



**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**FCC ID: IMK-HRFCF1**

**COMPACT FLASH WLAN ADAPTER**

**MODEL NO: PROXIM 7630/6630**

**REPORT NO: 01U0717-1**

**TEST DATE: MARCH 12, 2001**

*Prepared for*  
**PROXIM, INC.**  
**510 DEGUIGNE DRIVE**  
**SUNNYVALE, CA 94086, U.S.A.**

*Prepared by*  
**COMPLIANCE ENGINEERING SERVICES, INC.**  
**561F MONTEREY ROAD,**  
**MORGAN HILL, CA 95037, USA**  
**TEL: (408) 463-0885**

**NVLAQ<sup>®</sup>**  
**LAB CODE:200065-0**

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561 F. Monterey, Rd. Route 2 Morgan Hill, CA. TEL: (408)463-0885 FAX:(408)463-0888

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**1. VERIFICATION OF COMPLIANCE**

COMPANY NAME: PROXIM, INC.  
510 DEGUIGNE DRIVE  
SUNNYVALE, CA 94086

TELEPHONE NO : (408) 731-2700

TECHNICAL PERSON: PETE GARCIA/SENIOR RF TECHNICIAN/(408) 731-2762  
INFORMATIN CONTACT: KEITH GLOVER/VP OF FINANCE/(408) 731-2706

EUT DESCRIPTION : COMPACT FLASH WLAN ADAPTER

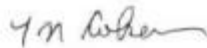
MODEL NAME : PROXIM 7630/6630

DATE TESTED : March 12, 2001

**LIMITS APPLY TO: FCC PART 15 SECTION 15.247**

TECHNICAL LIMITS	TEST RESULT
Radiated Emission/15.205 & 15.209	Complies
Radiated Emission/15.109	Complies
AC Line Conducted Emission	Complies
Minimum 20dB Bandwidth	Complies
RF Power Output	Complies
Minimum Number of Hopping Channels	Complies
Channel Separation	Complies
Average Time of Channel Occupancy	Complies

Compliance Engineering Services, Inc. tested the above equipment for compliance with the requirements set forth in CFR 47 PART 15, SUBPART C. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.



THOMAS N. COKENIAS/ EMC DIRECTOR  
COMPLIANCE CERTIFICATION SERVICES, INC.

3/28/01

DATE

**Warning:** 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 revision section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

## 2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

The Harmony 7630 Open Air Compact Flash™ card is a frequency hopping spread spectrum “HFSS” wireless LAN adapter operating in the 2400-2483.5MHz band with a nominal TX output power of 100mW. It is an enclosed circuit board assembly with a 50-pin data/power connector and a coaxial antenna connector.

## 3. ANTENNA CONNECTION

The PROXIM WIRELESS LAN ADAPTER is marketed with two specific antennas. Model "PROXIM 7630/6630" is normally shipped with a 0 dBi snap-on antenna. An optional 1 dBi dipole antenna is also offered. Please refer to ATTACHMENT#7: ANTENNA REQUIREMENT.

To comply with 15.203, this product has an MMCX antenna connector to provide a unique coupling to the intentional radiator. The Manufacturer's control drawing is in Attachment 7.

## 4. PSEUDORANDOM HOPPING SEQUENCE

Please refer to ATTACHMENT#8: **CONFIDENTIALITY PACKAGE.**

## 5. CHANNEL USAGE (EQUAL HOPPING FREQUENCY)

Please refer to ATTACHMENT#8: **CONFIDENTIALITY PACKAGE.**

## 6. THEORY OF OPERATION

Please refer to ATTACHMENT#8: **CONFIDENTIALITY PACKAGE.**

## 7. THE COORDINATION OF FREQUENCY HOPPING SYSTEM

Please refer to ATTACHMENT#8: **CONFIDENTIALITY PACKAGE.**

## 8. RECEIVER TECHNICAL INFORMATION

To describe system receiver input bandwidth and system receiver hopping capability  
Please refer to ATTACHMENT#5: **EUT TECHNICAL DESCRIPTION** exhibit.

## 9. TEST LOCATION

All emissions tests were performed at:

Compliance Consulting Services

561F Monterey Road  
Morgan Hill, CA 95087  
Contact Person: Steve Cheng/Senior EMC Engineer.

CCS has site descriptions on file with the FCC for 10 and 3 meter site configurations. CCS is a NVLAP accredited facility.

Radiated emissions from the digital portion of the EUT were performed on site A, one of the 10-meter sites.

**10. SUPPORT EQUIPMENT**

DEVICE TYPE	MANUFACTURER	MODEL NAME	SERIAL NO	FCC ID
LAPTOP PC	Dell Computer	LATITUDED	00066901-12800-843-0154	DOC
DC ADAPTER	Dell Computer	PA-2	12851-83R-5312	DOC

**TEST EQUIPMENT**

EQUIPMENT TYPE	MODEL NAME	SERIAL NO	CAL DUE:
SPECTRUM ANALYZER	HP8566B	3014A06685	6/16/01
SPECTRUM ANALYZER	HP8593EM	3710A00205	5/25/01
PRE-AMP	HP8449B 1-26.5G	3008A00369	04/12/01
PRE-AMP	MITEQ 1-26G	646456	
BILOG ANTENNA	SCHAFFNER- CHASE 30M-2G	CBL6112B	12/11/01
EMOC HORN ANTENNA	3115 1-18G	9001-2238	1/9/02
ARA HORN ANTENNA	MWH-1826 18-26G	1013	26/07/02
High Pass Filter	FYS Microwave		N/A
Band Pass Filter	NBP-1011	102	N/A

## 11. TEST PROCEDURES AND TEST RESULTS

### ***Radiated Emissions (General Requirements)***

Test Requirement: 15.205

#### **Measurement Equipment Used:**

HP 8593EM Spectrum Analyzer

HP8449B PRE-AMPLIFIER 1 –26.5 GHz

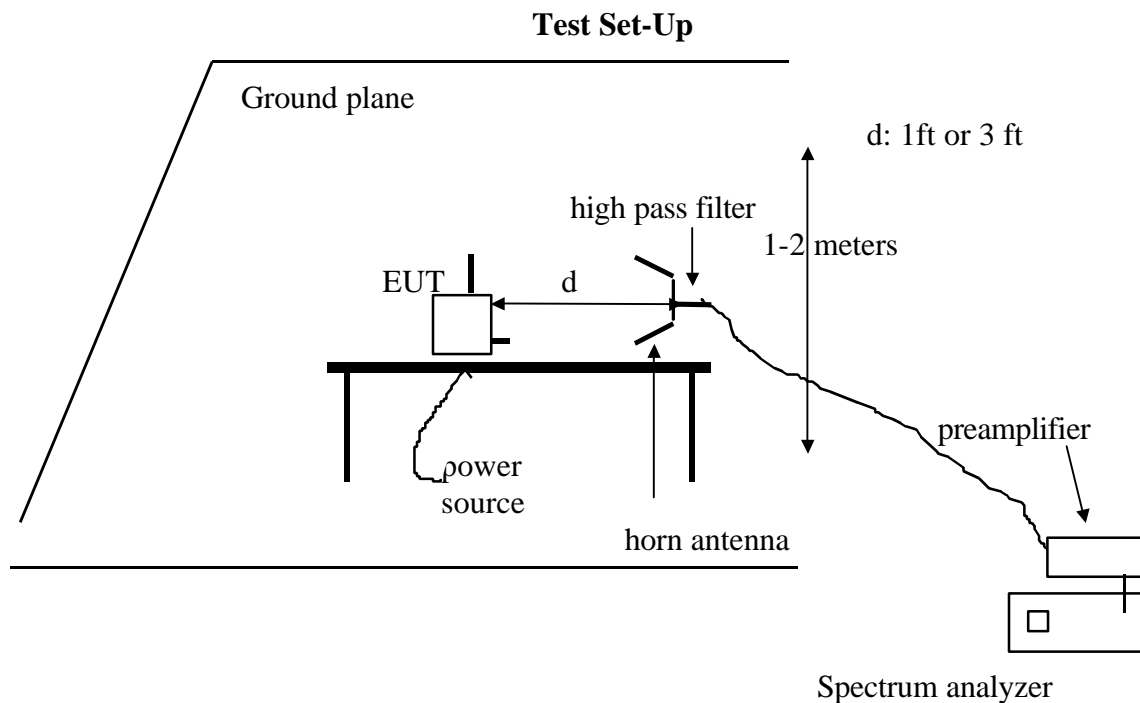
EMCO 3115 Horn Antenna, 1-18 GHz

ARA MWH1826/B Antenna, 18-26 GHz

FLEXCO Cables, 14ft (loss: 0.85 dB/ft@ 26 GHz)

FYS Microwave: High Pass Filter 4.305 GHz

NBP-1011: Band Pass Filter 4-8 GHz



#### **Test Procedures**

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 ft and 1 ft from the EUT. Measurement distance is chosen so that the noise floor of the measurement system is at least 6dB below the specification limits. The EUT frequency hopping sequence disabled and set the EUT to transmit at its lowest channel first.



2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.209.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.
4. Steps 1 to 3 were repeated for the middle and high channel

**Test Results:**

Refer to attached spreadsheets.

**PROXIM RADIATED EMISSION WITH 0dB GAIN ANT (data taken at 1m)**

Frequency	SA Peak Reading (dBuV)	SA Ave Reading (dBuV)		cable loss (dB)	Filter Loss (dB)	Antenna Factor (dB)	Amp Gain (dB)	Distance Factor (dB)	Corrected 3m PK reading (dBuV)	Corrected 3m AV reading (dBuV)	Peak limit (dBuV)	Average limit (dBuV)	Peak Margin (dB)	Average Margin (dB)
<b>Low Channel ( 2402 MHz )</b>														
4804	41.71	34.8		4.314	0.4	33.412	31.25	9.54	39.046	31.938	73.98	53.98	-34.934	-22.044
7206	46.15	34.83		5.322	1	37.265	31.25	9.54	48.947	37.627	73.98	53.98	-25.033	-16.353
9608	50.4	38.93		6.275	1	38.1	31.25	9.54	54.985	43.515	73.98	53.98	-18.995	-10.465
12010	46.13	34.51	NF	7.004	1	39.49	31.25	9.54	52.834	41.214	73.98	53.98	-21.148	-12.768
14412	49.27	36.89	NF	8.042	1	41.212	31.25	9.54	58.734	46.354	73.98	53.98	-15.246	-7.626
<b>Middle Channel ( 2440 MHz )</b>														
4880	41.14	35.34		4.351	0.4	33.64	31.25	9.54	38.741	32.941	73.98	53.98	-35.239	-21.039
7320	47	34.07		5.362	1	37.356	31.25	9.54	49.928	36.988	73.98	53.98	-24.052	-16.982
9760	48	36.78		6.339	1	38.1	31.25	9.54	52.649	41.429	73.98	53.98	-21.331	-12.551
12200	45.9	34.09	NF	7.084	1	39.3	31.25	9.54	52.494	40.684	73.98	53.98	-21.486	-13.296
14640	48.91	37.09	NF	8.154	1	40.88	31.25	9.54	58.154	46.334	73.98	53.98	-15.826	-7.646
<b>High Channel ( 2480 MHz )</b>														
4960	41.75	38.37		4.39	0.4	33.88	31.25	9.54	39.63	36.25	73.98	53.98	-34.35	-17.73
7440	45.36	35.81		5.404	1	37.452	31.25	9.54	48.425	38.876	73.98	53.98	-25.554	-15.104
9920	48.08	36.32		6.406	1	38.1	31.25	9.54	52.796	41.036	73.98	53.98	-21.184	-12.944
12400	45.54	34.15	NF	7.188	1	39.1	31.25	9.54	52.018	40.628	73.98	53.98	-21.962	-13.352
14880	49.3	37.21	NF	8.271	1	40.16	31.25	9.54	57.941	45.851	73.98	53.98	-16.039	-8.129

NF: Measured noise floor

DISTANCE FACTOR: 1M to 3M measurement distance: -9.5dB  
Correction to extrapolate reading to 3m specification distance

\*\*\*INSTRUMENT USED\*\*\*

ANTENNA: EMCO, 3115, S/N:2238 & ARA, MWH-1826/B, S/N:1013

SPECTRUM ANALYZER: HP8593EM, S/N:3710A00205

PRE-AMP: MITEQ, NSP2600-44, S/N:846456

PRE-AMP: HP8449B, S/N:3008A00369

CL: Cable loss (15ft)

HPF: High pass filter insertion loss (4.6GHz) FSY (S/N: 001)

**ANALYZER SETTINGS**

	<u>Res bw</u>	<u>Avg. bw</u>
PEAK(PK):	1MHz	1MHz
AVERAGE(Avg):	1MHz	10Hz

CORRECTED FIELD STRENGTH = SA reading +Cable Loss+ Filter Loss +Ant Factor - Amp Gain - (1 to 3 m conversion factor)

LIMIT: 500 uV = 20 x log 500 = 53.98 dBuV

NOTE: MEASURED HORIZONTAL (H) AND VERTICAL (V) (worse case vertical)

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**PROXIM RADIATED EMISSION WITH 1dB GAIN ANT (data taken at 1m)**

Frequency	SA Peak Reading (dBuV)	SA Avg Reading (dBuV)		cable Loss (dB)	Filter Loss (dB)	Antenna Factor (dB)	Amp Gain (dB)	Distance Factor (dB)	Corrected 3m Pk reading (dBuV)	Corrected 3m Avg reading (dBuV)	Peak limit (dBuV)	Average limit (dBuV)	Peak Margin (dB)	Average Margin (dB)
<b>Low Channel ( 2402 MHz )</b>														
4804	51	44.91		4.314	0.4	33.412	31.25	9.54	48.336	42.246	73.98	53.98	-25.644	-11.734
7206	53.75	45.22		5.322	1	37.265	31.25	9.54	56.547	48.017	73.98	53.98	-17.433	-5.963
9608	50.23	38.43		6.275	1	38.1	31.25	9.54	54.815	43.015	73.98	53.98	-19.165	-10.965
12010	47.21	34.98	NF	7.004	1	39.49	31.25	9.54	53.914	41.684	73.98	53.98	-20.066	-12.296
14412	48.78	37.03	NF	8.042	1	41.212	31.25	9.54	58.244	46.494	73.98	53.98	-15.736	-7.486
<b>Middle Channel ( 2440 MHz )</b>														
4880	48.25	43.02		4.351	0.4	33.64	31.25	9.54	45.851	40.621	73.98	53.98	-28.129	-13.359
7320	51.93	44.01		5.362	1	37.356	31.25	9.54	54.858	46.938	73.98	53.98	-19.122	-7.042
9760	51.95	40.38		6.339	1	38.1	31.25	9.54	56.599	45.029	73.98	53.98	-17.381	-8.951
12200	45.87	35.38	NF	7.084	1	39.3	31.25	9.54	52.464	41.974	73.98	53.98	-21.516	-12.008
14640	49.3	37.24	NF	8.154	1	40.88	31.25	9.54	58.544	46.484	73.98	53.98	-15.436	-7.496
<b>High Channel ( 2480 MHz )</b>														
4960	48.24	42.49		4.39	0.4	33.88	31.25	9.54	46.12	40.37	73.98	53.98	-27.86	-13.61
7440	50.77	42.38		5.404	1	37.452	31.25	9.54	53.836	45.446	73.98	53.98	-20.144	-8.534
9920	53.1	44.36		6.406	1	38.1	31.25	9.54	57.816	49.076	73.98	53.98	-16.164	-4.904
12400	47.79	34.53	NF	7.168	1	39.1	31.25	9.54	54.268	41.008	73.98	53.98	-19.712	-12.972
14680	48.69	37.56	NF	8.271	1	40.16	31.25	9.54	57.331	46.201	73.98	53.98	-16.649	-7.779

NF: Measured noise floor

DISTANCE FACTOR: 1M to 3M measurement distance: -9.5dB

Correction to extrapolate reading to 3m specification distance

\*\*\*INSTRUMENT USED\*\*\*

ANTENNA: EMCO, 3115, S/N:2238 & ARA, MWH-1826/B, S/N:1013

SPECTRUM ANALYZER: HP8593EM, S/N:3710A00205

PRE-AMP: MITEQ, NSP2600-44, S/N:646456

PRE-AMP: HP8449B, S/N:3008A00369

CL: Cable loss (15ft)

HPF: High pass filter insertion loss (4.6GHz) FSJ (S/N: 001)

**ANALYZER SETTINGS**

	Res bw	Avg. bw
PEAK(Pk):	1MHz	1MHz
AVERAGE(Avg):	1MHz	10Hz

CORRECTED FIELD STRENGTH = SA reading +Cable Loss+ Filter Loss +Ant Factor - Amp Gain - (1 to 3 m conversion factor)

LIMIT: 500 uV = 20 x log 500 = 53.98 dBuV

NOTE: MEASURED HORIZONTAL (H) AND VERTICAL (V) (worse case vertical)

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## Radiated Emissions

Test Requirement: 15.209

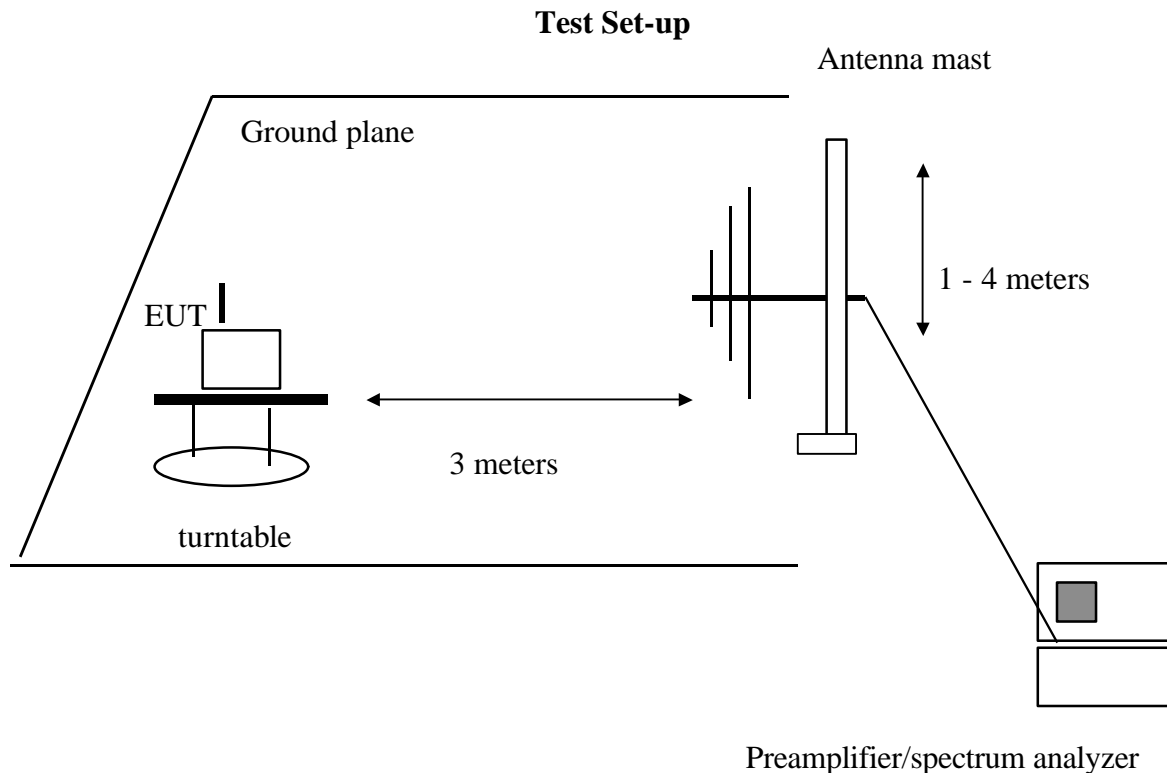
### Measurement Equipment Used:

HP 8566B Spectrum Analyzer

SCHAFFNER-CHASE BILOG Antenna, 30 - 2 GHz

EMCO 3146 Log Periodic Antenna, 200 - 1000 MHz

HP 8447D Amplifier



### TEST PROCEDURE:

The EUT was placed on a turntable at a distance of 3 meters from a BILOG search antenna. The unit was set to transmit while hopping normally. The antenna was raised and lowered, the EUT rotated on the turntable, until the EUT azimuth, antenna elevation, and antenna polarity were found which yielded maximum received emission levels on the spectrum analyzer.

### Test Result:

Refer to attached tabular data sheet.



FCC, VCCI, CISPR, CE, AUSTEL, NZ  
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001  
PHONE: (408) 463-0885 FAX: (408) 463-0888

**Project #:** 2/8/01  
**Report #:** 01u0717-1  
**Date & Time:** 03/08/01 11:05 AM  
**Test Engr:** Steve Cheng

**Company:** PROXIM, INC  
**EUT Description:** WIRELESS LAN ADAPTER 7630/6630  
**Test Configuration :** EUT/LAPTOP PC  
**Type of Test:** FCC CLASS B  
**Mode of Operation:** EUT CONTINUOUSLY SEND AND RECEIVE DATA

[<< Main Sheet](#)

Freq (MHz)	Reading (dBuV)	AF (dB)	Class (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
777.60	46.70	20.20	7.64	28.91	45.62	46.00	-0.38	3mV	180.00	1.00	P
33.57	48.20	19.36	1.34	29.51	39.39	40.00	-0.61	3mV	180.00	1.00	P
859.20	41.80	20.99	8.08	28.62	42.26	46.00	-3.74	3mV	0.00	1.00	P
1000.00	45.20	22.20	8.80	28.11	48.09	54.00	-5.19	3mV	0.00	1.00	P
197.79	54.10	9.74	3.25	28.94	38.16	43.50	-5.34	3mV	0.00	1.00	P
63.49	52.40	7.13	1.79	29.48	31.83	40.00	-8.17	3mV	0.00	1.00	P

6 Worst Data

COMPLETED SCAN FROM 30M TO 1000M FOR BOTH HORIZONTAL AND VERTICAL POLARIZATION

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## AC Line Conducted Emissions

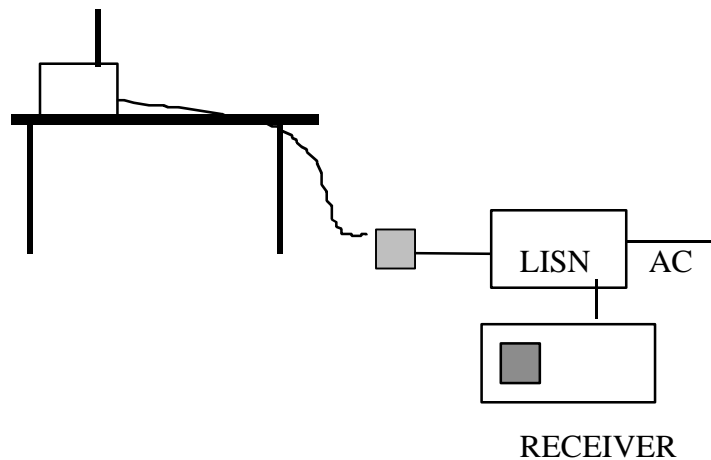
Test Requirement: 15.207

### Measurement Equipment Used:

Rhode & Schwarz EMI Receiver ESHS-20

Fischer Custom Communication LISN, FCC-LISN-50/250-25-2

### Test Set-up



### Test Procedure

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The unit was set to transmit while hopping normally.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

### Test Results

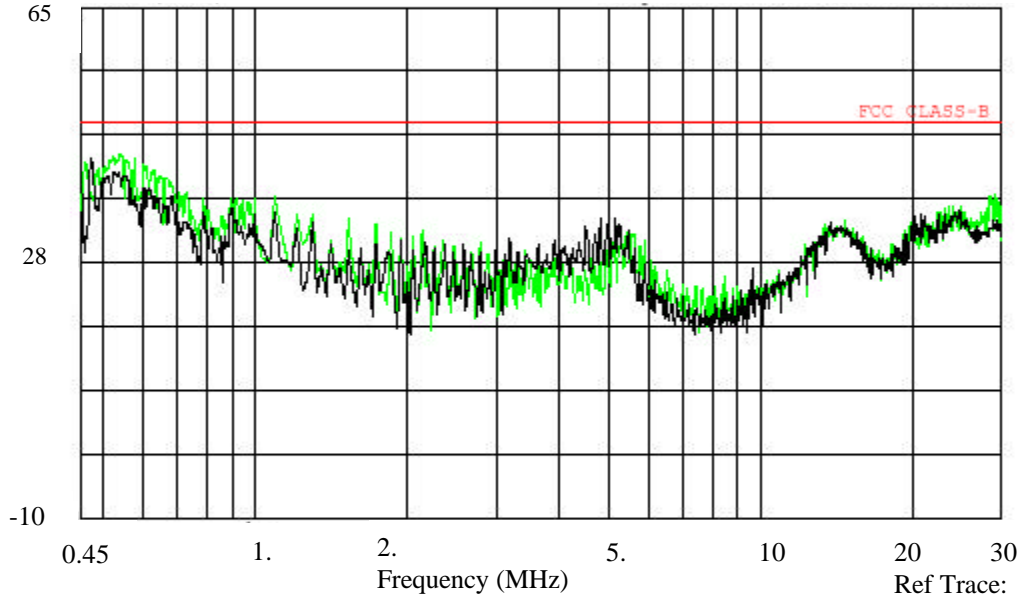
Refer to attached graph.

561F. Monterey Road, Route: 2  
 Morgan Hill, CA 95037-9001 USA  
 Tel: (408) 463-0885  
 Fax: (408) 463-0888



Data#: 7 File#: 01U0717 EMI  
 Level (dBuV)

Date : 03-07-2001 Time: 16:29:37  
 Compliance Certification Services



Trace: 3  
 Project No. :01U0717-1  
 Project No. :01U0717-1  
 Test Eng. :Steve Cheng  
 Company. :Proxim, Inc.  
 EUT description :Wireless LAN ADAPTER  
 Model :Proxim 7630/6630  
 EUT Config. :EUT/PC  
 Type of Test :FCC Class B  
 Mode of Operation :The unit was set to transmit while  
 :hopping normally.  
 :115Vac, 60Hz PEAK: L1(green) L2(black)

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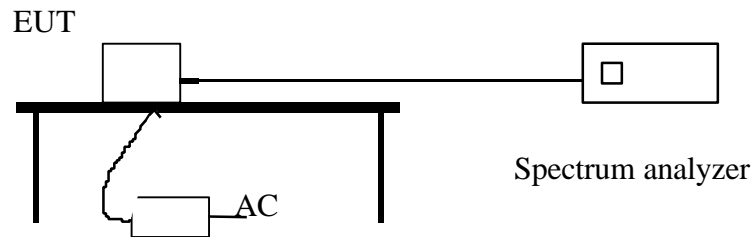
## Conducted Emission

Test Requirement: 15.247(c)

### Measurement Equipment Used:

HP 8593EM Spectrum Analyzer

### Test Set-up



### Test Procedure:

The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2 feet RG-316 cable. Total cable and adapter loss at 2.4-2.5 GHz was 1.5dB.

The EUT was configured on a test bench as shown above. The EUT was set to transmit while hopping normally. The spectrum analyzer was placed in MAX Hold mode, and individual sweeps were recorded with spectrum analyzer RES BW and VID BW set to 100KHz. The first plot shows spectrum analyzer START FREQUENCY set to 30 MHz and STOP FREQUENCY set to 2.68GHz. The second plot shows spectrum analyzer START FREQUENCY set to 2.68GHz and STOP FREQUENCY set to 25GHz. All emissions were compared to the 2-dB attenuation requirement.

### Test Result:

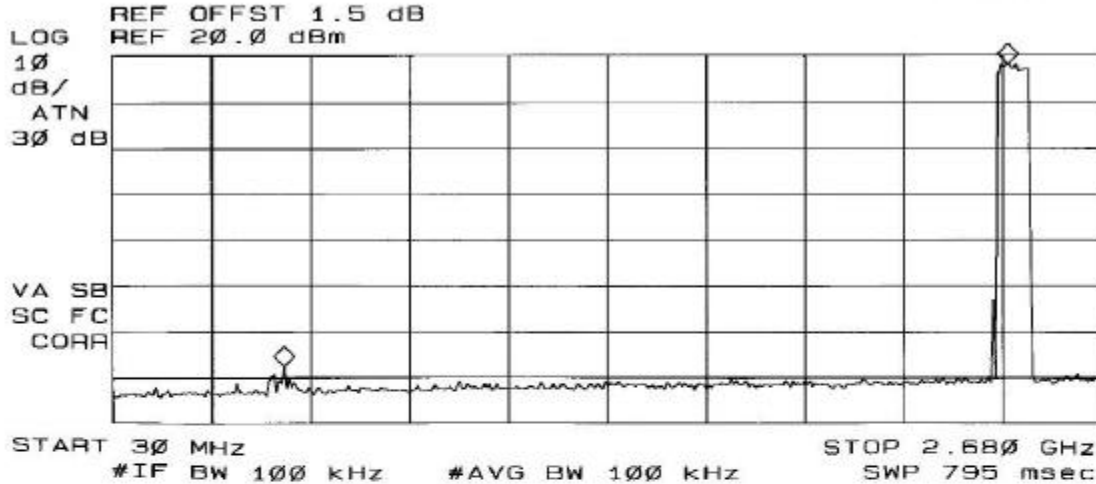
Please refer to attached plots.



16: 15: 40 MAR 07, 2001  
SPURIOUS RF CONDUCTED EMISSIONS

MARKER Δ  
1.941 GHz  
65.69 dB

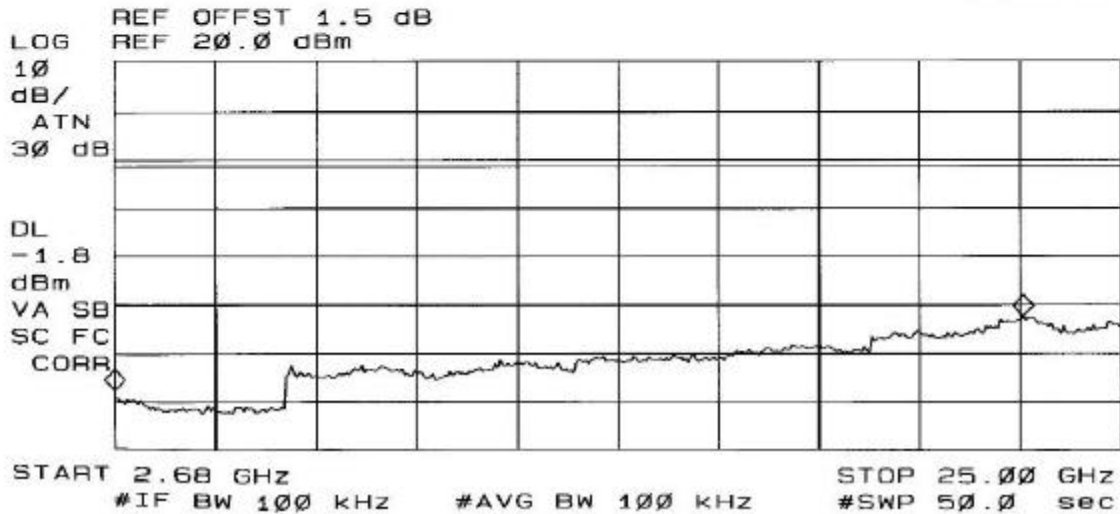
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 1.941 GHz  
65.69 dB



16: 27: 01 MAR 07, 2001  
SPURIOUS RF CONDUCTED EMISSION PEAK IS 18.2 dBm

DISPLAY LINE  
-1.8 dBm

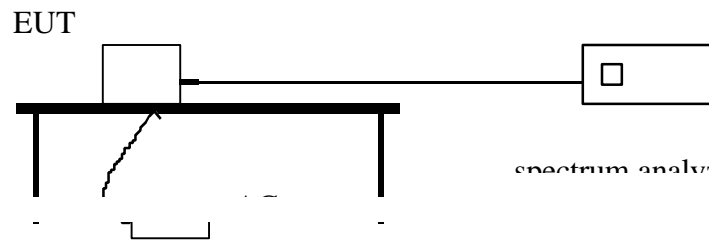
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 22.34 GHz  
15.11 dB



**BAND-EDGE**

Test Requirement: 15.247(c)

**Measurement Equipment Used:**  
HP 8593EM Spectrum Analyzer

**Test Set-up****Test Procedure:**

The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2 feet RG-316 cable. Total cable and adapter loss at 2.4-2.5 GHz was 1.5dB.

The EUT was configured on a test bench as shown above. The EUT was made to transmit uninterrupted random data on the low and high channel.

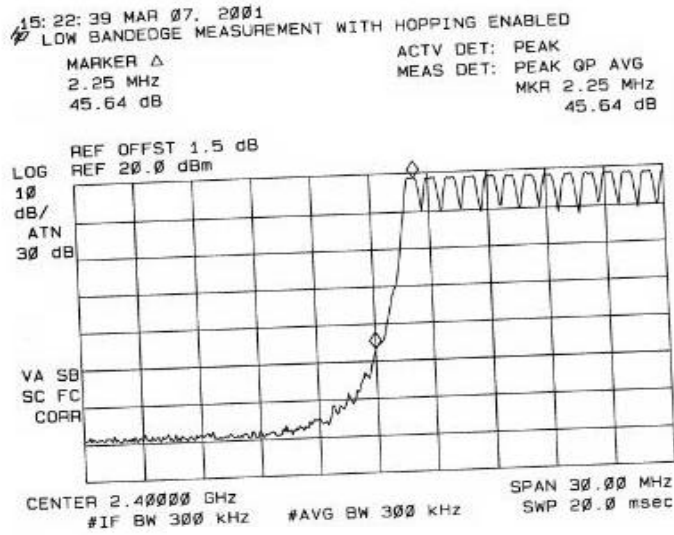
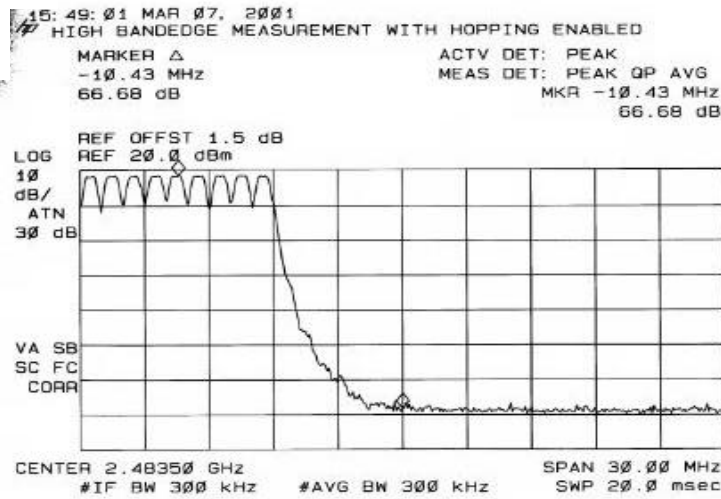
Spectrum analyzer CENTER FREQUENCY set to Low Channel (2402 MHz). SPAN set to 30MHz. RES BW and VIDEO BW both set to 300KHz. The spectrum analyzer was put into MAX HOLD mode. Using the delta marker function, the delta between the signal level at Low Channel and the signal level at 2400Mhz was determined.

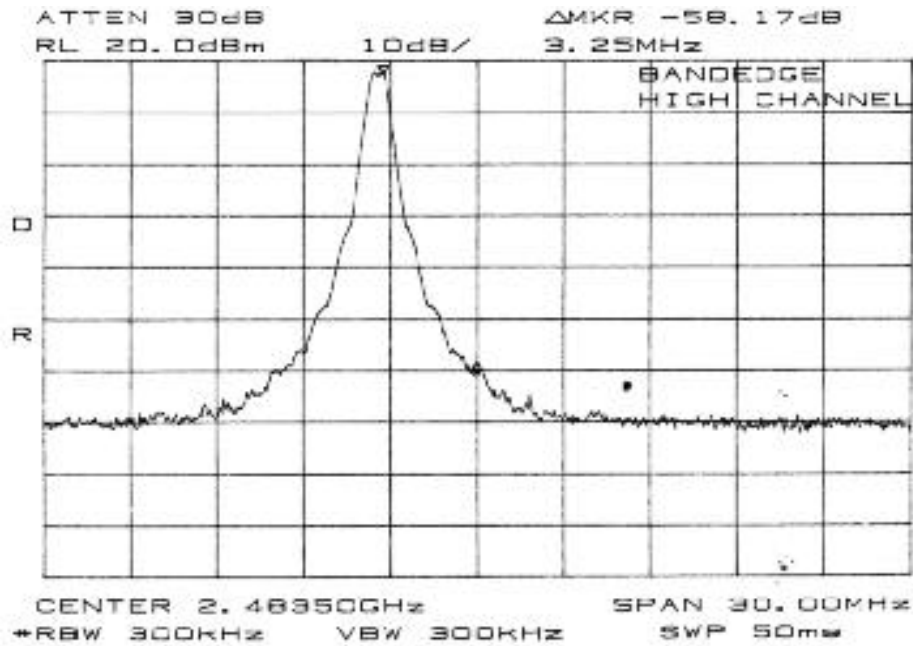
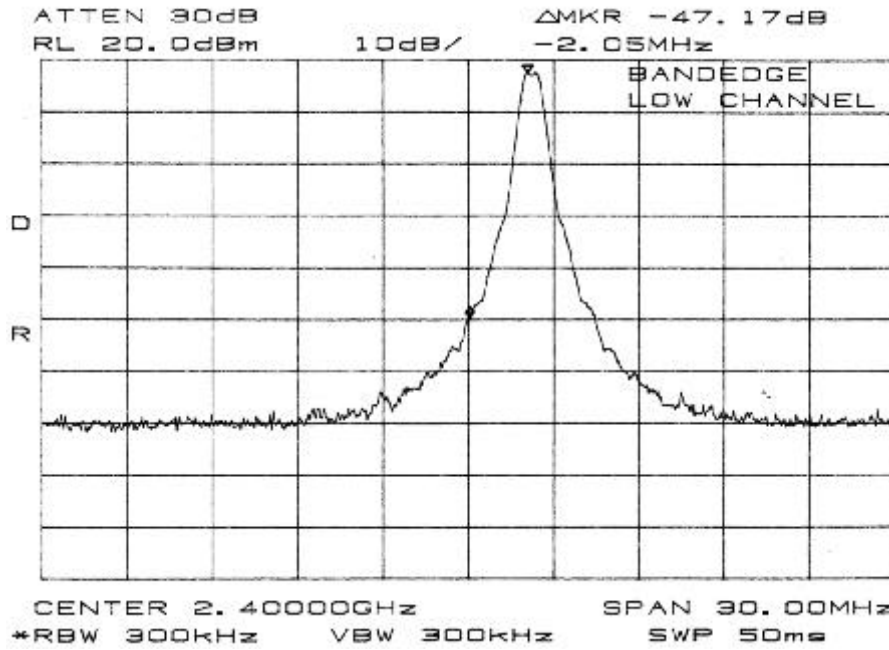
The above steps were repeated for HIGH Channel (2480 MHz) with delta markers set to High Channel (2480 MHz) and 2483.5 MHz.

To ensure that EUT will continue compliance with the Band-edge emission in normal hopping mode operation; the EUT was put back to the normal working condition (i.e. hopping mode enabled). And test repeated again.

**Test Result:**

Please refer to attached plots.





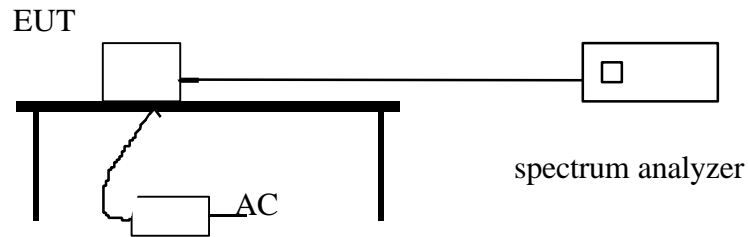
## 20dB Bandwidth for FHSS

Test Requirement: 15.247(a)1(i)(i-ii)

### Measurement Equipment Used:

HP 8593EM Spectrum Analyzer

### Test Set-up

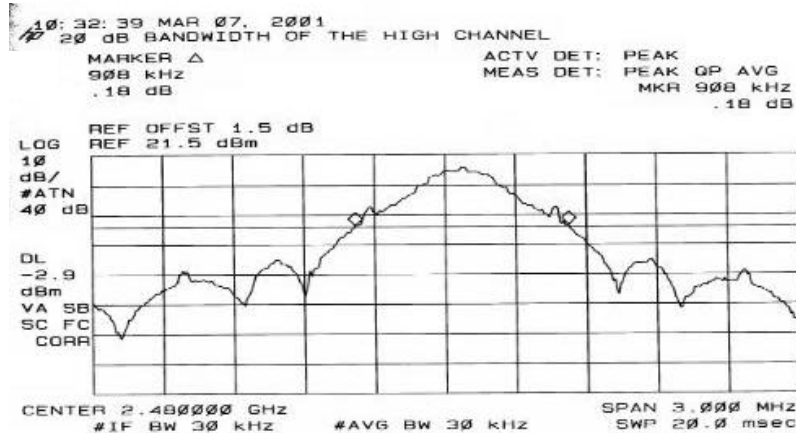
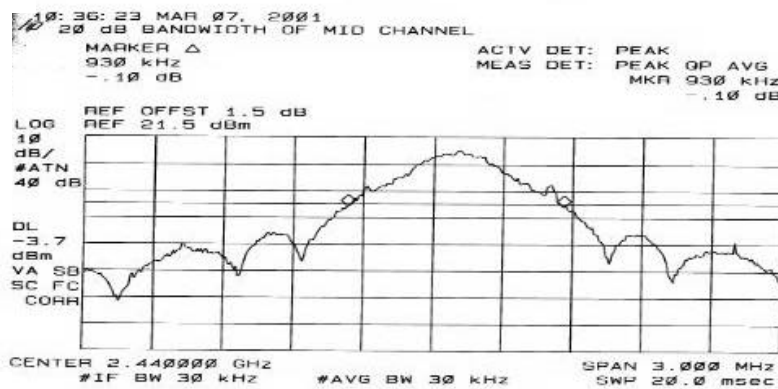
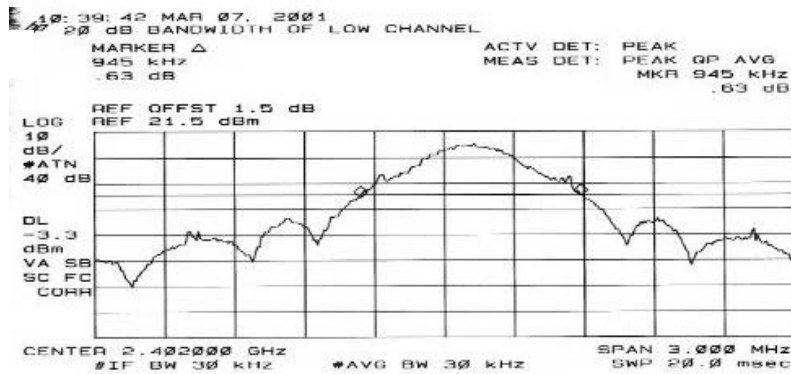


### Test Procedure:

The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2 feet R-316 cable. Total cable and adapter loss at 2.4-2.5 GHz was 1.5dB.

The EUT was configured on a test bench as shown above. The EUT was made to transmit uninterrupted random data on each of the low/mid/high channels. Spectrum analyzer CENTER FREQUENCY set to Low Channel (2402 MHz). SPAN set to 3 MHz. RES BW=30KHz. The above steps were repeated for MID Channel (2440 MHz) and HIGH Channel (2480 MHz).

**Test Results:** Refer to attached spectrum analyzer data chart and plots.

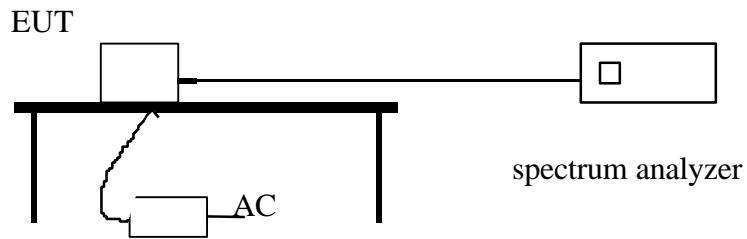


**RF Power Output**

Test Requirement: 15.247(b)

**Measurement Equipment Used:**  
 HP 8593EM Spectrum Analyzer

**Test Set-up**



**Test Procedure**

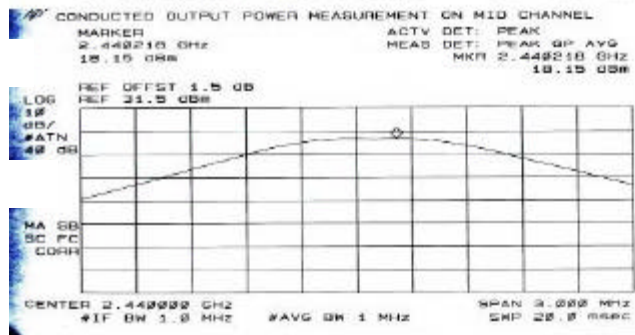
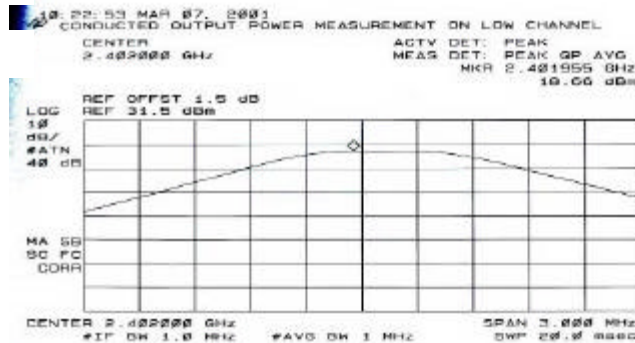
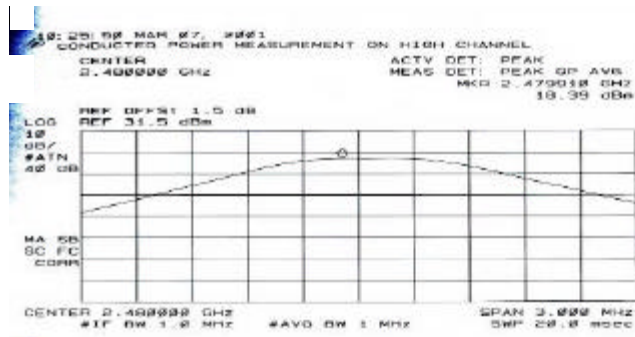
The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2feet RG-316 cable. Total cable and adapter loss at 2.4-2.5 GHZ was 1.5dB.

The EUT was configured on a test bench as shown above. The EUT was made to transmit uninterrupted random data on each of the low/mid/high channels. Spectrum analyzer CENTER FREQUENCY set to Low Channel (2402MHz). SPAN set to 3MHz. RES BW=1Mz and VID BW=1MHz. The above steps were repeated for MID Channel (2440 MHz) and High Channel (2480 MHz).

**Test Results:**

CHANNEL	dBm	Watts	LIMIT (W)	LIMIT (dBm)	RESULT
2402MHz	<b>18.66</b>	<b>0.074</b>	<b>1</b>	<b>30</b>	<b>COMPLIES</b>
2440MHz	<b>18.15</b>	<b>0.065</b>	<b>1</b>	<b>30</b>	<b>COMPLIES</b>
2480MHz	<b>18.39</b>	<b>0.069</b>	<b>1</b>	<b>30</b>	<b>COMPLIES</b>

Refer to attached spectrum plots.





**RF EXPOSURE REQUIREMENT**

Test Requirement: 15.247(b)(4)

**§ 1.1310 Radio frequency radiation exposure**

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

**Test result:**

TABLE 1 (B) LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

<u>F(MHz)</u>	<u>(POWER DENSITY (mW/cm<sup>2</sup>))</u>
1500 - 100,000	1

Transmitter Output power is **0.074 Watts** and will be used with a **1 dBi (1.26 numerically)** antenna

**Computation method:**

$$P = E^2 / 3770$$

$$\sqrt{E^2} = \sqrt{1 \text{ mW/cm}^2 * 3770}$$

$$E = 61.4 \text{ V/m}$$

$$E = \frac{\sqrt{30 * P * G}}{D}$$

$$D = \frac{\sqrt{30 * 0.074 * 1.26}}{61.4 \text{ V/m}}$$

$$D = 2.72 \text{ cm}$$

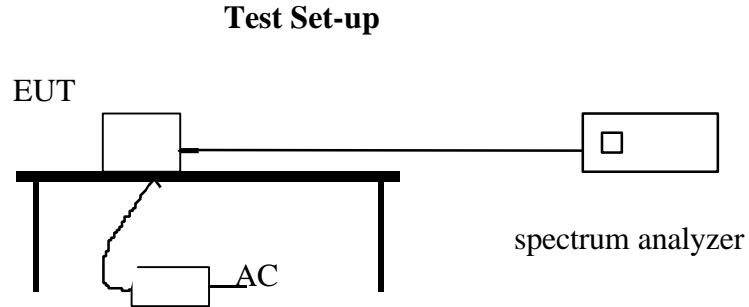
$$2.72 / 2.54 = 1.07 \text{ inch}$$

MPE distance requirement is 1.07 inch. A warning statement with a MPE distance requirement of 20cm is placed in the manual.

**Minimum Number of Hopping Channel**

Test Requirement: 15.247(a)1(ii)

**Measurement Equipment Used:**  
 HP 8593EM Spectrum Analyzer



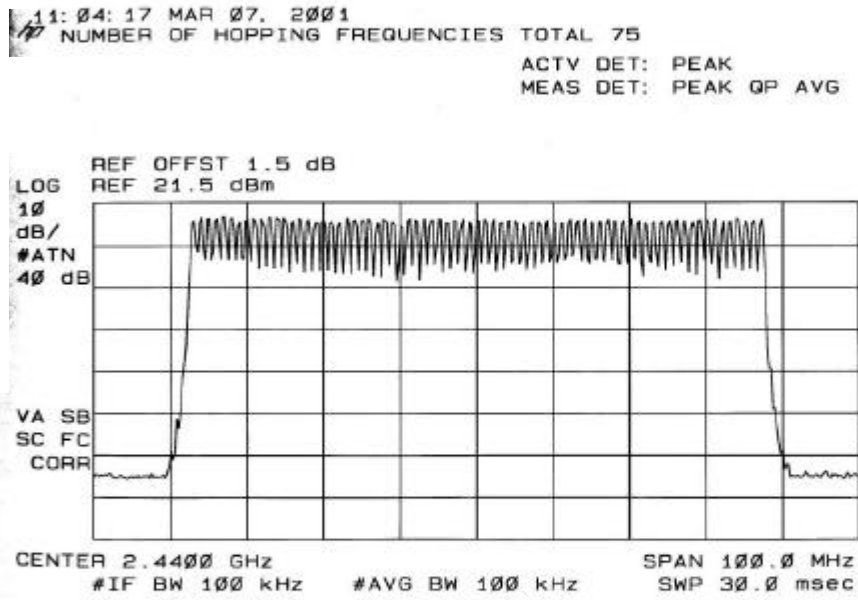
**Test Procedure:**

1. The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2 feet RF-316 cable. Total cable and adapter loss at 2.4-2.5 GHz was 1.5dB.
2. Turn on the transmitter in normal hopping mode. The emissions will “paint” the spectrum analyzer screen with individual traces from each transmit channel. Allow the transmitter to run for at least 3 minutes or until there are no more changes to the display.
3. Count the number of individual channel traces and compare to the design goal.

**Test Results:**

Frequency Range	Number of Hopping Channel
2.40000-2.48000GHz	<b>75</b>

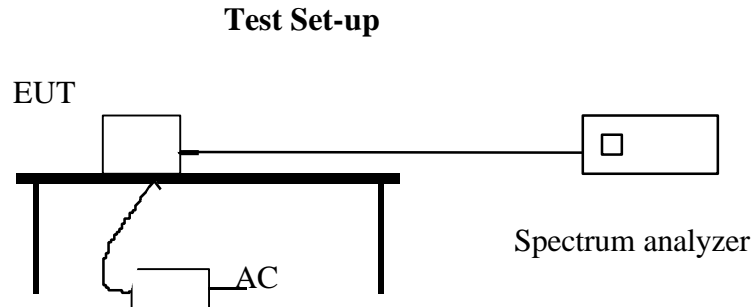
Please refer to attached spectrum plots.



## Hop Channel Separation

Test Requirement: 15.247(a)(i)

**Measurement Equipment Used:**  
HP 8593EM Spectrum Analyzer



### Test Procedure:

The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2feet RG-316cable. Total cable and adapter loss at 2.4-2.5 GHz was 1.5dB.

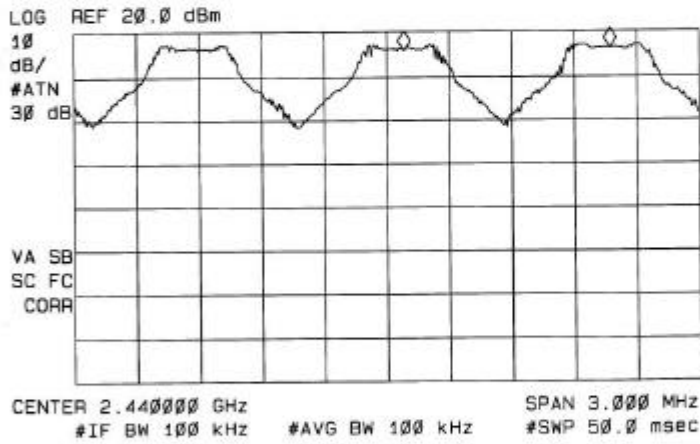
Turn on the transmitter in normal hopping mode. The emissions will “paint” the spectrum analyzer screen with individual traces from each transmit channel. Allow the transmitter to run for at least 3 minutes or until there are no more changes to the display. Move MARKER to the channel, which appears to have widest Channel separation and calculate the DELTA between two markers.

### Test Result:

Please refer to attached spectrum plot.

**Measured 990kHz > 25kHz (limit)**

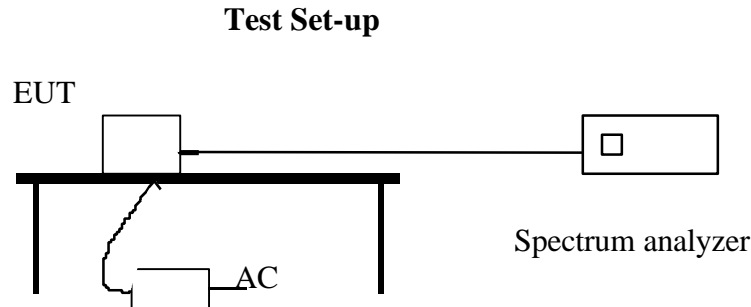
18: 10: 21 MAR 08, 2001  
CARRIER FREQUENCY SEPARATION  
MARKER Δ 990 kHz .46 dB  
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG MKR 990 kHz .46 dB



## Average Time of Channel Occupancy

Test Requirement: 15.247(a)1 (ii)

**Measurement Equipment Used:**  
HP 8593EM Spectrum Analyzer



### Test Procedure:

The RF output port of the EUT was attached to an MMCX to SMA adapter and connected to the spectrum analyzer through a 2-foot RG-316 cable. Total cable and adapter loss at 2.4-2.5 GHz was 1.5dB.

Set the transmitter to operate in its normal frequency-hopping mode.  
Set the spectrum analyzer Center Frequency at 2.440GHz. Set the Sweep Time to 30 seconds. Set Trace to Max Hold. Set the Amplitude function to Linear.

The maximum number of transmissions detected in any 30 Second periods determines the maximum time of channel occupancy.

The duration of each transmission is measured with RBW=VBW=300kHz. SPAN set to 0 Hz. SWP set to 50.0msec.

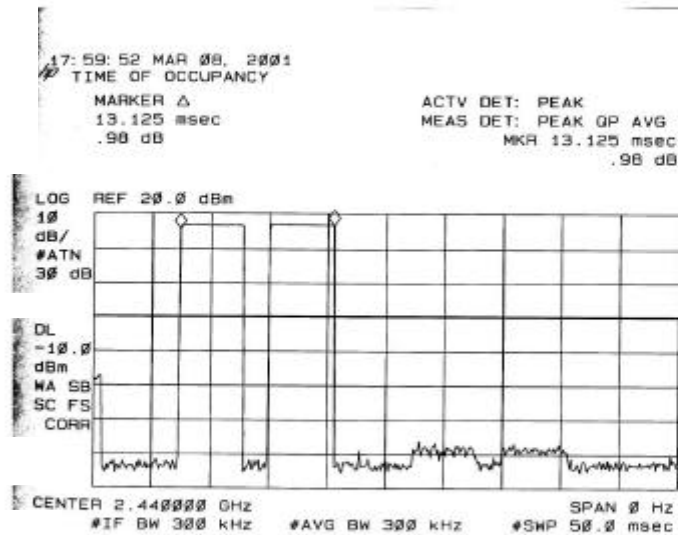
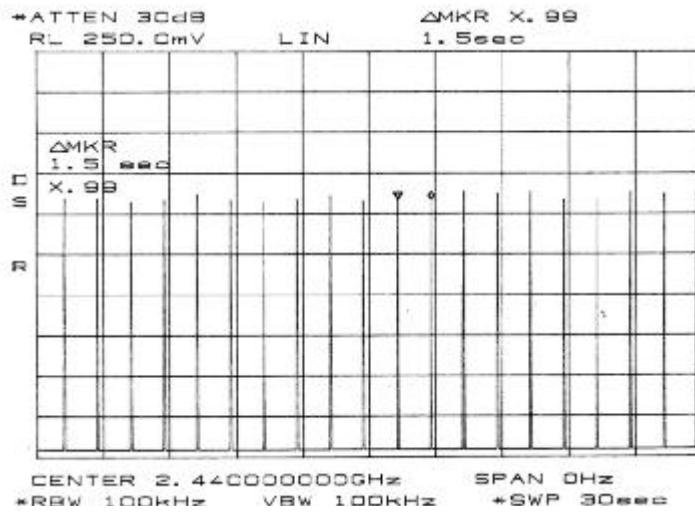
### Test Results:

Average time of single channel occupancy: 0.013125 seconds

Average number of times any individual channel is used within any 30 seconds: 20

$20 \times 0.013125 = 0.2625 \text{ second} < 0.4 \text{ second (limit)}$

Please refer to attached spectrum plots (two pages)



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## 12. ATTACHMENTS

**ATTACHMENT# 1: EUT PHOTOGRAPHS**

**ATTACHMENT# 2: PROPOSED FCC ID LABEL FORMAT**

**ATTACHMENT# 3: AGENT AUTHORIZATION LETTER**

**ATTACHMENT# 4: REQUEST FOR CONFIDENTIALITY LETTER**

**ATTACHMENT# 5: EUT TECHNICAL DESCRIPTION**

**ATTACHMENT# 6: USER'S GUIDE**

**ATTACHMENT# 7: ANTENNA REQUIREMENT**

**ATTACHMENT # 8: CONFIDENTIALITY PACKAGE**

**ATTACHMENT# 9: SET-UP PHOTOS**



## ATTACHMENT 1

### EUT PHOTOS

**ATTACHMENT 2**  
**PROPOSED FCC ID LABEL FORMAT**

**ATTACHMENT 3**  
**AGENT AUTHORIZATION LETTER**

**ATTACHMENT 4**  
**REQUEST FOR CONFIDENTIALITY LETTER**

## ATTACHMENT 5

### EUT TECHNICAL DESCRIPTON

## ATTACHMENT 6

### USER'S GUIDE

**ATTACHMENT 7**  
**ANTENNA REQUIREMENT**

**ATTACHMENT 8**

**CONFIDENTIALITY PACKAGE**

**CONFIDENTIALITY PACKAGE TO BE UP-LOADED SEPARATELY BY  
PROXIM AFTER RECEIPT OF CONFIRMATION NUMBER.**



## **ATTACHMENT 9**

### **SET-UP PHOTOS**