

MFA **M. Flom Associates, Inc. - Global Compliance Center**
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176
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Date of Report: September 12, 2000

Date Submitted: September 27, 2000

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Cisco Systems Inc
Equipment: AIR-USB340
FCC ID: LDK102041
FCC Rules: 15.247, Confidentiality

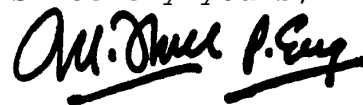
Gentlemen:

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,



Morton Flom, P. Eng.

enclosure(s)
cc: Applicant
MF/cvr

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

APPLICANT: Cisco Systems Inc

FCC ID: LDK102041

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
 - PARTS LIST
 - ACTIVE DEVICES
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: LDK102041

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

September 12, 2000

SUPERVISED BY:



Morton Flom, P. Eng.

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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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: d0090011
- d) Client: Cisco Systems Inc
3875 Embassy Parkway
Akron, OH 44333
- e) Identification: AIR-USB340
FCC ID: LDK102041
Description: Spread Spectrum Radio
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: September 12, 2000
EUT Received: July 20, 2000
- 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: 
Morton Flom, P. Eng.
- 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.

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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:

Cisco Systems Inc
170 West Tasman Drive
San Jose, CA 95134-1706

MANUFACTURER:

Applicant

(c)(2): FCC ID: LDK102041

MODEL NO: AIR-USB340

(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: 0.029 EIRP
 ___ Switchable ___ Variable x N/A

(c)(7): MAXIMUM POWER RATING, Watts: 50 mv/m @ 3m

15.203: ANTENNA REQUIREMENT:

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

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 24th day of November, 1998.



Peter Abjorn
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 85225
Morton Flom Phone: 480 926 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; CNS 13438
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

Revised 2/2/2000

Peter Abjorn

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8370 • Phone: 301 644 3248 • 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 C63.4-1992/2000 Draft, 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. 6 of 35.
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 = 0 (Integral)
 PEAK OUTPUT POWER, Watts = 0.029 EIRP
 WORST CASE FOR
 ALL CHANNELS

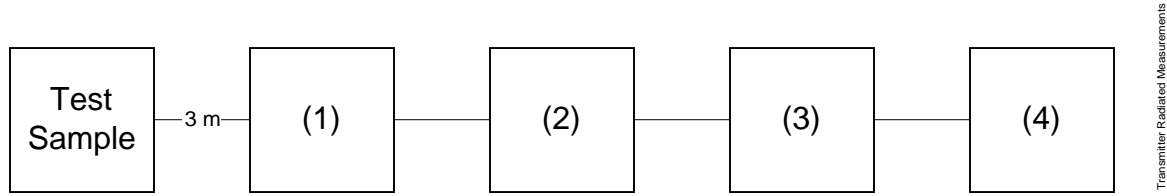
RADIATED:
 g0070800:2000-Jul-28 Fri 09:46:00

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, W
2412.000000	2412.110000	63.3	45.27	268225.46	13.3	0.021
2442.000000	2442.110000	64.45	45.46	312968.05	14.7	0.029
2462.000000	2462.560000	63.47	45.58	283465.36	13.8	0.024

SUPERVISED BY:

Morton Flom, P. Eng.

TRANSMITTER RADIATED MEASUREMENTS



Asset Description (as applicable)	s/n
<u>(1) TRANSDUCER</u>	
i00091 Emco 3115	001469
i00089 Aprel Log Periodic	001500
i00088 EMCO 3301-B Biconical	2336
<u>(2) HIGH PASS FILTER</u>	
i00 Narda μ PAD (In-Band Only)	
i00 Trilithic (Out-Of-Band Only)	
<u>(3) PREAMP</u>	
i00028 HP 8449 (+30 dB)	2749A00121
<u>(4) SPECTRUM ANALYZER</u>	
i00048 HP 8566B	2511A01467
i00057 HP 8557A	1531A00191
i00029 HP 8563E	3213A00104

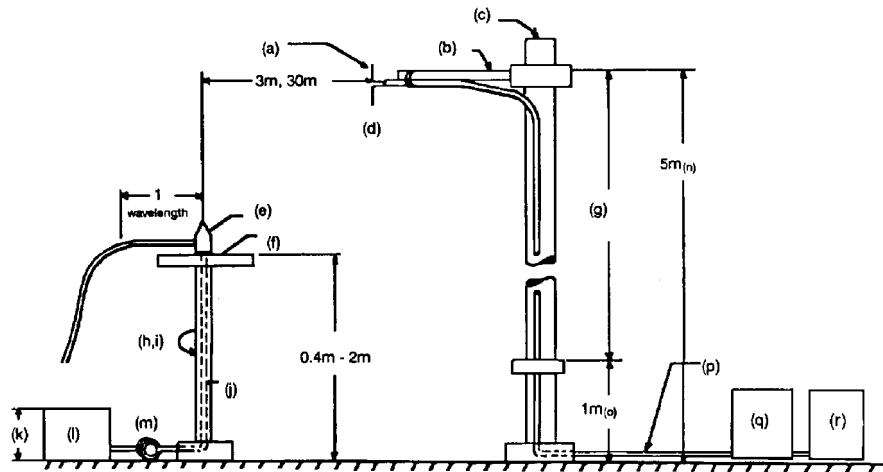
PAGE NO. 8 of 35.
NAME OF TEST: Field Strength of Spurious Radiation
SPECIFICATION: 47 CFR 2.1053(a)
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.12
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 2.948, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2003.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.

The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

RADIATED TEST SETUP



NOTES:

- (a) Search Antenna - Rotatable on boom
- (b) Non-metallic boom
- (c) Non-metallic mast
- (d) Adjustable horizontally
- (e) Equipment Under Test
- (f) Turntable
- (g) Boom adjustable in height.
- (h) External control cables routed horizontally at least one wavelength.
- (i) Rotatable
- (j) Cables routed through hollow turntable center
- (k) 30 cm or less
- (l) External power source
- (m) 10 cm diameter coil of excess cable
- (n) 25 cm (V), 1 m-7 m (V, H)
- (o) 25 cm from bottom end of 'V', 1m normally
- (p) Calibrated Cable at least 10m in length
- (q) Amplifier (optional)
- (r) Spectrum Analyzer

Asset Description (as applicable)	s/n	Cycle	Last Cal
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Per ANSI C63.4-1992/2000 Draft, 10.1.4

TRANSDUCER

i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-99
i00065	EMCO 3301-B Active Monopole	2635	12 mo.	Sep-99
i00089	Apral 2001 200MHz-1GHz	001500	12 mo.	Sep-99
i00103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Sep-99

AMPLIFIER

i00028	HP 8449A	2749A00121	12 mo.	Mar-00
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SPECTRUM ANALYZER

i00029	HP 8563E	3213A00104	12 mo.	Aug-00
i00033	HP 85462A	3625A00357	12 mo.	May-00
i00048	HP 8566B	2511AD1467	6 mo.	May-00

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NAME OF TEST: Field Strength of Spurious Radiation

g0080536: 2000-Aug-15 Tue 15:36:00

STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	ERP, dBm	MARGIN, dB
2412.000000	4823.775000	55.67	8.88	-32.8	-17.7
2412.000000	7235.925000	40.33	13.05	-44	-28.8
2412.000000	9647.958333	36.17	15.71	-45.5	-30.3
2412.000000	12059.983333	36	17.43	-43.9	-28.8
2412.000000	14472.000000	52.5	18.42	-26.5	-11.3
2412.000000	16884.000000	53.5	19.58	-24.3	-9.1

NAME OF TEST: Field Strength of Spurious Radiation

g0080535: 2000-Aug-15 Tue 14:08:00

STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	ERP, dBm	MARGIN, dB
2442.000000	4884.000000	58.67	8.99	-29.7	-14.5
2442.000000	7326.075000	43.33	13.2	-40.8	-25.7
2442.000000	9768.075000	37.33	15.81	-44.2	-29.1
2442.000000	12210.000000	36.5	17.01	-43.9	-28.7
2442.000000	14652.000000	36	18.35	-43	-27.9
2442.000000	17094.000000	36.33	20.05	-41	-25.8

NAME OF TEST: Field Strength of Spurious Radiation

g0080537: 2000-Aug-17 Thu 08:39:00

STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	ERP, dBm	MARGIN, dB
2462.000000	4923.883333	61.5	9.07	-26.8	-11.6
2462.000000	7385.900000	46.83	13.29	-37.3	-22.1
2462.000000	9847.966667	40.17	15.87	-41.3	-26.2
2462.000000	12309.993333	40.67	16.73	-40	-24.8
2462.000000	14771.966667	41.5	18.31	-37.6	-22.4
2462.000000	17233.966667	40.17	20.43	-36.8	-21.6

PAGE NO. 11 of 35.

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,T₁T₂T₃
 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

PAGE NO. 12 of 35.

NAME OF TEST: Out of Band Emissions
 g0080506: 2000-Aug-08 Tue 12:48:00
 STATE: 2:High Power Upper Bandedge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN dB	Pk/Av
2462.000000	2483.500000	18.67	32.95	381.07	-43.6	-2.4	A
2462.000000	2483.500000	22.67	32.95	603.95	-39.6	1.6	P
2462.000000	2484.950000	18.33	32.97	367.28	-43.9	-2.7	A
2462.000000	2485.000000	25	32.97	791.59	-37.3	4	P
2462.000000	2486.500000	18.33	32.97	367.28	-43.9	-2.7	A
2462.000000	2486.500000	22.83	32.97	616.6	-39.4	1.8	P
2462.000000	2487.900000	21.5	32.98	529.66	-40.7	0.5	P
2462.000000	2488.000000	18.33	32.98	367.71	-43.9	-2.7	A
2462.000000	2489.450000	18.17	32.98	360.99	-44.1	-2.9	A
2462.000000	2489.550000	22.33	32.98	582.77	-39.9	1.3	P
2462.000000	2490.900000	24.17	32.99	721.11	-38.1	3.2	P
2462.000000	2491.050000	18.5	32.99	375.4	-43.7	-2.5	A
2462.000000	2492.500000	25	32.99	793.41	-37.2	4	P
2462.000000	2492.550000	18.33	32.99	368.13	-43.9	-2.7	A
2462.000000	2494.000000	23	33	630.96	-39.2	2	P
2462.000000	2494.050000	18.33	33	368.55	-43.9	-2.7	A
2462.000000	2495.450000	18.33	33	368.55	-43.9	-2.7	A
2462.000000	2495.550000	20.83	33	491.47	-41.4	-0.2	A
2462.000000	2496.900000	23.5	33.01	669.11	-38.7	2.5	P
2462.000000	2497.050000	18.33	33.01	368.98	-43.9	-2.7	A

*P is for Peak Readings, A is for Average Readings

PAGE NO. 13 of 35.

NAME OF TEST: Out of Band Emissions
 g0080510: 2000-Aug-08 Tue 14:36:00
 STATE: 2:High Power Lower Bandedge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN dB	Pk/Av
2412.000000	2375.050000	19.33	32.51	390.84	-43.4	-2.2	A
2412.000000	2376.500000	28.83	32.51	1166.81	-33.9	7.3	P
2412.000000	2376.550000	19.5	32.51	398.57	-43.2	-2	A
2412.000000	2377.950000	29.33	32.52	1237.37	-33.4	7.9	P
2412.000000	2378.000000	19.5	32.52	399.02	-43.2	-2	A
2412.000000	2379.600000	28.5	32.52	1124.6	-34.2	7	P
2412.000000	2379.750000	19.5	32.53	399.48	-43.2	-2	A
2412.000000	2381.000000	28.67	32.53	1148.15	-34	7.2	P
2412.000000	2381.100000	19.67	32.53	407.38	-43	-1.8	A
2412.000000	2382.550000	28	32.54	1064.14	-34.7	6.5	P
2412.000000	2382.550000	19.67	32.54	407.85	-43	-1.8	A
2412.000000	2384.000000	19.67	32.55	408.32	-43	-1.8	A
2412.000000	2384.050000	29.33	32.55	1241.65	-33.3	7.9	P
2412.000000	2385.450000	29	32.55	1195.36	-33.7	7.6	P
2412.000000	2385.450000	19.67	32.55	408.32	-43	-1.8	A
2412.000000	2386.950000	19.83	32.56	416.39	-42.8	-1.6	A
2412.000000	2387.050000	30.33	32.56	1394.76	-32.3	8.9	P
2412.000000	2388.450000	19.67	32.57	409.26	-43	-1.8	A
2412.000000	2388.550000	28.33	32.57	1109.17	-34.3	6.9	P
2412.000000	2390.000000	19.83	32.57	416.87	-42.8	-1.6	A
2412.000000	2390.000000	28.83	32.57	1174.9	-33.8	7.4	P

*P is for Peak Readings, A is for Average Readings

PAGE NO. 14 of 35.
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 C63.4/2000 Draft.

Sensitivity of system was measured:

Below 2 GHz:
 CISPR Bandwidths = 8 dB μ V
 1 MHz RBW, 1 MHz VBW = 12 dB μ V
 1 MHz RBW, 10 Hz VBW = 3 dB μ V
 Above 2 GHz:
 1 MHz RBW, 1 MHz VBW = 33 dB μ V
 1 MHz RBW, 10 Hz VBW = 22 dB μ V

Sensitivity of system with preamps:

Below 2 GHz:
 Preamps are not used in this range.
 Above 2 GHz:
 Peak = 3 dB μ V
 Average = -8 dB μ V

Cable Loss:

915 MHz = -0.8 dB μ V
 2450 MHz = -3 dB μ V

Note:

dB loss vs. frequency included in programmed software.

Reference Level Offset:

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

TEST RESULTS: No harmonic or spurious emissions were detected in the restricted bands in excess of the limits of 15.205. System measurement sensitivity was -130 dBm.

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PAGE NO. 15 of 35.
NAME OF TEST: Emissions At Band Edges
SPECIFICATION: 47 CFR
TEST EQUIPMENT: As for "Out of Band Emissions"

MEASUREMENT RESULTS

ATTACHED

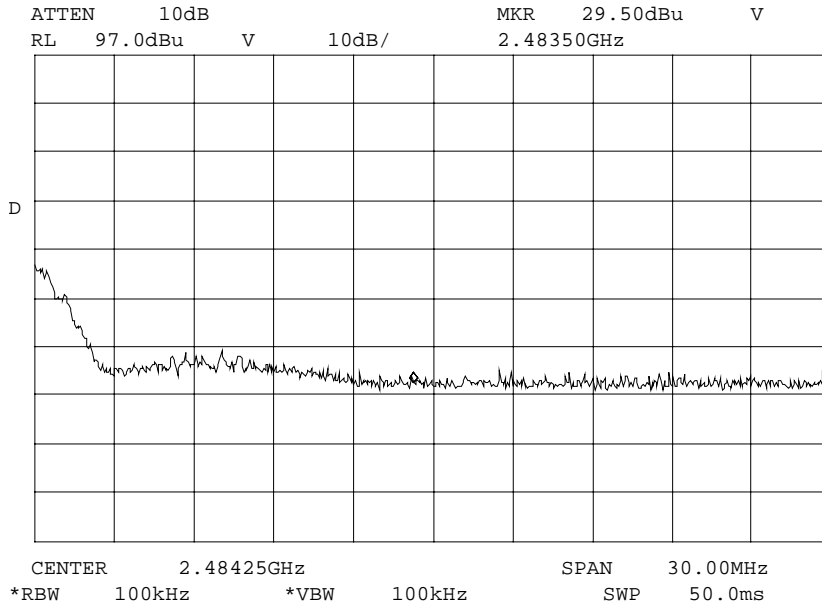
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PAGE NO. 16 of 35.

NAME OF TEST: Emission at Band Edges (Conducted)
g0080504: 2000-Aug-08 Tue 13:59:00
STATE: 0:General Upper Bandedge

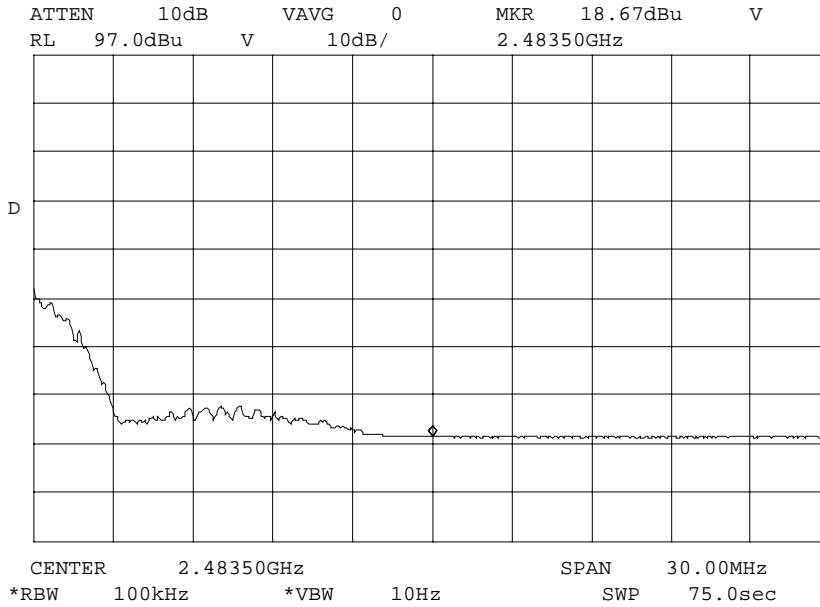


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PAGE NO. 17 of 35.

NAME OF TEST: Emission at Band Edges (Conducted)
g0080505: 2000-Aug-08 Tue 14:09:00
STATE: 0:General Upper Bandedge

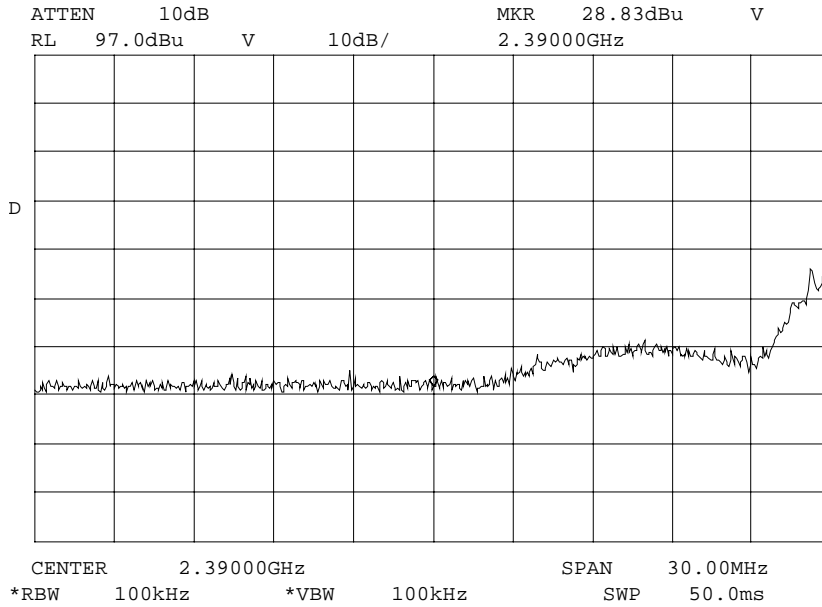


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NAME OF TEST: Emission at Band Edges (Conducted)
g0080508: 2000-Aug-08 Tue 15:29:00
STATE: 0:General Lower Bandedge

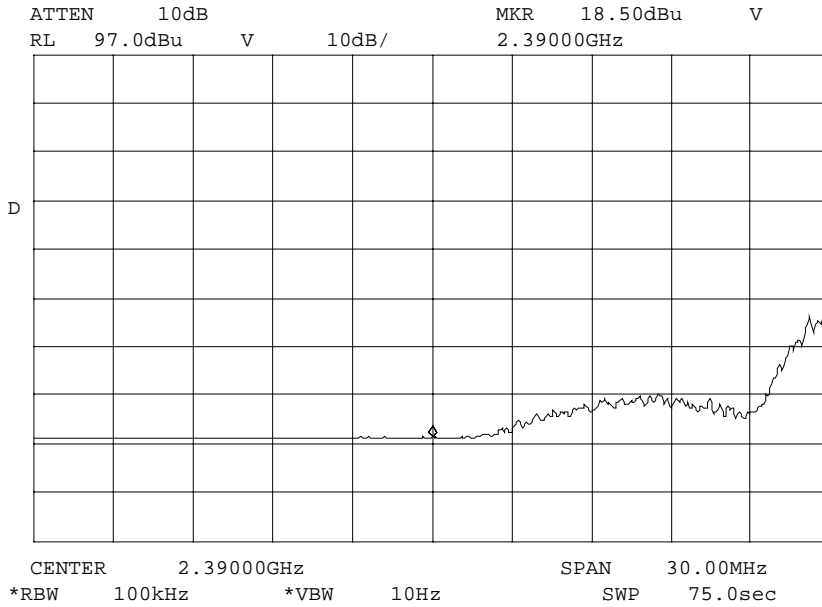


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NAME OF TEST: Emission at Band Edges (Conducted)
g0080509: 2000-Aug-08 Tue 15:44:00
STATE: 0:General Lower Bandedge



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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

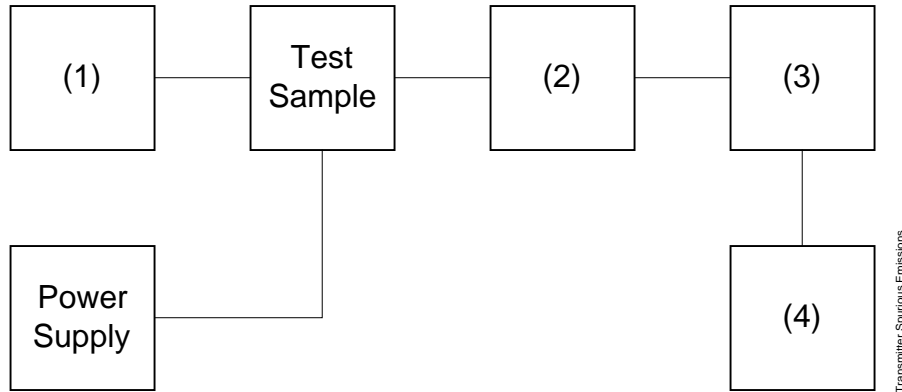
MEASURED BANDWIDTH, kHz = >500 kHz
 RESULTS = ATTACHED

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TRANSMITTER SPURIOUS EMISSION

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



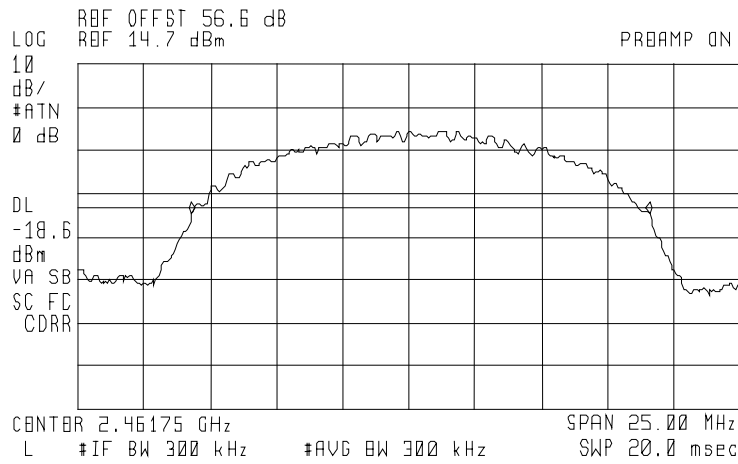
Asset Description (as applicable)	s/n
(1) <u>AUDIO OSCILLATOR/GENERATOR</u>	
i00010 HP 204D	1105A04683
i00017 HP 8903A	2216A01753
i00012 HP 3312A	1432A11250
(2) <u>COAXIAL ATTENUATOR</u>	
i00122 Narda 766-10	7802
i00123 Narda 766-10	7802A
i00069 Bird 8329 (30 dB)	1006
i00113 Sierra 661A-3D	1059
(3) <u>FILTERS; NOTCH, HP, LP, BP</u>	
i00126 Eagle TNF-1	100-250
i00125 Eagle TNF-1	50-60
i00124 Eagle TNF-1	250-850
(4) <u>SPECTRUM ANALYZER</u>	
i00048 HP 8566B	2511A01467
i00029 HP 8563E	3213A00104

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080516: 2000-Aug-10 Thu 12:41:00
STATE: 2:High Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.25 MHz
.04 dB



POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

SUPERVISED BY:

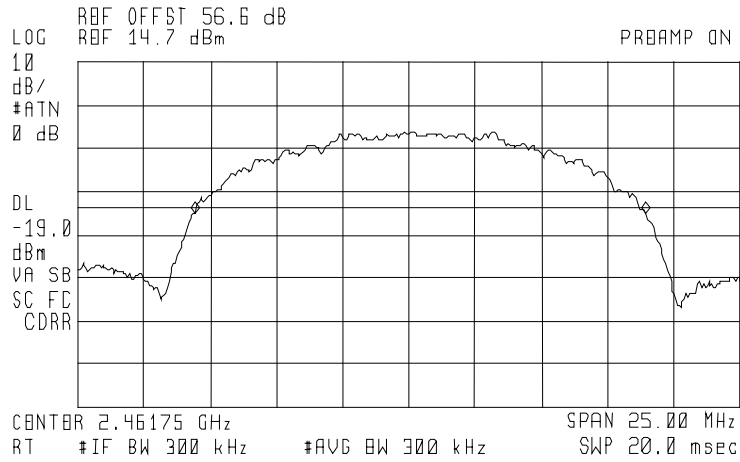
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PAGE NO. 23 of 35.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080524: 2000-Aug-10 Thu 13:13:00
STATE: 1:Low Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.00 MHz
.04 dB



POWER: HIGH
MODULATION: 5.5MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

SUPERVISED BY:

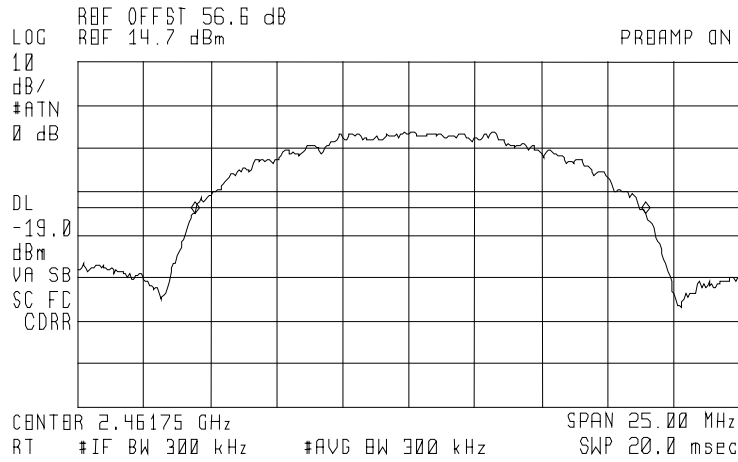
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080523: 2000-Aug-10 Thu 13:12:00
STATE: 1:Low Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.00 MHz
.04 dB



POWER: HIGH
MODULATION: 2MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

SUPERVISED BY:

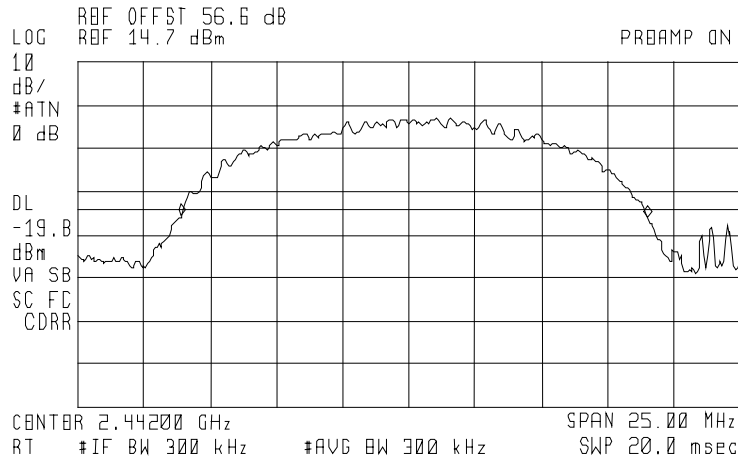
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080514: 2000-Aug-10 Thu 12:28:00
STATE: 2:High Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.56 MHz
-.98 dB



POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

SUPERVISED BY:

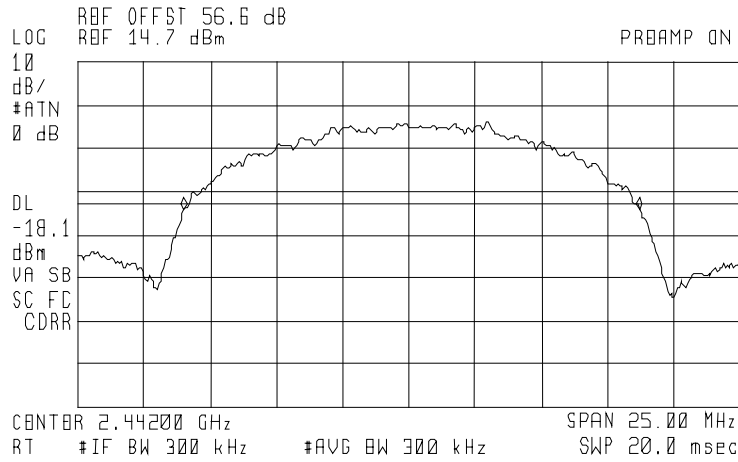
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080525: 2000-Aug-10 Thu 13:16:00
STATE: 1:Low Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.19 MHz
.19 dB



POWER: HIGH
MODULATION: 5.5MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

SUPERVISED BY:

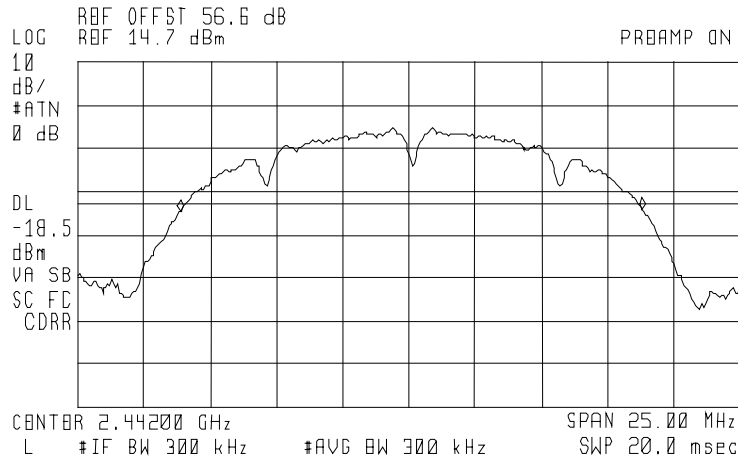
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080526: 2000-Aug-10 Thu 13:18:00
STATE: 1:Low Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.44 MHz
.21 dB



POWER: HIGH
MODULATION: 2MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

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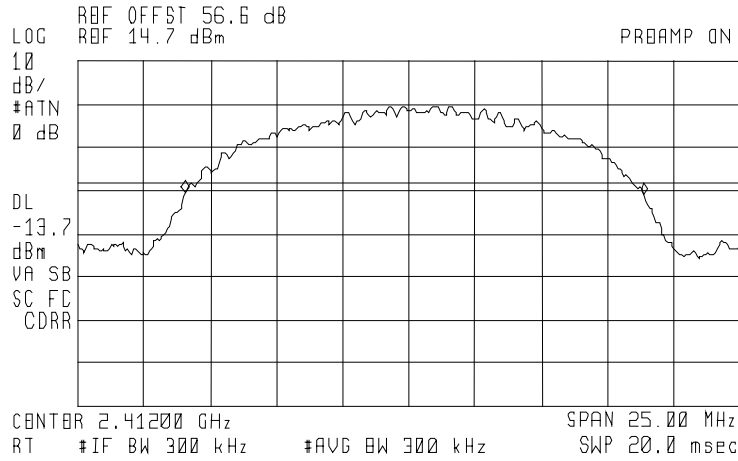
PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080512: 2000-Aug-10 Thu 11:40:00
STATE: 2:High Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.31 MHz
-.44 dB



POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

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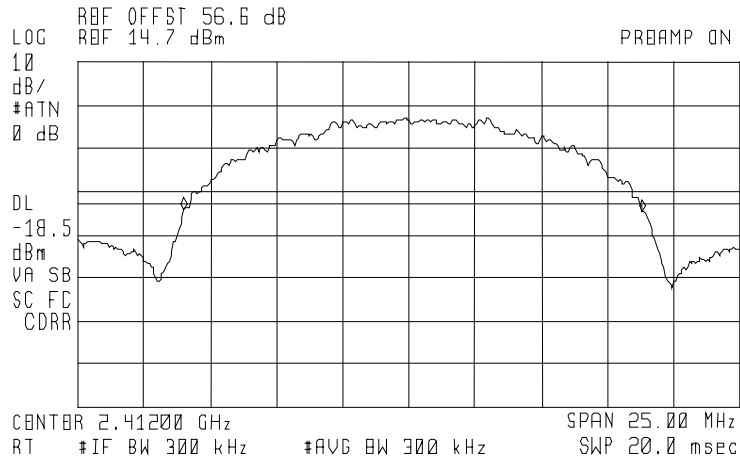
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080527: 2000-Aug-10 Thu 13:23:00
STATE: 1:Low Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.31 MHz
-.13 dB



POWER: HIGH
MODULATION: 5.5MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

SUPERVISED BY:

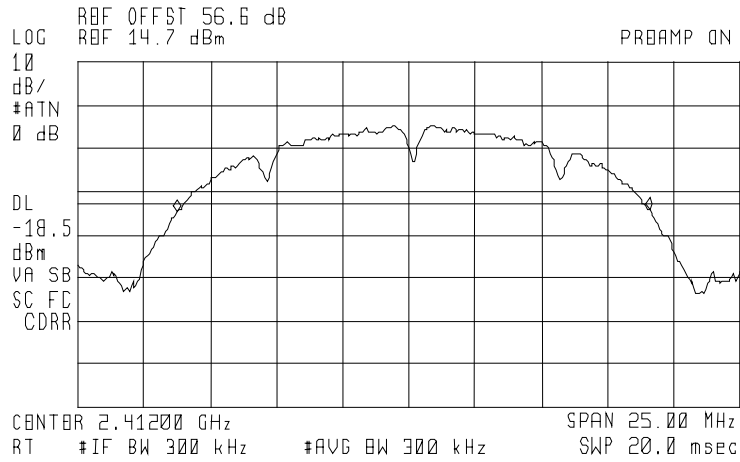
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080528: 2000-Aug-10 Thu 13:26:00
STATE: 1:Low Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKRΔ 17.81 MHz
.12 dB



POWER: HIGH
MODULATION: 2MB/SEC PSUDEO RANDOM DATA
15.247(A) (1) (I) 20DB BANDWIDTH

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NAME OF TEST: Spread Spectrum Technology
Direct Sequence Systems

15.247(a)(2) Minimum 6 dB Bandwidth

RESULTS: Please see results for "Allowed Occupied Bandwidth"

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

15.247(e) Processing Gain

LIMIT: The processing gain shall be ≥ 10 dB

RESULTS: See Applicant's statement

Pseudorandom Sequence Description

RESULTS: See Applicant's statement on page 2 of Processing Gain

Chip Rate

RESULTS: See Applicant's statement on page 2 of Processing Gain

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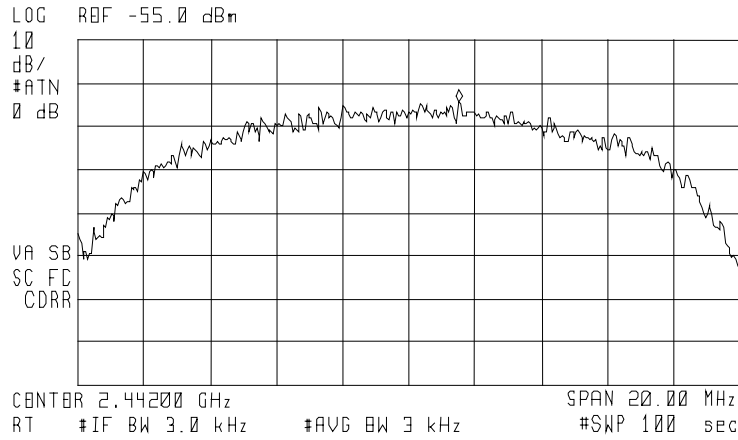
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080530: 2000-Aug-11 Fri 14:26:00
STATE: 2:High Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKR 2.44350 GHz
-69.44 dBm



POWER: HIGH
 MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
 SPECTRAL POWER DENSITY

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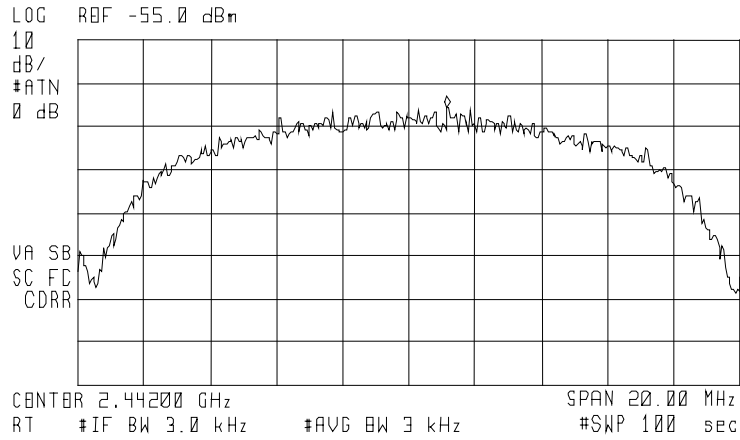
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080531: 2000-Aug-11 Fri 14:56:00
STATE: 2:High Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKR 2.44315 GHz
-70.98 dBm



POWER: HIGH
 MODULATION: 5.5 MB/SEC PSUDEO RANDOM DATA
 SPECTRAL POWER DENSITY

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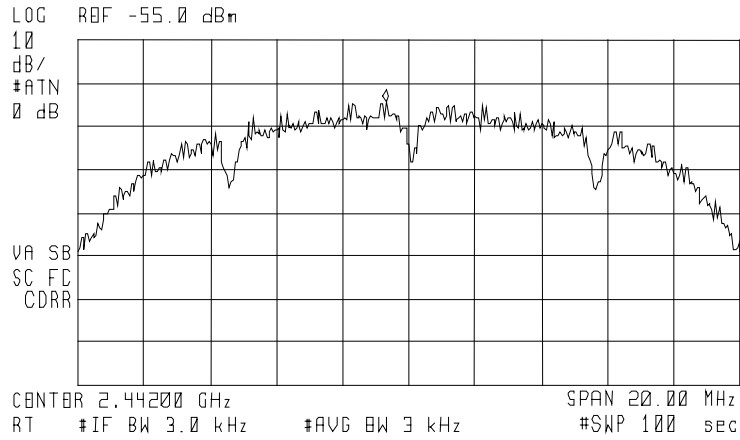
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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0080532: 2000-Aug-11 Fri 15:17:00
STATE: 2:High Power



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKR 2.44130 GHz
-69.39 dBm



POWER: HIGH
MODULATION: 2 MB/SEC PSEUDO RANDOM DATA
SPECTRAL POWER DENSITY

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NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION =

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	=	N/A
MAXIMUM DEVIATION (D), kHz	=	N/A
CONSTANT FACTOR (K)	=	N/A
NECESSARY BANDWIDTH (B_N), kHz	=	N/A
	=	500 kHz

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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
HP8563E	Spectrum Analyzer, 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 C63.4/2000 Draft, Section 13.1.7.

Part 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 avoided by the party responsible for compliance could void the user's authority to operate the equipment.

§ 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:



Morton Flom, P. Eng.