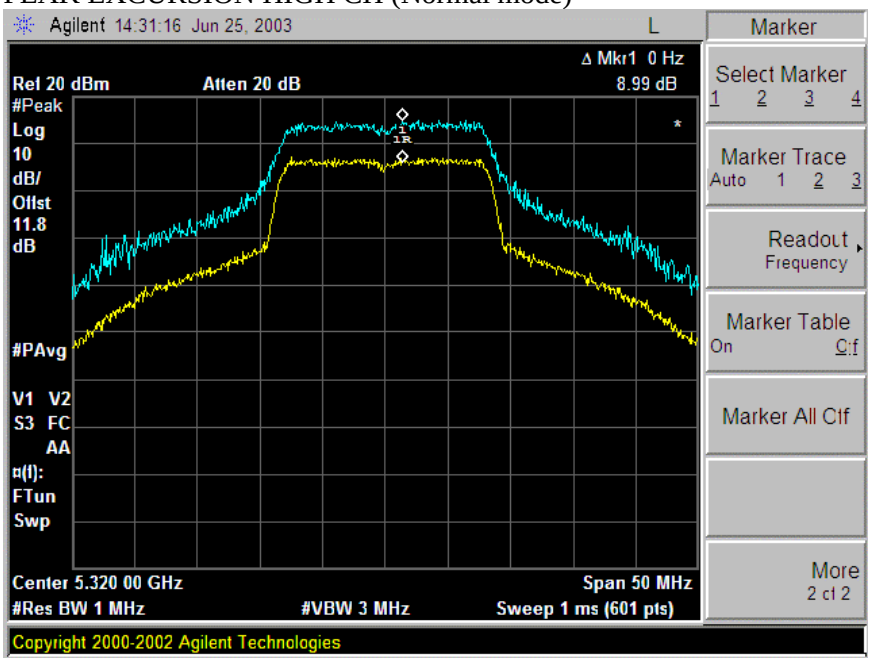
PEAK EXCURSION HIGH CH (Normal mode)



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7.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.407 (b) (1 & 2) For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

No non-compliance noted:

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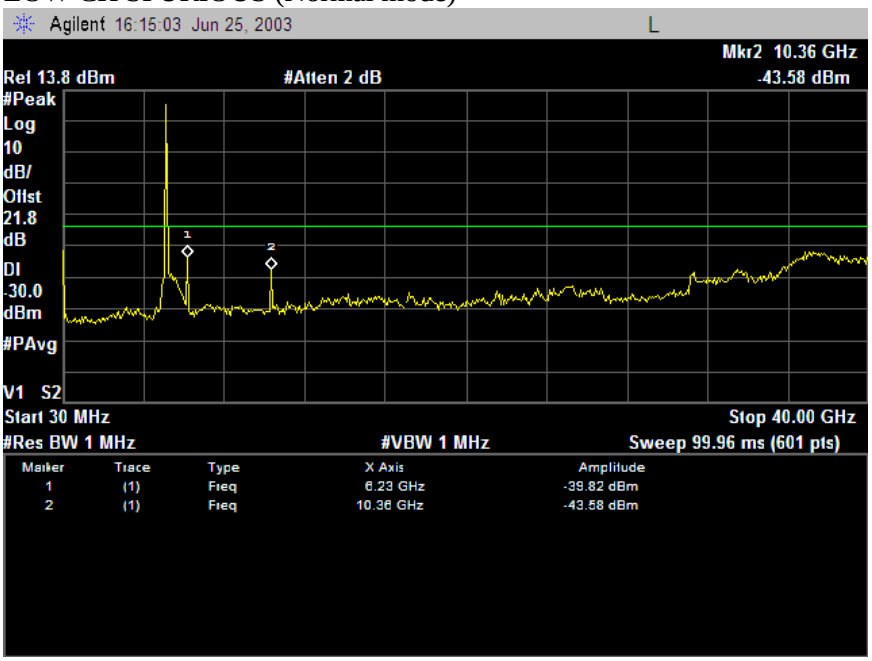
SPURIOUS EMISSIONS, LOW CHANNEL (NORMAL MODE)

LOW CH SPURIOUS (Normal mode)



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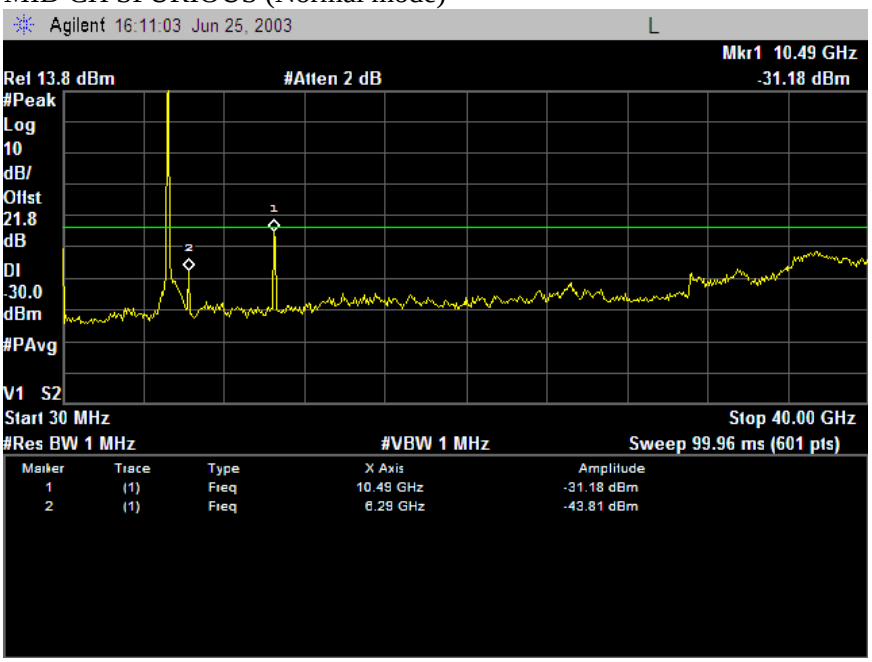
SPURIOUS EMISSIONS, MID CHANNEL (NORMAL MODE)

MID CH SPURIOUS (Normal mode)



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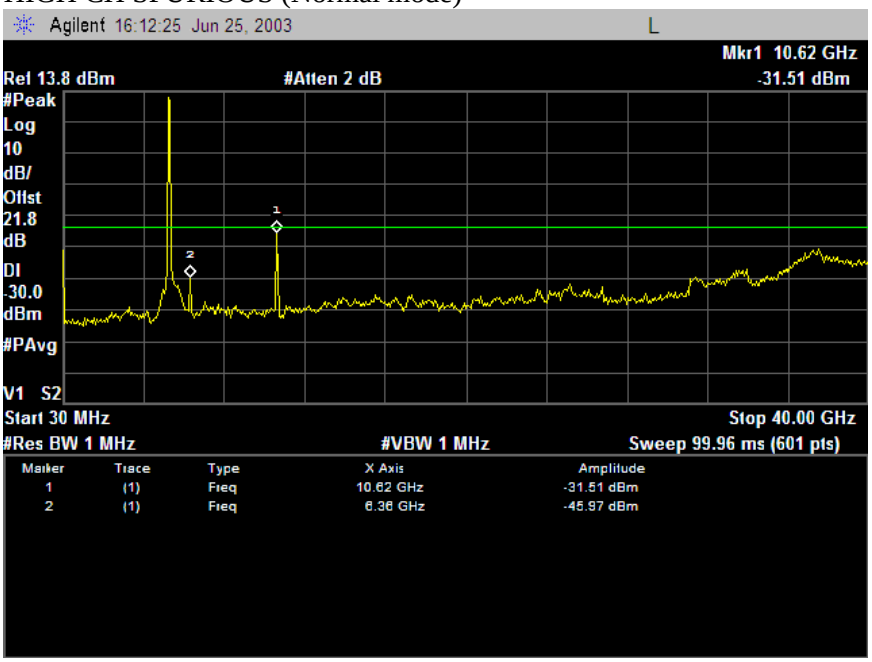
SPURIOUS EMISSIONS, HIGH CHANNEL (NORMAL MODE)

HIGH CH SPURIOUS (Normal mode)



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7.8. RADIATED 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.

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§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 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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.

RESULTS

No non-compliance noted:

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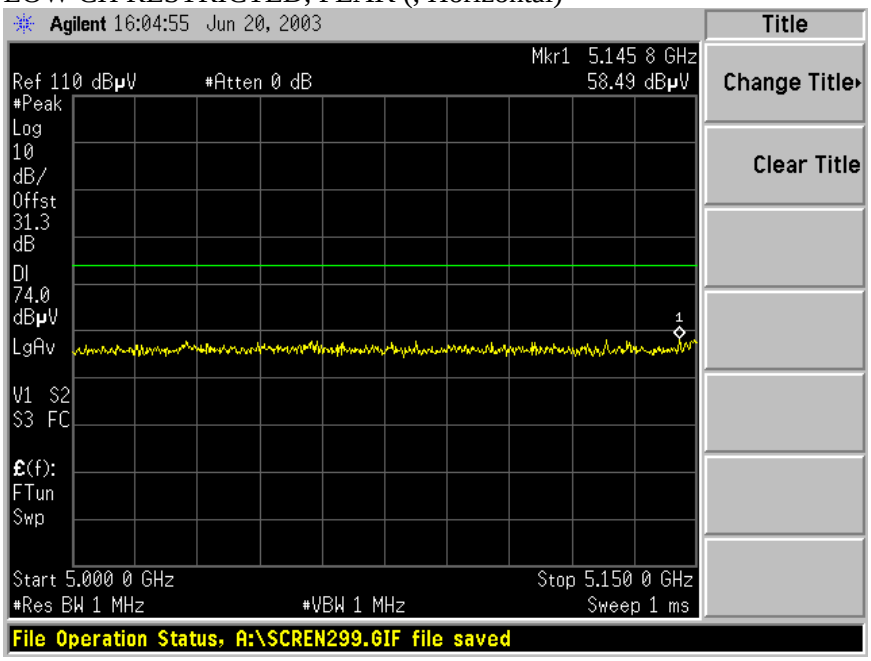
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (, Horizontal)



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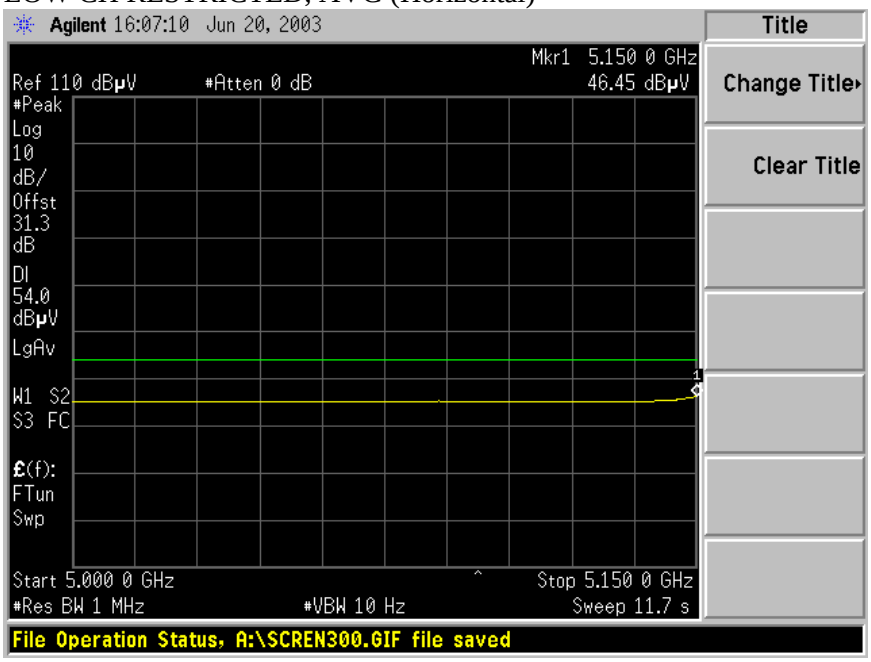
LOW CH RESTRICTED, AVG (Horizontal)



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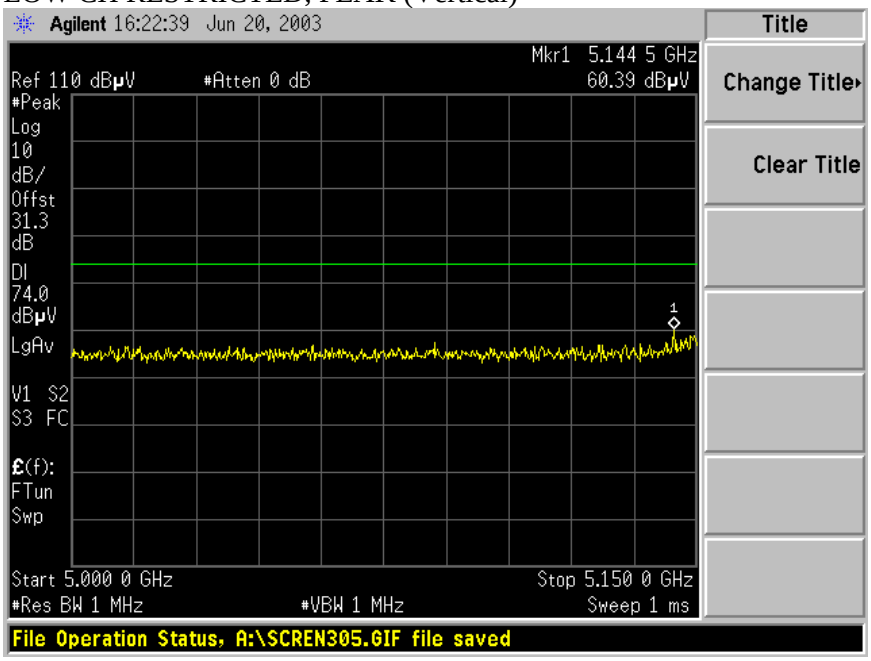
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (Vertical)



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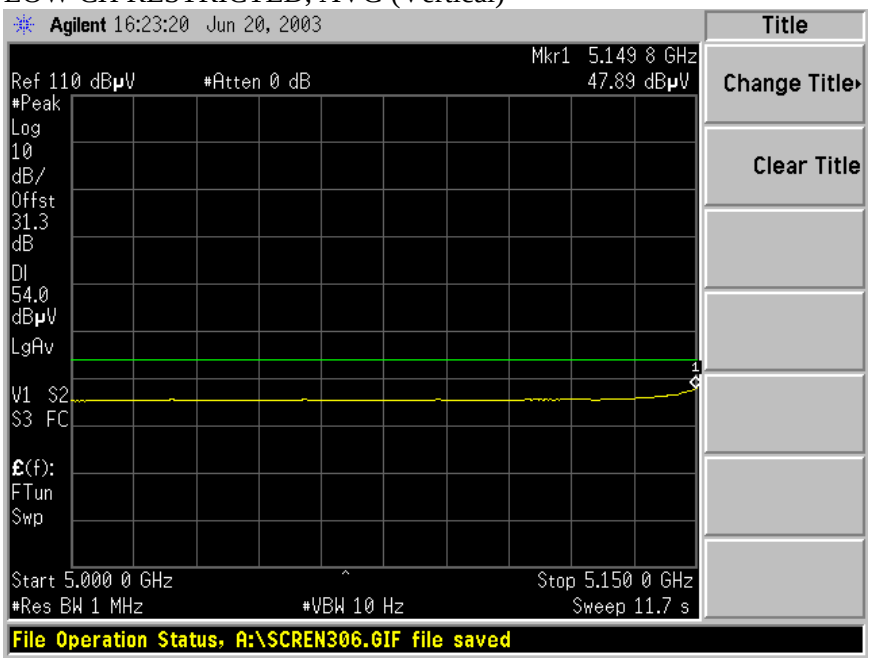
LOW CH RESTRICTED, AVG (Vertical)



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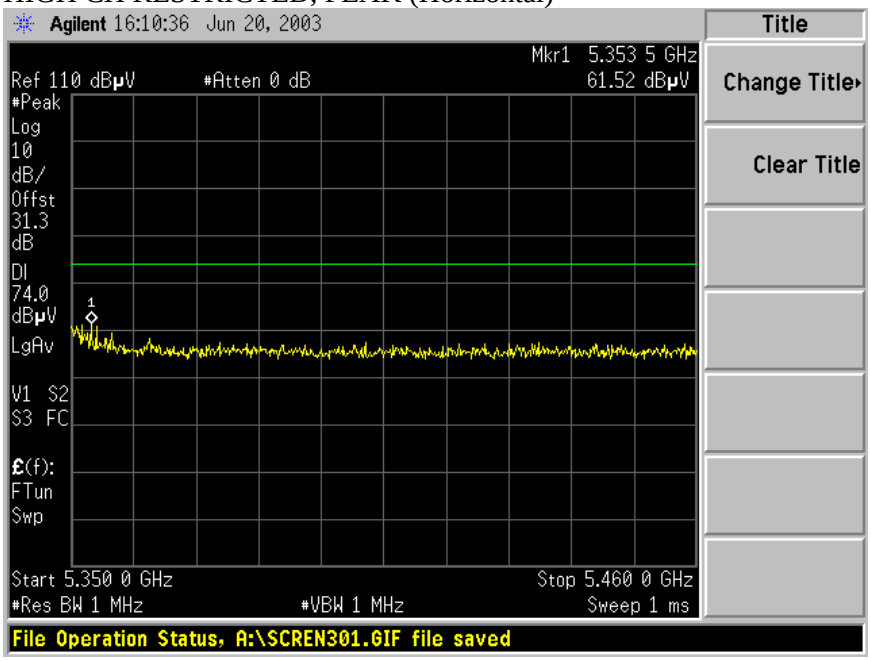
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (Horizontal)



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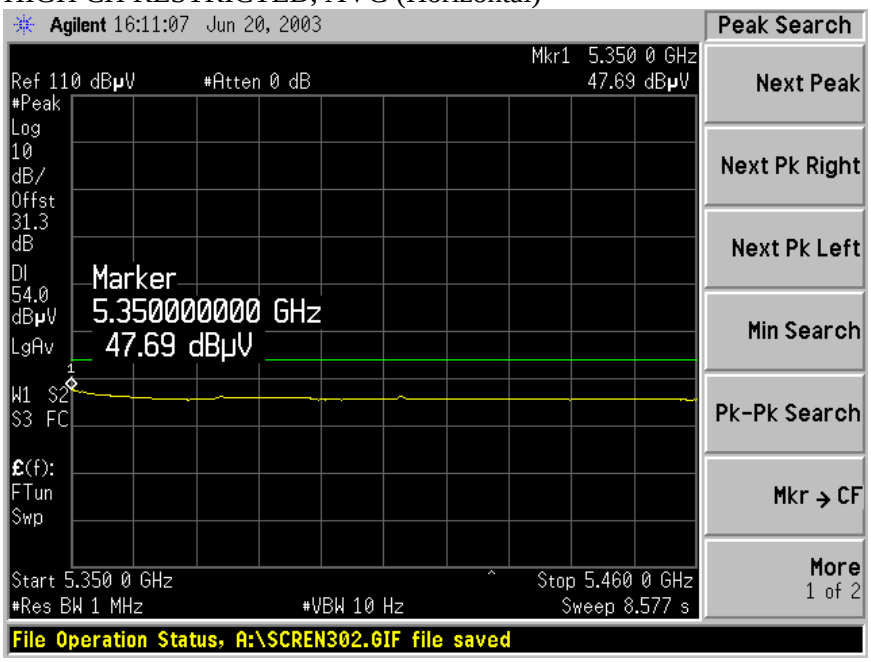
HIGH CH RESTRICTED, AVG (Horizontal)



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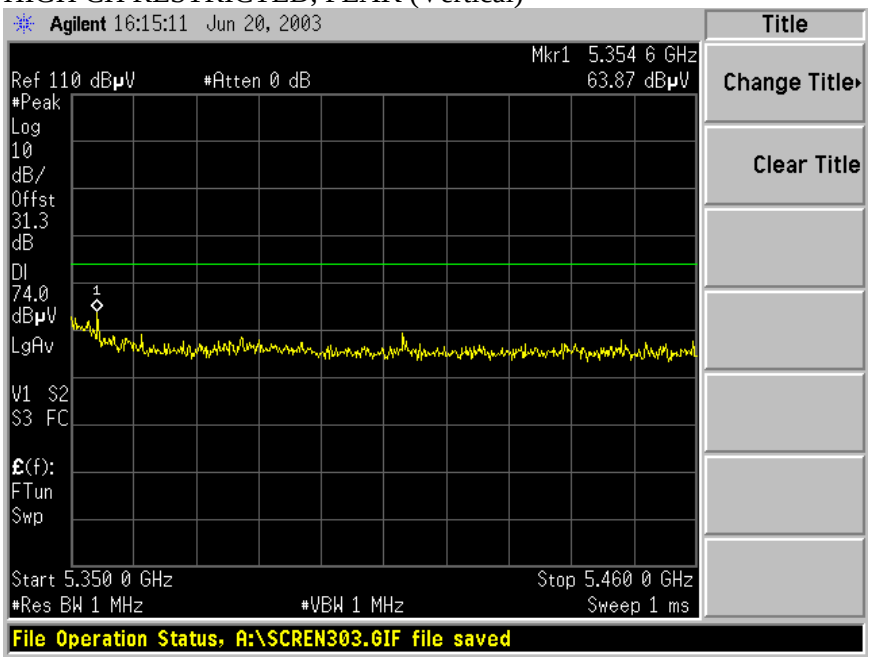
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (Vertical)



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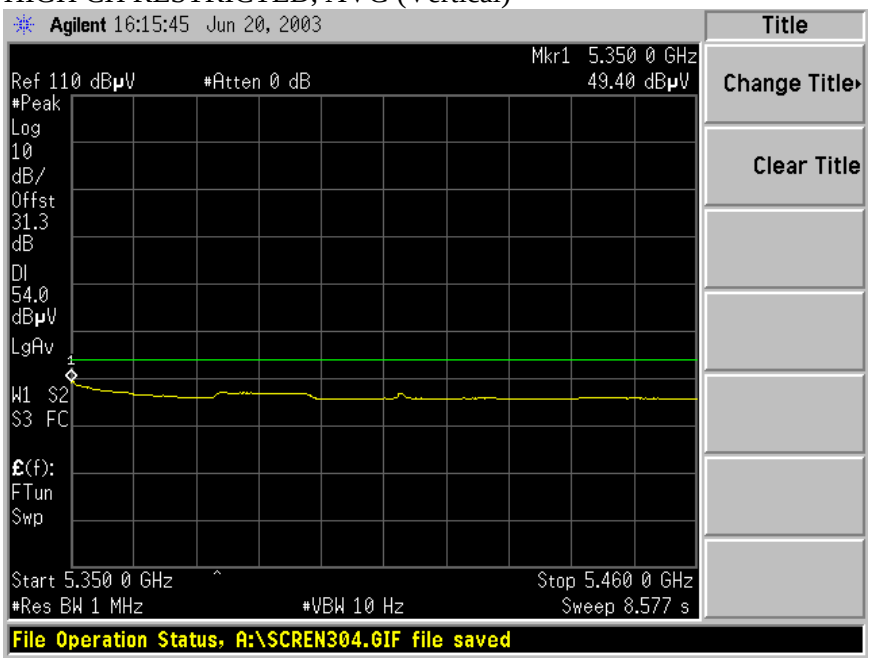
HIGH CH RESTRICTED, AVG (Vertical)



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HARMONICS AND SPURIOUS EMISSIONS

06/20/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
Project #: PHILIPS
Company: ACCTON/PHILIPS
EUT Descrip.: 802.11a/b/g MINI PCI MODULE
EUT M/N: PH11107-E & PH12127-E
Test Target: FCC 14.247/15.407
Mode Oper: Harmonic and Spur Tx at L/M/H Channels (5.2GHz)_Normal Mode

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T59; S/N: 3245 @3m	T34 HP 8449B	Agilent E4446A Analyzer	

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☑ (4 ~ 6 ft) ☑ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
LOW CH=5180MHz															
15.540	9.8	41.3	28.6	39.5	7.1	-33.9	0.0	1.0	55.0	42.3	74.0	54.0	-19.0	-11.7	V
15.540	9.8	40.4	28.0	39.5	7.1	-33.9	0.0	1.0	54.1	41.7	74.0	54.0	-19.9	-12.3	H
NO OTHER EMISSION FOUND AFTER 3rd HARMONIC															
															V
MID CH=5260MHz															
15.780	9.8	42.4	29.0	39.0	7.2	-33.9	0.0	1.0	55.6	42.3	74.0	54.0	-18.4	-11.7	V
15.780	9.8	41.9	28.9	39.0	7.2	-33.9	0.0	1.0	55.2	42.2	74.0	54.0	-18.8	-11.8	H
NO OTHER EMISSION FOUND AFTER 3rd HARMONIC															
HI CH=5320MHz															
10.640	9.8	42.3	31.6	38.0	5.5	-34.3	0.0	1.0	52.5	41.8	74.0	54.0	-21.5	-12.2	V
15.960	9.8	41.2	29.3	38.6	7.2	-33.8	0.0	1.0	54.1	42.2	74.0	54.0	-19.9	-11.8	V
10.640	9.8	45.2	31.6	38.0	5.5	-34.3	0.0	1.0	55.4	41.8	74.0	54.0	-18.6	-12.2	H
15.960	9.8	41.9	29.3	38.6	7.2	-33.8	0.0	1.0	54.8	42.2	74.0	54.0	-19.2	-11.8	H
NO OTHER EMISSION FOUND AFTER 3rd HARMONIC															

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		

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

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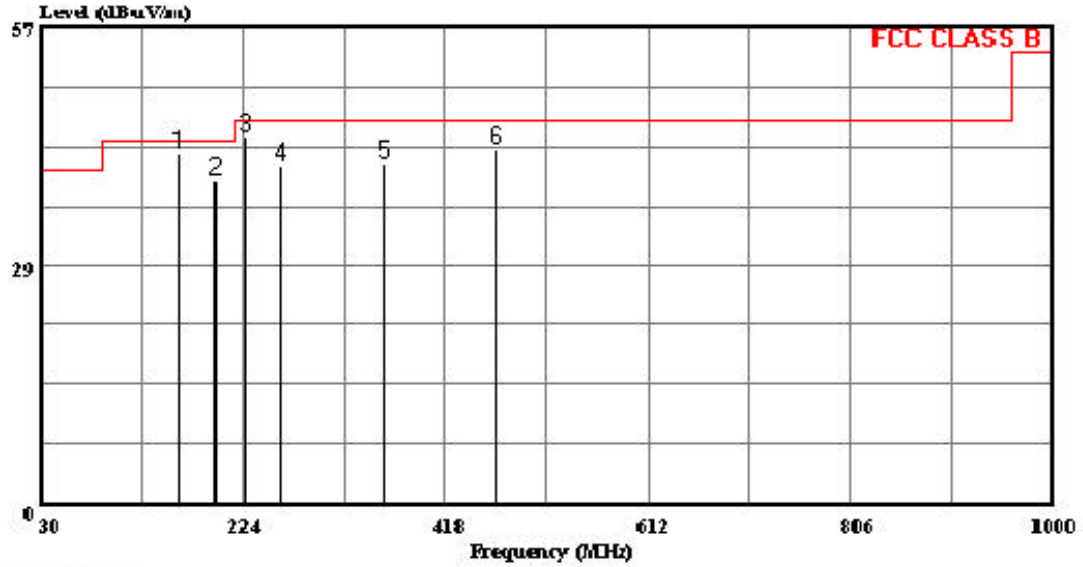
Morgan Hill, CA 95037, U.S.A.
Tel: (408) 463-0885
Fax:(408) 463-0888

Data#: 11 File#: 5mEMI.EMI Date: 06-14-2003 Time: 11:30:23



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 VERTICAL
Company : ACCTON and PHILIPS Wireless Networking
EUT Description : 802.11a/b/g Mini PCI Module.
Model Number : PH11107-E and PH12127-E
Test Configurtion: EUT in the IBM Laptop,
Test Target : FCC 15.247/15.407
Mode of Operation: WorstCase
Project No : 03U2040-1
Tester : Thanh Nguyen

Page: 1

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	162.890	32.07	8.66	1.28	0.00	42.01	43.50	-1.49	Peak
2	196.840	28.23	9.11	1.36	0.00	38.70	43.50	-4.80	Peak
3	227.880	31.73	10.59	1.48	0.00	43.80	46.00	-2.20	Peak
4	259.890	27.16	11.82	1.59	0.00	40.57	46.00	-5.43	Peak
5	358.830	25.31	13.55	1.89	0.00	40.75	46.00	-5.25	Peak
6	466.500	24.21	15.90	2.24	0.00	42.36	46.00	-3.64	Peak

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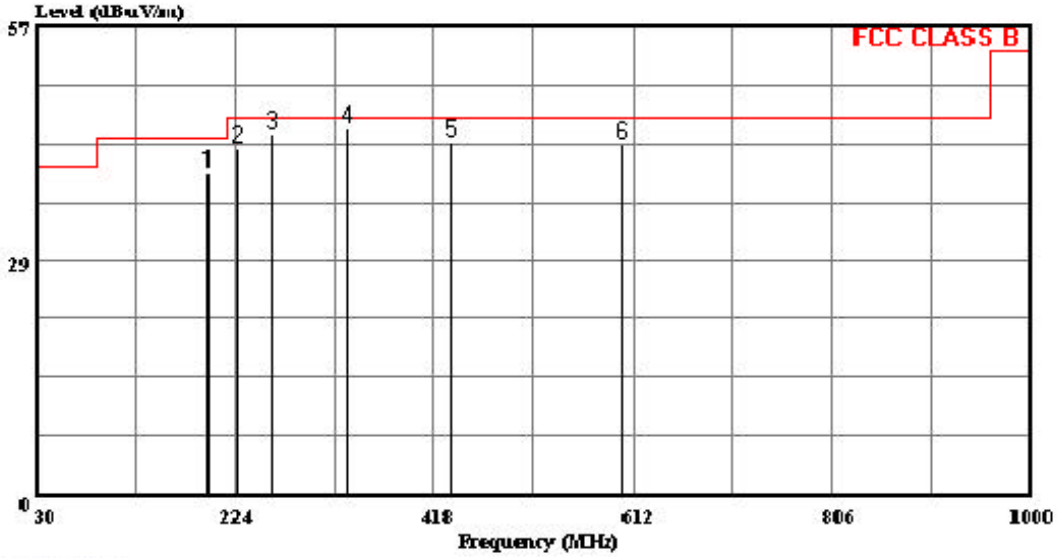
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)-HORIZONTAL

COMPLIANCE Engineering Services, Inc.
561F Monterey Road
Morgan Hill, CA 95037, U.S.A.
Tel: (408) 463-0885
Fax:(408) 463-0888

Data#: 9 File#: 5mEMI.EMI Date: 06-14-2003 Time: 11:21:29



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 HORIZONTAL
Company : ACCTON and PHILIPS Wireless Networking
EUT Description : 802.11a/b/g Mini PCI Module.
Model Number : PH11107-E and PH12127-E
Test Configurtion: EUT in the IBM Laptop,
Test Target : FCC 15.247/15.407
Mode of Operation: Tx worst case
Project No : 03U2040-1
Tester : Thanh Nguyen

Page: 1

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	197.810	28.70	9.08	1.37	0.00	39.15	43.50	-4.35	Peak
2	227.880	30.13	10.59	1.48	0.00	42.20	46.00	-3.80	Peak
3	259.890	30.56	11.82	1.59	0.00	43.97	46.00	-2.03	Peak
4	334.580	29.92	12.96	1.84	0.00	44.72	46.00	-1.28	Peak
5	433.520	25.55	15.21	2.13	0.00	42.89	46.00	-3.11	Peak
6	601.330	22.36	17.70	2.54	0.00	42.60	46.00	-3.40	Peak

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7.9. 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:

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6 WORST EMISSIONS

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
0.15	59.54	--	38.29	0.00	66.00	56.00	-6.46	-17.71	L1
0.29	48.80	--	24.11	0.00	62.00	52.00	-13.20	-27.89	L1
0.56	46.50	--	33.55	0.00	56.00	46.00	-9.50	-12.45	L1
0.15	55.88	--	17.15	0.00	66.00	56.00	-10.12	-38.85	L2
0.68	43.37	--	26.11	0.00	56.00	46.00	-12.63	-19.89	L2
1.63	45.79	--	24.62	0.00	56.00	46.00	-10.21	-21.38	L2
6 Worst Data									

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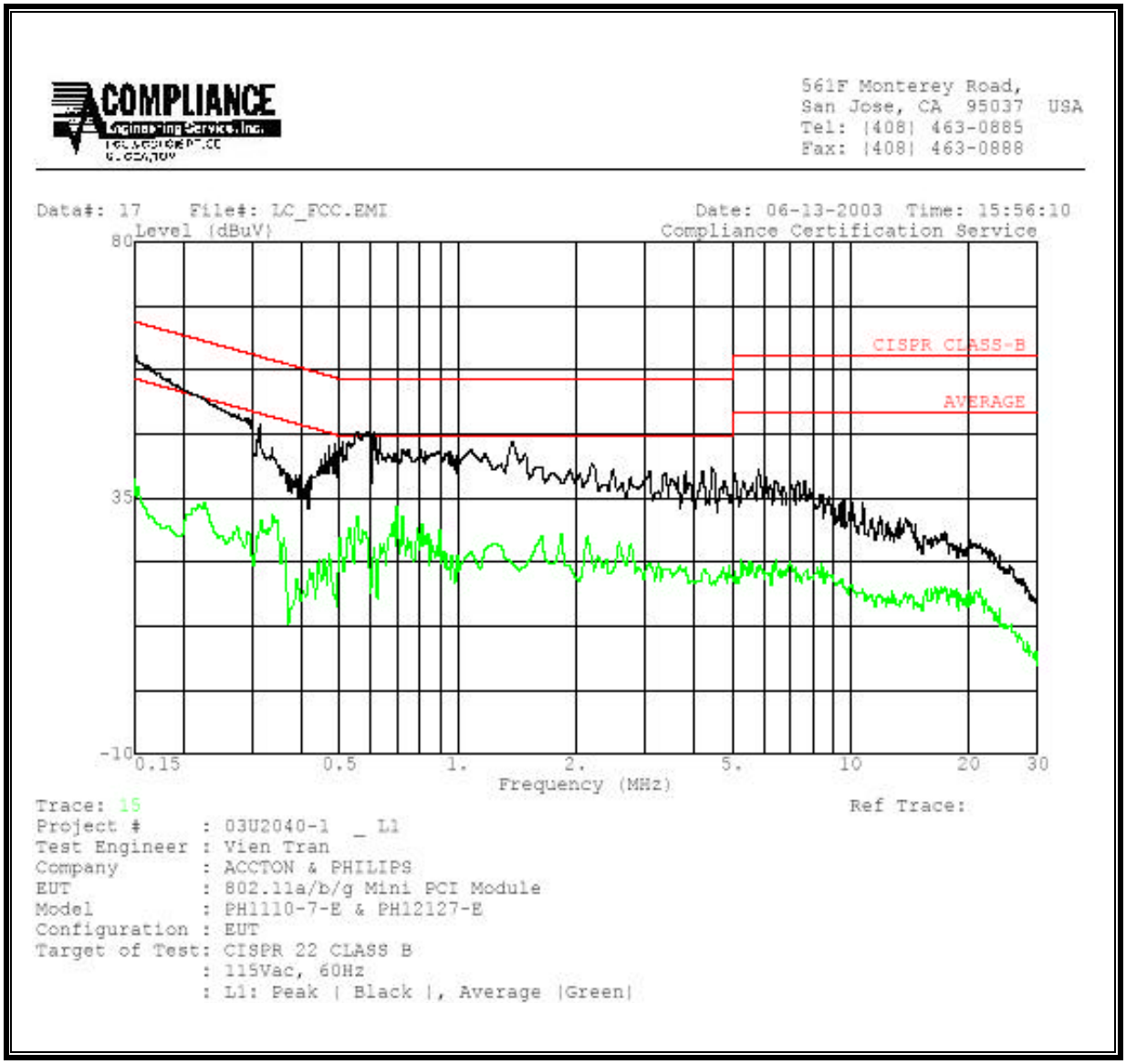
LINE 1 (LINE) RESULTS



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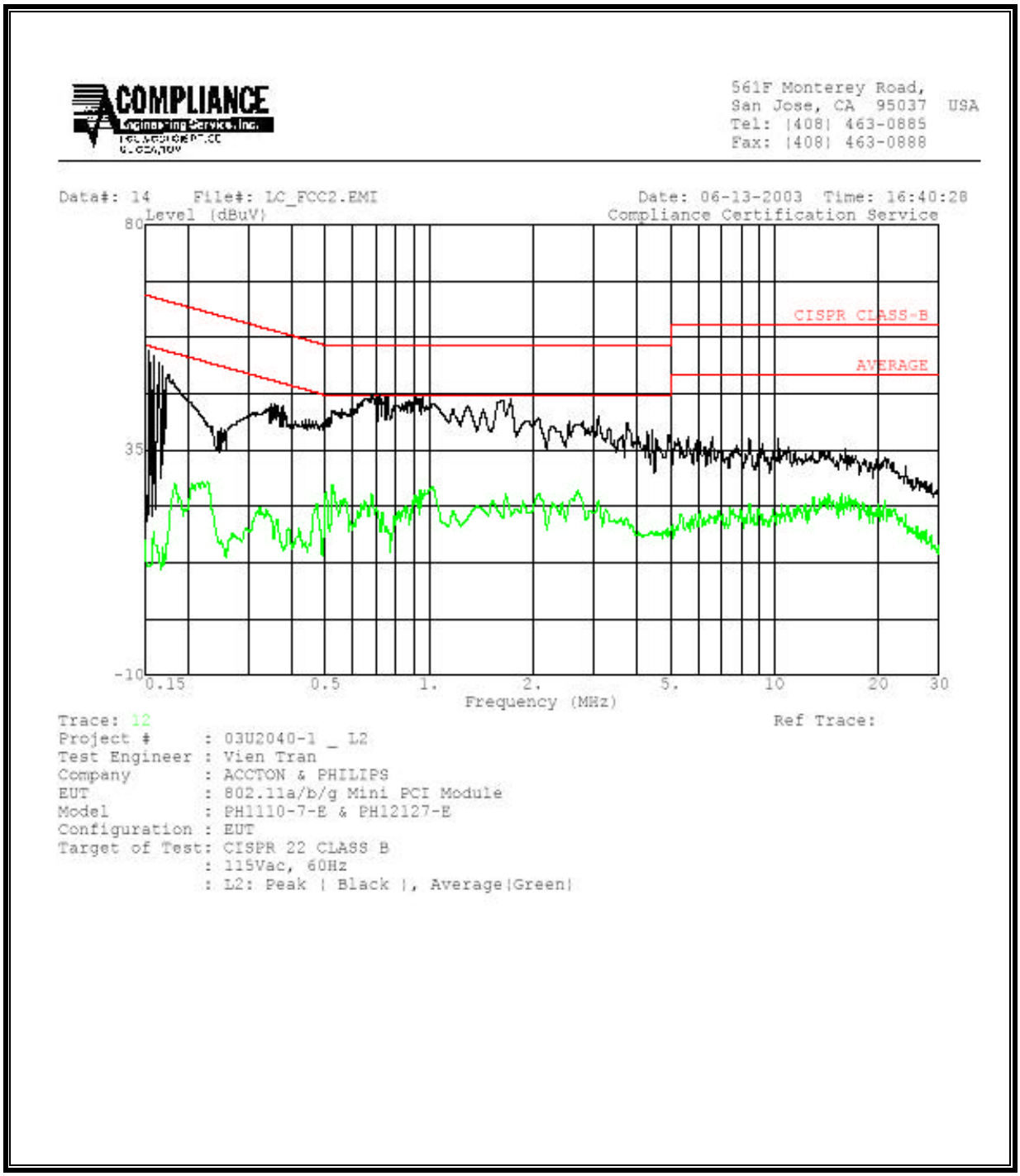
LINE 2 (NEUTRAL) RESULTS



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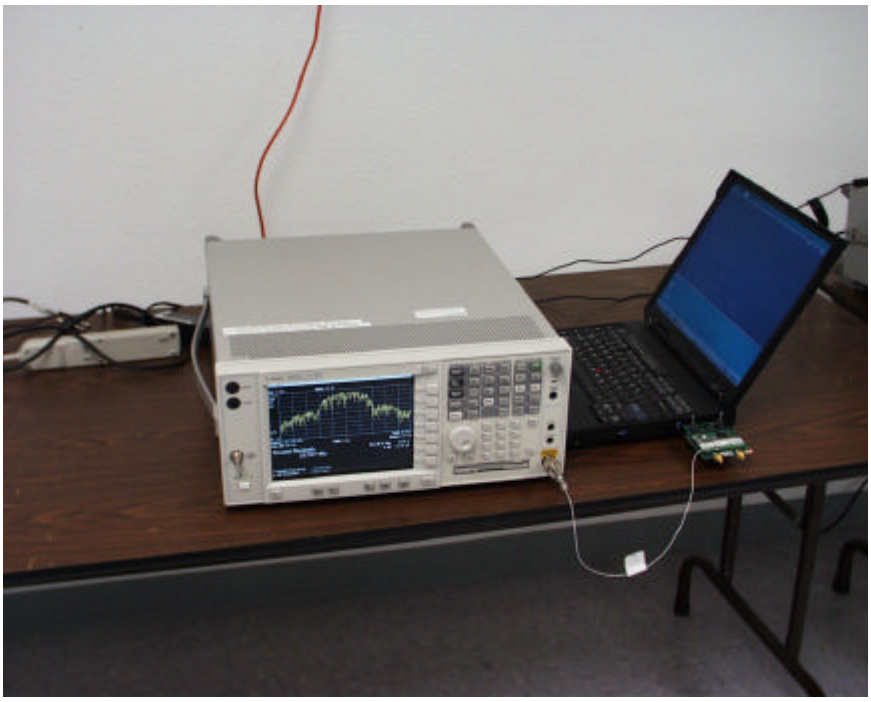
8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



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RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

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RADIATED LEFT SIDE PHOTO

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POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

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LINE CONDUCTED BACK PHOTO

END OF REPORT

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