engineering data service

5644

MECHANICAL DATA

Bulb	T-3
Base	E8-10, Subminiature Button Flexible Leads
Outline	JETEC 3-4
Basing	4CN
Cathode	Cold
Mounting Position	Any

RATINGS[1] (Absolute Maximum)

Impact Acceleration	450 G
Uniform Acceleration	1000 G
Fatigue (Vibrational Acceleration for Extended Periods)	2.5 G
Bulb Temperature	220° C Max. −55° C Min.
Altitude	80000 Ft.

ELECTRICAL DATA

RATINGS[1 & 2] (Absolute Values)

Minimum Starting Supply Voltage	130 Vdc
DC Operating Current	25 mAdc Max. 5 mAdc Min.

CHARACTERISTICS

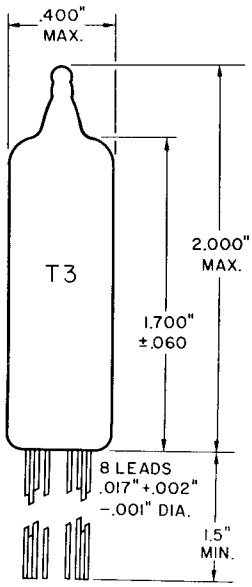
DC Operating Voltage	95 Vdc
Voltage Regulation[3]	5 Vdc Max.

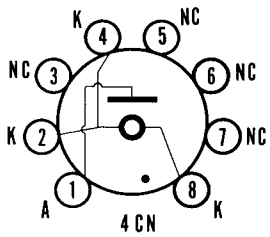
NOTES:

1. *Limitations beyond which normal tube performance and tube life may be impaired.*
2. *Values shown are as registered with RETMA.*
3. *Greatest change in operating voltage as operating current is varied between 5 and 25 milliamps.*

QUICK REFERENCE DATA

The Premium Subminiature Type 5644 is a cold cathode, glow discharge voltage regulator. It has an operating voltage of approximately 95 volts and is designed to provide dependable service under conditions of severe shock, vibration, high temperature and high altitude. The 5644 is manufactured and inspected to meet the applicable specification for reliability.





SYLVANIA ELECTRIC PRODUCTS INC.

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EMPORIUM, PA.

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ACCEPTANCE CRITERIA

Test Conditions

Plate Supply Voltage Note 1 . . . . . 150 Vdc

For the purposes of inspection, use applicable reliable paragraphs of MIL-E-1 and Inspection Instructions for Electron Tubes.

MIL-E-1 Ref.	Test	Symbol	Limits Min.	Limits Max.	Units
Production Tests					
4.13.1	Ionization Voltage (2): Rp/Ib = 25 mAdc; Illumination = 5 to 50 foot candles	(2) Ez	—	120	Vdc
4.13.2	Tube Voltage Drop (1): Rp/Ib = 5 mAdc	(1) Etd	85	—	Vdc
4.13.2	Tube Voltage Drop (2): Rp/Ib = 25 mAdc	(2) Etd	—	105	Vdc
4.13.2.1	Regulation: (2) Etd — (1) Etd	Reg	—	5.0	Vdc
4.13.4.2	Oscillation: RL = 500 Ohms; Eb/Ib = 5 to 25 mAdc	Esig	—	15	mV
Special Design Tests					
4.9.5.3	Subminiature Lead Fatigue:	—	4	—	arcs
4.13.4.3	Noise: Ebb/Ib = 25 mAdc	EB	—	15	mVac
Design Tests					
4.13.3	Leakage: Eb = 50 Vdc	LIB	—	10.0	μAdc
Degradation Tests					
4.9.20.5	Shock: Hammer Angle = 30°	—	—	—	
4.9.20.6	Fatigue: No. Voltages; Notes 2 and 3	—	—	—	
- - - - -	Post Shock and Fatigue Test End Points:				
	Ionization Voltage (2)	(2) Ez	—	130	Vdc
	Regulation	Reg	—	5.0	Vdc
Acceptance Life Tests					
4.11.5	Intermittent Life Test (1): Note 4 Rp/Ib = 25 mAdc; TA = Room	t	500	—	Hours
4.11.4	Intermittent Life Test End Points (1): (500 Hours)				
	Ionization Voltage (2)	(2) Ez	—	125	Vdc
	Tube Voltage Drop (1)	(1) Etd	82	—	Vdc
	Tube Voltage Drop (2)	(2) Etd	—	108	Vdc
	Regulation	Reg	—	5.0	Vdc

ACCEPTANCE CRITERIA NOTES:

1: Fixed resistor may be used and Ebb varied to give desired current.

2: Acceptance sampling procedure shall be in accordance with the shock test sampling procedure of the Inspection Instructions for Electron Tubes.

3: A frequency of 60 cps; G = 2.5 may be used as an alternate test.

4: At the conclusion of the 500 hour life test, the average life of the life test sample shall be not less than 475 hours. Life test sample size shall be 10 tubes. Provision for release of tubes prior to completion of life test on reduced basis as specified in 4.3.1.3 Inspection Instructions for Electron Tubes shall not apply.

APPLICATION DATA

The 5644 is a Premium Subminiature, cold cathode, gas-filled, glow discharge type voltage regulator characterized by long life and stable performance under conditions of severe vibration, shock, high altitude and high temperature.

This tube is constructed with three cathode leads, which provide a rugged mount support and additional external tie points. There are four tube leads with no internal connection. Since these leads extend through the base into the tube, however, they may influence operation of the tube if high voltages are connected to them. For this reason, the use of these leads for circuit tie points is not recommended.

A circuit for use with a 5644 regulator is shown in Figure 1. In this circuit the value of R and the nominal value of supply voltage must be chosen such that the current in the 5644 is maintained within the 5 to 25 milliampere rated limits. Consideration should be given to expected supply voltage variation and to load changes or load removal.

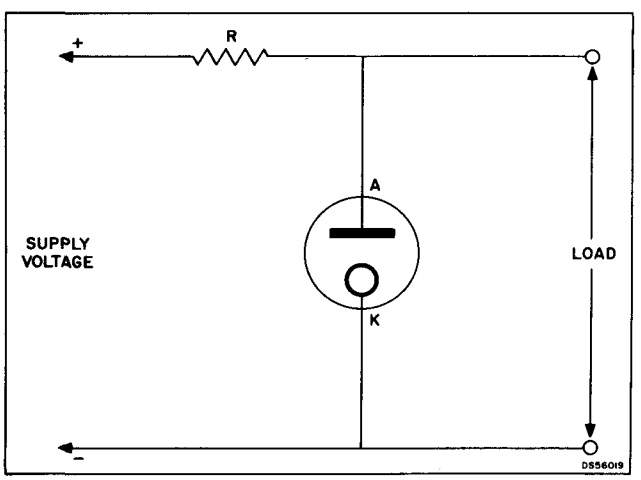


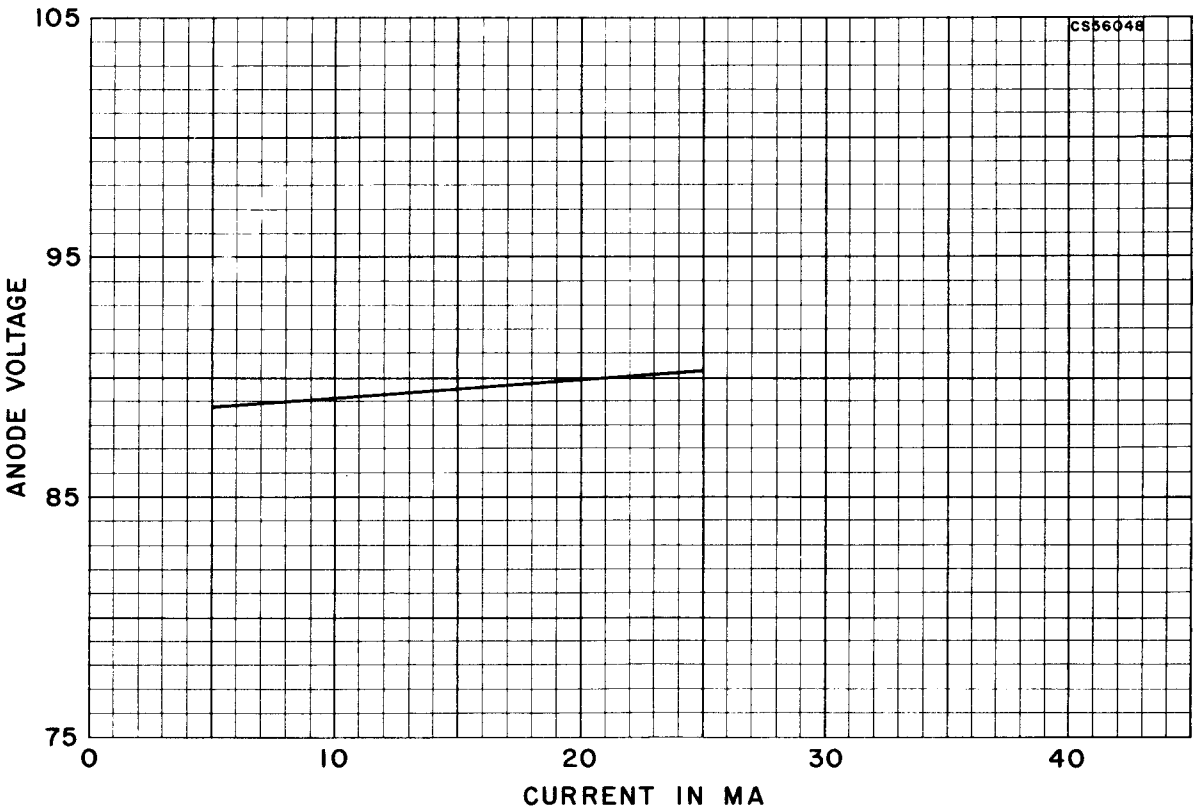
Figure 1—Basic regulator circuit.

When the equipment is first turned on, a starting current in excess of the average operating current is normally encountered. The surge starting current should never be more than double the maximum operating current. When relatively high starting currents are experienced, the tube may take a few minutes to drop to its normal regulating voltage. Similarly, the regulation is affected by changes in the operating current, and by the length of time for which the tube has been conducting this current. If the tube current is suddenly reduced to 5 milliamperes after a long period at 25 milliamperes, the tube will regulate at a slightly different voltage than if it had been conducting 5 milliamperes for the entire period. In like manner, the regulation voltage at a fixed current may vary slightly depending upon the length of periods of idleness. These variations are normal, and typical of all glow-discharge regulator tubes, and need not be considered in any except very precise applications. If the associated circuit has a capacitor shunting the 5644, care must be exercised to prevent peak starting currents from reaching excessively high values.

The type 5644 is intended for use as a regulator as shown in Figure 1 and is not well suited for use in voltage reference circuits which provide only a few milliamperes of reference tube current. The 5644 may be operated in series, but parallel operation is not recommended.

The 5644 is manufactured and inspected to meet the applicable MIL-E-1 specification for reliability.

Life expectancy is described by the life tests, specified on the attached page and/or individual MIL-E-1 specifications. The actual life expectancy of the tubes in an operating circuit is affected by both the operating and environmental conditions involved. Likewise, the life tests specified indicate performance under certain operating criteria to a set of specified end points. Performance at conditions other than those specified can usually be estimated only roughly as giving better or poorer life expectancy. For further discussion of life expectancy, reference should be made to the frontal section of this manual.

The information presented on this data sheet is furnished without assuming any obligation.

AVERAGE REGULATION CHARACTERISTICS