



ELECTRONIC TUBE REFERENCE

12D4A

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

RECTIFIER

Indirectly heated diode designed for horizontal-frequency damper service, built to withstand the high-voltage pulses encountered in direct-drive television deflection circuits.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	12.6 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	8 W
PEAK INVERSE VOLTAGE	5000 V
NOMINAL OUTPUT CURRENT	185 mA
PEAK FORWARD CURRENT	900 mA
FORWARD VOLTAGE DROP	30 V
MAXIMUM HEATER-CATHODE VOLTAGE	5000 V
WARM-UP TIME	11 s
<i>High-voltage horizontal-deflection damper diode; 5000 V peak inverse and heater-cathode total negative peak ratings.</i>	

12D4A — Half-Wave Damper Diode

An indirectly heated, single-diode vacuum tube designed for television horizontal-frequency damper service and high-voltage pulse applications.

Overview

The **12D4A** is a single, indirectly heated diode housed in a glass envelope, specifically engineered for use as a damper diode in television horizontal-deflection circuits. The tube is designed to withstand the high-voltage pulses that occur between the cathode and both the heater and plate elements, which are typical of "direct drive" television sweep circuits.

The 12D4A features a unipotential cathode, a 12.6 V heater, and an octal base. It is capable of handling peak inverse voltages up to 5000 V and steady-state peak currents up to 900 mA, making it highly suited for the demanding electrical environment of television receiver deflection systems.

Construction, Physical Dimensions, and Basing

The 12D4A is constructed with a T-9 glass bulb and an intermediate-shell 5-pin octal base (designated B5-85). The tube's physical dimensions are standardized to ensure proper fit and heat dissipation:

Dimension	Value (Inches)	Value (Metric/Approx)
Maximum Diameter	1.188 in	1-3/16 in
Maximum Seated Height	2.750 in	2-3/4 in
Maximum Overall Height	3.313 in	3-5/16 in

The tube can be mounted in **any position**. It utilizes the **4CG** basing arrangement. A critical wiring restriction is associated with the socket connections: **pins 1, 2, 4, and 6 must not be used as tie points** for auxiliary circuit connections, as doing so can compromise the high-voltage isolation of the active electrodes.

Heater Specifications and Warm-Up Characteristics

The 12D4A heater is designed for series or parallel operation with controlled characteristics to ensure reliable performance in television receivers.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V
Nominal Heater Current	0.60 ± 0.040 A (600 mA)
Nominal Warm-Up Time	11.0 seconds

The heater warm-up time is specifically defined under controlled test conditions: it is the time required for the voltage across the heater to reach 80% of its rated value (12.6 V) when a voltage equal to 4 times the rated heater voltage is applied to a circuit consisting of the tube heater in series with an external resistance equal to 3 times the nominal heater operating resistance.

To ensure tube longevity and reliable circuit operation, equipment designers must ensure that the heater supply is regulated or restricted so that the heater current is maintained at the specified bogie value of

0.60 A, within the specified tolerance.

Electrical Ratings and Damper Service Limits

The ratings of the 12D4A are established under the **Design-Maximum Rating System**. These ratings represent limiting values of operating and environmental conditions that must not be exceeded under the worst probable conditions.

Damper Service Ratings

Parameter	Maximum Rating
Peak Inverse Plate Voltage	5000 V
Plate Dissipation	8.0 W
Steady-State Peak Plate Current	900 mA
DC Plate Current	185 mA

Heater-Cathode Voltage Ratings

Because the cathode in damper service experiences high-voltage flyback pulses, the heater-to-cathode insulation is highly reinforced. The maximum allowable voltages between these elements depend on the polarity of the heater relative to the cathode:

- **Heater Negative with Respect to Cathode:**
 - Maximum DC Voltage: 1000 V
 - Maximum Total DC and Peak Voltage: 5000 V
- **Heater Positive with Respect to Cathode:**
 - Maximum DC Voltage: 100 V
 - Maximum Total DC and Peak Voltage: 300 V

Pulse Duty Cycle Limitation

For operation in standard television systems (such as a 525-line, 30-frame system), the high-voltage pulses applied to the tube must be strictly controlled. The duty cycle of the voltage pulse must not exceed **15% of one horizontal scanning cycle**.

Average Characteristics and Capacitances

Under typical operating conditions, the tube exhibits a low internal voltage drop to maximize efficiency in damper service. When conducting a plate current of **340 mA**, the average tube voltage drop is **30 V**.

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 12D4A are low, minimizing capacitive loading and pulse distortion in the deflection circuit. Depending on the specific measurement configuration, the approximate capacitances are:

- **Heater to Cathode (H to K):** 3.0 pF
- **Cathode to Plate and Heater:** 7.0 to 9.0 pF
- **Plate to Cathode and Heater:** 7.0 to 9.0 pF

Related Designations

The 12D4A belongs to a family of structurally identical damper diodes that share the same T-9 construction, 4CG basing, physical dimensions, and electrical ratings, but differ in their heater configurations:

- **6DA4A / 6DM4A:** Designed for 6.3 V, 1200 mA heater supplies.
- **17D4A:** Designed for 16.8 V, 450 mA heater supplies.

These related types offer identical damper service performance when operated with their respective correct heater supplies.

Technical Summary

The **12D4A** is an octal-based, indirectly heated single diode designed specifically for television horizontal frequency damper service. Housed in a T-9 glass envelope with a 5-pin intermediate shell base, it features a 12.6 V, 0.60 A heater with a controlled 11-second warm-up time. The tube is rated for a maximum peak inverse plate voltage of 5000 V, a maximum DC plate current of 185 mA, and a plate dissipation of 8.0 W. Its robust heater-cathode insulation allows it to withstand peak negative heater-to-cathode pulses up to 5000 V, making it an essential component for high-voltage "direct drive" television sweep circuits.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Rectifier

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Service	Horizontal-frequency damper	—

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater To Cathode Capacitance	3 pF	—
Cathode To Plate And Heater Capacitance	9 pF	—



SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 2 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 2 OF 4

Section 1 · Rectifier

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater-to-cathode capacitance	3 pF	WholeTube
Cathode-to-plate-and-heater capacitance	9 pF	WholeTube
Plate-to-cathode-and-heater capacitance	7 pF	WholeTube
Tube voltage drop at 340 mA	30 V	DamperService

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum heater-cathode voltage, heater negative DC	1000 V	DamperService
Maximum heater-cathode voltage, heater positive DC	100 V	DamperService
Maximum heater-cathode voltage, heater positive total DC and peak	300 V	DamperService

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