

ELECTRONIC TUBE REFERENCE

1B47

Voltage Regulator electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
VOLTAGEREGULATOR

Miniature cold-cathode voltage regulator maintaining approximately 82 V at roughly 1-2 mA for compact low-current reference circuits.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9Z	BASE PINS	–
NOMINAL HEATER	– / –	PARALLEL HEATER	– / –
HEATING	Indirect; cold cathode	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Voltage Regulator	
REGULATOR VOLTAGE	82 V
MINIMUM REGULATOR CURRENT	1 mA
MAXIMUM REGULATOR CURRENT	2 mA
STARTING VOLTAGE	250 V
MAINTAINING VOLTAGE	82 V
Glow-discharge voltage-regulator section; current fields normalized to amperes.	

1B47 — Miniature Glow-Discharge Voltage Regulator

The **1B47** is a cold-cathode, glow-discharge voltage regulator designed for voltage stabilization in compact electronic equipment. Housed in a miniature metal shell, this gas-filled tube maintains a relatively constant voltage across its terminals despite variations in supply voltage or load current, operating within a specified low-current range.

Physical Construction and Basing

The 1B47 features a robust physical design optimized for space-constrained applications. It is constructed with a cold cathode, eliminating the need for a heater filament or associated heater power supply. The tube is housed in a T-4 bulb with a protective metal shell.

The physical dimensions of the device are as follows:

- **Maximum Overall Length:** 1.66 inches
- **Maximum Shell Diameter:** 0.59 inches
- **Maximum Base Diameter:** 0.63 inches
- **Base Pin Height:** 0.500 inches
- **Pin Diameter/Width:** 0.125 inches
- **Pin Offset:** 0.267 inches

The tube is equipped with a double-contact bayonet candelabra base, which is also designated as a **9Z** basing configuration. The electrical connections are simplified to a two-terminal arrangement:

- **Contact 1:** Anode
- **Contact 2:** Cathode

This double-contact bayonet base ensures secure mechanical retention and reliable electrical contact. The 1B47 can be mounted and operated in **any position** without affecting its performance or electrical characteristics.

Electrical Ratings and Operating Characteristics

The 1B47 operates on the principle of a stable glow discharge. To initiate conduction, the applied voltage must exceed the ionization threshold of the gas mixture inside the tube. Once conduction is established, the voltage drop across the tube remains relatively stable.

The electrical limits and characteristics of the 1B47 include:

- **Minimum Starting Voltage Supply:** 250 Vdc (the minimum supply voltage required to guarantee that the tube will ionize and begin regulating)
- **Maximum Starting Voltage:** 225 Vdc (the maximum voltage at which the tube is rated to strike)
- **Minimum Operating Voltage:** 75 Vdc
- **Maximum Operating Voltage:** 90 Vdc
- **Approximate Operating Voltage:** 82 Vdc
- **Minimum Operating Current:** 1.0 mAdc (1 mA)
- **Maximum Operating Current:** 2.0 mAdc (2 mA)
- **Maximum Regulation:** 3.0 Vdc (3 V)

The maximum regulation of 3.0 Vdc is defined as the maximum variation in operating voltage across the tube when the operating current varies throughout the entire permissible range of 1.0 to 2.0 mAdc. This tight regulation window ensures stable voltage output for sensitive reference or bias circuits.

Circuit Application and Series Resistance

Because the 1B47 is a gas-discharge device, it exhibits a negative resistance characteristic during ionization and has extremely low internal impedance once conducting. Consequently, it must never be connected directly across a voltage source without a current-limiting device.

To ensure safe and reliable operation, a series protective resistor must always be wired in series with the tube. This resistor serves to limit the continuous steady-state current through the tube to a value not exceeding the maximum rating of 2.0 mA_{dc}.

Under typical operating conditions, the circuit parameters are configured as follows:

- **Anode Supply Voltage:** 250 V_{dc}
- **Series Protective Resistance (Approximate):** 15,000 ohms
- **Operating Current Range:** 1.0 to 2.0 mA_{dc}
- **Approximate Operating Voltage:** 82 V_{dc}

The series resistance value of approximately 15,000 ohms is calculated to drop the excess supply voltage (the difference between the 250 V_{dc} supply and the nominal 82 V_{dc} operating voltage) while maintaining the tube current within its safe 1.0 to 2.0 mA_{dc} operating limits. If the supply voltage fluctuates or the load current changes, the series resistor absorbs the voltage variations, keeping the voltage across the 1B47 stable.

Technical Summary

The **1B47** is a miniature, cold-cathode, glow-discharge voltage regulator housed in a T-4 metal shell with a double-contact bayonet candelabra base (9Z basing). It is designed to provide a stable voltage reference or regulation point of approximately **82 V_{dc}** (within a permissible operating range of **75 to 90 V_{dc}**). The tube operates at very low currents, requiring a minimum of **1.0 mA_{dc}** to maintain regulation and a maximum limit of **2.0 mA_{dc}** to prevent damage. With a maximum regulation of **3.0 V_{dc}** across its operating current range, the 1B47 offers precise voltage stabilization when paired with an appropriate series protective resistor, such as a typical **15,000 ohm** resistor connected to a **250 V_{dc}** supply.



SOURCE OPERATING CONDITIONS

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1950 Sylvania

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

1950 SYLVANIA

Section 1 · Voltage Regulator

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Series Protective Resistance	15 ohm	Series Protective Resistance 15,000 ohmg
15,000 ohmg		



SOURCE OPERATING CONDITIONS

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195X Raytheon Special Purpose Tubes

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

195X RAYTHEON SPECIAL PURPOSE TUBES

Section 1 · Voltage Regulator

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Operating voltage	82 V	—
Maximum regulation	3 V	1to2mA

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Minimum operating current	1 mA	—
Maximum operating current	2 mA	—
Minimum starting-voltage supply	250 V	—

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