G.E.C. **Advance Technical Information**

CV4520

LOW IMPEDANCE TRIODE
6.3V INDIRECTLY HEATED

ISSUE 2
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The CV4520 is an indirectly heated triode designed for use as a low impedance stabiliser valve in environments of extreme shock and vibration.

BASE CONNECTIONS AND VALVE DIMENSIONS

1.	a	5.	h	Base :	B9A/F
2.	k	6.	g	Bulb :	Tubular
3.	a	7.	IC		
4.	h	8.	a	Max. seated length :	66mm
		9.	a	Max. diameter :	22.2mm
				Min. lead length :	38mm

HEATER

V_h	6.3 ±5%	V
*I_h	1.1 ±0.1	A

*This test is performed on an agreed sample basis.

MAXIMUM RATINGS (Absolute)

$V_{a(b)}$	500	V
V_a	300	V
$-V_g$	100	V
p_a	15	W
I_k	125	mA
R_{g-k} (fixed bias)	100	kΩ
R_{g-k} (cathode bias)	500	kΩ
*V_{h-k} (cathode positive)	250	V
*V_{h-k} (cathode negative)	100	V
T_{bulb}	225	°C
Acceleration (continuous operation)		
†100 hours duration :	5.0	g
† 10 mins. duration :	20.0	g
Shock (short duration) :	500	g
Operating pressure (min) :	55	mm of Hg
Ambient storage temperature range :	-60 to +85	°C

*For maximum reliability V_{h-k} should not exceed 10V.

†When the vibration components are varying continuously over the spectrum 10 to 1000c/s in a random manner.

CAPACITANCES (Measured on a cold screened valve *)

†$c_{g\text{-all less a}}$: 7.1pF ±1.4pF †$c_{a\text{-all less g}}$: 6.0pF ±1.2pF

†$c_{g\text{-a}}$: 9.5pF ±1.75pF

*Measured at 1Mc/s in an approved manner.

†These tests are performed on an agreed sample basis.

CHARACTERISTICS

(i)	V_a	150	100	V
	I_a	100	2.0	mA
	$-V_g$	21.5 ±4.5†	35 (max)‡	V
	*g_m	11.0 ±2.0‡	-	mA/V
	I_g (R_{g-k} = 500kΩ)	2.0 (max)†	-	μA
	μ	4.5 ±1.0‡	-	-
	*§Δg_m	8.0 (max)‡	-	%

(ii)	V_a	170	V
	R_k (R_{g-k} = 0)	170	Ω
	I_a	100	mA
	//t_{hk}	40 (max)‡	s

(iii)	V_a	200	200	V
	R_a	1.0	1.0	kΩ
	R_k (c_k ≥1000μF)	200	200	Ω
	f	50	1000 to 2500	c/s
	Acceleration(pk)	20 (min)	5.0 (min)	g
	$V_{out(rms)}$	120 (max)†	350 (max)†	mV

(iv)	V_h	6.3	6.3	6.3	V
	$V_{a\text{-all}}$	-300	-	-	V
	$V_{g\text{-all}}$	-	-100	-	V
	$V_{h\text{-k}}$	-	-	±250	V
	R (insulation)	100 (min)†	100 (min)†	-	MΩ
	$I_{h\text{-k}}$	-	-	20 (max)‡	μA

(v)	V_h	6.3	Running conditions for 1000 hours life test‡	V
	V_a	120		V
	I_a	125		mA
	$V_{h\text{-k(rms)}}$ (50c/s)	200		V

Cont'd.....

CHARACTERISTICS (Continued)

After 1000 hours operation:-

V_a	150	V
I_a	100	mA
$-V_g$	15.5 (min)‡	V
$-V_g$	26.0 (max)‡	V
I_g (R_{g-k} = 500kΩ)	3.0 (max)‡	μA
V_{h-k}	±250	V
I_{h-k}	30 (max)‡	μA

*Measured in an approved manner.

†Every valve tested.

‡These tests are performed on an agreed sample basis.

§ Δg_m is defined here as:-

$$\Delta g_m = \frac{(g_m \text{ at } V_h = 6.3V) - (g_m \text{ at } V_h = 5.7V)}{(g_m \text{ at } V_h = 6.3V)} \times 100\%$$

// t_{hk} is defined here as the time taken for I_a to rise to 100mA, from switching on the heater of a valve whose heater has not been operated for at least two hours. The impedance of the heater voltage supply must be low enough to ensure that V_h = 6.3V throughout the heating time.

INSTALLATION

The valve may be mounted in any position.

TESTING

These valves are manufactured in discrete lots, under carefully controlled conditions. Each lot is very comprehensively tested for electrical and mechanical properties in a manner specified by the relevant Government Authority.

The limits imposed in the electrical tests are usually closer than those used in normal domestic or commercial valve testing and include control on the spread of characteristic parameters.

Random samples are also taken from each lot and subjected to specified destructive electrical and mechanical life test.

The lot is only released if it passes all the above tests, including the life test.

The careful control of manufacture and the comprehensive testing and lot release system are designed to reduce microphony, the spread in electrical properties, the incidence of early failures and provide known life performance within the specified electrical and mechanical maximum ratings. An article in British Communications and Electronics (April 1958) by R. Brewer of the G.E.C. Research Laboratories entitled "The Life Test Contribution to the Improvement of Valve Reliability" discusses these points more fully. Reprints can be supplied on request.

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