ELECTRONIC TUBE REFERENCE

19G6

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
RECTIFIER

> Very-high-voltage industrial half-wave rectifier for demanding power supplies. Its exceptionally high inverse-voltage capability and modest current rating emphasize specialized high-voltage DC generation.

General characteristics

BASE DESIGNATION	_	**BASE PINS**	_
NOMINAL HEATER	4 V / 500 mA	**PARALLEL HEATER**	_ / _
HEATING	Indirect	**SERIES OPERATION**	Not specified
CATHODE ARRANGEMENT	Separate cathodes	**SECTION CONSTRUCTION**	Similar

Section ratings

SECTION1 Rectifier

MAXIMUM CATHODE CURRENT	30 mA
PEAK INVERSE VOLTAGE	70000 V
NOMINAL OUTPUT CURRENT	30 mA
PEAK FORWARD CURRENT	180 mA
WARM-UP TIME	20 s

REDO promoted-field audit

19G6 — High-Vacuum Half-Wave Rectifier

The **19G6** is an indirectly heated, high-vacuum half-wave rectifier designed specifically for use in high-voltage power supplies. Manufactured by companies such as Associated Electrical Industries Limited (AEI) under the Ediswan brand, and Siemens Edison Swan Limited under the Mazda brand, this miniature diode is engineered to handle high peak inverse voltages while maintaining a compact physical footprint.

Mechanical Design and Physical Characteristics

The 19G6 is constructed in a compact glass envelope utilizing a Miniature Button 7-Pin (B7G) base, supplemented by a CT1 top cap for the anode connection. This top-cap configuration isolates the high-voltage anode from the low-voltage base pins, reducing the risk of arcing or corona discharge in high-voltage power supply environments.

The physical dimensions and mechanical properties of the tube are as follows:

- **Maximum Overall Length:** 60 mm
- **Maximum Diameter:** 19 mm
- **Weight:** The net weight of the device is approximately 1/4 oz to 1/2 oz, with a packed weight ranging from 1/2 oz to 1 1/2 oz.
- **Mounting Position:** Unrestricted, allowing for flexible physical orientation within a chassis.

Pinout and Base Connections

The B7G base connections, viewed from the free end of the pins, require specific strapping to ensure proper operation and internal stability. The anode is routed exclusively to the CT1 top cap. Pins 1, 5, 6, and 7 are designated as Internal Connections (IC) and must be connected externally to Pin 2 (Cathode).

The pinout configuration is detailed below:

Pin Number	Connection
Pin 1	Internal Connection (IC) — must be connected to Pin 2
Pin 2	Cathode (k)
Pin 3	Heater (h)
Pin 4	Heater (h)
Pin 5	Internal Connection (IC) — must be connected to Pin 2
Pin 6	Internal Connection (IC) — must be connected to Pin 2
Pin 7	Internal Connection (IC) — must be connected to Pin 2
Top Cap	Anode (a)

Heater Ratings and Operating Constraints

The 19G6 features an indirectly heated cathode designed for reliable emission under high-voltage conditions. To prevent damage to the heater-cathode insulation and ensure long-term reliability, specific

operating protocols must be observed:

- **Heater Voltage (V_h):** 4.0 V
- **Heater Current (I_h):** 0.5 A
- **Calculated Heater Power:** 2.0 W (calculated as $V_h times I_h = 4.0 text{V} times 0.5 text{A}$)
- **Heater-to-Cathode Voltage:** The cathode and heater should normally be tied together externally. If they are left free (unconnected), the peak heater-to-cathode voltage must never exceed a maximum of 10 V peak.
- **Pre-heating Delay:** To protect the tube from premature voltage stress, the heater must be switched on for a minimum of 20 seconds before the anode voltage is applied.

Electrical Characteristics and Curves

The 19G6 exhibits low interelectrode capacitance, with the anode-to-all-other-electrodes capacitance ($C_{a text{-all}}$) measured at approximately 2.8 pF.

The average characteristic curves of the tube illustrate the relationship between anode voltage (V_a), anode current (I_a), and internal impedance (r_a). Depending on the specific production run and testing conditions, the published curves demonstrate the following behaviors:

Anode Current (I_a)

The anode current begins at 0 mA at 0 V. As the anode voltage increases, the current rises as follows:

- In some characterizations, the current rises almost linearly above 25 V, reaching approximately 50 mA at 50 V, 150 mA at 100 V, and approaching 200 mA near 125 V.
- In alternative characterizations, the current rises non-linearly, reaching approximately 100 mA at an anode voltage of 100 V, and approximately 140 mA at 125 V.

Internal Impedance (r_a)

The internal impedance of the diode decreases significantly as the anode voltage rises:

- At low anode voltages, the impedance starts above 1500 \Omega.
- At 50 V, the impedance drops to approximately 1000 \Omega.
- At higher voltages, the impedance flattens out, reaching approximately 500 \Omega to 600 \Omega (or continuing down to approximately 450 \Omega) at an anode voltage of 125 V.

Absolute Maximum Ratings

All ratings for the 19G6 are absolute maximum values, not design-centre values. Operating the tube beyond these limits may cause permanent damage or severely degrade its service life.

Parameter	Absolute Maximum Rating
Peak Inverse Anode Voltage (Working, $P.I.V._{max(w)}$)	6.0 kV
Peak Inverse Anode Voltage (No-Load, $P.I.V._{max}$)	7.0 kV
Anode Voltage (R.M.S., $V_{a(rms)max}$)	2.5 kV
Mean Anode Current ($I_{a(av)max}$)	30.0 mA
Peak Anode Current ($I_{a(pk)max}$)	180.0 mA
Maximum Reservoir Capacitance (C_{max})	1.0 \muF
Minimum Surge Limiting Resistance	5,400 \Omega

The minimum surge limiting resistance of 5,400 \Omega is a critical requirement to protect the cathode from excessive peak currents during startup or transient conditions. This resistance can be met or obtained via the distributed resistance of the power transformer's secondary winding.

Technical Summary

The **19G6** is a specialized, indirectly heated high-vacuum half-wave rectifier designed for high-voltage power supply applications. Housed in a Miniature Button 7-Pin (B7G) envelope with a CT1 top cap, it operates with a 4.0 V, 0.5 A heater. The tube features strict operating constraints, including a mandatory 20-second pre-heating delay and a low 10 V peak limit on heater-to-cathode voltage if the two are not externally tied. With an absolute maximum peak inverse voltage rating of up to 7.0 kV under no-load conditions (6.0 kV working) and a maximum mean anode current of 30.0 mA, the 19G6 provides a reliable high-voltage rectification solution when paired with a minimum surge limiting resistance of 5,400 \Omega and a maximum reservoir capacitance of 1.0 \muF.

SOURCE OPERATING CONDITIONS

1960 Mazda

SOURCE PDF

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
No-load peak inverse voltage	**7 kV**	—
Maximum RMS anode voltage	**2.5 kV**	—
Minimum surge-limiting resistance	**5400 Ohm**	—
Maximum reservoir capacitance	**1 uF**	—

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

1961 AEI Industrial Valves

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1961 AEI INDUSTRIAL VALVES

Section 1 · Rectifier

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
No-load peak inverse voltage	**70 kV**	—
Maximum RMS anode voltage	**25 kV**	—
Maximum reservoir capacitance	**1 uF**	—

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

1961 Associated Electrical Industries

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1961 ASSOCIATED ELECTRICAL INDUSTRIES

Section 1 · Rectifier

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
No-load peak inverse voltage	**70 kV**	—
Maximum RMS anode voltage	**25 kV**	—
Maximum reservoir capacitance	**1 uF**	—

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