

ELECTRONIC TUBE REFERENCE

12LP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch P4 television picture tube with magnetic focusing and deflection, white medium-persistence screen, and an external double-field ion trap. Typical anode operation is about 11 kV for direct-view television presentation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	12000 V
MAXIMUM SCREEN VOLTAGE	410 V
Published source values promoted where applicable.	

12LP4 — 12-Inch Cathode Ray Picture Tube

The **12LP4** is a 12-inch, direct-viewed, round glass cathode ray tube designed for use in television receivers. It utilizes magnetic deflection and magnetic focusing to produce a $7\frac{1}{2} \times 10$ -inch picture. The tube features a double-field ion trap and an external conductive coating that acts as a high-voltage filter capacitor when grounded. A variant designated **12LP4A** is identical to the 12LP4 except for its use of a gray filter glass faceplate instead of a clear faceplate.

Mechanical Specifications and Physical Dimensions

The 12LP4 is constructed with a round glass bulb and has the following physical dimensions:

- **Overall Length:** $18\frac{3}{4} \pm \frac{3}{8}$ inches
- **Maximum Diameter:** $12\frac{7}{16}$ inches (+1/16, -1/8 inch)
- **Minimum Useful Screen Diameter:** 11 inches
- **Deflection Angle (approximate):** 54 degrees
- **Bulb Contact:** Recessed small cavity cap (J1-21)
- **Mounting Position:** Any position

Base and Pinout Configurations

The tube is equipped with a small shell duodecal base. Depending on the manufacturer's design, it may utilize a 5-pin configuration (B5-57) with a **12N** basing arrangement, or a 7-pin configuration with a **12D** basing arrangement.

The electrical connections on the base are assigned as follows:

Pin Number	12N Basing (5-Pin)	<u>12D</u> Basing (7-Pin)
Pin 1	Heater	Heater
Pin 2	Grid No. 1	Grid No. 1
Pin 6	—	No Connection
Pin 7	—	No Connection
Pin 10	Grid No. 2	Grid No. 2
Pin 11	Cathode	Cathode
Pin 12	Heater	Heater
Recessed Cap	Anode	Anode

The anode bulb contact is aligned with the vacant pin position No. 3 within a tolerance of ± 10 degrees. The reference line of the tube is determined by the plane of the upper edge of the reference line gauge (RTMA No. 112) when the gauge is resting on the glass cone.

Electrical Characteristics and Heater Ratings

The 12LP4 features an indirectly heated, coated unipotential cathode. The heater is designed for operation on either AC or DC.

- **Heater Voltage:** 6.3 Volts
- **Heater Current (approximate):** 0.6 Ampere

Direct Interelectrode Capacitances

The approximate interelectrode capacitances of the tube are:

- **Cathode to all other electrodes:** 5 $\mu\mu\text{f}$ (pF)
- **Grid No. 1 to all other electrodes:** 6 $\mu\mu\text{f}$ (pF)
- **External conductive coating to anode:** 750 $\mu\mu\text{f}$ minimum to 3000 $\mu\mu\text{f}$ maximum

The external conductive coating must be grounded in operation to function as a filter capacitor.

Maximum Ratings (Design Center Values)

The maximum ratings are interpreted according to the RMA Standard M8-210 design center system:

- **Anode Voltage:** 12,000 Volts DC
- **Grid No. 2 Voltage:** 410 Volts DC
- **Grid No. 1 Voltage:**
 - **Negative Bias Value:** 125 Volts DC
 - **Positive Bias Value:** 0 Volts DC
 - **Positive Peak Value:** 2 Volts

Heater-to-Cathode Voltage Limits

The maximum peak heater-to-cathode voltage limits vary depending on the specific design standard applied:

- **Heater negative with respect to cathode during equipment warm-up period (not to exceed 15 seconds):** 125 Volts DC or 410 Volts DC
- **Heater negative with respect to cathode after equipment warm-up period:** 125 Volts DC or 140 Volts DC
- **Heater positive with respect to cathode:** 125 Volts DC or 140 Volts DC

Typical Operating Conditions

Under typical operating conditions in a television receiver, the tube is operated with the following parameters:

- **Anode Voltage:** 11,000 Volts DC
- **Grid No. 2 Voltage:** 250 Volts DC
- **Grid No. 1 Voltage (required for visual extinction of undeflected focused spot):** -27 to -63 Volts DC
- **Grid No. 1 Circuit Resistance:** 1.5 Megohms maximum

Focusing and Ion Trap Adjustment

Focusing and ion-trap alignment require specific external components and operating currents:

- **Focusing Coil Current (approximate):** 110 mA DC. This value applies when using an RTMA focusing coil 106 (or equivalent) or a JETEC standard focus coil. The center of the focus coil air gap is positioned $3\frac{1}{4}$ inches (3.25 in.) from the reference line of the bulb. The bias is adjusted to produce a

highlight brightness of 20 foot-lamberts on a $7\frac{1}{2} \times 10$ -inch picture area, sharply focused at the center of the screen.

- **Ion Trap Magnet:**

- When using an external, double-field type ion trap magnet, the approximate required strength is **35 Gauss**.
- When using a JETEC standard ion-trap magnet, the approximate required current is **120 mA**.

Screen and Optical Characteristics

The 12LP4 utilizes a **P4** phosphor screen. The optical characteristics of this screen are:

- **Fluorescence:** White
- **Persistence:** Medium
- **Faceplate:** Clear glass on the standard **12LP4**, and gray filter glass on the **12LP4A** to improve contrast under ambient room lighting.

Safety and X-Ray Radiation Warning

Because the 12LP4 operates at high anode potentials, appropriate safety precautions must be taken. X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if the tube is operated at voltages higher than the manufacturer's Maximum Rated Anode Voltage (12,000 Volts) or 16,000 Volts, whichever is less.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 Sylvania

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

1950 SYLVANIA

Section 1 · Cathode Ray

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P4	—
Deflection method	Magnetic	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Cathode Ray

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	Nominal
Heater current	600 mA	Nominal



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Sylvania Electronic Tubes Vol3

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

1965 SYLVANIA ELECTRONIC TUBES VOL3

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
Focusing Method	Magnetic text	—
Deflection Method	Magnetic text	—
Fluorescence	White text	—
Persistence	Medium text	—
Phosphor	P4 text	—
Deflection Angle	54 deg	Approximate
Faceplate	Clear text	—
Ion Trap	External Double Field text	—
External Coating-to-Anode Capacitance Minimum	750 pF	—
External Coating-to-Anode Capacitance Maximum	3000 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Maximum Grid1 Negative Bias	125 V	—
Maximum Grid1 Positive Peak	2 V	—
Anode Voltage	11000 V	—
Grid2 Voltage	250 V	—
Grid1 Cutoff Voltage Minimum	-63 V	—
Grid1 Cutoff Voltage Maximum	-27 V	—
Focusing Coil Current	110 mA	Approximate
Ion Trap Magnet Field Strength	35 gauss	Approximate
Maximum Grid1 Circuit Resistance	1.5 Mohm	—