CX1722GF
Deuterium Thyratron

The data to be read in conjunction with the Hydrogen Thyratron Preamble.

ABRIDGED DATA

Deuterium-filled, flange mounted tetrode thyratron featuring high peak current, high rate of rise of current, low jitter and low anode delay time drift. It has an internally connected reservoir operated from the cathode heater supply and an internal shield to reduce X-ray emission.
The patented hollow anode structure enables the tube to cope with inverse voltage and current without consequent reduction in its high voltage hold-off capability due to electrode damage.

Peak forward anode voltage	-	35 kV max
Peak forward anode current	-	10 kA max
Peak reverse anode current	-	5 kA max
Average anode current	-	0.5 A max
Rate of rise of current	-	50 kA/µs max
Conducted charge	-	6.0 C max

GENERAL DATA

Electrical

Cathode (connected internally to mid-point of heater)	-	Oxide coated
Heater voltage	-	6.3 ± 5% V
Heater current	-	22 A
Tube heating time (minimum)	-	10 min

Mechanical

Seated height (excluding leads)	-	301 mm (11.850 inches) max
Clearance required below mounting flange	-	44.45 mm (1.750 inches) max
Overall diameter (excluding mounting flange)	-	84.12 mm (3.312 inches) max
Net weight	-	0.7 kg (1.5 pounds) approx.
Mounting position (see note 1)	-	Any
Cooling (see note 2)	-	Forced-air

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MAXIMUM AND MINIMUM RATINGS (Absolute values)

Anode		Min	Max	
Peak forward anode voltage (see note 3)	.	-	35	kV
Peak forward anode current	.		10	kA
Peak reverse anode voltage	.	-	5	kA
Average anode current	.	-	0.5	A
Rate of rise of anode current (see note 4)	.	-	50	kA/µs
Conducted charge:				
Capacitor discharge	.	-	0.7	C
Crowbar service (see note 5)		-	6	C

Grid 2 (see note 6)		Min	Max	
Unloaded grid 2 drive pulse voltage (see note 7)	.	600	2000	V
Grid 2 pulse duration	.	0.5	-	µs
Rate of rise of grid 2 pulse (see note 4)	.	1.0	-	kV/µs
Grid 1 – grid 2 pulse delay	.	0	3.0	µs
Peak inverse grid 2 voltage	.	-	450	V
Loaded grid 2 bias voltage	.	-50	-200	V
Forward impedance of grid 2 drive circuit	.	50	200	Ω

Grid 1 – Pulsed (see note 6)		Min	Max	
Peak grid 1 drive current	.	0.3	1.0	A
Unloaded grid 1 drive pulse voltage (see note 7)	.	300	2000	V
Grid 1 pulse duration	.	1.0	-	µs
Rate of rise of grid 1 pulse (see note 4)	.	1.0	-	kV/µs
Peak inverse grid 1 voltage	.	-	450	V
Loaded grid 1 bias voltage	.	See note 8		

Grid 1 – DC Primed (see note 9)		Min	Max	
DC grid 1 unloaded priming voltage	.	75	150	V
DC grid 1 priming current	.	50	100	mA

Cathode		Min	Max	
Heater voltage	.	6.3 ± 5%		V
Tube heating time	.	10.0	-	min

Environmental		Min	Max	
Ambient temperature	.	-50	+90	°C
Altitude	.	-	3	km
		-	10,000	ft

CHARACTERISTICS

Tube Triggered Normally		Min	Typ	Max	
Critical DC anode voltage for conduction (see note 10)	.	-	0.5	2.0	kV
Anode delay time (see notes 10 and 11)	.	-	0.15	0.25	µs
Time jitter (see note 9)	.	-	1.0	5.0	ns

Under Crowbar Conditions (see note 12)		Min	Typ	Max	
Critical DC anode voltage for conduction	.	<5	-	-	kV
Firing delay (see note 13)	.	-	1	2	µs
Heater current (at 6.3V)	.	18	22	25	A

NOTES

1. The tube must be fitted using its mounting flange.

2. Cooling of the anode stem is necessary under conditions of high voltage and high anode dissipation in order to avoid damage to the tube.

3. The tube is tested such that it must hold-off 35 kV for a 24-hour period without spurious firing. The spurious firing rate of the CX1722GF depends on the high voltage level. At the full rating of 35 kV the mean time between spurious firings is around 200 hours; at 30 kV it is around 800 hours and at 25 kV is well in excess of 1,000 hours.

4. This rate of rise refers to that part of the leading edge of the pulse between 10% and 90% of the pulse amplitude.

5. In crowbar service, most of the conducted charge is often in the power supply follow-on rather than the storage capacitor discharge.

6. For applications requiring the highest rate of rise of anode current, grid 1 should be pulse driven. Maximum grid drives should be used, the rate of rise of grid 2 trigger pulse should be as high as possible and the grid 2 pulse delay should be 0.2 µs min.
   For less severe applications, good results can be obtained by driving both grids from a single pulse using the circuit shown in Fig. 1, or with DC priming on grid 1.

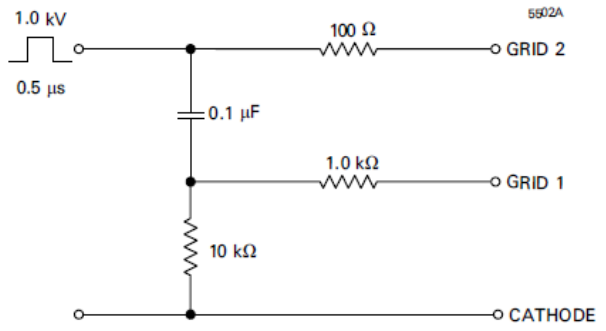


Fig. 1 Circuit for single pulse drive

7. Measured with respect to cathode. When grid 1 is pulse driven, the last 0.25 µs of the top of the grid 1 pulse must overlap the corresponding first 0.25 µs of the top of the delayed grid 2 pulse.

8. DC negative bias voltages must not be applied to grid 1. The potential of grid 1 may vary between -10 V and +5 V with respect to cathode potential during the period between the completion of recovery and the commencement of the succeeding grid pulse.

9. When DC priming is used on grid 1, a negative bias of 100 to 200 V must be applied to grid 2 to ensure anode voltage hold-off. DC priming is recommended for crowbar service.

10. Typical figures are obtained on test using conditions of minimum grid drive. Improved performance can be expected by increasing grid drive.

11. The time interval between the instant at which the rising unloaded grid 2 pulse reaches 25% of its pulse amplitude and the instant when anode conduction takes place.

12. A typical crowbar circuit is:

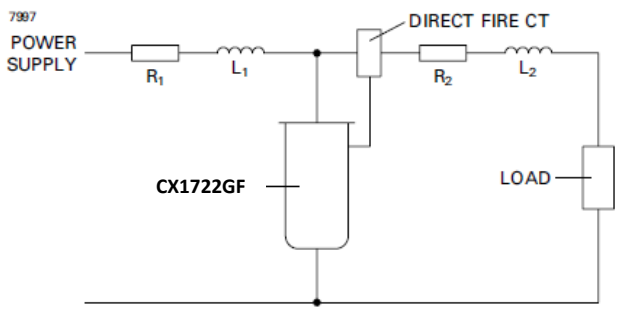


Fig. 2

   L1 and L2 are stray inductances. L2 should be equal to or greater than L1.
   R1 and R2 are surge limiting resistors. R1 should be equal to or greater than R2. In crowbar operation the thyratron is called upon to fire against a rapidly falling anode voltage. An analysis of the circuit in Fig. 2 above can be found in E2V Technologies Technical Reprint No. 122.

13. This maximum delay is obtained using a direct fire current transformer as shown in Fig. 2 above, at a low power supply voltage of 5 kV.

HEALTH AND SAFETY HAZARDS

e2v technologies thyratrons are safe to handle and operate, provided that the relevant precautions stated herein are observed. e2v technologies does not accept responsibility for damage or injury resulting from the use of electronic devices it produces. Equipment manufacturers and users must ensure that adequate precautions are taken. Appropriate warning labels and notices must be provided on equipment incorporating e2v technologies devices and in operating manuals.

High Voltage

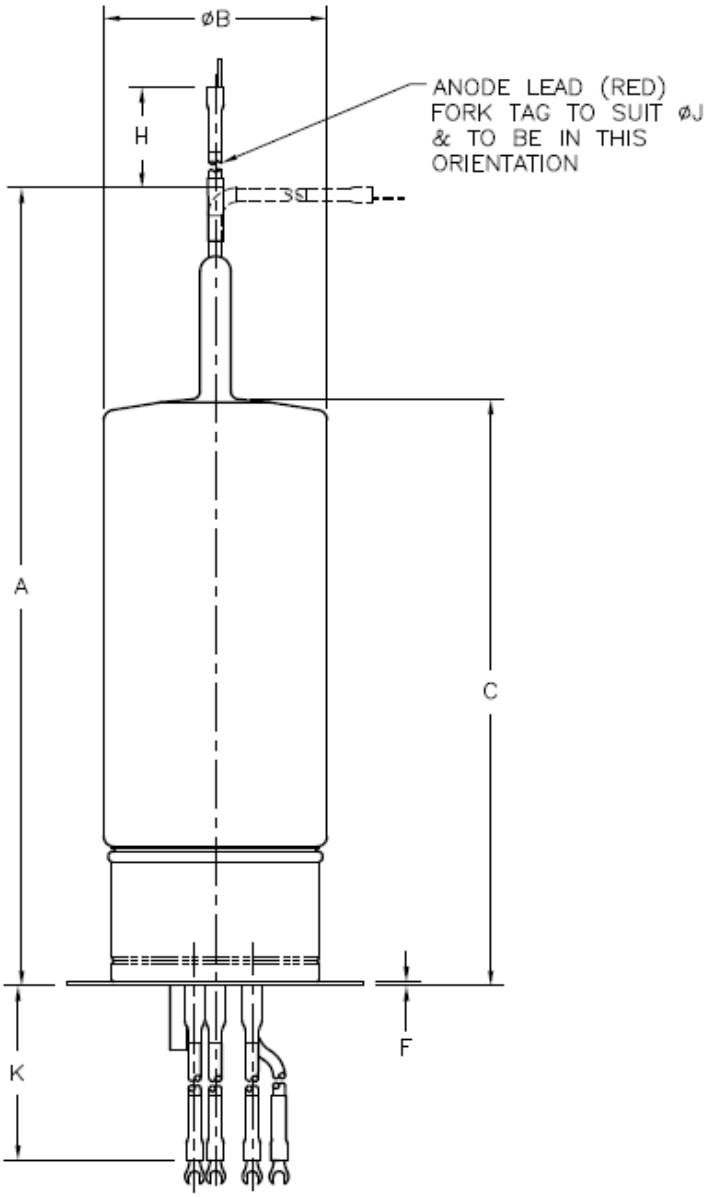
Equipment must be designed so that personnel cannot come into contact with high voltage circuits. All high voltage circuits and terminals must be enclosed and fail-safe interlock switches must be fitted to disconnect the primary power supply and discharge all high voltage capacitors and other stored charges before allowing access. Interlock switches must not be bypassed to allow operation with access door open.

X-Ray Radiation

All high voltage devices produce X-rays during operation and may require shielding. The X-ray radiation from hydrogen thyratrons is usually reduced to a safe level by enclosing the equipment or shielding the thyratron with at least 1.6 mm (1/16 inch) thick steel panels.
Users and equipment manufacturers must check the radiation level under their maximum operating conditions.

OUTLINE

(All dimensions without limits are nominal)



Ref	Millimetres	Inches
A	288.00 ± 13.00	11.339 ± 0.512
B	84.12 max	3.312 max
C	216.00 ± 13.00	8.500 ± 0.512
D	111.10	4.375
E	95.25	3.750
F	1.60	0.063
G	6.50	0.256
H	125.00 ± 5.00	4.921 ± 0.197
J	6.00	0.236
K	230.00 ± 10.00	9.055 ± 0.394
L	6.35	0.250

Inch dimensions have been derived from millimetres

Dimensions without tolerances are nominal

Outline Notes

1. The recommended hole in the mounting plate is 76 mm (3.0 inches) diameter
2. A minimum clearance of 44.45 mm (1.750 inches) must be allowed below the mounting surface.
3. The mounting flange is the cathode connection, and this is connected internally to the mid-point of the heater.