Curtis-Straus

Test Report

Report No	E0865-1
Client	Colubris Networks
Phone	781-547-0378
Fax	781-684-0009
Models	CN3300
FRN	0010292464
FCC ID	RTP-550-10016-3
IC	4891A-0100163
Equipment Type	Low Power Communication Device Transmitter
Equipment Code	DTS/NII
Standards	47CFR15.247, 15E, RSS-210 Issue 5
Results	As detailed within this report
Prepared by	Mairaj Hussain – Test Engineer
Authorized by	Michael Buehholz – EMC Manager
Issue Date	
Conditions of issue	This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this

Summary

This report presents the data obtained during the testing of CN 3300 radio for compliance with CFR 47 15.247 (DSS) and 15.407(a). The product under test employs two radios operating at the following frequencies.

a) 2400MHz – 2483.5MHz
b) 5150MHz – 5250MHz
c) 5250MHz – 5350MHz
d) 5745MHz – 5825MHz

CN 3300 was previously tested for 15.247 and 15.407 (5.25GHz – 5.35GHz & 5.745 – 5.825 GHz) bands and found to be compliant while operating at (a),(c), and (d) from the above mentioned list of bands. The manufacturer intends to add a second radio and a new frequency band 5.15GHz – 5.25GHz to the original radio tested under the FCC ID: RTP-55010016-1.
This is a new application with new FCC ID: RTP-550-10016-3. Original test reports are also provided to cover the previous radio testing.

The second radio is identical to the radio tested before. Additional testing was performed to demonstrate the compliance of the radio with respective FCC rules. For dual radio, only the spurious emissions were checked in order to verify that the addition of a second identical radio did not cause any new or elevated emissions. The MPE evaluation was also updated to reflect the collocation of two radios.

Test Methodology

All testing was performed according to the procedures specified in FCC public notice DA 02-2138, Measurement procedure for U-NII bands and ANSI C63.4 (2003).

Measurement Distance:		
Frequency (MHz)	*Distance (m)*	*Comments*
0.15 – 30MHz	-	Conducted or Radiated
30 – 1000MHz, 1 – 18GHz	3 m	Spurious
5.15 – 5.25 GHz	-	Fundamental conducted reading
18 – 40 GHz	1 m	Spurious

EUT antennas were maximized within their range of motion.

The product is powered by a AC-DC adapter, therefore lince conducted testing was performed on the AC side of the adapter using 50µH/50Ω LISN.

All readings are peak unless otherwise noted.

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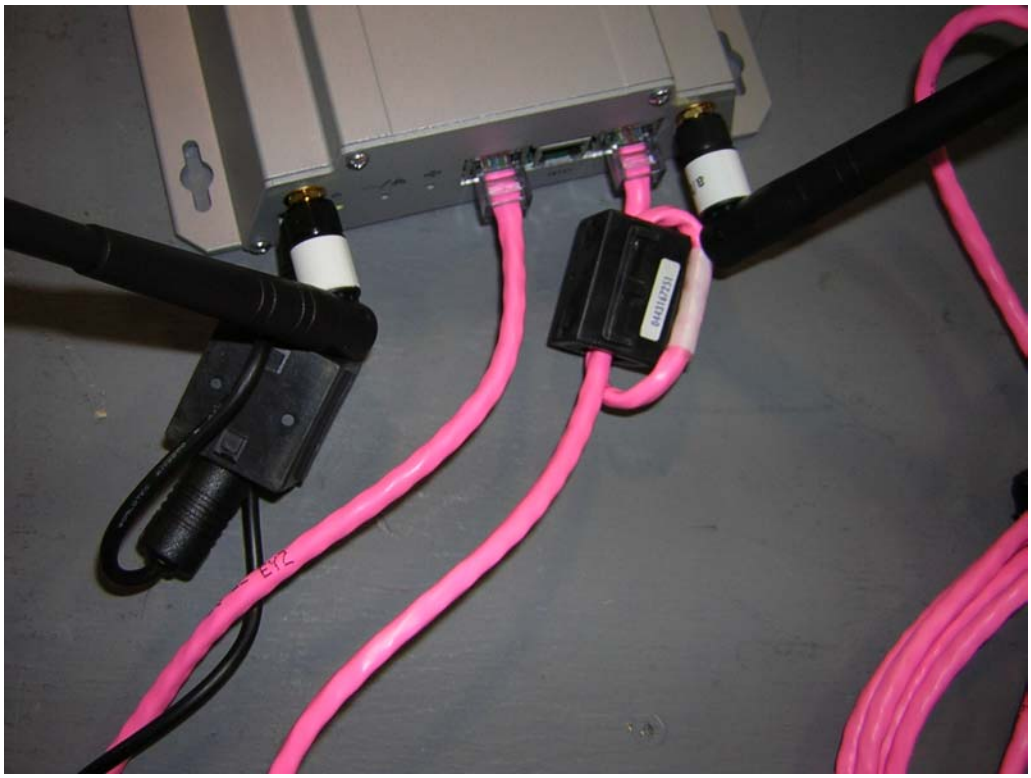
Modifications required for compliance

1. Full loop ferrite pn: 0443164151 added to dc power cable.
2. Full loop ferrite pn: 0443167251 added to the ethernet cable.



Picture of modification

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EUT Configuration

EUT Configuration

Work Order: E0865
Company: Colubris Networks
Company Address: 200 west Street
Waltham, MA 02451
Contact: Gerrett Durling
Person Present: Gerrett Durling

	MN	SN
EUT:	CN3300	Sample 1
FSP power supply	FSP015-1AD201A	H0000589

EUT Description: 802.11a/b/g wireless access point
EUT Max Frequency: 5.8GHz

Support Equipment:	MN	SN
Dell latitude	PPX	-

EUT Cables:	Qty	Shielded?	Length	Ferrites
AC power	1	No	1.5 m	None
DC	1	No	1 m	one
Ethernet	2	No	1.5 m	None

Unpopulated EUT Ports:	Qty	Reason
RJ45	1	diagnostics only

Software / Operating Mode Description:

Operating continuously in Tx or Rx modes during the testing. A representative sample of available data rates, channels, and modulation techniques was picked for testing in order to represent different modes of operation.

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Statement of Conformity

The CN3300 has been found to conform with the following parts of the 47 CFR as detailed below:

RSS-210	47 CFR Part #	47 CFR Part #	Comments
5.7		15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
5.10	2.925	15.19	The label is shown in the label exhibit.
5.11		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	Ferrites were added in order to comply with spurious emissions requirements.
		15.31(e)	The input power was varied from its nominal value to 4.25V and 5.75V. The respective radiated power was measured.
5.5		15.203	The device utilizes reverse sex SMA type antenna connector.
5.5		15.204	See attached documentation describing the antenna(s).
6.2.1		15.205 15.209	The fundamental is not in a Restricted band and the spurious emissions in the Restricted bands comply with the general emission limits of 15.209.
6.6		15.207	Unit is DC powered. Conducted EMI data is provided in this report, table 9.
6.2.2(o)		15.247	Product complies with the requirements of this section for DTS operating in the frequency band of 2400 -2483MHz. Please see attached test report.
		15.407	Product complies with the requirements of this section for equipment operating in the frequency band of 5.25 – 5.35GHz. Please see attached test report.
6.2.2(q1)(iii)		15.407	Product complies with the requirements of this section for equipment operating in the frequency band of 5.725 – 5.825GHz. Please see attached test report.
6.2.2(q1)(i)		15.407	Product complies with the requirements of this section for equipment operating in the frequency band of 5.15 – 5.25GHz.

Test Data and Plots (5.15-5.25GHz UNI band)

Section 15.31(e)

Input Voltage variation

FCC 15.231(e)		
Voltage Variation		
Company:	Colubris	
EUT:	CN3300	
Engineer:	Mairaj Hussain	
Date:	11/19/2004	
Site:	A	
Spectrum Ana:	Orange	
Cable:	7	
RBW:	1MHz	
VBW:	3MHz	
	Input VDC	Amplitude dBm
Nominal	5	-3.8
-15%	4.25	-3.5
15%	5.75	-2.7

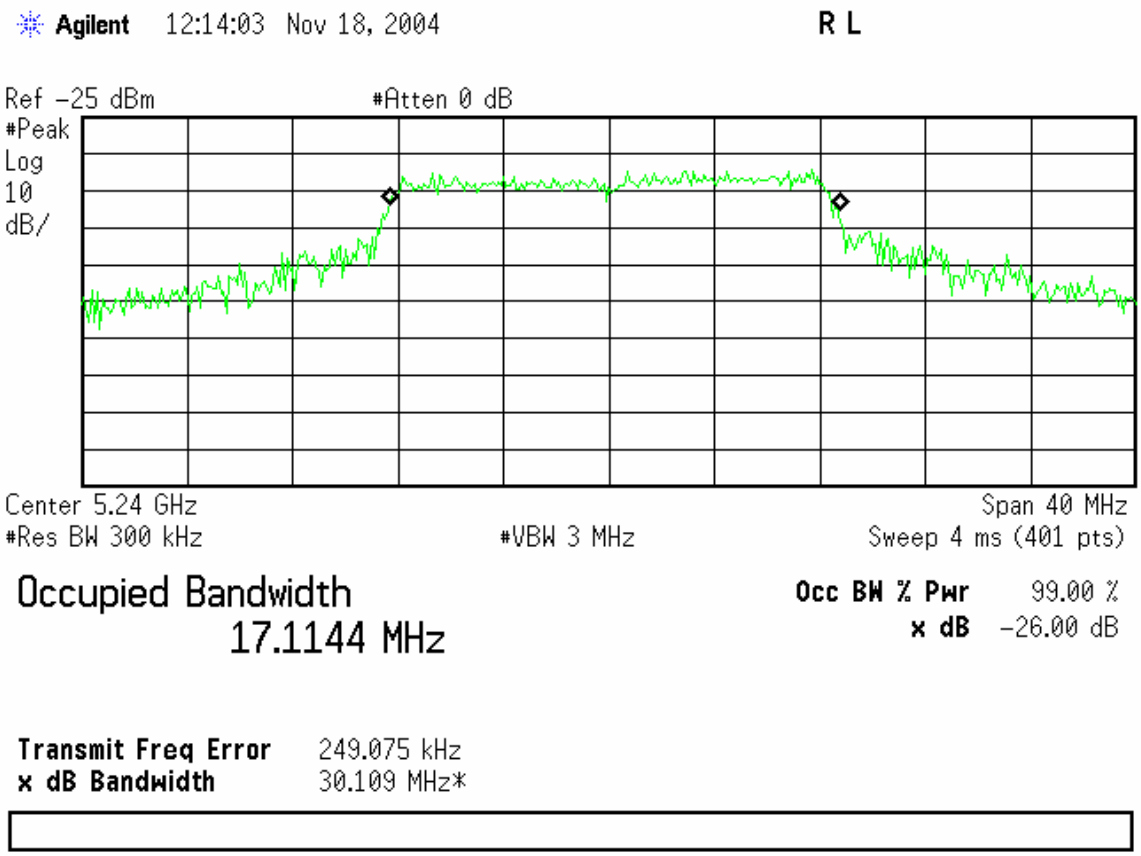
Conclusion:	The peak output power does not change with input voltage.

26dB Bandwidth

Bandwidth Table					Curtis-Straus LLC
Date: 18-Nov-04		Company: Colubris Networks		Work Order: E0865	
Engineer: MH/EG		EUT Desc: CN3300			
RBW: 300KHz		VBW: 3MHz		Detector type: Peak	

Channel	Data Rate (mbps)		26dB Bandwidt (MHz)		Occupied Bandwidth (MHz)	
48	54		30.1		17.1	
48	6		29.6		17.2	
36	6		27.4		17.1	
36	54		27		17	
44	6		29.3		17.4	
44	54		29.6		16.9	

Sample 26dB BW and Occupied BW plot:
CH48 at 54Mbps



15.407(a) Peak Output Power

Peak Out Put Power 15.407(a) *Curtis-Straus LLC*

Date: 22-Dec-04 **Company:** Colubris Networks **Work Order:** E0865
Engineer: MH/EG **EUT Desc:** CN3300

Analyzer: Orange **Cable:** #7
RBW: 1MHz **VBW:** 3MHz

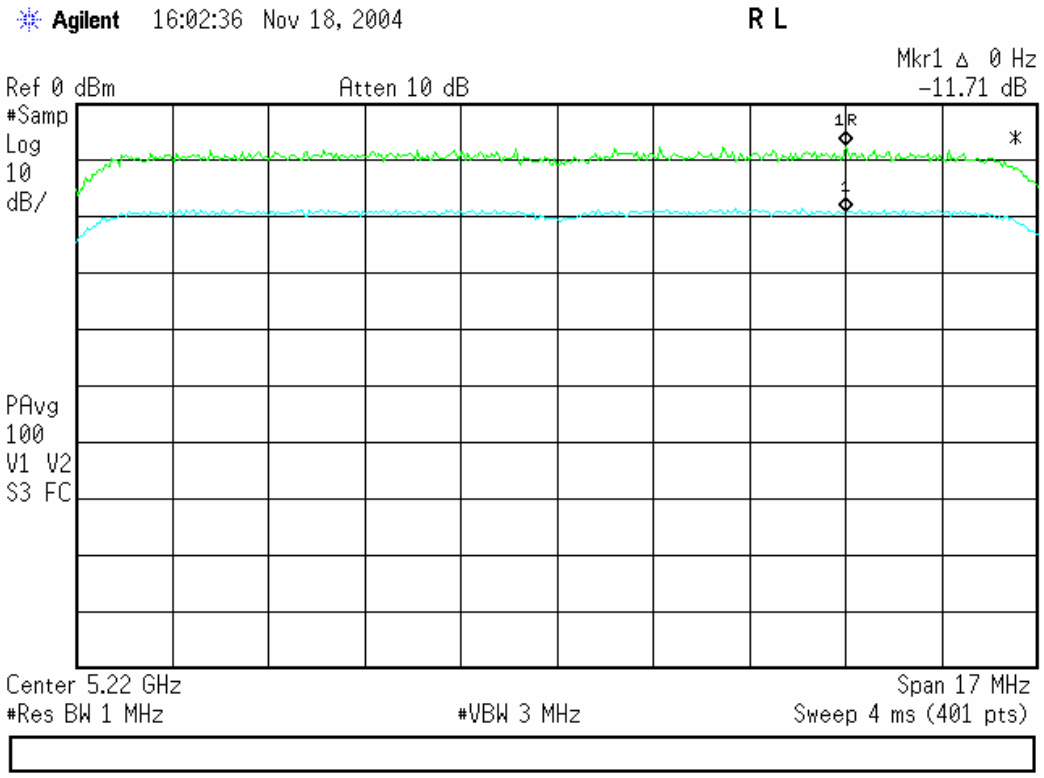
Measurement Method: #1 as outlined in FCC public notice DA 02-2138

CH	DR	Power (dBm)	Attenuator (dB)	Cable (dB)	Net Power (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
48	6	1.53	10	1.8	13.33	16.99	-3.66	Pass
48	54	-4.16	10	1.8	7.64	16.99	-9.35	Pass
36	6	-1.44	10	1.8	10.36	16.99	-6.63	Pass
36	54	-3.7	10	1.8	8.1	16.99	-8.89	Pass
44	6	-2.81	10	1.8	8.99	16.99	-8	Pass
44	54	-5.7	10	1.8	6.1	16.99	-10.89	Pass

15.407(a)(6) Peak Excursion

15.407(a)(6)Peak Excursion					
Work Order: E0865					
Company: Colubris Networks					
EUT: CN3300					
Date: Nov 18/04					
Engineer: Mairaj Hussain					
Channel	**Data Rate**	**Peak Excursion**	**Peak Excursion Limit**	**Margin**	**Result**
	(mbpd)	**(dBm)**	**(dBm)**	**(dB)**	**(Pass/Fail)**
44	54	11.7	13	-1.3	Pass
44	6	11.6	13	-1.4	Pass
36	6	11.4	13	-1.6	Pass
36	54	11.1	13	-1.9	Pass
48	6	10.4	13	-2.6	Pass
48	54	9.5	13	-3.5	Pass

Sample Peak Excursion plot:



CH44 at 54mbps

15.407(a) Peak Power Spectral Density

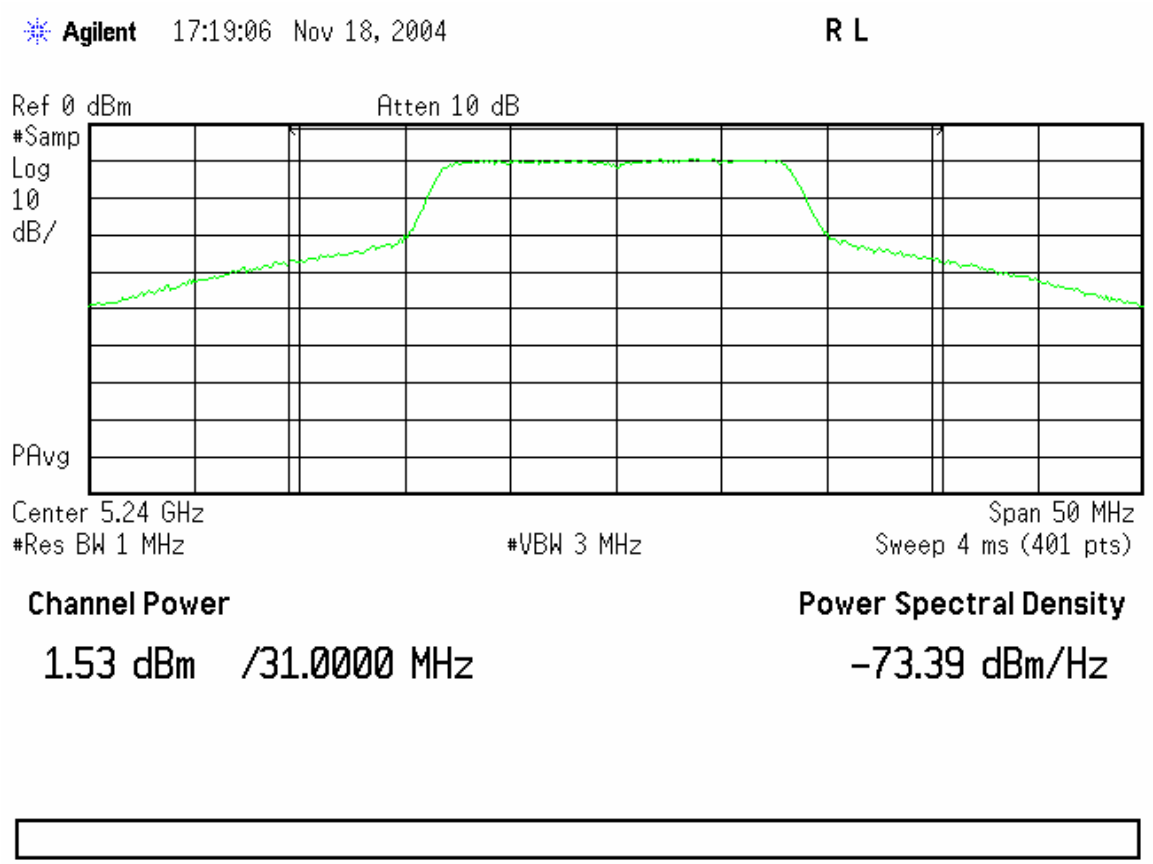
Peak Out Put Power 15.407(a)				Curtis-Straus LLC
Date: 22-Dec-04	**Company:**	Colubris Networks	**Work Order:**	E0865
Engineer: MH/EG	**EUT Desc:**	CN3300		

Analyzer: Orange **Cable:** #7
RBW: 1MHz **VBW:** 3MHz

Measurement Method: #2 as outlined in FCC public notice DA 02-2138

CH	DR	PPSD/Hz (dBm)	Attenuator (dB)	BW CF (dB)	Cable (dB)	Net PPSD/MHz (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
48	6	-73.4	10	60	1.8	-1.6	4	-5.6	Pass
48	54	-79.1	10	60	1.8	-7.3	4	-11.3	Pass
36	6	-76.4	10	60	1.8	-4.6	4	-8.6	Pass
36	54	-79	10	60	1.8	-7.2	4	-11.2	Pass
44	6	-77.7	10	60	1.8	-5.9	4	-9.9	Pass
44	54	-80.7	10	60	1.8	-8.9	4	-12.9	Pass

Sample Power Plot



CH48; DR 6mbps

15.407(b)(1)

Spurious Emissions

Lower Band Edge *Curtis-Straus LLC*

Date: 19-Nov-04 **Company:** Colubris **Work Order:** E0865
Engineer: Mairaj Hussain **EUT Desc:** CN3300

Measurement Distance: 3 m

Notes: RBW:1MHz; VBW:3MHz & 10Hz

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)
Hpk	5150.0	43.0	22.5	36.0	3.0	59.5	---	---	---	74.0	-14.5	Pass
Havg	5150.0	31.0	22.5	36.0	3.0	47.5	---	---	---	54.0	-6.5	Pass

Test Site: "A" **Pre-Amp:** Or-Blk **Cable:** 3 RG142LL **Analyzer:** White & Orange **Antenna:** Orange Horn

15.407(b)(1)Band Edge

Company: Colubris
EUT: CN3300
Engineer: Mairaj Hussain
Date: 11/19/2004

RBW: 1MHz **VBW:** 3MHz

	Freq (MHz)	Reading (dBuV/m)	Reading (dBm)	Antenna gain (dBi)	Adj. Reading (dBm)	Limit (dBm)	(Margin)
**Chpower **Conducted reading	5125	-	-47.00	5.0	-42.0	-27	-15.00

Sample Calculation:

Adjusted Reading = Reading – Pre $Amp_{(factor)}$ + $Antenna_{(factor)}$ + $Cable_{(factor)}$

Radiated Emissions Table *Curtis-Straus LLC*

Date: 26-Oct-04 **Company:** Colubris **Work Order:** E0865
Engineer: Mairaj Hussain **EUT Desc:** CN 3300

Frequency Range: 30 - 1000MHz **Measurement Distance:** 3 m

Notes: 802.11 b (both radios)

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	CISPR Class B Limit (dBµV/m)	CISPR Class B Margin (dB)	CISPR Class B Result (Pass/Fail)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
H-QP	125.0	44.0	22.2	12.9	1.5	36.2	40.5	-4.3	Pass	43.5	-7.3	Pass
H-QP	250.0	49.7	22.0	13.1	2.2	43.0	47.5	-4.5	Pass	46.0	-3.0	Pass
H-QP	375.0	44.8	21.9	15.9	2.8	41.6	47.5	-5.9	Pass	46.0	-4.4	Pass
V-QP	51.5	34.2	22.3	9.0	0.9	21.8	40.5	-18.7	Pass	40.0	-18.2	Pass
V-QP	53.4	36.8	22.3	8.5	0.9	23.9	40.5	-16.6	Pass	40.0	-16.1	Pass
V-QP	128.1	34.6	22.2	12.8	1.5	26.7	40.5	-13.8	Pass	43.5	-16.8	Pass
H-QP	144.0	34.0	22.3	11.9	1.6	25.2	40.5	-15.3	Pass	43.5	-18.3	Pass
H-QP	184.0	34.2	22.1	10.1	1.8	24.0	40.5	-16.5	Pass	43.5	-19.5	Pass
H-QP	384.7	41.4	21.9	16.2	2.8	38.5	47.5	-9.0	Pass	46.0	-7.5	Pass

Test Site: "M" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Black **Antenna:** Grn-Blk

Radiated Emissions Table *Curtis-Straus LLC*

Date: 26-Oct-04 **Company:** Colubris **Work Order:** E0865
Engineer: Mairaj Hussain **EUT Desc:** CN 3300

Frequency Range: 1 - 18GHz (except 2.4GHz band) **Measurement Distance:** 3 m

Notes: Radio 1: 802.11b; Radio 2: 802.11a
RBW: 1MHz; VBW: 3MHz & 30Hz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	Adjusted EIRP (dBm)	15.407(b)(1) Limit (dBm)	15.407(b)(1) Margin (dB)	15.407(b)(1) Result (Pass/Fail)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
Vpk	1658.0	45.0	23.8	27.3	1.7	50.2	-45.0	-27.0	-18.0	Pass	54.0	-3.8	Pass
Vpk	4825.0	49.5	22.6	35.3	2.9	65.1	-30.1	-27.0	-3.1	Pass	74.0	-8.9	Pass
Vav	4844.0	29.8	22.6	35.4	2.9	45.5	---		---	---	54.0	-8.5	Pass

Test Site: "M" **Pre-Amp:** Or-Blk **Cable:** 3 RG142LL **Analyzer:** Black **Antenna:** Orange Horn

No spurious emissions found in the frequency range of 18 – 40GHz.

IC Peak Excursion and PPSD

RSS 210 Issue 5	
Work Order:	E1000
Company:	Colubris Networks
EUT:	CN3300
Date:	11/18/2004
Engineer:	Mairaj Hussain

Peak Excursion

CH	DR (mbps)	Peak Excursion (dB)	6.2.2(q1)(iv)(b) Limit (dB)	Reduction in PPSD limit (dB)
44	54	11.7	3	8.7
44	6	11.6	3	8.6
36	6	11.4	3	8.4
36	54	11.1	3	8.1
48	6	10.4	3	7.4
48	54	9.5	3	6.5

Peak Power Spectral Density

			6.2.2(q1)(iii)		
		PPSD	Adjusted PPSD Limit	Margin	Result
CH	DR (mbps)	(dBm)	(dBm)	(dB)	(Pass/Fail)
44	54	-8.9	8.3	-17.2	Pass
44	6	-5.9	8.4	-14.3	Pass
36	6	-4.6	8.6	-13.2	Pass
36	54	-7.2	8.9	-16.1	Pass
48	6	-1.6	9.6	-11.2	Pass
48	54	-7.3	10.5	-17.8	Pass

AC Line Conducted Emission Measurements

AC Mains Conducted Emissions — ***Curtis-Straus LLC***

Date: 26-Oct-04 **Company:** Colubris **Work Order:** E0865
Engineer: Mairaj Hussain **EUT Desc:** CN 3300 **Test Site:** EMI2
Notes:
LISN(s): Red
Range: 0.15-30Mhz **Other Equipment:** --- **Spectrum Analyzer:** Black

Frequency (MHz)	Q.P. Readings QP1 (dBµV)	QP2 (dBµV)	Ave. Readings AV1 (dBµV)	AV2 (dBµV)	Impedance Factor (dB)	--- Limit (dBµV)	Margin dB	FCC/CISPR B qp Limit (dBµV)	qp Margin dB	FCC/CISPR B AVE Limit (dBµV)	AVE Margin dB	Overall Result (Pass/Fail)
0.17	22.1	24.9			20.0	---	---	65.2	-20.3	55.2	-10.3	Pass
0.23	23.4	25.2			20.0	---	---	62.5	-17.3	52.5	-7.3	Pass
0.40	13.7	12.7			20.0	---	---	58.0	-24.3	48.0	-14.3	Pass
0.85	7.4	5.9			20.0	---	---	56.0	-28.6	46.0	-18.6	Pass
1.01	8.1	5.7			20.0	---	---	56.0	-27.9	46.0	-17.9	Pass
1.30	6.8	3.5			20.0	---	---	56.0	-29.2	46.0	-19.2	Pass

Table Result: Pass by -7.26 dB ***Worst Freq:*** 0.23 MHz

LIMITS

Quasi-Peak: 250µV = 47.9dBµV in the range 450kHz to 30MHz

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

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

Frequency of emission (MHz)	Quasi-peak limit (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) Revised as of October 1, 2002; amended by ET Docket 98-80; FCC 02-157, published in the Federal Register Vol. 67, No. 132, on Wednesday, July 10, 2002]

Test Equipment Used

REV. 21-DEC-2004

SPECTRUM ANALYZERS / RECEIVERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	26-MAY-2005
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	04-MAR-2005
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	03-NOV-2005
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	11-AUG-2005
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	02-AUG-2005
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	18-AUG-2005
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	08-OCT-2005
TELECOM 3583A	20Hz-40.0MHz	3585A	HP	1750A02762	01067	03-SEP-2005
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	05-NOV-2005
EMI TEST RECEIVER	20-1000MHz	ESVS30	R&S	827957/001	01098	27-OCT-2005

LISNS/MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	10KHz-30MHz	8012-50-R-24-BNC	SOLAR	956348	00753	02-APR-2005
BLUE	10KHz-30MHz	8012-50-R-24-BNC	SOLAR	956349	00752	02-APR-2005
YELLOW-BLACK	10KHz-30MHz	8012-50-R-24-BNC	SOLAR	984735	00248	02-APR-2005
ORANGE	10KHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	02-APR-2005
GOLD	10KHz-30MHz	8012-50-R-24-BNC	SOLAR	984734	00247	02-APR-2005
WHITE-BLACK	10KHz-30MHz	8610-50-TS-100-N	SOLAR	972019	00678	02-APR-2005
BLACK	10KHz-30MHz	8610-50-TS-100-N	SOLAR	972017	00675	02-APR-2005
RED-BLACK	10KHz-30MHz	8610-50-TS-100-N	SOLAR	972016	00677	02-APR-2005
BLUE-BLACK	10KHz-30MHz	8610-50-TS-100-N	SOLAR	972018	00676	02-APR-2005
BLUE MONITORING PROBE	0.01-150MHz	91550-2	TEGAM	12350	00807	21-MAY-2005
YELLOW MONITORING PROBE	0.01-150MHz	91550-2	ETS	50972	00493	24-NOV-2005
GREEN CURRENT TRANSFORMER	40Hz-20MHz	150	PEARSON	10226	00793	03-APR-2005
CISPR LINE PROBE	150KHz-30MHz	N/A	C-S	01	00805	20-JAN-2005
CISPR TELCO VOLTAGE PROBE	10KHz-30MHz	CS A/C-10	C-S	CS01	00296	28-SEP-2005
CISPR 22 TELCO ISN	9KHz-30MHz	FCC-TLISN-T4	FISCHER	20115	00746	26-OCT-2006

OPEN AREA TEST SITE (OATS)	FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE
SITE F	93448	IC 2762-F	R-1688	25-MAR-2005
SITE T	93448	IC 2762-T	R-905	25-MAR-2005
SITE A	93448	IC 2762-A	R-903	25-MAR-2005
SITE M	93448	IC 2762-M	R-904	25-MAR-2005
BUBBLE (HP FACILITY)	N/A	N/A	R-1467	16-MAY-2005

LINE CONDUCTED TEST SITES	FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE
EMI 1	93448	N/A	C-1801	01-MAY-2006
EMI 2	93448	N/A	C-1802	01-MAY-2006
EMI 3	93448	N/A	C-1803	01-MAY-2006
BUBBLE (HP FACILITY)	N/A	N/A	C-1556	16-MAY-2005

MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A00900/A046903-01	00369	N/A
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A01695/A046903-01	1087	23-AUG-2005
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	3003A07825/A046903-01	1086	23-AUG-2005
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	03-JAN-2005
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	03-JAN-2005
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	05-JAN-2005
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	05-JAN-2005
DIPLEXER		DPL.26	OML	N/A	00813	05-JAN-2005

ABSORBING CLAMPS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE

Fischer Clamp	30-1000MHz	F-201-23mm	Fischer	10	00081	16-JAN-2006

Preamps / Attenuators / Filters	Range	MN	Mfr	SN	Asset	Calibration Due
Red	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	31-MAR-2005
Blue	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	26-JUL-2005
Blue-Black	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	31-MAR-2005
Green	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	27-FEB-2005
Black	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	27-FEB-2005
Orange	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	27-FEB-2005
White	1-20GHz	SMC-12A	C-S	426643	00760	21-JUL-2005
Yellow-Black	1-20GHz	SMC-12A	C-S	535055	00801	21-JUL-2005
Orange-Black	1-20GHz	SMC-12A	C-S	637367	00761	21-JUL-2005
HF (Yellow)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	20-JUL-2005
High Pass Filter	1-18 GHz	SPA-F-55204	K&L	36	00817	06-JAN-2006
Low Pass Filter	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	06-JAN-2006
HF 20dB Attenuator	0.03-20 GHz	PE 7019-20	Pasternack	01	00791	21-MAY-2005
Low Freq LPF	10-100kHz	L200K1G1	Microwave Circuits	4460-01 DC0432	1019	30-AUG-2005
Low Freq LPF	10-100kHz	L200K1G1	Microwave Circuits	4777-01 DC0434	1088	30-AUG-2005

Antennas	Range	MN	Mfr	SN	Asset	Calibration Due
Green Bilog	30-2000MHz	CBL6112B	Chase	2742	00620	06-APR-2006
Green-Black Bilog	30-2000MHz	CBL6112B	Chase	2412	00127	06-JAN-2006
Green-Red Bilog	30-2000MHz	CBL6112B	Chase	2435	00990	06-APR-2006
Blue-White Bilog	30-2000MHz	3142B	EMCO	1527	Telogy Rental	03-AUG-2006
Red Bilog	30-1000MHz	3143	EMCO	1270	00042	17-MAR-2005
Blue Bilog	30-1000MHz	3143	EMCO	1271	00803	17-MAR-2005
Gray Bilog	26-2000MHz	3141	EMCO	9703-1038	00066	19-MAY-2005(EMI) / 21-JUN-2005(RFI)
Yellow-Black Bilog	20-2000MHz	CBL6140A	Chase	1112	00126	19-MAY-2005(EMI) / 25-JUN-2005(RFI)
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	01105	28-SEP-2005
Red-Black Bilog	30-2000MHz	JB1	Sinol	A091604-2	01106	28-SEP-2005
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	00037	22-MAY-2005(EMI) / 29-NOV-2005 (RFI)
Black Horn	1-18GHz	3115	EMCO	9703-5148	00056	12-JUN-2005
Orange Horn	1-18GHz	3115	EMCO	0004-6123	00390	04-JUN-2005
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	00758	00758	15-JUL-2005
Small Loop (Rental)	10kHz-30MHz	PLA-130/A	ARA	1009	Telogy	11-FEB-2006
Small Loop	9kHz-30MHz	PLA-130/A	ARA	1024	00755	23-FEB-2006
Large Loop	20Hz-5MHz	6511	EMCO	9704-1154	00067	12-NOV-2005
Active Monopole	30Hz-30MHz	3301B	EMCO	3824	00068	05-MAY-2005
Induction Coil	50-60Hz	1000-4-8	C-S	N/A	00778	13-SEP-2006
Adjustable Dipole	30-1000MHz	3121C	EMCO	1370	00757	26-JUN-2005
Adjustable Dipole	30-1000MHz	3121C	EMCO	1371	00756	26-JUN-2005
RE101 Loop Sensor	30Hz-100kHz	RE101-13.3cm	C-S	N/A	00818	07-JAN-2005
RS101 Radiating Loop	30Hz-100kHz	RS101-12cm	C-S	N/A	00819	07-JAN-2005
RS101 Loop Sensor	30Hz-100kHz	RS101-4cm	C-S	N/A	00820	07-JAN-2005

EFT	MN	Mfr	SN	Asset	Calibration Due
EFT Direct Coupling Cap	N/A	C-S	01	00794	29-JAN-2006

ESD Generators	MN	Mfr	SN	Asset	Calibration Due
Green	NSG435	Schaffner	000839	00763	09-DEC-2005
Red	NSG435	Schaffner	001625	00762	09-JAN-2005
Yellow	930D	ETS	201	00673	16-JUN-2005

BEST EMC-2	MN	Mfr	SN	Asset	Calibration Due
Blue	711-1100	Schaffner	199824-002SC	00117	28-JUL-2005 (Surge/D+I/EFT)
Red	711-1100	Schaffner	200122-074SC	00623	24-JUN-2005 (Surge) / 28-JUL-2005 (D+I) / 03-DEC-2005 (EFT)

Harmonic Analyzer	MN	Mfr	SN	Asset	Calibration Due

HFTS	HP6842A	HP	3531A-00169	00738	03-DEC-2005

Chambers and Stripline	MN	Mfr	SN	Asset	Calibration Due
RFI 1 Chamber	3 Meter Compact	Panashield	N/A	00797	25-JUN-2005
RFI 2 Chamber	04' x 07' Shielding System	Lindgren	13329	00795	21-JUN-2005
RFI 3 Stripline	N/A	C-S	N/A	00796	22-JUL-2005
Environmental (Safety)	SGTH-31S	B-M-A Inc.	2245	00321	31-DEC-2004

Amplifiers	Range	MN	Mfr	SN	Asset	Calibration Due
Red	0.5-1000MHz	10W1000B	AR	18708	00032	23-JUN-2005
Green	0.5-1000MHz	10W1000B	AR	23423	00123	01-JUN-2005
Blue	0.01-250MHz	75A250	AR	19165	00039	19-JAN-2005(CRFI) / 23-JUN-2005 (RFI)
Black	0.01-250MHz	75A250	AR	23411	00122	22-JUN-2005(CRFI)/ 25-JUN-2005(RFI)
Orange	0.01-250MHz	75A250	AR	26827	00367	19-JAN-2005(CRFI) / 02-JUN-2005(RFI)
HP489A	1.0-2.0GHz	HP489A	HP	449-00762	00971	28-SEP-2005
Hughes 10W	1.0-2.0GHz	1177H09	Hughes	143	RENTAL	29-NOV-2005
HP491C	2.0-4.0GHz	HP491C	HP	449-00638	00764	29-NOV-2005
Hughes 10W	4.0-8.0GHz	1177H02	Hughes	092	RENTAL	23-NOV-2005
HP493A #1	4.0-8.0GHz	HP493A	HP	17140224 2	00085	28-SEP-2005
HP493A #2	4.0-8.0GHz	HP493A	HP	449-00562	00771	28-SEP-2005
HP495A	7.0-12.0GHz	HP495A	HP	904-00237	00086	29-NOV-2005

Field Probes	Range	MN	Mfr	SN	Asset	Calibration Due
Red	0.01-1000MHz	HI-4422	Holaday	90369	00031	11-OCT-2005
Green	0.01-1000MHz	HI-4422	Holaday	97363	00136	05-AUG-2005
Blue	0.01-1000MHz	HI-4422	Holaday	95696	01100	27-OCT-2005

Signal Generators	Range	MN	Mfr	SN	Asset	Calibration Due
Red	0.09-2000MHz	HP8648B	HP	3847U02192	00366	15-JAN-2005
Blue	0.1-1000MHz	HP8648A	HP	3426A00548	00034	20-JUL-2005
Green	0.09-2000MHz	HP8648B	HP	3623A02072	00125	12-OCT-2005
Orange	0.1-1000MHz	HP8648B	HP	3537A01210	00025	26-MAY-2005
Black (Telecom)	15MHz	HP33120A	HP	US36004674	00766	21-OCT-2005
Yellow	15MHz	HP33120A	HP	US36014119	00249	26-MAY-2005
Blue-White	0.1Hz-13MHz	HP3312A	HP	1432A07632	00775	09-MAR-2005
Sweeper	0.01-20.0GHz	HP83752A	HP	3610A01133	00087	04-APR-2005
AM/FM Stereo Sig. Gen.	0.1-170MHz	LG3236	Leader	3687301	00959	03-SEP-2005

Bulk Injection Clamps	Range	MN	Mfr	SN	Asset	Calibration Due
Green	0.01-100MHz	95236-1	ETS	50215	00118	22-JUN-2005
Red	0.01-100MHz	95236-1	ETS	34026	1020	07-JUL-2005

CDN Networks	Range	MN	Mfr	Asset	Calibration Due
Black	0.10-100MHz	20A M-2	C-S	00783	22-JUN-2005
Blue	0.10-100MHz	15A M-3	C-S	00806	22-JUN-2005
Orange	0.10-100MHz	15A M-2	C-S	00786	22-JUN-2005
Red	0.10-100MHz	15A M-3	C-S	00780	22-JUN-2005
White	0.10-100MHz	15A M-3	C-S	00782	22-JUN-2005
Yellow-Black	0.10-100MHz	15A M-3	C-S	00784	22-JUN-2005
Blue-Black	0.10-100MHz	15A M-3	C-S	00781	22-JUN-2005
Green	0.10-100MHz	30A M-3	C-S	00779	22-JUN-2005
Yellow	0.10-100MHz	30A M-5	C-S	00804	22-JUN-2005
Blue-White	0.10-100MHz	15A M-5	C-S	00788	22-JUN-2005
Yellow (res)	0.10-100MHz	100Ω Resistor Nwk	C-S	00810	28-SEP-2005
Green (res)	0.10-100MHz	100Ω Resistor Nwk	C-S	00785	09-MAR-2005

Oscilloscopes	MN	Mfr	SN	Asset	Calibration Due
Oscilloscope 100MHz	TDS 220	Tektronix	B068748	00885	02-JUN-2005
Oscilloscope 100MHz (Safety)	TDS 340	Tektronix	B012357	00737	05-OCT-2005
Oscilloscope 100MHz (Telecom)	54645A	HP	US36320452	00103	02-JUL-2005

Power Supplies	MN	Mfr	SN	Asset	Calibration Due
10001/2 AC Power System	(2) 500I	California Instruments	HK53687/HK53688	00376	16-JUL-2005

RMS VOLTMETERS/CURRENT CLAMP	MN	MNFR	SN	ASSET	CALIBRATION DUE
TRUE-RMS MULTIMETER	79III	FLUKE	71700298	00769	21-OCT-2005
TRUE-RMS MULTIMETER	177	FLUKE	83390024	00973	08-MAR-2005
TRUE-RMS MULTIMETER (REFERENCE)	177	FLUKE	83390025	00974	08-MAR-2005
TRUE-RMS MULTIMETER (TELECOM)	177	FLUKE	83430419	00975	08-MAR-2005
TRUE-RMS CLAMP METER (SAFETY)	36	FLUKE	68805882	00700	05-MAR-2005

SURGE GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	17-JUN-2005
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	09-JUN-2005
THREE PHASE COUPLING NWK	3CN	CDI	003455	00325	09-JUN-2005
1.2X50US PLUGIN MODULE	1.2X50US PLUGIN	CDI	N/A	00842	09-JUN-2005
10X160US PLUGIN MODULE	10X160US PLUGIN	C-S	N/A	00843	09-JUN-2005
10X560US PLUGIN MODULE	10X560US PLUGIN	C-S	N/A	00841	09-JUN-2005
10X700US PLUGIN MODULE W/ EXTENSION BOX	10X700US PLUGIN	C-S	N/A	00844/845	23-JUN-2005
PSURGE CONTROLLER MODULE	PSURGE 8000	HAEFELY	150267	00879	11-JUN-2005
COUPLING/DECOUPLING MODULE	PSD 900	HAEFELY	149213	00880	11-JUN-2005
IMPULSE MODULE	PIM 900	HAEFELY	149202	00881	11-JUN-2005
HIGH VOLTAGE CAP NWK 5KVDC, 18µF	CS-HVCC	C-S	01	00772	28-SEP-2006
NEBS SURGE GENERATOR	N/A	C-S	N/A	00088	17-JUN-2005
2X10US SURGE GENERATOR	2X10US	C-S	N/A	00846	23-JUN-2005
10X700US SURGE GENERATOR	10X700US	C-S	N/A	00847	17-JUN-2005
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	28-SEP-2005

POWER/NOISE METERS	MN	MFR	SN	ASSET	CALIBRATION DUE
POWER METER	435B	HP	2445A11012	00773	07-APR-2005
POWER METER	437B	HP	2912A01367	01099	27-OCT-2005
POWER SENSOR	8481A	HP	2702A61351	00774	07-APR-2005
PSOPHOMETER	2429	BRUEL & KJAER	1237642	00585	18-FEB-2005
TRANSMISSION LINE TESTER (DBRNC)	185T	AMREL	998658	00823	08-MAR-2005

OVERVOLTAGE CHAMBERS	MN	MFR	SN	ASSET	CALIBRATION DUE
72KW POWER FAULT SIMULATOR	OV1	C-S	N/A	00792	31-MAR-2005
POWER FAULT SIMULATOR	OV2	C-S	N/A	00116	31-MAR-2005

DIPOLE TAPE MEASURES	MN	MFR	SN	ASSET	CALIBRATION DUE
26FT TAPE #1	2338CME	LUFKIN	C3166-1	00776	26-FEB-2005
26FT TAPE #2	2338CME	LUFKIN	C3166-2	00777	26-FEB-2005

METEOROLOGICAL METERS	MN	MFR	SN	ASSET	CALIBRATION DUE
TEMP./HUMIDITY/ATM. PRESSURE GAUGE	7400 PERCEPTION II	DAVIS	N/A	00965	19-JAN-2005
TEMPERATURE /HUMIDITY GAUGE	THG-912	HUGER	4000562	00789	08-JAN-2005

TRACEABLE CLOCKS	MN	MFR	SN	ASSET	CALIBRATION DUE
5003	5003	CONTROL COMPANY	99026940	00808	09-JAN-2005

CONSUMABLES	SPEC.	MFR	STOCK/MN	ASSET	CALIBRATION DUE
NEBS CHEESECLOTH	26-28M/KG	ED&D	ACC-01	N/A	N/A
NEBS CARBON BLOCK	3-MIL-GAP 1KV SURGE	RELIABLE	3AB	N/A	N/A

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

Terms And Conditions

Paragraph 1. SERVICES. LABORATORY will:

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

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

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

Paragraph 3. GENERAL CONDITIONS:

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

Paragraph 4. INSURANCE:

4.1 LABORATORY shall secure and maintain throughout the full period of the services provided to the CLIENT adequate insurance to protect it from claims under applicable Workmen's Compensation Acts and also shall maintain one million dollars of general liability coverage to cover claims for bodily injury, death or property damage as may arise from the performance of its services.

4.2 The CLIENT hereby warrants that it has sufficient insurance to protect its employees adequately under applicable Workmen's Compensation Acts and for bodily injury, death, or property damage.
4.3 No insurance of whatever kind or type, which may be carried by either party is to be considered as in any way limiting any other party's responsibility for damages resulting from their operations or for furnishing work and materials.

Paragraph 5. PAYMENT:

5.1 CLIENT shall pay to LABORATORY such fees for services as previously agreed, orally or in writing, within 30 days of presentment of a bill for such services performed. In the event CLIENT ordered, orally or in writing, services but such services were not assigned a rate for billing, such services shall be billed at the LABORATORY's reasonable and customary rate.
5.2 CLIENT shall be responsible for all shipping, customs and other expenses related to services provided by LABORATORY to the CLIENT, and shall fully insure any test sample or other equipment provided to LABORATORY by the CLIENT.
5.3 Amounts overdue from CLIENT to LABORATORY shall be charged interest at a rate of 1½% per month.

Paragraph 6. ISO/IEC GUIDE 17025 ADDITIONS:

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

A2LA Accreditation

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.
EN 55011 1991, 1998	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) frequency equipment.
SABS CISPR 11:1997	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	Limits and methods of measurement of radio disturbance characteristics of electrical motor- operated and thermal household and similar purposes, electric tools and electric (*except discontinuous disturbances*) appliances for apparatus.
EN 55014 1993, 1997	Limits and methods of measurement of radio disturbance characteristics of electrical motor- operated and thermal household and similar purposes, electric tools and similar (*except discontinuous disturbances*) appliances for electric apparatus.
AS/NZS 1044: 1995	Limits and methods of measurement of radio disturbance characteristics of electrical motor- operated and thermal household and similar purposes, electric tools and similar (*except discontinuous disturbances*) appliances for 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	Limits and methods of measurement of immunity characteristics (*associated group only*) of sound and television broadcast receivers and associated equipment.
EN 55020: 1995, 2002	Electromagnetic immunity of broadcast receivers and Associated equipment.
(*associated group only*)	
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	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test
AS/NZS 61000.4.3 1999	
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	(EMC) Part 4: Testing and measurement techniques. Section 5:
AS/NZS 61000.4.5 1999	Surge immunity test.
EN 61000-4-6 1996	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields.
AS/NZS 61000.4.6 1999	
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 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, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission
EN 55103-2 1997	Electromagnetic Compatibility – Product family standard for audio, (*excluding Annex A3*) 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
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	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits AS/NZS 61000.3.2 1998 for harmonic current emissions
EN 61000-3-3 1995	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: AS/NZS 61000.3.3 1999 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

[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 50082-2 1995	Electromagnetic compatibility – Generic immunity Standard. Part 2: Industrial environment

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

EN 300 328-2:2001 (ERM);	Electromagnetic compatibility and Radio spectrum Matters
v1.2.1 equipment	Wideband Transmission systems; Data transmission operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques; Part 2: Harmonized EN covering requirements under article 3.2 of the R&TTE Directive
EN 301 489-1:2002 (ERM); equipment	Electromagnetic compatibility and Radio spectrum Matters Electromagnetic Compatibility (EMC) standard for radio and services; Part 1: Common technical requirements
EN 60669-2-1:2002 installations -- Part	Switches for household and similar fixed electrical 2-1: Particular requirements – Electronic switches
Canada Radio Standards	
Canadian GL-36 1995 Devices in the	Industry Canada – technical requirements for low power 2400 – 2483.5 MHz band.
Canadian RSS-119 1999, 2000 Issue 6 and	Industry Canada – Land mobile and fixed radio Transmitters receivers, 27.41 to 960.0 MHz
Canadian RSS-134 1996 & 2000, Issue 1 communications Rev 1	Industry Canada – 900 MHz narrowband personal services
Canadian RSS-210 2000 Issue 3, Issue 5	Industry Canada – Low power license-exempt radio 2001 communication devices
RFS29 1998 Zealand)	Specification for Restricted Radiation Radio Apparatus (New
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 Scope Services in the following FCC Rule Parts 22, 74, 90, 95, 97.	Scope B2
47 CFR FCC Maritime and Aviation Scope 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 Of scientific	FCC (Federal Communications Commission) methods measurement of radio noise emissions from industrial, and medical equipment.
GR-1089-CORE: 1997, 1999 issue 2/ safety – 2002 Issue 3 equipment.	Bellcore electromagnetic compatibility and electrical Generic criteria for network telecommunications
ANSI EMC Standards	
ANSI C63.4: 1992, 1999, 2001 measurement of electronic	American National Standard for methods of radio-noise emissions for low-voltage electrical and equipment in the range of 9 kHz to 40GHz.
ANSI C63.5 1988 compatibility –	American National Standard for electromagnetic radiated emissions measurements in electromagnetic interference (EMI) control – calibration of antennas.
IEEE EMC Standards	
IEEE C62.41: 1980, 1991 voltage	IEEE recommended practice on surge voltages in low-AC power circuits
Swedish EMC Standards	
BAKOM 3336.3 1995 (EMC & S) document	Electromagnetic compatibility and electrical safety for wired terminal equipment. Harmonization information over the OFCOM requirements.
South African EMC standards other than CISPR equivalents	
SABS 1718-1: 1996 Gaming	South African Bureau of Standards: Specification for equipment. Part 1: Casino equipment.
Japanese VCCI Standards	
VCCI V-3/99.05 1999	Technical Requirements
VCCI V-4/99.05 1999 Test	Instruction for Test Conditions for Requirement under

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
TIA/EIA-IS-968 Technical Telephone	Telecommunications Telephone Terminal Equipment Requirements for Connection of Terminal Equipment to the Network
TIA/EIA-IS-883 Supplemental Detection	Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Stutter Dial Tone Devices and ADSL Modems to the Telephone Network
TIA-968-A Technical Telephone	Telecommunications Telephone Terminal Equipment Requirements for Connection of Terminal Equipment to the Network
T1.TRQ.6-2001 Telephone	Technical Requirements for SHDSL, HDSL2, HDSL4 Digital Subscriber Line Terminal Equipment to Prevent Harm to the Network Industry
Canada VDSL Methods for Issue 1 January 2003	Terminal Attachment Program Requirements and Test Very-High-Bit-Rate Digital Subscriber Line (VDSL) Terminal Equipment
AS/ACIF S002-2001 Telephone	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Network
AS/ACIF S016-2001 hierarchical	Requirements for Customer Equipment for connection to 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 Metallic	Requirements for Customer Equipment for Connection to a Local Loop Interface of a Telecommunications Network — Part 1: General Part 2: Broadband Part 3: DC, Low Frequency AC and Voiceband
ITU-T G.703 interfaces	Physical/electrical characteristics of hierarchical Digital
HKTA 2028 the PTNs in kbit/s	Network connection specification for connection of CPE to Hong Kong using digital leased circuits at data rate of 1544
HKTA 2029 the PTNs in kbit/s	Network connection specification for connection of CPE to Hong Kong using digital leased circuits at data rate of 2048
TBR 1 : 1995 connected to CCITT Recommendation including,	Attachment requirements for terminal equipment to be circuit switched data networks and leased circuits using a Recommendation X.21 interface, or at an interface physically, functionally and electrically compatible with CCITT X.21 but operating at any data signaling rate up to, and

FCC 47 CFR Part 68 Telephone Terminal TCB Scope	Connection of terminal equipment to the telephone Equipment network. Analog and Digital Equipment.
CS-03 Issue 8 1996 through amendment 5 and TIA/EIA TSB31-B 1998 Guidelines (Feb	C1. Specification for terminal equipment, terminal systems, Network protection devices, connection arrangements hearing aids compatibility. Bulletin Part 68 Rationale and Measurement 1998)

	1 984 kbit/s
TBR 2 : 1997 to for rates up to 1 Recommendations	Attachment requirements for Data Terminal Equipment (DTE) connect to Packet Switched Public Data Networks (PSPDNs) CCITT Recommendation X.25 interfaces at data signaling 920 kbit/s utilizing interfaces derived from CCITT X.21 and X.21 bit

TBR 3 : 1995 + Amdt : 1997 Attachment ISDN	Integrated Services Digital Network (ISDN); requirements for terminal equipment to connect to an using ISDN basic access
TBR 4 : 1995 + Amdt : 1997 Attachment ISDN	Integrated Services Digital Network (ISDN); requirements for terminal equipment to connect to an using ISDN primary rate access
TBR 012 : 1993 + Amdt : 1996 Provision unstructured terminal	Business Telecommunications (BT); Open Network (ONP) technical requirements; 2 048 kbit/s digital leased line (D2048U) Attachment requirements for equipment
TBR 013 : 1996 digital requirements for	Business TeleCommunications (BTC); 2 048 kbit/s structured leased lines (D2048S); Attachment terminal equipment interface
TBR 21 : 1998 pan- (excluding TE network	Terminal Equipment (TE); Attachment requirements for European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE supporting the voice telephony service) in which addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signaling
TBR 24 : 1997 D34S); interface	Business TeleCommunications (BTC); 34 Mbit/s digital Unstructured and structured leased lines (D34U and Attachment requirements for terminal equipment
Australia	
TS 002 : 1997 Requirements for	Analogue Interworking and Non interference Customer Equipment Connected to the Public Switched Telephone Network
TS 016 : 1997 Connected to	General Requirements for Customer Equipment 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 a Network – Part	Requirements for Customer Equipment for connection to metallic loop interface of a Telecommunications 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 Includes equipment.	Safety of information technology equipment including Amendments 1, 2, 3, and 4 electrical business
UL 1950 1998	Safety of information technology equipment, including electrical business equipment.
CSA C22.2 No.950-95	Safety of Information Technology Equipment (UL 1950)
UL 60950 2000	Safety of information technology equipment

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 technology	Approval and test specification – Safety of information equipment including electrical business Equipment.
AS/NZS 3260 Supp 1 1996 technology	Approval and test specification – Safety of information equipment including electrical business equipment –
Alphabetical 3260:1993)	reference index to IEC 950 (Supplement to AS/NZS
ACA TS 001 1997 for	Australian Communications Authority – Safety requirements customer equipment.
UL 1459 1995	Telephone Equipment
IEC 1010-1 1990 measurement, control IEC 61010-1 1993	Safety requirements for electrical equipment for and laboratory use, Part 1: General requirements.
EN 61010-1 1993, 2001 measurement, control IEC 61010-1 2001	Safety requirements for electrical equipment for and laboratory use, Part 1: General requirements.
UL 61010B-1 2003	
UL 3101-1 1993 requirements.	Electrical equipment for laboratory use Part 1: General
CAN/CSA 1010-1 1999 (*Including AM 2*)	
UL 3111-1 1996 requirements.	Electrical measuring and test equipment. Part 1: General
UL 3121-1 1995	
IEC 60601-1 1995 for safety.	Medical electrical equipment. Part 1: General requirements
EN 60601-1 1995 (*Including AM 2*)	Medical electrical equipment
UL 2601-1 1997 for safety.	Medical electrical equipment. Part 1: General Requirements
IEC 60065 1998, 2000 requirements	Audio, video and similar electronic apparatus – Safety
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) and	Audio, video and similar electronic equipment. Consumer
1994, 1998	commercial products
EN 60065 1994 apparatus	Safety requirements for main operated electronic and related 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 requirements	Safety of laser products Part 1: equipment Classification,
IEC 60825-1 2001	and user's guide.
IEC 60825-2 2000-5 communication	Safety of laser products – Part 2: Safety of optical systems
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 measurement, requirements	Safety requirements for electrical equipment for control, and laboratory use - Part 1: General
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