MINISTRY OF SUPPLY - DLRD/RRE

VALVE ELECTRONIC CV4040

Specification MOS/CV4040 Issue 2 Dated 6.11.56 To be read in conjunction with K1001, BS448 and BS1409	SECURITY Specification: UNCLASSIFIED Valve: UNCLASSIFIED

Indicates a change ←

TYPE OF VALVE - Reliable Pulse Tetrode

CATHODE - Indirectly-heated

ENVELOPE - Glass

PROTOTYPE - CV416

MARKING

See K1001/4

RATING

All limiting values are absolute

			Note
Heater Voltage	(V)	6.3	
Heater Current	(A)	0.3	
Max. Anode Voltage	(V)	600	
Max. Anode Dissipation	(W)	3.5	
Max. Screen Voltage	(V)	600	
Max. Screen Dissipation	(W)	0.7	
Max. Heater-Cathode Voltage	(V)	100	
Mutual Conductance	(mA/V)	8.3	A
Max. Bulb Temperature	(°C)	165	B
Max. Shock (short duration)	(g)	500	
Max. Acceleration (continuous operation)	(g)	2.5	

CAPACITANCES (pF)

Cin (nom)	6.2
Cout (nom)	5.2
Cg, g1 (nom)	0.03

BASE

See BS448/B7G/1.1

CONNECTIONS

Pin	Electrode	
1	Control Grid	g1
2	Cathode	k
3	Heater	h
4	Heater	h
5	Anode	a
6	Beam Plates	bp
7	Screen Grid	g2

DIMENSIONS

See BS448/B7G/2.1

Size Ref. No. 2

Dimensions (mm)	Min.	Max.
A Seated height	-	47.5
B Diameter	16.0	19.0
D Overall length	-	54.5

MOUNTING POSITION

Any

NOTES

A. Tested at Va = Vg2 = 250V; Vg1 = -6.25V (Ia = 64mA approx. tested under pulsed conditions).

B. Caution to Electronic Equipment Design Engineers: Special attention should be given to the temperature of valves to be operated in aircraft. Reliability will be seriously impaired if the maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the valve and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardised if heater voltage ratings are exceeded: life and reliability performance are directly related to the degree that regulation of the heater voltage is maintained at its centre-rated value.

Z.14234.R.

To be performed in addition to those applicable in K1001
and in the specified order unless otherwise agreed with the Inspecting Authority.

Test Conditions - unless otherwise specified

Vh (V)	Va (V)	Vg2 (V)	Ia (mA)
6.3	200	200	17.0

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	UAL	Max.	ALD	Units
7.1	Glass Strain	No voltages	6.5	I			-					
	GROUP A											
5.2	Insulation			100%	R							
		Vg1 - all = -100V				100	-	-	-	-		M Ω
		Vg2 - all = -300V				100	-	-	-	-		M Ω
		Va - all = -300V				100	-	-	-	-		M Ω
	Reverse Grid Current	Rg1 = 500k Max		100%	Ig1	-	-	-	-	0.75		uA
	GROUP B	Combined AQL	1.0									
	Heater Current		0.65	II	Ih	0.27	-	0.30	-	0.33		A
	Heater-cathode Leakage Current	Vhk = ± 100V	0.65	II	Ihk	-	-	-	-	10		uA
				V2		-	-	-	2	-		uA
	Negative Grid Voltage		0.65	II	Vg1	8.4	-	-	-	15.8		V
				V2		-	-	12.5	-	-		V
	Negative Grid Voltage for cut-off	Ia = 100uA	0.65	II	Vg1	-	-	-	-	38		V
	Screen Current		0.65	II	Ig2	2.05	-	-	-	5.1		mA
	Mutual Conductance		0.65	II	gm	2.6	-	-	-	5.0	-	mA/V
				V2		-	3.1	3.6	4.0	-	1.1	mA/V
	GROUP C	Combined AQL	6.5									
	Change in Vg2	Vg1 reduced by 2V, Vg2 reduced to maintain Ia = 17mA	2.5	I	ΔVg2	15	-	-	-	25		V
	Pulse Anode Current	Va = Vg2 = 300V Vg1 = - 100V Pulse amp = +100V tp = 10 to 15 usecs Duty cycle = 0.25	2.5	I	Ia (pk)	133	-	-	-	-		mA
	Vibration Noise Output	Va(b) = 250V Vg1 = -17V RL = 2k	2.5	I	Va AC	-	-	-	-	60		mV (pk-pk)
	GROUP D											
	Grid Emission	Vh = 7.0V Vg1 = -38V Rg1 = 500K	6.5	IA	Ig1	-	-	-	-	-1.5		uA
	Capacitance	Measured on a 1 Mc/s bridge with the valve mounted in a fully screened socket. Shielded	6.5	IC	C out	4.4	-	5.2	-	6.1		pF
					C in	5.2	-	6.2	-	7.1		pF
					Cag1	-	-	0.03	-	.05		pF
7.2	Base Strain	No voltages	6.5	IA								
	GROUP E											
11.2	Resonance Search	Va(b) = 250V Vg1 = -17V RL = 2k Frequency range 25-500 c/s	2.5	IC								
	Vibration Noise Output				Va AC	-	-	-	-	Record		mV (pk-pk)
	Resonant Frequency				f	200	-	-	-	Record		c/s

TESTS (Cont'd)

CV4040

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	UAL	Max.	ALD	Units
11.3	Fatigue	Vh = 6.9V switched 1 min on, 3 mins off Va = Vg2 = 0 Frequency = 170 c/s Min pk accel = 5g Duration = 30,39,30hrs.		IA								
	Post Fatigue Tests											
	Vibration Noise Output	Va(b) = 250V Vg1 = -17V RL = 2k	2.5		Va AC	-	-	-	-	100		mV (pk-pk)
	Heater-cathode Leakage Current	Vhk = ± 100V	2.5		Ihk	-	-	-	-	30		uA
	Reverse Grid Current	Rg1 = 500k Max.	2.5		Ig1	-	-	-	-	1.5		uA
	Mutual Conductance		2.5		gm	2.5	-	-	-	5.0		mA/V
11.4	Shock	No voltages Hammer angle = 30°		IA								
	Post Shock Tests											
	Vibration Noise Output	Va(b) = 250V Vg1 = -17V RL = 2k	2.5		Va AC	-	-	-	-	100		mV (pk-pk)
	Heater-cathode Leakage current	Vhk = ± 100V	2.5		Ihk	-	-	-	-	30		uA
	Reverse Grid Current	Rg1 = 500k Max.	2.5		Ig1	-	-	-	-	1.5		uA
	Mutual Conductance		2.5		gm	2.5	-	-	-	5.0		mA/V
	GROUP F											
AVI/5	Life	Va=250V;Vg2=200V; Vhk=100V;RG1=500k; Rk=1000										
AVI/5.1	Stability Life Test											
	Change in Pulse Anode Current	Note 1	1.0	I	ΔIa (pk)	-	-	-	-	20		%
AVI/5.3	Intermittent Life Test											
AVI/5.6	Life Test End-point (500 hrs)		6.5	IA								
	Inoperatives		2.5									
	Heater Current		2.5		Ih	0.27	-	-	-	0.33		A
	Heater-cathode Leakage Current	Vhk = ± 100V	2.5		Ihk	-	-	-	-	10		uA
	Reverse Grid Current	Rg1 = 500k Max	2.5		Ig1	-	-	-	-	1.0		uA
	Pulse Anode Current	Note 1	2.5		Ia(pk)	100	-	-	-	-		mA
	do Average change				Δ Ia(pk)	-	-	-	-	25		%
	Negative Grid Voltage		4.0		Vg1	7.4	-	-	-	15.8		V
	Insulation		4.0		R							
		Vg1 - all = -100V				50	-	-	-	-		M Ω
		Vg2 - all = -300V				50	-	-	-	-		M Ω
		Va - all = -300V				50	-	-	-	-		M Ω

K1C01	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	UAL	Max.	ALD	Units
	GROUP F											
	Life Test End-point											
A VI	(1000 hrs.)		10.0	IA								
	Inoperatives		4.0									
	Heater Current		4.0		Ih	0.27	-	-	-	0.33		A
	Leakage Current	Vhk = ± 100V	4.0		Ihk	-	-	-	-	10		uA
→	Reverse Grid Current	Rgl = 500k Max.	4.0		Igl	-	-	-	-	1.5		uA
→	Pulse Anode Current	Note 1	4.0		Ia(pk)	90	-	-	-	-		mA
	Negative Grid Voltage		6.5		Vgl	6.6	-	-	-	15.8		V
	GROUP G											
A IX												
/2.5	Electrical re-test after			100%								
AVI	28-day holding period											
/5.6	Inoperatives		0.5									
	Reverse Grid Current	Rgl = 500k Max	0.5		Igl	-	-	-	-	1.0		uA

NOTE

1. The test conditions specified for Pulse Anode Current in Group C shall apply.