



ELECTRONIC TUBE REFERENCE

12BR7

Voltage - Triode (with diode, heptode or hexode) electronic tube

CONSOLIDATED TECHNICAL
DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-TRIODE

High-mu triode with two diode sections designed particularly for television receivers. The diodes provide detector or signal-rectifying functions while the triode offers unusually strong current capability for subsequent amplification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9CF	BASE PINS	9
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

9CF - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – 1P	A	P – Plate (Anode)	CONNECTED
PIN2 – 1G1	A	G1 – Control Grid	CONNECTED
PIN3 – 1K	A	K – Cathode	CONNECTED
PIN4 – H	–	H – Heater	CONNECTED
PIN5 – H	–	H – Heater	CONNECTED
PIN6 – 2P2	B	P – Plate (Anode)	CONNECTED
PIN7 – 2P1	B	P – Plate (Anode)	CONNECTED
PIN8 – IS	A	IS – Internal Screen	CONNECTED
PIN8 – 2K	B	K – Cathode	CONNECTED
PIN9 – HCT	–	HCT – Heater Center Tap	CONNECTED

SECTION RATINGS

SECTION1 Diode	
PEAK INVERSE VOLTAGE	300 V
PEAK FORWARD CURRENT	60 mA
<i>Values promoted from the supplied Sylvania source where explicitly published.</i>	

SECTION2 Diode	
PEAK INVERSE VOLTAGE	300 V
PEAK FORWARD CURRENT	60 mA
<i>Values promoted from the supplied Sylvania source where explicitly published.</i>	

SECTION3 Triode	
PLATE RESISTANCE	10900 Ω
TRANSCONDUCTANCE	0.0055 S
AMPLIFICATION FACTOR	60
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
PEAK INVERSE VOLTAGE	300 V
PEAK FORWARD CURRENT	60 mA
<i>Values promoted from the supplied Sylvania source where explicitly published.</i>	

12BR7 — Double Diode Triode Vacuum Tube

A miniature, multi-unit vacuum tube containing two high-perveance diodes and a high-mu triode in a single envelope, designed for detector and general-purpose amplifier applications.

Overview

The **12BR7** is a 9-pin miniature vacuum tube that combines two independent high-perveance diode sections and a single triode section within a single glass envelope. The tube is primarily designed for use as a detector and general-purpose amplifier in monochrome and color television receivers.

A key structural feature of the 12BR7 is its cathode arrangement: the two diode sections share a common cathode that is electrically independent of the triode section's cathode. This separation allows the triode and diode sections to operate with different bias levels and in separate parts of a circuit without unwanted interaction.

Mechanical Specifications and Pinout

The 12BR7 is constructed using a T-6 1/2 glass bulb and a small button 9-pin base (E9-1 designation). The tube is designed to operate in any mounting position.

Physical Dimensions

- **Maximum Diameter:** 0.875 inches
- **Maximum Seated Height:** 1.937 inches
- **Maximum Overall Height:** 2.187 inches

Basing Diagram (9CF)

The tube utilizes the **9CF** pinout configuration. When viewed from the bottom of the base, the pin connections are assigned as follows:

Pin	Connection
1	Triode Plate (P)
2	Triode Grid (G)
3	Triode Cathode (K)
4	Heater (H)
5	Heater (H)
6	Diode Plate 2 (<u>D2</u>)
7	Diode Plate 1 (<u>D1</u>)
8	Diode Cathode / Shield (K/S)
9	Heater Center Tap (Ht / Hc)

The inclusion of a heater center tap on Pin 9 allows the heater filament to be wired for either series or parallel operation.

Heater Characteristics

The 12BR7 features a coated unipotential cathode. The heater can be operated from either an AC or DC source and supports two wiring configurations:

- **Series Connection:** Labeled for a nominal heater voltage of **12.6 V** at a current of **0.225 A** (225 mA).
- **Parallel Connection:** Labeled for a nominal heater voltage of **6.3 V** at a current of **0.45 A** (450 mA).

Electrical Ratings

The maximum ratings for the 12BR7 are defined under the Design Center Rating System. These limits must be observed to ensure reliable operation and prevent damage to the tube.

Triode Section Ratings

- **Maximum Plate Voltage:** 300 V
- **Maximum Plate Dissipation:** 2.5 W
- **Maximum Negative DC Grid Voltage:** -50 V

Diode Sections Ratings

- **Maximum Peak Inverse Diode Voltage:** 300 V
- **Maximum Peak Diode Current (per section):** 60 mA

Heater-Cathode Voltage Limits

- **Heater Negative with Respect to Cathode (DC and Peak):** 200 V maximum
- **Heater Positive with Respect to Cathode (DC):** 100 V maximum
- **Heater Positive with Respect to Cathode (Total DC and Peak):** 200 V maximum

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 12BR7 are measured with an external shield (specifically Shield No. 315) connected to the cathode and heater:

- **Triode Input (Grid to Heater + Cathode):** 2.8 pF
- **Triode Output (Plate to Heater + Cathode):** 1.0 pF
- **Grid to Plate:** 1.9 pF
- **Diode Input (each diode, Diode Plate to Cathode + Heater):** 2.0 pF

Typical Operating Conditions and Characteristics

Class A1 Triode Amplifier

The triode section of the 12BR7 is characterized by an amplification factor of 60. Depending on the design requirements, two typical Class A1 operating points are established:

Parameter	Operating Point I	Operating Point II
Plate Voltage	100 V	250 V
Cathode Bias Resistor	270 Ohm	200 Ohm
Plate Current	3.7 mA	10 mA

Parameter	Operating Point I	Operating Point II
Plate Resistance (approx.)	15,000 Ohm	10,900 Ohm
Transconductance	4,000 umhos	5,500 umhos
Amplification Factor	60	60
Grid Voltage (approx.) for $I_b = 10 \mu A$	-5 V	-12 V

Diode Section Operation

The diode sections are designed for high-perveance detection. Under typical operating conditions, each diode section will draw an average diode current of **17 mA** when a DC potential of **5.0 V** is applied directly.

Related Designations and Comparisons

The **9BR7** is a closely related vacuum tube that shares the same 9CF basing, physical dimensions, interelectrode capacitances, ratings, and typical operating characteristics as the 12BR7. The primary difference between the two types lies in their heater specifications:

- The **9BR7** is designed for a nominal heater voltage of **9.4 V** (series) or **4.7 V** (parallel) with corresponding currents of **300 mA** and **600 mA**. It also features a controlled heater warm-up time of **11 seconds**.
- The **12BR7** operates at **12.6 V / 6.3 V** and does not have a specified heater warm-up time in its technical documentation.

Technical Summary

The **12BR7** is a versatile, 9-pin miniature double diode triode featuring a split heater (**12.6 V / 0.225 A** in series, or **6.3 V / 0.45 A** in parallel) and a coated unipotential cathode. Its internal structure consists of two high-perveance diodes sharing a common cathode, alongside an independent triode section with an amplification factor of **60**, a transconductance of **4,000 to 5,500 umhos**, and a plate resistance of **10.9 to 15 kOhm** depending on the operating point.

With its independent cathode arrangement and low interelectrode capacitances, the 12BR7 is optimized for detector and general-purpose voltage amplification duties in television receivers and related electronic equipment.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 Sylvania

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

1950 SYLVANIA

Section 3 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	10 mA	PlateVoltage=250V



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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
Heater voltage	12.6 V	Nominal
Heater current	150 mA	Nominal



SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 2 of 4

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 2 · Diode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DIODE INPUT: D TO (K}H) EACH DIODE	2 pF	Published datasheet

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM PEAK INVERSE DIODE VOLTAGE	300 V	Published datasheet
MAXIMUM PEAK DIODE CURRENT	60 mA	Published datasheet

1966 TUNG SOL ELECTRONIC TUBES 2 OF 4

Section 3 · Triode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TRIODE	0 pF	Published datasheet; operating column 1
TRIODE	1 pF	Published datasheet; operating column 2
GRID TO PLATE: G TO P	1.9 pF	Published datasheet

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER VOLTAGE j2	6 V	Published datasheet; operating column 1
HEATER VOLTAGE j2	6.3 V	Published datasheet; operating column 2
HEATER VOLTAGE	12.6 V	Published datasheet; operating column 1
HEATER VOLTAGE	6.3 V	Published datasheet; operating column 2
HEATER CURRENT	225 mA	Published datasheet; operating column 1
HEATER CURRENT	45 A	Published datasheet; operating column 2
PLATE VOLTAGE Z00	250 V	Published datasheet
PLATE CURRENT	3 mA	Published datasheet
PLATE RESISTANCE	15 ohm	Published datasheet; operating column 1
PLATE RESISTANCE	0 ohm	Published datasheet; operating column 2
PLATE RESISTANCE	900 ohm	Published datasheet; operating column 3
Transconductance	0.0055 A/V	Published datasheet; promoted section value

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DC AND PEAK	200 V	Published datasheet
MAXIMUM NEGATIVE DC GRID VOLTAGE	-50 V	Published datasheet
MAXIMUM PLATE VOLTAGE	300 V	Published datasheet
MAXIMUM PLATE DISSIPATION	2.5 W	Published datasheet
CATHODE BIAS RESISTOR	270 ohm	Published datasheet; operating column 1
CATHODE BIAS RESISTOR	0 ohm	Published datasheet; operating column 2
Maximum peak inverse voltage	300 V	Published datasheet; promoted section value
Peak forward current	60 mA	Published datasheet; promoted section value

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