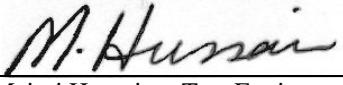




# Test Report

Report No	EE0412-1
Client	Adaptive Instrument Corp. 577 Main street Hudson, MA 01749
Phone	978-562-0154
Fax	978-562-2563
FRN	0007941438
Models	16363
FCC ID	QQN16363
Equipment Type	Part 15 Spread Spectrum Transmitter
Equipment Code	DSS
Results	As detailed within this report
Prepared by	 Mairaj Hussain – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	6/14/04
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 supports a Class II permissive change intended to add new antennas to FCC ID QQN16363 of a transmitter operating under 47 CFR 15.247 of the FCC rules for operation in the frequency band of 902 – 928MHz. The product covered by this report is 16363 which is 915 MHz FHSS Digital Relay Radio System (DRRS) RF module.

The manufacturer intends to add the following antennas:

- i) Yagi Antennas:
  - a) Y8963 Gain: 8.15dBi
  - b) Y8966 Gain: 11.14dBi
- ii) Omni-directional:
  - a) FG9023 Gain: 5.14dBi
  - b) FG9026 Gain: 8.14dBi

The product was tested with the highest gain antenna from each family mentioned above. Fundamental was checked in order to verify the antenna's gain. Spurious emissions were checked to verify the compliance of the product with FCC 15.209. To pass the requirements, the lowest data rate for the transmission is limited to 19.2Kbits/sec. At this data rate manufacturer can take advantage of 20dB allowance for duty cycle correction factor.

Tx power was set to the max level of 12.5dBm during the testing.

A detailed description of the above-mentioned antenna can be found in the antenna exhibit.

***Test Methodology***

All testing was performed according to the procedures specified in ANSI C63.4 (2000). The product was tested with modulation on and peak readings were compared against the average limit presented in section CFR 15.247.

<b><i>Frequency range investigated:</i></b>	30MHz – 10GHz
---	---------------

<b><i>Measurement Distance:</i></b>		
<i>Frequency (MHz)</i>	<i>Distance (m)</i>	<i>Comments</i>
Fundamental	3 m	Radiated
30MHz – 10GHz except 902-928 MHz band	3m	Radiated Spurious Measurements

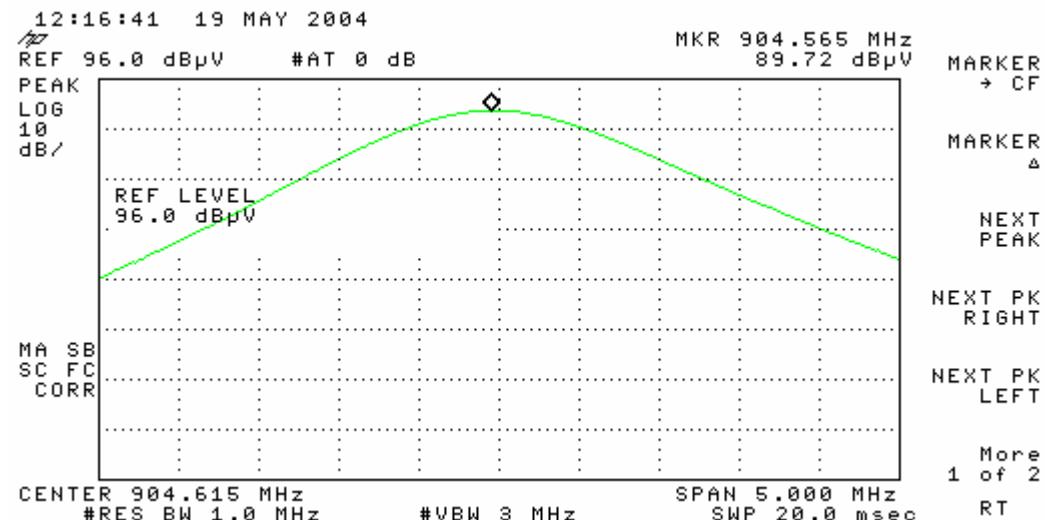
All readings are peak unless otherwise noted.

***EUT Configuration***

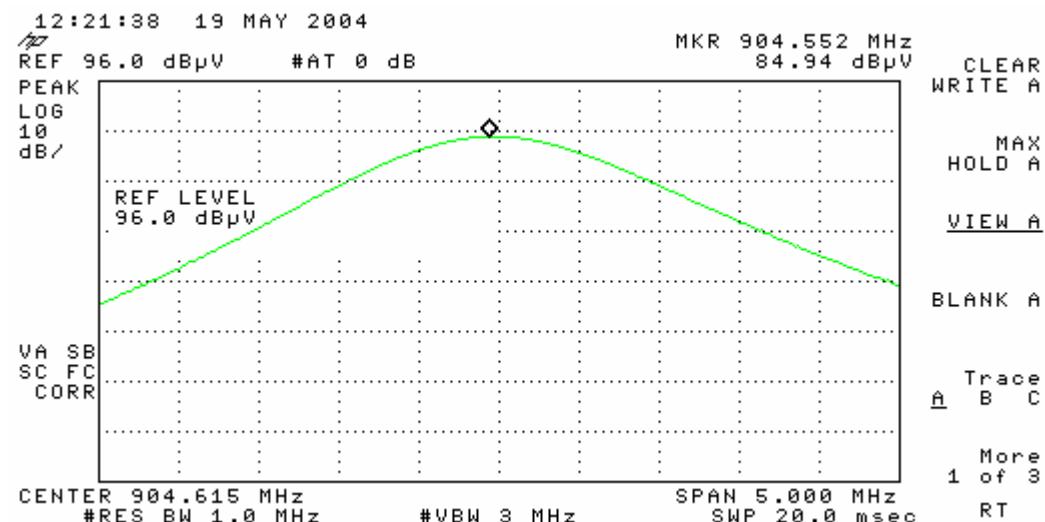
<b>EUT Configuration</b>						
<b>Work Order:</b> E0412						
<b>Company:</b> Adaptive Instrument Corp.						
<b>Company Address:</b> 577 Main Street Hudson, MA 01749						
<b>Contact:</b> Jeffery Cho						
<b>Person(s) Present:</b> Jeffery Cho						
<b>MN</b>	<b>SN</b>	<b>FCC ID</b>				
EUT: 16363	-	QQN16363				
<b>EUT Description:</b> 915 MHz FHSS RF Module						
<b>EUT Max Frequency:</b> 902 - 928 MHz						
<b>Support Equipment:</b>	<b>MN</b>	<b>SN</b>	<b>FCC ID</b>			
Agilent Power supply	E3630A	MY40001033	-			
<b>EUT Cables:</b>	<b>Qty</b>	<b>Shielded?</b>	<b>Length</b>	<b>Ferrites</b>		
None						
<b>Unpopulated EUT Ports:</b>	<b>Qty</b>	<b>Reason</b>				
None						
<b>Software / Operating Mode Description:</b>						
The product was tested for EMI in transmit mode.						

***Test Data and Plots*****Verifying Antenna Gains**

a: Yagi Y8966; Gain 9dBd or 11.14dBi

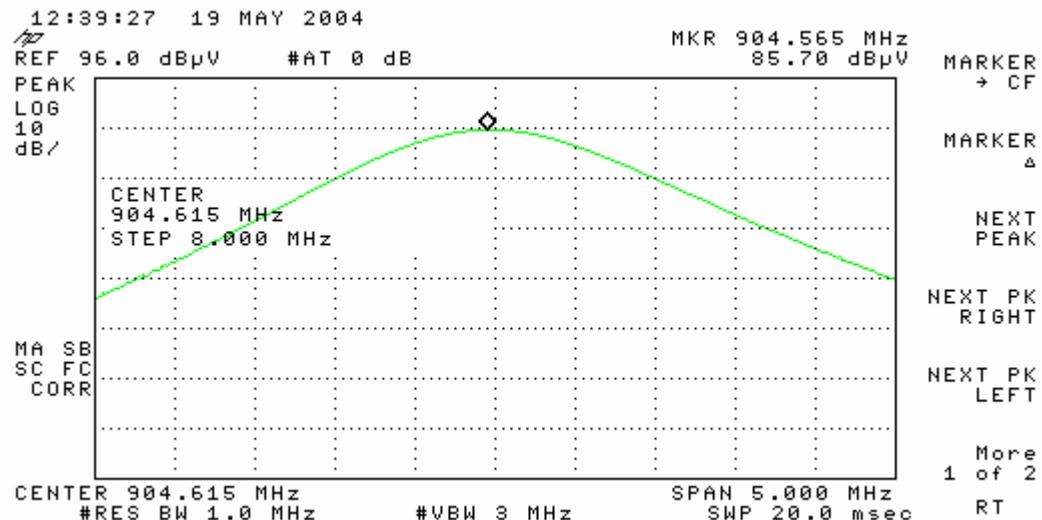


H



V

b: Omni-directional antenna FG9026; Gain 6dBd or 8.14dBi



V

Antenna Gain Verification							Curtis-Straus LLC																												
Date: 19-May-04			Company: Adaptive Instruments			Work Order: E0412																													
Engineer: Mairaj Hussain			EUT Desc: 16363			Distance: 3 m																													
Notes:																																			
<table border="1"> <thead> <tr> <th rowspan="2">Antenna Polarization (H / V)</th> <th rowspan="2">Frequency (MHz)</th> <th rowspan="2">Reading (dB<math>\mu</math>V)</th> <th rowspan="2">Preamp Factor (dB)</th> <th rowspan="2">Antenna Factor (dB/m)</th> <th rowspan="2">Cable Factor (dB)</th> <th rowspan="2">Adjusted Reading (dB<math>\mu</math>V/m)</th> <th colspan="4">Antenna gain verification</th> </tr> <tr> <th>EIRP (dBm)</th> <th>Tx power (dBm)</th> <th>Antenna Gain (dBi)</th> <th></th> </tr> </thead> <tbody> <tr> <td>(Yagi) Hpk (Omni directional)Vpk</td> <td>904.56 904.56</td> <td>89.7 85.7</td> <td>0.0 0.0</td> <td>21.6 21.6</td> <td>5.0 5.0</td> <td>116.3 112.3</td> <td>21.1 17.1</td> <td>12.5 12.5</td> <td>8.6 4.6</td> <td></td> </tr> </tbody> </table>										Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB $\mu$ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB $\mu$ V/m)	Antenna gain verification				EIRP (dBm)	Tx power (dBm)	Antenna Gain (dBi)		(Yagi) Hpk (Omni directional)Vpk	904.56 904.56	89.7 85.7	0.0 0.0	21.6 21.6	5.0 5.0	116.3 112.3	21.1 17.1	12.5 12.5	8.6 4.6	
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Test Site: "T"		Pre-Amp: none	Cable: 65 ft RG8A/U		Analyzer: Yellow		Antenna: Green																												

Sample calculation:

Adjusted reading = Reading + Antenna factor + Cable factor

EIRP = Adjusted reading + 20\*log(distance) - 104.7

## Spurious Radiated Emissions Data

Radiated Emissions Table								Curtis-Straus LLC							
Date: 19-May-04			Company: Adaptive Instrument Corp					Work Order: E0412							
Engineer: Mairaj Hussain								EUT Desc: 16363							
Frequency Range: 30 - 1000MHz restricted bands								Measurement Distance: 3 m							
Notes: Antenna Yagi 8966															
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB $\mu$ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB $\mu$ V/m)	---	Limit (dB $\mu$ V/m)	Margin (dB)	Result (Pass/Fail)					
H	125.9	45.5	65.5	12.8	1.5	38.4									
H	267.1	43.0	21.5	13.3	2.3	37.1									
H	327.3	38.3	21.5	14.6	2.6	34.0									
<b>Table Result:</b> Pass by -5.1 dB								<b>Worst Freq:</b> 125.9 MHz							
Test Site: "T"		Pre-Amp: Green		Cable: 65 ft RG8A/U		Analyzer: Yellow		Antenna: Green							

Radiated Emissions Table								Curtis-Straus LLC							
Date: 19-May-04			Company: Adaptive Instrument Corp					Work Order: E0412							
Engineer: Mairaj Hussain								EUT Desc: 16363							
Frequency Range: 1 - 10GHz (restricted bands)								Measurement Distance: 3 m							
Notes:															
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB $\mu$ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading		CFR 15.209						
Tx power 12.5dBm, DR 76.8Kb (Tx power includes 0.5dB loss for the antenna cable)															
Yagi 8966 antenna:															
Hpk	2713.4	61.5	24.2	30.7	2.2	-	70.2								
H 10hz vbw	2713.4	60.6	24.2	30.7	2.2	20.0	49.3								
V 10hz vbw	2713.4	59.0	24.2	30.7	2.2	20.0	47.7								
Hpk	1687.9	53.0	23.6	27.5	1.7	-	58.6								
H 10hz vbw	1687.9	39.0	23.6	27.5	1.7	20.0	24.6								
Hpk	3618.7	46.5	24.5	33.4	2.6	-	58.0								
H 10hz vbw	3618.7	43.0	24.5	33.4	2.6	20.0	34.5								
Test Site: "T"								Antenna: Orange							
Pre-Amp: Or-Blk															
Cable: 3 RG142LL															
Analyzer: Orange															

Radiated Emissions Table								Curtis-Straus LLC							
Date: 19-May-04			Company: Adaptive Instrument Corp					Work Order: E0412							
Engineer: Mairaj Hussain								EUT Desc: 16363							
Frequency Range: 30 - 1000 MHZ (Restricted bands)								Measurement Distance: 3 m							
Notes: Antenna FG9026															
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB $\mu$ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB $\mu$ V/m)	---	Limit (dB $\mu$ V/m)	Margin (dB)	Result (Pass/Fail)					
Vpk	117.0	47.4	21.4	12.7	1.4	40.1									
V	121.4	49.4	22.2	12.9	1.4	41.5									
Vpk	251.8	43.0	21.5	13.1	2.2	36.8									
Vpk	325.5	35.5	21.5	14.6	2.6	31.2									
Vpk	403.0	35.0	21.5	16.6	2.9	33.0									
Vpk	612.0	29.0	20.9	19.3	3.8	31.2									
Test Site: "T"								Antenna: Green							
Pre-Amp: Green															
Cable: 65 ft RG8A/U															
Analyzer: Yellow															

## Radiated Emissions Table

Curtis-Straus LLC

Date: 19-May-04	Company: Adaptive Instrument Corp	Work Order: E0412									
Engineer: Mairaj Hussain	EUT Desc:										
Frequency Range: 1 - 10GHz (restricted bands)		Measurement Distance: 3 m									
Notes: Antenna FG9026											
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading (dBuV/m)		FCC Class B		
									Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)
Hpk 10hz vbw	2714.0	55.3	24.2	30.7	2.2	20.0	44.0		54.0	-10.0	Pass
Hpk	2714.1	57.3	24.2	30.7	2.2	-	66.0		74.0	-8.0	Pass
Hpk	1687.0	45.0	23.6	27.4	1.7	-	50.5		54.0	-3.5	Pass
Hpk	3618.0	44.2	24.5	33.4	2.6	-	55.7		74.0	-18.3	Pass
Hpk 10hz vbw	3618.0	41.2	24.5	33.4	2.6	20.0	32.7		54.0	-21.3	Pass
Test Site: "T"	Pre-Amp: Or-Blk	Cable: 3 RG142LL		Analyzer: Orange				Antenna: Orange Horn			

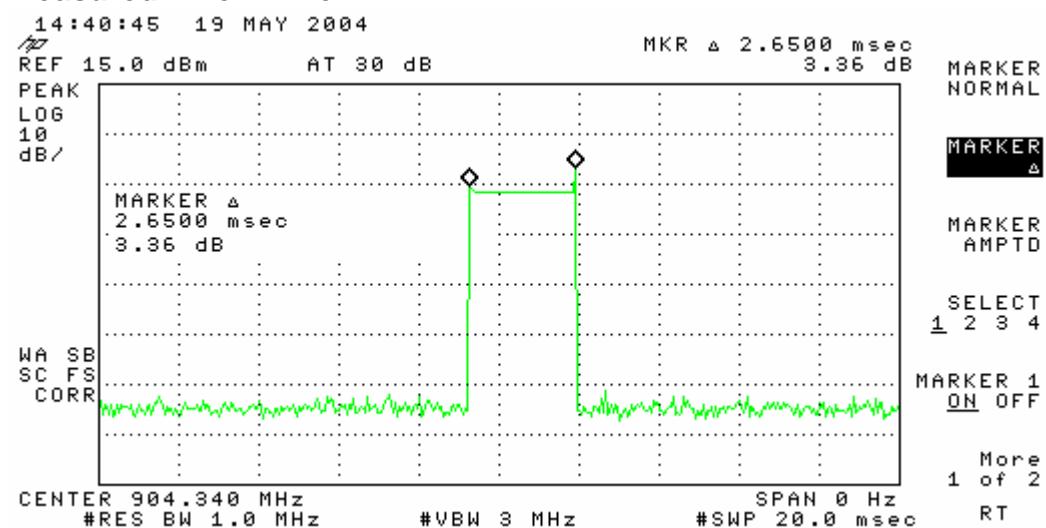
*Note: Reading < 1000 MHz are QP, readings > 1000 MHz are average.*

Sample calculation:

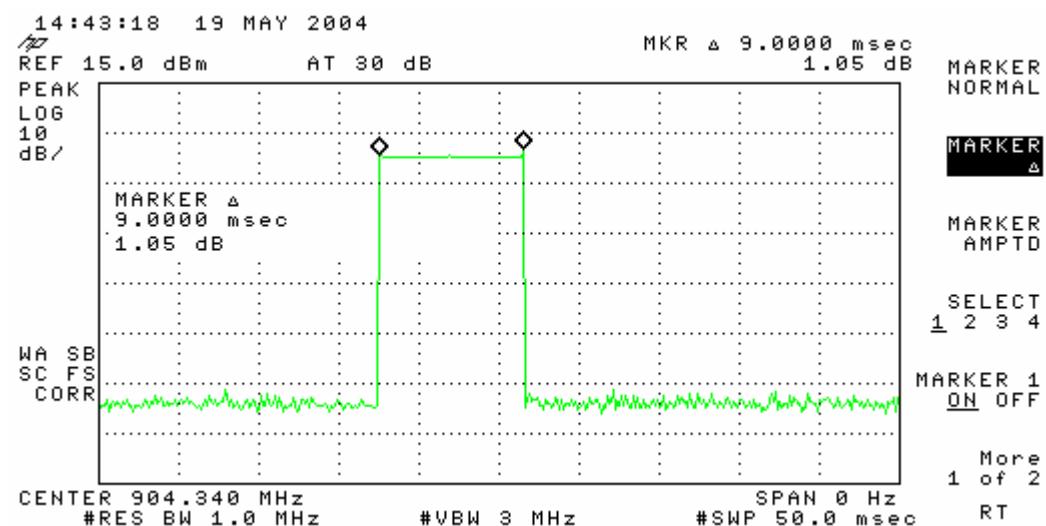
Adjusted reading = Reading + Antenna factor + Cable factor – Pre amp factor

## Duty Cycle Correction Factor

### Measured Dwell Time:



DR 76.8Kbits/sec



DR 19.2Kbits/sec

Duty Cycle Correction Factor for Data Rate: 76.8KB/sec

$$DCCF = 20 * \log\left(\frac{2.65ms}{100ms}\right)$$

DCCF = -31.5dB

Duty Cycle Correction Factor for Data Rate: 19.2KB/sec

$$DCCF = 20 * \log\left(\frac{9.0ms}{100ms}\right)$$

DCCF = -20.9dB

*Note: -20dB factor for the calculations was used.*

**REPORT:EE0412-1**  
**Test Equipment Used**

**FCC ID:QQN16363**

REV. 5/7/04

<b>SPECTRUM ANALYZERS</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	21-MAY-2004	
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	04-MAR-2005	
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	30-SEP-2004	
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	08-JUL-2004	
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	10-OCT-2004	
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	15-JUL-2004	
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	02-DEC-2004	
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	27-JUN-2004	
<b>LISNS/MEASUREMENT PROBES</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956348	00753	02-APR-2005	
BLUE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956349	00752	02-APR-2005	
YELLOW-BLACK	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984735	00248	02-APR-2005	
ORANGE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	02-APR-2005	
GOLD	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984734	00247	02-APR-2005	
WHITE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972019	00678	02-APR-2005	
BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972017	00675	02-APR-2005	
RED-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972016	00677	02-APR-2005	
BLUE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972018	00676	02-APR-2005	
BLUE MONITORING PROBE	0.01-150MHz	91550-2	TEGAM	12350	00807	21-MAY-2005	
YELLOW MONITORING PROBE	0.01-150MHz	91550-2	ETS	50972	00493	24-NOV-2004	
GREEN CURRENT TRANSFORMER	40Hz-20MHz	150	PEARSON	10226	00793	03-APR-2005	
CISPR LINE PROBE	150kHz-30MHz	N/A	C-S	01	00805	20-DEC-2004	
CISPR TELCO VOLTAGE PROBE	150kHz-30MHz	CS A/C-10	C-S	CS01	00296	11-SEP-2004	
CISPR 22 TELCO ISN	9kHz-30MHz	FCC-TLISN-T4	FISCHER	20115	00746	15-OCT-2004	
<b>OPEN AREA TEST SITE (OATS)</b>		FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE		
SITE F		93448	IC 2762-F	R-1688	25-MAR-2005		
SITE T		93448	IC 2762-T	R-905	25-MAR-2005		
SITE A		93448	IC 2762-A	R-903	25-MAR-2005		
SITE M		93448	IC 2762-M	R-904	25-MAR-2005		
BUBBLE (HP FACILITY)		N/A	N/A	R-1467	16-MAY-2005		
<b>LINE CONDUCTED TEST SITES</b>		FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE		
EMI 1		93448	N/A	C-1801	01-MAY-2006		
EMI 2		93448	N/A	C-1802	01-MAY-2006		
EMI 3		93448	N/A	C-1803	01-MAY-2006		
BUBBLE (HP FACILITY)		N/A	N/A	C-1556	16-MAY-2005		
<b>ANTENNAS</b>		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN BILOG	30MHz-2GHz	CBL6112B	CHASE	2742	00620	06-APR-2006	
GREEN-BLACK BILOG	30MHz-2GHz	CBL6112B	CHASE	2412	00127	06-JAN-2006	
GREEN-RED BILOG	30MHz-2GHz	CBL6112B	CHASE	2435	00990	06-APR-2006	
RED BILOG	30MHz-1GHz	3143	EMCO	1270	00042	17-MAR-2005	
BLUE BILOG	30MHz-1GHz	3143	EMCO	1271	00803	17-MAR-2005	
GRAY BILOG	26MHz-2GHz	3141	EMCO	9703-1038	00066	19-MAY-2005(EMI) / 06-JUN-2004(RFI)	
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	19-MAY-2005(EMI) / 09-JUN-2004(RFI)	
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	22-MAY-2005	
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	12-JUN-2005	
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	04-JUN-2005	
HF (WHITE) HORN	18-26.5GHz	801-WLM	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 MONOPOLE	30Hz-30MHz	3301B	EMCO	3824	00068	05-MAY-2005	
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	16-SEP-2004	
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1370	00757	26-JUN-2005	
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1371	00756	26-JUN-2005	
RE101 LOOP SENSOR	30Hz-100kHz	RE101-13.3CM	C-S	N/A	00818	07-JAN-2005	

## REPORT:EE0412-1

FCC ID:QQN16363

RS101 RADIATING LOOP	30Hz-100kHz	RS101-12CM	C-S	N/A	00819	07-JAN-2005
RS101 LOOP SENSOR	30Hz-100kHz	RS101-4CM	C-S	N/A	00820	07-JAN-2005
<b>MIXERS/DIPLEXERS</b>	<b>RANGE</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A00900/A046903-01	00369	09-JUL-2004
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	03-JAN-2005
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	03-JAN-2005
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	05-DEC-2004
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	05-DEC-2004
DIPLEXER		DPL.26	OML	N/A	00813	05-DEC-2004
<b>PREAMPS / ATTENUATORS / FILTERS</b>	<b>RANGE</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	31-MAR-2005
BLUE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	31-JUL-2004
BLUE-BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	31-MAR-2005
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	27-FEB-2005
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	27-FEB-2005
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	27-FEB-2005
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	29-JUL-2004
YELLOW-BLACK	1-20GHz	SMC-12A	C-S	535055	00801	19-AUG-2004
ORANGE-BLACK	1-20GHz	SMC-12A	C-S	637367	00761	29-JUL-2004
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	15-JUL-2004
HIGH PASS FILTER	1-18 GHz	SPA-F-55204	K&L	36	00817	06-JAN-2006
LOW PASS FILTER	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	06-JAN-2006
HF 20dB ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNACK	01	00791	21-MAY-2005
<b>ABSORBING CLAMPS</b>	<b>RANGE</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>
FISCHER CLAMP	30-1000MHz	F-201-23MM	FISCHER	10	00081	16-JAN-2006
<b>EFT</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>	
EFT DIRECT COUPLING CAP	N/A	C-S	01	00794	29-JAN-2006	
<b>ESD GENERATORS</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>	
GREEN	NSG435	SCHAFFNER	000839	00763	02-DEC-2004	
RED	NSG435	SCHAFFNER	001625	00762	09-DEC-2004	
YELLOW	930D	ETS	201	00673	11-JUN-2004	
<b>BEST EMC-2</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>	
BLUE	711-1100	SCHAFFNER	199824-002SC	00117	16-JUN-2004 (SURGE) / 03-SEP-2004 (D+I) / 05-NOV-2004 (EFT)	
RED	711-1100	SCHAFFNER	200122-074SC	00623	17-JUN-2004 (SURGE) / 03-SEP-2004 (D+I) / 05-NOV-2004 (EFT)	
<b>CHAMBERS AND STRIPLINE</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>	
RFI 1 CHAMBER	3 METER COMPACT	PANASHIELD	N/A	00797	09-JUN-2004	
RFI 2 CHAMBER	04' x 07' SHIELDING SYSTEM	LINDGREN	13329	00795	06-JUN-2004	
RFI 3 STRIPLINE	N/A	C-S	N/A	00796	22-JUL-2005	
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	31-DEC-2004	
<b>AMPLIFIERS</b>	<b>RANGE</b>	<b>MN</b>	<b>MFR</b>	<b>SN</b>	<b>ASSET</b>	<b>CALIBRATION DUE</b>
RED	0.5-1000MHz	10W1000B	AR	18708	00032	12-JUN-2004
GREEN	0.5-1000MHz	10W1000B	AR	23423	00123	24-MAY-2004
BLUE	0.01-250MHz	75A250	AR	19165	00039	19-JAN-2005(CRFI) / 12-JUN-2004 (RFI)
BLACK	0.01-250MHz	75A250	AR	23411	00122	25-MAR-2005(CRFI) / 25-MAR-2005(RFI)
ORANGE	0.01-250MHz	75A250	AR	26827	00367	19-JAN-2005(CRFI) / 05-JAN-2005(RFI)
HP489A	1.0-2.0GHz	HP489A	HP	449-00762	00971	10-FEB-2005
HP491C	2.0-4.0GHz	HP491C	HP	449-00638	00764	16-OCT-2004
HP493A	4.0-8.0GHz	HP493A	HP	171402242	00085	16-OCT-2004
HP493A (SPARE)	4.0-8.0GHz	HP493A	HP	449-00562	00771	01-DEC-2004

HP495A	7.0-12.0GHz	HP495A	HP	904-00237	00086	16-OCT-2004
<b>FIELD PROBES</b>	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.01-1000MHz	HI-4422	HOLADAY	90369	00031	14-MAY-2004
GREEN	0.01-1000MHz	HI-4422	HOLADAY	97363	00136	11-MAY-2005
<b>SIGNAL GENERATORS</b>	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.09-2000MHz	HP8648B	HP	3847U02192	00366	15-JAN-2005
BLUE	0.1-1000MHz	HP8648A	HP	3426A00548	00034	15-JUL-2004
GREEN	0.09-2000MHz	HP8648B	HP	3623A02072	00125	10-SEP-2004
ORANGE	0.1-1000MHz	HP8648B	HP	3537A01210	00025	21-MAY-2004
BLACK	15MHz	HP33120A	HP	US36004674	00766	12-NOV-2004
YELLOW	15MHz	HP33120A	HP	US36014119	00249	21-MAY-2004
BLUE-WHITE	0.1Hz-13MHz	HP3312A	HP	1432A07632	00775	09-MAR-2005
SWEEPER	0.01-20.0GHz	HP83752A	HP	3610A01133	00087	04-APR-2005
<b>BULK INJECTION CLAMPS</b>	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.01-100MHz	95236-1	TEGAM	12248	00035	19-JAN-2005
GREEN	0.01-100MHz	95236-1	EMCO	50215	00118	19-JAN-2005
<b>CDN NETWORKS</b>	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
BLACK	0.10-100MHz	20A M-2	C-S	04	00783	07-JAN-2005
BLUE	0.10-100MHz	15A M-3	C-S	05	00806	07-JAN-2005
RED	0.10-100MHz	15A M-3	C-S	06	00780	07-JAN-2005
WHITE	0.10-100MHz	15A M-3	C-S	07	00782	07-JAN-2005
YELLOW-BLACK	0.10-100MHz	15A M-3	C-S	08	00784	07-JAN-2005
BLUE-BLACK	0.10-100MHz	15A M-3	C-S	09	00781	07-JAN-2005
GREEN	0.10-100MHz	30A M-3	C-S	10	00779	07-JAN-2005
YELLOW	0.10-100MHz	30A M-5	C-S	11	00804	07-JAN-2005
BLUE-WHITE	0.10-100MHz	15A M-5	C-S	12	00788	07-JAN-2005
YELLOW (RES)	0.10-100MHz	100Ω RESISTOR Nwk	C-S	01	00810	10-SEP-2004
GREEN (RES)	0.10-100MHz	100Ω RESISTOR Nwk	C-S	02	00785	09-MAR-2005
<b>HARMONIC ANALYZER</b>	MN	MFR	SN	ASSET	CALIBRATION DUE	
HFTS	HP6842A	HP	3531A-00169	00738	03-DEC-2005	
<b>FREQUENCY COUNTER</b>	MN	MFR	SN	ASSET	CALIBRATION DUE	
5340A	HP5340A	HP	1440A02320	00787	30-JUL-2004	
<b>SURGE GENERATORS</b>	MN	MFR	SN	ASSET	CALIBRATION DUE	
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	18-JUN-2004	
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	13-JUN-2004	
THREE PHASE COUPLING NWK	3CN	CDI	003455	00325	13-JUN-2004	
1.2x50US PLUGIN MODULE	1.2x50US PLUGIN	CDI	N/A	00842	13-JUN-2004	
10X160US PLUGIN MODULE	10X160US PLUGIN	C-S	N/A	00843	12-JUN-2004	
10X560US PLUGIN MODULE	10X560US PLUGIN	C-S	N/A	00841	12-JUN-2004	
10x700US PLUGIN MODULE W/ EXTENSION BOX	10x700US PLUGIN	C-S	N/A	00844/845	12-JUN-2004	
PSURGE CONTROLLER MODULE	PSURGE 8000	HAEFELY	150267	00879	11-JUN-2004	
COUPLING/DECOPUPLING MODULE	PSD 900	HAEFELY	149213	00880	11-JUN-2004	
IMPULSE MODULE	PIM 900	HAEFELY	149202	00881	11-JUN-2004	
HIGH VOLTAGE CAP NWK 5kVDC, 18μF	CS-HVCC	C-S	01	00772	15-OCT-2004	
NEBS SURGE GENERATOR	N/A	C-S	N/A	00088	17-JUN-2004	
2X10US SURGE GENERATOR	2X10US	C-S	N/A	00846	18-JUN-2004	
10X700US SURGE GENERATOR	10X700US	C-S	N/A	00847	12-JUN-2004	
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	18-SEP-2004	
<b>OSCILLOSCOPES</b>	MN	MFR	SN	ASSET	CALIBRATION DUE	
OSCILLOSCOPE 100MHz	TDS 220	TEKTRONIX	B068748	00885	03-JUN-2004	
OSCILLOSCOPE 100MHz (SAFETY)	TDS 340	TEKTRONIX	B012357	00737	16-OCT-2004	
OSCILLOSCOPE 100MHz (TELECOM)	54645A	HP	US36320452	00103	30-JUN-2004	
<b>POWER SUPPLIES</b>	MN	MFR	SN	ASSET	CALIBRATION DUE	
10001/2 AC POWER SYSTEM	(2) 500I	CALIFORNIA INSTRUMENTS	HK53687/HK53688	00376	31-FEB-2004	

<b>RMS VOLTMETERS/CURRENT CLAMP</b>		MN	MNFR	SN	ASSET	CALIBRATION DUE
TRUE-RMS MULTIMETER	79III	FLUKE	71700298	00769	15-OCT-2004	
TRUE-RMS MULTIMETER	177	FLUKE	83390024	00973	08-MAR-2005	
TRUE-RMS MULTIMETER (REFERENCE)	177	FLUKE	83390025	00974	08-MAR-2005	
TRUE-RMS CLAMP METER (SAFETY)	36	FLUKE	68805882	00700	05-MAR-2005	
<b>POWER/NOISE METERS</b>		MN	MFR	SN	ASSET	CALIBRATION DUE
POWER METER	435B	HP	2445A11012	00773	07-APR-2005	
POWER SENSOR	8481A	HP	2702A61351	00774	07-APR-2005	
PSOPHOMETER	2429	BRUEL & KJAER	1237642	00585	18-FEB-2005	
TRANSMISSION LINE TESTER (dBRNC)	185T	AMREL	998658	00823	08-MAR-2005	
<b>OVERVOLTAGE CHAMBERS</b>		MN	MFR	SN	ASSET	CALIBRATION DUE
72kW POWER FAULT SIMULATOR	OV1	C-S	N/A	00792	31-MAR-2005	
POWER FAULT SIMULATOR	OV2	C-S	N/A	00116	31-MAR-2005	
<b>DIPOLE TAPE MEASURES</b>		MN	MFR	SN	ASSET	CALIBRATION DUE
26FT TAPE #1	2338CME	LUFKIN	C3166-1	00776	26-FEB-2005	
26FT TAPE #2	2338CME	LUFKIN	C3166-2	00777	26-FEB-2005	
<b>METEOROLOGICAL METERS</b>		MN	MFR	SN	ASSET	CALIBRATION DUE
TEMP./HUMIDITY/ATM. PRESSURE GAUGE	7400 PERCEPTION II	DAVIS	N/A	00965	19-JAN-2005	
TEMPERATURE /HUMIDITY GAUGE	THG-912	HUGER	4000562	00789	08-JAN-2005	
<b>TRACEABLE CLOCKS</b>		MN	MFR	SN	ASSET	CALIBRATION DUE
5003	5003	CONTROL COMPANY	99026940	00808	09-DEC-2004	
<b>CONSUMABLES</b>		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

<b>SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999</b> <b>CURTIS-STRAUSS<sup>1</sup></b> 527 Great Road Littleton, MA 01460 Barry Quinlan Phone: 978-486-8880 <b>ELECTRICAL</b> Valid until: July 31, 2005 Certificate Number: 1627-01 In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following <u>Electromagnetic Compatibility (EMC), Telecommunications, and Product Safety tests:</u> <b>Electromagnetic Compatibility (EMC)</b> Radiated emissions testing (electric and magnetic fields); Conducted emissions testing (voltage and current); Electrostatic Discharge testing; Electrical Fast Transient testing; Radiated Immunity testing; Conducted Immunity testing; Lightning Immunity testing; Voltage Dips, Interrupts and Voltage Variations testing; Magnetic Immunity testing; RF Power measurements; Frequency Stability measurements; Longitudinal Induction measurements; Harmonic emissions testing; Light flicker testing; Low frequency disturbance voltage testing; Disturbance Power measurements		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 <b>Immunity</b> 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.
<small><sup>1</sup> Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460</small>			
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CISPR 14-2 1996, 1997 + A1:2001 CISPR 20: 1995, 2002 with amendment 3 (associated group only) EN 55020: 1995, 2002 (associated group only) CISPR 24 SABS CISPR 24 1997 AS/NZS 3200.1.2: 1995  <b>European Union Basic EMC Standards</b> EN 61000-4-2: 1995, 1999, 2001 EN 61000-4-3:1997, 1998, 2002 AS/NZS 61000.4.3 1999 EN 61000-4-4 1995 EN 61000-4-5 1995 AS/NZS 61000.4.5 1999 EN 61000-4-6 1996 AS/NZS 61000.4.6 1999 EN 61000-4-8 1994 EN 61000-4-11 1994 ENV 61000-2-2 1993  <b>EU Product Family Standards</b> EN 50081-1 1992 EN 50081-2 1993 EN 50082-1 1992, 1998 EN 50082-2 1995  (A2LA Cert. No. 1627-01) 10/31/03	EN 61000-6-1: 1997, 2001 EN 61000-6-2: 1998, 2001 EN 50091-2 1996 EN 55024 1998 EN 55103-1 1997 EN 55103-2 1997 (excluding Annex A3) EN 61326 1998 EN 61547 1996 EN 50130-4 1996 EN 55104 1995 EN 50083-2 1995 EN 60601-1-2: 1993, 2002 IEC 1800-3 1995 EN 60555 Part 2 1987 EN 60555 Part 3 1987 EN 61000-3-2: 1995, 2000 AS/NZS 61000.3.2 1998 EN 61000-3-3 1995 AS/NZS 61000.3.3 1999 ETS 300 386-1 1994	Electromagnetic Compatibility (EMC)- Part 6: Generic standards-Section 1: Immunity for residential, commercial and light-industrial environments Electromagnetic Compatibility (EMC)- Part 6: Generic standards-Section 2: Immunity for industrial environments Specification for Uninterruptible Power Systems (UPS). Part 2: EMC requirements Information technology equipment – Immunity Characteristics – Limits and methods of measurement Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control professional use. Part 2: Immunity Electrical equipment for measurement, control and laboratory use – EMC requirements Equipment for general lighting purposes – EMC immunity requirements Alarm Systems. Part 4: Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems. Electromagnetic compatibility immunity – requirements for household appliances, tools and similar apparatus. Product family standard. Cabled distribution systems for television and sound signals. Part 2: Electromagnetic compatibility for equipment. Medical electrical equipment Part 1: general requirements for safety Section 2: Collateral standard: Electromagnetic compatibility – requirements and tests Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods. Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 2: Harmonics Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 3: Voltage fluctuations. Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits for harmonic current emissions Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limitation of voltage fluctuations and flicker in low-voltage supply systems. Equipment Engineering (EE): Public telecommunication network equipment electro-magnetic compatibility (EMC) requirements Part 1: Product family overview, compliance criteria and test levels	
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<p>ETS EN 300 386-2 1997, 1998, ETS EN 300 386 2000 v1.2.1, 2001 v1.3.1</p> <p>ETS 300 132-1 1996</p> <p>ETS 300 132-2 1996</p> <p>ETR 283 1997</p> <p><b>EU radio standards</b> (ETS) EN 300 385 v1.2.1: 1998, 1999</p> <p>EN 300 330 v1.2.1: 1998, 1999</p> <p>ETS 300 328 1996</p> <p>ETS EN 300 440 v1.2.1 1999</p> <p>EN 301 893:2002 v1.2.1</p> <p>ETS 300 836-1:1998</p> <p>EN301 489-17:2002 v1.2.1</p>	<p>Electromagnetic compatibility and radio spectrum matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements; Part 2: Product family standard.</p> <p>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</p> <p>Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)</p> <p>Equipment Engineering (EE); Transient voltages at Interface A on telecommunications direct current (DC) power distributions.</p> <p>Electromagnetic compatibility and Radio spectrum matters (ERM); Electromagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment (ETS)</p> <p>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</p> <p>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</p> <p>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</p> <p>Broadband Radio Access Networks (BRAN); 5 GHz (draft) high performance RLAN; Harmonized EN covering Essential requirements of Article 3.2 of the R&amp;TTE Directive</p> <p>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</p> <p>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</p>	<p>EN 300 328-2:2001 v1.2.1</p> <p>EN 301 489-1:2002</p> <p>EN 60669-2-1:2002</p> <p><b>Canada Radio Standards</b> Canadian GL-36 1995</p> <p>Canadian RSS-119 1999, 2000 Issue 6</p> <p>Canadian RSS-134 1996 &amp; 2000, Issue 1 Rev 1</p> <p>Canadian RSS-210 2000 Issue 3, RFS29 1998</p> <p><b>FCC Standards</b></p> <p>47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices.</p> <p>47 CFR FCC low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices.</p> <p>47 CFR FCC Unlicensed Personal Scope A3 Communications System (PCS) devices</p> <p>47 CFR FCC Unlicensed National Scope A4 Information Infrastructure devices and low power transmitters using spread spectrum techniques.</p> <p>47 CFR FCC Personal mobile Scope B1 Radio Services in the following FCC Rule Parts 22, 24, 25, 27.</p> <p>47 CFR FCC General Mobile Radio Scope Services in the following FCC Rule Parts 22, 74, 90, 95, 97.</p> <p>47 CFR FCC Maritime and Aviation Scope RadioServices in 47 CFR Parts 80 and 87</p> <p>47 CFR FCC Microwave Radio Services B4 Scope in 47 CFR Parts 21, 74 and 101.</p>	<p>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&amp;TTE Directive</p> <p>Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements</p> <p>Switches for household and similar fixed electrical installations -- Part 2-1: Particular requirements - Electronic switches</p> <p>Industry Canada – technical requirements for low power Devices in the 2400 – 2483.5 MHz band.</p> <p>Industry Canada – Land mobile and fixed radio Transmitters and receivers, 27.41 to 960.0 MHz</p> <p>Industry Canada – 900 MHz narrowband personal communications services</p> <p>Industry Canada – Low power license-exempt radio 2001 Issue 5 communication devices</p> <p>Specification for Restricted Radiation Radio Apparatus (New Zealand)</p> <p>Scope A1</p> <p>Scope A2</p> <p>Scope A3</p> <p>Scope A4</p> <p>B1</p> <p>B2</p> <p>B3</p> <p>B4</p>
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<p><b>FCC/OST MP-5 1986</b></p> <p><b>GR-1089-CORE: 1997, 1999 issue 2/2002 Issue 3</b></p> <p><b>ANSI EMC Standards</b> ANSI C63.4: 1992, 1999, 2001</p> <p><b>ANSI C63.5 1988</b></p> <p><b>IEEE EMC Standards</b> IEEE C62.41: 1980, 1991</p> <p><b>Swedish EMC Standards</b> BAKOM 3336.3 1995</p> <p><b>South African EMC standards other than CISPR equivalents</b> SABS 1718-1: 1996</p> <p><b>Japanese VCCI Standards</b> VCCI V-3/99.05 1999 VCCI V-4/99.05 1999</p> <p><b>Telecommunications</b> 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.</p> <p><b>Telecom Standards</b></p> <p><b>Title</b></p> <p>FCC 47 CFR Part 68 Telephone</p> <p>CS-03 Issue 8 1996 through amendment 5</p> <p>TIA/EIA TSB31-B 1998</p>	<p>FCC (Federal Communications Commission) methods Of measurement of radio noise emissions from industrial, scientific and medical equipment.</p> <p>Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.</p> <p>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.</p> <p>American National Standard for electromagnetic compatibility – radiated emissions measurements in electromagnetic interference (EMI) control – calibration of antennas.</p> <p>IEEE recommended practice on surge voltages in low-voltage AC power circuits</p> <p>Electromagnetic compatibility and electrical safety (EMC &amp; S) for wired terminal equipment. Harmonization document information over the OFCOM requirements.</p> <p>South African Bureau of Standards: Specification for Gaming equipment. Part 1: Casino equipment.</p> <p>Technical Requirements Instruction for Test Conditions for Requirement under Test</p> <p>Connection of terminal equipment to the telephone Terminal Equipment network. Analog and Digital Equipment. TCB Scope C1.</p> <p>Specification for terminal equipment, terminal systems, Network protection devices, connection arrangements and hearing aids compatibility.</p> <p>Bulletin Part 68 Rationale and Measurement Guidelines (Feb 1998)</p>	<p>TIA/EIA-IS-968</p> <p>TIA/EIA-IS-883</p> <p>TIA-968-A</p> <p>T1.TRQ.6-2001</p> <p>Canada VDSL Issue 1 January 2003</p> <p>AS/ACIF S002-2001</p> <p>AS/ACIF S016-2001</p> <p>AS/ACIF S031-2001 AS/ACIF S038-2001 AS/ACIF S043-2001</p> <p>ITU-T G.703 HKTA 2028</p> <p>HKTA 2029</p> <p>TBR 1 : 1995</p> <p>TBR 2 : 1997</p> <p>Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network</p> <p>Telecommunications Telephone Terminal Equipment Supplemental Technical Requirements for Connection of Stutter Dial Tone Detection Devices and ADSL Modems to the Telephone Network</p> <p>Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network</p> <p>Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Telephone Network Industry</p> <p>Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment</p> <p>Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network</p> <p>Requirements for Customer Equipment for connection to hierarchical digital interfaces</p> <p>Requirements for ISDN Basic Access Interface</p> <p>Requirements for ISDN Primary Rate Access Interface</p> <p>Requirements for Customer Equipment for Connection to a Metallic Local Loop Interface of a Telecommunications Network — Part 1: General</p> <p>Part 2: Broadband</p> <p>Part 3: DC, Low Frequency AC and Voiceband</p> <p>Physical/electrical characteristics of hierarchical Digital interfaces</p> <p>Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s</p> <p>Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s</p> <p>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</p> <p>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 1920 kbit/s utilizing interfaces derived from CCITT Recommendations X.21 and X.21 bit</p>	<p>(A2LA Cert. 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TBR 3 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access	IEC 60950 2000 EN 60950 1997, 1998, 2000 IEC 60950-1 2001 UL 60950-1 2003 CSA C22.2 No. 60950-00 CSA C22.2 No. 60950-1 03 AS/NZS 3260 1993	Safety of information technology equipment Safety of information technology equipment, including Electrical business equipment.
TBR 4 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access		
TBR 012 : 1993 + Amdt : 1996	Business Telecommunications (BT); Open Network Provision (ONP) technical requirements; 2 048 kbit/s digital unstructured leased line (D2048U) Attachment requirements for terminal equipment	AS/NZS 3260 Supp 1 1996	Approval and test specification – Safety of information technology equipment including electrical business equipment.
TBR 013 : 1996	Business Telecommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface	ACA TS 001 1997	Approval and test specification – Safety of information technology equipment including electrical business equipment – Alphabetical reference index to IEC 950 (Supplement to AS/NZS 3260:1993) Australian Communication Authority – Safety requirements for customer equipment.
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	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	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. 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.	IEC 60601-1 1995 EN 60601-1 1995 ( <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	Medical electrical equipment, Part 1: General requirements for safety. Medical electrical equipment
TS 016 : 1997	General Requirements for Customer Equipment Connected to Hierarchical Digital Interfaces	Canadian C22.2 No. 1-94 (1-98) 1994, 1998 EN 60065 1994	Medical electrical equipment, Part 1: General Requirements for safety. Audio, video and similar electronic apparatus – Safety requirements Audio/video and musical instrument apparatus for Household, commercial and similar general use Australian/New Zealand Standard – Approval and test Specification – Mains operated electronic and related Equipment for household and similar general use Audio, video and similar electronic equipment, Consumer and commercial products Safety requirements for main operated electronic and related apparatus for household and similar general use.
TS 031 : 1997	Requirements for ISDN Basic Access Interface	IEC 60825 1990	Radiation safety of laser products, equipment Classification, requirements and user's guide
TS 038 : 1997	Requirements for ISDN Primary Rate Access Interface	EN 60825-1 1994 IEC 60825-1 2001 IEC 60825-2 2000-5	Safety of laser products Part 1: equipment Classification, requirements and user's guide.
AS/ACIF S043.2:2001	Requirements for Customer Equipment for connection to a metallic loop interface of a Telecommunications Network – Part 2 Broadband	IEC 60825-4 1997-11 IEC 60335-1 1995 ( <i>Including AM 2 – 1997 &amp; AM 12 – 1997</i> ) EN 60335-1 2001 UL 60335-1 1998 CAN/CSA E335-1 1994	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
<b>Product Safety</b>			
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> ).			
<b>Product Safety Standards</b>	<b>Title</b>		
<i>Specific Product Safety Standards</i>			
IEC 950 1991	Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment.		
UL 1950 1998	Safety of information technology equipment, including electrical business equipment.		
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)		
UL 60950 2000	Safety of information technology equipment		
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UL 61010A-1 : 2002	Electrical equipment for laboratory use; part 1: General requirements		
EN 61010-1 : 2001	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements		
AS/NZS 60950 : 2000	Safety information technology equipment		
<b>Environmental<sup>2</sup></b>			
<b>Environmental Standards</b>	<b>Title</b>		
GR-63-CORE	NEBS Requirements: Physical Protection		
ETS 300 019	Environmental conditions and environmental tests For telecommunications equipment		
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<sup>2</sup> Environmental testing is performed at the satellite facility located at 168 Ayer Rd, Littleton, MA 01460