

**FCC CFR47 PART 15 CERTIFICATION**



**TEST REPORT**

**FOR**

**2.4GHz DIRECT SEQUENCE SPREAD SPECTRUM  
WIRELESS NETWORKING ACCESS POINT**

**MODEL: WNG-WAP-104**

**FCC ID: PO3WNGWAP104**

**REPORT NUMBER: 01U1031-1**

**ISSUE DATE: NOVEMBER 14, 2001**

*Prepared for*  
**GALTRONICS USA INC.**  
**4645 E. COTTON CENTER BLVD., BLDG 2**  
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**USA**

*Prepared by*  
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**NVLAP<sup>®</sup>**  
**LAB CODE:200065-0**

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### ATTACHMENTS

- EUT PHOTOGRAPHS
- PROPOSED FCC ID LABEL
- AGENT AUTHORIZATION LETTER
- ANTENNA SPECIFICATION
- THEORY OF OPERATION
- TECHNICAL DESCRIPTION
- USER'S MANUAL
- BLOCK DIAGRAM & SCHEMATIC DIAGRAM

## 1. TEST RESULT CERTIFICATION

**COMPANY NAME:**            **GALTRONICS USA INC.**  
                                      **4645 E. COTTON CENTER BLVD., BLDG 2**  
                                      **PHOENIX, AZ 85040 USA**

**CONTACT PERSON:**        **SCOTT R. MILLER / ANTENNA AND SYSTEM**  
                                      **DEVELOPMENT MANAGER**

**TELEPHONE NO:**            **602-659-3000**

**EUT DESCRIPTION:**        **2.4GHZ DIRECT SEQUENCE SPREAD SPECTRUM WIRELESS**  
                                      **NETWORKING ACCESS POINT**

**MODEL NAME:**             **WNG-WAP-104**

**DATE TESTED:**             **NOVEMBER 14, 2001**

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	2.4GHz TRANSCEIVER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.247

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 15.247. 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:

Tested By:

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STEVE CHENG  
EMC ENGINEERING MANAGER  
COMPLIANCE CERTIFICATION SERVICES

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JESSE SALDIVAR  
ASSOCIATE EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. EUT DESCRIPTION

The WNG-WAP-104 is a 2.4GHz Direct Sequence Spread Spectrum Wireless Networking Access Point, which supports IEEE 802.11b standard for wireless LAN and all major networking standards (including IP, IPX)

- Indoor Range approx. 35-100 meters
- Outdoor Range approx. 100-300 meters
- Frequency Range: 2.4-2.4835GHz DSSS
- US and Canada has 11 Channels

### EUT Printed Circuit Board Information

Board Name	Crystals/Clocks (MHz)
Main Board	44MHz, 16MHz

## 3. TEST METHODOLOGY

Both 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 and 2.1057.



## 4. TEST FACILITY

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.

## 5. ACCREDITATION AND LISTING

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))

## 5.1. Laboratory 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

## 6. 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.

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer	HP100Hz - 22GHz	8566B	2140A01296	5/4/02
Spectrum Display	HP	85662A	2152A03066	4/10/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01155	5/4/02
Pre-Amplifier, 25 dB	HP 0.1 - 1300MHz	8447D (P_1M)	2944A06833	11/21/01
Antenna, BiLog	Chase 30 - 2000MHz	CBL6112	2049	12/11/01
LISN	Fisher Cus. Comm.	LISN-50/250-25-2	2023	8/5/02
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	2/28/02
EMC Receiver (9K-26.5GHz)	HP	8593EM	3710A00205	6/20/02
Horn Antenna(1 - 18GHz)	EMCO	3115	2238	6/20/02
Horn Antenna,(18 - 26GHz)	Antenna Research Associate	MWH 1826/B	1013	7/26/02
Power Meter	HP	436A	2709A29209	2/8/02
High pass filter	ESM Microwave	HM 4570-9SS	3	N.C.R.

### 6.1. Measurement Uncertainty

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

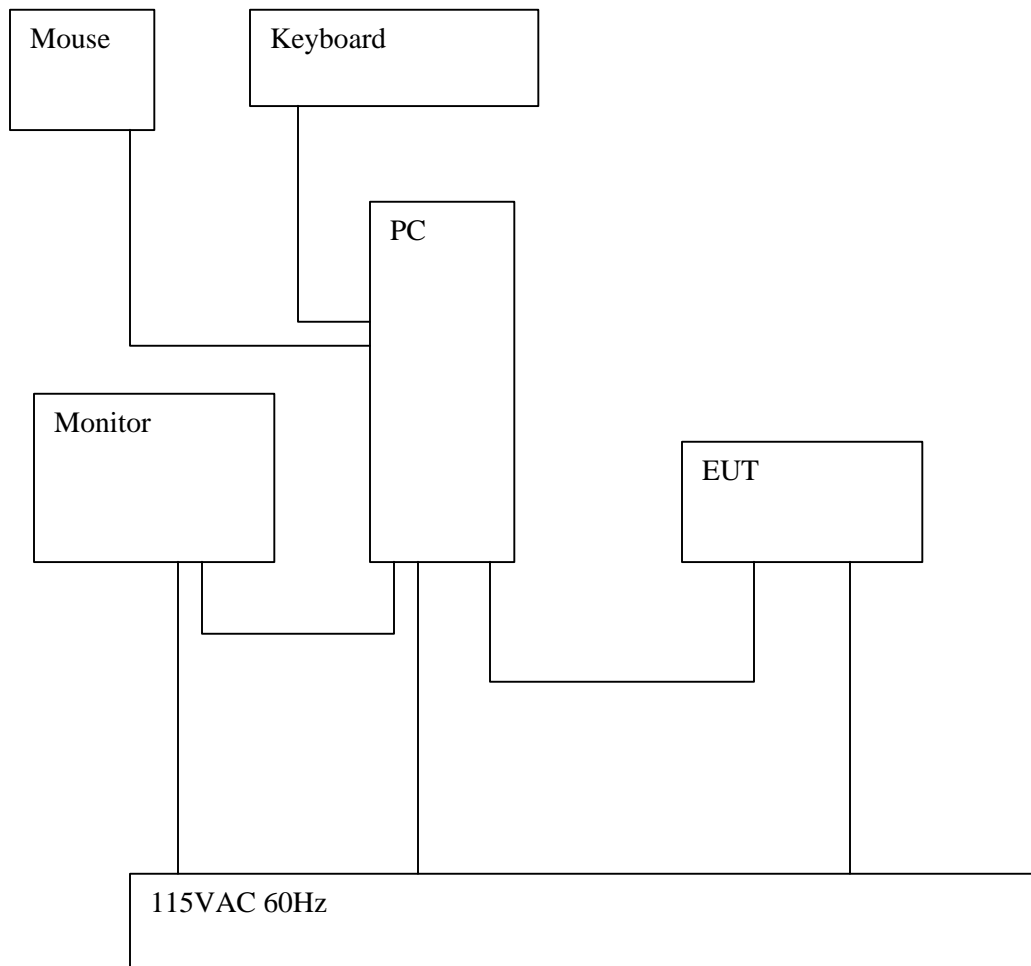
Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

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

## 7. SUPPORT EQUIPMENT / TEST DIAGRAM

### Support Equipment

### Test Diagram



**I/O Cables**

<b>TEST I / O CABLES</b>								
<b>Cable No</b>	<b>I/O Port</b>	<b># of I/O Port</b>	<b>Connector Type</b>	<b>Type of Cable</b>	<b>Cable Length</b>	<b>Data Traffic</b>	<b>Bundled</b>	<b>Remark</b>
1	AC	1	US 115V	Un-shielded	2m	No	No	N/A
2	AC	1	US 115V	Un-shielded	2m	No	No	N/A
3	AC	1	US 115V	Un-shielded	2m	No	No	N/A
4	Video	1	DB15	Shielded	2m	Yes	Yes	One Torroid on Each End
5	KB	1	PS/2	Shielded	2m	Yes	No	
6	Mouse	1	PS/2	Un-shielded	2m	Yes	No	
7	RJ45	1	RJ45	Un-shielded	2m	Yes	Yes	

## 8. APPLICABLE RULES AND BRIEF TEST RESULT

### **§15.247 (b) (1) - POWER OUTPUT**

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

(1) For frequency hopping systems operating in the 2400-2483.5 MHz or 5725-5850 MHz band, and all direct sequence systems: 1 watt.

*Spec limit: As specified above, 1W maximum.*

*Test result: No non-compliance noted.*

<i>Channel</i>	<i>Frequency (MHz)</i>	<i>Output Power(watts)</i>
<i>1</i>	<i>2412.0</i>	<i>.117</i>
<i>6</i>	<i>2437.3</i>	<i>.097</i>
<i>11</i>	<i>2461.68</i>	<i>.093</i>

### **§15.247 (a) (2)- BANDWIDTH LIMITATION**

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

*Spec limit: > 500 kHz.*

*Test result: No non-compliance noted.*

<i>Channel</i>	<i>Frequency (MHz)</i>	<i>Bandwidth(MHz)</i>
<i>1</i>	<i>2412.0</i>	<i>12.94</i>
<i>6</i>	<i>2437.3</i>	<i>11.13</i>
<i>11</i>	<i>2461.68</i>	<i>11.50</i>

**§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.

*Spec limit: < 8dBm.*

*Test result: No non-compliance noted.*

**Main unit**

<i>Channel</i>	<i>Frequency (MHz)</i>	<i>Results (dBm)</i>
<i>1</i>	<i>2411.8</i>	<i>-8.5</i>
<i>6</i>	<i>2437.03</i>	<i>-9.4</i>
<i>11</i>	<i>2461.46</i>	<i>-10.1</i>

**§15.247- PROCESS GAIN**

(e) The processing gain of a direct sequence system shall be at least 10 dB. The processing gain represents the improvement to the received signal-to-noise ratio, after filtering to the information bandwidth, from the spreading/despreading function.

*Spec limit: >10dBm.*

*Test result: No non-compliance noted.*

### **§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
<sup>1</sup> 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	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> 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.

***Spec limit: As specified above,.***

***Test result: No non-compliance noted. See section 9.7 Radiated Emission.***

## **§90.209- RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS**

(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 (micro volts/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.

### **FCC PART 15 CLASS A**

MEASURING DISTANCE OF 10 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	90	39.1
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

### **FCC PART 15 CLASS B**

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

***Spec limit: As specified above.***

***Test result: No non-compliance noted.***

### **§15.207- CONDUCTED LIMITS**

(a) For an intentional radiator which 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 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

#### **FCC CLASS A**

<b>FREQUENCY RANGE</b>	<b>FIELD STRENGTH (Microvolts)</b>	<b>FIELD STRENGTH (dBuV)/QP</b>
450kHz-1.705MHz	1000	60
1.705MHz - 30MHz	3000	69.54

#### **FCC CLASS B**

<b>FREQUENCY RANGE</b>	<b>FIELD STRENGTH (Microvolts)</b>	<b>FIELD STRENGTH (dBuV)/QP</b>
450kHz-30MHz	250	48

***Spec limit: As specified above.***

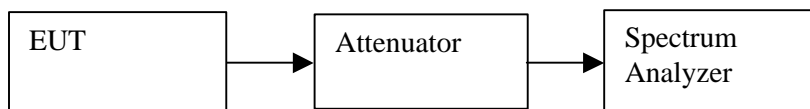
***Test result: No non-compliance noted. No radiated emissions were detected other than the fundamental frequency and harmonics. Line conducted emissions comply.***

## 9. TEST SETUP, PROCEDURE AND RESULT

### 9.1. CONDUCTED POWER

#### 9.1.1. Spectrum Analyzer Measurement

##### TEST SETUP



Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	<input checked="" type="checkbox"/> Peak	<input checked="" type="checkbox"/> 3 MHz	<input checked="" type="checkbox"/> 3 MHz

##### TEST PROCEDURE

The EUT is configured on a test bench as shown above in a continuously transmitting / receiving mode. While the transceiver started, the analyzer MAX HOLD function is used to capture the emissions and a plot is made with the marker at the peak emission. The max hold number is added to the 6 dB Bandwidth correction factor.

Formula = reading + 10 log (6dB bandwidth / resolution bandwidth)

##### **Base Unit**

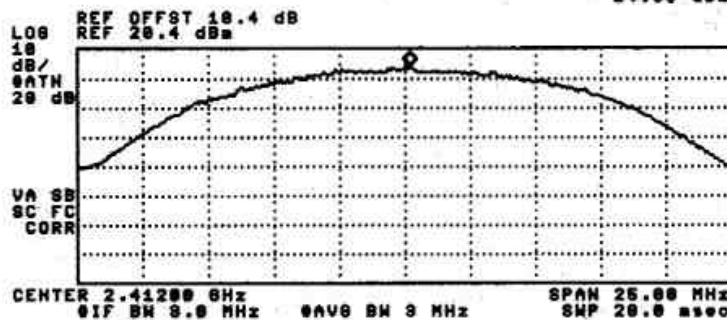
<i>Channel</i>	<i>Frequency (MHz)</i>	<i>EUT reading (dBm)</i>	<i>6 dB Bandwidth (MHz)</i>	<i>Corrected Power (dBm)</i>
<b>1</b>	<b>2412.19</b>	<b>14.33</b>	<b>12.94</b>	<b>20.67</b>
<b>6</b>	<b>2437.19</b>	<b>14.17</b>	<b>11.13</b>	<b>19.86</b>
<b>11</b>	<b>2462.19</b>	<b>13.85</b>	<b>11.50</b>	<b>19.68</b>

See plots:

6 dB plots is in the 6 dB bandwidth measurement sections

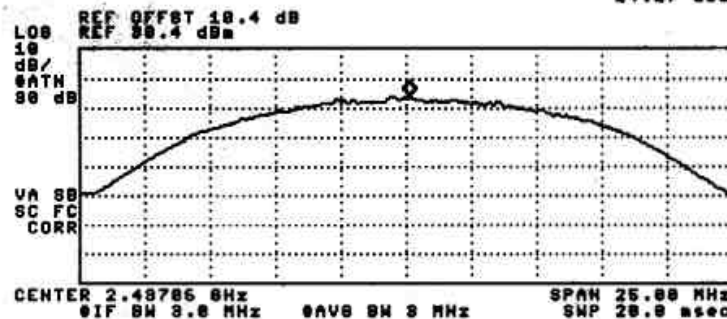
13:05:13 OCT 30, 2001  
PEAK POWER 11Mbps CH 1

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.41219 GHz  
14.88 dBm



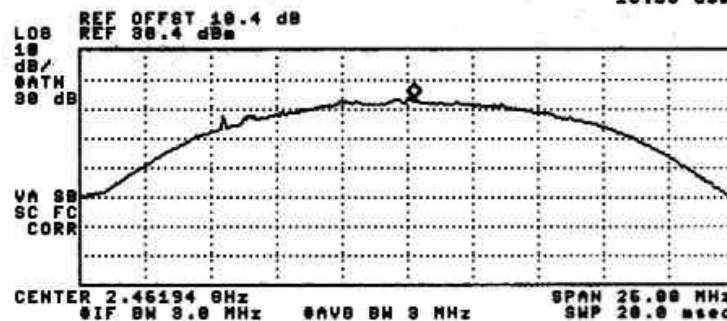
13:17:40 OCT 30, 2001  
PEAK POWER 11Mbps CH 6

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.43719 GHz  
14.17 dBm



13:19:49 OCT 30, 2001  
PEAK POWER 11Mbps CH 11

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.45219 GHz  
13.66 dBm

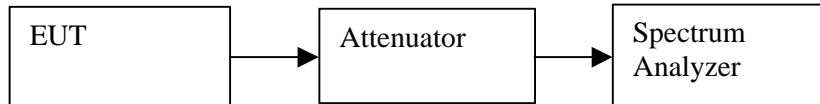


## 9.2. 6 dB BANDWIDTH MEASUREMENT

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	<input checked="" type="checkbox"/> Peak <input type="checkbox"/> Average	<input checked="" type="checkbox"/> 100 kHz <input type="checkbox"/> 1 MHz	<input checked="" type="checkbox"/> 100 kHz <input type="checkbox"/> 1 MHz

### TEST SETUP



### TEST PROCEDURE

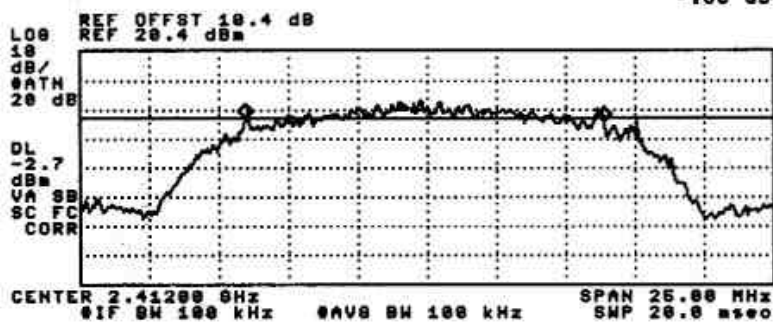
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW.

### RESULT

*No non-compliance noted.*

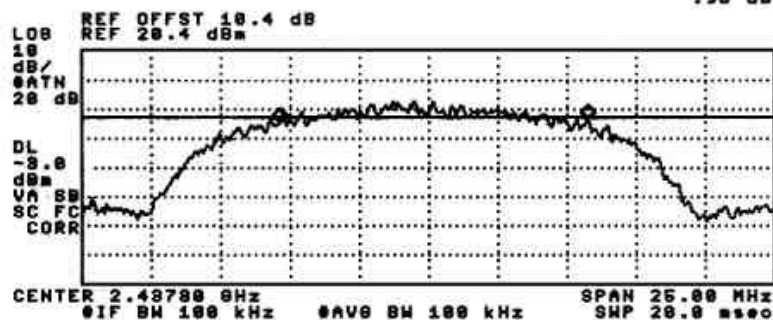
11:09:19 OCT 30, 2001  
6dB BANDWIDTH CH 1

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRA 12.94 MHz  
-.66 dB



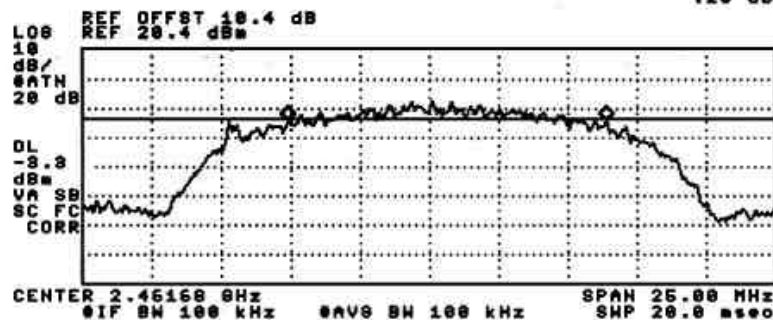
11:12:00 OCT 30, 2001  
6dB BANDWIDTH CH 6

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRA 11.13 MHz  
.90 dB



11:13:59 OCT 30, 2001  
6dB BANDWIDTH CH 11

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRA 11.60 MHz  
.25 dB

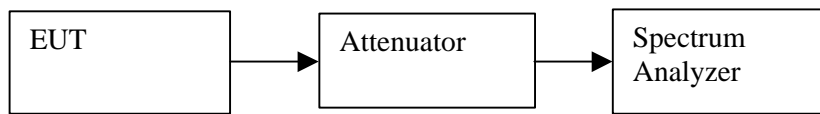


### 9.3. CONDUCTED SPURIOUS EMISSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Below 1000	<input checked="" type="checkbox"/> Peak	<input checked="" type="checkbox"/> 100 kHz	<input checked="" type="checkbox"/> 100 kHz
	<input type="checkbox"/> Average	<input type="checkbox"/> 1 MHz	<input type="checkbox"/> 10 Hz
Above 1000	<input checked="" type="checkbox"/> Peak	<input checked="" type="checkbox"/> 100 kHz	<input checked="" type="checkbox"/> 100 kHz
	<input type="checkbox"/> Average	<input type="checkbox"/> 1 MHz	<input type="checkbox"/> 10 Hz

#### TEST SETUP

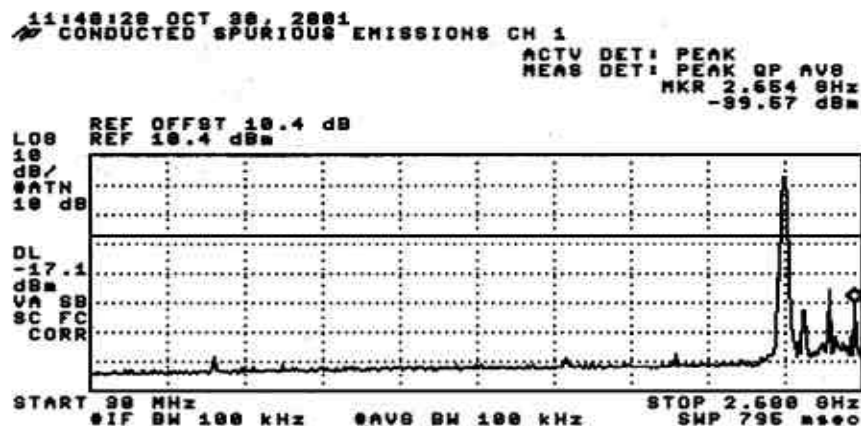
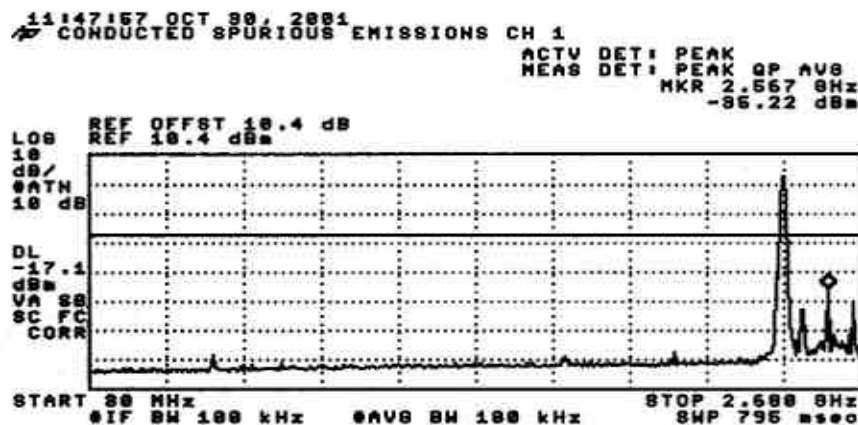
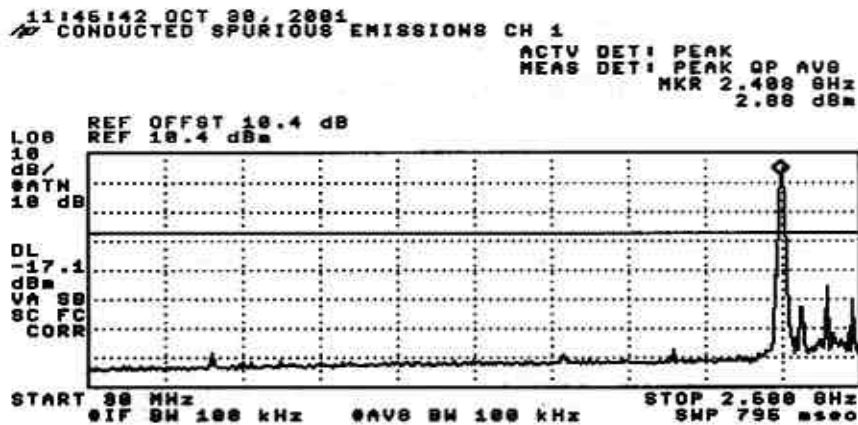


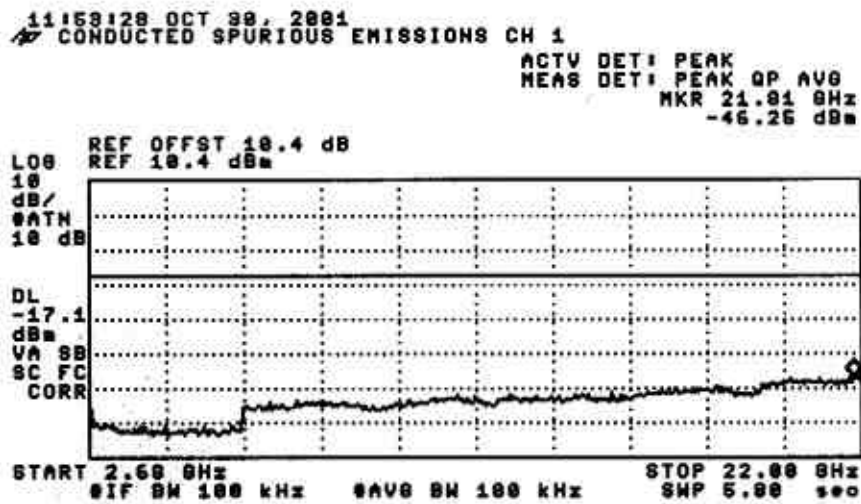
#### TEST PROCEDURE

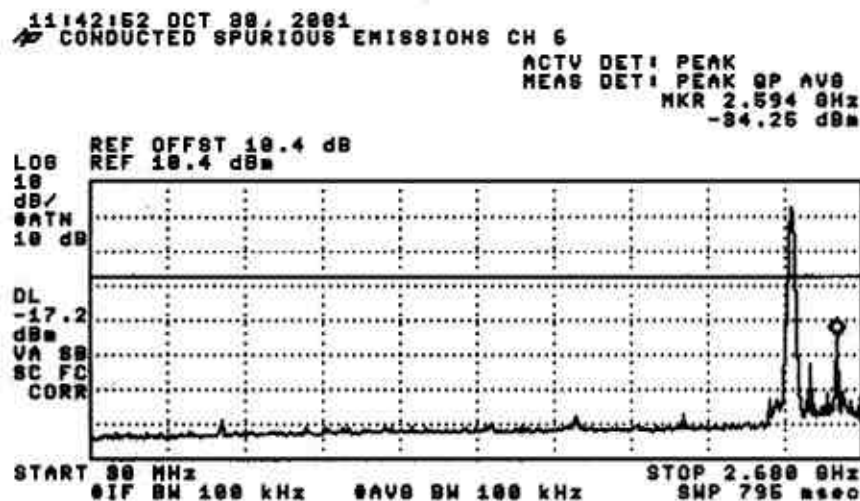
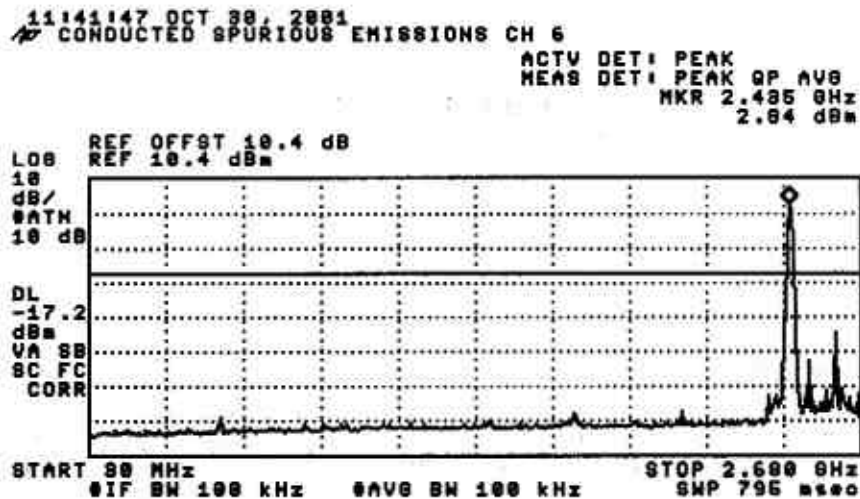
Connect the EUT's antenna port to the Spectrum Analyzer's input port.  
Investigate the entire frequency of the carrier frequency, up to the tenth harmonic.

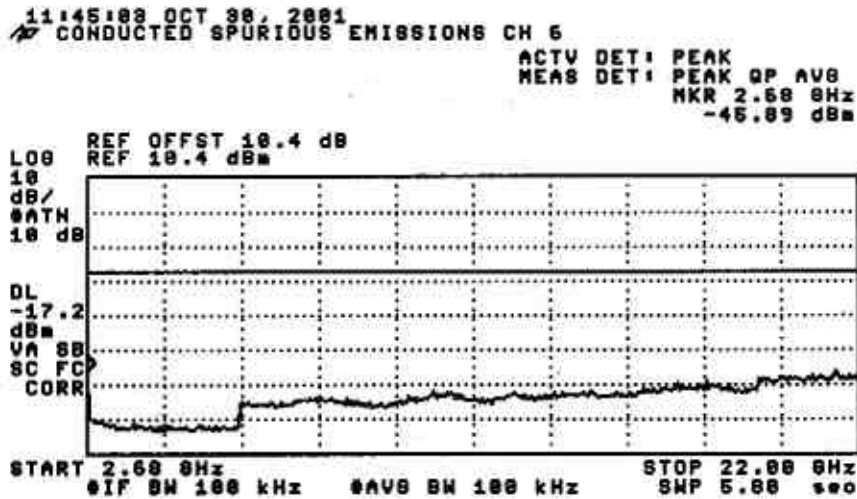
#### RESULT

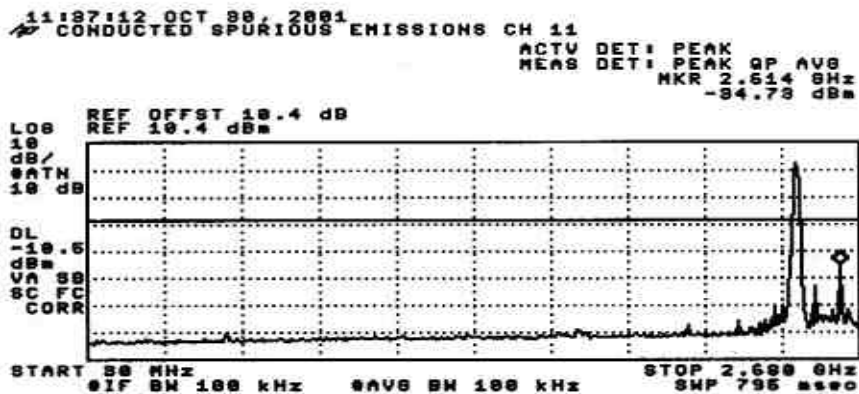
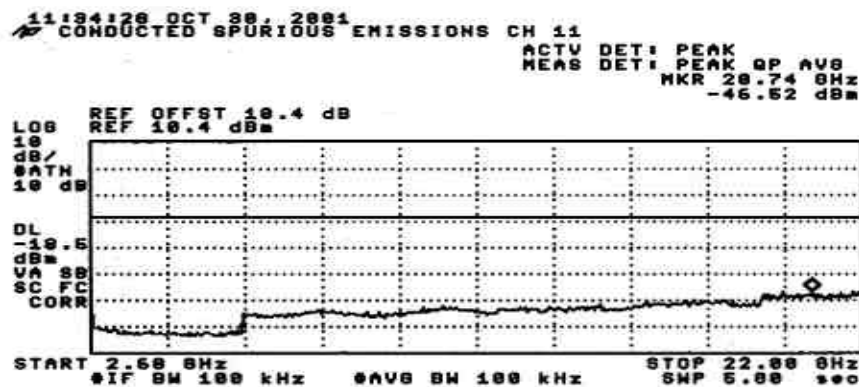
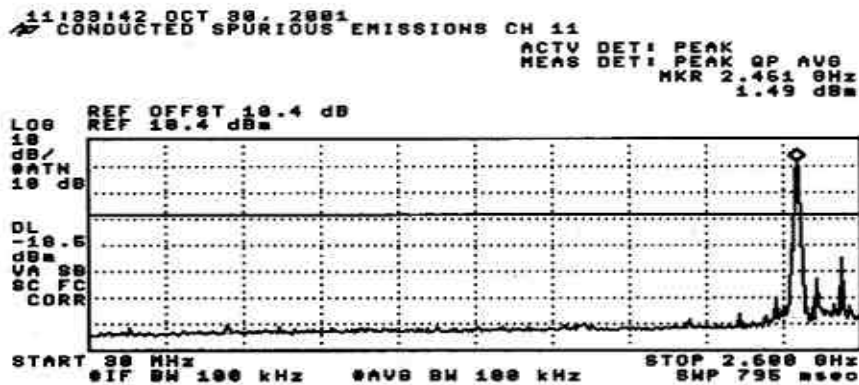
*No non-compliance noted.*









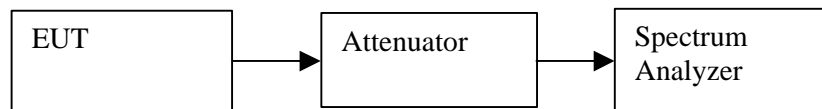


## 6.4 PEAK POWER SPECTRAL DENSITY

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	<input checked="" type="checkbox"/> Peak	<input checked="" type="checkbox"/> 3 kHz	<input checked="" type="checkbox"/> 3 kHz

### TEST SETUP



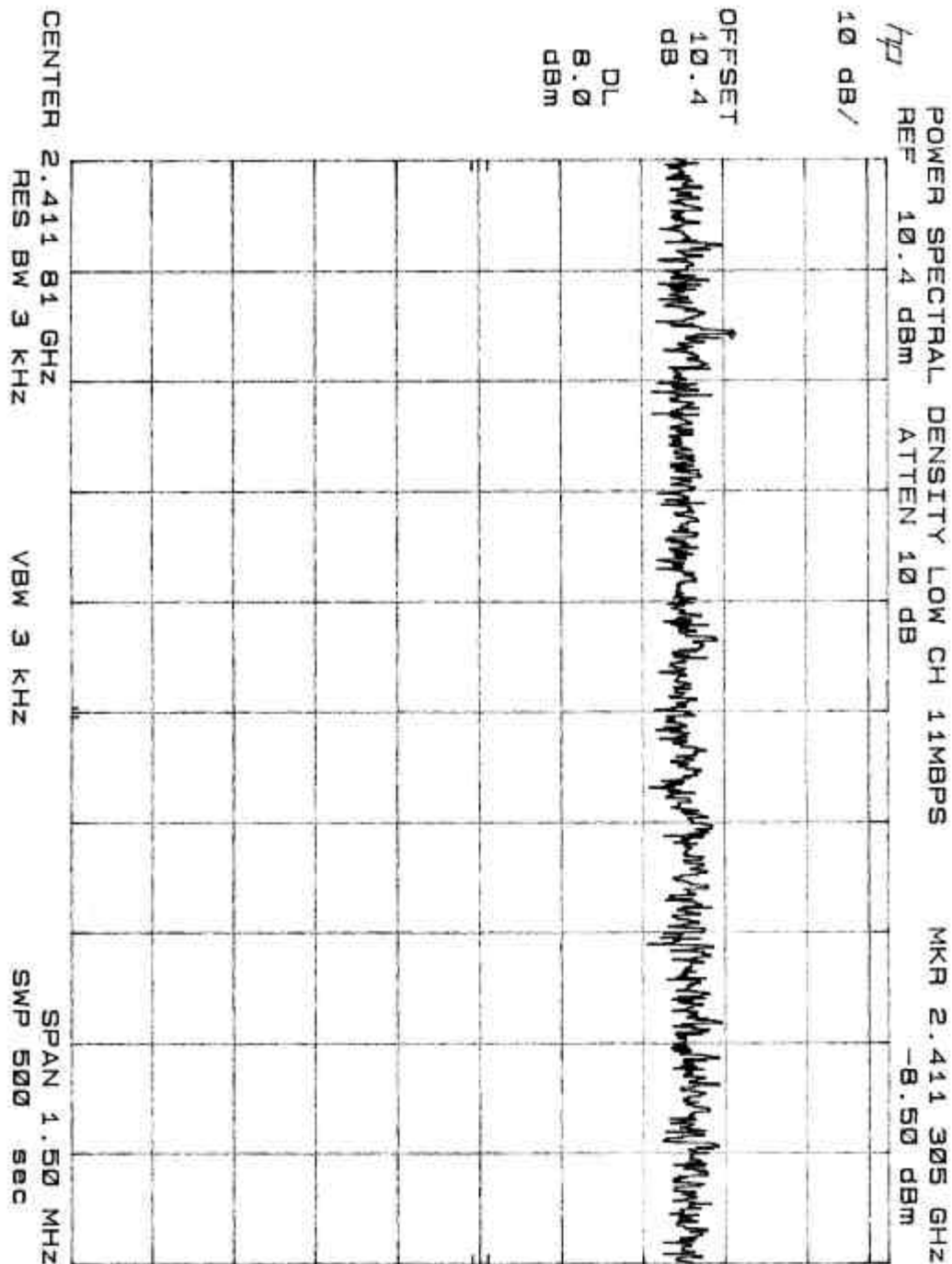
### TEST PROCEDURE

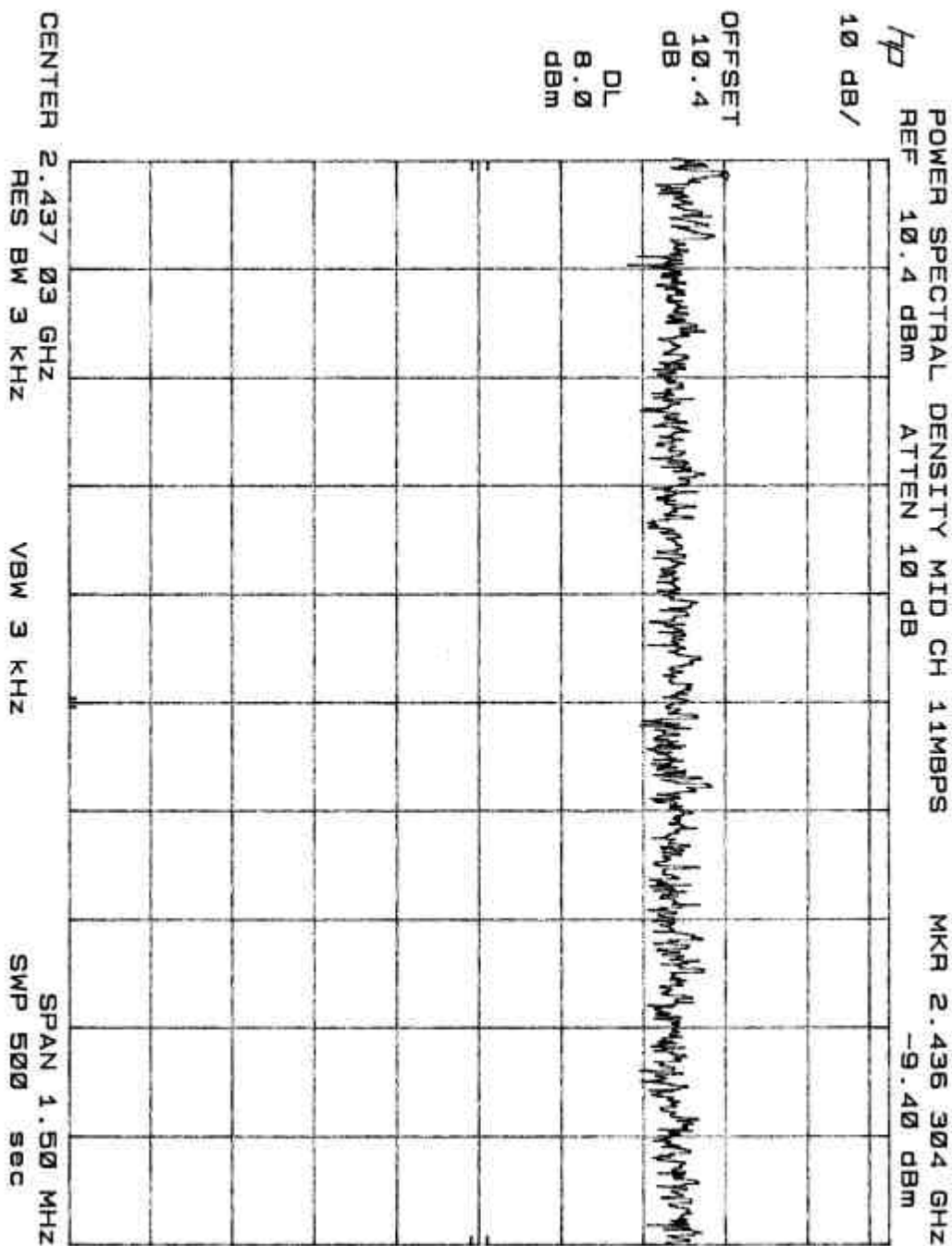
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 3 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded.

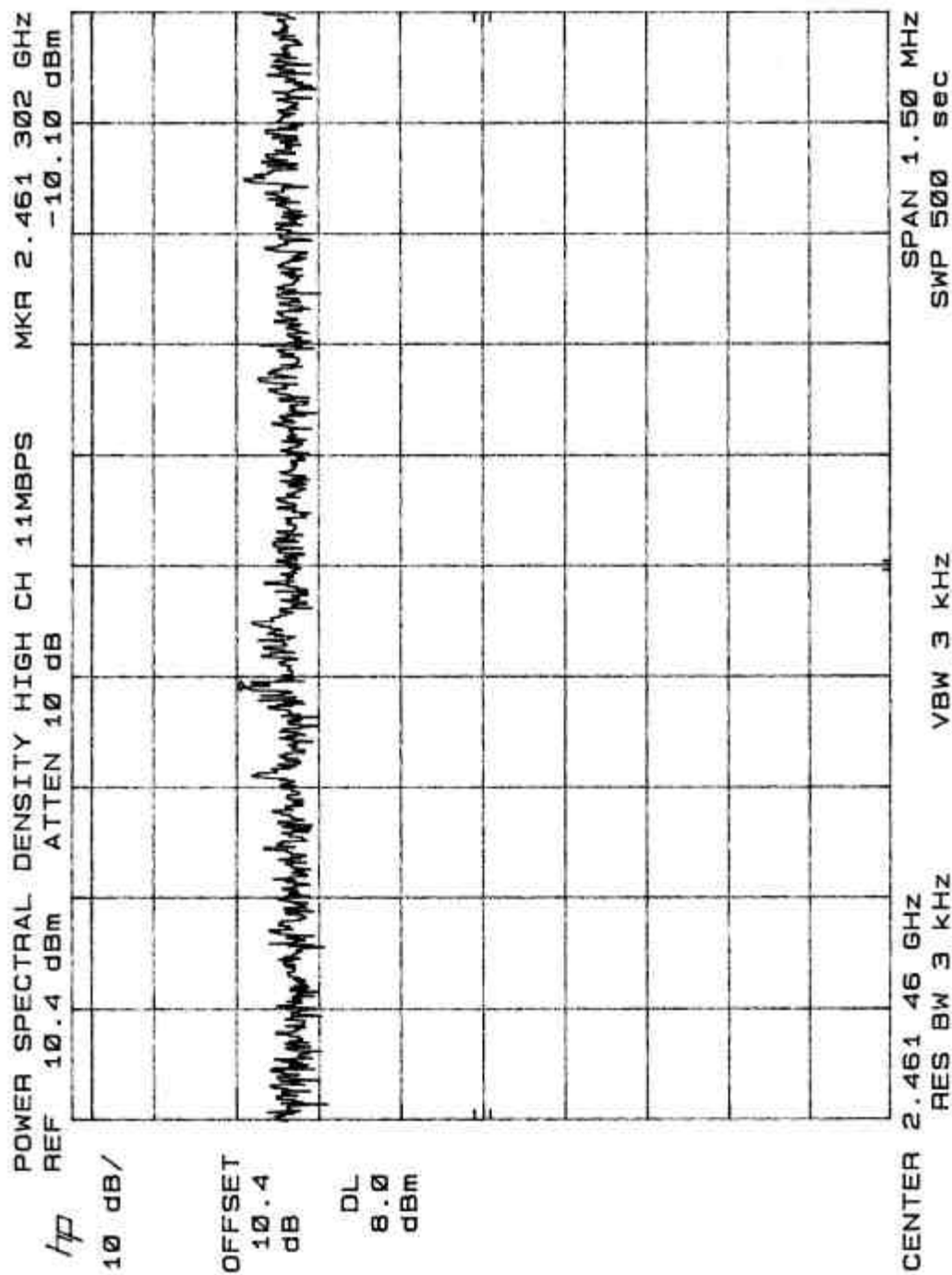
The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

### Result:

*No non-compliance noted. See plots:*







#### **9.4.      PROCESSING GAIN**

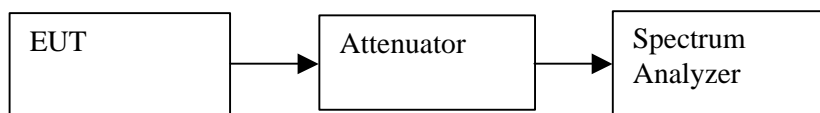
CUSTOMER PROVIDED PROCESSING GAIN.

## 9.5. RESTRICTED BAND EDGE MEASUREMENT

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	<input checked="" type="checkbox"/> Peak <input type="checkbox"/> Average	<input checked="" type="checkbox"/> 100 KHz <input type="checkbox"/> 1 MHz	<input checked="" type="checkbox"/> 100 KHz <input type="checkbox"/> 10 Hz

### TEST SETUP



### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator; the lower and upper band edge of the EUT is investigated.

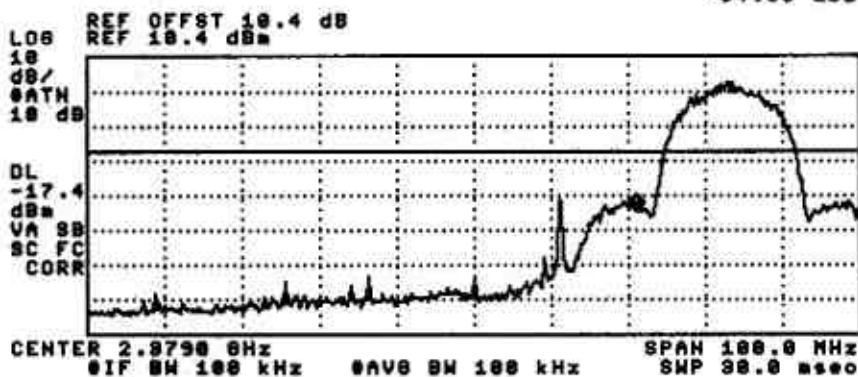
The resolutions and video bandwidth were set to 100kHz.

### RESULT

*No non-compliance noted. See plots:*

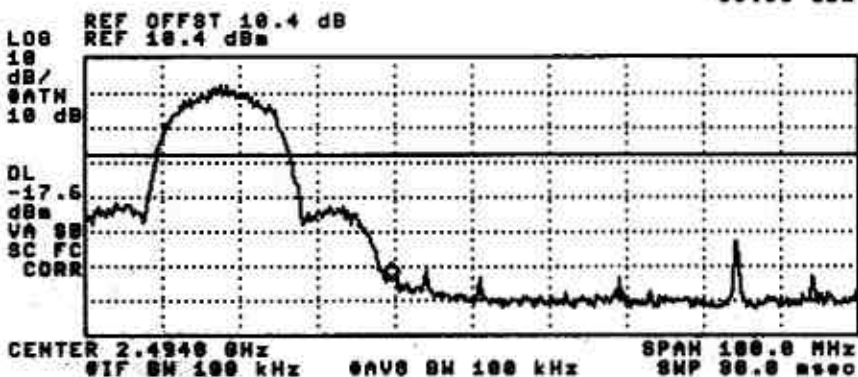
12:48:49 OCT 30, 2001  
BANDEDGE LOW 11Mbps CH 1

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.4888 GHz  
-84.38 dBm



13:48:23 OCT 30, 2001  
BANDEDGE HIGH 11Mbps CH 11

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.4885 GHz  
-63.65 dBm



## 9.6. RADIATED EMISSION

### Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	<input checked="" type="checkbox"/> Peak	<input checked="" type="checkbox"/> 100 KHz	<input checked="" type="checkbox"/> 100 KHz
	<input checked="" type="checkbox"/> Quasi Peak	<input checked="" type="checkbox"/> 1 MHz	<input checked="" type="checkbox"/> 1 MHz
Above 1000	<input checked="" type="checkbox"/> Peak	<input checked="" type="checkbox"/> 1 MHz	<input checked="" type="checkbox"/> 1 MHz
	<input checked="" type="checkbox"/> Average	<input checked="" type="checkbox"/> 1 MHz	<input checked="" type="checkbox"/> 10 Hz

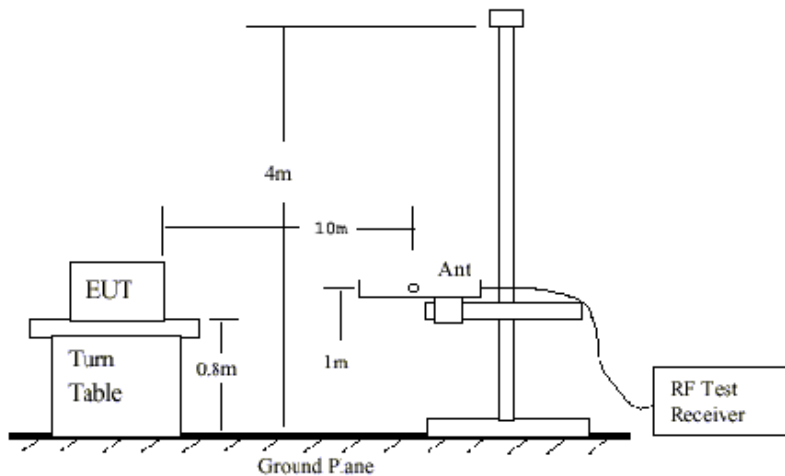


Fig 1: Radiated Emission Measurement: 30 to 1000 MHz

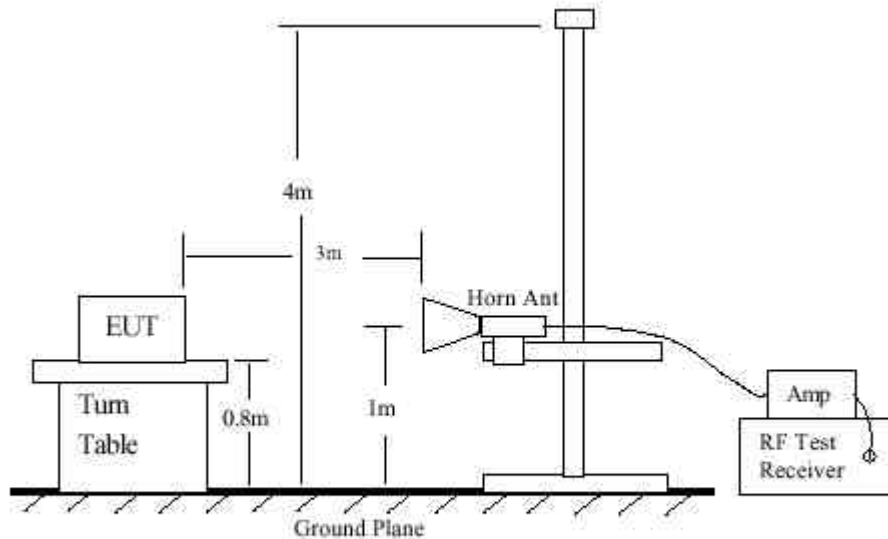


Fig 2: Radiated Emission Above 1000 MHz

#### **TEST SETUP & PROCEDURE**

1. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures C ~ F. If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.
8. Set the resolution and video bandwidth of the spectrum analyzer to 1MHz and repeat procedures C ~ F for frequency band from 1 GHz to 10 times carrier frequency.

9. If the reading for the local peak is lower than the Average limit, no further testing is needed in this local peak and this reading should be recorded. If it is higher than Average limit but lower than Peak limit, then set the resolution bandwidth to 1MHz and video bandwidth to 300Hz. Repeat procedures C ~ F. If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

**RESULT**

*No non-compliance noted, as shown below.*



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 #:** 01U1031-1

Report #: 01107A1

**Date & Time:** 11/07/01 2:34PM

**Test Engr:** Jesse Saldivar

**Company:** Galtronics

**EUT Description:** 2.4GHz DSSS Transmitter for Access Point

**Test Configuration :** EUT/PC/Monitor/Mouse/Keyboard

**Type of Test:** EN55022 Class B

**Mode of Operation:** TX

[illegible]

Low Channel

7-Nov-01    FCC Measurement  
Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz  
HP8566B Analyzer  
Mileq NSP2600-44 Preamp  
EMCO 3115 Antenna  
Cable    17.0      feet

Average Measurements:  
1 MHz Resolution Bandwidth  
10Hz Video Bandwidth

Peak Measurements:  
1MHz Resolution Bandwidth  
1MHz Video Bandwidth

EUT S/N:      Low Channel

f	Dist	Read Peak	Read Avg	AF	CL	Amp	D Corr	HPF	Peak	Avg	Peak Lim	Avg Lim	Peak Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
4.82	3.3	44.6	32.4	32.6	6.5	-41.8	-9.5	1.0	33.4	21.2	74.0	54.0	-40.6	-32.8	V
7.23	3.3	47.2	36.7	36.6	8.2	-41.2	-9.5	1.0	42.3	31.8	74.0	54.0	-31.7	-22.2	V
9.65	3.3	47.0	35.8	37.3	9.6	-39.3	-9.5	1.0	46.2	35.0	74.0	54.0	-27.8	-19.0	V
12.07	3.3	45.4	35.2	39.0	10.7	-40.1	-9.5	1.0	46.6	36.4	74.0	54.0	-27.4	-17.6	V
14.47	3.3	49.4	39.1	40.4	12.2	-43.6	-9.5	1.0	49.9	39.6	74.0	54.0	-24.1	-14.4	No Emissions Found
16.88	3.3	50.0	38.6	32.5	13.9	-44.1	-9.5	1.0	43.8	32.4	74.0	54.0	-30.2	-21.6	No Emissions Found
19.23	3.3	52.8	42.0	24.2	15.3	-44.3	-9.5	1.0	39.5	28.7	74.0	54.0	-34.5	-25.3	No Emissions Found

f    Measurement Frequency  
Dist    Distance to Antenna  
Read    Analyzer Reading  
AF    Antenna Factor  
CL    Cable Loss

Amp    Preamp Gain  
D Corr    Distance Correct to 3 meters  
Avg    Average Field Strength @ 3 m  
Peak    Calculated Peak Field Strength  
HPF    High Pass Filter

Avg Lim    Average Field Strength Limit  
Pk Lim    Peak Field Strength Limit  
Avg Mar    Margin vs. Average Limit  
Pk Mar    Margin vs. Peak Limit

Low Channel

Mid Channel

7-Nov-01 FCC Measurement  
Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz:  
HP8566B Analyzer  
Mileq NSP2600-44 Preamp  
EMCO 3115 Antenna  
Cable: 17.0' Test

Average Measurements: 1 MHz Resolution Bandwidth  
10 Hz Video Bandwidth  
Peak Measurements: 1 MHz Resolution Bandwidth  
10 Hz Video Bandwidth

f	Dist	Read Peak	Read Avg	AF	CL	Amp	D Corr	HPF	Peak	Avg	Peak Lim	Avg Lim	Peak Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
4.87	3.3	43.1	32.8	32.7	6.5	-41.8	-9.5	1.0	31.0	21.7	74.0	54.0	-43.0	-32.3	V
7.31	3.3	46.3	36.6	36.7	8.3	-41.1	-9.5	1.0	40.7	31.0	74.0	54.0	-33.3	-23.0	V
9.75	3.3	45.0	34.9	37.5	9.7	-39.3	-9.5	1.0	43.4	34.3	74.0	54.0	-30.6	-19.7	V
12.19	3.3	44.0	35.4	39.1	10.8	-40.2	-9.5	1.0	44.3	36.7	74.0	54.0	-29.7	-17.3	V
14.62	3.3	48.8	38.3	40.2	12.3	-43.9	-9.5	1.0	47.7	38.4	74.0	54.0	-26.3	-15.6	Near Floor
17.06	3.3	49.2	38.2	32.5	14.0	-44.0	-9.5	1.0	42.1	32.1	74.0	54.0	-31.9	-21.9	Near Floor
19.49	3.3	52.8	41.6	24.2	16.4	-44.3	-9.5	1.0	38.7	28.6	74.0	54.0	-35.3	-25.5	Near Floor

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Ma Margin vs. Average Limit
AF	Antenna Factor	Offset	Peak Offset (Peak-to-Average)	Pk Mar Margin vs. Peak Limit
CL	Cable Loss	Peak	Calculated Peak Field Strength	

High Channel

FCC Measurement  
Compliance Certification Services, Morgan Hill Open Field Site  
7-Nov-01  
Equipment for 1.22 GHz  
HP8566B Analyzer  
Miteq NSP2800-44 Preamp  
EMCO 3115 Antenna  
Cable 17.0 feet

Average Measurements:  
1 MHz Resolution Bandwidth  
10-Hz Video Bandwidth

Peak Measurements:  
1MHz Resolution Bandwidth  
1MHz Video Bandwidth

High Channel

f	Dist	Read Peak	Read Avg	AF	CL	Amp	D Cor	Pre	Peak	Avg	Peak Lim	Avg Lim	Peak Mar	Avg Mar	Note
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
4.92	3.3	44.0	32.3	32.8	8.6	-41.8	-9.5	1.0	33.1	21.4	74.0	54.0	-40.9	-32.8	V
7.39	3.3	45.4	35.0	35.9	11.3	-41.0	-9.5	1.0	41.0	30.6	74.0	54.0	-33.0	-23.4	V
9.85	3.3	43.9	35.2	37.7	9.8	-39.3	-9.5	1.0	43.5	34.8	74.0	54.0	-30.5	-19.2	V
12.31	3.3	44.2	34.8	39.2	10.9	-40.3	-9.5	1.0	45.5	35.9	74.0	54.0	-28.5	-18.1	V
14.77	3.3	47.5	38.9	40.1	12.4	-44.2	-9.5	1.0	47.3	38.7	74.0	54.0	-26.7	-15.3	Noise Floor
17.23	3.3	48.0	38.8	32.5	14.1	-44.1	-9.5	1.0	42.8	32.8	74.0	54.0	-31.2	-21.4	Noise Floor
19.70	3.3	53.3	43.2	24.2	15.6	-44.3	-9.5	1.0	40.3	30.2	74.0	54.0	-33.7	-23.8	Noise Floor

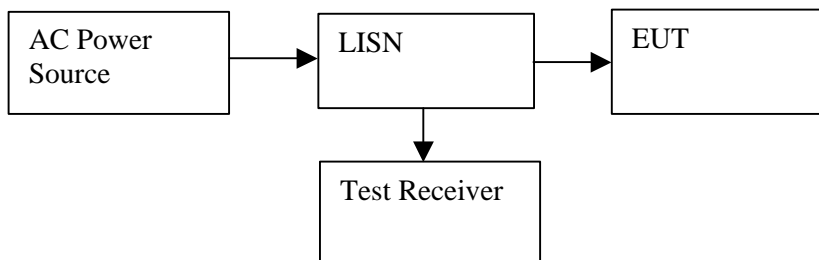
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss				

## 9.7. POWER LINE CONDUCTED EMISSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
450 KHz to 30 MHz	<input checked="" type="checkbox"/> Peak <input type="checkbox"/> CISPR Quasi Peak	<input checked="" type="checkbox"/> 9 KHz	<input checked="" type="checkbox"/> 9 KHz

### TEST SETUP



### 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 EUT was set to transmit in a continuous mode.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

### RESULT

No non-compliance noted. See plot Line Conduction.

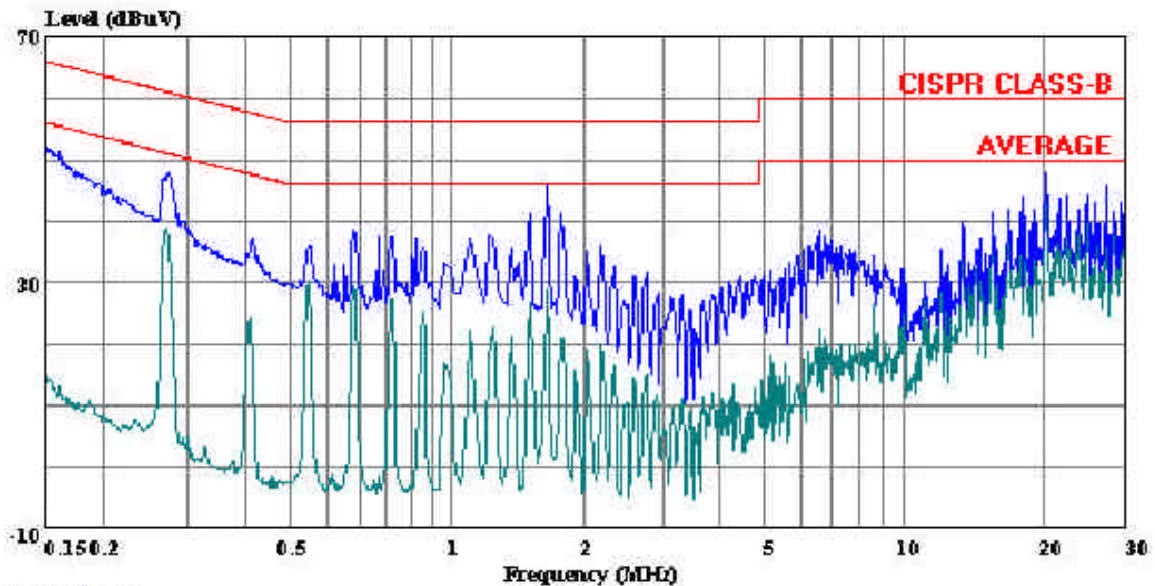
Delta ADP-10SB Power Supply

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
1.76	45.90	--	28.62	0.00	56.00	46.00	-10.10	-17.38	L1
20.27	47.83	--	45.11	0.00	60.00	50.00	-12.17	-4.89	L1
0.27	47.82	--	38.72	0.00	62.46	52.46	-14.64	-13.74	L1
1.73	45.62	--	29.89	0.00	56.00	46.00	-10.38	-16.11	L2
0.15	56.68	--	17.54	0.00	66.00	56.00	-9.32	-38.46	L2
0.27	47.10	--	35.20	0.00	62.49	52.49	-15.39	-17.29	L2
6 Worst Data									



561F Monterey Road,  
Morgan Hill, CA 95037  
Tel: (408) 463-0885  
Fax: (408) 463-0888

Data#: 14 File#: Linecond.EMI Date: 10-31-2001 Time: 09:14:32



(Audix ATC)

Trace: 12

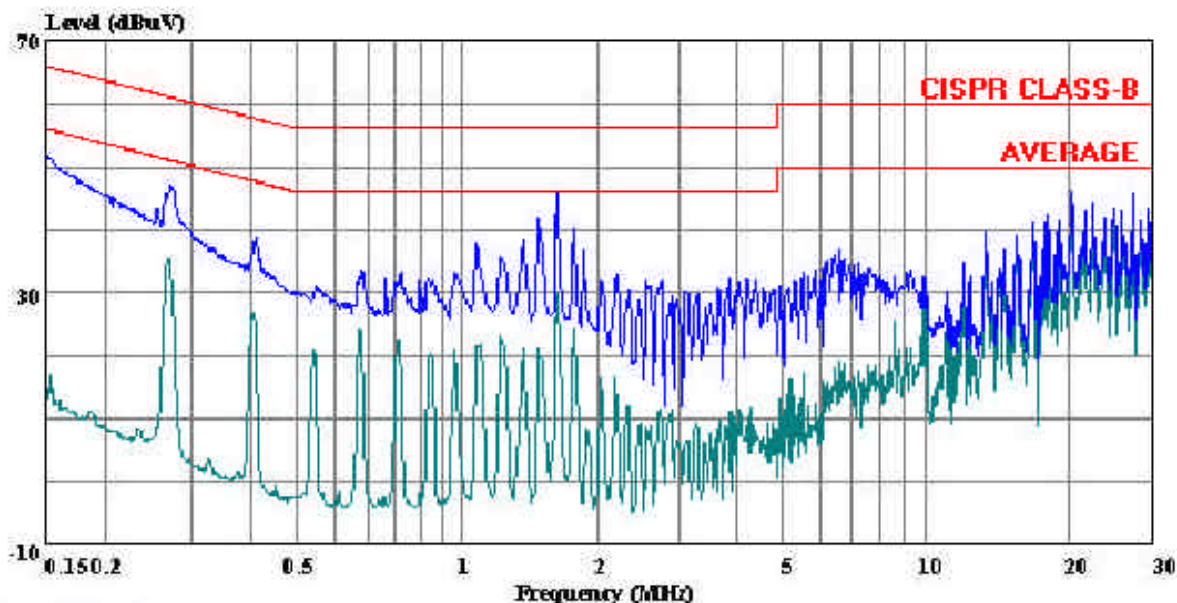
Ref Trace:

Report : 01U1031-1  
Project# : 011030LC  
Tested By : Jesse Saldivar  
Manufacture : Galtronics  
EUT Description : 2.4GHz DSSS Transmitter for Access Point  
Model : WNG-DAP-104  
Test Config. : EUT/MONITOR/KB/MOUSE/MODEM/Printer/  
: Power Over LAN Hub- Power Dsine  
Test Target : FCC Class B  
Mode of Operation: Test Mode Using NWN Manager  
: 115VAC, 60Hz/Delta ADP-10SB Power Supply  
: L1: PEAK(blue), AVERAGE(green)



561F Monterey Road,  
Morgan Hill, CA 95037  
Tel: (408) 463-0885  
Fax: (408) 463-0888

Data#: 22      File#: Linecond.EMI      Date: 10-31-2001      Time: 09:29:38



(Audix ATC)

Trace: 20

Ref Trace:

Report : 01U1031-1  
Project# : 011030LC  
Tested By : Jesse Saldivar  
Manufacture : Galtronics  
EUT Description : 2.4GHz DSSS Transmitter for Access Point  
Model : WNG-DAP-104  
Test Config. : EUT/MONITOR/KB/MOUSE/MODEM/Printer/  
: Power Over LAN Hub- Power Dsine  
Test Target : FCC Class B  
Mode of Operation: Test Mode Using NWN Manager  
: 115VAC, 60Hz/Delta ADP-10SB Power Supply  
: L2: PEAK(blue), AVERAGE(green)

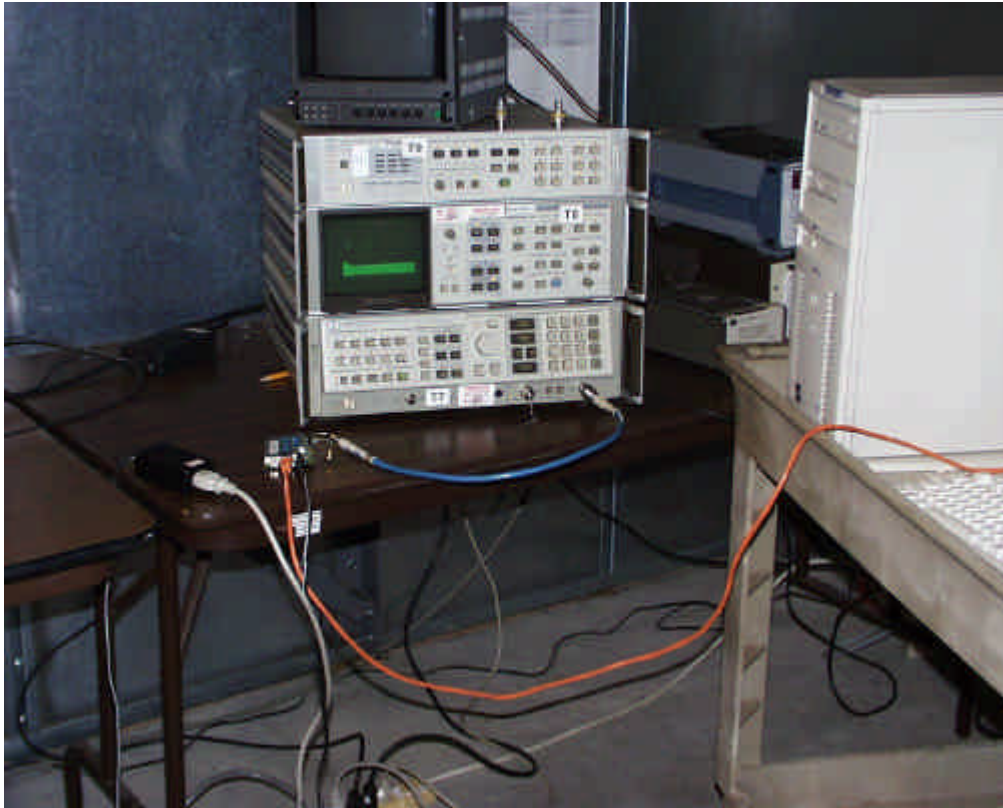
## 9.8. SETUP PHOTOS

### Radiated Emission photos



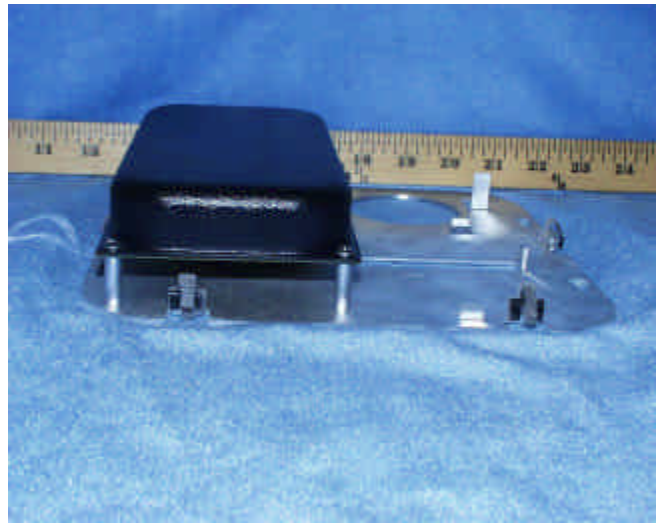
**Conducted Emission Photos**

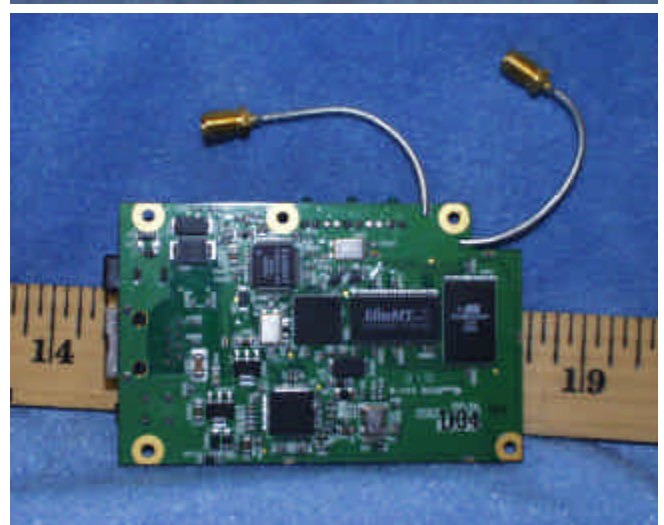
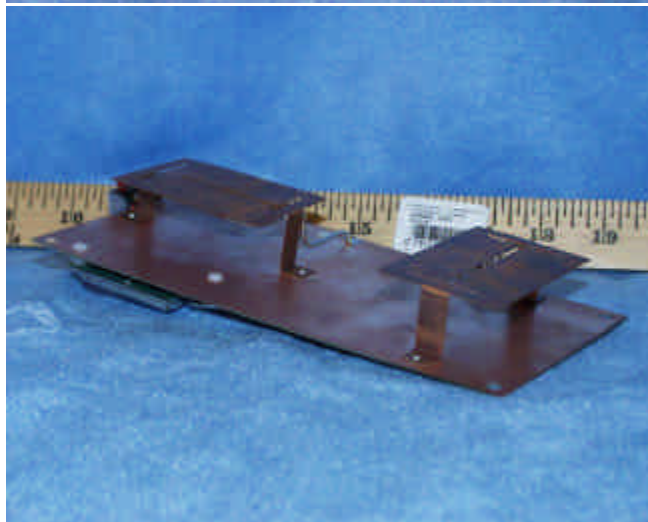
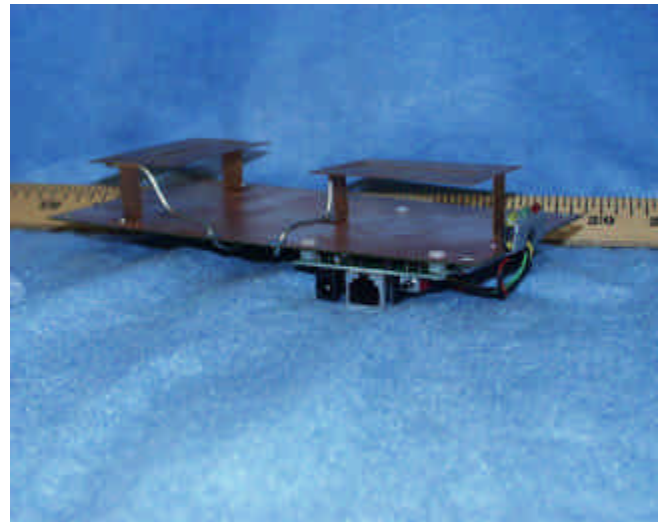
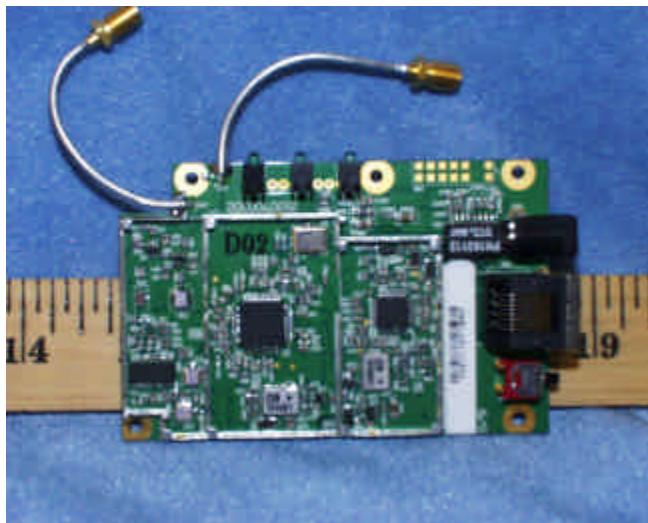
## FCC testing to antenna port



**FCC testing above 1GHz**

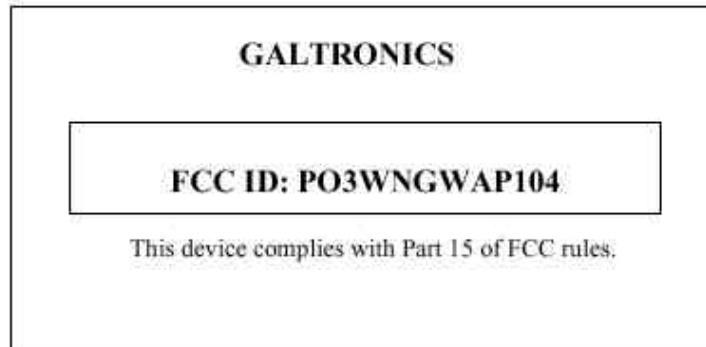
## ATTACHMENTS

**EUT PHOTOGRAPHS**



## PROPOSED FCC ID LABEL

### PROPOSED FCC ID LABEL AND LOCATION



FCC ID LABEL

**AGENT AUTHORIZATION LETTER**

**May 31, 2001**

**Federal Communications Commission  
Authorization & Evaluation Division  
7435 Oakland Mills Road  
Columbia, Maryland 21046**

**Gentlemen:**

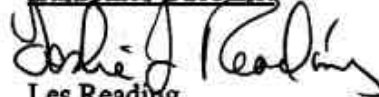
**This letter will authorize the appointment of Compliance Certification Services to act as our Agent in all FCC matters.**

**This appointment is effective until otherwise notified by us.**

**This is to advise that we are in full compliance with the Anti-Drug Abuse Act. The Applicant is not subject to denial of federal benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 USC 862, and no party to the application is subject to a denial of federal benefits pursuant to that section.**

**Sincerely,**

**Galtronics USA Inc.**



**Les Reading**

**Chief Technical Officer**

## ANTENNA SPECIFICATION

### Antenna Specification for Galtronics Wireless Access Point WNG-WAP-104

#### Antenna system:

- Dual antenna diversity system
- Internal Double-Folded Dipole Antennas
- Peak Gain 8 dBi



## THEORY OF OPERATION

### Theory of Operation of WNG-WAP-104

Instead of wire, this product uses the direct sequence spread spectrum wireless technique for data transmission in Local Area Network applications. This Access Point unit operates as a transmitter and a receiver to exchange data with Client units. The basic access method used to determine which device will be transmitting and which will be receiving in this wireless data transmission environment is carrier sense multiple access with collision avoidance (CSMA/CA). This is a "listen before talk" system in which a station will check that the channel is not occupied with another transmission before beginning a transmission of its own. This product is mainly composed of four parts, the Base Band block, the MO/DEM (modulation/demodulation) block, the IF block, and the RF block and antenna module.

The antenna is controlled by the feedback loop for transmitting and receiving status. The base band digital signal is modulated into coded data sequence by spreading code. This coded data sequence is divided into I/Q channels. IF carrier frequency is then modulated by the coded data using normal digital modulation techniques such as DPSK and . The modulated IF signal is then upgraded to RF signal and then transmitted through the antenna.

## TECHNICAL DESCRIPTION

### Technical specifications of Galtronics WNG-WAP-104 Wall Access Point

#### Standards supported

- IEEE 802.11b standard for Wireless LAN
- All major networking standards (including IP, IPX)

#### Environmental

Operating temperature (ambient):

- -10 ~ 55°C

Humidity:

- Max. 95% Non-condensing

#### Power specifications

##### DC power supply

- Input : AC 100-240 50-60 Hz 1A
- Output: 5V DC 1A converter incl.

##### Power Over Ethernet Option

- Input (from power injector to optional P.O.E. splitter supplied by Galtronics) : Nominal 48V DC
- Output (from P.O.E splitter supplied by Galtronics): Nominal 5V DC

#### Radio specifications

##### Range:

- per cell indoors approx. 35-100 meters
- per cell outdoors up to 100-300 meters

##### Transmit power:

- Nominal Temp Range: 14 dBm, 12 min.
- Extend Temp Range: 14 dBm, 11 dBm min.
- Transmit Power, 2.7 v to 3v: 14 dBm max, 11 dBm min.

##### Frequency range:

- 2.4-2.4835 GHz, direct sequence spread spectrum

##### Number of Channels:

- Most European countries: 13
- US and Canada: 11 (3 non-overlapping)
- France: 4 (1 non-overlapping)
- Japan : 14

##### Antenna system:

- Dual antenna diversity system; 1 dB internal Planar Inverted F Antennas

#### Specific features

##### Supported bit rates:

- 11 Mbps : CCK
- 5.5 Mbps : CCK
- 1 Mbps : DBSK
- 2 Mbps : DQPSK

##### Data encryption:

- 40-bit WEP Encryption, 128 bit WEP

##### Utility Software:

- AP Manager to manage wireless LAN, network connection and client access control

#### Physical Dimensions

24.5 x 24.5 x 4.75 cm

## USER'S MANUAL

## **BLOCK DIAGRAM & SCHEMATIC DIAGRAM**