

ELECTRONIC TUBE REFERENCE

0Z4

Rectifier - Full Wave electronic tube

CONSOLIDATED TECHNICAL DATA
2 SECTIONS
CONSTRUCTION
RECTIFIER-RECTIFIER

Gas-filled cold-cathode full-wave rectifier for power supplies without a heater or filament supply. Two rectifier sections provide full-wave operation with relatively low gas-discharge forward voltage.

GENERAL CHARACTERISTICS

BASE DESIGNATION	4R	BASE PINS	4
NOMINAL HEATER	– / –	PARALLEL HEATER	– / –
HEATING	Indirect; cold cathode	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Common cathode	SECTION CONSTRUCTION	Similar

4R - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN3 – P1	A	P – Plate (Anode)	CONNECTED
PIN5 – P2	A	P – Plate (Anode)	CONNECTED
PIN8 – K	A	K – Cathode	CONNECTED

SECTION RATINGS

SECTION1 Rectifier	
MAXIMUM CATHODE CURRENT	75 mA
PEAK INVERSE VOLTAGE	1000 V
NOMINAL OUTPUT CURRENT	75 mA
PEAK FORWARD CURRENT	200 mA
FORWARD VOLTAGE DROP	24 V
Published handbook ratings and operating characteristics reviewed.	

SECTION 2 Rectifier

PEAK INVERSE VOLTAGE	1000 V
NOMINAL OUTPUT CURRENT	75 mA
PEAK FORWARD CURRENT	200 mA
FORWARD VOLTAGE DROP	24 V

Physical rectifier section 2; electrical properties populated from the same published ratings applicable to the identical rectifier path.

0Z4 — Full-Wave Gas-Filled Rectifier

The **0Z4** is a full-wave, gas-filled cold-cathode rectifier tube designed primarily for high-efficiency power supplies. It requires no heater or filament voltage, utilizing an ionic heated cathode that relies on the gas discharge to maintain operating temperature. The tube was developed for use in vibrator-type B power supply units in automobile receivers and portable equipment where minimizing battery drain and maximizing overall efficiency are critical.

The family includes the metal-envelope **0Z4** (and its variant **0Z4A**) and the glass-envelope **0Z4G**. Because these tubes do not require a heater supply, they eliminate heater power loss entirely. However, the gas discharge process generates radio-frequency (RF) noise, requiring proper shielding and filtering.

Construction and Operating Principles

The 0Z4 is a gas-filled device containing a permanent gas rather than a vapor. This permanent gas filling ensures that the tube's electrical characteristics remain independent of the surrounding ambient temperature.

Cathode and Gas Discharge

The cathode is an ionic heated (or cold) cathode. Because there is no physical heater filament, the tube relies on a minimum starting voltage to initiate ionization of the gas. Once ionization occurs, the bombardment of the cathode by positive gas ions heats the active cathode area, maintaining the electron emission necessary for rectification. To ensure the cathode remains at its proper operating temperature and to guarantee a long service life, a minimum DC output current of **30 mA** must be maintained during operation.

Envelope Variants and Shielding

The physical construction differs between the metal and glass variants:

- **0Z4 / 0Z4A (Metal)**: These versions feature a metal shell (MT8, MT8A, or MTT8A outline) that serves as both a physical container and an electrostatic shield. Inside the metal shell, an internal glass bulb insulates the ionized gas from the grounded outer shell. The metal shell must be efficiently earthed (grounded) to prevent the radiation of RF interference.

- **0Z4G (Glass):** This version uses a glass bulb (T7 or T-7 outline). Because the glass envelope does not provide electrostatic shielding, the metal 0Z4 is generally preferred in receiver designs where shielding is critical to prevent RF noise from coupling into sensitive circuits.

Mechanical Specifications and Pin Connections

The 0Z4 family uses an octal base with a 4R basing arrangement. The mounting position is unrestricted (any position).

Physical Dimensions

- **Diameter:** Maximum diameter ranges from 1-1/16 inches (1.031 in.) to 1-5/16 inches depending on the specific envelope and manufacturer (with some glass [0Z4G](#) variants reaching up to 1-9/16 inches).
- **Height:** Maximum overall height is 2-5/8 inches (2.625 in.), with a maximum seated height of 2-1/16 inches (2.063 in.).

Pinout Configurations

The pin connections, viewed from the bottom of the socket, differ slightly between the metal and glass versions due to the presence of the metal shell:

Pin	0Z4 (Metal, 6-Pin Octal)	0Z4G (Glass, 5-Pin Octal)
Pin 1	Metal Shell / Shield (S/Sh/M)	No Connection (Omitted)
Pin 2	No Connection (Nc)	No Connection (Nc)
Pin 3	Plate / Anode 2 (P/A2)	Plate / Anode 2 (P/A2)
Pin 4	Omitted / No Pin	Omitted / No Pin
Pin 5	Plate / Anode 1 (P/A1)	Plate / Anode 1 (P/A1)
Pin 6	Omitted / No Pin	Omitted / No Pin
Pin 7	No Connection (Nc)	No Connection (Nc)
Pin 8	Cathode (K)	Cathode (K)

Electrical Characteristics and Ratings

The electrical behavior of the 0Z4 is characterized by a constant voltage drop once conduction is established, but it requires a high initial voltage to start.

Key Ratings and Limits

The maximum and minimum ratings depend on the specific tube suffix (0Z4/[0Z4G](#) vs. the higher-rated [0Z4A](#)):

Parameter	0Z4 / 0Z4G Limit	0Z4A Limit
Minimum Peak Starting Voltage	300 V	300 V
Maximum Peak Plate-to-Plate Voltage	1,000 V	—
Maximum Peak Inverse Plate Voltage	880 V to 1,250 V	880 V
Maximum Peak Plate Current (per plate)	200 mA to 270 mA	330 mA
Maximum DC Output Current	75 mA to 90 mA	110 mA
Minimum DC Output Current	30 mA	30 mA
Maximum DC Output Voltage	300 V	—
Average Tube Voltage Drop	24 V	24 V

Note on Starting Voltage: A minimum peak starting supply voltage of **300 V** per plate is required to initiate the gas discharge. This starting voltage requirement typically increases over the operating life of the tube.

Typical Operation

Typical operating conditions for full-wave rectifier service with a capacitor-input filter are specified as follows:

- **0Z4 and 0Z4G:**
 - Peak AC Plate Voltage (per plate): 380 V
 - Filter Input Condenser: 8 μ F
 - Total Effective Plate Supply Impedance (per plate): 800 Ω
 - DC Output Current: 65 mA
 - DC Output Voltage: 275 V
 - Tube Voltage Drop (at 90 mA per plate): 24 V
- **0Z4A:**
 - Peak AC Plate Voltage (per plate): 440 V
 - Filter Input Condenser: 8 μ F
 - Total Effective Plate Supply Impedance (per plate): 600 Ω
 - DC Output Current: 110 mA
 - DC Output Voltage: 310 V
 - Tube Voltage Drop (at 110 mA per plate): 24 V

In alternative specifications, an AC operating voltage of **350 V RMS** per plate is also defined.

Circuit Considerations and RF Noise

Because the 0Z4 operates via gas ionization, the sudden initiation of current during each half-cycle generates high-frequency RF noise. This behavior is similar to that of mercury-vapor rectifiers.

To prevent this RF interference from degrading receiver performance, designers must implement the following measures:

1. **Shielding:** The metal-envelope 0Z4 is highly preferred over the glass [0Z4G](#) in applications where sensitive RF stages are nearby. The metal shell must be connected to a solid ground point that provides the most effective shielding.
2. **Filtering:** Adequate RF filtering must be connected in the plate and cathode leads. This typically involves RF chokes and bypass capacitors placed close to the tube socket to suppress transient noise before it radiates into the receiver wiring.

Dynamic Behavior and Curves

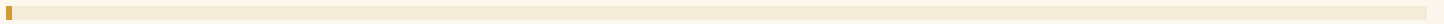
The dynamic characteristics of the 0Z4 and [0Z4G](#) in a typical vibrator-type power supply demonstrate the unique properties of a gas-filled rectifier:

- **Constant Voltage Drop:** Unlike vacuum rectifiers where the voltage drop increases significantly with current, the dynamic voltage drop of the 0Z4 remains nearly constant between **22 V and 25 V** across its entire recommended DC output current range of 30 mA to 75 mA.
- **Output Regulation:** In a typical vibrator circuit operating at a primary battery voltage of 6.2 V, the DC output voltage decreases as the load current increases. For example, the output drops from approximately 250 V at a 30 mA load to approximately 225 V at a 75 mA load.
- **Input Current Draw:** The DC input current drawn by the vibrator supply from the battery increases linearly with the rectified output current. At a 6.2 V battery supply, the input current rises from approximately 2.5 A when delivering 30 mA of output current, up to approximately 4.5 A when delivering 75 mA.

Technical Summary

The **0Z4** is an octal-based, full-wave, gas-filled cold-cathode rectifier designed for high-efficiency power supplies, particularly in automotive vibrator units. By utilizing an ionic heated cathode, it eliminates the need for a heater supply, saving valuable battery power in mobile and portable equipment. The tube features a constant voltage drop of approximately **24 V** during conduction, but requires a minimum peak starting voltage of **300 V** to initiate ionization.

The metal-envelope **0Z4** and [0Z4A](#) provide built-in electrostatic shielding, which is crucial for suppressing the RF noise inherent to gas-discharge rectification, while the glass [0Z4G](#) is suitable for applications where external shielding is provided or RF noise is less critical. To ensure reliable operation and long life, the circuit must maintain a minimum DC output current of **30 mA** to keep the cathode at its proper operating temperature, while maximum DC output currents are rated up to **75 mA** (or **110 mA** for the [0Z4A](#) variant).



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1937 Raytheon Radio Receiving Tubes

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

1937 RAYTHEON RADIO RECEIVING TUBES

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC output voltage	300 V	FullWave
DC output current	30–75 mA	FullWave
Maximum peak plate current	200 mA	PerPlate
Minimum starting peak voltage	300 V	FullWave

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Average dynamic voltage drop	24 V	—

1937 RAYTHEON RADIO RECEIVING TUBES

Section 2 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC output voltage	300 V	FullWave
DC output current	30–75 mA	FullWave
Maximum peak plate current	200 mA	PerPlate
Minimum starting peak voltage	300 V	FullWave

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Average dynamic voltage drop	24 V	—

1948 Brimar Radio Valve Manual

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

1948 BRIMAR RADIO VALVE MANUAL

Section 1 · Rectifier

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Starting Peak Voltage	300 V	Minimum
DC Output Current Minimum	30 mA	Minimum maintaining output current

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DC Output Voltage	300 V	Maximum
DC Output Current Maximum	75 mA	Maximum

1948 BRIMAR RADIO VALVE MANUAL

Section 2 · Rectifier

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Starting Peak Voltage	300 V	Minimum
DC Output Current Minimum	30 mA	Minimum maintaining output current

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DC Output Voltage	300 V	Maximum
DC Output Current Maximum	75 mA	Maximum



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

Characteristic		
Parameter	Published Value	Condition / Note
StartingPeakVoltageMinimum	300 V	—

1958 BRIMAR RADIO VALVE NO 7

Section 2 · Rectifier

Characteristic		
Parameter	Published Value	Condition / Note
StartingPeakVoltageMinimum	300 V	—



SOURCE DATA APPENDIX

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	75 mA	RectifierService
RMS supply voltage per plate	300 V	RectifierService
Peak current	200 mA	RectifierService

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 2 · Rectifier

Other		
Parameter	Published Value	Condition / Note
DC output current	75 mA	RectifierService
RMS supply voltage per plate	300 V	RectifierService
Peak current	200 mA	RectifierService



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