



ELECTRONIC TUBE REFERENCE

0G3

Voltage Regulator electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

VOLTAGEREGULATOR

Precision-oriented 85 V cold-cathode regulator for instrumentation and low-current reference service, with published stability, drift, temperature, and long-life characteristics.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect; cold cathode	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Voltage Regulator	
REGULATOR VOLTAGE	85 V
MINIMUM REGULATOR CURRENT	1 mA
MAXIMUM REGULATOR CURRENT	10 mA
STARTING VOLTAGE	115 V
MAINTAINING VOLTAGE	85 V
DYNAMIC IMPEDANCE	300 Ω

Explicit equivalent designation published on SR53 datasheet.

0G3 — Miniature Voltage Reference Tube

The **0G3** (also designated as the **0G3/85A2**) is a miniature, cold-cathode, gas-discharge voltage reference tube. It is designed for use in D.C. amplifiers, stable regulated power supplies, oscilloscope calibrators, and similar precision electronic applications. The tube is engineered to provide high operating voltage

stability over long periods of time, featuring superior regulation, a wide allowable operating current range, and excellent reproducibility between individual tubes within a 5-volt tolerance.

Construction, Mechanical Specifications, and Pinout

The 0G3 is constructed with a cold cathode, requiring no heater or filament power. It is housed in a T-5½ glass bulb with a 7-pin miniature button base. The device can be mounted and operated in any physical position.

Physical Dimensions

- **Maximum Overall Height:** 2⅛ inches
- **Maximum Seated Height:** 1⅞ inches
- **Maximum Diameter:** ¾ inch

Pinout and Basing Connections

The 7-pin miniature button base provides the following electrical connections, viewed from the bottom of the tube:

- **Pin 1:** Plate (Anode)
- **Pin 2:** Cathode
- **Pin 3:** Internally Connected
- **Pin 4:** Cathode
- **Pin 5:** Plate (Anode)
- **Pin 6:** Internally Connected
- **Pin 7:** Cathode

The multiple plate and cathode pins are connected internally to their respective electrodes. Pins designated as "Internally Connected" must not be used for external circuit connections. The tube must be operated strictly with the cathode negative and the anode positive. Additionally, the mechanical structure is sensitive to physical stress and must not be subjected to severe shock or continuous vibration.

Electrical Characteristics and Operating Limits

The electrical parameters of the 0G3 are divided into absolute maximum ratings and typical operating characteristics.

Absolute Maximum Ratings

- **Maximum D.C. Starting Voltage:** 125 V
- **Maximum D.C. Operating Current:** 10 mA
- **Minimum D.C. Operating Current:** 1 mA
- **Ambient Temperature Limits:** -55 to +90 °C

Typical Operating Characteristics

At its recommended operating point, the tube exhibits the following typical parameters:

- **Recommended D.C. Operating Current:** 6 mA
- **D.C. Operating Voltage (at 6 mA):** 83 to 87 V (representing the variation from tube to tube)
- **Average A.C. Resistance (at 6 mA):** 300 Ω
- **Maximum A.C. Resistance (at 6 mA):** 450 Ω
- **Temperature Coefficient of Operating Voltage:** -2.7 mV/°C

Long-Term Stability and Noise

The 0G3 is optimized for long-term voltage stability, particularly after an initial "run-in" period of 300 hours. The percentage variations in operating voltage over its operating life are specified as follows:

- **Maximum Variation During First 300 Hours of Life:** 0.3%
- **Maximum Variation During Subsequent 1000 Hours of Life:** 0.2%
- **Maximum Short-Term (100 hours max.) Variation After First 300 Hours:** 0.1%

Equilibrium conditions are normally reached within 3 minutes of starting operation. Over the tube's operating life, the A.C. resistance remains essentially constant, while the temperature coefficient of the operating voltage can be expected to decrease slightly. The greatest constancy of the operating voltage is achieved when the tube is operated at a single, constant value of current.

The inherent noise of the tube over a frequency band of 30 to 10,000 Hz is of the order of 60 μ V, which is equivalent to a noise resistance of 22 M Ω . This noise is evenly distributed across the specified frequency range.

Application and Circuit Design

While the 0G3 is similar in construction and basic operation to common voltage regulator tubes like the [OA3](#), there is a distinct functional difference. A standard regulator tube like the [OA3](#) is designed to maintain a reasonably constant D.C. voltage across itself under varying loads and line voltages by drawing a compensating current through a series voltage-dropping resistor. In contrast, the 0G3 is designed as a high-stability voltage reference tube.

To achieve its superior stability and minimize voltage jumps or oscillations, the 0G3 is designed with a higher A.C. resistance than typical regulator tubes. This higher resistance is of little consequence in reference applications because the tube is intended to draw a constant D.C. current. After its 300-hour run-in period, the voltage stability of the 0G3 under constant current conditions is highly stable and compares favorably with a standard chemical cell.

Accurate D.C. Voltage Source Circuit

In precision reference applications, multiple 0G3 tubes can be combined to form an extremely stable voltage source. A typical circuit configuration utilizes three 0G3 tubes (V_1 , V_2 , and V_3):

- Two 0G3 tubes (V_1 and V_2) are configured as pre-regulators to control the input voltage supplied to the third 0G3 (V_3).
- The third tube (V_3) acts as the primary voltage reference. Because the pre-regulator stage maintains a highly constant current through V_3 , the reference tube provides an exceptionally stable 85 V output. This voltage can then be tapped off using an accurate voltage-dividing network.
- In this series-cascade arrangement, a resistor (R_2) is connected in parallel with V_2 to ensure that V_1 fires first, followed subsequently by the firing of V_2 .
- **Parallel Operation Warning:** Parallel connection of multiple 0G3 tubes is explicitly not recommended. Because of minor variations in individual tube characteristics, the tube with the lowest starting (striking) voltage will ionize first and conduct all the load current, preventing the other tubes from firing.

Technical Summary

The **0G3** (or **0G3/85A2**) is a cold-cathode, gas-discharge miniature voltage reference tube featuring a 7-pin miniature button base and a T-5½ envelope. Operating within a current range of 1 mA to 10 mA, it provides a highly stable reference voltage of approximately 83 to 87 V (nominally 85 V) at its recommended operating current of 6 mA. With a temperature coefficient of -2.7 mV/°C and a maximum long-term voltage variation of just 0.2% after a 300-hour run-in period, the 0G3 is optimized for high-precision reference applications in D.C. amplifiers, calibrators, and regulated power supplies where constant current is maintained.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1953 Amperex

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

1953 AMPEREX

Section 1 · Voltage Regulator

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Operating voltage at 6 mA	83–87 V	—

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AC resistance at 6 mA	300 ohm	—



SOURCE OPERATING CONDITIONS

1962 Cerberus

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

1962 CERBERUS

Section 1 · Voltage Regulator

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Stabilized voltage	83–87 V	5.5mA
Regulation maximum	4 V	1-10mA
Temperature coefficient	-2.2 mV/C	IA=5.5mA
Initial drift	0.15 %	2min
Stabilized-voltage change over 20000 h maximum	1 V	—
Service life minimum	30000 h	—

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