VOLTAGE REFERENCE TUBE

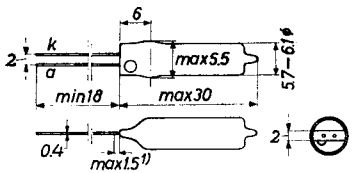
Subminiature 81 volts, long life, shock and vibration resistant, gas filled voltage reference tube.

QUICK REFERENCE DATA		
Preferred cathode current	I_k	= 3.2 mA
Incremental resistance	r_a	= 200 Ω
Temperature coefficient of maintaining voltage		
averaged over the range +20 to +125 °C	$\frac{\Delta V_{am}}{\Delta t_{bulb}}$	= −1.2 mV/°C
averaged over the range −55 to +20 °C	$\frac{\Delta V_{am}}{\Delta t_{bulb}}$	= −3.2 mV/°C

MECHANICAL DATA

Dimensions in mm

The glass dot indicates the anode lead



The tube may be soldered directly into the circuit but heat conducted to the glass to metal seal should be kept to a minimum by the use of a thermal shunt.

The tube may be dip-soldered at a solder temperature of max. 240°C for a maximum of 10 sec up to a point 5 mm from the seal.

Care should be taken not to bend the leads nearer than 1.5 mm from the seal.

1) Not tinned

7Z2 2413

CHARACTERISTICS AND RANGE VALUES at t_{amb} = 20 to 30 °C

Thermal equilibrium is reached within 2 minutes after ignition of the tube.

A. Limits applicable to all tubes (initial values)

Ignition voltage	V_{ign}	< 115 V
Maintaining voltage at I_k = 3.2 mA	V_{am}	> 80.1 V < 82.5 V
Incremental resistance at I_k = 3.2 mA	r_a	< 400 Ω

B. Typical limits (initial values)

When establishing the electrical characteristics of a large number of tubes, it will be found that for each characteristic at least 80% of the tubes investigated will meet the figures quoted.

Voltage jumps at I_k = 2 to 4 mA	V_{aj}	< 100 mV [1]
Breakdown delay in darkness at V_b = 115 V	T_{delay}	< 5 msec
Tube impedance with sinusoidal variation of I_k with 50 c/s from 2.7 to 3.7 mA	z_a	< 400 Ω
Oscillation + random noise voltage at I_k = 2 to 4 mA, B = 10 c/s to 10 kc/s	V_{an}	< 1 mV
Vibration noise voltage at I_k = 3.2 mA, g = 2.5 g_p, f = 10 to 50 c/s, B = 1 to 100 c/s	V_{an}	< 100 mV
Temperature coefficient of maintaining voltage at I_k = 3.2 mA		
averaged over the range +20 to +125 °C	$-\frac{\Delta V_{am}}{\Delta t_{bulb}}$	< 2 mV/°C
averaged over the range −55 to +20 °C	$-\frac{\Delta V_{am}}{\Delta t_{bulb}}$	< 4 mV/°C

[1] To avoid voltage jumps over life, current variations around the preferred current should be limited to 0.3 mA.

7Z2 2414

CHARACTERISTICS AND RANGE VALUES (continued)

C. Life performance

When establishing the electrical characteristics of a large number of tubes, it will be found that for each characteristic at least 80% of the tubes investigated will meet the figures quoted.

C1. Typical maximum variation in maintaining voltage with continuous operation at I_k = 3.2 mA and t_{bulb} = 45 °C

0 to 100 hours operation	$\Delta V_{a_m} < 0.3$ V
0 to 2000 hours operation	$\Delta V_{a_m} < 0.7$ V

C2. Typical maximum variation in maintaining voltage during storage and stand-by at t_{bulb} = 25 °C

0 to 2000 hours	$\Delta V_{a_m} < 0.3$ V

SHOCK AND VIBRATION RESISTANCE

These conditions are used solely to assess the mechanical quality of the tube. The tube should not be continuously operated under these conditions.

Shock resistance 500 g

Forces as applied by the NRL impact machine for electronic devices caused by 5 blows of the hammer lifted over an angle of 30° in each of 4 different positions of the tube.

Vibration resistance 2.5 g peak

Vibrational forces for a period of 32 hours at a frequency of 50 c/s in each of 3 directions of the tube.

7Z2 2415

LIMITING VALUES (Absolute limits)

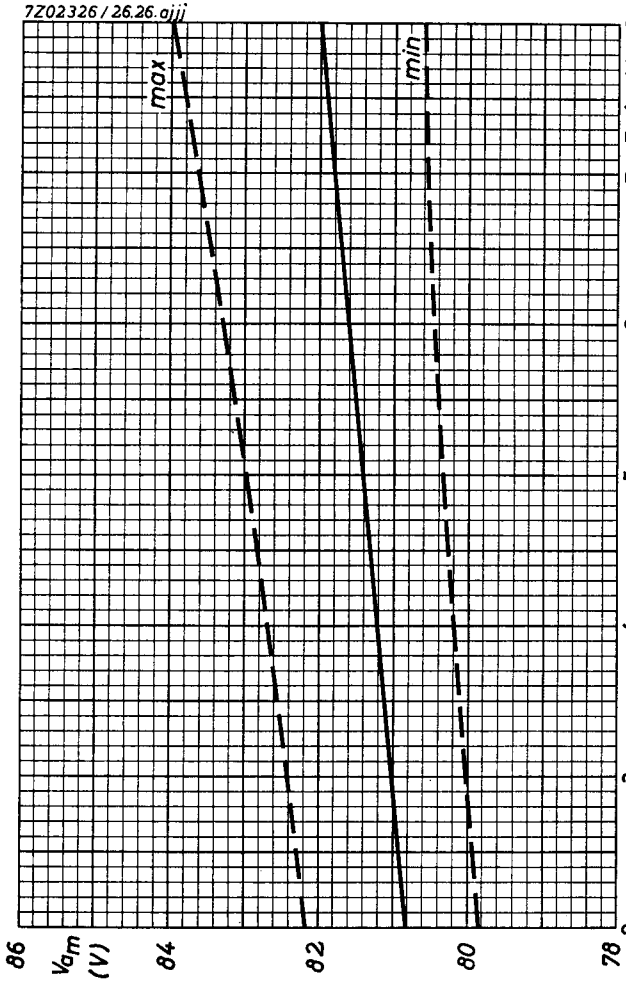
Cathode current	I_k	= max.	4.0 mA[1])
	I_k	= min.	2.0 mA
Starting current. Max. duration 20 sec.	I_{kp}	= max.	20 mA
Peak negative anode voltage	$-V_{ap}$	= max.	100 V
Bulb temperature			
during operation	t_{bulb}	= −55 °C to +125 °C	
during storage and stand-by	t_{bulb}	= −55 °C to +100 °C	

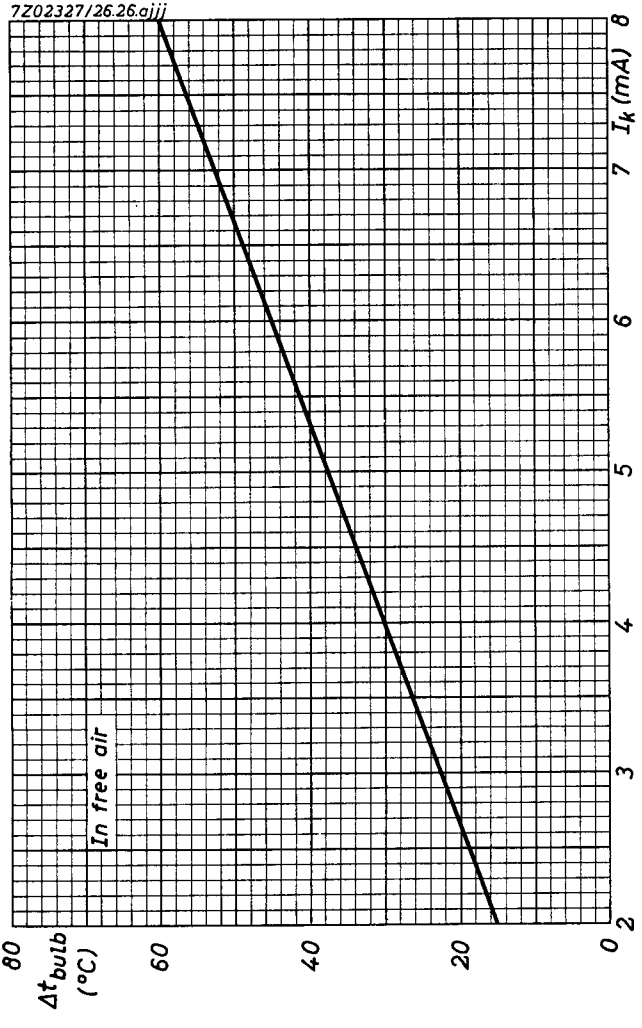
CIRCUIT DESIGN VALUES

Shunt capacitor	C_p	= max.	0.03 μF
Voltage necessary for ignition	V_b	= min.	120 V

[1]) For use as a stabilizer tube I_k = max. 8 mA. At cathode currents between 2 and 8 mA voltage jumps of 0.5 V may occur.

7Z2 2416


7Z02326 / 26.26.ajjj
max
min
I_k (mA)
2
3
4
5
6
7
8
V_{am} (V)
86
84
82
80
78


7Z02327/26.26.ajjj
In free air
Δt_{bulb} (°C)
80
60
40
20
0
2
3
4
5
6
7
8
I_k (mA)

ZZ1000

page	sheet	date
1	1	1964.05.05
2	2	1964.05.05
3	3	1964.05.05
4	4	1964.05.05
5	A	1964.05.05
6	B	1964.05.05
7	FP	2000.01.14