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Report No.: SZEMO11020049803

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FCC REPORT

Application No. : SZEMO110200498RF(SGS HK NO.:2026164EL)
Applicant: Educational Insights
Product Name: CLASSROOM JEOPARDY!
Operation Frequency: 2405MHz to 2477MHz
FCC ID: MJO-EI-8098
Standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249: 2009
Date of Receipt 2011-02-10
Date of Test 2011-02-10 to 2011-03-04
Date of Issue 2011-03-08

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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3 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a)/15.209	Pass
Band edge (Radiated Emission)	15.249(a)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

Remark: Pass: The EUT complies with the essential requirements in the standard.

Fail: The EUT does not comply with the essential requirements in the standard.

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4 General Information

4.1 Client Information

Applicant:	Educational Insights
Address of Applicant:	152 Walnut Street, Suite 201, Gardena CA 90248

4.2 General Description of E.U.T.

Product Name:	CLASSROOM JEOPARDY!
Model No.:	EI-8098
Request Age Grading:	5+
Country of Origin:	Hong Kong
Country of Destination:	US
Operation Frequency:	2405MHz to 2477MHz
Channel numbers:	16
Modulation type:	FSK
Antenna Type:	PCB antenna
Antenna gain:	-2dBi
Power supply:	4.5V DC (3 * 1.5V "AAA" Size Batteries)

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Operation Frequency@Channel List								
Channel	29	4	67	32	7	65	36	10
Frequency	2430	2405	2468	2433	2408	2466	2437	2411
Channel	62	38	8	59	45	12	76	40
Frequency	2463	2439	2409	2460	2446	2413	2477	2441

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	2405MHz
The middle channel	2439MHz
The Highest channel	2477MHz

4.3 E.U.T Operation mode

Operating Environment:

Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar

Test mode:

Transmitting mode:	Keep the EUT in Transmitting mode at low channel, middle channel and high channel.
--------------------	--

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4.4 Description of Support Units

The EUT has been tested independently.

4.5 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 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 and C-2383 respectively.
Date of Registration: September 29, 2008. Valid until September 28, 2011.
- **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 556682, June 27, 2008.
- **Industry Canada (IC)**
The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

4.6 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

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.7 Other Information Requested by the Customer

None.

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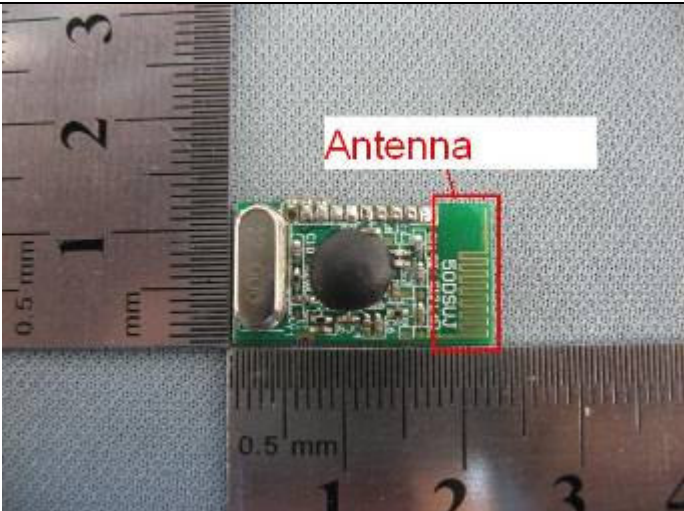
4.8 Test Instruments list:

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2010-06-17	2011-06-17
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2010-11-05	2011-11-05
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0028	2008-06-18	2011-06-18
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2010-11-09	2011-11-09
6	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2010-11-09	2011-11-09
7	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2010-11-09	2011-11-09
8	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2010-06-02	2011-06-02
9	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2010-10-27	2011-10-27
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	SEL0080	2010-06-04	2011-06-04
11	Band filter	Amindeon	82346	SEL0094	2010-06-02	2011-06-02

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5 Test results and Measurement Data

5.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement: <i>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.</i></p>	
E.U.T Antenna:	Antenna gain: -2dBi
	

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5.2 Radiated Emission

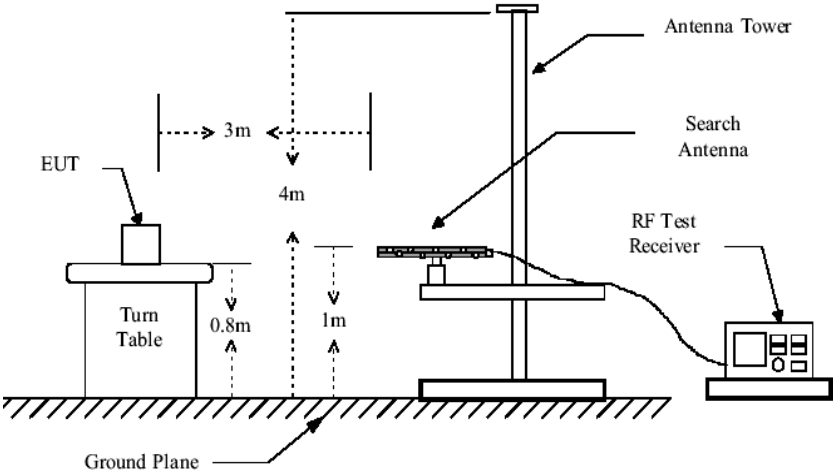
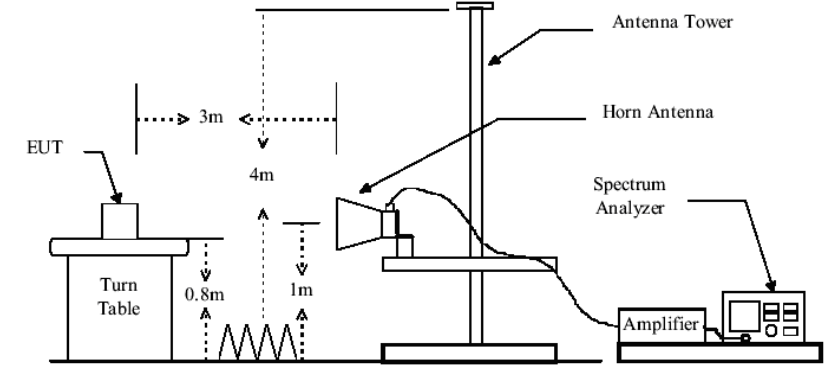
Test Requirement:	FCC Part15 C Section 15.249 and 15.209																							
Test Method:	ANSI C63.10: 2009																							
Test Frequency Range:	30MHz to 25000MHz																							
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)																							
Receiver setup:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Frequency</th> <th>Detector</th> <th>RBW</th> <th>VBW</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>30MHz-1GHz</td> <td>Quasi-peak</td> <td>100KHz</td> <td>300KHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td rowspan="2">Above 1GHz</td> <td>Peak</td> <td>1MHz</td> <td>3MHz</td> <td>Peak Value</td> </tr> <tr> <td>Peak</td> <td>1MHz</td> <td>10Hz</td> <td>Average Value</td> </tr> </tbody> </table>				Frequency	Detector	RBW	VBW	Remark	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value	Above 1GHz	Peak	1MHz	3MHz	Peak Value	Peak	1MHz	10Hz	Average Value	
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	74.0	Peak Value																						
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.																							
Test Procedure:	<ol 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. 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. 																							

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	g. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
Test Instruments:	Refer to section 4.7 for details
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p> 
Test mode:	Transmitting
Test results:	Pass

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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Measurement Data

5.2.1 Field Strength Of The Fundamental Signal

Peak value:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Over Limit (dB)	polarization
2405	2.99	32.54	39.86	98.78	94.45	114.00	-19.55	Horizontal
2405	2.99	32.54	39.86	96.23	91.90	114.00	-22.10	Vertical
2439	3.00	32.61	39.89	98.35	94.07	114.00	-19.93	Horizontal
2439	3.00	32.61	39.89	95.66	91.38	114.00	-22.62	Vertical
2477	3.03	32.67	39.92	95.76	91.54	114.00	-22.46	Horizontal
2477	3.03	32.67	39.92	95.18	90.96	114.00	-23.04	Vertical

Note:

Peak Level (Final Level)= Reading Level + Antenna Factor + Cable Loss - Preamp Factor

Average value:

Frequency (MHz)	Peak Level (dBuV/m)	PDCF (dB)	Average Level (dBuV/m)	Average Limit (dBuV/m)	Over Limit (dB)	polarization
2405	94.45	-23.77	70.68	94.00	-23.32	Horizontal
2405	91.90	-23.77	68.13	94.00	-25.87	Vertical
2439	94.07	-23.77	70.30	94.00	-23.70	Horizontal
2439	91.38	-23.77	67.61	94.00	-26.39	Vertical
2477	91.54	-23.77	67.77	94.00	-26.23	Horizontal
2477	90.96	-23.77	67.19	94.00	-26.81	Vertical

PDCF Calculate Formula:

Average value=Peak value + PDCF(pulse desensitization correction factor)

PDCF=20 log(Duty cycle)= -23.77dB

Duty cycle= T on time / T period = 0.065

Ton time = 140µs

T period = 2160µs

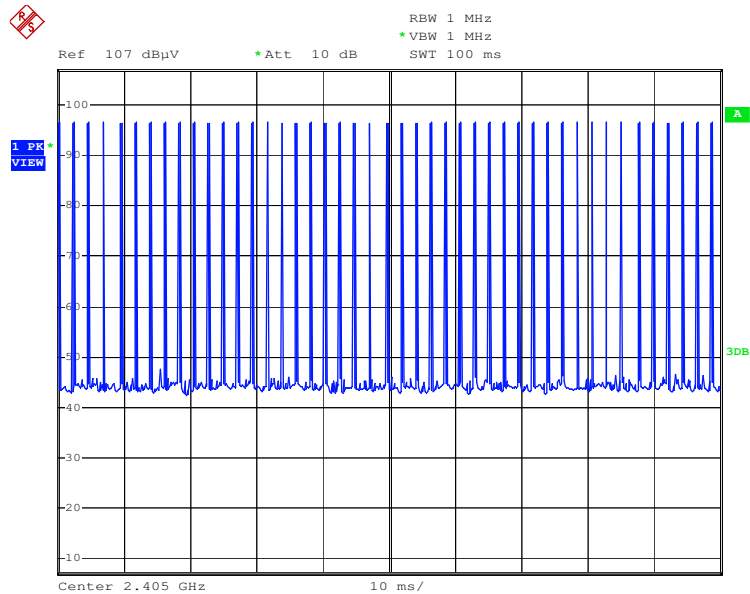
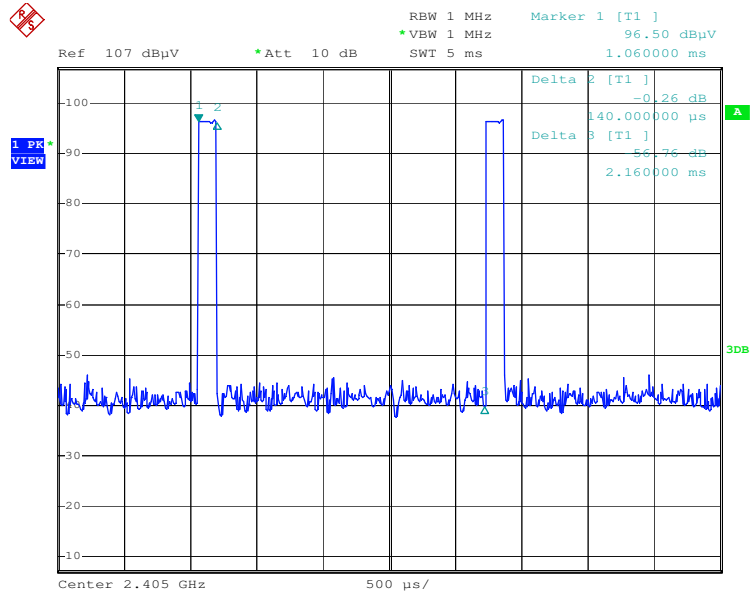
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Test plot as follows:



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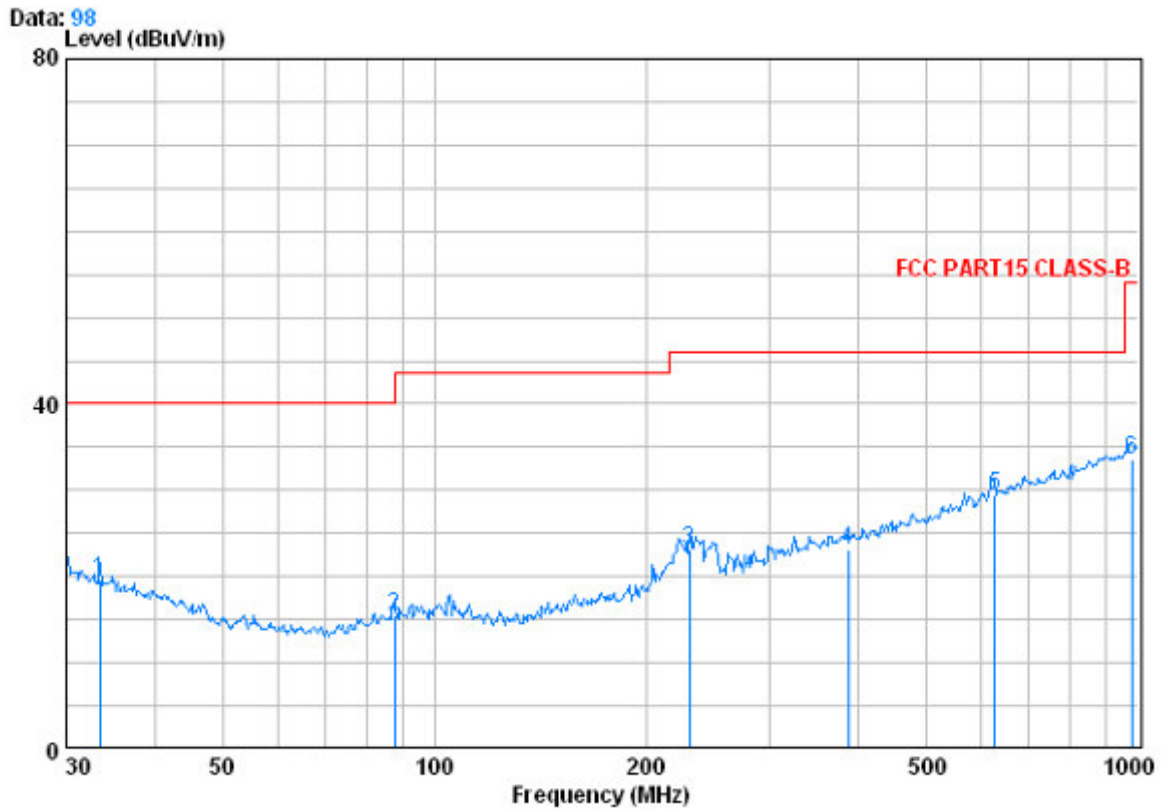
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5.2.2 Spurious Emissions

30MHz~1GHz

Horizontal:



	Freq	CableAntenna Loss	Preamp Factor	Read Level	Limit	Over		
	MHz	dB	dB/m	dBuV	dBuV/m	dB		
1	33.445	0.60	13.63	27.34	32.63	19.51	40.00	-20.49
2	87.725	1.10	8.48	27.22	33.06	15.42	40.00	-24.58
3	230.907	1.58	11.70	26.59	36.35	23.03	46.00	-22.97
4	387.992	2.17	16.15	27.05	31.84	23.11	46.00	-22.89
5	625.078	2.75	20.50	27.51	33.73	29.47	46.00	-16.53
6	979.180	3.68	24.04	26.40	32.20	33.52	54.00	-20.48

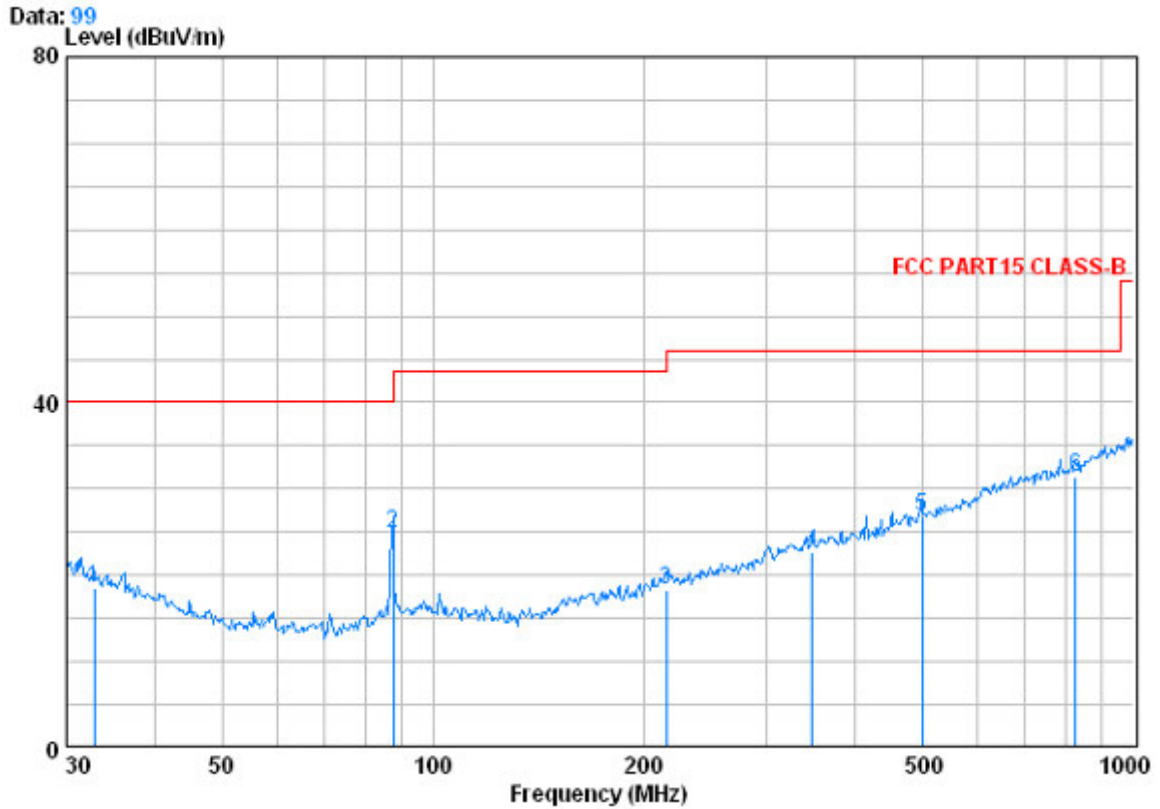
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Vertical:



	Freq	CableAntenna Loss	Preamp Factor	Read Level	Limit	Over
	MHz	dB	dB/m	dBuV	dBuV/m	dB
1	32.864	0.60	13.97	31.21	40.00	-21.57
2	87.725	1.10	8.48	42.53	40.00	-15.11
3	215.268	1.49	11.01	32.55	43.50	-25.09
4	348.027	2.05	15.37	31.98	46.00	-23.36
5	499.425	2.59	17.80	34.18	46.00	-19.13
6	827.493	3.32	22.40	32.74	46.00	-14.66

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Above 1GHz									
Test mode:		Transmitting		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	
3709.691	3.91	33.45	40.83	48.95	45.48	74.00	-28.52	Vertical	
4821.757	4.70	34.68	41.64	51.09	48.83	74.00	-25.17	Vertical	
6032.401	5.13	35.74	40.89	50.19	50.17	74.00	-23.83	Vertical	
7624.250	6.23	36.00	39.51	49.15	51.87	74.00	-22.13	Vertical	
8904.986	6.16	36.52	38.40	47.36	51.64	74.00	-22.36	Vertical	
10480.590	6.09	38.28	37.65	45.09	51.81	74.00	-22.19	Vertical	
2957.654	3.29	33.33	40.27	48.95	45.30	74.00	-28.70	Horizontal	
3700.260	3.91	33.45	40.81	48.88	45.43	74.00	-28.57	Horizontal	
4821.757	4.70	34.68	41.64	49.43	47.17	74.00	-26.83	Horizontal	
7245.810	5.83	35.90	39.84	49.60	51.49	74.00	-22.51	Horizontal	
8882.347	6.16	36.51	38.42	47.49	51.74	74.00	-22.26	Horizontal	
11112.520	6.25	38.48	37.91	45.79	52.61	74.00	-21.39	Horizontal	

Test mode:		Transmitting		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	
3700.260	3.91	33.45	40.81	48.15	44.70	74.00	-29.30	Vertical	
4490.048	4.48	35.15	41.40	48.58	46.81	74.00	-27.19	Vertical	
6283.164	5.20	36.04	40.68	49.12	49.68	74.00	-24.32	Vertical	
7781.104	6.22	36.00	39.38	48.61	51.45	74.00	-22.55	Vertical	
9251.580	6.08	36.89	38.11	46.04	50.90	74.00	-23.10	Vertical	
11112.520	6.25	38.48	37.91	44.46	51.28	74.00	-22.72	Vertical	
2957.654	3.29	33.33	40.27	48.06	44.41	74.00	-29.59	Horizontal	
4688.616	4.61	34.90	41.54	48.53	46.50	74.00	-27.50	Horizontal	
6412.427	5.23	36.18	40.56	49.69	50.54	74.00	-23.46	Horizontal	
7800.936	6.22	36.00	39.36	48.34	51.20	74.00	-22.80	Horizontal	
8703.294	6.17	36.36	38.59	46.73	50.67	74.00	-23.33	Horizontal	
10669.020	6.14	38.37	37.73	44.76	51.54	74.00	-22.46	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		
3700.260	3.91	33.45	40.81	47.88	44.43	74.00	-29.57	Vertical		
4933.497	4.75	34.51	41.72	49.25	46.79	74.00	-27.21	Vertical		
6478.053	5.25	36.26	40.51	48.77	49.77	74.00	-24.23	Vertical		
7702.278	6.22	36.00	39.44	48.20	50.98	74.00	-23.02	Vertical		
10560.940	6.11	38.32	37.68	45.28	52.03	74.00	-21.97	Vertical		
11722.720	6.40	38.62	38.16	46.01	52.87	74.00	-21.13	Vertical		
3143.979	3.44	33.34	40.41	47.97	44.34	74.00	-29.66	Horizontal		
4107.316	4.23	34.13	41.12	48.07	45.31	74.00	-28.69	Horizontal		
5631.725	5.00	35.09	41.24	49.31	48.16	74.00	-25.84	Horizontal		
7643.683	6.23	36.00	39.49	48.84	51.58	74.00	-22.42	Horizontal		
9088.188	6.13	36.70	38.24	46.27	50.86	74.00	-23.14	Horizontal		
10587.850	6.12	38.33	37.69	44.85	51.61	74.00	-22.39	Horizontal		

Remark:

As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

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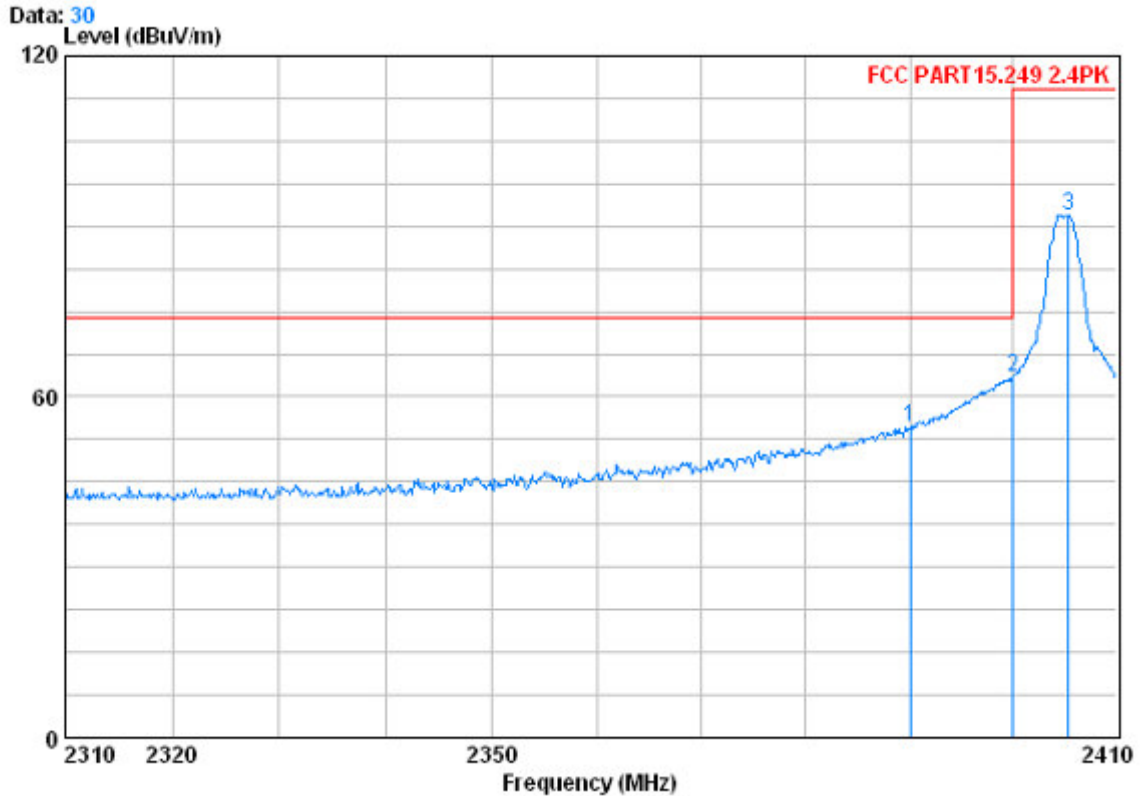
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5.2.3 Band edge (Radiated Emission)					
Test mode:	Transmitting	Test channel:	Lowest	Remark:	Peak

Vertical:



	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1 @	2390.000	2.98	32.51	39.85	58.82	74.00	-19.53
2 @	2400.000	2.98	32.51	39.86	67.87	74.00	-10.49
3 @	2405.400	2.99	32.54	39.86	96.24	114.00	-22.08

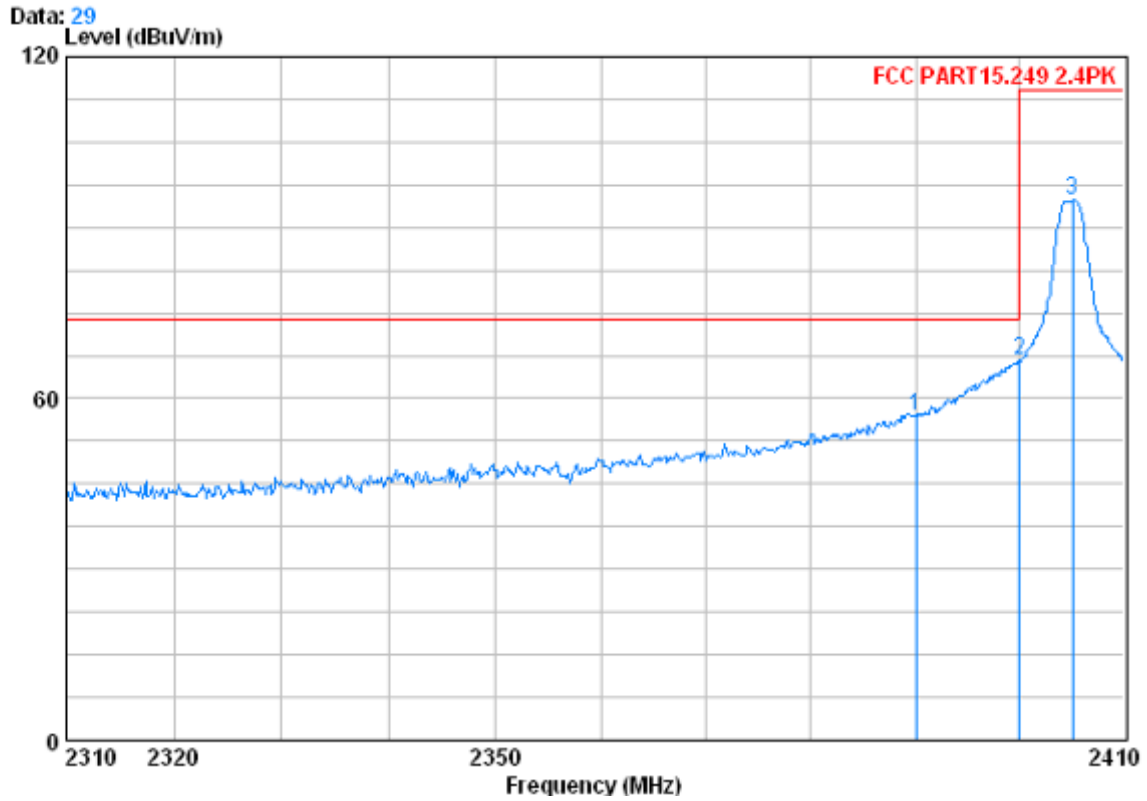
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Horizontal:



	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	61.41	57.06	74.00	-16.94
2	2400.000	2.98	32.51	39.86	70.99	66.62	74.00	-7.38
3	2405.100	2.99	32.54	39.86	99.13	94.80	114.00	-19.20

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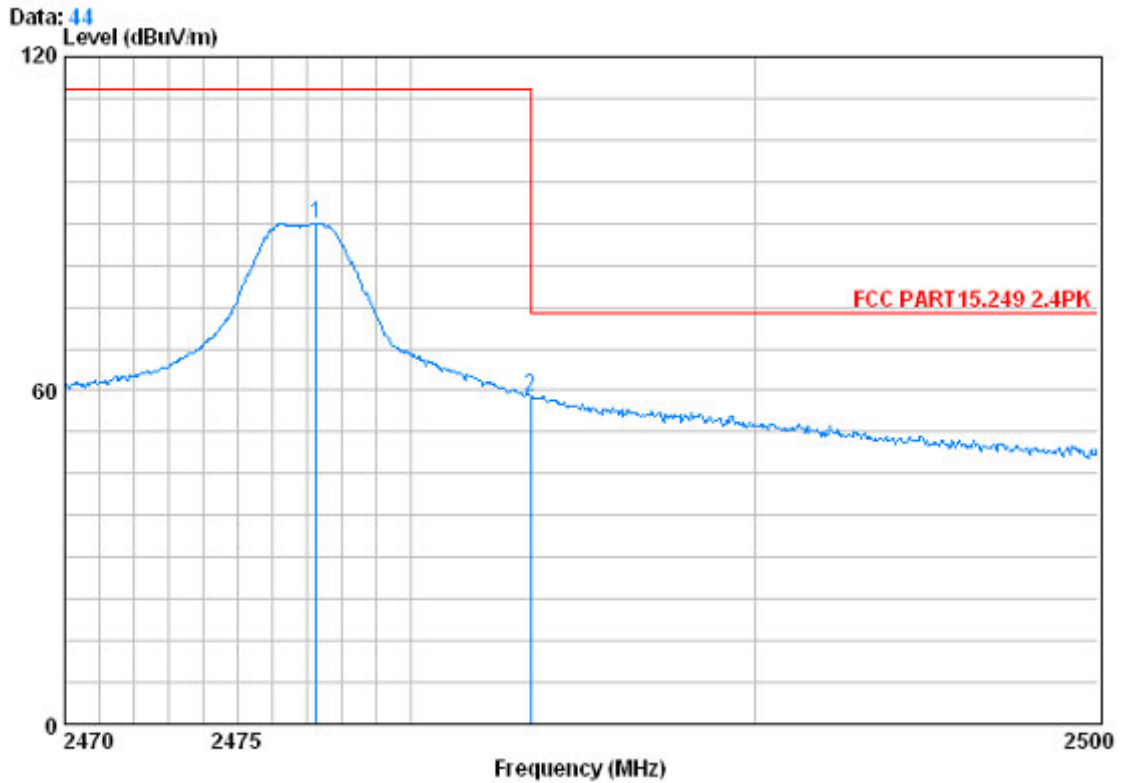
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Test mode:	Transmitting	Test channel:	Highest	Remark:	Peak
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Vertical:



	Freq	CableAntenna Loss	Preamp Factor	Read Level	Limit	Over		
	MHz	dB	dB/m	dB	dBuV/m	dB		
1	2477.290	3.03	32.67	39.92	94.10	89.88	114.00	-24.12
2	2483.500	3.03	32.67	39.92	63.17	58.95	74.00	-15.05

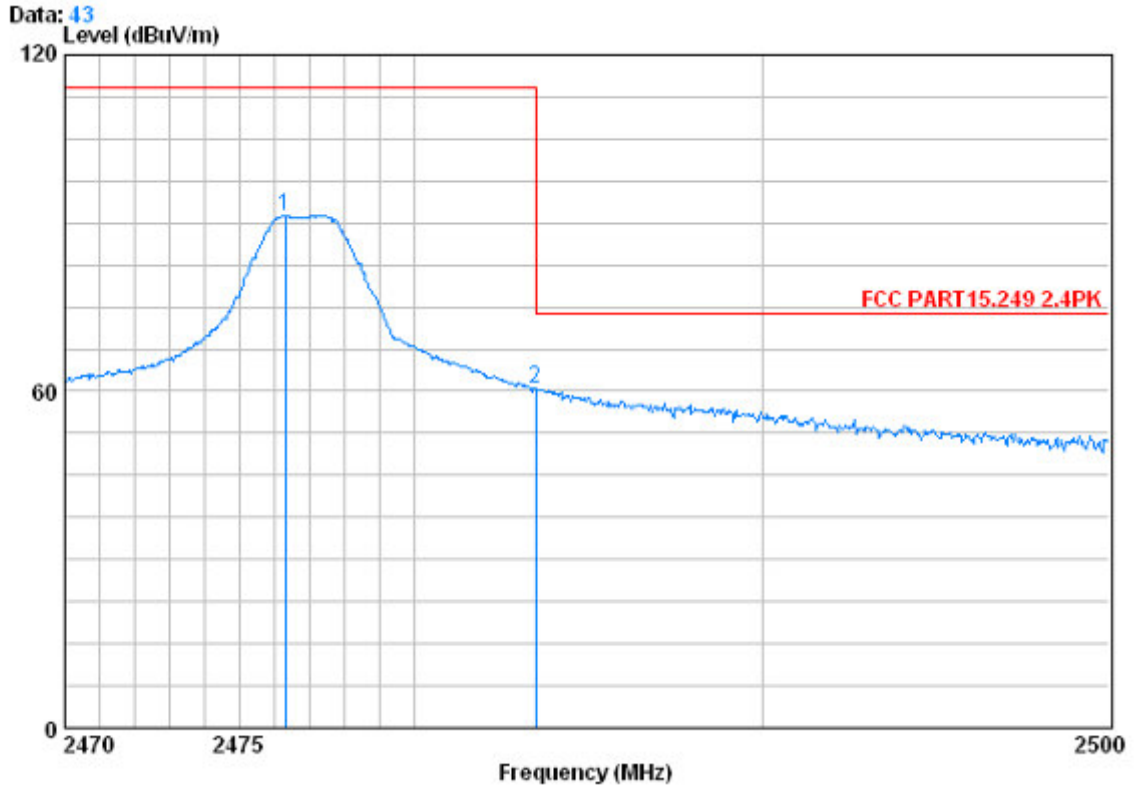
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Horizontal:



	Freq	Cable&Antenna Loss	Antenna Factor	Preamp Factor	Read Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1 @	2476.300	3.03	32.67	39.92	95.43	91.21	114.00 -22.79
2 @	2483.500	3.03	32.67	39.92	64.61	60.39	74.00 -13.61

Remark:

For the pulse emissions measurement, Average value = Peak value + PDCF and Average limit = Peak limit - 20dB. Since the device is pulse emission, PDCF = -23.77dB < -20dB and Peak value has met Peak limit. Base on the above state, average value should meet average limit. So, only the peak measurements were shown in the report.

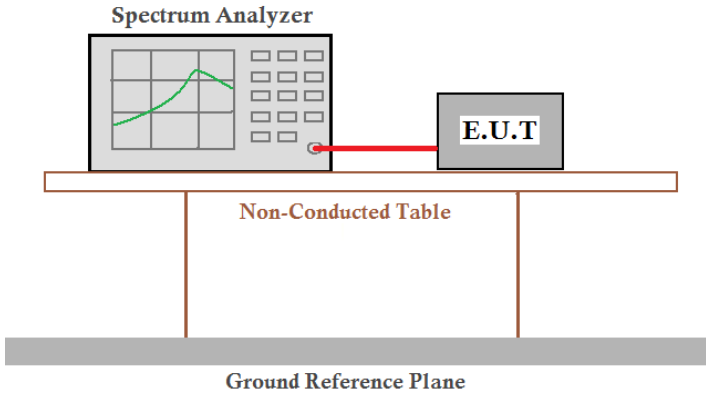
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5.3 20dB Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2009
Receiver setup:	RBW=100KHz, VBW=300KHz, detector: Peak
Limit:	Operation Frequency range 2400MHz-2483.5MHz
Test Procedure:	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 4.7 for details
Test mode:	Transmitting
Test results:	Pass

Measurement Data

Test channel	20dB bandwidth (MHz)	Results
Lowest	1.980	Pass
Middle	2.000	Pass
Highest	2.300	Pass

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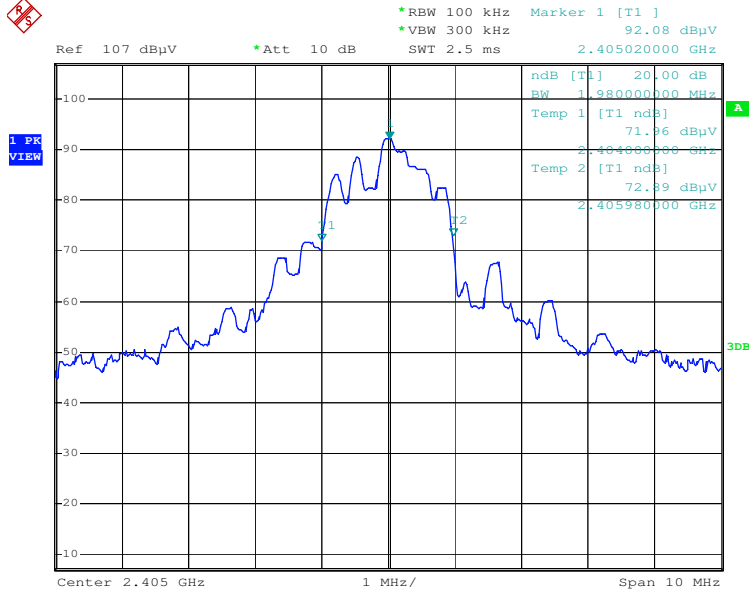
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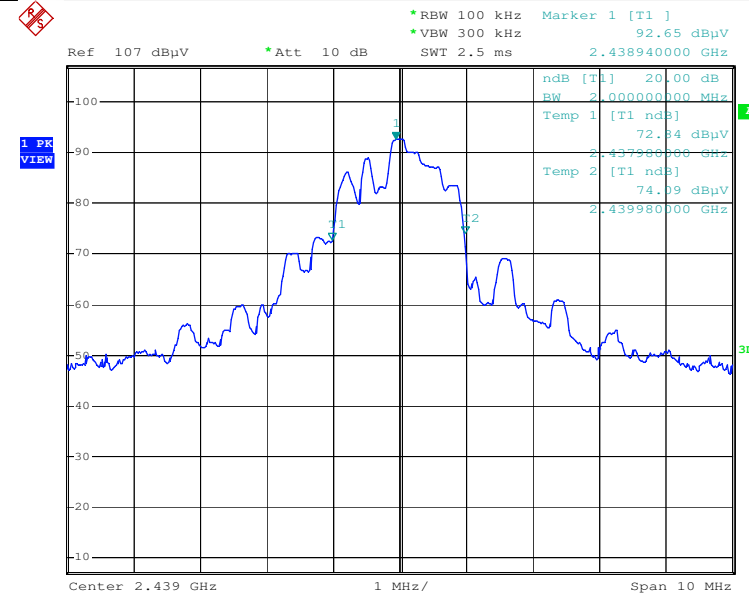
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Test plot as follows:

Test channel:	Lowest	
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Test channel:	Middle	
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Test channel:	Highest	
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