Engineering and Testing for EMC and Safety Compliance

APPLICATION FOR FCC CLASS B CERTIFICATION

WIDE BAND COMMUNICATION RECEIVER

Alinco Incorporated; Electronics Division
Twin 21 MID Tower Building 23F
Shiromi 2-Chome
Chuo-Ku, Osaka, 540-8580
Japan

MODEL: DJ-X3T
FCC ID: PH3 DJ-X3T

July 3, 2001

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	RADIO FREQUENCY DEVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
RSS-215; ISSUE 1 (PROVISIONAL)	ANALOGUE SCANNER RECEIVERS

FCC Rules Parts	Frequency Range MHz	Output Power (W)	Freq. Tolerance	Emission Designator
15.121	30 – 960 MHz	N/A	N/A	N/A

REPORT PREPARED BY:

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Document Number: 2001173

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1 GENERAL INFORMATION

The following Application for FCC Type Certification of a Transceiver (Analog Scanner Receiver portion) is prepared on behalf of ***Alinco Incorporated; Electronics Division*** in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions rules and regulations and Industry Canada RSS-215. The Equipment Under Test (EUT) was the ***DJ-X3T, FCC ID: PH3 DJ-X3T***. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the three-meter, open field; test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. The FCC accepts Rhein Tech Laboratories, Inc. as a facility available to do measurement work for others on a contractual basis.

1.1 MODIFICATIONS

Modifications were not made during testing.

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original certification submission.

1.3 TEST METHODOLOGY

Radiated testing was performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.4 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

360 Herndon Parkway
Suite 1400
Herndon, VA 20170
http://www.rheintech.com

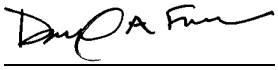
2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	RADIO FREQUENCY DEVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
RSS-215; ISSUE 1 (PROVISIONAL)	ANALOGUE SCANNER RECEIVERS

FCC Rules Parts	Frequency Range MHz	Output Power (W)	Freq. Tolerance	Emission Designator
15.121	30-960 MHz	N/A	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. Modifications were not made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature:  Date: June 26, 2001

Typed/Printed Name: Desmond A. Fraser Position: President
(NVLAP Signatory)

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

3 SYSTEM TEST CONFIGURATION

JUSTIFICATION

To complete the test configuration required by the FCC, the receiver was connected to an external antenna, which receives a signal from a signal generator output. With the antenna installed, the receiver indicator was used to determine optional reception. The EUT's IF, local oscillators, and crystal oscillators and harmonics of each were investigated. Conducted emission was measured from the AC port of the charger. All modes were investigated and tested including standby mode and scanning mode. The final radiated data was taken with the EUT locked to a set frequency.

3.1 EXERCISING THE EUT

The EUT was exercised using a Hewlett Packard Signal Generator to generate a continuous wave frequency, which activated the EUT receiver portion under test.

3.2 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

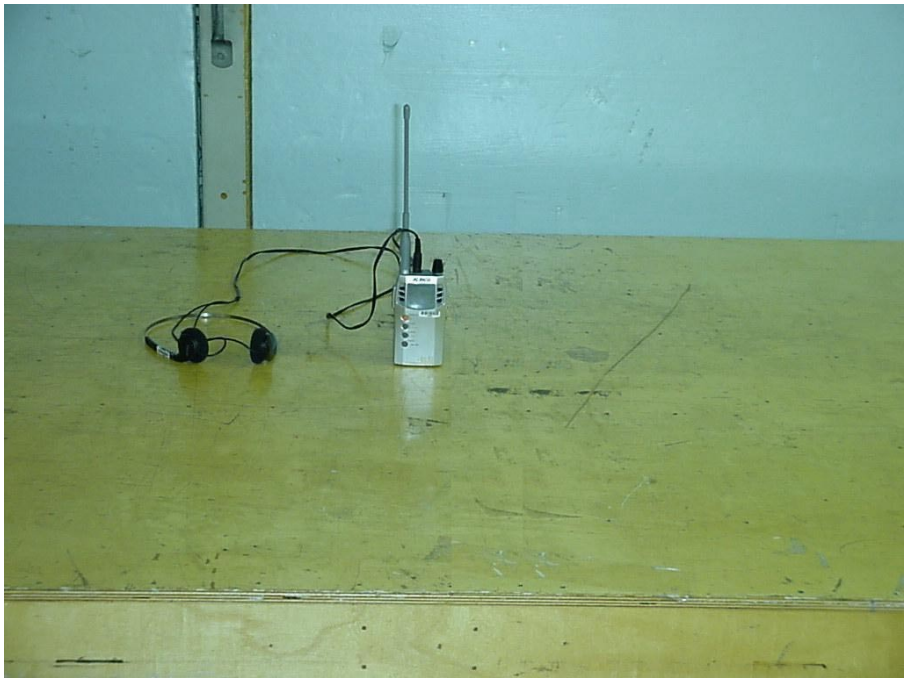
TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
WIDE BAND COMMUNICATION RECEIVER	ALINCO	DJ-X3	N/A	PH3 DJ-X3T	N/A	013429

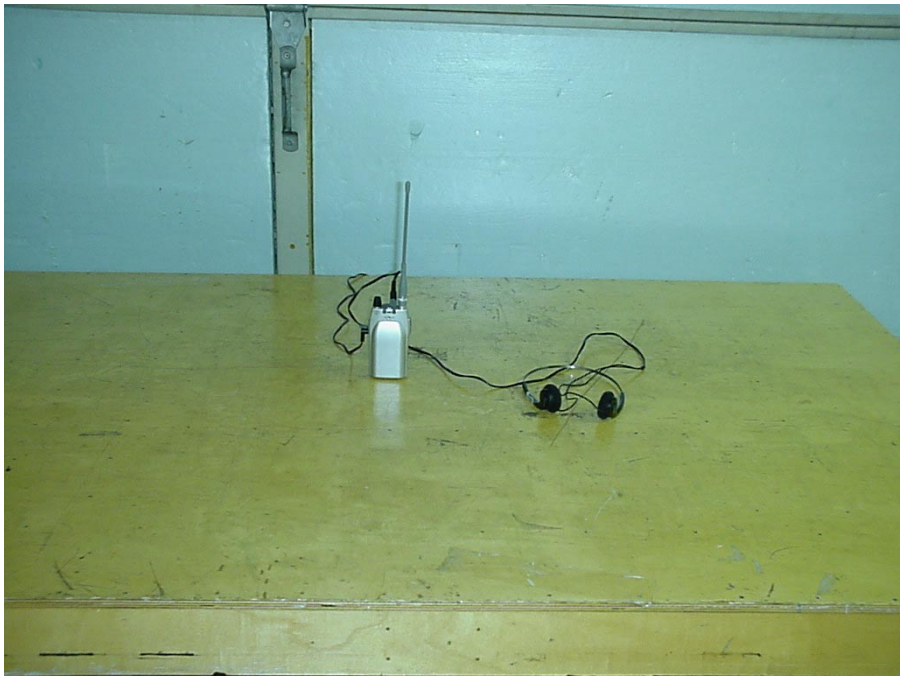
TABLE 3-2: EXTERNAL COMPONENTS IN TEST CONFIGURATION

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
SIGNAL GENERATOR	HEWLETT PACKARD	8648C	3537A01741	N/A	SHIELDED POWER	900917
ANTENNA	ALINCO	WHIP ANTENNA	N/A	N/A	N/A	013430

3.3 CONFIGURATION OF TESTED SYSTEM



PHOTOGRAPH 1: CONFIGURATION OF TESTED SYSTEM (FRONT VIEW)



PHOTOGRAPH 2: CONFIGURATION OF TESTED SYSTEM (REAR VIEW)

4 CONDUCTED EMISSIONS

4.1 TEST METHODOLOGY FOR CONDUCTED EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

4.2 CONDUCTED EMISSION TEST

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode. If the quasi-peak measurement is at least 6dB higher than the amplitude in the average mode, the level measured in the quasi-peak mode may be reduced by 13dB before comparing it to the limit.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 450 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively.

4.3 CONDUCTED EMISSION TEST DATA

TABLE 4-1: CONDUCTED EMISSIONS TEST {NEUTRAL SIDE (L1)} (83.5 MHZ)

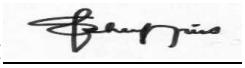
Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.455	Pk	40.6	0.8	41.4	48.0	-6.6	48.0	-6.6
0.574	Pk	34.4	0.7	35.1	48.0	-12.9	48.0	-12.9
0.795	Pk	39.4	0.7	40.1	48.0	-7.9	48.0	-7.9
0.845	Pk	38.8	0.7	39.5	48.0	-8.5	48.0	-8.5
1.000	Pk	33.9	0.8	34.7	48.0	-13.3	48.0	-13.3
1.364	Pk	31.4	0.9	32.3	48.0	-15.7	48.0	-15.7
22.120	Pk	16.8	3.4	20.2	48.0	-27.8	48.0	-27.8

TABLE 4-2: CONDUCTED EMISSIONS TEST {HOT SIDE (L2)} (83.5 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.521	Pk	33.7	0.7	34.4	48.0	-13.6	48.0	-13.6
0.750	Pk	41.0	0.8	41.8	48.0	-6.2	48.0	-6.2
0.832	Pk	37.6	0.7	38.3	48.0	-9.7	48.0	-9.7
0.922	Pk	27.0	0.8	27.8	48.0	-20.2	48.0	-20.2
1.256	Pk	31.5	0.9	32.4	48.0	-15.6	48.0	-15.6
1.864	Pk	26.4	1.1	27.5	48.0	-20.5	48.0	-20.5
5.545	Pk	16.5	1.9	18.4	48.0	-29.6	48.0	-29.6
23.540	Pk	17.0	3.7	20.7	48.0	-27.3	48.0	-27.3

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature:  Date: July 3, 2001

Typed/Printed Name: Franck Schuppius

TABLE 4-3: CONDUCTED EMISSIONS TEST {NEUTRAL SIDE (L1)} (179.995 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.519	Pk	42.6	0.7	43.3	48.0	-4.7	48.0	-4.7
0.725	Pk	41.7	0.8	42.5	48.0	-5.5	48.0	-5.5
0.883	Pk	36.5	0.8	37.3	48.0	-10.7	48.0	-10.7
1.016	Pk	36.3	0.8	37.1	48.0	-10.9	48.0	-10.9
1.028	Pk	35.9	0.8	36.7	48.0	-11.3	48.0	-11.3
1.372	Pk	32.9	0.9	33.8	48.0	-14.2	48.0	-14.2
3.988	Pk	38.9	1.5	40.4	48.0	-7.6	48.0	-7.6
5.180	Pk	18.4	1.8	20.2	48.0	-27.8	48.0	-27.8
21.430	Pk	16.8	3.4	20.2	48.0	-27.8	48.0	-27.8

TABLE 4-4: CONDUCTED EMISSIONS TEST {HOT SIDE (L2)} (455.995 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.507	Pk	42.0	0.7	42.7	48.0	-5.3	48.0	-5.3
0.728	Pk	38.8	0.8	39.6	48.0	-8.4	48.0	-8.4
0.963	Pk	33.2	0.8	34.0	48.0	-14.0	48.0	-14.0
1.012	Pk	32.9	0.8	33.7	48.0	-14.3	48.0	-14.3
1.464	Pk	28.5	1.0	29.5	48.0	-18.5	48.0	-18.5
5.145	Pk	18.9	1.8	20.7	48.0	-27.3	48.0	-27.3
11.180	Pk	16.5	2.4	18.9	48.0	-29.1	48.0	-29.1
23.380	Pk	17.0	3.6	20.6	48.0	-27.4	48.0	-27.4

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

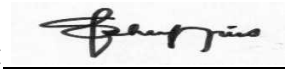
Signature:  Date: July 3, 2001

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TABLE 4-5: CONDUCTED EMISSIONS TEST {NEUTRAL SIDE (L1)} (295.495 MHZ)

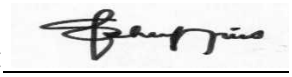
Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.520	Pk	42.3	0.7	43.0	48.0	-5.0	48.0	-5.0
0.726	Pk	41.9	0.8	42.7	48.0	-5.3	48.0	-5.3
0.887	Pk	35.9	0.8	36.7	48.0	-11.3	48.0	-11.3
1.048	Pk	35.9	0.8	36.7	48.0	-11.3	48.0	-11.3
1.404	Pk	32.6	1.0	33.6	48.0	-14.4	48.0	-14.4
2.368	Pk	26.7	1.3	28.0	48.0	-20.0	48.0	-20.0
5.215	Pk	19.0	1.8	20.8	48.0	-27.2	48.0	-27.2
17.660	Pk	16.9	3.3	20.2	48.0	-27.8	48.0	-27.8
29.870	Pk	16.5	4.0	20.5	48.0	-27.5	48.0	-27.5

TABLE 4-6: CONDUCTED EMISSIONS TEST {HOT SIDE (L2)} (295.995 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.485	Pk	41.8	0.7	42.5	48.0	-5.5	48.0	-5.5
0.699	Pk	40.0	0.8	40.8	48.0	-7.2	48.0	-7.2
0.947	Pk	33.9	0.8	34.7	48.0	-13.3	48.0	-13.3
1.008	Pk	31.7	0.8	32.5	48.0	-15.5	48.0	-15.5
1.424	Pk	29.0	1.0	30.0	48.0	-18.0	48.0	-18.0
7.660	Pk	17.3	2.2	19.5	48.0	-28.5	48.0	-28.5
10.760	Pk	18.9	2.4	21.3	48.0	-26.7	48.0	-26.7
21.280	Pk	16.9	3.4	20.3	48.0	-27.7	48.0	-27.7

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature:  Date: July 3, 2001

Typed/Printed Name: Franck Schuppius

TABLE 4-7: CONDUCTED EMISSIONS TEST {NEUTRAL SIDE (L1)} (418.495 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.519	Pk	42.4	0.7	43.1	48.0	-4.9	48.0	-4.9
0.726	Pk	41.6	0.8	42.4	48.0	-5.6	48.0	-5.6
0.889	Pk	36.0	0.8	36.8	48.0	-11.2	48.0	-11.2
1.036	Pk	35.6	0.8	36.4	48.0	-11.6	48.0	-11.6
1.404	Pk	32.4	1.0	33.4	48.0	-14.6	48.0	-14.6
1.768	Pk	28.9	1.1	30.0	48.0	-18.0	48.0	-18.0
2.364	Pk	27.8	1.3	29.1	48.0	-18.9	48.0	-18.9
5.185	Pk	18.7	1.8	20.5	48.0	-27.5	48.0	-27.5
18.740	Pk	17.0	3.4	20.4	48.0	-27.6	48.0	-27.6

TABLE 4-8: CONDUCTED EMISSIONS TEST {HOT SIDE (L2)} (418.995 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.481	Pk	42.2	0.7	42.9	48.0	-5.1	48.0	-5.1
0.709	Pk	40.3	0.8	41.1	48.0	-6.9	48.0	-6.9
0.942	Pk	34.0	0.8	34.8	48.0	-13.2	48.0	-13.2
1.008	Pk	31.5	0.8	32.3	48.0	-15.7	48.0	-15.7
1.392	Pk	29.8	1.0	30.8	48.0	-17.2	48.0	-17.2
1.736	Pk	27.9	1.1	29.0	48.0	-19.0	48.0	-19.0
10.210	Pk	16.8	2.3	19.1	48.0	-28.9	48.0	-28.9
13.570	Pk	17.5	2.8	20.3	48.0	-27.7	48.0	-27.7
15.630	Pk	17.0	3.1	20.1	48.0	-27.9	48.0	-27.9

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature:  Date: July 3, 2001

Typed/Printed Name: Franck Schuppius

TABLE 4-7: CONDUCTED EMISSIONS TEST {NEUTRAL SIDE (L1)} (715.000 MHZ)

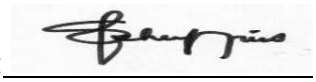
Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.514	Pk	42.7	0.7	43.4	48.0	-4.6	48.0	-4.6
0.725	Pk	41.3	0.8	42.1	48.0	-5.9	48.0	-5.9
0.879	Pk	36.7	0.8	37.5	48.0	-10.5	48.0	-10.5
1.048	Pk	36.1	0.8	36.9	48.0	-11.1	48.0	-11.1
1.396	Pk	32.8	1.0	33.8	48.0	-14.2	48.0	-14.2
3.716	Pk	42.0	1.5	43.5	48.0	-4.5	48.0	-4.5
5.120	Pk	18.4	1.8	20.2	48.0	-27.8	48.0	-27.8
6.520	Pk	17.0	2.0	19.0	48.0	-29.0	48.0	-29.0
20.750	Pk	16.9	3.4	20.3	48.0	-27.7	48.0	-27.7

TABLE 4-8: CONDUCTED EMISSIONS TEST {HOT SIDE (L2)} (715.000 MHZ)

Temperature: 73°F Humidity: 45%								
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.470	Pk	42.0	0.8	42.8	48.0	-5.2	48.0	-5.2
0.707	Pk	40.7	0.8	41.5	48.0	-6.5	48.0	-6.5
0.921	Pk	34.9	0.8	35.7	48.0	-12.3	48.0	-12.3
1.012	Pk	30.0	0.8	30.8	48.0	-17.2	48.0	-17.2
4.144	Pk	33.9	1.5	35.4	48.0	-12.6	48.0	-12.6
5.000	Pk	17.2	1.8	19.0	48.0	-29.0	48.0	-29.0
19.010	Pk	17.8	3.3	21.1	48.0	-26.9	48.0	-26.9
28.040	Pk	17.3	4.2	21.5	48.0	-26.5	48.0	-26.5

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: 

Date: July 3, 2001

Typed/Printed Name: Franck Schuppius

TABLE 4-5: EQUIPMENT USED FOR TESTING

Conducted Emissions					
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900931	HP	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	05/16/02
900070	Solar		LISN		

5 RADIATED EMISSIONS

5.1 TEST METHODOLOGY FOR RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, and EMCO log periodic and biconical antenna. In order to gain sensitivity, a New Circuits ZHL-4240W preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When any clock exceeds 108 MHz, the EUT was tested between 1 to 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

5.2 RADIATED EMISSION DATA

TABLE 5-1: RADIATED EMISSIONS: (30.000 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
192.000	Qp	V	90	1.0	39.8	-18.1	21.7	43.5	-21.8
209.603	Qp	H	145	1.0	51.2	-17.3	33.9	43.5	-9.6
278.446	Qp	V	180	1.3	41.3	-14.6	26.7	46.0	-19.3
396.800	Qp	V	345	1.0	36.1	-11.1	25.0	46.0	-21.0
419.178	Qp	H	90	1.0	39.9	-8.9	31.0	46.0	-15.0
499.200	Qp	V	225	1.0	35.5	-8.5	27.0	46.0	-19.0
556.892	Qp	V	145	1.0	41.9	-6.4	35.5	46.0	-10.5
835.338	Qp	V	270	1.0	36.6	-4.1	32.5	46.0	-13.5

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-2: RADIATED EMISSIONS: (83.500 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
78.600	Qp	H	145	1.0	36.4	-21.9	14.5	40.0	-25.5
209.590	Qp	H	225	1.3	51.6	-17.3	34.3	43.5	-9.2
331.949	Qp	V	0	1.3	46.7	-13.0	33.7	46.0	-12.3
419.187	Qp	H	225	1.2	39.6	-8.9	30.7	46.0	-15.3
628.795	Qp	H	180	1.4	39.2	-5.8	33.4	46.0	-12.6
663.898	Qp	H	0	1.0	40.4	-5.6	34.8	46.0	-11.2

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

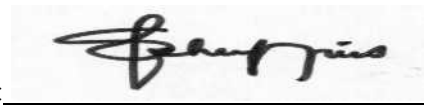
Signature:  Date: July 10, 2001

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TABLE 5-3: RADIATED EMISSIONS: (136.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
209.599	Qp	H	145	1.0	53.8	-17.3	36.5	43.5	-7.0
385.435	Qp	H	90	1.0	55.1	-11.4	43.7	46.0	-2.3
419.198	Qp	H	180	1.0	43.3	-8.9	34.4	46.0	-11.6
458.016	Qp	V	225	1.0	36.8	-9.7	27.1	46.0	-18.9
628.797	Qp	H	90	1.0	36.7	-5.8	30.9	46.0	-15.1
770.870	Qp	H	145	1.0	41.8	-4.2	37.6	46.0	-8.4

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-4: RADIATED EMISSIONS: (137.000 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
209.597	Qp	H	90	1.2	52.0	-17.3	34.7	43.5	-8.8
217.600	Qp	H	0	1.0	36.8	-17.5	19.3	46.0	-26.7
385.450	Qp	H	90	1.3	52.7	-11.4	41.3	46.0	-4.7
419.194	Qp	H	90	1.0	45.9	-8.9	37.0	46.0	-9.0
628.791	Qp	H	125	1.0	37.1	-5.8	31.3	46.0	-14.7
770.900	Qp	H	225	1.0	43.5	-4.2	39.3	46.0	-6.7

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

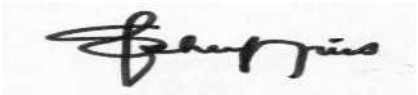
Signature:  Date: July 10, 2001

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TABLE 5-5: RADIATED EMISSIONS: (179.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
209.596	Qp	H	145	1.2	50.8	-17.3	33.5	43.5	-10.0
419.192	Qp	H	90	1.0	45.7	-8.9	36.8	46.0	-9.2
428.440	Qp	H	0	1.0	42.4	-9.3	33.1	46.0	-12.9
628.790	Qp	H	270	1.0	35.3	-5.8	29.5	46.0	-16.5
838.386	Qp	H	180	1.0	34.8	-3.5	31.3	46.0	-14.7
856.885	Qp	H	90	1.0	38.0	-2.9	35.1	46.0	-10.9
1285.321	Av	H	90	1.0	36.4	0.0	36.4	54.0	-17.6

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-6: RADIATED EMISSIONS: (222.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
209.600	Qp	H	180	1.0	51.7	-17.3	34.4	43.5	-9.1
419.200	Qp	H	90	1.0	44.7	-8.9	35.8	46.0	-10.2
471.442	Qp	H	0	1.8	52.2	-8.5	43.7	46.0	-2.3
628.800	Qp	H	225	1.0	39.3	-5.8	33.5	46.0	-12.5
838.400	Qp	H	145	1.0	39.2	-3.5	35.7	46.0	-10.3
942.884	Qp	H	180	1.0	42.7	-2.8	39.9	46.0	-6.1

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

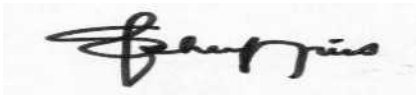
Signature:  Date: July 10, 2001

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TABLE 5-7: RADIATED EMISSIONS: (223.000 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
209.600	Qp	H	145	1.0	50.4	-17.3	33.1	43.5	-10.4
419.200	Qp	H	145	1.0	47.8	-8.9	38.9	46.0	-7.1
471.450	Qp	H	90	1.0	49.5	-8.5	41.0	46.0	-5.0
628.800	Qp	H	145	1.0	36.9	-5.8	31.1	46.0	-14.9
838.400	Qp	H	270	1.2	39.0	-3.5	35.5	46.0	-10.5
942.895	Qp	H	0	1.0	44.2	-2.8	41.4	46.0	-4.6

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-8: RADIATED EMISSIONS: (295.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
79.800	Qp	V	145	1.0	34.6	-17.5	17.1	40.0	-22.9
209.600	Qp	V	225	1.2	41.8	-10.9	30.9	43.5	-12.6
419.200	Qp	V	145	1.0	34.0	-1.6	32.4	46.0	-13.6
543.945	Qp	V	90	1.0	36.0	1.7	37.7	46.0	-8.3
628.800	Qp	V	270	1.0	37.8	2.9	40.7	46.0	-5.3
838.400	Qp	V	225	1.1	31.3	5.7	37.0	46.0	-9.0

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

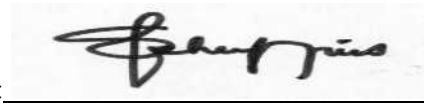
Signature:  Date: July 10, 2001

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TABLE 5-9: RADIATED EMISSIONS: (367.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
192.000	Qp	V	225	1.0	33.0	-11.8	21.2	43.5	-22.3
209.594	Qp	H	90	1.8	50.5	-17.3	33.2	43.5	-10.3
419.185	Qp	H	225	1.5	34.3	-1.3	33.0	46.0	-13.0
616.445	Qp	H	145	1.0	34.7	2.8	37.5	46.0	-8.5
628.777	Qp	H	145	1.0	32.3	3.0	35.3	46.0	-10.7
838.370	Qp	H	225	1.0	32.7	6.4	39.1	46.0	-6.9
1232.890	Av	H	145	1.0	26.7	0.5	27.2	54.0	-26.8
1849.335	Av	H	270	1.0	24.0	6.9	30.9	54.0	-23.1

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-10: RADIATED EMISSIONS: (368.000 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
192.000	Qp	V	145	1.0	34.8	-11.8	23.0	43.5	-20.5
209.600	Qp	H	125	1.2	50.4	-10.8	39.6	43.5	-3.9
307.200	Qp	V	225	1.0	33.2	-6.3	26.9	46.0	-19.1
419.199	Qp	H	270	1.0	37.8	-1.3	36.5	46.0	-9.5
616.445	Qp	H	145	1.0	38.3	2.8	41.1	46.0	-4.9
628.799	Qp	H	270	1.0	35.8	3.0	38.8	46.0	-7.2

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

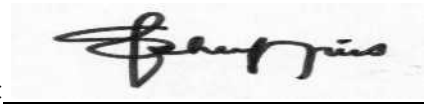
Signature:  Date: July 10, 2001

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TABLE 5-11: RADIATED EMISSIONS: (418.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
179.200	Qp	H	245	1.0	29.7	-12.1	17.6	43.5	-25.9
209.600	Qp	H	180	1.0	51.2	-10.8	40.4	43.5	-3.1
243.200	Qp	V	270	1.0	29.8	-8.8	21.0	46.0	-25.0
419.199	Qp	H	225	1.0	34.6	-1.3	33.3	46.0	-12.7
628.799	Qp	H	145	1.0	35.2	3.0	38.2	46.0	-7.8
667.445	Qp	H	145	1.2	36.3	3.5	39.8	46.0	-6.2
838.398	Qp	H	90	1.0	30.1	6.4	36.5	46.0	-9.5

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-12: RADIATED EMISSIONS: (469.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
192.000	Qp	V	335	1.2	31.0	-11.8	19.2	43.5	-24.3
209.589	Qp	H	145	1.0	50.5	-10.8	39.7	43.5	-3.8
419.178	Qp	H	270	1.0	35.7	-1.3	34.4	46.0	-11.6
628.767	Qp	H	145	1.0	36.3	3.0	39.3	46.0	-6.7
718.438	Qp	H	325	1.0	33.4	4.6	38.0	46.0	-8.0
838.356	Qp	H	145	1.0	31.6	6.4	38.0	46.0	-8.0

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

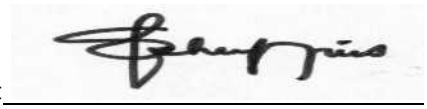
Signature:  Date: July 10, 2001

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TABLE 5-13: RADIATED EMISSIONS: (470.000 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
209.600	Qp	H	90	1.0	51.3	-10.8	40.5	43.5	-3.0
359.223	Qp	H	0	1.0	37.7	-3.5	34.2	46.0	-11.8
419.200	Qp	H	45	1.2	35.5	-1.3	34.2	46.0	-11.8
628.800	Qp	H	225	1.1	31.0	3.0	34.0	46.0	-12.0
718.446	Qp	H	345	1.1	32.4	4.6	37.0	46.0	-9.0
838.400	Qp	H	145	1.1	29.5	6.4	35.9	46.0	-10.1

**All readings are quasi-peak, unless stated otherwise.*

TABLE 5-14: RADIATED EMISSIONS: (714.995MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
192.000	Qp	H	45	1.0	32.5	-12.1	20.4	43.5	-23.1
209.603	Qp	H	90	1.0	47.5	-10.8	36.7	43.5	-6.8
419.206	Qp	H	145	1.0	33.7	-1.3	32.4	46.0	-13.6
466.545	Qp	H	90	1.0	42.5	-0.8	41.7	46.0	-4.3
628.798	Qp	H	245	1.0	37.5	3.0	40.5	46.0	-5.5
838.401	Qp	H	145	1.0	30.3	6.4	36.7	46.0	-9.3

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

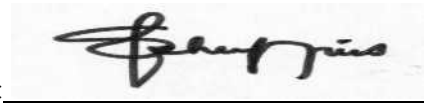
Signature:  Date: July 10, 2001

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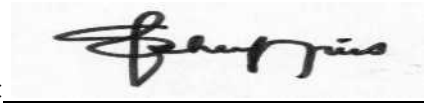
TABLE 5-15: RADIATED EMISSIONS: (959.995 MHZ)

Temperature: 84°F Humidity: 63%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
192.000	Qp	H	145	1.0	30.1	-12.1	18.0	43.5	-25.5
209.598	Qp	H	90	1.0	45.2	-10.8	34.4	43.5	-9.1
419.196	Qp	H	225	1.0	38.2	-1.3	36.9	46.0	-9.1
628.812	Qp	H	325	1.0	35.2	3.0	38.2	46.0	-7.8
711.537	Qp	H	245	1.0	33.6	4.3	37.9	46.0	-8.1
838.413	Qp	H	145	1.0	30.5	6.4	36.9	46.0	-9.1

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: July 10, 2001

Typed/Printed Name: Franck Schuppius

TABLE 5-7: EQUIPMENT USED FOR TESTING

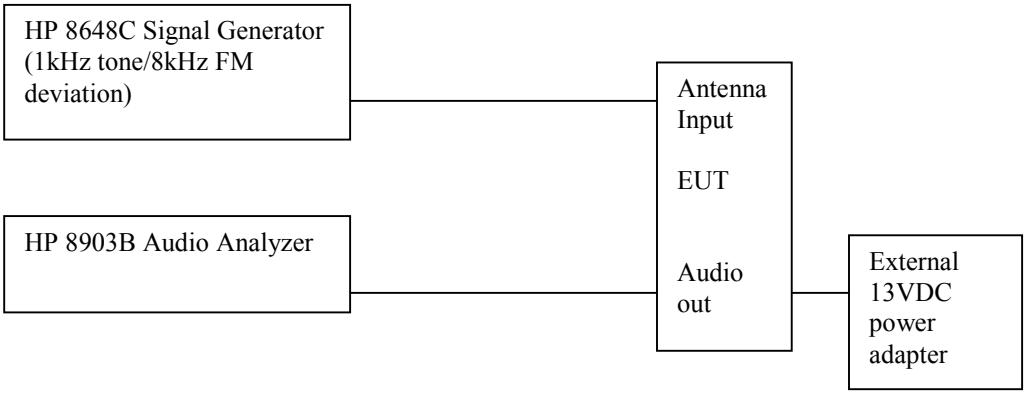
Radiated Emissions					
RTL Asset #	**Manufacturer**	**Model**	**Part Type**	**Serial Number**	**Calibration Due Date**
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	03/27/02
900999	HP	8596EM Analyzer	Spectrum Analyzer (9KHz - 12.5GHz)	3826A00144	03/25/02
901053	Schaffner@Chase	CBL6112B	Bilog antenna (20 MHz - 2 GHz)	2648	05/24/02
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020	N/A
900323	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020	N/A
900772	Electro Metrics	RGA 60	Horn Antenna	2310	03/25/02
900889	HP	85685A	RF Preselector for HP 8566B or 8568B (20Hz-2GHz)	3146A01309	11/08/01
900800	EMCO	3301B	Active monopole antenna (30 Hz – 50 MHz)	9809-4071	05/02/02

6 38DB REJECTION TEST

A signal generator was connected to the receiver under test, and the output of the receiver was connected to an audio analyzer.

A FM signal was applied to the receiver antenna input with a 1kHz tone modulated at 8 kHz deviation, and adjusted with the audio analyzer to produce a 12 dB SINAD. This was done across the receiver bands to determine a reference level. The reference level used was that with the highest sensitivity in all of the bands.

The output of the signal generator was then adjusted to a level 40 dB above the reference level established and set to a low, medium and high frequency in both the mobile and base cellular bands. (Mobile = 824.04 MHz through 848.97 MHz, Base = 881.50 MHz through 893. 97 MHz). The squelch of the receiver was then set to a minimum threshold level and scanning began from the lowest to the highest channel. Whenever the receiver stopped and "un-squelched" that frequency was noted as a response. After all the frequencies of responses were noted, the signal generator was set to measure the sensitivity at each of these response frequencies. This measurement was the reference sensitivity for the particular received frequency measured. The audio analyzer measurement was used to measure the 12 dB SINAD and that is the spurious value. The difference between the reference sensitivity and the spurious value is the rejection ratio and must be at least 38 dB.



Frequencies used on the Signal Generator were 824.04, 836.50, 848.97 MHz for the Mobile and 881.50, 869.04, 893.97 MHz for the Base.

The DJ-X2000T unit reference level used was –50 dBm from the signal generator, this was determined from the highest sensitivity from 930 MHz at –90.0 dBm measurement of 12dB SINAD. The DJ-X2000T unit was scanned from 30 - 960 MHz for all channels (manufacturers spec.). Signals that were noted as responses were checked with the signal generator off and if they still existed as a response were determined as ambient signals and removed from the response list. There was one signal available for the 38 dB rejection test requirements.

6.1 38DB REJECTION TEST DATA FOR CELLULAR BAND (869.040-893.970 MHZ)

TABLE 6-1: 38DB REJECTION {FREQUENCY INJECTED: 869.040 MHZ} (CELLULAR BAND)

Frequency Injected: 869.040 MHz		Temperature: 74°F; Humidity: 33%		
Frequency Detected (MHz)	**Level 12dB SINAD at 869.040 MHz**	**Level 12dB at frequency detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

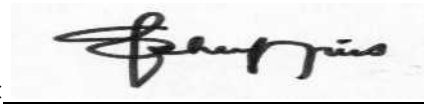
TABLE 6-2: 38DB REJECTION {FREQUENCY INJECTED: 881.500 MHZ} (CELLULAR BAND)

Frequency Injected: 881.500 MHz		Temperature: 74°F; Humidity: 33%		
Frequency Detected (MHz)	**Level 12dB SINAD at 881.50MHz**	**Level 12dB at frequency detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

TABLE 6-3: 38DB REJECTION {FREQUENCY INJECTED: 93.970 MHZ} (CELLULAR BAND)

Frequency Injected: 893.970 MHz		Temperature: 74°F; Humidity: 33%		
Frequency Detected (MHz)	**Level 12dB SINAD at 893.970MHz**	**Level 12dB at frequency detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

TEST PERSONNEL:

Signature:  Date: July 12, 2001

Typed/Printed Name: Franck Schuppius

6.2 38DB REJECTION TEST DATA FOR MOBILE BAND (824.040 – 848.970 MHZ)

TABLE 6-4: 38DB REJECTION {FREQUENCY INJECTED: 824.040 MHZ} (MOBILE BAND)

Frequency Injected: 824.040 MHz		Temperature: 74°F; Humidity: 33%		
Frequency Detected (MHz)	Level 12dB SINAD at 824.040MHz	Level 12dB at frequency detected	Rejection	Margin
483.530	-28.7	-86.6	**-57.9**	**-19.9**
483.540	-28.0	-86.7	**-58.7**	**-20.7**
483.550	-27.3	-86.7	**-59.4**	**-21.4**
483.555	-28.1	-86.7	**-58.6**	**-20.6**
483.565	-27.9	-86.7	**-58.8**	**-20.8**
483.575	-27.1	-86.5	**-59.4**	**-21.4**
528.380	-40.8	-96.5	**-55.7**	**-17.7**
614.445	-20.0	-94.8	**-74.8**	**-36.8**
627.755	-38.9	-92.7	**-53.8**	**-15.8**
641.045	-33.2	-90.1	**-56.9**	**-18.9**
679.895	-28.0	-94.1	**-66.1**	**-28.1**
715.000	-45.4	-95.6	**-50.2**	**-12.2**
722.580	-42.7	-95.5	**-52.8**	**-14.8**
746.340	-33.2	-94.5	**-61.3**	**-23.3**

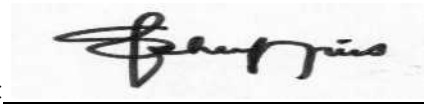
TABLE 6-5: 38DB REJECTION {FREQUENCY INJECTED: 836.500 MHZ} (MOBILE BAND)

Frequency Injected: 836.500 MHz		Temperature: 74°F; Humidity: 33%		
Frequency Detected (MHz)	Level 12dB SINAD at 836.500MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

TABLE 6-6: 38DB REJECTION {FREQUENCY INJECTED: 848.970 MHZ} (MOBILE BAND)

Frequency Injected: 848.970 MHz		Temperature: 74°F; Humidity: 33%		
Frequency Detected (MHz)	Level 12dB SINAD at 848.970MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

TEST PERSONNEL:

Signature:  Date: July 12, 2001

Typed/Printed Name: Franck Schuppius