



**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*  
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March 9, 2009

Hillcrest Laboratories, Inc.  
15245 Shady Grove Road  
Rockville, MD 20850

Dear Roy Illingworth,

Enclosed is the EMC Wireless test report for compliance testing of the Hillcrest Laboratories, Inc., USB RF Transceiver as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart C for Intentional Radiators.

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.

Jennifer Warnell  
Documentation Department

Reference: (\Hillcrest Laboratories, Inc.\EMC26122A-FCC249 Rev. 3)

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## **Electromagnetic Compatibility Criteria Test Report**

for the

**Hillcrest Laboratories, Inc.  
Model USB RF Transceiver**

**Verified under**  
the FCC Certification Rules  
contained in  
Title 47 of the CFR, Part 15.249  
for Low Power License-Exempt Radio Communications Devices  
Intentional Radiators

**MET Report: EMC26122A-FCC249 Rev. 3**

March 9, 2009

**Prepared For:**

**Hillcrest Laboratories, Inc.  
15245 Shady Grove Road  
Rockville, MD 20850**

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

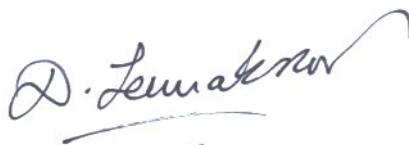
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Title 47 of the CFR, Part 15.249  
for Low Power License-Exempt Radio Communications Devices  
Intentional Radiators



Dusmantha Tennakoon  
Project Engineer, Electromagnetic Compatibility Lab



Jennifer Warnell  
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 limits applicable. 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 Part 15 Part 15.249, of the FCC Rules under normal use and maintenance.



Shawn McMillen,  
Wireless Manager, Electromagnetic Compatibility Lab

## Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	February 5, 2009	Initial Issue.
1	February 11, 2009	Customer corrections.
2	February 13, 2009	Corrected block diagram.
3	March 9, 2009	Corrections per engineer.

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## List of Terms and Abbreviations

<b>AC</b>	<b>Alternating Current</b>
<b>ACF</b>	<b>Antenna Correction Factor</b>
<b>Cal</b>	<b>Calibration</b>
<b><i>d</i></b>	<b>Measurement Distance</b>
<b>dB</b>	<b>Decibels</b>
<b>dB<math>\mu</math>A</b>	<b>Decibels above one microamp</b>
<b>dB<math>\mu</math>V</b>	<b>Decibels above one microvolt</b>
<b>dB<math>\mu</math>A/m</b>	<b>Decibels above one microamp per meter</b>
<b>dB<math>\mu</math>V/m</b>	<b>Decibels above one microvolt per meter</b>
<b>DC</b>	<b>Direct Current <math>\mu</math></b>
<b>E</b>	<b>Electric Field</b>
<b>DSL</b>	<b>Digital Subscriber Line</b>
<b>ESD</b>	<b>Electrostatic Discharge</b>
<b>EUT</b>	<b>Equipment Under Test</b>
<b><i>f</i></b>	<b>Frequency</b>
<b>FCC</b>	<b>Federal Communications Commission</b>
<b>GRP</b>	<b>Ground Reference Plane</b>
<b>H</b>	<b>Magnetic Field</b>
<b>HCP</b>	<b>Horizontal Coupling Plane</b>
<b>Hz</b>	<b>Hertz</b>
<b>IEC</b>	<b>International Electrotechnical Commission</b>
<b>kHz</b>	<b>kilohertz</b>
<b>kPa</b>	<b>kilopascal</b>
<b>kV</b>	<b>kilovolt</b>
<b>LISN</b>	<b>Line Impedance Stabilization Network</b>
<b>MHz</b>	<b>Megahertz</b>
<b><math>\mu</math>H</b>	<b>microhenry</b>
<b><math>\mu</math></b>	<b>microfarad</b>
<b><math>\mu</math>s</b>	<b>microseconds</b>
<b>PRF</b>	<b>Pulse Repetition Frequency</b>
<b>RF</b>	<b>Radio Frequency</b>
<b>RMS</b>	<b>Root-Mean-Square</b>
<b>TWT</b>	<b>Traveling Wave Tube</b>
<b>V/m</b>	<b>Volts per meter</b>
<b>VCP</b>	<b>Vertical Coupling Plane</b>



# **I. Executive Summary**





## A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Hillcrest Laboratories, Inc. USB RF Transceiver, with the requirements of Part 15, §15.249. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the USB RF Transceiver. Hillcrest Laboratories, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the USB RF Transceiver, has been **permanently** discontinued

## B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.249, in accordance with Hillcrest Laboratories, Inc., purchase order number 2008-12-160. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	Description	Results
§15.207	AC Power Line Conducted Emissions	Compliant
§15.203	Antenna Requirement	Compliant
§15.249 (a)	Field Strength of Fundamental and Harmonics	Compliant
§15.249(d)	Spurious Emissions	Compliant

**Table 1. Executive Summary of EMC Part 15.249 Compliance Testing**

## **II. Equipment Configuration**

## A. Overview

MET Laboratories, Inc. was contracted by Hillcrest Laboratories, Inc. to perform testing on the USB RF Transceiver, under Hillcrest Laboratories, Inc.'s purchase order number 2008-12-160.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Hillcrest Laboratories, Inc., USB RF Transceiver.

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

<b>Model(s) Tested:</b>	USB RF Transceiver	
<b>Model(s) Covered:</b>	USB RF Transceiver	
<b>EUT Specifications:</b>	Primary Power: 5 VDC (Laptop USB port)	
	FCC ID: WRN-4	
	Type of Modulations:	MSK
	Equipment Code:	DXT
	EUT Frequency Ranges:	2401 – 2482 MHz
<b>Analysis:</b>	The results obtained relate only to the item(s) tested.	
<b>Environmental Test Conditions:</b>	Temperature (15-35° C)	
	Relative Humidity (30-60%)	
	Barometric Pressure (860-1060 mbar)	
<b>Evaluated by:</b>	Dusmantha Tennakoon	
<b>Date(s):</b>	February 5, 2009	

**Table 2. EUT Specifications**

## B. References

<b>CFR 47, Part 15, Subpart C</b>	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
<b>ANSI C63.4:2003</b>	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz

## C. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 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 (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

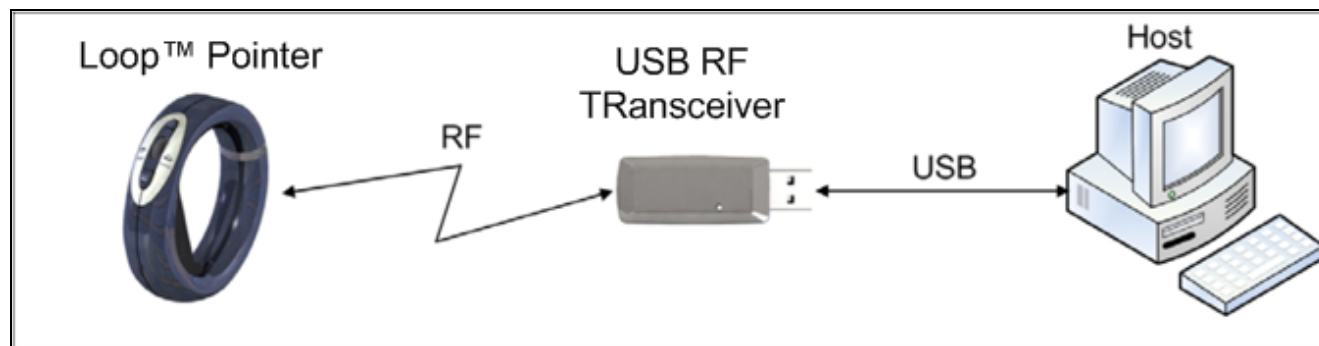
## D. Description of Test Sample

The USB RF Transceiver, Equipment Under Test (EUT), works with The Hillcrest Labs Loop™ Pointer in the model HL2201 to form a system connected by a RF link that conveys motion data of the Loop™ Pointer to the host via the USB RF Transceiver.

This test report only contains information for the USB RF Transceiver. Please refer to EMC26122B-FCC249 for The Hillcrest Labs Loop™ Pointer.



**Photograph 1. Hillcrest Laboratories, Inc. USB RF Transceiver**



**Figure 1. Block Diagram of Test Configuration**

## **E. Equipment Configuration**

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Name / Description	Model Number	Part Number	Serial Number	Revision
USB RF TRANSCEIVER	HL2201	1000-2022	007	1

**Table 3. Equipment Configuration**

## **F. Support Equipment**

Hillcrest Laboratories, Inc. supplied support equipment necessary for the operation and testing of the USB RF Transceiver. All support equipment supplied is listed in the following Support Equipment List.

Name / Description	Manufacturer	Model Number	Serial Number
LAPTOP WITH POWER SUPPLY	DELL	LATITUDE D810	2727712261

**Table 4. Support Equipment**

## **G. Ports and Cabling Information**

Ports and cabling information was not needed for equipment configuration.

## **H. Mode of Operation**

The USB RF Transceiver was made to transmit in its normal mode of operations.

## **I. Modifications**

### **a) Modifications to EUT**

No modifications were made to the EUT.

### **b) Modifications to Test Standard**

No modifications were made to the test standard.

## **J. Disposition of EUT**

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Hillcrest Laboratories, Inc. upon completion of testing.

### **III. Electromagnetic Compatibility Criteria for Intentional Radiators**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.207 Conducted Emissions Limits

**Test Requirement(s):** § 15.207 (a): For an intentional radiator 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 30MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50  $\Omega$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

**Table 5. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)**

**Test Procedure:** The EUT was placed on a 0.8 m-high wooden table inside a shielded screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2003 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50  $\Omega$ /50  $\mu$ H LISN as the input transducer to an EMC/field intensity meter. The tests were conducted in a RF-shielded enclosure.

**Test Results:** The EUT is compliant with this requirement. Pre-scans were made on channel 1, 40, and 82. They revealed that the emission profiles were similar. Therefore, final measurements were only made on channel 40.

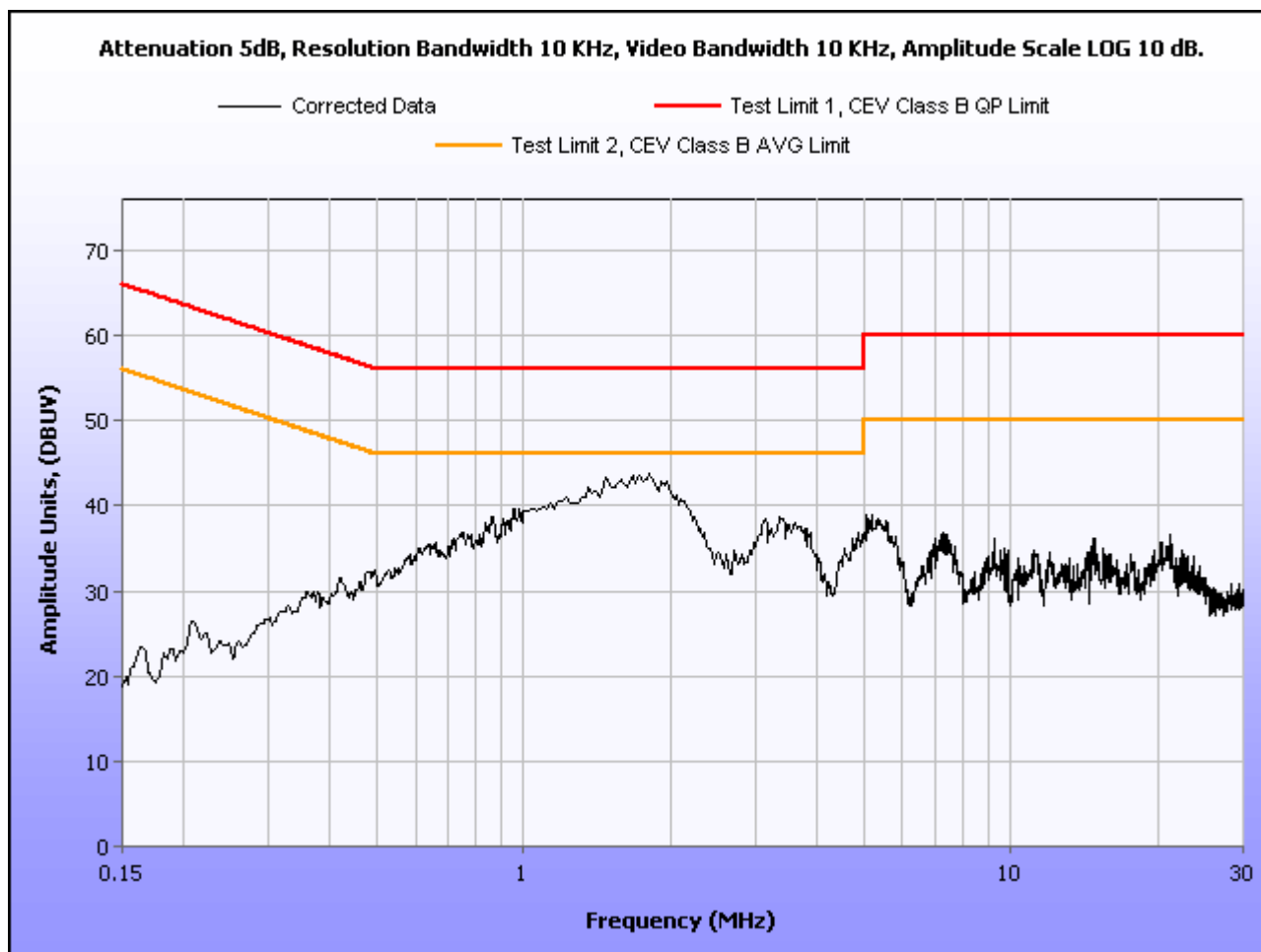
**Test Engineer(s):** Dusmantha Tennakoon

**Test Date(s):** 01/20/09



Frequency (MHz)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
1.452	33.36	56.00	-22.64	19.82	46.00	-26.18
3.135	26.5	56.00	-29.50	15.67	46.00	-30.33
5.067	25.63	60.00	-34.37	16.79	50.00	-33.21
7.34	22.17	60.00	-37.83	13.79	50.00	-36.21
17.1	19.11	60.00	-40.89	12.48	50.00	-37.52
20.11	20.79	60.00	-39.21	12.89	50.00	-37.11

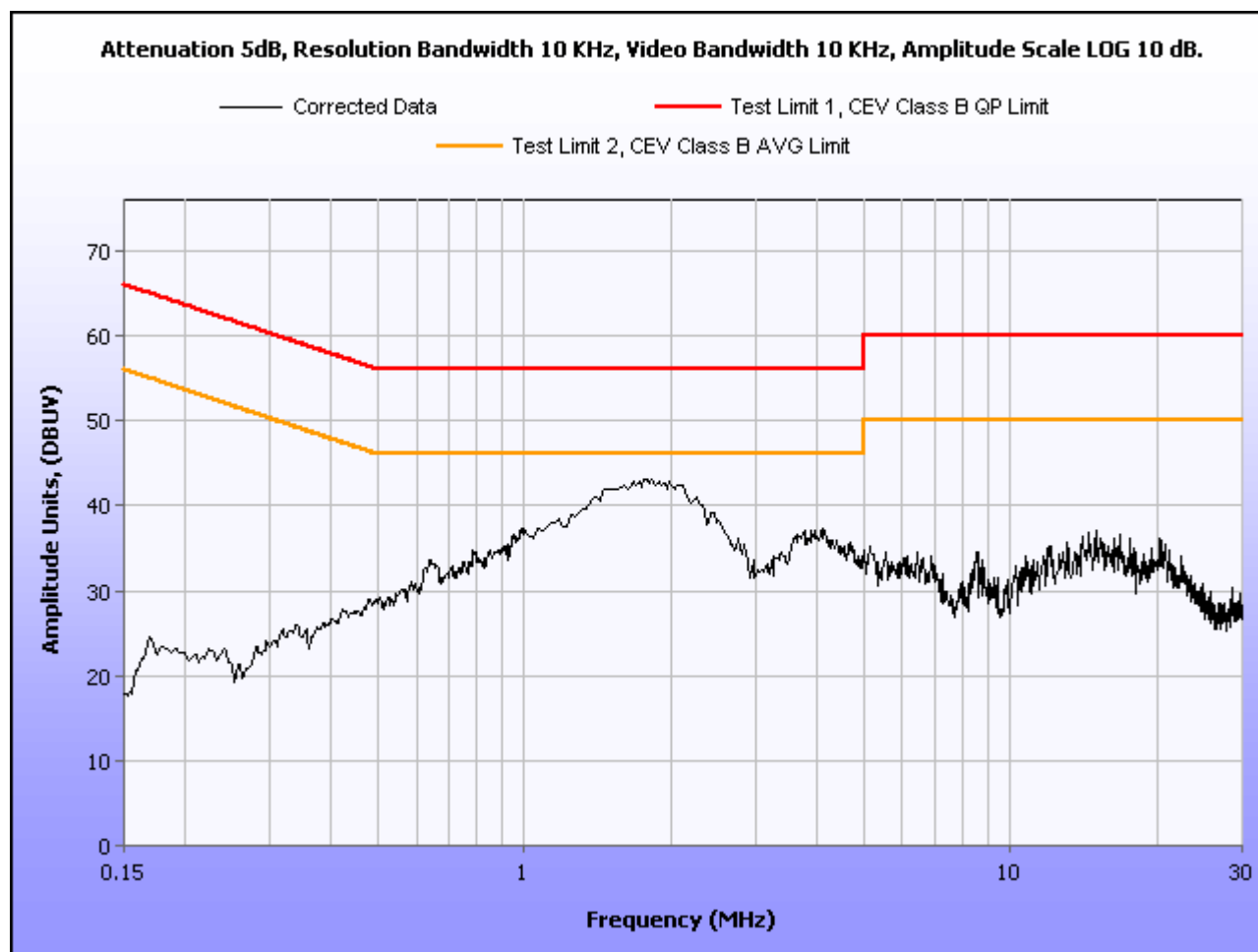
Table 6. Conducted Emissions, Test Results, Phase Line



Plot 1. Conducted Emissions, Phase Line Plot

Frequency (MHz)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
1.805	35.10	56.00	-20.90	21.75	46.00	-24.25
3.885	26.83	56.00	-29.17	16.73	46.00	-29.27
15.68	24.48	60.00	-35.52	16.74	50.00	-33.26
20.27	25.52	60.00	-34.48	19.31	50.00	-30.69
0.4948	23.06	56.09	-33.03	7.99	46.09	-38.10
0.9675	25.26	56.00	-30.74	12.73	46.00	-33.27

Table 7. Conducted Emissions, Test Results, Neutral Line



Plot 2. Conducted Emissions, Neutral Line Plot



**Photograph 2. Conducted Emissions, Test Setup**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.203      Antenna Requirement

**Test Requirement:**      **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

**Results:**      The EUT as tested meets the criteria of this rule by having an integral antenna. The EUT is therefore compliant with §15.203.

**Test Engineer(s):**      Dusmantha Tennakoon

**Test Date(s):**      01/09/09

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.249(a) Radiated Field Strength of Fundamental and Harmonics

**Test Requirements:** § 15.249 (a): Except as provided in paragraph(b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

Fundamental frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

**Table 8. Radiated Limits for Intentional Radiators from FCC Part 15 § 15.249(a)**

**Test Procedure:** The transmitter was set to the low, mid, and high channels at the highest output power and placed in a semi-anechoic chamber. Measurements were performed with the EUT rotated on all 3 orthogonal planes with the antenna height varied to find maximum emissions. Measuring distance was 1m.

**Test Results** Equipment complies with § 15.249(a).

**Test Engineer(s):** Dusmantha Tennakoon

**Test Date(s):** 01/20/09

Channel	Frequency (MHz)	Measured AVG Field Strength (dBuV/m)*	Measured Peak Field Strength (dBuV/m)*	Limit Avg Field Strength (dBuV/m)	Limit Peak Field Strength (dBuV/m)
1	2401	62.05	96.32	94	114
40	2440	61.52	96.21	94	114
82	2482	59.29	95.74	94	114

**Table 9. Radiated Field Strength of Fundamental**

\* Data has been corrected for cable loss, ACF, and distance.

Channel	Frequency (GHz)	Final measurement corrected for cable loss, preamp, ACF and distance (dBuV/m)	Limit (dBuV/m)	Remark	Pass/Fail
1	4.802	46.58	74	Peak	Pass
40	4.88	47.4	74	Peak	Pass
82	4.964	47.66	74	Peak	Pass

**Table 10. Harmonic Emissions**

**Notes:** The peak amplitudes of the harmonics are below the average limit.

All other harmonics of the principle were made below the noise floor of the measurement system.



**Photograph 3. Test Setup for Various Radiated Measurements**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.249(d) Spurious Emissions Requirements

**Test Requirements:** §15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

**§15.205(a):** Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110-----	16.42–16.423	399.9–410	4.5–5.15
<sup>1</sup> 0.495–0.505-----	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905-----	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128-----	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775-----	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775-----	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218-----	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825-----	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225-----	123–138	2200–2300	14.47–14.5
8.291–8.294-----	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366-----	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675-----	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475-----	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293-----	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025-----	240–285	3345.8–3358 36.	43–36.5
12.57675–12.57725-----	322–335.4	3600–4400	( <sup>2</sup> )

**Table 11. Restricted Bands of Operation**

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.

<sup>2</sup> Above 38.6

**Test Procedure:**

The transmitter was set to the low, mid, and high channels at the highest output power in a semi-anechoic chamber. Measurements were performed with the EUT rotated on all 3 orthogonal planes varying the antenna height to determine worst case orientation for maximum emissions.

**Test Results:**

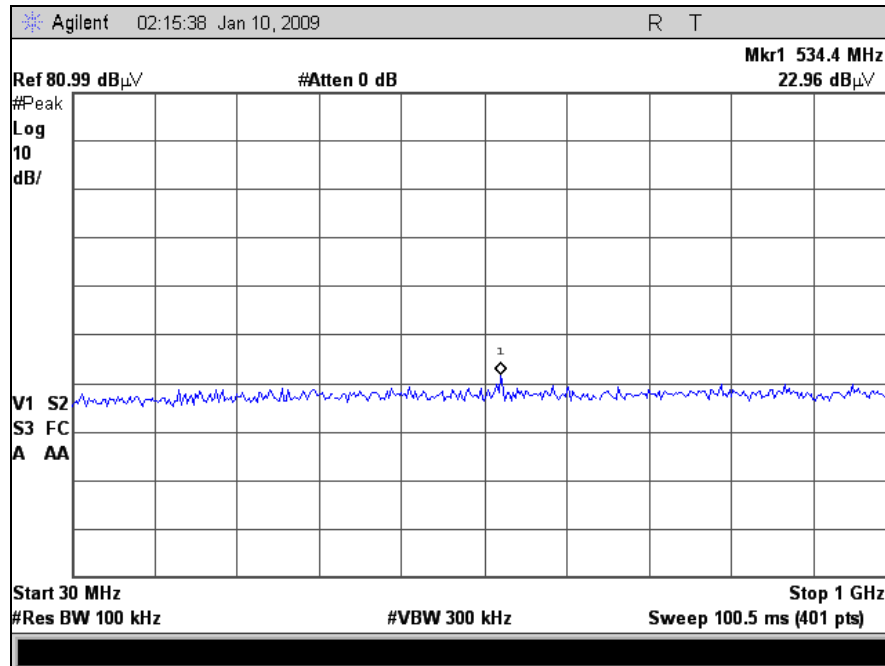
Equipment complies with the Spurious Emissions Requirements of § 15.249 (d), and band edge requirements of §15.205.

**Test Engineer(s):**

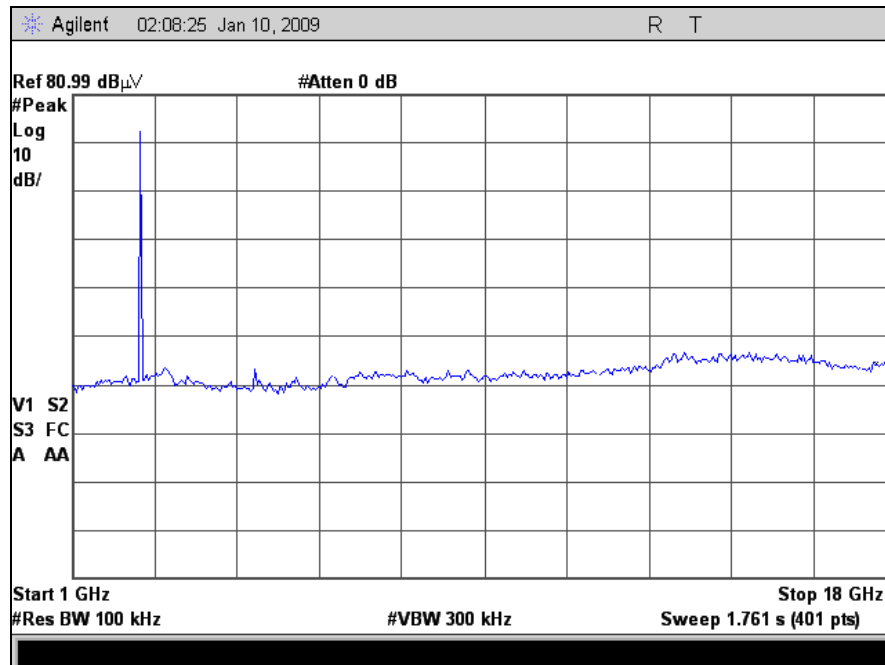
Dusmantha Tennakoon

**Test Date(s):**

01/23/09

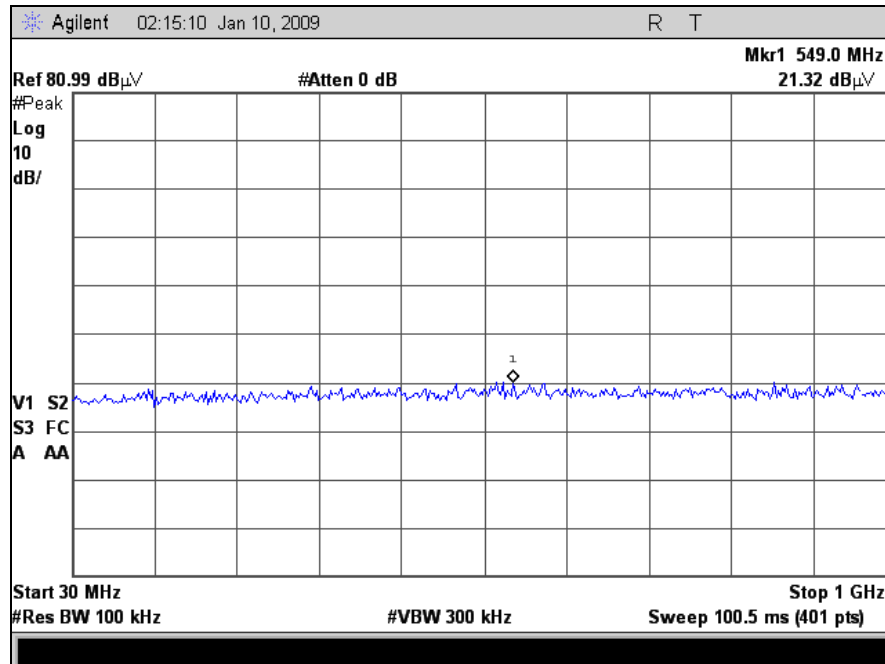


Plot 3. Harmonic Emissions, Channel 1, 30 MHz – 1 GHz

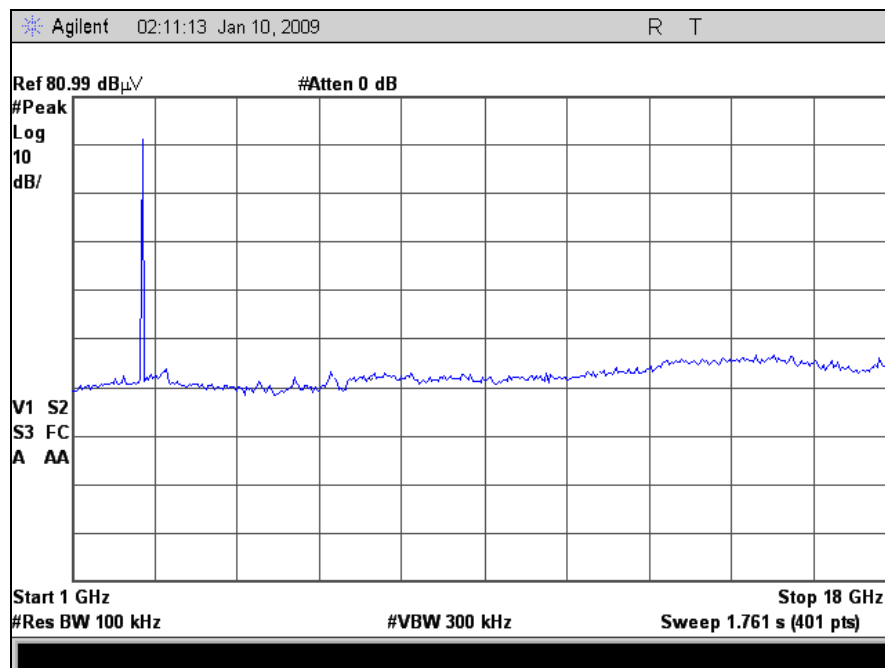


Plot 4. Harmonic Emissions, Channel 1, 1 GHz – 18 GHz

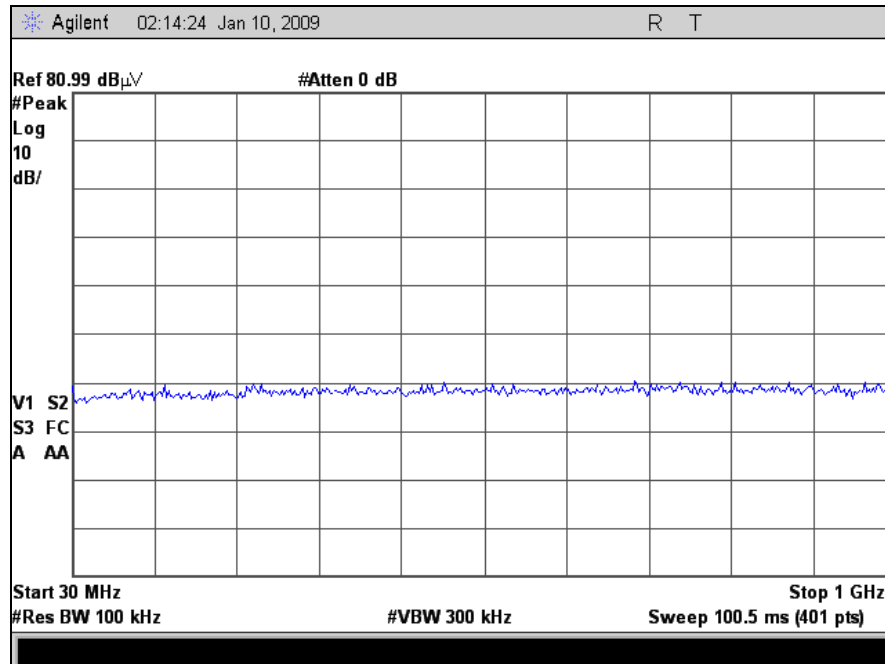




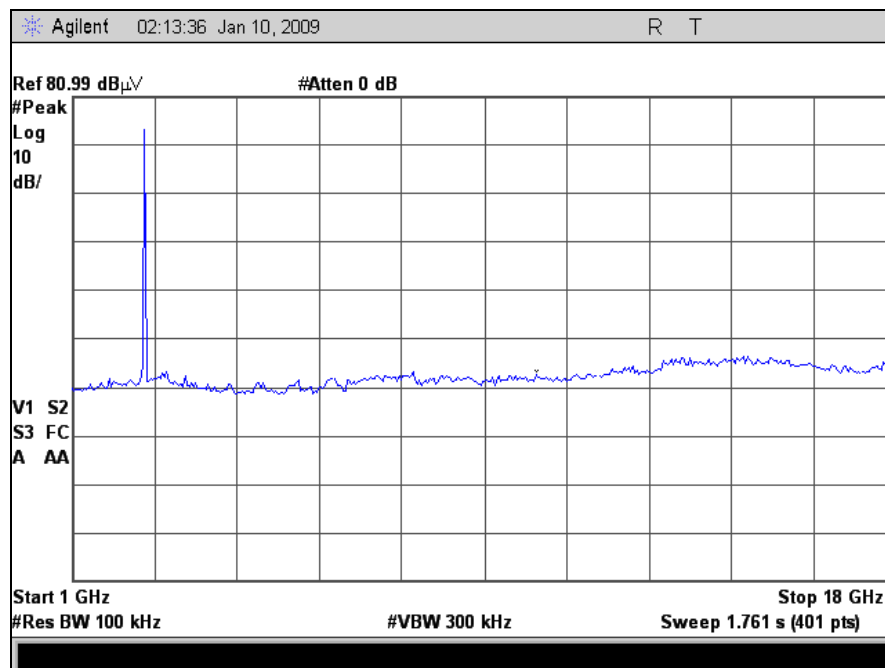
Plot 5. Harmonic Emissions, Channel 40, 30 MHz – 1 GHz



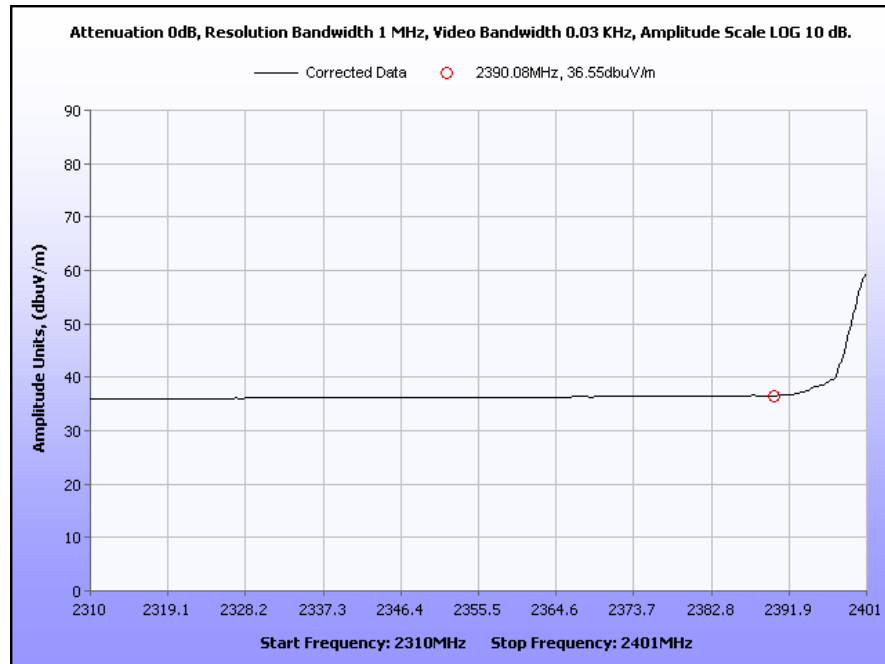
Plot 6. Harmonic Emissions, Channel 40, 1 GHz – 18 GHz



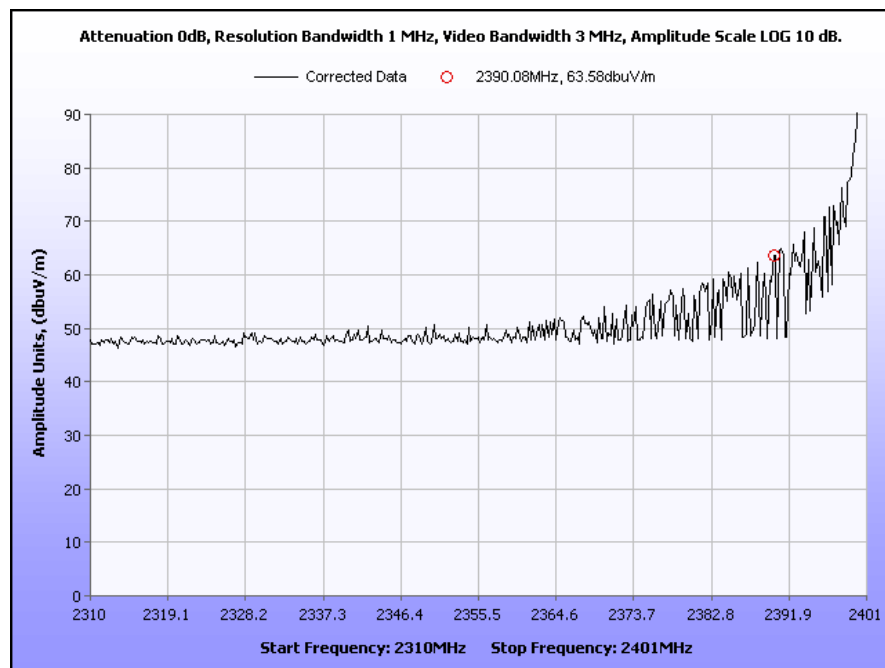
Plot 7. Harmonic Emissions, Channel 82, 30 MHz – 1 GHz



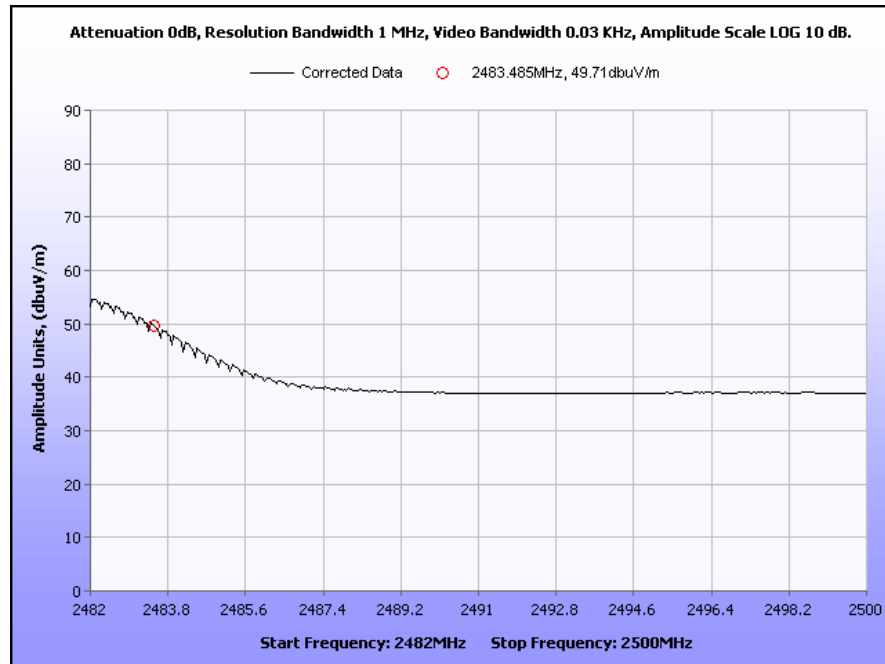
Plot 8. Harmonic Emissions, Channel 82, 1 GHz – 18 GHz



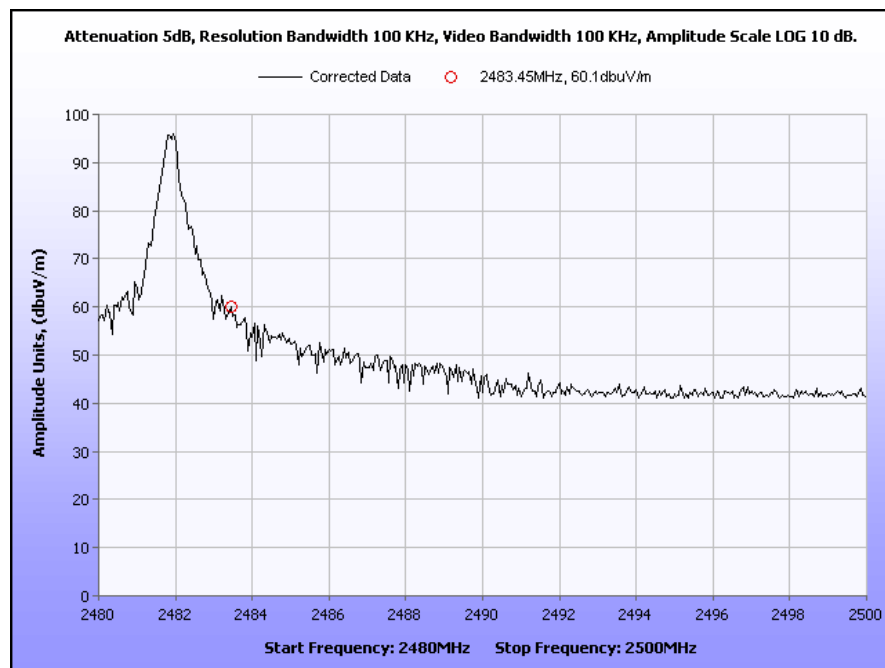
**Plot 9. Band Edge, Channel 1, Average**



**Plot 10. Band Edge, Channel 1, Peak**



**Plot 11. Band Edge, Channel 82, Average**



**Plot 12 Band Edge, Channel 82, Peak**

Note: Peak band edge measurement was made with a RBW = 100 kHz. It then needs to be corrected back to 1 MHz.

Correction factor =  $10\log(1000 \text{ kHz}/100 \text{ kHz}) = 10 \text{ dB}$ .

Therefore, corrected field strength at 2483.5 MHz =  $60.1 + 10$   
= 70.1 dBuV/m



## IV. Test Equipment



## 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 17025:2000.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	02/17/2006	05/17/2009
1T2665	HORN ANTENNA	EMCO	3115	05/07/2008	05/07/2009
1T4612	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4407B	01/04/2008	01/22/2009
1T4303	ANTENNA; BILOG	SCHAFNER-CHASE EMC	CBL6140A	07/07/2008	07/07/2009
1T4592	RF FILTER KIT	VARIOUS	N/A	SEE NOTE	
1T4414	MICROWAVE PRE-AMPLIFIER	AH SYSTEMS	PAM-0118	SEE NOTE	

**Table 12. Test Equipment**

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

## **V. Certification & User's Manual Information**

## Certification & User's Manual Information

### A. Certification 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 states; 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 proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

## Certification & User's Manual Information

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.<sup>1</sup> *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.

### § 2.907 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

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<sup>1</sup> 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.

## Certification & User's Manual Information

### § 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.

## Certification & User's Manual Information

### 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.

## Verification & User's Manual Information

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 when the equipment is operated in a residential 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. 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.



Hillcrest Laboratories, Inc.  
USB RF Transceiver

Electromagnetic Compatibility  
End of Report  
CFR Title 47, Part 15, Subpart C

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# End of Report