



No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

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FCC REPORT

Application No. : SZEM1309005051RF
Applicant: Snapproducts (HK) Ltd
Factory: SunnyCraft Co,Ltd
Product Name: Wireless Mouse
Model No.(EUT): WIC#286936
FCC ID: 2AARC286936U
Standards: 47 CFR Part 15, Subpart C (2012)
Date of Receipt: 2013-09-09
Date of Test: 2013-09-18 to 2013-09-26
Date of Issue: 2013-10-14

Test Result:	PASS *
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* 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	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 (2009)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2009)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2009)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2009)	PASS
Band Edge (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2009)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2009)	PASS



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4 General Information

4.1 Client Information

Applicant:	Snapproducts (HK) Ltd
Address of Applicant:	Unit 739, KITEC, 1 Trademart Drive , Kowloon Bay
Factory:	SunnyCraft Co,Ltd
Address of Factory:	Room713, ZhuChi Building, Song Shan Road.Shantou, China

4.2 General Description of EUT

Product Name:	Wireless Mouse
Model No.:	WIC#286936
Frequency Range:	2402MHz~2478MHz
Modulation Type:	GFSK
Number of Channels:	77 (declared by the client)
Sample Type:	Fixed production
Antenna Type:	Integral
Antenna Gain:	0dBi
Power Supply:	DC 5V from USB
Test Voltage:	DC 5V



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz		
19	2420MHz	39	2440MHz	59	2460MHz		
20	2421MHz	40	2441MHz	60	2461MHz		

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:

Channel	Frequency
The Lowest channel(CH1)	2402MHz
The Middle channel(CH41)	2442MHz
The Highest channel(CH77)	2478MHz

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4.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	48 % RH
Atmospheric Pressure:	1005 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode .

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
Notebook	Lenovo	T60
PC	DELL	DCSM
LCD-displaying	DELL	SP2208WFPt
KEYBOARD	DELL	SK-8115
MOUSE	Lenovo	MO28UOL
Coder	HengTong ELECTRON	HT4000
Printer	Canon	BJC-1000SP

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**

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
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	2014-05-59
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

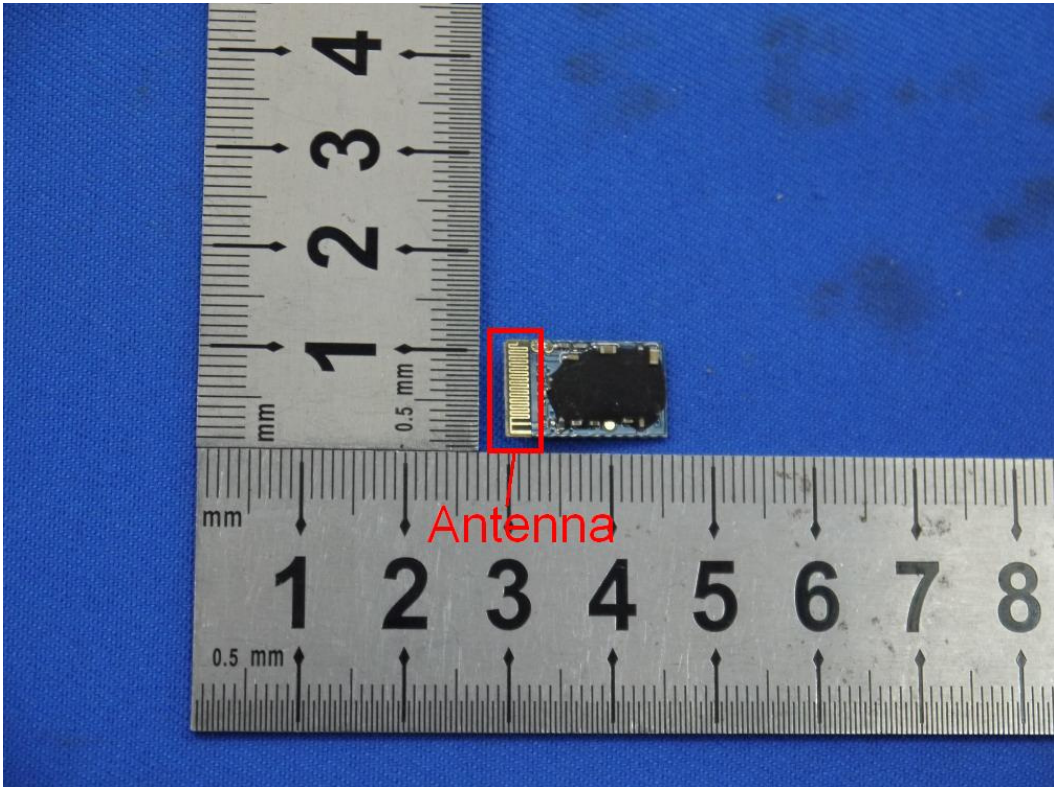
Note: The calibration interval is one year, all the instruments are valid.



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5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
<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>	
EUT Antenna:	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.</p>	
	



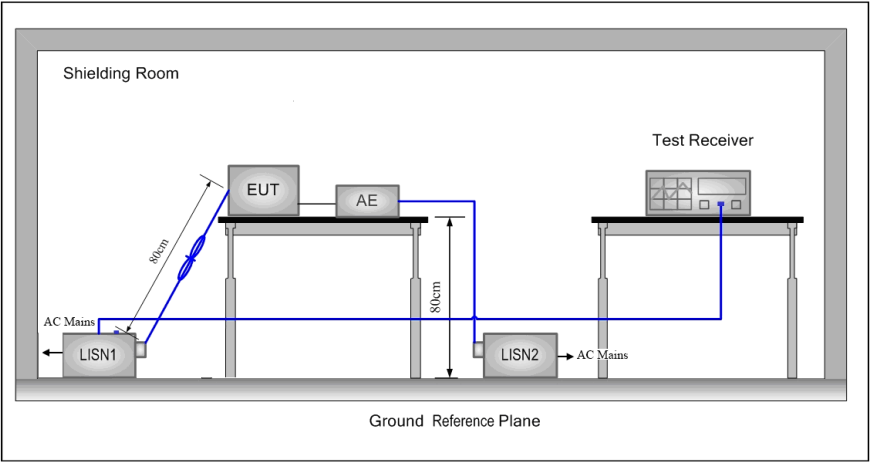
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5.2 Conducted Emissions

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">1) The mains terminal disturbance voltage test was conducted in a shielded room.2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ 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.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,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 2.5) 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.		

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.

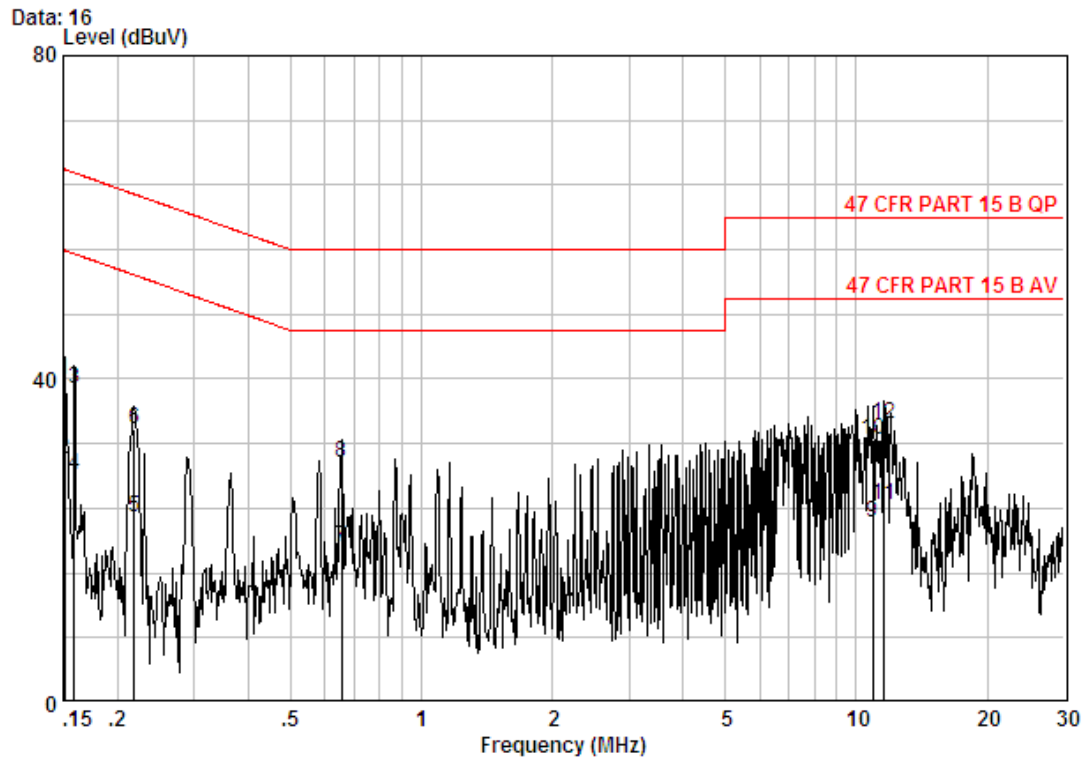


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Live Line:



Site : Shielding Room
Condition : 47 CFR PART 15 B QP CE LINE
Job No. : 5051RF
Test mode : TX

	Freq	Cable	LISN	Read	Limit	Over	
	MHz	Loss	Factor	Level	Line	Limit	Remark
		dB		dBuV	dBuV	dB	
1	0.15080	0.02	9.70	30.10	39.82	65.96	-26.13 QP
2	0.15080	0.02	9.70	20.31	30.03	55.96	-25.93 Average
3	0.15900	0.02	9.70	28.98	38.70	65.52	-26.82 QP
4	0.15900	0.02	9.70	18.36	28.08	55.52	-27.44 Average
5	0.21851	0.02	9.70	13.24	22.96	52.88	-29.92 Average
6	0.21851	0.02	9.70	24.00	33.72	62.88	-29.16 QP
7	0.65430	0.02	9.80	9.34	19.16	46.00	-26.84 Average
8	0.65430	0.02	9.80	19.76	29.58	56.00	-26.42 QP
9	10.905	0.01	9.94	12.34	22.29	50.00	-27.71 Average
10	10.905	0.01	9.94	22.62	32.57	60.00	-27.43 QP
11	11.559	0.01	9.97	14.39	24.37	50.00	-25.63 Average
12	11.559	0.01	9.97	24.40	34.38	60.00	-25.62 QP

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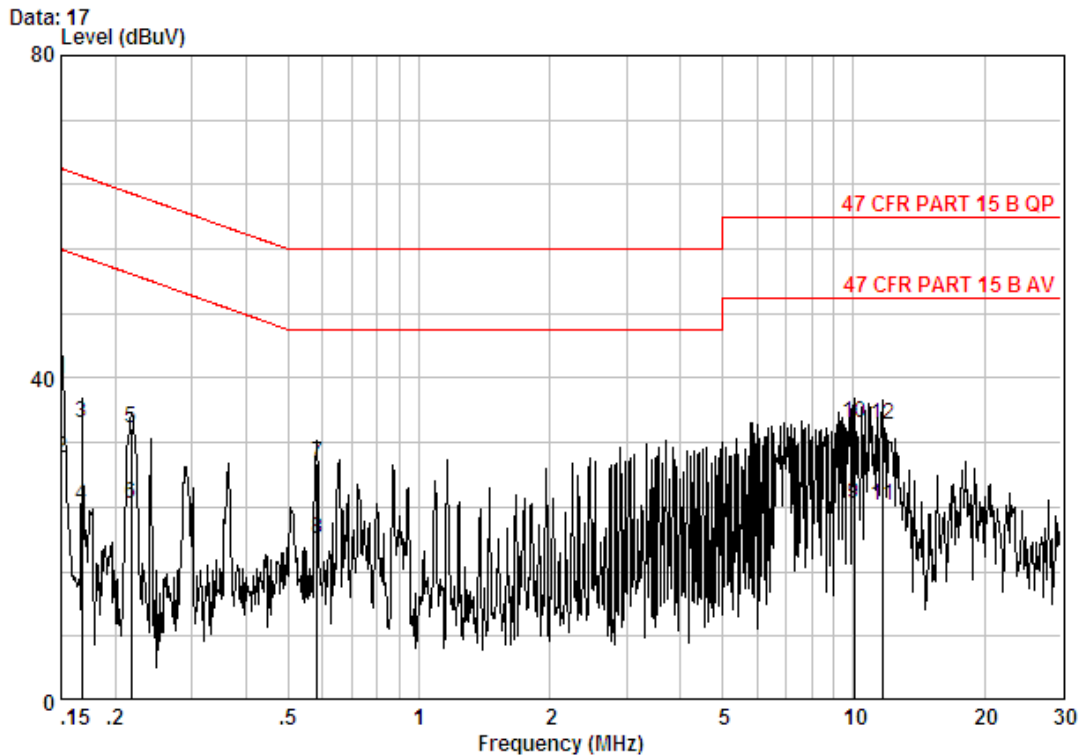


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Neutral Line:



Site : Shielding Room
Condition : 47 CFR PART 15 B QP CE NEUTRAL
Job No. : 5051RF
Test mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dB	
1	0.15000	0.02	9.70	30.21	39.93	66.00	-26.07 QP
2	0.15000	0.02	9.70	20.31	30.03	56.00	-25.97 Average
3	0.16765	0.02	9.70	24.76	34.48	65.08	-30.60 QP
4	0.16765	0.02	9.70	14.39	24.11	55.08	-30.97 Average
5	0.21735	0.02	9.70	24.02	33.74	62.92	-29.18 QP
6	0.21735	0.02	9.70	14.64	24.36	52.92	-28.56 Average
7	0.58231	0.01	9.80	19.54	29.35	56.00	-26.65 QP
8	0.58231	0.01	9.80	10.25	20.06	46.00	-25.94 Average
9 @	10.019	0.01	10.00	14.43	24.44	50.00	-25.56 Average
10	10.019	0.01	10.00	24.39	34.40	60.00	-25.60 QP
11	11.621	0.01	10.00	14.28	24.29	50.00	-25.71 Average
12	11.621	0.01	10.00	24.29	34.30	60.00	-25.70 QP

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 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209				
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: (Spurious Emissions)	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.					
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.0		Average Value	
		114.0		Peak Value	

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Test Setup:

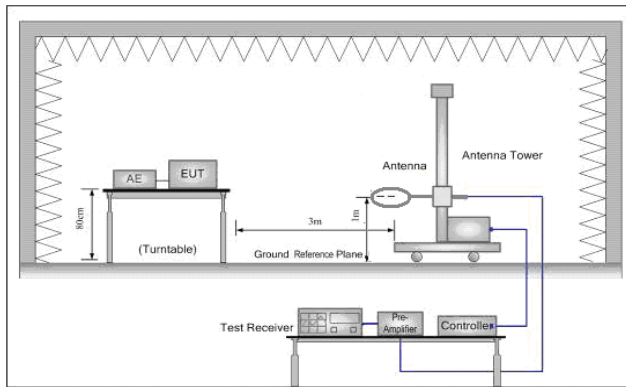


Figure 1. Below 30MHz

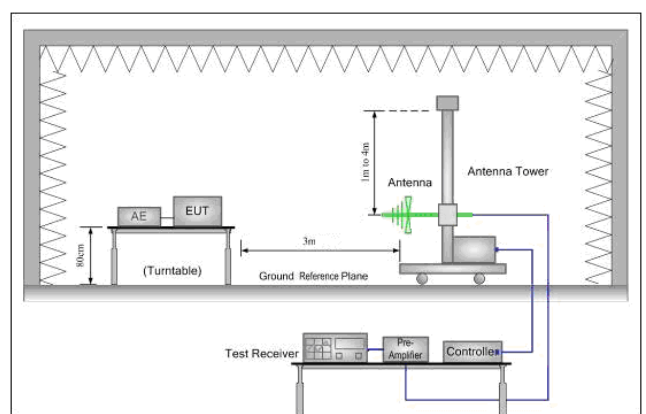


Figure 2. 30MHz to 1GHz

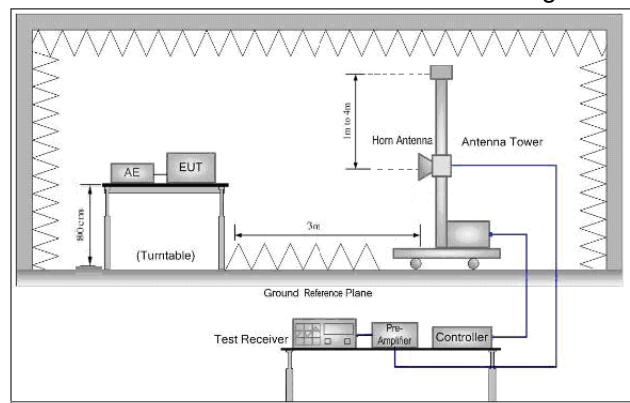


Figure 3. Above 1 GHz

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.



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	<p>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.</p> <p>g. Test the EUT in the lowest channel,the middle channel,the Highest channel</p> <p>h. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	Transmitter mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



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Measurement Data

5.3.1.1 Field Strength Of The Fundamental Signal

Peak value:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Read Level (dBuV)	Peak Level (dBuV/m)	Average Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2402	2.98	32.51	39.86	87.49	83.12	94	-10.88	Horizontal
2402	2.98	32.51	39.86	88.87	84.50	94	-9.50	Vertical
2442	3.01	32.61	39.89	86.43	82.16	94	-11.84	Horizontal
2442	3.01	32.61	39.89	87.50	83.23	94	-10.77	Vertical
2478	3.03	32.67	39.92	83.18	78.96	94	-15.04	Horizontal
2478	3.03	32.67	39.92	83.72	79.50	94	-14.50	Vertical

Remark:

The peak field strength of fundamental signal 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.

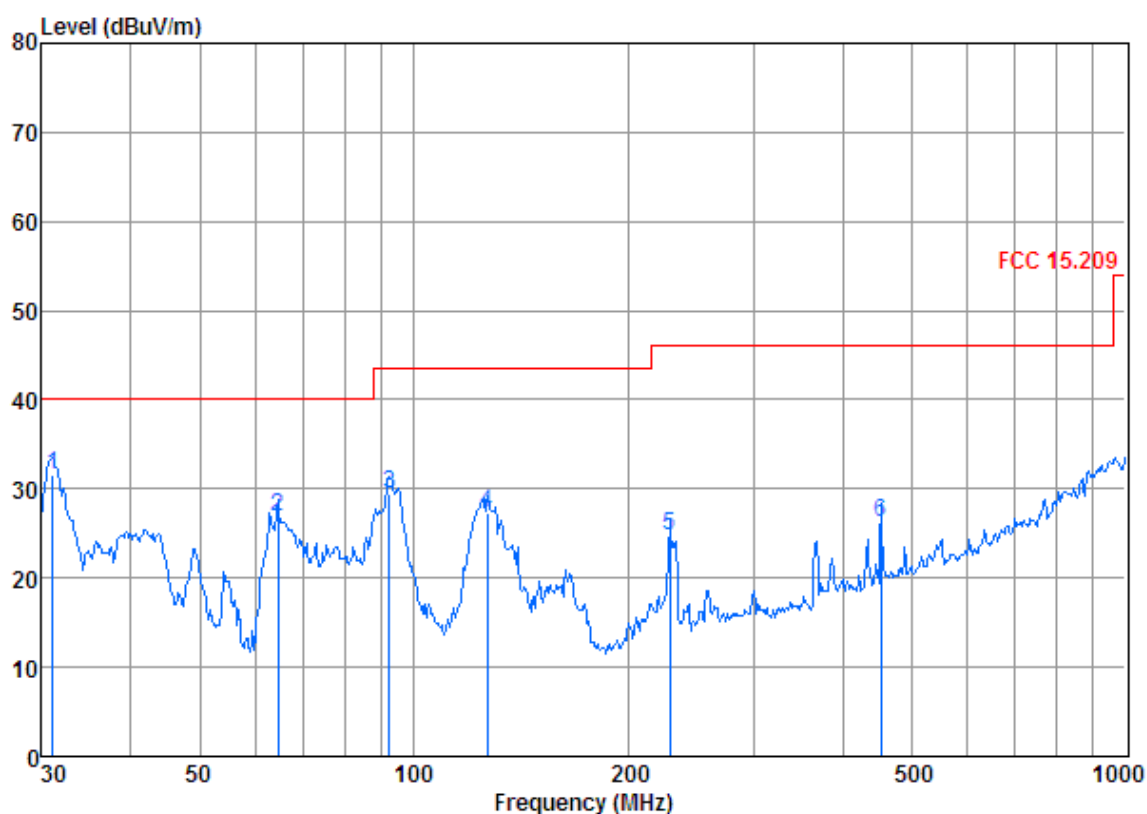


5.3.1.2 Spurious Emissions

30MHz~1GHz	
Test mode:	Transmitting

QP value:

Vertical:



Condition: FCC 15.209 3m 3142C VERTICAL

Job No. : 5051RF

Mode : TX mode

	Freq	Cable Loss	Antenna Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.07	0.60	17.07	27.35	41.24	31.56	40.00	-8.44
2	64.43	0.80	4.28	27.26	49.01	26.83	40.00	-13.17
3	92.46	1.12	5.73	27.21	49.76	29.40	43.50	-14.10
4	126.77	1.27	8.01	27.03	44.97	27.22	43.50	-16.28
5	228.49	1.56	7.93	26.60	41.81	24.70	46.00	-21.30
6	452.72	2.42	12.92	27.46	38.40	26.28	46.00	-19.72



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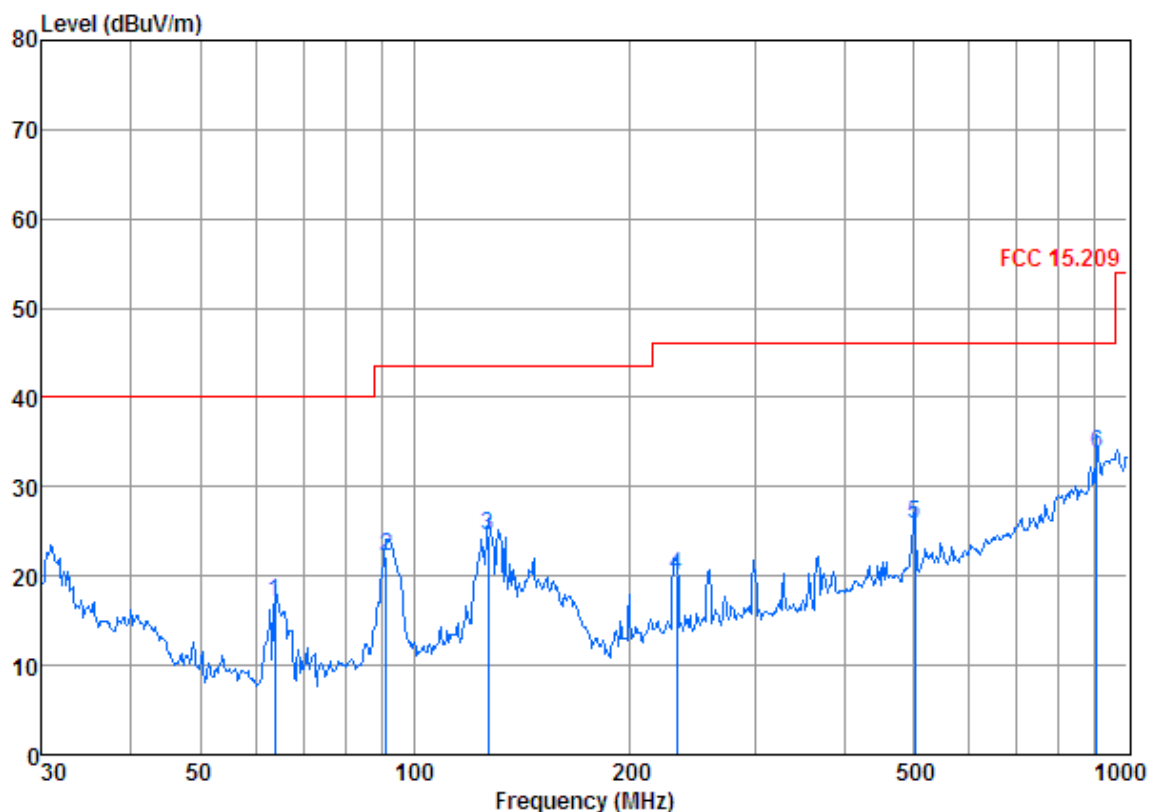


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Horizontal:



Condition: FCC 15.209 3m 3142C HORIZONTAL

Job No. : 5051RF

Mode : TX mode

	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	63.54	0.80	4.45	27.26	39.00	16.99	40.00	-23.01
2	91.17	1.11	5.91	27.21	42.30	22.11	43.50	-21.39
3	126.77	1.27	8.01	27.03	42.24	24.49	43.50	-19.01
4	233.35	1.59	8.42	26.58	36.72	20.15	46.00	-25.85
5	502.94	2.60	13.52	27.69	37.32	25.75	46.00	-20.25
6	906.48	3.61	20.27	26.75	36.61	33.74	46.00	-12.26

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Above 1GHz								
Test mode:		Transmitting		Test channel:		Lowest		Remark:
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
4804.000	4.69	34.70	41.63	49.31	47.07	74	-26.93	Vertical
6047.776	5.14	35.76	40.87	47.30	47.33	74	-26.67	Vertical
7206.000	5.77	35.88	39.87	46.70	48.48	74	-25.52	Vertical
8042.903	6.20	36.01	39.15	43.79	46.85	74	-27.15	Vertical
9608.000	5.99	37.30	37.80	45.20	50.69	74	-23.31	Vertical
11963.890	6.46	38.87	38.26	45.40	52.47	74	-21.53	Vertical
3662.775	3.87	33.41	40.79	46.83	43.32	74	-30.68	Horizontal
4804.000	4.69	34.70	41.63	48.82	46.58	74	-27.42	Horizontal
6347.466	5.22	36.12	40.63	46.51	47.22	74	-26.78	Horizontal
7206.000	5.77	35.88	39.87	47.78	49.56	74	-24.44	Horizontal
9608.000	5.99	37.30	37.80	44.43	49.92	74	-24.08	Horizontal
11963.890	6.46	38.87	38.26	45.52	52.59	74	-21.41	Horizontal

Test mode:		Transmitting		Test channel:		Middle		Remark:
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
3662.775	3.87	33.41	40.79	45.76	42.25	74	-31.75	Vertical
4884.000	4.72	34.59	41.68	52.39	50.02	74	-23.98	Vertical
6299.178	5.20	36.06	40.66	46.61	47.21	74	-26.79	Vertical
7326.000	5.92	35.93	39.77	49.94	52.02	74	-21.98	Vertical
9768.000	5.98	37.48	37.66	44.67	50.47	74	-23.53	Vertical
11574.460	6.36	38.47	38.10	44.70	51.43	74	-22.57	Vertical
3738.129	3.95	33.49	40.84	46.12	42.72	74	-31.28	Horizontal
4884.000	4.72	34.59	41.68	49.28	46.91	74	-27.09	Horizontal
6412.427	5.23	36.18	40.56	46.48	47.33	74	-26.67	Horizontal
7326.000	5.92	35.93	39.77	50.64	52.72	74	-21.28	Horizontal
9768.000	5.98	37.48	37.66	44.68	50.48	74	-23.52	Horizontal
11457.210	6.34	38.41	38.05	45.03	51.73	74	-22.27	Horizontal

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Test mode:		Transmitting		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			
3983.750	4.14	33.80	41.02	46.17	43.09	74	-30.91	Vertical			
4956.000	4.75	34.46	41.74	53.05	50.52	74	-23.48	Vertical			
6544.350	5.27	36.27	40.45	46.91	48.00	74	-26.00	Vertical			
7434.000	6.04	35.97	39.67	49.95	52.29	74	-21.71	Vertical			
9912.000	5.98	37.61	37.53	44.41	50.47	74	-23.53	Vertical			
11603.960	6.37	38.50	38.11	44.93	51.69	74	-22.31	Vertical			
4055.371	4.20	33.99	41.08	46.89	44.00	74	-30.00	Horizontal			
4956.000	4.75	34.46	41.74	53.99	51.46	74	-22.54	Horizontal			
6561.030	5.27	36.25	40.43	47.66	48.75	74	-25.25	Horizontal			
7434.000	6.04	35.97	39.67	50.20	52.54	74	-21.46	Horizontal			
9912.000	5.98	37.61	37.53	45.93	51.99	74	-22.01	Horizontal			
12461.220	6.59	39.37	38.47	45.26	52.75	74	-21.25	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.

5.4 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(band edge):	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.	
	Frequency	Limit (dBuV/m @3m)
	30MHz-88MHz	40.0
	88MHz-216MHz	43.5
	216MHz-960MHz	46.0
	960MHz-1GHz	54.0
	Above 1GHz	Average Value
		Peak Value
Test Setup:		

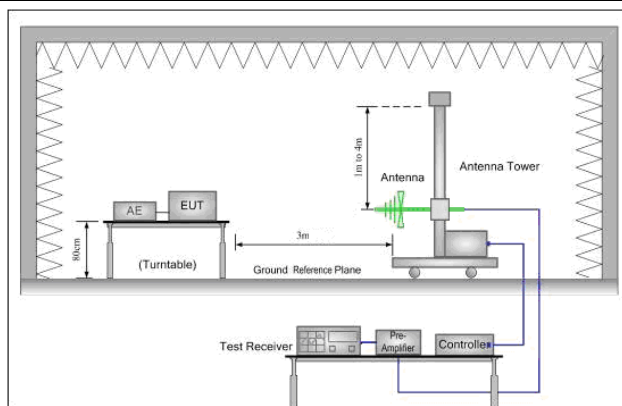


Figure 1. 30MHz to 1GHz

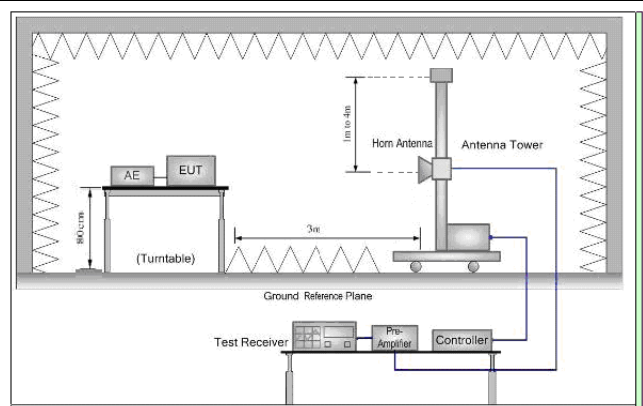


Figure 2. Above 1 GHz



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Test Procedure:	<ul style="list-style-type: none">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.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.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.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.e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.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 channelg. Test the EUT in the lowest channel , the Highest channelh. Repeat above procedures until all frequencies measured was complete.
Test Mode :	Transmitter mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



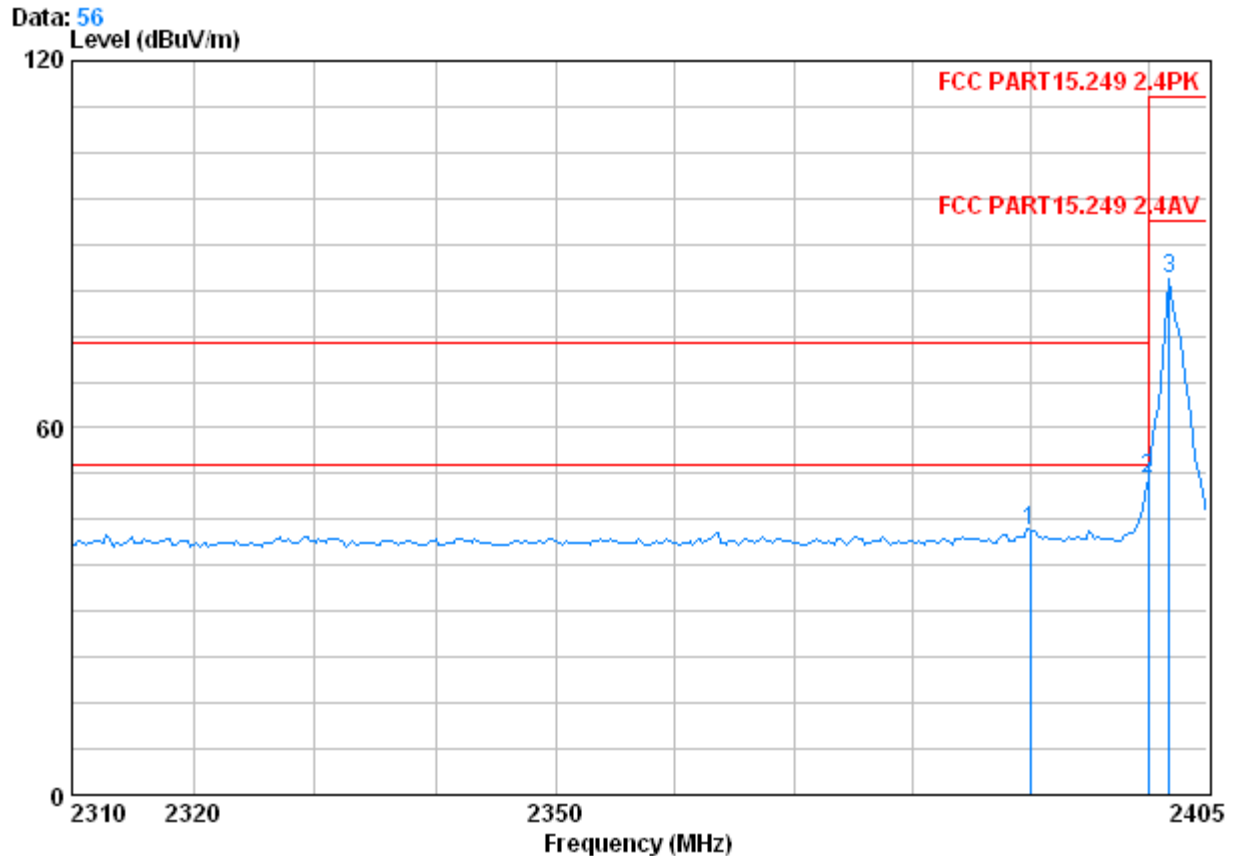
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Test plot as follows:

Test mode:	Transmitting	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition : FCC PART15.249 2.4PK 3m VERTICAL

Job No. : 5051RF

test mode : 2402 Bandedge

	Freq	Cable Loss	Antenna Factor	Preamp Factor	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	47.67	43.32	74.00	-30.68	Peak
2 @	2400.000	2.98	32.51	39.86	55.98	51.61	74.00	-22.39	Peak
3	2401.770	2.98	32.51	39.86	88.69	84.32	114.00	-29.68	Peak

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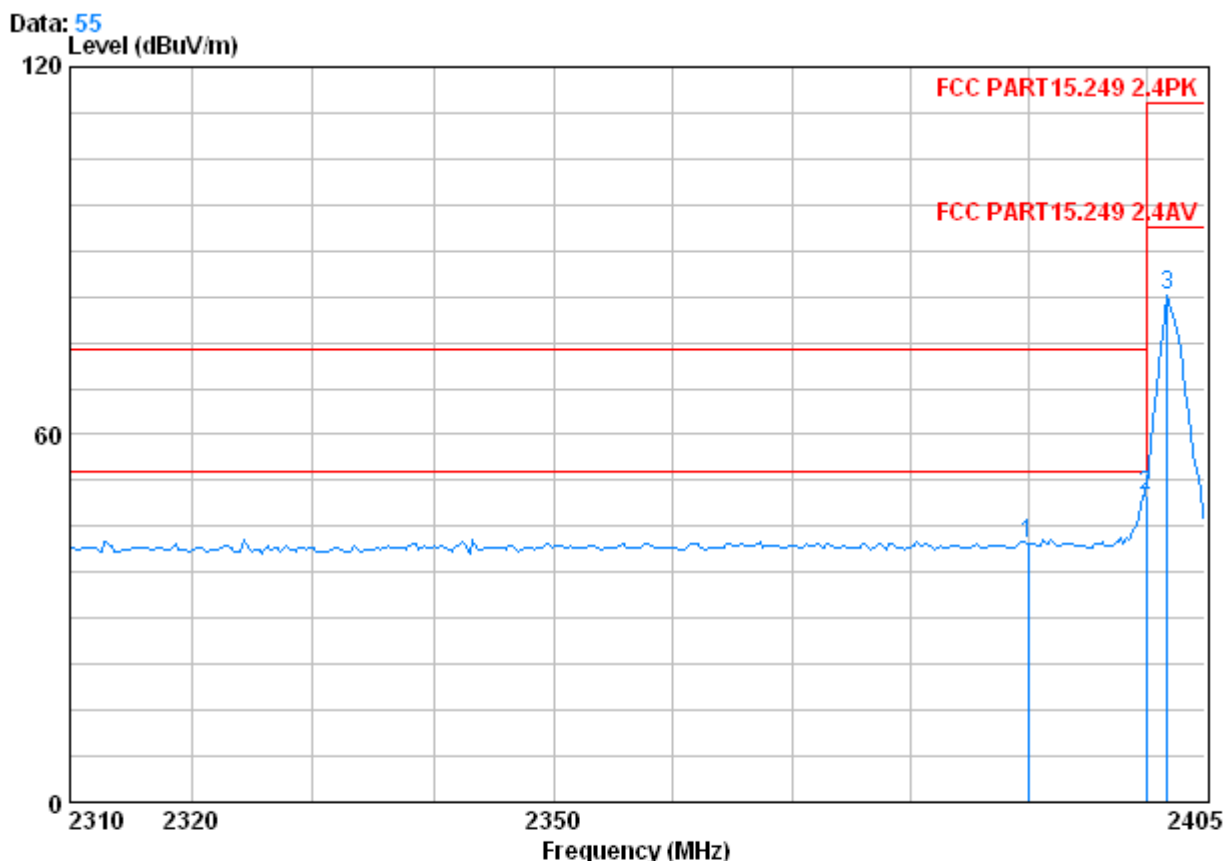


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Test mode:	Transmitting	Test channel:	Lowest	Remark:	Peak	Horizontal
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Condition : FCC PART15.249 2.4PK 3m HORIZONTAL

Job No. : 5051RF

test mode : 2402 Bandedge

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	2.98	32.51	39.85	46.58	42.23	74.00	-31.77	Peak
2 @	2400.000	2.98	32.51	39.86	54.33	49.96	74.00	-24.04	Peak
3	2401.770	2.98	32.51	39.86	87.14	82.77	114.00	-31.23	Peak

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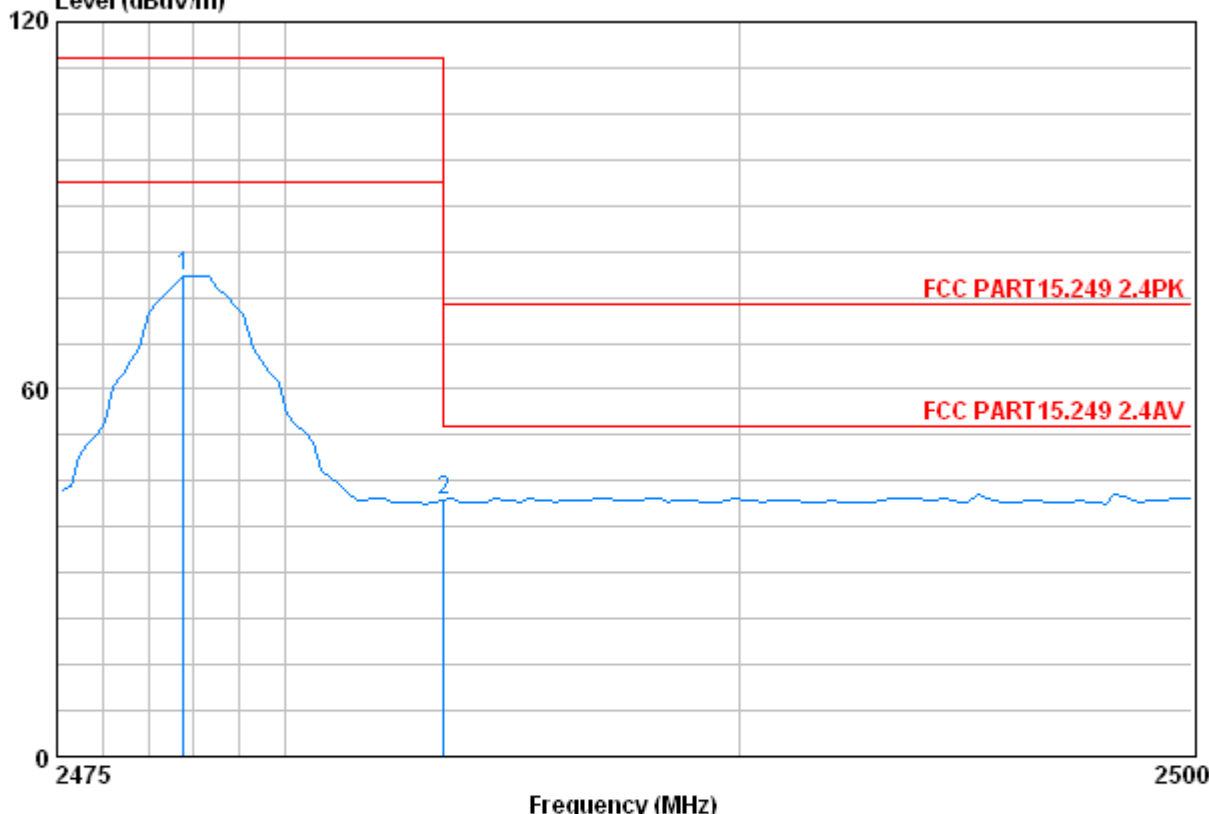
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Test mode:	Transmitting	Test channel:	Highest	Remark:	Peak	Vertical
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Data: 58

Level (dBuV/m)



Condition : FCC PART15.249 2.4PK 3m VERTICAL

Job No. : 5051RF

test mode : 2478 Bandedge

	Freq	Cable	Antenna	Preamp	Read	Limit	Over	
	MHz	Loss	Factor	Factor	Level	Level	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2477.770	3.03	32.67	39.92	82.81	78.59	114.00	-35.41 Peak
2	2483.500	3.03	32.67	39.92	46.02	41.80	74.00	-32.20 Peak

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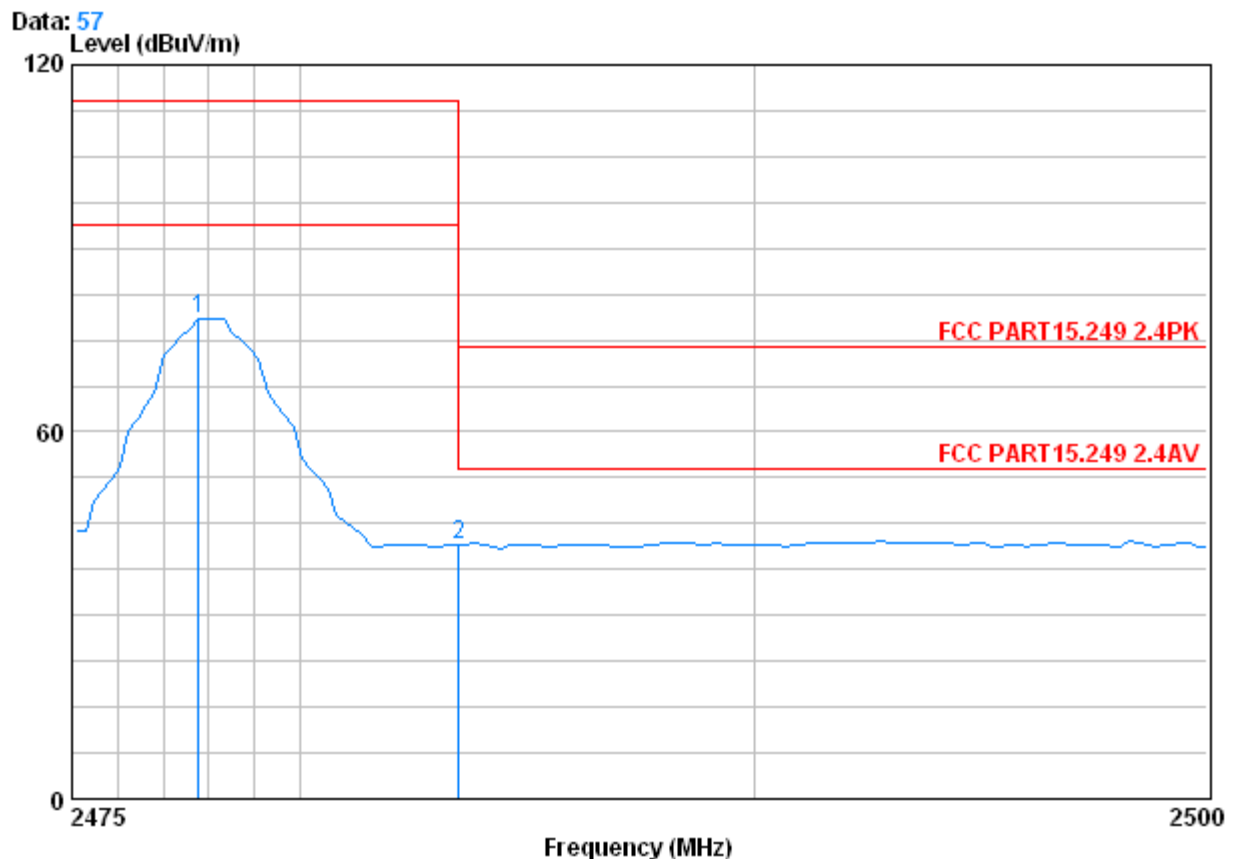


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Test mode:	Transmitting	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition : FCC PART15.249 2.4PK 3m HORIZONTAL

Job No. : 5051RF

test mode : 2478 Bandedge

	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	2477.770	3.03	32.67	39.92	82.58	78.36	114.00	-35.64	Peak
2	2483.500	3.03	32.67	39.92	45.75	41.53	74.00	-32.47	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:

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

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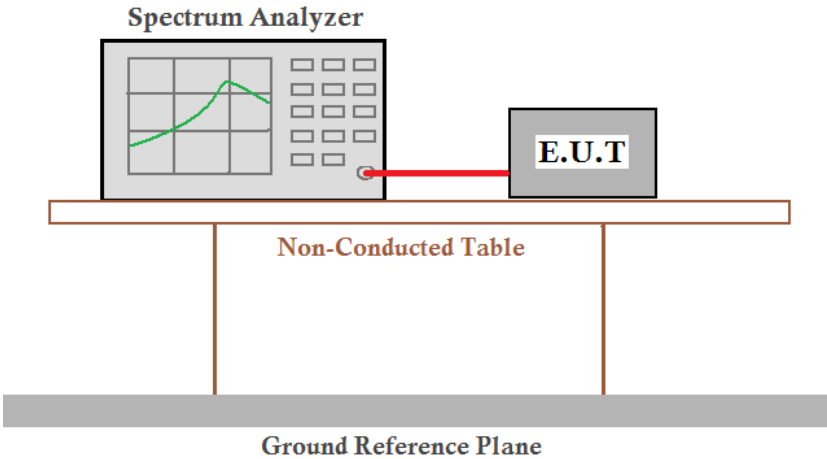
Remark:

As shown in this section, for radiated Band-edge measurements, the 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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5.5 20dB Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	N/A
Test Mode:	Transmitter mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

Measurement Data

Test Channel	20dB bandwidth (MHz)	Results
Lowest	0.186	Pass
Middle	0.148	Pass
Highest	0.268	Pass



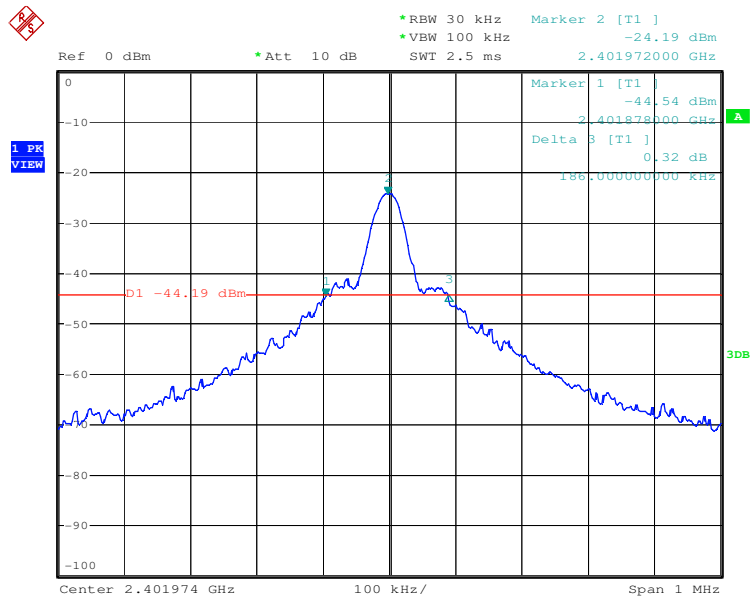
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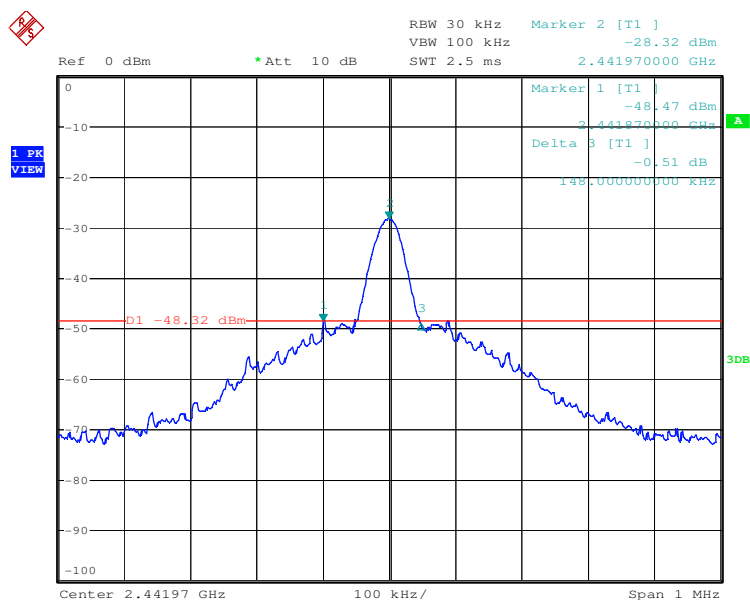
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Test plot as follows:

Test channel:	Lowest
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Test channel:	Middle
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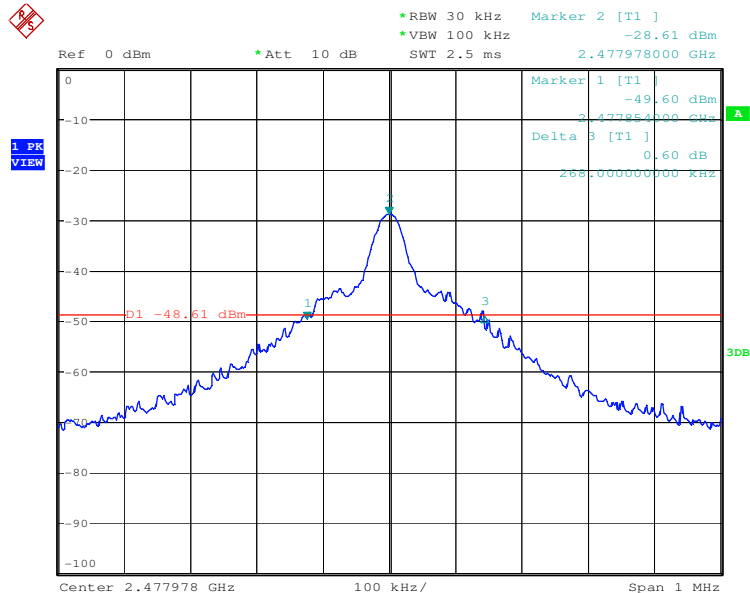


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Test channel:	Highest
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