

STATEMENT

This test report# MFA-p0080005 is valid for all conducted measurements required as per FCC part 15.247 for FCC ID: P5IMBS2A.

The FCC ID mentioned within the test report belongs to WLAN radio module used in this application.

MFA **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

Date: May 31, 2000

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Cisco Systems Inc
Equipment: AIR-LMC350
FCC ID: LDK102040
FCC Rules: 15.247 and Confidentiality

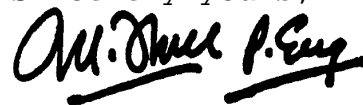
Gentlemen:

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: LDK102040

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

MFA **M. Flom Associates, Inc. - Global Compliance Center**
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176
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Sub-part
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: LDK102040

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

May 31, 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.

TABLE OF CONTENTS

RULE	DESCRIPTION	PAGE
	Test Report	1
2.1033(c)	General Information Required	2
	Standard Test Conditions and Engineering Practices	6
15.247(b)	Maximum Peak Output Power	7
15.247(c)	Out of Band Emissions	19
15.205	Restricted Bands Of Operation	26
15.247(a)(2)	Allowed Occupied Bandwidth	39
15.247(d)	Transmitter Power Density	49
15.247(e)	Processing Gain (Summary)	49

PAGE NO. 1 of 53.

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: d0050047
- d) Client: Cisco Systems Inc.
3875 Embassy Parkway
Akron, OH 44333
- e) Identification: AIR-LMC350
FCC ID: LDK102040
Description: Unlicensed PCMCIA Direct Sequence Spread
Spectrum Transceiver
- f) EUT Condition: Not required unless specified in individual
tests.
- g) Report Date: May 31, 2000
EUT Received: April 14, 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.

PAGE NO. 2 of 53.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

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

15.247 and 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: LDK102040

MODEL NO: AIR-LMC350

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

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION:

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

(c)(6): POWER RATING, Watts: 0.1 (conducted all channels, all bit rates)
0.355 (EIRP with Yagi)
0.132 (EIRP with Dipole)
0.117 (EIRP with Snap)
 Switchable Variable x N/A

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

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

PAGE NO. 3 of 53.

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

M. Flom Associates, Inc. is accredited by the American Association for Laboratory Association (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 Abjz
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 Abjz

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.

5 of 53.

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)

PAGE NO.

6 of 53.

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 53.
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 = 11.5 Yagi
 PEAK OUTPUT POWER, Watts = 0.355 EIRP
 WORST CASE FOR ALL CHANNELS

NAME OF TEST: Radiated Emissions
g0040226: 2000-Apr-17 Mon 11:11:00 Snap On Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, Watts
2412.000000	2413.300000	75.5	41.33	694224.6	21.6	0.115
2442.000000	2443.233333	74.5	41.43	625892.86	20.7	0.117
2462.000000	2463.233333	74.17	41.5	607435.26	20.4	0.110

NAME OF TEST: Out of Band Emissions
g0040291: 2000-Apr-19 Wed 11:08:00 Dipole Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, Watts
2412.000000	2413.450000	72.17	41.33	473151.26	18.3	0.067
2442.000000	2443.800000	75	41.44	663743.07	21.2	0.132
2462.000000	2463.750000	72.67	41.5	511093.08	18.9	0.078

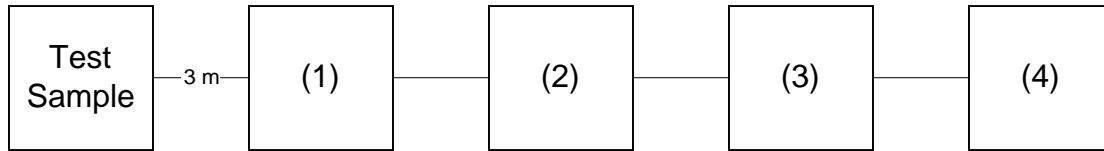
NAME OF TEST: Radiated Emissions
g0040265: 2000-Apr-18 Tue 13:22:00 Yagi Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, Watts
2412.000000	2411.350000	76.83	41.32	808164.93	22.9	0.195
2442.000000	2441.400000	79.33	41.42	1090184.49	25.5	0.355
2462.000000	2463.800000	77.17	41.5	858025.11	23.4	0.219

SUPERVISED BY:

Morton Flom, P. Eng.

TRANSMITTER RADIATED MEASUREMENTS



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.

9 of 53.

NAME OF TEST: Out of Band Emissions
 g0040237: 2000-Apr-18 Tue 08:51:00 Snap On Antenna
 Transmitter Harmonics

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m
2412.000000	4823.666666	30	7.41	74.22
2442.000000	4883.833333	27.33	7.51	55.21
2462.000000	4923.666666	31.17	7.58	86.6
2412.000000	7235.749999	29.17	12.62	122.89
2442.000000	7326.083333	24.5	12.59	71.53
2462.000000	7386.416666	30.17	12.57	137.09
2412.000000	9647.333332	30.33	16.06	208.69
2442.000000	9768.000000	31	16.71	242.94
2462.000000	9847.499999	32.33	17.12	296.82
2412.000000	12059.166665	28.83	14.99	155.24
2442.000000	12210.083333	29.83	15.47	184.08
2462.000000	12308.916665	30.67	15.79	210.38
2412.000000	14470.999998	29	16.34	184.93
2442.000000	14651.916667	31.17	15.87	224.91
2462.000000	14770.999998	30.5	15.57	201.14
2412.000000	16882.833331	30.33	20.29	339.63
2442.000000	17093.500000	30.83	20.85	383.71
2462.000000	17232.666665	31	21.01	398.57

PAGE NO. 10 of 53.

NAME OF TEST: Out of Band Emissions
 g0040298: 2000-Apr-19 Wed 13:20:00 Dipole Antenna
 Transmitter Harmonics

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m
2412.000000	4824.200000	36.17	7.41	151.01
2442.000000	4884.000000	37	7.51	168.07
2462.000000	4924.100000	35	7.58	134.59
2412.000000	7236.300000	33.67	12.62	206.3
2442.000000	7326.000000	33.83	12.59	209.41
2462.000000	7386.150000	34.17	12.57	217.27
2412.000000	9648.400000	35.17	16.07	364.75
2412.000000	9648.400000	29.5	16.07	189.89
2442.000000	9768.000000	35	16.71	385.03
2442.000000	9768.000000	30.17	16.71	220.8
2462.000000	9848.200000	35.83	17.12	444.12
2462.000000	9848.200000	30.5	17.12	240.44
2412.000000	12060.500000	34.5	14.99	298.19
2412.000000	12060.500000	29.17	14.99	161.44
2442.000000	12210.000000	34.33	15.47	309.03
2442.000000	12210.000000	29.17	15.47	170.61
2462.000000	12310.250000	36.17	15.79	396.28
2462.000000	12310.250000	29.67	15.79	187.5
2442.000000	14472.600000	35.5	16.34	390.84
2442.000000	14472.600000	29.17	16.34	188.58
2412.000000	14652.000000	34	15.87	311.53
2412.000000	14652.000000	29.33	15.87	181.97
2462.000000	14772.300000	34.33	15.57	312.61
2462.000000	14772.300000	29.17	15.57	172.58
2412.000000	16884.700000	28.83	20.29	285.76
2412.000000	16884.700000	33.5	20.29	489.22
2442.000000	17094.000000	28.67	20.85	299.23
2442.000000	17094.000000	34.33	20.85	574.12
2462.000000	17234.350000	28.83	21.01	310.46
2462.000000	17234.350000	34.33	21.01	584.79

PAGE NO.

11 of 53.

NAME OF TEST: Out of Band Emissions
 g0040272: 2000-Apr-19 Wed 08:08:00 Yagi Antenna
 Transmitter Harmonics

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m
2412.000000	4823.350000	37.17	7.41	169.43
2442.000000	4885.900000	36.5	7.52	158.85
2462.000000	4924.050000	36.33	7.58	156.86
2442.000000	6618.910000	35.33	11.58	221.56
2412.000000	7234.950000	34	12.62	214.29
2462.000000	7386.100000	36	12.57	268.23
2442.000000	8706.840000	29.83	12.47	130.32
2442.000000	8707.390000	35.5	12.47	250.32
2412.000000	9646.300000	36	16.06	400.87
2412.000000	9646.300000	30.33	16.06	208.69
2462.000000	9848.200000	31.33	17.12	264.55
2462.000000	9848.200000	36	17.12	452.9
2442.000000	10795.920000	31	15.26	205.59
2442.000000	10795.920000	36.83	15.26	402.25
2412.000000	12057.700000	29.83	14.99	174.18
2412.000000	12057.700000	35.67	14.99	341.19
2462.000000	12310.250000	30.5	15.79	206.3
2462.000000	12310.250000	36.33	15.79	403.65
2442.000000	12883.800000	30.17	17.56	243.5
2442.000000	12883.800000	35.83	17.56	467.2
2412.000000	14469.100000	29.83	16.34	203.47
2412.000000	14469.100000	35.5	16.34	390.84
2462.000000	14772.300000	30	15.57	189.89
2462.000000	14772.300000	35.67	15.57	364.75
2442.000000	14972.280000	30	15.07	179.27
2442.000000	14972.280000	35.67	15.07	344.35
2412.000000	16880.500000	30	20.28	326.59
2412.000000	16880.500000	35.5	20.28	615.18
2442.000000	17060.760000	29.67	20.81	334.2
2442.000000	17060.760000	34.83	20.81	605.34
2462.000000	17234.350000	30	21.01	355.22
2462.000000	17234.350000	35.5	21.01	669.11

PAGE NO. 12 of 53.

TEST SETUP: Radiated Emissions
g0040221: 2000-Apr-18 Tue 09:52:50
STATE: 0:General Snap On Antenna



TEST SETUP: Radiated Emissions
g0040222: 2000-Apr-18 Tue 09:52:50
STATE: 0:General



PAGE NO. 13 of 53.

TEST SETUP: Radiated Emissions
g0040221: 2000-Apr-18 Tue 09:52:50
STATE: 0:General Dipole Antenna



TEST SETUP: Radiated Emissions
g0040222: 2000-Apr-18 Tue 09:52:50
STATE: 0:General



PAGE NO.

14 of 53.

TEST SETUP: Radiated Emissions
g0040223: 2000-Apr-19 Wed 10:33:36
STATE: 0:General Yagi Antenna

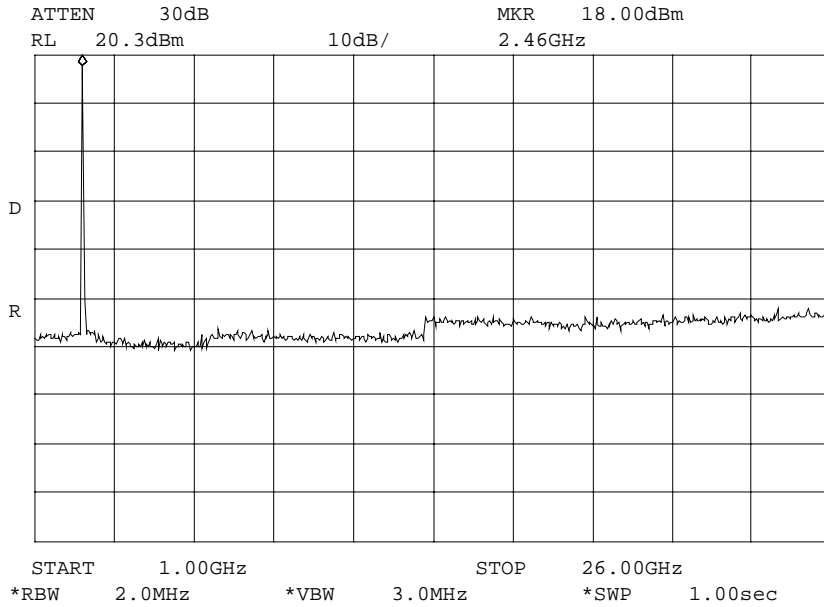


TEST SETUP: Radiated Emissions
g0040224: 2000-Apr-19 Wed 10:33:36
STATE: 0:General



PAGE NO. 15 of 53.

NAME OF TEST: Transmitter Conducted Spurious Emissions
g0040264: 2000-Apr-21 Fri 08:20:00
STATE: 2:High Power



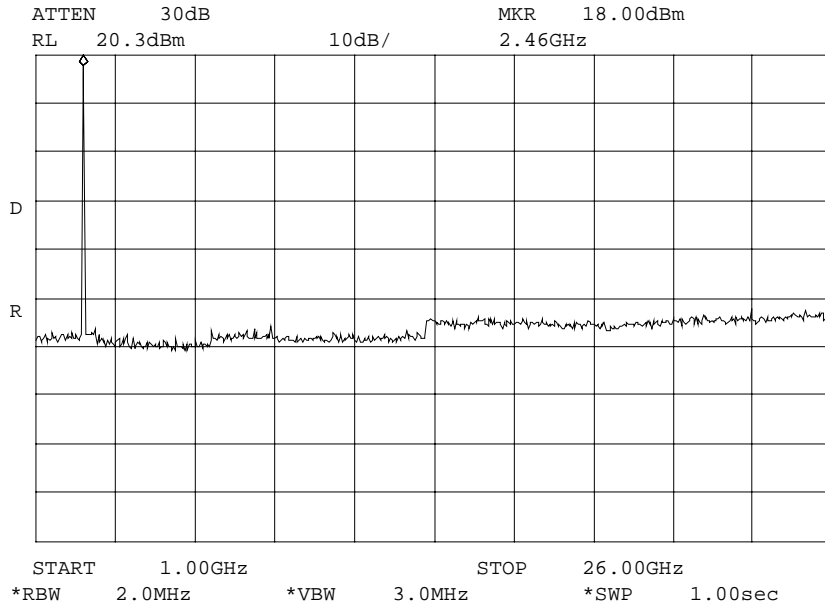
POWER: HIGH
 MODULATION: 1 MB/SEC PSEUDO RANDOM DATA
 15.247(C) SPURIOUS EMISSIONS

SUPERVISED BY:

Morton Flom P. Eng.
 Morton Flom, P. Eng.

PAGE NO. 16 of 53.

NAME OF TEST: Transmitter Conducted Spurious Emissions
g0040263: 2000-Apr-21 Fri 08:19:00
STATE: 2:High Power



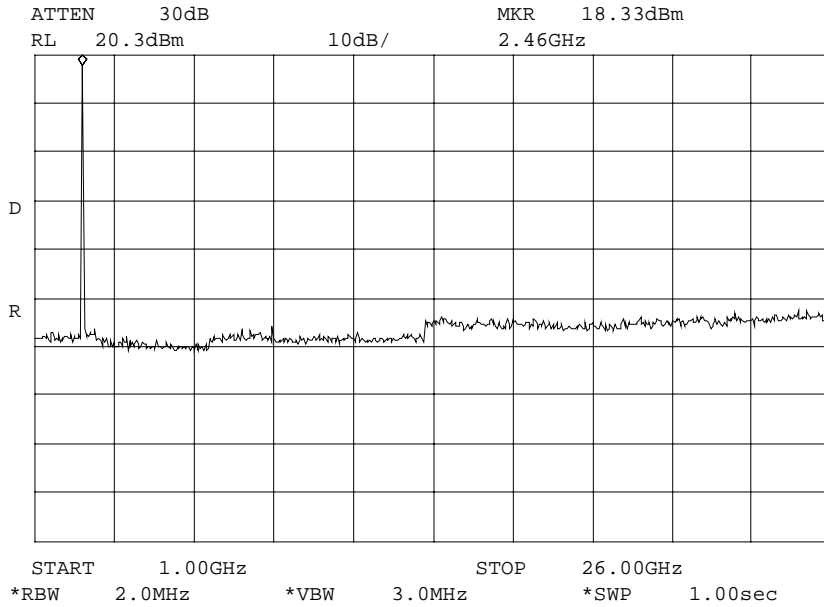
POWER: HIGH
 MODULATION: 2 MB/SEC PSEUDO RANDOM DATA
 15.247(C) SPURIOUS EMISSIONS

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 17 of 53.

NAME OF TEST: Transmitter Conducted Spurious Emissions
g0040262: 2000-Apr-21 Fri 08:18:00
STATE: 2:High Power



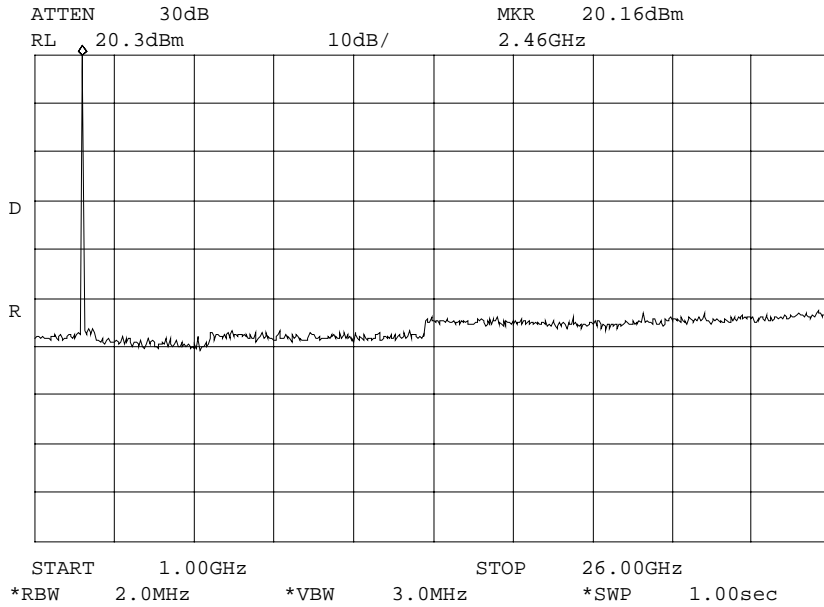
POWER:	HIGH
MODULATION:	5.5 MB/SEC PSEUDO RANDOM DATA
	15.247(C) SPURIOUS EMISSIONS

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 18 of 53.

NAME OF TEST: Transmitter Conducted Spurious Emissions
g0040261: 2000-Apr-21 Fri 08:17:00
STATE: 2:High Power



POWER:	HIGH
MODULATION:	11 MB/SEC PSEUDO RANDOM DATA
	15.247(C) SPURIOUS EMISSIONS

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 19 of 53.

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.

20 of 53.

NAME OF TEST: Band Edge Emissions
g0040231: 2000-Apr-17 Mon 16:04:00 Snap On Antenna
Lower Band Edge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2412.000000	2375.200000	31.67	41.2	4400.48	P
2412.000000	2375.300000	9.5	41.2	342.77	A
2412.000000	2376.500000	9.5	41.21	343.16	A
2412.000000	2376.850000	31.83	41.21	4487.45	P
2412.000000	2378.000000	9.5	41.21	343.16	A
2412.000000	2378.400000	31.5	41.21	4320.16	P
2412.000000	2378.950000	9.5	41.21	343.16	A
2412.000000	2380.700000	31.67	41.22	4410.62	P
2412.000000	2380.950000	9.67	41.22	350.35	A
2412.000000	2382.100000	9.5	41.22	343.56	A
2412.000000	2382.950000	32.5	41.22	4852.89	P
2412.000000	2383.300000	9.5	41.22	343.56	A
2412.000000	2384.350000	32.5	41.23	4858.48	P
2412.000000	2384.650000	9.5	41.23	343.95	A
2412.000000	2385.550000	9.67	41.23	350.75	A
2412.000000	2385.800000	32.83	41.24	5052.43	P
2412.000000	2386.250000	9.5	41.24	344.35	A
2412.000000	2386.750000	32.33	41.24	4769.8	P
2412.000000	2387.100000	9.5	41.25	344.75	A
2412.000000	2387.950000	9.5	41.25	344.75	A
2412.000000	2388.000000	32.33	41.25	4775.29	P
2412.000000	2388.450000	9.5	41.25	344.75	A
2412.000000	2388.900000	31.67	41.25	4425.88	P
2412.000000	2389.150000	9.5	41.25	344.75	A
2412.000000	2390.000000	9.67	41.25	351.56	A
2412.000000	2390.000000	31.33	41.25	4255.98	P

PAGE NO.

21 of 53.

NAME OF TEST: Band Edge Emissions
g0040292: 2000-Apr-19 Wed 11:57:00 Dipole Antenna
Lower Band Edge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2412.000000	2375.000000	20	41.2	1148.15	P
2412.000000	2375.000000	9.17	41.2	329.99	A
2412.000000	2376.500000	21.33	41.21	1339.68	P
2412.000000	2377.300000	9	41.21	323.97	A
2412.000000	2377.650000	19.83	41.21	1127.2	P
2412.000000	2378.700000	9.17	41.21	330.37	A
2412.000000	2379.200000	19.83	41.21	1127.2	P
2412.000000	2380.350000	20.17	41.22	1173.55	P
2412.000000	2380.400000	9.17	41.22	330.75	A
2412.000000	2381.600000	20.17	41.22	1173.55	P
2412.000000	2381.650000	9.17	41.22	330.75	A
2412.000000	2382.850000	9	41.22	324.34	A
2412.000000	2383.100000	20.33	41.22	1195.36	P
2412.000000	2384.250000	9.17	41.23	331.13	A
2412.000000	2384.300000	20	41.23	1152.13	P
2412.000000	2385.450000	9.33	41.23	337.29	A
2412.000000	2385.950000	20.67	41.24	1245.95	P
2412.000000	2386.300000	9.17	41.24	331.51	A
2412.000000	2387.350000	20.5	41.25	1223.21	P
2412.000000	2387.400000	9.33	41.25	338.06	A
2412.000000	2388.550000	9	41.25	325.46	A
2412.000000	2388.850000	20.33	41.25	1199.5	P
2412.000000	2390.000000	9.33	41.25	338.06	A
2412.000000	2390.000000	20.5	41.25	1223.21	P

PAGE NO.

22 of 53.

NAME OF TEST: Band Edge Emissions
 g0040266: 2000-Apr-18 Tue 15:10:00 Yagi Antenna
 Lower Band Edge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2412.000000	2375.000000	18.67	41.2	985.14	P
2412.000000	2375.000000	9.67	41.2	349.54	A
2412.000000	2375.750000	19	41.2	1023.29	P
2412.000000	2375.900000	10.33	41.2	377.14	A
2412.000000	2376.950000	22.33	41.21	1503.14	P
2412.000000	2377.150000	9.5	41.21	343.16	A
2412.000000	2378.000000	20.33	41.21	1193.99	P
2412.000000	2378.400000	9.33	41.21	336.51	A
2412.000000	2379.200000	20.5	41.21	1217.59	P
2412.000000	2379.600000	9.67	41.21	349.95	A
2412.000000	2381.100000	19.67	41.22	1107.9	P
2412.000000	2381.200000	9.67	41.22	350.35	A
2412.000000	2382.550000	21.17	41.22	1316.74	P
2412.000000	2382.650000	9.33	41.22	336.9	A
2412.000000	2383.850000	21	41.23	1292.71	P
2412.000000	2384.050000	9.33	41.23	337.29	A
2412.000000	2385.000000	19.83	41.23	1129.8	P
2412.000000	2385.450000	9.83	41.23	357.27	A
2412.000000	2385.900000	19.5	41.24	1088.93	P
2412.000000	2386.200000	9.67	41.24	351.16	A
2412.000000	2386.800000	9.67	41.24	351.16	A
2412.000000	2387.000000	20.5	41.24	1221.8	P
2412.000000	2388.050000	9.33	41.25	338.06	A
2412.000000	2389.000000	9.67	41.25	351.56	A
2412.000000	2389.000000	20.33	41.25	1199.5	P

PAGE NO.

23 of 53.

NAME OF TEST: Band Edge Emissions
 g0040235:2000-Apr-18 Tue 08:17:00 Snap On Antenna
 Upper Band Edge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2462.000000	2483.500000	20.5	40.56	1129.8	A
2462.000000	2483.500000	9.5	40.56	318.42	P
2462.000000	2484.950000	9.33	40.57	312.61	P
2462.000000	2485.200000	21.67	40.57	1294.2	A
2462.000000	2486.400000	9.33	40.58	312.97	P
2462.000000	2486.500000	20.83	40.58	1176.25	A
2462.000000	2487.950000	21.83	40.58	1319.78	P
2462.000000	2488.100000	9.33	40.58	312.97	A
2462.000000	2489.450000	9.33	40.58	312.97	A
2462.000000	2489.600000	21	40.58	1199.5	P
2462.000000	2490.900000	9.17	40.59	307.61	A
2462.000000	2491.100000	21.67	40.59	1297.18	P
2462.000000	2492.500000	21.5	40.59	1272.04	A
2462.000000	2492.500000	9.33	40.59	313.33	P
2462.000000	2493.800000	21.67	40.6	1298.67	A
2462.000000	2494.150000	9.5	40.6	319.89	P
2462.000000	2495.550000	21	40.6	1202.26	A
2462.000000	2495.600000	9.33	40.6	313.69	P
2462.000000	2496.750000	10.17	40.6	345.54	A
2462.000000	2497.350000	23.17	40.6	1543.48	P
2462.000000	2498.500000	21	40.61	1203.65	P
2462.000000	2498.500000	9.33	40.61	314.05	A

PAGE NO.

24 of 53.

NAME OF TEST: Band Edge Emissions
 g0040295:2000-Apr-19 Wed 12:20:00 Dipole Antenna
 Upper Band Edge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2462.000000	2483.500000	20.67	41.56	1292.71	P
2462.000000	2483.500000	10	41.56	378.44	A
2462.000000	2484.400000	9.83	41.56	371.11	A
2462.000000	2484.650000	21.17	41.57	1370.88	P
2462.000000	2485.650000	21	41.57	1344.31	P
2462.000000	2485.850000	10.17	41.57	386.37	A
2462.000000	2487.050000	20.33	41.58	1245.95	P
2462.000000	2487.250000	10	41.58	379.31	A
2462.000000	2488.150000	10	41.58	379.31	A
2462.000000	2488.200000	21.5	41.58	1425.61	P
2462.000000	2489.200000	22	41.58	1510.08	P
2462.000000	2489.500000	9.83	41.58	371.96	A
2462.000000	2490.550000	20.67	41.59	1297.18	P
2462.000000	2490.950000	9.67	41.59	365.59	A
2462.000000	2491.950000	20.5	41.59	1272.04	P
2462.000000	2492.200000	9.67	41.59	365.59	A
2462.000000	2493.200000	21.83	41.59	1482.52	P
2462.000000	2493.800000	9.5	41.6	358.92	A
2462.000000	2494.500000	21.5	41.6	1428.89	P
2462.000000	2495.050000	9.5	41.6	358.92	A
2462.000000	2495.700000	21.5	41.6	1428.89	P
2462.000000	2496.450000	9.5	41.6	358.92	A
2462.000000	2497.300000	21	41.6	1348.96	P
2462.000000	2498.500000	20.17	41.61	1227.44	P
2462.000000	2498.500000	9.5	41.61	359.34	A

PAGE NO.

25 of 53.

NAME OF TEST: Band Edge Emissions
 g0040271:2000-Apr-18 Tue 15:44:00 Yagi Antenna
 Upper Band Edge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2462.000000	2483.500000	11.67	41.56	458.67	A
2462.000000	2483.500000	19.5	41.56	1129.8	P
2462.000000	2484.700000	20.5	41.57	1269.11	P
2462.000000	2484.950000	10.83	41.57	416.87	A
2462.000000	2485.850000	20.33	41.57	1244.51	P
2462.000000	2486.300000	11.17	41.58	434.01	A
2462.000000	2487.250000	20.67	41.58	1295.69	P
2462.000000	2487.800000	10.83	41.58	417.35	A
2462.000000	2488.850000	11.5	41.58	450.82	A
2462.000000	2488.900000	20.67	41.58	1295.69	P
2462.000000	2490.000000	10.83	41.59	417.83	A
2462.000000	2490.100000	20.83	41.59	1321.3	P
2462.000000	2491.100000	10.67	41.59	410.2	A
2462.000000	2491.800000	19	41.59	1070.29	P
2462.000000	2492.300000	10.17	41.59	387.26	A
2462.000000	2493.200000	19.5	41.59	1133.7	P
2462.000000	2493.600000	9.83	41.59	372.39	A
2462.000000	2494.500000	18.83	41.6	1050.75	P
2462.000000	2495.150000	9.83	41.6	372.82	A
2462.000000	2495.900000	18.5	41.6	1011.58	P
2462.000000	2497.050000	9.83	41.6	372.82	A
2462.000000	2497.200000	19.83	41.6	1178.96	P
2462.000000	2498.500000	20.67	41.61	1300.17	P
2462.000000	2498.500000	9.83	41.61	373.25	A

PAGE NO. 26 of 53.
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 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
 2450 MHz = -3 dB

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.

Morton Flom P. Eng.

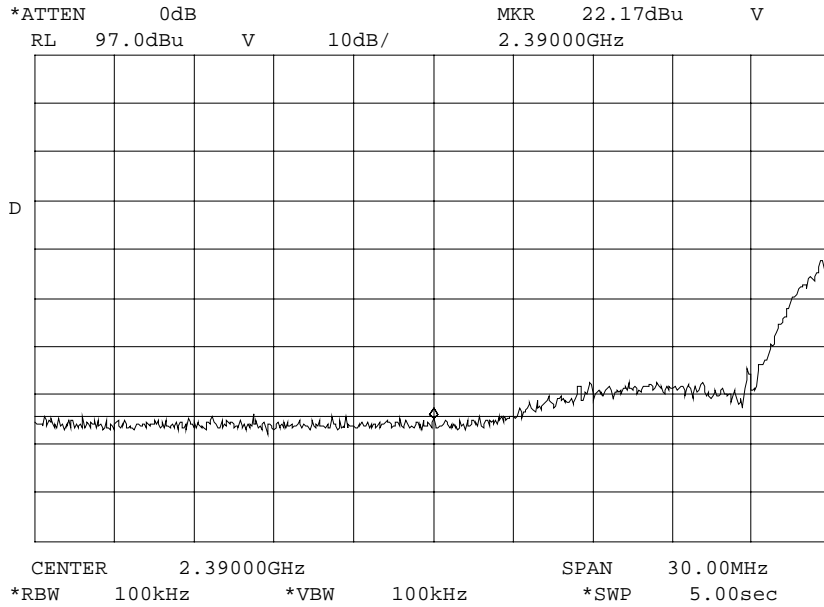
SUPERVISED BY:

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PAGE NO.

27 of 53.

NAME OF TEST: Radiated Band Edge
g0040233: 2000-Apr-17 Mon 16:27:00
Snap On Antenna



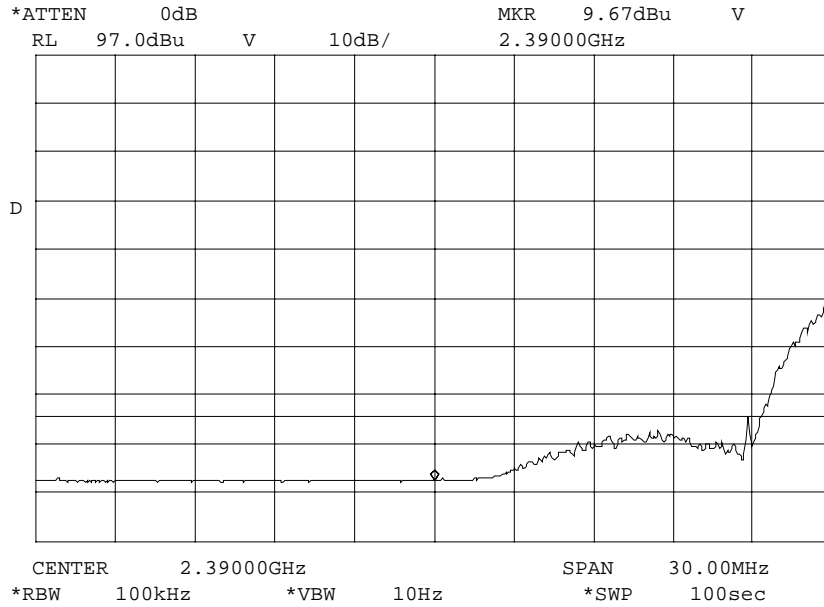
POWER: HIGH
 MODULATION: DIRECT SEQUENCE (Worst Case)
 LOWER BANDEDGE FREQ. 2412/PEAK

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PAGE NO. 28 of 53.

NAME OF TEST: Radiated Band Edge
g0040232: 2000-Apr-17 Mon 16:26:00
Snap On Antenna



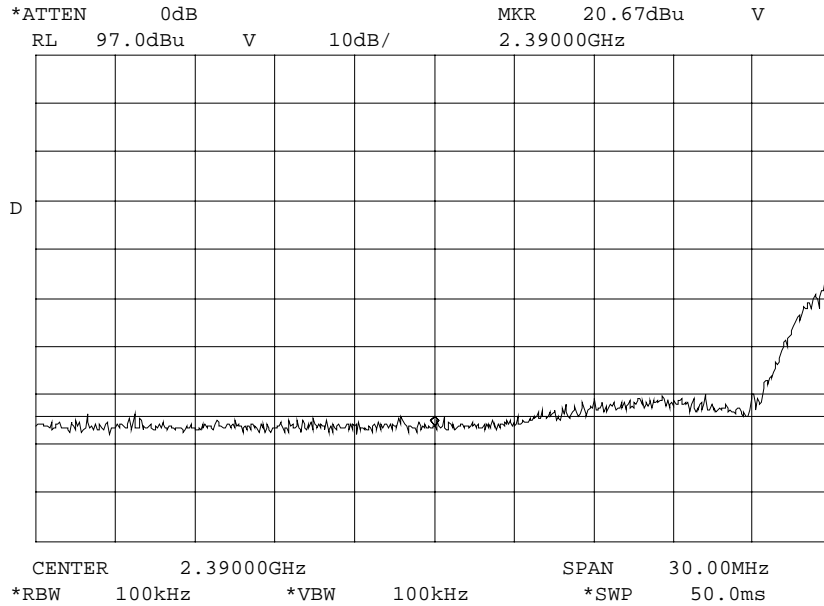
POWER: HIGH
MODULATION: DIRECT SEQUENCE (Worst Case)
LOWER BANDEDGE FREQ. 2412/AVG

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PAGE NO. 29 of 53.

NAME OF TEST: Radiated Band Edge
g0040293: 2000-Apr-19 Wed 12:04:00
Dipole Antenna



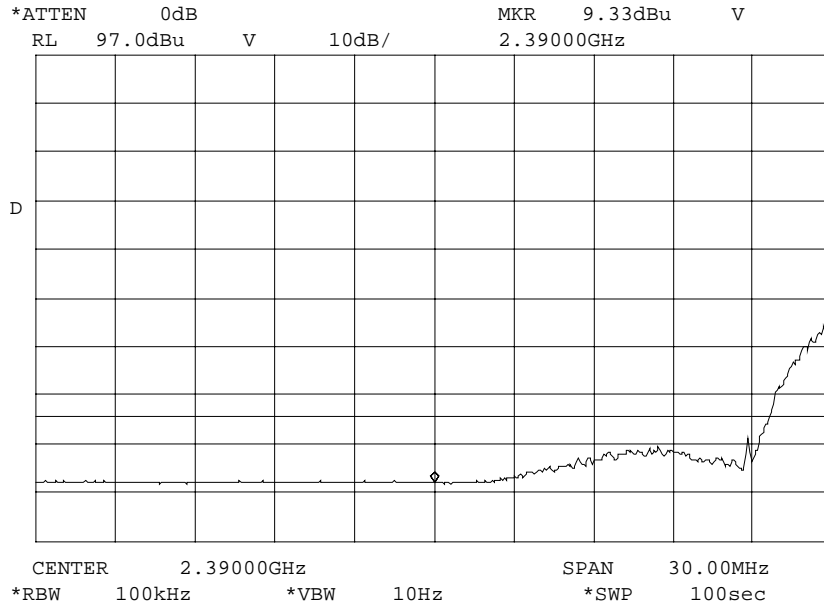
POWER: HIGH
MODULATION: DIRECT SEQUENCE (Worst Case)
LOWER BANDEDGE FREQ. 2442/PEAK

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PAGE NO. 30 of 53.

NAME OF TEST: Radiated Band Edge
g0040294: 2000-Apr-19 Wed 12:08:00
Dipole Antenna



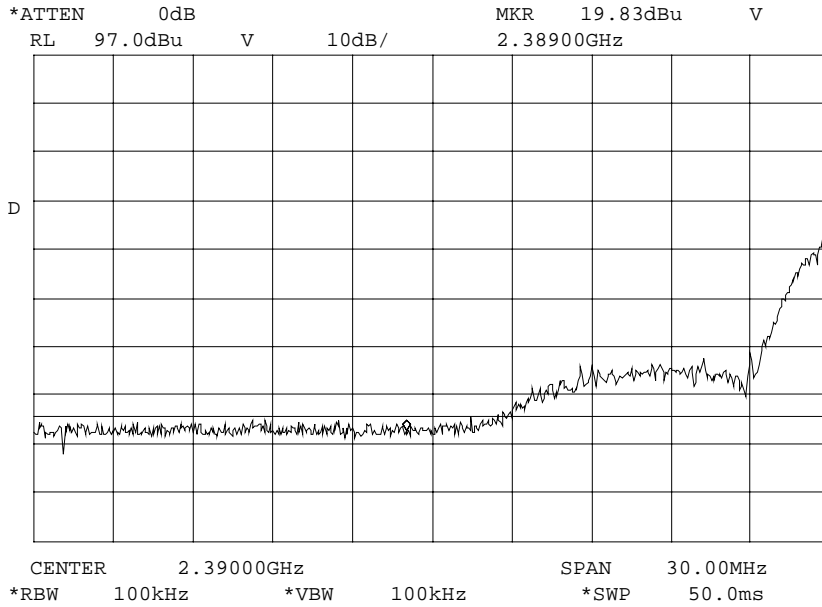
POWER: HIGH
MODULATION: DIRECT SEQUENCE (Worst Case)
LOWER BANDEDGE FREQ. 2442/AVG

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PAGE NO. 31 of 53.

NAME OF TEST: Radiated Band Edge
g0040267: 2000-Apr-18 Tue 15:19:00
Yagi Antenna



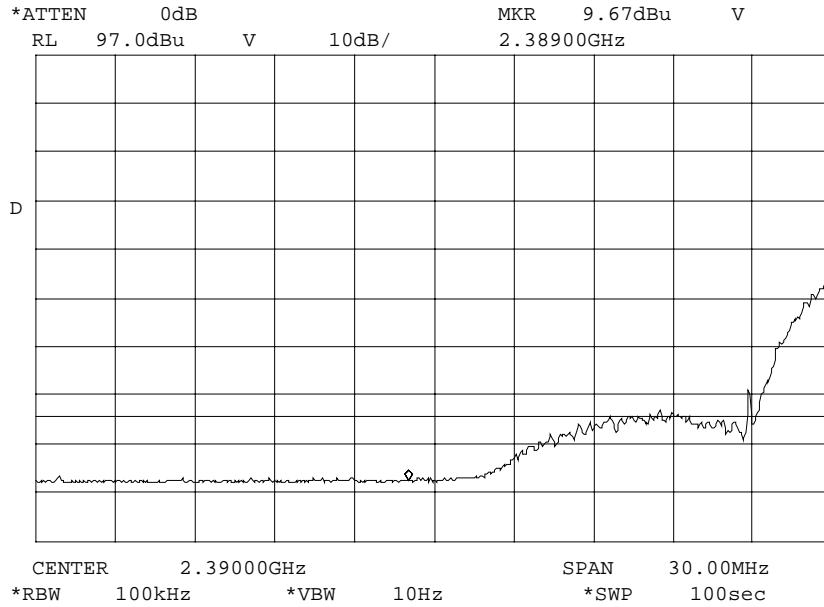
POWER: HIGH
 MODULATION: DIRECT SEQUENCE (Worst Case)
 LOWER BANDEGE FREQ. 2412/PEAK

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PAGE NO. 32 of 53.

NAME OF TEST: Radiated Band Edge
g0040268: 2000-Apr-18 Tue 15:23:00
Yagi Antenna



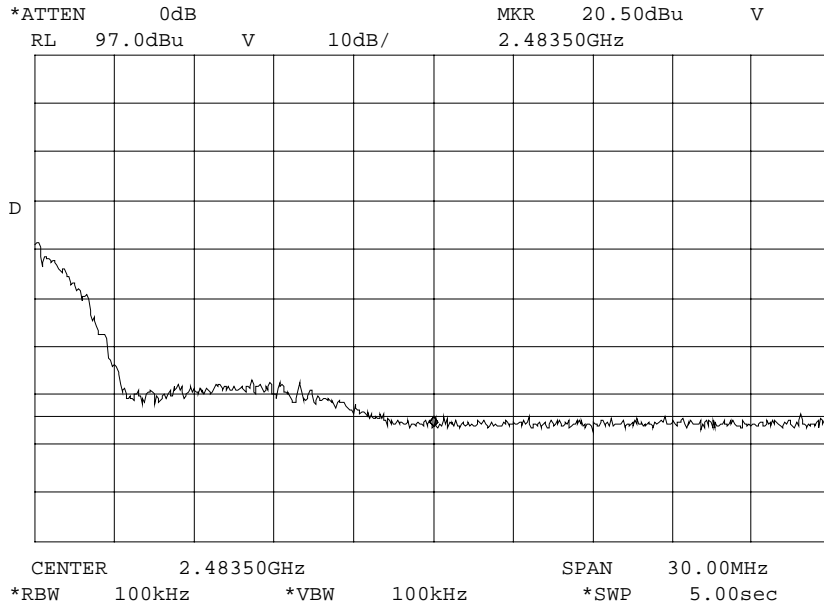
POWER: HIGH
MODULATION: DIRECT SEQUENCE (Worst Case)
LOWER BANDEDGE FREQ. 2412/AVG

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PAGE NO. 33 of 53.

NAME OF TEST: Radiated Band Edge
g0040236: 2000-Apr-18 Tue 08:28:00
Snap On Antenna



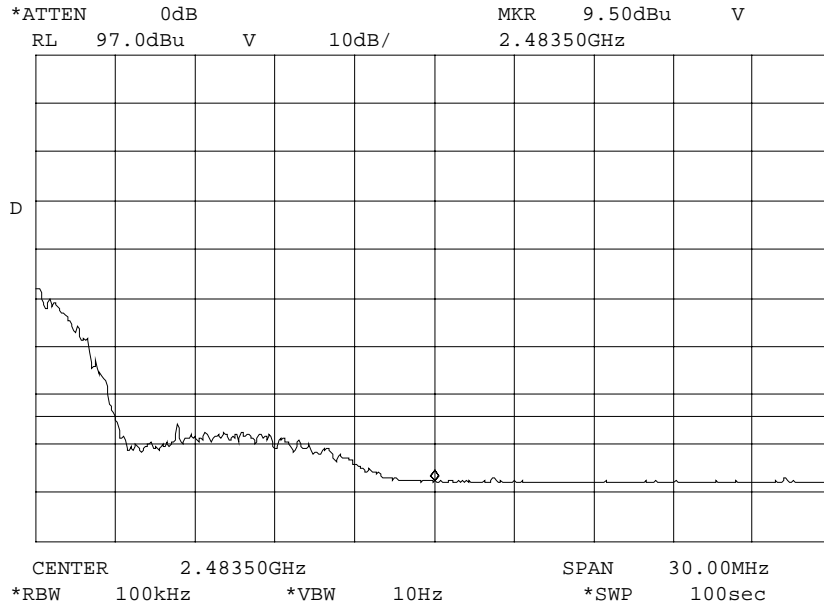
POWER: HIGH
MODULATION: DIRECT SEQUENCE (Worst Case)
UPPER BANDEDGE FREQ. 2462/PEAK

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PAGE NO. 34 of 53.

NAME OF TEST: Radiated Band Edge
g0040234: 2000-Apr-18 Tue 08:15:00
Snap On Antenna



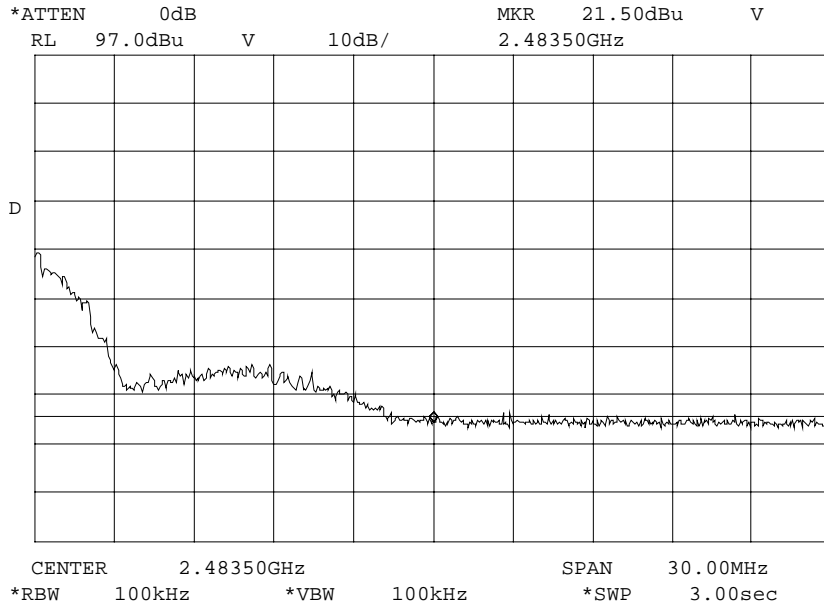
POWER: HIGH
MODULATION: DIRECT SEQUENCE (Worst Case)
UPPER BANDEDGE FREQ. 2462/AVG

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PAGE NO. 35 of 53.

NAME OF TEST: Radiated Band Edge
g0040296: 2000-Apr-19 Wed 12:24:00
Dipole Antenna



POWER: HIGH
 MODULATION: DIRECT SEQUENCE (Worst Case)
 UPPER BANDEDGE FREQ. 2462/PEAK

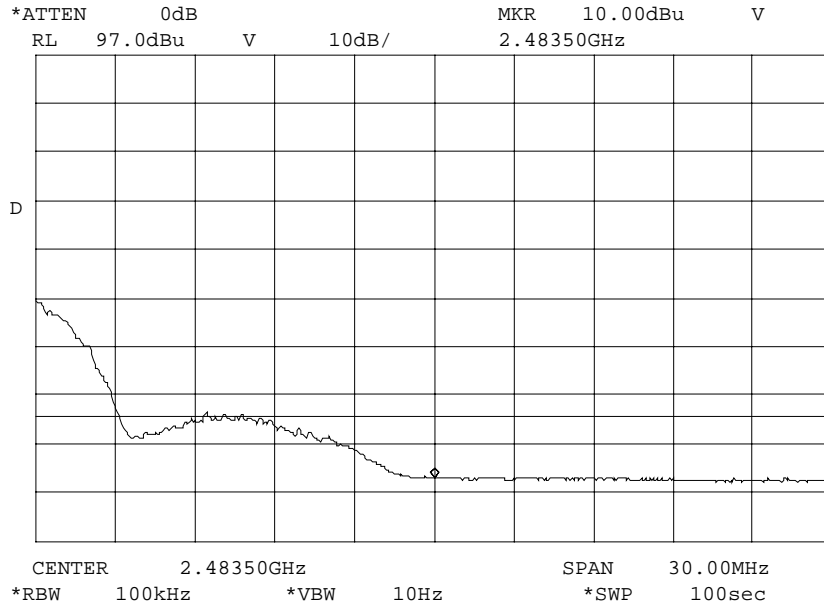
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PAGE NO.

36 of 53.

NAME OF TEST: Radiated Band Edge
g0040297: 2000-Apr-19 Wed 12:30:00
Dipole Antenna



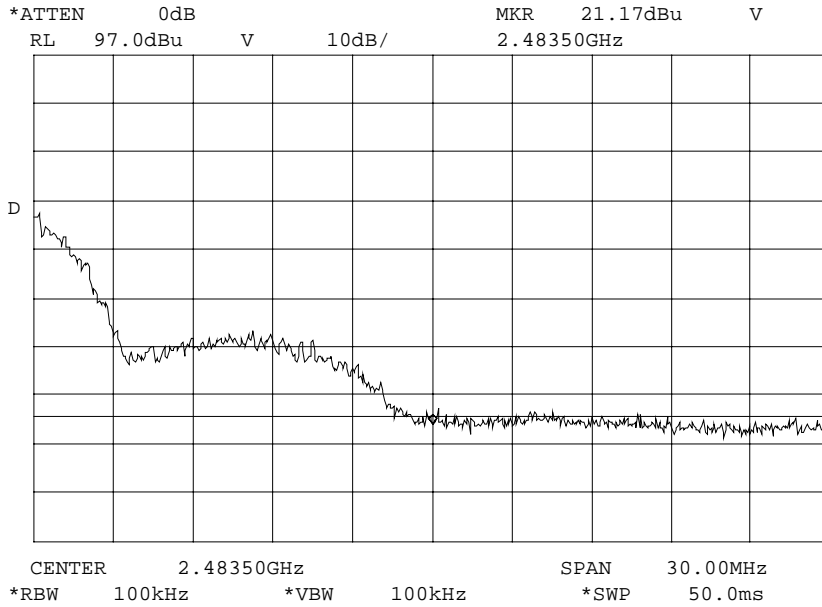
POWER: HIGH
 MODULATION: DIRECT SEQUENCE (Worst Case)
 UPPER BANDEDGE FREQ. 2462/AVG

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PAGE NO. 37 of 53.

NAME OF TEST: Radiated Band Edge
g0040269: 2000-Apr-18 Tue 15:40:00
Yagi Antenna



POWER: HIGH
 MODULATION: DIRECT SEQUENCE (Worst Case)
 UPPER BANDEDGE FREQ. 2462/PEAK

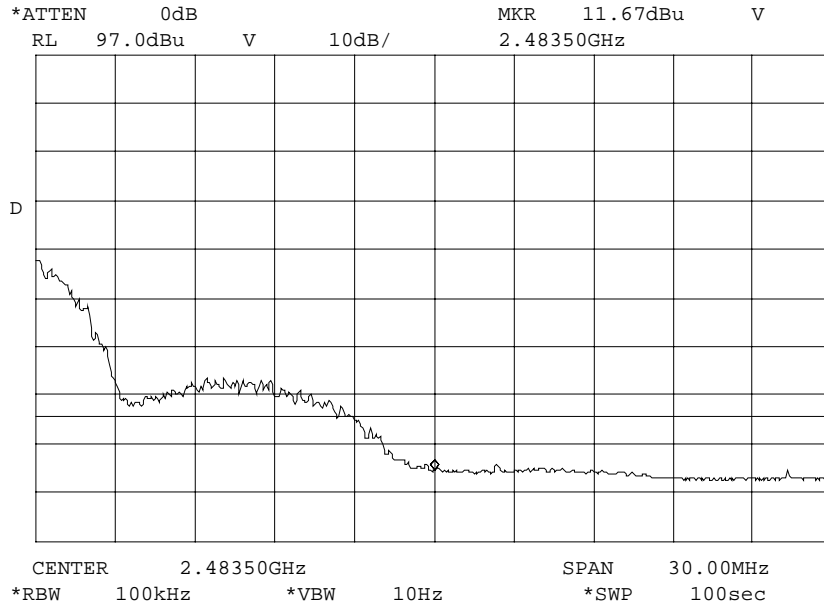
SUPERVISED BY:

Morton Flom P. Eng.
 Morton Flom, P. Eng.

PAGE NO.

38 of 53.

NAME OF TEST: Radiated Band Edge
g0040270: 2000-Apr-18 Tue 15:44:00
Yagi Antenna



POWER: HIGH
 MODULATION: DIRECT SEQUENCE (Worst Case)
 UPPER BANDEDGE FREQ. 2462/AVG

SUPERVISED BY:

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PAGE NO. 39 of 53.
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

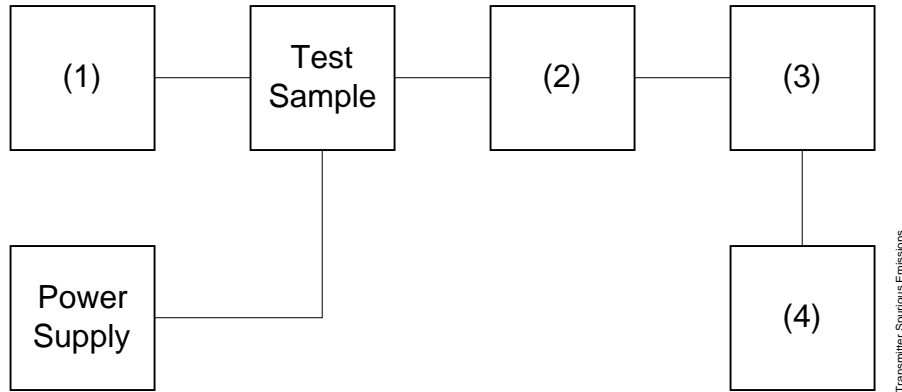
RESULTS = ATTACHED

SUPERVISED BY:


Morton Flom, P. Eng.

TRANSMITTER SPURIOUS EMISSION

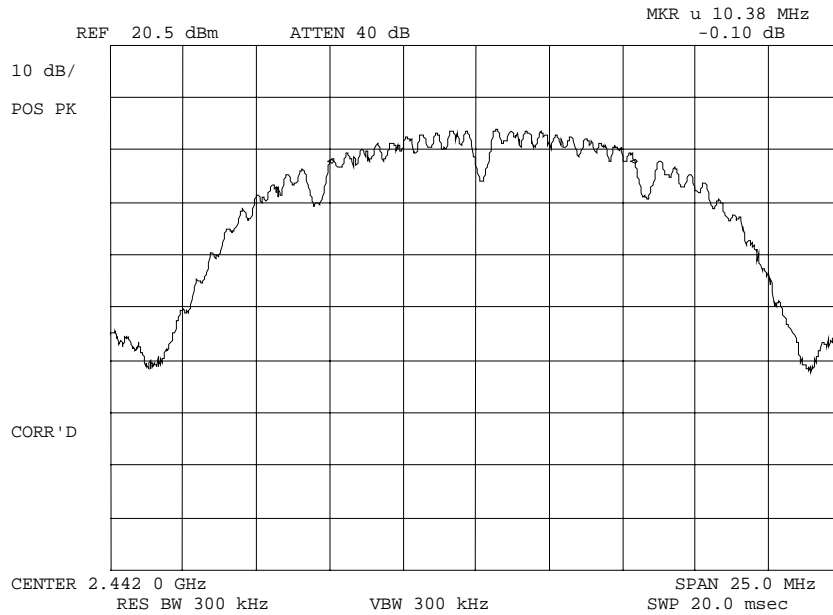
TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)
 TEST B. OUT-OF-BAND SPURIOUS



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

PAGE NO. 41 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040278: 2000-Apr-21 Fri 09:20:00
STATE: 2:High Power



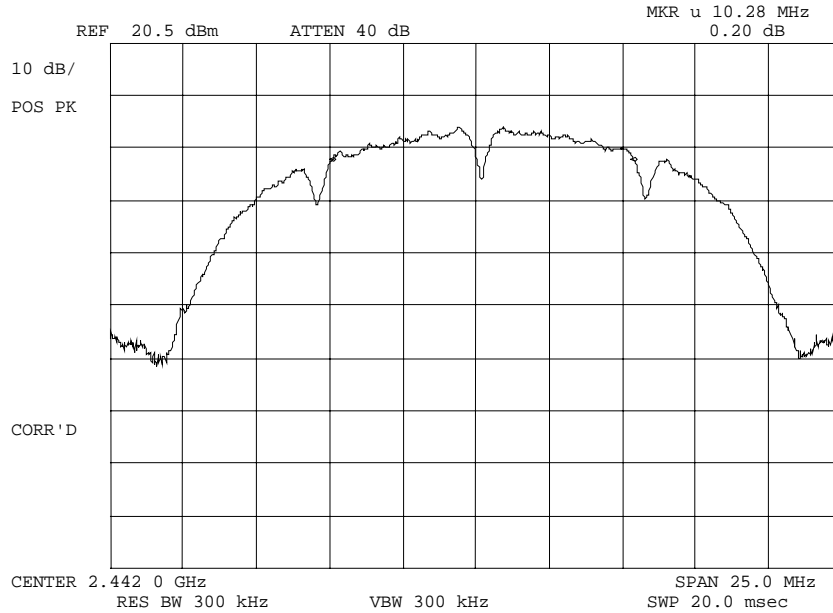
POWER: HIGH
MODULATION: 1 MB/SEC PSEUDO RANDOM DATA
15.247(a)(2) 6 DB BANDWIDTH

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 42 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040279: 2000-Apr-21 Fri 09:21:00
STATE: 2:High Power



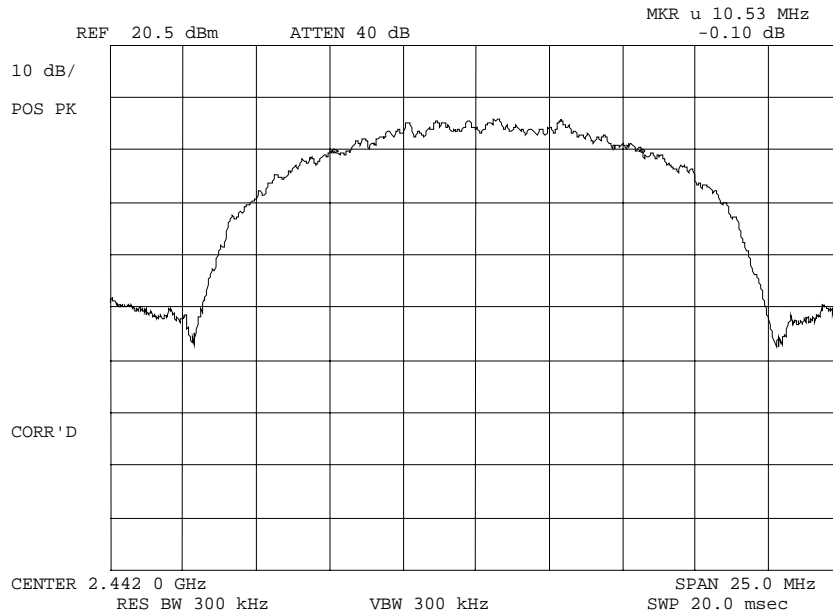
POWER:	HIGH
MODULATION:	2 MB/SEC PSEUDO RANDOM DATA
	15.247(a)(2) 6 DB BANDWIDTH

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 43 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040280: 2000-Apr-21 Fri 09:23:00
STATE: 2:High Power



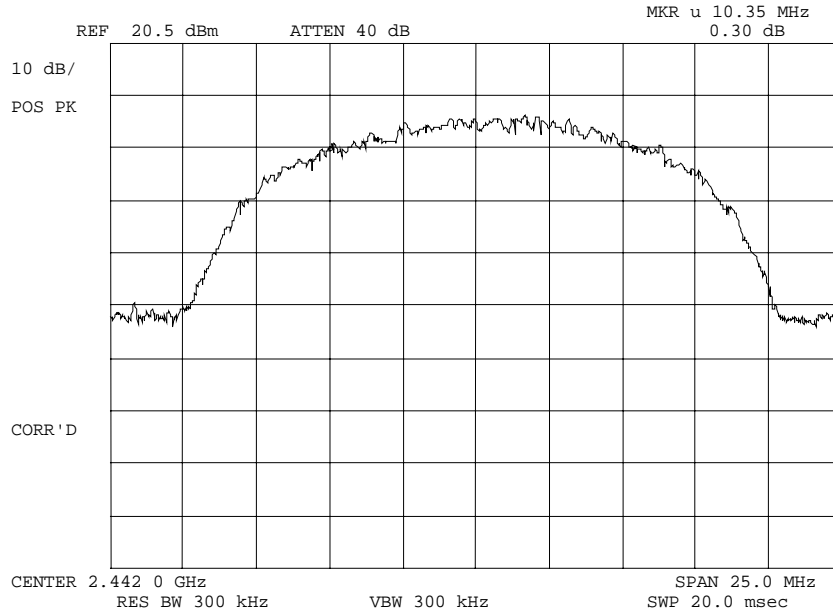
POWER: HIGH
MODULATION: 5.5 MB/SEC PSEUDO RANDOM DATA
15.247(a)(2) 6 DB BANDWIDTH

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 44 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040281: 2000-Apr-21 Fri 09:24:00
STATE: 2:High Power



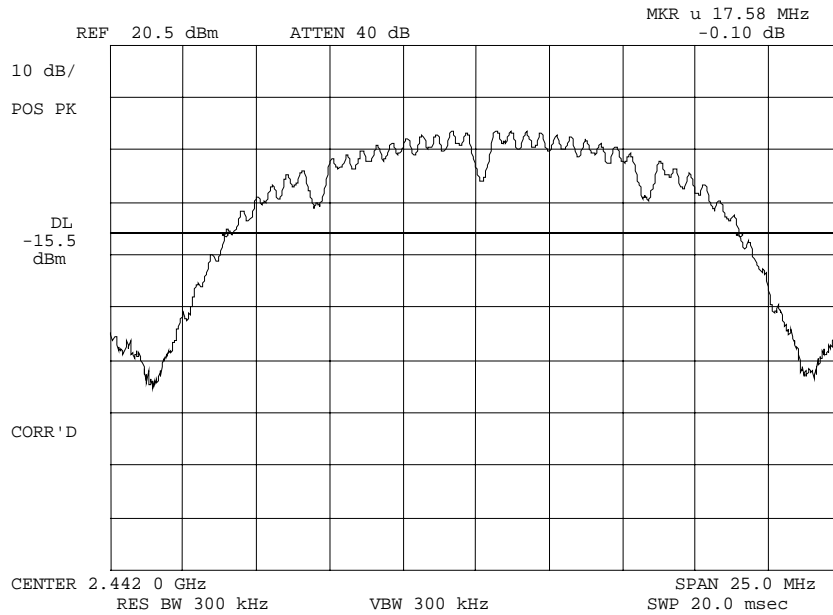
POWER:	HIGH
MODULATION:	11 MB/SEC PSEUDO RANDOM DATA
	15.247(a)(2) 6 DB BANDWIDTH

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 45 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040277: 2000-Apr-21 Fri 09:08:00
STATE: 2:High Power



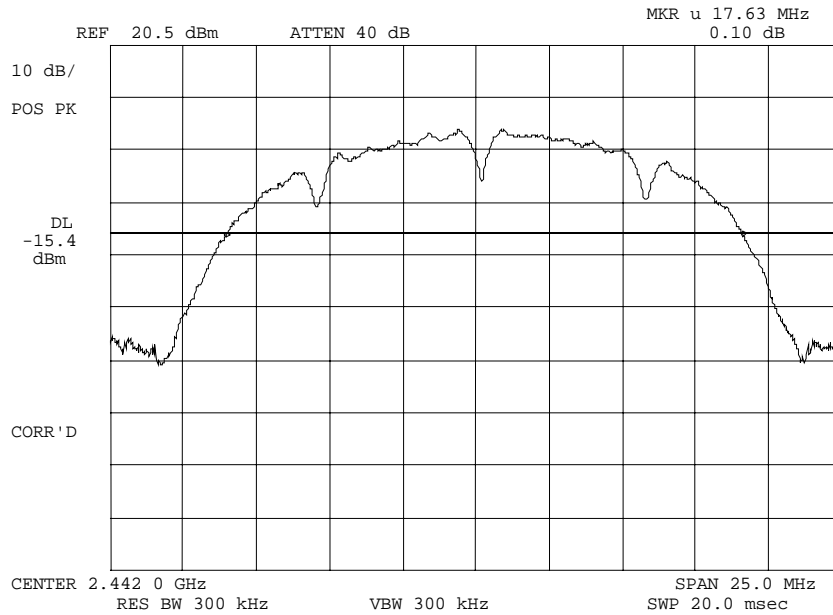
POWER: HIGH
MODULATION: 1 MB/SEC PSEUDO RANDOM DATA
15.247(a)(1)(I) 20 DB
BANDWIDTH

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 46 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040276: 2000-Apr-21 Fri 09:06:00
STATE: 2:High Power



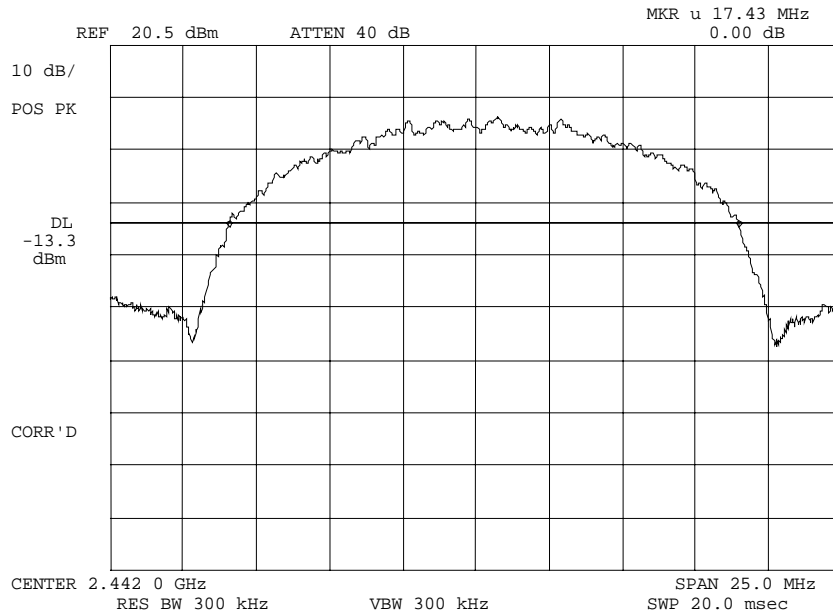
POWER: HIGH
 MODULATION: 2 MB/SEC PSEUDO RANDOM DATA
 15.247(a)(1)(i) 20 DB BANDWIDTH

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PAGE NO. 47 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040275: 2000-Apr-21 Fri 09:04:00
STATE: 2:High Power



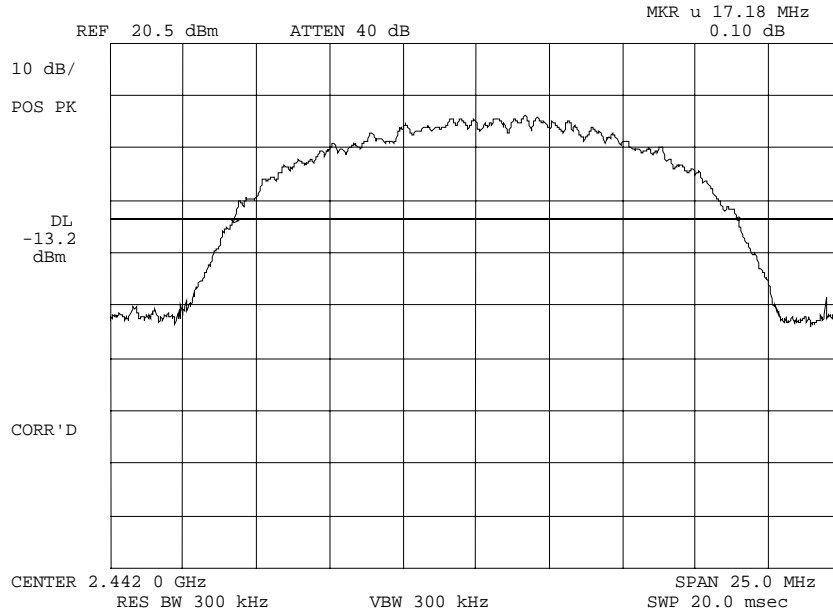
POWER: HIGH
MODULATION: 5.5 MB/SEC PSEUDO RANDOM DATA
15.247(a)(1)(i) 20 DB BANDWIDTH

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PAGE NO. 48 of 53.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0040274: 2000-Apr-21 Fri 09:02:00
STATE: 2:High Power



POWER:	HIGH
MODULATION:	11 MB/SEC PSEUDO RANDOM DATA
	15.247(a)(1)(i) 20 DB BANDWIDTH

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PAGE NO. 49 of 53.

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 = Attached

15.247(e) Processing Gain

LIMIT: The processing gain shall be ≥ 10 dB

RESULTS: See Applicant's statement
Processing Gain, dB = Attached

Pseudorandom Sequence Description

RESULTS: Not Applicable to Direct Sequence Systems

Chip Rate

RESULTS: See Applicant's statement

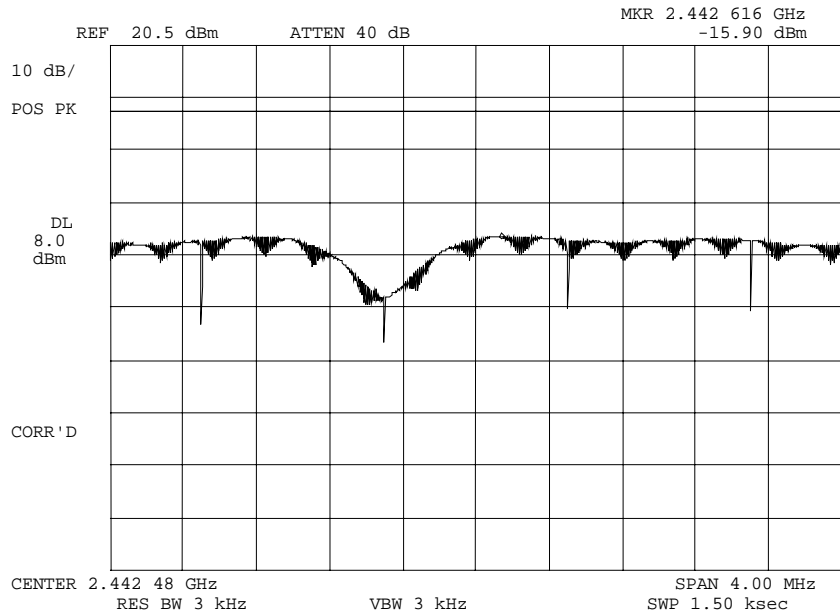
SUPERVISED BY:



Morton Flom, P. Eng.

PAGE NO. 50 of 53.

NAME OF TEST: Spectral Power Density
g0040287: 2000-Apr-21 Fri 10:42:00
Yagi Antenna



POWER: HIGH
MODULATION: 1 MB/SEC PSEUDO RANDOM DATA
15.247(D) SPECTRAL POWER DENSITY

SUPERVISED BY:

Morton Flom, P. Eng.

RADIATED MEASUREMENTS
FOR PART 15 TRANSMITTERS (INTENTIONAL RADIATORS)

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, 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.

PAGE NO. 7 of 53. AMENDED August 22, 2000
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 Snap On
 PEAK OUTPUT POWER, Watts = 0.0955 EIRP
 WORST CASE FOR
 ALL CHANNELS

NAME OF TEST: Radiated Emissions
 g0080488: 2000-Aug-17 Thu 14:16:00 Snap On Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, mw
2412.000000	2413.200000	59.06	55.77	551442.2	19.6	91.2
2442.000000	2443.300000	59.06	55.96	563637.66	19.8	95.5
2462.000000	2463.300000	57.94	56.1	503500.61	18.8	75.9

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO.

9.1 of 53. AMENDED August 22, 2000

NAME OF TEST: Out of Band Emissions
 g0080487: 2000-Aug-17 Thu 11:10:00 Snap On Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
2442.000000	30.213000	11.93	14.87	21.88	-68.4	-13.2
2442.000000	34.000000	10.13	14.33	16.71	-70.8	-15.5
2442.000000	38.000000	17.61	13.83	37.33	-63.8	-8.6
2442.000000	42.000000	15.85	13.23	28.44	-66.1	-10.9
2442.000000	46.000000	-0.6	12.54	3.95	-83.3	-28.1
2442.000000	50.120000	11.04	11.88	14	-72.3	-17.1
2442.000000	54.000000	3.73	11.23	5.6	-80.3	-25
2442.000000	58.000000	-2.16	10.6	2.64	-86.8	-31.6
2442.000000	66.000000	-0.5	9.68	2.88	-86	-30.8
2442.000000	69.940000	2.99	9.31	4.12	-82.9	-27.7
2442.000000	74.000000	5.13	9.05	5.12	-81	-25.8
2442.000000	83.000000	10.1	9.04	9.06	-76.1	-20.9
2442.000000	86.000000	18.49	9.38	24.75	-67.4	-12.1
2442.000000	110.000000	10.59	12.97	15.07	-71.7	-19.4
2442.000000	114.550000	15.21	13.37	26.85	-66.6	-14.4
2442.000000	118.000000	10.86	13.67	16.85	-70.7	-18.5
2442.000000	122.000000	7.24	13.9	11.4	-74.1	-21.9
2442.000000	126.000000	14.16	14.04	25.7	-67	-14.8
2442.000000	130.000000	13.58	14.19	24.46	-67.5	-15.2
2442.000000	134.000000	11.51	14.5	19.98	-69.2	-17
2442.000000	138.000000	9.02	14.8	15.52	-71.4	-19.2
2442.000000	142.000000	8.73	14.98	15.33	-71.5	-19.3
2442.000000	144.025000	17.39	15.01	41.69	-62.8	-10.6
2442.000000	146.025000	4.69	15.04	9.69	-75.5	-23.3
2442.000000	150.325000	12	15.09	22.62	-68.1	-15.9
2442.000000	161.950000	7.43	14.89	13.06	-72.9	-20.7
2442.000000	166.000000	6.6	14.82	11.78	-73.8	-21.6
2442.000000	170.000000	6.65	14.74	11.74	-73.8	-21.6
2442.000000	174.000000	7.53	14.79	13.06	-72.9	-20.7
2442.000000	178.000000	7.59	14.85	13.24	-72.8	-20.6
2442.000000	190.000000	23.06	15.95	89.23	-56.2	-4
2442.000000	202.000000	5.78	17.18	14.06	-72.3	-20
2442.000000	212.638000	14.57	18.16	43.3	-62.5	-10.3
2442.000000	216.013000	15.82	18.46	51.76	-60.9	-11.7
2442.000000	218.000000	6.06	18.63	17.16	-70.5	-21.3
2442.000000	222.000000	4.66	18.95	15.15	-71.6	-22.4
2442.000000	226.000000	8.27	19.23	23.71	-67.7	-18.5
2442.000000	230.000000	7.34	19.51	22	-68.4	-19.2
2442.000000	234.000000	7.97	19.63	23.99	-67.6	-18.4
2442.000000	238.000000	12.37	19.75	40.36	-63.1	-13.9
2442.000000	239.988000	16.91	19.81	68.55	-58.5	-9.3
2442.000000	242.000000	10.93	19.95	34.99	-64.3	-15.1
2442.000000	246.000000	8.43	20.22	27.07	-66.6	-17.4
2442.000000	250.650000	18.35	20.51	87.7	-56.4	-7.1
2442.000000	254.000000	11.76	20.54	41.21	-62.9	-13.7
2442.000000	258.000000	10.17	20.59	34.51	-64.5	-15.2
2442.000000	262.000000	9.24	20.71	31.44	-65.3	-16.1
2442.000000	264.025000	17.96	20.81	86.8	-56.5	-7.2

PAGE NO.

9.2 of 53. AMENDED August 22, 2000

NAME OF TEST: Out of Band Emissions (Continued)
 g0080487: 2000-Aug-17 Thu 11:10:00 Snap On Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
2442.000000	266.000000	10.08	20.91	35.44	-64.2	-15
2442.000000	271.313000	16.93	21.16	80.26	-57.1	-7.9
2442.000000	274.000000	8.39	21.27	30.41	-65.6	-16.3
2442.000000	278.000000	8.48	21.43	31.3	-65.3	-16.1
2442.000000	282.000000	5.04	21.49	21.21	-68.7	-19.5
2442.000000	286.000000	5.61	21.45	22.54	-68.2	-18.9
2442.000000	288.050000	11.92	21.43	46.51	-61.9	-12.7
2442.000000	290.000000	6.49	21.41	24.83	-67.3	-18.1
2442.000000	294.000000	6.27	25.17	37.33	-63.8	-14.6
2442.000000	298.000000	1.71	28.87	33.81	-64.6	-15.4
2442.000000	300.693000	25.42	17.85	145.71	-52	-2.7
2442.000000	304.693000	10.91	18.09	28.18	-66.2	-17
2442.000000	308.693000	13.54	18.34	39.26	-63.3	-14.1
2442.000000	311.978000	20.14	18.54	85.9	-56.5	-7.3
2442.000000	317.448000	19.96	18.87	87.4	-56.4	-7.2
2442.000000	320.658000	11.75	19.06	34.71	-64.4	-15.2
2442.000000	324.658000	8.65	19.3	24.97	-67.3	-18.1
2442.000000	328.658000	8.51	19.53	25.23	-67.2	-18
2442.000000	332.658000	6.56	19.76	20.7	-68.9	-19.7
2442.000000	337.348000	15.16	20.02	57.41	-60	-10.8
2442.000000	340.663000	3.88	20.21	16.01	-71.1	-21.9
2442.000000	344.663000	21.82	20.43	129.57	-53	-3.8
2442.000000	348.663000	6.07	20.65	21.68	-68.5	-19.3
2442.000000	352.663000	4.63	20.87	18.84	-69.7	-20.5
2442.000000	356.663000	1.76	21.1	13.9	-72.4	-23.1
2442.000000	360.663000	4.97	21.32	20.63	-68.9	-19.7
2442.000000	364.663000	6.77	21.54	26.03	-66.9	-17.7
2442.000000	368.663000	6.98	21.77	27.38	-66.5	-17.3
2442.000000	372.663000	1.08	21.98	14.22	-72.2	-22.9
2442.000000	375.913000	12.68	22.16	55.21	-60.4	-11.2
2442.000000	380.668000	5.38	22.41	24.52	-67.4	-18.2
2442.000000	381.303000	11.95	22.44	52.42	-60.8	-11.6
2442.000000	384.658000	4.07	22.61	21.58	-68.5	-19.3
2442.000000	388.658000	17.49	22.82	103.63	-54.9	-5.7
2442.000000	392.658000	4.23	23.03	23.07	-68	-18.7
2442.000000	396.658000	3.88	23.23	22.67	-68.1	-18.9
2442.000000	400.658000	3.12	23.39	21.16	-68.7	-19.5
2442.000000	404.658000	1.99	23.39	18.58	-69.8	-20.6
2442.000000	408.658000	4.64	23.38	25.18	-67.2	-18
2442.000000	412.658000	2.53	23.37	19.72	-69.3	-20.1
2442.000000	416.658000	-2.12	23.35	11.52	-74	-24.8
2442.000000	420.658000	0.89	23.35	16.29	-71	-21.8
2442.000000	424.658000	1.46	23.34	17.38	-70.4	-21.2
2442.000000	428.658000	2.49	23.33	19.54	-69.4	-20.2
2442.000000	432.658000	12.65	23.32	62.88	-59.3	-10
2442.000000	436.658000	1.53	23.31	17.46	-70.4	-21.2
2442.000000	440.658000	-0.43	23.3	13.92	-72.4	-23.1
2442.000000	444.658000	-0.97	23.29	13.06	-72.9	-23.7

PAGE NO.

9.3 of 53. AMENDED August 22, 2000

NAME OF TEST: Out of Band Emissions (Continued)
 g0080487: 2000-Aug-17 Thu 11:10:00 Snap On Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
2442.000000	448.658000	1.54	23.28	17.42	-70.4	-21.2
2442.000000	456.658000	5.82	23.29	28.54	-66.1	-16.9
2442.000000	460.658000	2.8	23.28	20.14	-69.1	-19.9
2442.000000	464.658000	4.77	23.28	25.26	-67.2	-18
2442.000000	468.658000	-0.85	23.28	13.23	-72.8	-23.6
2442.000000	472.658000	2.51	23.29	19.5	-69.4	-20.2
2442.000000	484.658000	-0.68	23.29	13.51	-72.6	-23.4
2442.000000	496.658000	0.3	23.3	15.14	-71.6	-22.4
2442.000000	500.658000	-0.23	23.33	14.29	-72.1	-22.9
2442.000000	504.658000	-2.65	23.49	11.02	-74.4	-25.2
2442.000000	508.658000	-1.37	23.65	13	-72.9	-23.7
2442.000000	520.658000	3.54	24.12	24.15	-67.6	-18.3
2442.000000	524.658000	-0.24	24.28	15.92	-71.2	-22
2442.000000	528.658000	-1.84	24.44	13.49	-72.6	-23.4
2442.000000	532.658000	0.97	24.59	18.97	-69.7	-20.4
2442.000000	536.658000	-3.19	24.74	11.95	-73.7	-24.5
2442.000000	540.658000	-0.57	24.88	16.42	-70.9	-21.7
2442.000000	544.658000	17.09	25.04	127.79	-53.1	-3.9
2442.000000	548.658000	0.61	25.19	19.5	-69.4	-20.2
2442.000000	552.658000	-1.53	25.33	15.49	-71.4	-22.2
2442.000000	556.658000	-1.4	25.48	16	-71.1	-21.9
2442.000000	560.658000	-1.86	25.62	15.42	-71.5	-22.2
2442.000000	564.658000	9.84	25.76	60.26	-59.6	-10.4
2442.000000	568.658000	-2.06	25.92	15.6	-71.4	-22.1
2442.000000	580.658000	-0.7	26.34	19.14	-69.6	-20.4
2442.000000	584.658000	12.89	26.48	93	-55.9	-6.6
2442.000000	588.658000	9.1	26.62	61.09	-59.5	-10.3
2442.000000	592.658000	-2.37	26.75	16.56	-70.8	-21.6
2442.000000	596.658000	-1.02	26.89	19.66	-69.4	-20.1
2442.000000	600.658000	0.64	27.01	24.13	-67.6	-18.4
2442.000000	610.658000	-0.87	27.14	20.58	-69	-19.7
2442.000000	620.658000	-0.75	27.26	21.16	-68.7	-19.5
2442.000000	630.663000	1.35	27.39	27.35	-66.5	-17.3
2442.000000	640.663000	-1.73	27.51	19.45	-69.4	-20.2
2442.000000	650.663000	-1.99	27.63	19.14	-69.6	-20.4
2442.000000	670.663000	-0.79	27.87	22.59	-68.1	-18.9
2442.000000	680.663000	-1.31	27.98	21.55	-68.6	-19.3
2442.000000	690.663000	-1.88	28.1	20.46	-69	-19.8
2442.000000	700.663000	-1.85	28.21	20.8	-68.9	-19.6
2442.000000	710.663000	-2.76	28.35	19.03	-69.6	-20.4
2442.000000	720.663000	-1.06	28.48	23.5	-67.8	-18.6
2442.000000	730.663000	-1.35	28.62	23.09	-68	-18.7
2442.000000	740.663000	2.04	28.75	34.63	-64.4	-15.2
2442.000000	750.663000	0.76	28.88	30.34	-65.6	-16.4
2442.000000	760.663000	-2.64	29.01	20.82	-68.9	-19.6
2442.000000	770.663000	-0.32	29.13	27.57	-66.4	-17.2
2442.000000	780.663000	-1.04	29.26	25.76	-67	-17.8
2442.000000	790.663000	-1.21	29.39	25.64	-67	-17.8

PAGE NO.

9.4 of 53. AMENDED August 22, 2000

NAME OF TEST: Out of Band Emissions (Continued)
 g0080487: 2000-Aug-17 Thu 11:10:00 Snap On Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
2442.000000	800.663000	-0.15	29.5	29.34	-65.9	-16.7
2442.000000	810.663000	-1.88	29.54	24.15	-67.6	-18.3
2442.000000	820.663000	0.45	29.57	31.7	-65.2	-16
2442.000000	830.663000	-0.18	29.59	29.55	-65.8	-16.6
2442.000000	840.663000	-0.51	29.61	28.51	-66.1	-16.9
2442.000000	850.663000	2.42	29.64	40.09	-63.2	-13.9
2442.000000	870.663000	0.14	29.7	31.05	-65.4	-16.2
2442.000000	880.663000	2.8	29.73	42.32	-62.7	-13.5
2442.000000	890.663000	1.08	29.76	34.83	-64.4	-15.2
2442.000000	900.663000	-0.81	29.84	28.28	-66.2	-17
2442.000000	910.663000	-1.98	30.8	27.61	-66.4	-17.2
2442.000000	920.663000	-0.62	31.75	36.02	-64.1	-14.9
2442.000000	930.663000	-0.75	32.69	39.54	-63.3	-14.1
2442.000000	940.663000	3.27	33.62	69.9	-58.3	-9.1
2442.000000	950.663000	-0.66	34.53	49.37	-61.4	-12.1
2442.000000	960.663000	0.74	35.44	64.42	-59	-17.8
2442.000000	970.663000	-2.47	36.34	49.37	-61.4	-20.1
2442.000000	980.663000	-2.45	37.22	54.76	-60.5	-19.2
2442.000000	990.663000	-1.97	38.1	64.05	-59.1	-17.9
2442.000000	999.993000	0.54	38.9	93.76	-55.8	-14.6

PAGE NO. 20 of 53. AMENDED August 22, 2000

NAME OF TEST: Band Edge Emissions
 g0080491: 2000-Aug-17 Thu 15:37:00 Snap On Antenna
 Lower Bandedge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3 m	PEAK (P) OR AVERAGE (A)
2412.000	2375.050000	7.8	41.4	49.3	A
2412.000	2375.083333	18.8	44.9	63.8	P
2412.000	2375.800000	8.5	41.4	49.9	A
2412.000	2375.833333	20.8	44.9	65.8	P
2412.000	2376.850000	7.8	41.4	49.3	A
2412.000	2377.000000	19.0	44.9	63.9	P
2412.000	2378.150000	7.8	41.5	49.3	A
2412.000	2379.600000	8.0	41.5	49.5	A
2412.000	2379.833333	18.3	45.0	63.3	P
2412.000	2381.050000	8.0	41.5	49.5	A
2412.000	2382.100000	7.8	41.5	49.3	A
2412.000	2382.333333	19.0	45.0	64.0	P
2412.000	2383.400000	8.2	41.5	49.7	A
2412.000	2384.100000	7.8	41.5	49.4	A
2412.000	2384.750000	19.2	45.0	64.2	P
2412.000	2385.450000	8.2	41.5	49.7	A
2412.000	2386.850000	8.3	41.6	49.6	A
2412.000	2386.916667	19.3	45.1	64.4	P
2412.000	2388.450000	8.0	41.6	49.6	A
2412.000	2390.000000	8.2	41.6	49.4	A
2412.000	2390.000000	18.2	45.1	63.3	P

PAGE NO.

23 of 53. AMENDED August 22, 2000

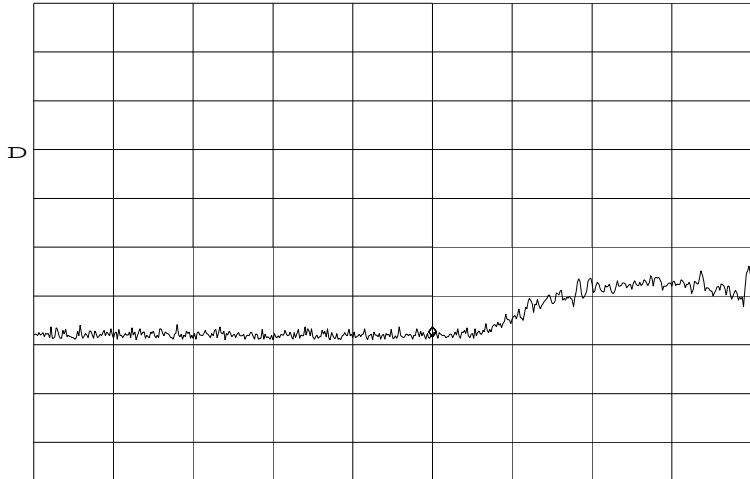
NAME OF TEST: Band Edge Emissions
 g0080495: 2000-Aug-18 Fri 09:44:00 Snap On Antenna
 Upper Bandedge

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	PEAK (P) OR AVERAGE (A)
2462.000000	2483.500000	8.33	42.22	336.9	A
2462.000000	2483.500000	18	45.72	1534.62	P
2462.000000	2484.950000	8.17	42.23	331.13	A
2462.000000	2485.000000	20.67	45.73	2089.3	P
2462.000000	2486.500000	19.67	45.74	1864.23	P
2462.000000	2486.500000	8.17	42.24	331.51	A
2462.000000	2487.900000	19	45.75	1727.83	P
2462.000000	2488.000000	8.17	42.25	331.89	A
2462.000000	2489.500000	18.33	45.75	1599.56	P
2462.000000	2489.500000	8.17	42.25	331.89	A
2462.000000	2490.950000	21.67	45.77	2355.05	P
2462.000000	2491.050000	8	42.27	326.21	A
2462.000000	2492.500000	18.5	45.77	1634.93	P
2462.000000	2492.500000	8.17	42.27	332.66	A
2462.000000	2493.950000	8	42.29	326.96	A
2462.000000	2494.050000	19.83	45.79	1909.85	P
2462.000000	2495.500000	19.33	45.79	1803.02	P
2462.000000	2495.550000	8	42.29	326.96	A
2462.000000	2496.950000	20.17	45.81	1990.67	P
2462.000000	2497.050000	8	42.31	327.72	A

PAGE NO. 27 of 53. AMENDED August 22, 2000

NAME OF TEST: Radiated Band Edge
g0080494: 2000-Aug-18 Fri 09:37:00
Snap On Antenna

*ATTEN 0dB MKR 18.67dBu
RL 87.0dBu V 10dB/ 2.39000GHz



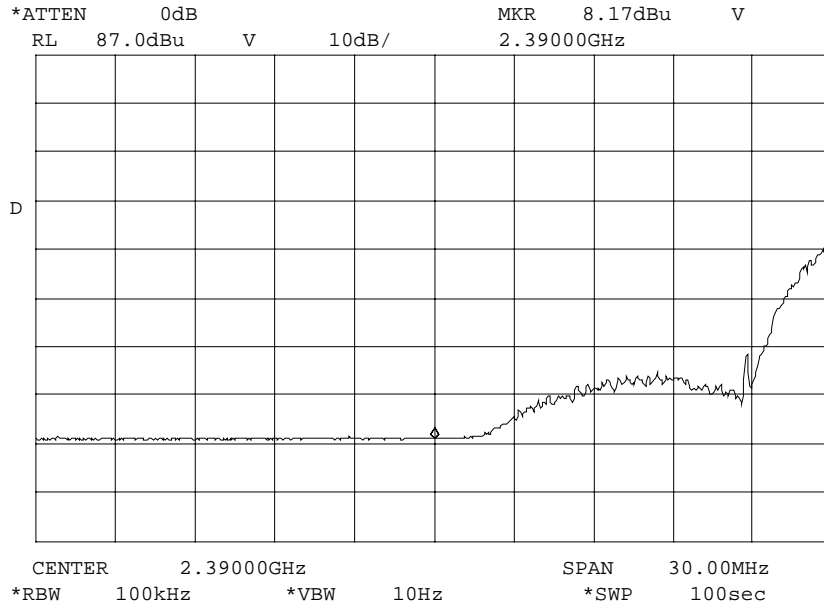
POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
LOWER BANDEDGE CH 2412 /PEAK

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 28 of 53. AMENDED August 22, 2000

NAME OF TEST: Radiated Band Edge
g0080493: 2000-Aug-18 Fri 09:35:00
Snap On Antenna



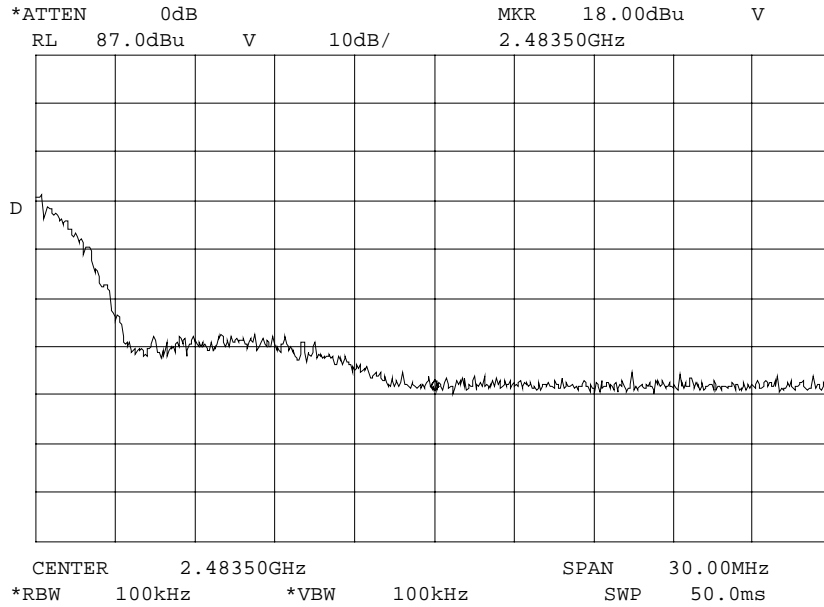
POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
LOWER BANDEDGE CH 2412/AVG

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 33 of 53. Amended August 22, 2000

NAME OF TEST: Radiated Band Edge
g0080498: 2000-Aug-18 Fri 10:14:00
Snap On Antenna



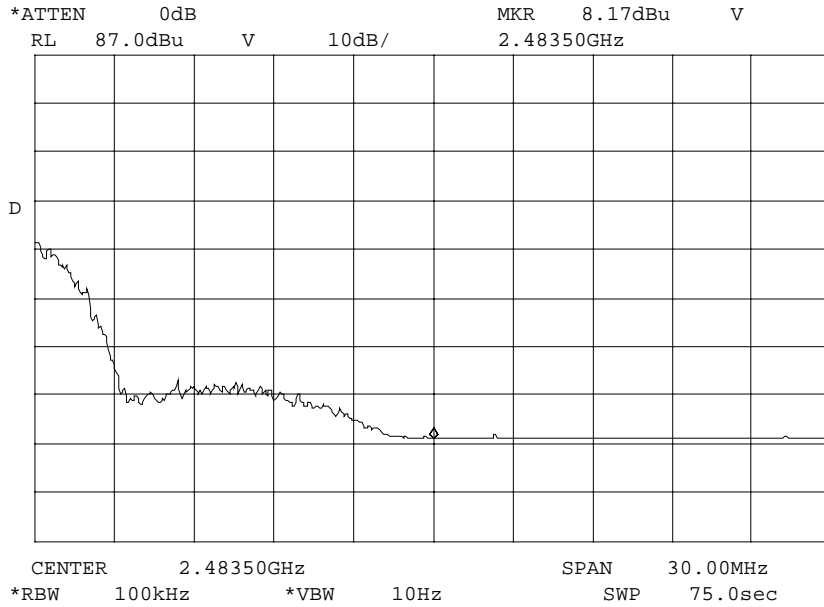
POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
UPPER BANDEDGE CH 2462/PEAK

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 34 of 53. AMENDED August 22, 2000

NAME OF TEST: Radiated Band Edge
g0080497: 2000-Aug-18 Fri 10:06:00
Snap On Antenna



POWER: HIGH
MODULATION: 11 MB/SEC PSUDEO RANDOM DATA
UPPER BANDEDGE CH 2462/AVG

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 7 of 53. Addendum September 19, 2000
NAME OF TEST: RF Conducted Power
SPECIFICATION: 47 CFR 15.247(b)

MEASUREMENT DATA

<u>MHz</u>	<u>Watts Conducted</u>
2412	0.0774
2442	0.093
2462	0.081

SUPERVISED BY:



Morton Flom, P. Eng.