



ELECTRONIC TUBE REFERENCE

12BU6

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

CONSOLIDATED TECHNICAL
DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-TRIODE

Miniature double-diode triode for detector and amplifier service. Two diodes provide signal detection or related rectification while the lower-mu triode supplies comparatively strong current capability.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	12.6 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Diode	
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM CATHODE CURRENT	1 mA
<i>Published source values promoted where applicable.</i>	

SECTION2 Diode	
MAXIMUM CATHODE CURRENT	1 mA
<i>Published source values promoted where applicable.</i>	

SECTION3 Triode	
TRANSCONDUCTANCE	0.0019 S
AMPLIFICATION FACTOR	16
MAXIMUM PLATE VOLTAGE	300 V
Published source values promoted where applicable.	

12BU6 — Double-Diode Triode

The **12BU6** is a miniature, double-diode triode vacuum tube designed for use as a combined low-mu triode voltage amplifier and double diode detector. Constructed in a compact 7-pin miniature envelope, it is engineered to deliver high rectification efficiency at low signal levels while providing a triode section capable of handling large output signals with minimal distortion.

Construction and Physical Characteristics

The 12BU6 features a T-5 1/2 glass bulb and utilizes a 7-pin miniature button base (E7-1 designation, with a 7BT or 7BT-0-2 basing arrangement). The tube incorporates a coated, unipotential cathode.

The physical dimensions of the device are characterized by the following maximum limits:

- **Maximum Diameter:** 3/4 inch
- **Maximum Overall Length:** 2 5/8 inches
- **Maximum Seated Height:** 2 3/8 inches

The tube is designed to operate in any mounting position. To prevent unwanted interaction between the high-frequency diode signals and the sensitive triode section, the 12BU6 includes internal diode shielding. This shielding reduces undesirable audio coupling between the diodes and the triode.

Heater, Pinout, and Capacitances

The 12BU6 is equipped with a heater designed for series or parallel operation with AC or DC power.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V
Nominal Heater Current	150 mA

Pin Connections

Viewed from the bottom of the miniature button 7-pin base, the electrical connections are assigned as follows:

- **Pin 1:** Control Grid

- **Pin 2:** Cathode and Diode Shield
- **Pin 3:** Heater
- **Pin 4:** Heater
- **Pin 5:** Diode Plate #2
- **Pin 6:** Diode Plate #1
- **Pin 7:** Triode Plate

Direct Interelectrode Capacitances

The capacitances of the internal elements are specified both with and without an external shield (specifically, an RMA shield #316 connected directly to Pin 2):

Capacitance Parameter	Without Shield	With Shield
Diode #2 Input: Plate #2 to (Heater + Cathode + Internal Shield)	1.0 μpF	1.0 μpF
Diode #1 Input: Plate #1 to (Heater + Cathode + Internal Shield)	1.0 μpF	1.0 μpF
Diode #1 Plate to Control Grid (Maximum)	0.013 μpF	0.01 μpF

Electrical Ratings and Operating Conditions

The maximum ratings for the 12BU6 are established under the Design Center system (interpreted according to RMA Standard MB-210):

Rating Parameter	Limit
Maximum Plate Voltage (DC)	300 V
Maximum Positive Grid Voltage (DC)	0 V
Maximum Heater-Cathode Voltage	90 V
Maximum Continuous Diode Current (Each Plate)	1.0 mA

Typical Operating Conditions (Class A1 Amplifier)

The triode section of the 12BU6 can be operated under different plate voltage conditions. The following table outlines typical operating parameters for two distinct plate voltages:

Parameter	Low-Voltage Condition	High-Voltage Condition
Plate Voltage	100 V	250 V
Grid Voltage	-3 V	-9 V
Self-Bias Resistor	770 Ω	950 Ω
Plate Current	3.9 mA	9.5 mA
Plate Resistance	11,000 Ω	8,500 Ω
Transconductance	1,500 μmhos	1,900 μmhos
Amplification Factor	16.5	16
Load Resistance	—	10,000 Ω
Total Harmonic Distortion	—	6.5%
Power Output	—	300 mW

Diode Unit Characteristics

The two diode units are designed with high perveance to ensure efficient detection. When a DC potential of 10 volts is applied to each diode plate, the current characteristics are:

- **Minimum Diode Current (per plate):** 1.5 mA
- **Average Diode Current (per plate):** 4.0 mA

Circuit Applications and Performance Curves

The 12BU6 is primarily employed in receiver circuits where it performs the dual roles of AM detection (or automatic volume control rectification) and audio voltage amplification.

Triode Performance

The low amplification factor (approximately 16) of the triode unit is a deliberate design choice. It allows the stage to handle large input signal swings and deliver substantial output voltages with low distortion. At a plate voltage of 250 V and a load resistance of 10,000 Ω , the triode can deliver 300 mW of power with only 6.5% total harmonic distortion.

Analysis of the triode characteristic curves shows that:

- The plate current varies smoothly with grid bias voltages ranging from 0 V down to -33 V.
- At a fixed plate voltage of 250 V, the transconductance (g_m) increases and plate resistance (r_p) decreases as plate current rises from 0 to 20 mA, while the amplification factor (μ) remains relatively stable near 16.

Diode Performance

The high-perveance diodes provide highly efficient rectification even when operating with weak input signals. Performance curves for each diode unit demonstrate the relationship between the rectified microamperes and the DC voltage developed across various load resistors (ranging from 0.1 Megohm to 2.0 Megohms) under RMS signal inputs up to 30 V. The internal shield connected to Pin 2 ensures that these high-frequency rectified signals do not couple into the triode grid circuit, preserving audio signal purity.

Related Designations

The 12BU6 is closely associated with the [6BU6](#) designation. The two types share identical physical construction, electrode configurations, and typical operating characteristics, differing primarily in their heater ratings (the [6BU6](#) utilizing a 6.3 V heater supply).

Technical Summary

The **12BU6** is a versatile, 7-pin miniature double-diode triode featuring a 12.6 V, 150 mA heater and a unipotential cathode. It combines a low- μ ($\mu \approx 16$) triode voltage amplifier with two high-perveance diode detectors in a single T-5 1/2 glass envelope. With built-in diode shielding to minimize internal capacitive coupling, a maximum plate voltage rating of 300 V, and the ability to operate in any mounting position, the 12BU6 serves as an efficient and compact solution for detection and audio pre-amplification in electronic receiver designs.

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	300 mA	Nominal
Plate voltage	300 V	Typical operating conditions
Plate current	3.99.5 mA	Typical operating conditions

TUBE TINKER

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