



**M. Flom Associates, Inc. - Global Compliance Center**

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176

www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

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Date: July 20, 1999

Federal Communications Commission  
EQUIPMENT APPROVAL SERVICES  
P.O. Box 358315  
Pittsburgh, PA 15251-5315

Attention: Authorization & Evaluation Division

Applicant: Aironet Wireless Communications, Inc.  
Equipment: PC4850  
FCC ID: LOZ102038  
FCC Rules: 15.247, Confidentiality

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

A handwritten signature in black ink, appearing to read "William H. Graff", is written over a horizontal line.

William H. Graff

enclosure(s)  
CERTIFIED MAIL, R.R.R.  
cc: Applicant  
WHG/cvr



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Attention: Authorization & Evaluation Division

Applicant: Aironet Wireless Communications, Inc.  
FCC ID: LOZ102038  
Equipment: PC4850  
Subject: Electronically Filed FORM 731  
Confirmation:

Gentlemen:

As per instructions received, enclosed herewith please find completed Remittance Advice Form 159 for the referenced equipment, bearing original signature, and the application having been electronically filed.

Sincerely yours,

A handwritten signature in black ink, appearing to read "William H. Graff", is written over a horizontal line.

William H. Graff

enclosure(s)  
CERTIFIED MAIL, R.R.R.  
cc: Visa  
cc: File

WHG/cvr

LIST OF EXHIBITS  
(FCC **CERTIFICATION** (TRANSMITTERS) - REVISED 9/28/98)

APPLICANT:                   Aironet Wireless Communications, Inc.

FCC ID:                     LOZ102038

BY APPLICANT:

1. LETTER OF AUTHORIZATION
2. IDENTIFICATION DRAWINGS
  - \_\_\_\_\_ ID LABEL
  - \_\_\_\_\_ LOCATION INFO
  - \_\_\_\_\_ ATTESTATION STATEMENT(S)
  - \_\_\_\_\_ LOCATION OF COMPLIANCE STATEMENT
3. DOCUMENTATION: 2.1033(b)
  - (3) USER MANUAL(S)
  - (4) OPERATIONAL DESCRIPTION
  - (5) BLOCK DIAGRAM
  - (5) SCHEMATIC DIAGRAM
  - (7) EXTERNAL PHOTOGRAPHS
  - INTERNAL PHOTOGRAPHS
4. DRAFT SPECIFICATION INFORMATION
5. PARTS LIST/TUNE UP INFO

BY M.F.A. INC.

- A. TESTIMONIAL & STATEMENT OF CERTIFICATION
- B. STATEMENT OF QUALIFICATIONS



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Sub-part  
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: LOZ102038

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

July 20, 1999

SUPERVISED BY:

A handwritten signature in black ink, appearing to read 'William H. Graff', is written over a horizontal line.

William H. Graff

THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

15.21 INFORMATION TO USER.

The users manual or instruction manual for an intentional 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.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.


Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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	Standard Test Conditions and Engineering Practices	6
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PAGE NO. 1 of 45.

*Required information per ISO/IEC Guide 25-1990, paragraph 13.2:*

- a) TEST REPORT
- b) Laboratory: M. Flom Associates, Inc.  
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107  
(Canada: IC 2044) Chandler, AZ 85225
- c) Report Number: d9970040
- d) Client: Aironet Wireless Communications, Inc.  
P.O. Box 5292  
Fairlawn, OH 44334-0292
- e) Identification: PC4850  
FCC ID: LOZ102038  
Description: Direct Sequence Spread Spectrum
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: July 20, 1999  
EUT Received: July 7, 1999
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by:   
William H. Graff
- n) Results: The results presented in this report relate only to the item tested.
- o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

PAGE NO. 2 of 45.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,  
VOLUME II, PART 2 AND TO

15.247, Confidentiality

Sub-part 2.1033

(c)(1): NAME AND ADDRESS OF APPLICANT:

Aironet Wireless Communications, Inc.  
3875 Embassy Parkway  
Akron, OH 44333

MANUFACTURER:

Applicant

(c)(2): FCC ID: LOZ102038

MODEL NO: PC4850

(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: N/A

(c)(5): FREQUENCY RANGE, MHz: 2412 to 2462

(c)(6): POWER RATING, Watts: 0.1  
       \_\_\_ Switchable \_\_\_ Variable   x   N/A

(c)(7): MAXIMUM POWER RATING, Watts: 1

15.203: ANTENNA REQUIREMENT:

  x   The antenna is permanently attached to the EUT  
 \_\_\_ The antenna uses a unique coupling  
 \_\_\_ The EUT must be professionally installed  
 \_\_\_ The antenna requirement does not apply



PAGE NO. 3 of 45.

Subpart 2.1033 (continued)

(c)(8): VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE,  
INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual  
COLLECTOR VOLTAGE, Vdc = per manual  
SUPPLY VOLTAGE, Vdc = 5

(c)(9): TUNE-UP PROCEDURE:

PLEASE SEE ATTACHED EXHIBITS

(c)(10): CIRCUIT DIAGRAM/CIRCUIT DESCRIPTION:

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

PLEASE SEE ATTACHED EXHIBITS

(c)(11): LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

(c)(12): PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

(c)(13): DIGITAL MODULATION DESCRIPTION:

     ATTACHED EXHIBITS  
  x   N/A

(c)(14): TEST AND MEASUREMENT DATA:

FOLLOWS

PAGE NO.

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M. Flom Associates, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA) as shown in the scope below.



**THE AMERICAN  
ASSOCIATION  
FOR LABORATORY  
ACCREDITATION**

**ACCREDITED LABORATORY**

A2LA has accredited

**M. FLOM ASSOCIATES, INC.**  
**Chandler, AZ**

for technical competence in the field of

**Electrical (EMC) Testing**


The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 24<sup>th</sup> day of November, 1998.



*Peter Mlynar*  
President  
For the Accreditation Council  
Certificate Number 1008.01  
Valid to December 31, 2000

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation



**American Association for Laboratory Accreditation**

**SCOPE OF ACCREDITATION TO ISO/IEC GUIDE 25-1990 AND EN 45001**

**M. FLOM ASSOCIATES, INC.**  
Electronic Testing Laboratory  
3356 North San Marcos Place, Suite 107  
Chandler, AZ 85224-1571  
Morton Flom Phone: 602 926 3100

**ELECTRICAL (EMC)**

Valid to: December 31, 2000 Certificate Number: 1008-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

Tests	Standard(s)
RF Emissions	FCC Part 15 (Subparts B and C) using ANSI C63.4-1992; CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 50081-1; EN 50081-2; FCC Part 18; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1
RF Immunity	EN 50082-1; EN 50082-2; AS/NZS 4251.1
Radiated Susceptibility	EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3
ESD	EN 61000-4-2; IEC 1000-4-2; IEC 801-2
EFT	EN 61000-4-4; IEC 1000-4-4; IEC 801-4
Surge	EN 61000-4-5; ENV 50142; IEC 1000-4-5; IEC 801-5
47 CFR (FCC)	2, 21, 22, 23, 24, 74, 80, 87, 90, 95, 97

*Peter Mlynar*

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8307 • Phone: 301 644 3200 • Fax: 301 662 2974

"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not covered by this laboratory's A2LA accreditation.

PAGE NO.

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Sub-part  
2.1033(b):TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.1031, 2.1033, 2.1035, 2.1041, 2.1043, 2.1045, and the following individual Parts:

- \_\_\_\_\_ 15.209 Radiated emission limits; general requirements
- \_\_\_\_\_ 15.211 Tunnel radio systems
- \_\_\_\_\_ 15.213 Cable locating equipment
- \_\_\_\_\_ 15.214 Cordless telephones
- \_\_\_\_\_ 15.217 Operation in the band 160-190 kHz
- \_\_\_\_\_ 15.219 Operation in the band 510-1705 kHz
- \_\_\_\_\_ 15.221 Operation in the band 525-1705 kHz (leaky coax)
- \_\_\_\_\_ 15.223 Operation in the band 1.705-10 MHz
- \_\_\_\_\_ 15.225 Operation in the band 13.553-13.567 MHz
- \_\_\_\_\_ 15.227 Operation in the band 26-27.28 MHz (remote control)
- \_\_\_\_\_ 15.229 Operation in the band 40.66-40.70 MHz
- \_\_\_\_\_ 15.231 Periodic operation in the band 40.66-40.70 MHz and above 70 MHz
- \_\_\_\_\_ 15.233 Operation within the bands 43.71-44.49, 46.60-46.98 MHz 48.75-49.51 MHz and 49.66-50.0 MHz
- \_\_\_\_\_ 15.235 Operation within the band 49.82-49.90 MHz
- \_\_\_\_\_ 15.237 Operation within the bands 72.0-73.0 MHz, 74.6-74.8 MHz and 75.2-76.0 MHz (auditory assistance)
- \_\_\_\_\_ 15.239 Operation in band 88-108 MHz
- \_\_\_\_\_ 15.241 Operation in the band 174-216 MHz (biomedical)
- \_\_\_\_\_ 15.243 Operation in the band 890-940 MHz (materials)
- \_\_\_\_\_ 15.245 Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, and 24075-24175 MHz (filed disturbance sensors)
- x \_\_\_\_\_ 15.247 Operation within bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz (spread spectrum)
- \_\_\_\_\_ 15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz
- \_\_\_\_\_ 15.251 Operation within the bands 2.9-3.26 GHz, 3.267-3.332 GHz, 3.339-3.3458 GHz, and 3.358-3.6 GHz (vehicle identification systems)
- \_\_\_\_\_ 15.321 Specific requirements for asynchronous devices operating in the 1910-1920 MHz and 2390-2400 MHz bands (Unlicensed PCS)
- \_\_\_\_\_ 15.323 Specific requirements for isochronous devices operating in the 1920-1930 MHz sub-band (Unlicensed PCS)

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STANDARD TEST CONDITIONS  
and  
ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurements.

PAGE NO. 7 of 45.  
NAME OF TEST: Maximum Peak Output Power  
SPECIFICATION: 47 CFR 15.247(b)  
SPEC. LIMIT: = 1 Watt peak (0.25 if <50 Hopping Channels)  
TEST EQUIPMENT: Attached

MEASUREMENT DATA

ANTENNA GAIN, dBi =  
 PEAK OUTPUT POWER, Watts =  
 WORST CASE FOR  
 ALL CHANNELS

RADIATED:


FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, Watts
2412.000	2409.40000	70.8	42.7	113.6	18.4	0.007
2442.000	2439.40000	70.0	43.0	113.0	17.8	0.006
2462.000	2464.70000	70.8	43.2	114.0	18.7	0.007

Sample Calculation:

$$P_{ERP} = (E_V \times R_M)^2 / 49.2 = (113.6 \times 3)^2 / 49.2 = 0.007 \text{ Watts}$$

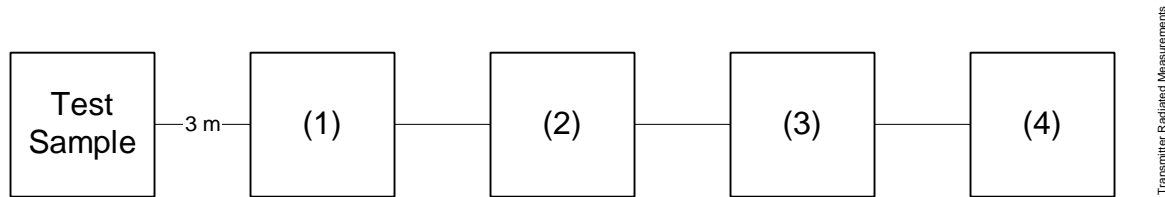
\*Correction factor includes a 7dB correction for 2 MHz RBW to Broadband Power Output.

SUPERVISED BY:

  
 William H. Graff

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TRANSMITTER RADIATED MEASUREMENTS

Asset	Description	s/n
(1) <u>TRANSDUCER</u>		
<u>x</u>	i00091 Emco 3115	001469
<u>x</u>	i00089 Aprel Log Periodic	001500
(2) <u>HIGH PASS FILTER</u>		
<u>x</u>	i00 Narda $\mu$ PAD (In-Band Only)	
<u>x</u>	i00 Trilithic	
	(Out-Of-Band Only)	
(3) <u>PREAMP</u>		
<u>x</u>	i00028 HP 8449 (+30 dB)	2749A00121
(4) <u>SPECTRUM ANALYZER</u>		
<u>x</u>	i00048 HP 8566B	2511A01467
	i00043 HP 8558B	2004A02076
	i00057 HP 8557A	1531A00191
<u>x</u>	i00029 HP 8563E	3213A00104

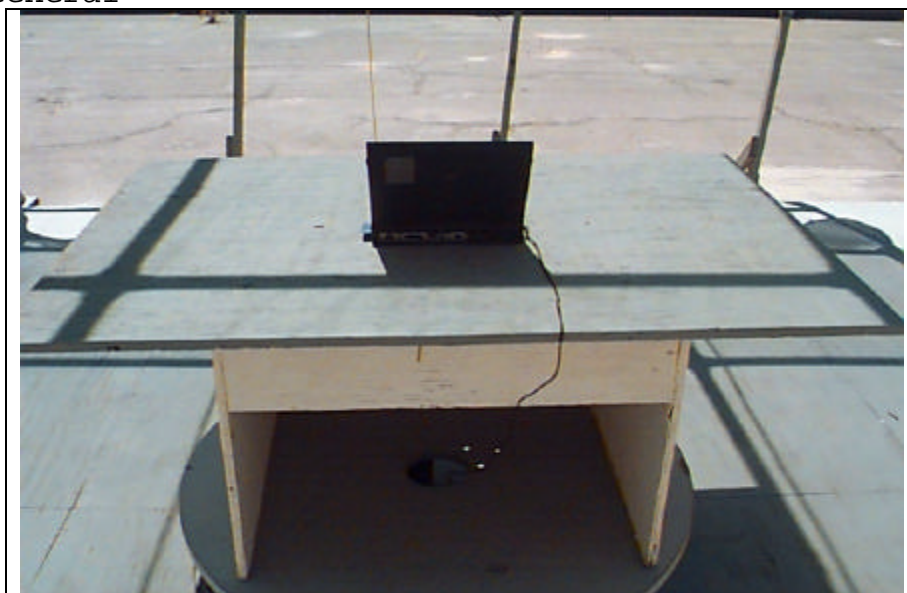
PAGE NO.

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TEST SETUP: Radiated Emissions  
g9970043: 1999-Jul-08 Thu 16:25:58  
STATE: 0:General



TEST SETUP: Radiated Emissions  
g9970044: 1999-Jul-08 Thu 16:25:58  
STATE: 0:General



PAGE NO. 10 of 45.

NAME OF TEST: Out of Band Emissions

SPECIFICATION: 47 CFR 15.247(c), 15.209(a)

SPEC. LIMIT: See Below

TEST EQUIPMENT: As per previous page

SEARCH ANTENNAS: 10 kHz - 32 MHz: LOOP 94598-1  
 32 MHz - 1 GHz: SINGER DM105, T<sub>1</sub>T<sub>2</sub>T<sub>3</sub>  
 1 GHz - 18 GHz: EMCO 3115

### LIMIT

In any 100 kHz bandwidth outside these frequency bands, radio frequency power that is produced by the modulation products of the spreading sequence, information sequence, and the carrier frequency shall be either

at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power

or

shall not exceed the general levels specified in 15.209(a),

whichever results in the lesser attenuation.

All other emissions outside these bands shall not exceed the general radiated emission limits specified in 15.209(a).

### MEASUREMENTS PROCEDURE:

At first, bench tests were performed to locate the emissions at the antenna terminals.

In the field, tests were conducted over the range shown. The test sample was set up on a wooden turntable above ground, and at a distance of three meters from the antenna connected to the spectrum analyzer.

In order to obtain the maximum response at each frequency, the turntable was rotated, and the search antenna was raised and lowered. The EUT was also adjusted for maximum response.

The field strength was calculated from:

$$E \text{ } \mu\text{V/m @ 3 m} = \text{LOG}_{10}^{-1}(\text{dBm} + 107 + \text{A.F.} + \text{C.L.})$$

The following results are worst case conditions. Tests were conducted in Horizontal and Vertical polarization modes.

MEASUREMENT RESULTS: ATTACHED



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NAME OF TEST: Out of Band Emissions

g9970265: 1999-Jul-07 Wed 12:41:00

STATE: 2:High Power Spurious Emissions

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV		CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
2412.000000	4823.750000	30.67	A	7.41	80.17	-61.4	-15.9
2412.000000	4824.000000	41.67	P	7.41	284.45	-50.4	-4.9
2442.000000	4884.000000	40.5	P	7.51	251.48	-51.5	-6
2442.000000	4884.000000	29.33	A	7.51	69.5	-62.7	-17.2
2462.000000	4924.000000	30.83	A	7.58	83.27	-61.1	-15.6
2462.000000	4924.000000	40.67	P	7.58	258.52	-51.3	-5.8
2412.000000	7235.750000	27.67	A	12.62	103.4	-59.2	-13.7
2412.000000	7235.750000	37.67	P	12.62	326.96	-51.3	-3.7
2442.000000	7326.000000	28.17	A	12.59	109.14	-58.8	-13.2
2442.000000	7326.000000	40	P	12.59	426.09	-46.9	-1.4
2462.000000	7386.000000	29	A	12.57	119.81	-58.0	-12.4
2462.000000	7386.000000	39.83	P	12.57	416.87	-47.1	-1.6
2412.000000	9647.750000	29.33	A	16.07	186.21	-54.1	-8.6
2412.000000	9647.750000	40.17	P	16.07	648.63	-43.3	2.2
2442.000000	9768.000000	40.5	P	16.71	725.27	-42.3	3.2
2442.000000	9768.000000	29.67	A	16.71	208.45	-52.1	-7.6
2462.000000	9848.000000	42.33	P	17.12	938.64	-40.1	5.5
2462.000000	9848.000000	30.17	A	17.12	231.47	-52.3	-6.7
2412.000000	12059.750000	28.5	A	14.99	149.45	-56.0	-10.5
2412.000000	12059.750000	39.33	P	14.99	520	-45.2	0.3
2442.000000	12210.000000	28.67	A	15.47	161.06	-55.4	-9.9
2442.000000	12210.000000	39.5	P	15.47	560.4	-43.6	1
2462.000000	12310.000000	29.33	A	15.79	180.3	-54.4	-8.9
2462.000000	12310.000000	38.33	P	15.79	508.16	-45.4	0.1
2412.000000	14471.750000	40	P	16.34	656.15	-43.2	2.3
2412.000000	14471.750000	28.83	A	16.34	181.34	-52.3	-8.8
2442.000000	14652.000000	39.17	P	15.87	564.94	-44.5	1
2442.000000	14652.000000	29	A	15.87	175.19	-54.7	-9.1
2462.000000	14772.000000	39.5	P	15.57	566.89	-44.5	1.1
2462.000000	14772.000000	29.17	A	15.57	172.58	-54.8	-9.3
2412.000000	16883.750000	28.67	A	20.29	280.54	-50.6	-5
2412.000000	16883.750000	39.83	P	20.29	1013.91	-39.4	6.1
2442.000000	17094.000000	28	A	20.85	277.01	-50.7	-5.2
2442.000000	17094.000000	36.67	P	20.85	751.62	-42.0	3.5
2462.000000	17234.000000	29.17	A	21.01	322.85	-49.3	-3.8
2462.000000	17234.000000	38.17	P	21.01	909.91	-40.3	5.2

(P: Peak reading, A: Average reading)

PAGE NO. 12 of 45.  
NAME OF TEST: Restricted Bands of Operation  
SPECIFICATION: 47 CFR 15.205  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

The EUT was set up on a three meter open field site according to the procedure on ANSI C63.4.

Sensitivity of system was measured:

Below 2 GHz:

CISPR Bandwidths	= 8 dBμV
1 MHz RBW, 1 MHz VBW	= 12 dBμV
1 MHz RBW, 10 Hz VBW	= 3 dBμV

Above 2 GHz:

1 MHz RBW, 1 MHz VBW	= 33 dBμV
1 MHz RBW, 10 Hz VBW	= 22 dBμV

Sensitivity of system with preamps:

Below 2 GHz:

Preamps are not used in this range.

Above 2 GHz:

Peak	= 3 dBμV
Average	= -8 dBμV

Cable Loss:

915 MHz	= -0.8 dBμV
2450 MHz	= -3 dBμV


Note:

dB loss vs. frequency included in programmed software.

Reference Level Offset:

set @ 1 dB, accounts for cable and connector loss.

SUPERVISED BY:

  
 William H. Graff

PAGE NO.

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NAME OF TEST: Out of Band Emissions

g9970267: 1999-Jul-07 Wed 15:04:00

STATE: 2:High Power Upper Restricted Band

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV		CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN dB
2462.000000	2483.480000	23.99	P	43.68	2418.24	-31.9	13.7
2462.000000	2483.480000	8.29	A	43.68	396.73	-47.6	-2
2462.000000	2488.600000	7.04	A	43.72	345.14	-48.8	-3.2
2462.000000	2488.600000	21.81	P	43.72	1890.17	-34.0	11.5
2462.000000	2490.100000	23.13	P	43.73	2202.93	-32.7	12.9
2462.000000	2490.100000	8.84	A	43.73	425.11	-47.0	-1.4
2462.000000	2493.600000	21.19	P	43.76	1768.07	-34.6	11
2462.000000	2493.600000	5.43	A	43.76	288.07	-50.3	-4.8
2462.000000	2498.600000	4.18	A	43.79	250.32	-51.6	-6
2462.000000	2498.600000	19.77	P	43.79	1506.61	-33.9	9.6
2462.000000	2503.600000	18.8	P	43.81	1350.52	-36.0	8.6
2462.000000	2503.600000	3.65	A	43.81	236.05	-52.1	-6.5
2462.000000	2508.600000	2.78	A	43.84	214.29	-52.9	-7.4
2462.000000	2508.600000	19.82	P	43.84	1524.05	-35.9	9.7

(P: Peak reading, A: Average reading)

NAME OF TEST: Out of Band Emissions

g9970264: 1999-Jul-07 Wed 11:33:00

STATE: 2:High Power Lower Restricted Band

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV		CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN dB
2412.000000	2365.000000	14.03	A	35.55	301.3	-49.9	-4.4
2412.000000	2365.000000	25.73	P	35.55	1158.78	-38.2	7.3
2412.000000	2370.000000	14.03	A	35.56	301.65	-49.9	-4.4
2412.000000	2370.000000	26.72	P	35.56	1300.17	-36.2	8.3
2412.000000	2375.000000	14.17	A	35.58	307.26	-49.8	-4.3
2412.000000	2375.000000	26.12	P	35.58	1216.19	-37.8	7.7
2412.000000	2380.000000	26.33	P	35.6	1248.82	-37.6	7.9
2412.000000	2380.000000	14.4	A	35.6	316.23	-49.5	-4
2412.000000	2385.000000	27.03	P	35.62	1356.75	-36.9	8.7
2412.000000	2385.000000	14.84	A	35.62	333.43	-49.1	-3.5
2412.000000	2390.000000	15.33	A	35.63	353.18	-48.6	-3
2412.000000	2390.000000	27.07	P	35.63	1364.58	-36.8	8.7

(P: Peak reading, A: Average reading)

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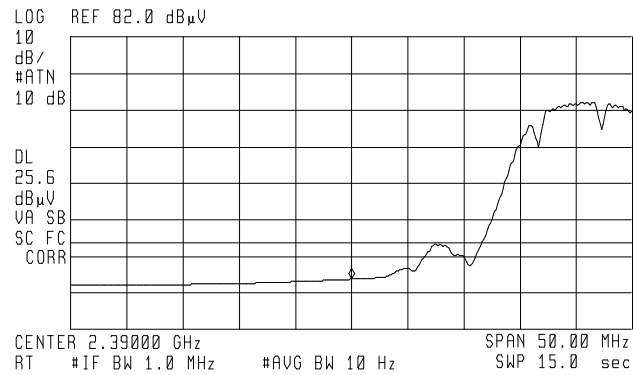
NAME OF TEST: Emissions At Band Edges

g9970263: 1999-Jul-07 Wed 12:00:00

STATE: 0:General Data Rate = 1 MB Per SEC.



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.39000 GHz  
15.60 dBμV



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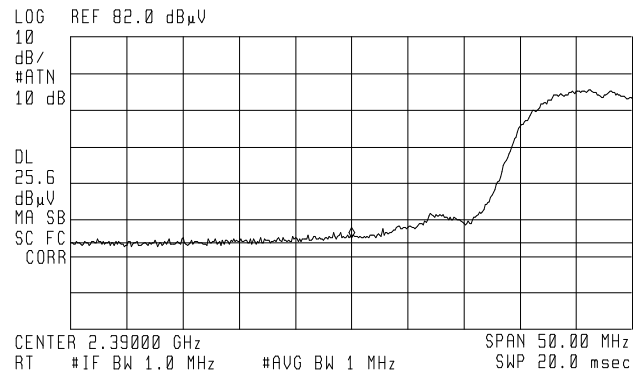
PAGE NO.

15 of 45.

NAME OF TEST: Emissions At Band Edges  
g9970262: 1999-Jul-07 Wed 11:58:00  
STATE: 0:General Data Rate = 1 MB Per SEC.



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.39000 GHz  
27.07 dBμV



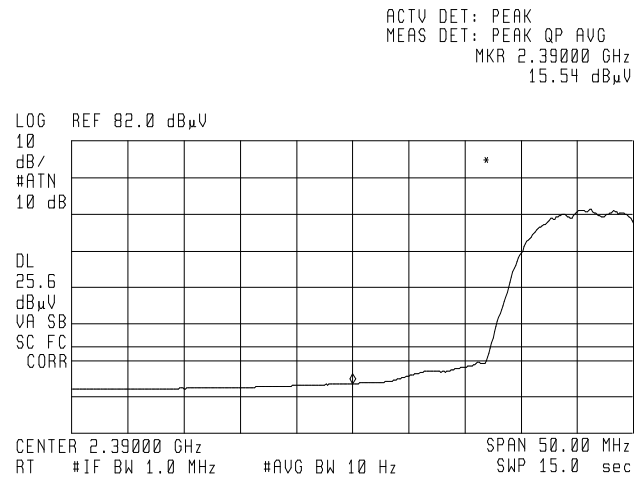
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NAME OF TEST: Emissions At Band Edges  
 99970260: 1999-Jul-07 Wed 11:55:00  
 STATE: 0:General Data Rate = 2 MB Per SEC.



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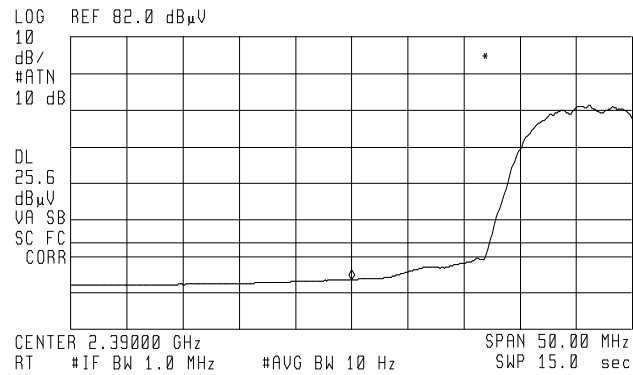
NAME OF TEST: Emissions At Band Edges

g9970260: 1999-Jul-07 Wed 11:54:00

STATE: 0:General Data Rate = 2 MB Per SEC.



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.39000 GHz  
15.54 dBμV



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NAME OF TEST: Emissions At Band Edges  
g9970259: 1999-Jul-07 Wed 11:52:00  
STATE: 0:General Data Rate = 5.5 MB Per SEC.



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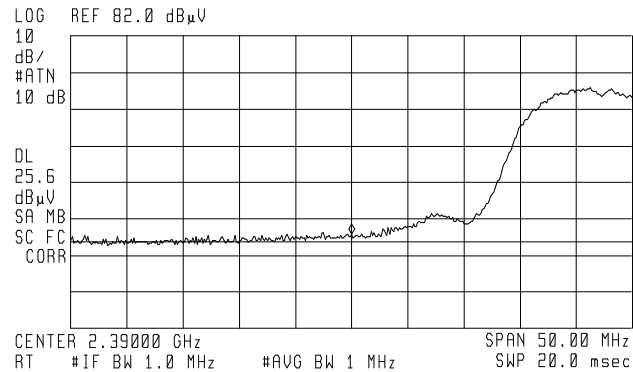
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NAME OF TEST: Emissions At Band Edges  
g9970258: 1999-Jul-07 Wed 11:51:00  
STATE: 0:General Data Rate = 5.5 MB Per SEC.



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.39000 GHz  
27.90 dBμV



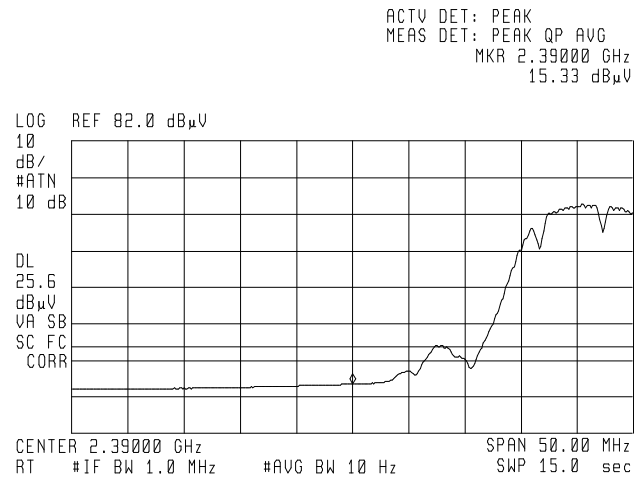
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NAME OF TEST: Emissions At Band Edges  
g9970255: 1999-Jul-07 Wed 11:30:00  
STATE: 0:General Data Rate = 11 MB Per SEC.



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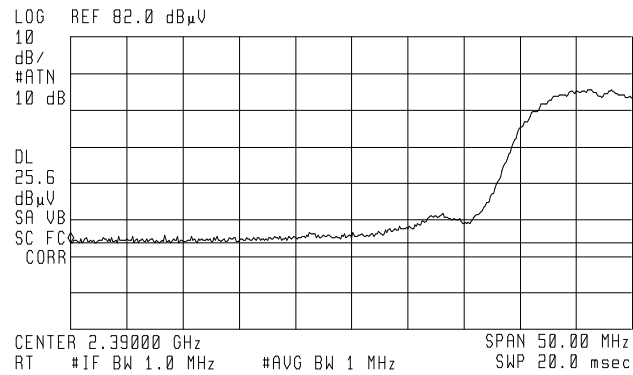
PAGE NO.

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NAME OF TEST: Emissions At Band Edges  
g9970257: 1999-Jul-07 Wed 11:48:00  
STATE: 0:General Data Rate = 11 MB Per SEC.



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.36500 GHz  
25.73 dBμV



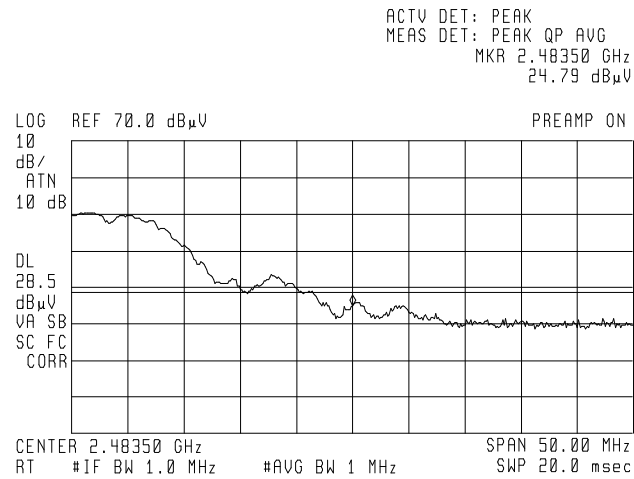
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22 of 45.

NAME OF TEST: Emissions At Band Edges  
g9970275: 1999-Jul-08 Thu 09:21:00  
STATE: 0:General Data Rate = 1 MB Per SEC.



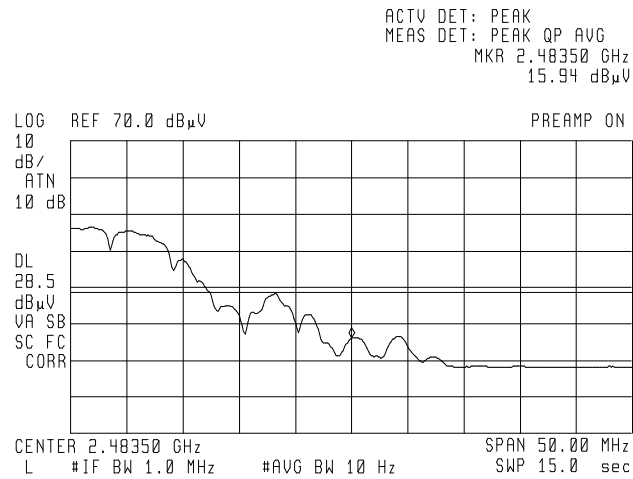
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23 of 45.

NAME OF TEST: Emissions At Band Edges  
g9970276: 1999-Jul-08 Thu 09:22:00  
STATE: 0:General Data Rate = 1 MB Per SEC.



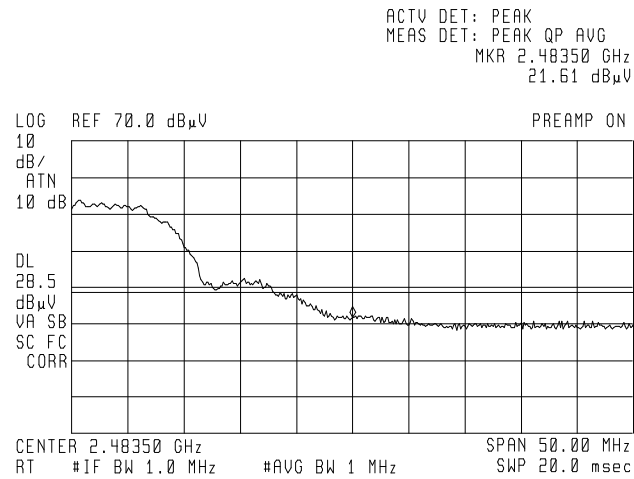
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24 of 45.

NAME OF TEST: Emissions At Band Edges  
g9970273: 1999-Jul-08 Thu 09:18:00  
STATE: 0:General Data Rate = 2 MB Per SEC.



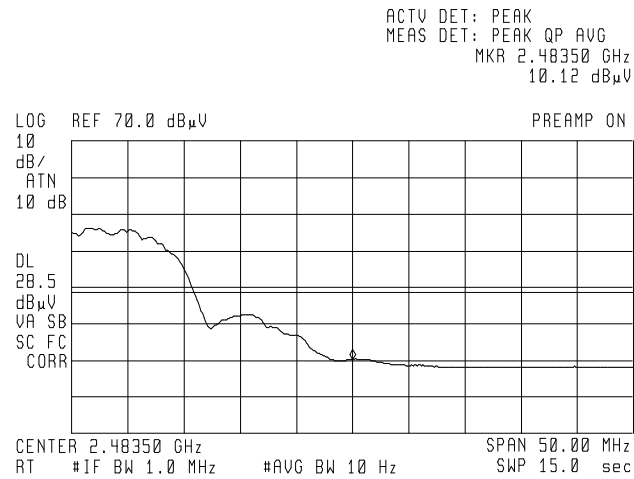
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NAME OF TEST: Emissions At Band Edges  
g9970274: 1999-Jul-08 Thu 09:19:00  
STATE: 0:General Data Rate = 2 MB Per SEC.



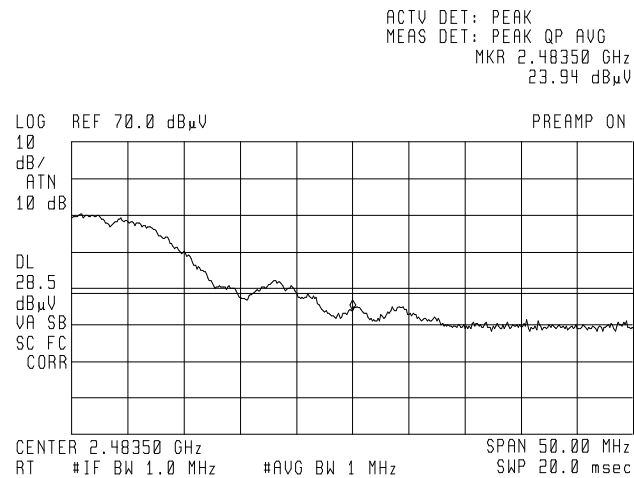
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NAME OF TEST: Emissions At Band Edges  
g9970271: 1999-Jul-08 Thu 09:14:00  
STATE: 0:General Data Rate = 5.5 MB Per SEC.



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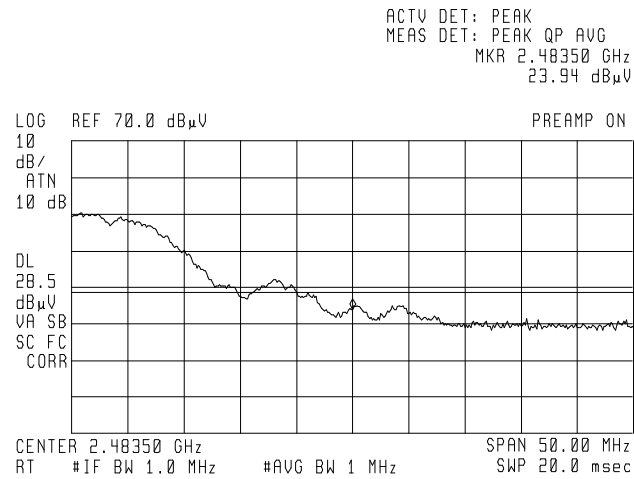
  
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27 of 45.

NAME OF TEST: Emissions At Band Edges  
g9970271: 1999-Jul-08 Thu 09:13:00  
STATE: 0:General Data Rate = 5.5 MB Per SEC.



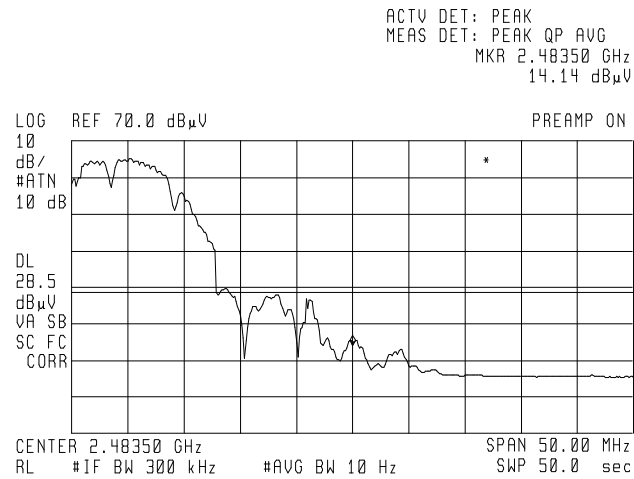
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NAME OF TEST: Emissions At Band Edges  
g9970281: 1999-Jul-08 Thu 14:31:00  
STATE: 0:General Data Rate = 11 MB Per SEC.



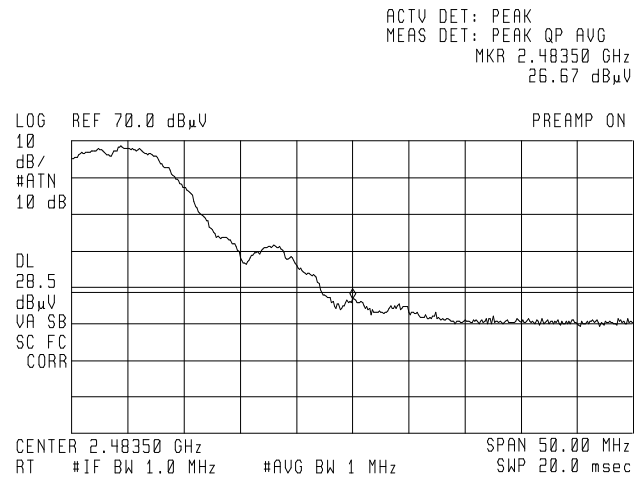
SUPERVISED BY:

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NAME OF TEST: Emissions At Band Edges  
g9970279: 1999-Jul-08 Thu 14:27:00  
STATE: 0:General Data Rate = 11 MB Per SEC.



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NAME OF TEST: Allowed Occupied Bandwidth

SPECIFICATION: 47 CFR 15.247(a)(2)

TEST EQUIPMENT: As per attached page

LIMITS

<u>RULE</u>	<u>TYPE</u>	<u>BANDS (MHz)</u>	<u>LIMIT (kHz)</u>
15.247(a)(1)(i)	F.H.	902-928	20 dB BW = 500
15.247(a)(1)(ii)	F.H.	2400-2483.5, 5725-5850	20 dB BW = 1000
15.247(a)(2)	D.S.	ALL	6 dB BW = 500


MEASUREMENT DATA

\*MEASURED BANDWIDTH = 17.3 MHz

RESULTS = ATTACHED

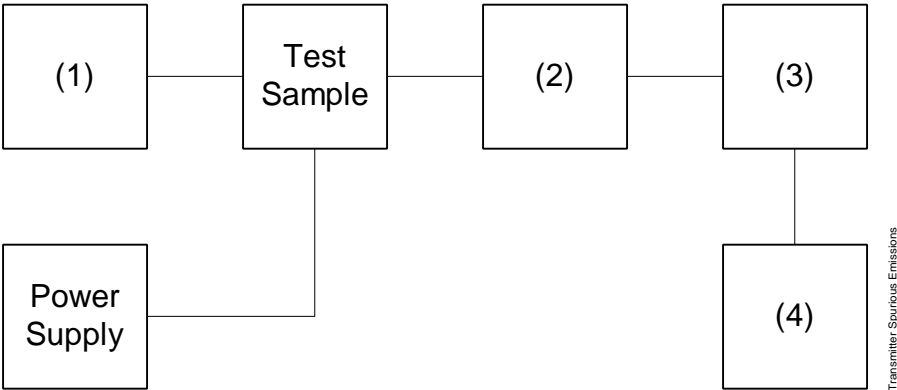
NOTE: MEASURED BANDWIDTH STAYS APPROXIMATELY CONSTANT OVER ALL DATA RATES

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TRANSMITTER SPURIOUS EMISSION

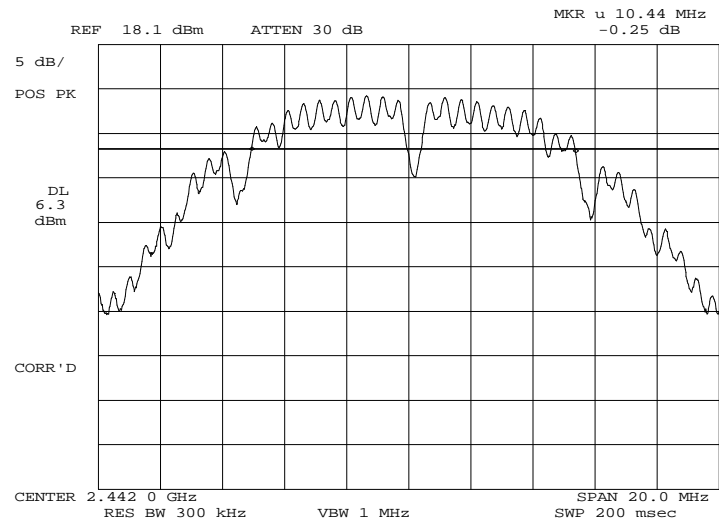
TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)  
TEST B. OUT-OF-BAND SPURIOUS



Asset	Description	s/n
(2)	<u>COAXIAL ATTENUATOR</u>	
___	i00122 Narda 766-10	7802
___	i00123 Narda 766-10	7802A
___	i00069 Bird 8329 (30 dB)	1006
___	i00113 Sierra 661A-3D	1059
(3)	<u>HIGH PASS FILTER</u>	
x	i00 Narda $\mu$ PAD (In-Band Only)	
x	i00 Trilithic	
___	(Out-Of-Band Only)	
(4)	<u>SPECTRUM ANALYZER</u>	
x	i00048 HP 8566B	2511A01467
___	i00029 HP 8563E	3213A00104

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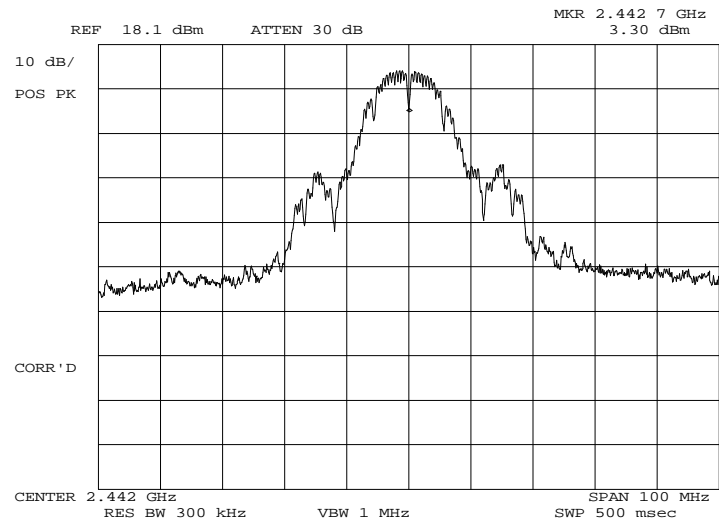
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970287: 1999-Jul-08 Thu 15:34:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: 11 MB/S CCK  
6 DB POWER BANDWIDTH

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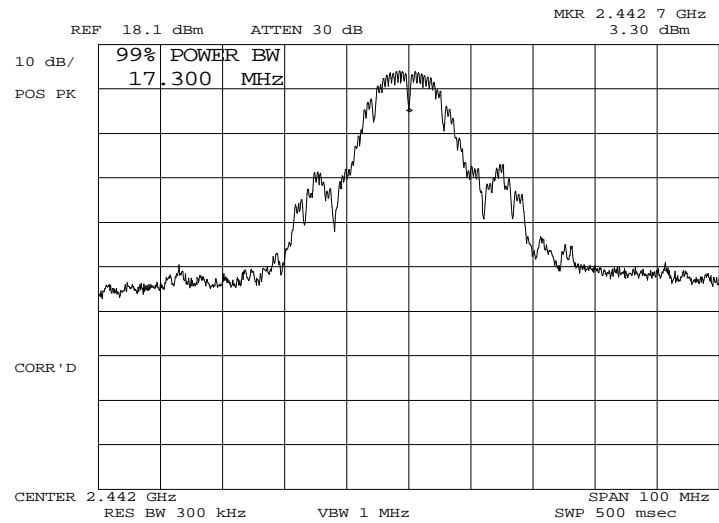
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970288: 1999-Jul-08 Thu 15:37:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: 11 MB/S CCK

PAGE NO. 34 of 45.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970289: 1999-Jul-08 Thu 15:38:00  
STATE: 2:High Power

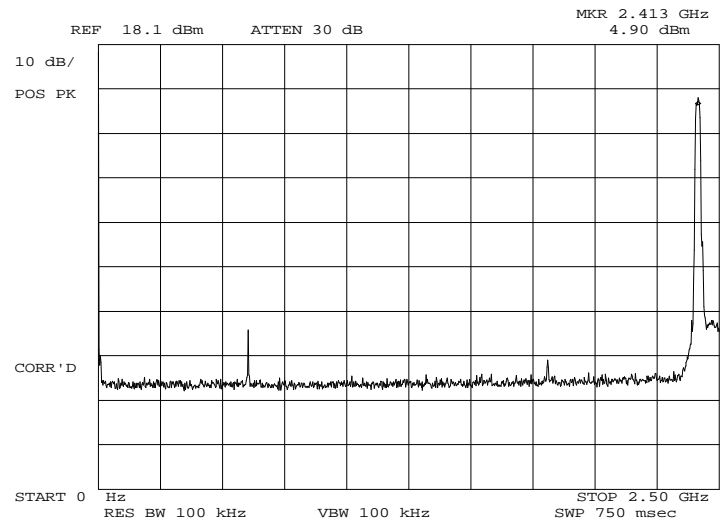


POWER: HIGH  
MODULATION: 11 MB/S CCK  
99% POWER BANDWIDTH



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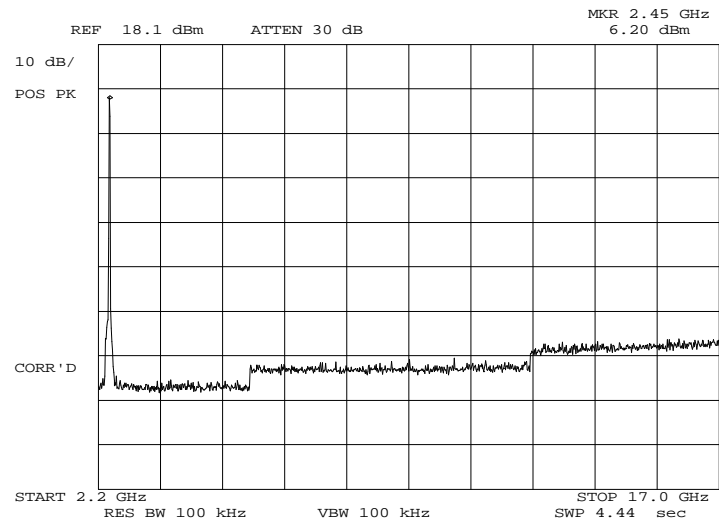
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970291: 1999-Jul-10 Sat 08:34:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: 11 MB/S CCK  
15.247 (C)

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970292: 1999-Jul-10 Sat 08:37:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: 11 MB/S CCK  
15.247 (C)

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NAME OF TEST: Spread Spectrum Technology  
Direct Sequence Systems

15.247(d) Transmitter Power Density

LIMIT: The transmitter power density peak over any 1 second interval shall not be greater than 8 dBm in any 3 kHz Bandwidth within these bands.

RESULTS: Please see attached plots.  
Transmitter Power Density, dBm = -8.7 dB  
See attached data page

15.247(e) Processing Gain

LIMIT: The processing gain shall be = 10 dB

RESULTS: See Applicant's statement  
Processing Gain, dB

1 MB/sec	= 11.0 db
2 MB/sec	= 11.1 db
5.5 MB/sec	= 10.4 db
11 MB/sec	= 10.7


Pseudorandom Sequence Description

RESULTS: See Applicant's statement

Chip Rate

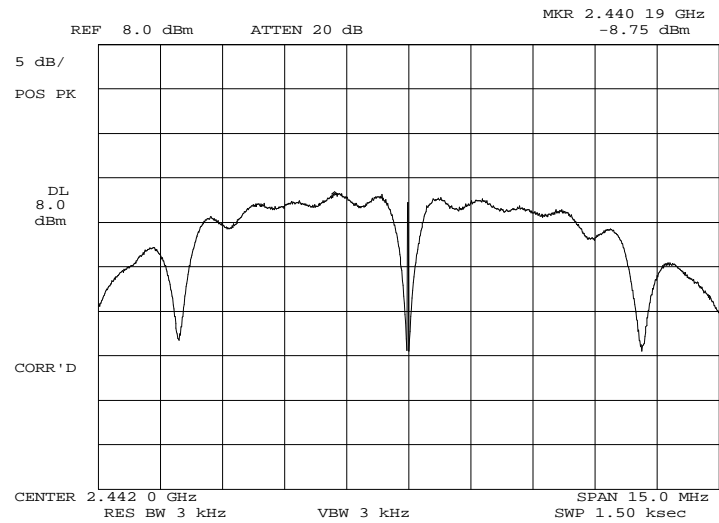
RESULTS: See Applicant's statement

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970286: 1999-Jul-08 Thu 15:31:00  
STATE: 2:High Power WORST CASE OF ALL DATA RATES



POWER: HIGH  
MODULATION: 11 MB/S CCK  
SPECTRAL POWER DENSITY

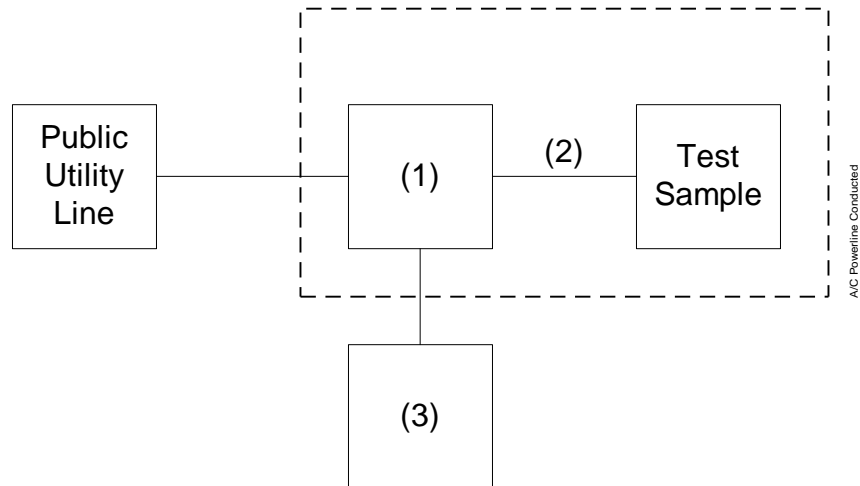
PAGE NO. 39 of 45.  
NAME OF TEST: A/C Powerline Conducted Emissions  
SPECIFICATION: FCC: 47 CFR 15.207  
TEST CONDITIONS: S. T. & H.  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A test sample was connected to the Public Utility lines through a LISN Ailtech Model 94641-1 (50  $\mu$ H).
2. A reference level of 250  $\mu$ V was set on the Spectrum Analyzer. The spectrum was searched over the range of 450 kHz to 30 MHz.
3. All other emissions were 20 dB or more below limit.
4.      The test sample used a charger.  
  x   The test sample does not use a charger.  
      \*Equipment tested in PCMCIA port of host laptop computer.
5. Measurement Results: Attached.

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AC POWERLINE CONDUCTED MEASUREMENTS

Asset	Description	s/n	Cycle	Last Cal
<small>Per ANSI C63.4-1992, 10.1.4</small>				
(1) <u>LINE IMPEDANCE STABILIZATION NETWORK</u>				
_____	i00077 Singer 91221-1 (5 $\mu$ H)	0396	12 mo.	
_____	i00155 Eaton 94641-1 (50 $\mu$ H)	178	12 mo.	Sep-98
<u>x</u>	i00167 Ailtech 94641-1 (50 $\mu$ H)	0103	12 mo.	
(2) <u>SCREEN ROOM</u>				
<u>x</u>	i00169 Lindgren 22-2/2-0	3861	N/A	none
_____	i00170 Lindgren LG170	4999		
(3) <u>SPECTRUM ANALYZER</u>				
_____	i00029 HP 8563E	3213A00104	12 mo.	
_____	i00033 HP 85462A	3625A00357	12 mo.	Dec-98
<u>x</u>	i00048 HP 8566B	2511AD1467	6 mo.	Mar-99

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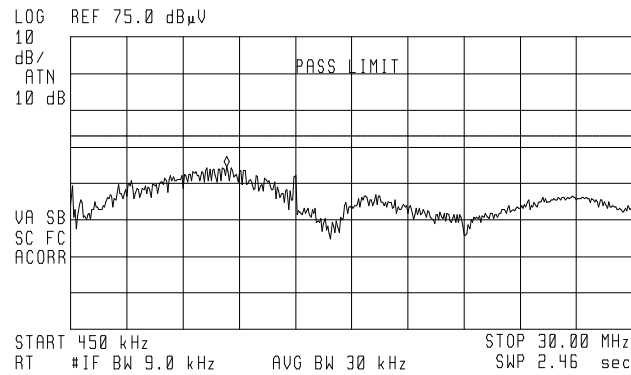
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NAME OF TEST: A/C Powerline Conducted Emissions  
99970282: 1999-Jul-08 Thu 15:54:00  
STATE: 0:General



FCC

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 8.65 MHz  
39.36 dBμV



NEUTRAL SIDE, UNGROUNDED

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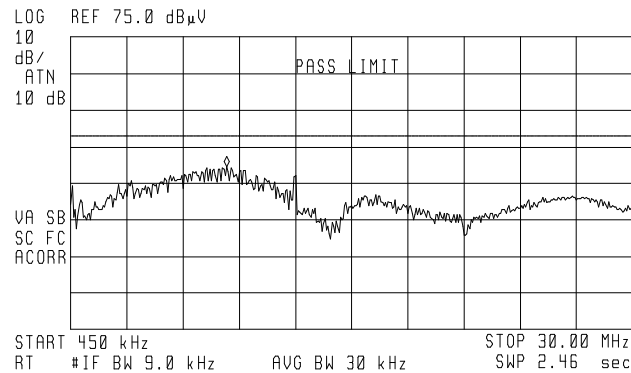
42 of 45.

NAME OF TEST: A/C Powerline Conducted Emissions  
g9970282: 1999-Jul-08 Thu 15:54:00  
STATE: 0:General



FCC

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 8.65 MHz  
39.36 dBμV



LINE SIDE, UNGROUNDED

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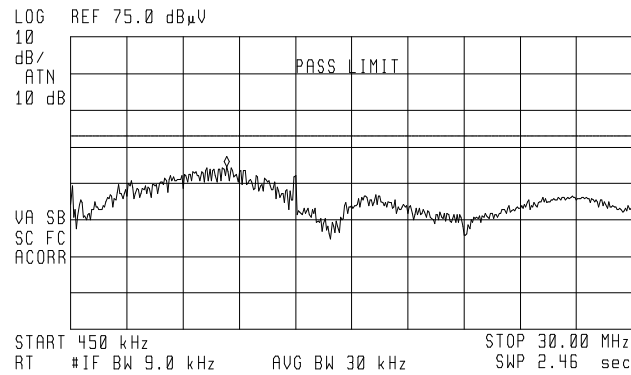
43 of 45.

NAME OF TEST: A/C Powerline Conducted Emissions  
g9970282: 1999-Jul-08 Thu 15:54:00  
STATE: 0:General



FCC

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 8.65 MHz  
39.36 dBμV



NEUTRAL SIDE, GROUNDED

SUPERVISED BY:

  
William H. Graff

PAGE NO.

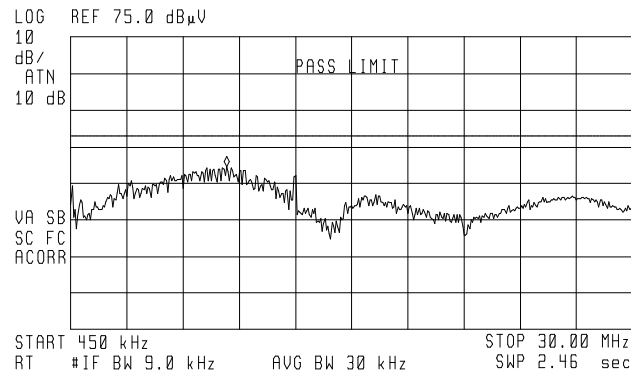
44 of 45.

NAME OF TEST: A/C Powerline Conducted Emissions  
g9970282: 1999-Jul-08 Thu 15:54:00  
STATE: 0:General



FCC

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 8.65 MHz  
39.36 dBμV



LINE SIDE, GROUNDED

SUPERVISED BY:

  
William H. Graff

PAGE NO. 45 of 45.  
NAME OF TEST: Maximum Permissible Exposure  
SPECIFICATION: FCC: 47 CFR 1.1310  
TEST CONDITIONS: S. T. & H.  
SPEC. LIMIT: = 1.6 mW/cm<sup>2</sup>  
GUIDE: IEEE C95.1-1991  
 IEEE Standard for Safety Levels with respect to  
 Human Exposure to Radio Frequency  
 Electromagnetic Field, 3 kHz to 300 GHz.

Ref: Reference Data for Radio Engineers, Fifth Ed., p. 25-7

$$P = P_t / 4\pi R^2$$

Where P = Power Density (in W/m<sup>2</sup>) at a distance R  
 P<sub>t</sub> = Power radiated by an isotropic radiator (Watts)  
 = (Transmitter Power)%(Duty Cycle)%(Antenna Gain)  
 P = Distance of measurement from source (meters)

ARRANGM'T	POWER	DUTY CYCLE	ANTENNA GAIN	P <sub>t</sub>	P	P
	Watts	(FACTOR)	(FACTOR)	w	w/m	mw/cm

RADIATED MEASUREMENTS  
FOR PART 15 TRANSMITTERS W/ INTEGRAL ANTENNAS

Radiated Measurements

<u>RANGE OF MEASUREMENT</u>	<u>SPECIFICATION</u>	<u>RESOLUTION B/W</u>	<u>VIDEO B/A</u>
30 to 1000 MHz	CISPR	=100 kHz	=100 kHz
>1000 MHz	FCC, 15.37(b)	1 MHz	=1 MHz
(if averaging)	FCC, 15.37(b)	1 MHz	10 Hz

Measuring Equipment

a. ANTENNAS:

EMCO 3109	20 - 300 MHz
APREL AALP2001	200 - 1000 MHz
APREL AAB20200	20 - 200 MHz
APREL AAH118	1 - 18 GHz

b. INSTRUMENTS:

HP8566B	Spectrum Analyzer
HP85685A	Preselector, w/ preamp below 2 GHz
HP85650A	Quasi Peak Adapter
HP8449	Preamp, above 2 GHz

All test instrumentation is calibrated every January and every July. In addition, all test instrumentation is calibrated daily, or as required by the manufacturer. A Calibration Agreement is maintained with Hewlett Packard.

Occupied Bandwidth

Occupied Bandwidth is measured as a radiated signal without attenuators and/or filter. RBW, VBW and scan settings as shown were set to produce a meaningful result in accordance with ANSI C63.4, Section 13.1.7.

## § 15.205 Restricted Bands of Operation

(a) Except as shown in paragraph (b) 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	4.5-5.25
0.495-0.505	16.69475-16.69625	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	322-339.4	3600-4400	(2)
13.36-13.41			


Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. Above 38.6

TESTIMONIAL  
AND  
STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY THAT:

1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.
2. THAT the technical data supplied with the application was taken under my direction and supervision.
3. THAT the data was obtained on representative units, randomly selected.
4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

CERTIFYING ENGINEER:

  
William H. Graff