Test Report

Class II Permissive Change

Frequency Hopping Spread Spectrum Transmitter

FCC ID: R7PIWRS3
IC ID: 5294A-IWRS3

FCC Rule Part: 15.247
IC RSS 210

ACS Report Number: 05-0319-15PC

Manufacturer: Cellnet Technology, Inc.
Equipment Type: Utility Meter Usage Data Transceiver
Model: IWR with UTILINET DC RADIO

Test Begin Date: August 24, 2005
Test End Date: August 24, 2005

Report Issue Date: September 9, 2005

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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This report contains 24 pages

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1.0 GENERAL

1.1 Introduction
The purpose of this report is to demonstrate continued compliance of the IWR Utilinet Radio to the Radiated Spurious Emission and Bandedge requirements of 15.247 of the FCC's Code of Federal Regulations and Industry Canada's RSS 210.

The are 2 reasons for this Class 2 permissive change:

1. The manufacturer has a need that requires the device to be installed, wholly, into a steel enclosure. The enclosure also houses an AC to DC power supply to provide the DC power for the radio. The IWR itself is electrically and mechanically identical with the exception of the added enclosure and power supply.
2. During the evaluation, the bandedges were found to have changed and closer to the limits as measured in the original filing.

1.2 Product Description

System Overview
UtiliNet is a comprehensive wireless data communications solution that utilizes spread-spectrum radios in the 902-928 MHz area of the radio spectrum to provide reliable network answers for remote telemetry or distributed control applications. UtiliNet radios combine three important technologies: a mesh architecture for peer-to-peer communications and true networking functionality, asynchronous spread spectrum frequency hopping for maximum use of bandwidth, and packet switching for guaranteed message transfer and automatic store-and-forward routing.

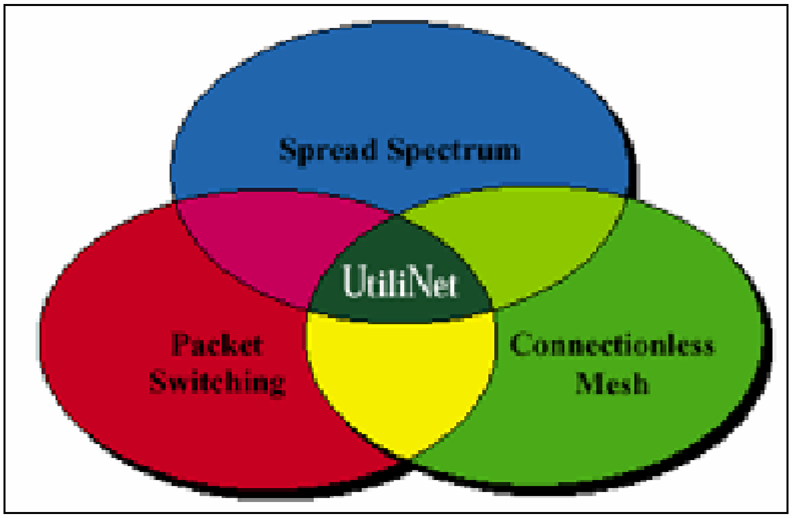


Figure 1.1 UtiliNet Technologies

These three technologies work together to ensure that UtiliNet networks are fast (up to 9600 bps), operate transparently, and are reliable in the delivery of all data messages. These are the key advantages of UtiliNet.

UtiliNet Basics

UtiliNet is a wireless data communications network based on spread-spectrum radio technologies.

Network of Intelligent Radios

UtiliNet radios form the foundation of a UtiliNet network and serve multiple functions.

- Each radio can communicate to end devices for some data collection or control function. This may involve transparent applications where data is merely passed through UtiliNet radios, or it may involve programs running in radios and/or other gateway devices to perform custom applications, higher network efficiency or enhanced functionality.
- Each radio interacts with its UtiliNet radio RF neighbors to form a wide area network (WAN) into which it may initiate a packet, automatically route a packet between other radios, or accept a packet as the final destination.
- Each radio automatically integrates itself into an RF wide area network and routes packets. Upon power up or reboot, and at intervals while powered on, a radio automatically scans the frequency band searching for other UtiliNet radios in its vicinity to learn about its RF neighbors. As the radios learn about one another, they pass their geographic address coordinates for routing and to keep communication statistics for choosing the best data transmission paths. This allows the radios to automatically route packets and dynamically build routing tables to choose the best paths if RF conditions change. Once configured by the user, radios automatically acquire radios and route packets.
- Each radio can execute one or more programs written in the Device Control Word (DCW) language. These programs can send, receive, and process packets to and from other radios. They also are able to send, receive, and process data to and from end devices connected to the radio. Examples of DCW applications include: radio configuration, radio queries, data collection, communication to end devices, protocol translation and peer-to-peer control. Several types of UtiliNet radios are available:
  - The Integrated WanGate Radio (IWR) and WanGate radio are used with RS-232 end devices and as additional repeaters if necessary (the IWR is designed for installation inside another enclosure and the WanGate is designed for independent outdoor installations).
  - The MicroRTU WanGate radio allows an integrator to install an appropriate RTU into the specialized MicroRTU WanGate enclosure to create a combined RTU and radio communication package.
  - The Network radio is used with Reliable Power Line Carrier (RPLC) end devices.

Mesh Architecture

Much like a giant net over a service area—UtiliNet radios work together to create a mesh. At each point where one thread of the net crosses over another, a node is created in the wider area network. Because each radio can forward messages to and respond to every other radio in the network, each radio is an equal participant in the network. The result is increased communication reliability because there is no single point of failure. While a radio is interacting with an end-device, it can be simultaneously acting as part of the mesh network. The concept of creating a mesh is central to what makes UtiliNet a truly robust data communication solution.

Radios With Programmable Intelligence

Each radio is similar to a programmable logic controller (PLC). The radio acts much like a small computer, carrying out any number of computing and command functions. The intelligence in each radio enables it to perform many functions not normally associated with radios such as making intelligent routing decisions, transporting industry protocols, and recognizing operating conditions and responding with pre-programmed logic.

Packets Hop From Radio To Radio

When an end device generates a message that needs to traverse the network, the end-device radio packets the data, places the data into an envelope—addressed to the destination radio—and enters it into the network. The data packet traverses the network by hopping from radio to radio in the direction of the destination radio. The number of hops between origin and destination radio(s) is automatically minimized to increase transmission speed. The route chosen for traversing the network is dynamic and employs automatic re-routing in the event a particular data path is not clear.

Polling and Report By Exception

Traditional point-to-multipoint systems are prone to network latency as only one radio can communicate with the master at a time. A mesh network eliminates this problem as data is evenly spread across the entire mesh (i.e., a multipoint-to multipoint network). Further, most traditional network topologies poll, gathering data sequentially. UtiliNet radios can be programmed to respond under predetermined parameters or on an unsolicited, report-by-exception basis—which is both faster and more efficient. A node could be represented by one radio attached to end-devices.

1.2.1 Intended Use

The IWR with UTILINET DC RADIO is a data radio used in the Utility industry for controls and automatic meter reading.

1.2.2 Antenna Kit (P/N 105665-000)

The antenna kit provides a simple 5dB gain whip antenna and extends the IWR antenna connection to an adaptor on the enclosure in which it is installed.

Figure 1.2.2-1 displays the following components:

• Antenna, 5 dB gain whip, 915 MHz, N-Male
• Coax jumper cable, RG 58, 18” N-Male to N-Male
• Antenna mounting plate
• Bulkhead connector w/O-ring gasket, lock washer, and nut
• Reference drawing

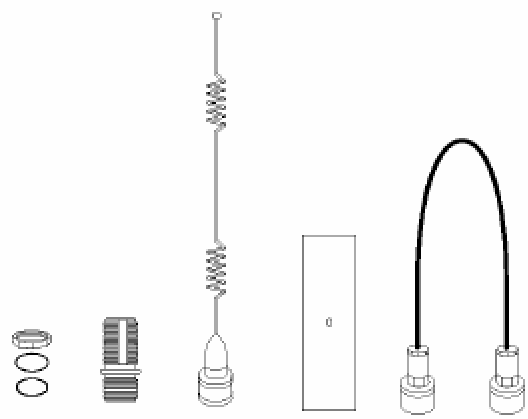


Figure 1.2.2-1: Antenna Kit

2.0 LOCATION OF TEST FACILTY

All testing was performed by qualified ACS personnel located at the following address:

ACS, Inc.
5015 B.U. Bowman Drive
Buford, GA 30518

2.1 DESCRIPTION OF TEST FACILITY

Both the 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

2.1.1 Open Area Test Site

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 2.1-1 below:

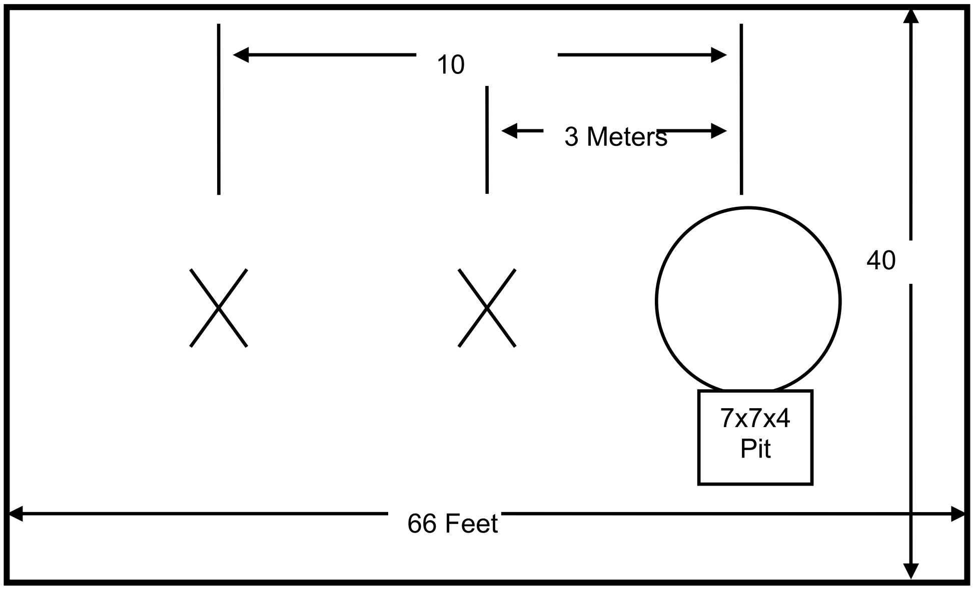


Figure 2.1-1: Open Area Test Site

2.1.2 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 2.1.2-1:

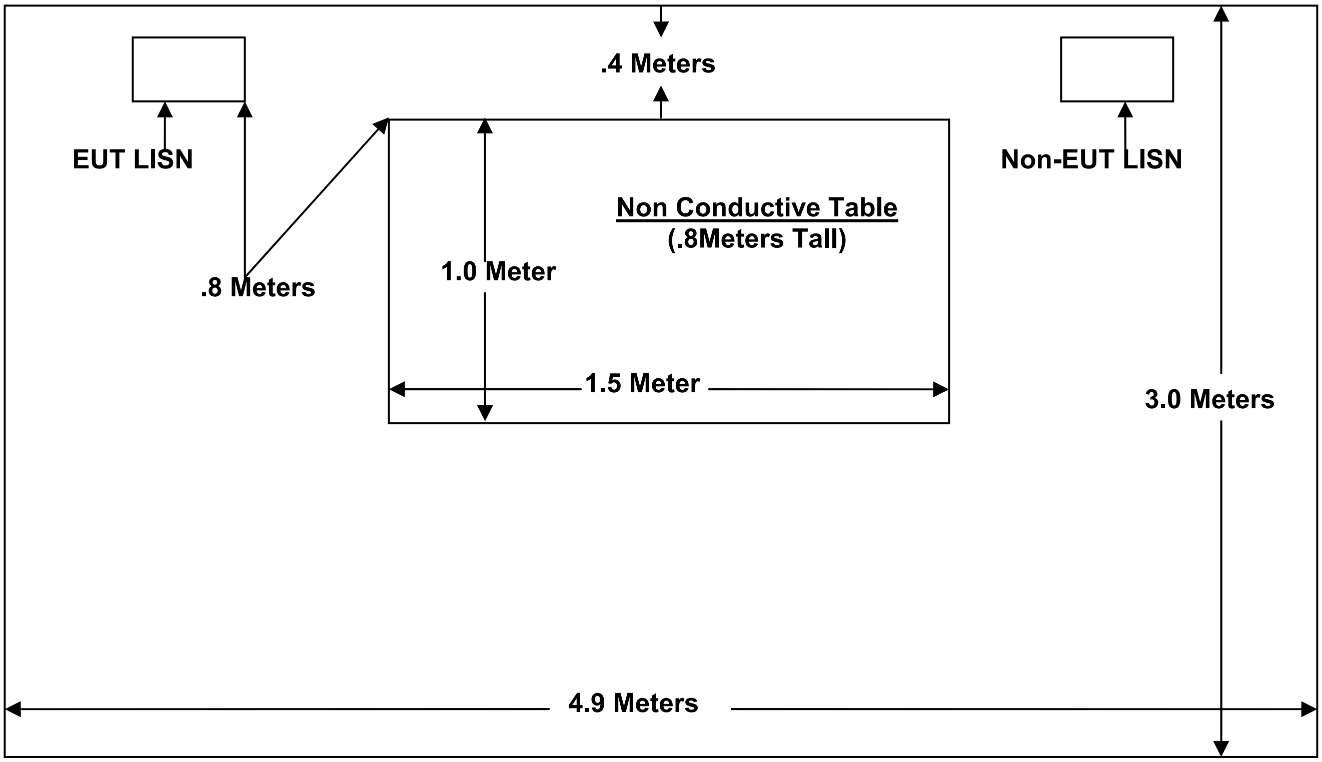


Figure 2.1.2-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: 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	10/15/05
☒ 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	05/06/06
☒ 73	Agilent	Pre-Amplifier	8447D	272A05624	05/18/06
☒ 30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	05/09/06
☒ 105	Microwave Circuits	High Pass Filter	H1G810G1	2123-01 DC0225	06/09/06
☒ 1	Rohde & Schwarz	Receiver Display	804.8932.52	833771/007	03/07/06
☒ 2	Rohde & Schwarz	ESMI Receiver	1032.5640.53	839587/003	03/07/06
☒ 3	Rohde & Schwarz	Receiver Display	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	06/29/06
☒ 211	Eagle	Band Reject Filter	C7RFM3NFNM	n/a	01/06/06
☒ 168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	01/06/06
☒ 204	ACS	Cable	RG8	204	12/29/05
☒ 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	Harbour Industries	HF RF Cable	LL142	00208	60/24/06
☒ 167	ACS	Chamber EMI Cable Set	RG6	167	12/29/05
☒ 204	ACS	Chamber EMI RF cable	RG8	204	01/07/06

5.0 SYSTEM BLOCK DIAGRAM

Table 5.0: System Block Diagram

Diagram Number	Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
1	EUT	Utility Meter Data Transceiver	UTILINET DC RADIO	None	R7PIWRS3
2	Unknown	Enclosure	Unknown	---	---
3	Unknown	Internal DC Power Supply	Unknown	---	---
4	Unknown	Antenna	P/N 105665-000	None	None

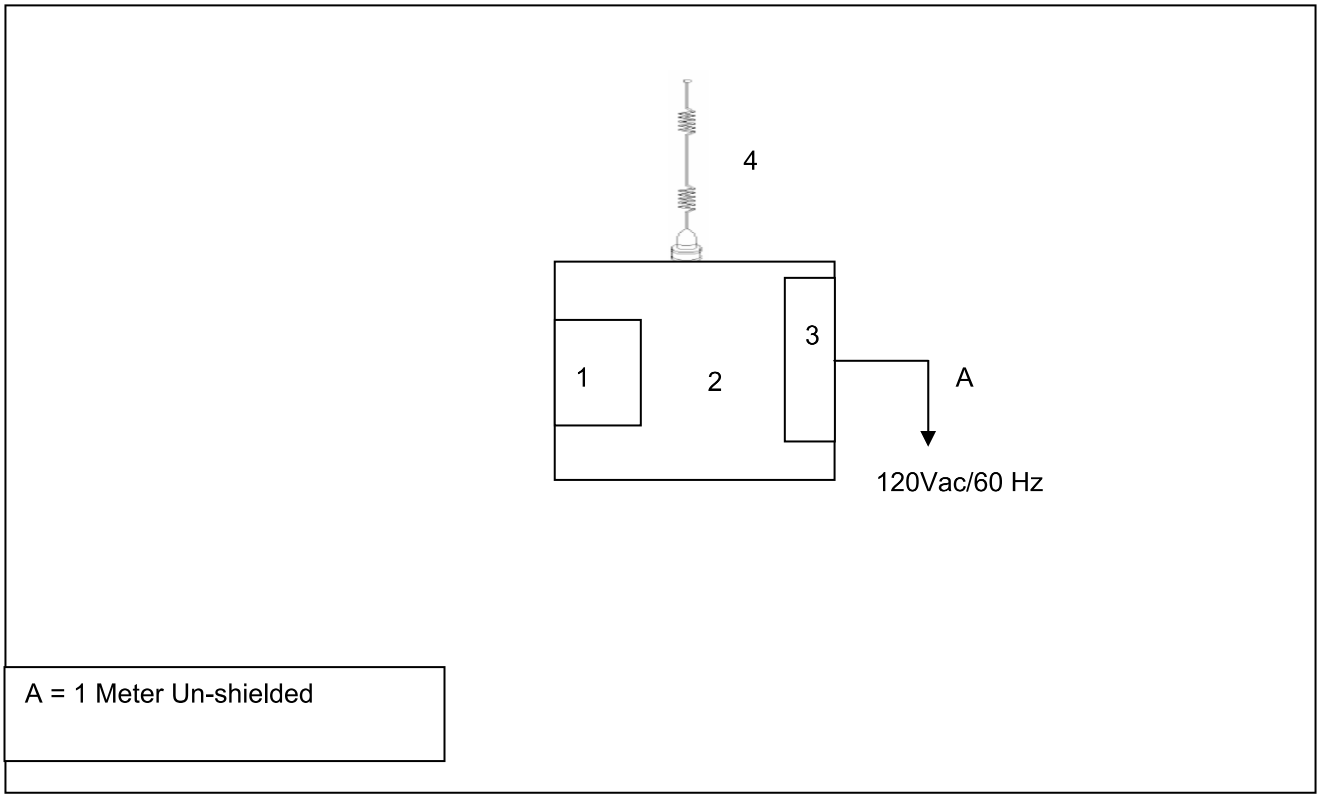


Figure 5.0-1: EUT Test Setup

6.0 SUMMARY OF TESTS

6.1 Antenna Requirement – FCC Section 15.203

The EUT employs a Standard N-Type Connector. This equipment is designed for use by the utility industry and is not marketed to the general public and must be professionally installed. The standard connector allows for antenna replacement by qualified service personnel.

6.2 Power Line Conducted Emissions - FCC Section 15.207

6.2.1 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.

6.2.2 Test Results

TEST DATE: August 18, 2005

MODEL: MCC

TECHNICIAN: A Rudd

EUT VOLTAGE:
230VAC/50HZ: ________ **120VAC/60HZ:** √ **12VDC:** ________ **OTHER:** ________

Table 6.2.2-1: Conducted Emissions Line 1 - Quasi-Peak

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Line	PE
0.150000	51.10	66.0	14.8	L2	GND
0.432000	39.50	57.2	17.7	L2	GND
0.726000	42.20	56.0	13.7	L2	GND
0.774000	43.80	56.0	12.1	L2	GND
1.356000	29.80	56.0	26.1	L2	GND
1.848000	10.80	56.0	45.1	L2	GND
2.178000	17.20	56.0	38.7	L2	GND
3.990000	11.40	56.0	44.5	L2	GND
4.680000	15.50	56.0	40.4	L2	GND
26.586000	21.00	60.0	38.9	L2	GND

Table 6.2.2-2: Conducted Emissions Line 1 - Average

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Line	PE
0.156000	22.00	55.6	33.6	L2	GND
0.462000	16.40	46.6	30.1	L2	GND
0.708000	16.20	46.0	29.7	L2	GND
0.780000	22.00	46.0	23.9	L2	GND
1.266000	13.20	46.0	32.7	L2	GND
1.764000	8.90	46.0	37.0	L2	GND
2.172000	10.30	46.0	35.6	L2	GND
3.936000	7.60	46.0	38.3	L2	GND
4.680000	11.80	46.0	34.1	L2	GND
26.580000	18.80	50.0	31.1	L2	GND

* Measurement Uncertainty = ±4dB

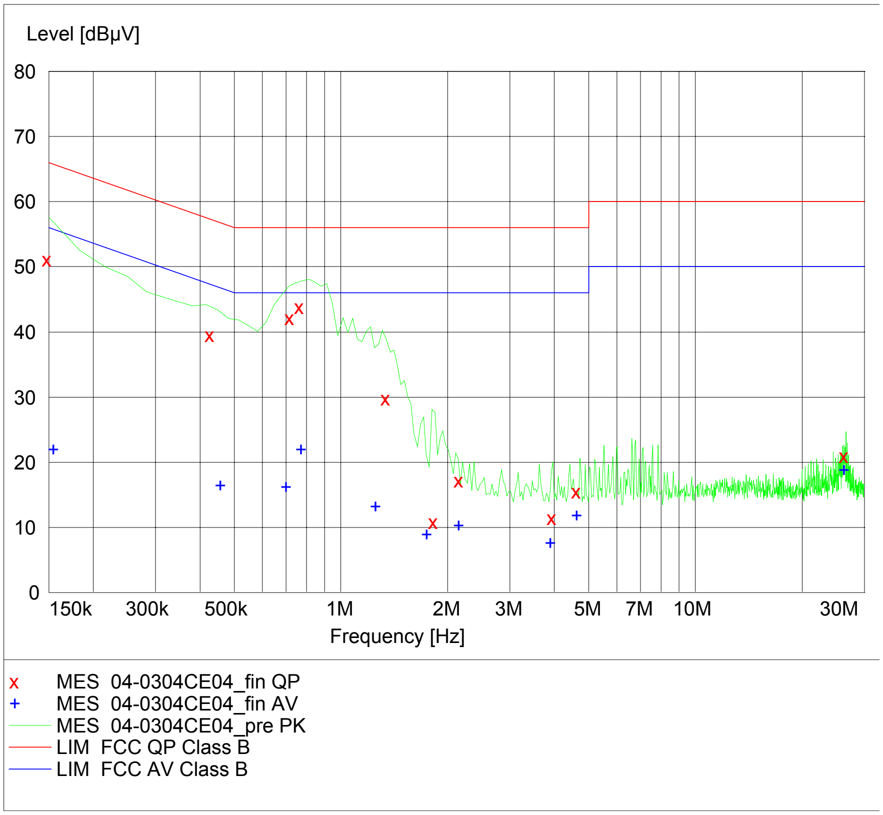


Figure 6.2.2-1 Conducted Emissions Line 1

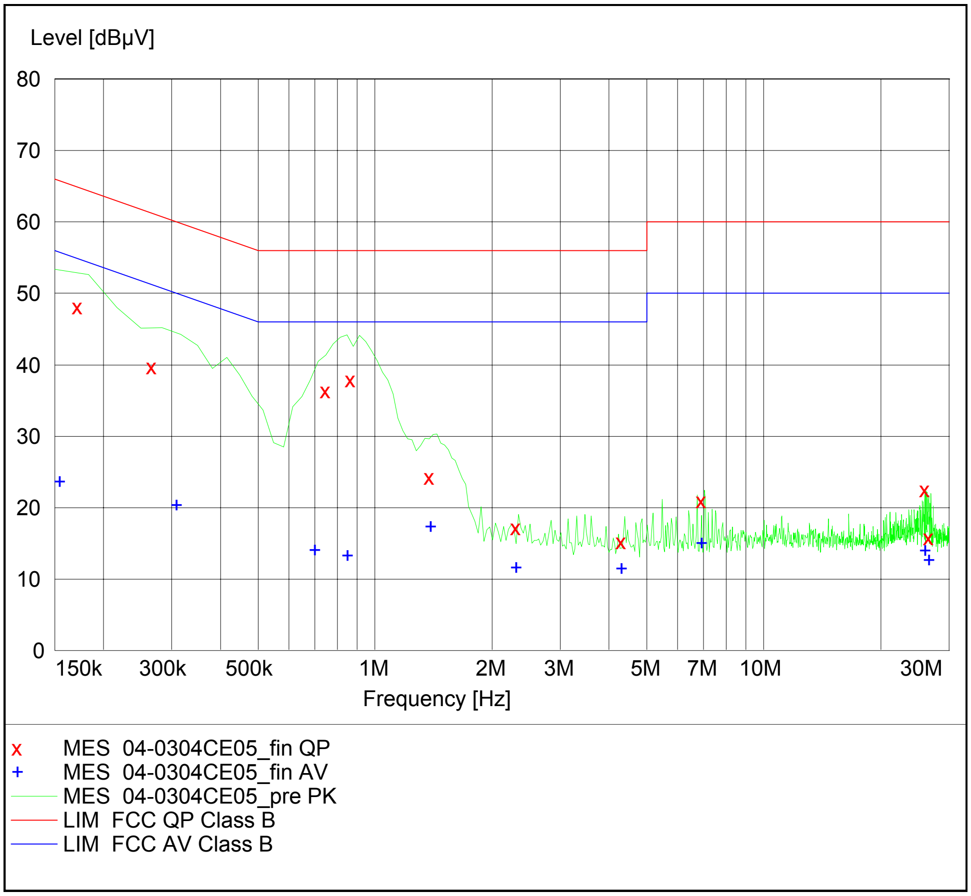
Table 6.2.2-3: Conducted Emissions Line 2 - Quasi-Peak

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Line	PE
0.174000	48.10	64.7	16.5	L1	GND
0.270000	39.70	61.1	21.4	L1	GND
0.756000	36.40	56.0	19.5	L1	GND
0.876000	37.90	56.0	18.0	L1	GND
1.398000	24.30	56.0	31.6	L1	GND
2.334000	17.20	56.0	38.7	L1	GND
4.356000	15.20	56.0	40.7	L1	GND
7.008000	21.00	60.0	38.9	L1	GND
26.334000	22.50	60.0	37.4	L1	GND
26.928000	15.80	60.0	44.1	L1	GND

Table 6.2.2-4: Conducted Emissions Line 2 - Average

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Line	PE
0.156000	23.70	55.6	31.9	L1	GND
0.312000	20.40	49.9	29.4	L1	GND
0.708000	14.10	46.0	31.8	L1	GND
0.858000	13.30	46.0	32.6	L1	GND
1.404000	17.40	46.0	28.5	L1	GND
2.334000	11.60	46.0	34.3	L1	GND
4.356000	11.50	46.0	34.4	L1	GND
7.008000	15.00	50.0	34.9	L1	GND
26.334000	14.00	50.0	35.9	L1	GND
26.922000	12.70	50.0	37.2	L1	GND

* Measurement Uncertainty = ±4dB



Graphic 6.2.2-2 Conducted Emissions Line 2

___√__ Based on the above results, the EUT meets the conducted emission limits of FCC Part 15B and Industry Canada ICES-003 when tested as described in section 5.0.

6.3 Radiated Emissions - FCC Section 15.109(Unintentional Radiation)

6.3.1 Test Methodology

ANSI C63.4 Sections 6 and 8 were the guiding documents for this evaluation. Radiated emissions tests were performed over the frequency range of 30MHz to 10000MHz. 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 120KHz for measurements above 30MHz.

The EUT was caused to go into a "Receive" mode of operation for this test.

6.3.2 Test Results

Results of the test are given in Tables 6.3.2-1through 6.3.2-3 below:

Table 6.3.2-1: Radiated Emissions Tabulated Data <1GHz (Unintentional Radiators)

Frequency (MHz)	Polarisation	Height (cm)	Azimuth (deg)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.560000	HORIZONTAL	120.0	264.00	15.60	40.0	24.4
59.120000	VERTICAL	108.0	234.00	24.60	40.0	15.4
65.120000	VERTICAL	109.0	251.00	23.60	40.0	16.4
97.120000	VERTICAL	100.0	0.00	27.10	43.5	16.4
135.600000	VERTICAL	108.0	124.00	29.40	43.5	14.1
169.520000	HORIZONTAL	150.0	207.00	34.30	43.5	9.2
372.960000	VERTICAL	118.0	190.00	35.70	46.0	10.3
440.800000	VERTICAL	178.0	168.00	38.00	46.0	8.0
610.320000	HORIZONTAL	110.0	274.00	35.70	46.0	10.3
813.760000	VERTICAL	150.0	145.00	39.50	46.0	6.5

Table 6.3.2-2: Radiated Emissions Tabulated Data up to 10GHz (Unintentional Radiators)

Frequency (GHz)	Level (dBuV/m)	Detector (P/A)	Antenna Polarity (H/V)	Antenna Height (cm)	Correction Factors (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.37	42.47	p	Vertical	100	0.03	42.50	74.00	31.50
2.45	43.33	p	Horizontal	100	0.39	43.72	74.00	30.28
3.43	42.57	p	Vertical	100	4.00	46.57	74.00	27.43
3.32	43.26	p	Horizontal	100	3.54	46.80	74.00	27.20
4.96	42.88	p	Horizontal	100	8.58	51.46	74.00	22.54
4.56	41.53	p	Vertical	100	6.80	48.33	74.00	25.67
7.92	42.06	p	Vertical	100	15.09	57.15	74.00	16.85
7.38	42.14	p	Horizontal	100	14.72	56.86	74.00	17.14
8.53	42.19	p	Horizontal	100	15.69	57.88	74.00	16.12
9.86	41.97	p	Vertical	100	17.97	59.94	74.00	14.06

6.4 Radiated Spurious Emissions – FCC Section 15.247(c)

6.4.1 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 120kHz and a video bandwidth(VBW) of 300kHz. For frequencies above 1000MHz, average measurements were made using an RBW of 1MHz and a VBW of 10Hz and peak measurements were made with RBW of 1MHz and a VBW of 1MHz.

The EUT was caused to generate a constant carrier signal for the test.

6.4.2 Test Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in Table 6.4.2-1 through 6.4.2-3. Plots of these emissions are also presented separately in a file titled "05-0319 Radiated Spurious Plots". Each emission found to be in a restricted band as defined by section 15.205, was compared to the radiated emission limits for as defined in section 15.209.

Table 6.4.2-1: Radiated Spurious Emissions (Low)

Frequency (MHz)	Peak Level (dBuV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (o)	Correction Factors (dB)	Corrected Peak Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)
2709	48.00	H	242	291	2.28	50.28*	54	3.72
2709	48.20	V	100	180	2.28	50.48*	54	3.20
3612	43.10	H	100	180	5.70	48.80*	54	5.20
3612	42.36	V	100	180	5.70	48.06*	54	5.94
4515	41.50	H	100	180	7.60	49.10*	54	4.90
4515	40.60	V	100	180	7.60	48.20*	54	5.80

* Peak measurement met average limit, therefore average measurement was not necessary

Table 6.4.2-2: Radiated Spurious Emissions (Mid)

Frequency (MHz)	Peak Level (dBuV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (o)	Correction Factors (dB)	Corrected Peak Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)
2745	38.4	H	137	158	2.4	40.80*	54	13.2
2745	49.8	V	158	37	2.4	52.20*	54	2.20
3660	40.8	H	100	180	5.9	46.68*	54	7.32
3660	40.9	V	100	137	5.9	46.78*	54	7.22

* Peak measurement met average limit, therefore average measurement was not necessary

Table 6.4.2-3: Radiated Spurious Emissions (High)

Frequency (MHz)	Peak Level (dBuV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (o)	Correction Factors (dB)	Corrected Peak Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)
2783	41	H	153	321	2.53	43.53*	54	10.47
2783	46.78	V	153	321	2.53	49.31*	54	4.69
3711	28.5	H	100	0	6.07	34.57*	54	19.43
3711	28.5	V	100	0	6.07	34.57*	54	19.43
4639	28.6	H	100	0	8.16	36.76*	54	17.24
4639	28.6	V	100	0	8.16	36.76*	54	17.24

* Peak measurement met average limit, therefore average measurement was not necessary

Sample Calculations

$R_C = R_U + CF_T$

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 (If applicable)

Note: Duty Cycle for this EUT is 100%. No Correction applied.

6.5 Bandedge Compliance – FCC Section 15.247(c)

6.5.1 Test Methodology

Radiated emissions measurements were made at the bandedges to ensure that they were 20 dB down from the wanted signal in the pass-band.

A test receiver was used for this measurement. The settings on the receiver were as follows:

- Span = set wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
- RBW ≥ 1% of the span
- VBW ≥ RBW
- Sweep = auto
- Detector function = peak
- Trace = max hold

The EUT was caused to generate a constant carrier and the trace was allowed to stabilize. A marker is set on the emission at the bandedge, or on the highest modulation product outside of the band, if this level was greater than that at the bandedge. The marker-delta function was enabled to measure the peak of the in-band emission versus the bandedge level. The marker-delta value must be >/= 20dB.

6.5.2 Test Results

Plots of the bandedge measurements are shown in figures 6.5.2-1 and 6.5.2-4 below.

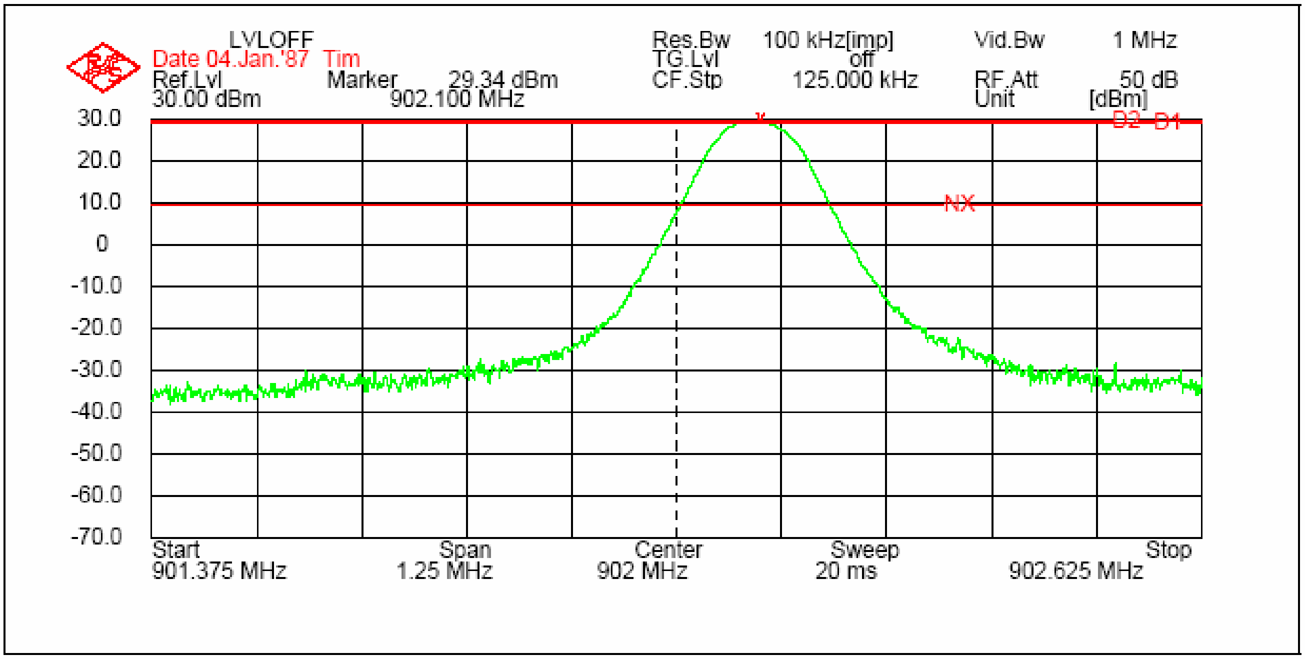


Figure 6.5.2-1: Lower Bandedge measured in 100kHz RBW as originally filed(Conducted)

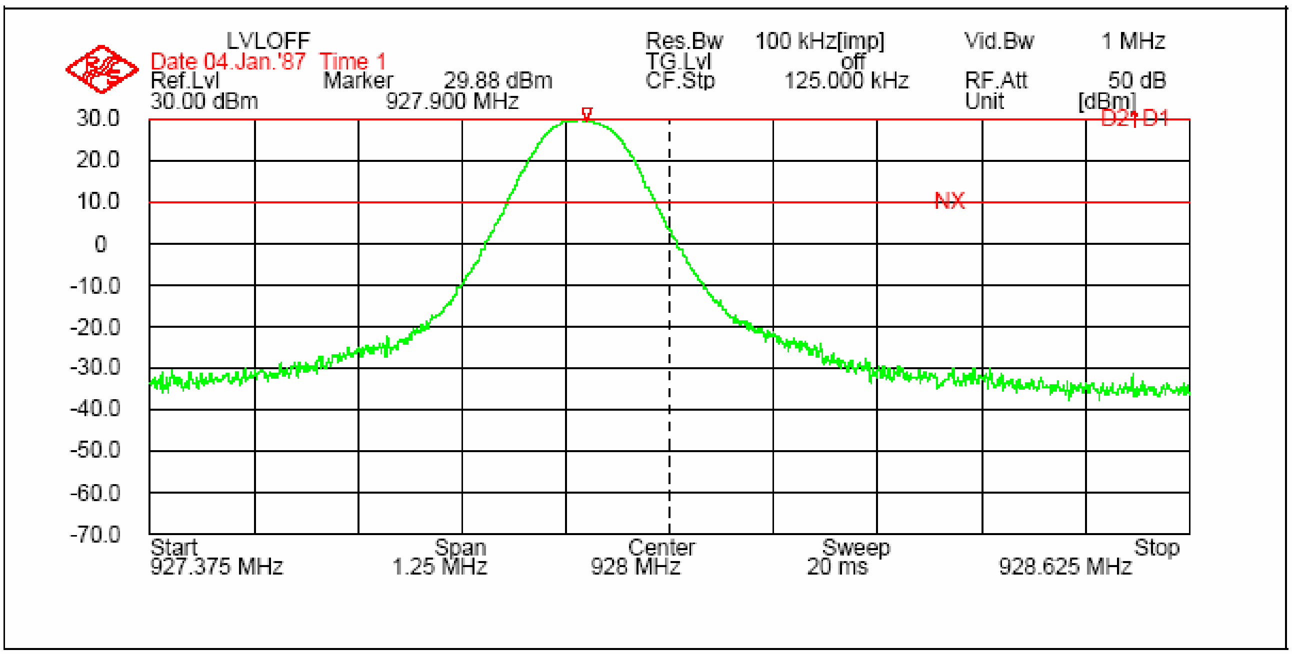


Figure 6.5.2-2: Upper Bandedge measured in 100kHz RBW as originally filed (Conducted)

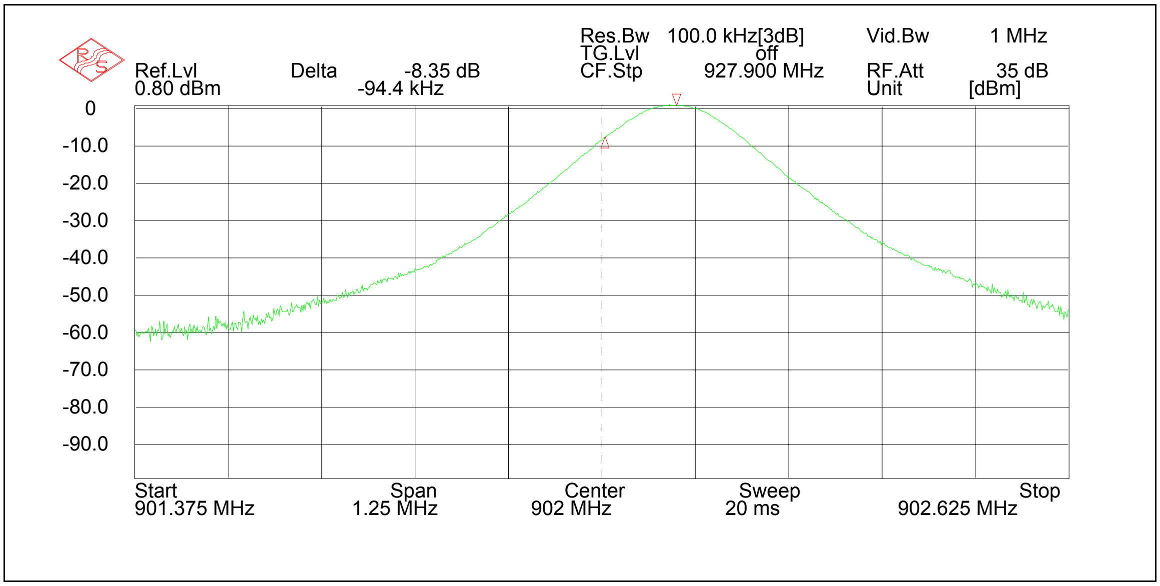


Figure 6.5.2-3: Lower Bandedge as currently measured in 100kHz RBW(Radiated)

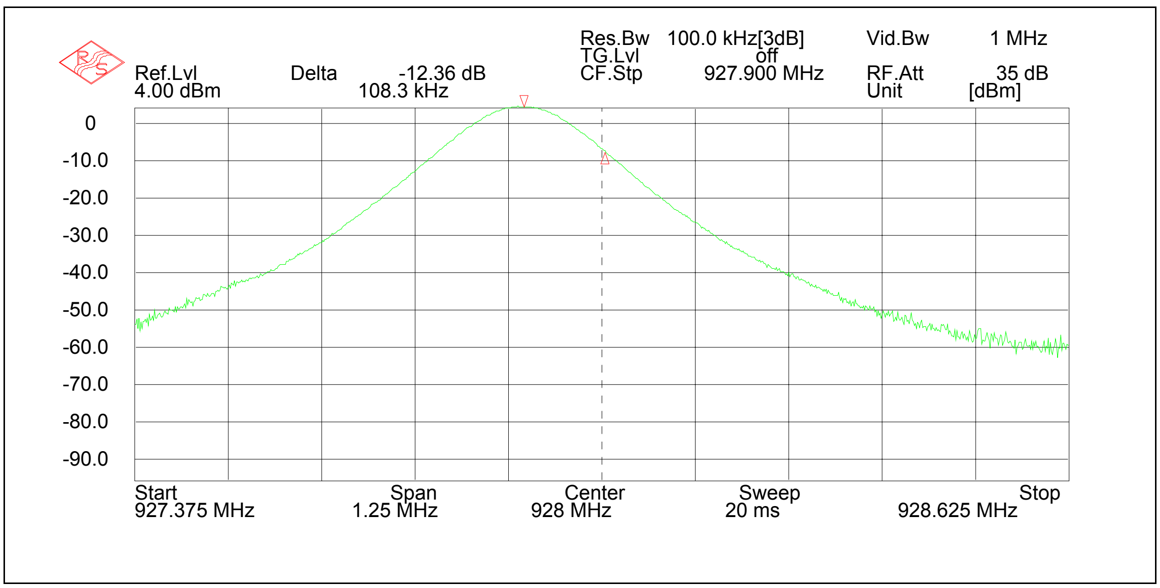


Figure 6.5.2-4: Upper Bandedge as currently measured in 100kHz RBW(Radiated)

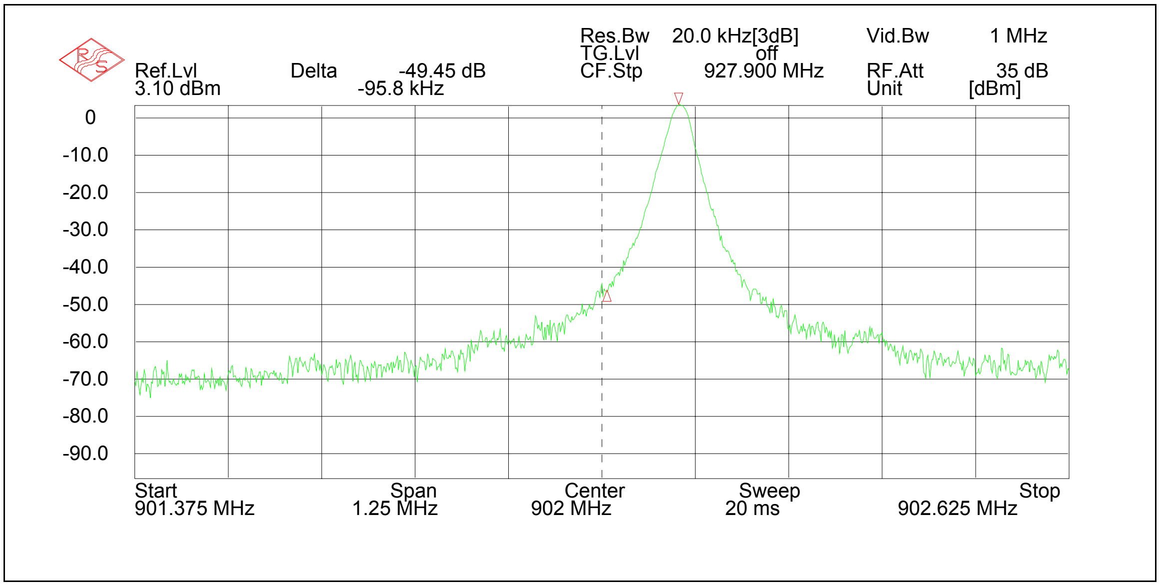


Figure 6.5.2-1: Lower Bandedge as measured in minimum allowable RBW(Radiated)

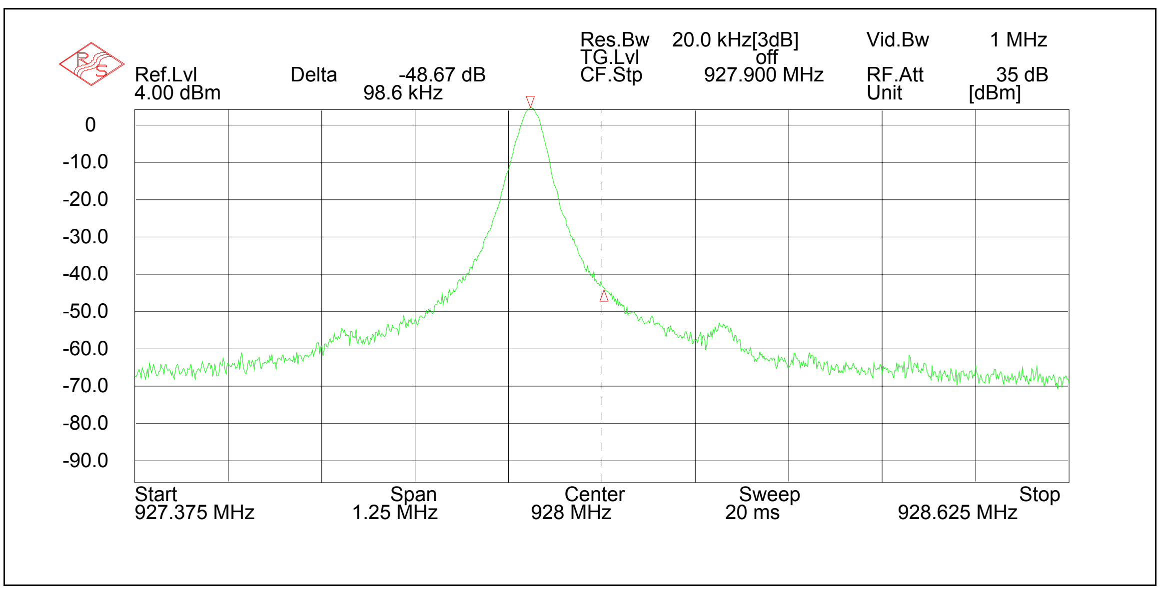
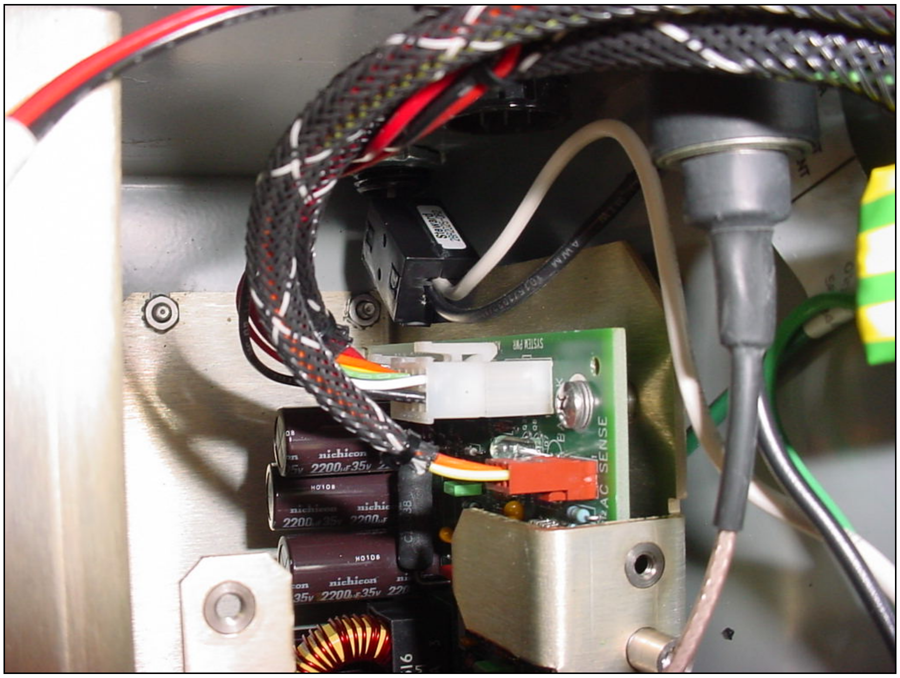


Figure 6.5.2-2: Upper Bandedge as measured in minimum allowable RBW(Radiated)

7.0 MODIFICATIONS

Modifications were necessary to bring the EUT into compliance with the rules. The following modifications were made:

1. A single Steward model 28A2025-0A2 ferrite was placed on the Internal AC power leads as they entered the enclosure. The conductors of the ferrite clamp passed one time through the clamp.



8.0 CONCLUSION

In the opinion of ACS, Inc. the UTILINET DC RADIO manufactured by Cellnet Technology, Inc., meets the relevant requirements of FCC Parts 2 and 15, as required.

Appendix

Test Setup Photographs

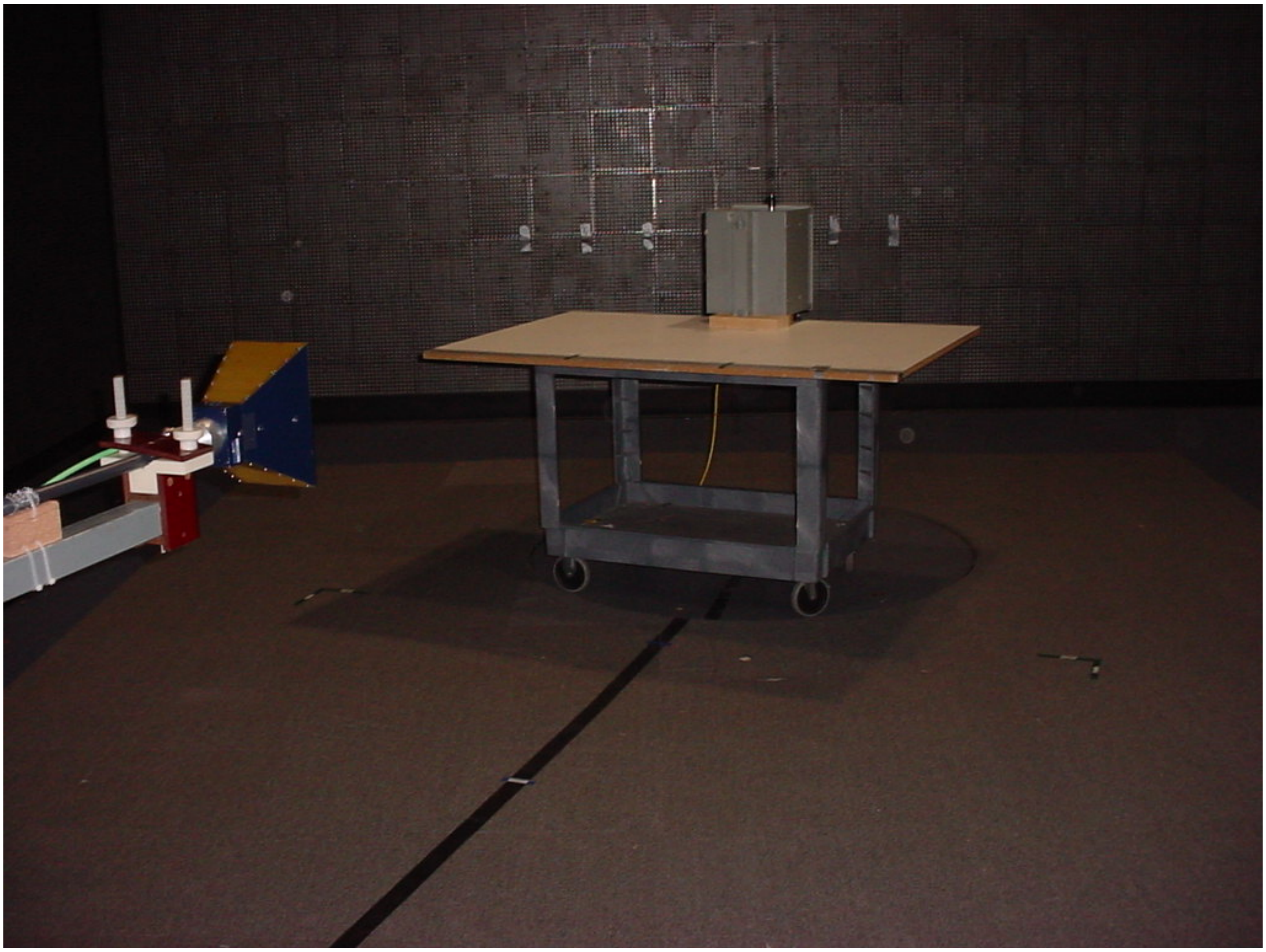


Figure A1: Radiated Spurious Emissions - Front

Figure A2: Conducted Emissions