

ELECTRONIC TUBE REFERENCE

1907

Specialized - Thyatron electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
THYRATRON

Heavy-duty hydrogen thyatron with built-in reservoir for high-voltage pulsed switching. Its construction supports rapid, high-current pulse discharge.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / —	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Thyatron
No fixed ratings recorded.
Published ratings and characteristics promoted semantically from the approved source.

1907 — Heavy-Duty Grid-Controlled Gas Thyatron

The **1907** is a heavy-duty, hot-cathode, grid-controlled gas rectifier (thyatron) featuring an integrated hydrogen reservoir. Designed for high-power pulse-switching and high-voltage applications, this device is capable of handling peak anode voltages up to 25.0 kV and peak anode currents up to 500 A.

Overview

The 1907 is a specialized gas-filled thyatron designed to operate under extreme electrical conditions. Its primary applications include switching and clipper service in radar modulators, high-power pulse generators, switching in welding circuits, and magnetron aging. The inclusion of a built-in hydrogen

reservoir helps maintain stable gas pressure over the operating life of the tube, ensuring consistent triggering and conduction characteristics.

Mechanical Design, Mounting, and Environmental Constraints

The physical construction of the 1907 is optimized for high-voltage isolation and thermal management.

- **Bulb:** T-26 glass envelope.
- **Base:** Super Jumbo 5-Pin base.
- **Anode Connection:** A specialized top cap is used for the anode to maximize physical separation from the grid and cathode connections, preventing high-voltage arcing.
- **Mounting Position:** The tube may be mounted in either a vertical or horizontal position. Clamping is permissible by the base only; clamping the glass envelope is prohibited.
- **Cooling:** No direct cooling stream of air should be applied to the tube envelope, as uneven cooling can disrupt the internal gas pressure equilibrium.
- **Ambient Temperature Range:** The tube is rated for operation in ambient temperatures from -55 to +75°C.
- **Shielding:** The device must be kept away from strong external electromagnetic or electrostatic fields, which could prematurely ionize the internal gas.

Heater, Reservoir, and Pin Connections

The 1907 requires separate heater supplies for its main cathode and its internal hydrogen reservoir.

Heater and Reservoir Characteristics

The main cathode heater operates at a nominal voltage of 6.3 V ($\pm 5\%$) and draws a high current of 15.0 to 22.0 A. Due to the thermal mass of the heavy-duty cathode, a minimum cathode heating time of 15 minutes must be observed before applying anode voltage.

The hydrogen reservoir heater operates with a voltage range of 3.0 to 5.5 V. The optimum reservoir voltage for specific operation is printed on the individual tube base and must be maintained within $\pm 5\%$. At a reservoir voltage of 4.5 V, the reservoir heater draws a current of 2.0 to 5.0 A.

Pinout Configuration

The Super Jumbo 5-Pin base and top cap connections are assigned as follows:

Pin / Cap	Connection	Description
Pin 1	H_k + R	Heater-Cathode and Reservoir common
Pin 2	K, H_c	Cathode, Heater Center-tap

Pin / Cap	Connection	Description
Pin 3	G	Grid
Pin 4	H_r	Heater Reservoir
Pin 5	H_k	Heater-Cathode
Top Cap	A	Anode

Electrical Ratings and Operating Limits

The absolute maximum and minimum ratings for the 1907 are defined to prevent damage during high-power switching:

- **Peak Anode Voltage (epy):** 25.0 kV maximum. Instantaneous starting is not recommended. If instantaneous starting is absolutely necessary, the maximum permissible peak anode voltage is limited to 18.0 kV, which must be attained in no less than 0.04 μ s.
- **Peak Inverse Anode Voltage (epx):** 25.0 kV maximum, with a minimum limit of 5% of the peak anode voltage (epy). The inverse voltage must not exceed 5 kV during the first 25 μ s immediately following the anode pulse.
- **Peak Anode Current (Ib):** 500 A maximum.
- **Average Anode Current (Ib):** 0.5 A DC maximum.
- **Rate of Rise of Cathode Current:** 2500 A/ μ s maximum.
- **Starting Anode Voltage:** 5 kV DC minimum.
- **Peak Inverse Grid Voltage (egx):** 450 V maximum.

Dissipation and Duty Cycle Calculations

The operating limits of the tube are further governed by its dissipation factor and duty cycle:

- **Dissipation Factor:** The maximum dissipation factor is 6.25×10^9 , applicable for pulse repetition rates (prf) up to 1200 pps. It is calculated using the formula: $epy \times Ib \times prf \leq 6.25 \times 10^9$
- **Duty Cycle:** The maximum duty cycle is 0.001, calculated using the formula: $prf \times t_p \leq 0.001$ where t_p is the anode pulse width in microseconds (μ s).

Grid Drive Requirements

To ensure reliable triggering, the grid drive signal (measured at the tube socket with the grid disconnected) must meet the following minimum specifications:

- **Peak Grid Voltage (egy):** 550 V minimum.
- **Rate of Rise of Grid Voltage:** 1800 V/ μ s minimum.
- **Grid Pulse Duration:** 2.0 μ s minimum.
- **Driver Impedance:** 50 to 200 Ω .
- **Peak Inverse Grid Voltage (egx):** 450 V.

Circuit-Specific Operating Example

A typical operating point (Operation 1) under resonant charging conditions demonstrates the tube's capabilities:

Parameter	Value
Peak Anode Voltage (epy)	25 kV
Rate of Rise of Cathode Current	2500 A/μs
Peak Anode Current	500 A
Anode Pulse Duration (<i>t_p</i>)	2 μs
Pulse Repetition Rate (prp)	500 pps

Under these conditions, the duty cycle is calculated as: $prp \times t_p = 500 \text{ pps} \times 2 \times 10^{-6} \text{ s} = 0.001$ This is exactly equal to the maximum duty cycle limit of 0.001.

The dissipation factor is calculated as: $epy \times Ib \times prp = 25,000 \text{ V} \times 500 \text{ A} \times 500 \text{ pps} = 6.25 \times 10^9$ This is exactly equal to the maximum dissipation factor limit of 6.25×10^9 .

Technical Summary

The **1907** is a high-power, grid-controlled hydrogen thyatron housed in a T-26 bulb with a Super Jumbo 5-Pin base. It is designed for high-voltage, high-current switching applications, supporting peak anode voltages up to 25.0 kV and peak currents up to 500 A. The tube features a separate hydrogen reservoir heater requiring 3.0 to 5.5 V to maintain optimal gas pressure, alongside a main heater drawing 15.0 to 22.0 A at 6.3 V. With its strict grid drive requirements, 15-minute cathode preheating time, and specific mounting and cooling constraints, the 1907 provides highly reliable performance in radar modulators, pulse generators, and industrial welding switchgear.



SOURCE OPERATING CONDITIONS

SOURCE PDF

1950 Sylvania

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1950 SYLVANIA
Section 1 · Thyatron

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	18.5 A	Approximate from published operating range

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Hydrogen Reservoir	Built-in	—

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