TEST REPORT

KQ9LRU REQUEST FOR CERTIFICATION

AND VERIFICATION DATA

SUBMITTED BY:

CONSOLIDATED SPECTRUM SERVICES
22 MERRILL DRIVE
ATKINSON, NH 03811

ON BEHALF OF:

SERCEL INC.
17200 PARK ROW
HOUSTON, TEXAS 77084

1.0 - GENERAL INFORMATION

1.1 - Company Information

SERCEL INC. is a well recognized leader in the oil and natural gas exploration markets. SERCEL INC is based in France with additional manufacturing and business headquarters in the State of Texas. The product herein described is set for a particular frequency of operation by country code at the factory.

1.2 - Description of Equipment Tested

The KQ9LRU, also referred to as EUT, is used to measure geological characteristics that lie beneath the earth or ocean floor. It is used in cable and wireless applications. The unit is waterproof.

The EUT consists of three main sections, which are:

a) A protocol analyzer
b) Modem or Mod/Demod Board
c) RF Module

The EUT in transmit mode, develops 6.0 Watts,nominal. It transmits in very short bursts during normal operation. It is typically polled from a central site. The KQ9LRU has data storage capability in its receiver section. It can also be used as a central unit or as a relay for a group of units.

The EUT, is powered by a 12 V DC deep cycle marine battery source as provided by others.

The EUT is intended for operation by prospective licensees in the 216 to 220 Mhz band, under FCC rule part 90.259. Operation is on a secondary basis to the maritime mobile and federal government services.

1.3 - FCC Rule Parts and Standards

The EUT falls under FCC rule parts 2, 15 and 90. FCC rule part 90.203 (a) requires the EUT to meet the Certification process, for the transmit portion. In addition since the receiver operates between 30 and 960 Mhz and the transmitter is subject to certification, FCC rule part 15.101 (b) applies. This section requires the receiver portion to be subject to the verification process.

FCC rule part 15.3 (k) defines digital devices and unintentional radiators. It states in part, "a radio frequency device that is specifically subject to an emanation requirement in any other rule part or an intentional radiator subject to subpart C of this part that contains a digital device is not subject to the standards for digital devices, provided that the digital device is used only to enable operation of the radio frequency device and the digital device does not control additional functions or capabilities."

FCC rule part 2.1057 (a) (1) specifies the measurement range over which harmonics are to be measured for equipment operating below 10 Ghz. It states in part "to the tenth harmonic of the highest fundamental frequency or to 40 Ghz, whichever is lower." This unit has a fundamental frequency of 220 Mhz maximum. The highest oscillator in the unit operates at 336 Mhz. If we use the oscillator as the highest frequency, 10 times this would be 3360 Mhz. We measured to 40 Ghz for the Verification and Certification process, well exceeding the FCC specification.

1.4 - Technical Information

The following tests and measurements were performed in the engineering laboratories of Sercel Inc., with the exception of Electromagnetic Compatibility Testing, which was recorded on a characterized open area test site, herein referred to as OATS.

All equipment utilized was calibrated with an accuracy traceable to the National Bureau of Standards and American National Standards Institute (ANSI).

All tests were performed under the direction of Howard Epstein of Consolidated Spectrum Services. We had two people from our company at the site, myself and an employee.

1.5 - Equipment Utilized

A List of Equipment used for the tests is contained below along with the calibration due dates.

DESCRIPTION	CALIBRATION DUE
KQ9LRU S/N 000022 PRODUCTION UNIT	N/A
HP5313A FREQUENCY COUNTER	08/08/2002
HP778D DUAL DIRECTIONAL COUPLER, 20 DB	03/01/2003
HP435A POWER METER WITH HP8481A SENSOR	05/21/2002
LAMBDA DC VARIABLE POWER SUPPLY	05/21/2002
WEINSCHEL 30 DB 25 W COXIAL ATTENUUATOR	08/08/2002
WEINSCHEL 10 DB 25 W COXIAL ATTENUUATOR	08/08/2002
TENNEY TTC TEST CHAMBER	02/02/2003
EMCO 2075-2 MINI-MAST	02/21/2003
EMCO 2090 CONTROLLER	02/21/2003
IFR A7550 SPECTRUM ANALYZER	02/24/2003
HP141T, 8552, 8555 SPECTRUM ANALYZER	12/27/2002
HP11517A EXTERNAL MIXER	08/21/2002
EMCO 3143 BICON LOG PERIODIC ANTENNA CALIBRATED BY EMCO TO 1.7 Ghz	02/26/2003
ANTENNA RESEARCH LPB 2520/A BICON LOG PERIODIC ANTENNA	12/19/2002
EMPIRE SYSTEMS APN101 LOG PERIODIC ANTENNA	03/04/2003
MR STANDARD GAIN HORN ANTENNA	03/04/2005
WAVELINE 799 HORN ANTENNA	03/04/2005
WAVELINE 1099 HORN ANTENNA	03/04/2005

NARDA 56K1 HORN ANTENNA	**03/04/2005**
MARCONI 2022E SIGNAL GENERATOR	**03/04/2003**
SERCEL DESIGN FLUSH CONDUCTIVE TURNTABLE	**03/04/2003**
WOOD TRIPOD	**N/A**
LOW PASS FILTERS	**03/04/2005**
HIGH PASS FILTERS	**03/04/2005**

2.0 - TEST DATA

The Test Data is divided into sections, as follows:

a) Environmental,
b) Modulation Characteristics and
c) Electromagnetic Compatibility.

For those portions of the test dealing with the transmitter the EUT was operated in the transmit mode one hundred (100) percent of the time.

For those portions of the test dealing with the receiver the EUT was operated in the receive mode one hundred (100) percent of the time.

3.1 ENVIRONMENTAL

3.2 - General

Pursuant to FCC rule parts 2 and 90 the EUT was subjected to environmental testing. these tests are subdivided into two sections, as follows:

a) RF Output Power Stability and
b) Frequency Stability

For the EUT, the temperature range over which testing occurred was -30 to +55 degrees Celsius. This range was spanned in increments of 10 degrees or less. The voltage was varied from 10.2 to 13.8 V DC, which are considered to be the battery "end point voltages".

3.3 RF Output Power Stability

The highest power output of concern, occurred at a temperature of plus 40 degrees Celsius. This level was recorded at 6.0 watts, reference Figure 2.

The commission limit, reference rule part 90.205, is to be specified in the authorization.

The requested RF output power is 6.0 watts, nominal, as measured at the RF output connector of the units.

3.4 - Frequency Stability

The general limits for frequency tolerance in the United States and Canada is 0.00025%. The KQ9LRU meets these specifications. It achieves this by use of a Temperature Controlled Crystal Oscillator (TCX0, data sheet attached. Figure 2 shows the frequency stability.

3.5 - Frequency Pulling Effects

No frequency pulling effects were noted as a result of varying the input voltages. All tests were made using the test setup shown in Figure 1 and attached photos.

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FIGURE 1 - ENVIRONMENTAL TEST SETUP

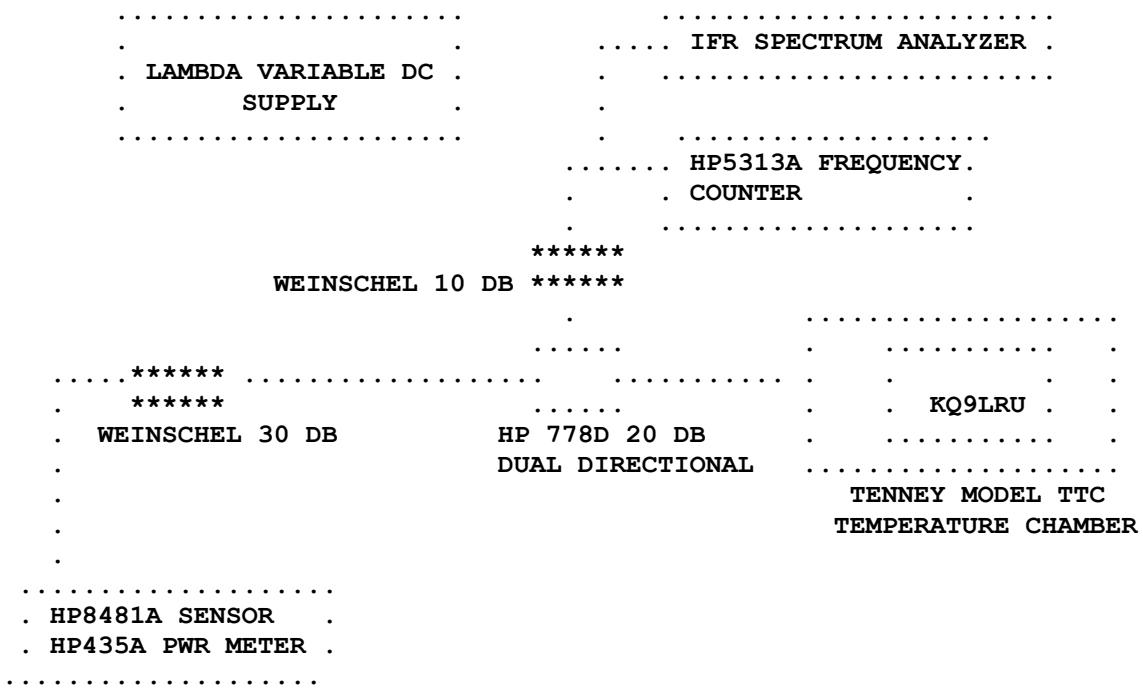


PHOTO 1

EUT IN ENVIRONMENTAL TEST CHAMBER WITH DOOR OPEN

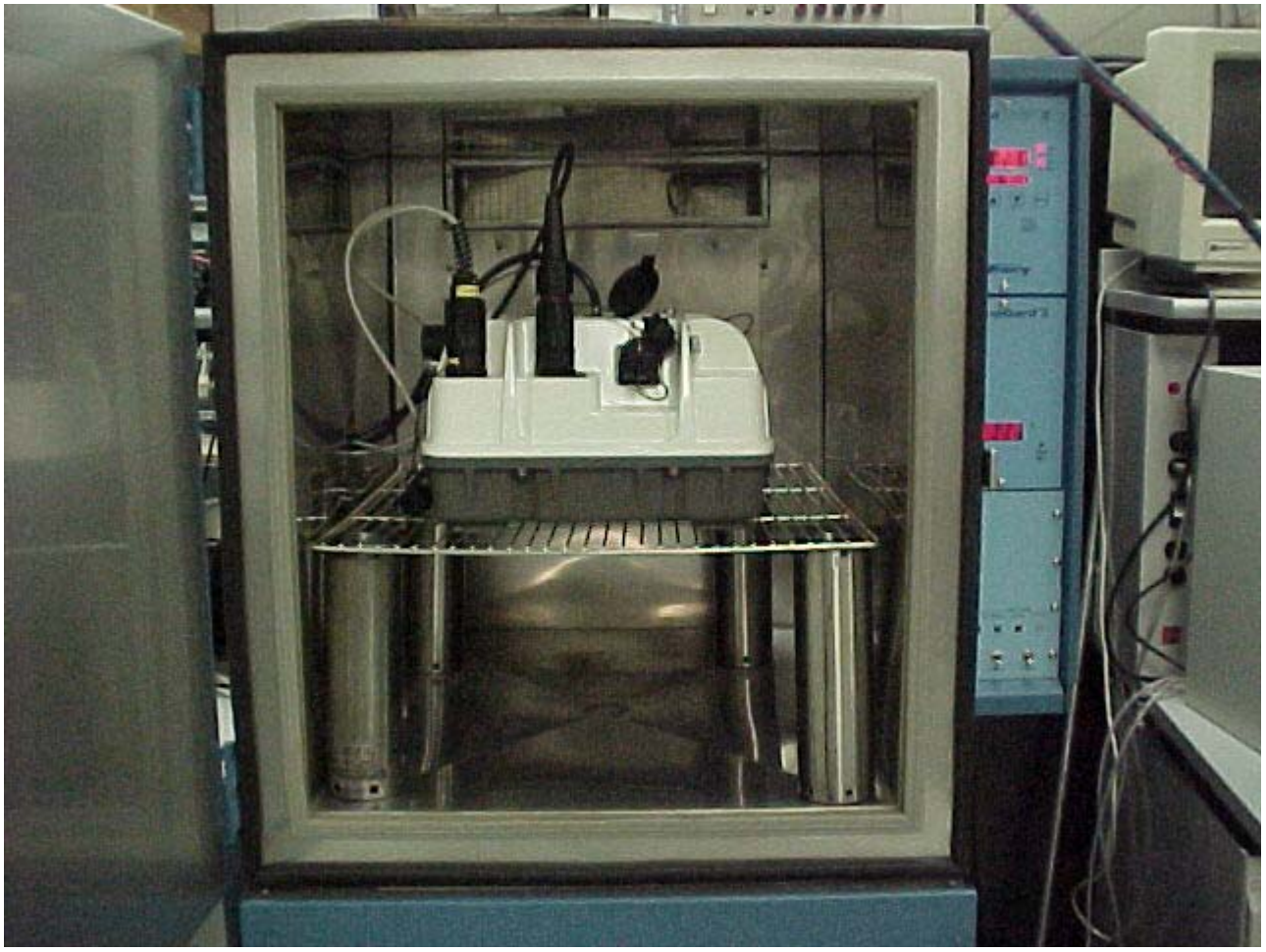
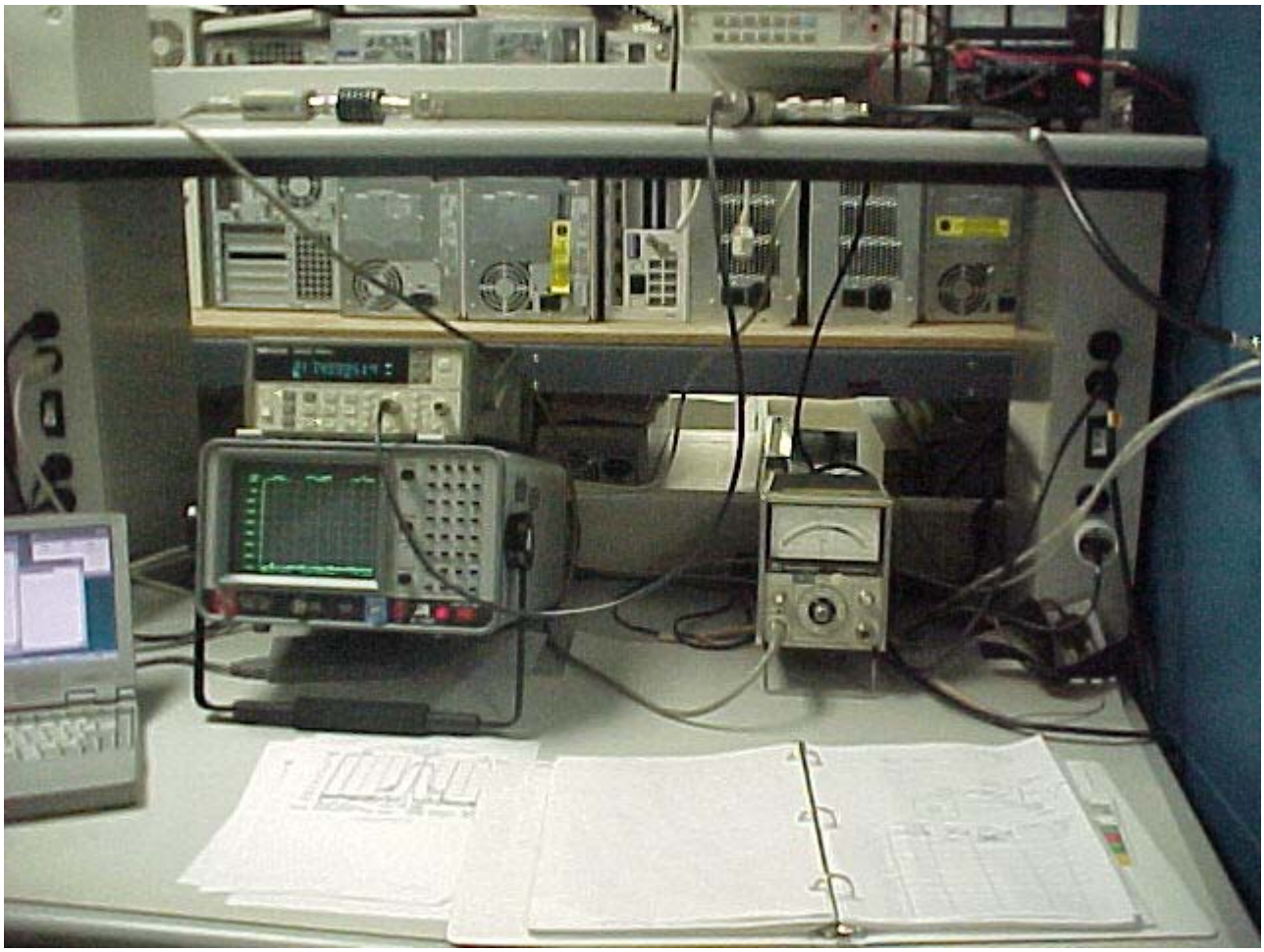


PHOTO 2

TEST EQUIPMENT PHOTOGRAPH



Surface Mount Temperature Compensated Crystal Oscillator

Features

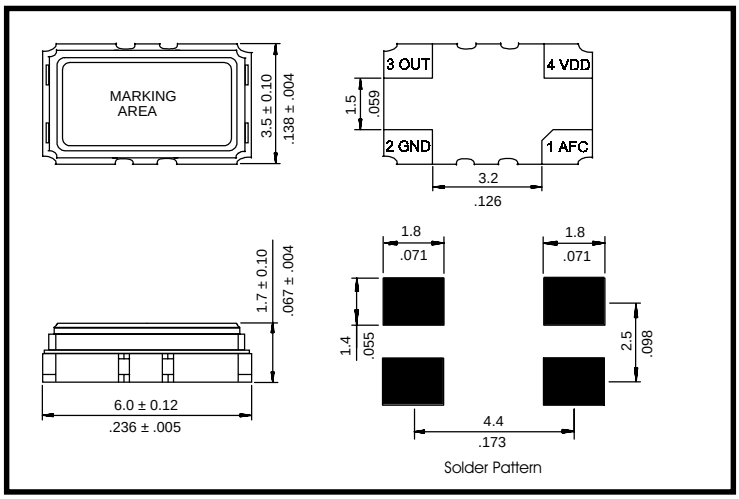
Series RTVY-174

- Extremely Small Size of 6.0 x 3.5 x 1.7 mm
- Excellent Frequency Stability over Temperature
- Compatible with 7 x 5 mm TCXO solder patterns

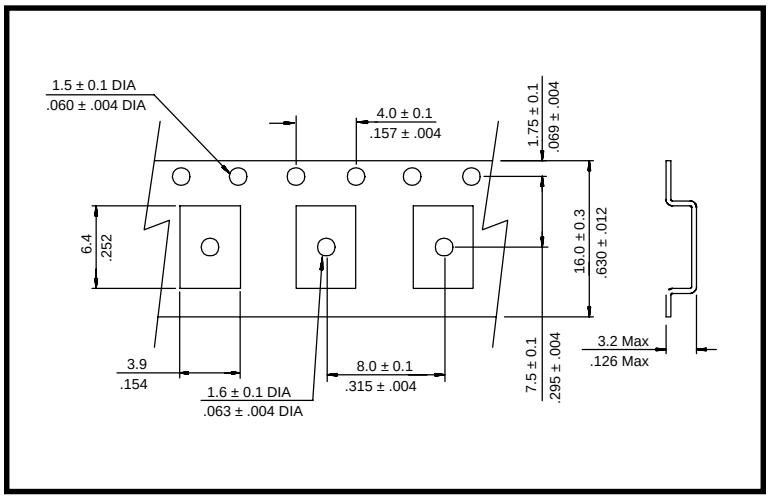
Specifications

Frequency Range	12.600 MHz to 19.800 MHz
Frequency Stability over Temperature Range	±2.5 PPM Maximum
Temperature Range	-30° C to +80° C
Frequency Stability over Supply Voltage Variation	±0.3 PPM Maximum at +3 V ±5%
Aging	±1.0 PPM per Year Maximum
Input Voltage	+3 VDC ±5%
Current Consumption	2.0 mA Maximum
Output Level	0.9 V Peak to Peak Minimum
Output Load	10 pF // 10k Ohm
Control Voltage Range	1.5 V ±1.0 V
Frequency Control Range	±5 PPM to ±12 PPM

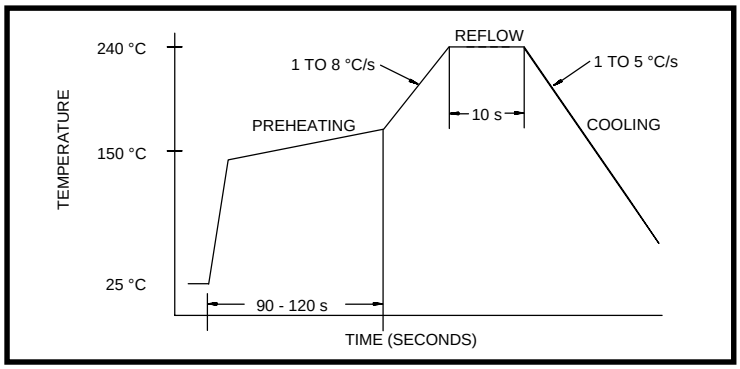
Outline Drawing



Carrier Tape Dimensions



Solder Reflow Profile



Packaging

180 mm Reel Diameter
16 mm Tape Width, 8 mm Pitch
Quantity: 1000 pieces per Reel

Note: Other temperature stabilities are available. Please consult Raltron for specifications.

Part Numbering System

TYPE	REVISION	-	SERIES	STABILITY	TEMPERATURE RANGE	VOLTAGE	FREQUENCY CONTROL	-	WAVEFORM	-	FREQUENCY	-	TAPE AND REEL
RTV	Y		174	E: ±2.5 PPM	F2 :-30°C TO +80°C	3: +3.0 VDC ± 5%	O: ±5.0 PPM TO ±12.0 PPM (+1.5 V ±1.0 V)		S:CLIPPED SINE		IN MHz		TR

Example: RTVY-174EF23O-S-14.400-TR

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