Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Topaz3, L.L.C.
10828 NW Air World Drive
Kansas City, MO 64153

MODEL: SM-3450 Mobile Radio

FCC ID: O7KSM3450U2

August 16, 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 MOBILES SERVICES
PART 74: 1998	LOW POWER AUXILIARY STATION
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

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
22, 74, 90, 95(a)	440-470 MHz	10	2.5	11K0F3E
22, 74, 90, 95(a)	440-470 MHz	10	2.5	16K0F3E
22, 74, 90, 95(a)	440-470 MHz	40	2.5	11K0F3E
22, 74, 90, 95(a)	440-470 MHz	40	2.5	16K0F3E

REPORT PREPARED BY:

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Document Number: 2000301 / QRTL00-316

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1 GENERAL INFORMATION

The following Report of a Type Certification, is prepared on behalf of Topaz3, L.L.C. in accordance with the Federal Communications Commissions Rules and Regulations. The Equipment Under Test (EUT) was the SM-3450 Mobile Radio; FCC ID: XXXSM3450U2. 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.

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.

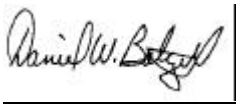
Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 90 Certification methodology.

Signature: 

Date: August 16, 2000

Typed/Printed Name: Bruno Clavier

Position: Director Compliance Engineering
(NVLAP Signatory)

Signature: 

Date: August 16, 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.

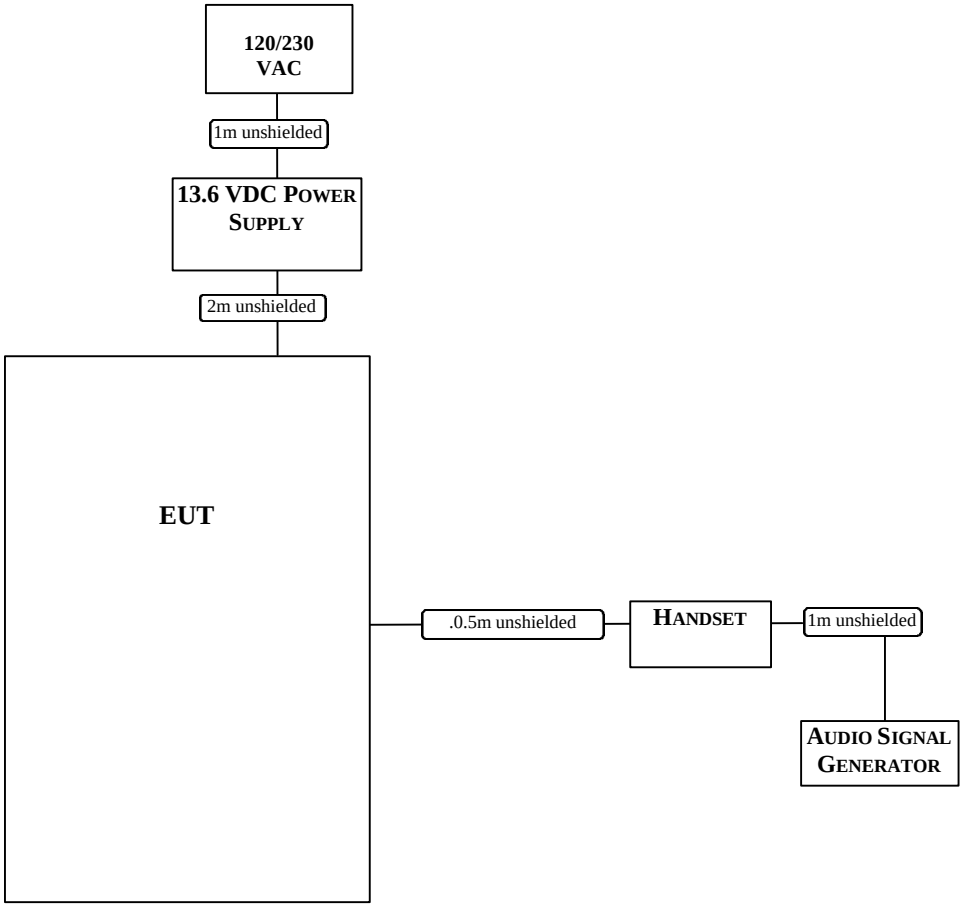
1.4 Tested System Details

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

EXTERNAL COMPONENTS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
CONDENSER MIC	MAXON AMERICA INC.	MA-2472	N/A	SAMPLE		012240
MOBILE RADIO	MAXON AMERICA INC.	SM-3000 (CANADA HI-PWR, 30W)	FCC#2	SAMPLE		012238
ANTENNA	MOSAIC	WHIP ANTENNA W/ ADAPTER	108-512 MHz	N/A		011897
CONDENSER MIC	MAXON AMERICA INC.	MA-2472	N/A	SAMPLE		012241
MOBIL RADIO (EUT)	**MAXON AMERICA INC.**	**SM-3000**	**FCC#1**	**SAMPLE**		**012239**

1.5 Configuration of Tested System



1.6 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(dBuV/m) = SAR(dBuV) + SCF(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(dB/m) = - PG(dB) + AF(dB/m) + CL(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:

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

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 dBuV - 11.5 dB/m = 37.8 dBuV/m

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

1.7 Conducted Measurement

The EUT is operates with a battery.

1.8 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.