



ELECTRONIC TUBE REFERENCE

12BE3A

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Compactron single heater-cathode diode designed for television horizontal-deflection damper service, with high inverse-voltage capability and controlled heater warm-up.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12GA	BASE PINS	12
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	6.5 W
PEAK INVERSE VOLTAGE	5000 V
NOMINAL OUTPUT CURRENT	200 mA
PEAK FORWARD CURRENT	1.2 A
WARM-UP TIME	11 s
<i>Published maximum ratings and characteristics promoted from supplied datasheet.</i>	

12BE3A — Compactron TV Damper Diode

An indirectly heated, single-system Compactron diode designed for television horizontal-deflection damper service.

Overview

The **12BE3A** is a single-system heater-cathode diode constructed in a Compactron T-9 glass envelope. It is specifically designed to serve as a damping diode in the horizontal deflection circuits of television receivers, particularly color television systems. The device is characterized by high peak inverse voltage capabilities, substantial current-carrying capacity, and a low internal voltage drop.

Except for its heater characteristics and ratings, the 12BE3A is electrically identical to the [6BE3A](#) and [17BE3A](#) damper diodes. Additionally, the 12BE3A features a lower voltage drop than the older [12BE3](#) type.

Physical Construction and Basing

The 12BE3A utilizes a Compactron construction with a T-9 glass bulb and a 12-pin button base (JEDEC E12-70). The tube features a coated unipotential cathode and is designed to operate in any mounting position.

Physical Dimensions

- **Maximum Diameter:** 1.188 inches
- **Maximum Seated Height:** 2.500 inches
- **Maximum Overall Height:** 2.875 inches

Pin Connections (JEDEC 12GA Basing Diagram)

The 12BE3A uses the JEDEC 12GA basing arrangement. When viewed from the bottom of the tube, the pin connections are assigned as follows:

Pin Number	Connection	Description
1	H	Heater
2	NC	No Connection
3	NC	No Connection
4	P	Plate
5	IC	Internal Connection (Do not use as tie point)
6	NC	No Connection (Do not use as tie point)
7	K	Cathode
8	NC	No Connection (Do not use as tie point)

Pin Number	Connection	Description
9	IC	Internal Connection (Do not use as tie point)
10	P	Plate
11	NC	No Connection
12	H	Heater

Note on Socket Wiring: Socket terminals 5, 6, 8, and 9 must not be used as circuit tie points. To prevent voltage breakdown or unwanted coupling, it is recommended that the socket clips for these specific pins be entirely removed from the tube socket.

Heater Characteristics and Ratings

The 12BE3A is designed for series or parallel heater operation, with controlled warm-up characteristics to ensure reliability in series-string television receivers.

Heater Parameters

- **Nominal Heater Voltage:** 12.6 Volts
- **Nominal Heater Current:** 600 mA (0.6 A)
- **Heater Supply Limits (Current Operation):** 600 ± 40 mA
- **Heater Warm-up Time:** 11 seconds

The heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated voltage after applying four times the rated heater voltage (calculated as $4 \times 12.6 \text{ V} = 50.4 \text{ V}$) to a circuit consisting of the tube heater in series with a resistance equal to three times the nominal heater operating resistance.

Related Heater Variants

The 12BE3A belongs to a family of identical damper diodes with different heater configurations:

- **6BE3A:** Designed for 6.3 V, 1200 mA heater supplies.
- **17BE3A:** Designed for 16.8 V, 450 mA heater supplies (with an 11-second warm-up time).

Heater-Cathode Voltage Ratings

Because the cathode of a horizontal damper diode experiences extremely high pulse voltages during flyback, the heater-to-cathode insulation is heavily reinforced. The maximum ratings (Design Maximum Values under EIA Standard RS-239) are:

- **Heater Negative with Respect to Cathode:**
 - DC Component: 900 Volts
 - Total DC and Peak: 5000 Volts

- **Heater Positive with Respect to Cathode:**

- DC Component: 100 Volts
- Total DC and Peak: 300 Volts

Electrical Characteristics and Damper Service Ratings

The 12BE3A is rated under the Design Maximum Rating System for TV Damper Service. These ratings represent the limits within which the tube can be operated safely in typical television horizontal deflection circuits.

Direct Interelectrode Capacitances

The capacitances of the tube electrodes, measured without an external shield, are approximately:

- **Cathode to Plate and Heater [K to (P + H)]:** 10 pF
- **Plate to Cathode and Heater [P to (K + H)]:** 8.0 pF
- **Heater to Cathode (H to K):** 3.4 pF

Maximum Ratings (TV Damper Service)

- **Peak Inverse Plate Voltage:** 5000 Volts
- **Plate Dissipation:** 6.5 Watts
- **Steady State Peak Plate Current:** 1200 mA
- **DC Output Current (DC Plate Current):** 200 mA

These ratings are specified for operation in a standard 525-line, 30-frame television system. Under these operating conditions, the duty cycle of the high-voltage pulse must not exceed 15% of one horizontal scanning cycle.

Average Characteristics and Voltage Drop

The efficiency of a damper diode is heavily dependent on its internal resistance. The 12BE3A features a low internal voltage drop during conduction:

- **Tube Voltage Drop (at $I_b = 350$ mA DC):** 22.5 Volts

Technical Summary

The **12BE3A** is a high-performance Compactron damper diode designed for television horizontal deflection circuits. Operating with a **12.6 V, 600 mA** heater, it features an 11-second controlled warm-up time, making it suitable for series-string heater designs. It is physically identical to the [6BE3A](#) and [17BE3A](#), and offers a lower forward voltage drop than the older [12BE3](#). With a peak inverse voltage rating of **5000 V**, a peak current rating of **1200 mA**, and a maximum plate dissipation of **6.5 W**, the 12BE3A provides robust and efficient performance under the demanding pulse conditions of television receivers.



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	Television damper diode	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
CATHODE TO PLATE AND HEATER: K TO (P+H)	10 pF	Published datasheet
PLATE TO CATHODE AND HEATER: P TO (K + H)	8 pF	Published datasheet

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER TO CATHODE: (H TO K)	3.4 pF	Published datasheet
AVERAGE CHARACTERISTICS	12.6 mA	Published datasheet; operating column 1
AVERAGE CHARACTERISTICS	600 mA	Published datasheet; operating column 2
HEATER WARM-UP TIME SEE BELOW	11 s	Published datasheet
DC COMPONENT	900 V	Published datasheet

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TOTAL DC AND PEAK	5000 V	Published datasheet
DC COMPONENT	100 V	Published datasheet
TOTAL DC AND PEAK	300 V	Published datasheet
PEAK INVERSE PLATE VOLTAGE	5000 V	Published datasheet
PLATE DISSIPATION	6.5 W	Published datasheet
Maximum plate dissipation	6.5 W	Published datasheet; promoted section value
Maximum peak inverse voltage	5000 V	Published datasheet; promoted section value
DC output current	200 mA	Published datasheet; promoted section value
Peak forward current	1.2 A	Published datasheet; promoted section value

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
CURRENT	0 mA	Published datasheet; operating column 1
CURRENT	600 mA	Published datasheet; operating column 2
CURRENT	40 mA	Published datasheet; operating column 3
STEADY STATE PEAK PLATE CURRENT	1200 mA	Published datasheet
TUBE VOLTAGE DROP	16 V	Published datasheet; operating column 1
TUBE VOLTAGE DROP	350 V	Published datasheet; operating column 2
TUBE VOLTAGE DROP	225 V	Published datasheet; operating column 3