



Test Report

Report No	EF0699-1
Client	Dynastream Innovations, Inc. 228 River Ave Cochrane, Alberta T4C 2C1
Phone	403-932-9292
FRN	0008033557
	FCC Part 15.249; RSS-210 Issue 6
Model	BKM1
FCC ID	O6RBKM-A
IC	3797A-BKMA
Equipment Type	Low Power Communications Device Transmitter
Equipment Code	DXX
Results	As detailed within this report
Prepared by	 Evan Gould – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	5/17/06
Conditions of issue	This Test Report is issued subject to the conditions stated in ‘terms and conditions’ section of this report.

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

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Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.249 and RSS-210(A2.9). The product is the Dynastream Innovations Bike Speed / Cadence Monitor (Models BKM1, BKM2, BKM3, BKM4). It is a transmitter that operates at one of 31 channels in the range 2434-2464MHz. The particular frequency for any given sample is chosen by the manufacturer; it cannot be changed by the user.

Test Methodology

Radiated emissions testing is performed according to the procedures specified in ANSI C63.4 (2003) and RSS-GEN. Emissions were maximized by rotating the device around three orthogonal axes as well as varying the test antenna's height and polarity. Fresh batteries were used during testing. The standard battery voltage is 3VDC. The environmental conditions are shown below.

Date	Temperature	Humidity
9/27/05	24.8°C	41%
9/28/05	24.7°C	35%

Frequency range investigated: 30MHz – 26GHz

Measurement distance:	30MHz – 7GHz	3m
	7 – 26GHz	1m

Statement of Conformity

The Bike Speed / Cadence Monitor has been found to conform to the following parts of 47 CFR as detailed below:

RSS-GEN	RSS 210	Part 15	Comments
5.3		15.15(b)	There are no controls accessible to the user that vary the output power.
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.
7.1.4		15.203	The antenna for this device is hardwired to the PCB.
	2.6	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
7.2.2		15.207	EUT is battery powered.
	A2.9	15.249	The unit complies with the requirements of 15.249

EUT Configuration

EUT Configuration				
Work Order: F0699				
Company: Dynastream Innovations, Inc.				
Company Address: 228 River Ave Cochrane, Alberta T4C 2C1				
Contact: Victor Beda				
MN		SN		
EUT: BKM1		1		
EUT Description: Bike Speed Sensor				
EUT Max Frequency: 2465MHz				
Support Equipment:	MN	SN		
None				
EUT Cables:	Qty	Shielded?	Length	Ferrites
None				
Unpopulated EUT Ports:	Qty	Reason		
None				
Software / Operating Mode Description:				
Transmits an approximately 230µs pulse every 247.5ms in normal operation. The various samples make possible both normal operation and CW mode at the lowest, middle, and highest frequency.				

Fundamental Measurement

LIMIT

Average: 50mV/m = 93.9dBμV/m @ 3m [15.249(a)]

Peak: 93.9dBμV/m + 20dB = 113.9dBμV/m @ 3m [15.35(b)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

MEASUREMENTS

Radiated Emissions Table								Curtis-Straus LLC		
Date: 27-Sep-05				Company: Dynastream				Work Order: F0699		
Engineer: Evan Gould				EUT Desc: Bike Speed Sensor						
Frequency Range: fundamental						Measurement Distance: 3 m				
Notes: Duty Cycle factor = 20dB						RBW: 1MHz				
						VBW: 3MHz				
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading (dBuV/m)	47 CFR 15.249(a)		
								Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)
Hpk	2434.0	61.3	0.0	29.8	2.6	0.0	93.7	113.9	-20.2	Pass
Hpk	2457.0	64.2	0.0	29.9	2.6	0.0	96.7	113.9	-17.2	Pass
Hpk	2465.0	66.1	0.0	29.9	2.6	0.0	98.6	113.9	-15.3	Pass
Hav	2434.0	61.3	0.0	29.8	2.6	20.0	73.7	93.9	-20.2	Pass
Hav	2457.0	64.2	0.0	29.9	2.6	20.0	76.7	93.9	-17.2	Pass
Hav	2465.0	66.1	0.0	29.9	2.6	20.0	78.6	93.9	-15.3	Pass
Table Result:		Pass	by	-15.3 dB			Worst Freq:		2465.0 MHz	
Test Site: "T"		Pre-Amp: none		Cable: EMIR-HIGH 10			Analyzer: Orange		Antenna: Orange Horn	

Worse case 100ms on-time: 230μs

Duty Cycle Factor = $20 \cdot \log(100\text{ms}/0.23\text{ms}) = 52.8\text{dB}$ (20dB maximum)

Band Edge Measurements

LIMITS

Average: 50dB below level of Fundamental OR

General radiated emission limits of 15.209

"...whichever is the lesser attenuation." [15.249(d)]

Peak: {Average limit} + 20dB [15.35(b)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

MEASUREMENTS

Radiated Emissions Table								Curtis-Straus LLC		
Date: 28-Sep-05				Company: Dynastream				Work Order: F0699		
Engineer: Evan Gould				EUT Desc: Bike Speed Sensor						
Frequency Range: 2400-2483.5MHz						Measurement Distance: 3 m				
Notes:								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 15.209		
								Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
High band edge			---	---	---		---			---
Hpk	2485.4	54.5	20.0	30.0	2.6	0.0	67.1	74.0	-6.9	Pass
Hav	2485.4	54.5	20.0	30.0	2.6	20.0	47.1	54.0	-6.9	Pass
Low band edge			---	---	---		---			---
Hpk	2399.8	36.6	20.4	29.7	2.5	0.0	48.4	54.0	-5.6	Pass
Table Result:			Pass	by	-5.6 dB			Worst Freq: 2399.8 MHz		
Test Site: "T"		Pre-Amp: Yel-Blk		Cable: EMIR-HIGH 10			Analyzer: Orange		Antenna: Orange Horn	

Radiated Spurious Emissions

LIMITS

Average: $500\mu\text{V/m} = 53.9\text{dB}\mu\text{V/m}$ @ 3m [15.249(a), (b), and (d)]

Peak: $53.9\text{dB}\mu\text{V/m} + 20\text{dB} = 73.9\text{dB}\mu\text{V}$ @ 3m [15.249(d)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

MEASUREMENTS

Radiated Emissions Table								Curtis-Straus LLC		
Date: 28-Sep-05				Company: Dynastream				Work Order: F0699		
Engineer: Evan Gould				EUT Desc: Bike Speed Sensor						
Frequency Range: 30MHz-7GHz						Measurement Distance: 3 m				
Notes:								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 15.209		
								Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Vpk	4867.9	41.8	18.9	35.4	3.8		62.1	74.0	-11.9	Pass
Vav	4867.9	41.8	18.9	35.4	3.8	20.0	42.1	54.0	-11.9	Pass
Table Result:			Pass	by	-11.9 dB			Worst Freq:		4867.9 MHz
Test Site: "T"		Pre-Amp: Yel-Blk		Cable: EMIR-HIGH 10			Analyzer: Orange		Antenna: Orange Horn	
30-1000MHz >>		Pre-Amp: Green		Cable: RFI Cables			Analyzer: Orange		Antenna: Yellow-Blk	

Radiated Emissions Table								Curtis-Straus LLC		
Date: 28-Sep-05				Company: Dynastream				Work Order: F0699		
Engineer: Evan Gould				EUT Desc: Bike Speed Sensor				Test Site: T		
Frequency Range: 7-26GHz						Measurement Distance: 1 m				
Notes:								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 15.209		
								Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
								Vpk	9736.0	40.1
Vav	9736.0	40.1	16.4	38.5	6.1	20.0	48.3	63.5	-15.2	Pass
Table Result:		Pass	by	-15.2 dB			Worst Freq:		9736.0 MHz	
7-18GHz >>		Pre-Amp: Yel-Blk		Cable: EMIR-HIGH 10			Analyzer: Orange		Antenna: Orange Horn	
18-26GHz >>		Pre-Amp: Yellow		Cable: EMIR-HIGH 10			Analyzer: Orange		Antenna: White Horn	

Test Equipment Used

REV. 16-SEP-2005

SPECTRUM ANALYZERS / RECEIVERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	I	13-JAN-2006
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	I	08-MAR-2006
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	I	03-NOV-2005
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	I	20-APR-2006
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	I	02-AUG-2006
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	I	27-DEC-2005
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	I	Out of Service
TELECOM 3585A	20Hz-40.0MHz	3585A	HP	1750A02762	01067	I	04-FEB-2006
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	I	22-JUN-2006
EMI TEST RECEIVER	20-1000MHz	ESVS30	R&S	827957/001	01098	I	27-OCT-2005

OPEN AREA TEST SITE (OATS)	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE
SITE F	93448	IC 2762-F	R-1688	II	04-APR-2007
SITE T	93448	IC 2762-T	R-905	II	14-AUG-2007
SITE A	93448	IC 2762-A	R-903	II	13-AUG-2007
SITE M	93448	IC 2762-M	R-904	II	19-MAR-2007

MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A01695/A046903-01	1087	I	23-AUG-2006
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	3003A07825/A046903-01	1086	I	23-AUG-2006
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	I	02-MAR-2007
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	I	03-MAR-2007
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	I	03-MAR-2007
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	II	OUT OF CALIBRATION
DIPLEXER	40-220 GHz	DPL.26	OML	N/A	00813	I	03-MAR-2007

PREAMPS / ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	II	08-APR-2006
BLUE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	II	03-AUG-2006
BLUE-BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	II	10-FEB-2006
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	II	21-JUL-2006
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	II	25-AUG-2006
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	II	10-FEB-2006
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	II	04-AUG-2006
BROWN	1-20GHz	PM2-38-218-4R5-17-15-SFF	C-S	PL1655	1132	II	27-JUN-2006
YELLOW-BLACK	1-20GHz	SMC-12A	C-S	535055	00801	II	25-AUG-2006
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	II	23-AUG-2007
HIGH PASS FILTER	1-18 GHz	SPA-F-55204	K&L	36	00817	II	06-JAN-2006
LOW PASS FILTER	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	II	06-JAN-2006
HF 20dB 50W ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNAK	01	00791	II	10-MAY-2007
HF 30dB 50W ATTENUATOR	0.03-20 GHz	PE 7019-30	PASTERNAK	02	1168	II	10-MAY-2007
LOW FREQ LPF	10-100kHz	L200K1G1	MICROWAVE CIRCUITS	4460-01 DC0432	1019	II	OUT OF SERVICE
LOW FREQ LPF	10-100kHz	L200K1G1	MICROWAVE CIRCUITS	4777-01 DC0434	1088	II	30-AUG-2006

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN BILOG	30-2000MHz	CBL6112B	CHASE	2742	00620	II	06-APR-2006
GREEN-BLACK BILOG	30-2000MHz	CBL6112B	CHASE	2412	00127	II	06-JAN-2006
GREEN-RED BILOG	30-2000MHz	CBL6112B	CHASE	2435	00990	II	OUT OF SERVICE
BLUE BILOG	30-1000MHz	3143	EMCO	1271	00803	II	06-MAY-2007
GRAY BILOG	20-2000MHz	3141	EMCO	9703-1038	00066	II	06-MAY-2007(EMI) / 05-AUG-2006(RFI)
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	II	06-MAY-2007(EMI) / 12-AUG-2006(RFI)
RED-WHITE BILOG	30-2000MHz	JB1	SUNOL	A091604-1	01105	II	28-SEP-2006
RED-BLACK BILOG	30-2000MHz	JB1	SUNOL	A091604-2	01106	II	28-SEP-2006
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	I	27-MAY-2007(EMI) / 05-JUN-2006 (RFI)
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	I	17-JUN-2007
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	I	09-JUN-2007
HF (WHITE) HORN	18-26.5GHz	801-WLM	WAVELINE	00758	00758	I	26-AUG-2007
SMALL LOOP	9kHz-30MHz	PLA-130/A	ARA	1024	00755	I	23-FEB-2006
LARGE LOOP	20Hz-5MHz	6511	EMCO	9704-1154	00067	I	12-NOV-2005

ACTIVE MONOPOLE	30Hz-30MHz	3301B	EMCO	3824	00068	II	04-MAY-2006
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	II	26-SEP-2007
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1370	00757	II	18-MAR-2007
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1371	00756	II	18-MAR-2007
RE101 LOOP SENSOR	30Hz-100kHz	RE101-13.3cm	C-S	N/A	00818	II	13-MAR-2007
RS101 RADIATING LOOP	30Hz-100kHz	RS101-12cm	C-S	N/A	00819	II	13-MAR-2007
RS101 LOOP SENSOR	30Hz-100kHz	RS101-4cm	C-S	N/A	00820	II	13-MAR-2007

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

Terms And Conditions

Paragraph 1. SERVICES. LABORATORY will:

- 1.1 Use the degree of care and skill ordinarily exercised by and consistent with the standards of the profession.
- 1.2 Perform all technical services in substantial accordance with the generally accepted laboratory principles and practices.
- 1.3 Retain all pertinent records relating to the services performed for a period of three (3) years following submission of the report describing such services, during which period the records will be made available to CLIENT upon reasonable request.

Paragraph 2. CLIENT'S RESPONSIBILITIES. CLIENT or his authorized representative will:

- 2.1 Provide LABORATORY with all plans, schematics, specifications, addenda, change orders, drawings and other information for the proper performance of technical services.
- 2.2 Designate a person to act as CLIENT's representative with respect to LABORATORY's services to be performed on behalf of the CLIENT; such person or firm to have complete authority to transmit instructions, receive information and data, interpret and define CLIENT's policies and decisions with respect to the LABORATORY's work on behalf of the CLIENT and to order, at CLIENT's expense, such technical services as may be required.
- 2.3 Designate a person who is authorized to receive copies of LABORATORY's reports.
- 2.4 Undertake the following:
 - (a) Secure and deliver to LABORATORY, without cost to LABORATORY, preliminary representative samples of the equipment proposed to require technical services, together with any relevant data.
 - (b) Furnish such labor and equipment needed by LABORATORY to handle samples at the LABORATORY and to facilitate the specified technical services.

Paragraph 3. GENERAL CONDITIONS:

- 3.1 LABORATORY, by the performance of services covered hereunder, does not in any way assume any of those duties or responsibilities customarily vested in the CLIENT, its employees, or any other party, agency or authority.
- 3.2 LABORATORY shall not be responsible for acts of omissions of any other party or parties involved in the design, manufacture or maintenance of the equipment or the failure of any employee, contractor or subcontractor to undertake any aspect of equipment's design, manufacture or maintenance.
- 3.3 LABORATORY is not authorized to revoke, alter, release, enlarge or release any requirement of the equipment's design, manufacture or maintenance unless specifically authorized by CLIENT or his authorized representative.
- 3.4 THE ONLY WARRANTY MADE BY LABORATORY IN CONNECTION WITH ITS SERVICE PERFORMED HEREUNDER IS THAT IT WILL USE THAT DEGREE OF CARE AND SKILL AS SET FORTH IN PARAGRAPH 1 ABOVE. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE OR INTENDED FOR SERVICES PROVIDED HEREUNDER.
- 3.5 Where the LABORATORY indicates that additional testing is advisable to obtain more valid or useful data, and where such testing has not been authorized, CLIENT agrees to view such test reports as inconclusive and preliminary.
- 3.6 The LABORATORY will supply technical service and prepare a report based solely on the sample submitted to the LABORATORY by the CLIENT. The CLIENT understands that application of the data to other devices is highly speculative and should be applied with extreme caution.
- 3.7 The LABORATORY agrees to exercise ordinary care in receiving, preserving and shipping (F.O.B. Littleton, MA) any sample to be tested, but assumes no responsibility for damages, either direct or consequential, which arise from loss, damage or destruction of the samples due to the act of examination, modification or testing, or technical services or circumstances beyond LABORATORY's control.
- 3.8 The LABORATORY will hold samples for thirty (30) days after tests are completed, or until the CLIENT's outstanding debts to the LABORATORY are satisfied, whichever is later.
- 3.9 The CLIENT recognizes that generally accepted error variances apply and agrees to consider such error variances in its use of test data.
- 3.10 It is agreed between LABORATORY and CLIENT that no distribution of any tests, reports or analysis other than that described below shall be made to any third party without the prior written consent of both parties unless such distribution is mandated by operation of law. It is agreed that tests, reports, or analysis results may be disclosed to third party auditors of the laboratory at the laboratory facility in the course of accreditation maintenance audits. No reference to reports or technical services of the LABORATORY shall be made in any advertising or promotional literature without the express written permission of the LABORATORY.
- 3.11 The CLIENT acknowledges that all employees of LABORATORY operate under employment contracts with the LABORATORY and CLIENT agrees not to solicit employment of such employees or to solicit information related to other clients from said employees.
- 3.12 In recognition of the relative risks and benefits of the project to both CLIENT and LABORATORY, the risks have been allocated such that the CLIENT agrees, to the fullest extent permitted by law, to limit the liability of the LABORATORY to the CLIENT for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of the LABORATORY to the CLIENT shall not exceed \$100,000, or the LABORATORY'S total fee for services rendered on this project, whichever is greater. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

Paragraph 4. INSURANCE:

- 4.1 LABORATORY shall secure and maintain throughout the full period of the services provided to the CLIENT adequate insurance to protect it from claims under applicable Workmen's Compensation Acts and also shall maintain one million dollars of general liability coverage to cover claims for bodily injury, death or property damage as may arise from the performance of its services.
- 4.2 The CLIENT hereby warrants that it has sufficient insurance to protect its employees adequately under applicable Workmen's Compensation Acts and for bodily injury, death, or property damage.
- 4.3 No insurance of whatever kind or type, which may be carried by either party is to be considered as in any way limiting any other party's responsibility for damages resulting from their operations or for furnishing work and materials.

Paragraph 5. PAYMENT:

- 5.1 CLIENT shall pay to LABORATORY such fees for services as previously agreed, orally or in writing, within 30 days of 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

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

CURTIS-STRAUS¹
527 Great Road
Littleton, MA 01460
Barry Quinlan Phone: 978-486-8880
ELECTRICAL

Valid until: 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; KN22; CISPR 11; EN 55011; SABS CISPR 11; AS/NZS CISPR 11; AS/NZS 2064; Canada ICES-001; CNS13803; KN11; CISPR 13; EN 55013; SABS CISPR 13; AS/NZS CISPR 13; AS/NZS 1053; KN13; CISPR 14-1; EN 55014-1; SABS CISPR 14; AS/NZS CISPR 14; AS/NZS 1044; CNS 13439; KN14; CISPR 15; EN 55015; KN15; 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."

(A2LA Cert. No. 1627.01) 3/20/06

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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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Immunity	
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; KN61000-4-7
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	
EU R&TTE Radio Standards;	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
EU R&TTE EMC Standards	EN 300 339; EN 301 489-01; EN 301 489-03; EN 301 489-17
Canada Radio Standards	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;
Australia/New Zealand Radio Standards	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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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
North American standards	
FCC 47 CFR Part 68 Telephone Terminal Equipment CS-03 Issue 9	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.
TIA/EIA TSB31-B 1998	Bulletin Part 68 Rationale and Measurement Guidelines (Feb 1998)
TIA-968-A, A1, A2, A3	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
T1.TRQ 6-2001	Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Telephone Network Industry
Australia standards	
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
International standards	
ITU-T G.703	Physical/electrical characteristics of hierarchical Digital interfaces
Hong Kong standards	
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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<u>Telecom Standards</u> HKTA 2028 HKTA 2029 HKTA 2030 HKTA 2031 HKTA 2032 HKTA 2033 <u>European standards</u> TBR 1: 1995 TBR 2: 1997 TBR 3: 1995 + Amdt : 1997 TBR 4: 1995 + Amdt : 1997 TBR 012: 1993 + Amdt : 1996 TBR 013: 1996 (A2LA Cert. No. 1627.01) 3/20/06	<u>Title</u> Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s 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 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 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 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 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 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); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access Integrated Services Digital Network (ISDN); 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 Page 5 of 10	<u>European standards (cont'd)</u> TBR 21: 1998 TBR 24: 1997 <u>Taiwan standards (DGT)</u> ADSL01 ID0002 IS6100 PSTN01 (non-voice only) <u>New Zealand standards</u> PTC 200 (non-voice only) PTC 217 TNA 117 PTC 270 <u>Singapore Standards</u> IDA TS ADSL IDA TS ADSL 2 IDA TS DLCN 1 IDA TS ISDN 1 IDA TS ISDN 2 IDA TS PSTN (non-voice only) <u>South Africa standards</u> TE-001 (non-voice only) (A2LA Cert. No. 1627.01) 3/20/06	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 Business Telecommunications (BTC); 34 Mbit/s Digital Unstructured and structured leased lines (D34U and D34S); Attachment requirements for Terminal equipment interface Asymmetric Digital Subscriber Line Terminal Equipment and POTS Splitter Technical Specifications DS1 Equipment Type Approval Guidelines ISDN Terminal Equipment Technical Specifications Technical Specifications for Terminal Equipment for Connection to Public Switched Telephone Network Requirements for Connection of Customer Equipment to Analogue Lines Requirements for Bandwidth Management Devices Telecom 2048 kbit/s Standard Network Interface Interim arrangements for ADSL CPE Type Approval Specification for Asymmetric Digital Subscriber Line (Full-rate ADSL) Modems Type Approval Specification for Asymmetric Digital Subscriber Line Splitterless (G-Lite) Modems Type Approval Specification for Digital Interfaces based on hierarchical bit rates of 2048 kbit/s, 34 368 kbit/s and 139 264 kbit/s Type Approval Specification for connection of Terminal Equipment to Integrated Services Digital Network (ISDN) Basic Access Type Approval Specification for connection of Terminal Equipment to Integrated Services Digital Network (ISDN) Primary Rate Access (PRA) Type Approval Specification for connection of Terminal Equipment to Public Switched Telephone Network (PSTN) Standard for Telecommunication Line Terminal Equipment (TLTE) for Connection to the Public Switched Telephone Network (PSTN) Page 6 of 10
<u>Product Safety</u> General test methods: 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* <u>Product Safety Standards</u> <u>Specific Product Safety Standards</u> UL 60950 2000 IEC 60950 1999 EN 60950 2000 IEC 60950-1 2001 UL 60950-1 2003 CSA C22.2 No. 60950-00 CSA C22.2 No. 60950-1 03 IEC 61010-1 1993 EN 61010-1 1993, 2001 IEC 61010-1 2001 UL 61010B-1 2003 CAN/CSA 1010-1 1999 (Including AM 2) IEC 60601-1 1995 EN 60601-1 1995 (Including AM 2) UL 2601-1 1997 IEC 60065 1998, 2000 ANSI/UL 6500: 1998 CAN/CSA 60065-00 AS/NZS 60065 2000 Canadian C22.2 No. 1-94 (1-98) 1994, 1998 EN 60065 1994 IEC 60825 1990 EN 60825-1 1994 (A2LA Cert. No. 1627.01) 3/20/06	<u>Title</u> Safety of information technology equipment Safety of information technology equipment Safety of information technology equipment, including Electrical business equipment. Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements. Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements. Electrical equipment for laboratory use Part 1: General requirements. Medical electrical equipment. Part 1: General requirements for safety. Medical electrical equipment. Part 1: General Requirements for safety. Audio, video and similar electronic apparatus – Safety requirements Audio/video and musical instrument apparatus for Household, commercial and similar general use Australian/New Zealand Standard – Approval and test Specification – Mains operated electronic and related Equipment for household and similar general use Audio, video and similar electronic equipment. Consumer and commercial products Safety requirements for main operated electronic and related apparatus for household and similar general use. Radiation safety of laser products, equipment Classification, requirements and user's guide Safety of laser products Part 1: equipment Page 7 of 10	<u>Product Safety Standards</u> IEC 60825-1 2001 IEC 60825-2 2000-5 IEC 60825-4 1997-11 21 CFR 1040.10 IEC 60335-1 1995 (Including AM2 – 1997 & AM 12 – 1997) EN 60335-1 2001 UL 60335-1 1998 CAN/CSA E335-1 1994 UL 61010A-1: 2002 EN 61010-1: 2001 AS/NZS 60950: 2000 EN 60950-1: 2001 AS/NZS 60950-1: 2003 UL 61010-1: 2004 UL 60601-1: 2003 IEC 60601-1-1: 2000 EN 60601-1-1: 2001 UL 60065: 2003 CSA 60065: 2003 IEC 60065: 2001 EN 60065: 2002 EN 60204-1: 1998 HKTA 2001 (A2LA Cert. No. 1627.01) 3/20/06	<u>Title</u> Classification, requirements and user's guide. Safety of laser products – Part 2: Safety of optical communication systems Safety of laser products – Part 4: Laser guards Performance standard for laser products Safety of household and similar electrical appliances Part 1: General requirements Electrical equipment for laboratory use; part 1: General requirements Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements Safety information technology equipment Information Technology Equipment – Safety – Part 1: General Requirements Information Technology Equipment – Safety – General requirements Electrical Equipment for Measurement, Control and Laboratory Use; Part 1: General Requirements Medical Electrical Equipment, Part 1: General Requirements for Safety Medical Electrical Equipment - Part 1: General Requirements For Safety 1: Collateral Standard: Safety Requirements For Medical Electrical Systems Medical Electrical Equipment - Part 1: General Requirements for Safety – Section 1-1. Collateral Standard: Safety Requirements For Medical Electrical Systems Audio, Video and Similar Electronic Apparatus – Safety Requirements Audio, Video and Similar Electronic Apparatus – Safety Requirements Audio, Video and Similar Electronic Apparatus – Safety Requirements Audio, Video and Similar Electronic Apparatus – Safety Requirements Safety of Machinery – Electrical Equipment of Machines – Part 1: Specification for General Requirements Compliance Test Specification – Safety and Electrical Protection Requirements for Subscriber Equipment Connected to the Public Telecommunications Networks In Hong Kong Page 8 of 10

<i>Environmental Simulation</i>			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. * On-site test service is available for this technology, test, or method.
<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	
Dust	GR-63-CORE Sec 4.3		
Firearms Resistance Testing	IEC 60529	IP-5x & IP-6x	
Fire Resistance	GR-487		
Heat Dissipation*	ANSI T1.319	Fire & Needle Flame	
Illumination	GR-63-CORE Sec 4.2		
Operational Temperature & Humidity (OpTH)*	GR-63-CORE Sec 4.1.4		
	GR-63-CORE Sec 4.7		
	ETS 300 019	IEC 60068-2-1	
		IEC 60068-2-2	
		IEC 60068-2-14	
		IEC 60068-2-56	
Salt Fog & Spray	GR-63-CORE Sec 4.1.2		
Spatial*	ASTM B117		
Spraying-Splashing	GR-63-CORE Sec 2.0 & 3.0	IP-x3 & IP-x4	
Storage (Temperature & Humidity)*	IEC 60529	IEC 60068-2-1	
	ETS 300 019	IEC 60068-2-2	
		IEC 60068-2-14	
		IEC 60068-2-30	
		IEC 60068-2-56	
Vibration	GR-63-CORE Sec 4.1.1	IEC 60068-2-6	
	ETS 300 019	IEC 60068-2-27	
		IEC 60068-2-29	
		IEC 60068-2-32	
		IEC 60068-2-57	
		IEC 60068-2-64	
	GR-63-CORE Sec 4.4	Earthquake, Office & Transportation	
Water Immersion	IEC 60529	IP-x7 & IP-x8	
Water Jet	IEC 60529	IP-x5 & IP-x6	

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