FCC Test Report
for
47CFR15, Subpart B for Unintentional Radiators, per Section 101
Equipment authorization of unintentional radiators, *and*
47CFR15, Subpart C for Intentional Radiators, per Section 247
Operation within the bands 902 to 928 MHz

on

RELAY

[FCC ID: OWS - 901]

models

Relay with bandpass filter
Relay without bandpass filter

report number

20050629-01-F15

manufacturer

Silver Spring Networks, Inc.
13000 West Silver Spring Drive
Butler, WI 53007

judgement

Complies

tests and report by

ITC Engineering Services, Inc. (ITC)
9959 Calaveras Road, P.O. Box 543
Sunol, California 94586
Tel.: (925) 862-2944
Fax: (925) 862-9013
E-Mail: docs@itcemc.com
Web Site: www.itcemc.com

Lab Code: 200172-0

EN45001 Accredited Compliance Laboratory (RES-GmbH)
Registration number: TTI-P-G 159/98-00 (RES-GmbH)

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PART 1 General

SECTION 1.1 TEST INFORMATION

GENERAL INFORMATION

Product Type **Model**	Relay Relay with bandpass filter Relay without bandpass filter	
Manufacturer's Name **Manufacturer's Address** **Contact**	Silver Spring Networks Inc. 13000 West Silver Springs Drive Butler,WI 53007 United States Tel: +1 (262) 364-5317 Juan Luglio, PhD	 Fax: +1 (262) 783-0200 email : juan.luglio@silverspringnetworks.com
Test Laboratory	ITC Engineering Services, Inc. 9959 Calaveras Road, PO Box 543 Sunol, CA 94586-0543 Email: docs@itcemc.com Web Site: http://www.itcemc.com	 Tel: +1(925) 862-2944 Fax: +1(925) 862-9013
Test Number and Report Numbers	20050629 – 01	20050629 – 01 – F15
Test Date(s) & Issue Date	July 08 –July 12,2005	July 19, 2005
Test Engineer(s)	Femi Ojo and Robert Kershaw	
Chief Engineer	Michael Gbadebo, P.E	
Documentation	George Brown.	
Test Results	☑ Complies as Tested	❑ Fail

The electromagnetic interference and RF tests, which this report describes, were performed by an independent engineering consultancy firm, ITC Engineering Services, Inc. (ITC), in accordance with the emissions and RF requirements specified in the FCC rules, 47CFR Part 15, Subparts B and C. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications specified in this report for compliance must be implemented in all production units for compliance to be maintained.

SECTION 1.2 TESTS PERFORMED:

Emissions Requirements:

- OPEN FIELD RADIATED EMISSIONS in accordance with the FCC 47 CFR 15.109
- POWER LINE CONDUCTED EMISSIONS in accordance with FCC 47 CFR 15.207.

RF Requirements:

- MAXIMUM PEAK OUTPUT OF FUNDAMENTAL in accordance with the FCC 47 CFR 15.247(b) (1)
- OPERATING BAND in accordance with FCC 47 CFR 15.247(a)
- BAND-EDGE in accordance with the FCC 47 CFR 15.247(c)
- 6dB BANDWIDTH in accordance with FCC 47 CFR 15.247(a)(2)
- SPECTRAL DENSITY in accordance with FCC 47 CFR 15.247(d)
- HARMONIC/SPURIOUS EMISSIONS in accordance with the FCC 47 CFR 15.247(c)
- RESTRICTED BAND EMISSIONS in accordance with the FCC 47 CFR 15.205(c)

PART 1 General (Cont)

SECTION 1.3 DECLARATION/DISCLAIMER

ITC Engineering Services, Inc. (ITC) reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. ITC Engineering Services, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from ITC Engineering Services, Inc. issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full with our written approval. The applicant/manufacturer shall not use this report to claim product endorsement by NVLAP or any US Government agency.

ITC Engineering Services, Inc. (ITC) is:
Accepted by the Federal Communications Commission (FCC) for FCC Methods, CISPR Methods and AUSTEL Technical Standards (Ref: NVLAP Lab Code 200172-0)

Approved by the Industry Canada for Telecom Testing

Certified by Rockford Engineering Services GmbH for EMC Testing according to the European EMC Directive 89/336/EEC per EN45001

Certified by Reg. TP for EMC Testing according to the European EMC Directive 89/336/EEC per EN45001 for RES GmbH (DAR-Registration number: TTI-P-G 159/98-00)

Certified by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI) for EMC testing, in accordance with the Regulations for Voluntary Control Measures, Article 8, Registration Numbers - Site 1: C-1582 and R-1497.

PART 1 General (Cont)

SECTION 1.4 TEST METHODOLOGY

The electromagnetic interference and RF tests, which this report describes, were performed by an independent engineering consultancy firm, ITC Engineering Services, Inc., in accordance with the FCC test procedure ANSI C63.4-2003.

SECTION 1.5 TEST FACILITY

The open area test site, the conducted measurement facility, the semi anechoic chamber and the test equipment used to collect the emissions data is located in Sunol, California, and is fully described in a site attenuation report. The approved site attenuation description is on file at the Federal Communications Commission.

Table 1 Radio Device Measurement Information

Product Type **Models**	Relay Relay with bandpass filter Realy without bandpass filter.	
Applicant / Manufacturer Address	Silver Spring Networks, Inc. 13000 West Silver Spring Drive Butler, WI 53007	
Contact	Juan Luglio,PhD Tel: (262) 364-5317	juan.luglio@silverspringnetworks.com Fax: (262) 783-0200
Test Results	☒ **Complies**	☐ **Not Compliant**
Total Number of Pages including Appendices	53 Pages	
Test Report File No.	20050629-01-F15	

Table 2 Measurement Uncertainty

RF frequency	± 1 x 10^{-7} HP8565E
RF power, conducted	± 1.5 dB
Adjacent channel power	± 3 dB
Conducted emission of transmitter, valid up to 1 GHz	± 1.5 dB
Conducted emission of transmitter, valid up to 18 GHz	± 1.5 dB
Conducted emission of receivers	± 1.5 dB
Radiated emission of transmitter, valid up to 1 GHz	± 1.5 dB
Radiated emission of transmitter, valid up to 18 GHz	± 1.5 dB
Radiated emission of transmitter, valid up to 26 GHz	± 3 dB
Radiated emission of transmitter, valid up to 40 GHz	± 3 dB
Radiated emission of transmitter, valid up to 75 GHz	± 3 dB

SECTION 1.6 ACCURACY OF TEST DATA

The test results contained in this report accurately represent the emissions generated by the sample equipment under test. ITC Engineering Services, Inc. (ITC) as an independent testing laboratory declares that the equipment as tested complies with the requirements of:

1. FCC standard 47CFR15.247.

for Intentional Radiators Operation within the bands 902MHz to 928MHz

PART 2 RECEIVER MEASUREMENTS

OPEN FIELD RADIATED EMISSIONS

SECTION 2.1 EUT DESCRIPTION AND TEST SPECIFICATION: 47 CFR PART 15, SUB-PART B

Silver Spring's product Relay, models (relay with bandpass filter and relay without bandpass filter) are devices intended for relaying messages from pole top devices to meters via Silver Spring's LAN. The units are similar both in design and configuration; the only difference is the bandpass filter. The EUT were set up at 3 or 10 meters in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-2003. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT were set up on a wooden non-conductive tabletop, 80 cm above the ground reference plane, in an open field. The transmit function was de-activated for the tests. For measurements below 1GHz, the EUT were set up at a 10 meters distance from the search antenna with the EUT running in a continuous mode. The EUT were rotated 360 degrees azimuth and the search antenna height varied 1 to 4m in order to maximize the emissions. Significant peaks from the EUT were then recorded to determine margin to the limits. For measurements above 1GHz, the EUT running in continuous mode were set up at a 3 meter distance from the search antenna and was rotated 360 degrees azimuth and also rotated in its x-y-z axis positions to determine the precise amplitude of the emissions. The EUT were tested at the low, mid and high frequencies and the worst case was observed at the mid frequency. The worst case result between the two units was recorded in this test report.

Table 3 Test Equipment and Software Used– Radiated Emissions Tests

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due
Spectrum Analyzer	Hewlett-Packard	8568B	2841A04315	11-29-05
Spectrum Analyzer Display	Hewlett-Packard	85662A	2848A17028	11-29-05
Quasi Peak Adapter	Hewlett-Packard	85650	2521A00871	11-29-05
Preselector	Hewlett-Packard	85685A	2620A00265	11-29-05
Spectrum Analyzer	Hewlett-Packard	8565E	2618A02909	03-29-06
Biconical Antenna	EMCO	3104	3667	02-03-06
L. P. Ant. (200-1000 MHz)	EMCO	3146	9510-4202	02-03-06
Horn Antenna (Below 18GHz)	EMCO	3115	8812-3050	12-19-05

Software Used	Manufacturer	Model Name	Version Number	Calibration/Validation Date
Test Software	ITC	1.04b1	Rev. 4	02-05-06
Antenna Software	ITC	L.P-V/H 10m	Rev. 4	02-05-06
Antenna Software	ITC	B-V/H 10m	Rev. 4	02-05-06
Cable Software	ITC	OATS 30MHz-1GHz	Rev. 4	02-01-06

Table 4 Support Equipment – Radiated Emissions Tests

No	Description	Manufacturer	Model Name	Serial Number
1	FSU	N/A	N/A	BF00000034
2	NOTEBOOK	SONY	PCG – 974L	283293303418746

Test Voltage: 120V/240V, 60Hz

OPEN FIELD RADIATED EMISSIONS (cont)

SECTION 2.2 TEST RANGE RADIATED EMISSIONS TESTS

The frequency search range investigated was from 30 MHz to 10GHz

SECTION 2.3 SPECTRUM ANALYZER CONFIGURATION (SWEPT FREQUENCY SCANS)-

IF Bandwidth.....120 kHz
Measurements below 1000 MHz (unless stated otherwise)
Analyzer Mode (for Peak Measurements) ..... Peak/Log
Resolution Bandwidth..... 100 kHz
Video Bandwidth..... 100 kHz
Analyzer Mode (for Quasi-Peak Measurements)
Ouasi-Peak/Linear Resolution Bandwidth..... 1000 kHz
Video Bandwidth..... 1000 kHz
Measurements above 1000 MHz (unless stated otherwise)
Quasi-Peak Adapter Mode ..... Disabled
Analyzer Mode (for Peak Measurements) ..... Peak
Resolution Bandwidth..... 1000 kHz
Video Bandwidth..... 1000 kHz
Analyzer Mode (for Average Measurements) ..... Video Filter
Resolution Bandwidth..... 1000 kHz
Video Bandwidth..... 10 Hz

Table 5 Data Table Legend and Field Strength Calculation – Radiated Emissions Tests

Detector mode: Peak (P) or Quasi-Peak (QP) or Average (A)

	Polarization	Antenna	Freq Range (MHz)
VB	Vertical	EMCO 3104/sn 3549 Biconical	30 – 200
HB	Horizontal	EMCO 3104/sn 3549 Biconical	30 – 200
VL	Vertical	EMCO 3146/sn. 2075 Log Periodic	200 – 1000
HL	Horizontal	EMCO 3146/sn. 2075 Log Periodic	200 – 1000
VH1	Vertical	EMC 3115/sn. 2362 Horn	Below 18000
HH1	Horizontal	EMC 3115/sn. 2362 Horn	Below 18000
VH2	Vertical	EMC 3116/sn. 2655 Horn	Below 26500
HH2	Horizontal	EMC 3116/sn. 2655 Horn	Below 26500
VH4	Vertical	S&D DBD-520 Horn	Below 75000
HH4	Horizontal	S&D DBD-520 Horn	Below 75000

The margin in the Table 6 is calculated as follows:
Margin = Corrected Amplitude – Limit, where Corrected Amplitude = Spectrum Analyzer Amplitude + Cable Loss + Antenna Factor – Pre-Amp Gain.

SECTION 2.4 OPEN FIELD RADIATED EMISSIONS RESULTS

- ☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
- ☒ Test Site 1 - 3m Open Field Radiated Site
- ☒ Test Site 1 - 10m Open Field Radiated Site
- ☐ Test Site 2 - Environmental Lab
- ☐ EMC Lab 1 - Test Laboratory
- ☐ Semi-Anechoic Absorber Lined Shielded Room
- ☐ Other: _____

SECTION 2.5 ADMINISTRATIVE AND ENVIRONMENTAL CONDITIONS DETAILS – RADIATED EMISSIONS

Test Date:	July 12 , 2005
Test Engineer:	Bob Kershaw and Femi Ojo
Temperature	79.4°F
Humidity	32%

SECTION 2.6 OPEN FIELD RADIATED EMISSIONS TEST RESULTS

Table 6 Test Data for Radiated Emissions Measurement (below 1 GHz)

The table below shows a summary of the highest amplitudes of the radiated emissions from the equipment under test at various antenna heights, antenna polarization, and EUT orientations.

INDICATED		CORRECTION		CORR	TURNTABLE	ANT		CLASS A		CLASS B			
FREQ	AMPL	ANT	CAB	AMPL	ANG	HT	POL	AMPL	MARG	AMPL	MARG	FILTER	
MHz	dBuV/m	dB	dB	dBuV/m	DEG	m	-	dBuV/m	dB	dBuV/m	db	MODE	NOTES
72.11	11.9	7.1	2.7	21.7	0	1.0	VB	-	-	30.0	-8.3	P	
113.02	11.1	12.5	3.2	26.8	0	1.0	VB	-	-	33.0	-6.2	P	
132.82	6.5	12.5	3.4	22.4	90	1.0	VB	-	-	33.0	-10.6	P	
165.95	10.7	14.7	3.9	29.3	90	1.0	VB	-	-	33.0	-3.7	P	
195.54	8.1	18.4	3.9	30.4	0	1.0	VB	-	-	33.0	-2.6	P	
195.54	8.2	18.4	3.9	30.5	90	4.0	VB	-	-	33.0	-2.5	P	
229.16	4.9	10.9	4.0	19.8	0	0.0	HL	-	-	36.0	-16.2	P	
257.76	7.4	11.9	5.5	24.8	0	1.0	HL	-	-	36.0	-11.2	P	
306.58	5.6	15.3	6.3	27.2	0	1.0	HL	-	-	36.0	-8.8	P	
325.77	8.2	14.0	6.3	28.5	0	1.0	HL	-	-	36.0	-7.5	P	
407.63	6.5	14.7	6.2	27.4	90	1.0	HL	-	-	36.0	-8.6	P	
456.08	6.5	16.0	7.4	29.9	90	1.0	HL	-	-	36.0	-6.1	P	
536.38	6.8	17.1	8.1	31.9	90	1.0	HL	-	-	36.0	-4.1	P	

Note: No emissions of significant levels were observed between 30MHz-72.11MHz and 536.38MHz-1000MHz.

Table 7 Test Data for Radiated Emissions Measurement (Above 1 GHz)

The table below shows a summary of the highest amplitudes of the radiated emissions from the equipment under test at various antenna heights, antenna polarization, and EUT orientations. The EUT were tested at the low, mid and high frequencies and the worst case was observed at the mid frequency.

INDICATED		CORRECTION		CORR	TURNTABLE	ANT		CLASS A		CLASS B			
FREQ	AMPL	ANT	CAB	AMPL	ANG	HT	POL	AMPL	MARG	AMPL	MARG	FILTER	
MHz	dBuV/m	dB	dB	dBuV/m	DEG	m	-	dBuV/m	dB	dBuV/m	db	MODE	NOTES
915.00	89.5	23.9	-34.6	78.8	0	1.0	HH	-	-	141.0	-62.2	P	1
915.00	98.7	23.9	-34.6	88.0	90	1.0	VH	-	-	141.0	-53.0	P	1
924.00	51.2	23.9	-34.6	40.5	0	1.0	HH	-	-	54.0	-13.5	P	
924.00	56.3	23.9	-34.6	45.6	90	1.0	VH	-	-	54.0	-8.4	P	
931.00	45.8	24.0	-34.6	35.2	0	1.0	HH	-	-	54.0	-18.8	P	
931.00	44.5	24.0	-34.6	33.9	90	1.0	VH	-	-	54.0	-20.1	P	
952.00	37.7	24.0	-34.5	27.2	0	1.0	HH	-	-	54.0	-26.8	P	
952.00	32.3	24.0	-34.5	21.8	0	1.0	VH	-	-	54.0	-32.2	P	
986.00	33.3	24.2	-34.9	22.6	0	1.0	HH	-	-	54.0	-31.4	P	
986.00	31.7	24.2	-34.9	20.9	0	1.0	VH	-	-	54.0	-33.1	P	
1089.00	39.2	24.4	-34.5	29.0	0	1.0	HH	-	-	54.0	-25.0	P	
1089.00	32.0	24.4	-34.5	21.8	0	1.0	VH	-	-	54.0	-32.2	P	
1280.00	32.8	24.7	-34.3	23.3	0	1.0	HH	-	-	54.0	-30.7	P	
1280.00	32.5	24.7	-34.3	22.9	0	1.0	VH	-	-	54.0	-31.1	P	
1376.00	33.0	24.9	-34.1	23.8	0	1.0	HH	-	-	54.0	-30.2	P	
1376.00	32.3	24.9	-34.1	23.1	0	1.0	VH	-	-	54.0	-30.9	P	
1445.00	33.5	25.0	-33.9	24.6	0	1.0	HH	-	-	54.0	-29.4	P	
1445.00	32.0	25.0	-33.9	23.1	0	1.0	VH	-	-	54.0	-30.9	P	
1527.00	32.8	25.3	-33.8	24.3	0	1.0	HH	-	-	54.0	-29.7	P	
1527.00	32.8	25.2	-33.8	24.3	0	1.0	VH	-	-	54.0	-29.7	P	
1828.00	53.7	26.9	-33.3	47.3	0	1.0	HH	-	-	54.0	-6.7	P	
1828.00	56.2	26.8	-33.3	49.6	90	1.0	VH	-	-	54.0	-4.4	P	
1835.00	44.3	27.0	-33.3	38.0	0	1.0	HH	-	-	54.0	-16.0	P	
1835.00	56.3	26.8	-33.3	49.8	90	1.0	VH	-	-	54.0	-4.2	P	
2198.00	33.2	28.2	-32.7	28.6	0	1.0	HH	-	-	54.0	-25.4	P	
2198.00	33.7	28.1	-32.7	29.0	90	1.0	VH	-	-	54.0	-25.0	P	
2452.00	33.7	28.5	-32.2	30.0	0	1.0	HH	-	-	54.0	-24.0	P	
2452.00	32.5	28.5	-32.2	28.8	0	1.0	VH	-	-	54.0	-25.2	P	
2740.00	39.2	29.3	-32.0	36.5	0	1.0	HH	-	-	54.0	-17.5	P	
2740.00	48.0	29.3	-32.0	45.3	90	1.0	VH	-	-	54.0	-8.7	P	
2986.00	35.5	30.1	-31.8	33.7	0	1.0	HH	-	-	54.0	-20.3	P	
2986.00	33.8	30.1	-31.8	32.0	0	1.0	VH	-	-	54.0	-22.0	P	
3418.00	36.0	31.1	-31.3	35.8	0	1.0	HH	-	-	54.0	-18.2	P	
3418.00	36.2	31.0	-31.3	35.9	0	1.0	VH	-	-	54.0	-18.1	P	
3636.00	33.7	31.7	-31.2	34.2	0	1.0	HH	-	-	54.0	-19.8	P	
3636.00	34.5	31.6	-31.2	34.9	90	1.0	VH	-	-	54.0	-19.1	P	
4027.00	36.2	32.7	-30.9	37.9	0	1.0	HH	-	-	54.0	-16.1	P	
4027.00	35.3	32.7	-30.9	37.1	0	1.0	VH	-	-	54.0	-16.9	P	
4534.00	34.2	32.5	-30.4	36.2	0	1.0	HH	-	-	54.0	-17.8	P	
4534.00	33.0	32.5	-30.4	35.1	0	1.0	VH	-	-	54.0	-18.9	P	
4573.00	32.3	32.5	-30.3	34.6	0	1.0	HH	-	-	54.0	-19.4	P	
4573.00	33.3	32.5	-30.3	35.6	90	1.0	VH	-	-	54.0	-18.4	P	
5511.00	33.8	34.2	-29.3	38.7	0	1.0	HH	-	-	54.0	-15.3	P	
5511.00	34.3	34.2	-29.3	39.2	90	1.0	VH	-	-	54.0	-14.8	P	
6398.00	32.8	34.4	-28.9	38.4	0	1.0	HH	-	-	54.0	-15.6	P	
6398.00	34.2	34.5	-28.9	39.8	90	1.0	VH	-	-	54.0	-14.2	P	
7361.00	35.3	36.2	-28.8	42.7	0	1.0	HH	-	-	54.0	-11.3	P	
7361.00	36.0	36.2	-28.8	43.4	90	1.0	VH	-	-	54.0	-10.6	P	
8249.00	33.2	36.9	-29.0	41.1	0	1.0	HH	-	-	54.0	-12.9	P	
8249.00	35.2	37.0	-29.0	43.2	90	1.0	VH	-	-	54.0	-10.8	P	
9137.00	33.8	37.4	-28.7	42.5	0	1.0	HH	-	-	54.0	-11.5	P	

9137.00	34.8	37.4	-28.7	43.5	90	1.0	VH	-	-	54.0	-10.5	P

1. Fundamental frequency

SECTION 2.7 TEST DATA SUMMARY

The margin is calculated as follows:
Margin = Corrected Amplitude - Limit; where Corrected Amplitude = Amplitude + Cable Loss + Antenna Factor.

SECTION 2.8 CONCLUSION

The Relay meets the requirements of FCC Part 15, Class B for open field radiated emissions.

OPEN FIELD RADIATED EMISSIONS Results (cont)

SECTION 2.9 RADIATED EMISSIONS TEST SETUP PHOTOGRAPHS

Figure 1: Radiated Emissions Test Setup (Below 1 GHz) Front View

Figure 2 Radiated Emissions Test Setup (Below 1 GHz) Rear View

OPEN FIELD RADIATED EMISSIONS (cont)

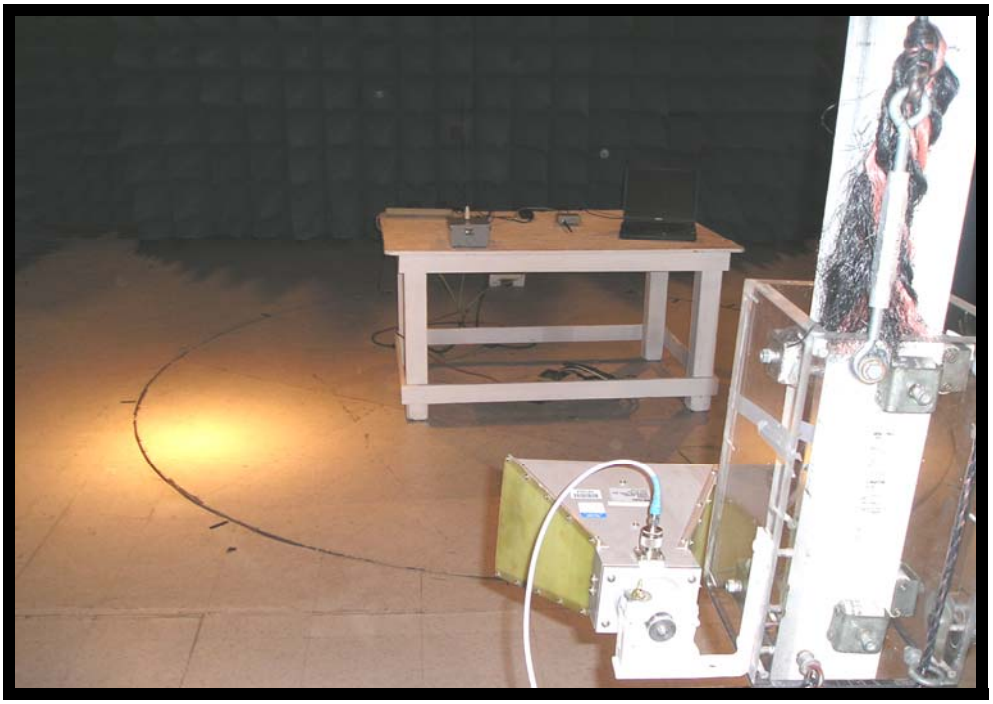

Figure 3: Radiated Emissions Test Setup at 10 meters (Above 1 GHz) Front View

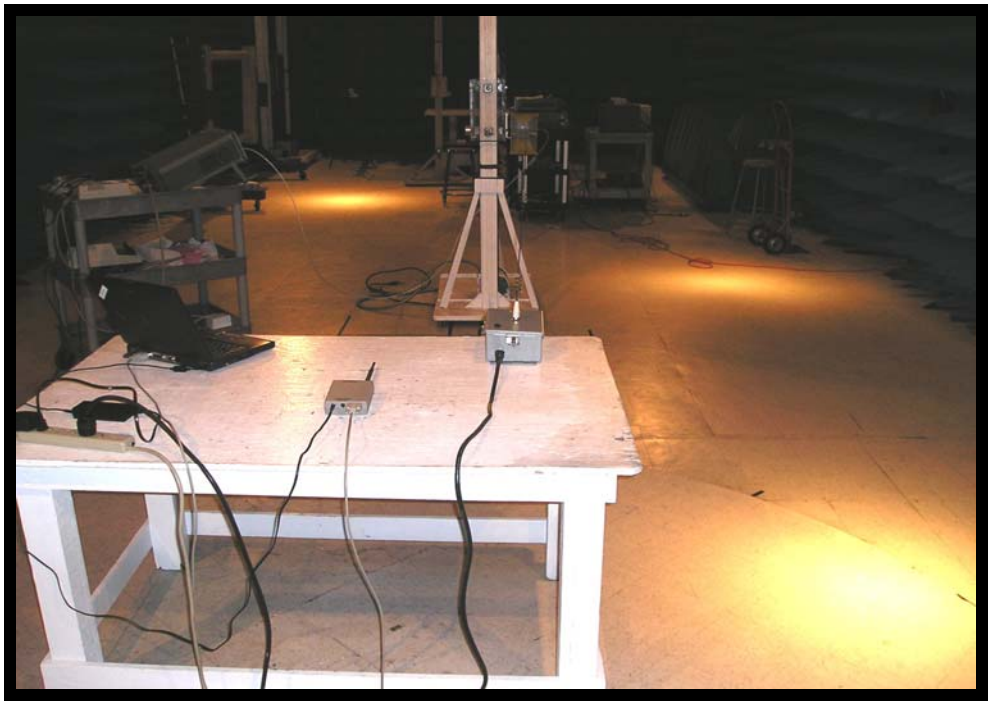

Figure 4: Radiated Emissions Test Setup at 10 meters (Above 1 GHz) Rear View.

PART 3 RF MEASUREMENTS

SECTION 3.1 LIST OF EQUIPMENT USED DURING RF TESTS

Table 8: Support Equipment – RF Measurements

No	Description	Manufacturer	Model Name	Serial Number
1	FSU	N/A	N/A	BF00000034
2	PLOTTER	HEWLETT PACKARD	7440A	N/A
3	NOTEBOOK	SONY	PCG – 974L	283293303418746

Table 9: Test Equipment – RF Measurements

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due
Spectrum Analyzer	Hewlett-Packard	8568B	2841A04315	11-29-05
Spectrum Analyzer Display	Hewlett-Packard	85662A	2848A17028	11-29-05
Quasi Peak Adapter	Hewlett-Packard	85650	2521A00871	11-29-05
Preselector	Hewlett-Packard	85685A	2620A00265	11-29-05
Spectrum Analyzer	Hewlett-Packard	8565E	2618A02909	03-29-06
Signal Generator	Hewlett-Packard	83650A	3420A00599	09-09-06
Power Supply	BK Precision	1688	2250558	No Cal.Needed
Biconical Antenna	EMCO	3104	3667	02-03-06
L. P. Ant. (200-1000 MHz)	EMCO	3146	9510-4202	02-03-06
Horn Antenna (Below 18GHz)	EMCO	3115	8812-3050	12-19-05

Software Used	Manufacturer	Model Name	Version Number	Calibration/Validation Date
Test Software	ITC	1.04b1	Rev. 4	02-05-06
Antenna Software	ITC	L.P-V/H 10m	Rev. 4	02-05-06
Antenna Software	ITC	B-V/H 10m	Rev. 4	02-05-06
Cable Software	ITC	OATS 30MHz-1GHz	Rev. 4	02-01-06

Table 10: Data Table Legend and Field Strength Calculation

Detector mode: Peak (P) or Quasi-Peak (QP) or Average (A)

	Polarization	Antenna	Freq Range (MHz)
VB	Vertical	EMCO 3104/sn 3549 Biconical	30 – 200
HB	Horizontal	EMCO 3104/sn 3549 Biconical	30 – 200
VL	Vertical	EMCO 3146/sn. 2075 Log Periodic	200 – 1000
HL	Horizontal	EMCO 3146/sn. 2075 Log Periodic	200 – 1000
VH1	Vertical	EMC 3115/sn. 2362 Horn	Below 18000
HH1	Horizontal	EMC 3115/sn. 2362 Horn	Below 18000
VH2	Vertical	EMC 3116/sn. 2655 Horn	Below 26500
HH2	Horizontal	EMC 3116/sn. 2655 Horn	Below 26500
VH4	Vertical	S&D DBD-520 Horn	Below 75000
HH4	Horizontal	S&D DBD-520 Horn	Below 75000

RF Conducted Measurements

SECTION 3.2 SETUP PHOTOGRAPHS

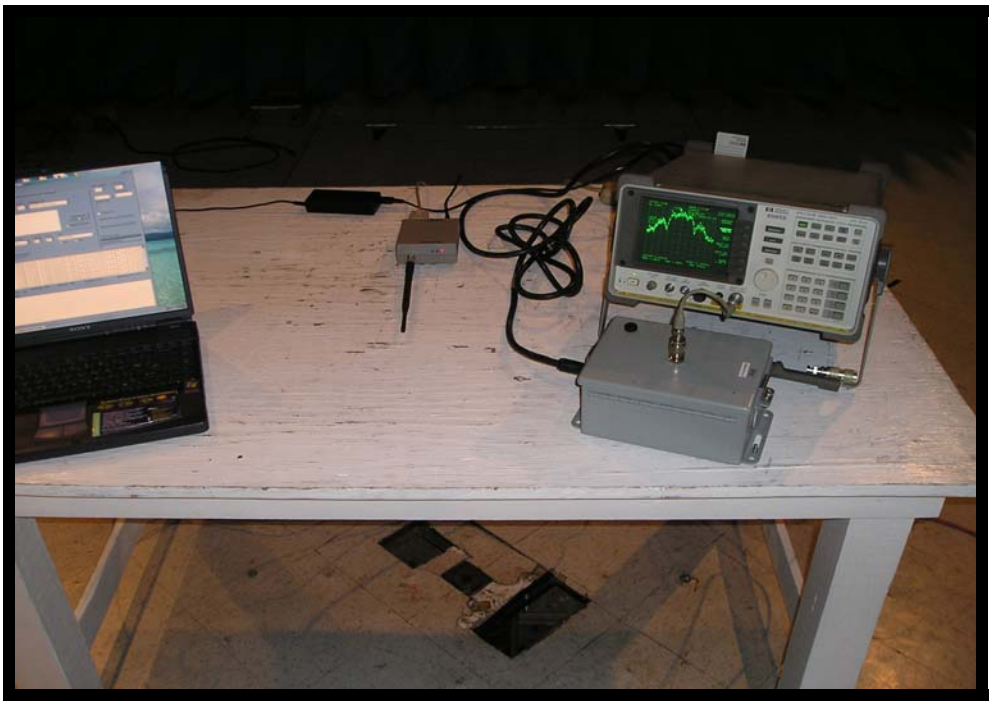

Figure 5 Test Set Up Photo – Front View

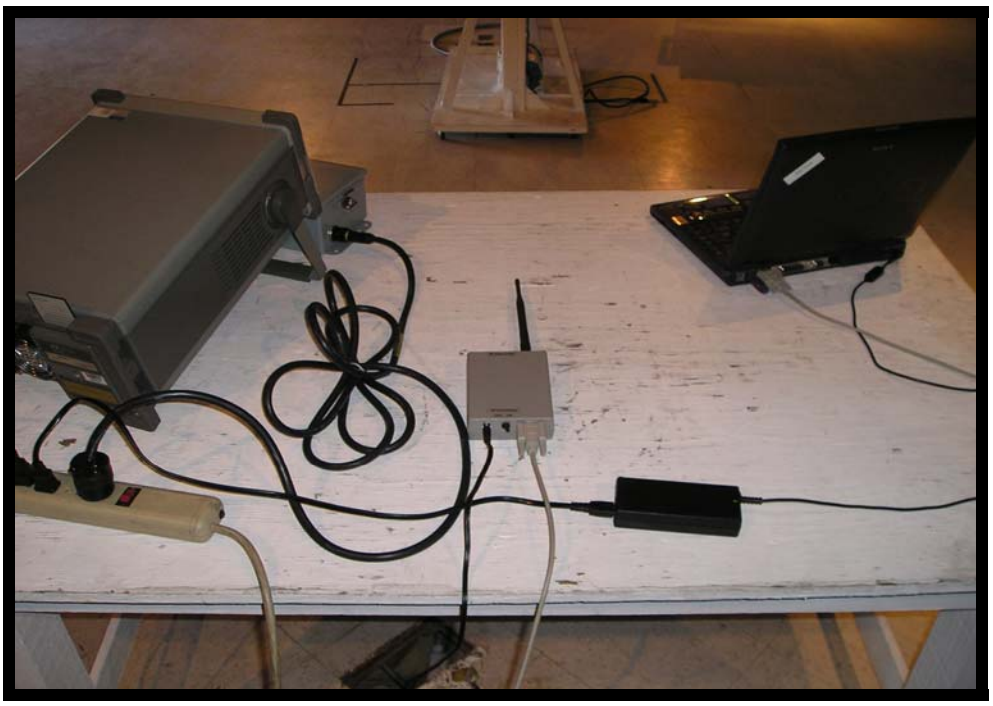

Figure 6 Test Set Up Photo – Rear View.

PART 4 MAXIMUM IN-BAND PEAK / NUMBER OF CHANNELS

SECTION 4.1 MAXIMUM PEAK MEASUREMENT

The EUT were set up on a wooden non-conductive tabletop, attached at the antenna connector to the measuring device. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT were configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 4.2 SITE USED – MAXIMUM IN-BAND PEAK MEASUREMENT

☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☐ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 4.3 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS –MAXIMUM IN-BAND PEAK DATA

Test Date(s):	July 08, 2005
Test Engineer(s):	Bob Kershaw and Femi Ojo
Temperature	74.8°F
Humidity	34.4%

SECTION 4.4 TEST DATA – MAXIMUM IN-BAND PEAK MEASUREMENT

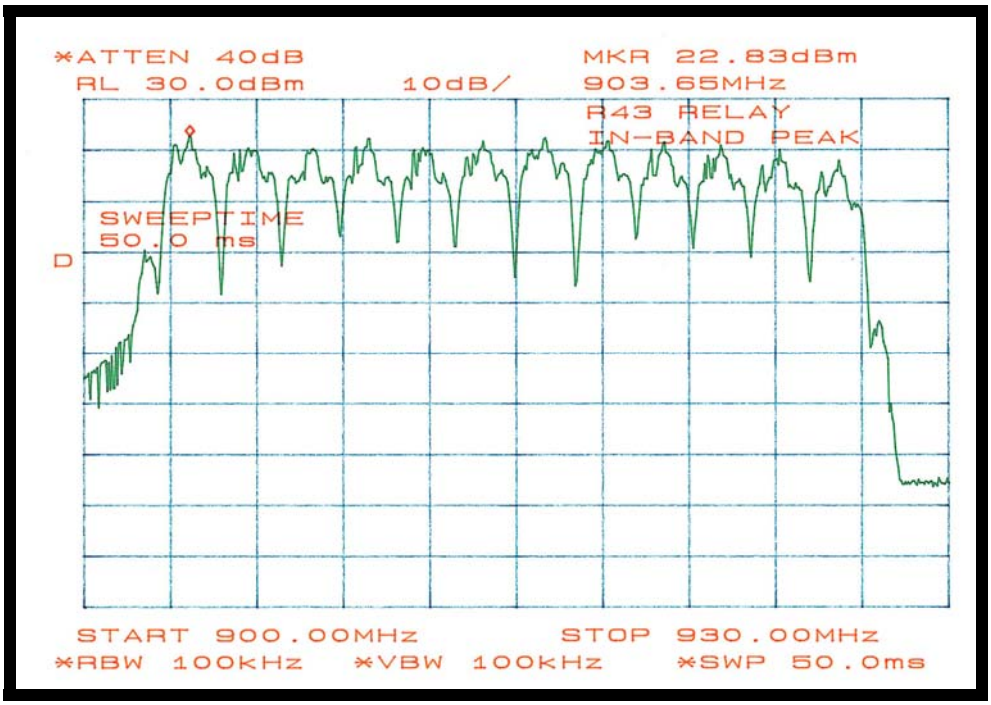

Figure 7: Plot of In-Band Peak Measurement

Test-Data Summary – Peak Measurement:

Peak Frequency	=	903.65 MHz
Peak Level:	=	22.83 dBm
Number of Channels	=	11

PART 5 CHANNEL SEPARATION MEASUREMENT

SECTION 5.1 CHANNEL SEPARATION MEASUREMENT

The EUT were set up on a wooden non-conductive tabletop, attached at the antenna connector to the measuring device. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT were configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 5.2 SITE USED – CHANNEL SEPARATION MEASUREMENT

☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☐ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 5.3 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS – CHANNEL SEPARATION MEASUREMENT

Test Date(s):	July 08, 2005
Test Engineer(s):	Femi Ojo and Bob Kershaw
Temperature	74.8°F
Humidity	34.4%

SECTION 5.4 TEST DATA – CHANNEL SEPARATION MEASUREMENT

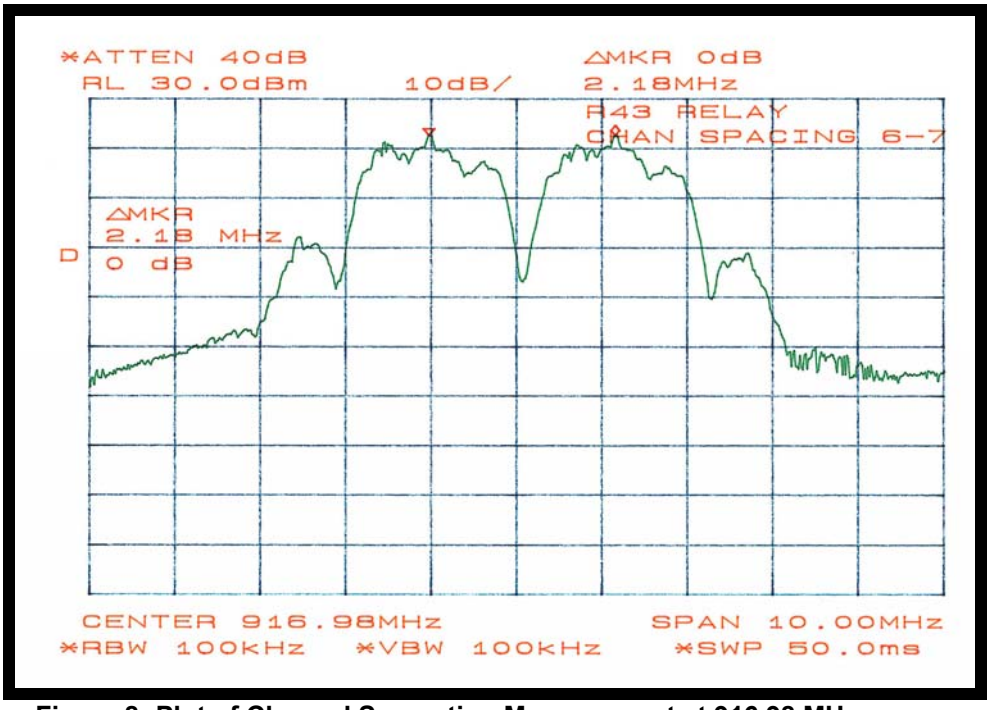

Figure 8: Plot of Channel Separation Measurement at 916.98 MHz

Test-Data Summary – Channel Separation Measurement:

Peak Frequencies = 915.968 MHz (CH 6) & 918.106 MHz (CH 7)
Channel Separation (measured) = 2.18 MHz

PART 6 MAXIMUM POWER OUTPUT PER 47 CFR 15.247(B) (1)

SECTION 6.1 MAXIMUM POWER MEASUREMENT

The EUT was set up on a wooden non-conductive tabletop, attached at the antenna connector to the measuring device. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT was configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 6.2 SITE USED – MAXIMUM POWER MEASUREMENT

☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☐ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 6.3 ADMINISTRATIVE DETAILS – MAXIMUM POWER MEASUREMENT

Test Date(s):	July 08, 2005
Test Engineer(s):	Bob Kershaw and Femi Ojo
Temperature	74.8°F
Humidity	34.4%

SECTION 6.4 TEST DATA – MAXIMUM POWER MEASUREMENT (CH 0 – 903.680 MHZ)

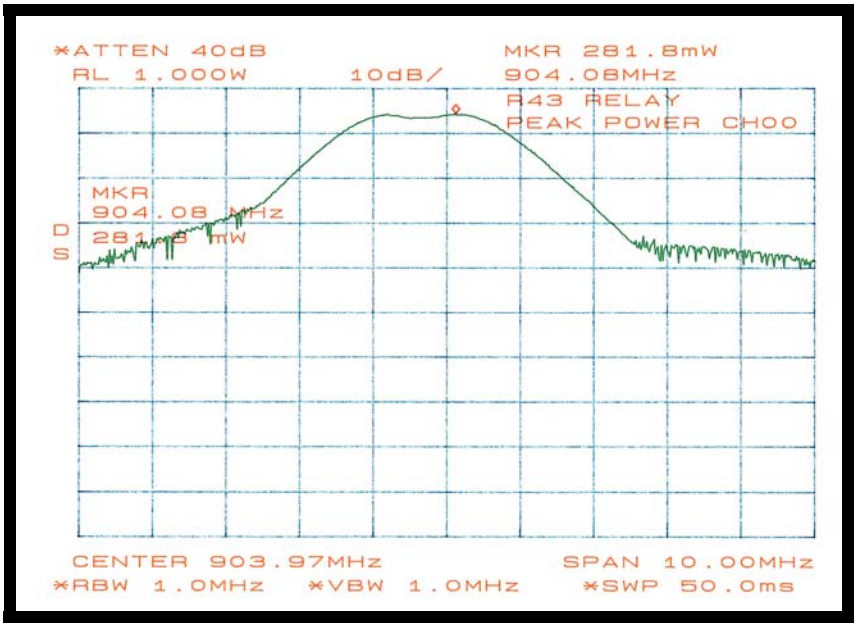

Figure 9: Plot of Maximum Power Measurement at Channel 0

Test-Data Summary – Peak Measurement (CH 0 – 903.680 MHz):

Center Frequency = 904.08 MHz
Peak Level: = 281.08 mW
Limit per 15.247(b)(1) = 1 W

SECTION 6.5 TEST DATA – MAXIMUM POWER MEASUREMENT (CH 6 – 915.97 MHZ)

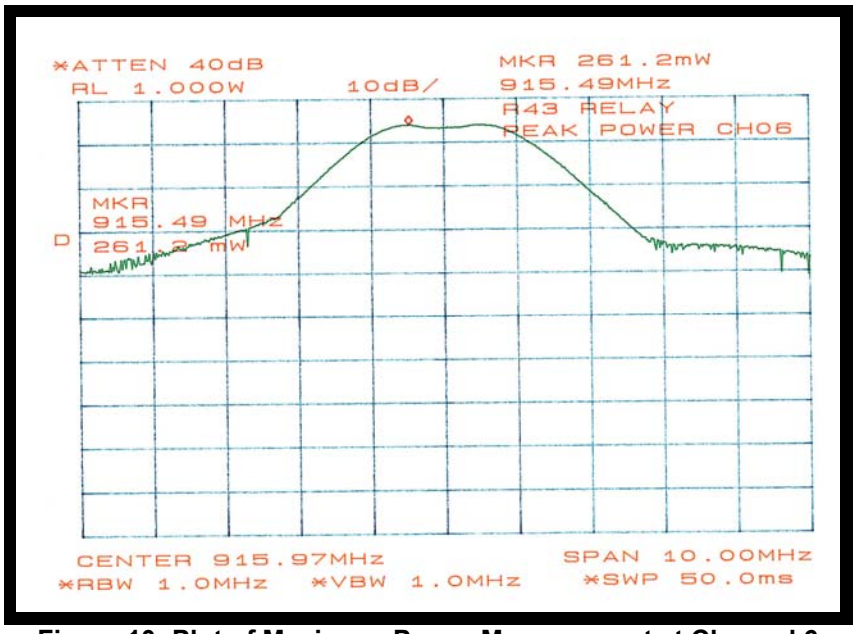

Figure 10: Plot of Maximum Power Measurement at Channel 6

Test-Data Summary – Maximum Power Measurement (CH 6 – 915.968 MHz):

Center Frequency	=	915.97 MHz
Peak Level:	=	261.2 mW
Limit per 15.247(b)(1)	=	1 W

SECTION 6.6 TEST DATA – MAXIMUM POWER MEASUREMENT (CH 11 – 926.208 MHZ)

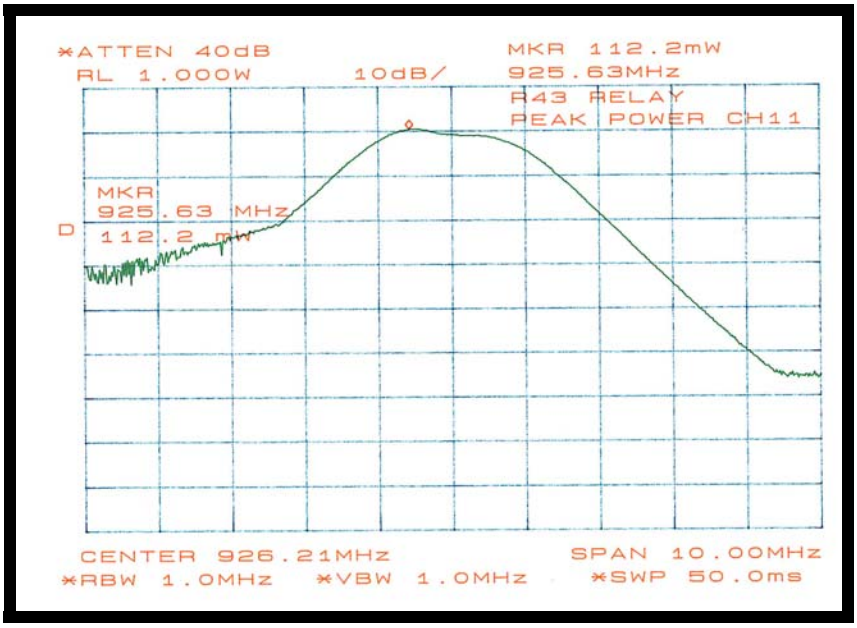

Figure 11: Plot of Maximum Power Measurement at Channel 11

Test-Data Summary – Maximum Power Measurement (CH 11 – 926.208 MHz):

Center Frequency	=	926.21 MHz
Peak Level:	=	112.2 mW
Limit per 15.247(b)(1)	=	1 W

PART 7 SPECTRAL DENSITY per 47 CFR 15.247(c)

SECTION 7.1 SPECTRAL DENSITY MEASUREMENT

The EUT were set up at 3m in accordance with the suggested configuration given in FCC Alternative Measurement Procedure. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in FCC Standard. The EUT were set up on a wooden non-conductive tabletop, 80 cm above the ground reference plane, in a semi-anechoic absorber lined shielded room.

The EUT were configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 7.2 SITE USED – SPECTRAL DENSITY MEASUREMENT

☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☐ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 7.3 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS-

Test Date(s):	July 11, 2005
Test Engineer(s):	Bob Kershaw and Femi Ojo
Temperature	74.7°F
Humidity	35%

SECTION 7.4 TEST DATA – SPECTRAL DENSITY MEASUREMENT (CHANNEL 0 903.680MHZ)

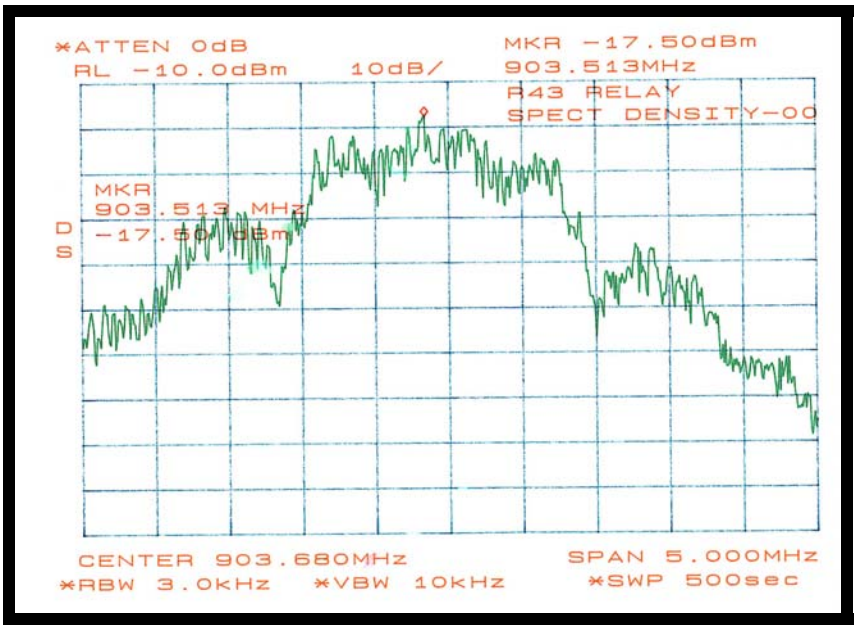

Figure 12: Plot of Spectral Density Measurement at Channel 0

Test-Data Summary – Spectral Density Measurement (903.513MHz):

Center Frequency = 903.680 MHz
Peak Level: = -17.50dBm = 89.5dBµV
Field Strength: = 89.5+22.4+1.0=112.90dBµV
112.90dBµV = 5.9dBm.

Power Spectral Density (alternate method) per FCC Appendix C

$P=(Ed)^2/(30G)$

$P = (5.9 \times 3)^2/(30 \times 5.0) = 2.09$dBm

P = Power Spectral Density
E = Field strength = 5.9dBm.
d = Distance (m) = 3m
G = Gain of the antenna = 5.0
Limit per 15.247(c) =8dBm

SECTION 7.5 TEST DATA – SPECTRAL DENSITY MEASUREMENT (CHANNEL 6 – 915.968MHZ)

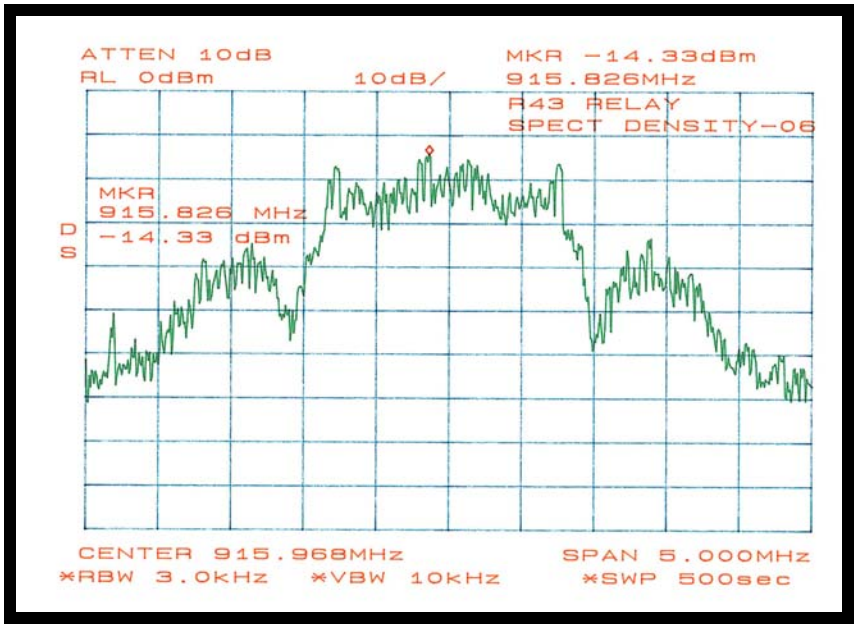

Figure 13: Plot of Spectral Density Measurement at Channel 6

Test-Data Summary – Spectral Density Measurement (915.826 MHz)

Center Frequency = 915.968 MHz
Peak Level: = -14.33dBm = 92.67dBµV
Field Strength: = 92.67+22.5+1.0=116.17dBµV
116.17dBµV = 9.17dBm.

Power Spectral Density (alternate method) per FCC Appendix C

$P=(Ed)^2/(30G)$

$P = (9.17 \times 3)^2 / (30 \times 5.0) = 5.05$dBm

P = Power Spectral Density
E = Field strength = 9.17dBm.
d = Distance (m) = 3m
G = Gain of the antenna = 5.0
Limit per 15.247(c) =8dBm

SECTION 7.6 TEST DATA – SPECTRAL DENSITY MEASUREMENT (CHANNEL 11 – 926.208MHZ)

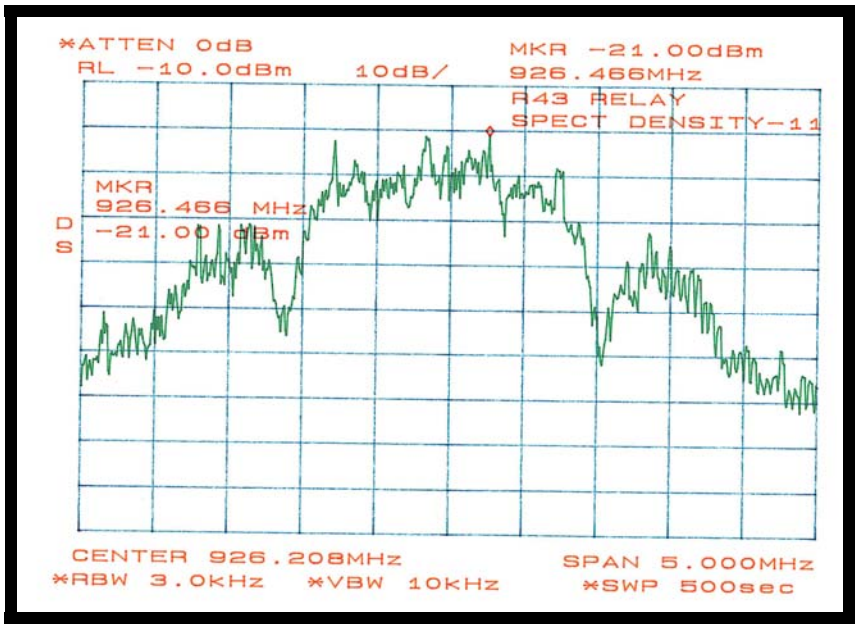

Figure 14: Plot of Spectral Density Measurement at Channel 11

Test-Data Summary – Spectral Density Measurement (926.466 MHz)

Center Frequency = 926.208 MHz
Peak Level: = -21.00dBm = 86.0dBµV
Field Strength: = 86.0+22.6+1.0=109.6dBµV
109.6dBµV = 2.6dBm.

Power Spectral Density (alternate method) per FCC Appendix C

$P=(Ed)^2/(30G)$

$P = (2.6 \times 3)^2/(30 \times 5.0) = 0.41$dBm

P = Power Spectral Density
E = Field strength = 2.6dBm.
d = Distance (m) = 3m
G = Gain of the antenna = 5.0
Limit per 15.247(c) =8dBm

Section 7.7 Test Setup Photograph

Figure 15: Power Spectral Density Test Setup (Front view)

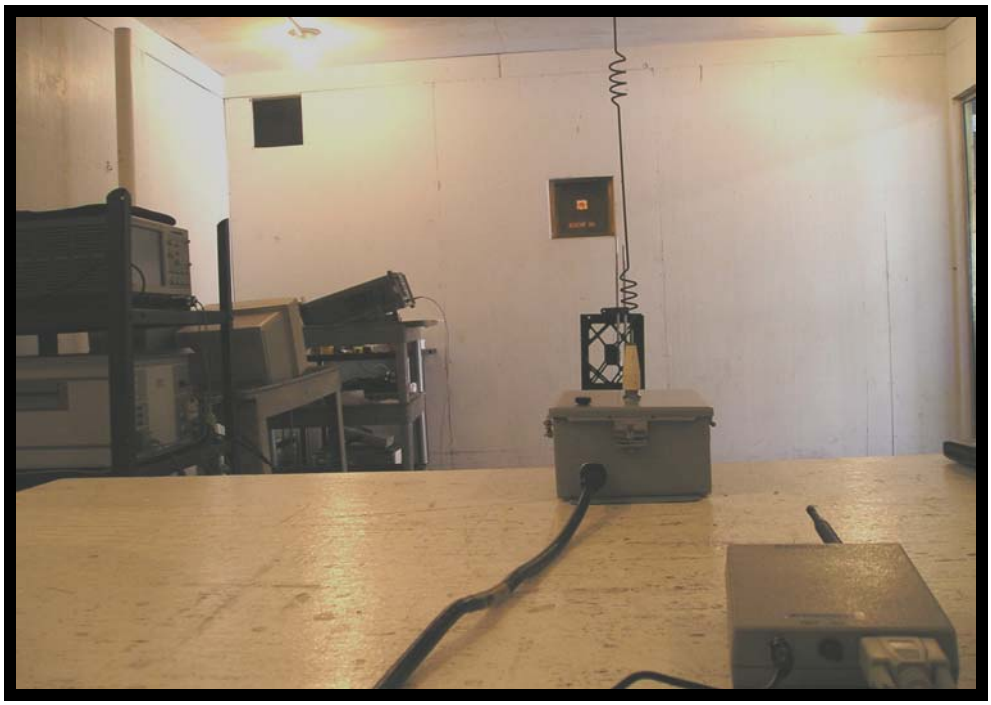

Figure 16: Power Spectral density Test Setup (Rear View)

PART 8 6dB BANDWIDTH per 47 CFR 15.247(a) (2)

SECTION 8.1 6DB BANDWIDTH MEASUREMENT

The EUT were set up on a wooden non-conductive tabletop, attached at the antenna connector to the measuring device. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT were configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 8.2 SITE USED – 6DB BANDWIDTH MEASUREMENT

☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☐ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 8.3 ADMINISTRATIVE & ENVIRONMENTAL - 6DB BANDWIDTH DETAILS

Test Date(s):	July 08, 2005
Test Engineer(s):	Bob Kershaw and Femi Ojo
Temperature	74.8°F
Humidity	34.4%

SECTION 8.4 TEST DATA – 6DB BANDWIDTH MEASUREMENT (CHANNEL 0 – 903.68 MHZ)

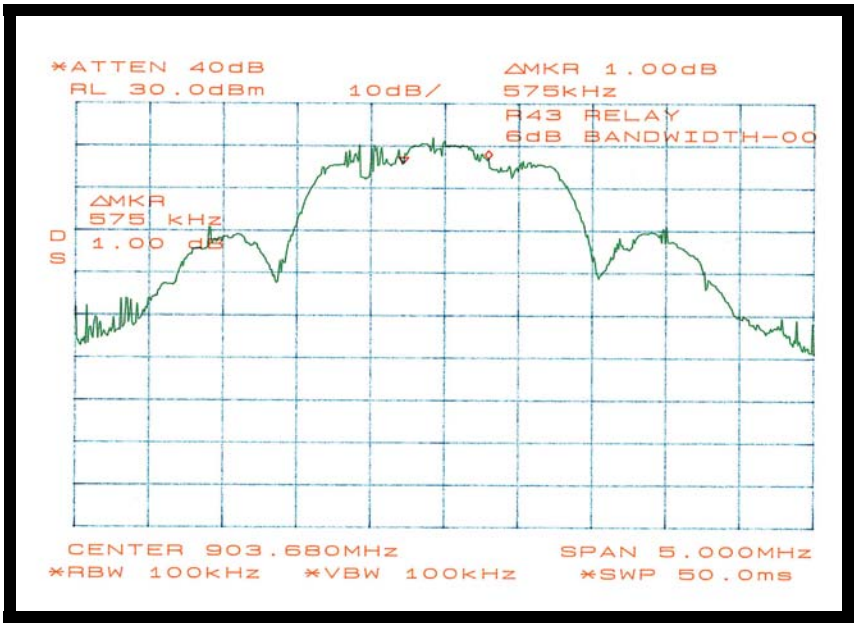

Figure 17: Plot of 6dB Bandwidth Measurement at Channel 0

Test-Data Summary – 6dB Bandwidth Measurement (CH 0 –903.68 MHz):

Center Frequency = 903.68 MHz
6dB Bandwidth = 575 KHz
Limit per 15.247(a)(2) = 500 KHz minimum

SECTION 8.5 TEST DATA – 6DB BANDWIDTH MEASUREMENT (CH 6 – 915.968 MHZ)

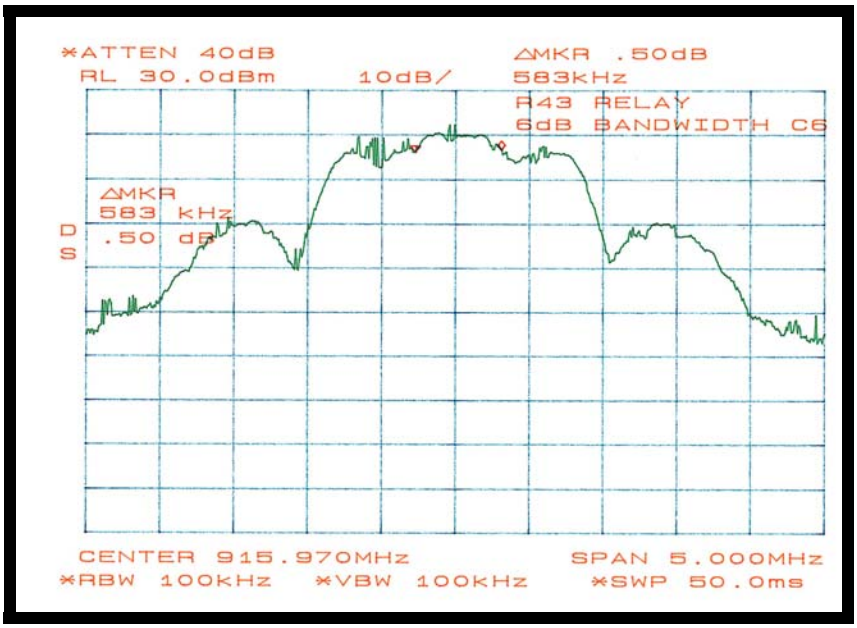

Figure 18: Plot of 6dB Bandwidth Measurement at Channel 6

Test-Data Summary – 6dB Bandwidth Measurement (CH 6 – 915.968 MHz):

Center Frequency	=	915.97 MHz
6dB Bandwidth	=	583 KHz
Limit per 15.247(a)(2)	=	500KHz minimum

SECTION 8.6 TEST DATA – 6DB BANDWIDTH MEASUREMENT (CH 11 – 926.208 MHZ)

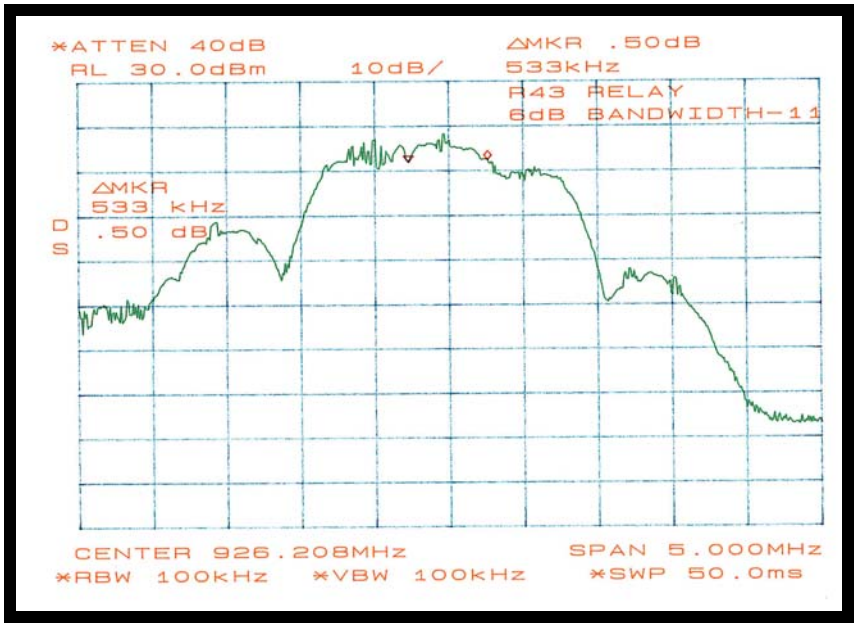

Figure 19: Plot of 6dB Bandwidth Measurement at Channel 11

Test-Data Summary – 6dB Bandwidth Measurement (CH11 - 926.208MHz).

Center Frequency	=	926.208 MHz
6dB Bandwidth	=	533 KHz
Limit per 15.247(a) (2)	=	500 KHz minimum

PART 9 6DB BANDEDGE MEASUREMENT

6dB BAND-EDGE per 47 CFR 15.247(c)

SECTION 9.1 6DB BAND-EDGE MEASUREMENT

The EUT were set up on a wooden non-conductive tabletop, attached at the antenna connector to the measuring device. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT were configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 9.2 SITE USED –BAND-EDGE MEASUREMENT

☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 9.3 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS–BAND-EDGE MEASUREMENT

Test Date(s):	July 08, 2005
Test Engineer(s):	Bob Kershaw and Femi Ojo
Temperature	74.8°F
Humidity	34.4%

SECTION 9.4 TEST DATA –BAND-EDGE MEASUREMENT (UPPER BAND EDGE - 928MHZ)

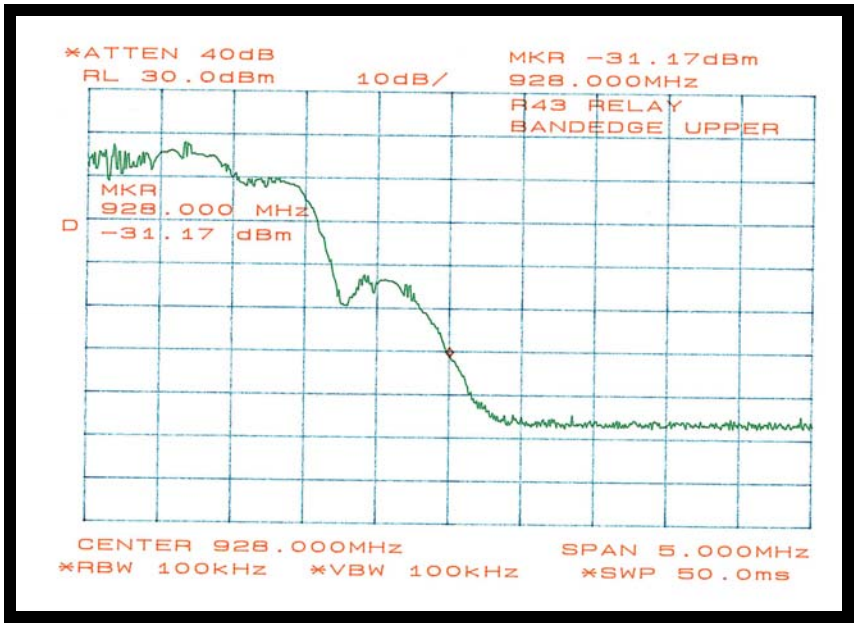

Figure 20: Plot of Upper Band-Edge Measurement at 928 MHz

Test-Data Summary –Band-Edge Measurement (Upper Band Edge – 928MHz):

Center Frequency = 928 MHz
Band-Edge Level = -31.17dBm
Limit per 15.247(c) = 20dB below in-band peak (or -20dB)

BAND-EDGE MEASUREMENT (cont)

SECTION 9.5 TEST DATA –BAND-EDGE MEASUREMENT (LOWER BANDEDGE - 902MHZ)

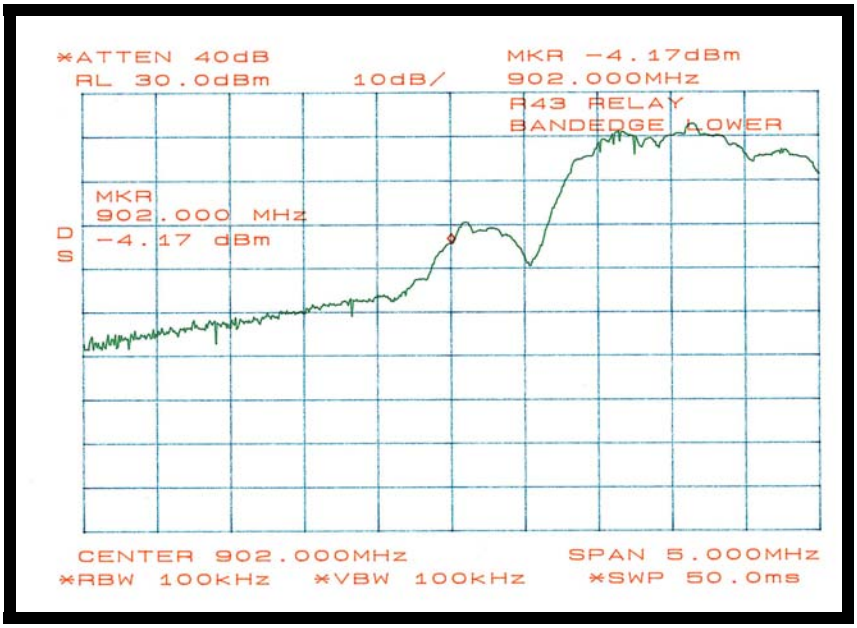

Figure 21: Plot of Lower Band-Edge Measurement at 902MHz

Test-Data Summary –Band-Edge Measurement (Lower Band Edge – 902MHz):

Center Frequency	=	902 MHz
Band-Edge Level	=	-4.17dBm
Limit per 15.247(c)	=	20dB below in-band peak (or -20dB)

PART 10 100kHz Bandwidth Out-of-Band Emissions per 47 CFR 15.247(a) (2)

SECTION 10.1 100KHZ BANDWIDTH OUT-OF-BAND EMISSIONS MEASUREMENT

The EUT were set up on a wooden non-conductive tabletop, attached at the antenna connector to the measuring device. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-2003. The EUT were configured to run in continuous mode during the tests. The measurement data below represents the maximum worst-case result from the measurement performed in accordance to the requirements of this section.

SECTION 10.2 SITE USED – 100 KHZ BANDWIDTH OUT-OF-BAND MEASUREMENT

☐ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room

SECTION 10.3 ADMINISTRATIVE & ENVIRONMENTAL - (OUT OF BAND DETAILS)

Test Date(s):	July 08, 2005
Test Engineer(s):	Femi Ojo and Bob Kershaw
Temperature	74.8°F
Humidity	34.4%

SECTION 10.4 TEST DATA – 100KHZ OUT-OF-BAND MEASUREMENT (IN-BAND PEAK)

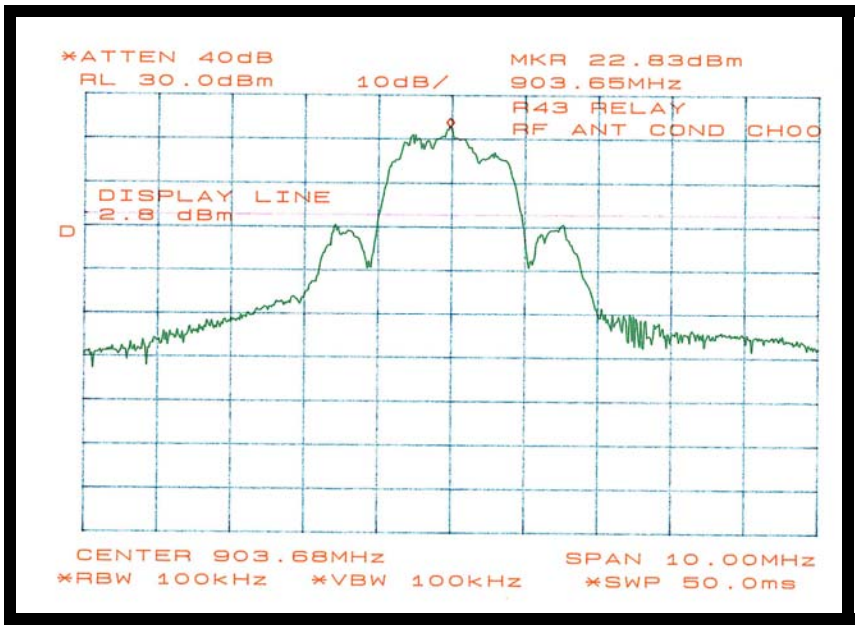

Figure 22: Plot of 100 kHz Bandwidth Out-of-Band Measurement (In-Band-Peak)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement (In-Band Peak):

Center Frequency	=	903.68 MHz
Center Frequency Peak	=	22.83dBm
20dB Limit (measured) per 15.247(c)	=	2.8dBm

SECTION 10.5 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 0 – 903.680 MHZ) 27 MHZ TO 930MHZ

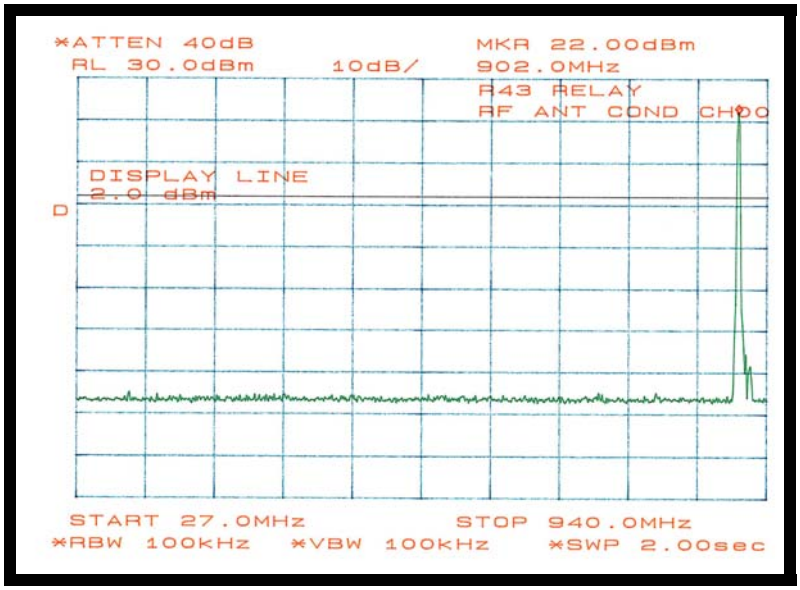

Figure 23: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 0 (27 MHz – 940 MHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 0 – 903.680MHz (27MHz – 940MHz)

Peak Frequency (Fundamental)	**=**	902.0MHz
Maximum Peak (27MHz to 940MHz)	**=**	Noise floor
20dB Limit (measured) per 15.247(c)	**=**	2.0dBm

SECTION 10.6 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 0 – 903.680 MHZ) 834 MHZ TO 5 GHZ

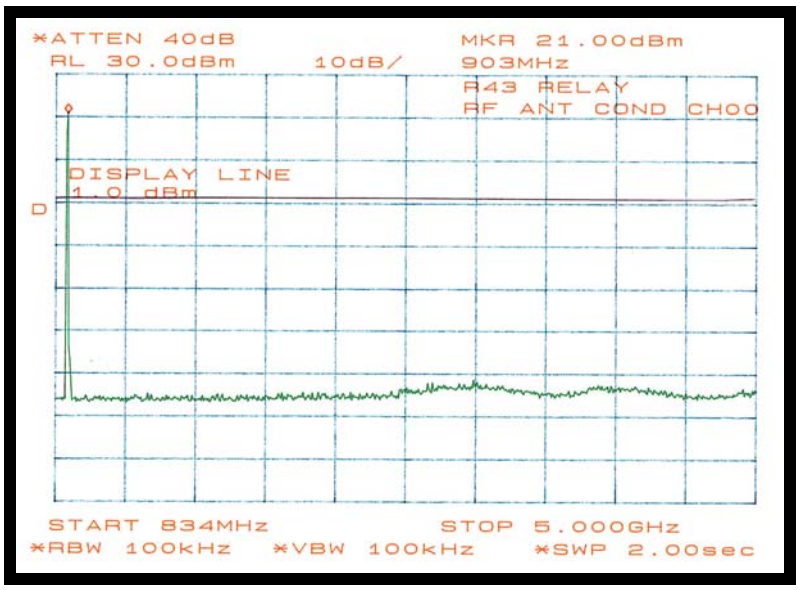

Figure 24: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 0 (834 MHz – 5GHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 0 – 903.680MHz (834MHz – 5GHz)

Peak Frequency (Fundamental)	**=**	903 MHz
Maximum Peak (834MHz to 5GHz)	**=**	Noise Floor
20dB Limit (measured) per 15.247(c)	**=**	1.0dBm

SECTION 10.7 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 0- 903.680MHZ) 5 GHZ TO 10 GHZ

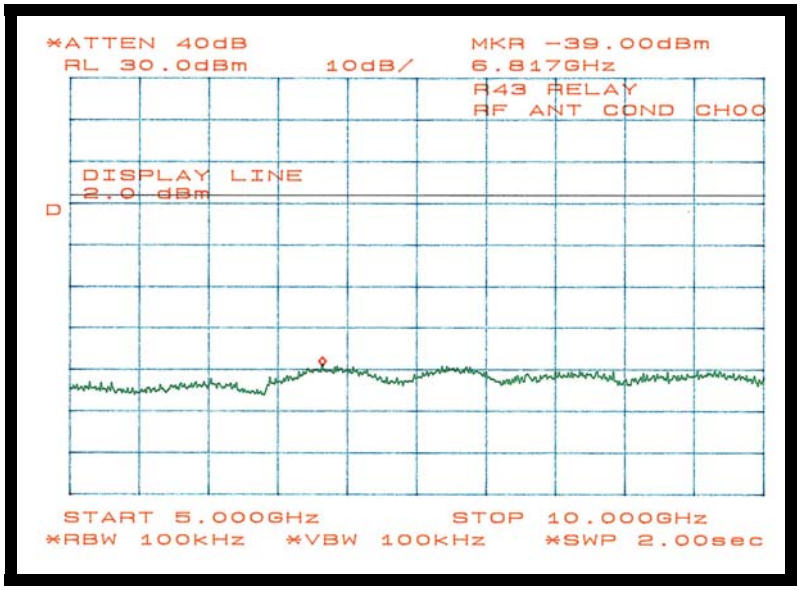

Figure 25: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 0 (5GHz – 10GHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 0 – 903.680MHz (5GHz – 10GHz)

Peak Frequency (Fundamental)	=	903.680MHz
Maximum Peak (5GHz – 10GHz)	=	Noise Floor
20dB Limit (measured) per 15.247(c)	=	2.0dBm

SECTION 10.8 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 6- 915.968) 27MHZ TO 940 MHZ

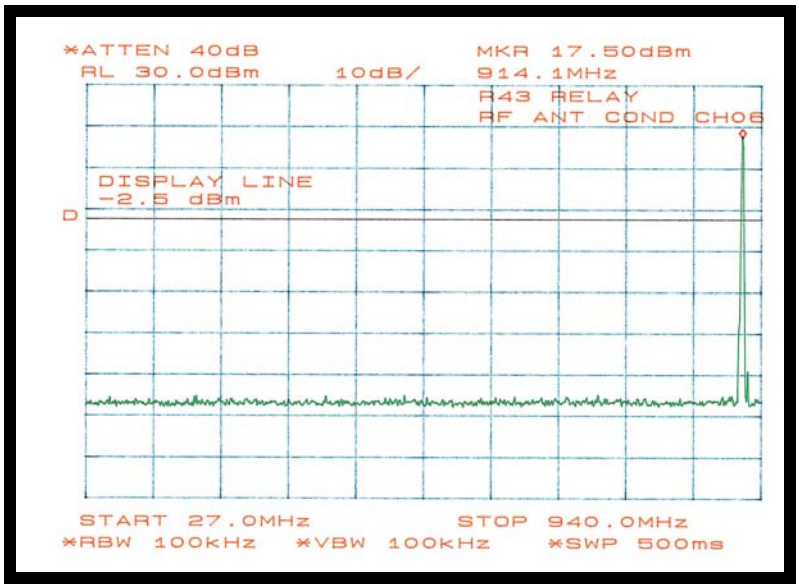

Figure 26: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 6 (27MHz – 940MHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 6 – 915.968MHz (27MHz – 940MHz)

Peak Frequency (Fundamental)	=	914.1 MHz
Maximum Peak (27MHz to 940MHz)	=	Noise Floor
20dB Limit (measured) per 15.247(c)	=	-2.5dBm

SECTION 10.9 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 6- 915.968) 834MHZ TO 5GHZ

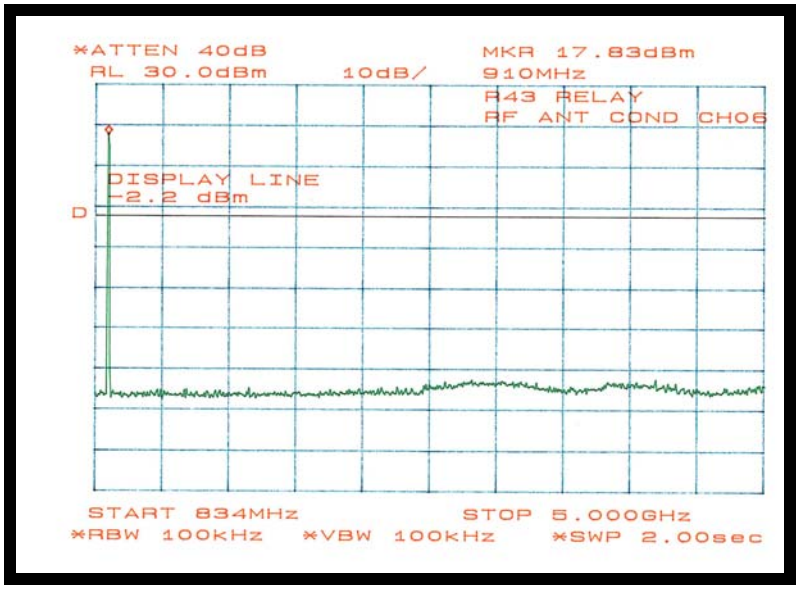

Figure 27: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 6 (834 MHz to 5 GHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 6 915.968MHz (834MHz to 5GHz)

Peak Frequency (Fundamental)	**=**	910 MHz
Maximum Peak (834MHz to 5GHz)	**=**	Noise Floor
20dB Limit (measured) per 15.247(c)	**=**	-2.2dBm

SECTION 10.10 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 6- 915.968) 5GHZ TO 10GHZ

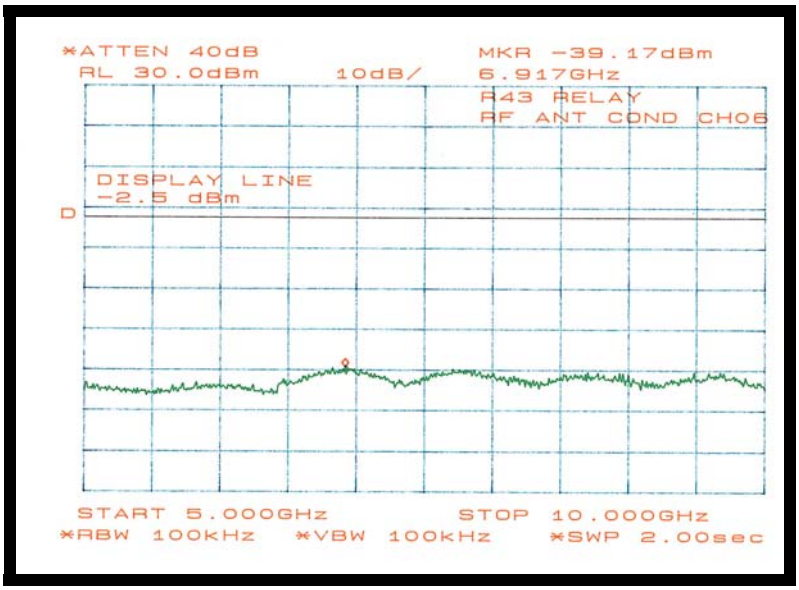

Figure 28: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 6 (5GHz to 10GHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 6 915.968MHz (5GHz to 10GHz)

Peak Frequency (Fundamental)	**=**	915.968MHz
Maximum Peak (5GHz to 10GHz)	**=**	Noise Floor
20dB Limit (measured) per 15.247(c)	**=**	-2.5dBm

SECTION 10.11 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 11- 926.208MHZ) 27MHZ TO 940MHZ

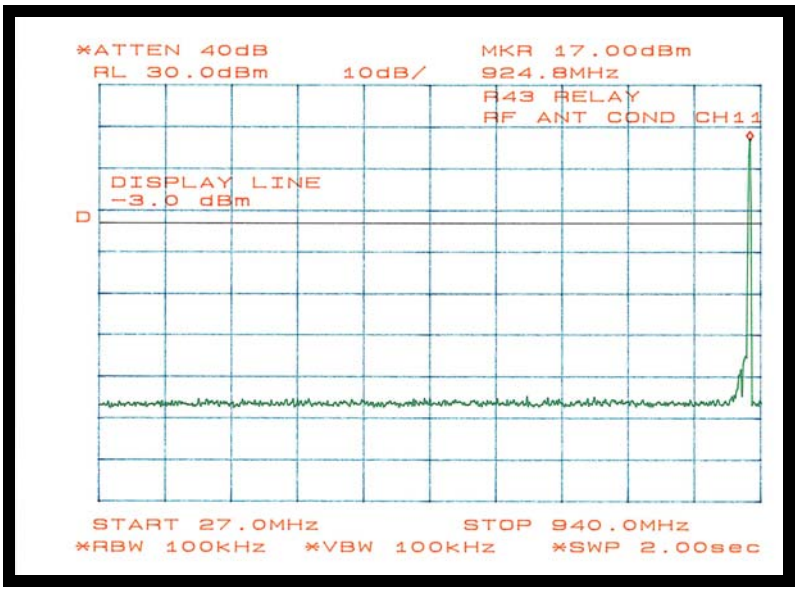

Figure 29: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 11 (27MHz to 940MHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 11 926.208MHz (27MHz to 940MHz)

Peak Frequency (Fundamental)	**=**	924.8 MHz
Maximum Peak (27MHz - 940 MHz)	=	Noise Floor
20dB Limit (measured) per 15.247(c)	=	-3.0dBm

SECTION 10.12 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 11- 926.208MHZ) 817MHZ TO 5GHZ

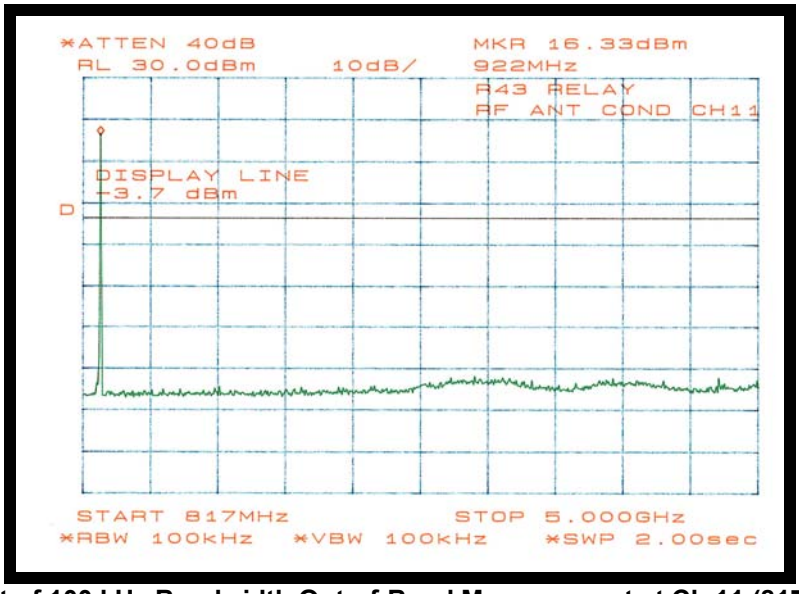

Figure 30: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 11 (817MHz to 5GHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 11 926.208MHz (817MHz to 5GHz)

Peak Frequency (Fundamental)	**=**	922 MHz
Maximum Peak (817MHz – 5GHz)	=	Noise Floor
20dB Limit (measured) per 15.247(c)	=	-3.7dBm

SECTION 10.13 TEST DATA – 100 KHZ BANDWIDTH OUT-OF-BAND (CH 11- 926.208MHZ) 5GHZ TO 10GHZ

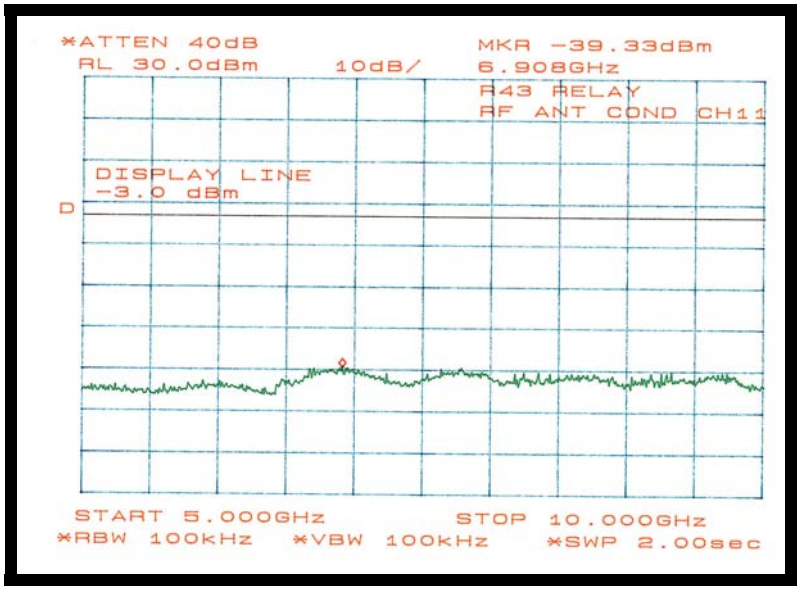

Figure 31: Plot of 100 kHz Bandwidth Out-of-Band Measurement at Ch 11 (5GHz to 10GHz)

Test-Data Summary – 100 kHz Bandwidth Out-of-Band Measurement Ch 11 926.208MHz (5GHz to 10GHz)

Peak Frequency (Fundamental)	**=**	926.208MHz
Maximum Peak (5GHz – 10GHz)	=	Noise Floor
20dB Limit (measured) per 15.247(c)	=	-3.0dBm

PART 11 SPURIOUS/HARMONIC EMISSIONS IN THE RESTRICTED BANDS

SECTION 11.1 TEST SPECIFICATION:

FCC PART 15 SECTION 47 CFR 15.205
FCC PART 15 SECTION 47 CFR 15.247(c)

SECTION 11.2 TEST RANGE – SPURIOUS/HARMONICS EMISSIONS:

The measurement range investigated was from 30 MHz to 10GHz.

SECTION 11.3 SITE USED – SPURIOUS/HARMONICS EMISSIONS MEASUREMENTS

☐ Test Site 1 - Shielded Room: 16' x 12' x 9'
☒ Test Site 1 - 3m Open Field Radiated Site
☐ Test Site 1 - 10m Open Field Radiated Site
☐ Test Site 2 - Environmental Lab
☐ EMC Lab 1 - Test Laboratory
☒ Semi-Anechoic Absorber Lined Shielded Room
☐ Other: _____

SECTION 11.4 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

Test Date:	July 12 ,2005
Test Engineer:	Bob Kershaw and Femi Ojo
Temperature	79.4°F
Humidity	32%

SECTION 11.5 SPURIOUS AND HARMONIC EMISSION IN THE RESTRICTED BANDS DATA

Table 11 Test Data – Spurious Emissions (Below 1 GHz)

The table below shows the summary of the highest amplitudes of the spurious RF radiated emissions from the equipment under test.

INDICATED		CORRECTION		CORR	TURNTABLE	ANT		CLASS A		CLASS B			
FREQ	AMPL	ANT	CAB	AMPL	ANG	HT	POL	AMPL	MARG	AMPL	MARG	FILTER	
MHz	dBuV/m	dB	dB	dBuV/m	DEG	m	-	dBuV/m	dB	dBuV/m	db	MODE	NOTES
72.11	11.9	7.1	2.7	21.7	0	1.0	VB	-	-	30.0	-8.3	P	
113.02	11.1	12.5	3.2	26.8	0	1.0	VB	-	-	33.0	-6.2	P	
132.82	6.5	12.5	3.4	22.4	90	1.0	VB	-	-	33.0	-10.6	P	
165.95	10.7	14.7	3.9	29.3	90	1.0	VB	-	-	33.0	-3.7	P	
195.54	8.1	18.4	3.9	30.4	0	1.0	VB	-	-	33.0	-2.6	P	
195.54	8.2	18.4	3.9	30.5	90	4.0	VB	-	-	33.0	-2.5	P	
229.16	4.9	10.9	4.0	19.8	0	0.0	HL	-	-	36.0	-16.2	P	
257.76	7.4	11.9	5.5	24.8	0	1.0	HL	-	-	36.0	-11.2	P	
306.58	5.6	15.3	6.3	27.2	0	1.0	HL	-	-	36.0	-8.8	P	
325.77	8.2	14.0	6.3	28.5	0	1.0	HL	-	-	36.0	-7.5	P	
407.63	6.5	14.7	6.2	27.4	90	1.0	HL	-	-	36.0	-8.6	P	
456.08	6.5	16.0	7.4	29.9	90	1.0	HL	-	-	36.0	-6.1	P	
536.38	6.8	17.1	8.1	31.9	90	1.0	HL	-	-	36.0	-4.1	P	

Note: No emissions of significant levels were observed between 30MHz-72.11MHz and 536.38MHz-1000MHz.

SPURIOUS and HARMONICS Emissions (cont)

Table 12 Test Data – Spurious and Harmonics Emissions (Above 1GHz)

The table below shows a summary of the highest amplitudes of the radiated emissions from the equipment under test at various antenna heights, antenna polarization, and EUT orientations. The EUT were tested at the low, mid and high frequencies and the worst case was observed at the mid frequency (915.968MHz)

INDICATED		CORRECTION		CORR	TURNTABLE	ANT		CLASS A		CLASS B			
FREQ	AMPL	ANT	CAB	AMPL	ANG	HT	POL	AMPL	MARG	AMPL	MARG	FILTER	
MHz	dBuV/m	dB	dB	dBuV/m	DEG	m	-	dBuV/m	dB	dBuV/m	db	MODE	NOTES
915.00	89.5	23.9	-34.6	78.8	0	1.0	HH	-	-	141.0	-62.2	P	1
915.00	98.7	23.9	-34.6	88.0	90	1.0	VH	-	-	141.0	-53.0	P	1
924.00	51.2	23.9	-34.6	40.5	0	1.0	HH	-	-	54.0	-13.5	P	
924.00	56.3	23.9	-34.6	45.6	90	1.0	VH	-	-	54.0	-8.4	P	
931.00	45.8	24.0	-34.6	35.2	0	1.0	HH	-	-	54.0	-18.8	P	
931.00	44.5	24.0	-34.6	33.9	90	1.0	VH	-	-	54.0	-20.1	P	
952.00	37.7	24.0	-34.5	27.2	0	1.0	HH	-	-	54.0	-26.8	P	
952.00	32.3	24.0	-34.5	21.8	0	1.0	VH	-	-	54.0	-32.2	P	
986.00	33.3	24.2	-34.9	22.6	0	1.0	HH	-	-	54.0	-31.4	P	
986.00	31.7	24.2	-34.9	20.9	0	1.0	VH	-	-	54.0	-33.1	P	
1089.00	39.2	24.4	-34.5	29.0	0	1.0	HH	-	-	54.0	-25.0	P	
1089.00	32.0	24.4	-34.5	21.8	0	1.0	VH	-	-	54.0	-32.2	P	
1280.00	32.8	24.7	-34.3	23.3	0	1.0	HH	-	-	54.0	-30.7	P	
1280.00	32.5	24.7	-34.3	22.9	0	1.0	VH	-	-	54.0	-31.1	P	
1376.00	33.0	24.9	-34.1	23.8	0	1.0	HH	-	-	54.0	-30.2	P	
1376.00	32.3	24.9	-34.1	23.1	0	1.0	VH	-	-	54.0	-30.9	P	
1445.00	33.5	25.0	-33.9	24.6	0	1.0	HH	-	-	54.0	-29.4	P	
1445.00	32.0	25.0	-33.9	23.1	0	1.0	VH	-	-	54.0	-30.9	P	
1527.00	32.8	25.3	-33.8	24.3	0	1.0	HH	-	-	54.0	-29.7	P	
1527.00	32.8	25.2	-33.8	24.3	0	1.0	VH	-	-	54.0	-29.7	P	
1828.00	53.7	26.9	-33.3	47.3	0	1.0	HH	-	-	54.0	-6.7	P	
1828.00	56.2	26.8	-33.3	49.6	90	1.0	VH	-	-	54.0	-4.4	P	
1835.00	44.3	27.0	-33.3	38.0	0	1.0	HH	-	-	54.0	-16.0	P	
1835.00	56.3	26.8	-33.3	49.8	90	1.0	VH	-	-	54.0	-4.2	P	
2198.00	33.2	28.2	-32.7	28.6	0	1.0	HH	-	-	54.0	-25.4	P	
2198.00	33.7	28.1	-32.7	29.0	90	1.0	VH	-	-	54.0	-25.0	P	
2452.00	33.7	28.5	-32.2	30.0	0	1.0	HH	-	-	54.0	-24.0	P	
2452.00	32.5	28.5	-32.2	28.8	0	1.0	VH	-	-	54.0	-25.2	P	
2740.00	39.2	29.3	-32.0	36.5	0	1.0	HH	-	-	54.0	-17.5	P	
2740.00	48.0	29.3	-32.0	45.3	90	1.0	VH	-	-	54.0	-8.7	P	
2986.00	35.5	30.1	-31.8	33.7	0	1.0	HH	-	-	54.0	-20.3	P	
2986.00	33.8	30.1	-31.8	32.0	0	1.0	VH	-	-	54.0	-22.0	P	
3418.00	36.0	31.1	-31.3	35.8	0	1.0	HH	-	-	54.0	-18.2	P	
3418.00	36.2	31.0	-31.3	35.9	0	1.0	VH	-	-	54.0	-18.1	P	
3636.00	33.7	31.7	-31.2	34.2	0	1.0	HH	-	-	54.0	-19.8	P	
3636.00	34.5	31.6	-31.2	34.9	90	1.0	VH	-	-	54.0	-19.1	P	
4027.00	36.2	32.7	-30.9	37.9	0	1.0	HH	-	-	54.0	-16.1	P	
4027.00	35.3	32.7	-30.9	37.1	0	1.0	VH	-	-	54.0	-16.9	P	
4534.00	34.2	32.5	-30.4	36.2	0	1.0	HH	-	-	54.0	-17.8	P	
4534.00	33.0	32.5	-30.4	35.1	0	1.0	VH	-	-	54.0	-18.9	P	
4573.00	32.3	32.5	-30.3	34.6	0	1.0	HH	-	-	54.0	-19.4	P	
4573.00	33.3	32.5	-30.3	35.6	90	1.0	VH	-	-	54.0	-18.4	P	
5511.00	33.8	34.2	-29.3	38.7	0	1.0	HH	-	-	54.0	-15.3	P	
5511.00	34.3	34.2	-29.3	39.2	90	1.0	VH	-	-	54.0	-14.8	P	
6398.00	32.8	34.4	-28.9	38.4	0	1.0	HH	-	-	54.0	-15.6	P	
6398.00	34.2	34.5	-28.9	39.8	90	1.0	VH	-	-	54.0	-14.2	P	

7361.00	35.3	36.2	-28.8	42.7	0	1.0	HH	-	-	54.0	-11.3	P
7361.00	36.0	36.2	-28.8	43.4	90	1.0	VH	-	-	54.0	-10.6	P
8249.00	33.2	36.9	-29.0	41.1	0	1.0	HH	-	-	54.0	-12.9	P
8249.00	35.2	37.0	-29.0	43.2	90	1.0	VH	-	-	54.0	-10.8	P
9137.00	33.8	37.4	-28.7	42.5	0	1.0	HH	-	-	54.0	-11.5	P
9137.00	34.8	37.4	-28.7	43.5	90	1.0	VH	-	-	54.0	-10.5	P

Conclusion

The Relay meets the requirements of the test reference for Spurious and Harmonics emissions in Restricted Bands specified in 15.209

SECTION 11.6 SPURIOUS EMISSIONS PHOTOGRAPHS

Figure 32: Spurious Emissions Test Setup (Below 1 GHz) Front View

Figure 33 Spurious Emissions Test Setup (Below 1 GHz) Rear View

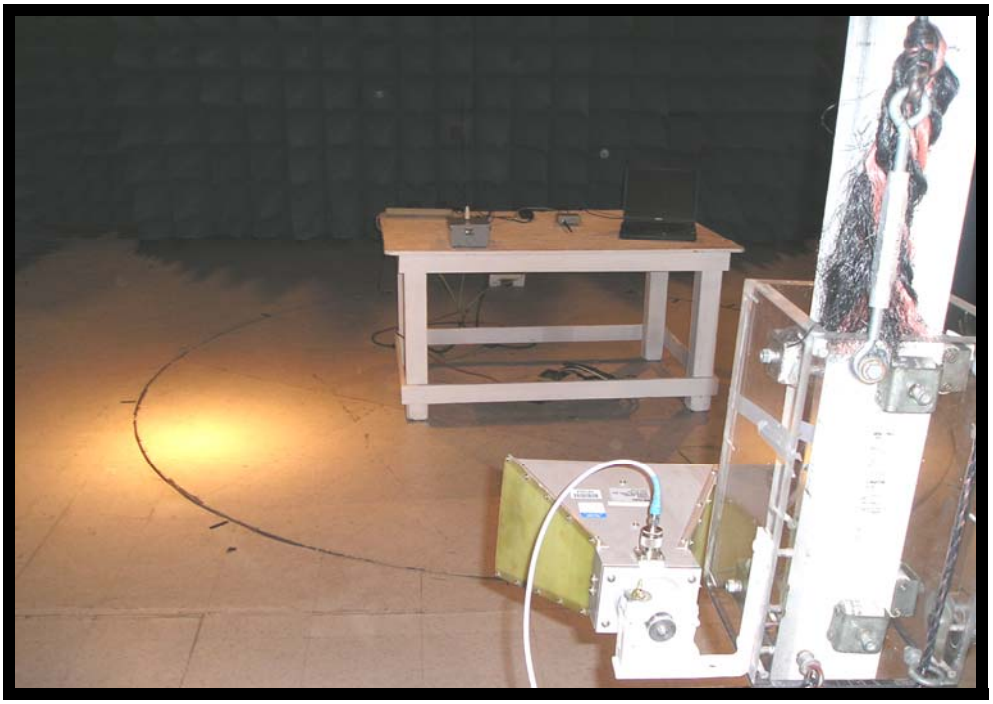

Figure 34: Spurious Emissions Test Setup (Above 1 GHz) Front View

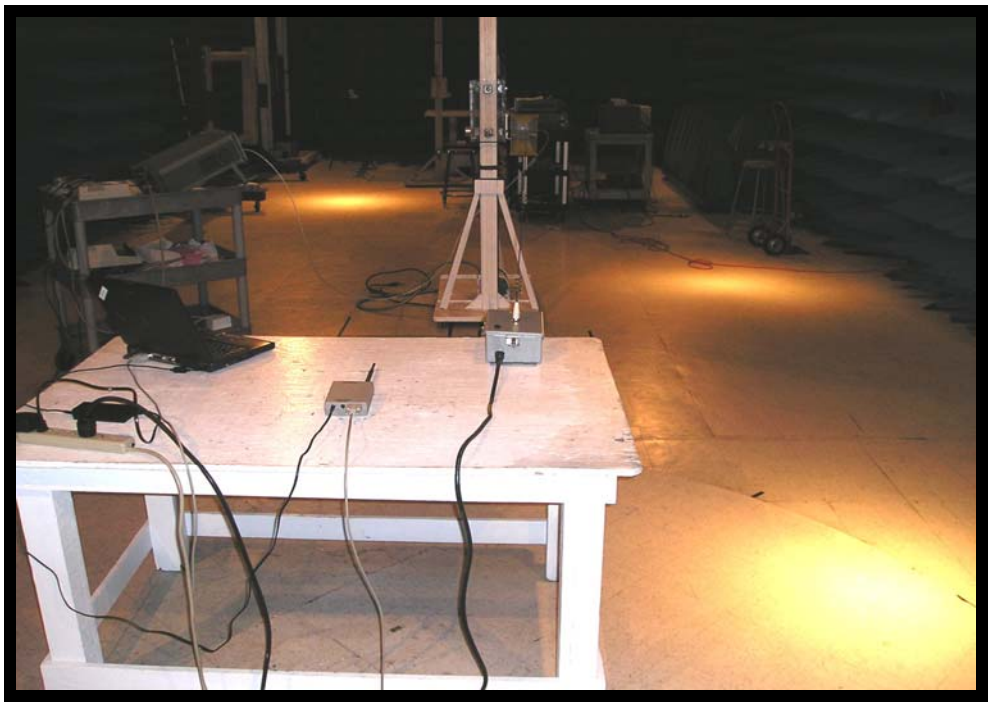

Figure 35: Spurious Emissions Test Setup (Above 1 GHz) Rear View.

PART 12 POWER LINE CONDUCTED EMISSIONS per 47CFR. 15.207

SECTION 12.1: EUT CONFIGURATION AND TEST PROCEDURE

Silver Spring"s products Relays, model (relay with bandpass filter and relay without bandpass filter) are devices intended for relaying messages from pole top devices to meters via Silver Spring's LAN.The EUT were set up on a wooden table, 80cm above the horizontal reference plane and 40cm away from the vertical reference plane in a shielded room, with the suggested configuration given in FCC Measurement Procedure ANSI C63.4 (2003). The transmitter function was disabled during testing. Excess cord of the EUT was bundled in the center or shortened to appropriate length. The Relays were tested at high, middle and low receive frequencies. There was no significant difference in data between the three frequencies tested. The worst case result was obsserved at the middle frequecy and is representative of all three frquencies.

SECTION 12.2: TEST EQUIPMENT USED

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Date
Spectrum Analyzer	Hewlett-Packard	8568B	2841A04315	11-29-2005
Spectrum Analyzer Display	Hewlett-Packard	85662A	2848A17028	11-29-2005
Quasi Peak Adapter	Hewlett-Packard	85650	2521A00871	11-29-2005
Preselector	Hewlett-Packard	85685A	2620A00265	11-29-2005
Biconical Antenna	EMCO	3104	3667	02-03-2006
L. P. Ant. (200-1000 MHz)	EMCO	3146	9510- 4202	02-03-2006
Horn. Ant. (Above 1000 MHz)	EMCO	3115	8812-3050	12/19/2005

Equipment calibration data is listed in appendix A of this report.

Spectrum Analyzer Configuration (during swept frequency scans)

Analyzer Mode (for Peak Measurements)..... Peak
- Sweep Speed ..... Manual
- IF Bandwidth..... 9 kHz
- Resolution Bandwidth..... 10 kHz
- Video Bandwidth..... 10 kHz
- Quasi Peak Adapter Mode ..... Disabled
- Quasi Peak Adapter bandwidth..... 9 kHz
- Attenuation..... 0 dB

Analyzer Mode (for Quasi-Peak Measurements) ..... Quasi-Peak/Linear
- Resolution Bandwidth..... 100 kHz
- Video Bandwidth..... 100 kHz
- Quasi Peak Adapter Mode ..... Normal

Analyzer Mode (for Average Measurements)..... Video Averaging
- Resolution Bandwidth..... 100 kHz
- Video Bandwidth..... 100 kHz
- Quasi Peak Adapter Mode ..... Disabled

Data Table Legend and Field Strength Calculation

Detector mode: Peak (P) or Quasi-Peak (QP) or Average (A)

The margin is calculated as follows:
Margin = Corrected Amplitude - Limit; where Corrected Amplitude = Amplitude + Cable Loss + Antenna Factor.

SECTION 12.3: POWERLINE CONDUCTED EMISSIONS TEST RESULTS

SECTION 12.4: SITE USED – SPECTRAL DENSITY MEASUREMENT OF FUNDAMENTAL (BASE UNIT)

- ☒ Test Site 1 - Shielded Room: 16' x 12' x 9'
- ☐ Test Site 1 - 3m Open Field Radiated Site
- ☐ Test Site 1 - 10m Open Field Radiated Site
- ☐ Test Site 2 - Environmental Lab
- ☐ EMC Lab 1 - Test Laboratory
- ☐ Semi-Anechoic Absorber Lined Shielded Room
- ☐ Other: _____

SECTION 12.5: ADMINISTRATIVE DETAILS

Test Date:	July 12, 2005
Test Engineer:	Lan Vu

SECTION 12.6: ENVIRONMENTAL CONDITIONS

Temperature:	75.4°F
Humidity:	33%

SECTION 12.7: EMISSIONS TEST RESULTS

The tables which follow show summaries of the highest conducted emissions on the current carrying conductors supplying power to the host device for the EUT.

INDICATED		CORRECTION		CORR	TURNTABLE ANT			CLASS A		CLASS B			
FREQ	AMPL	ANT	CAB	AMPL	ANG	HT	POL	AMPL	MARG	AMPL	MARG	FILTER	
MHz	dBuV/m	dB	dB	dBuV/m	DEG	m	-	dBuV/m	dB	dBuV/m	db	MODE	NOTES
0.18	41.6	-	1.1	42.7	-	-				61.0	-18.3	P	Neutral
0.18	42.0	-	1.1	43.1	-	-				61.0	-17.9	P	Hot
0.90	35.4	-	1.0	36.4	-	-				61.0	-24.6	P	Hot
0.91	35.2	-	1.0	36.2	-	-				61.0	-24.8	P	Neutral
1.38	42.5	-	1.0	43.5	-	-				61.0	-17.5	P	Neutral
1.38	42.9	-	1.0	43.9	-	-				61.0	-17.1	P	Hot
2.10	39.8	-	1.1	40.9	-	-				61.0	-20.1	P	Hot
2.16	39.0	-	1.1	40.1	-	-				61.0	-20.9	P	Neutral
3.84	38.8	-	1.2	40.0	-	-				61.0	-21.0	P	Hot
3.90	38.7	-	1.2	39.9	-	-				61.0	-21.1	P	Neutral
5.57	34.3	-	1.3	35.6	-	-				61.0	-25.4	P	Hot
6.89	27.7	-	1.3	29.0	-	-				61.0	-32.0	P	Hot
12.44	26.7	-	1.6	28.3	-	-				61.0	-32.7	P	Hot
12.68	28.2	-	1.6	29.8	-	-				61.0	-31.2	P	Neutral
18.43	13.9	-	1.5	15.4	-	-				61.0	-45.6	P	Hot
24.57	24.3	-	1.2	25.5	-	-				61.0	-35.5	P	Neutral
24.58	25.0	-	1.2	26.2	-	-				61.0	-34.8	P	Hot
28.34	15.3	-	1.2	16.5	-	-				61.0	-44.5	P	Neutral
28.93	17.4	-	1.2	18.6	-	-				61.0	-42.4	P	Hot

No Emissions of significant level were observed in the ranges 0.15MHz to 0.18MHz and 28.93 to 30MHz

Data Table Legend and Field Strength Calculation
Detector mode: Peak (P) or Quasi-Peak (QP) or Average (A)

The margin is calculated as follows:
Margin = Corrected Amplitude - Limit; where Corrected Amplitude = Amplitude + Cable Loss + Antenna Factor.

SECTION 12.8: REMARKS

The EUT meets the requirements of the test reference for power line conducted emissions.

POWERLINE CONDUCTED Emissions (cont.)

SECTION 12.9: TEST SETUP PHOTOGRAPHS

Figure 36: Power Line Conducted Maximized Emissions Test Setup (Front View)

Figure 37: Power Line Conducted Maximized Emissions Test Setup (Rear View)

PART 13 APPENDICES

A. EUT TECHNICAL SPECIFICATION

Applicant	Silver Spring Networks
General Description	Telco Gateway with Bandpass filter
Model	T-313,
Dimension	H= 4" ,L=9.5" ,W= 7.5", WEIGHT = 7lbs
Power Input	120/480V , 60 Hz.

B.EUT PHOTOGRAPHS

Figure 38: EUT Top View (with bandpass filter)

Figure 39: EUT Top View (without bandpass filter)

Figure 40: EUT Front View

Figure 41: EUT Rear View

Figure 42: EUT Internal View1

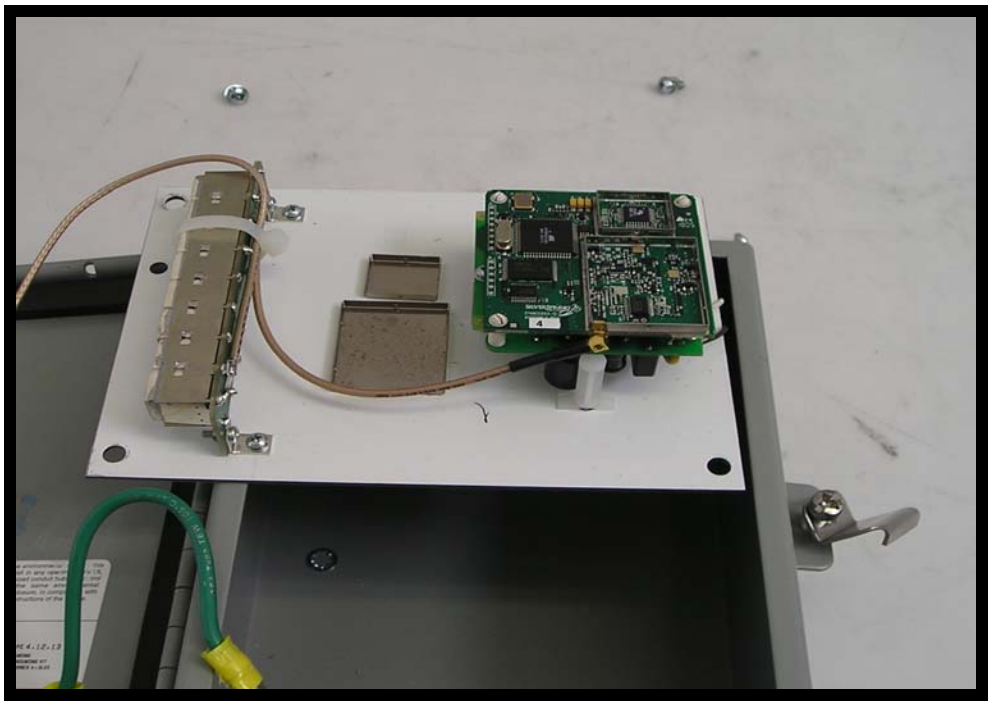

Figure 43: EUT Internal View2

Figure 44: EUT Component View

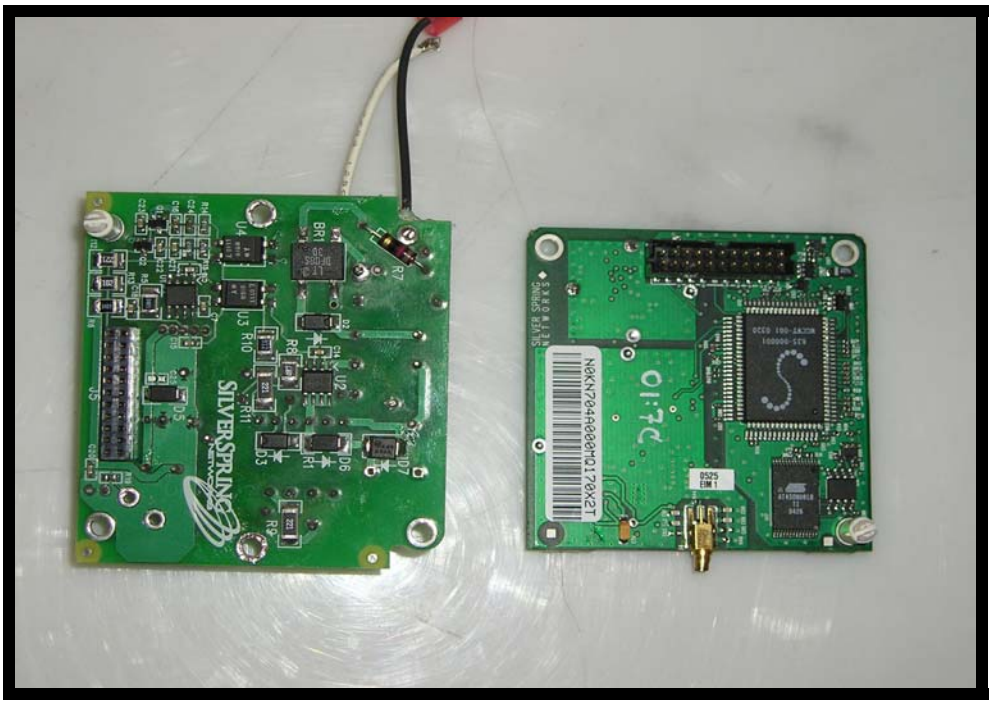

Figure 45: EUT Solder View

Figure 46: Component View with Shield off

C. MODIFICATION LETTER

To Whom It May Concern:

This is to certify that no modifications were required for Relay, models; Relay with bandpass filter and Relay without bandpass filter to comply with the requirements of the standard listed below.

FCC Rules and Regulations per 47 CFR 15.247

It is the manufacturer's responsibility to ensure that additional production units of the Relays are manufactured with identical electrical and mechanical characteristics.

For further information, please contact the manufacturer at:

Silver Spring Network, Inc.
13000 West Silver Spring Drive
Butler, WI 53007

ATTN: Juan Luglio, PhD
Tel: (262) 364-5317
juan.luglio@silverspringnetworks.comm