



ELECTRONIC TUBE REFERENCE

19DK3

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Novar half-wave vacuum rectifier designed for television horizontal-deflection damper service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9SG	BASE PINS	9
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	6500 V
NOMINAL OUTPUT CURRENT	400 mA
PEAK FORWARD CURRENT	1.2 A
FORWARD VOLTAGE DROP	16 V
WARM-UP TIME	11 s
<i>TV damper diode. Promoted values include 6.5 kV peak inverse voltage, 400 mA DC output current, 1.2 A steady-state peak plate current, and approximately 16 V tube drop at 400 mA; the 25 V drop at 800 mA is retained as a parameter.</i>	

19DK3 — Half-Wave Vacuum Rectifier and Damper Diode

The **19DK3** is a heater-cathode type half-wave vacuum rectifier designed specifically for use as a damping diode in the horizontal-deflection circuits of television receivers, including color television receivers. It

features a specialized heater-cathode insulating system that enables high peak voltage ratings, making it suitable for the demanding electrical stresses of television horizontal-deflection systems. The tube is constructed in a T-9 glass envelope with a 9-pin novar base and operates with a nominal 19-volt heater.

Mechanical Construction and Physical Dimensions

The 19DK3 is housed in a T-9 glass envelope and utilizes a button 9-pin novar base (E9-89) with a 0.687-inch pin circle, requiring a standard novar 9-contact socket. The tube can be operated in any mounting position.

The physical dimensions of the envelope are:

- **Maximum overall length:** 3.880 inches
- **Maximum seated height:** 3.500 inches
- **Minimum seated height:** 3.250 inches
- **Maximum diameter:** 1.188 inches
- **Minimum diameter:** 1.062 inches

Depending on the manufacturer's specification, the tube may feature a top cap (EIA C1-2, skirted miniature) connected to the cathode to isolate the high-voltage terminal from the base pins. The outline drawing is classified under EIA 9-117 or outlines section 35A.

Heater Characteristics

The 19DK3 is designed for series heater strings or dedicated power supplies, featuring a controlled warm-up time.

Parameter	Value
Heater Voltage (AC or DC)	19 V
Heater Current	0.6 A (± 0.04 A)
Average Heater Warm-up Time	11 seconds

The average heater warm-up time of 11 seconds is measured in series with a resistance equal to three times the bogey voltage divided by the bogey current, with four times the bogey voltage applied.

Terminal Connections and Basing Variations

The 19DK3 uses the EIA 9SG basing diagram, but documentation describes two distinct terminal configurations.

Configuration A (All-Base Connections)

In this configuration, all active electrodes are connected directly to the 9-pin base:

- **Pin 1:** Internal Connection (IC) — Do not use as a tie point

- **Pin 2:** Cathode (K)
- **Pin 3:** Internal Connection (IC) — Do not use as a tie point
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Internal Connection (IC) — Do not use as a tie point
- **Pin 7:** Plate (P)
- **Pin 8:** Internal Connection (IC) — Do not use as a tie point
- **Pin 9:** No Connection (NC) — Do not use as a tie point

Under this specification, socket terminals 1, 3, 6, 8, and 9 must not be used as tie points.

Configuration B (Top-Cap Cathode Connection)

In this configuration, the cathode is routed to a top cap to maximize high-voltage isolation, and the plate is connected to multiple base pins:

- **Pin 1:** Heater Insulation Coil (may be used as a tie point for components at or near heater potential)
- **Pin 2:** Plate (P)
- **Pin 3:** No Connection (NC)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Internal Connection (IC) — Do not use
- **Pin 7:** Plate (P)
- **Pin 8:** Internal Connection (IC) — Do not use
- **Pin 9:** No Connection (NC)
- **Top Cap (C1-2):** Cathode (K)

Direct Interelectrode Capacitances

Measured without an external shield, the approximate direct interelectrode capacitances of the 19DK3 are:

- **Cathode to Plate and Heater (k to $[p + h]$):** 22.0 pF
- **Plate to Cathode and Heater (p to $[k + h]$):** 13.6 pF
- **Heater to Cathode (h to k):** 1.1 pF (or 1.10 pF)

Damper Service Ratings

The 19DK3 is rated under the Design-Maximum system for operation in television receivers (specifically 525-line, 30-frame systems). The voltage pulse duty cycle must not exceed 15% of one horizontal scanning cycle.

Rating Parameter	Design-Maximum Limit
Peak Inverse Plate Voltage	6,500 V
Steady-State Peak Plate Current	1,200 mA
DC Output / Average Plate Current	400 mA
Plate Dissipation	9.0 W
Maximum Bulb Temperature (hottest point)	220 °C

Heater-Cathode Voltage Ratings

The unique heater-cathode insulation system allows high voltage differentials between the heater and cathode:

- **Heater Positive with Respect to Cathode:**
 - DC Component: 100 V
 - Total DC and Peak: 300 V
- **Heater Negative with Respect to Cathode:**
 - DC Component: 900 V
 - Total DC and Peak: 6,500 V

Electrical Characteristics and Plate Curves

The tube exhibits a low internal voltage drop during conduction, which is critical for high-efficiency damper service.

- **Tube Voltage Drop:**
 - 16 V at a plate current (I_b) of 400 mA
 - 25 V at a plate current (I_b) of 800 mA

Qualitative Curve Analysis

At the rated heater voltage, the average plate characteristics show that the plate current rises non-linearly from 0 V to approximately 5 V. Beyond 5 V, the characteristic becomes highly linear. The relationship between plate voltage and instantaneous plate current is illustrated by the following points:

- At **16 V** plate potential, plate current reaches **500 mA**.
- At **28 V** plate potential, plate current reaches **1000 mA**.
- At **39 V** plate potential, plate current reaches **1500 mA**.
- At **48 V** plate potential, plate current reaches **2000 mA**.

Technical Summary

The **19DK3** is a specialized novar-based half-wave vacuum rectifier designed for television damper service. Operating with a 19 V, 0.6 A heater, it features a robust heater-cathode insulation system capable of withstanding peak negative heater-to-cathode voltages up to 6,500 V. With a maximum plate dissipation of 9.0 W, a peak plate current rating of 1,200 mA, and a low voltage drop of 25 V at 800 mA, the 19DK3 provides efficient energy recovery and damping in horizontal-deflection circuits.

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	400 mA	TVDamperService
Steady State Peak Plate Current	1200 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	6500 V	—
Maximum Bulb Temperature	220 C	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode To Plate And Heater Capacitance	9.2 pF	—
Plate To Cathode And Heater Capacitance	13.6 pF	—
Heater To Cathode Capacitance	11 pF	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube Voltage Drop	16 V	PlateCurrent=400mA
Tube Voltage Drop	25 V	PlateCurrent=800mA



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1975 RCA RC30

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

1975 RCA RC30

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Inverse Plate Voltage	6500 V	DamperService
Peak Plate Current	1200 mA	DamperService
Average Plate Current	400 mA	DamperService

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube Voltage Drop	25 V	PlateCurrent=800mA

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