



ELECTRONIC TUBE REFERENCE

19X3

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Half-wave high-vacuum rectifier designed for television damper service, with high peak-inverse-voltage and pulse-current ratings for horizontal-deflection circuits.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9BM	BASE PINS	9
NOMINAL HEATER	19 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
PEAK INVERSE VOLTAGE	4000 V
NOMINAL OUTPUT CURRENT	180 mA
PEAK FORWARD CURRENT	400 mA
FORWARD VOLTAGE DROP	16 V
MAXIMUM HEATER-CATHODE VOLTAGE	650 V
<i>Published voltage drop is 16 V at 180 mA dc.</i>	

19X3 — Half-Wave High-Vacuum Rectifier and Booster Diode

The **19X3** (also written as **19 X 3**) is a half-wave high-vacuum rectifier and booster diode designed specifically for television damper service. Introduced by N.V. Philips' Gloeilampenfabrieken under RTMA release #1029 on October 16, 1951, the 19X3 features a coated unipotential cathode and is housed in a T6 1/2 glass envelope with a small button noval 9-pin base.

Physical Specifications and Basing

The 19X3 is designed for flexible installation and can be mounted in any position. Its physical dimensions and mechanical characteristics are as follows:

- **Bulb Type:** T6 1/2
- **Outline Drawing:** 6-4
- **Maximum Overall Length:** 3 1/16 inches
- **Maximum Seated Height:** 2 13/16 inches
- **Bulb Length (excluding tip):** 2 7/16 inches $\pm$ 3/32 inch
- **Maximum Diameter:** 7/8 inch
- **Basing Designation (JETEC):** 9BM

The tube utilizes a 9-pin miniature (noval) base. The pinout configuration is defined as:

Pin	Connection
Pin 1	Internally connected (i.c.) — Do not connect externally
Pin 2	Internally connected (i.c.) — Do not connect externally
Pin 3	Cathode
Pin 4	Heater
Pin 5	Heater
Pin 6	Internally connected (i.c.) — Do not connect externally
Pin 7	Internally connected (i.c.) — Do not connect externally
Pin 8	Internally connected (i.c.) — Do not connect externally
Pin 9	Plate

Heater and Electrical Characteristics

The 19X3 is equipped with an indirectly heated, coated unipotential cathode. Its heater and basic electrical parameters include:

- **Heater Voltage:** 19 V
- **Heater Current:** 0.3 A (300 mA)
- **Interelectrode Capacitance (Plate to Cathode, C_{p-k}):** 5.5 μ F

- **Tube Voltage Drop:** 16 V at 180 mA D-C

Television Damper Service Ratings

In television damper service, the 19X3 operates under demanding high-voltage pulse conditions. The maximum ratings established for this service are:

- **Maximum Peak Inverse Plate Voltage:** 4,000 V (subject to pulse duration limits)
- **Maximum Peak Plate Current:** 400 mA
- **Maximum Average Plate Current (D-C Output):** 180 mA
- **Pulse Duration Limit:** The voltage pulse duration must not exceed 18% of one scanning cycle, and must be limited to a maximum of 18 microseconds.

Heater-Cathode Voltage Limits

Because the cathode is subjected to high-voltage pulses in booster service, the insulation between the heater and cathode is rated for the following maximum limits:

- **Peak (Cathode Positive with respect to Heater):** 650 V
- **D.C. Component:** 450 V
- **A.C. Component:** 160 V

Installation and Socketing Requirements

To ensure safe operation and prevent electrical breakdown under high peak inverse voltages, the following installation guidelines must be observed:

- **Insulation:** Adequate socket insulation is essential to withstand the peak inverse voltage of up to 4,000 V.
- **Shielding:** For noval 9-pin sockets equipped with a cylindrical center shield, the shield must be removed.
- **Flash-over Prevention:** It is recommended to physically remove the socket contact for Pin 6 to minimize leakage and the risk of high-voltage flash-over.
- **Mounting Plate:** For certain socket types, mounting the socket in an insulating plate with a minimum diameter of 1 5/8 inches may be required.
- **Unused Pins:** Pins 1, 2, 6, 7, and 8 are internally connected (i.c.) and must not be connected externally or used as tie points.

Plate D.C. Characteristics

The plate direct-current characteristic of the 19X3 exhibits a smooth, upward-curving diode response. Typical operating points along this curve are:

- At a plate voltage (V_p) of 10 V, the plate current (I_p) is approximately 100 mA.
- At a plate voltage (V_p) of 20 V, the plate current (I_p) is approximately 250 mA.

- At a plate voltage (V_p) of 30 V, the plate current (I_p) is approximately 440 mA.
- The characteristic curve reaches a plate current of 500 mA at approximately 33 V.

Technical Summary

The **19X3** is a **9-pin miniature (noval) booster diode** and **half-wave high-vacuum rectifier** designed for television damper service. Operating with a **19 V, 0.3 A** heater, it provides a low voltage drop of **16 V at 180 mA D-C**. It is rated for a maximum peak inverse voltage of **4,000 V** and a peak plate current of **400 mA**, subject to strict pulse duration limits (maximum 18% of a cycle or 18 microseconds). Proper installation requires removing cylindrical center shields, ensuring robust socket insulation, and avoiding any external connections to the internally connected pins (Pins 1, 2, 6, 7, and 8) to prevent flash-over and leakage.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Rectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Forward voltage drop test current	180 mA	ForwardVoltageDrop=16V

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum dc output current	180 mA	TVDamperService
Maximum peak inverse voltage	4000 V	TVDamperService
Maximum peak current	400 mA	TVDamperService



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1999 Philips 0-D

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

1999 PHILIPS 0-D

Section 1 · Rectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Hleater current	300 mA	Hleater current 300 ma
Plate to cathode 5¢	5 pF	Plate to cathode 5¢5 uuF
Peak inverse plate voltage (see note 2)	4000 V	Peak inverse plate voltage (see note 2) 4000 volts

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Teuk plate current	400 mA	Teuk plate current 400 ma
Averzge plate current	18 C	Averzge plate current 18C ma
cathode positive wit!i respect to heater)	650 V	cathode positive wit!i respect to heater) 650 volts
L.C.component of heater-cuthode voltage	160 V	L.C.component of heater-cuthode voltuge 160 volts