NVLAP Lab Code 200087-0

Application Submittal Report For Grant of Certification

FOR

Model: ISN-G-1 (Intelligent Sensor Node)
903.1-926.9 MHz
FHSS Transmission System

FCC ID: 2AFK4-ISNG1
IC: 20563-ISNG1

FOR

C2Ag, LLC

PO Box 315, 207 South Main Street
Archie, MO 64725

Test Report Number: 150811
IC Test Site Registration: 3041A-1

Authorized Signatory: Scot D Rogers
Scot D. Rogers

NVLAP Lab Code 200087-0

ROGERS LABS, INC.

4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

Engineering Test Report For Grant of Certification Application

FOR

47CFR, PART 15C - Paragraph 15.247,
Industry Canada RSS-247
License Exempt FHSS Intentional Radiator

For

C2Ag, LLC

PO Box 315, 207 South Main Street
Archie, Mo. 64725

Model: ISN-G-1
FHSS Transmission System
Frequency Range 903.1-926.9 MHz
FCC ID#: 2AFK4-ISNG1
IC: 20563-ISNG1

Test Date: August 11, 2015

Certifying Engineer: Scot D Rogers

Scot D. Rogers
Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053
Telephone/Facsimile: (913) 837-3214

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Revisions

Revision 3 Issued March 13, 2016 – corrected type errors and band edge plots
Revision 2 Issued March 11, 2016 – corrected type errors and emission plots
Revision 1 Issued March 1, 2016

Forward

The following information is submitted for consideration in obtaining Grant of Certification for License Exempt FHSS Intentional Radiator operating under 47CFR Paragraph 15.247 and Industry Canada RSS-247 operations in the 902 – 928 MHz frequency band.

Name of Applicant: C2Ag, LLC
PO Box 315, 207 South Main Street
Archie, Mo. 64725

Model: ISN-G-1
FCC I.D.: 2AFK4-ISNG1 IC: 20563-ISNG1
Frequency Range: 903.1-926.9 MHz
Operating Power: 0.99 Watts, Occupied Bandwidth 21.8 kHz

Opinion / Interpretation of Results

Test Performed per 47CFR	Minimum Margin (dB)	Results
Antenna requirement per 47CFR 15.203	N/A	Complies
Radiated Emissions Restricted Bands (Tx)	-19.0	Complies
AC Line Conducted Emissions	N/A	Complies
Radiated Emissions (General Out-of-Band)	-12.8	Complies
Radiated Emissions per (harmonics)	-10.3	Complies

Equipment Tested

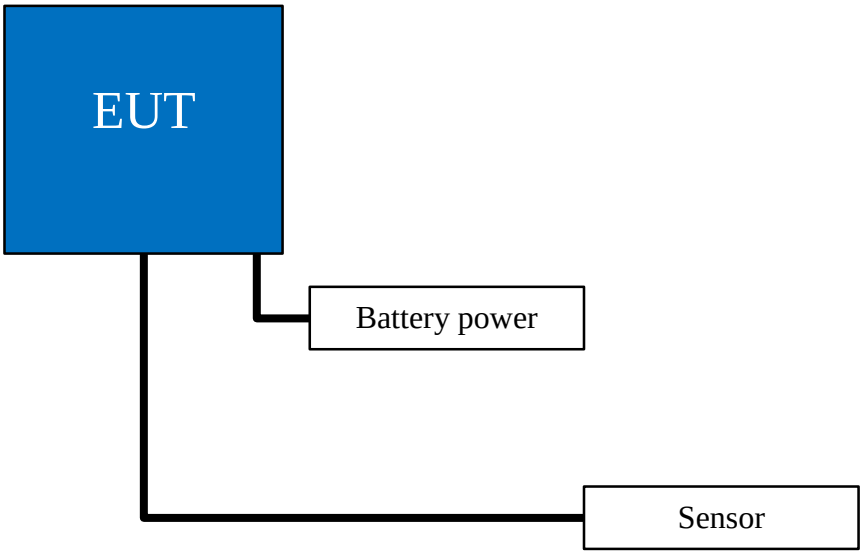
Equipment	Model / PN	Serial Number	FCC Identifier	IC Identifier
EUT	ISN-G-1	ENG1	2AFK4-ISNG1	20563-ISNG1
Soil Sensor	Soil Probe	N/A	N/A	N/A

Test results in this report relate only to the items tested

Equipment Function and Configuration

The EUT is a 903.1-926.9 MHz frequency hopping spread spectrum transceiver system incorporating certified transceiver modules into single enclosure. The system combines battery power, solar panel, and soil sensor probe for placement into agricultural field applications. The EUT operates from direct current power only supplied from battery only and offers no provision for connection to utility AC power systems. The design utilizes internal fixed antenna system and offers no provision for user replacement. The EUT also contains transceiver module (FCC ID: T9JRN4020, IC: 6514A-RN4020) providing low power communications in the 2400-2483.5 MHz frequency band. The manufacturer provided software which allowed testing personnel operational control of the system for testing purposes. The EUT was arranged as described by the manufacturer emulating user configuration during testing. The EUT offers no other interface connections than those documented in the configuration options presented. During testing all interface connections were appropriately terminated. As requested by the manufacturer and required by regulations, the equipment was tested for emissions compliance using the available configurations with the worst-case data presented. Test results in this report relate only to the products described in this report.

Equipment Configuration



Application for Certification

(1) Manufacturer: C2Ag, LLC
PO Box 315, 207 South Main Street
Archie, Mo. 64725

(2) Identification: Model: ISN-G-1
FCC I.D.: 2AFK4-ISNG1
IC: 20563-ISNG1

(3) Instruction Book:

Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions:

Refer to Exhibit of Operational Description.

(5) Block Diagram with Frequencies:

Refer to Exhibit of Operational Description.

(6) Report of Measurements:

Report of measurements follows in this Report.

(7) Photographs: Construction, Component Placement, etc.:

Refer to Exhibit for photographs of equipment.

(8) List of Peripheral Equipment Necessary for operation. The equipment operates from direct current battery power only. The EUT offers no other connection ports than those presented in this filing

(9) Transition Provisions of 15.37 are not being requested.

(10) Not Applicable. The unit is not a scanning receiver.

(11) Not Applicable. The EUT does not operate in the 59 – 64 GHz frequency band.

(12) The equipment is not software defined and this section is not applicable.

Applicable Standards & Test Procedures

In accordance with the 47CFR, dated October 1, 2014, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and applicable parts of paragraph 15, Part 15C Paragraph 15.247 and Industry Canada standard RSS-247 Issue 1 the following information is submitted. Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI C63.10-2013 and DA00-705.

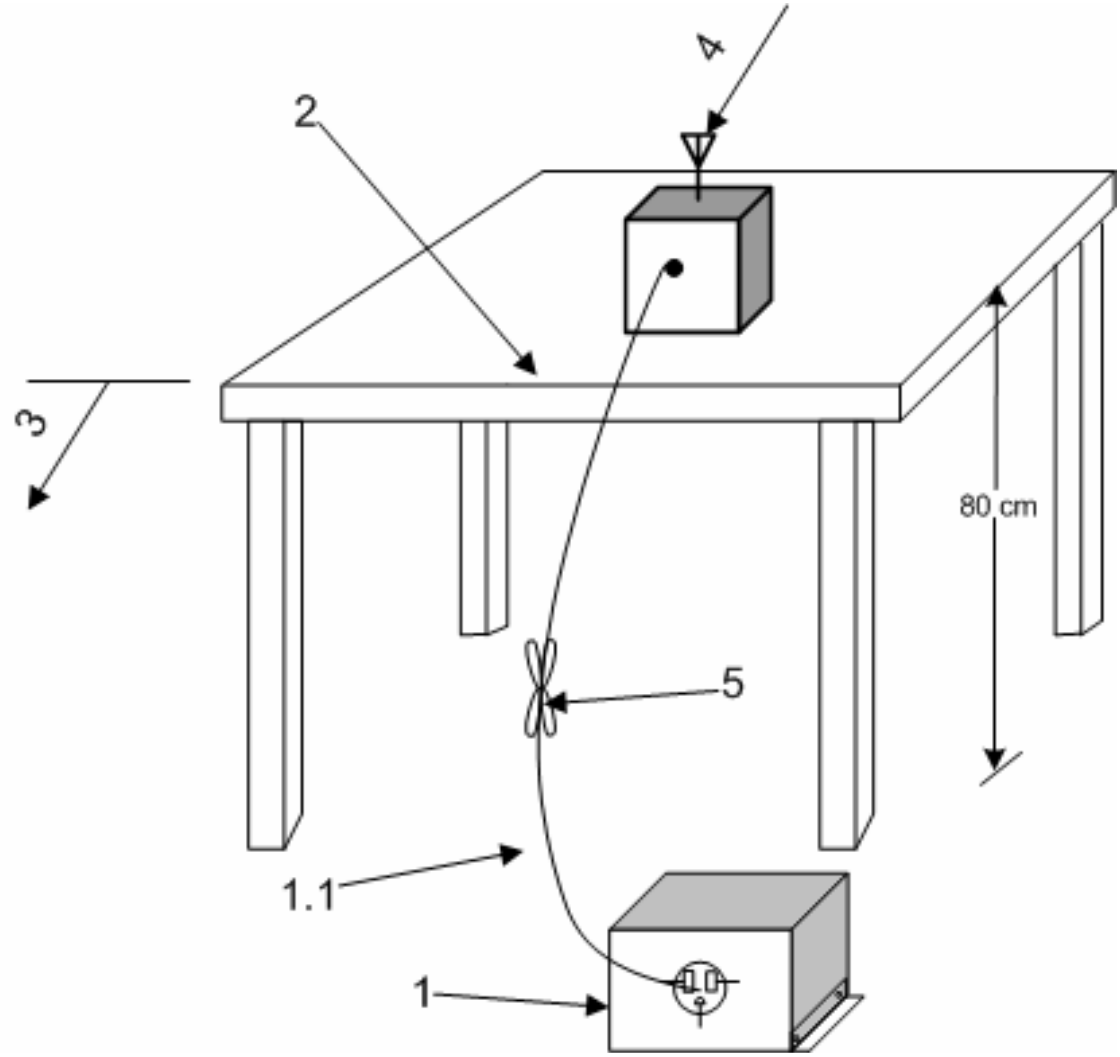
Equipment Testing Procedures

AC Line Conducted Emission Test Procedure

The equipment operates solely from Direct Current (DC) Power and offers no provision for connection to utility AC power systems. Therefore, no AC power line conducted emissions test is required or performed.

Radiated Emission Test Procedure

The EUT was placed on a rotating 0.9 x 1.2-meter platform, elevated as required above the ground plane at a distance of 3 meters from the FSM antenna. Radiated emissions testing were performed as specified in ANSI C63.10-2013. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was taken using a spectrum analyzer. The frequency spectrum from 9 kHz to 10,000 MHz was searched for during preliminary investigation. Refer to diagrams 1 and 2 showing typical test arrangement. The EUT was tested while oriented in each of three orthogonal axis positions. The test setup exhibit provides detailed orientation (EUT in vertical plane) of module once worst case emissions were determined.



1. A LISN is optional for radiated measurements between 30 MHz to 1000 MHz, but not allowed for measurements below 30 MHz and above 1000 MHz (See 6.4.3, 6.5.1, and 6.6.3). If used, connect EUT to one LISN. Unused LISN measuring port connectors shall be terminated in 50Ω. LISN can be placed on top of, or immediately beneath, reference ground plane (see 6.2.2 and 6.2.3.1).
   1.1 LISN spaced at least 80 cm from nearest part of EUT chassis.
2. The EUT shall be placed in the center of the table to the extent possible (See 6.2.3.1 and 6.3.4).
3. A vertical conducting plane, if used for conducted tests per 6.2.2, shall be removed for radiated emission tests.
4. Antenna may be integral or detachable, depending on the EUT.
5. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

Diagram 1 Test arrangement for radiated emissions

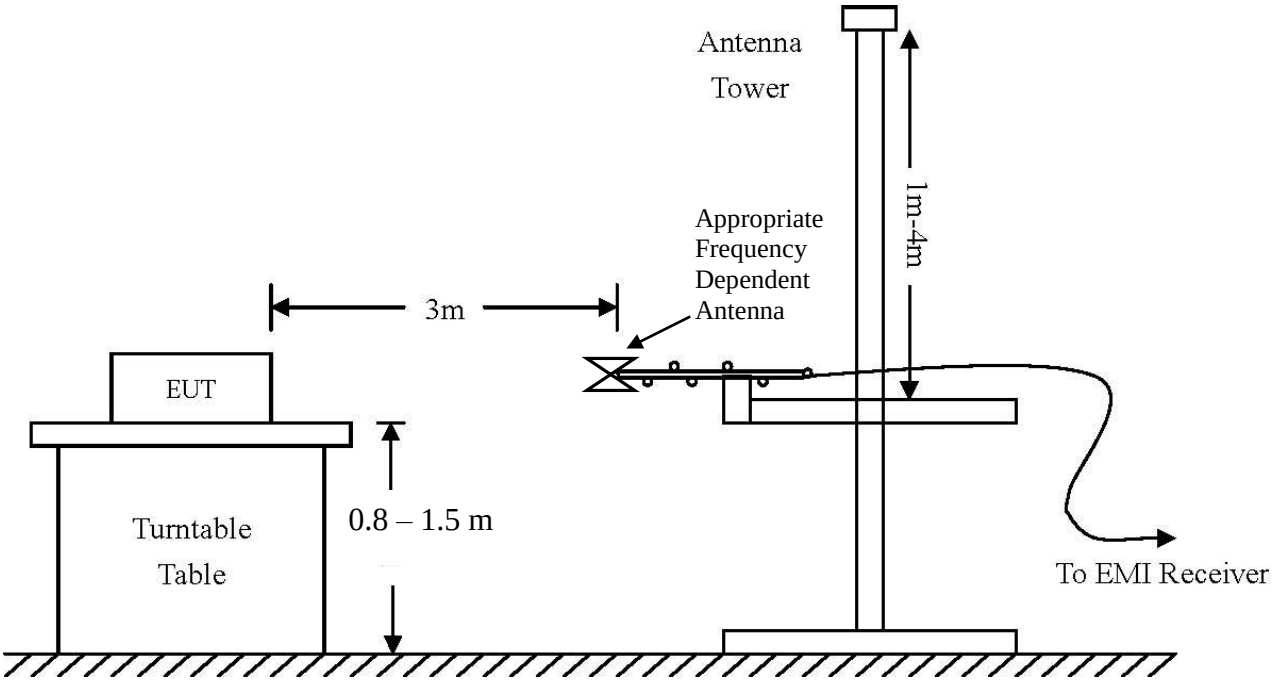


Diagram 2 Test arrangement for radiated emissions tested on Open Area Test Site (OATS)

Test Site Locations

Conducted EMI	The AC power line conducted emissions testing performed in a shielded screen room located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS
Radiated EMI	The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS
Site Registration	Refer to Annex for Site Registration Letters
NVLAP Accreditation	Lab code 200087-0

List of Test Equipment

A Rohde and Schwarz ESU40 and/or Hewlett Packard 8591EM was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Rohde and Schwarz ESU40 and/or Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table.

Frequency: 9 kHz-30 MHz	Frequency: 30 MHz- 1 GHZ	Frequency: Above 1 GHz
Loop Antenna	Broadband Biconilog	Horn
RBW = 9 kHz	RBW = 120 kHz	RBW = 1 MHz
VBW = 30 kHz	VBW = 500 kHz	VBW = 3 MHz
Sweep time = Auto	Sweep time = Auto	Sweep time = Auto
Detector = PK, QP	Detector = PK, QP	Detector = PK, AV
Antenna Height 1m	Antenna Height 1-4m	Antenna Height 1-4m

Equipment	Manufacturer	Model (SN)	Band	Cal Date	Due
☐ LISN	FCC	FCC-LISN-50-2-10(1PA) (160611)	.15-30MHz	6/15	5/16
☒ Cable	Time Microwave	750HF290-750 (L10M)	9kHz-40 GHz	10/14	10/15
☐ Cable	Belden	RG-58 (L1-CAT3-11509)	9kHz-30 MHz	10/14	10/15
☐ Cable	Belden	RG-58 (L2-CAT3-11509)	9kHz-30 MHz	10/14	10/15
☐ Antenna	ARA	BCD-235-B (169)	20-350MHz	10/14	10/15
☐ Antenna	EMCO	3147 (40582)	200-1000MHz	10/14	10/15
☒ Antenna	ETS-Lindgren	3117 (200389)	1-18 GHz	5/15	5/17
☐ Antenna	Com Power	AH-118 (10110)	1-18 GHz	10/14	10/15
☒ Antenna	Com Power	AH-840 (101046)	18-40 GHz	5/15	5/17
☒ Antenna	EMCO	6509 (9502-1374)	.001-30 MHz	10/14	10/15
☒ Antenna	Sunol	JB-6 (A100709)	30-1000 MHz	10/14	10/15
☐ Antenna	EMCO	3143 (9607-1277)	20-1200 MHz	5/15	5/16
☐ Analyzer	HP	8591EM (3628A00871)	9kHz-1.8GHz	5/15	5/16
☐ Analyzer	HP	8562A (3051A05950)	9kHz-110GHz	5/15	5/16
☐ Analyzer	HP External Mixers	11571, 11970	25GHz-110GHz	5/15	5/16
☒ Analyzer	Rohde & Schwarz	ESU40 (100108)	20Hz-40GHz	5/15	5/16
☒ Amplifier	Com-Power	PA-010 (171003)	100Hz-30MHz	10/14	10/15
☒ Amplifier	Com-Power	CPPA-102 (01254)	1-1000 MHz	10/14	10/15
☒ Amplifier	Com-Power	PAM-118A (551014)	0.5-18 GHz	10/14	10/15

Environmental Conditions

Ambient Temperature	22.8° C
Relative Humidity	50%
Atmospheric Pressure	1020.8 mb

Units of Measurements

Conducted EMI Data is in dBµV; dB referenced to one microvolt

Radiated EMI Data is in dBµV/m; dB/m referenced to one microvolt per meter

Sample Calculation:

RFS = Radiated Field Strength, FSM = Field Strength Measured

A.F. = Receive antenna factor, Gain = amplification gains and/or cable losses

RFS (dBµV/m @ 3m) = FSM (dBµV) + A.F. (dB/m) - Gain (dB)

Comparison for Compliance: RFS – Limit ≤ 0 = compliant with requirement

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to demonstrate compliance with the 47CFR Part 15C and RSS-247 and Industry Canada RSS-247 emission requirements. There were no deviations to the specifications.

Intentional Radiators

As per 47CFR, Subpart C, paragraph 15.247 and Industry Canada RSS-247 Issue 1 the following information is submitted.

Antenna Requirements

The EUT utilizes fixed antenna system internal to the enclosure. The antenna connection point complies with the unique antenna connection requirements.

Restricted Bands of Operation

The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Spurious emissions falling in the restricted frequency bands of operation were measured at a distance of three meters on the OATS. Emissions were measured using appropriate antennas, pyramidal horns, amplification stages, and spectrum analyzer/receiver. Emissions emanating from the EUT and support system falling in the restricted bands of operation are presented in Table 1. No other significant emission was observed which fell into the restricted bands of operation.

Table 1 Radiated Emissions in Restricted Bands

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
2709.3	52.7	N/A	34.9	50.7	N/A	32.8	54.0
2745.0	50.5	N/A	33.4	50.6	N/A	32.8	54.0
2780.4	52.8	N/A	35.0	50.8	N/A	33.2	54.0
3612.4	39.8	N/A	17.8	47.1	N/A	28.1	54.0
3660.0	38.2	N/A	14.7	41.6	N/A	20.1	54.0
3707.2	38.8	N/A	16.0	40.4	N/A	14.0	54.0
4515.5	38.6	N/A	8.1	38.0	N/A	8.3	54.0
4575.0	39.0	N/A	10.9	36.1	N/A	6.9	54.0
4634.0	42.2	N/A	16.8	39.9	N/A	15.0	54.0
5418.6	40.7	N/A	10.1	40.1	N/A	10.7	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Quasi-Peak amplitude emissions are recorded above for frequency range of 30-1000 MHz.
Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for Radiated Emissions in Restricted Bands

The EUT demonstrated compliance with the radiated emissions requirements of 47CFR Part 15C Intentional Radiators. The EUT transmitter demonstrated a minimum margin of –19.0 dB below the requirements. Peak, Quasi-peak, and average amplitudes were checked for compliance with the regulations. Worst-case emissions are reported with other emissions found in the restricted frequency bands at least 20 dB below the requirements.

General Radiated EMI Testing Procedure

The EUT was arranged in the test configuration emulating worst-case equipment configuration and operated through available modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Investigations were performed to identify the frequencies, which produced the highest radiated emissions. Radiated emission investigations were performed from 9 kHz to 10,000 MHz with the EUT oriented in the manufacturer defined orientation. Frequencies of interest were recorded for use during testing on the OATS. Each investigated emission was then maximized at the OATS site before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open area test site at a distance of 3 meters between the EUT and the receiving antenna. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. Measured emission levels were maximized by EUT placement on the table, changing cable location, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Loop from 0.009 to 30 MHz, Broadband Biconical from 30 MHz to 200 MHz, Log Periodic from 200 MHz to 1 GHz, and/or Biconilog from 30 MHz to 1000 MHz, and above 1 GHz, Double Ridge or Pyramidal Horns, notch filters and appropriate amplifiers and mixers were utilized.

Table 2 General Radiated Emissions Data (worst-case)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
123.4	26.5	20.8	N/A	26.2	17.9	N/A	43.5
127.8	24.8	20.4	N/A	11.9	7.1	N/A	43.5
128.0	25.8	20.0	N/A	10.6	6.4	N/A	43.5
129.4	24.6	19.6	N/A	10.5	4.1	N/A	43.5
130.2	25.8	20.5	N/A	9.6	4.9	N/A	43.5
200.0	32.2	30.7	N/A	30.9	25.1	N/A	43.5
280.0	27.3	25.1	N/A	18.8	15.5	N/A	46.0
360.0	32.2	28.4	N/A	32.1	29.2	N/A	46.0
440.0	19.9	14.6	N/A	13.3	10.1	N/A	46.0

Other emissions present had amplitudes at least 20 dB below the limit.
Quasi-Peak amplitude emissions are recorded above for frequency range of 30-1000 MHz.
Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for General Radiated Emissions

The EUT demonstrated compliance with the general radiated emissions requirements of 47CFR Part 15C. The EUT demonstrated a minimum margin of -12.8 dB below general radiated emissions requirements. There are no other significantly measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the requirements.

Operation in the Band 902 – 928 MHz

Radiated emissions were measured on the Open Area Test Site (OATS) at a three-meter distance. The EUT utilizes permanently attached printed circuit board antenna. The EUT was placed on a turntable elevated as required above the ground plane at a distance of 3 meters from the FSM antenna located on the OATS. The table permitted orientation of the EUT in each of three orthogonal axis positions. Emissions testing was performed with EUT oriented in three orthogonal axis positions with the worst case emissions presented. The test setup exhibit provides detail of worst case orientation observed during testing. The peak and quasi-peak amplitude of the frequencies below 1000 MHz were measured using a spectrum analyzer. The peak and average amplitude of emissions above 1000 MHz were measured using a spectrum analyzer. Emissions data was recorded from the measurement results. The test system gains and losses were accounted for in the measurement results presented. Plots were made of transmitter performance for reference purposes. Refer to figures one through twenty presenting plots of the EUT performance displaying compliance with the specifications.

This product utilizes permanently attached antenna system and offers no provision for antenna port conducted measurements. As such, the testing procedures as defined in publication ANSI C63.10-2013 were utilized during compliance testing. These procedures provide for antenna port measurement or measurement of maximum field strength and conversion calculations for comparison with requirements. The power output was measured at the open area test site at a three-meter distance with the integral antenna system. Band edge and harmonic radiated emission measurements were taken while EUT was operated in both DSS and test modes. Data presented below represents worst-case emissions from all modes investigated during testing. Harmonic emissions measurement data presented in table seven accounts for Duty Cycle correction Factor (DCF) reduction of -19.9 dB (as authorized in 47 CFR paragraph 15.35(b) and RSS –GEN paragraph 4.5). The DCF was calculated using the absolute maximum transmitter on time (10.1 mS) over a 100 millisecond period (20log [10.1/100] = -19.9).

Average occupancy time Requirement:

Average time of occupancy on any channel shall not be greater than 400 mS (0.4 seconds) within a 20 second period.

Dwell Time on channel: The units resides on channel 33 times over 20 seconds, each time transmitting for 10.1 mS which equates to average time of occupancy of 333.3 mS.

333.3 mS operational time demonstrates compliance with requirement of less than 400 mS in 20 second period.

Additional Frequency Hopping detail may be found in the operational description exhibits.

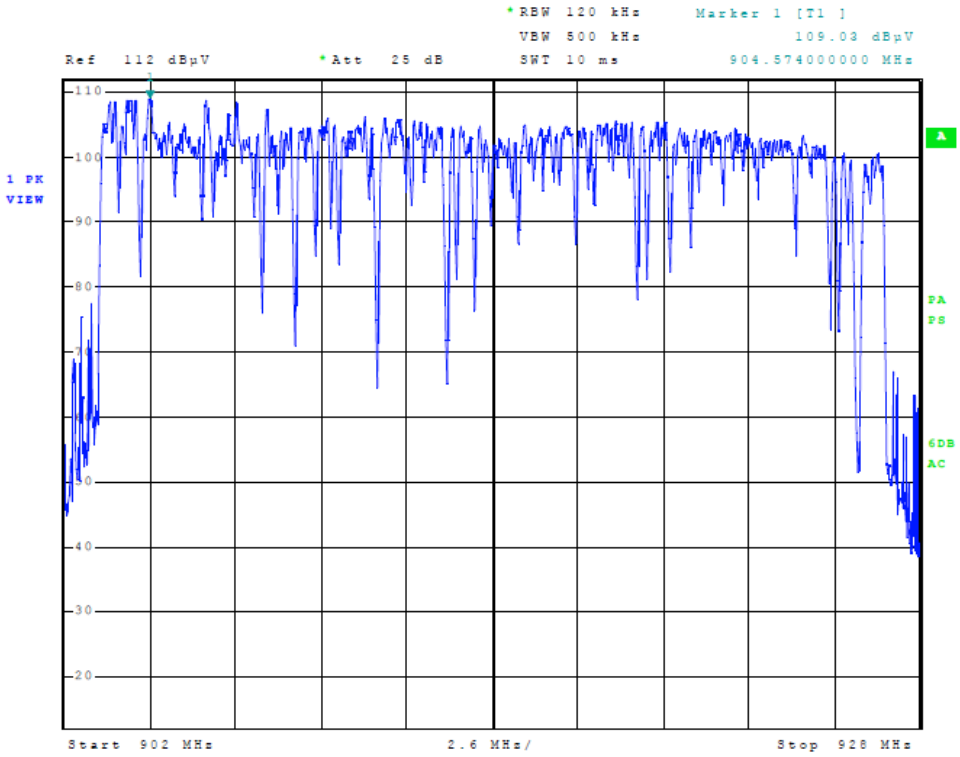


Figure 1 of Plot of Operation across Frequency band

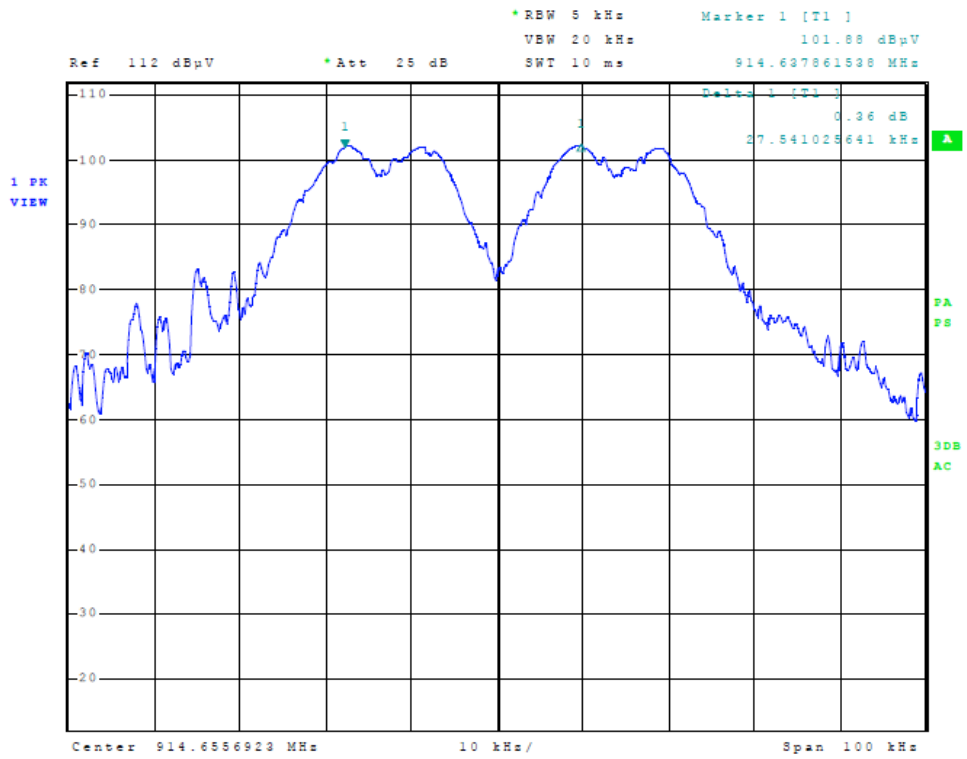


Figure 2 of Plot of Channel Separation

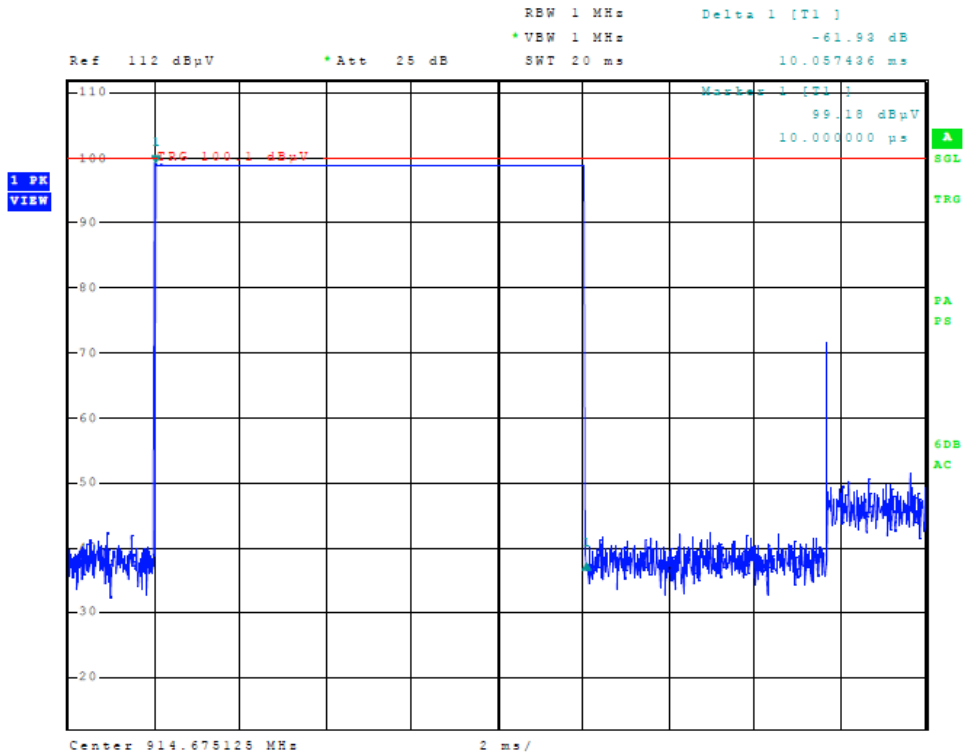


Figure 3 of Plot of Dwell Time on Channel

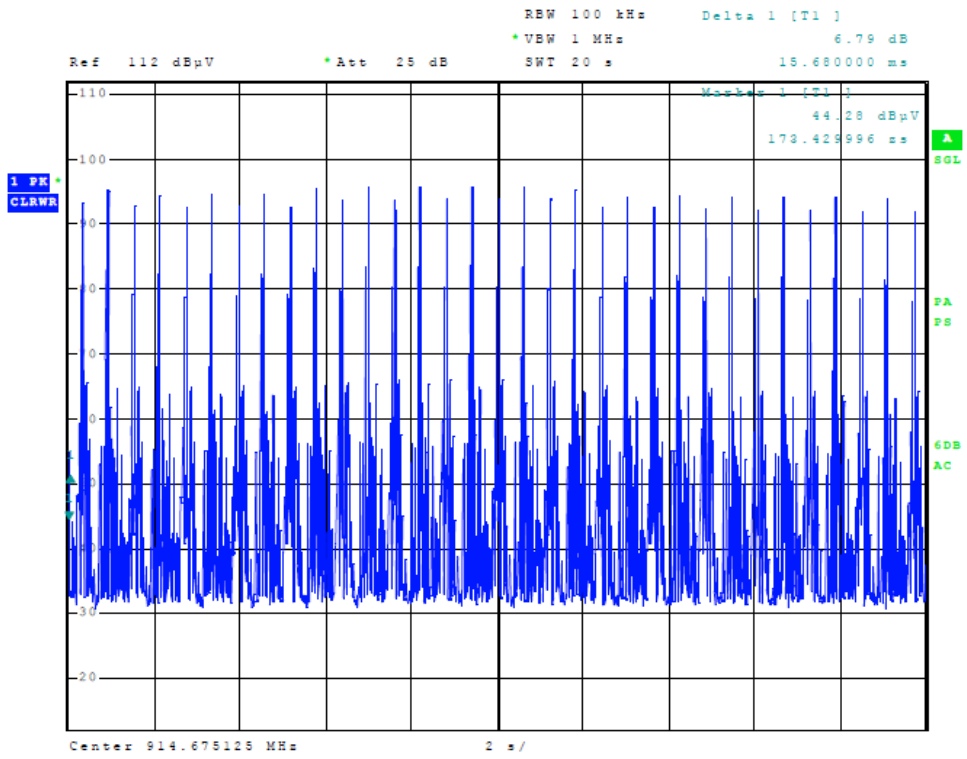


Figure 4 of Plot of 33 Times on Channel over 20 second period

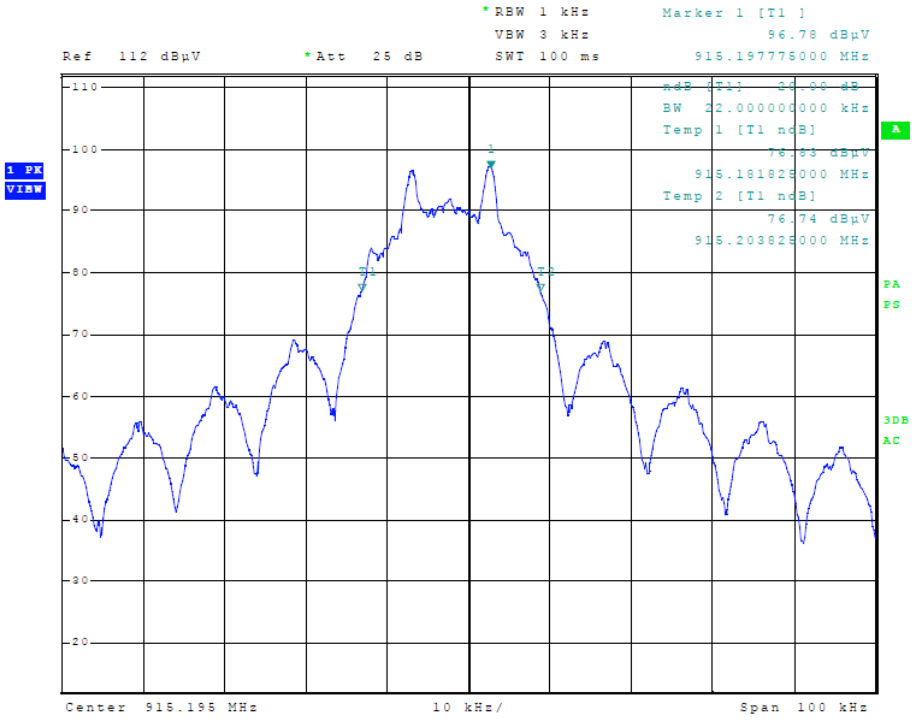
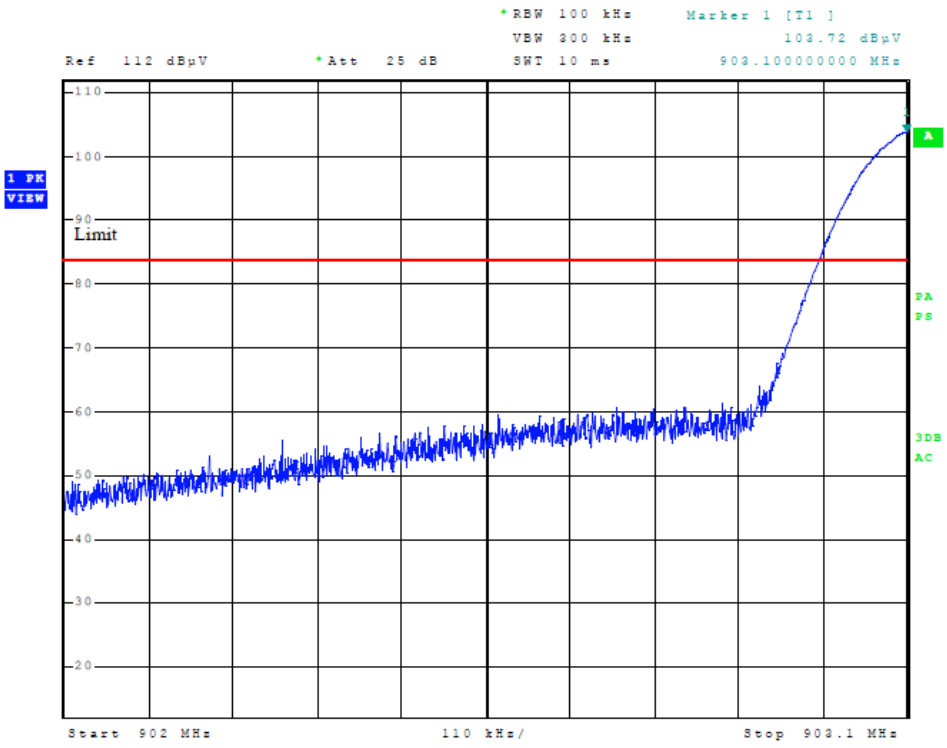
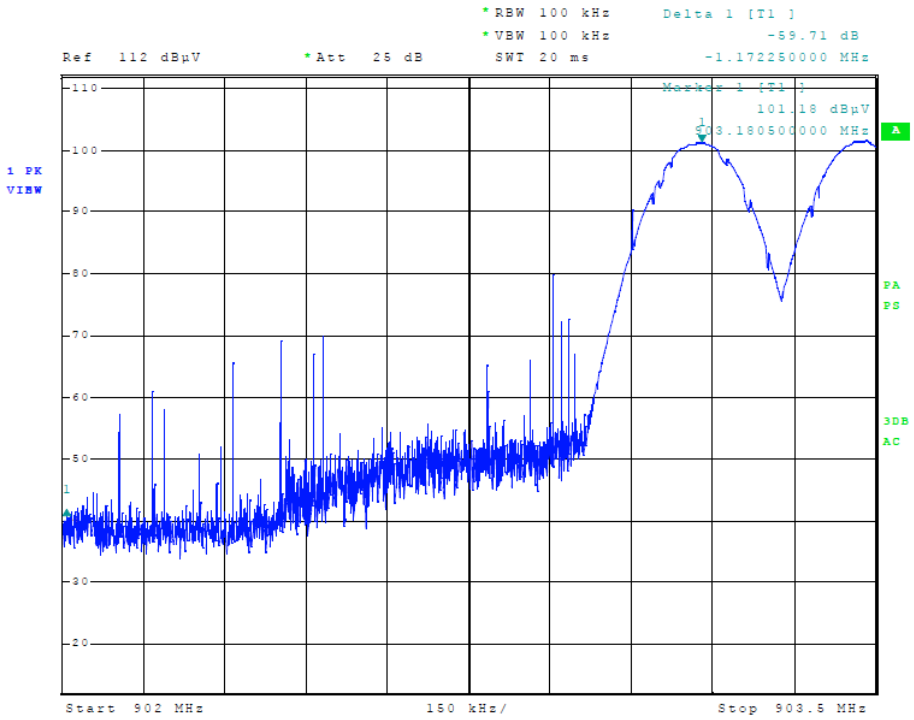


Figure 5 of Plot of Occupied Bandwidth

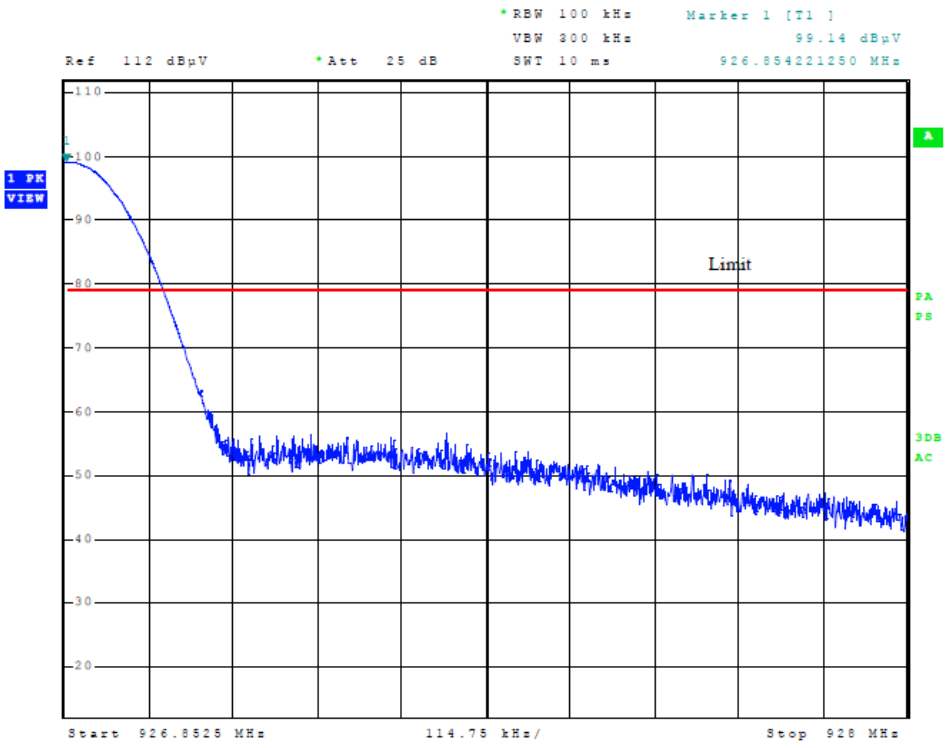


Single Channel band edge -55 dB below in band emission

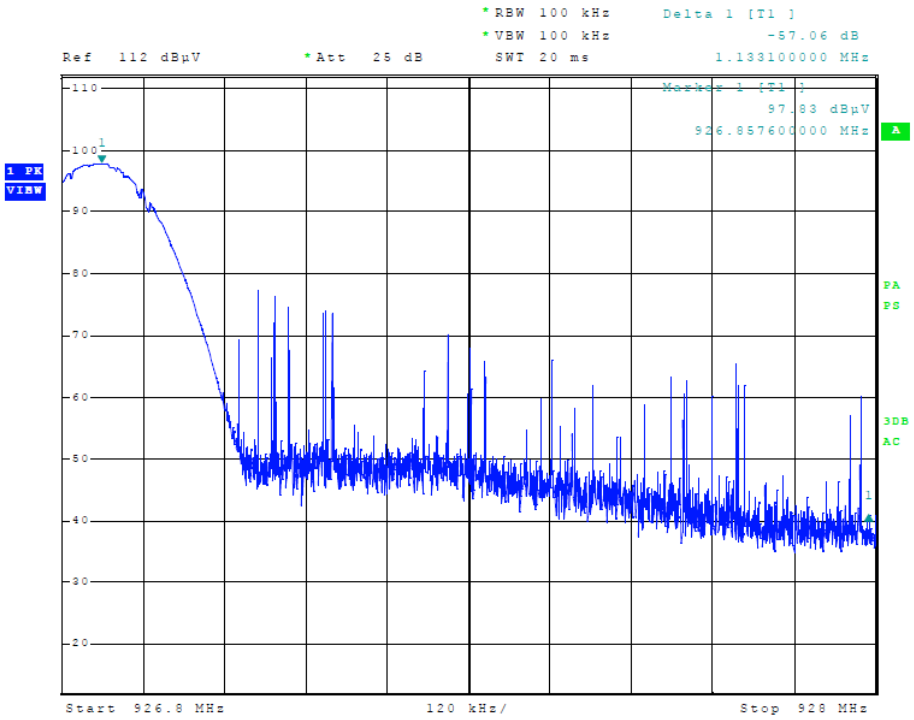


Channel Hopping, Band edge -59 dB below in band emission

Figure 6 of Plot of Low Band Edge Emissions



Single Channel, Band edge -58 dB below in band emission



Channel Hopping, Band edge -57 dB below in band emission

Figure 7 of Plots of High Band Edge Emissions

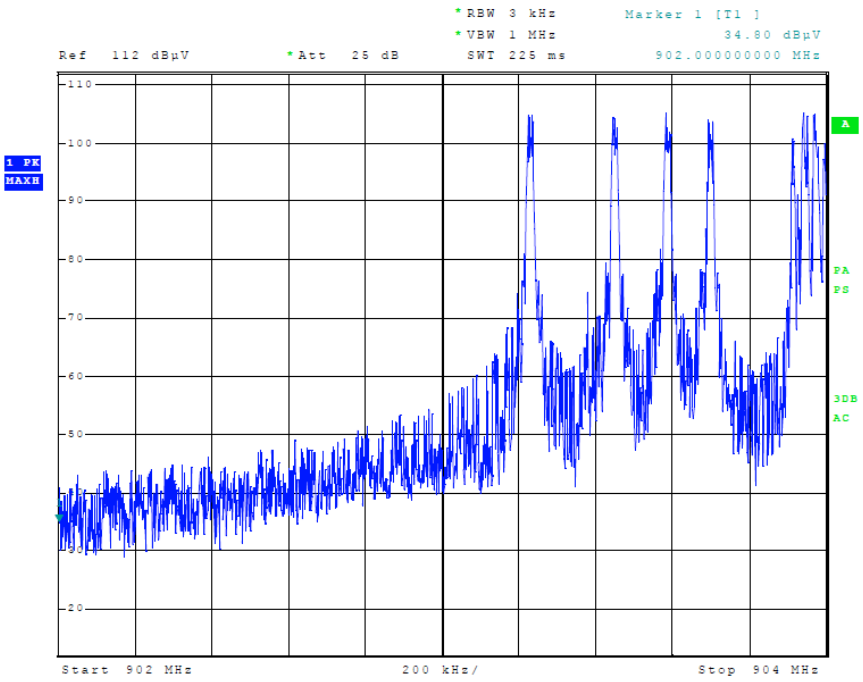


Figure 8 Plot of number of channels utilized 902-904 MHz

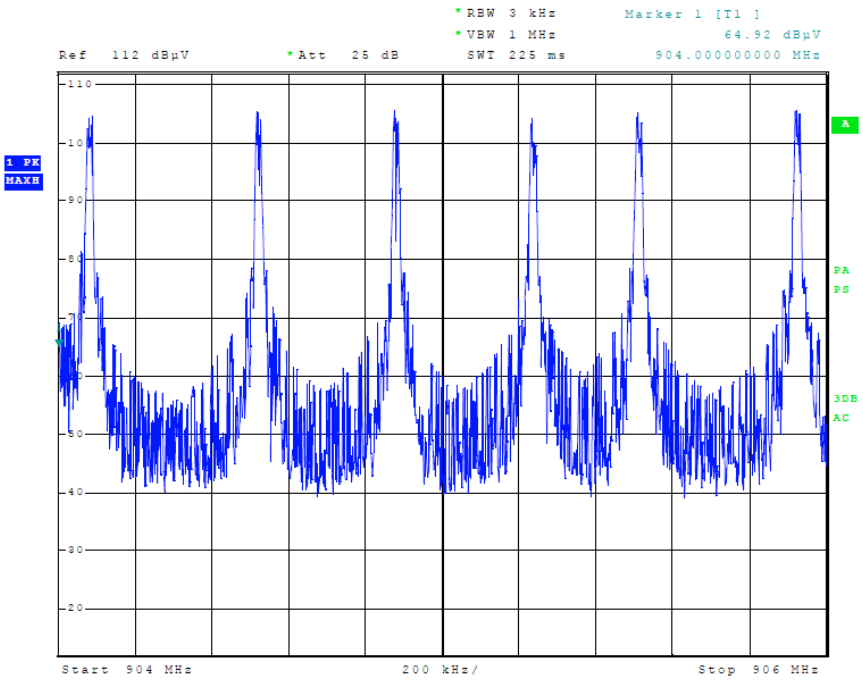


Figure 9 Plot of number of channels utilized 904-906 MHz

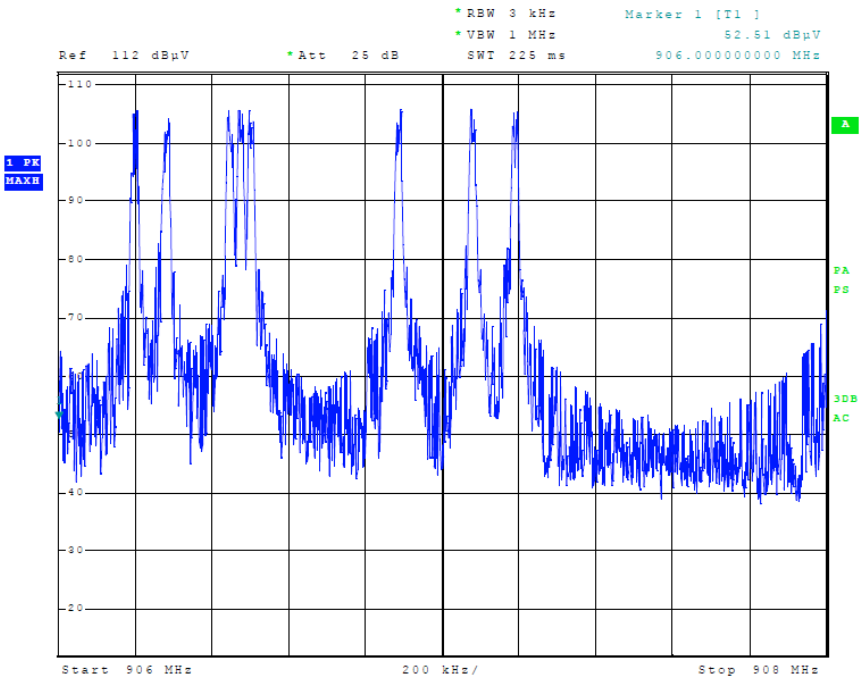


Figure 10 Plot of number of channels utilized 906-908 MHz

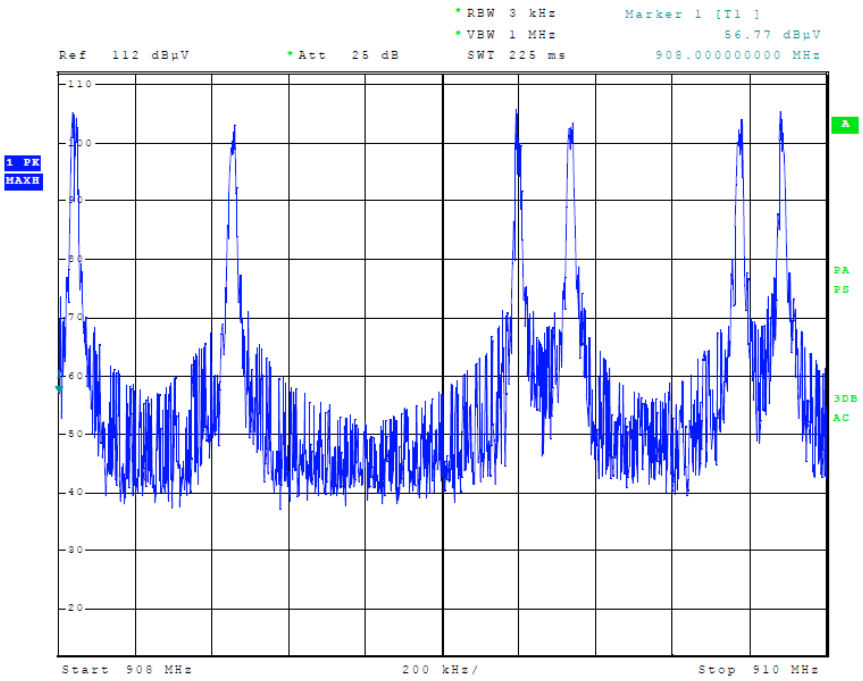


Figure 11 Plot of number of channels utilized 908-910 MHz

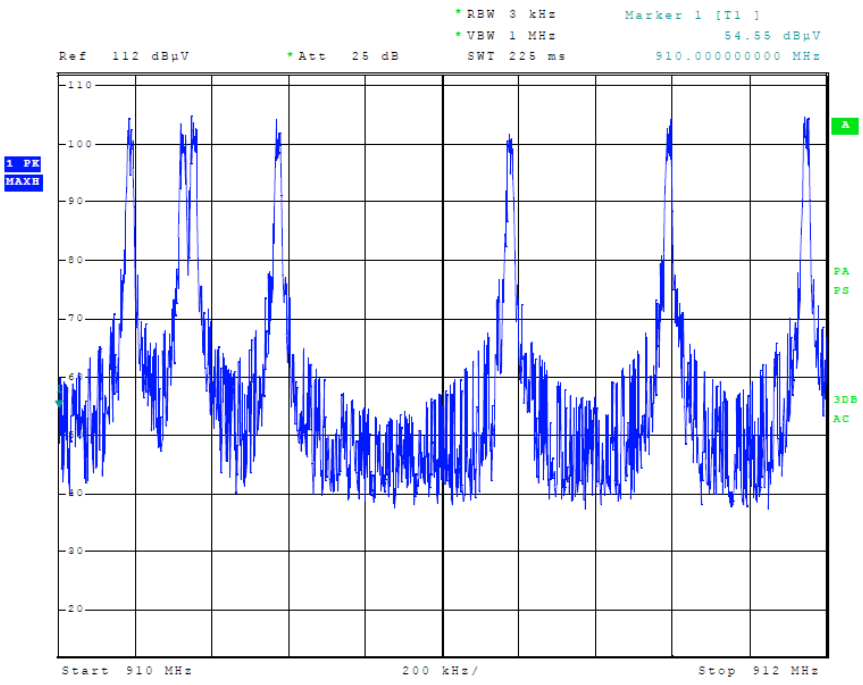


Figure 12 Plot of number of channels utilized 910-912 MHz

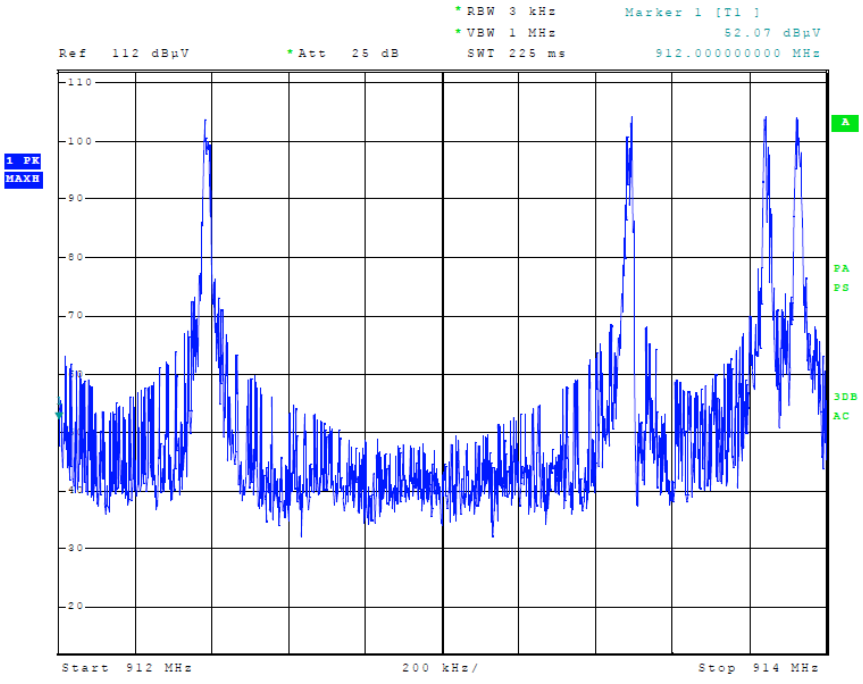


Figure 13 Plot of number of channels utilized 912-914 MHz

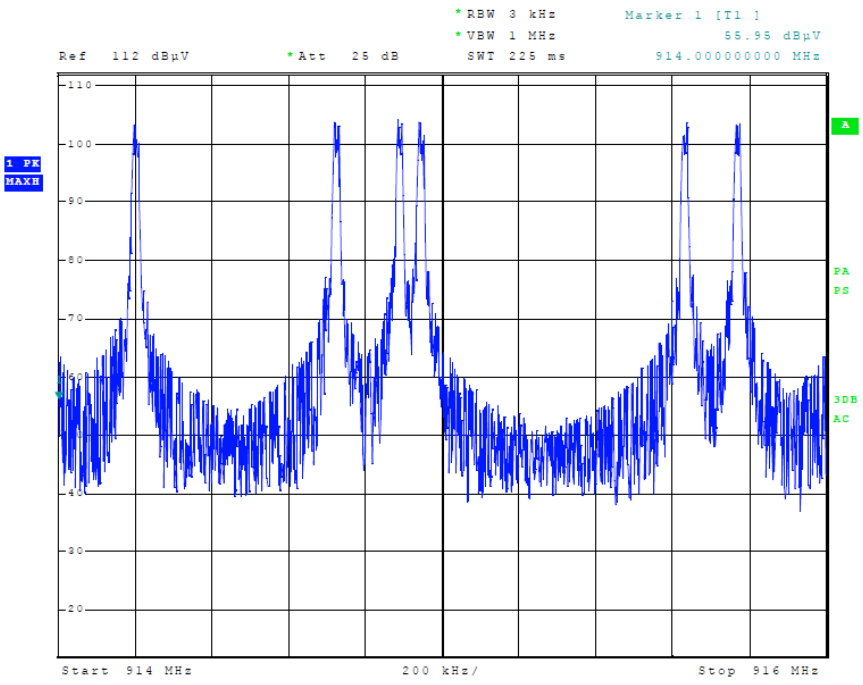


Figure 14 Plot of number of channels utilized 914-916 MHz

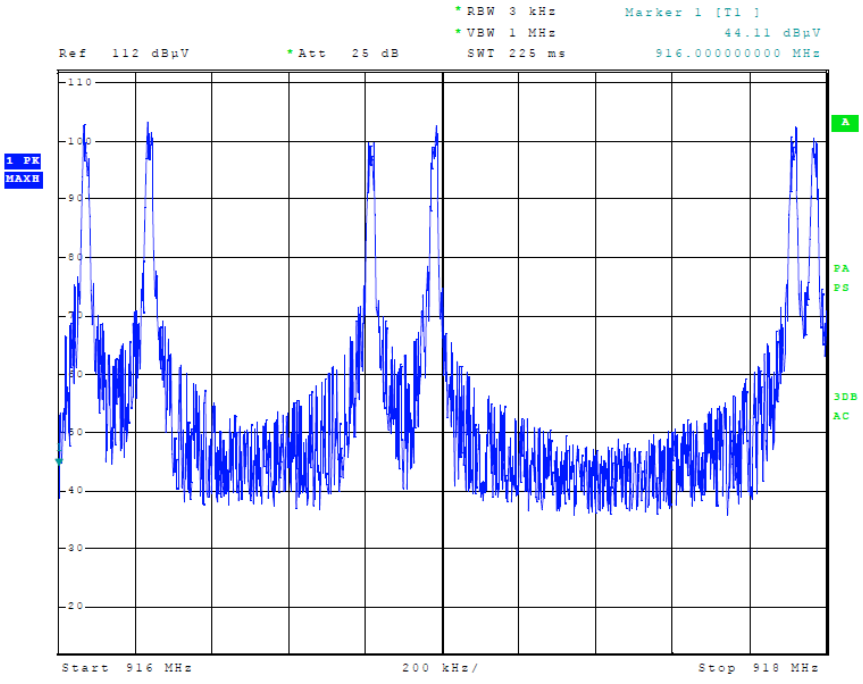


Figure 15 Plot of number of channels utilized 916-918 MHz

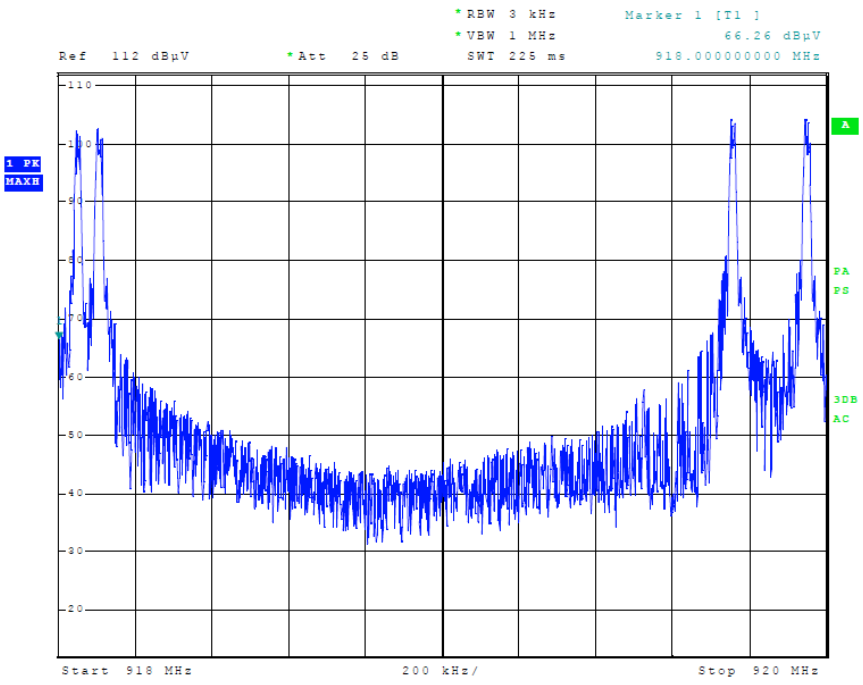


Figure 16 Plot of number of channels utilized 918-920 MHz

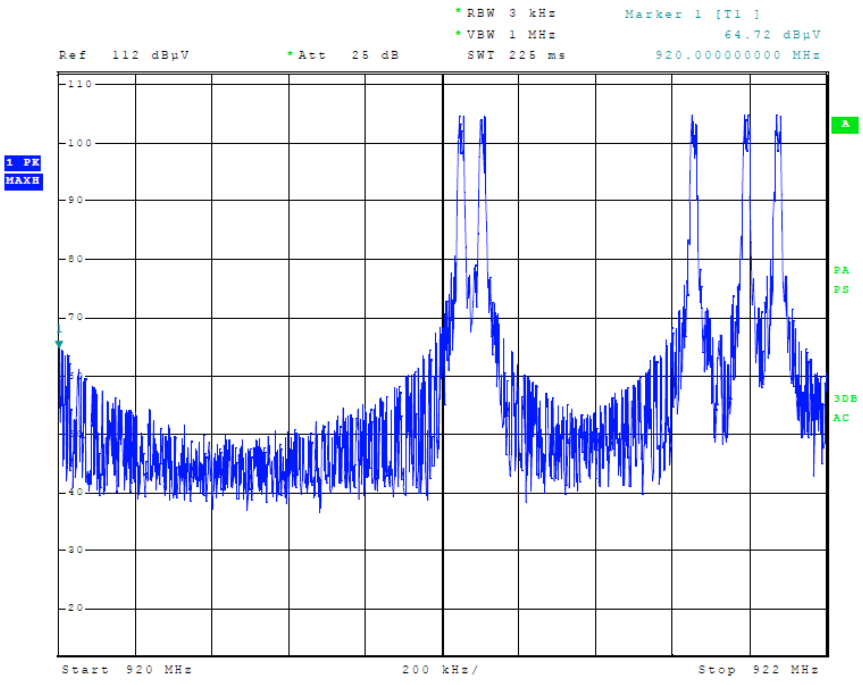


Figure 17 Plot of number of channels utilized 920-922 MHz

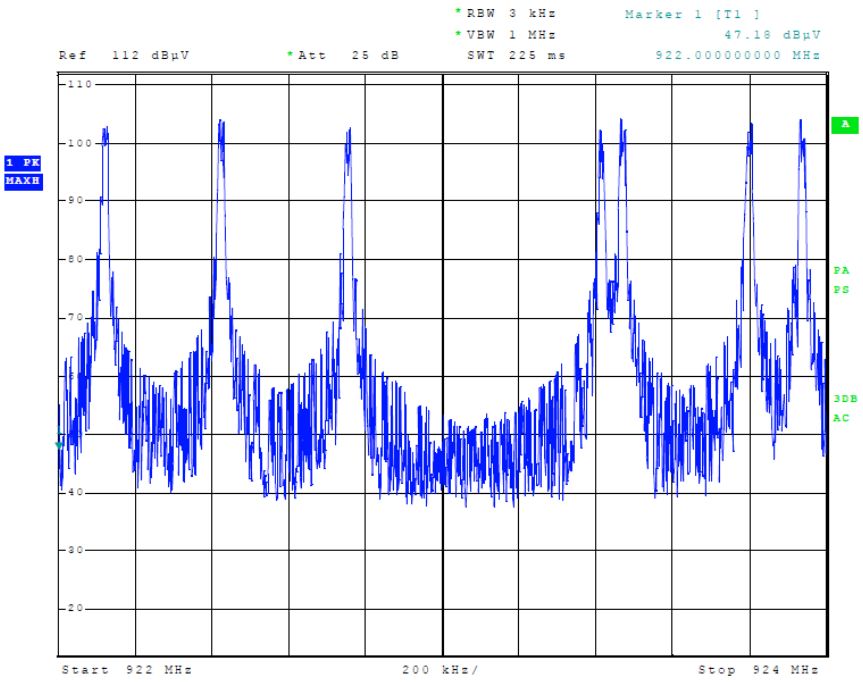


Figure 18 Plot of number of channels utilized 922-924 MHz

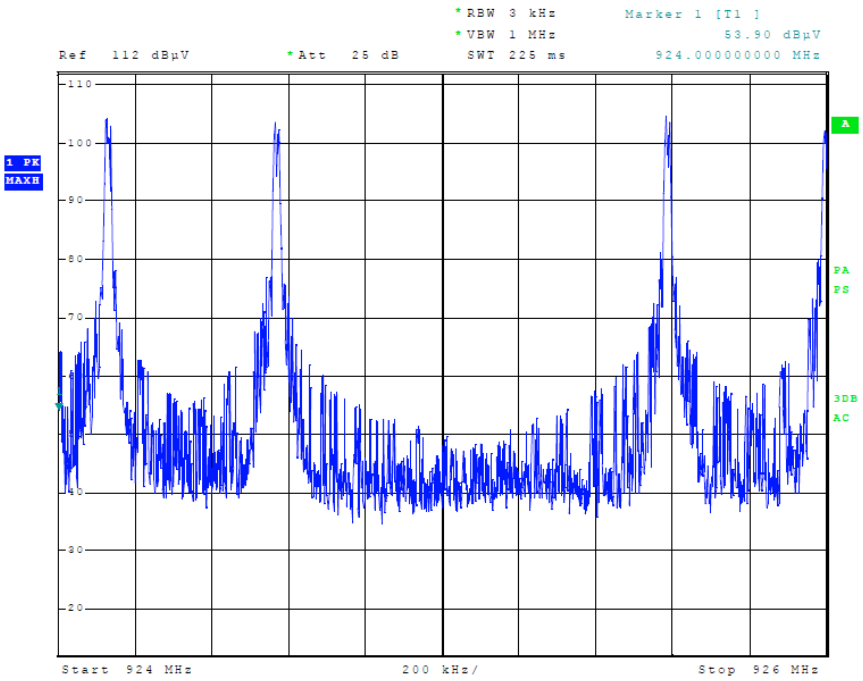


Figure 19 Plot of number of channels utilized 924-926 MHz

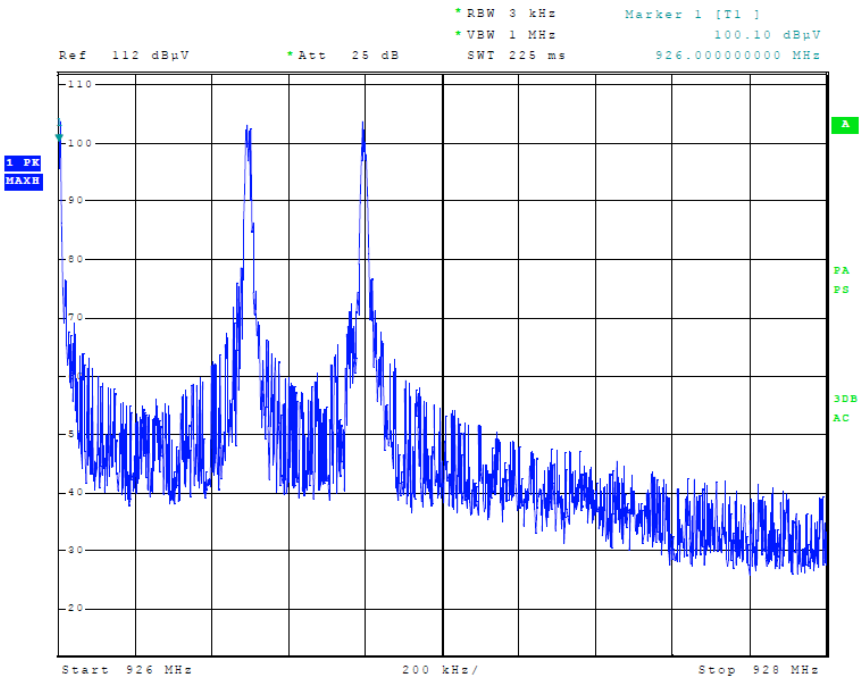


Figure 20 Plot of number of channels utilized 926-928 MHz

Transmitter Emissions Data

Table 3 Transmitter Radiated Emission Data

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
903.1	--	--	--	--	--	--	--
1806.2	60.9	N/A	43.7	58.6	N/A	41.5	54.0
2709.3	58.2	N/A	40.4	56.2	N/A	38.3	54.0
3612.4	43.9	N/A	21.9	51.2	N/A	32.2	54.0
4515.5	41.5	N/A	11.0	40.9	N/A	11.2	54.0
5418.6	42.2	N/A	11.6	41.6	N/A	12.2	54.0
915.0	--	--	--	--	--	--	--
1830.0	60.5	N/A	43.0	59.9	N/A	42.6	54.0
2745.0	56.0	N/A	38.9	56.1	N/A	38.3	54.0
3660.0	42.5	N/A	19.0	45.9	N/A	24.4	54.0
4575.0	41.9	N/A	13.8	39.0	N/A	9.8	54.0
5490.0	45.0	N/A	17.1	42.2	N/A	15.5	54.0
926.9	--	--	--	--	--	--	--
1853.6	60.5	N/A	43.1	59.0	N/A	41.6	54.0
2780.4	58.3	N/A	40.5	56.3	N/A	38.7	54.0
3707.2	43.2	N/A	20.4	44.8	N/A	18.4	54.0
4634.0	45.0	N/A	19.6	42.7	N/A	17.8	54.0
5560.8	44.2	N/A	17.6	41.6	N/A	12.6	54.0

Other emissions present had amplitudes at least 20 dB below the limit.
Quasi-Peak amplitude emissions are recorded above for frequency range of 30-1000 MHz.
Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 4 Transmitter Antenna Conducted Emissions Data

The calculated antenna conducted output power and 20-dB bandwidth were measured while operating in available modes for the lowest, middle and highest available channels. The data reported below represents the worst-case operational conditions.

Operational Mode	Frequency MHz	Calculated Output Power dBm	Calculated Output Power Watts	Occupied Bandwidth kHz
Hop Set	903.1	29.67	0.927	21.2
Hop Set	915.0	29.77	0.949	21.8
Hop Set	926.9	29.96	0.993	21.8

Summary of Results for Radiated Emissions of Intentional Radiator

The EUT demonstrated calculated output power of 993 Milliwatts (1.00 Watts). The EUT demonstrated a minimum radiated emission margin of -19.0 dB below the restricted emissions requirements. The EUT demonstrated a minimum radiated harmonics emission margin of -10.3 dB below the emissions requirements. The EUT tested was observed in compliance with the radiated emissions requirements of 47CFR Part 15.247 and Industry Canada RSS-247 Intentional Radiators. There were no other significantly measurable emissions observed in restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the requirements. There were no deviations or exceptions to the requirements.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex C Rogers Qualifications
- Annex C FCC Site Registration Letter
- Annex D Industry Canada Site Registration Letter

Annex A Measurement Uncertainty Calculations

Measurement uncertainty calculations were made for the laboratory. Result of measurement uncertainty calculations are recorded below for AC line conducted and radiated emission measurements.

Measurement Uncertainty	$U_{(E)}$	$U_{(lab)}$
3 Meter Horizontal 30-200 MHz Measurements	2.08	4.16
3 Meter Vertical 30-200 MHz Measurements	2.16	4.33
3 Meter Vertical Measurements 200-1000 MHz	2.99	5.97
10 Meter Horizontal Measurements 30-200 MHz	2.07	4.15
10 Meter Vertical Measurements 30-200 MHz	2.06	4.13
10 Meter Horizontal Measurements 200-1000 MHz	2.32	4.64
10 Meter Vertical Measurements 200-1000 MHz	2.33	4.66
3 Meter Measurements 1-6 GHz	2.57	5.14
3 Meter Measurements 6-18 GHz	2.58	5.16
AC Line Conducted	1.72	3.43

Annex B Rogers Qualifications

Scot D. Rogers, Engineer

Rogers Labs, Inc.

Mr. Rogers has approximately 17 years' experience in the field of electronics. Engineering experience includes six years in the automated controls industry and remaining years working with the design, development and testing of radio communications and electronic equipment.

Positions Held

Systems Engineer:	A/C Controls Mfg. Co., Inc.	6 Years
Electrical Engineer:	Rogers Consulting Labs, Inc.	5 Years
Electrical Engineer:	Rogers Labs, Inc.	Current

Educational Background

1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.

2) Bachelor of Science Degree in Business Administration Kansas State University.

3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot D Rogers

Scot D. Rogers

NVLAP Lab Code 200087-0

Annex C FCC Site Registration Letter

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

April 16, 2015

Registration Number: 90910

Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053

Attention: Scot Rogers,

Re: Measurement facility located at Louisburg
3 & 10 meter site
Date of Renewal: April 16, 2015

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Phyllis Parrish
Industry Analyst

NVLAP Lab Code 200087-0

Annex D Industry Canada Site Registration Letter

Industry Canada Industrie Canada

June 08, 2015

OUR FILE: 46405-3041
Authorization No: 010277847-001

Rogers Labs Inc.
4405 West 259th Terrace
Louisburg, KS
USA
66053

Attention: Mr. Scot D. Rogers

Dear Sir:

The Bureau has received your application for the renewal of 3m OATS. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought **(Site# 3041A-1).** Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please keep for your records the following information;

- The company address code associated to the site(s) located at the above address is: **3041A**

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2009 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2009 or later shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 metre OATS or 3 metre chamber). If the test facility is not accredited to ANSI C63.4-2009 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to **exceed three years**. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL; http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h_tt00052e.html.

If you have any questions, you may contact the Bureau by e-mail at certification.bureau@ic.gc.ca Please reference our file and submission number above for all correspondence.

Yours sincerely,

Bill Payn
For: Wireless Laboratory Manager
Certification and Engineering Bureau
3701 Carling Ave., Building 94
P.O. Box 11490, Station AH@
Ottawa, Ontario K2H 8S2
Email: certification.bureau@ic.gc.ca