Engineering and Testing for EMC and Safety Compliance

APPLICATION FOR FCC CLASS B CERTIFICATION

SCANNING RECEIVER

Alinco, Inc.
438 Amapola Ave.
Suite 130
Torrance, CA 90501

MODEL: DJ-X2R
FCC ID: EUG DJ-X2R

June 28, 2000

This report concerns (check one): Original Grant: X **Class II Change:** **Equipment Type: Scanning Receiver**
Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)? Yes: No: X **If yes, defer until:** _____ ***Date*** **Company name agrees to notify the Commission by: _____(date) of the intended date of announcement of the product so that the grant can be issued on that date.**

Transition Rules Request per 15.37? Yes: No: X **If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision..**

REPORT PREPARED BY:

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1.0 GENERAL INFORMATION

The following Application for FCC Type Certification of a Scanning Receiver is prepared on behalf of Alinco, Inc. in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the DJ-X2R, FCC ID: EUGDJ-X2R. 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 STANDARDS REFERENCED

STANDARDS REFERENCED FOR THIS REPORT	
FCC RULES AND REGULATION	PART 2 SUBPART J
FCC RULES AND REGULATION	PART 15 §15.109
FCC RULES AND REGULATION	PART 15 §15.111
FCC RULES AND REGULATION	PART 15 § 15.121
ANSI	C63.4:1992

1.2 BASIC INFORMATION ON THE EUT

FREQUENCY RANGE MHZ	OUTPUT POWER (W)	FREQUENCY TOLERANCE	EMISSION DESIGNATOR
0.5-999.995	N/A	N/A	N/A

1.3 MODIFICATIONS

Use of Chomerics EMI Shielding tape to form a shield around PCB internally. Shield used: CHO-FAB CFT-101 (.005 inches thick, Nickel Plated Cloth with Electrically Conductive Acrylic Adhesive).

1.4 RELATED SUBMITTAL(S)/GRANT(S)

This is an original certification submission.

1.5 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.

1.6 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 dated June 24, 1996, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 SYSTEM TEST CONFIGURATION

2.1 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 and a DC power supply connected, the receiver indicator was used to determine optional reception. The EUT's IF, local oscillators, and crystal oscillators and harmonics of each were investigated.

2.2 EXERCISING THE EUT

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

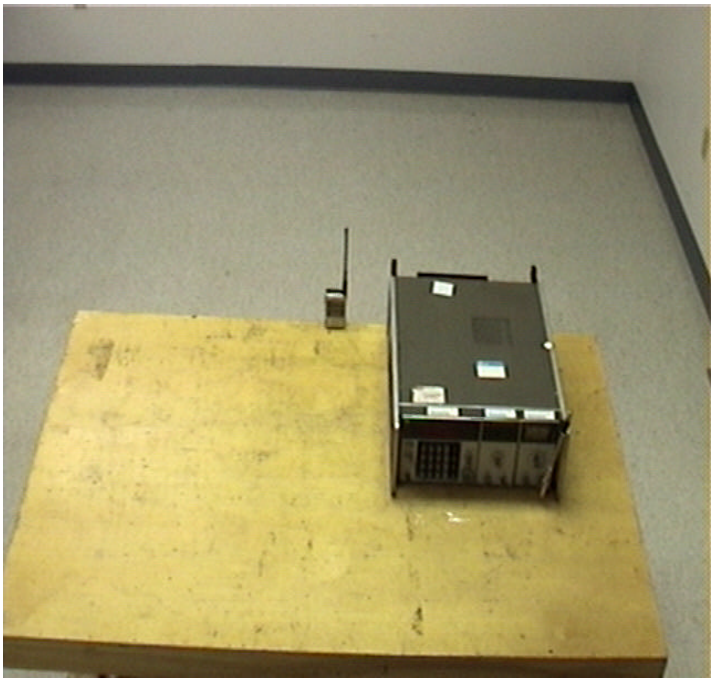
2.3 TEST SYSTEM DETAILS

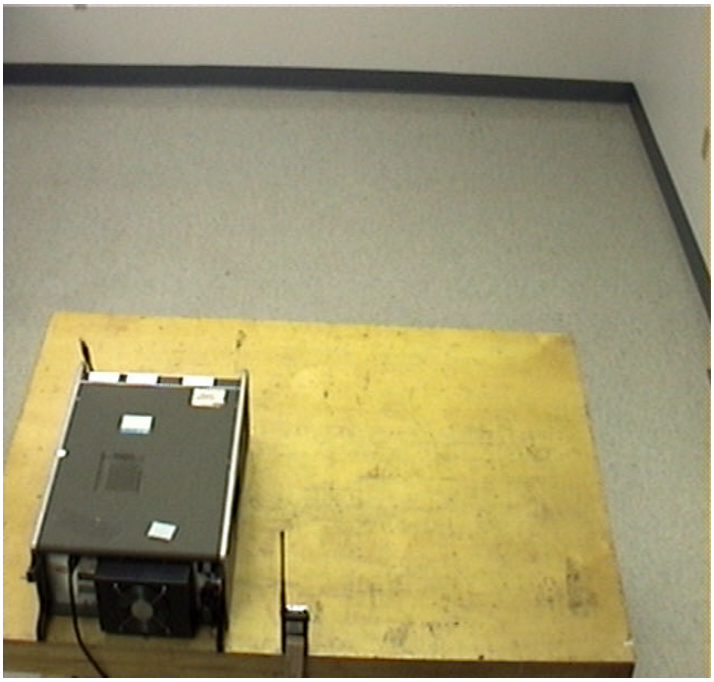
The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

EXTERNAL PERIPHERALS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
ANTENNA	ALINCO	WHIP ANTENNA	N/A	N/A		012141
RECEIVER (EUT)	**ALINCO**	**DJ-X2T**	**0000401**	**EUG-DJ-X2T**		**012140**
SIGNAL GENERATOR	HEWLETT PACKARD	8660C SYNTHESIZED SIGNAL GENERATOR	1947A02956	N/A	SHIELDED POWER	900059
BATTERY CHARGER	ALINCO	EDH-27	N/A	N/A	UNSHIELDED POWER	012146

2.4 TEST SYSTEM CONFIGURATION PHOTOGRAPHS





2.5 EMISSIONS EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. LAB
AMPLIFIER	HEWLETT PACKARD	11975A	2304A00348	TEST EQUITY
AMPLIFIER (S/A 1)	RHEIN TECH	PR-1040	00001	RTL
AMPLIFIER (S/A 2)	RHEIN TECH	RTL2	900723	RTL
AMPLIFIER (S/A 3)	RHEIN TECH	8447F	2944A03783	RTL
AMPLIFIER (S/A 4)	RHEIN TECH	8447D	2727A05397	RTL
BICONICAL/LOG ANTENNA 1	ANTENNA RESEARCH	LPB-2520	1037	LIBERTY LABS
BICONICAL/LOG ANTENNA 2	ANTENNA RESEARCH	LPB-2520	1036	LIBERTY LABS
FIELD SITE SOURCE	EMCO	4610	9604-1313	RTL
FILTER (ROOM 1)	SOLAR	8130	947305	RTL
FILTER (ROOM 2)	SOLAR	8130	947306	RTL
HARMONIC MIXER 1	HEWLETT PACKARD	11970K	2332A00563	TELOGY
HARMONIC MIXER 2	HEWLETT PACKARD	11970A	2332A01199	TELOGY
HORN ANTENNA 1	EMCO	3160-10	9606-1033	EMCO
HORN ANTENNA 2	EMCO	3160-9	9605-1051	EMCO
HORN ANTENNA 3	EMCO	3160-7	9605-1054	EMCO
HORN ANTENNA 4	EMCO	3160-8	9605-1044	EMCO
HORN ANTENNA 5	EMCO	3160-03	9508-1024	EMCO
LISN (ROOM 1/L1)	SOLAR	7225-1	900727	ACUCAL
LISN (ROOM 1/L2)	SOLAR	7225-1	900726	ACUCAL
LISN (ROOM 2/L1)	SOLAR	7225-1	900078	ACUCAL
LISN (ROOM 2/L2)	SOLAR	7225-1	900077	ACUCAL
PRE-AMPLIFIER	HEWLETT PACKARD	8449B OPT	3008A00505	TELOGY
QUASI-PEAK ADAPTER (S/A 1)	HEWLETT PACKARD	85650A	3145A01599	ACUCAL
QUASI-PEAK ADAPTER (S/A 2)	HEWLETT PACKARD	85650A	2811A01276	ACUCAL
QUASI-PEAK ADAPTER (S/A 3)	HEWLETT PACKARD	85650A	2521A00473	ACUCAL
QUASI-PEAK ADAPTER (S/A 4)	HEWLETT PACKARD	85650A	2521A01032	ACUCAL
RF PRESELECTOR (S/A 1)	HEWLETT PACKARD	85685A	3146A01309	ACUCAL
SIGNAL GENERATOR (HP)	HEWLETT PACKARD	8660C	1947A02956	ACUCAL
SIGNAL GENERATOR (WAVETEK)	WAVETEK	3510B	4952044	ACUCAL
SPECTRUM ANALYZER 1	HEWLETT PACKARD	8566B	3138A07771	ACUCAL
SPECTRUM ANALYZER 2	HEWLETT PACKARD	8567A	2841A00614	ACUCAL
SPECTRUM ANALYZER 4	HEWLETT PACKARD	8567A	2727A00535	ACUCAL
TUNABLE DIPOLE	EMCO	3121	274	LIBERTY LABS
ANTENNA	ATM	WR08	08443-6	ATM
MIXER	OLESON	M08HW	F80814-1	OLESON
MIXER	OLESON	M05HW	G80814-1	OLESON
DIPLEXER	OLESON	M05HW	G80814-1	OLESON
MIXER	HEWLETT PACKARD	11970U	2332A01110	ACUCAL
MIXER	HEWLETT PACKARD	11970V	2521A00512	TELOGY
MIXER	HEWLETT PACKARD	11970W	2521A00710	TELOGY
ANTENNA	ATM	WR15	15-443-6	ATM
ANTENNA	ATM	WR10	10-443-6	ATM
ANTENNA	ATM	WR05	05-443-6	ATM
SWEEP GENERATOR	HEWLETT PACKARD	83752A	3610A00866	HEWLETT PACKARD

2.6 TEST METHODOLOGY

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.

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.

3.0 CONDUCTED EMISSION DATA

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.

Conducted emissions testing was performed using the manufacturers battery charger providing power to the receiver.

TABLE 1: CONDUCTED EMISSIONS: (76 MHZ)

Neutral Side (L1)

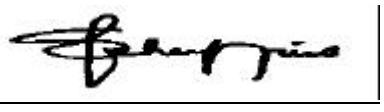
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.451	Pk	34.7	0.8	35.5	48.0	-12.5	48.0	-12.5
0.519	Pk	31.4	0.9	32.3	48.0	-15.7	48.0	-15.7
0.727	Pk	25.4	0.9	26.3	48.0	-21.7	48.0	-21.7
1.031	Pk	21.4	1.0	22.4	48.0	-25.6	48.0	-25.6
4.952	Pk	17.6	2.0	19.6	48.0	-28.4	48.0	-28.4
9.330	Pk	17.8	2.3	20.1	48.0	-27.9	48.0	-27.9
21.880	Pk	17.7	3.4	21.1	48.0	-26.9	48.0	-26.9

Hot Side (L2)

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)
0.453	Pk	35.2	0.7	35.9	48.0	-12.1	48.0	-12.1
0.530	Pk	32.8	0.7	33.5	48.0	-14.5	48.0	-14.5
0.836	Pk	26.2	0.8	27.0	48.0	-21.0	48.0	-21.0
1.008	Pk	22.8	0.9	23.7	48.0	-24.3	48.0	-24.3
8.642	Pk	17.5	2.3	19.8	48.0	-28.2	48.0	-28.2
13.620	Pk	18.4	2.8	21.2	48.0	-26.8	48.0	-26.8
15.390	Pk	18.2	3.0	21.2	48.0	-26.8	48.0	-26.8

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

TEST PERSONNEL:

Signature: 

Date: June 27, 2000

Typed/Printed Name: K. Franck Schuppius

TABLE 2: CONDUCTED EMISSIONS: (173 MHz)

Neutral Side (L1)

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)
0.461	Pk	34.8	0.8	35.6	48.0	-12.4	48.0	-12.4
0.553	Pk	29.1	0.9	30.0	48.0	-18.0	48.0	-18.0
0.777	Pk	26.0	0.9	26.9	48.0	-21.1	48.0	-21.1
1.028	Pk	21.2	1.0	22.2	48.0	-25.8	48.0	-25.8
7.535	Pk	18.6	2.2	20.8	48.0	-27.2	48.0	-27.2
14.290	Pk	18.7	2.8	21.5	48.0	-26.5	48.0	-26.5
21.920	Pk	18.2	3.4	21.6	48.0	-26.4	48.0	-26.4

Hot Side (L2)

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)
0.453	Pk	35.2	0.7	35.9	48.0	-12.1	48.0	-12.1
0.539	Pk	31.9	0.7	32.6	48.0	-15.4	48.0	-15.4
0.778	Pk	26.8	0.9	27.7	48.0	-20.3	48.0	-20.3
1.020	Pk	22.5	0.9	23.4	48.0	-24.6	48.0	-24.6
7.220	Pk	17.9	2.2	20.1	48.0	-27.9	48.0	-27.9
10.220	Pk	18.6	2.4	21.0	48.0	-27.0	48.0	-27.0
20.240	Pk	18.3	3.4	21.7	48.0	-26.3	48.0	-26.3

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

TEST PERSONNEL:

Signature:_____ Date: June 27, 2000

Typed/Printed Name: K. Franck Schuppius

TABLE 3: CONDUCTED EMISSIONS: (295.5 MHz)

Neutral Side (L1)

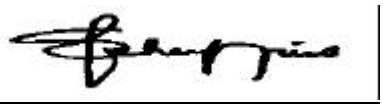
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.460	Pk	34.7	0.8	35.5	48.0	-12.5	48.0	-12.5
0.527	Pk	31.7	0.9	32.6	48.0	-15.4	48.0	-15.4
0.712	Pk	25.6	0.9	26.5	48.0	-21.5	48.0	-21.5
0.798	Pk	25.2	0.9	26.1	48.0	-21.9	48.0	-21.9
1.018	Pk	20.6	1.0	21.6	48.0	-26.4	48.0	-26.4
20.700	Pk	18.4	3.4	21.8	48.0	-26.2	48.0	-26.2

Hot Side (L2)

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)
0.466	Pk	34.7	0.7	35.4	48.0	-12.6	48.0	-12.6
0.534	Pk	30.8	0.7	31.5	48.0	-16.5	48.0	-16.5
0.755	Pk	26.9	0.9	27.8	48.0	-20.2	48.0	-20.2
2.390	Pk	17.8	1.3	19.1	48.0	-28.9	48.0	-28.9
6.985	Pk	18.6	2.2	20.8	48.0	-27.2	48.0	-27.2
21.900	Pk	17.9	3.4	21.3	48.0	-26.7	48.0	-26.7

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

TEST PERSONNEL:

Signature: 

Date: June 27, 2000

Typed/Printed Name: K. Franck Schuppius

TABLE 4: CONDUCTED EMISSIONS: (418.995 MHz)

Neutral Side (L1)

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)
0.458	Pk	34.8	0.8	35.6	48.0	-12.4	48.0	-12.4
0.509	Pk	32.6	0.9	33.5	48.0	-14.5	48.0	-14.5
0.757	Pk	26.3	0.9	27.2	48.0	-20.8	48.0	-20.8
2.168	Pk	17.9	1.4	19.3	48.0	-28.7	48.0	-28.7
6.808	Pk	18.3	2.2	20.5	48.0	-27.5	48.0	-27.5
13.090	Pk	17.9	2.6	20.5	48.0	-27.5	48.0	-27.5
27.370	Pk	18.1	3.5	21.6	48.0	-26.4	48.0	-26.4

Hot Side (L2)

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)
0.458	Pk	35.3	0.7	36.0	48.0	-12.0	48.0	-12.0
0.528	Pk	32.0	0.7	32.7	48.0	-15.3	48.0	-15.3
0.762	Pk	26.2	0.9	27.1	48.0	-20.9	48.0	-20.9
7.600	Pk	18.4	2.3	20.7	48.0	-27.3	48.0	-27.3
8.720	Pk	18.4	2.3	20.7	48.0	-27.3	48.0	-27.3
17.320	Pk	18.5	3.2	21.7	48.0	-26.3	48.0	-26.3
24.270	Pk	17.7	3.5	21.2	48.0	-26.8	48.0	-26.8

[1]Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature:_____ Date: June 27, 2000

Typed/Printed Name: K. Franck Schuppius

TABLE 5: CONDUCTED EMISSIONS: (806 MHz)

Neutral Side (L1)

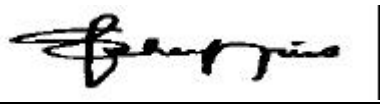
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)
0.450	Pk	34.3	0.8	35.1	48.0	-12.9	48.0	-12.9
0.520	Pk	30.8	0.9	31.7	48.0	-16.3	48.0	-16.3
0.791	Pk	26.0	0.9	26.9	48.0	-21.1	48.0	-21.1
3.248	Pk	17.8	1.6	19.4	48.0	-28.6	48.0	-28.6
8.080	Pk	18.6	2.2	20.8	48.0	-27.2	48.0	-27.2
10.480	Pk	17.8	2.5	20.3	48.0	-27.7	48.0	-27.7

Hot Side (L2)

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	34.7	0.7	35.4	48.0	-12.6	48.0	-12.6
0.506	Pk	33.1	0.7	33.8	48.0	-14.2	48.0	-14.2
0.797	Pk	27.5	0.9	28.4	48.0	-19.6	48.0	-19.6
7.616	Pk	18.8	2.3	21.1	48.0	-26.9	48.0	-26.9
11.200	Pk	17.8	2.5	20.3	48.0	-27.7	48.0	-27.7
28.710	Pk	18.2	3.4	21.6	48.0	-26.4	48.0	-26.4

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

TEST PERSONNEL:

Signature: 

Date: June 27, 2000

Typed/Printed Name: K. Franck Schuppius

4.0 RADIATED EMISSION DATA

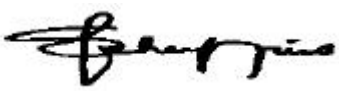
TABLE 6: RADIATED EMISSIONS: (30 MHz)

(Temperature: 68° F Degree, Humidity: 43%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.601	Qp	H	315	1.5	49.6	-17.0	32.6	43.5	-10.9
278.450	Qp	H	180	1.0	45.8	-13.5	32.3	46.0	-13.7
556.900	Qp	H	180	1.9	45.2	-6.2	39.0	46.0	-7.0
835.350	Qp	H	180	1.0	43.1	-3.4	39.7	46.0	-6.3

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 1, 2000

Typed/Printed Name: K. Franck Schuppius

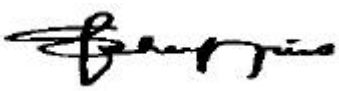
TABLE 7: RADIATED EMISSIONS: (76 MHz)

(Temperature: 97° F Degree, Humidity: 12%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.601	Qp	H	225	1.4	50.6	-17.0	33.6	43.5	-9.9
324.460	Qp	H	90	1.0	46.2	-12.1	34.1	46.0	-11.9
419.202	Qp	H	90	1.0	42.7	-8.5	34.2	46.0	-11.8
628.803	Qp	V	90	1.0	37.6	-5.3	32.3	46.0	-13.7
648.902	Qp	H	45	1.8	46.6	-5.3	41.3	46.0	-4.7

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 1, 2000

Typed/Printed Name: K. Franck Schuppius

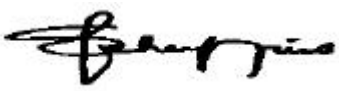
TABLE 8: RADIATED EMISSIONS: (136.995 MHz)

(Temperature: 97° F Degree, Humidity: 12%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	180	1.8	56.9	-17.0	39.9	43.5	-3.6
385.445	Qp	V	180	1.9	49.0	-11.0	38.0	46.0	-8.0
419.212	Qp	V	125	1.8	43.0	-8.8	34.2	46.0	-11.8
628.800	Qp	V	90	1.0	39.3	-5.3	34.0	46.0	-12.0
770.889	Qp	V	270	1.0	47.2	-3.8	43.4	46.0	-2.6

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 5, 2000

Typed/Printed Name: K. Franck Schuppius

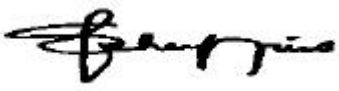
TABLE 9: RADIATED EMISSIONS: (137 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.602	Qp	H	145	1.8	45.8	-17.0	28.8	43.5	-14.7
385.451	Qp	V	180	1.6	48.4	-11.0	37.4	46.0	-8.6
419.195	Qp	V	180	1.4	42.3	-8.8	33.5	46.0	-12.5
770.898	Qp	V	270	1.0	47.1	-3.8	43.3	46.0	-2.7
838.408	Qp	H	45	1.0	38.6	-3.5	35.1	46.0	-10.9

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 5, 2000

Typed/Printed Name: K. Franck Schuppius

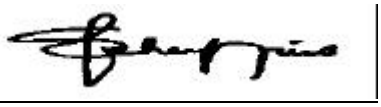
TABLE 10: RADIATED EMISSIONS: (173 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.600	Qp	H	25	1.6	47.9	-17.0	30.9	43.5	-12.6
419.200	Qp	H	45	1.0	43.7	-8.5	35.2	46.0	-10.8
421.442	Qp	H	185	1.0	47.7	-8.6	39.1	46.0	-6.9
838.400	Qp	H	180	1.4	34.5	-3.5	31.0	46.0	-15.0
842.888	Qp	H	180	1.0	46.9	-3.3	43.6	46.0	-2.4

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

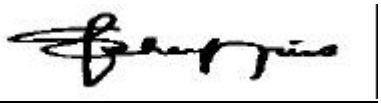
TABLE 11: RADIATED EMISSIONS: (222.995 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.587	Qp	V	90	2.2	46.3	-17.2	29.1	43.5	-14.4
419.200	Qp	V	145	2.1	40.5	-8.8	31.7	46.0	-14.3
471.445	Qp	H	45	1.0	45.4	-8.0	37.4	46.0	-8.6
838.395	Qp	H	180	1.4	38.4	-3.5	34.9	46.0	-11.1

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

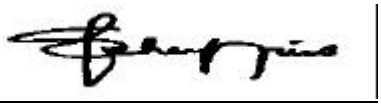
TABLE 12: RADIATED EMISSIONS: (223 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.600	Qp	H	145	1.1	45.4	-17.0	28.4	43.5	-15.1
419.200	Qp	V	270	1.0	40.0	-8.8	31.2	46.0	-14.8
471.449	Qp	V	180	1.0	45.0	-8.2	36.8	46.0	-9.2
628.800	Qp	V	90	1.0	32.1	-5.3	26.8	46.0	-19.2
942.894	Qp	H	90	1.0	44.9	-2.3	42.6	46.0	-3.4

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 5, 2000

Typed/Printed Name: K. Franck Schuppius

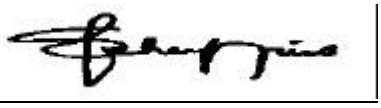
TABLE 13: RADIATED EMISSIONS: (295.5 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.600	Qp	H	120	1.5	48.1	-17.0	31.1	43.5	-12.4
419.200	Qp	V	185	1.5	42.3	-8.8	33.5	46.0	-12.5
543.950	Qp	H	120	1.0	40.0	-7.7	32.3	46.0	-13.7
628.800	Qp	V	275	1.0	38.9	-5.3	33.6	46.0	-12.4
838.400	Qp	H	180	2.0	42.2	-3.5	38.7	46.0	-7.3

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

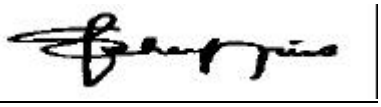
TABLE 14: RADIATED EMISSIONS: (367.995 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	30	1.0	41.5	-17.0	24.5	43.5	-19.0
419.176	Qp	H	270	1.0	39.6	-8.5	31.1	46.0	-14.9
616.445	Qp	V	30	1.0	43.9	-5.4	38.5	46.0	-7.5
628.764	Qp	V	270	1.0	37.0	-5.3	31.7	46.0	-14.3
838.352	Qp	H	30	1.0	41.8	-3.5	38.3	46.0	-7.7

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

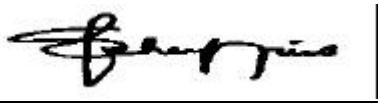
TABLE 15: RADIATED EMISSIONS: (368 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	265	2.0	45.9	-17.0	28.9	43.5	-14.6
419.176	Qp	H	0	2.5	39.4	-8.5	30.9	46.0	-15.1
419.176	Qp	V	180	1.4	41.1	-8.8	32.3	46.0	-13.7
616.450	Qp	H	175	3.1	49.5	-5.6	43.9	46.0	-2.1
628.764	Qp	V	275	1.0	39.9	-5.3	34.6	46.0	-11.4
838.352	Qp	H	180	1.0	40.6	-3.5	37.1	46.0	-8.9

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

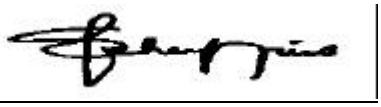
TABLE 16: RADIATED EMISSIONS: (418.995 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	120	1.4	43.9	-18.5	25.4	43.5	-18.1
419.176	Qp	V	180	1.5	40.3	-9.4	30.9	46.0	-15.1
628.764	Qp	V	190	1.2	34.2	-5.4	28.8	46.0	-17.2
667.445	Qp	H	180	1.4	44.3	-6.2	38.1	46.0	-7.9
838.352	Qp	V	300	1.0	38.6	-4.0	34.6	46.0	-11.4

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

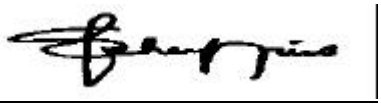
TABLE 17: RADIATED EMISSIONS: (469 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	225	1.1	46.4	-17.0	29.4	43.5	-14.1
419.176	Qp	V	180	1.5	40.7	-8.8	31.9	46.0	-14.1
628.764	Qp	V	120	1.2	38.3	-5.3	33.0	46.0	-13.0
718.445	Qp	H	185	1.2	46.2	-4.5	41.7	46.0	-4.3
838.352	Qp	H	180	1.0	41.3	-3.5	37.8	46.0	-8.2

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

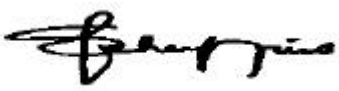
TABLE 18: RADIATED EMISSIONS: (470 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	230	1.5	52.1	-17.0	35.1	43.5	-8.4
419.176	Qp	V	90	1.5	40.5	-8.8	31.7	46.0	-14.3
628.764	Qp	V	290	1.2	35.8	-5.3	30.5	46.0	-15.5
718.450	Qp	H	180	1.2	47.6	-4.5	43.1	46.0	-2.9
838.352	Qp	H	220	1.0	38.5	-3.5	35.0	46.0	-11.0

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

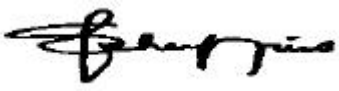
TABLE 19: RADIATED EMISSIONS: (806 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	225	1.6	50.5	-17.0	33.5	43.5	-10.0
419.176	Qp	V	30	1.4	41.4	-8.8	32.6	46.0	-13.4
557.550	Qp	V	180	1.0	47.5	-5.7	41.8	46.0	-4.2
628.764	Qp	V	290	1.1	36.7	-5.3	31.4	46.0	-14.6
838.352	Qp	H	225	1.1	37.4	-3.5	33.9	46.0	-12.1

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

Typed/Printed Name: K. Franck Schuppius

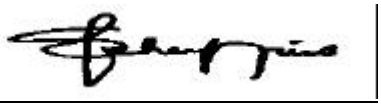
TABLE 20: RADIATED EMISSIONS: (959.962 MHz)

(Temperature: 83° F Degree, Humidity: 32%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
209.588	Qp	H	270	1.0	45.3	-17.0	28.3	43.5	-15.2
419.176	Qp	V	180	1.5	41.6	-8.8	32.8	46.0	-13.2
628.764	Qp	V	300	1.0	37.6	-5.3	32.3	46.0	-13.7
711.512	Qp	H	110	1.4	48.2	-4.7	43.5	46.0	-2.5
838.352	Qp	V	30	1.0	38.5	-3.9	34.6	46.0	-11.4

All readings are quasi-peak, unless stated otherwise.

TEST PERSONNEL:

Signature: 

Date: June 2, 2000

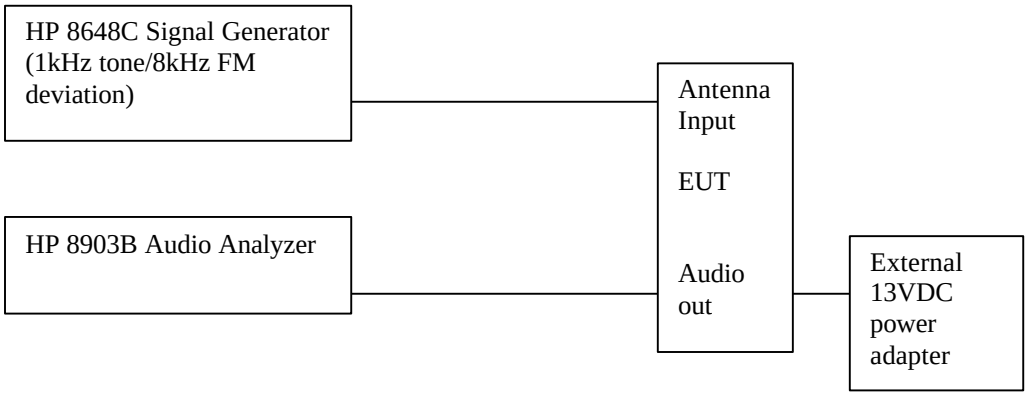
Typed/Printed Name: K. Franck Schuppius

4.1 38dB REJECTION TEST

The EUT was investigated and tested across three frequencies in the base transmit (subscriber receive), and three frequencies in the subscriber transmit (base transmit) bands. The test data represents only the worst case data. A signal generator was connected to the receiver under test at the antenna port, 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 (level) 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 = 869.04 MHz through 893. 97 MHz) should be checked. 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 response frequency measured. The audio analyzer was used to measure a spurious value (12 dB SINAD). The difference between the reference sensitivity and the spurious value is the rejection ratio and must be at least 38 dB.



Frequencies applied with the Signal Generator were 824.04 MHz for the Mobile and 881.5 MHz for the Base, due to the large number of frequencies only some were checked for 38 dB rejection across the range.

The reference level used was –31.3 dBm from the signal generator, and was determined from the highest sensitivity from 999.995 MHz at –71.3 dBm 12dB SINAD measurement.

Low channel mobile cellular band (824.04 MHz)
38 dB rejection test results

Freq band of receiver	Tripped frequency	Reference sensitivity	Spurious Value	Rejection Ratio (dB)	
0.5 - 29.995 MHz	None				
30 - 136.996 MHz	None				
137 - 222.995 MHz	None				
223- 367.995 MHz	None				
368 - 469.995 MHz	409.585	-111.3	-40.3	71	pass
	412.015	-111.1	-70.2	40.9	pass
	412.035				
	469.312	-108.5	-40	68.5	pass
470 - 999.995 MHz	523.75	-89.4	-28.3	61.1	pass
	535.75				
	631.75				
	806.85				
	808.3	-110.5	-39.7	70.8	pass
	808.312				
	809.675				
	810.412				
	810.825				
	810.837				
	811.237				
	811.375	-110.5	-18.4	92.1	pass
	811.55				
	814.04				
	822.44				
	850.64				
	852.76	-110.2	-40.8	69.4	pass
	856.62				
	862.02				
	862.44				
	865.32				
	867.112	-112	-25.5	86.5	pass
	868.38				
	901.745				
	906.7	-110.8	-23.5	87.3	pass
	908.545				
	909.405				
	911.64	-110.6	-31.6	79	pass
	916.365				
	922.425				
	924.07 / .085 / .74				
	928.605 / .985				
	930.19 / .505 / .825				

	940.485				
	944.885				
	948.262	-107.9	-38	69.9	pass
	950.465				
	955.465				
	962.855	-84.9	-32.4	52.5	pass
	963.46	-104	-58.8	45.2	Pass
	963.56	-103.4	-52.1	51.3	pass
	968.74	-82.3	-42.5	39.8	pass
	980.35	-104.2	-55.6	48.6	pass
	980.825	-90.5	-41.5	51	pass
	981.67 thru 981.981				
	982.345				
	982.625	-85.7	-40.7	45	pass
	982.745	-76.3	-29.3	47	pass
Mid channel base cellular band (881.5 MHz) 38 dB rejection test results					
Freq band of receiver	Tripped frequency	Reference sensitivity	Spurious Value	Rejection Ratio (dB)	
0.5 - 29.995 MHz	None				
30 - 136.996 MHz	None				
137 - 222.995 MHz	None				
223- 367.995 MHz	None				
368 - 469.995 MHz	384.625	-100	-34.5	65.5	pass
	440.3				
	440.74	-110.4	-59.9	50.5	pass
	447.85				
	454.95	-110.2	-45.7	64.5	pass
	469.15	-107.2	-49.4	57.8	pass
470 - 999.995 MHz	565.75				
	583.75				
	625.75				
	661.75	-97.1	-22.3	74.8	pass
	806.437				
	810.212	-110.4	-55.5	54.9	pass
	810.225				
	811.15				
	811.162				
	813.425	-110.7	-53	57.7	pass
	818.7				
	823.15/.35/.362/.787				
	854.262/.275				
	855.9	-111.8	32.4	44.2	pass

	897.737				
	904.57		*		
	908.41		*		
	917.47				
	918.22/.23/.75/.93/.94				
	919.8				
	920.87	-110.4	-41.2	69.2	pass
	922.93/.94/.95/.96				
	924.59	-107.6	-14.7	92.9	pass
	930.27/.71				
	933.03				
	935.187/.562				
	937.637				
	937.65	-109.1	-53.1	56	pass
	937.662				
	941.075				
	944.275/.287				
	945.7				
	948.062	-108	-25.3	82.7	pass
	949.95/.962				
	950.137	-107.7	-26.5	81.2	pass
	951.95	-107.1	-26.7	80.4	pass
	952.812				
	957.975				
	959.2	-104.8	-34.3	70.5	pass
	965.9		*		
	968.3	-82.4	-35.7	46.7	pass
	971.8	-68.7	*		
	972.3/.4/.5				
	973/.1/.8/.974				
	979.8/.9				
	980				
	983.1	-56.9	-16.8	40.1	pass
	984.1/.2/.3				

* 12 dB SINAD could not be achieved on these measurements. The entire frequency bands were tested

Conclusion

The EUT passed the 38 dB rejection test. Both the lower and upper cellular bands were thoroughly investigated and found to be in compliance. The result above are the worst case results.

5.0 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
FCC RULES AND REGULATION	PART 2 SUBPART J
FCC RULES AND REGULATION	PART 15 §15.109
FCC RULES AND REGULATION	PART 15 §15.111
FCC RULES AND REGULATION	PART 15 § 15.121
ANSI	C63.4:1992

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 28, 2000

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.