

ELECTRONIC TUBE REFERENCE

10LY8

Voltage - Triode Pentode electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-TRIODE

Television triode-pentode with a video-amplifier pentode and general-purpose triode section.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9DX	BASE PINS	9
NOMINAL HEATER	10.5 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Capable
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 Triode	
PLATE RESISTANCE	59000 Ω
TRANSCONDUCTANCE	0.0017 S
AMPLIFICATION FACTOR	100
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	1 W
<i>Sylvania/RCA 10LY8 high-mu general-purpose triode paired with video pentode. Maximum triode plate voltage 330 V, dissipation 1 W. Typical triode at plate 250 V, grid -2 V, plate current 1 mA: μ 100, g_m 1.7 mA/V, plate resistance $\sim$59 kΩ. Published interelectrode capacitances already recorded. 10.5 V 0.45 A heater for series-heater receiver service.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	60000 Ω
TRANSCONDUCTANCE	0.02 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	5 W
MAXIMUM SCREEN DISSIPATION	1.1 W
<i>10LY8 sharp-cutoff video pentode: maximum plate 330 V, dissipation 5 W. Screen dissipation 1.1 W up to 165 V screen, with other conditions governed by rating curves. The former 165 V maximum screen field was not a general limit. Typical 200 V anode, 100 V screen: g_m 20 mA/V and plate resistance 60 kΩ.</i>	

10LY8 — High-Mu Triode and Sharp-Cutoff Pentode

An indirectly heated, multi-section miniature vacuum tube containing a high-mu triode and a sharp-cutoff pentode in a single envelope, designed for television receiver applications.

Overview

The **10LY8** is a miniature multi-section vacuum tube incorporating two distinct and electrically independent active structures: a high-mu triode and a sharp-cutoff pentode. It is designed primarily for use in color and black-and-white television receivers. Within these applications, the sharp-cutoff pentode section is optimized for service as a video amplifier, while the high-mu triode section is designed for general-purpose voltage amplification and control functions.

The 10LY8 features a 10.5 V heater designed for series-string heater chains, drawing a nominal current of 0.45 A. An electrically identical counterpart, the **6LY8**, is available for parallel heater circuits requiring a 6.3 V, 0.75 A supply. Both types share the same physical construction, internal electrode structures, and electrical characteristics, differing only in their heater ratings and warm-up specifications.

Construction, Physical Dimensions, and Basing

The 10LY8 is constructed in a miniature T-6 1/2 glass envelope. It utilizes a standard button 9-pin base (E9-1 designation) and requires a 9-contact socket for operation. The physical dimensions of the tube are as follows:

Physical Parameter	Value (Inches)
Maximum Diameter	0.875
Maximum Seated Height	2.375
Maximum Overall Height	2.625

The tube uses the **9DX** basing arrangement, which provides separate connections for the triode and pentode sections. The pentode section includes an internal shield (IS) connected internally to the pentode cathode and grid No. 3 (suppressor grid) to minimize internal feedback and capacitive coupling.

The pin connections, viewed from the underside of the base, are assigned as follows:

Pin Number	Symbol	Electrode Connection
1	PT	Plate, Triode Unit
2	GT	Control Grid, Triode Unit
3	KT	Cathode, Triode Unit
4	H	Heater
5	H	Heater
6	G3P, KP, IS	Grid No. 3 (Suppressor Grid), Cathode, and Internal Shield, Pentode Unit
7	G1P	Grid No. 1 (Control Grid), Pentode Unit
8	G2P	Grid No. 2 (Screen Grid), Pentode Unit
9	PP	Plate, Pentode Unit

Heater and Heater-Cathode Ratings

The heater of the 10LY8 is designed for reliable operation in series-connected heater strings. It features a controlled warm-up time to ensure balanced voltage distribution across series elements during the initial power-up phase.

Heater Parameter	10LY8 Value	<u>6LY8</u> Value	Unit
Heater Voltage (AC or DC)	10.5	6.3	V
Heater Current	0.45 (450)	0.75 (750)	A (mA)
Average Heater Warm-up Time	11	—	seconds

Heater-Cathode Voltage Limits

To prevent insulation breakdown and minimize hum or leakage between the heater and the individual cathodes, the following maximum voltage limits must be observed:

- **Heater Negative with Respect to Cathode:**
 - Total DC and Peak Value: **200 V max**
- **Heater Positive with Respect to Cathode:**
 - DC Value: **100 V max**
 - Total DC and Peak Value: **200 V max**

Direct Interelectrode Capacitances

The 10LY8 is designed to operate without an external shield. The direct interelectrode capacitances of the unshielded tube are specified separately for each section:

Pentode Section Capacitances

- **Grid No. 1 to Plate:** 0.075 pF
- **Input (Grid No. 1 to Heater + Pentode Cathode + Grid No. 2 + Grid No. 3 + Internal Shield):** 13 pF
- **Output (Plate to Heater + Pentode Cathode + Grid No. 2 + Grid No. 3 + Internal Shield):** 4.4 pF

Triode Section Capacitances

- **Grid to Plate:** 3.8 pF
- **Input (Grid to Heater + Triode Cathode + Pentode Cathode + Grid No. 3 + Internal Shield):** 2.6 pF
- **Output (Plate to Heater + Triode Cathode + Pentode Cathode + Grid No. 3 + Internal Shield):** 2.8 pF

These low capacitances, particularly the extremely low grid-to-plate capacitance of the pentode section (0.075 pF), are critical for maintaining stability and high gain in wideband video amplifier circuits.

Maximum Ratings (Design-Maximum System)

The maximum ratings of the 10LY8 are established under the Design-Maximum Rating System. Operating the tube beyond these limits may impair its performance and significantly shorten its service life.

Rating Parameter	Pentode Section	Triode Section	Unit
Plate Voltage	330	330	V
Screen Supply Voltage (Grid No. 2)	330	—	V
Screen Voltage (Grid No. 2)	<i>See Note</i>	—	V
Positive DC Grid No. 1 Voltage	0	0	V
Plate Dissipation	5.0	1.0	W
Screen Dissipation (Grid No. 2 Input):			
— For Grid No. 2 voltages up to 165 V	1.1	—	W
— For Grid No. 2 voltages between 165 and 330 V	<i>See Note</i>	—	W

Note: The maximum allowable screen voltage and screen dissipation for voltages between 165 V and 330 V are determined by established rating charts and curves.

Maximum Grid No. 1 Circuit Resistance

To prevent thermal runaway caused by grid emission or gas currents, the resistance in the control grid circuit must not exceed the following limits:

- **Fixed-Bias Operation:**
 - Pentode Section: **0.5 M**
 - Triode Section: **0.5 M**
- **Cathode-Bias Operation:**
 - Pentode Section: **1.0 M**
 - Triode Section: **1.0 M**

Electrical Characteristics and Typical Operation

The 10LY8 combines a high-transconductance, sharp-cutoff pentode with a high-mu triode. The typical operating points and characteristics for each section are detailed below.

Triode Section

The triode section is characterized by a high amplification factor ($\mu = 100$), making it highly suitable for voltage preamplification, sync separation, or general-purpose control circuitry.

- **Plate Voltage:** 250 V
- **Grid No. 1 Voltage:** -2.0 V
- **Amplification Factor:** 100
- **Plate Resistance (Approximate):** 59,000
- **Transconductance:** 1,700 μmhos
- **Plate Current:** 1.0 mA
- **Grid Voltage (Approximate) for Plate Current of 10 μA :** -5 V

Pentode Section

The pentode section is designed to deliver high transconductance and high plate current at low plate voltages, which is essential for driving the capacitive loads encountered in video amplifier stages. Two typical operating points illustrate its performance:

Parameter	Operating Point A (Low Plate Voltage)	Operating Point B (High Plate Voltage)	Unit
Plate Voltage	35	200	V
Screen Voltage (Grid No. 2)	100	100	V
Grid No. 1 Voltage	0	—	V
Cathode Bias Resistor	—	82	Ω
Plate Resistance (Approximate)	—	60,000	Ω
Transconductance	—	20,000	μmhos
Plate Current	54	19.5	mA
Screen Current (Grid No. 2)	13.5	3.0	mA
Grid No. 1 Voltage (Approx.) for $I_b = 100 \mu\text{A}$	—	-6.3	V

At Operating Point B, the pentode section exhibits an exceptionally high transconductance of **20,000 μmhos** with a plate current of **19.5 mA**. This high transconductance-to-current ratio is achieved through advanced grid design and close electrode spacing, allowing the tube to provide high voltage gain over a wide frequency bandwidth.

Technical Summary

The **10LY8** is a versatile, high-performance miniature tube that combines a **high-mu triode** and a **sharp-cutoff pentode** in a single T-6 1/2 envelope. It is specifically optimized for television receiver applications, where the pentode serves as a high-transconductance video amplifier and the triode performs general-purpose voltage amplification.

With a **10.5 V, 0.45 A series-string heater** (and its 6.3 V, 0.75 A parallel-heater counterpart, the [6LY8](#)), the tube integrates seamlessly into standard television chassis designs. The pentode section's capability to deliver **20,000 μmhos** of transconductance at a typical operating point of 200 V, combined with a robust **5.0 W plate dissipation rating**, ensures excellent performance in demanding video output stages. Meanwhile, the triode section provides a high amplification factor of **100** with a modest **1.0 W plate dissipation rating**, offering a compact and efficient solution for auxiliary signal processing.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1975 RCA RC30

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

1975 RCA RC30

Section 1 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Average Cathode Current	75 mA	Published value from supplied target entry
Grid-No	2.75 watts	Published value from supplied target entry
# Pulse duration must not exceed	10	Published value from supplied target entry
Heater Voltage	10.5 volts	Published value from supplied target entry
Heater Current	0.45 ampere	Published value from supplied target entry
Heater Warm-up Time (Average)	11 seconds	Published value from supplied target entry
Plate Voltage	330 volts	Published value from supplied target entry
Grid-No	330 volts	Published value from supplied target entry
Grid-No	300	Published value from supplied target entry
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0 volts	Published value from supplied target entry
Plate Dissipation	5 watts	Published value from supplied target entry
Grid-No	2	Published value from supplied target entry
For grid-No	1.1 volts	Published value from supplied target entry
Por grid-No	300 volts	Published value from supplied target entry
Plate Voltage	200 volts	Published value from supplied target entry
Grid-No	100 volts	Published value from supplied target entry
Grid-No.1 Voltage	0 volts	Published value from supplied target entry
Amplification Factor	100	Published value from supplied target entry
Plate Current	19.5 mA	Published value from supplied target entry
Grid-No	3 mA	Published value from supplied target entry
Heater Voltage (ac/dc)	6.3	Published value from supplied target entry

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Current	0.77 ampere	Published value from supplied target entry
Plate Dissipation	3.1 watts	Published value from supplied target entry
For voltages up to	0.65 volts	Published value from supplied target entry
For voltages between	300 volts	Published value from supplied target entry

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid to Plate	1.8 PF	Published value from supplied target entry
Plate to Cathode, Grid No	2.8 pF	Published value from supplied target entry

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