VALVE ELECTRONIC

CV4058

MINISTRY OF TECHNOLOGY - D.L.R.D./R.R.E.

Specification MIN. TECH./CV4058
Issue 1A Dated May 1967.
To be read in conjunction with BS.448, BS.1409 and K.1001

SECURITY	
Specification	Valve
UNCLASSIFIED	UNCLASSIFIED

→ Indicates a change.

TYPE OF VALVE - Reliable Miniature R.F. Power Triode

CATHODE - Indirectly heated

ENVELOPE - Glass

PROTOTYPE - CV133

R.E.T.M.A. - 6100/6C4WA

MARKING
K1001/4

Additional Marking:-
6100/6C4WA

BASE
BS.448/B7G

RATING

			Note
Heater Voltage	(V)	6.3	C
Heater Current	(A)	0.15	
Max. Heater Cathode Voltage	(V)	±150	A
Max. Operating Anode Voltage	(V)	330	A
Max. Anode Voltage (Ia = 0)	(V)	550	A
Max. Anode Dissipation	(W)	3.8	A
Max. Mean Cathode Current	(mA)	21	A
Max. Bulb Temperature	(°C)	170	C
Max. Shock (short duration)	(g)	500	
Max. Acceleration (continuous operation)	(g)	2.5	
Max. Operating Frequency	(Mc/s)	150	
Amplification Factor		17	B
Mutual Conductance	(mA/V)	2.2	B
Anode Impedance	(kΩ)	7.7	B

CAPACITANCE (pF)

C in (nom.)	1.8	D
C out (nom.)	1.3	D
Ca, g (nom.)	1.6	D

CONNECTIONS

Pin	Electrode
1	a
2	I^C
3	h
4	h
5	a
6	g
7	k

DIMENSIONS

See BS.448/B7G/2.1
Size Ref. No. 2

Dimensions (mm)	Min.	Max.
A seated height	-	47.5
C diameter	16.0	19.0
D overall length	-	54.5

MOUNTING POSITION
Any

NOTES

A. Absolute value.

B. Measured at Va = 250V; Vg = -8.5 (Ia = 10.5 mA).

C. 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 tests 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.

D. Measured with valve unscreened.

To be performed in addition to those applicable in K1001

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

Test Conditions - unless otherwise specified

Vh(V)	Va(V)	Vg(V)	Vhk(V)
6.3	250	-6.5	0

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
7.1	Glass Strain	No voltages	6.5	I								
	GROUP A											
	Electrode Insulation	Vh = 6.3V. Note 1.										
		Vg-all = -100V		100%	R	100	-	-	-	-	-	MΩ
		Va-all = -300V		100%	R	100	-	-	-	-	-	MΩ
	Reverse Grid Current			100%	Ig	-	-	-	-	0.5	-	μA
	GROUP B											
		Combined AQL	1.0	II								
	Heater Current		0.65	II	Ih	138	-	150	-	162	-	mA
5.3	hk Leakage Current	Vhk = ±100V. Note 3	0.65	II	Ihk	-	-	-	-	10	-	μA
		Vhk = -100V Cathode Positive		V2	Ihk	-	-	-	3	-	-	μA
	Anode Current		0.65	II	Ia	6.5	-	-	-	14.5	-	mA
				V2	Ia	-	9.0	10.5	12.0	-	3.5	mA
	Mutual Conductance		0.65	II	gm	1.75	-	-	-	2.65	-	mA/V
				V2	gm	-	2.0	2.2	2.4	-	0.45	mA/V
	GROUP C											
		Combined AQL	6.5	I								
	Anode Current	Vg1 = -30V	2.5	I	Ia	-	-	-	-	50	-	μA
	Reverse Grid Current	Vh = 6.9V. Note 7.	2.5	I	Ig	-	-	-	-	1.0	-	μA
11.1	Vibration Noise	Va(b) = 250; RL = 2 kΩ Notes 5 and 6.	2.5	I	Va AC	-	-	-	-	7.0	-	mV
	GROUP D											
7.2	Base Strain	No Voltages.	6.5	IA								
5.9	Capacitances	Measured on 1 Mc/s bridge with valve mounted in a fully shielded holder. No valve screen or holder skirt. Pin 2 link to pin 7.	6.5	IC	C in	1.35	-	1.8	-	2.25	-	pF
					C out	0.98	-	1.3	-	1.62	-	pF
					Ca,g	1.2	-	1.6	-	2.0	-	pF

TESTS (Cont'd)

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	UAL	Max.	ALD	Units
	Amplification Factor		6.5	IA	μ	15.5	-	-	-	18.5	-	
				V1	μ	-	16.15	17.0	17.85	-	1.9	
	Mutual Conductance	Va = 100V; Vg = 0	6.5	IA	gm	2.25	-	-	-	3.75	-	mA/V
				V1	gm	-	2.60	3.0	3.4	-	0.9	mA/V
	Change of Mutual Conductance	Va = 100V; Vg = 0 Vh = 5.7V. Note 2	6.5	IA	Δ gm		-	-	-	15	-	%
	Power Oscillation	Va(b) = 300V Rg = 8.5 kΩ f = 150 Mc/s. Note 8	4.0	IA	PO	1.8	-	-	-	-	-	W
	GROUP E											
11.2	Resonance Search	Va = 250V RL = 2kΩ Frequency:-	2.5	IC								
		(1) 25-200 c/s			-	-	-	-	-	7	-	mV rms
		(2) 200-500 c/s			-	-	-	-	-	35	-	mV rms
		(3) 500-2500 c/s			-	-	-	-	-	150	-	mV rms
11.3	Fatigue	Note 4. Vh = 6.9V.		I								
	Post Fatigue Tests											
	hk Leakage Current	Vhk = ±100V Note 3	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	1.6	-	-	-	2.65	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		Va AC	-	-	-	-	15	-	mV rms
11.4	Shock	Hammer Angle = 30° No voltages.		IA								
	Post Shock Tests											
5.3	hk Leakage Current	Vhk = ±100V Note 3	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	1.6	-	-	-	2.65	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		Va AC	-	-	-	-	15	-	mV rms
	GROUP F											
A VI/5	Life	Vhk = 150V D.C. Heater positive Note 9.										
A VI/5.1	Stability Life (1 hour)											
	Change in Mutual Conductance		1.0	I	Δ gm	-	-	-	-	10	-	%
A VI/5.2	Survival Rate Life (100 hours)											
5.6	Inoperatives		0.65	II								

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
	Intermittent Life											
	Test Point 500 hrs.	Combined AQL	6.5	IA								
A VI/5.6	Inoperatives		2.5									
	Heater Current		2.5		Ih	138	-	-	-	162	-	mA
5.3	hk Leakage Current	Vhk = +100V. NOTE 3	2.5		Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current		2.5		Ig	-	-	-	-	0.5	-	µA
	Mutual Conductance		2.5		gm	1.6	-	-	-	2.65	-	mA/V
	Average Change in Mutual Conductance				Δ gm	-	-	-	-	15	-	%
	Anode Current		4.0		Ia	5.5	-	-	-	14.5	-	mA
	Electrode Insulation	Vh = 6.3V. Note 1.	4.0									
		Vg -all = -100V			R	50	-	-	-	-	-	MΩ
		Va -all = -300V			R	50	-	-	-	-	-	MΩ
	Test Point 1000 hrs.	Combined AQL	10									
A VI/5.6	Inoperatives		4.0									
5.3	hk Leakage Current	Vhk = ±100V. Note 3	4.0		Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current		4.0		Ig	-	-	-	-	0.5	-	µA
	Mutual Conductance		4.0		gm	1.5	-	-	-	2.65	-	mA/V
	Anode Current		6.5		Ia	5.0	-	-	-	14.5	-	mA
	Electrode Insulation	Vh = 6.3V. Note 1										
		Vg -all = -100V			R	30	-	-	-	-	-	MΩ
		Va -all = -300V			R	30	-	-	-	-	-	MΩ
	GROUP C											
A IX/2.5	Electrical Re-test after 28 days holding period			100%								
A VI/5.6	Inoperatives		0.5									
	Reverse Grid Current		0.5		Ig	-	-	-	-	0.5	-	µA

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NOTES

1. Heater and cathode strapped and considered as a single electrode.

2. Change of mutual conductance is expressed:

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

3. Heater positive and negative successively.

4. Valves shall be vibrated in each of the three required planes for not less than 30 hours and not less than 100 hours total. Heater switched 1 minute on 3 minutes off. No other voltages. Minimum peak acceleration = 5g; frequency = 170 $\pm$5 c/s.

5. The valve shall be mounted so that the direction of vibration is parallel to the minor axis of the mounting structure.
Vibration frequency = any fixed frequency in the range 25-100 c/s.
Minimum peak acceleration = 2g.
The test shall be of sufficient duration to obtain a steady reading of noise output.

6. Alternatively Va(b) = 250V; RL = 2kΩ; Vg = 0; Rk = 810Ω; Ck = 1000 μF.

7. Prior to this test the valve shall be pre-heated for 5 minutes under the test conditions. Ig shall not be rising or out of limit after 10 minutes.
Alternative test conditions: Va(b) = 250V; Vg = 0; Rk = 810Ω may be used for this test.

8. An average valve shall be set to give Ia = 25mA by adjusting the load/tank circuit coupling while the load is simultaneously tuned to give maximum power output.

9. Life test conditions. Va = 250V; Vg adjust so that the anode dissipation is 3.45 watts $\pm$ 10%.
Cathode Bias may be used .