



HYDROGEN THYRATRON (Tetrode)

7384 (CX1119)

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INTRODUCTION

The 7384 is a hydrogen-filled tetrode designed for pulse modulation duty where low pulse to pulse jitter and low anode delay time drift are important. By virtue of its good recovery characteristics it is suitable for operation at high pulse repetition rates. The precise triggering associated with these tetrodes enables them to be used in parallel for switching higher powers. They may also be used for switching long pulses provided the mean current rating is not exceeded.

GENERAL DATA

(See also Preamble to Thyatron Section of this catalogue)

Electrical

Cathode (connected internally to mid-point of heater) ..	Oxide Coated
Heater Voltage	6.3 V
Heater Current	21.5 A
Cathode Heating Time (Minimum) (<i>See Note 7</i>)	5 minutes

Mechanical

Overall Length	12.5 inches (318 mm)	Max
Overall Diameter	3.32 inches (84 mm)	Max
Net Weight	1½ pounds (0.7 kg)	Approx
Mounting Position		Any
(Clamping is permissible by the base only)		

Base	Pin spacing as B5F. Metal shell with micaalex inset	
Top Cap (<i>See Note 1</i>)		B.S. 448/CT31
Cooling		Natural



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MINIMUM AND MAXIMUM RATINGS (Absolute Values)

	<i>Min</i>	<i>Max</i>	
Heater Voltage	5.58	6.75	V
Heater Current (at 6.3V)	18	25	A
Cathode Heating Time (<i>See Note 7</i>)	5	—	minutes
Ambient Temperature	—55 to +90		°C
Altitude	—	10 000	feet
Grid 1 Drive Pulse (<i>See Note 2</i>)	300	750	V
Grid 2 Drive Pulse (<i>See Note 3</i>)	200	750	V
Rate of Rise of Grid 1 Pulse (<i>See Note 4</i>)	1	—	kV/μsec
Rate of Rise of Grid 2 Pulse (<i>See Note 4</i>)	1	—	kV/μsec
Peak Inverse Grid 1 Voltage	—	450	V
Peak Inverse Grid 2 Voltage	—	450	V
D.C. Potential of Grid 1 (<i>See Note 5</i>)	—10 to +5		V
D.C. Potential of Grid 2 (<i>See Note 5</i>)	—120 to —50		V
Peak Grid 1 Drive Current	0.3	1.0	A
Grid 2 Pulse Delay (<i>See Note 6</i>)	0.5	3	μsec
Anode Take Over Voltage (<i>See Note 9</i>)	2.0	—	kV
Anode Delay Time (<i>See Note 9</i>)	—	0.2	μsec
Anode Delay Time Drift (<i>See Note 9</i>)	—	50	milli-μsec
Jitter (<i>See Note 9</i>)	—	5	milli-μsec
Peak Forward Anode Voltage (<i>See Note 7</i>)	—	25	kV
Peak Inverse Anode Voltage (<i>See Note 8 and Preamble</i>)	—	25	kV
Mean Anode Current	—	1.25	A
Peak Anode Current	—	1000	A

→ If the Pulse Repetition Rate is limited to 50 p.p.s. Max, then the Peak Anode Current may be increased to 2000A Max.

Rate of Rise of Anode Current	—	5000	A/μsec
Heating Factor	—	6.25×10^9	V.A.p.p.s.
Recovery Time (<i>See Note 3</i>)	—	20	μsec

→ Indicates a change

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NOTES

1. A large area anode connector such as Ediswan Clix T.C. 833 is recommended.
2. The trigger pulse should be measured at the valve socket with the thyatron removed. The pulse length should be $1\mu\text{sec}$ minimum at the 300 volt level and should overlap by $0.25\mu\text{sec}$ minimum the 200 volt level of the Grid 2 pulse. The impedance of the trigger circuit should be such that for the grid 1 pulse at a drive voltage within the stated limits the peak current will be within the limits given. The D.C. resistance must not exceed 2000 ohms.
3. The trigger pulse should be measured at the valve socket with the thyatron removed. The pulse length should be $0.5\mu\text{sec}$ minimum at the 200 volt level. The impedance of the trigger circuit should be in the range 50 to 800 ohms for the duration of the pulse. The D.C. resistance, calculated from the reduction in bias voltage at the grid terminal when a direct current of 5mA is being drawn, must not exceed 2000 ohms.

When the shortest recovery time is required it is important that the impedance of the trigger pulse generator be low throughout the recovery period. This impedance is defined as

$$\frac{e_{g2} - E_{ce2}}{i_{c2}}$$

and must not exceed 1000 ohms, if the recovery time is to be within the limit stated.

e_{g2} is the value of the Grid 2 voltage at any instant during the recovery period,

i_{c2} is the value of the Grid 2 current at the same instant and

E_{ce2} is the Grid 2 bias supply voltage

Improved recovery time will be obtained if this latter impedance is reduced. A safe rule when a pulse transformer is used is to make the sum of the values of the secondary shunting resistor and the grid series resistor less than the limit stated for the recovery impedance.

4. The instantaneous rate of rise of voltage must not be less than the given values between the 50V and 300V levels (Grid 1 pulse) and between the 0 and 200V levels (Grid 2 pulse) relative to the cathode.
5. The limits apply to the potential of the grid during the period between the completion of recovery and the commencement of the succeeding grid pulse. No external bias may be applied to grid 1. Negative bias must be applied to Grid 2 to bring the D.C. potential at the grid during this period to within the limits stated.



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6. Grid 2 pulse delay is defined as the time delay of the Grid 2 pulse after the Grid 1 pulse, measured at the 300V and 200V levels of the leading edges of the Grid 1 and Grid 2 pulses respectively. The measurement must be made with respect to the cathode at the valve socket with the thyatron removed.
7. To obtain best results in respect of anode delay time, drift and jitter the peak forward voltage should be greater than 6kV.
The maximum permissible peak forward voltage for instantaneous starting is 18.0kV and must not be attained in less than 40 milli-seconds after a preheating period of 15 minutes.
8. The peak inverse voltage must not exceed 5kV for the first 25 micro-seconds after the anode pulse. See also under 'Effect of Load' in preamble.
9. These are test figures. Better values can generally be expected under normal triggering conditions.

X-Ray Warning

X-rays are produced when the 7384 is operated with a forward or peak inverse anode voltage above 16 kV (absolute value). These rays can constitute a health hazard unless the valve is adequately shielded for X-ray radiation. This is entirely a function of high voltage devices and does not reflect on the design of the valve.

→ Indicates a change

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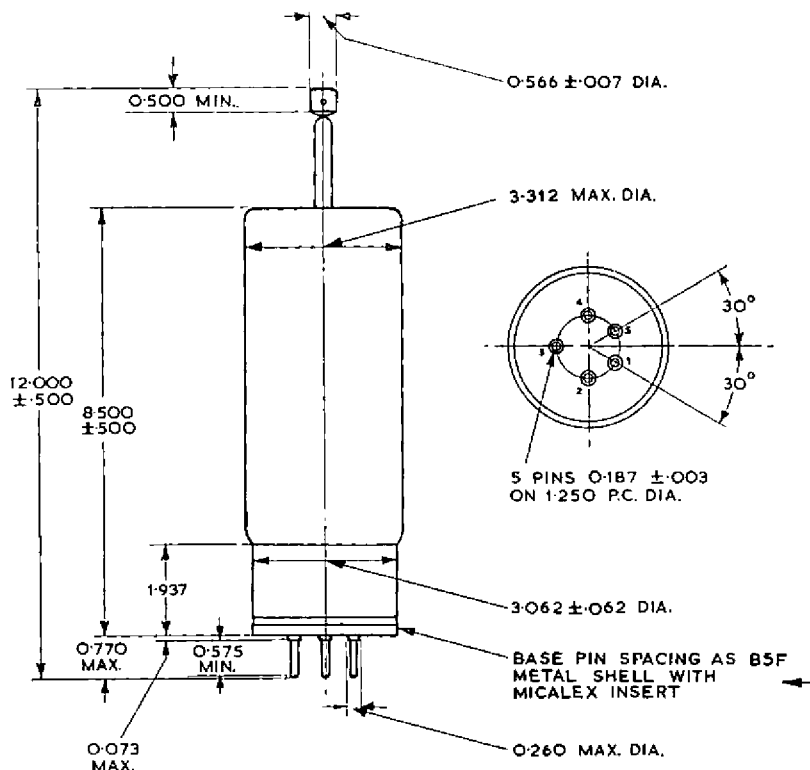


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OUTLINE



← INDICATES A CHANGE
ALL DIMENSIONS IN INCHES

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PIN	ELEMENT
1	HEATER
2	CATHODE AND HEATER CENTRE TAP
3	GRID No 2
4	GRID No 1
5	HEATER
CAP	ANODE

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