

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

**ABRIDGED DATA**

Hydrogen-filled triode thyatron for pulse operation at high peak currents and high voltages. The tube has been designed to offer low grid spike performance when operated under conditions similar to MIL-PRF-1/1099G. It incorporates an internal shield to minimise X-ray emission from the region of the anode.

Peak forward anode voltage . . . . . 25 kV max  
 Peak anode current . . . . . 1000 A max  
 Average anode current . . . . . 1.0 A max  
 Anode heating factor . . . . .  $9.0 \times 10^9$  VApps max

**GENERAL**

**Electrical**

Cathode (connected internally to mid-point of heater) . . . . . oxide coated  
 Cathode heater voltage . . . . .  $6.3 \pm 5\%$  V  
 Cathode heater current . . . . . 19.5 A  
 Reservoir heater voltage (see note 1) . . . . . 4.0 to 5.5 V  
 Reservoir heater current (at 5.0 V) . . . . . 4.0 A  
 Tube heating time (minimum) . . . . . 5.0 min

**Mechanical**

Seated height . . . . . 311.93 mm (12.281 inches) max  
 Overall diameter (excluding mounting flange) . . . . . 84.12 mm (3.312 inches) max  
 Clearance required below mounting flange . . . . . 44.45 mm (1.750 inches) min  
 Net weight . . . . . 0.7 kg (1.5 pounds) approx  
 Mounting position . . . . . any  
 Top cap (see note 2) . . . . . BS448-CT3

**Cooling** . . . . . natural

**PULSE MODULATOR SERVICE  
 MAXIMUM AND MINIMUM RATINGS  
 (Absolute values)**

	Min	Max	
<b>Anode</b>			
Peak forward anode voltage (see note 3) . . . . .	-	25	kV
Peak inverse anode voltage (see note 4) . . . . .	-	25	kV
Peak anode current . . . . .	-	1000	A
Average anode current . . . . .	-	1.0	A
Rate of rise of anode current (see note 5) . . . . .	-	5000	A/ $\mu$ s
Anode heating factor . . . . .	-	$9.0 \times 10^9$	VApps



## MAXIMUM AND MINIMUM RATINGS (continued)

	Min	Max	
<b>Grid</b>			
Unloaded grid drive pulse voltage (see note 6)	700	1000	V
Grid pulse duration	1.5	3.0	μs
Rate of rise of grid pulse (see note 5)	1.0	-	kV/μs
Peak inverse grid voltage	-	450	V
Forward impedance of grid drive circuit	50	200	Ω
<b>Cathode</b>			
Heater voltage	6.3 ± 5%		V
Heater time	5.0	-	min
<b>Reservoir</b>			
Heater voltage (see note 1)	4.0	5.5	V
Heating time	5.0	-	min
<b>Environmental</b>			
Ambient temperature	-55	+75	°C
Altitude	-	3	km
	-	10 000	ft

## CHARACTERISTICS

	Min	Typical	Max	
Critical DC anode voltage for conduction (see note 7)	-	1.0	4.0	kV
Anode delay time (see notes 7 and 8)	-	0.35	1.0	μs
Anode delay time drift (see notes 7 and 9)	-	0.03	0.25	μs
Time jitter (see notes 7 and 10)	-	2.0	4.0	ns
Grid spike voltage (see note 11)	-	1.5	3.0	kV
Cathode heater current (at 6.3 V)	15	19.5	25	A
Reservoir heater current (at 5.0 V)	3.0	4.0	5.0	A

## NOTES

1. The reservoir voltage must be set to within ±5% of the value marked on the tube base.
2. A large area anode connector, E2V Technologies type MA360, is recommended.
3. This is the maximum forward hold-off voltage imposed on the thyatron in a pulse modulator circuit. Tubes are tested at 27.5 kV peak forward anode voltage, with the charging reactor inductance and pulse forming network capacitance resonant at 500 pps. For instantaneous starting applications the maximum permissible peak forward voltage is 18 kV; this must not be reached in less than 0.04 seconds and there must be no overshoot.

4. In pulsed operation the peak inverse voltage, exclusive of a spike of 0.05 μs duration, must not exceed 5.0 kV during the first 25 μs after the anode pulse.
5. This rate of rise refers to that part of the leading edge of the pulse between 25% and 75% of the pulse amplitude.
6. Measured with respect to cathode potential.
7. Typical figures are obtained on test using conditions of minimum grid drive. Improved performance can be expected by increasing the grid drive.
8. The time interval between the instant at which the rising unloaded grid pulse reaches 25% of its pulse amplitude and the instant when anode conduction takes place.
9. Normally taken as the drift in delay time over a 5-minute run at full ratings between the second and seventh minutes of operation.
10. The variation of firing time measured at 50% of current pulse amplitude.
11. When triggered from a 500 V, 2 μs pulse through 250 Ω, as described in MIL-PRF-1/1099G, at 25 kV anode voltage and a di/dt of 2500 A/μs, the typical grid spike is 1.5 kV.

## HEALTH AND SAFETY HAZARDS

E2V Technologies hydrogen 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 equipments 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 doors open.



### X-Ray Radiation

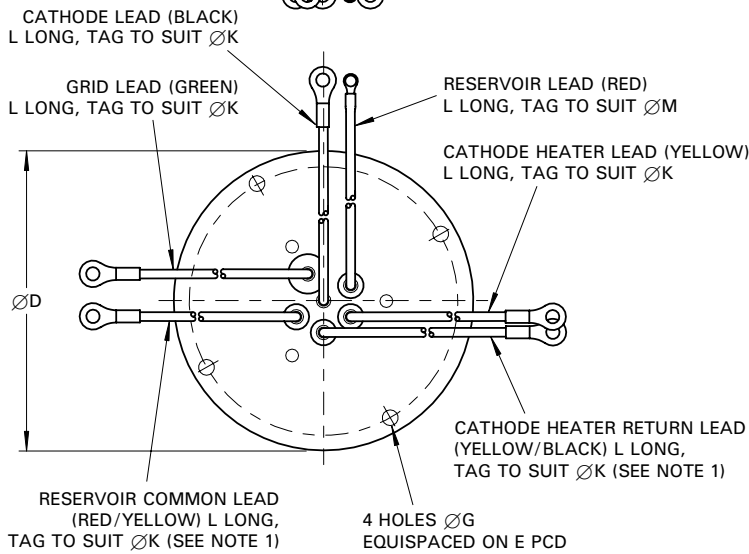
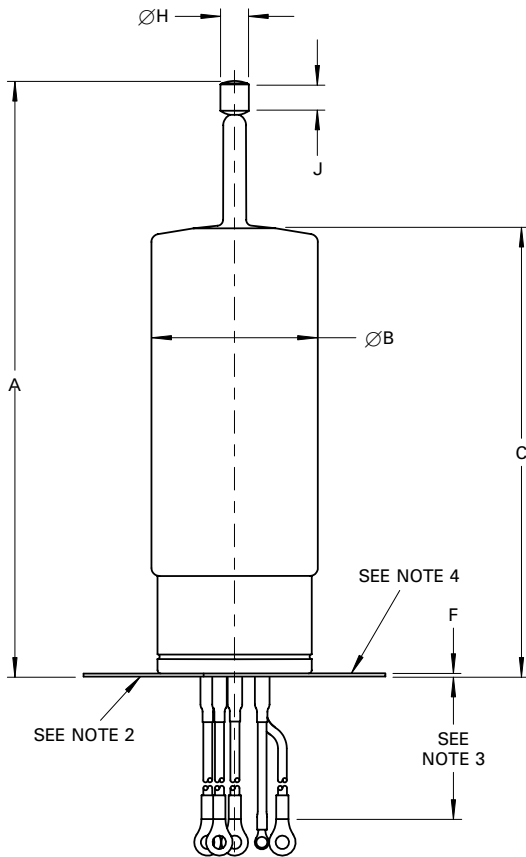
All high voltage devices produce X-rays during operation and may require shielding. The X-ray radiation from hydrogen thyratrons is usually reduced to a safe level by enclosing the equipment or shielding the thyatron with at least 1.6 mm (1/16 inch) thick steel panels.

Users and equipment manufacturers must check the radiation level under their maximum operating conditions.

# OUTLINE

(All dimensions without limits are nominal)

7659A



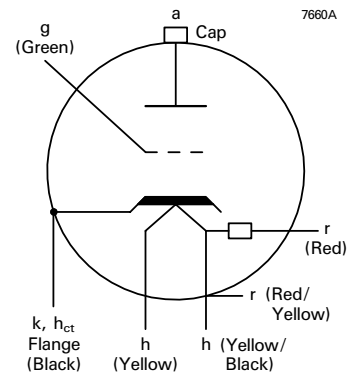
Ref	Millimetres	Inches
A	302.40 ± 9.53	11.906 ± 0.375
B	84.12 max	3.312 max
C	226.2 ± 14.3	8.906 ± 0.562
D	152.4	6.000
E	135.74	5.344
F	1.6	0.063
G	8.0	0.315
H	14.38 ± 0.18	0.566 ± 0.007
J	12.7 min	0.500 min
K	6.35	0.250
L	241.3 ± 12.7	9.500 ± 0.500
M	5.0	0.197

Inch dimensions have been derived from millimetres.

## Outline Notes

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

## SCHEMATIC DIAGRAM



Whilst E2V Technologies has taken care to ensure the accuracy of the information contained herein it accepts no responsibility for the consequences of any use thereof and also reserves the right to change the specification of goods without notice. E2V Technologies accepts no liability beyond that set out in its standard conditions of sale in respect of infringement of third party patents arising from the use of tubes or other devices in accordance with information contained herein.