



Test Report

Report No	EF0527-1
Client	Signal Dynamics LLC 446 Main Street West Townsend, MA 01474
Phone	(978) 502 4954
FRN	0013778493
Models	C3.5C and C3.5R
FCC ID	THRSIGDYN-AMS
Equipment Type Equipment Code	Low Power Communication Device Transmitter DXX
Results	As detailed within this report
Prepared by	 Evan Gould – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	7/27/05
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 15.231. The product is the Signal Dynamics apartment building video distribution system (Model C3.5R and Model C3.5C). The C3.5C is the Converter which contains a receiver only. The C3.5R is a battery powered transmitter remote control unit that operates at the frequency 418MHz. Since the C3.5R is the transmitter portion of the system, the certification and FCC ID are only applicable to it, and not the C3.5C.

Test Methodology

Radiated emissions testing is performed according to the procedures specified in ANSI C63.4 (2003). The C3.5R was maximized by rotating around three orthogonal axes, as well as varying the test antenna's height and polarity. Fresh batteries were used during testing.

Frequency range investigated: 30MHz – 4.18GHz

Measurement distance:	30MHz – 2GHz	3m
	2GHz – 4.18GHz	1m

Statement of Conformity

The C3.5R 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 accessible to the user that vary the output power.
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	This product uses an antenna that 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.
	15.231	The unit complies with the requirements of 15.231

EUT Configuration

EUT Configuration				
Work Order:	F0527			
Company:	Signal Dynamics			
Company Address:	15 Sophia Drive Cranston, RI 02921			
Contact:	Michael Cardarelli			
Person Present:	Michael Cardarelli			
	MN	SN		
EUT:	C3.5C	000103		
	C3.5R	000103		
EUT Description:	Video Converter and Remote			
EUT Max Frequency:	418MHz			
Support Equipment:	MN	SN		
PDI Channel Modulator	60SF	0044140		
Tektronix NTSC generator	TSG100	B022623		
EUT Cables:	Qty	Shielded?	Length	Ferrites
DC Power terminated 75ohm coax	1	No	6ft	No
75ohm coax to support	3	Yes	2m	No
RCA cable	1	Yes	20ft	No
Unpopulated EUT Ports:	Qty	Reason		
none				
Software / Operating Mode Description:				
Activation of the Remote switches a relay inside the Video Converter on and off.				

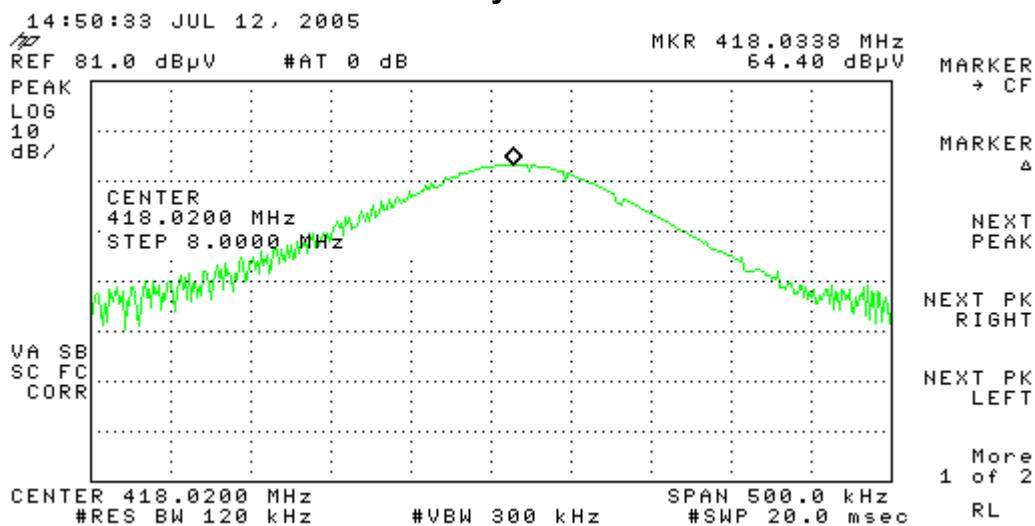


Fundamental**LIMITS**

Limit = $(41.6667 \times (\text{fundamental freq [MHz]}) - 7083.333) \mu\text{V/m} = 80.2 \text{ dB}\mu\text{V/m}$ at 3m.
[15.231(b)]

MEASUREMENT

Fundamental							Curtis-Straus LLC					
Date: 12-Jul-05			Company: Signal Dynamics				Work Order: F0527					
Engineer: Evan Gould			EUT Desc: C3.5R									
Frequency Range: 30-1000MHz					Measurement Distance: 3 m							
Notes:					EUT Max Freq: 418MHz							
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB μ V/m)	47 CFR 15.231(b)					
Hpk	418.02	64.4	23.9	16.8	2.9	60.2	80.2	-20.0	Pass			
Table Result: Pass by -20.0 dB				Worst Freq: 418.0 MHz								
Test Site: "A"		Pre-Amp: Orange		Cable: 65 ft RG8A/U		Analyzer: White		Antenna: Green				

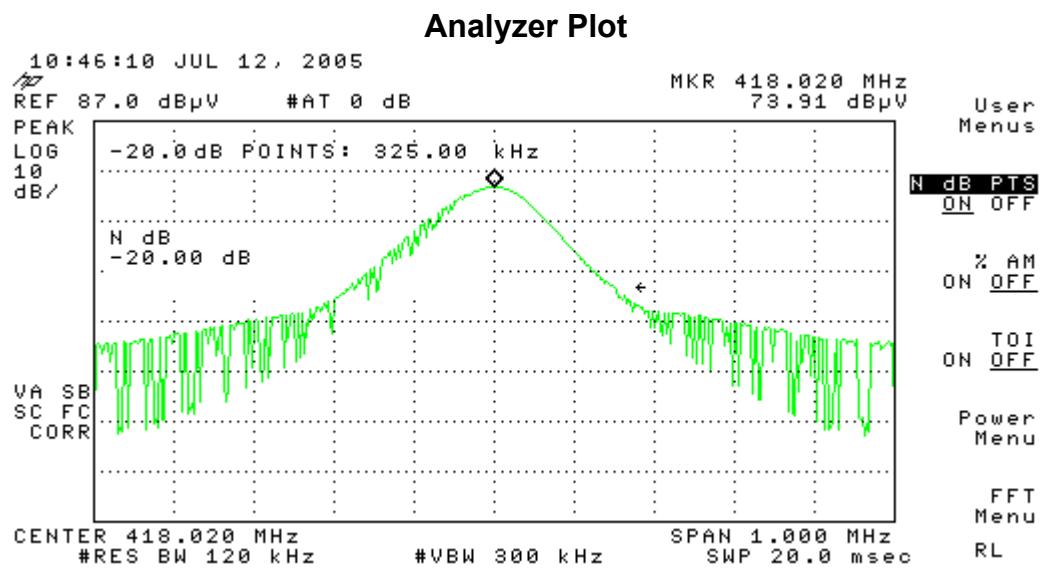
Analyzer Plot

Bandwidth**LIMITS**

20dB BW limit = 0.25% of center frequency

MEASUREMENT

20dB BW = 325kHz



Transmission Times

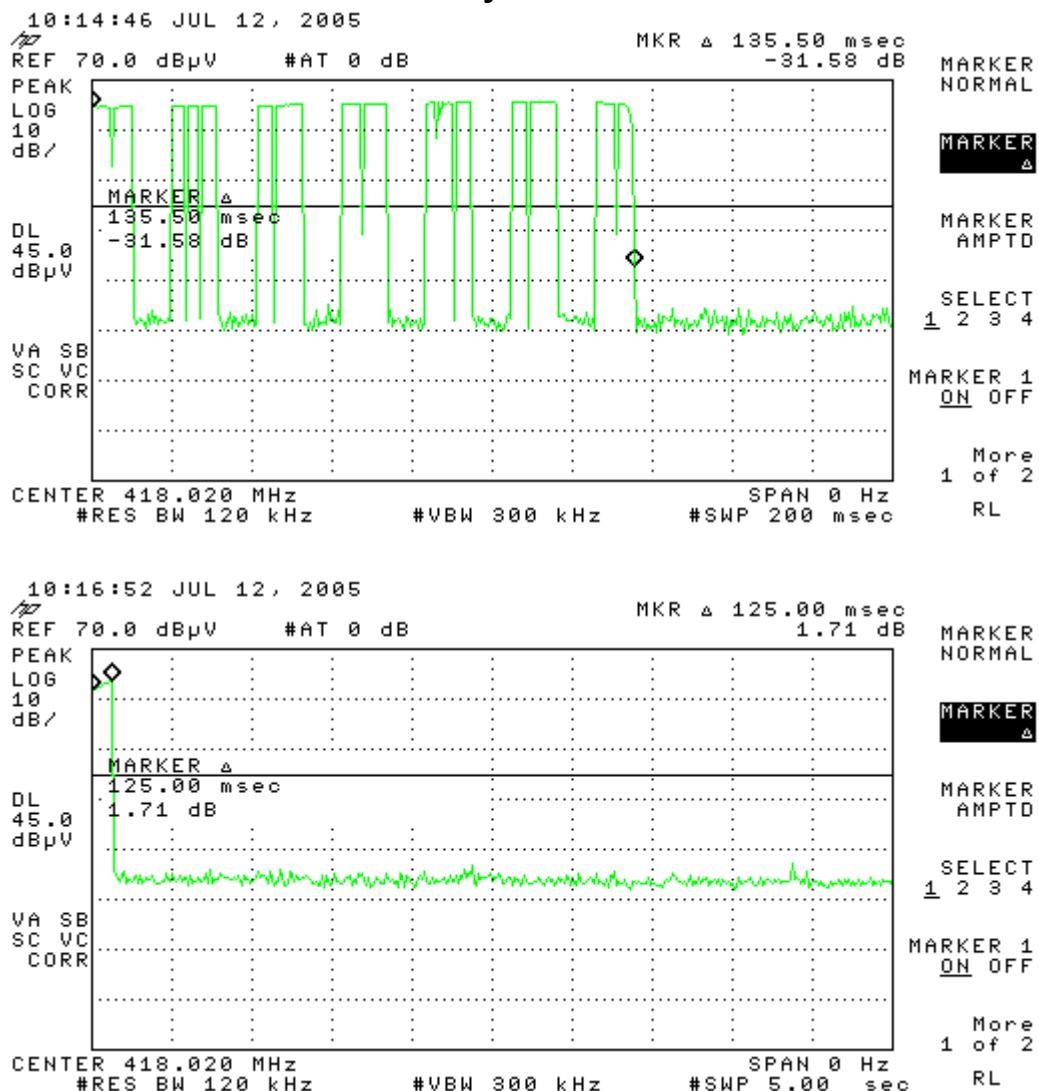
LIMIT

Maximum on-time limit = 5s [15.231(a)]

MEASUREMENT

On-time = 135.5ms

Analyzer Plots



Radiated Spurious Emissions

LIMITS

Limit = $(41.6667 \times (\text{fundamental freq [MHz]})) - 7083.333 \mu\text{V/m} - 20\text{dB} = 60.2\text{dB}\mu\text{V/m}$ at 3m or 15.209 limits (worse case). [15.231(b)]

MEASUREMENTS

Radiated Emissions Table								Curtis-Straus LLC							
Date: 12-Jul-05 Engineer: Evan Gould			Company: Signal Dynamics EUT Desc: C3.5C and C3.5R					Work Order: F0527							
Frequency Range: 30-2000MHz								Measurement Distance: 3 m							
Notes: Duty Cycle Factor = $20 \times \log(56\text{ms}/100\text{ms}) = -5.04\text{dB}$ C3.5C Receiving, C3.5R Transmitting								EUT Max Freq: 418MHz							
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading (dB μ V/m)	47 CFR 15.209							
nf	43.1	23.8	24.7	12.7	0.7	0.0	12.5	40.0	-27.5	Pass					
	110.0	24.5	24.6	12.1	1.3	0.0	13.3	43.5	-30.2	Pass					
	207.4	21.9	24.3	11.0	1.8	0.0	10.4	43.5	-33.1	Pass					
	319.8	19.5	24.1	14.4	2.4	0.0	12.2	46.0	-33.8	Pass					
	423.8	20.8	23.9	16.9	2.9	0.0	16.7	46.0	-29.3	Pass					
	519.8	17.8	23.7	18.1	3.3	0.0	15.5	46.0	-30.5	Pass					
	Hpk	836.04	59.9	23.6	21.1	4.6	5.0	57.0	60.2	-3.2	Pass				
Table Result: Pass by -9.2 dB								Worst Freq: 836.04 MHz							
Test Site: "A"			Pre-Amp: Orange			Cable: 65 ft RG8A/U			Analyzer: White		Antenna: Green				

Radiated Emissions Table								Curtis-Straus LLC							
Date: 04-Aug-05 Engineer: Evan Gould			Company: Signal Dynamics EUT Desc: C3.5R					Work Order: F0527							
Frequency Range: 2-4.18GHz								Measurement Distance: 1 m							
Notes: 5dB duty cycle factor is calculated into the limit															
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB μ V/m)	47 CFR 15.231(b)								
pk	2090.2	46.8	18.3	28.1	2.9	59.5	74.7	-15.2	Pass						
	2508.2	42.3	18.5	28.6	3.2	55.6	74.7	-19.1	Pass						
	2926.2	36.9	18.6	30.3	3.2	51.8	74.7	-22.9	Pass						
	3344.2	57.1	18.4	31.4	3.6	73.7	74.7	-1.0	Pass						
	3762.2	47.1	18.1	32.4	3.8	65.2	68.5	-3.3	Pass						
	4180.2	39.9	18.2	33.0	3.9	58.6	74.7	-16.1	Pass						
Table Result: Pass by -1.0 dB								Worst Freq: 3344.2 MHz							
Test Site: EMC2			Pre-Amp: White			Cable: EMIR-HIGH 7			Analyzer: Orange		Antenna: Yellow Horn				

DUTY CYCLE CALCULATION

On-time was measured during worse case 100ms window: 56ms

$$\begin{aligned}
 \text{Duty cycle averaging factor} &= 20 \times \log(\text{worse case on-time}/100\text{ms}) \\
 &= 20 \times \log(56\text{ms}/100\text{ms}) \\
 &= \mathbf{-5.04\text{dB}}
 \end{aligned}$$

Line Conducted Emissions

AC Mains Conducted Emissions								Curtis-Straus LLC											
Date: 12-Jul-05		Company: Signal Dynamics				Work Order: F0527													
Engineer: Evan Gould		EUT Desc: C3.5C				Test Site: EMI 1													
Notes:																			
LISN(s): Yellow Orange																			
Range: 0.15-30Mhz		Other Equipment:				Spectrum Analyzer: Blue													
Frequency (MHz)	Q.P. Readings		Ave. Readings		Impedance Factor (dB)	FCC/CISPR B		FCC/CISPR B		Overall Result (Pass/Fail)									
	QP1 (dB μ V)	QP2 (dB μ V)	AV1 (dB μ V)	AV2 (dB μ V)		qp Limit (dB μ V)	qp Margin dB	AVE Limit (dB μ V)	AVE Margin dB										
0.16	16.8	18.3		20.0	65.5	-27.2	55.5	-17.2	Pass										
3.18	12.9	14.6		20.0	56.0	-21.4	46.0	-11.4	Pass										
7.60	8.2	6.3		20.0	60.0	-31.8	50.0	-21.8	Pass										
14.90	5.8	6.2		20.0	60.0	-33.8	50.0	-23.8	Pass										
20.30	5.3	7.8		20.0	60.0	-32.2	50.0	-22.2	Pass										
27.70	7.0	6.3		20.0	60.0	-33.0	50.0	-23.0	Pass										
Table Result:		Pass		by		-11.40 dB		Worst Freq:											
								3.18 MHz											

Test Equipment Used

REV. 01-JUL-2005

SPECTRUM ANALYZERS / RECEIVERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	13-JAN-2006
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	08-MAR-2006
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	03-NOV-2005
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	20-APR-2006
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	02-AUG-2005
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	27-DEC-2005
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	08-OCT-2005
TELECOM 3585A	20Hz-40.0MHz	3585A	HP	1750A02762	01067	04-FEB-2006
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	22-JUN-2006
EMI TEST RECEIVER	20-1000MHz	ESVS30	R&S	827957/001	01098	27-OCT-2005
LISNS/MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956348	00753	15-APR-2006
BLUE (DC)	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956349	00752	02-MAY-2006
YELLOW-BLACK	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984735	00248	15-APR-2006
ORANGE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	02-MAY-2006
GOLD (DC)	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984734	00247	02-MAY-2006
BROWN	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411656	00986	04-MAY-2006
GREEN	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411657	00987	04-MAY-2006
YELLOW	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411658	1080	04-MAY-2006
WHITE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972019	00678	15-APR-2006
BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972017	00675	15-APR-2006
RED-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972016	00677	15-APR-2006
BLUE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972018	00676	15-APR-2006
BLUE MONITORING PROBE	0.01-150MHz	91550-2	TEGAM	12350	00807	26-MAY-2007
YELLOW MONITORING PROBE	0.01-150MHz	91550-2	ETS	50972	00493	24-NOV-2005
GREEN CURRENT TRANSFORMER	40Hz-20MHz	150	PEARSON	10226	00793	07-APR-2007
CISPR LINE PROBE	150kHz-30MHz	N/A	C-S	01	00805	06-MAY-2007
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
OPEN AREA TEST SITE (OATS)	FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE		
SITE F	93448	IC 2762-F	R-1688	04-APR-2007		
SITE T	93448	IC 2762-T	R-905	20-MAR-2007		
SITE A	93448	IC 2762-A	R-903	20-MAR-2007		
SITE M	93448	IC 2762-M	R-904	19-MAR-2007		
SITE J				09-MAY-2007		
LINE CONDUCTED TEST SITES	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		
PREAMPS / ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	08-APR-2006
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	10-FEB-2006
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	10-FEB-2006
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	10-FEB-2006
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	10-FEB-2006
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	21-JUL-2005
BROWN	1-20GHz	PM2-38-218-4R5-17-15-SFF	C-S	PL1655	1132	27-JUN-2006
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 50W ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNACK	01	00791	10-MAY-2006
HF 30dB 50WATTENUATOR	0.03-20 GHz	PE 7019-30	PASTERNACK	02		10-MAY-2006
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

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN BILOG	30-2000MHz	CBL6112B	CHASE	2742	00620	06-APR-2006
GREEN-BLACK BILOG	30-2000MHz	CBL6112B	CHASE	2412	00127	06-JAN-2006
GREEN-RED BILOG	30-2000MHz	CBL6112B	CHASE	2435	00990	06-APR-2006
BLUE BILOG	30-1000MHz	3143	EMCO	1271	00803	06-MAY-2007
GRAY BILOG	26-2000MHz	3141	EMCO	9703-1038	00066	06-MAY-2007(EMI) / 24-SEP-2005(RFI)
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	06-MAY-2007(EMI) / 02-JUN-2006(RFI)
RED-WHITE BILOG	30-2000MHz	JB1	SUNOL	A091604-1	01105	28-SEP-2006
RED-BLACK BILOG	30-2000MHz	JB1	SUNOL	A091604-2	01106	28-SEP-2006
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	27-MAY-2007(EMI) / 05-JUN-2006 (RFI)
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	17-JUN-2007
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	09-JUN-2007
HF (WHITE) HORN	18-26.5GHz	801-WLM	WAVELINE	00758	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	04-MAY-2006
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	13-SEP-2006
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1370	00757	18-MAR-2007
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1371	00756	18-MAR-2007
RE101 LOOP SENSOR	30Hz-100kHz	RE101-13.3cm	C-S	N/A	00818	13-MAR-2007
RS101 RADIATING LOOP	30Hz-100kHz	RS101-12CM	C-S	N/A	00819	13-MAR-2007
RS101 LOOP SENSOR	30Hz-100kHz	RS101-4CM	C-S	N/A	00820	13-MAR-2007

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

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999 CURTIS-STRAUS¹ 527 Great Road Littleton, MA 01460 Barry Quinlan Phone: 978-486-8880 ELECTRICAL Valid until: September 30, 2005 Certificate Number: 1627-01		EN 55011 1991, 1998 SABS CISPR 11:1997 Canada ICES-001 1998 CNS13803 AS/NZS 2064: 1997 CSA C108.8 – M1983 CISPR 13:1996, 1998, 2001 EN 55013: 1990, 2001 EN 55013 Amend 12 1994 SABS CISPR 13: 1996 CNS 13439 AS/NZS 1053: 1999 CISPR 14 1993 (except discontinuous disturbances) EN 55014 1993, 1997 discontinuous disturbances AS/NZS 1044: 1995 discontinuous disturbances Immunity CNS13783-1 SABS CISPR 14-1 1993 SABS CISPR 14-2 1997 + A1:2001	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment. 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 (except 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 (except characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus. 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																																																																				
¹ Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460																																																																							
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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 Specification for Restricted Radiation Radio Apparatus (New Zealand)
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	<i>FCC Standards</i>	
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, 2003	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 Industry
<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 AS/ACIF S031-2001 AS/ACIF S038-2001 AS/ACIF S043-2001	Requirements for Customer Equipment for connection to hierarchical digital interfaces 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 Part 3: DC, Low Frequency AC and Voiceband
<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	ITU-T G.703 HKTA 2028 HKTA 2029 TBR 1 : 1995	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>Telecommunications</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
<i>Telecom Standards</i>	<i>Title</i>		
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 AS/NZS 3260 Supp 1 1996	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		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 Audio/video and musical instrument apparatus for Household, commercial and similar general use
Product Safety			Australian/New Zealand Standard – Approval and test Specification – Mains operated electronic and related Equipment for household and similar general use
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>).			Audio, video and similar electronic equipment. Consumer and 1994, commercial products
Product Safety Standards	Title		Safety requirements for main operated electronic and related apparatus for household and similar general use.
Specific Product Safety Standards			Radiation safety of laser products, equipment Classification, requirements and user's guide
IEC 950 1991	Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment.		Safety of laser products Part 1: equipment Classification, requirements and user's guide.
UL 1950 1998	Safety of information technology equipment, including electrical business equipment.		Safety of laser products – Part 2: Safety of optical communication systems
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)		Safety of laser products – Part 4: Laser guards
UL 60950 2000	Safety of information technology equipment		Safety of household and similar electrical appliances
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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		
Environmental²			
Environmental Standards	Title		
GR-63-CORE	NEBS Requirements: Physical Protection		
ETS 300 019	Environmental conditions and environmental tests For telecommunications equipment		
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² Environmental testing is performed at the satellite facility located at 168 Ayer Rd, Littleton, MA 01460