TELEDYNE

Teledyne e2v

CX1570
Hydrogen-Filled Ceramic Thyratron

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

ABRIDGED DATA

Hollow anode, hydrogen-filled tetrode thyratron with ceramic envelope, featuring low jitter and low anode delay time drift. Suitable for use in high rate of rise, low inductance circuits such as those used for driving lasers.
A hydrogen reservoir is incorporated. The reservoir heater voltage can be adjusted to a value consistent with anode voltage hold-off in order to achieve the fastest rate of rise of current possible from the tube in the circuit.

Peak forward anode voltage	-	16 kV max
Peak forward anode current	-	1.5 kA max
Average anode current	-	0.3 A max

GENERAL DATA

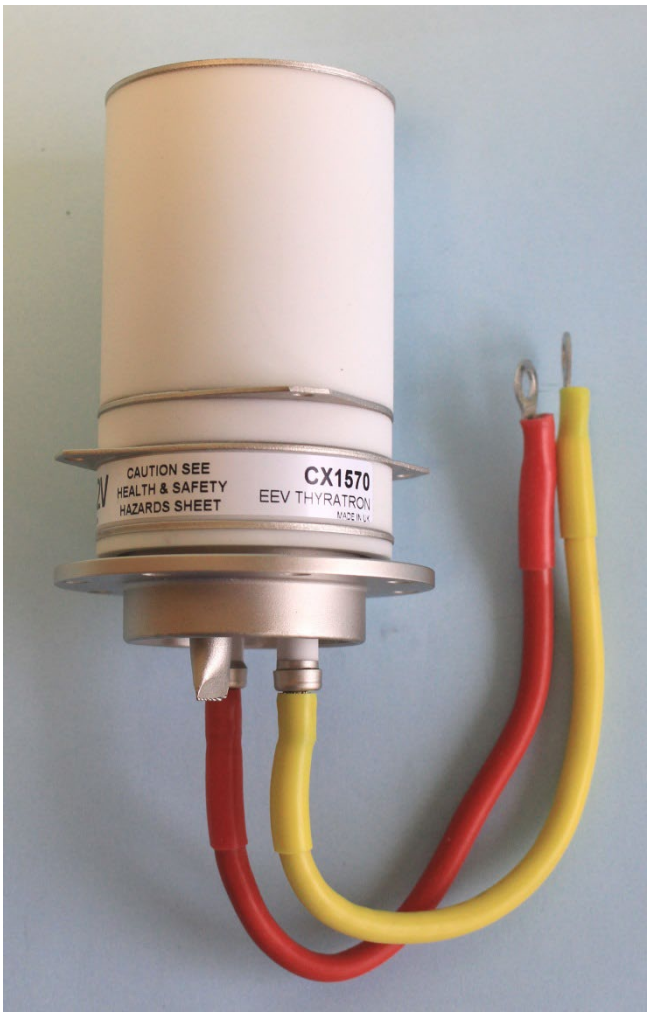
Electrical

Cathode (connected internally to one end of	-	Oxide coated
Cathode heater voltage	-	6.3 ± 7.5% V
Cathode heater current	-	8.5 A
Reservoir heater voltage (see note 1)	-	4.5 to 6.5 V
Reservoir heater current	-	1.0 A
Tube heating time (minimum)	-	3.0 min

Mechanical

Seated height	-	76.2 mm (3.000 inches) max
Clearance required below mounting flange	-	31.75 mm (1.250 inches) min
Overall diameter (mounting flange)	-	57.15 mm (2.250 inches) nom
Net weight	-	284 g (10 ounces) approx.
Mounting position (see note 2)	-	Any
Tube connections	-	See outline

Cooling: Natural, forced-air or liquid



Where natural cooling is insufficient to maintain the envelope temperatures below the specified rated values, cooling by forced-air, or by oil or coolant immersion may be used.
The temperature of the anode terminal and the base, measured at the points indicated on the outline drawing, must not exceed the values specified below.

Anode terminal	-	250 °C
Base	-	220 °C

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Approved for public release: Teledyne e2v APPROVED *(CM 5002586)*

OPERATING CONDITIONS

Anode		Min	Typ	Max	
Peak forward anode voltage	.	-	-	16	kV
Peak inverse anode voltage	.	-	-	16	kV
Peak anode current	.	-	-	1.5	kA
Average anode current	.	-	-	0.3	A
Rate of rise of anode current (see note 3)	.	-	100	-	kA/µs
Pulse duration	.	-	0.3	-	µs

Grid 2		Min	Typ	Max	
Unloaded grid 2 drive pulse voltage (see note 4)	.	200	-	750	V
Grid 2 pulse duration	.	0.25	-	-	µs
Rate of rise of grid 2 pulse (see note 3)	.	10	-	-	kV/µs
Peak inverse grid 2 voltage	.	-	-	200	V
Loaded grid 2 bias voltage	.	-50	-	-200	V
Forward impedance of grid 2 drive current	.	50	-	500	Ω

Grid 1 – DC Primed (see note 5)		Min	Typ	Max	
DC grid 1 unloaded priming voltage	.	75	-	150	V
DC grid 1 priming current	.	50	75	100	mA

Grid 1 – Pulsed		Min	Typ	Max	
Unloaded grid 1 drive pulse voltage (see note 4)	.	300	-	750	V
Grid 1 pulse duration	.	1.0	-	-	µs
Rate of rise of grid 1 pulse (see note 3)	.	1.0	-	-	kV/µs
Peak inverse grid 1 voltage	.	-	-	200	V
Loaded grid 1 bias voltage	.	See note 6			
Peak grid 1 drive current	.	0.15	-	0.5	A

Heaters		Min	Typ	Max	
Cathode heater voltage	.	6.3 ± 7.5%			V
Reservoir heater voltage (see note 1)	.	4.5	-	6.5	V
Tube heating time	.	3.0	-	-	min

Environmental		Min	Typ	Max	
Ambient temperature	.	-55	-	+130	°C
Altitude	.	- -	- -	3 10,000	km ft

CHARACTERISTICS

		Min	Typ	Max	
Critical DC anode voltage for conduction (see note 7)	.	-	0.2	0.3	kV
Anode delay time (see notes 7 and 8)	.	-	0.15	0.25	µs
Anode delay time drift (see notes 7 and 9)	.	-	20	50	ns
Time jitter (see note 7)	.	-	1.0	5.0	ns
Heater and reservoir current (at 6.3 V)	.	7.5	9.5	10.5	A

NOTES

1. The reservoir heater supply must be obtained either from the cathode heater supply or if a separate supply is used it must be decoupled with suitable capacitors (for example a 1 µF capacitor in parallel with a low inductance 1000 pF capacitor) to avoid damage to the reservoir.
   The recommended reservoir voltage for pulse applications at maximum anode voltage and maximum average current is stamped on the tube.
   For maximum rate of rise of current and optimum performance, the reservoir voltage should be set to the highest level compatible with maintenance of anode hold-off voltage.

2. The tube must be mounted by means of its mounting flange.

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

4. 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.

5. 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.

6. DC negative bias voltages must not be applied to grid 1. When grid 1 is pulse driven, 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.

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

8. The time interval between the instant when the unloaded grid 2 voltage passes cathode potential and the instant when anode conduction takes place.

9. 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

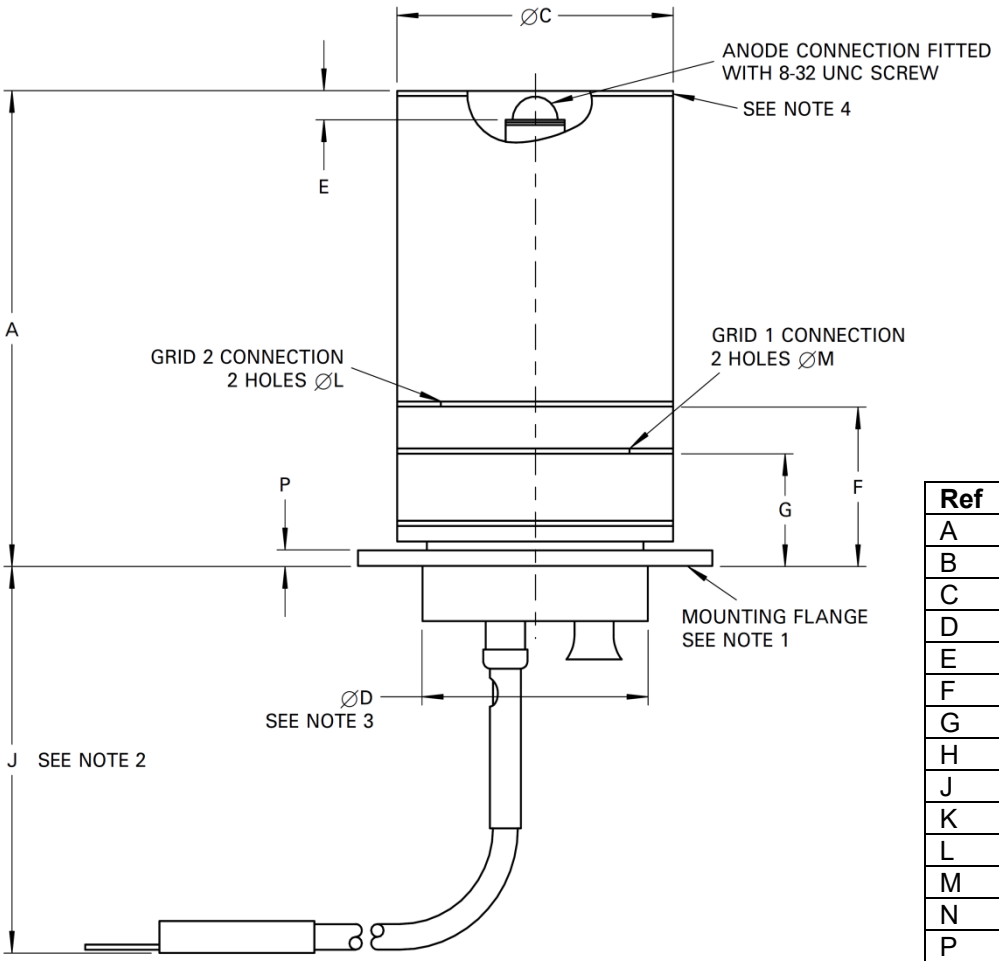
Equipment must be designed so that personnel cannot come into contact with high voltage circuits. All high voltage circuits and terminals must be enclosed and fail-safe interlock switches must be fitted to disconnect the primary power supply and discharge all high voltage capacitors and other stored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

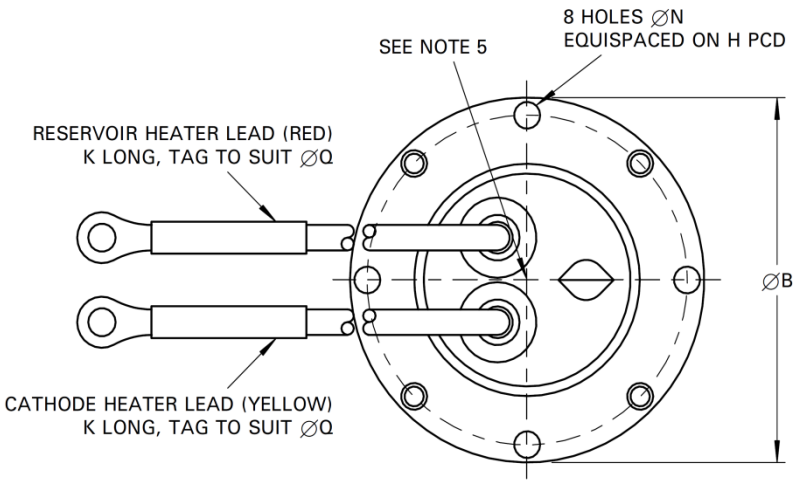
X-Ray Radiation

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)





Ref	Millimetres	Inches
A	76.2 max	3.000 max
B	57.15	2.250
C	44.45 ± 0.79	1.750 ± 0.031
D	36.5	1.437
E	5.59 ± 0.38	0.220 ± 0.015
F	23.88	0.940
G	17.8	0.700
H	51.59 ± 0.25	2.031 ± 0.010
J	31.75 min	1.250 min
K	152.4	6.000
L	3.05	0.120
M	3.05	0.120
N	4.19	0.165
P	2.54	0.100
Q	4.19	0.165

Inch dimensions have been derived from millimetres

Outline Notes

1. The mounting flange is the connection for the cathode, cathode heater return and reservoir heater return.
2. A minimum clearance of 31.75 mm (1.250 inches) must be allowed below the flange.
3. The recommended mounting hole is 38.10 mm (1.500 inches) diameter.
4. Anode temperature is measured at this point.
5. Base temperature is measured at this point.