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) / √ S Equation (1)

where
d = MPE safe distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW / cm^2

RESULTS

No non-compliance noted:

P = 19.86 dBm EUT output power
G = 1.50 dBi EUT antenna gain
S = 1.00 mW/cm^2 from 1.1310 Table 1

Substituting these parameters into Equation (1) sbove:

MPE safe distance d = 3.29 cm

NOTE: For mobile or fixed location transmitters, minimum separation distance is 20 cm, even if calculations indicate MPE distance is less.

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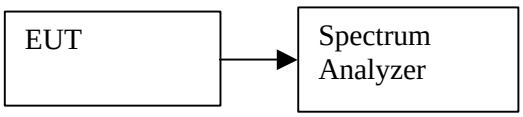
8.5. SPURIOUS EMISSIONS – CONDUCTED MEASUREMENTS

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 26.5 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth and video bandwidth are both set to 100 kHz, and peak detection is used.

BAND EDGE RESULTS

No non-compliance noted:

Normal Mode

Band Edge	Frequency (MHz)		In-Band Power (dBm)	Out-Of-Band Power (dBm)	Delta (dBc)	Limit (dBc)	Margin (dB)
Low	5725	Peak	4.6	-23.52	-28.12	-20	-8.12
High	5850	Peak	5.4	-29.90	-35.30	-20	-15.3

Turbo Mode

Band Edge	Frequency (MHz)		In-Band Power (dBm)	Out-Of-Band Power (dBm)	Delta (dBc)	Limit (dBc)	Margin (dB)
Low	5725	Peak	6.3	-20.25	-26.55	-20	-6.55
High	5850	Peak	6.6	-30.46	-37.06	-20	-17.1

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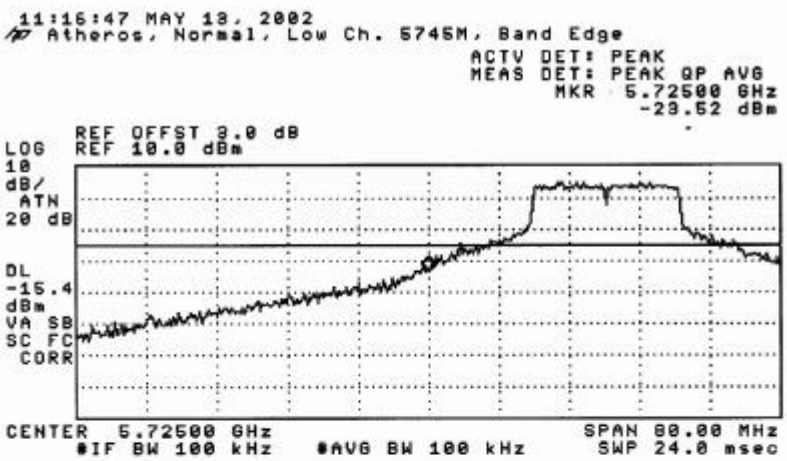

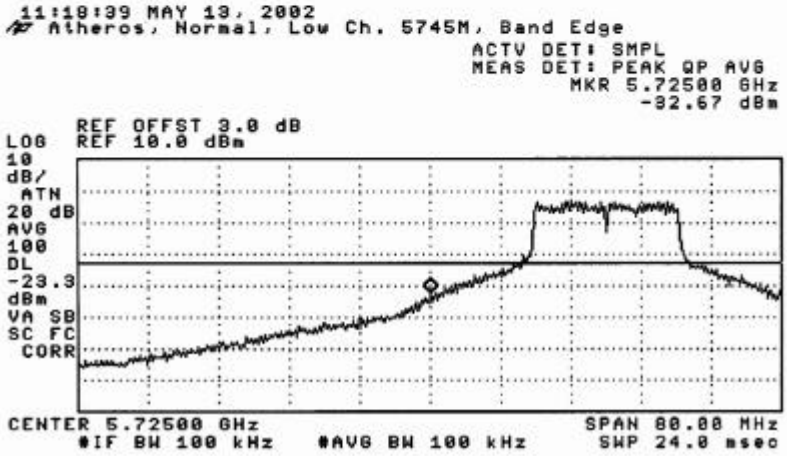

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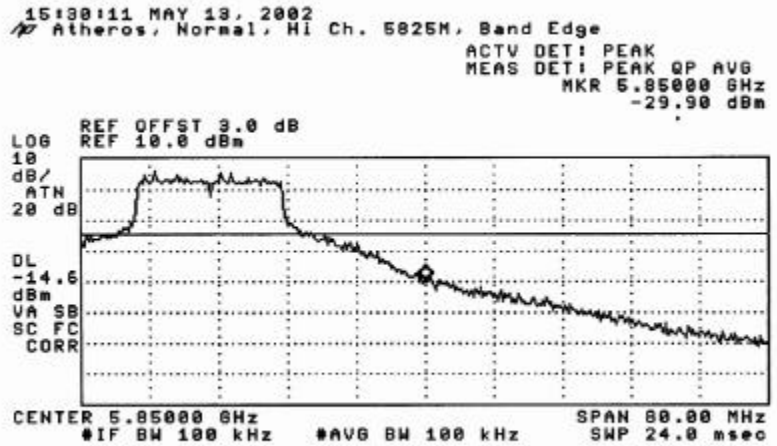

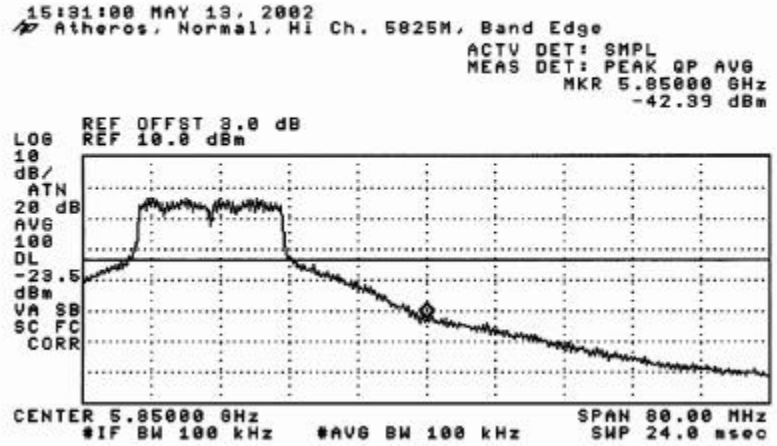

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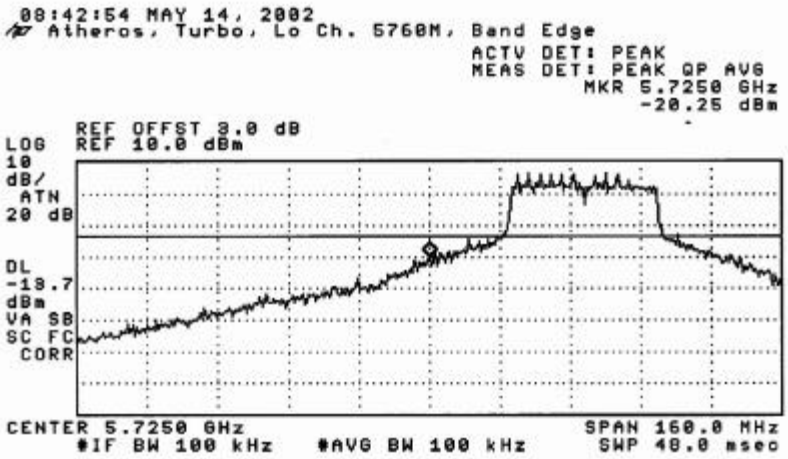

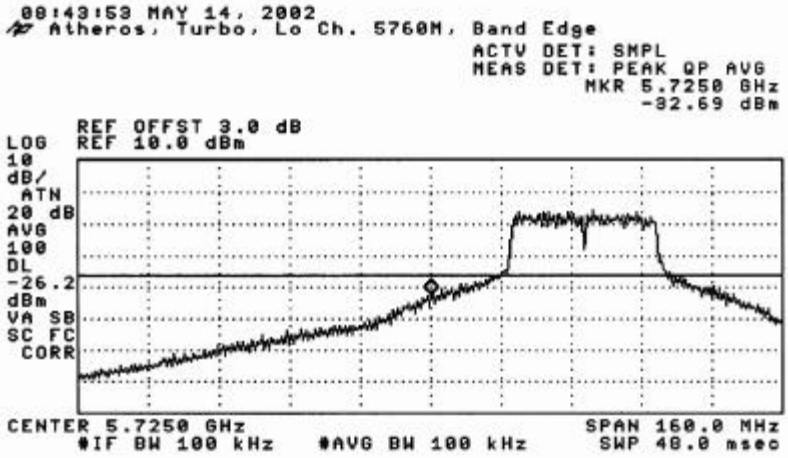

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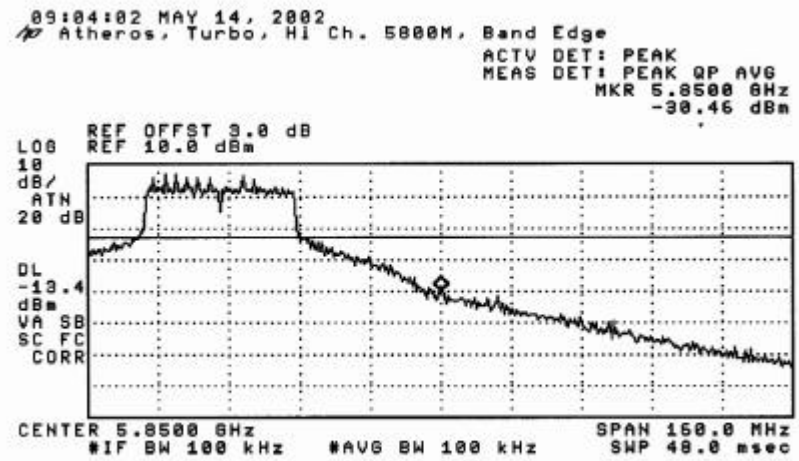

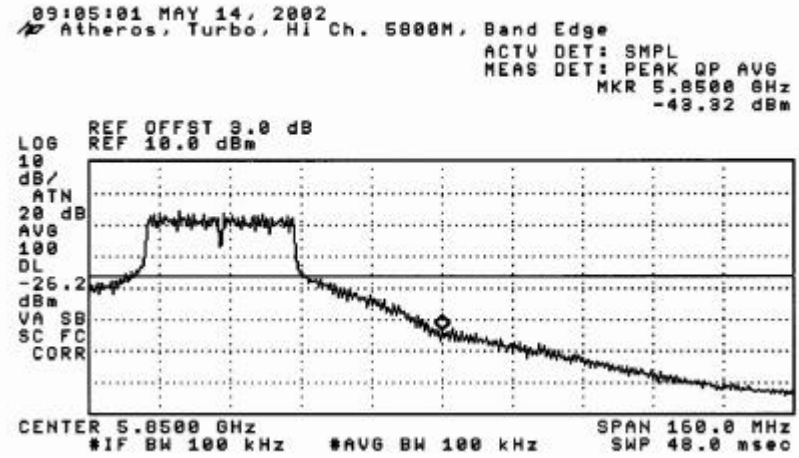

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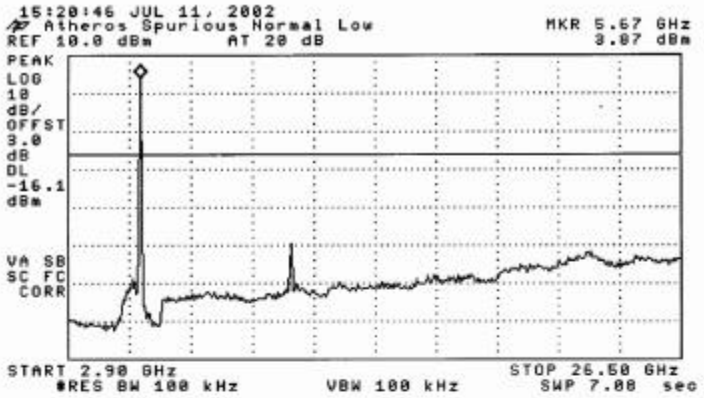
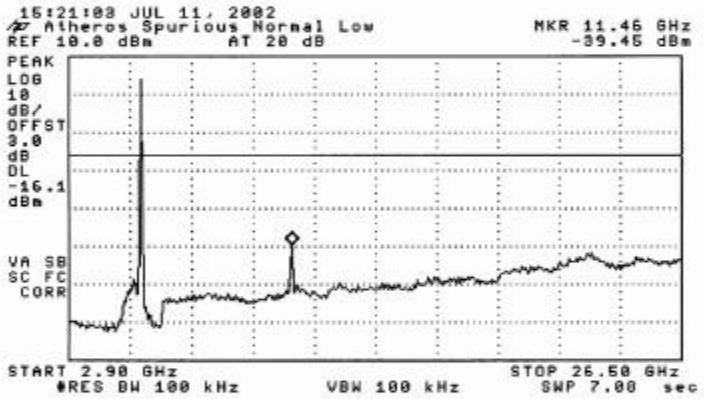
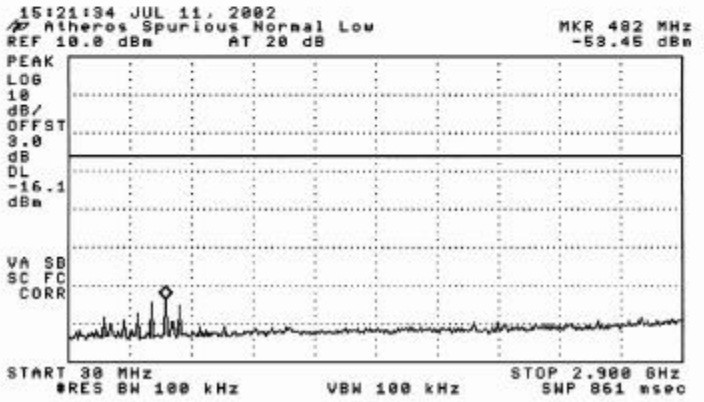
SPURIOUS EMISSION RESULTS FROM 30 MHz TO 26 GHz







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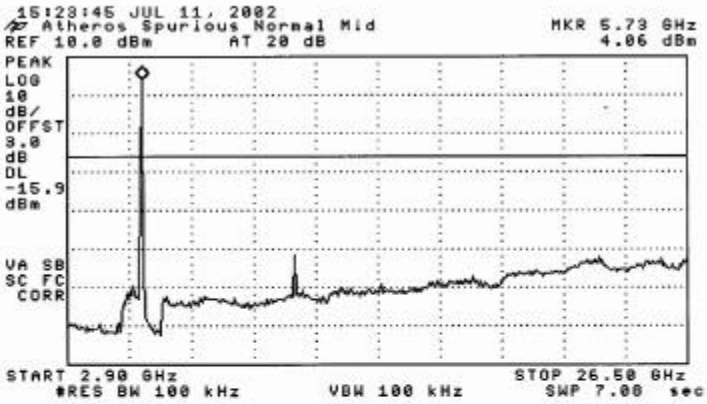

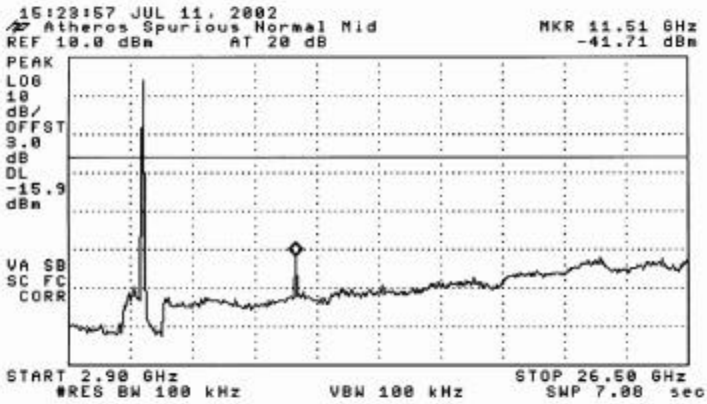

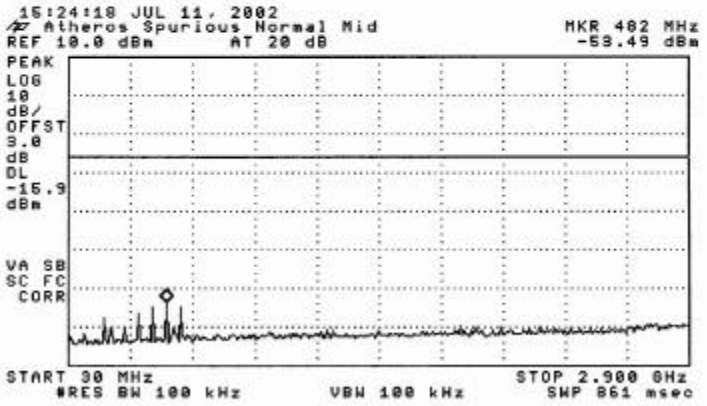

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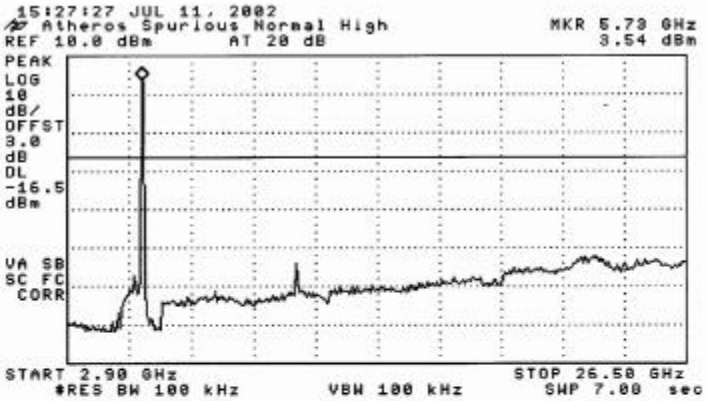

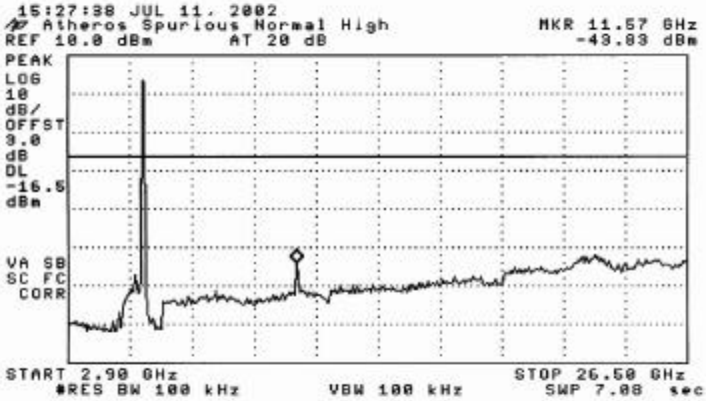

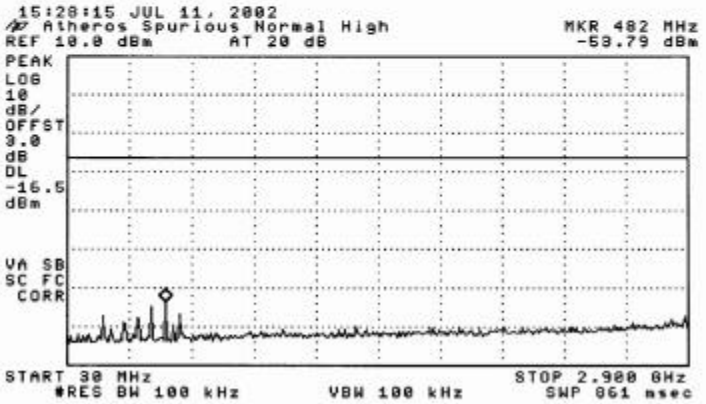

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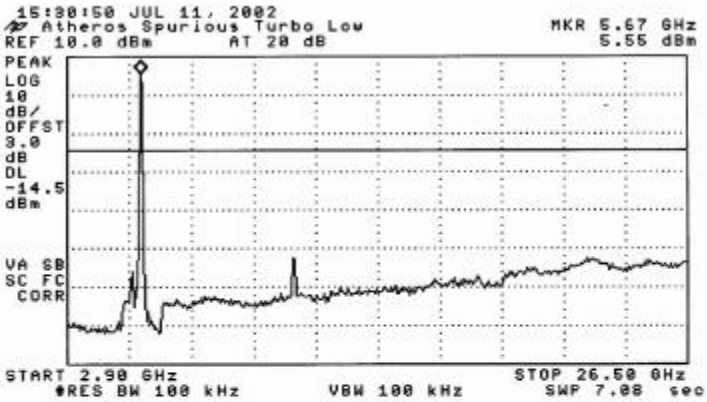

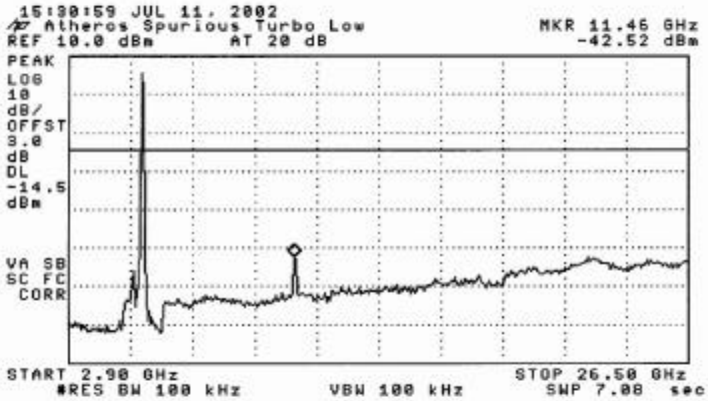

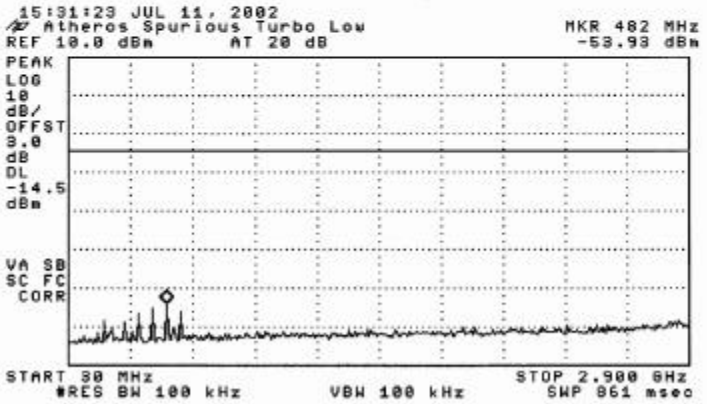

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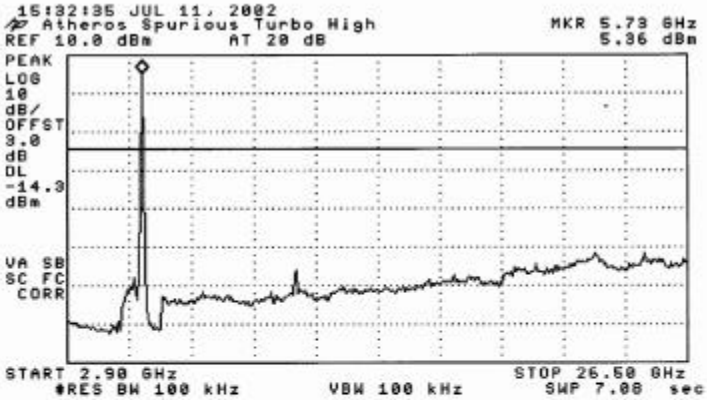

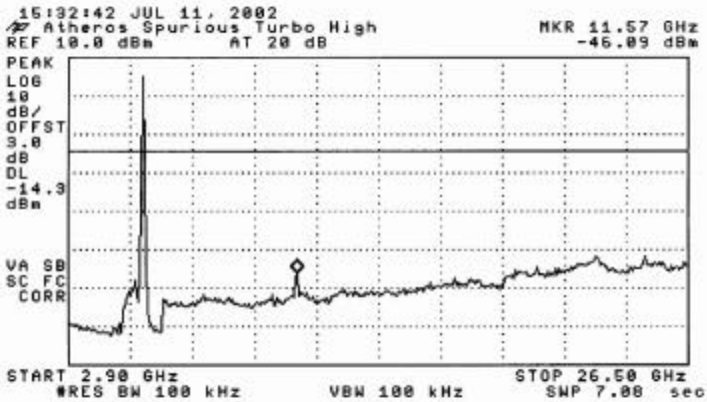

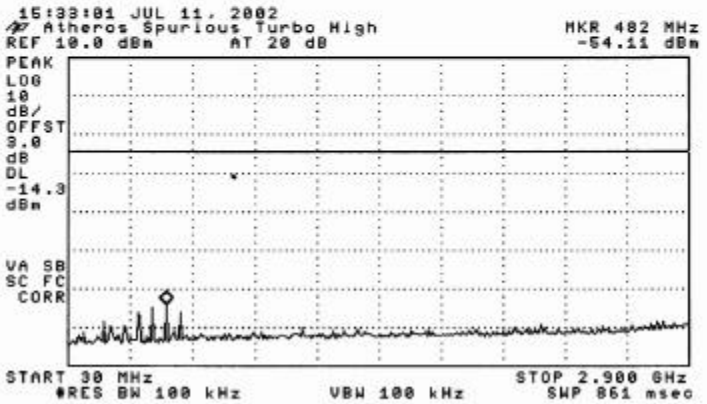

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8.6. SPURIOUS EMISSIONS – RADIATED MEASUREMENTS

TEST SETUP

For measurements of the EUT as a digital device, the EUT and all other support equipment were placed on a wooden table 80 cm above the ground plane. For measurements of the EUT as a transmitter , the EUT and the laptop were placed on the wooden table. The antenna to EUT distance is 3 meters for measurements below 1 GHz and 1 meter for measurements above 1 GHz. The EUT is configured in accordance with Section 8 of ANSI C63.4/1992.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

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.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. 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 suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

RESULTS

No non-compliance noted:

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FUNDAMENTAL, HARMONIC AND SPURIOUS RADIATED EMISSIONS RESULTS

05/08/02 **FCC Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thu Chan
Project #: 02U1295
Company: AtherosCommunications, Inc.
EUT Descrip.: 802.11a Wireless LAN Cardbus Card
EUT M/N: Tecra 8200 Laptop Computer
Test Target: FCC 15.407 UNII
Mode Oper: Normal, Low Channel, 5745MHz
(Frequency Range 5.725 - 5.850GHz)

Equipment for 1-26 GHz:
HP8593EM Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Horn Antenna
ARA MWH 1826/B
Cable: 15.0 feet

Equipment for 26 - 40 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970A External mixer/antenna
Dico 1149 Horn Antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz 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
Fundamental Frequency:															
5.745	5.0	77.3	66.9	35.3	5.1	0.0	-5.9	0.0	111.9	101.5					V
5.745	5.0	69.9	59.6	35.3	5.1	0.0	-5.9	0.0	104.5	94.2					H
Band Edge (-20dBc from the fundamental output power):															
5.725	5.0	52.6	39.3	35.3	5.1	0.0	-5.9	0.0	87.2	73.8	91.9	81.5	-4.7	-7.7	** V
5.725	5.0	46.3	36.8	35.3	5.1	0.0	-5.9	0.0	80.9	71.4	91.9	81.5	-11.0	-10.1	** H
Harmonic:															
11.489	5.0	58.2	44.4	39.5	9.3	-36.0	-5.9	1.0	66.1	52.2	74.0	54.0	-7.9	-1.8	* V
17.236	5.0	51.4	40.1	43.6	12.4	-38.9	-5.9	1.0	63.7	52.4	91.9	81.5	-28.2	-29.1	** V
22.980	2.5	52.0	40.5	32.7	15.6	-39.1	-11.9	0.0	49.3	37.8	74.0	54.0	-24.7	-16.2	* V (Noise Floor)
27.120	1.0	37.0	26.0	44.1	0.0	0.0	-19.9	0.0	61.2	50.2	91.9	81.5	-30.7	-31.3	** V (Noise Floor)
28.725	1.0	37.1	26.1	44.1	0.0	0.0	-19.9	0.0	61.3	50.3	91.9	81.5	-30.6	-31.2	** V (Noise Floor)
34.470	1.0	37.2	26.2	44.1	0.0	0.0	-19.9	0.0	61.4	50.4	91.9	81.5	-30.5	-31.1	** V (Noise Floor)
11.489	5.0	55.5	42.5	39.5	9.3	-36.0	-5.9	1.0	63.3	50.4	74.0	54.0	-10.7	-3.6	* H
17.236	5.0	51.0	39.7	43.6	12.4	-38.9	-5.9	1.0	63.3	52.0	91.9	81.5	-28.6	-29.5	** H
22.980	2.5	52.0	40.5	32.7	15.6	-39.1	-11.9	0.0	49.3	37.8	74.0	54.0	-24.7	-16.2	* H (Noise Floor)
28.725	1.0	37.0	26.0	44.1	0.0	0.0	-19.9	0.0	61.2	50.2	91.9	81.5	-30.7	-31.3	** H (Noise Floor)
34.470	1.0	37.1	26.1	44.1	0.0	0.0	-19.9	0.0	61.3	50.3	91.9	81.5	-30.6	-31.2	** H (Noise Floor)
Spurious:															
4.009	5.0	64.5	48.7	33.3	5.1	-36.1	-5.9	0.0	60.9	45.1	74.0	54.0	-13.1	-8.9	* V (w/ 10dB attn)
3.811	5.0	56.9	42.8	32.9	4.9	-36.2	-5.9	0.0	52.6	38.6	74.0	54.0	-21.4	-15.4	* V (w/ 10dB attn)
4.682	5.0	62.5	44.6	33.4	5.6	-36.1	-5.9	0.0	59.6	41.7	74.0	54.0	-14.4	-12.3	* V (w/ 10dB attn)
6.608	5.0	66.2	52.4	35.7	6.9	-36.4	-5.9	0.0	66.5	52.8	91.9	81.5	-25.4	-28.7	** V (w/ 10dB attn)
6.812	5.0	62.8	47.5	36.1	7.0	-36.4	-5.9	0.0	63.7	48.4	91.9	81.5	-28.2	-33.1	** V (w/ 10dB attn)
7.475	5.0	73.8	51.0	37.4	7.4	-36.2	-5.9	0.0	76.6	53.8	74.0	54.0	2.6	-0.2	* V (w/ 10dB attn)
7.475	2.5	64.9	52.0	37.5	7.4	-36.2	-11.9	0.0	61.7	48.7	74.0	54.0	-12.3	-5.3	* V (w/ 20dB attn)
6.608	5.0	57.0	45.0	35.7	6.9	-36.4	-5.9	0.0	57.4	45.4	91.9	81.5	-34.5	-36.1	** H (w/ 10dB attn)

Note: * Restricted Band Limit
** Non Restricted Band Liimit = -20dBc from the fundamental output power

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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561F MONTEREY ROAD, MORGAN HILL, CA 95037 USA TEL: (408) 463-0885 FAX: (408) 463-0888
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05/10/02 **FCC Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thu Chan
Project #: 02U1295
Company: AtherosCommunications, Inc.
EUT Descrip.: 802.11a Wireless LAN Cardbus Card
EUT M/N: Tecra 8200 Laptop Computer
Test Target: FCC 15.407 UNII
Mode Oper: Normal, Mid Channel, 5785MHz
(Frequency Range 5.725 - 5.850GHz)

Equipment for 1-26 GHz:
HP8593EM Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Horn Antenna
ARA MWH 1826/B
Cable: 15.0 feet

Equipment for 26 - 40 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970A External mixer/antenna
Dico 1149 Horn Antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz 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
Fundamental Frequency:															
5.785	5.0	78.3	67.4	35.4	5.2	0.0	-5.9	0.0	113.0	102.1					V
5.785	5.0	71.7	60.7	35.4	5.2	0.0	-5.9	0.0	106.4	95.4					H
Harmonic:															
11.570	5.0	60.0	45.0	39.5	9.3	-36.0	-5.9	1.0	67.8	52.8	74.0	54.0	-6.2	-1.2	* V
17.355	5.0	50.8	39.4	44.5	12.5	-38.9	-5.9	1.0	64.1	52.7	93.0	82.1	-28.9	-29.4	** V
23.140	2.5	52.5	41.0	32.8	15.7	-39.1	-11.9	0.0	49.9	38.4	93.0	82.1	-43.1	-43.7	** V (Noise Floor)
28.925	1.0	37.7	26.8	44.1	0.0	0.0	-19.9	0.0	61.9	51.0	93.0	82.1	-31.1	-31.1	** V (Noise Floor)
34.710	1.0	37.8	27.0	44.1	0.0	0.0	-19.9	0.0	62.0	51.2	93.0	82.1	-31.0	-30.9	** V (Noise Floor)
11.570	5.0	52.7	40.0	39.5	9.3	-36.0	-5.9	1.0	60.5	47.8	74.0	54.0	-13.5	-6.2	* H
17.355	5.0	40.0	39.0	44.5	12.5	-38.9	-5.9	1.0	53.3	52.3	93.0	82.1	-39.7	-29.8	** H
23.400	2.5	52.5	41.0	32.9	15.9	-39.2	-11.9	0.0	50.2	38.7	93.0	82.1	-42.8	-43.4	** H (Noise Floor)
28.925	1.0	37.6	26.7	44.1	0.0	0.0	-19.9	0.0	61.8	50.9	93.0	82.1	-31.2	-31.2	** H (Noise Floor)
34.710	1.0	37.8	26.9	44.1	0.0	0.0	-19.9	0.0	62.0	51.1	93.0	82.1	-31.0	-31.0	** H (Noise Floor)
Spurious:															
4.026	5.0	76.1	56.0	33.3	5.1	-36.1	-5.9	0.0	72.5	52.4	74.0	54.0	-1.5	-1.6	* V (w/ 10dB attn)
4.908	5.0	69.0	52.5	34.1	5.8	-36.1	-5.9	0.0	67.0	50.5	74.0	54.0	-7.0	-3.5	* V (w/ 10dB attn)
2.988	5.0	68.5	48.5	31.0	4.2	-36.2	-5.9	0.0	61.5	41.5	93.0	82.1	-31.5	-40.6	** V (w/ 10dB attn)
6.660	5.0	70.0	55.0	35.8	6.9	-36.4	-5.9	0.0	70.5	55.5	93.0	82.1	-22.5	-26.6	** V (w/ 10dB attn)
6.660	5.0	65.5	54.0	35.8	6.9	-36.4	-5.9	0.0	66.0	54.5	93.0	82.1	-27.0	-27.6	** H (w/ 10dB attn)
4.026	5.0	62.0	46.5	33.3	5.1	-36.1	-5.9	0.0	58.4	42.9	74.0	54.0	-15.6	-11.1	* H (w/ 10dB attn)
4.908	5.0	59.3	46.0	34.1	5.8	-36.1	-5.9	0.0	57.3	44.0	74.0	54.0	-16.7	-10.0	* H (w/ 10dB attn)

Note: * Restricted Band Limit
** Non Restricted Band Liimit = -20dBc from the fundamental output power

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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05/08/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thu Chan
Project #: 02U1295
Company: AtherosCommunications, Inc.
EUT Descrip.: 802.11a Wireless LAN Cardbus Card
EUT M/N: Tecra 8200 Laptop Computer
Test Target: FCC 15.407 UNII
Mode Oper: Normal, Hi Channel, 5825MHz
(Frequency Range 5.725 - 5.850GHz)

Equipment for 1-26 GHz:
HP8593EM Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Horn Antenna
ARA MWH 1826/B
Cable: 15.0 feet

Equipment for 26 - 40 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970A External mixer/antenna
Dico 1149 Horn Antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz 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
Fundamental Frequency:															
5.825	5.0	76.8	66.3	35.4	5.2	0.0	-5.9	0.0	111.5	101.0					V
5.825	5.0	68.1	58.2	35.4	5.2	0.0	-5.9	0.0	102.8	92.9					H
Band Edge (-20dBc from the fundamental output power):															
5.850	5.0	41.0	28.0	35.4	5.2	0.0	-5.9	0.0	75.7	62.7	91.5	81.0	-15.8	-18.3	** V (RBW=VBW=100KHz)
5.850	5.0	36.7	25.5	35.4	5.2	0.0	-5.9	0.0	71.4	60.2	91.5	81.0	-20.1	-20.8	** H (RBW=VBW=100KHz)
Harmonic:															
11.652	5.0	58.5	45.0	39.4	9.3	-36.1	-5.9	1.0	66.3	52.8	74.0	54.0	-7.7	-1.2	* V
17.468	5.0	51.6	38.5	45.4	12.6	-38.9	-5.9	1.0	65.7	52.6	91.5	81.0	-25.8	-28.4	** V
23.300	2.5	52.0	41.7	32.8	15.8	-39.2	-11.9	0.0	49.6	39.3	91.5	81.0	-41.9	-41.7	** V (Noise Floor)
29.125	1.0	37.9	26.9	44.1	0.0	0.0	-19.9	0.0	62.1	51.1	91.5	81.0	-29.4	-29.9	** V (Noise Floor)
34.950	1.0	38.0	27.0	44.1	0.0	0.0	-19.9	0.0	62.2	51.2	91.5	81.0	-29.3	-29.8	** V (Noise Floor)
11.560	5.0	52.1	39.5	39.5	9.3	-36.0	-5.9	1.0	59.9	47.3	74.0	54.0	-14.1	-6.7	* H
17.475	5.0	50.5	38.5	45.4	12.6	-38.9	-5.9	1.0	64.7	52.7	91.5	81.0	-26.8	-28.3	** H
23.300	2.5	52.0	41.7	32.8	15.8	-39.2	-11.9	0.0	49.6	39.3	91.5	81.0	-41.9	-41.7	** H (Noise Floor)
29.125	5.0	37.8	26.8	44.1	0.0	0.0	-5.9	0.0	76.0	65.0	91.5	81.0	-15.5	-16.0	** H (Noise Floor)
34.950	5.0	37.9	26.9	44.1	0.0	0.0	-5.9	0.0	76.1	65.1	91.5	81.0	-15.4	-15.9	** H (Noise Floor)
Spurious:															
4.945	5.0	72.4	55.5	34.2	5.8	-36.1	-5.9	0.0	70.5	53.6	74.0	54.0	-3.5	-0.4	* V
4.889	5.0	60.0	47.4	34.1	5.8	-36.1	-5.9	0.0	57.9	45.3	74.0	54.0	-16.1	-8.7	* V (w/ 10dB attn)
6.686	5.0	72.5	56.5	35.9	7.0	-36.4	-5.9	0.0	73.1	57.1	91.5	81.0	-18.4	-23.9	** V (w/ 10dB attn)
7.554	2.5	71.0	56.4	37.5	7.4	-36.1	-11.9	0.0	67.9	53.3	74.0	54.0	-6.1	-0.7	* V (w/ 20dB attn)
6.686	2.5	72.5	57.0	35.9	7.0	-36.4	-11.9	0.0	67.0	51.5	91.5	81.0	-24.5	-29.5	** V (w/ 20dB attn)
6.686	5.0	61.7	50.0	35.9	7.0	-36.4	-5.9	0.0	62.3	50.6	91.5	81.0	-29.2	-30.4	** H (w/ 10dB attn)
7.554	5.0	67.8	50.0	37.5	7.4	-36.1	-5.9	0.0	70.7	52.9	74.0	54.0	-3.3	-1.1	* H (w/ 10dB attn)

Note: * Restricted Band Limit
** Non Restricted Band Liimit = -20dBc from the fundamental output power

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		

COMPLIANCE CERTIFICATION SERVICES DOCUMENT NO: CCSUP4031A
561F MONTEREY ROAD, MORGAN HILL, CA 95037 USA TEL: (408) 463-0885 FAX: (408) 463-0888

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05/08/02 **FCC Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thu Chan
Project #: 02U1295
Company: AtherosCommunications, Inc.
EUT Descrip.: 802.11a Wireless LAN Cardbus Card
EUT M/N: Tecra 8200 Laptop Computer
Test Target: FCC 15.407 UNII
Mode Oper: Turbo, Low Channel, 5760MHz
(Frequency Range 5.725 - 5.850GHz)

Equipment for 1-26 GHz:
HP8593EM Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Horn Antenna
ARA MWH 1826/B
Cable: 15.0 feet

Equipment for 26 - 40 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970A External mixer/antenna
Dico 1149 Horn Antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz 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
Fundamental Frequency:															
5.760	5.0	76.6	65.5	35.4	5.1	0.0	-5.9	0.0	111.2	100.1					V
5.760	5.0	68.9	58.0	35.4	5.1	0.0	-5.9	0.0	103.5	92.6					H
Band Edge (-20dBc from the fundamental output power):															
5.725	5.0	46.7	36.0	35.3	5.1	0.0	-5.9	0.0	81.3	70.6	91.2	80.1	-9.9	-9.5	** V
5.725	5.0	39.0	29.0	35.3	5.1	0.0	-5.9	0.0	73.6	63.6	91.2	80.1	-17.6	-16.5	** H
Harmonic:															
11.520	5.0	55.2	43.1	39.5	9.3	-36.0	-5.9	1.0	63.1	51.0	74.0	54.0	-10.9	-3.0	* V
17.280	5.0	51.3	39.5	44.0	12.5	-38.9	-5.9	1.0	64.0	52.2	91.2	80.1	-27.2	-27.9	** V
23.040	2.5	54.0	41.0	32.7	15.6	-39.1	-11.9	0.0	51.3	38.3	74.0	54.0	-22.7	-15.7	* V (Noise Floor)
28.800	1.0	37.2	26.1	44.1	0.0	0.0	-19.9	0.0	61.4	50.3	91.2	80.1	-29.8	-29.8	** V (Noise Floor)
34.560	1.0	37.2	26.2	44.1	0.0	0.0	-19.9	0.0	61.4	50.4	91.2	80.1	-29.8	-29.7	** V (Noise Floor)
11.489	5.0	50.0	38.0	39.5	9.3	-36.0	-5.9	1.0	57.9	45.9	74.0	54.0	-16.1	-8.1	* H
17.236	5.0	50.0	39.5	43.6	12.4	-38.9	-5.9	1.0	62.3	51.8	91.2	80.1	-28.9	-28.3	** H
23.040	2.5	52.0	40.5	32.7	15.6	-39.1	-11.9	0.0	49.3	37.8	74.0	54.0	-24.7	-16.2	* H (Noise Floor)
28.800	1.0	37.1	26.0	44.1	0.0	0.0	-19.9	0.0	61.3	50.2	91.2	80.1	-29.9	-29.9	** H (Noise Floor)
34.560	1.0	37.0	26.1	44.1	0.0	0.0	-19.9	0.0	61.2	50.3	91.2	80.1	-30.0	-29.8	** H (Noise Floor)
Spurious:															
4.009	5.0	65.6	53.0	33.3	5.1	-36.1	-5.9	0.0	62.0	49.4	74.0	54.0	-12.0	-4.6	* V (w/ 20dB attn)
4.884	5.0	65.0	53.7	34.1	5.8	-36.1	-5.9	0.0	62.9	51.6	74.0	54.0	-11.1	-2.4	* V (w/ 20dB attn)
6.640	2.5	70.0	59.0	35.8	6.9	-36.4	-11.9	0.0	64.4	53.4	91.2	80.1	-26.8	-26.7	** V (w/ 20dB attn)
6.640	2.5	69.5	58.0	35.8	6.9	-36.4	-11.9	0.0	63.9	52.4	91.2	80.1	-27.3	-27.7	** H (w/ 20dB attn)
7.475	2.5	64.9	52.0	37.5	7.4	-36.2	-11.9	0.0	61.7	48.7	74.0	54.0	-12.3	-5.3	* V (w/ 20dB attn)

Note: * Restricted Band Limit
** Non Restricted Band Liimit = -20dBc from the fundamental output power

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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05/08/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thu Chan
Project #: 02U1295
Company: AtherosCommunications, Inc.
EUT Descrip.: 802.11a Wireless LAN Cardbus Card
EUT M/N: Tecra 8200 Laptop Computer
Test Target: FCC 15.407 UNII
Mode Oper: Turbo, Hi Channel, 5800MHz
(Frequency Range 5.725 - 5.850GHz)

Equipment for 1-26 GHz:
HP8593EM Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Horn Antenna
ARA MWH 1826/B
Cable: 15.0 feet

Equipment for 26 - 40 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970A External mixer/antenna
Dico 1149 Horn Antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz 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
Fundamental Frequency:															
5.800	5.0	73.9	63.1	35.4	5.2	0.0	-5.9	0.0	108.6	97.8					V
5.800	5.0	68.0	57.1	35.4	5.2	0.0	-5.9	0.0	102.7	91.8					H
Band Edge (-20dBc from the fundamental output power):															
5.850	5.0	37.8	27.0	35.4	5.2	0.0	-5.9	0.0	72.5	61.7	88.6	77.8	-16.1	-16.1	** V
5.850	5.0	36.6	25.5	35.4	5.2	0.0	-5.9	0.0	71.3	60.2	88.6	77.8	-17.3	-17.6	** H
Harmonic:															
11.600	5.0	55.4	44.0	39.5	9.3	-36.1	-5.9	1.0	63.2	51.8	74.0	54.0	-10.8	-2.2	* V
17.400	5.0	51.6	39.0	44.9	12.5	-38.9	-5.9	1.0	65.2	52.6	88.6	77.8	-23.4	-25.2	** V
23.200	2.5	52.0	41.7	32.8	15.8	-39.1	-11.9	0.0	49.5	39.2	88.6	77.8	-39.1	-38.6	** V (Noise Floor)
29.000	1.0	38.0	27.0	44.1	0.0	0.0	-19.9	0.0	62.2	51.2	88.6	77.8	-26.4	-26.6	** V (Noise Floor)
34.800	1.0	38.2	27.1	44.1	0.0	0.0	-19.9	0.0	62.4	51.3	88.6	77.8	-26.2	-26.5	** V (Noise Floor)
11.600	5.0	49.5	38.0	39.5	9.3	-36.1	-5.9	1.0	57.3	45.8	74.0	54.0	-16.7	-8.2	* H
17.400	5.0	51.0	38.5	44.9	12.5	-38.9	-5.9	1.0	64.6	52.1	88.6	77.8	-24.0	-25.7	** H
23.200	2.5	52.0	41.7	32.8	15.8	-39.1	-11.9	0.0	49.5	39.2	88.6	77.8	-39.1	-38.6	** H (Noise Floor)
29.000	1.0	37.9	26.9	44.1	0.0	0.0	-19.9	0.0	62.1	51.1	88.6	77.8	-26.5	-26.7	** H (Noise Floor)
34.800	1.0	38.0	27.0	44.1	0.0	0.0	-19.9	0.0	62.2	51.2	88.6	77.8	-26.4	-26.6	** H (Noise Floor)
Spurious:															
6.656	5.0	71.3	58.0	35.8	6.9	-36.4	-5.9	0.0	71.8	58.5	88.6	77.8	-16.8	-19.3	** V (w/ 10dB attn)
6.656	5.0	62.0	49.7	35.8	6.9	-36.4	-5.9	0.0	62.5	50.2	88.6	77.8	-26.1	-27.6	** H (w/ 10dB attn)
4.942	5.0	66.6	53.6	34.2	5.8	-36.1	-5.9	0.0	64.7	51.7	74.0	54.0	-9.3	-2.3	* V (w/ 20dB attn)
4.076	5.0	65.0	53.0	33.2	5.2	-36.1	-5.9	0.0	61.4	49.4	74.0	54.0	-12.6	-4.6	* V (w/ 20dB attn)
4.942	5.0	65.0	53.5	34.2	5.8	-36.1	-5.9	0.0	63.1	51.6	74.0	54.0	-10.9	-2.4	* H (w/ 20dB attn)
4.076	5.0	64.0	53.1	33.2	5.2	-36.1	-5.9	0.0	60.4	49.5	74.0	54.0	-13.6	-4.5	* H (w/ 20dB attn)

Note: * Restricted Band Limit
** Non Restricted Band Liimit = -20dBc from the fundamental output power

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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DIGITAL DEVICE RADIATED EMISSION RESULTS

COMPLIANCE Certification Services

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

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

Project #: 02U1295-2
Report #: 020513B2
Date& Time: 05/13/02 12:07 PM
Test Engr: Chin Pang

Company: Atheros communications, Inc.
EUT Description: 802.11a Wireless LAN Cardbus Card
Test Configuration : EUT/Support Peripherals
Type of Test: FCC Class B
Mode of Operation: Turbo, 108Mb/s, 5.80GHz

A-Site | B-Site | C-Site | F-Site | 6 Worst Data | Descending

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
20Mhz & 32Mhz step size											
160.00	46.20	10.03	2.67	29.34	29.56	43.50	-13.94	3mV	180.00	1.00	P
480.00	43.60	17.03	5.10	29.68	36.05	46.00	-9.95	3mV	180.00	1.00	P
800.00	43.60	19.73	7.07	29.29	41.11	46.00	-4.89	3mV	180.00	1.00	P
224.00	44.60	10.38	3.17	29.03	29.12	46.00	-16.88	3mV	180.00	1.00	P
544.00	44.30	17.93	5.53	29.75	38.02	46.00	-7.98	3mV	180.00	1.00	P
343.00	44.20	14.20	4.12	29.04	33.47	46.00	-12.53	3mV	180.00	1.00	P
416.00	43.70	16.09	4.67	29.41	35.05	46.00	-10.95	3mV	180.00	1.00	P
416.00	44.20	16.09	4.67	29.41	35.55	46.00	-10.45	3mH	180.00	1.20	P
320.00	45.00	13.54	3.94	28.92	33.55	46.00	-12.45	3mH	180.00	1.20	P
480.00	43.40	17.03	5.10	29.68	35.85	46.00	-10.15	3mH	180.00	1.20	P
800.00	45.00	19.73	7.07	29.29	42.51	46.00	-3.49	3mH	180.00	1.20	P
720.00	44.20	19.01	6.62	29.47	40.37	46.00	-5.63	3mH	180.00	1.00	P
520.00	43.20	17.60	5.37	29.75	36.42	46.00	-9.58	3mH	180.00	1.00	P
220.00	42.80	10.11	3.13	29.05	27.00	46.00	-19.00	3mH	180.00	1.00	P
Total data #: 14											
V.2b											

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COMPLIANCE Certification Services

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

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

Project #: 02U1295-2
Report #: 020513B3
Date& Time: 05/13/02 2:34 PM
Test Engr: Chin Pang

Company: Atheros communications, Inc.
EUT Description: 802.11a Wireless LAN Cardbus Card
Test Configuration : EUT/Support Peripherals
Type of Test: FCC Class B
Mode of Operation: Normal , 54Mb/s, 5.785GHz

A-Site | B-Site | C-Site | F-Site | 6 Worst Data | Descending

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
589.83	44.70	18.57	5.84	29.73	39.38	46.00	-6.62	3mV	180.00	1.00	P
544.00	44.00	17.93	5.53	29.75	37.72	46.00	-8.28	3mV	180.00	1.00	P
160.00	46.50	10.03	2.67	29.34	29.86	43.50	-13.64	3mV	180.00	1.00	P
800.00	43.00	19.73	7.07	29.29	40.51	46.00	-5.49	3mV	180.00	1.00	P
288.00	45.00	12.77	3.68	28.84	32.61	46.00	-13.39	3mH	0.00	1.00	P
544.00	44.00	17.93	5.53	29.75	37.72	46.00	-8.28	3mH	0.00	1.00	P
800.00	42.00	19.73	7.07	29.29	39.51	46.00	-6.49	3mH	0.00	1.00	P

Total data #: 7
V.2b

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8.7. POWER LINE CONDUCTED EMISSION

TEST SETUP

The EUT is placed on a wooden table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane on the floor.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

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:

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCCB	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.65	40.17	____	____	0	48.00	____	-7.83	____	L1
0.76	42.22	____	____	0	48.00	____	-5.78	____	L1
13.97	40.18	____	____	0	48.00	____	-7.82	____	L1
0.64	39.40	____	____	0	48.00	____	-8.60	____	L2
0.75	43.34	____	____	0	48.00	____	-4.66	____	L2
7.86	38.14	____	____	0	48.00	____	-9.86	____	L2
6 Worst Data									

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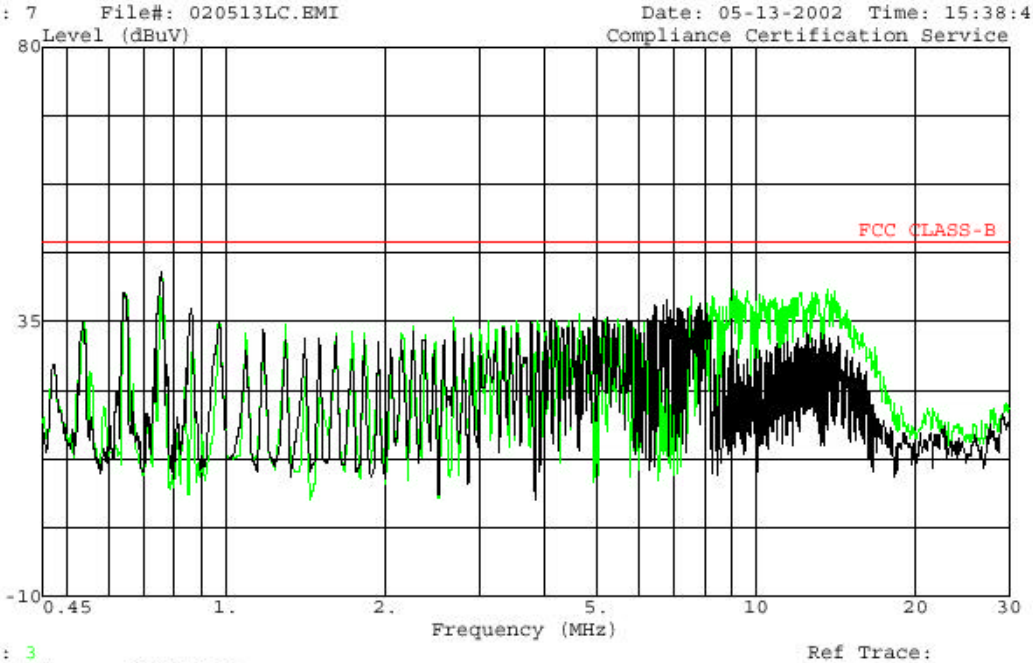
PLOT OF CONDUCTED EMISSIONS

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: 020513LC.EMI Date: 05-13-2002 Time: 15:38:42



Trace: 3 Ref Trace:
Project # : 02U1295-2
Test Engineer: Chin Pang
Company : Atheros Communications, Inc.
EUT : 802.11 Wireless LAN Cardbus Card
Test Config : EUt/Support Peripherals
Type of Test : FCc Class B
Mode of Op. : Turbo, 50Mb/s, 5.80Ghz, PCDac=23
: L1: Peak (Green), L2: Peak (Black)
: 115VAC, 60Hz

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8.8. SETUP PHOTOS

DIGITAL DEVICE RADIATED EMISSION SETUP

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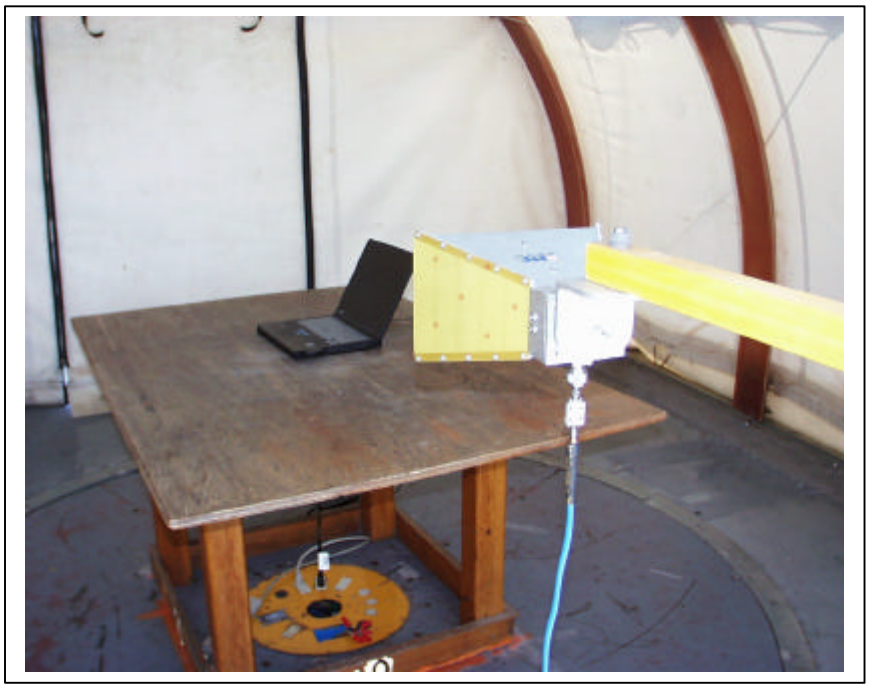
TRANSMITTER RADIATED EMISSION SETUP



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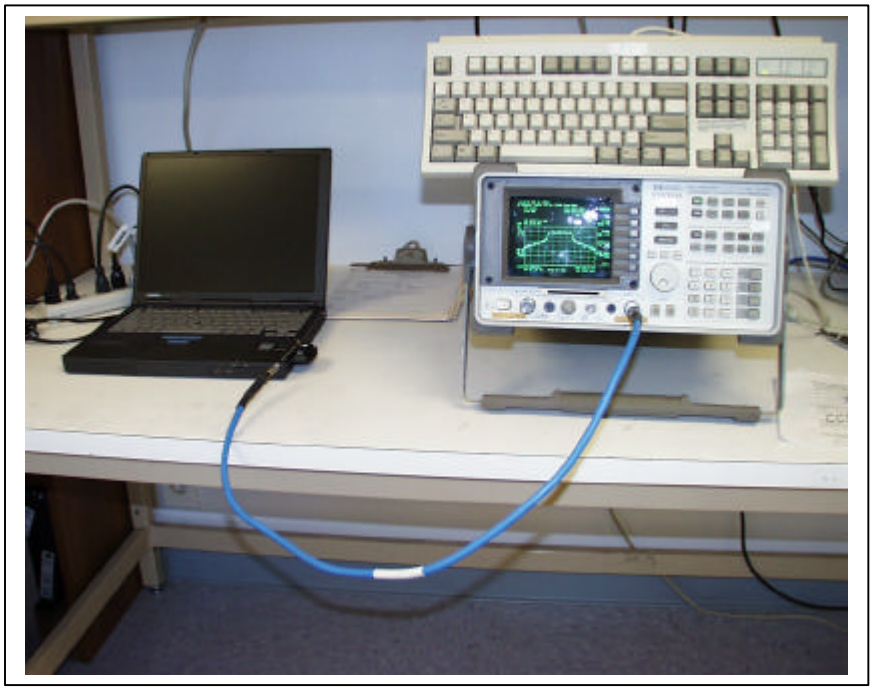
ANTENNA TERMINAL PORT MEASUREMENT SETUP



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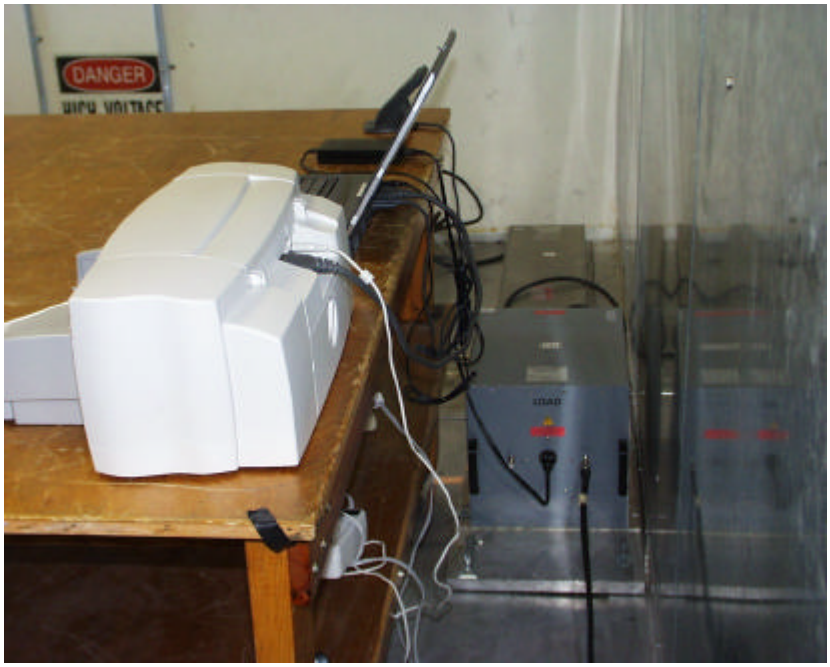
LINE CONDUCTION EMISSION SETUP



END OF REPORT

COMPLIANCE CERTIFICATION SERVICES DOCUMENT NO: CCSUP4031A
561F MONTEREY ROAD, MORGAN HILL, CA 95037 USA TEL: (408) 463-0885 FAX: (408) 463-0888
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