ELECTRONIC TUBE REFERENCE

12DT8

Voltage - Dual Triode (similar high frequency) electronic tube

CONSOLIDATED TECHNICAL DATA
2 SECTIONS
CONSTRUCTION
TRIODE-TRIODE

Twin triode developed for VHF television tuner service, where its two triode units serve radio-frequency amplifier, oscillator, and mixer functions in high-frequency receiving circuits.

General characteristics

BASE DESIGNATION	9DE	**BASE PINS**	9
NOMINAL HEATER	12.6 V / 150 mA	**PARALLEL HEATER**	6.3 V / 300 mA
HEATING	Indirect	**SERIES OPERATION**	Capable
CATHODE ARRANGEMENT	Separate cathodes	**SECTION CONSTRUCTION**	Similar

9DE - Terminal pinout

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 — 2P	B	P — Plate (Anode)	CONNECTED
PIN2 — 2G1	B	G1 — Control Grid	CONNECTED
PIN3 — 2K	B	K — Cathode	CONNECTED
PIN4 — H	—	H — Heater	CONNECTED
PIN5 — H	—	H — Heater	CONNECTED
PIN6 — 1P	A	P — Plate (Anode)	CONNECTED
PIN7 — 1G1	A	G1 — Control Grid	CONNECTED
PIN8 — 1K	A	K — Cathode	CONNECTED
PIN9 — IS	A	IS — Internal Screen	CONNECTED

Section ratings

SECTION1 Triode	
PLATE RESISTANCE	10900 Ω
TRANSCONDUCTANCE	0.0055 S
AMPLIFICATION FACTOR	60
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
Representative of two identical sections; characteristics promoted from 250 V operating column.	

SECTION2 Triode	
PLATE RESISTANCE	10900 Ω
TRANSCONDUCTANCE	0.0055 S
AMPLIFICATION FACTOR	60
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
Physical triode row restored under current one-row-per-physical-section policy.	

12DT8 — High-Mu Twin Triode

An indirectly heated, dual-section miniature receiving valve featuring an internal electrostatic shield, designed for RF amplification, oscillator-mixer service in FM tuners, and general-purpose radio and television applications.

Overview

The **12DT8** is a general-purpose, high-mu twin triode vacuum tube of the 9-pin miniature type. It is designed primarily for high-frequency applications, specifically as an RF amplifier and as a combined oscillator-mixer in FM tuners. Additionally, it is highly versatile and suitable for a wide variety of general-purpose applications in radio and television receivers.

The 12DT8 features two independent triode sections housed within a single T-6 1/2 glass envelope. A key design feature of this tube is the inclusion of an internal shield positioned between the two triode units. This shield is connected to its own dedicated base pin, providing excellent electrical isolation between the sections to ensure stable operation in high-frequency circuits. Furthermore, each triode section has its own independent cathode connection, offering circuit designers enhanced flexibility.

Mechanical Construction and Pinout

The 12DT8 is constructed in a miniature T-6 1/2 glass bulb and utilizes a small-button noval 9-pin base. The tube can be operated in any mounting position.

The physical dimensions of the tube are as follows:

- **Maximum overall length:** 2-3/16 inches (approximately 2.187 inches)
- **Maximum seated length:** 1-15/16 inches (approximately 1.937 inches)
- **Length from base seat to bulb top (excluding tip):** 1-9/16 inches ± 3/32 inch
- **Maximum diameter:** 7/8 inch (0.875 inch)

The tube uses the **9DE** basing arrangement. The pin connections, viewed from the bottom of the tube, are:

Pin	Connection
Pin 1	Plate of Triode Unit No. 2
Pin 2	Grid of Triode Unit No. 2
Pin 3	Cathode of Triode Unit No. 2
Pin 4	Heater
Pin 5	Heater
Pin 6	Plate of Triode Unit No. 1
Pin 7	Grid of Triode Unit No. 1
Pin 8	Cathode of Triode Unit No. 1
Pin 9	Internal Shield

Triode Unit No. 1 is connected to pins 6, 7, and 8, while Triode Unit No. 2 is connected to pins 1, 2, and 3. Pin 9 connects the internal shield, which must be properly grounded or bypassed to achieve the intended isolation between the two triode sections.

Heater and Heater-Cathode Ratings

The 12DT8 features a coated unipotential cathode. The heater is designed to operate from either an AC or DC supply.

The heater specifications for the 12DT8 are:

- **Heater Voltage:** 12.6 V
- **Heater Current:** 0.15 A (150 mA)

For applications requiring a 6.3 V heater supply, the **6DT8** is identical to the 12DT8 in all electrical and physical characteristics except for its heater ratings, which require a voltage of 6.3 V and a current of 0.3 A (300 mA).

To ensure reliable operation and prevent insulation breakdown, the voltage difference between the heater and the cathode must be kept within specified limits:

- **Heater negative with respect to cathode:**
  - Maximum total DC and peak voltage: 200 V
- **Heater positive with respect to cathode:**
  - Maximum total DC and peak voltage: 200 V
  - Maximum DC component: 100 V

Electrical Characteristics and Typical Class A1 Operation

Each triode section of the 12DT8 operates as a high-mu amplifier. Typical operating conditions and characteristics for each individual section in Class A1 amplifier service are documented at two distinct plate-supply voltage points:

Parameter	Operating Point I	Operating Point II
Plate-Supply Voltage	100 V	250 V
Cathode-Bias Resistor	270 Ω	200 Ω
Amplification Factor (μ)	60	60
Plate Resistance (r_p) (Approx.)	15,000 Ω	10,900 Ω
Transconductance (g_m)	4,000 μmhos	5,500 μmhos
Plate Current (I_b)	3.7 mA	10.0 mA
Grid Voltage (Approx.) for $I_b = 10\ \mu$A	-5 V	-12 V

At both operating points, the intrinsic amplification factor (μ) remains constant at 60. As the plate-supply voltage is increased from 100 V to 250 V, the plate resistance decreases from 15,000 Ω to 10,900 Ω, while the transconductance increases from 4,000 μmhos to 5,500 μmhos. This increase in transconductance is accompanied by a rise in plate current from 3.7 mA to 10.0 mA. The grid voltage required to cut off plate current (defined at a plate current of 10 μA) shifts from approximately -5 V at a 100 V supply to -12 V at a 250 V supply.

Maximum Ratings and Circuit Design

The maximum ratings for the 12DT8 are established under the **Design-Center Rating System** (or Design-Maximum Values in some rating systems). Under the standard design-center system, these ratings represent working limits that should not be exceeded under normal operating conditions, taking into account line-voltage variations. Equipment designed for these tubes will perform satisfactorily when operated from AC or DC power lines whose normal voltage, including variations, falls within $\pm 10\%$ of a line-center value of 117 V.

The maximum ratings for each triode unit are:

- **Maximum Plate Voltage:** 300 V
- **Maximum Negative Grid Voltage (Bias Value):** 50 V
- **Maximum Plate Dissipation:** 2.5 W
- **Maximum Grid-Circuit Resistance:**
  - For fixed-bias operation: 0.25 MΩ
  - For cathode-bias (self-bias) operation: 1.0 MΩ

These limits must be strictly observed in circuit design. For instance, if fixed bias is employed, the grid-circuit resistance must not exceed 0.25 MΩ to prevent thermal runaway caused by grid emission. When cathode bias is used, the degenerative effect of the cathode resistor provides negative feedback that stabilizes the operating point, allowing a higher maximum grid-circuit resistance of 1.0 MΩ.

Interelectrode Capacitances and Shielding

Because the 12DT8 is intended for high-frequency RF amplifier and mixer service, its interelectrode capacitances are critical parameters. The tube's internal shield (connected to Pin 9) plays a vital role in isolating the two triode sections, minimizing cross-talk and feedback.

The capacitances vary depending on whether the stage is configured for grid-drive (grounded-cathode) or cathode-drive (grounded-grid) operation. The approximate values, measured with an external shield connected to either the cathode or the grid of the unit under test, are as follows:

Grid-Drive Operation (External shield connected to cathode of unit under test)

- **Grid to Plate:** 1.6 pF (for both Unit 1 and Unit 2)
- **Grid to Cathode, Heater, and Internal Shield:** 2.7 pF (for both Unit 1 and Unit 2)
- **Plate to Cathode, Heater, and Internal Shield:** 1.6 pF (for both Unit 1 and Unit 2)
- **Heater to Cathode:** 3.0 pF (with external shield connected to ground)

Cathode-Drive Operation (External shield connected to grid of unit under test)

- **Cathode to Grid, Heater, and Internal Shield (Unit 2):** 5.3 pF
- **Plate to Grid, Heater, and Internal Shield (Unit 2):** 2.8 pF

The low grid-to-plate capacitance of 1.6 pF is essential for minimizing the Miller effect in grounded-cathode RF amplifiers, which helps maintain stable gain and prevents unwanted oscillations. In grounded-grid (cathode-drive) configurations, the cathode-to-input capacitance is 5.3 pF, and the plate-to-output capacitance is 2.8 pF, providing excellent isolation between input and output circuits when the grid and internal shield are RF-grounded.

Comparison with Related Tubes

The 12DT8 is closely related to other vacuum tubes in the miniature family:

- **6DT8:** The 6DT8 is the 6.3 V heater counterpart of the 12DT8. It draws 0.3 A of heater current. All other electrical characteristics, maximum ratings, capacitances, and physical dimensions are identical to those of the 12DT8.
- **12AT7:** Except for the heater ratings, heater-cathode ratings, interelectrode capacitances, and basing arrangement, the 12DT8 and 6DT8 are identical to the miniature type **12AT7**. The 12AT7 features a center-tapped heater (allowing operation at either 6.3 V or 12.6 V on pins 4, 5, and 9) and does not include the dedicated internal shield on Pin 9 that characterizes the 12DT8. The 12DT8's unique pinout (9DE) allocates Pin 9 exclusively to the internal shield and provides separate cathode connections on pins 3 and 8, which are optimized for high-frequency isolation and circuit flexibility.

Technical Summary

The **12DT8** is a high-mu twin triode housed in a 9-pin miniature T-6 1/2 glass envelope. It features a 12.6 V, 0.15 A heater and is designed for any mounting position. Engineered for RF amplifier and oscillator-mixer service in FM tuners, as well as general-purpose radio and television receiver applications, the tube incorporates an internal shield connected to Pin 9 to ensure high-frequency isolation between its two triode units.

Each triode section exhibits an amplification factor of 60, with a transconductance of 5,500 μmhos and a plate resistance of 10,900 Ω at a typical plate voltage of 250 V. The tube is rated for a maximum plate voltage of 300 V and a maximum plate dissipation of 2.5 W per section. By providing independent cathode connections and an integrated electrostatic shield, the 12DT8 delivers stable, high-gain performance in demanding high-frequency and general-purpose circuitry.

SOURCE OPERATING CONDITIONS

1940 RCA

SOURCE PDF

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

1940 RCA

Section 1 · Triode

APPLICATION		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Application	**RF_Amplifier_Oscillator_Mixer text**	—

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

1966 Tung Sol Electronic Tubes 2 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 2 OF 4

Section 1 · Triode

CHARACTERISTIC		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
HEATER VOLTAGE	**12.6 V**	HEATER VOLTAGE 12,6 VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	**2 V**	HEATER POSITIVE WITH RESPECT TO CATHODE 2OOG VOLTS
HEATER VOLTAGE	**12 V**	HEATER VOLTAGE 12,(7 12.6 VOLTS
HEATER CURRENT ~	**15 A**	HEATER CURRENT ~,15 ~,15 AMP.
PLATE-SUPPLY VOLTAGE LOO	**25 V**	PLATE-SUPPLY VOLTAGE LOO 25O VOLTS
PLATE RESISTANCE (APPRO%.)	**15 Ω**	PLATE RESISTANCE (APPRO%.) 15 OOO lO 9OO OHMS
PLATE CURRENT	**3 mA**	PLATE CURRENT 3.~ 1O MA.
CURRENT OF	**1 V**	CURRENT OF 1p µA. -5 - 12 VOLTS

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
MAXIMUM PLATE VOLTAGE	**3 V**	MAXIMUM PLATE VOLTAGE 3OO VOLTS
NEGATIVE BIAS VALUE	**5 V**	NEGATIVE BIAS VALUE 5O VOLTS
MAXIMUM PLATE DISSIPATION	**2.5 mA**	MAXIMUM PLATE DISSIPATION 2,5 WATTS
FOR FIXED—BIAS OPERATION	**0.25 MΩ**	FOR FIXED—BIAS OPERATION 0,25 MEGOHM
FOR CATHODE —BIAS OPERATION	**1 MΩ**	FOR CATHODE —BIAS OPERATION 1 MEGOHM
CATHODE- BIAS RESISTOR	**2 Ω**	CATHODE- BIAS RESISTOR 2~Q 2QQ OHMS

SOURCE OPERATING CONDITIONS

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Triode

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
HeaterVoltageNominal	**12.6 V**	—
HeaterCurrentNominal	**150 mA**	—

CHARACTERISTIC		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Plate Resistance	**10900 Ohm**	—
Transconductance	**5500 uS**	—
Amplification Factor	**60**	—
Plate Resistance	**15000 Ohm**	PlateVoltage=100V
Transconductance	**4000 uS**	PlateVoltage=100V
Plate Resistance	**10900 Ohm**	PlateVoltage=250V
Transconductance	**5500 uS**	PlateVoltage=250V

SOURCE OPERATING CONDITIONS

1975 RCA RC30

SOURCE PDF

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

1975 RCA RC30

Section 1 · Triode

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Heater Voltage (ac/dc) 6.3	**12.6 V**	Published in approved 12DT8 target entry; Section1
Heater Current 0.3	**150 mA**	Published in approved 12DT8 target entry; Section1
Nuvistor type used at frequencies up to	**1000 MHz**	Published in approved 12DT8 target entry; Section1
2.1	**6.3 V**	Published in approved 12DT8 target entry; Section1
0.45	**135 mA**	Published in approved 12DT8 target entry; Section1
Heater Warm-up Time (Average)	**8 seconds**	Published in approved 12DT8 target entry; Section1
Plate Supply Voltage	**300 V**	Published in approved 12DT8 target entry; Section1
Plate Voltage	**125 V**	Published in approved 12DT8 target entry; Section1
Negative-bias value	**55 V**	Published in approved 12DT8 target entry; Section1
Peak positive value	**2 V**	Published in approved 12DT8 target entry; Section1
Plate Dissipation	**1 W**	Published in approved 12DT8 target entry; Section1
Cathode Current	**15 mA**	Published in approved 12DT8 target entry; Section1
Cathode-Bias Resistor	**100 Ω**	Published in approved 12DT8 target entry; Section1
Plate Resistance (Approx.)	**3100 Ω**	Published in approved 12DT8 target entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TYPICAL OPERATION AS OSCILLATOR AT	**950 MHz**	Published in approved 12DT8 target entry; Section1
Plate Voltage	**60 V**	Published in approved 12DT8 target entry; Section1
Grid Voltage	**-2 V**	Published in approved 12DT8 target entry; Section1
Grid Resistor	**5600 Ω**	Published in approved 12DT8 target entry; Section1
Plate Current	**8 mA**	Published in approved 12DT8 target entry; Section1

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid to Plate	**1.8 pF**	Published in approved 12DT8 target entry; Section1
Grid to Cathode, Heater, and Shell	**4.4 pF**	Published in approved 12DT8 target entry; Section1
Plate to Cathode, Heater, and Shell	**1.9 pF**	Published in approved 12DT8 target entry; Section1
Plate to Cathode	**0.25 pF**	Published in approved 12DT8 target entry; Section1
Grid to Cathode	**3.7 pF**	Published in approved 12DT8 target entry; Section1

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	**10.5 mA**	Published in approved 12DT8 target entry; Section1
Grid Voltage (Approx.) for plate current of 10 /xA	**7 V**	Published in approved 12DT8 target entry; Section1

Tube Tinker

An independent reference for electronic tubes, vacuum tubes, and their source documents.

Catalog Tube types Full books Blog Feedback & corrections

© 2026 Tube Tinker