

PROJECT "T" KLYSTRON
TEMPERATIVE SPECIFICATIONS FOR GENERAL PLANNING ONLY

Description:

Pulsed amplifier klystron tube, 24 megawatt, 5 cavities, perveance $k = 2 \times 10^{-6} \text{ A/V}^{3/2}$, S-band, single frequency, magnetically focused, double waveguide output, coax input, liquid cooled, sealed-off.

Description	Symbol	Units	Absolute Ratings			Typical Operating Conditions					
			Max.	Min.	Notes	Operation A		Operation B		Notes	
						Max.	Min.	Notes	Max.		Min.
Filament Voltage	E_f	volts	20	12	4						
Filament Current	I_f	amps	20	12							
Peak Forward Beam Voltage	e_{py}	kv	270	-	1	195	-	1	248	-	1
Peak Inverse Beam Voltage	e_{px}	kv	60	-	-	40	-	-	50	-	-
Peak Beam Current	i_k	amps	234	265	2	180	163	2	258	234	2
Peak Input Beam Power	P_i	Mw	79	71	5	35	32	5	64	59	5
Pulse Length Beam Voltage	τ_0	μsec	3.2	-	3	3.2	-	-	3.2	-	-
Pulse Repetition Frequency	prf	pps	360	-	-	360	-	-	360	-	-
Average Input Beam Power	P_i	kw	31	32	-	40.5	37	-	74	67	-
Frequency	f	Mc	2856	2856	-	2856	2856	-	2856	2856	-
Peak Drive Power	P_{drive}	watts	240	-	-	240	-	-	240	-	-
Peak Output rf Power	P_{out}	Mw	-	50	8	-	12	8	-	32	8
Pulse Length of Output	τ_{rf}	μsec	-	2.5	-	-	2.5	-	-	2.5	-
Average Output rf Power	P_{out}	kw	-	27	8	-	10.8	8	-	21.6	8
Efficiency (peak output rf power / peak input beam power)	η	%	-	38	5	-	35	5	-	38	5
Gain		db	-	51	-	-	47	-	-	50	-
Load		VSWR	1.5:1	-	7	1.5:1	-	7	1.5:1	-	7
Window Pressure		mm Hg	10^{-7}	-	-	10^{-7}	-	-	10^{-7}	-	-
Life		hours	-	-	-	-	2000	6	-	200	6

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Cooling: Water flow lbs at lbs psig
Water temp. inlet lbs (to be specified)

Drift: P_{out} to change not more than lbs percent per $^{\circ}F$ in inlet water temp.

Base: Special plug-in socket - see drawing no. ML

Input: Female coaxial connector, type C - (mates with US-578/U male connector)

Output: 2 Waveguides RG-49/U, connecting through special flange see drawing no. ML....

Cooling Connections: two quick-disconnect type lbs

Phase Modulation: phase modulation produced by stray heater magnetic field to be less than lbs $^{\circ}$; produced by beam voltage changes to be less than lbs percent.

Focusing: By integral permanent magnet

Radiation: Shielding may be provided on collector

Note 1 - Any short transient spike on the voltage pulse shall not exceed 10 percent in magnitude and 0.25 μ s in duration.

Note 2 - The limits of acceptable current at operating voltage correspond to variation of \pm 5 percent in permeance.

Note 3 - Pulse length measured at 70 percent of maximum voltage; minimum of 2.5 μ sec flat top is required.

Note 4 - Heater power is expected to be 280 watts; the actual heater operating voltage will be specified later.

Note 5 - The present requirements on power input and efficiency are conservative. It is hoped that at a future date, the minimum acceptable efficiency can be increased to 42 percent.

Note 6 - It is expected that a minimum life of 3000 hours for operation A and 2000 hours for operation B will be obtainable as improvements in techniques are made. In other words, the presently specified minimum average life requirements are only for evaluation purposes.

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Note 7:

The VSWR of each load connected to each of the two waveguide outputs shall not exceed the specified value. Less than 1.2:1 connected to each of the output waveguides, the rf output power at each load shall be equal to within 10 percent.

Note 8:

With a load having a VSWR less than 1.2:1 connected to each output, the power in each load shall be within ± 5 percent of one half of the total power output.

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