



## ELECTRONIC TUBE REFERENCE

# 19A3

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

**1 SECTION**

CONSTRUCTION

**RECTIFIER**

Half-wave high-vacuum rectifier for transformerless radio-receiver power supplies. Its 19 V series-string heater and moderate current capability suit compact mains-operated receivers.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | E7-1              | BASE PINS            | 7             |
| NOMINAL HEATER      | 19 V / 150 mA     | PARALLEL HEATER      | – / –         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

## SECTION RATINGS

|                            |        |
|----------------------------|--------|
| <b>SECTION 1</b> Rectifier |        |
| PEAK INVERSE VOLTAGE       | 350 V  |
| NOMINAL OUTPUT CURRENT     | 70 mA  |
| PEAK FORWARD CURRENT       | 450 mA |

## 19A3 — Half-Wave Vacuum Rectifier

### Overview

The **19A3** is a miniature half-wave vacuum rectifier designed primarily for use in transformer-less radio receivers, particularly FM/AM receivers. Housed in a compact T5 1/2 glass envelope with a 7-pin miniature button base, this tube is engineered to supply DC power directly from AC power lines. A notable feature of the 19A3 is its tapped heater, which allows for the integration of a panel lamp directly into the heater circuit, simplifying power supply designs in series-string consumer electronics.

## Mechanical and Physical Specifications

The 19A3 is constructed using a T5 1/2 glass bulb and utilizes an E7-1 Miniature Button 7-Pin base. It is designed to operate in any mounting position. The physical dimensions of the tube are as follows:

- **Maximum Overall Length:** 2-5/8 inches
- **Seated Length:** 2-3/32 to 2-3/8 inches
- **Maximum Diameter:** 3/4 inch

## Heater and Pinout Configuration

The heater of the 19A3 is tapped to facilitate operation with or without a panel lamp. The nominal heater current is **0.15 A**. The voltage distribution across the heater pins depends on whether a panel lamp (rated at 3.2 V, 0.16 A) is connected:

### Heater Voltage Ratings

- **Without Panel Lamp:**
  - Voltage between Pins 3 and 4: 19 V
  - Voltage between Pins 4 and 6: 3.0 V
- **With Panel Lamp (3.2 V, 0.16 A):**
  - Voltage between Pins 3 and 4: 17.3 V
  - Voltage between Pins 4 and 6: 2.2 V

### Pin Connections (E7-1 Base)

The underside view of the E7-1 base provides the following connections:

| Pin | Connection                              |
|-----|-----------------------------------------|
| 1   | NC (No Connection)                      |
| 2   | NC (No Connection)                      |
| 3   | Heater (H)                              |
| 4   | Heater Tap (H)                          |
| 5   | Plate (P)                               |
| 6   | Heater Tap / Panel Lamp Connection (HL) |
| 7   | Cathode (K)                             |

## Maximum Ratings

The maximum ratings for the 19A3 are established under the Design Center system:

- **Peak Inverse Plate Voltage:** 350 V
- **Peak Plate Current:** 450 mA
- **Peak Heater-Cathode Voltage:**
  - Heater negative with respect to cathode: 350 V
  - Heater positive with respect to cathode: 350 V
- **Maximum D.C. Output Current:**
  - With panel lamp and no shunting resistor: 60 mA
  - With panel lamp and shunting resistor: 70 mA
  - Without panel lamp: 70 mA

## Typical Operation and Circuit Integration

The 19A3 is typically operated in a half-wave rectifier circuit with a capacitor-input filter. The operating parameters vary depending on the AC supply voltage, the presence of a panel lamp, and the filter configuration.

### Typical Operating Points

| Parameter                                      | Case 1 (With Lamp) | Case 2 (No Lamp) | Case 3 (With Lamp) | Case 4 (No Lamp) |
|------------------------------------------------|--------------------|------------------|--------------------|------------------|
| A.C. Plate Supply Voltage (RMS)                | 100 V              | 117 V            | 127 V              | 127 V            |
| D.C. Output Current                            | 70 mA              | 60 mA            | 70 mA              | 70 mA            |
| Panel Lamp Shunting Resistor                   | 200 $\Omega$       | —                | 200 $\Omega$       | —                |
| Effective Plate-Supply Impedance               | 25 $\Omega$        | 25 $\Omega$      | 40 $\Omega$        | 0 $\Omega$       |
| Filter Input Capacitor                         | 100 $\mu$ F        | 50 $\mu$ F       | 100 $\mu$ F        | 100 $\mu$ F      |
| Approx. D.C. Output Voltage (Half-Load, 35 mA) | —                  | —                | —                  | 150 V            |

| Parameter                                      | Case 1 (With Lamp) | Case 2 (No Lamp) | Case 3 (With Lamp) | Case 4 (No Lamp) |
|------------------------------------------------|--------------------|------------------|--------------------|------------------|
| Approx. D.C. Output Voltage (Full-Load, 70 mA) | —                  | —                | —                  | 140 V            |

## Circuit-Specific Operating Details

When incorporating a panel lamp (3.2 V, 0.16 A) into the circuit, the lamp is connected across Pin 4 and Pin 6. To protect the lamp and regulate current, a shunting resistor (200 ohms) is placed in parallel with the lamp.

In this configuration:

1. The AC power line is connected to Pin 3 and Pin 4 (via the parallel network of the panel lamp and the shunting resistor).
2. The series heater string of the remaining tubes in the receiver is connected starting from Pin 6 to the other side of the AC line.
3. The plate (Pin 5) is connected directly to the AC line.
4. The cathode (Pin 7) serves as the source for the rectified DC output.

This arrangement ensures that the panel lamp is safely integrated into the series heater string while the 19A3 performs its primary rectification function.

## Technical Summary

The **19A3** is a compact, 7-pin miniature half-wave vacuum rectifier designed for transformer-less AM/FM radio receivers. Operating with a 0.15 A heater current, it features a tapped heater design that accommodates a 3.2 V, 0.16 A panel lamp across Pins 4 and 6. With a peak inverse plate voltage rating of 350 V and a maximum DC output current of up to 70 mA (depending on the panel lamp configuration), the 19A3 provides a reliable and space-efficient solution for direct-line rectification in series-string consumer electronics.

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