DNB ENGINEERING, INC.

APPLICATION FOR CERTIFICATION

OF A SCANNING RECEIVER

per
FCC Part 15 Subpart B

EUT: AR8200B

PREPARED FOR APPLICANT:
AOR LTD.
2-6-4, Misuji, Taito-ku
Tokyo, 111-0055, Japan

REPORT # 86060-1

Prepared By:
DNB ENGINEERING, INC.
1100 East Chalk Creek Rd.
Coalville, Utah 84017
TEL: 1 (435) 336 - 4433

TRANSMITTAL SUMMARY

Unit tested:	AR8200B
Specifications:	ANSI C63.4 (1992) CFR 47 FCC part 15 Subpart B
Purpose of Report:	This report was prepared to document the status of the AR8200B with requirements of the regulations listed above.
Test Summary	The EUT's compliance status according to the tests performed is as follows.

REQUIREMENTS	STATUS
CFR 47 Part 15	
Radiated Emissions	COMPLIANT Class B

CERTIFICATION OF TEST DATA - per 2.911(d)

This report, containing emissions test data and evaluations, has been prepared by an independent electromagnetic compatibility laboratory, DNB ENGINEERING, in accordance with the applicable specifications and instructions required per the Introduction. DNB Engineering has been evaluated and approved to do these tests as proof of compliance.

The data evaluation and equipment configuration presented herein are a true and accurate representation of the measurements of the test emissions characteristics as of the dates and at the times of the test under the conditions herein specified.

Equipment Tested:	AR8200B
FCC ID:	NVJ AR8200B
Dates of Test:	May 22,26, 1998

Test Performed: West Page — 6/4/98
West Page
Test Technician
Date

Test Report Reviewed: Rick Linford — June 4, 1998
Rick Linford
Facility Manager
Regulatory Engineer
Date

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Administrative Data Per 2.1033(a) and 2.911(c)

1.1.1 REQUEST FOR CERTIFICATION Per 2.1033(b)1:

Applicant:	AOR LTD. 2-6-4, Misuji, Taito-ku Tokyo, 111-0055, Japan
Contact:	Takashi Nakayama
Phone:	(310) 530-8145
Manufacturer:	Same as above
Dates of Test:	May 22, 26, 1998
Equipment Under Test (EUT):	AR8200B
FCC ID:	NVJ AR8200B

1.2 Related Submittals/Grants

All Peripherals possess grants.

1.3 Purpose of Tests

The purpose of this series of tests was to demonstrate the Electromagnetic Compatibility (EMC) characteristics of the EUT. The following tests were performed:

REQUIREMENTS	STATUS
CFR 47 Part 15	
Radiated Emissions	COMPLIANT Class B

2. TEST DESCRIPTION

2.1 System Configuration Table

Config-uration	Unit Name - Processor, Monitor, Printer, Cable, etc. (Indent for features of a unit)	Style/Model/ Part No.	Serial Number	Obj. of test	120V	220V	Comments/ FCC ID#
	AR8200B	AR8200	U1	■			Battery Powered
	Com Cable Densen	2830	E91416	■			Supplied by AOR
	AOR Auto DC Adapter	None	None	■			Supplied by AOR
	Ear Phone Generic	None	None	■			Supplied by DNB
	12 V DC Power Supply	Cat No. .22-1270		■			Supplied by DNB to simulate automobile 12V DC

■ - Specific device(s) for which this test is being conducted.

2.2 Equipment Description

Wide Range Receiver

2.3 Circuit Description - per 2.1033(b)4

See following pages.

2.3.1 Mode of Operation

Turn to frequency as shown. Operation on external. DC supply to simulate automobile 12 V AC.

2.4 Test Plan Summary

2.4.1 Summary Table

The test plan is summarized in the following table.

REQUIREMENTS	STATUS
CFR 47 Part 15	
Radiated Emissions	COMPLIANT Class B

THEORY OF OPERATION

Refer to the block diagram. The AR8200 consists of 4 kinds of main printed circuit board :

1. RF printed circuit board (PWB)
2. IF PWB
3. CPU PWB
4. PA (Power Supply) PWB

1. RF PWB

All signals from the antenna connector pass to 9 kinds of filter through the 10dB attenuator :

(1) 0.1 - 1.9 MHz (Low Pass Filter : LPF)
(2) 1.9 - 30 MHz (Band Pass Filter : BPF)
(3) 30 - 75 MHz (BPF)
(4) 75 - 118 MHz (Tuned BPF)
(5) 118 - 174 MHz (Tuned BPF)
(6) 174 - 240 MHz (BPF)
(7) 240 - 470 MHz (BPF)
(8) 470 - 820 MHz (BPF)
(9) 820 - 2040 MHz (High Pass Filter : HPF)

The signals below 30MHz pass to TR101, the low band RF amplifier controlled by AGC (Auotomatic Gain Control), and then pass to the mixer consisting of TR104, TR105, and coils to be mixed with the 1st local frequency produced in the 1st VCO (Voltage Controlled Oscillator) controlled by the PLL section, and will be converted to 45.05MHz IF.

The signals above 30MHz pass to TR102 and TR103, RF amplifiers controlled by AGC.
These amplified signals pass to the mixer stage, IC104, which is a monolithic IC, to be mixed with the 1st local frequency produced in the 1st VCO of the PLL section, and will be converted to the two kinds of IF frequency. It depends on receiving frequencies :

754.850MHz for 30 - 540MHz and 1540 - 2040MHz
243.850MHz for 540 - 1540MHz

The above converted signals pass to each filter (Surface Acoustic Wave: SAW) and come into the 2nd mixer IC (uPC2757T) to produce 2nd IF 45.05MHz by mixing with the 2nd local frequencies produced in the 2nd VCO.

IC107 (MB15F04) is the PLL frequency synthesizer including Pre-scaler, and packed two PLL circuits inside. It can controll two VCO for 1st and 2nd local carriers.

The 1st local is generated by the 1st VCO consisting of TR701 (2SC4094) for the 30MHz over and TR702 (2SC3356) for the 30MHz under of receiving frequencies :

45.150 - 75.05MHz and 783.850 - 1296.150MHz for each band

The 2nd local carriers are fixed :

709.800MHz for 754.850MHz IF and 198.800MHz for 243.850MHz IF

The IC111 (Inverter IC) and X101 crystal generates 14.400MHz and it is fed to the PLL IC for the main reference. The 14.400MHz will be devided to 10KHz for the reference of PLL system.

2. IF PWB

All converted 45.05MHz signal in the RF PWB passes through the crystal filter (F301,F302) for all modes except WFM.
The signal from the crystal filter is amplified in TR302, and fed to IC302, which includes oscillator, mixer, IF amplifier, FM detecter and noise squelch amplifier and squelch control.
The 3rd oscillating frequency is 44.595MHz to produce 455KHz IF, and be varying 10KHz from 44.595MHz to 44.605MHz in required frequency steps controlled by D-A converter under controlled by the CPU.

For example,

Receive Freq.	1st IF	2nd IF	3rd IF	3rd Local
80.500MHz	754.850MHz	45.050MHz	455KHz	44.595MHz
80.501MHz	754.859MHz	45.059MHz	455KHz	44.604MHz
80.509MHz	754.851MHz	45.051MHz	455KHz	44.596MHz

The converted 455KHz IF signal passes through three kinds of Ceramic filters selected by its mode and input again to IC302 for amplification and FM detection.

In AM mode, the 455KHz signal passses through TR305, buffer amplifier, and be fed to IC303 for IF amplification and AM detection here.

In SSB mode, the 455KHz signal will be sent to TR306 from pin 18 of IC303, and be detected by mixing with the BFO circuitry, TR310 and TR311.

In WFM mode, the 45.05MHz signal is fed to IC303 and mixed with 34.35MHz carrier of the crystal oscillator of TR312 to get 10.7MHz IF, and then the IF signal through F304 (Ceramic filter) amplified and detected in IC303.

IC304 is MODE switch, that selects a detector output, and then detected audio signal passes through IC306, audio amplifier. The audio signal is fed to de-emphasis filter, and VR306, volume control.

IC309, TK11818, is DC-DC converter. 4V DC will be connverted to 28V DC for PLL loop filter.

3. CPU PWB

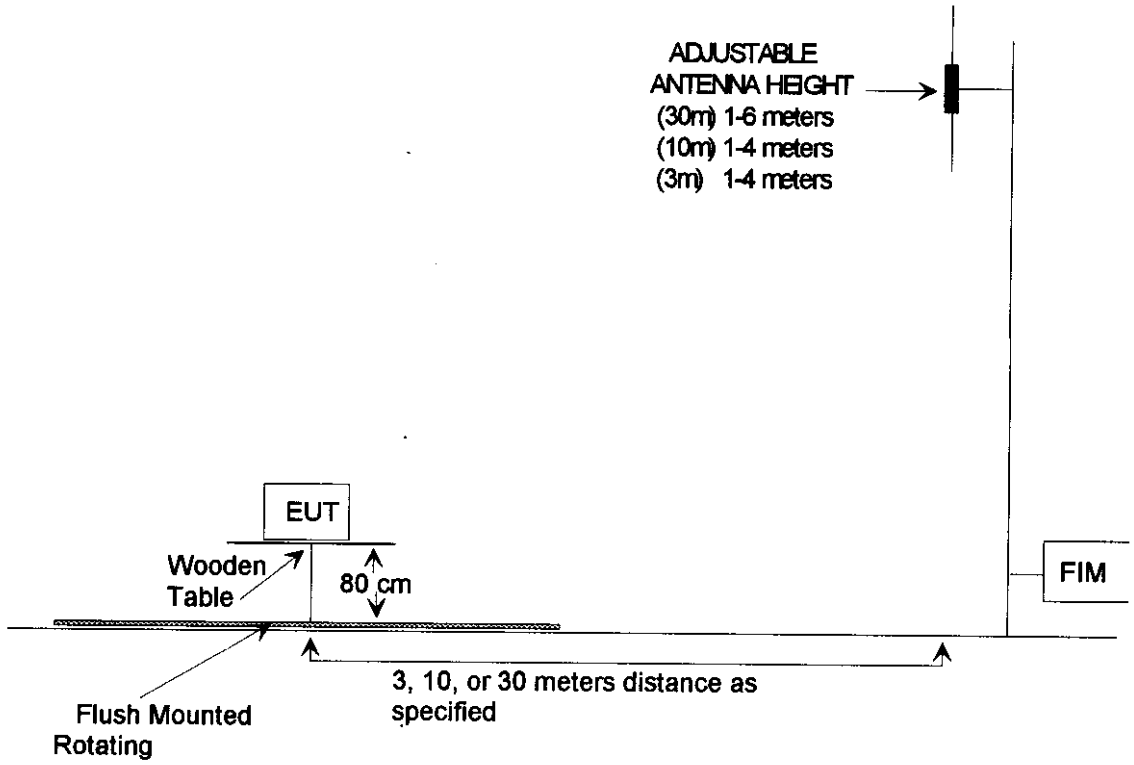
This PWB includes AF PA amplifier, CPU, falash memory, LCD and voltage regulators.
IC501 is 8bit microprocessor, uPD78054, and it controls all signals for PLL data, analog switches, LCD and so on, according to memorised data of IC502, flash memory.

3. EMISSIONS FCC PART 15

3.1 Radiated Emissions Test Setup and Procedure - Per 2.1033(b)(6) Per 2.947(a)

The EUT was placed on a wooden table 1 meter wide and 1.5 meters long which rests on a flush mounted, steel-top turntable on the open area test site as shown in Section 3.1.1. The top of the table is 80 cm above the ground plane. The turn-table can be rotated 360 degrees. Measuring antenna is set at the prescribed distance. Measurements are made with broad band antennas that have been correlated with tuned dipole antennas. The mast is 4.5 meters high and is self-supporting. The height of the antenna can be varied from 1 to 4 meters. Positioning of the antenna is controlled remotely.

3.1.1 Spurious Radiation Test Site Per 2.1033(b)6



Radiated Test Setup and Procedure - cont'd

The EUT is put into the operational test mode as stated in Section 2.3.1 is then started.

The spectrum analyzer is setup to store the peak emission over the band of the antenna. Peak EUT and ambient emissions are stored while the turntable is rotated 360^0. Peak spectrum analyzer trace is then plotted with the addition of antenna and cable correction factors. The limit is plotted on the same graph. A receiver with CISPR Quasi Peak capabilities is then used on the frequencies identified as the highest with respect to the plotted limit. Ambients are noted on the graph along with EUT emissions. The highest EUT frequencies, with respect to the limit, are maximized.

To maximize emissions levels, the turntable is rotated and the antenna is raised and lowered to determine the point of maximum emanations. The cables are then manipulated at that point to maximize emissions. Measurements are made with the antennas in each horizontal and vertical polarization separately. The data obtained from these tests is corrected with the proper cable, preamplifier and antenna factors. The results are then transcribed onto tables that show the maximum emission levels. The highest emissions are listed in a Radiated Emissions Summary table.

If no emissions can be found, the lowest harmonics of the EUT clocks within the bands of the standard are tuned into with the receiver. If no emissions are found, the noise floor will be entered into the table and noted. A minimum of six frequencies will be logged. Summary results will reflect only actual emissions from the EUT.

Radiated Test Setup and Procedure - cont'd

The field intensity measurements are made using standard techniques with a spectrum analyzer or EMI receiver as the calibrated Field Intensity Meter (FIM). Preamplifiers and filters are used when required.

When using the Hewlett Packard Model 8568B Spectrum Analyzer as the FIM, the Analyzer is calibrated to read signal level in dBm. Where:

0 dBm (50 ohms) = 107 dBuV (50 ohms)

The signal level (dBuV) = indicated signal level (dBm) + 107 dB. To obtain the signal level in dBuV/m it is necessary to add the antenna factor in dB.

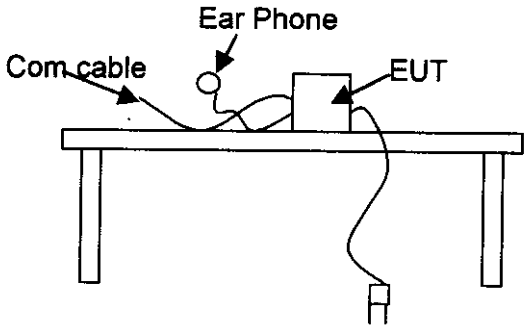
3.1.2 Example Of Typical Calculation Per 2.1033(b)6

Measurement Distance = 3 Meter

Rohde and Schwarz reading @ 60 MHz	→ 49.0 dBuV	
Antenna Factor	+7.5 dBuV	
Cable Loss	+2.0 dBuV	
Preamplifier	-25.5 dBuV	
	-16.0 dBuV →	-16.0 dBuV
Field Strength dBuV/m at 3 Meter =	→	33.0 dBuV

Radiated testing in the range of 1000 MHz to 2000 MHz was investigated with the spectrum (peak detector function) under the FCC regulation section 15.35 (b). The test performed at an antenna to EUT distance of three meters.

3.1.3 Diagram of Test Setup - per 2.1033(b)5



3.1.4 Radiated Emissions Compliance Data - table #1

The EUT was compliant with FCC part 15 class B radiated emissions requirements.

AOR LTD. EUT: AR8200B

Radiated Emissions Summary Test Data

Freq. (MHz)	Corrected signal (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Tune To Frequency
1419.60	49.9	54.0	-4.1	30 MHz
1419.70	48.9	54.0	-5.1	500 MHz
1419.80	48.5	54.0	-5.5	250 MHz
1004.98	47.7	54.0	-6.3	250 MHz
1419.70	47.6	54.0	-6.4	500 MHz
709.81	39.4	46.0	-6.6	30 MHz
1419.60	46.5	54.0	-7.5	30 MHz
709.81	38.3	46.0	-7.7	250 MHz
709.81	38.2	46.0	-7.8	500 MHz
1590.60	45.7	54.0	-8.3	750 MHz
1569.70	45.7	54.0	-8.3	30 MHz
1203.10	45.5	54.0	-8.5	959 MHz
1590.52	45.4	54.0	-8.6	600 MHz
1590.60	45.4	54.0	-8.6	959 MHz
1419.80	45.0	54.0	-9.0	250 MHz
1569.70	44.6	54.0	-9.4	30 MHz
1590.52	43.7	54.0	-10.3	600 MHz
1590.00	43.7	54.0	-10.3	959 MHz
1004.98	43.6	54.0	-10.4	250 MHz
1590.60	43.5	54.0	-10.5	750 MHz
709.80	34.8	46.0	-11.2	30 MHz
1203.10	42.4	54.0	-11.6	959 MHz
1567.20	41.8	54.0	-12.2	540 MHz
397.60	33.5	46.0	-12.5	540 MHz
397.60	33.5	46.0	-12.5	600 MHz
397.60	33.4	46.0	-12.6	750 MHz
709.81	32.7	46.0	-13.3	500 MHz
397.60	32.0	46.0	-14.0	540 MHz
397.60	32.0	46.0	-14.0	750 MHz
397.60	31.8	46.0	-14.2	600 MHz
397.60	31.6	46.0	-14.4	959 MHz
1567.20	38.2	54.0	-15.8	540 MHz
397.60	29.9	46.0	-16.1	959 MHz

- Reference Appendix A for all data taken.

3.1.5 Photograph of Radiated Test Setup - per 2.1033(b)(7)

AR8200B

Photo # 15 Front View - Radiated
Photo # 16 Rear View - Radiated

7.1 APPENDIX A: TEST DATA

RADIATED EMISSIONS
Location #2 FCC Part 15 Class B

Client: AOR
Date : 22-May-98

File # 86060-1
Engr.: WEST

Rep. : TAKA
System: SCANNING RECEVER AR 8200
Meas Type

Freq (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dBuV/m)	Total (dBuV/m)	3 Meter FCC Limit (dBuV/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/ Vert	HP/ R&S.	Ave QP Peak	Comments
709.81	34.8	26.1	8.2	22.5	4.6	39.4	46.0	-6.6	23	1.00	Hor/	R&S	QP	TUNE TO FREQ 30 MHZ RUN 20
709.81	33.7	26.1	8.2	22.5	4.6	38.3	46.0	-7.7	231	1.00	Hor/	R&S	QP	TUNE TO FREQ 250 MHZ RUN 21
709.81	33.6	26.1	8.2	22.5	4.6	38.2	46.0	-7.8	26	1.00	Hor/	R&S	QP	TUNE TO FREQ 500 MHZ RUN 22
709.80	30.2	26.1	8.2	22.5	4.6	34.8	46.0	-11.2	32	1.00	Vert	R&S	QP	TUNE TO FREQ 30 MHZ RUN 20
397.60	34.9	25.1	6.4	17.3	-1.4	33.5	46.0	-12.5	318	1.00	Vert	R&S	QP	TUNE TO FREQ 540 MHZ RUN 23
397.60	34.9	25.1	6.4	17.3	-1.4	33.5	46.0	-12.5	340	1.00	Vert	R&S	QP	TUNE TO FREQ 600MHZ RUN 24
397.60	34.8	25.1	6.4	17.3	-1.4	33.4	46.0	-12.6	315	1.00	Vert	R&S	QP	TUNE TO FREQ 750 MHZ RUN 25
709.81	28.1	26.1	8.2	22.5	4.6	32.7	46.0	-13.3	20	1.00	Vert	R&S	QP	TUNE TO FREQ 500 MHZ RUN 22
397.60	33.4	25.1	6.4	17.3	-1.4	32.0	46.0	-14.0	42	1.00	Hor/	R&S	QP	TUNE TO FREQ 540 MHZ RUN 23
397.60	33.4	25.1	6.4	17.3	-1.4	32.0	46.0	-14.0	35	1.00	Hor/	R&S	QP	TUNE TO FREQ 750 MHZ RUN 25
397.60	33.2	25.1	6.4	17.3	-1.4	31.8	46.0	-14.2	30	1.00	Hor/	R&S	QP	TUNE TO FREQ 600MHZ RUN 24
397.60	33.0	25.1	6.4	17.3	-1.4	31.6	46.0	-14.4	340	1.00	Vert	R&S	QP	TUNE TO FREQ 959 MHZ RUN 26
397.60	31.3	25.1	6.4	17.3	-1.4	29.9	46.0	-16.1	42	1.00	Hor/	R&S	QP	TUNE TO FREQ 959 MHZ RUN 26
709.81	18.2	26.1	8.2	22.5	4.6	22.8	46.0	-23.2	0-360	1.00	Vert	R&S	QP	TUNE TO FREQ 250 MHZ RUN 21 NOISE FLOOR

1100 E. Chalk Creek Rd.
Coalville, UT, 84017

Data not valid for report unless signed by DNB personnel

West

Phone (801) 336-4433
Fax (801) 336-4436

RADIATED EMISSIONS
Location #1 FCC Part 15 Class B

Client: AOR
Date : 22-May-98

File # 86060-1
Engr.: WEST

Rep. : TAKA NAKAYA
System: AR 8200

Freq (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dBuV/m)	Total (dBuV/m)	3 Meter FCC Limit (dBuV/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/ Vert	HP/ R&S	Meas Type Ave Peak	Comments
1419.600	47.5	25.7	3.2	24.9	2.4	49.9	54.0	-4.1	41	1.60	Hor/	HP/	AVE	TUNE TO FREQ 30 MHZ RUN 20
1419.700	46.4	25.7	3.2	24.9	2.4	48.9	54.0	-5.1	270	1.90	Hor/	HP/	Ave	TUNE TO FREQ 500 MHZ RUN 22
1419.800	46.1	25.7	3.2	24.9	2.4	48.5	54.0	-5.5	274	1.80	Hor/	HP/	Ave	TUNE TO FREQ 250 MHZ RUN 21
1004.980	43.5	21.8	2.7	23.3	4.2	47.7	54.0	-6.3	140	1.00	Vert	HP/	Ave	TUNE TO FREQ 250 MHZ RUN 21
1419.700	45.1	25.7	3.2	24.9	2.4	47.6	54.0	-6.4	34	1.00	Vert	HP/	Ave	TUNE TO FREQ 500 MHZ RUN 22
1419.600	44.0	25.7	3.2	24.9	2.4	46.5	54.0	-7.5	28	1.00	Vert	HP/	AVE	TUNE TO FREQ 30 MHZ RUN 20
1203.100	42.2	23.7	2.9	24.1	3.3	45.5	54.0	-8.5	42	3.60	Hor/	HP/	Ave	TUNE TO FREQ 959 MHZ RUN 26
1419.800	42.6	25.7	3.2	24.9	2.4	45.0	54.0	-9.0	307	1.00	Vert	HP/	Ave	TUNE TO FREQ 250 MHZ RUN 21
1569.700	42.1	26.4	3.3	25.7	2.6	44.6	54.0	-9.4	340	1.00	Vert	HP/	Ave	TUNE TO FREQ 30 MHZ RUN 20
1004.980	39.4	21.8	2.7	23.3	4.2	43.6	54.0	-10.4	55	2.00	Hor/	HP/	Ave	TUNE TO FREQ 250 MHZ RUN 21
1203.100	39.1	23.7	2.9	24.1	3.3	42.4	54.0	-11.6	30	1.00	Vert	HP/	Ave	TUNE TO FREQ 959 MHZ RUN 26
1567.200	39.2	26.4	3.3	25.7	2.6	41.8	54.0	-12.2	2	1.00	Vert	HP/	Ave	TUNE TO FREQ 540 MHZ RUN 23
1567.200	35.7	26.4	3.3	25.7	2.6	38.2	54.0	-15.8	353	1.30	Hor/	HP/	Ave	TUNE TO FREQ 540 MHZ RUN 23
1590.600	43.0	26.4	3.3	25.8	2.7	45.7	54.0	-8.3	0	1.00	Vert	HP/	Peak	TUNE TO FREQ 750 MHZ RUN 25
1569.700	43.1	26.4	3.3	25.7	2.6	45.7	54.0	-8.3	0	1.50	Hor/	HP/	Peak	TUNE TO FREQ 30 MHZ RUN 20
1590.520	42.7	26.4	3.3	25.8	2.7	45.4	54.0	-8.6	0	1.00	Vert	HP/	Peak	TUNE TO FREQ 600MHZ RUN 24
1590.600	42.6		3.3	25.8	29.2	71.8	54.0	17.8	10	1.00	Vert	HP/	Peak	TUNE TO FREQ 959 MHZ RUN 26
1590.520	41.0	26.4	3.3	25.8	2.7	43.7	54.0	-10.3	0-360	1.80	Hor/	HP/	Peak	TUNE TO FREQ 600 MHZRUN 24 NOISE FLOOR
1590.000	41.0	26.4	3.3	25.8	2.7	43.7	54.0	-10.3	0-360	2.00	Hor/	HP/	Peak	TUNE TO FREQ 959 MHZ RUN 26 NOISE FLOOR
1590.600	40.8	26.4	3.3	25.8	2.7	43.5	54.0	-10.5	0-360	2.00	Hor/	HP/	Peak	TUNE TO FREQ 750 MHZ RUN 25 NOISE FLOOR

1100 E. Chalk Creek Road.
Coalville Utah, 84017

Data not valid for report unless signed by DNB personnel

Phone (801) 336-4433
Fax (801) 336-4436

7.2 APPENDIX B: UNCERTAINTY TOLERANCE

UNCERTAINTY TOLERANCE

DNB Engineering's Utah Facility is within acceptable uncertainty tolerances per ANSI C63.4 (1992) sections 5.4.6.1 and 5.4.6.2 as well as CISPR 16-1(1993) Annex M, section M.2.

ANSI C63.4 (1992)

5.4.6.1 Site Attenuation. A measurement site shall be considered acceptable for radiated electromagnetic field measurements if the horizontal and vertical NSA derived from measurements, i.e., the "measured NSA," are within ±4 dB of the theoretical NSA (5.4.6.3) for an ideal site.

5.4.6.1 NSA Tolerance. The ±4 dB tolerance in 5.4.6.1 includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies. These errors are analyzed in ANSI C63.6-1988 [3], wherein it is shown that the performance of a well-built site contributes only 1 dB of the total allowable tolerance.

CISPR 16-1 (1993)

M.2 Error analysis

. . . The total estimated errors are the basis for the ±4 dB site acceptability criterion consisting of approximately 3 dB measurement uncertainty and an additional allowable 1 dB for site imperfections.

7.3 APPENDIX C: TEST SITE CERTIFICATION, CHALK CREEK EMI SITE - per 2.948(a)

SITE CHARACTERISTICS, CHALK CREEK EMI TEST SITE

General:

The DNB Engineering test facility is located in Chalk Creek Canyon near Coalville, Utah. Site characteristics were measured according to the procedures outlined in ANSI C63.4 (1992) "Characteristics of Open Field Test Site". The results of these characterizations indicate that the Chalk Creek site is an outstanding facility to perform accurate and repeatable EMI tests.

This facility has been FCC approved to perform class B certification testing since January, 1986. In October of 1996, according to the FCC requirement to re-apply every three years, the facility was recertified. Certification was granted for the 3, 10, and 30 meter positions for both ranges. Facility approval was granted by the FCC Oct. 15, 1996 under file number 31040/PRV 1300F2.

In July of 1997, **The American Association for Laboratory Accreditation**, **A2LA**, granted accreditation to this facility. Standards for which accreditation was granted: RF Emissions: ANSI C63.4 - 1992, FCC Part 15 subpart B and C, FCC Part 18 CISPR 11, CISPR 13, CISPR 14, CISPR 22, EN 55011, EN 55013, EN 55014, EN 55022, EN 60601-1-2, EN 50081-1, EN 50081-2, IEC 601-1-2; RF Immunity: EN 50082-1, EN 50082-2, Radiated Susceptibility: EN 61000-4-3, ENV 50140, ENV 50204, IEC 1000-4-3, IEC 801-3, ESD: EN 61000-4-2, IEC 1000-4-2, IEC 801-2, EFT: EN 61000-4-4, IEC 1000-4-4, IEC 801-4, Surge: EN 61000-4-5, ENV 50142, IEC 1000-4-5, IEC 801-5, Injected RF Immunity: EN 61000-4-6, ENV 50141, IEC 1000-4-6, IEC 801-6

In September,1994 the National Certified Testing/Competent/ Notified Body for Norway and Scandinavian Countries (NEMKO) approved this test facility. DNB now offers the testing required for the CE Mark. **NEMKO EMC Laboratory Authorization No.: ELA 131** Standards for which accreditation was granted: RF Emission: EN 55011, EN 55022, EN 50081-1, EN 50081-2; RF Immunity: EN 50082-1, EN 50082-2

In September, 1994, the New Zealand Ministry of Commerce certified that DNB ENGINEERING, INC. EMC facilities meet their laboratory approval criteria for EMC testing and placed DNB ENGINEERING on their list of Ministry-Approved laboratories.

In August, 1995, VCCI certified that the Chalk Creek facility was acceptable to perform EMI test according to VCCI requirements. The certificate number is 715.

Ambient Emissions

Ambient emission measurements were made to determine the level of the ambient emanations at the DNB test facility. The results indicate that all ambient signals are below the FCC, and VCCI radiated emission limits or that each can easily be identified as an ambient signal.

7.4 APPENDIX D: EMC INSTRUMENTATION AND MEASUREMENT EQUIPMENT

All test equipment is calibrated by a certified metrology facility using standards traceable to NIST.

Each instrument is calibrated annually or more frequently if required.

Test Equipment for Emissions

Description	Manufacturer	Model	Serial	CalDue
Antenna Mast, site 2 (30m)	AH Systems	AMSC-6	2159-4C	
Plotter	HP	7475A	2517A20261	
Printer	HP	2671G	2520A31080	
PRE Amp (30m)	HP	8447D	2727A06182	3/4/99
PRE Amp (3,10m)	HP	8447D	2727A06180	6/20/98
CISPR Adapter site 2	HP	85650A	2043A00277	8/7/98
Computer desk top site 1	HP	9826A	2439A09175	
Spectrum Analyzer site 2	HP	8568B	1721A00113	8/7/98
Receiver site 2	R&S	ESH3	872842/045	1/27/99
Receiver site 2	R&S	ESVP	882402/005	1/27/99
Spectrum Monitor site 2	R&S site 1	EZM(3)	880 087/038	
Log Periodic Antenna site 2	SCH	UHAL09107	91071004(L10)	10/24/98
LISN	SCH	NSLK 8126	142	10/24/98
LISN	SCH	NNLA 8120	301	10/24/98
Bicon Antenna	AH SYS	SAS-200/543	183	
Log Periodic Antenna	AH SYS	SAS-200/512	322	
Horn Antenna, Double Rdg Gd	AH SYS	SAS-200/571	222	6/24/98
Horn Antenna	AR	AT4000	10801	
Antenna Mast, site 1(30m outside)	DNB	2159-2	AMS6	
Antenna Mast, site 1(10m inside)	EMCO 1	1050*	1236a	
Antenna Mast, site 1(3m inside)	EMCO1	1050*	1236b	
Printer	HP	2671G	2520A31883	
Computer desk top	HP	9826A	231A05633	
PRE Amp (3m)	HP	8447D	2727A06191	6/18/98
PRE Amp (30m) site 1	HP	8447D	2727A06181	6/20/98
CISPR Adapter site 1 (ref. only)	HP	85650A	2043A00124	10/24/98
Plotter	HP	7475A	2325A64445	
Spectrum Analyzer site 1	HP	8566B	2421A00516	10/24/98
RF/Preselector site 1 (ref. only)	HP	85685A	2724A00659	10/24/98
PRE Amp. (10m)	HP	8447D	2727A06184	6/18/98
Amplifier	Mini-Circuits	ZHL-1042J	N111496-6	
Amplifier (2-20 GHz, 22dB gain)	MITEQ	AFS6-02002000-18O-MP	428738	6/6/98
Receiver site 1	R&S	ESH3	882399/025	6/19/98
Spectrum Monitor site 1	R&S	EZM(3)	880 487/037	
Receiver site 1	R&S	ESVP	879807/048	6/19/98
LISN	SCH	NNLK 8121	218	10/23/98
Biconical Antenna site 1	SCH	BBA1906	13	10/24/98
Log Periodic Antenna	SCH	UJALP9107	2C	
LISN	SCH	NNLK 8121	156	10/23/98
Antenna Mast site 1 port. (10m outside)	Unisys	U-258	CC-300-5023	

7.5 APPENDIX E: INFORMATION SUPPLIED TO APPLICANT

INFORMATION PERTAINING TO EQUIPMENT MANUFACTURED AFTER COMPLIANCE TESTING

It is prudent that manufacturers have an established Quality Assurance program to spot check their products on a periodic basis, either based upon time or quantities produced. Obviously, a change in the engineering design should be sufficient justification for a re-test.

The Quality assurance test need not be formal Verification or Certification such as required during the initial production of the product. However, it should be sufficient in scope to assure that the EMI characteristics of the product have not changed to the degree that the product exceeds the FCC limits. If a new model of a product is produced, it must undergo full Verification or Certification testing and, in case of Certification, be filed with the FCC.

It is expected that the FCC will place greater emphasis and resources in spot checking commercially available products. If a product is found not to be compliant with the Limits specified in Part 15, Subpart B. the manufacturer will be subject to the appropriate penalties imposed by the Commission. The initial Certification or Verification is sufficient to justify initial production. The additional quality assurance testing performed is the manufacturer's responsibility to assure continued compliance.

(801) 336-4433
(800) 887-4433 (Utah Only)
FAX (801) 336-4436

DNB ENGINEERING, INC.
CHALK CREEK TEST FACILITY
1100 E. CHALK CREEK ROAD
COALVILLE, UT 84017

CERTIFICATION

OF

AGENCY AGREEMENT

I appoint RICK LINFORD of DNB ENGINEERING, INC. to act as agent for our organization in the preparation of applications, including the signing thereof, to make representations to the FEDERAL COMMUNICATIONS COMMISSION on our behalf and to receive and exchange data between the two parties:

FEDERAL COMMUNICATIONS COMMISSION

and

AOR Ltd.

It is further understood that all information supplied to DNB ENGINEERING, INC. as representations of our company, i.e. FCC ID labels, schematics, instruction manuals, etc., will continue to comply in production; that each unit manufactured, imported or marketed, as defined in the Commissions regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis; will comply with the FEDERAL COMMUNICATIONS COMMISSION requirements.

Dated this 1 day of MAY, 1998.

Agency Agreement expiration date: April 30, 2001.

By: Shigeru Takano
Signature

Shigeru Takano
Printed

Title: President Telephone: 011-81-3-3865-1695

Applicant AOR Ltd.

2-6-4, Misuji, Taito-ku

Tokyo, 111-0055, Japan
(complete address)