Curtis-Straus

Test Report

Report No	EH0300-1
Client	Mobile Aspects, Inc. 112 19th Street Pittsburg, PA 15222
Phone	1-412-325-1690
FRN	0010877447
Product Name	iRISupply
Model	iRISupply 4.0
FCC ID	R4FIRISUPPLY40
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	9/6/07
Conditions of issue	This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this report.

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Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.225. The product is the Mobile Aspects iRISupply 4.0 RFID supply cabinet system. The transmitter operates at 13.56MHz. The transmitter used is the FEIG Electronic ID ISC.LRM200-A/B Reader Module (FCC ID PJMLRM200A). The system tested consisted of three cabinets wired together. The middle cabinet contained the user interface, and the other two cabinets contained only various antennas. This provided all possible antenna orientations to be represented.

Test Methodology

Radiated emissions testing is performed according to the procedures specified in ANSI C63.4 (2003). Emissions were maximized by rotating the system around its vertical axis as well as varying the test antenna's height and polarity.

Frequency range investigated: 0.09MHz – 5GHz

Measurement distance:		
	0.15 - 30MHz	Conducted
	0.09 – 30MHz	3m (loop antenna)
	30MHz – 1GHz	3m
	1 – 5GHz	1m

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

Statement of Conformity

The iRISupply 4.0 has been found to conform to the following parts of 47 CFR as detailed below:

Part 2	Part 15	Comments
	15.15(b)	There are no controls accessible to the user that vary the output power.
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.
	15.203	This product is professionally installed.
	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.
	15.207	The unit meets the AC conducted emissions requirements of 15.207.
	15.225(a-d)	The unit complies with these requirements as shown in this test report
	15.225(e)	See attached ID ISC.LRM200 Test Report for frequency stability test data (pp 11-12).

EUT Configuration

EUT Configuration				
Work Order:	H0300			
Company:	Mobile Aspects			
Company Address:	112 19th Street Pittsburg, PA 15222			
Contact:	Khang Lee			
	MN		**SN**	
EUT:	iRISupply 4.0		1	
EUT Description:	iRISupply 4.0			
EUT Max Frequency:	1GHz (PC)			
Support Equipment:	**MN**		**SN**	
none				
EUT Cables:	**Qty**	**Shielded?**	**Length**	**Ferrites**
AC Power	9	No	2m	No
Ethernet	1	No	1m	No
Unpopulated EUT Ports:	**Qty**	**Reason**		
none				
Software / Operating Mode Description:				
Fundamental: Transmitting full power on each antenna.in the system. Spurious: Continuously reading. Line Conducted: Transmitting to the dummy load.				

EUT was tested with both of the following power supplies:
Antec Model SP-400
IEI Model ACE-841AP
EUT was tested with both of the following AC/DC Converters
Carlo Gavazzi Type SPD24480W
Lambda DHP480-24-1

Required Modifications

The following is a list of modifications that were in place for the passing configuration, paired with references to their applications in the assembly manual (see attached file "Installation and Assembly Guide 0.6"):

Modification	Installation and Assembly Guide Reference
Reader moved inside metal chassis	Page 17, P/N 33-0030-00
In-house low-pass filter	Page 18, P/N 50-0010-00
PCI card cage gasket	Page 6, P/N 33-0033-00
SMA connectors grounded to card front-plate	Page 6, P/N 32-0029-00
3-loop ferrite toroid between PC and filter	Page 18, "Ferrite Toroid"
Clamp-on ferrites on antenna board ribbon cables	Page 18, P/N 60-0095-00
clamp-on ferrites on antenna board RF cables	Page 18/19, P/N 60-0094-00
Flat clamp-on ferrites on cabinet controller board ribbon cables	Page 19, P/N 60-0093-00
7-turn ferrite toroid on RF cable inside chassis coming from reader	Page 17, "Ferrite Core 7-loop"
Clamp-on ferrite on wire pair going to reader	Page 17, P/N 60-0095-00
4-loop ferrite toroid on DC side of AC/DC Converter	Page 17, "Ferrite Core 4-loop"
Clamp-on ferrite on AC wires inside and outside chassis and going to AC/DC Converter	Page 17, P/N 60-0094-00

In addition to the list above, the PC chassis sheet metal is no longer painted and is fastened in such a way as to provide sufficient electrically sealed seams.

Fundamental Measurements

LIMITS

Frequency Range (MHz)	Limit @ 30m (µV/m)	Limit @ 30m (dBµV/m)
13.553-13.567	15,848	83.9
13.410-13.553 13.567-13.710	334	50.4
13.110-13.410 13.710-14.010	106	40.5

[15.225(a-c)]

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

The limits of 15.209 apply outside the range 13.110-14.010 MHz.

MEASUREMENTS

Radiated Emissions Table *Curtis-Straus LLC*

Date: 15-Mar-07 **Company:** Mobile Aspects **Work Order:** H0300
Engineer: Evan Gould **EUT Desc:** iRISupply 4.0

Frequency Range: 13.56MHz **Measurement Distance:** 3 m

Notes: RBW=9kHz VBW=30kHz

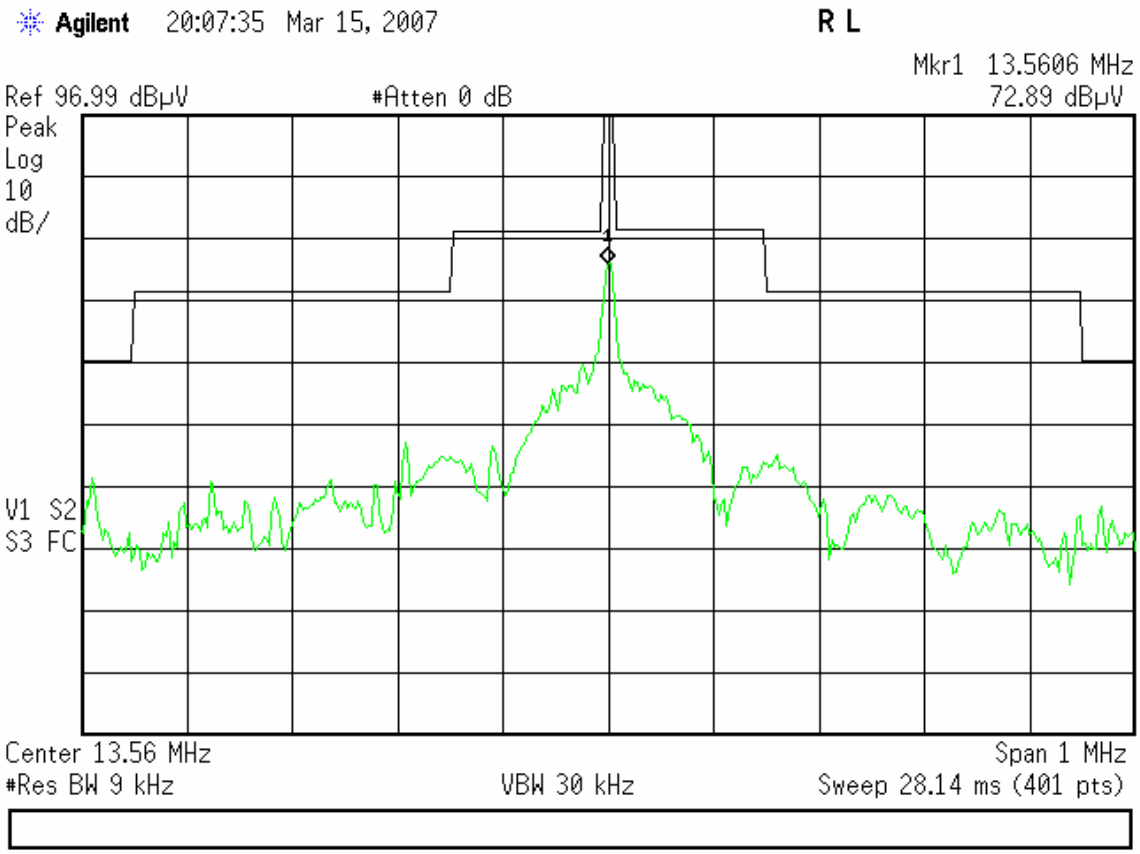
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Distance Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.225(a) Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Cabinet 1 Antenna 1; 90	13.56	74.8	25.9	38.0	0.1	40.0	47.0	83.9	-36.9	Pass
Cabinet 1 Antenna 2; 90	13.56	80.8	25.9	38.0	0.1	40.0	53.0	83.9	-30.9	Pass
Cabinet 1 Antenna 3; 90	13.56	76.6	25.9	38.0	0.1	40.0	48.8	83.9	-35.1	Pass
Cabinet 2 Antenna 4; 90	13.56	81.7	25.9	38.0	0.1	40.0	53.9	83.9	-30.0	Pass
Cabinet 2 Antenna 5; 90	13.56	78.2	25.9	38.0	0.1	40.0	50.4	83.9	-33.5	Pass
Cabinet 3 Antenna 3; 90	13.56	84.6	25.9	38.0	0.1	40.0	56.8	83.9	-27.1	Pass
Cabinet 3 Antenna 4; 90	13.56	75.1	25.9	38.0	0.1	40.0	47.3	83.9	-36.6	Pass

Table Result: Pass by -27.1 dB ***Worst Freq:*** 13.56 MHz

Test Site: "M" **Pre-Amp:** Red **Cable:** EMIR-11 **Analyzer:** Orange **Antenna:** Sm Loop (high)

Peak measurements were taken using each antenna in the three-cabinet system.

SAMPLE ANALYZER PLOT



Radiated Spurious Emissions

LIMITS

"The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209" [15.225(d)]

Bandwidth Settings:

0.009-30MHz	RBW=9kHz, VBW=30kHz
30-1000MHz	RBW=120kHz, VBW=300kHz
1-5GHz	RBW=1MHz, VBW=3MHz

MEASUREMENTS

Radiated Emissions Table — *Curtis-Straus LLC*

Date: 01-May-07 **Company:** Mobile Aspects **Work Order:** H0300
Engineer: Will Brown **EUT Desc:** iRISupply 4.0
Frequency Range: **Measurement Distance:** 10 m
Notes:

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	--- Limit (dBµV/m)	--- Margin (dB)	--- Result (Pass/Fail)	47 CFR 15.209 Limit (dBµV/m)	47 CFR 15.209 Margin (dB)	47 CFR 15.209 Result (Pass/Fail)
A1			---	---	---	---	---	---	---	---	---	---
90	27.12	5.4	22.1	36.6	0.3	20.2	---	---	---	48.6	-28.4	Pass
A2			---	---	---	---	---	---	---	---	---	---
90	27.12	4.4	22.1	36.6	0.3	19.2	---	---	---	48.6	-29.4	Pass
A3			---	---	---	---	---	---	---	---	---	---
90	27.12	4.6	22.1	36.6	0.3	19.4	---	---	---	48.6	-29.2	Pass
B4			---	---	---	---	---	---	---	---	---	---
90	27.12	6.8	22.1	36.6	0.3	21.6	---	---	---	48.6	-27.0	Pass
B5			---	---	---	---	---	---	---	---	---	---
90	27.12	8.0	22.1	36.6	0.3	22.8	---	---	---	48.6	-25.8	Pass
C3			---	---	---	---	---	---	---	---	---	---
90	27.12	8.3	22.1	36.6	0.3	23.1	---	---	---	48.6	-25.5	Pass
C4			---	---	---	---	---	---	---	---	---	---
90	27.12	9.1	22.1	36.6	0.3	23.9	---	---	---	48.6	-24.7	Pass

Table Result: Pass by -24.7 dB ***Worst Freq:*** 27.12 MHz

Test Site: "M" **Pre-Amp:** Black **Cable:** EMIR-11 **Analyzer:** White **Antenna:** Sm Loop (high)

Radiated Emissions Table — *Curtis-Straus LLC*

Date: 15-May-07 25-May-07 **Company:** Mobile Aspects **Work Order:** H0300
Engineer: Chad Bell Evan Gould **EUT Desc:** iRISupply 4.0 **Test Site:** "M"
Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes:

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
Hss	233.0	38.5	21.8	12.2	1.7	30.6	46.0	-15.4	Pass
Vss	299.57	43.4	21.9	13.9	2.0	37.4	46.0	-8.6	Pass
Vss	330.5	37.8	21.7	14.7	2.1	32.9	46.0	-13.1	Pass
H	366.68	27.8	21.5	15.7	2.2	24.2	46.0	-21.8	Pass
Hss	399.54	35.3	21.8	16.6	2.4	32.5	46.0	-13.5	Pass
Hss	429.6	35.5	21.8	16.9	2.5	33.1	46.0	-12.9	Pass
H	833.4	36.5	21.3	21.1	3.9	40.2	46.0	-5.8	Pass
noise floor	914.5	19.9	21.1	21.7	4.2	24.7	46.0	-21.3	Pass

Table Result: Pass by -5.8 dB ***Worst Freq:*** 833.4 MHz

15-May-07 **Pre-Amp:** Black **Cable:** EMIR-11 **Analyzer:** Yellow **Antenna:** Green
15-May-07 **Pre-Amp:** Black **Cable:** EMIR-11 **Analyzer:** Green **Antenna:** Green

Radiated Emissions Table

Curtis-Straus LLC

Date: 25-May-07 **Company:** Mobile Aspects **Work Order:** H0300

Engineer: Evan Gould **EUT Desc:** iRISupply 4.0

Frequency Range: 1-5GHz **Measurement Distance:** 3 m

Notes: **EUT Max Freq:**

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	--- Limit (dBµV/m)	--- Margin (dB)	--- Result (Pass/Fail)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
Hav	1409.8	54.1	40.8	26.8	0.9	41.0	---	---	---	54.0	-13.0	Pass

Table Result: Pass by -13.0 dB ***Worst Freq:*** 1409.8 MHz

Test Site: "M" **Pre-Amp:** Brown **Cable:** EMIR-HIGH-21 **Analyzer:** Brown **Antenna:** Black Horn

AC Line Conducted Emission Measurements

LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
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)]

MEASUREMENTS

AC Mains Conducted Emissions — *Curtis-Straus LLC*

Date: 17-May-07 **Company:** Mobile Aspects **Work Order:** H0300
Engineer: Evan Gould **EUT Desc:** iRISupply 4.0 **Test Site:** EMI 1
Notes: Lambda AC-DC Converter and Antec Power supply.
Measurement Device: Red LISN
Range: 0.15-30MHz **Spectrum Analyzer:** Blue

Frequency (MHz)	Q.P. Readings QP1 (dBµV)	Q.P. Readings QP2 (dBµV)	Ave. Readings AV1 (dBµV)	Ave. Readings AV2 (dBµV)	Impedance Factor (dB)	--- Limit (dBµV)	--- Margin dB	FCC/CISPR B qp Limit (dBµV)	FCC/CISPR B qp Margin dB	FCC/CISPR B AVE Limit (dBµV)	FCC/CISPR B AVE Margin dB	Overall Result (Pass/Fail)
0.16	22.3	23.1	22.3	23.1	20.4	---	---	65.5	-22.0	55.5	-12.0	Pass
2.16	4.8	5.4	4.8	5.4	20.1	---	---	56.0	-30.5	46.0	-20.5	Pass
12.10	3.3	3.1	3.3	3.1	20.3	---	---	60.0	-36.4	50.0	-26.4	Pass
16.70	3.5	3.1	3.5	3.1	20.4	---	---	60.0	-36.1	50.0	-26.1	Pass
23.20	2.3	6.1	2.3	6.1	20.7	---	---	60.0	-33.2	50.0	-23.2	Pass
26.00	2.1	5.7	2.1	5.7	20.8	---	---	60.0	-33.5	50.0	-23.5	Pass

Table Result: Pass by -12.00 dB ***Worst Freq:*** 0.16 MHz

AC Mains Conducted Emissions — *Curtis-Straus LLC*

Date: 18-May-07 **Company:** Mobile Aspects **Work Order:** H0300
Engineer: Evan Gould **EUT Desc:** iRISupply 4.0 **Test Site:** EMI 1
Notes: Carlo Gavazzi AC-DC Converter and iEi Power supply.
Measurement Device: Red LISN
Range: 0.15-30MHz **Spectrum Analyzer:** Blue

Frequency (MHz)	Q.P. Readings QP1 (dBµV)	Q.P. Readings QP2 (dBµV)	Ave. Readings AV1 (dBµV)	Ave. Readings AV2 (dBµV)	Impedance Factor (dB)	--- Limit (dBµV)	--- Margin dB	FCC/CISPR B qp Limit (dBµV)	FCC/CISPR B qp Margin dB	FCC/CISPR B AVE Limit (dBµV)	FCC/CISPR B AVE Margin dB	Overall Result (Pass/Fail)
0.30	23.1	6.3	23.1	6.3	20.3	---	---	60.2	-16.8	50.2	-6.8	Pass
3.80	3.0	4.4	3.0	4.4	20.1	---	---	56.0	-31.5	46.0	-21.5	Pass
9.90	2.7	2.7	2.7	2.7	20.3	---	---	60.0	-37.0	50.0	-27.0	Pass
13.70	3.4	2.3	3.4	2.3	20.4	---	---	60.0	-36.2	50.0	-26.2	Pass
22.90	1.9	2.2	1.9	2.2	20.7	---	---	60.0	-37.1	50.0	-27.1	Pass
26.70	3.8	2.6	3.8	2.6	20.9	---	---	60.0	-35.3	50.0	-25.3	Pass

Table Result: Pass by -6.80 dB ***Worst Freq:*** 0.30 MHz

Voltage Variation

REQUIREMENT

"For intentional radiators, measurements of the variation of the...radiated signal level of the fundamental frequency component of the emission...shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage." [15.31(e)]

MEASUREMENTS

Voltage Variation

Date: 16-Mar-04
Company: Mobile Aspects
EUT: iRISupply 4.0

Engineer: Evan Gould
Analyzer: Green
Antenna: Small Loop

Notes:

Supply Voltage (VAC)	Frequency (MHz)	Reading (dBµV/m)
(85%) 102	13.56	85.6
(nominal) 120	13.56	85.7
(115%) 138	13.56	85.2

Test Equipment Used

REV. 21-MAY-2007

SPECTRUM ANALYZERS / RECEIVERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	Agilent	3441A03559	00024	I	08-JAN-2008
WHITE	9kHz-22GHz	8593E	Agilent	3547U01252	00022	I	06-OCT-2007
BLUE	9kHz-1.8GHz	8591E	Agilent	3223A00227	00070	I	18-DEC-2007
YELLOW	9kHz-2.9GHz	8594E	Agilent	3523A01958	00100	I	05-JUN-2007
GREEN	9kHz-26.5GHz	8593E	Agilent	3829A03618	00143	I	05-SEP-2007
BLACK	9kHz-12.8GHz	8596E	Agilent	3710A00944	00337	I	08-DEC-2007
TELECOM 3585A	20Hz-40.0MHz	3585A	Agilent	2504A05219	00030	I	15-FEB-2008
TELECOM 3585A	20Hz-40.0MHz	3585A	Agilent	1750A03418	00558	I	Out of Service
TELECOM 3585A	20Hz-40.0MHz	3585A	Agilent	1750A02762	01067	I	Out of Service
ORANGE	9kHz-26.5GHz	E4407B	Agilent	US39440975	00394	I	Out of Service
BROWN (RENTAL)	9kHz-26.5GHz	E4407B	Agilent	SG44210511	Rental	I	01-FEB-2008
EMI TEST RECEIVER	20-1000MHz	ESVS30	R&S	827957/001	01098	I	27-OCT-2008
RENTAL 7405A	100Hz-26.5 GHz	E7405A	Agilent	MY44212795	Rental	I	28-DEC-2007

LISNS/MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	956348	00753	II	05-JUN-2007
BLUE (DC)	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	956349	00752	II	05-JUN-2007
YELLOW-BLACK	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	984735	00248	II	05-JUN-2007
ORANGE	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	903707	00754	I	07-MAY-2008
GOLD (DC)	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	984734	00247	II	05-JUN-2007
BROWN	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	0411656	00986	II	05-JUN-2007
GREEN	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	0411657	00987	II	08-JUN-2007
YELLOW	10KHZ-30MHZ	8012-50-R-24-BNC	SOLAR	0411658	1080	II	05-JUN-2007
WHITE-BLACK	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972019	00678	I	17-MAY-2008
BLACK	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972017	00675	I	18-MAY-2008
RED-BLACK	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972016	00677	I	18-MAY-2008
BLUE-BLACK	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972018	00676	I	17-MAY-2008
BLUE MONITORING PROBE	0.01-150MHZ	91550-2	TEGAM	12350	00807	I	26-MAY-2007
YELLOW MONITORING PROBE	0.01-150MHZ	91550-2	ETS	50972	00493	I	23-JAN-2008
GREEN CURRENT TRANSFORMER	40HZ-20MHZ	150	PEARSON	10226	00793	I	19-APR-2009
BLUE CISPR LINE PROBE	150KHZ-30MHZ	N/A	C-S	N/A	00805	II	08-JUN-2007
BLACK CISPR LINE PROBE	150KHZ-30MHZ	N/A	C-S	N/A	1254	II	08-JUN-2007
CISPR TELCO VOLTAGE PROBE	10KHZ-30MHZ	CS A/C-10	C-S	CS01	00296	II	17-NOV-2007
CISPR 22 TELCO ISN	9KHZ-30MHZ	FCC-TLISN-T4	FISCHER	20115	00746	I	15-NOV-2007

OPEN AREA TEST SITES (OATS)	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE
SITE F	93448	IC 2762A-1	R-1688	II	23-JUN-2008
SITE T	93448	IC 2762A-2	R-905	II	23-JUN-2008
SITE A	93448	IC 2762-A	R-903	II	20-JUN-2008
SITE M	93448	IC 2762-M	R-904	II	19-JUN-2008
SITE J	93448	IC 2762A-3	R-2377	II	12-APR-2008

CONDUCTED TEST SITES (MAINS / TELCO)	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE
EMI 1	93448	N/A	C-1801, T-268	III	NA
EMI 2	93448	N/A	C-1802, T-269	III	NA
EMI 3	93448	N/A	C-1803, T-270	III	NA

PREAMPS / ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	00798	II	20-APR-2008
BLUE	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	00759	II	17-APR-2008
BLUE-BLACK	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	00800	II	18-JAN-2008
GREEN	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	00802	II	02-MAY-2008
BLACK	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	00799	II	20-JUL-2007
ORANGE	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	00765	II	02-MAY-2008
RED-WHITE	0.009-2000MHZ	ZFL-1000-LN	C-S	N/A	1258	II	08-MAY-2008
WHITE	1-20GHZ	SMC-12A	C-S	426643	00760	II	22-JUL-2007
BROWN	1-20GHZ	PM2-38-218-4R5-17-15-SFF	C-S	PL1655	1132	II	02-APR-2008
YELLOW-BLACK	1-20GHZ	SMC-12A	C-S	535055	00801	II	OUT OF SERVICE
RED-GREEN	1-20GHZ	PM2-38-218-4R5-17-15-SFF	C-S	N/A	1256	II	14-AUG-2007
RED-BLUE	1-20GHZ	PE2-38-218-4R5-17-15-SFF	C-S	PL3177	1257	II	19-APR-2008
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	05-JAN-2008
LOW PASS FILTER	1-9 GHZ	11SL10-4100/X4400-O/O	K&L	4	00816	II	05-JAN-2008
HF 20DB 50W ATTENUATOR	0.03-20 GHZ	PE 7019-20	PASTERNACK	01	00791	II	08-MAY-2009
HF 30DB 50W ATTENUATOR	0.03-20 GHZ	PE 7019-30	PASTERNACK	02	1168	II	08-MAY-2009
40DB 100W ATTENUATOR	0.09-4000MHZ	BW-40N100W+	MINI-CIRCUITS	V N014900638	1231	II	08-NOV-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	OUT OF SERVICE

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN BILOG	30-2000MHZ	CBL6112B	CHASE	2742	00620	II	13-JAN-2008
GREEN-BLACK BILOG	30-2000MHZ	CBL6112B	CHASE	2412	00127	II	13-JAN-2008
GREEN-RED BILOG	30-2000MHZ	CBL6112B	CHASE	2435	00990	I	12-APR-2008
BLUE BILOG	30-1000MHZ	3143	EMCO	1271	00803	II	06-JUN-2007
GRAY BILOG	20-2000MHZ	3141	EMCO	9703-1038	00066	II	06-JUN-2007(EMI) / 04-FEB-2008(RFI2)
YELLOW-BLACK BILOG	20-2000MHZ	CBL6140A	CHASE	1112	00126	II	06-JUN-2007(EMI) /20-APR-2008(RFI)
RED-WHITE BILOG	30-2000MHZ	JB1	SUNOL	A091604-1	01105	I	07-NOV-2008
RED-BLACK BILOG	30-2000MHZ	JB1	SUNOL	A091604-2	01106	I	20-OCT-2008
RED-BROWN BILOG	30-2000MHZ	JB1	SUNOL	A0032406	1218	I	04-AUG-2008
YELLOW HORN	1-18GHZ	3115	EMCO	9608-4898	00037	I	27-MAY-2007(EMI)
BLACK HORN	1-18GHZ	3115	EMCO	9703-5148	00056	I	17-JUN-2007(EMI) / 17-MAY-2008 (RFI)
ORANGE HORN	1-18GHZ	3115	EMCO	0004-6123	00390	I	09-JUN-2007(EMI) / 17-MAY-2008 (RFI)
HF (WHITE) HORN	18-26.5GHZ	801-WLM	WAVELINE	00758	00758	I	26-AUG-2007
SMALL LOOP	10KHZ-30MHZ	PLA-130/A	ARA	1024	00755	I	22-FEB-2008
LARGE LOOP	20HZ-5MHZ	6511	EMCO	9704-1154	00067	I	23-JAN-2008
ACTIVE MONOPOLE	30HZ-30MHZ	3301B	EMCO	3824	00068	II	06-DEC-2007
INDUCTION COIL	50-60HZ	1000-4-8	C-S	N/A	00778	II	26-SEP-2007
ADJUSTABLE DIPOLE	30-1000MHZ	3121C	EMCO	1370	00757	I	26-OCT-2008
ADJUSTABLE DIPOLE	30-1000MHZ	3121C	EMCO	1371	00756	I	09-NOV-2008
RE101 LOOP SENSOR	30HZ-100KHZ	RE101-13.3CM	C-S	N/A	00818	II	22-MAR-2009
RS101 RADIATING LOOP	30HZ-100KHZ	RS101-12CM	C-S	N/A	00819	II	22-MAR-2009
RS101 LOOP SENSOR	30HZ-100KHZ	RS101-4CM	C-S	N/A	00820	II	22-MAR-2009

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-STRAUS[1]
527 Great Road
Littleton, MA 01460
Barry Quinlan Phone: 978-486-8880

ELECTRICAL

Valid until: July 31, 2005 Certificate Number: 1627-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following 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

EMC Standards	Title
Emissions	
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	Digital apparatus
AS/NZS 3548 1995	Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of information technology equipment
CISPR 11 1990, 1997, 1999	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

[1] Note: This accreditation covers testing performed at the laboratory listed above and the satellite facility located at 168 Ayer Rd, Littleton, MA 01460

EN 55011 1991, 1998 characteristics of SABS CISPR 11:1997	Limits and methods of measurement of radio disturbance industrial, scientific and medical (ISM) radio-frequency equipment. Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics Limits and methods of measurement
Canada ICES-001 1998	Industrial, scientific and medical radio frequency generators
CNS13803	Industrial, Scientific and Medical Instrument
AS/NZS 2064: 1997	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
CSA C108.8 – M1983	Electromagnetic Emission from Data Processing Equipment and Electronic Office Machines
CISPR 13:1996, 1998, 2001	Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment.
EN 55013: 1990, 2001	Sound and television broadcast receivers and associated equipment: Electromagnetic compatibility. Part 1: Specification for limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment.
EN 55013 Amend 12 1994	Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment. Amendment 12
SABS CISPR 13: 1996	Limits and methods of measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment.
CNS 13439	Broadcast receiver and associated equipment Limits and methods of
AS/NZS 1053: 1999	measurement of radio interference characteristics of sound and television broadcast receivers and associated equipment.
CISPR 14 1993 (*except discontinuous disturbances*)	Limits and methods of measurement of radio disturbance characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and electric apparatus.
EN 55014 1993, 1997 *discontinuous disturbances*)	Limits and methods of measurement of radio disturbance (*except* characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus.
AS/NZS 1044: 1995 *discontinuous disturbances*)	Limits and methods of measurement of radio disturbance (*except* characteristics of electrical motor- operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus.
Immunity	
CNS13783-1	Household Electrical Appliances
SABS CISPR 14-1 1993	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission – Product family standard
SABS CISPR 14-2 1997 + A1:2001	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity - Product family standard

CISPR 14-2 1996, 1997 + A1:2001	Immunity requirements for household appliances, tools and similar apparatus.
CISPR 20: 1995, 2002 with amendment 3 (*associated group only*)	Limits and methods of measurement of immunity characteristics of sound and television broadcast receivers and associated equipment.
EN 55020: 1995, 2002 (*associated group only*)	Electromagnetic immunity of broadcast receivers and Associated equipment.
CISPR 24	Information technology equipment – Immunity characteristics – Limits and methods of measurement
SABS CISPR 24 1997	Information technology equipment – Immunity characteristics – Limits and methods of measurement
AS/NZS 3200.1.2: 1995	Approval and test specification – Medical electrical Equipment – General requirements for safety – Collateral Standard: Electromagnetic compatibility – Requirements and tests.
European Union Basic EMC Standards	
EN 61000-4-2: 1995, 1999, 2001	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication
EN 61000-4-3:1997, 1998, 2002 AS/NZS 61000.4.3 1999	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4 1995	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication
EN 61000-4-5 1995 AS/NZS 61000.4.5 1999	(EMC) Part 4: Testing and measurement techniques. Section 5: Surge immunity test.
EN 61000-4-6 1996 AS/NZS 61000.4.6 1999	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields.
EN 61000-4-8 1994	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test.
EN 61000-4-11 1994	(EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage Variations immunity tests.
ENV 61000-2-2 1993	Electromagnetic compatibility (EMC). Part 2: Environment, Section 2: Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power supply systems (IEC 1000-2-2:1990)
EU Product Family Standards	
EN 50081-1 1992	Electromagnetic capability – Generic emission standard. Part 1: Residential, commercial and light industry. (I.S.)
EN 50081-2 1993	Electromagnetic compatibility – Generic emission standard. Part 2: Industrial environment
EN 50082-1 1992, 1998	Electromagnetic compatibility – Generic emission standard. Part 1: Residential, commercial and light industry
EN 50082-2 1995	Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment

EN 61000-6-1: 1997, 2001	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 1: Immunity for residential, commercial and light-industrial environments
EN 61000-6-2: 1998, 2001	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 2: Immunity for industrial environments
EN 50091-2 1996	Specification for Uninterruptible Power Systems (UPS). Part 2: EMC requirements
EN 55024 1998	Information technology equipment – Immunity Characteristics – Limits and methods of measurement.
EN 55103-1 1997	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission
EN 55103-2 1997 (*excluding Annex A3*)	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control professional use. Part 2: Immunity
EN 61326 1998	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61547 1996	Equipment for general lighting purposes – EMC immunity requirements
EN 50130-4 1996	Alarm Systems. Part 4: Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems.
EN 55104 1995	Electromagnetic compatibility immunity – requirements for household appliances, tools and similar apparatus. Product family standard.
EN 50083-2 1995	Cabled distribution systems for television and sound signals. Part 2: Electromagnetic compatibility for equipment.
EN 60601-1-2: 1993, 2002	Medical electrical equipment Part 1: general requirements for safety Section 2: Collateral standard: Electromagnetic compatibility – requirements and tests
IEC 1800-3 1995	Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods.
EN 60555 Part 2 1987	Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 2: Harmonics
EN 60555 Part 3 1987	Disturbances in supply systems caused by household appliances and similar electrical equipment. Part 3: Voltage fluctuations.
EN 61000-3-2: 1995, 2000 AS/NZS 61000.3.2 1998	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits for harmonic current emissions
EN 61000-3-3 1995 AS/NZS 61000.3.3 1999	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limitation of voltage fluctuations and flicker in low-voltage supply systems.
ETS 300 386-1 1994	Equipment Engineering (EE); Public telecommunication network equipment electro-magnetic compatibility (EMC) requirements Part 1: Product family overview, compliance criteria and test levels

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ETS EN 300 386-2 1997, 1998,	Electromagnetic compatibility and radio spectrum matters (ERM);
ETS EN 300 386 2000 v1.2.1, 2001 v1.3.1	Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements; Part 2: Product family standard.
ETS 300 132-1 1996	Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources
ETS 300 132-2 1996	Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)
ETR 283 1997	Equipment Engineering (EE): Transient voltages at Interface A on telecommunications direct current (DC) power distributions.
EU radio standards	
(ETS) EN 300 385 v1.2.1: 1998, 1999	Electromagnetic compatibility and Radio spectrum matters (ERM); Electromagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment (ETS)
EN 300 330 v1.2.1: 1998, 1999	Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices (SRD); Technical characteristics and test methods for radio equipment in the range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz
ETS 300 328 1996	Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques
ETS EN 300 440 v1.2.1 1999	Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices; Technical characteristics and test methods for radio equipment to be used in the 1 Ghz to 40 Ghz frequency range
EN 301 893:2002 v1.2.1	Broadband Radio Access Networks (BRAN); 5 GHz (draft) high performance RLAN; Harmonized EN covering Essential requirements of article 3.2 of the R&TTE Directive
ETS 300 836-1:1998	Broadband Radio Access Networks (BRAN); High Performance Radio Local Area Network (HIPERLAN) Type 1; Conformance testing specification; Part 1: Radio Type approval and Radio Frequency (RF) conformance test specification
EN301 489-17:2002 v1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2,4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment

EN 300 328-2:2001 v1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive
EN 301 489-1:2002	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
EN 60669-2-1:2002	Switches for household and similar fixed electrical installations -- Part 2-1: Particular requirements – Electronic switches
Canada Radio Standards	
Canadian GL-36 1995	Industry Canada – technical requirements for low power Devices in the 2400 – 2483.5 MHz band.
Canadian RSS-119 1999, 2000 Issue 6	Industry Canada – Land mobile and fixed radio Transmitters and receivers, 27.41 to 960.0 MHz
Canadian RSS-134 1996 & 2000, Issue 1 Rev 1	Industry Canada – 900 MHz narrowband personal communications services
Canadian RSS-210 2000 Issue 3,	Industry Canada – Low power license-exempt radio 2001 Issue 5 communication devices
RFS29 1998	Specification for Restricted Radiation Radio Apparatus (New Zealand)
FCC Standards	
47 CFR FCC low power transmitters operating on frequencies below 1 GHz, emergency alert systems, unintentional radiators and ISM devices.	Scope A1
47 CFR FCC low power transmitters operating on frequencies above 1 GHz, with the exception of spread spectrum devices.	Scope A2
47 CFR FCC Unlicensed Personal Communications System (PCS) devices	Scope A3
47 CFR FCC Unlicensed National Information Infrastructure devices and low power transmitters using spread spectrum techniques.	Scope A4
47 CFR FCC Personal mobile Radio Services in the following FCC Rule Parts 22, 24, 25, 27.	Scope B1
47 CFR FCC General Mobile Radio Services in the following FCC Rule Parts 22, 74, 90, 95, 97.	Scope B2
47 CFR FCC Maritime and Aviation RadioServices in 47 CFR Parts 80 and 87	Scope B3
47 CFR FCC Microwave Radio Services Scope in 47 CFR Parts 21, 74 and 101.	Scope B4

FCC/OST MP-5 1986	FCC (Federal Communications Commission) methods Of measurement of radio noise emissions from industrial, scientific and medical equipment.
GR-1089-CORE: 1997, 1999 issue 2/ 2002 Issue 3	Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.
ANSI EMC Standards	
ANSI C63.4: 1992, 1999, 2001	American National Standard for methods of measurement of radio-noise emissions for low-voltage electrical and electronic equipment in the range of 9 kHz to 40GHz.
ANSI C63.5 1988	American National Standard for electromagnetic compatibility – radiated emissions measurements in electromagnetic interference (EMI) control – calibration of antennas.
IEEE EMC Standards	
IEEE C62.41: 1980, 1991	IEEE recommended practice on surge voltages in low-voltage AC power circuits
Swedish EMC Standards	
BAKOM 3336.3 1995	Electromagnetic compatibility and electrical safety (EMC & S) for wired terminal equipment. Harmonization document information over the OFCOM requirements.
South African EMC standards other than CISPR equivalents	
SABS 1718-1: 1996	South African Bureau of Standards: Specification for Gaming equipment. Part 1: Casino equipment.
Japanese VCCI Standards	
VCCI V-3/99.05 1999	Technical Requirements
VCCI V-4/99.05 1999	Instruction for Test Conditions for Requirement under Test

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
FCC 47 CFR Part 68 Telephone	Connection of terminal equipment to the telephone Terminal Equipment network. Analog and Digital Equipment. TCB Scope C1.
CS-03 Issue 8 1996 through amendment 5	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/EIA-IS-968	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
TIA/EIA-IS-883	Telecommunications Telephone Terminal Equipment Supplemental Technical Requirements for Connection of Stutter Dial Tone Detection Devices and ADSL Modems to the Telephone Network
TIA-968-A	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
Canada VDSL Issue 1 January 2003	Terminal Attachment Program Requirements and Test Methods for Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment
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 Voiceband
ITU-T G.703	Physical/electrical characteristics of hierarchical Digital interfaces
HKTA 2028	Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 1544 kbit/s
HKTA 2029	Network connection specification for connection of CPE to the PTNs in Hong Kong using digital leased circuits at data rate of 2048 kbit/s
TBR 1 : 1995	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
TBR 2 : 1997	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

TBR 3 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access
TBR 4 : 1995 + Amdt : 1997	Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access
TBR 012 : 1993 + Amdt : 1996	Business Telecommunications (BT); Open Network Provision (ONP) technical requirements; 2 048 kbit/s digital unstructured leased line (D2048U) Attachment requirements for terminal equipment
TBR 013 : 1996	Business TeleCommunications (BTC); 2 048 kbit/s digital structured leased lines (D2048S); Attachment requirements for terminal equipment interface
TBR 21 : 1998	Terminal Equipment (TE); Attachment requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signaling
TBR 24 : 1997	Business TeleCommunications (BTC); 34 Mbit/s digital Unstructured and structured leased lines (D34U and D34S); Attachment requirements for terminal equipment interface
Australia	
TS 002 : 1997	Analogue Interworking and Non interference Requirements for Customer Equipment Connected to the Public Switched Telephone Network
TS 016 : 1997	General Requirements for Customer Equipment Connected to Hierarchical Digital Interfaces
TS 031 : 1997	Requirements for ISDN Basic Access Interface
TS 038 : 1997	Requirements for ISDN Primary Rate Access Interface
AS/ACIF S043.2:2001	Requirements for Customer Equipment for connection to a metallic loop interface of a Telecommunications Network – Part 2 Broadband

Product Safety

General test methods; Input tests; Electric strength tests; Impulse tests; Permanency of marking tests; Accessibility tests; Energy Hazard measurements; Capacitor discharge tests; Humidity conditioning; Earthing tests; Limited power source measurements; Stability tests; Steel ball tests; Lithium Battery Reverse Current measurements; Leakage current tests; Transformer abnormal tests; Telecom leakage tests; Over voltage/power cross tests (*excluding x-ray tests*).

Product Safety Standards	Title
Specific Product Safety Standards	
IEC 950 1991	Safety of information technology equipment including Includes Amendments 1, 2, 3, and 4 electrical business equipment.
UL 1950 1998	Safety of information technology equipment, including lectrical business equipment.
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)
UL 60950 2000	Safety of information technology equipment

IEC 60950 2000	Safety of information technology equipment
EN 60950 1997, 1998, 2000	Safety of information technology equipment, including
IEC 60950-1 2001	Electrical business equipment.
UL 60950-1 2003	
CSA C22.2 No. 60950-00	
CSA C22.2 No. 60950-1 03	
AS/NZS 3260 1993	Approval and test specification – Safety of information technology equipment including electrical business Equipment.
AS/NZS 3260 Supp 1 1996	Approval and test specification – Safety of information technology equipment including electrical business equipment – Alphabetical reference index to IEC 950 (Supplement to AS/NZS 3260:1993)
ACA TS 001 1997	Australian Communications Authority – Safety requirements for customer equipment.
UL 1459 1995	Telephone Equipment
IEC 1010-1 1990	Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements.
IEC 61010-1 1993	
EN 61010-1 1993, 2001	Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements.
IEC 61010-1 2001	
UL 61010B-1 2003	
UL 3101-1 1993	Electrical equipment for laboratory use Part 1: General requirements.
CAN/CSA 1010-1 1999 (*Including AM 2*)	
UL 3111-1 1996	Electrical measuring and test equipment. Part 1: General requirements.
UL 3121-1 1995	
IEC 60601-1 1995	Medical electrical equipment. Part 1: General requirements for safety.
EN 60601-1 1995 (*Including AM 2*)	Medical electrical equipment
UL 2601-1 1997	Medical electrical equipment. Part 1: General Requirements for safety.
IEC 60065 1998, 2000	Audio, video and similar electronic apparatus – Safety requirements
ANSI/UL 6500: 1998	Audio/video and musical instrument apparatus for
CAN/CSA 60065-00	Household, commercial and similar general use
AS/NZS 3250 1995	Australian/New Zealand Standard – Approval and test
AS/NZS 60065 2000	Specification – Mains operated electronic and related Equipment for household and similar general use
Canadian C22.2 No. 1-94 (1-98) 1998	Audio, video and similar electronic equipment. Consumer and 1994, commercial products
EN 60065 1994	Safety requirements for main operated electronic and related apparatus for household and similar general use.
IEC 60825 1990	Radiation safety of laser products, equipment Classification, requirements and user's guide
EN 60825-1 1994	Safety of laser products Part 1: equipment Classification, requirements
IEC 60825-1 2001	and user's guide.
IEC 60825-2 2000-5 systems	Safety of laser products – Part 2: Safety of optical communication
IEC 60825-4 1997-11	Safety of laser products – Part 4: Laser guards
IEC 60335-1 1995 (*Including AM2 – 1997 & AM 12 – 1997*)	Safety of household and similar electrical appliances Part 1: General requirements
EN 60335-1 2001	
UL 60335-1 1998	
CAN/CSA E335-1 1994	

UL 61010A-1 : 2002	Electrical equipment for laboratory use; part 1: General requirements
EN 61010-1 : 2001	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
AS/NZS 60950 : 2000	Safety information technology equipment

Environmental [2]

Environmental Standards	Title
GR-63-CORE	NEBS Requirements: Physical Protection
ETS 300 019 (vibration up to 1000Hz)	Environmental conditions and environmental tests For telecommunications equipment

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