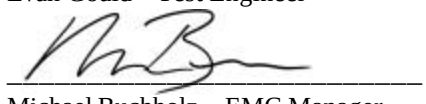
Curtis-Straus Test Report

Report No	EC0838-1
Client	Enterasys Networks 485 Amherst Street Nashua, NH 03063
Phone	978-684-1009
Fax	603-424-9047
FRN	0006-9167-61
Model	RBTBF-AX
FCC ID	QXO-RBTBF
Equipment Type	Low Power Communication Device Transmitter
Equipment Code	DXX
Results	As detailed within this report
Prepared by	 Evan Gould – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	2/26/03
Conditions of issue	This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.

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Summary

This report accompanies an application for certification of a transmitter operating pursuant to 47 CFR 15.407: Subpart E – Unlicensed National Information Infrastructure Devices. The product covered by this report is the 802.11a Super Rate Wireless LAN PC Card, which operates in the ranges 5.15-5.25GHz and 5.25-5.35GHz. The report is designed to demonstrate the compliance of this device with the requirements outlined in 47 CFR Part 15 using the methods outlined in 47 CFR Part 2 and guidance from FCC's "*Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*", which appears in Public Notice DA 02-2138 as Appendix A.

Test Methodology

All testing was performed according to the procedures specified in ANSI C63.4 (2000).

Frequency range investigated: 150kHz – 40GHz

Measurement distance:		
	0.15-30MHz	Conducted
	30-5000MHz	3 Meters (Spurious)
	5-18GHz	1 Meter (Spurious)
	18-40GHz	0.1 Meters (Spurious)

EUT Configuration

EUT Configuration

Work Order: C0838
Company: Enterasys Networks
Company Address: 486 Amherst Street
Nashua, NH 03063
Contact: John Ballew

	MN	SN
EUT:	RBTBF-AX	Card 4 - used for radiated measurements Card 49 - used for conducted measurements
EUT Description:	802.11a Super Rate Wireless LAN PC Card	
EUT Max Frequency:	5.32GHz	

Support Equipment:	**MN**	**SN**	**FCC ID**
Toshiba Satellite laptop	1200-S121	72072868C	-
Acbel Polyteck AC Adaptor	API7629	-	-

Support Equip. Cables:	**Qty**	**Shielded?**	**Length**	**Ferrites**
VGA	1	yes	1m	no
parallel	1	yes	1m	no
Ethernet	1	no	1m	no
RJ11	1	no	1m	no
USB	1	yes	1m	no
microphones	2	no	1m	no
DC Power	1	no	1m	1 molded

Unpopulated EUT Ports:	**Qty**	**Reason**
USB	2	redundant

Software / Operating Mode Description:

Software: MVS(Ver 42) test software written by Resonext/RFMD to perform continuous transmission (flexTx) and receive (flexRx) modes of operation.

EUT was installed in the support laptop computer, and using the software mentioned above, was able to be set to transmit with or without modulation, on either antenna; and depending on which card was intalled, conducted (Card 49) or radiated (Card 4) measurements were taken.

Antenna 1 is a SkyCross SMT-5250-MA which has a manufacturer specified antenna gain between 2 and 3dBi across the band of operation.

Antenna 2 is a SkyCross SMT-5250-UA which has a manufacturer specified antenna gain between 3 and 4dBi across the band of operation.

Statement of Conformity

The Enterasys RBTBF-AX has been found to conform with the following parts of the 47 CFR as detailed below:

Part 2	Part 15	Comments
	15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
	15.31(e)	The EUT receives its power from a computer in which it is installed.
	15.203	This antennas are mounted directly to the PCB, and cannot be readily accessed by the user..
	15.205 15.209	The fundamental is not in a Restricted band and the spurious emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.407(a)(1)	The EUT complies with peak output power and peak power spectral density limits in the range 5.15-5.25 GHz.
	15.407(a)(2)	The EUT complies with peak output power and peak power spectral density limits in the range 5.25-5.35 GHz.
	15.407(a)(6)	The EUT complies with the peak excursion limit of 13dB.
	15.407(b)	The EUT complies with the spurious emissions limits.
	15.407(c)	See attached document “5N5-RBTBF – 47CFR15.407(c).pdf”
	15.407(d)	The antenna is an integral part of the device.
	15.407(e)	The EUT is restricted to indoor use only, in the band 5.15-5.25GHz.
	15.407(f)	See attached SAR Report.
	15.407(g)	The fundamental emission was found to stay within the specified band as temperature was varied from –20° to 50°C.

Peak Output Power

LIMITS

"For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10logB, where B is the 26-dB emission bandwidth in MHz." [15.407(a)(1)]

"For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10logB, where B is the 26-dB emission bandwidth in MHz." [15.407(a)(2)]

"If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi." [15.407(a)(1)&(2)]

METHOD

Method 3 from the *"Guidelines..."* document (mentioned in the Summary) was used to measure the peak conducted output power. This was because the auto sweep time of the analyzer was greater than the transmission pulse duration, and the –26dB EBW was greater than the largest available RBW setting.

MEASUREMENTS

Peak Output Power - Antenna 1 *Curtis-Straus LLC*

Date: 18-Feb-03 **Company:** Enterasys **Table No:** 1
Engineer: Evan Gould **EUT:** HARP II (Card 49) Antenna 1 **Work Order:** C0838
Analyzer: Orange **Detector Type:** Sample (Max Hold) **RANGE A:** 5.15-5.25GHz
Attenuator: Pasternack 20dB **Resolution BW:** 1MHz **RANGE B:** 5.25-5.35GHz
Cable: Blue Microflex **Video BW:** 1kHz or 10kHz (for 6 or 54Mbps data rates, respectively)

Range / Ch. / Data Rate (Mbps)	Center Frequency (GHz)	Measured EBW (MHz)	Measured Peak Output Power (dBm)	Microflex Cable Factor (dB)	Dongle Factor (dB)	EBW Factor (dB)	Attenuator Factor (dB)	Adjusted Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.18	20.1	-28.60	3.5	0.25	13.03	20.2	8.38	16.98	-8.60	Pass
A / 36 / 6	5.18	20.9	-25.20	3.5	0.25	13.20	20.2	11.95	16.98	-5.03	Pass
A / 40 / 6	5.2	21.5	-25.50	3.5	0.25	13.32	20.2	11.77	16.98	-5.21	Pass
A / 40 / 54	5.2	20.2	-29.00	3.5	0.25	13.05	20.2	8.00	16.98	-8.98	Pass
A / 48 / 54	5.24	20.3	-29.30	3.5	0.25	13.07	20.2	7.72	16.98	-9.26	Pass
A / 48 / 6	5.24	21	-25.90	3.5	0.25	13.22	20.2	11.27	16.98	-5.71	Pass
B / 52 / 6	5.26	22	-24.40	3.5	0.25	13.42	20.2	12.97	23.97	-11.00	Pass
B / 52 / 54	5.26	20.7	-27.60	3.5	0.25	13.16	20.2	9.51	23.97	-14.46	Pass
B / 60 / 54	5.3	20.2	-26.30	3.5	0.25	13.05	20.2	10.70	23.97	-13.27	Pass
B / 60 / 6	5.3	22.3	-22.80	3.5	0.25	13.48	20.2	14.63	23.97	-9.34	Pass
B / 64 / 6	5.32	24	-23.2	3.5	0.25	13.80	20.2	14.55	23.97	-9.42	Pass
B / 64 / 54	5.32	20.9	-26.8	3.5	0.25	13.20	20.2	10.35	23.97	-13.62	Pass

Peak Output Power - Antenna 2 *Curtis-Straus LLC*

Date: 17-Feb-03 **Company:** Enterasys **Table No:** 2
Engineer: Mairaj Hussain and Evan Gould **EUT:** HARP II (Card 49) Antenna 2 **Work Order:** C0838
Analyzer: Orange **Detector Type:** Sample (Max Hold) **RANGE A:** 5.15-5.25GHz
Attenuator: Pasternack 20dB **Resolution BW:** 1MHz **RANGE B:** 5.25-5.35GHz
Cable: Blue Microflex **Video BW:** 1kHz or 10kHz (for 6 or 54Mbps data rates, respectively)

Range / Ch. / Data Rate (Mbps)	Center Frequency (GHz)	Measured EBW (MHz)	Measured Peak Output Power (dBm)	Microflex Cable Factor (dB)	Dongle Factor (dB)	EBW Factor (dB)	Attenuator Factor (dB)	Adjusted Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.18	20.04	-26.70	3.5	0.25	13.02	20.2	10.27	16.98	-6.71	Pass
A / 36 / 6	5.18	21	-26.80	3.5	0.25	13.22	20.2	10.37	16.98	-6.61	Pass
A / 40 / 6	5.2	20.15	-27.60	3.5	0.25	13.04	20.2	9.39	16.98	-7.59	Pass
A / 40 / 54	5.2	20.05	-27.11	3.5	0.25	13.02	20.2	9.86	16.98	-7.12	Pass
A / 48 / 54	5.24	20.24	-29.10	3.5	0.25	13.06	20.2	7.91	16.98	-9.07	Pass
A / 48 / 6	5.24	20.97	-29.70	3.5	0.25	13.22	20.2	7.47	16.98	-9.51	Pass
B / 64 / 6	5.32	20.9	-24.00	3.5	0.25	13.20	20.2	13.15	23.97	-10.82	Pass
B / 64 / 54	5.32	20.48	-23.50	3.5	0.25	13.11	20.2	13.56	23.97	-10.41	Pass
B / 60 / 54	5.3	20.95	-23.00	3.5	0.25	13.21	20.2	14.16	23.97	-9.81	Pass
B / 60 / 6	5.3	20	-23.70	3.5	0.25	13.01	20.2	13.26	23.97	-10.71	Pass
B / 52 / 6	5.26	20.2	-28.6	3.5	0.25	13.05	20.2	8.40	23.97	-15.57	Pass
B / 52 / 54	5.26	20.77	-28.1	3.5	0.25	13.17	20.2	9.02	23.97	-14.95	Pass

To prove that the antennas do not have directional gain greater than 6dBi, radiated measurements were taken for each antenna and compared to the corresponding conducted power reading.

Antenna Gain *Curtis-Straus LLC*

Date: 19-Feb-03 **Company:** Enterasys **Table:** 2.5
Engineer: Mairaj Hussain **EUT Desc:** HARP II (card 4) **Work Order:** C0838
Measurement Distance: 3 m
Notes: EUT was maximized through three orthogonal axes **Antenna:** Black Horn

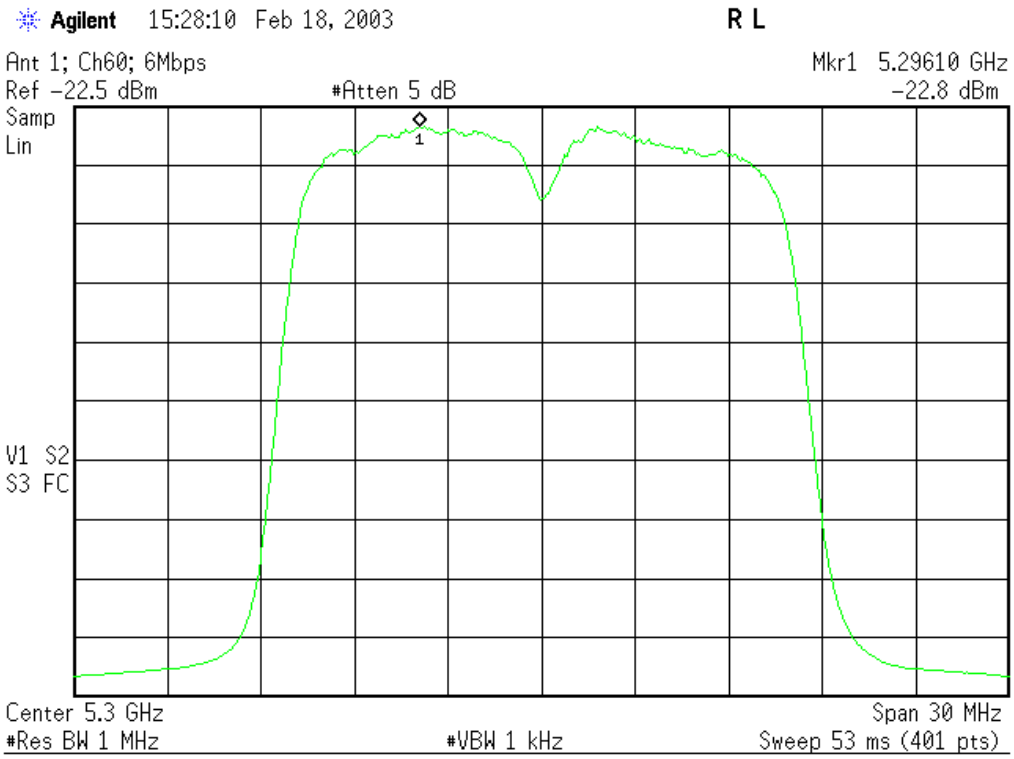
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	Calculated EIRP (dBm)	Measured Output Power (dBm)	Delta (dBi)
ANTENNA 1									(should be less than 2)
V	5173.5	69.0	0.0	35.7	2.2	106.9	11.7	11.95	-0.25
ANTENNA 2									(should be less than 4)
H	5295.3	69.5	0.0	35.9	2.2	107.6	12.4	14.16	-1.76

Test Site: "T" **Pre-Amp:** none **Cable:** 3m Microflex **Analyzer:** Orange

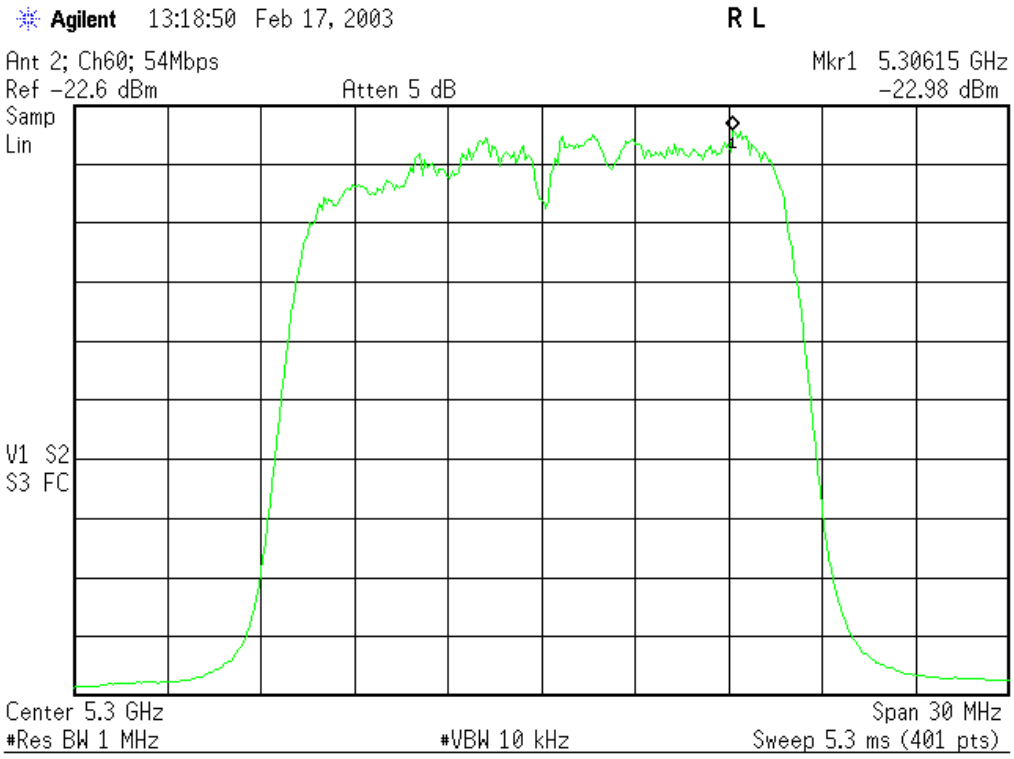
Note: Worst case peak output power analyzer plots are displayed for each antenna on the following page. The exhibits chosen to be displayed for peak power spectral density and peak excursion are plots resulting from the same EUT settings as shown on the following page.

ANALYZER PLOTS

Antenna 1 Peak Output Power – 6Mbps @ Ch 60



Antenna 2 Peak Output Power – 54Mbps @ Ch 60



Peak Power Spectral Density

LIMITS

"For the band 5.15-5.25 GHz,... the peak power spectral density shall not exceed 4 dBm in any 1-MHz band." [15.407(a)(1)]

"For the band 5.25-5.35 GHz,... the peak power spectral density shall not exceed 11 dBm in any 1-MHz band." [15.407(a)(2)]

METHOD

Method 2 was used to measure the peak power spectral density. The product was set up so as to meet the requirements of this method.

MEASUREMENTS

Peak Power Spectral Density - Antenna 1 *Curtis-Straus LLC*

Date: 18-Feb-03 **Company:** Enterasys **Table No:** 3
Engineer: Evan Gould **EUT:** HARP II (Card 49) Antenna 1 **Work Order:** C0838
Analyzer: Orange **Detector Type:** Sample (Power Average over 100 sweeps)
Attenuator: Pasternack 20dB **Resolution BW:** 1MHz **RANGE A:** 5.15-5.25GHz
Cable: Blue Microflex **Video BW:** 3MHz **RANGE B:** 5.25-5.35GHz

Range / Ch. / Data Rate (Mbps)	Center Frequency (GHz)	Measured Peak Power Spectral Density(dBm)	Microflex Cable Factor (dB)	Dongle Factor (dB)	Attenuator Factor (dB)	Adjusted Peak Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.18	-28.1	3.5	0.25	20.2	-4.15	4.00	-8.15	Pass
A / 36 / 6	5.18	-23.8	3.5	0.25	20.2	0.15	4.00	-3.85	Pass
A / 40 / 6	5.2	-24.1	3.5	0.25	20.2	-0.15	4.00	-4.15	Pass
A / 40 / 54	5.2	-28.6	3.5	0.25	20.2	-4.65	4.00	-8.65	Pass
A / 48 / 54	5.24	-29.4	3.5	0.25	20.2	-5.45	4.00	-9.45	Pass
A / 48 / 6	5.24	-24.6	3.5	0.25	20.2	-0.65	4.00	-4.65	Pass
B / 52 / 6	5.26	-23.2	3.5	0.25	20.2	0.75	11.00	-10.25	Pass
B / 52 / 54	5.26	-27.3	3.5	0.25	20.2	-3.35	11.00	-14.35	Pass
B / 60 / 54	5.3	-25.6	3.5	0.25	20.2	-1.65	11.00	-12.65	Pass
B / 60 / 6	5.3	-21.9	3.5	0.25	20.2	2.05	11.00	-8.95	Pass
B / 64 / 6	5.32	-22.1	3.5	0.25	20.2	1.85	11.00	-9.15	Pass
B / 64 / 54	5.32	-26.2	3.5	0.25	20.2	-2.25	11.00	-13.25	Pass

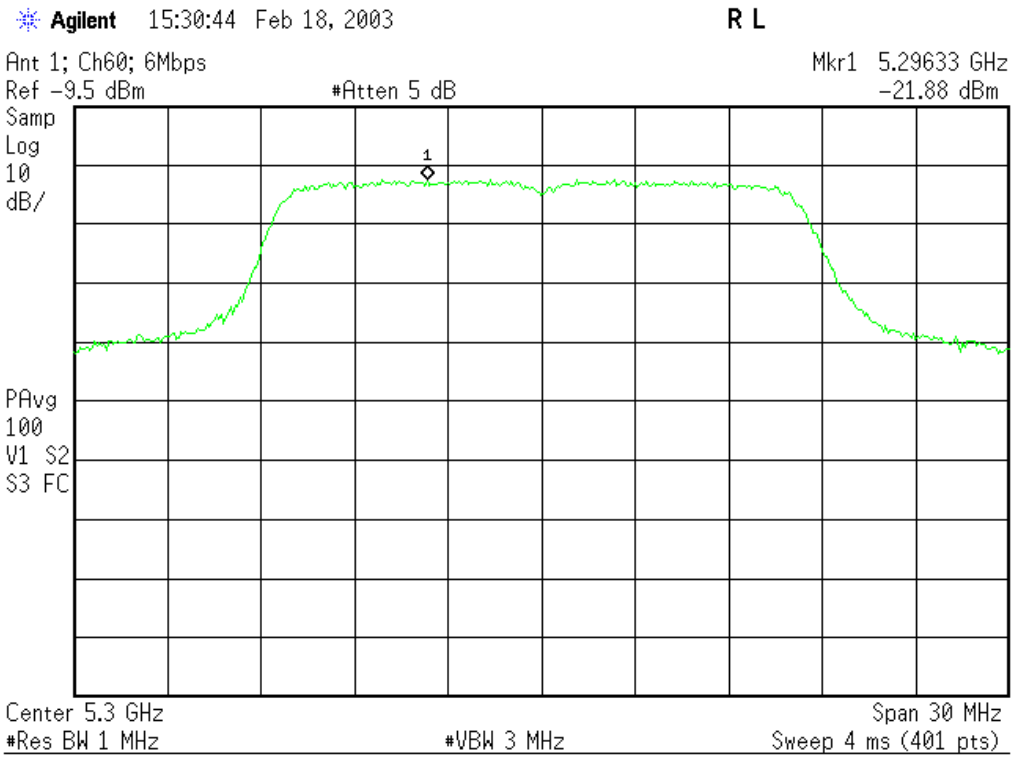
Peak Power Spectral Density - Antenna 2 *Curtis-Straus LLC*

Date: 17-Feb-03 **Company:** Enterasys **Table No:** 4
Engineer: Mairaj Hussain and Evan Gould **EUT:** HARP II (Card 49) Antenna 2 **Work Order:** C0838
Analyzer: Orange **Detector Type:** Sample (Power Average over 100 sweeps)
Attenuator: Pasternack 20dB **Resolution BW:** 1MHz **RANGE A:** 5.15-5.25GHz
Cable: Blue Microflex **Video BW:** 3MHz **RANGE B:** 5.25-5.35GHz

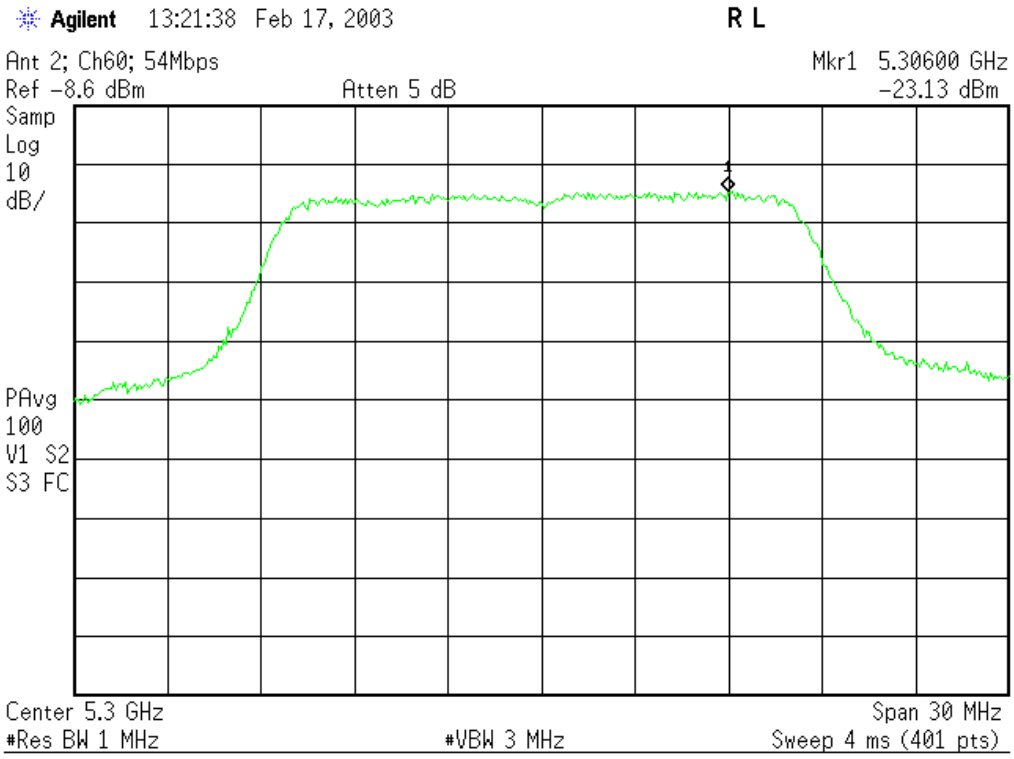
Range / Ch. / Data Rate (Mbps)	Center Frequency (GHz)	Measured Peak Power Spectral Density(dBm)	Microflex Cable Factor (dB)	Dongle Factor (dB)	Attenuator Factor (dB)	Adjusted Peak Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.18	-27	3.5	0.25	20.2	-3.05	4.00	-7.05	Pass
A / 36 / 6	5.18	-26.2	3.5	0.25	20.2	-2.25	4.00	-6.25	Pass
A / 40 / 6	5.2	-27	3.5	0.25	20.2	-3.05	4.00	-7.05	Pass
A / 40 / 54	5.2	-27.3	3.5	0.25	20.2	-3.35	4.00	-7.35	Pass
A / 48 / 54	5.24	-29.3	3.5	0.25	20.2	-5.35	4.00	-9.35	Pass
A / 48 / 6	5.24	-29.1	3.5	0.25	20.2	-5.15	4.00	-9.15	Pass
B / 64 / 6	5.32	-23	3.5	0.25	20.2	0.95	11.00	-10.05	Pass
B / 64 / 54	5.32	-23.3	3.5	0.25	20.2	0.65	11.00	-10.35	Pass
B / 60 / 54	5.3	-23.1	3.5	0.25	20.2	0.85	11.00	-10.15	Pass
B / 60 / 6	5.3	-22.9	3.5	0.25	20.2	1.05	11.00	-9.95	Pass
B / 52 / 6	5.26	-27.9	3.5	0.25	20.2	-3.95	11.00	-14.95	Pass
B / 52 / 54	5.26	-28.2	3.5	0.25	20.2	-4.25	11.00	-15.25	Pass

ANALYZER PLOTS

Antenna 1 Peak Power Spectral Density – 6Mbps @ Ch 60



Antenna 2 Peak Power Spectral Density – 54Mbps @ Ch 60



Peak Excursion

LIMIT

"The ratio of the peak excursion of the modulation envelope ... to the peak transmit power ... shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less." [15.407(a)(6)]

METHOD

Max hold traces were taken with the span set to the 99% bandwidth. Using Agilent's BenchLink Spectrum Analyzer software, data from the traces (400 points each) were copied into a spreadsheet and sorted according to the difference between amplitudes. The largest difference is therefore the peak excursion.

MEASUREMENTS

Peak Excursion - Antenna 1 *Curtis-Straus LLC*

Date: 18-Feb-03 **Company:** Enterasys **Table No:** 5
Engineers: Evan Gould **EUT:** HARP II (Card 49) Antenna 1 **Work Order:** C0838

TRACE 1 **TRACE 2** **RANGE A:** 5.15-5.25GHz
Detector Type: Peak (Max Hold) **Detector Type:** Peak (Max Hold) **RANGE B:** 5.25-5.35GHz
Resolution BW: 1MHz **Resolution BW:** 1MHz
Video BW: 3MHz **Video BW:** 1kHz or 10kHz (for 6 or 54Mbps data rates, respectively)

Range / Ch. / Data Rate (Mbps)	Center Frequency (GHz)	99% Occupied BW (MHz)	Peak Excursion (dB)	Frequency of Peak Excursion (GHz)	Limit (dB)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.18	16.52	10.1	5.19	13.00	-2.90	Pass
A / 36 / 6	5.18	16.33	11.5	5.18	13.00	-1.50	Pass
A / 40 / 6	5.2	16.5	11.5	5.20	13.00	-1.50	Pass
A / 40 / 54	5.2	16.5	10.3	5.20	13.00	-2.75	Pass
A / 48 / 54	5.24	16.65	10.0	5.24	13.00	-3.00	Pass
A / 48 / 6	5.24	16.42	11.5	5.24	13.00	-1.50	Pass
B / 52 / 6	5.26	16.57	11.6	5.26	13.00	-1.40	Pass
B / 52 / 54	5.26	16.38	10.0	5.26	13.00	-3.00	Pass
B / 60 / 54	5.3	16.58	10.0	5.31	13.00	-3.00	Pass
B / 60 / 6	5.3	16.78	11.6	5.30	13.00	-1.40	Pass
B / 64 / 6	5.32	16.5	11.7	5.32	13.00	-1.30	Pass
B / 64 / 54	5.32	16.88	10.0	5.32	13.00	-3.00	Pass

Note: The portion of the fundamental transmission investigated for Peak Excursion was: CENTER FREQ ± 1/2(99% OCCUPIED BW)

Peak Excursion - Antenna 2 *Curtis-Straus LLC*

Date: 17-Feb-03 **Company:** Enterasys **Table No:** 6
Engineers: Mairaj Hussain, Evan Gould **EUT:** HARP II (Card 49) Antenna 2 **Work Order:** C0838

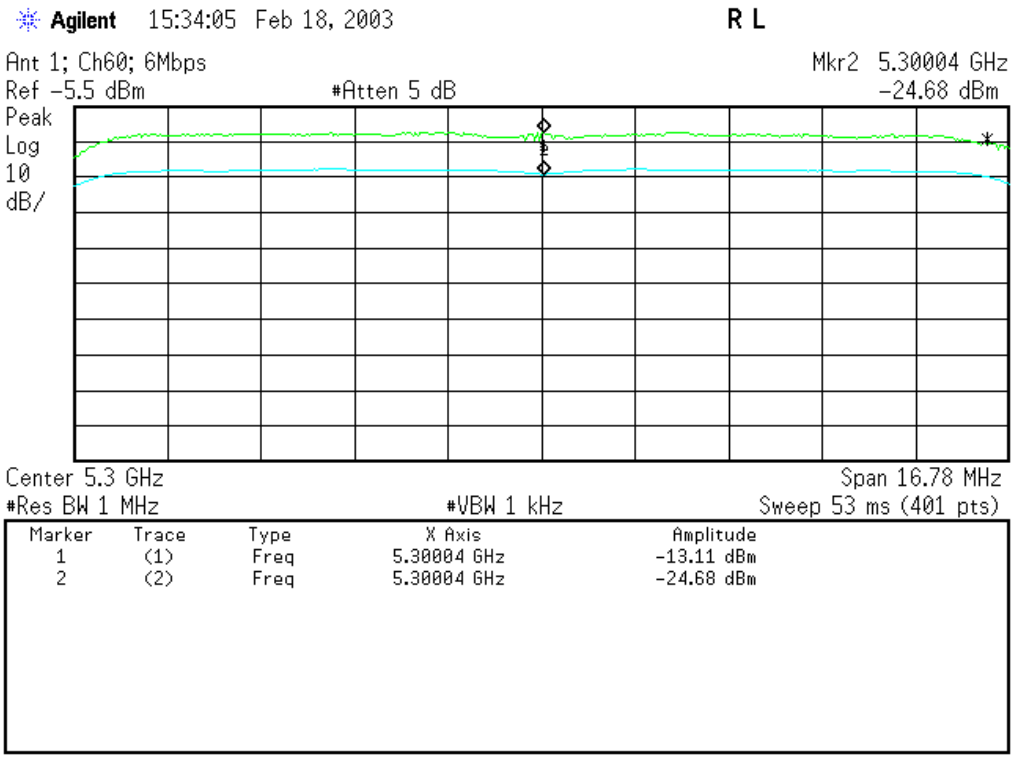
TRACE 1 **TRACE 2** **RANGE A:** 5.15-5.25GHz
Detector Type: Peak (Max Hold) **Detector Type:** Peak (Max Hold) **RANGE B:** 5.25-5.35GHz
Resolution BW: 1MHz **Resolution BW:** 1MHz
Video BW: 3MHz **Video BW:** 1kHz or 10kHz (for 6 or 54Mbps data rates, respectively)

Range / Ch. / Data Rate (Mbps)	Center Frequency (GHz)	99% Occupied BW (MHz)	Peak Excursion (dB)	Frequency of Peak Excursion (GHz)	Limit (dB)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.18	16.49	5.2	10.15	13.00	-7.83	Pass
A / 36 / 6	5.18	16.42	11.4	5.18	13.00	-1.60	Pass
A / 40 / 6	5.2	16.48	11.7	5.20	13.00	-1.30	Pass
A / 40 / 54	5.2	16.69	10.0	2.20	13.00	-2.96	Pass
A / 48 / 54	5.24	16.49	10.1	5.23	13.00	-2.88	Pass
A / 48 / 6	5.24	16.42	11.7	5.24	13.00	-1.29	Pass
B / 64 / 6	5.32	16.53	11.6	5.31	13.00	-1.40	Pass
B / 64 / 54	5.32	16.35	10.0	5.33	13.00	-3.00	Pass
B / 60 / 54	5.3	16.34	10.0	5.29	13.00	-3.05	Pass
B / 60 / 6	5.3	16.48	11.9	5.30	13.00	-1.13	Pass
B / 52 / 6	5.26	16.51	11.2	5.25	13.00	-1.80	Pass
B / 52 / 54	5.26	16.37	10.1	5.26	13.00	-2.90	Pass

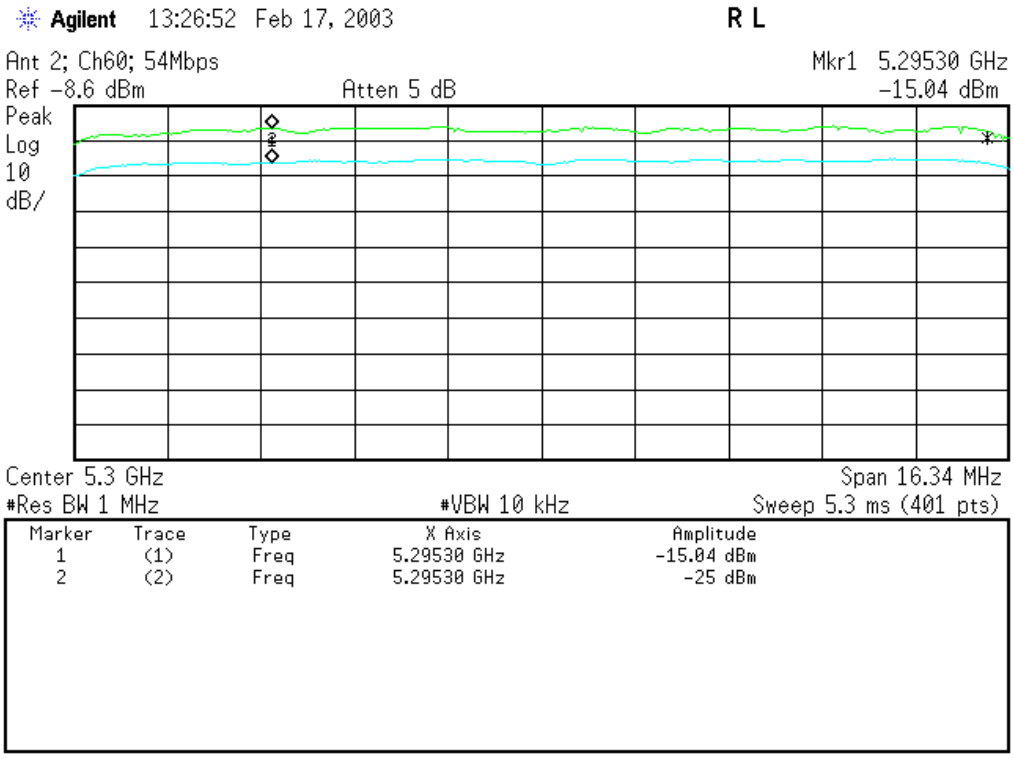
Note: The portion of the fundamental transmission investigated for Peak Excursion was: CENTER FREQ ± 1/2(99% OCCUPIED BW)

ANALYZER PLOTS

Antenna 1 Peak Excursion – 6Mbps @ Ch 60



Antenna 2 Peak Excursion – 54Mbps @ Ch 60



Band Edge Measurements

LIMITS

"...all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz." [15.407(b)(1)]

MEASUREMENTS

Band Edge Measurements - Antenna 1 *Curtis-Straus LLC*

Date: 18-Feb-03 **Company:** Enterasys **Table No:** 7
Engineer: Evan Gould **EUT:** HARP II (Card 49) Antenna 1 **Work Order:** C0838
Analyzer: Orange **Detector Type:** Peak (Max Hold)
Attenuator: Pasternack 20dB **Resolution BW:** 1MHz **RANGE A:** 5.15-5.25GHz
Cable: Blue Microflex **Video BW:** 3MHz **RANGE B:** 5.25-5.35GHz

Range / Ch. / Data Rate (Mbps)	Frequency (GHz)	Measurement (dBµV)	Microflex Cable Factor (dB)	Dongle Factor (dB)	Attenuator Factor (dB)	dBµV->dBm Factor (dB)	Adjusted Reading (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.1477	41.8	3.5	0.25	20.2	-106.9	-41.15	-27.00	-14.15	Pass
A / 36 / 6	5.1472	46.5	3.5	0.25	20.2	-106.9	-36.45	-27.00	-9.45	Pass
B / 64 / 6	5.3523	-54.6 (dBm)	3.5	0.25	20.2	0.0	-30.65	-27.00	-3.65	Pass
B / 64 / 54	5.3524	-60.63 (dBm)	3.5	0.25	20.2	0.0	-36.65	-27.00	-9.65	Pass

Band Edge Measurements - Antenna 2 *Curtis-Straus LLC*

Date: 18-Feb-03 **Company:** Enterasys **Table No:** 8
Engineer: Evan Gould **EUT:** HARP II (Card 49) Antenna 2 **Work Order:** C0838
Analyzer: Orange **Detector Type:** Peak (Max Hold)
Attenuator: Pasternack 20dB **Resolution BW:** 1MHz **RANGE A:** 5.15-5.25GHz
Cable: Blue Microflex **Video BW:** 3MHz **RANGE B:** 5.25-5.35GHz

Range / Ch. / Data Rate (Mbps)	Frequency (GHz)	Measurement (dBm)	Microflex Cable Factor (dB)	Dongle Factor (dB)	Attenuator Factor (dB)	Adjusted Reading (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Result (Pass/Fail)
A / 36 / 54	5.1479	-61.8	3.5	0.25	20.2	-37.85	-27.00	-10.85	Pass
A / 36 / 6	5.1477	-61.8	3.5	0.25	20.2	-37.85	-27.00	-10.85	Pass
B / 64 / 6	5.3524	-60.9	3.5	0.25	20.2	-36.95	-27.00	-9.95	Pass
B / 64 / 54	5.3525	-60.8	3.5	0.25	20.2	-36.85	-27.00	-9.85	Pass

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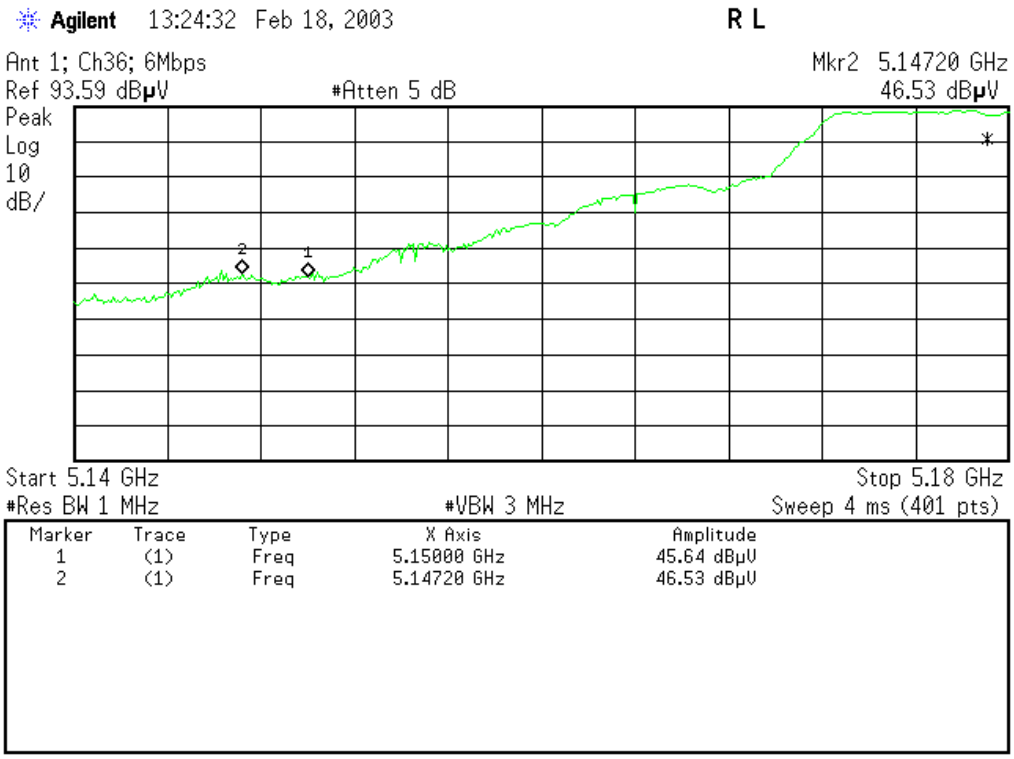
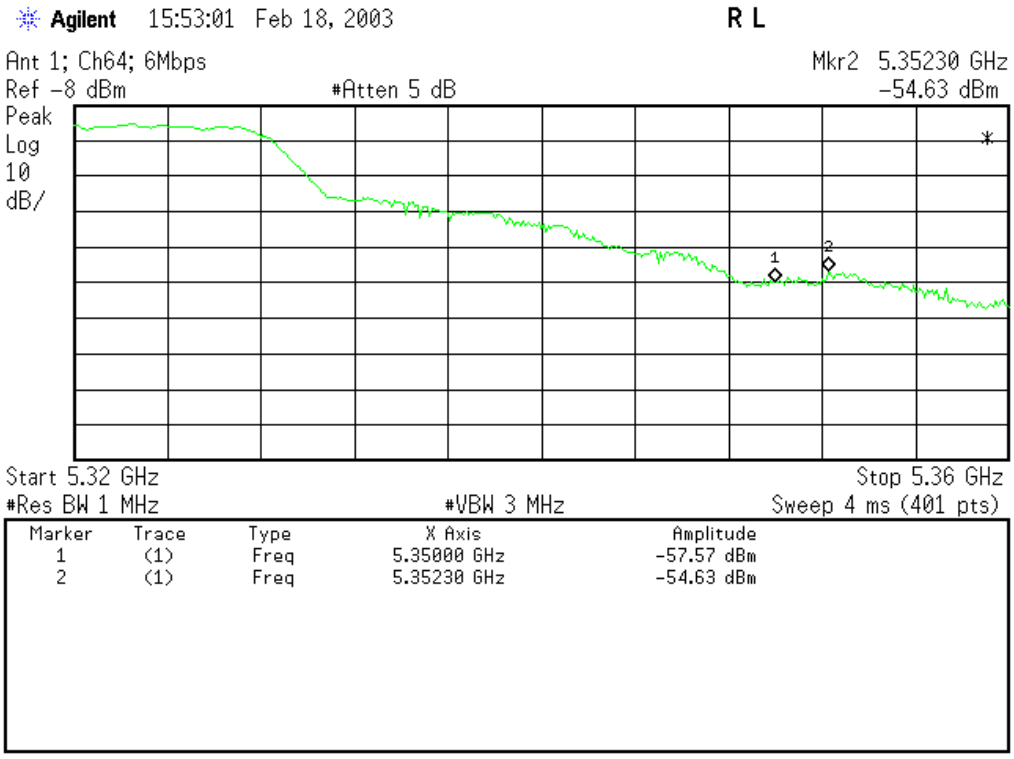
ANALYZER PLOTS

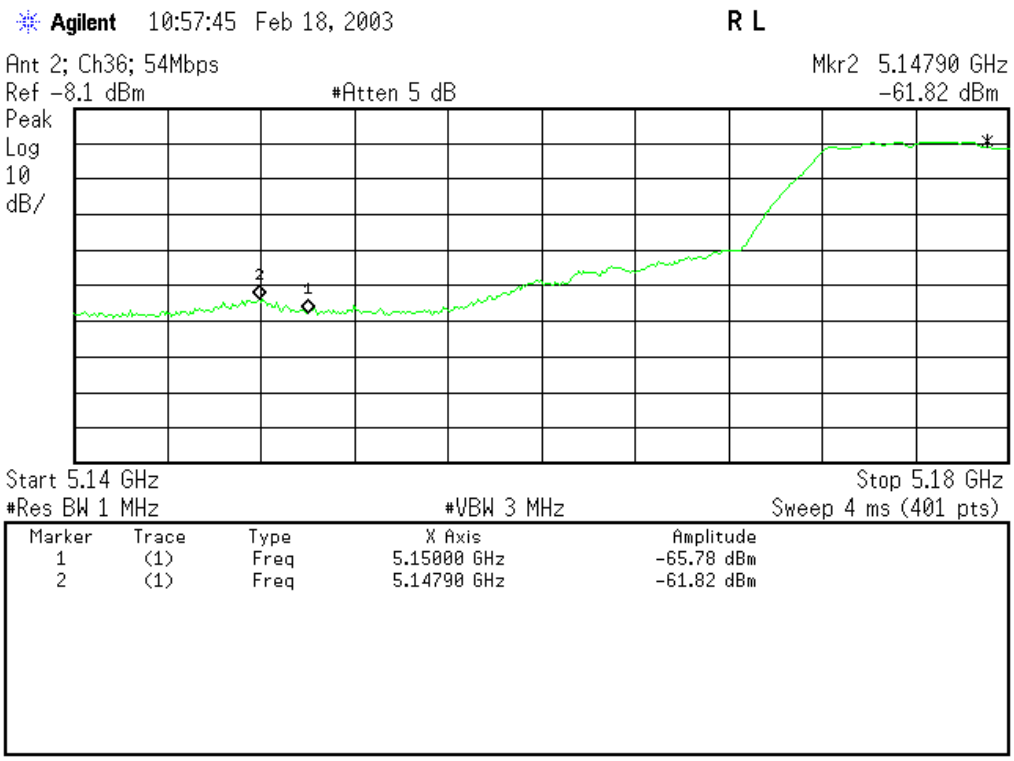
Antenna 1 Worst Case Low Band Edge



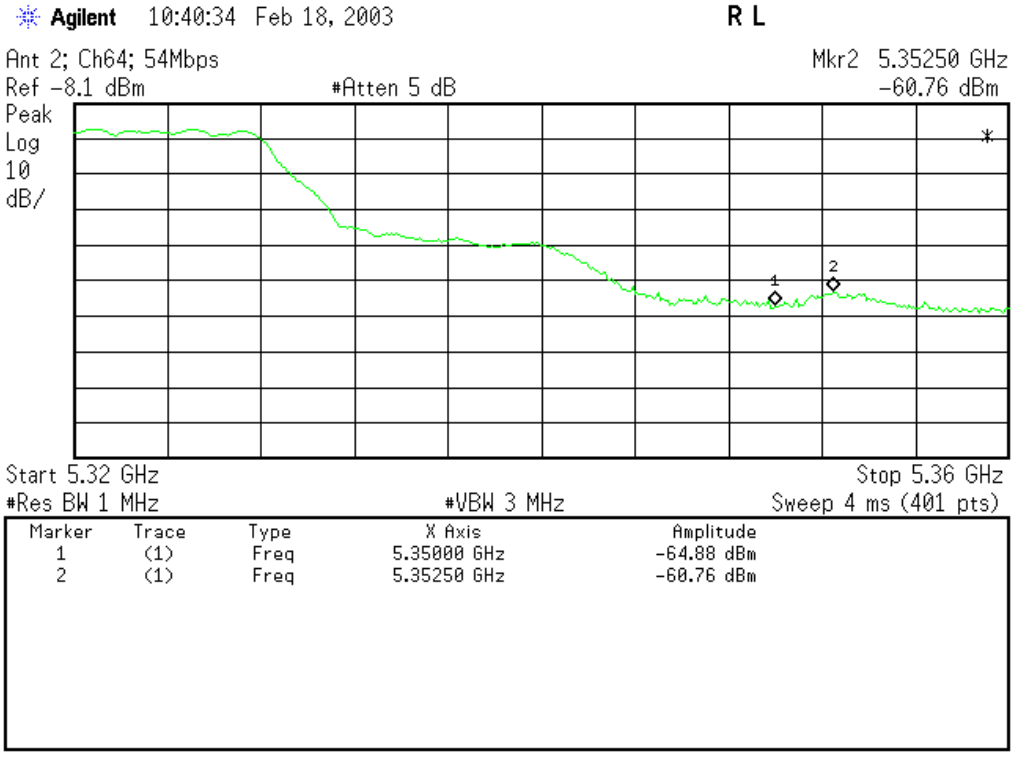
Antenna 1 Worst Case High Band Edge



Antenna 2 Worst Case Low Band Edge



Antenna 2 Worst Case High Band Edge



Spurious Emissions

LIMITS

"...all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz." [15.407(b)(1)]

"Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209." [15.407(b)(5)]

METHOD

Spurious emissions were taken with the product set to transmit at the channels of highest power from each antenna in each frequency range (5.15-5.25GHz and 5.25-5.35GHz) as determined by the conducted peak output power readings. In addition, the product was set to receive at one of these channels.

MEASUREMENTS

Radiated Emissions Table — *Curtis-Straus LLC*

Date: 19-Feb-03 **Company:** Enterasys **Table** 9

Engineer: Mairaj Hussain **EUT Desc:** HARP II (Card 4) **Work Order:** C0838

Frequency Range: 30 - 1000 MHz **Measurement Distance:** 3 m

Notes: Antenna 1; Channel 60; 6Mbps flexTx (transmitting only) **EUT Max Freq:** 5.32GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209 Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	97.13	36.6	21.8	7.3	0.9	23.0	43.5	-20.5	Pass
V	110.28	34.2	21.8	7.0	1.0	20.4	43.5	-23.1	Pass
V	122.9	36.0	21.9	7.3	1.0	22.4	43.5	-21.1	Pass
V	132.5	42.3	21.9	8.3	1.1	29.8	43.5	-13.7	Pass
V	184.3	39.8	21.7	9.6	1.4	29.1	43.5	-14.4	Pass
H	240.0	45.4	21.7	12.3	1.7	37.7	46.0	-8.3	Pass
H	320.0	34.3	21.8	14.6	2.1	29.2	46.0	-16.8	Pass
H	360.0	26.0	21.8	15.6	2.2	22.0	46.0	-24.0	Pass
H	390.0	27.0	21.8	16.4	2.3	23.9	46.0	-22.1	Pass
H	520.0	36.6	21.6	18.1	2.8	35.9	46.0	-10.1	Pass

Table Result: Pass by -8.3 dB ***Worst Freq:*** 240.0 MHz

Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Green **Antenna:** Red

Radiated Emissions Table — *Curtis-Straus LLC*

Date: 20-Feb-03 **Company:** Enterasys **Table** 10

Engineer: Mairaj Hussain **EUT Desc:** HARP II (Card 4) **Work Order:** C0838

Frequency Range: 30 - 1000 MHz **Measurement Distance:** 3 m

Notes: Antenna 1; Channel 36; 6Mbps flexTx (transmitting only) **EUT Max Freq:** 5.32GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209 Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	110.6	34.0	21.8	7.0	1.0	20.2	43.5	-23.3	Pass
V	122.9	33.7	21.9	7.3	1.0	20.1	43.5	-23.4	Pass
V	133.1	41.0	21.9	8.4	1.1	28.6	43.5	-14.9	Pass
H	185.0	39.8	21.7	9.7	1.4	29.2	43.5	-14.3	Pass
H	240.0	40.6	21.7	12.3	1.7	32.9	46.0	-13.1	Pass
H	320.0	34.4	21.8	14.6	2.1	29.3	46.0	-16.7	Pass
H	360.0	29.0	21.8	15.6	2.2	25.0	46.0	-21.0	Pass
H	390.0	36.6	21.8	16.4	2.3	33.5	46.0	-12.5	Pass
H	520.0	38.5	21.6	18.1	2.8	37.8	46.0	-8.2	Pass

Table Result: Pass by -8.2 dB ***Worst Freq:*** 520.0 MHz

Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Red **Antenna:** Red

Radiated Emissions Table

Curtis-Straus LLC

Date: 20-Feb-03 **Company:** Enterasys **Table** 11

Engineer: Mairaj Hussain **EUT Desc:** HARP II (Card 4) **Work Order:** C0838

Frequency Range: 30 - 1000 MHz **Measurement Distance:** 3 m

Notes: Antenna 2; Channel 60; 54Mbps flexTx (transmitting only) **EUT Max Freq:** 5.32GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209 Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	97.13	30.0	21.8	7.3	0.9	16.4	43.5	-27.1	Pass
V	110.28	32.0	21.8	7.0	1.0	18.2	43.5	-25.3	Pass
V	122.8	34.0	21.9	7.2	1.0	20.3	43.5	-23.2	Pass
V	132.5	42.1	21.9	8.3	1.1	29.6	43.5	-13.9	Pass
V	183.7	38.2	21.7	9.6	1.4	27.5	43.5	-16.0	Pass
H	240.0	41.0	21.7	12.3	1.7	33.3	46.0	-12.7	Pass
H	320.0	32.5	21.8	14.6	2.1	27.4	46.0	-18.6	Pass
H	360.0	28.1	21.8	15.6	2.2	24.1	46.0	-21.9	Pass
H	390.0	34.0	21.8	16.4	2.3	30.9	46.0	-15.1	Pass
H	520.0	38.6	21.6	18.1	2.8	37.9	46.0	-8.1	Pass

Table Result: Pass by -8.1 dB ***Worst Freq:*** 520.0 MHz

Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Red **Antenna:** Red

Radiated Emissions Table

Curtis-Straus LLC

Date: 20-Feb-03 **Company:** Enterasys **Table** 12

Engineer: Mairaj Hussain **EUT Desc:** HARP II (Card 4) **Work Order:** C0838

Frequency Range: 30 - 1000 MHz **Measurement Distance:** 3 m

Notes: Antenna 2; Channel 36; 6Mbps flexTx (transmitting only) **EUT Max Freq:** 5.32GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209 Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	97.13	29.0	21.8	7.3	0.9	15.4	43.5	-28.1	Pass
V	110.6	34.1	21.8	7.0	1.0	20.3	43.5	-23.2	Pass
V	122.8	34.2	21.9	7.2	1.0	20.5	43.5	-23.0	Pass
V	133.1	40.5	21.9	8.4	1.1	28.1	43.5	-15.4	Pass
H	185.3	37.2	21.7	9.7	1.4	26.6	43.5	-16.9	Pass
H	240.0	40.6	21.7	12.3	1.7	32.9	46.0	-13.1	Pass
H	320.0	33.3	21.8	14.6	2.1	28.2	46.0	-17.8	Pass
H	360.0	30.0	21.8	15.6	2.2	26.0	46.0	-20.0	Pass
H	390.0	33.6	21.8	16.4	2.3	30.5	46.0	-15.5	Pass
H	520.0	39.0	21.6	18.1	2.8	38.3	46.0	-7.7	Pass

Table Result: Pass by -7.7 dB ***Worst Freq:*** 520.0 MHz

Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Red **Antenna:** Red

Radiated Emissions Table

Curtis-Straus LLC

Date: 20-Feb-03 **Company:** Enterasys **Table** 13

Engineer: Mairaj Hussain **EUT Desc:** HARP II (Card 4) **Work Order:** C0838

Frequency Range: 30 - 1000 MHz **Measurement Distance:** 3 m

Notes: Antenna 1; Channel 36; 6Mbps flexRx (receiving only) **EUT Max Freq:** 5.32GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209 Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	110.6	36.5	21.8	7.0	1.0	22.7	43.5	-20.8	Pass
V	122.9	33.7	21.9	7.3	1.0	20.1	43.5	-23.4	Pass
H	133.1	45.3	21.9	8.4	1.1	32.9	43.5	-10.6	Pass
H	184.5	40.4	21.7	9.6	1.4	29.7	43.5	-13.8	Pass
H	240.0	41.2	21.7	12.3	1.7	33.5	46.0	-12.5	Pass
H	320.0	31.2	21.8	14.6	2.1	26.1	46.0	-19.9	Pass
H	360.0	28.1	21.8	15.6	2.2	24.1	46.0	-21.9	Pass
H	390.0	38.7	21.8	16.4	2.3	35.6	46.0	-10.4	Pass
H	520.0	37.4	21.6	18.1	2.8	36.7	46.0	-9.3	Pass

Table Result: Pass by -9.3 dB ***Worst Freq:*** 520.0 MHz

Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Red **Antenna:** Red

Note: No spurious emissions were detected above 1GHz, for any of the above modes.

AC Line Conducted Emission Measurements

LIMITS

Quasi-Peak: 250µV = 47.9dBµV in the range 450kHz to 30MHz
[47 CFR 15.207(a) Revised as of October 1, 2001]

Note: On July 12, 2004, FCC adopts the conducted emissions limits of the European CISPR 22 standard as outlined below

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
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.

[47 CFR 15.207(a) Revised as of October 1, 2002; amended by ET Docket 98-80; FCC 02-157, published in the Federal Register Vol. 67, No. 132, on Wednesday, July 10, 2002]

MEASUREMENTS

AC Mains Conducted Emissions — *Curtis-Straus LLC*

Date: 08-Jan-03 **Company:** Enterasys **Table No:** 14
Engineer: Evan Gould **EUT Desc:** Harp II (Card 45) **Work Order:** C0838
Notes: AC adaptor on laptop; flexTx Ch.36; Ant 1
Range: 0.15-30Mhz **LISN(s):** Red **Other Equipment:** --- **Spectrum Analyzer:** Red

	Q.P. Readings		Ave. Readings		Impedance Factor	FCC B Applicable until July 12, 2004		FCC/CISPR B		FCC/CISPR B		Overall Result
Frequency (MHz)	OP1 (dBµV)	OP2 (dBµV)	AV1 (dBµV)	AV2 (dBµV)	(dB)	Limit (dBµV)	Margin dB	qp Limit (dBµV)	qp Margin dB	AVE Limit (dBµV)	AVE Margin dB	(Pass/Fail)
0.15	19.4	19.8			20.0	---	---	66.0	-26.2	56.0	-16.2	Pass
1.19	9.1	13.4			20.0	47.9	-14.5	56.0	-22.6	46.0	-12.6	Pass
2.44	13.3	13.6			20.0	47.9	-14.3	56.0	-22.4	46.0	-12.4	Pass
3.77	9.1	10.6			20.0	47.9	-17.3	56.0	-25.4	46.0	-15.4	Pass
5.33	7.4	10.0			20.0	47.9	-17.9	60.0	-30.0	50.0	-20.0	Pass
7.50	7.2	9.0			20.0	47.9	-18.9	60.0	-31.0	50.0	-21.0	Pass

Table Result: Pass by -12.40 dB ***Worst Freq:*** 2.44 MHz

AC Mains Conducted Emissions — *Curtis-Straus LLC*

Date: 08-Jan-03 **Company:** Enterasys **Table No:** 15
Engineer: Evan Gould **EUT Desc:** Harp II (Card 45) **Work Order:** C0838
Notes: AC adaptor on laptop; flexRx
Range: 0.15-30Mhz **LISN(s):** Red **Other Equipment:** --- **Spectrum Analyzer:** Red

	Q.P. Readings		Ave. Readings		Impedance Factor	FCC B Applicable until July 12, 2004		FCC/CISPR B		FCC/CISPR B		Overall Result
Frequency (MHz)	OP1 (dBµV)	OP2 (dBµV)	AV1 (dBµV)	AV2 (dBµV)	(dB)	Limit (dBµV)	Margin dB	qp Limit (dBµV)	qp Margin dB	AVE Limit (dBµV)	AVE Margin dB	(Pass/Fail)
0.16	18.0	19.4			20.0	---	---	65.5	-26.1	55.5	-16.1	Pass
1.04	12.4	12.4			20.0	47.9	-15.5	56.0	-23.6	46.0	-13.6	Pass
1.56	11.2	15.0			20.0	47.9	-12.9	56.0	-21.0	46.0	-11.0	Pass
2.59	12.9	16.7			20.0	47.9	-11.2	56.0	-19.3	46.0	-9.3	Pass
4.29	10.5	10.5			20.0	47.9	-17.4	56.0	-25.5	46.0	-15.5	Pass
12.90	7.5	8.2			20.0	47.9	-19.7	60.0	-31.8	50.0	-21.8	Pass

Table Result: Pass by -9.30 dB ***Worst Freq:*** 2.59 MHz

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Frequency Stability

REQUIREMENT

"Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual." [15.407(g)]

MEASUREMENTS

Frequency Stability			***Curtis-Straus LLC***
Date: 1/10/03		**Company:** Enterasys	
Engineer: Evan Gould		**EUT:** HARP II (45)	
Test Site: Env Chamber		**RBW:** 1kHz	
Analyzer: Orange		**VBW:** 1kHz	
Nominal (20°C): 5.1800035GHz			
Temperature (°C)	**Center Frequency** (GHz)	**Drift** (kHz)	**Pass/Fail**
-20	5.180027	-23.5000	Pass
-10	5.180024	-20.5000	Pass
0	5.1800200	-16.5000	Pass
5	5.1800140	-10.5000	Pass
10	5.1800050	-1.5000	Pass
20	5.1800035	0.0000	Pass
30	5.1799995	4.0000	Pass
35	5.1799975	6.0000	Pass
40	5.179997	6.5000	Pass
50	5.179997	6.5000	Pass

The maximum frequency drift was –23.5kHz. The band edge plots on pages 12 and 13 show that this drift is orders of magnitude less than a drift which would cause the fundamental emission to leave it's designated band of operation.

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Sample Calculations

PEAK OUTPUT POWER

Limit: 10log(50[mW]) = 16.98dBm

Emission Bandwidth Factor: 10log(EBW[MHz]/RBW[MHz]) = Factor[dB]
10log(21.1/1) = 13.24dB

Adjusted Reading = Measured[dBm] + (Cable+Dongle+Attenuator+EBW Factor)[dB]
Adjusted Reading = -29.7 + 3.5 + 0.25 + 20.2 + 13.24
Adjusted Reading = 7.49dBm

Calculated EIRP: 106.9dBµV/m = 0.221309V/m

$P[W] = ((E[V/m]*R[m])/5.5)^2$
$P[W] = ((0.221309*3)/5.5)^2$
P[W] = 0.014572

0.014572W = 11.63dBm

PEAK POWER SPECTRAL DENSITY

Adjusted Reading = Measured[dBm] + (Cable+Dongle+Attenuator)[dB]
Adjusted Reading = -29.7 + 3.5 + 0.25 + 20.2
Adjusted Reading = -5.75dBm

BAND EDGE MEASUREMENTS

dBµV --> dBm Factor: $X[\mu V] = X^2/50x10^9[mW]$ (assuming 50Ω)

Factor = [dBµV] – [dBm]
$Factor = 20\log(X) - 10\log(X^2/(50*10^9))$
$Factor = \log(X)^{20} - \log(X^2/(50*10^9))^{10}$
$Factor = \log(X^{20}/(X^{20}/(50*10^9)^{10}))$
$Factor = 10\log(50*10^9)$
Factor = 106.99dB

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Test Equipment Used

REV. 1/07/03

SPECTRUM ANALYZERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	05-JUN-2003
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	02-OCT-2003
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	07-JUN-2003

LISN	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	956348	00753	18-APR-2003

OPEN AREA TEST SITE (OATS)	FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE
SITE T	93448	IC 2762-T	R-905	04-FEB-2004

LINE CONDUCTED TEST SITE	FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE
EMI 2	93448	N/A	C-480	31-MAR-2003

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED BILOG	30MHZ-1GHZ	3143	EMCO	1270	00042	11-JUL-2004
BLACK HORN	1-18GHZ	3115	EMCO	9703-5148	00056	12-JUN-2003
WHITE HORN	18-26.5GHZ	3160-09	EMCO	9610-1068	00758	26-JUN-2003

MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
MIXER / HORN	26.5-40 GHZ	11970A/28-442-6	HP/ATM	2332A00900/A046903-01	00369	09-JUL-2003

PREAMPS / ATTENUATORS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
BLACK	0.01-2000MHZ	ZFL-1000-LN	C-S	N/A	00799	22-MAR-2003
ORANGE-BLACK	1-20GHZ	SMC-12A	C-S	690639	00761	27-AUG-2003
20DB ATTENUATOR	0.03-20 GHZ	PE 7019-20	PASTERNACK	01	00791	13-JUN-2003

CHAMBER	MN	MFR	SN	ASSET	CALIBRATION DUE
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	07-JUN-2003

Unless otherwise noted the calibration interval is one year. All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Terms And Conditions

Paragraph 1. SERVICES. LABORATORY will:

1.1 Use the degree of care and skill ordinarily exercised by and consistent with the standards of the profession.
1.2 Perform all technical services in substantial accordance with the generally accepted laboratory principles and practices.
1.3 Retain all pertinent records relating to the services performed for a period of three (3) years following submission of the report describing such services, during which period the records will be made available to CLIENT upon reasonable request.

Paragraph 2. CLIENT'S RESPONSIBILITIES. CLIENT or his authorized representative will:

2.1 Provide LABORATORY with all plans, schematics, specifications, addenda, change orders, drawings and other information for the proper performance of technical services.
2.2 Designate a person to act as CLIENT's representative with respect to LABORATORY's services to be performed on behalf of the CLIENT; such person or firm to have complete authority to transmit instructions, receive information and data, interpret and define CLIENT's policies and decisions with respect to the LABORATORY's work on behalf of the CLIENT and to order, at CLIENT's expense, such technical services as may be required.
2.3 Designate a person who is authorized to receive copies of LABORATORY's reports.
2.4 Undertake the following:
(a) Secure and deliver to LABORATORY, without cost to LABORATORY, preliminary representative samples of the equipment proposed to require technical services, together with any relevant data.
(b) Furnish such labor and equipment needed by LABORATORY to handle samples at the LABORATORY and to facilitate the specified technical services.

Paragraph 3. GENERAL CONDITIONS:

3.1 LABORATORY, by the performance of services covered hereunder, does not in any way assume any of those duties or responsibilities customarily vested in the CLIENT, its employees, or any other party, agency or authority.
3.2 LABORATORY shall not be responsible for acts of omissions of any other party or parties involved in the design, manufacture or maintenance of the equipment or the failure of any employee, contractor or subcontractor to undertake any aspect of equipment's design, manufacture or maintenance.
3.3 LABORATORY is not authorized to revoke, alter, release, enlarge or release any requirement of the equipment's design, manufacture or maintenance unless specifically authorized by CLIENT or his authorized representative.
3.4 THE ONLY WARRANTY MADE BY LABORATORY IN CONNECTION WITH ITS SERVICE PERFORMED HEREUNDER IS THAT IT WILL USE THAT DEGREE OF CARE AND SKILL AS SET FORTH IN PARAGRAPH 1 ABOVE. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE OR INTENDED FOR SERVICES PROVIDED HEREUNDER.
3.5 Where the LABORATORY indicates that additional testing is advisable to obtain more valid or useful data, and where such testing has not been authorized, CLIENT agrees to view such test reports as inconclusive and preliminary.
3.6 The LABORATORY will supply technical service and prepare a report based solely on the sample submitted to the LABORATORY by the CLIENT. The CLIENT understands that application of the data to other devices is highly speculative and should be applied with extreme caution.
3.7 The LABORATORY agrees to exercise ordinary care in receiving, preserving and shipping (F.O.B. Littleton, MA) any sample to be tested, but assumes no responsibility for damages, either direct or consequential, which arise from loss, damage or destruction of the samples due to the act of examination, modification or testing, or technical services or circumstances beyond LABORATORY's control.
3.8 The LABORATORY will hold samples for thirty (30) days after tests are completed, or until the CLIENT's outstanding debts to the LABORATORY are satisfied, whichever is later.
3.9 The CLIENT recognizes that generally accepted error variances apply and agrees to consider such error variances in its use of test data.
3.10 It is agreed between LABORATORY and CLIENT that no distribution of any tests, reports or analysis other than that described below shall be made to any third party without the prior written consent of both parties unless such distribution is mandated by operation of law. It is agreed that tests, reports, or analysis results may be disclosed to third party auditors of the laboratory at the laboratory facility in the course of accreditation maintenance audits. No reference to reports or technical services of the LABORATORY shall be made in any advertising or promotional literature without the express written permission of the LABORATORY.
3.11 The CLIENT acknowledges that all employees of LABORATORY operate under employment contracts with the LABORATORY and CLIENT agrees not to solicit employment of such employees or to solicit information related to other clients from said employees.
3.12 In recognition of the relative risks and benefits of the project to both CLIENT and LABORATORY, the risks have been allocated such that the CLIENT agrees, to the fullest extent permitted by law, to limit the liability of the LABORATORY to the CLIENT for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of the LABORATORY to the CLIENT shall not exceed $100,000, or the LABORATORY'S total fee for services rendered on this project, whichever is greater. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

Paragraph 4. INSURANCE:

4.1 LABORATORY shall secure and maintain throughout the full period of the services provided to the CLIENT adequate insurance to protect it from claims under applicable Workmen's Compensation Acts and also shall maintain one million dollars of general liability coverage to cover claims for bodily injury, death or property damage as may arise from the performance of its services.
4.2 The CLIENT hereby warrants that it has sufficient insurance to protect its employees adequately under applicable Workmen's Compensation Acts and for bodily injury, death, or property damage.
4.3 No insurance of whatever kind or type, which may be carried by either party is to be considered as in any way limiting any other party's responsibility for damages resulting from their operations or for furnishing work and materials.

Paragraph 5. PAYMENT:

5.1 CLIENT shall pay to LABORATORY such fees for services as previously agreed, orally or in writing, within 30 days of presentment of a bill for such services performed. In the event CLIENT ordered, orally or in writing, services but such services were not assigned a rate for billing, such services shall be billed at the LABORATORY's reasonable and customary rate.
5.2 CLIENT shall be responsible for all shipping, customs and other expenses related to services provided by LABORATORY to the CLIENT, and shall fully insure any test sample or other equipment provided to LABORATORY by the CLIENT.
5.3 Amounts overdue from CLIENT to LABORATORY shall be charged interest at a rate of 1⅛% per month.

Paragraph 6. ISO/IEC GUIDE 17025 ADDITIONS:

6.1 CLIENT agrees that this test report will not be reproduced except in full, without written approval from the LABORATORY.
6.2 CLIENT agrees that this test report shall not be used to claim product endorsement by A2LA or ANSI or any agency of the U.S. Government.
6.3 CLIENT agrees that test results presented herein relate only to the sample tested by the LABORATORY.