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Report No.: SZEM130100023502  
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## FCC REPORT

**Application No. :** SZEM1301000235RF (GZEM1211005101RF)  
**Applicant:** CATEYE Co. Ltd  
**Manufacturer:** National Electronics & Watch Co. Ltd.  
**Factory:** National Electronics & Watch Co. Ltd.  
**EUT Name:** Bike sensor  
**Model No.(EUT):** M11-1898  
**FCC ID:** ON5M11-1898CS  
**Standards:** 47 CFR Part 15, Subpart C (2012)  
**Date of Receipt:** 2013-01-15  
**Date of Test:** 2013-01-30 to 2013-02-03  
**Date of Issue:** 2013-05-10

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

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

Authorized Signature:



Jack Zhang  
EMC Laboratory Manager

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

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

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## 2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	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

Remark:

GPS BIKE COMPUTER is the system which contain Chest Strap, Bike sensor, Bike computer and USB cable

CC-GL50 is Model No. of GPS BIKE COMPUTER

M11-1896D is Model No. of Bike computer

M11-1887 is Model No. of Chest Strap

M11-1898 is Model No. of Bike sensor

M11-2058 is Model No. of USB cable

Only the model M11-1898 was tested and displayed in this report.



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## 4 General Information

### 4.1 Client Information

Applicant:	CATEYE Co. Ltd
Address of Applicant:	2-8-25 Kuwazu, Higashi-Sumiyoshi-ku, Osaka Japan
Manufacturer:	National Electronics & Watch Co. Ltd.
Address of Manufacturer:	15/F., SHING DAO IND. BLDG., 232 ABERDEEN MAIN ROAD, ABERDEEN, HONG KONG
Factory:	National Electronics & Watch Co. Ltd.
Address of Factory:	2 <sup>nd</sup> Ind. State, Hong Hua Shan, Gongming Zhen, Baoan District, Shenzhen, P.R.C.

### 4.2 General Description of EUT

EUT Name:	Bike sensor
Model No.(EUT):	M11-1898
Trade Mark:	CATEYE
Frequency Range:	2457MHz
Modulation Type:	GFSK
Number of Channels:	1 (declared by the client)
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	0.04dBi
Power Supply:	DC 3.0V (3.0V x 1 "CR2032" Size Battery)
Test Voltage:	DC 3.0V



### 4.3 Test Environment and Mode

Operating Environment:	
Temperature:	26.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1015 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation .

### 4.4 Description of Support Units

The EUT has been tested as an 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

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	2013-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2013-05-17
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	2013-05-17
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2013-10-24
9	Coaxial cable	SGS	N/A	SEL0027	2013-05-59
10	Coaxial cable	SGS	N/A	SEL0189	2013-05-29
11	Coaxial cable	SGS	N/A	SEL0121	2013-05-29
12	Coaxial cable	SGS	N/A	SEL0178	2013-05-29
13	Band filter	Amindeon	82346	SEL0094	2013-05-17
14	Barometer	Chang Chun	DYM3	SEL0088	2013-05-24
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	2013-05-17
18	Signal Generator	Rohde & Schwarz	SMY01	SEL0155	2013-10-24
19	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2013-06-04

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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	2013-05-29
5	Coaxial cable	SGS	N/A	SEL0179	2013-05-29
6	Barometer	ChangChun	DYM3	SEL0088	2013-05-24
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2013-05-17
8	Band filter	amideon	82346	SEL0094	2013-05-17
9	POWER METER	R & S	NRVS	SEL0144	2013-10-24
10	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2013-05-17
11	Power Divider(splitter)	Agilent Technologies	11636B	SEL0130	2013-10-24

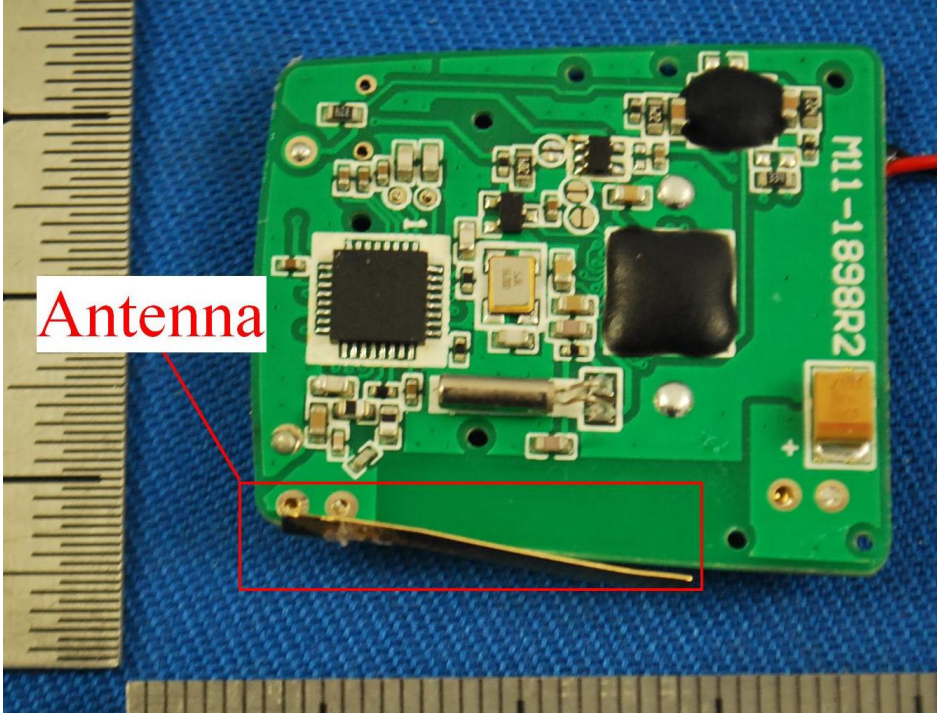
**Note: The calibration interval is one year, all the instruments are valid.**

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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
<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>	
<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 0.04dBi.</p>	
 <p>The photograph shows a green printed circuit board (PCB) with various electronic components. A red box highlights a small, thin antenna structure on the board. A red line points from the word 'Antenna' in a white box to this highlighted area. The PCB is marked with 'M11-1898R2' on the right side. A ruler is visible on the left side of the board for scale.</p>	



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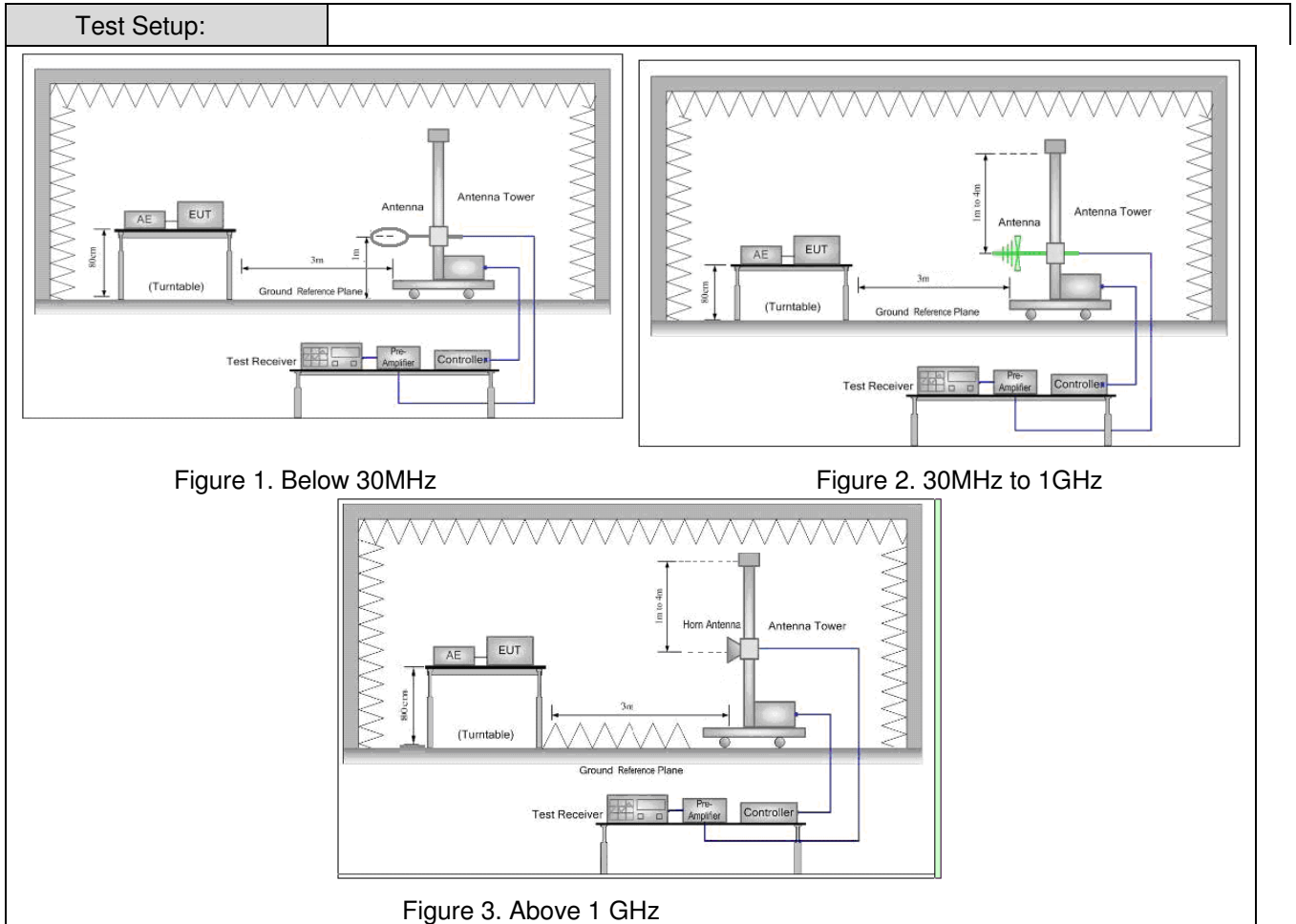
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### 5.2 Radiated Spurious Emissions

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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<b>Test Procedure:</b>	<ol 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 (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.</li> <li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the</li> </ol>
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	<p>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. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.</p> <p>i. Repeat above procedures until all frequencies measured was complete.</p>
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



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### Measurement Data

#### 5.2.1.1 Field Strength Of The Fundamental Signal

Peak value:

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
2456.960	3.01	32.64	39.91	88.42	84.16	114	-29.84	Vertical
2456.880	3.01	32.64	39.91	88.15	83.89	114	-30.11	Horizontal

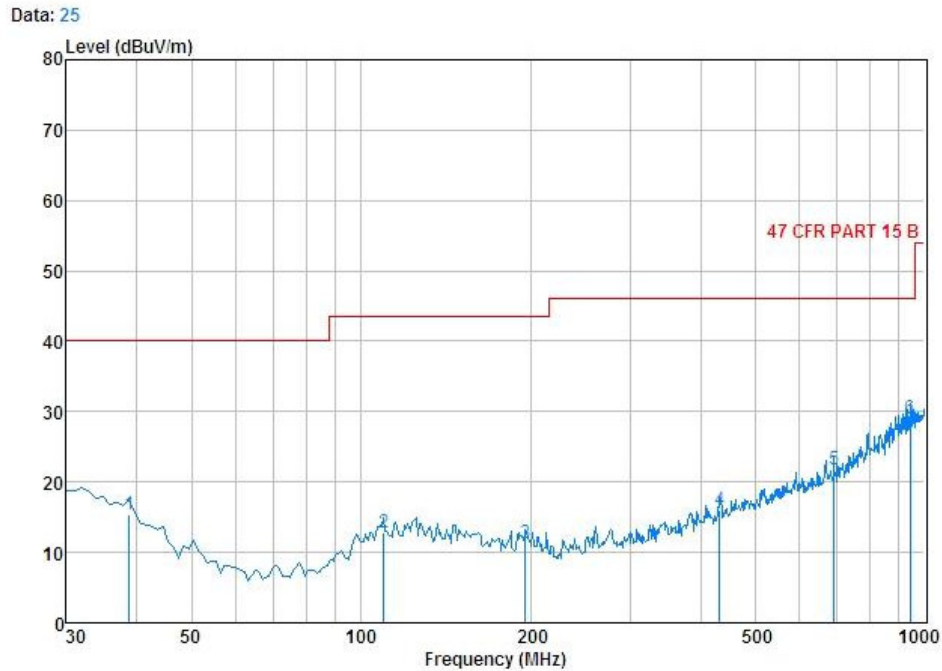
Remark: As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the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



5.2.1.2 Spurious Emissions

30MHz~1GHz	
Test mode:	Transmitting

QP value:  
Horizontal



Condition: 47 CFR PART 15 B 3m 3142C NEW HORIZONTAL  
Job No. : 0235RF  
Mode : Transmitting

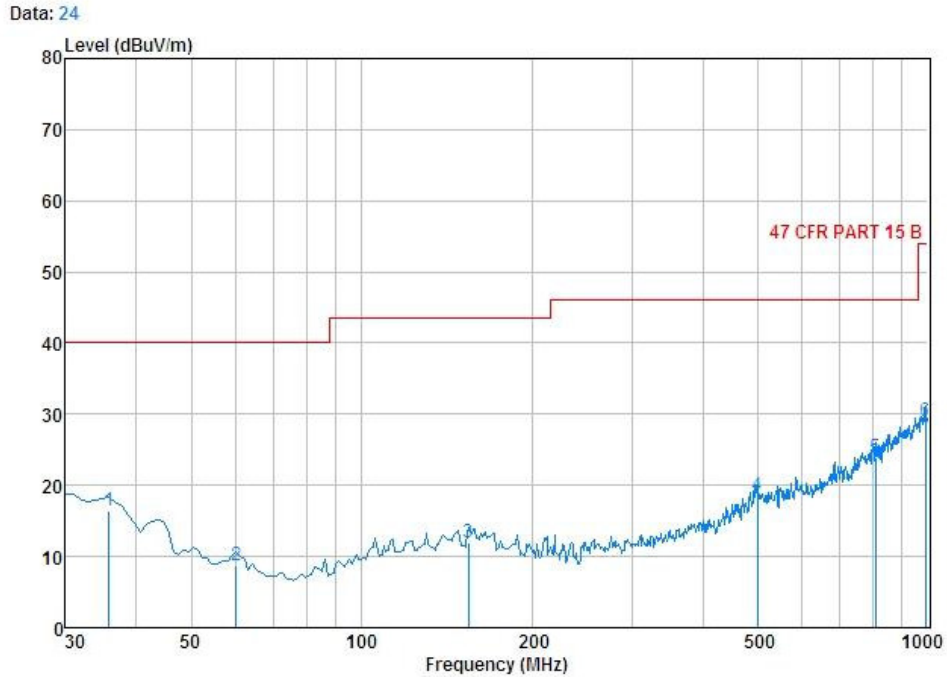
	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	38.730	0.60	11.51	27.32	30.66	15.45	40.00	-24.55
2	109.540	1.23	7.55	27.14	31.19	12.83	43.50	-30.67
3	195.870	1.39	7.04	26.71	29.54	11.26	43.50	-32.24
4	432.550	2.34	11.97	27.33	29.00	15.98	46.00	-30.02
5	689.600	2.88	16.40	27.43	29.89	21.74	46.00	-24.26
6 p	940.830	3.64	20.60	26.58	31.40	29.06	46.00	-16.94

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Vertical



Condition: 47 CFR PART 15 B 3m 3142C NEW VERTICAL  
 Job No. : 0235RF  
 Mode : Transmitting

	Freq	CableAntenna Loss	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dBuV	dBuV/m	dB
1	35.820	0.60	13.23	27.33	29.89	16.39
2	60.070	0.80	5.06	27.27	30.17	8.76
3	154.160	1.33	9.53	26.89	28.04	12.01
4	499.480	2.60	13.40	27.70	30.25	18.55
5 p	807.940	3.24	18.77	27.23	29.22	24.00
6	990.300	3.69	20.70	26.37	31.07	29.09



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Above 1GHz								
Test mode:	Transmitting		Test channel:	2457MHz		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
1561.221	2.56	28.59	39.38	51.00	42.77	74	-31.23	Vertical
3088.453	3.39	33.37	40.37	47.50	43.89	74	-30.11	Vertical
4547.561	4.53	35.12	41.44	47.63	45.84	74	-28.16	Vertical
6611.326	5.28	36.20	40.40	48.79	49.87	74	-24.13	Vertical
7547.013	6.17	36.00	39.57	48.34	50.94	74	-23.06	Vertical
10062.310	5.99	37.78	37.47	45.19	51.49	74	-22.51	Vertical
1593.340	2.58	28.84	39.39	50.38	42.41	74	-31.59	Horizontal
3088.453	3.39	33.37	40.37	48.27	44.66	74	-29.34	Horizontal
4149.351	4.27	34.22	41.15	48.40	45.74	74	-28.26	Horizontal
5177.971	4.84	34.58	41.63	49.13	46.92	74	-27.08	Horizontal
7099.747	5.64	35.84	39.97	48.83	50.34	74	-23.66	Horizontal
8377.241	6.19	36.15	38.87	48.07	51.54	74	-22.46	Horizontal

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Pre-amplifier Factor
- 2) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
- 3) The disturbance above 10GHz 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.



### 5.3 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) Remark
	30MHz-88MHz	40.0 Quasi-peak Value
	88MHz-216MHz	43.5 Quasi-peak Value
	216MHz-960MHz	46.0 Quasi-peak Value
	960MHz-1GHz	54.0 Quasi-peak Value
Above 1GHz	54.0 Average Value	
	74.0 Peak Value	
Test Setup:		

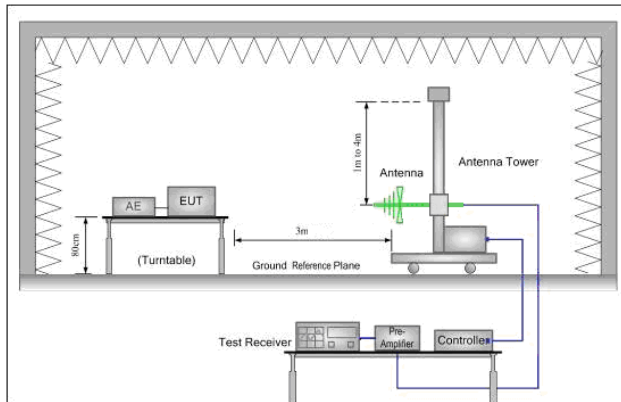


Figure 1. 30MHz to 1GHz

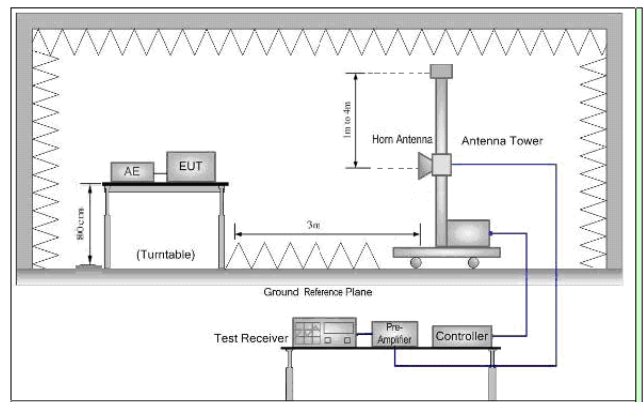


Figure 2. Above 1 GHz



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Test Procedure:	<ol 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. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.</li><li>i. Repeat above procedures until all frequencies measured was complete.</li></ol>
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



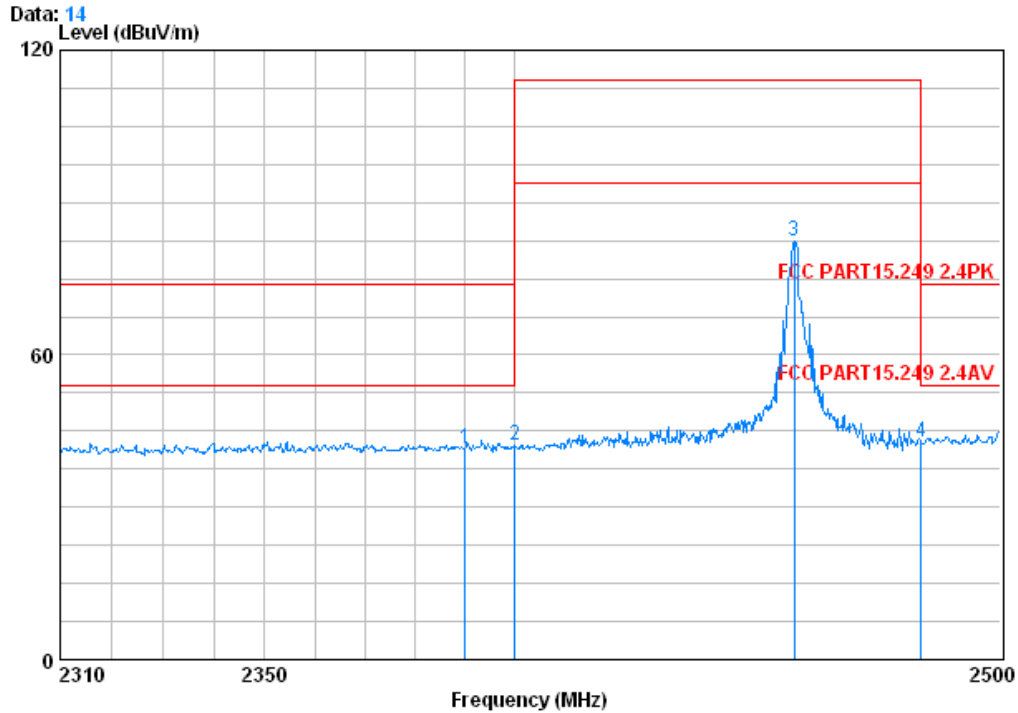
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Test plot as follows:

Test mode:	Transmitting	Test channel:	2457MHz	Remark:	Peak	Vertical
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Condition : FCC PART15.249 2.4PK 3m VERTICAL  
Job No. : 0235RF  
Mode : Bandedge

	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	46.00	74.00	-32.36
2	2400.000	2.98	32.51	39.86	46.63	74.00	-31.74
3	2457.060	3.02	32.64	39.91	86.72	114.00	-31.52
4	2483.500	3.03	32.67	39.92	47.15	74.00	-31.07

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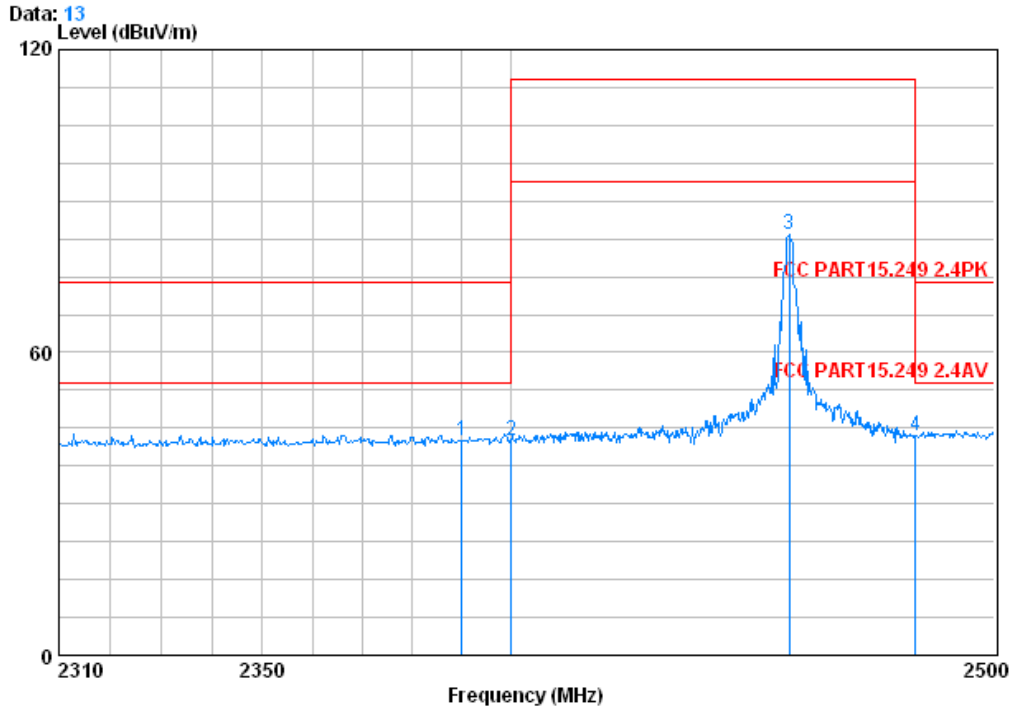


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Test mode:	Transmitting	Test channel:	2457MHz	Remark:	Peak	Horizontal
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Condition : FCC PART15.249 2.4PK 3m HORIZONTAL  
 Job No. : 0235RF  
 Mode : Bandedge

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	2390.000	2.98	32.51	39.85	46.81	74.00	-31.55
2	2400.000	2.98	32.51	39.86	46.90	74.00	-31.47
3	2457.060	3.02	32.64	39.91	87.49	114.00	-30.76
4 @	2483.500	3.03	32.67	39.92	47.62	74.00	-30.60

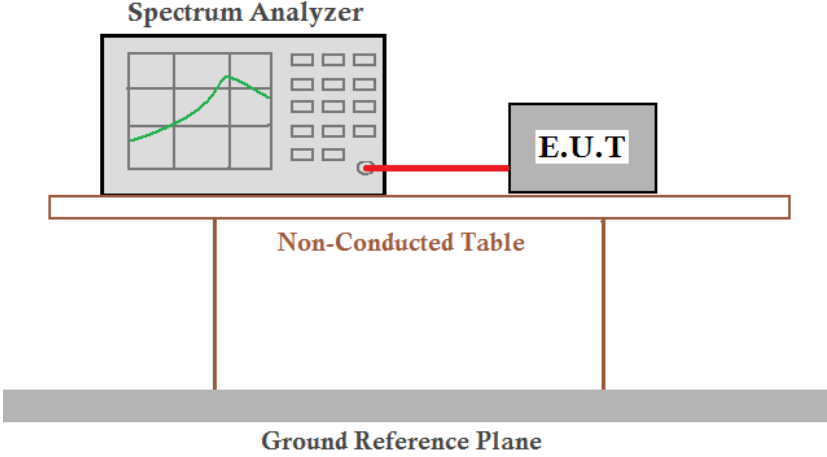
**Note:**

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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### 5.4 20dB Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2009
Test Setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Limit:	N/A
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

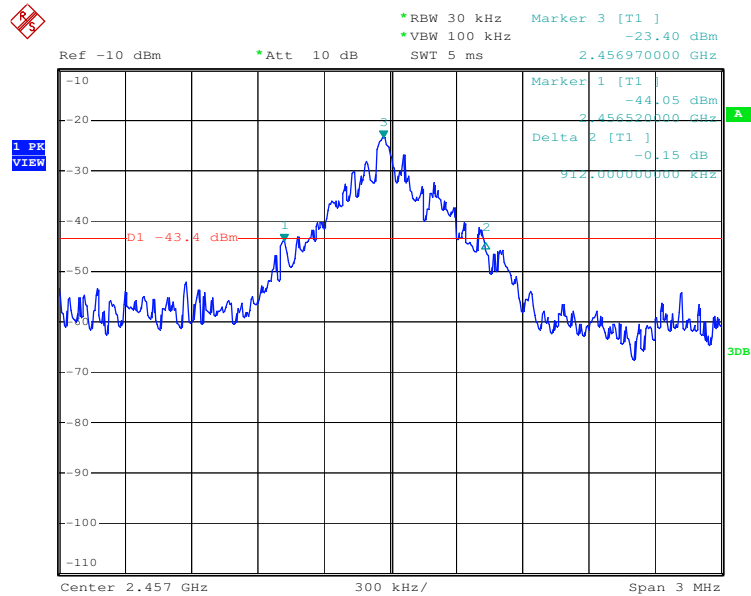
### Measurement Data

Test Channel	20dB bandwidth (MHz)	Results
2457MHz	0.912	Pass



Test plot as follows:

Test channel:	2457MHz
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