Excellence in Compliance Testing

Certification Test Report

FCC ID: R7PNG6R1S4
IC: 5294A-NG6R1S4

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Report Number 08-0153 - 15C

Manufacturer: **Cellnet Technology, Inc.**
Model(s): **UtiliNet Mesh Extender**

Test Begin Date: April 15, 2008
Test End Date: April 28, 2008

Report Issue Date: June 2, 2008

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

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This report contains 23 pages

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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 and Industry Canada's Radio Standards Specification RSS-210.

1.2 Product Description

1.2.1 General

UtiliNet is a wireless mesh network that utilizes asynchronous frequency hopping spread spectrum technology to enable reliable communications in advanced meter infrastructure (AMI) applications.

The UtiliNet Mesh Extender (UME) is a radio transceiver operating in the 902-928 MHz unlicensed band. It is designed to extend the range of the UtiliNet mesh network in rural environments, where the distance between neighboring endpoints is too great for them to communicate reliably.

Manufacturer Information:
Cellnet Technology, Inc.
30000 Mill Creek Avenue
Suite 100
Alpharetta, GA 30022
USA

Test Sample Serial Numbers: NA (ACS Test Sample #1)

Test Sample Condition:
The test samples were provided in good working order with no visible defects.

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

1.2.2 Intended Use

The UtiliNet Mesh Extender (UME) is designed to extend the range of the UtiliNet mesh network in rural environments.

1.3 Test Methodology and Considerations

No special test methodology or considerations.

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: 894540
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: 200612-0

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:

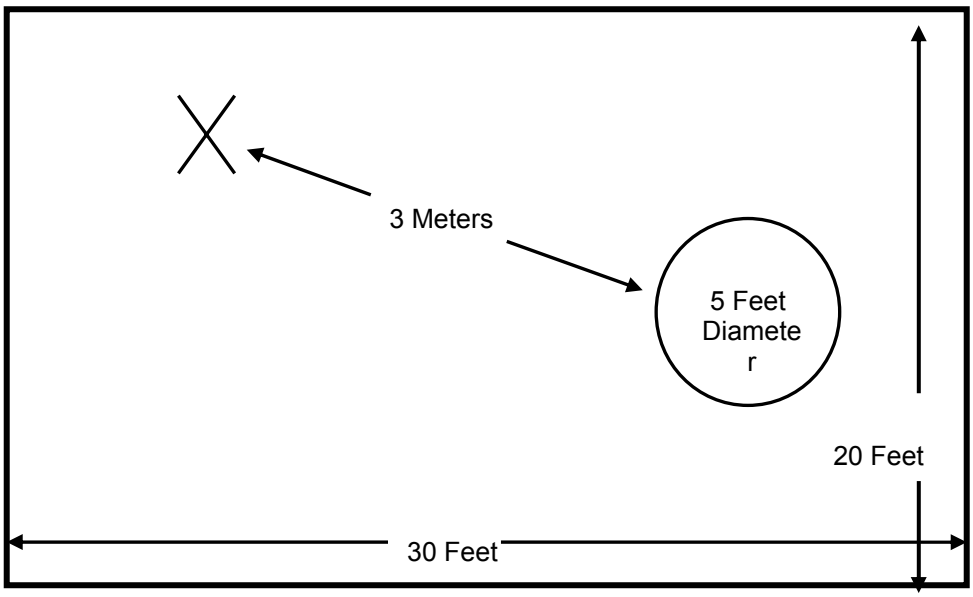

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

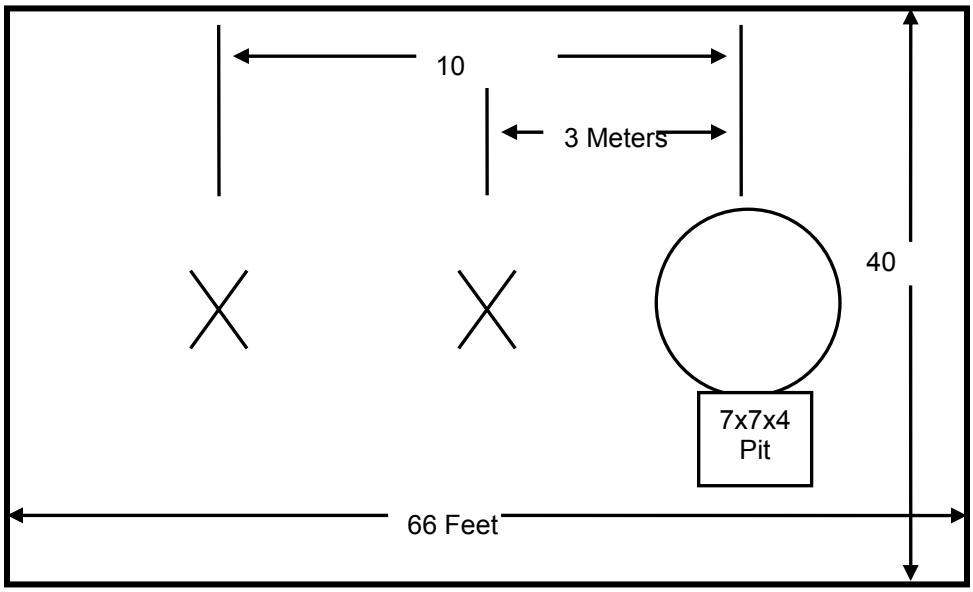

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site 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 4.1.3-1:

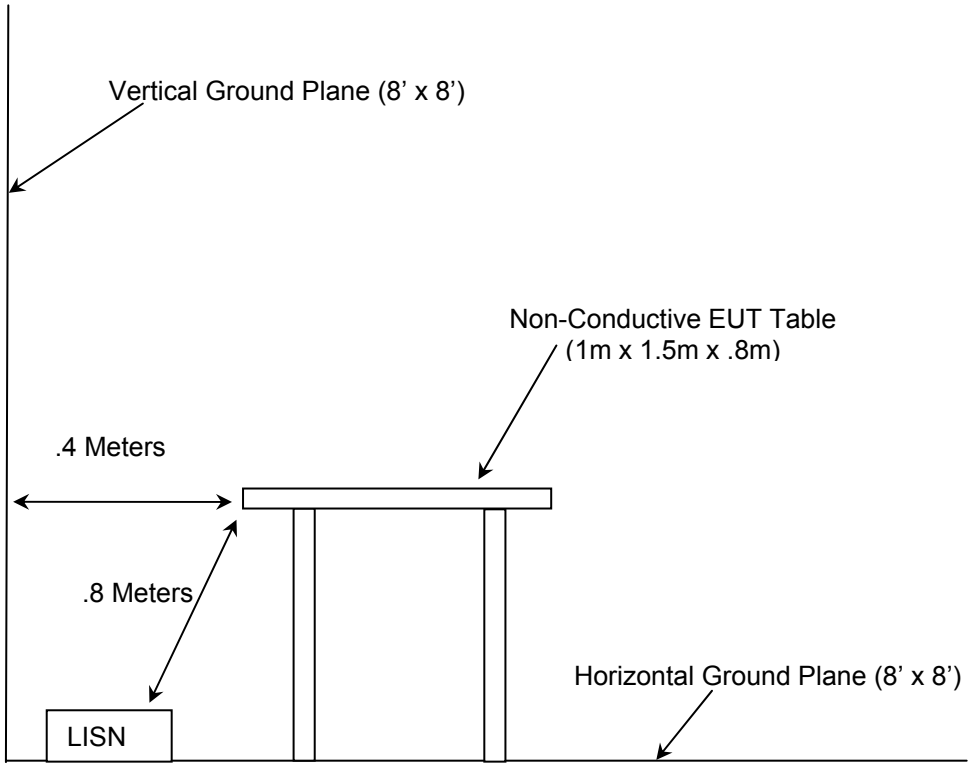

Figure 2.4-1: AC Mains Conducted EMI Site

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, 2007
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2007
- FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, 2001
- FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, March 30, 2000
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 7 June 2007

4.0 LIST OF TEST EQUIPMENT

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

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS #	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	10-26-2008
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	10-26-2008
3	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	839379/011	10-26-2008
4	Rohde & Schwarz	Spectrum Analyzers	ESMI - Receiver	833827/003	10-26-2008
22	Agilent	Amplifiers	8449B	3008A00526	10-25-2008
25	Chase	Antennas	CBL6111	1043	06-06-2008
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-10-2008
70	Rohde & Schwarz	Spectrum Analyzers	ESH-3	879676/050	10-24-2008
73	Agilent	Amplifiers	8447D	2727A05624	12-19-2008
152	EMCO	LISN	Feb-25	9111-1905	03-26-2009
153	EMCO	LISN	Feb-25	9411-2268	11-27-2008
168	Hewlett Packard	Attenuators	11947A	44829	02-18-2009
193	ACS	Cable Set	OATS cable Set	193	01-04-2009
211	Eagle	Filters	C7RFM3NFNM	HLC-700	01-04-2009
213	TEC	Amplifiers	PA 102	44927	12-19-2008
277	Emco	Antennas	93146	9904-5199	06-18-2008
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	11-09-2008
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11-21-2008
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11-21-2008
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	07-17-2008
324	ACS	Cables	Belden	8214	07-10-2008
331	Microwave Circuits	Filters	H1G513G1	31417	08-27-2008
338	Hewlett Packard	Amplifiers	8449B	3008A01111	10-24-2008
339	Aeroflex/Weinschel	Attenuators	AS-18	7142	08-20-2008
422	Florida RF	Cables	SMS-200AW-72.0-SMR	805	02-25-2009

5.0 SUPPORT EQUIPMENT

Table 5-3: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number	FCC ID
The EUT was tested as a stand alone device and no support equipment was utilized.					

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

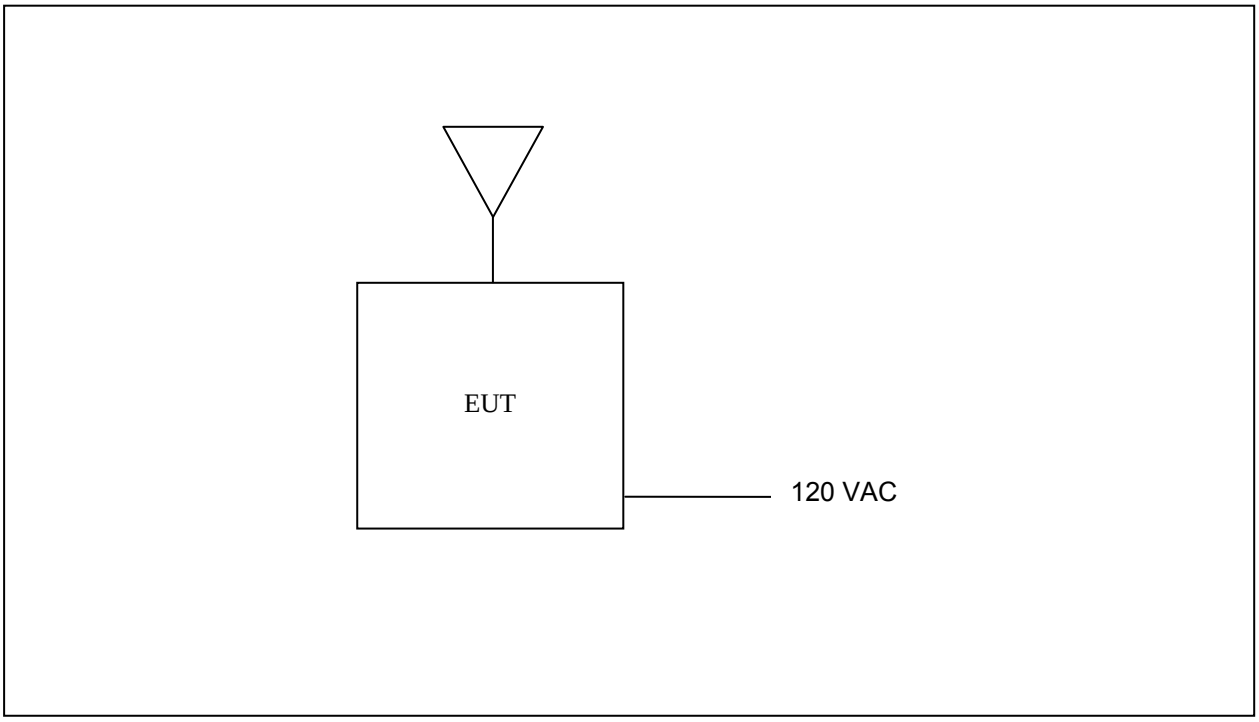

Figure 6-1: EUT Test Setup

*See Test Setup photographs for additional detail.

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

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 connectors allow for antenna replacement by qualified service personnel.

7.2 Power Line Conducted Emissions

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 = Applicable Limit - Corrected Reading

7.2.2 Test Results

Results of the test are shown below in and Table 7.2-1.

Table 7.2-1: Conducted EMI Results

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
Line 1									
0.27	36.9	29.3	9.80	46.70	39.10	61.12	51.12	14.4	12.0
0.38	23.7	21.1	9.80	33.50	30.90	58.28	48.28	24.8	17.4
1.46	20	15.7	9.80	29.80	25.50	56.00	46.00	26.2	20.5
2.67	18	14.5	9.80	27.80	24.30	56.00	46.00	28.2	21.7
3.63	18.2	15.2	9.80	28.00	25.00	56.00	46.00	28.0	21.0
4.28	17.1	13.9	9.80	26.90	23.70	56.00	46.00	29.1	22.3
Line 2									
0.27	31.4	22.8	9.80	41.20	32.60	61.12	51.12	19.9	18.5
1.46	27.1	23.4	9.80	36.90	33.20	56.00	46.00	19.1	12.8
2.24	17.8	14.5	9.80	27.60	24.30	56.00	46.00	28.4	21.7
2.7	18.2	14.5	9.80	28.00	24.30	56.00	46.00	28.0	21.7
3.14	17.3	14.1	9.80	27.10	23.90	56.00	46.00	28.9	22.1
3.57	17.7	14.2	9.80	27.50	24.00	56.00	46.00	28.5	22.0

7.3 Radiated Emissions - Unintentional Radiation

7.3.1 Test Methodology

Radiated emissions tests were performed over the frequency range of 30MHz to 5GHz. 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 above 30MHz and below 1GHz were made with the Spectrum Analyzer's resolution bandwidth set to 120 KHz using a Quasi-peak detector. Above 1GHz, average measurements are taken with the RBW set to 1MHz.

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)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
41.78	---------	24.28	V	-13.86	---------	10.42	--------	40.0	---------	29.58
79.49	---------	24.58	V	-15.13	---------	9.45	--------	40.0	---------	30.55
113.11	---------	14.48	V	17.33	---------	31.81	--------	43.5	---------	11.69
114.62	---------	14.55	V	18.03	---------	32.58	--------	43.5	---------	10.92
189.61	---------	18.23	V	-5.48	---------	12.75	--------	43.5	---------	30.75
656.89	---------	18.25	V	-0.46	---------	17.79	--------	46.0	---------	28.21
787.56	---------	24.11	H	1.38	---------	25.49	--------	46.0	---------	20.51
863.14	---------	37.05	H	2.83	---------	39.88	--------	46.0	---------	6.12
983.24	---------	32.84	H	4.66	---------	37.50	--------	54.0	---------	16.50
984.89	---------	21.74	H	4.74	---------	26.48	--------	54.0	---------	27.52
960	---------	18.35	H	4.20	---------	22.55	--------	54.0	---------	31.45

* Note: All emissions above 960 MHz were attenuated below the permissible limit.

7.4 Peak Output Power

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 RF output port of the EUT was directly connected to the input of the spectrum analyzer via a 10dB passive attenuator. The resolution and video bandwidth were set to > 20 dB bandwidth of the emission measured. 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]
902.1	29.47
915.0	29.23
927.9	29.01

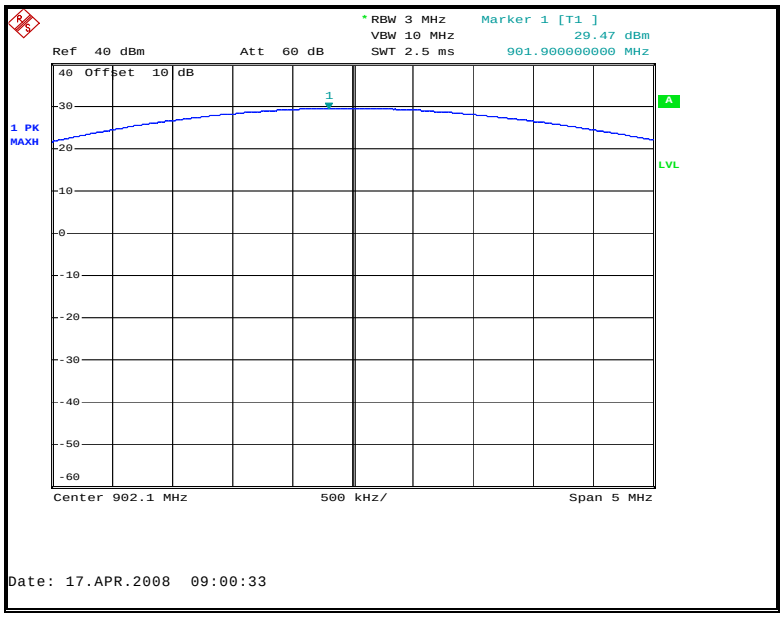

Figure 7.4-1: Output power – Low Channel

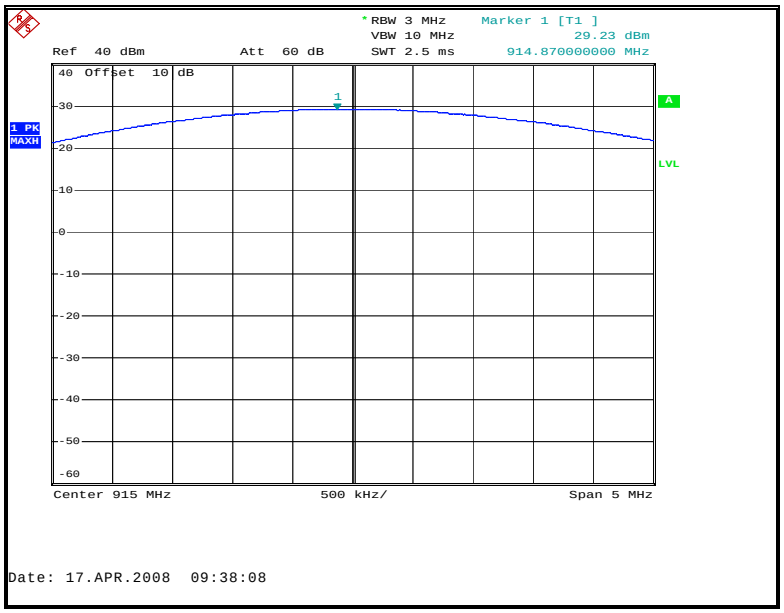

Figure 7.4-2: Output power – Mid Channel

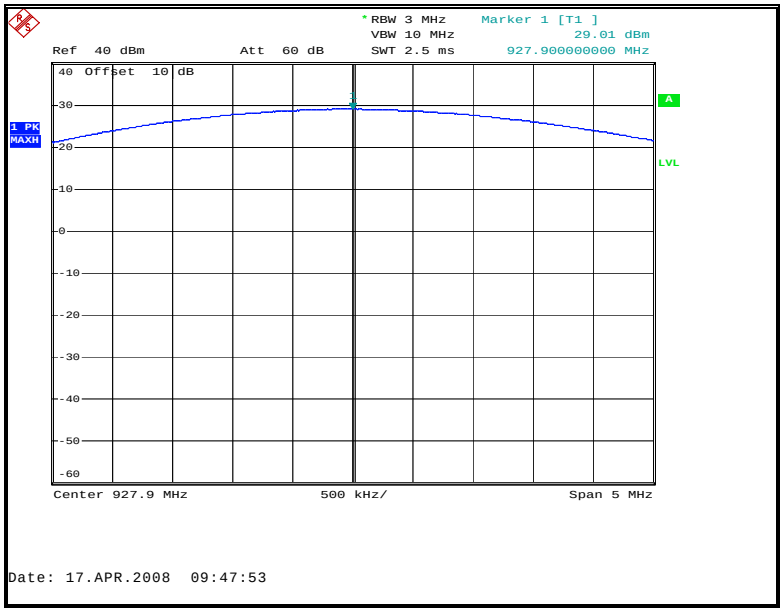

Figure 7.4-3: Output power – High Channel

7.5 Channel Usage Requirements

7.5.1 Carrier Frequency Separation

7.5.1.1 Test Methodology

The RF output port of the EUT was directly connected to the input of the spectrum analyzer via a 10dB passive attenuator. 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 31.5kHz (See figure 7.5.4-1 to 7.5.4-3 below). The adjacent channel separation was measured to be 99.6kHz. Results are shown in figure 7.5.1-1 below:

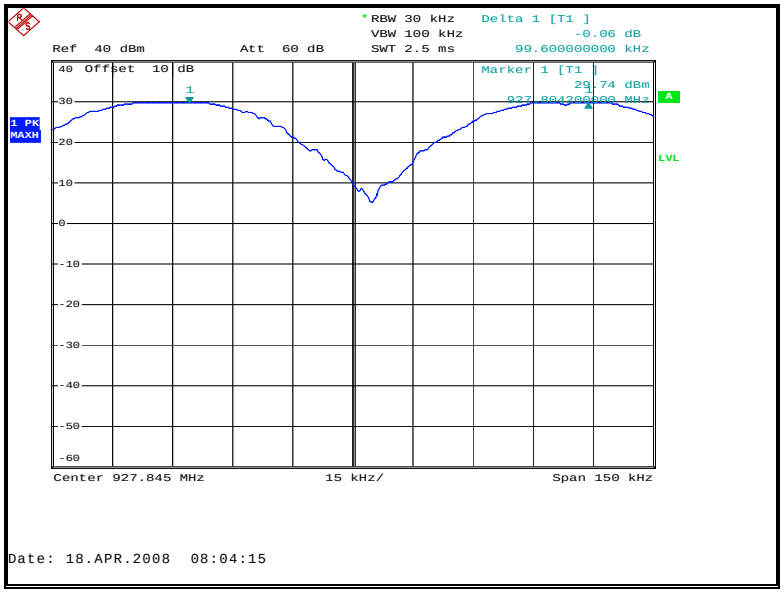

Figure 7.5.1-1: Carrier Frequency Separation

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. Hopping channels are shown in Table 7.5.2-1 below:

Table 7.5.2-1: Number of Hopping Channels

Frequency Hopping (FHSS) - Channel Hopping Sequence									
Channel	Freq (MHz	Channel	Freq (MHz	Channel	Freq (MHz	Channel	Freq (MHz	Channel	Freq (MHz)
86	910.6	69	908.9	252	927.2	214	923.4	208	922.8
211	923.1	256	927.6	200	922	28	904.8	84	910.4
173	919.3	176	919.6	185	920.5	158	917.8	21	904.1
141	916.1	52	907.2	36	905.6	77	909.7	121	914.1
72	909.2	134	915.4	131	915.1	124	914.4	125	914.5
166	918.6	242	926.2	32	905.2	61	908.1	81	910.1
63	908.3	228	924.8	22	904.2	147	916.7	165	918.5
23	904.3	187	920.7	235	925.5	191	921.1	95	911.5
180	920	82	910.2	222	924.2	150	917	182	920.2
227	924.7	174	919.4	108	912.8	171	919.1	122	914.2
40	906	230	925	99	911.9	41	906.1	229	924.9
144	916.4	241	926.1	126	914.6	188	920.8	216	923.6
33	905.3	133	915.3	152	917.2	89	910.9	253	927.3
195	921.5	169	918.9	193	921.3	220	924	204	922.4
154	917.4	30	905	254	927.4	127	914.7	70	909
190	921	136	915.6	146	916.6	20	904	44	906.4
236	925.6	178	919.8	34	905.4	217	923.7	259	927.9
149	916.9	210	923	49	906.9	114	913.4	240	926
143	916.3	71	909.1	255	927.5	111	913.1	48	906.8
181	920.1	205	922.5	129	914.9	213	923.3	66	908.6
232	925.2	192	921.2	209	922.9	35	905.5	79	909.9
123	914.3	85	910.5	94	911.4	42	906.2	132	915.2
233	925.3	53	907.3	140	916	172	919.2	245	926.5
38	905.8	202	922.2	83	910.3	25	904.5	120	914
118	913.8	37	905.7	257	927.7	59	907.9	67	908.7
60	908	43	906.3	237	925.7	87	910.7	183	920.3
201	922.1	54	907.4	135	915.5	168	918.8	248	926.8
198	921.8	243	926.3	234	925.4	196	921.6	78	909.8
116	913.6	64	908.4	92	911.2	223	924.3	80	910
91	911.1	68	908.8	57	907.7	24	904.4	93	911.3
212	923.2	100	912	109	912.9	225	924.5	184	920.4
221	924.1	239	925.9	249	926.9	103	912.3	74	909.4
96	911.6	29	904.9	215	923.5	151	917.1	153	917.3
157	917.7	177	919.7	179	919.9	203	922.3	65	908.5
247	926.7	139	915.9	258	927.8	197	921.7	159	917.9
167	918.7	117	913.7	186	920.6	219	923.9	142	916.2
224	924.4	148	916.8	244	926.4	97	911.7	58	907.8
246	926.6	75	909.5	189	920.9	51	907.1	164	918.4
238	925.8	206	922.6	31	905.1	98	911.8	163	918.3
46	906.6	226	924.6	73	909.3	45	906.5	90	911
39	905.9	155	917.5	130	915	156	917.6	106	912.6
251	927.1	47	906.7	194	921.4	101	912.1	145	916.5
115	913.5	62	908.2	162	918.2	50	907	76	909.6
128	914.8	138	915.8	119	913.9	27	904.7	199	921.9
110	913	231	925.1	107	912.7	207	922.7		
160	918	113	913.3	88	910.8	250	927		
56	907.6	137	915.7	175	919.5	102	912.2		
26	904.6	55	907.5	170	919	112	913.2		
161	918.1	105	912.5	218	923.8	104	912.4		

7.5.3 Channel Dwell Time

The maximum duration of the RF transmission is 364ms during a 700ms channel dwell time. There is a minimum of 50 channels used during the hopping sequence therefore a channel will not be re-occupied until at least 35s. Therefore the average time of occupancy on any one channel in a 20 second period is 364ms.

A detailed description of the RF timing and a timing diagram are included in the theory of operation.

7.5.4 20dB Bandwidth

7.5.4.1 Test Methodology

The RF output port of the EUT was directly connected to the input of the spectrum analyzer via a 10dB passive attenuator. 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 Delta 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 times 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 31.5kHz. Results are shown below in Table 7.5.4-1 and Figures 7.5.4-1 through 7.5.4-3.

Table 7.5.4-1

Frequency (MHz)	20dB Bandwidth (kHz)
902.1	31.5
915.0	28.1
927.9	27.2

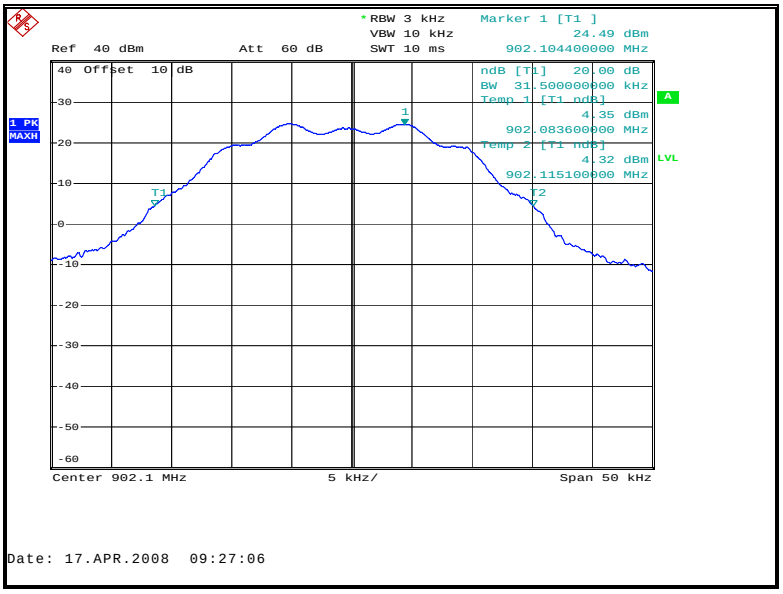

Figure 7.5.4-1: 20dB Bandwidth Low Channel

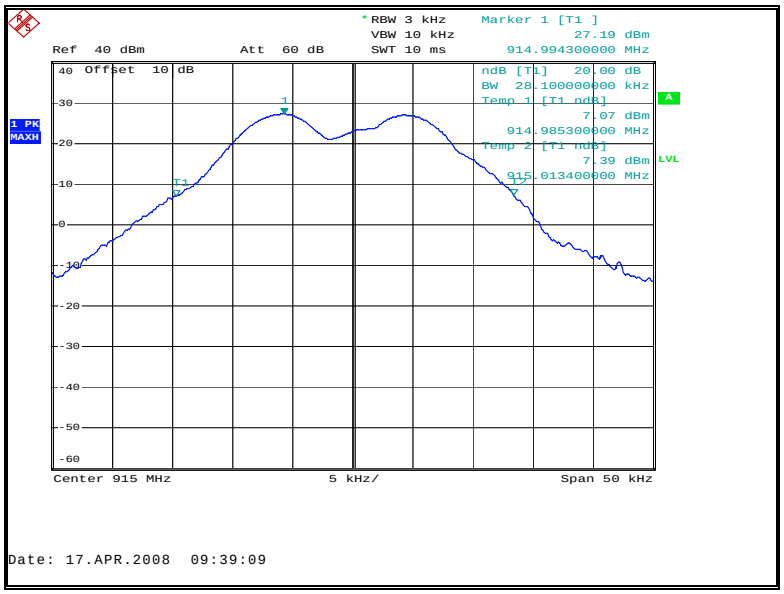

Figure 7.5.4-2: 20dB Bandwidth Mid Channel

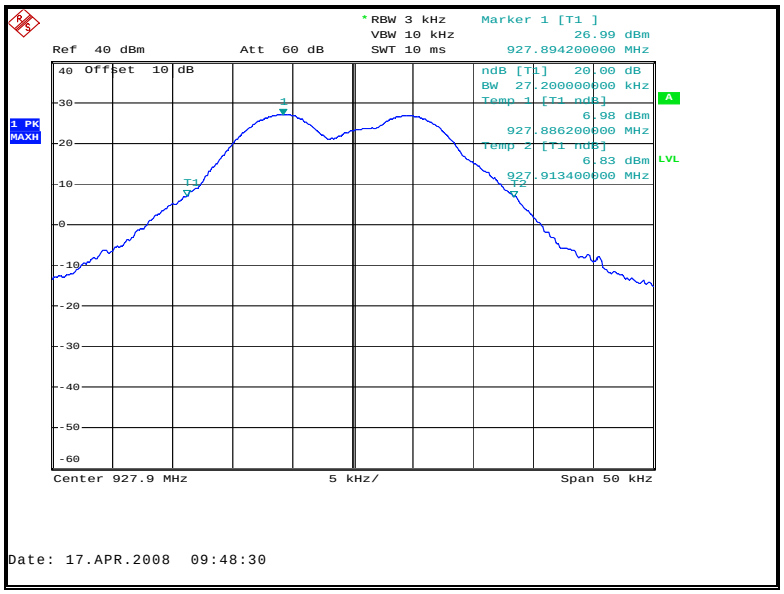

Figure 7.5.4-3: 20dB Bandwidth High Channel

7.6 Band-Edge Compliance and Spurious Emissions

7.6.1 Band-Edge Compliance of RF Conducted Emissions

7.6.1.1 Test Methodology

The RF output port of the EUT was directly connected to the input of the spectrum analyzer via a 10dB passive attenuator. 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 30 kHz, which is ≥ 1% of the span, and the VBW was set to 100kHz.

7.6.1.2 Test Results

All emission found were greater than 20dB down from the fundamental carrier. Results are shown in Figures 7.6.1-1 and 7.6.2-4

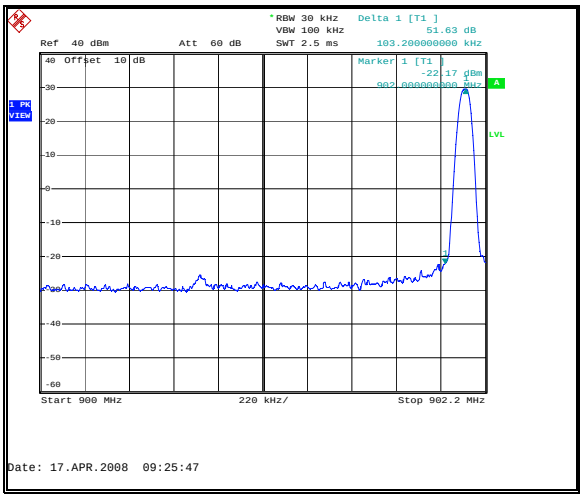

Figure 7.6.1-1: Lower Band-edge

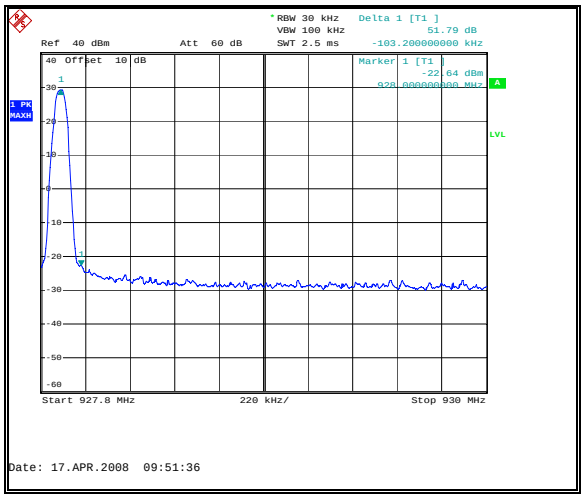

Figure 7.6.1-2: Upper Band-edge

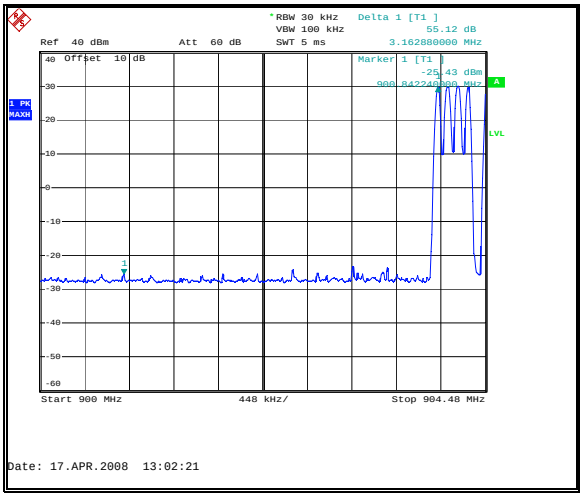

Figure 7.6.1-3: Lower Band-edge - Hopping

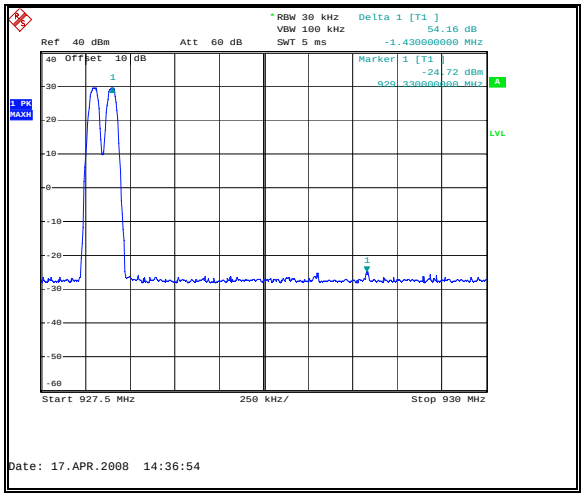

Figure 7.6.1-4: Upper Band-edge - Hopping

7.6.2 RF Conducted Spurious Emissions

7.6.2.1 Test Methodology

The RF output port of the EUT was directly connected to the input of the spectrum analyzer via a 10dB passive attenuator. 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 RBW was set to 100kHz. 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. Results are shown below in Figure 7.6.2-1 through 7.6.2-6.

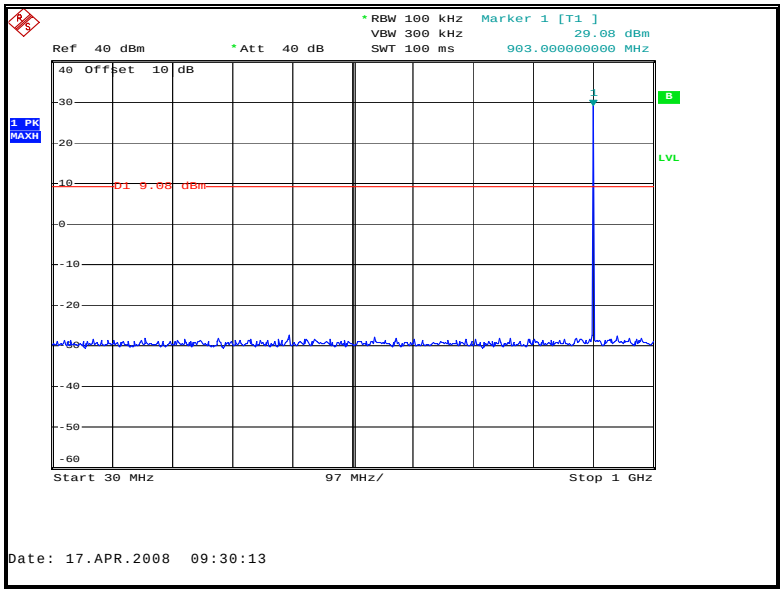

Figure 7.6.2-1 RF Conducted Spurious Emissions – Low Channel

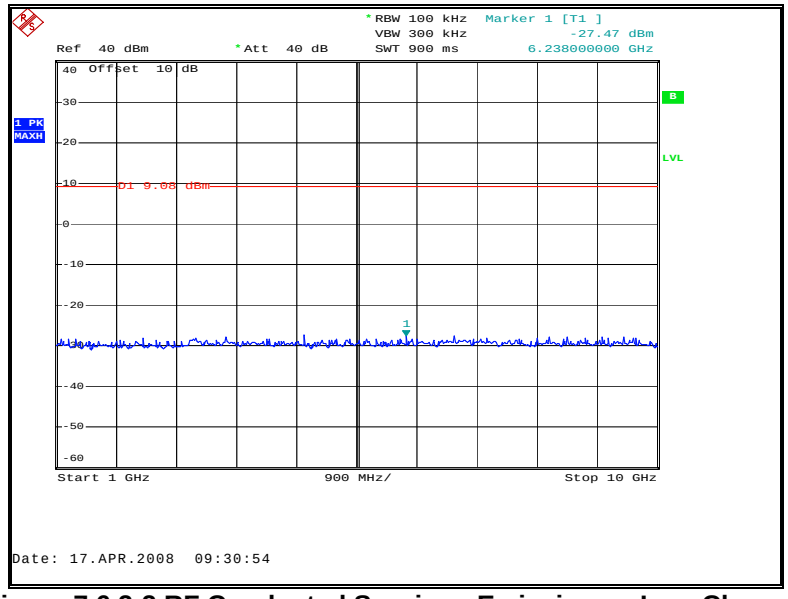

Figure 7.6.2-2 RF Conducted Spurious Emissions – Low Channel

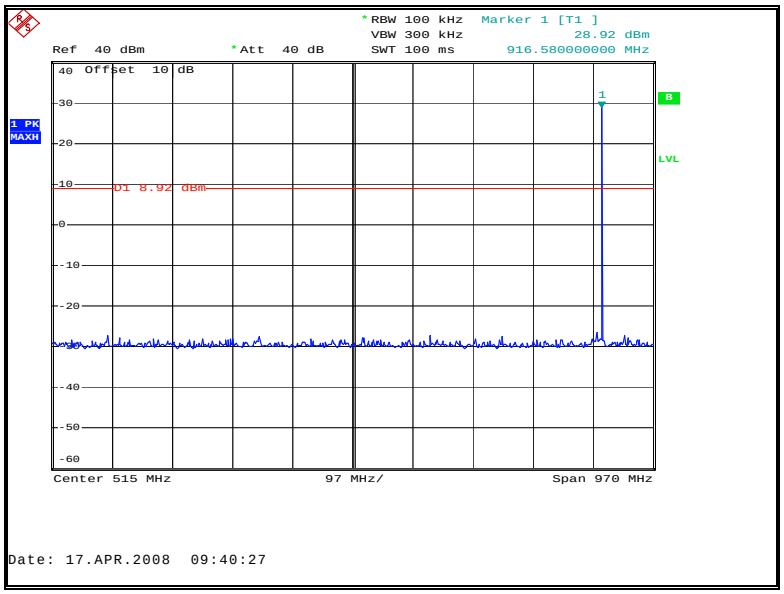

Figure 7.6.2-3 RF Conducted Spurious Emissions – Mid Channel

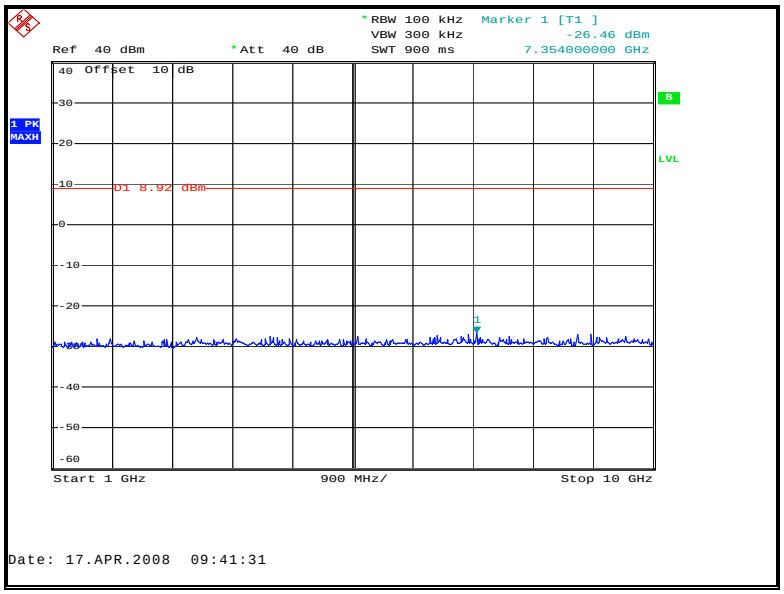

Figure 7.6.2-4 RF Conducted Spurious Emissions – Mid Channel

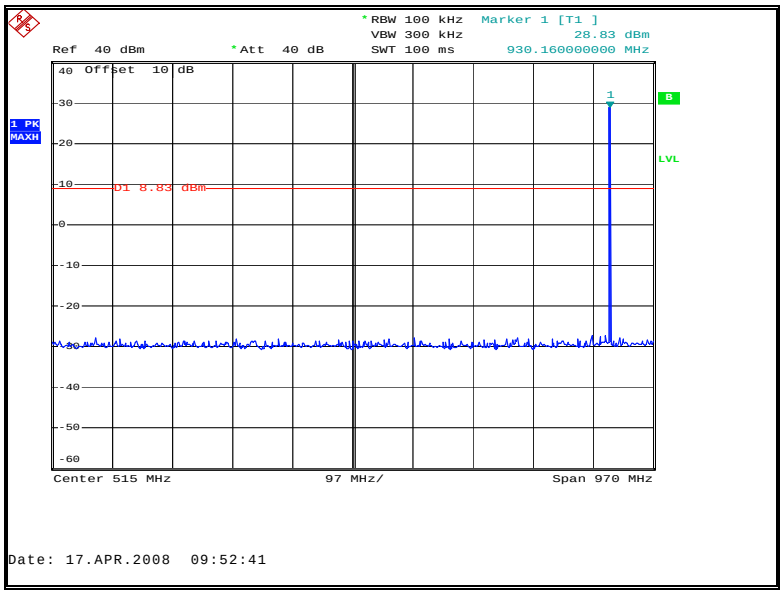

Figure 7.6.2-5 RF Conducted Spurious Emissions – High Channel

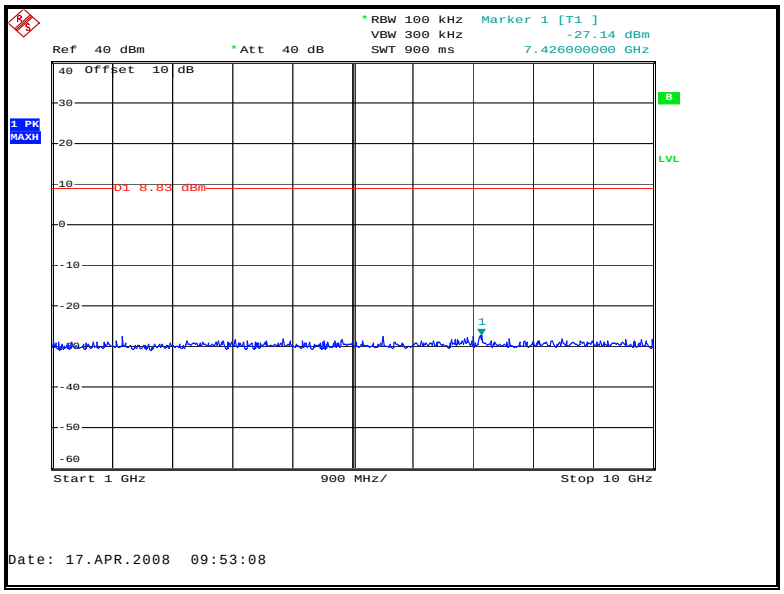

Figure 7.6.2-6 RF Conducted Spurious Emissions – High Channel

7.6.3 Radiated Spurious Emissions – Intentional Radiation (Restricted Bands)

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.

Table 7.6.3-1: Radiated Spurious Emissions

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2706.3	43.26	33.38	V	0.29	43.55	33.67	74.0	54.0	30.45	20.33
3608.4	43.31	33.87	V	3.72	47.03	37.59	74.0	54.0	26.97	16.41
4510.5	43.82	34.91	H	5.81	49.63	40.72	74.0	54.0	24.37	13.28
4510.5	46.79	42.63	V	5.71	52.50	48.34	74.0	54.0	21.50	5.66
Mid Channel										
2745	44.13	36.00	H	0.69	44.82	36.69	74.0	54.0	29.18	17.31
2745	47.48	43.95	V	0.44	47.92	44.39	74.0	54.0	26.08	9.61
4575	44.40	36.15	H	5.95	50.35	42.10	74.0	54.0	23.65	11.90
4575	47.25	42.30	V	5.88	53.13	48.18	74.0	54.0	20.87	5.82
High Channel										
2783.7	45.90	39.86	H	0.83	46.73	40.69	74.0	54.0	27.27	13.31
2783.7	50.07	47.30	V	0.59	50.66	47.89	74.0	54.0	23.34	6.11
4639.5	45.47	38.97	V	6.04	51.51	45.01	74.0	54.0	22.49	8.99

***** 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

PEAK:
Corrected Level: 43.26 + 0.29 = 43.55dBuV
Margin: 74dBuV – 43.55dBuV = 30.45dB

AVERAGE:
Corrected Level: 33.38 + 0.29 - 0 = 33.67dBuV
Margin: 54dBuV – 33.67dBuV = 20.33dB

8.0 CONCLUSION

In the opinion of ACS, Inc. the UtiliNet Mesh Extender, manufactured by Cellnet Technology, Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT