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# **FCC REPORT**

Application No.: SZEMO110200681RF

Applicant: PIXEL ENTERPRISE LIMITED

Product Name: Wireless Shutter Remote Control

**Operation Frequency:** 2401.9MHz-2476.9MHz **FCC ID:** X5SWSRCRW-221TX

Standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249: 2009

Date of Receipt 2011-02-28

**Date of Test** 2011-03-02 to 2011-03-24

**Date of Issue** 2011-03-26

Test Result : PASS \*

#### Remark:

Complete product formed by RW-221TX and RW-221RX, only the test result of RW-221TX is recorded in this report.

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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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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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:	PIXEL ENTERPRISE LIMITED						
Manufacturer/ Factory:	PIXEL ENTERPRISE LIMITED						
Address of Applicant:	RM1228, 12/F, ONE GRAND TOWER, 639 NATHAN RD, MONGKOK, KOWLOON, HONG KONG						
Address of Manufacturer/ Factory:	PRM1228, 12/F, ONE GRAND TOWER, 639 NATHAN RD, MONGKOK, KOWLOON, HONG KONG						

# 4.2 General Description of E.U.T.

Product Name:	Wireless Shutter Remote Control
Model No.:	RW-221TX
Operation Frequency:	2401.9MHz-2476.9MHz
Channel numbers:	16
Modulation type	FSK
Antenna Type:	Integral
Antenna gain:	0dBi
Power supply:	3.0V DC (1.5V x 2 "AAA"Size Batteries)

Channel number	Frequency(MHz)	Channel number	Frequency(MHz)
CH 00	2401.9	CH 08	2444.9
CH 01	2406.4	CH 09	2446.4
CH 02	2409.2	CH 10	2451.4
CH 03	2418.4	CH 11	2459.9
CH 04	2420.9	CH 12	2461.9
CH 05	2429.4	CH 13	2469.4
CH 06	2435.4	CH 14	2470.9
CH 07	2438.4	CH 15	2476.9

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	2401.9MHz		
The middle channel	2444.9MHz		
The highest channel	2476.9MHz		

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### 4.3 E.U.T Operation mode

# **Operating Environment:**

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

Test mode:

Transmitter mode: the EUT transmitted the continuous modulation test signal at the low,

middle and high channels

# 4.4 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.

#### 4.5 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

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

No tests were sub-contracted.

#### 4.6 Other Information Requested by the Customer

None.

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#### 4.7 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:

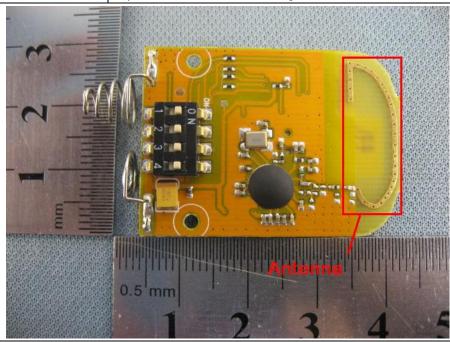
**Standard requirement:** FCC Part15 C Section 15.203

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

E.U.T Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The maximum gain of the antenna is 0dBi.



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#### 5.2 Radiated Emission

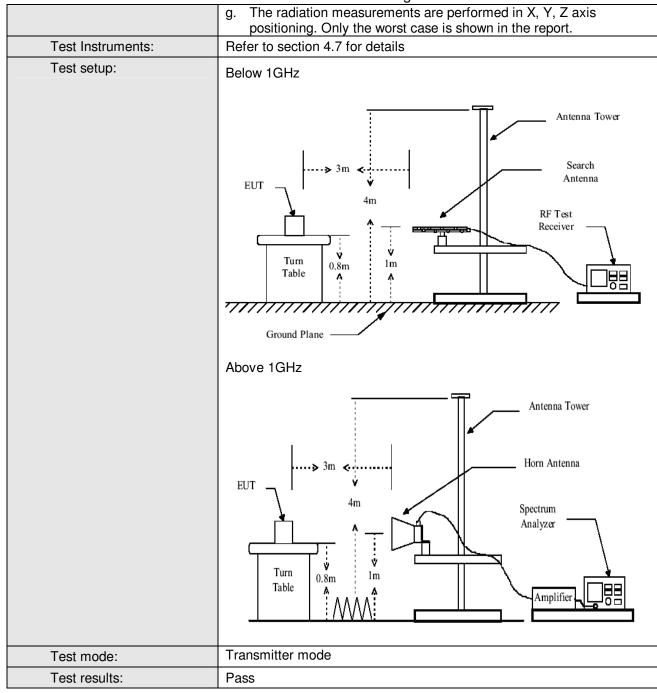
Test Requirement:	FCC Part15 C Section 15.249 and 15.209						
Test Method:	ANSI C63.10: 2	009					
Test Frequency Range:	30MHz to 25000	OMHz					
Test site:	Measurement D	istance: 3m	(Semi-Anecho	ic Chambe	r)		
Receiver setup:			•		,		
•	Frequency	Frequency Detector		VBW	Remark		
	30MHz-1GHz	Quasi-peal		300KHz	Quasi-peak Value		
	Above 1GHz	Peak	1MHz	3MHz	Peak Value		
Limite		Peak	1MHz	10Hz	Average Value		
Limit:	Freque	encv	Limit (dBuV/	m @3m)	Remark		
(Field strength of the fundamental signal)	2400MHz-24	•	94.0		Average Value		
randamental signal)	2400IVIHZ-24	183.5IVIHZ	114.	0	Peak Value		
Limit:			ı		,		
(Spurious Emissions)	Freque		Limit (dBuV/		Remark		
	30MHz-8 88MHz-21		40.0 43.5		Quasi-peak Value  Quasi-peak Value		
	216MHz-9		46.0		Quasi-peak Value		
	960MHz-		54.0		Quasi-peak Value		
	Above 1	CU-2	54.0	)	Average Value		
	Above i	GHZ	74.0	)	Peak Value		
(band edge)  Test Procedure:	the fundamenta 15.209, whicheva. The EUT was above the gwas rotated	al or to the queris the lesses on the lesses of the lesses on the lesses	general radiate ser attenuation the top of a ro meter semi-ar	ed emission  n.  ntating table  nechoic car	below the level of n limits in Section  e 0.8 meters mber. The table n of the highest		
	antenna, wh antenna tov	nich was mou ver.	unted on the to	p of a varia	ence-receiving able-height our meters above		
	the ground Both horizo make the m	to determine ntal and vert leasurement	the maximum ical polarizatio	value of th	ne field strength. ntenna are set to		
	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						
					the emissions that		
		-peak or ave	in would be re- rage method a		and then reported		

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#### 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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#### **Measurement Data**

# 5.2.1 Field Strength Of The Fundamental Signal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Peak Level (dBuV/m)	Average Limit Line (dBuV/m)	Over Limit (dB)	polarization
2401.900	2.98	32.51	39.86	72.82	68.46	94.00	-45.54	Horizontal
2401.900	2.98	32.51	39.86	79.03	74.66	94.00	-39.34	Vertical
2444.900	3.01	32.61	39.89	73.82	69.55	94.00	-44.45	Horizontal
2444.900	3.01	32.61	39.89	79.74	75.46	94.00	-38.54	Vertical
2476.900	3.03	32.67	39.92	73.03	68.81	94.00	-45.19	Horizontal
2476.900	3.03	32.67	39.92	77.69	73.47	94.00	-40.53	Vertical

#### Note:

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

#### Remark:

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



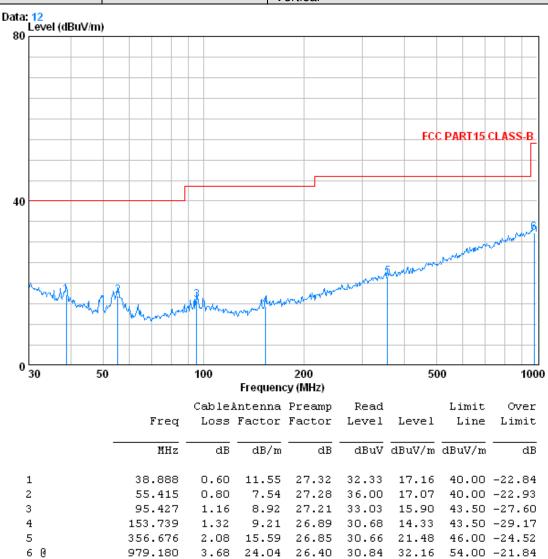
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# 5.2.2 Spurious Emissions

#### 30MHz~1GHz

Test mode: Transmitting Vertical



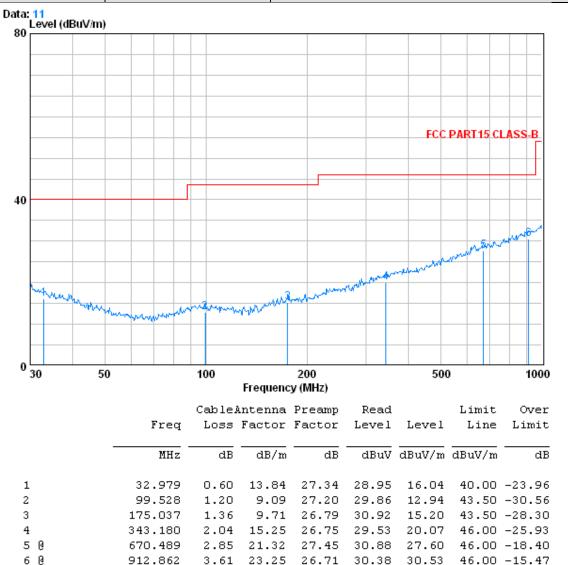
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Test mode: Transmitting Horizontal



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Above 1GHz								
Test mode:	Transmitting	Test channel:	Lowest	Remark:	Peak			

rest mode.		ommung	1 Cot Gridi	11101.	744031	Heman.	1 0	ar C
Frequency (MHz)	Cable Loss (dB)	Antenn a Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4783.500	7.42	34.73	41.61	58.51	59.05	74.00	-14.95	Vertical
6381.500	8.11	36.16	40.59	50.46	54.14	74.00	-19.86	Vertical
7603.500	9.21	36.00	39.52	50.09	55.78	74.00	-18.22	Vertical
9436.500	9.66	37.12	37.94	46.72	55.56	74.00	-18.44	Vertical
11081.500	10.63	38.48	37.90	45.82	57.03	74.00	-16.97	Vertical
12315.250	11.41	39.23	38.41	48.98	61.21	74.00	-12.79	Vertical
4783.500	7.42	34.73	41.61	61.09	61.63	74.00	-12.37	Horizontal
6146.500	8.02	35.88	40.79	50.64	53.75	74.00	-20.25	Horizontal
7521.250	9.12	36.00	39.61	50.33	55.84	74.00	-18.16	Horizontal
8590.500	9.50	36.27	38.67	49.36	56.46	74.00	-17.54	Horizontal
10611.500	10.29	38.34	37.70	46.45	57.38	74.00	-16.62	Horizontal
12585.500	11.52	39.44	38.52	48.04	60.48	74.00	-13.52	Horizontal

Test mode:	Tran	smitting	Test char	nnel: Lo	owest	Remark:	ave	erage
Frequency (MHz)	Cable Loss (dB)	Antenn a Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4783.500	7.42	34.73	41.61	48.03	48.57	54.00	-5.43	Vertical
6381.500	8.11	36.16	40.59	40.66	44.34	54.00	-9.66	Vertical
7603.500	9.21	36.00	39.52	40.99	46.68	54.00	-7.32	Vertical
9436.500	9.66	37.12	37.94	36.24	45.08	54.00	-8.92	Vertical
11081.500	10.63	38.48	37.90	35.14	46.35	54.00	-7.65	Vertical
12315.250	11.41	39.23	38.41	37.77	50.00	54.00	-4.00	Vertical
4783.500	7.42	34.73	41.61	49.26	49.80	54.00	-4.20	Horizontal
6146.500	8.02	35.88	40.79	40.38	43.49	54.00	-10.51	Horizontal
7521.250	9.12	36.00	39.61	40.27	45.78	54.00	-8.22	Horizontal
8590.500	9.50	36.27	38.67	39.55	46.65	54.00	-7.35	Horizontal
10611.500	10.29	38.34	37.70	36.86	47.79	54.00	-6.21	Horizontal
12585.500	11.52	39.44	38.52	37.41	49.85	54.00	-4.15	Horizontal

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Test mode:	Tran	smitting	Test char	nnel: M	iddle	Remark:	Pe	ak
Frequency (MHz)	Cable Loss (dB)	Antenn a Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4736.500	7.36	34.81	41.58	49.54	50.13	74.00	-23.87	Vertical
5594.250	7.80	35.04	41.27	50.30	51.87	74.00	-22.13	Vertical
6440.250	8.13	36.22	40.55	49.85	53.65	74.00	-20.35	Vertical
7615.250	9.22	36.00	39.52	49.26	54.96	74.00	-19.04	Vertical
8731.500	9.55	36.39	38.55	48.07	55.46	74.00	-18.54	Vertical
10141.500	9.94	37.88	37.51	46.49	56.80	74.00	-17.20	Vertical
4736.500	7.36	34.81	41.58	49.27	49.86	74.00	-24.14	Horizontal
6099.500	8.01	35.82	40.84	50.36	53.35	74.00	-20.65	Horizontal
7568.250	9.17	36.00	39.56	49.67	55.28	74.00	-18.72	Horizontal
8073.500	9.35	36.03	39.13	49.38	55.63	74.00	-18.37	Horizontal
10141.500	9.94	37.88	37.51	46.10	56.41	74.00	-17.59	Horizontal
12585.500	11.52	39.44	38.52	47.46	59.90	74.00	-14.10	Horizontal

Test mode:	Tran	smitting	Test char	nnel: M	iddle	Remark:	ave	erage
Frequency (MHz)	Cable Loss (dB)	Antenn a Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4736.500	7.36	34.81	41.58	39.45	40.04	54.00	-13.96	Vertical
5594.250	7.80	35.04	41.27	40.02	41.59	54.00	-12.41	Vertical
6440.250	8.13	36.22	40.55	39.47	43.27	54.00	-10.73	Vertical
7615.250	9.22	36.00	39.52	40.64	46.34	54.00	-7.66	Vertical
8731.500	9.55	36.39	38.55	38.88	46.27	54.00	-7.73	Vertical
10141.500	9.94	37.88	37.51	36.83	47.14	54.00	-6.86	Vertical
4736.500	7.36	34.81	41.58	39.77	40.36	54.00	-13.64	Horizontal
6099.500	8.01	35.82	40.84	40.66	43.65	54.00	-10.35	Horizontal
7568.250	9.17	36.00	39.56	39.35	44.96	54.00	-9.04	Horizontal
8073.500	9.35	36.03	39.13	39.84	46.09	54.00	-7.91	Horizontal
10141.500	9.94	37.88	37.51	36.53	46.84	54.00	-7.16	Horizontal
12585.500	11.52	39.44	38.52	36.69	49.13	54.00	-4.87	Horizontal

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Test mode:	Tran	smitting	Test char	nnel: Hi	ghest	Remark:	Pe	ak
Frequency (MHz)	Cable Loss (dB)	Antenn a Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4936.250	7.51	34.48	41.72	53.88	54.15	74.00	-19.85	Vertical
6146.500	8.02	35.88	40.79	51.00	54.11	74.00	-19.89	Vertical
7180.500	8.69	35.88	39.90	50.01	54.68	74.00	-19.32	Vertical
8085.250	9.35	36.03	39.11	50.35	56.62	74.00	-17.38	Vertical
9906.500	9.80	37.61	37.53	46.44	56.32	74.00	-17.68	Vertical
12315.250	11.41	39.23	38.41	48.35	60.58	74.00	-13.42	Vertical
4595.500	7.18	35.03	41.47	49.83	50.57	74.00	-23.43	Horizontal
6299.250	8.08	36.06	40.66	50.23	53.71	74.00	-20.29	Horizontal
7133.500	8.63	35.86	39.94	49.76	54.31	74.00	-19.69	Horizontal
7897.250	9.30	36.00	39.28	49.18	55.20	74.00	-18.80	Horizontal
8778.500	9.56	36.43	38.52	47.64	55.11	74.00	-18.89	Horizontal
10611.500	10.29	38.34	37.70	46.41	57.34	74.00	-16.66	Horizontal

Test mode:	Tran	smitting	Test char	nnel: H	ighest	Remark:	av	erage
Frequency (MHz)	Cable Loss (dB)	Antenn a Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4936.250	7.51	34.48	41.72	43.56	43.83	54.00	-10.17	Vertical
6146.500	8.02	35.88	40.79	42.41	45.52	54.00	-8.48	Vertical
7180.500	8.69	35.88	39.90	39.84	44.51	54.00	-9.49	Vertical
8085.250	9.35	36.03	39.11	40.72	46.99	54.00	-7.01	Vertical
9906.500	9.80	37.61	37.53	36.31	46.19	54.00	-7.81	Vertical
12315.250	11.41	39.23	38.41	37.59	49.82	54.00	-4.18	Vertical
4595.500	7.18	35.03	41.47	39.24	39.98	54.00	-14.02	Horizontal
6299.250	8.08	36.06	40.66	40.38	43.86	54.00	-10.14	Horizontal
7133.500	8.63	35.86	39.94	39.54	44.09	54.00	-9.91	Horizontal
7897.250	9.30	36.00	39.28	39.79	45.81	54.00	-8.19	Horizontal
8778.500	9.56	36.43	38.52	37.33	44.80	54.00	-9.20	Horizontal
10611.500	10.29	38.34	37.70	36.08	47.01	54.00	-6.99	Horizontal

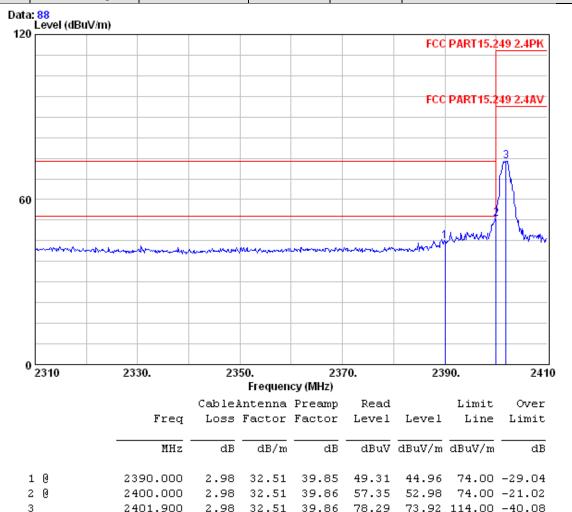
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# 5.2.3 Band edge (Radiated Emission) Test mode: Transmitting Test channel: Lowest Remark: Vertical

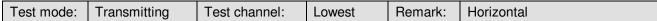


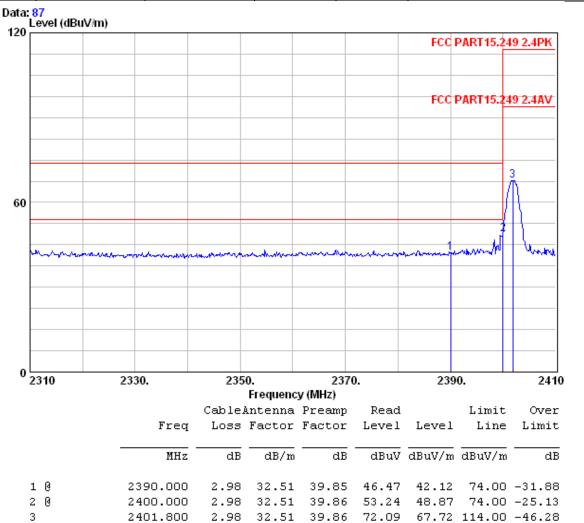
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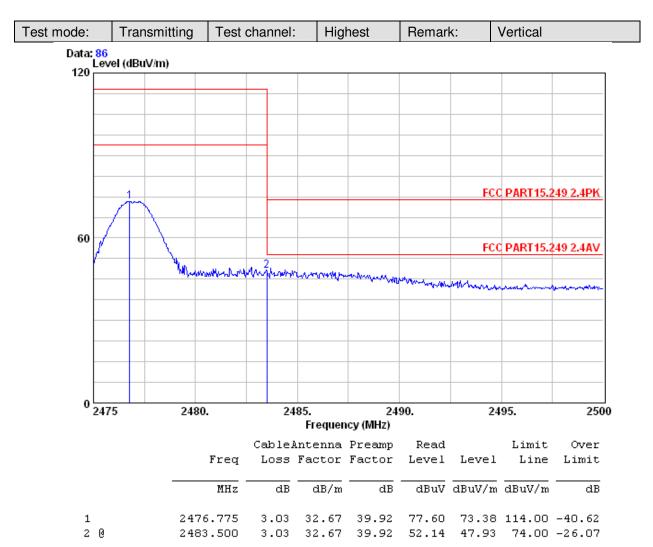


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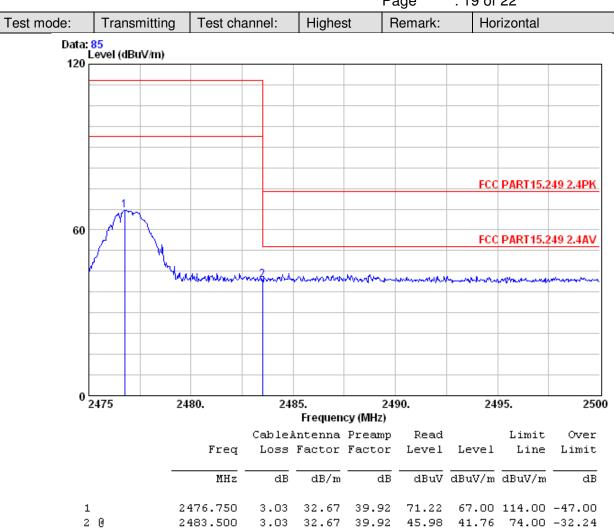


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#### Remark:

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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#### 5.2.4 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				
Test Procedure:	<ol> <li>According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.</li> <li>Set the EUT to proper test channel.</li> <li>Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points.</li> <li>Read 20dB bandwidth.</li> </ol>				
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane				
Test Instruments:	Refer to section 4.7 for details				
Test results:	Pass				

#### **Measurement Data**

Test channel	20dB bandwidth (MHz)	Results	
Lowest	0.840		
Middle	0.870		
Highest	0.860		

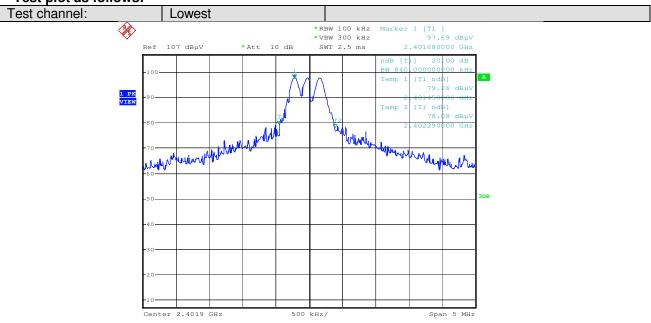
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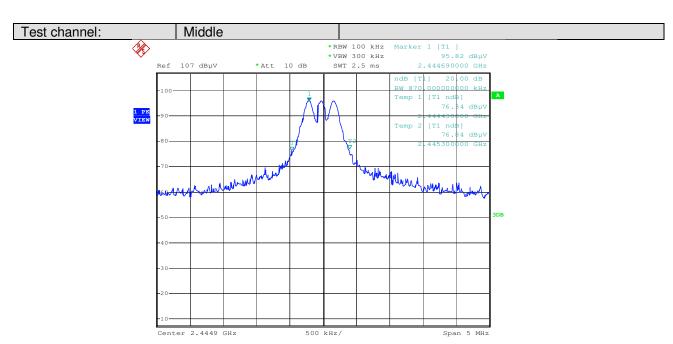


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Test plot as follows:





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