Curtis-Straus

Test Report

Report No	ED0094-4
Client	Sensormatic Electronics Corp 6600 Congress Ave Boca Raton, FL 33487
Phone	561-921-6440
Fax	561-912-6093
FRN	0005052626
Models	RF ID Reader
FCC ID	BVCIDR3000
Equipment Type	Low Power Communication Device Transmitter
Equipment Code	DXX
Results	As detailed within this report
Prepared by	Mairaj Hussain – Test Engineer
Authorized by	Michael Buchholz – EMC Manager
Issue Date	3-25-03
Conditions of issue	This Test Report is issued subject to the conditions stated in 'terms and conditions' section of this

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

Summary

This report is an application for certification of a transmitter operating under 47 CFR 15.225 of the FCC rules provided for operating within the band 13.553 – 13.567 MHz. The product covered by this report is RF ID Reader.

The product also contains a transmitter covered by 47 CFR 15.247 of the FCC rules provided for operation of frequency hopping systems in the frequency range of 902 MHz – 928 MHz. FHSS transmitter section of the product is covered under a separate report.

Product uses four antennas for transmissions, however only one antenna is activated at any given moment in time as described in the technical description exhibit of the report.

Test Methodology

All testing was performed according to the procedures specified in ANSI C63.4 (2000).

Frequency range investigated:	13MHz – 1000MHz

Measurement Distance:		
Frequency (MHz)	*Distance (m)*	*Comments*
13 MHz – 1000 MHz	3	Radiated

The EUT was maximized around three orthogonal axes. EUT antennas were maximized within their range of motion.

Magnetic loop antenna at 3m away from the EUT was used for measuring E-field below 30MHz. The readings obtained from the loop antenna were adjusted to account for the distance factor of 30m to 3m. The distance factor was calculated as:

$$40Log\left(\frac{30}{3}\right) = 40dB$$

All readings are peak unless otherwise noted.

EUT Configuration

EUT Configuration

Work Order: D0094
Company: Sensormatic Electronics Corp
Company Address: 6600 Congress Ave
Boca Raton, FL 33487
Contact: Don Umbdenstock
Person Present: Matt Reynolds

	MN	SN	FCC ID
EUT:	RF ID Reader	-	BVCIDR3000
Antenna:	ICode 9910 (13.56 MHz box)		
	RI-Ant-T01A (13.56 MHz loop)		
AC Adapter	EA10603A	-	-

EUT Description: RFID Reader
EUT Max Frequency: 927.35 MHz
EUT Min Frequency: 13.56 MHz

Support Equipment:	**MN**	**SN**	**FCC ID**
Dell laptop	-	-	-

EUT Cables:	**Qty**	**Shielded?**	**Length**	**Ferrites**
DC cable from adapter	1	No	1 m	One
AC cable to adapter	1	No	> 1M	None
RJ 45 (Ethernet)	1	Yes	> 1m	None
Antenna Cables	1	Yes	> 1m	None

Unpopulated EUT Ports:	**Qty**	**Reason**
db-9	1	Not used in the configuration

Software / Operating Mode Description:

Radar was operated at 13.56 MHz with maximum power and with and without modulation

Statement of Conformity

The 13.56MHz transmitter has been found to conform with the following parts of the 47 CFR as detailed below:

47 CFR Part #	47 CFR Part #	Comments
	15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
15.31(e)	15.225 (c)	The frequency tolerance of the carrier signal complies with 0.01% of the operating frequency (table 2). The input power was varied from its nominal value (120V) to 102V and 138V. The respective radiated power was measured see table 1.
	15.203	The device utilizes reverse sex BNC type antenna connector.
	15.204	See attached documentation describing the antenna(s).
	15.205 15.209	The fundamental is not in a Restricted band and the spurious emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.207	Conducted EMI data on AC side of DC supply is provided in this report, table 6.
15.225	(a) (b)	The field strength of emissions within the band of 13.553 – 13.567MHz is less than 10,000µV/m at 30m. See table 3.

Test Data and Plots

Section 15.31(e)

Input Voltage variation

Section 15.31(e) Voltage Variation			***Curtis-Straus LLC***
Work Order:	D0094		**Table:** 1
Date(s):	2/4/03		
Engineer:	Evan Gould		
EUT:	RFID Reader		
Carrier Frequency:	13.56 MHz	**Temp:**	20°C
Voltage		**Peak Signal Level**	
Nominal (120V)		119.7dBuV	
102V		119.7 dBuV	
139V		119.7 dbuV	

Conclusion:	The level of output signal at the antenna port does not change with input voltage.

Note: Above PoP readings are off of spectrum analyzer and do not take in account for cables loss and any attenuator used.

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Section 15.225(c) Frequency Stability — *Curtis-Straus LLC*

Work Order: D0094 **Table:** 2
Date(s): 2/4/03
Engineer: Evan Gould
EUT: RFID Reader

Carrier Frequency:	13.55933 MHz
Tolerance Allowed:	0.01% of carrier frequency
	1355.93 Hz

Temp °C	Start Freq (MHz)	Change (Hz)
20	13.55933	-
10	13.55933	0
0	13.5594	-70
-10	13.55945	-120
-20	13.55955	-220
30	13.5593	30
40	13.5592	130
50	13.55915	180

Conclusion:	The carrier frequency variation with respect to temperature variations is within the specified limits

Section 15.225 (a) & (b)

Spurious Radiated Emissions

Radiated Spurious Emissions Table - Low Freq E-Fields Sec 15.225

Curtis-Straus LLC

Date: 05-Feb-03 **Company:** Sensormatic Electronics Corp **Table** 3
Engineer: MH/EG/YF **EUT Desc:** RF ID Reader **Work Order:** D0094

Frequency Range: 10kHz - 30MHz **Measurement Distance:** 3 m

Notes: Four antennas on reader: 900 Circ, 900 Lin, 13.56 TI, 13.56 Philips

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 15.209 & 225 Limits useed Limit (dBµV/m)	FCC 15.209 & 225 Limits useed Margin (dB)	FCC 15.209 & 225 Limits useed Result (Pass/Fail)
ICODE antenna in HF1 port												
0 pk	13.56	70.0	0.0	38.2	0.0	108.2				120.0	-11.8	Pass
RI-Ant-T01A antenna HF1 port												
0 pk	13.56	70.4	0.0	38.2	0.0	108.6				120.0	-11.4	Pass
RI-Ant-T01A antenna HF2 port												
0 pk	13.56	70.4	0.0	38.2	0.0	108.6				120.0	-11.4	Pass
Spurious Emissions 13-30MHz												
Noise	17.0	25.0	0.0	37.6	0.0	62.6				69.5	-6.9	Pass
0 qpk (1m)	27.1	16.5	0.0	36.6	0.0	53.1				88.6	-35.5	Pass

Table Result: Pass by -6.9 dB ***Worst Freq:*** 17.0 MHz

Test Site: "T" **Pre-Amp:** none **Cable:** 65 ft RG8A/U **Analyzer:** Green **Antenna:** Sm Loop (high)

LIMIT for Fundamental

40 dB Factor to adjust limit from 30m to 3 m
80 dbuV/m Limit at 30m
120 dBuV/m Limit at 3m

LIMIT for Spurious EMI (13MHz-30MHz)

59.08 dB Factor to adjust limit at 1m
29.54 dbuV/m Sec 15.209 Limit at 30m
88.58 dBuV/m Sec 15.209 Limit at 1.0m

Radiated Emissions Table

Curtis-Straus LLC

Date: 07-Feb-03 **Company:** Sensormatic Electronics Corp **Table** 4
Engineer: Mairaj Hussain **EUT Desc:** RFID Reader **Work Order:** D0094

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

Notes: Four antennas on reader: 900 Cicr, 900 Lin, 13.56 TI, 13.56 Philips **EUT Max Freq:** 927.35 MHz

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)
H	128.0	41.0	21.9	7.9	1.1	28.1				43.5	-15.4	Pass
H	160.0	42.6	21.9	9.3	1.3	31.3				43.5	-12.2	Pass
H	192.0	50.0	21.6	10.1	1.5	40.0				43.5	-3.5	Pass
H	256.0	47.1	21.7	13.0	1.8	40.2				46.0	-5.8	Pass
H	288.0	48.4	21.8	13.8	1.9	42.3				46.0	-3.7	Pass
H	320.0	49.5	21.8	14.6	2.1	44.4				46.0	-1.6	Pass
H	352.0	48.5	21.8	15.4	2.2	44.3				46.0	-1.7	Pass
H	384.0	48.0	21.8	16.3	2.3	44.8				46.0	-1.2	Pass
H	448.0	39.0	21.7	17.2	2.5	37.0				46.0	-9.0	Pass
H	480.0	38.1	21.6	17.5	2.7	36.7				46.0	-9.3	Pass
H	512.0	35.0	21.6	18.0	2.8	34.2				46.0	-11.8	Pass
H	704.0	40.5	21.7	21.1	3.5	43.4				46.0	-2.6	Pass
H	768.0	37.6	21.7	22.5	3.7	42.1				46.0	-3.9	Pass

Table Result: Pass by -1.2 dB ***Worst Freq:*** 384.0 MHz

Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Black **Antenna:** Red

Thickness of DC cable's barrel was increased by using the Cu tape. Recommended thickness is 5.5mm. .
Barrel used during the testing had thickness of 5.0mm. This modification was done to pass some of the failing frequencies below 1000MHz.

Radiated Emissions Table

Curtis-Straus LLC

Date: 07-Feb-03 **Company:** Sensormatic Electronics Corp **Table** 5

Engineer: Mairaj Hussain **EUT Desc:** RFID Reader **Work Order:** D0094

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

Notes: Four antennas on reader: 900 Cicr, 915 Shelf Antenna, 13.56 TI, 13.56 Philips **EUT Max Freq:** 927.35 MHz

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)
V	128.0	38.7	21.9	7.9	1.1	25.8				43.5	-17.7	Pass
V	160.0	36.5	21.9	9.3	1.3	25.2				43.5	-18.3	Pass
V	174.99	33.6	21.8	9.4	1.3	22.5				43.5	-21.0	Pass
H	192.0	46.7	21.6	10.1	1.5	36.7				43.5	-6.8	Pass
H	224.0	42.0	21.6	11.6	1.6	33.6				46.0	-12.4	Pass
H	256.0	49.0	21.7	13.0	1.8	42.1				46.0	-3.9	Pass
H	288.0	50.6	21.8	13.8	1.9	44.5				46.0	-1.5	Pass
H	320.0	49.0	21.8	14.6	2.1	43.9				46.0	-2.1	Pass
H	352.0	48.6	21.8	15.4	2.2	44.4				46.0	-1.6	Pass
V	384.0	45.4	21.8	16.3	2.3	42.2				46.0	-3.8	Pass
H	448.0	38.0	21.7	17.2	2.5	36.0				46.0	-10.0	Pass
H	480.0	39.0	21.6	17.5	2.7	37.6				46.0	-8.4	Pass
H	512.0	40.0	21.6	18.0	2.8	39.2				46.0	-6.8	Pass

Table Result: Pass by -1.5 dB ***Worst Freq:*** 288.0 MHz

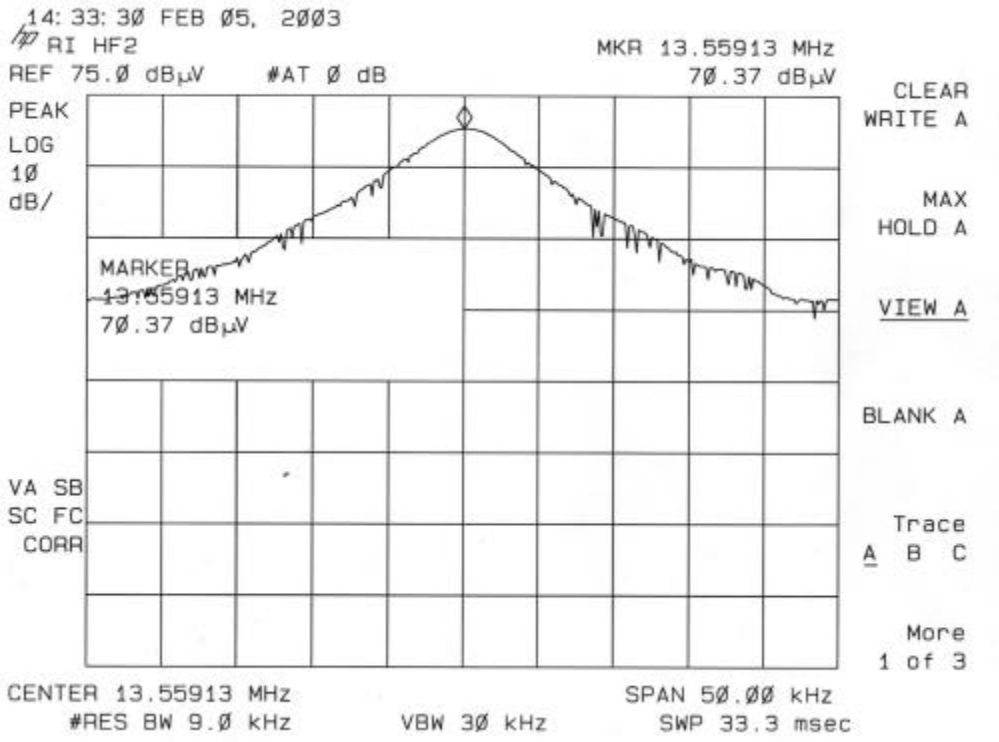
Test Site: "T" **Pre-Amp:** Black **Cable:** 65 ft RG8A/U **Analyzer:** Black **Antenna:** Red

Thickness of DC cable's barrel was increased by using the Cu tape. Recommended thickness is 5.5mm. .
Barrel used during the testing had thickness of 5.0mm. This modification was done to pass some of the failing frequencies below 1000MHz.

Sample Calculation:

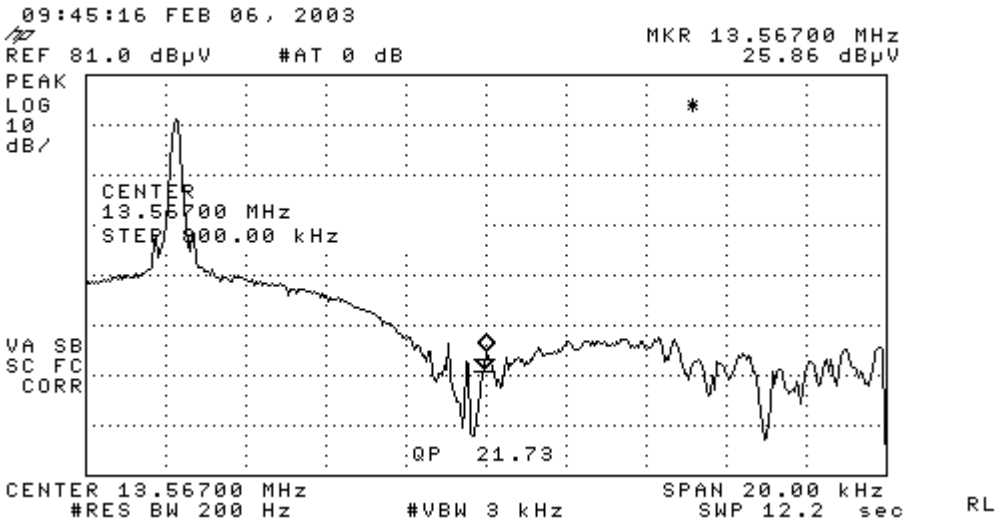
Sample calculation:

Adjusted Reading = Reading + Antenna factor + Cable factor – PreAmp factor

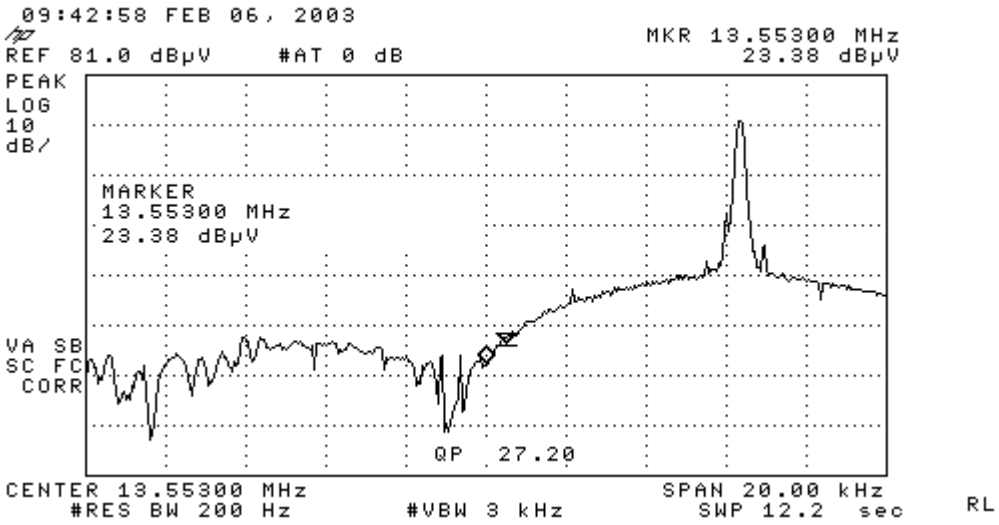


Plot showing fundamental at 13.559MHz

BandEdge Plots:



Plot showing upper band edge



Plot showing lower band edge

Band Edge Requirements for Section 15.225 *Curtis-Straus LLC*

Date: 25-Mar-03 **Company:** Sensormatic Electronics Corp **Table** 6

Engineer: Mairaj Hussain **EUT Desc:** RFID Reader **Work Order:** D0094

Measurement Distance: 3 m

Notes: Highest emissions outside the band of operation.

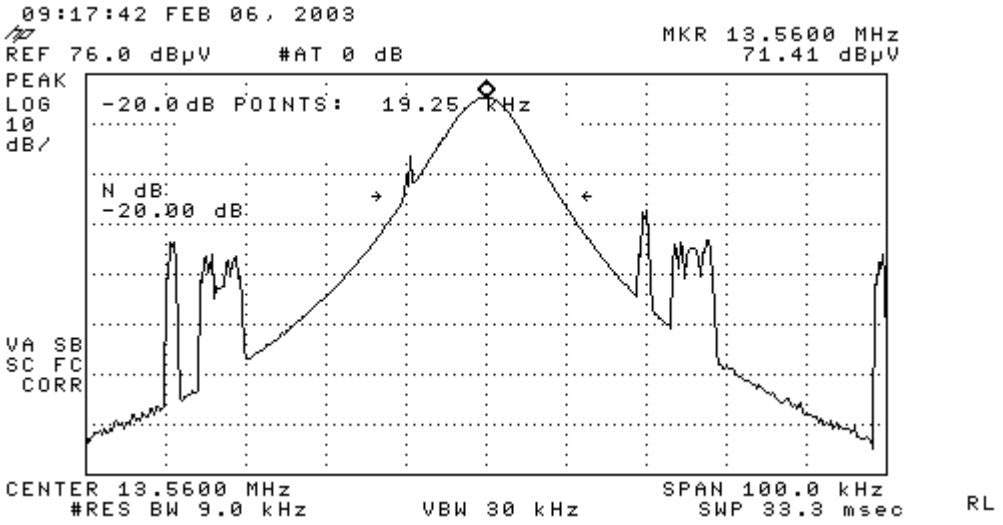
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	--- Limit (dBµV/m)	--- Margin (dB)	--- Result (Pass/Fail)	FCC 15.209 Class B Limit (dBµV/m)	FCC 15.209 Class B Margin (dB)	FCC 15.209 Class B Result (Pass/Fail)
0	13.57	25.1	0.0	38.2	0.0	63.3				69.5	-6.2	Pass
0	13.548	26.1	0.0	38.2	0.0	64.3				69.5	-5.2	Pass

Table Result: Pass by -5.2 dB ***Worst Freq:*** 13.548 MHz

Test Site: "T" **Pre-Amp:** none **Cable:** 65 ft RG8A/U **Analyzer:** Blue **Antenna:** Sm Loop (high)

Limit was adjusted to account for distance factor.
Limit at 30m 29.54 dBuV
Distance factor for 3m 40.00
Limit at 3m 69.54 dBuV

20dB Band Width



AC Line Conducted Emission Measurements

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]

AC Mains Conducted Emissions

Curtis-Straus LLC

Date: 07-Feb-03 **Company:** Sensormatic Electronics Corp **Table No:** 7

Engineer: Mairaj Hussain **EUT Desc:** RFID Reader **Work Order:** D0094

Notes:

Range: 0.15-30Mhz **LISN(s):** Yellow-Black Orange **Other Equipment:** --- **Spectrum Analyzer:** Black

Frequency (MHz)	Q.P. Readings QP1 (dBµV)	Q.P. Readings QP2 (dBµV)	Ave. Readings AV1 (dBµV)	Ave. Readings AV2 (dBµV)	Impedance Factor (dB)	FCC A Applicable until July 12, 2004 Limit (dBµV)	FCC A Applicable until July 12, 2004 Margin dB	FCC/CISPR A qp Limit (dBµV)	FCC/CISPR A qp Margin dB	FCC/CISPR A AVE Limit (dBµV)	FCC/CISPR A AVE Margin dB	Overall Result (Pass/Fail)
11.02	10.6	12.5			20.0	69.5	-37.0	73.0	-40.5	60.0	-27.5	Pass
12.77	22.0	22.1			20.0	69.5	-27.4	73.0	-30.9	60.0	-17.9	Pass
13.41	31.1	31.3			20.0	69.5	-18.2	73.0	-21.7	60.0	-8.7	Pass
13.56	73.7	68.7	38.0	38.8	20.0	69.5	**11.2**	73.0	**20.7**	60.0	-1.2	Fail
13.57	31.7	31.0			20.0	69.5	-17.8	73.0	-21.3	60.0	-8.3	Pass
13.70	28.5	30.2			20.0	69.5	-19.3	73.0	-22.8	60.0	-9.8	Pass
18.53	19.6	20.0			20.0	69.5	-29.5	73.0	-33.0	60.0	-20.0	Pass
22.30	17.6	19.1			20.0	69.5	-30.4	73.0	-33.9	60.0	-20.9	Pass
50 ohm terminator on HF 1 & 2												
13.56	12.6	13.1			20.0	69.5	-36.4	73.0	-39.9	60.0	-26.9	Pass

Table Result: Pass by 8.30 dB ***Worst Freq:*** 13.57 MHz

Test Equipment Used

REV. 3/5/03

SPECTRUM ANALYZERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	HP	3441A03559	00024	05-JUN-2003
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	25-FEB-2004
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	04-SEP-2003
YELLOW	9kHz-2.9GHz	8594E	HP	3523A01958	00100	03-JUL-2003
GREEN	9kHz-26.5GHz	8593E	HP	3829A03618	00143	02-OCT-2003
BLACK	9kHz-12.8GHz	8596E	HP	3710A00944	00337	08-JUL-2003
YELLOW-BLACK	20Hz-40.0MHz	3585A	HP	2504A05219	00030	25-DEC-2003
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	07-JUN-2003

LISN	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956348	00753	18-APR-2003
BLUE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	956349	00752	18-APR-2003
YELLOW-BLACK	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984735	00248	10-MAY-2003
ORANGE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	24-OCT-2003
GOLD	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	984734	00247	24-OCT-2003
WHITE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972019	00678	18-APR-2003
BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972017	00675	18-APR-2003
RED-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972016	00677	18-APR-2003
BLUE-BLACK	10kHz-30MHz	8610-50-TS-100-N	SOLAR	972018	00676	18-APR-2003

OPEN AREA TEST SITE (OATS)	FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE
SITE F	93448	IC 2762-F	R-468	04-FEB-2004
SITE T	93448	IC 2762-T	R-905	04-FEB-2004
SITE A	93448	IC 2762-A	R-903	04-FEB-2004
SITE M	93448	IC 2762-M	R-904	04-FEB-2004
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-480	31-MAR-2003
EMI 2	93448	N/A	C-480	31-MAR-2003
EMI 3	93448	N/A	C-480	31-MAR-2003
BUBBLE (HP FACILITY)	N/A	N/A	C-1556	16-MAY-2005

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN BILOG	30MHz-2GHz	CBL6112B	CHASE	2742	00620	26-FEB-2003
GREEN-BLACK BILOG	30MHz-2GHz	CBL6112B	CHASE	2412	00127	11-JUL-2004
GREEN-WHITE BILOG	30MHz-2GHz	CBL6112B	CHASE	2574	00319	11-JUL-2004
RED BILOG	30MHz-1GHz	3143	EMCO	1270	00042	11-JUL-2004
BLUE BILOG	30MHz-1GHz	3143	EMCO	1271	00803	11-JUL-2004
GRAY BILOG	26MHz-2GHz	3141	EMCO	9703-1038	00066	18-JUL-2003
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	18-JUL-2003
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	08-MAY-2003
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	12-JUN-2003
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	27-MAY-2003
WHITE HORN	18-26.5GHz	3160-09	EMCO	9610-1068	00758	26-JUN-2003
SMALL LOOP	9kHz-30MHz	PLA-130/A	ARA	1024	00755	27-JAN-2004
LARGE LOOP	20Hz-5MHz	6511	EMCO	9704-1154	00067	05-NOV-2003
ACTIVE MONOPOLE	30Hz-30MHz	3301B	EMCO	3824	00068	24-APR-2003
BLUE ACTIVE MONOPOLE	30Hz-50MHz	3301B	EMCO	4287	TELOGY RENTAL	17-AUG-2003
INDUCTION COIL	50-60Hz	1000-4-8	C-S	N/A	00778	16-SEP-2004
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1370	00757	26-JUN-2003
ADJUSTABLE DIPOLE	30-1000MHz	3121C	EMCO	1371	00756	26-JUN-2003
RE101 LOOP SENSOR	30Hz-100kHz	RE101-13.3CM	C-S	N/A	00818	07-JAN-2005
RS101 RADIATING LOOP	30Hz-100kHz	RS101-12CM	C-S	N/A	00819	07-JAN-2005
RS101 LOOP SENSOR	30Hz-100kHz	RS101-4CM	C-S	N/A	00820	07-JAN-2005

MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE

MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A00900/A046903-01	00369	09-JUL-2003
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	03-JAN-2005
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	03-JAN-2005
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	05-DEC-2004
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	05-DEC-2004
DIPLEXER		DPL.26	OML	N/A	00813	05-DEC-2004

PREAMPS / ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.10-2000MHz	ZFL-1000-LN	C-S	N/A	00798	22-MAR-2003
BLUE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00759	07-AUG-2003
BLUE-BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00800	12-SEP-2003
GREEN	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00802	22-MAR-2003
GOLD	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00044	24-MAY-2003
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	22-MAR-2003
ORANGE	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00765	22-MAR-2003
WHITE	1-20GHz	SMC-12A	C-S	426643	00760	27-AUG-2003
YELLOW-BLACK	1-20GHz	SMC-12A	C-S	535055	00801	27-AUG-2003
ORANGE-BLACK	1-20GHz	SMC-12A	C-S	690639	00761	27-AUG-2003
YELLOW	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	27-AUG-2003
HIGH PASS FILTER	1-18 GHz	SPA-F-55204	K&L	36	00817	31-DEC-2003
LOW PASS FILTER	1-9 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	31-DEC-2003
20DB ATTENUATOR	0.03-20 GHz	PE 7019-20	PASTERNACK	01	00791	13-JUN-2003

ABSORBING CLAMPS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
FISCHER CLAMP	30-1000MHz	F-201-23MM	FISCHER	10	00081	04-JAN-2004

EFT GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE
EFT/B-100	EFT/B-100	CDI	101	00038	02-JUL-2003
EFT DIRECT COUPLING CAP	N/A	C-S	01	00794	10-DEC-2003

ESD GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN	NSG435	SCHAFFNER	000839	00763	04-NOV-2003
RED	NSG435	SCHAFFNER	001625	00762	15-NOV-2003
BLUE	NSG435	SCHAFFNER	005274	TELOGY RENTAL	19-SEP-2003
YELLOW	930D	ETS	201	00673	29-APR-2003

BEST EMC-2	MN	MFR	SN	ASSET	CALIBRATION DUE
BLUE	711-1100	SCHAFFNER	199824-002SC	00117	04-SEP-2003
RED	711-1100	SCHAFFNER	200122-074SC	00623	04-SEP-2003

CHAMBERS AND STRIPLINE	MN	MFR	SN	ASSET	CALIBRATION DUE
RFI 1 CHAMBER	3 METER COMPACT	PANASHIELD	N/A	00797	11-JUN-2003
RFI 2 CHAMBER	04' X 07' SHIELDING SYSTEM	LINDGREN	13329	00795	09-MAY-2003
RFI 3 STRIPLINE	N/A	C-S	N/A	00796	09-JUL-2003
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	07-JUN-2003

AMPLIFIERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.5-1000MHz	10W1000B	AR	18708	00032	11-JUN-2003
BLUE	0.01-250MHz	75A250	AR	19165	00039	14-JAN-2004
GREEN	0.5-1000MHz	10W1000B	AR	23423	00123	11-JUN-2003
BLACK	0.01-250MHz	75A250	AR	23411	00122	14-JAN-2004
ORANGE	0.01-250MHz	75A250	AR	26827	00367	14-JAN-2004
HP489A	1.0-2.0GHz	HP489A	HP	1144AU1780	00083	28-AUG-2003
HP491C	2.0-4.0GHz	HP491C	HP	449-00638	00764	28-AUG-2003
HP493A	4.0-8.0GHz	HP493A	HP	171402242	00085	28-AUG-2003
HP495A	7.0-12.0GHz	HP495A	HP	904-00237	00086	28-AUG-2003

FIELD PROBES	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.01-1000MHz	HI-4422	HOLADAY	90369	00031	13-APR-2003
GREEN	0.01-1000MHz	HI-4422	HOLADAY	97363	00136	01-APR-2003

SIGNAL GENERATORS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.09-2000MHz	HP8648B	HP	3847U02192	00366	11-DEC-2003
BLUE	0.1-1000MHz	HP8648A	HP	3426A00548	00034	11-JUL-2003
GREEN	0.09-2000MHz	HP8648B	HP	3623A02072	00125	04-SEP-2003
ORANGE	0.1-1000MHz	HP8648B	HP	3537A01210	00025	05-JUN-2003
WHITE	0.2Hz-2MHz	FG2A	BECKMAN	102037	00767	25-MAR-2003
BLACK	15MHz	HP33120A	HP	US36004674	00766	23-OCT-2003
YELLOW	15MHz	HP33120A	HP	US36014119	00249	07-JUN-2003
BLUE-WHITE	0.1Hz-13MHz	HP3312A	HP	1432A07632	00775	27-FEB-2004
SWEEPER	0.01-20.0GHz	HP83752A	HP	3610A01133	00087	12-APR-2003

BULK INJECTION CLAMPS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
RED	0.01-100MHz	95236-1	TEGAM	12248	00035	14-JAN-2004
GREEN	0.01-100MHz	95236-1	EMCO	50215	00118	14-JAN-2004

MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
BLUE MONITORING PROBE	0.01-150MHz	91550-2	TEGAM	12350	00807	17-APR-2003
YELLOW MONITORING PROBE	0.01-150MHz	91550-2	ETS	50972	00493	21-NOV-2003
GREEN CURRENT TRANSFORMER	40Hz-20MHz	150	PEARSON	10226	00793	19-MAR-2003
CISPR LINE PROBE	150kHz-30MHz	N/A	C-S	01	00805	20-DEC-2004
CISPR TELCO VOLTAGE PROBE	150kHz-30MHz	CS A/C-10	C-S	CS01	00296	12-SEP-2003

CDN NETWORKS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
BLACK	0.15-100MHz	20A M-2	C-S	04	00783	14-JAN-2004
BLUE	0.15-100MHz	15A M-3	C-S	05	00806	14-JAN-2004
RED	0.15-100MHz	15A M-3	C-S	06	00780	14-JAN-2004
WHITE	0.15-100MHz	15A M-3	C-S	07	00782	14-JAN-2004
YELLOW-BLACK	0.15-100MHz	15A M-3	C-S	08	00784	14-JAN-2004
BLUE-BLACK	0.15-100MHz	15A M-3	C-S	09	00781	14-JAN-2004
GREEN	0.15-100MHz	30A M-3	C-S	10	00779	14-JAN-2004
YELLOW	0.15-100MHz	30A M-5	C-S	11	00804	14-JAN-2004
BLUE-WHITE	0.15-100MHz	15A M-5	C-S	12	00788	14-JAN-2004
YELLOW (RES)	0.15-100MHz	100Ω RESISTOR NWK	C-S	01	00810	10-SEP-2003
GREEN (RES)	0.15-100MHz	100Ω RESISTOR NWK	C-S	02	00785	10-SEP-2003

HARMONIC ANALYZER	MN	MFR	SN	ASSET	CALIBRATION DUE
HFTS	HP6842A	HP	3531A-00169	00738	29-OCT-2003

FREQUENCY COUNTER	MN	MFR	SN	ASSET	CALIBRATION DUE
5340A	HP5340A	HP	1440A02320	00787	12-JUN-2003

SURGE GENERATORS	MN	MFR	SN	ASSET	CALIBRATION DUE
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	13-JUN-2003
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	10-OCT-2003
THREE PHASE COUPLING NWK	3CN	CDI	003455	00325	10-OCT-2003
HIGH VOLTAGE CAP NWK 5kVDC, 18µF	CS-HVCC	C-S	01	00772	15-OCT-2003
NEBS SURGE GENERATOR	N/A	C-S	N/A	00088	12-SEP-2003
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	12-SEP-2003

POWER SUPPLIES	MN	MFR	SN	ASSET	CALIBRATION DUE
10001I/2 AC POWER SYSTEM	(2) 500I	CALIFORNIA INSTRUMENTS	HK53687/HK53688	00376	31-DEC-2003

RMS VOLTMETERS/CURRENT CLAMP	MN	MNFR	SN	ASSET	CALIBRATION DUE
RED RMS VOLTMETER	3400A	HP	40102044	00770	04-OCT-2003
WHITE RMS VOLTMETER	3400A	HP	1218A14427	00809	09-DEC-2003
GREEN RMS VOLTMETER (TELECOM)	3400A	HP	806-09594	00344	10-DEC-2003
TRUE-RMS VOLTMETER	79III	FLUKE	71700298	00769	03-OCT-2003
TRUE-RMS CLAMP METER (SAFETY)	36	FLUKE	68805882	00700	04-APR-2003

POWER/NOISE METERS	MN	MFR	SN	ASSET	CALIBRATION DUE
POWER METER	435B	HP	2445A11012	00773	22-MAR-2003
POWER SENSOR	8481A	HP	2702A61351	00774	22-MAR-2003
TRANSMISSION LINE TESTER (dBrnC)	185T	AMREL	998658	00823	14-JAN-2004

OVERVOLTAGE CHAMBERS	MN	MFR	SN	ASSET	CALIBRATION DUE

72KW POWER FAULT SIMULATOR	OV1	C-S	N/A	00792	04-APR-2003

DIPOLE TAPE MEASURES	MN	MFR	SN	ASSET	CALIBRATION DUE
26FT TAPE #1	2338CME	LUFKIN	C3166-1	00776	26-MAR-2005
26FT TAPE #2	2338CME	LUFKIN	C3166-2	00772	26-MAR-2005

METEOROLOGICAL METERS	MN	MFR	SN	ASSET	CALIBRATION DUE
TEMPERATURE /HUMIDITY GAUGE	TH300	DICKSON	9044101	00733	09-DEC-2003
TEMPERATURE /HUMIDITY GAUGE	THG-912	HUGER	4000562	00789	08-NOV-2003
ATMOSPHERIC PRESSURE GAUGE	BA928	OREGON SCIENTIFIC	C3166-1	00831	03-MAR-2004

TRACEABLE CLOCKS	MN	MFR	SN	ASSET	CALIBRATION DUE
5003	5003	CONTROL COMPANY	99026940	00808	09-DEC-2003

Unless otherwise noted the calibration interval is one year. 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.