



ELECTRONIC TUBE REFERENCE

19H5

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

High-voltage Mazda half-wave rectifier for demanding pulse and power-supply applications. Its heavy filament, high continuous inverse-voltage rating, and greater pulse-voltage capability suit specialized high-voltage systems.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	4 V / 4 A	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
MAXIMUM PLATE DISSIPATION	32 W
MAXIMUM CATHODE CURRENT	180 mA
PEAK INVERSE VOLTAGE	20000 V

19H5 — High-Vacuum Charging and Damping Diode

The **19H5** (also designated as **19.H.5**) is an indirectly heated, high-vacuum diode manufactured by Ediswan Mazda. It is designed primarily as a very low impedance diode for use as a charging and damping diode in radar applications. Additionally, the device is suitable for use as a power rectifier operating at mains frequencies.

Physical Construction and Heater Requirements

The 19H5 is constructed with a clear glass bulb and features a robust physical profile designed to handle high-voltage and high-current demands. Its physical dimensions and weights are as follows:

Dimension / Weight Parameter	Value
Maximum Overall Length	240 mm
Maximum Diameter	57 mm
Approximate Net Weight	7 ozs
Approximate Packed Weight	18 ozs

The tube is designed for unrestricted mounting positions, allowing flexibility in physical layout within radar or power supply chassis.

Heater Specifications and Operation

The 19H5 features an indirectly heated cathode. A critical design aspect of this tube is that the heater is connected internally to the cathode. This internal connection dictates specific circuit configurations, as the heater supply will be at the cathode potential.

To prevent damage to the tube's internal structure and ensure stable emission, a strict pre-heating sequence must be followed: the heater must be switched on for a minimum of 30 seconds before any anode voltage is applied.

Heater Parameter	Value
Heater Voltage (Vh)	4.0 V
Heater Current (Ih)	4.0 A
Calculated Heater Power (calculated as 4.0 V multiplied by 4.0 A)	16.0 W
Heater-Cathode Connection	Internally connected to cathode
Pre-heating Delay	30 seconds minimum

Base Configuration and Connections

The 19H5 utilizes a heavy-duty **Goliath Ediswan Screw Cap** base to accommodate its high operating currents and voltages. The electrical connections are distributed between the screw cap base and a top cap terminal to maximize insulation and prevent high-voltage arcing.

The pinout and contact assignments are:

- **Contact 1:** Heater (h)

- **Contact 2:** Heater (h)
- **Top Cap:** Anode (a)

Because the heater is internally connected to the cathode, the cathode connection is effectively accessed through the heater contacts (Contact 1 and Contact 2). The anode is isolated at the top of the envelope via the top cap.

Operating Modes and Absolute Maximum Ratings

All maximum ratings for the 19H5 are specified as absolute values, not design centres. Operating the tube beyond these limits can cause permanent damage or catastrophic failure. The general maximum anode dissipation ($P_a(\max)$) for the tube is **32 W**.

The tube's ratings are divided into two distinct application categories: damping diode service and power rectifier/delay line charging service.

Damping Diode Service

When operated as a damping diode in pulsed applications (such as radar systems), the tube is rated to handle extremely high peak currents and voltages for very short durations:

- **Maximum Pulsed Anode Current ($I_a(\max)\text{pulse}$):** 10 A (for a maximum pulse duration of 2 microseconds)
- **Maximum Peak Inverse Voltage (P.I.V.(max)):** 27 kV under short pulse or transient conditions
- **Maximum Peak Inverse Voltage under Fault Conditions:** 35 kV (for a maximum duration of 50 milliseconds)

Power Rectifier or Delay Line Charging Diode Service

When used as a power rectifier at mains frequencies or as a delay line charging diode, the ratings are optimized for continuous or semi-continuous operation. The maximum allowable mean anode current depends heavily on the type of filter circuit employed:

- **Choke Input Filter (4:1 Peak/Mean Ratio):** The maximum mean anode current ($I_a(\max)_{av}$) is **180 mA**.
- **Capacitor Input Filter (8:1 Peak/Mean Ratio):** The maximum mean anode current ($I_a(\max)_{av}$) is **125 mA**. When using a capacitor input filter, the effective resistance in the anode circuit must not be less than **1600 ohms** to limit peak inrush currents.
- **Maximum R.M.S. Anode Current ($I_a(\max)_{r.m.s.}$):** 350 mA.

The peak inverse voltage (P.I.V.) limits for rectifier or charging service are:

- **Maximum Peak Inverse Voltage - No Load (P.I.V.(max)o):** 20 kV
- **Maximum Peak Inverse Voltage - On Load (P.I.V.(max)):** 18 kV
- **Maximum Peak Inverse Voltage under Fault Conditions (P.I.V.(max) Fault):** 30 kV (for a maximum duration of 5 seconds)

Electrical Characteristics and Impedance

The 19H5 is characterized by its exceptionally low internal impedance, which is essential for efficient damping and charging functions. Under peak operating conditions, the tube exhibits the following typical characteristic:

- **Approximate Impedance (ra):** 100 ohms, measured at a peak anode current of 8 A.

This low internal resistance minimizes voltage drop across the diode during high-current conduction phases, maximizing power transfer and efficiency in radar pulse-forming networks and power supply circuits.

Technical Summary

The **19H5** (or **19.H.5**) is a specialized, high-vacuum, indirectly heated diode designed by Ediswan Mazda for high-voltage, high-current applications. Featuring a **4.0 V, 4.0 A** heater internally connected to its cathode, the tube requires a mandatory 30-second pre-heating delay before anode voltage is applied. It is housed in a clear glass envelope with a **Goliath Ediswan Screw Cap** base and a top cap anode connection, supporting unrestricted mounting.

With a maximum anode dissipation of **32 W** and an exceptionally low typical impedance of **100 ohms** at 8 A peak, the 19H5 excels as a radar charging and damping diode (supporting up to 10 A pulsed current and 27 kV P.I.V.) or as a mains-frequency power rectifier (supporting up to 180 mA mean anode current and 18 kV P.I.V. on load).

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1960 Mazda

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

1960 MAZDA

Section 1 · Rectifier

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum pulse inverse voltage	27 kV	—
Maximum pulse anode current	10 A	—
Choke-filter mean anode current	180 mA	—
Capacity-filter mean anode current	126 mA	—
Maximum RMS anode current	360 mA	—
No-load peak inverse voltage	20 kV	—
Fault-condition peak inverse voltage	30 kV	—
Warmup time	30 s	—

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