

ELECTRONIC TUBE REFERENCE

19CZP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Nineteen-inch direct-view monochrome television CRT with electrostatic focus, magnetic deflection, and an aluminized P4 white screen. Its 110-degree-class deflection and high-voltage operation are intended for large-screen receiver display service with X-ray precautions.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8HR	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	23000 V
Cathode-ray picture-tube section; anode rating and published direct capacitances captured from supplied family sheet.	

19CZP4 — Television Picture Tube

The **19CZP4** is a 19-inch direct-viewed rectangular glass television picture tube designed for use in television receivers. It features a bonded shield construction, electrostatic focusing, and magnetic deflection. The tube utilizes an aluminized P4 phosphor screen with white fluorescence and medium-short persistence, eliminating the need for an ion trap. To prevent electrical hazards and ensure proper operation, the tube is equipped with an external conductive coating that must be grounded.

The 19CZP4 is closely related to the **19DAP4** model. The two tubes are identical in their electrical and physical specifications, with the sole distinction being the safety plate treatment: the **19DAP4** features an anti-reflection treated safety plate, whereas the 19CZP4 uses a standard, non-treated 1/8-inch gray glass safety plate.

Mechanical Specifications and Construction

The 19CZP4 is constructed using the J149C glass bulb and a B7-208 base. The physical dimensions and mechanical characteristics of the tube are detailed below:

- **Overall Length:** 11 9/16 ± 5/16 inches
- **Neck Length:** 4 1/8 ± 1/8 inches
- **Neck Diameter:** 1 1/8 inches (nominal outer diameter of 1.125 inches, with a tolerance of +0.043 to -0.025 inches)
- **Weight:** Approximately 15 1/2 pounds
- **Bulb Contact:** Recessed small cavity cap (J1-21)
- **Deflection Angles (Approximate):** Diagonal 114°, Horizontal 101°, Vertical 86°

Screen and Faceplate Characteristics

The faceplate is a bonded shield design featuring a 1/8-inch gray filter glass safety plate laminated directly to the face of the tube. This configuration provides a light transmittance of approximately 60%. The screen dimensions and area are as follows:

- **Minimum Useful Screen Height:** 12 1/4 to 12 3/4 inches
- **Minimum Useful Screen Width:** 15 1/4 inches
- **Minimum Useful Screen Diagonal:** 17 9/16 to 17 5/8 inches
- **Minimum Useful Screen Area:** 172 square inches

Electrical Characteristics and Basing

The 19CZP4 operates with an indirectly heated cathode. The heater and interelectrode capacitance characteristics include:

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.45 Ampere (± 5% tolerance)
- **Heater Warm-up Time:** 11 seconds (defined as the time required to reach 80% of the rated heater voltage under specified series resistance conditions)
- **Cathode to All Other Electrodes Capacitance:** Approximately 5 pF
- **Grid No. 1 to All Other Electrodes Capacitance:** Approximately 6 pF
- **External Conductive Coating to Anode Capacitance:** 1000 pF minimum to 1500 pF maximum

Pinout and Basing Configuration (8HR)

The tube uses the 8HR basing arrangement. The electrical connections are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1
- **Pin 3:** Grid No. 2
- **Pin 4:** Grid No. 4 (Focusing Electrode)

- **Pin 8:** Heater
- **Anode Cap:** Anode (consisting of Grid No. 3, Grid No. 5, Screen, and Collector; accessed via the recessed small cavity cap)

Note on Pinout Discrepancies: Published technical specifications contain conflicting assignments for Pins 6 and 7. In some configurations, Pin 6 is designated as the Cathode and Pin 7 as Grid No. 1. In alternative configurations, Pin 6 is designated as Grid No. 1 and Pin 7 as the Cathode. Pin 2 is consistently assigned to Grid No. 1 across all configurations.

Operating Services and Maximum Ratings

The 19CZP4 can be operated in either Grid Drive Service or Cathode Drive Service. The design-maximum ratings and typical operating conditions for both modes are outlined below.

Grid Drive Service

In Grid Drive Service, operating voltages are referenced with respect to the cathode.

Parameter	Design-Maximum Rating	Typical Operation
Anode Voltage	15,000 V dc (Min) to 23,000 V dc (Max)	20,000 V dc
Grid No. 4 (Focusing) Voltage	-550 to +1100 V dc	0 to 400 V dc
Grid No. 2 Voltage	200 V dc (Min) to 550 V dc (Max)	400 V dc
Grid No. 1 Negative Bias	155 V dc (Max)	—
Grid No. 1 Negative Peak	220 V (Max)	—
Grid No. 1 Positive Bias	0 V dc (Max)	—
Grid No. 1 Positive Peak	2 V (Max)	—
Grid No. 1 Cutoff Voltage	—	-46 to -94 V dc

Cathode Drive Service

In Cathode Drive Service, operating voltages are referenced with respect to Grid No. 1.

Parameter	Design-Maximum Rating	Typical Operation
Anode Voltage	15,000 V dc (Min) to 23,000 V dc (Max)	20,000 V dc
Grid No. 4 (Focusing) Voltage	-400 to +1250 V dc	0 to 400 V dc

Parameter	Design-Maximum Rating	Typical Operation
Grid No. 2 Voltage	350 V dc (Min) to 700 V dc (Max)	400 V dc
Cathode Positive Bias	155 V dc (Max)	—
Cathode Positive Peak	220 V (Max)	—
Cathode Negative Bias	0 V dc (Max)	—
Cathode Negative Peak	2 V (Max)	—
Cathode Cutoff Voltage	—	42 to 78 V dc

Cutoff Characteristics

The voltage required to achieve cutoff (visual extinction) varies based on the definition of the raster or spot. Transitioning between the visual extinction of a focused raster and an undeflected focused spot shifts the absolute bias required between the cathode and Grid No. 1 by approximately 5 Volts.

Heater-Cathode Voltage Limits (Both Services)

The peak heater-cathode voltage limits must be strictly observed to prevent insulation breakdown:

- **Heater Negative with Respect to Cathode:**
 - During the warm-up period (first 15 seconds or less): 450 Volts maximum
 - After the equipment warm-up period: 200 Volts maximum
- **Heater Positive with Respect to Cathode:** 200 Volts maximum

Circuit and Safety Requirements

To ensure safe and reliable operation of the 19CZP4, several circuit parameters and safety precautions must be implemented:

- **Grid No. 1 Circuit Resistance:** The maximum allowable resistance in the Grid No. 1 circuit is 1.5 Megohms.
- **X-ray Radiation Shielding:** When the tube is operated at anode voltages exceeding 16,000 Volts, X-ray radiation shielding may be necessary to protect users from exposure.
- **Grounding:** The external conductive coating of the tube must be reliably connected to the chassis ground. This coating acts as a capacitor in conjunction with the internal anode coating, and proper grounding is essential for both circuit stability and safety.



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	—
Focusing method	Electrostatic	—
Deflection method	Magnetic	—

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



SOURCE OPERATING CONDITIONS

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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

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
FocusingMethod	Electrostatic	—
DeflectionMethod	Magnetic	—
Phosphor	Aluminized P4 white	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngles	110-class magnetic	—
Cathode To All Capacitance	5 pF	—
Grid1 To All Capacitance	6 pF	—
ExternalConductiveCoatingToAnodeCapacitanceMaximum	1500 pF	—
ExternalConductiveCoatingToAnodeCapacitanceMinimum	1000 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AnodeVoltageMaximum	23000 V	—
AnodeVoltageMinimum	15000 V	—
FocusingElectrodeVoltageRangeMaximum	-400 to +1250 V	—
Grid2VoltageMaximum	700 V	—
Grid2VoltageMinimum	350 V	—
Grid1NegativeBiasMagnitudeMaximum	155 V	—
Grid1PositivePeakVoltageMaximum	2 V	—
HeaterCathodeVoltageMaximum	450 V	Warmup<=15s;HeaterNegative
HeaterCathodeVoltageMaximum	200 V	AfterWarmup
HeaterCathodeVoltageMaximum	200 V	HeaterPositive
Anode Voltage	20000 V	—
FocusingElectrodeVoltage	0 to +400 V	—
Grid1VoltageForCutoff	-42 to -78 V	—
Grid1CircuitResistanceMaximum	1.5 Mohm	—