

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
RECTIFIER

19H12

Rectifier - Half Wave electronic tube

Heavy-current industrial half-wave rectifier designed for short-pulse service. Its massive directly heated filament and high inverse-voltage capability emphasize pulsed high-power rectification rather than ordinary continuous receiver supplies.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	4 V / 12 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Rectifier	
MAXIMUM PLATE DISSIPATION	50 W
PEAK INVERSE VOLTAGE	25000 V
REDO promoted-field audit	

19H12 — Directly Heated High Vacuum Inverse Damping Diode

The **19H12** is a directly heated, high-vacuum diode designed specifically for heavy-duty pulse applications. Its primary intended application is as an inverse damping diode in radar transmitters, where it prevents voltage overswings and protects associated circuitry. The device is characterized by its exceptionally high peak inverse voltage capability, high peak pulse current ratings, and robust physical construction.

Filament Requirements and Pre-heating

The 19H12 features a directly heated filament designed to deliver the high thermionic emission required for pulse operation. Because of the substantial thermal mass and the extreme electrical stresses encountered in radar transmitter circuits, a strict pre-heating schedule must be observed.

Filament Parameter	Value
Filament Voltage (V_h)	4.0 V
Filament Current (I_h)	12.0 A
Calculated Filament Power	48.0 W
Minimum Pre-heating Time	30 seconds

Calculation: Filament Power = Filament Voltage % Filament Current (4.0 V % 12.0 A = 48.0 W).

The filament must be energized for at least 30 seconds before any anode voltage is applied. This pre-heating period ensures that the filament reaches its proper operating temperature, preventing localized emission hot-spots and protecting the emitter from damage under high-voltage and high-current conditions.

Mechanical Construction and Physical Dimensions

The physical design of the 19H12 is optimized for high-voltage isolation and high-current conduction. The tube is housed in a large glass bulb with an unrestricted mounting position.

The electrical connections are divided between the top and bottom of the envelope to maximize the physical distance between the high-voltage anode and the low-voltage filament terminals:

- **Anode Terminals:** Located at the top of the envelope, terminating in two CT3 top caps.
- **Filament Terminals:** Located at the base of the tube, consisting of two heavy-duty terminal pins of unequal diameters to ensure correct orientation. The pin diameters are specified as **9.53 % 0.13 mm** and **11.11 % 0.13 mm**.

Physical Property	Value
Maximum Overall Length	240 mm (dimensioned as 235 % 5 mm)
Maximum Diameter	120 mm (dimensioned as 117 mm max)
Approximate Net Weight	1.75 lb (1% lb)
Approximate Packed Weight	6.5 lb (6% lb)
Mounting Position	Unrestricted
Top Cap Style	CT3 (two caps)

Electrical Characteristics and Pulse Impedance

The 19H12 is designed to present low impedance during conduction while maintaining low interelectrode capacitance to minimize loading on high-frequency pulse circuits.

- **Anode-to-Filament Capacitance (C_{a-f}):** 27.8 pF
- **Approximate Pulse Impedance:** 23 Ω (measured as DC resistance at a peak current of 30 A)

The low pulse impedance of 23 Ω at high current levels ensures minimal voltage drop across the diode during the damping cycle, which maximizes the efficiency of the damping action in radar transmitter circuits.

Absolute Maximum Ratings

The ratings for the 19H12 are defined under the Absolute System. These values represent absolute operational limits that must not be exceeded under any circumstances, rather than typical design-center values.

Parameter	Absolute Maximum Limit
Maximum Peak Inverse Voltage (PIV_{max})	25 kV
Maximum Anode Dissipation (p_a)	50 W
Maximum Peak Pulse Current (Normal, $i_{k(pk)max}$)	30 A
Maximum Peak Pulse Current (Fault, $i_{k(fault)max}$)	50 A

Under normal operating conditions, the maximum peak pulse current of 30 A is restricted to a maximum pulse length of 10 %s. Under fault conditions, the tube can withstand a peak pulse current of up to 50 A, provided the duration of the fault does not exceed 1.0 second.

Operating Boundaries and Rating Charts

The safe operating area of the 19H12 is defined by several interdependent boundaries, which are graphically represented in the manufacturer's rating charts. These boundaries prevent the tube from exceeding its maximum thermal and electrical limits under various pulse waveforms.

Normal Operating Boundaries

- **RMS vs. Mean Current:** The normal operating region is bounded by the peak anode current limit (at 2000 mA RMS), the steady anode current line where RMS equals mean current (up to 1000 mA mean), and the maximum anode dissipation limit for rectangular pulses.
- **Peak Anode Current vs. Mean Anode Current ($I_{a(pk)}$ vs. $I_{a(av)}$):** This boundary is defined by the maximum anode dissipation limits for both rectangular and exponential pulses, extending up to 40 A

peak and 0.25 A mean anode current (or duty ratio factor).

- **Peak Anode Current vs. Duty Ratio:** Under rectangular pulse conditions, the operating region is bounded by the maximum anode dissipation limit up to a duty ratio of 0.0025 to 0.025.

Fault Operating Boundaries

- **Fault Current Limits ($I_{a(pk)}$ vs. $I_{a(av)}$):** Under transient fault conditions, the tube's operation is bounded by specific fault limits for both rectangular and exponential pulses. These limits allow for a maximum peak current of 50 A and a mean anode current of up to 2.0 A, with a strict maximum duration of 1.0 second.

Technical Summary

The **19H12** is a specialized, directly heated high-vacuum diode designed for use as an inverse damping diode in radar transmitters. Operating with a high-power **4.0 V, 12.0 A** filament, the tube requires a minimum **30-second pre-heating period** before anode voltage is applied. Physically, the tube features a robust glass envelope with a maximum length of 240 mm, a maximum diameter of 120 mm, two CT3 top caps for the anode, and heavy-duty unequal base pins for the filament.

Electrically, the 19H12 is rated for a maximum peak inverse voltage of **25 kV**, a maximum anode dissipation of **50 W**, and a normal peak pulse current of **30 A** (for pulses up to 10 %s). It exhibits a low pulse impedance of approximately **23**, at 30 A and an anode-to-filament capacitance of **27.8 pF**. Safe operation is governed by detailed rating charts that define boundaries for RMS, mean, and peak currents under both normal and short-duration fault conditions (up to **50 A** for 1.0 second).



SOURCE OPERATING CONDITIONS

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1961 AEI Industrial Valves

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

1961 AEI INDUSTRIAL VALVES

Section 1 · Rectifier

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum pulse length	10 us	—
Anode-filament capacitance	27.8 pF	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Associated Electrical Industries

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

1961 ASSOCIATED ELECTRICAL INDUSTRIES

Section 1 · Rectifier

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum pulse length	10 us	—
Anode-filament capacitance	27.8 pF	—

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