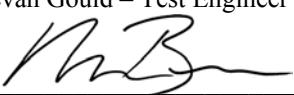




# Test Report

Report No	EE0878-1
Client	Frontier Design Group 240 Mechanic Street Lebanon, NH 03766
Phone	800-928-3236
FRN	0012087854
Model	TranzPort
FCC ID	SOG00400100
Equipment Type	Digitally Modulated
Equipment Code	DTS
Results	As detailed within this report
Prepared by	 Evan Gould – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	9/14/04
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.

**Curtis-Straus** LLC • 527 Great Road • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



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## ***Summary***

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.247. The product is the Frontier TranzPort system, which consists of a battery powered Remote unit and a Bridge unit that connects to a PC via a USB cable. The continual communication between the two units allows the user to control audio recording software from the Remote. Both units include the same transceiver circuit and layout. The TranzPort system operates in the frequency range 2402 – 2479MHz using 78 channels.

## ***Test Methodology***

Radiated emissions testing is performed according to the procedures specified in ANSI C63.4 (2003). FCC's "*Guidance on Measurements for Digital Transmission Systems Section 15.247*" was followed for testing. Radiated emissions were maximized by rotating the EUT around it's vertical axis as well as varying the receiving antenna's height and polarity. The internal antenna cannot be maximized separately.

Testing was performed with fresh batteries in the Remote unit.

Frequency range investigated: 0.15MHz – 25GHz

Measurement distance:	0.15 - 30MHz	Conducted
	30MHz – 25GHz	3m

AC Line conducted emissions testing was performed with a 50Ω/50µH LISN.

***Statement of Conformity***

The TranzPort has been found to conform to the following parts of 47 CFR as detailed below:

Part 2	Part 15	Comments
	15.15(b)	There are no controls that adjust the power level on this device.
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.
	15.203	The antenna is printed on the PCB.
	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.207	The unit meets the AC conducted emissions requirements of 15.207.
	15.247	The unit complies with the digitally modulated transmitter requirements of 15.247

## ***EUT Configuration***

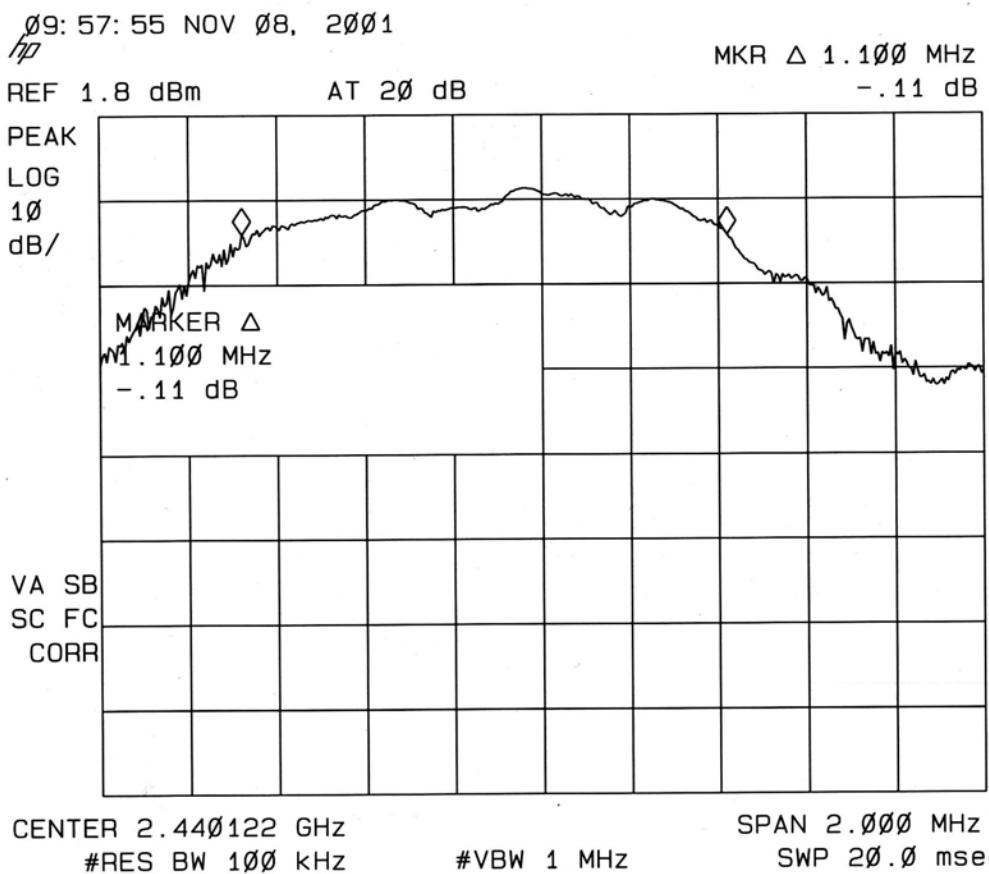
<b>EUT Configuration</b>				
<b>Work Order:</b> E0878				
<b>Company:</b> Frontier Design Group				
<b>Company Address:</b> 240 Mechanic Street				
Lebanon, NH 03766				
<b>Contact:</b> Roseanne Sullivan				
<b>Person Present:</b> Charlie Hitchcock				
<b>MN</b>				
<b>EUT:</b> TranzPort				
<i>Sample 1</i> diag sample: channel selectable and constant on				
<i>Sample 2</i> diag sample: same as above except an added SMA connector				
<i>Sample 3</i> normally operating				
<b>EUT Description:</b> Remote and Bridge				
<b>EUT Max Frequency:</b> 2.479GHz				
<b>Support Equipment:</b>	<b>MN</b>		<b>SN</b>	
Apple iBook	M6497		UV1411	
<b>EUT Cables:</b>	<b>Qty</b>	<b>Shielded?</b>	<b>Length</b>	<b>Ferrites</b>
USB	1	Yes	1.5 m	None
Foot Pedal cable	1	No	1.5 m	None
<b>Unpopulated EUT Ports:</b>	<b>Qty</b>	<b>Reason</b>		
None				
<b>Software / Operating Mode Description:</b>				
The iBook was running Steinberg Cubase LE v1.10, which was controlled by the Remote through the Bridge.				

**15.247 - 6dB Bandwidth****REQUIREMENT**

*"Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz."* [15.247(a)(2)]

**MEASUREMENTS**

The smallest 6dB bandwidth measurement taken was **1.1MHz**.

**SAMPLE ANALYZER PLOT****Channel 38 – 6dB Bandwidth**

## 15.247 - Peak Output Power

### LIMIT

"For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt" [15.247(b)(3)]

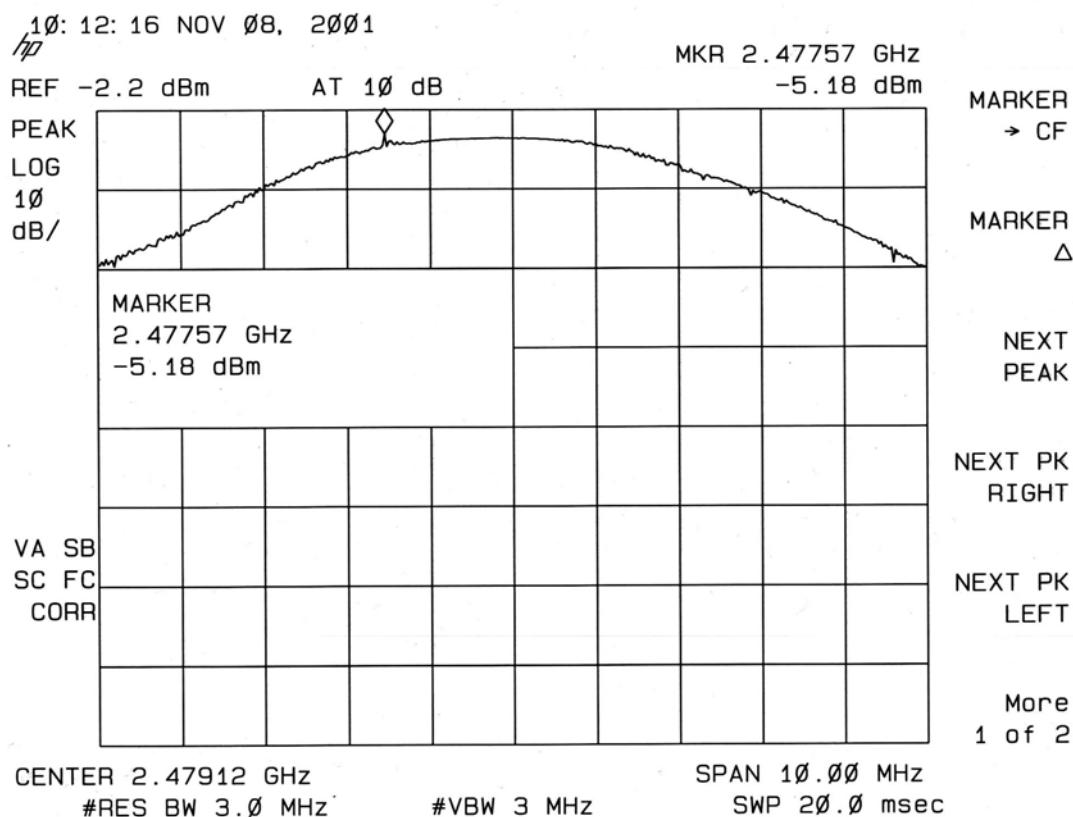
1 Watt = 30dBm

### MEASUREMENTS

Peak Output Power					Curtis-Straus LLC		
Date: 8-Nov-04 Engineer: Evan Gould		Company: Frontier EUT: TranzPort (sample 2)			Work Order: E0878		
Cable: Microflex #8 RBW: 3MHz VBW: 3MHz					Analyzer: Green Detector: Peak		
Channel	Center Frequency (MHz)	Measured Peak Output Power (dBm)	Cable Factor (dB)	Adjusted Peak Output Power (dBm)	47 CFR 15.247(b)(3)		
0	2402	-5.92	1.0	-4.92	30.00	-34.92	Pass
38	2440	-5.47	1.0	-4.47	30.00	-34.47	Pass
77	2479	-5.18	1.0	-4.18	30.00	-34.18	Pass

### SAMPLE ANALYZER PLOT

#### Channel 77 – Peak Output Power



## 15.247 - Conducted Spurious Emissions

### REQUIREMENT

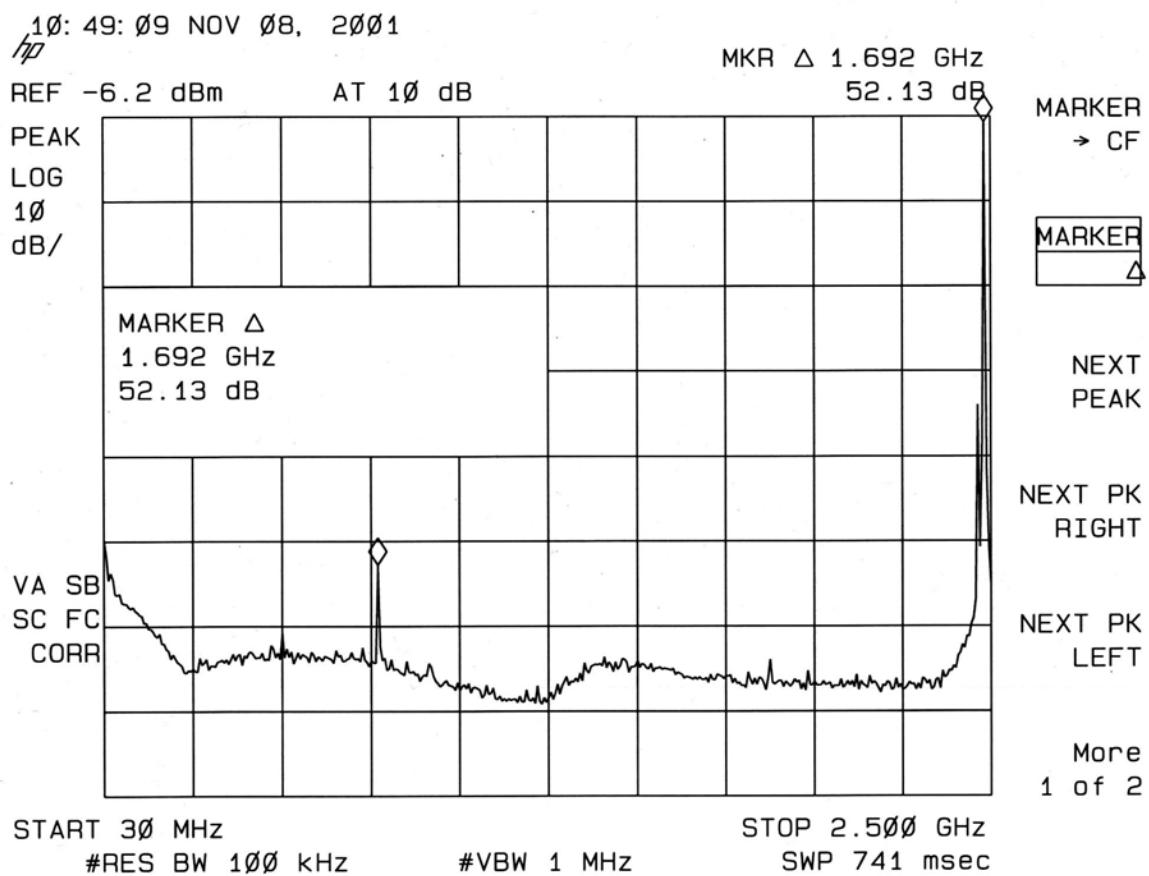
*"In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power..."*  
 [15.247(d)]

### MEASUREMENTS

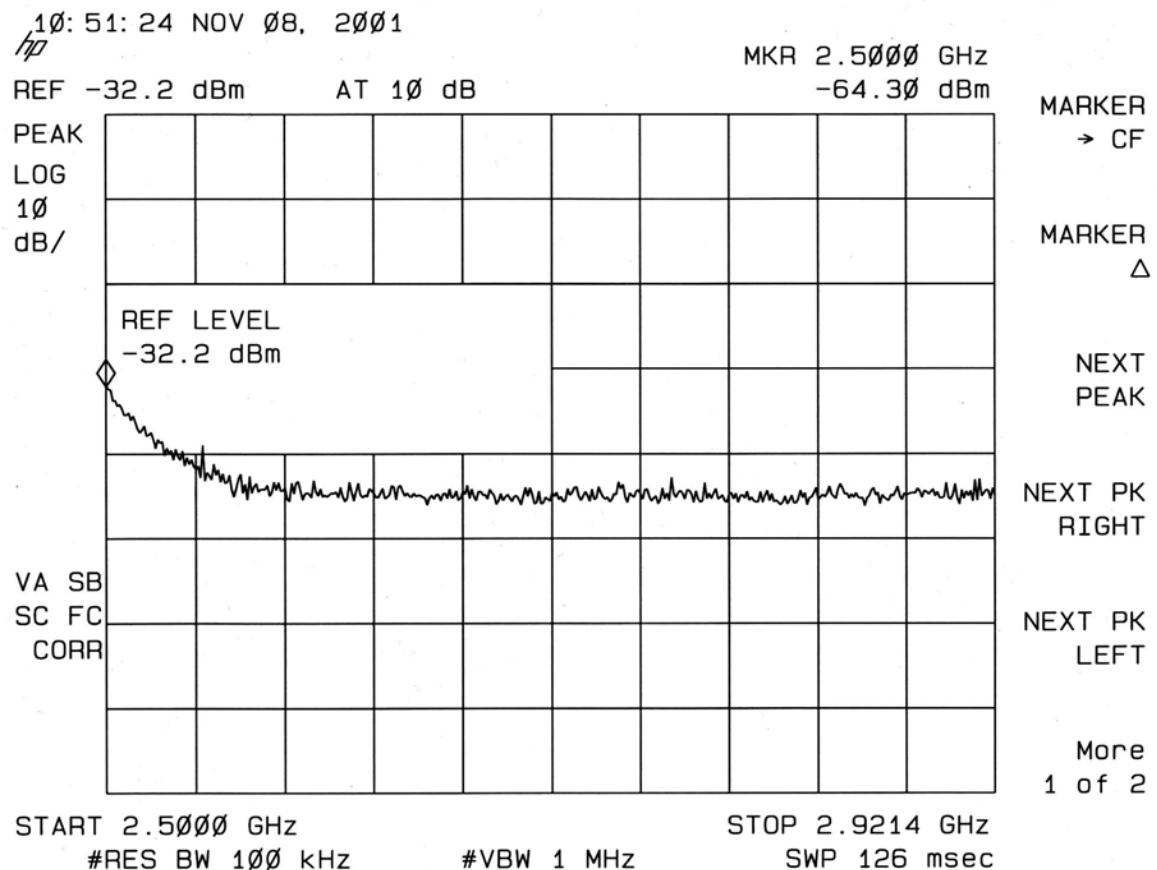
As can be seen in the following analyzer plots, conducted spurious emissions as well as conducted band edge measurements meet the above requirement.

### ANALYZER PLOTS

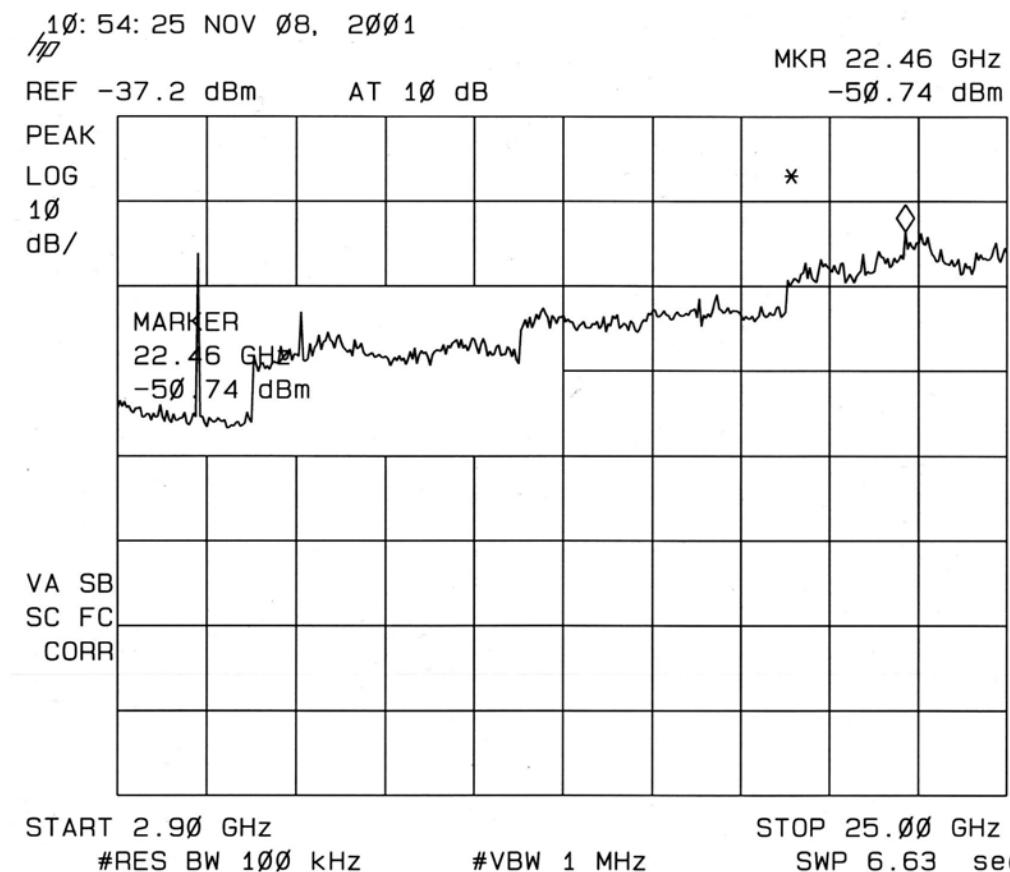
30-2500MHz



## 2.5-2.914GHz



## 2.9-25GHz



## Low Band Edge

10:36:28 NOV 08, 2001

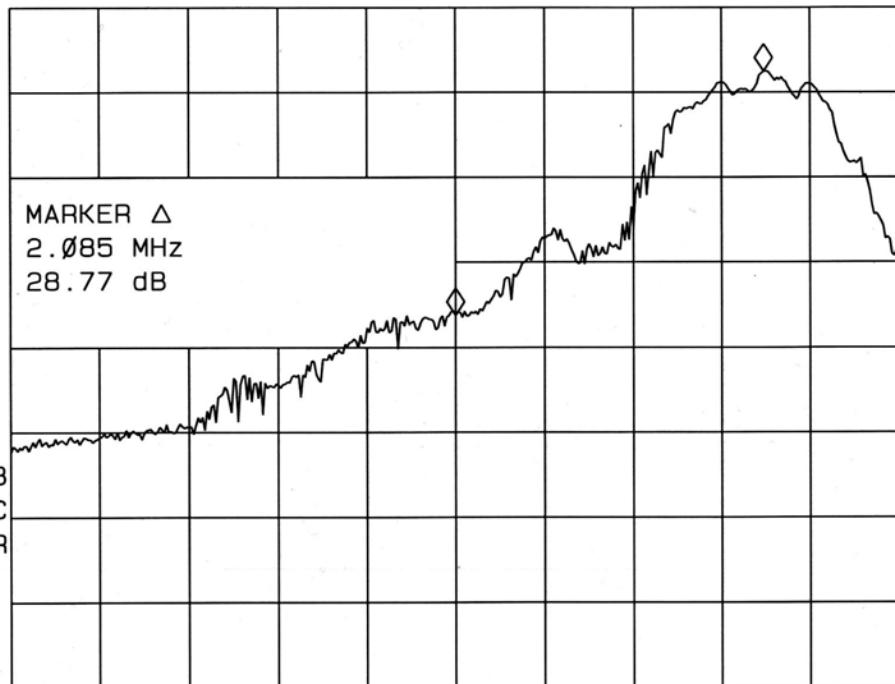
/10

REF .8 dBm

AT 20 dB

MKR  $\Delta$  2.085 MHz

28.77 dB

PEAK  
LOG  
10  
dB/VA SB  
SC FC  
CORRMARKER  
→ CFMARKER  
4NEXT  
PEAKNEXT PK  
RIGHTNEXT PK  
LEFTMore  
1 of 2

CENTER 2.400000 GHz

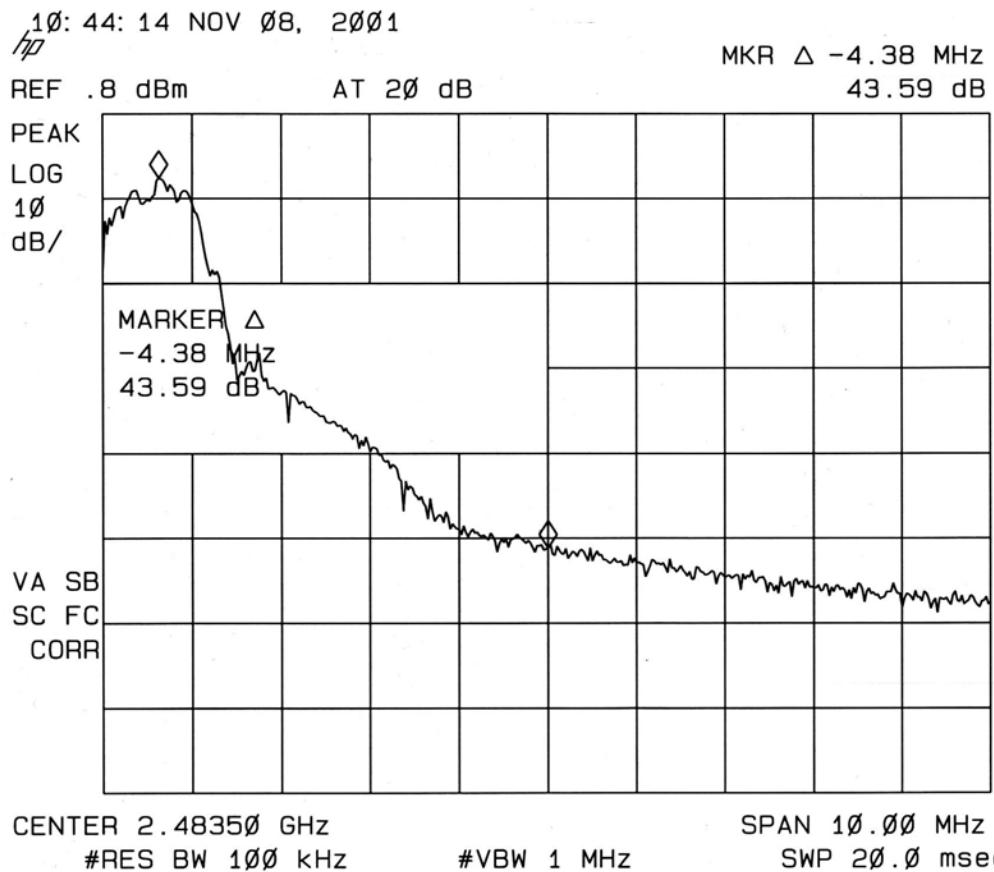
#RES BW 100 kHz

#VBW 1 MHz

SPAN 6.000 MHz

SWP 20.0 msec

## High Band Edge

MARKER  
→ CF

MARKER

NEXT PEAK

NEXT PK  
RIGHTNEXT PK  
LEFTMore  
1 of 2

## 15.247 - Radiated Spurious Emissions

### REQUIREMENT

“...radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).”  
[15.247(d)]

### MEASUREMENTS

Spurious Emissions Table							Curtis-Straus LLC					
Date: 05-Nov-04			Company: Frontier Design Group			Work Order: E0878						
Engineer: MH			EUT Desc: TranzPort (sample 3)									
Frequency Range: 30-2000MHz							Measurement Distance: 3 m					
Notes: TX and RX modes are active Bridge and Remote							EUT Max Freq: 2.479GHz					
							RBW: 120kHz					
							VBW: 300kHz					
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB $\mu$ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB $\mu$ V/m)	47 CFR 15.209					
							Limit (dB $\mu$ V/m)	Margin (dB)	Result (Pass/Fail)			
VQpk	130.78	40.2	25.3	12.8	1.5	29.2	43.5	-14.3	Pass			
VQpk	133.14	40.9	25.3	12.7	1.5	29.8	43.5	-13.7	Pass			
VQpk	177.9	37.1	25.3	9.6	1.8	23.2	43.5	-20.3	Pass			
HQpk	260.0	46.8	25.3	13.3	2.2	37.0	46.0	-9.0	Pass			
HQpk	325.0	47.8	25.3	14.4	2.6	39.5	46.0	-6.5	Pass			
VQpk	332.8	46.2	25.3	14.6	2.6	38.1	46.0	-7.9	Pass			
HQpk	332.8	46.3	25.3	14.6	2.6	38.2	46.0	-7.8	Pass			
HQpk	665.6	39.3	25.5	19.4	4.1	37.3	46.0	-8.7	Pass			
<b>Table Result:</b> Pass			by -6.5 dB			<b>Worst Freq:</b> 325.0 MHz						
Test Site: "T"			Pre-Amp: Red			Cable: 65 ft RG8A/U						
			Analyzer: Yellow			Antenna: Grn-Red						

Spurious Emissions							Curtis-Straus LLC					
Date: 05-Nov-04			Company: Frontier Design Group			Work Order: E0878						
Engineer: MH			EUT Desc: Tranzport (sample 3)									
Frequency Range: 2 - 25GHz							Measurement Distance: 3 m					
Notes: TX and RX modes are active Bridge and Remote							EUT Max Freq: 2.479GHz					
							RBW: 1MHz					
							VBW: 1MHz					
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB $\mu$ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB $\mu$ V/m)	47 CFR 15.209					
							Limit (dB $\mu$ V/m)	Margin (dB)	Result (Pass/Fail)			
Vpk	4864.0	40.0	22.6	35.4	2.9	55.7	74.0	-18.3	Pass			
Vpk(10Hz)	4864.0	26.8	22.6	35.4	2.9	42.5	54.0	-11.5	Pass			
Vpk	7296.0	42.4	21.5	38.4	4.1	63.4	74.0	-10.6	Pass			
Vpk(10Hz)	7296.0	28.2	21.5	38.4	4.1	49.2	54.0	-4.8	Pass			
<b>Table Result:</b> Pass			by -4.8 dB			<b>Worst Freq:</b> 7296.0 MHz						
Test Site: "T"			Pre-Amp: Or-Blk			Cable: 3 RG142LL						
			Analyzer: White			Antenna: Orange Horn						

Radiated High Band Edge (Restricted)								Curtis-Straus LLC							
Date: 08-Nov-04	Company: Frontier					Work Order: E0878									
Engineer: Evan Gould	EUT Desc: Tranzport														
Frequency Range: 2400-2483.5MHz								Measurement Distance: 3 m							
Notes: using marker-delta method								EUT Max Freq: 2.479GHz							
								RBW: 1MHz							
								VBW: 3MHz							
Antenna		Frequency	Reading	Preamp	Antenna	Cable	Adjusted	47 CFR 15.209							
Polarization	(H / V)	(MHz)	(dB $\mu$ V)	Factor	Factor	Factor	Reading	Limit	Margin	Result					
Remote				(dB)	(dB/m)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	(Pass/Fail)					
Hpk	2483.5	93.2	24.2	30.9	2.1	43.3	58.7	74.0	-15.3	Pass					
Hav (10Hz VBW)	2483.5	79.1	24.2	30.9	2.1	43.3	44.6	54.0	-9.4	Pass					
Bridge															
Hpk	2483.5	90.6	24.2	30.9	2.1	43.1	56.3	74.0	-17.7	Pass					
Hav (10Hz VBW)	2483.5	80.1	24.2	30.9	2.1	43.1	45.8	54.0	-8.2	Pass					
Test Site: "T"		Pre-Amp: Or-Blk		Cable: 3 RG142LL		Analyzer: Green		Antenna: Black Horn							

## 15.247 - Peak Power Spectral Density

### LIMIT

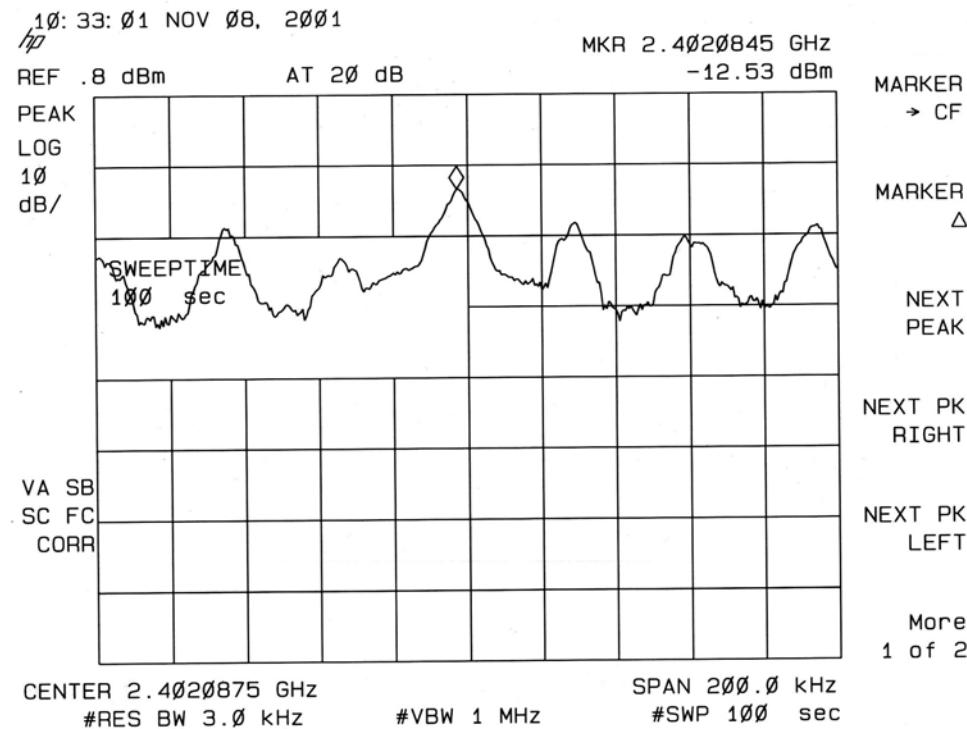
"For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission." [15.247(e)]

### MEASUREMENTS

Peak Power Spectral Density					Curtis-Straus LLC		
Date: 8-Nov-04	Company: Frontier			Work Order: E0878			
Engineer: Evan Gould	EUT: TranzPort (sample 2)						
Cable: Microflex #8				Analyzer: Green			
RBW: 3kHz	Span: 200kHz			Detector: Peak			
VBW: 1MHz	Sweep: 100s						
Channel	Center Frequency (MHz)	Measured Peak Output Power (dBm)	Cable Factor (dB)	Adjusted Peak Output Power (dBm)	47 CFR 15.247(d)		
0	2402	-12.53	1.0	-11.53	8.00	-19.53	Pass
38	2440	-12.89	1.0	-11.89	8.00	-19.89	Pass
77	2479	-12.75	1.0	-11.75	8.00	-19.75	Pass

### SAMPLE ANALYZER PLOT

#### Channel 0 – Peak Power Spectral Density



**AC Line Conducted Emission Measurements****LIMITS**

Frequency of emission (MHz)	Quasi-peak limit (dB $\mu$ V)	Average limit (dB $\mu$ V)
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)]

**MEASUREMENTS**

AC Mains Conducted Emissions								Curtis-Straus LLC			
Date: 08-Nov-04		Company: Frontier				Work Order: E0878					
Engineer: Evan Gould		EUT Desc: TranzPort (sample 3)				Test Site: EMI 2					
Notes: Bridge (powered from support laptop w/o battery)				RBW: 9kHz							
LISN(s): Red				VBW: 30kHz							
Range: 0.15-30Mhz		Other Equipment:				Spectrum Analyzer: Green					
Frequency (MHz)	Q.P. Readings		Ave. Readings		Impedance Factor (dB)	47 CFR 15.207		47 CFR 15.207		Overall Result (Pass/Fail)	
	QP1 (dB $\mu$ V)	QP2 (dB $\mu$ V)	AV1 (dB $\mu$ V)	AV2 (dB $\mu$ V)		qp Limit (dB $\mu$ V)	qp Margin dB	AVE Limit (dB $\mu$ V)	AVE Margin dB		
0.15	26.7	28.0			20.0	66.0	-18.0	56.0	-8.0	Pass	
5.61	4.8	11.4			20.0	60.0	-28.6	50.0	-18.6	Pass	
18.40	6.9	13.1			20.0	60.0	-26.9	50.0	-16.9	Pass	
20.50	4.6	12.3			20.0	60.0	-27.7	50.0	-17.7	Pass	
28.80	14.4	19.3			20.0	60.0	-20.7	50.0	-10.7	Pass	
29.70	11.3	17.8			20.0	60.0	-22.2	50.0	-12.2	Pass	

**Table Result:** Pass by -8.00 dB      **Worst Freq:** 0.15 MHz

## ***Voltage Variation***

### **REQUIREMENT**

*"For intentional radiators, measurements of the variation of the...radiated signal level of the fundamental frequency component of the emission...shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage."*  
[15.31(e)]

### **MEASUREMENTS**

<b>Voltage Variations</b>		<b>Curtis-Straus LLC</b>
WO: E0878		
Company: Frontier		
EUT: TranzPort		
Date: 11/8/2004		
Engineer: Evan Gould		
<b>Notes:</b> Nominal voltage: 120VAC		
Amplitude (dBm)		Voltage
-5.39		102
-5.16		120
-5.13		138

## Antenna Gain

### REQUIREMENT

*“...if transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the stated value (30dBm)...by the amount in dB that the directional gain of the antenna exceeds 6 dBi.”*  
[15.247(b)(4)]

### MEASUREMENTS

The measured antenna gain was determined by calculating an EIRP from a maximized field strength reading, and subtracting from it the highest conducted Peak Output Power measurement. The result follows:

Measured Antenna Gain										Curtis-Straus LLC						
Date: 08-Nov-03			Company: Frontier						Work Order: E0878							
Engineer: Evan Gould			EUT Desc: TranzPort													
Frequency Range: 2478MHz										Measurement Distance: 3 m						
Notes: EIRP[dBm] = Field Strength[dBuV/m]-104.77+20log(distance[m])										Antenna: Black Horn						
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBuV/m)	EIRP (dBm)	POP (dBm)	Antenna Gain (dBi)							
Hpk	2478.0	70.3	0.0	30.9	2.1	103.3	8.1	-4.2	12.3							
Test Site: T			Pre-Amp: none			Cable: 3 RG142LL		Analyzer: Green								

A directional gain of 12.3dBi yields a corresponding reduction in the Peak Output Power limit of 6.3dB. All of the Peak Output Power measurements meet this additional requirement.

**Test Equipment Used**

REV. 09-NOV-2004

<b>SPECTRUM ANALYZERS</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	26-MAY-2005	
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	04-MAR-2005	
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	03-NOV-2005	
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	11-AUG-2005	
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	02-AUG-2005	
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	18-AUG-2005	
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	02-DEC-2004	
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	03-JUN-2005	
<b>LISNS/MEASUREMENT PROBES</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956348	00753	02-APR-2005	
BLUE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956349	00752	02-APR-2005	
YELLOW-BLACK	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984735	00248	02-APR-2005	
ORANGE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	02-APR-2005	
GOLD	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984734	00247	02-APR-2005	
WHITE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972019	00678	02-APR-2005	
BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972017	00675	02-APR-2005	
RED-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972016	00677	02-APR-2005	
BLUE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972018	00676	02-APR-2005	
BLUE MONITORING PROBE	0.01-150MHz	91550-2	TEGAM	12350	00807	21-MAY-2005	
YELLOW MONITORING PROBE	0.01-150MHz	91550-2	ETS	50972	00493	24-NOV-2004	
GREEN CURRENT TRANSFORMER	40Hz-20MHz	150	PEARSON	10226	00793	03-APR-2005	
CISPR LINE PROBE	150kHz-30MHz	N/A	C-S	01	00805	20-DEC-2004	
CISPR TELCO VOLTAGE PROBE	10kHz-30MHz	CS A/C-10	C-S	CS01	00296	28-SEP-2005	
CISPR 22 TELCO ISN	9kHz-30MHz	FCC-TLISN-T4	FISCHER	20115	00746	26-OCT-2006	
<b>OPEN AREA TEST SITE (OATS)</b>		FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE		
SITE F		93448	IC 2762-F	R-1688	25-MAR-2005		
SITE T		93448	IC 2762-T	R-905	25-MAR-2005		
SITE A		93448	IC 2762-A	R-903	25-MAR-2005		
SITE M		93448	IC 2762-M	R-904	25-MAR-2005		
BUBBLE (HP FACILITY)		N/A	N/A	R-1467	16-MAY-2005		
<b>LINE CONDUCTED TEST SITES</b>		FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE		
EMI 1		93448	N/A	C-1801	01-MAY-2006		
EMI 2		93448	N/A	C-1802	01-MAY-2006		
EMI 3		93448	N/A	C-1803	01-MAY-2006		
BUBBLE (HP FACILITY)		N/A	N/A	C-1556	16-MAY-2005		
<b>PREAMPS/ATTENUATORS/FILTERS</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	31-MAR-2005	
BLUE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	26-JUL-2005	
BLUE-BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	31-MAR-2005	
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	27-FEB-2005	
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	27-FEB-2005	
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	27-FEB-2005	
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	21-JUL-2005	
YELLOW-BLACK	1-20GHz	SMC-12A	C-S	535055	00801	21-JUL-2005	
ORANGE-BLACK	1-20GHz	SMC-12A	C-S	637367	00761	21-JUL-2005	
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	20-JUL-2005	
HIGH PASS FILTER	1-18 GHz	SPA-F-55204	K&L	36	00817	06-JAN-2006	
LOW PASS FILTER	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	06-JAN-2006	
HF 20dB ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNAK	01	00791	21-MAY-2005	
LOW FREQ LPF	10-100kHz	L200K1G1	MICROWAVE CIRCUITS	4460-01 DC0432	1019	30-AUG-2005	
LOW FREQ LPF	10-100kHz	L200K1G1	MICROWAVE CIRCUITS	4777-01 DC0434	1088	30-AUG-2005	
<b>ANTENNAS</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE



GREEN BILOG	30MHz-2GHz	CBL6112B	CHASE	2742	00620	06-APR-2006
GREEN-BLACK BILOG	30MHz-2GHz	CBL6112B	CHASE	2412	00127	06-JAN-2006
GREEN-RED BILOG	30MHz-2GHz	CBL6112B	CHASE	2435	00990	06-APR-2006
BLUE-WHITE BILOG	30MHz-2GHz	3142B	EMCO	1527	TELOGY RENTAL	03-AUG-2006
RED BILOG	30MHz-1GHz	3143	EMCO	1270	00042	17-MAR-2005
BLUE BILOG	30MHz-1GHz	3143	EMCO	1271	00803	17-MAR-2005
GRAY BILOG	26MHz-2GHz	3141	EMCO	9703-1038	00066	19-MAY-2005(EMI) / 21-JUN-2005(RFI)
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	19-MAY-2005(EMI) / 25-JUN-2005(RFI)
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	22-MAY-2005(EMI) / 28-SEP-2005(RFI)
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	12-JUN-2005
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	04-JUN-2005
HF (WHITE) HORN	18-26.5GHz	801-WLM	WAVELIN E	00758		15-JUL-2005
SMALL LOOP (RENTAL)	10kHz-30MHz	PLA-130/A	ARA	1009	TELOGY	11-FEB-2006
SMALL LOOP	9kHz-30MHz	PLA-130/A	ARA	1024	00755	23-FEB-2006
LARGE LOOP	20Hz-5MHz	6511	EMCO	9704-1154	00067	12-NOV-2005
ACTIVE MONPOLE	30Hz-30MHz	3301B	EMCO	3824	00068	05-MAY-2005
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	13-SEP-2006
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1370	00757	26-JUN-2005
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1371	00756	26-JUN-2005
RE101 LOOP SENSOR	30Hz-100kHz	RE101-13.3cm	C-S	N/A	00818	07-JAN-2005
RS101 RADIATING LOOP	30Hz-100kHz	RS101-12CM	C-S	N/A	00819	07-JAN-2005
RS101 LOOP SENSOR	30Hz-100kHz	RS101-4CM	C-S	N/A	00820	07-JAN-2005

CHAMBERS AND STRIPLINE	MN	MFR	SN	ASSET	CALIBRATION DUE
RFI 1 CHAMBER	3 METER COMPACT	PANASHIELD	N/A	00797	25-JUN-2005
RFI 2 CHAMBER	04' x 07' SHIELDING SYSTEM	LINDGREN	13329	00795	21-JUN-2005
RFI 3 STRIPLINE	N/A	C-S	N/A	00796	22-JUL-2005
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	31-DEC-2004

RMS VOLTMETERS	MN	MNFR	SN	ASSET	CALIBRATION DUE
TRUE-RMS MULTIMETER	177	FLUKE	83390024	00973	08-MAR-2005
TRUE-RMS MULTIMETER (REFERENCE)	177	FLUKE	83390025	00974	08-MAR-2005
TRUE-RMS MULTIMETER (TELECOM)	177	FLUKE	83430419	00975	08-MAR-2005

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 presentation 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 1½% 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.

## A2LA Accreditation

<p><u>SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999</u></p> <p>CURTIS-STRAUSS<sup>1</sup> 527 Great Road Littleton, MA 01460 Barry Quinlan Phone: 978-486-8880</p> <p><b>ELECTRICAL</b></p> <p>Valid until: July 31, 2005</p> <p>In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following <u>Electromagnetic Compatibility (EMC), Telecommunications, and Product Safety tests:</u></p> <p><b>Electromagnetic Compatibility (EMC)</b> Radiated emissions testing (electric and magnetic fields); Conducted emissions testing (voltage and current); Electrostatic Discharge testing; Electrical Fast Transient testing; Radiated Immunity testing; Conducted Immunity testing; Lightning Immunity testing; Voltage Dips, Interrupts and Voltage Variations testing; Magnetic Immunity testing; RF Power measurements; Frequency Stability measurements; Longitudinal Induction measurements; Harmonic emissions testing; Light flicker testing; Low frequency disturbance voltage testing; Disturbance Power measurements</p>		<p>EN 55011 1991, 1998 characteristics of SABS CISPR 11:1997</p> <p>Canada ICES-001 1998 CNS13803 AS/NZS 2064: 1997</p> <p>CSA C108.8 – M1983</p> <p>CISPR 13:1996, 1998, 2001</p> <p>EN 55013: 1990, 2001</p> <p>EN 55013 Amend 12 1994</p> <p>SABS CISPR 13: 1996</p> <p>CNS 13439 AS/NZS 1053: 1999</p> <p>CISPR 14 1993 (<i>except discontinuous disturbances</i>)</p> <p>EN 55014 1993, 1997 <i>discontinuous disturbances</i>)</p> <p>AS/NZS 1044: 1995 <i>discontinuous disturbances</i>)</p> <p><i>Immunity</i> CNS13783-1 SABS CISPR 14-1 1993</p> <p>SABS CISPR 14-2 1997 + A1:2001</p> <p>Limits and methods of measurement of radio disturbance characteristics of information technology equipment. Limits and methods of measurement of radio interference characteristics of information technology equipment. Limits and methods of measurement of radio disturbance characteristics of information technology equipment. Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement Digital apparatus Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of information technology equipment</p> <p>Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.</p> <p>Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics Limits and methods of measurement Industrial, scientific and medical radio frequency generators Industrial, Scientific and Medical Instrument Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment. Electromagnetic Emission from Data Processing Equipment and Electronic Office Machines Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment. Sound and television broadcast receivers and associated equipment: Electromagnetic compatibility. Part 1: Specification for limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment. Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment. Amendment 12 Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment. Broadcast receiver and associated equipment Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment. Limits and methods of measurement of radio disturbance characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and electric apparatus. Limits and methods of measurement of radio disturbance (<i>except</i> characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus. Limits and methods of measurement of radio disturbance (<i>except</i> characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus.</p> <p>Household Electrical Appliances Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission – Product family standard Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity - Product family standard</p>	
<p><sup>1</sup> Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460</p>		<p>(A2LA Cert. No. 1627-01) 10/31/03</p>	
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<p>CISPR 14-2 1996, 1997 + A1:2001</p> <p>CISPR 20: 1995, 2002 with amendment 3 (<i>associated group only</i>)</p> <p>EN 55020: 1995, 2002 (<i>associated group only</i>)</p> <p>CISPR 24</p> <p>SABS CISPR 24 1997</p> <p>AS/NZS 3200.1.2: 1995</p> <p><i>European Union Basic EMC Standards</i> EN 61000-4-2: 1995, 1999, 2001</p> <p>EN 61000-4-3:1997, 1998, 2002 AS/NZS 61000.4.3 1999</p> <p>EN 61000-4-4 1995</p> <p>EN 61000-4-5 1995 AS/NZS 61000.4.5 1999</p> <p>EN 61000-4-6 1996 AS/NZS 61000.4.6 1999</p> <p>EN 61000-4-8 1994</p> <p>EN 61000-4-11 1994</p> <p>ENV 61000-2-2 1993</p> <p><i>EU Product Family Standards</i> EN 50081-1 1992</p> <p>EN 50081-2 1993</p> <p>EN 50082-1 1992, 1998</p> <p>EN 50082-2 1995</p>		<p>EN 61000-6-1: 1997, 2001</p> <p>EN 61000-6-2: 1998, 2001</p> <p>EN 50091-2 1996</p> <p>EN 55024 1998</p> <p>EN 55103-1 1997</p> <p>EN 55103-2 1997 (<i>excluding Annex A3</i>)</p> <p>EN 61326 1998</p> <p>EN 61547 1996</p> <p>EN 50130-4 1996</p> <p>EN 55104 1995</p> <p>EN 50083-2 1995</p> <p>EN 60601-1-2: 1993, 2002</p> <p>IEC 1800-3 1995</p> <p>EN 60555 Part 2 1987</p> <p>EN 60555 Part 3 1987</p> <p>EN 61000-3-2: 1995, 2000 AS/NZS 61000.3.2 1998</p> <p>EN 61000-3-3 1995 AS/NZS 61000.3.3 1999</p> <p>ETS 300 386-1 1994</p> <p>Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication (EMC) Part 4: Testing and measurement techniques. Section 5: Surge immunity test. Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields. Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test. (EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage Variations immunity tests. Electromagnetic compatibility (EMC). Part 2: Environment, Section 2: Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power supply systems (IEC 1000-2-2:1990) Electromagnetic capability – Generic emission standard. Part 1: Residential, commercial and light industry. (I.S.) Electromagnetic compatibility – Generic emission standard. Part 2: Industrial environment Electromagnetic compatibility – Generic emission standard. Part 1: Residential, commercial and light industry Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment</p>	
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ETS EN 300 386-2 1997, 1998, ETS EN 300 386 2000 v1.2.1, 2001 v1.3.1	Electromagnetic compatibility and radio spectrum matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements; Part 2: Product family standard.	EN 300 328-2:2001 v1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive
ETS 300 132-1 1996	Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources	EN 301 489-1:2002	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETS 300 132-2 1996	Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)	EN 60669-2-1:2002	Switches for household and similar fixed electrical installations -- Part 2-1: Particular requirements - Electronic switches
ETR 283 1997	Equipment Engineering (EE); Transient voltages at Interface A on telecommunications direct current (DC) power distributions.	<i>Canada Radio Standards</i> Canadian GL-36 1995	
<i>EU radio standards</i> (ETSI) EN 300 385 v1.2.1: 1998, 1999	Electromagnetic compatibility and Radio spectrum matters (ERM); Electromagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment (ETSI)	Canadian RSS-119 1999, 2000 Issue 6	Industry Canada - technical requirements for low power Devices in the 2400 - 2483.5 MHz band
EN 300 330 v1.2.1: 1998, 1999	Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices (SRD); Technical characteristics and test methods for radio equipment in the range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz	Canadian RSS-134 1996 & 2000, Issue Rev 1	Industry Canada - Land mobile and fixed radio Transmitters and receivers, 27.41 to 960.0 MHz
ETS 300 328 1996	Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques	Canadian RSS-210 2000 Issue 3, RFS29 1998	Industry Canada - Low power license-exempt radio 2001 Issue 5 communication devices
ETS EN 300 440 v1.2.1 1999	Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices; Technical characteristics and test methods for radio equipment to be used in the 1 GHz to 40 GHz frequency range		Specification for Restricted Radiation Radio Apparatus (New Zealand)
EN 301 893:2002 v1.2.1	Broadband Radio Access Networks (BRAN); 5 GHz (draft) high performance RLAN; Harmonized EN covering Essential requirements of article 3.2 of the R&TTE Directive	47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices.	Scope A1
ETS 300 836-1:1998	Broadband Radio Access Networks (BRAN); High Performance Radio Local Area Network (HIPERLAN) Type 1; Conformance testing specification; Part 1: Radio Type approval and Radio Frequency (RF) conformance test specification	47 CFR FCC low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices.	Scope A2
EN301 489-17:2002 v1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2.4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment	47 CFR FCC Unlicensed Personal Scope Communications System (PCS) devices 47 CFR FCC Unlicensed National Scope Information Infrastructure devices and low power transmitters using spread spectrum techniques.	A3
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FCC/OST MP-5 1986	FCC (Federal Communications Commission) methods Of measurement of radio noise emissions from industrial, scientific and medical equipment.	TIA/EIA-IS-968	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
GR-1089-CORE: 1997, 1999 issue 2/ 2002 Issue 3	Bellcore electromagnetic compatibility and electrical safety - Generic criteria for network telecommunications equipment.	TIA/EIA-IS-883	Telecommunications Telephone Terminal Equipment Supplemental Technical Requirements for Connection of Stutter Dial Tone Detection Devices and ADSL Modems to the Telephone Network
<i>ANSI EMC Standards</i> ANSI C63.4: 1992, 1999, 2001	American National Standard for methods of measurement of radio-noise emissions for low-voltage electrical and electronic equipment in the range of 9 kHz to 40GHz.	TIA-968-A	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
ANSI C63.5 1988	American National Standard for electromagnetic compatibility - radiated emissions measurements in electromagnetic interference (EMI) control - calibration of antennas.	T1.TRQ-6-2001	Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Telephone Network
<i>IEEE EMC Standards</i> IEEE C62.41: 1980, 1991	IEEE recommended practice on surge voltages in low-voltage AC power circuits	Canada VDSL Issue 1 January 2003	Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment
<i>Swedish EMC Standards</i> BAKOM 3336.3 1995	Electromagnetic compatibility and electrical safety (EMC & S) for wired terminal equipment. Harmonization document information over the OFCOM requirements.	AS/ACIF S002-2001	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network
<i>South African EMC standards other than CISPR equivalents</i> SABS 1718-1: 1996	South African Bureau of Standards: Specification for Gaming equipment. Part 1: Casino equipment.	AS/ACIF S016-2001	Requirements for Customer Equipment for connection to hierarchical digital interfaces
<i>Japanese VCCI Standards</i> VCCI V-3/99.05 1999 VCCI V-4/99.05 1999	Technical Requirements Instruction for Test Conditions for Requirement under Test	AS/ACIF S031-2001 AS/ACIF S038-2001 AS/ACIF S043-2001	Requirements for ISDN Basic Access Interface Requirements for ISDN Primary Rate Access Interface Requirements for Customer Equipment for Connection to a Metallic Local Loop Interface of a Telecommunications Network — Part 1: General Part 2: Broadband
<i>Telecommunications</i>	Telecommunications Registration; General test methods; Lightning surge; Drop testing; Balance testing; Signal power (metallic and longitudinal); Frequency measurements; Pulse templates; Leakage testing; Impedance testing; Hearing Aid Compatibility testing ( <i>excluding volume control</i> ); Protocol analysis and Jitter testing.	ITU-T G.703 HKTA 2028 HKTA 2029 TBR 1 : 1995	Part 3: DC, Low Frequency AC and Voiceband Physical/electrical characteristics of hierarchical Digital interfaces Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s Attachment requirements for terminal equipment to be connected to circuit switched data networks and leased circuits using a CCITT Recommendation X.21 interface, or at an interface physically, functionally and electrically compatible with CCITT Recommendation X.21 but operating at any data signaling rate up to, and including, 1 984 kbit/s
<i>Telecom Standards</i>	<i>Title</i>	TBR 2 : 1997	Attachment requirements for Data Terminal Equipment (DTE) to connect to Packet Switched Public Data Networks (PSPDNs) for CCITT Recommendation X.25 interfaces at data signaling rates up to 1 920 kbit/s utilizing interfaces derived from CCITT Recommendations X.21 and X.21 bit
FCC 47 CFR Part 68 Telephone	Connection of terminal equipment to the telephone Terminal Equipment network. Analog and Digital Equipment. TCB Scope C1.		
CS-03 Issue 8 1996 through amendment 5	Specification for terminal equipment, terminal systems, Network protection devices, connection arrangements and hearing aids compatibility.		
TIA/EIA TSB31-B 1998	Bulletin Part 68 Rationale and Measurement Guidelines (Feb 1998)		
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TBR 3 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access	IEC 60950 2000 EN 60950 1997, 1998, 2000 IEC 60950-1 2001 UL 60950-1 2003 CSA C22.2 No. 60950-00 CSA C22.2 No. 60950-1 03 AS/NZS 3260 1993	Safety of information technology equipment Safety of information technology equipment, including Electrical business equipment.
TBR 4 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access		
TBR 012 : 1993 + Amdt : 1996	Business Telecommunications (BT); Open Network Provision (ONP) technical requirements; 2 048 kbit/s digital unstructured leased line (D2048U) Attachment requirements for terminal equipment	AS/NZS 3260 Supp 1 1996	Approval and test specification – Safety of information technology equipment including electrical business Equipment.
TBR 013 : 1996	Business TeleCommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface	ACA TS 001 1997	Approval and test specification – Safety of information technology equipment including electrical business equipment – Alphabetical reference index to IEC 950 (Supplement to AS/NZS 3260:1993)
TBR 21 : 1998	Terminal Equipment (TE); Attachment requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signaling	UL 1459 1995 IEC 1010-1 1990 IEC 61010-1 1993 EN 61010-1 1993, 2001 IEC 61010-1 2001 UL 61010B-1 2003 UL 3101-1 1993 CAN/CSA 1010-1 1999 ( <i>Including AM 2</i> ) UL 3111-1 1996 UL 3121-1 1995 IEC 60601-1 1995 EN 60601-1 1995 ( <i>Including AM 2</i> ) UL 2601-1 1997 IEC 60065 1998, 2000 ANSI/UL 6500: 1998 CAN/CSA 60065-00 AS/NZS 3250 1995 AS/NZS 60065 2000	Australian Communications Authority – Safety requirements for customer equipment. Telephone Equipment Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements. Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements.
TBR 24 : 1997	Business TeleCommunications (BTC); 34 Mbit/s digital Unstructured and structured leased lines (D34U and D34S); Attachment requirements for terminal equipment interface		Electrical equipment for laboratory use Part 1: General requirements.
<i>Australia</i> TS 002 : 1997	Analogue Interworking and Non interference Requirements for Customer Equipment Connected to the Public Switched Telephone Network		Electrical measuring and test equipment. Part 1: General requirements.
TS 016 : 1997	General Requirements for Customer Equipment Connected to Hierarchical Digital Interfaces		Medical electrical equipment. Part 1: General requirements for safety.
TS 031 : 1997	Requirements for ISDN Basic Access Interface		Medical electrical equipment
TS 038 : 1997	Requirements for ISDN Primary Rate Access Interface		Medical electrical equipment. Part 1: General Requirements for safety.
AS/ACIF S043.2:2001	Requirements for Customer Equipment for connection to a metallic loop interface of a Telecommunications Network – Part 2 Broadband		Audio, video and similar electronic apparatus – Safety requirements for household, commercial and similar general use
<b>Product Safety</b>			Australian/New Zealand Standard – Approval and test
General test methods; Input tests; Electric strength tests; Impulse tests; Permanency of marking tests; Accessibility tests; Energy Hazard measurements; Capacitor discharge tests; Humidity conditioning; Earthing tests; Limited power source measurements; Stability tests; Steel ball tests; Lithium Battery Reverse Current measurements; Leakage current tests; Transformer abnormal tests; Telecom leakage tests; Over voltage/power cross tests ( <i>excluding x-ray tests</i> ).			Specification – Mains operated electronic and related Equipment for household and similar general use
<b>Product Safety Standards</b>	<b>Title</b>		Audio, video and similar electronic equipment. Consumer and 1994, commercial products
Specific Product Safety Standards			Safety requirements for main operated electronic and related apparatus for household and similar general use.
IEC 950 1991	Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment.		Radiation safety of laser products, equipment Classification, requirements and user's guide
UL 1950 1998	Safety of information technology equipment, including electrical business equipment.		Safety of laser products Part 1: equipment Classification, requirements and user's guide.
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)		Safety of laser products – Part 2: Safety of optical communication
UL 60950 2000	Safety of information technology equipment		
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UL 61010A-1 : 2002	Electrical equipment for laboratory use; part 1: General requirements		
EN 61010-1 : 2001	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements		
AS/NZS 60950 : 2000	Safety information technology equipment		
<b>Environmental<sup>2</sup></b>			
<b>Environmental Standards</b>	<b>Title</b>		
GR-63-CORE	NEBS Requirements: Physical Protection		
ETS 300 019	Environmental conditions and environmental tests For telecommunications equipment		
(vibration up to 1000Hz)			

<sup>2</sup> Environmental testing is performed at the satellite facility located at 168 Ayer Rd, Littleton, MA 01460