CX1622G
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 been specifically designed to switch discharge circuits for pulsed lasers and for switching long pulses. It has an internally connected reservoir operated from the cathode heater supply and an internal shield to minimise X-ray emission from the region of the anode.

Peak forward anode voltage	-	35 kV max
Peak forward anode current	-	5.0 kA max
Average anode current	-	0.5 A max
Rate of rise of current	-	50 kA/µs max
Pulse repetition rate	-	200 pps max

GENERAL DATA

Electrical

Cathode (connected internally to mid-point of heater)	-	Oxide coated
Heater voltage	-	6.3 +0.2 V -0.3 V
Heater current	-	22 A
Tube heating time (minimum)	-	5.0 min

Mechanical

Overall length	-	304.8 mm (12.000 inches) max
Clearance required below mounting flange	-	44.45 mm (1.750 inches) min
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
Top cap connector (see note 2)	-	BS448-CT3
Cooling (see note 3)	-	Natural

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A1A-787034 Version 1, December 2016
122571

Template: DF764388A-11

MAXIMUM AND MINIMUM RATINGS
(Absolute values)

Anode (Pulse Laser Service)		Min	Max	
Peak forward anode voltage (see note 4)	.	-	35	kV
Peak inverse anode voltage (see note 5)	.	-	25	kV
Peak forward anode current	.	-	5.0	kA
Average anode current	.	-	0.25	A
Rate of rise of anode current (see notes 6 and 7)	.	-	50	kA/µs
Pulse repetition rate	.	-	50	pps

Anode (Pulse Modulator Service)		Min	Max	
Peak forward anode voltage (see note 4)	.	-	35	kV
Peak inverse anode voltage (see note 5)	.	-	25	kV
Peak forward anode current	.	-	5.0	kV
Average anode current	.	-	0.5	A
Rate of rise of anode current (see notes 6 and 7)	.	-	5.0	kA/µs
Pulse repetition rate	.	-	200	pps

Grid 2 (see note 7)		Min	Max	
Unloaded grid 2 drive pulse voltage (see note 8)	.	600	2000	V
Grid 2 pulse duration	.	0.5	-	µs
Rate of rise of grid 2 pulse (see note 6)	.	1.0	-	kV/µs
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 – DC Primed (see note 9)		Min	Max	
DC grid 1 unloaded priming voltage	.	75	150	V
DC grid 1 priming current	.	50	100	mA

Grid 1 – Pulsed (see note 7)		Min	Max	
Peak grid 1 drive current	.	0.3	1.0	A
Unloaded grid 1 drive pulse voltage (see note 8)	.	300	2000	V
Grid 1 pulse duration	.	1.0	-	µs
Rate of rise of grid 1 pulse (see note 6)	.	1.0	-	kV/µs
Peak inverse grid 1 voltage	.	-	450	V
Loaded grid 1 bias voltage	.	See note 10		

Cathode		Min	Max	
Heater voltage	.	6.3	+0.2 -0.3	V V
Tube heating time	.	5.0	-	min

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

CHARACTERISTICS

		Min	Typ	Max	
Critical DC anode voltage for conduction (see note 11)	.	-	0.5	2.0	kV
Anode delay time (see notes 11 and 12)	.	-	0.15	0.25	µs
Anode delay drift time (see notes 11 and 13)	.	-	20	50	ns
Time jitter (see note 11)	.	-	5.0	10.0	ns
Heater current (at 6.3 V)	.	18	22	25	A

NOTES

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

2. A large area anode connector, e2v technologies type MA360, is recommended.

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

4. The maximum permissible peak forward voltage for instantaneous starting is 25 kV and there must be no overshoot.

5. The peak inverse voltage must not exceed 10 kV for the first 25 µs after the anode pulse. Amplitude and rate of rise of inverse voltage contribute greatly to tube dissipation and electrode damage; if these are not minimised in the circuit, tube life will be shortened considerably. The aim should be for an inverse voltage of 3 - 5 kV peak with a rise time of 0.5 µs.

6. This rate of rise refers to that part of the leading edge of the pulse between 25% and 75% of the pulse amplitude.

7. 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.

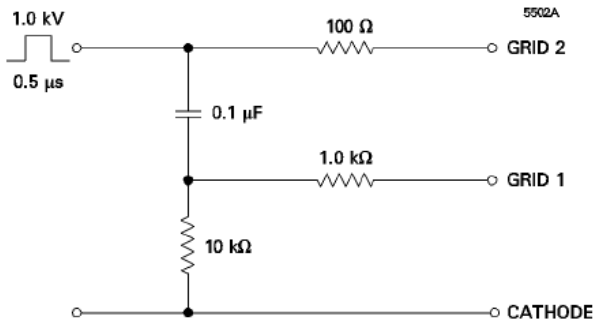


Fig. 1 Circuit for single pulse drive

8. 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.

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.

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

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

12. 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.

13. The drift in delay time over a period from 10 seconds to 10 minutes after reaching full voltage.

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

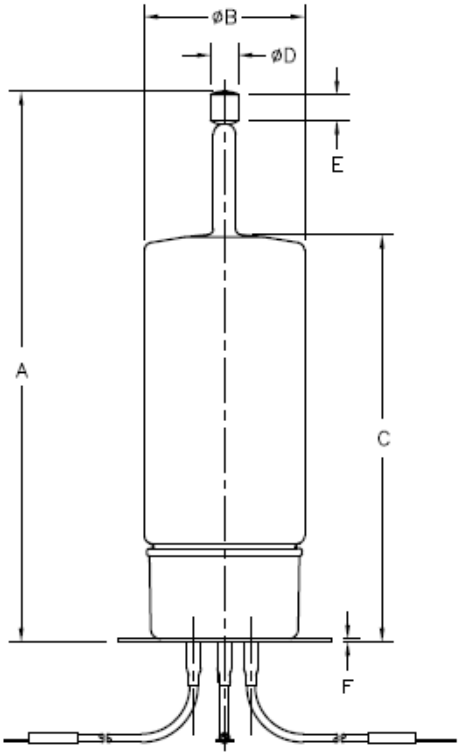
Equipment must be designed so that personnel cannot come into contact with high voltage circuits. All high voltage circuits and terminals must be enclosed and fail-safe interlock switches must be fitted to disconnect the primary power supply and discharge all high voltage capacitors and other stored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

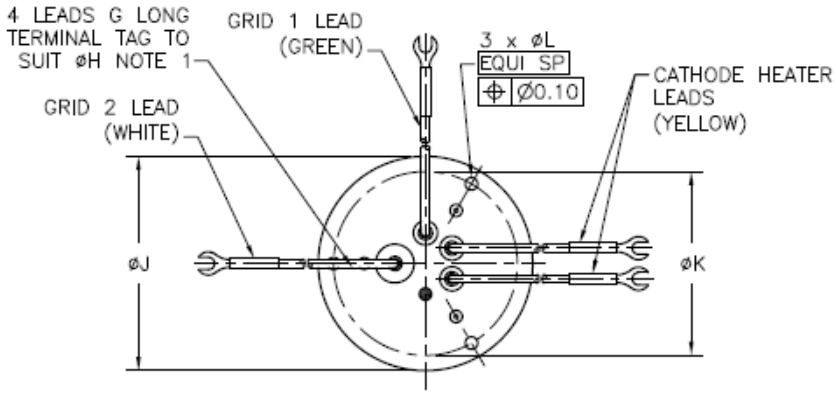
X-Ray Radiation

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)





NOTES:–
1. LEAD LENGTHS ARE MEASURED FROM BOTTOM FACE OF MOUNTING FLANGE TO CENTRE OF TAGS.

Ref	Millimetres	Inches
A	304.8 max	12.000 max
B	84.12 max	3.312 max
C	215.9 ± 13.0	8.500 ± 0.512
D	111.1	4.375
E	95.25	3.750
F	1.6	0.063
G	6.5	0.256
H	381.0	15.000
J	6.35	0.250
K	14.38 ± 0.18	0.566 ± 0.007
L	12.7 min	0.500 min

Inch dimensions have been derived from millimetres

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 (1.75 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.