

ELECTRONIC TUBE REFERENCE

1007

Rectifier - Full Wave electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

RECTIFIER-RECTIFIER

Gas-filled full-wave rectifier for DC power-supply applications. Its two rectifier sections provide substantial current capability and relatively low forward voltage compared with conventional high-vacuum rectifiers.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	5
NOMINAL HEATER	1 V / 1.2 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	1200 V
NOMINAL OUTPUT CURRENT	110 mA
PEAK FORWARD CURRENT	510 mA
FORWARD VOLTAGE DROP	24 V
Values promoted from published ratings/characteristics where identifiable.	

SECTION 2 Rectifier	
PEAK INVERSE VOLTAGE	1200 V
NOMINAL OUTPUT CURRENT	110 mA
PEAK FORWARD CURRENT	510 mA
FORWARD VOLTAGE DROP	24 V
<i>Physical rectifier section 2; electrical properties populated from the same published ratings applicable to the identical rectifier path.</i>	

1007 — Full-Wave Gaseous Rectifier

The **1007** is a full-wave gaseous rectifier tube designed for power rectification applications. It is characterized by its highly versatile design, which allows it to operate either as a directly heated (hot-cathode) rectifier or as a cold-cathode rectifier. The tube features an oxide-coated filament and a gaseous atmosphere, and it is housed in a glass envelope with an octal base.

Construction, Physical Dimensions, and Basing

The 1007 is constructed with an oxide-coated filament and two anodes enclosed in a gaseous atmosphere. The tube is housed in an MT-8 glass bulb (also designated as an M.21-0.1 envelope) and utilizes a small wafer octal 5-pin base. Although the base is physically an octal type, three of the standard eight pin positions are omitted, leaving five active pins.

The physical dimensions of the device are as follows:

- **Maximum Overall Length:** 2 5/8 inches (approximately 66.8 mm, including pins)
- **Maximum Seated Height:** 2 1/16 inches
- **Maximum Diameter:** 1 5/16 inches (approximately 33.5 mm)

The basing arrangement is designated as **5AQ-1-0** or **5.0-LA**. When looking at the bottom of the base (with the pins facing the observer), the pin connections are assigned as follows:

Pin Number	Connection	Description
Pin 1	External Shield	Blindage externe
Pin 2	Omitted	Missing pin
Pin 3	Anode No. 1	Plate 1
Pin 4	Omitted	Missing pin
Pin 5	Anode No. 2	Plate 2
Pin 6	Omitted	Missing pin
Pin 7	Filament	Filament terminal

Pin Number	Connection	Description
Pin 8	Filament	Filament terminal

The tube is designed to be mounted in any position.

Heater and Cathode Modes

The 1007 can be operated in two distinct cathode modes depending on whether the filament is energized:

1. **Hot-Cathode (Directly Heated) Mode:** The filament is supplied with a nominal voltage of **1.0 V** (with an allowable tolerance of $\pm 10\%$). Under this condition, the nominal heater current is **1.2 A**.
 - *Filament Power Calculation:* Using the nominal voltage and current, the calculated power consumption of the filament is: $\text{Power} = 1.0 \text{ V} \times 1.2 \text{ A} = 1.2 \text{ W}$
2. **Cold-Cathode Mode:** The filament is left unheated (**0 V** supply voltage, drawing **0 A** of current). In this mode, the tube relies entirely on the gaseous ionization initiated by the anode voltage to establish conduction, functioning as a cold-cathode glow-discharge rectifier.

Electrical Characteristics and Single-Tube Operation

When operating as a single-tube full-wave rectifier with a condenser-input filter (typically utilizing an 8 μF input capacitor), the electrical characteristics of the 1007 depend heavily on the chosen cathode mode.

Hot-Cathode Operation (1.0 V Filament)

When the filament is heated, the tube exhibits a lower starting voltage and is capable of operating down to zero load current:

- **Minimum Peak Starting Voltage:** 150 V to 170 V is required to initiate conduction.
- **Minimum D-C Output Current:** 0 mA (no minimum load current is required to maintain conduction).
- **Maximum D-C Output Current:** 110 mA to 120 mA.
- **Maximum Peak Anode Current:** 330 mA (with some ratings permitting up to 1.0 A peak).
- **Maximum Peak Inverse Voltage:** 980 V to 1,080 V.
- **Maximum Peak Anode Voltage:** 490 V.

Cold-Cathode Operation (0 V Filament)

When operated with an unheated filament, the tube requires a higher voltage to initiate the gas discharge, and a minimum load current must be maintained to prevent the discharge from extinguishing:

- **Minimum Peak Starting Voltage:** 340 V is required to start conduction.
- **Minimum D-C Output Current:** 30 mA must be maintained through the tube during operation.
- **Maximum D-C Output Current:** 110 mA to 120 mA.
- **Maximum Peak Anode Current:** 330 mA (with some ratings permitting up to 1.0 A peak).
- **Maximum Peak Inverse Voltage:** 980 V to 1,080 V.

- **Maximum Peak Anode Voltage:** 490 V.

Internal Voltage Drop

Regardless of the cathode mode, the tube exhibits a low and relatively constant internal voltage drop during conduction, which is characteristic of gaseous rectifiers. The average dynamic voltage drop is **24 V**, with a specified maximum internal voltage drop of **35 V**.

Parallel Multi-Tube Operation

For applications requiring different current or voltage capabilities, two 1007 tubes can be operated in parallel. In parallel configurations, a balancing network is required to ensure that both tubes ionize and share the load current. This network typically consists of a 1 M Ω resistor connected across the anodes of each tube, along with a series capacitor (C_1). The value of C_1 and the overall circuit regulation must be carefully selected to guarantee that both tubes start reliably.

The operating parameters for two-tube parallel configurations with a condenser-input filter are defined as follows:

Hot-Cathode Parallel Operation (1.0 V Filament)

- **Minimum Peak Starting Voltage:** 170 V
- **Minimum D-C Output Current:** 0 mA per tube
- **Maximum D-C Output Current:** 85 mA per tube
- **Maximum Peak Anode Current:** 510 mA per tube
- **Maximum Peak Inverse Voltage:** 1200 V
- **Maximum Peak Anode Voltage:** 600 V
- **Average Dynamic Voltage Drop:** 24 V

Cold-Cathode Parallel Operation (0 V Filament)

- **Minimum Peak Starting Voltage:** 340 V
- **Minimum D-C Output Current:** 30 mA per tube (required to maintain conduction in both tubes)
- **Maximum D-C Output Current:** 85 mA per tube
- **Maximum Peak Anode Current:** 510 mA per tube
- **Maximum Peak Inverse Voltage:** 1200 V
- **Maximum Peak Anode Voltage:** 600 V
- **Average Dynamic Voltage Drop:** 24 V

Environmental and Temperature Ratings

The 1007 is rated for operation across a wide environmental temperature range. The allowable operating temperature limits for the tube are:

- **Minimum Operating Temperature:** -55 °C

- **Maximum Operating Temperature:** +70 °C

These temperature limits ensure reliable gas ionization and stable electrical characteristics under varying environmental conditions.

Technical Summary

The **1007** is an octal-based, full-wave gaseous rectifier tube capable of operating in both directly heated (hot-cathode) and cold-cathode modes. When operated with a **1.0 V, 1.2 A** filament supply, it provides a low starting voltage of **150 V to 170 V** and can operate down to zero load current. In cold-cathode mode (**0 V** filament), it eliminates the need for a filament supply but requires a higher starting voltage of **340 V** and a minimum load current of **30 mA** to maintain conduction.

Depending on the circuit configuration (single-tube or two-tube parallel) and the cathode mode, the tube supports maximum D-C output currents ranging from **85 mA to 120 mA** per tube, peak anode currents up to **510 mA** (or **1.0 A** peak under specific ratings), and peak inverse voltages up to **1200 V**. With a low average dynamic voltage drop of **24 V to 35 V** and an operating temperature range of **-55 °C to +70 °C**, the 1007 offers a highly adaptable solution for full-wave power rectification.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1938 Raytheon

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

1938 RAYTHEON

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
¥Filament Voltage (RMS or DC)	1 volts	¥Filament Voltage (RMS or DC) 1.0 0 1.0 0 volts
Nominal Heater Current	1.2 amp	Nominal Heater Current 1.2 0 1.2 0 amp
(Per tube)	30 ma	(Per tube) 0 30 0 30 ma
(Per tube)	85 ma	(Per tube) 110 110 85 85 ma
(Per tube)	510 ma	(Per tube) 330 330 510 510 ma
age (Full Wave)	340 volts	age (Full Wave) 170 340 170 340 volts
Average Dynamic Voltage Drop	24 volts	Average Dynamic Voltage Drop 24 24 24 24 volts
*Maximum Peak Inverse Voltage	1200 volts	*Maximum Peak Inverse Voltage 980 980 1200 1200 volts
*Maximum Peak Anode Voltage	800 volts	*Maximum Peak Anode Voltage 490 490 600 800 volts

1938 RAYTHEON

Section 2 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
¥Filament Voltage (RMS or DC)	1 volts	¥Filament Voltage (RMS or DC) 1.0 0 1.0 0 volts
¥Filament Voltage (RMS or DC)	1 volts	¥Filament Voltage (RMS or DC) 1.0 0 1.0 0 volts
Nominal Heater Current	1.2 amp	Nominal Heater Current 1.2 0 1.2 0 amp
Nominal Heater Current	1.2 amp	Nominal Heater Current 1.2 0 1.2 0 amp
(Per tube)	30 ma	(Per tube) 0 30 0 30 ma
(Per tube)	30 ma	(Per tube) 0 30 0 30 ma

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
(Per tube)	85 ma	(Per tube) 110 110 85 85 ma
(Per tube)	85 ma	(Per tube) 110 110 85 85 ma
(Per tube)	510 ma	(Per tube) 330 330 510 510 ma
age (Full Wave)	340 volts	age (Full Wave) 170 340 170 340 volts
Average Dynamic Voltage Drop	24 volts	Average Dynamic Voltage Drop 24 24 24 24 volts
*Maximum Peak Inverse Voltage	1200 volts	*Maximum Peak Inverse Voltage 980 980 1200 1200 volts
*Maximum Peak Anode Voltage	800 volts	*Maximum Peak Anode Voltage 490 490 600 800 volts

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