GL8262D Klystron Technical Specification

The Klystron operates in pulse mode, 5.0MW Peak, 45kW Average, S-band-2856MHz, Coaxial Input and Waveguide Output, Electromagnetically Focused, Liquid Cooled.

Physical Characteristics

Tuning: Fixed

Mounting: Vertical, Electron Gun downwards

RF Input Connector: N Type Coaxial UG-21 E/U(50Ω)

RF Output Connector(1):WR-284

Cooling(2)(3): Liquid

Ground: Klystron Body

Operation: Cathode Pulsed

Cathode: Impregnated Barium Tungsten

Focusing(4): Electromagnetic Coil GD8262FS

X-ray Shielding(5):3mR/hr

Packaging and Transportation(6):GL Standard Commercial Transport

Absolute Ratings (7) (8)

Parameters	Heater Voltage	Surge Current	Beam Voltage	Inverse Voltage	Emission Current	RF Drive	Input Power
Units:	Vac	A	kV	kV	Adc	W	kW
Max:	8.0	54	135	30	102	500	120
Min:	---	---	---	---	---	---	---
Notes:	3, 9		10, 11, 12		13	14	

General Data

Electrical	Min		Max	Units
Frequency(15)	2854	2856	2858	MHz
Peak RF Output Power	---	---	5.0	MW
Heater Voltage	---	7.5	---	Vac
Heater Current	--	30	---	A
Heater Warm-up Time	15	---	---	min
Peak Beam Voltage	---	---	135	kV
Peak Beam Current	---	---	102	A
RF Drive Power	---	---	500	W

Average RF Output Power	---	---	45	kW
Pulse Width (RF)[16]	---	---	16.3	μs
Pulse Width (Beam Voltage)	---	---	18.0	μs
Duty Cycle	---	---	0.010	
Load VSWR[17]	---	---	1.2	
Magnet Current	---	32	---	A
Capacitance (Anode to Cathode)[18]	---	---	35	pF

Mechanical	**Min**	**Max**	**Units**
Dimensions and Connection	See Outline Drawing		
Height	Approx.1200		mm
Net Weight	Approx.120		kg
Ion Pump[19]	2		L/s
Output Waveguide Pressurization[20]	0.18	0.24	MPa
Marking	See Outline Drawing		

Environmental	**Min**	**Max**	**Units**
Temperature	5	45	℃
Humidity	30	65	%

Cooling	**Collector**		**Body**		**Window/Waveguide**		**Units**
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	
Coolant Pressure		0.85		0.85		0.85	MPa
Hydrostatic Pressure		1.0		1.0		1.0	MPa
Flow Rate	60		6		8		L/min
Pressure Drop		0.35		0.35		0.35	MPa
Inlet Coolant Temperature	10	50	10	50	10	50	℃

Product Test

Test Items	Conditions	Symbol	Min	Max	Units
Vacuum inspection	No Operating Voltages for 24 hours VacIon Pump Reading t=120s later	---	---	1	μA
Body and collector hydrostatic pressure	No Operating Voltages P= 1.0MPa Water t=15minutes	---	No visible leaks and no damage		---
Window/Waveguide hydrostatic pressure	NO Operating Voltages P= 1.0MPa Water t=15minutes	---	No visible leaks and no damage		---
Dimensions	See Outline Drawing	---	---	---	----
Pressurization(21)	0.24MPa		No Leakage		
Heater Current	Ef = NPV	If	26	33	A
Emission (22)	Cathode Current	Δik/ik	---	2	%
Beam Current	eb=NPV Pd=0	ib	---	92	A
Pressure Drop, Collector	Water Flow = 60L/min	ΔP	---	0.35	MPa
Pressure Drop, Window/Waveguide	Water Flow = 8L/min	ΔP	---	0.35	MPa
Body Coolant Flow	ΔP = 0.35MPa	---	6	---	L/min

Product Test (continue)

Test Items	Conditions	Symbol	Min	Max	Units
Working Condition (1) Output Power	Ef = NPV Imag = NPV eb = 125 kv, max. F0 (23)= 2856 MHz Pd (24)= 200 W max. Load VSWR = 1.20:1 max tp (RF) = 16.3 µsec Duty Cycle (RF)(25) = 0.009	**Po**	**5.0**	**---**	**MW**
Working Condition (2) Output Power	Ef = NPV Imag = NPV eb = 125 kv, max. F0 (23) = 2856 MHz Pd (24)= 200 W max. Load VSWR = 1.20:1max. tp (RF) = 16.3 µsec Duty Cycle (RF) (25) = 0.009	Po	4.0	---	MW
Working Condition (3) Output Power	Ef = NPV Imag = NPV eb = 125 kv, max. F0(23) = 2856 MHz Pd(24) = 200 W max. Load VSWR = 1.20:1 max. tp (RF) = 16.3 µsec Duty Cycle (RF) (25) = 0.009	Po	3.0	---	MW

NOTES

Note 1: A flexible waveguide must be provided between the klystron output flange and output waveguide system to prevent excessive forces from being applied to the output flange.

Note2: Distilled water shall be used along with a filter in the cooling system to limit particle size to 100 microns.

Note3: It is recommended that a current-regulated power supply be used when applying heater powerto a klystron. Body coolant flow must be operating whenever heater power is applied for an extended period of time. Interlocks in the liquid-coolant system shallprevent the application of heater voltage unless the liquid-coolant flow in the body is at or above the specified minimum flow rate. The electron gun must be immersed in oil to maintain the gun base plate at a temperature below 60°C whenever heater power is applied. If a DC heater supply is used, the positive terminal of the supply must be connected to the heater-cathode terminal.

Note4: Interlocks shall be provided to prevent application of beam voltage unless solenoid coil currents are within ±5 percent of the specified values and all coolants are at normal flow.

Note5: It is the responsibility of the klystron manufacturer to provide sufficient X-ray shielding to reduce radiation to 3 mR/hr at a distance of 3meter from the surface of any integral part of the klystron above the plane of the bottom of the focusing-solenoid base plate.

Note6: The klystron shall be capable of withstanding transportation over rough roads by truck when suitably crated.

Note 7:The absolute ratings are limiting values that are not to be exceeded under any service conditions, or the serviceability of any individual unit may be impaired. Design values for systems should include a safety factor to maintain operation within ratings under voltage and environmental variations. A single rating may be the limitation, and simultaneous operation at another rating may not be possible. The Life Warranty is predicated on product operation under the specified test conditions given in this Product Specification.

Note 8:All voltages except the heater voltage are referenced to the cathode.

Note 9:Interlocks shall be provided to prevent application of beam voltage unless the heater voltage is within ±5 percent of NPV.

Note 10:The electron gun insulators shall be operated in an insulating oil such as 35# or equivalent.

Note 11:Interlocks shall be provided to prevent the application of beam voltage greater than 5 percent above the nameplate value and prevent the absolute ratings from being exceeded.

Note 12:Maximum operating voltage for each klystron shall be limited to its nameplate value as specified in the accompanying Test Performance Sheet.

Note 13:Interlocks shall be provided to prevent the beam current from exceeding values greater than 10 percent above normal operating values and prevent the Absolute Ratings from being exceeded.

Note 14:The klystron shall not be damaged when operated at maximum rated RFdrive when the beam voltage is removed.The klystron shall not be damaged when operated at operating beam voltage when RF drive is removed.

Note15: The frequency is set at the factory and is specified as 2856 MHz.

Note16:The beam voltage pulse width maximum is 18 microseconds at the 70% level.

Note17: The load VSWR must not exceed 1.2:1 in the operating range for rated performance. A VSWR up to 1.5:1 will cause damage to the klystron.

Note18: The anode-to-cathode capacitance shall be measured in air without heater and cathode-voltage leads connected.

Note19: One 2L/s VacIon pump shall be an integral part of each klystron. This ion pump shall operate at an open-circuit voltage of +3500 Vdc±300 Vdc from a high-impedance power supply capable of delivering 1.5 milliamperes. For normal klystron operation, the ion-pump current shall be less than 10 μAdc.

Note20: The klystron may be operated at rated output power provided the output waveguide is pressurized to at least 0.18MPa with a high-dielectric gas such as nitrogen, dry air, or sulfur hexafluoride.

Note21: The RF output transmission line is pressurized to 0.24MPa for 15 minutes. At the end of 15 minutes, the pressure must be between 0.22MPa minimum and 0.24MPa maximum.

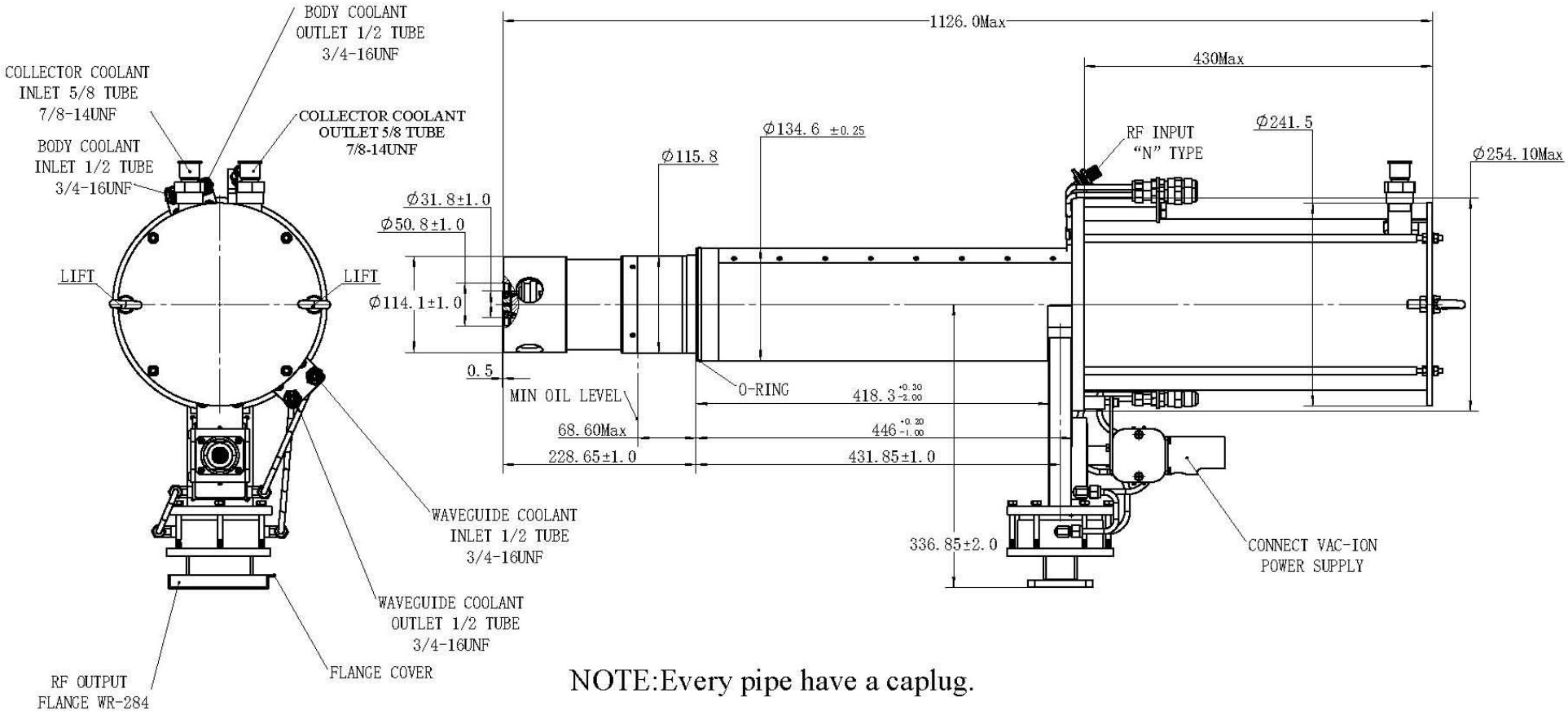
Note22: The filament voltage is decreased from NPV to 5 percent less than NPV, and the cathode emission is allowed to stabilize. The percent change in the peak cathode current shall not exceed the value specified.

Note23: When operating under power-output conditions, power output shall be measured at 2856 MHz. Power output shall be within the limits specified. Drive power shall be 200 watts or less under all conditions. The beam voltage and drive power shall be recorded.

Note24: Drive power is defined as the power incident at the RF input coupler of the klystron.

Note25: Power-output test conditions may use combinations of tp (video), tp (RF), and pulse repetition rate other than these specified to accomplish the required duty cycle for factory testing.

Outline Drawing



NOTE:Every pipe have a caplug.