



ELECTRONIC TUBE REFERENCE

12CM6

Power - Pentode (NOT beam) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Beam-power output tube intended for audio-frequency amplification in television and radio equipment, providing moderate output power from low-voltage receiving-tube supplies.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	12.6 V / 225 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
TRANSCONDUCTANCE	0.0041 S
MAXIMUM PLATE VOLTAGE	315 V
MAXIMUM SCREEN VOLTAGE	285 V
MAXIMUM PLATE DISSIPATION	12 W
MAXIMUM SCREEN DISSIPATION	2 W
<i>Published source values promoted where applicable.</i>	

12CM6 — Beam Power Pentode

The **12CM6** is a miniature beam power pentode designed for use in color television receivers. It is specifically rated for service as an audio power amplifier or a vertical deflection amplifier. The 12CM6 belongs to a family of structurally identical tubes that includes the [5CM6](#) and [6CM6](#), differing only in their heater ratings.

Construction, Basing, and Physical Dimensions

The 12CM6 is constructed with a miniature T-6 1/2 glass envelope and utilizes a button 9-pin (E9-1) base. The tube's physical dimensions are as follows:

- **Maximum Diameter:** 0.875 inches
- **Maximum Seated Height:** 2.375 inches
- **Maximum Overall Height:** 2.625 inches
- **Outline Designation:** 6-3

The tube uses the **9CK** basing arrangement, which provides the following pin connections:

- **Pin 1:** Grid No. 1 (Control Grid)
- **Pin 2:** No Connection
- **Pin 3:** Grid No. 1 (Control Grid)
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Grid No. 3 (Suppressor Grid) and Cathode (internally connected)
- **Pin 7:** Grid No. 2 (Screen Grid)
- **Pin 8:** No Connection
- **Pin 9:** Plate

Heater and Capacitance Characteristics

The 12CM6 is designed for series or parallel heater circuits, operating at a nominal heater voltage of **12.6 V** and a heater current of **225 mA**. Unlike its sister tube, the [5CM6](#), which has a controlled heater warm-up time of 11 seconds, the warm-up time for the 12CM6 is not specified.

Heater-Cathode Voltage Ratings

The insulation between the heater and cathode is rated to withstand the following maximum voltages:

- **Heater Negative with Respect to Cathode:** 200 V (Total DC and Peak)
- **Heater Positive with Respect to Cathode:** 100 V DC, 200 V (Total DC and Peak)

Direct Interelectrode Capacitances

The typical capacitances of the tube, measured without an external shield, are:

- **Grid No. 1 to Plate:** 0.7 pF
- **Input (g1 to h + k + g2 + g3):** 8.0 pF
- **Output (p to h + k + g2 + g3):** 8.5 pF

Class A1 Amplifier Ratings and Typical Operation

Under the Design Center Rating System, the maximum ratings for Class A1 amplifier service are:

- **Maximum Plate Voltage:** 315 V
- **Maximum Plate Dissipation:** 12 W
- **Maximum Grid No. 2 Voltage:** 285 V
- **Maximum Grid No. 2 Dissipation:** 2 W
- **Maximum Grid No. 1 Circuit Resistance (Fixed Bias):** 0.1 M Ω
- **Maximum Grid No. 1 Circuit Resistance (Cathode Bias):** 0.5 M Ω

Typical Operation (Triode Connection)

When operated with the screen grid (Grid No. 2) connected to the plate, the 12CM6 exhibits the following typical characteristics:

- **Plate Voltage:** 250 V
- **Grid No. 1 Voltage:** -12.5 V
- **Zero Signal Plate Current:** 49.5 mA
- **Plate Resistance (Approximate):** 1960 Ω
- **Transconductance:** 5000 μ mhos
- **Amplification Factor:** 9.8
- **Grid No. 1 Voltage for Cutoff ($I_b = 0.5$ mA):** -37 V (Approximate)

Typical Operation (Single Tube Pentode Connection)

The 12CM6 can be operated as a single-tube pentode amplifier under several typical conditions:

Parameter	Condition A	Condition B	Condition C
Plate Voltage	180 V	250 V	315 V
Grid No. 2 Voltage	180 V	250 V	225 V
Grid No. 1 Voltage	-8.5 V	-12.5 V	-13.0 V
Peak AF Grid No. 1 Voltage	8.5 V	12.5 V	13.0 V
Zero Signal Plate Current	29 mA	45 mA	34 mA
Maximum Signal Plate Current	30 mA	47 mA	35 mA
Zero Signal Grid No. 2 Current	3.0 mA	4.5 mA	2.2 mA
Maximum Signal Grid No. 2 Current	4.0 mA	7.0 mA	6.0 mA

Parameter	Condition A	Condition B	Condition C
Plate Resistance (Approximate)	50,000 Ω	50,000 Ω	80,000 Ω
Transconductance	3700 μmhos	4100 μmhos	3750 μmhos
Load Resistance	5500 Ω	5000 Ω	8500 Ω
Maximum Signal Power Output	2.0 W	4.5 W	5.5 W
Total Harmonic Distortion	8%	8%	12%
Grid No. 1 Voltage for Cutoff ($I_b = 0.5 \text{ mA}$)	—	-37 V	—

Typical Operation (Push-Pull Pentode Connection)

For higher power output, two 12CM6 tubes can be operated in a push-pull configuration:

Parameter	Condition A	Condition B
Plate Voltage	250 V	285 V
Grid No. 2 Voltage	250 V	285 V
Grid No. 1 Voltage	-15 V	-19 V
Peak AF Grid No. 1 Voltage	30 V	38 V
Zero Signal Plate Current	70 mA	70 mA
Maximum Signal Plate Current	90 mA	92 mA
Zero Signal Grid No. 2 Current	5 mA	4 mA
Maximum Signal Grid No. 2 Current	13 mA	13.5 mA
Load Resistance (Plate-to-Plate)	10,000 Ω	8000 Ω
Maximum Signal Power Output	10 W	14 W
Total Harmonic Distortion	5%	3.5%

Vertical Deflection Amplifier Service

When used as a vertical deflection amplifier in a 525-line, 30-frame television system, the 12CM6 is subject to specific pulsed ratings. The duty cycle of the voltage pulse must not exceed 15% of one

horizontal scanning cycle.

The maximum ratings for vertical deflection service under both pentode and triode connections are:

Rating	Pentode Connection	Triode Connection
Maximum Plate Voltage	315 V	315 V
Absolute Maximum Peak Positive Plate Voltage	2000 V	2000 V
Maximum Plate Dissipation	8 W	9 W
Maximum Grid No. 2 Voltage	285 V	—
Maximum Grid No. 2 Dissipation	1.75 W	—
Maximum Peak Negative Grid Voltage	250 V	250 V
Maximum Average Cathode Current	40 mA	40 mA
Maximum Peak Cathode Current	120 mA	120 mA
Maximum Grid No. 1 Circuit Resistance (Cathode Bias)	2.2 M Ω	2.2 M Ω

In stages operating with grid-leak bias, designers must provide an adequate cathode bias resistor or other suitable protective means to prevent damage to the tube in the event that excitation is lost.

Technical Summary

The **12CM6** is a versatile miniature beam power pentode housed in a T-6 1/2 envelope with a 9-pin button base. It features a **12.6 V, 225 mA** heater and shares its electrical characteristics and physical structure with the [5CM6](#) and [6CM6](#). Designed for color television applications, it serves effectively as either an audio power amplifier or a vertical deflection amplifier. In audio applications, a push-pull pair can deliver up to 14 W of output power with low distortion. In vertical deflection service, it is rated to handle peak positive plate pulses up to 2000 V, making it robust against the high-voltage transients typical of television sweep circuits.



SOURCE OPERATING CONDITIONS

1950 Sylvania

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

1950 SYLVANIA

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak positive plate voltage	2000 V	VerticalDeflection