



Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Com-Net Ericsson Critical Radio Systems, Inc.
1 Mountain View Road
Room 2725
Lynchburg, VA 24502
804-592-6202 (Michael Fulk)

MODEL: UHF-M SPLIT 450-488 MHz PANTHER 300M

FCC ID: OWDTR-0005-A

August 2, 2000

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	§15.109: RADIATED EMISSIONS LIMITS
PART 22: 1998	PUBLIC MOBILE SERVICES
PART 74: 1998	LOW POWER AUXILIARY STATION
PART 80 (E): 1998	STATION IN THE MARITIME SERVICES
PART 90: 1998	PRIVATE LAND MOBILE RADIO SERVICES
PART 95 (A): 1998	GENERAL MOBILE RADIO SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 1992	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992
RSS-119, Issue 5: 1996	LAND MOBILE AND FIXED RADIO TRANSMITTERS AND RECEIVERS.27.41 TO 960.0 MHz

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
22, 74, 80 (E), 90, 95 (A)	450-488 MHz	20	2.5 ppm	11K0F3E
22, 74, 80 (E), 90, 95 (A)	450-488 MHz	20	2.5 ppm	16K0F3E
22, 74, 80 (E), 90, 95 (A)	450-488 MHz	40	2.5 ppm	11K0F3E
22, 74, 80 (E), 90, 95 (A)	450-488 MHz	40	2.5 ppm	16K0F3E
Canadian	Frequency Range	Output Power (W)	Freq. Tolerance	
RSS-119	450-488 MHz	30	2.5 ppm	

REPORT PREPARED BY:

EMI Technician: Daniel Baltzell
Administrative Writer: Melissa Fleming

Document Number: 2000279

No part of this report may be reproduced without the full written approval of Rhein Tech Laboratories, Inc.

360 Herndon Parkway, Suite 1400
Herndon, VA 20170
Phone: 703-689-0368; Fax: 703-689-2056; Metro: 703-471-6441



COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHz PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

TABLE OF CONTENTS

1.0	GENERAL INFORMATION.....	4
1.1	TEST FACILITY	4
1.2	RELATED SUBMITTAL(S)/GRANT(S)	4
1.3	CONFORMANCE STATEMENT.....	5
3.6	CONFORMANCE STATEMENT.....	5
1.4	TESTED SYSTEM DETAILS	6
1.5	CONFIGURATION OF TESTED SYSTEM.....	6
1.7	FIELD STRENGTH CALCULATION.....	7
1.8	CONDUCTED MEASUREMENT	8
1.9	RADIATED MEASUREMENT	8
2.0	FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED	9
2.1	TEST PROCEDURE.....	9
2.2	TEST DATA	9
2.3	TEST EQUIPMENT	9
3.0	FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA	
	TERMINALS	10
3.1	TEST PROCEDURE.....	10
3.2	TEST DATA	10
3.2.1	47 CFR PART 90 REQUIREMENTS.....	10
3.2.2	IC RSS-119 REQUIREMENTS.....	11
3.3	TEST EQUIPMENT	11
4.0	FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS	
	RADIATION	12
4.1	TEST PROCEDURE.....	12
4.2	TEST DATA	12
4.2.1	CFR 47 PART 90.210 REQUIREMENTS	12
4.2.2	IC RSS-119 REQUIREMENTS.....	13
4.3	TEST EQUIPMENT	14
5.0	FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH.....	15
5.1	TEST PROCEDURE.....	15
5.2	TEST DATA	15
5.2.1	CHANNEL 3: 40 W FOR 25 kHz CHANNEL BANDWIDTH: MASK B (AUDIO MODULATION: 2,500 Hz)...	15
5.2.2	CHANNEL 1: 20 W FOR 25 kHz CHANNEL BANDWIDTH: MASK B (AUDIO MODULATION: 2,500 Hz)...	16
5.2.3	CHANNEL 4: 40 W FOR 12.5 kHz CHANNEL BANDWIDTH: MASK D (AUDIO MODULATION: 2,500 Hz)	16
5.2.4	CHANNEL 4: 20 W FOR 12.5 kHz CHANNEL BANDWIDTH: MASK D (AUDIO MODULATION: 2,500 Hz)	17
5.3	TEST EQUIPMENT	17
6.0	FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY	18
6.1	TEST PROCEDURE.....	18
6.2	TEST DATA	18
6.2.1	FREQUENCY STABILITY/FREQUENCY VARIATION.....	18
6.2.2	FREQUENCY STABILITY/VOLTAGE VARIATION.....	19
7.0	FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS	
	- AUDIO FREQUENCY RESPONSE.....	20
7.1	TEST PROCEDURE.....	20
7.2	TEST DATA	20



COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHZ PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

7.3	TEST EQUIPMENT	21
8.0	FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS	
	- AUDIO LOW PASS FILTER RESPONSE	22
8.1	TEST PROCEDURE	22
8.2	TEST DATA	22
8.3	TEST EQUIPMENT	23
9.0	FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS	
	- MODULATION LIMITING	24
9.1	TEST PROCEDURE	24
9.2	TEST DATA	24
9.3	TEST EQUIPMENT	26
10.0	FCC RULES AND REGULATIONS PART 90 §90.214 : TRANSIENT FREQUENCY	
	BEHAVIOR.....	27
10.1	TEST PROCEDURE	27
10.2	TEST DATA.....	27
10.3	TEST EQUIPMENT.....	39
11.0	FCC RULES AND REGULATIONS PART 2.202: NECESSARY BANDWIDTH AND	
	EMISSION BANDWIDTH	40
12.0	FCC RULES AND REGULATIONS PART 1.1307, 1.1310, 2.1091, 2.1093: RF EXPOSURES	
	COMPLIANCE	40

APPENDIX LISTING

APPENDIX A: TEST CONFIGURATION PHOTOGRAPHS.....	42
APPENDIX B: LABEL INFORMATION	44
B1: WARNING LABEL	45
B2: LOCATION OF LABEL ON EUT.....	45
APPENDIX C: PRODUCT DESCRIPTION.....	46
APPENDIX D: SCHEMATICS	51
APPENDIX E: USER'S MANUAL.....	52
APPENDIX F: INTERNAL PHOTOGRAPHS	53
APPENDIX G: EXTERNAL PHOTOGRAPHS	58



COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHZ PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

1.0 GENERAL INFORMATION

The following Report of a Type Certification, is prepared on behalf of Com-Net Ericsson Critical Radio Systems, Inc. in accordance with the Federal Communications Commissions and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the UHF-M SPLIT 450-488 MHz PANTHER 300M. 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 FCC Rules and Regulations CFR 47, Industry Canada RSS-119, and 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. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 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 March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.2 Related Submittal(s)/Grant(s)

This is an original application report.



COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHz PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

1.3 Conformance Statement

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

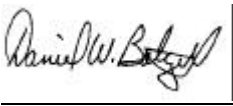
Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 90 and Industry Canada RSS-119 Certification methodology.

Signature: 

Date: August 2, 2000

Typed/Printed Name: Bruno Clavier

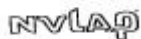
Position: Director Compliance Engineering
(NVLAP Signatory)

Signature: 

Date: August 2, 2000

Typed/Printed Name: Daniel W. Baltzell

Position: Test Engineer



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

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



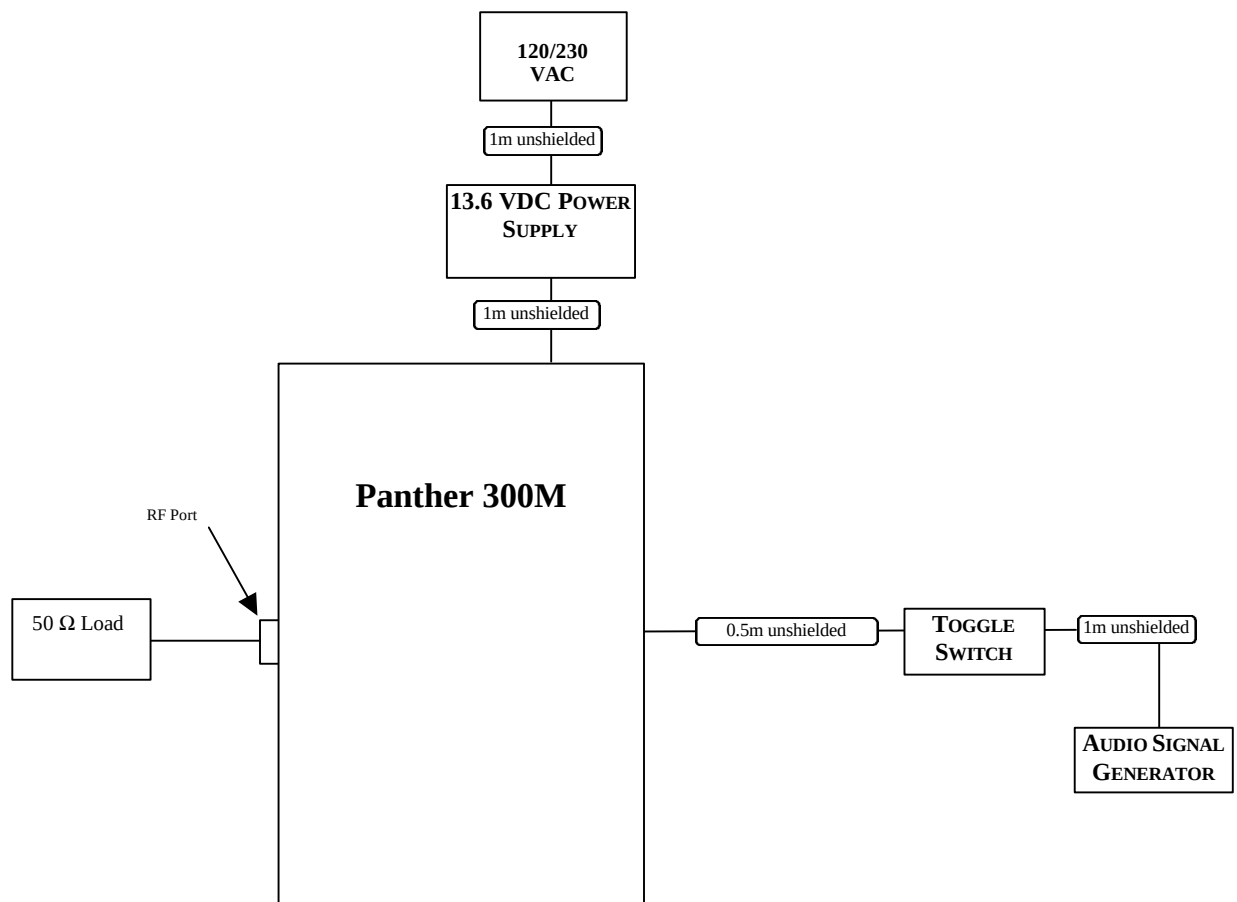
COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHz PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

1.4 Tested System Details

Listed below is the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID
RADIO	ERICSSON	300M	M2-29, M2-19, M2-21, M2-35	N/A
ANTENNA	MOSAIC	ASP-7490	N/A	N/A
MICROPHONE/SPEAKER	ERICSSON	300M	KRY101 1654/1	N/A

1.5 Configuration of Tested System





COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHz PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

1.7 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(\text{dBuV/m}) = SAR(\text{dBuV}) + SCF(\text{dB/m})$$

FI = Field Intensity

SAR = Spectrum Analyzer Reading

SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(\text{dB/m}) = -PG(\text{dB}) + AF(\text{dB/m}) + CL(\text{dB})$$

SCF = Site Correction Factor

PG = Pre-amplifier Gain

AF = Antenna Factor

CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\text{uV/m}) = 10^{FI(\text{dBuV/m})/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB/m} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$



COMPANY NAME: COM NET ERICSSON.
EUT: UHF-M SPLIT 450-488 MHZ PANTHER 300M
CLIENT REFERENCE NUMBER: QRTL00-257
WORK ORDER NUMBER: 2000279
FCC ID: OWDTR-0005-A

1.8 Conducted Measurement

N/A

1.9 Radiated Measurement

Before final measurements of radiated emissions were made on the open-field three meter range, the EUT was scanned indoors at a three meter distance 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.

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.

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.