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: October 11, 1999

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

Attention: Authorization & Evaluation Division

Applicant: Javad Positioning Systems
Equipment: MODELS: L SPSP 900 MHz, O SPSP 900 MHz, and R SPSP 900 MHz
FCC ID: ONS SPSP 900 MHz
FCC Rules: 15.247

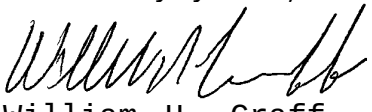
Gentlemen:

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,



William H. Graff, Director
of Engineering

enclosure(s)
ELECTRONIC FILING
cc: Applicant
WHG/cvr

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

APPLICANT: Javad Positioning Systems

FCC ID: ONS SPSP 900 MHz

BY APPLICANT:

1. LETTER OF AUTHORIZATION

2. IDENTIFICATION DRAWINGS
   - ___ ID LABEL
   - ___ LOCATION INFO
   - ___ ATTESTATION STATEMENT(S)
   - ___ LOCATION OF COMPLIANCE STATEMENT

3. DOCUMENTATION: 2.1033(b)
   - (3) USER MANUAL(S)
   - (4) OPERATIONAL DESCRIPTION
   - (5) BLOCK DIAGRAM
   - (5) SCHEMATIC DIAGRAM
   - (7) EXTERNAL PHOTOGRAPHS
   - INTERNAL PHOTOGRAPHS

4. DRAFT SPECIFICATION INFORMATION

5. PARTS LIST/TUNE UP INFO

BY M.F.A. INC.

A. TESTIMONIAL & STATEMENT OF CERTIFICATION

B. STATEMENT OF QUALIFICATIONS

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

Sub-part
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: ONS SPSP 900 MHz

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

October 11, 1999

SUPERVISED BY: William H. Graff, Director of Engineering

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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2.1033(c)	General Information Required	2
	Standard Test Conditions and Engineering Practices	6
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15.205	Restricted Bands Of Operation	16
15.247(a)(2)	Allowed Occupied Bandwidth	20
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15.247(e)	Processing Gain (Summary)	33

PAGE NO. 1 of 34.

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: d99a0024

d) Client: Javad Positioning Systems
1731 Technology Dr. Suite 2209
San Jose, CA 95110

e) Identification: MODELS: L SPSP 900 MHz, O SPSP 900 MHz, and R SPSP 900 MHz

FCC ID: ONS SPSP 900 MHz
Description: Differential GPS Transceiver

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

g) Report Date: October 11, 1999
EUT Received: July 20, 1999

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:

William H. Graff, Director
of Engineering

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:

Javad Positioning Systems
1731 Technology Dr. Suite 2209
San Jose, CA 95110

MANUFACTURER:

Applicant

(c)(2): FCC ID: ONS SPSP 900 MHz

MODEL NOs: L SPSP 900 MHz, O SPSP 900 MHz, and R SPSP 900 MHz

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

PLEASE SEE ATTACHED EXHIBITS

(c)(5): FREQUENCY RANGE, MHz: 902.2 to 927.8

(c)(6): POWER RATING, Watts: 0.1 EIRP

___ Switchable ___ Variable _x_ N/A

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

15.203: ANTENNA REQUIREMENT:

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

PAGE NO. 3 of 34.

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 = 12

(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.

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

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

American Association for Laboratory Accreditation

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

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

ELECTRICAL (EMC)

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

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

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

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

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

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

PAGE NO. 5 of 34.

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, 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 34.

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 = 0.047
WORST CASE FOR
ALL CHANNELS

RADIATED:

g9970430: 1999-Jul-27 Tue 13:25:00
FREQUENCY HOPPER, 1st Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, W
902.2000	902.208000	80.75	30.41	361409.86	15.9	0.039
915.0000	915.013000	79.71	31.64	369402.64	16.1	0.041
927.6000	927.583000	80.04	32.84	440554.86	17.7	0.059

g9980343: 1999-Aug-03 Tue 09:25:00
FREQUENCY HOPPER, 2nd Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, W
902.2000	902.185000	83.84	30.41	515822.17	19	0.079
915.0000	914.985000	80.25	31.64	393097.24	16.7	0.047
927.6000	927.613000	77.64	32.84	334195.04	15.3	0.034

g9980350: 1999-Aug-11 Wed 10:52:00
DIRECT SEQUENCE, 1st Antenna 9" Center FRD Dipole

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, W
915.0000	915.030000	77.96	32.55	335351.3	15.3	0.034

g9980351: 1999-Aug-11 Wed 11:10:00
DIRECT SEQUENCE, 2nd Antenna Antenex EB8965C

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, W
915.0000	915.080000	78.68	32.55	364334.25	16	0.04

SUPERVISED BY: William H. Graff, Director of Engineering

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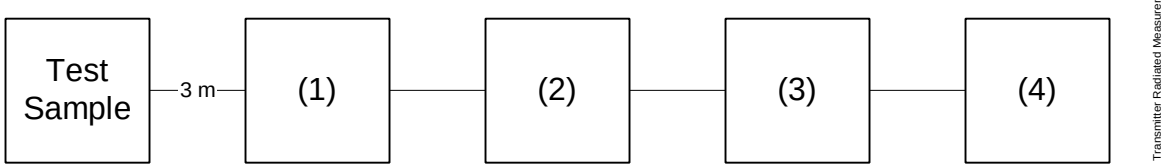
TRANSMITTER RADIATED MEASUREMENTS



Transmitter Radiated Measurements

Asset	Description	s/n
	AS APPLICABLE	
(1) TRANSDUCER		
i00091	Emco 3115	001469
i00089	Aprel Log Periodic	001500
(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
i00043	HP 8558B	2004A02076
i00057	HP 8557A	1531A00191
i00029	HP 8563E	3213A00104

PAGE NO. 9 of 34.

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 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:

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

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

MEASUREMENT RESULTS: ATTACHED

PAGE NO. 10 of 34.

NAME OF TEST: Out of Band Emissions
g9970427: 1999-Jul-26 Mon 10:10:00 STATE: 2:High Power
FREQUENCY HOPPER, 1st Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m		MARGIN, dB
902.200000	1804.375000	25.5	32.34	779.83	P	3.8
902.200000	1804.408333	21.67	32.34	501.76	A	0
915.000000	1830.006667	29.5	29.1	851.14	P	4.6
915.000000	1830.010000	26.5	29.1	602.56	A	1.6
927.600000	1855.170000	28.17	31.6	973.87	P	5.8
927.600000	1855.243333	24.67	31.59	650.13	A	2.3
902.200000	2706.608333	48.67	7.36	633.14	P	2
902.200000	2706.641666	44.17	7.36	377.14	A	-2.5
915.000000	2744.983333	40.83	7.57	263.03	A	-5.6
915.000000	2745.150000	48	7.57	600.48	P	1.6
927.600000	2782.816667	39.33	7.77	226.46	A	-6.9
927.600000	2782.883333	46.83	7.77	537.03	P	0.6
902.200000	3608.741666	48.33	9.2	752.49	P	3.5
902.200000	3608.808333	42	9.21	363.5	A	-2.8
915.000000	3659.866667	49.33	9.33	857.04	P	4.7
915.000000	3659.983334	44.17	9.33	473.15	A	-0.5
927.600000	3710.450000	38.67	9.45	254.68	A	-5.9
927.600000	3710.716667	46.67	9.45	639.73	P	2.1
902.200000	4511.041666	29.5	11.61	113.63	A	-12.9
902.200000	4511.041666	41	11.61	427.07	P	-1.4
915.000000	4575.005000	29.67	11.78	118.17	A	-12.6
915.000000	4575.005000	41	11.78	435.51	P	-1.2
927.600000	4638.016667	29.67	11.96	120.64	A	-12.4
927.600000	4638.016667	40.83	11.96	436.01	P	-1.2
902.200000	5413.225000	41.17	13.99	572.8	P	1.2
902.200000	5413.275000	29.5	13.99	149.45	A	-10.5
915.000000	5489.933333	31.83	14.18	199.76	A	-8
915.000000	5490.016667	42.5	14.18	682.34	P	2.7
927.600000	5565.633333	28.33	14.37	136.46	A	-11.3
927.600000	5565.633333	39.83	14.37	512.86	P	0.2
902.200000	6315.441666	27.33	16.73	159.59	A	-9.9
902.200000	6315.441666	37.67	16.73	524.81	P	0.4
915.000000	6405.000000	28.17	17.1	183.44	A	-8.7
915.000000	6405.000000	39.67	17.1	689.45	P	2.8
927.600000	6493.216667	27.83	17.45	183.65	A	-8.7
927.600000	6493.216667	38.5	17.45	627.34	P	2
902.200000	7217.641666	27.17	19.48	215.03	A	-7.4
902.200000	7217.641666	37.83	19.48	733.67	P	3.3
915.000000	7320.100000	27.5	19.53	224.65	A	-7
915.000000	7320.100000	39	19.53	844.31	P	4.5
927.600000	7420.816667	27.5	19.56	225.42	A	-6.9
927.600000	7420.816667	39	19.56	847.23	P	4.6
902.200000	8119.830000	27.83	19.86	242.38	A	-6.3
902.200000	8119.830000	38.5	19.86	827.94	P	4.4
915.000000	8235.100000	28.17	19.94	254.39	A	-5.9
915.000000	8235.100000	39	19.94	885.12	P	4.9

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NAME OF TEST: Out of Band Emissions
g9970427: 1999-Jul-26 Mon 10:10:00 STATE: 2:High Power
FREQUENCY HOPPER, 1st Antenna (Cont)

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m		MARGIN, dB
927.600000	8348.416667	28.17	20.03	257.04	A	-5.8
927.600000	8348.416667	38.83	20.03	877	P	4.9
902.200000	9022.030000	28.33	20.64	280.87	A	-5
902.200000	9022.030000	39.17	20.64	978.36	P	5.8
915.000000	9150.100000	28.5	21.43	313.69	A	-4.1
915.000000	9150.100000	40	21.43	1178.96	P	7.4
927.600000	9276.016667	28.5	22.21	343.16	A	-3.3
927.600000	9276.016667	40.83	22.21	1419.06	P	9

(P: Peak reading, A: Average reading)

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NAME OF TEST: Out of Band Emissions
g9970428: 1999-Jul-26 Mon 14:39:00 STATE: 2:High Power
DIRECT SEQUENCE, 1st Antenna 9" Center FRD Dipole

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m		MARGIN, dB
915.000000	1829.988000	21.48	31.96	469.89	P	-0.6
915.000000	1830.000000	19.05	31.96	355.22	A	-3
915.000000	2743.858333	33.67	7.56	115.21	A	-12.8
915.000000	2744.941667	45.67	7.57	459.2	P	-0.8
915.000000	3659.933333	43	9.33	413.52	A	-1.7
915.000000	3660.150000	48.67	9.33	794.33	P	4
915.000000	4574.866667	30	11.78	122.74	A	-12.2
915.000000	4574.866667	41.33	11.78	452.38	P	-0.9
915.000000	5489.866667	29	14.18	144.21	A	-10.8
915.000000	5489.866667	38.83	14.18	447.2	P	-1
915.000000	6404.866667	28.17	17.1	183.44	A	-8.7
915.000000	6404.866667	38.83	17.1	625.89	P	1.9
915.000000	7319.866667	28.17	19.53	242.66	A	-6.3
915.000000	7319.866667	39	19.53	844.31	P	4.5
915.000000	8234.866667	28.67	19.94	269.46	A	-5.4
915.000000	8234.866667	38.5	19.94	835.6	P	4.4
915.000000	9149.866667	29.33	21.43	345.14	A	-3.2
915.000000	9149.866667	39.67	21.43	1135.01	P	7.1

(P: Peak reading, A: Average reading)

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NAME OF TEST: Out of Band Emissions
g9980344: 1999-Aug-03 Tue 10:21:00 STATE: 2:High Power
FREQUENCY HOPPER, 2nd Antenna

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m		MARGIN, dB
902.200000	1804.396667	14.17	32.34	211.59	A	-7.5
902.200000	1804.400000	24.83	32.34	721.94	P	3.2
915.000000	1829.998333	13.5	31.96	187.5	A	-8.5
915.000000	1830.001667	22.33	31.96	518.2	P	0.3
927.600000	1855.198334	14.33	31.59	197.7	A	-8.1
927.600000	1855.211667	24.17	31.59	613.76	P	1.8
902.200000	2706.566667	36.17	7.36	150.14	A	-10.5
902.200000	2706.600000	45.5	7.36	439.54	P	-1.1
915.000000	2745.016667	41.67	7.57	289.73	P	-4.8
915.000000	2745.016667	30.83	7.57	83.18	A	-15.6
927.600000	2782.816667	42.33	7.77	319.89	P	-3.9
927.600000	2782.816667	30.5	7.77	81.94	A	-15.7
902.200000	3608.800000	40.17	9.2	294.1	P	-4.6
902.200000	3608.800000	29.17	9.2	82.89	A	-15.6
915.000000	3660.016667	41.67	9.33	354.81	P	-3
915.000000	3660.016667	30.33	9.33	96.16	A	-14.3
927.600000	3710.416667	43.5	9.45	444.12	P	-1.1
927.600000	3710.483333	33.33	9.45	137.72	A	-11.2
902.200000	4511.000000	39.67	11.61	366.44	P	-2.7
902.200000	4511.000000	29.17	11.61	109.4	A	-13.2
915.000000	4575.016667	39.5	11.78	366.44	P	-2.7
915.000000	4575.016667	29.83	11.78	120.36	A	-12.4
927.600000	4638.083333	40.5	11.96	419.76	P	-1.5
927.600000	4638.083333	29.5	11.96	118.3	A	-12.5
902.200000	5413.200000	38.17	13.99	405.51	P	-1.8
902.200000	5413.200000	28	13.99	125.75	A	-12
915.000000	5490.016667	38.83	14.18	447.2	P	-1
915.000000	5490.016667	28.67	14.18	138.84	A	-11.2
927.600000	5565.583333	31.83	14.37	204.17	A	-7.8
927.600000	5565.683333	40.83	14.37	575.44	P	1.2
902.200000	6315.400000	27.33	16.73	159.59	A	-9.9
902.200000	6315.400000	37.5	16.73	514.64	P	0.2
915.000000	6405.016667	39.17	17.1	650.88	P	2.3
915.000000	6405.016667	28	17.1	179.89	A	-8.9
927.600000	6493.183333	28	17.45	187.28	A	-8.6
927.600000	6493.183333	38.83	17.45	651.63	P	2.3
902.200000	7217.600000	27.17	19.48	215.03	A	-7.4
902.200000	7217.600000	37.17	19.48	679.99	P	2.7
915.000000	7320.016667	38.17	19.53	767.36	P	3.7
915.000000	7320.016667	28.17	19.53	242.66	A	-6.3
927.600000	7420.783333	28	19.56	238.78	A	-6.4
927.600000	7420.783333	38.5	19.56	799.83	P	4.1
902.200000	8119.800000	38.33	19.86	811.9	P	4.2
902.200000	8119.800000	28.17	19.86	252.06	A	-6
915.000000	8235.016667	40.67	19.94	1072.75	P	6.6
915.000000	8235.016667	28.83	19.94	274.47	A	-5.2

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NAME OF TEST: Out of Band Emissions
g9980344: 1999-Aug-03 Tue 10:21:00 STATE: 2:High Power
FREQUENCY HOPPER, 2nd Antenna (Cont)

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m		MARGIN, dB
927.600000	8348.383333	28.67	20.03	272.27	A	-5.3
927.600000	8348.383333	38.67	20.03	860.99	P	4.7
902.200000	9022.000000	38.5	20.64	905.73	P	5.1
902.200000	9022.000000	29	20.64	303.39	A	-4.4
915.000000	9150.016667	40.17	21.43	1202.26	P	7.6
915.000000	9150.016667	29.33	21.43	345.14	A	-3.2
927.600000	9275.983333	28.83	22.21	356.45	A	-3
927.600000	9275.983333	40.17	22.21	1315.22	P	8.4

(P: Peak reading, A: Average reading)

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NAME OF TEST: Out of Band Emissions
g9980345: 1999-Aug-03 Tue 14:15:00 STATE: 2:High Power
DIRECT SEQUENCE, 2nd Antenna Antenex EB8965C

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m		MARGIN, dB
915.000000	1829.833333	19.5	31.96	374.11	A	-2.5
915.000000	1830.000000	30.67	31.96	1353.63	P	8.6
915.000000	2744.966667	40.67	7.57	258.23	P	-5.8
915.000000	2744.966667	31.5	7.57	89.85	A	-14.9
915.000000	3659.966667	41.33	9.33	341.19	P	-3.3
915.000000	3659.966667	30.17	9.33	94.41	A	-14.5
915.000000	4574.966667	40.5	11.78	411.15	P	-1.7
915.000000	4574.966667	30	11.78	122.74	A	-12.2
915.000000	5489.966667	39.83	14.18	501.76	P	0
915.000000	5489.966667	28.83	14.18	141.42	A	-11
915.000000	6404.966667	39	17.1	638.26	P	2.1
915.000000	6404.966667	28	17.1	179.89	A	-8.9
915.000000	7319.966667	28	19.53	237.96	A	-6.5
915.000000	7319.966667	38.67	19.53	812.83	P	4.2
915.000000	8234.966667	28.67	19.94	269.46	A	-5.4
915.000000	8234.966667	39	19.94	885.12	P	4.9
915.000000	9149.966667	29.33	21.43	345.14	A	-3.2
915.000000	9149.966667	39.5	21.43	1113.01	P	6.9

(P: Peak reading, A: Average reading)

PAGE NO. 16 of 34.

NAME OF TEST: Restricted Bands of Operation

SPECIFICATION: 47 CFR 15.205

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDORE

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.

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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

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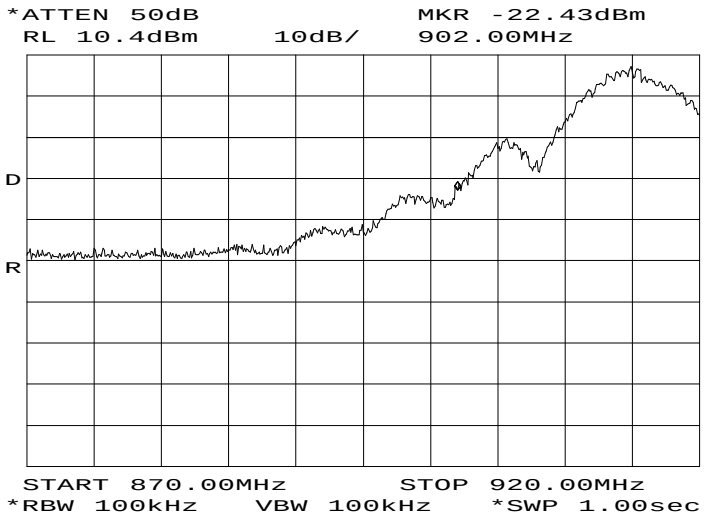
NAME OF TEST: Emission at Band Edges (Conducted)
g9980357: 1999-Aug-11 Wed 13:57:00
STATE: 2:High Power



POWER: HIGH
MODULATION: DIRECT SEQUENCE SS
15.247 (C) LOWER BAND EDGE

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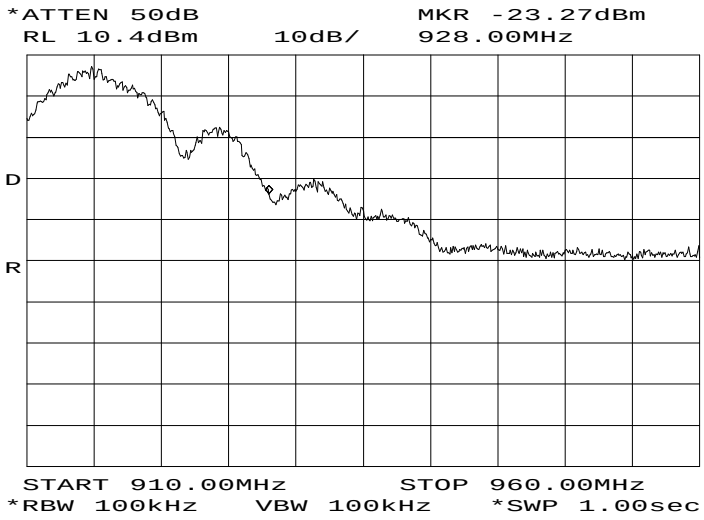
NAME OF TEST: Emission at Band Edges (Conducted)
g9980358: 1999-Aug-11 Wed 13:58:00
STATE: 2:High Power



POWER: HIGH
MODULATION: DIRECT SEQUENCE SS
15.247 (C) UPPER BAND EDGE

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NAME OF TEST: Allowed Occupied Bandwidth

SPECIFICATION: 47 CFR 15.247(a)(2)

TEST EQUIPMENT: As per attached page

LIMITS

RULE	TYPE	BANDS (MHz)	LIMIT (kHz)
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, MHz = 6.24 (6 dB BW)
12.57 (20 dB (BW)

RESULTS = ATTACHED

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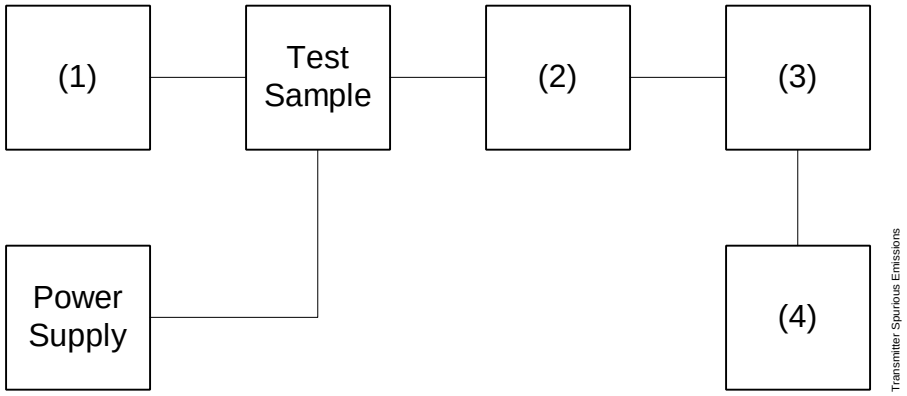
TRANSMITTER SPURIOUS EMISSION

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



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

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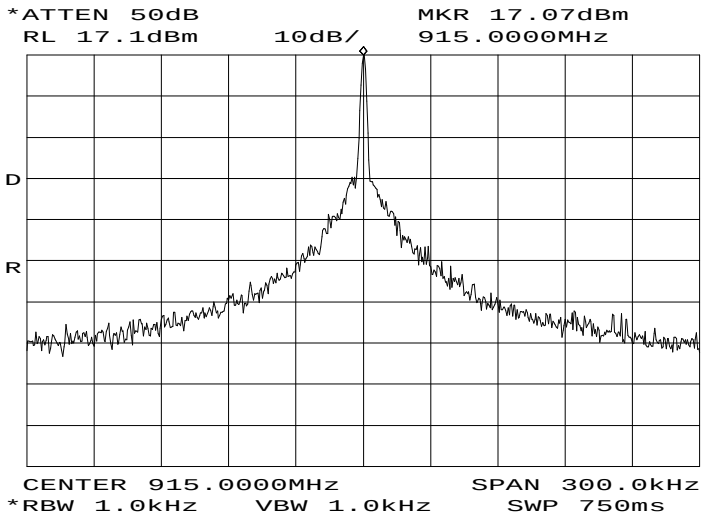
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980360: 1999-Aug-11 Wed 14:29:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS
REFERENCE LEVEL SET

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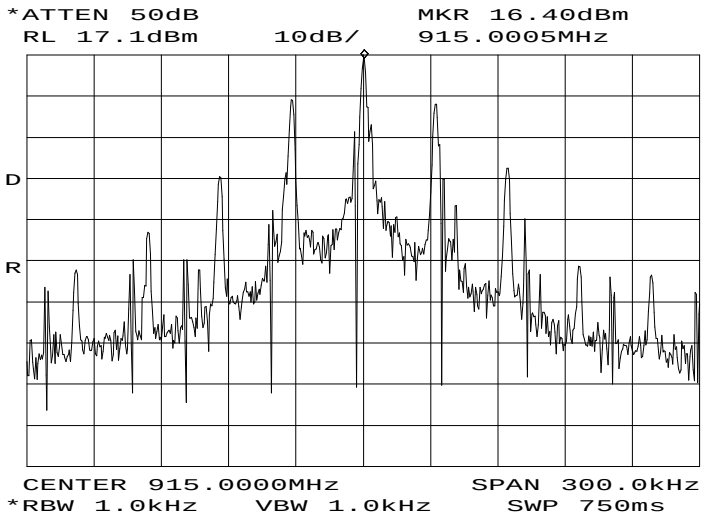
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980361: 1999-Aug-11 Wed 14:34:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS
MODULATED FH CARRIER

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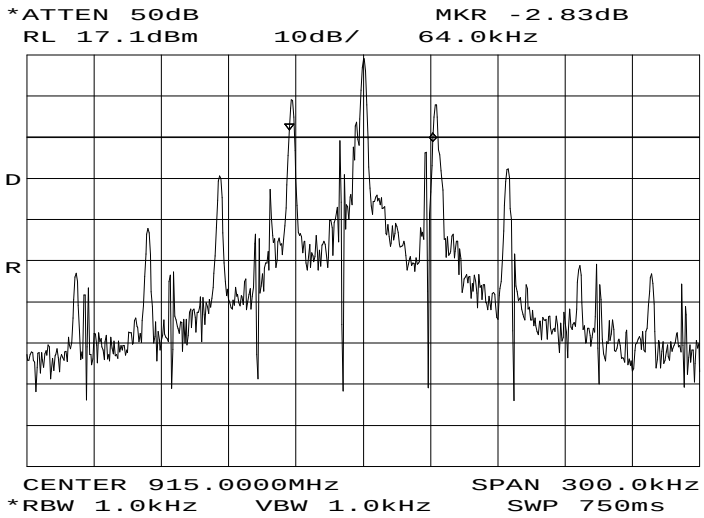
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980362: 1999-Aug-11 Wed 14:51:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS
20 DB BANDWIDTH = 64 kHz

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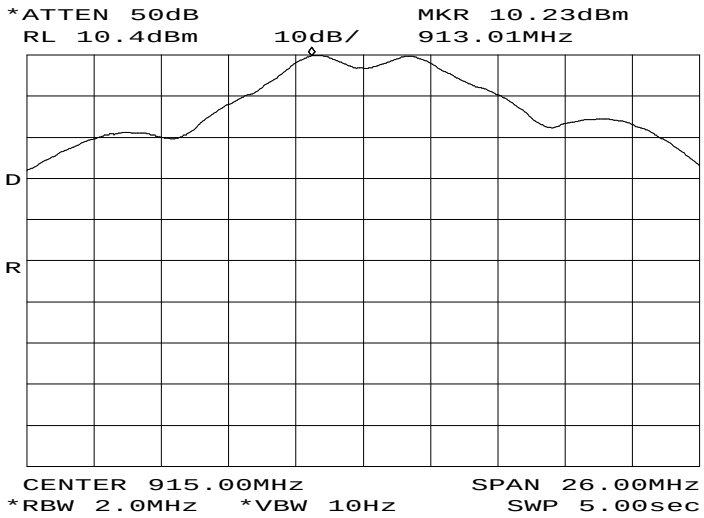
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980356: 1999-Aug-11 Wed 13:49:00
STATE: 2:High Power



POWER: HIGH
MODULATION: DIRECT SEQUENCE SS
REFERENCE LEVEL SET

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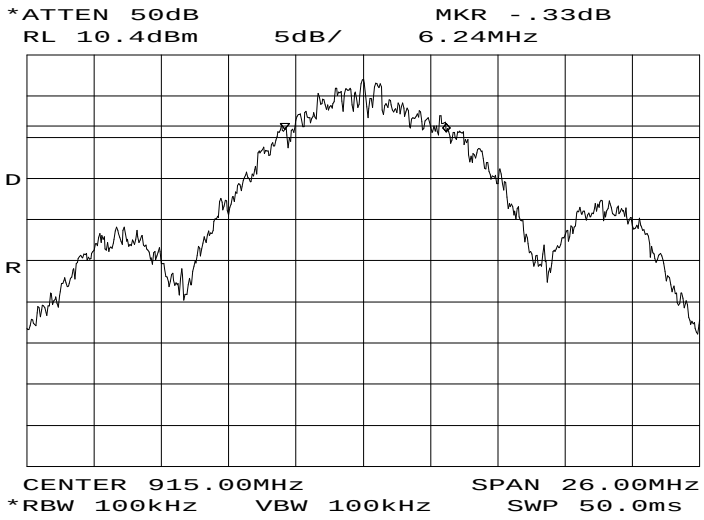
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980354: 1999-Aug-11 Wed 13:44:00
STATE: 2:High Power



POWER: HIGH
MODULATION: DIRECT SEQUENCE SS
6 DB BANDWIDTH = 6.24 MHz

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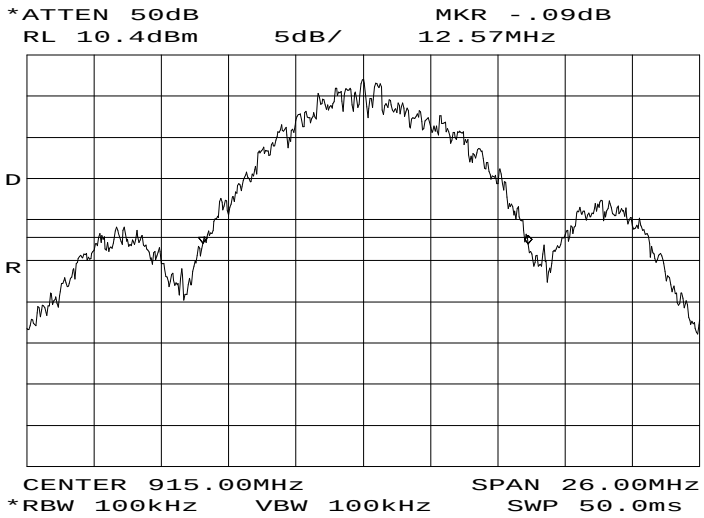
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980355: 1999-Aug-11 Wed 13:46:00
STATE: 2:High Power



POWER: HIGH
MODULATION: DIRECT SEQUENCE SS
20 DB BANDWIDTH = 12.57 MHz

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NAME OF TEST: Spread Spectrum Technology
Frequency Hopping Systems

15.247(a)(1) Channel Separation
LIMIT: 25 kHz minimum of 20 dB Bandwidth of the hopping channel, whichever is greater.
RESULTS: See attached plots.

15.247(a)(1) Hopping Sequence Description
LIMIT: Hopping channels must be selected from a psuedorandom ordered list of frequencies.
RESULTS: See Applicant's statement.

15.247(a)(1) Reuse Rate Description
LIMIT: Each frequency must be used equally on the average by each transmitter.
RESULTS: See Applicant's statement.

15.247(a)(1) System Receiver Compatibility and Correlation
LIMIT: Receiver Bandwidths must match the hopping bandwidths and their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signal.
RESULTS: The system was operated and found to stay in sync.

15.247(a)(1)(i)&(ii) Number of Hopping Frequencies
LIMIT: 902-928 MHz band: = 50 (if Channel BW < 250 kHz)
902-928 MHz band: = 25 (if Channel BW = 250 kHz)
2400-2483.5, 5725-5850 MHz band: =75
RESULTS: See Applicant's statement.

15.247(a)(1)(i)&(ii) Maximum 20 dB Bandwidth
LIMIT: Channel bandwidth = 500 kHz
RESULTS: Please see results for "Allowed Occupied Bandwidth".

15.247(a)(1)(i)&(ii) Average Time of Occupancy
LIMIT: 902-928 MHz, = 0.4 seconds in 20 second period.
2400-2483.5, 5725-5850 MHz = 0.4 second in 30 second period.
RESULTS: See Applicant's statement.

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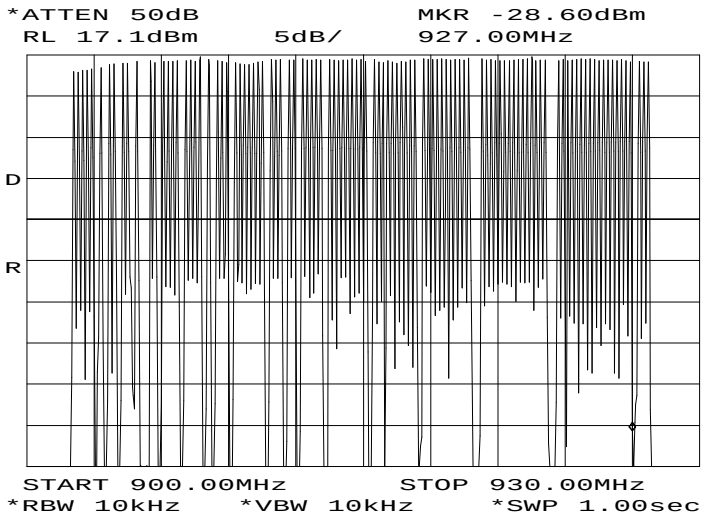
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980363: 1999-Aug-11 Wed 15:00:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS
NUMBER OF HOPPING
FREQUENCIES

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of Engineering

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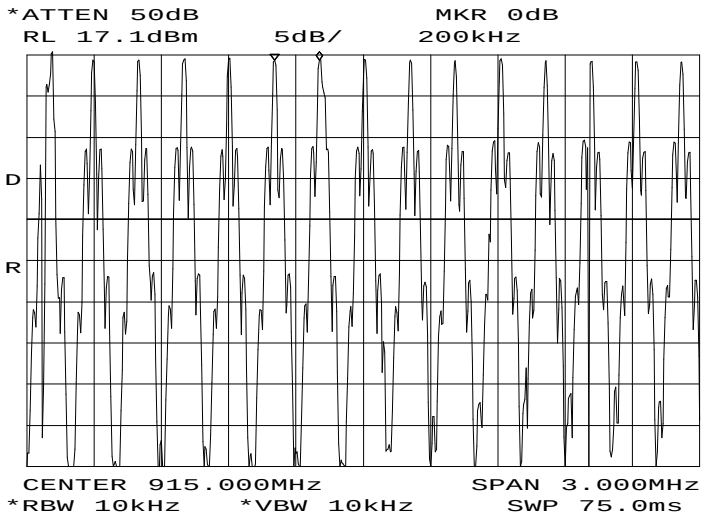
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980364: 1999-Aug-11 Wed 15:02:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS
HOPPING FREQUENCY CH
SPACING = 200 kHz

SUPERVISED BY: William H. Graff, Director of Engineering

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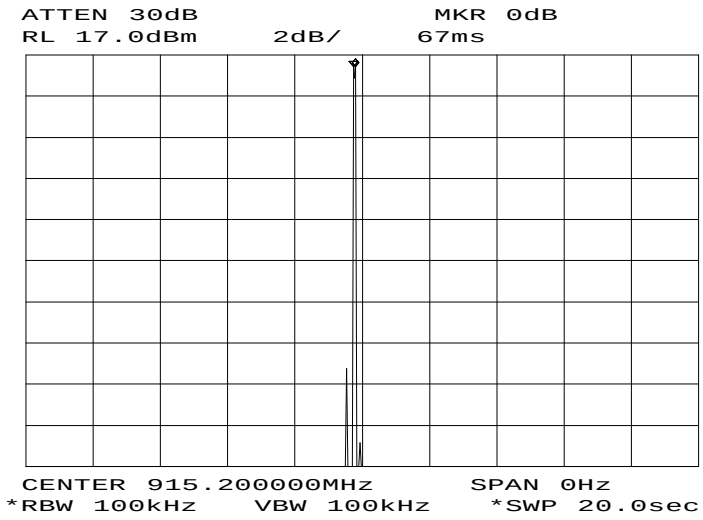
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980365: 1999-Aug-11 Wed 15:26:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS HOPPING FREQUENCY TIME OF OCCUPANCY

EUT ON ONCE IN 20 SEC

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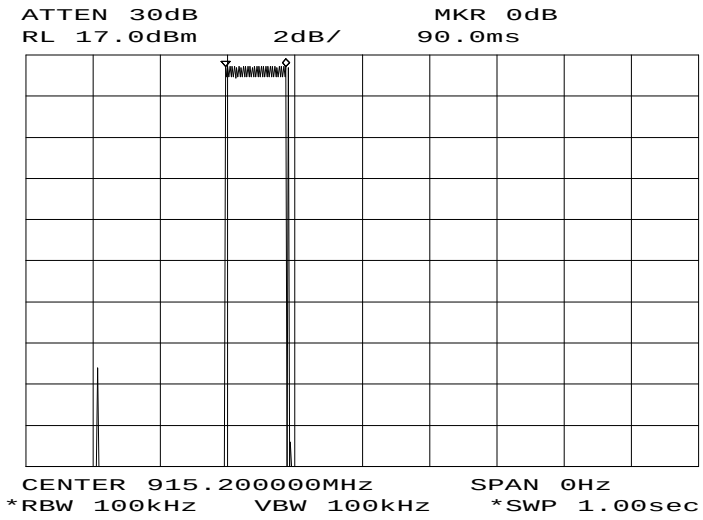
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980366: 1999-Aug-11 Wed 15:27:00
STATE: 2:High Power



POWER: HIGH
MODULATION: FREQUENCY HOPPER SS
HOPPING FREQUENCY TIME OF OCCUPANCY

EUT ON TIME DURATION = 90 msec

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NAME OF TEST: Spread Spectrum Technology
Direct Sequence Systems

15.247(a)(2) Minimum 5 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 = -5.5

15.247(e) Processing Gain
LIMIT: The processing gain shall be = 10 dB
RESULTS: See Applicant's statement
Processing Gain, dB = 10.8 (Worst Case)

Psuedorandom Sequence Description
RESULTS: See Applicant's statement

Chip Rate
RESULTS: See Applicant's statement
Chip Rate, MHz = See manual

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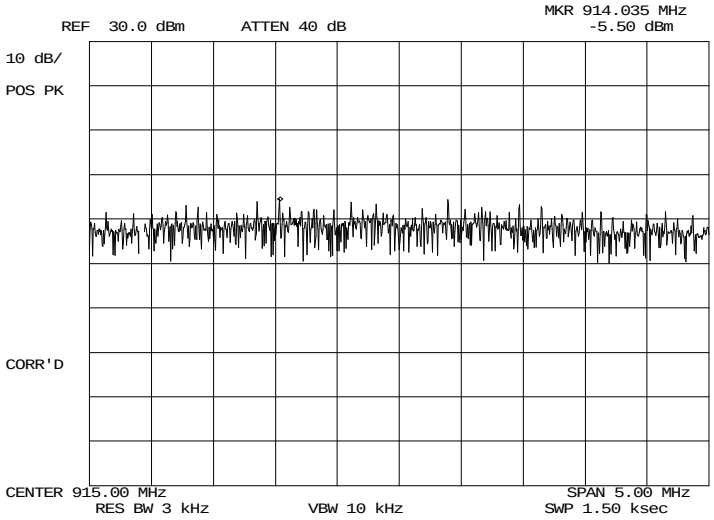
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9980346: 1999-Aug-04 Wed 12:48:00
STATE: 2:High Power



POWER: HIGH
MODULATION: DIRECT SEQUENCE SPREAD SPECTRUM
SPECTRAL POWER DENSITY

SUPERVISED BY: William H. Graff, Director of Engineering

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: William H. Graff, Director of Engineering