



ELECTRONIC TUBE REFERENCE

19DE3

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

RECTIFIER

Compactron heater-cathode diode designed specifically for damper service in color-television horizontal-deflection circuits. High inverse-voltage and current capability support energy-recovery operation in the line-scan stage.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12HX	BASE PINS	12
NOMINAL HEATER	19 V / 600 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
MAXIMUM PLATE DISSIPATION	9 W
PEAK INVERSE VOLTAGE	5000 V
NOMINAL OUTPUT CURRENT	350 mA
PEAK FORWARD CURRENT	1.05 A
FORWARD VOLTAGE DROP	25 V
TV damper diode. Promoted values include 5 kV peak inverse voltage, 350 mA DC output current, 1.05 A steady-state peak plate current, and approximately 25 V tube drop at 700 mA DC.	

19DE3 — Compactron Damper Diode

An indirectly heated, single-diode vacuum tube designed for television damper service, featuring a Compactron envelope and a specialized cathode construction to withstand high electrostatic fields.

Overview

The **19DE3** is a single heater-cathode type diode housed in a glass Compactron envelope. It is designed primarily for use as a damping diode in the horizontal deflection circuits of color television receivers. The device features high peak inverse voltage ratings and a specialized cathode construction to withstand the demanding electrical environments of television scanning systems.

Construction and Physical Characteristics

The 19DE3 is constructed with a T-9 glass envelope and an E12-70 button 12-pin Compactron base. A key design feature of this tube is its **diffusion bonded cathode**. This construction technique practically eliminates plate-to-cathode arcing, which can otherwise be caused by emissive particles being pulled from the cathode surface by the high electrostatic fields present during horizontal retrace.

The physical dimensions of the 19DE3 are specified as follows:

- **Maximum Diameter:** 1.188 inches
- **Minimum Diameter:** 1.062 inches
- **Maximum Overall Length:** 3.875 inches
- **Maximum Seated Height:** 3.500 inches
- **Minimum Seated Height:** 3.250 inches

The tube features a C1-1 small top cap, which provides the connection for the cathode. The 19DE3 can be operated in **any position**.

Heater and Warm-up Ratings

The heater of the 19DE3 is designed for series-string or parallel operation, with a controlled warm-up time to ensure reliable operation in series-connected heater chains.

Parameter	Value
Nominal Heater Voltage (AC or DC)	19 V (for a bogey tube at 0.6 A)
Heater Current	0.6 ± 0.04 A
Average Heater Warm-up Time	11 seconds

The 11-second warm-up characteristic helps minimize voltage surges across other heaters in a series-string circuit during the initial power-on phase.

Pinout and Basing Diagram

The 19DE3 utilizes the **EIA 12HX** basing arrangement. The connections are distributed across the 12-pin button base, with the cathode connection routed separately to the top cap to maximize insulation and voltage isolation.

- **Pin 1:** Heater
- **Pin 2:** Internal Connection (Do Not Use)
- **Pin 3:** No Connection
- **Pin 4:** Plate
- **Pin 5:** Internal Connection (Do Not Use)
- **Pin 6:** Internal Connection (Do Not Use)
- **Pin 7:** Internal Connection (Do Not Use)
- **Pin 8:** Internal Connection (Do Not Use)
- **Pin 9:** Internal Connection (Do Not Use)
- **Pin 10:** Plate
- **Pin 11:** No Connection
- **Pin 12:** Heater
- **Top Cap:** Cathode

Pins designated as "Internal Connection" must not be used for circuit tie points, as they may be connected to internal structures or support elements.

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 19DE3, measured without an external shield, are:

- **Cathode to Plate and Heater [k to (p + h)]:** 21 pF
- **Plate to Cathode and Heater [p to (k + h)]:** 13 pF
- **Heater to Cathode [h to k]:** 1.7 pF

These capacitances are important for analyzing high-frequency behavior and transient response in the horizontal deflection circuit.

Electrical Characteristics and Conduction Curves

Under typical operating conditions, the 19DE3 exhibits a low forward voltage drop to maximize efficiency in damper service. The approximate tube voltage drop is **25 Volts** when conducting a direct current (I_b) of **700 Milliampères**.

The average plate characteristics show a smooth, non-linear diode conduction curve. The relationship between plate voltage and forward plate current is characterized by the following approximate points:

- At **21 V** plate voltage, the plate current (I_b) reaches approximately **500 mA**.
- At **32 V** plate voltage, the plate current (I_b) reaches approximately **1000 mA**.
- At **42 V** plate voltage, the plate current (I_b) reaches approximately **1500 mA**.

These values demonstrate the low internal resistance of the diode during conduction, which minimizes power loss and heat generation within the envelope.

Absolute Maximum Ratings (TV Damper Service)

The ratings for the 19DE3 are defined under the Design-Maximum system for television damper service. These limits must not be exceeded under the worst-case operating conditions.

Rating Parameter	Limit Value
Peak Inverse Plate Voltage	5000 V
Plate Dissipation	9.0 W
Steady-State Peak Plate Current	1050 mA
DC Output Current	350 mA

The peak inverse plate voltage rating of **5000 Volts** is applicable for operation in a standard **525-line, 30-frame television system**, provided that the duty cycle of the voltage pulse does not exceed **15% of one scanning cycle**.

Heater-Cathode Voltage Ratings

Because the cathode is subjected to high pulse voltages in damper service, the heater-to-cathode insulation is rated separately depending on the polarity of the heater relative to the cathode:

- **Heater Positive with respect to Cathode:**
 - DC Component: **100 Volts**
 - Total DC and Peak: **300 Volts**
- **Heater Negative with respect to Cathode:**
 - DC Component: **900 Volts**
 - Total DC and Peak: **5000 Volts**

These ratings reflect the robust insulation design of the heater-cathode structure, particularly when the heater is negative with respect to the cathode, which is the typical condition during the flyback pulse in horizontal deflection circuits.

Technical Summary

The **19DE3** is a high-voltage Compactron damper diode designed specifically for color television horizontal deflection circuits. Its **diffusion bonded cathode** provides exceptional reliability by preventing electrostatic arcing. Operating from a **19 V, 0.6 A** heater with an 11-second warm-up time, the tube is well-suited for series-string applications. With a peak inverse voltage rating of **5000 Volts**, a plate dissipation limit of **9.0 Watts**, and a low forward voltage drop of approximately **25 Volts at 700 mA**, the 19DE3 delivers the high-efficiency performance required for demanding television receiver designs.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warmup Time	11 s	Average
DC Output Current	350 mA	TVDamperService
Steady State Peak Plate Current	1050 mA	TVDamperService
Heater Cathode Positive DC Component	100 V	—
Heater Cathode Positive Total Peak	300 V	—
Heater Cathode Negative DC Component	900 V	—
Heater Cathode Negative Total Peak	5000 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode To Plate And Heater Capacitance	21 pF	—
Plate To Cathode And Heater Capacitance	13 pF	—
Heater To Cathode Capacitance	1.7 pF	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube Voltage Drop	25 V	PlateCurrent=700mA

An independent reference for electronic tubes, vacuum tubes,
and their source documents.

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