



## SGS-CSTC Standards Technical Services Ltd.

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Report No.: SZEM130600343103  
Page: 1 of 84

# FCC REPORT

**Application No:** SZEM1306003431RF  
**Applicant:** Vignet Incorporated  
**Manufacturer:** IDT Technology Limited  
**Factory:** IDT Technology Limited  
**Product Name:** The Hub device  
**Model No.(EUT):** AD802  
**Add Model No.:** AD803, AD8XX where(X=0,1,2,...9)  
**FCC ID:** 2AAS3VHUBI  
**Standards:** 47 CFR Part 15, Subpart C (2012)  
**Date of Receipt:** 2013-07-19  
**Date of Test:** 2013-07-25 to 2013-09-05  
**Date of Issue:** 2013-10-25

<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
<b>Antenna Requirement</b>	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2009	PASS
<b>AC Power Line Conducted Emission</b>	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2009	PASS
<b>Conducted Peak Output Power</b>	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	KDB558074 D01	PASS
<b>6dB Occupied Bandwidth</b>	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	KDB558074 D01	PASS
<b>Power Spectral Density</b>	47 CFR Part 15, Subpart C Section 15.247 (e)	KDB558074 D01	PASS
<b>Band-edge for RF Conducted Emissions</b>	47 CFR Part 15, Subpart C Section 15.247(d)	KDB558074 D01	PASS
<b>RF Conducted Spurious Emissions</b>	47 CFR Part 15, Subpart C Section 15.247(d)	KDB558074 D01	PASS
<b>Radiated Spurious Emissions</b>	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2009	PASS
<b>Band Edge (Radiated Emission)</b>	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2009	PASS

Remark:

Model No.: AD802, AD803, AD8XX where(X=0,1,2,...9)

Only the Model AD802 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models. Only different on exterior.



### 3 Contents

	Page
1 COVER PAGE .....	1
2 TEST SUMMARY .....	2
3 CONTENTS .....	3
4 GENERAL INFORMATION .....	4
4.1 CLIENT INFORMATION .....	4
4.2 GENERAL DESCRIPTION OF EUT .....	4
4.3 TEST ENVIRONMENT AND MODE .....	6
4.4 DESCRIPTION OF SUPPORT UNITS .....	6
4.5 TEST LOCATION .....	6
4.6 TEST FACILITY .....	7
4.7 DEVIATION FROM STANDARDS .....	7
4.8 ABNORMALITIES FROM STANDARD CONDITIONS .....	7
4.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER .....	7
4.10 EQUIPMENT LIST .....	8
5 TEST RESULTS AND MEASUREMENT DATA .....	11
5.1 ANTENNA REQUIREMENT .....	11
5.2 CONDUCTED EMISSIONS .....	12
5.3 CONDUCTED PEAK OUTPUT POWER .....	16
5.4 6dB OCCUPY BANDWIDTH .....	23
5.5 POWER SPECTRAL DENSITY .....	30
5.6 BAND-EDGE FOR RF CONDUCTED EMISSIONS .....	37
5.7 RF CONDUCTED SPURIOUS EMISSIONS .....	41
5.8 RADIATED SPURIOUS EMISSIONS .....	47
5.8.1 Radiated emission below 1GHz .....	50
5.8.2 Transmitter emission above 1GHz .....	52
5.9 BAND EDGE (RADIATED EMISSION) .....	57
6 PHOTOGRAPHS - EUT TEST SETUP .....	83
6.1 RADIATED SPURIOUS EMISSION .....	83
6.2 CONDUCTED EMISSION .....	84
7 PHOTOGRAPHS - EUT CONSTRUCTIONAL DETAILS .....	84



## 4 General Information

### 4.1 Client Information

Applicant:	Vignet Incorporated
Address of Applicant:	1616 Anderson Road, Mclean, VA USA
Manufacturer:	IDT Technology Limited
Address of Manufacturer:	Block C, 9/F., Kaiser Estate, Phase 1, 41 Man Yue Street, Hung Hom, Kowloon, Hong Kong.
Factory:	IDT Technology Limited
Address of Factory:	Chentian Industrial Estate Xixiang, BaoAn, Shenzhen, P.R.C.

### 4.2 General Description of EUT

Product Name:	The Hub device	
Model No.:	AD802, AD803, AD8XX where(X=0,1,2,...9)	
Trade Mark:	Vignet	
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz	
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 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) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)	
Sample Type:	fixed production	
Test Power Grade:	N/A(manufacturer declare )	
Test Software of EUT:	N/A (manufacturer declare )	
Antenna Type:	Integral	
Antenna Gain:	1.15dBi	
Power Supply:	Adapter:	MODEL NO.:SCE0501500P INPUT:100-240V~50-60Hz 300mA OUTPUT:5V 1500mA
	Battery:	Li-Ion Battery, 3.7V 480mAh
Test Voltage:	AC 120V~ 60Hz	
DC cable:	141cm	



Operation Frequency each of channel(802.11b/g/n HT20)							
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/n (HT20):

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



### 4.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode:	The EUT transmitted the continuous modulation test signal at the specific channel(s)

### 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)**

Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

## 4.7 Deviation from Standards

None.

## 4.8 Abnormalities from Standard Conditions

None.

## 4.9 Other Information Requested by the Customer

None.

**4.10 Equipment List**

<b>Conducted Emission</b>					
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal.Due date (yyyy-mm-dd)</b>
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	2014-06-10
2	LISN	Rohde & Schwarz	ENV216	SEL0152	2013-10-24
3	LISN	ETS-LINDGREN	3816/2	SEL0021	2014-05-16
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	SEL0162	2013-11-10
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	SEL0163	2013-11-10
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	SEL0164	2013-11-10
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	2014-05-16
8	Coaxial Cable	SGS	N/A	SEL0025	2014-05-29
9	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2013-10-24
10	Humidity/ Temperature Indicator	Shanghai Qixiang	ZJ1-2B	SEL0103	2013-10-24
11	Barometer	Chang Chun	DYM3	SEL0088	2014-05-24

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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	2014-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2014-05-16
3	EMI Test software	AUDIX	E3	SEL0050	N/A
4	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2013-10-24
5	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2013-10-24
6	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2013-10-24
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2014-05-16
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2013-10-24
9	Coaxial cable	SGS	N/A	SEL0027	2014-05-29
10	Coaxial cable	SGS	N/A	SEL0189	2014-05-29
11	Coaxial cable	SGS	N/A	SEL0121	2014-05-29
12	Coaxial cable	SGS	N/A	SEL0178	2014-05-29
13	Band filter	Amindeon	82346	SEL0094	2014-05-16
14	Barometer	Chang Chun	DYM3	SEL0088	2014-05-24
15	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2013-10-24
16	Humidity/ Temperature Indicator	Shanghai Qixiang	ZJ1-2B	SEL0103	2013-10-24
17	Signal Generator (10M-27GHz)	Rohde & Schwarz	SMR27	SEL0067	2014-05-16
18	Signal Generator	Rohde & Schwarz	SMY01	SEL0155	2013-10-24
19	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2014-06-04

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RF connected test					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2013-10-24
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2013-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2013-10-24
4	Coaxial cable	SGS	N/A	SEL0178	2014-05-29
5	Coaxial cable	SGS	N/A	SEL0179	2014-05-29
6	Barometer	ChangChun	DYM3	SEL0088	2014-05-24
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2014-05-16
8	Band filter	amideon	82346	SEL0094	2014-05-16
9	POWER METER	R & S	NRVS	SEL0144	2013-10-24
10	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2014-05-16
11	Power Divider(splitter)	Agilent Technologies	11636B	SEL0130	2013-10-24

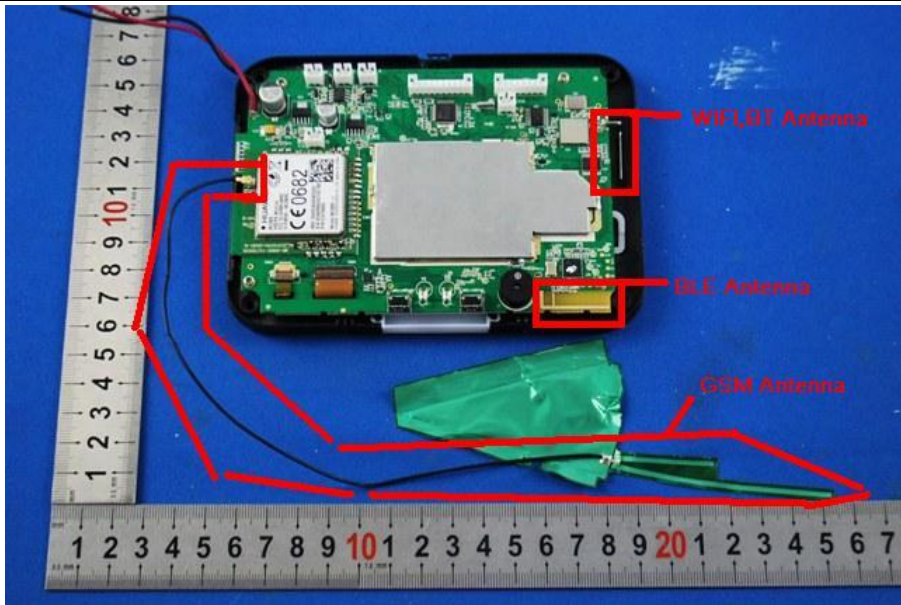
Note: The calibration interval is one year, all the instruments are valid.



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## 5 Test results and Measurement Data

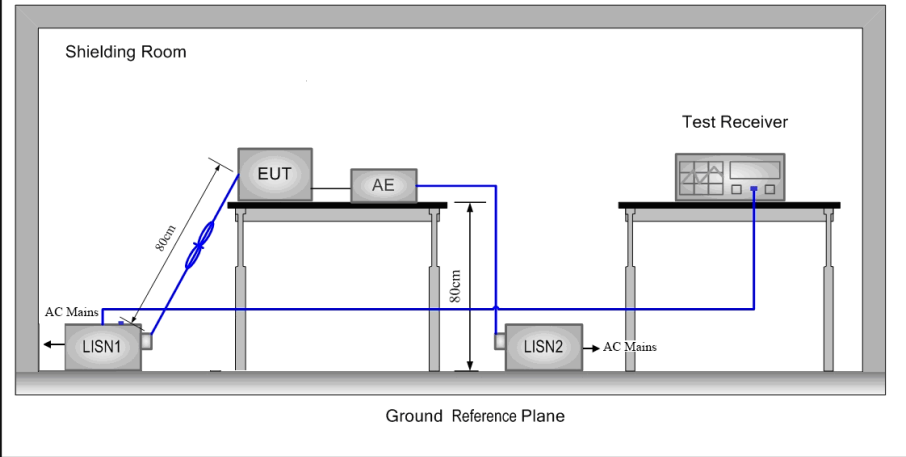
### 5.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 requirement:</p> <p>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:</p> <p>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>	
<b>EUT Antenna:</b>	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.15dBi.</p>	
	



## 5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2009		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none"><li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li><li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li><li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</li><li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li><li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.</li></ol>		

Test Setup:	
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

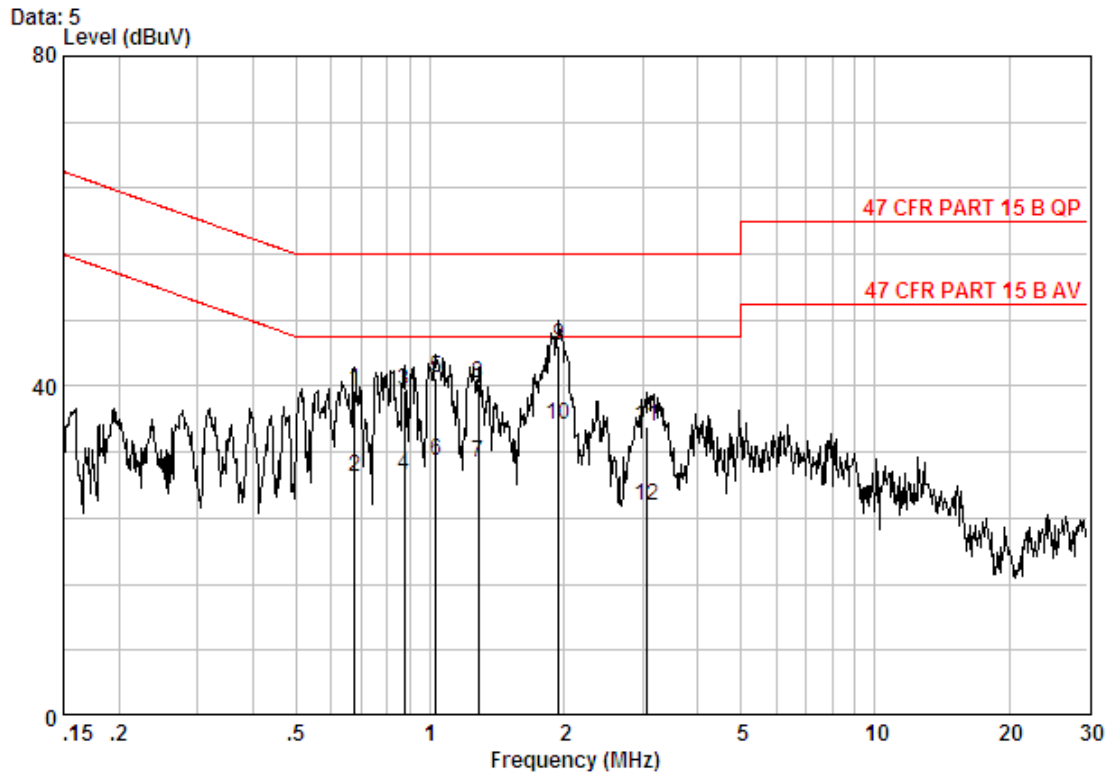
### Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Live Line:



Site : Shielding Room  
Condition : 47 CFR PART 15 B QP CE LINE  
Job No. : 3431RF  
Test mode : TX (Wifi)

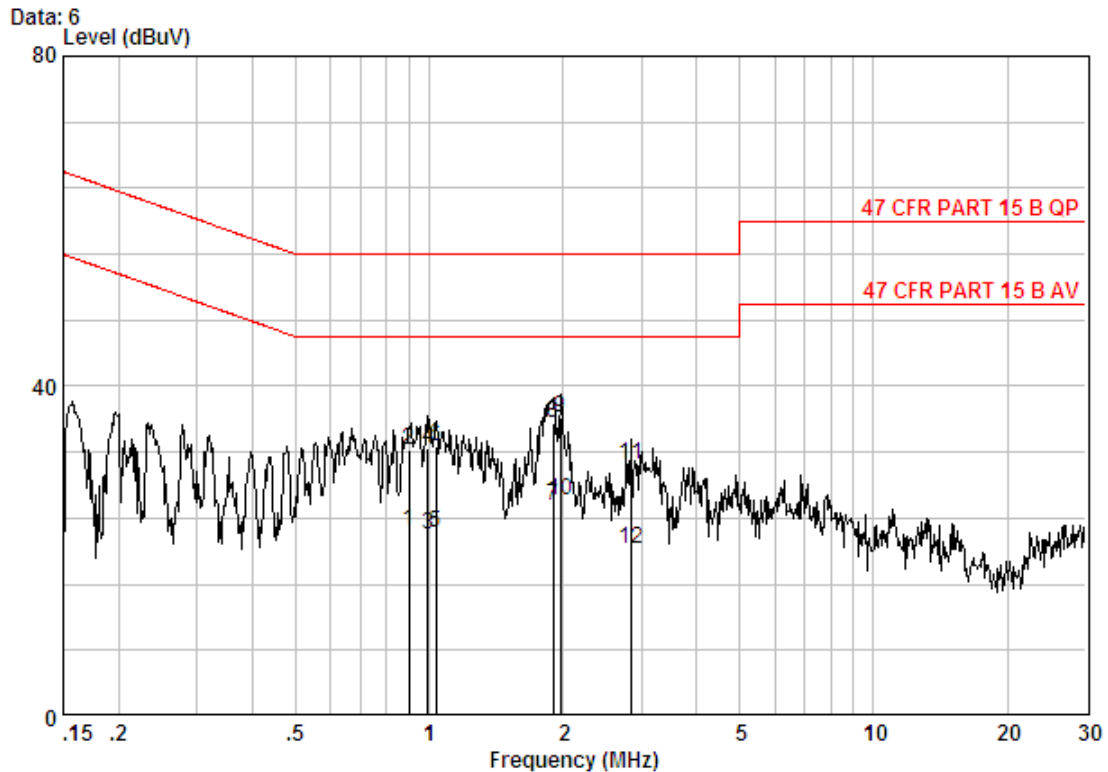
	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.67544	0.02	9.80	29.55	39.37	56.00	-16.63	QP
2	0.67544	0.02	9.80	19.28	29.10	46.00	-16.90	Average
3	0.87566	0.02	9.80	29.74	39.56	56.00	-16.44	QP
4	0.87566	0.02	9.80	19.43	29.25	46.00	-16.75	Average
5	1.032	0.02	9.80	31.07	40.89	56.00	-15.11	QP
6	1.032	0.02	9.80	21.17	30.99	46.00	-15.01	Average
7	1.282	0.02	9.80	20.82	30.64	46.00	-15.36	Average
8	1.282	0.02	9.80	30.56	40.38	56.00	-15.62	QP
9 @	1.949	0.02	9.80	35.04	44.86	56.00	-11.14	QP
10 @	1.949	0.02	9.80	25.43	35.25	46.00	-10.75	Average
11	3.074	0.02	9.85	25.32	35.19	56.00	-20.81	QP
12	3.074	0.02	9.85	15.71	25.58	46.00	-20.42	Average

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Neutral Line:



Site : Shielding Room  
Condition : 47 CFR PART 15 B QP CE NEUTRAL  
Job No. : 3431RF  
Test mode : TX (Wifi)

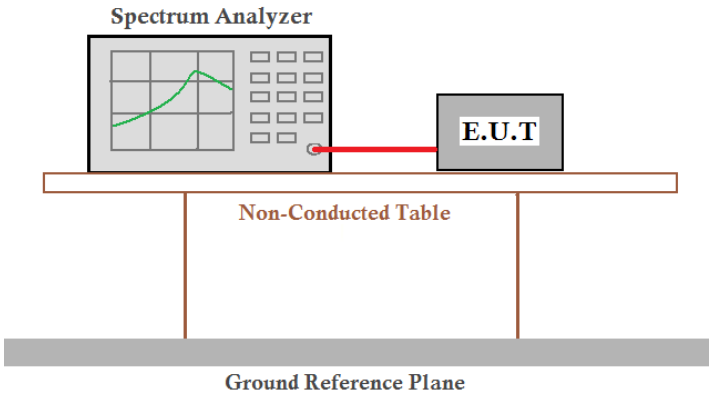
	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.89917	0.02	9.80	12.61	22.43	46.00	-23.57	Average
2	0.89917	0.02	9.80	22.34	32.16	56.00	-23.84	QP
3	0.99440	0.02	9.80	12.28	22.10	46.00	-23.90	Average
4	0.99440	0.02	9.80	22.57	32.39	56.00	-23.61	QP
5	1.037	0.02	9.80	12.43	22.25	46.00	-23.75	Average
6	1.037	0.02	9.80	22.94	32.76	56.00	-23.24	QP
7	1.898	0.02	9.80	15.74	25.56	46.00	-20.44	Average
8	1.898	0.02	9.80	25.70	35.52	56.00	-20.48	QP
9	1.970	0.02	9.80	26.28	36.10	56.00	-19.90	QP
10	1.970	0.02	9.80	16.34	26.16	46.00	-19.84	Average
11	2.839	0.02	9.84	20.73	30.59	56.00	-25.41	QP
12	2.839	0.02	9.84	10.40	20.26	46.00	-25.74	Average

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

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### 5.3 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	KDB558074 D01
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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
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)	23.33	23.01	22.94	22.85				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power (dBm)	22.86	22.72	22.64	22.52	22.38	22.32	22.28	22.23
Mode	802.11n(HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power (dBm)	22.49	22.42	22.38	22.32	22.28	22.25	22.16	22.12

Through Pre-scan, 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20).

**Measurement Data**

802.11b mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	23.33	30.00	Pass
Middle	23.53	30.00	Pass
Highest	23.73	30.00	Pass
802.11g mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	22.86	30.00	Pass
Middle	22.90	30.00	Pass
Highest	23.10	30.00	Pass
802.11n(HT20)mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	22.49	30.00	Pass
Middle	23.00	30.00	Pass
Highest	23.06	30.00	Pass

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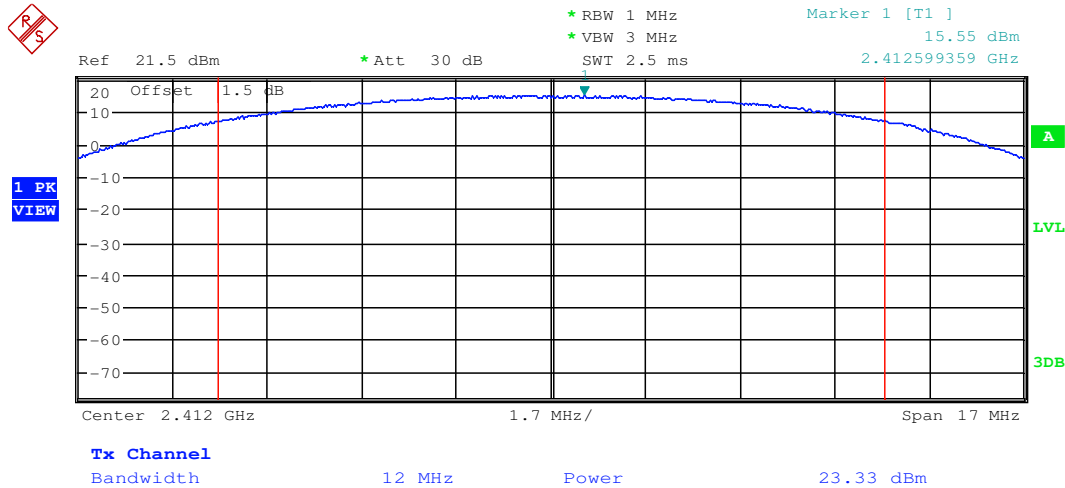
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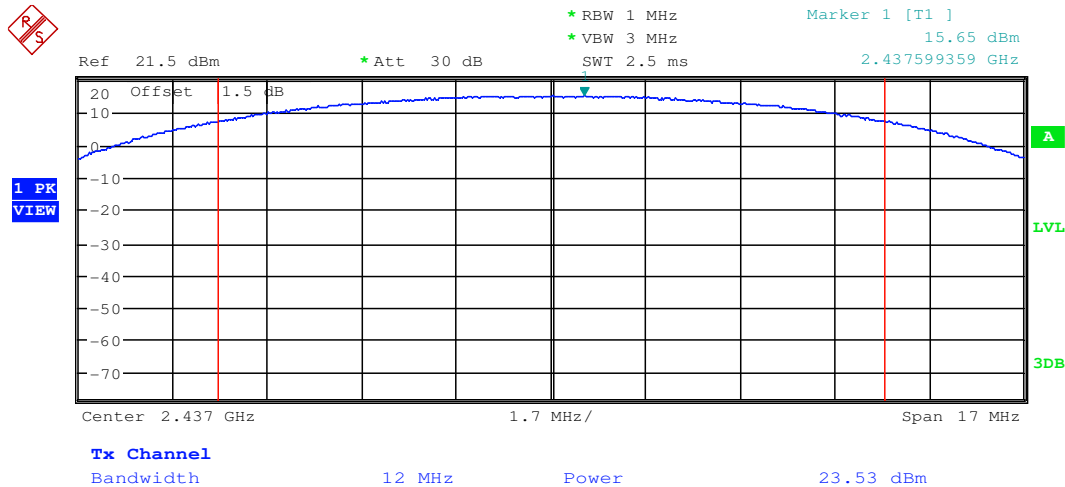
Page: 18 of 84

Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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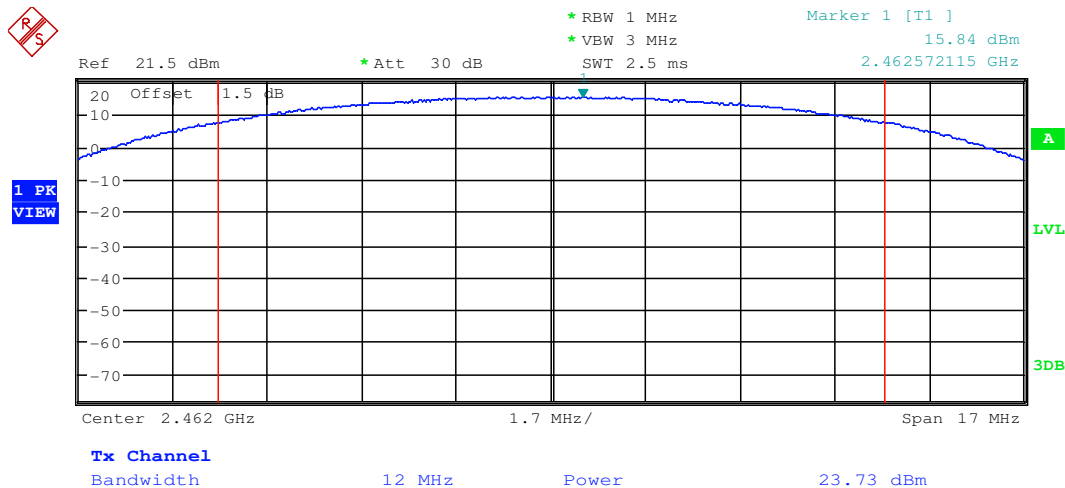
Test mode:	802.11b	Test channel:	Middle
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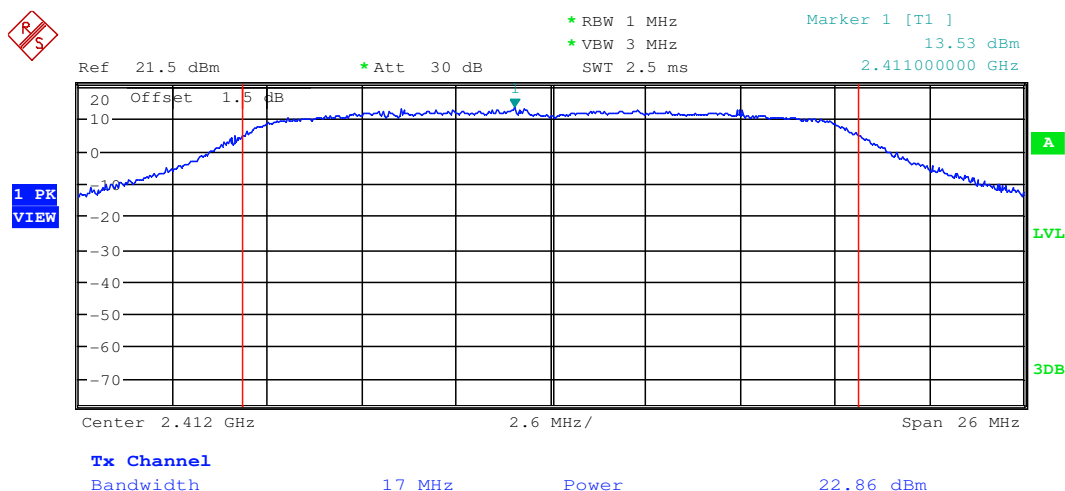
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Test mode:	802.11b	Test channel:	Highest
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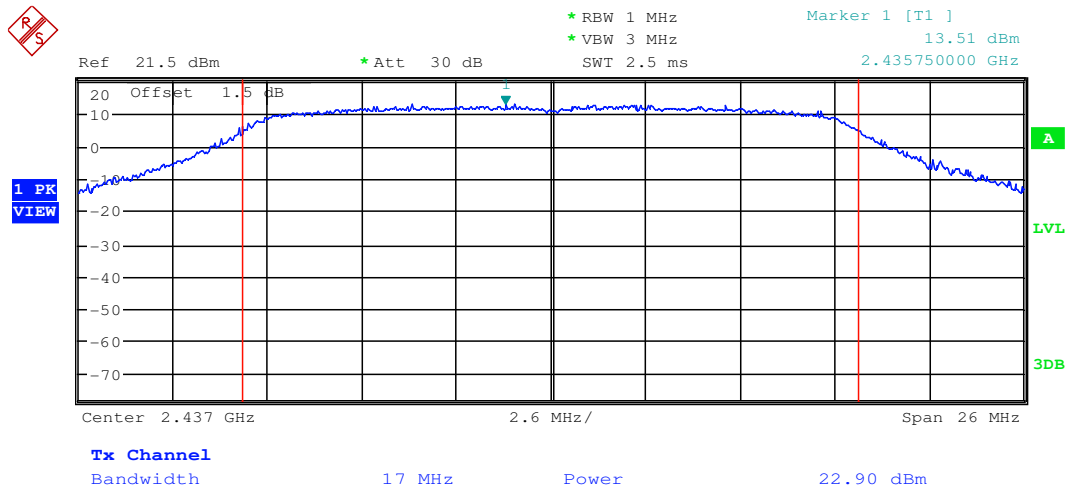
Test mode:	802.11g	Test channel:	Lowest
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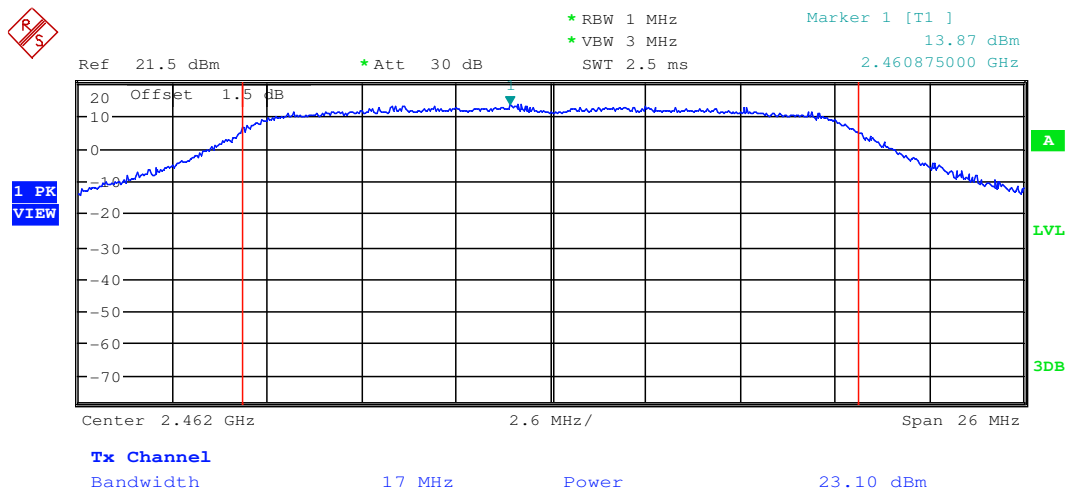
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Test mode:	802.11g	Test channel:	Middle
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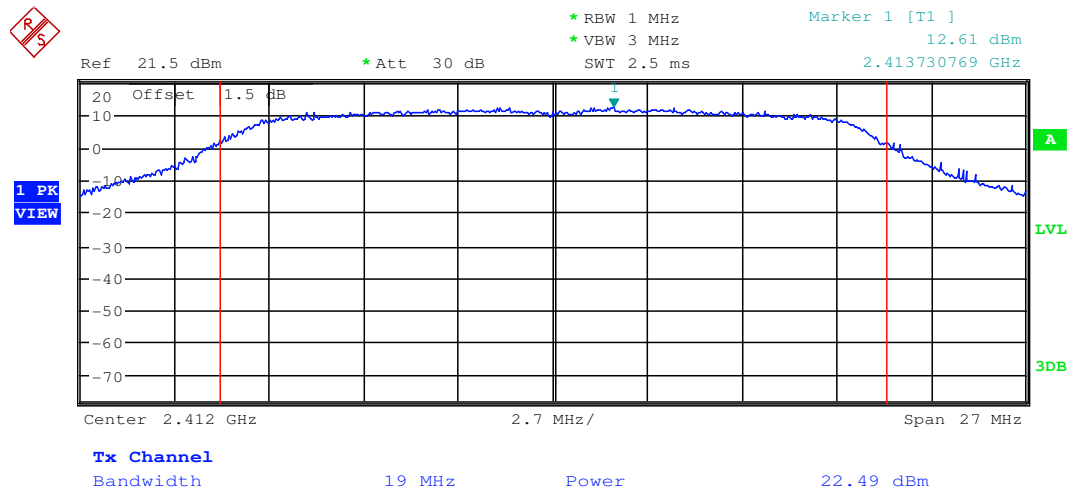
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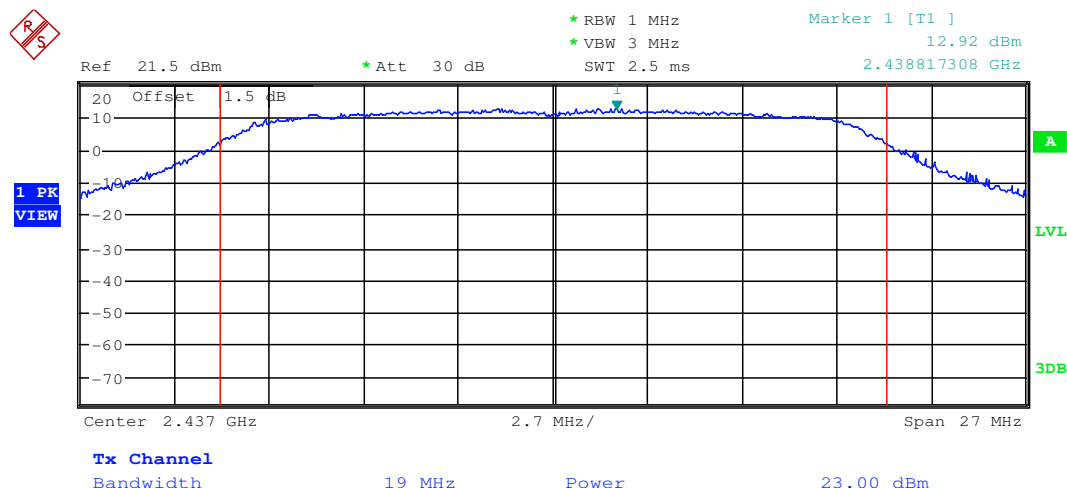
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Test mode:	802.11n(HT20)	Test channel:	Lowest
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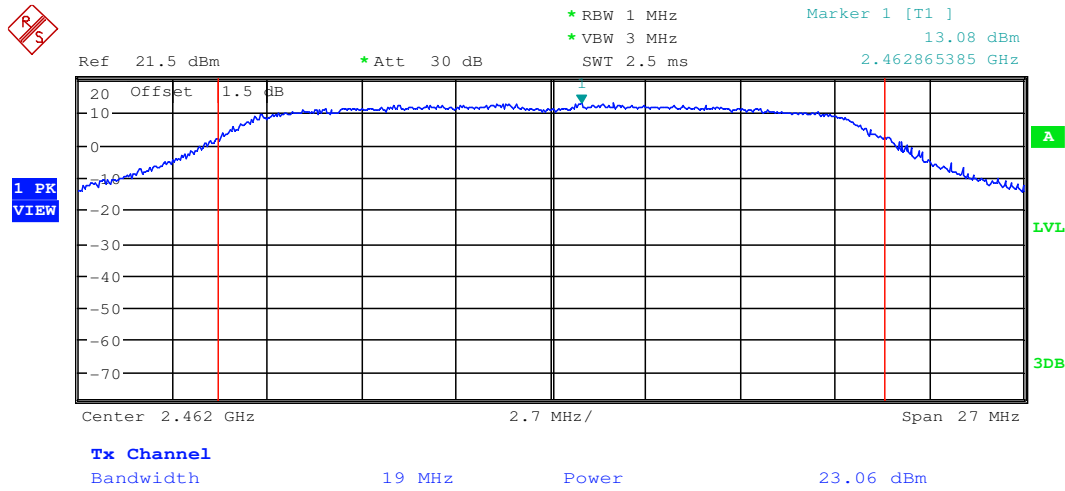


Test mode:	802.11n(HT20)	Test channel:	Middle
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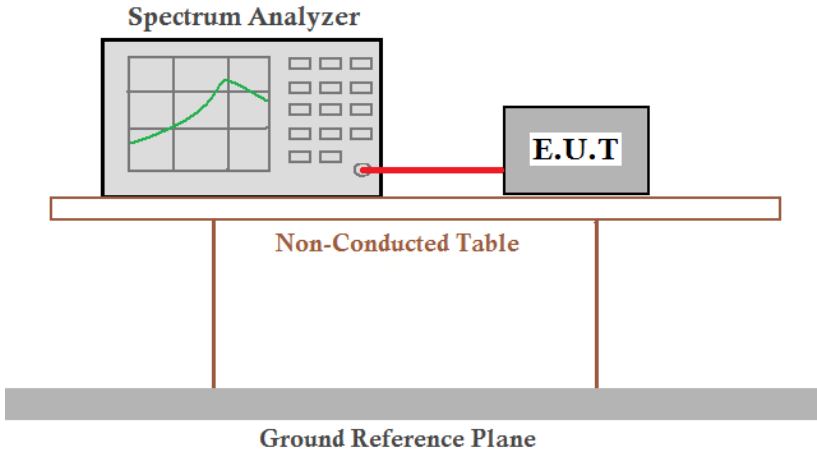


Test mode:	802.11n(HT20)	Test channel:	Highest
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## 5.4 6dB Occupancy Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	KDB558074 D01
Test Setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by two vertical legs. 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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
Limit:	$\geq 500$ kHz
Test Results:	Pass

**Measurement Data**

802.11b mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	11.10569231	≥500	Pass
Middle	10.576923077	≥500	Pass
Highest	11.153046154	≥500	Pass
802.11g mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	16.490384615	≥500	Pass
Middle	16.442307692	≥500	Pass
Highest	16.490384615	≥500	Pass
802.11n(HT20) mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	17.644230769	≥500	Pass
Middle	17.740384615	≥500	Pass
Highest	17.692307692	≥500	Pass





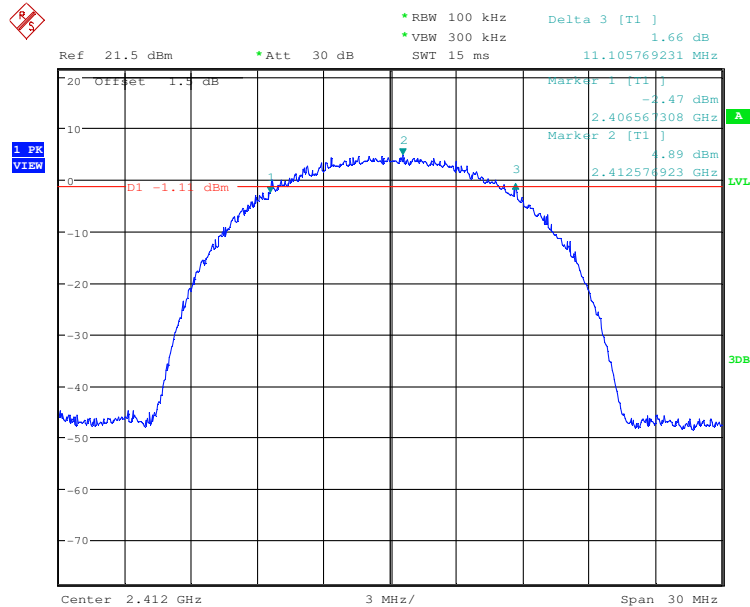
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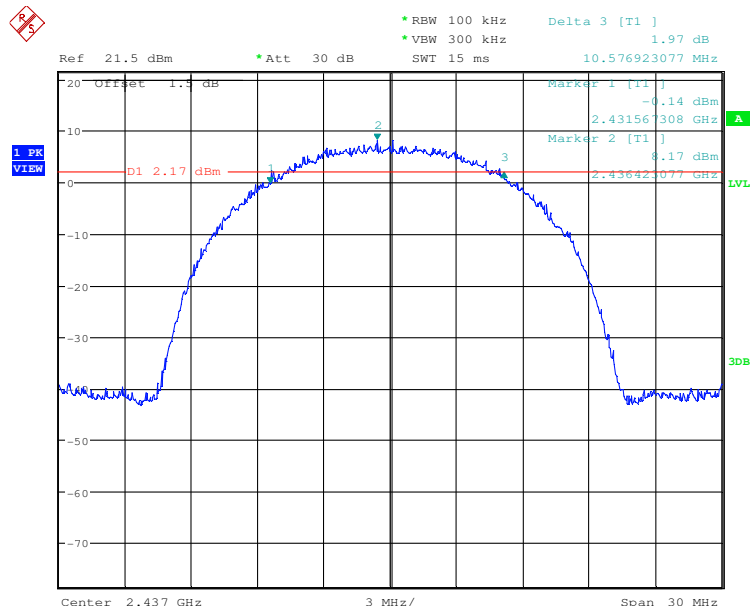
Page: 25 of 84

## 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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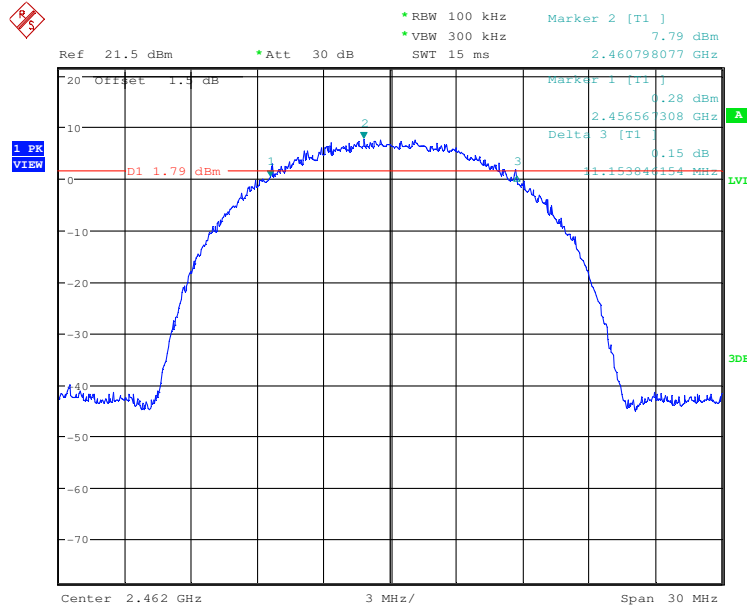


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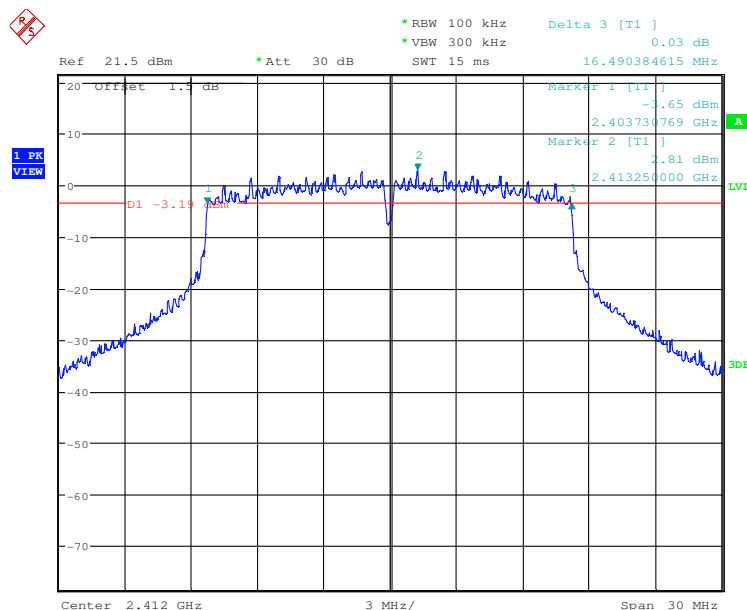
Report No.: SZEM130600343103

Page: 26 of 84

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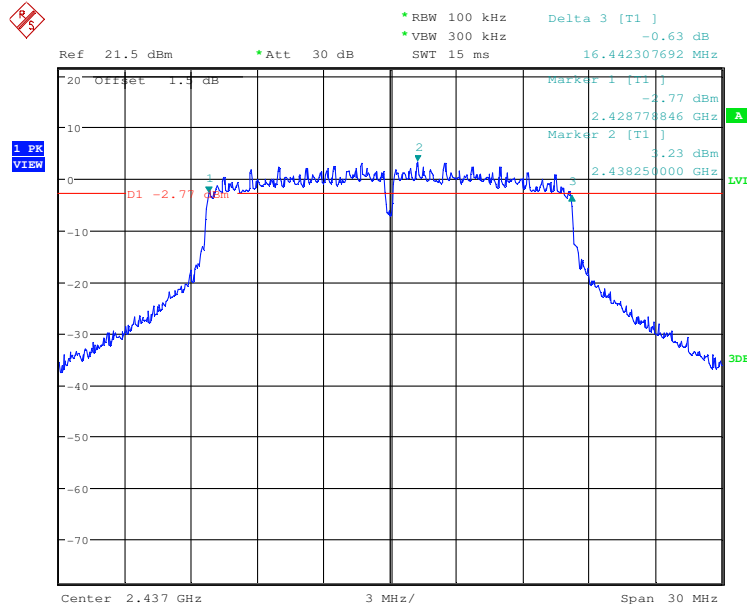


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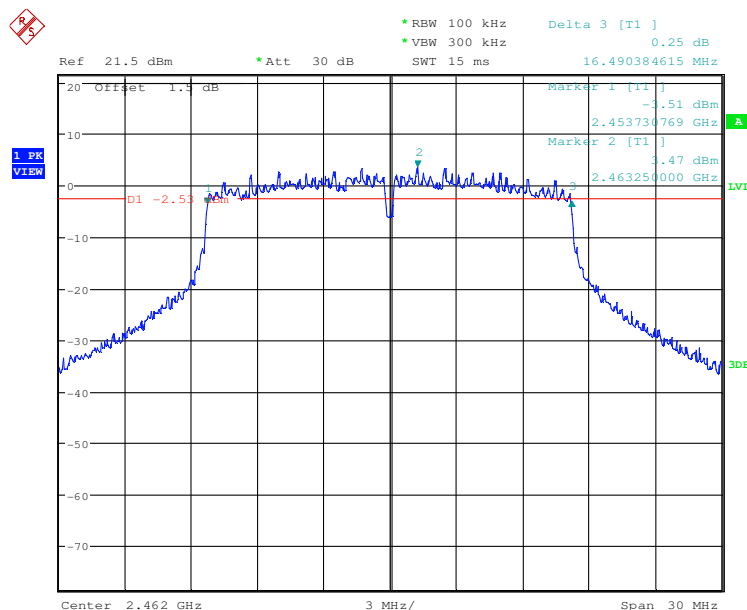
Report No.: SZEM130600343103

Page: 27 of 84

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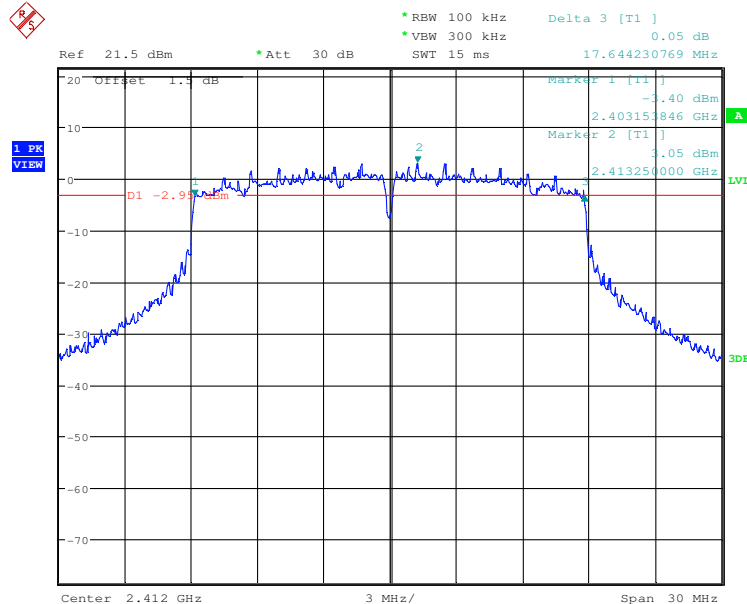


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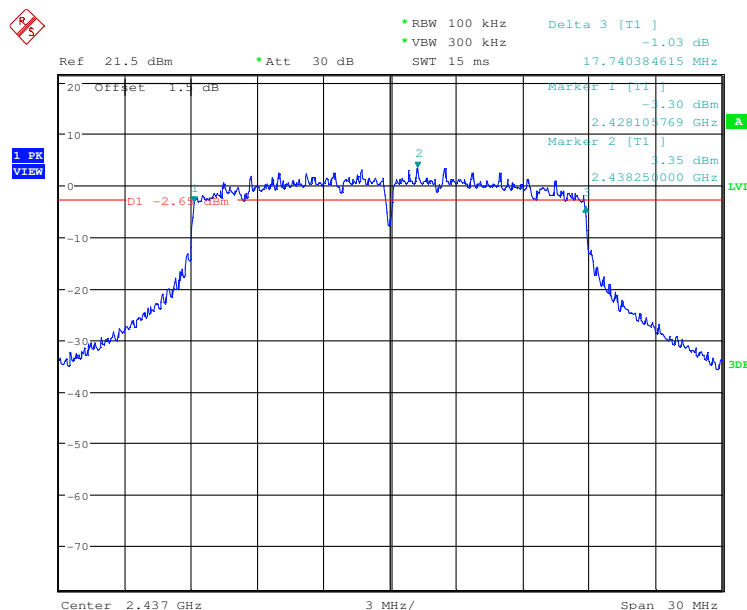
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Page: 28 of 84

Test mode:	802.11n(HT20)	Test channel:	Lowest
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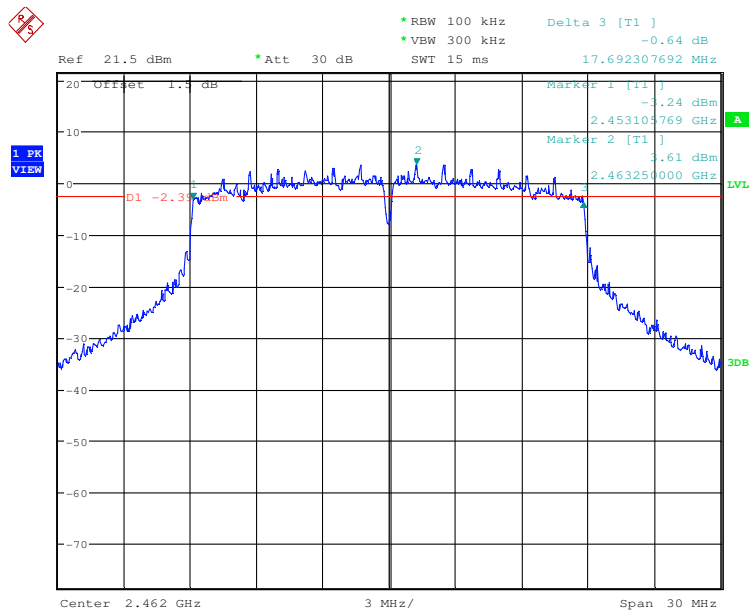
Test mode:	802.11n(HT20)	Test channel:	Middle
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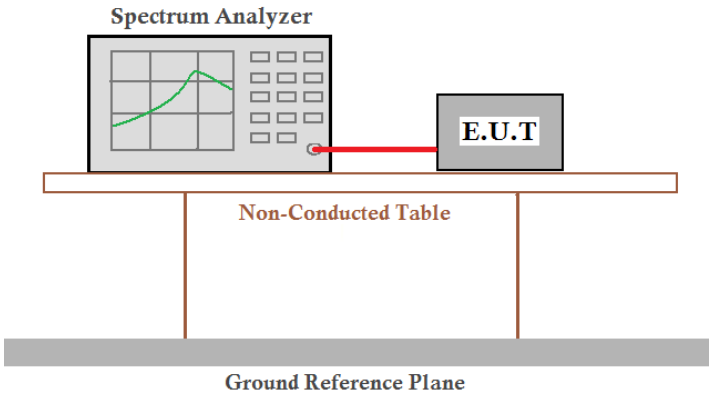


Test mode:	802.11n(HT20)	Test channel:	Highest
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## 5.5 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	KDB558074 D01
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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
Limit:	≤8.00dBm
Test Results:	Pass



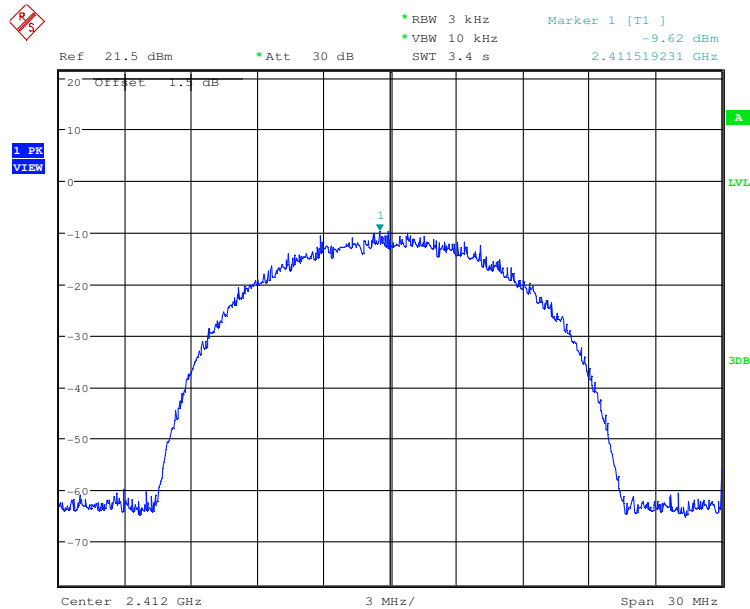
**Measurement Data**

802.11b mode			
Test channel	Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-9.62	≤8.00	Pass
Middle	-7.65	≤8.00	Pass
Highest	-7.97	≤8.00	Pass
802.11g mode			
Test channel	Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-11.52	≤8.00	Pass
Middle	-11.62	≤8.00	Pass
Highest	-10.68	≤8.00	Pass
802.11n(HT20) mode			
Test channel	Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-11.98	≤8.00	Pass
Middle	-11.37	≤8.00	Pass
Highest	-11.40	≤8.00	Pass

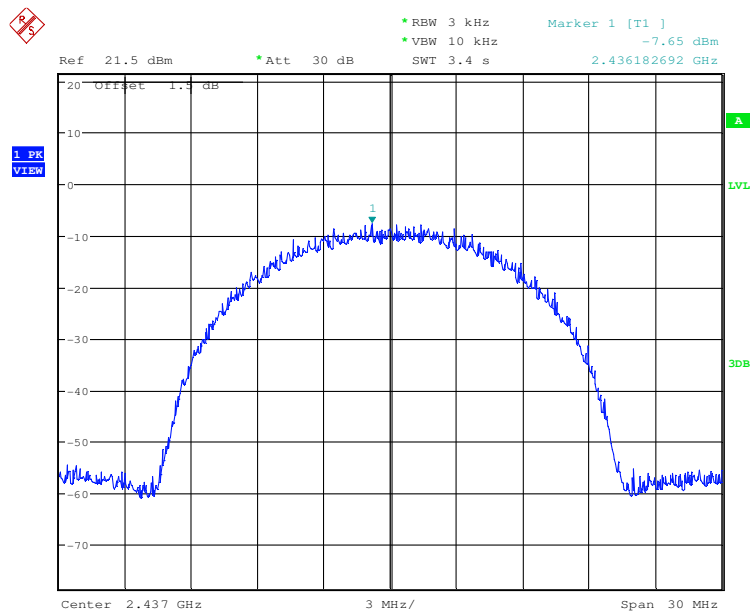


Test plot as follows:

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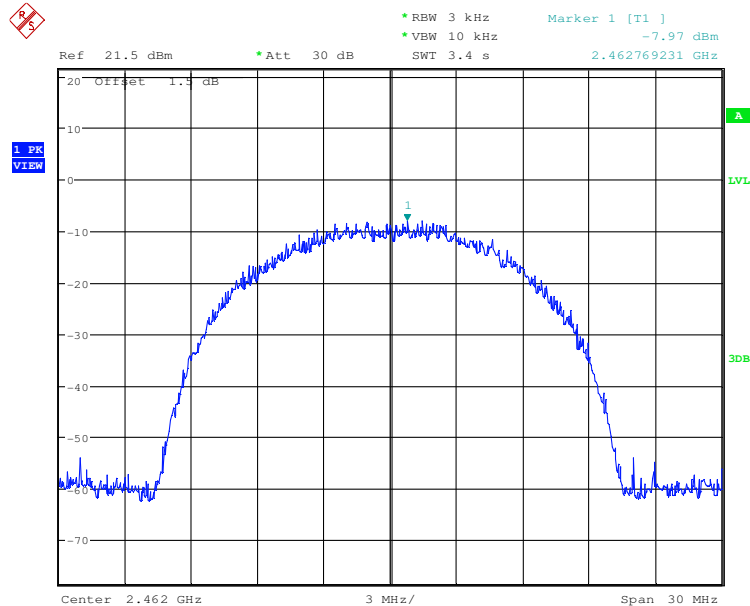


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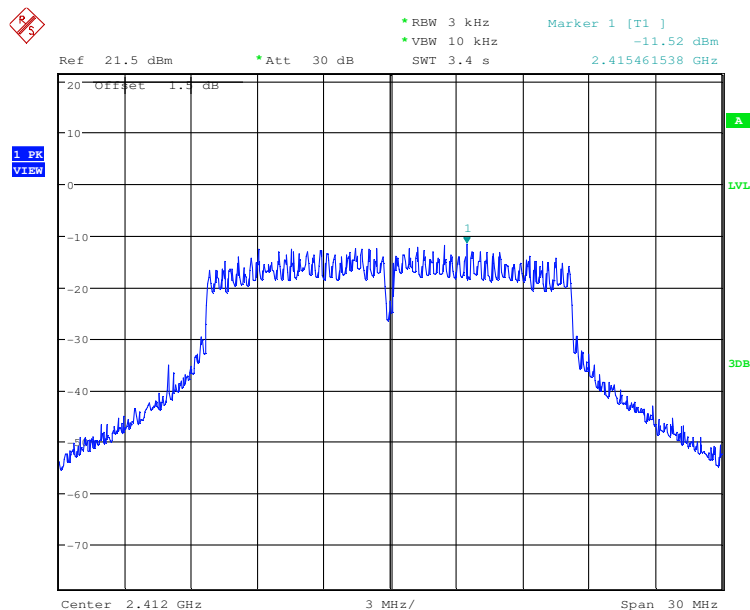
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Page: 33 of 84

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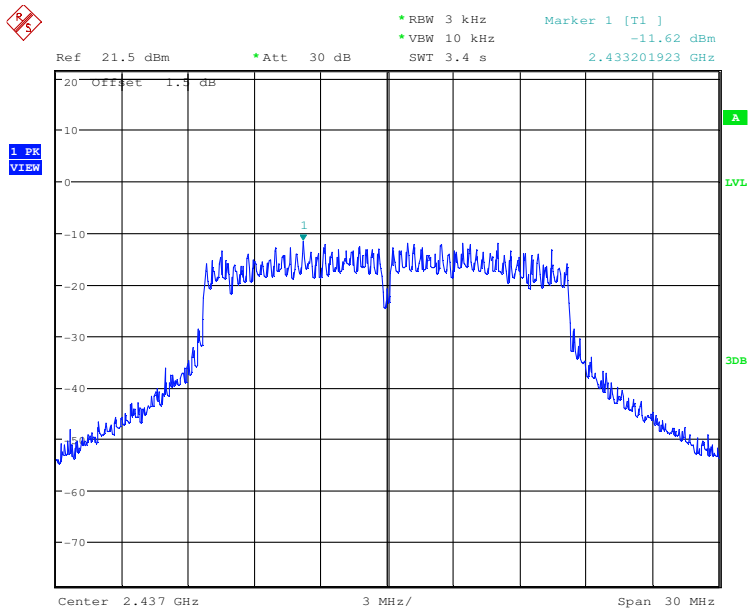
Test mode:	802.11g	Test channel:	Lowest
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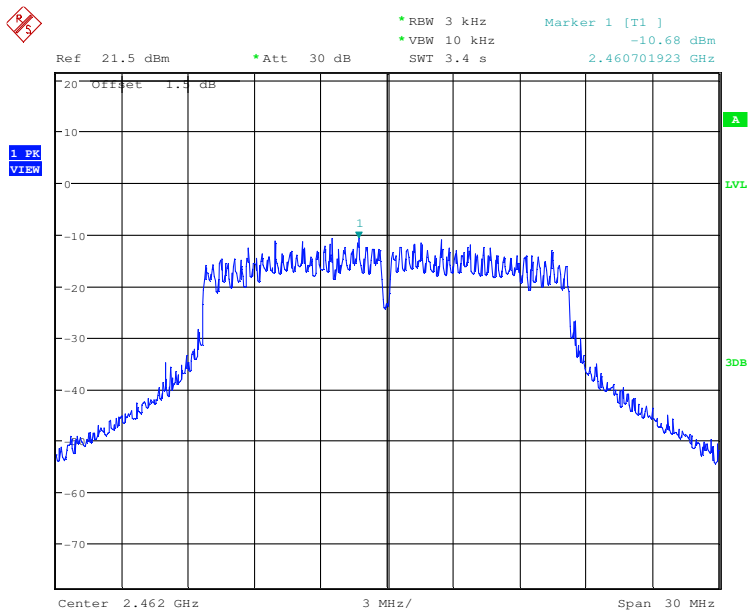
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Test mode:	802.11g	Test channel:	Middle
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Test mode:	802.11g	Test channel:	Highest
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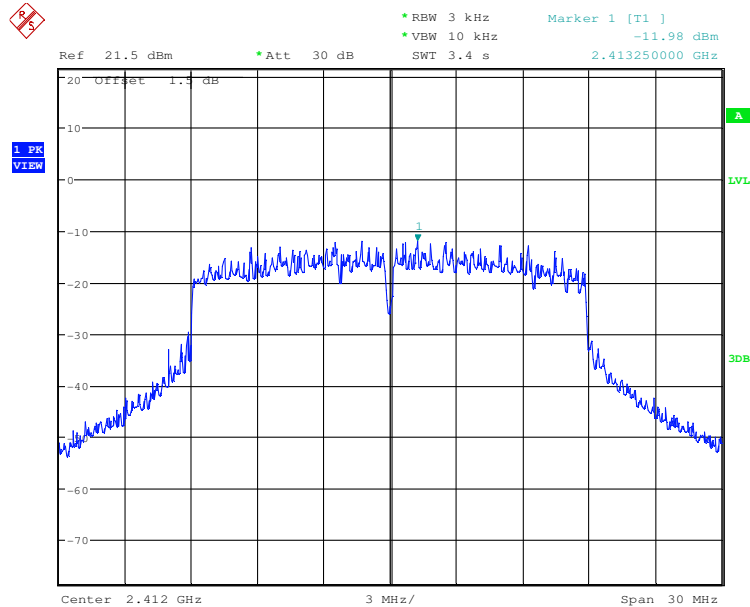


# SGS-CSTC Standards Technical Services Ltd.

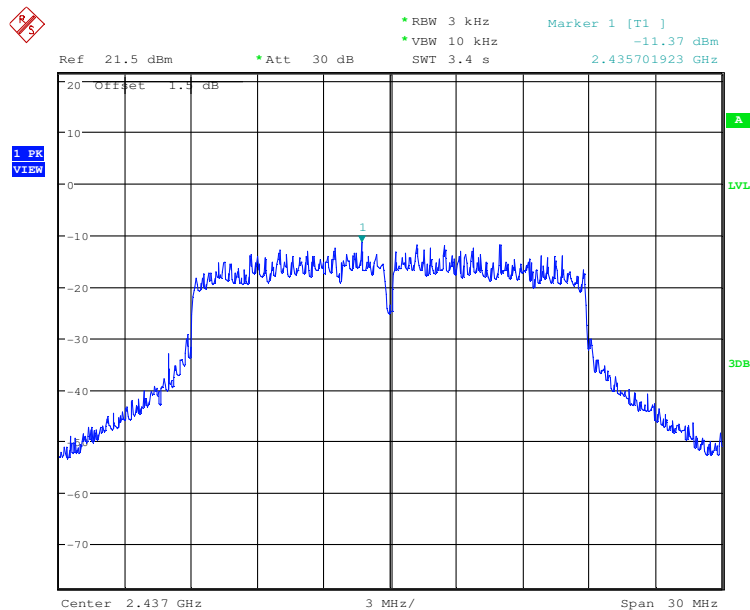
Report No.: SZEM130600343103

Page: 35 of 84

Test mode:	802.11n(HT20)	Test channel:	Lowest
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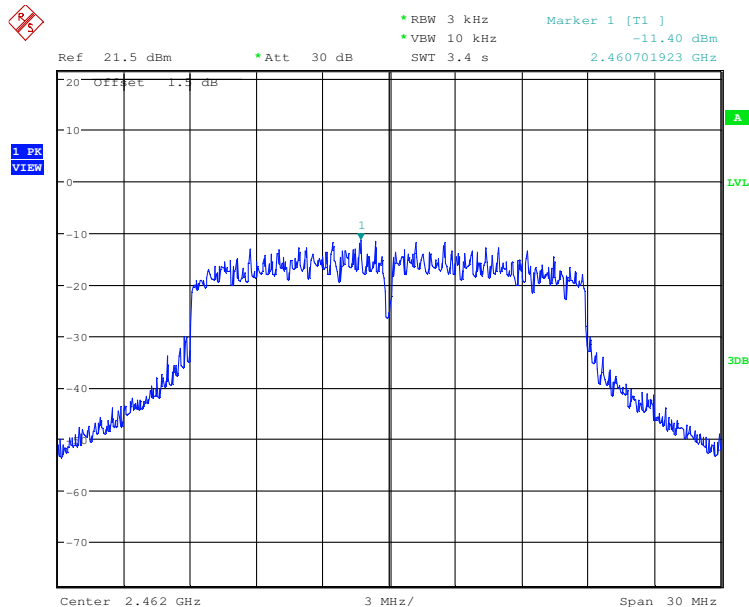
Test mode:	802.11n(HT20)	Test channel:	Middle
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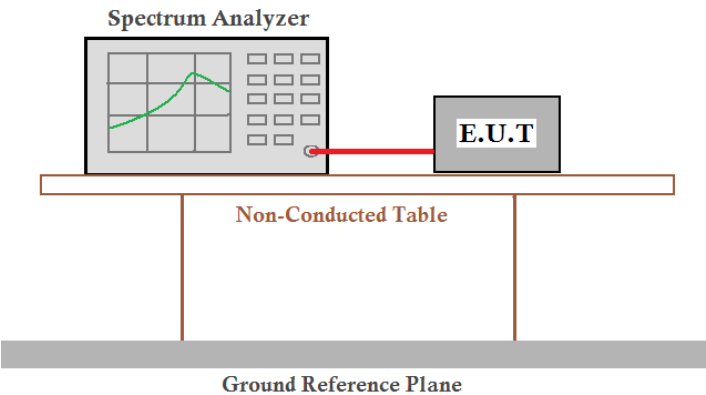


Test mode:	802.11n(HT20)	Test channel:	Highest
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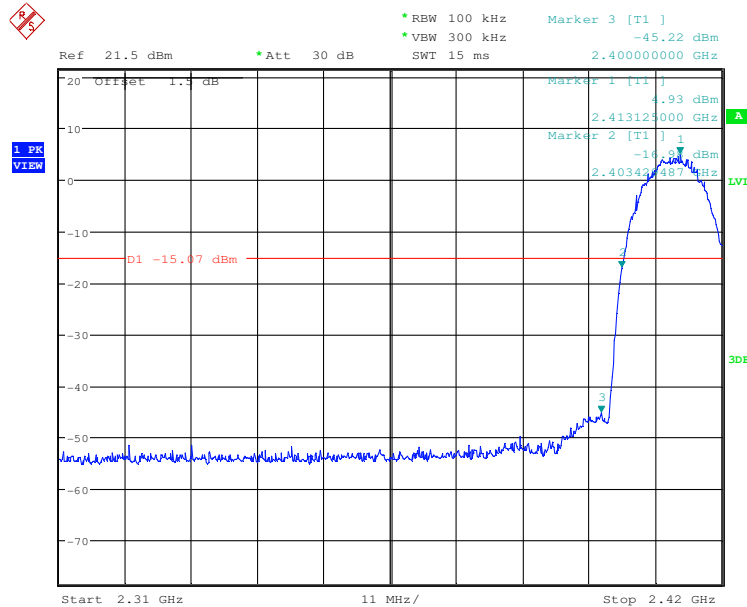
## 5.6 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	KDB558074 D01
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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
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

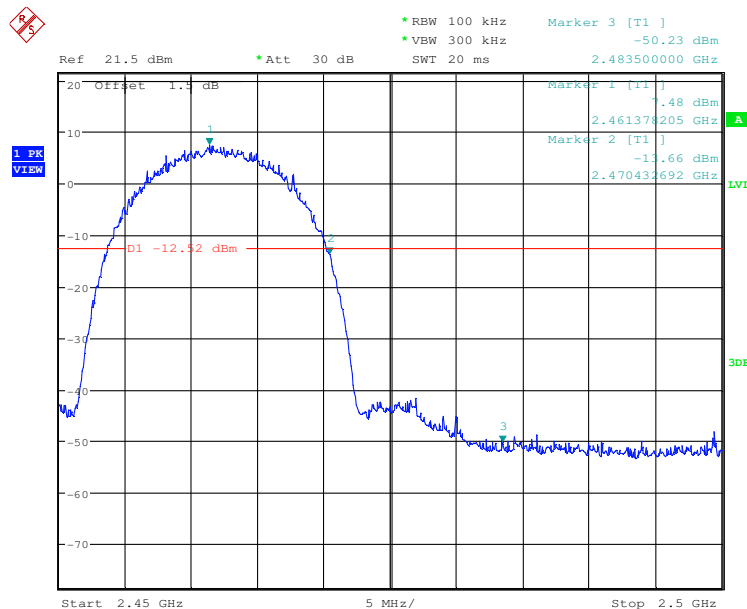


Test plot as follows:

Test mode:	802.11b	Test channel:	Lowest
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Test mode:	802.11b	Test channel:	Highest
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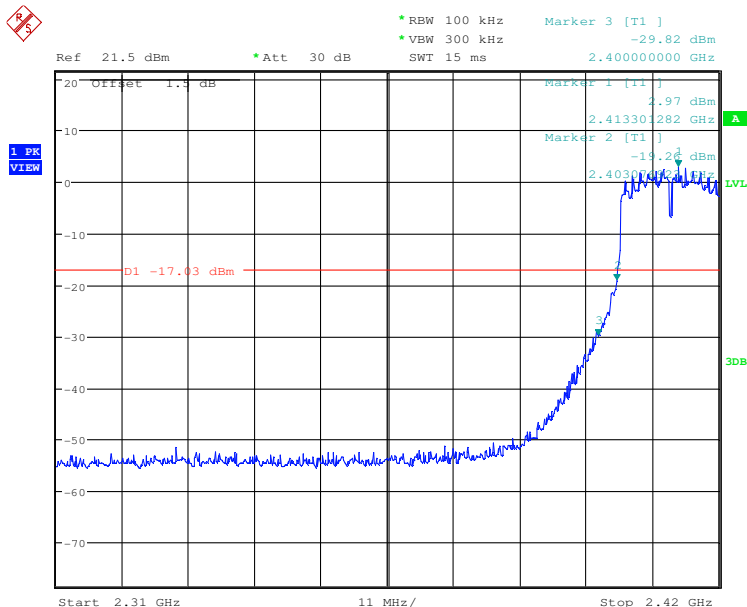
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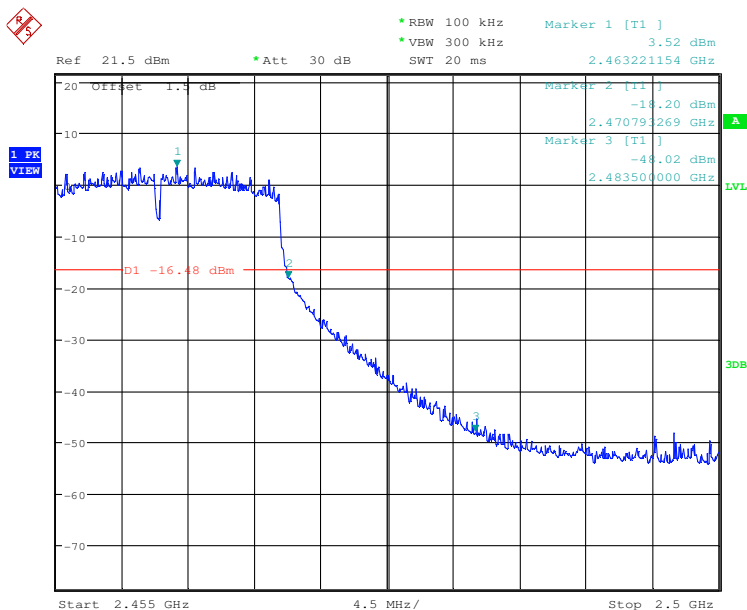
# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103  
Page: 39 of 84

Test mode:	802.11g	Test channel:	Lowest
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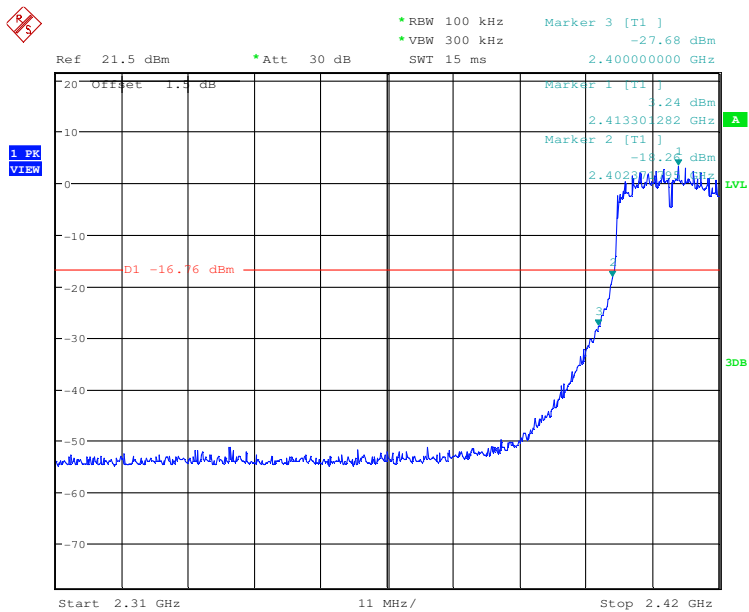
Test mode:	802.11g	Test channel:	Highest
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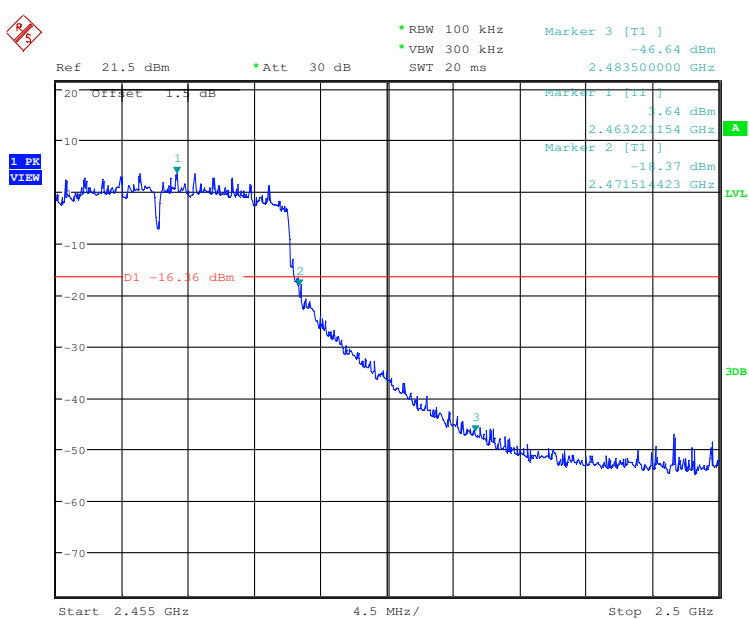
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Test mode:	802.11n(HT20)	Test channel:	Lowest
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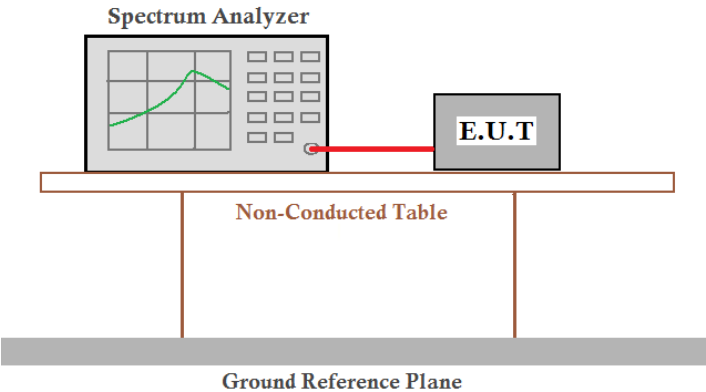
Test mode:	802.11n(HT20)	Test channel:	Highest
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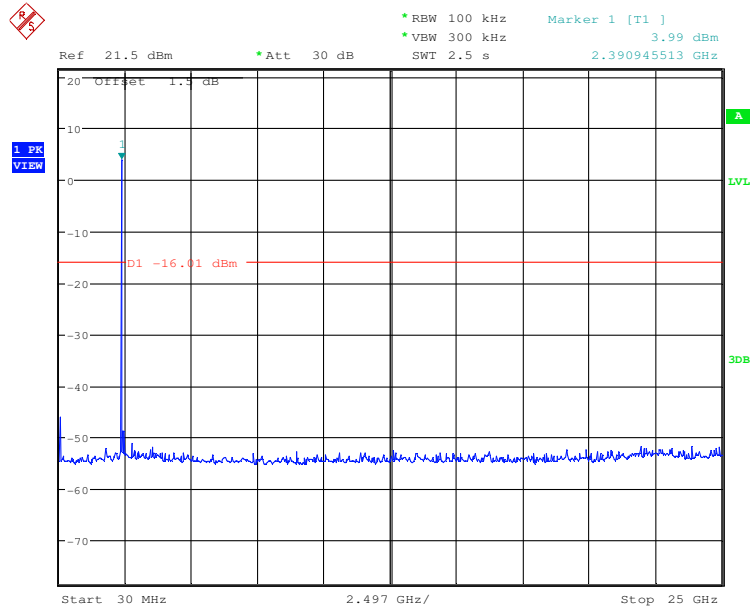
## 5.7 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	KDB558074 D01
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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
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

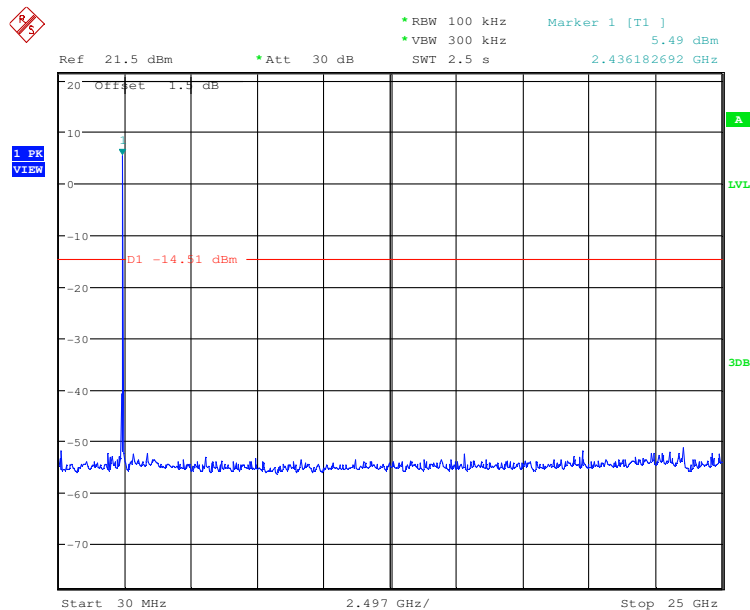


Test plot as follows:

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



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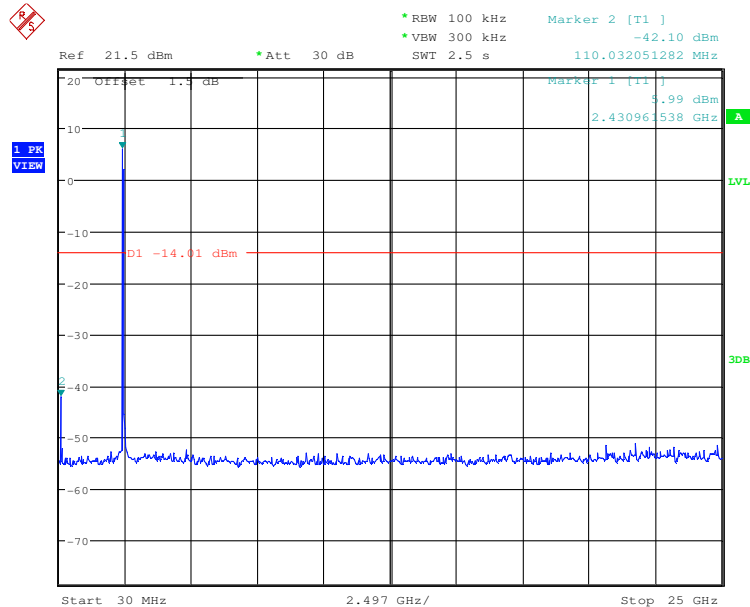


# SGS-CSTC Standards Technical Services Ltd.

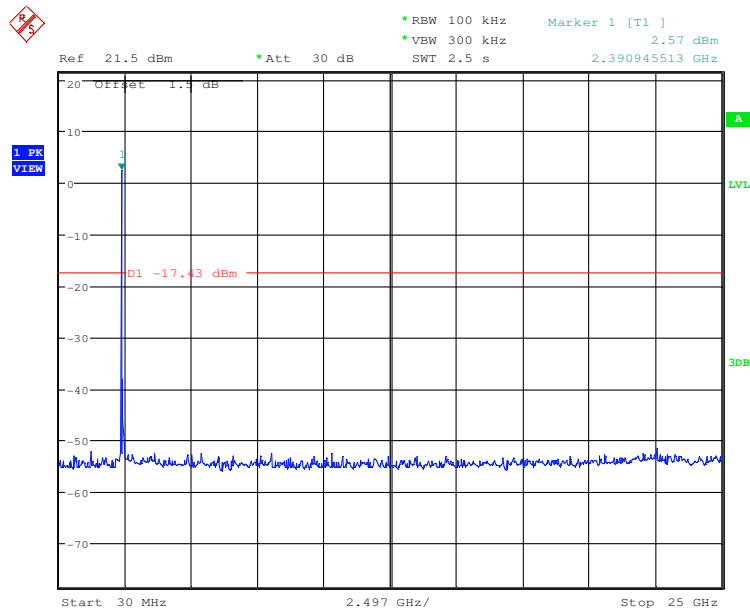
Report No.: SZEM130600343103

Page: 43 of 84

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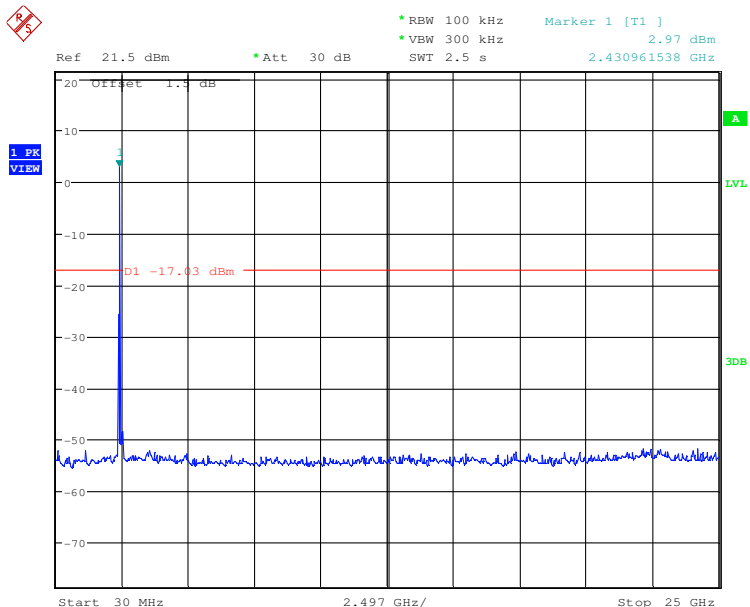


# SGS-CSTC Standards Technical Services Ltd.

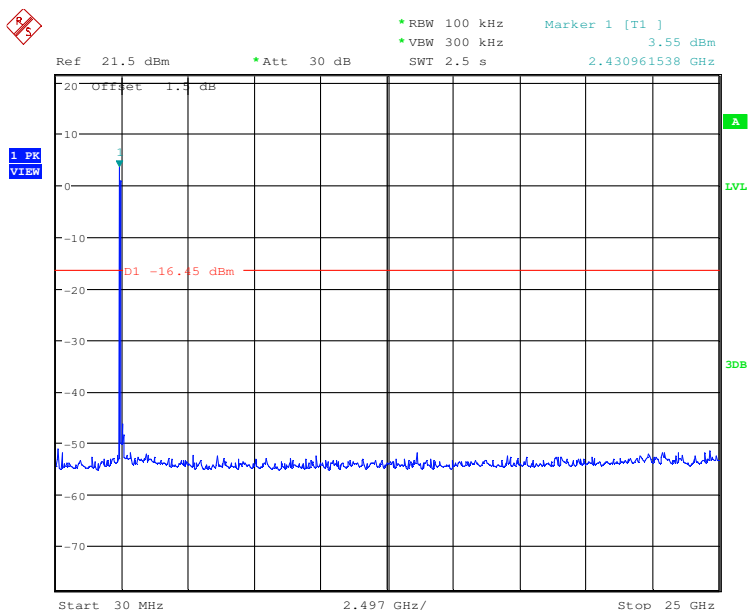
Report No.: SZEM130600343103

Page: 44 of 84

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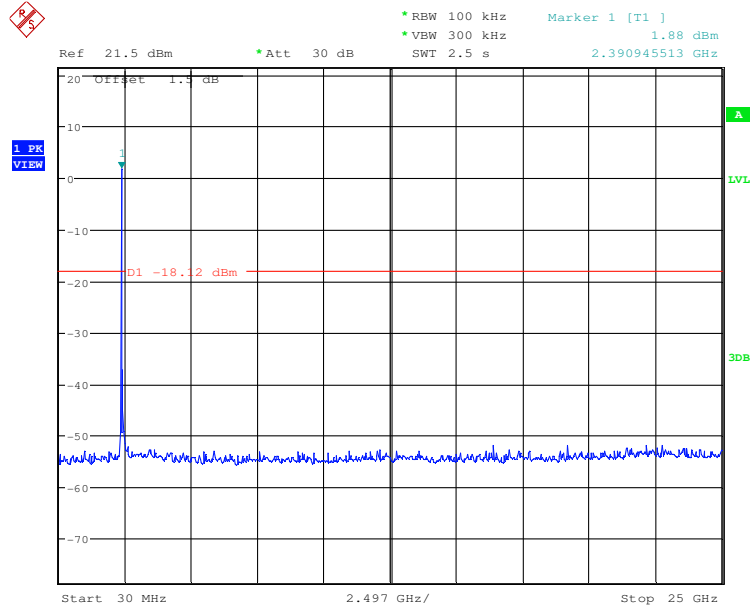


# SGS-CSTC Standards Technical Services Ltd.

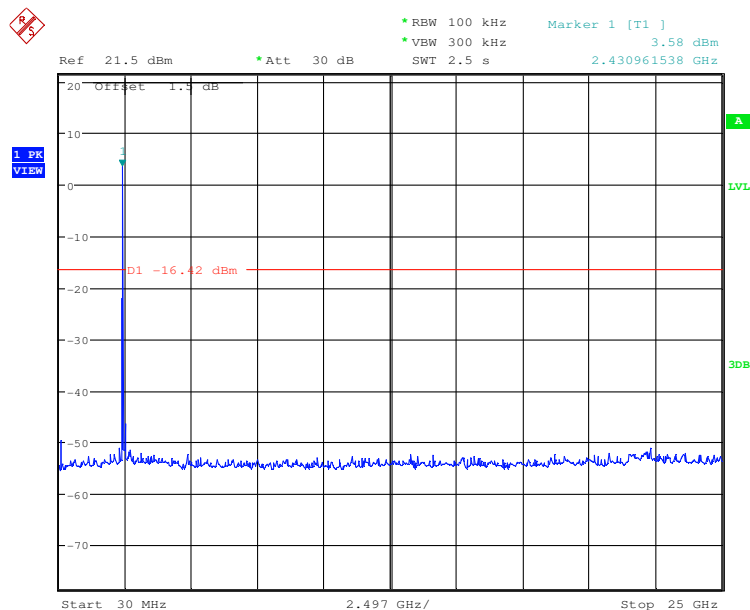
Report No.: SZEM130600343103

Page: 45 of 84

Test mode:	802.11n(HT20)	Test channel:	Lowest
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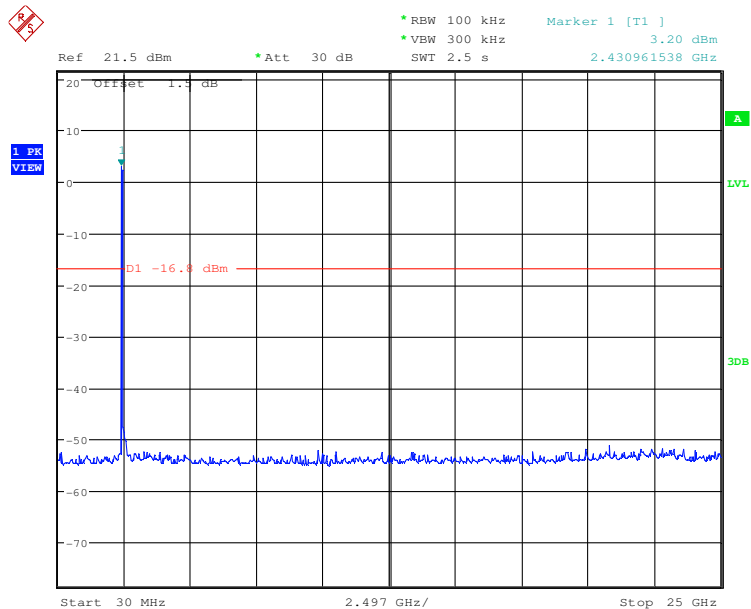
Test mode:	802.11n(HT20)	Test channel:	Middle
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Test mode:	802.11n(HT20)	Test channel:	Highest
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## 5.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C 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
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

Test Setup:

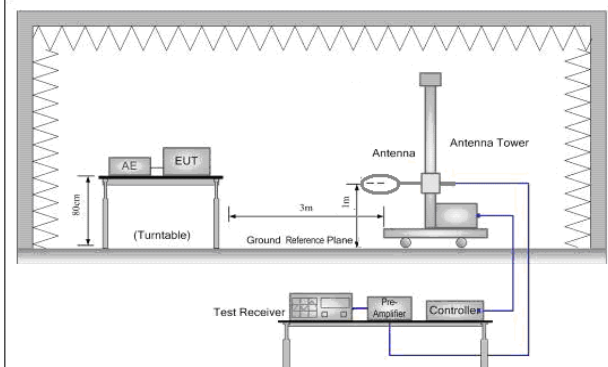


Figure 1. Below 30MHz

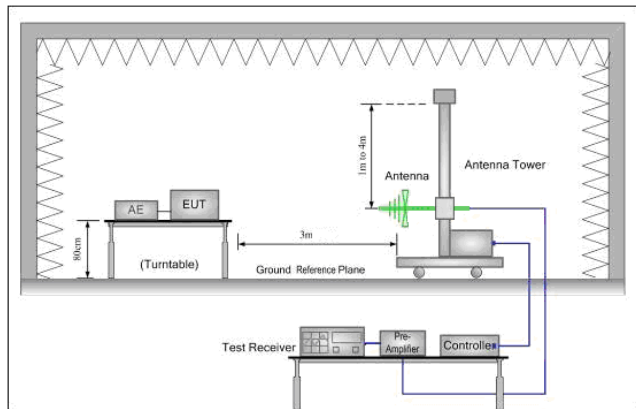


Figure 2. 30MHz to 1GHz

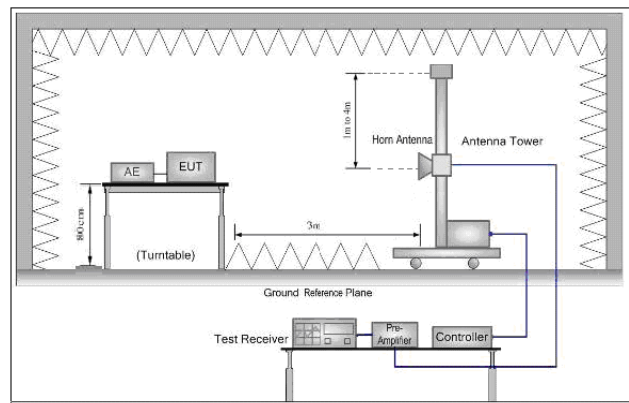


Figure 3. Above 1 GHz

Test Procedure:

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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





## SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 49 of 84

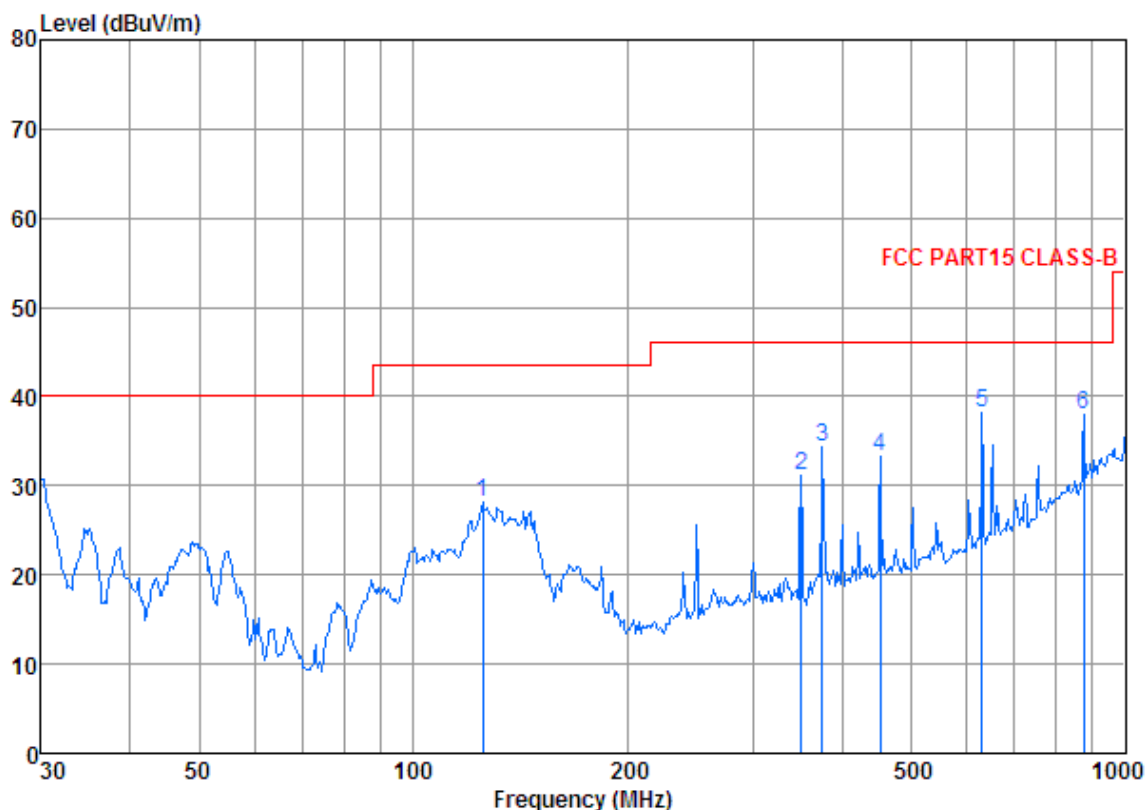
	margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting 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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

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### 5.8.1 Radiated emission below 1GHz

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

Data: 1



Condition: FCC PART15 CLASS-B 3m 3142C VERTICAL

Job No. : 3431RF

Mode: : TX

	Freq	Cable	Antenna	Preamp	Read	Limit	Over
		Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	125.01	1.27	7.90	27.04	46.12	28.25	43.50 -15.25
2	350.48	2.06	10.66	26.79	45.19	31.12	46.00 -14.88
3	375.94	2.14	11.49	26.97	47.75	34.41	46.00 -11.59
4	452.72	2.42	12.92	27.46	45.36	33.24	46.00 -12.76
5	629.48	2.76	15.60	27.50	47.24	38.10	46.00 -7.90
6	875.25	3.50	19.47	26.89	41.90	37.98	46.00 -8.02

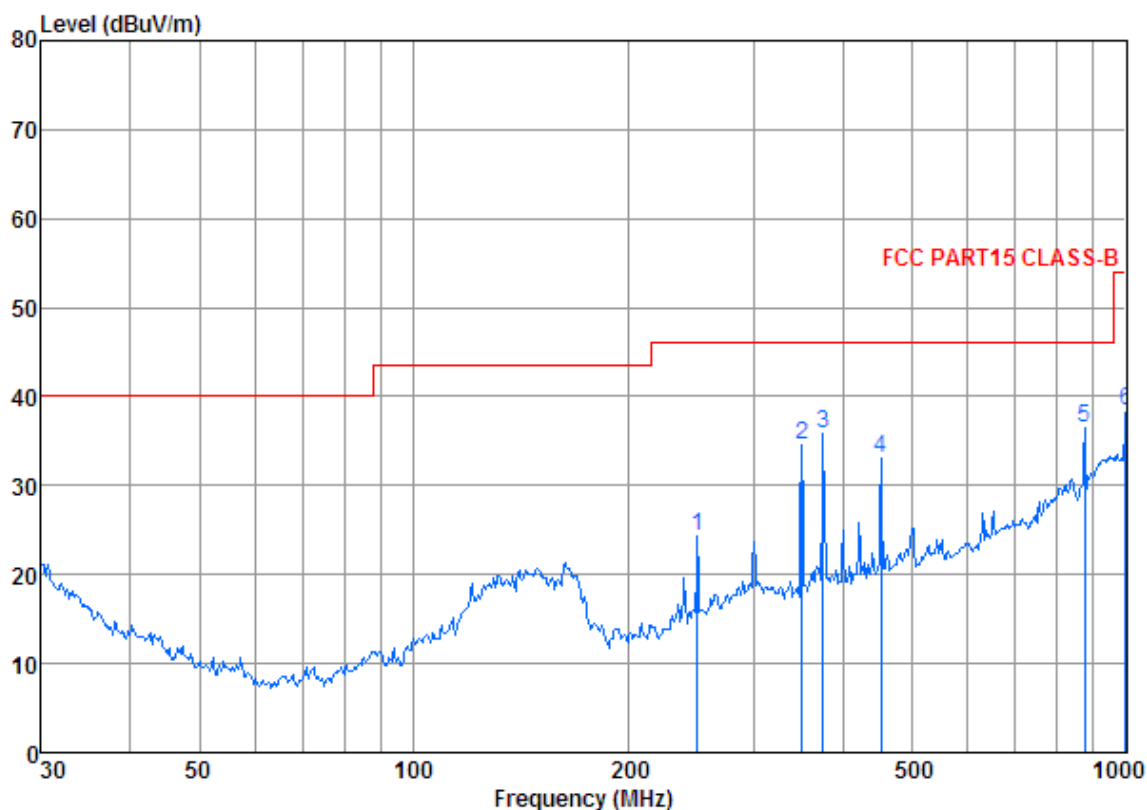


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Test mode:	Transmitting	Horizontal
------------	--------------	------------

Data: 2



Condition: FCC PART15 CLASS-B 3m 3142C HORIZONTAL

Job No. : 3431RF

Mode: : TX

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	250.30	1.68	8.57	26.54	40.51	24.22	46.00	-21.78
2	350.48	2.06	10.66	26.79	48.54	34.47	46.00	-11.53
3	375.94	2.14	11.49	26.97	49.24	35.90	46.00	-10.10
4	452.72	2.42	12.92	27.46	45.27	33.15	46.00	-12.85
5	875.25	3.50	19.47	26.89	40.48	36.56	46.00	-9.44
6	1000.00	3.70	21.50	26.30	39.47	38.37	54.00	-15.63

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**5.8.2 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			
3579.815	5.88	33.30	40.73	48.80	47.25	74	-26.75	Vertical			
4883.519	7.48	34.59	41.68	50.59	50.98	74	-23.02	Vertical			
5910.798	7.93	35.56	41.01	48.57	51.05	74	-22.95	Vertical			
6764.538	8.24	36.04	40.27	48.25	52.26	74	-21.74	Vertical			
8506.170	9.48	36.21	38.75	46.96	53.90	74	-20.10	Vertical			
11254.860	10.75	38.45	37.97	41.59	52.82	74	-21.18	Vertical			
3463.291	5.70	33.21	40.65	48.88	47.14	74	-26.86	Horizontal			
5476.219	7.75	34.87	41.37	49.63	50.88	74	-23.12	Horizontal			
7489.599	9.08	36.00	39.62	47.03	52.49	74	-21.51	Horizontal			
8792.365	9.56	36.43	38.50	45.42	52.91	74	-21.09	Horizontal			
9611.663	9.68	37.32	37.80	43.56	52.76	74	-21.24	Horizontal			
11574.460	10.98	38.47	38.10	42.23	53.58	74	-20.42	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			
3350.560	5.55	33.26	40.56	47.89	46.14	74	-27.86	Vertical			
4582.422	7.18	35.06	41.47	48.24	49.01	74	-24.99	Vertical			
5518.199	7.77	34.93	41.34	49.03	50.39	74	-23.61	Vertical			
6747.341	8.23	36.06	40.28	48.67	52.68	74	-21.32	Vertical			
8484.545	9.47	36.19	38.77	45.66	52.55	74	-21.45	Vertical			
10971.980	10.55	38.49	37.85	42.04	53.23	74	-20.77	Vertical			
2705.543	4.82	32.98	40.09	46.40	44.11	74	-29.89	Horizontal			
3225.037	5.37	33.31	40.47	47.52	45.73	74	-28.27	Horizontal			
4821.757	7.45	34.68	41.64	48.18	48.67	74	-25.33	Horizontal			
6764.538	8.24	36.04	40.27	47.50	51.51	74	-22.49	Horizontal			
8814.774	9.57	36.45	38.49	44.69	52.22	74	-21.78	Horizontal			
11112.520	10.64	38.48	37.91	42.19	53.40	74	-20.60	Horizontal			

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## SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 53 of 84

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			
3616.451	5.93	33.34	40.76	46.53	45.04	74	-28.96	Vertical			
5009.426	7.54	34.42	41.78	46.95	47.13	74	-26.87	Vertical			
6047.776	7.99	35.76	40.87	46.42	49.30	74	-24.70	Vertical			
7470.558	9.05	35.99	39.64	47.32	52.72	74	-21.28	Vertical			
9088.188	9.63	36.70	38.24	44.77	52.86	74	-21.14	Vertical			
11370.050	10.84	38.43	38.02	41.22	52.47	74	-21.53	Vertical			
3824.757	6.21	33.59	40.91	47.72	46.61	74	-27.39	Horizontal			
4809.499	7.44	34.70	41.63	48.32	48.83	74	-25.17	Horizontal			
5865.832	7.92	35.48	41.04	49.44	51.80	74	-22.20	Horizontal			
7432.622	9.01	35.97	39.67	47.68	52.99	74	-21.01	Horizontal			
8973.250	9.62	36.57	38.34	44.40	52.25	74	-21.75	Horizontal			
10971.980	10.55	38.49	37.85	41.87	53.06	74	-20.94	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			
3543.550	5.83	33.26	40.70	47.01	45.40	74	-28.60	Vertical			
4785.075	7.42	34.73	41.61	47.65	48.19	74	-25.81	Vertical			
5703.861	7.85	35.23	41.17	48.23	50.14	74	-23.86	Vertical			
7624.250	9.22	36.00	39.51	46.94	52.65	74	-21.35	Vertical			
8484.545	9.47	36.19	38.77	45.21	52.10	74	-21.90	Vertical			
10087.960	9.90	37.82	37.48	42.48	52.72	74	-21.28	Vertical			
3516.592	5.78	33.22	40.67	46.69	45.02	74	-28.98	Horizontal			
4958.678	7.52	34.46	41.74	47.41	47.65	74	-26.35	Horizontal			
6974.358	8.43	35.83	40.08	47.79	51.97	74	-22.03	Horizontal			
8187.502	9.38	36.08	39.03	45.60	52.03	74	-21.97	Horizontal			
9809.404	9.76	37.51	37.61	42.82	52.48	74	-21.52	Horizontal			
11633.540	11.02	38.54	38.13	41.52	52.95	74	-21.05	Horizontal			

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## SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 54 of 84

Test mode:		802.11g		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	
3570.714	5.85	33.28	40.72	48.32	46.73	74	-27.27	Vertical	
4908.444	7.50	34.54	41.71	48.86	49.19	74	-24.81	Vertical	
6938.942	8.39	35.87	40.10	48.86	53.02	74	-20.98	Vertical	
7981.717	9.32	36.00	39.21	46.65	52.76	74	-21.24	Vertical	
9441.913	9.66	37.14	37.94	43.61	52.47	74	-21.53	Vertical	
11692.920	11.07	38.59	38.15	41.65	53.16	74	-20.84	Vertical	
3112.129	5.22	33.36	40.38	48.70	46.90	74	-27.10	Horizontal	
4159.927	6.66	34.27	41.15	47.56	47.34	74	-26.66	Horizontal	
5434.559	7.73	34.83	41.42	48.40	49.54	74	-24.46	Horizontal	
8083.955	9.35	36.03	39.11	46.03	52.30	74	-21.70	Horizontal	
9884.602	9.80	37.60	37.55	42.56	52.41	74	-21.59	Horizontal	
11545.040	10.95	38.43	38.09	42.52	53.81	74	-20.19	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	
3489.840	5.75	33.21	40.66	48.53	46.83	74	-27.17	Vertical	
4478.633	7.05	35.15	41.39	48.27	49.08	74	-24.92	Vertical	
5546.364	7.78	34.96	41.32	49.54	50.96	74	-23.04	Vertical	
6461.583	8.13	36.24	40.53	48.50	52.34	74	-21.66	Vertical	
8814.774	9.57	36.45	38.49	45.20	52.73	74	-21.27	Vertical	
11226.250	10.73	38.45	37.95	40.86	52.09	74	-21.91	Vertical	
3516.592	5.78	33.22	40.67	47.68	46.01	74	-27.99	Horizontal	
5047.827	7.56	34.45	41.75	48.36	48.62	74	-25.38	Horizontal	
6494.564	8.15	36.28	40.50	48.89	52.82	74	-21.18	Horizontal	
7301.355	8.85	35.92	39.79	47.74	52.72	74	-21.28	Horizontal	
8725.477	9.55	36.37	38.55	45.47	52.84	74	-21.16	Horizontal	
11283.550	10.77	38.44	37.98	40.41	51.64	74	-22.36	Horizontal	

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# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 55 of 84

Test mode:		802.11n(HT20)		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			
3308.185	5.50	33.28	40.52	47.23	45.49	74	-28.51	Vertical			
4724.558	7.33	34.84	41.57	48.31	48.91	74	-25.09	Vertical			
5880.782	7.93	35.51	41.02	49.24	51.66	74	-22.34	Vertical			
7282.792	8.83	35.92	39.80	47.95	52.90	74	-21.10	Vertical			
8814.774	9.57	36.45	38.49	44.53	52.06	74	-21.94	Vertical			
10860.830	10.46	38.44	37.80	41.30	52.40	74	-21.60	Vertical			
3570.714	5.85	33.28	40.72	47.91	46.32	74	-27.68	Horizontal			
4834.046	7.46	34.65	41.65	47.02	47.48	74	-26.52	Horizontal			
5617.407	7.81	35.09	41.25	49.03	50.68	74	-23.32	Horizontal			
6445.156	8.13	36.22	40.53	48.29	52.11	74	-21.89	Horizontal			
7781.104	9.26	36.00	39.38	46.46	52.34	74	-21.66	Horizontal			
10888.510	10.49	38.46	37.81	41.89	53.03	74	-20.97	Horizontal			

Test mode:		802.11n(HT20)		Test channel:		Middle		Remark:		Peak	
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
3308.185	5.50	33.28	40.52	46.52	44.78	74	-29.22	Vertical			
4354.967	6.90	34.78	41.30	47.25	47.63	74	-26.37	Vertical			
5393.215	7.72	34.78	41.45	48.37	49.42	74	-24.58	Vertical			
6781.779	8.24	36.02	40.25	47.93	51.94	74	-22.06	Vertical			
9322.501	9.65	36.99	38.04	43.95	52.55	74	-21.45	Vertical			
11283.550	10.77	38.44	37.98	42.21	53.44	74	-20.56	Vertical			
3096.325	5.19	33.37	40.37	47.90	46.09	74	-27.91	Horizontal			
4366.067	6.92	34.83	41.30	49.18	49.63	74	-24.37	Horizontal			
5747.586	7.86	35.29	41.14	48.73	50.74	74	-23.26	Horizontal			
7063.693	8.54	35.83	40.00	48.36	52.73	74	-21.27	Horizontal			
8571.377	9.50	36.25	38.70	44.19	51.24	74	-22.76	Horizontal			
11341.140	10.81	38.43	38.00	41.38	52.62	74	-21.38	Horizontal			

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Test mode:		802.11n(HT20)		Test channel:		Highest		Remark:	Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
3342.042	5.55	33.26	40.55	47.57	45.83	74	-28.17	Vertical	
4809.499	7.44	34.70	41.63	47.93	48.44	74	-25.56	Vertical	
5940.967	7.95	35.62	40.97	48.83	51.43	74	-22.57	Vertical	
7860.737	9.29	36.00	39.31	46.66	52.64	74	-21.36	Vertical	
8904.986	9.60	36.52	38.40	43.76	51.48	74	-22.52	Vertical	
11056.090	10.60	38.49	37.88	41.59	52.80	74	-21.20	Vertical	
2712.439	4.84	33.00	40.09	46.53	44.28	74	-29.72	Horizontal	
3625.669	5.93	33.34	40.76	48.16	46.67	74	-27.33	Horizontal	
5850.919	7.91	35.45	41.06	48.85	51.15	74	-22.85	Horizontal	
7741.590	9.25	36.00	39.41	47.41	53.25	74	-20.75	Horizontal	
9538.543	9.67	37.23	37.86	43.31	52.35	74	-21.65	Horizontal	
11545.040	10.95	38.43	38.09	40.56	51.85	74	-22.15	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:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

- 2) Scan from 9kHz to 25GHz, The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
- 3) 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.



## 5.9 Band Edge (Radiated Emission)

Test Requirement:	47 CFR Part 15C 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:			

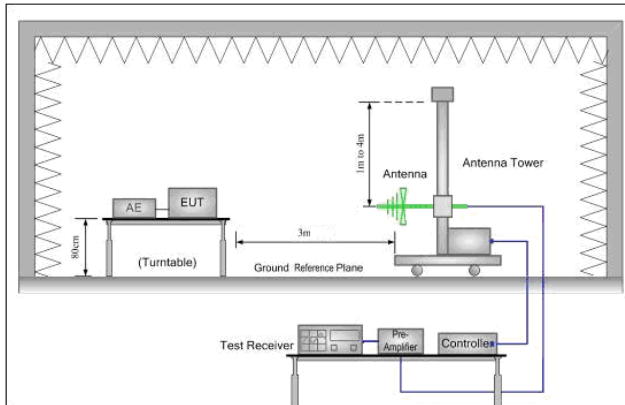


Figure 1. 30MHz to 1GHz

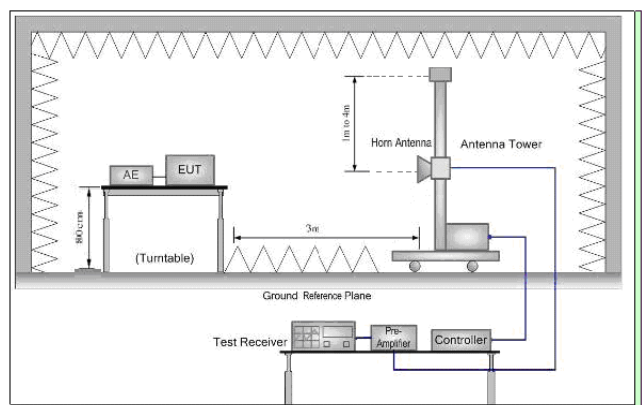


Figure 2. Above 1 GHz



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 ; 6.5Mbps of rate is the worst case of 802.11n(HT20) .
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



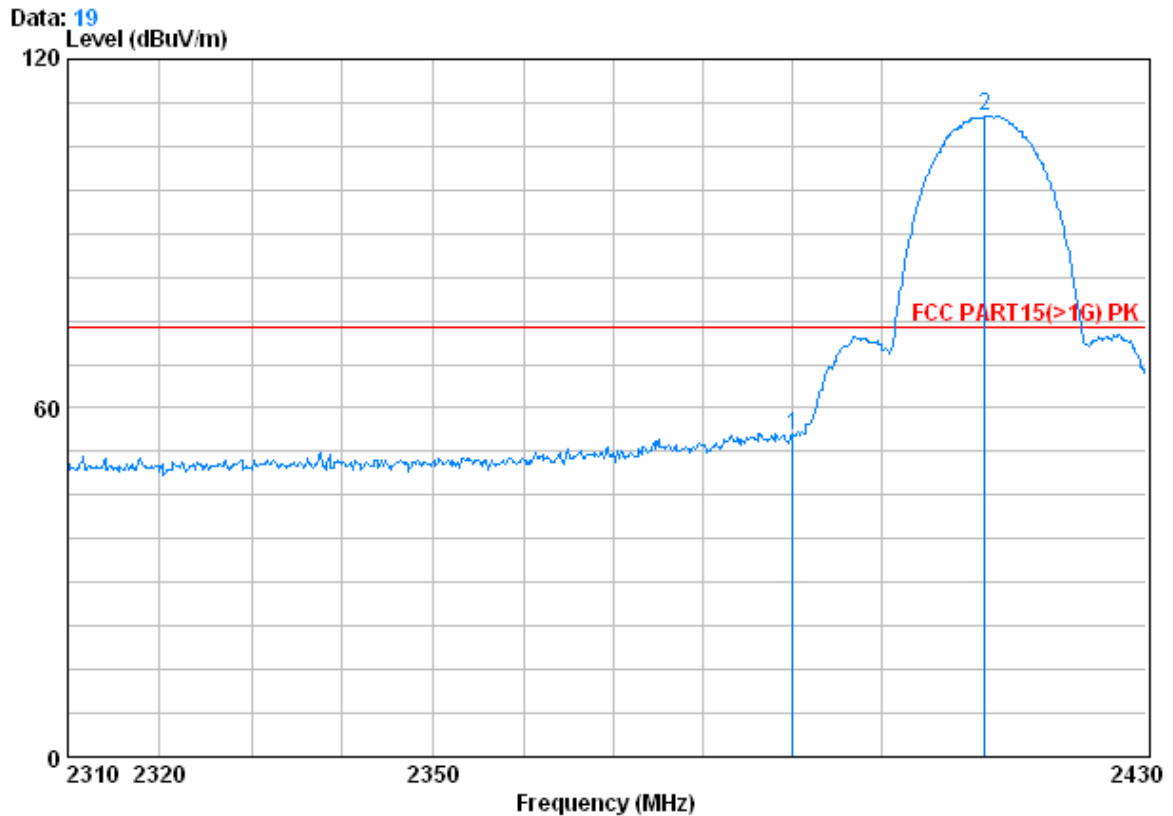
# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 59 of 84

Test plot as follows:

Worse case mode:	802.11b	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge b

		CableAntenna Preamp			Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	59.48	55.13	74.00	-18.87
2 X	2411.640	2.99	32.54	39.86	114.54	110.21	74.00	36.21

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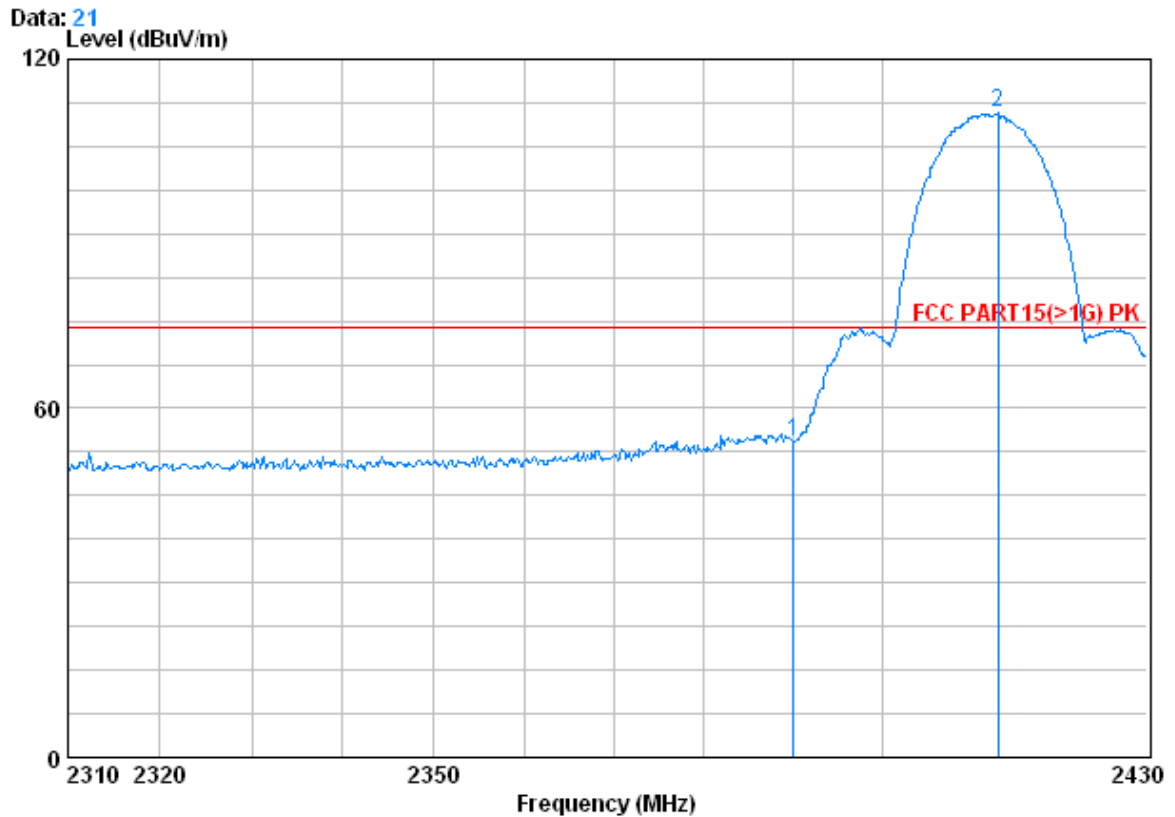


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 60 of 84

Worse case mode:	802.11b	Test channel:	Lowest	Remark:	Peak	Horizontal
------------------	---------	---------------	--------	---------	------	------------



Condition : FCC PART15(>1G) PK 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge b

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	58.73	54.38	74.00	-19.62
2 X	2413.080	2.99	32.54	39.86	115.09	110.77	74.00	36.77



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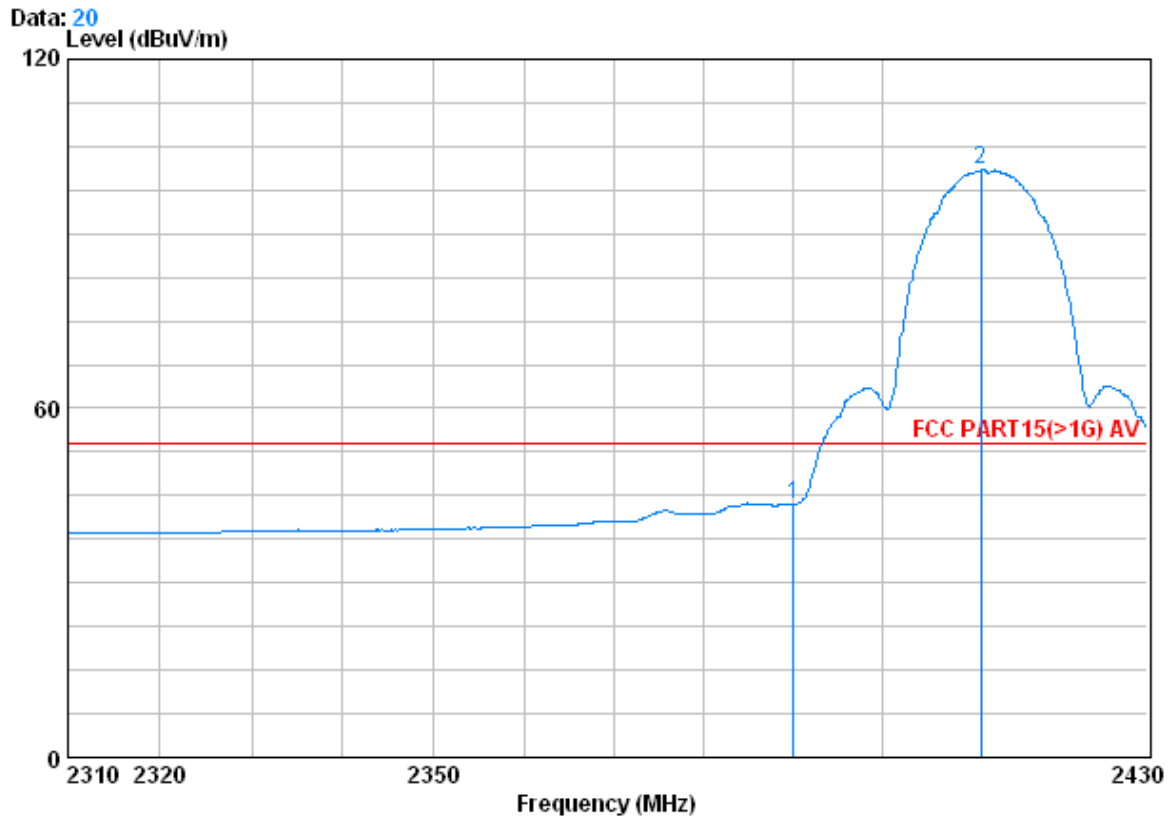


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 61 of 84

Worse case mode:	802.11b	Test channel:	Lowest	Remark:	Average	Vertical
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Condition : FCC PART15(>1G) AV 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge b

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	47.72	43.36	54.00	-10.64
2 @	2411.160	2.99	32.54	39.86	105.28	100.95	54.00	46.95

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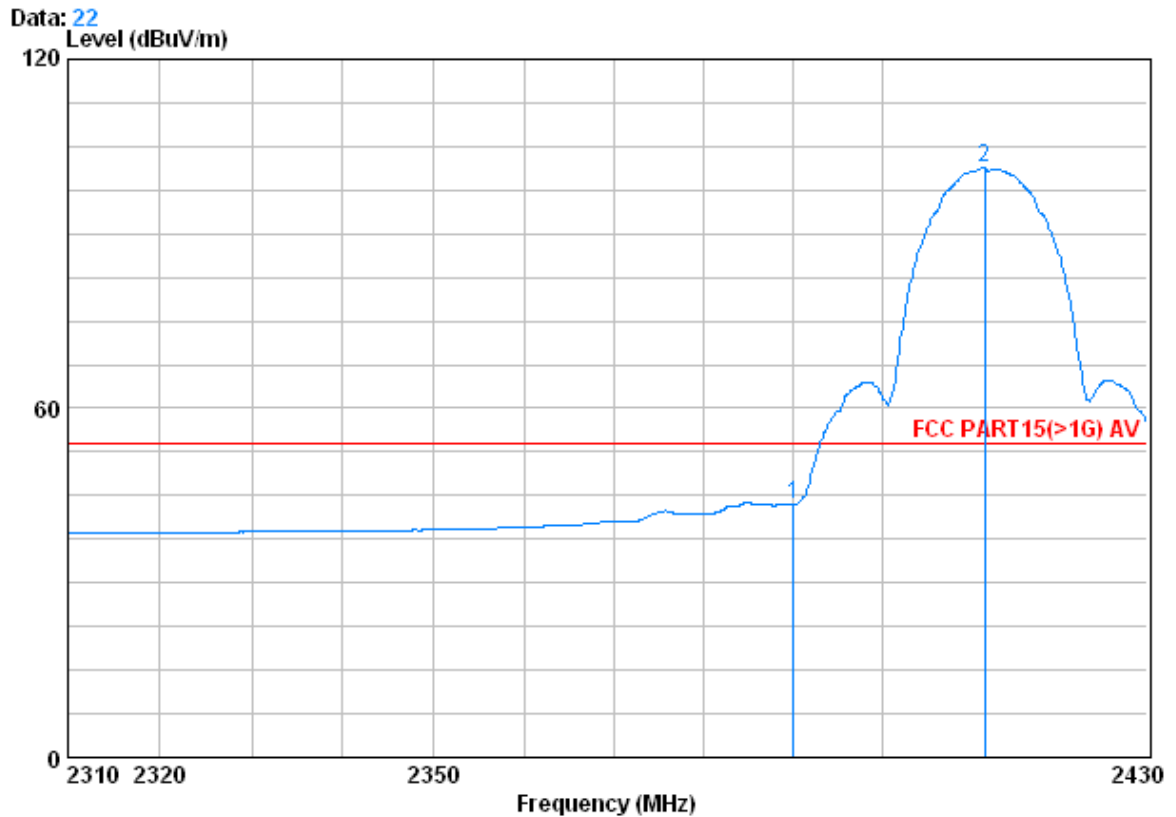


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 62 of 84

Worse case mode:	802.11b	Test channel:	Lowest	Remark:	Average	Horizontal
------------------	---------	---------------	--------	---------	---------	------------



Condition : FCC PART15(>1G) AV 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge b

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	47.81	43.46	54.00	-10.54
2 @	2411.520	2.99	32.54	39.86	105.57	101.24	54.00	47.24

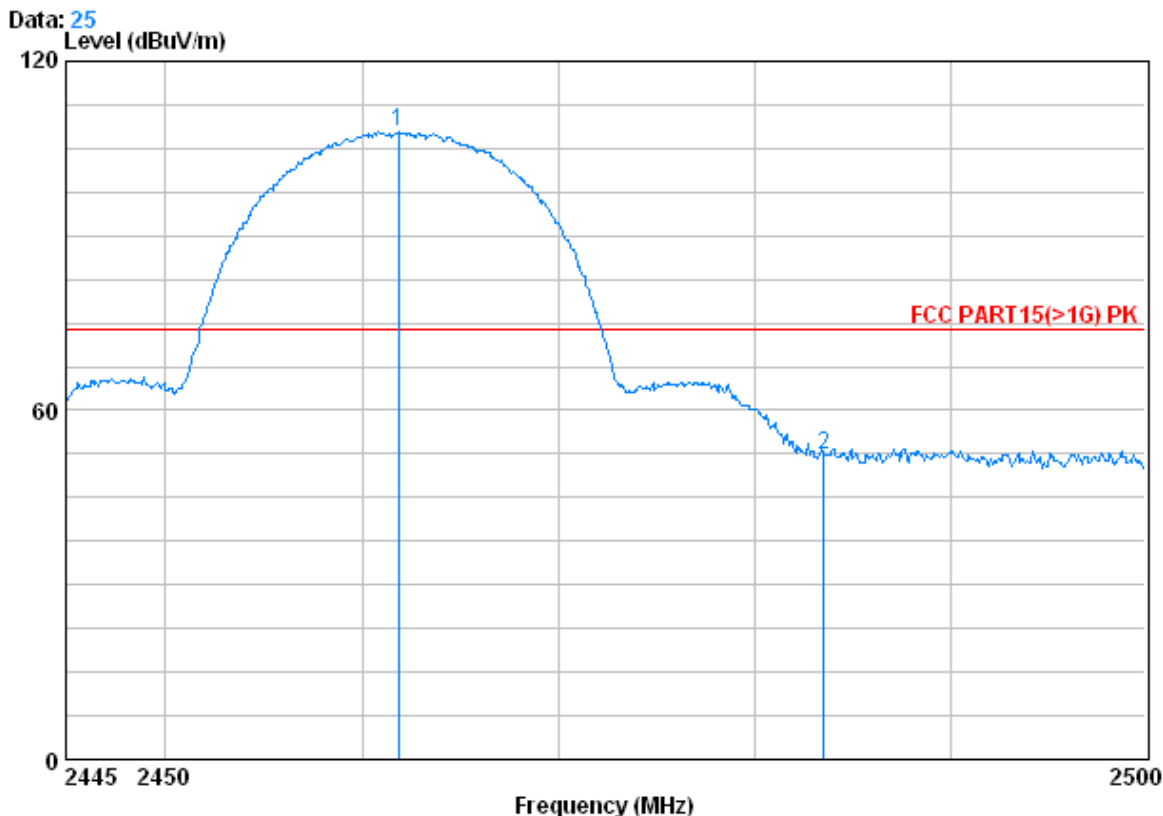
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# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103  
Page: 63 of 84

Worse case mode:	802.11b	Test channel:	Highest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL  
Job No. : 3431RF  
Mode : Wifi 2462 Bandedge b

		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	2461.830	3.02	32.64	39.91	112.13	107.89	74.00	33.89
2	2483.500	3.03	32.67	39.92	56.66	52.44	74.00	-21.56

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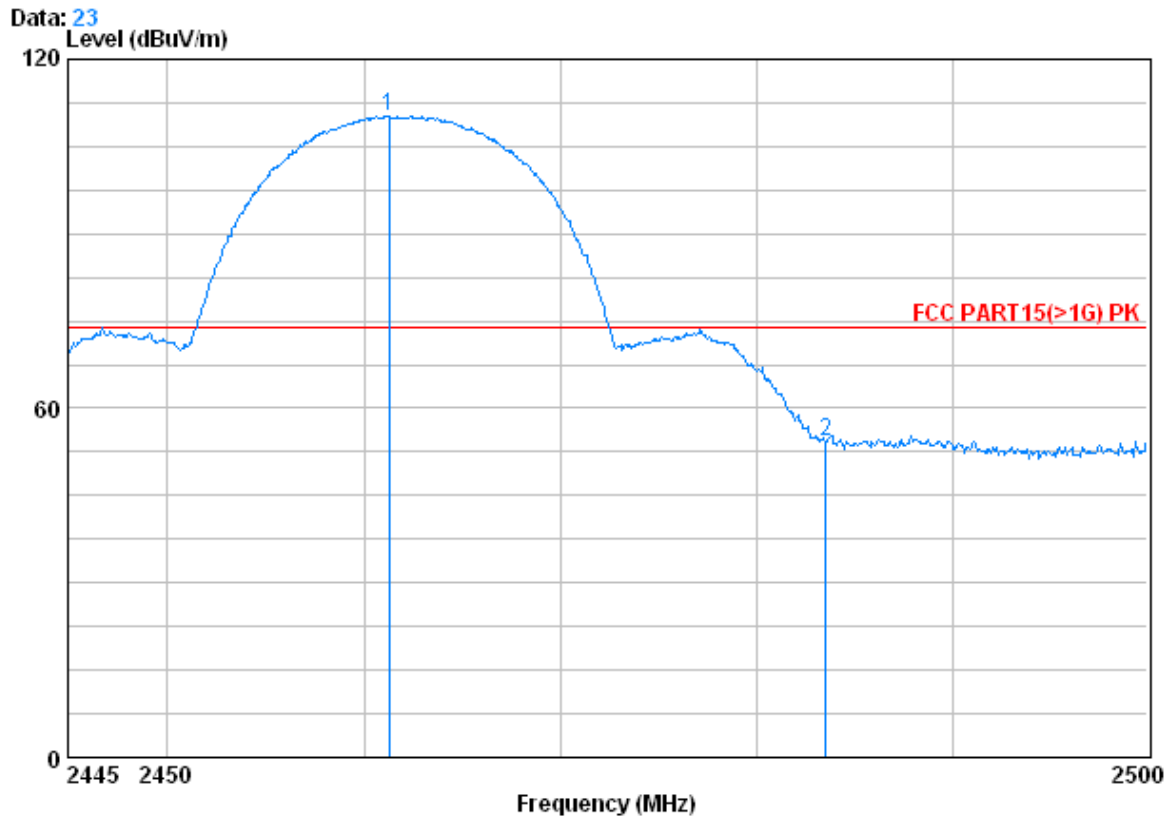


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 64 of 84

Worse case mode:	802.11b	Test channel:	Highest	Remark:	Peak	Horizontal
------------------	---------	---------------	---------	---------	------	------------



Condition : FCC PART15(>1G) PK 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2462 Bandedge b

		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	2461.225	3.02	32.64	39.91	114.53	110.28	74.00	36.28
2	2483.500	3.03	32.67	39.92	58.50	54.28	74.00	-19.72

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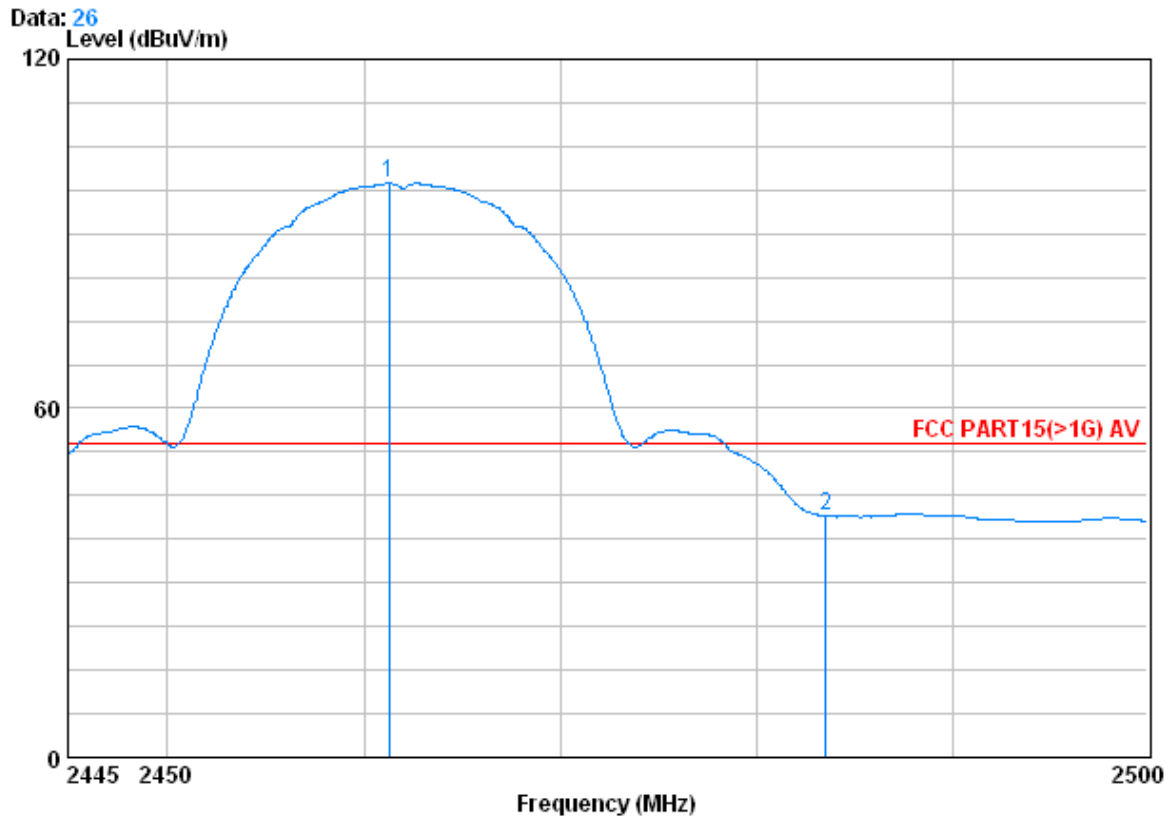


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 65 of 84

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

Job No. : 3431RF

Mode : Wifi 2462 Bandedge b

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2461.225	3.02	32.64	39.91	102.91	98.66	54.00	44.66
2	2483.500	3.03	32.67	39.92	45.68	41.46	54.00	-12.54

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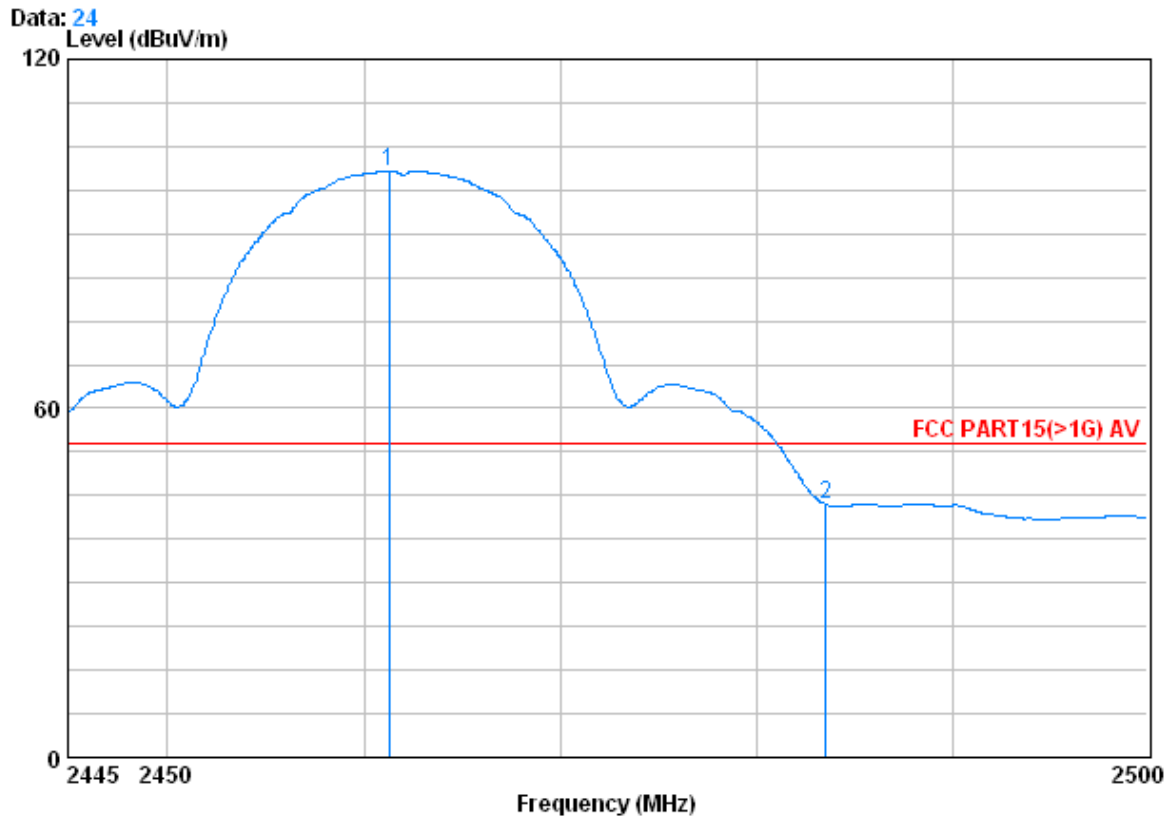


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 66 of 84

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



Condition : FCC PART15(>1G) AV 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2462 Bandedge b

	Freq	Cable Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2461.225	3.02	32.64	39.91	105.10	100.86	54.00	46.86
2	2483.500	3.03	32.67	39.92	47.73	43.51	54.00	-10.49

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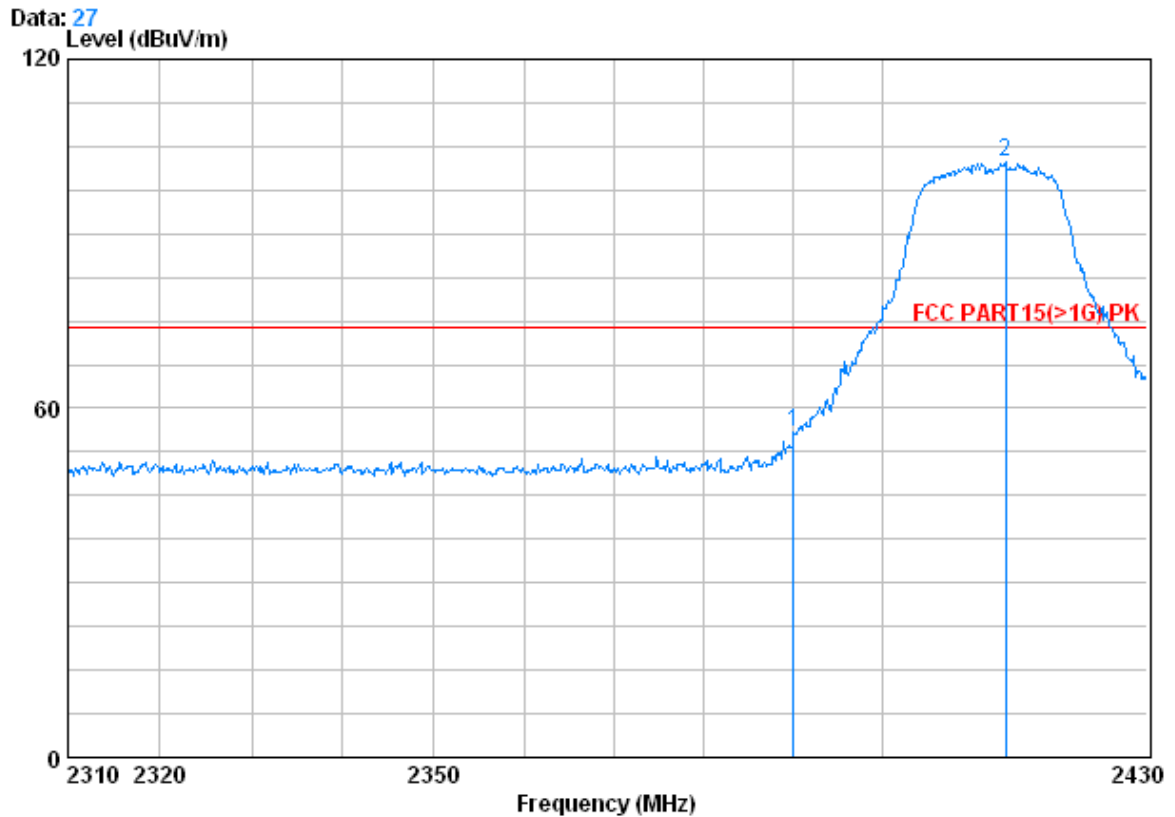


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 67 of 84

Worse case mode:	802.11g	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	60.18	55.82	74.00	-18.18
2 @	2413.920	2.99	32.54	39.86	106.68	102.35	74.00	28.35

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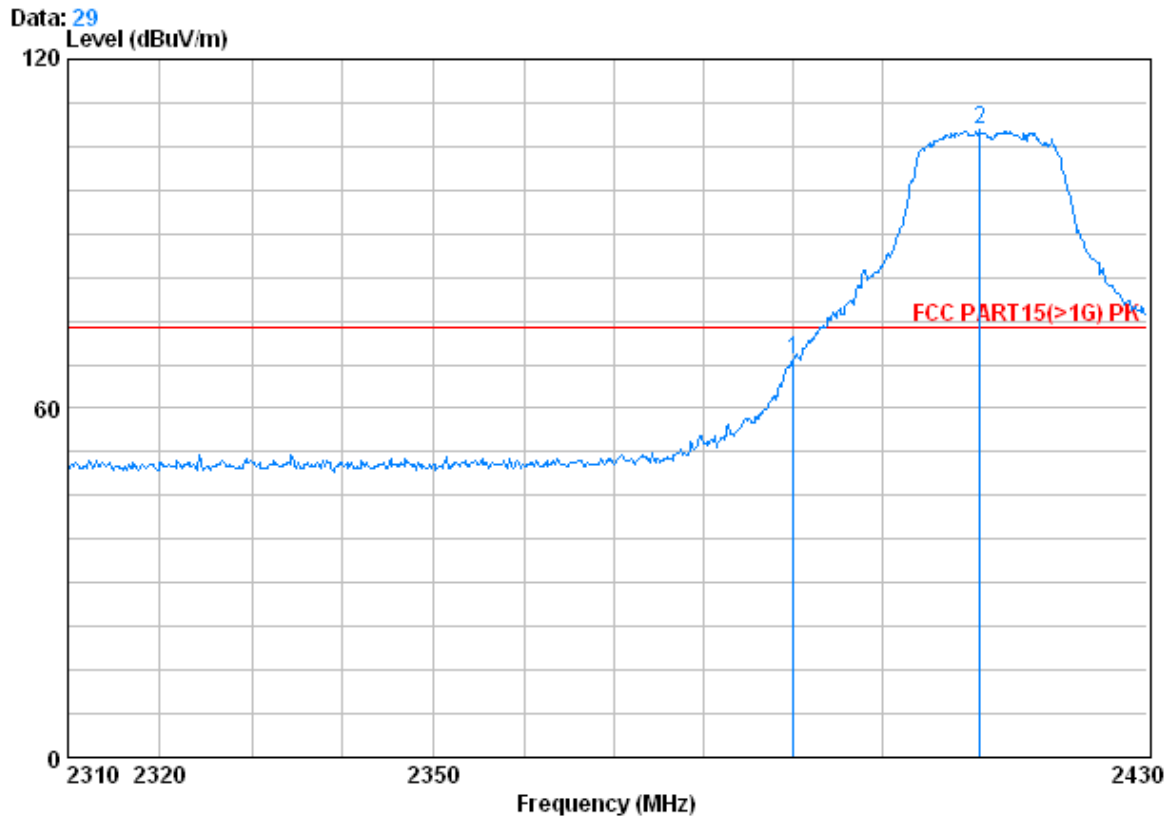


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 68 of 84

Worse case mode:	802.11g	Test channel:	Lowest	Remark:	Peak	Horizontal
------------------	---------	---------------	--------	---------	------	------------



Condition : FCC PART15(>1G) PK 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	72.81	68.46	74.00	-5.54
2 @	2411.040	2.99	32.54	39.86	112.17	107.84	74.00	33.84

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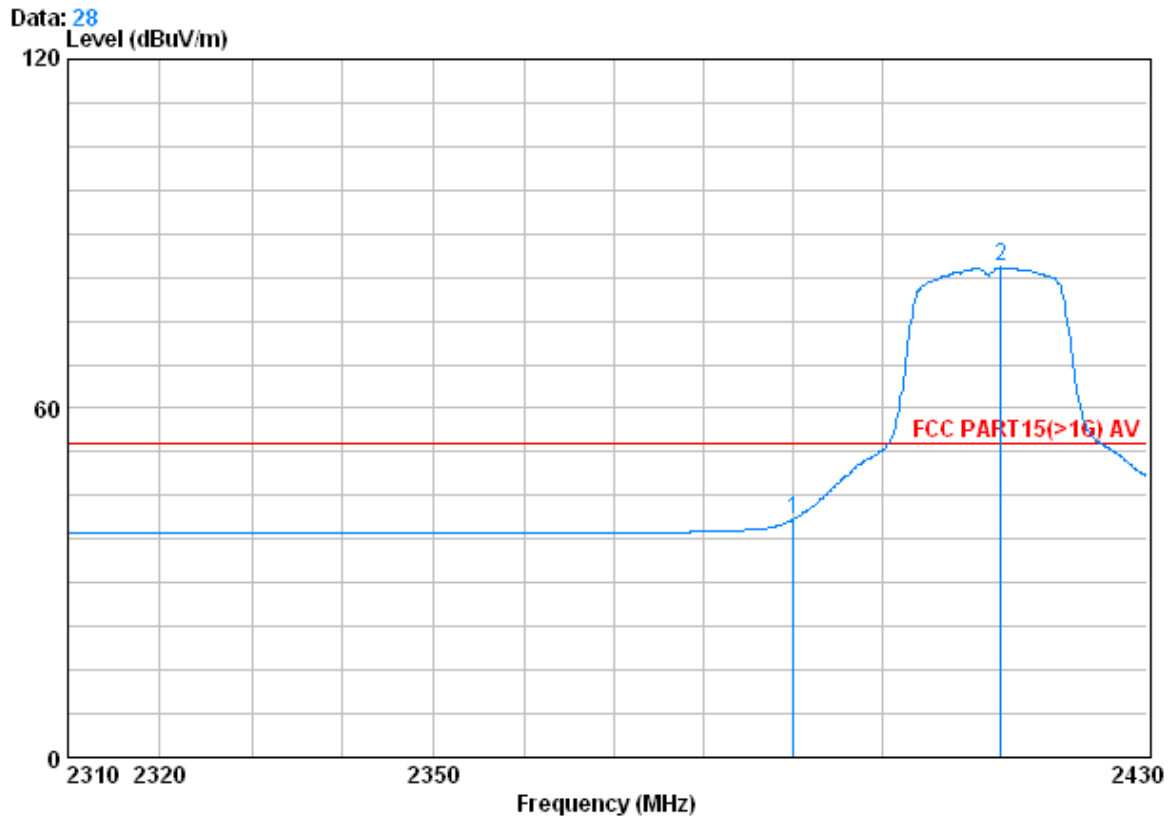


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 69 of 84

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

Job No. : 3431RF

Mode : Wifi 2412 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	45.34	40.99	54.00	-13.01
2 @	2413.440	2.99	32.54	39.86	88.53	84.20	54.00	30.20

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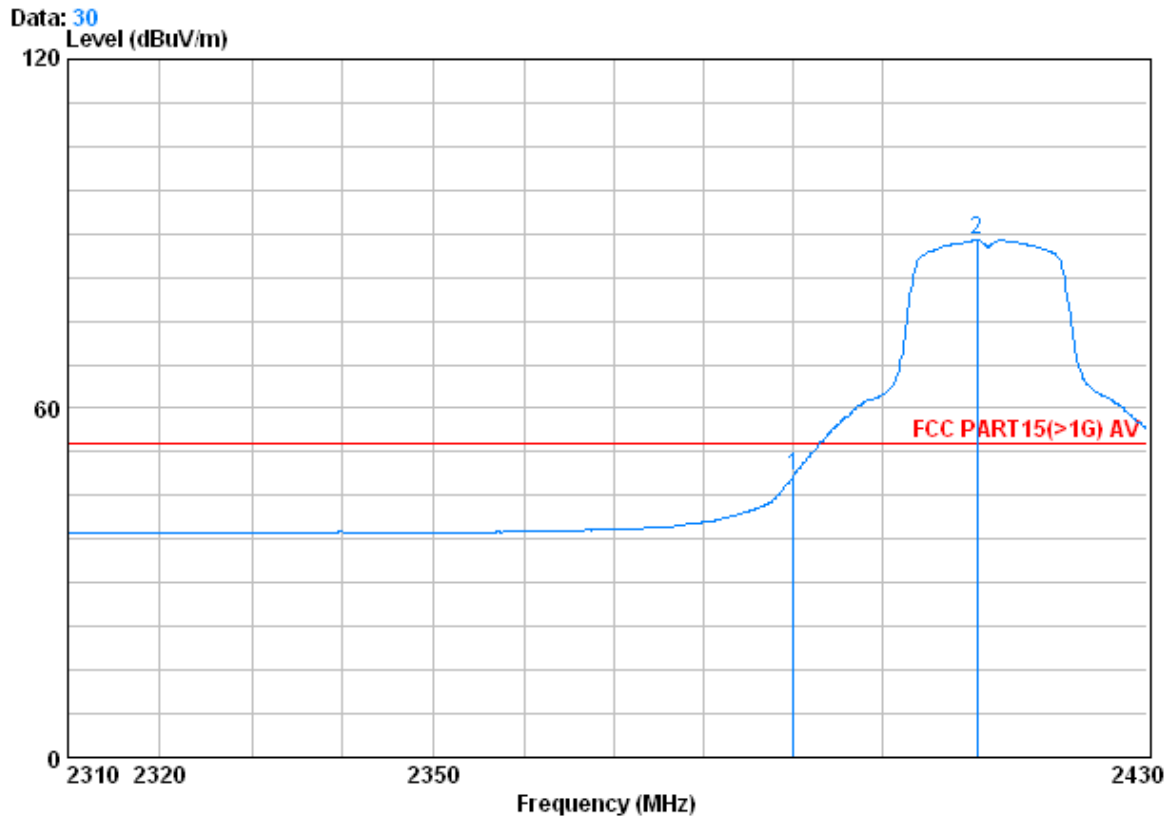


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 70 of 84

Worse case mode:	802.11g	Test channel:	Lowest	Remark:	Average	Horizontal
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Condition : FCC PART15(>1G) AV 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	52.88	48.53	54.00	-5.47
2	2410.680	2.99	32.54	39.86	93.24	88.91	54.00	34.91



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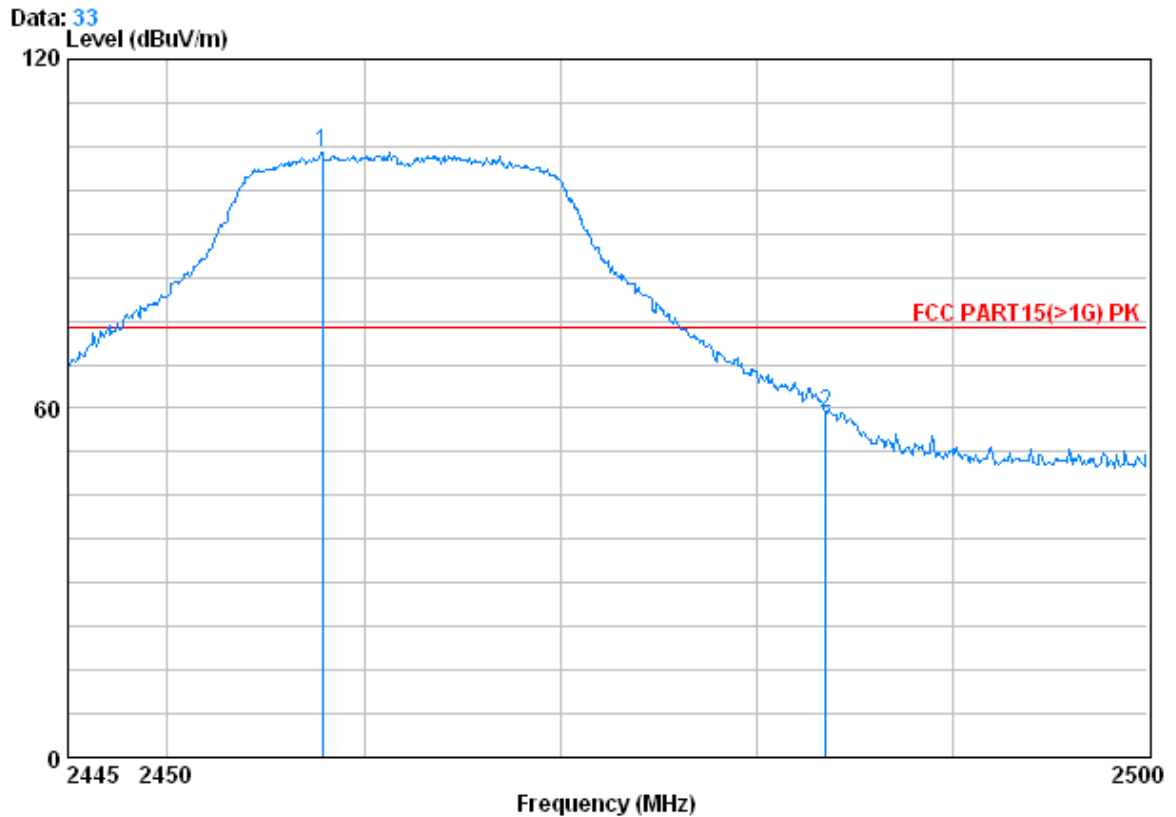


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 71 of 84

Worse case mode:	802.11g	Test channel:	Highest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2462 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2457.870	3.02	32.64	39.91	108.30	104.05	74.00	30.05
2	2483.500	3.03	32.67	39.92	63.49	59.27	74.00	-14.73

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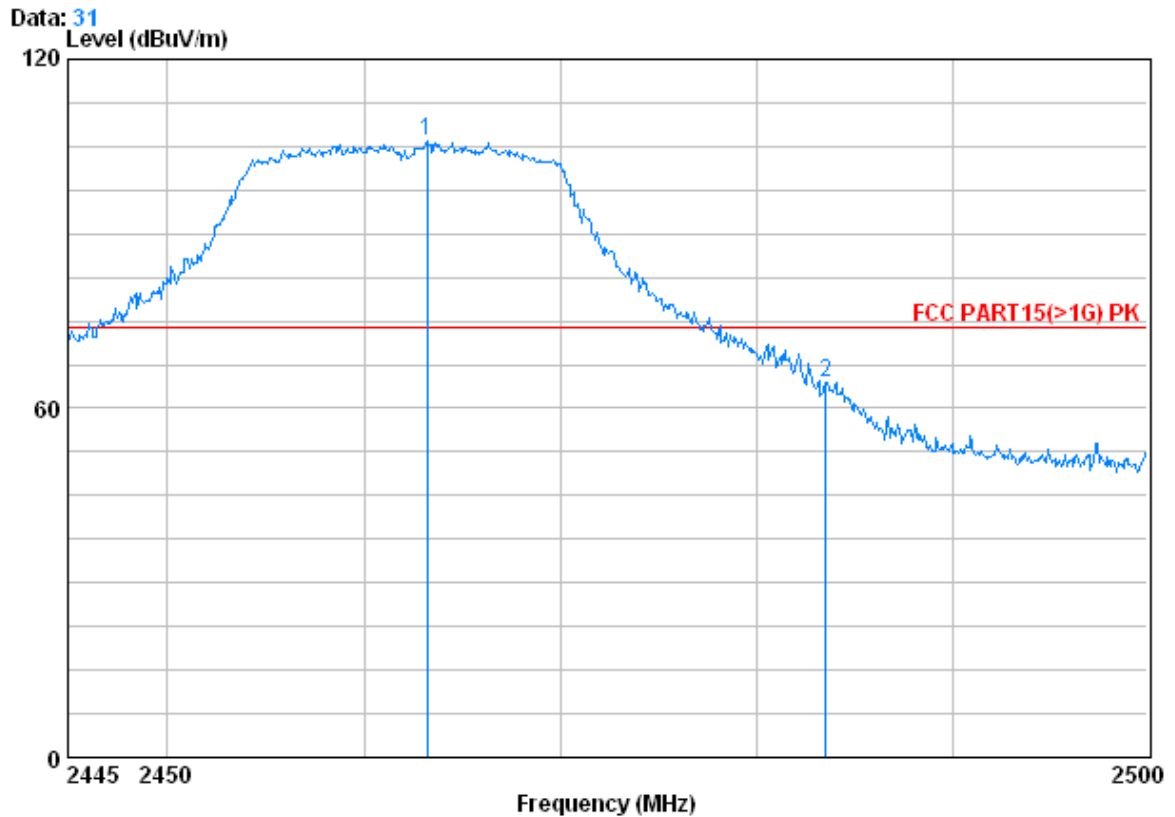


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 72 of 84

Worse case mode:	802.11g	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition : FCC PART15(>1G) PK 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2462 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2463.150	3.02	32.64	39.91	110.06	105.82	74.00	31.82
2	2483.500	3.03	32.67	39.92	68.76	64.54	74.00	-9.46

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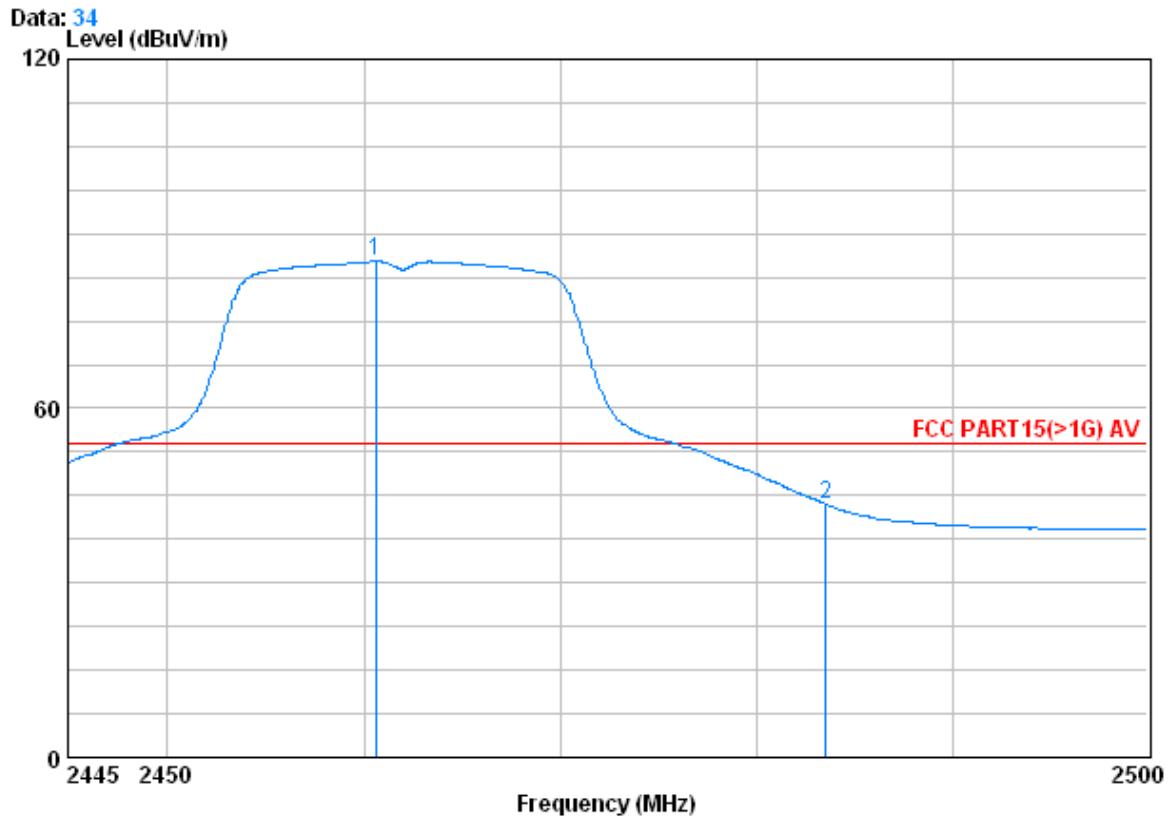


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 73 of 84

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

Job No. : 3431RF

Mode : Wifi 2462 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2460.565	3.02	32.64	39.91	89.52	85.28	54.00	31.28
2	2483.500	3.03	32.67	39.92	47.79	43.58	54.00	-10.42

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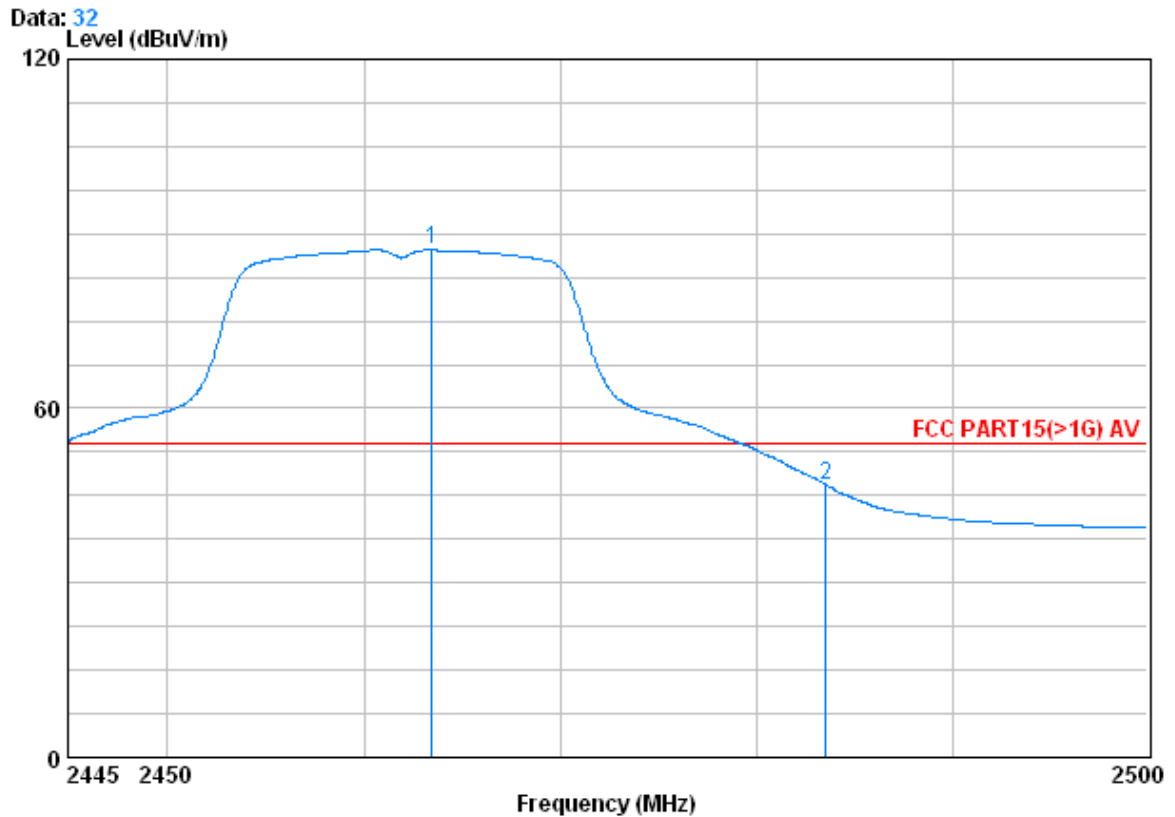


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 74 of 84

Worse case mode:	802.11g	Test channel:	Highest	Remark:	Average	Horizontal
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Condition : FCC PART15(>1G) AV 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2462 Bandedge g

	Freq	Cable Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2463.425	3.02	32.64	39.91	91.48	87.23	54.00	33.23
2	2483.500	3.03	32.67	39.92	51.12	46.90	54.00	-7.10

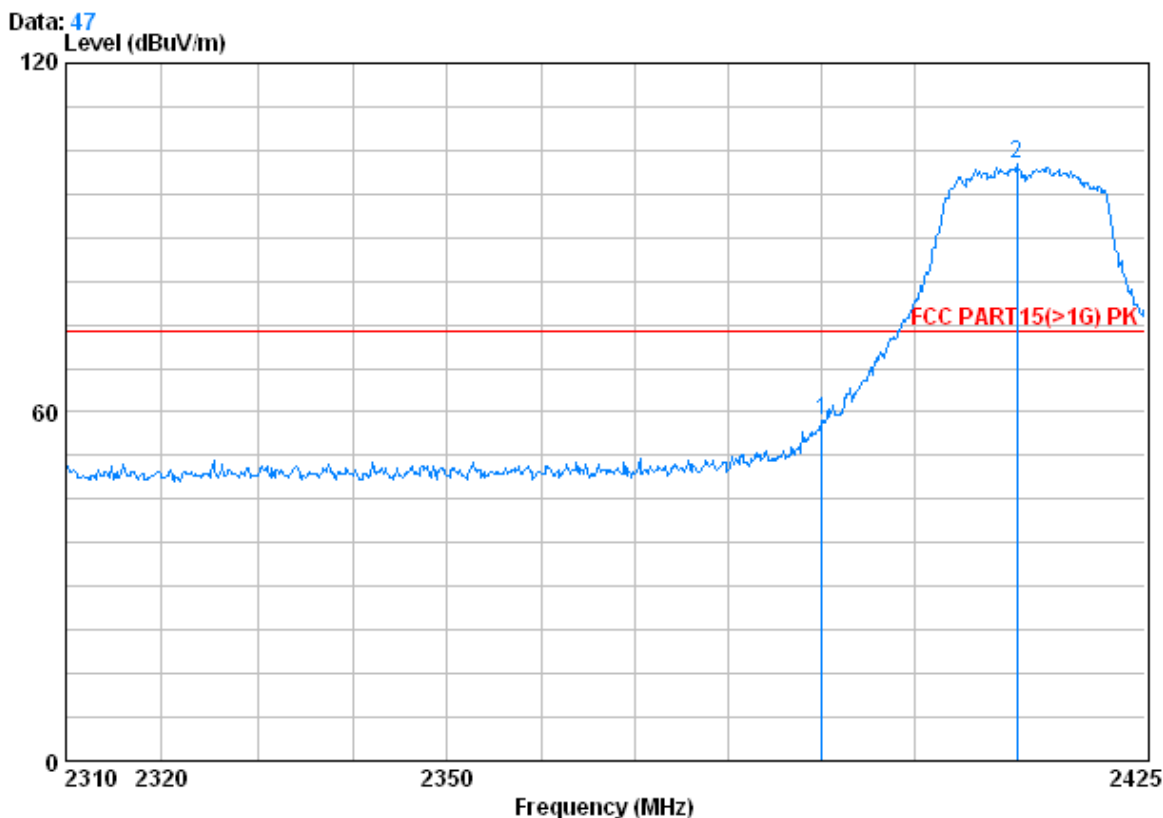
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# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103  
Page: 75 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL  
Job No. : 3431RF  
Mode : Wifi 2412 Bandedge N20

		CableAntenna Preamp			Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	62.72	58.37	74.00	-15.63
2 X	2411.085	2.99	32.54	39.86	106.87	102.55	74.00	28.55

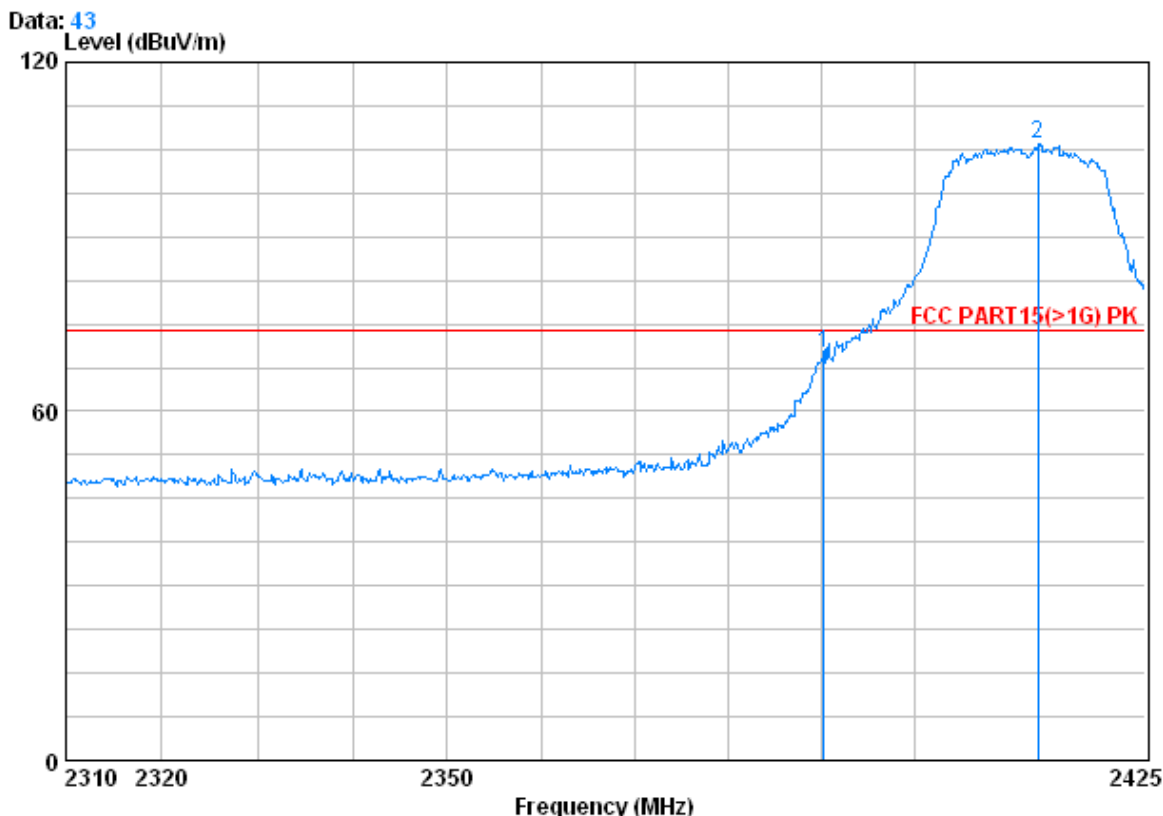
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# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103  
Page: 76 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Lowest	Remark:	Peak	Horizontal
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Condition : FCC PART15(>1G) PK 3m HORIZONTAL  
Job No. : 3431RF  
Mode : Wifi 2412 Bandedge N20

		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	2390.155	2.98	32.51	39.85	74.41	70.06	74.00	-3.94
2 X	2413.385	2.99	32.54	39.86	110.35	106.02	74.00	32.02

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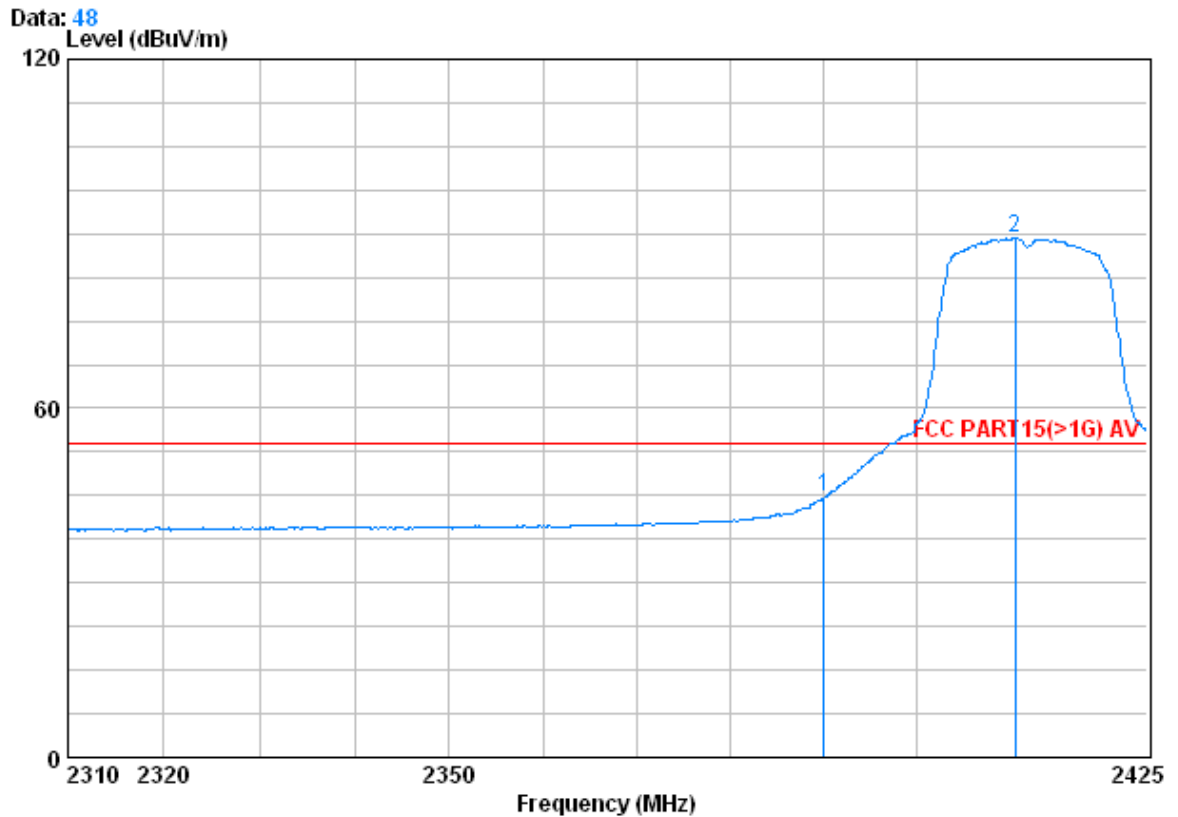


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 77 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Lowest	Remark:	Average	Vertical
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Condition : FCC PART15(>1G) AV 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge N20

		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	2390.000	2.98	32.51	39.85	49.05	44.69	54.00	-9.31
2 0	2410.625	2.99	32.54	39.86	93.57	89.24	54.00	35.24

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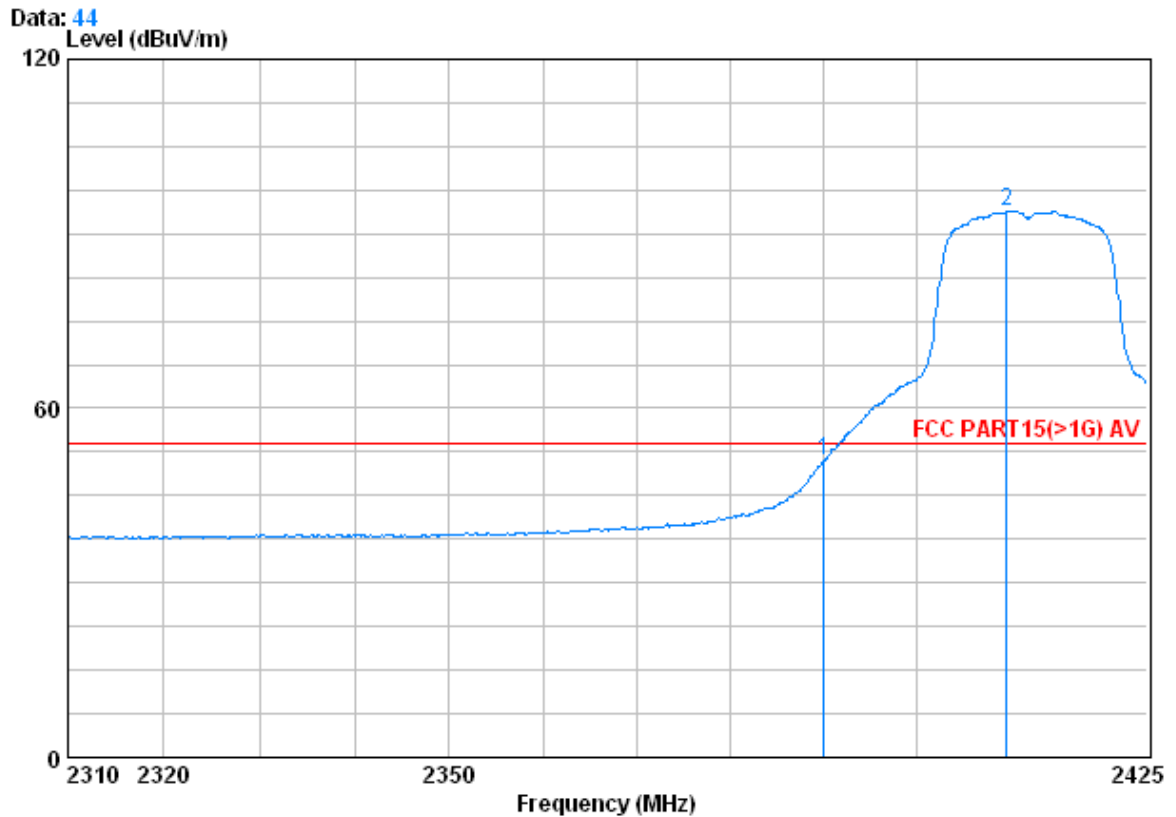


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 78 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Lowest	Remark:	Average	Horizontal
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Condition : FCC PART15(>1G) AV 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge N20

		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	2390.000	2.98	32.51	39.85	55.52	51.17	54.00	-2.83
2 0	2409.705	2.99	32.54	39.86	98.21	93.88	54.00	39.88

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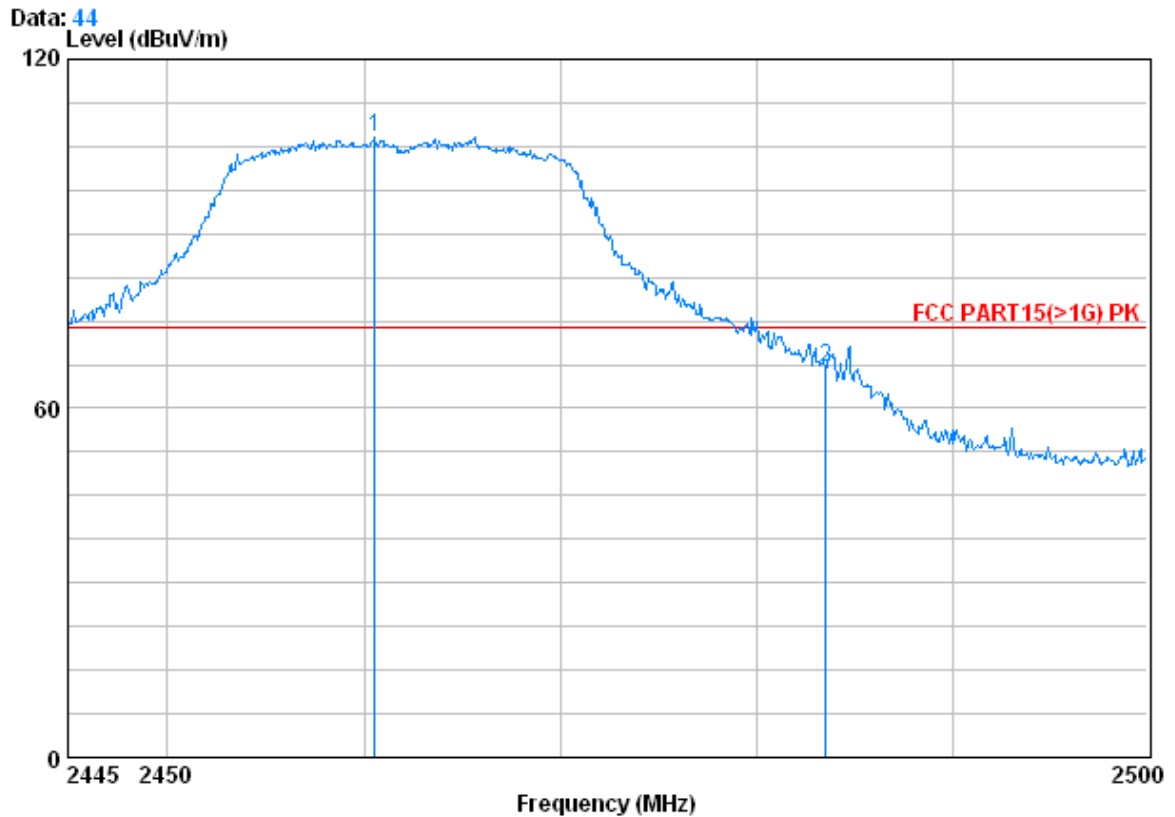


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 79 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Highest	Remark:	Peak	Vertical
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Condition : FCC PART15(>1G) PK 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge N20

		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	2460.510	3.02	32.64	39.91	110.92	106.68	74.00	32.68
2	2483.500	3.03	32.67	39.92	71.25	67.03	74.00	-6.97



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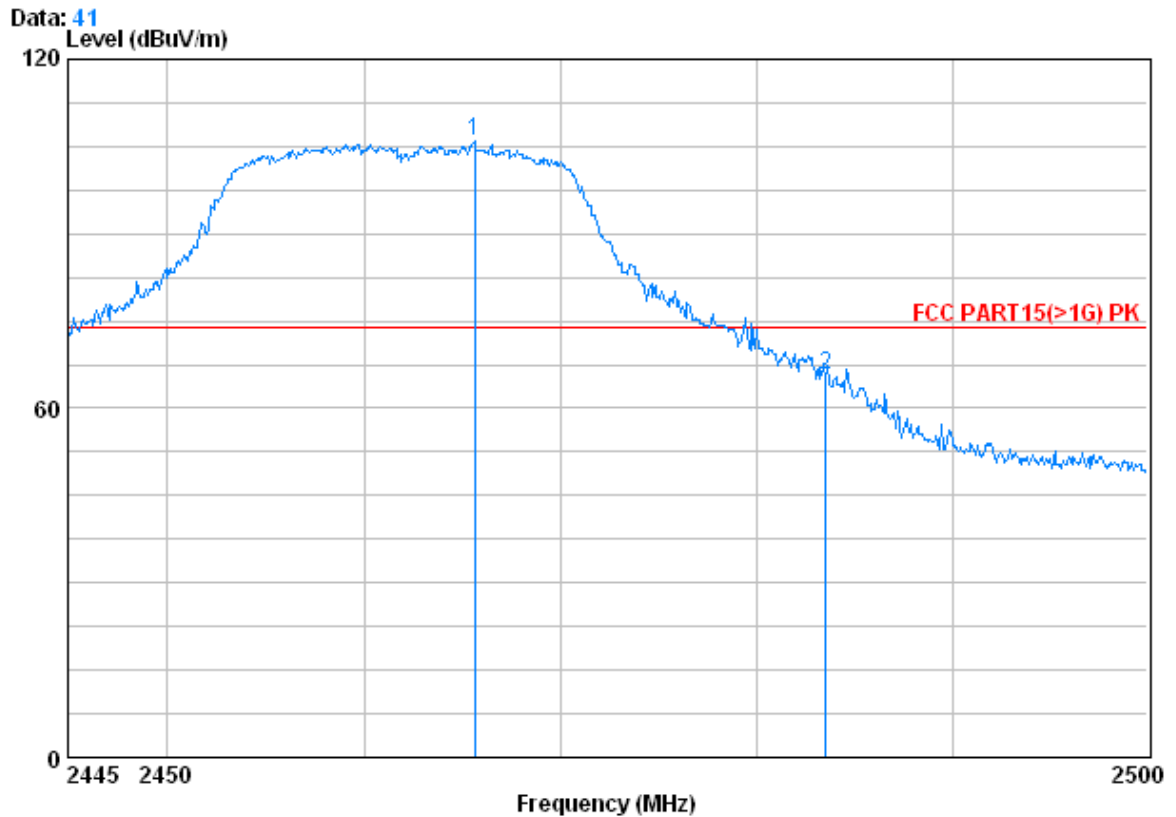


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 80 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Highest	Remark:	Peak	Horizontal
------------------	---------------	---------------	---------	---------	------	------------



Condition : FCC PART15(>1G) PK 3m HORIZONTAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge N20

		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	2465.570	3.02	32.64	39.91	110.19	105.95	74.00	31.95
2	2483.500	3.03	32.67	39.92	69.83	65.61	74.00	-8.39

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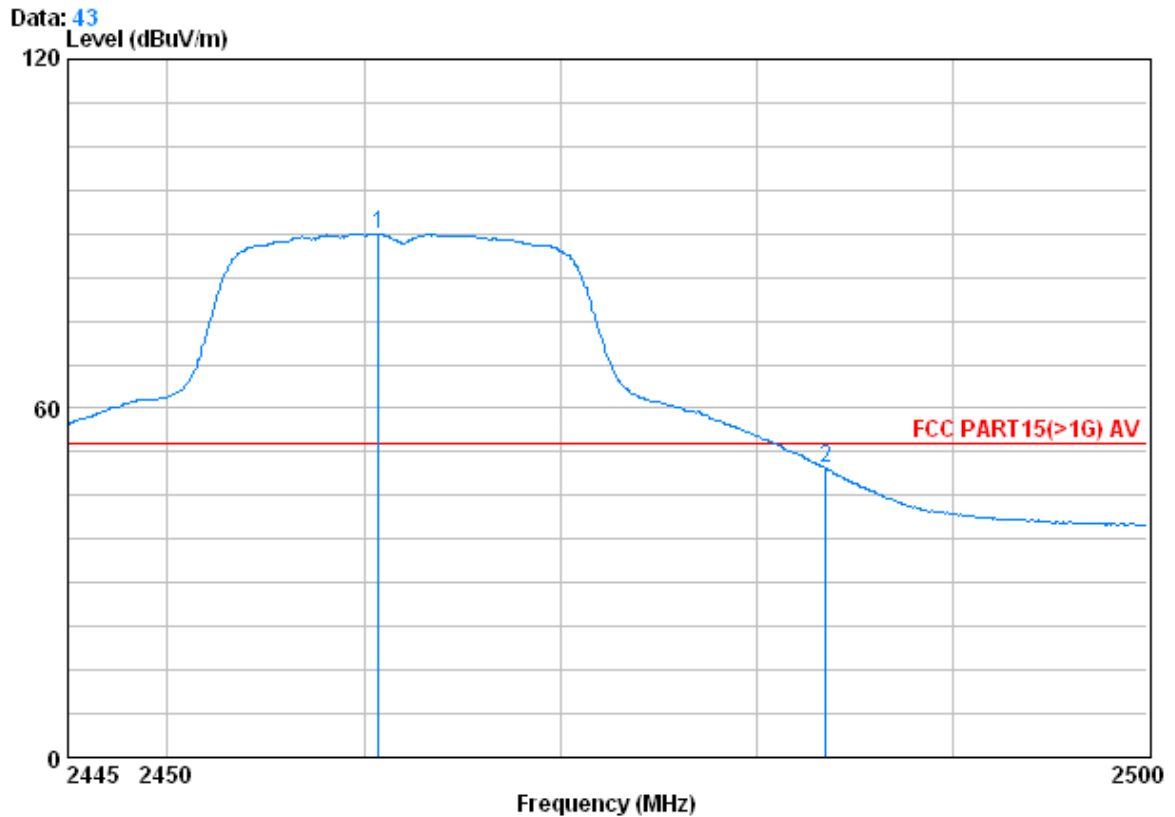


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 81 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Highest	Remark:	Average	Vertical
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Condition : FCC PART15(>1G) AV 3m VERTICAL

Job No. : 3431RF

Mode : Wifi 2412 Bandedge N20

	Freq	Cable Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2460.730	3.02	32.64	39.91	94.22	89.97	54.00	35.97
2	2483.500	3.03	32.67	39.92	53.82	49.60	54.00	-4.40

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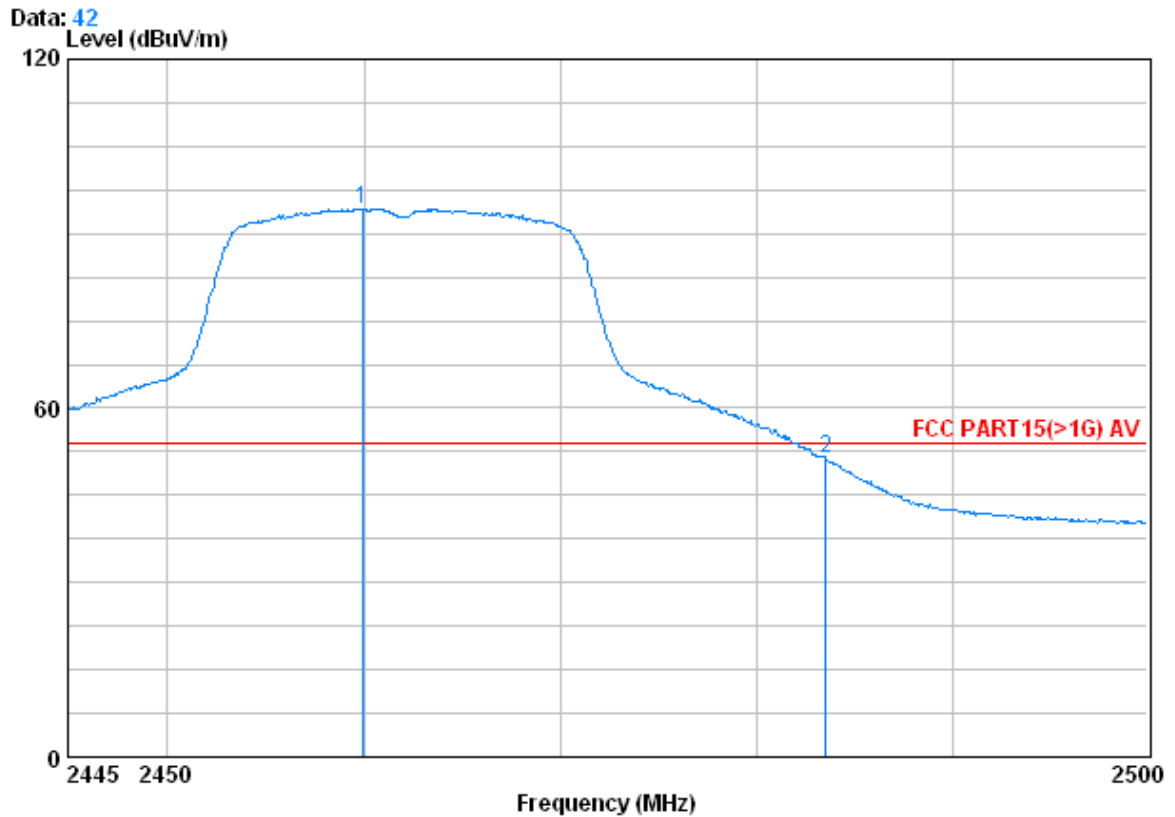


# SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM130600343103

Page: 82 of 84

Worse case mode:	802.11n(HT20)	Test channel:	Highest	Remark:	Average	Horizontal
------------------	---------------	---------------	---------	---------	---------	------------



Condition : FCC PART15(>1G) AV 3m HORIZONTAL  
Job No. : 3431RF  
Mode : Wifi 2412 Bandedge N20

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 @	2459.905	3.02	32.64	39.91	98.48	94.23	54.00	40.23
2	2483.500	3.03	32.67	39.92	55.58	51.36	54.00	-2.64

## Note:

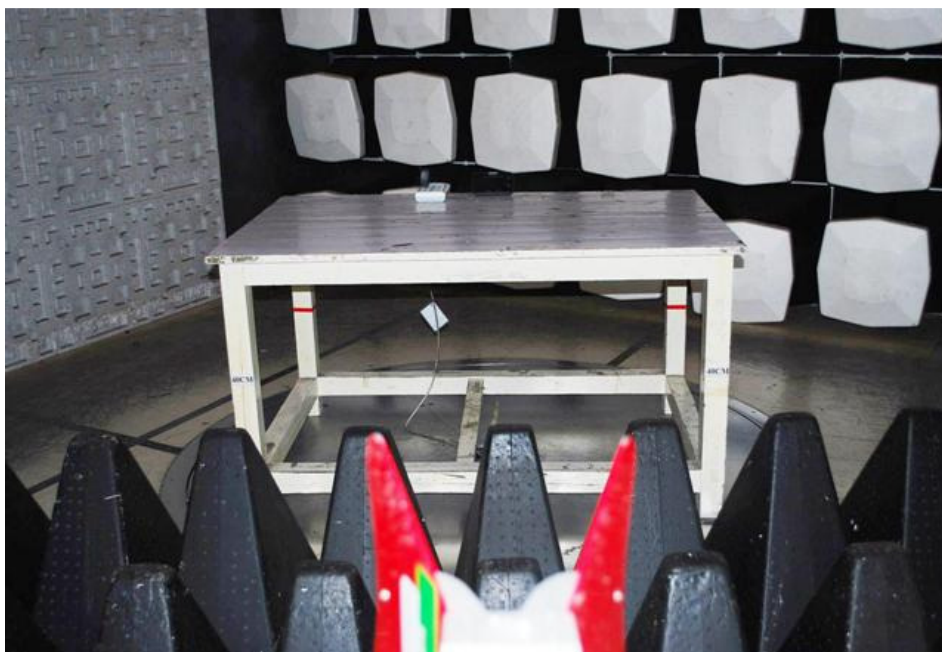
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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

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## 6 Photographs - EUT Test Setup (Test Model No.: AD802)

### 6.1 Radiated Spurious Emission



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## 6.2 Conducted Emission



## 7 Photographs - EUT Constructional Details

Refer to Report No. SZEM130600343101 for EUT external and internal photos.