MINISTRY OF SUPPLY - DLRD/RRE

VALVE ELECTRONIC

CV4039

Specification MOS/CV4039

Issue 1 dated 26 Nov. 1956

To be read in conjunction with K1001, BS448 and BS1409

SECURITY	
Specification	Valve
UNCLASSIFIED	UNCLASSIFIED

TYPE OF VALVE - Reliable VHF Power Amplifier Pentode

CATHODE - Indirectly-heated

ENVELOPE - Glass

PROTOTYPE - CV2129, 5763

RETMA DESIGNATION - 6062

MARKING

See K1001/4

See also Note A

BASE

See BS448/B9A/1.1

RATING

All limiting values are absolute

			Note
Heater Voltage	(V)	6.0	
Heater Current	(A)	0.75	
Max. Anode Voltage (Ia = 0)	(V)	500	
Max. Anode Voltage (Wa = 12)	(V)	300	
Max. Screen Voltage (Ig2 = 0)	(V)	500	
Max. Screen Voltage (Wg2 = 2)	(V)	250	
Max. Negative Control Grid Voltage	(V)	125	
Max. Anode Dissipation	(W)	12	
Max. Screen Dissipation	(W)	2	
Max. Heater-Cathode Voltage	(V)	100	
Max. Bulb Temperature	(°C)	250	
Max. Operating Frequency	(Mc/s)	175	
Max. Shock (short duration)	(g)	500	
Max. Acceleration (continuous vibration)	(g)	2.5	

Typical Operating Conditions

Measured at Va = Vg2 = 250V; Vg1 = -7.5V, Vg3 = 0		
Anode Current	(mA)	45
Screen Current	(mA)	4.5
Mutual Conductance	(mA/V)	7.0
Inner/u (g1, g2)		16

CONNECTIONS

Pin	Electrode	
1	Anode	a
2	No connection	nc
3	Suppressor Grid	g3
4	Heater	h
5	Heater	h
6	Screen Grid	g2
7	Cathode	k
8	Control Grid	g1
9	Control Grid	g1

DIMENSIONS

See BS448/B9A/2.1

Size Ref. No. 3

Dimension (mm)	Min.	Max.
A Seated height	-	60.5
B Diameter	19.0	22.2
D Overall length	-	67.5

CAPACITANCES (pF)

Measured in a fully screened socket, no external shield

Ca, g1 (max.)	0.3
C in (nom)	9.5
C out (nom)	4.5

MOUNTING POSITION

Any

NOTES

A. In addition to the requirements of K1001/4 the RETMA designation shall also be clearly and indelibly marked on the valve.

B. Caution to Electronic Equipment Design Engineers - 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.

CV4039

TESTS

To be performed in addition to those applicable in K1001

Tests shall be performed in the specified order unless otherwise agreed with the Inspecting Authority

Test Conditions - unless otherwise specified

Vh (V)	Va (V)	Vg1 (V)	Vg2 (V)	Vg3 (V)	Vhk (V)
6.0	250	-7.5	250	0	0

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	ALD	
7.1	Glass Strain	No voltages	6.5	I								
	GROUP A											
	Insulation			100%	R							
		Vg1, all = -100V				100	-	-	-	-		M
		Vg2, all = -300V				100	-	-	-	-		M
		Va, all = -300V				100	-	-	-	-		M
	Reverse Grid Current	Rg1 = 100k Max.		100%	Ig1	-	-	-	-	2.5		uA
	GROUP B	Combined AQL	1.0									
	Heater Current		0.65	II	Ih	0.69	-	-	-	0.81		A
	Heater-cathode Leakage Current	Vhk = ± 100V	0.65	II	Ihk	-	-	-	-	20		uA
	Anode Current	Note 1	0.65	II	Ia	33	-	-	-	57		mA
				V2	Ia	-	39	45	51	-	13.2	mA
	Screen Grid Current		0.65	II	Ig2	-	-	-	-	7.0		mA
	Mutual Conductance		0.65	II	gm	5.6	-	-	-	9.0		mA/V
				V2	gm	-	6.3	7.0	7.7	-	1.55	mA/V
	GROUP C	Combined AQL	6.5									
	g3 Continuity	Vg3 = 250V; Note 2	2.5	I								
	Anode Current (2)	Vg1 = -15V	2.5	I	Ia	-	-	-	-	15		mA
	Change in Mutual Conductance	Vh = 5.7V	2.5	I	Δ gm	-	-	-	-	15		%
	Inner u		2.5	I	u(g1,g2)	13	-	-	-	20		-
11.1	Vibration Noise	Va(b) = 250V; Vg1 = -15V RL = 2k	2.5	I	Va AC	-	-	-	-	250		mV rms
	GROUP D											
7.2	Base Strain	No voltages	6.5	IA								
	Capacitance	Measured on a 1 MC bridge with the valve mounted in a fully screened socket. No shield	6.5	IC	Ca, g1	-	-	-	-	0.3		pF
					C in	7.9	-	-	-	11.1		pF
					C out	3.0	-	-	-	6.0		pF
	Peak Cathode Current	Va = Vg1 = Vg2 = Vg3 = 200V peak; Note 3	6.5	IA	Ik	4.5	-	-	-	-		A
	Reverse Grid Current (3)	Vh = 6.6V; Va = 300V; set Vg1; Vg2 = 250V; Note 4	6.5	IA	Ig1	-	-	-	-	2.5		uA
	Reverse Screen Grid Current	Va = 0; set Vg1; Vg2=170V r.m.s.; Note 5	6.5	IA	Ig2	-	-	-	-	500		uA
	Power Oscillation	Note 6	6.5	IA	Po	1.5	-	-	-	-		W

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	UAL	Max.	ALD	Units
	GROUP E											
11.2	Resonance Search	Va(b) = 250V; Vg1 = -15V; RL = 2k. Frequency = 25-500 c/s	2.5	IC	Va AC	-	-	-	-	Record		mV r.m.s.
					f	200	-	-	-	-		c/s
11.3	Fatigue	Vh = 6.6V switched 1 min. 'on' and 3 mins. 'off'; Va = Vg2 = 0; Acceleration = 5g Frequency = 170 c/s Duration = 30+30+30 hrs.		IA								
	Post Fatigue Tests											
	Heater-Cathode Leakage Current	Vhk = ± 100V	2.5		Ihk	-	-	-	-	40		uA
	Reverse Grid Current	Rg1 = 100k Max.	2.5		Ig1	-	-	-	-	5.0		uA
	Vibration Noise	Note 7	2.5		Va AC	-	-	-	-	500		mV r.m.s.
	Power Oscillation	Note 6	2.5		Po	1.0	-	-	-	-		W
11.4	Shock	Hammer angle = 30°; No voltages		IA								
	Post Shock Tests											
	Heater-cathode Leakage Current	Vhk = ± 100V	2.5		Ihk	-	-	-	-	40		uA
	Reverse Grid Current	Rg1 = 100k Max.	2.5		Ig1	-	-	-	-	5.0		uA
	Vibration Noise	Note 7	2.5		Va AC	-	-	-	-	500		mV r.m.s.
	Power Oscillation	Note 6	2.5		Po	1.0	-	-	-	-		W
	Group F											
AVI/5	Life	Vhk = 100V, heater positive Rg1 = 100k ± 20% Rk = 150 ± 10% Ck = 1000 uF										
AVI/5.1	Stability Life Test											
	Change in Anode Current		1.0	I	▲Ia	-	-	-	-	7.5		%
	Change in Mutual Conductance		1.0	I	Δgm	-	-	-	-	10.0		%
AVI/5.3	Intermittent Life Test			IA								
	Life Test End-point-500 hrs.	Combined AQL	6.5									
AVI/5.6	Inoperatives		2.5									
	Heater Current		2.5		Ih	0.64	-	-	-	0.81		A
	Heater-cathode Leakage Current	Vhk = ± 100V	2.5		Ihk	-	-	-	-	30		uA
	Reverse Grid Current	Rg1 = 100k Max.	2.5		Ig1	-	-	-	-	3.0		uA
	Mutual Conductance		2.5		gm	4.8	-	-	-	-		mA/V
	Average Change in Mutual Conductance				Δgm	-	-	-	-	15		%
	Anode Current		4.0		Ia	28	-	-	-	57		mA
	Power Oscillation		4.0		Po	1.0	-	-	-	-		W
	Insulation		4.0		R							
		Vg1, all = -100V				50	-	-	-	-		M
		Vg2, all = -300V				50	-	-	-	-		M
		Va, all = -300V				50	-	-	-	-		M

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UAL	Min.	ALD	
	Life Test End-Point-1000 hrs.	Combined AQL	10.0									
AVI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	0.64	-	-	-	0.81		A
	Heater-Cathode Leakage current	Vhk ± 100V	4.0		Ihk	-	-	-	-	40		uA
	Reverse Grid Current	Rgl = 100k Max.	4.0		Igl	-	-	-	-	4.0		uA
	Mutual Conductance		4.0		gm	4.5	-	-	-	-		mA/V
	Anode Current		6.5		Ia	25	-	-	-	-		mA
	Power Oscillation		6.5		Po	0.8	-	-	-	-		W
	GROUP C											
AIX/2.5	Re-test after 28-day holding period			100%								
AVI/5.6	Inoperatives		0.5									
	Reverse Grid Current	Rgl = 100k Max.	0.5		Igl	-	-	-	-	2.5		uA

NOTES

1. With Vgl applied in turn to pins 8 and 9, Ia must show no change. During this test the anode current shall not change when the valve is tapped.

2. During this test the anode and screen currents shall change from values obtained under normal conditions.

3. Voltage waveform shall be a half-sine wave; PRF = 50pps; tp = 12.5usec max.

4. Adjust Vg to give Ia = 40 mA. Igl should not be rising or outside limit after 10 minutes.

5. Measured in an approved test circuit. Set Vgl to give Ig2 = 10mA.

6. Measured in an approved test circuit with supply, Va(b) = 300V; Ia = 50mA; Rgl = 16k and f = 135 Mc/s, the power output shall be measured using a calibrated load.

   or alternatively,

   The valve may be tested in an approved oscillator circuit loaded with a diode measuring circuit,

   Va = 250V
   Vg2 = 250V through 10K ± 10%
   Diode load resistor = 22k ± 10%
   Diode = CV4007 or CV4025 with both sections strapped.
   The diode currents corresponding with the Po Limits are

Po Watts	IdmA
1.5	6.0
1.0	4.75
0.8	4.25

7. The test conditions for vibration noise in Group C shall apply.

AMENDMENT NO.1

to Specification CV 4039 - Issue 1 - dated 26.11.1956

Page 3

Group F - Stability Life Test

DELETE CLAUSE:

"Change in Anode Current" and figures in reference to it in all columns.

T.V.C.
for R.R.E.

January, 1958
N.24481R