



varian associates of canada ltd.

TECHNICAL DATA

VRE-2103A

Series

REFLEX KLYSTRON

50-80 GHz

150 mW

Formerly VA-250

DESCRIPTION

VRE-2103A reflex klystrons are compact, rugged oscillators for airborne equipment or other applications requiring good frequency stability under adverse environmental conditions. Each tube delivers at least 150 milliwatts into a matched load over a selected tuning range of 6 gigahertz between 50 and 80 gigahertz. It is equally useful as a local oscillator, where an output of only 10 milliwatts is needed. Tuning is achieved by means of a simple single-screw tuner. The base and leads are molded to the tube to permit reliable high altitude operation without pressurization.



MAXIMUM RATINGS¹

Resonator Voltage ²	2550 Vdc
Resonator Current.....	27 mAdc
Reflector Voltage ³	-1250 Vdc
Heater Voltage.....	6.5 V
Body Surface Temperature ⁴	120 °C

GENERAL CHARACTERISTICS⁵

ELECTRICAL

Frequency Coverage ^{2,3}	50 to 80 GHz
Mechanical Tuning Range, each tube ...	6 GHz
Output Power, minimum ⁷	
Signal Source.....	150 mW
Local Oscillator.....	10 mW
Heater Voltage.....	6.3 ± 0.2 V
Heater Current, typical.....	0.76 A

PHYSICAL

Dimensions.....	See Outline Drawing
Weight, approximate.....	10 oz
Mounting Position.....	Any
Cathode.....	Impregnated, Unipotential
Cooling ⁴	Forced Air or Conduction
R-F Output ⁸	Mates with VAE-2000 Series Adapter and Heat Sinks
Base.....	Molded Flexible Leads

TYPICAL OPERATING CONDITIONS⁵

	Signal Source		Local Oscillator
Frequency ⁶	59	59	59 GHz
Mode of Operation.....	4-3/4	5-3/4	---
Mechanical Tuning Range.....	±3	±3	±3 GHz
Output Power, matched load ⁷	250	100	25 mW
Resonator Voltage ²	2500	2500	1400 Vdc
Resonator Current.....	24	24	10 mAdc
Reflector Voltage ³	-650	-500	-250 Vdc
Electronic Tuning Range ⁹	150	250	150 MHz
Reflector Modulation Sensitivity ¹⁰	4	6	--- MHz/V
Frequency/Temperature Coefficient ¹¹	1	1	--- MHz/°C

RANGE VALUES FOR EQUIPMENT DESIGN^{1,2}

	Min	Max
Resonator Voltage ²	---	2550 Vdc
Resonator Current	---	27 mAdc
Reflector Voltage ³	-50	-900 Vdc
Electronic Tuning Range ⁹ ...	100	--- MHz
Heater Current, at 6.3 V ..	0.6	0.9 A

Reflector Modulation

Sensitivity¹⁰

4-3/4 Mode	1	6 MHz/V
5-3/4 Mode	3	8 MHz/V

Frequency/Temperature

Coefficient ¹¹	---	±1.4 MHz/°C
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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 not be possible. Equipment design should limit voltage and environmental variations so that the ratings will never be exceeded.
2. Frequency increases as resonator voltage decreases. Hence, if operation at other than 2500 volts is contemplated, please specify desired resonator voltage when ordering.
3. Reflector must always be at least 20 volts negative with respect to the cathode.
4. Sufficient forced-air flow or conduction cooling must be supplied to maintain the body surface temperature below 120 °C; for optimum tube life, this temperature should be less than 100 °C. For conduction cooling, refer to Adapter and Heat Sink data sheets to find the appropriate Varian adapters and liquid-cooled, convection-cooled, and conduction-cooled heat sinks.
5. 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 Varian Associates of Canada, Ltd. before using this information for equipment design.
6. When ordering, specify the center frequency or frequency range desired. Special versions can be furnished between 42 and 50 gigahertz but with reduced mechanical tuning ranges.
7. Output power is a function of frequency and maximum output is normally obtained at the high-frequency end of the band. Output decreases as frequency is decreased. The ratio of output at the highest frequency to the output at the lowest frequency is typically 4 dB.
8. Tube couples to several waveguide sizes by use of suitable adapters or heat sinks. A type VAE-2000A12 adapter flange which mates with a UG-385/U flange on a RG-98 waveguide is supplied with the tube unless otherwise specified.
9. Measured between half-power points.
10. This parameter varies with operating frequency and mode. For more detailed information contact your local Varian sales office or Varian Associates of Canada Ltd.
11. The rate of frequency change with temperature variation is a function of tuner position. Accurate figures apply only at the high-frequency end of the tuning range.
12. These values are acceptance limits for VRE-2103A series tubes. Equipment design should allow for these variations.

OUTLINE DRAWING

