ELECTRONIC TUBE REFERENCE

19GQ7

Diode (NOT rectifier) electronic tube

CONSOLIDATED TECHNICAL DATA
3 SECTIONS
CONSTRUCTION
DIODE-DIODE-DIODE

Triple high-perveance diode designed for AM detection and FM ratio-detector or discriminator applications, integrating three diode sections in one miniature envelope.

General characteristics

BASE DESIGNATION	9QM	**BASE PINS**	9
NOMINAL HEATER	18.9 V / 150 mA	**PARALLEL HEATER**	— / —
HEATING	Indirect	**SERIES OPERATION**	Not specified
CATHODE ARRANGEMENT	Separate cathodes	**SECTION CONSTRUCTION**	Similar

Section ratings

SECTION1 Diode

PEAK INVERSE VOLTAGE	330 V
NOMINAL OUTPUT CURRENT	9 mA
PEAK FORWARD CURRENT	54 mA
FORWARD VOLTAGE DROP	10 V

Representative electrical row for three identical high-perveance detector diode sections; values shown are per diode.

SECTION2 Diode

No fixed ratings recorded.

Second physical diode section added for documented triple-diode construction.

SECTION3 Diode

No fixed ratings recorded.

Third physical diode section added for documented triple-diode construction.

19GQ7 — Triple High-Perveance Diode

The **19GQ7** is a miniature triple high-perveance diode designed for use in AM and FM radio receivers and television circuitry. It contains three independent diode units in a single envelope, sharing a common heater but having separate cathode and plate connections. The tube is primarily intended for AM detection, FM radio-detection, FM discriminator circuits, and color television applications.

Mechanical Specifications and Physical Dimensions

The 19GQ7 is constructed in a miniature glass envelope designated as **T-6 1/2** (JEDEC 6-2 outline). It utilizes a standard **button 9-pin base** (JEDEC E9-1) and can be mounted in **any position**.

The physical dimensions of the tube are as follows:

- **Maximum Overall Length**: 2.187 to 2.188 inches
- **Maximum Seated Height**: 1.937 to 1.938 inches
- **Diameter**: 0.750 to 0.875 inches (with a maximum diameter of 0.875 inches)

The tube requires a standard miniature 9-contact socket for installation.

Pinout and Electrode Connections

The 19GQ7 uses the JEDEC **9QM** basing diagram. However, different documentation sources describe the internal pin connections and unit numbering with notable variations.

Configuration A

In some documentation, the pins are assigned as follows:

- **Pin 1**: Cathode, Unit #3 (3K)
- **Pin 2**: Plate, Unit #3 (3P)
- **Pin 3**: Internal Connection (IC) — do not use
- **Pin 4**: Heater (H)
- **Pin 5**: Heater (H)
- **Pin 6**: Plate, Unit #2 (2P)
- **Pin 7**: Cathode, Unit #2 (2K)
- **Pin 8**: Plate, Unit #1 (1P)
- **Pin 9**: Cathode, Unit #1 (1K)

Configuration B

An alternative documentation source lists a slightly different mapping for the diode units:

- **Pin 1**: Cathode, Diode 1 ($K_{[D1]}(/tubes/D1)$)
- **Pin 2**: Plate, Diode 3 (P_{D3})
- **Pin 3**: Internal Connection (IC)
- **Pin 4**: Heater (H)
- **Pin 5**: Heater (H)
- **Pin 6**: Plate, Diode 2 ($P_{[D2]}(/tubes/D2)$)
- **Pin 7**: Cathode, Diode 2 ($K_{[D2]}(/tubes/D2)$)
- **Pin 8**: Plate, Diode 1 ($P_{[D1]}(/tubes/D1)$)
- **Pin 9**: Cathode, Diode 3 (K_{D3})

Configuration C

A third documentation source describes a configuration where the internal connection pin and plate/cathode assignments differ further:

- **Pin 1**: Cathode 1 (1K)
- **Pin 2**: Plate 2 (2P)
- **Pin 3**: Plate 3 (3P)
- **Pin 4**: Heater (H)
- **Pin 5**: Heater (H)
- **Pin 6**: Internal Connection (IC)
- **Pin 7**: Cathode 2 (2K)
- **Pin 8**: Plate 1 (1P)
- **Pin 9**: Cathode 3 (3K)

Because of these conflicting pinout descriptions, designers must verify the specific manufacturer's pinout mapping or trace the physical connections of the target device to ensure correct wiring.

Heater Characteristics and Ratings

The 19GQ7 features a coated unipotential cathode and is designed for series-string heater circuits or dedicated power supplies. Its heater ratings are:

- **Heater Voltage (AC/DC)**: 18.9 V
- **Heater Current**: 150 mA (0.15 A)
- **Limits of Supplied Current**: 150 ± 9 mA

The maximum heater-cathode voltage ratings are defined under the Design Maximum Values system, but they vary across different documentation sources:

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

    - Some sources specify a maximum peak value of 330 V (with a DC component limit of 330 V).
    - Other sources specify a maximum peak value of 300 V.
    - A third set of specifications lists a maximum total DC and peak limit of 200 V.
- **Heater Positive with Respect to Cathode**:
    - Some sources specify a maximum peak value of 200 V (with a DC component limit of 100 V).
    - Other sources specify a maximum average or DC limit of 100 V, and a total DC and peak limit of 200 V.

Electrical Characteristics and Maximum Ratings

The maximum ratings of the 19GQ7 are established under the Design Maximum Rating System (EIA Standard RS-239). These limits apply to each individual diode section:

Parameter	Maximum Rating
Peak Inverse Plate Voltage	330 V
AC Plate Voltage (RMS)	117 V
Steady State Peak Plate Current	54 mA
DC Output Current	9 mA
Minimum Total Effective Plate Supply Impedance	300 Ω

Operating Characteristics

- **Tube Voltage Drop**: When operating as a half-wave rectifier, the tube exhibits a voltage drop of **10 V** at a plate current of **60 mA** DC.
- **Resonant Frequency**: Each diode unit has an approximate resonant frequency of **700 Mc/s**, making the tube highly suitable for high-frequency detection.

Direct Interelectrode Capacitances

The capacitances of the 19GQ7 are measured without an external shield. The values for each individual section and the coupling capacitances between sections are:

- **Plate Input (each unit, P to K+H)**: 2.05 pF
- **Cathode Input (each unit, K to P+H)**: 3.10 pF
- **Plate #1 to Plate #2 Coupling**: 0.47 pF
- **Plate #1 to Plate #3 Coupling**: 0.47 pF
- **Plate #2 to Plate #3 Coupling**: 0.05 pF

These low inter-plate capacitances, particularly between Plate #2 and Plate #3, help minimize crosstalk and unwanted coupling when the sections are used in separate detector or discriminator circuits.

Average Diode Curves and Qualitative Behavior

The average characteristics of each diode unit show a typical exponential power-law relationship starting at 0 V and 0 mA. The relationship between plate current and plate voltage is nearly linear at higher voltages, spanning from approximately 1.5 V DC (at 5 mA) up to 9.0 V DC (at 53–54 mA).

Key operating points along the average characteristic curve include:

- **2.5 V DC**: ~10 mA plate current
- **5.0 V DC**: ~25 mA plate current
- **7.5 V DC**: ~41 to 42 mA plate current
- **9.0 V DC**: ~53 to 54 mA plate current

These curves demonstrate the high-perveance nature of the diode units, allowing significant current conduction at relatively low forward voltages.

Related Designations

The 19GQ7 is electrically identical to the **6GQ7** vacuum tube, with the sole exception of its heater ratings. While the 19GQ7 operates at a nominal heater voltage of 18.9 V and 150 mA, the 6GQ7 is designed for standard 6.3 V heater supplies.

Technical Summary

The **19GQ7** is a miniature, 9-pin triple high-perveance diode featuring three independent diode units with coated unipotential cathodes. Operating with an 18.9 V, 150 mA heater, it is optimized for AM/FM detection, FM discriminator, and television receiver applications. Each section is rated for a maximum peak inverse voltage of 330 V, a peak plate current of 54 mA, and a DC output current of 9 mA. With a low tube voltage drop of 10 V at 60 mA and a resonant frequency of approximately 700 Mc/s, the 19GQ7 provides efficient and reliable high-frequency rectification and detection in a compact T-6 1/2 glass envelope.

SOURCE OPERATING CONDITIONS

1961 Tung Sol

SOURCE PDF

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

1961 TUNG SOL

Section 1 · Diode

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
AC plate voltage RMS	**117 V**	EachPlate
Steady state peak plate current	**54 mA**	EachPlate
DC output current	**9 mA**	EachPlate

CHARACTERISTIC		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Tube voltage drop at 60 mA	**10 V**	—

CAPACITANCE		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Plate input each unit	**2.05 pF**	—

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

1966 Tung Sol Electronic Tubes 3 of 4

SOURCE PDF

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

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Diode

CHARACTERISTIC		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Plate input capacitance each unit	**2.05 pF**	WholeTube

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode input capacitance each unit	**3.1 pF**	WholeTube
Plate 1-to-plate 2 capacitance	**0.47 pF**	WholeTube
Plate 2-to-plate 3 capacitance	**0.05 pF**	WholeTube
Minimum effective plate supply impedance each diode	**300 ohm**	WholeTube
Tube voltage drop at 60 mA	**10 V**	WholeTube

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse voltage each diode	**330 V**	WholeTube
AC plate voltage RMS each diode	**117 V**	WholeTube
Steady-state peak plate current each diode	**54 mA**	WholeTube
DC output current each diode	**9 mA**	WholeTube

Tube Tinker

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