



ELECTRONIC TUBE REFERENCE

12DW7

Voltage - Dual Triode (dissimilar) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

Dissimilar twin triode combining a high-mu voltage-amplifier section with a lower-mu, higher-current section, allowing voltage gain and driver functions within one envelope.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	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	Dissimilar

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	62500 Ω
TRANSCONDUCTANCE	0.0016 S
AMPLIFICATION FACTOR	100
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	1 W
MAXIMUM CATHODE CURRENT	8 mA
<i>High-mu system.</i>	

SECTION2 Triode	
PLATE RESISTANCE	7700 Ω
TRANSCONDUCTANCE	0.0026 S
AMPLIFICATION FACTOR	20
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.75 W
MAXIMUM CATHODE CURRENT	20 mA
<i>Medium-mu system.</i>	

12DW7 — Dissimilar Double Triode Vacuum Tube

An asymmetric, miniature double triode designed for audio frequency amplification and phase-inverter applications, combining high-mu and medium-mu triode systems in a single envelope.

Overview

The **12DW7** (also known by the European designation [ECC832](#)) is a 9-pin miniature double triode characterized by its highly dissimilar triode sections. It is specifically designed for electronic circuits that require both a high-gain voltage amplifier and a low-impedance driver or phase inverter, such as a cathodyne-type (split-load) phase-inverter stage.

The tube's design integrates two distinct triode systems:

- **Section 1 (System I):** A high-mu triode system electrically similar to the [12AX7](#) (or [ECC83](#)).
- **Section 2 (System II):** A medium-mu triode system electrically similar to the [12AU7](#) (or [ECC82](#)).

This combination allows a single tube envelope to perform dual roles in audio preamplifiers and driver stages, reducing component count and space requirements.

Construction, Heater, and Pinout

The 12DW7 is constructed in a T-6 1/2 glass bulb with a small button 9-pin (Noval, E9-1) base. It features coated unipotential cathodes and a center-tapped heater designed for flexible series or parallel operation using either AC or DC power.

Heater Characteristics

The heater can be wired in two configurations:

- **Series Connection:** 12.6 V nominal voltage at 0.15 A (150 mA), applied across pins 4 and 5.

- **Parallel Connection:** 6.3 V nominal voltage at 0.30 A (300 mA), with pins 4 and 5 connected together and the voltage applied between them and the center-tap pin 9.

Pinout and Electrode Connections

The tube uses the **9A** basing diagram. The two triode sections are electrically independent, except for their shared heater. The pin connections, viewed from the bottom of the base, are:

Pin	Connection	Description
1	Plate (2P)	Section 2 Plate
2	Grid (2G)	Section 2 Grid
3	Cathode (2K)	Section 2 Cathode
4	Heater (H)	Heater Connection
5	Heater (H)	Heater Connection
6	Plate (1P)	Section 1 Plate
7	Grid (1G)	Section 1 Grid
8	Cathode (1K)	Section 1 Cathode
9	Heater Center Tap (Hc / HT)	Heater Center Tap

Section 1 (pins 6, 7, and 8) corresponds to the high-mu system, while Section 2 (pins 1, 2, and 3) corresponds to the medium-mu system.

A variant designated as **ECC823** is available on request from certain manufacturers. This variant features a reversed pin configuration where pins 1, 2, and 3 connect to the high-mu ([ECC83](#)) system, and pins 6, 7, and 8 connect to the medium-mu ([ECC82](#)) system. There is no direct international equivalent for the ECC823 configuration.

Direct Interelectrode Capacitances

The interelectrode capacitances of the two sections differ due to their distinct internal structures. The capacitances are measured both with and without an external shield (specifically, external shield No. 315 connected to the cathode of the section under test):

Capacitance Parameter	Section 1 (High-Mu) Shielded	Section 1 (High-Mu) Unshielded	Section 2 (Medium-Mu) Shielded	Section 2 (Medium-Mu) Unshielded
Grid to Plate	1.7 pF	1.7 pF	1.5 pF	1.5 pF
Input: G to (H + K)	1.8 pF	1.6 pF	1.8 pF	1.7 pF

Capacitance Parameter	Section 1 (High-Mu) Shielded	Section 1 (High-Mu) Unshielded	Section 2 (Medium-Mu) Shielded	Section 2 (Medium-Mu) Unshielded
Output: P to (H + K)	2.0 pF	0.44 pF	2.4 pF	0.4 pF

Electrical Characteristics and Operating Points

Under Class A1 amplifier operation, the two sections of the 12DW7 exhibit highly distinct electrical characteristics. Section 1 provides high voltage gain with high plate resistance, whereas Section 2 provides lower gain with lower plate resistance and higher current capability.

Typical Class A1 Operating Conditions

Parameter	Section 1 (Point A)	Section 1 (Point B)	Section 2 (Point A)	Section 2 (Point B)
Plate Voltage	100 V	250 V	100 V	250 V
Grid Voltage	-1 V	-2 V	0 V	-8.5 V
Plate Current	0.5 mA	1.2 mA	11.8 mA	10.5 mA
Transconductance	1,250 μmhos	1,600 μmhos (1.6 mA/V)	3,100 μmhos	2,200 μmhos (2.2 mA/V)
Amplification Factor (μ)	100	100	20	17
Plate Resistance	80,000 Ω	62,500 Ω	6,500 Ω	7,700 Ω
Grid Voltage for $I_b = 10 \mu\text{A}$	—	—	—	-24 V

The relationship between transconductance (g_m), plate resistance (r_p), and amplification factor (μ) is maintained across these operating points.

- **Calculation for Section 1 (at 250 V):** Using the input values of $g_m = 1,600 \mu\text{mhos}$ (or 0.0016 S) and $r_p = 62,500 \Omega$, the calculated amplification factor is: $\mu = 0.0016 \text{ S} \times 62,500 \Omega = 100$
- **Calculation for Section 2 (at 250 V):** Using the input values of $g_m = 2,200 \mu\text{mhos}$ (or 0.0022 S) and $r_p = 7,700 \Omega$, the calculated amplification factor is: $\mu = 0.0022 \text{ S} \times 7,700 \Omega = 16.94 \approx 17$

Design-Maximum Ratings

The ratings of the 12DW7 are interpreted according to the Design-Maximum System. These values represent limiting operating and environmental conditions that must not be exceeded under the worst probable conditions.

Rating Parameter	Section 1	Section 2
Maximum Plate Voltage	330 V	330 V
Maximum Plate Dissipation	1.2 W	3.3 W
Maximum Cathode Current	—	22 mA
Maximum Positive DC Grid Voltage	0 V	—
Maximum Negative DC Grid Voltage	55 V	—
Maximum Grid Circuit Resistance (Fixed Bias)	—	0.25 M Ω
Maximum Grid Circuit Resistance (Self Bias)	—	1.0 M Ω

Heater-Cathode Voltage Limits

The maximum heater-to-cathode voltage ratings are common to both sections:

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

Characteristic Curves and Interpretation

The average plate and transfer characteristics of the 12DW7 highlight the distinct behaviors of its two internal systems:

- **Section 1 (High-Mu System):** The plate characteristics show a low plate current range, peaking at approximately 4.0 mA. The grid bias curves are tightly spaced between 0 V and -5.0 V, reflecting the high transconductance and high amplification factor ($\mu = 100$). This section is optimized for small-signal voltage amplification where high input sensitivity and maximum voltage gain are required.
- **Section 2 (Medium-Mu System):** The plate characteristics show a much higher current capability, with plate current extending up to 40 mA. The grid bias curves are wider, spanning from 0 V to -30 V. This section is designed to handle larger signal swings and deliver higher current, making it ideal for driving subsequent stages or operating as a low-impedance cathodyne phase splitter.

Technical Summary

The **12DW7** (or [ECC832](#)) is a specialized **9-pin miniature dissimilar double triode** designed for audio frequency amplification and phase-inverter service. By combining a high-mu triode (Section 1, similar to a [12AX7](#)) and a medium-mu triode (Section 2, similar to a [12AU7](#)) in a single envelope, it provides an efficient single-tube solution for gain and driver stages.

Operating from a flexible **6.3 V / 12.6 V** heater supply, the tube features separate cathodes and independent triode connections. Designers must observe the distinct plate dissipation limits of **1.2 W** for Section 1 and **3.3 W** for Section 2, as well as the maximum cathode current of **22 mA** for Section 2, to ensure reliable operation within the Design-Maximum System.



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



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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal
Heater current	150 mA	Nominal
Plate voltage	330330 V	Typical operating conditions

1961 TUNG SOL

Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal
Heater current	150 mA	Nominal
Plate voltage	330330 V	Typical operating conditions

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 2 of 4

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1966 TUNG SOL ELECTRONIC TUBES 2 OF 4

Section 1 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER VOLTAGE (°FRIES)	12.6 V	HEATER VOLTAGE (°FRIES) 12.6 voLrs
HEATER VOLTAGE (PARALLEL)	6.3 V	HEATER VOLTAGE (PARALLEL) 6.3 voLrs
HEATER VOLTAGE (SERIES)	12.6 V	HEATER VOLTAGE (SERIES) 12.6
PLATE VOLTAGE	100 V	PLATE VOLTAGE 100 250 100 250 voLrs
GRID VOLTAGE	1 V	GRID VOLTAGE -1 -2 0 -8.5 voLTs
PLATE CURRENT	0.5 mA	PLATE CURRENT 0.5 1.2 11.8 10.5 MA.
AMPLIFICATION FACTOR	100 A	AMPLIFICATION FACTOR 100 100 20 17
PLATE RESISTANCE	80000 Ω	PLATE RESISTANCE 80000 62500 6500 7700 OHMS

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM PLATE VOLTAGE	330 V	MAXIMUM PLATE VOLTAGE 330 330 voLrs
MAXIMUM PLATE DISSIPATION	1.2 mA	MAXIMUM PLATE DISSIPATION 1.2 3.3 wnrr
MAXIMUM CATHODE CURRENT	22 mA	MAXIMUM CATHODE CURRENT --- 22 MA.
MAXIMUM NEGATIVE DC GRID VOLTAGE	55 V	MAXIMUM NEGATIVE DC GRID VOLTAGE 55 voLrs
FIXED BIAS	0.2 MΩ	FIXED BIAS 0,2rj MEGOHM
SELF BIAS	1 MΩ	SELF BIAS 1.0 MEGOHM

2026 JJ Electronic

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2026 JJ ELECTRONIC

Section 1 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ua	250	Published value
Ug	-2	Published value
Ia	1.2	Published value
S	1.6	Published value
μ	100	Published value

2026 JJ ELECTRONIC

Section 2 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ua	250	Published value
Ug	-2	Published value
Ia	1.2	Published value
S	1.6	Published value
μ	100	Published value