

DESCRIPTION

The X-13 micrometer-tuned reflex klystron is a power source for microwave tests and measurements. It delivers a CW output of at least 100 milliwatts under optimum load conditions over the frequency range of 8.1 to 12.4 gigahertz. The very wide tuning range and ample power output provide the versatility required for its use as a general-purpose microwave power source. The low-current heater assures long tube life and excellent over-all efficiency.

MAXIMUM RATINGS¹

Resonator Voltage	550 Vdc
Reflector Voltage ²	-1000 Vdc
Body Temperature ³	160 °C

GENERAL CHARACTERISTICS⁴

ELECTRICAL

Frequency Range ⁵	8.1 to 12.4 GHz
Power Output, min	100 mW
Heater Voltage	6.3 ± 0.6 V
Heater Current, typ	0.45 A

TYPICAL OPERATING CONDITIONS⁴

Operating Mode	3-3/4	4/34	5-3/4
Frequency	8.1	10.0	12.4 GHz
Power Output			
optimum load ⁶	180	350	230 mW
Resonator Voltage ...	500	500	500 Vdc
Resonator Current ...	55	54	55 mAdc
Reflector Voltage ² ...	-300	-300	-350 Vdc
Electronic Tuning			
Range ⁷	40	61	45 MHz

NOTES:

1. Ratings should not be exceeded under continuous or transient conditions. Simultaneous operation at more than one rating may not be possible. Equipment design should limit voltage and environmental variations so that no ratings will ever be exceeded.
2. Reflector must always be at least 20 volts negative with respect to the cathode.
3. Forced air cooling is required. For maximum tube life, the tube surface temperature should be less than 100 °C.



PHYSICAL

Dimensions	See Outline Drawing
Weight, approx	6 oz
Mounting Position	Any
Cooling ³	Forced Air
RF Connector and Base ..	See Outline Drawing

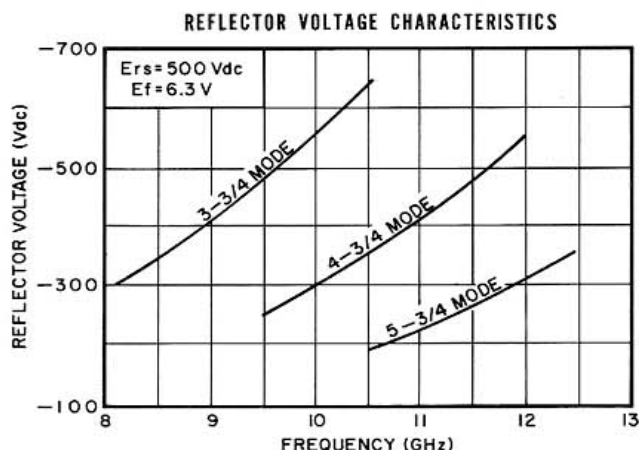
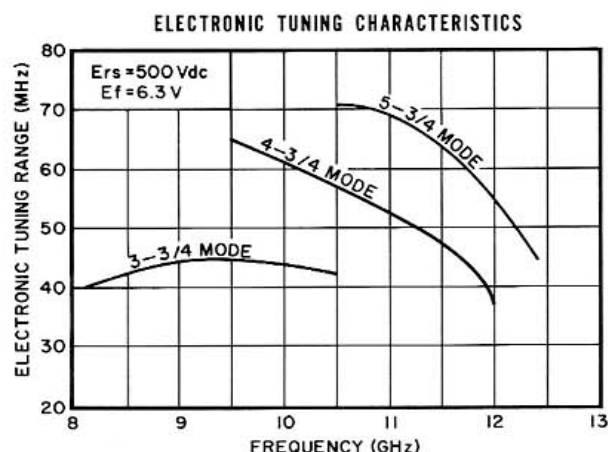
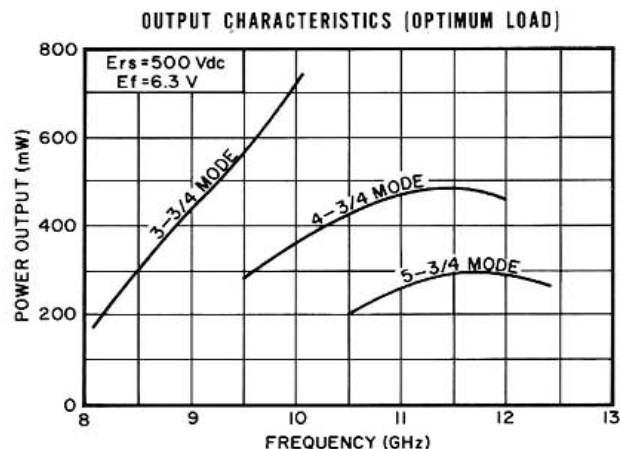
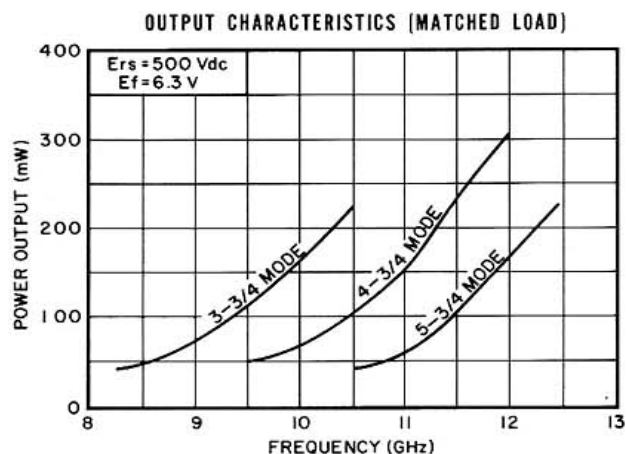
RANGE VALUES FOR EQUIPMENT DESIGN⁸

	Min	Max
Power Output, optimum load ..	100	--- mW
Resonator Voltage	---	550 Vdc
Resonator Current	---	60 mAdc
Reflector Voltage ²	-20	-1000 Vdc
Heater Current, at 6.3 V	0.3	0.5 A

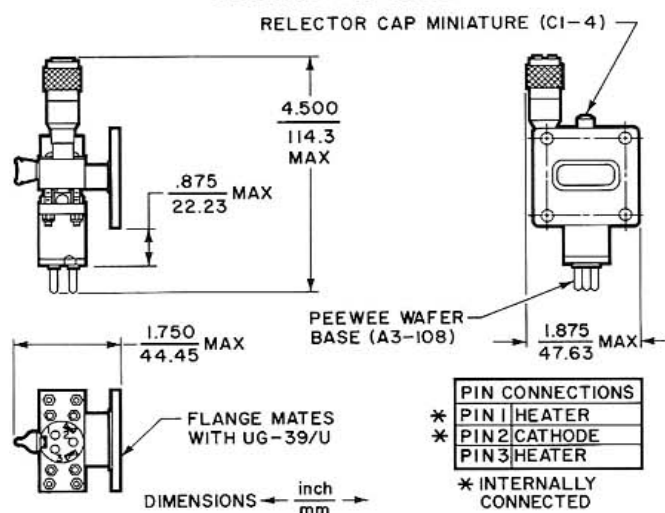
4. Characteristics and operating values are based on performance tests. These figures may change without notice as a result of additional performance data or product refinement. Consult the Varian Eastern Tube Division, Beverly, Massachusetts, before using this information for equipment design.
5. The tuning range is covered by approximately one turn of the micrometer head and is limited by mechanical stops.
6. Load VSWR adjusted for maximum output power.
7. Measured between half-power points.
8. These values are acceptance limits for the X-13 tube. Equipment design should allow for these variations.

CHARACTERISTIC CURVES

Typical performance values



OUTLINE DRAWING



OPERATING HAZARDS

Read the following and take all necessary precautions to protect personnel. Safe operating conditions are the responsibility of the equipment designer and the user.

High Voltage. This tube operates at voltages which can be deadly. Equipment must be designed so personnel cannot come in contact with operating voltages. Enclose high-voltage circuits and terminals and provide fail-safe interlocking switch circuits to open the primary circuits of the power supply and to discharge high-voltage condensers whenever access is required.

Microwave Radiation. Exposure of the human body to microwave radiation in excess of 1 milliwatt per square centimeter is unsafe and can result in blindness or other injury. Personnel must be fully protected from the microwave energy which radiates from this device. All output connections, waveguide flanges, and gaskets must be r-f leakproof and properly engaged. Never operate this device without a microwave-energy-absorbing load attached. Personnel must be prevented from looking into open waveguides or antennas while such a device is energized. (Ref. Proc. IRE, Vol. 49, No. 2, pp. 427-447, Feb. 1961).

Equipment must be designed to fully safeguard all personnel from these hazards. Labels and caution notices must be provided on equipment and in manuals clearly warning of those hazards which cannot be avoided.