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Report No.: SZEM120900538901
Page: 1 of 53

FCC REPORT

Application No: SZEM1209005389RF
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): RX04
FCC ID: TBQRX04-915
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: 2014-01-09

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



3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	2
3 CONTENTS.....	3
4 GENERAL INFORMATION	4
4.1 CLIENT INFORMATION	4
4.2 GENERAL DESCRIPTION OF EUT	4
4.3 TEST ENVIRONMENT.....	6
4.4 DESCRIPTION OF SUPPORT UNITS	6
4.5 TEST LOCATION	6
4.6 TEST FACILITY	7
4.7 DEVIATION FROM STANDARDS	7
4.8 ABNORMALITIES FROM STANDARD CONDITIONS.....	7
4.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	7
4.10 EQUIPMENT LIST	8
5 TEST RESULTS AND MEASUREMENT DATA.....	11
5.1 ANTENNA REQUIREMENT	11
5.2 CONDUCTED EMISSIONS	12
5.3 CONDUCTED PEAK OUTPUT POWER.....	16
5.4 20dB OCCUPY BANDWIDTH.....	19
5.5 CARRIER FREQUENCIES SEPARATION	22
5.6 HOPPING CHANNEL NUMBER	26
5.7 OCCUPANCY TIME	28
5.8 BAND-EDGE FOR RF CONDUCTED EMISSIONS	30
5.9 SPURIOUS RF CONDUCTED EMISSIONS	33
5.10 RADIATED SPURIOUS EMISSION	36
5.10.1 Radiated Emission.....	39
5.10.2 Transmitter Emission above 1GHz.....	45
5.11 BAND EDGE (RADIATED EMISSION)	48-53

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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

Name:	CAR ALARM
Model No.:	RX04
Operation Frequency:	910MHz~918.4MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	FSK
Number of Channel:	25
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Fixed production
Antenna Type	Integral
Antenna Gain	-0.73dBi
Power Supply:	DC 5V
Test Voltage:	AC 120V 60Hz



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

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4.3 Test Environment

Operating Environment:	
Temperature:	25.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	1005 mbar

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
Adapter	Supply by client	ZK-1006-6B

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

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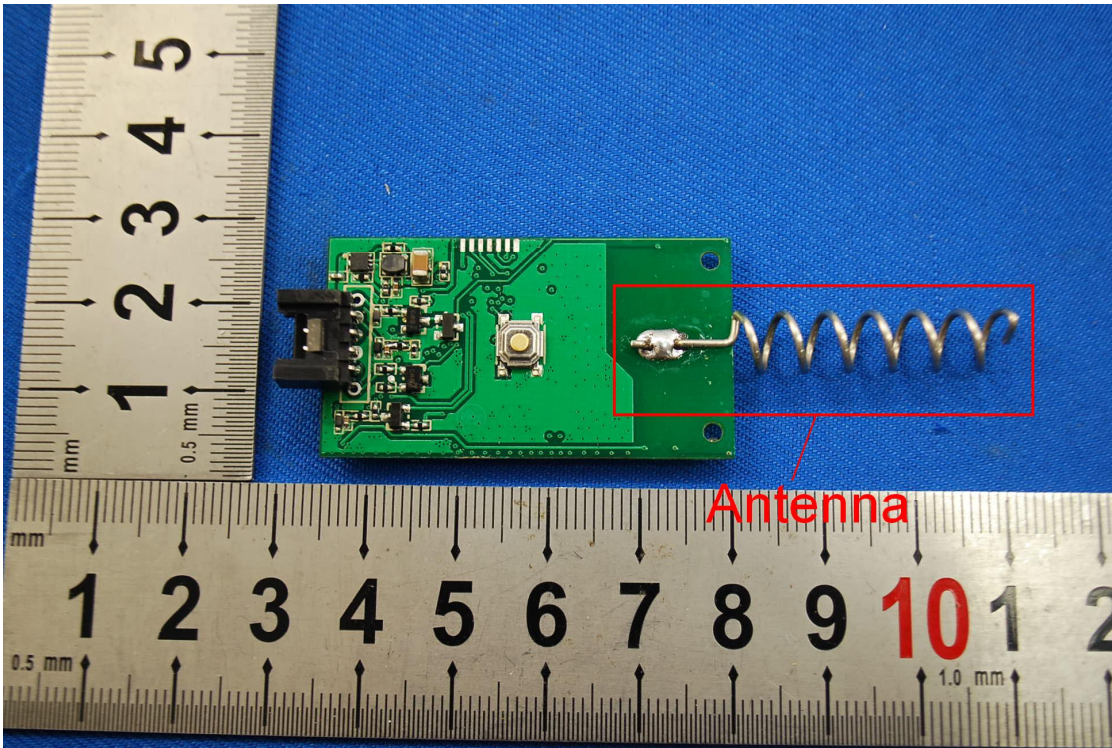
RF connected test					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2014-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2014-10-24
4	Coaxial cable	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.

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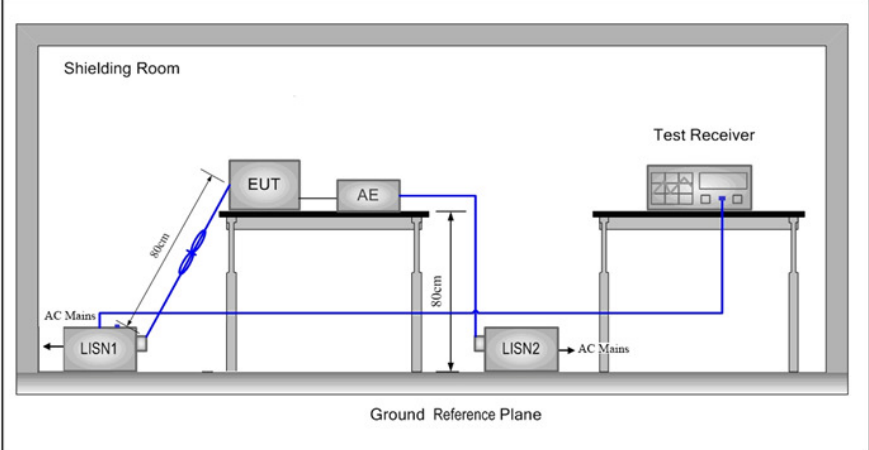
5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 requirement: 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: 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 on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.73dBi.</p> 	

5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2009		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none"> 1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement. 		

<p>Test Setup:</p>	
<p>Test Mode:</p>	<p>Transmitting mode</p>
<p>Instruments Used:</p>	<p>Refer to section 4.10 for details</p>
<p>Test Results:</p>	<p>Pass</p>

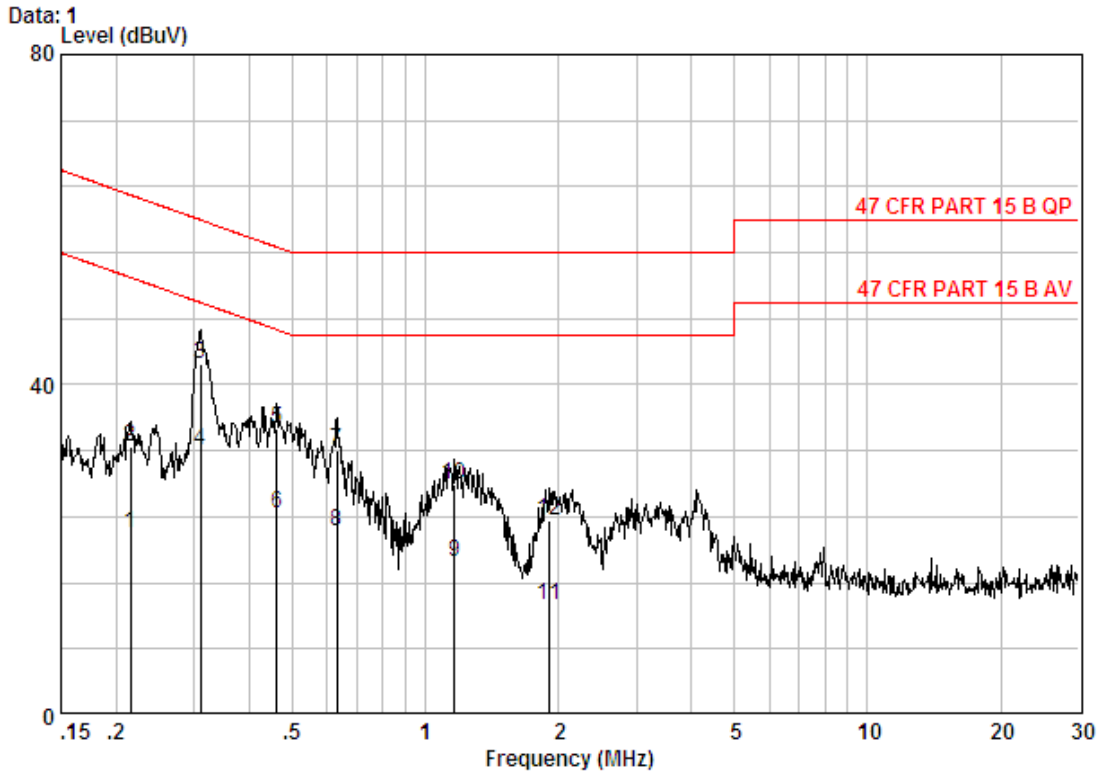
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Live line:



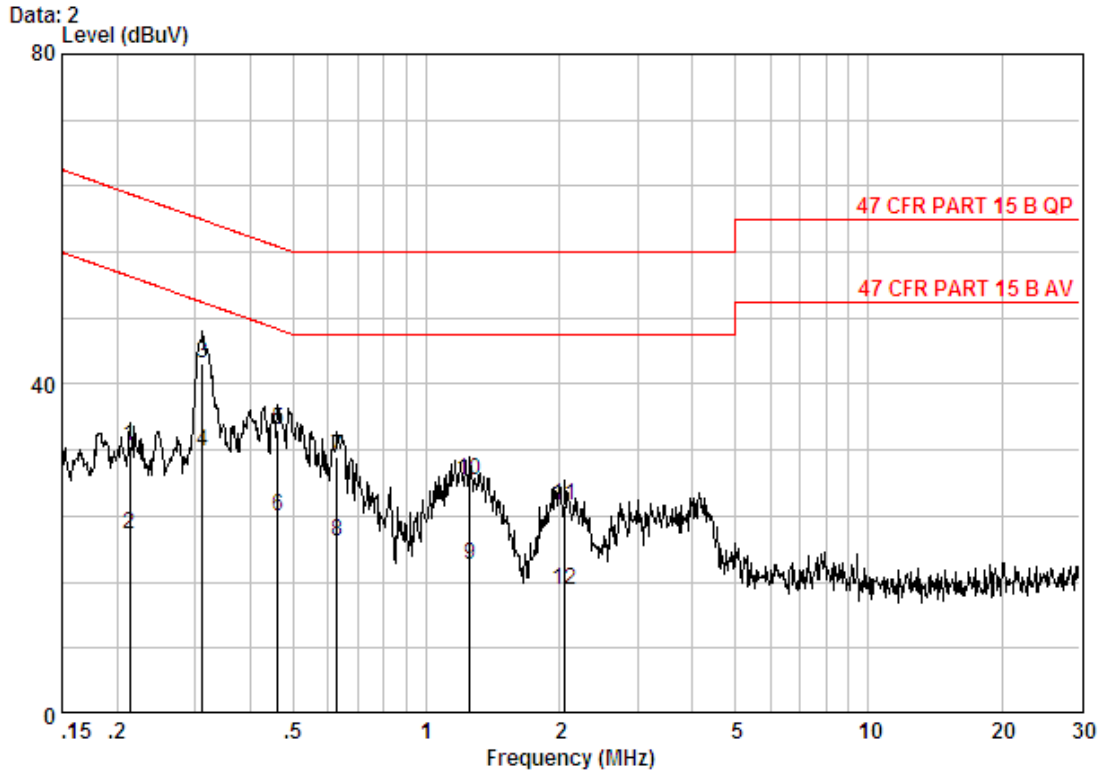
Site : Shielding Room
 Condition : 47 CFR PART 15 B QP CE LINE
 Job No. : 5389RF
 Test mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.21506	0.02	9.70	12.34	22.06	53.01	-30.95	Average
2	0.21506	0.02	9.70	22.78	32.49	63.01	-30.51	QP
3 @	0.30998	0.01	9.71	32.87	42.59	59.97	-17.38	QP
4	0.30998	0.01	9.71	22.28	32.00	49.97	-17.97	Average
5	0.46122	0.01	9.80	24.82	34.63	56.67	-22.04	QP
6	0.46122	0.01	9.80	14.61	24.42	46.67	-22.25	Average
7	0.63048	0.02	9.80	22.21	32.03	56.00	-23.97	QP
8	0.63048	0.02	9.80	12.43	22.25	46.00	-23.75	Average
9	1.166	0.02	9.80	8.69	18.51	46.00	-27.49	Average
10	1.166	0.02	9.80	18.14	27.96	56.00	-28.04	QP
11	1.898	0.02	9.80	3.58	13.40	46.00	-32.60	Average
12	1.898	0.02	9.80	13.74	23.56	56.00	-32.44	QP

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Neutral line:



Site : Shielding Room
 Condition : 47 CFR PART 15 B QP CE NEUTRAL
 Job No. : 5389RF
 Test mode : TX

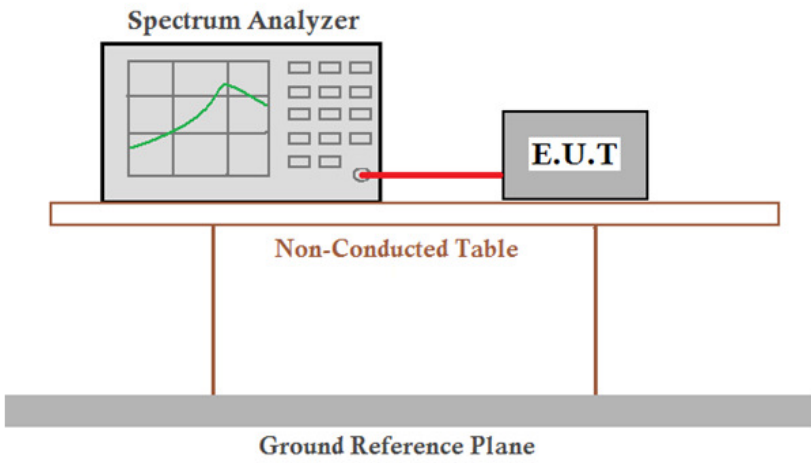
	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.21392	0.02	9.70	22.70	32.41	63.05	-30.64	QP
2	0.21392	0.02	9.70	12.16	21.88	53.05	-31.17	Average
3	0.31163	0.01	9.71	32.74	42.46	59.93	-17.47	QP
4	0.31163	0.01	9.71	22.16	31.89	49.93	-18.04	Average
5	0.46122	0.01	9.80	24.69	34.50	56.67	-22.17	QP
6	0.46122	0.01	9.80	14.16	23.97	46.67	-22.70	Average
7	0.62715	0.02	9.80	21.40	31.21	56.00	-24.79	QP
8	0.62715	0.02	9.80	11.16	20.98	46.00	-25.02	Average
9	1.255	0.02	9.80	8.17	17.99	46.00	-28.02	Average
10	1.255	0.02	9.80	18.45	28.27	56.00	-27.73	QP
11	2.055	0.02	9.80	15.49	25.31	56.00	-30.69	QP
12	2.055	0.02	9.80	5.16	14.99	46.00	-31.01	Average

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

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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

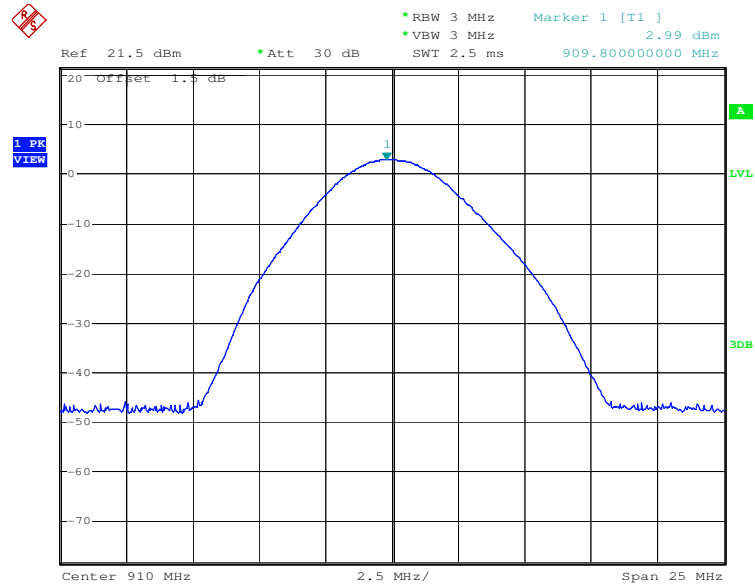
Measurement Data

FSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	2.99	24.00	Pass
Middle	7.95	24.00	Pass
Highest	1.67	24.00	Pass

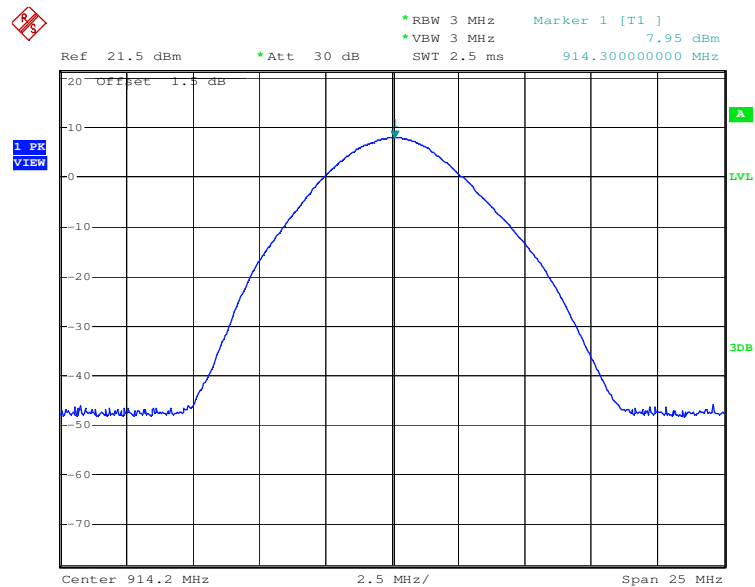


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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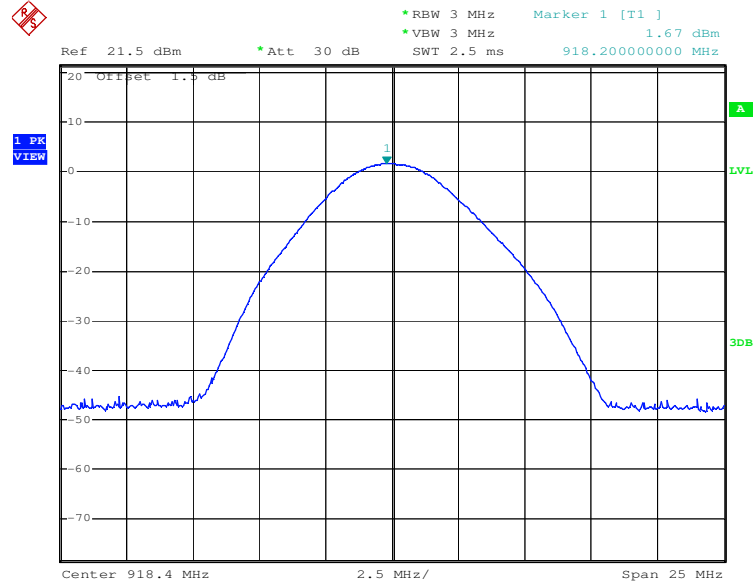
Test mode:	FSK	Test channel:	Middle
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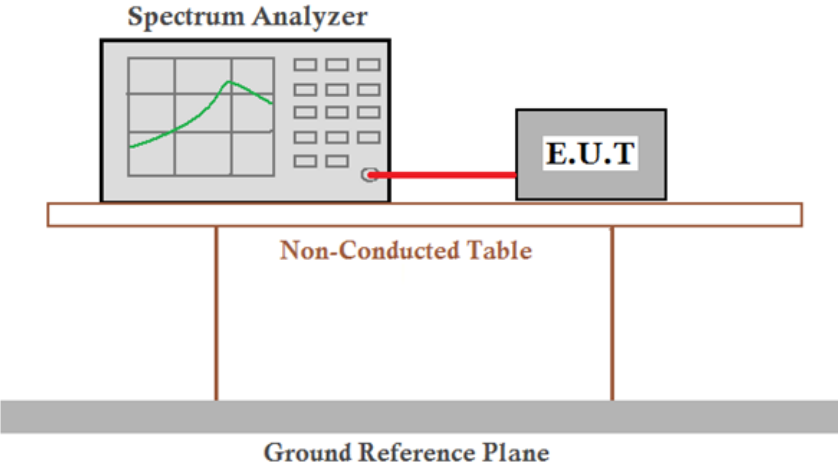


Test mode:	FSK	Test channel:	Highest
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5.4 20dB Occupancy Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2009
Test Setup:	 <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:	≥250kHz & ≤500kHz
Test Mode:	Non-hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

Measurement Data

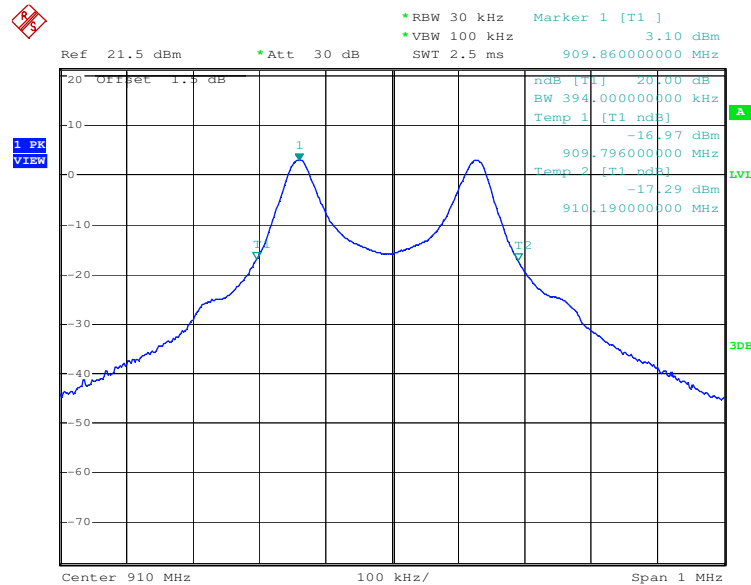
Test channel	20dB Occupancy Bandwidth (kHz)	Limit
	FSK	
Lowest	394.00000000	≥250kHz ≤500kHz
Middle	388.00000000	
Highest	390.00000000	

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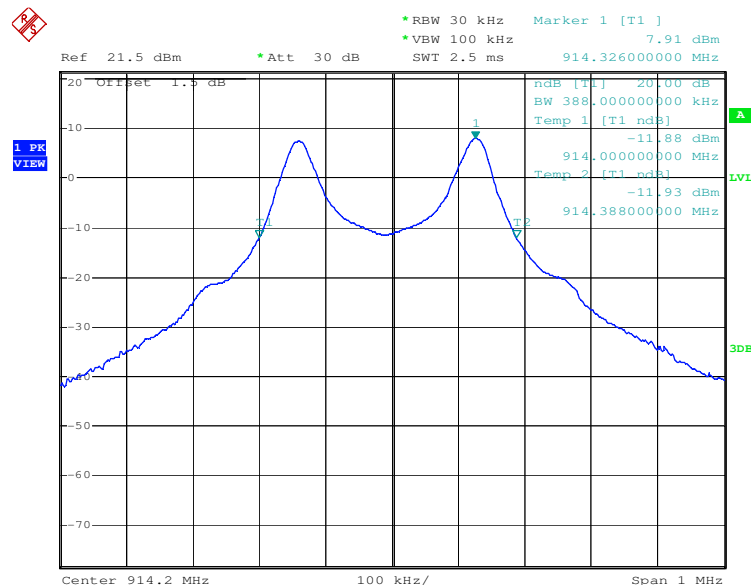


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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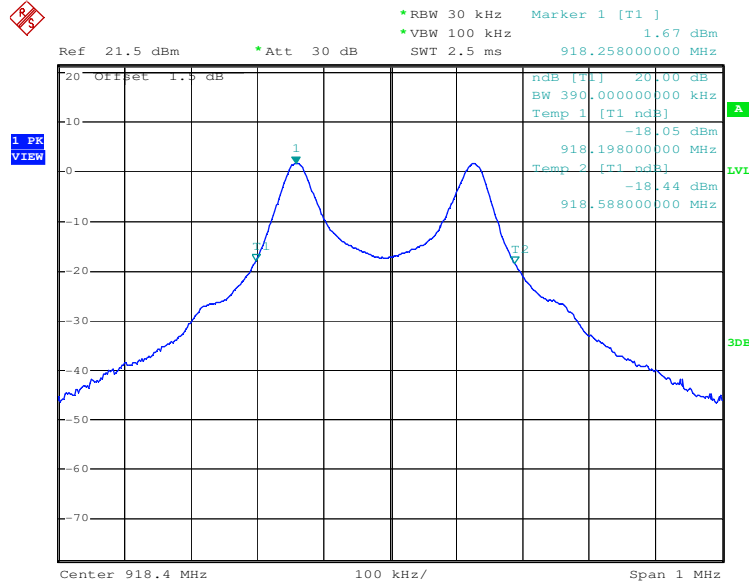
Test mode:	FSK	Test channel:	Middle
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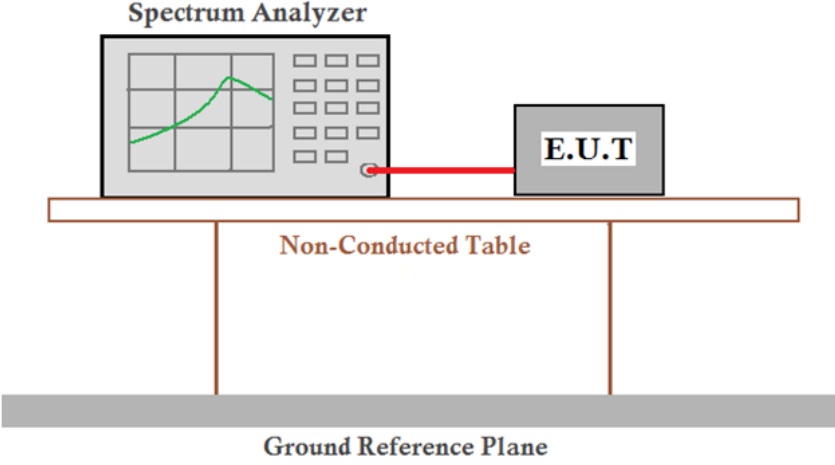


Test mode:	FSK	Test channel:	Highest
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5.5 Carrier Frequencies Separation

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is positioned above a Ground Reference Plane.</p>
Limit:	N/A
Test Mode:	Hopping transmitting
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



Measurement Data

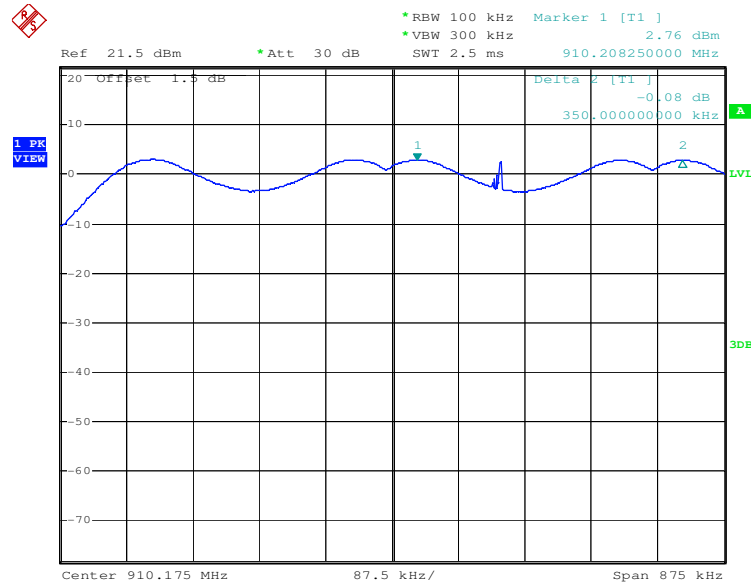
FSK mode		
Test channel	Carrier Frequencies Separation (kHz)	Result
Lowest	350.000	N/A
Middle	350.000	N/A
Highest	350.000	N/A

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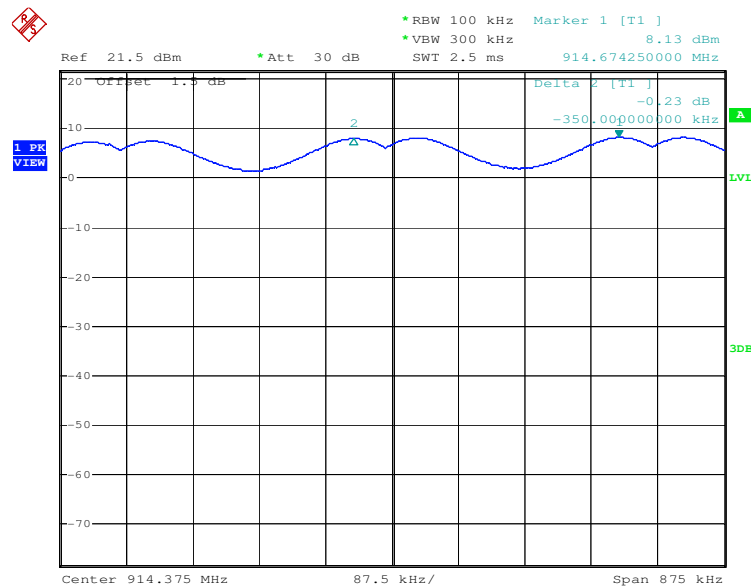


Test plot as follows:

Test mode:	FSK	Test channel:	Lowest
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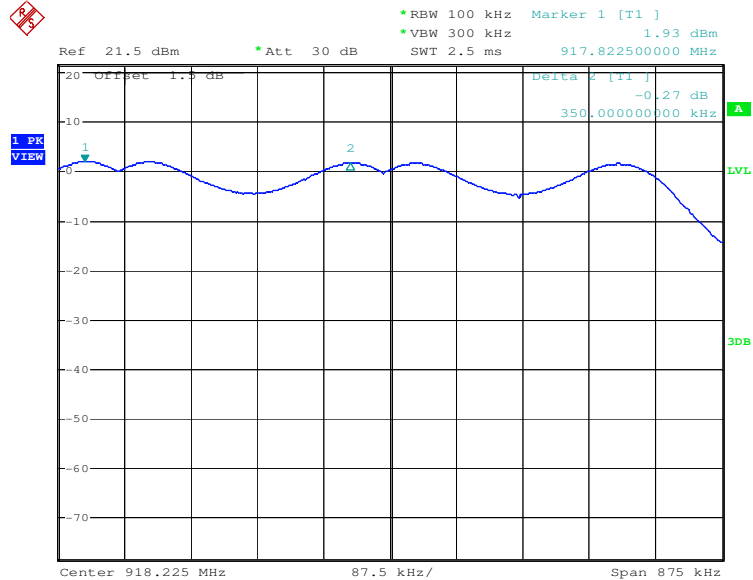
Test mode:	FSK	Test channel:	Middle
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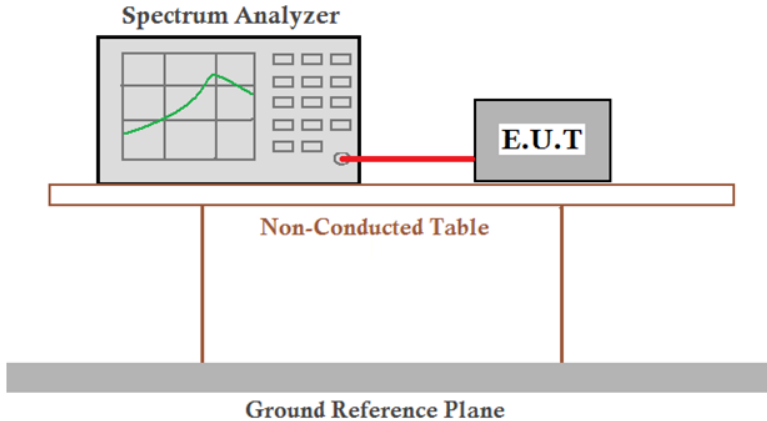


Test mode:	FSK	Test channel:	Highest
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5.6 Hopping Channel Number

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

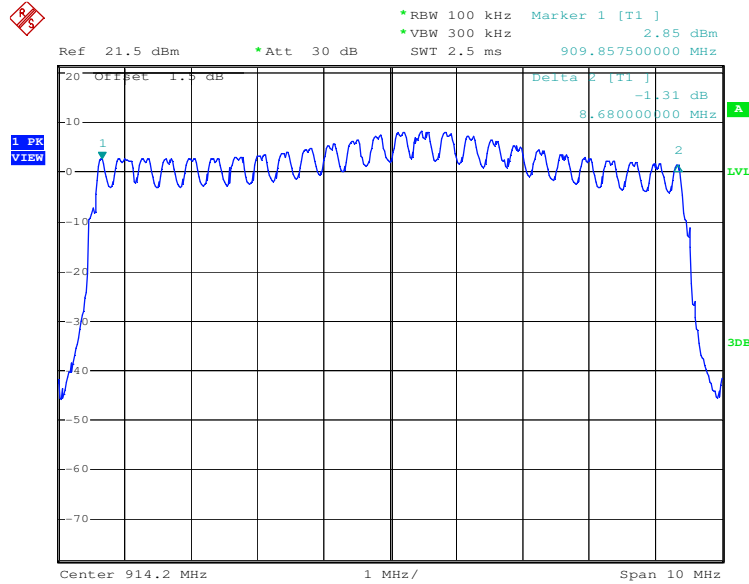
Measurement Data

Mode	Hopping channel numbers	Limit
FSK	25	≥25



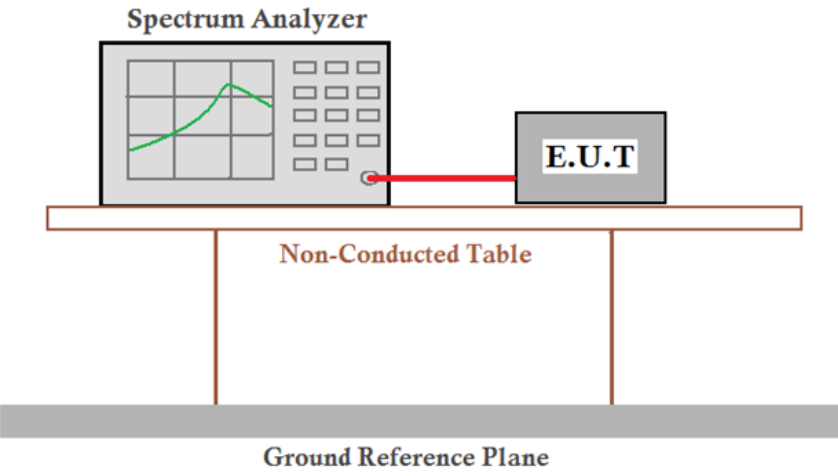
Test plot as follows:

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:	 <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>
Instruments Used:	Refer to section 4.10 for details
Test Mode:	Hopping transmitting
Limit:	0.4 Second
Test Results:	Pass

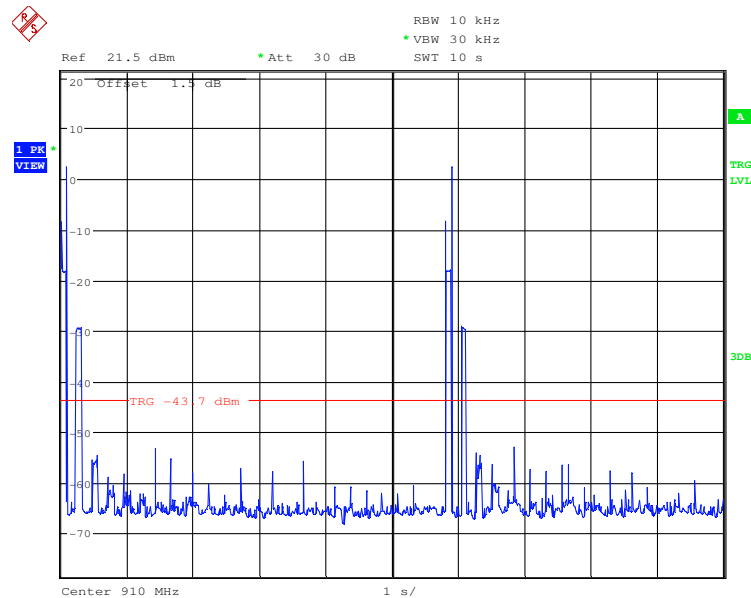
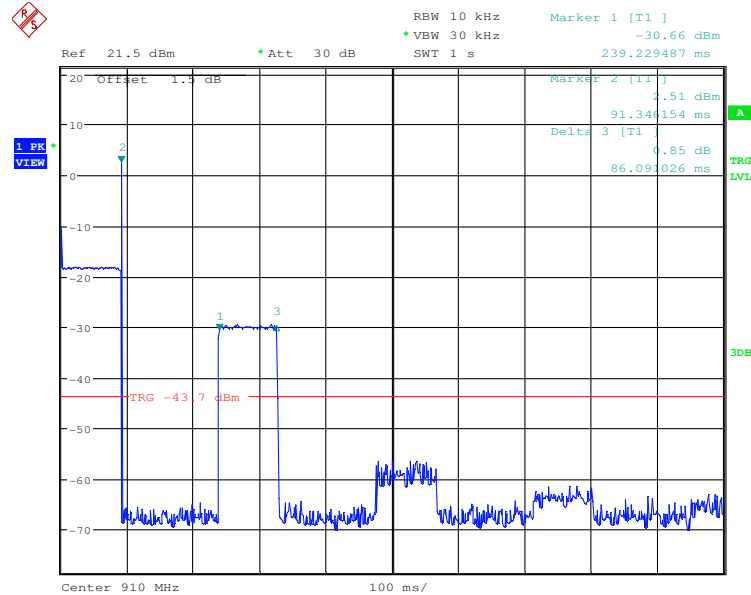
Measurement Data

Mode	Occupancy Time (second)	Limit (second)
FSK	0.355	0.4

Test Result:

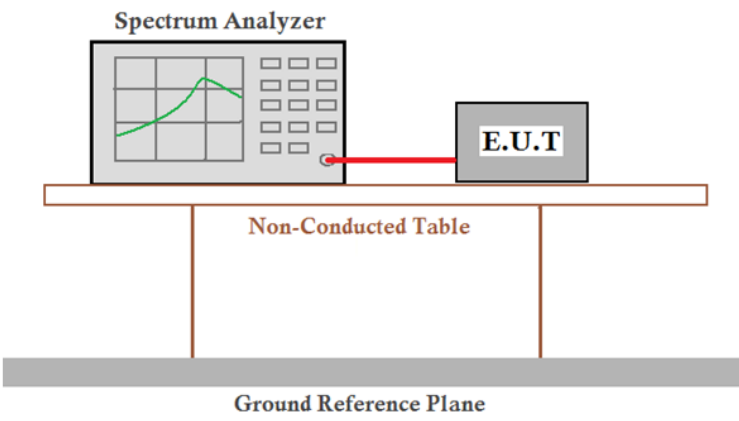
Occupancy Time = $2*(T1+T2) = 2*(91.346+86.091)=0.355s$

Test plot as follows:



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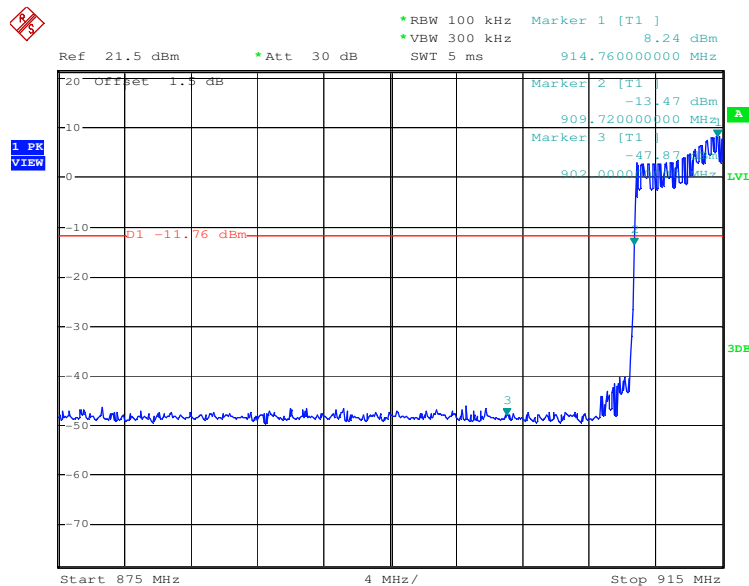
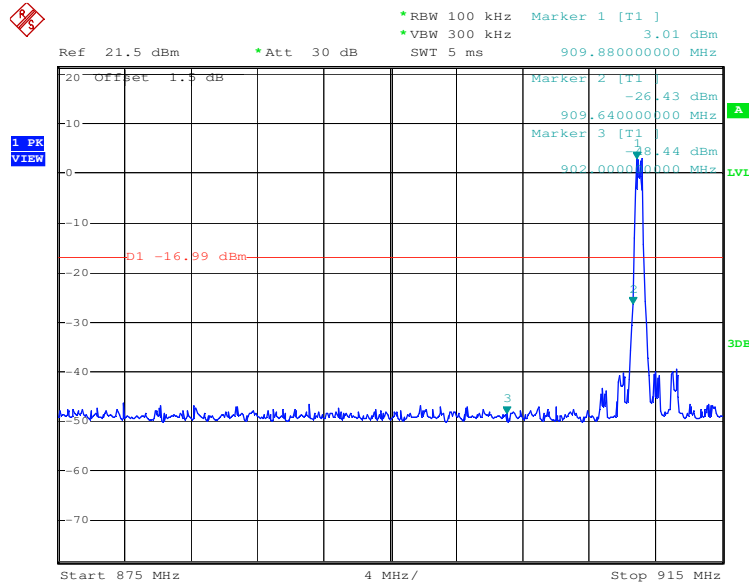
5.8 Band-edge for RF Conducted Emissions

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:

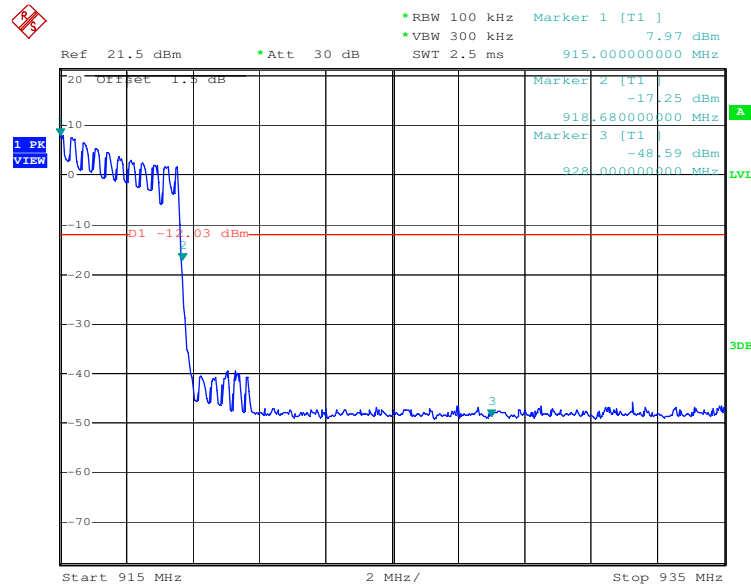
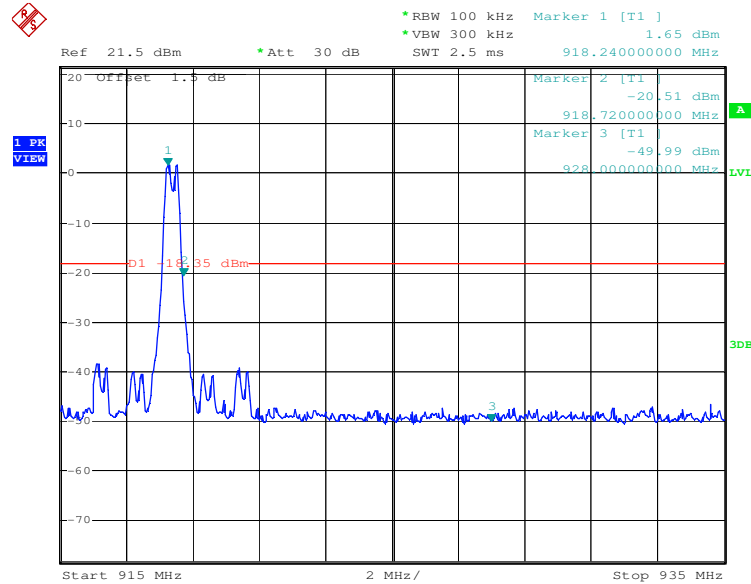
Test mode:	FSK	Test channel:	Lowest
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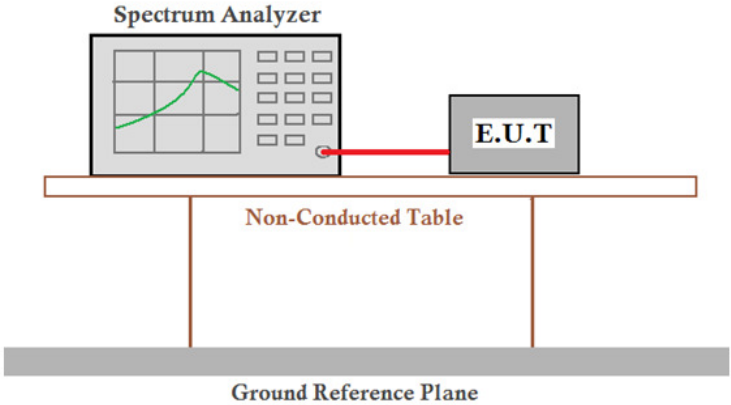


Test mode:	FSK	Test channel:	Highest
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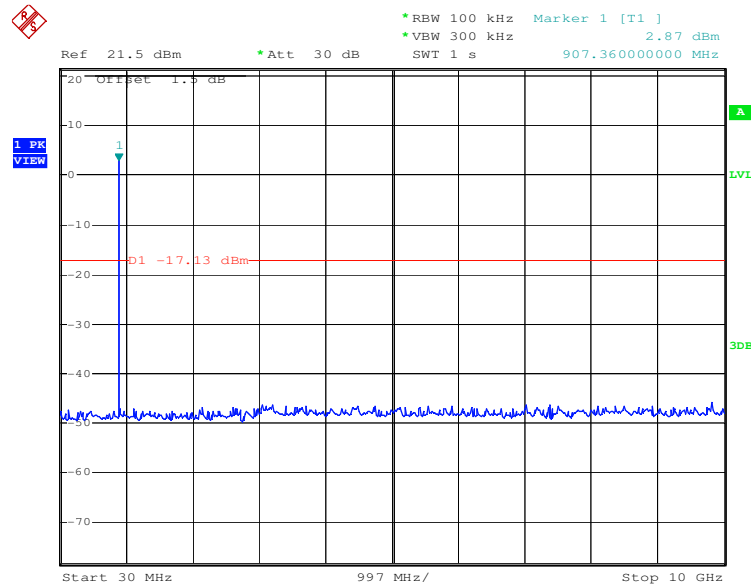
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5.9 Spurious RF Conducted Emissions

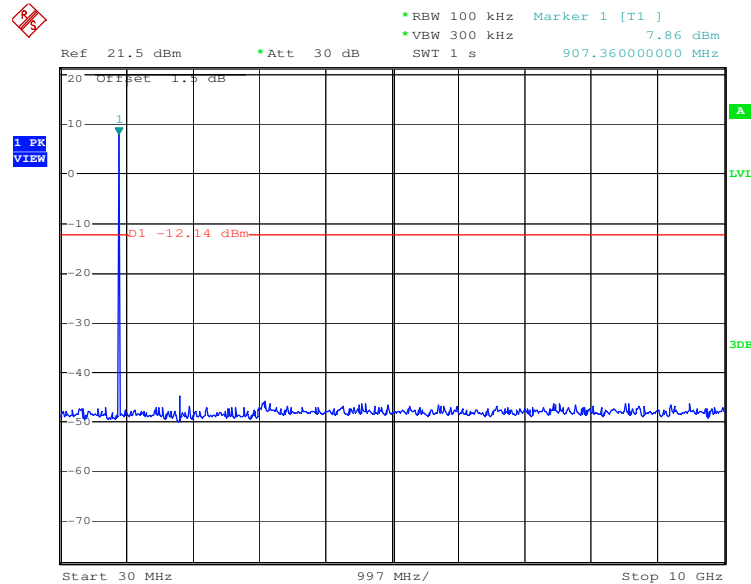
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 <p>Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, 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 mode:	FSK	Test channel:	Lowest
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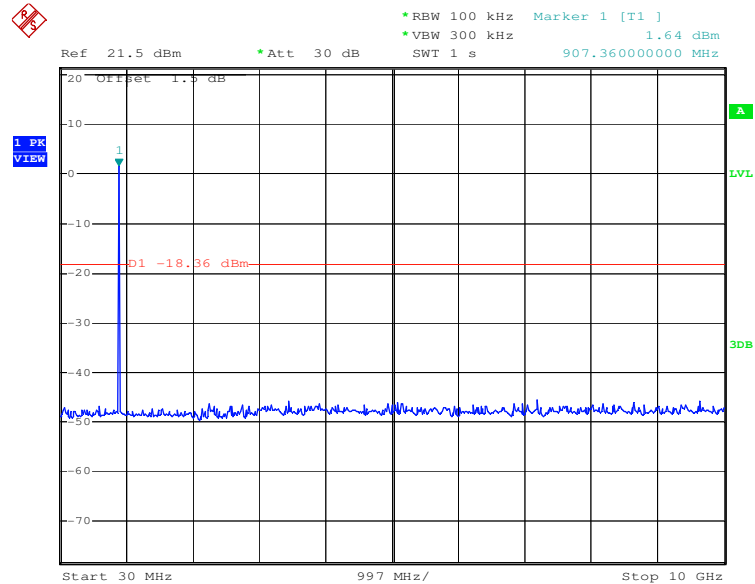
Test mode:	FSK	Test channel:	Middle
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Test mode:	FSK	Test channel:	Highest
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5.10 Radiated Spurious Emission

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
<p>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.</p>					

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Test Setup:

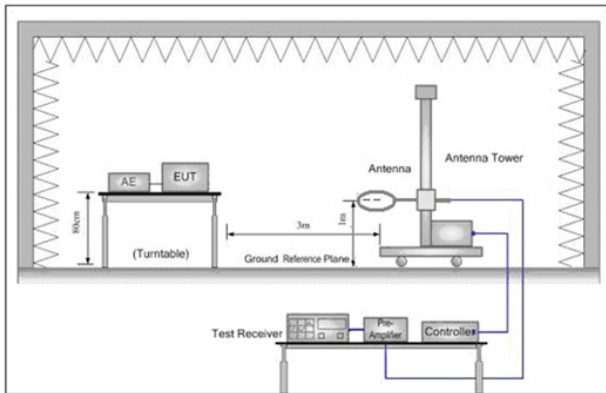


Figure 1. Below 30MHz

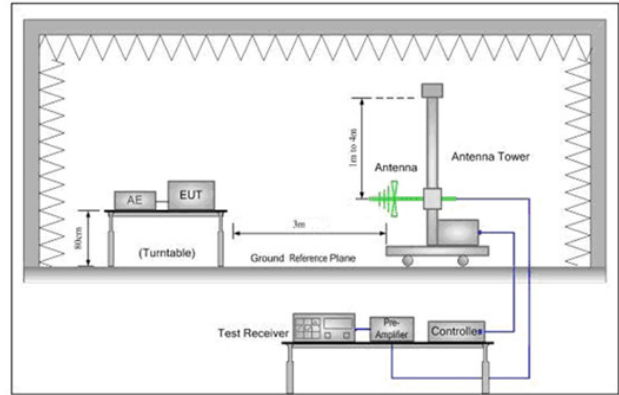


Figure 2. 30MHz to 1GHz

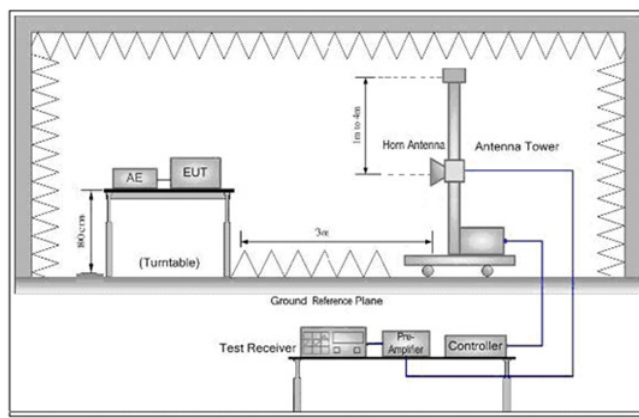


Figure 3. Above 1 GHz

Test Procedure:

- 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 (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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB

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SGS-CSTC Standards Technical Services Ltd.

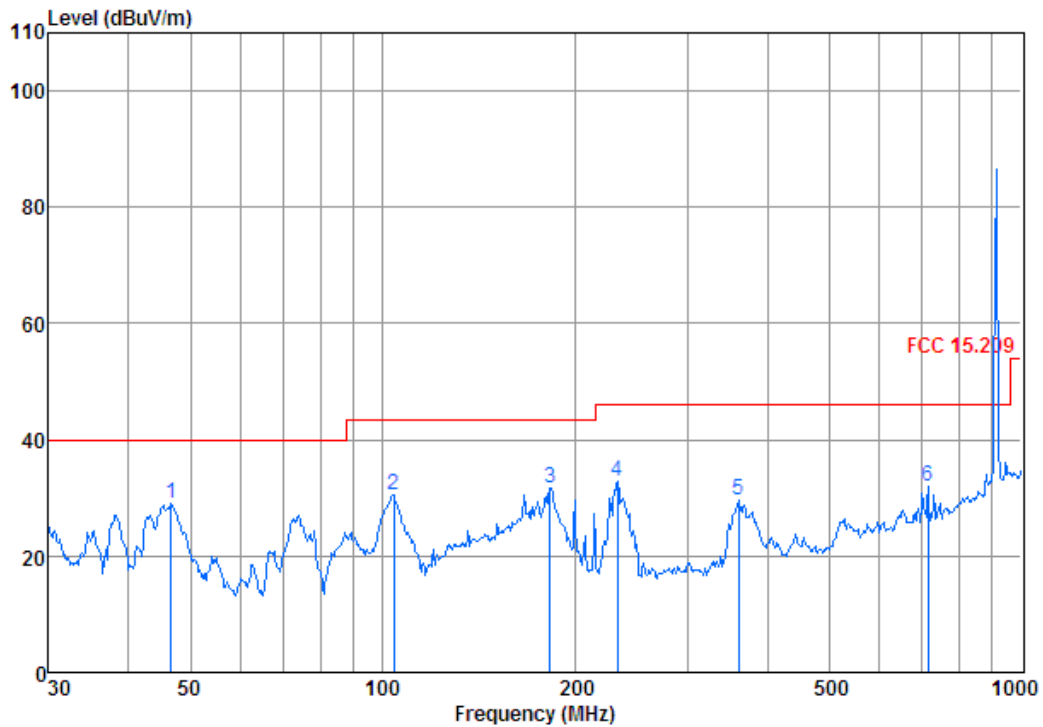
Report No.: SZEM120900538901

Page: 38 of 53

	margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel (910MHz),the middle channel (914.2MHz),the Highest channel (918.4MHz) h. 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

5.10.1 Radiated Emission

910MHz (QP)		
Test mode:	Transmitting	Vertical



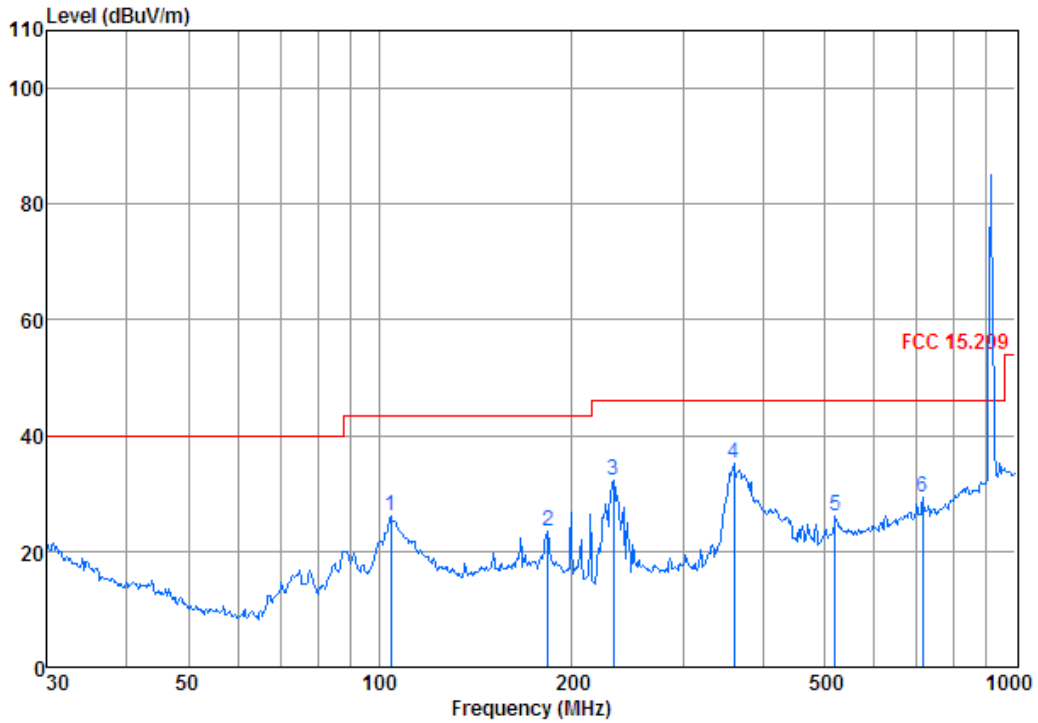
Condition: FCC 15.209 3m 3142C VERTICAL
 Job No. : 5389RF
 Mode : 910 TX SE

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	46.67	0.74	8.33	27.30	47.24	29.01	-10.99
2	104.17	1.21	6.88	27.17	49.68	30.60	-12.90
3	182.56	1.37	6.70	26.77	50.47	31.77	-11.73
4	233.35	1.59	8.42	26.58	49.45	32.88	-13.12
5	360.45	2.09	10.40	26.87	44.04	29.66	-16.34
6	714.17	2.95	17.10	27.39	39.41	32.07	-13.93

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

Job No. : 5389RF

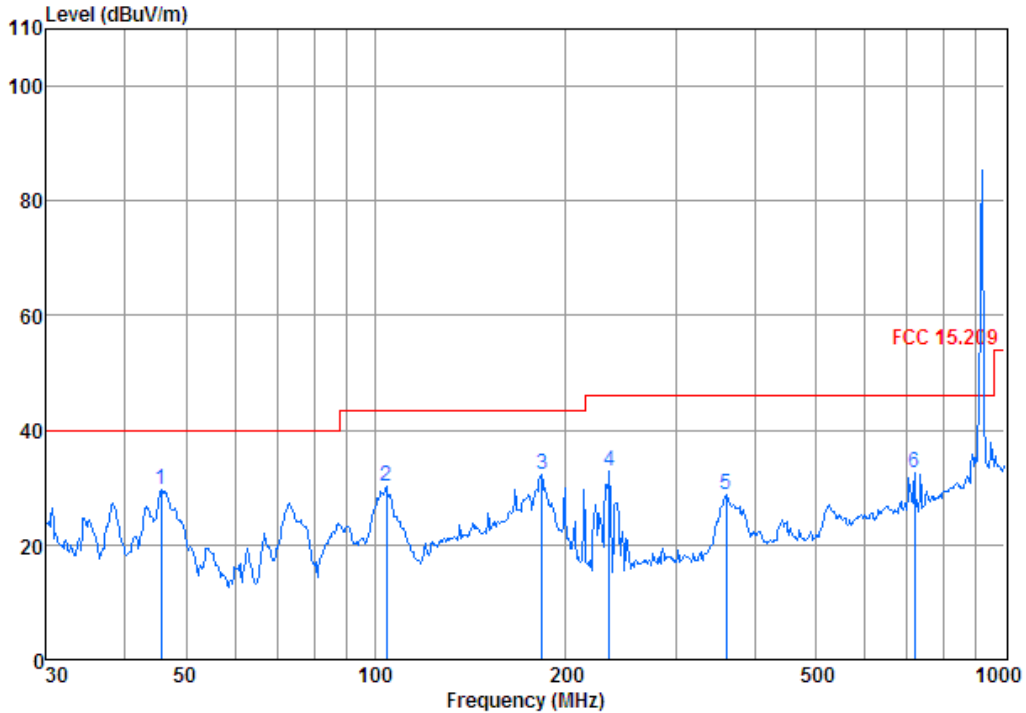
Mode : 910 TX SE

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	104.17	1.21	6.88	27.17	45.31	26.23	43.50	-17.27
2	183.84	1.38	6.70	26.76	42.27	23.59	43.50	-19.91
3	233.35	1.59	8.42	26.58	48.71	32.14	46.00	-13.86
4	360.45	2.09	10.40	26.87	49.63	35.25	46.00	-10.75
5	520.89	2.62	14.10	27.66	37.17	26.23	46.00	-19.77
6	714.17	2.95	17.10	27.39	36.58	29.24	46.00	-16.76

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914.2MHz (QP)		
Test mode:	Transmitting	Vertical



Condition: FCC 15.209 3m 3142C VERTICAL

Job No. : 5389RF

Mode : 914.2 TX SE

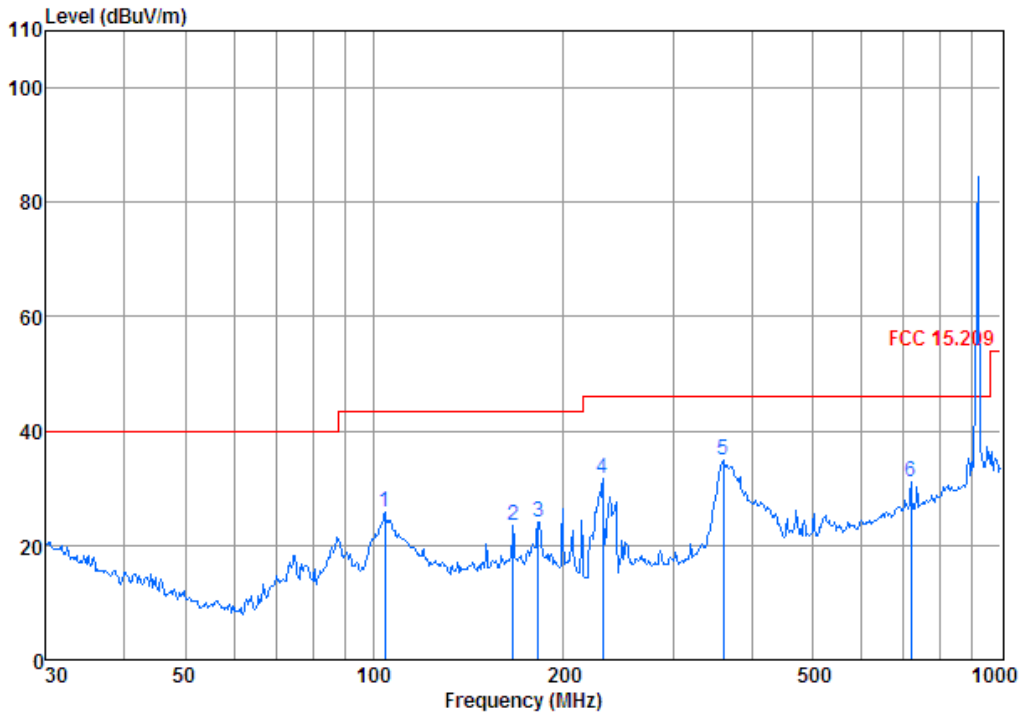
	Freq	Cable Loss	Antenna Factor	Preamp	Read Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	45.69	0.72	8.63	27.30	47.60	29.65	40.00 -10.35
2	104.17	1.21	6.88	27.17	49.27	30.19	43.50 -13.31
3	183.84	1.38	6.70	26.76	50.98	32.30	43.50 -11.20
4	234.99	1.60	8.50	26.58	49.38	32.90	46.00 -13.10
5	360.45	2.09	10.40	26.87	43.09	28.71	46.00 -17.29
6	719.20	2.96	17.10	27.39	40.01	32.68	46.00 -13.32



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Test mode:	Transmitting	Horizontal
------------	--------------	------------



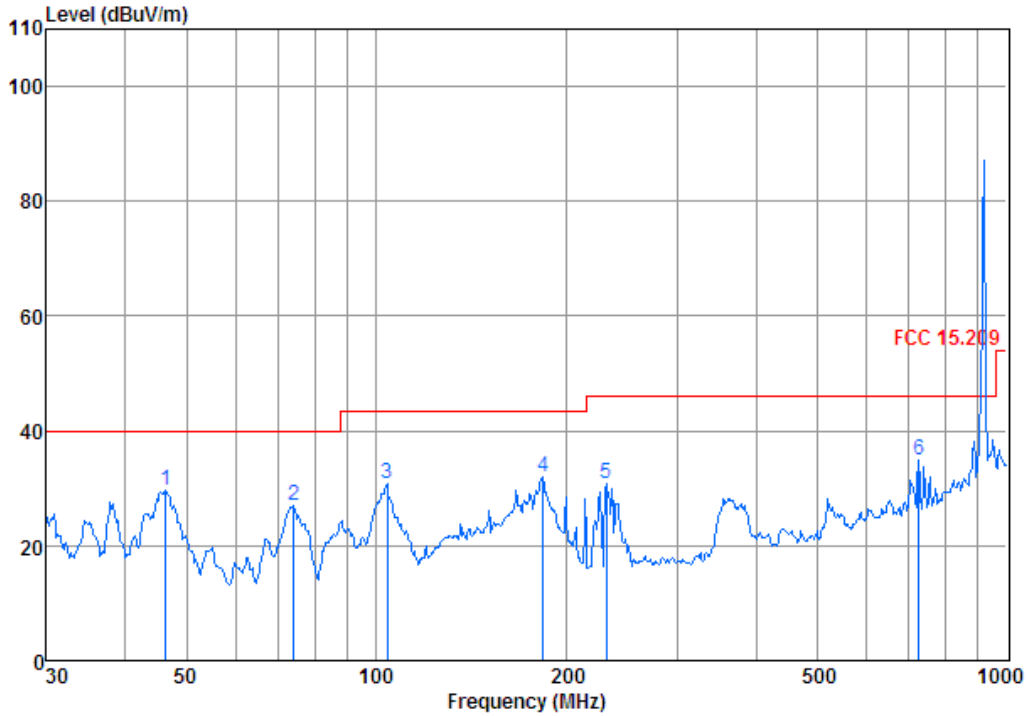
Condition: FCC 15.209 3m 3142C HORIZONTAL
 Job No. : 5389RF
 Mode : 914.2 TX SE

	Freq	Cable Loss	Antenna Factor	Preamplifier	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	104.17	1.21	6.88	27.17	44.81	25.73	43.50	-17.77
2	166.65	1.35	9.38	26.83	39.68	23.58	43.50	-19.92
3	182.56	1.37	6.70	26.77	42.70	24.00	43.50	-19.50
4	231.72	1.58	8.26	26.59	48.38	31.63	46.00	-14.37
5	360.45	2.09	10.40	26.87	49.38	35.00	46.00	-11.00
6	719.20	2.96	17.10	27.39	38.41	31.08	46.00	-14.92

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918.4MHz (QP)		
Test mode:	Transmitting	Vertical



Condition: FCC 15.209 3m 3142C VERTICAL

Job No. : 5389RF

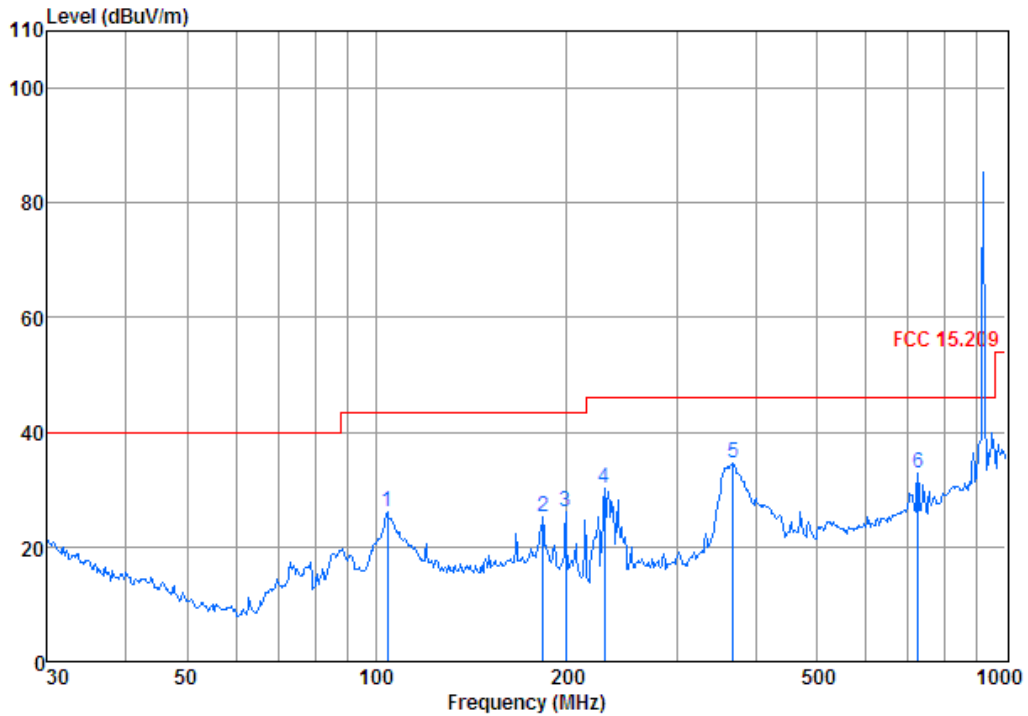
Mode : 918.4 TX SE

	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	46.34	0.74	8.32	27.30	47.77	29.53	40.00	-10.47
2	73.88	0.93	4.58	27.24	48.61	26.88	40.00	-13.12
3	104.17	1.21	6.88	27.17	49.79	30.71	43.50	-12.79
4	183.84	1.38	6.70	26.76	50.51	31.83	43.50	-11.67
5	231.72	1.58	8.26	26.59	47.48	30.73	46.00	-15.27
6	724.26	2.98	17.05	27.38	42.13	34.78	46.00	-11.22

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Test mode:	Transmitting	Horizontal
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Condition: FCC 15.209 3m 3142C HORIZONTAL
 Job No. : 5389RF
 Mode : 918.4 TX SE

	Freq	Cable Loss	Antenna Factor	Preamplifier	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	104.17	1.21	6.88	27.17	45.17	26.09	43.50 -17.41
2	183.84	1.38	6.70	26.76	43.97	25.29	43.50 -18.21
3	199.99	1.40	6.70	26.70	44.80	26.20	43.50 -17.30
4	230.10	1.57	8.10	26.59	46.99	30.07	46.00 -15.93
5	368.11	2.11	11.17	26.93	48.21	34.56	46.00 -11.44
6	724.26	2.98	17.05	27.38	40.34	32.99	46.00 -13.01

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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		
1972.423	2.82	31.55	39.55	47.51	42.33	74	-31.67	Vertical		
3061.963	3.36	33.38	40.35	48.81	45.20	74	-28.80	Vertical		
4591.980	4.55	35.06	41.47	48.85	46.99	74	-27.01	Vertical		
6237.348	5.19	35.98	40.71	49.30	49.76	74	-24.24	Vertical		
7620.790	6.23	36.00	39.52	48.73	51.44	74	-22.56	Vertical		
9354.057	6.05	37.01	38.01	46.84	51.89	74	-22.11	Vertical		
2060.630	2.86	31.89	39.61	48.77	43.91	74	-30.09	Horizontal		
3097.419	3.39	33.37	40.37	49.00	45.39	74	-28.61	Horizontal		
4602.566	4.56	35.03	41.49	49.39	47.49	74	-26.51	Horizontal		
6067.363	5.14	35.78	40.86	49.67	49.73	74	-24.27	Horizontal		
7413.103	6.02	35.97	39.69	49.11	51.41	74	-22.59	Horizontal		
9862.795	5.98	37.56	37.58	46.72	52.68	74	-21.32	Horizontal		

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SGS-CSTC Standards Technical Services Ltd.

Report No.: SZEM120900538901

Page: 46 of 53

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	
2137.962	2.89	32.05	39.67	47.03	42.30	74	-31.70	Vertical	
3126.079	3.42	33.35	40.40	47.10	43.47	74	-30.53	Vertical	
4149.541	4.27	34.22	41.15	47.14	44.48	74	-29.52	Vertical	
5333.349	4.89	34.73	41.50	48.01	46.13	74	-27.87	Vertical	
6950.243	5.48	35.85	40.10	47.91	49.14	74	-24.86	Vertical	
9162.205	6.11	36.79	38.17	44.89	49.62	74	-24.38	Vertical	
1828.100	2.73	30.57	39.50	47.49	41.29	74	-32.71	Horizontal	
2754.229	3.18	33.05	40.12	47.62	43.73	74	-30.27	Horizontal	
3767.038	3.96	33.53	40.87	48.82	45.44	74	-28.56	Horizontal	
4931.738	4.75	34.51	41.72	48.81	46.35	74	-27.65	Horizontal	
6251.727	5.19	36.00	40.71	49.23	49.71	74	-24.29	Horizontal	
8413.951	6.19	36.17	38.83	47.89	51.42	74	-22.58	Horizontal	

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Worse case mode:		FSK		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		
1999.862	2.84	31.80	39.57	46.11	41.18	74	-32.82	Vertical		
2851.018	3.23	33.19	40.19	47.08	43.31	74	-30.69	Vertical		
4236.430	4.31	34.45	41.21	47.22	44.77	74	-29.23	Vertical		
5533.501	4.96	34.96	41.32	47.57	46.17	74	-27.83	Vertical		
6902.398	5.43	35.90	40.13	48.52	49.72	74	-24.28	Vertical		
9057.326	6.14	36.66	38.27	45.98	50.51	74	-23.49	Vertical		
1958.845	2.81	31.43	39.55	46.96	41.65	74	-32.35	Horizontal		
2971.666	3.30	33.35	40.28	47.97	44.34	74	-29.66	Horizontal		
3706.807	3.91	33.45	40.81	48.40	44.95	74	-29.05	Horizontal		
5128.614	4.82	34.53	41.68	48.02	45.69	74	-28.31	Horizontal		
6606.935	5.28	36.20	40.40	48.29	49.37	74	-24.63	Horizontal		
8912.510	6.16	36.52	38.40	47.07	51.35	74	-22.65	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 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.
- 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.

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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:			

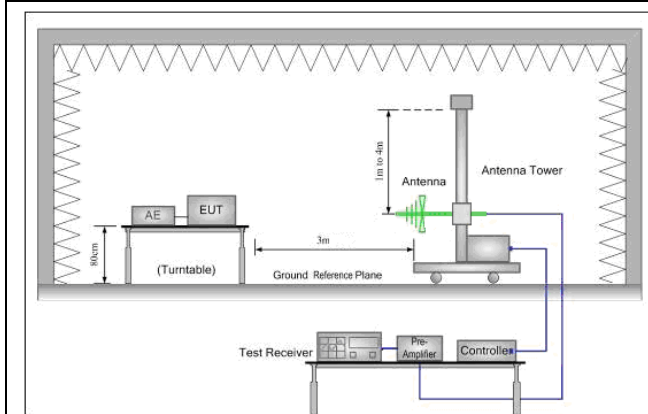


Figure 1. 30MHz to 1GHz

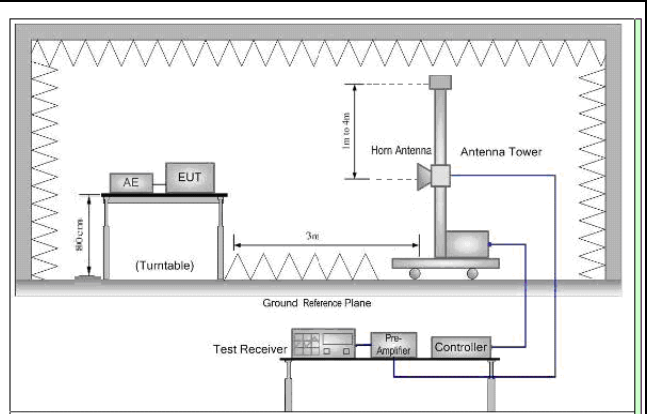


Figure 2. Above 1 GHz

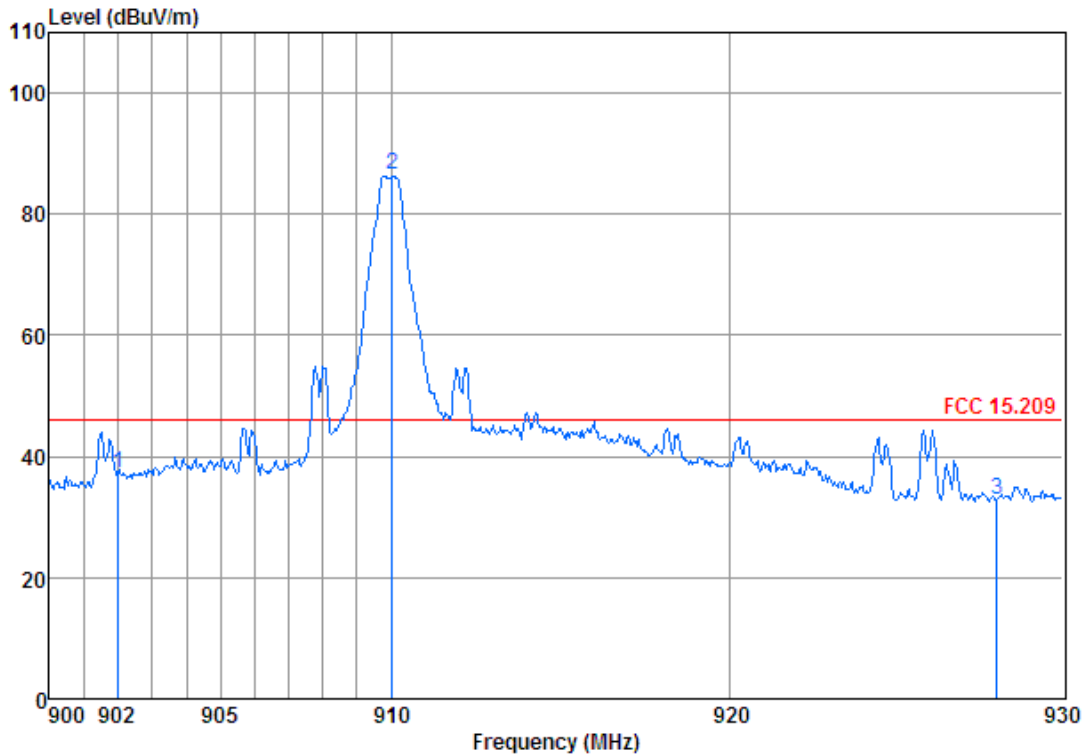


Test Procedure:	<ul style="list-style-type: none">a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.b. The EUT was set 3 meters away from the interference-receiving 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. 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

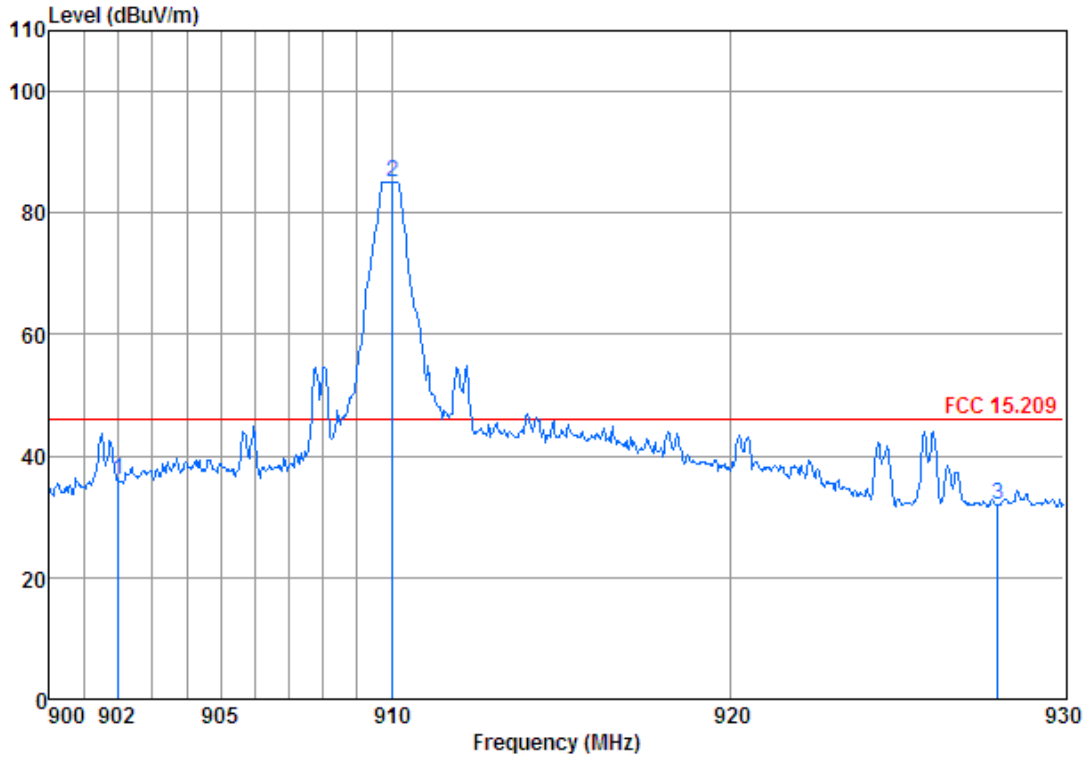
Job No. : 5389RF

Mode : 910 Bandedge

	Freq	Cable Loss	Antenna Factor	Preamplifier	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	902.00	3.60	20.23	26.75	40.26	37.34	-8.66
2	910.03	3.61	20.30	26.71	89.23	86.43	40.43
3	928.00	3.63	20.70	26.64	35.18	32.87	-13.13

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

Job No. : 5389RF

Mode : 910 Bandedge

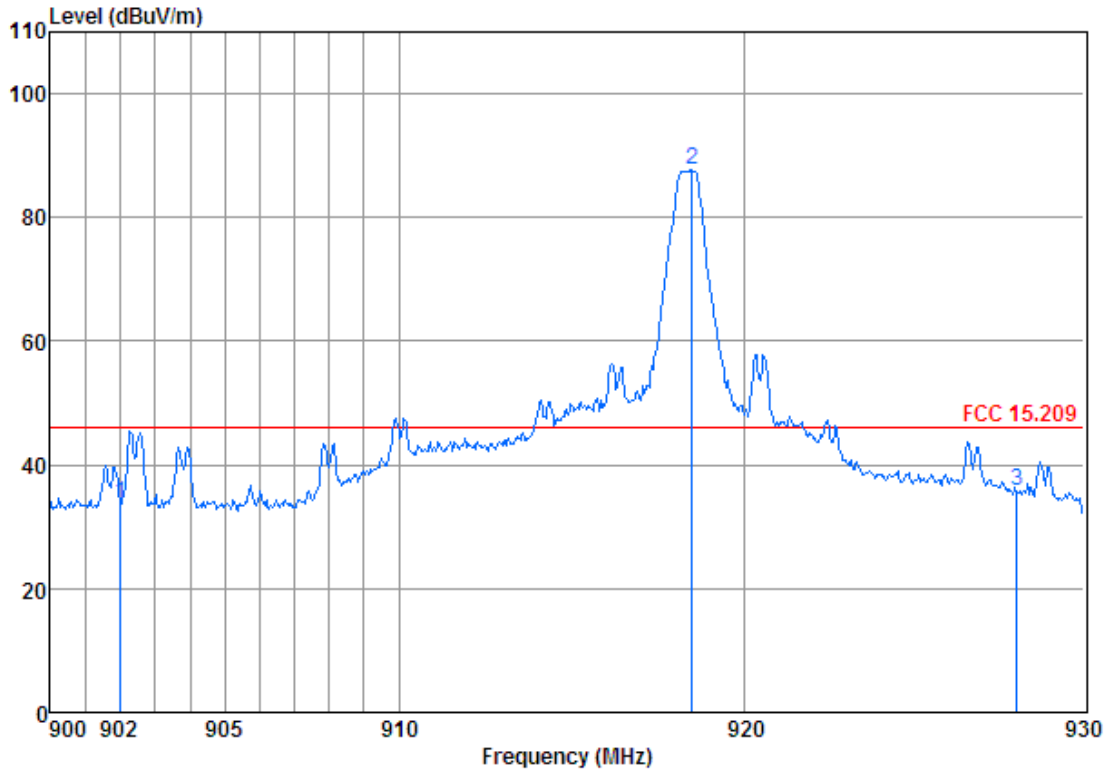
	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	902.00	3.60	20.23	26.75	38.95	36.03	-9.97
2	910.03	3.61	20.30	26.71	88.00	85.20	39.20
3	928.00	3.63	20.70	26.64	34.33	32.02	-13.98



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

Job No. : 5389RF

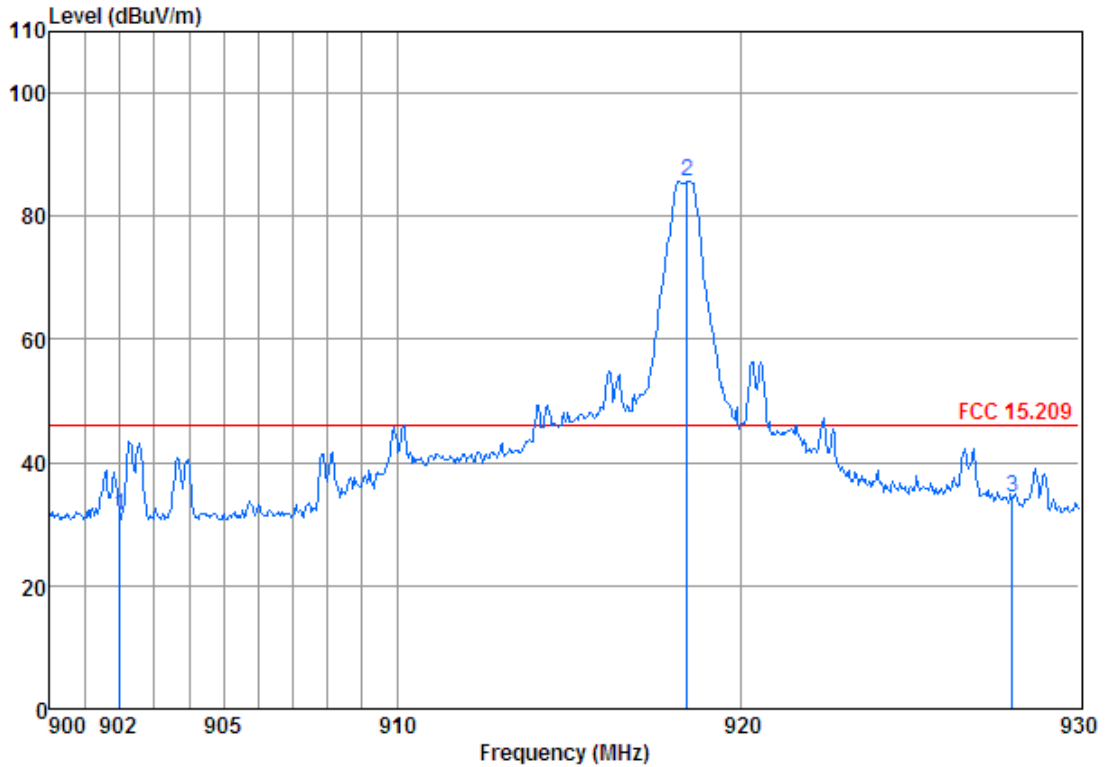
Mode : 918.4 Bandedge

	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	902.00	3.60	20.23	26.75	36.75	33.83	-12.17
2	918.51	3.62	20.80	26.68	90.02	87.76	41.76
3	928.00	3.63	20.70	26.64	38.11	35.80	-10.20

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

Job No. : 5389RF

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	34.42	31.50	46.00	-14.50
2	918.45	3.62	20.80	26.68	87.84	85.58	46.00	39.58
3	928.00	3.63	20.70	26.64	36.60	34.29	46.00	-11.71

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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