Curtis-Straus

Test Report

Report No	EF0775-1
Client	Huber-Suhner AG
Phone Fax	413-863-2796 / +41 (0)71 353 41 11 +41 (0)71 353 45 90
FRN	0014049316
Models FCC ID	Sencity Link TTDSL60100
Equipment Type Equipment Code	Low Power Communication Device Transmitter DXX
Results	As detailed within this report
Prepared by	Mairaj Hussain – Test Engineer
Authorized by	Michael Buehholz – EMC Manager
Issue Date	1/11/06
Conditions of issue	This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this

Summary

This report is an application for certification of a transmitter operating under 47 CFR 15.255 of the FCC rules provided for operation in the frequency range of 57GHz – 64GHz. The product covered by this report is Sencity Link. The product was tested using the methods outlined in ANSI C63.4 (2003).

The product utilizes following two antennas:

SL60-100-57/64-E-O	59400MHz – 62400MHz	38dBi
HP2-60	57000MHz - 64000MHz	46dBi

Test Methodology

Peak output power was measured at a distance of 3m from the EUT and integrated channel power was measured over 26dB bandwidth.
Spurious emissions testing was performed at an OATS with EUT placed on a non conductive 80cm high table. Testing was done with guidance from FCC "Millimeter Wave Test Procedure".

Frequency range investigated:	150KHz – 220GHz

Measurement Distance:		
Frequency (MHz)	*Distance (m)*	*Comments*
150KHz-30MHz 57 – 64 GHz	Conducted 3 m	AC line Radiated Fundamental
30MHz – 220GHz	3 m, 1m, & 0.1m	Spurious

The EUT was maximized around two orthogonal axes. EUT antenna can not be maximized separately with respect to EUT.

The product is powered by power over Ethernet, therefore AC line conducted emissions were performed on AC side of POE adapter. Voltage variation test was performed by varying DC input voltage ±15% from nominal 48V.

All readings are peak unless otherwise noted.

EUT Configuration

EUT:	Sencity Link
Model #:	SL60-100-57/64-38-E-O
SN:	84019862 (59.2GHz unit) 84019863 (62.3GHz unit)
Cable:	Ethernet (shielded)

Support Equipment:

POE adapter:	Manufacturer:	Power Design
	MN:	PD-3001/AC

Modification Required for Compliance

1. Absorbing material by Kitagawa type code MG-02A (1mm) added in side the chassis.
2. Two ferrites by Kitagawa type code USB-4 added to Ethernet cable.
3. Shielded connector used to terminate Ethernet cable at the EUT end.

Statement of Conformity

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

47 CFR Part #	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) 15.255 (f)	Input voltage variation was performed at ±15% of 48V DC. Temperature variation test was performed for the range of -20ºC to 50ºC.
15.203, 15.204	The device utilizes permanent antenna see attached document describing the antenna.
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.
15.207	EUT gets its power from POE adapter. AC line conducted emissions were performed on POE adapter.
15.255(b)(1)	Power spectral density meets the requirements of 9µW/cm^2
15.255(e)	Peak out put power meets the 500mW limit.
15.255(C)(2)	Spurious emissions below 40GHz meet 15.209 limits.
15.255(C)(3)	No emissions found above 40GHz.
15.255(h)	Product is intended for outdoor use only.
15.255(i)	Product is intended for outdoor use only.

Test Data and Plots

Section 15.31(e) & 15.255 (f)

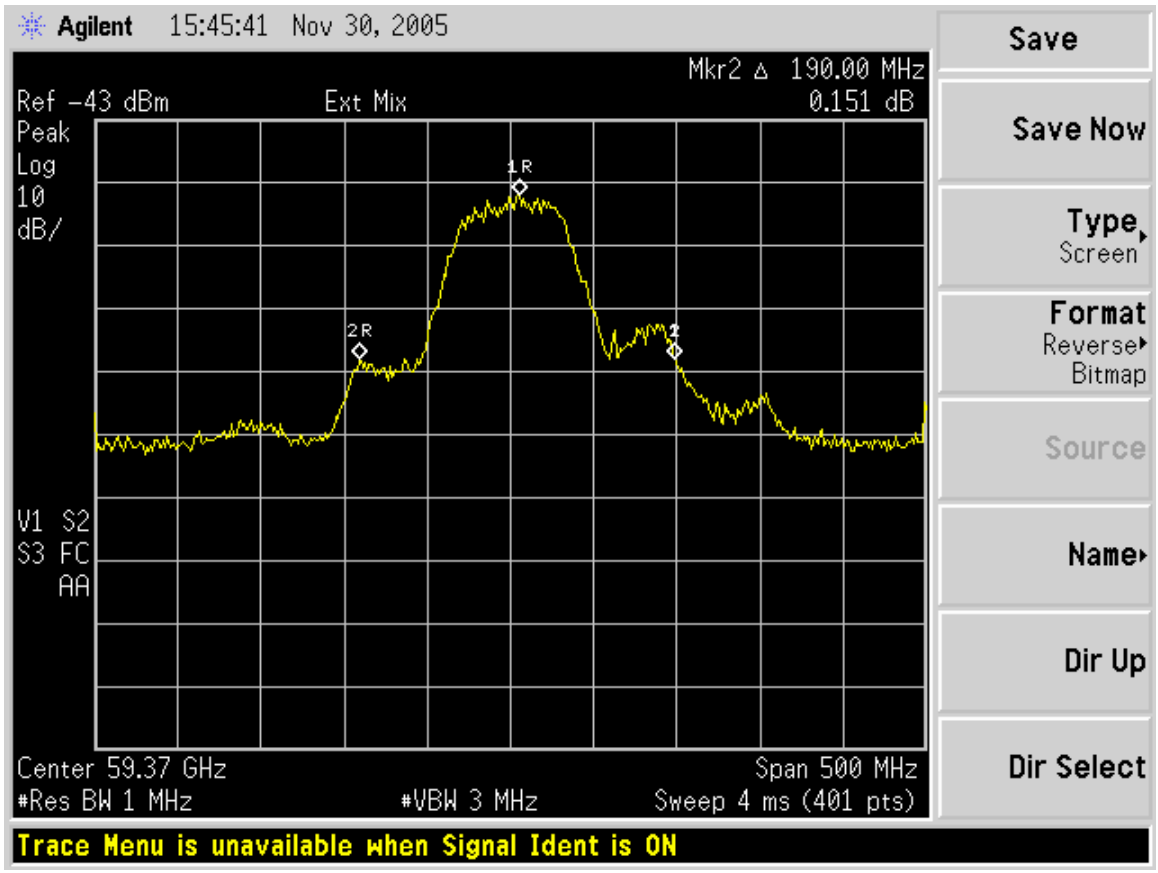
Table 1

Voltage Variation and Frequency Stability			***Section 15.255(f)***
Company:	Huber-Suhner AG		
Product:	Sencity Link		
Date:	Oct 21-2005		
Engineer:	Mairaj Hussain		
Temp (Deg C)	**Voltage (V)**	**Frequency (GHz)**	**Amplitude (dBm)**
25	48	62.3	-66.1
	40.8	62.3	-66.9
	55.2	62.3	-66.9
-20	48	62.3	-67.4
	40.8	62.3	-66.8
	55.2	62.31	-66.7
50	48	62.29	-67.8
	40.2	62.3	-67.9
	55.2	62.3	-67.3

Conclusion:	The peak output power does not change with input voltage. Fundamental emissions remains within the specified frequency band over the temperature range of -20 deg C to +50 deg C

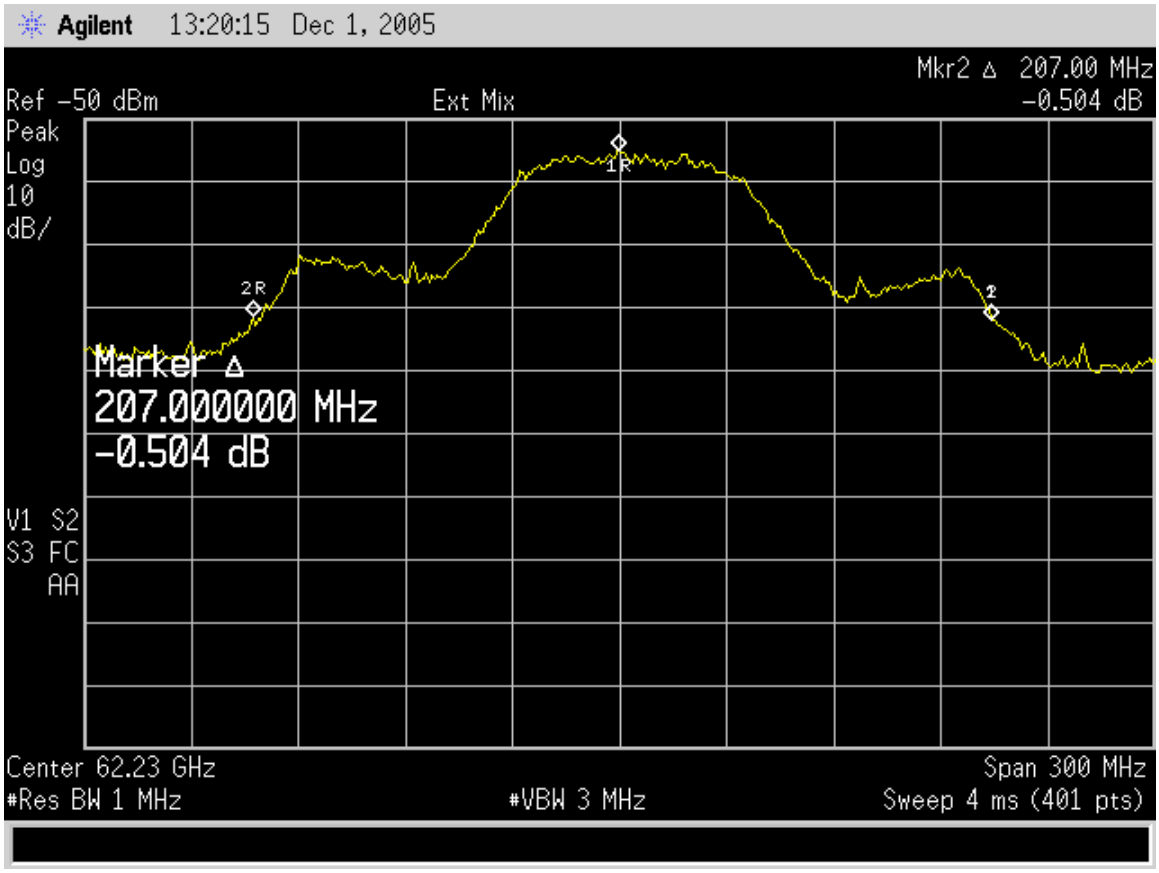
Note: Above PoP readings are off of spectrum analyzer and do not take in account for cables loss and any attenuator used.

Emissions Bandwidth



Channel 1
-26dB BW = 190MHz

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



Channel 2

-26dB BW = 207MHz

Peak Output Power - Section 15.255(e)

Table 2

Peak Output Power ***Curtis-Straus, LLC***

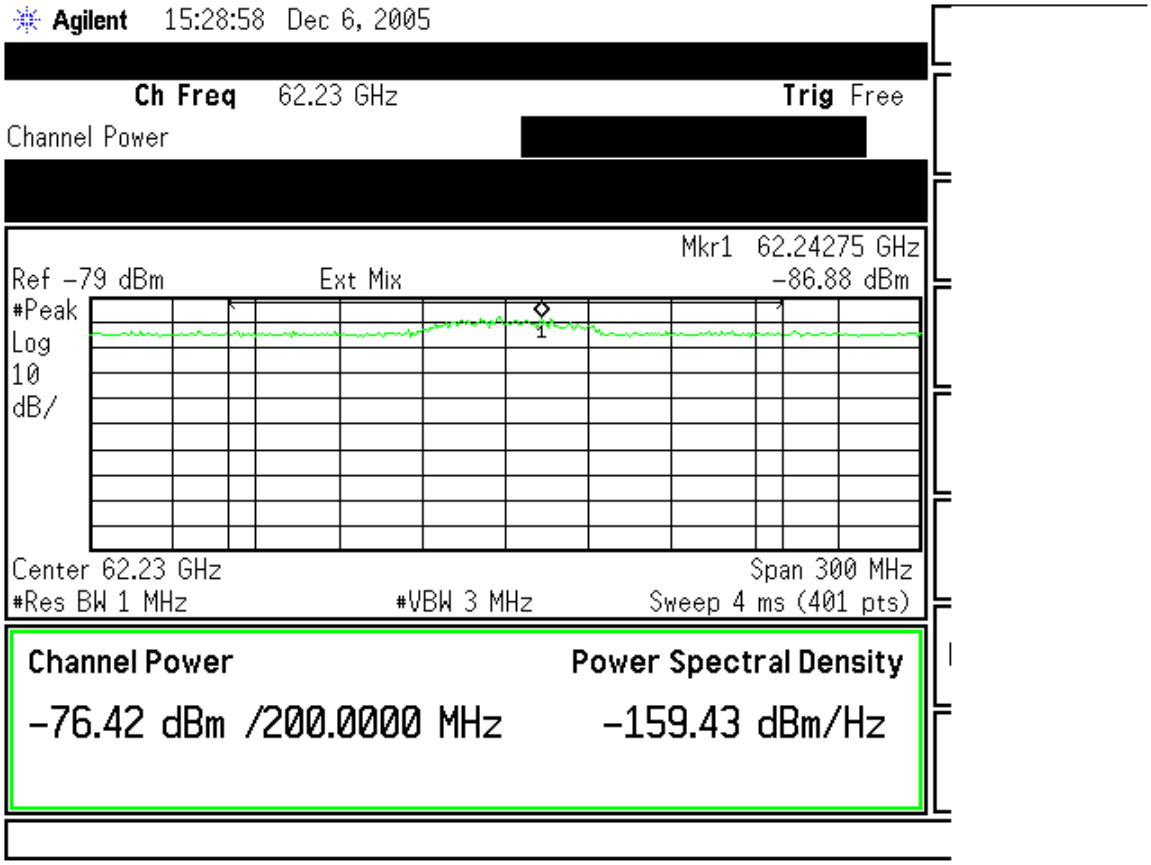
Company: Huber-Suhner
Product: Sencity Link
Engineer: Mairaj Hussain
Date: 6-Dec-05
Spectrum Analyzer: Orange(rental) **Cables:** HF microflex
Mixer: 50 - 75GHz mixer **Distance:** 3 m
RBW: 1MHz **VBW:** 3MHz **Det Type:** Pk

	Spectrum Ana. Reading (integration reading) (dBuV)	AF Mix CF (dB)	Adjusted Reading dBuV/m	Adjusted Reading V/m	Power W	Power mW
CH2	30.6	80.3	110.9	0.35	0.0367	36.70
CH1	30.8	79.8	110.6	0.34	0.0348	34.81

Limit: 500mW

Sample Calculation (per mmW procedure):
Peirp=(E x d)^2/30G W
E=10^((30.6+80.3)/20) x 10^6 =0.35V/m
P=(0.35 x 3)^2/(30 x 1) = 0.0367W EIRP

Sample plot:



Power Density - Section 15.255(b)(1)

Table 3

Peak Power Density			*Curtis-Straus, LLC*
Company: Huber-Suhner			
Product: Sencity Link			
Engineer: Mairaj Hussain			
Date: 6-Dec-05			
Spectrum Analyzer: Orange(rental)		**Cables:** HF microflex	
Mixer: 50 - 75GHz mixer		**Distance:** 3 m	
RBW: 1MHz	**VBW:** 3MHz	**Det Type:** Pk	
	Power (peak) (W)	**Power Density** (W/cm^2)	**Average Limit** (W/cm^2)
CH2	0.0367	3.25E-08	9.0E-06
CH1	0.0348	3.08E-08	9.0E-06
Note:	***Peak reading passes average and peak limit***		

$P_d = P_t / 4pid^2$

P_d is the power density in W/cm^2

P_t is the EIRP, in watts

d is the measurement distance in cm

Sample Calcualtion:
P_d = 0.0367/(4*3.14*300*300) = 3.25E-8W/cm^2

Spurious Emissions - Section 15.255(C)

Table 4

Radiated Emissions Table *Curtis-Straus LLC*

Date: 30-Nov-05 **Company:** Huber-Schner **Work Order:**
Engineer: Mairaj Hussain **EUT Desc:** Sencity Link

Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes: add absorbing material inside the box and two ferrites on ethernet cable **EUT Max Freq:** 62.2GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)				FCC Class B Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	51.8	38.4	22.3	8.2	1.5	25.8				40.0	-14.2	Pass
v	125.0	47.8	22.2	14.4	2.5	42.5				43.5	-1.0	Pass
v	250.0	46.6	22.2	12.3	3.7	40.4				46.0	-5.6	Pass
h	312.5	49.4	22.1	14.1	4.3	45.7				46.0	-0.3	Pass
v	325.0	35.7	22.1	14.4	4.4	32.4				46.0	-13.6	Pass
v	375.0	37.3	22.1	15.5	4.7	35.4				46.0	-10.6	Pass
h	437.5	38.7	22.1	16.7	5.2	38.5				46.0	-7.5	Pass
h	500.0	41.2	22.0	18.3	5.6	43.1				46.0	-2.9	Pass
h	625.0	32.5	21.9	19.5	6.5	36.6				46.0	-9.4	Pass
v	687.5	36.1	21.9	20.3	6.9	41.4				46.0	-4.6	Pass
h	875.0	26.0	21.8	22.4	7.9	34.5				46.0	-11.5	Pass
h	937.5	32.0	21.6	23.4	8.3	42.1				46.0	-3.9	Pass
h	1000.0	36.2	21.6	24.3	8.6	47.5				54.0	-6.5	Pass

Table Result: Pass by -0.3 dB ***Worst Freq:*** 312.5 MHz

Test Site: "M" **Pre-Amp:** Blue **Cable:** EMIR-06 **Analyzer:** White **Antenna:** Red-White

Table 5

Radiated Emissions Table *Curtis-Straus LLC*

Date: 30-Nov-05 **Company:** Huber-Schner **Work Order:** F0775
Engineer: Mairaj Hussain **EUT Desc:** Sencity Link

Frequency Range: 1-18GHz **Measurement Distance:** 3 m
Notes: **EUT Max Freq:** 62.2GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)				FCC Class B Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	1062.0	38.9	15.6	25.5	1.1	49.9				54.0	-4.1	Pass
Vpk	1062.0	40.4	15.6	25.5	1.1	51.4				74.0	-22.6	Pass
Vpk	1125.0	38.2	15.4	25.8	1.2	49.8				74.0	-24.2	Pass
v	1125.0	37.1	15.4	25.8	1.2	48.7				54.0	-5.3	Pass
v	1187.0	37.0	15.5	26.0	1.2	48.7				54.0	-5.3	Pass
Vpk	1187.0	41.4	15.5	26.0	1.2	53.1				74.0	-20.9	Pass
Vpk	1437.5	36.7	17.4	26.9	1.5	47.7				74.0	-26.3	Pass
Vpk	1500.0	37.1	17.6	27.1	1.6	48.2				54.0	-5.8	Pass
Vpk	5654.3	35.0	18.8	37.0	3.2	56.4				74.0	-17.6	Pass
v	5654.3	31.6	18.8	37.0	3.2	53.0				54.0	-1.0	Pass

Table Result: Pass by -1.0 dB ***Worst Freq:*** 5654.3 MHz

Test Site: "A" **Pre-Amp:** White **Cable:** EMIR-HIGH 11 **Analyzer:** Orange **Antenna:** Black Horn

Sample Calculation:

Adjusted Reading = Reading – Pre Amp$_{(factor)}$ + Antenna$_{(factor)}$ + Cable$_{(factor)}$

No spuriouse missions found 40GHz – 200GHz

Both antennas were tested in this range.

Band Edge

Table 6

Band Edge						Curtis-Straus, LLC
Company: Huber-Suhner						
Product: Sencity Link						
Engineer: Mairaj Hussain						
Date: 29-Dec-05						48dBi Dish antenna
Spectrum Analyzer: Orange				**Cables:** HF microflex		
Mixer: 50 - 75GHz mixer				**Distance:** 1 m		
RBW: 1MHz		**VBW:** 3MHz		**Det Type:** Pk		
Frequency	**Adjusted Reading**				**Limit**	**Margin**
(GHz)	**(dBuV/m)**	**(v/m)**	**(W)**	**(w/cm2)**	**(pW/cm2)**	**(dB)**
67	80.8	0.011	3.607E-05	1.0636E-08	9.00E-08	-7.94E-08
57	79.85	0.010	2.898E-05	8.5461E-09	9.00E-08	-8.15E-08

Sample calculation:
Adjusted reading = reading + Factors for (mixer and wave guide) + 20*log(3/1)

AC Line Conducted Emission Measurements

Line conducted emissions were measure using 50mH/50µH lisin.

Table 7

AC Mains Conducted Emissions *Curtis-Straus LLC*

Date: 08-Dec-05 **Company:** Huber-Suhner **Work Order:** F0775
Engineer: Mairaj Hussain **EUT Desc:** Sencity Link **Test Site:** EMI2
Notes: Re check with modified uint shielded cable and shielded connector for RJ cable on the EUT.
LISN(s): Brown
Range: 0.15-30MHz **Other Equipment:** --- **Spectrum Analyzer:** Black

	Q.P. Readings		Ave. Readings		Impedance Factor	---		FCC/CISPR B		FCC/CISPR B		Overall
Frequency (MHz)	QP1 (dBµV)	QP2 (dBµV)	AV1 (dBµV)	AV2 (dBµV)	(dB)	Limit (dBµV)	Margin dB	qp Limit (dBµV)	qp Margin dB	AVE Limit (dBµV)	AVE Margin dB	Result (Pass/Fail)
Use ITE POE adapter mn: PW130												
0.15	22.0	19.9			20.0			66.0	-24.0	56.0	-14.0	Pass
0.34	19.4	18.3			20.0			59.2	-19.8	49.2	-9.8	Pass
0.54	20.3	20.1			20.0			56.0	-15.7	46.0	-5.7	Pass
1.35	15.4	14.8			20.0			56.0	-20.6	46.0	-10.6	Pass
4.20	16.3	15.0			20.0			56.0	-19.7	46.0	-9.7	Pass
15.60	19.0	18.3			20.0			60.0	-21.0	50.0	-11.0	Pass
17.05	19.4	19.7			20.0			60.0	-20.3	50.0	-10.3	Pass
17.96	19.6	19.6			20.0			60.0	-20.4	50.0	-10.4	Pass
Power Design POE mn: PD-3001/AC												
0.17	35.1	32.3	12.0	14.2	20.0			65.0	-9.9	55.0	-20.8	Pass
0.77	14.1	13.2			20.0			56.0	-21.9	46.0	-11.9	Pass
19.57	10.0	7.4			20.0			60.0	-30.0	50.0	-20.0	Pass
21.20	14.2	13.8			20.0			60.0	-25.8	50.0	-15.8	Pass
21.93	18.4	16.0			20.0			60.0	-21.6	50.0	-11.6	Pass
23.74	14.8	13.0			20.0			60.0	-25.2	50.0	-15.2	Pass

Table Result: Pass by -5.70 dB ***Worst Freq:*** 0.54 MHz

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]

Test Equipment Used

REV. 30-NOV-2005

SPECTRUM ANALYZERS / RECEIVERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	I	13-JAN-2006
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	I	08-MAR-2006
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	I	03-DEC-2005
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	I	20-APR-2006
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	I	02-AUG-2006
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	I	02-NOV-2006
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	I	Out of Service
TELECOM 3585A	20Hz-40.0MHz	3585A	HP	1750A02762	01067	I	04-FEB-2006
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	I	22-JUN-2006
EMI TEST RECEIVER	20-1000MHz	ESVS30	R&S	827957/001	01098	I	27-OCT-2006

LISNS/MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956348	00753	II	15-APR-2006
BLUE (DC)	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956349	00752	II	02-MAY-2006
YELLOW-BLACK	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984735	00248	II	15-APR-2006
ORANGE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	II	02-MAY-2006
GOLD (DC)	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984734	00247	II	02-MAY-2006
BROWN	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411656	00986	II	04-MAY-2006
GREEN	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411657	00987	II	04-MAY-2006
YELLOW	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411658	1080	II	04-MAY-2006
WHITE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972019	00678	II	15-APR-2006
BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972017	00675	II	15-APR-2006
RED-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972016	00677	II	15-APR-2006
BLUE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972018	00676	II	15-APR-2006
BLUE MONITORING PROBE	0.01-150MHz	91550-2	TEGAM	12350	00807	I	26-MAY-2007
YELLOW MONITORING PROBE	0.01-150MHz	91550-2	ETS	50972	00493	I	24-NOV-2005
GREEN CURRENT TRANSFORMER	40Hz-20MHz	150	PEARSON	10226	00793	I	07-APR-2007
BLUE CISPR LINE PROBE	150kHz-30MHz	N/A	C-S	N/A	00805	II	08-JUN-2007
BLACK CISPR LINE PROBE	150kHz-30MHz	N/A	C-S	N/A	NONE	II	08-JUN-2007
CISPR TELCO VOLTAGE PROBE	10kHz-30MHz	CS A/C-10	C-S	CS01	00296	II	30-SEP-2006
CISPR 22 TELCO ISN	9kHz-30MHz	FCC-TLISN-T4	FISCHER	20115	00746	I	26-OCT-2006

OPEN AREA TEST SITE (OATS)	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE
SITE F	93448	IC 2762-F	R-1688	II	04-APR-2007
SITE T	93448	IC 2762-T	R-905	II	14-AUG-2007
SITE A	93448	IC 2762-A	R-903	II	13-AUG-2007
SITE M	93448	IC 2762-M	R-904	II	19-MAR-2007

LINE CONDUCTED TEST SITES	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE
EMI 1	93448	N/A	C-1801	II	01-MAY-2006
EMI 2	93448	N/A	C-1802	II	01-MAY-2006
EMI 3	93448	N/A	C-1803	II	01-MAY-2006

MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A01695/A046903-01	1087	I	23-AUG-2006
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	3003A07825/A046903-01	1086	I	23-AUG-2006
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	I	02-MAR-2007
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	I	03-MAR-2007
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	I	03-MAR-2007
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	II	
DIPLEXER	40-220 GHz	DPL.26	OML	N/A	00813	I	03-MAR-2007

ABSORBING CLAMPS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
FISCHER CLAMP	30-1000MHz	F-201-23MM	FISCHER	10	00081	I	16-JAN-2006

HARMONIC & FLICKER ANALYZER	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
HFTS	HP6842A	HP	3531A-00169	00738	II	03-DEC-2005

10001I/2 AC POWER SYSTEM	(2) 500I	CALIFORNIA INSTRUMENTS	HK53687/HK53688	00376	II	20-JAN-2006	

PREAMPS / ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	II	08-APR-2006
BLUE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	II	03-AUG-2006
BLUE-BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	II	10-FEB-2006
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	II	21-JUL-2006
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	II	25-AUG-2006
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	II	10-FEB-2006
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	II	04-AUG-2006
BROWN	1-20GHz	PM2-38-218-4R5-17-15-SFF	C-S	PL1655	1132	II	27-JUN-2006
YELLOW-BLACK	1-20GHz	SMC-12A	C-S	535055	00801	II	25-AUG-2006
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	II	23-AUG-2007
HIGH PASS FILTER	1-18 GHz	SPA-F-55204	K&L	36	00817	II	06-JAN-2006
LOW PASS FILTER	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	II	06-JAN-2006
HF 20DB 50W ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNACK	01	00791	II	10-MAY-2007
HF 30DB 50W ATTENUATOR	0.03-20 GHz	PE 7019-30	PASTERNACK	02	1168	II	10-MAY-2007
LOW FREQ LPF	10-100KHz	L200K1G1	MICROWAVE CIRCUITS	4460-01 DC0432	1019	II	OUT OF SERVICE
LOW FREQ LPF	10-100KHz	L200K1G1	MICROWAVE CIRCUITS	4777-01 DC0434	1088	II	30-AUG-2006

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN BILOG	30-2000MHz	CBL6112B	CHASE	2742	00620	II	06-APR-2006
GREEN-BLACK BILOG	30-2000MHz	CBL6112B	CHASE	2412	00127	II	06-JAN-2006
GREEN-RED BILOG	30-2000MHz	CBL6112B	CHASE	2435	00990	II	OUT OF SERVICE
BLUE BILOG	30-1000MHz	3143	EMCO	1271	00803	II	06-MAY-2007
GRAY BILOG	20-2000MHz	3141	EMCO	9703-1038	00066	II	06-MAY-2007(EMI) / 05-AUG-2006(RFI)
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	II	06-MAY-2007(EMI) / 12-AUG-2006(RFI)
RED-WHITE BILOG	30-2000MHz	JB1	SUNOL	A091604-1	01105	II	28-SEP-2006
RED-BLACK BILOG	30-2000MHz	JB1	SUNOL	A091604-2	01106	II	28-SEP-2006
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	I	27-MAY-2007(EMI) / 05-JUN-2006 (RFI)
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	I	17-JUN-2007
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	I	09-JUN-2007
HF (WHITE) HORN	18-26.5GHz	801-WLM	WAVELINE	00758	00758	I	26-AUG-2007
SMALL LOOP	9KHz-30MHz	PLA-130/A	ARA	1024	00755	I	23-FEB-2006
LARGE LOOP	20Hz-5MHz	6511	EMCO	9704-1154	00067	I	12-DEC-2005
ACTIVE MONOPOLE	30Hz-30MHz	3301B	EMCO	3824	00068	II	04-MAY-2006
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	II	26-SEP-2007
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1370	00757	II	18-MAR-2007
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1371	00756	II	18-MAR-2007
RE101 LOOP SENSOR	30Hz-100KHz	RE101-13.3CM	C-S	N/A	00818	II	13-MAR-2007
RS101 RADIATING LOOP	30Hz-100KHz	RS101-12CM	C-S	N/A	00819	II	13-MAR-2007
RS101 LOOP SENSOR	30Hz-100KHz	RS101-4CM	C-S	N/A	00820	II	13-MAR-2007

EFT	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
EFT DIRECT COUPLING CAP	N/A	C-S	01	00794	II	29-JAN-2006

ESD GENERATORS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN	NSG435	SCHAFFNER	000839	00763	I	17-FEB-2006
RED	NSG435	SCHAFFNER	001625	00762	I	29-DEC-2005
YELLOW	930D	ETS	201	00673	I	18-AUG-2007

BEST EMC-2	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
BLUE	711-1100	SCHAFFNER	199824-002SC	00117	II	16-JUN-2006 (SURGE) / 03-AUG-2006 (D+I) / 05-AUG-2006 (EFT)
RED	711-1100	SCHAFFNER	200122-074SC	00623	II	16-JUN-2006 (SURGE) / 04-AUG-2006 (D+I) / 03-DEC-2005 (EFT)

CHAMBERS AND STRIPLINE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RFI 1 CHAMBER	3 METER COMPACT	PANASHIELD	N/A	00797	II	12-AUG-2006
RFI 2 CHAMBER	04' X 07' SHIELDING SYSTEM	LINDGREN	13329	00795	II	05-AUG-2006
RFI 3 STRIPLINE	N/A	C-S	N/A	00796	III	NA
ENVIRONMENTAL (SAFETY)	ECL5	B-M-A INC.	2041	00029	I	12-JAN-2006
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	I	12-JAN-2006

AMPLIFIERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.5-1000MHz	10W1000 B	AR	18708	00032	II	05-AUG-2006 (RFI2) / 12-AUG-2006 (RFI1)
GREEN	0.5-1000MHz	10W1000 B	AR	23423	00123	II	05-AUG-2006 (RFI2)
BLUE	0.01-250MHz	75A250	AR	19165	00039	II	08-JUL-2006 (EU & NEBS CRFI)
BLACK	0.01-250MHz	75A250	AR	23411	00122	II	08-JUL-2006 (EU & NEBS CRFI) / 05-AUG-2006 (RFI2)
ORANGE	0.01-250MHz	75A250	AR	26827	00367	II	08-JUL-2006 (NEBS CRFI) / 12-AUG-2006 (RFI1)
HP489A	1.0-2.0GHz	HP489A	HP	449-00762	00971	II	OUT OF SERVICE
HUGHES 10W	1.0-2.0GHz	1177H09	HUGHES	272	RENTAL	II	14-JUL-2006
HP491C	2.0-4.0GHz	HP491C	HP	449-00636	00764	II	05-JUN-2006
HUGHES 10W	4.0-8.0GHz	1177H02	HUGHES	092	RENTAL	II	05-JUN-2006
HP493A #1	4.0-8.0GHz	HP493A	HP	171402242	00085	II	OUT OF SERVICE
HP493A #2	4.0-8.0GHz	HP493A	HP	449-00562	00771	II	OUT OF SERVICE
HP495A	7.0-10.0GHz	HP495A	HP	304-00237	00086	II	05-JUN-2006
AUDIO AMP		MPA-200	RADIO SHACK	700438	NONE	III	NA
AUDIO AMP		MPA-200	RADIO SHACK	708545	00862	III	NA

FIELD PROBES	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.01-1000MHz	HI-4422	HOLADAY	90369	00031	I	15-AUG-2006
GREEN	0.01-1000MHz	HI-4422	HOLADAY	97363	00136	I	26-AUG-2006
BLUE	0.01-1000MHz	HI-4422	HOLADAY	95696	01100	I	15-AUG-2006

SIGNAL GENERATORS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.09-2000MHz	HP8648B	HP	3847U02192	00366	I	15-FEB-2006
BLUE	0.1-1000MHz	HP8648A	HP	3426A00548	00034	I	25-AUG-2006
GREEN	0.09-2000MHz	HP8648B	HP	3623A02072	00125	I	17-OCT-2006
ORANGE	0.1-1000MHz	HP8648B	HP	3537A01210	00025	I	24-JUN-2006
BLACK (TELECOM)	0.01Hz-15MHz	HP33120A	HP	US36004674	00766	I	25-OCT-2006
YELLOW	0.01Hz-15MHz	HP33120A	HP	US36014119	00249	I	02-JUN-2006
BLUE-WHITE	0.1Hz-13MHz	HP3312A	HP	1432A07632	00775	I	11-MAR-2006
SWEEPER	0.01-20.0GHz	HP83752A	HP	3610A01133	00087	II	03-MAY-2006
AM/FM STEREO SIG. GEN.	0.1-170MHz	LG3236	LEADER	3687301	00959	I	30-AUG-2006
IMPULSE GENERATOR	1-100Hz	CIG-25	ELECTRO-METRICS	290	00942	I	05-AUG-2006

BULK INJECTION CLAMPS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN	0.01-100MHz	95236-1	ETS	50215	00118	II	08-JUL-2006 (EU & NEBS CRFI)
RED	0.01-100MHz	95236-1	ETS	34026	1020	II	08-JUL-2006 (EU & NEBS CRFI)

CDN NETWORKS	RANGE	MN	MFR	ASSET	CAT	CALIBRATION DUE
BLACK	0.10-100MHz	20A M-2 (DC)	C-S	00783	II	08-JUL-2006
BLUE	0.10-100MHz	15A M-3	C-S	00806	II	08-JUL-2006
ORANGE	0.10-100MHz	15A M-2	C-S	00786	II	08-JUL-2006
RED	0.10-100MHz	15A M-3	C-S	00780	II	08-JUL-2006
WHITE	0.10-100MHz	15A M-3	C-S	00782	II	08-JUL-2006
YELLOW-BLACK	0.10-100MHz	15A M-3	C-S	00784	II	08-JUL-2006
GREEN	0.10-100MHz	30A M-3	C-S	00779	II	08-JUL-2006
YELLOW	0.10-100MHz	30A M-5	C-S	00804	II	08-JUL-2006
BLUE-WHITE	0.10-100MHz	15A M-5	C-S	00788	II	08-JUL-2006
BROWN	0.10-100MHz	M-3	C-S	1169	II	08-JUL-2006
BROWN-WHITE	0.10-100MHz	M-3	C-S	1170	II	08-JUL-2006
BROWN-BLACK	0.10-100MHz	M-2 (DC)	C-S	1171	II	08-JUL-2006
RED-BLACK	0.10-100MHz	M-2 (DC)	C-S	1177	II	
YELLOW (RES)	0.10-100MHz	100Ω RESISTOR NWK (M-1)	C-S	00810	II	05-OCT-2006
GREEN (RES)	0.10-100MHz	100Ω RESISTOR NWK (M-1)	C-S	1172	II	17-JAN-2006

OSCILLOSCOPES	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
EMC 100MHz	TDS 220	TEKTRONIX	C036986	1166	I	26-AUG-2006
PRODUCT SAFETY 100 MHz	TDS 340	TEKTRONIX	B012357	00737	I	06-OCT-2006
TELECOM 100 MHz	54645A	HP/AGILENT	US36320452	00103	I	06-JUL-2006

RMS VOLTMETERS/CURRENT CLAMP	MN	MNFR	SN	ASSET	CAT	CALIBRATION DUE
TRUE-RMS MULTIMETER	79III	FLUKE	71700298	00769	I	25-OCT-2006
TRUE-RMS MULTIMETER	177	FLUKE	83390024	00973	I	10-MAR-2006
TRUE-RMS MULTIMETER (REFERENCE)	177	FLUKE	83390025	00974	I	10-MAR-2006
TRUE-RMS MULTIMETER (TELECOM)	177	FLUKE	83430419	00975	I	10-MAR-2006

TRUE-RMS CLAMP METER (SAFETY)	36	FLUKE	68805882	00700	I	11-MAR-2006

SURGE GENERATORS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	II	07-JUN-2006
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	II	09-JUN-2006
THREE PHASE COUPLING NWK	3CN	CDI	003455	00325	II	09-JUN-2006
1.2X50US PLUGIN MODULE	1.2X50US PLUGIN	CDI	N/A	00842	II	09-JUN-2006
10X160US PLUGIN MODULE	10X160US PLUGIN	C-S	N/A	00843	II	09-JUN-2006
10X560US PLUGIN MODULE	10X560US PLUGIN	C-S	N/A	00841	II	09-JUN-2006
PSURGE CONTROLLER MODULE	PSURGE 8000	HAEFELY	150267	00879	II	13-JUN-2006
COUPLING/DECOUPLING MODULE	PCD 900	HAEFELY	149213	00880	II	13-JUN-2006
IMPULSE MODULE	PIM 900	HAEFELY	149202	00881	II	13-JUN-2006
HIGH VOLTAGE CAP NWK 5KVDC, 18µF	CS-HVCC	C-S	01	00772	II	28-SEP-2006
NEBS SURGE GENERATOR	N/A	C-S	N/A	00088	II	08-JUN-2006
2X10US SURGE GENERATOR	2X10US	C-S	N/A	00846	II	09-JUN-2006
10X700US SURGE GENERATOR	10X700US	C-S	N/A	00847	II	09-JUN-2006
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	II	30-SEP-2006

POWER/NOISE METERS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
POWER METER	435B	HP	2445A11012	00773	I	06-APR-2006
POWER METER	437B	HP	2912A01367	01099	I	25-OCT-2006
POWER SENSOR	8481A	HP	2702A61351	00774	I	05-APR-2006
PSOPHOMETER	2429	BRUEL & KJAER	1237642	00585	II	14-FEB-2007
TRANSMISSION LINE TESTER (DBRNC)	185T	AMREL	998658	00823	II	07-MAR-2006

ANSI T1.315	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
SBC NOISE CART		C-S			III	CALIBRATION NOT REQUIRED
SBC TRANSIENT CART		C-S			III	WAVESHAPE VERIFIED BEFORE USE

OVERVOLTAGE CHAMBERS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
72KW POWER FAULT SIMULATOR	OV1	C-S	N/A	00792	II	31-MAR-2007
POWER FAULT SIMULATOR	OV2	C-S	N/A	00116	II	31-MAR-2007

DIPOLE TAPE MEASURES	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
26FT TAPE #1	2338CME	LUFKIN	C3166-1	00776	I	13-MAR-2007
26FT TAPE #2	2338CME	LUFKIN	C3166-2	00777	I	13-MAR-2007

METEOROLOGICAL METERS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
TEMP./HUMIDITY/ATM. PRESSURE GAUGE	7400 PERCEPTION II	DAVIS	N/A	00965	II	08-FEB-2007
TEMPERATURE /HUMIDITY GAUGE	THG-912	HUGER	4000562	00789	I	01-FEB-2007
WEATHER CLOCK (PRESSURE ONLY)	BA928	OREGON SCIENTIFIC	C3166-1	00831	I	02-FEB-2007

CONSUMABLES	SPEC.	MFR	STOCK/MN	ASSET	CAT	CALIBRATION DUE
NEBS CHEESECLOTH	26-28M/KG	ED&D	ACC-01	N/A	III	N/A
NEBS CARBON BLOCK	3-MIL-GAP 1KV SURGE	RELIABLE	3AB	N/A	III	N/A

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 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

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

CURTIS-STRAUS[1]
527 Great Road
Littleton, MA 01460
Barry Quinlan Phone: 978-486-8880

ELECTRICAL

Valid until: September 30, 2005 Certificate Number: 1627-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following Electromagnetic Compatibility (EMC), Telecommunications, and Product Safety tests:

Electromagnetic Compatibility (EMC)
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

EMC Standards	Title
Emissions	
CISPR 22 1997 with amendments 1 and 2	Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
CNS13438 1994	Limits and methods of measurement of radio interference characteristics of information technology equipment.
EN55022:1994 and 1998	Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
SABS CISPR 22:1997	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
Canada ICES-003 1997	Digital apparatus
AS/NZS 3548 1995	Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of information technology equipment
CISPR 11 1990, 1997, 1999	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

[1] Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460

EN 55011 1991, 1998 characteristics of SABS CISPR 11:1997	Limits and methods of measurement of radio disturbance industrial, scientific and medical (ISM) radio-frequency equipment. Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics Limits and methods of measurement
Canada ICES-001 1998	Industrial, scientific and medical radio frequency generators
CNS13803	Industrial, Scientific and Medical Instrument
AS/NZS 2064: 1997	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
CSA C108.8 – M1983	Electromagnetic Emission from Data Processing Equipment and Electronic Office Machines
CISPR 13:1996, 1998, 2001	Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment.
EN 55013: 1990, 2001	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.
EN 55013 Amend 12 1994	Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment. Amendment 12
SABS CISPR 13: 1996	Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment.
CNS 13439	Broadcast receiver and associated equipment Limits and methods of
AS/NZS 1053: 1999	measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment.
CISPR 14 1993 (*except discontinuous disturbances*)	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.
EN 55014 1993, 1997 *discontinuous disturbances*)	Limits and methods of measurement of radio disturbance (*except* characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus.
AS/NZS 1044: 1995 *discontinuous disturbances*)	Limits and methods of measurement of radio disturbance (*except* characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus.
Immunity	
CNS13783-1	Household Electrical Appliances
SABS CISPR 14-1 1993	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission – Product family standard
SABS CISPR 14-2 1997 + A1:2001	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity - Product family standard

CISPR 14-2 1996, 1997 + A1:2001	Immunity requirements for household appliances, tools and similar apparatus.
CISPR 20: 1995, 2002 with amendment 3 (*associated group only*)	Limits and methods of measurement of immunity characteristics of sound and television broadcast receivers and associated equipment.
EN 55020: 1995, 2002 (*associated group only*)	Electromagnetic immunity of broadcast receivers and Associated equipment.
CISPR 24	Information technology equipment – Immunity characteristics – Limits and methods of measurement
SABS CISPR 24 1997	Information technology equipment – Immunity characteristics – Limits and methods of measurement
AS/NZS 3200.1.2: 1995	Approval and test specification – Medical electrical Equipment – General requirements for safety – Collateral Standard: Electromagnetic compatibility – Requirements and tests.
European Union Basic EMC Standards	
EN 61000-4-2: 1995, 1999, 2001	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication
EN 61000-4-3:1997, 1998, 2002	Electromagnetic compatibility (EMC). Part 4: Testing and
AS/NZS 61000.4.3 1999	measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4 1995	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication
EN 61000-4-5 1995	(EMC) Part 4: Testing and measurement techniques. Section 5:
AS/NZS 61000.4.5 1999	Surge immunity test.
EN 61000-4-6 1996	Electromagnetic compatibility (EMC). Part 4: Testing
AS/NZS 61000.4.6 1999	and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields.
EN 61000-4-8 1994	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test.
EN 61000-4-11 1994	(EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage Variations immunity tests.
ENV 61000-2-2 1993	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)
EU Product Family Standards	
EN 50081-1 1992	Electromagnetic capability – Generic emission standard. Part 1: Residential, commercial and light industry. (I.S.)
EN 50081-2 1993	Electromagnetic compatibility – Generic emission standard. Part 2: Industrial environment
EN 50082-1 1992, 1998	Electromagnetic compatibility – Generic emission standard. Part 1: Residential, commercial and light industry
EN 50082-2 1995	Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment

EN 61000-6-1: 1997, 2001	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 1: Immunity for residential, commercial and light-industrial environments
EN 61000-6-2: 1998, 2001	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 2: Immunity for industrial environments
EN 50091-2 1996	Specification for Uninterruptible Power Systems (UPS). Part 2: EMC requirements
EN 55024 1998	Information technology equipment – Immunity Characteristics – Limits and methods of measurement.
EN 55103-1 1997	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission
EN 55103-2 1997 (*excluding Annex A*3)	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control professional use. Part 2: Immunity
EN 61326 1998	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61547 1996	Equipment for general lighting purposes – EMC immunity requirements
EN 50130-4 1996	Alarm Systems. Part 4: Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems.
EN 55104 1995	Electromagnetic compatibility immunity – requirements for household appliances, tools and similar apparatus. Product family standard.
EN 50083-2 1995	Cabled distribution systems for television and sound signals. Part 2: Electromagnetic compatibility for equipment.
EN 60601-1-2: 1993, 2002	Medical electrical equipment Part 1: general requirements for safety Section 2: Collateral standard: Electromagnetic compatibility – requirements and tests
IEC 1800-3 1995	Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods.
EN 60555 Part 2 1987	Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 2: Harmonics
EN 60555 Part 3 1987	Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 3: Voltage fluctuations.
EN 61000-3-2: 1995, 2000	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits
AS/NZS 61000.3.2 1998	for harmonic current emissions
EN 61000-3-3 1995	Electromagnetic compatibility (EMC). Part 3: Limits Section 2:
AS/NZS 61000.3.3 1999	Limitation of voltage fluctuations and flicker in low-voltage supply systems.
ETS 300 386-1 1994	Equipment Engineering (EE); Public telecommunication network equipment electro-magnetic compatibility (EMC) requirements Part 1: Product family overview, compliance criteria and test levels

ETS EN 300 386-2 1997, 1998,	Electromagnetic compatibility and radio spectrum matters (ERM);
ETS EN 300 386 2000 v1.2.1, 2001 v1.3.1	Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements; Part 2: Product family standard.
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
ETS 300 132-2 1996	Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)
ETR 283 1997	Equipment Engineering (EE): Transient voltages at Interface A on telecommunications direct current (DC) power distributions.
EU radio standards	
(ETS) 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 (ETS)
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
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
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
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
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
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

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
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
EN 60669-2-1:2002	Switches for household and similar fixed electrical installations -- Part 2-1: Particular requirements – Electronic switches
Canada Radio Standards	
Canadian GL-36 1995	Industry Canada – technical requirements for low power Devices in the 2400 – 2483.5 MHz band.
Canadian RSS-119 1999, 2000 Issue 6	Industry Canada – Land mobile and fixed radio Transmitters and receivers, 27.41 to 960.0 MHz
Canadian RSS-134 1996 & 2000, Issue 1 Rev 1	Industry Canada – 900 MHz narrowband personal communications services
Canadian RSS-210 2000 Issue 3,	Industry Canada – Low power license-exempt radio 2001 Issue 5 communication devices
RFS29 1998	Specification for Restricted Radiation Radio Apparatus (New Zealand)
FCC Standards	
47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices.	Scope A1
47 CFR FCC low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices.	Scope A2
47 CFR FCC Unlicensed Personal Communications System (PCS) devices	Scope A3
47 CFR FCC Unlicensed National Information Infrastructure devices and low power transmitters using spread spectrum techniques.	Scope A4
47 CFR FCC Personal mobile Radio Services in the following FCC Rule Parts 22, 24, 25, 27.	Scope B1
47 CFR FCC General Mobile Radio Services in the following FCC Rule Parts 22, 74, 90, 95, 97.	Scope B2
47 CFR FCC Maritime and Aviation RadioServices in 47 CFR Parts 80 and 87	Scope B3
47 CFR FCC Microwave Radio Services Scope in 47 CFR Parts 21, 74 and 101.	Scope B4

FCC/OST MP-5 1986	FCC (Federal Communications Commission) methods Of measurement of radio noise emissions from industrial, scientific and medical equipment.
GR-1089-CORE: 1997, 1999 issue 2/ 2002 Issue 3	Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.
ANSI EMC Standards	
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.
ANSI C63.5 1988	American National Standard for electromagnetic compatibility – radiated emissions measurements in electromagnetic interference (EMI) control – calibration of antennas.
IEEE EMC Standards	
IEEE C62.41: 1980, 1991	IEEE recommended practice on surge voltages in low-voltage AC power circuits
Swedish EMC Standards	
BAKOM 3336.3 1995	Electromagnetic compatibility and electrical safety (EMC & S) for wired terminal equipment. Harmonization document information over the OFCOM requirements.
South African EMC standards other than CISPR equivalents	
SABS 1718-1: 1996	South African Bureau of Standards: Specification for Gaming equipment. Part 1: Casino equipment.
Japanese VCCI Standards	
VCCI V-3/99.05 1999	Technical Requirements
VCCI V-4/99.05 1999	Instruction for Test Conditions for Requirement under Test

Telecommunications

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 (*excluding volume control*); Protocol analysis and Jitter testing.

Telecom Standards	Title
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)

TIA/EIA-IS-968	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
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
TIA-968-A	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
T1.TRQ.6-2001	Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Telephone Network Industry
Canada VDSL Issue 1 January 2003	Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment
AS/ACIF S002-2001	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network
AS/ACIF S016-2001	Requirements for Customer Equipment for connection to hierarchical digital interfaces
AS/ACIF S031-2001	Requirements for ISDN Basic Access Interface
AS/ACIF S038-2001	Requirements for ISDN Primary Rate Access Interface
AS/ACIF S043-2001	Requirements for Customer Equipment for Connection to a Metallic Local Loop Interface of a Telecommunications Network — Part 1: General Part 2: Broadband Part 3: DC, Low Frequency AC and Voiceband
ITU-T G.703	Physical/electrical characteristics of hierarchical Digital interfaces
HKTA 2028	Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s
HKTA 2029	Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s
TBR 1 : 1995	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
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

TBR 3 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access
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
TBR 013 : 1996	Business TeleCommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface
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
TBR 24 : 1997	Business TeleCommunications (BTC); 34 Mbit/s digital Unstructured and structured leased lines (D34U and D34S); Attachment requirements for terminal equipment interface
Australia	
TS 002 : 1997	Analogue Interworking and Non interference Requirements for Customer Equipment Connected to the Public Switched Telephone Network
TS 016 : 1997	General Requirements for Customer Equipment Connected to Hierarchical Digital Interfaces
TS 031 : 1997	Requirements for ISDN Basic Access Interface
TS 038 : 1997	Requirements for ISDN Primary Rate Access Interface
AS/ACIF S043.2:2001	Requirements for Customer Equipment for connection to a metallic loop interface of a Telecommunications Network – Part 2 Broadband

Product Safety

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 (*excluding x-ray tests*).

Product Safety Standards	Title
Specific Product Safety Standards	
IEC 950 1991	Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment.
UL 1950 1998	Safety of information technology equipment, including lectrical business equipment.
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)
UL 60950 2000	Safety of information technology equipment

IEC 60950 2000	Safety of information technology equipment
EN 60950 1997, 1998, 2000	Safety of information technology equipment, including
IEC 60950-1 2001	Electrical business equipment.
UL 60950-1 2003	
CSA C22.2 No. 60950-00	
CSA C22.2 No. 60950-1 03	
AS/NZS 3260 1993	Approval and test specification – Safety of information technology equipment including electrical business Equipment.
AS/NZS 3260 Supp 1 1996	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)
ACA TS 001 1997	Australian Communications Authority – Safety requirements for customer equipment.
UL 1459 1995	Telephone Equipment
IEC 1010-1 1990	Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements.
IEC 61010-1 1993	
EN 61010-1 1993, 2001	Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements.
IEC 61010-1 2001	
UL 61010B-1 2003	
UL 3101-1 1993	Electrical equipment for laboratory use Part 1: General requirements.
CAN/CSA 1010-1 1999 (*Including AM 2*)	
UL 3111-1 1996	Electrical measuring and test equipment. Part 1: General requirements.
UL 3121-1 1995	
IEC 60601-1 1995	Medical electrical equipment. Part 1: General requirements for safety.
EN 60601-1 1995 (*Including AM 2*)	Medical electrical equipment
UL 2601-1 1997	Medical electrical equipment. Part 1: General Requirements for safety.
IEC 60065 1998, 2000	Audio, video and similar electronic apparatus – Safety requirements
ANSI/UL 6500: 1998	Audio/video and musical instrument apparatus for
CAN/CSA 60065-00	Household, commercial and similar general use
AS/NZS 3250 1995	Australian/New Zealand Standard – Approval and test
AS/NZS 60065 2000	Specification – Mains operated electronic and related Equipment for household and similar general use
Canadian C22.2 No. 1-94 (1-98) 1998	Audio, video and similar electronic equipment. Consumer and 1994, commercial products
EN 60065 1994	Safety requirements for main operated electronic and related apparatus for household and similar general use.
IEC 60825 1990	Radiation safety of laser products, equipment Classification, requirements and user's guide
EN 60825-1 1994	Safety of laser products Part 1: equipment Classification, requirements
IEC 60825-1 2001	and user's guide.
IEC 60825-2 2000-5 systems	Safety of laser products – Part 2: Safety of optical communication
IEC 60825-4 1997-11	Safety of laser products – Part 4: Laser guards
IEC 60335-1 1995 (*Including AM2 – 1997 & AM 12 – 1997*)	Safety of household and similar electrical appliances Part 1: General requirements
EN 60335-1 2001	
UL 60335-1 1998	
CAN/CSA E335-1 1994	

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

Environmental [2]

Environmental Standards	Title
GR-63-CORE	NEBS Requirements: Physical Protection
ETS 300 019 (vibration up to 1000Hz)	Environmental conditions and environmental tests For telecommunications equipment

[2] Environmental testing is performed at the satellite facility located at 168 Ayer Rd, Littleton, MA 01460