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: November 22, 2002

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Modular Mining Systems Inc
Equipment: 302230
FCC ID: FJ6-302230
FCC Rules: 15.247

Gentlemen:

Further to Andrew Leimer's email of November 13, 2002, we are submitting this as a new Application. Per his instructions we are sending a separate email to Richard Fabina, who agreed to notify the assigned engineer to process this application as received on October 16, 2002.

Therefore, 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/cva

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

APPLICANT: Modular Mining Systems Inc

FCC ID: FJ6-302230

BY APPLICANT:

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

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

T R A N S M I T T E R C E R T I F I C A T I O N

of

FCC ID: FJ6-302230
MODEL: 302230

to

FEDERAL COMMUNICATIONS COMMISSION

Rule Part(s) 15.247

DATE OF REPORT: November 22, 2002

ON THE BEHALF OF THE APPLICANT:

Modular Mining Systems Inc

AT THE REQUEST OF: P.O. 4500016108

Modular Mining Systems Inc
3289 East Hemisphere Loop
Tucson, AZ 85706-5028

Attention of: Romer Johnson, Supervisor, Product Design
(520) 806-3603; FAX: 3344
Email: johnsonr@mmsi.com

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

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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: d02b0054

d) Client: Modular Mining Systems Inc
3289 East Hemisphere Loop
Tucson, AZ 85706-5028

e) Identification: 302230
FCC ID: FJ6-302230
Description: Cisco System and Modular Mining Antenna for 2.4Ghz Radio

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: November 22, 2002
EUT Received: September 12, 2002

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

Sub-part 2.1033

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

Modular Mining Systems Inc
3289 East Hemisphere Loop
Tucson, AZ 85706-5028

MANUFACTURER:

Applicant

(c)(2): FCC ID: FJ6-302230

MODEL NO: 302230

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

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: DSSS

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

(c)(6): POWER RATING, Watts: 0.361 EIRP to 0.380 EIRP
___ Switchable ___ Variable _x_ N/A

(c)(7): MAXIMUM POWER RATING, Watts: 1.0 Watts, Peak
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

PAGE NO. 3 of 18.

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 = 5.0

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

PLEASE SEE ATTACHED EXHIBITS

(c)(10): CIRCUIT DIAGRAM/CIRCUIT DESCRIPTION:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

PLEASE SEE ATTACHED EXHIBITS

(c)(11): LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

(c)(12): PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

(c)(13): DIGITAL MODULATION DESCRIPTION:

___ ATTACHED EXHIBITS
_X_ N/A

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

FOLLOWS

PAGE NO. 4 of 18.

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

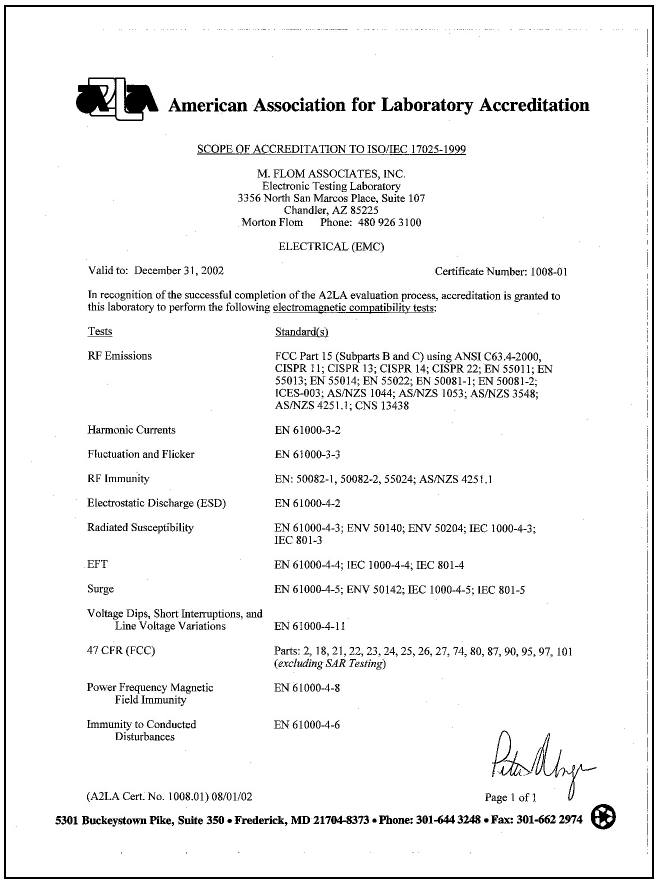
Electrical (EMC) Testing

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 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002.

Presented this 2nd day of March, 2001.

President
For the Accreditation Council
Certificate Number 1008.01
Valid to December 31, 2002

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 17025-1999

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, 2002 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 C63.4-2000, CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 50081-1; EN 50081-2; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1; CNS 13438
Harmonic Currents	EN 61000-3-2
Fluctuation and Flicker	EN 61000-3-3
RF Immunity	EN: 50082-1, 50082-2, 55024; AS/NZS 4251.1
Electrostatic Discharge (ESD)	EN 61000-4-2
Radiated Susceptibility	EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3
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
Voltage Dips, Short Interruptions, and Line Voltage Variations	EN 61000-4-11
47 CFR (FCC)	Parts: 2, 18, 21, 22, 23, 24, 25, 26, 27, 74, 80, 87, 90, 95, 97, 101 (*excluding SAR Testing*)
Power Frequency Magnetic Field Immunity	EN 61000-4-8
Immunity to Conducted Disturbances	EN 61000-4-6

(A2LA Cert. No. 1008.01) 08/01/02 Page 1 of 1

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • 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 18.

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)

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, 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 18.

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
PEAK OUTPUT POWER, Watts	=	0.380 EIRP WORST CASE FOR ALL CHANNELS

PAGE NO. 8 of 18.

NAME OF TEST: Radiated Emissions
g0290265: 2002-Sep-13 Fri 08:22:00
STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	EIRP, dBm	EIRP, dbc
2412.000000	4823.708334	-41.8	≤ -52.9
2412.000000	4824.125000	-48.3	≤ -52.9
2442.000000	4873.916667	-40.7	≤ -52.9
2442.000000	4873.916667	-56.7	≤ -52.9
2462.000000	4923.833334	-39.7	≤ -52.9
2462.000000	4924.083334	-43	≤ -52.9
2412.000000	7225.000000	-41.7	≤ -52.9
2412.000000	7226.458333	-52.9	≤ -52.9
2442.000000	7301.958333	-40.9	≤ -52.9
2442.000000	7308.749999	-51.9	≤ -52.9
2462.000000	7363.458333	-50.9	≤ -52.9
2462.000000	7367.874999	-38.9	≤ -52.9
2412.000000	9648.333332	-49.3	≤ -52.9
2412.000000	9648.333332	-38.7	≤ -52.9
2442.000000	9738.666666	-48.7	≤ -52.9
2442.000000	9743.458332	-37.4	≤ -52.9
2462.000000	9849.166668	-49.1	≤ -52.9
2462.000000	9849.166668	-41.9	≤ -52.9
2412.000000	12060.416665	-48.7	≤ -52.9
2412.000000	12060.416665	-39.3	≤ -52.9
2442.000000	12185.916665	-47.8	≤ -52.9
2442.000000	12185.916665	-36.7	≤ -52.9
2462.000000	12311.458335	-48.8	≤ -52.9
2462.000000	12311.458335	-38.7	≤ -52.9
2412.000000	14472.499998	-46.4	≤ -52.9
2412.000000	14472.499998	-36.4	≤ -52.9
2442.000000	14622.999998	-45.9	≤ -52.9
2442.000000	14622.999998	-37.1	≤ -52.9
2462.000000	14773.750002	-46.4	≤ -52.9
2462.000000	14773.750002	-36.1	≤ -52.9
2412.000000	16884.583331	-45.5	≤ -52.9
2412.000000	16884.583331	-35.6	≤ -52.9
2442.000000	17061.541665	-44.1	≤ -52.9
2442.000000	17061.541665	-31.8	≤ -52.9
2462.000000	17236.041669	-44.3	≤ -52.9
2462.000000	17236.041669	-32.9	≤ -52.9

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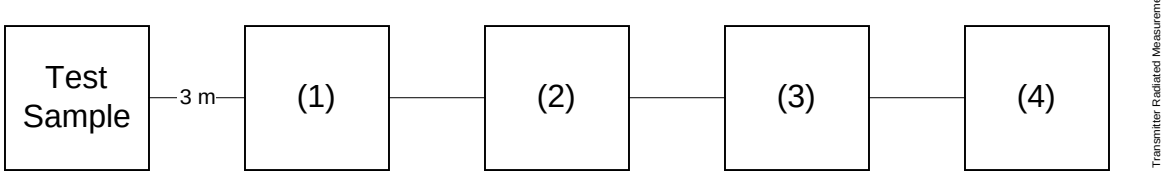
TRANSMITTER RADIATED MEASUREMENTS



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

PAGE NO. 10 of 18.

TEST SETUP: Radiated Emissions
g0290072: 2002-Sep-13 Fri 13:09:34
STATE: 0:General

TEST SETUP: Radiated Emissions
g0290073: 2002-Sep-13 Fri 13:09:34
STATE: 0:General

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NAME OF TEST: Out of Band Emissions

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

SPEC. LIMIT: See Below

TEST EQUIPMENT: As per previous page

SEARCH ANTENNAS: 10 kHz – 32 MHz: LOOP 94598-1
32 MHz – 1 GHz: SINGER DM105, $T_1T_2T_3$
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 ar 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:

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

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

MEASUREMENT RESULTS: ATTACHED

PAGE NO. 12 of 18.

NAME OF TEST: Out of Band Emissions

STATE: 2:High Power Lower Bandedge
g0290258: 2002-Sep-12 Thu 12:00:00

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER dBuV	CF, dB	uV/m @ 3m	EIRP dBm	MARGIN dB	*PEAK AVERAGE
2412.000000	2367.500000	8.43	48.33	688.65	-38.5	2.8	PEAK
2412.000000	2367.500000	-2.15	48.33	203.7	-49	-7.8	AVERAGE
2412.000000	2370.090000	8.73	48.34	713.67	-38.2	3.1	PEAK
2412.000000	2370.200000	-2.1	48.34	205.12	-49	-7.8	AVERAGE
2412.000000	2371.890000	9.25	48.36	759.45	-37.6	3.6	PEAK
2412.000000	2371.890000	-2.11	48.36	205.35	-49	-7.8	AVERAGE
2412.000000	2374.360000	8.85	48.37	726.11	-38	3.2	PEAK
2412.000000	2374.480000	-2.21	48.37	203.24	-49.1	-7.8	AVERAGE
2412.000000	2376.390000	8.03	48.39	662.22	-38.8	2.4	PEAK
2412.000000	2376.730000	-2.18	48.4	204.64	-49	-7.8	AVERAGE
2412.000000	2378.530000	15.94	48.41	1650.06	-30.9	10.4	PEAK
2412.000000	2378.860000	-1.95	48.41	210.38	-48.8	-7.5	AVERAGE
2412.000000	2381.000000	8.58	48.43	708.76	-38.2	3	PEAK
2412.000000	2381.110000	-1.93	48.43	211.35	-48.7	-7.5	AVERAGE
2412.000000	2383.360000	-1.98	48.44	210.38	-48.8	-7.5	AVERAGE
2412.000000	2383.360000	10.3	48.44	864.97	-36.5	4.7	PEAK
2412.000000	2385.500000	15.57	48.46	1590.38	-31.2	10	PEAK
2412.000000	2385.500000	-0.94	48.46	237.68	-47.7	-6.5	AVERAGE
2412.000000	2387.980000	10.82	48.48	922.57	-35.9	5.3	PEAK
2412.000000	2388.090000	-1.09	48.48	234.15	-47.8	-6.6	AVERAGE
2412.000000	2390.000000	11.47	48.5	996.55	-35.3	6	PEAK
2412.000000	2390.000000	-0.73	48.5	244.62	-47.5	-6.2	AVERAGE

*PEAK AND AVERAGE VALUES

PAGE NO. 13 of 18.

NAME OF TEST: Out of Band Emissions

STATE: 2:High Power Upper Bandedge
g0290263: 2002-Sep-12 Thu 13:52:00

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN dB	*PEAK AVERAGE
2462.000000	2483.500000	9.32	49.18	841.4	-36.7	4.5	PEAK
2457.000000	2483.500000	-0.46	49.18	272.9	-46.5	-5.3	AVERAGE
2457.000000	2485.860000	-1.84	49.2	233.35	-47.9	-6.6	AVERAGE
2457.000000	2485.860000	7.97	49.2	721.94	-38.1	3.2	PEAK
2457.000000	2488.000000	8.63	49.21	779.83	-37.4	3.8	PEAK
2457.000000	2488.000000	-1.42	49.21	245.19	-47.4	-6.2	AVERAGE
2457.000000	2490.250000	-1.87	49.23	233.35	-47.9	-6.6	AVERAGE
2457.000000	2491.040000	8.68	49.24	787.05	-37.3	3.9	PEAK
2457.000000	2492.610000	9.98	49.24	914.11	-36	5.2	PEAK
2457.000000	2492.730000	-2.15	49.24	226.2	-48.1	-6.9	AVERAGE
2457.000000	2494.750000	-2.22	49.26	224.91	-48.2	-7	AVERAGE
2457.000000	2495.310000	8.47	49.27	770.9	-37.5	3.7	PEAK
2457.000000	2496.890000	9.84	49.27	902.61	-36.1	5.1	PEAK
2457.000000	2497.110000	-2.26	49.28	224.39	-48.2	-7	AVERAGE
2457.000000	2499.030000	-2.24	49.3	225.42	-48.2	-6.9	AVERAGE
2457.000000	2499.030000	8.54	49.3	779.83	-37.4	3.8	PEAK
2457.000000	2501.610000	9.05	49.32	828.9	-36.9	4.4	PEAK
2457.000000	2501.610000	-2.24	49.32	225.94	-48.1	-6.9	AVERAGE
2457.000000	2503.750000	9.1	49.33	834.64	-36.8	4.4	PEAK
2457.000000	2503.980000	-2.22	49.33	226.73	-48.1	-6.9	AVERAGE
2457.000000	2505.550000	-2.24	49.35	226.73	-48.1	-6.9	AVERAGE
2457.000000	2505.890000	8.89	49.35	816.58	-37	4.2	PEAK

*PEAK AND AVERAGE VALUES

PAGE NO. 14 of 18.

NAME OF TEST: Restricted Bands of Operation

SPECIFICATION: 47 CFR 15.205

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

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

Sensitivity of system was measured:

Below 2 GHz:

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

Above 2 GHz:

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

Sensitivity of system with preamps:

Below 2 GHz:

Preamps are not used in this range.

Above 2 GHz:

Peak	= 3 dBµV
Average	= -8 dBµV

Cable Loss:

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

Note:

dB loss vs. frequency included in programmed software.

Reference Level Offset:

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

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.

SUPERVISED BY: Morton Flom, P. Eng.

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NAME OF TEST: Emissions At Band Edges

SPECIFICATION: 47 CFR

TEST EQUIPMENT: As for "Out of Band Emissions"

MEASUREMENT RESULTS

ATTACHED

SUPERVISED BY: Morton Flom, P. Eng.

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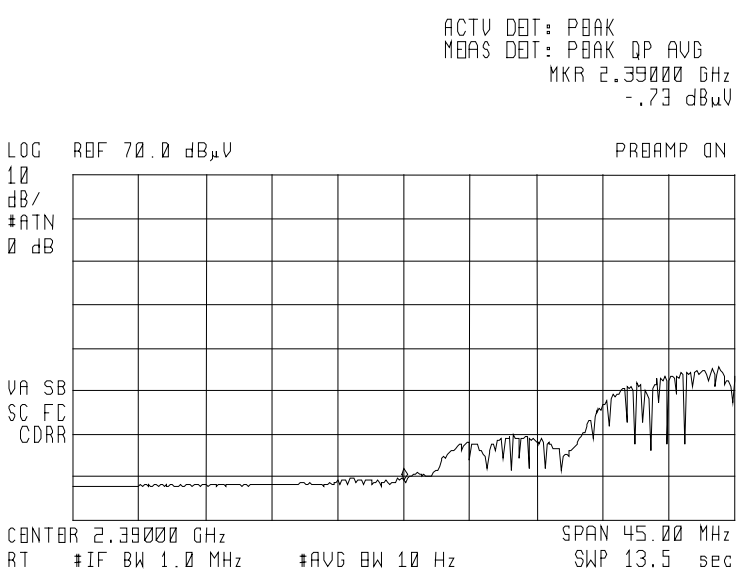
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0290257: 2002-Sep-12 Thu 11:59:00
STATE: 2:High Power



POWER: HIGH
MODULATION: CISCO SYSTEM DSSS
LOWER BANDEDGE CH 1

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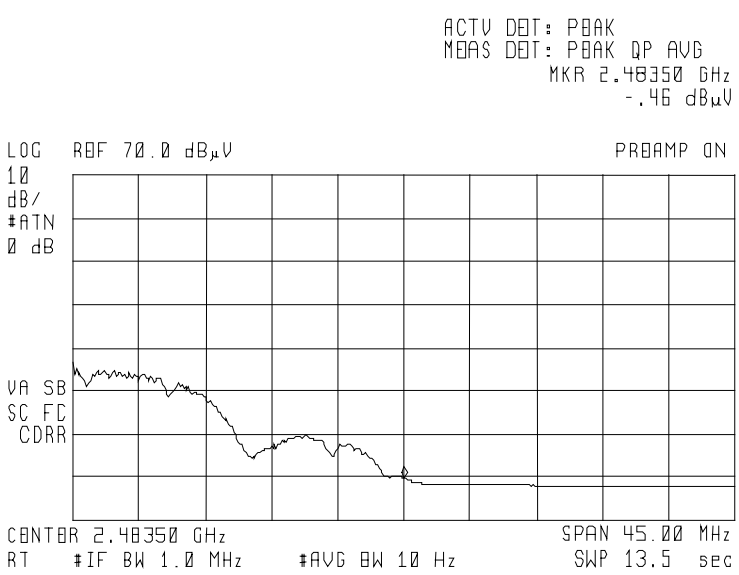
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0290262: 2002-Sep-12 Thu 13:51:00
STATE: 2:High Power



POWER: HIGH
MODULATION: CISCO SYSTEM DSSS
UPPER BANDEDGE CH 11

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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 that 8 dBm in any 3 kHz Bandwidth within these bands.
RESULTS: Please see attached plots.
Transmitter Power Density, dBm = <8.0

15.247(e) Processing Gain
LIMIT: The processing gain shall be ≥ 10 dB
Processing Gain, dB = N/A

Psuedorandom Sequence Description
RESULTS: See Applicant's statement

Chip Rate
RESULTS: See Applicant's statement
Chip Rate, MHz = N/A

SUPERVISED BY: Morton Flom, P. Eng.

END OF TEST REPORT

RADIATED MEASUREMENTS
FOR PART 15 TRANSMITTERS W/ INTEGRAL ANTENNAS

Radiated Measurements

RANGE OF MEASUREMENT	SPECIFICATION	RESOLUTION B/W	VIDEO B/A
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.