



varian associates of canada ltd.

TECHNICAL DATA

VKH-2405A1

CW KLYSTRON AMPLIFIER

7.9-8.4 GHz
8.5 kW

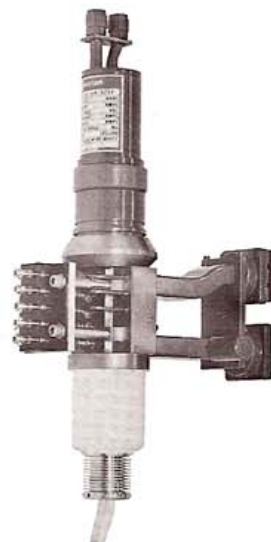
Formerly VA-925F

DESCRIPTION

The VKH-2405A1 is a five-cavity klystron amplifier for use in ground-terminal, earth-to-satellite communication equipment. This tube delivers a CW output of 8.5 kilowatts or more, depending on beam voltage, at any center frequency over its tunable range of 7.9 to 8.4 gigahertz. The VA-1925 Electromagnet focuses the beam, and the tube is liquid and forced-air cooled.

MAXIMUM RATINGS¹

Beam Voltage	14 kVdc
Beam Current	2 Adc
Collector Dissipation	30 kW
Body Current	50 mAdc
Heater Surge Current	14 Adc
Load VSWR	1.25:1



GENERAL CHARACTERISTICS²

ELECTRICAL

Frequency Range	7.9 to 8.4 GHz
Power Output, min	8.5 kW
Heater Voltage	7.75 ± 0.25 Vdc
Heater Current, typ	7.6 Adc
Heater Warm-up Time, min	10 min
Focusing	VA-1925 Electromagnet
Electromagnet Voltage, max	150 Vdc
Electromagnet Current, max	8 Adc

PHYSICAL

Dimensions	See Outline Drawing
Weight, approx	
Tube	9.1 kg, 20 lb
Magnet	31.8 kg, 70 lb
Mounting Position	Any
Cooling ³	Liquid and Forced Air
Waveguide Pressurization,	
Dry Air or Nitrogen	10 lbf/in ² g
Hydrostatic Pressure, max	
Tube and Magnet	125 lbf/in ² g

COOLING³

	Distilled Water	Glycol/ Water	
Coolant Flow, min			
Collector	6	8	gal/min
Body	1	1	gal/min
Magnet	1	1	gal/min
Pressure Drop, at min flow			
Collector	25	25	lbf/in ²
Body	5	5	lbf/in ²
Magnet	25	25	lbf/in ²
Tube Outlet Temperature, max	80 °C		
Magnet Inlet			
Coolant Temperature, max	65 °C		

TYPICAL OPERATING CONDITIONS

Frequency	7.995 GHz
Power Output	9 kW
Drive Power	50 mW
Gain	53 dB
Bandwidth, 1-dB	55 MHz
Efficiency	37 %
Beam Voltage	13.5 kVdc
Beam Current	1.8 Adc
Body Current	25 mAdc
Magnet Current	6.8 Adc
Load VSWR	1.05:1

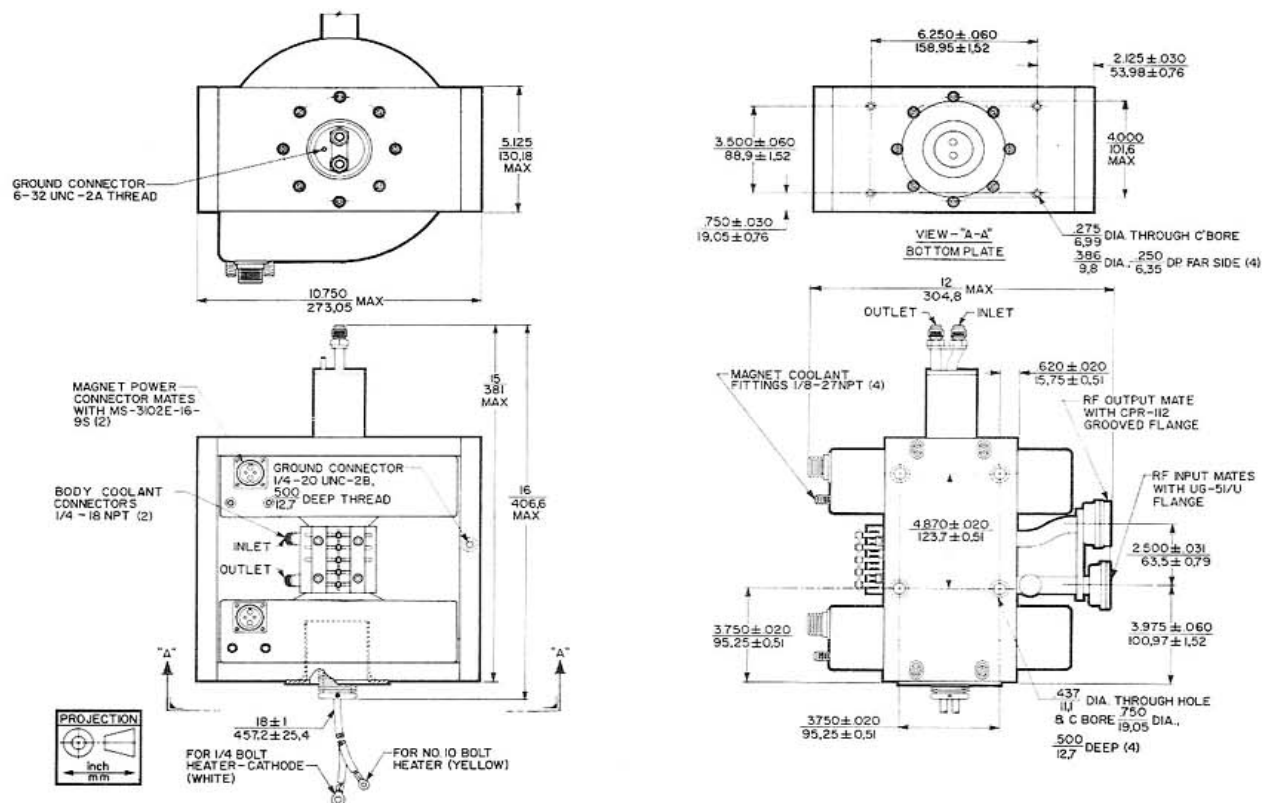
NOTES:

1. Ratings should not be exceeded under continuous or transient conditions. A single rating may be the limitation and simultaneous operation at more than one rating may damage the tube. Equipment design should limit voltage and environmental variations so that the ratings will never be exceeded.
2. General characteristics and operating values are based on performance tests. These figures may change without notice as a result of additional data or product refinement. Varian Associates of Canada Ltd. should be

consulted before using this information for equipment design.

3. The tube and magnet require a liquid cooling system capable of dissipating about 30 kW. Metals in the system should be close to copper in the galvanic series. Mixtures up to 60% ethylene glycol and 40% water may be used as coolant. In addition, approximately 20 ft³/min of air should be directed at the cathode end of the tube. Values are for cooling systems operating at atmospheric pressure at sea level. For different coolants or operating conditions, please consult Varian Associates of Canada Ltd. for recommendations.

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 input and output r-f 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).

X Rays. This device may produce X-ray radiation when energized. Operating personnel must be protected by appropriate shielding. Provide adequate X-ray shielding on all sides of this device, as well as the modulator and pulse transformer tanks. X-ray caution signs or labels must be permanently attached to equipment directing operating personnel never to operate this device without X-ray shielding in place. 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.