FCC CFR47 PART 90 SUBPART Y
CERTIFICATION
TEST REPORT

FOR

4.9 GHZ, 802.11 BASED, FIXED WIRELESS NODE

MODEL NUMBER: SKYCONNECTOR INDOOR SC1050 AND SKYCONNECTOR OUTDOOR SC1050

FCC ID: RV7-SC1050

REPORT NUMBER: 05U3795-2

ISSUE DATE: JANUARY 3, 2006

Prepared for
SKYPILOT NETWORK, INC
2055 LAURELWOOD DRIVE
SANTA CLARA, CA 95054
U.S.A

Prepared by
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Revision History

Rev.	Issue Date	Revisions	Revised By
A	12/6/2005	Initial Issue	DG
B	1/6/2006	Corrected frequency of operation, fixed typo in sec. 5.5, changed antenna gain in MPE to 16.5 dBi,, clarified power test procedure to include rms equivalent.	DG

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1. ATTESTATION OF TEST RESULTS

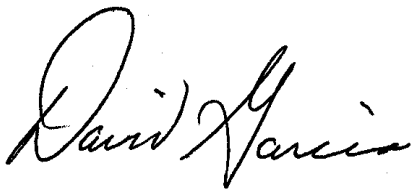
COMPANY NAME:	SKYPILOT NETWORK, INC 2055 LAURELWOOD DRIVE SANTA CLARA, CA 95054
EUT DESCRIPTION:	4.9 GHz, 802.11 Based, Fixed Wireless Node
MODEL:	SkyConnector Indoor SC1050 and SkyConnector Outdoor SC1050
SERIAL NUMBER:	F20723499
DATE TESTED:	NOVEMBER 10 – NOVEMBER 12, 2005

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 90 SUBPART Y	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By: Tested By:



DAVID GARCIA
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, TIA-603-C and FCC CFR 47 Part 90.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a transceiver operating in the 4940-4990 MHz band. It is intended for use as a fixed Wireless Subscriber unit.

The EUT comes in two models, the SkyConnector Outdoor SC1050 and the SkyConnector Indoor SC1050. Both utilize the same electronics. The only difference between the two models is the enclosure. The outdoor unit has and internal metal casing with a plastic outer enclosure. The indoor unit is built with a metal outer enclosure.

The radio module is made by Skypilot Network Corporation.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

4940 to 4990 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
4940 - 4990	20 MHz Bandwidth	17.77	59.84

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a panel antenna with a maximum gain of 16.5 dBi for point-to-point operation.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was SkyPilot Software Version 001.06.000.S.

The EUT driver software installed in the host support equipment during testing was TeraTerm Pro.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 4965 MHz for 20 MHz channel bandwidth operation.

The worst-case data rate for this channel is determined to be 6 Mb/s for 20 MHz channel bandwidth based on previous experience with 4.9 GHz WLAN product design architectures.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	QuickNote	A929	GAYR22190154	DoC
PC AC Adapter	Lite-on Electronics	PA-1900-05	250109400C	N/A
RS 362-Converter	SkyPilot	Asy-aw	N/A	N/A
POE Adapter	SkyPilot	POE	640-00009-01	N/A
Mouse	Logitech	MUB48	LTC95102432	N/A
EUT AC Adapter	Amigo	AM-24750	N/A	N/A

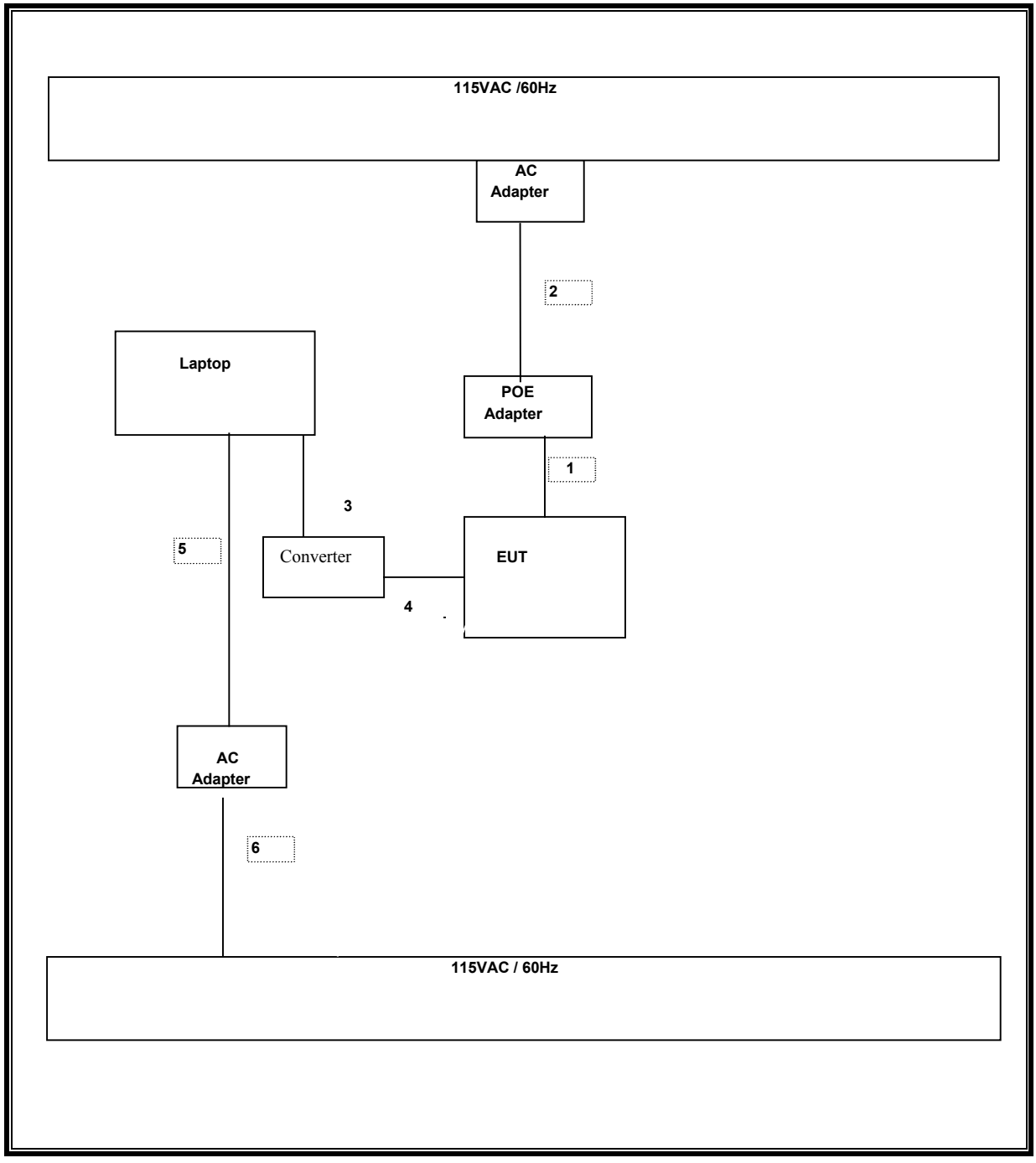
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	LAN	1	RJ45	shielded	1 m	N/A
2	DC	1	1/8"	unshielded	1m	N/A
3	Serial	1	DB9	Rs232	1.2m	N/A
4	Serial	1	10 Pins	Rippon	1.2m	N/A
5	DC	1	1/8"	Unshielded	1.8m	N/A
6	AC	1	AC power	Unshielded	1m	N/A

TEST SETUP

The EUT is connected to a host laptop computer via a shielded crossover LAN cable during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/2006
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42510266	3/28/2006
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	29800	6/10/2006
Antenna, Horn 1 ~ 18 GHz	Erctco	3115	6717	4/22/2006
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-SP	924342	9/2/2006
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	3/3/2006
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/2006
RF Filter Section	HP	85420E	3705A00256	3/29/2006
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/2006
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/2006
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	8/20/2006
Site A Line Stabilizer/Conditioner	Tripplite	LC-1800a	A005181	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2006
4.0 High Pass Filter	Micro Tronics	HPM13351	3	N/A

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 4940 TO 4990 MHz BAND

7.1.1. EMISSION BANDWIDTH

LIMIT

For reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

No non-compliance noted:

26 dB Bandwidth

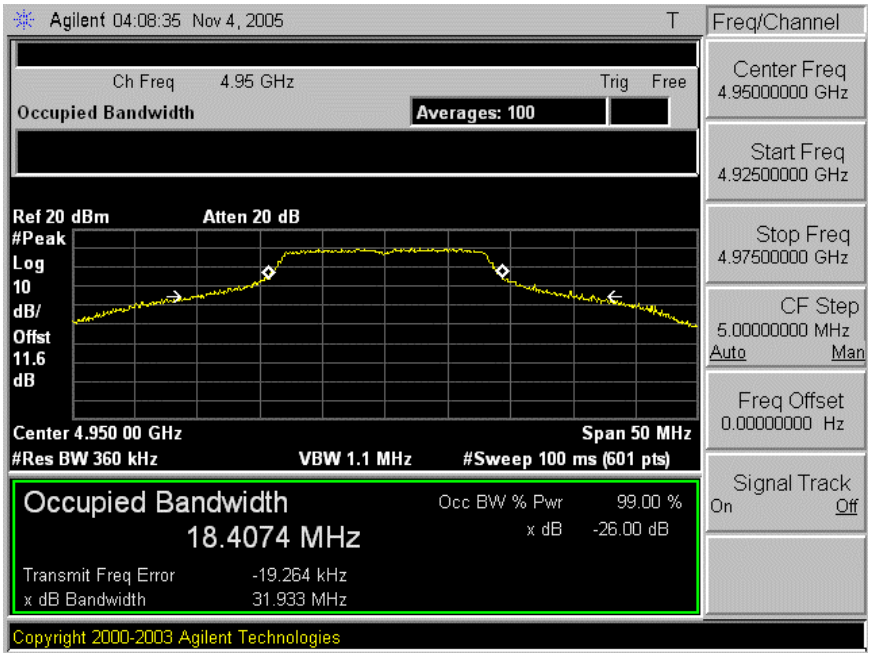
Channel	Frequency (MHz)	26 dB BW (MHz)
Low	4950	31.93
Middle	4965	32.43
High	4980	32.67

99% Bandwidth

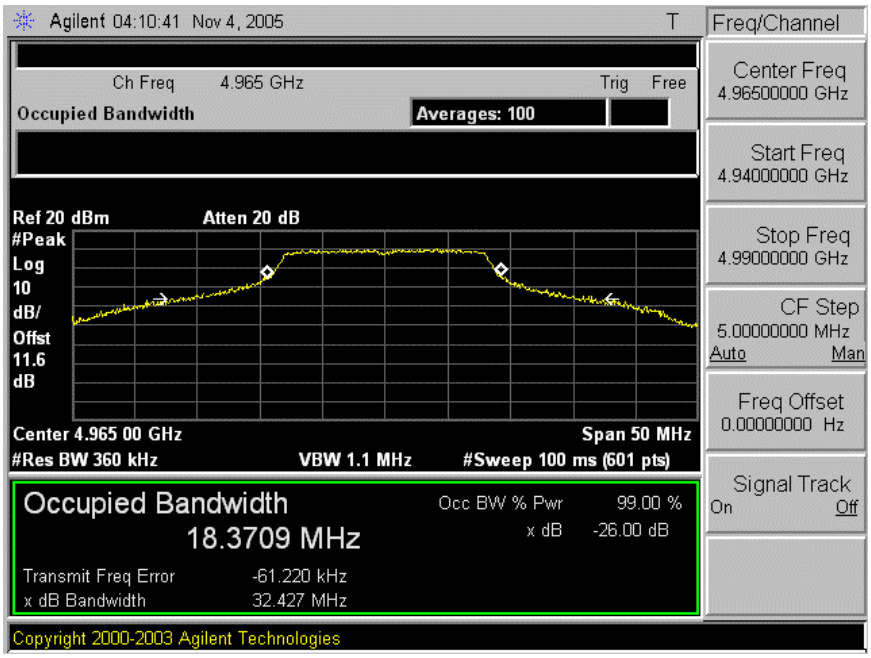
Channel	Frequency (MHz)	99% BW (MHz)	Limit (MHz)	Margin (MHz)
Low	4950	18.41	20.00	-1.59
Middle	4965	18.37	20.00	-1.63
High	4980	18.32	20.00	-1.68

26 dB EMISSION BANDWIDTH

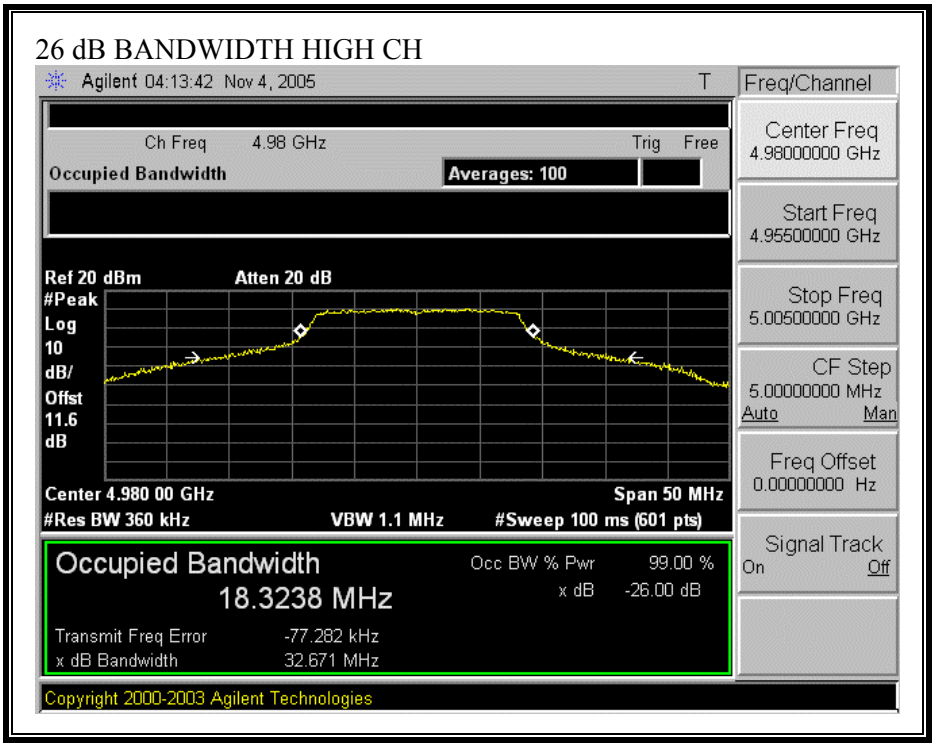
26 dB BANDWIDTH LOW CH



26 dB BANDWIDTH MID CH



26 dB BANDWIDTH HIGH CH



7.1.2. PEAK OUTPUT POWER

PEAK POWER LIMIT

§ 90.1215 The transmitting power of stations operating in the 4940–4990 MHz band must not exceed the maximum limits in this section.

(a) The peak transmit power should not exceed:

Channel bandwidth (MHz)	Low power Device Peak transmitter Power (dBm)	High power Device Peak transmitter Power (dBm)
1.....	7	20
5.....	14	27
10.....	17	30
15.....	18.8	31.8
20.....	20	33

High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to a peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the peak transmit power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point or point-to-multipoint operation (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the transmitter power or spectral density. Corresponding reduction in the peak transmit power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 26 dB bandwidth. The peak transmit power is measured as a conducted emission over any interval of continuous transmission calibrated in terms of an rms-equivalent voltage.

RESULTS

For antenna gains up to 26 dBi the limit is 33 dBm.

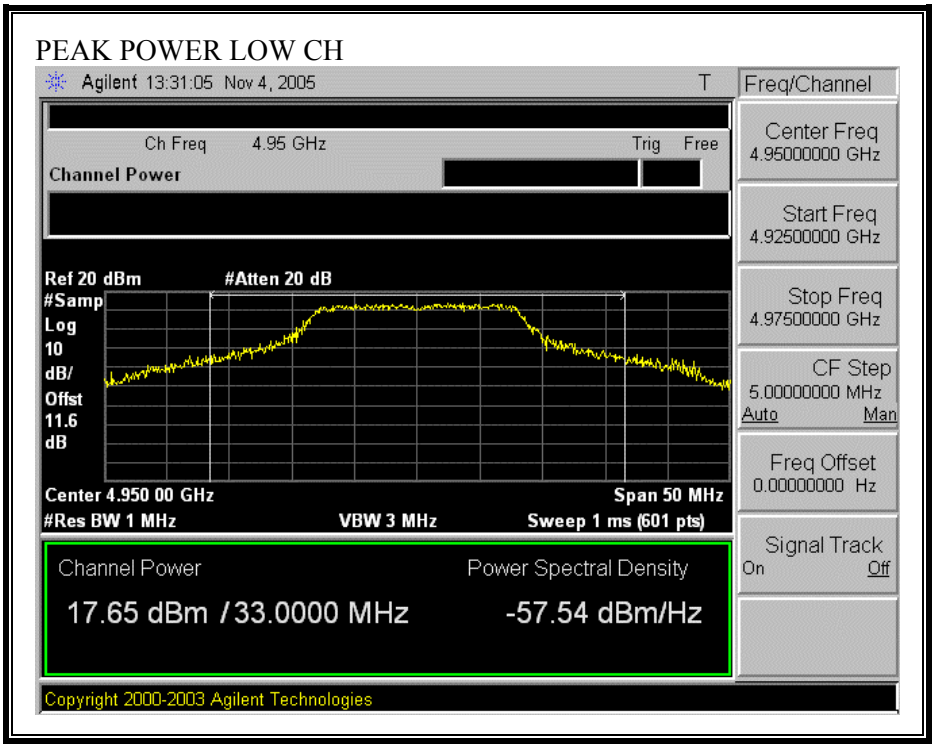
No non-compliance noted:

For antennas up to 16.5 dBi

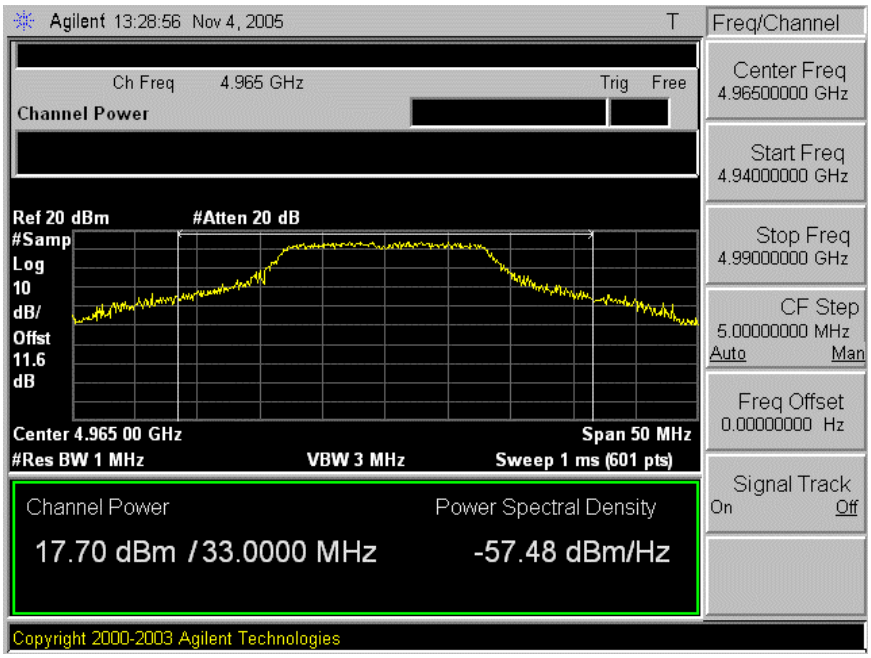
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	4950	17.65	33	-15.35
Middle	4965	17.70	33	-15.30
High	4980	17.77	33	-15.23

OUTPUT POWER (802.11a MODE, FOR ANTENNAS UP TO 16.5 dBi)

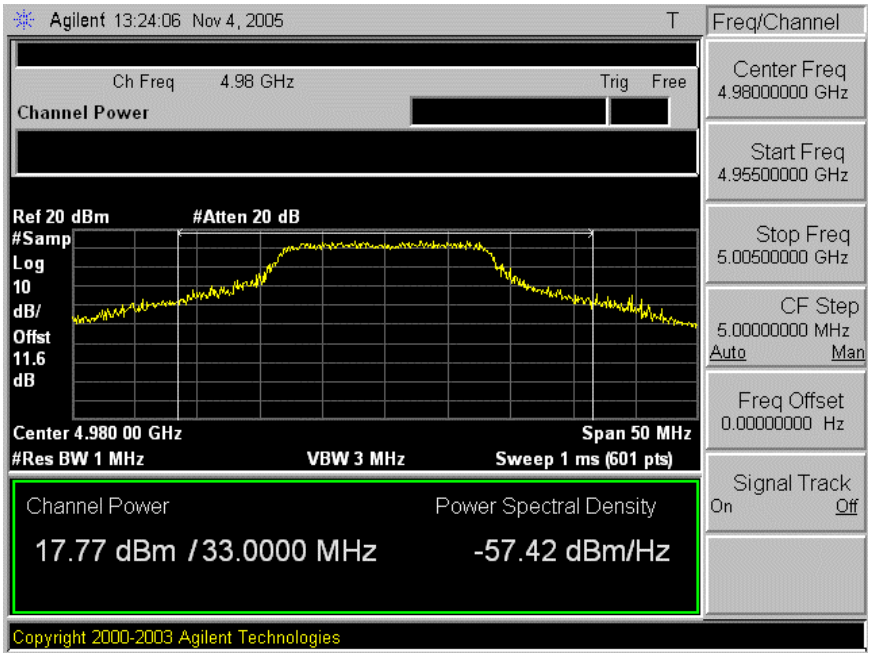
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



7.1.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

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^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

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

and

$S = E ^ 2 / 3770$

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 Power to mW and Distance to 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 distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11a	20.0	17.77	16.50	0.53

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.

7.1.4. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11.6 dB (including 10 dB pad and 1.6 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	4950	15.78
Middle	4965	16.15
High	4980	15.85

7.1.5. PEAK POWER SPECTRAL DENSITY

LIMIT

§ 90.1215 (a) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to a peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the peak transmit power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point or point-to-multipoint operation (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the transmitter power or spectral density. Corresponding reduction in the peak transmit power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

(c) The peak power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A resolution bandwidth less than the measurement bandwidth can be used, provided that the measured power is integrated to show total power over the measurement bandwidth. If the resolution bandwidth is approximately equal to the measurement bandwidth, and much less than the emission bandwidth of the equipment under test, the measured results shall be corrected to account for any difference between the resolution bandwidth of the test instrument and its actual noise bandwidth.

Limits as determined by antenna Gain:

Antenna Gain dBi	**Limit dBm**
Up to 26	21

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 1 MHz and VBW 3 MHz. The PPSD is the highest level found across the emission in any 3 kHz band.

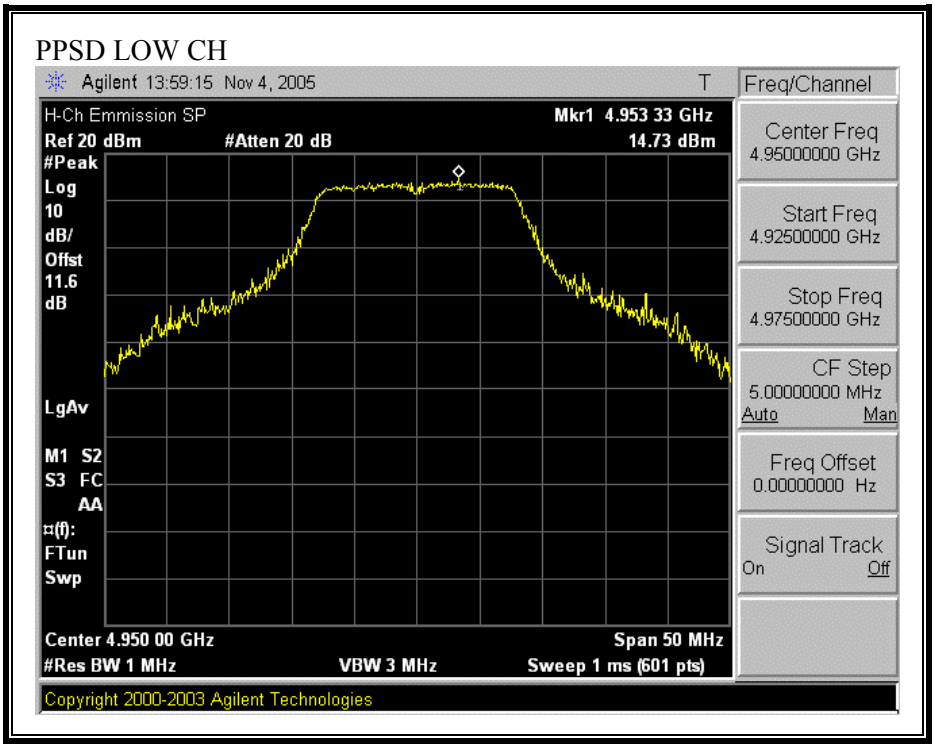
RESULTS

No non-compliance noted:

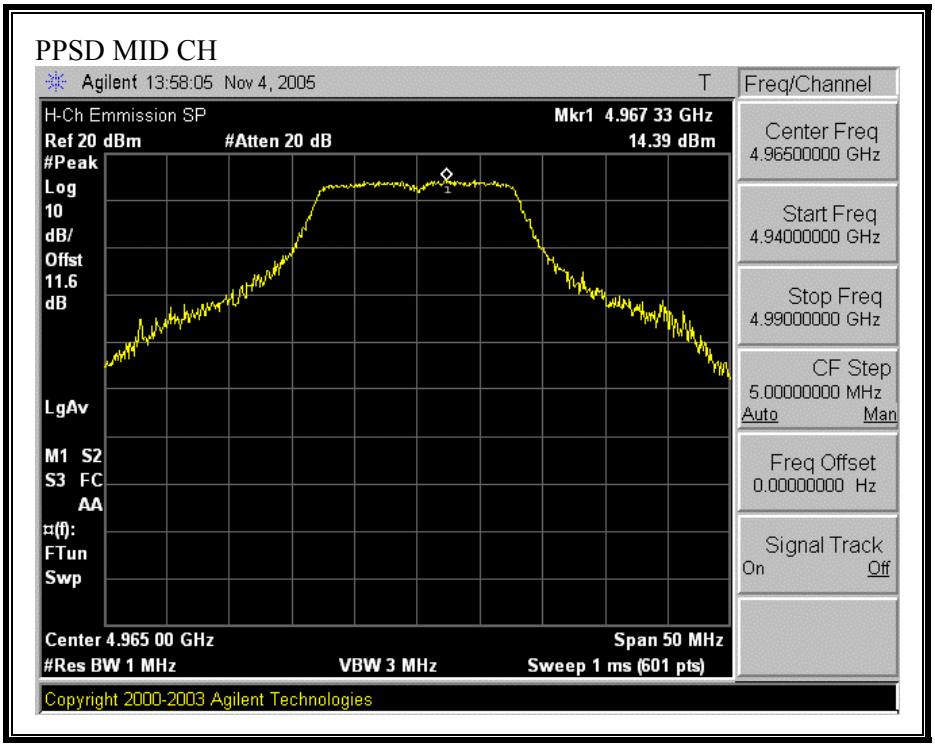
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	4950	14.73	20	-5.27
Middle	4965	14.39	20	-5.61
High	4980	14.44	20	-5.56

PEAK POWER SPECTRAL DENSITY (FOR UPTO 16.5 dBi ANTENNA GAIN)

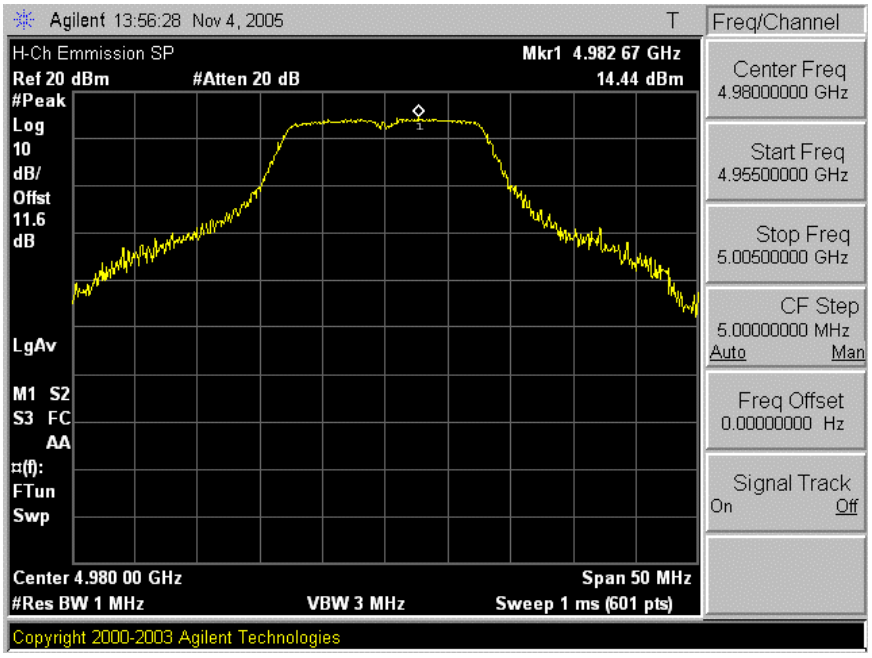
PPSD LOW CH



PPSD MID CH



PPSD HIGH CH



7.2. EMISSION MASK AND CONDUCTED SPURIOUS

§ 90.210 (m) Emission Mask M. For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.
(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.
(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of (BW)/50) dB.
(4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB attenuation.
(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB attenuation.
(6) On any frequency removed from the assigned frequency above 150% of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation..
(7) The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

TEST PROCEDURE

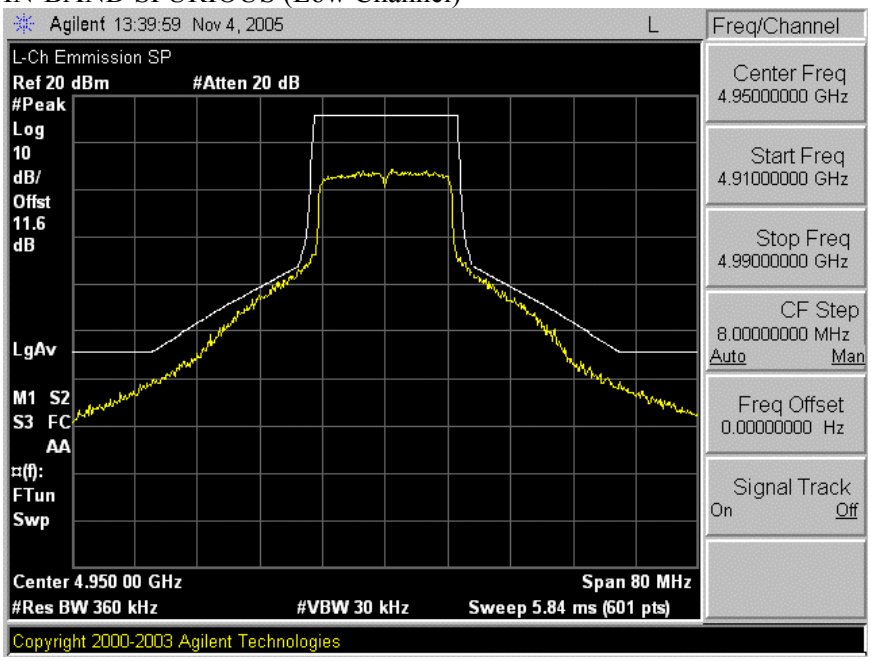
The EUT is connected to the spectrum analyzer, the average peak amplitude is used as the reference value for the mask, and the trace is compared to the mask.

RESULTS

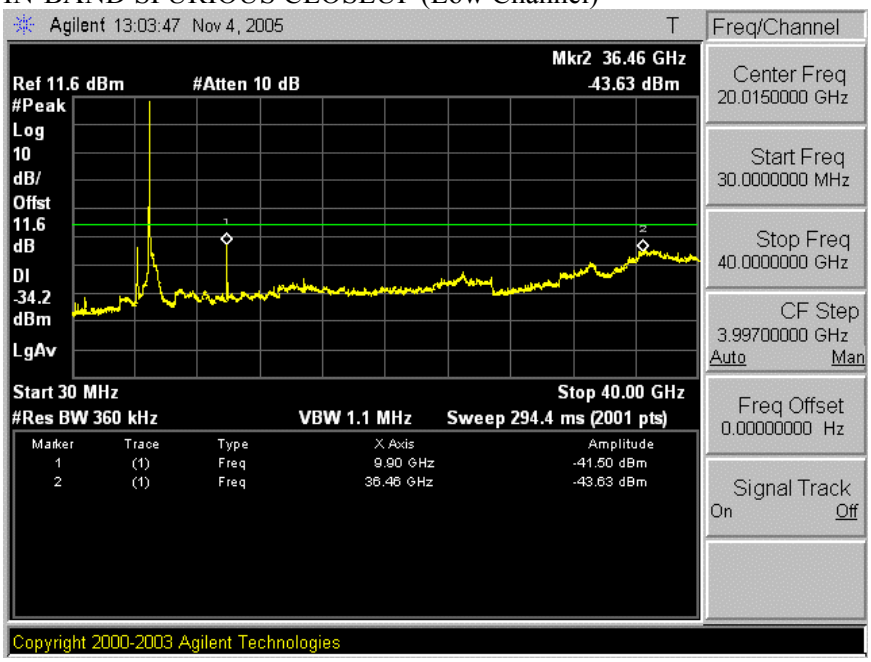
No non-compliance noted:

IN-BAND SPURIOUS EMISSIONS

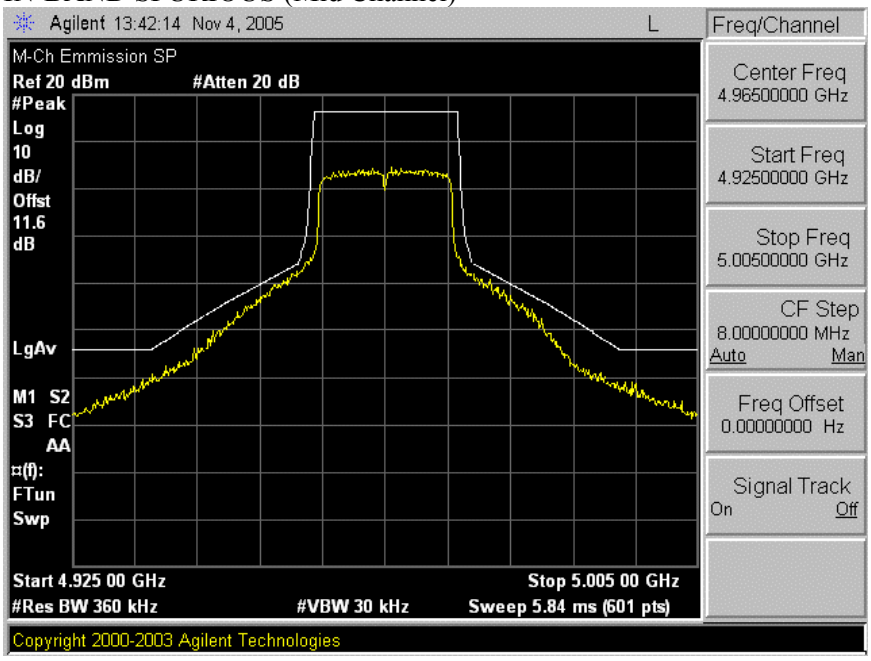
IN-BAND SPURIOUS (Low Channel)



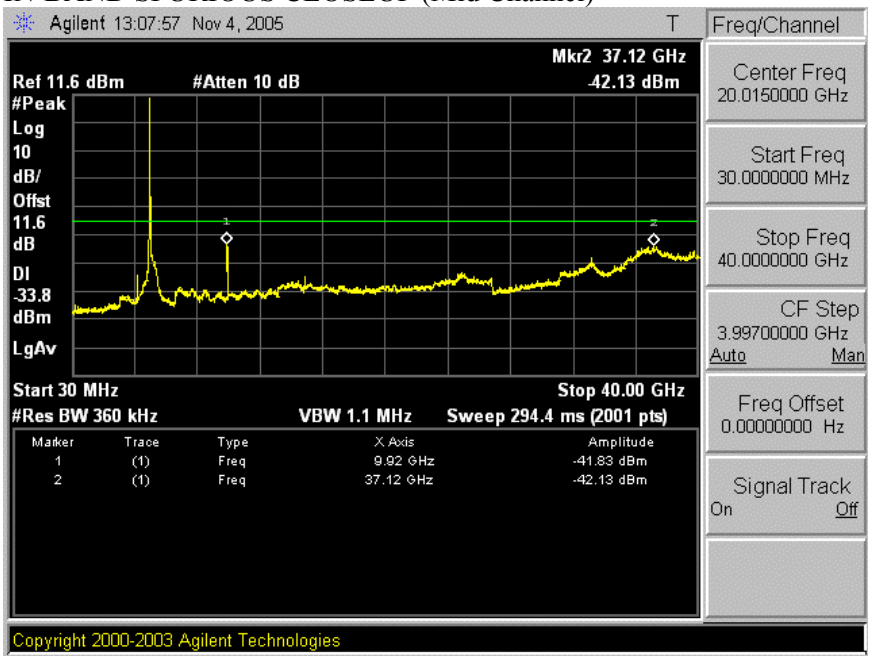
IN-BAND SPURIOUS CLOSEUP (Low Channel)



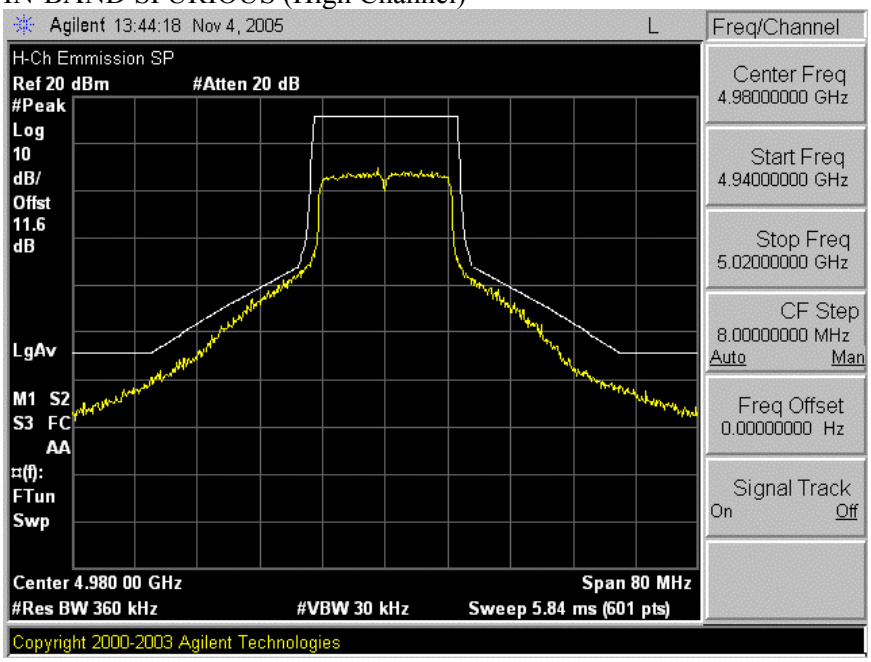
IN-BAND SPURIOUS (Mid Channel)



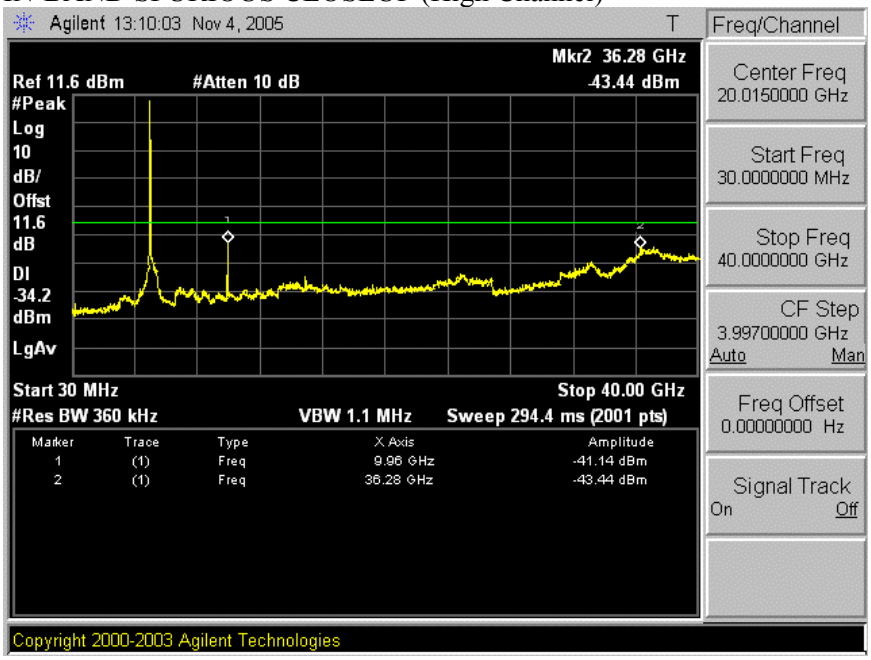
IN-BAND SPURIOUS CLOSEUP (Mid Channel)



IN-BAND SPURIOUS (High Channel)



IN-BAND SPURIOUS CLOSEUP (High Channel)



7.3. FREQUENCY STABILITY

LIMIT

§ 90.213 (a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table (See FCC § 90.1215 rules for table).

Above 2450 MHz: Frequency stability to be specified in the station authorization.

For equipment authorization purposes, this is a reporting requirement only.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted:

NORMAL VOLTAGE EXTREME TEMPERATURE RESULTS

Temp. Celsius	Channel Frequency (MHz)	Measured Frequency (MHz)	Delta Frequency (kHz)	ppm
-30	4965	4964.96492	-35.08	7.07
-20	4965	4964.96421	-35.79	7.21
-10	4965	4964.96408	-35.92	7.23
0	4965	4964.96419	-35.81	7.21
10	4965	4964.96395	-36.05	7.26
20	4965	4964.96383	-36.17	7.28
30	4965	4964.96377	-36.23	7.30
40	4965	4964.96922	-30.78	6.20
50	4965	4964.96984	-30.16	6.07

LOW VOLTAGE NORMAL TEMPERATURE RESULTS

Temp. Celsius	Channel Frequency (MHz)	Measured Frequency (MHz)	Delta Frequency (kHz)	ppm
20	4965	4964.96283	-37.17	7.49

HIGH VOLTAGE NORMAL TEMPERATURE RESULTS

Temp. Celsius	Channel Frequency (MHz)	Measured Frequency (MHz)	Delta Frequency (kHz)	ppm
20	4965	4964.96492	-35.08	7.07

7.4. RADIATED EMISSIONS

LIMITS

§ 90.210 (l) Emission Mask M. For high power transmitters (20 dBm or greater) operating in the 4894–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

On any frequency removed from the assigned frequency above 150% of the authorized bandwidth: 40 dB.

The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

The field strength of the fundamental is measured to provide a reference value for the –50 dBc limit. All measurements are peak.

The resolution bandwidth is set to 1 MHz, and the video bandwidth is set to 1 MHz for peak measurements.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels. Conducted measurements are made of spurious signals removed by less than 150% of the authorized bandwidth. Conducted and radiated measurements are made of spurious signals removed by more than 150% of the authorized bandwidth.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. 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 emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

7.4.1. TRANSMITTER ABOVE 1 GHz FOR 4894 TO 4990 MHz BAND

HARMONICS AND SPURIOUS EMISSIONS (Indoor)

11/16/05 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Can Ming Chung
Project #: 05U3795-T2
Company: Skypilot Network
EUT Descrip.: 802.11 a Base Fixed Wirless Node 4.9 GHz
EUT M/N: Skyconnector SC-1050(Indoor)
Test Target: Fcc Part 90
Mode Oper: Tx

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: ERP
Hi Frequency Cables: (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)
Pre-amplifer 1-26GHz: T87 Miteq 924342
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
4.950	81.0	V	14.7	3.0	10.2	8.1	19.7			Fundalmental
9.900	49.5	V	-51.8	4.2	12.5	10.3	-45.7	-30.3	-15.4	2nd Harmonic
14.850	47.3	V	-50.1	5.3	13.3	11.2	-44.3	-30.3	-14.0	3rd Harmonic
Mid Ch										
4.965	80.7	V	14.4	3.0	10.3	8.1	19.4			Fundalmental
9.930	45.6	V	-55.6	4.2	12.5	10.3	-49.5	-30.6	-18.9	2nd Harmonic
14.895	49.6	V	-47.8	5.3	13.3	11.1	-41.9	-30.6	-11.3	3rd Harmonic
High Ch										
4.980	80.8	V	14.5	3.1	10.3	8.1	19.6			Fundalmental
9.960	50.5	V	-50.6	4.2	12.5	10.4	-44.5	-30.4	-14.1	2nd Harmonic
14.940	46.4	V	-50.9	5.3	13.3	11.1	-45.1	-30.4	-14.7	3rd Harmonic
No other emissions were detected above system noise floor										

HARMONICS AND SPURIOUS EMISSIONS (Outdoor)

11/16/05 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Can Ming Chung
Project #: 05U3795-T2
Company: Skypilot Network
EUT Descrip.: 802.11 a Base Fixed Wirless Node 4.9 GHz
EUT M/N: Skyconnector SC-1050(Outdoor)
Test Target: Fcc Part 90
Mode Oper: Tx

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: ERP
Hi Frequency Cables: (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)
Pre-amplifer 1-26GHz: T87 Miteq 924342
Pre-amplifer 26-40GHz:

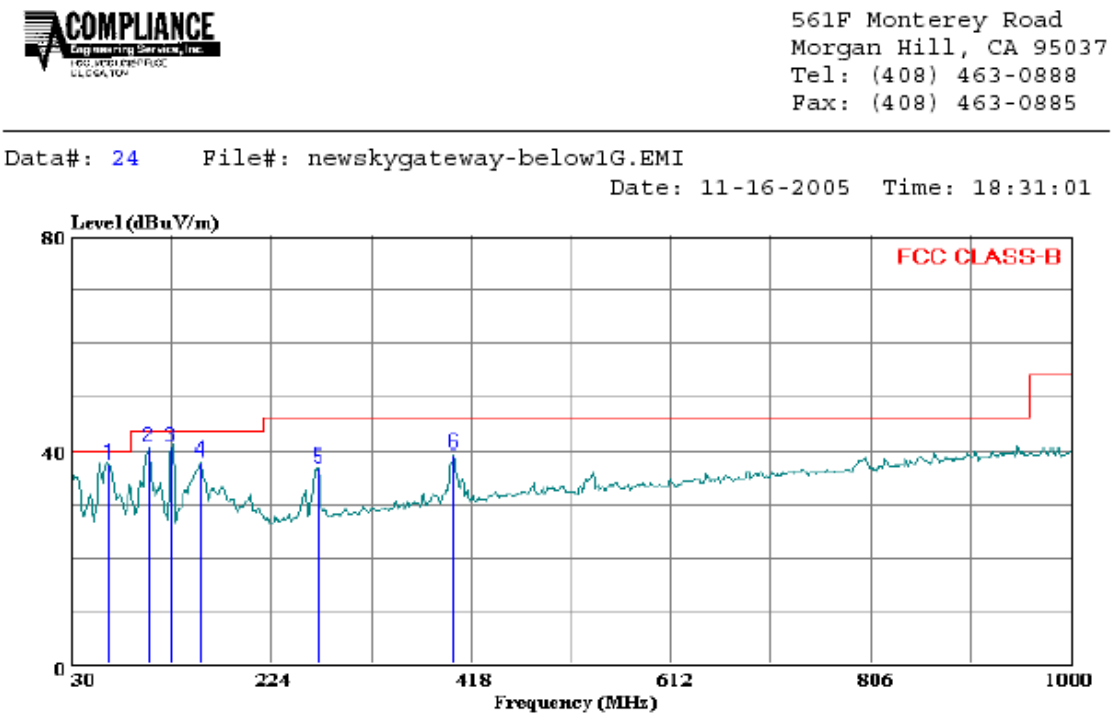
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
4.950	87.4	V	21.1	3.0	10.2	8.1	26.1			Fundalmental
9.900	61.7	V	-39.6	4.2	12.5	10.3	-33.5	-23.9	-9.6	2nd Harmonic
14.850	47.3	V	-50.1	5.3	13.3	11.2	-44.2	-23.9	-20.3	3rd Harmonic
Mid Ch										
4.965	85.5	V	19.2	3.0	10.3	8.1	24.2			Fundalmental
9.930	61.5	V	-39.7	4.2	12.5	10.3	-33.6	-25.8	-7.8	2nd Harmonic
14.895	47.1	V	-50.2	5.3	13.3	11.1	-44.4	-25.8	-18.6	3rd Harmonic
High Ch										
4.980	85.2	V	18.9	3.1	10.3	8.1	24.0			Fundalmental
9.960	58.2	V	-42.9	4.2	12.5	10.4	-36.8	-26.0	-10.8	2nd Harmonic
14.940	46.9	V	-50.4	5.3	13.3	11.1	-44.6	-26.0	-18.6	3rd Harmonic

No other emissions were detected above system noise floor

7.4.2. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL, SKYCONNECTOR INDOOR)

HORIZONTAL PLOT



HORIZONTAL DATA

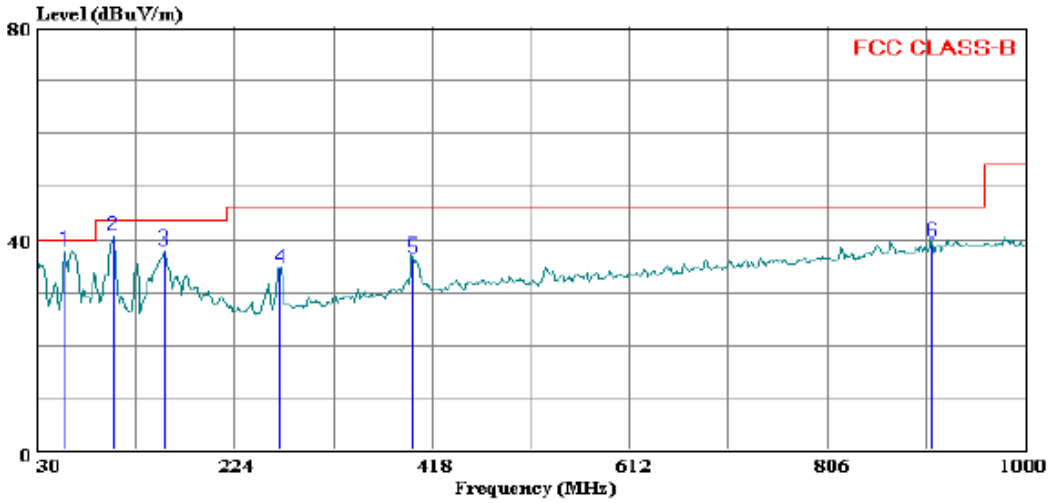
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	66.860	28.24	9.15	37.39	40.00	-2.61	Peak
2	104.690	27.94	12.38	40.32	43.50	-3.18	Peak
3	127.000	25.11	15.22	40.34	43.50	-3.16	Peak
4	155.130	23.92	13.95	37.87	43.50	-5.63	Peak
5	269.590	22.29	14.61	36.90	46.00	-9.10	Peak
6	400.540	21.23	18.04	39.27	46.00	-6.73	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL, SKYCONNECTOR INDOOR)

VERTICAL PLOT

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

Data#: 22 File#: newskygateway-below1G.EMI
Date: 11-16-2005 Time: 18:24:49



(Audix ATC)
Trace: 21 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Can Ming Chung
Project #: : 05U3795-T2
Company: : Skypilot Network, Inc
EUT: : 802.11 a Based Fixed Wireless Node4.9 GHz
Model No. : Skyconnector SC-1050 (Indoor)
Configuration : EUT Only
Target of Test : Fcc Part 90.1209
Mode of Operation: Tx, Worst Case (Mid Ch)

VERTICAL DATA

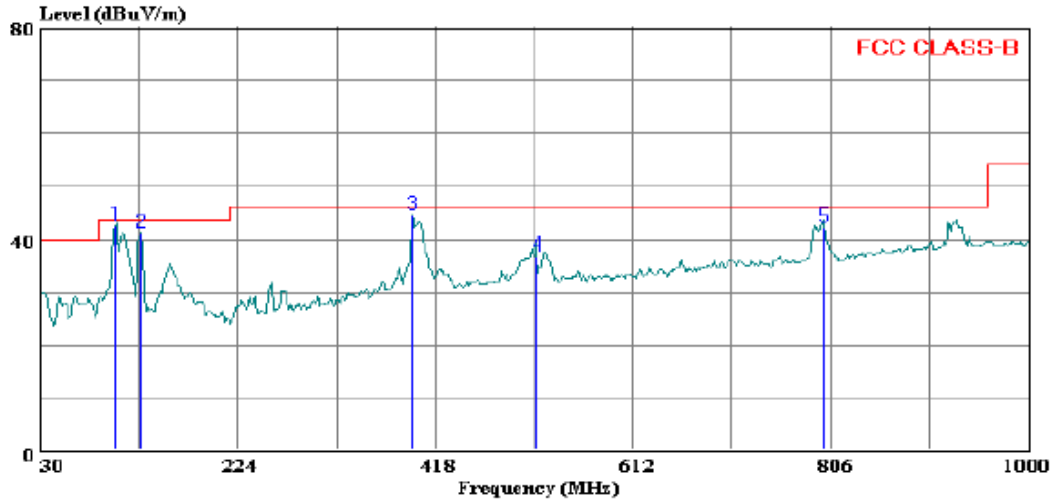
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	57.160	29.17	8.47	37.65	40.00	-2.35	Peak
2	104.690	27.94	12.38	40.32	43.50	-3.18	Peak
3	155.130	23.92	13.95	37.87	43.50	-5.63	Peak
4	268.620	20.18	14.53	34.71	46.00	-11.29	Peak
5	398.600	18.66	18.01	36.67	46.00	-9.33	Peak
6	907.850	13.22	26.00	39.22	46.00	-6.78	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL, SKYCONNECTOR OUTDOOR)

HORIZONTAL PLOT

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

Data#: 18 File#: newskygateway-below1G.EMI
Date: 11-16-2005 Time: 17:34:20



(Audix ATC)
Trace: 17 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Can Ming Chung
Project #: : 05U3795-T2
Company: : Skypilot Network, Inc
EUT: : 802.11 a Based Fixed Wireless Node4.9 GHz
Model No. : Skyconnector SC-1050 (outdoor)
Configuration : EUT Only
Target of Test : Fcc Part 90.1209
Mode of Operation: Tx, Worst Case (Mid Ch)

HORIZONTAL DATA

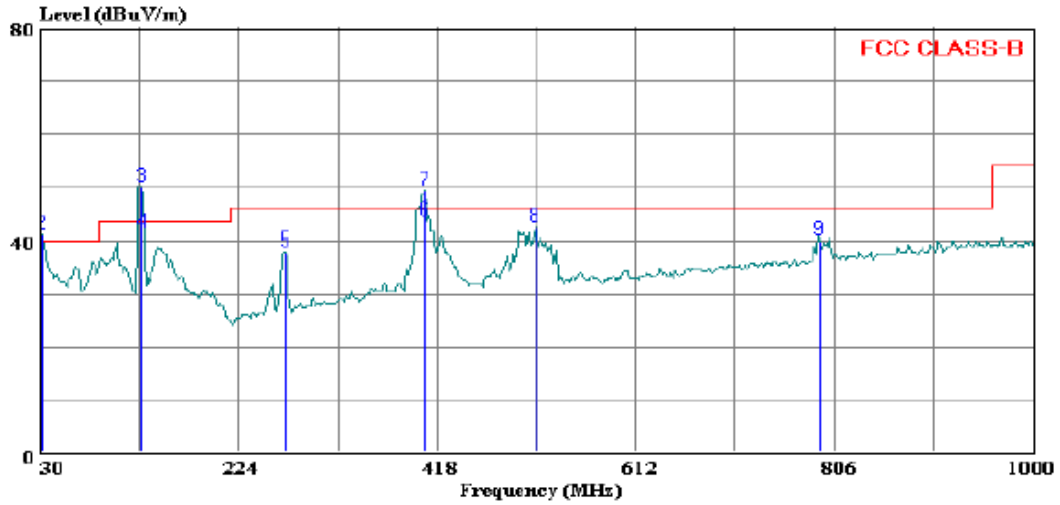
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	103.720	30.04	12.23	42.27	43.50	-1.23	Peak
2	128.940	25.85	15.15	41.00	43.50	-2.50	Peak
3	395.690	26.39	17.93	44.32	46.00	-1.68	Peak
4	517.910	16.21	20.52	36.72	46.00	-9.28	Peak
5	799.210	17.40	24.56	41.96	46.00	-4.04	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL, SKYCONNECTOR OUTDOOR)

VERTICAL PLOT

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

Data#: 16 File#: newskygateway-below1G.EMI
Date: 11-16-2005 Time: 17:19:16



(Audix ATC)
Trace: 11 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Can Ming Chung
Project #: : 05U3795-T2
Company: : Skypilot Network, Inc
EUT: : 802.11 a Based Fixed Wireless Node4.9 GHz
Model No. : Skyconnector SC-1050 (outdoor)
Configuration : EUT Only
Target of Test : Fcc Part 90.1209
Mode of Operation: Tx, Worst Case (Mid Ch)

VERTICAL DATA

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		32.910	19.33	19.94	39.27	40.00	-0.73	QP
2	*	32.910	20.93	19.94	40.86	40.00	0.86	Peak
3	*	128.940	34.58	15.15	49.73	43.50	6.23	Peak
4		128.940	26.18	15.15	41.33	43.50	-2.17	QP
5		269.590	23.29	14.61	37.90	46.00	-8.10	Peak
6		405.390	25.33	18.18	43.51	46.00	-2.49	QP
7	*	405.390	31.06	18.18	49.24	46.00	3.24	Peak
8		514.030	21.83	20.44	42.27	46.00	-3.73	Peak
9		791.450	15.47	24.44	39.91	46.00	-6.09	Peak

7.5. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (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 of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

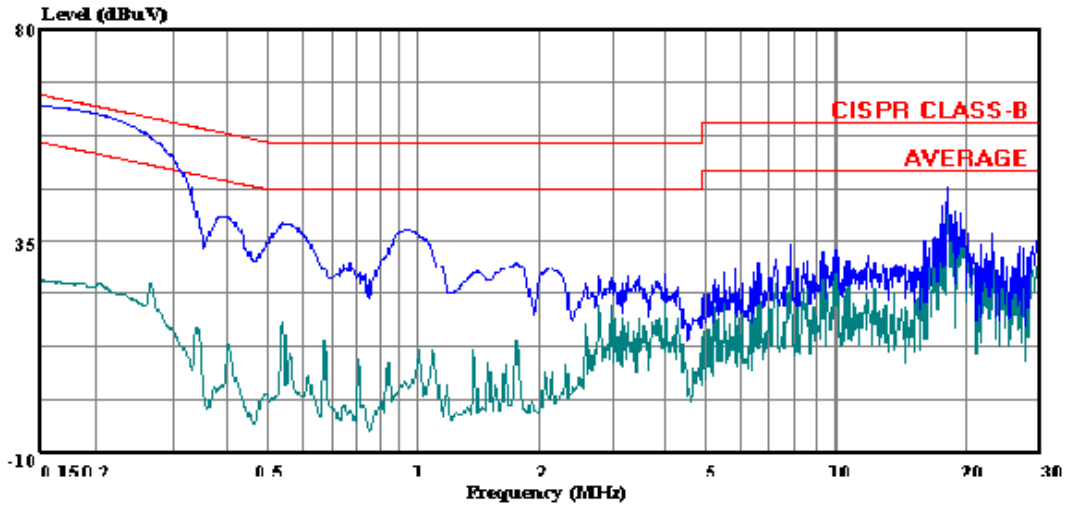
6 WORST EMISSIONS WITH SKYCONNECTOR (INDOOR)

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	62.08		25.75	0.00	64.77	54.77	-64.77	-29.02	L1
1.04	37.50	--	17.19	0.00	56.00	46.00	-18.50	-28.81	L1
18.33	46.68	--	42.65	0.00	60.00	50.00	-13.32	-7.35	L1
0.20	64.80	58.78	27.82	0.00	63.61	53.61	-4.83	-25.79	L2
0.55	53.70	47.46	22.85	0.00	56.00	46.00	-8.54	-23.15	L2
18.23	41.40	40.62	39.54	0.00	60.00	50.00	-19.38	-10.46	L2
6 Worst Data									

LINE 1 RESULTS

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

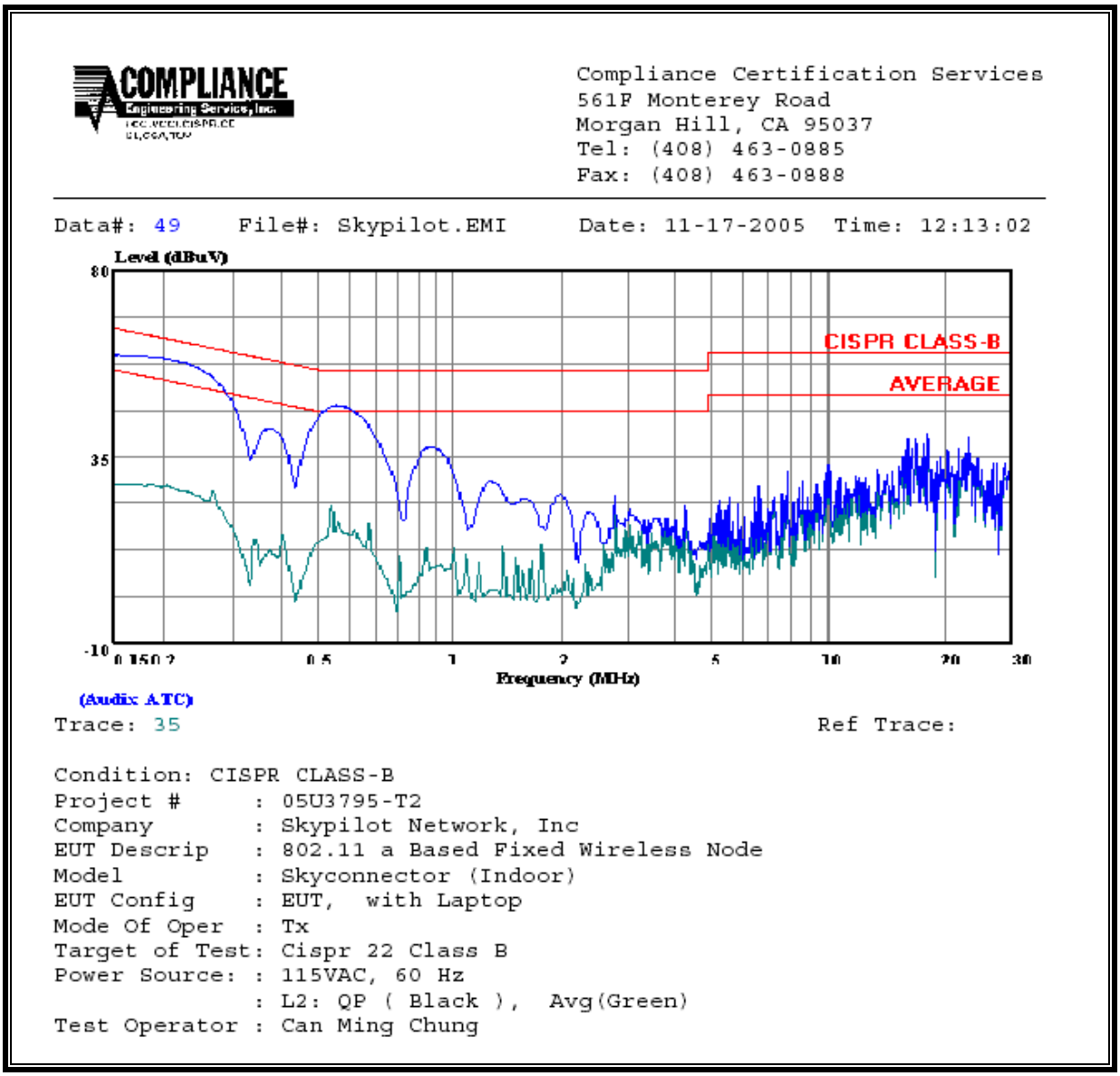
Data#: 28 File#: Skypilot.EMI Date: 11-17-2005 Time: 10:55:25



Trace: 26 Ref Trace:

Condition: CISPR CLASS-B
Project # : 05U3795-T1
Company : Skypilot Network, Inc
EUT Descrip : 802.11 a Based Fixed Wireless Node
Model : Skyconnector (Indoor)
EUT Config : EUT, with Laptop
Mode Of Oper : Tx
Target of Test: Cispr 22 Class B
Power Source: : 115VAC, 60 Hz
: L1: Peak (Black), Avg (Green)
Test Operator : Can Ming Chung

LINE 2 RESULTS



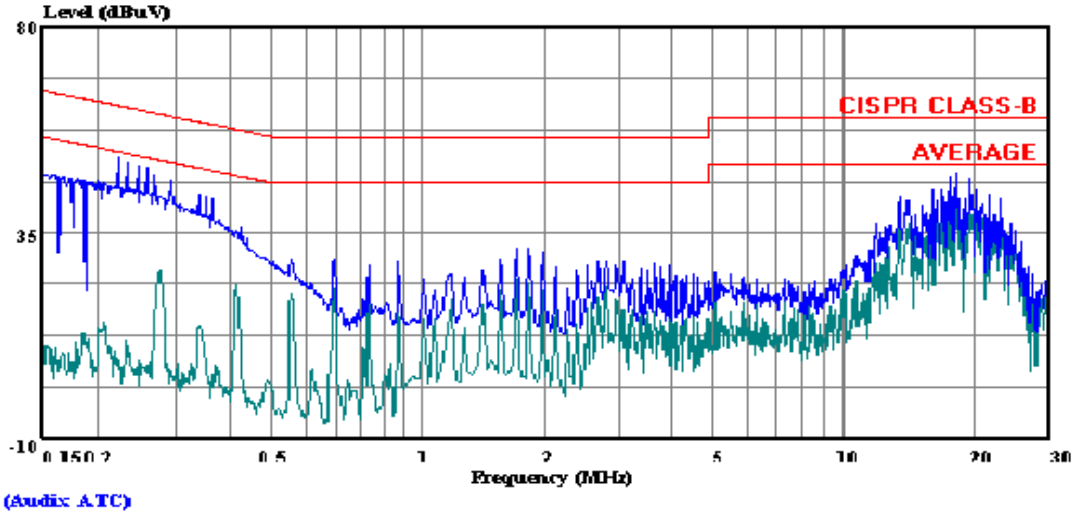
6 WORST EMISSIONS WITH SKYCONNECTOR (OUTDOOR)

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.22	51.52	--	5.19	0.00	62.71	52.71	-11.19	-47.52	L1
0.23	50.40	--	9.95	0.00	62.31	52.31	-11.91	-42.36	L1
18.33	48.14	--	43.66	0.00	60.00	50.00	-11.86	-6.34	L1
17.75	46.80	--	42.17	0.00	60.00	50.00	-13.20	-7.83	L2
18.33	47.88	--	43.31	0.00	60.00	50.00	-12.12	-6.69	L2
19.74	46.78	--	42.49	0.00	60.00	50.00	-13.22	-7.51	L2
6 Worst Data									

LINE 1 RESULTS

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

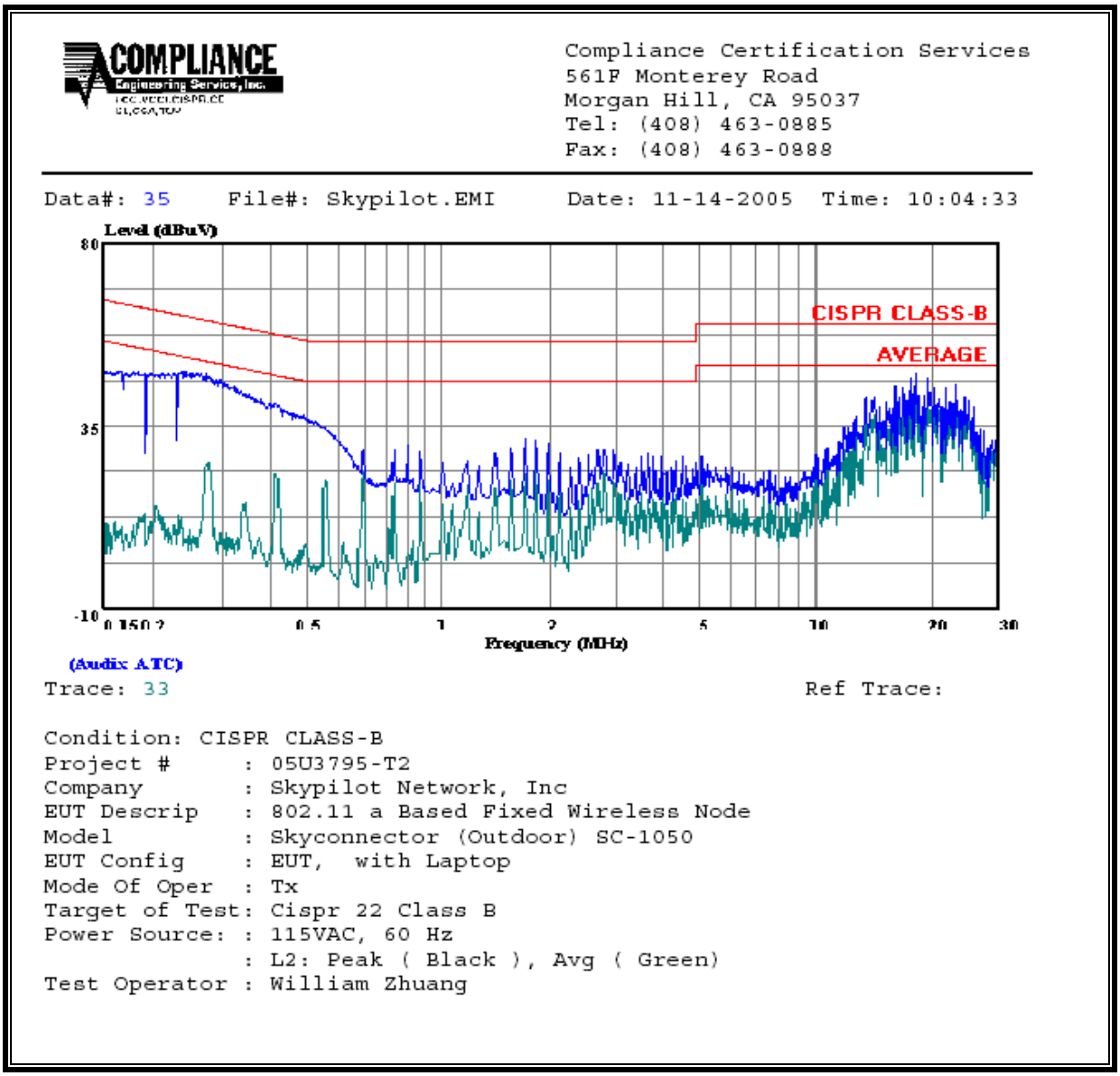
Data#: 28 File#: Skypilot.EMI Date: 11-14-2005 Time: 09:54:45



Trace: 26 Ref Trace:

Condition: CISPR CLASS-B
Project # : 05U3795-2
Company : Skypilot Network, Inc
EUT Descrip : 802.11 a Based Fixed Wireless Node
Model : Skyconnector SC-1050
EUT Config : EUT, with Laptop
Mode Of Oper : Transmittering
Target of Test: Cispr 22 Class B
Power Source: : 115VAC, 60 Hz
: L1: Peak (Black), Avg (Green)
Test Operator : William Zhuang

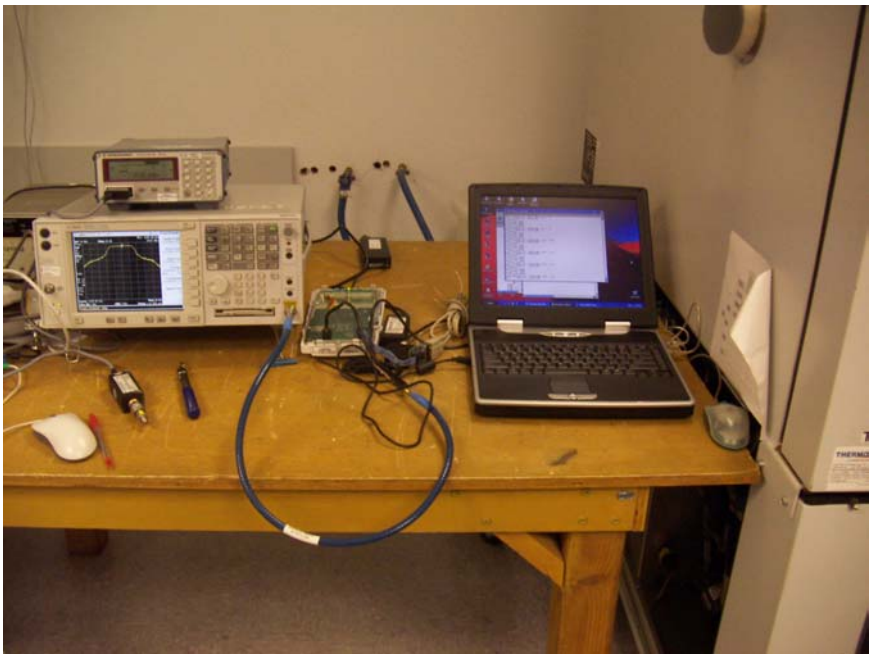
LINE 2 RESULTS



8. SETUP PHOTOS

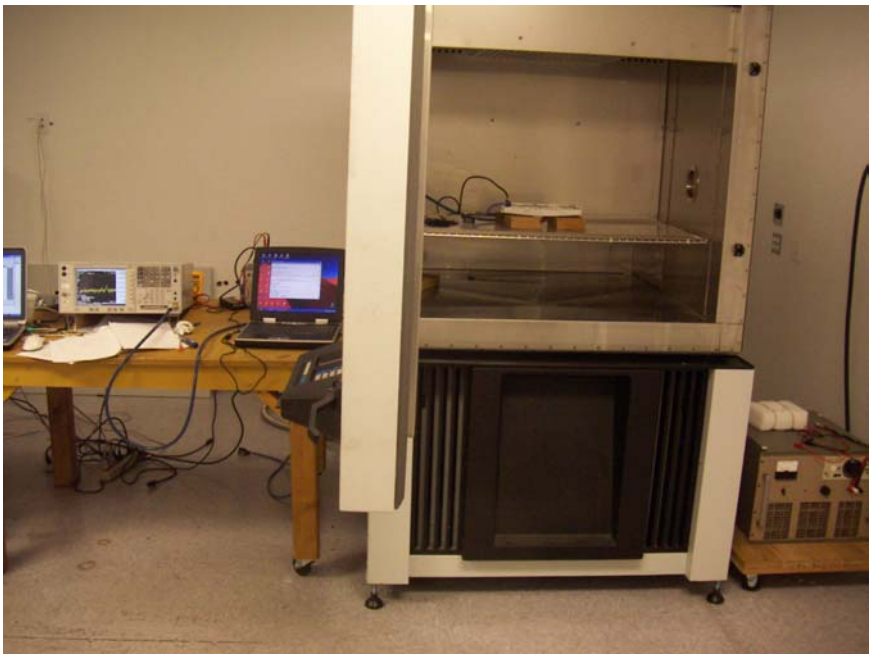
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



TEMPERATURE CHAMBER MEASUREMENT SETUP

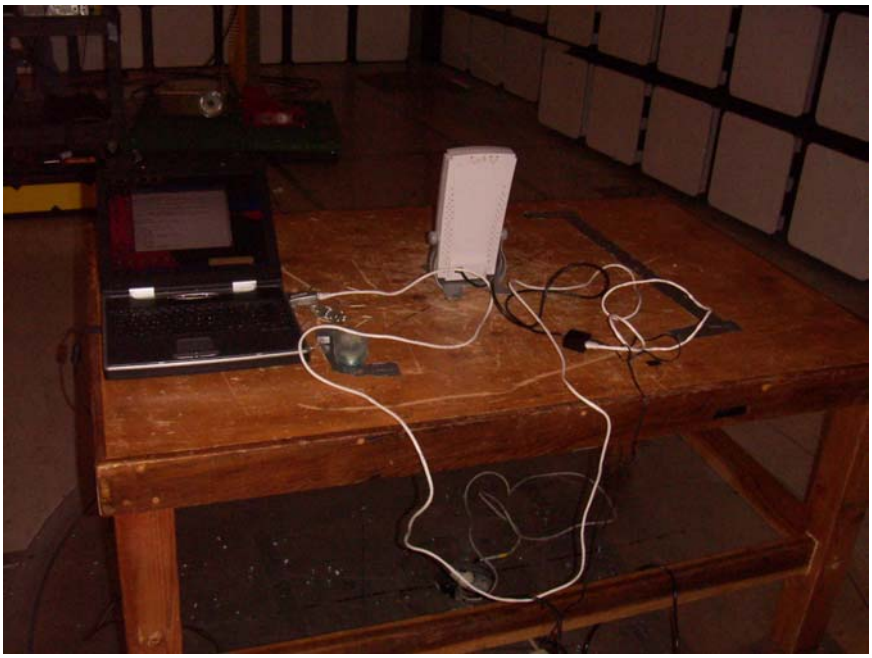
TEMPERATURE CHAMBER PHOTO



RADIATED RF MEASUREMENT SETUP ABOVE 1GHz WITH SKYCONNECTOR INDOOR ABOVE 1GHz

RADIATED FRONT PHOTO

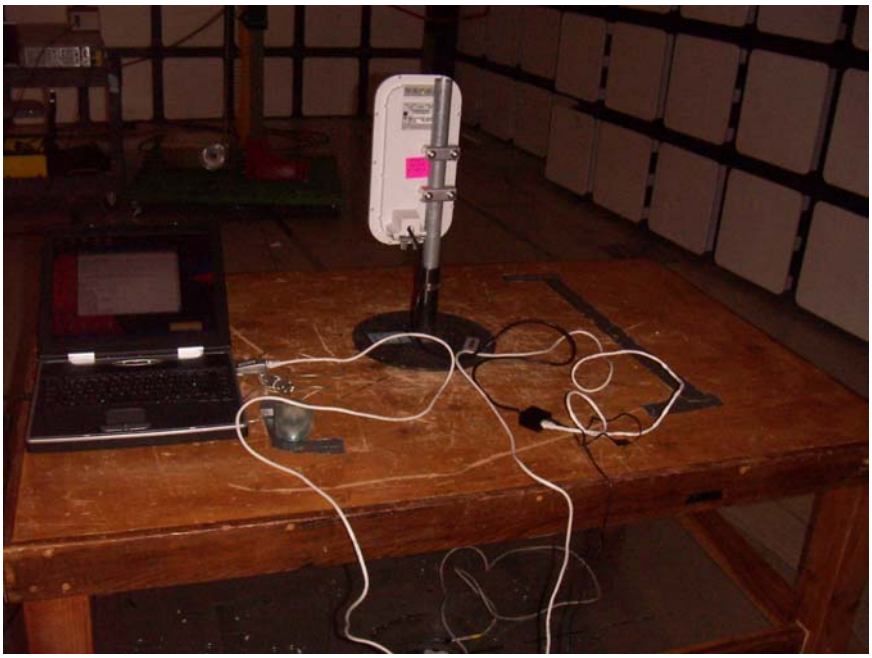
RADIATED BACK PHOTO



RADIATED RF MEASUREMENT SETUP WITH SKYCONNECTOR OUTDOOR ABOVE 1GHz

RADIATED FRONT PHOTO

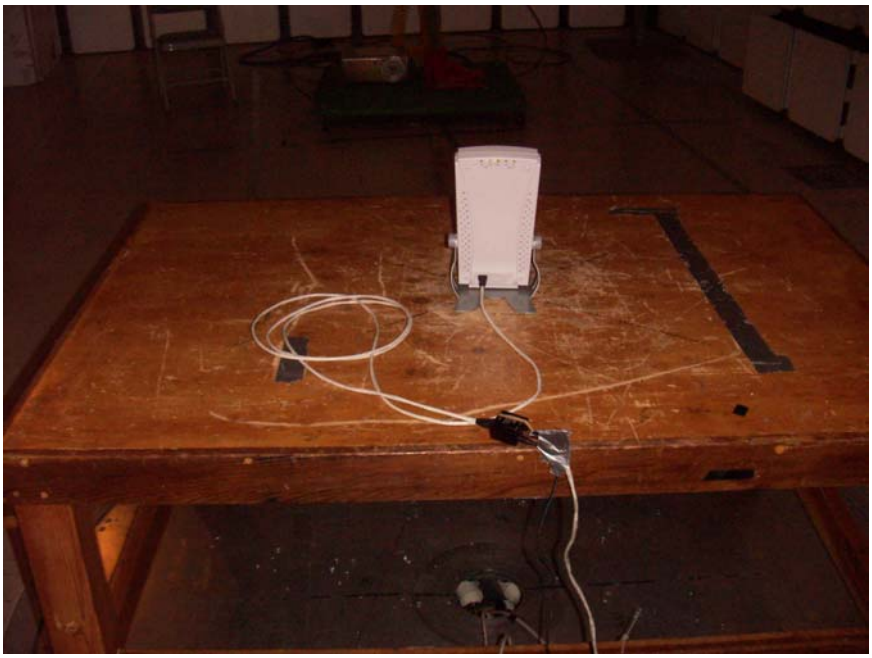
RADIATED BACK PHOTO



RADIATED RF MEASUREMENT SETUP WITH SKYCONNECTOR INDOOR BELOW 1GHz

RADIATED FRONT PHOTO

RADIATED BACK PHOTO



RADIATED RF MEASUREMENT SETUP WITH SKYCONNECTOR OUTDOOR BELOW 1GHz

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP WITH SKYCONNECTOR INDOOR

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP WITH SKYCONNECTOR OUTDOOR

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT