



ELECTRONIC TUBE REFERENCE

12BZ7

Voltage - Dual Triode (similar) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

High-mu twin triode designed primarily for voltage-amplifier service, providing two similar high-gain triode sections with series/parallel heater operation.

GENERAL CHARACTERISTICS

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

SECTION RATINGS

SECTION1 Triode	
TRANSCONDUCTANCE	0.0032 S
AMPLIFICATION FACTOR	100
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	1.5 W
Two identical triode sections; represented once under identical-section compression.	

SECTION2 Triode	
TRANSCONDUCTANCE	0.0032 S
AMPLIFICATION FACTOR	100
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	1.5 W
Second physical triode section; electrically identical twin section.	

12BZ7 — High-Mu Twin Triode

A miniature, high-mu double triode designed for television sync circuits, clipping applications, and general-purpose audio-frequency voltage amplification.

Overview

The **12BZ7** is a miniature, high-mu twin triode vacuum tube containing two independent triode sections within a single glass envelope. It is designed primarily for specialized television receiver applications, specifically as a sync separator and sync amplifier. Additionally, the 12BZ7 is highly suitable for use in clipping circuits and as a general-purpose audio-frequency voltage amplifier.

The tube features a small 9-pin button base and is constructed in a miniature T-6 1/2 glass envelope. Each of the two triode sections is electrically independent, with its own cathode, grid, and plate, allowing for flexible circuit configurations such as independent amplification, cascading, or dual-function operation.

Mechanical Specifications and Physical Dimensions

The 12BZ7 is built using a miniature glass construction. Its physical and mechanical parameters are standardized as follows:

Parameter	Specification
Bulb Type	T-6 1/2
Base Type	E9-1, Small Button 9-Pin
Basing Designation	9A
Outline	6-3 (also designated as 6E)
Cathode Type	Coated Unipotential
Mounting Position	Any
Maximum Diameter	0.875 inches
Maximum Seated Height	2.375 inches
Maximum Overall Height	2.625 inches

The tube requires a standard miniature 9-contact socket for installation and can be operated in any physical orientation without affecting its performance or structural integrity.

Heater and Basing Configuration

The 12BZ7 incorporates a split heater design that allows for either series or parallel operation, making it adaptable to different power supply configurations.

Heater Parameter	Series Connection	Parallel Connection
Heater Voltage	12.6 V	6.3 V
Heater Current	0.3 A (300 mA)	0.6 A (600 mA)
Heater Supply Type	AC or DC	AC or DC

Heater-to-Cathode Voltage Ratings

To prevent insulation breakdown and minimize hum or leakage, the potential difference between the heater and the cathodes must be kept within specified limits:

- **Maximum Heater-Cathode Voltage (Peak or DC):** 180 Volts
- This limit applies to both polarities: heater negative with respect to cathode, and heater positive with respect to cathode.

Pinout Connections (9A Basing)

The 9A basing arrangement provides separate connections for all electrodes of both triode units, with the heater center tap brought out to a separate pin. Viewed from the bottom of the tube, the pin assignments are:

- **Pin 1:** Plate (Triode Unit 2)
- **Pin 2:** Grid (Triode Unit 2)
- **Pin 3:** Cathode (Triode Unit 2)
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Plate (Triode Unit 1)
- **Pin 7:** Grid (Triode Unit 1)
- **Pin 8:** Cathode (Triode Unit 1)
- **Pin 9:** Heater Center Tap (labeled as HM or Nc)

This configuration allows the heaters of the two sections to be wired in series (using pins 4 and 5, with pin 9 open or used as a center tap) or in parallel (by tying pins 4 and 5 together and applying voltage between them and pin 9).

Electrical Characteristics and Typical Operating Points

Under Class A1 amplifier conditions, each independent triode section of the 12BZ7 exhibits high voltage amplification capability combined with moderate plate current. The typical operating parameters for each section are defined at the following operating point:

- **Plate Voltage:** 250 Volts
- **Grid Voltage:** -2 Volts
- **Plate Current:** 2.5 mA

- **Plate Resistance (Approximate):** 31,800 Ohms
- **Transconductance:** 3,200 μ mhos
- **Amplification Factor (μ):** 100

The high amplification factor of 100 makes each section of the 12BZ7 comparable to other high- μ triodes, providing significant voltage gain in resistance-coupled preamplifier stages or sync-processing circuits.

Maximum Ratings and Circuit Constraints

The maximum ratings for the 12BZ7 are established under the Design-Center Rating System. These limits must not be exceeded under normal operating conditions to ensure reliable operation and longevity of the tube. The ratings apply to each individual triode section:

Rating Parameter	Maximum Value
Plate Voltage	300 Volts
Plate Dissipation	1.5 Watts
Positive DC Grid Voltage	0 Volts
Negative DC Grid Voltage	50 Volts

Grid Circuit Resistance Limit

When operating the 12BZ7 with grid bias developed by means of contact potential, a high grid-circuit resistance is permissible:

- **Maximum Grid No. 1 Circuit Resistance:** 5.0 Megohms This high resistance limit is particularly useful in high-gain audio input stages or specialized clipping and sync-separation circuits where contact-potential biasing is utilized.

Interelectrode Capacitances

The direct interelectrode capacitances of the 12BZ7 are measured without an external shield. Because the two triode sections reside in close proximity within the T-6 1/2 envelope, a small amount of capacitive coupling exists between the plates of the two units.

Capacitance Parameter	Section 1 / Unit 1	Section 2 / Unit 2
Grid to Plate	2.5 pF	2.5 pF
Grid to Cathode and Heater (Input)	6.5 pF	6.5 pF
Plate to Cathode and Heater (Output)	0.7 pF	0.55 pF

Capacitance Parameter	Section 1 / Unit 1	Section 2 / Unit 2
Plate of Unit 1 to Plate of Unit 2	-	1.3 pF

These capacitance values are critical when designing high-frequency sync circuits or high-fidelity audio stages, as they influence high-frequency roll-off and potential feedback paths.

Average Plate Characteristics

The average plate characteristics of the 12BZ7 define the relationship between plate voltage, plate current, and grid bias.

- At a grid bias of 0 Volts, the plate current rises steeply with plate voltage, reaching approximately 10 mA at a plate voltage of 150 Volts.
- As the grid bias is made progressively more negative (from -0.5 Volts down to -5.0 Volts in steps of 0.5 Volts), the curves shift to the right, requiring higher plate voltages to initiate and maintain plate current.
- For example, at a grid bias of -2.0 Volts and a plate voltage of 250 Volts, the typical plate current is positioned at 2.5 mA.
- At a grid bias of -5.0 Volts, the plate current remains below 1 mA even as the plate voltage approaches 350 Volts, demonstrating the sharp cutoff characteristics of this high-mu design.

These curves illustrate the tube's suitability for clipping and sync-separation applications, where the grid can be driven into cutoff or saturation to produce clean, square-edged pulses from complex television signal waveforms.

Technical Summary

The **12BZ7** is a versatile, high-mu twin triode housed in a miniature 9-pin T-6 1/2 package. Featuring an amplification factor of 100, a transconductance of 3,200 μmhos , and a plate resistance of 31,800 Ohms per section under typical Class A1 conditions, it is optimized for high-gain voltage amplification. Its dual-section construction, flexible 12.6V/6.3V heater arrangement, and independent cathodes make it highly effective for television sync separators, sync amplifiers, clipping circuits, and general-purpose audio preamplifiers. By adhering to the design-center limits—including a 300V maximum plate voltage and 1.5W plate dissipation per section—designers can leverage the 12BZ7 to achieve reliable, high-performance signal processing.



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 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage series	12.6 V	Series
Heater voltage parallel	6.3 V	Parallel

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