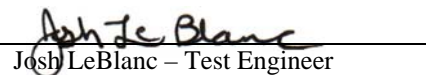





FCC ID: IGKHP107A
IC: 4213A-HP107A

Test Report

Report No	EG0726-1
Client	Arbitron
Phone	410-312-8515
Fax	410-312-8604
FRN	007870256
Models	Model HP107A Locator Hub
FCC ID	IGKHP107A
IC #	4213A-HP107A
Emissions Designator	12K1A1D
Equipment Type	Low Power Periodic Communications Device Transmitter
Equipment Code	DXX
Results	As detailed within this report
Prepared by	 Josh LeBlanc – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	9/14/06
Conditions of issue	This Test Report is issued subject to the conditions stated in 'Conditions of Testing' section of this

Summary	3
Test Methodology	3
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Emission Bandwidth	7
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Summary

This report is an application for certification of a transmitter operating pursuant to 47 CFR and RSS-210 Issue 6. The product covered by this report is the Model HP107A Locator Hub. It has only a transmitter which operates at 433.92MHz.

Test Methodology

Radiated emissions testing was performed according to the procedures specified in ANSI C63.4 (2003). The EUT was maximized around one axis, as the EUT can only be installed in one position. The EUT has an integrated internal antenna which can not be maximized separately. The standard test voltage was 120VAC. The ambient environmental conditions were as follows:

Date	Temperature	Humidity
7/24/06	24.7°C	1010.6mb
7/25/06	24.8°C	1012.0mb
7/26/06	25.1°C	1009.8mb
7/29/06	24.6°C	1004.7mb
8/09/06	25.2°C	1014.7mb

Frequency range investigated:	30 MHz- 5GHz
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Measurement Distance:		
<i>Frequency (MHz)</i>	<i>Distance (m)</i>	<i>Comments</i>
AC conducted 0.15 – 30MHz	-	Conducted
Fundamental 433.82MHz	3 m	Radiated
Spurious & harmonics 30 –5000 MHz	3 m	Radiated

All readings are peak unless otherwise noted.

Statement of Conformity

The HP107A has been found to conform to the following parts of the 47 CFR, RSS-210, and RSS-GEN as detailed below:

RSS-GEN	RSS-210	47 CFR Part #	Comments
5.3		15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
5.2		15.19	The label is shown in the label exhibit.
7.1.5		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)	The voltage was varied to $\pm 15\%$ of the rated voltage. The fundamental did not change.
7.1.4		15.203	The device utilizes an integrated antenna.
7.1.4		15.204	The antenna is not accessible to the user and therefore cannot be easily removed.
	2.2	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.
See comment		15.207(b)(2)	AC line conducted emissions. EUT meets ICES-006 Issue 1 limits for carrier current systems.
	A1.1.1(1)	15.231(a)(1)	Product complies with 15.231(e), and A1.1.5
	(2)	(2)	Product complies with 15.231(e), and A1.1.5
	(3)	(3)	Product complies with 15.231(e), and A1.1.5
	(4)	(4)	Product complies with 15.231(e), and A1.1.5
		15.231(b)	Product complies with 15.231(e).
	A1.1.3	15.231(c)	20dB bandwidth of the emission is less than 0.25% of the center frequency.
	A1.1.4	15.231(d)	Frequency tolerance is not required, because product does not operate in the specified band.
	A1.1.5	15.231(e)	Fundamental and spurious emissions meet the limits specified in this section.

Modifications required for compliance:

In order to meet the limit at the fundamental, the output power was lowered by increasing R34 from 5.9kOhms to 24.9kOhms.

EUT Configuration

EUT Configuration				
Work Order: G0726 Company: Arbitron Inc. Company Address: 9705 Patuxent Woods Drive Columbia, MD 21046 Contact: Robert Shelley				
MN		SN		
EUT: HP107A		001267	(Operational Sample)	
		001266	(100% Duty Cycle Sample)	
		001265	(Actual Duty Cycle Sample)	
EUT Description: Data Collector EUT Max Frequency: 433MHz				
Support Equipment:	MN	SN		
Bell Telephone	2500DM	-		
Compaq Laptop w/ mouse	Armada 7400	Arbitron 103184		
Telephone Line Simulator	Telton TLS-3B-01	168258		
ZOOM Modem	3048	1384-3048-00-03C1-0079		
EUT Cables:	Qty	Shielded?	Length	Ferrites
AC Power	1	No	2m	No
RJ11 Telephone Cables	2	No	7ft	No
Unpopulated EUT Ports:	Qty	Reason		
None				
Software / Operating Mode Description:				
Radiated/Conducted Spurious Emissions: EUT is operating normally; placing calls to the support laptop through the telephone line simulator and uploading packets of data.				
Radiated Fundamental/Harmonic Emissions: EUT is transmitting a 100% duty cycle CW signal				

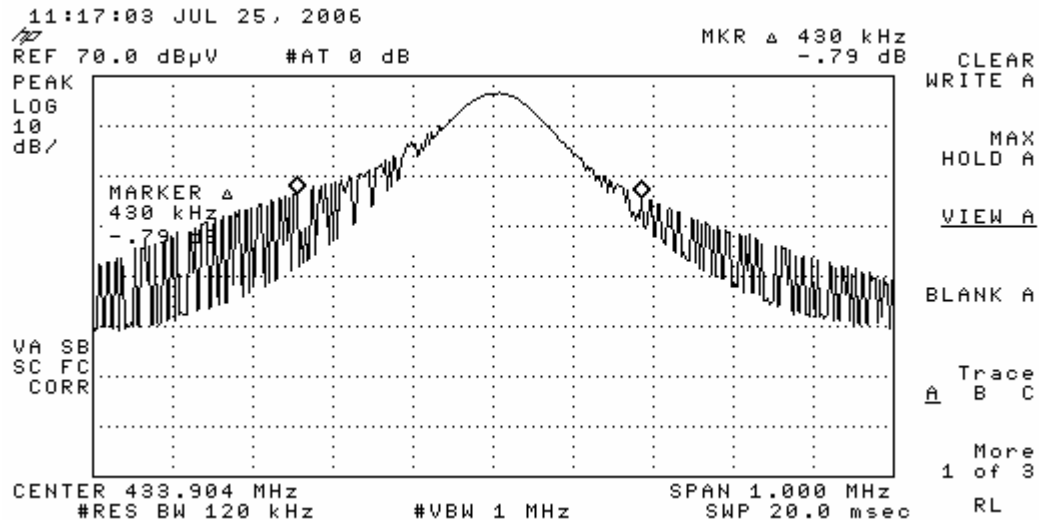
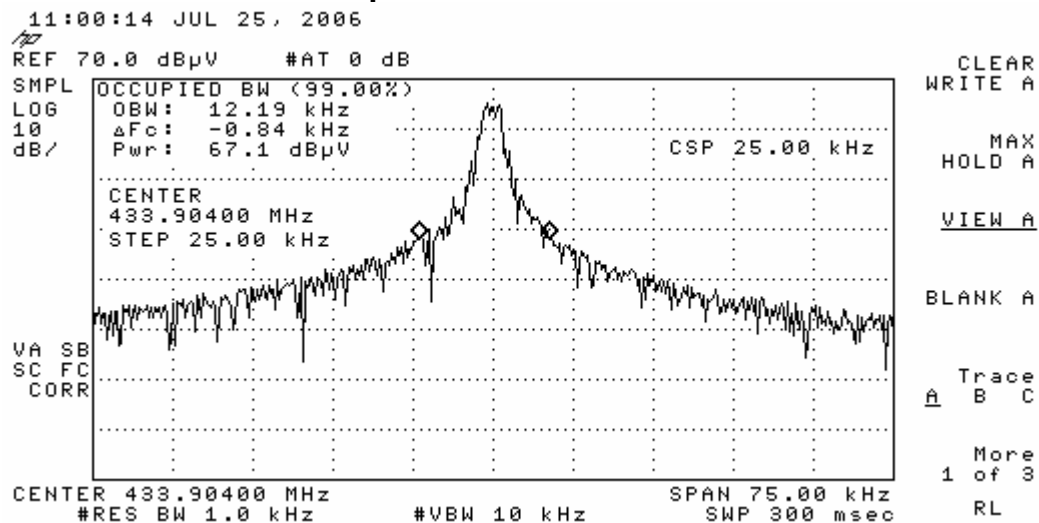
Spurious Radiated Emissions

FCC Sections 15.231(b) & (e), 15.205, 15.209, & RSS-210 section 2.2

Radiated Emissions Table							Curtis-Straus LLC		
Date: 25-Jul-06			Company: Arbitron			Work Order: G0726			
Engineer: Evan Gould			EUT Desc: HP107A						
Frequency Range: 30-1000MHz					Measurement Distance: 3 m				
Notes: TX mode						RBW: 120kHz			
						VBW: 1MHz			
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.231(b); RSS-210 Table 4		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Vbb	144.8	42.2	21.4	13.5	1.5	35.8	52.8	-17.0	Pass
Hqp	221.2	40.2	21.3	11.5	1.9	32.3	52.8	-20.5	Pass
Hqp	294.9	42.1	21.3	13.9	2.3	37.0	52.8	-15.8	Pass
Hqp	368.6	43.0	21.2	15.6	2.6	40.0	52.8	-12.8	Pass
Hqp	516.1	30.1	20.9	18.3	3.2	30.7	52.8	-22.1	Pass
Table Result:		Pass		by		-12.8 dB		Worst Freq: 368.6 MHz	
Test Site: "T"		Pre-Amp: Green		Cable: EMIR-04		Analyzer: Green		Antenna: Red-Black	

Radiated Emissions Table								Curtis-Straus LLC		
Date: 26-Jul-06				Company: Arbitron				Work Order: G0726		
Engineer: Evan Gould				EUT Desc: HP107A						
Frequency Range: 1-5GHz						Measurement Distance: 3 m				
Notes: TX mode						RBW: 1MHz				
						VBW: 3MHz				
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.231(b); RSS-210 Table 4		
								Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Hpk	1301.5	53.3	42.4	26.2	2.1	0.0	39.2	72.8	-33.6	Pass
Hav	1301.5	53.3	42.4	26.2	2.1	16.8	22.4	52.8	-30.4	Pass
Vpk	1735.3	56.0	42.4	27.6	2.3	0.0	43.5	72.8	-29.3	Pass
Vav	1735.3	56.0	42.4	27.6	2.3	16.8	26.7	52.8	-26.1	Pass
Table Result:		Pass		by		-26.1 dB		Worst Freq:		1735.3 MHz
Test Site: "A"		Pre-Amp: Red-Green		Cable: EMIR-HIGH 5		Analyzer: Black		Antenna: Orange Horn		

Sample Calculation:Adjusted Reading = Reading – Pre Amp_(factor) + Antenna_(factor) + Cable_(factor)

Emission Bandwidth**FCC Section 15.231(c) & RSS-210 section A1.1.3****20dB bandwidth plot****1 kHz RBW 99% bandwidth plot**

0.25% of center frequency = $(433.82\text{MHz} * .0025) = 1.084\text{MHz}$

Conclusion: The 20dB and 99% bandwidths are less than 0.25% of the center frequency.

Fundamental Field Strength and Duty Cycle

FCC Section 15.231(e) & RSS-210 section A1.1.5

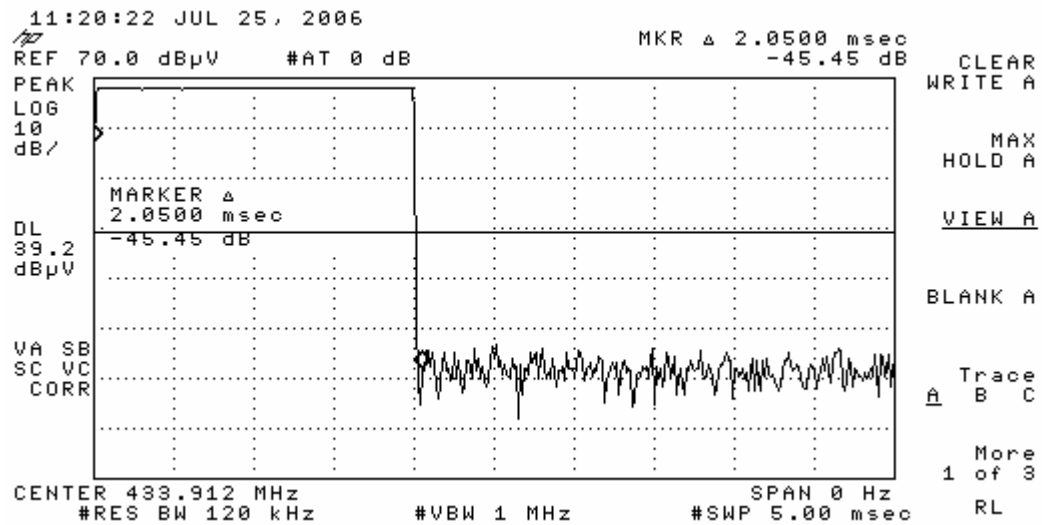
Fundamental Field Strength								Curtis-Straus LLC		
Date: 29-Aug-06			Company: Arbitron					Work Order: G0726		
Engineer: Evan Gould			EUT Desc: HP107A (s/n: 001266)							
Frequency Range: 433.82MHz							Measurement Distance: 3 m			
Notes: Duty Cycle = 14.35% (worst case 100ms) Duty Cycle Correction Factor = 16.8dB R34 has been changed from 5.9kOhms to 24.9kOhms.							RBW: 120kHz VBW: 1MHz			
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.231(e); RSS-210 Table 4		
								Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Hpk	433.84	69.5	0.0	16.8	2.5	0.0	88.8	92.8	-4.0	Pass
Hav	433.84	69.5	0.0	16.8	2.5	16.8	71.9	72.8	-0.9	Pass
Table Result:		Pass		by		-0.9 dB		Worst Freq:		433.84 MHz
Test Site: "A"		Pre-Amp: none		Cable: EMIR-11		Analyzer: Yellow		Antenna: Red-Black		

Sample Calculation:Adjusted Reading = Reading – Pre Amp_(factor) + Antenna_(factor) + Cable_(factor)**Duty Cycle Correction Factor:**

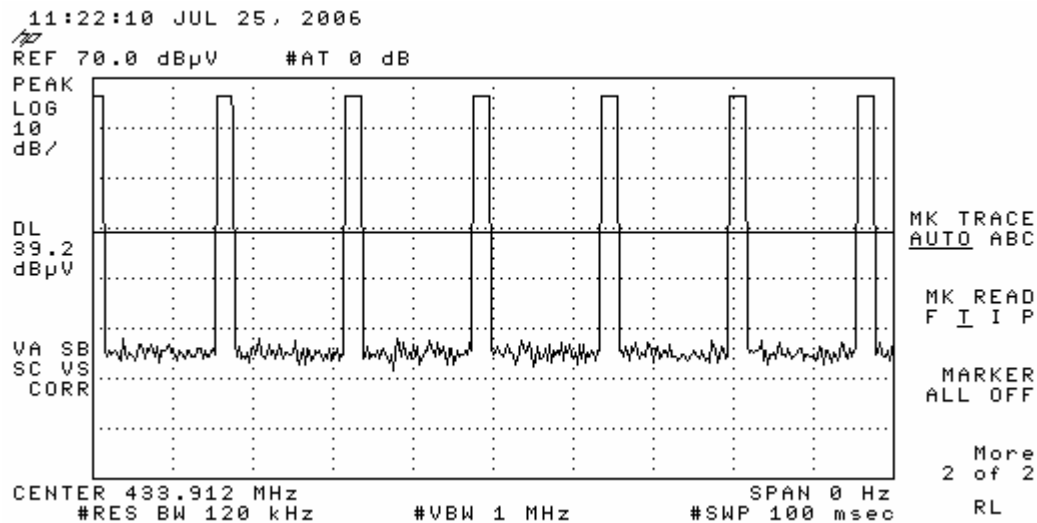
DCCF over 100ms = 20*log(14.35ms/100ms) = -16.8dB

See technical description document and plots on page 9 for further details on the duty cycle.

Duty Cycle Plots



Transmission Pulse = 2.05 seconds



100mS window

AC Line Conducted Emission Measurements

FCC Section 15.207(b)(2) & ICES-006

AC Mains Conducted Emissions					Curtis-Straus LLC		
Date: 24-Jul-06		Company: Arbitron		Work Order: G0726			
Engineer: Evan Gould		EUT Desc: HP107A		Test Site: EMI 2			
Notes: RBW = 9kHz; VBW = 30kHz							
Measurement Device: Green LISN							
Range: 535-1705 kHz				Spectrum Analyzer: Yellow			
Frequency (MHz)	QP Readings		Impedance Factor (dB)	Adjusted Reading (dBμV)	CFR 15.207(b)(2) ICES 006		Overall Result (Pass/Fail)
	QP1 (dBμV)	QP2 (dBμV)			QP Limit (dBμV)	QP Margin dB	
During a call							
0.79	14.4	15.3	20.3	35.6	60.0	-24.4	Pass
0.99	16.4	20.1	20.3	40.4	60.0	-19.6	Pass
1.09	16.7	21.0	20.3	41.3	60.0	-18.7	Pass
1.19	17.3	21.3	20.3	41.6	60.0	-18.4	Pass
1.29	17.5	20.3	20.3	40.6	60.0	-19.4	Pass
1.58	18.3	13.7	20.3	38.6	60.0	-21.4	Pass
Idle mode							
0.59	22.3	16.8	20.4	42.7	60.0	-17.3	Pass
1.09	22.6	18.1	20.3	42.9	60.0	-17.1	Pass
1.19	24.1	20.3	20.3	44.4	60.0	-15.6	Pass
1.29	24.3	19.0	20.3	44.6	60.0	-15.4	Pass
1.38	23.2	18.0	20.3	43.5	60.0	-16.5	Pass
1.48	21.0	16.0	20.3	41.3	60.0	-18.7	Pass
Pass by -15.40 dB Worst Freq: 1.29 MHz							

Line conducted testing was performed with 50Ω/50μH LISN.

Voltage Variations

FCC Section 15.31(e)

Voltage Variations		
Work Order: G0726		
Date: 9-Aug-06		
Engineer: Josh LeBlanc		
EUT: HP107A		
Fundamental (MHz)	voltage (Vac)	Reading (dBuV)
433.9	230.00	71.5
433.9	76.50	71.5
433.9	281.75	71.5
Analyzer: Red		

Conclusion: The fundamental amplitude does not vary when the input voltage is varied by ±15%.

Test Equipment Used

REV. 28-AUG-2006

REV: 20-AUG-2006

SPECTRUM ANALYZERS / RECEIVERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	I	30-DEC-2006
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	I	05-JUN-2007
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	I	02-AUG-2005
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	I	02-NOV-2006
LISNS/MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	0411657	00987	II	08-MAY-2007
OPEN AREA TEST SITES (OATS)	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE		
SITE T	93448	IC 276A-2	R-905	II	14-AUG-2007		
SITE A	93448	IC 2762-A	R-903	II	13-AUG-2007		
CONDUCTED TEST SITES (MAINS / TELCO)	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE		
EMI 2	93448	N/A	C-1802, T-269	III	NA		
PREAMPS / ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN	0.01-2000MHZ	ZFL-1000-LN	C-S	N/A	00802	II	07-AUG-2007
RED-GREEN	1-20GHZ	PM2-38-218-4R5-17-15-SFF	C-S			II	14-AUG-2007
ANTENNAS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED-BLACK BILOG	30-2000MHZ	JB1	SUNOL	A091604-2	01106	II	11-APR-2008
ORANGE HORN	1-18GHZ	3115	EMCO	0004-6123	00390	I	09-JUN-2007
RMS VOLTMETERS/CURRENT CLAMP	MN	MNFR	SN	ASSET	CAT	CALIBRATION DUE	
TRUE-RMS MULTIMETER	79III	FLUKE	71700298	00769	I	25-OCT-2006	
TRUE-RMS MULTIMETER (REFERENCE)	177	FLUKE	83390024	00973	I	21-MAR-2007	
TRUE-RMS MULTIMETER	177	FLUKE	83390025	00974	I	10-MAR-2007	
TRUE-RMS MULTIMETER (TELECOM)	177	FLUKE	83430419	00975	I	21-MAR-2007	
METEOROLOGICAL METERS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE	
TEMP./HUMIDITY/ATM. PRESSURE GAUGE	7400 PERCEPTION II	DAVIS	N/A	00965	II	08-FEB-2007	
TEMPERATURE /HUMIDITY GAUGE	THG-912	HUGER	4000562	00789	I	01-FEB-2007	
WEATHER CLOCK (PRESSURE ONLY)	BA928	OREGON SCIENTIFIC	C3166-1	00831	I	02-FEB-2007	

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and "CURTIS-STRAUS" (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS

AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

Rev.160009121(2)_#684340 v13CS

A2LA Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

CURTIS-STAUS¹
527 Great Road
Littleton, MA 01460
Barry Quinlan Phone: 978-486-8880
ELECTRICAL

Valid until: July 31, 2007

Certificate Number: 1627.01

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

Electromagnetic Compatibility (EMC)

Radiated emissions testing (electric and magnetic fields)*; Conducted emissions testing (voltage and current)*; Electrostatic Discharge testing*; Electrical Fast Transient testing*; Radiated Immunity testing*; Conducted Immunity testing*; Lightning Immunity testing*; Voltage Dips*, Interrupts and Voltage Variations testing*; Magnetic Immunity testing*; RF Power measurements*; Frequency Stability Measurements*; Longitudinal Induction measurements*; Harmonic emissions testing*; Light flicker testing*; Low frequency disturbance voltage testing*; Disturbance Power measurements*; Power Cross Overvoltage testing*;

Test Type	Test Method(s)
Emissions	
Radiated and Conducted Emissions	FCC 47 CFR Parts 15 & 18; C63.4; CISPR 22; EN55022; SABS CISPR 22; AS/NZS CISPR 22; AS/NZS 3548; Canada ICES-003; CNS13438; KN 22 (RRL No. 2005-82, September 29, 2005); CISPR 11; EN 55011; SABS CISPR 11; AS/NZS CISPR 11; AS/NZS 2064; Canada ICES-001; CNS13803; CISPR 13; EN 55013; SABS CISPR 13; AS/NZS CISPR 13; AS/NZS 1053; CISPR 14-1; EN 55014-1; SABS CISPR 14; AS/NZS CISPR 14; AS/NZS 1044; CNS 13439; CISPR 15; EN 55015; GR-1089-CORE; CSA C108.8-M1983;
Harmonics	EN 61000-3-2; AS/NZS 61000.3.2
Flicker	EN 61000-3-3; AS/NZS 61000.3.3

1 Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460 and, for test types marked with an asterisk, at other sites as defined in "A2LA specific criteria for the accreditation of site testing and site calibration laboratories."

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Immunity	RRL No. 2005-130 (December 27, 2005)
Electrostatic Discharge (ESD)	EN 61000-4-2; AS/NZS 61000.4.2; KN61000-4-2
Radiated Immunity (RFI)	EN 61000-4-3; AS/NZS 61000.4.3; KN61000-4-3
Electrical Fast Transient Bursts (EFT)	EN 61000-4-4; AS/NZS 61000.4.4; KN61000-4-4
Surge	EN 61000-4-5; AS/NZS 61000.4.5; KN61000-4-5
Conducted Immunity	EN 61000-4-6; AS/NZS 61000.4.6; KN61000-4-6
Magnetic Immunity	EN 61000-4-8; AS/NZS 61000.4.8; KN61000-4-8
Voltage Dips and Interrupts	EN 61000-4-11; KN61000-4-11
Low Frequency Conducted Disturbances	EN 61000-2-2

Family Product or Industry Specific Specifications including emissions and/or immunity	GR-1089-CORE; GR-78-CORE (ESD) EN50081-1; EN50081-2; EN50082-2; EN50082-1; EN 61000-6-1; EN 61000-6-2; EN 61000-6-3; EN 61000-6-4; EN 50091-2; EN 55024; CISPR 24 EN 55103-1; EN 55103-2; EN 61326; EN 61547; EN 50130-4; EN 50083-2; EN 60601-1-2; EN 60601-2-2; EN 60601-2-24; EN 60601-2-32; EN 60601-2-38; EN 60601-2-47; IEC 1800-3; EN 61800-3; EN 55020; CISPR 20; EN 60555 Part 2; EN 60555 Part 3; ETS 300 386-1; EN 300 386-2; EN 300 386; ETS 300 132-1; ETS 300 132-2; EN 60669-2-1; AS/NZS 3200.1.2; CNS 13783-1; ETR 283; C62.41
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Radiocommunications	
<i>EU R&TTE Radio Standards;</i>	EN 300 220-1; EN 300 220-3; EN 300 330-1; EN 300 330-2; EN 300 440-1; EN 300 440-2; EN 300 328; EN 300 385; EN 301 893
<i>EU R&TTE EMC Standards</i>	EN 300 339; EN 301 489-01; EN 301 489-03; EN 301 489-17
<i>Canada Radio Standards</i>	RSS-102; RSS-117; RSS-118; RSS-119; RSS-123; RSS-125; RSS-128; RSS-129; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-136; RSS-137; RSS-138; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-187; RSS-188; RSS-191; RSS-192; RSS-193; RSS-195; RSS-210; RSS-212; RSS-213; RSS-215; RSS-243; RSS-GEN; RSS-310; GL-36;
<i>Australia/New Zealand Radio Standards</i>	AS/NZS 4268; AS/NZS 4771; RFS29; Radiocommunications (Data Transmission Equipment Using Spread Spectrum Modulation Techniques); Radiocommunications (Spread Spectrum Devices); Radiocommunications (Short Range Devices); Radiocommunications (Low Interference Potential Devices);

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Other Radio Standards	RTTE 01 (DGT-Taiwan);
FCC Standards and Test methods Support TCB Status--	
FCC Scope A – Unlicensed Radio Frequency Devices	
A1	1. 47 CFR Parts 11, 15 and 18 2. FCC MP-5, 3. ANSI C63.4-2003;
A2	1. 47 CFR Part 15, 2. ANSI C63.4-2003;
A3	1. 47 CFR Part 15, 2. ANSI C63.17-1998, 3. ANSI C63.4-2003;
A4	1. 47 CFR Part 15, 2. ANSI C63.4-2003;
FCC Scope B – Licensed Radio Service Equipment	
B1	1. 47 CFR Parts 2, 22, 24, 25, and 27 2. ANSI/TIA-603-C (2004)
B2	1. 47 CFR Parts 2, 22, 74, 90, 95, and 97 2. ANSI/TIA-603-C (2004)
B3	1. 47 CFR Parts 2, 80, and 87 2. ANSI/TIA-603-C (2004)
B4	1. 47 CFR Parts 2, 21, 74, and 101 2. ANSI/TIA-603-C (2004)
Country Specific Standards and Other	
ITU EMC Standards	K.20; K.21; K.41; K.44
Swedish EMC Standards	BAKOM 3336.3
South African EMC Standards other than CISPR equivalents	SABS 1718-1; SANS 211/SABS CISPR 11; SANS 224/SABS CISPR 24; SANS 213/SABS CISPR 13; SANS 2200; SANS214-1/SABS CISPR 14-1; SANS214-2/SABS CISPR 14-2; SANS 215/SABS CISPR 15; SANS 222/SABS CISPR 22
Hong Kong EMC Standards	HKTA 1006; HKTA 1007; HKTA 1008; HKTA 1010; HKTA 1015; HKTA 1026; HKTA 1035; HKTA 1039; HKTA 1041; HKTA 1042; HKTA 1045
Singapore EMC Standards	IDA TS SRD; IDA TS EMC
Japanese VCCI Standards	VCCI V-3, VCCI V-4

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Telecommunications	Telecommunications Registration; General test methods; Lightning surge*; Drop testing*; Balance testing*; Signal power (metallic and longitudinal)*; Frequency measurements*; Pulse templates*; Leakage testing*; Impedance testing*; Hearing Aid Compatibility testing (excluding volume control)*; Protocol analysis* and Jitter testing*.
Telecom Standards	Title
<i>North American standards</i>	
FCC 47 CFR Part 68 Telephone Terminal Equipment	Connection of terminal equipment to the telephone network. Analog and Digital Equipment. TCB Scope C1. Specification for terminal equipment, terminal systems, Network protection devices, connection arrangements and hearing aids compatibility.
CS-03 Issue 9	Bulletin Part 68 Rationale and Measurement Guidelines (Feb 1998)
TIA/EIA TSB31-B 1998	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
TIA-968-A, A1, A2, A3	Technical Requirements for SHDSL, HDLSL2, HDLSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Telephone Network Industry
T1.TRQ 6-2001	
<i>Australia standards</i>	
AS/ACIF S002-2001	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network
AS/ACIF S016-2001	Requirements for Customer Equipment for connection to hierarchical digital interfaces
AS/ACIF S031-2001	Requirements for ISDN Basic Access Interface
AS/ACIF S038-2001	Requirements for ISDN Primary Rate Access Interface
AS/ACIF S043-2001	Requirements for Customer Equipment for Connection to a Metallic Local Loop Interface of a Telecommunications Network — Part 1: General Part 2: Broadband Part 3: DC, Low Frequency AC and Voice band
<i>International standards</i>	
ITU-T G.703	Physical/electrical characteristics of hierarchical Digital interfaces
<i>Hong Kong standards</i>	
HKTA 2011	Network Connection Specification for Connection of Customer Premises Equipment (CPE) to Direct Exchange Lines (DEL) of the Public Switched Telephone Network (PSTN) in Hong Kong
HKTA 2014	Network Connection Specification for Connection of Customer Premises Equipment (CPE) to the Public Telecommunications Network (PTN) in Hong Kong using ISDN Basic Rate Access (BRA) based on ITU-T Recommendations

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<p><u>Telecom Standards</u> HKTA 2028</p> <p>HKTA 2029</p> <p>HKTA 2030</p> <p>HKTA 2031</p> <p>HKTA 2032</p> <p>HKTA 2033</p> <p><u>European standards</u> TBR 1: 1995</p> <p>TBR 2: 1997</p> <p>TBR 3: 1995 + Amdt : 1997</p> <p>TBR 4: 1995 + Amdt : 1997</p> <p>TBR 012: 1993 + Amdt : 1996</p> <p>TBR 013: 1996</p> <p>(A2LA Cert. No. 1627.01) 3/27/06</p>	<p><u>Title</u></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>Network Connection Specification for Connection of Customer Premises Equipment (CPE) to the Public Telecommunications Network (PTN) in Hong Kong using Digital Leased Circuits at nx64 kbit/s</p> <p>Network Connection Specification for Connection of Customer Premises Equipment (CPE) to the Public Telecommunications Network (PTN) in Hong Kong using Digital Leased Circuits below 64 kbit/s</p> <p>Network Connection Specification for Connection of Customer Premises Equipment (CPE) to the Public Telecommunications Networks in Hong Kong using Asymmetric Digital Subscriber Lines (ADSL) based on ITU-T Recommendation G.992.1</p> <p>Network Connection Specification for Connection of Customer Premises Equipment (CPE) to Fixed Telecommunications Networks in Hong Kong using Splitterless Asymmetric Digital Subscriber Lines (ADSL) based on ITU-T Recommendation G.992.2</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, 1 984 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 1 920 kbit/s utilizing interfaces derived from CCITT Recommendations X.21 and X.21 bit Integrated Services Digital Network (ISDN);</p> <p>Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access Integrated Services Digital Network (ISDN);</p> <p>Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access Business Telecommunications (BT); Open Network Provision (ONP) technical requirements; 2 048 kbit/s digital unstructured leased line (D2048U) Attachment requirements for terminal equipment Business Telecommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface</p> <p>Page 5 of 10</p>	<p><u>European standards</u> (cont'd) TBR 21: 1998</p> <p>TBR 24: 1997</p> <p><u>Taiwan standards (DGT)</u> ADSL01</p> <p>ID0002 IS6100 PSTN01 (non-voice only)</p> <p><u>New Zealand standards</u> PTC 200 (non-voice only)</p> <p>PTC 217 TNA 117 PTC 270</p> <p><u>Singapore Standards</u> IDA TS ADSL</p> <p>IDA TS ADSL 2</p> <p>IDA TS DLCN 1</p> <p>IDA TS ISDN 1</p> <p>IDA TS ISDN 2</p> <p>IDA TS PSTN (non-voice only)</p> <p><u>South Africa standards</u> TE-001 (non-voice only)</p> <p>Terminal Equipment (TE); Attachment requirements For pan-European approval for connection to the Analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signaling</p> <p>Business Telecommunications (BTC); 34 Mbit/s Digital Unstructured and structured leased lines (D34U and D34S); Attachment requirements for Terminal equipment interface</p> <p>Asymmetric Digital Subscriber Line Terminal Equipment and POTS Splitter Technical Specifications</p> <p>DS1 Equipment Type Approval Guidelines</p> <p>ISDN Terminal Equipment Technical Specifications</p> <p>Technical Specifications for Terminal Equipment for Connection to Public Switched Telephone Network</p> <p>Requirements for Connection of Customer Equipment to Analogue Lines</p> <p>Requirements for Bandwidth Management Devices</p> <p>Telecom 2048 kbit/s Standard Network Interface</p> <p>Interim arrangements for ADSL CPE</p> <p>Type Approval Specification for Asymmetric Digital Subscriber Line (Full-rate ADSL) Modems</p> <p>Type Approval Specification for Asymmetric Digital Subscriber Line Splitterless (G-Lite) Modems</p> <p>Type Approval Specification for Digital Interfaces based on hierarchical bit rates of 2048 kbit/s, 34 368 kbit/s and 139 264 kbit/s</p> <p>Type Approval Specification for connection of Terminal Equipment to Integrated Services Digital Network (ISDN) Basic Access</p> <p>Type Approval Specification for connection of Terminal Equipment to Integrated Services Digital Network (ISDN) Primary Rate Access (PRA)</p> <p>Type Approval Specification for connection of Terminal Equipment to Public Switched Telephone Network (PSTN)</p> <p>Standard for Telecommunication Line Terminal Equipment (TLTE) for Connection to the Public Switched Telephone Network (PSTN)</p> <p>(A2LA Cert. 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<p><u>Product Safety</u></p> <p>General test methods:</p> <p>Power input*, Permanence of marking*, Accessibility*, Permissibly limits*, Energy hazard measurement*, SELV circuits*, TNV limits*, Limited current*, Capacitor Discharge / voltage limitation*, Ring signal*, Humidity conditioning*, Creepage / Clearance / Distance thru Insulation (excluding CTI)*, Limited power measurement*, Ground Bond/Earthing*, Ground continuity*, Temperature*, Stability*, Applied force*, Steel sphere impact*, Mold stress*, Battery reverse current*, Ball pressure*, Leakage current*, Component abnormal*, Electric strength*, Impulse*, Overvoltage*, Acoustic sound pressure*, 130mm / 20mm flame*, Needle flame*, Hot flaming oil*, Locked rotor/motor armature*, Vibration, Bump, Drop*, Strain relief*, Torque*, Insulation resistance*, Sound level*, Handle loading*, Liquid overflow*, Spillage*, Liquid leakage*, Transformer shorts/overloads*, Rain test*, Wall mount*, Laser radiation (excluding x-ray)*, Voltage surge*, Functionality*, Protective impedance abnormal*, Capacitor short circuit abnormal*, Output abnormal*, Multi-supply abnormal*, Cooling abnormal*, Heating device abnormal*, Interlock abnormal*, Rigidity*, Cleaning*</p> <p><u>Product Safety Standards</u></p> <p><u>Specific Product Safety Standards</u></p> <p>UL 60950 2000</p> <p>IEC 60950 1999</p> <p>EN 60950 2000</p> <p>IEC 60950-1 2001</p> <p>UL 60950-1 2003</p> <p>CSA C22.2 No. 60950-00</p> <p>CSA C22.2 No. 60950-1 03</p> <p>IEC 61010-1 1993</p> <p>EN 61010-1 1993, 2001</p> <p>IEC 61010-1 2001</p> <p>UL 61010B-1 2003</p> <p>CAN/CSA 1010-1 1999 (Including AM 2)</p> <p>IEC 60601-1 1995</p> <p>EN 60601-1 1995 (Including AM 2)</p> <p>UL 2601-1 1997</p> <p>IEC 60065 1998, 2000</p> <p>ANSI/UL 6500: 1998</p> <p>CAN/CSA 60065-00</p> <p>AS/NZS 60065 2000</p> <p>Canadian C22.2 No. 1-94 (1-98)</p> <p>1994, 1998</p> <p>EN 60065 1994</p> <p>IEC 60825 1990</p> <p>EN 60825-1 1994</p> <p>(A2LA Cert. No. 1627.01) 3/27/06</p>	<p><u>Title</u></p> <p>Classification, requirements and user's guide.</p> <p>Safety of laser products – Part 2: Safety of optical communication systems</p> <p>Safety of laser products – Part 4: Laser guards</p> <p>Performance standard for laser products</p> <p>Safety of household and similar electrical appliances</p> <p>Part 1: General requirements</p> <p>Electrical equipment for laboratory use; part 1: General requirements</p> <p>Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements</p> <p>Safety information technology equipment</p> <p>Information Technology Equipment – Safety – Part 1: General Requirements</p> <p>Information Technology Equipment – Safety – General requirements</p> <p>Electrical Equipment for Measurement, Control and Laboratory Use: Part 1: General Requirements</p> <p>Medical Electrical Equipment, Part 1: General Requirements for Safety</p> <p>Medical Electrical Equipment - Part 1: General Requirements For Safety 1: Collateral Standard: Safety Requirements For Medical Electrical Systems</p> <p>Medical Electrical Equipment - Part 1: General Requirements for Safety – Section 1-1. Collateral Standard: Safety Requirements For Medical Electrical Systems</p> <p>Audio, Video and Similar Electronic Apparatus – Safety Requirements</p> <p>Audio, Video and Similar Electronic Apparatus – Safety Requirements</p> <p>Audio, Video and Similar Electronic Apparatus – Safety Requirements</p> <p>Audio, Video and Similar Electronic Apparatus – Safety Requirements</p> <p>Safety of Machinery – Electrical Equipment of Machines – Part 1: Specification for General Requirements</p> <p>Compliance Test Specification – Safety and Electrical Protection Requirements for Subscriber Equipment Connected to the Public Telecommunications Networks In Hong Kong</p> <p>Page 7 of 10</p>	<p><u>Product Safety Standards</u></p> <p>IEC 60825-1 2001</p> <p>IEC 60825-2 2000-5</p> <p>IEC 60825-4 1997-11</p> <p>21 CFR 1040.10</p> <p>IEC 60335-1 1995</p> <p>(Including AM2 – 1997 & AM 12 – 1997)</p> <p>EN 60335-1 2001</p> <p>UL 60335-1 1998</p> <p>CAN/CSA E335-1 1994</p> <p>UL 61010A-1: 2002</p> <p>EN 61010-1: 2001</p> <p>AS/NZS 60950: 2000</p> <p>EN 60950-1: 2001</p> <p>AS/NZS 60950.1: 2003</p> <p>UL 61010 -1: 2004</p> <p>UL 60601-1: 2003</p> <p>IEC 60601-1-1: 2000</p> <p>EN 60601-1-1: 2001</p> <p>UL 60065: 2003</p> <p>CSA 60065: 2003</p> <p>IEC 60065: 2001</p> <p>EN 60065: 2002</p> <p>EN 60204 -1: 1998</p> <p>HKTA 2001</p> <p>(A2LA Cert. No. 1627.01) 3/27/06</p> <p>Page 8 of 10</p>

Environmental Simulation			<p>Note 1. For standards or methods listed on the scope of accreditation without a revision date, laboratories are expected to be competent in the use of the current version within one year of the date of publication of the standard test method or upon the date specified by the standard test method originator when the originator has implementation authority. When a superseded standard or method is required for an accredited test, the scope will include the superseded date/version. For those that support the TCB/CB status of the organization acting as a certifier on behalf of the FCC or IC the expectation is currency within 30 days of Federal Register publication of changes for FCC and 30 days after IC website update. This note shall not be construed as an Accreditation Body implication to adopt a more current standard than is required in a regulation or code (i.e. the legal requirement) which is adopted by the lab under their responsibility.</p> <p>* On-site test service is available for this technology, test, or method.</p>
<u>Test Technology</u>	<u>Test Standard</u>	<u>Supporting Standards</u>	
Accessibility*	IEC 60529	IP-0x thru IP-6x	
Acoustic Noise*	GR-63-CORE Sec 4.6		
Airborne Contaminants	GR-63-CORE Sec 4.5	MFG & Hygroscopic Dust	
Altitude	GR-63-CORE Sec 4.1.3		
Cold Start*	ETS 300 019	IEC 60068-2-1	
Drip	IEC 60529	IP-x1 & IP-x2	
Drops*	ETS 300 019	IEC 60068-2-32	
	GR-63-CORE Sec 4.3		
Dust	IEC 60529	IP-5x & IP-6x	
Firearms Resistance Testing	GR-487		
Fire Resistance	ANSI T1.319	Fire & Needle Flame	
	GR-63-CORE Sec 4.2		
Heat Dissipation*	GR-63-CORE Sec 4.1.4		
Illumination	GR-63-CORE Sec 4.7		
Operational Temperature & Humidity (OpTH)*	ETS 300 019	IEC 60068-2-1 IEC 60068-2-2 IEC 60068-2-14 IEC 60068-2-56	
	GR-63-CORE Sec 4.1.2		
Salt Fog & Spray	ASTM B117		
Spatial*	GR-63-CORE Sec 2.0 & 3.0		
Spraying-Splashing	IEC 60529	IP-x3 & IP-x4	
Storage (Temperature & Humidity)*	ETS 300 019	IEC 60068-2-1 IEC 60068-2-2 IEC 60068-2-14 IEC 60068-2-30 IEC 60068-2-56	
	GR-63-CORE Sec 4.1.1		
Vibration	ETS 300 019	IEC 60068-2-6 IEC 60068-2-27 IEC 60068-2-29 IEC 60068-2-32 IEC 60068-2-57 IEC 60068-2-64 Earthquake, Office & Transportation	
	GR-63-CORE Sec 4.4		
Water Immersion	IEC 60529	IP-x7 & IP-x8	
Water Jet	IEC 60529	IP-x5 & IP-x6	
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