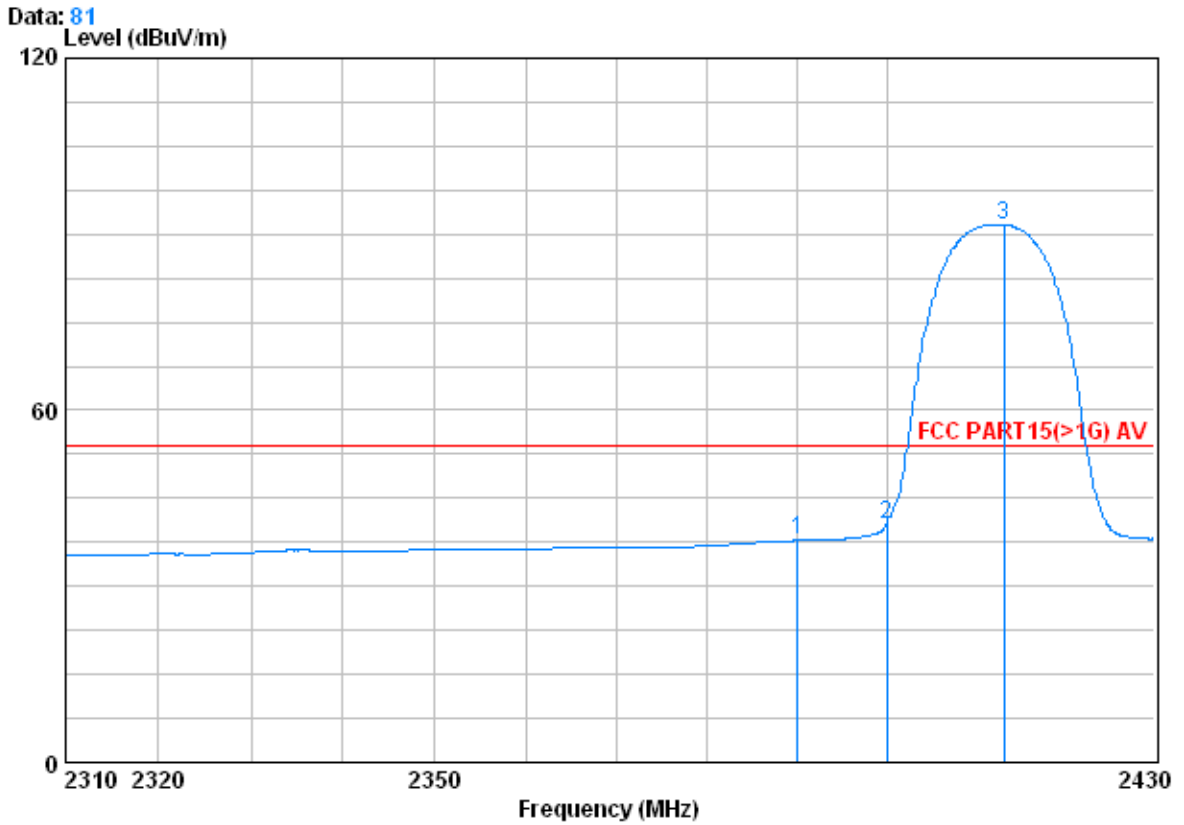
	Freq	CableAntenna Loss	Antenna Factor	Preamplifier	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	37.62	33.27	54.00	-20.73	Peak
2	2400.000	2.98	32.51	39.86	44.87	40.50	54.00	-13.50	Peak
3 X	2411.160	2.99	32.54	39.86	92.87	88.54	54.00	34.54	Peak



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Test mode:	802.11b	Test channel:	Lowest	Remark:	Average	Horizontal
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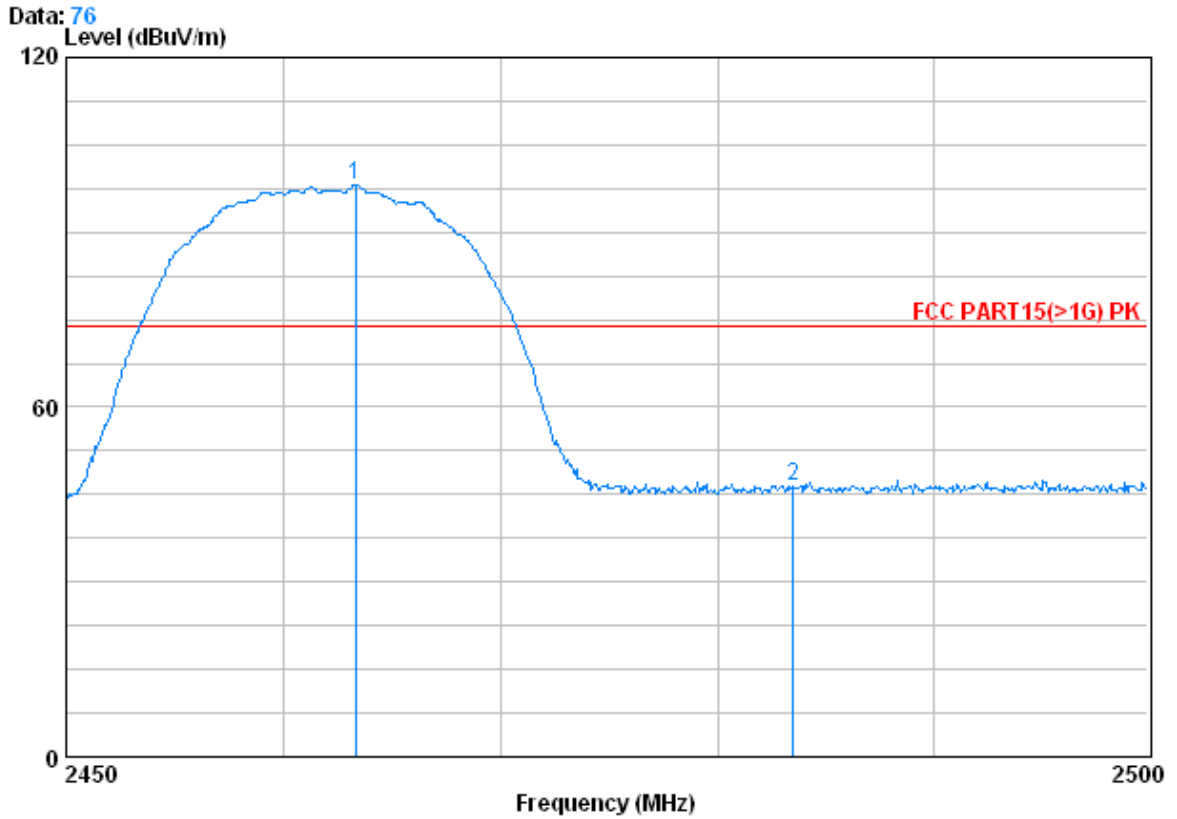
Condition : FCC PART15(>1G) AV 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	CableAntenna Loss	Antenna Factor	Preamplifier	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	42.17	37.82	-16.18	Peak
2	2400.000	2.98	32.51	39.86	45.00	40.63	-13.37	Peak
3	2413.080	2.99	32.54	39.86	95.95	91.63	37.63	Peak

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Test mode:	802.11b	Test channel:	Highest	Remark:	Peak	Vertical
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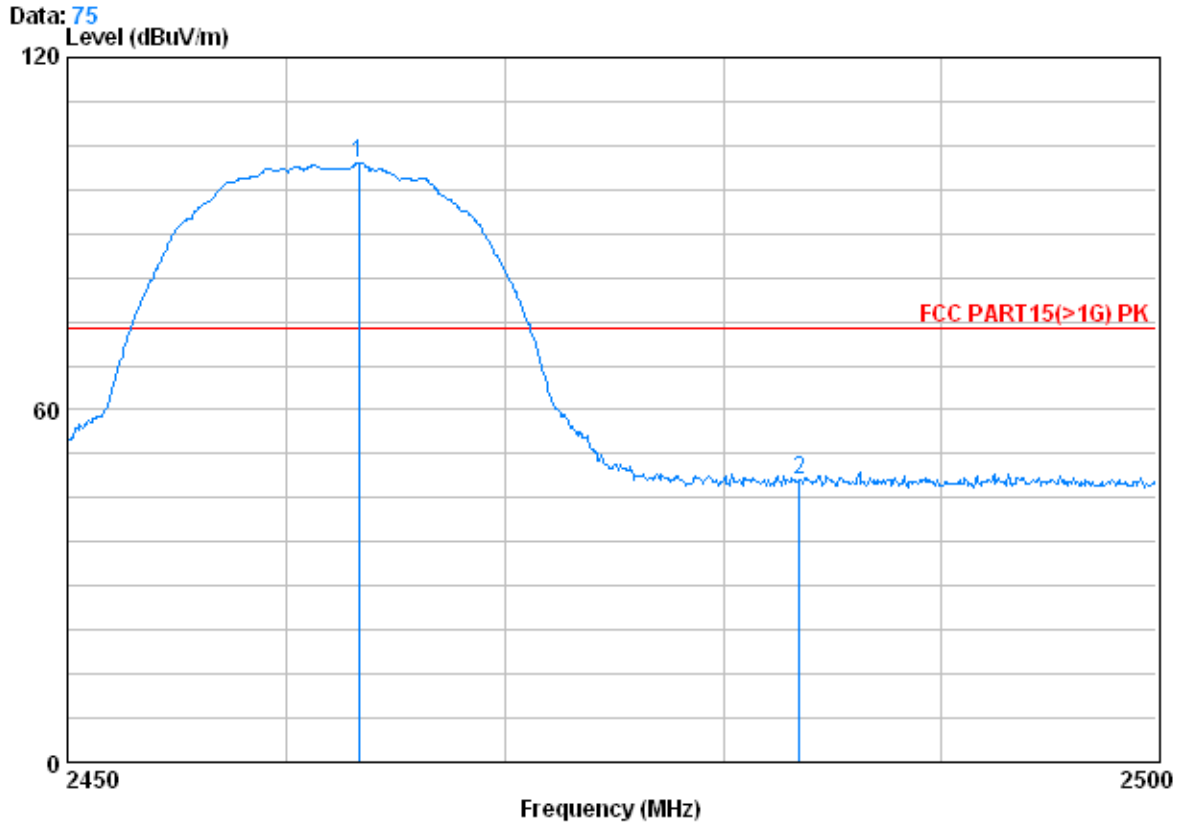
Condition : FCC PART15(>1G) PK 3m VERTICAL  
 Job No. : 1212RF  
 test mode : high channel

		Cable	Antenna	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 X	2463.300	3.02	32.64	39.91	102.29	98.04	74.00	24.04 Peak
2	2483.500	3.03	32.67	39.92	50.79	46.57	74.00	-27.43 Peak

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Test mode:	802.11b	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition : FCC PART15(>1G) PK 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : high channel

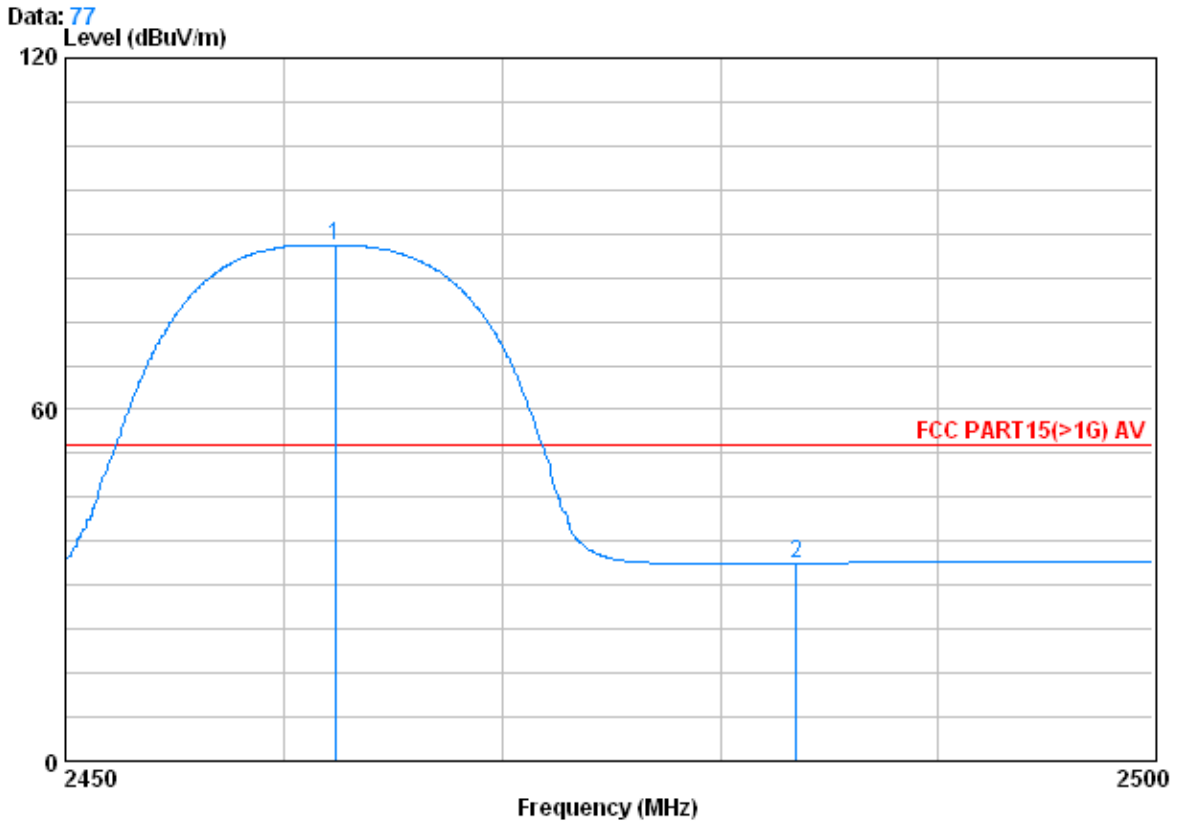
		Cable	Antenna	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 X	2463.300	3.02	32.64	39.91	106.37	102.13	74.00	28.13	Peak
2	2483.500	3.03	32.67	39.92	52.14	47.92	74.00	-26.08	Peak

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Test mode:	802.11b	Test channel:	Highest	Remark:	Average	Vertical
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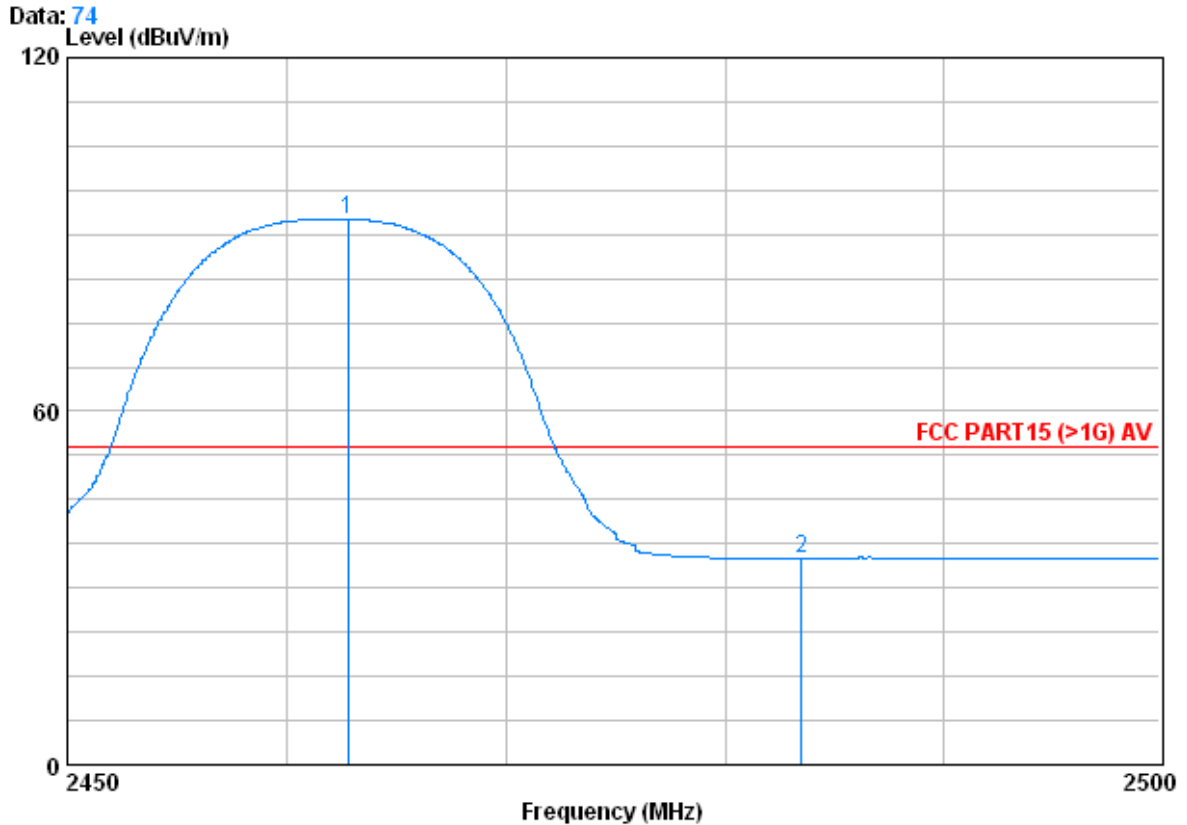
Condition : FCC PART15(>1G) AV 3m VERTICAL  
 Job No. : 1212RF  
 test mode : high channel

		CableAntenna	Preamp	Read	Limit	Over		
	Freq	Loss	Factor	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	
1 X	2462.300	3.02	32.64	39.91	92.34	88.10	54.00	34.10 Peak
2	2483.500	3.03	32.67	39.92	37.94	33.72	54.00	-20.28 Peak

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Test mode:	802.11b	Test channel:	Highest	Remark:	Average	Horizontal
------------	---------	---------------	---------	---------	---------	------------



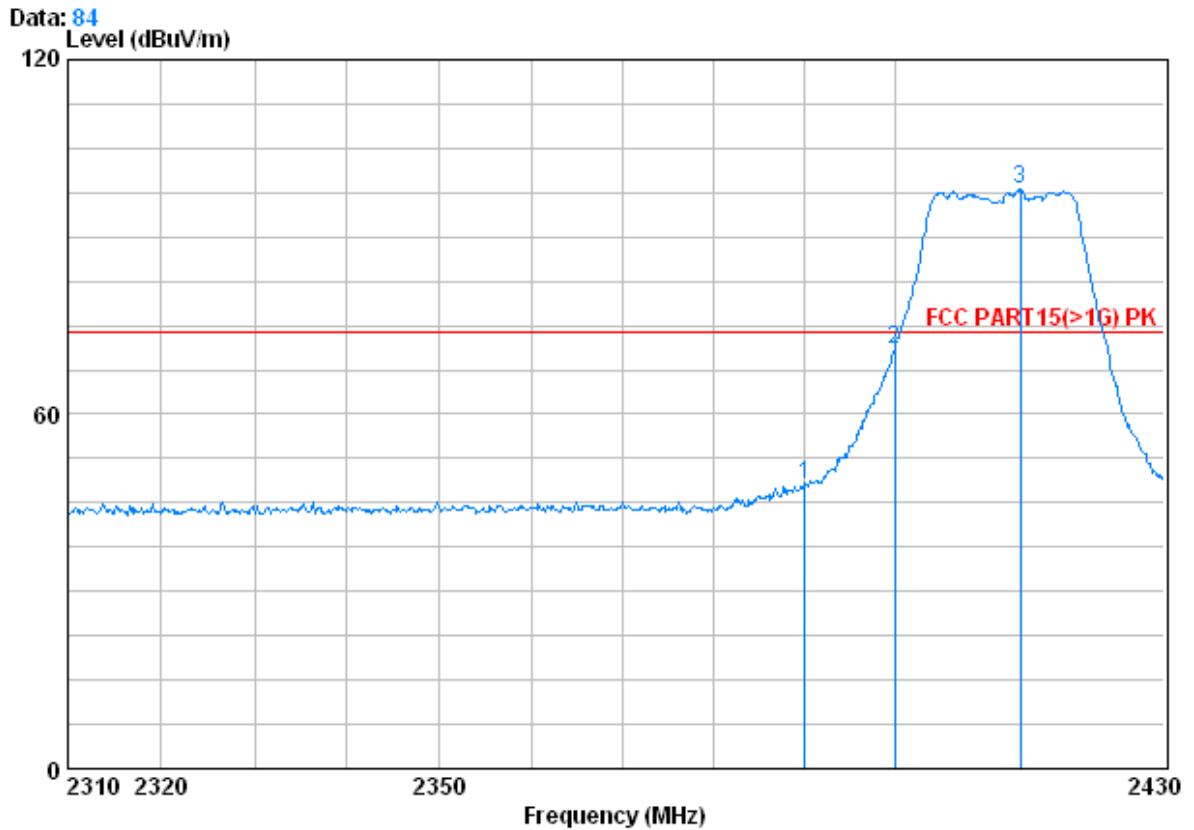
Condition : FCC PART15 (>1G) AV 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : high channel

	Freq	CableAntenna Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 @	2462.750	3.02	32.64	39.91	96.86	92.61	54.00	38.61	Peak
2	2483.500	3.03	32.67	39.92	39.35	35.13	54.00	-18.87	Peak

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Test mode:	802.11g	Test channel:	Lowest	Remark:	Peak	Vertical
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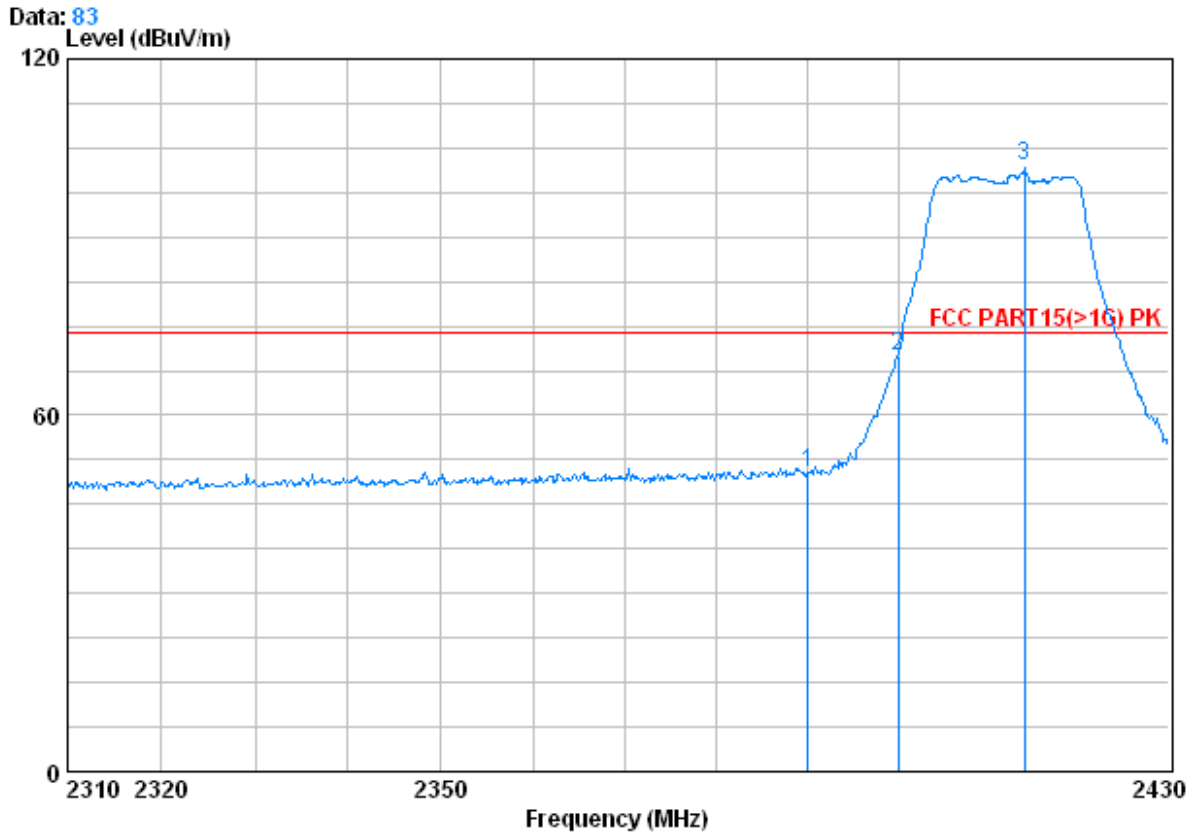
Condition : FCC PART15(>1G) PK 3m VERTICAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	CableAntenna Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	52.30	47.94	74.00	-26.06	Peak
2	2400.000	2.98	32.51	39.86	75.31	70.94	74.00	-3.06	Peak
3 X	2413.920	2.99	32.54	39.86	102.32	97.99	74.00	23.99	Peak

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Test mode:	802.11g	Test channel:	Lowest	Remark:	Peak	Horizontal
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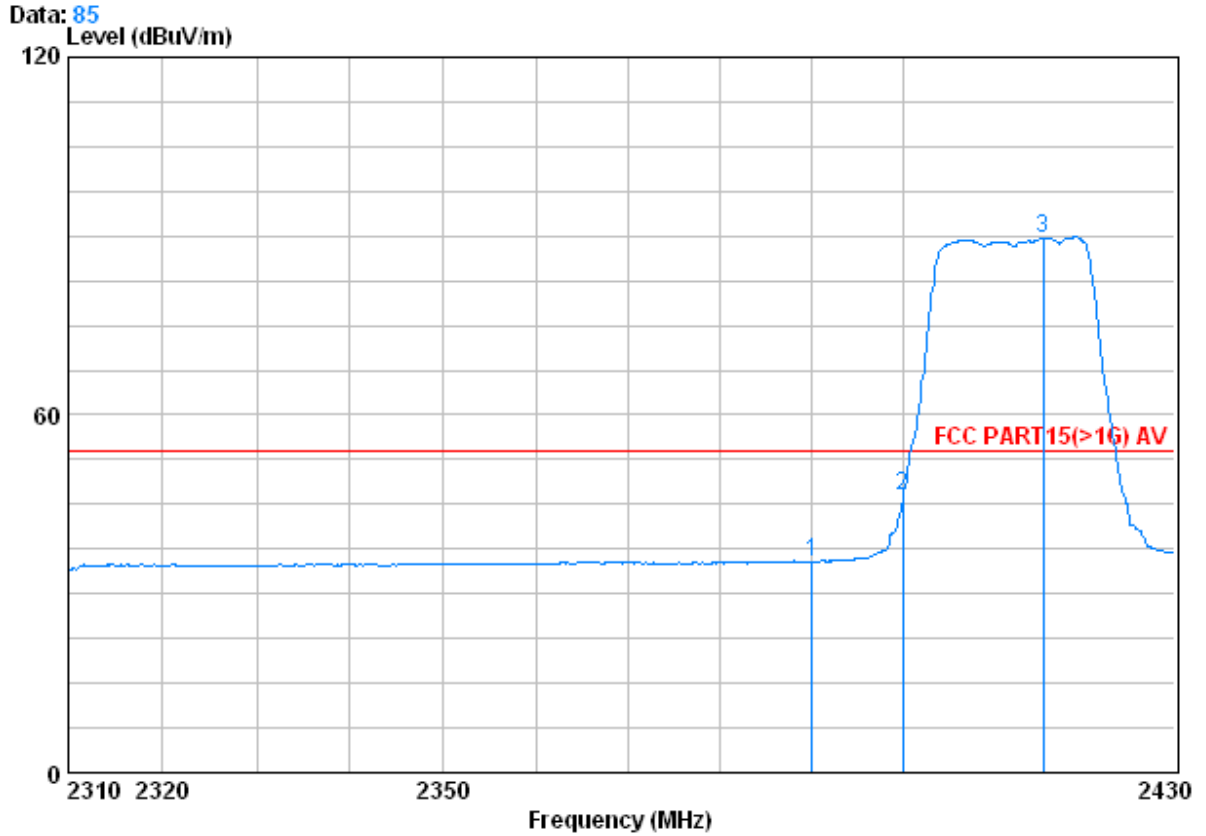
Condition : FCC PART15(>1G) PK 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	54.78	50.42	74.00	-23.58	Peak
2	2400.000	2.98	32.51	39.86	74.26	69.89	74.00	-4.11	Peak
3 X	2413.920	2.99	32.54	39.86	106.28	101.96	74.00	27.96	Peak

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Test mode:	802.11g	Test channel:	Lowest	Remark:	Average	Vertical
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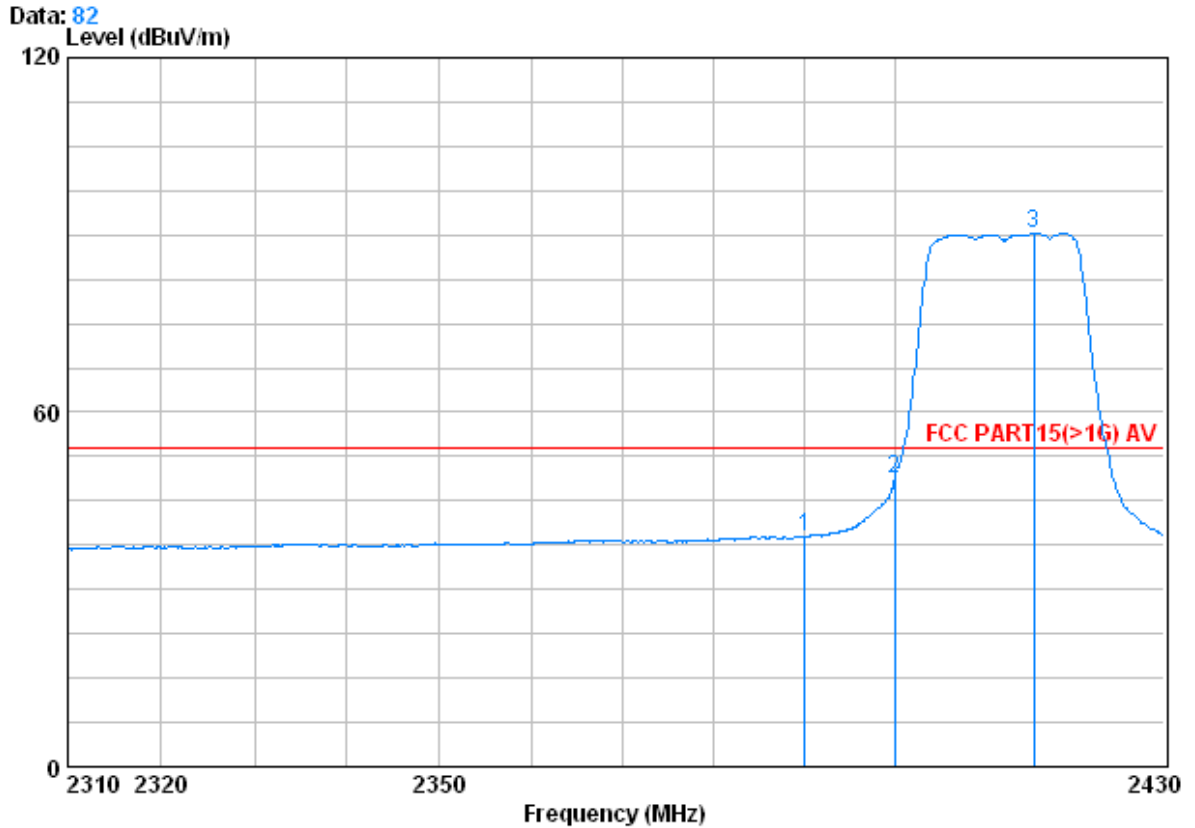
Condition : FCC PART15(>1G) AV 3m VERTICAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	CableAntenna Loss	Antenna Factor	Preamplifier	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	39.69	35.34	54.00	-18.66	Peak
2	2400.000	2.98	32.51	39.86	50.74	46.37	54.00	-7.63	Peak
3	2415.480	2.99	32.54	39.86	93.96	89.64	54.00	35.64	Peak

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Test mode:	802.11g	Test channel:	Lowest	Remark:	Average	Horizontal
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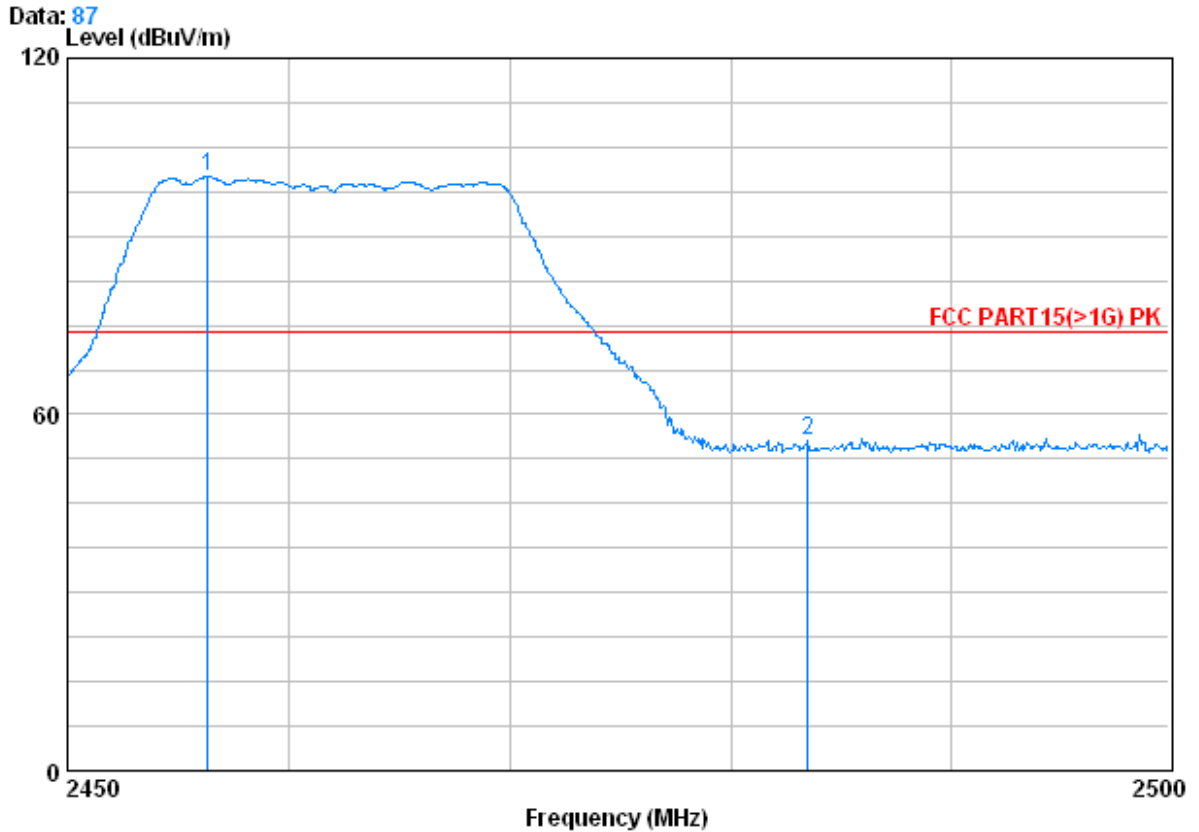
Condition : FCC PART15(>1G) AV 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : low channel

	Freq	CableAntenna Loss	Antenna Factor	Preamp Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	43.34	38.98	54.00	-15.02 Peak
2	2400.000	2.98	32.51	39.86	52.94	48.58	54.00	-5.42 Peak
3 @	2415.480	2.99	32.54	39.86	94.63	90.30	54.00	36.30 Peak

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Test mode:	802.11g	Test channel:	Highest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL  
 Job No. : 1212RF  
 test mode : high channel

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 X	2456.300	3.01	32.64	39.91	104.38	100.12	74.00	26.12	Peak
2	2483.500	3.03	32.67	39.92	59.84	55.62	74.00	-18.38	Peak



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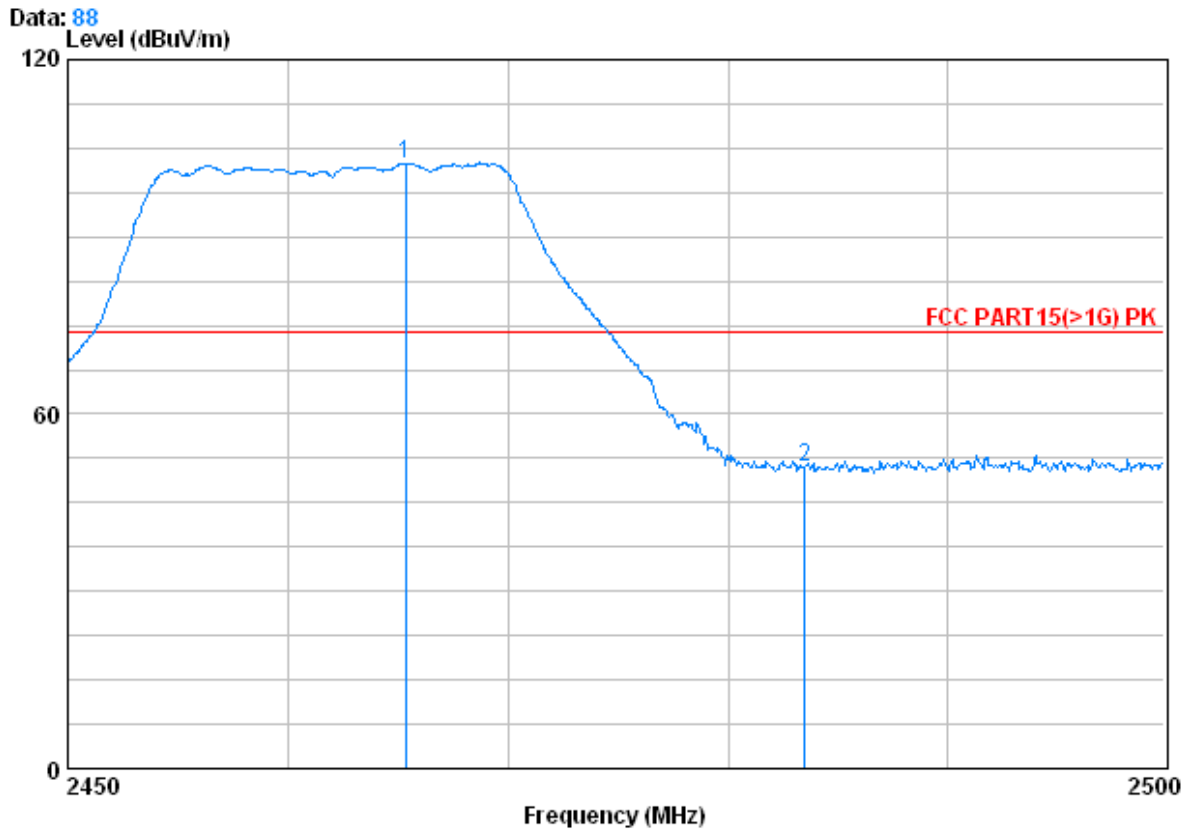


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM120300121201

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Test mode:	802.11g	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition : FCC PART15(>1G) PK 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : high channel

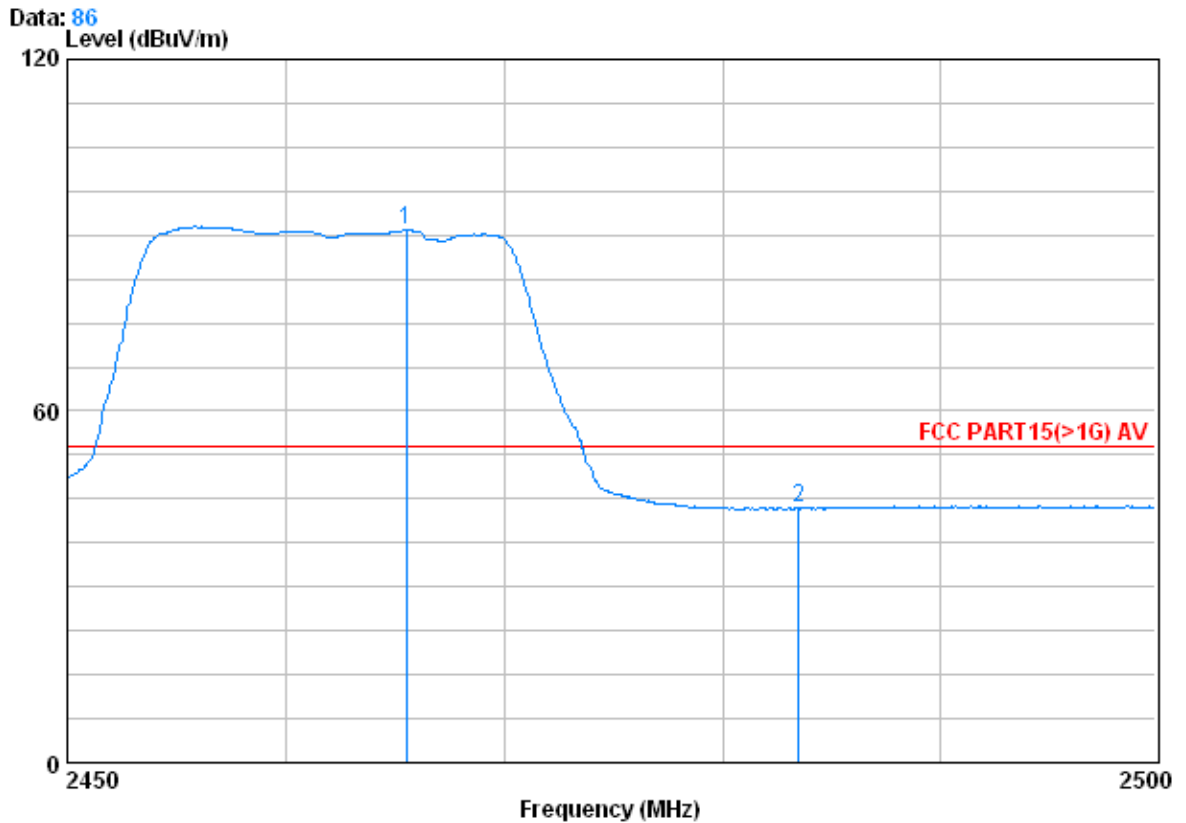
		Cable	Antenna	Preamp	Read	Limit	Over			
	Freq	Loss	Factor	Factor	Level	Line	Limit	Remark		
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	X	2465.300	3.02	32.64	39.91	106.73	102.49	74.00	28.49	Peak
2		2483.500	3.03	32.67	39.92	55.17	50.95	74.00	-23.05	Peak

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Test mode:	802.11g	Test channel:	Highest	Remark:	Average	Vertical
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Condition : FCC PART15(>1G) AV 3m VERTICAL

Job No. : 1212RF

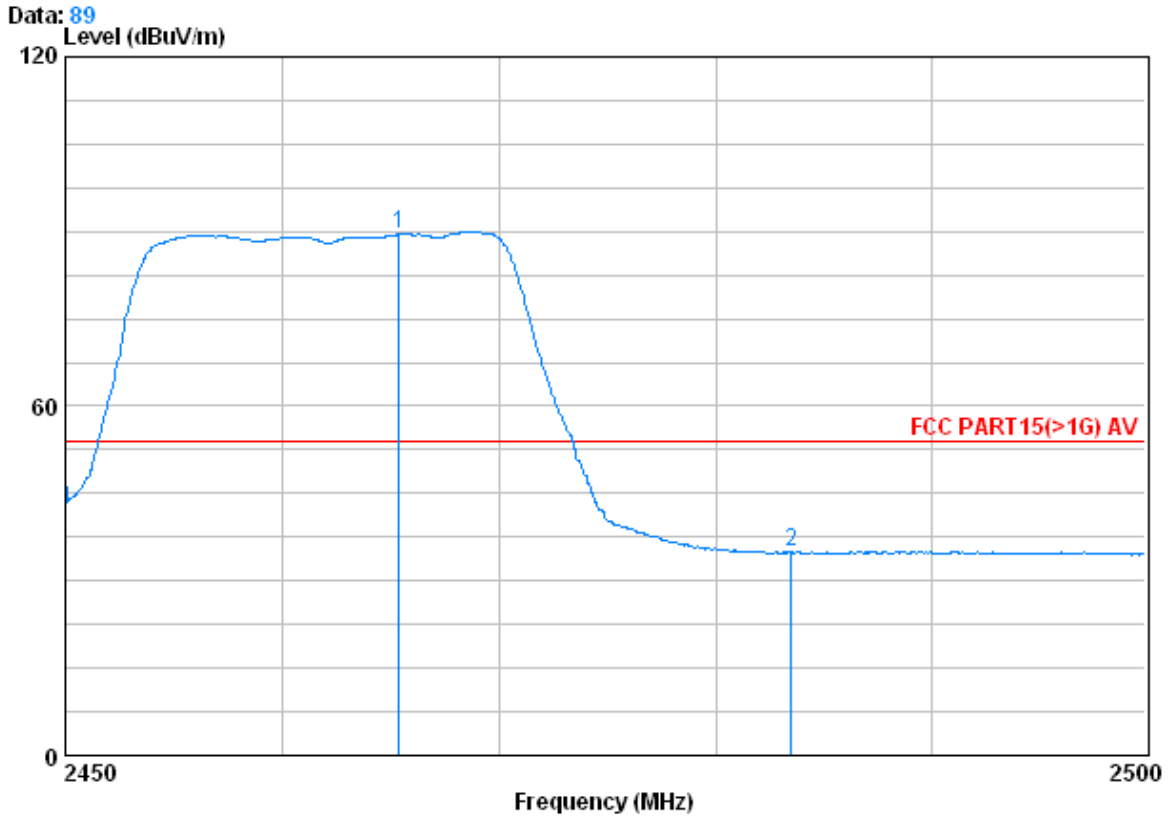
test mode : high channel

	Freq	Cable&Antenna Loss Factor	Preamp Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1 @	2465.500	3.02	32.64	39.91	95.08	90.83	54.00 36.83 Peak
2	2483.500	3.03	32.67	39.92	47.65	43.43	54.00 -10.57 Peak

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Test mode:	802.11g	Test channel:	Highest	Remark:	Average	Horizontal
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Condition : FCC PART15(>1G) AV 3m HORIZONTAL  
 Job No. : 1212RF  
 test mode : high channel

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2465.350	3.02	32.64	39.91	93.81	89.56	54.00	35.56	Peak
2	2483.500	3.03	32.67	39.92	39.06	34.84	54.00	-19.16	Peak

Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

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