FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT

FOR

FHP WIRELESS, INC.

SMARTPOINT / ROUTEPOINT WIRELESS MESHED ROUTER

**MODEL NUMBER: RP-01-00C-E-N-00 OR SP-01-00C-E-N-00,
RP01-00C-F-N-00 OR SP-01-00C-F-N-00,
RP-01-00C-H-N-00 OR SP-01-00C-H-N-00,
RP-01-00C-I-N-00 OR SP-01-00C-I-N-00,
RP-01-00C-D-N-00 OR SP-01-00C-D-N-00, AND
FI-1310SM-GL-3000**

FCC ID: P9JSP-01-00C-D

REPORT NUMBER: 01U1491-1

ISSUE DATE: SEPTEMBER 6, 2002

Prepared for
**FHP WIRELESS, INC.
1730 S. AMPHLETT BLVD.
SAN MATEO, CA 94402
USA**

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: FHP WIRELESS INC.
1710 SOUTH AMPHLETT BOULEVARD
SAN MATEO, CA 94402 USA

EUT DESCRIPTION: 802.11B WIRELESS MESHED ROUTER

MODEL NUMBER: RP-01-00C-E-N-00 OR SP-01-00C-E-N-00, RP01-00C-F-N-00 OR SP-01-00C-F-N-00, RP-01-00C-H-N-00 OR SP-01-00C-H-N-00, RP-01-00C-I-N-00 OR SP-01-00C-I-N-00, RP-01-00C-D-N-00 OR SP-01-00C-D-N-00, AND FI-1310SM-GL-3000

DATE TESTED: AUGUST 5 – SEPTEMBER 3, 2002

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	2.4 - 2.4835 GHz TRANSCEIVER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.C

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirements set forth in CFR 47, PART 15, Subpart C. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

THU CHAN
SENIOR EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The SmartPoint and RoutePoint products are 802.11b wireless access points with mesh routing capabilities. The SmartPoint and RoutePoint products are identical except for the software personalities configured on the products at the factory.

These products are installed in a weatherproof housing for outdoor use. There is a Self-contained Power configuration and a Power Over Ethernet configuration.

Both configurations include a router / transceiver module and coaxial lightning arrestors between each of the two RF connectors on the module and the corresponding RF connectors on the weatherproof housing. The Self-contained Power configuration also has an Ethernet-to-fiber-optic converter and a power supply with an AC lightning arrestor module.

The 802.11b PCMCIA card is a ZCOMAX XI-325H2 80mW transceiver (FCC ID M4Y 325H2). The SmartPoint and RoutePoint devices must be installed by a qualified technician, and quality ethernet cables should be used.

There are five types of available antenna configurations:

1. A single 15.0 dBi gain Omni antenna with no diversity;
2. A single 13.5 dBi gain Yagi antenna with no diversity;
3. A single 12.0 dBi gain Patch antenna with no diversity;
4. Two identical 7.4 dBi Omni antennas with receive diversity;
5. Two identical 7.0 dBi Omni antennas with Counterpoise Ground Planes with receive diversity.

3. TEST METHODOLOGY

Conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 15.407.

4. FACILITIES AND ACCREDITATION

4.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specifications for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

4.2. LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2)).

4.3. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	FCC Part 15, CISPR 22, AS/NZS 3548,IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, CNS 13438	200065-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	ELA-171
Taiwan	BSMI	CNS 13438	SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	IC2324 A,B,C, and F

* No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

Any results falling within the above values are deemed to be marginal.

5.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Spectrum Analyzer	HP	8566B	3014A06685	6/1/03
Spectrum Display	HP	85662A	2152A03066	6/1/03
Quasi-Peak Detector	HP	85650A	3145A01654	6/1/03
Preamplifier	HP	8447D	2944A06833	8/22/03
Log Periodic Antenna	EMCO	3146	9107-3163	3/30/03
Biconical Antenna	Eaton	94455-1	1197	3/30/03
LISN	F.C.C.	LISN-50/250-25-2	2023	9/6/03
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	4/17/03
Spectrum Analyzer	HP	8563E	3720A07066	3/18/04
Spectrum Analyzer	HP	8564E	3943A01643	7/22/03
Preamplifier (1 - 26.5GHz)	HP	NSP2600-44	646456	4/26/03
Horn Antenna (1 - 18GHz)	EMCO	3115	6717	1/31/03
Horn Antenna (18 – 26.5 GHz)	ARA	MWH 1826/B	1013	10/26/02
High Pass Filter (4.57GHz)	FSY Microwave	FM-4570-9SS	003	N.C.R.

6. SETUP OF EQUIPMENT UNDER TEST

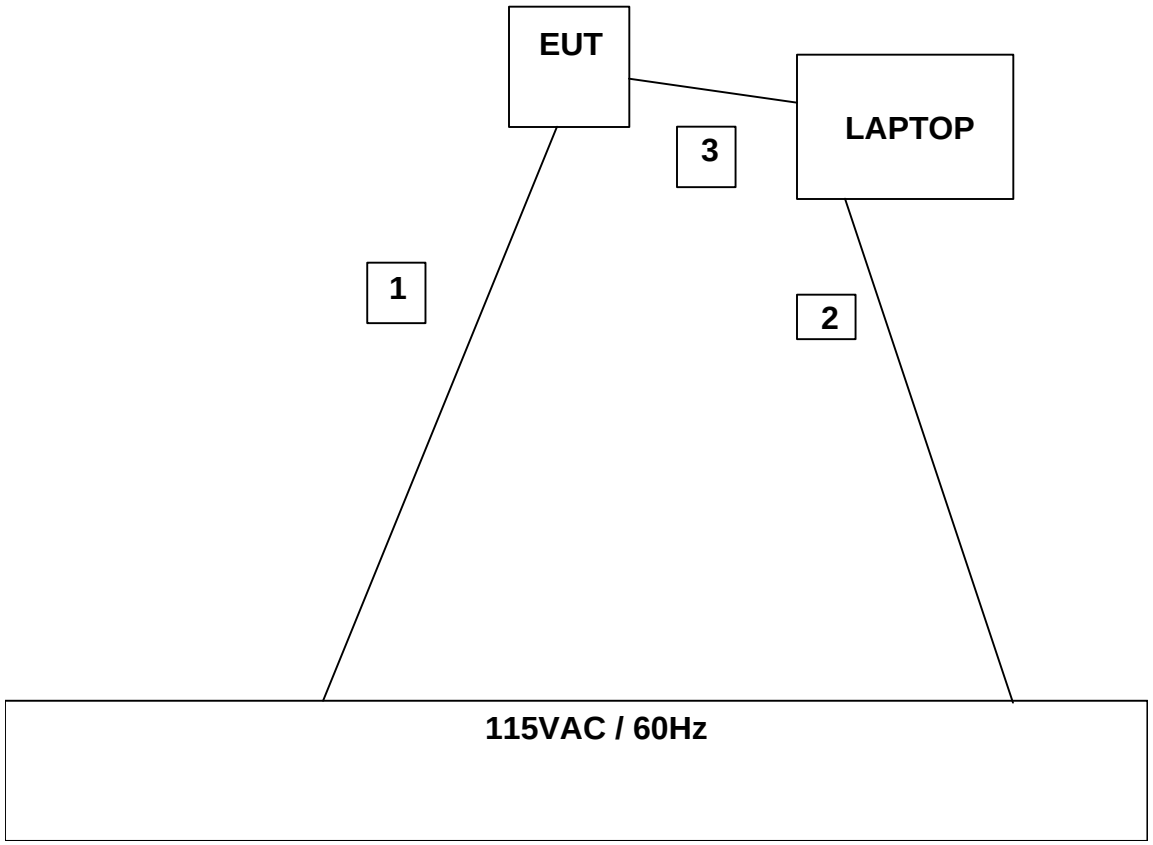
SUPPORT EQUIPMENT

Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	HP	Pavillion xf235	TW21906585	DoC
AC Power Adapter	HP	ADP-75HP	MUT0217005049	DoC
Ethernet Power Adapter	3COM	61-0127-000	N/A	N/A

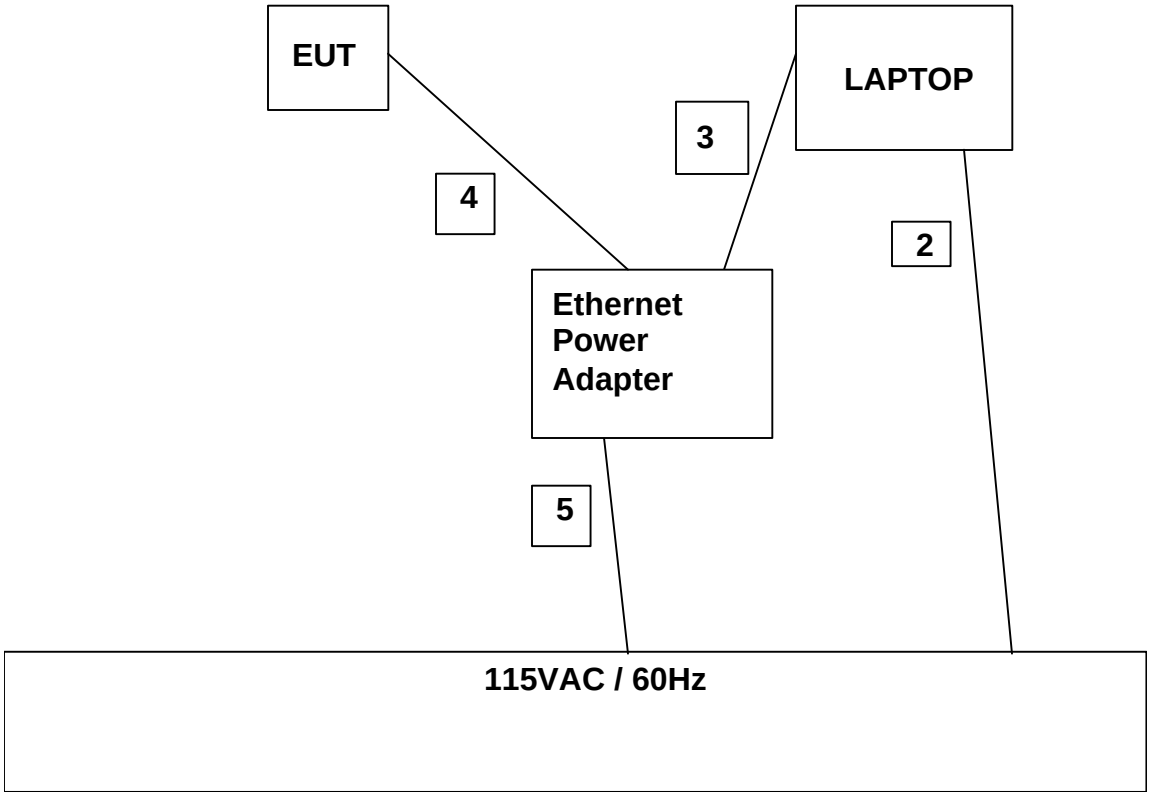
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	2 m	
2	AC	1	US115	Unshielded	1 m	Integrated with AC Adapter
3	RJ45	1	RJ45	Shielded	2 m	Reversing Cable
4	RJ45	1	RJ45	Shielded	2 m	Non-reversing Cable
5	AC	1	US115	Unshielded	1 m	

SETUP DIAGRAM FOR SELF-CONTAINED POWER CONFIGURATION



SETUP DIAGRAM FOR POWER OVER ETHERNET CONFIGURATION



7. APPLICABLE RULES

§15.247 (a)- BANDWIDTH

(2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

§15.247 (b)- POWER OUTPUT

The maximum peak output power of the intentional radiator shall not exceed the following:

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

(4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Specification Limit: Maximum Antenna Gain = 15 dBi, therefore the limit is 21 dBm

§15.247 (b)- RADIO FREQUENCY EXPOSURE

(5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

§15.247 (c)- SPURIOUS EMISSIONS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

§15.247 (d)- PEAK POWER SPECTRAL DENSITY

(d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

§15.205- RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) 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 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	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 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

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

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.207- CONDUCTED LIMITS

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Quasi-Peak Limit (dBuV)	Average Limit (dBuV)
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

§15.209- RADIATED EMISSION LIMITS

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

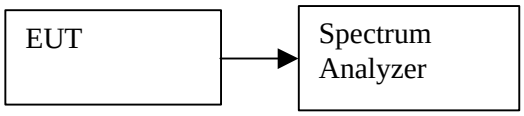
(b) In the emission table above, the tighter limit applies at the band edges.

Frequency Range (MHz)	Field Strength (uV/m at 3 m)	Field Strength (dBuV/m at 3 m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

8. TEST SETUP, PROCEDURE AND RESULT

8.1. 6 dB BANDWIDTH

TEST SETUP



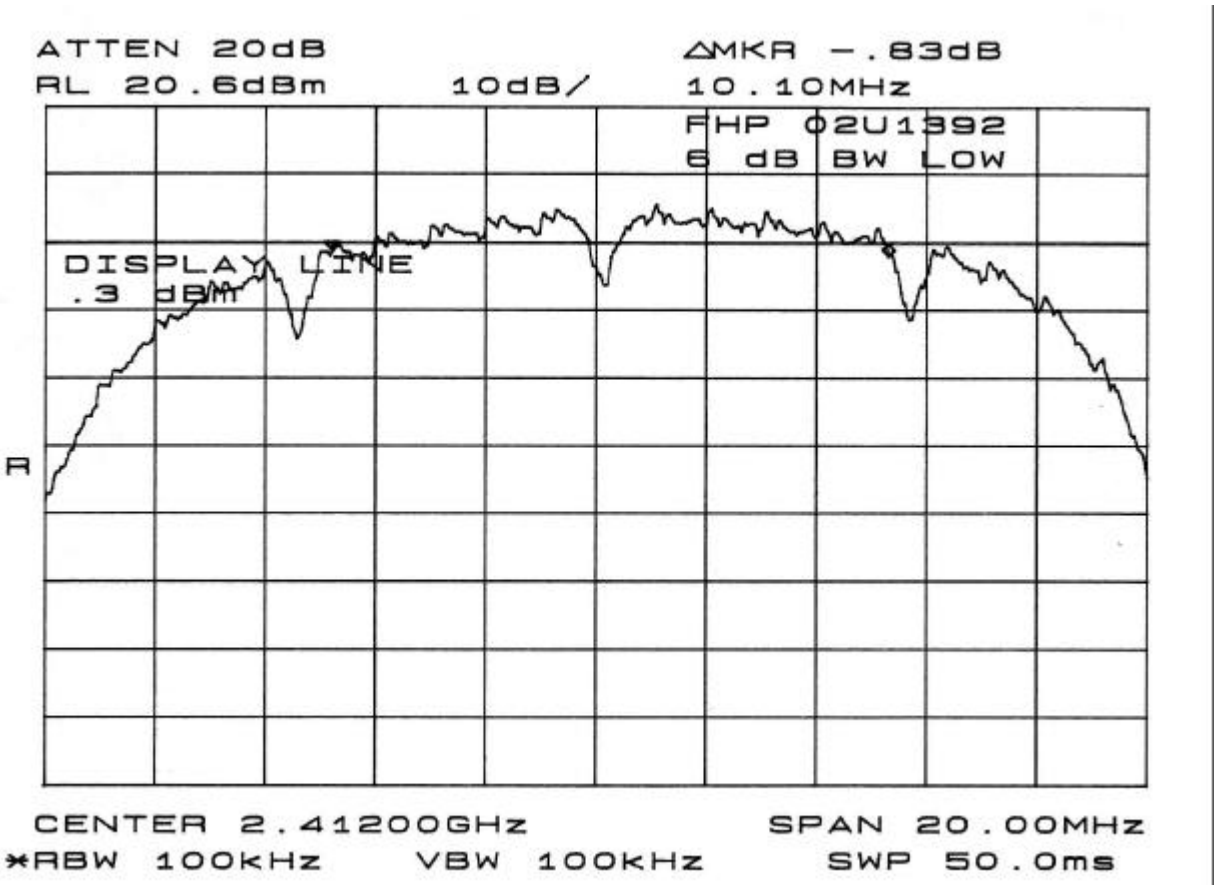
TEST PROCEDURE

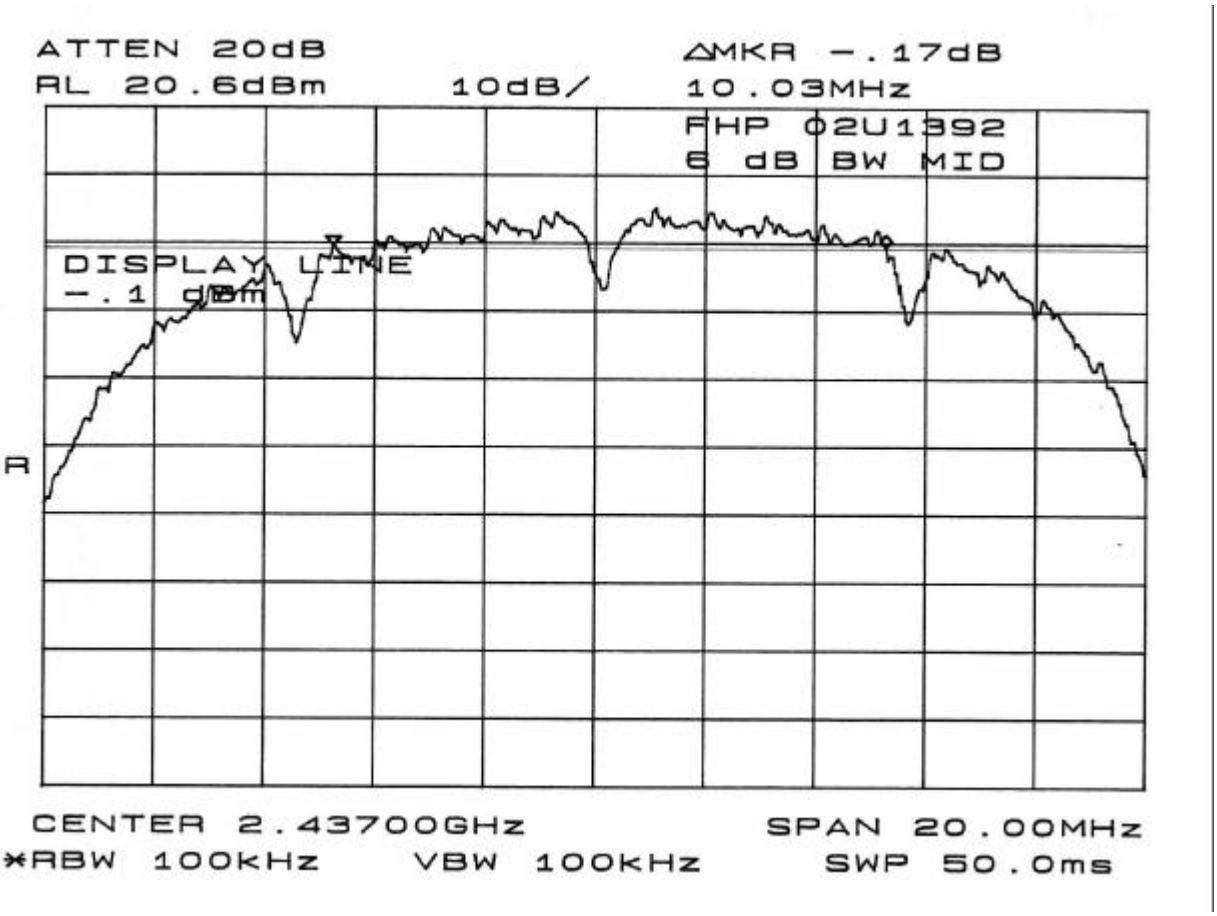
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection is used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.

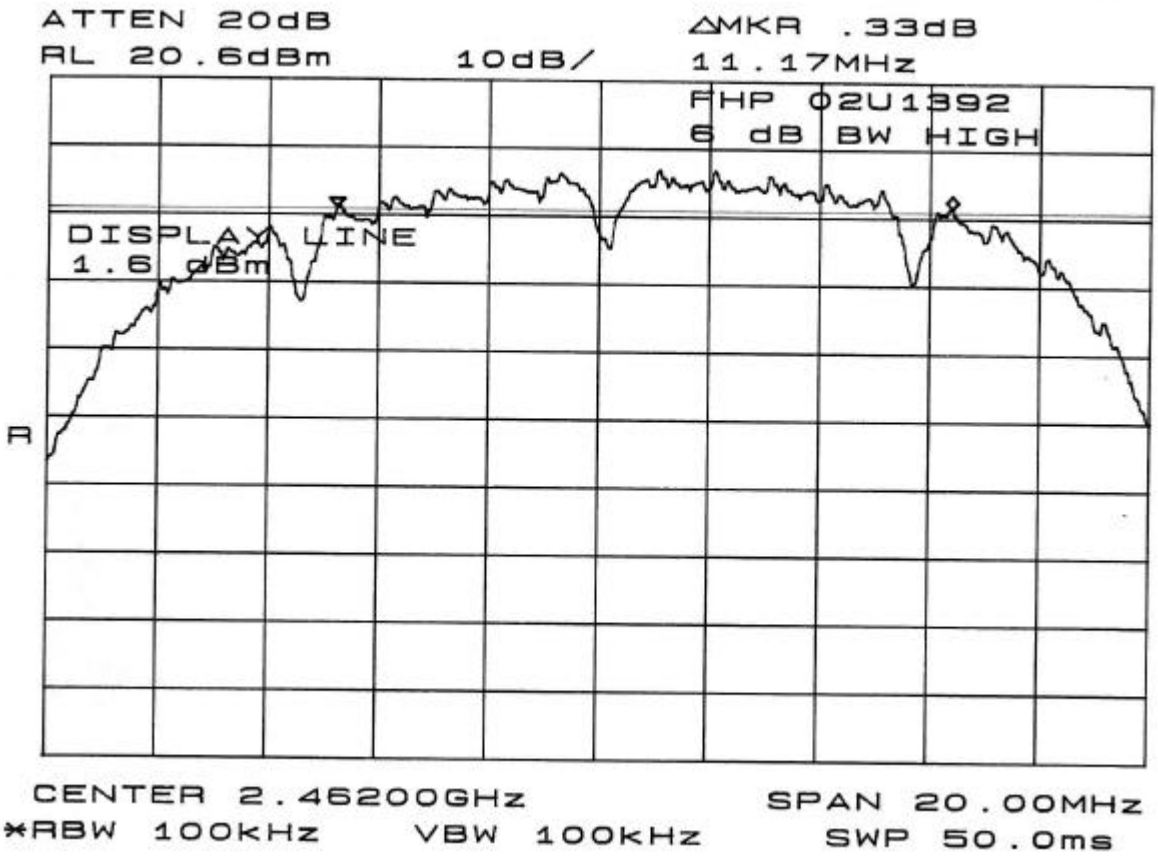
RESULTS

No non-compliance noted:

Channel	Frequency (MHz)	B (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	10100	500	9600
Middle	2437	10030	500	9530
High	2462	11170	500	10670



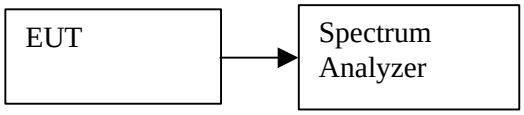




8.2. EMISSION BANDWIDTH

This measurement is used to determine the channel bandwidth for the peak power measurement.

TEST SETUP

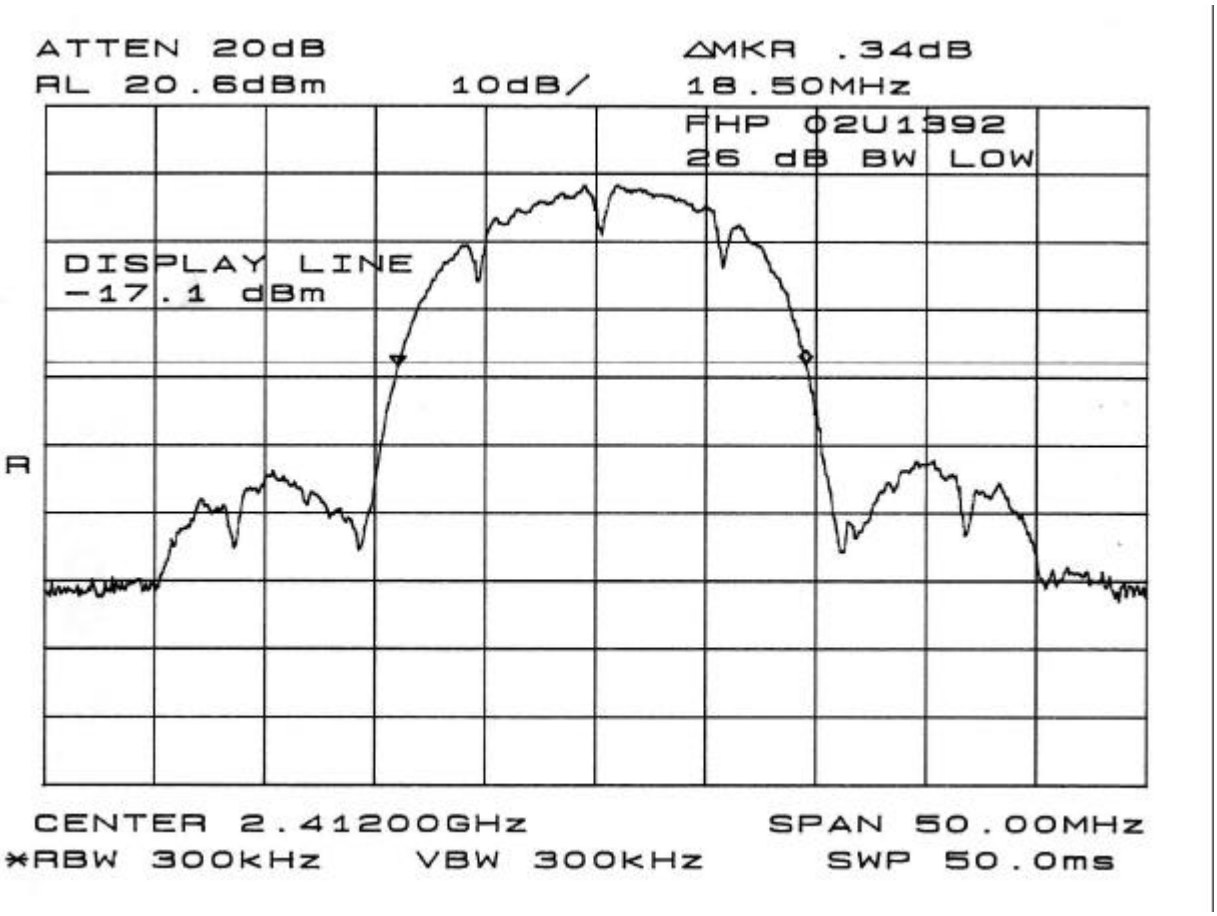


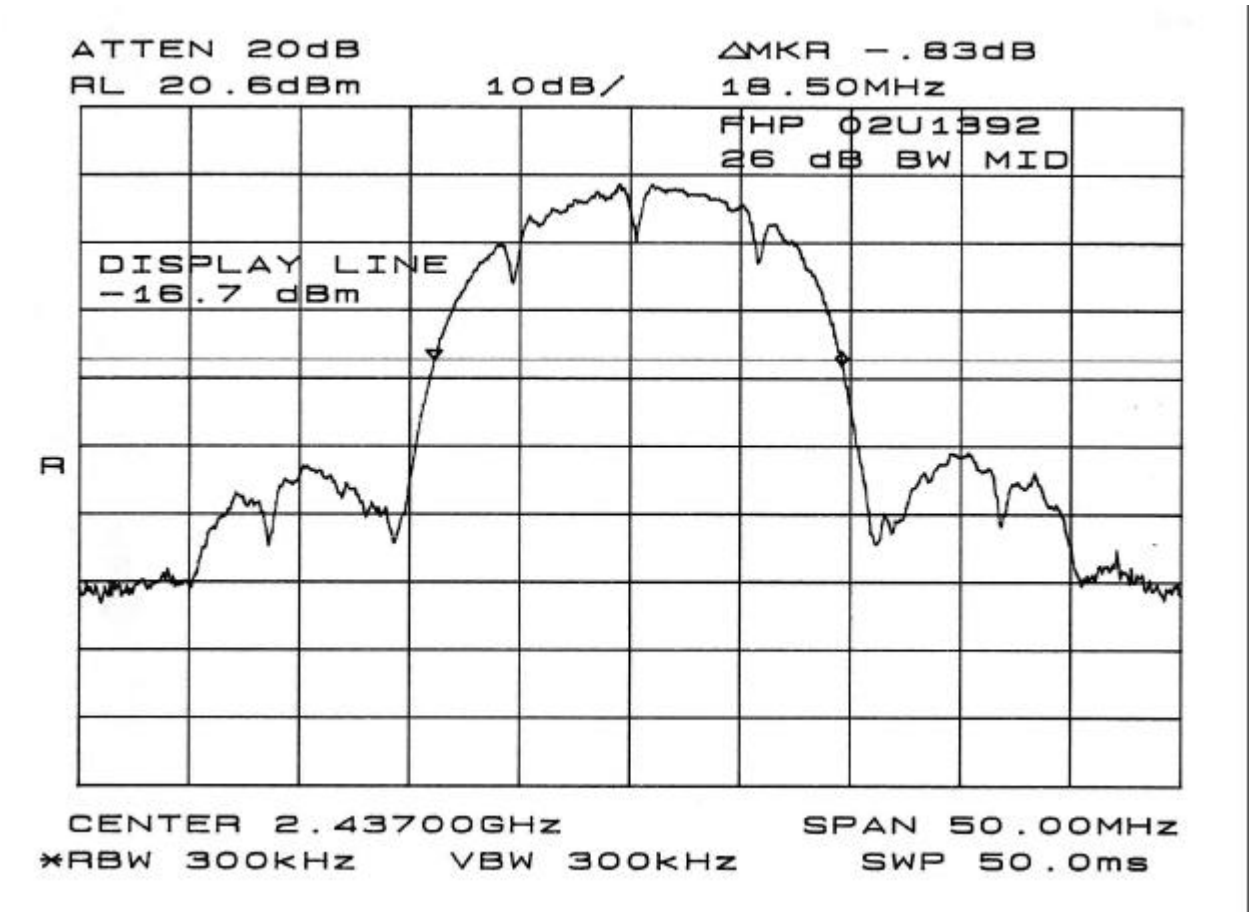
TEST PROCEDURE

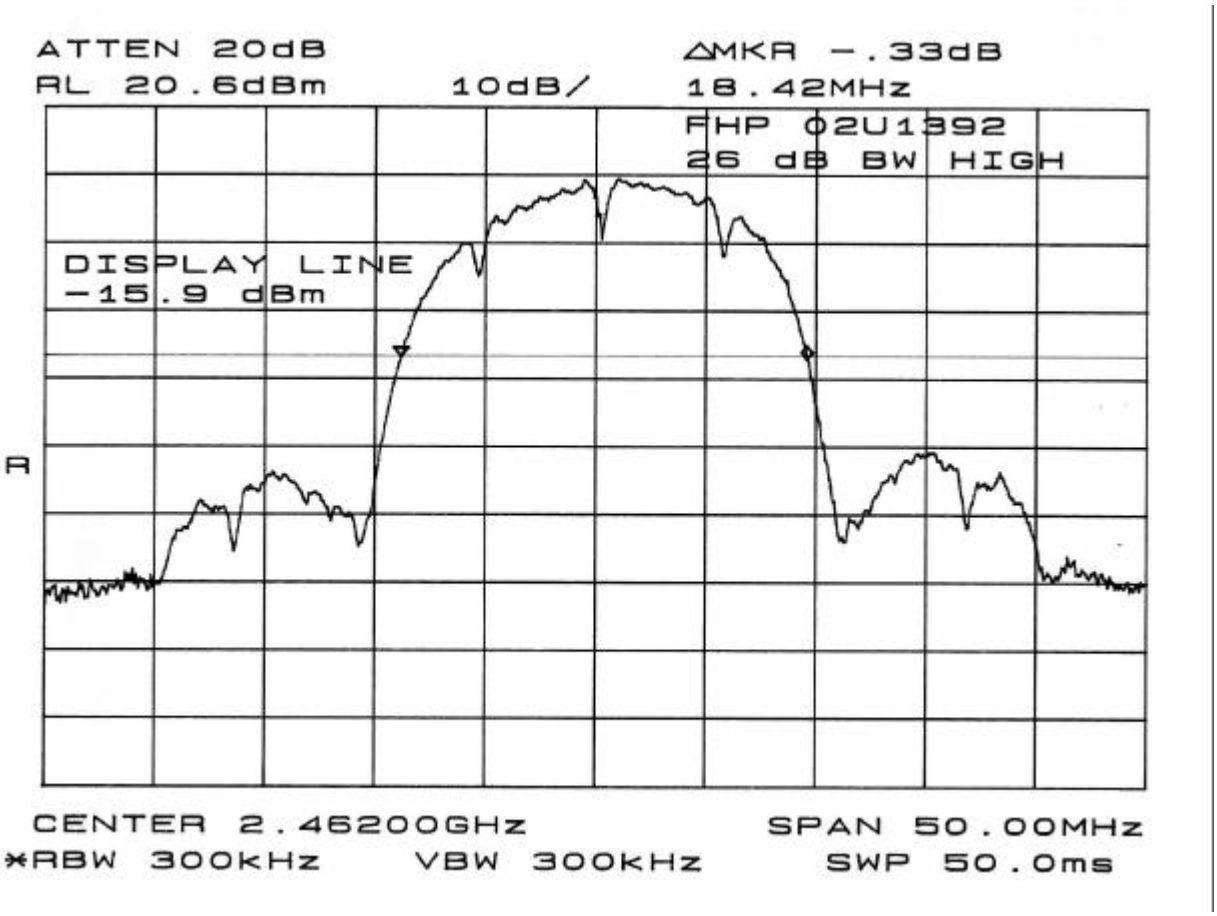
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to approximately 1% of the emission bandwidth and peak detection is used. The emission bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26 dB.

RESULTS

Channel	Frequency (MHz)	B (MHz)
Low	2412	18.50
Middle	2437	18.50
High	2462	18.42

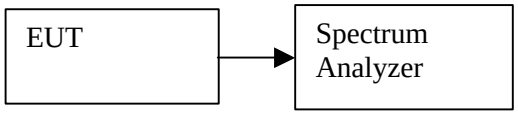






8.3. PEAK POWER

TEST SETUP



TEST PROCEDURE

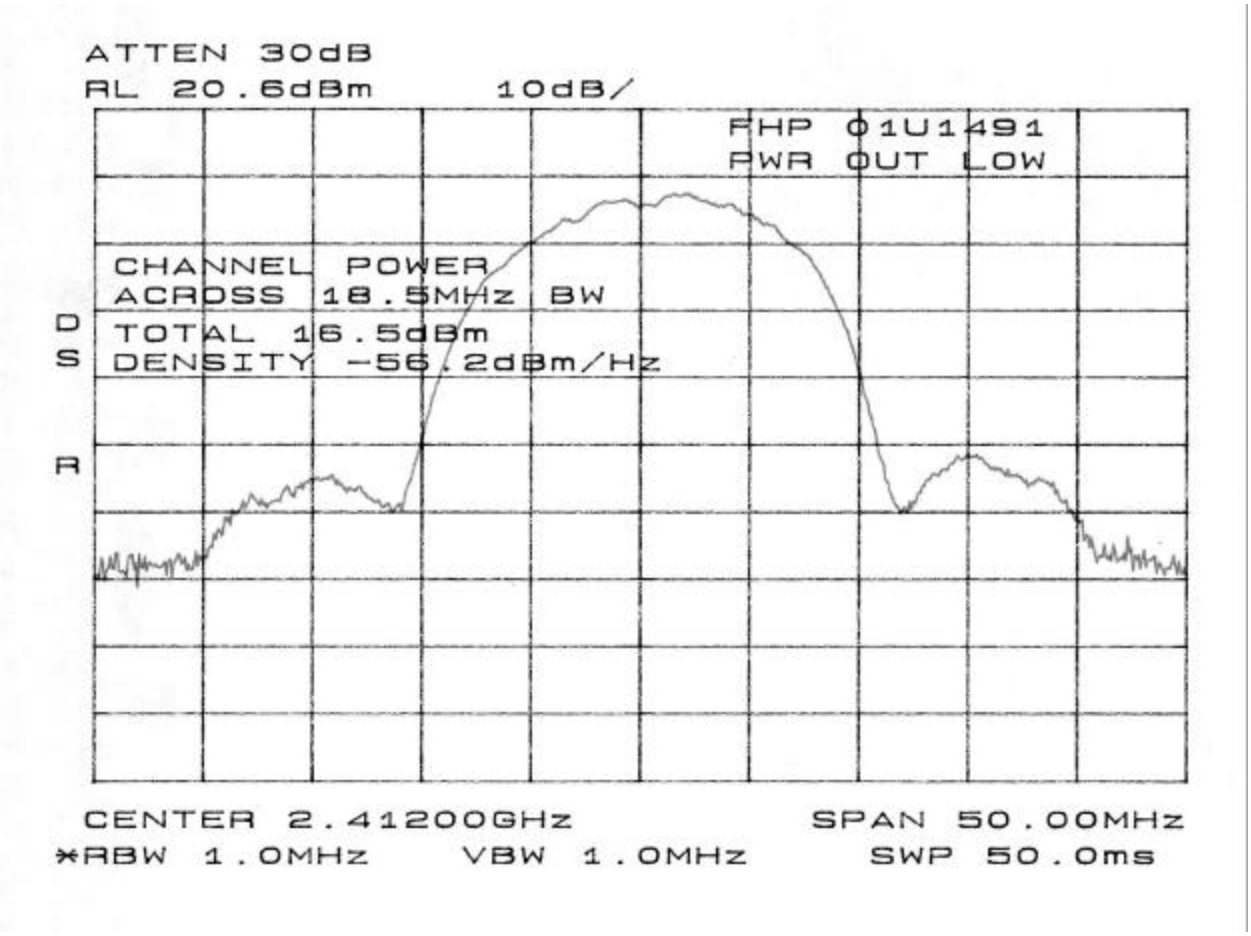
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth and video bandwidth are both set to 1 MHz.

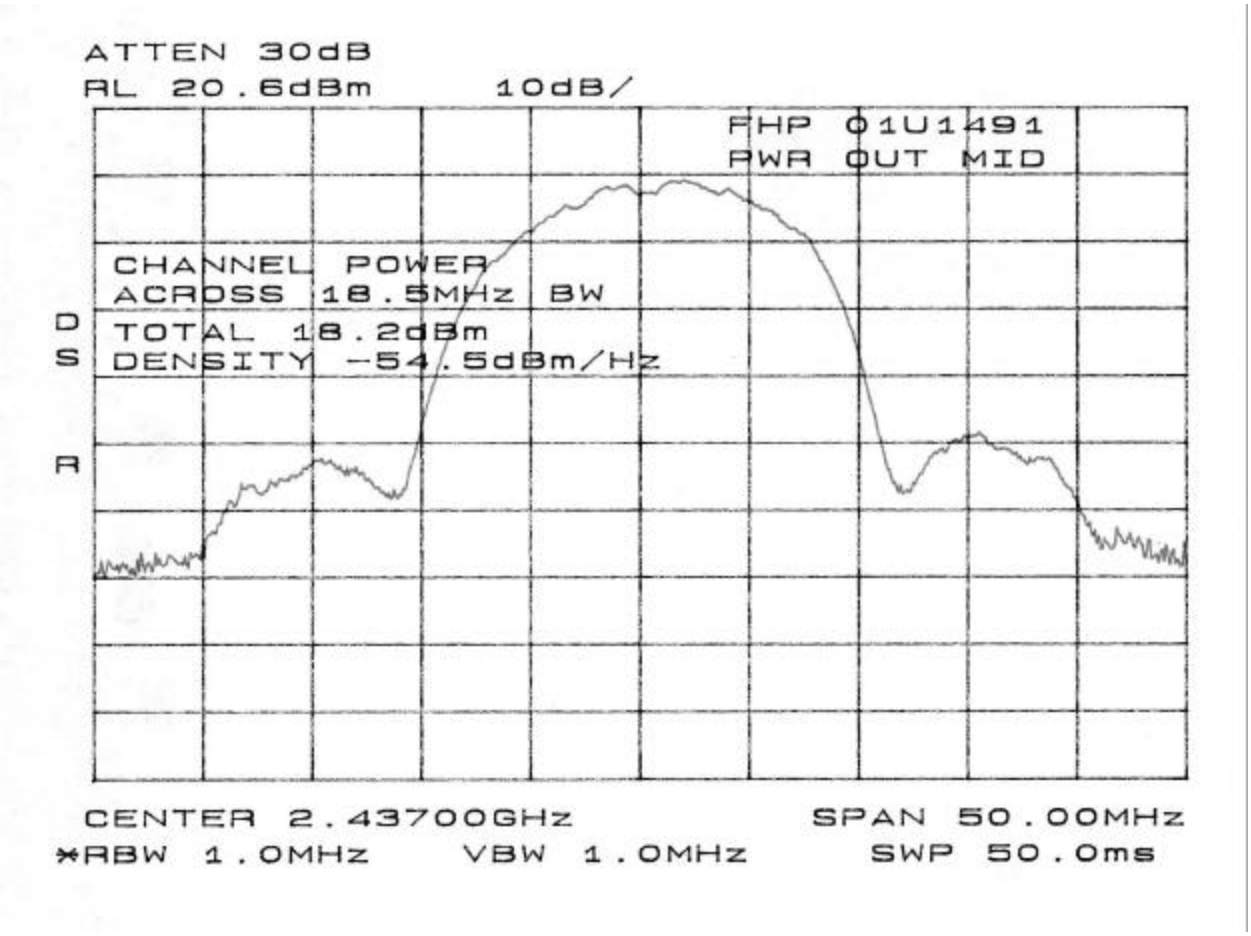
Peak detection is used, and the peak power is determined by channel integration over the previously measured emission bandwidth.

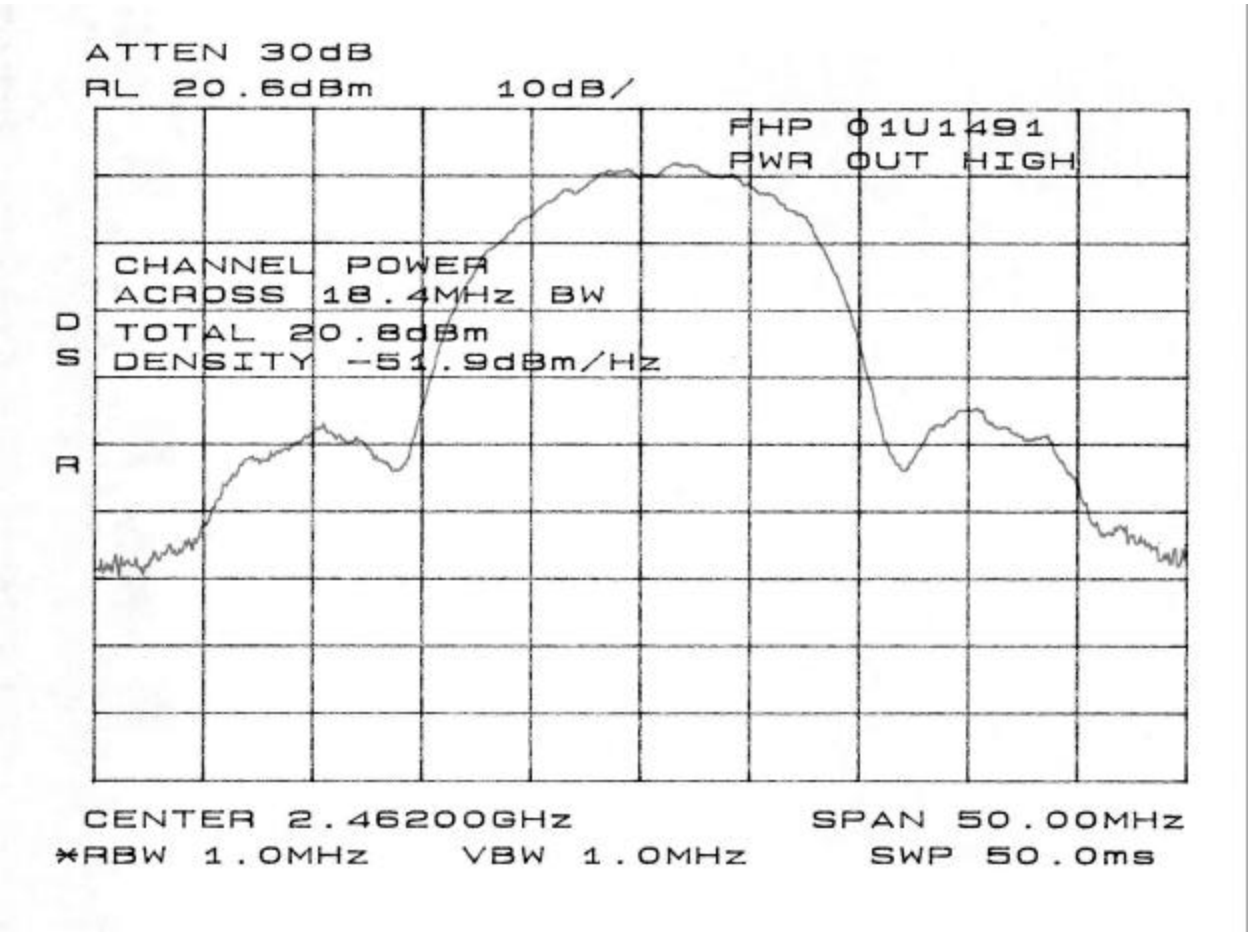
RESULTS

No non-compliance noted:

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin dB
Low	2412	16.5	21	-4.5
Middle	2437	18.2	21	-2.8
High	2462	20.8	21	-0.2

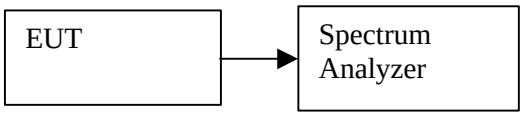






8.4. PEAK POWER SPECTRAL DENSITY

TEST SETUP



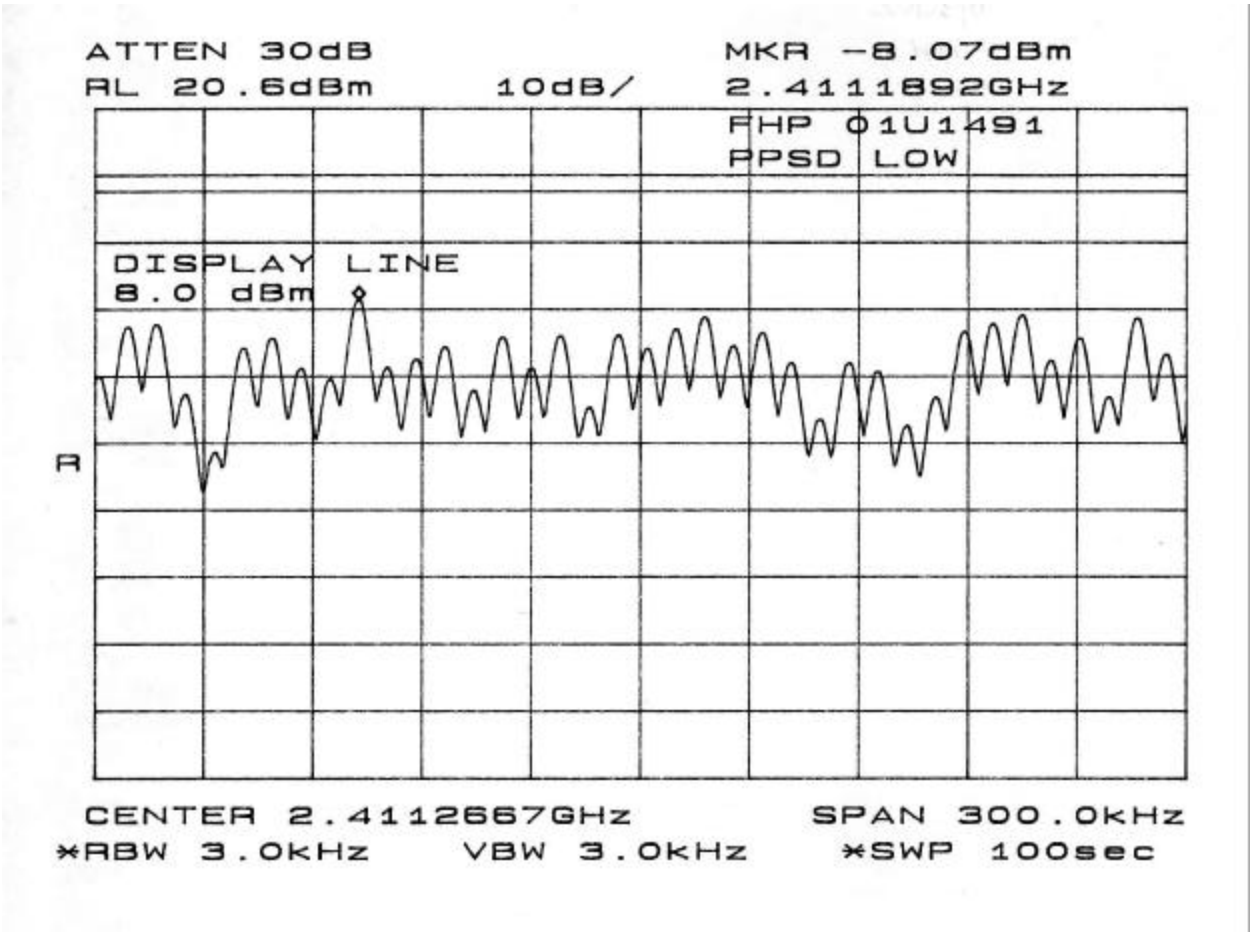
TEST PROCEDURE

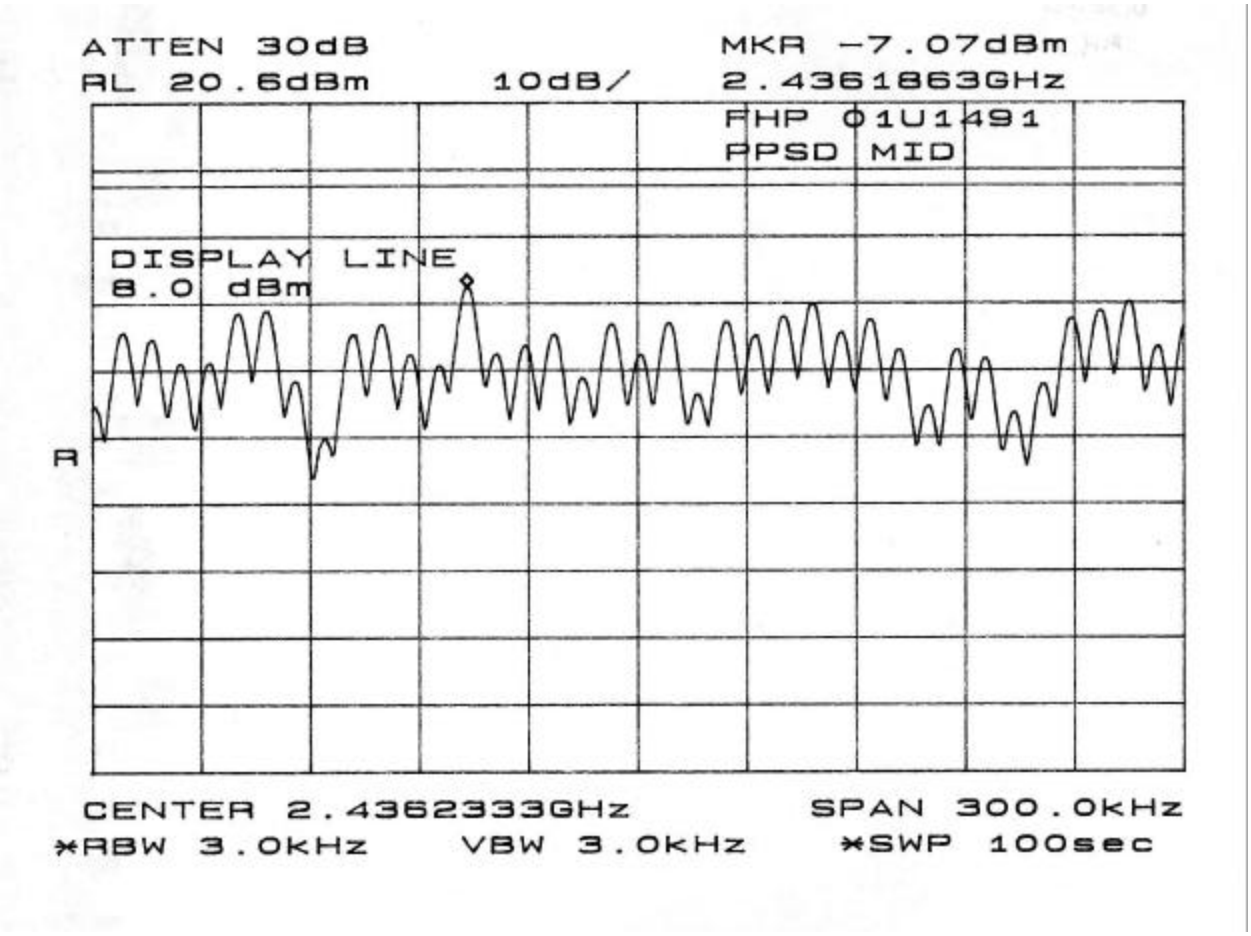
The transmitter output is connected to the spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = VBW = 3KHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

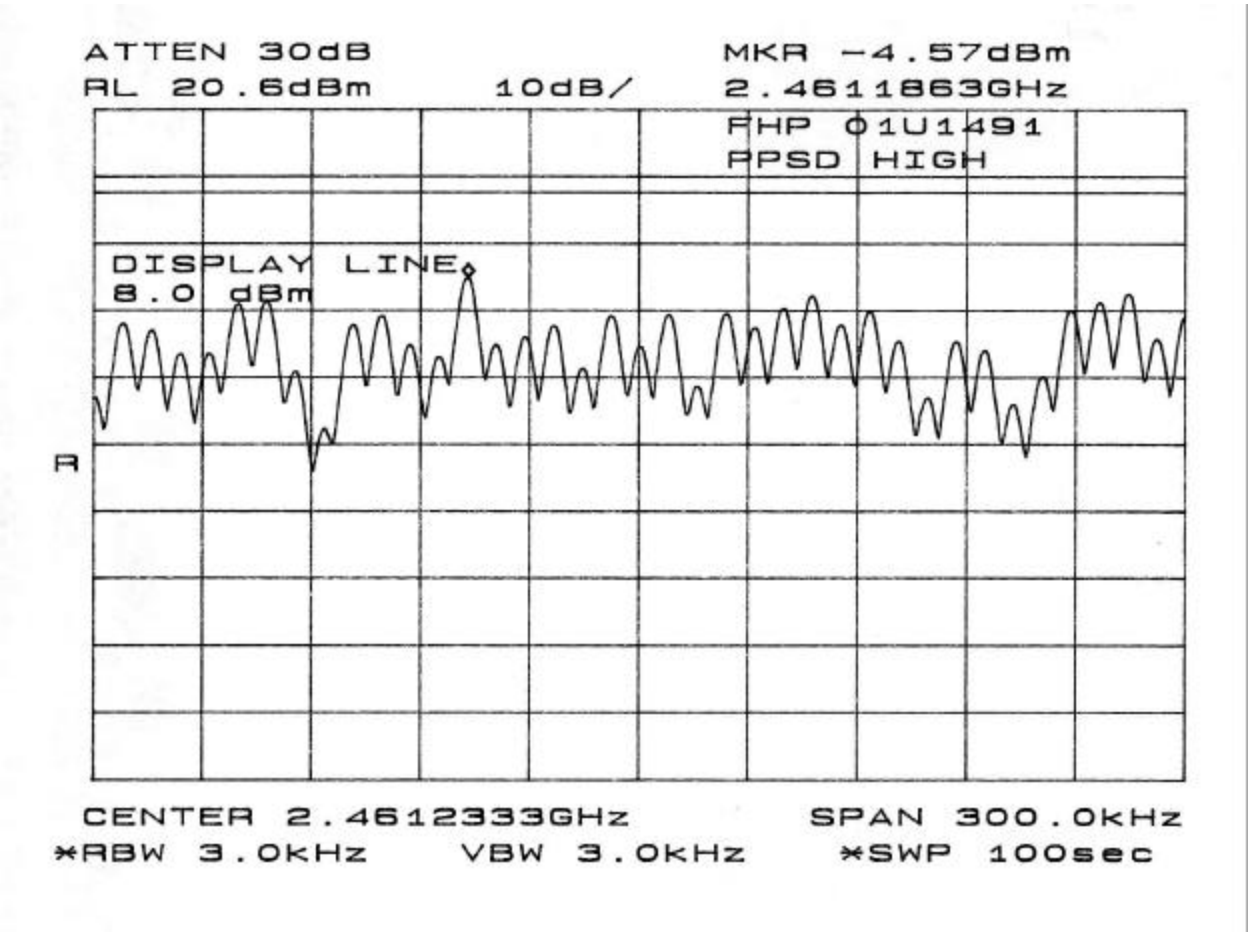
RESULTS

No non-compliance noted:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin dB
Low	2412	-8.07	8	-16.07
Middle	2437	-7.07	8	-15.07
High	2462	-4.57	8	-12.57







8.5. MAXIMUM PERMISSIBLE EXPOSURE

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = distance in meters
S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$

$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW / cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and

G (numeric) = 10 ^ (G (dBi) / 10)

yields

$$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$$ Equation (1)

where

d = MPE safe distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW / cm^2

RESULTS

No non-compliance noted:

EUT output power = 20.8 dBm
Antenna Gain = 15.0 dBi
S = 1.0 mW / cm^2 from 1.1310 Table 1

Substituting these parameters into Equation (1) above:

MPE Safe Distance = 17.4 cm

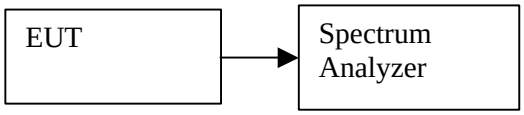
NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

8.6. SPURIOUS EMISSIONS – CONDUCTED MEASUREMENTS

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 26.5 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made at the lower band edge with the transmitter set to the lowest channel.

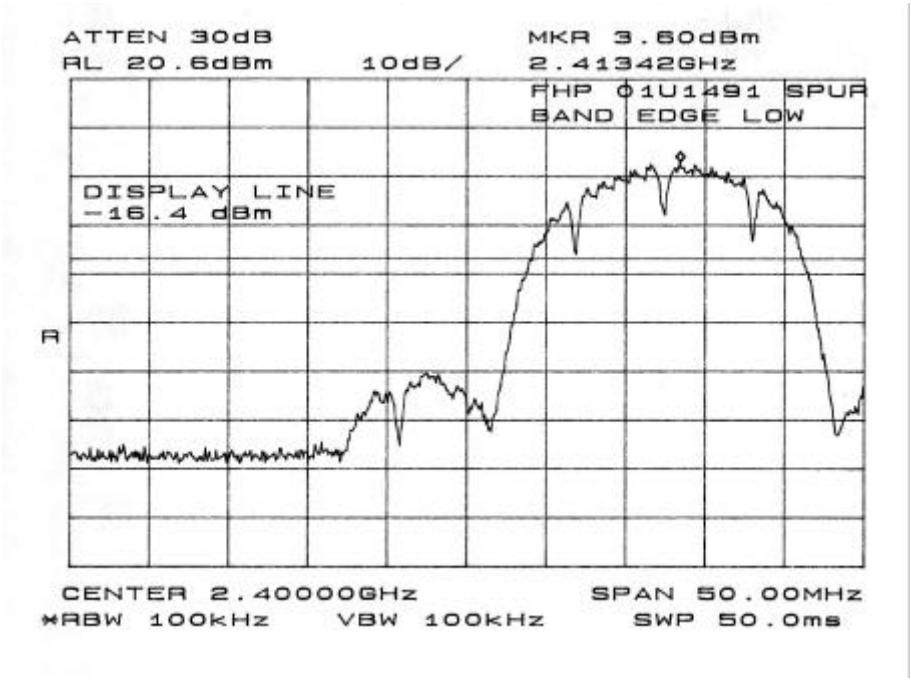
Measurements are made at the upper band edge with the transmitter set to the highest channel.

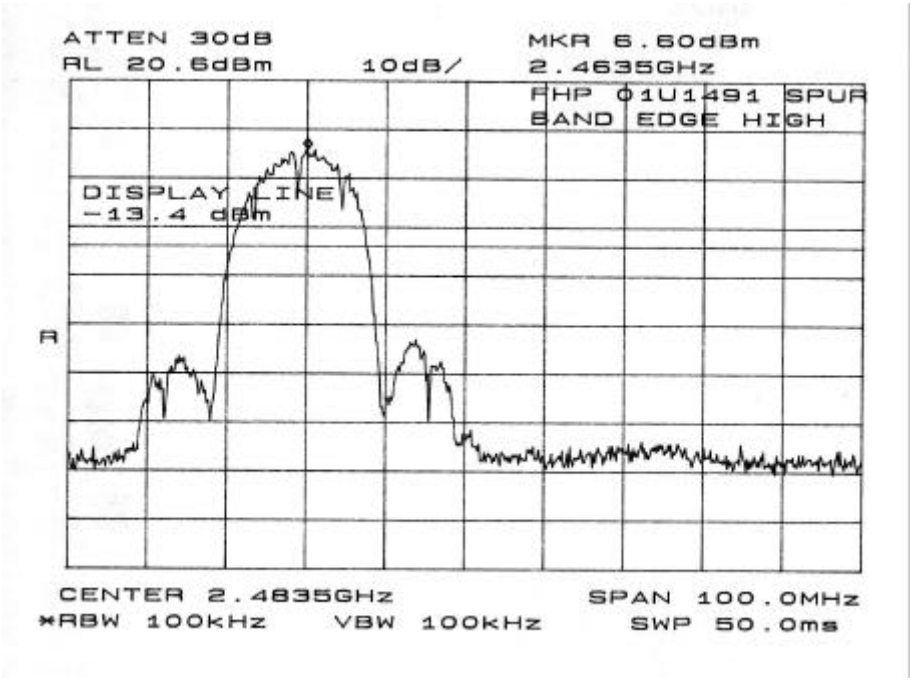
Measurements are made over the 30 MHz to 26.5 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

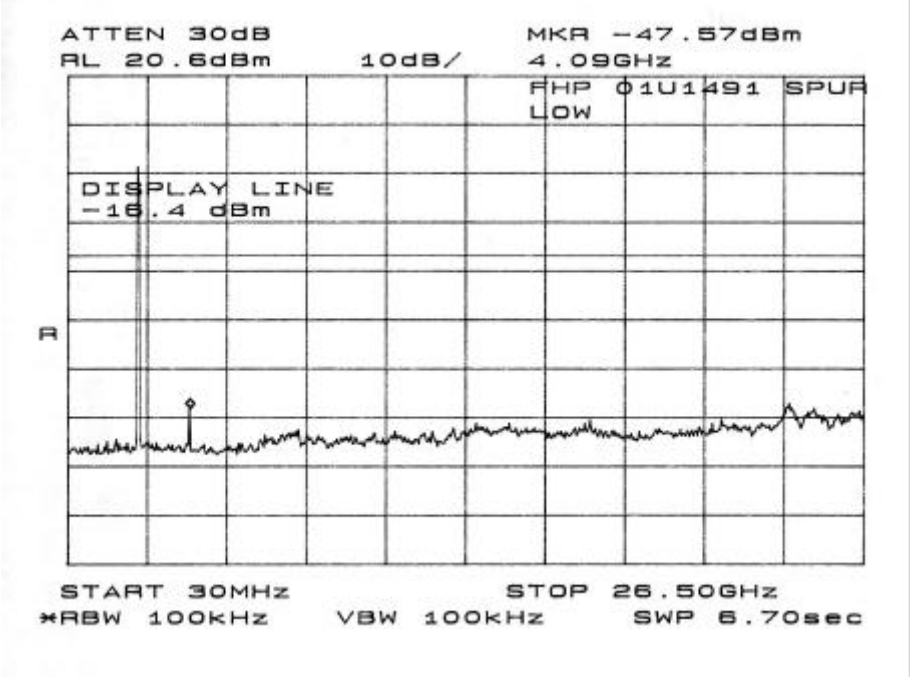
No non-compliance noted:

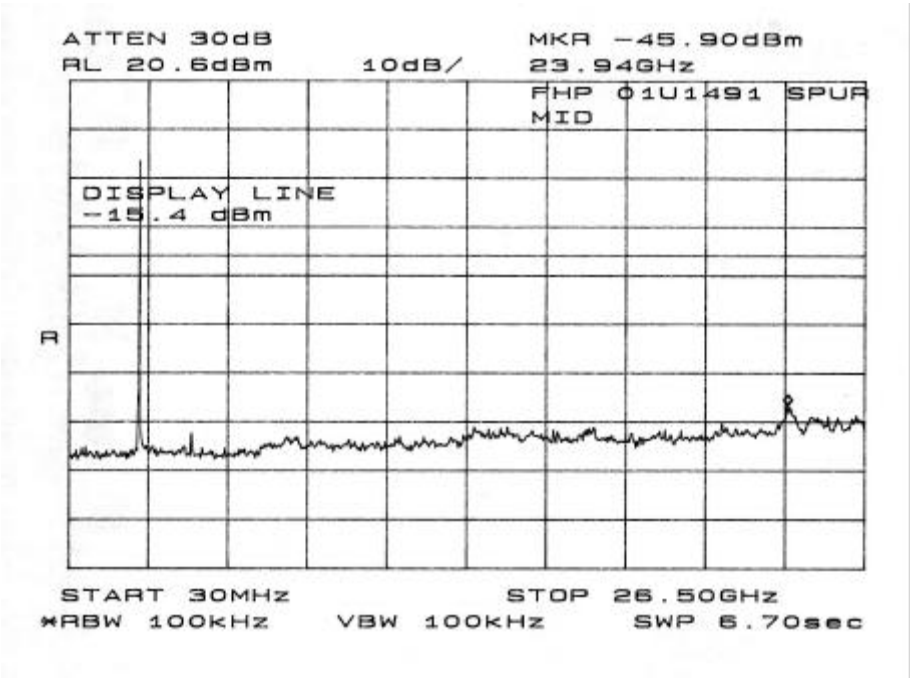
BAND EDGES

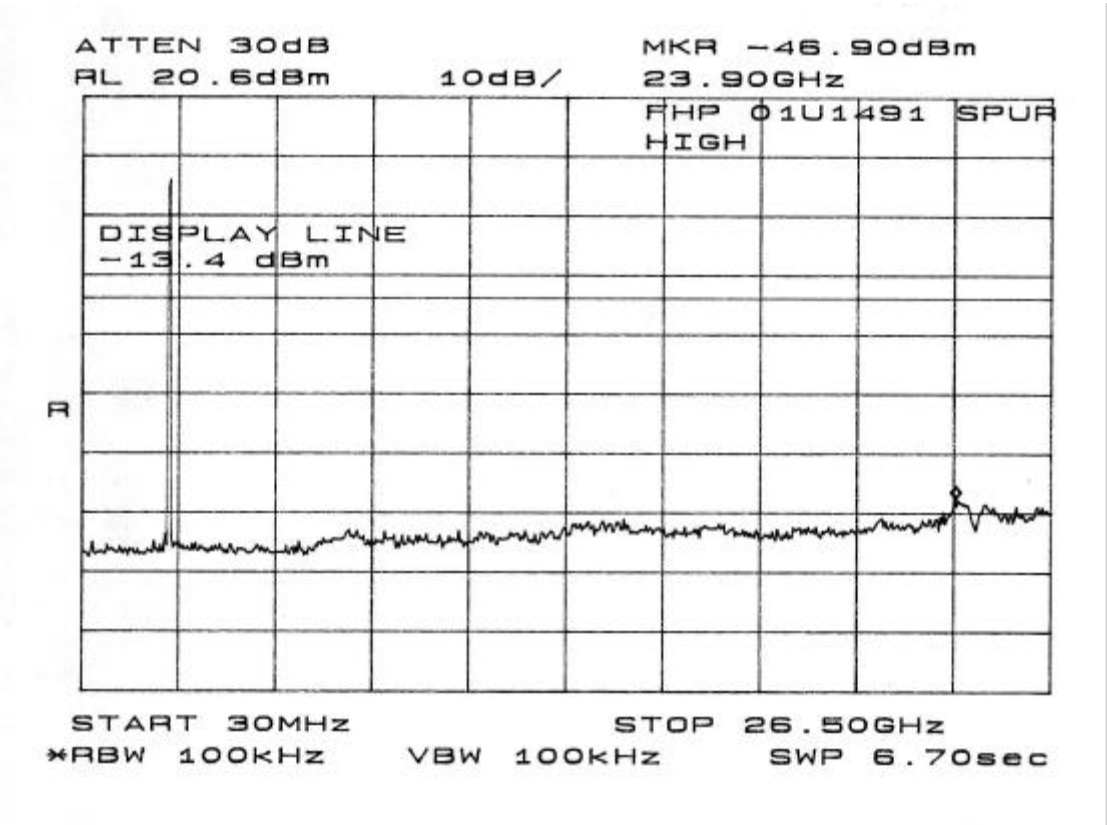




SPURIOUS PLOTS







8.7. UNDESIRABLE EMISSIONS – RADIATED MEASUREMENTS

8.7.1. SETUP AND PROCEDURE

TEST SETUP

The EUT is mounted on a metal antenna mast. The Yagi, Patch and Single Omni antennas are mounted on the mast and connected to the transmit / receive coaxial connector via a coaxial cable. The Diversity Omni antennas are connected directly to the coaxial connectors on the weatherproof housing.

For transmitter tests, the EUT is set to the desired frequency, the applicable receive diversity mode, and to continuous RF transmission.

For digital device tests the EUT is set to continuously transmit ethernet packets. In the self-contained power configuration an Ethernet-to-fiber-optic converter within the EUT housing receives the Ethernet packets and in the power over Ethernet configuration the laptop is connected to receive the ethernet packets.

The EUT is configured as a floor-standing device in accordance with ANSI C63.4/1992. The base of the antenna mast is set directly on the ground plane to simulate typical installation guidelines which require the mast to be grounded for lightning protection.

TEST PROCEDURE

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz outside restricted bands, the resolution bandwidth is set to 100 kHz. Peak detection is used.

For measurements above 1 GHz within restricted bands, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26.5 GHz is investigated.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

SYSTEM NOISE FLOOR FOR HARMONIC AND SPURIOUS MEASUREMENTS

Compliance Certification Services

Worst Case Radiated Emissions System Noise Floor

Each band below corresponds to each horn antenna band
Uses the lowest gain preamplifier; actual preamp used may have higher gain
Uses the longest typical cable configuration; actual cables used may have less loss
Noise floor field strength results are compared to the FCC 15.205 Restricted Band limit

Specification Distance: 3 meters

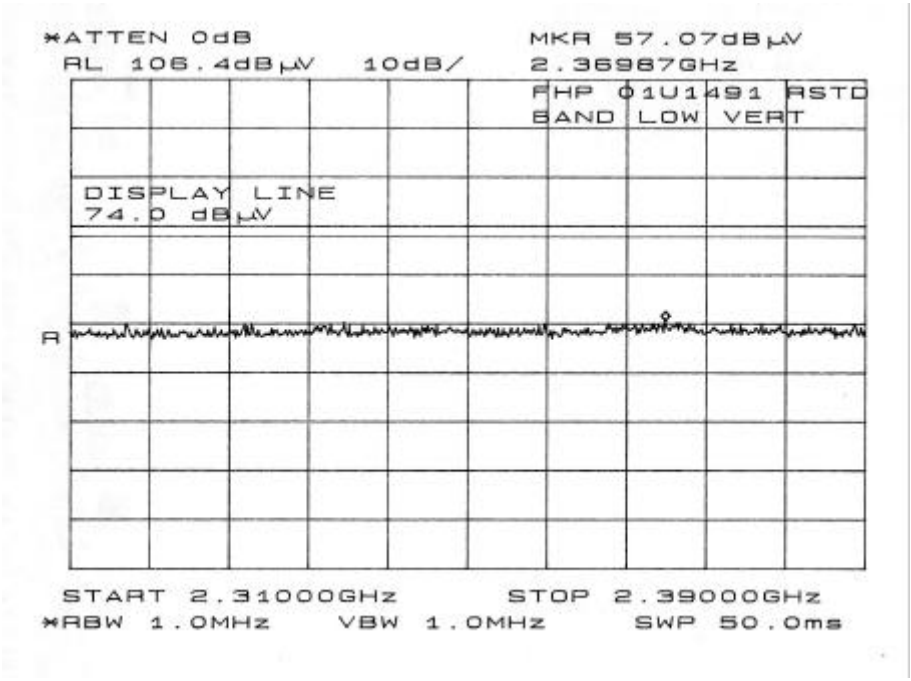
Freq GHz	SA dBuV	AF dB/m	Distance m	Distance dB	Preamp dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
1 to 18 GHz band									
RBW = 1 MHz, peak detection									
18	41.9	47.8	1	-9.5	32.6	13.5	61.06	74	-12.94
RBW = 1 MHz, average detection									
18	28.7	47.8	1	-9.5	32.6	13.5	47.86	54	-6.14
18 to 26 GHz band									
RBW = 1 MHz, peak detection									
26	44.6	33.4	1	-9.5	35.0	19.5	52.96	74	-21.04
RBW = 1 MHz, average detection									
26	32.4	33.4	1	-9.5	35.0	19.5	40.76	54	-13.24
26 to 40 GHz band									
External mixer is used for this band									
Preamplifier is internal to Spectrum Analyzer, with gain factor built into firmware									
Antenna is mounted directly on external mixer, therefore cable = 0 dB									
RBW = 1 MHz, peak detection									
40	39.2	44.5	0.3	-20.0	0.0	0	63.70	74	-10.30
RBW = 1 MHz, average detection									
40	27.2	44.5	0.3	-20.0	0.0	0	51.70	54	-2.30

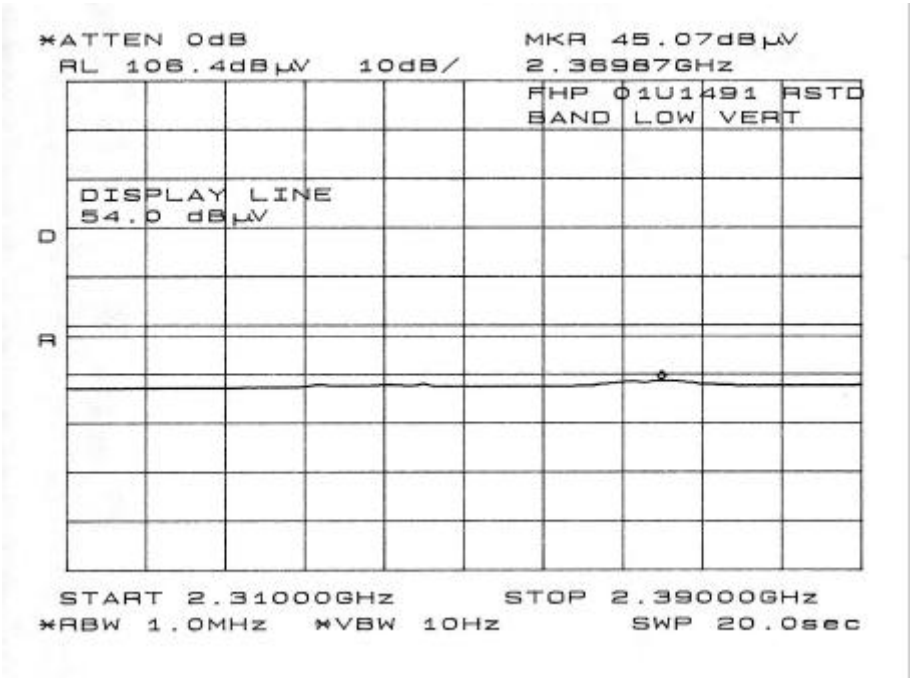
TEST RESULTS

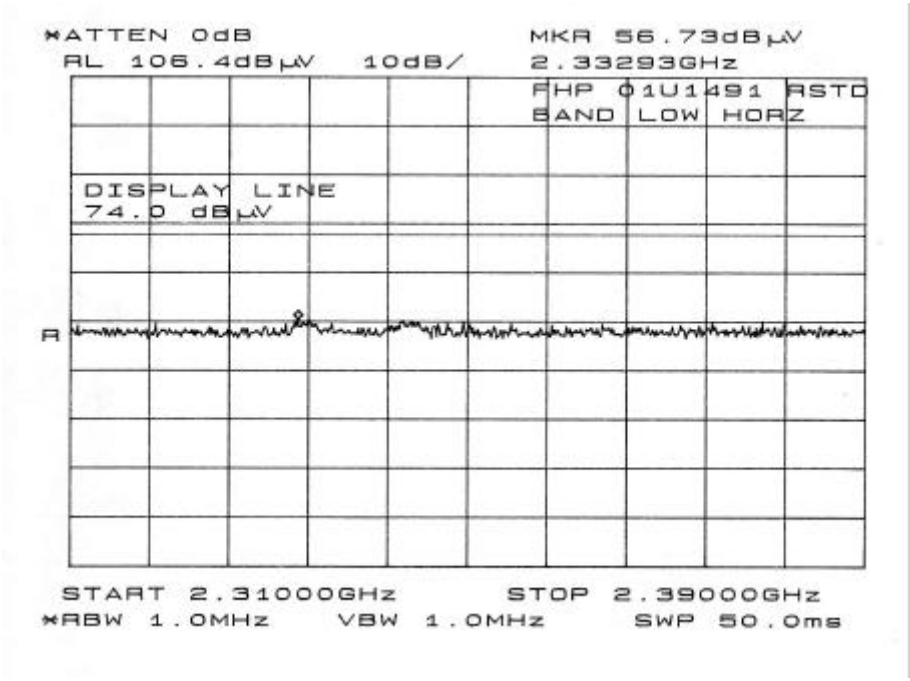
No non-compliance noted:

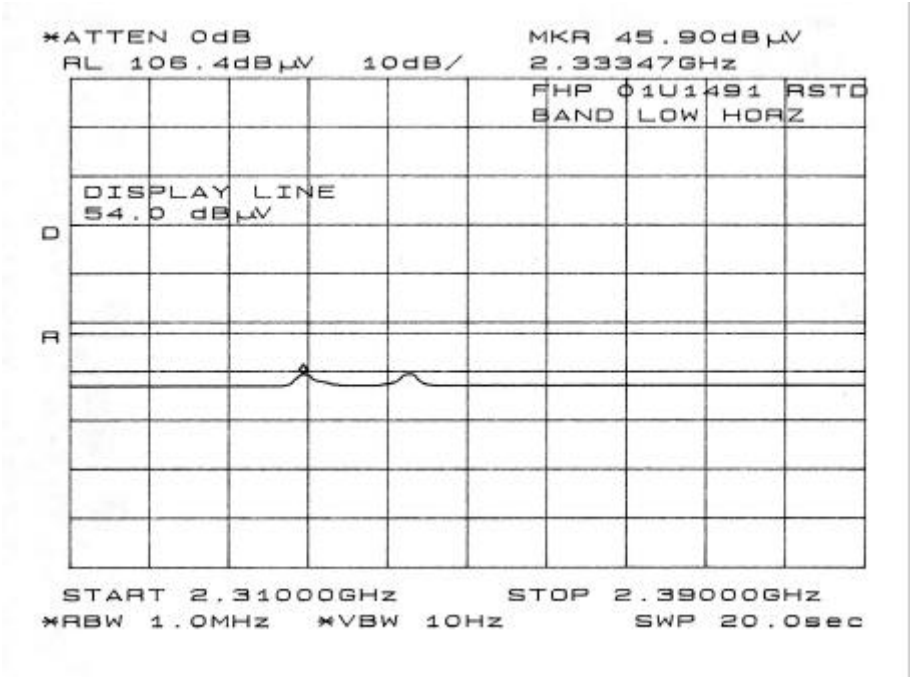
8.7.2. TRANSMITTER TEST RESULTS

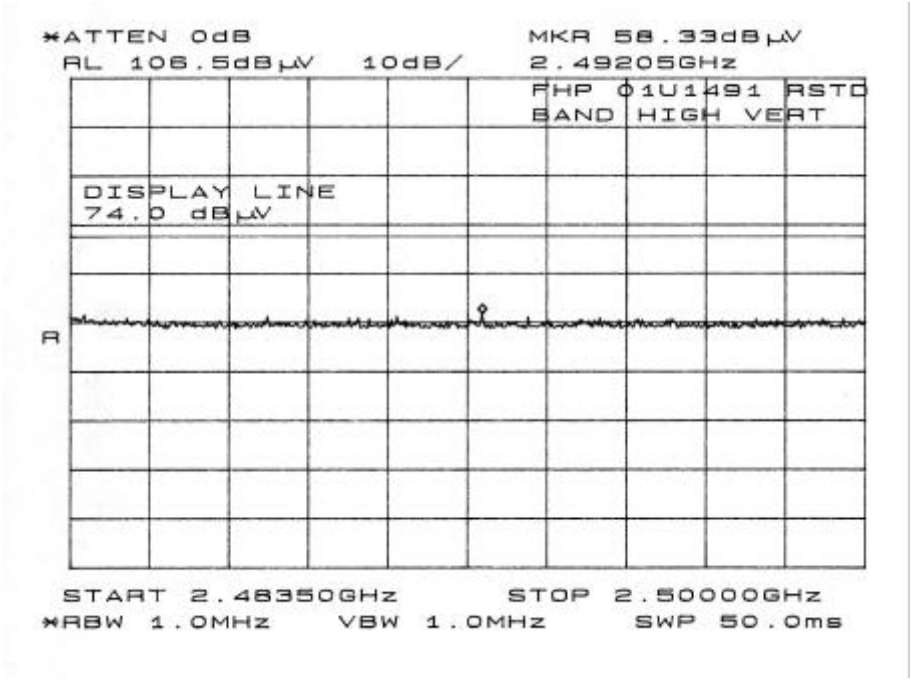
15 dBi OMNI ANTENNA - RESTRICTED BAND RADIATED EMISSIONS

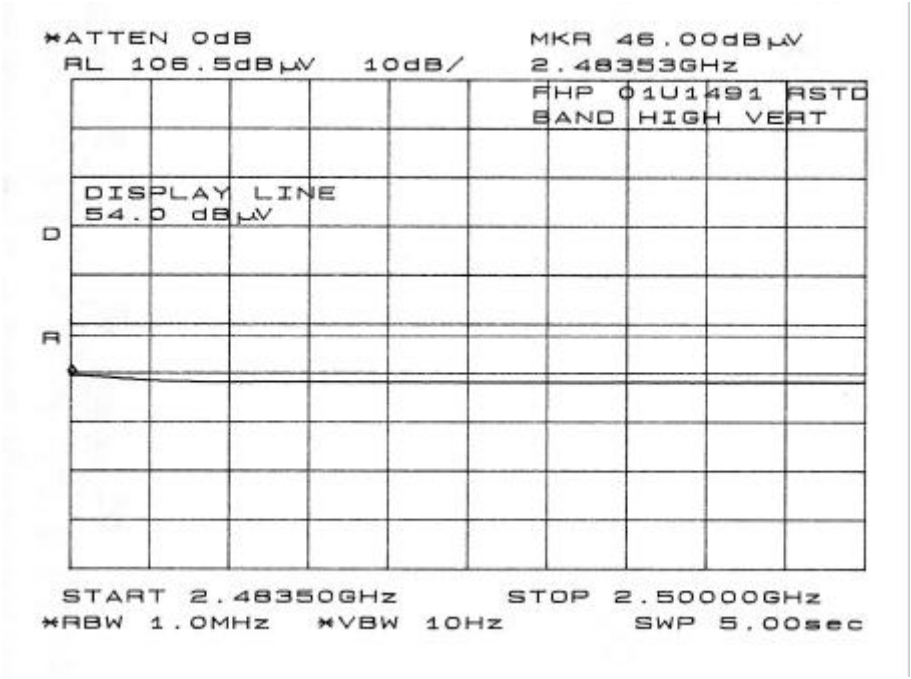


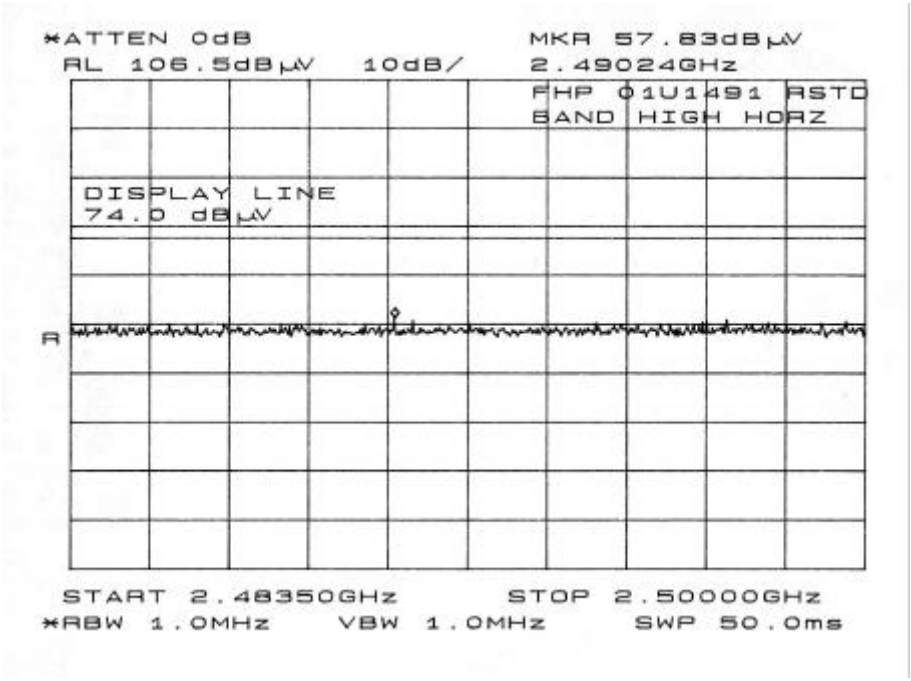


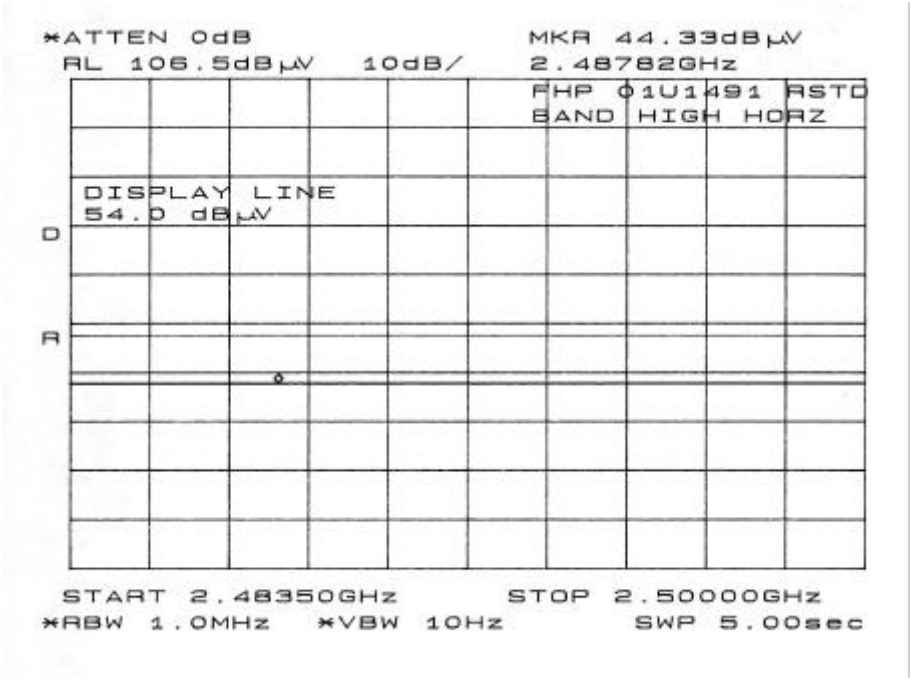












15 dBi OMNI ANTENNA - SPURIOUS RADIATED EMISSIONS

Compliance Certification Services A-Site 8/29/02 Mike H

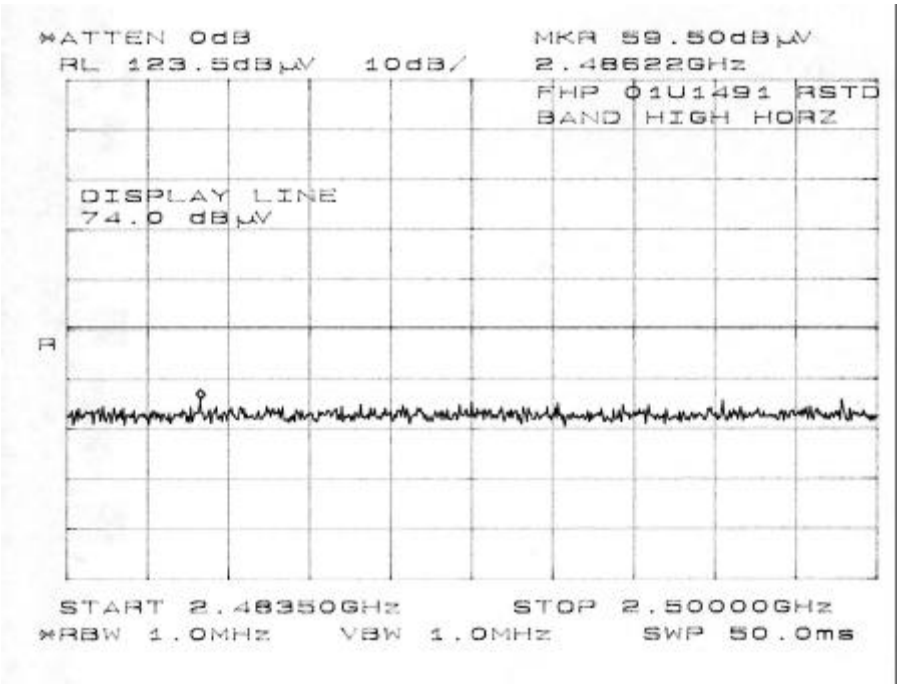
Radiated Emissions FHP with 15 dBi Omni Antenna, No Diversity
FCC 15.247 Mode: Transmitting

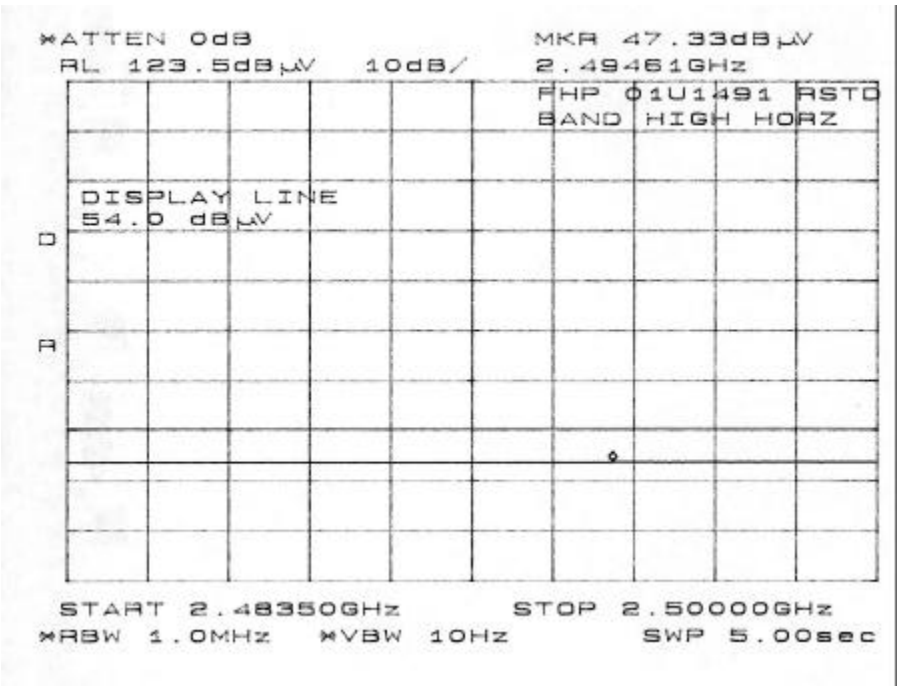
Specification Distance: 3 meters

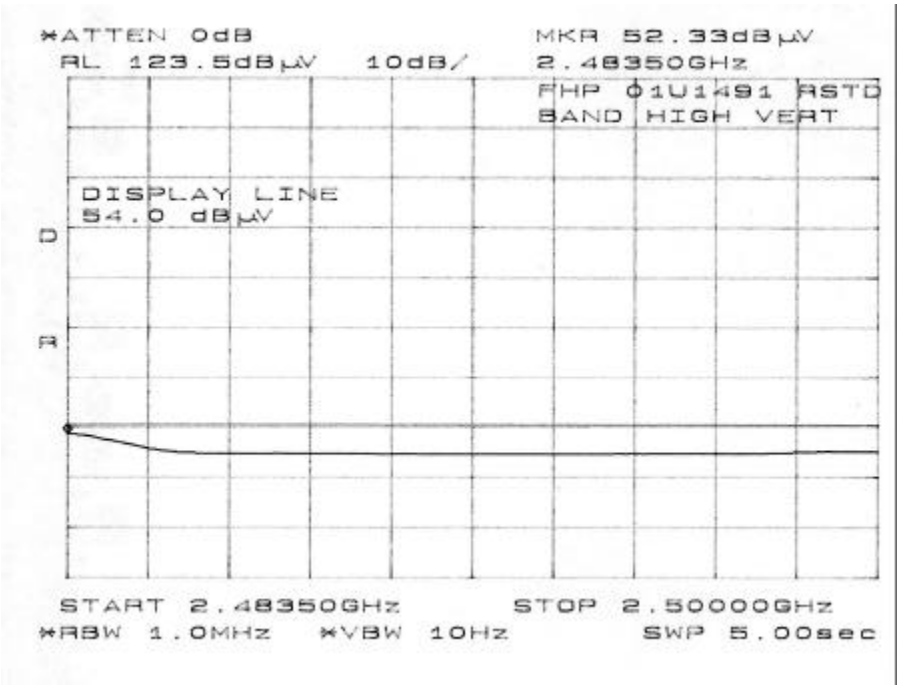
Freq MHz	Pol V/H	Det	SA dBuV	AF dB/m	Dist m	Dist dB	Preamp dB	Cable / HPF dB	Field dBuV/m	Limit dBuV/m	Margin dB
4075.5	V	Peak	45.63	33.2	3	0.0	34.8	10.1	54.13	74	-19.87
4075.5	V	Avg	39.13	33.2	3	0.0	34.8	10.1	47.63	54	-6.37
4075.5	H	Peak	43.2	33.2	3	0.0	34.8	10.1	51.70	74	-22.30
4075.5	H	Avg	34.13	33.2	3	0.0	34.8	10.1	42.63	54	-11.37
4824	V	Peak	41.79	33.9	3	0.0	34.5	7	48.19	74	-25.81
4824	V	Avg	30.9	33.9	3	0.0	34.5	7	37.30	54	-16.70
4125.5	V	Peak	43.93	33.2	3	0.0	34.8	10.1	52.43	74	-21.57
4125.5	V	Avg	35.4	33.2	3	0.0	34.8	10.1	43.90	54	-10.10
4125.5	H	Peak	42.87	33.2	3	0.0	34.8	10.1	51.37	74	-22.63
4125.5	H	Avg	30.7	33.2	3	0.0	34.8	10.1	39.20	54	-14.80
4924	V	Peak	40.97	34.2	3	0.0	34.5	6.3	46.97	74	-27.03
4924	V	Avg	29.4	34.2	3	0.0	34.5	6.3	35.40	54	-18.60

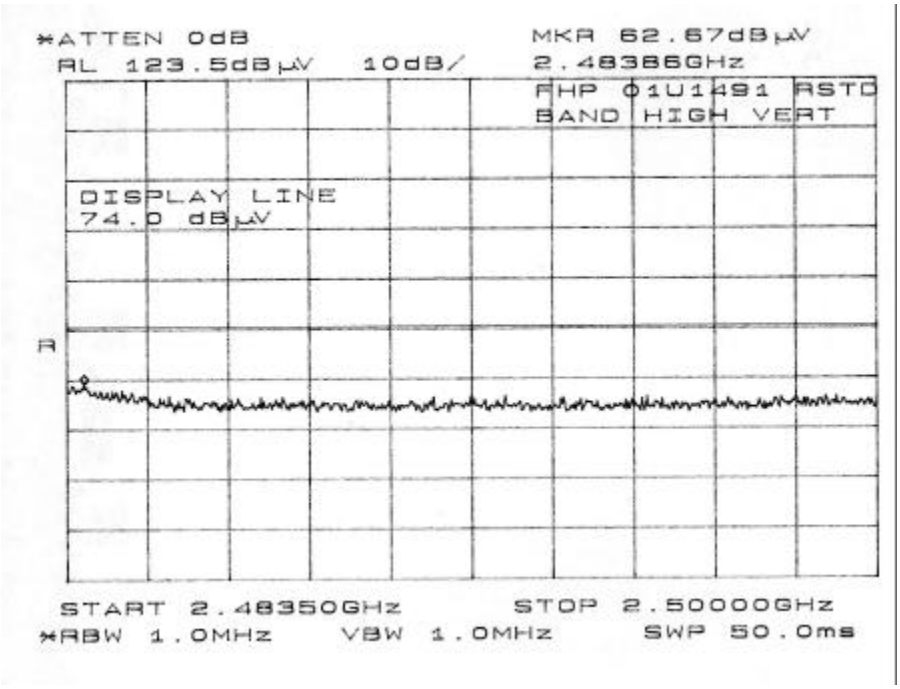
Note: All other readings were at system noise floor.

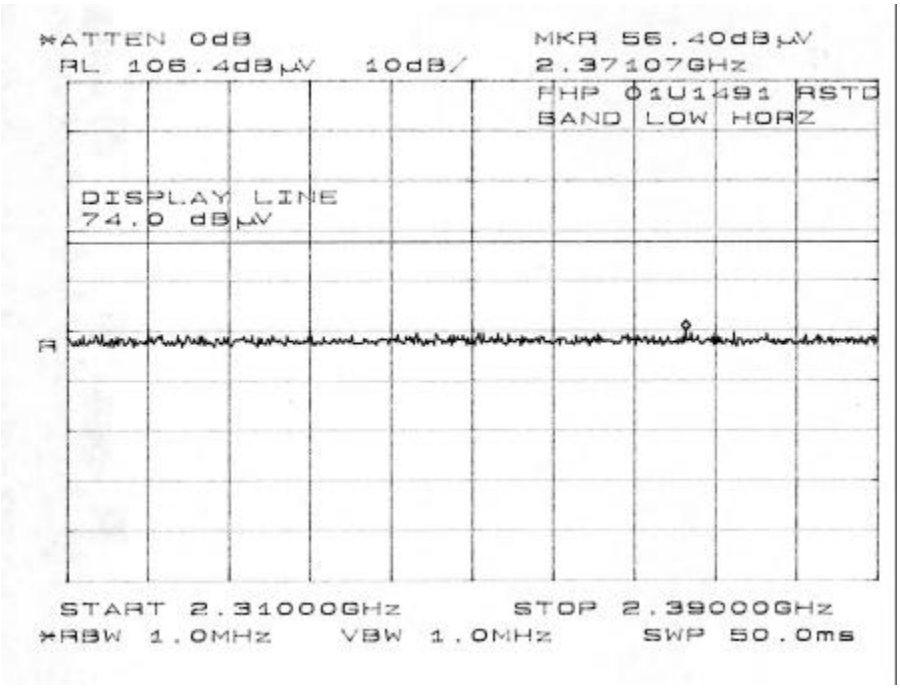
13.5 dBi YAGI ANTENNA - RESTRICTED BAND RADIATED EMISSIONS

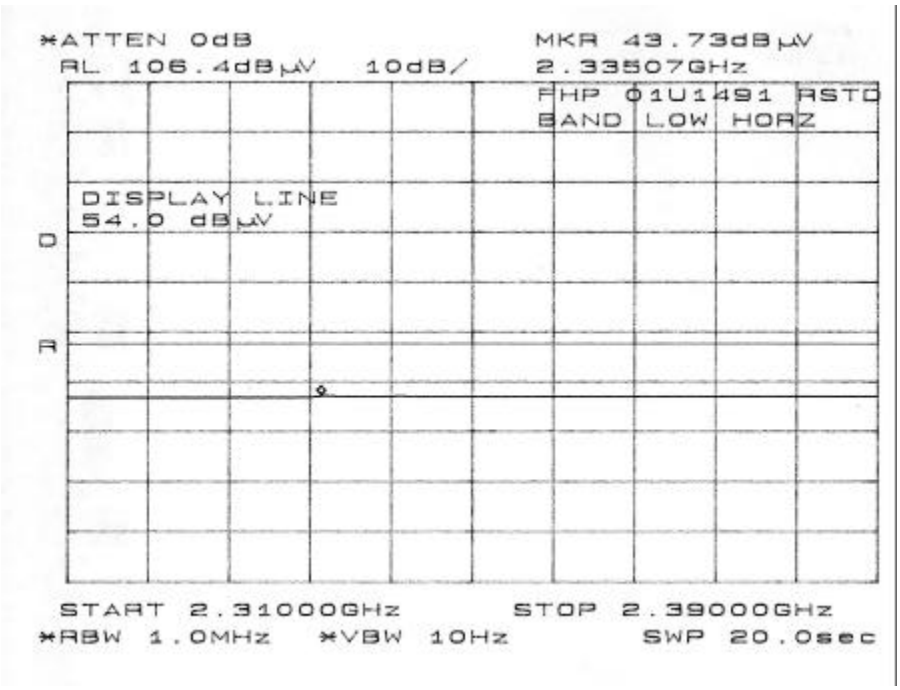


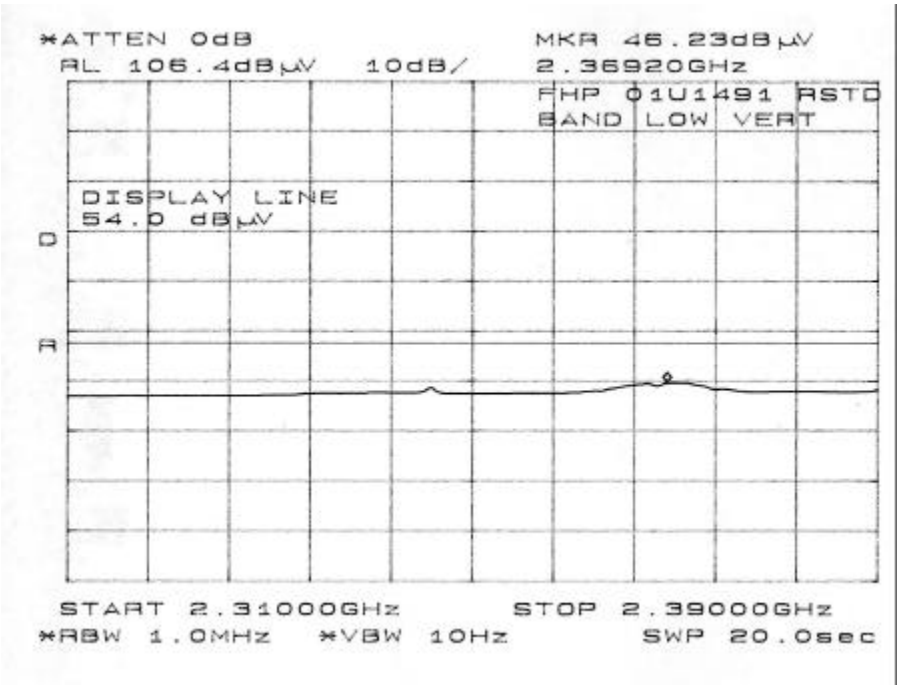


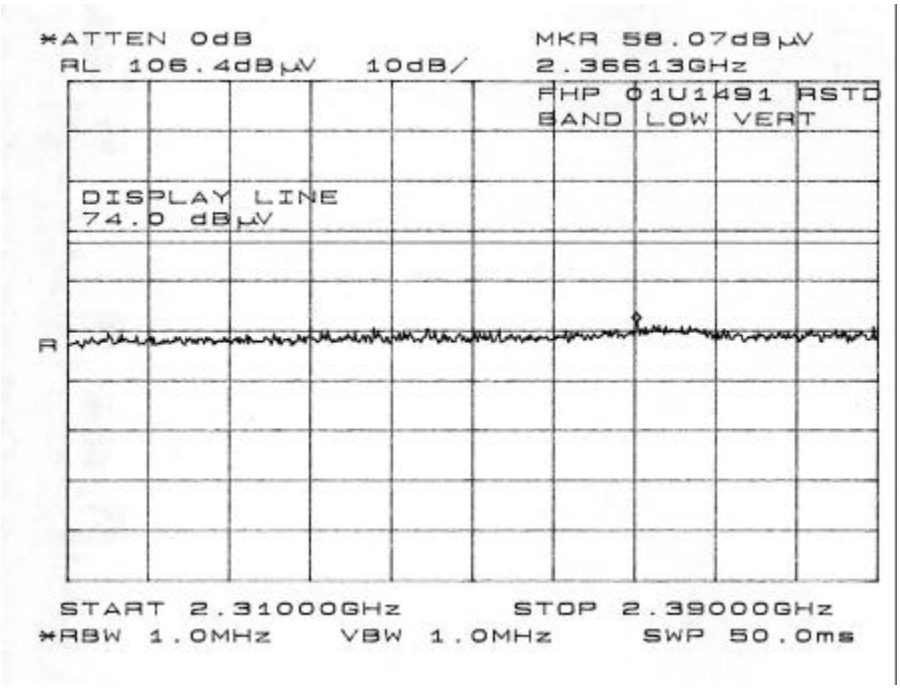












13.5 dBi YAGI ANTENNA - SPURIOUS RADIATED EMISSIONS

Compliance Certification Services A-Site 8/29/02 Mike H

Radiated Emissions FHP with 13.5 dBi Yagi Antenna, No Diversity

FCC 15.247 Mode: Transmitting

Specification Distance: 3 meters

Freq MHz	Pol V/H	Det	SA dBuV	AF dB/m	Dist m	Dist dB	Preamp dB	Cable / HPF dB	Field dBuV/m	Limit dBuV/m	Margin dB
4075.5	V	Peak	46.13	33.2	1.5	-6.0	34.8	10.1	48.61	74	-25.39
4075.5	V	Avg	39.07	33.2	1.5	-6.0	34.8	10.1	41.55	54	-12.45
4075.5	H	Peak	42.73	33.2	1.5	-6.0	34.8	10.1	45.21	74	-28.79
4075.5	H	Avg	30.07	33.2	1.5	-6.0	34.8	10.1	32.55	54	-21.45
4824	V	Peak	42.7	33.9	1.5	-6.0	34.5	7	43.08	74	-30.92
4824	V	Avg	32.23	33.9	1.5	-6.0	34.5	7	32.61	54	-21.39
7236	V	Peak	46	36.9	1.5	-6.0	34.5	7.8	50.18	74	-23.82
7236	V	Avg	37	36.9	1.5	-6.0	34.5	7.8	41.18	54	-12.82
7236	H	Peak	45	36.9	1.5	-6.0	34.5	7.8	49.18	74	-24.82
7236	H	Avg	35.5	36.9	1.5	-6.0	34.5	7.8	39.68	54	-14.32
4125.5	V	Peak	47.03	33.2	1.5	-6.0	34.8	10.1	49.51	74	-24.49
4125.5	V	Avg	42.7	33.2	1.5	-6.0	34.8	10.1	45.18	54	-8.82
4125.5	H	Peak	42.27	33.2	1.5	-6.0	34.8	10.1	44.75	74	-29.25
4125.5	H	Avg	30.2	33.2	1.5	-6.0	34.8	10.1	32.68	54	-21.32
4874	V	Peak	42.67	34	1.5	-6.0	34.5	6.4	42.55	74	-31.45
4874	V	Avg	31.83	34	1.5	-6.0	34.5	6.4	31.71	54	-22.29
7311	V	Peak	44.5	37.1	1.5	-6.0	34.6	7.8	48.78	74	-25.22
7311	V	Avg	35.8	37.1	1.5	-6.0	34.6	7.8	40.08	54	-13.92
7311	H	Peak	43.7	37.1	1.5	-6.0	34.6	7.8	47.98	74	-26.02
7311	H	Avg	32.8	37.1	1.5	-6.0	34.6	7.8	37.08	54	-16.92
4175.5	V	Peak	41.3	33.2	1.5	-6.0	34.8	10.1	43.78	74	-30.22
4175.5	V	Avg	28.8	33.2	1.5	-6.0	34.8	10.1	31.28	54	-22.72
4175.5	H	Peak	41.07	33.2	1.5	-6.0	34.8	10.1	43.55	74	-30.45
4175.5	H	Avg	28.87	33.2	1.5	-6.0	34.8	10.1	31.35	54	-22.65
4924	V	Peak	42.2	34.2	1.5	-6.0	34.5	6.3	42.18	74	-31.82
4924	V	Avg	30.87	34.2	1.5	-6.0	34.5	6.3	30.85	54	-23.15
7386	V	Peak	43.5	37.3	1.5	-6.0	34.5	7.8	48.08	74	-25.92
7386	V	Avg	35.17	37.3	1.5	-6.0	34.5	7.8	39.75	54	-14.25
7386	H	Peak	42.8	37.3	1.5	-6.0	34.5	7.8	47.38	74	-26.62
7386	H	Avg	31.2	37.3	1.5	-6.0	34.5	7.8	35.78	54	-18.22

Note: All other readings were at system noise floor.

12 dBi PATCH ANTENNA - RESTRICTED BAND RADIATED EMISSIONS