MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372

November 5, 2006

Crossbow Technology, Inc.
4145 North First Street
San Jose, California 95134

Dear Afshin Afzali,

Enclosed is the Telecom test report for compliance testing of the Crossbow Technology, Inc., Wireless Network Sensor as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-03 ed.), Part 15, Subpart B for a Class B Digital Device and 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.

Cheryl Anicete
Documentation Department

Reference: (Crossbow Technology, Inc.\EMCU20557-FCC247)

Electromagnetic Compatibility Criteria
Test Report

For the

Crossbow Technology, Inc.

Wireless Network Sensor
Model Number: MXP200 and MXP210
FCC ID: SHU002MXP2X0

Verified under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 15.247, Subpart C
for Intentional Radiators

MET Report: EMCU20557-FCC247

November 5, 2006

Prepared For:

Crossbow Technology, Inc.
4145 North First Street
San Jose, California 95134

Prepared By:
MET Laboratories, Inc.
33439 Western Avenue
Union City, California 94587-3201

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Cheryl Anicete
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, Section 15.247 of the FCC Rules under normal use and maintenance.

Asad Bajwa, Manager
Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	November 5, 2006	Initial Issue.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent µ
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GR-1089-CORE	***(GR)*** **G**eneral **R**equirement(s) imposed by the NEBS standard, **(*CORE*) C**entral **O**ffice **R**ecovery **E**xpress (AT&T), ***(1089)*** specifies various parts of the General Requirements under Bellcore Technical Standard, Requirements for Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Crossbow Technology, Inc., Wireless Network Sensor, with the requirements of Part 15, §15.247. 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 Wireless Network Sensor. Crossbow Technology, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Wireless Network Sensor, 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, §15.247. All tests were conducted using measurement procedure ANSI C63.4-2003.

Reference	Description	Compliance
Title 47 of the CFR, Part 15, Subpart C, §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.207(a);	Electromagnetic Compatibility - Conducted Emissions for Intentional Radiators	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.209(a)	Electromagnetic Compatibility - Radiated Emissions for Intentional Radiators	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.247(a)	Bandwidth & Channelization	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.247(b)	Output Power and RF Exposure	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.247(c)	Power Spectral Density	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.247(c)	Spurious Emissions Requirements – Radiated and RF Conducted	Compliant

Table 1 Executive Summary of EMC Part 15.247 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Crossbow Technology, Inc. to perform testing on the Wireless Network Sensor, under Crossbow Technology, Inc.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Crossbow Technology, Inc., Wireless Sensor Device Model: MXP200 and MXP210 with the limits of CFR 47, §15.247 for Intentional Radiators.

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

Type of Submission/Rule:	Part 15.247 Original Filing
Model(s) Tested:	Wireless Network Sensor, MXP200 and MXP210
Model(s) Number:	Wireless Network Sensor, MXP200 and MXP210
EUT Specifications:	Primary Power: 7-12VDC
	NA
	RF Power Output (conducted): 0.826 mW
	Equipment Frequency Range: 2405 – 2480 MHz
	Equipment Code: DTS
Lab Ambient (Normal) Test Conditions:	Temperature: 15-35º C
	Relative Humidity: 30-60%
	Atmospheric Pressure: 860-1060 mbar
Evaluated by:	Asad Bajwa
Test Date(s):	August 15, 2006

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4-2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025: 2000	General Requirements for the Competence of Testing and Calibration Laboratories

C. Test Site

All testing was performed at MET Laboratories, Inc., 33439 Western Avenue, Union City, California 94587-3201. 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 semi-anechoic chamber. In accordance with §2.948(a) (3), a complete site description is contained at MET Laboratories. In accordance with §2.948(d), MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0).

D. Description of Test Sample

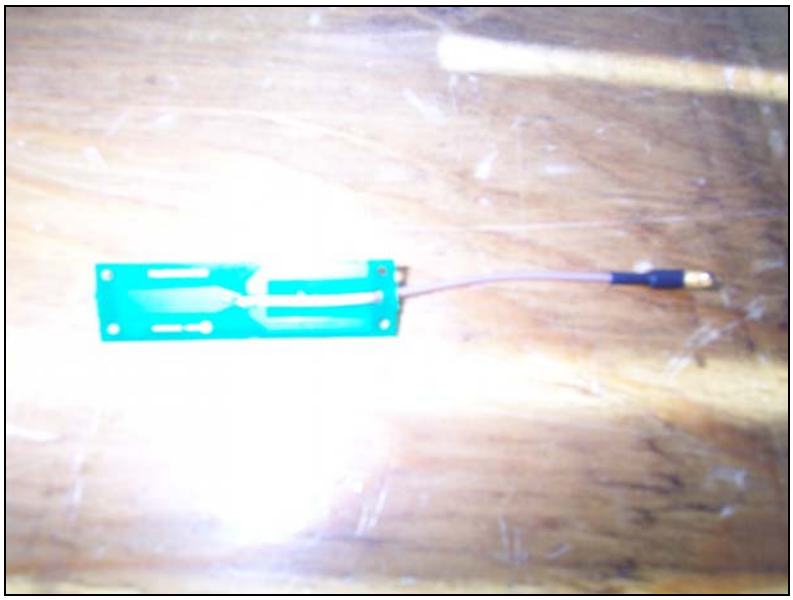
The device provides wireless connectivity between similar EUT's and central controller (server) to control and monitor status of external equipment connected to EUT via CSAFE (RS232) interface.

EUT functional areas are

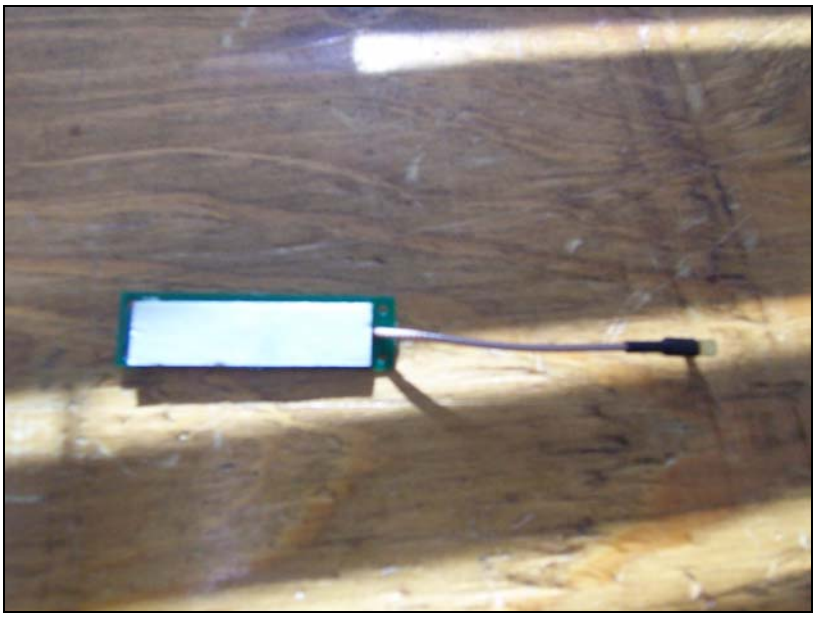
- 802.15.4 2.4GHz DSSS radio transceiver
- 8 Bit Micro Controller
- 4Kbit Flash Memory
- Power Management
- CSAFE Interface

Photograph 1. Internal View of EUT 1

Photograph 2. Internal View of EUT 2



Photograph 3. External View of EUT 1



Photograph 4. External View of EUT 2

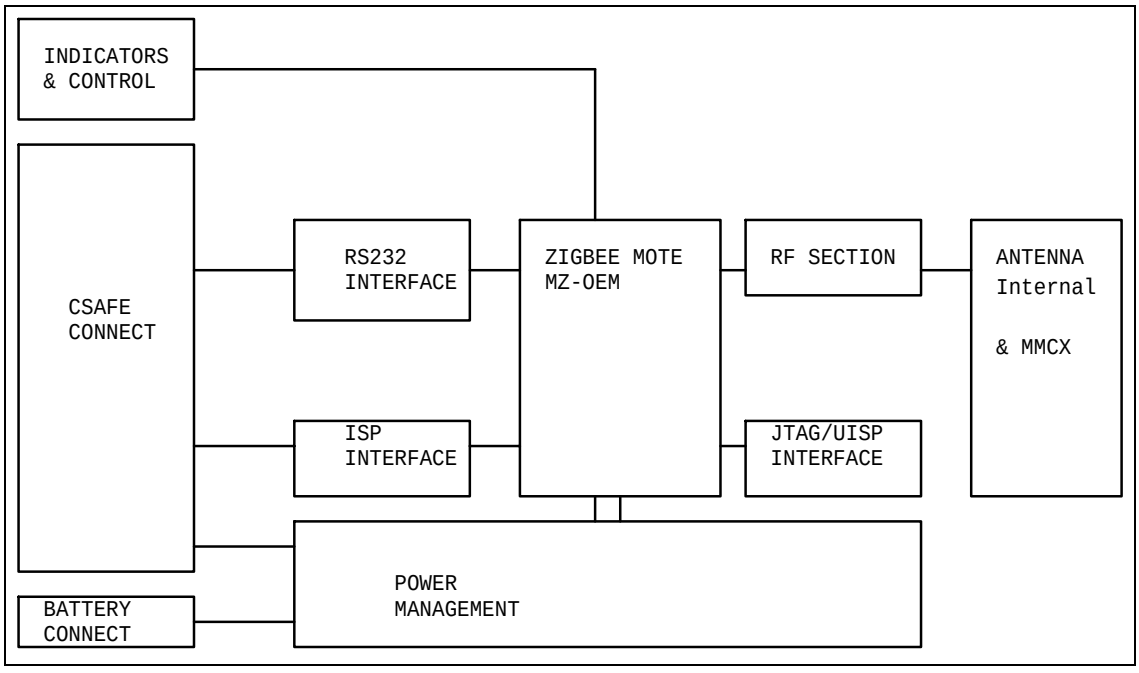


Figure 1. EUT Block Diagram

E. Support Equipment

Crossbow Technology, Inc. supplied support equipment necessary for the operation and testing of the Wireless Sensor Device Model: MXP200 and MXP210. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
There was no support equipment necessary for testing.				

Table 2. Support Equipment

F. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description or Reason for No Cable	Qty.	Length (m)	Shielded (Y/N)	Termination Box ID & Port ID
J1	Battery Connector	Battery power	1	NA	Yes	NA
J3	Case Connector	CSAFE	1	NA	No	NA

Table 3. Ports and Cabling Information

G. Mode of Operation

Primary EUT power is provided from external 7.5 VDC source. A 3.6VDC Battery provides standby power if the primary source is removed.

EUT Control and Status is via CASFE port connection which is RS232 9600/8/N/1 compliant interface. Additional monitoring is via 3 LED indicators on EUT.

Primary modes or operation are
-Transmit Radio Packet
-Receive Radio Packet
-Send/receive commands over CSAFE RS232 port
-Power Down

H. Method of Monitoring EUT Operation

Operation is verified using CSAFE/RS232 port to monitor EUT transmission and reception of radio packets.

I. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the EUT.

J. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

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 4...

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 4..

Frequency (MHz)	Field Strength (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 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 4 Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 10 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 bandwidth.

Test Results: The EUT was found compliant with the Radiated Emission limits of **§15.209** for Intentional Radiators. See following pages for detailed test results.

Test Engineer(s): Asad Bajwa

Test Date(s): 8/16/06

Radiated Emissions Limits Worst Case, 30 – 1000 MHz Vertical and Horizontal

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna Height (m)	Uncorrected Amplitude (dBuv)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Corrected Amplitude (dBuv)	Limit (dBuv)	Margin (dB)
*40.280	68	V	0.99	35.423	10.688	0.440	36.091	39.0	-2.909
*74.600	227	V	1.00	40.773	5.980	0.522	36.815	39.0	-2.185
*66.000	227	V	1.00	39.954	7.700	0.490	37.684	39.0	-1.316
621.680	-1	H	1.55	14.538	20.750	1.309	26.137	46.4	-20.263
895.750	360	V	1.55	17.104	22.158	1.744	30.546	46.4	-15.854
258.040	282	H	1.51	30.585	12.680	0.907	33.712	46.4	-12.688

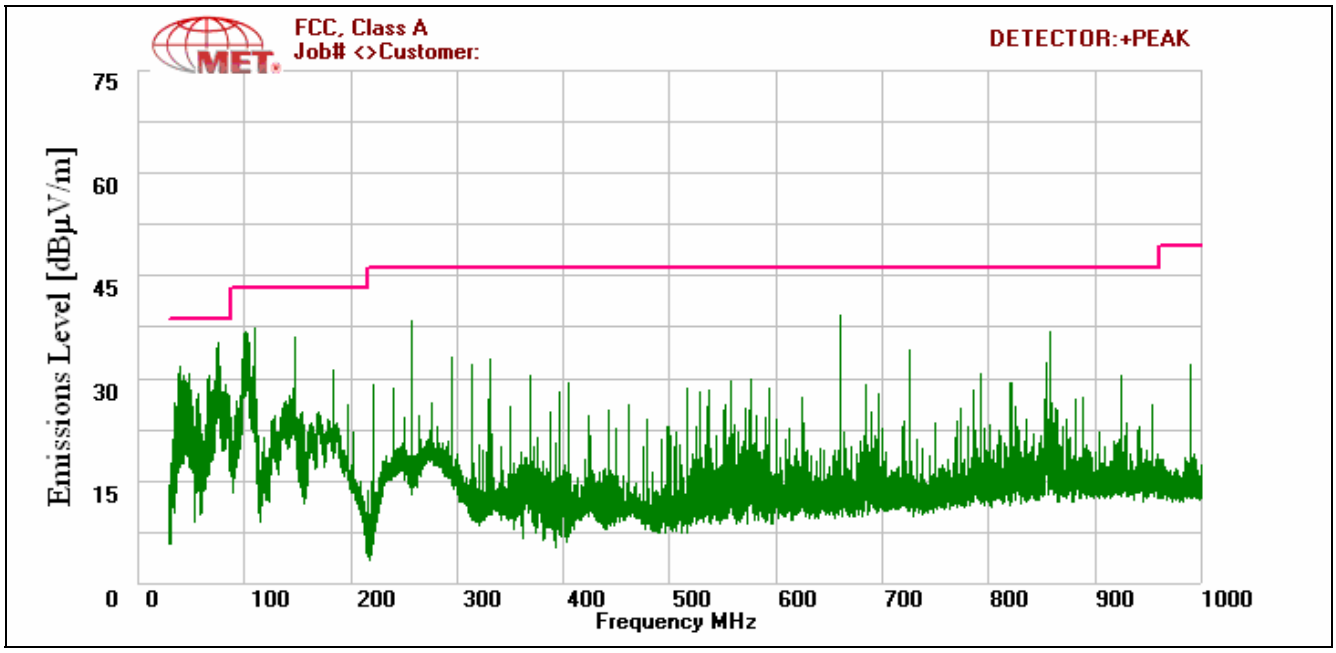
Table 5. Radiated Emissions Limits Worst Case, 30 – 1000 MHz Vertical and Horizontal

Note 1: * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

Note 2: There are no detectable emissions between 0.9 GHz and 25 GHz.

Note 3: Test was performed in Worst Case Mode.

Radiated Emissions Limits Worst Case, 30 – 1000 MHz Vertical and Horizontal

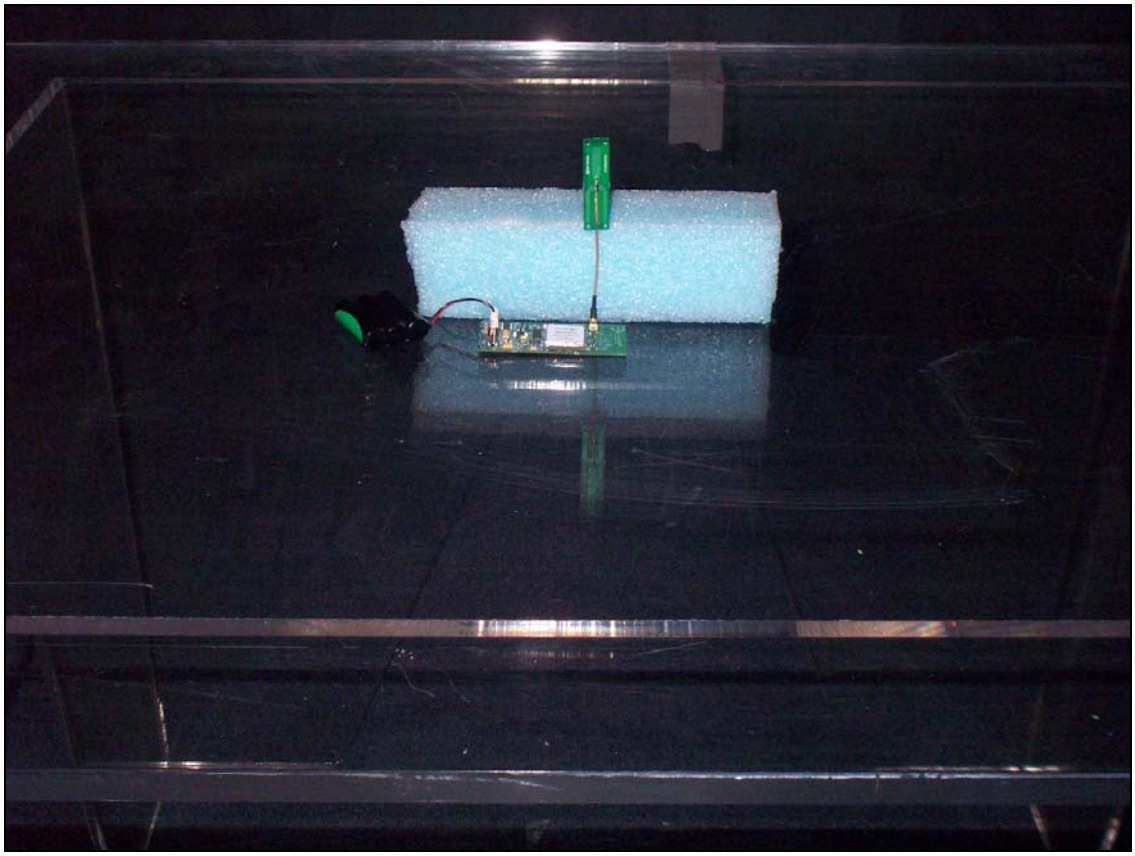


Plot 1. Radiated Emissions Limits Test Results

Remarks: The EUT meets the specifications of **Section 15.209(a)** for Radiated Emissions of Intentional Radiators.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209(a) Radiated Emission



Photograph 5. Radiated Emission Test Setup, 30-1000 MHz

IV. Electromagnetic Compatibility Criteria for Intentional Radiators

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: There are two antenna options. The EUT as tested meets the criteria of this rule by virtue of having a permanently attached internal antenna soldered onto the EUT and is not accessible by the user. The other antenna uses a non-standard antenna jack (MMCX).The EUT is therefore compliant with §15.203.

Type of Antenna: PCBA, Gain of Antenna: 2.2 dBi

Type of Antenna: External (8150-0548-01), Gain of Antenna: 2.2 dBi

Test Engineer(s): Asad Bajwa

Test Date(s): 8/23/06

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a) 6 dB and 99% Bandwidth

Test Requirements: **§ 15.247(a):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Procedure: The transmitter was set to the mid channel at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 6 dB Bandwidth was measured and recorded. The measurements were repeated at the low and high channels.

Test Results The EUT was found compliant with the Radiated Emission limits of **§15.247(a)** for Intentional Radiators. See following pages for detailed test results.

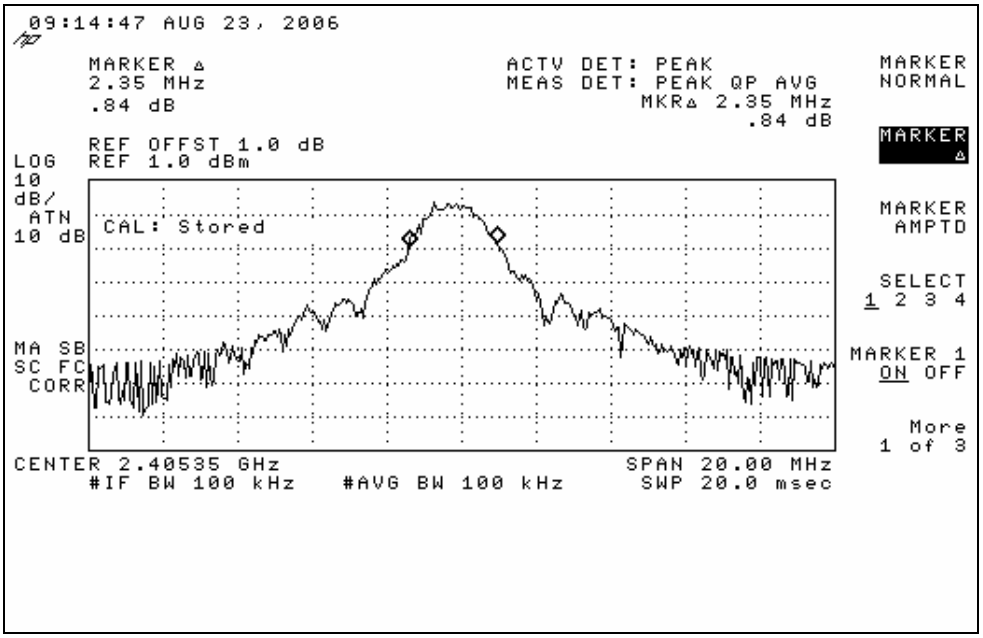
Carrier Channel	Frequency (MHz)	Measured 6 dB Bandwidth (MHz)	Measured 99% Bandwidth (MHz)
Low	2.405	2.35	2.45
Mid	2.440	2.55	2.72
High	2.4803	2.05	2.32

Test Engineer: Asad Bajwa

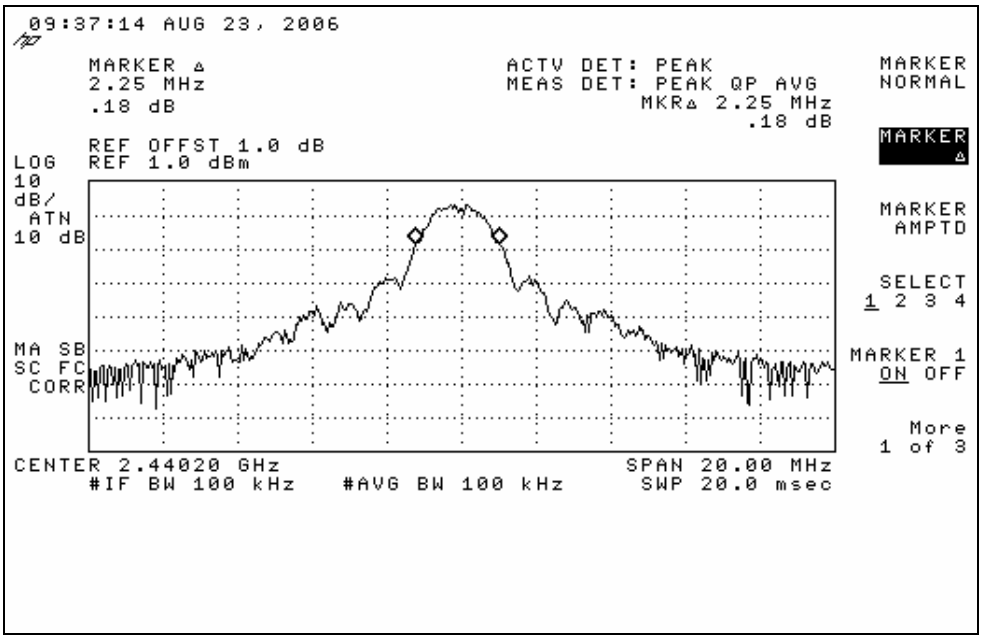
Test Date(s): 8/16/06

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247 6 dB Bandwidth & 99% Bandwidth



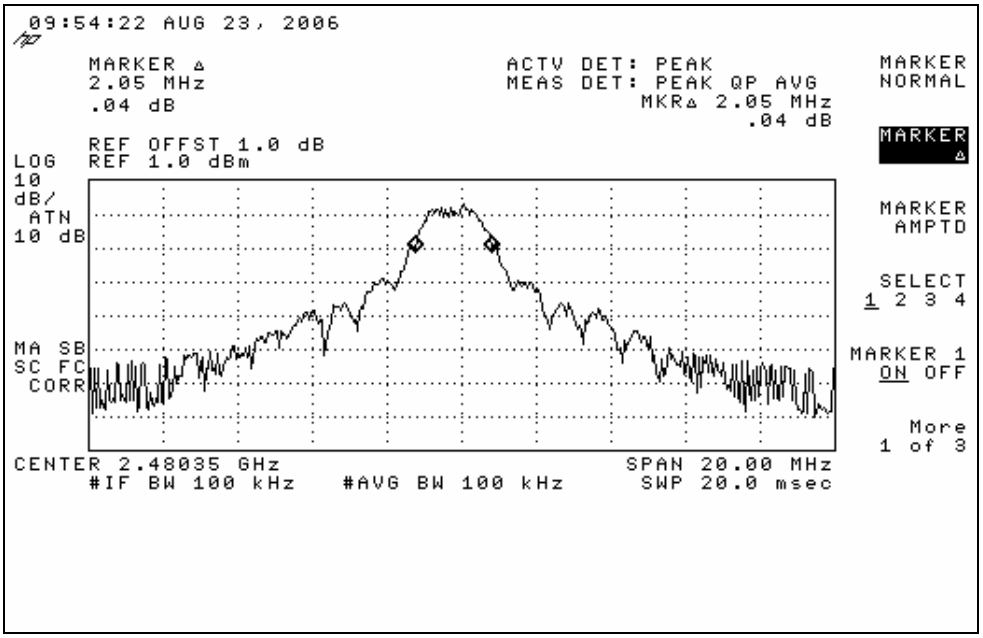
Plot 2. Low-Channel Occupied BW



Plot 3. Mid-Channel Occupied BW

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247 6 dB Bandwidth & 99% Bandwidth



Plot 4. High-Channel Occupied BW

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output and RF Exposure

Test Requirements: **§15.247(b):** The maximum peak output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (Watts)
902-928	1.000
2400–2483.5	1.000
5725– 5850	1.000

Table 6. Output Power Requirements from §15.247

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in the Table 6, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, omni-directional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

Test Procedure: The transmitter was set to the lowest channel and the output was connected to the spectrum analyzer. The RBW was set at least 3 times larger than the bandwidth of the emission, VBW≥ RBW. The output power was measured and recorded. Repeated the measurement with middle and highest channel.

Test Results: Equipment complies with the Output Power and RF Exposure limits of **§ 15.247 (b)**.

The peak output power was determined from the plots on the following page(s).

Test Engineer: Asad Bajwa

Test Date(s): 8/23/06

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output and RF Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

Remarks: Equipment complies with the Output Power and RF Exposure limits of **§ 15.247 (b)**.

Test Results:

Channel #	Channel (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP(mW)
11	2405	-1.83	2.2	0.37	1.088
18	2440	-0.83	2.2	1.37	1.377
26	2480	-2.50	2.2	0.30	0.933

Table 7. RF Exposure Requirements - 1.1307(b) (2); 1.1310

Specification: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's Guidelines.

MPE Limit Calculation: EUT's operating frequencies @ 2402 - 2480 MHz; EIRP 1.377 dBm therefore,
Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2

Equation from page 18 of OET 65, Edition 97-01

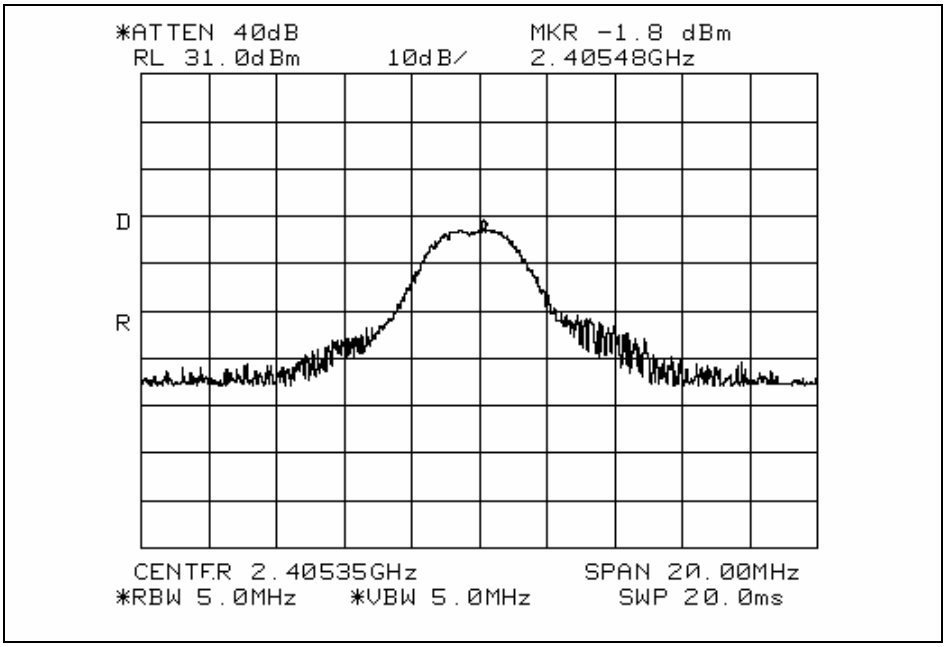
$S = PG / 4\pi R^2$ where, S = Power Density
P = Power Input to antenna (0.000826 Watts)
G = Antenna Gain (2.2 dBi) – numeric gain (1.66)
R = distance to the center of radiation of the antenna (20 cm or 0.2 m)

$S = 0.000826W*1.66 / 4*3.14*(0.2m)^2 = 0.0135W / 0.5024m^2 = 0.00273W/m^2$

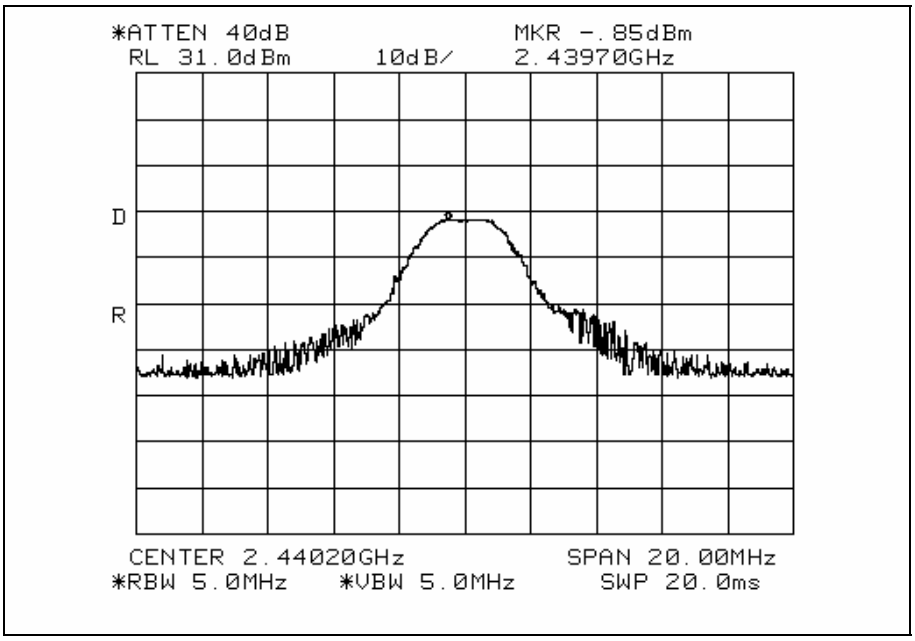
EUT comply with 20cm distance exposure.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Output Power and RF Exposure



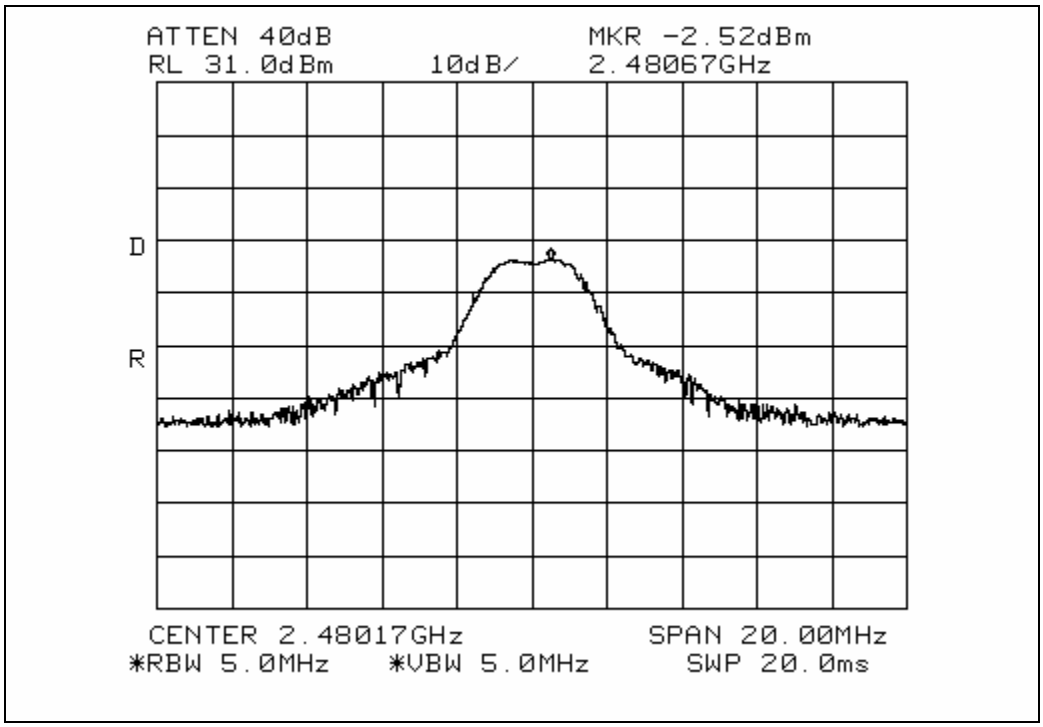
Plot 5. Low Channel (2402 MHz) Power Output



Plot 6. Mid Channel (2441 MHz) Power

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Output Power and RF Exposure



Plot 7. High Channel Power

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Harmonic Emissions – Radiated and Conducted

Test Requirements: **§15.247(c)**; **§15.209; §15.205:** Emissions outside the frequency band.

§15.247(c): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. 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
[1] 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	([2])

Table 8. Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

Test Results: There are no detectable emissions at 2.39 GHz. (noise floor).

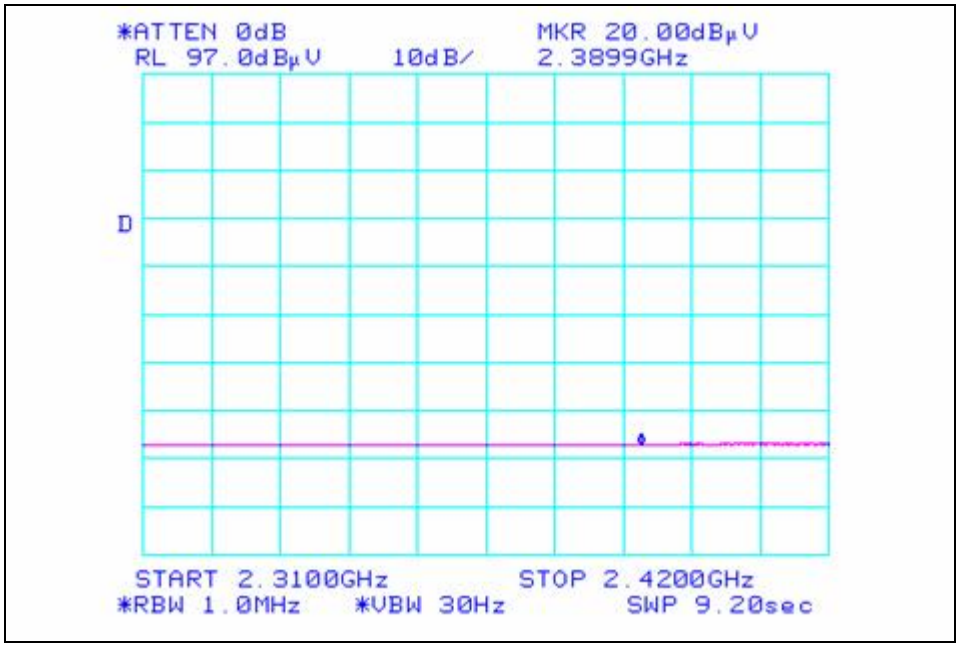
(20.43 + 28.9 – 10) dBµV = 39.33 dBµV

The 28.9 dB is antenna factor @ 2.4835 GHz
The 10 dB is distance correction factor.

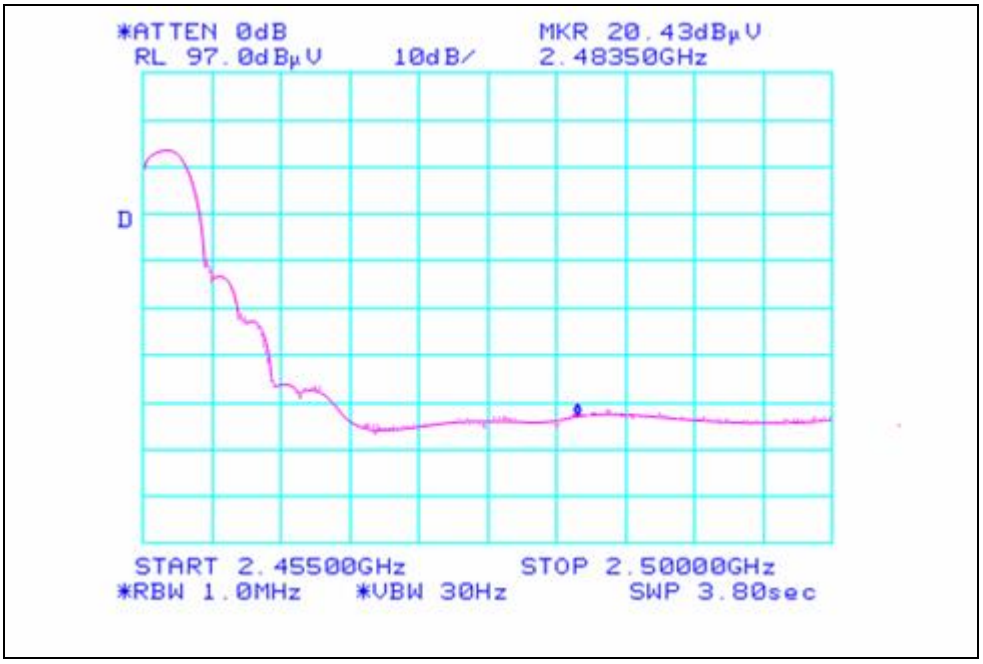
Limit: 54 dBµV at 3 meters

Test Engineer: Asad Bajwa

Test Date: 9/05/06



Plot 7. Radiated Emissions at Restricted Band 2390 MHz



Plot 8. Radiated Emissions at Restricted Band 2483.5 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Spurious Emissions Requirements –RF Conducted

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

For frequencies 1-18GHz, measurements were made at coupler port of a 20dB directional coupler. The output of the coupler was terminated by a 50Ω load. For frequencies 18-40GHz a HP11970A and HP11970K harmonic mixer was used. Each harmonic mixer was fed with a SMA to wave guide adapter.

Test Results: Equipment complies with the Spurious Emissions Requirements – Radiated and RF Conducted limits of **§ 15.247 (c)**. For Radiated Emissions result, refer to section "§15.209: Radiated Emission Limits". See following pages for detailed test results with RF Conducted Spurious Emissions and §15.205 Restricted Bands.

Test Engineer: Asad Bajwa

Test Date: 9/05/06

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Spurious Emissions Requirements – Radiated

Frequency (GHz)	EUT Azimuth (Degrees)	EUT Polarization (H/V)	Height (m)	Detector (AVG/ PK)	Raw (dBµV)	Pre-Amp (dB)	Antenna Correction Factor (dB)	CBL (dB)	Distance Correction Factor (dB)	Corrected (dBuV/m)	Limit (dBuV/m)	Delta (dBuV/m)	Remark(s)
4.810	0	H	1.2	AVG	28.2	34.52	34.80	3.61	9.54	22.54880	54.0	-31.4512	A & E
4.810	0	V	1.0	AVG	31.3	34.52	34.90	3.61	9.54	25.74880	54.0	-28.2512	A & E
4.810	0	H	1.2	PK	36.7	34.52	34.80	3.61	9.54	31.04880	74.0	-42.9512	A & E
4.810	0	V	1.0	PK	40.2	34.52	34.90	3.61	9.54	34.64880	74.0	-39.3512	A & E
7.215	0	H	1.2	AVG	32.3	34.50	38.05	4.55	9.54	30.85740	54.0	-23.1426	A & E
7.215	270	V	1.0	AVG	33.2	34.50	38.05	4.55	9.54	31.75740	54.0	-22.2426	A & E
7.215	135	H	1.2	PK	44.4	34.50	38.05	4.55	9.54	42.95740	74.0	-31.0426	A & E
7.215	270	V	1.0	PK	46.2	34.50	38.05	4.55	9.54	44.75740	74.0	-29.2426	A & E
9.620	135	H	1.2	AVG	31.3	34.90	39.20	5.45	9.54	31.51200	54.0	-22.488	A & E
9.620	270	V	1.0	AVG	32.4	34.90	39.10	5.45	9.54	32.51200	54.0	-21.488	A & E
9.620	135	H	1.2	PK	43.3	34.90	39.20	5.45	9.54	43.51200	74.0	-30.488	A & E
9.620	270	V	1.0	PK	43.7	34.90	39.10	5.45	9.54	43.81200	74.0	-30.188	A & E
12.025	135	H	1.2	AVG	34.5	34.10	40.91	6.50	9.54	38.27100	54.0	-15.729	A & E
12.025	270	V	1.0	AVG	34.5	34.10	40.99	6.50	9.54	38.35100	54.0	-15.649	A & E
12.025	135	H	1.2	PK	3.2	34.10	40.91	6.50	9.54	6.97100	74.0	-67.029	A & E
12.025	270	V	1.0	PK	44.2	34.10	40.99	6.50	9.54	48.05100	74.0	-25.949	A & E
14.430	135	H	1.2	AVG	37.8	33.73	41.37	7.14	9.54	43.04137	54.0	-10.95863	A & E
14.430	270	V	1.0	AVG	38	33.73	41.37	7.14	9.54	43.24137	54.0	-10.75863	A & E
14.430	135	H	1.2	PK	48.2	33.73	41.37	7.14	9.54	53.44137	74.0	-20.55863	A & E
14.430	270	V	1.0	PK	48.7	33.73	41.37	7.14	9.54	53.94137	74.0	-20.05863	A & E
16.835	135	H	1.2	AVG	35.6	33.99	41.85	7.85	15.56	35.75451	54.0	-18.24549	B & E
16.835	270	V	1.0	AVG	36.4	33.99	42.09	7.85	15.56	36.79851	54.0	-17.20149	B & E
16.835	135	H	1.2	PK	48.3	33.99	41.85	7.85	15.56	48.45451	74.0	-25.54549	B & E
16.835	270	V	1.0	PK	47.9	33.99	42.09	7.85	15.56	48.29851	74.0	-25.70149	B & E
19.240	135	H	1.2	AVG	37.56	33.78	44.78	8.93	15.56	41.92796	54.0	-12.07204	B & E
19.240	270	V	1.0	AVG	37.9	33.78	44.78	8.93	15.56	42.26796	54.0	-11.73204	B & E
19.240	135	H	1.2	PK	48.9	33.78	44.78	8.93	15.56	53.26796	74.0	-20.73204	B & E
19.240	270	V	1.0	PK	51.2	33.78	44.78	8.93	15.56	55.56796	74.0	-18.43204	B & E
21.645	135	H	1.2	AVG	45.1	34.24	45.36	9.41	20.00	45.63472	54.0	-8.365276	C & E
21.645	270	V	1.0	AVG	45.2	34.24	45.36	9.41	20.00	45.73472	54.0	-8.265276	C & E
21.645	135	H	1.2	PK	54.2	34.24	45.36	9.41	20.00	54.73472	74.0	-19.26528	C & E
21.645	270	V	1.0	PK	56.1	34.24	45.36	9.41	20.00	56.63472	74.0	-17.36528	C & E
24.050	135	H	1.2	AVG	45.2	34.23	45.78	10.1	20.00	46.93750	54.0	-7.062500	C & E
24.050	270	V	1.0	AVG	42.4	34.23	45.78	10.1	20.00	44.137500	54.0	-9.862500	C & E
24.050	135	H	1.2	PK	53.5	34.23	45.78	10.1	20.00	55.237500	74.0	-18.76250	C & E
24.050	270	V	1.0	PK	52.1	34.23	45.78	10.1	20.00	53.837500	74.0	-20.16250	C & E

Low Channel Emissions

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Spurious Emissions Requirements – Radiated

Frequency (GHz)	EUT Azimuth (Degrees)	EUT Polarization (H/V)	Height (m)	Detector (AVG/ PK)	Raw (dBµV)	Pre-Amp (dB)	Antenna Correction Factor (dB)	CBL (dB)	Distance Correction Factor (dB)	Corrected (dBuV/m)	Limit (dBuV/m)	Delta (dBuV/m)	Remark(s)
4.88	0	H	1.2	AVG	29.20	34.52	34.80	3.64	9.54	23.57600	54.0	-30.42400	A & E
4.88	0	V	1.0	AVG	32.20	34.52	34.90	3.64	9.54	26.67600	54.0	-27.32400	A & E
4.88	0	H	1.2	PK	35.60	34.52	34.80	3.64	9.54	29.97600	74.0	-44.02400	A & E
4.88	270	V	1.0	PK	39.70	34.52	34.90	3.64	9.54	34.17600	74.0	-39.82400	A & E
7.32	0	H	1.2	AVG	31.60	34.50	38.05	4.59	9.54	30.20300	54.0	-23.79700	A & E
7.32	0	V	1.0	AVG	32.40	34.50	38.05	4.59	9.54	31.00300	54.0	-22.99700	A & E
7.32	135	H	1.2	PK	44.40	34.50	38.05	4.59	9.54	43.00300	74.0	-30.99700	A & E
7.32	270	V	1.0	PK	46.2	34.50	38.05	4.59	9.54	44.80300	74.0	-29.19700	A & E
9.76	135	H	1.2	AVG	31.30	34.90	39.20	5.50	9.54	31.56000	54.0	-22.44000	A & E
9.76	270	V	1.0	AVG	32.40	34.90	39.10	5.50	9.54	32.56000	54.0	-21.44000	A & E
9.76	135	H	1.2	PK	43.30	34.90	39.20	5.50	9.54	43.56000	74.0	-30.44000	A & E
9.76	270	V	1.0	PK	43.70	34.90	39.10	5.50	9.54	43.86000	74.0	-30.14000	A & E
12.20	135	H	1.2	AVG	34.50	34.10	40.91	6.55	9.54	38.31500	54.0	-15.68500	A & E
12.20	270	V	1.0	AVG	34.50	34.10	40.99	6.55	9.54	38.39500	54.0	-15.60500	A & E
12.20	135	H	1.2	PK	3.20	34.10	40.91	6.55	9.54	7.01500	74.0	-66.98500	A & E
12.20	270	V	1.0	PK	44.20	34.10	40.99	6.55	9.54	48.09500	74.0	-25.90500	A & E
14.64	135	H	1.2	AVG	37.80	33.96	41.14	7.18	9.54	42.62816	54.0	-11.37180	A & E
14.64	270	V	1.0	AVG	38.00	33.96	41.10	7.18	9.54	42.78816	54.0	-11.21180	A & E
14.64	135	H	1.2	PK	48.20	33.96	41.14	7.18	9.54	53.02816	74.0	-20.97180	A & E
14.64	270	V	1.0	PK	48.70	33.96	41.10	7.18	9.54	53.48816	74.0	-20.51180	A & E
17.08	135	H	1.2	AVG	35.60	33.78	43.37	7.92	15.56	37.54657	54.0	-16.45340	B & E
17.08	270	V	1.0	AVG	36.40	33.78	43.62	7.92	15.56	38.59657	54.0	-15.40340	B & E
17.08	135	H	1.2	PK	48.30	33.78	43.37	7.92	15.56	50.24657	74.0	-23.75340	B & E
17.08	270	V	1.0	PK	47.90	33.78	43.62	7.92	15.56	50.09657	74.0	-23.90340	B & E
19.52	135	H	1.2	AVG	37.56	33.96	45.12	9.06	15.56	42.22700	54.0	-11.77300	B & E
19.52	270	V	1.0	AVG	37.90	33.96	45.12	9.06	15.56	42.56700	54.0	-11.43300	B & E
19.52	135	H	1.2	PK	48.90	33.96	45.12	9.06	15.56	53.56700	74.0	-20.43300	B & E
19.52	270	V	1.0	PK	51.20	33.96	45.12	9.06	15.56	55.86700	74.0	-18.13300	B & E
21.96	135	H	1.2	AVG	45.10	34.30	45.34	9.51	20.00	45.65695	54.0	-8.343050	C & E
21.96	270	V	1.0	AVG	45.20	34.30	45.34	9.51	20.00	45.75695	54.0	-8.243050	C & E
21.96	135	H	1.2	PK	54.20	34.30	45.34	9.51	20.00	54.75695	74.0	-19.243100	C & E
21.96	270	V	1.0	PK	56.10	34.30	45.34	9.51	20.00	56.65695	74.0	-17.343100	C & E
24.40	135	H	1.2	AVG	44.30	34.05	45.70	10.4	20.00	46.34430	54.0	-7.655700	C & E
24.40	270	V	1.0	AVG	41.60	34.05	45.70	10.4	20.00	43.64430	54.0	-10.35570	C & E
24.40	135	H	1.2	PK	52.40	34.05	45.70	10.4	20.00	54.44430	74.0	-19.55570	C & E
24.40	270	V	1.0	PK	53.70	34.05	45.70	10.0	20.00	55.74430	74.0	-18.25570	C & E

Mid-Channel Emissions

Electromagnetic Compatibility Criteria for Intentional Radiators

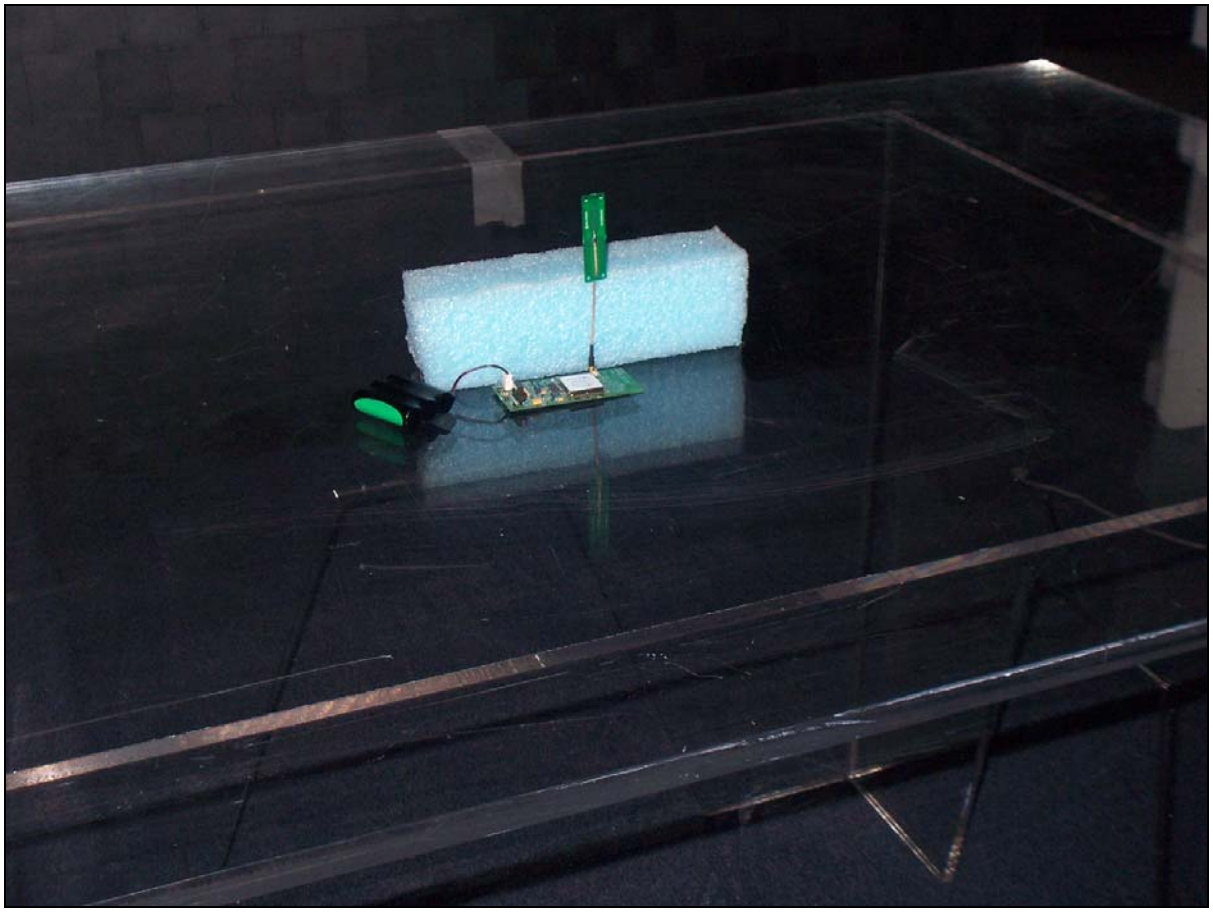
§ 15.247(c) Spurious Emissions Requirements – Radiated

Frequency (GHz)	EUT Azimuth (Degrees)	EUT Polarization (H/V)	Height (m)	Detector (AVG/ PK)	Raw (dBµV)	Pre-Amp (dB)	Antenna Correction Factor (dB)	CBL (dB)	Distance Correction Factor (dB)	Corrected (dBuV/m)	Limit (dBuV/m)	Delta (dBuV/m)	Remark(s)
4.96	135	H	1.2	AVG	32.7	34.52	34.80	3.65	9.54	27.0896	54.0	-26.91040	A
4.96	270	V	1.0	AVG	38.9	34.52	34.90	3.65	9.54	33.3896	54.0	-20.61040	A
4.96	135	H	1.2	PK	46.9	34.52	34.80	3.65	9.54	41.2896	74.0	-32.71040	A
4.96	270	V	1.0	PK	53.9	34.52	34.90	3.65	9.54	48.3896	74.0	-25.61040	A
7.44	135	H	1.2	AVG	34.1	34.50	38.05	4.62	9.54	32.7258	54.0	-21.27420	A & E
7.44	270	V	1.0	AVG	34.6	34.50	38.05	4.62	9.54	33.2258	54.0	-20.77420	A & E
7.44	135	H	1.2	PK	44.9	34.50	38.05	4.62	9.54	43.5258	74.0	-30.47420	A & E
7.44	270	V	1.0	PK	44.8	34.50	38.05	4.62	9.54	43.4258	74.0	-30.57420	A & E
9.92	135	H	1.2	AVG	34.1	34.90	39.20	5.52	9.54	34.384	54.0	-19.61600	A & E
9.92	270	V	1.0	AVG	32.9	34.90	39.10	5.52	9.54	33.084	54.0	-20.91600	A & E
9.92	135	H	1.2	PK	44.4	34.90	39.20	5.52	9.54	44.684	74.0	-29.31600	A & E
9.92	270	V	1.0	PK	45.1	34.90	39.10	5.52	9.54	45.284	74.0	-28.71600	A & E
12.4	135	H	1.2	AVG	33.8	34.10	40.91	6.57	9.54	37.637	54.0	-16.36300	A & E
12.4	270	V	1.0	AVG	33.8	34.10	40.99	6.57	9.54	37.717	54.0	-16.28300	A & E
12.4	135	H	1.2	PK	43.8	34.10	40.91	6.57	9.54	47.637	74.0	-26.36300	A & E
12.4	270	V	1.0	PK	43.8	34.10	40.99	6.57	9.54	47.717	74.0	-26.28300	A & E
14.88	135	H	1.2	AVG	37.9	34.06	41.04	7.21	9.54	42.55498	54.0	-11.44500	A & E
14.88	270	V	1.0	AVG	37.8	34.06	40.98	7.21	9.54	42.39098	54.0	-11.60900	A & E
14.88	135	H	1.2	PK	48.6	34.06	41.04	7.21	9.54	53.25498	74.0	-20.74500	A & E
14.88	270	V	1.0	PK	47.8	34.06	40.98	7.21	9.54	52.39098	74.0	-21.60900	A & E
17.36	135	H	1.2	AVG	38.7	33.77	44.18	7.95	15.56	41.50474	54.0	-12.49530	B & E
17.36	270	V	1.0	AVG	38.8	33.77	44.29	7.95	15.56	41.71474	54.0	-12.28530	B & E
17.36	135	H	1.2	PK	51.1	33.77	44.18	7.95	15.56	53.90474	74.0	-20.09530	B & E
17.36	270	V	1.0	PK	50.3	33.77	44.29	7.95	15.56	53.21474	74.0	-20.78530	B & E
19.84	135	H	1.2	AVG	40.2	34.06	45.31	9.10	15.56	44.9974	54.0	-9.00260	B & E
19.84	270	V	1.0	AVG	38.8	34.06	45.31	9.10	15.56	43.5974	54.0	-10.40260	B & E
19.84	135	H	1.2	PK	50.2	34.06	45.31	9.10	15.56	54.9974	74.0	-19.00260	B & E
19.84	270	V	1.0	PK	49.6	34.06	45.31	9.10	15.56	54.3974	74.0	-19.60260	B & E
22.32	135	H	1.2	AVG	43.9	34.14	45.48	9.56	20.00	44.80525	54.0	-9.19475	C & E
22.32	270	V	1.0	AVG	44.2	34.14	45.48	9.56	20.00	45.10525	54.0	-8.89475	C & E
22.32	135	H	1.2	PK	54.8	34.14	45.48	9.56	20.00	55.70525	74.0	-18.29480	C & E
22.32	270	V	1.0	PK	55.3	34.14	45.48	9.56	20.00	56.20525	74.0	-17.79480	C & E
24.8	135	H	1.2	AVG	44.4	33.97	45.58	10.50	20.00	46.51066	54.0	-7.489340	C & E
24.8	270	V	1.0	AVG	44.2	33.97	45.58	10.50	20.00	46.31066	54.0	-7.689340	C & E
24.8	135	H	1.2	PK	54.3	33.97	45.58	10.50	20.00	56.41066	74.0	-17.58930	C & E
24.8	270	V	1.0	PK	54.8	33.97	45.58	10.50	20.00	56.91066	74.0	-17.08930	C & E

High-Channel Emissions

Electromagnetic Compatibility Criteria for Intentional Radiators

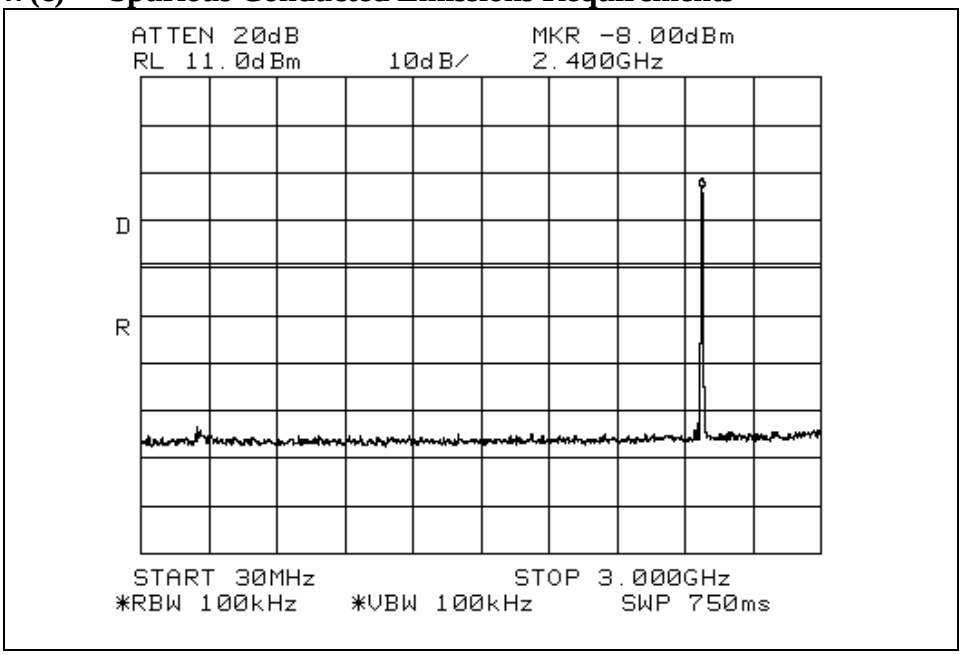
§ 15.247(c) Spurious Emissions Requirements – Radiated



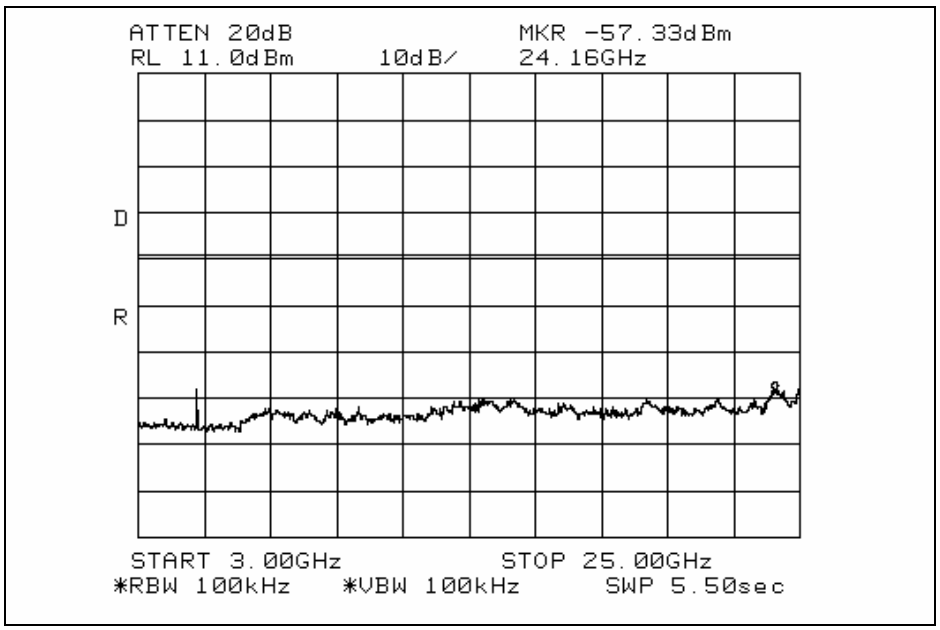
Photograph 6. Spurious Radiated Emissions Measurement Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Spurious Conducted Emissions Requirements



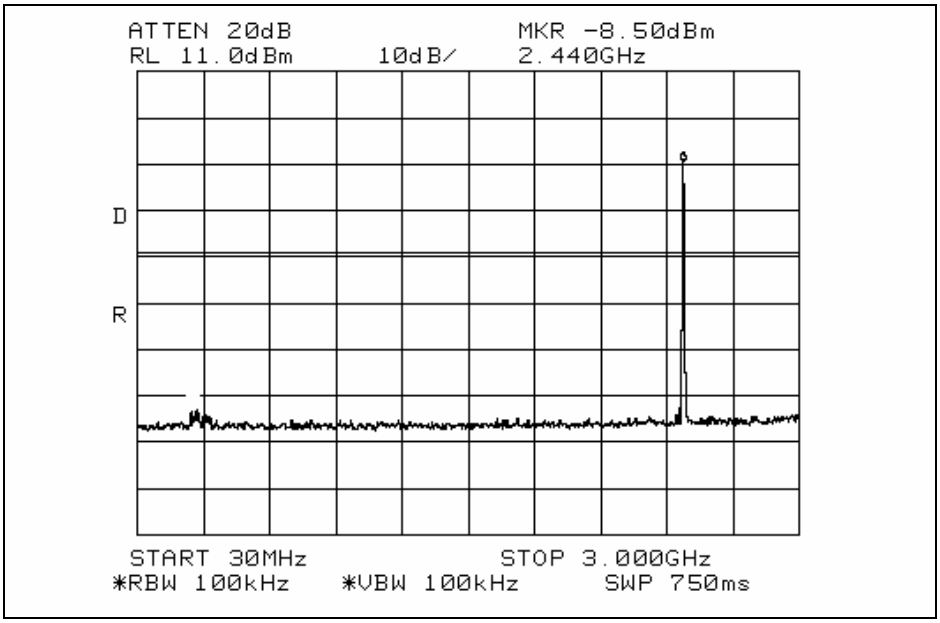
Plot 9. Low-Channel (2402 MHz) Spurious Emission, 30 MHz - 2.9 GHz



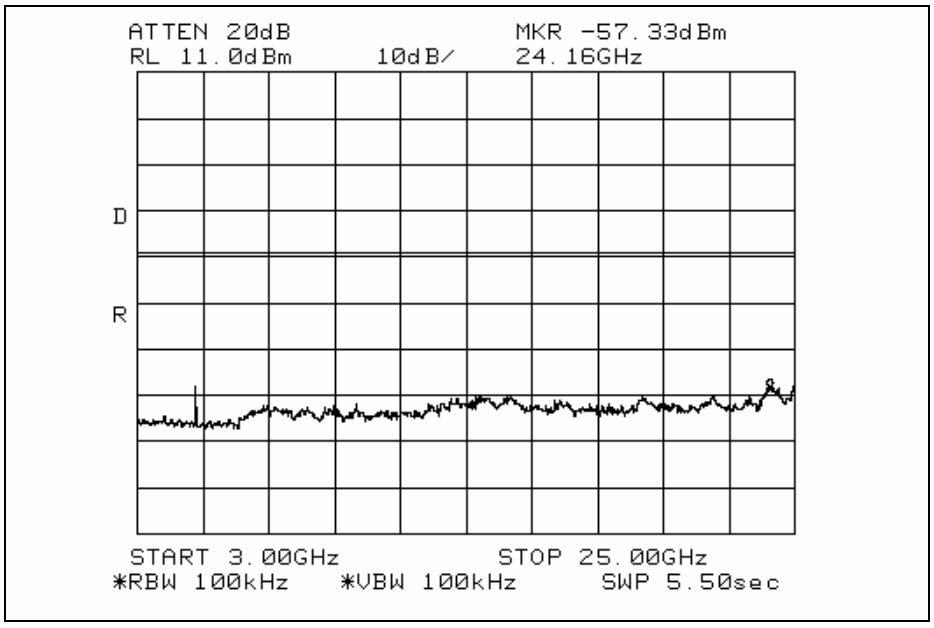
Plot 10. Low-Channel (2402 MHz) Spurious Emission, 2.68 – 25 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Spurious Conducted Emissions Requirements



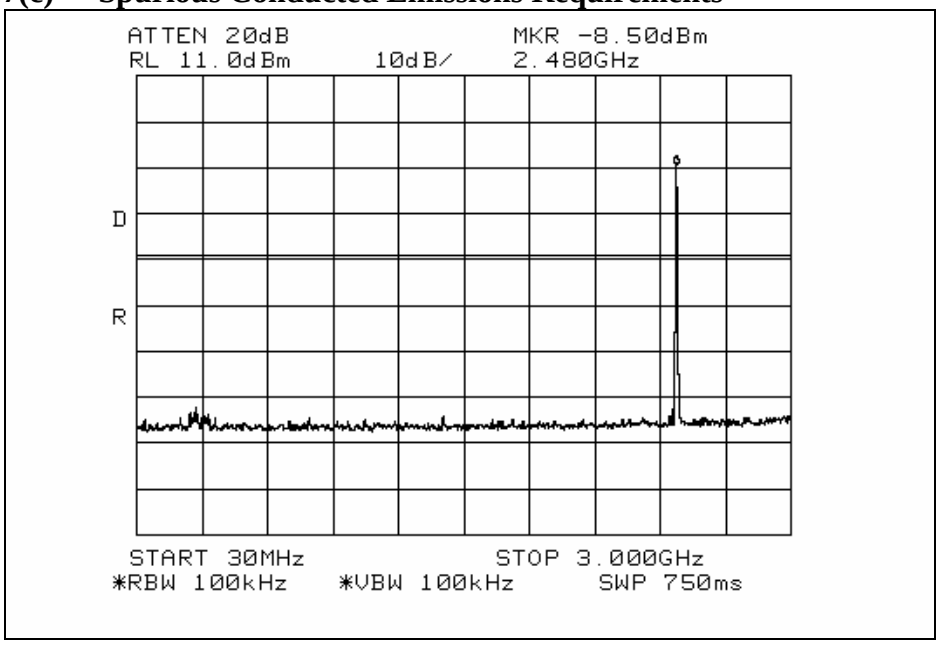
Plot 11. Mid-channel (2441 MHz) Spurious Emission, 30 MHz - 2.9 GHz



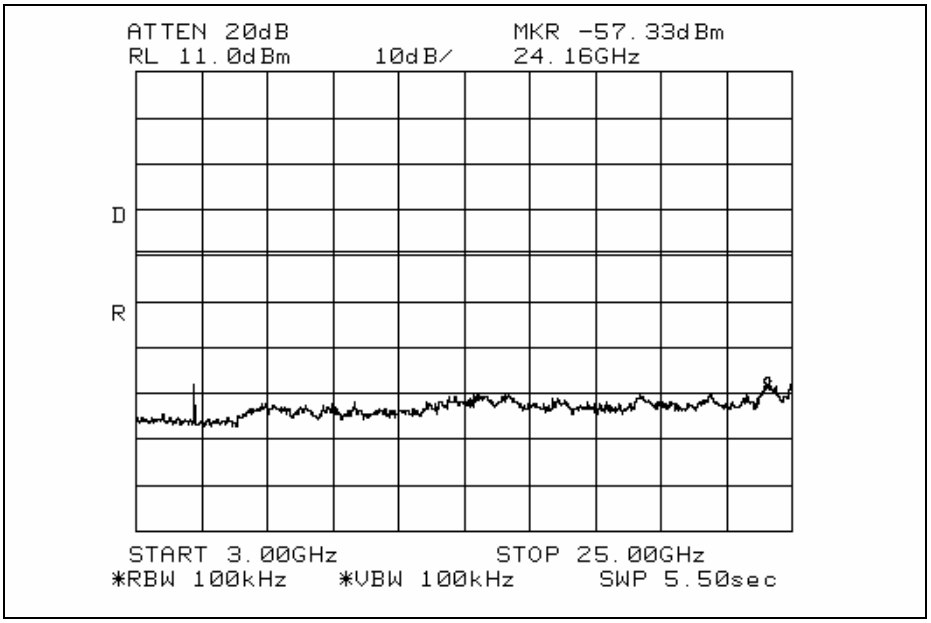
Plot 12. Mid-channel (2441 MHz) Spurious Emission, 2.68 GHz - 25 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Spurious Conducted Emissions Requirements



Plot 13. High channel (2480 MHz) Spurious Emission, 30 MHz - 2.9 GHz

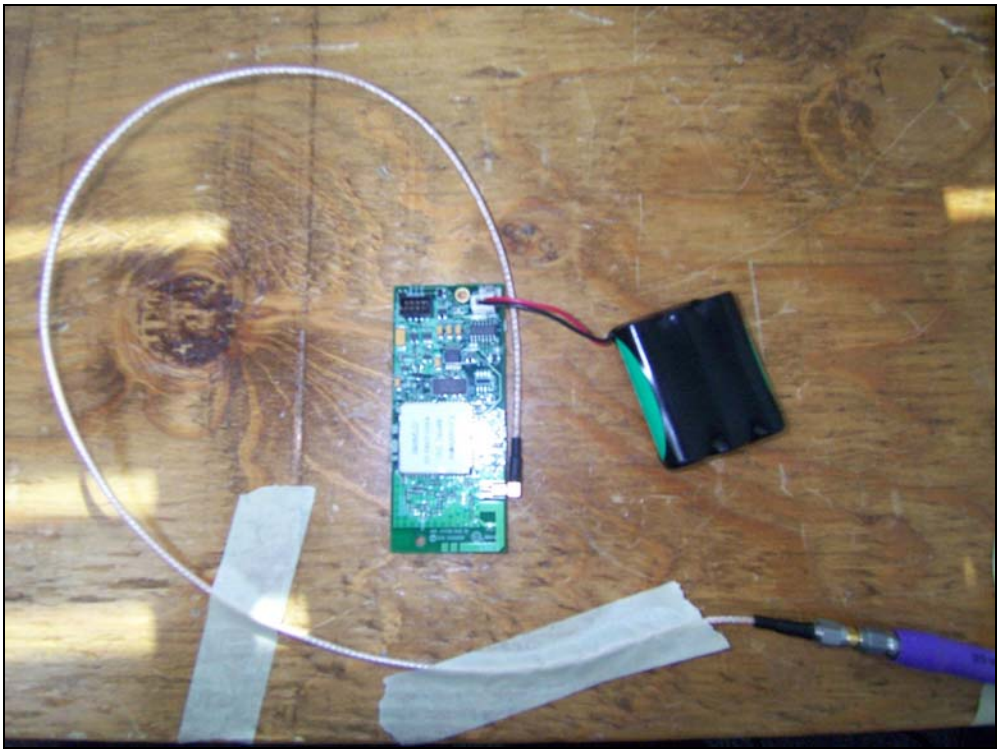


Plot 14 . High-Channel (2480 MHz) Spurious Emission, 2.68 GHz - 25 GHz

Remarks: Equipment complies with the Spurious Emissions Requirements – RF Conducted limits of **§ 15.247(c)**.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Spurious Conducted Emissions Requirements



Photograph 7. Spurious Conducted Measurements Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Peak Power Spectral Density

Test Requirements: **§15.247(d):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through a directional couple. The power was monitored at the coupler port with a Peak Power Meter. The power level was set to the maximum level. The RBW and VBW were set to 3 kHz and a SPAN of 3.0 MHz with a 100 second sweep to the Spectrum Analyzer. Measurements were carried out at the low, mid and high channels.

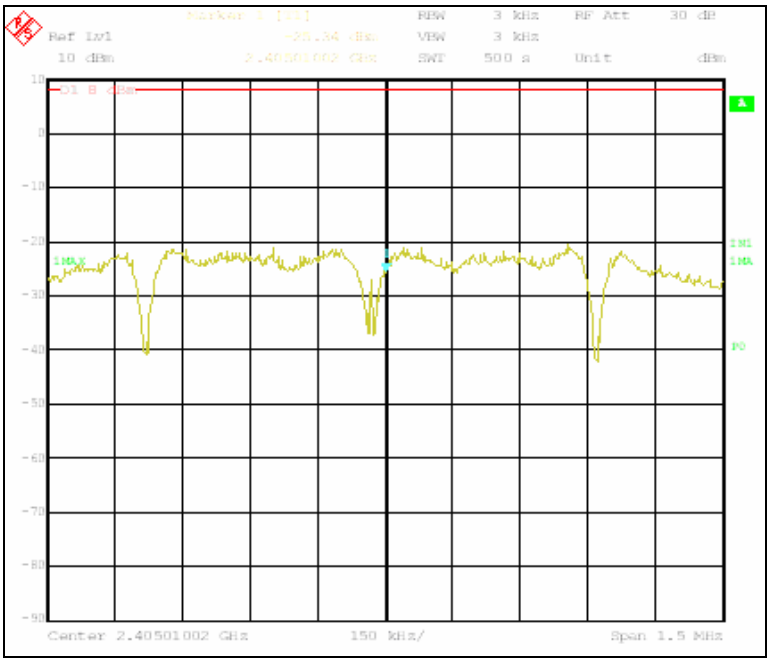
Test Results: Equipment complies with the power spectral density limits of **§15.247 (d)**. The power spectral density was determined from plots on the following page(s).

Test Engineer: Asad Bajwa

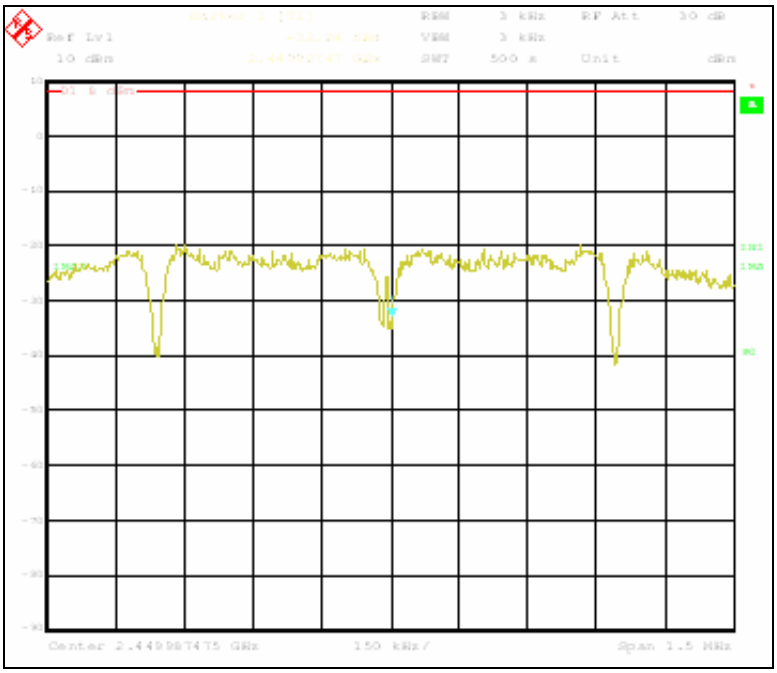
Test Date: 9/06/06

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Power Spectral Density Test Results



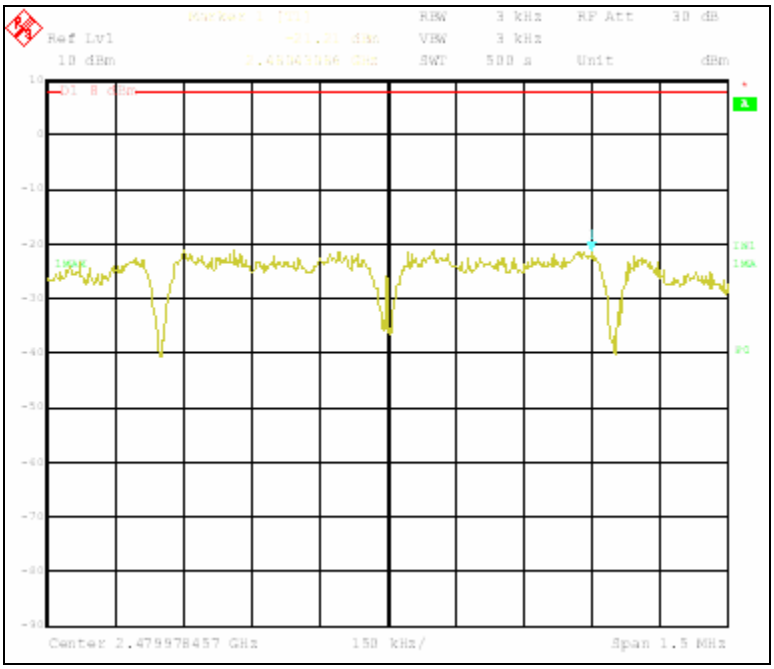
Plot 15. Power Spectral Density Plot 1



Plot 16, Power Spectral Density Plot 2

Electromagnetic Compatibility Criteria for Intentional Radiators

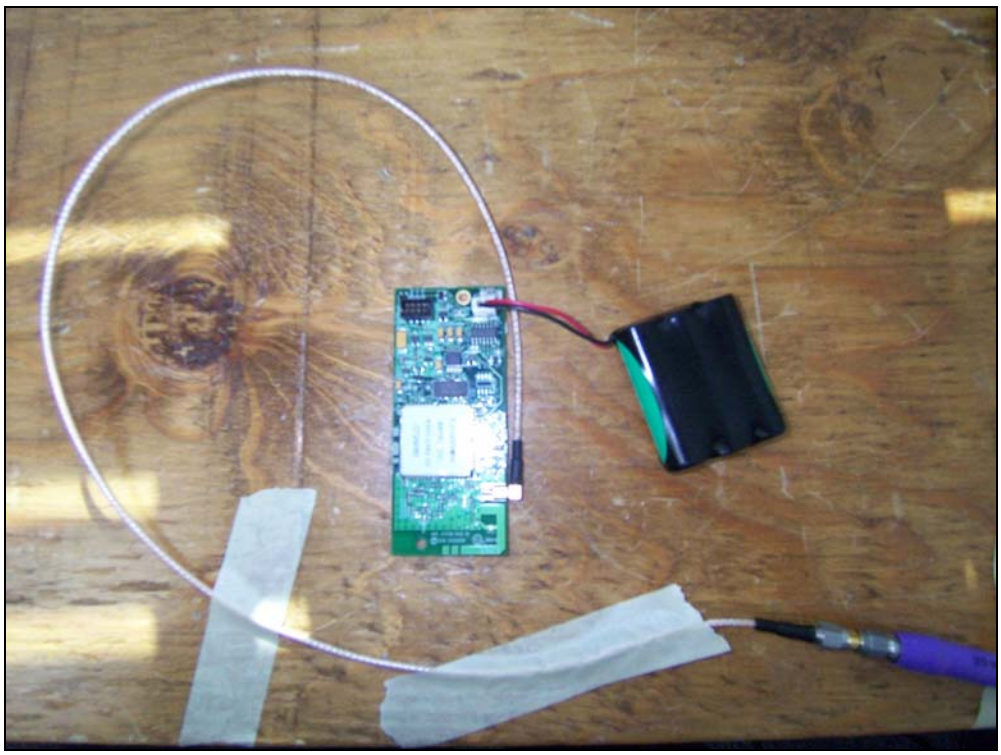
§ 15.247(c) Power Spectral Density Test Results



Plot 17. Power Spectral Density Plot 3

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(c) Power Spectral Density Test Setup



Photograph 8. Power Spectral Density Test Setup

V. 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.

All Test Equipment			**Test Date(s):** 8/16/06, 8/23/06, 9/05/06, and 9/06/06,		
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1U32	Semi- Anechoic Chamber	Lindgren Enclosures	Fact 4	07/25/06	07/25/07
1U170	Biconilog Antenna	ETS Lindgren	3142C	05/13/06	05/13/07
1U2	Spectrum Analyzer	Hewlett Packard	8593EM	03/07/06	03/07/07
1U165	Active Horn Antenna	Com-Power	AHA-118	01/29/06	01/29/07
1U27	Pre-Amplifier	Hewlett Packard	08449B H02	01/25/06	01/25/07
1U150	EMI Test Receiver	Rhode & Schwarz	ESIB7	04/15/06	04/15/07
1U98	LISN	Solar Electronics Company	8616-50-TS-200-N	11/15/05	11/15/06
1U97	LISN	Solar Electronics Company	8616-50-TS-200-N	11/15/05	11/15/06
1U92	Transient Limiter	Hewlett Packard	11947A	06/28/06	06/28/07

VI. Certification of User's Manual Information

Certification & User's Manual Information

K. 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.[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.

§ 2.907 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.

[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.

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 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.

End of Report

