EMTEK
Access to the World

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC CFR47 PART 15 Section 15.249
REQUIREMENT

OF

RF Remote Control

MODEL No.: SRS-1C-TX, SRS-2C-TX

Trademark: N/A

FCC ID: 2AI6L-SRSTX1

REPORT NO: ES160630054E

ISSUE DATE: July 29, 2016

Prepared for

SR Smith, LLC.

1017 SW Berg Parkway, Canby, OR 97013

Prepared by

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VERIFICATION OF COMPLIANCE

Applicant:	SR Smith, LLC. 1017 SW Berg Parkway, Canby, OR 97013
Manufacturer:	SR Smith, LLC. 1017 SW Berg Parkway, Canby, OR 97013
Product Description:	RF Remote Control
Model Number:	SRS-1C-TX, SRS-2C-TX (Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only difference is color, We prepare SRS-1C-TX for test, and the worst result recorded in the report.)
Date of Test:	July 1, 2016 to July 28, 2016

We hereby certify that:
The above equipment was tested by EMTEK (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : July 1, 2016 to July 28, 2016

Prepared by : Rui Zhou

Rui Zhou/Editor

Reviewer : Joe Xia

Joe Xia/Supervisor

Approve & Authorized Signer :

Lisa Wang/Manager

Table of Contents

1. GENERAL INFORMATION

1.1. Product Description

Product information:	
Power supply:	DC 3V from 2*AAA battery
Operating Frequency Range:	915 MHz
Modulation:	GFSK
Number of Channels:	1 channel
Antenna Type:	PCB antenna
Antenna Gain:	-3.6 dBi
Temperature Range:	-10°C ~ +55°C

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AI6L-SRSTX1 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

1.3. Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4. Special Accessories

Not available for this EUT intended for grant.

1.5. Equipment Modifications

Not available for this EUT intended for grant.

1.6. Measurement Uncertainty

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Emissions	0.15 MHz to 30 MHz	95%	±3.00dB
Fundamental Fieldstrength	Not Applicable	95%	±2.94dB
Transmitter 20 dB Bandwidth	Not Applicable	95%	±0.92PPm
Radiated Spurious Emissions	30 MHz to 40 GHz	95%	±3.00dB

1.7. Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2013.10.29
The certificate is valid until 2016.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen 2015.4
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

: Accredited by FCC, July 24, 2013
The Certificate Registration Number is 406365.

: Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number is 4480A-2

2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3. Test Procedure

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. Emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013

2.4. Description of test modes

The EUT has been tested under normal operating condition.
Pre-scanned tests, X, Y, Z in the three orthogonal panels, were conducted to determine the final configuration from all possible combinations. Let EUT transmit with highest power, and the worst result was recorded with modulation GFSK.

3. SUMMARY OF TEST RESULTS

FCC Part15, Subpart C		
Standard Section	**Test Item**	**Result**
FCC		
15.207	Conducted Emission	N/A
15.209 15.205 15.249	Radiated Emission	Pass
15.249 15.209 15.205	Band edge test	Pass
15.249	20dB Bandwidth	Pass
15.203	Antenna Requirement	Pass

NOTE:
(1)"N/A" denotes test is not applicable in this Test Report

4. CONDUCTED EMISSION TEST

4.1. Applicable Standard

According to FCC Part 15.207(a)

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	Cal. Interval
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	May 28, 2016	1 Year
L.I.S.N.	Schwarzbeck	NNLK8129	101161	May 28, 2016	1 Year
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	May 29, 2016	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100122	May 29, 2016	1 Year

4.2. Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.3. Test Configuration

Test according to clause 7.3 conducted emission test setup

4.4. Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

4.5. Test Results

Not Applicable

5. RADIATED EMISSION TEST

5.1. Measurement Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013

Below 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

30GHz-1GHz：

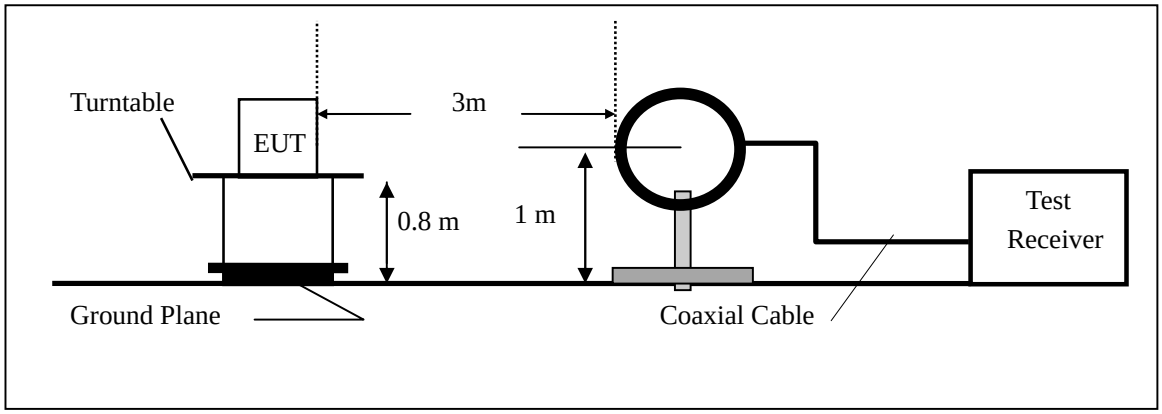
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz：

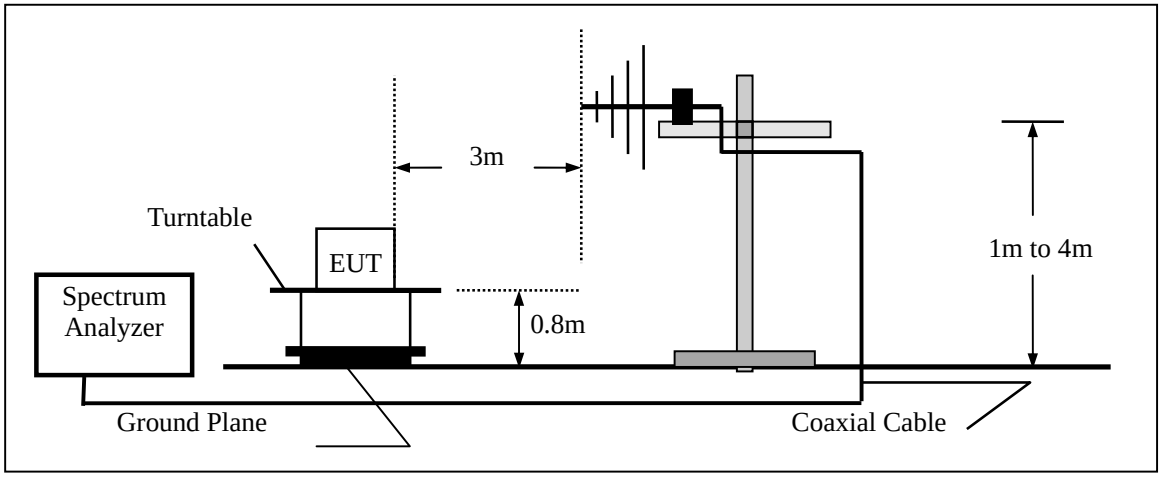
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

5.2. Test SET-UP (Block Diagram of Configuration)

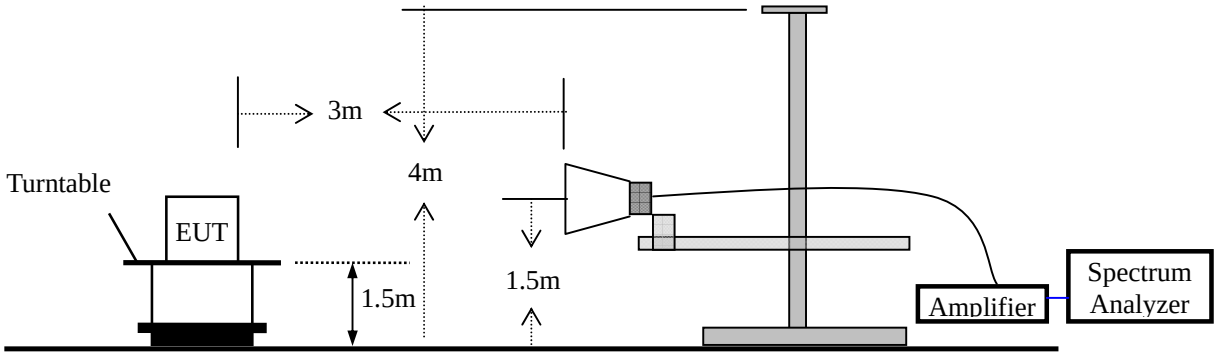
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



5.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	Cal. Interval
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	May 29, 2016	1 Year
Spectrum Analyzer	HP	E4407B	839840481	May 28, 2016	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 28, 2016	1 Year
Pre-Amplifier	HP	8447D	2944A07999	May 29, 2016	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	142	May 29, 2016	1 Year
Loop Antenna	ARA	PLA-1030/B	1029	May 29, 2016	1 Year
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 29, 2016	1 Year
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 29, 2016	1 Year
Cable	Schwarzbeck	AK9513	ACRX1	May 29, 2016	1 Year
Cable	Rosenberger	N/A	FP2RX2	May 29, 2016	1 Year
Cable	Schwarzbeck	AK9513	CRPX1	May 29, 2016	1 Year
Cable	Schwarzbeck	AK9513	CRRX2	May 29, 2016	1 Year

5.4 Radiated Emission Limit

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

The fundamental limit comply with below 94dBuV/m at 3m, Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other 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 comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Note:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

Limits of radiated emission measurement (FCC 15.209)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:
(1) The limit for radiated test was performed according to FCC PART 15C.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m) =20log Emission level (uV/m).

Limits of radiated emission measurement (FCC 15.249)

FCC Part15 (15.249) , Subpart C	
	Limit
Field strength of fundamental	50000uV/m (94 dBV/m) @ 3 m
Field strength of harmonics	500uV/m (54 dBV/m) @ 3 m

5.5 Measurement Result

Spurious Emission below 30MHz (9KHz to 30MHz)

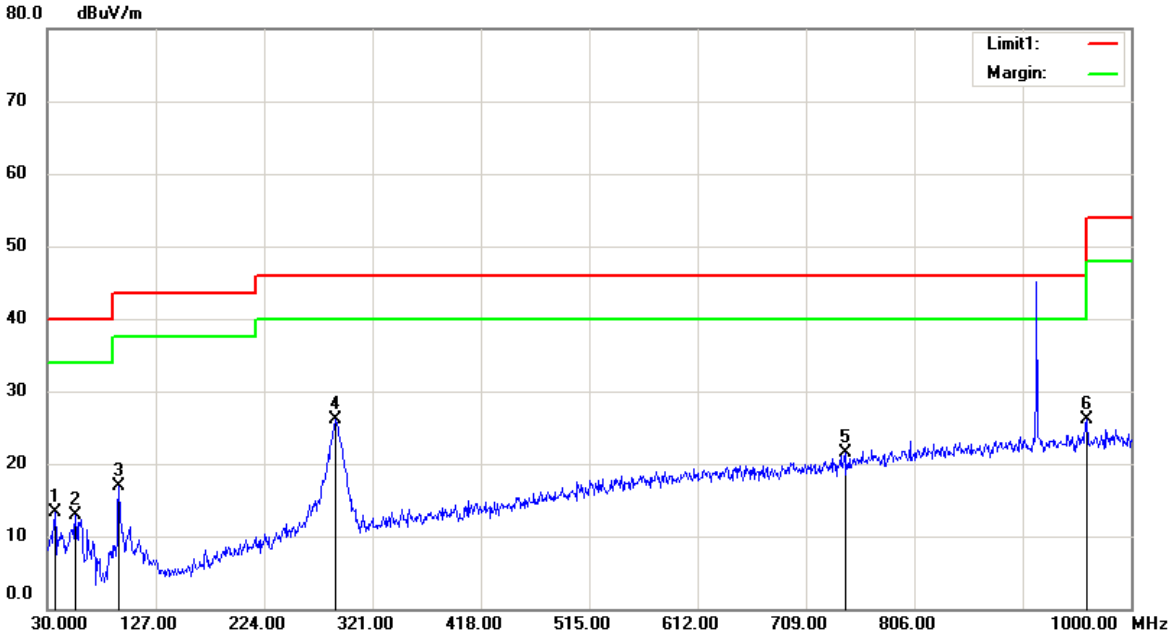
Temperature:	24℃	Test Date:	July 22, 2016
Humidity:	53 %	Test By:	KK
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor

Spurious Emission below 1GHz (30MHz to 1GHz)

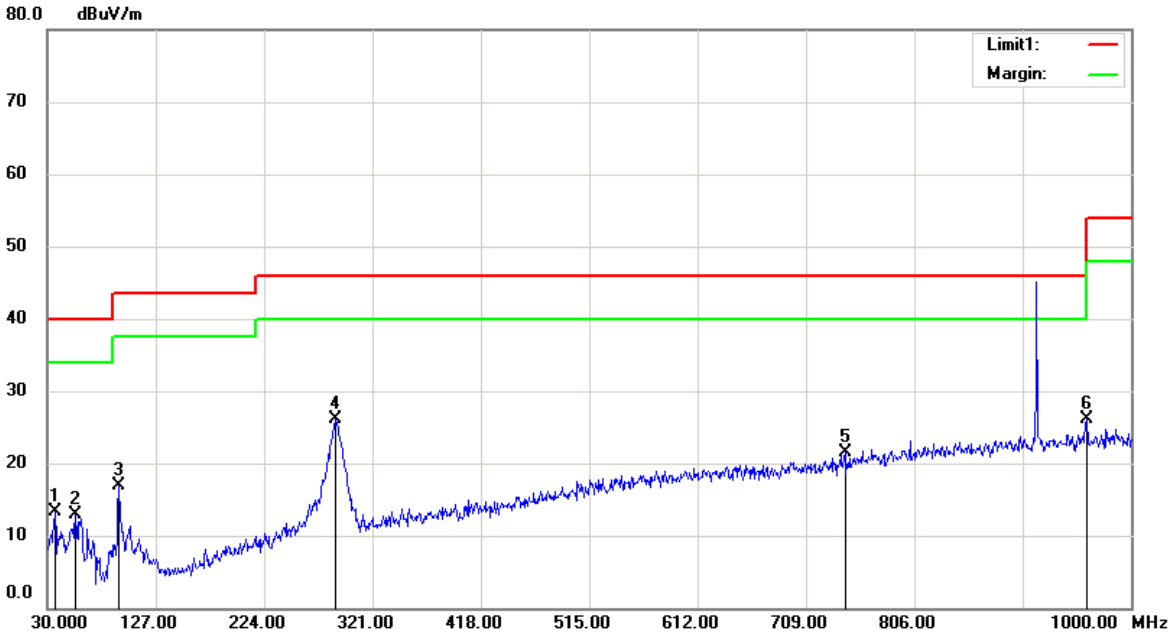
Operation Mode:	915 MHz	Test Date :	July 22, 2016
Frequency Range:	30~1000MHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	CSL
Polarization:	V		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		36.7900	44.83	-31.44	13.39	40.00	-26.61	QP			
2		55.2200	44.10	-31.22	12.88	40.00	-27.12	QP			
3		94.0200	47.95	-31.09	16.86	43.50	-26.64	QP			
4	*	288.0200	55.67	-29.58	26.09	46.00	-19.91	QP			
5		743.9200	40.98	-19.47	21.51	46.00	-24.49	QP			
6		960.2300	41.77	-15.62	26.15	54.00	-27.85	QP			

*:Maximum data x:Over limit !:over margin Operator: Wang

Operation Mode:	915 MHz	Test Date :	July 22, 2016
Frequency Range:	30~1000MHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	CSL
Polarization:	H		



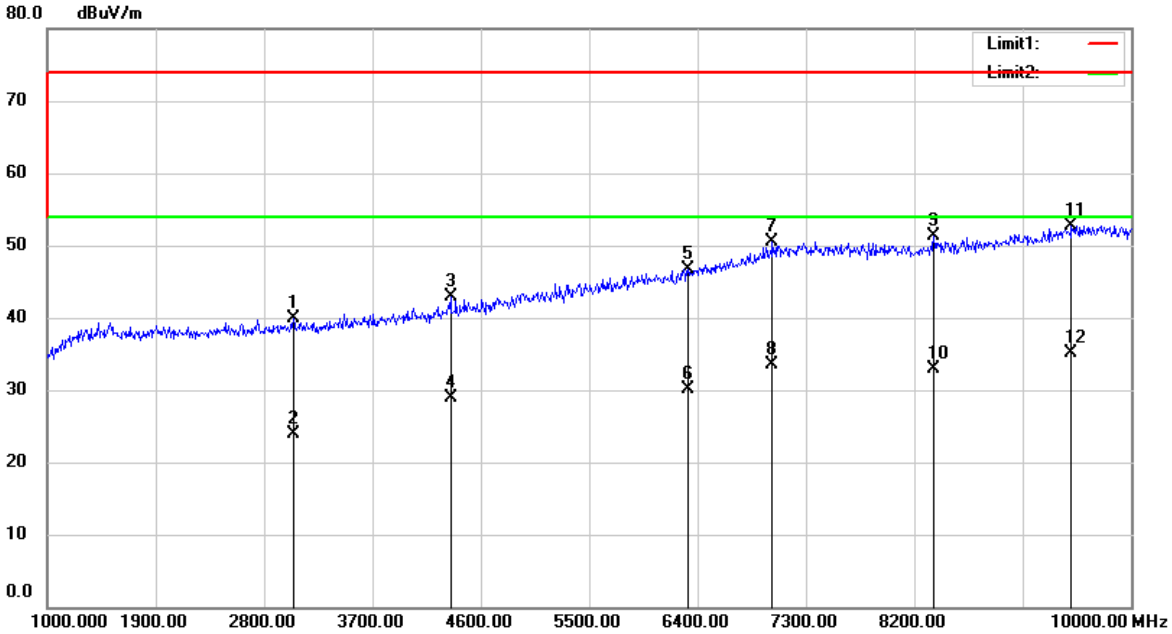
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		36.7900	44.83	-31.44	13.39	40.00	-26.61	QP			
2		55.2200	44.10	-31.22	12.88	40.00	-27.12	QP			
3		94.0200	47.95	-31.09	16.86	43.50	-26.64	QP			
4	*	288.0200	55.67	-29.58	26.09	46.00	-19.91	QP			
5		743.9200	40.98	-19.47	21.51	46.00	-24.49	QP			
6		960.2300	41.77	-15.62	26.15	54.00	-27.85	QP			

*:Maximum data x:Over limit !:over margin Operator: Wang

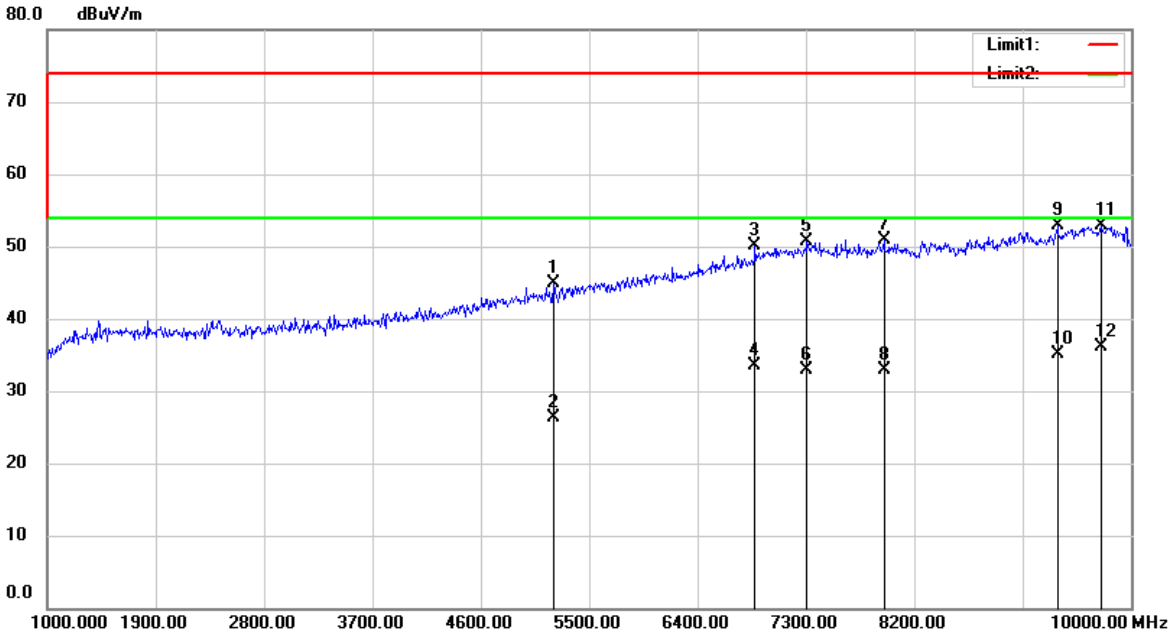
Spurious Emission Above 1GHz (1GHz to 25GHz)

Operation Mode:	915MHz	Test Date :	July 22, 2016
Frequency Range:	1-10GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	CSL

V:



H:



Freq. (MHz)	Ant.Pol. H/V	Emission Level		Limit at 3m		Margin	
		PK (dBuV/m)	AV (dBuV/m)	PK (dBuV/m)	AV (dBuV/m)	PK (dB)	AV (dB)
3043	V	39.84	23.90	74.00	54.00	-34.16	-30.10
4348	V	42.96	29.00	74.00	54.00	-31.04	-25.00
6319	V	46.76	30.20	74.00	54.00	-27.24	-23.80
7021	V	50.46	33.60	74.00	54.00	-23.54	-20.40
8362	V	51.34	32.90	74.00	54.00	-22.66	-21.10
9505	V	52.77	35.10	74.00	54.00	-21.23	-18.90
5203	H	44.82	26.30	74.00	54.00	-29.18	-27.70
6877	H	50.15	33.60	74.00	54.00	-23.85	-20.40
7309	H	50.69	32.90	74.00	54.00	-23.31	-21.10
7948	H	50.90	33.00	74.00	54.00	-23.10	-21.00
9388	H	52.84	35.20	74.00	54.00	-21.16	-18.80
9748	H	52.85	36.20	74.00	54.00	-21.15	-17.80

Note: (1) All Readings are Peak Value.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Transmitter Fundamental Field Strength

Operation Mode:	915MHz	Test Date :	July 22, 2016
FCC Part:	15.249(a)	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	CSL

Freq. (MHz)	Ant.Pol. H/V	Emission Level PK (dBuV/m)	Limit at 3m AV (dBuV/m)	Margin (dB)
915.02	V	48.21	94	-45.79
915.02	H	62.35	94	-31.65

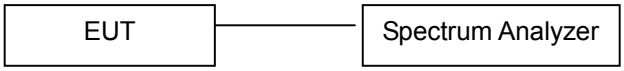
Note: (1) All Readings are Peak Value.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

6. BANDWIDTH TEST

6.1. Measurement Procedure

The EUT was operating in normal mode. Printed out the test result from the spectrum by hard copy function.

6.2. Test SET-UP (Block Diagram of Configuration)



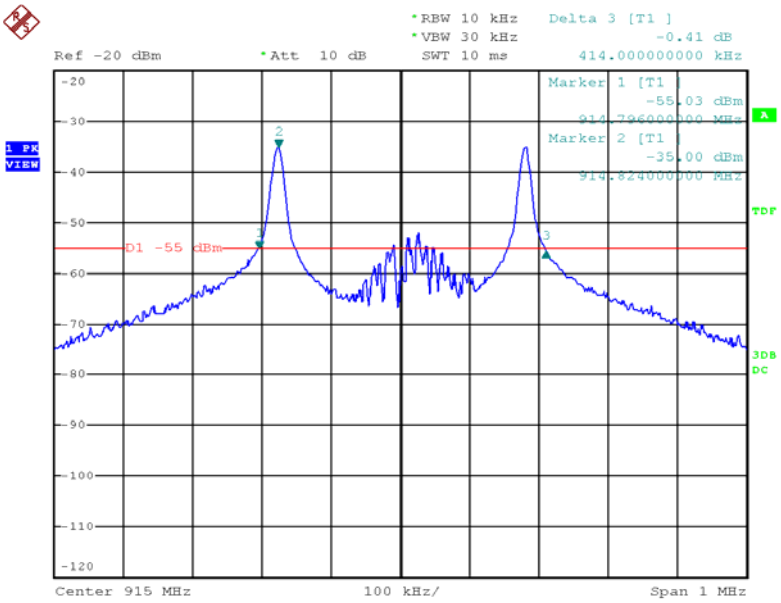
6.3. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/15/2016	05/14/2017

6.4. Measurement Results:

Test By:	CSL	Test Date:	July 28, 2016
Temperature:	24℃	Humidity:	55 %
Modulation:	GFSK		

Channel frequency (MHz)	20dB Down BW(kHz)
915	414.00



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7. BAND EDGE TEST

7.1. Measurement Procedure

1. The EUT was Operating in normal mode. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 1.5 m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

7.2. Test SET-UP (Block Diagram of Configuration)

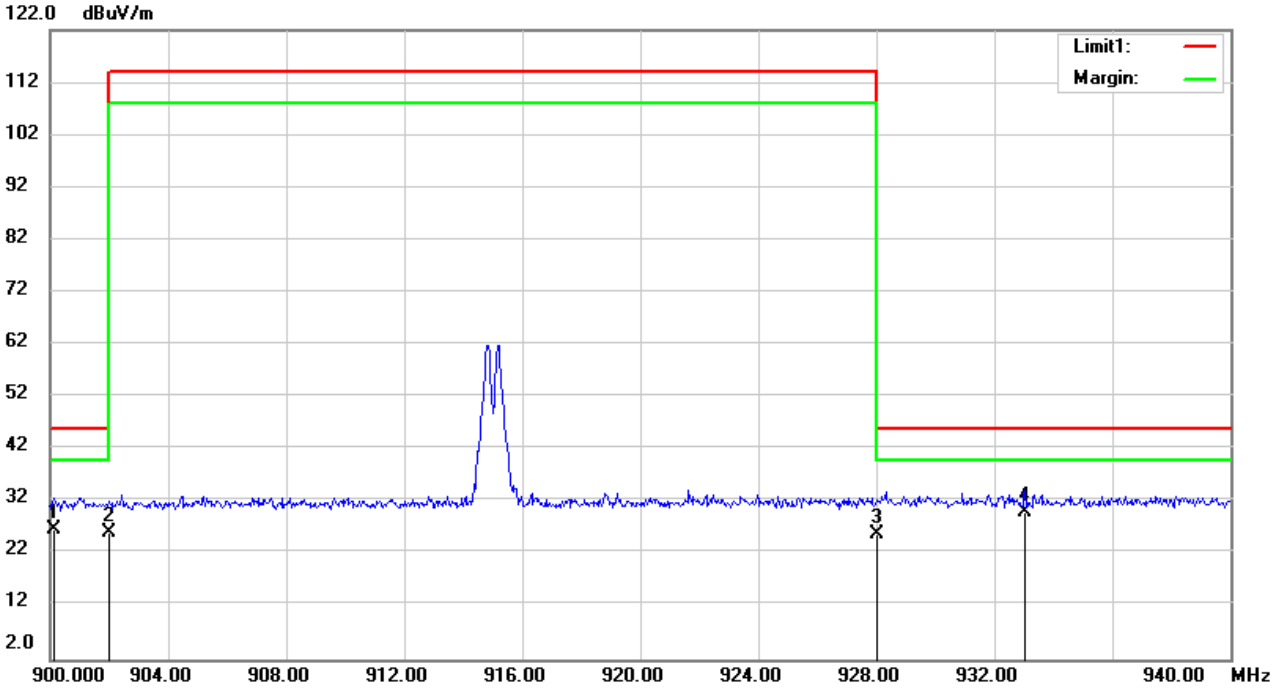
As 5.2 Test set up (B) and (C)

7.3. Measurement Equipment Used:

Same as 5.3 Radiated Emission Measurement.

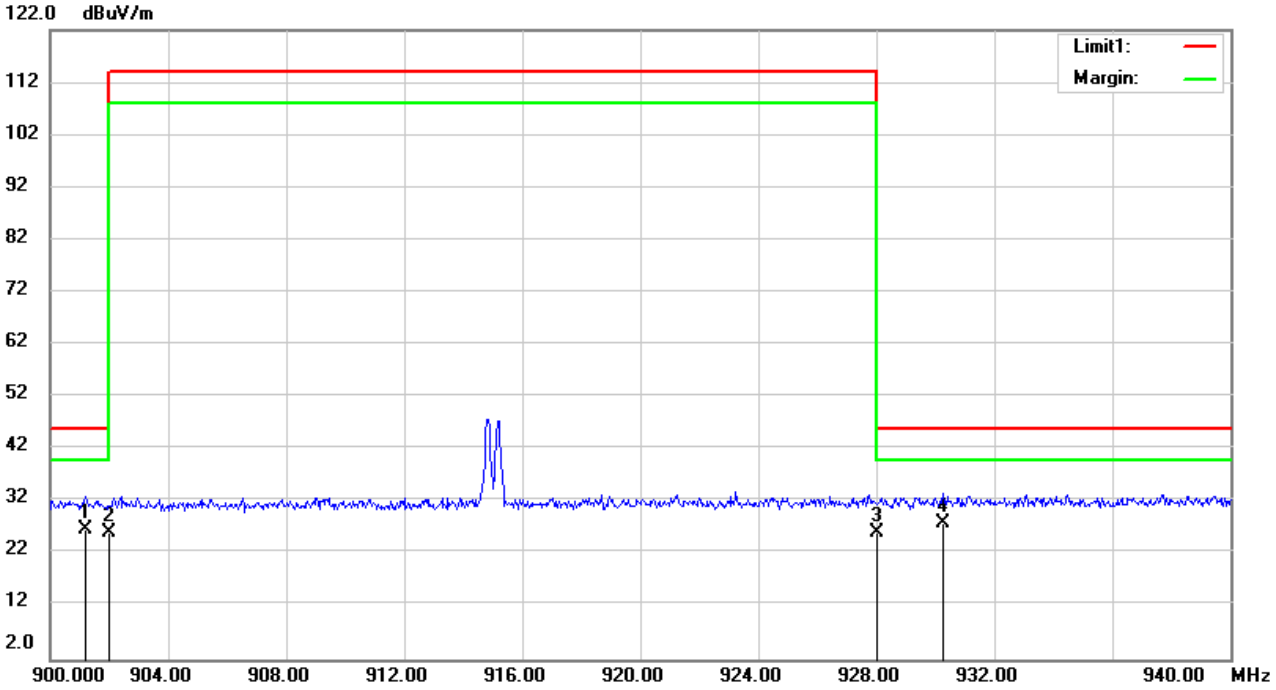
7.4. Measurement Results:

H:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		900.1200	28.46	-1.56	26.90	46.00	-19.10	QP			
2		902.0000	27.83	-1.53	26.30	46.00	-19.70	QP			
3		928.0000	27.04	-1.14	25.90	46.00	-20.10	QP			
4	*	933.0400	31.26	-1.06	30.20	46.00	-15.80	QP			

V:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		901.2000	28.25	-1.55	26.70	46.00	-19.30	QP			
2		902.0000	27.83	-1.53	26.30	46.00	-19.70	QP			
3		928.0000	27.24	-1.14	26.10	46.00	-19.90	QP			
4	*	930.2400	29.00	-1.10	27.90	46.00	-18.10	QP			

8. Antenna Application

8.1. Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, 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.

8.2. Result

The EUT has a PCB antenna, the gain is -3.6 dBi, which in accordance to section 15.203, please refer to the internal photos.