



ELECTRONIC TUBE REFERENCE

1605V4

Power - Triode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

TRIODE

Cathode-tapped V4 version of the directly heated 1605 high-power audio triode. Published Class A conditions specify about 22 W output at 580 V and 110 mA, with a 64 W maximum plate-dissipation rating.

GENERAL CHARACTERISTICS

BASE DESIGNATION	OCTAL	BASE PINS	8
NOMINAL HEATER	5 V / 2.1 A	PARALLEL HEATER	– / –
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Triode	
PLATE RESISTANCE	861 Ω
TRANSCONDUCTANCE	0.0088 S
AMPLIFICATION FACTOR	7.5
MAXIMUM PLATE VOLTAGE	650 V
MAXIMUM PLATE DISSIPATION	64 W
MAXIMUM CATHODE CURRENT	160 mA

1605V4 — Cathode-Tapped Power Triode

The **1605V4** (also designated as **EML1605-V4**) is a high-power, indirectly-behaving directly heated triode designed for high-fidelity audio amplification. It is characterized by a medium-mu design, high plate dissipation, and a unique cathode-tapped filament structure that allows it to function as a true three-connection triode with an independent cathode connection. The tube is related in design and sonic

character to the classic Marconi [PX25](#), while offering significantly higher voltage capability, higher impedance, and substantially greater power output than standard 300B-type tubes.

Design Philosophy and Sonic Character

The 1605V4 is engineered to address the limitations of traditional large power triodes, which can sound sterile at low power levels. To preserve a sweet, silky sound character even at low output levels, the tube features wide, box-shaped anodes similar to those of the Marconi [PX25](#). Sonically, the 1605V4 is positioned between the [300B](#) and the [PX25](#), but it is capable of operating at much higher power levels.

To achieve higher output power without excessively increasing anode current, the 1605V4 is designed for higher anode voltage operation. This approach increases plate dissipation while keeping the DC current at a moderate level. This offers a significant advantage for single-ended (SE) output transformers, which do not have to operate under excessive DC current. Consequently, the transformer is easier to construct, and its primary inductance can be higher.

Furthermore, the 1605V4 features a lower bias voltage relative to its operating voltage, which improves power supply efficiency by reducing the voltage dropped and wasted across the cathode bias resistor. Although this lower bias voltage limits the maximum grid signal swing, the tube's higher gain (approximately twice that of a [300B](#)) compensates for this, requiring a lower total input signal and simplifying the design of the driver stage.

Construction and Mechanical Features

The 1605V4 incorporates several advanced mechanical and materials technologies to ensure stability, longevity, and low microphonics:

- **Hard-Metal Construction:** The tube utilizes hard-metal construction rather than classic nickel. This ensures a highly precise and stable anode distance, prevents damage during shipment, and provides reproducible electrical parameters and long-term stability.
- **Wolfram Grids:** The grid wires are made of wolfram (tungsten), an extremely hard metal that allows for highly precise grid wire spacing. This precise geometry ensures excellent uniformity and linearity in the tube's characteristic curves.
- **Gold-Plated Grid:** The gold-plated grid structure provides increased bias stability, protection against accidental overload, and improved curve linearity.
- **Anode and Cooling Design:** The tube features 0.5 mm thick anodes equipped with 12 coolers (6 on each side of the anode) to manage heat dissipation.
- **Suspension and Envelope:** It features a double mica top, a soft rubber suspended base, and an anti-microphonic anode and grid suspension system. The envelope is a hand-blown glass bulb.
- **Getters:** The vacuum is maintained using a three-getter system consisting of two side getters and one top getter.
- **Physical Dimensions:** The tube has a physical size of 200 mm in height (including the socket, but excluding the pins) and a diameter of 68 mm. The weight of a single tube is 190 grams.
- **Aesthetics and Pins:** The tube features gold-plated pins and is printed with real gold metal, with red lettering burned directly into the glass. It is designed to be used with high-quality sockets, such as Yamamoto tube sockets, and is supplied with a black ceramic socket featuring a white bottom.

Heater and Cathode-Tapped (V4) Technology

The defining feature of the 1605V4 is its **Cathode-Tapped heater (V4-Version)**, which distinguishes it from the standard V3-Version (which uses a conventional heater).

In a standard directly heated triode (DHT) like the [300B](#), there is no physical cathode terminal. Biasing requires an artificial center tap created via an external resistor network. This configuration forces the entire AC signal current, along with the DC bias current, to pass through these centering resistors, introducing a compromise in signal purity.

The 1605V4 solves this by serializing the internal heater wires and tapping them precisely at the electrical center. This center tap is brought out to a dedicated pin, acting as a true physical cathode (K). This configuration eliminates the need for external centering resistors or hum-balancing networks. The heater itself is powered by a floating 5.0 V supply connected across the H1 and [H2](#) terminals. To minimize contact resistance, the H1 and [H2](#) heater connections are each routed through two parallel contacts on the base.

For flexibility, the 1605V4 can also be operated in a classic DHT configuration. By disconnecting the cathode tap, the remaining four wires can be wired in the traditional manner of a standard directly heated tube (such as a [300B](#) or 520B-V3).

Base and Pin Connections

Due to the five-wire electrical interface (Anode, Grid, Cathode Tap, and two dual-contact Heater connections), the 1605V4 cannot use a standard 4-pin UX4 base. Instead, it is fitted with an **Octal base**.

The pin assignments, viewed from the bottom of the octal socket, are as follows:

Pin Number	Connection	Description
1	H1	Heater Connection 1 (Contact A)
2	H1	Heater Connection 1 (Contact B)
3	A	Anode (Plate)
4	G	Grid (Contact A)
5	G	Grid (Contact B)
6	H2	Heater Connection 2 (Contact A)
7	H2	Heater Connection 2 (Contact B)
8	K	Cathode Tap (Center Tap)

Note: The physical orientation of the internal plates is parallel to the side of the base where the logo is printed.

Electrical Ratings and Operating Points

The 1605V4 is rated for high-power Class A operation. Its electrical characteristics, filament requirements, and maximum limits are detailed below.

Filament Ratings

The filament must be operated at its nominal voltage to ensure optimal emission and tube life. Operating the tube at a lower filament voltage in an attempt to extend its lifetime is explicitly discouraged.

Parameter	Rating / Value
Filament Voltage (AC or DC)	5.0 V (with balanced heater: 2 x 2.5 V)
Filament Current	2.1 A
Filament Voltage Tolerance	±4%
Electronic Heater Module Requirement	Voltage source only

Maximum Conditions

These maximum ratings represent the absolute limits of safe operation. They must not be applied simultaneously.

Parameter	Absolute Maximum
Anode Voltage	650 V
Anode Current	160 mA
Power Output (Class A)	30 W
Grid Resistor	50 kΩ

Typical Recommended Operating Point

The typical operating point is optimized for Class A service using either auto bias or fixed bias:

Parameter	Recommended Value
Anode Voltage	580 V
Anode Dissipation	64 W
Anode Current	110 mA

Parameter	Recommended Value
Control Grid Voltage	-82 V
Anode Impedance (R_p)	861 Ω
Amplification Factor (μ)	7.5
Transconductance (G_m)	8.8 mA/V
Power Output (Class A)	22 W
Required Input Signal (for full output)	57 V AC (RMS)
Load Impedance (R_a)	2700 – 5600 Ω
Grid Resistor to Ground	Max. 100 k Ω

Recommended Transformer Configuration

For optimal performance at the typical operating point, a Lundahl LL1623-120mA transformer (or equivalent) is recommended under the following circuit conditions:

- **Transformer Primary Impedance:** 3000 Ω
- **Transformer Secondary Options:** 4 Ω (Alt.B), 8 Ω (Alt.C), or 16 Ω (Alt.D)
- **Auto-Bias Cathode Resistor:** 800 Ω
- **Anode Current:** 110 mA
- **Anode Voltage to Ground:** 668 V

Technical Summary

The **1605V4** is a premium, octal-based, cathode-tapped power triode designed for uncompromising Class A audio amplifiers. Combining the sonic refinement of the classic [PX25](#) with modern high-voltage capability, it delivers up to **22 W** of Class A output power at its recommended operating point of **580 V** anode voltage and **110 mA** anode current.

Its unique **cathode-tapped filament** design provides a true physical cathode connection, eliminating the need for external centering resistors and allowing for a cleaner, more direct signal path. With an amplification factor of **7.5**, a transconductance of **8.8 mA/V**, and a low anode impedance of **861 Ω** , the 1605V4 simplifies driver stage requirements and optimizes output transformer performance, making it an exceptional choice for high-end single-ended triode designs.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 1 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filament voltage	5 V	—
Filament current	2.1 A	—
Plate resistance	861 ohm	ClassA
Amplification factor	7.5	ClassA
Transconductance	8800 uS	ClassA

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	580 V	ClassA
Plate current	110 mA	ClassA
Grid voltage	-82 V	ClassA
Load resistance	2700 ohm	ClassA
Output power	22 W	ClassA

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode-tapped filament	2.5-0-2.5 V	—

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