



Test Report

Report No	EE0649-1
Client	Delta Systems, Inc.
Phone	330-422-5142
Fax	330-655-5039
FRN	0011099124
Models	2023-001 & 2024-001
FCC ID	R932023-001
Equipment Type	Remote Control Transmitter
Equipment Code	DSR
Results	As detailed within this report
Prepared by	 Mairaj Hussain – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	
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.



Summary	3
Product Description (Transmitter)	3
Product Description (Receiver)	3
Test Methodology	4
Statement of Conformity	5
Test Data and Plots	6
Section 15.231(a)	6
Section 15.231(b)	7
Section 15.231(C)	8
Section 15.231(b), 15.205, & 15.209	9
AC Line Conducted Emission Measurements	10
Test Equipment Used	11
Terms And Conditions	15
A2LA Accreditation	17

Summary

This report is an application for certification of a transmitter operating under 47 CFR 15.231(a) of the FCC rules provided for periodic operation within the band 40.66 - 40.7 MHz and above 70 MHz. The product covered by this report is Powerwinch. There are two parts of the product a transmitter and a receiver. Transmitter was tested according to FCC 15.231(a), whereas receiver was tested for spurious emissions in the frequency range of 30 – 5000 MHz. Both transmitter and receiver will be sold together as a system. All testing was done with fresh battery.

Please note that only the TX device is being submitted for certification. RX data is provided for informational purposes.

Product Description (Transmitter)

MN:	2023-001
SN:	Test sample 1
Cables:	None
Power Source:	12V Alkaline battery
Operating Mode:	Constant periodic Tx mode

Product Description (Receiver)

MN:	2024-001
SN:	Test sample 1
Cables:	DC power 1.5 m unshielded Antenna wire 0.3 m unshielded Motor wire 0.3 m unshielded External light (2) wire 0.1 m unshielded Switch (3) wire 0.3 m unshielded
Power Source:	RadioShack AC adapter cat no: 273-1779
Operating Mode:	Constant on Rx mode

Test Methodology

All testing was performed according to the procedures specified in ANSI C63.4 (2003).

Frequency range investigated:	30 MHz- 5000 MHz
--------------------------------------	------------------

Measurement Distance:		
<i>Frequency (MHz)</i>	<i>Distance (m)</i>	<i>Comments</i>
AC conducted (Rx only) 0.15 – 30MHz	-	Conducted
Fundamental 433.92MHz	3 m	Radiated
Spurious & harmonics 30 – 5000 MHz	3 m	Radiated

The EUT was maximized around three orthogonal axes. EUT antenna can not be maximized separately

All readings are peak unless otherwise noted.

Statement of Conformity

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

47 CFR Part #	47 CFR Part #	Comments
	15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
	15.31(e)	Product is battery powered and therefore, voltage variation was not performed on Tx unit.
	15.203	The device utilizes an integrated loop antenna.
	15.204	The antenna is not accessible to the user and therefore cannot be easily removed.
	15.205 15.209	The fundamental is not in a Restricted band and the spurious emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.207	Tx unit is battery powered, therefore conducted EMI was not performed. AC line conducted emissions were performed on Rx
15.231(a)	(1)	Product employs a switch which automatically deactivates the transmitter within 5 sec of being released.
	(2)	Product is manually operated.
	(3)	Product does not transmit periodically at regular predetermined intervals., it only transmit when a switch is pressed.
	(4)	Not used for radio control purposes during emergencies.
15.231(b)		Fundamental and spurious emissions meet the limits specified in this section.
15.231(c)		20dB bandwidth of the emission is less than 0.25% of the center frequency.
15.231(d)		Frequency tolerance is not required, because product does not operate in the specified band.
15.231(e)		Product complies with 15.231(a).

*Test Data and Plots***Section 15.231(a)**

Above plot shows that transmission shuts off in less than 5 seconds.

Section 15.231(b)

Fundamental								Curtis-Straus LLC							
Date: 23-Aug-04 Engineer: Mairaj Hussain				Company: Delta Systems EUT Desc: Power Winch				Work Order: E0649							
								Measurement Distance: 3 m							
Notes: RBW: 120KHz; VBW: 1MHz								EUT Max Freq: 433.92MHz							
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)	---	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	FCC 15.231(b)				
Hpk	433.92	60.8	0.0	17.0	3.1	80.9	---	---	---	100.8	-19.9 Pass				
Havg	433.92	49.4	0.0	17.0	3.1	69.5	---	---	---	80.8	-11.3 Pass				
Table Result: Pass by -11.3 dB								Worst Freq: 433.92 MHz							
Test Site: "T"			Pre-Amp: none			Cable: 65 ft RG8A/U		Analyzer: Yellow		Antenna: Green					
Above readings are adjusted by -11.4dB Duty Cycle CF.															

Sample Calculation:

$$\text{Adjusted Reading} = \text{Reading} - \text{Pre Amp}_{(\text{factor})} + \text{Antenna}_{(\text{factor})} + \text{Cable}_{(\text{factor})}$$

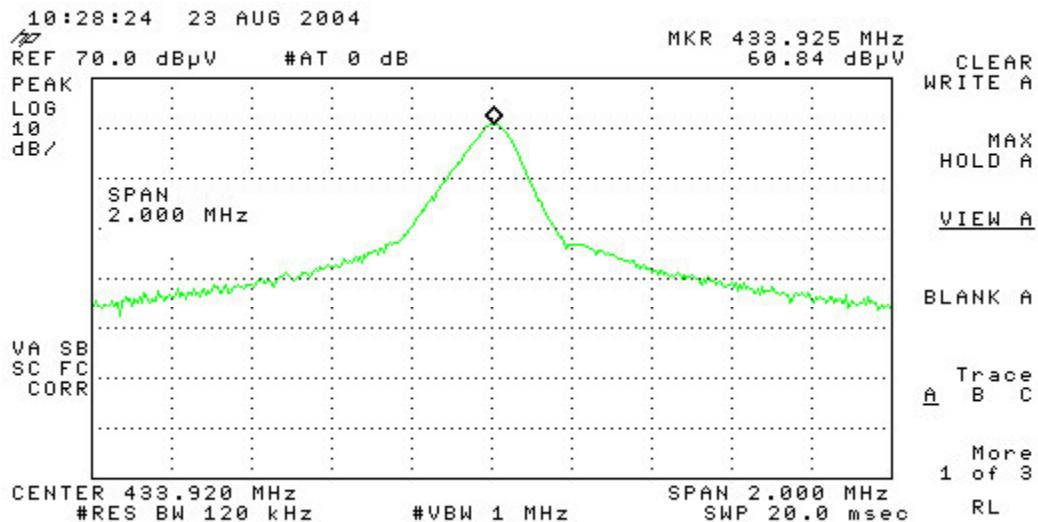
Duty Cycle Correction Factor:

$$\text{Total Length of message} = ((4.24 * .5) + (35.8 * .636) + 2.12) \text{ ms}$$

$$\text{DCCF over 100ms} = 20 * \log\left(\frac{27\text{ms}}{100\text{ms}}\right)$$

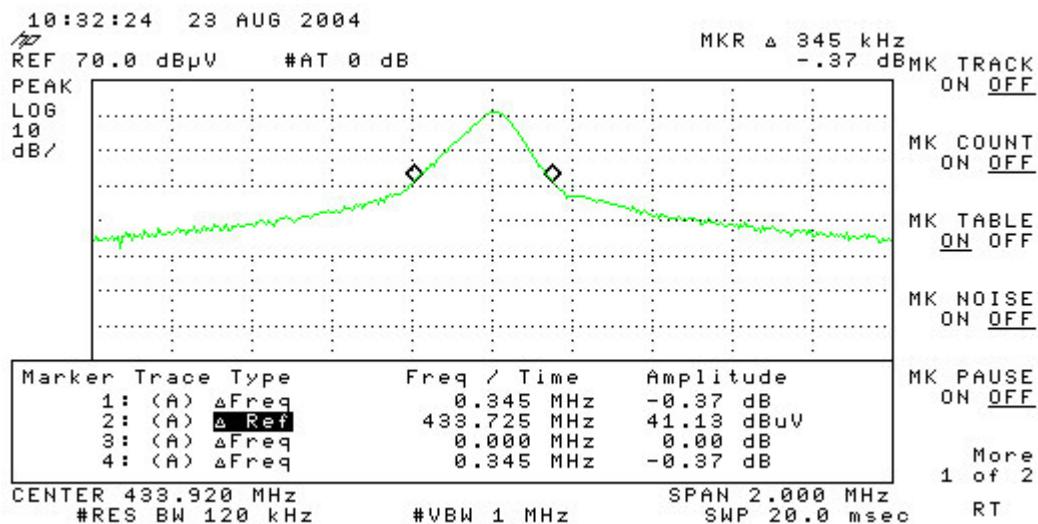
$$= -11.4 \text{ dB}$$

Please also see duty cycle correction factor (DCCF) exhibit.



Fundamental

Section 15.231(C)



20dB bandwidth plot

0.25% of center frequency = (433.92MHz * .0025) = 1.08MHz

Conclusion: 20dB BW is less than 0.25% of center frequency.

Section 15.231(b), 15.205, & 15.209

Spurious Emissions

Radiated Emissions Table											Curtis-Straus LLC					
Date: 23-Aug-04			Company: Delta Systems							Work Order: E0649						
Engineer: Mairaj Hussain																
Frequency Range: 30 - 5000MHz							Measurement Distance: 3 m									
Notes: Tx Spurious Emissions No spurious emissions found for Rx.							EUT Max Freq: 433.92MHz RBW: 120KHz; VBW: 1MHz For F > 1GHz; RBW:1MHz, VBW 3MHz									
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB μ V/m)	Adjusted Reading (dB μ V/m)	---	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)			
Hpk	867.8	40.5	21.5	21.3	4.8	45.1					60.8	-15.7	Pass			
Hpk	1301.0	30.0	20.1	23.3	6.1	39.3					60.8	-21.5	Pass			
Hpk	1735.0	29.0	19.3	26.1	7.6	43.4					60.8	-17.4	Pass			
<i>Note:</i> Peak readings are compared against average limit.																
Table Result: Pass by -15.7 dB							Worst Freq: 867.8 MHz									
Test Site: "T"			Pre-Amp: Black			Cable: 65 ft RG8A/U			Analyzer: Yellow			Antenna: Green				

Sample Calculation:

$$\text{Adjusted Reading} = \text{Reading} - \text{Pre Amp}_{(\text{factor})} + \text{Antenna}_{(\text{factor})} + \text{Cable}_{(\text{factor})}$$

AC Line Conducted Emission Measurements

AC Mains Conducted Emissions								Curtis-Straus LLC											
Date: 24-Aug-04		Company: Delta Systems		Work Order: E0649															
Engineer: Mairaj Hussain		EUT Desc: PowerWinch		Test Site: EM12															
Notes: Rx unit running on RadioShack power supply																			
LISN(s): Orange																			
Range: 0.15-30MHz																			
Other Equipment: ---																			
Frequency (MHz)	Q.P. Readings		Ave. Readings		Impedance Factor	---		Spectrum Analyzer: Blue		Overall Result (Pass/Fail)									
	QP1	QP2	AV1	AV2	(dB)	Limit (dB μ V)	Margin dB	qp Limit (dB μ V)	qp Margin dB										
0.15	18.2	25.3			20.0	---	---	66.0	-20.7	Pass									
0.22	10.3	11.3			20.0	---	---	62.8	-31.5	Pass									
0.41	5.0	4.9			20.0	---	---	57.6	-32.6	Pass									
0.74	4.1	4.1			20.0	---	---	56.0	-31.9	Pass									
1.28	3.6	3.7			20.0	---	---	56.0	-32.3	Pass									
6.45	2.3	2.1			20.0	---	---	60.0	-37.7	Pass									
13.24	2.2	2.2			20.0	---	---	60.0	-37.8	Pass									
26.30	2.7	2.5			20.0	---	---	60.0	-37.3	Pass									

Table Result:

Pass

by

-10.70 dB

Worst Freq:

0.15 MHz

LIMITS

Quasi-Peak: $250\mu\text{V} = 47.9\text{dB}\mu\text{V}$ in the range 450kHz to 30MHz

[47 CFR 15.207(a) Revised as of October 1, 2001]

Note: On July 12, 2004, FCC adopts the conducted emissions limits of the European CISPR 22 standard as outlined below

Frequency of emission (MHz)	Quasi-peak limit (dB μ V)	Average limit (dB μ V)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

[47 CFR 15.207(a) Revised as of October 1, 2002; amended by ET Docket 98-80; FCC 02-157, published in the Federal Register Vol. 67, No. 132, on Wednesday, July 10, 2002]

Line conducted testing was performed with $50\Omega/50\mu\text{H}$ LISN.

Test Equipment Used

REV. 11-AUG-2004

SPECTRUM ANALYZERS		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	26-MAY-2005	
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	04-MAR-2005	
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	30-SEP-2004	
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	11-AUG-2005	
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	10-OCT-2004	
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	15-AUG-2004	
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	02-DEC-2004	
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	03-JUN-2005	
LISNs/MEASUREMENT PROBES		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	
OPEN AREA TEST SITE (OATS)		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		
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		
BUBBLE (HP FACILITY)		N/A	N/A	C-1556	16-MAY-2005		
PREAMPS / ATTENUATORS / FILTERS		RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	31-MAR-2005	
BLUE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	26-JUL-2005	
BLUE-BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	31-MAR-2005	
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	27-FEB-2005	
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	27-FEB-2005	
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	27-FEB-2005	
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	21-JUL-2005	
YELLOW-BLACK	1-20GHz	SMC-12A	C-S	535055	00801	21-JUL-2005	
ORANGE-BLACK	1-20GHz	SMC-12A	C-S	637367	00761	21-JUL-2005	
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	20-JUL-2005	
HIGH PASS FILTER	1-18 GHz	SPA-F-55204	K&L	36	00817	06-JAN-2006	
LOW PASS FILTER	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	06-JAN-2006	
HF 20dB ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNACK	01	00791	21-MAY-2005	

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN BILOG	30MHz-2GHz	CBL6112B	CHASE	2742	00620	06-APR-2006
GREEN-BLACK BILOG	30MHz-2GHz	CBL6112B	CHASE	2412	00127	06-JAN-2006
GREEN-RED BILOG	30MHz-2GHz	CBL6112B	CHASE	2435	00990	06-APR-2006
BLUE-WHITE BILOG	30MHz-2GHz	3142B	EMCO	1527	TELOGY RENTAL	03-AUG-2006
RED BILOG	30MHz-1GHz	3143	EMCO	1270	00042	17-MAR-2005
BLUE BILOG	30MHz-1GHz	3143	EMCO	1271	00803	17-MAR-2005
GRAY BILOG	26MHz-2GHz	3141	EMCO	9703-1038	00066	19-MAY-2005(EMI) / 21-JUN-2005(RFI)
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	19-MAY-2005(EMI) / 25-JUN-2005(RFI)
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	22-MAY-2005
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	12-JUN-2005
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	04-JUN-2005
HF (WHITE) HORN	18-26.5GHz	801-WLM	WAVELIN E	00758	00758	15-JUL-2005
SMALL LOOP (RENTAL)	10kHz-30MHz	PLA-130/A	ARA	1009	TELOGY	11-FEB-2006
SMALL LOOP	9kHz-30MHz	PLA-130/A	ARA	1024	00755	23-FEB-2006
LARGE LOOP	20Hz-5MHz	6511	EMCO	9704-1154	00067	12-NOV-2005
ACTIVE MONPOLE	30Hz-30MHz	3301B	EMCO	3824	00068	05-MAY-2005
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	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
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
MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A00900/A046903-01	00369	09-AUG-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
ABSORBING CLAMPS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
FISCHER CLAMP	30-1000MHz	F-201-23MM	FISCHER	10	00081	16-JAN-2006
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	02-DEC-2004	
RED	NSG435	SCHAFFNER	001625	00762	09-DEC-2004	
YELLOW	930D	ETS	201	00673	16-JUN-2005	
BEST EMC-2	MN	MFR	SN	ASSET	CALIBRATION DUE	
BLUE	711-1100	SCHAFFNER	199824-002SC	00117	28-JUL-2005 (SURGE/D+I/EFT)	
RED	711-1100	SCHAFFNER	200122-074SC	00623	24-JUN-2005 (SURGE) / 28-JUL-2005 (D+I) / 05-NOV-2004 (EFT)	
CHAMBERS AND STRIPLINE	MN	MFR	SN	ASSET	CALIBRATION DUE	
RFI 1 CHAMBER	3 METER COMPACT	PANASHIELD	N/A	00797	25-JUN-2005	
RFI 2 CHAMBER	04' x 07' SHIELDING SYSTEM	LINDGREN	13329	00795	21-JUN-2005	
RFI 3 STRIPLINE	N/A	C-S	N/A	00796	22-JUL-2005	
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	31-DEC-2004	
HARMONIC ANALYZER	MN	MFR	SN	ASSET	CALIBRATION DUE	
HFTS	HP6842A	HP	3531A-00169	00738	03-DEC-2005	

FREQUENCY COUNTER		MN	MFR	SN	ASSET	CALIBRATION DUE
5340A		HP5340A	HP	1440A02320	00787	30-JUL-2004
AMPLIFIERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.5-1000MHz	10W1000B	AR	18708	00032	23-JUN-2005
GREEN	0.5-1000MHz	10W1000B	AR	23423	00123	01-JUN-2005
BLUE	0.01-250MHz	75A250	AR	19165	00039	19-JAN-2005(CRFI) / 23-JUN-2005(RFI)
BLACK	0.01-250MHz	75A250	AR	23411	00122	22-JUN-2005(CRFI) / 25-JUN-2005(RFI)
ORANGE	0.01-250MHz	75A250	AR	26827	00367	19-JAN-2005(CRFI) / 02-JUN-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
FIELD PROBES	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.01-1000MHz	HI-4422	HOLADAY	90369	00031	20-MAY-2005
GREEN	0.01-1000MHz	HI-4422	HOLADAY	97363	00136	05-AUG-2005
SIGNAL GENERATORS	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	20-JUL-2005
GREEN	0.09-2000MHz	HP8648B	HP	3623A02072	00125	10-SEP-2004
ORANGE	0.1-1000MHz	HP8648B	HP	3537A01210	00025	26-MAY-2005
BLACK (TELECOM)	15MHz	HP33120A	HP	US36004674	00766	12-NOV-2004
YELLOW	15MHz	HP33120A	HP	US36014119	00249	26-MAY-2005
BLUE-WHITE	0.1Hz-13MHz	HP3312A	HP	1432A07632	00775	09-MAR-2005
SWEEPER	0.01-20.0GHz	HP83752A	HP	3610A01133	00087	04-APR-2005
BULK INJECTION CLAMPS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN	0.01-100MHz	95236-1	ETS	50215	00118	22-JUN-2005
RED	0.01-100MHz	95236-1	ETS	34026	1020	07-JUL-2005
CDN NETWORKS	RANGE	MN	MFR	ASSET	CALIBRATION DUE	
BLACK	0.10-100MHz	20A M-2	C-S	00783	22-JUN-2005	
BLUE	0.10-100MHz	15A M-3	C-S	00806	22-JUN-2005	
ORANGE	0.10-100MHz	15A M-2	C-S	00786	22-JUN-2005	
RED	0.10-100MHz	15A M-3	C-S	00780	22-JUN-2005	
WHITE	0.10-100MHz	15A M-3	C-S	00782	22-JUN-2005	
YELLOW-BLACK	0.10-100MHz	15A M-3	C-S	00784	22-JUN-2005	
BLUE-BLACK	0.10-100MHz	15A M-3	C-S	00781	22-JUN-2005	
GREEN	0.10-100MHz	30A M-3	C-S	00779	22-JUN-2005	
YELLOW	0.10-100MHz	30A M-5	C-S	00804	22-JUN-2005	
BLUE-WHITE	0.10-100MHz	15A M-5	C-S	00788	22-JUN-2005	
YELLOW (RES)	0.10-100MHz	100Ω RESISTOR Nwk	C-S	00810	10-SEP-2004	
GREEN (RES)	0.10-100MHz	100Ω RESISTOR Nwk	C-S	00785	09-MAR-2005	
SURGE GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE	
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	17-JUN-2005	
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	09-JUN-2005	
THREE PHASE COUPLING Nwk	3CN	CDI	003455	00325	09-JUN-2005	
1.2X50US PLUGIN MODULE	1.2x50US PLUGIN	CDI	N/A	00842	09-JUN-2005	
10X160US PLUGIN MODULE	10X160US PLUGIN	C-S	N/A	00843	09-JUN-2005	
10X560US PLUGIN MODULE	10X560US PLUGIN	C-S	N/A	00841	09-JUN-2005	
10X700US PLUGIN MODULE w/ EXTENSION BOX	10X700US PLUGIN	C-S	N/A	00844/845	23-JUN-2005	
PSURGE CONTROLLER MODULE	PSURGE 8000	HAEFELY	150267	00879	11-JUN-2005	
COUPLING/DECOPUPLING MODULE	PSD 900	HAEFELY	149213	00880	11-JUN-2005	
IMPULSE MODULE	PIM 900	HAEFELY	149202	00881	11-JUN-2005	
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-2005	
2X10US SURGE GENERATOR	2X10US	C-S	N/A	00846	23-JUN-2005	
10X700US SURGE GENERATOR	10X700US	C-S	N/A	00847	17-JUN-2005	
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	18-SEP-2004	

POWER SUPPLIES	MN	MFR	SN	ASSET	CALIBRATION DUE
10001I/2 AC POWER SYSTEM	(2) 500I	CALIFORNIA INSTRUMENTS	HK53687/HK53688	00376	16-JUL-2005
OSCILLOSCOPES	MN	MFR	SN	ASSET	CALIBRATION DUE
OSCILLOSCOPE 100MHz	TDS 220	TEKTRONIX	B068748	00885	02-JUN-2005
OSCILLOSCOPE 100MHz (SAFETY)	TDS 340	TEKTRONIX	B012357	00737	16-OCT-2004
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	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
POWER/NOISE METERS	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
OVERVOLTAGE CHAMBERS	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
DIPOLE TAPE MEASURES	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
METEOROLOGICAL METERS	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
TRACEABLE CLOCKS	MN	MFR	SN	ASSET	CALIBRATION DUE
5003	5003	CONTROL COMPANY	99026940	00808	09-DEC-2004
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 presentment of a bill for such services performed. In the event CLIENT ordered, orally or in writing, services but such services were not assigned a rate for billing, such services shall be billed at the LABORATORY's reasonable and customary rate.
- 5.2 CLIENT shall be responsible for all shipping, customs and other expenses related to services provided by LABORATORY to the CLIENT, and shall fully insure any test sample or other equipment provided to LABORATORY by the CLIENT.
- 5.3 Amounts overdue from CLIENT to LABORATORY shall be charged interest at a rate of 1½% per month.

Paragraph 6. ISO/IEC GUIDE 17025 ADDITIONS:

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

A2LA Accreditation

<p>SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999</p> <p>CURTIS-STRAU¹ 527 Great Road Littleton, MA 01460 Barry Quinlan Phone: 978-486-8880</p> <p>ELECTRICAL</p> <p>Valid until: July 31, 2005</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 Electromagnetic Compatibility (EMC), Telecommunications, and Product Safety tests:</p> <p>Electromagnetic Compatibility (EMC)</p> <p>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> <table border="1"> <thead> <tr> <th>EMC Standards</th><th>Title</th></tr> </thead> <tbody> <tr> <td><i>Emissions</i></td><td></td></tr> <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>Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of technology equipment</td></tr> <tr> <td>information</td><td>Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and (ISM) radio-frequency equipment.</td></tr> <tr> <td>CISPR 11 1990, 1997, 1999</td><td></td></tr> <tr> <td>medical</td><td></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>		EMC Standards	Title	<i>Emissions</i>		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	Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of technology equipment	information	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and (ISM) radio-frequency equipment.	CISPR 11 1990, 1997, 1999		medical		<p>EN 55011 1991, 1998</p> <p>SABS CISPR 11:1997 equipment –</p> <p>Canada ICES-001 1998 CNS13803 AS/NZS 2064: 1997 disturbance</p> <p>CSA C108.8 – M1983</p> <p>CISPR 13:1996, 1998, 2001</p> <p>EN 55013: 1990, 2001 equipment:</p> <p>EN 55013 Amend 12 1994</p> <p>SABS CISPR 13: 1996</p> <p>CNS 13439 of AS/NZS 1053: 1999</p> <p>CISPR 14 1993 (<i>except discontinuous disturbances</i>) appliances for apparatus.</p> <p>EN 55014 1993, 1997 <i>discontinuous disturbances</i>) appliances for</p> <p>AS/NZS 1044: 1995 <i>discontinuous disturbances</i>) appliances for</p> <p><i>Immunity</i></p> <p>CNS13783-1 SABS CISPR 14-1 1993</p> <p>SABS CISPR 14-2 1997 + A1:2001</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 11</p> <p>Household Electrical Appliances Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission – Product family standard Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity – Product family standard</p> <p>Household Electrical Appliances Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission – Product family standard Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity – Product family standard</p> <p>EN 61000-6-1: 1997, 2001</p> <p>industrial EN 61000-6-2: 1998, 2001 EN 50091-2 1996 EMC EN 55024 1998 Limits EN 55103-1 1997 audio, for EN 55103-2 1997 audio, (<i>excluding Annex A3</i>) use. EN 61326 1998 – EN 61547 1996 EN 50130-4 1996 family and EN 55104 1995 household EN 50083-2 1995 2: EN 60601-1-2: 1993, 2002 safety IEC 1800-3 1995 product EN 60555 Part 2 1987 and EN 60555 Part 3 1987 and EN 61000-3-2: 1995, 2000 Limits AS/NZS 61000.3.2 1998 EN 61000-3-3 1995 AS/NZS 61000.3.3 1999 supply ETS 300 386-1 1994</p> <p>Part 1:</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 of 11</p> <p>Electromagnetic Compatibility (EMC) – Generic emission standard. Residential, commercial and light industry. (L.S.) Electromagnetic compatibility – Generic emission standard. 2: Industrial environment Electromagnetic compatibility – Generic emission standard. 1: Residential, commercial and light industry Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment</p>
EMC Standards	Title																					
<i>Emissions</i>																						
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	Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of technology equipment																					
information	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and (ISM) radio-frequency equipment.																					
CISPR 11 1990, 1997, 1999																						
medical																						
<p>(A2LA Cert. No. 1627-01) 10/31/03 11</p>	<p>Page 1 of 11</p>																					
<p>(A2LA Cert. No. 1627-01) 10/31/03 11</p>	<p>Page 2 of 11</p>																					
<p>CISPR 14-2 1996, 1997 + A1:2001</p> <p>CISPR 20: 1995, 2002 with amendment 3 characteristics (<i>associated group only</i>)</p> <p>EN 55020: 1995, 2002 (<i>associated group only</i>) CISPR 24 characteristics – SABS CISPR 24 1997 characteristics – AS/NZS 3200.1.2: 1995 Equipment</p> <p><i>European Union Basic EMC Standards</i> EN 61000-4-2: 1995, 1999, 2001</p> <p>EN 61000-4-3:1997, 1998, 2002 AS/NZS 61000.4.3 1999 frequency, EN 61000-4-4 1995</p> <p>EN 61000-4-5 1995 AS/NZS 61000.4.5 1999 EN 60000-4-6 1996 AS/NZS 61000.4.6 1999 conducted EN 61000-4-8 1994 magnetic EN 61000-4-11 1994 11:</p> <p>ENV 61000-2-2 1993 supply</p> <p><i>EU Product Family Standards</i> EN 50081-1 1992 Part 1: EN 50081-2 1993 Part EN 50082-1 1992, 1998 Part EN 50082-2 1995</p>	<p>Immunity requirements for household appliances, tools and similar apparatus.</p> <p>Limits and methods of measurement of immunity of sound and television broadcast receivers and associated equipment.</p> <p>Electromagnetic immunity of broadcast receivers and Associated equipment.</p> <p>Information technology equipment – Immunity</p> <p>Limits and methods of measurement</p> <p>Information technology equipment – Immunity</p> <p>Limits and methods of measurement</p> <p>Approval and test specification – Medical electrical – General requirements for safety – Collateral Standard: Electromagnetic compatibility – Requirements and tests.</p> <p>Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication</p> <p>Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-electromagnetic field immunity test</p> <p>Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication (EMC) Part 4: Testing and measurement techniques. Section 5:</p> <p>Surge immunity test.</p> <p>Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to disturbances, induced by radio-frequency fields.</p> <p>Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency field immunity test.</p> <p>(EMC) Part 4: Testing and measurement techniques. Section 10: Voltage dips, short interruptions and voltage Variations immunity tests.</p> <p>Electromagnetic compatibility (EMC). Part 2: Environment, Section 2: Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power systems (IEC 1000-2-2:1990)</p> <p>Electromagnetic capability – Generic emission standard. Residential, commercial and light industry. (L.S.)</p> <p>Electromagnetic compatibility – Generic emission standard. 2: Industrial environment</p> <p>Electromagnetic compatibility – Generic emission standard. 1: Residential, commercial and light industry</p> <p>Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment</p>	<p>EN 61000-6-1: 1997, 2001</p> <p>industrial EN 61000-6-2: 1998, 2001 EN 50091-2 1996 EMC EN 55024 1998 Limits EN 55103-1 1997 audio, for EN 55103-2 1997 audio, (<i>excluding Annex A3</i>) use. EN 61326 1998 – EN 61547 1996 EN 50130-4 1996 family and EN 55104 1995 household EN 50083-2 1995 2: EN 60601-1-2: 1993, 2002 safety IEC 1800-3 1995 product EN 60555 Part 2 1987 and EN 60555 Part 3 1987 and EN 61000-3-2: 1995, 2000 Limits AS/NZS 61000.3.2 1998 EN 61000-3-3 1995 AS/NZS 61000.3.3 1999 supply ETS 300 386-1 1994</p> <p>Part 1:</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 of 11</p> <p>Electromagnetic Compatibility (EMC) – Generic standards-Section 1: Immunity for residential, commercial and light-environments Electromagnetic Compatibility (EMC)- Part 6: Generic standards-Specification for Uninterruptible Power Systems (UPS). Part 2: requirements Information technology equipment – Immunity Characteristics – and methods of measurement.</p> <p>Electromagnetic Compatibility – Product family standard for video, audio-visual and entertainment lighting control apparatus professional use. Part 1: Emission</p> <p>Electromagnetic Compatibility – Product family standard for video, audio-visual and entertainment lighting control professional use. Part 2: Immunity</p> <p>Electrical equipment for measurement, control and laboratory use EMC requirements</p> <p>Equipment for general lighting purposes – EMC immunity</p> <p>Alarm Systems. Part 4: Electromagnetic compatibility. Product standard: Immunity requirements for components of fire, intruder social alarm systems.</p> <p>Electromagnetic compatibility immunity – requirements for appliances, tools and similar apparatus. Product family standard. Cabled distribution systems for television and sound signals. Part Electromagnetic compatibility for equipment.</p> <p>Medical electrical equipment Part 1: general requirements for Section 2: Collateral standard: Electromagnetic compatibility – Adjustable speed electrical power drive systems. Part 3: EMC standard including specific test methods.</p> <p>Disturbances in supply systems caused by household appliances similar electrical equipment. Part 2: Harmonics</p> <p>Disturbances in supply systems caused by household appliances similar electrical equipment. Part 3: Voltage fluctuations.</p> <p>Electromagnetic compatibility (EMC). Part 3: Limits Section 2: for harmonic current emissions</p> <p>Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limitation of voltage fluctuations and flicker in low-voltage systems.</p> <p>Equipment Engineering (EE); Public telecommunication network equipment electro-magnetic compatibility (EMC) requirements</p> <p>Product family overview, compliance criteria and test levels</p>																				
<p>(A2LA Cert. No. 1627-01) 10/31/03 11</p>	<p>Page 3 of 11</p>																					

<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 by sources ETS 300 132-2 1996 by ETR 283 1997 Interface A distributions.</p> <p><i>EU radio standards</i> (ETS) EN 300 385 v1.2.1; 1998, 1999</p> <p>EN 300 330 v1.2.1; 1998, 1999 characteristics 25 kHz ETS 300 328 1996 transmission data and ETS EN 300 440 v1.2.1 1999 test GHz EN 301 893:2002 v1.2.1 Essential ETS 300 836-1:1998 Performance Conformance Radio EN301 489-17:2002 v1.2.1 for</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 11</p>	<p>Electromagnetic compatibility and radio spectrum matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements; Part 2: Product family standard. Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated alternating current (ac) derived from direct current (dc) Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated direct current (dc) Equipment Engineering (EE); Transient voltages at telecommunications direct current (DC) power</p> <p>Electromagnetic compatibility and Radio spectrum matters (ERM); Electromagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment (ETS) Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices (SRD); Technical and test methods for radio equipment in the range 9 kHz to 30 MHz Radio Equipment and Systems (RES); Wideband systems; Technical characteristics and test conditions for transmission equipment operating in the 2.4 GHz ISM band using spread spectrum modulation techniques Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices; Technical characteristics and methods for radio equipment to be used in the 1 GHz to 40 frequency range Broadband Radio Access Networks (BRAN); 5 GHz (draft) high performance RLAN; Harmonized EN covering requirements of article 3.2 of the R&TTE Directive Broadband Radio Access Networks (BRAN); High Radio Local Area Network (HIPERLAN) Type 1; testing specification; Part 1: Radio Type approval and Frequency (RF) conformance test specification Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions 2.4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment</p> <p>FCC (Federal Communications Commission) methods Of measurement of radio noise emissions from industrial, and medical equipment. Bellcore electromagnetic compatibility and electrical safety Generic criteria for network telecommunications</p> <p>American National Standard for methods of measurement radio-noise emissions for low-voltage electrical and equipment in the range of 9 kHz to 40GHz. American National Standard for electromagnetic radiated emissions measurements in electromagnetic interference (EMI) control – calibration of antennas.</p> <p>IEEE recommended practice on surge voltages in low-AC power circuits</p> <p>Electromagnetic compatibility and electrical safety (EMC for wired terminal equipment. Harmonization document information over the OFCOM requirements.</p> <p>South African Bureau of Standards: Specification for equipment. Part 1: Casino equipment.</p> <p>Technical Requirements Instruction for Test Conditions for Requirement under Test</p> <p>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>Connection of terminal equipment to the telephone Equipment network. Analog and Digital Equipment. TCB Scope</p> <p>C1. Specification for terminal equipment, terminal systems,</p> <p>EN 300 328-2:2001 (ERM); v1.2.1</p> <p>EN 301 489-1:2002 (ERM); equipment EN 60669-2-1:2002 Part</p> <p><i>Canada Radio Standards</i> Canadian GL-36 1995 in the Canadian RSS-119 1999, 2000 Issue 6 Canadian RSS-134 1996 & 2000, Issue 1 Rev 1 Canadian RSS-210 2000 Issue 3, RFS29 1998 Zealand)</p> <p><i>FCC Standards</i> 47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices. 47 CFR FCC low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices. 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 B2 Scope Services in the following FCC Rule Parts 22, 74, 90, 95, 97. 47 CFR FCC Maritime and Aviation B3 Scope RadioServices in 47 CFR Parts 80 and 87 47 CFR FCC Microwave Radio Services B4 Scope in 47 CFR Parts 21, 74 and 101.</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 11</p>	<p>Electromagnetic compatibility and Radio spectrum Matters 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 Electromagnetic compatibility and Radio spectrum Matters Electromagnetic Compatibility (EMC) standard for radio and services; Part 1: Common technical requirements Switches for household and similar fixed electrical installations -- 2-1: Particular requirements – Electronic switches</p> <p>Industry Canada – technical requirements for low power Devices 2400 – 2483.5 MHz band. Industry Canada – Land mobile and fixed radio Transmitters and receivers, 27.41 to 960.0 MHz Industry Canada – 900 MHz narrowband personal communications services Industry Canada – Low power license-exempt radio 2001 Issue 5 communication devices Specification for Restricted Radiation Radio Apparatus (New Zealand)</p> <p>Scope A1</p> <p>Scope A2</p> <p>A3</p> <p>A4</p> <p>B1</p> <p>B2</p> <p>B3</p> <p>B4</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 11</p>
<p>FCC/OST MP-5 1986 scientific GR-1089-CORE: 1997, 1999 issue 2/ – 2002 Issue 3 equipment.</p> <p><i>ANSI EMC Standards</i> ANSI C63.4: 1992, 1999, 2001 of electronic ANSI C63.5 1988 compatibility –</p> <p><i>IEEE EMC Standards</i> IEEE C62.41: 1980, 1991 voltage</p> <p><i>Swedish EMC Standards</i> BAKOM 3336.3 1995 & S)</p> <p><i>South African EMC standards other than CISPR equivalents</i> SABS 1718-1: 1996 Gaming</p> <p><i>Japanese VCCI Standards</i> VCCI V-3/99.05 1999 VCCI V-4/99.05 1999</p> <p>Telecommunications Telecommunications Registration; General test methods; Lightning surge; Drop testing; Balance testing; Signal power (metallic and longitudinal); Frequency measurements; Pulse templates; Leakage testing; Impedance testing; Hearing Aid Compatibility testing (<i>excluding volume control</i>); Protocol analysis and Jitter testing.</p> <p>Telecom Standards</p> <p>FCC 47 CFR Part 68 Telephone Terminal Scope</p> <p>CS-03 Issue 8 1996 through amendment 5</p>	<p>TIA/EIA-IS-968 Telephone TIA/EIA-IS-883 Supplemental Detection</p> <p>TIA-968-A Telephone T1.TRQ.6-2001</p> <p>Telephone Canada VDSL Issue 1 January 2003</p> <p>AS/ACIF S002-2001 Telephone AS/ACIF S016-2001 hierarchical AS/ACIF S031-2001 AS/ACIF S038-2001 AS/ACIF S043-2001 Metallic</p> <p>ITU-T G.703 HKTA 2028 PTNs in HKTA 2029 PTNs in TBR 1 : 1995 to</p> <p>Recommendation</p> <p>TBR 2 : 1997</p> <p>to 1 Recommendations</p>	<p>Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Network Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Stutter Dial Tone</p> <p>Devices and ADSL Modems to the Telephone Network Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Network Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Network Industry Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Network Requirements for Customer Equipment for connection to digital interfaces Requirements for ISDN Basic Access Interface Requirements for ISDN Primary Rate Access Interface Requirements for Customer Equipment for Connection to a Local Loop Interface of a Telecommunications Network — Part 1: General Part 2: Broadband Part 3: DC, Low Frequency AC and Voiceband Physical/electrical characteristics of hierarchical Digital interfaces Network connection specification for connection of CPE to the Hong Kong using digital leased circuits at data rate of 1544 kbit/s Network connection specification for connection of CPE to the Hong Kong using digital leased circuits at data rate of 2048 kbit/s Attachment requirements for terminal equipment to be connected 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 X.21 but operating at any data signaling rate up to, and including, 1 984 kbit/s 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 920 kbit/s utilizing interfaces derived from CCITT X.21 and X.21 bit</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 920 kbit/s utilizing interfaces derived from CCITT X.21 and X.21 bit</p> <p>Page 5 of</p> <p>(A2LA Cert. No. 1627-01) 10/31/03 11</p> <p>Page 6 of</p>

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

(A2LA Cert. No. 1627-01) 10/31/03
11 Page 11 of