DNB ENGINEERING, INC.

CERTIFICATION
FOR
INTENTIONAL RADIATOR

Per
Part 15 Subpart C
(CFR 47, 15,201, - 15.209 &15.231)

EUT: Transponder (418.0 MHz)
Model No. Impulse Tag
418.0 MHz

PREPARED FOR APPLICANT:
Elite
25741 Commercentre Dr.
Lake Forest, CA 92630
949-580-1700

REPORT #06036-1
Test Date: 12/17/99

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	32		Document Release	1/12/00

TRANSMITTAL SUMMARY

Unit tested:	Transponder (418.0 MHz)
Model #:	Impulse Tag
FCC ID:	NIFAT1K
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 Transponder (418.0 MHz) 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.

REQUIREMENTS	STATUS
FCC part 15 Subpart C	
per 15.201-, 15.209 & 15.231	COMPLIANT

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. The American Association has evaluated DNB Engineering to do these tests 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:	Transponder (418.0 MHz)
Model #:	IMPULSE TAG
FCC ID#:	NIFAT1K
Dates of Test:	12/17/99

Test Performed: _____ _____
Yancey Staples — Date
Test Technician

Test Report Reviewed: _____ _____
Rick Linford — Date
Facility Manager
Regulatory Engineer

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: **Elite**
25741 Commercentre Dr.
Lake Forest, CA 92630

Contact: Daniel Perez
Phone: (949)580-1700

Dates of Test: 12/17/99

Equipment Under Test (EUT): Transponder (418.0 MHz)
FCC ID: NIFAT1K

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 15.201- 15.209 &15.231	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	VAC	Comments/ FCC ID#
A	Transponder (418.0 MHz)	IMPULSE TAG		■	3 vdc	NIFAT1K

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

2.2 Equipment Description

The Elite Impulse Tag Transponder (418.0 MHz) is a Active transponder for the use with an Elite Impulse Access System or elite entry phone for an apartment building, gated community or like.

2.3 Mode of Operation

Hard wired to transmit continuously powered by 3V-button lithium battery**.** EUT was placed in three orthogonal positions to determine worst case emissions. Fresh batteries were for final measurements.

2.4 Antenna Requirement - per 15.203

The antenna is internally fixed. - - - -

2.5 Circuit Description - per 2.1033(b)4

PDF File is sent separately and is confidential.

2.6 Schematics

PDF File is sent separately and is confidential.

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

Transponder (418.0 MHz) Front and Back View

Internal Photos

PDF File. See the attachment that was electronically submitted.

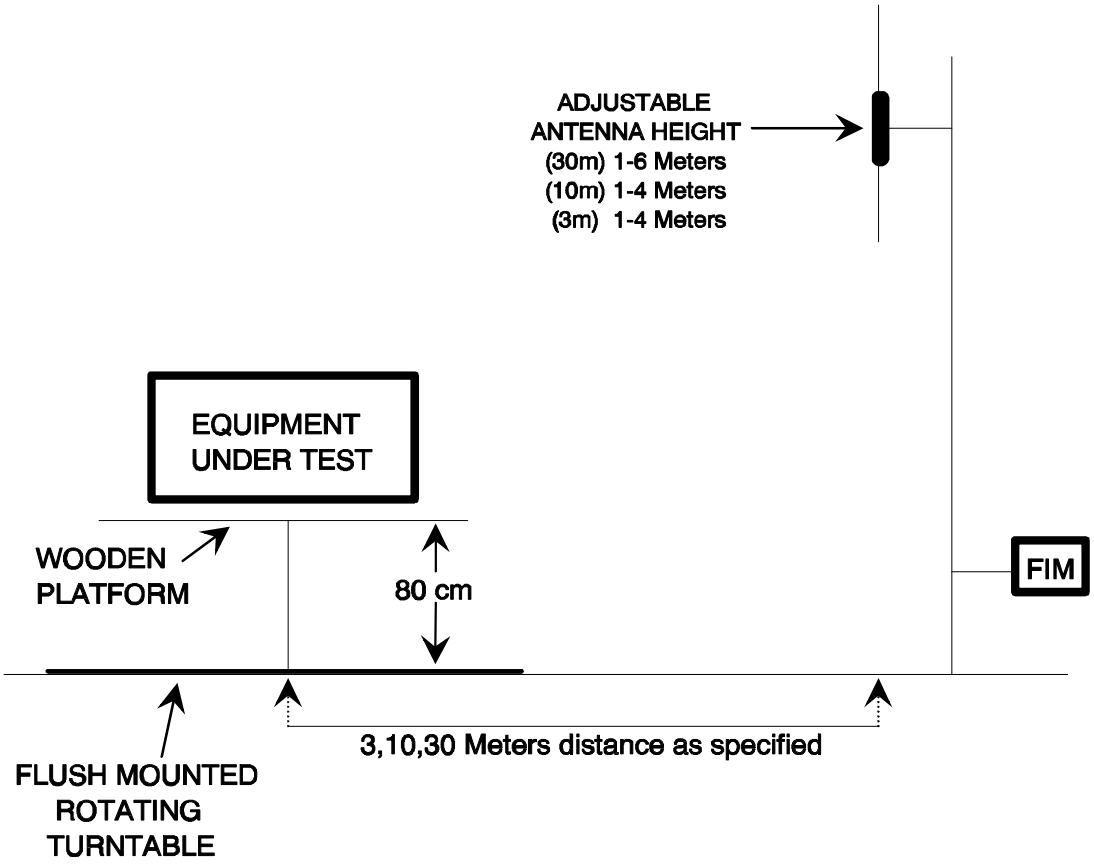
3. EMISSIONS FCC PART 15

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 turntable 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 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. Ambience 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 - 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 Field Strength of Fundamental

Per FCC part 15, Subpart C 15.231(b) at 3 meters

Elite EUT: Transponder Tuned to 418.00 MHz

Freq. (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Duty Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dB)	Corrected signal (dBuV/m)	Limit (dBuV/m)	Delta (dB)
418.000	83.0	26.3	-1.6	17.9	-10.0	73.00	80.3	-7.30

- Reference Appendix A for all data taken.

Duty cycle correction was determined by counting the number of pulses on over a 100 ms period.
The following calculation was applied.

		Time in ms	
Pulse Train Cycle Time		37	
Number of long pulses	13	3.744	
Number of Short pulses	16	10.4	
Total on Time per cycle		14.144	
Number of Cycles per 100 ms	2.702703		
Total on time per 100 ms		38.22703	
Percent on per 100 ms			38.2%
Total duty cycle correction in dB		-8.4	

3.1.4 Harmonics Radiated Emissions

Per FCC part 15, Subpart C 15.231(b) at 3 meters

Elite EUT: Transponder Tuned to 418.00 MHz

Freq. (MHz)	Meas'd (dBuV)	Amp Factors (dB)	Duty Cable Factors (dB)	Antenna Factors (dB)	Total Factors (dB)	Corrected signal (dBuV/m)	Limit (dBuV/m)	Delta (dB)
2090.10	42.3	24.5	-4.8	28.7	-0.6	**41.7**	60.3	**-18.6**
1254.16	45.3	22.7	-5.4	24.3	-3.9	**41.4**	60.3	**-18.9**
1672.02	41.3	25.0	-5.0	26.4	-3.7	**37.6**	60.3	**-22.7**

- Highest frequencies relative to the Limit.
- Reference Appendix A for all data taken.
- Duty Cable factors include the duty cycle of 8.4 dB (Calculation shown in report) and cables.

3.1.5 Spurious Emissions not associated with Fundamental.

Per FCC part 15, Subpart C, 15.209 at 3 meters

No Emissions were detected.

3.1.6 Occupied Bandwidth.

Per FCC part 15, Subpart C 15.231(c)

The occupied bandwidth at the transmitter fundamental frequency output was measured using a HP8568B Spectrum Analyzer.

The spectrum analyzer was adjusted as follows:

Frequency: 418.0 MHz
Input Attenuation: 10 dB
Scan Width: 0.2 MHz/div
Vertical Scale: 10 dB/div

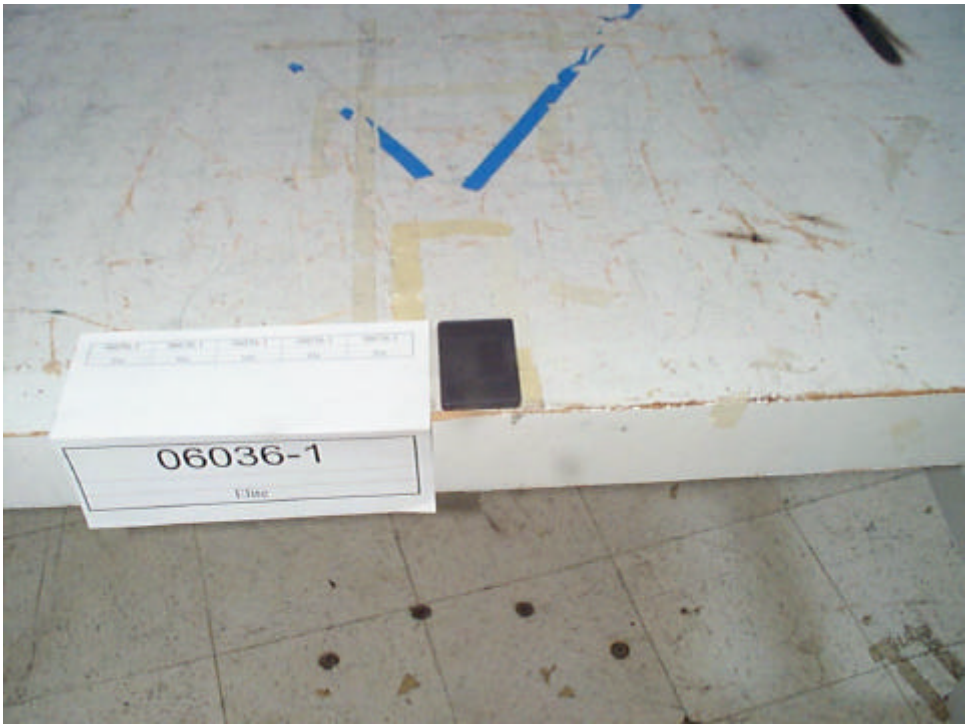
Resolution Bandwidth: 10 kHz
Reference Level: 82.1 dBµV
Detector: Peak

Bandwidth	dB Delta from Peak
Center Frequency plus 0.125%.	> 45 dB
Center Frequency minus 0.125%.	> 45 dB

Reference: plotted data in appendix.

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

Transponder (418.0 MHz)



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

Picture of EUT was scanned and picture enhanced due to Label being imprinted on unit.

PDF File. See the attachment that was electronically submitted.

5. SCHEMATIC DIAGRAMS

Schematic information is Confidential and will be submitted separately.

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

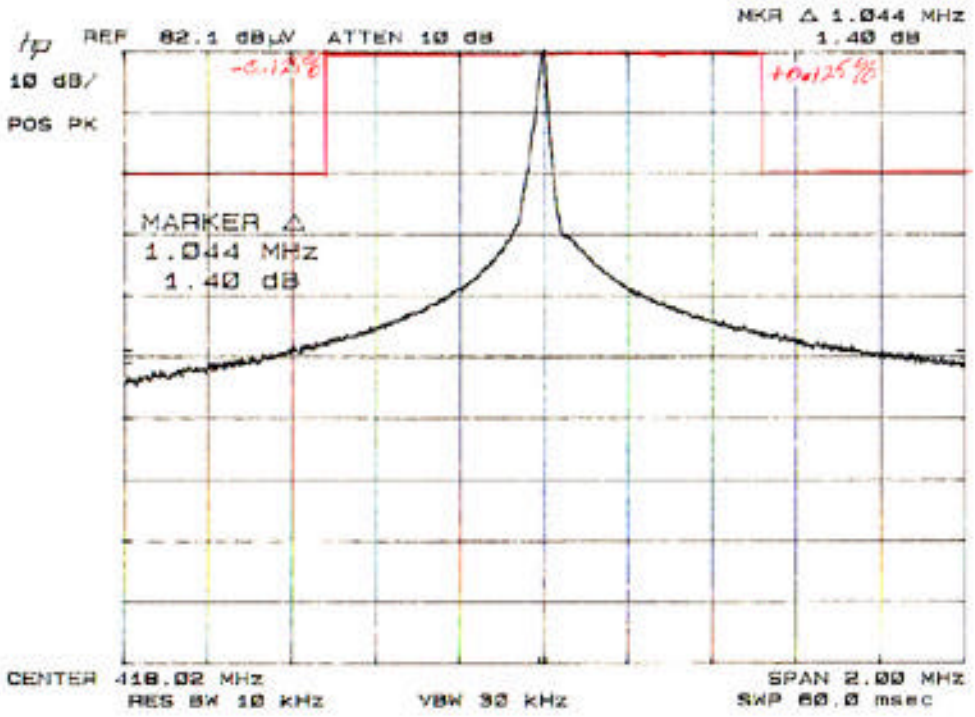
1.0 GHz to 10.0 GHz Emissions

Using an HP8566B with the Quasi-peak detector bypassed a HP low noise preamplifier, and a high frequency antenna, signals between 1.0 GHz and 10 GHz were analyzed. The Spectrum Analyzer settings were as follows:

Start Frequency..... 1.00 GHz
Stop Frequency..... 10.0 GHz
Resolution Bandwidth ..... 1 MHz
Video Bandwidth ..... 3 MHz
Sweep Time ..... 20 msec
Reference ..... 46.0 dBµV
RF Attenuation ..... 10 dB

There we signals measured between 1.0 GHz and 10.0 GHz down to the Spectrum analyzer's noise floor.

Occupied Bandwidth



Radiated Emissions Unintentional Radiators Worksheet

Project # 06036-1 Covering Run #s or dates: 12-20-1999

Procedure Used: ☒ ANSI C63.4 (1992), ☐ EN 55022 (1994), ☐ CISPR 22 (1997), ☐ EN 55011 (1992), ☐ MP 5, ☐ Other

Radiated Limits Applied:
☐ EN 55022 (1994) With A1 and A2 (B), ☐ EN 50081-1, ☐ VCCI (B), ☐ EN 55022 (1998)(B), ☐ CNS 13438 (1997)(B)
☐ EN 55011 (1991) (B), ☐ CFR 47, 15.109(a) (B), ☐ CFR 47, 15.109(g), CISPR 22 Limits (B)
☐ EN 55022 (1994) With A1 and A2 (A), ☐ EN 50081-2, ☐ VCCI (A), ☐ EN 55022 (1998)(A), ☐ CNS 13438 (1997)(A)
☐ EN 55011 (1991) (A), ☐ CFR 47, 15.109(b), (A), ☐ CFR 47, 15.109(g),CISPR 22 (A)
☒ Other 47 CFR PART 15 Subpart C 15.201-15.209 &15.231

Input Power ☐ As shown on configuration table Section ???, ☒ Other 3vdc

Location: Site ☐1, ☒ 2, Antenna Distance ☒ 3 m, ☐10 m, ☐10m in, ☐ 30 m,

Test Equipment used

Description	Manufacturer /Model	Asset	Serial	Calibration Due	Pre/Final Compliance	Notes
Amplifier	HP/8447D	067	2727A06182	26FEB00	☒/☒	
Amplifier	HP/8447D	065	2727A06180	26FEB00	☐/☐	
Amplifier	HP/8447D	069	2727A06191	18JUN00	☐/☐	
Amplifier	HP/8447D	066	2727A06181	26FEB00	☐/☐	
Amplifier	HP/8447D	068	2727A06184	26FEB00	☐/☐	
Amplifier	Miteq/AFS6-02002000-180-MP	U-162	428738		☐/☒	
Bicon Antenna	SCH/BBA9106	187	6	10AUG00	☐/☒	
Bicon Antenna	SCH/BBA9106	186	7	6AUG00	☐/☐	
Log P Antenna	SCH/UJALP9107	011	11	6AUG00	☐/☐	
Log P Antenna	SCH/UHAL09107	010	10	17AUG00	☐/☒	
Loop Antenna	R&S/HFH 2-Z2	173	880665/-40	4JUN00	☐/☐	
QP Adapter	HP/85650 A	002	2043A00277	28SEP00	☒/☐	
QP Adapter	HP/85650 A	001	2043A00124	19OCT00	☐/☐	
Receiver	R&S/ESVP	078	879807/048	4SEP00	☐/☐	
Receiver	R&S/ESVP	083	882402/005	02NOV00	☐/☐	
RF Preselector	85685A	070	2724A00659	18OCT00	☐/☐	
Spectrum Analyzer	HP/8568B	003A	17221A00113	18OCT00	☐/☐	
Spectrum Analyzer	HP/8566B	138A	2421A00516	18AUG00	☒/☒	
					☐/☐	
					☐/☐	
					☐/☐	

Photographs: ☐ Showing arrangement for maximum emission Number of photographs taken:

Deviation from procedures or limits as checked above:

☐ Deviation approved by applicant and DNB

Modifications to EUT to gain compliance: :

Attachments: ☐ Signed table of frequencies ☐ Worksheet page 2(used only if more information is required.)

Temperature: ····· 17 °C | Humidity: ····· 31 % | Barometric: ····· 824 mbar

Other Notes:

DNB Engineering, Inc | 436-336-4433 | Report Page # ????
1100 E. Chalk Creek Rd. | 435-336-4436 | Worksheet page # 1
Coalville, UT 84017 | In Utah 800-887-4433 | RE (12NOV99)

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 were 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 are calibrated by a certified metrology facility using standards traceable to NIST.

Each instrument is calibrated annually or more frequently if required.

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.