



ELECTRONIC TUBE REFERENCE

12DK6

Voltage - Pentode Sharp Cutoff (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
PENTODE

Sharp-cutoff miniature pentode designed as an IF amplifier in color and black-and-white television receivers. Its fixed-gain high-frequency characteristics suit television intermediate-frequency signal stages.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	350000 Ω
TRANSCONDUCTANCE	0.0098 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	2.3 W
<i>Promoted from published maximum-ratings/characteristics tables; additional source values are retained in TUBE_SECTION_PARAMETER.</i>	

12DK6 — Sharp-Cutoff Pentode

The **12DK6** is a miniature, sharp-cutoff pentode designed primarily for use as an intermediate-frequency (IF) amplifier in both color and black-and-white television receivers. It belongs to a family of closely related tubes—including the **3DK6**, **4DK6**, and **6DK6**—that share identical physical construction,

electrode structures, and electrical characteristics, differing only in their heater ratings and specific heater-cathode voltage limits.

Physical Construction and Basing

The 12DK6 is constructed in a miniature T-5 1/2 glass envelope. It features a standard button 7-pin base (designated E7-1) and utilizes the **7CM** basing arrangement. The physical dimensions of the tube are as follows:

Dimension	Value
Maximum Diameter	0.750 in.
Maximum Seated Height	1.875 in.
Maximum Overall Height	2.125 in.

The tube requires a standard miniature 7-contact socket. The internal electrode structure includes a suppressor grid (Grid No. 3) and an internal shield, which are designed to be connected directly to the cathode at the socket to ensure stable high-frequency operation.

Heater Specifications and Heater-Cathode Ratings

The 12DK6 is specifically designed for operation in circuits where a 12.6-volt heater supply is utilized, such as series-string heater chains. Its heater characteristics and heater-cathode voltage limits are distinct from other members of its tube family:

Parameter	12DK6	<u>6DK6</u>	<u>4DK6</u>	<u>3DK6</u>
Heater Voltage (AC/DC)	12.6 V	6.3 V	4.2 V	3.15 V
Heater Current	0.15 A (150 mA)	0.3 A (300 mA)	0.45 A (450 mA)	0.6 A (600 mA)
Average Warm-up Time	—	—	11 s	11 s

Heater-Cathode Voltage Limits

The insulation between the heater and the cathode is rated to withstand specific voltage potentials, which vary depending on the polarity and the nature of the voltage:

- **Heater Negative with Respect to Cathode:**
 - **Peak Value:** 200 V maximum.
 - **Total DC and Plate:** 200 V maximum.
- **Heater Positive with Respect to Cathode:**
 - **DC Component:** 100 V maximum.

- **Total DC and Peak:** 200 V maximum.
- **Average Value:** 100 V maximum.

Electrical Characteristics and Class A1 Operation

Under typical Class A1 amplifier operating conditions, the 12DK6 exhibits high transconductance and a high plate resistance, making it highly effective for voltage amplification at intermediate frequencies. The typical operating parameters are defined as follows:

Parameter	Value
Plate Voltage	125 V
Grid No. 3 (Suppressor Grid) Voltage	Connected to cathode at socket
Grid No. 2 (Screen Grid) Voltage	125 V
Cathode-Bias Resistor	56 Ω
Plate Resistance (Approximate)	0.35 M Ω
Transconductance	9,800 μ mhos
Plate Current	12.0 mA
Grid No. 2 Current	3.8 mA
Grid No. 1 Bias for Plate Current of 20 μ A (Approximate)	-6.5 V

The low value of the cathode-bias resistor (56 ohms) combined with the relatively high plate current (12.0 mA) and screen current (3.8 mA) establishes a stable operating point that maximizes transconductance while maintaining the sharp-cutoff characteristic.

Maximum Ratings

The maximum ratings for the 12DK6 are established under the Design-Maximum Rating System. Operating the tube beyond these limits may compromise its performance and longevity.

- **Plate Voltage:** 330 V maximum
- **Grid No. 3 (Suppressor Grid) Positive Voltage:** 0 V maximum
- **Grid No. 2 (Screen Grid) Supply Voltage:** 330 V maximum
- **Grid No. 2 Voltage:** Subject to specific rating curves based on dissipation limits
- **Positive Grid No. 1 (Control Grid) Voltage:** 0 V maximum
- **Plate Dissipation:** 2.3 W maximum
- **Grid No. 2 Dissipation:**
 - For Grid No. 2 voltages up to 165 V: 0.55 W to 0.66 W maximum
 - For Grid No. 2 voltages between 165 V and 330 V: Subject to specific rating curves

Direct Interelectrode Capacitances

Because the 12DK6 is designed for high-frequency IF amplifier service, minimizing feedback capacitance between the plate and the control grid is critical. The unshielded direct interelectrode capacitances are:

- **Grid No. 1 to Plate (Maximum):** 0.025 pF
- **Input (Grid No. 1 to Cathode, Heater, Grid No. 2, Grid No. 3, and Internal Shield):** 6.3 pF
- **Output (Plate to Cathode, Heater, Grid No. 2, Grid No. 3, and Internal Shield):** 1.9 pF

These low capacitance values, particularly the extremely low grid-to-plate feedback capacitance of 0.025 pF maximum, allow for high-gain amplification stages without a high risk of regenerative feedback or oscillation.

Technical Summary

The **12DK6** is a miniature, sharp-cutoff pentode featuring a 7-pin button base and a T-5 1/2 envelope. It is designed for intermediate-frequency amplifier service in television receivers. Operating with a **12.6 V, 0.15 A** heater, it is electrically identical to the [3DK6](#), [4DK6](#), and [6DK6](#) except for its heater ratings. Under typical Class A1 conditions with a plate and screen supply of 125 V, the tube provides a transconductance of **9,800 μ mhos**, a plate current of **12.0 mA**, and an approximate plate resistance of **0.35 M Ω** . Its design-maximum ratings include a maximum plate voltage of **330 V** and a maximum plate dissipation of **2.3 W**, making it a robust and high-performing choice for television IF stages.

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 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	15 mA	Published in approved 12DK6 target entry; Section1
Equivalent Noise Resistance	300 Ω	Published in approved 12DK6 target entry; Section1
Grid-Circuit Resistance	1 MΩ	Published in approved 12DK6 target entry; Section1
Heater to Cathode Circuit Resistance	0.02 MΩ	Published in approved 12DK6 target entry; Section1
Heater Voltage (ac/dc) 3.16 4.2 6.3	12.6 V	Published in approved 12DK6 target entry; Section1
Heater Current 0.6 0.45 0.3	150 mA	Published in approved 12DK6 target entry; Section1
Plate Voltage	330 V	Published in approved 12DK6 target entry; Section1
Grid-No.3 (Suppressor-Grid) Voltage, Positive value	0 V	Published in approved 12DK6 target entry; Section1
Grid-No.2 (Screen-Grid) Supply Voltage	330 V	Published in approved 12DK6 target entry; Section1
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0 V	Published in approved 12DK6 target entry; Section1
Plate Dissipation	2.3 W	Published in approved 12DK6 target entry; Section1
For grid-No.2 voltages up to	165 V	Published in approved 12DK6 target entry; Section1
For grid-No.2 voltages up to 165 volts	0.55 W	Published in approved 12DK6 target entry; Section1
For grid-No.2 voltages between 165 and	330 V	Published in approved 12DK6 target entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Internal Shield	6.3 pF	Published in approved 12DK6 target entry; Section1
Internal Shield	1.9 pF	Published in approved 12DK6 target entry; Section1

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No.1 Voltagre (Approx.) for plate current of 20 fiA	-6.5 V	Published in approved 12DK6 target entry; Section1

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