



ELECTRONIC TUBE REFERENCE

12AT7EH

Voltage - Dual Triode (similar) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

Modern 12AT7-family twin triode intended for low-frequency voltage amplification, offering medium-high gain and relatively high transconductance for audio driver and preamplifier applications.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 370 mA	PARALLEL HEATER	6.3 V / 370 mA
HEATING	Indirect	SERIES OPERATION	Capable
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Triode	
TRANSCONDUCTANCE	0.0054 S
AMPLIFICATION FACTOR	45
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
MAXIMUM CATHODE CURRENT	20 mA
Representative section for two electrically identical triodes.	

SECTION2 Triode	
TRANSCONDUCTANCE	0.0054 S
AMPLIFICATION FACTOR	45
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
Second identical physical triode section; added to align rows with SectionCount.	

12AT7EH — Miniature Twin Triode Vacuum Tube

An indirectly heated, dual-section miniature receiving valve designed for low-frequency voltage amplification in radio engineering devices.

Overview

The **12AT7EH** (including its variant, the **12AT7EH gold**) is a miniature twin triode vacuum tube constructed with independent, equipotential cathodes. It is designed specifically to amplify low-frequency voltage within various radio engineering applications. The tube integrates two separate triode systems within a single compact glass envelope, sharing a common heater with a center-tap connection that allows for either series or parallel filament operation.

Construction, Physical Dimensions, and Pinout

The 12AT7EH is housed in a miniature glass bulb with a 9-pin base. The physical dimensions and mechanical specifications are as follows:

- **Maximum overall height:** 56.5 mm
- **Envelope diameter:** 20.5 mm to 22.5 mm, specified as $\varnothing(22.5 - 2)$ mm
- **Pin circle diameter:** 12 mm
- **Pin diameter:** 1.0 mm with a tolerance of +0.03 mm to -0.07 mm
- **Pin spacing:** 8 intervals of 36°, spanning a total of 288° around the base

The electrode connections are routed to a standard 9-pin base. The two triode sections are electrically independent, except for the shared heater. The heater is split into two sections with a center tap, allowing for flexible filament supply configurations.

Pin Connection Table

Pin	Electrode Designation
1	Second triode plate

Pin	Electrode Designation
2	Second triode grid
3	Second triode cathode
4	Heater
5	Heater
6	First triode plate
7	First triode grid
8	First triode cathode
9	Heater (Center Tap)

Heater and Power Supply Configurations

The heater of the 12AT7EH can be wired in either a series or parallel configuration, depending on the available supply voltage:

- **Parallel Connection:** The heater is operated at a nominal voltage of 6.3 V (allowable range: 6.0 V to 6.6 V). In this configuration, the nominal heater current is between 350 mA and 390 mA.
- **Series Connection:** The heater is operated at a nominal voltage of 12.6 V (allowable range: 12.0 V to 13.2 V). In this configuration, the nominal heater current is between 175 mA and 195 mA.

Electrical Parameters and Operating Characteristics

The nominal electrical parameters for each triode section of the 12AT7EH are specified under the following test conditions: a plate voltage (E_p) of 250 V, a negative grid bias (E_g) of -2.0 V, and a filament voltage of either 6.3 V or 12.6 V.

- **Plate Current (I_p):** 7.0 mA to 14.0 mA.
- **Plate Current Difference:** The difference in plate current between the first and second triode sections is limited to a maximum of $\pm 40\%$.
- **Slope of Characteristic (Transconductance, g_m):** 4.3 mA/V to 6.5 mA/V (equivalent to 4,300 to 6,500 μmhos).
- **Amplification Factor (μ):** Minimum of 45.
- **Grid Back Current:** Maximum of 0.5 μA (measured with a grid circuit resistance of 0.25 M Ω).
- **Plate Current at Cutoff (Beginning of Characteristic):** Maximum of 30 μA , measured at a plate voltage of 250 V and an increased negative grid bias of -12.0 V.
- **Cathode-Heater Insulation Resistance:** Minimum of 20 M Ω , measured with a cathode-to-heater voltage of ± 200 V.

Limiting Values and Ratings

To ensure reliable operation and prevent premature failure, circuit designs must adhere to the absolute maximum ratings (limiting values) specified for the 12AT7EH:

Parameter	Minimum	Maximum
Filament voltage (parallel connection)	6.0 V	6.6 V
Filament voltage (series connection)	12.0 V	13.2 V
Plate voltage	—	330 V
Cathode-heater voltage	—	± 200 V
Power dissipation at the plate of each triode	—	3.25 W
Cathode current	—	18 mA
Grid circuit resistance (fixed bias)	—	0.25 M Ω
Grid circuit resistance (self-bias)	—	1.0 M Ω

Characteristic Curves and Behavior

The performance of the 12AT7EH is illustrated by two sets of characteristic curves, both recorded at a filament voltage (E_f) of 6.3 V:

Plate Current vs. Grid Voltage ($I_p = f(E_g)$)

This transfer characteristic shows the relationship between grid bias and plate current at three distinct plate voltages: 200 V, 250 V, and 300 V.

- At a plate voltage of 250 V and a grid bias of -2.0 V, the nominal plate current lies within the 7.0 mA to 14.0 mA range.
- As the grid voltage becomes more negative, the plate current decreases. At a grid bias of -3.5 V, the plate current is significantly reduced but not fully cut off. Full cutoff (defined as plate current falling below 30 μ A) occurs as the grid bias approaches -12.0 V when the plate voltage is 250 V.

Plate Current vs. Plate Voltage ($I_p = f(E_p)$)

This family of plate curves displays plate current against plate voltage for grid bias steps from 0 V to -3.5 V in -0.5 V increments.

- The curves demonstrate a relatively steep slope, reflecting the high transconductance (4.3 mA/V to 6.5 mA/V) and moderate plate resistance of the triode sections.
- At $E_g = 0\text{ V}$, the plate current rises rapidly with plate voltage, reaching approximately 26 mA before the plate voltage exceeds 150 V. Designers must use appropriate negative bias or cathode resistors to avoid exceeding the maximum plate dissipation limit of 3.25 W per section or the maximum cathode current limit of 18 mA.

Technical Summary

The **12AT7EH** and its gold-pin counterpart, the **12AT7EH gold**, are high-performance, miniature 9-pin twin triodes designed for low-frequency voltage amplification. Featuring independent triode sections with separate equipotential cathodes, the tube offers an amplification factor of at least 45 and a transconductance of 4.3 to 6.5 mA/V under nominal conditions. Its versatile heater design supports both 6.3 V parallel and 12.6 V series operation. With a maximum plate voltage rating of 330 V and a plate dissipation limit of 3.25 W per triode, the 12AT7EH provides robust and reliable performance in a wide range of radio engineering and audio amplification applications.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

2026 Electro Harmonix Gold

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

2026 ELECTRO HARMONIX GOLD

Section 1 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	7–14 mA	Plate 250 V; Grid -2 V

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