FCC Part 15.247
Transmitter Certification

Frequency Hopping Spread Spectrum Transmitter

Test Report

FCC ID: SK9C1A-3

FCC Rule Part: 15.247

ACS Report Number: 05-0122-15C

Manufacturer: Itron Electricity Metering, Inc.
Trade Name: CENTRON ICARe
Model: C1A-3

Test Begin Date: April 5, 2005
Test End Date: April 6, 2005

Report Issue Date: April 7, 2005

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

Prepared by: _____
J. Kirby Munroe
Manager Wireless Certifications
ACS, Inc.

Reviewed by: _____
R. Sam Wismer
Engineering Manager
ACS, Inc.

This report contains 25 pages

Table of Contents

Additional Exhibits Included In Filing

Internal Photographs
External Photographs
Test Setup Photographs
Product Labeling
RF Exposure – MPE Calculations
Installation/Users Guide
Theory of Operation
BOM (Parts List)
System Block Diagram
Schematics

1.0 GENERAL

1.1 Purpose
The purpose of this report is to demonstrate compliance with Part 15, Subpart C of the FCC's Code of Federal Regulations.

1.2 Product Description

1.2.1 General
The C1A-3 is part of the CENTRON meter family, a solid-state, single phase and network meter used for measuring electrical energy consumption. The CENTRON meter family incorporates a two piece design combining a base metrology with a variety of personality modules that snap on the standard meter base. Utilizing the Hall Effect technology for accurate power measurement, the metrology portion of the meter contains all measurement circuitry and calibration information, while the personality modules contain the register functionality and communication mediums. The C1A-3 contains a frequency hopping spread spectrum transmitter utilizing OOK modulation. The C1A-3 will be a transmit-only meter module that collects and transmits metering data over the 902 - 928 MHz Industrial, Scientific and Medical (ISM) RF band.

Detailed photographs of the EUT are filed separately with this filing.

1.2.2 Intended Use
The C1A-3 will be a transmit-only meter module that collects and transmits metering data over the 902 - 928 MHz Industrial, Scientific and Medical (ISM) RF band for collection by electric utility companies.

2.0 TEST FACILITIES

2.1 Location
The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications
The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 89450
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831
- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

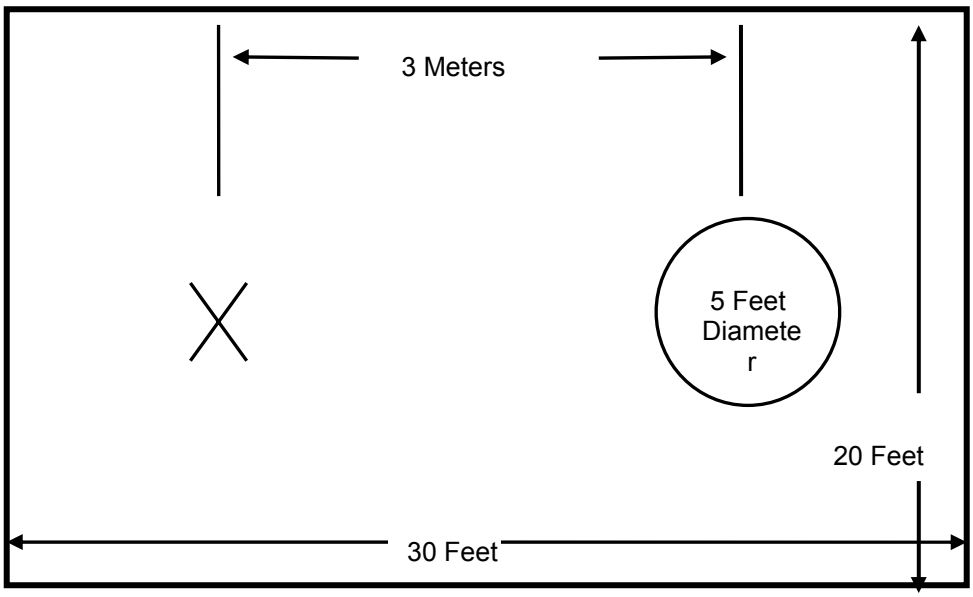

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

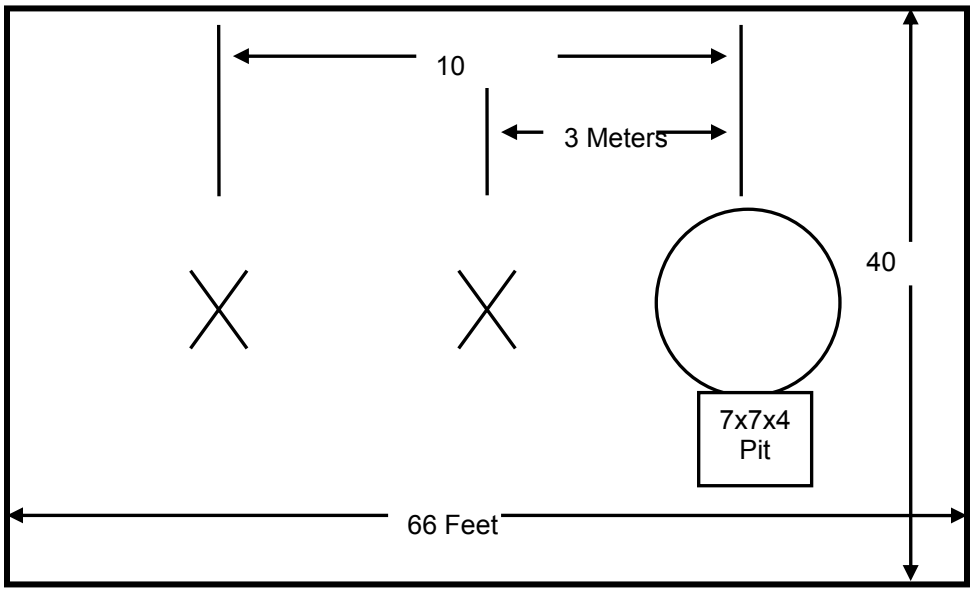

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is a shielded room with the following dimensions:

- Height: 3.0 Meters
- Width: 3.6 Meters
- Length: 4.9 Meters

The room is manufactured by Rayproof Corporation and installed by Panashield, Inc. Earth ground is provided to the room via an 8' copper ground rod. Each panel of the room is connected electrically at intervals of 4".

Power to the room is filtered to prevent ambient noise from coupling to the EUT and measurement equipment. Filters are models 1B42-60P manufactured by Rayproof Corporation.

The room is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 2.4-1:

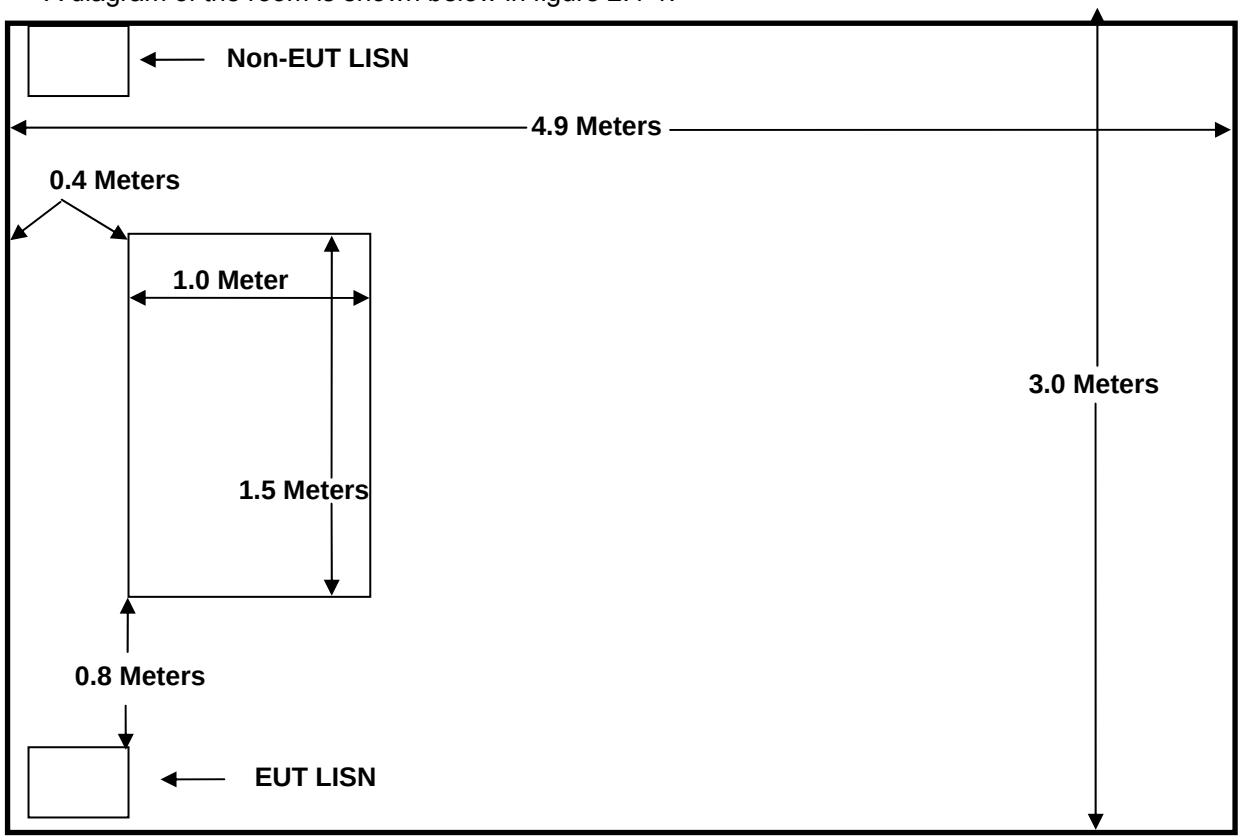

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-1992: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures (October 2004)
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators (October 2004)
- FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4.0-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
26	Chase	Bi-Log Antenna	CBL6111	1044	10/05/05
152	EMCO	LISN	3825/2	9111-1905	01/18/06
153	EMCO	LISN	3825/2	9411-2268	12/20/05
193	ACS	OATS Cable Set	RG8	193	01/07/06
225	Andrew	OATS RF cable	Heliax	225	01/06/06
165	ACS	Conducted EMI Cable Set	RG8	165	01/06/06
22	Agilent	Pre-Amplifier	8449B	3008A00526	05/12/05
73	Agilent	Pre-Amplifier	8447D	272A05624	04/30/05
30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	05/08/05
105	Microwave Circuits	High Pass Filter	H1G810G1	2123-01 DC0225	06/09/05
209	Microwave Circuits	High Pass Filters	H3G020G2	4382-01 DC0421	06/09/05
1	Rohde & Schwarz	Receiver	804.8932.52	833771/007	02/26/06
2	Rohde & Schwarz	Receiver	1032.5640.53	839587/003	02/26/06
3	Rohde & Schwarz	ESMI Receiver	804.8932.52	839379/011	12/15/05
4	Rohde & Schwarz	ESMI Receiver	1032.5640.53	833827/003	12/15/05
213	Test Equipment Corp.	Pre-Amplifier	PA-102	44927	06/28/05
211	Eagle	Band Reject Filter	C7RFM3NFNM	n/a	06/28/05
168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	04/30/05
93	Chase	EM Clamp	CIC 8101	65	01/06/06
204	ACS	Cable	RG8	204	12/29/05
169	Solar Electronics	LISN	9117-5-TS-50-N	031032	04/12/05
6	Harbour Industries	HF RF Cable	LL-335	00006	03/16/06
7	Harbour Industries	HF RF Cable	LL-335	00007	03/16/06
208	n/a	HF RF Cable	n/a	00208	06/14/05
5	ChaseRF Current Probe	Current Probe	CSP-8441	19	01/06/06
237	Gigatronics	Signal Generator	900	282706	01/03/06
176	Weinschel	30 dB Attenuator	46-30-34	BN4922	1/10/2006
N/A	Termaline	Coaxial Resistor 100W	8164	7655	N/A
167	ACS	Chamber EMI Cable Set	RG6	167	12/29/05
204	ACS	Chamber EMI RF cable	RG8	204	01/07/06

* Note: No calibration required – used for pre-scan data only

5.0 SUPPORT EQUIPMENT

Table 5-3: Support Equipment

Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
EUT Was Self Supporting				

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

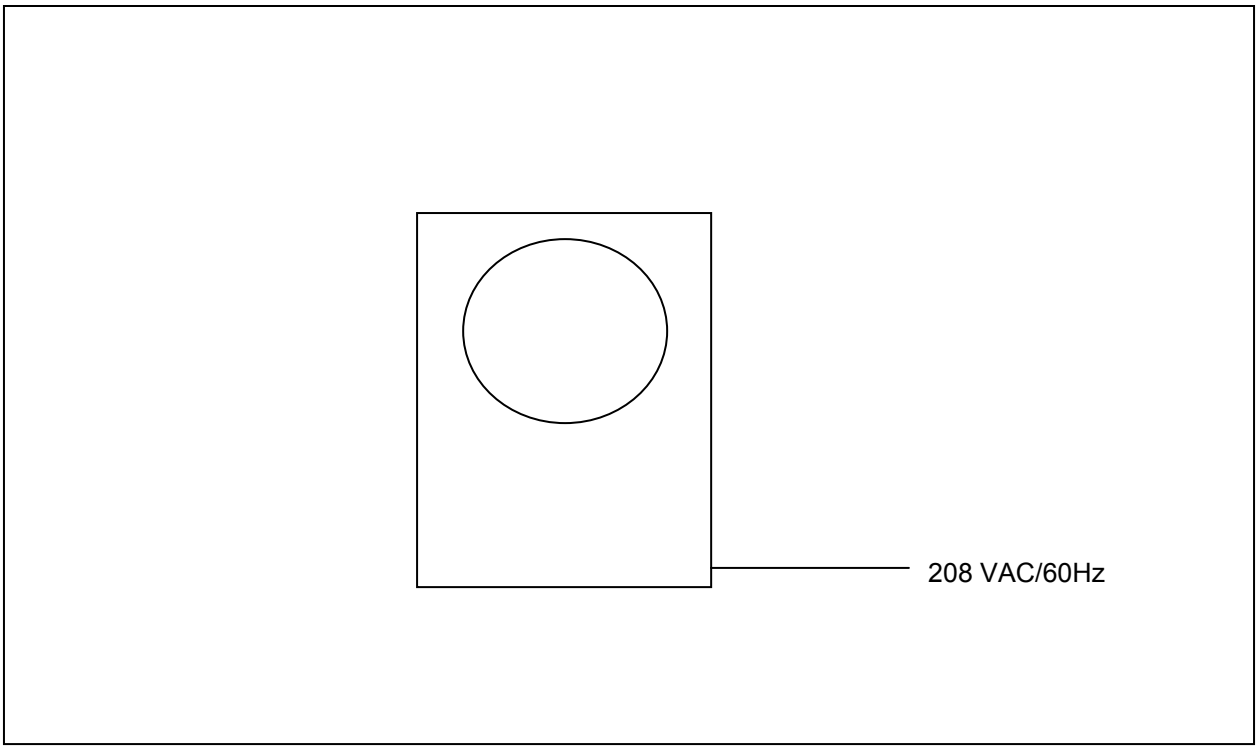

Figure 6-1: EUT Test Setup

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement - FCC Section 15.203

The EUT employs an integrated antenna that cannot be modified without damaging the device.

7.2 Power Line Conducted Emissions - FCC Section 15.207

7.2.1 Test Methodology

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Corrected Reading – Applicable Limit

7.2.2 Test Results

Results of the test are shown below in and Tables 7.2-1 through 7.2-4 and Figure 7.2-1 through 7.2-2

Table 7.2-1: Line 1 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.294	22.0	9.6	60.4	38.3	L1	GND
0.396	21.9	9.6	57.9	35.9	L1	GND
0.534	23.5	9.6	56	32.4	L1	GND
0.840	16.9	9.9	56	39.0	L1	GND
1.458	12.3	9.6	56	43.6	L1	GND
4.194	37.8	9.6	56	18.2	L1	GND
8.388	22.9	9.6	60	37.0	L1	GND
16.776	22.1	9.7	60	37.8	L1	GND
20.970	24.3	9.7	60	35.6	L1	GND
29.364	29.4	9.8	60	30.5	L1	GND

Table 7.2-2: Line 1 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.294	12.2	9.6	50.4	38.1	L1	GND
0.372	12.8	9.6	48.4	35.6	L1	GND
0.504	12.6	9.6	46	33.3	L1	GND
0.852	8.1	9.9	46	37.8	L1	GND
1.458	8.3	9.6	46	37.6	L1	GND
4.194	34.4	9.6	46	11.5	L1	GND
8.388	19.0	9.6	50	30.9	L1	GND
16.776	18.5	9.7	50	31.4	L1	GND
20.970	20.7	9.7	50	29.2	L1	GND
29.364	24.6	9.8	50	25.3	L1	GND

Table 7.2-3: Line 2 Conducted EMI Results (Quasi-Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.294	24.9	9.6	60.4	35.4	L2	GND
0.414	26.0	9.6	57.5	31.5	L2	GND
0.558	26.7	9.6	56	29.2	L2	GND
0.894	18.8	9.8	56	37.1	L2	GND
1.590	10.7	9.6	56	45.2	L2	GND
4.194	38.2	9.6	56	17.7	L2	GND
8.388	23.3	9.6	60	36.6	L2	GND
16.776	22.5	9.7	60	37.4	L2	GND
20.970	23.8	9.7	60	36.1	L2	GND
29.364	30.4	9.8	60	29.5	L2	GND

Table 7.2-4: Line 2 Conducted EMI Results (Average)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.294	11.7	9.6	50.4	38.6	L2	GND
0.372	12.4	9.6	48.4	36.0	L2	GND
0.510	12.6	9.6	46	33.3	L2	GND
0.912	8.6	9.7	46	37.3	L2	GND
1.536	6.7	9.6	46	39.2	L2	GND
4.194	34.2	9.6	46	11.7	L2	GND
8.388	18.8	9.6	50	31.1	L2	GND
16.776	18.7	9.7	50	31.2	L2	GND
20.976	18.9	9.7	50	31.0	L2	GND
29.364	24.8	9.8	50	25.1	L2	GND

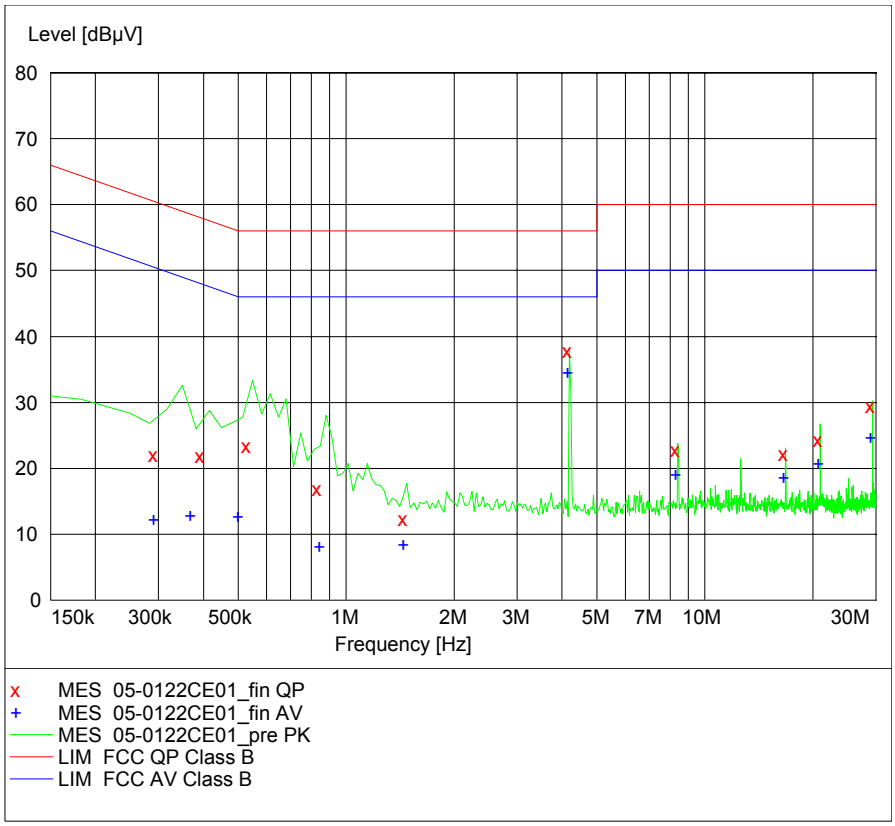

Figure 7.2-1: Conducted Emissions Graph – Line 1

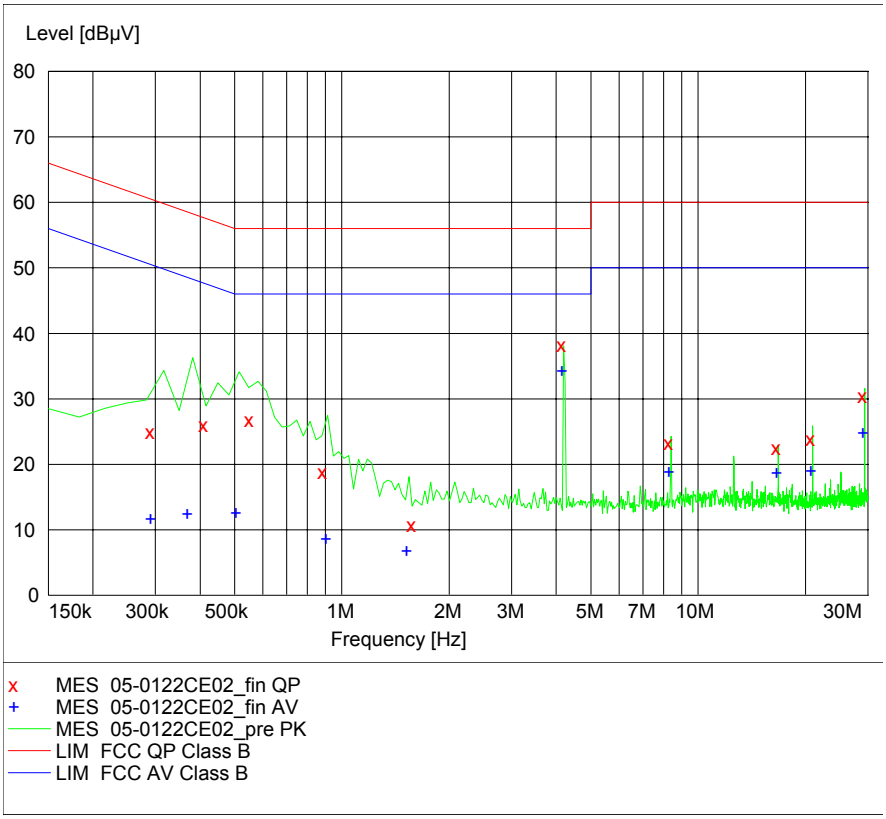

Figure 7.2-2: Conducted Emissions Graph – Line 2

7.3 Radiated Emissions - FCC Section 15.109(Unintentional Radiation)

7.3.1 Test Methodology

Radiated emissions tests were performed over the frequency range of 30MHz to 1 GHz. Measurements of the radiated field strength were made at a distance of 3m from the boundary of the equipment under test (EUT) and the receiving antenna. The antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. Radiated measurements were made with the Spectrum Analyzer's resolution bandwidth set to 120 KHz for measurements above 30MHz. Average measurements are taken with the RBW and VBW were set to 1MHz and 10 Hz respectively for measurements above 1000MHz.

7.3.2 Test Results

Results of the test are given in Table 7.3-1 below:

Table 7.3-1: Radiated Emissions Tabulated Data

Frequency **(MHz)**	Polarization	Height **(cm)**	Azimuth **(deg)**	Level **(dBµV/m)**	Limit **(dBµV/m)**	Margin **(dB)**
457.840	VERTICAL	110	344	33.70	46.0	12.3
786.880	HORIZONTAL	249	0	38.80	46.0	7.2
839.200	HORIZONTAL	250	12	32.50	46.0	13.5
849.440	VERTICAL	400	357	30.70	46.0	15.3
945.280	VERTICAL	278	0	24.20	46.0	21.8

* Note: All emissions above 945.28 MHz were attenuated below the permissible limit.

7.4 Peak Output Power – FCC Section 15.247(b)(2)

7.4.1 Test Methodology (Conducted Method)

The 20dB bandwidth of the EUT was within the resolution bandwidth of spectrum analyzer, therefore the power measurement was made using the spectrum analyzer method. The resolution and video bandwidth were set to > 20 dB bandwidth of the emission measured (300 kHz/1 MHz). The device employs >50 channels therefore the power is limited to 1 Watt.

7.4.2 Test Results

Results are shown below in table 7.4-1 and the worst case was plotted and shown in figure 7.4-1 to 7.4-3 below:

Table 7.4-1: RF Output Power

Frequency [MHz]	Level [dBm]
909.5861	21.67
915.6142	20.35
921.7733	20.86

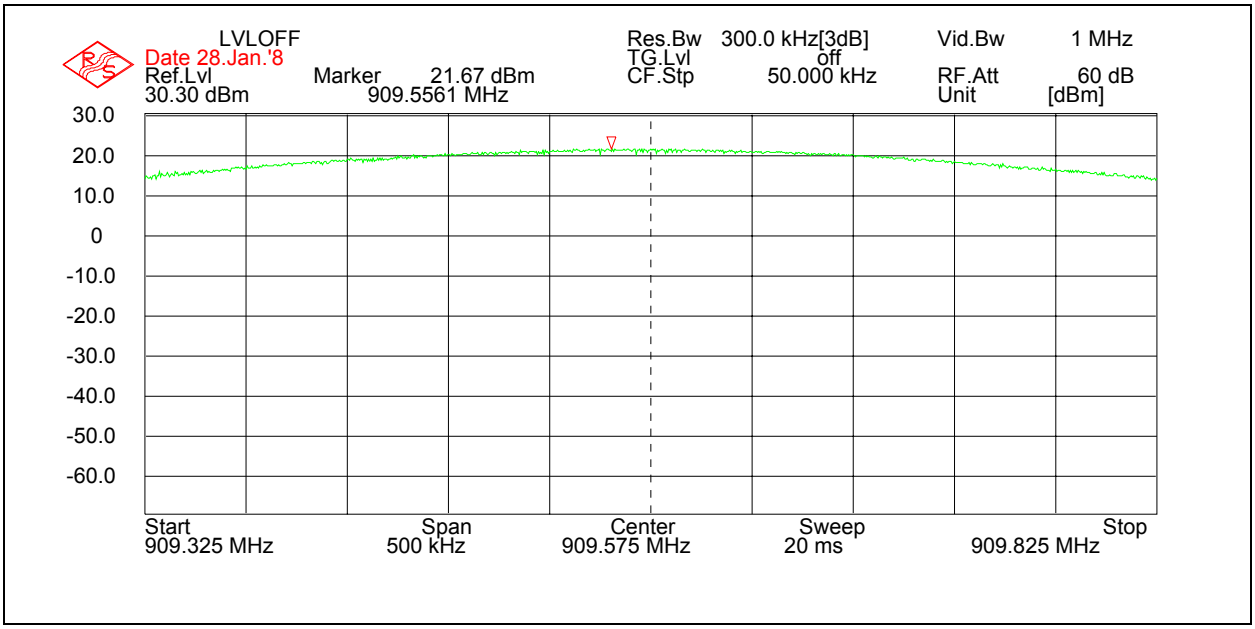

Figure 7.4-1: Output power – Low Channel

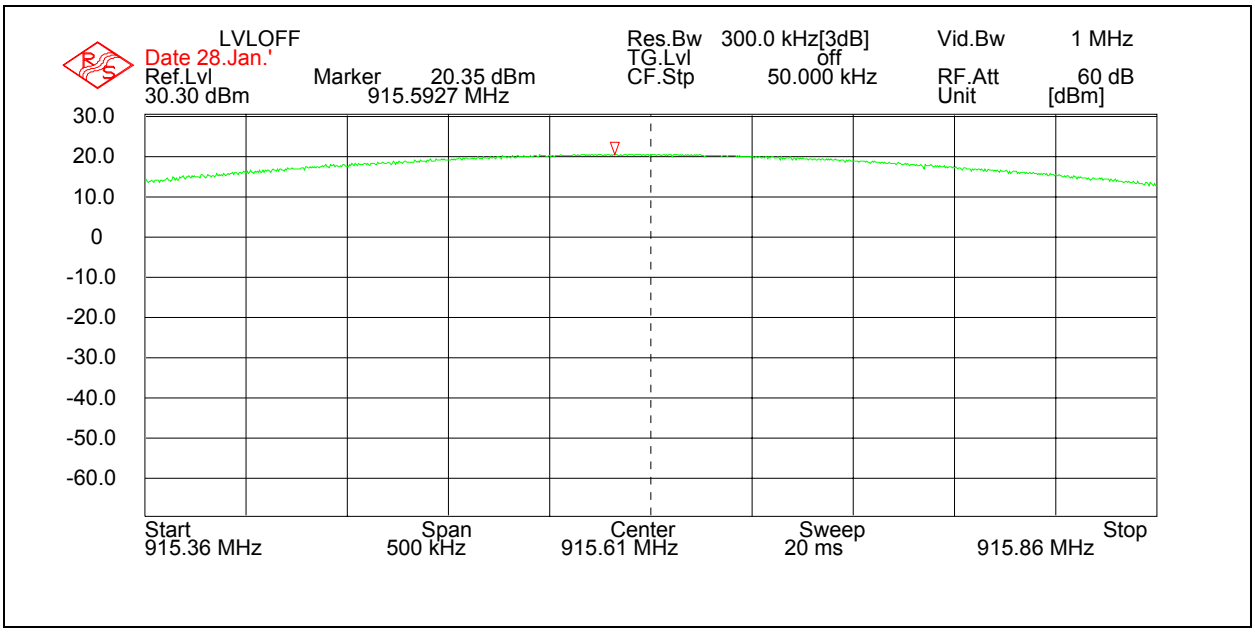

Figure 7.4-2: Output power – Mid Channel

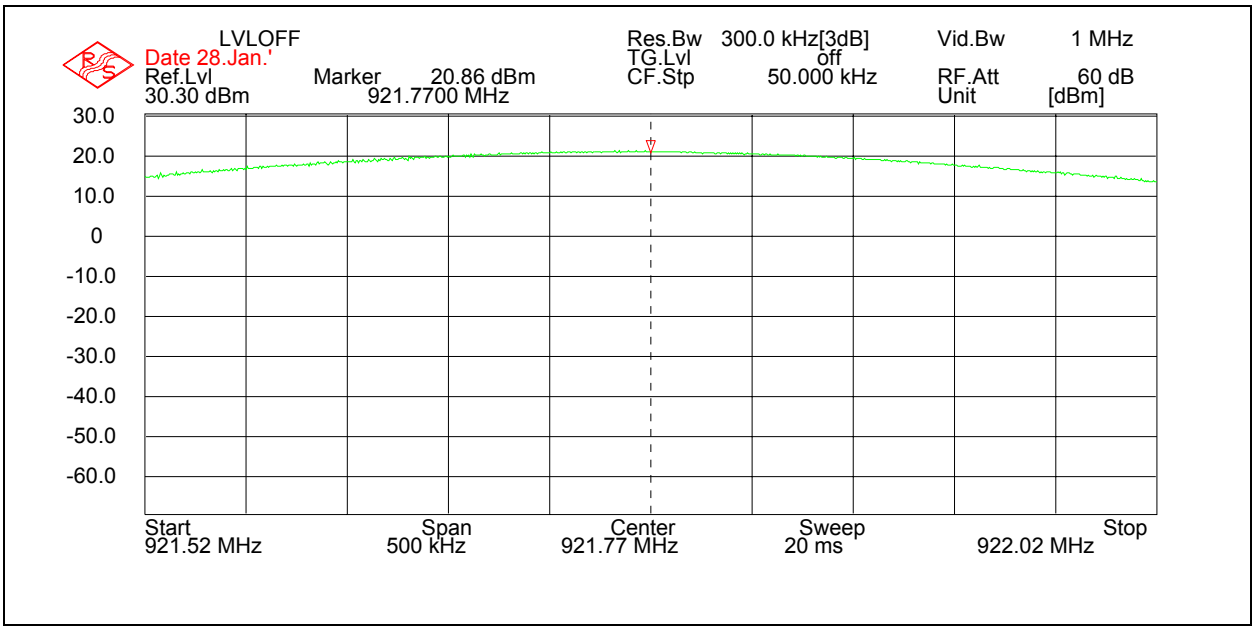

Figure 7.4-3: Output power – High Channel

7.5 Channel Usage Requirements - FCC Section 15.247(a) (1)

15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

15.247(a) (1) (i): For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

7.5.1 Carrier Frequency Separation

7.5.1.1 Test Methodology

The span of the spectrum analyzer was set wide enough to capture two adjacent peaks and the RBW and VBW were set to ≥ 1% of the span.

7.5.1.2 Test Results

The maximum 20dB bandwidth of the hopping channel was measured to be 113.33 kHz (See figure 7.5.4-1 to 7.5.4-3 below). The adjacent channel separation was measured to be 196.0 kHz. Results are shown in figure 7.5.1-1 below:

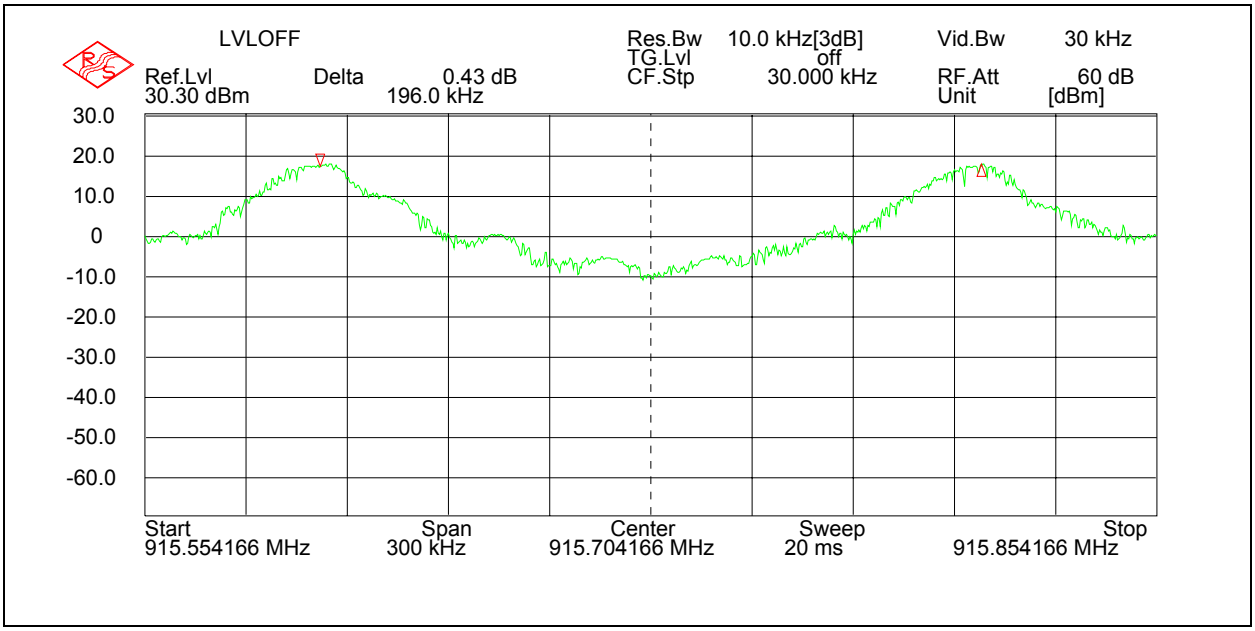

Figure 7.5.1-1: Carrier Frequency Separation

7.5.2 Number of Hopping Channels

The 20dB bandwidth of the device is less than 250 kHz. The device employs 50 hopping channels as required. Results are shown in table 7.5.2-1 below:

Table 7.5.2-1: Frequency Table

Value	Channel Frequency	Channel No.	Offset	Channel Seperation	Value	Channel Frequency	Channel No.	Offset	Channel Seperation
1594	909586111	0	0	0	1698	916400471	26	104	196568
1597	909782679	1	3	196568	1701	916597040	27	107	196568
1600	909979247	2	6	196568	1704	916793608	28	110	196568
1603	910175815	3	9	196568	1707	916990176	29	113	196568
1619	911224178	4	25	1048363	1710	917186744	30	116	196568
1622	911420746	5	28	196568	1713	917383312	31	119	196568
1625	911617314	6	31	196568	1716	917579880	32	122	196568
1628	911813882	7	34	196568	1719	917776448	33	125	196568
1631	912010451	8	37	196568	1735	918824811	34	141	1048363
1634	912207019	9	40	196568	1738	919021379	35	144	196568
1637	912403587	10	43	196568	1741	919217947	36	147	196568
1640	912600155	11	46	196568	1744	919414516	37	150	196568
1643	912796723	12	49	196568	1747	919611084	38	153	196568
1646	912993291	13	52	196568	1750	919807652	39	156	196568
1649	913189859	14	55	196568	1753	920004220	40	159	196568
1652	913386427	15	58	196568	1756	920200788	41	162	196568
1655	913582995	16	61	196568	1759	920397356	42	165	196568
1658	913779563	17	64	196568	1762	920593924	43	168	196568
1661	913976132	18	67	196568	1765	920790492	44	171	196568
1677	915024495	19	83	1048363	1768	920987060	45	174	196568
1680	915221063	20	86	196568	1771	921183628	46	177	196568
1683	915417631	21	89	196568	1774	921380197	47	180	196568
1686	915614199	22	92	196568	1777	921576765	48	183	196568
1689	915810767	23	95	196568	1780	921773333	49	186	196568
1692	916007335	24	98	196568					
1695	916203903	25	101	196568					

Base Frequency Number is 1594 For Channel Algorithm.

7.5.3 Channel Dwell Time

7.5.3.1 Test Methodology

The emission measured centered on the analyzer and the span set to 0 Hz. The RBW was set to 1 MHz and the VBW to 3 MHz. Sweep time was set to 20 ms to capture the burst duration of the emission. The marker –delta function of the analyzer was employed to measure the burst duration.

7.5.3.2 Test Results

The C1A-3 meter will operate with a transmission timing of 1 RF transmission every 2 seconds randomized. The transmission time is < 7 milliseconds and there are 50 transmitter frequencies used. Based on the average timing of 2 seconds per transmission per channel the dwell time would be < 7 ms per channel within a 20 second period. A single transmission is shown in figure 7.5.3-1 below:

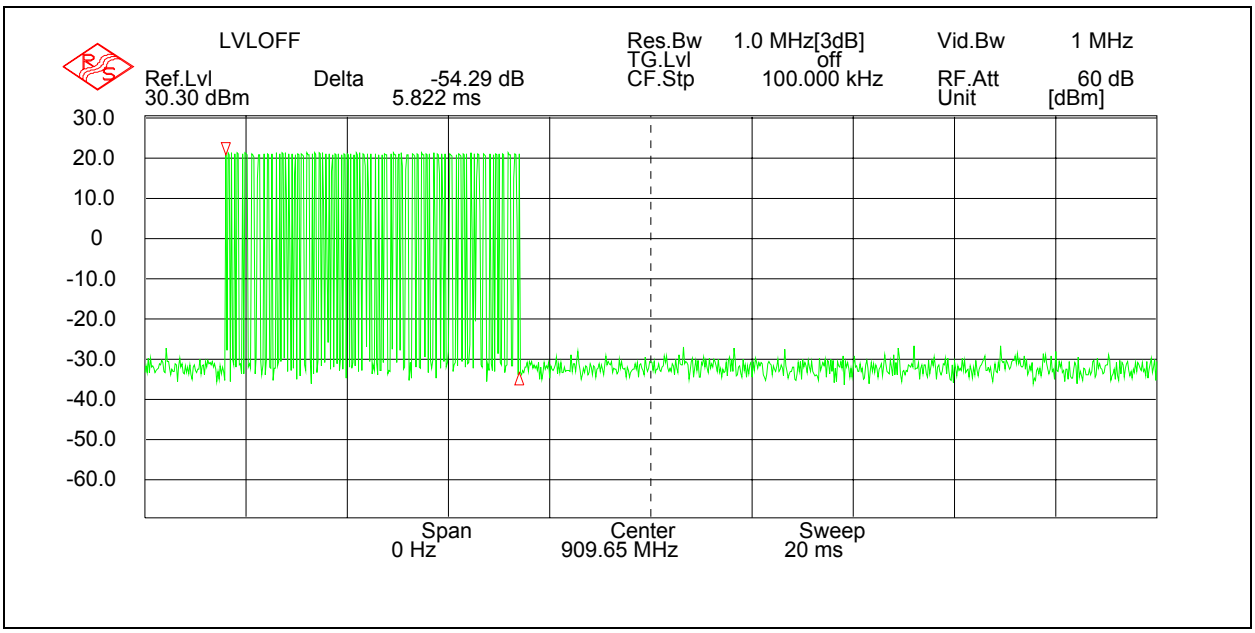

Figure 7.5.3-1: Channel Dwell Time

7.5.4 20dB Bandwidth

7.5.4.1 Test Methodology

The spectrum analyzer span was set to 2 to 3 times the estimated 20 dB bandwidth of the emission. The RBW was to ≥ 1% of the estimated 20 dB bandwidth. The trace was set to max hold with a peak detector active. The N-dB Down function of the analyzer was utilized to determine the 20 dB bandwidth of the emission. The span and RBW were examined and re-adjusted if necessary to meet the requirements of 2 to 3 time the 20 bandwidth for the span and ≥ 1% of the 20 dB bandwidth for the RBW.

7.5.4.2 Test Results

The maximum 20dB bandwidth was found to be approximately 113.33 kHz. Results are shown below in Figure 7.5.4-1 through 7.5.4-3.

Channel	Frequency (MHz)	20dB Bandwidth (kHz)
Low	909.5861	98.61
Mid	915.6142	92.50
High	921.7733	113.33

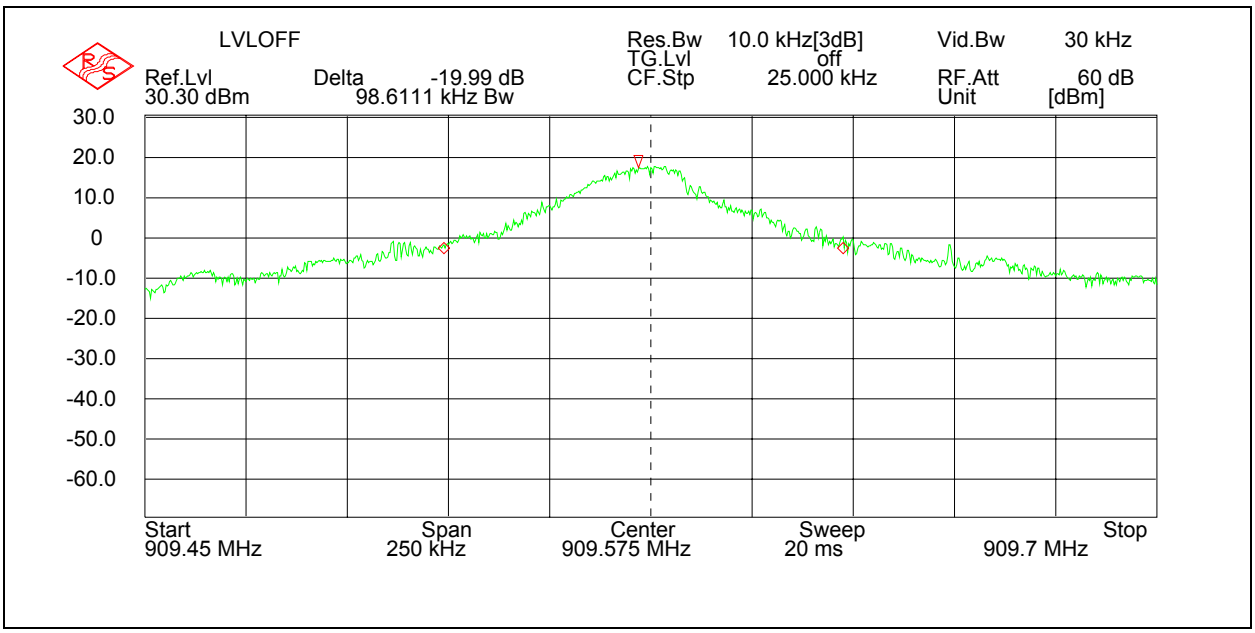

Figure 7.5.4-1: 20dB Bandwidth Low Channel

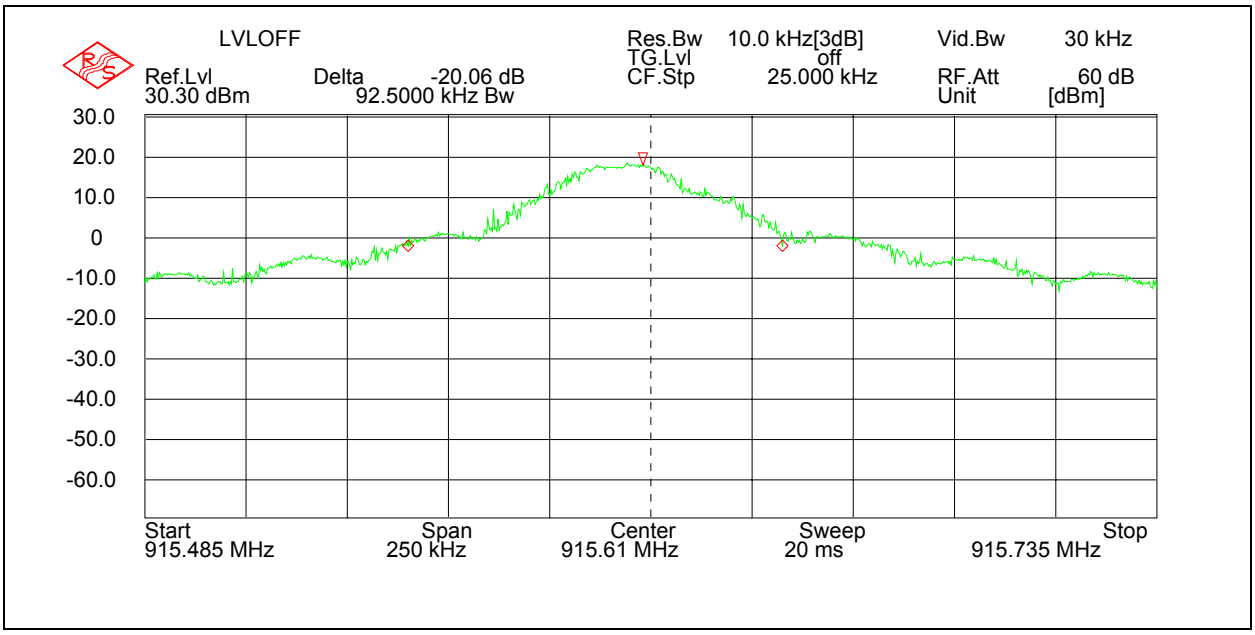

Figure 7.5.4-2: 20dB Bandwidth Mid Channel

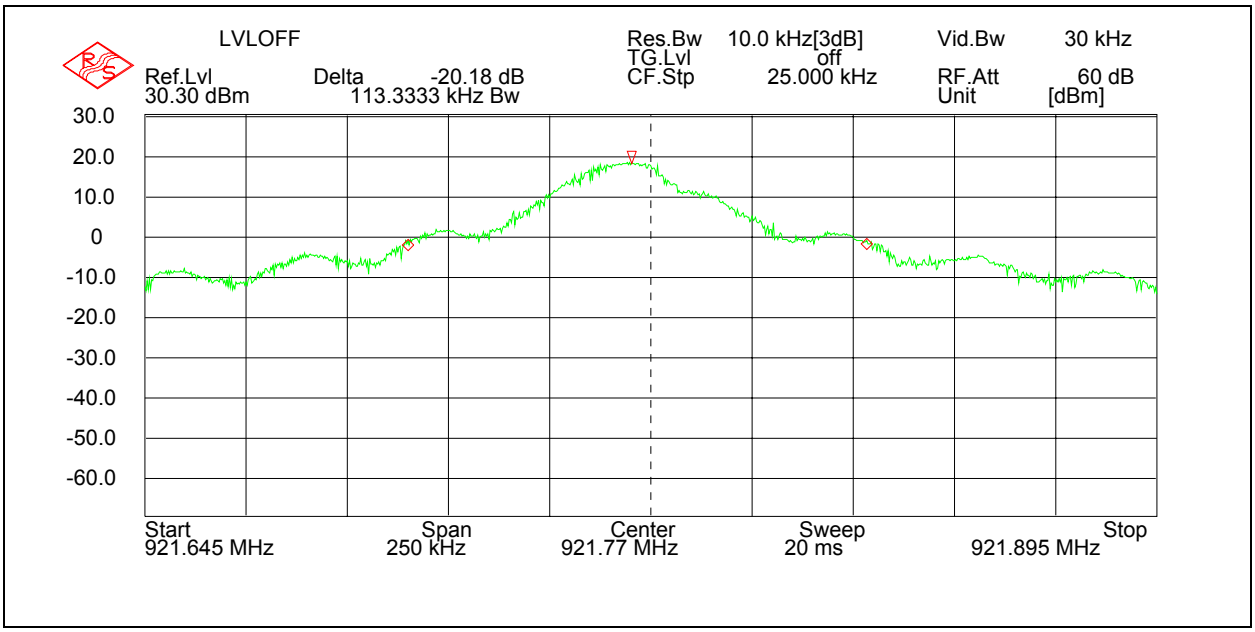

Figure 7.5.4-3: 20dB Bandwidth High Channel

7.6 Band-Edge Compliance and Spurious Emissions - FCC Section 15.247(c)

7.6.1 Band-Edge Compliance of RF Conducted Emissions

7.6.1.1 Test Methodology

The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement the spectrum analyzer's RBW was set to 300 kHz, which is ≥ 1% of the span, and the VBW was set to 1 MHz.

7.6.1.2 Test Results

In a 100 kHz bandwidth at the lower and upper band-edge, the radio frequency power that was produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. Band-edge compliance is displayed in Figures 7.6.1-1 and 7.6.2-2

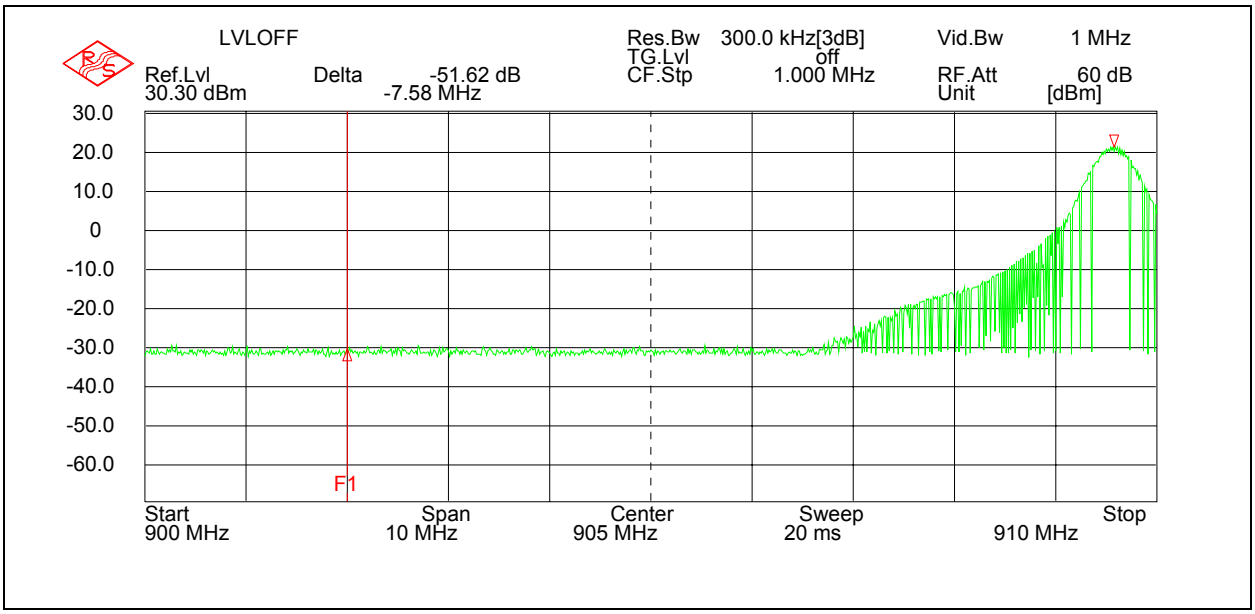

Figure 7.6.1-1: Lower Band-edge

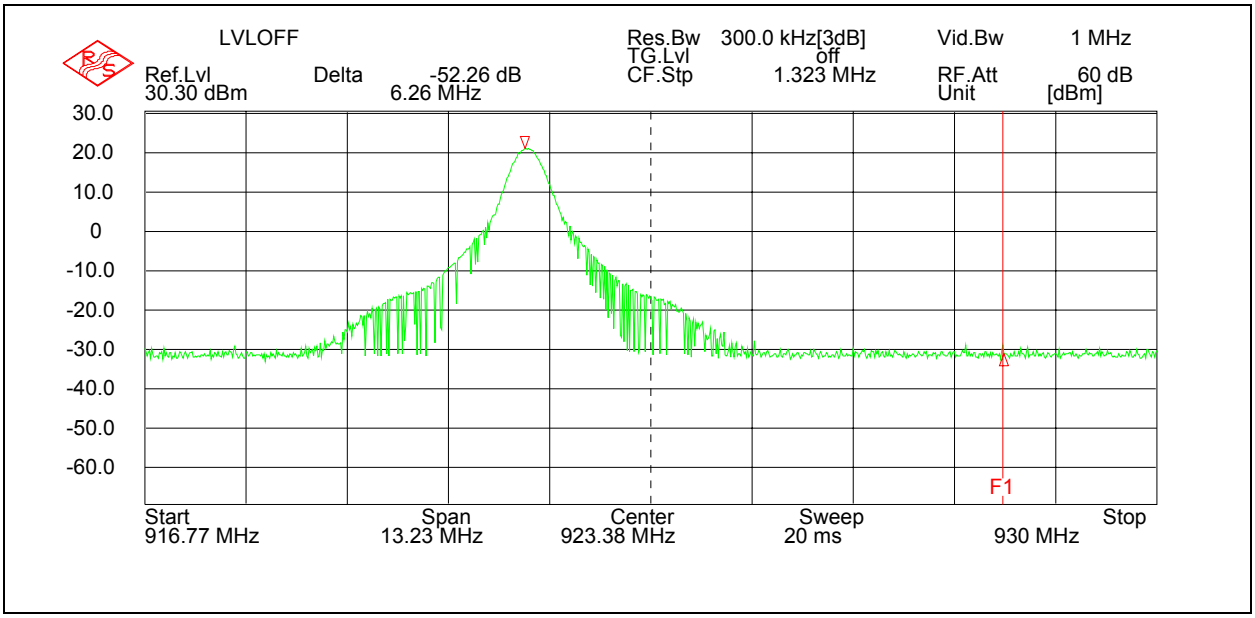

Figure 7.6.1-2: Upper Band-edge

7.6.2 RF Conducted Spurious Emissions

7.6.2.1 Test Methodology

The EUT was investigated for conducted spurious emissions from 30MHz to 10GHz, 10 times the highest fundamental frequency.

The EUT was investigated for conducted spurious emissions from 30MHz to 10GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's VBW was set to 100kHz and the RBW was set to 1MHz. A peak detector function was used with the trace set to max hold.

7.6.2.1 Test Results

All emission found were greater than 20dB down from the fundamental carrier. The RF conducted spurious emissions were measured in the band of 30MHz to 10GHz. Results are shown below in Figure 7.6.2-1 through 7.6.2-6.

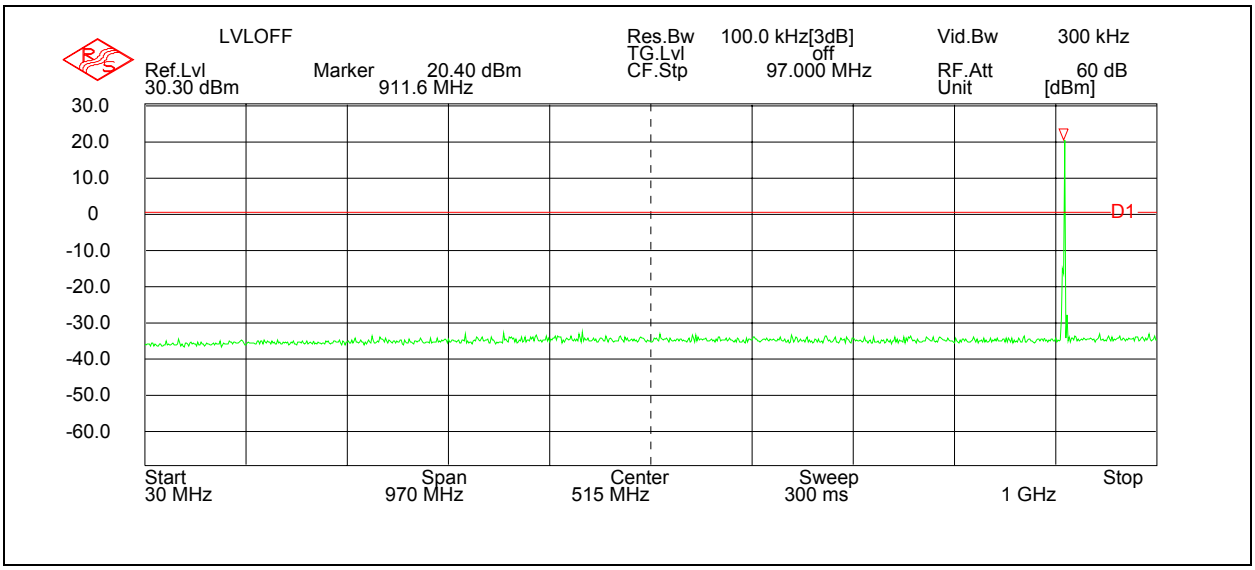

Figure 7.6.2-1 RF Conducted Spurious Emissions – Low Channel

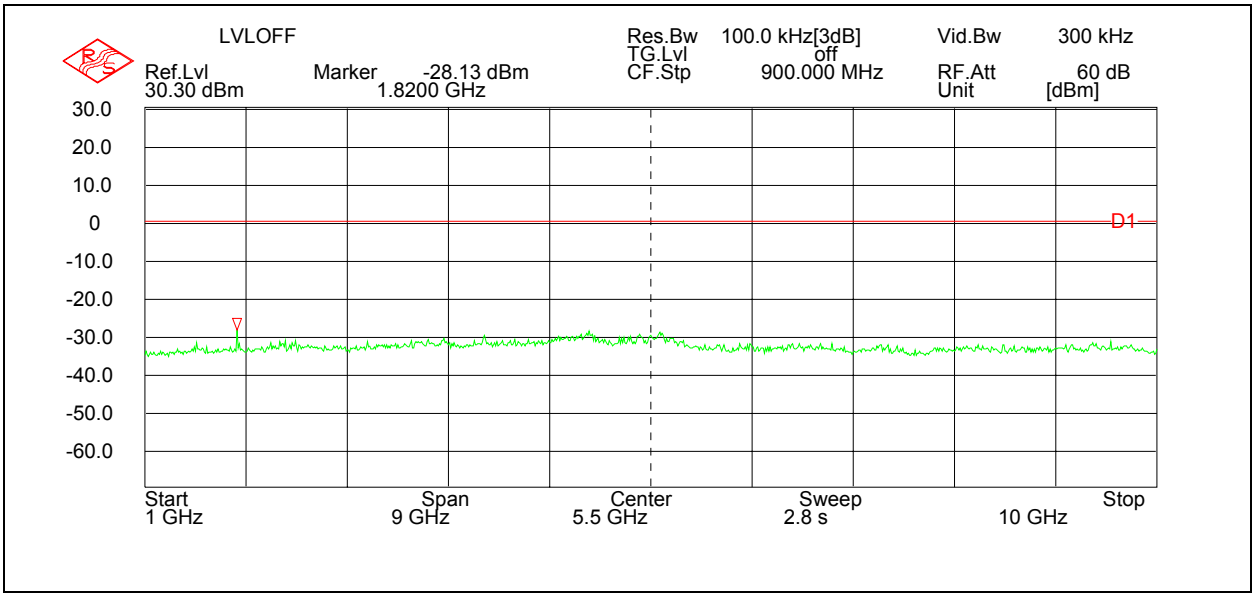

Figure 7.6.2-2 RF Conducted Spurious Emissions – Low Channel

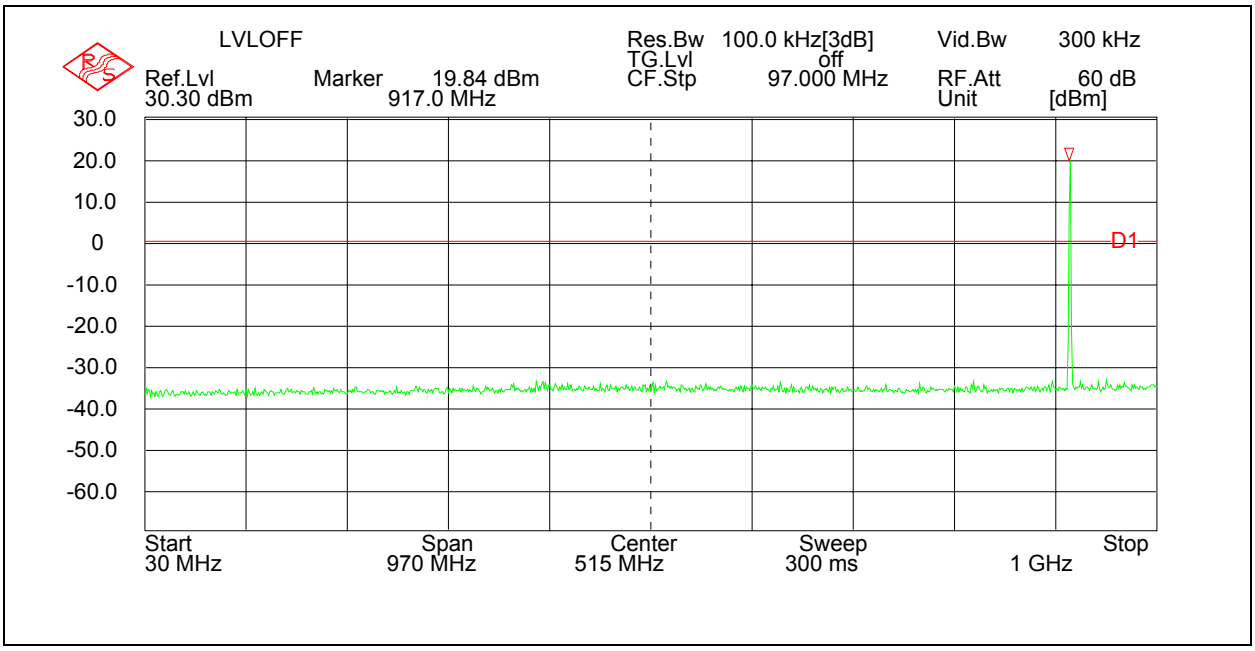

Figure 7.6.2-3 RF Conducted Spurious Emissions – Mid Channel

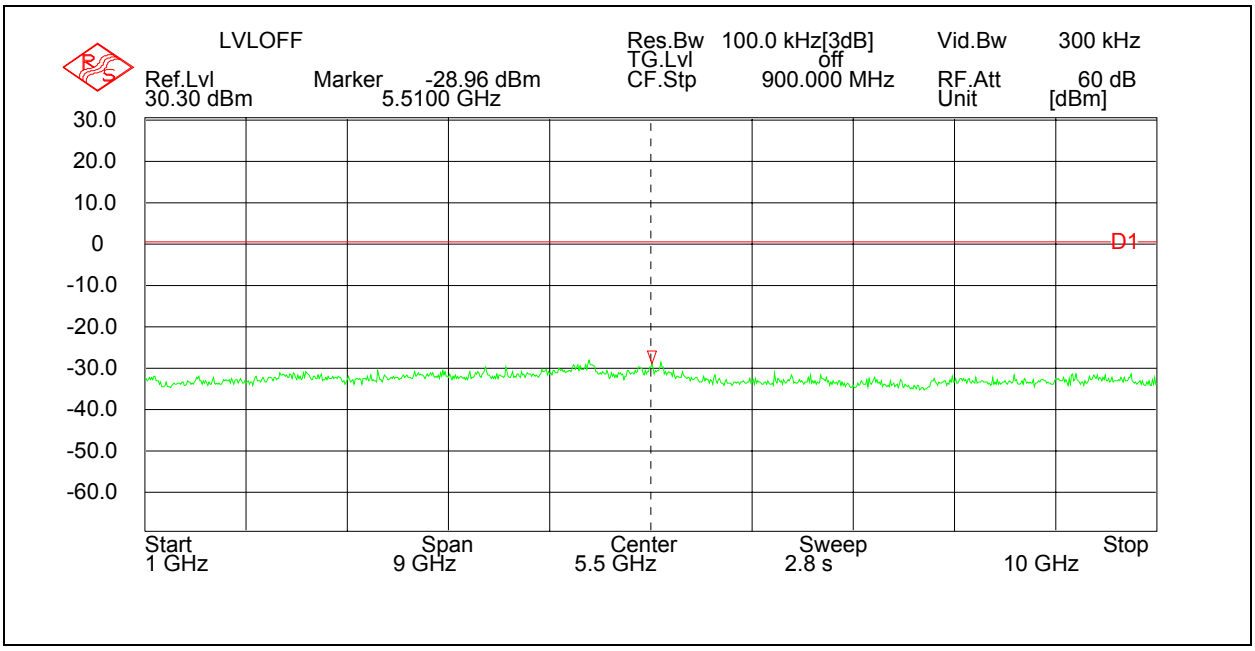

Figure 7.6.2-4 RF Conducted Spurious Emissions – Mid Channel

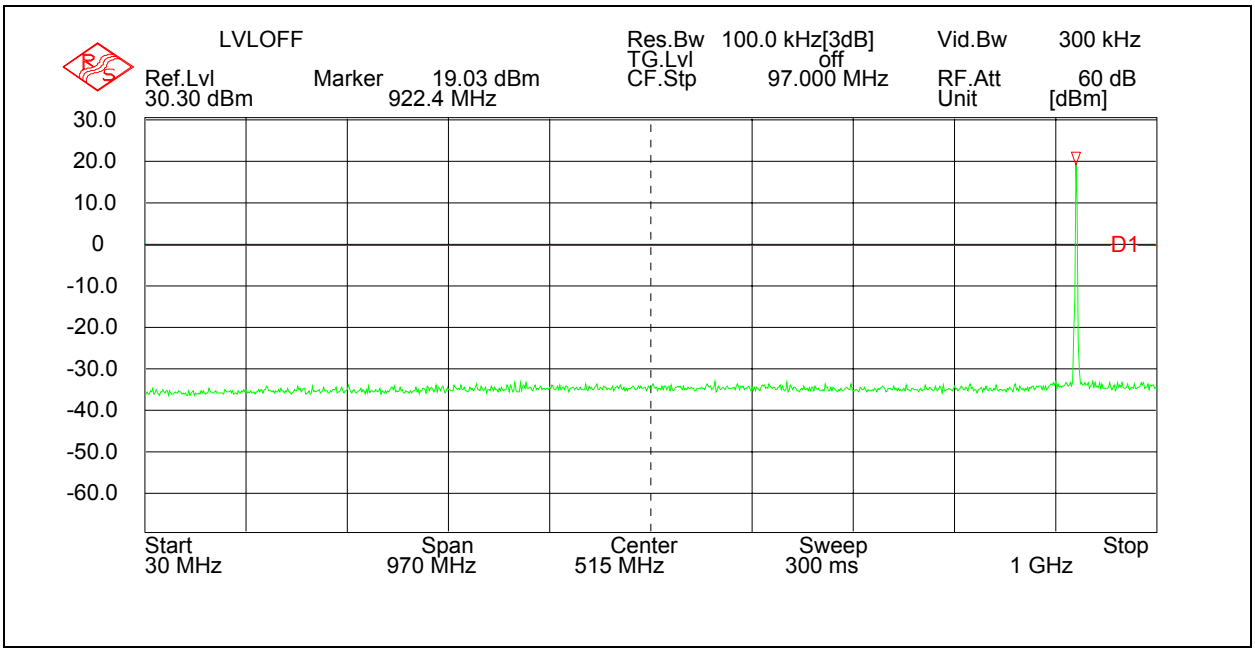

Figure 7.6.2-5 RF Conducted Spurious Emissions – High Channel

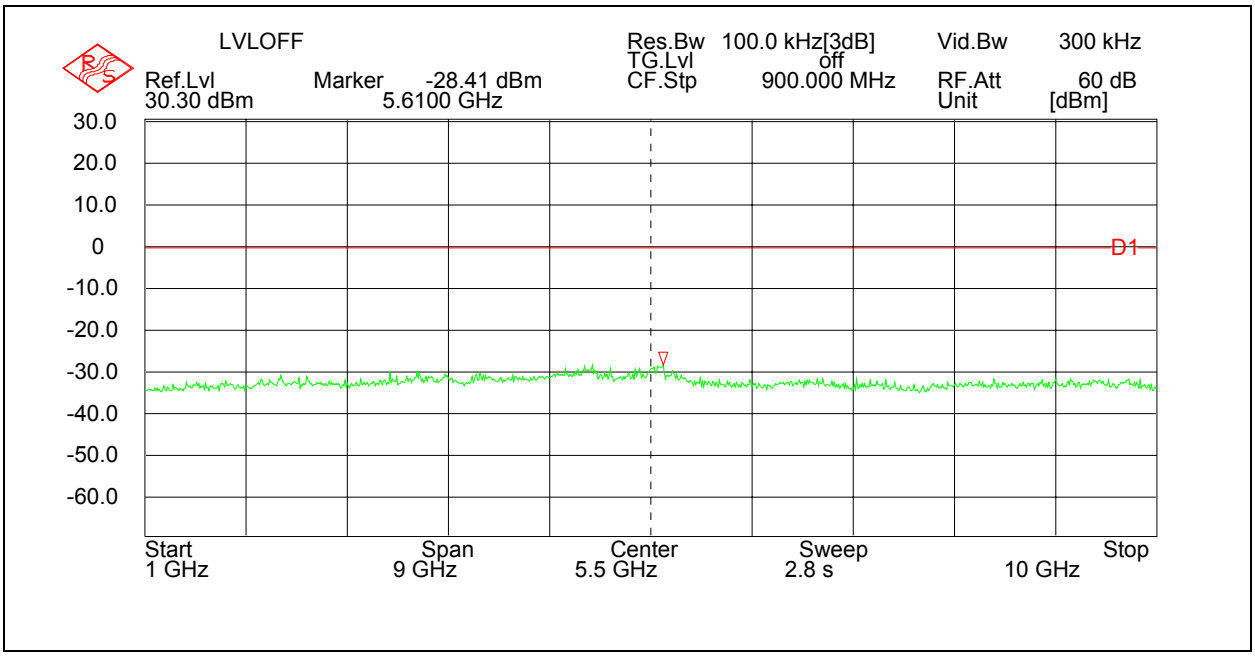

Figure 7.6.2-6 RF Conducted Spurious Emissions – High Channel

7.6.3 Radiated Spurious Emissions (Restricted Bands) - FCC Section 15.205

7.6.3.1 Test Methodology

Radiated emissions tests were made over the frequency range of 30MHz to 10GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For frequencies above 1000MHz, average measurements were made using an RBW of 1 MHz and a VBW of 10 Hz and peak measurements were made with RBW of 1 MHz and a VBW of 1 MHz.

The EUT was caused to generate a continuous carrier signal on the hopping channel.

7.6.3.2 Test Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in Table 7.6.3-1. Each emission found to be in a restricted band as defined by section 15.205, was compared to the radiated emission limits as defined in section 15.209.

Table 7.6.3-1: Radiated Spurious Emissions

Frequency (MHz/GHz)	Level (dBuV/m)	Detector (P/A)	Antenna Polarity (H/V)	Turntable Position (o)	Correction Factors (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low Channel								
2.729	45.77	p	h	100	2.34	48.11	74	25.89
2.729	28.93	a	h	100	2.34	31.27	54	22.73
3.638	49.5	p	h	100	6.59	56.09	74	17.91
3.638	29.51	a	h	100	6.59	36.10	54	17.90
Mid Channel								
3.664	48.43	p	h	100	6.71	55.14	74	18.86
3.664	29.56	a	h	100	6.71	36.27	54	17.73
High Channel								
2.765	44.65	p	h	100	2.53	47.18	74	26.82
2.765	29.41	a	h	100	2.53	31.94	54	22.06
3.686	49.65	p	h	100	6.81	56.46	74	17.54
3.686	29.31	a	h	100	6.81	36.12	54	17.88

***** The magnitude of all emissions not reported were below the noise floor of the measurement system.

7.6.3.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation

Corrected Level: 45.77 + 2.43 = 48.11 dBuV
Margin: 74dBuV – 48.11 dBuV = 25.89 dB

8.0 CONCLUSION

In the opinion of ACS, Inc. the C1A-3, manufactured by Itron Electricity Metering, Inc., meets the requirements of FCC Part 15 subpart C.