FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

WIRELESS INTERNET ACCESS SUBSCRIBR UNIT

MODEL NUMBER: M5800S-FSU-D2

FCC ID: NCYM5800SFSUD2

REPORT NUMBER: 05U3457

ISSUE DATE: JUNE 15, 2005

Prepared for
TRANGO SYSTEMS, INC.
15070 AVENUE OF SCIENCE, SUITE 200
SAN DIEGO, CA 92128
U.S.A.

Prepared by
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Revision History

Rev.	Issue Date	Revisions	Revised By
A		Initial Issue	YZ

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: TRANGO SYSTEMS, INC.
15070 AVENUE OF SCIENCE, SUITE 200
SAN DIEGO, CA 92128

EUT DESCRIPTION: WIRELESS INTERNET ACCESS SUBSCRIBR UNIT

MODEL: M5800S-FSU-D2

SERIAL NUMBER: 01350006

DATE TESTED: MAY 26 ~ JUNE 1, 2005

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	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:

YANG ZHENG
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

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 a WIRELESS INTERNET ACCESS SUBSCRIBR UNIT.

The radio module is manufactured by TRANGO SYSTEMS, INC.

5.2. MAXIMUM OUTPUT POWER

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

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5736 - 5836	802.11a	27.07	509.33

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio has two configurations: configuration #1 is stand-alone; and configuration # 2 is utilizing a Dish antenna as a reflector. The maximum antenna gain for the stand-alone is 8dBi; the maximum antenna gain with the reflector is 25dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Rev 1P06

The test utility program used during the testing was telnet, any current standards compliant version

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 5785 MHz.

The worst-case radiated emission configuration is with the reflector. Thus, all the tests were performed with the worst-case configuration.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Sony	VSIO PCGR505EL	NA	DoC
AC Adapter	Sony	PCGA-AC19V1	0044Q0183529	DoC
AC Adapter	Hon-Kwang	D12-10-1000-10	NA	DoC
Dish	Trango	NA	NA	NA

I/O CABLES

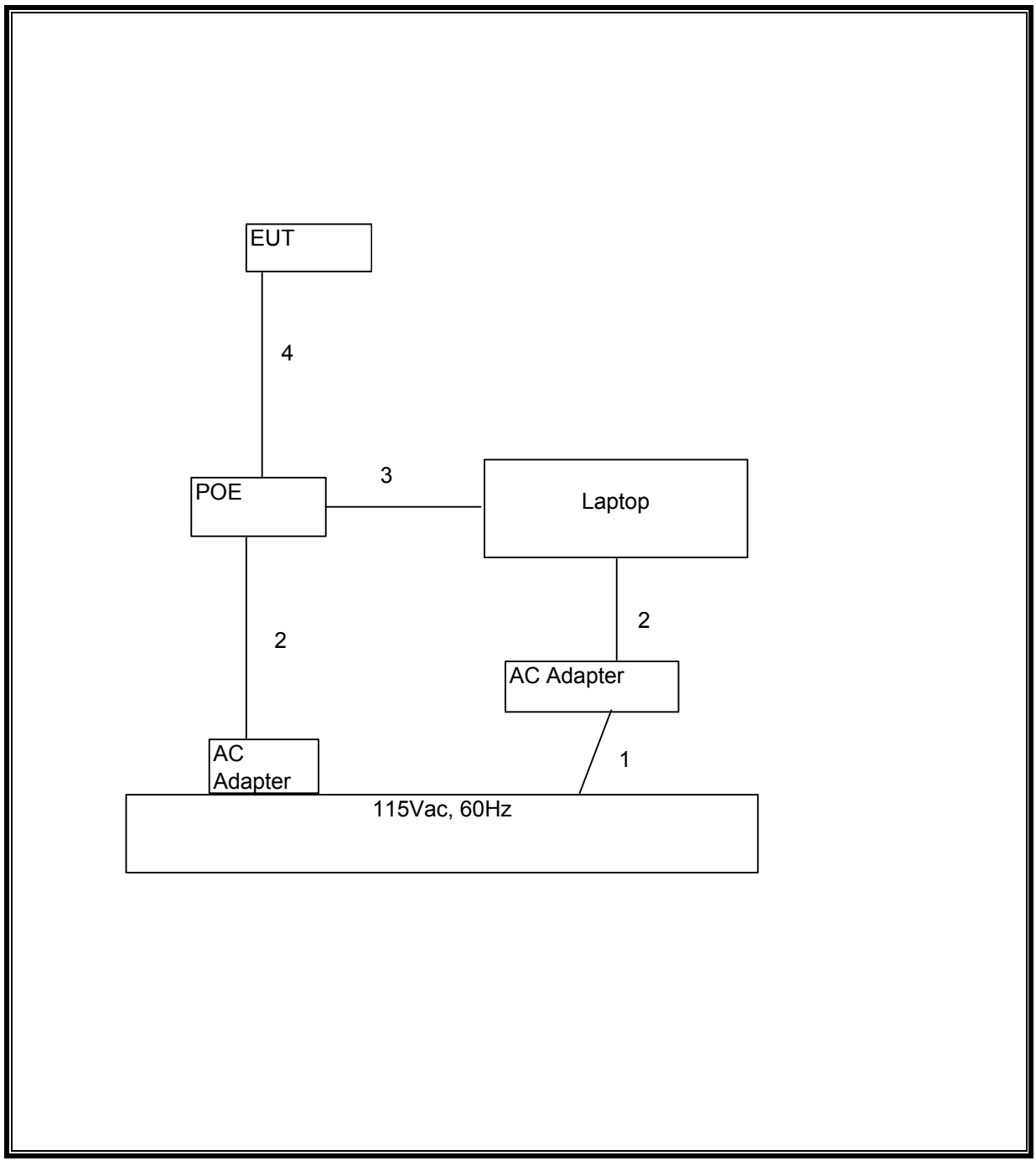
I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	NA
2	DC	2	DC	Un-shielded	1m	NA
3	Ethernet	1	RJ45	Un-shielded	2m	NA
4	Ethernet	1	RJ45	Un-shielded	5m	NA

TEST SETUP

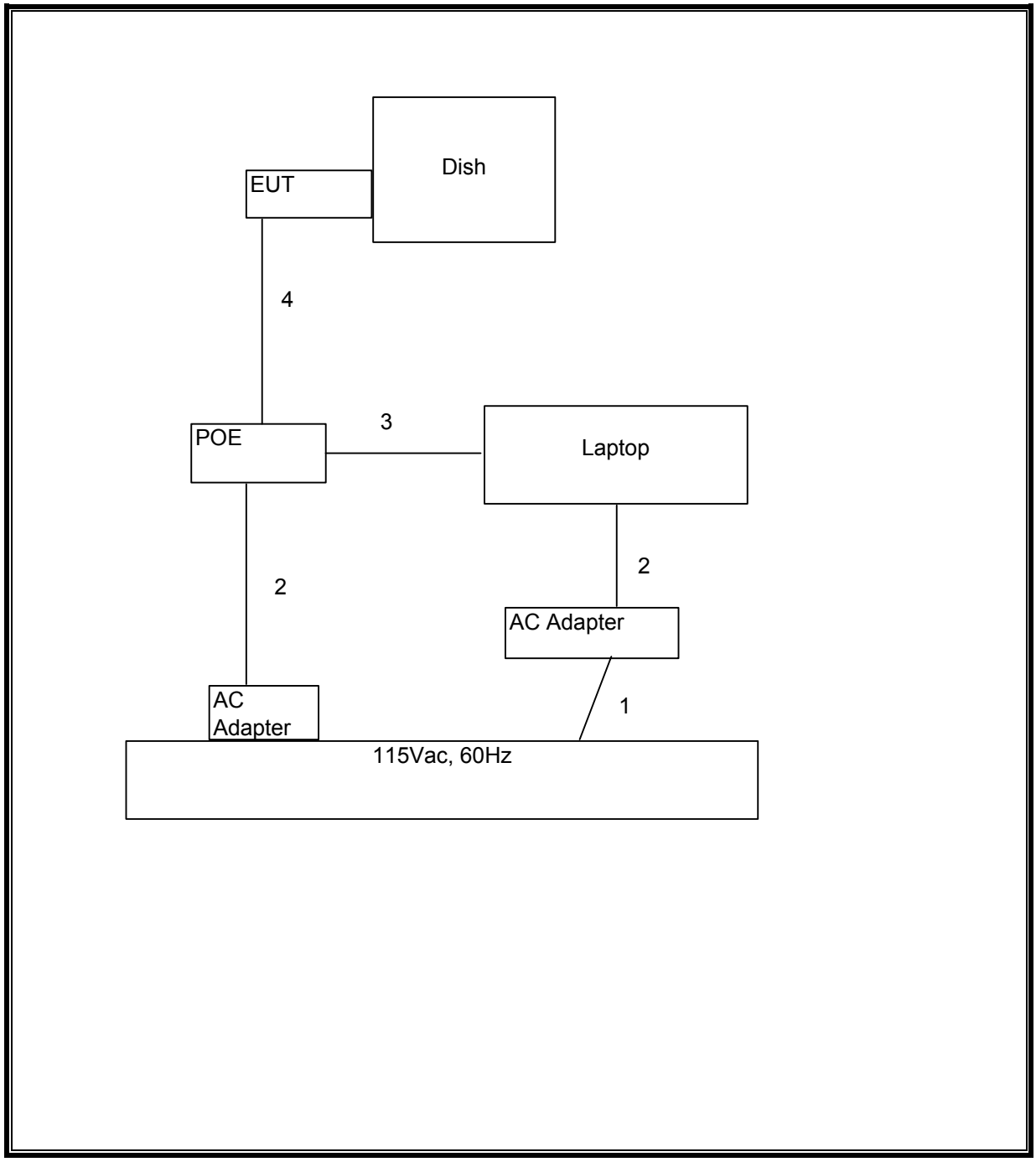
The EUT is connected to a laptop computer via a shielded twisted pair cable and a Power over Ethernet Adapter. The test software exercised the radio.

SETUP DIAGRAM FOR TESTS

Configuration 1 – Stand alone



Configuration 2 – With reflector



6. TEST AND MEASUREMENT EQUIPMENT

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

EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2005
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/2005
Spectrum Analyzer	HP	E4446A	US42510266	8/25/2005
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29310	9/12/2005
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/2005
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/2006
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/2006
RF Filter Section	HP	85420E	3705A00256	3/6/2006
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/6/2006
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/12/2005
7.6GHz HPF	Micro Tronics	HPM13195	1	N/A
Antenna, Horn 18 ~ 26 GHz	ARA	SWH-28	1007	9/12/05

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 5725 TO 5850 MHz BAND

7.1.1. 6 dB BANDWIDTH

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

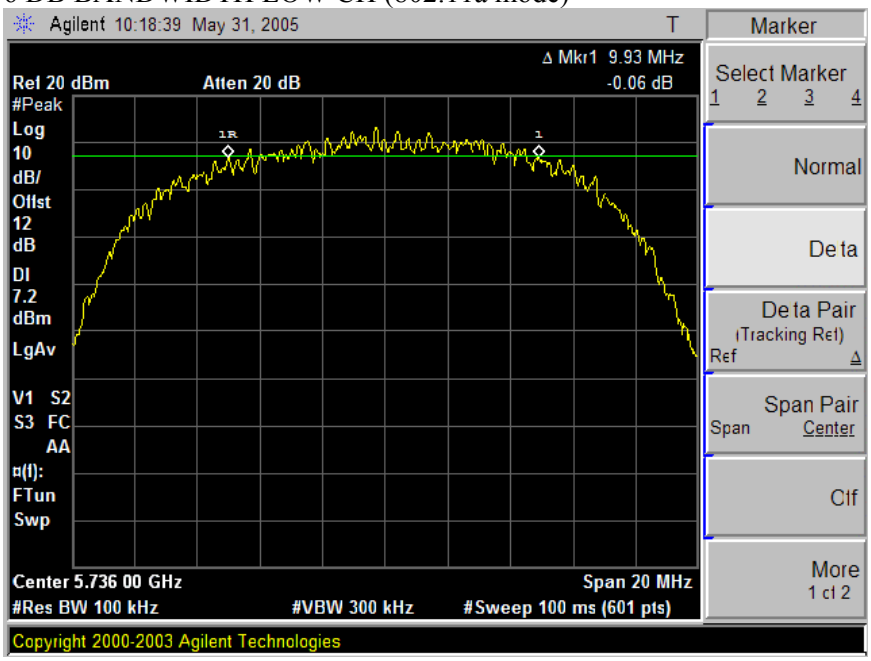
No non-compliance noted:

802.11a Mode

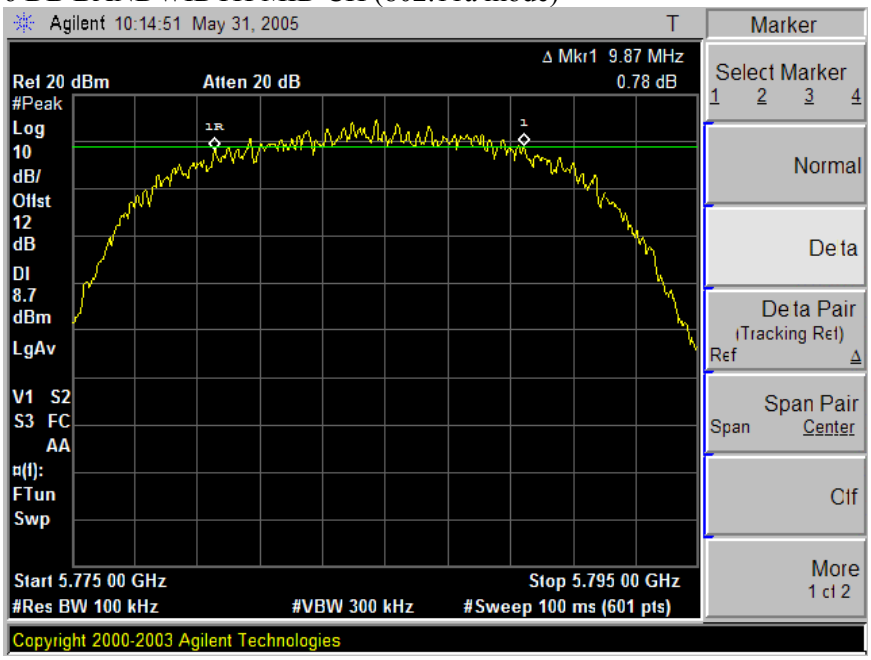
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	5736	9930	500	9430
Middle	5785	9870	500	9370
High	5836	9930	500	9430

6 DB BANDWIDTH (802.11a MODE)

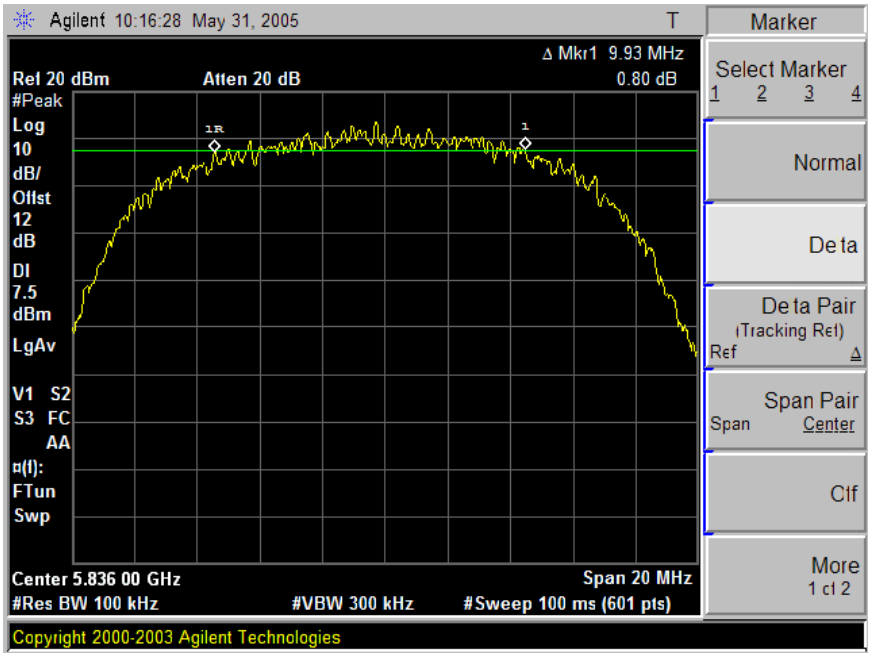
6 DB BANDWIDTH LOW CH (802.11a mode)



6 DB BANDWIDTH MID CH (802.11a mode)



6 DB BANDWIDTH HIGH CH (802.11a mode)



7.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

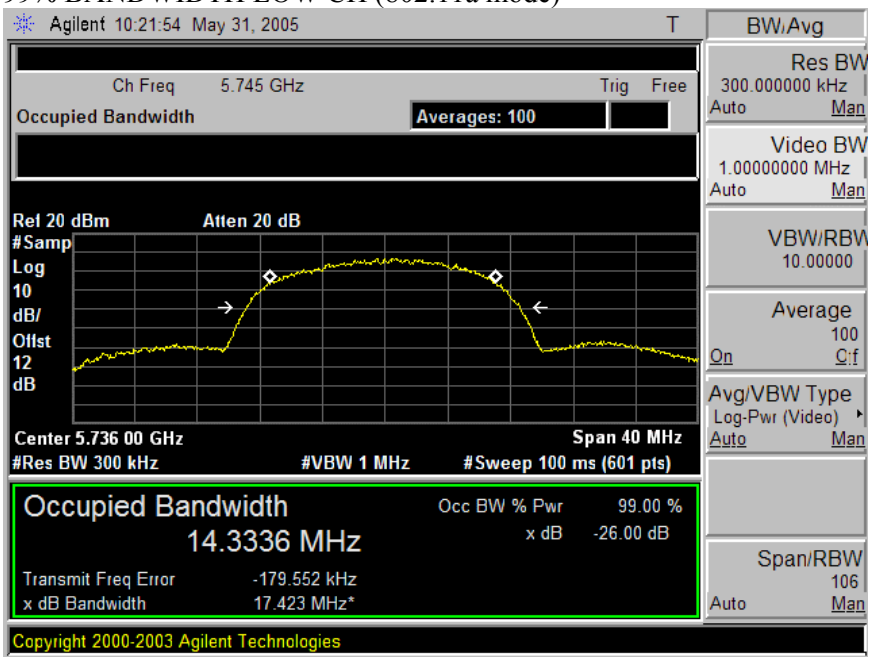
No non-compliance noted:

802.11a Mode

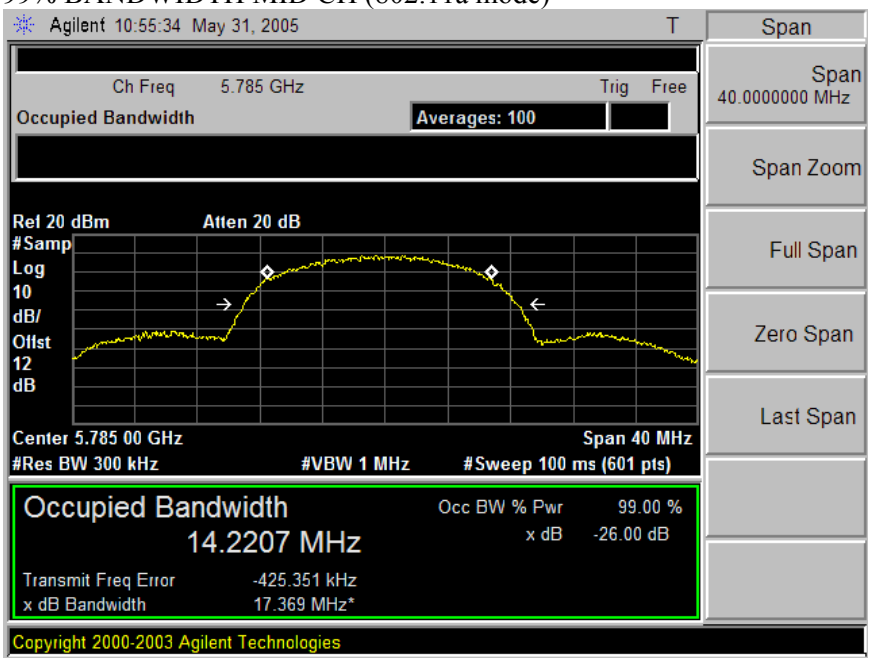
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5736	14.3336
Middle	5785	14.2207
High	5836	14.2921

99% BANDWIDTH (802.11a MODE)

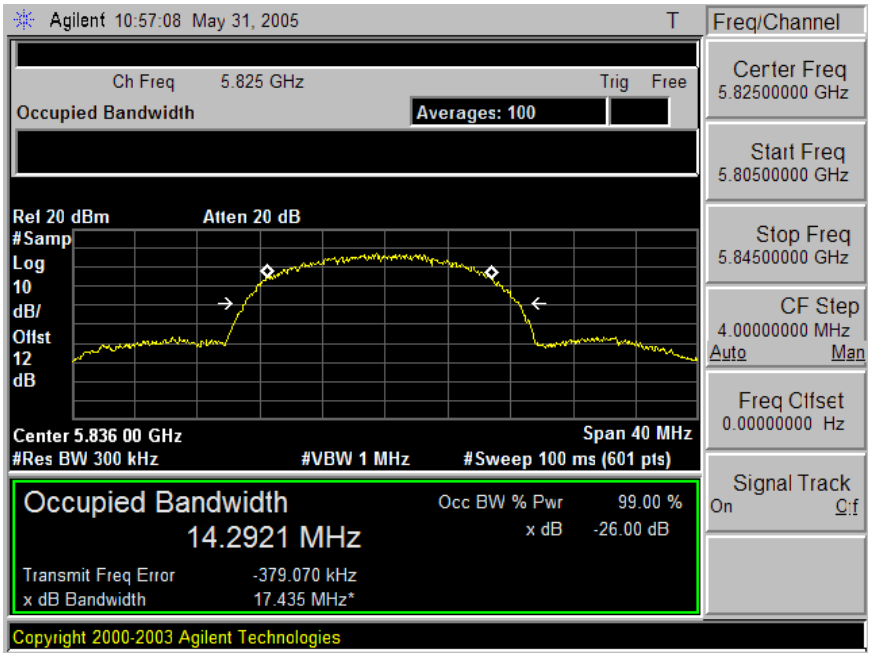
99% BANDWIDTH LOW CH (802.11a mode)



99% BANDWIDTH MID CH (802.11a mode)



99% BANDWIDTH HIGH CH (802.11a mode)



7.1.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

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

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

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

§15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

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 99% bandwidth.

RESULTS

The maximum antenna gain is 25dBi exclusively for fixed, point-to-point operations, therefore the limit is 30 dBm.

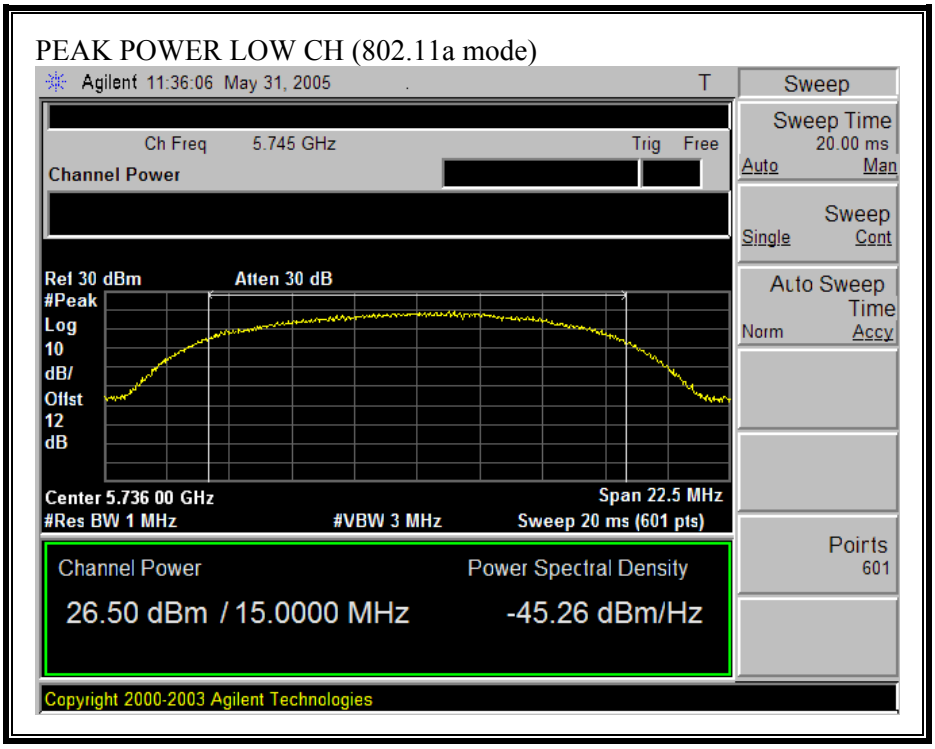
No non-compliance noted:

802.11a Mode

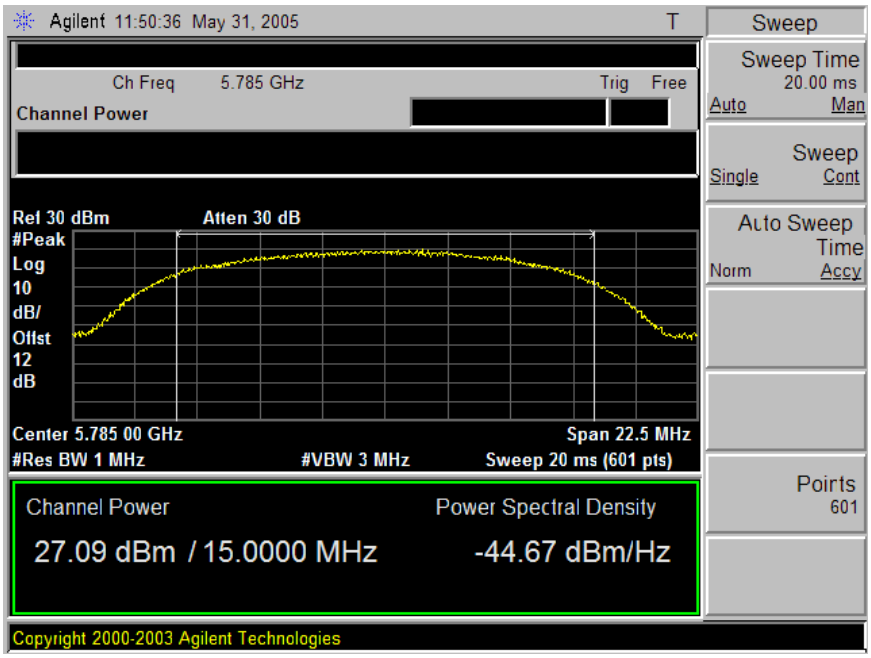
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5736	26.50	30	-3.50
Middle	5785	27.09	30	-2.91
High	5836	26.90	30	-3.10

OUTPUT POWER (802.11a MODE)

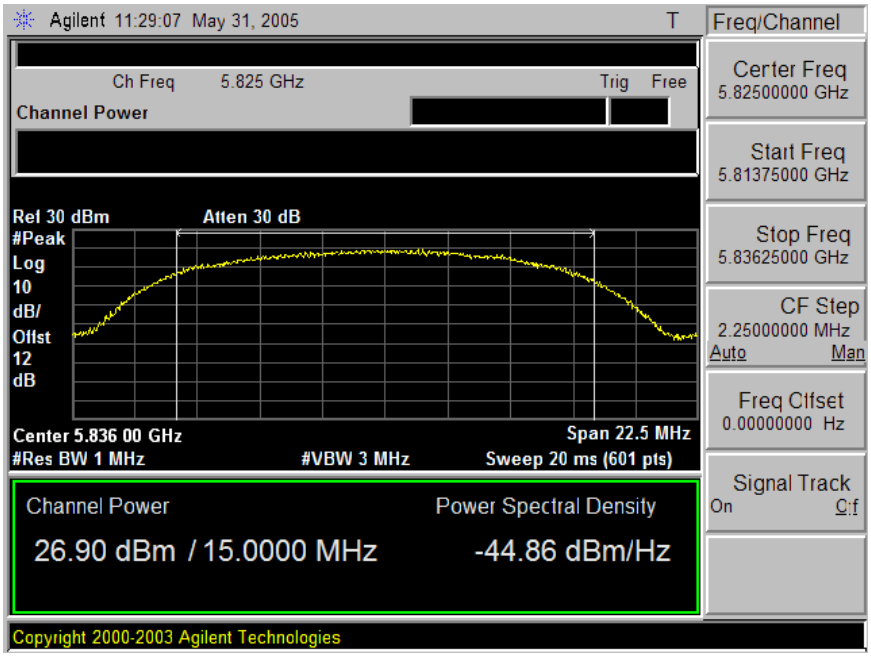
PEAK POWER LOW CH (802.11a mode)



PEAK POWER MID CH (802.11a mode)



PEAK POWER HIGH CH (802.11a mode)



7.1.4. 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:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11a	1.0	27.09	25.00	113.44

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.

7.1.5. 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 12 dB (including 10 dB pad and 2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5736	22.70
Middle	5785	23.30
High	5836	23.00

7.1.6. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (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.

TEST PROCEDURE

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 = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

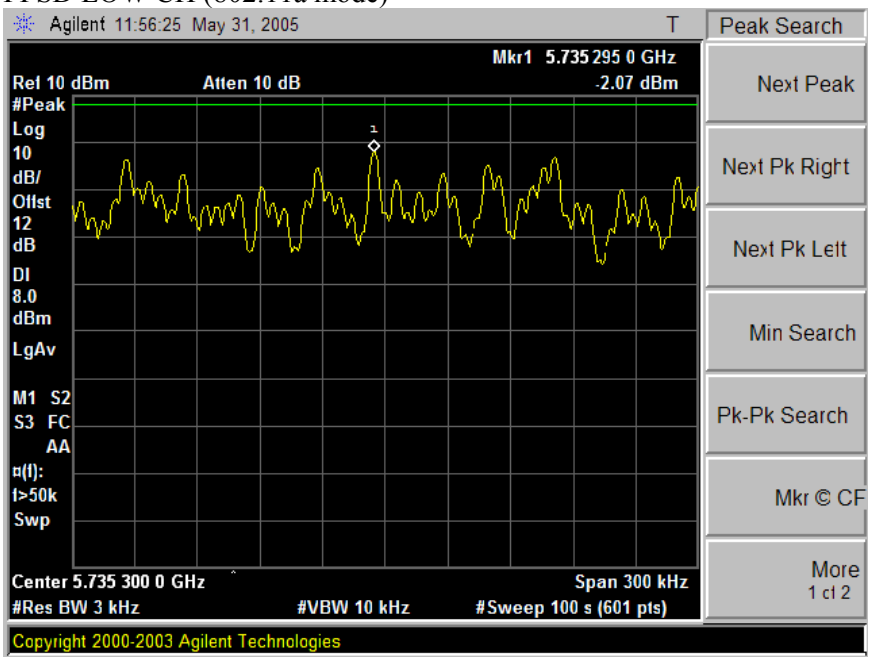
No non-compliance noted:

802.11a Mode

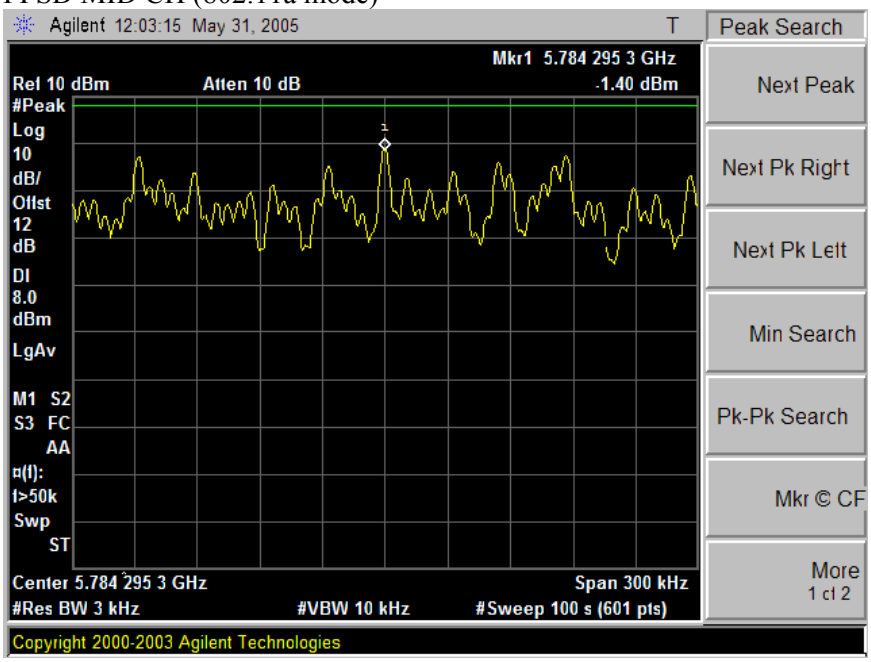
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5736	-2.07	8	-10.07
Middle	5785	-1.40	8	-9.40
High	5836	-1.48	8	-9.48

PEAK POWER SPECTRAL DENSITY (802.11a MODE)

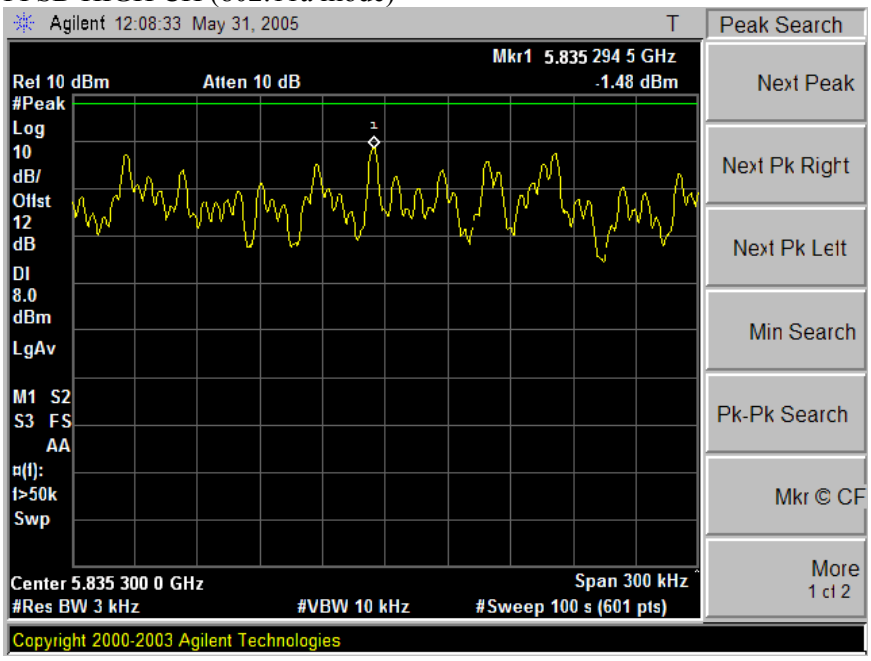
PPSD LOW CH (802.11a mode)



PPSD MID CH (802.11a mode)



PPSD HIGH CH (802.11a mode)



7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

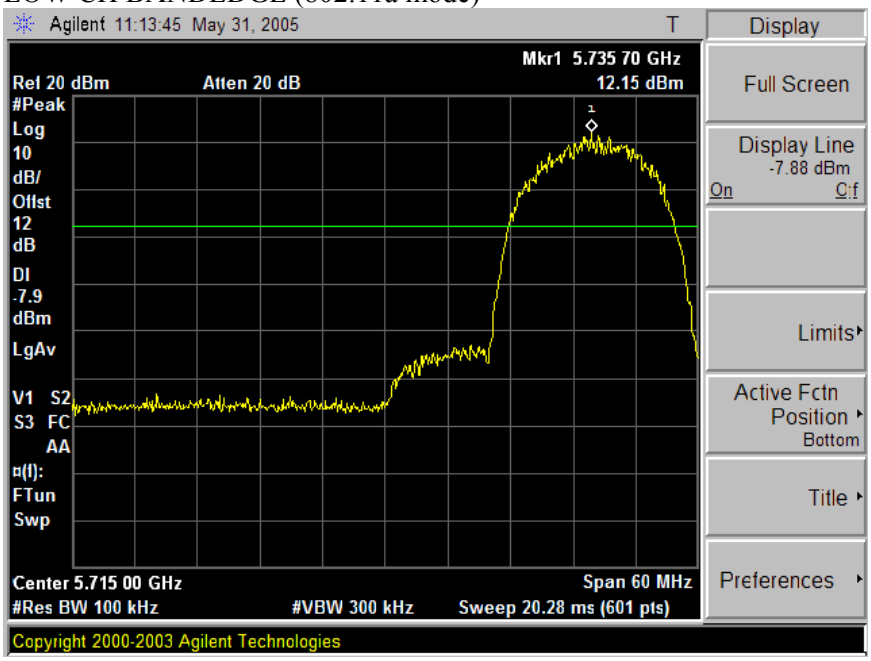
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

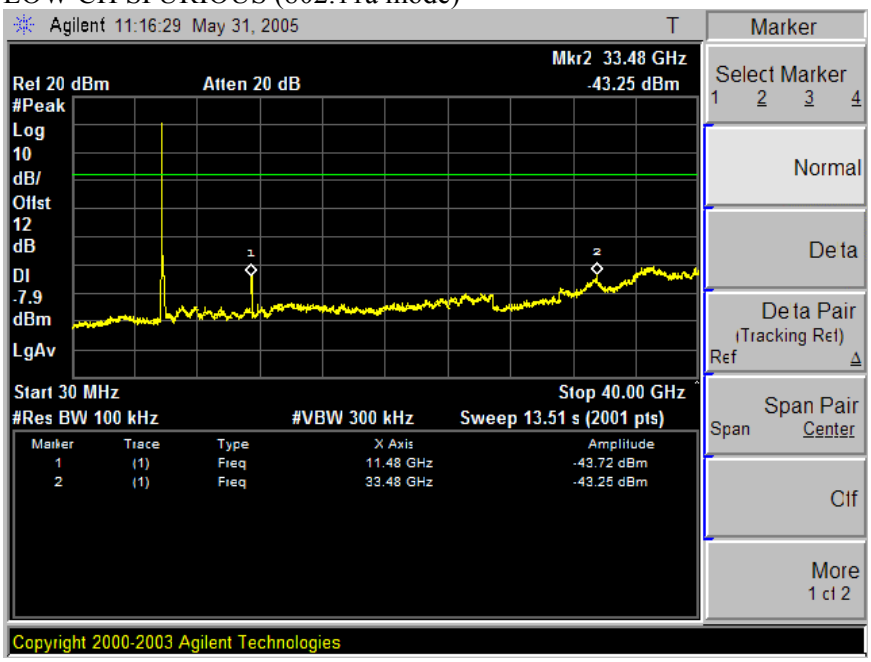
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11a MODE)

LOW CH BANDEDGE (802.11a mode)

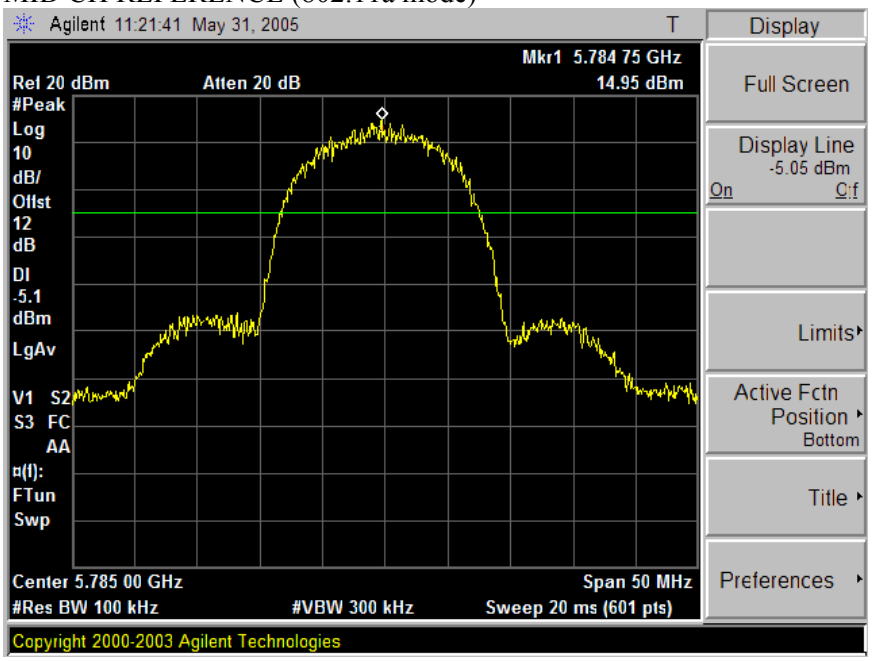


LOW CH SPURIOUS (802.11a mode)

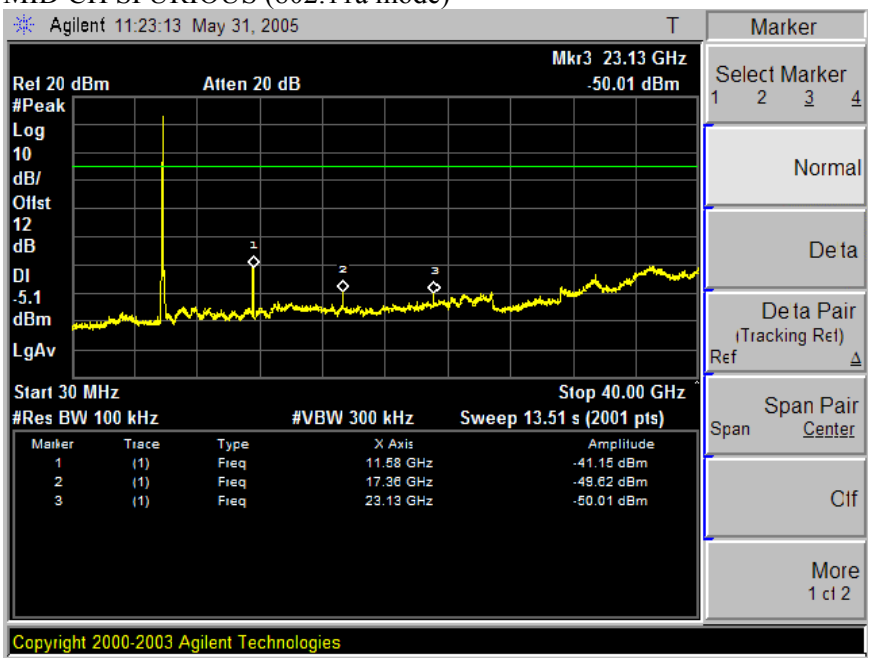


SPURIOUS EMISSIONS, MID CHANNEL (802.11a MODE)

MID CH REFERENCE (802.11a mode)

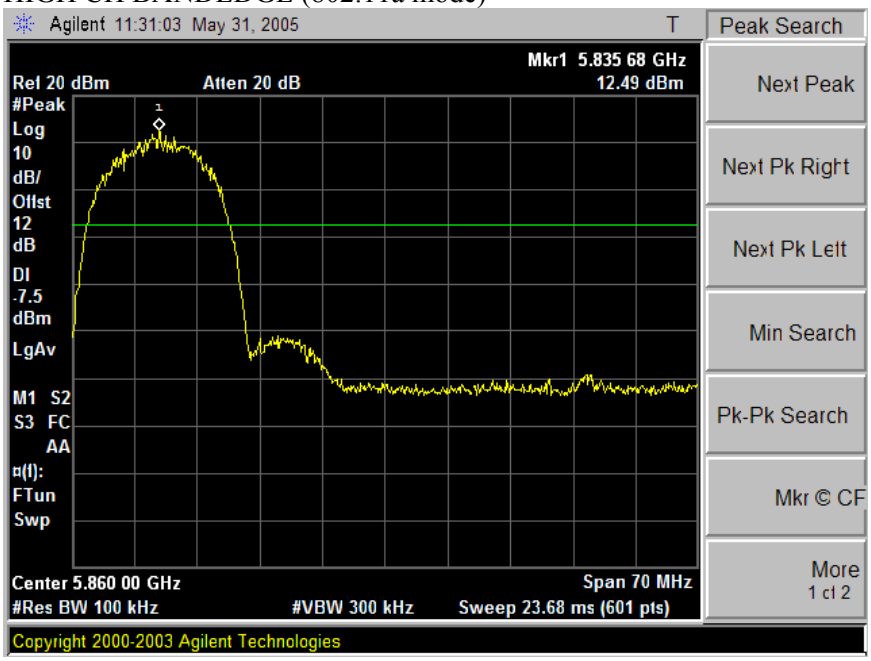


MID CH SPURIOUS (802.11a mode)

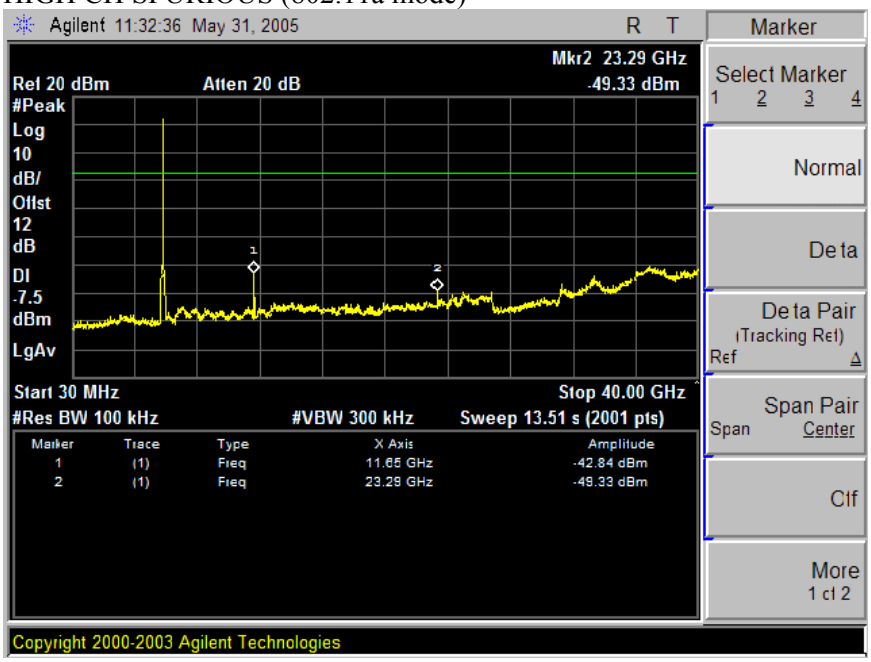


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11a MODE)

HIGH CH BANDEDGE (802.11a mode)



HIGH CH SPURIOUS (802.11a mode)



7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

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

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

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

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

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

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

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.

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

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

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

7.2.2. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND WITH STAND-ALONE CONFIGURATION

HARMONICS AND SPURIOUS EMISSIONS without DISH (802.11a MODE)

05/31/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 05U3457-1
Company: Trango
EUT Descrip.: 5.8 GHz Transceiver, unit # 1
EUT M/N: M5800S-FSU-D2
Test Target: FCC 15.247
Mode Oper: TX, EUT only, no dish
Average Power Meter: Low = 22.7 dBm, Mid = 23.3 dBm, High = 23 dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T63 Miteq 646456	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Thanh	12_Neelesh	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
															Unit 3
low ch															
11.472	3.0	50.5	37.6	38.2	7.1	-37.2	0.0	0.7	59.4	46.5	74	54	-14.6	-7.5	V
Mid Ch															
11.570	3.0	52.0	38.2	38.2	7.2	-37.2	0.0	0.7	60.9	47.1	74	54	-13.1	-6.9	V
Hig ch															
11.672	3.0	51.3	37.8	38.3	7.2	-37.3	0.0	0.7	60.2	46.7	74	54	-13.8	-7.3	V
low ch															
11.472	3.0	53.8	40.0	38.2	7.1	-37.2	0.0	0.7	62.7	48.9	74	54	-11.3	-5.1	H
mid ch															
11.490	3.0	54.0	40.3	38.2	7.1	-37.2	0.0	0.7	62.9	49.2	74	54	-11.1	-4.8	H
high															
11.672	3.0	53.4	39.6	38.3	7.2	-37.3	0.0	0.7	62.3	48.5	74	54	-11.7	-5.5	H
Note: No other emissions were detected above the system noise 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 Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.2.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND WITH REFLECTTOR CONFIGURATION

HARMONICS AND SPURIOUS EMISSIONS with DISH (802.11a MODE)

05/28/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 05U3457-1
Company: Trango
EUT Descrip.: 5.8 GHz Transceiver, unit # 3
EUT M/N: M5800S-FSU-D2
Test Target: FCC 15.247
Mode Oper: TX ON
Average Power Meter: Low = 22.7 dBm, Mid = 23.3 dBm, High = 23 dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T87 Miteq 924342	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Thanh	12_Neelesh	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

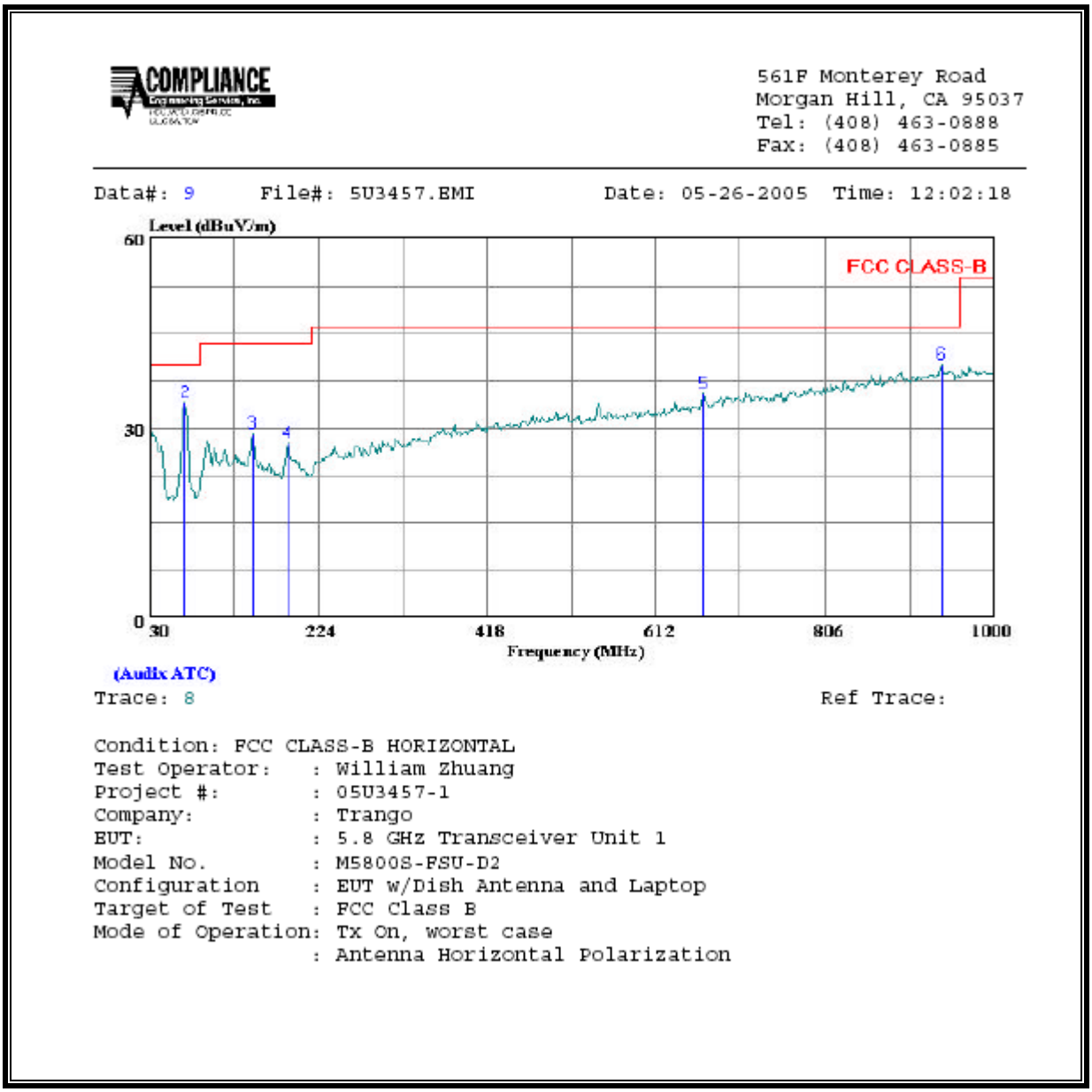
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
low ch,															Unit 3
11.472	3.0	57.2	46.0	38.2	7.1	-41.8	0.0	0.7	61.4	50.2	74	54	-12.6	-3.8	V (EUT is vertically polarized)
11.472	3.0	56.0	43.2	38.2	7.1	-41.8	0.0	0.7	60.2	47.4	74	54	-13.8	-6.6	V (EUT is horizontally polarized)
11.472	3.0	51.0	40.0	38.2	7.1	-41.8	0.0	0.7	55.2	44.2	74	54	-18.8	-9.8	H (EUT is vertically polarized)
11.472	3.0	50.0	38.4	38.2	7.1	-41.8	0.0	0.7	54.2	42.6	74	54	-19.8	-11.4	H (EUT is horizontally polarized)
Mid Ch															
11.570	3.0	58.3	47.0	38.2	7.2	-41.9	0.0	0.7	62.5	51.2	74	54	-11.5	-2.8	V (EUT is vertically polarized)
11.570	3.0	53.5	43.0	38.2	7.2	-41.9	0.0	0.7	57.7	47.2	74	54	-16.3	-6.8	V (EUT is horizontally polarized)
11.570	3.0	48.0	37.5	38.2	7.2	-41.9	0.0	0.7	52.2	41.7	74	54	-21.8	-12.3	H (EUT is vertically polarized)
11.570	3.0	50.0	38.6	38.2	7.2	-41.9	0.0	0.7	54.2	42.8	74	54	-19.8	-11.2	H (EUT is horizontally polarized)
high ch															
11.672	3.0	55.5	44.2	38.3	7.2	-42.0	0.0	0.7	59.7	48.4	74	54	-14.3	-5.6	V (EUT is vertically polarized)
11.672	3.0	52.0	42.4	38.3	7.2	-42.0	0.0	0.7	56.2	46.6	74	54	-17.8	-7.4	V (EUT is horizontally polarized)
11.672	3.0	47.0	37.0	38.3	7.2	-42.0	0.0	0.7	51.2	41.2	74	54	-22.8	-12.8	H (EUT is vertically polarized)
11.672	3.0	48.2	38.0	38.3	7.2	-42.0	0.0	0.7	52.4	42.2	74	54	-21.6	-11.8	H (EUT is horizontally polarized)
Note: No other emissions were detected above the system noise 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 Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.2.5 WORST-CASE CONFIGURATION RADIATED EMISSIONS BELOW 1 GHz,

7.2.5.1 ANTENNA SET AS HORIZONTAL POLARIZATION

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



HORIZONTAL DATA

Page: 1

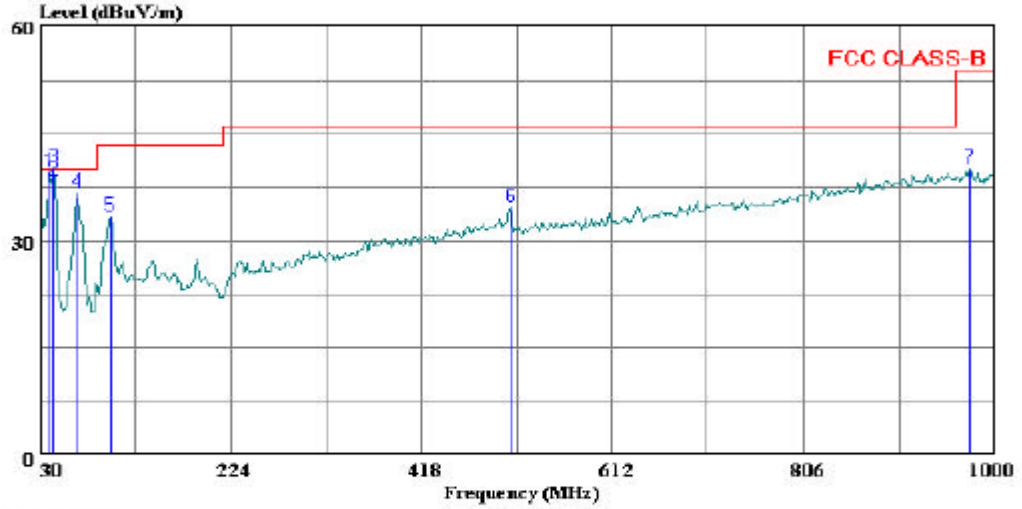
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	10.31	20.45	30.76	40.00	-9.24	Peak
2	70.740	24.82	9.34	34.16	40.00	-5.84	Peak
3	148.340	14.75	14.33	29.07	43.50	-14.43	Peak
4	189.080	14.63	12.93	27.56	43.50	-15.94	Peak
5	667.290	12.91	22.66	35.57	46.00	-10.43	Peak
6	938.890	13.57	26.43	40.00	46.00	-6.00	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT

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

Data#: 13 File#: 5U3457.EMI Date: 05-26-2005 Time: 12:23:18



(Audix ATC)
Trace: 10 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : William Zhuang
Project #: : 05U3457-1
Company: : Trango
EUT: : 5.8 GHz Transceiver Unit 1
Model No. : M5800S-FSU-D2
Configuration : EUT w/Dish Antenna and Laptop
Target of Test : FCC Class B
Mode of Operation: Tx On, worst case
: Antenna Horizontal Polarization

VERTICAL DATA

Page: 1

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		38.730	23.57	16.12	39.69	40.00	-0.31	Peak
2		43.580	24.85	13.58	38.43	40.00	-1.57	QP
3	*	43.580	27.27	13.02	40.29	40.00	0.29	Peak
4		67.830	27.64	9.20	36.84	40.00	-3.16	Peak
5		101.780	21.66	11.77	33.43	43.50	-10.07	Peak
6		509.180	14.38	20.36	34.74	46.00	-11.26	Peak
7		974.780	13.33	26.67	40.00	54.00	-14.00	Peak

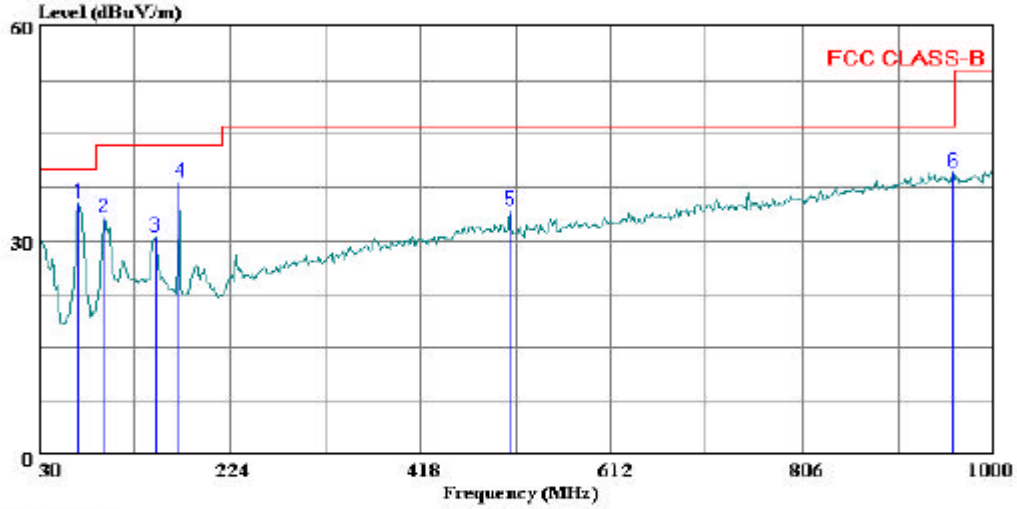
7.2.5.2 ANTENNA SET AS VERTICAL POLARIZATION

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

HORIZONTAL PLOT

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

Data#: 7 File#: 5U3457.EMI Date: 05-26-2005 Time: 11:52:12



(Audix ATC)
Trace: 6 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : William Zhuang
Project #: : 05U3457-1
Company: : Trango
EUT: : 5.8 GHz Transceiver Unit 1
Model No. : M5800S-FSU-D2
Configuration : EUT w/Dish Antenna and Laptop
Target of Test : FCC Class B
Mode of Operation: Tx On, worst case
: Antenna Vertical Polarization

HORIZONTAL DATA

Page: 1

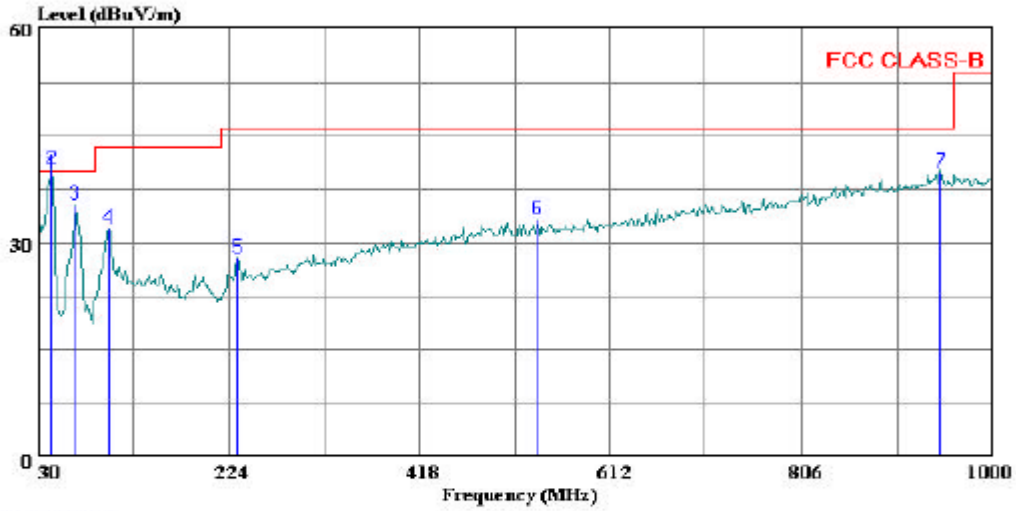
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	70.740	25.95	9.34	35.29	40.00	-4.71	Peak
2	96.930	22.71	10.58	33.29	43.50	-10.21	Peak
3	148.340	16.22	14.33	30.54	43.50	-12.96	Peak
4	172.590	24.87	13.31	38.18	43.50	-5.32	Peak
5	509.180	13.92	20.36	34.28	46.00	-11.72	Peak
6	958.290	13.18	26.50	39.68	46.00	-6.32	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT

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

Data#: 5 File#: 5U3457.EMI Date: 05-26-2005 Time: 11:41:24



(Audix ATC)
Trace: 2 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : William Zhuang
Project #: : 05U3457-1
Company: : Trango
EUT: : 5.8 GHz Transceiver Unit 1
Model No. : M5800S-FSU-D2
Configuration : EUT w/Dish Antenna and Laptop
Target of Test : FCC Class B
Mode of Operation: Tx On, worst case
: Antenna Vertical Polarization

VERTICAL DATA

Page: 1

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		43.580	26.11	13.58	39.69	40.00	-0.31	QP
2	*	43.580	27.31	13.02	40.33	40.00	0.33	Peak
3		67.830	26.18	9.20	35.38	40.00	-4.62	Peak
4		101.780	20.11	11.77	31.88	43.50	-11.62	Peak
5		232.730	14.72	13.17	27.89	46.00	-18.11	Peak
6		538.280	12.45	20.70	33.15	46.00	-12.85	Peak
7		946.650	13.44	26.45	39.89	46.00	-6.11	Peak

7.3. 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

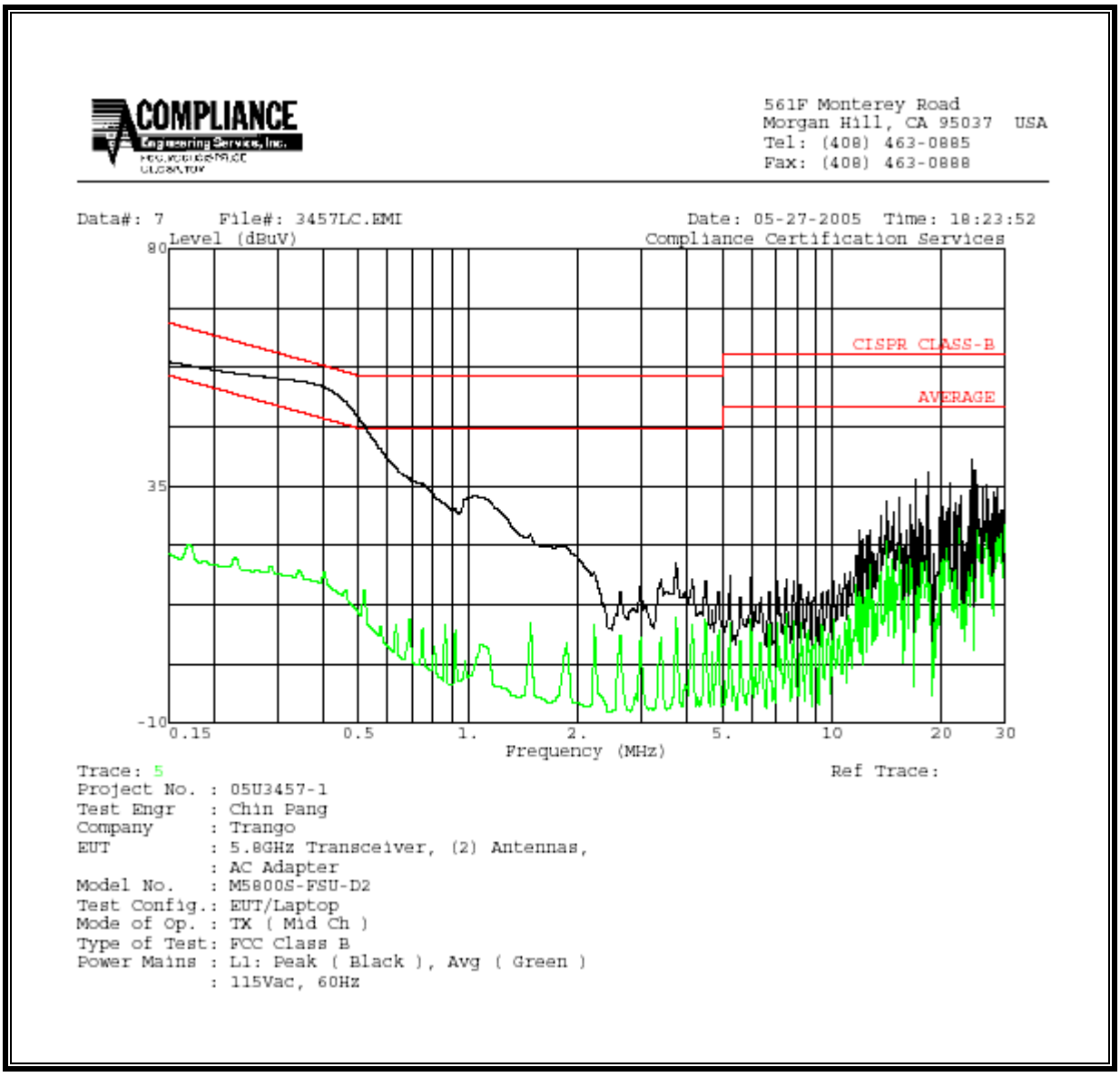
No non-compliance noted:

6 WORST EMISSIONS

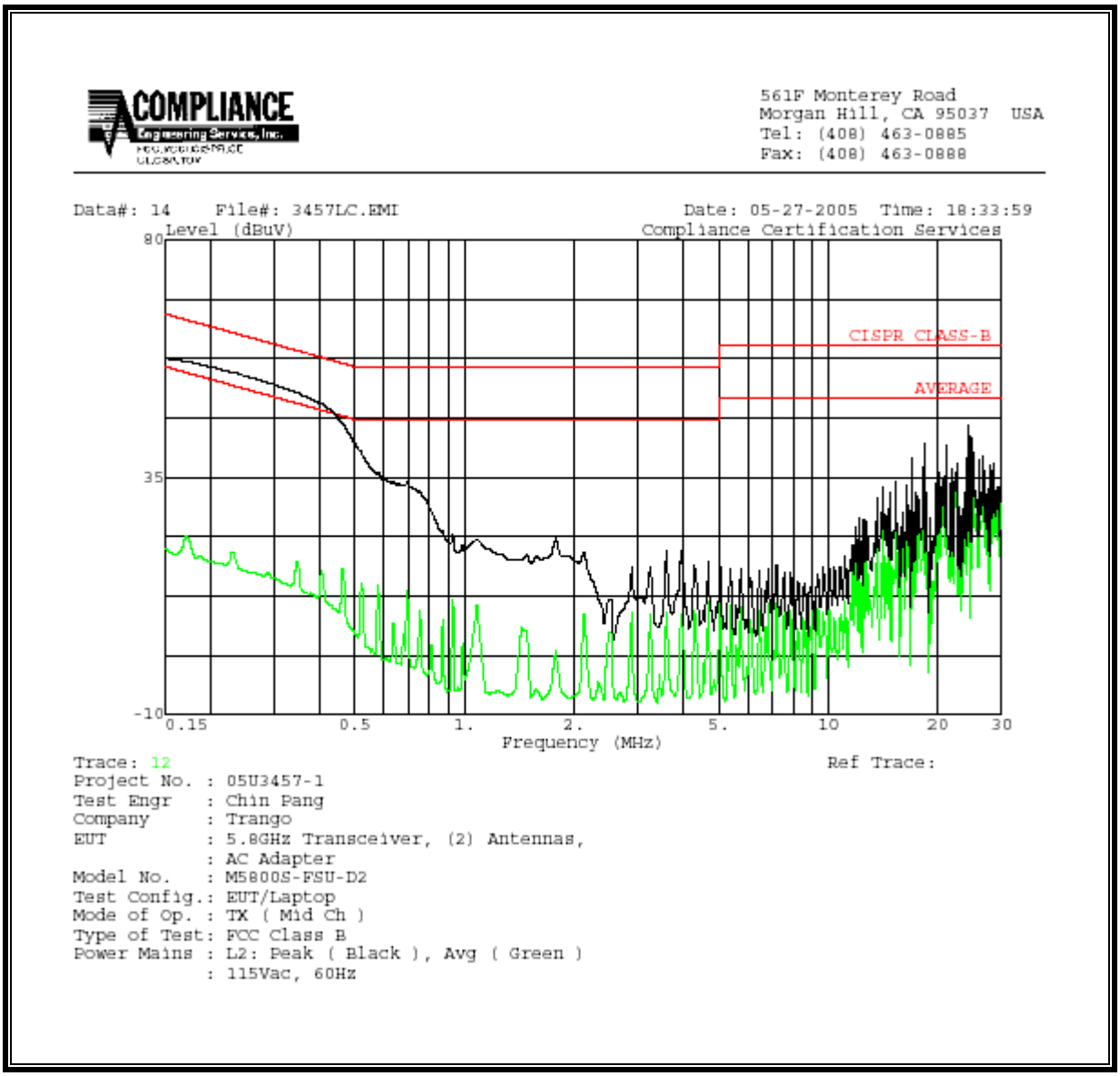
CONDUCTED EMISSIONS DATA (115VAC 60Hz)

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	57.91	--	23.33	0.00	64.96	54.96	-7.05	-31.63	L1
0.42	53.04	--	18.67	0.00	57.43	47.43	-4.39	-28.76	L1
24.40	40.18	--	35.39	0.00	60.00	50.00	-19.82	-14.61	L1
0.17	57.37	--	23.70	0.00	64.96	54.96	-7.59	-31.26	L2
0.30	52.77	--	17.66	0.00	60.35	50.35	-7.58	-32.69	L2
24.40	44.76	--	39.91	0.00	60.00	50.00	-15.24	-10.09	L2
6 Worst Data									

LINE 1 RESULTS



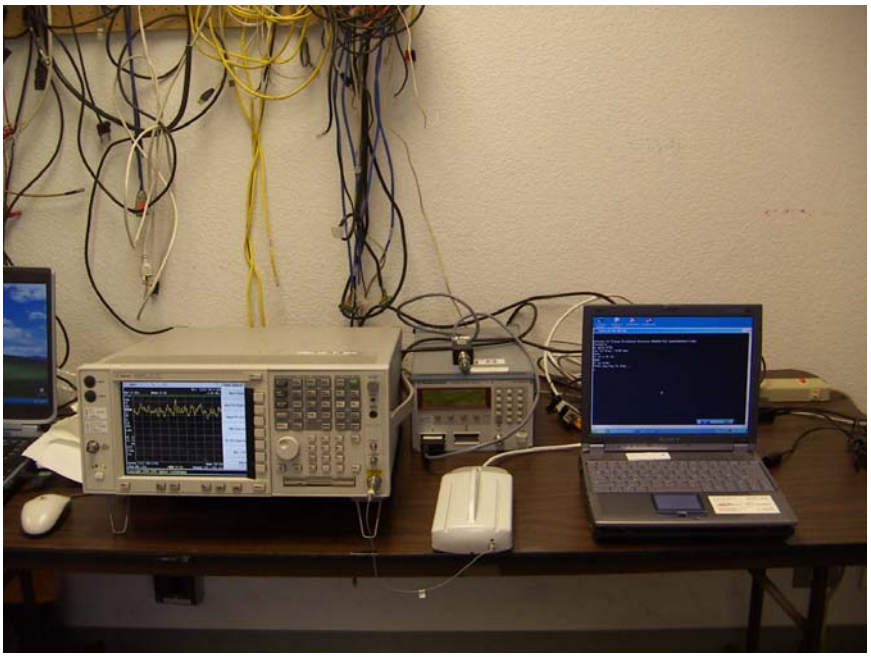
LINE 2 RESULTS



8. SETUP PHOTOS

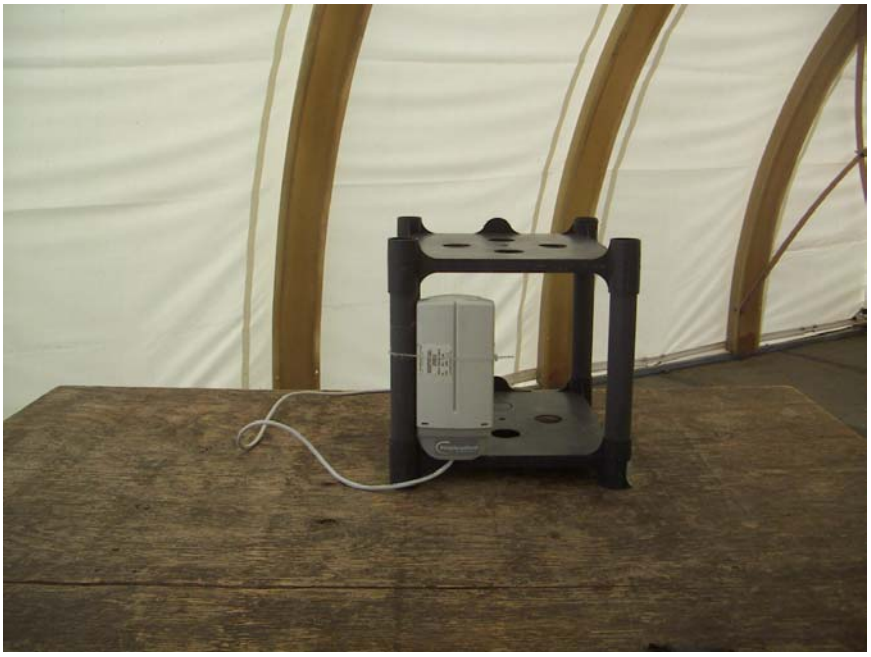
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

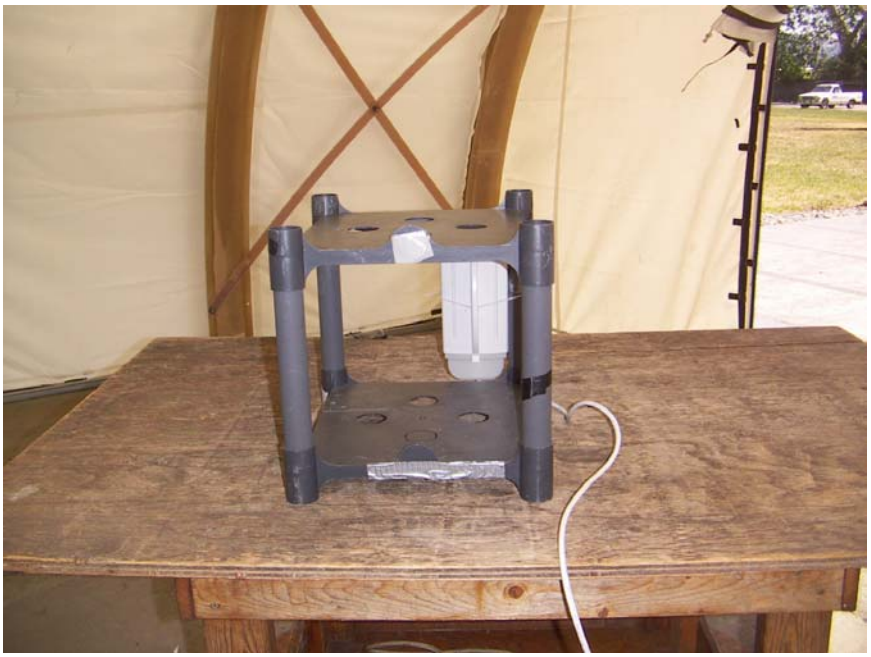


RADIATED RF MEASUREMENT SETUP, STAND ALONE

RADIATED FRONT PHOTO



RADIATED BACK PHOTO



RADIATED RF MEASUREMENT SETUP, WITH REFLECTOR

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT