



MET Laboratories, Inc.

Safety Certification - EMI - Telecom Environmental Simulation

914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313

Spectrovation.Com
14313 Poplar Hill Rd.
Darnestown, MD 20874

June 7, 2012

Dear Balu Subramanya,

Enclosed is the EMC test report for compliance testing of the Spectrovation.Com LPV01M12, tested to the requirements of Title 47 of the Code of Federal Regulations (CFR), Part 15 Subpart B for a Class B Digital Device.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Sean O'Loane
Documentation Department

Reference: (\Spectrovation.Com\EMC31184-FCC Rev. 1)

Certificates and reports shall not be reproduced except in full, without the written permission of MET Laboratories, Inc. This letter of transmittal is not a part of the attached report.



MET Laboratories, Inc.

Safety Certification - EMI - Telecom Environmental Simulation

914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313

**Electromagnetic Compatibility
Test Report**

For the

**Spectrovation.Com
LPV01M12**

Tested under

**Title 47 of the Code of Federal Regulations (CFR),
Part 15 Subpart B
for a Class B Digital Device
and
Part 15 Subpart C
For Intentional Radiators**

MET Report: EMC31184-FCC Rev. 1

June 7, 2012

Prepared For:

**Spectrovation.Com
14313 Poplar Hill Rd.
Darnestown, MD 20874**

**Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, Maryland 21230**



Spectrovation.Com
LPV01M12

Electromagnetic Compatibility
CFR Title 47, Part 15, Subpart B

Electromagnetic Compatibility Test Report

For the

**Spectrovation.Com
LPV01M12**

Tested under

**Title 47 of the Code of Federal Regulations (CFR),
Part 15 Subpart B
for a Class B Digital Device
and
Part 15 Subpart C
For Intentional Radiators**

MET Report: EMC31184-FCC Rev. 1

A handwritten signature in blue ink that appears to read "Len Knight".

Len Knight
Project Engineer, Electromagnetic Compatibility Lab

A handwritten signature in blue ink that appears to read "Sean O'Loane".

Sean O'Loane
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the applicable limits. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Parts 15B, 15.247 and Industry Canada standards ICES-003, Issue 4 February 2004, RSS-210, Issue 8, Dec. 2010 under normal use and maintenance.

A handwritten signature in blue ink that appears to read "Shawn McMillen".

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab



Spectrovation.Com
LPV01M12

Electromagnetic Compatibility
CFR Title 47, Part 15, Subpart B

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	June 5, 2012	Initial Issue.
1	June 7, 2012	Editorial changes requested.



Table of Contents

1.0 Testing Summary	1
2.0 Equipment Configuration.....	2
2.1 Overview.....	2
2.2 Test Site	3
2.3 Description of Test Sample.....	3
2.4 Equipment Configuration.....	3
2.5 Support Equipment	3
2.6 Ports and Cabling Information.....	3
2.7 Mode of Operation	5
2.8 Method of Monitoring EUT Operation	5
2.9 Modifications	5
2.9.1 Modifications to EUT	5
2.9.2 Modifications to Test Standard.....	5
2.10 Disposition of EUT	5
3.0 Electromagnetic Compatibility Emission Criteria	6
3.1 Conducted Emission Limits	6
3.2 Radiated Emission Limits	7
4.0 Electromagnetic Compatibility Criteria for Intentional Radiators	10
4.1 § 15.209 Radiated Emissions Limits; General Requirements	10
5.0 Test Equipment	23
6.0 Compliance Information.....	24
6.1 Verification Information	24
6.2 Label and User's Manual Information	29



List of Tables

Table 1. Summary of Test Results	1
Table 2. EUT Overview	2
Table 3. Equipment Configuration	3
Table 4. Support Equipment.....	3
Table 5. Ports and Cabling Information	3
Table 6. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Section 15.107(a) (b)	6
Table 7. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)	7
Table 8. 15.209 Field Strength Levels.....	10
Table 9. Test Equipment	23

List of Figures

Figure 1. Block Diagram of Test Configuration.....	4
Figure 2. Basic RF Pulse (from Agilent Application Note 150-2)	15
Figure 3. Equation for the line spectrum pulse desensitization factor (from Agilent Application Note 150-2)	15
Figure 4. Transmitter Timing	16
Figure 5. Theoretical Mainlobe (from Agilent Application Note 150-2)	17

List of Photographs

Photograph 1. Radiated Emission Limits Test Setup	9
Photograph 2. Radiated Emissions	21
Photograph 3. Radiated Spurious Emissions.....	22

List of Plots

Plot 1. Radiated Emissions Limits, FCC Pre-Scan.....	8
Plot 2. Radiated Spurious Emissions, 30 MHz – 1000 MHz.....	11
Plot 3. Radiated Spurious Emissions, 1 GHz – 5.6 GHz.....	11
Plot 4. Radiated Spurious Emissions, 6.3 GHz – 13 GHz.....	12
Plot 5. Radiated Spurious Emissions, 13 GHz – 18 GHz.....	12
Plot 6. Radiated Spurious Emissions, 18 GHz – 26.5 GHz.....	13
Plot 7. Radiated Spurious Emissions, 26.5 GHz – 40 GHz.....	13
Plot 8. Radiated Fundamental, Average	20
Plot 9. Radiated Fundamental, Peak.....	20



List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
ANSI	American National Standards Institute
Cal	Calibration
d	Measurement Distance
dB	Deci Bels
dBμV	Deci-Bels above one micro Volt
dBμV/m	Deci-Bels above one micro Volt per meter
DC	Direct Current
DCF	Distance Correction Factor
E	Electric Field
EUT	Equipment Under Test
f	Frequency
FCC	Federal Communications Commission
GHz	Giga Hertz
Hz	Hertz
kHz	kilohertz
kPa	kilopascal
kV	kilo Volt
LISN	Line Impedance Stabilization Network
MHz	MegaHertz
μH	micro Henry
μF	micro Farad
μs	micro seconds
RF	Radio Frequency
RMS	Root-Mean-Square



Spectrovation.Com
LPV01M12

Electromagnetic Compatibility
Testing Summary
CFR Title 47, Part 15, Subpart B

1.0 Testing Summary

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
47 CFR Part 15.107 (a)	Conducted Emission Limits for a Class B Digital Device	Not Applicable
47 CFR Part 15.109 (a)	Radiated Emission Limits for a Class B Digital Device	Compliant
Title 47 of the CFR, Part 15 §15.209	Radiated Spurious Emissions Requirements	Compliant

Table 1. Summary of Test Results



2.0 Equipment Configuration

2.1 Overview

MET Laboratories, Inc. was contracted by Spectrovation.Com to perform testing on the LPV01M12, under Spectrovation.Com purchase order number 2011-19.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Spectrovation.Com, LPV01M12.

In accordance with §2.955(a) (3), the following data is presented in support of the verification of the Spectrovation.Com, LPV01M12. Spectrovation.Com should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the LPV01M12 has been **permanently** discontinued, as per §2.955(b).

The results obtained relate only to the item(s) tested.

Model(s) Tested:	LPV01M12
Model(s) Covered:	LPV01M12
Primary Power as Tested:	3.0 VDC
Equipment Emissions Class:	B
Highest Clock Frequency:	10 MHz
Evaluated by:	Len Knight
Report Date:	June 7, 2012

Table 2. EUT Overview



2.2 Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, Maryland 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a semi-anechoic chamber. In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

2.3 Description of Test Sample

The LPV01M12, Equipment Under Test (EUT), is a very low power, battery operated object and motion sensor. It is designed to be used only with its integrated antenna. EUT has a standard connector for external interfaces such as power, trigger and sensing data output.

2.4 Equipment Configuration

The EUT was set up as outlined in Figure 1. All equipment incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Serial Number
1	EUT	LPV03	D03000032

Table 3. Equipment Configuration

2.5 Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	Serial Number
1	Test Harness	Custom	LPVTest01	Test02

Table 4. Support Equipment

2.6 Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
1	J1	Power and Data	1	0.5	N	Test02

Table 5. Ports and Cabling Information

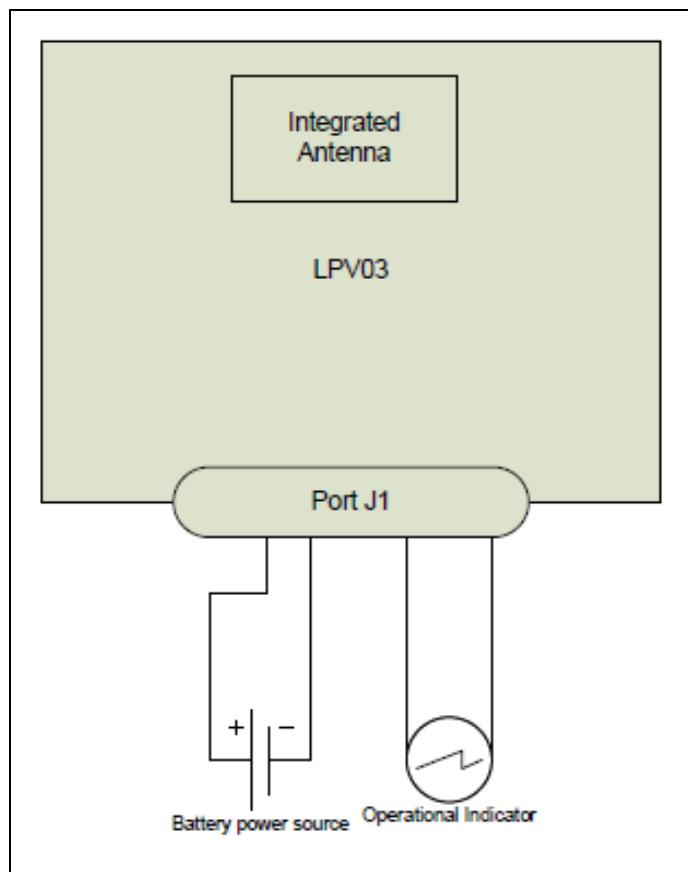


Figure 1. Block Diagram of Test Configuration



2.7 Mode of Operation

The EUT can be controlled externally either by applying power or by way of trigger and on/off signals available to external controllers. There is only one mode of operation. Upon receiving trigger and power externally, the EUT will start sensing and reporting data.

For the purposes of testing, the EUT was set to continuously transmit.

2.8 Method of Monitoring EUT Operation

The EUT's digital output signal can be used as measurable, physical indication that the EUT is working.

2.9 Modifications

2.9.1 Modifications to the EUT

No modifications were made to the EUT.

2.9.2 Modifications to the Test Standard

No modifications were made to the test standard.

2.10 Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Spectrovation.Com upon completion of testing.



3.0 Electromagnetic Compatibility Emission Criteria

3.1 Conducted Emission Limits

Test Requirement(s): **15.107 (a)** “Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 6. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.”

15.107 (b) “For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 6. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.”

Frequency range (MHz)	15.107(b), Class A Limits (dB μ V)		15.107(a), Class B Limits (dB μ V)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15- 0.5	79	66	66 - 56	56 - 46
0.5 - 5.0	73	60	56	46
5.0 - 30	73	60	60	50

Note 1 — The lower limit shall apply at the transition frequencies.
Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.

Table 6. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Section 15.107(a) (b)

Test Results: The EUT was **not applicable** with the Class B requirement(s) of this section. EUT is battery powered.



3.2 Radiated Emission Limits

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 7.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 7.

Frequency (MHz)	Field Strength (dB μ V/m)	
	§15.109 (b), Class A Limit (dB μ V) @ 10m	§15.109 (a), Class B Limit (dB μ V) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 7. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was located on a turntable inside a semi-anechoic chamber. The EUT was placed on an 80 cm non-conductive table. The method of testing and test conditions of ANSI C63.4:2003 were used. For emissions between 30 and 1000 MHz, a broadband antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz resolution bandwidth.

Test Results: The EUT was **compliant** with the Class B requirement(s) of this section. Measured emissions were below applicable limits.

The pre-scan plot shows no peak emissions within 20 dB of the quasi-peak limit line.

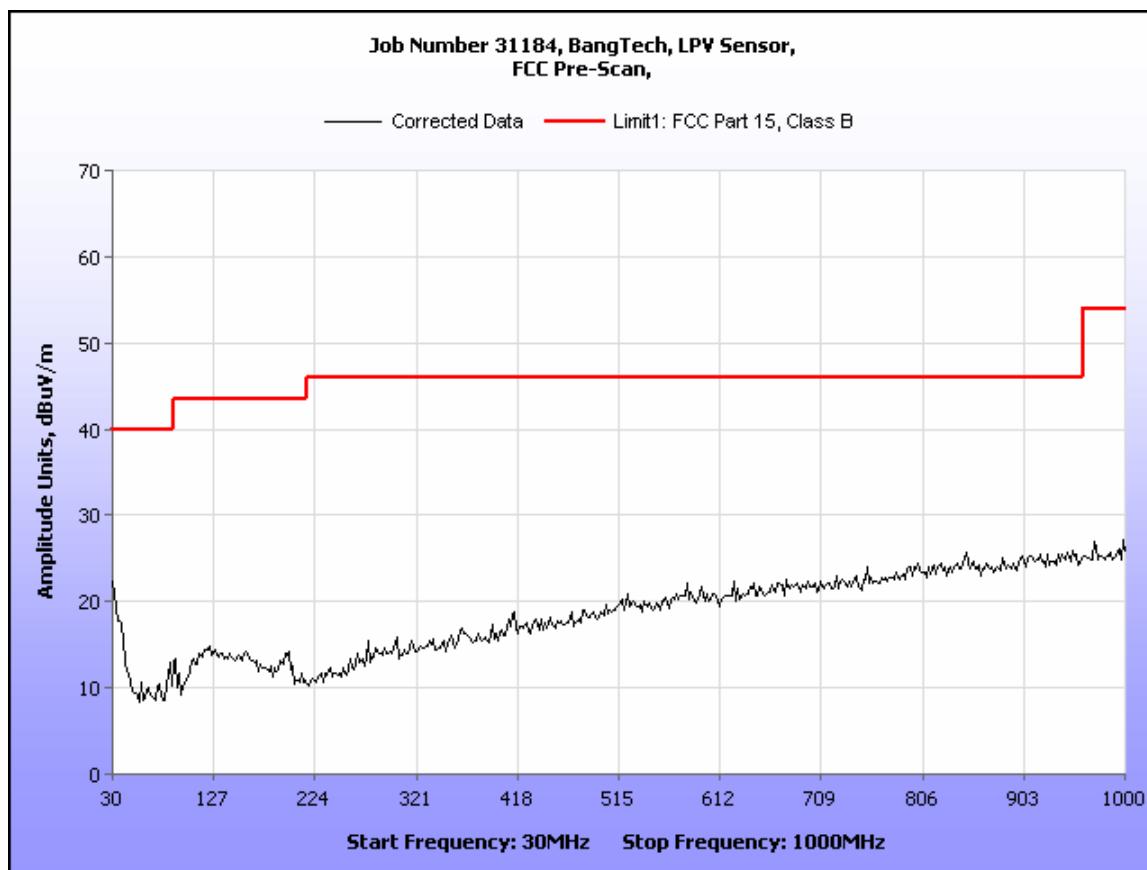
Test Engineer(s): Len Knight

Test Date(s): April 19, 2011 - April 29, 2011



Spectrovation.Com
LPV01M12

Electromagnetic Compatibility
Emission Criteria
CFR Title 47, Part 15, Subpart B



Plot 1. Radiated Emissions Limits, FCC Pre-Scan

Radiated Emission Limits Test Setup**Photograph 1. Radiated Emission Limits Test Setup**



4.0 Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Emissions Limits; General Requirements

Test Requirements:

§15.209

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 – 216	150**	3
216 – 960	200**	3
Above 960	500	3

Table 8. 15.209 Field Strength Levels

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54 – 72 MHz, 76 – 88 MHz, 174 – 216 MHz or 470 – 806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

Test Procedures:

The transmitter was turned on and transmitting. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.

Test Results:

The EUT was **compliant** with the Radiated Spurious Emission limits of **§ 15.209**. Measured emissions were below applicable limits. In order to demonstrate compliance for spurious emissions, peak plots were taken and compared to a quasi-peak or average limit line as appropriate.

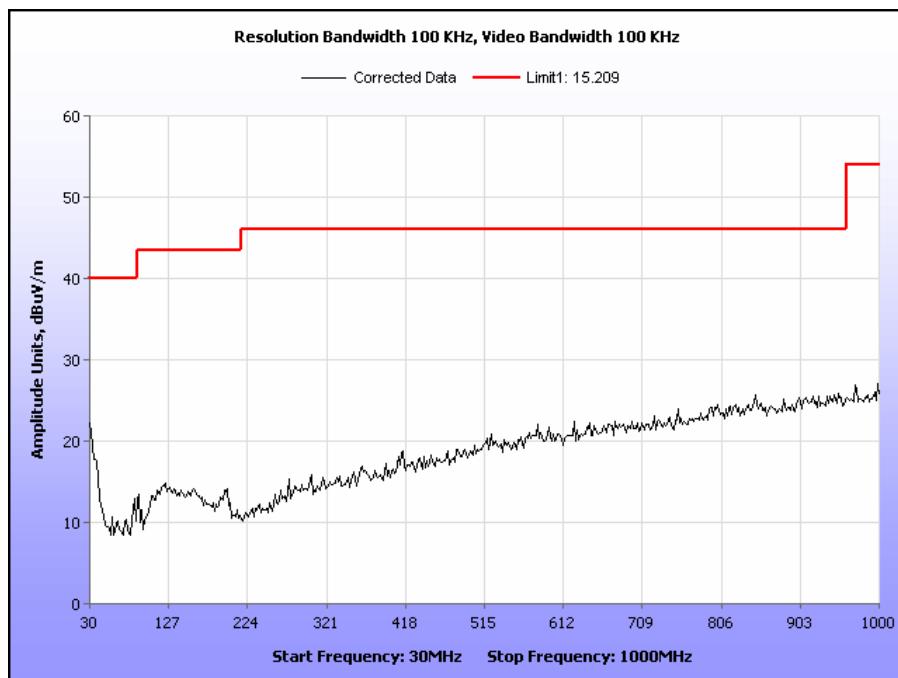
Test Engineer(s):

Len Knight

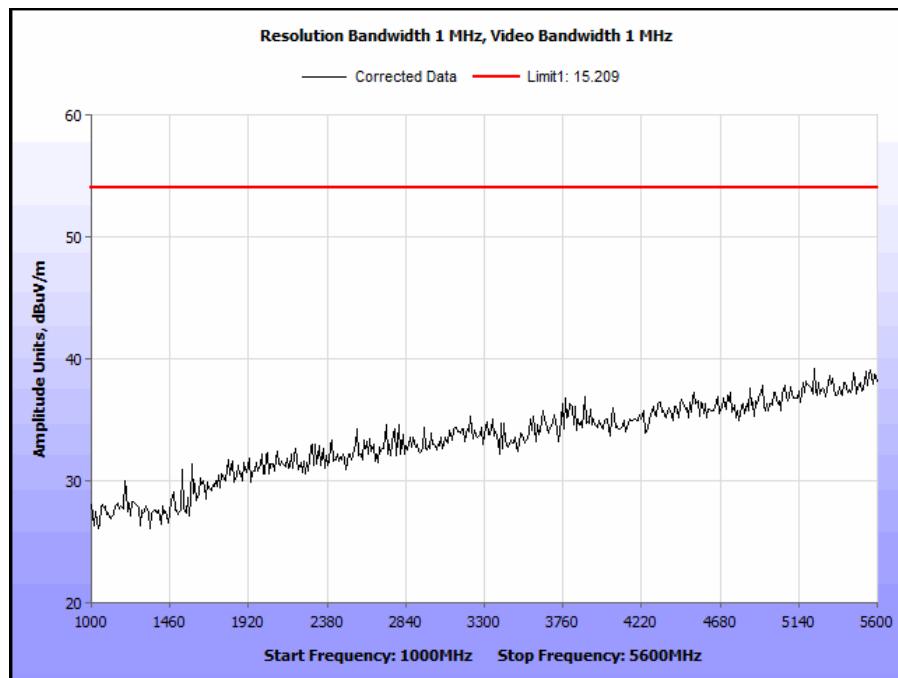
Test Date(s):

January 31, 2012

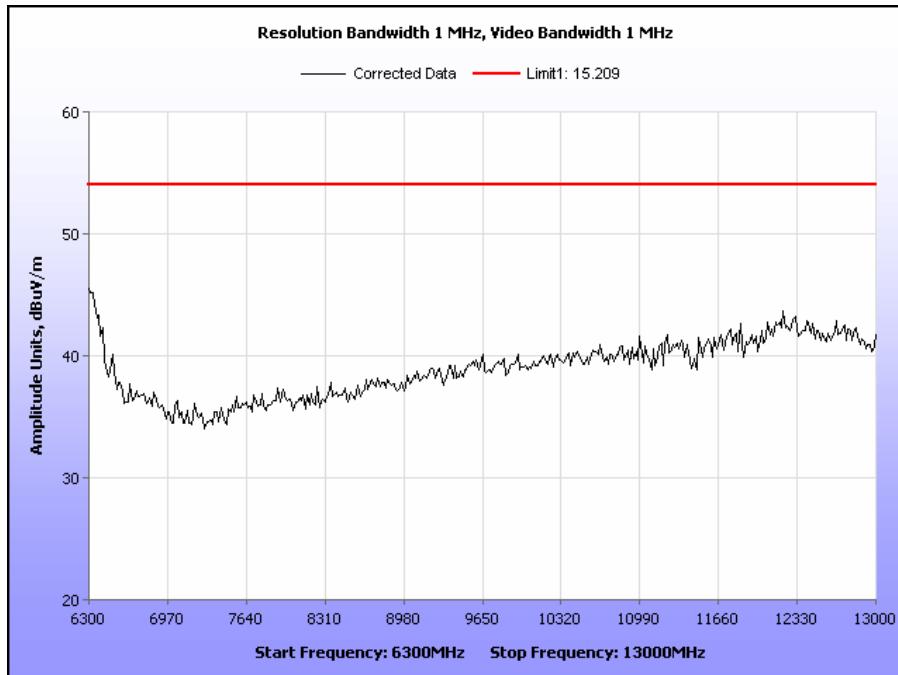
Radiated Spurious Emissions Test Results



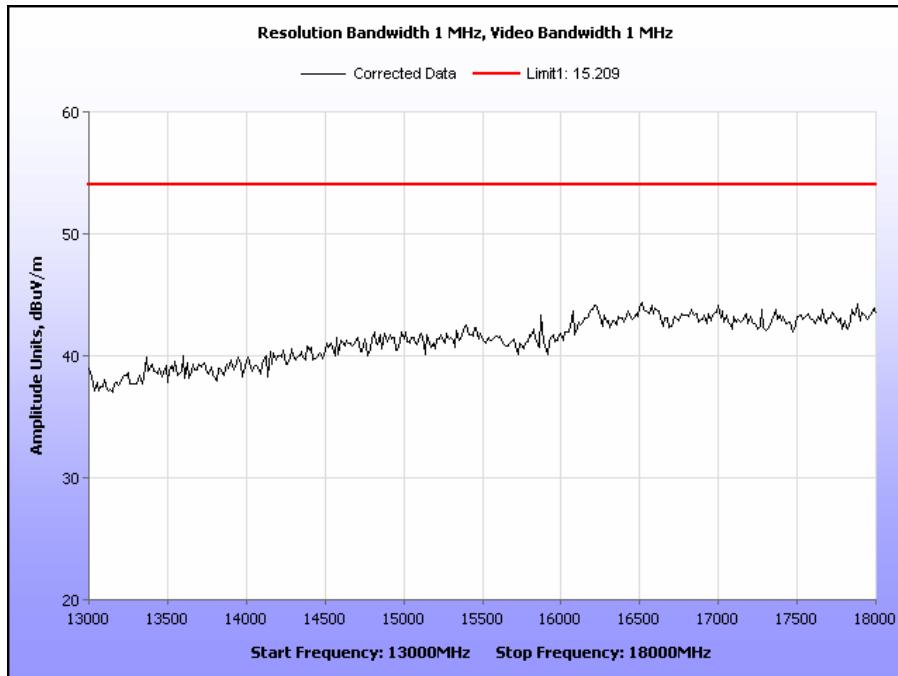
Plot 2. Radiated Spurious Emissions, 30 MHz – 1000 MHz



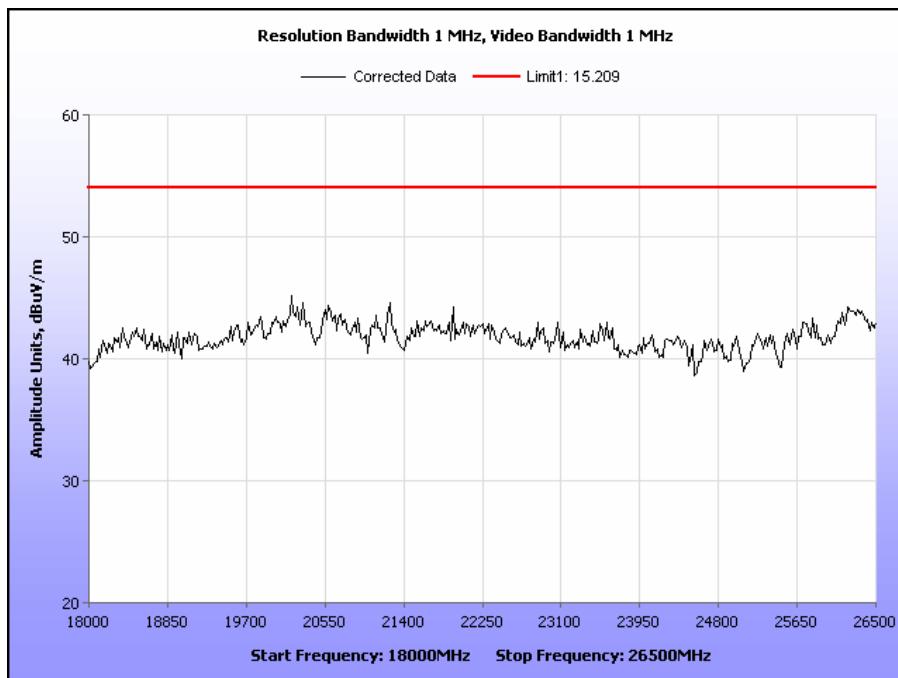
Plot 3. Radiated Spurious Emissions, 1 GHz – 5.6 GHz



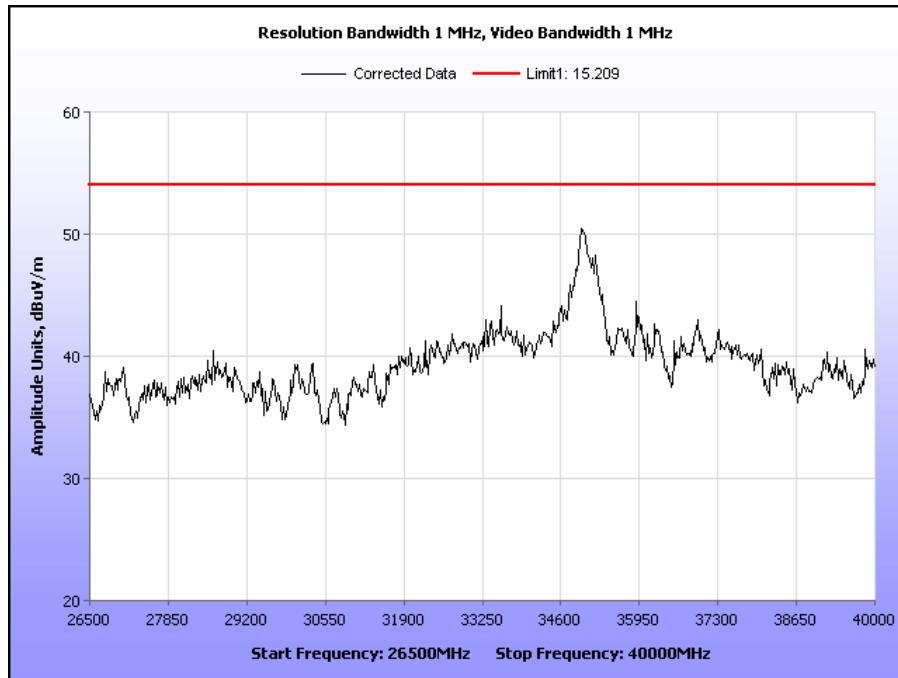
Plot 4. Radiated Spurious Emissions, 6.3 GHz – 13 GHz



Plot 5. Radiated Spurious Emissions, 13 GHz – 18 GHz



Plot 6. Radiated Spurious Emissions, 18 GHz – 26.5 GHz



Plot 7. Radiated Spurious Emissions, 26.5 GHz – 40 GHz



Radiated Fundamental Measurements

Test Requirements: § 15.209 Radiated emission limits; general requirements.

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

§15.35 Measurement detector functions and bandwidths

(b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emissions measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, *e.g.*, see §§ 15.250, 15.252, 15.255, and 15.509–15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, *e.g.*, the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

Test Procedures: The transmitter was turned on and transmitting. The EUT was rotated orthogonally through all three axes. Measurements of the fundamental were made with both a peak and an average detector.

In accordance with §15.35, the peak emission was corrected using a pulse desensitization correction factor.

Calculation of PDCF

Calculation of PDCF is based upon the guidance of the Agilent Application Note 150-2, Spectrum and Signal Analysis . . . Pulsed RF.

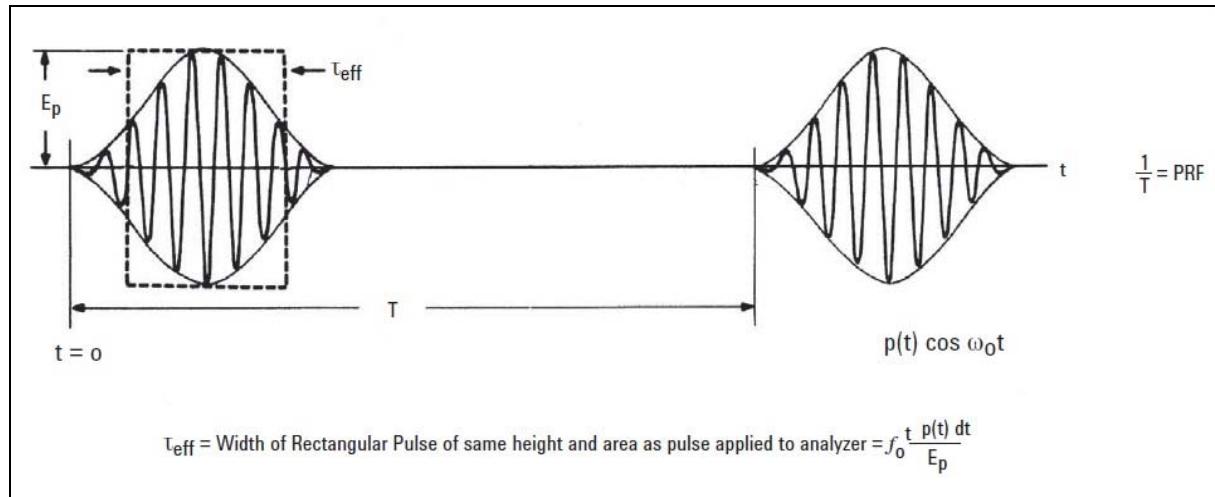


Figure 2. Basic RF Pulse (from Agilent Application Note 150-2)

$$\alpha_L [\text{dB}] = 20 \log_{10} \frac{T_{eff}}{T}$$

$$= 20 \log_{10} T_{eff} \times \text{PRF}$$

Figure 3. Equation for the line spectrum pulse desensitization factor (from Agilent Application Note 150-2)

Theoretical Calculation of PDCF

According to design calculations, the EUT has the following transmitter timing:

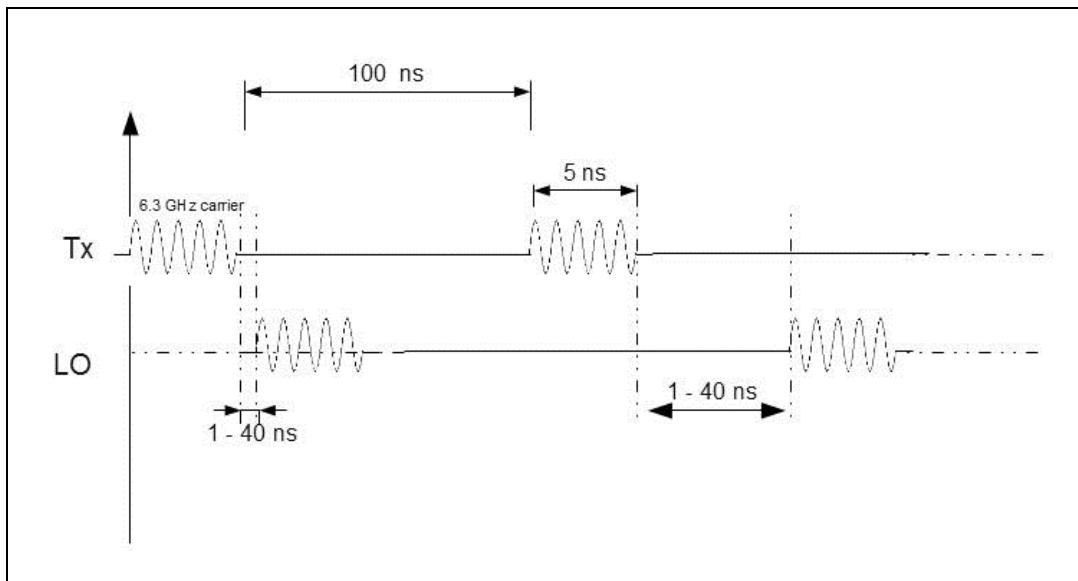


Figure 4. Transmitter Timing

Where:

$$T_{\text{eff}} = 5 \text{ ns}$$

$$\text{PRF} = 20 \text{ MHz}$$

From the equation:

$$\alpha_L[\text{dB}] = 20\log_{10} T_{\text{eff}} \times \text{PRF}$$

$$\alpha_L[\text{dB}] = 20\log_{10} [5 \text{ ns}][20 \text{ MHz}]$$

$$\alpha_L[\text{dB}] = 20\log_{10} [0.1]$$

$$\alpha_L[\text{dB}] = -20 \text{ dB}$$

Therefore, the theoretical PDCF would be 20 dB.

Calculation of PDCF from Measurement

The sidelobe widths in frequency are related to the modulating pulse width by the expression $f = 1/\tau$. Since the mainlobe contains the origin of the spectrum (the carrier frequency), the upper and lower sidebands extending from this point form a main lobe $2/\tau$ wide.

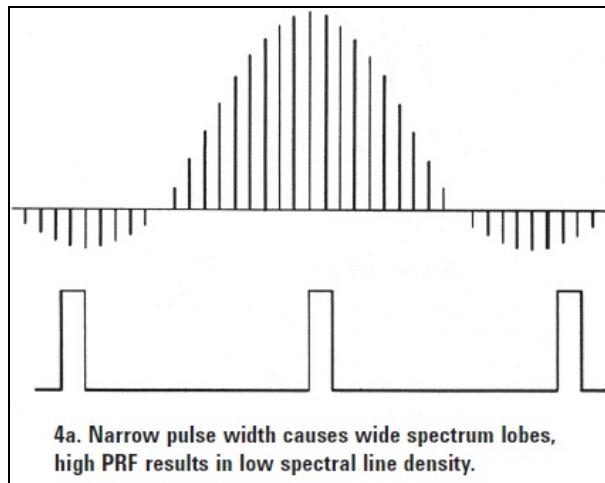


Figure 5. Theoretical Mainlobe (from Agilent Application Note 150-2)

The measured full spectrum width can be found from the following plot:



Measured full spectrum width = 630 MHz

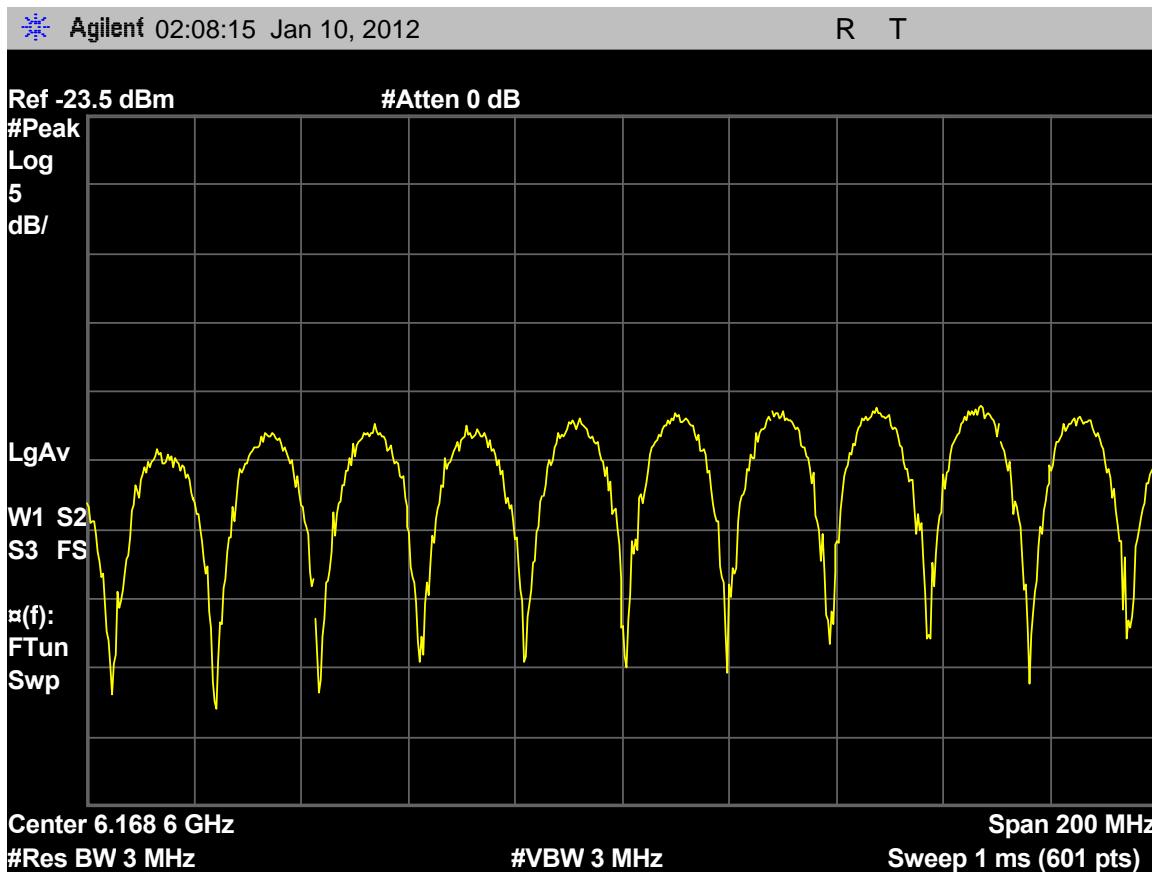
Half spectrum width = 315 MHz

Mainlobe = $2/\tau$ wide where:

$T = \text{pulse width} = T_{\text{eff}} = 3.174 \text{ nS}$

The individual spectral components are spaced at the pulse repetition frequency (PRF) of the periodically pulsed RF.

The number of lines per 150 MHz can be measured from the following plot:



Measured number of lines per 200 MHz = 11

Line separation = 18.18 MHz

PRF = 18.18 MHz

$$\begin{aligned}
 \alpha_L[\text{dB}] &= 20\log_{10} T_{\text{eff}} \times \text{PRF} \\
 \alpha_L[\text{dB}] &= 20\log_{10} [3.174 \text{ ns}][18.18 \text{ MHz}] \\
 \alpha_L[\text{dB}] &= 20\log_{10} [0.0577] \\
 \alpha_L[\text{dB}] &= -24.78 \text{ dB}
 \end{aligned}$$

Therefore, the calculated PDCF based on measurement would be 24.78 dB.



Spectrovation.Com
LPV01M12

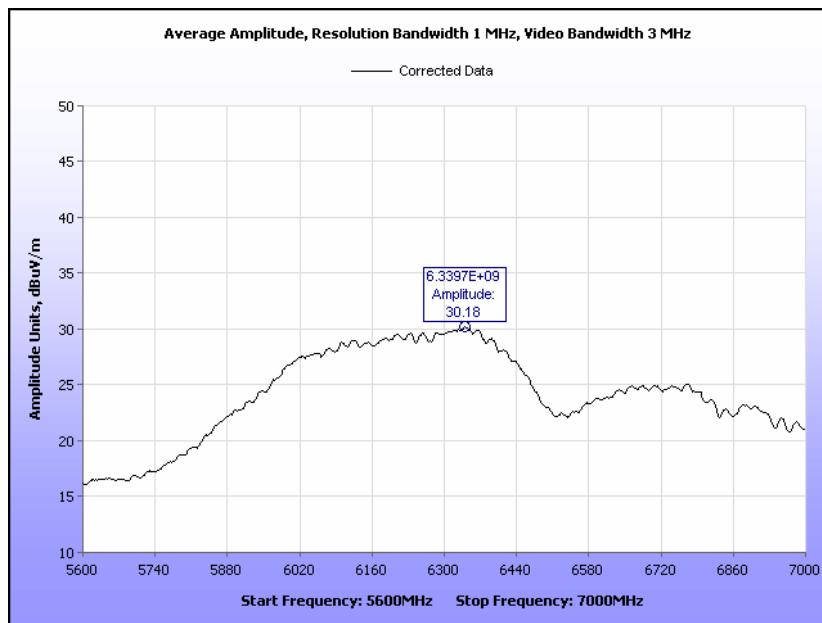
Electromagnetic Compatibility
Emission Criteria
CFR Title 47, Part 15, Subpart B

In order to demonstrate compliance, the Peak Radiated Fundamental is corrected for PDCF using the calculated value:

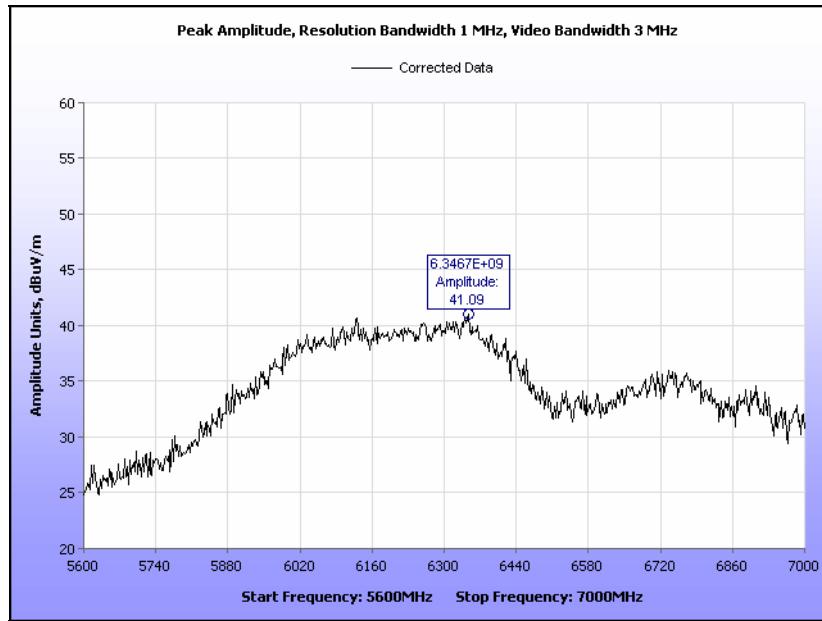
Frequency (GHz)	Peak Field Strength (dB μ V/m)	PDCF	Corrected Field Strength (dB μ V/m)	Peak Field Strength Limit (dB μ V/m)
6.3467	41.09	24.78	65.87	74

For the average field strength:

Frequency (GHz)	Average Field Strength (dB μ V/m)	Average Field Strength Limit (dB μ V/m)
6.3397	30.18	54

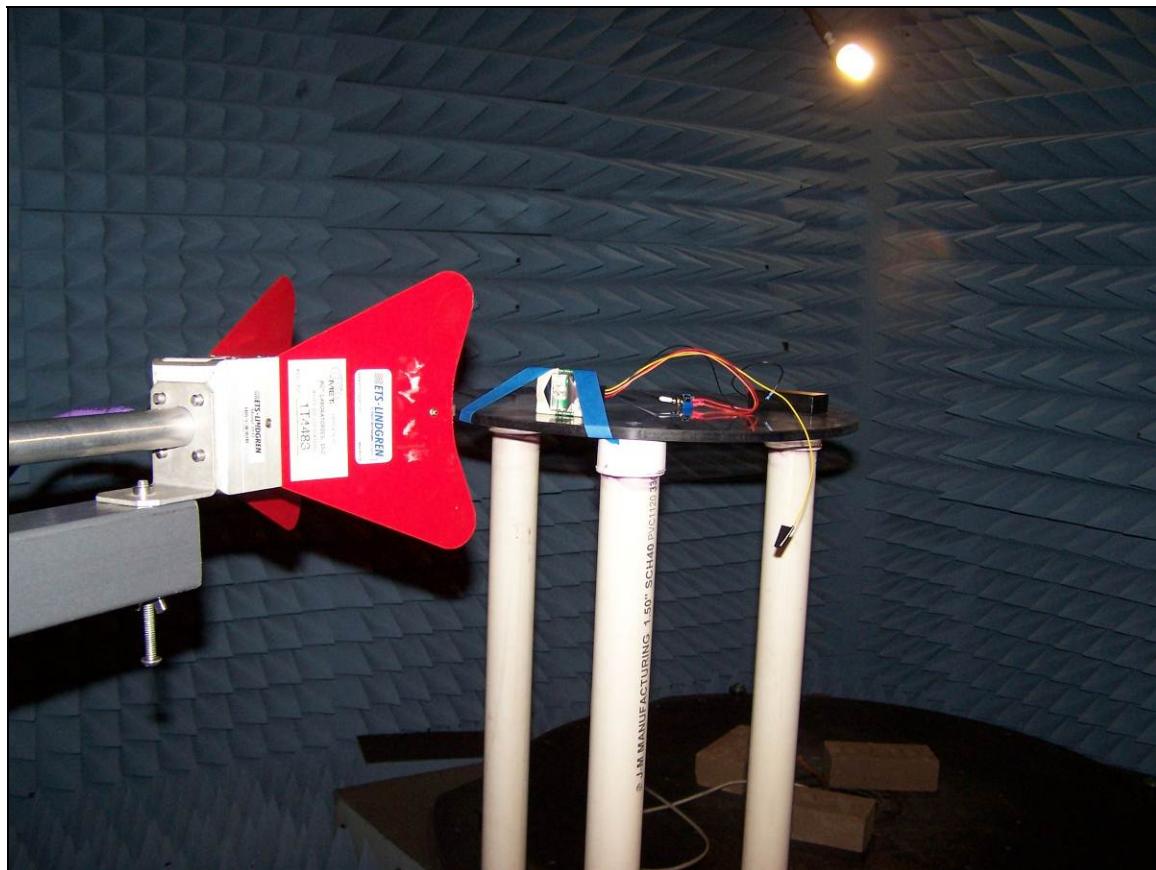


Plot 8. Radiated Fundamental, Average



Plot 9. Radiated Fundamental, Peak

Radiated Spurious Emissions Test Setup

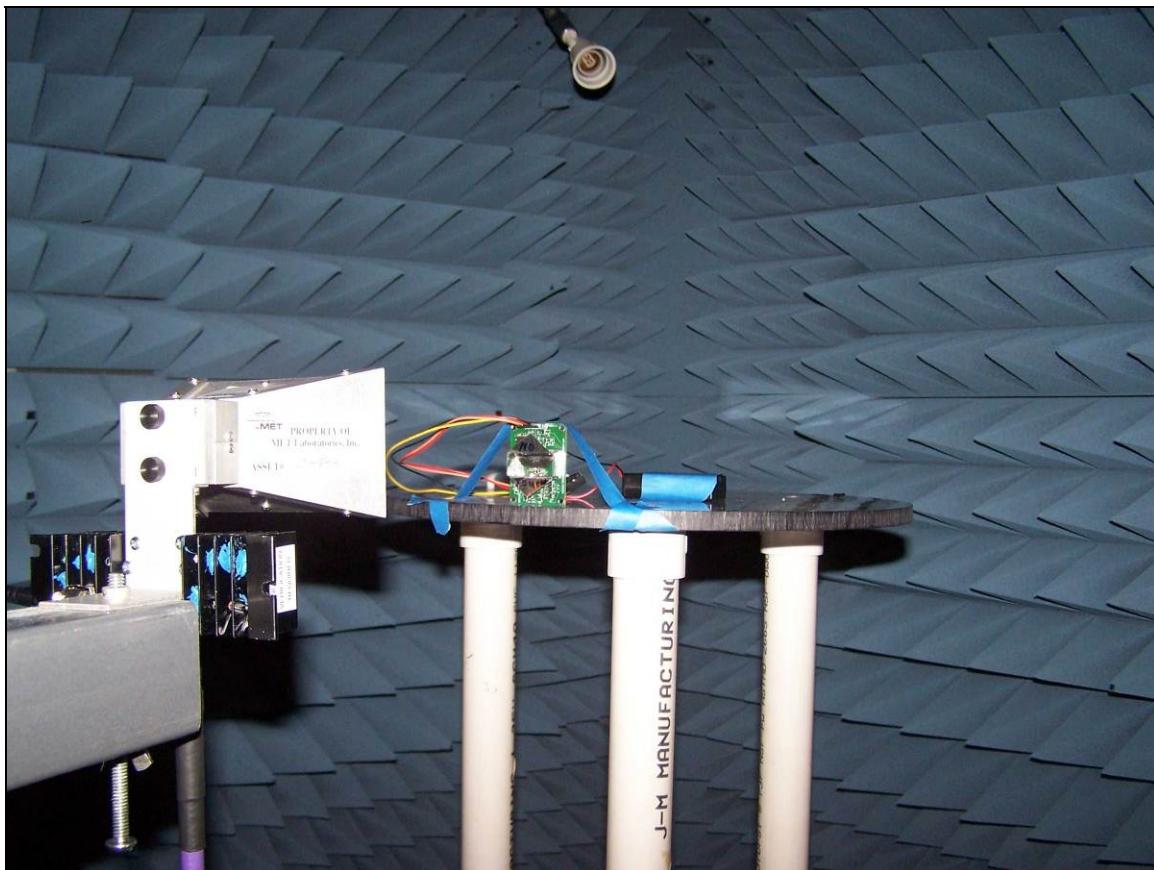


Photograph 2. Radiated Emissions



Spectrovation.Com
LPV01M12

Electromagnetic Compatibility
Emission Criteria
CFR Title 47, Part 15, Subpart B



Photograph 3. Radiated Spurious Emissions



5.0 Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:1999.

Test Name: Radiated Emissions			Test Date(s): April 19, 2011 - April 29, 2011		
MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	05/25/2010	05/25/2011
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	11/03/2010	11/03/2011
1T4568	RADIATING NOISE SOURCE	MET LABORATORIES	N/A	SEE NOTE	
1T4300	SEMI-ANECHOIC CHAMBER #1	EMC TEST SYSTEMS	NONE	08/23/2010	08/23/2013

Test Name: 15.209 Radiated Emissions			Test Date(s): January 31, 2012		
MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	07/19/2011	07/19/2012
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4149	HIGH-FREQUENCY ANECHOIC CHAMBER	RAY-PROOF	81	NOT REQUIRED	
1T4752	PRE-AMPLIFIER	MITEQ	JS44-18004000-35-8P	SEE NOTE	
1T4745	ANTENNA, HORN	ETS-LINDGREN	3116	10/04/2011	10/04/2012
1T4771	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	06/25/2011	06/25/2012

Table 9. Test Equipment

Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.



6.0 Compliance Information

Verification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of emitting radio-frequency energy by radiation, conduction, or other means. Radio-frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

- (i) *Compliance testing;*
- (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
- (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
- (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production stages; or
- (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a provision that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.



The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.¹ *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer,* be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.902 Verification.

- (a) *Verification is a procedure where the manufacturer*² *makes measurements or takes the necessary steps to insure that the equipment complies with the appropriate technical standards.* Submission of a sample unit or representative data to the Commission demonstrating compliance is not required unless specifically requested by the Commission pursuant to § 2.957, of this part.
- (b) Verification attaches to all items subsequently marketed by the manufacturer or importer which are identical as defined in § 2.908 to the sample tested and found acceptable by the manufacturer.

¹ In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

² In this case, MET Laboratories, Inc. is acting as an agent of the manufacturer.



§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
 - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
 - (i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*
 - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.
 - (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

§ 2.952 Limitation on verification.

- (a) Verification signifies that the manufacturer or importer has determined that the equipment has been shown to be capable of compliance with the applicable technical standards if no unauthorized change is made in the equipment and if the equipment is properly maintained and operated. Compliance with these standards shall not be construed to be a finding by the manufacturer or importer with respect to matters not encompassed by the Commission's rules.
- (b) Verification of the equipment by the manufacturer or importer is effective until a termination date is otherwise established by the Commission.
- (c) No person shall, in any advertising matter, brochure, etc., use or make reference to a verification in a deceptive or misleading manner or convey the impression that such verification reflects more than a determination by the manufacturer or importer that the device or product has been shown to be capable of compliance with the applicable technical standards of the Commission's rules.



§ 2.953 Responsibility for compliance.

- (a) In verifying compliance, the responsible party, as defined in §2.909 warrants that each unit of equipment marketed under the verification procedure will be identical to the unit tested and found acceptable with the standards and that the records maintained by the responsible party continue to reflect the equipment being produced under such verification within the variation that can be expected due to quantity production and testing on a statistical basis.
- (b) The importer of equipment subject to verification may upon receiving a written statement from the manufacturer that the equipment complies with the appropriate technical standards rely on the manufacturer or independent testing agency to verify compliance. The test records required by §2.955 however should be in the English language and made available to the Commission upon a reasonable request, in accordance with §2.956.
- (c) In the case of transfer of control of equipment, as in the case of sale or merger of the grantee, the new manufacturer or importer shall bear the responsibility of continued compliance of the equipment.
- (d) Verified equipment shall be re-verified if any modification or change adversely affects the emanation characteristics of the modified equipment. The party designated in §2.909 bears responsibility for continued compliance of subsequently produced equipment.

§ 2.954 Identification.

Devices subject only to verification shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.

§ 2.955 Retention of records.

- (a) For each equipment subject to verification, the responsible party, as shown in §2.909 shall maintain the records listed as follows:
 - (1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the requirements of §2.953.
 - (2) A record of the procedures used for production inspection and testing (if tests were performed) to insure the conformance required by §2.953. (Statistical production line Emission testing is not required.)
- (b) The records listed in paragraph (a) of this section shall be retained for two years after the manufacture of said equipment item has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving his equipment has been instituted.



§ 2.956 FCC inspection and submission of equipment for testing.

(a) Each responsible party shall upon receipt of reasonable request:

- (1) Submit to the Commission the records required by §2.955.
- (2) Submit one or more sample units for measurements at the Commission's Laboratory.
 - (i) Shipping costs to the Commission's Laboratory and return shall be borne by the responsible party.
 - (ii) In the event the responsible party believes that shipment of the sample to the Commission's Laboratory is impractical because of the size or weight of the equipment, or the power requirement or for any other reason, the responsible party may submit a written explanation why such shipment is impractical and should not be required.

Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.
- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.
- (3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

- (a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

- (b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.