

# E2V Technologies

## FX227 (Service Type CV372)

### Hydrogen Thyatron

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

#### ABRIDGED DATA

Hydrogen-filled triode thyatron, positive grid, for pulse operation. A hydrogen reservoir is incorporated.

Peak forward anode voltage . . . . .	3.0	kV max
Peak anode current . . . . .	40	A max
Average anode current . . . . .	50	mA max
Anode heating factor . . . . .	$0.36 \times 10^9$	VApps max
Peak output power . . . . .	60	kW max

#### GENERAL

##### Electrical

Cathode (connected internally to one end of heater) . . . . .	oxide coated
Heater voltage . . . . .	6.3 $\begin{matrix} + 5\% \\ - 10\% \end{matrix}$ V
Heater current . . . . .	2.7 A
Tube heating time (minimum) . . . . .	2.0 min

##### Mechanical

Overall length . . . . .	127.0 mm (5.000 inches) max
Overall diameter . . . . .	38.9 mm (1.532 inches) nom
Net weight . . . . .	60 g (2 ounces) approx
Mounting position (see note 1) . . . . .	any
Base . . . . .	medium UX4
Top cap . . . . .	BS 448-CT2

Cooling . . . . . natural

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

	Min	Max
<b>Anode</b>		
Peak forward anode voltage (see note 2) . . . . .	-	3.0 kV
Peak inverse anode voltage (see note 3) . . . . .	-	3.0 kV
Peak anode current . . . . .	-	40 A
Average anode current . . . . .	-	50 mA
Rate of rise of anode current (see note 4) . . . . .	-	750 A/ $\mu$ s
Anode heating factor . . . . .	-	$0.36 \times 10^9$ VApps

##### Grid

Unloaded grid drive pulse voltage (see note 5) . . . . .	175	-	V
Grid pulse duration . . . . .	2.0	-	$\mu$ s
Rate of rise of grid pulse (see note 4) . . . . .	160	-	V/ $\mu$ s
Peak inverse grid voltage . . . . .	-	200	V
Loaded grid bias voltage . . . . .	0	-120	V
Forward impedance of grid drive circuit . . . . .	-	1500	$\Omega$

##### Cathode

	Min	Max
Heater voltage . . . . .	6.3 $\begin{matrix} + 5\% \\ - 10\% \end{matrix}$	V
Tube heating time . . . . .	2.0	- min

##### Environmental

Ambient temperature . . . . .	-50	+90	$^{\circ}$ C
Altitude . . . . .	-	3	km
	-	10 000	ft



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## CHARACTERISTICS

	Min	Typical	Max	
Critical DC anode voltage for conduction (see note 6)	-	200	800	V
Anode delay time (see notes 6 and 7)	-	0.3	0.6	μs
Anode delay time drift (see notes 6 and 8)	-	0.05	0.15	μs
Time jitter (see notes 6 and 9)	-	3.0	20	ns
Recovery time	see note 10 and curves			
Heater current (at 6.3 V)	2.35	2.7	3.0	A

## NOTES

- The tube should preferably be clamped by the base only. Any clamps used on the bulb must not extend beyond 50 mm (2 inches) above the top of the base and should be made from material of low thermal conductivity.
- For instantaneous starting applications the maximum permissible peak forward voltage is 3.0 kV. This must not be reached in less than 0.04 s and there must be no overshoot.
- In pulsed operation the peak inverse anode voltage, exclusive of a spike of 0.05 μs duration, must not exceed 1.5 kV during the first 25 μs after the pulse.
- This rate of rise refers to that part of the leading edge of the pulse between 25% and 75% of the pulse amplitude.
- Measured with respect to cathode potential.
- The typical figures are obtained on test using conditions of minimum grid drive. Improved performance can be expected by increasing the grid drive.
- The time interval between a point on the leading edge of the unloaded grid pulse at 25% of the pulse amplitude and the point where anode conduction takes place.
- Normally taken as the drift in delay time over a 5-minute run at full ratings between the second and seventh minutes of operation.
- The variation of firing time measured at 50% of current pulse amplitude.
- The recovery characteristics are controlled on a sampling basis.

## 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.



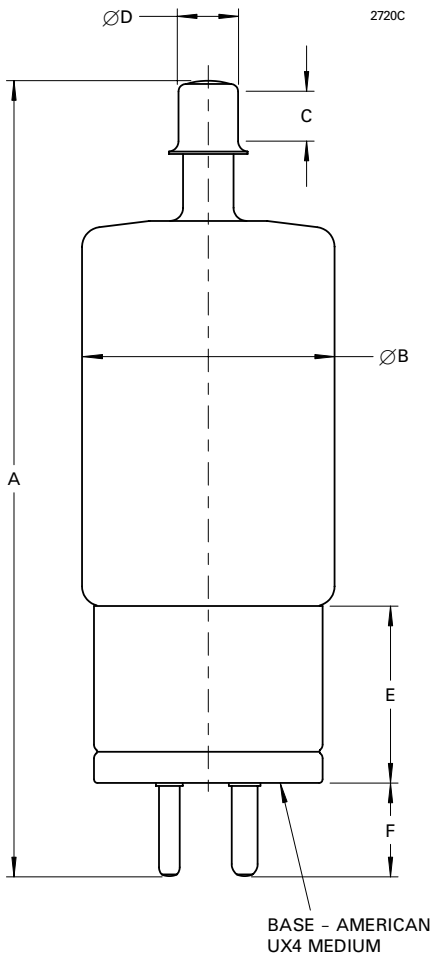
### X-Ray Radiation

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 thyratron with at least 1.6 mm (<sup>1</sup>/<sub>16</sub> inch) thick steel panels.

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

# OUTLINE

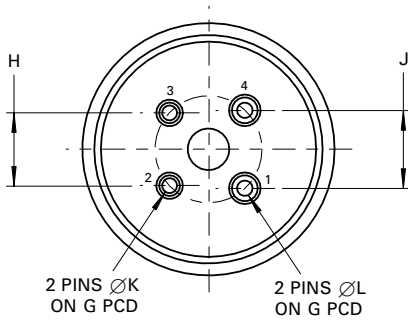
(All dimensions without limits are nominal)



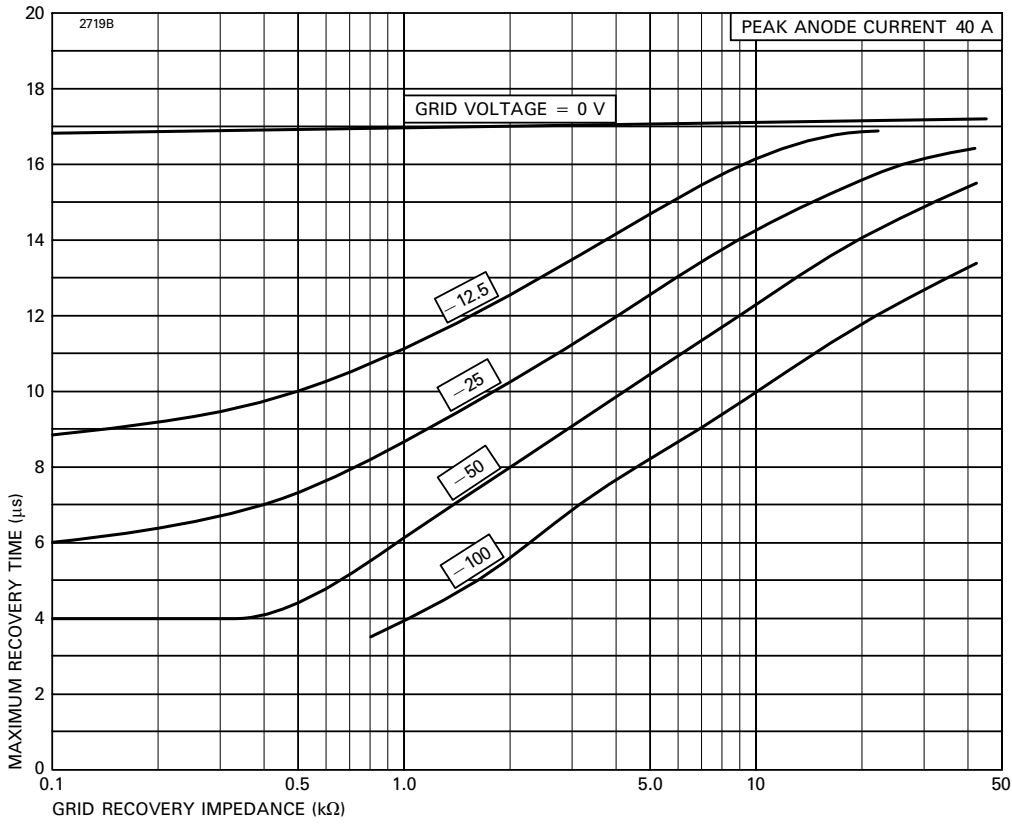
Ref	Millimetres	Inches
A	120.7 ± 6.4	4.750 ± 0.250
B	39.0 max	1.535 max
C	6.81 min	0.268 min
D	9.119 ± 0.076	0.359 ± 0.003
E	27.61 max	1.087 max
F	15.98 max	0.629 max
G	16.26	0.640
H	11.1	0.437
J	11.89	0.468
K	3.18 ± 0.13	0.125 ± 0.005
L	3.962 ± 0.076	0.156 ± 0.003

Inch dimensions have been derived from millimetres.

Pin	Element
1	Heater
2	Cathode
3	Grid
4	Heater, cathode
Top cap	Anode



# MAXIMUM RECOVERY CHARACTERISTICS



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