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Report No.: SZEM120900538801
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FCC REPORT

Application No: SZEM1209005388RF
Applicant: PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Manufacturer: PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Factory: PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Product Name: CAR ALARM
Model No.(EUT): T53
FCC ID: TBQT53-915
Standards: 47 CFR Part 15, Subpart C (2012)
Date of Receipt: 2012-09-25
Date of Test: 2012-10-08 to 2013-12-31
Date of Issue: 2014-01-02

Test Result:	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 (2009)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2009)	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(2)	ANSI C63.10 (2009)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)(i)	ANSI C63.10 (2009)	PASS
Carrier Frequencies Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)(i)	ANSI C63.10 (2009)	PASS
Hopping Channel Number	47 CFR Part 15, Subpart C Section 15.247 (a)(1)(i)	ANSI C63.10 (2009)	PASS
Occupancy Time	47 CFR Part 15, Subpart C Section 15.247 (a)(1)(i)	ANSI C63.10 (2009)	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2009)	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2009)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2009)	PASS
Band Edge (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2009)	PASS



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4 General Information

4.1 Client Information

Applicant:	PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Address of Applicant:	NO#10 , Luyi 2 Road, Keyuancheng, Tangxia Town, Dongguan, China 523718
Manufacturer:	PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Address of Manufacturer:	NO#10 , Luyi 2 Road, Keyuancheng, Tangxia Town, Dongguan, China 523718
Factory:	PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Address of Factory:	NO#10 , Luyi 2 Road, Keyuancheng, Tangxia Town, Dongguan, China 523718

4.2 General Description of EUT

Product Name:	CAR ALARM
Model No.:	T53
Operation Frequency:	910MHz~918.4MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	FSK
Number of Channel:	25
Channel Separated:	0.35MHz
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Portable production
Antenna Type	Integral
Antenna Gain	-0.73dBi
Power Supply:	3.0V DC (3.0 x 1 "CR2032" Button cell)
Test Voltage:	DC 3.0V



Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	910MHz	10	913.15MHz	19	916.3MHz
2	910.35MHz	11	913.5MHz	20	916.65MHz
3	910.7MHz	12	913.85MHz	21	917MHz
4	911.05MHz	13	914.2MHz	22	917.35MHz
5	911.4MHz	14	914.55MHz	23	917.7MHz
6	911.75MHz	15	914.9MHz	24	918.05MHz
7	912.1MHz	16	915.25MHz	25	918.4MHz
8	912.45MHz	17	915.6MHz		
9	912.8MHz	18	915.95MHz		

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	910MHz
The Middle channel	914.2MHz
The Highest channel	918.4MHz



4.3 Test Environment

Operating Environment:	
Temperature:	25.0 °C
Humidity:	51 % RH
Atmospheric Pressure:	1005 mbar

4.4 Description of Support Units

The EUT has been tested 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

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	2014-06-10
2	LISN	Rohde & Schwarz	ENV216	SEL0152	2014-10-24
3	LISN	ETS-LINDGREN	3816/2	SEL0021	2014-05-16
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	SEL0162	2014-11-10
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	SEL0163	2014-11-10
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	SEL0164	2014-11-10
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	2014-05-16
8	Coaxial Cable	SGS	N/A	SEL0025	2014-05-29
9	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24
10	Humidity/ Temperature Indicator	Shanghai Qixiang	ZJ1-2B	SEL0103	2014-10-24
11	Barometer	Chang Chun	DYM3	SEL0088	2014-05-24



RE in Chamber					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2014-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2014-05-16
3	EMI Test software	AUDIX	E3	SEL0050	N/A
4	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2014-10-24
5	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2014-10-24
6	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2014-10-24
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2014-05-16
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2014-10-24
9	Coaxial cable	SGS	N/A	SEL0027	2014-05-29
10	Coaxial cable	SGS	N/A	SEL0189	2014-05-29
11	Coaxial cable	SGS	N/A	SEL0121	2014-05-29
12	Coaxial cable	SGS	N/A	SEL0178	2014-05-29
13	Band filter	Amindeon	82346	SEL0094	2014-05-16
14	Barometer	Chang Chun	DYM3	SEL0088	2014-05-24
15	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24
16	Humidity/ Temperature Indicator	Shanghai Qixiang	ZJ1-2B	SEL0103	2014-10-24
17	Signal Generator (10M-27GHz)	Rohde & Schwarz	SMR27	SEL0067	2014-05-16
18	Signal Generator	Rohde & Schwarz	SMY01	SEL0155	2014-10-24
19	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2014-06-04

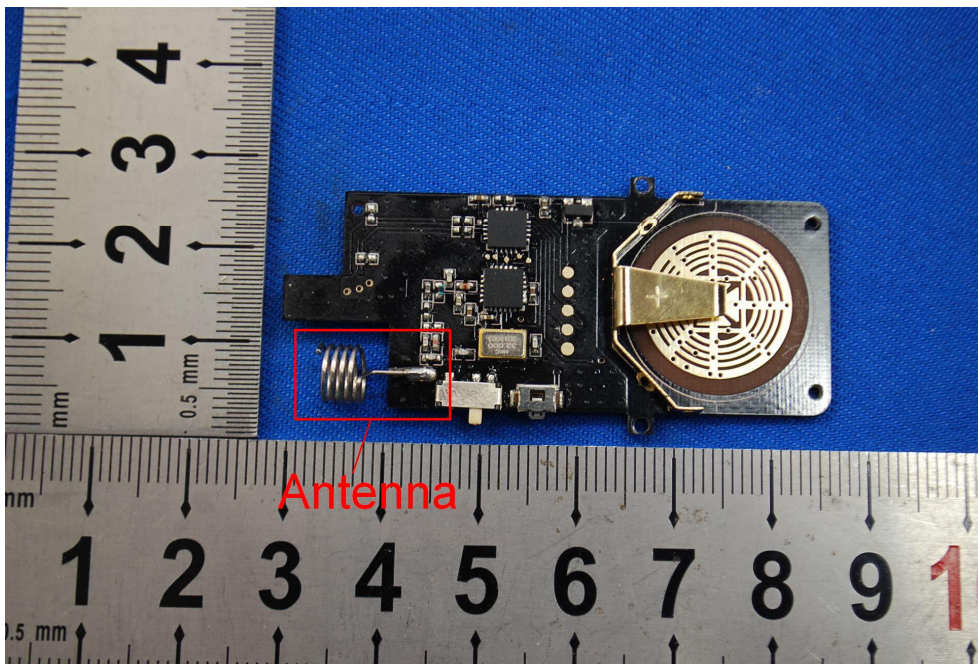


RF connected test					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2014-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2014-10-24
4	Coaxial cable	SGS	N/A	SEL0178	2014-05-29
5	Coaxial cable	SGS	N/A	SEL0179	2014-05-29
6	Barometer	ChangChun	DYM3	SEL0088	2014-05-24
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2014-05-16
8	Band filter	amideon	82346	SEL0094	2014-05-16
9	POWER METER	R & S	NRVS	SEL0144	2014-10-24
10	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2014-05-16
11	Power Divider(splitter)	Agilent Technologies	11636B	SEL0130	2014-10-24

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

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
<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> <p>15.247(b) (4) requirement:</p> <p>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
EUT Antenna:	
<p>The antenna is integrated and no consideration of replacement. The best case gain of the antenna is -0.73dBi.</p> 	

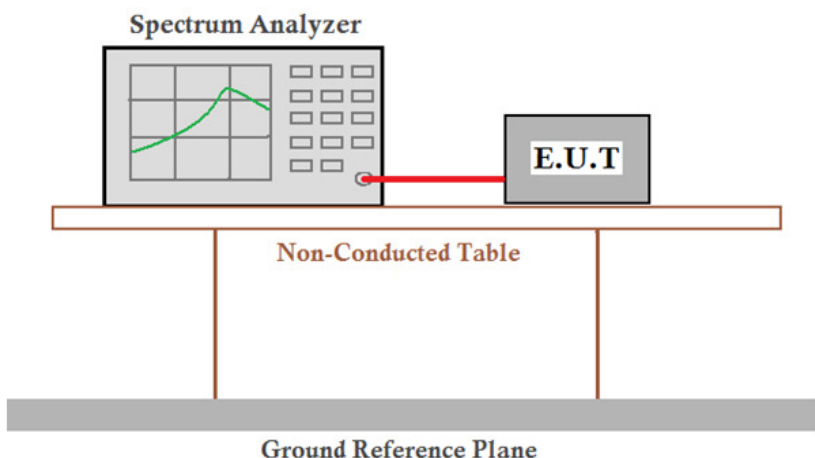




5.2 Conducted Emissions

Not applicable, since the EUT is only operated for battery.

5.3 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(2)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p><i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Limit:	24dBm
Test Mode:	Non-hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

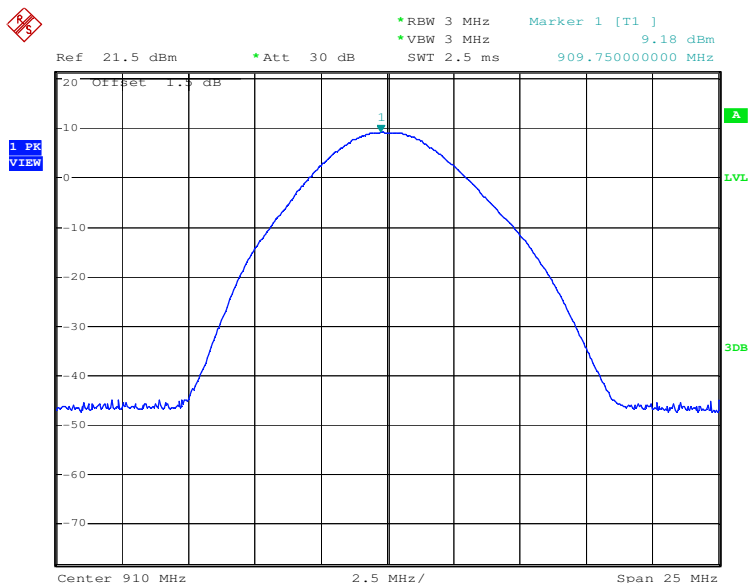
Measurement Data

FSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	9.18	24.00	Pass
Middle	7.68	24.00	Pass
Highest	7.07	24.00	Pass

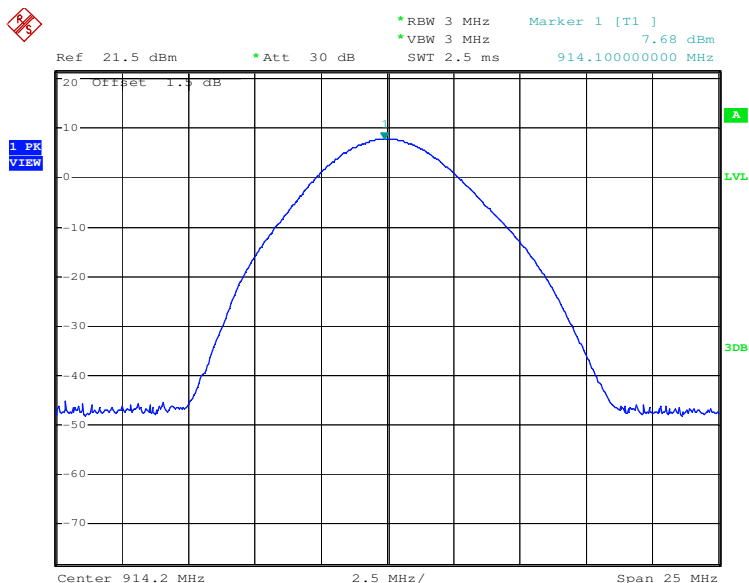


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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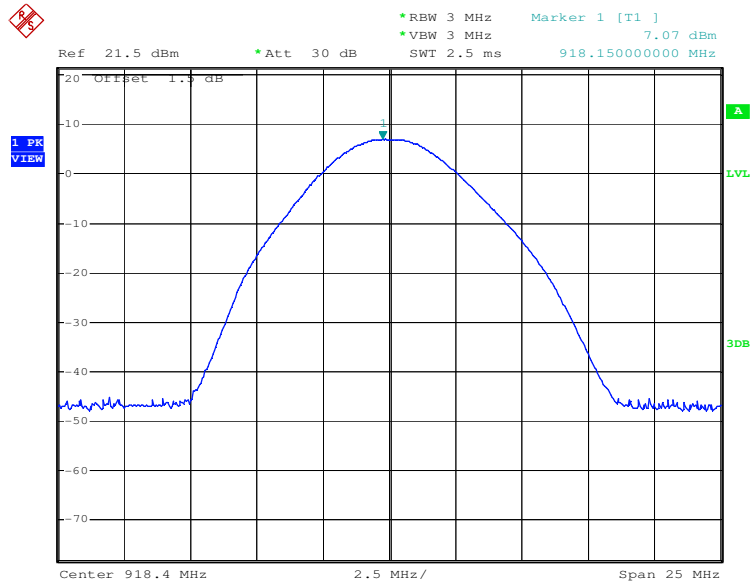


Test mode:	FSK	Test channel:	Middle
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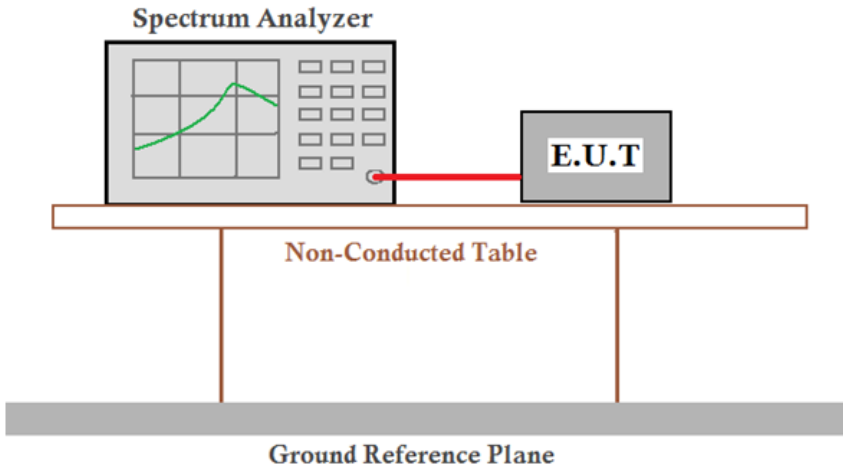




Test mode:	FSK	Test channel:	Highest
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5.4 20dB Occupancy Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	$\geq 250\text{kHz}$ & $\leq 500\text{kHz}$
Test Mode:	Non-hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

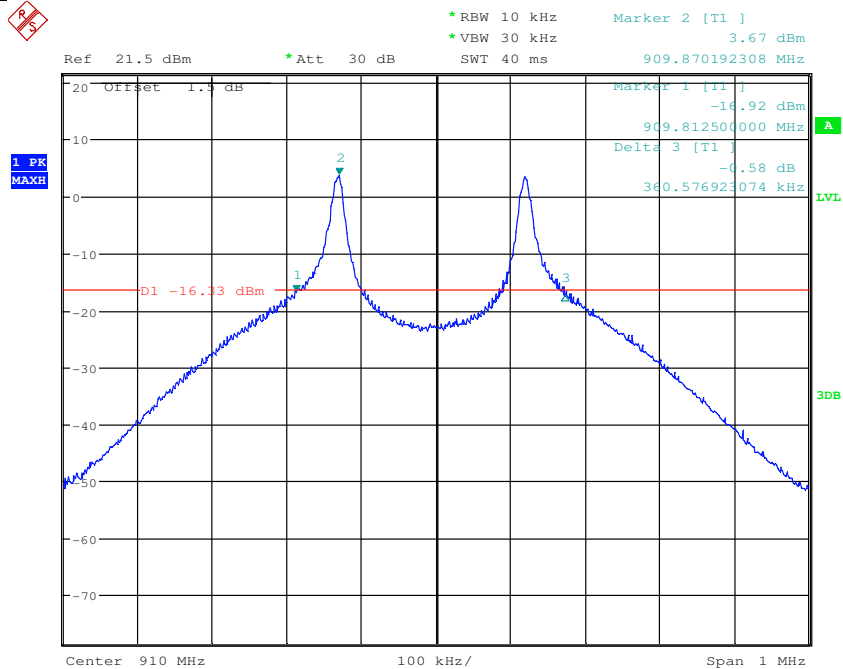
Measurement Data

Test channel	20dB Occupancy Bandwidth (kHz)	Limit
	FSK	
Lowest	360.576923074	$\geq 250\text{kHz}$ $\leq 500\text{kHz}$
Middle	354.166666665	
Highest	360.576923076	

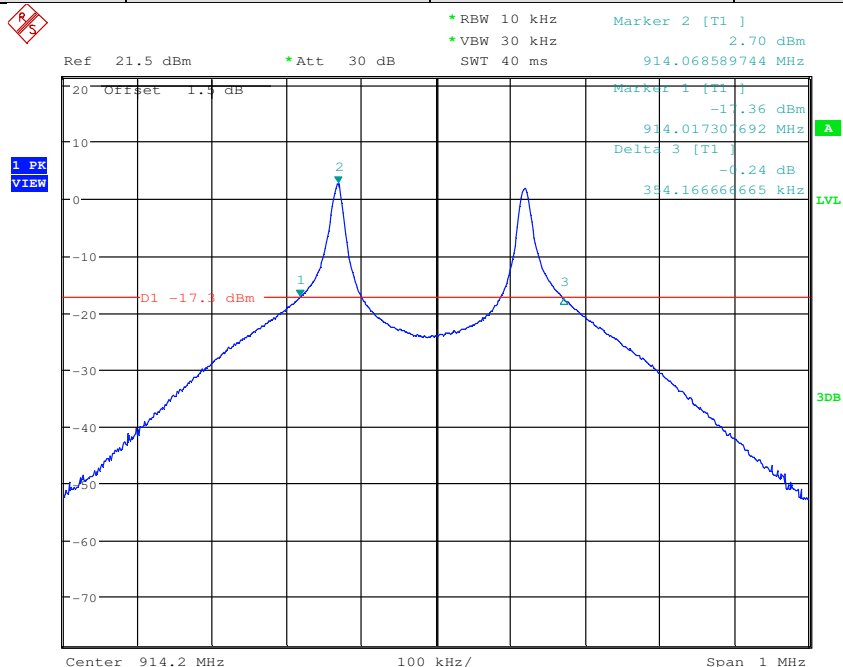


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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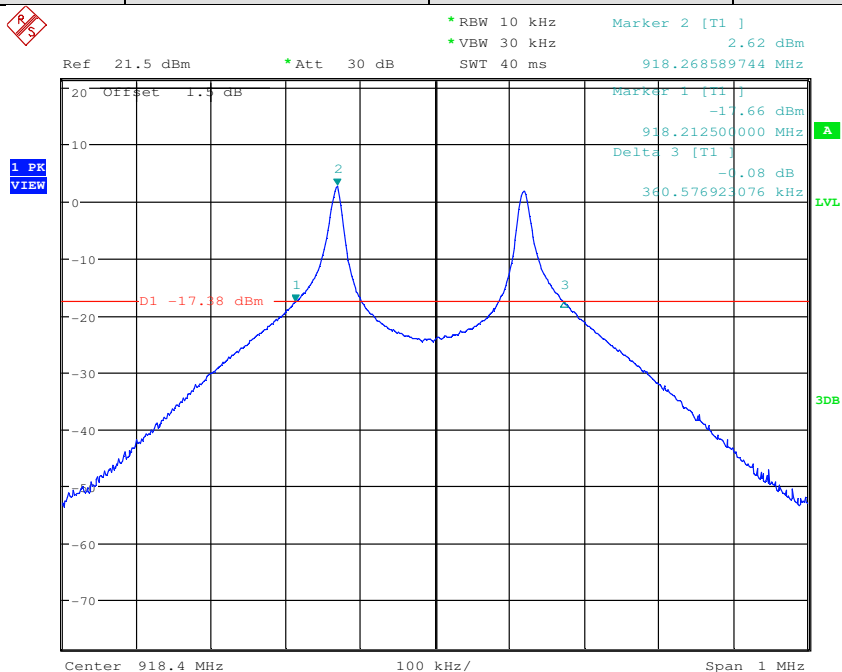


Test mode:	FSK	Test channel:	Middle
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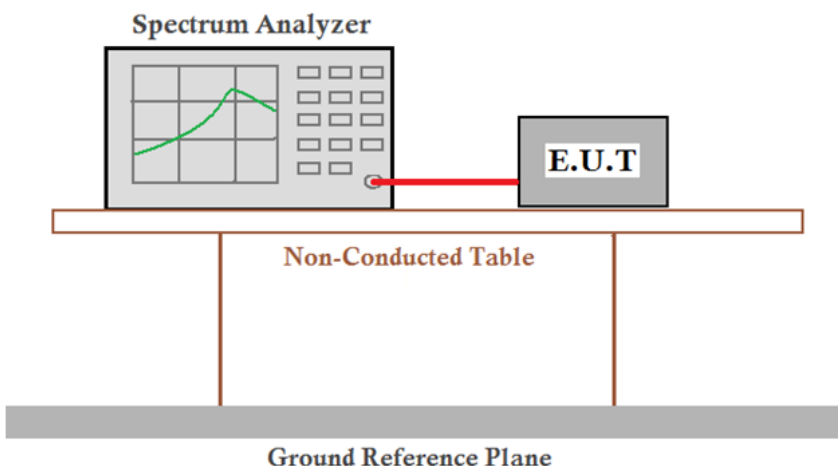




Test mode:	FSK	Test channel:	Highest
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5.5 Carrier Frequencies Separation

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	N/A
Test Mode:	Hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

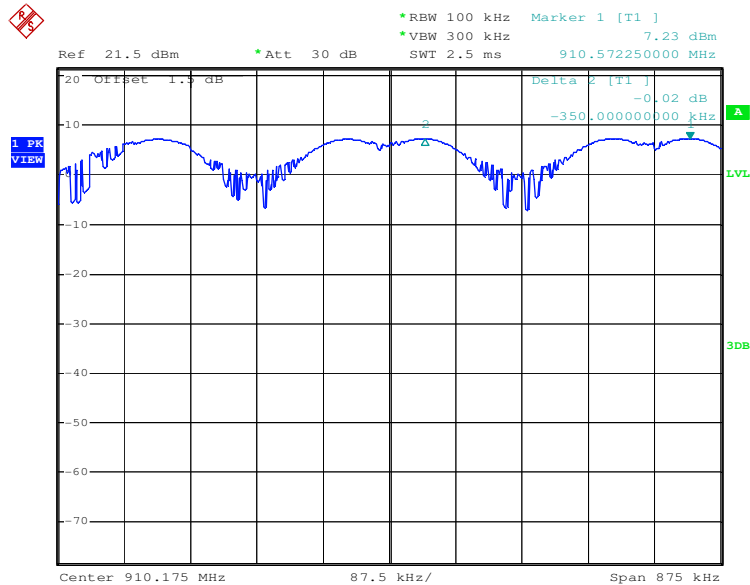
Measurement Data

FSK mode		
Test channel	Carrier Frequencies Separation (kHz)	Result
Lowest	350.000	N/A
Middle	350.000	N/A
Highest	350.000	N/A

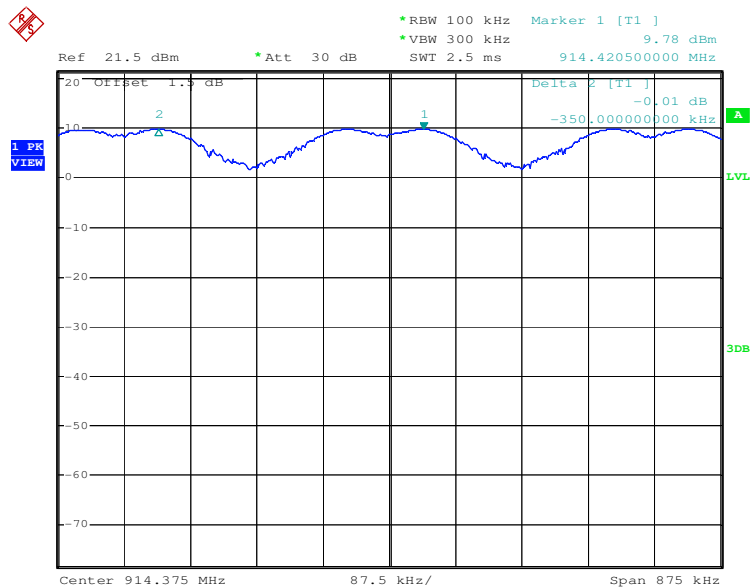


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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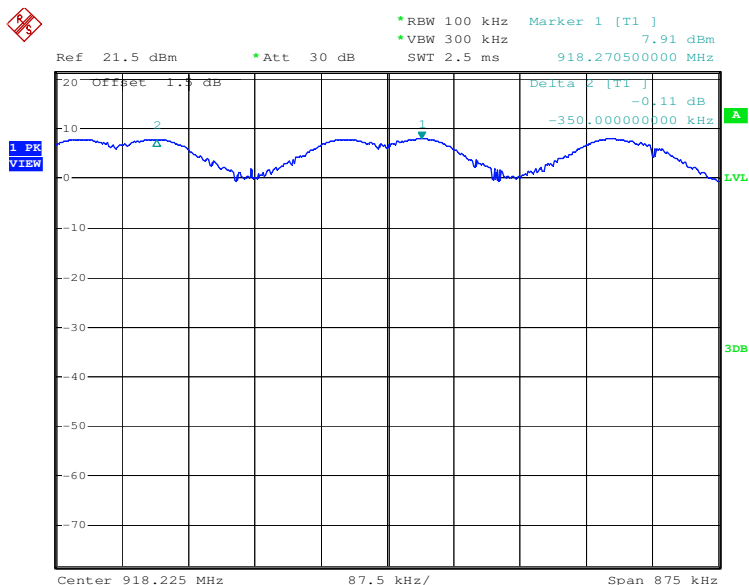


Test mode:	FSK	Test channel:	Middle
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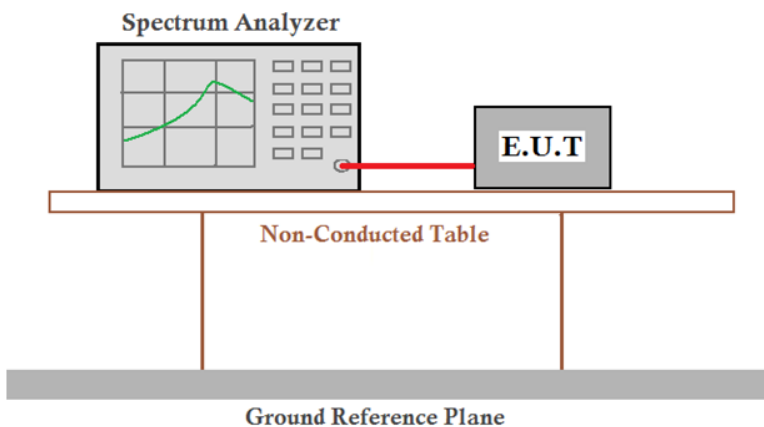




Test mode:	FSK	Test channel:	Highest
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5.6 Hopping Channel Number

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	At least 25 channels
Test Mode:	Hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

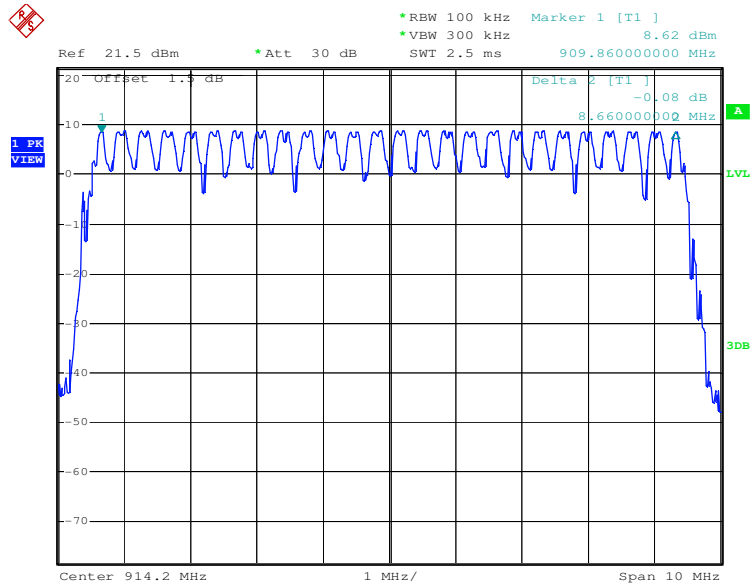
Measurement Data

Mode	Hopping channel numbers	Limit
FSK	25	≥ 25

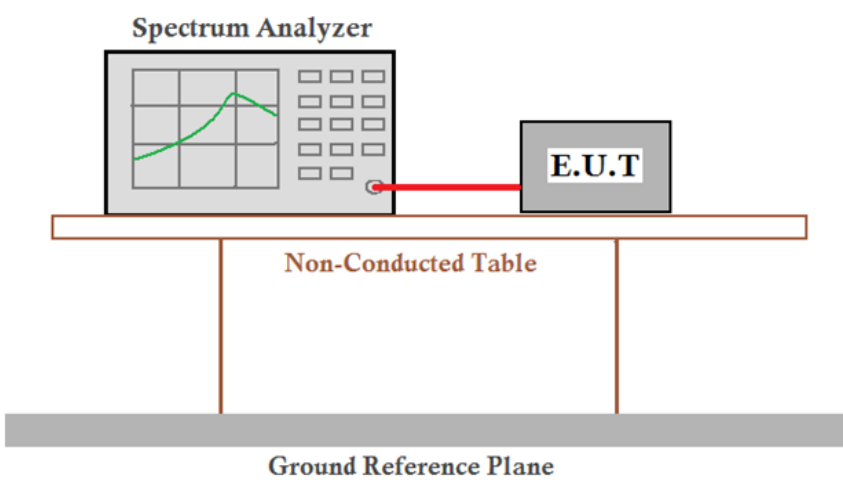


Test plot as follows:

Test mode:	FSK
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5.7 Occupancy Time

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2009
Test Setup:	
Instruments Used:	Refer to section 4.10 for details
Test Mode:	Hopping transmitting
Limit:	≤0.4 Second
Test Results:	Pass

Measurement Data

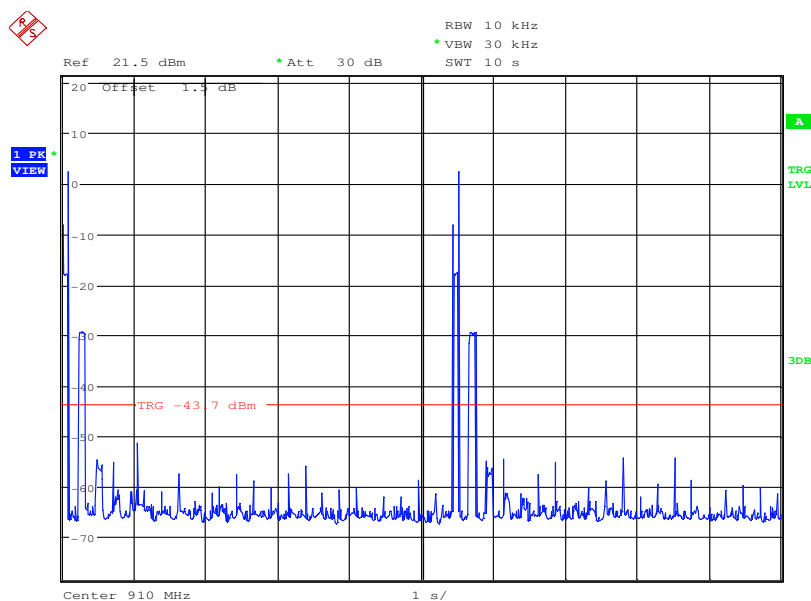
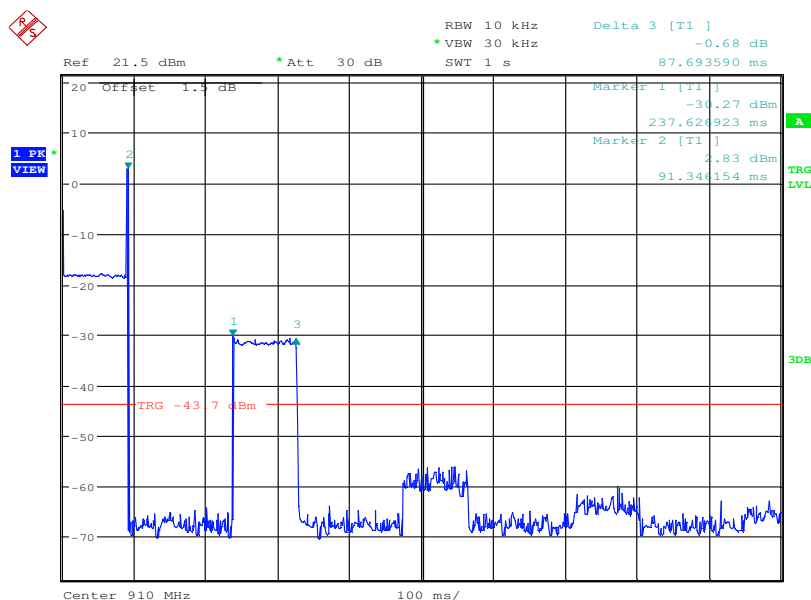
Mode	Occupancy Time (second)	Limit (second)
FSK	0.179	≤0.4

Test Result:

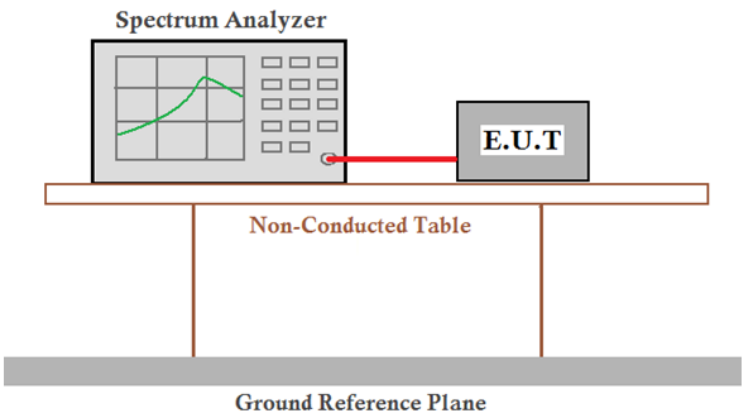
Occupancy Time = $2 \times (T1 + T2) = 2 \times (91.346 + 87.694) = 0.179s$



Test plot as follows:



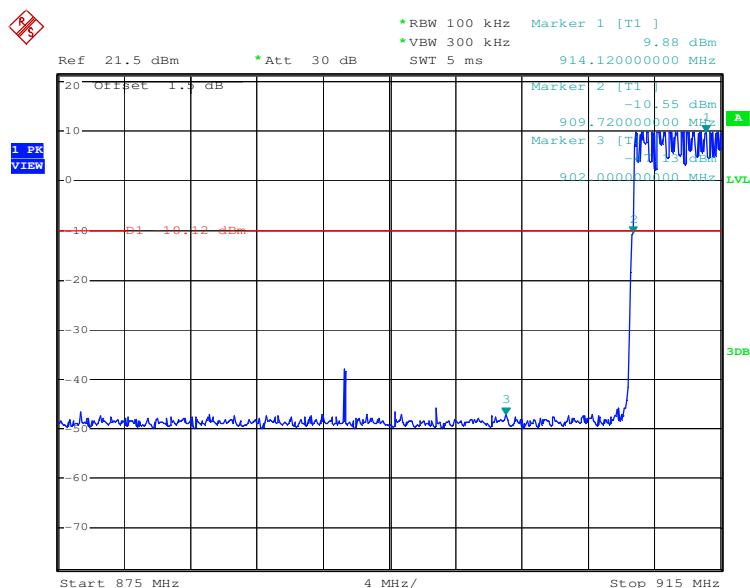
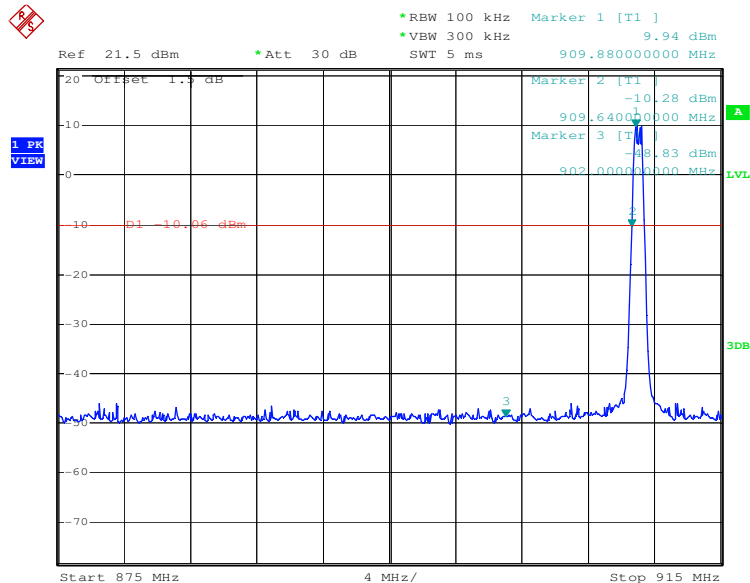
5.8 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p>Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Mode:	hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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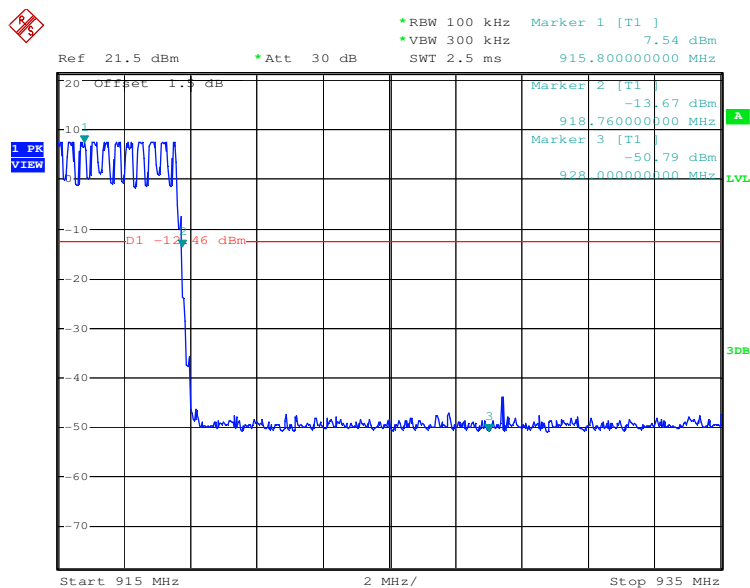
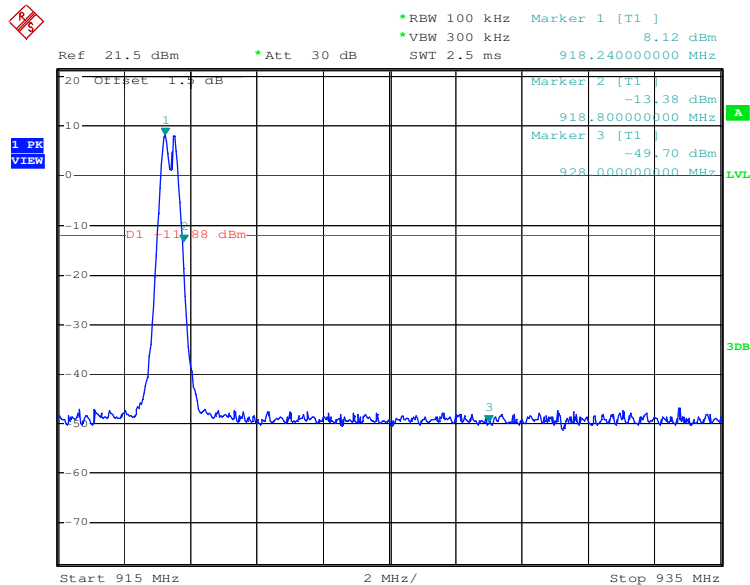


SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM120900538801

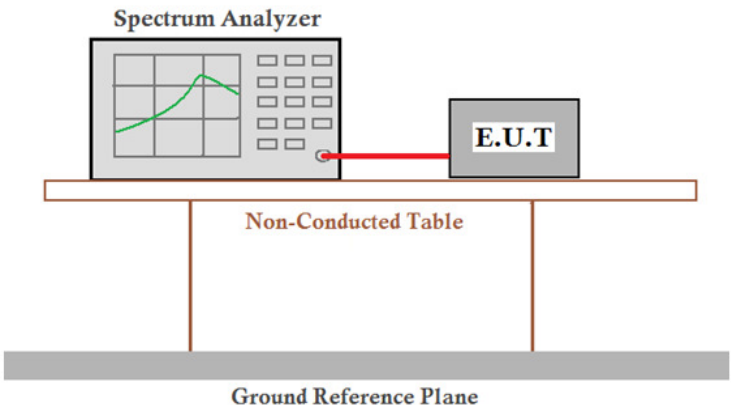
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Test mode:	FSK	Test channel:	Highest
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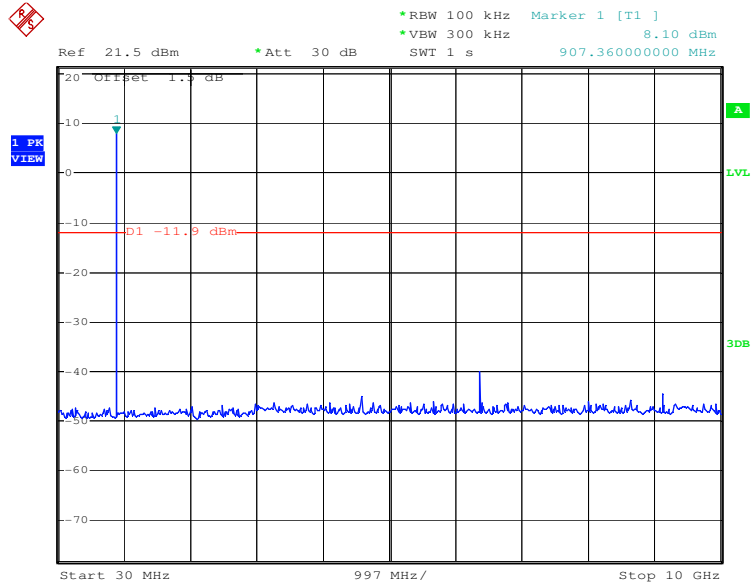
5.9 Spurious RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p>Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Mode:	Non-hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

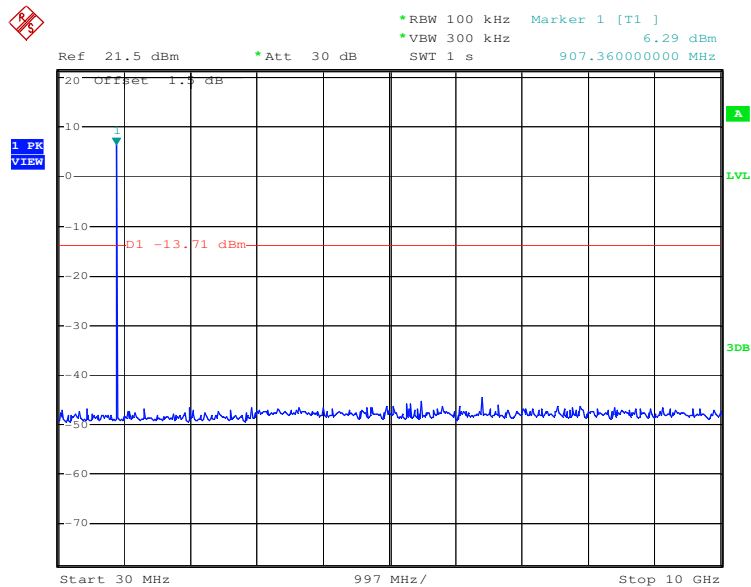


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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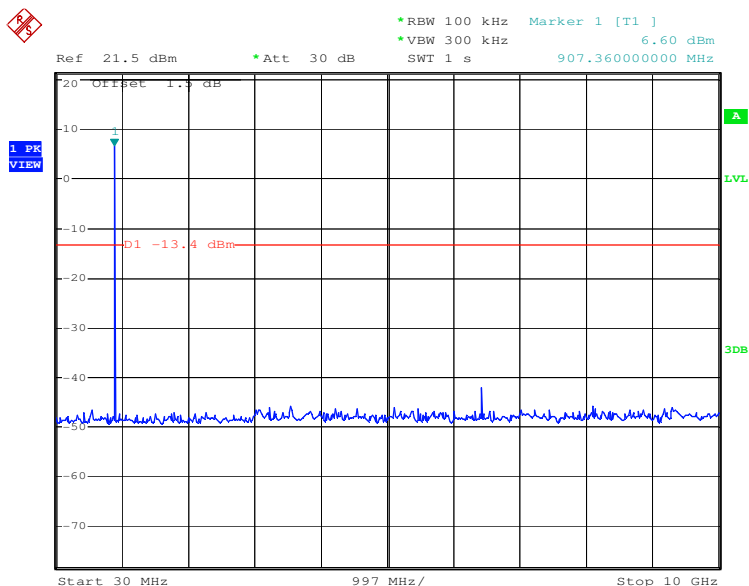


Test mode:	FSK	Test channel:	Middle
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Test mode:	FSK	Test channel:	Highest
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5.10 Radiated Spurious Emission

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)				
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:	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.					

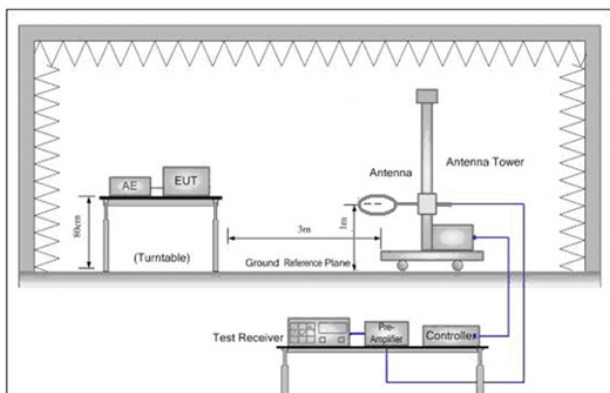
Test Setup:


Figure 1. Below 30MHz

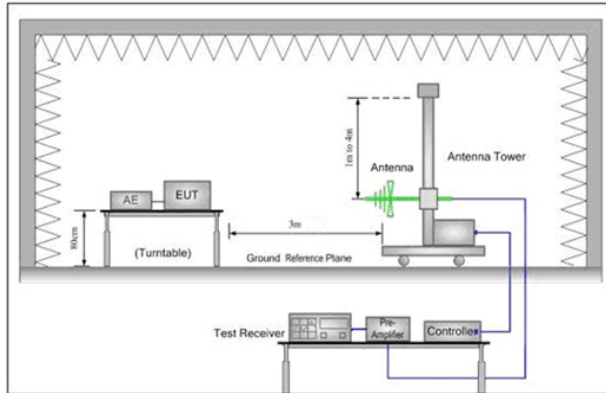


Figure 2. 30MHz to 1GHz

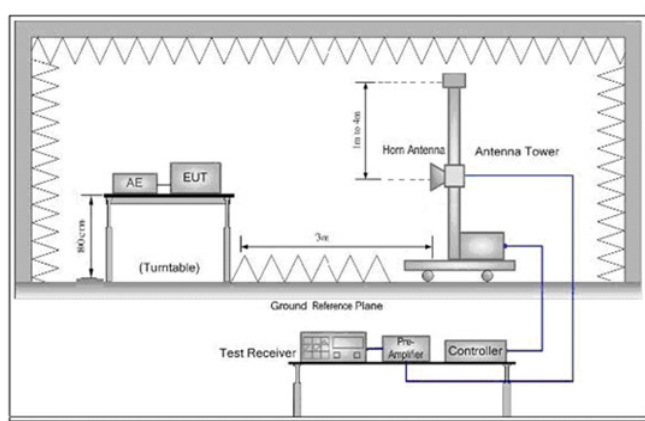


Figure 3. Above 1 GHz

Test Procedure:

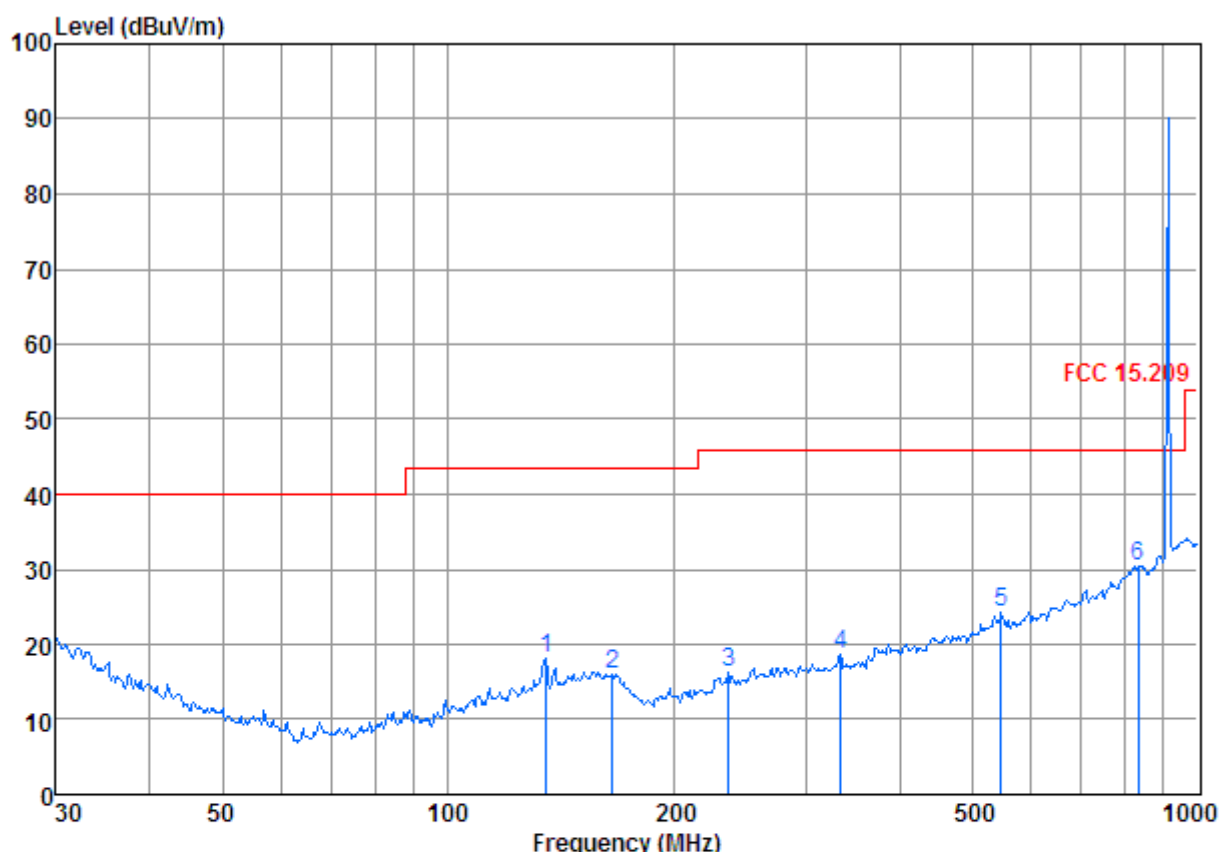
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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



	<p>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 (910MHz),the middle channel (914.2MHz),the Highest channel (918.4MHz)</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:	Non-hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

5.10.1 Radiated Emission below 1GHz

910MHz (QP)		
Test mode:	Transmitting	Vertical



Condition: FCC 15.209 3m 3142C VERTICAL

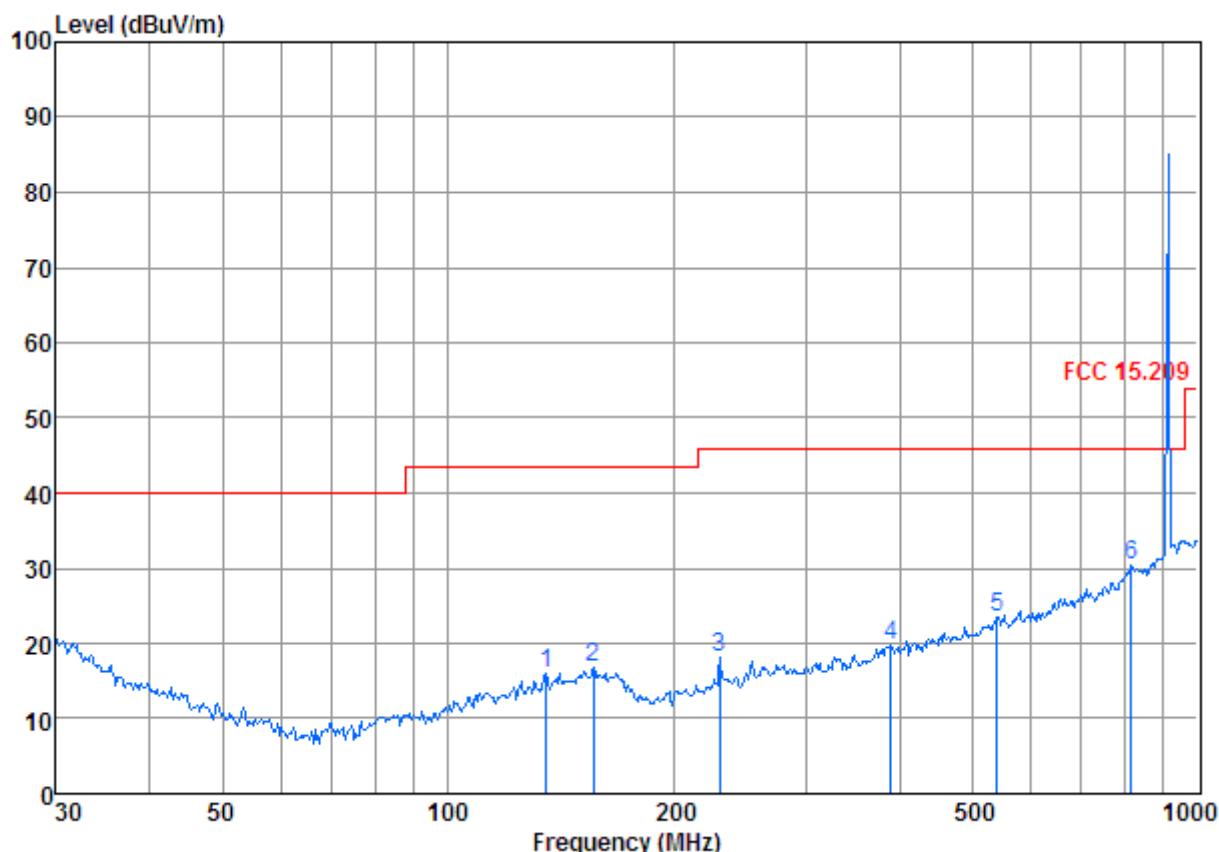
Job No. : 5388RF

Mode : 910 TX SE

		CableAntenna		Preamplifier	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	135.03	1.29	8.30	26.98	35.54	18.15	43.50	-25.35
2	165.49	1.35	9.50	26.83	31.94	15.96	43.50	-27.54
3	236.64	1.61	8.33	26.58	32.89	16.25	46.00	-29.75
4	333.69	2.01	10.37	26.66	32.93	18.65	46.00	-27.35
5	547.10	2.65	14.78	27.62	34.55	24.36	46.00	-21.64
6	833.32	3.34	19.15	27.13	35.16	30.52	46.00	-15.48



Test mode:	Transmitting	Horizontal
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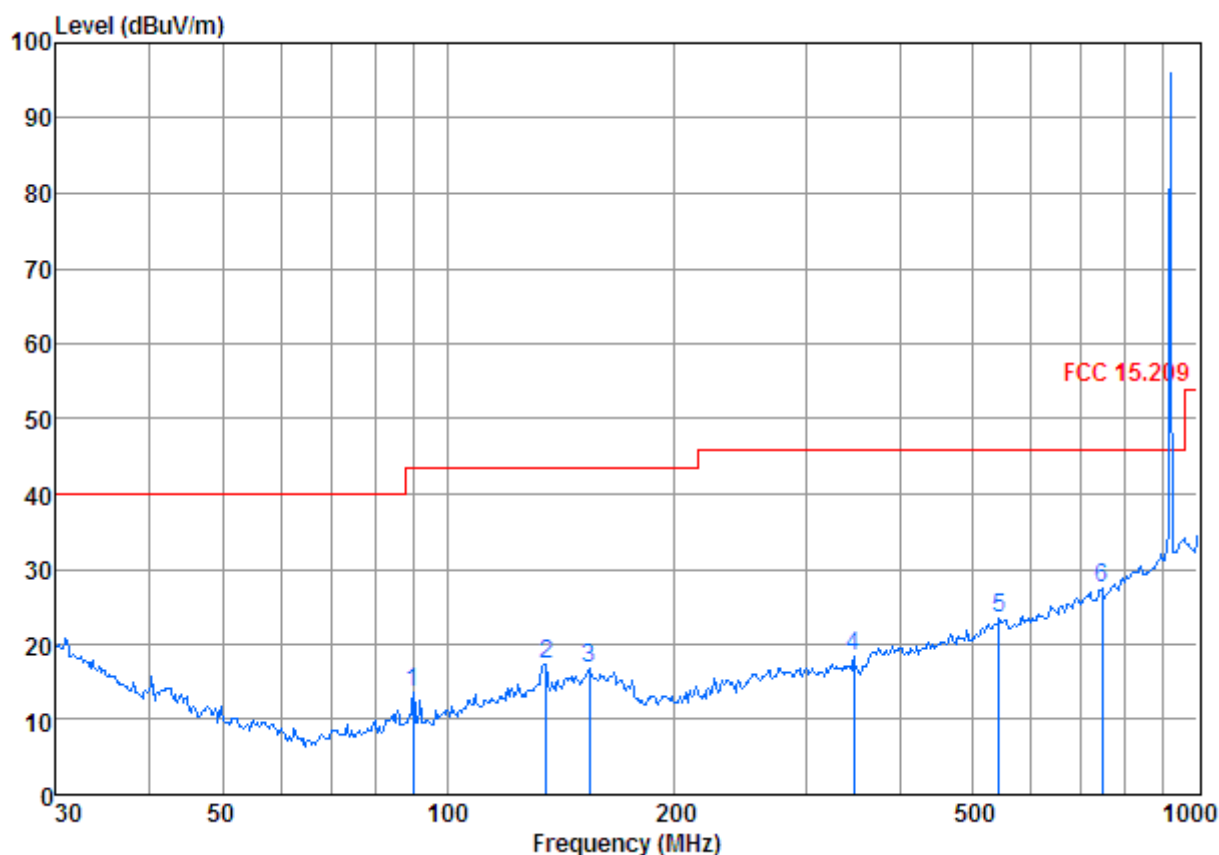
Condition: FCC 15.209 3m 3142C HORIZONTAL

Job No. : 5388RF

Mode : 910 TX SE

		CableAntenna		Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB		dB/m	dB	dBuV	dBuV/m	dB
1	135.03	1.29	8.30	26.98	33.30	15.91	43.50	-27.59
2	156.46	1.33	9.58	26.87	32.69	16.73	43.50	-26.77
3	230.10	1.57	8.10	26.59	35.15	18.23	46.00	-27.77
4	389.35	2.17	11.77	27.07	32.85	19.72	46.00	-26.28
5	539.48	2.64	14.70	27.63	33.79	23.50	46.00	-22.50
6	815.97	3.27	19.07	27.20	35.21	30.35	46.00	-15.65

914.2MHz (QP)		
Test mode:	Transmitting	Vertical



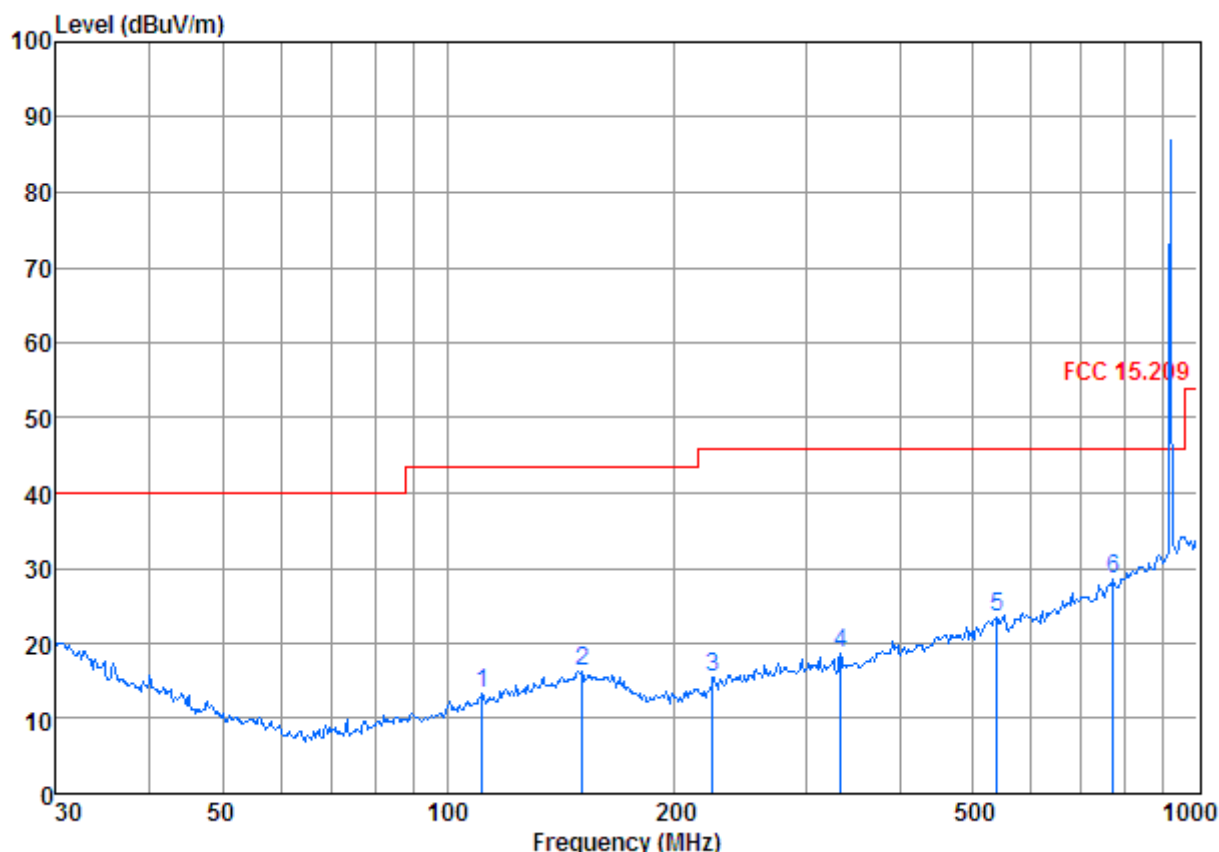
Condition: FCC 15.209 3m 3142C VERTICAL

Job No. : 5388RF

Mode : 914.2 TX SE

	Freq	Cable	Antenna	Preamp	Read	Limit	Over
	MHz	Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	89.90	1.10	6.10	27.21	33.56	13.55	43.50 -29.95
2	135.03	1.29	8.30	26.98	34.75	17.36	43.50 -26.14
3	154.28	1.33	9.53	26.89	32.89	16.86	43.50 -26.64
4	348.03	2.05	10.67	26.77	32.47	18.42	46.00 -27.58
5	543.27	2.65	14.74	27.63	33.73	23.49	46.00 -22.51
6	744.87	3.04	17.55	27.36	34.29	27.52	46.00 -18.48

Test mode:	Transmitting	Horizontal
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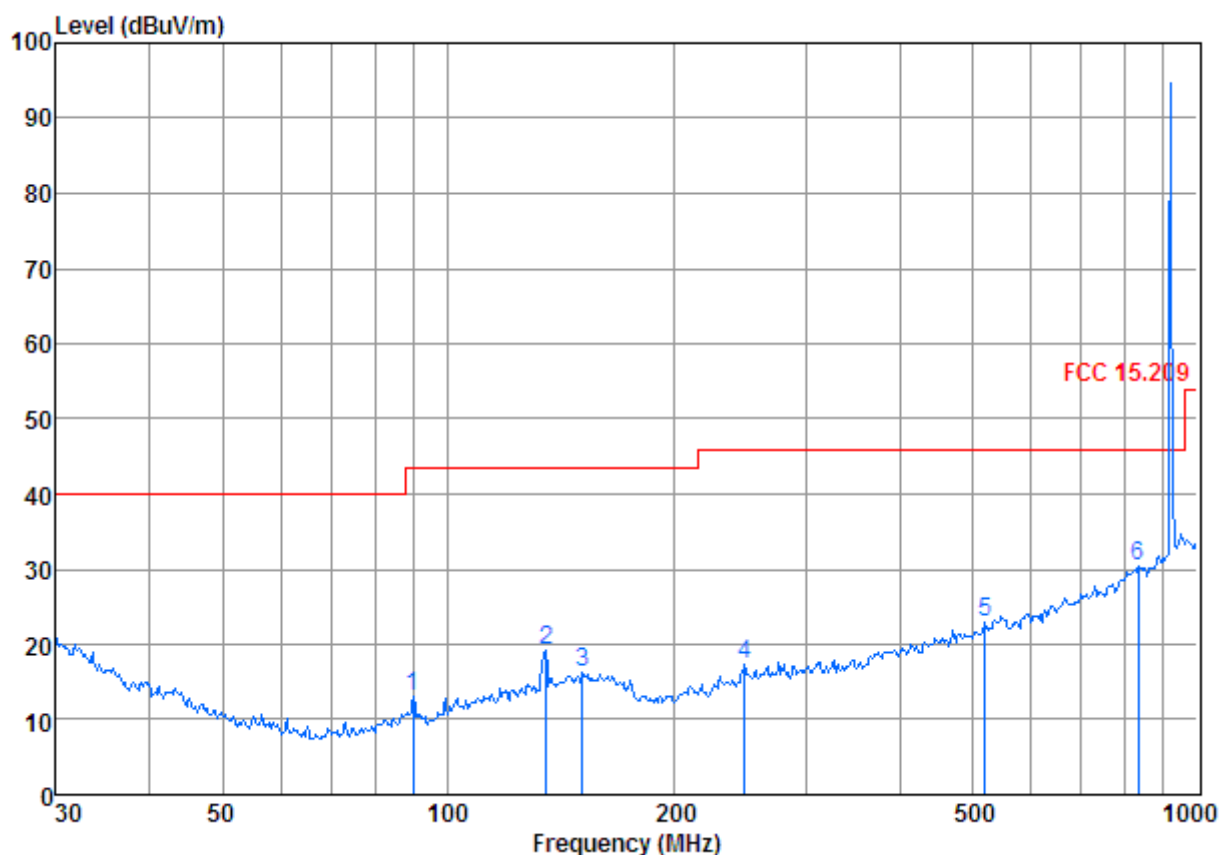
Condition: FCC 15.209 3m 3142C HORIZONTAL

Job No. : 5388RF

Mode : 914.2 TX SE

		CableAntenna		Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB		dB/m	dB	dBuV	dBuV/m	dB
1	110.96	1.23	7.58	27.13	31.77	13.45	43.50	-30.05
2	151.07	1.32	9.37	26.90	32.58	16.37	43.50	-27.13
3	225.31	1.55	7.60	26.61	32.82	15.36	46.00	-30.64
4	333.69	2.01	10.37	26.66	32.98	18.70	46.00	-27.30
5	539.48	2.64	14.70	27.63	33.78	23.49	46.00	-22.51
6	771.45	3.12	18.17	27.33	34.47	28.43	46.00	-17.57

918.4MHz (QP)		
Test mode:	Transmitting	Vertical



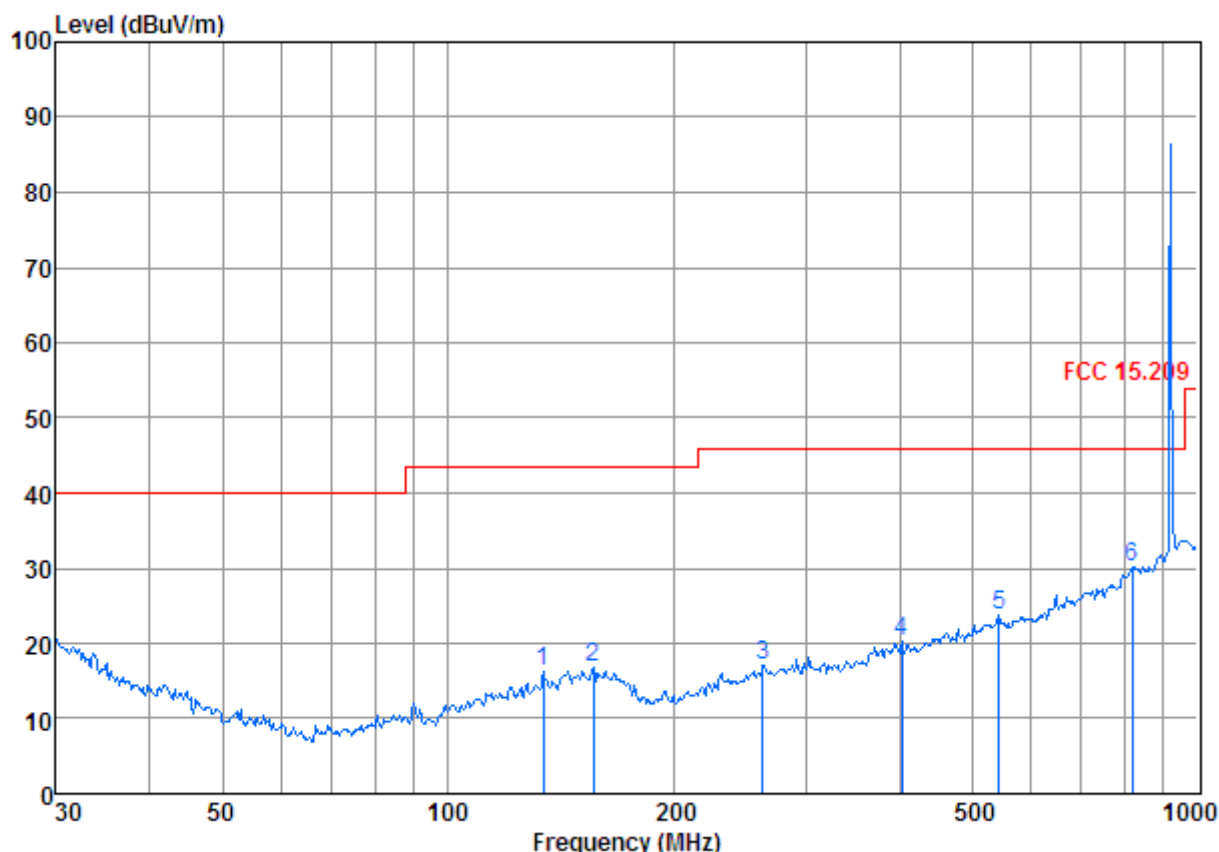
Condition: FCC 15.209 3m 3142C VERTICAL

Job No. : 5388RF

Mode : 918.4 TX SE

		CableAntenna		Preamplifier	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	89.90	1.10	6.10	27.21	33.04	13.03	43.50	-30.47
2	135.03	1.29	8.30	26.98	36.62	19.23	43.50	-24.27
3	151.07	1.32	9.37	26.90	32.49	16.28	43.50	-27.22
4	248.55	1.67	8.40	26.54	33.78	17.31	46.00	-28.69
5	520.89	2.62	14.10	27.66	33.89	22.95	46.00	-23.05
6	833.32	3.34	19.15	27.13	35.15	30.51	46.00	-15.49

Test mode:	Transmitting	Horizontal
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Condition: FCC 15.209 3m 3142C HORIZONTAL

Job No. : 5388RF

Mode : 918.4 TX SE

		CableAntenna		Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB		dB/m	dB	dBuV	dBuV/m	dB
1	134.09	1.29	8.28	26.99	33.75	16.33	43.50	-27.17
2	156.46	1.33	9.58	26.87	32.66	16.70	43.50	-26.80
3	262.90	1.74	9.20	26.50	32.71	17.15	46.00	-28.85
4	403.25	2.21	11.40	27.15	33.81	20.27	46.00	-25.73
5	543.27	2.65	14.74	27.63	33.96	23.72	46.00	-22.28
6	818.83	3.28	19.20	27.20	34.79	30.07	46.00	-15.93

5.10.2 Transmitter Emission above 1GHz

Worse case mode:		FSK		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		
2008.676	2.84	31.80	39.57	47.38	42.45	74	-31.55	Vertical		
3184.250	3.47	33.33	40.44	48.75	45.11	74	-28.89	Vertical		
4490.048	4.48	35.15	41.40	49.17	47.40	74	-26.60	Vertical		
6611.326	5.28	36.20	40.40	49.20	50.28	74	-23.72	Vertical		
7941.185	6.21	36.00	39.24	48.91	51.88	74	-22.12	Vertical		
9370.083	6.05	37.03	37.99	47.63	52.72	74	-21.28	Vertical		
2184.699	2.90	32.14	39.70	48.26	43.60	74	-30.40	Horizontal		
3184.250	3.47	33.33	40.44	50.41	46.77	74	-27.23	Horizontal		
4444.562	4.46	35.06	41.36	49.05	47.21	74	-26.79	Horizontal		
6494.564	5.26	36.28	40.50	49.71	50.75	74	-23.25	Horizontal		
8042.903	6.20	36.01	39.15	49.77	52.83	74	-21.17	Horizontal		
9346.262	6.06	37.01	38.03	47.08	52.12	74	-21.88	Horizontal		

Worse case mode:		FSK		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		
1818.842	2.72	30.44	39.49	47.17	40.84	74	-33.16	Vertical		
2754.185	3.18	33.05	40.12	47.50	43.61	74	-30.39	Vertical		
3700.260	3.91	33.45	40.81	48.15	44.70	74	-29.30	Vertical		
5560.500	4.97	34.98	41.30	49.09	47.74	74	-26.26	Vertical		
7860.737	6.21	36.00	39.31	48.89	51.79	74	-22.21	Vertical		
9370.083	6.05	37.03	37.99	46.60	51.69	74	-22.31	Vertical		
2008.676	2.84	31.80	39.57	47.15	42.22	74	-31.78	Horizontal		
2513.013	3.05	32.72	39.95	48.67	44.49	74	-29.51	Horizontal		
3151.992	3.44	33.34	40.41	48.34	44.71	74	-29.29	Horizontal		
4444.562	4.46	35.06	41.36	48.82	46.98	74	-27.02	Horizontal		
6544.350	5.27	36.27	40.45	49.32	50.41	74	-23.59	Horizontal		
8042.903	6.20	36.01	39.15	48.71	51.77	74	-22.23	Horizontal		





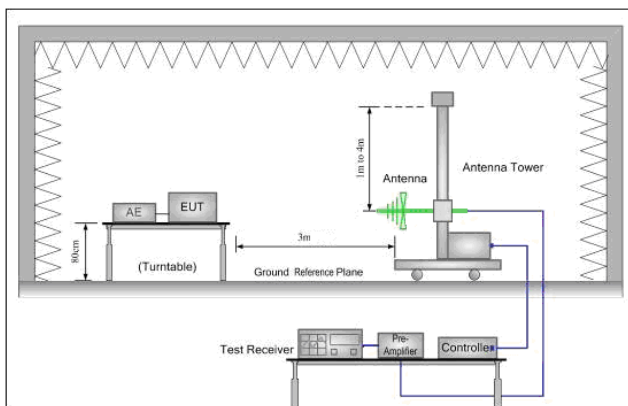
Worse case mode:		FSK		Test channel:		Highest		Remark:	Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
1968.184	2.81	31.55	39.55	46.78	41.59	74	-32.41	Vertical	
2754.185	3.18	33.05	40.12	47.93	44.04	74	-29.96	Vertical	
3709.691	3.91	33.45	40.83	48.36	44.89	74	-29.11	Vertical	
4501.492	4.49	35.20	41.40	48.34	46.63	74	-27.37	Vertical	
5865.832	5.08	35.48	41.04	49.50	49.02	74	-24.98	Vertical	
7860.737	6.21	36.00	39.31	49.11	52.01	74	-21.99	Vertical	
2013.795	2.84	31.83	39.57	46.71	41.81	74	-32.19	Horizontal	
3176.155	3.46	33.33	40.44	48.62	44.97	74	-29.03	Horizontal	
4490.048	4.48	35.15	41.40	48.21	46.44	74	-27.56	Horizontal	
6494.564	5.26	36.28	40.50	48.71	49.75	74	-24.25	Horizontal	
7547.013	6.17	36.00	39.57	48.33	50.93	74	-23.07	Horizontal	
8725.477	6.17	36.37	38.55	47.30	51.29	74	-22.71	Horizontal	

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 10GHz, 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. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

5.11 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:	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:			



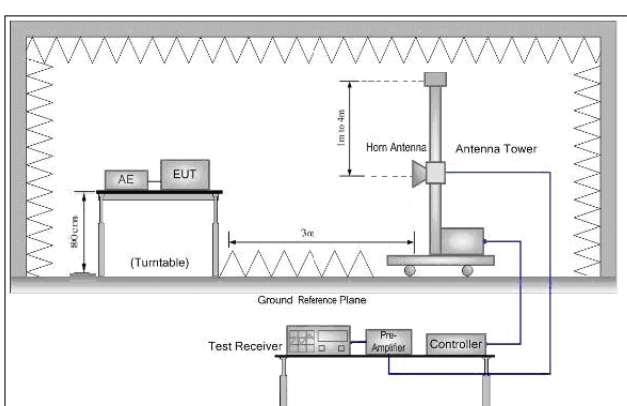


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz

Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz

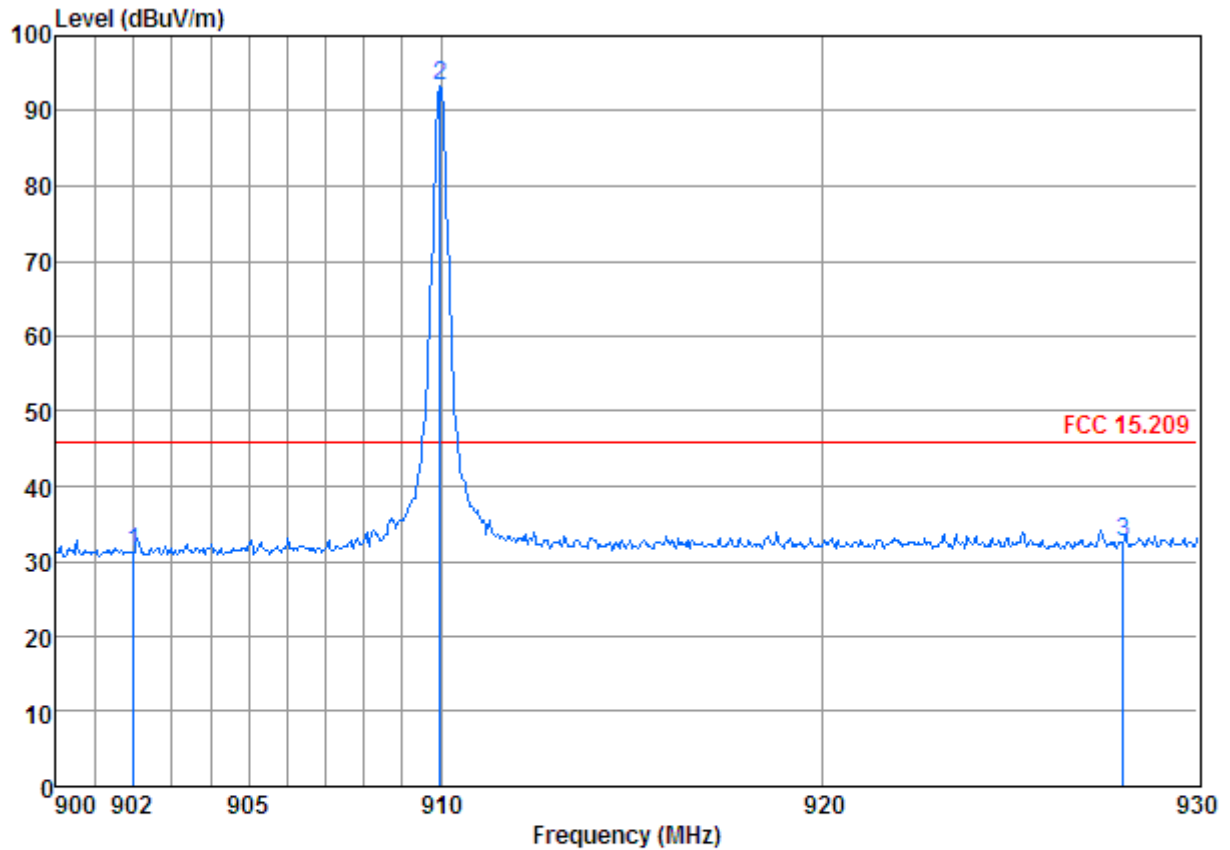


Test Procedure:	<ul style="list-style-type: none">a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channelg. Test the EUT in the lowest channel , the Highest channelh. 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.i. Repeat above procedures until all frequencies measured was complete.
Test Mode:	Non-hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



Test plot as follows:

Worse case mode:	FSK	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition: FCC 15.209 3m 3142C VERTICAL

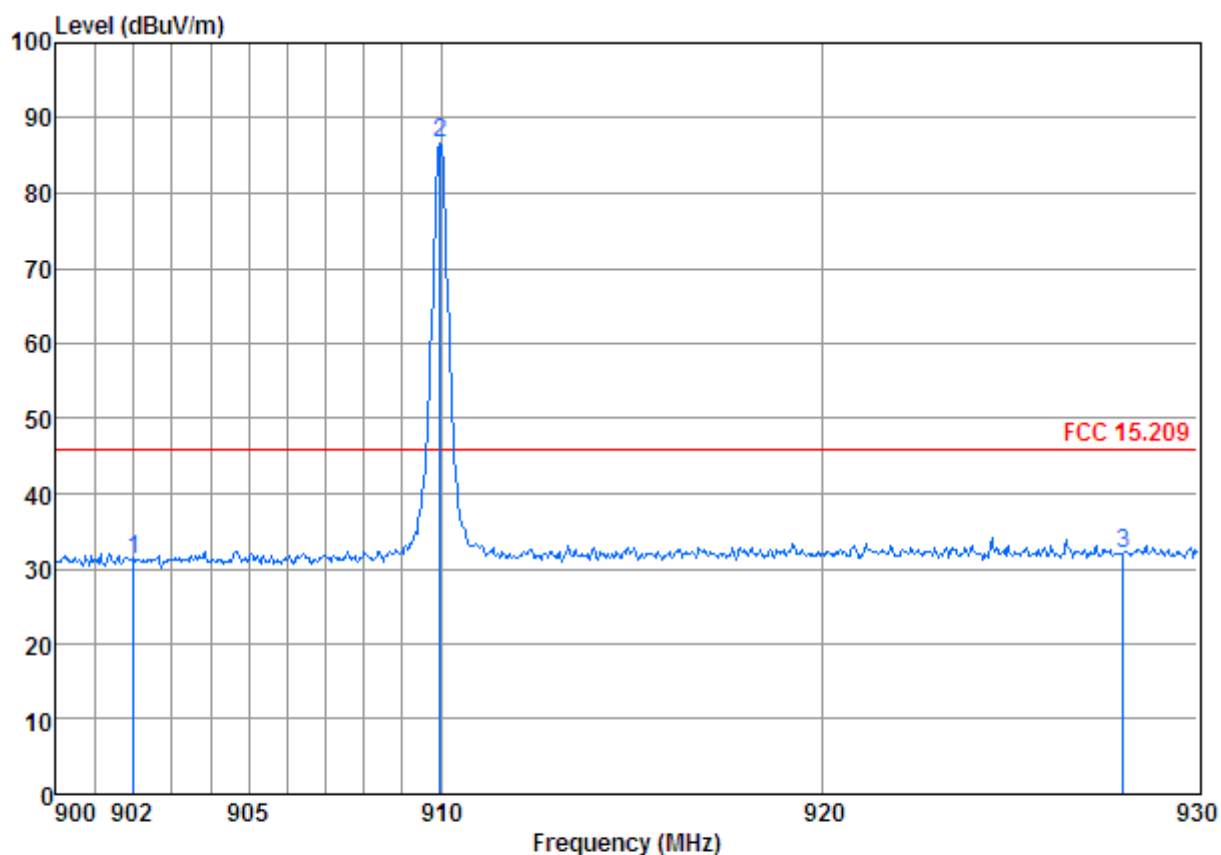
Job No. : 5388RF

Mode : 910 Bandedge

		CableAntenna Preamp			Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	902.00	3.60	20.23	26.75	34.07	31.15	46.00	-14.85
2	909.97	3.61	20.30	26.71	96.03	93.23	46.00	47.23
3	928.00	3.63	20.70	26.64	34.71	32.40	46.00	-13.60



Worse case mode:	FSK	Test channel:	Lowest	Remark:	Peak	Horizontal
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Condition: FCC 15.209 3m 3142C HORIZONTAL

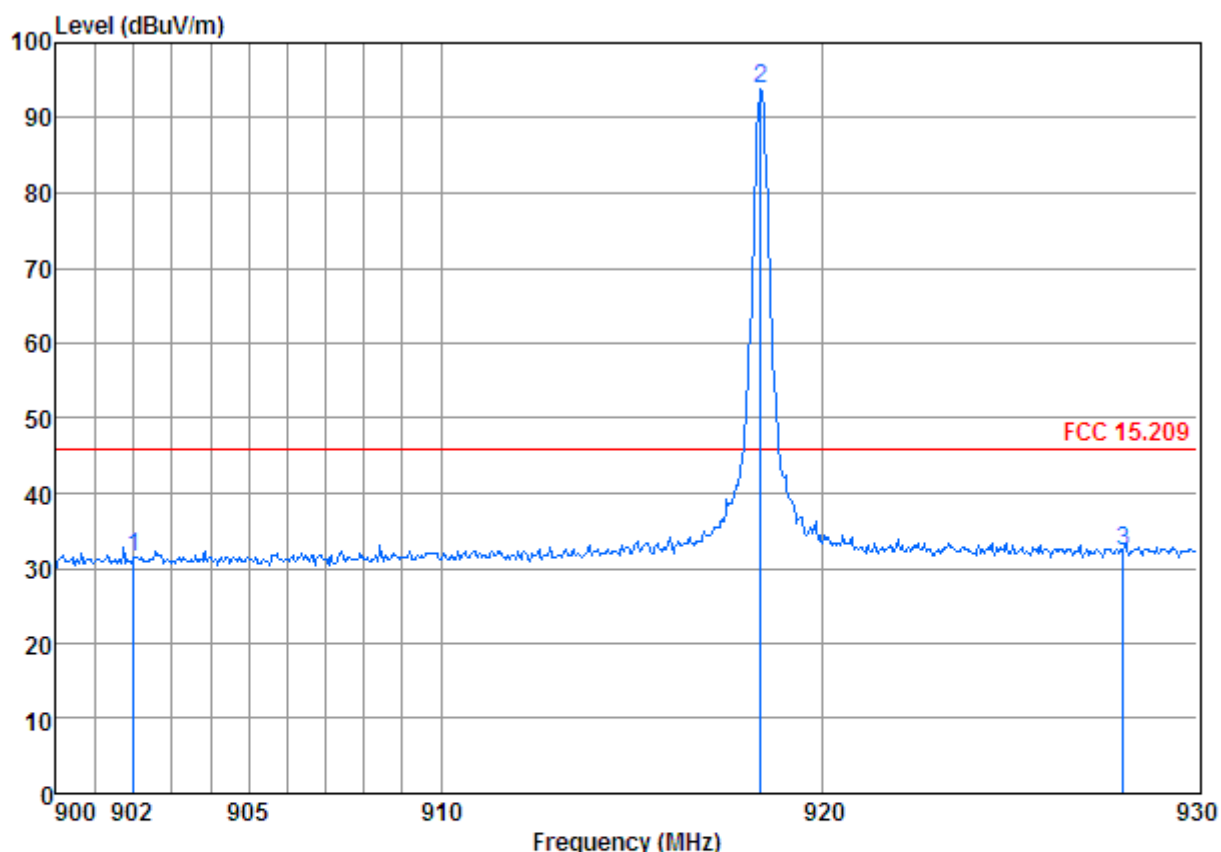
Job No. : 5388RF

Mode : 910 Bandedge

		CableAntenna		Preamplifier	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	902.00	3.60	20.23	26.75	34.16	31.24	46.00	-14.76
2	909.97	3.61	20.30	26.71	89.47	86.67	46.00	40.67
3	928.00	3.63	20.70	26.64	34.41	32.10	46.00	-13.90



Worse case mode:	FSK	Test channel:	Highest	Remark:	Peak	Vertical
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Condition: FCC 15.209 3m 3142C VERTICAL

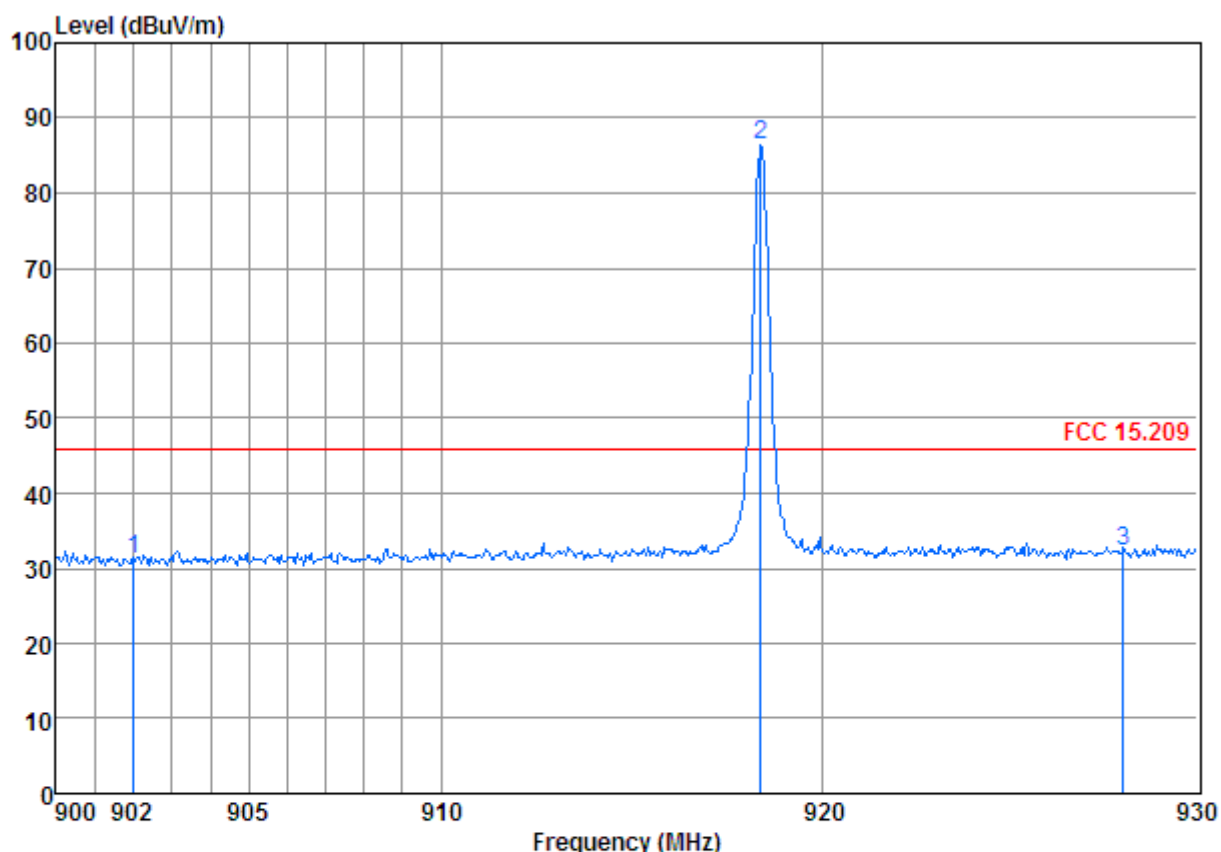
Job No. : 5388RF

Mode : 918.4 Bandedge

	Freq	Cable Loss	Antenna Factor	Preamplifier	Read Level	Level	Limit	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	902.00	3.60	20.23	26.75	34.33	31.41	46.00	-14.59
2	918.39	3.62	20.80	26.68	96.17	93.91	46.00	47.91
3	928.00	3.63	20.70	26.64	34.70	32.39	46.00	-13.61



Worse case mode:	FSK	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition: FCC 15.209 3m 3142C HORIZONTAL

Job No. : 5388RF

Mode : 918.4 Bandedge

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	902.00	3.60	20.23	26.75	34.03	31.11	46.00	-14.89
2	918.39	3.62	20.80	26.68	88.58	86.32	46.00	40.32
3	928.00	3.63	20.70	26.64	34.70	32.39	46.00	-13.61

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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