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Report No.: SZEM160100031501  
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## FCC REPORT

**Application No. :** SZEM1601000315CR  
**Applicant:** LIONEL LLC  
**Manufacturer:** LIONEL LLC  
**Factory:** Dong Guan LC Technology Co., Ltd  
**Product Name:** LIONEL MEGATRACKS  
**Model No.(EUT):** 7-20003  
**Add Model No.:** 7-20004  
**FCC ID:** LIV-MEGTRACK  
**Standards:** 47 CFR Part 15, Subpart C (2015)  
**Date of Receipt:** 2016-01-18  
**Date of Test:** 2016-01-26 to 2016-01-27  
**Date of Issue:** 2016-02-14

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

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## 2 Version

<b>Revision Record</b>				
<b>Version</b>	<b>Chapter</b>	<b>Date</b>	<b>Modifier</b>	<b>Remark</b>
00		2016-02-14		Original

<b>Authorized for issue by:</b>				
<b>Tested By</b>		Gebin Sun		2016-01-27
		_____		_____
		(Gebin Sun) /Project Engineer		<b>Date</b>
<b>Prepared By</b>		Joyce Shi		2016-02-14
		_____		_____
		(Joyce Shi) /Clerk		<b>Date</b>
<b>Checked By</b>		Eric Fu		2016-02-14
		_____		_____
		(Eric Fu) /Reviewer		<b>Date</b>

### 3 Test Summary

Test Item	Test Requirement	Test method	Result
<b>Antenna Requirement</b>	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 (2013)	PASS
<b>Field Strength of the Fundamental Signal</b>	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2013)	PASS
<b>Spurious Emissions</b>	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013)	PASS
<b>Restricted bands around fundamental frequency (Radiated Emission)</b>	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013)	PASS
<b>20dB Occupied Bandwidth</b>	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013)	PASS

Remark:

Model No.: 7-20003, 7-20004

Only the model 7-20003 was tested, since the circuit design, PCB layout, electrical components used, internal wiring and functions were identical for the above models, with difference being color and modulation code.

The modulation code is determined by the difference between component resistor R2 and R6 as listed below.

Model No.	Modulation Code	R2	R6
7-20003	A	10Kohm	None
7-20004	B	None	10Kohm



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## 5 General Information

### 5.1 Client Information

Applicant:	LIONEL LLC
Address of Applicant:	6031 PERFORMANCE DRIVE, CONCORD, NC 28027 USA
Manufacturer:	LIONEL LLC
Address of Manufacturer:	6031 PERFORMANCE DRIVE, CONCORD, NC 28027 USA
Factory:	Dong Guan LC Technology Co., Ltd
Address of Factory:	Qiao Li Industrial District Chang Huang Road, Chang Ping Town, DongGuan City, Guang Dong Province, China

### 5.2 General Description of EUT

Name:	LIONEL MEGATRACKS
Model No.:	7-20003
Operating Frequency:	2.4GHz Wireless (2405MHz~2468MHz)
Modulation Type:	GFSK
Number of Channels:	6
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	0dBi
EUT Power Supply:	9V DC (1 x 9V "6F22" Size Battery)



Operation Frequency each of channel	
Channel	Frequency
1CH	2405MHz
2CH	2415MHz
3CH	2428MHz
4CH	2442MHz
5CH	2458MHz
6CH	2468MHz

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)	2405MHz
The Middle channel(CH4)	2442MHz
The Highest channel(CH6)	2468MHz



### 5.3 Test Environment and Mode

<b>Operating Environment:</b>	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1020mbar
<b>Test mode:</b>	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

### 5.4 Description of Support Units

The EUT has been tested independently.

### 5.5 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.



## 5.6 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.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, 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)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-2, 4620C-3.

## 5.7 Deviation from Standards

None.

## 5.8 Abnormalities from Standard Conditions

None.

## 5.9 Other Information Requested by the Customer

None.



## 5.10 Equipment List

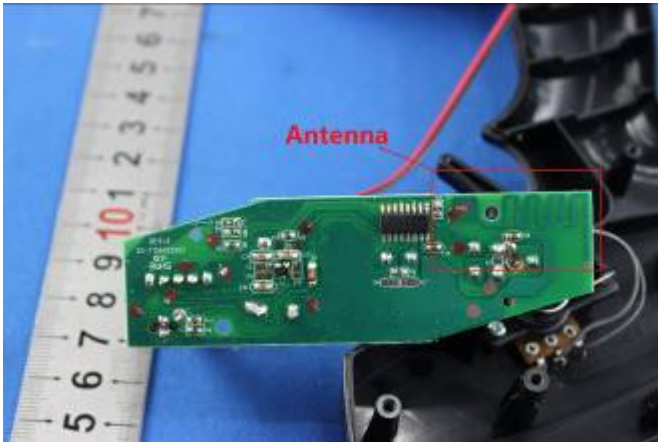
RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2015-05-13	2016-05-13
2	EMI Test Receiver	Agilent Technologies	N9038A	SEL0312	2015-09-16	2016-09-16
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2014-11-15	2017-11-15
5	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2015-10-17	2016-10-17
6	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2014-11-24	2017-11-24
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2015-05-13	2016-05-13
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2015-10-17	2016-10-17
9	Coaxial cable	SGS	N/A	SEL0027	2015-05-13	2016-05-13
10	Coaxial cable	SGS	N/A	SEL0189	2015-05-13	2016-05-13
11	Coaxial cable	SGS	N/A	SEL0121	2015-05-13	2016-05-13
12	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
13	Band filter	Amindeon	82346	SEL0094	2015-05-13	2016-05-13
14	Barometer	Chang Chun	DYM3	SEL0088	2015-05-13	2016-05-13
15	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2015-10-09	2016-10-09
16	Humidity/ Temperature Indicator	Shanghai Qixiang	ZJ1-2B	SEL0103	2015-10-24	2016-10-24
17	Signal Generator (10M-27GHz)	Rohde & Schwarz	SMR27	SEL0067	2015-05-13	2016-05-13
18	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2015-05-13	2016-05-13



RF connected test						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2015-10-09	2016-10-09
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2015-10-24	2016-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2015-10-17	2016-10-17
4	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
5	Coaxial cable	SGS	N/A	SEL0179	2015-05-13	2016-05-13
6	Barometer	ChangChun	DYM3	SEL0088	2015-05-13	2016-05-13
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2015-04-25	2016-04-25
8	POWER METER	R & S	NRVS	SEL0144	2015-10-09	2016-10-09
9	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2015-04-25	2016-04-25

## 6 Test results and Measurement Data

### 6.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203
<p>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.</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 0Bi.</p>	



## 6.2 Spurious Emissions

### 6.2.1 Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209				
Test Method:	ANSI C63.10: 2013				
Test Site:	Measurement Distance: 3m				
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			
Test Setup:					

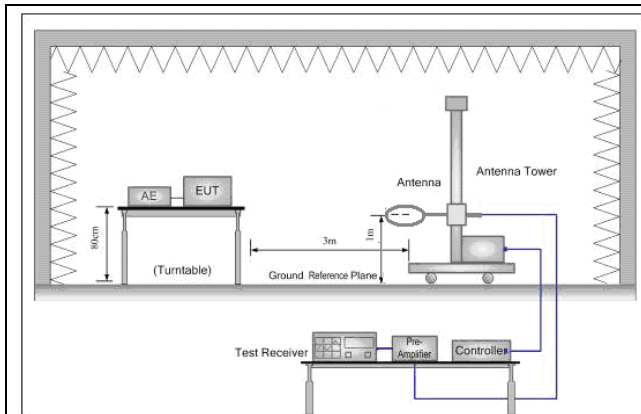


Figure 1. Below 30MHz

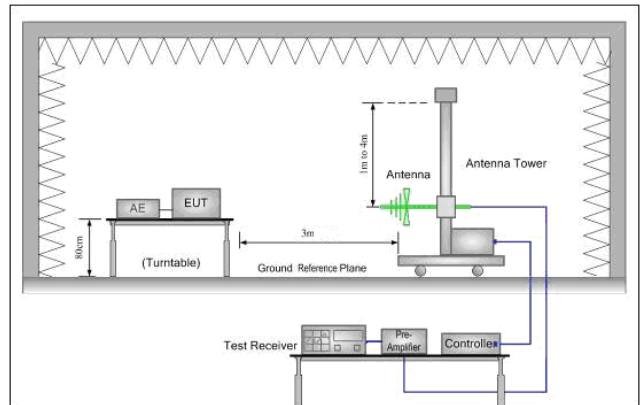


Figure 2. 30MHz to 1GHz

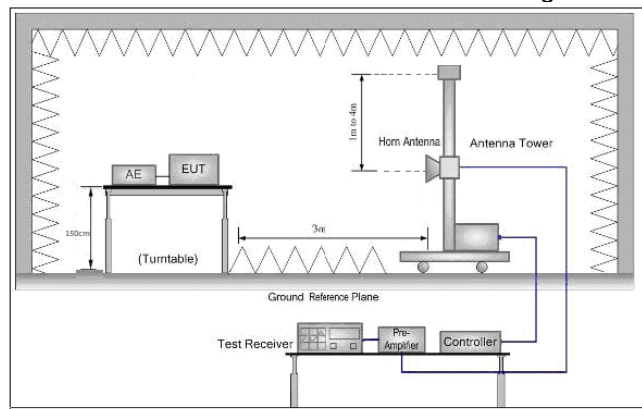


Figure 3. Above 1 GHz

**Test Procedure:**

- a. For below 1GHz, 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. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. 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.
- e. 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.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. 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.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel

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	i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 5.10 for details
Test Mode:	Transmitting with GFSK modulation. Transmitting mode
Test Results:	Pass

**Measurement Data**

**6.2.1.1 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
2405.205	28.62	5.35	38.11	84.93	80.79	114	-33.21	Horizontal
2405.408	28.63	5.35	38.11	84.44	80.31	114	-33.69	Vertical
2441.801	28.79	5.38	38.11	84.61	80.67	114	-33.33	Horizontal
2441.801	28.79	5.38	38.11	83.57	79.63	114	-34.37	Vertical
2467.734	28.91	5.4	38.12	82.43	78.62	114	-35.38	Horizontal
2468.233	28.92	5.4	38.12	82.65	78.85	114	-35.15	Vertical

Remark:

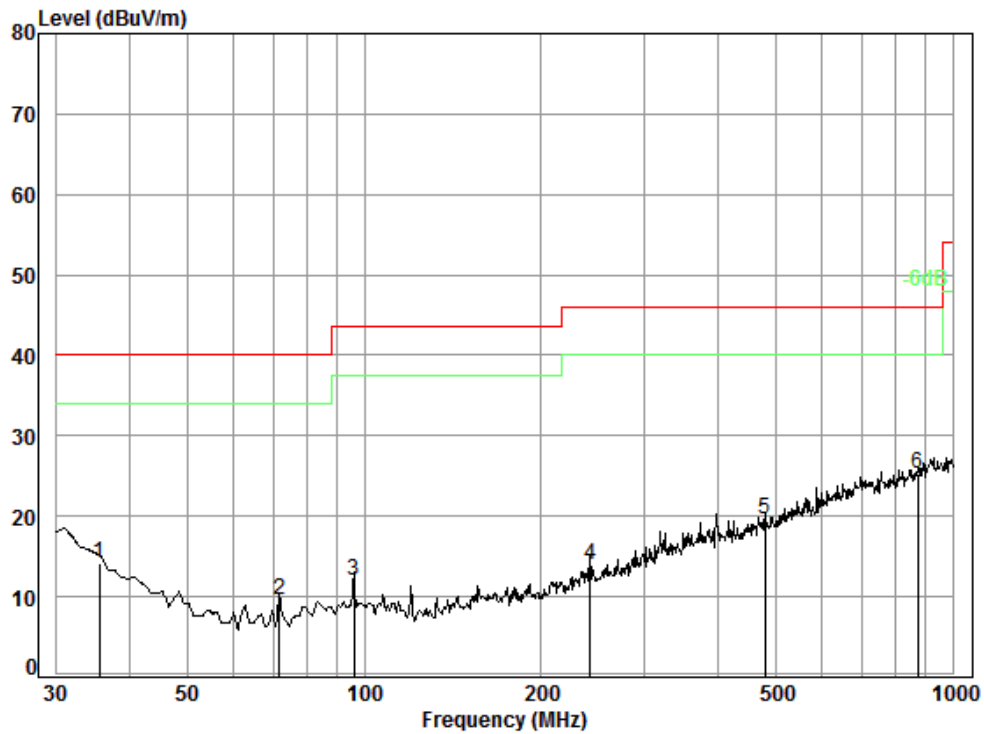
The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

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6.2.1.2 Spurious Emissions

30MHz~1GHz			
Test mode:	Transmitter mode	Polarization:	Vertical



Condition: FCC PART 15C 3m 3142C Vertical

Job No. : 0315CR

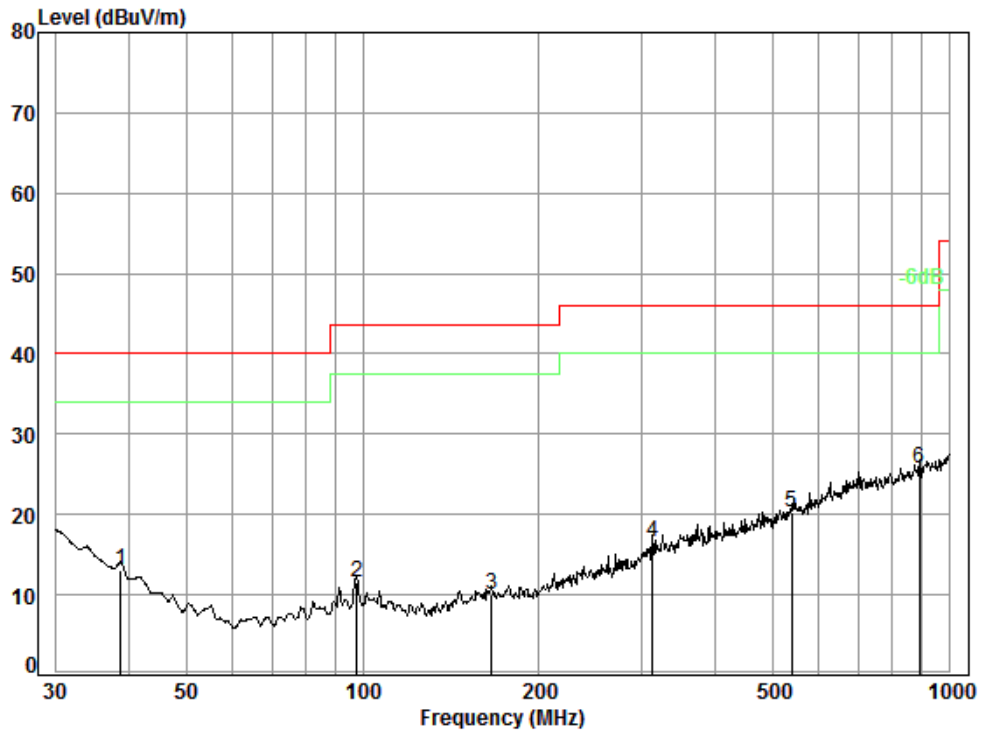
Test mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	35.50	0.60	15.61	27.34	25.25	14.12	40.00	-25.88
2	71.83	0.86	7.07	27.24	28.81	9.50	40.00	-30.50
3	96.10	1.16	8.99	27.21	29.06	12.00	43.50	-31.50
4	241.68	1.63	11.94	26.56	27.00	14.01	46.00	-31.99
5	478.85	2.52	17.68	27.60	26.98	19.58	46.00	-26.42
6	872.18	3.49	22.74	26.92	25.89	25.20	46.00	-20.80

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Test mode:	Transmitter mode	Polarization:	Horizontal
------------	------------------	---------------	------------



Condition: FCC PART 15C 3m 3142C HORIZONTAL

Job No. : 0315CR

Test mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	38.75	0.60	13.84	27.32	26.05	13.17	40.00	-26.83
2	97.80	1.18	9.04	27.20	28.47	11.49	43.50	-32.01
3	166.07	1.35	9.58	26.83	26.03	10.13	43.50	-33.37
4	312.18	1.94	14.20	26.50	26.90	16.54	46.00	-29.46
5	539.48	2.64	18.75	27.63	26.60	20.36	46.00	-25.64
6	890.73	3.56	23.05	26.82	25.91	25.70	46.00	-20.30

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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	
3781.495	32.83	7.73	38.48	46.10	48.18	74	-25.82	Vertical	
4810.000	34.11	8.88	38.75	49.38	53.62	74	-20.38	Vertical	
6016.949	34.71	10.54	38.94	45.75	52.06	74	-21.94	Vertical	
7215.000	35.59	10.68	37.63	45.08	53.72	74	-20.28	Vertical	
9620.000	37.10	12.51	36.33	37.64	50.92	74	-23.08	Vertical	
12639.790	37.92	14.55	37.79	38.36	53.04	74	-20.96	Vertical	
3705.664	32.53	7.71	38.45	46.32	48.11	74	-25.89	Horizontal	
4810.000	34.11	8.88	38.75	48.40	52.64	74	-21.36	Horizontal	
6034.386	34.72	10.52	38.91	47.01	53.34	74	-20.66	Horizontal	
7215.000	35.59	10.68	37.63	42.58	51.22	74	-22.78	Horizontal	
9620.000	37.10	12.51	36.33	37.35	50.63	74	-23.37	Horizontal	
12530.530	37.83	14.24	37.68	38.84	53.23	74	-20.77	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	
3716.403	32.57	7.71	38.45	46.01	47.84	74	-26.16	Vertical	
4884.000	34.18	8.98	38.77	49.47	53.86	74	-20.14	Vertical	
6016.949	34.71	10.54	38.94	46.67	52.98	74	-21.02	Vertical	
7326.000	35.54	10.73	37.59	41.83	50.51	74	-23.49	Vertical	
9768.000	37.10	12.59	36.13	38.00	51.56	74	-22.44	Vertical	
12566.850	37.87	14.34	37.72	38.68	53.17	74	-20.83	Vertical	
3803.444	32.90	7.74	38.49	45.19	47.34	74	-26.66	Horizontal	
4884.000	34.18	8.98	38.77	47.76	52.15	74	-21.85	Horizontal	
6016.949	34.71	10.54	38.94	46.65	52.96	74	-21.04	Horizontal	
7326.000	35.54	10.73	37.59	41.92	50.60	74	-23.40	Horizontal	
9768.000	37.10	12.59	36.13	38.22	51.78	74	-22.22	Horizontal	
12530.530	37.83	14.24	37.68	38.15	52.54	74	-21.46	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		
3610.398	32.14	7.67	38.41	46.88	48.28	74	-25.72	Vertical		
4936.000	34.24	9.05	38.78	49.40	53.91	74	-20.09	Vertical		
5999.562	34.70	10.56	38.96	46.95	53.25	74	-20.75	Vertical		
7404.000	35.51	10.75	37.55	40.71	49.42	74	-24.58	Vertical		
9872.000	37.17	12.64	36.00	38.72	52.53	74	-21.47	Vertical		
12603.270	37.90	14.44	37.75	38.48	53.07	74	-20.93	Vertical		
3814.467	32.91	7.75	38.49	46.14	48.31	74	-25.69	Horizontal		
4936.000	34.24	9.05	38.78	47.67	52.18	74	-21.82	Horizontal		
6016.949	34.71	10.54	38.94	47.02	53.33	74	-20.67	Horizontal		
7404.000	35.51	10.75	37.55	40.34	49.05	74	-24.95	Horizontal		
9872.000	37.17	12.64	36.00	38.37	52.18	74	-21.82	Horizontal		
12603.270	37.90	14.44	37.75	39.15	53.74	74	-20.26	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) 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. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .
- 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.

### 6.3 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013		
Test site:	Measurement Distance: 3m		
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:			

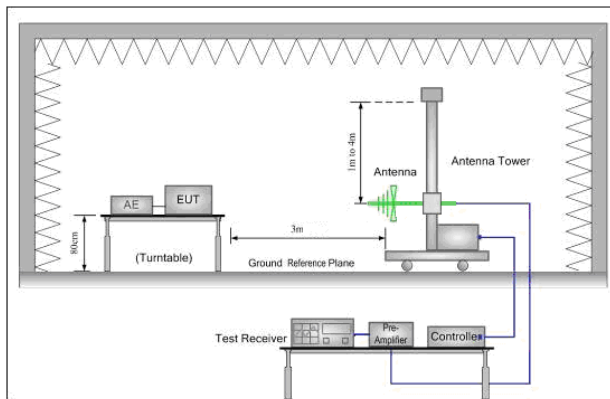


Figure 1. 30MHz to 1GHz

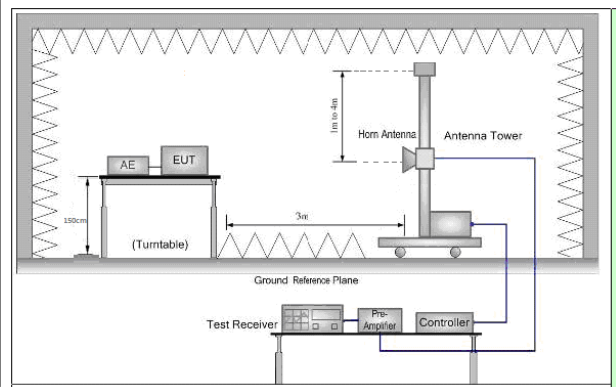


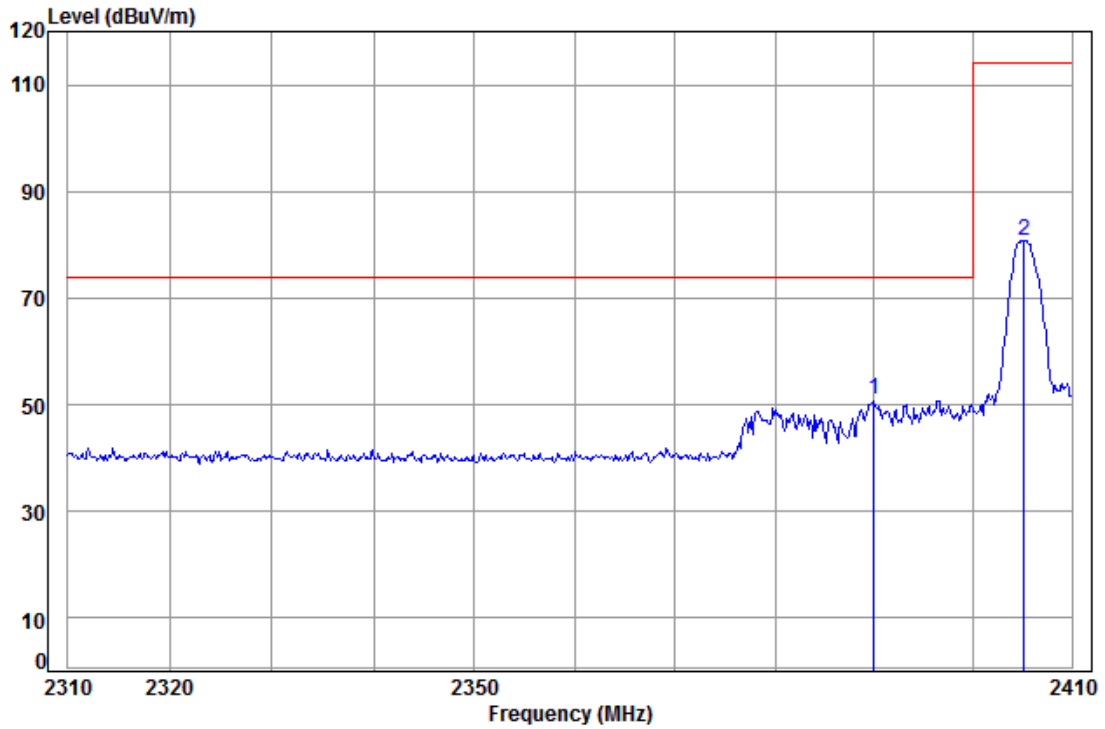
Figure 2. Above 1 GHz



Test Procedure:	<ol style="list-style-type: none"><li>a. For below 1GHz, 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. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li><li>c. 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>d. 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>e. 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>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li><li>g. 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>h. Test the EUT in the lowest channel , the Highest channel</li><li>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case..</li><li>j. Repeat above procedures until all frequencies measured was complete.</li></ol>
Instruments Used:	Refer to section 5.10 for details
Test Mode:	Transmitting with GFSK modulation. Transmitting mode
Test Results:	Pass



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



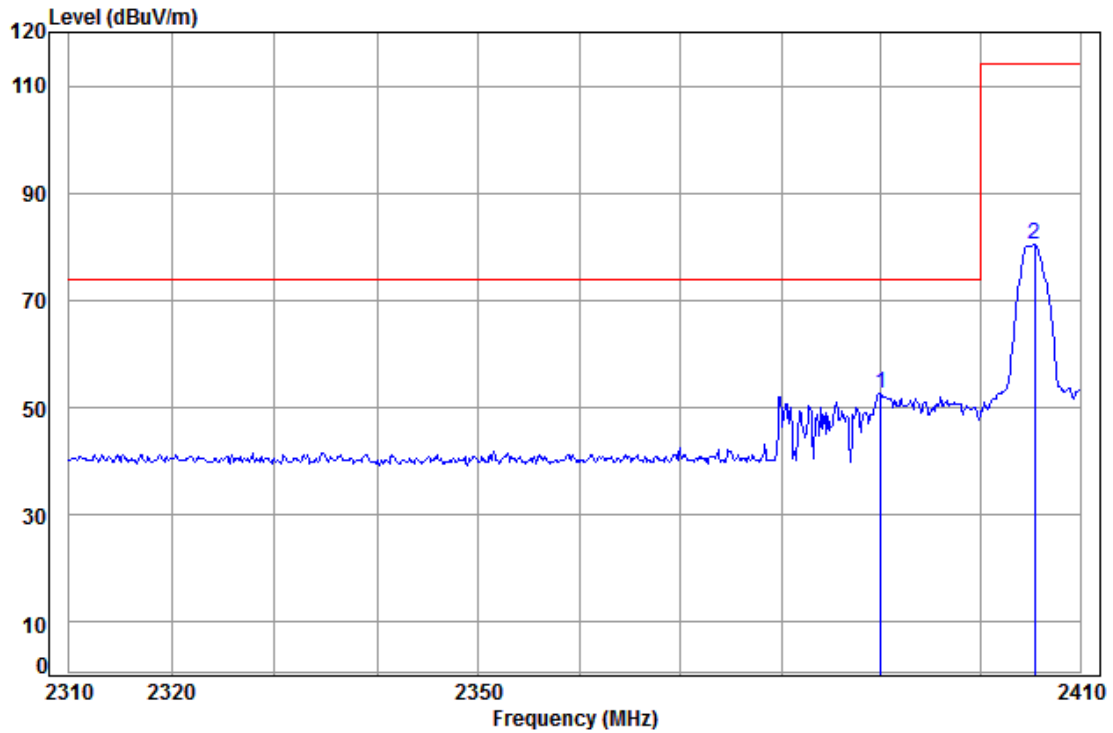
Condition: 3m Horizontal

Job No: : 0315CR

Mode: : 2405 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2390.00	5.34	28.57	38.11	55.29	51.09	74.00	-22.91
2	2405.21	5.35	28.62	38.11	84.93	80.79	114.00	-33.21

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Condition: 3m Vertical

Job No: : 0315CR

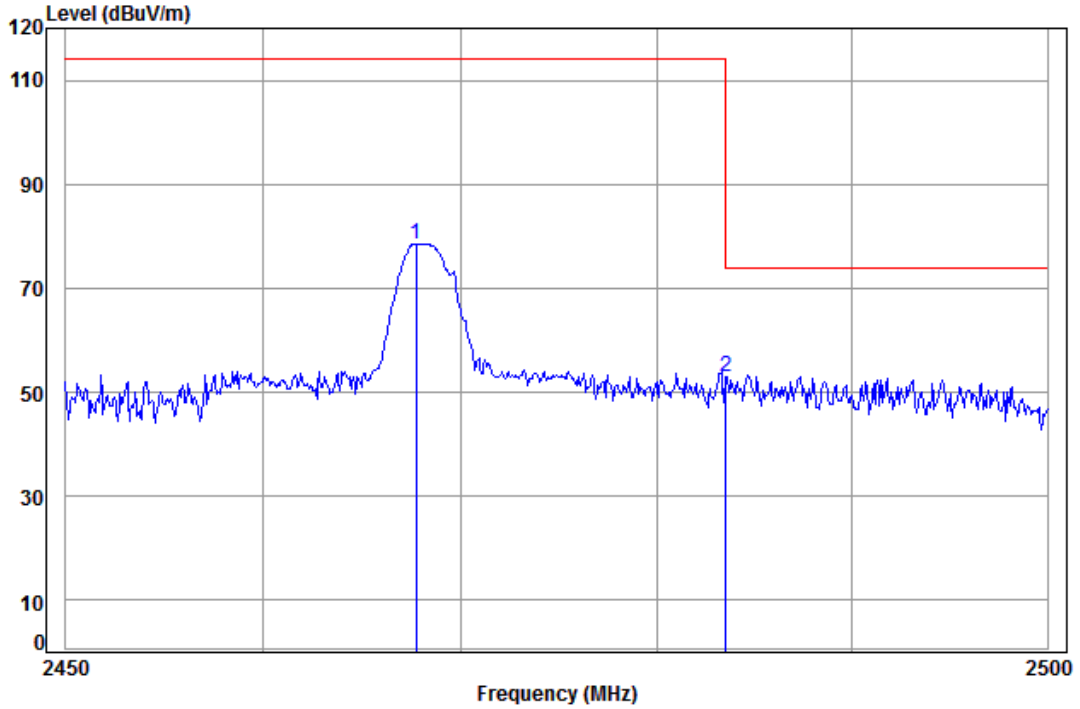
Mode: : 2405 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1 pp	2390.00	5.34	28.57	38.11	56.85	52.65	74.00 -21.35
2	2405.41	5.35	28.63	38.11	84.44	80.31	114.00 -33.69





Test mode:	Transmitting	Test channel:	Highest	Remark:	Peak
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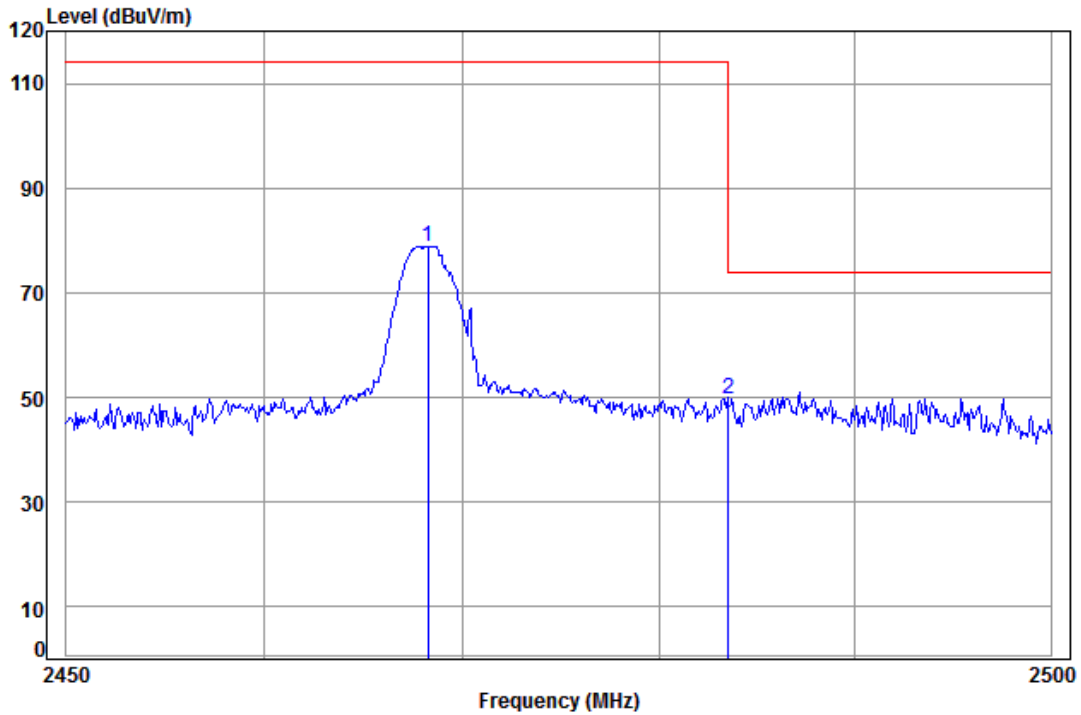
Condition: 3m Horizontal

Job No: : 0315CR

Mode: : 2468 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2467.73	5.40	28.91	38.12	82.43	78.62	114.00	-35.38
2 pp	2483.50	5.41	28.98	38.12	56.56	52.83	74.00	-21.17

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Condition: 3m Vertical

Job No: : 0315CR

Mode: : 2468 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2468.23	5.40	28.92	38.12	82.65	78.85	114.00	-35.15
2 pp	2483.50	5.41	28.98	38.12	53.49	49.76	74.00	-24.24

**Note:**

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

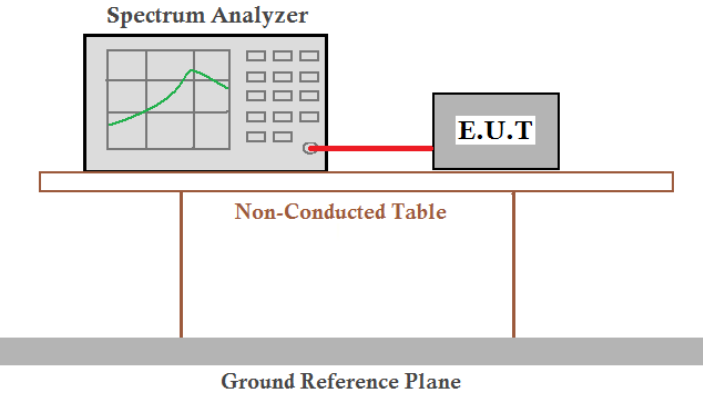
$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

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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## 6.4 20dB Bandwidth

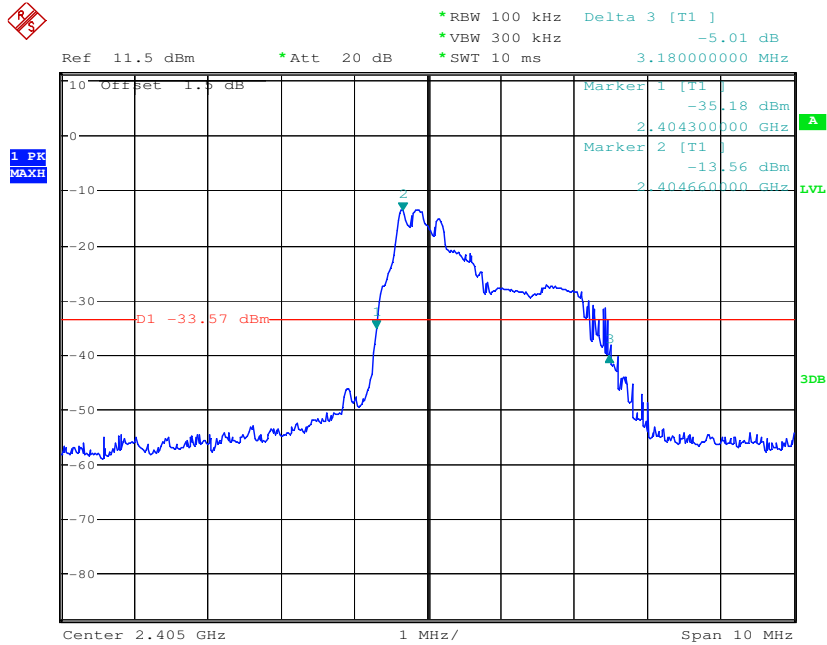
Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2013
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Test mode:	Transmitting mode
Limit:	Within the band 2400MHz-2483.5MHz
Test Results:	Pass

### Measurement Data

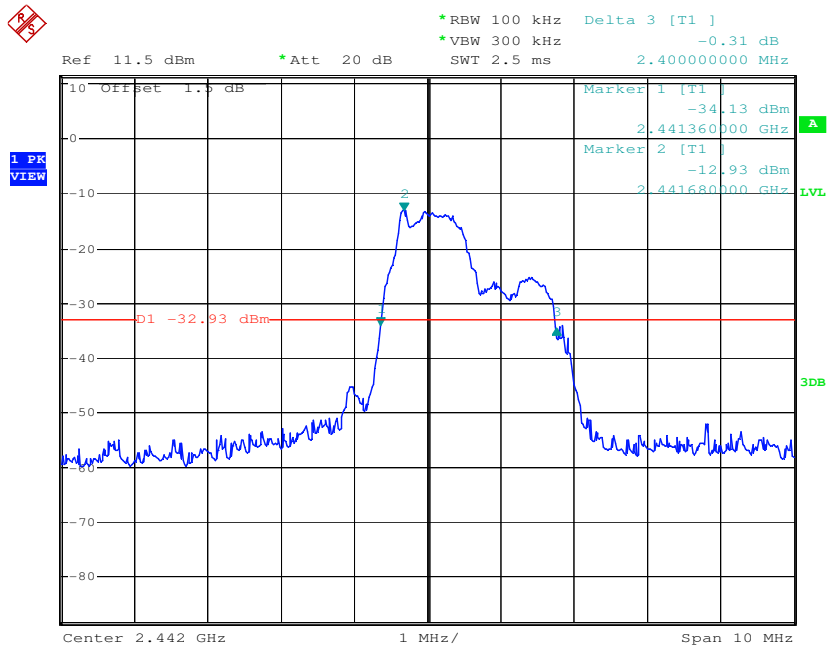
Test channel	20dB bandwidth (MHz)	Results
Lowest	3.18	Pass
Middle	2.40	Pass
Highest	2.58	Pass

Test plot as follows:

Test channel:	Lowest
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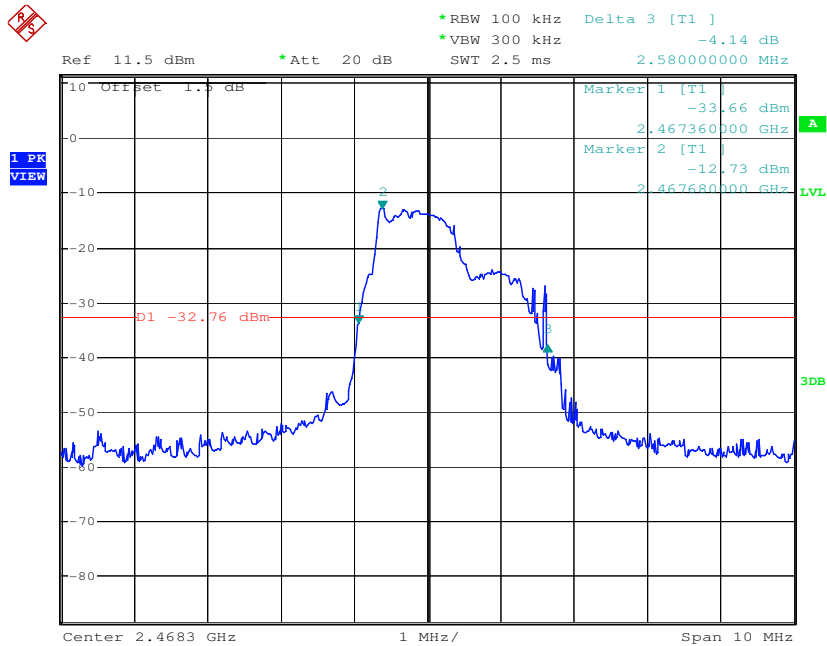
Test channel:	Middle
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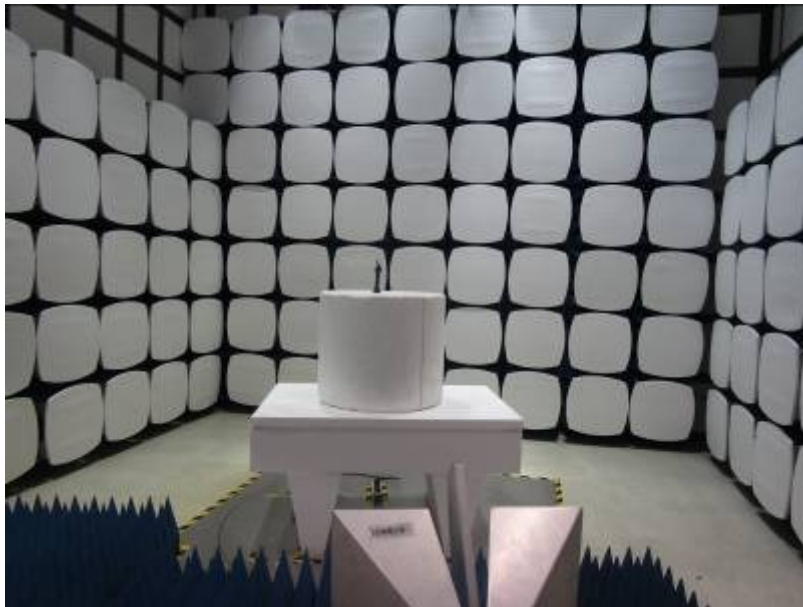
Test channel:	Highest
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## 7 Photographs

### 7.1 Radiated Emission Test Setup



### 7.2 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1601000315CR.