

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

17Z3

1 SECTION
CONSTRUCTION
RECTIFIER

Rectifier - Damper Diode electronic tube

Television booster/damper diode co-designated with PY81, designed for line-time-base energy recovery rather than CRT EHT rectification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9CB	BASE PINS	9
NOMINAL HEATER	17 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

9CB - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – IC	–	–	IC
PIN2 – IC	–	–	IC
PIN3 – IC	–	–	IC
PIN4 – H	–	H – Heater	CONNECTED
PIN5 – H	–	H – Heater	CONNECTED
PIN6 – IC	–	–	IC
PIN7 – IC	–	–	IC
PIN8 – IC	–	–	IC
PIN9 – P	A	P – Plate (Anode)	CONNECTED
CAP1 – K	A	K – Cathode	CONNECTED

SECTION RATINGS

SECTION1 Rectifier	
MAXIMUM CATHODE CURRENT	150 mA
PEAK INVERSE VOLTAGE	4500 V
NOMINAL OUTPUT CURRENT	150 mA
PEAK FORWARD CURRENT	450 mA
MAXIMUM HEATER-CATHODE VOLTAGE	4500 V
WARM-UP TIME	11 s
<i>Promoted from printed maximum-rating/characteristic columns; additional published values retained in TUBE_SECTION_PARAMETER.</i>	

17Z3 — Half-Wave Booster Diode

The **17Z3** (also designated as the **PY81**) is an indirectly heated half-wave booster diode designed primarily for use in the time base and damper circuits of AC/DC television receivers. Featuring high heater-to-cathode insulation, the tube is specifically engineered to operate in series heater chains. This robust insulation eliminates the necessity of a separate, highly insulated heater transformer winding, simplifying power supply design in television chassis.

Physical Characteristics and Construction

The 17Z3 is a miniature glass-envelope tube utilizing a 9-pin Noval base. Depending on the manufacturing variant, the physical envelope and electrode terminations exhibit slight differences:

- **Envelope and Dimensions:** The tube is housed in a clear glass envelope, typically of the T6 1/2 or T-X outline. The maximum overall length ranges from 3-3/16 inches to 3-9/32 inches (81 to 83 mm), with a maximum seated height of 2-15/16 to 3 inches (74.6 to 76 mm). The maximum diameter is 7/8 inch (22.2 mm).
- **Cathode:** The tube features a coated unipotential cathode designed for high-voltage isolation.
- **Mounting Position:** The device is rated for operation in any mounting position.
- **Top Cap:** Many variants incorporate a top cap (such as the CT1 style) with a nominal diameter of 0.250 inches and a height of 0.420 inches to isolate the high-voltage electrode from the base pins.

Pinout and Connection Configurations

The 17Z3 has been documented with three distinct pinout and connection configurations. These variations must be carefully distinguished when analyzing or servicing circuits:

Configuration 1: Top Cap as Anode

In this arrangement, the high-voltage anode is routed to the top cap, while the cathode is connected to the base:

- **Pins 1, 2, 3, 6, 7, 8:** Internal Connection (IC) — must not be used for external circuit tie points.
- **Pins 4, 5:** Heater
- **Pin 9:** Cathode
- **Top Cap:** Anode

Configuration 2: Top Cap as Cathode (JETEC 9CB / B9A-Noval)

In this configuration, which is common for television damper service, the cathode is routed to the top cap to isolate its high pulse voltages from the heater pins:

- **Pins 1, 2, 3, 6, 7, 8:** Internal Connection (IC) or Not Connected (NC)
- **Pins 4, 5:** Heater
- **Pin 9:** Anode / Plate
- **Top Cap:** Cathode

Configuration 3: No Top Cap (9CB Base Connection)

A single-ended variant of the 17Z3 does not utilize a top cap, routing all active electrodes to the 9-pin base:

- **Pins 1, 3, 6, 7, 8:** No Connection (NC)
- **Pin 2:** Cathode
- **Pins 4, 5:** Heater
- **Pin 9:** Plate

Heater Ratings

The heater of the 17Z3 is designed for series-string operation in television receivers:

Parameter	Value
Heater Voltage	17.0 V (nominal / maximum)
Heater Current	0.3 A
Heating Time	Approximately twice that of standard series-chain valves

The controlled heating time ensures balanced voltage distribution across the series chain during the warm-up phase, protecting other tubes in the string from voltage surges.

Electrical Characteristics and Curves

Interelectrode Capacitances

The capacitances of the 17Z3, measured without an external shield, are as follows:

- **Anode to Cathode (C_{a-k}):** 6.4 pF
- **Heater to Cathode (C_{h-k}):** 2.8 pF to 3.6 pF

Qualitative Curve Observations

The 17Z3 exhibits typical high-vacuum diode characteristics. The relationship between anode current and anode voltage varies slightly across documented production curves:

- **Low-Voltage Region:** The anode current rises smoothly from 0 mA at 0 V to approximately 30 mA at 5 V, 70 mA to 75 mA at 10 V, and 130 mA at 15 V.
- **Mid-to-High Voltage Region:** At 20 V, the current reaches approximately 195 mA to 200 mA. By 25 V, it rises to about 280 mA.
- **Pulsed Region:** The characteristic curve transitions from a solid line to a dashed line at higher currents, indicating pulsed operation limits. For example, the current reaches approximately 350 mA at 30 V and up to 450 mA at approximately 35 V.

Maximum Ratings and Operating Limits

The 17Z3 is subject to strict limiting values depending on the phase of the television horizontal deflection cycle (scanning vs. flyback).

Current and Capacitor Limits

- **Maximum Mean Anode Current (D-C Output):** 150 mA
- **Maximum Peak Anode Current:** 450 mA
- **Maximum Reservoir / Booster Capacitor:** 4 μ F

Pulse Duration Specifications

The peak ratings are highly dependent on the pulse duty cycle and duration:

- Some specifications restrict peak pulses to a maximum of 15% of one cycle (with a maximum duration of 15 μ s).
- Other specifications permit a maximum pulse duration of 18% of the cycle (maximum 18 μ s) or up to 22% of the cycle (maximum 18 μ s).

Voltage Limits During Flyback (Pulsed)

- **Maximum Peak Inverse Voltage:** 4,500 V to 4,750 V
- **Peak Voltage between Cathode and Heater (Cathode Positive):** 4,500 V (with an absolute maximum rating of 5,600 V in specific booster services) or 4,750 V
- **Peak Voltage between Cathode and Plate (Cathode Positive):** 4,500 V
- **Peak Voltage between Heater and Plate (Heater Positive / Anode Negative):** 3,000 V

Voltage Limits During Scanning (Forward Stroke)

- **Peak Voltage between Cathode and Heater (Cathode Positive):** 800 V (typically composed of a maximum of 220 V R.M.S. at mains frequency and a D.C. component of up to 600 V)
- **Average Voltage between Cathode and Heater (Cathode Positive):** 500 V (averaged over the scan period)
- **Maximum Heater-to-Earth Voltage (V_{h-e}):** 220 V R.M.S.

Technical Summary

The **17Z3 (PY81)** is a specialized **9-pin miniature half-wave booster diode** designed for television damper and time base applications. Operating with a **17 V, 0.3 A** heater, it is optimized for series-string heater chains. The tube is characterized by its exceptional heater-to-cathode insulation, allowing it to withstand peak flyback pulses of up to **4,500 V to 5,600 V** without requiring a dedicated insulated heater transformer. With a maximum mean current rating of **150 mA** and a peak current capability of **450 mA**, the 17Z3 provides reliable energy recovery and damping in television horizontal deflection systems.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1958 Brimar Radio Valve No 7

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

1958 BRIMAR RADIO VALVE NO 7

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Anode Current	450 mA	—
Mean Anode Current	150 mA	—
Heater-Cathode Voltage During Flyback	4500 V	HeaterNegative

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Television booster/damper diode	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DC output current maximum	150 mA	TVDamper
Peak inverse voltage maximum	4500 V	TVDamper
Peak current maximum	450 mA	TVDamper



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Ferranti Technical Handbook

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

1961 FERRANTI TECHNICAL HANDBOOK

Section 1 · Rectifier

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Television booster / damper diode	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1999 Philips 0-D

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

1999 PHILIPS 0-D

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum primary-booster plate current	150 mA	—
Maximum primary-booster peak plate current	450 mA	—
Maximum peak cathode-heater voltage	4500 V	PrimaryBooster;CathodePositive
Absolute maximum peak cathode-heater voltage	5600 V	PulseDuration<=18us;Duty<=18%
Maximum peak heater-plate voltage	3000 V	HeaterPositive
Maximum continuous cathode-heater voltage	500 V	CathodePositive;CycleAverage
Maximum non-pulsed cathode-heater voltage	800 V	CathodePositive