

ELECTRONIC TUBE REFERENCE

10LW8

Voltage Triode Pentode electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-TRIODE

High-mu triode combined with a sharp-cutoff pentode for signal-amplifier service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9DX	BASE PINS	9
NOMINAL HEATER	10.5 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

9DX - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – 2K	B	K – Cathode	CONNECTED
PIN2 – 2G1	B	G1 – Control Grid	CONNECTED
PIN3 – 2P	B	P – Plate (Anode)	CONNECTED
PIN4 – H	–	H – Heater	CONNECTED
PIN5 – H	–	H – Heater	CONNECTED
PIN6 – 1G3	A	G3 – Suppressor Grid	CONNECTED
PIN6 – IS	A	IS – Internal Screen	CONNECTED
PIN6 – 1K	A	K – Cathode	CONNECTED
PIN7 – 1G1	A	G1 – Control Grid	CONNECTED
PIN8 – 1G2	A	G2 – Screen Grid	CONNECTED
PIN9 – 1P	A	P – Plate (Anode)	CONNECTED

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	60000 Ω
TRANSCONDUCTANCE	0.019 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	4 W
MAXIMUM SCREEN DISSIPATION	1.5 W

SECTION2 Triode	
PLATE RESISTANCE	18700 Ω
TRANSCONDUCTANCE	0.004 S
AMPLIFICATION FACTOR	75
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	1.5 W

10LW8 — High-Mu Triode and Sharp-Cutoff Pentode

The 10LW8 is a miniature triode-pentode vacuum tube containing a high-mu triode and a sharp-cutoff pentode in a single envelope. The pentode section is designed for service as a video amplifier in television receivers, while the triode section is intended for general-purpose applications.

Overview

The **10LW8** is a multi-unit miniature tube featuring two independent electrical systems: a high-mu triode and a sharp-cutoff pentode. The tube is constructed with a T-6 1/2 glass envelope and utilizes a small button 9-pin (E9-1) base. It is designed to operate in any position.

The heater is designed for series-string television receivers, requiring a nominal voltage of **10.5 V** and a current of **0.45 A** (with a tolerance of ± 0.03 A). The heater features a controlled warm-up time of **11 seconds** to ensure reliable operation in series-connected heater strings.

Physical Construction, Basing, and Pinout

The 10LW8 utilizes the **9DX** basing diagram, which provides separate connections for the triode and pentode electrodes, with the exception of a shared heater. The pentode section includes an internal shield connected to its cathode and grid number 3.

Terminal Connections (EIA 9DX)

- **Pin 1:** Triode Cathode
- **Pin 2:** Triode Grid
- **Pin 3:** Triode Plate
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Pentode Cathode, Grid Number 3, and Internal Shield
- **Pin 7:** Pentode Grid Number 1
- **Pin 8:** Pentode Grid Number 2 (Screen)
- **Pin 9:** Pentode Plate

Physical Dimensions

- **Envelope:** T-6 1/2 Glass
- **Base:** E9-1, Small Button 9-Pin
- **Maximum Diameter:** 0.875 inches
- **Maximum Seated Height:** 2.375 inches
- **Maximum Overall Length:** 2.625 inches

Direct Interelectrode Capacitances

The capacitances of each section, measured without an external shield, are as follows:

Section	Parameter	Value
Pentode	Grid-Number 1 to Plate (Pg1 to Pp)	0.08 pF
	Input: Pg1 to (h + Pk + Pg2 + Pg3 + i.s.)	12 pF
	Output: Pp to (h + Pk + Pg2 + Pg3 + i.s.)	4.4 pF
Triode	Grid to Plate (Tg to Tp)	3.6 pF
	Input: Tg to (h + Tk + Pk + Pg3 + i.s.)	2.8 pF
	Output: Tp to (h + Tk + Pk + Pg3 + i.s.)	3.0 pF

Electrical Characteristics and Typical Operation

The 10LW8 provides distinct operating characteristics for its two sections. The pentode section is characterized by high transconductance and sharp-cutoff behavior, making it highly suitable for wideband

video amplification. The triode section offers a high amplification factor ($\mu = 75$) for general-purpose voltage amplification or control circuitry.

Typical Operating Points (Class A1 Amplifier)

Parameter	Pentode Section (Point A)	Pentode Section (Point B)	Triode Section
Plate Supply Voltage	35 V	200 V	200 V
Screen (Grid-No. 2) Voltage	100 V	100 V	—
Grid-No. 1 Voltage	0 V	—	-2.0 V
Cathode-Bias Resistor	—	82 Ohms	—
Amplification Factor (μ)	—	—	75
Plate Resistance (Approx.)	—	60,000 Ohms	18,700 Ohms
Transconductance	—	19,000 micromhos	4,000 micromhos
Plate Current	48 mA	16.5 mA	2.6 mA
Screen Current	12.5 mA	2.8 mA	—
Grid-No. 1 Voltage for $I_b = 100 \text{ uA}$	—	-5.5 V	—
Grid-No. 1 Voltage for $I_b = 30 \text{ uA}$	—	—	-4.0 V

Maximum Ratings

The maximum ratings are established under the Design-Maximum Rating System. These limiting values must not be exceeded under the worst probable operating conditions.

Rating	Pentode Section	Triode Section
Maximum Plate Voltage	330 V	330 V
Maximum Screen Supply Voltage	330 V	—
Maximum Screen Voltage	See Screen Rating Chart	—

Rating	Pentode Section	Triode Section
Maximum Positive DC Grid-No. 1 Voltage	0 V	0 V
Maximum Plate Dissipation	4.0 W	1.5 W
Maximum Screen Dissipation	1.5 W	—
Heater-Cathode Voltage		
- Heater Positive (DC Component)	100 V	100 V
- Heater Positive (Total DC and Peak)	200 V	200 V
- Heater Negative (Total DC and Peak)	200 V	200 V
Grid-No. 1 Circuit Resistance		
- With Fixed Bias	0.5 Megohms	0.5 Megohms
- With Cathode Bias	1.0 Megohms	1.0 Megohms

Analysis of Characteristic Curves

The graphical data for the 10LW8 illustrates the performance of both sections under varying bias and voltage conditions:

Pentode Section Curves

- **Average Plate Characteristics:** At a fixed screen voltage (E_{c2}) of 150 V, the plate current (I_b) rises rapidly at low plate voltages (below 50 V) and remains highly constant across a wide range of plate voltages up to 500 V. This flat characteristic is typical of a sharp-cutoff pentode. The curves are plotted for grid-No. 1 voltages (E_{c1}) from 0 V down to -3.0 V. Screen current (I_{c2}) curves show a complementary behavior, decreasing as plate voltage increases.
- **Average Transfer Characteristics:** Plotted at a plate voltage (E_b) of 200 V, these curves show plate current, screen current, and transconductance as functions of grid-No. 1 voltage for screen voltages ranging from 25 V to 150 V. The transconductance curves demonstrate a steep slope at low bias voltages, peaking near 30,000 micromhos at $E_{c2} = 150$ V and $E_{c1} = 0$ V, and dropping sharply to cutoff near -5.5 V.

Triode Section Curves

- **Average Plate Characteristics:** The triode plate curves show plate current plotted against plate voltage for grid bias values from 0 V to -9.0 V. The curves exhibit the typical exponential rise of a high- μ triode.

- **Average Transfer Characteristics:** Plotted for plate voltages from 100 V to 300 V, these curves show plate current vs. grid voltage, illustrating a cutoff region near -4.0 V for a 200 V plate supply.
- **Average Characteristics vs. Plate Current:** This set of curves plots the amplification factor (μ), plate resistance (r_p), and transconductance (g_m) against plate current up to 7 mA. The amplification factor remains remarkably stable around 75 across the entire operating range. The plate resistance decreases from over 40,000 Ohms at low currents to approximately 15,000 Ohms at 7 mA, while the transconductance rises from under 1,000 micromhos to over 5,000 micromhos.

Technical Summary

The **10LW8** is a versatile **9-pin miniature triode-pentode** designed for television receiver applications. It combines a **high- μ triode** ($\mu = 75$) and a **sharp-cutoff pentode** with exceptionally high transconductance (**19,000 micromhos** at typical operating conditions) in a single T-6 1/2 glass envelope. Featuring a controlled **11-second heater warm-up time** and a **10.5 V / 0.45 A** heater rating, it is optimized for series-string heater circuits. The pentode section is highly effective for video amplifier service, while the triode section serves general-purpose voltage amplification and control functions.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	11 V	—
Plate Voltage	-55611 V	—
Screen Voltage	1 V	—
Plate Dissipation	4 W	—
Screen Current	4 mA	—
Grid Voltage	30 V	—
Grid Voltage	-55611 V	—
Plate Voltage	200 V	AverageCharacteristics
Screen Voltage	100 V	AverageCharacteristics

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
GridtoPlateCapacitance	3.6 pF	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	16.5 mA	AverageCharacteristics
Screen Current	2.8 mA	AverageCharacteristics

1968 GENERAL ELECTRIC CO

Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	200 V	AverageCharacteristics

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	2.6 mA	AverageCharacteristics