DNB ENGINEERING, INC.

CERTIFICATION
FOR
INTENTIONAL RADIATOR

Per
Part 15 Subpart C
(CFR 47, 15,203, 15.249 & 15.209)

EUT: RCT 200
Model No. RCT 200

PREPARED FOR APPLICANT:
Remtron
1916 W. Mission Rd
Escondido, CA 92029-1114

REPORT #06049-1
Test Date: 2/10/00

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

Revision Letter	Number of Pages	Page No. of Rev.	Description	Date
A	31		Document Release	02/16/2000

TRANSMITTAL SUMMARY

Unit tested:	RCT 200
Model #:	RCT 200
FCC ID:	EGTRCT200A
Specifications:	ANSI C63.4 1992 and CFR 47 FCC part 15 Subpart C
Purpose of Report:	This report was prepared to document the status of the RCT 200 with requirements of the standards listed above.
Requirements not applicable to EUT	Part 15.37 - Not applicable Emergency Broadcast System - Not applicable Spread Spectrum Exhibit - Not applicable Scanning Receiver - Not applicable
Test Summary	The EUT's compliance status according to the tests performed is as follows.

Refer to Section 1.3

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 to do these tests by the American Association for Laboratory Accreditation, A2LA.

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:	RCT 200
Model #:	RCT 200
FCC ID#:	EGTRCT200A
Dates of Test:	2/10/00

Test Performed: _____ _____
Clay Allred — Date
Test Engineer

Test Report Reviewed: _____ _____
Bryan C. Broaddus — Date
Senior Vice President/Operations

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: Remtron
1916 W. Mission Rd
Escondido, CA 92029-1114

Contact: John Schooley
Phone: (619) 737-7800

Dates of Test: 2/10/00

Equipment Under Test (EUT): RCT 200 433 MHz
FCC ID: EGTRCT200A

1.2 Related Submittals/Grants

None.

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
FCC part 15 Subpart C	
per 15.249 & 15.209	COMPLIANT

2. TEST DESCRIPTION

2.1 Test Configuration

Config-uration	Unit Name - Processor, Monitor, Printer, Cable, etc. (indent for features of a unit)	Style/Model/ Part No.	Serial Number	Obj. of test	9V	Comments/ FCC ID#
A	RCT 200	RCT 200		■	■	EGTRCT200A
	PCB	RCT 204	0003-114	■		

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

2.2 Equipment Description

The RCT 200 is a digital remote control system. It is housed in a plastic case with membrane switches for control inputs.

2.2.1 Mode of Operation

The RCT 200 was tested by placing the EUT flat on a table and rotating it. A Jumper was installed to enable continuous transmission. A fresh battery was used for final measurements.

2.3 Antenna Requirement – per 15.203

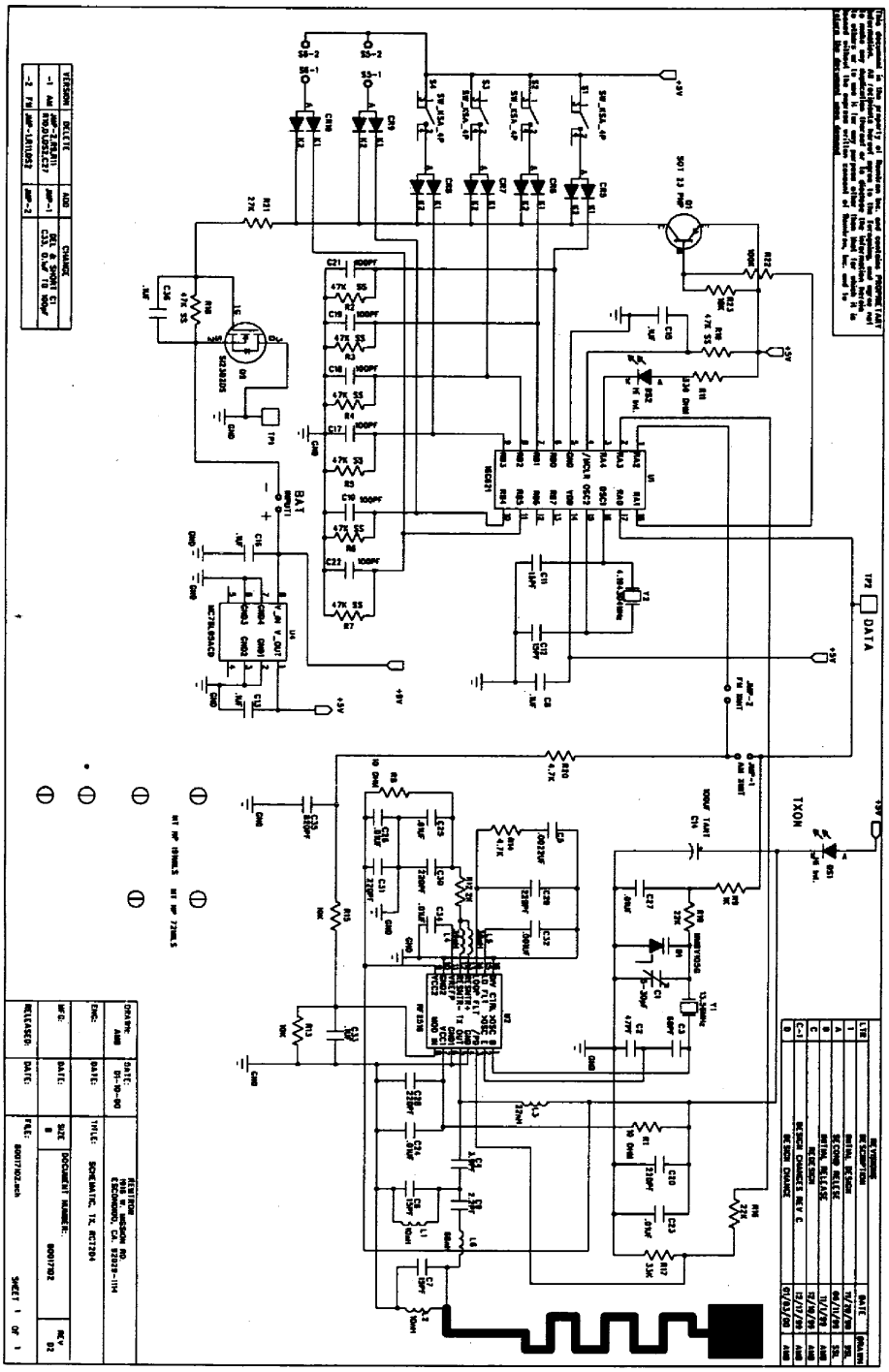
The antenna is Internally fixed.

2.4 Circuit Description – per 2.1033(b)4

The RCT200 Transmitter signal format consists of an Amplitude Shift Key (ASK) signal that carries a 24 bit address, 8 data bits and verified through a 16 bit CRC check word. Data is transmitted using Manchester format at a 4800 baud rate. The address is permanently programmed into the transmitter at the factory and cannot be modified.

2.5 Schematics

RCT 200



PDF File. See the attachment that was electronically submitted.

2.6 Photograph of EUT – per 2.1033(b)(7)

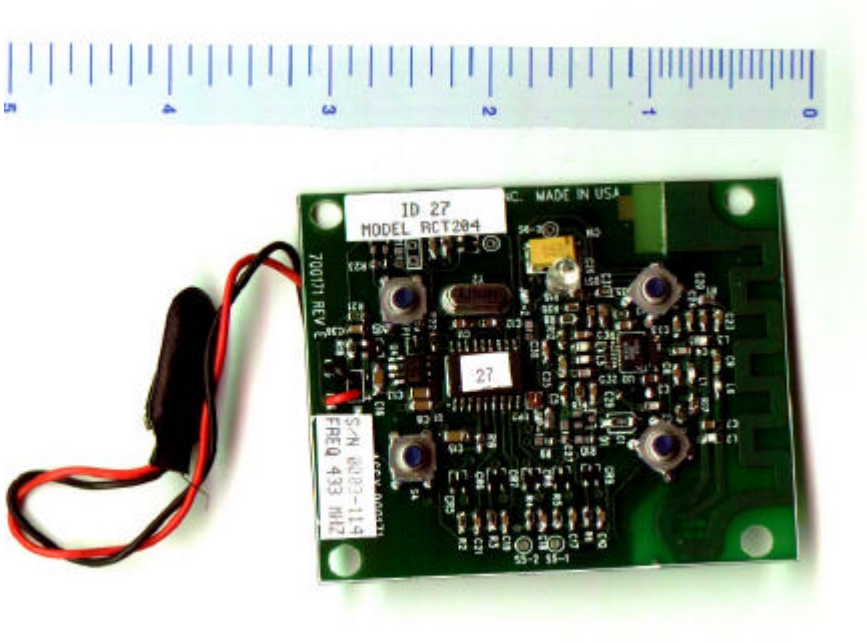
RCT 200
Front and Back View

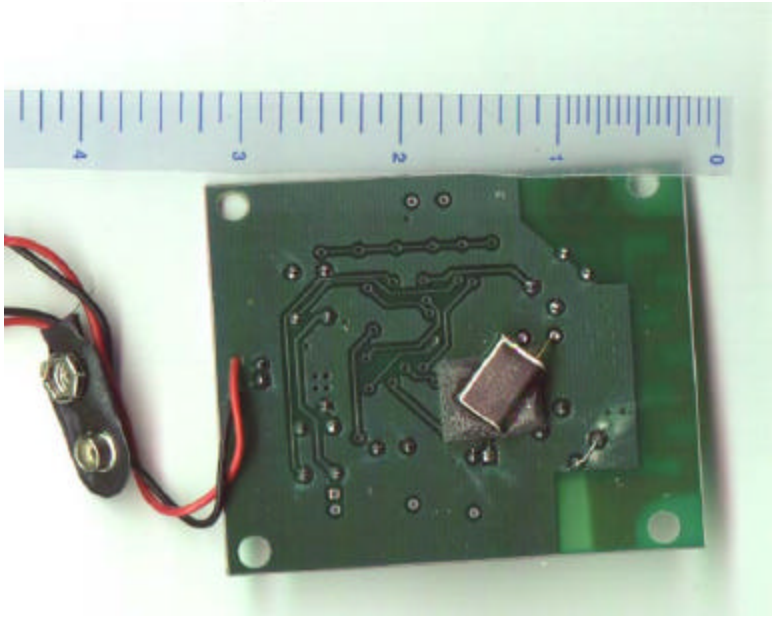
PDF File. See the attachment that was electronically submitted.

2.7 Photograph of EUT – per 2.1033(b)(7)

RCT 200

Photograph of PCB Internals Front and Back





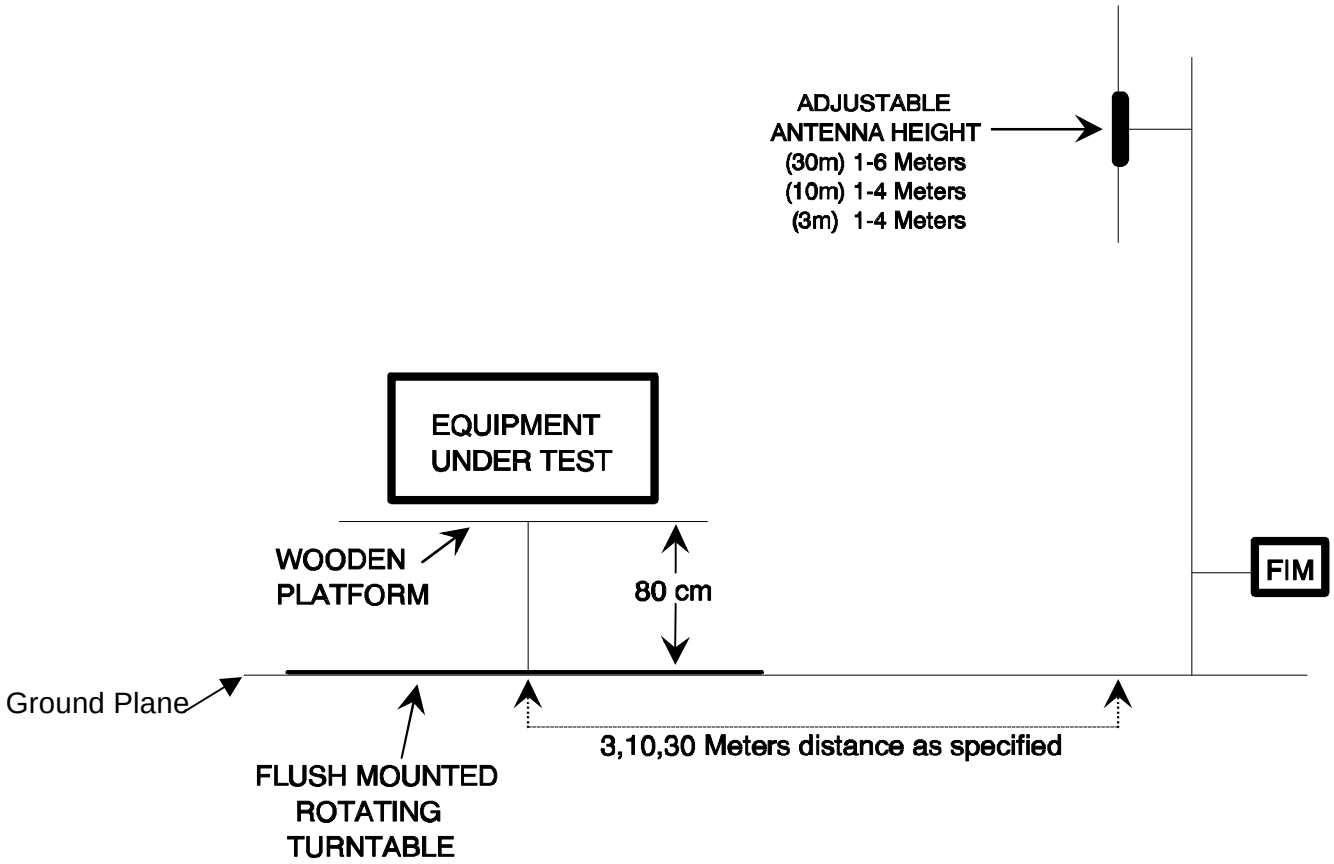
3. EMISSIONS FCC PART 15

Per FCC part 15 Subpart C

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 3.1.1.1. 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 2.2.1 is then started.

The spectrum analyzer is setup to store the peak emission over the frequency range of the antenna. Peak EUT and ambient emissions are stored while the turntable is rotated 360^0. The 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 detector 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 emissions 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. 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 to 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 - contd.

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

The Following FCC limits for acceptance were used:

Limit 902 to 928 MHz (At the Carrier Frequency):
50,000 μV/M = 20 log (50,000) dBμV/M = 94.0 dBμV/M @ 3 Meters

Limit 88 to 216 MHz (Not at the Carrier Frequency):
150 μV/M = 20 log (150) dBμV/M = 43.5 dBμV/M @ 3 Meters

Limit 30 to 88 MHz:
100 μV/M = 20 log (100) dBμV/M = 40.0 dBμV/M @ 3 Meters

Limit >960 MHz:

500μV/M = 20 log (500) dBμV/M = 54.0 dBμV/M @ 3 Meters

3.1.3 Radiated Emissions

RADIATED EMISSIONS
FCC Part 15, Sub-part C (15.209)

File # 06049-1 Engr.: Clay/Yancey/Bryan Date : Feb 11, 2000
Site : 2 Distance 3 meter Cables 2.2
Bicon: 187 Log: 10 Amp 1 : 67

Freq. (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dBuV/m)	Total (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (degree)	Height (m)	Hor/ Vert	HP/ R&S	Meas Type Ave QP Peak	Comments
433.912	79.5	26.5	6.9	18.2	-1.4	78.10	80.0	-1.90	360	1	Vert	R&S	QP	Run 1 fundimental frequincey
433.912	65.3	26.5	6.9	18.2	-1.4	63.90	80.0	-16.10	360	1	Vert	R&S	Ave	Run 1 fundimental frequincey
867.842	29.8	26.8	10.8	24.5	8.5	38.30	60.0	-21.70	0	1	Vert	R&S	QP	Run 1 Harmonics
1301.736	41.5	24.2		23.8	-0.4	41.10	60.0	-18.90	0	1	Vert	HP/	Peak	Run 1 Harmonics
1735.648	49.4	24.7		27.5	2.8	52.20	60.0	-7.80	0	1	Vert	HP/	Peak	Run 1 Harmonics
2169.560	40.3	24.4		28.6	4.3	44.55	60.0	-15.45	0	1	Vert	HP/	Peak	Run 1 Harmonics
2603.472	36.4	25.5		30.0	4.5	40.90	60.0	-19.10	0	1	Vert	HP/	Peak	Run 1 Harmonics
3037.384	42.2	25.6		30.4	4.9	47.05	60.0	-12.95	0	1	Vert	HP/	Peak	Run 1 Harmonics
3471.296	40.6	27.0		31.3	4.3	44.90	60.0	-15.10	0	1	Vert	HP/	Peak	Run 1 Harmonics
3905.208	39.1	26.2		31.4	5.3	44.35	60.0	-15.65	0	1	Vert	HP/	Peak	Run 1 Harmonics
4339.120	37.6	27.1		32.1	5.0	42.60	60.0	-17.40	0	1	Vert	HP/	Peak	Run 1 Harmonics

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

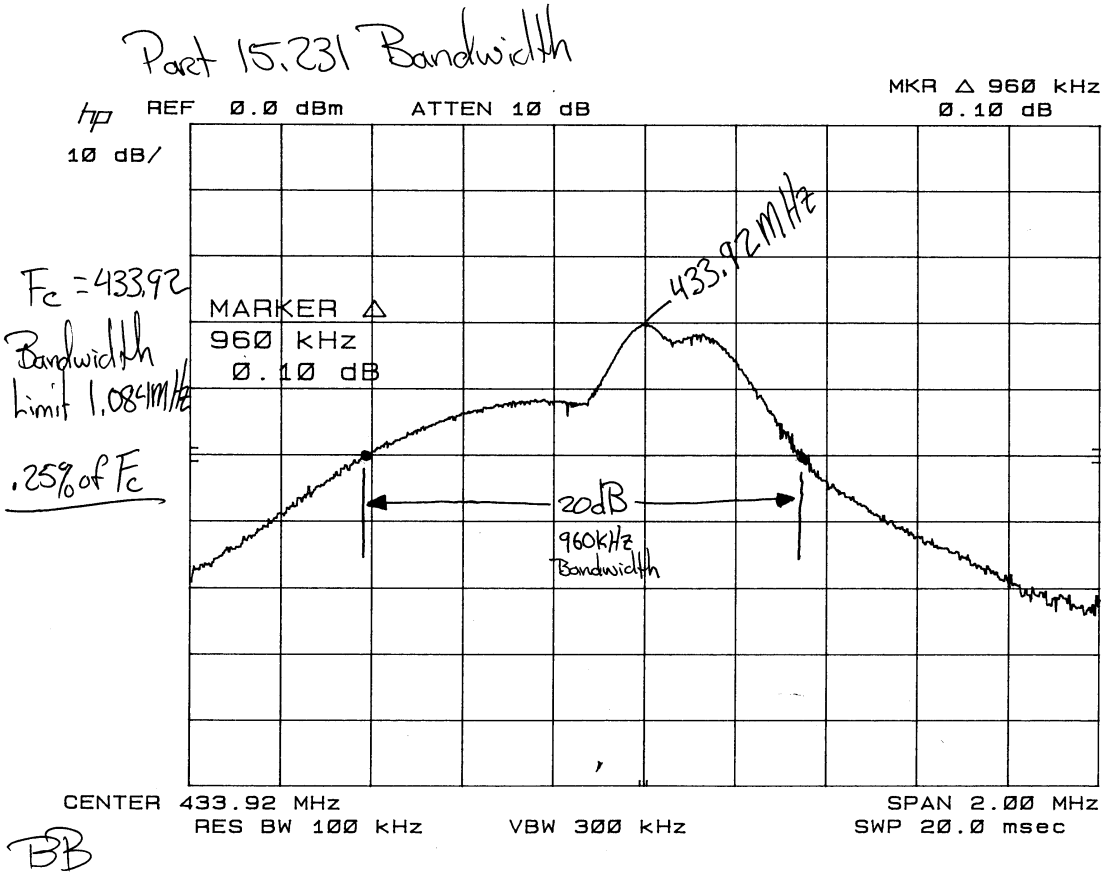
Data not valid for report unless signed by DNB personnel

Phone (435) 336-4433
Fax (435) 336-4436

3.1.2.1 Occupied Bandwidth

The occupied bandwidth at the transceiver's fundamental frequency output was measured using a HP8568B spectrum analyzer. The spectrum analyzer was adjusted as follows:

Frequency: 433.92 MHz	Resolution Bandwidth: 100 kHz
Input Attenuation: 10dB	Reference Level: 0.0 dBm
Scan Width: 2.00 MHz	Detector: Peak
Vertical Scale: 10 dB/div	Max Hold Multiple Sweeps



PDF File. See the attachment that was electronically submitted.

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

RCT 200
Front View

PDF File. See the attachment that was electronically submitted.

4. LABELING REQUIREMENTS - PER 2.1033(B)(7)

Label will be constructed of 0.02 inch plastic attached as shown on the equipment with permanent adhesive.

All information on the label will be etched or screened. All methods will exceed the expected lifetime of the equipment.

The label will be large enough to allow all information to be readily legible.

4.1 Additional Label Required

This device complies with Part 15 of the FCC Rules. Operation is subject to the following tow conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Shown above is a copy of the label with the Part 15.19 Compliance Statement, Location of required information is checked “below”.

☐ The label will be placed in a conspicuous location on the device.

☐ The device is too small for a compliance label. Therefore the label will be placed in a prominent location in the Instruction Manual or other information supplied to the user.

☐ The device is too small for a compliance label. The label will be placed on the container in which the device will be marketed.

4.2 Photograph of Label Placement and Contents

PDF File. See the attachment that was electronically submitted.

5. BLOCK DIAGRAM

PDF File. See the attachment that was electronically submitted.

6. OWNERS MANUAL

PDF File. See the attachment that was electronically submitted.

7. APPENDIX SECTION

7.1 APPENDIX A: TEST DATA

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

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. According to the FCC requirement to re-apply every three years, the facility was rectified. Certification was granted for the 3, 10, and 30 meter positions for both ranges. Facility approval was granted by the FCC Feb 2, 2000 under file number Registration number 90532.

In August of 1999, **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 Magnetic EN 61000-4-8, Power Quality EN 61000-4-11, Harmonic EN 61000-3-2, Flicker EN 61000-3-3, Electric Strength Testing EN 60065(A1,A2,A3,),EN 61010-1, EN 60601-1-1, EN 60065, IEC 950, (Hi Pot) IEC 1010, IEC 601-1, IEC 65, IEC 335XX, Leakage EN 60950, EN 60601-1-1, Temperature Rise, Electric Strength Testing EN 60065(A1,A2,A3,),EN 61010-1, EN 60601-1-1, EN 60065, IEC 950, IEC 1010, IEC 601-1, IEC 65, IEC 335XX, Ground Bonding EN 61010-1, EN 60950, (A1,A2,A3,),EN 60601-1-1, EN 60065, IEC 1010, IEC 950, IEC 601-1, IEC 65, IEC 335XX, Humidity Conditioning EN 61010-1, EN 60950, (A1,A2,A3,),EN 60601-1-1, EN 60065, IEC 1010, IEC 950, IEC 601-1, IEC 65, IEC 335XX, Surges to Antenna or Mains EN 60065, IEC 65

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 June of 1999, 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 are 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

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.