



Test Report

Report No	EF0285-1
Client	Colubris Networks 200 West Street Waltham, MA 02451
Phone	781-547-0378
Fax	781-684-0009
FRN	0010292464
Models	CM9
FCC ID	RTP55010016-5
Equipment Type	Low Power Communication Device Transmitter
Equipment Code	DTS and NII
Application Type	Class II Permissive Change
Rule Part	FCC 15.247, & 15E
Results	As detailed within this report
Prepared by	 Mairaj Hussain – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	1/27/06
Conditions of issue	This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this

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



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Summary

This report is an application for class II permissive change to a transmitter operating under 47 CFR 15.247 and 15.407 of the FCC rules provided for operation of digital transmission systems and U-NII transmitters. The product covered by this report is CM9. The product was tested using the methods outlined in ANSI C63.4 (2003).

Class II permissive change is requested because manufacturer intends to add new antennas to previously approved modular radio. A list of antennas is given below.

Antenna	Gain (dBi)	Frequency of Operation
Nearson p/n: T614AM-2.4/5.x-s	4 @ 2.45GHz	2.4 – 2.5GHz
	5 @ 5.25GHz	5.15 - 5.35GHz
	4.5 @ 5.75GHz	5.725 – 5.85GHz
2.4GHz Omni m/n: Ituner	5.6 @ 2.45GHz	2.4 – 2.485GHz
Cushcraft m/n: S5153WBPX	6	5.15 – 5.875GHz
* Centurion	2.5dBi @ 2.4GHz 3dBi @ 5.3GHz 3.4dBi @ 5.7GHz	2.4 – 2.5 GHz band 4.9 – 6 GHz band

* A lower gain antenna and hence was not tested.

Antenna	Channels Allowed	Indoor or Outdoor Operation
Nearson p/n: T614AM-2.4/5.x-s	All available channels in respective band	Indoor antenna
2.4GHz Omni m/n: Ituner	All available channels in respective band	NA
Cushcraft m/n: S5153WBPX	All channels	Indoors for band 5.15-5.35GHz.

Test Methodology

Frequency range investigated:	1GHz – 10GHz
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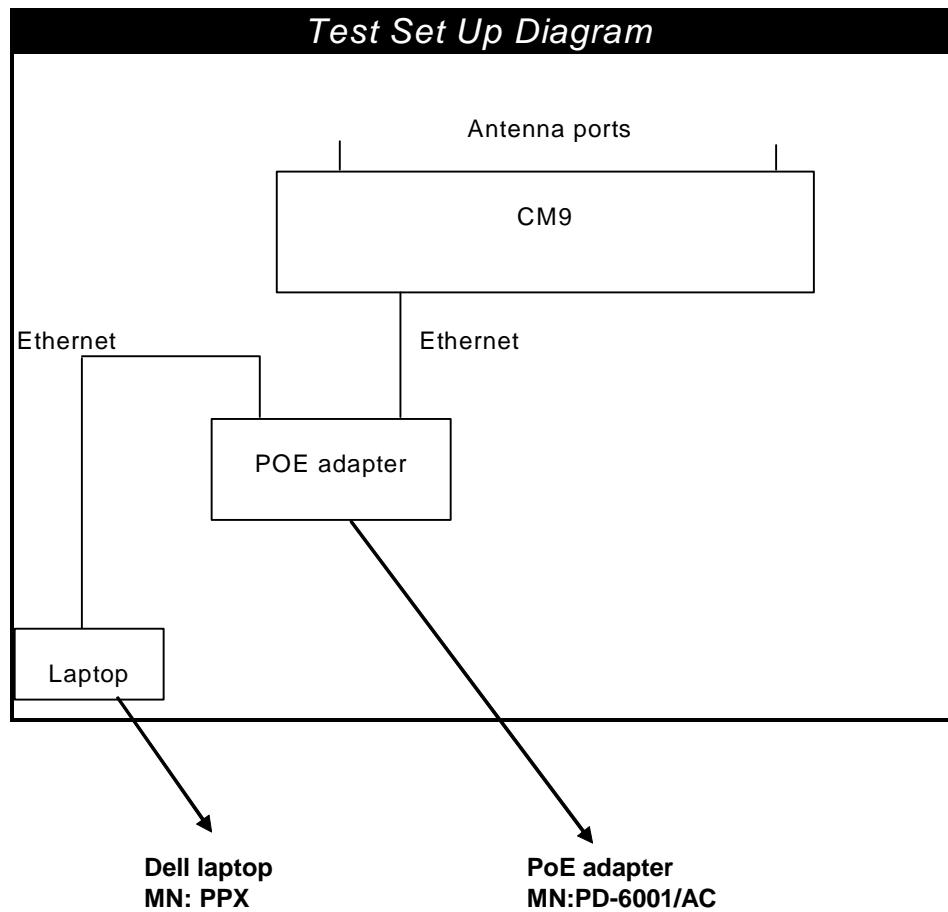
The EUT was maximized around three orthogonal axes. EUT antennas were maximized within there range of motion.

Spurious emissions were measured with each antenna in order to ensure the compliance of the product with the applicable CFR part.

Product was tested on a non conductive table 80cm above the ground plane. Receiving antenna was placed at a distance of 3m from the product. Radio output power was set to maximum level. All readings are peak unless otherwise noted.

EUT Configuration

Eut Model Number	CM9
EUT Serial Number	Sample 1
Cables	Ethernet quantity 2 unshielded 2 m long



Test Data and Plots

T614AH-2.4/5.X-S antenna

2GHz Operation

Table below shows the band edges at the restricted bands while radio running at CH1 and CH11.

Table 1

Band Edge							Curtis-Straus LLC								
Date: 06-Jul-05			Company: Colubris Networks			Work Order: F0285									
Engineer: Mairaj Hussain			EUT Desc: CM9												
Measurement Distance: 3 m															
Notes: Running at CH1 (2412MHz)															
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)				FCC Class B					
										Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)			
6mbps							54.0	-14.7	Pass						
Vavg	2390.0	26.0	18.4	30.7	1.0	39.3	74.0	-4.5	Pass						
Vpk	2390.0	56.2	18.4	30.7	1.0	69.5									
18mbps							54.0	-15.5	Pass						
Vavg	2389.0	25.2	18.4	30.7	1.0	38.5	74.0	-0.7	Pass						
Vpk	2389.0	60.0	18.4	30.7	1.0	73.3									
54mbps							74.0	-3.2	Pass						
Vpk	2389.0	57.5	18.4	30.7	1.0	70.8	54.0	-15.4	Pass						
Vavg	2389.0	25.3	18.4	30.7	1.0	38.6									
Running at CH11 (2462MHz)															
6mbps							74.0	-2.1	Pass						
Vpk	2483.5	58.4	18.4	30.9	1.0	71.9	54.0	-18.2	Pass						
Vavg	2483.5	22.3	18.4	30.9	1.0	35.8									
18mbps							74.0	-4.0	Pass						
Vpk	2483.5	56.5	18.4	30.9	1.0	70.0	54.0	-18.5	Pass						
Vavg	2483.5	22.0	18.4	30.9	1.0	35.5									
54mbps							74.0	-3.7	Pass						
Vpk	2483.5	56.8	18.4	30.9	1.0	70.3	54.0	-19.5	Pass						
Vavg	2483.5	21.0	18.4	30.9	1.0	34.5									
Table Result: Pass by -0.7 dB							Worst Freq: 2389.0 MHz								
Test Site: "T"	Pre-Amp: White	Cable: 9 Microflex	Analyzer: Green												

Table 2

Spurious emissions within antenna pass band							Curtis-Straus LLC								
Date: 06-Jul-05			Company: Colubris Networks			Work Order: F0285									
Engineer: Mairaj Hussain			EUT Desc: CM9												
Frequency Range: 2 - 6GHz									Measurement Distance: 3 m						
Notes:															
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)				FCC Class B					
										Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)			
Vpk	2972.0	38.2	18.6	32.3	1.1	53.0	54.0	-1.0	Pass						
Vpk	4825.0	47.9	19.1	36.5	1.6	66.9	74.0	-7.1	Pass						
Vavg	4825.0	21.6	19.1	36.5	1.6	40.6	54.0	-13.4	Pass						
Table Result: Pass by -1.0 dB							Worst Freq: 2972.0 MHz								
Test Site: "T"	Pre-Amp: White	Cable: 9 Microflex	Analyzer: Green												

Table 2 presents data obtained from spurious emission scan within antenna pass band.

Table 3

Radiated Emissions Table								Curtis-Straus LLC																																			
Date: 15-Jul-05 Engineer: Mairaj Hussain			Company: Colubris EUT Desc: CM9																																								
						Measurement Distance: 3 m																																					
Notes: Nearson T614AM 5GHz operation Non cont Tx mode																																											
<table border="1"> <thead> <tr> <th>Antenna Polarization (H / V)</th><th>Frequency (MHz)</th><th>Reading (dBμV)</th><th>Preamp Factor (dB)</th><th>Antenna Factor (dB/m)</th><th>Cable Factor (dB)</th><th>Adjusted Reading (dBμV/m)</th><th colspan="3"></th><th>FCC Class B</th></tr> </thead> <tbody> <tr> <td>Vpk</td><td>5250.0</td><td>76.0</td><td>20.3</td><td>37.4</td><td>3.0</td><td>96.1</td><td></td><td></td><td></td><td>Limit (dBμV/m)</td></tr> <tr> <td>Vavg</td><td>5250.0</td><td>22.0</td><td>20.3</td><td>37.4</td><td>3.0</td><td>42.1</td><td></td><td></td><td></td><td>Margin (dB)</td></tr> </tbody> </table>											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)				FCC Class B	Vpk	5250.0	76.0	20.3	37.4	3.0	96.1				Limit (dB μ V/m)	Vavg	5250.0	22.0	20.3	37.4	3.0	42.1				Margin (dB)
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)				FCC Class B																																	
Vpk	5250.0	76.0	20.3	37.4	3.0	96.1				Limit (dB μ V/m)																																	
Vavg	5250.0	22.0	20.3	37.4	3.0	42.1				Margin (dB)																																	
Test Site: "T"		Pre-Amp: Yel-Blk		Cable: 6 RG142LL		Analyzer: Green		Antenna: Black Horn																																			

Table 3 presents data while radio operates at 5.26GHz. Radio meets the band edge requirements at 5.25GHz given that the operation in the band 5.15 – 5.35GHz is limited to indoor use only.

Table 4

Band Edges								Curtis-Straus LLC																																																																																																																																																																																		
Date: 27-Jul-05 Engineer: Mairaj Huyssain			Company: Colubris Networks EUT Desc: CM9																																																																																																																																																																																							
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Test Site: "T"		Pre-Amp: none		Cable: EMIR-HIGH 11		Analyzer: Orange		Antenna: Black Horn																																																																																																																																																																																		

Table 5

Spurious Emissions								Curtis-Straus LLC																																			
Date: 27-Jul-05 Engineer: Mairaj Hussain			Company: Colubris Networks EUT Desc: CM9																																								
Frequency Range: 1 - 10GHz						Measurement Distance: 3 m																																					
Notes: Antenna: Nearson T614AM 2.4/5.x 5GHz filter at the input of PA																																											
<table border="1"> <thead> <tr> <th>Antenna Polarization (H / V)</th><th>Frequency (MHz)</th><th>Reading (dBμV)</th><th>Preamp Factor (dB)</th><th>Antenna Factor (dB/m)</th><th>Cable Factor (dB)</th><th>Adjusted Reading (dBμV/m)</th><th colspan="3"></th><th>FCC Class B</th></tr> </thead> <tbody> <tr> <td>Vavg</td><td>5550.0</td><td>25.5</td><td>38.3</td><td>36.9</td><td>3.1</td><td>27.2</td><td></td><td></td><td></td><td>Limit (dBμV/m)</td></tr> <tr> <td>Vpk</td><td>5550.0</td><td>40.0</td><td>38.3</td><td>36.9</td><td>3.1</td><td>41.7</td><td></td><td></td><td></td><td>Margin (dB)</td></tr> </tbody> </table>											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)				FCC Class B	Vavg	5550.0	25.5	38.3	36.9	3.1	27.2				Limit (dB μ V/m)	Vpk	5550.0	40.0	38.3	36.9	3.1	41.7				Margin (dB)
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)				FCC Class B																																	
Vavg	5550.0	25.5	38.3	36.9	3.1	27.2				Limit (dB μ V/m)																																	
Vpk	5550.0	40.0	38.3	36.9	3.1	41.7				Margin (dB)																																	
Table Result: Pass		by -12.3 dB				Worst Freq: 5550.0 MHz																																					
Test Site: "T"		Pre-Amp: Brown		Cable: EMIR-HIGH 11		Analyzer: Orange		Antenna: Black Horn																																			

2.4GHz Outdoor Omni

Band edges at the restricted bands were checked and spurious emissions were checked in the frequency range of 1 – 10GHz.

Table 6

Spurious and Band Edges										Curtis-Straus LLC										
Date: 28-Jul-05		Company: Colubris Networks								Work Order: F0285										
Engineer: Mairaj Hussain																				
EUT Desc: CM9																				
Frequency Range: 1 - 10GHz										Measurement Distance: 3 m										
Notes: Antenna: 2.4GHz Omni Non cont Tx mode										EUT Max Freq: 2462MHz										
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)	---			FCC Class B										
CH1, 2412MHz							Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)								
1mbps																				
Vpk	2412.0	85.1																		
Vavg	2412.0	30.0																		
300KHz RBW																				
Vpk	2412.0	81.3																		
Vbe	2390.0	32.0																		
delta:		49.3																		
mkr delta pk	2390.0	35.8	0.0	29.7	2.2	67.7				74.0	-6.3	Pass								
avg mkr delta	2390.0	-19.3	0.0	29.7	2.2	12.6				54.0	-41.4	Pass								
Vpk	2462.0	86.0																		
Vavg	2462.0	29.0																		
300KHz RBW																				
Vpk	2462.0	82.0																		
Vbe	2483.5	35.0																		
delta:		47.0																		
mkr delta pk	2483.5	39.0	0.0	30.0	2.4	71.4				74.0	-2.6	Pass								
avg mkr delta	2483.5	-18.0	0.0	30.0	2.4	14.4				54.0	-39.6	Pass								
Test Site: "T"	Pre-Amp: none	Cable: EMIR-HIGH 11	Analyzer: White			Antenna: Orange Horn														

CushCraft s5153**Table 7**

Spurious and Band Edges								Curtis-Straus LLC								
Date: 28-Jul-05		Company: Colubris Networks				Work Order: F0285										
Engineer: Mairaj Hussain		EUT Desc: CM9														
Frequency Range: 1 - 10GHz							Measurement Distance: 1 m									
Notes: Antenna: Cushcraft 5GHz Omni S5153WPBX							EUT Max Freq: 5825MHz									
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)	---			FCC Class B						
							Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)				
Vpk Vavg 300KHz RBW	5177.0 5182.0	78.8 65.0														
Vpk Vbe delta: mkr delta pk avg mkr delta	5182.0 5150.0 45.1 5150.0 5150.0	76.1 31.0 31.0 33.7 19.9														
Vpk Vavg 300KHz RBW	5316.0 5316.0	80.6 66.1														
Vpk Vbe delta: mkr delta pk avg mkr delta	5315.0 5350.0 46.4 5350.0 5350.0	75.4 29.0 29.0 34.2 19.7	0.0 0.0 0.0 0.0 0.0	34.4 34.4 34.4 34.5 34.5	3.1 3.1 3.2 3.2 3.2	71.2 57.4 57.4 71.9 57.4										
At CH 52, 5.26GHz In door operation																
Vpk Out door operation Drop CH 52. Run at CH56	5250.0 5250.0	51.0 26.3	0.0 0.0	36.2 36.2	3.2 3.2	90.4 65.7										
Vpk	5250.0	26.3	0.0	36.2	3.2	65.7										
Test Site: "T"		Pre-Amp: none	Cable: EMIR-HIGH 11		Analyzer: White		Antenna: Orange Horn									

Note: Radio operation is limited to indoor use with this antenna for the entire band of 5.15 – 5.35GHz.

Antenna Gain Check

Table 8

Antenna Gains								Curtis-Straus LLC										
Date: 09-Aug-05 Engineer: Mairaj Hussain			Company: Colubris EUT Desc: CM9 Antennas				Work Order: F0285											
Measurement Distance: 3 m																		
Notes: A CW signal of 0dBm was injected into the antennas and resulting EIRP was calculated for each antenna. RBW 1MHz; VBW 3MHz																		
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)	Adjusted EIRP dBm	Power in (dBm)	Gain (dB)									
Cushcraft Vpk	5150.0	64.1	0.0	36.2	3.1	103.4	8.2	0.0	8.24									
Vpk	5875.0	63.8	0.0	37.2	3.2	104.2	9.0	0.0	9.04									
The following antenna gain is based on radiated reading obtained from the radio																		
Antenna: 2.4GHz Omni																		
Frequency (MHz)	Conducted Power Max hold Peak (dBm)	Pad + cable factor (dB)	Total conducted Power (dBm)	Radiated EIRP (Max peak) (dBm)					Antenna Gain (dBi)									
2462	-9.0	22.2	13.2	21.8					8.6									
Test Site: RFI 1		Pre-Amp: none		Cable: EMIR-HIGH 11		Antenna: Black Horn												

Test Equipment Used

REV. 22-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		
MIXERS/DIPLEXERS		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A01695/A046903-01	1087	23-AUG-2005	
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	3003A07825/A046903-01	1086	23-AUG-2005	
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	02-MAR-2007	
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	03-MAR-2007	
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	03-MAR-2007	
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	05-JAN-2005	
DIPLEXER		DPL.26	OML	N/A	00813	03-MAR-2007	
ABSORBING CLAMPS		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
FISCHER CLAMP	30-1000MHz	F-201-23MM	FISCHER	10	00081	16-JAN-2006	
PREAMPS / ATTENUATORS / FILTERS		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE

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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	21-JUL-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-AUG-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-AUG-2005
ORANGE-BLACK	1-20GHz	SMC-12A	C-S	637367	00761	21-AUG-2005
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	20-AUG-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	0.03-20 GHz	PE 7019-20	PASTERNACK	01	00791	10-MAY-2006
ATTENUATOR						
HF 30dB	0.03-20 GHz	PE 7019-30	PASTERNACK	02		10-MAY-2006
50WATTENUATOR						
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		28-SEP-2006
RED-BLACK BILOG	30-2000MHz	JB1	SUNOL	A091604-2		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	20-AUG-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 MONOPOLE	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

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

ESD GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN	NSG435	SCHAFFNER	000839	00763	17-FEB-2006
RED	NSG435	SCHAFFNER	001625	00762	29-DEC-2005
YELLOW	930D	ETS	201	00673	16-JUL-2005

BEST EMC-2	MN	MFR	SN	ASSET	CALIBRATION DUE
BLUE	711-1100	SCHAFFNER	199824-002SC	00117	16-JUN-2006 (SURGE) / 28-JUL-2005 (D+I/EFT)
RED	711-1100	SCHAFFNER	200122-074SC	00623	16-JUN-2006 (SURGE) / 28-JUL-2005 (D+I) / 03-DEC-2005 (EFT)

FREQUENCY COUNTER	MN	MFR	SN	ASSET	CALIBRATION DUE
5340A	HP5340A	HP	1440A02320	00787	30-JUL-2005

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

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

CHAMBERS AND STRIPLINE		MN	MFR	SN	ASSET	CALIBRATION DUE
RFI 1 CHAMBER		3 METER COMPACT	PANASHIELD	N/A	00797	02-JUN-2006
RFI 2 CHAMBER		04' x 07' SHIELDING SYSTEM	LINDGREN	13329	00795	24-SEP-2005
RFI 3 STRIPLINE		N/A	C-S	N/A	00796	22-AUG-2005
ENVIRONMENTAL (SAFETY)		ECL5	B-M-A INC.	2041	00029	12-JAN-2006
ENVIRONMENTAL (SAFETY)		SGTH-31S	B-M-A INC.	2245	00321	12-JAN-2006
AMPLIFIERS		RANGE	MN	MFR	SN	CALIBRATION DUE
RED		0.5-1000MHz	10W1000B	AR	18708	00032
GREEN		0.5-1000MHz	10W1000B	AR	23423	00123
BLUE		0.01-250MHz	75A250	AR	19165	00039
BLACK		0.01-250MHz	75A250	AR	23411	00122
ORANGE		0.01-250MHz	75A250	AR	26827	00367
HP489A		1.0-2.0GHz	HP489A	HP	449-00762	00971
HUGHES 10W		1.0-2.0GHz	1177H09	HUGHES	143	RENTAL
HP491C		2.0-4.0GHz	HP491C	HP	449-00638	00764
HUGHES 10W		4.0-8.0GHz	1177H02	HUGHES	092	RENTAL
HP493A #1		4.0-8.0GHz	HP493A	HP	17140224	00085
HP493A #2		4.0-8.0GHz	HP493A	HP	449-00562	00771
HP495A		7.0-12.0GHz	HP495A	HP	904-00237	00086
FIELD PROBES		RANGE	MN	MFR	SN	ASSET
RED		0.01-1000MHz	HI-4422	HOLADAY	90369	00031
GREEN		0.01-1000MHz	HI-4422	HOLADAY	97363	00136
BLUE		0.01-1000MHz	HI-4422	HOLADAY	95696	01100
SIGNAL GENERATORS		RANGE	MN	MFR	SN	CALIBRATION DUE
RED		0.09-2000MHz	HP8648B	HP	3847U02192	00366
BLUE		0.1-1000MHz	HP8648A	HP	3426A00548	00034
GREEN		0.09-2000MHz	HP8648B	HP	3623A02072	00125
ORANGE		0.1-1000MHz	HP8648B	HP	3537A01210	00025
BLACK (TELECOM)		15MHz	HP33120A	HP	US36004674	00766
YELLOW		15MHz	HP33120A	HP	US36014119	00249
BLUE-WHITE		0.1Hz-13MHz	HP3312A	HP	1432A07632	00775
SWEEPER		0.01-20.0GHz	HP83752A	HP	3610A01133	00087
AM/FM STEREO SIG. GEN.		0.1-170MHz	LG3236	LEADER	3687301	00959
BULK INJECTION CLAMPS		RANGE	MN	MFR	SN	ASSET
GREEN		0.01-100MHz	95236-1	ETS	50215	00118
RED		0.01-100MHz	95236-1	ETS	34026	1020
CDN NETWORKS		RANGE	MN	MFR	ASSET	CALIBRATION DUE
BLACK		0.10-100MHz	20A M-2	C-S	00783	30-JUN-2006
BLUE		0.10-100MHz	15A M-3	C-S	00806	30-JUN-2006
ORANGE		0.10-100MHz	15A M-2	C-S	00786	30-JUN-2006
RED		0.10-100MHz	15A M-3	C-S	00780	30-JUN-2006
WHITE		0.10-100MHz	15A M-3	C-S	00782	30-JUN-2006
YELLOW-BLACK		0.10-100MHz	15A M-3	C-S	00784	30-JUN-2006
GREEN		0.10-100MHz	30A M-3	C-S	00779	30-JUN-2006
YELLOW		0.10-100MHz	30A M-5	C-S	00804	30-JUN-2006
BLUE-WHITE		0.10-100MHz	15A M-5	C-S	00788	30-JUN-2006
BROWN		0.10-100MHz	M-3	C-S		30-JUN-2006
BROWN-WHITE		0.10-100MHz	M-3	C-S		30-JUN-2006
BROWN_BLACK		0.10-100MHz	M-2	C-S		30-JUN-2006
YELLOW (RES)		0.10-100MHz	100Ω RESISTOR Nwk	C-S	00810	28-SEP-2005
GREEN (RES)		0.10-100MHz	100Ω RESISTOR Nwk	C-S	NA	17-JAN-2006
OSCILLOSCOPES		MN	MFR	SN	ASSET	CALIBRATION DUE
OSCILLOSCOPE 100MHz		TDS 220	TEKTRONIX	B068748	00885	14-JUN-2006
OSCILLOSCOPE 100MHz (SAFETY)		TDS 340	TEKTRONIX	B012357	00737	05-OCT-2005
OSCILLOSCOPE 100MHz (TELECOM)		54645A	HP	US36320452	00103	02-JUL-2005
RMS VOLTMETERS/CURRENT CLAMP		MN	MNFR	SN	ASSET	CALIBRATION DUE

TRUE-RMS MULTIMETER	79III	FLUKE	71700298	00769	21-OCT-2005
TRUE-RMS MULTIMETER	177	FLUKE	83390024	00973	10-MAR-2006
TRUE-RMS MULTIMETER (REFERENCE)	177	FLUKE	83390025	00974	10-MAR-2006
TRUE-RMS MULTIMETER (TELECOM)	177	FLUKE	83430419	00975	10-MAR-2006
TRUE-RMS CLAMP METER (SAFETY)	36	FLUKE	68805882	00700	11-MAR-2006

SURGE GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	17-JUL-2005
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	09-JUN-2006
THREE PHASE COUPLING NWK	3CN	CDI	003455	00325	09-JUN-2006
1.2x50US PLUGIN MODULE	1.2x50US PLUGIN	CDI	N/A	00842	09-JUN-2006
10x160US PLUGIN MODULE	10x160US PLUGIN	C-S	N/A	00843	09-JUN-2006
10x560US PLUGIN MODULE	10x560US PLUGIN	C-S	N/A	00841	09-JUN-2006
PSURGE CONTROLLER MODULE	PSURGE 8000	HAEFELY	150267	00879	13-JUN-2006
COUPLING/DECOPUPLING MODULE	PSD 900	HAEFELY	149213	00880	13-JUN-2006
IMPULSE MODULE	PIM 900	HAEFELY	149202	00881	13-JUN-2006
HIGH VOLTAGE CAP NWK 5kVDC, 18 μ F	CS-HVCC	C-S	01	00772	28-SEP-2006
NEBS SURGE GENERATOR	N/A	C-S	N/A	00088	08-JUN-2006
2x10US SURGE GENERATOR	2x10US	C-S	N/A	00846	09-JUN-2006
10x700US SURGE GENERATOR	10x700US	C-S	N/A	00847	09-JUN-2006
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	28-SEP-2005

POWER/NOISE METERS	MN	MFR	SN	ASSET	CALIBRATION DUE
POWER METER	435B	HP	2445A11012	00773	06-APR-2006
POWER METER	437B	HP	2912A01367	01099	27-OCT-2005
POWER SENSOR	8481A	HP	2702A61351	00774	05-APR-2006
PSOPHOMETER	2429	BRUEL & KJAER	1237642	00585	14-FEB-2007
TRANSMISSION LINE TESTER (dBRNC)	185T	AMREL	998658	00823	07-MAR-2006

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

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

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

CONSUMABLES	SPEC.	MFR	STOCK/MN	ASSET	CALIBRATION DUE
NEBS CHEESECLOTH	26-28M/KG	ED&D	ACC-01	N/A	N/A
NEBS CARBON BLOCK	3-MIL-GAP 1kV SURGE	RELIABLE	3AB	N/A	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 presentation of a bill for such services performed. In the event CLIENT ordered, orally or in writing, services but such services were not assigned a rate for billing, such services shall be billed at the LABORATORY's reasonable and customary rate.
- 5.2 CLIENT shall be responsible for all shipping, customs and other expenses related to services provided by LABORATORY to the CLIENT, and shall fully insure any test sample or other equipment provided to LABORATORY by the CLIENT.
- 5.3 Amounts overdue from CLIENT to LABORATORY shall be charged interest at a rate of 1½% per month.

Paragraph 6. ISO/IEC GUIDE 17025 ADDITIONS:

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

A2LA Accreditation

<p><u>SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999</u></p> <p>CURTIS-STRAU⁵ 527 Great Road Littleton, MA 01460 Barry Quinlan Phone: 978-486-8880</p> <p>ELECTRICAL</p> <p>Valid until: January 31, 2006</p> <p>Certificate Number: 1627.01</p> <p>In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following <u>Electromagnetic Compatibility (EMC), Telecommunications, and Product Safety</u> tests:</p> <p>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</p> <p>EMC Standards</p> <table border="0"> <thead> <tr> <th><u>Title</u></th> </tr> </thead> <tbody> <tr> <td>CISPR 22 1997 with amendments 1 and 2</td> <td>Limits and methods of measurement of radio disturbance characteristics of information technology equipment.</td> </tr> <tr> <td>CNS13438 1994</td> <td>Limits and methods of measurement of radio interference characteristics of information technology equipment.</td> </tr> <tr> <td>EN55022:1994 and 1998</td> <td>Limits and methods of measurement of radio disturbance characteristics of information technology equipment.</td> </tr> <tr> <td>SABS CISPR 22:1997</td> <td>Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement</td> </tr> <tr> <td>Canada ICES-003 1997 AS/NZS 3548 1995</td> <td>Digital apparatus Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of information technology equipment</td> </tr> <tr> <td>CISPR 11 1990, 1997, 1999</td> <td>Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.</td> </tr> </tbody> </table> <p>¹ Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460</p>	<u>Title</u>	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 AS/NZS 3548 1995	Digital apparatus 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.	
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EN 55024 1995, 2002 with amendment 3 (<i>associated group only</i>)	Immunity requirements for household appliances, tools and similar apparatus.													
EN 55020: 1995, 2002 (<i>associated group only</i>)	Limits and methods of measurement of immunity characteristics of sound and television broadcast receivers and associated equipment.													
CISPR 24	Electromagnetic immunity of broadcast receivers and Associated equipment.													
SABS CISPR 24 1997	Information technology equipment – Immunity characteristics – Limits and methods of measurement													
AS/NZS 3200.1.2: 1995	Information technology equipment – Immunity characteristics – Limits and methods of measurement													
European Union Basic EMC Standards EN 61000-4-2: 1995, 1999, 2001	Approval and test specification – Medical electrical Equipment – General requirements for safety – Collateral Standard: Electromagnetic compatibility – Requirements and tests.													
EN 61000-4-3:1997, 1998, 2002 AS/NZS 61000.4.3 1999	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication													
EN 61000-4-4 1995	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test													
EN 61000-4-5 1995 AS/NZS 61000.4.5 1999	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication													
EN 61000-4-6 1996 AS/NZS 61000.4.6 1999	EMC) Part 4: Testing and measurement techniques. Section 5: Surge immunity test.													
EN 61000-4-8 1994	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields.													
EN 61000-4-11 1994	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test.													
ENV 61000-2-2 1993	(EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage Variations immunity tests.													
EU Product Family Standards EN 50081-1 1992	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)													
EN 50081-2 1993	Electromagnetic capability – Generic emission standard. Part 1: Residential, commercial and light industry. (I.S.)													
EN 50082-1 1992, 1998	Electromagnetic compatibility – Generic emission standard. Part 2: Industrial environment													
EN 50082-2 1995	Electromagnetic compatibility – Generic emission standard. Part 1: Residential, commercial and light industry													
	Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment													
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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 1 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	Industry Canada – 900 MHz narrowband personal communications services
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	RFS29 1998	Industry Canada – Low power license-exempt radio 2001 Issue 5 communication devices
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	<i>FCC Standards</i>	Specification for Restricted Radiation Radio Apparatus (New Zealand)
ETS 300 836-1:1998	Broadband Radio Access Networks (BRAN); High Performance Radio Local Area Network (HIPERLAN) Type I; Conformance testing specification; Part 1: Radio Type approval and Radio Frequency (RF) conformance test specification	47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices.	Scope A1
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 low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices.	Scope A2
(A2LA Cert. No. 1627-01) 11/28/05	Page 5 of 11	47 CFR FCC Unlicensed Personal Scope	A3
		Communications System (PCS) devices	
		47 CFR FCC Unlicensed National Scope	A4
		Information Infrastructure devices and low power transmitters using spread spectrum techniques.	
		47 CFR FCC Personal mobile Scope	B1
		Radio Services in the following FCC Rule Parts 22, 24, 25, 27.	
		47 CFR FCC General Mobile Radio Scope Services in the following FCC Rule Parts 22, 74, 90, 95, 97.	B2
		47 CFR FCC Maritime and Aviation Scope RadioServices in 47 CFR Parts 80 and 87	B3
		47 CFR FCC Microwave Radio Services	B4
		Scope in 47 CFR Parts 21, 74 and 101.	
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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	Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment
<i>Swedish EMC Standards</i> BAKOM 3336.3 1995	Electromagnetic compatibility and electrical safety (EMC & S) for wired terminal equipment. Harmonization document information over the OFCOM requirements.	AS/ACIF S002-2001	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network
<i>South African EMC standards other than CISPR equivalents</i> SABS 1718-1: 1996	South African Bureau of Standards: Specification for Gaming equipment. Part 1: Casino equipment.	AS/ACIF S016-2001	Requirements for Customer Equipment for connection to hierarchical digital interfaces
<i>Japanese VCCI Standards</i> VCCI V-3/99.05 1999 VCCI V-4/99.05 1999	Technical Requirements Instruction for Test Conditions for Requirement under Test	AS/ACIF S031-2001 AS/ACIF S038-2001 AS/ACIF S043-2001	Requirements for ISDN Basic Access Interface Requirements for ISDN Primary Rate Access Interface Requirements for Customer Equipment for Connection to a Metallic Local Loop Interface of a Telecommunications Network – Part 1: General Part 2: Broadband
<i>Telecommunications</i>	Telecommunications Registration; General test methods; Lightning surge; Drop testing; Balance testing; Signal power (metallic and longitudinal); Frequency measurements; Pulse templates; Leakage testing; Impedance testing; Hearing Aid Compatibility testing (<i>excluding volume control</i>); Protocol analysis and Jitter testing.	ITU-T G.703 HKTA 2028	Part 3: DC, Low Frequency AC and Voiceband Physical/electrical characteristics of hierarchical Digital interfaces
<i>Telecom Standards</i>	Title	HKTA 2029	Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s
FCC 47 CFR Part 68 Telephone	Connection of terminal equipment to the telephone Terminal Equipment network. Analog and Digital Equipment. TCB Scope C1.	TBR 1 : 1995	Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s
CS-03 Issue 8 1996 through amendment 5	Specification for terminal equipment, terminal systems, Network protection devices, connection arrangements and hearing aids compatibility.	TBR 2 : 1997	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, 1984 kbit/s
TIA/EIA TSB31-B 1998	Bulletin Part 68 Rationale and Measurement Guidelines (Feb 1998)		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
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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. 60950-1 03 AS/NZS 3260 1993 AS/NZS 3260 Supp 1 1996 ACA TS 001 1997	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	Approval and test specification – Safety of information technology equipment including electrical business Equipment.	
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 – Alphabetical reference index to IEC 950 (Supplement to AS/NZS 3260:1993) Australian Communications Authority – Safety requirements for customer equipment.	
TBR 013 : 1996	Business Telecommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface	Telephone Equipment Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements.	
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) signalling	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. Electrical measuring and test equipment. 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	Medical electrical equipment. Part 1: General requirements for safety.	
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	Audio, video and similar electronic apparatus – Safety requirements	
TS 038 : 1997	Requirements for ISDN Primary Rate Access Interface	Audio/video and musical instrument apparatus for Household, commercial and similar general use	
AS/ACIF S043.2:2001	Requirements for Customer Equipment for connection to a metallic loop interface of a Telecommunications Network – Part 2 Broadband	Australian/New Zealand Standard – Approval and test Specification – Mains operated electronic and related Equipment for household and similar general use	
<i>Product Safety</i>			
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 Safety requirements for main operated electronic and related apparatus for household and similar general use. Radiation safety of laser products, equipment Classification, requirements and user's guide Safety of laser products Part 1: equipment Classification, requirements and user's guide. Safety of laser products – Part 2: Safety of optical communication systems Safety of laser products – Part 4: Laser guards Safety of household and similar electrical appliances
<u>Product Safety Standards</u>	<u>Title</u>		
Specific Product Safety Standards			
IEC 950 1991	Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment.	IEC 60601-1 1995 (Including AM 2) UL 2601-1 1997	
UL 1950 1998	Safety of information technology equipment, including electrical business equipment.	IEC 60065 1998, 2000 ANSI/UL 6500: 1998	
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)	CAN/CSA 60065-00	
UL 60950 2000	Safety of information technology equipment	AS/NZS 3250 1995 AS/NZS 60065 2000	
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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		
<i>Environmental</i> ²			
<u>Environmental Standards</u>	<u>Title</u>		
GR-63-CORE	NEBS Requirements: Physical Protection	IEC 60825-4 1997-11 IEC 60335-1 1995 (Including AM2 – 1997 & AM 12 – 1997) Part 1: General requirements	
ETS 300 019	Environmental conditions and environmental tests For telecommunications equipment	EN 60335-1 2001 UL 60335-1 1998 CAN/CSA E335-1 1994	

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