MINISTRY OF SUPPLY - D.G.W.R.D. VALVE ELECTRONIC

CV4505

Specification MOS/CV4505
Issue 1 dated 21.6.57
To be read in conjunction with K.1001, B.S.448 and B.S.1409

SECURITY	
Specification	Valve
UNCLASSIFIED	UNCLASSIFIED

→ Indicates a change

TYPE OF VALVE - Reliable Sub-Miniature Half-Wave Rectifier with Flying Leads
CATHODE - Indirectly - heated
ENVELOPE - Glass
PROTOTYPE - CV473, VX8155

MARKING
See K.1001/4

BASE
See B.S.448/B8D/F/1.1

RATINGS (Note A)

(All limiting values are absolute)

			Note
Heater Voltage	(V)	6.3	
Heater Current	(mA)	400	
Max. Heater - Cathode Voltage, Cathode +ve	(V)	465	B
Cathode -ve	(V)	465	B
Max. Peak Inverse Voltage	(V)	930	F
Max. Mean Anode Current	(mA)	50	
Max. Peak Anode Current	(mA)	300	
Max. Surge Anode Current	(A)	1.1	
Max. Vibration (100 Hours duration Max.)	(g)	5	C
(10 Minutes duration Max.)	(g)	20	D
Max. Shock (short duration)	(g)	500	
Max. Bulb Temperature	(°C)	200	
Max. Operating Altitude	(ft)	60,000	F
Max. Ambient Storage Temperature	(°C)	-60/+85	
Min. Socree Resistance	(ohms)	300	
Max.Reservoir Condenser	(μF)	16	

Typical Operating Conditions

Condenser Input Filter

Measured at Va = 275V r.m.s. 50 c/s; CL = 16μF;
RL = 5000 ohms; RS = 300 ohms

Output Voltage	(V)	250
Output Current	(mA)	50

CONNECTIONS

Lead	Electrode	
1	No connection	NC
2	Anode	a
3	Heater	h
4	Anode	a
5	Cathode	k
6	Heater	h
7	No connection	NC
8	Anode	a

DIMENSIONS

See B.S.448/B8D/F/2.1
Size Ref. No.4

Dimensions (m.m.)	Min.	Max.
A	35.4	38.2
B	-	44.4
C	9.3	10.16
Lead length (Note E)	38.1	-

MOUNTING POSITION

Any

NOTES

A. Caution to Electronic Equipment Design Engineers: Special attention should be given to the temperature of valves to be operated in Guided Weapons and 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 jeopardized 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. Under no circumstances should the heater voltage supply be allowed to deviate more than ± 5% from the rated value.

/B.

NOTES (Contd.)

B. For greater reliability, the potential between heater and cathode should not be allowed to exceed 150 Volts.

C. The maximum peak acceleration under continuous random vibration conditions specified assumes that the vibration frequency components are varying continuously over the band 10 to 1,000 cycles/sec. in a random manner.

D. The maximum peak acceleration under short term random vibration conditions specified assumes that the vibration frequency components are varying continuously over the band 10 to 1,000 cycles/sec. in a random manner.

E. Direct soldered connections to the leads must be at least 5 mm. from the seal and any bending of the leads must be at least 1.5 mm. from the seal.

F. For greater reliability, the Peak Inverse Voltage should be kept as low as possible. This is especially important when operation is required at high altitude.

TESTS

CV4505

TO BE PERFORMED IN ADDITION TO THOSE APPLICABLE IN K.1001

TESTS IN ANY ONE GROUP SHALL BE PERFORMED IN THE SPECIFIED ORDER

TEST CONDITIONS - UNLESS OTHERWISE SPECIFIED

Vh(V)
6.3

K1001	TEST	TEST CONDITIONS	AQL %	INSP. LEVEL	SYMBOL	LIMITS						UNITS
						MIN.	LAL	BOGEY	UAL	MAX.	ALD	
	GROUP A											
	Visual Inspection	Notes: 1, 2 No voltages		100%								
AVI/5.6	Inoperatives			100%								
	Insulation	Va-all = -300V		100%	R	5	-	-	-	-	-	M
	GROUP B	Note: 3										
	Heater Current		0.4	II V2	Ih Ih	370 To be recorded later.	-	400	-	430	-	mA mA
5.3	Heater-Cathode Leakage Current	Vhk = ± 465V	0.4	II V2	Ihk Ihk	- To be recorded later.	-	-	-	50	-	µA µA
	D.C. Output Current	Va = 275V r.m.s. 50 c/s Rk = 5000 C = 16µF Notes: 4,5	0.4	II	Io	47	-	-	-	-	-	mA
	GROUP C											
	Anode Voltage	Ia = 100 mA	2.5	I	Va	-	-	-	-	30	-	V
	GROUP E											
5.12	Lead Fragility	No Voltages	1.0	IA								
7.1	Glass Strain	No Voltages	4.0	IA								
	Low Pressure Voltage Breakdown	Pressure = 55 ± 5 mm Hg. Temperature = 25 ± 5°C Relative Humidity = 0 Voltage = 670V r.m.s. 50 c/s No other voltage applied Note: 6	4.0	IA								
	Vibration Fatigue(1)	Acceleration = 4g peak min. Time = 200 hours Va(b) = 45V RL = 680 Note: 7		II								
	Vibration (1)	Note: 8 Acceleration = 20g peak min. Frequency = 60 - 2000 c/s RL = 5000 Va = 275V r.m.s. 50 c/s C = 16µF Notes: 4,5										

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K1001	TEST	TEST CONDITIONS	AQL %	INSP. LEVEL	SYMBOL	LIMITS MIN.	LAL	BOGEY	UAL	MAX.	ALD	UNITS
	GROUP E (Contd.)											
	Post Vibration(1) Tests:	Combined AQL	4.0									
	Heater-Cathode Leakage Current	Vhk = ± 150V	2.5		Ihk	-	-	-	-	70	-	μA
	D.C.Output Current	As in Group B Notes: 4,5	1.0		Io	43	-	-	-	-	-	mA
	Catastrophics	Note: 9	0.4									
	Vibration Fatigue(2)	Note: 10 Acceleration = 4g peak min. Time = 200 hours Va = 275V r.m.s. 50 c/s RL = 5000 C = 16μF Vhk = 150V cathode positive Notes: 4, 7		Code I								
	Vibration (2)	Note: 8 Conditions as in Vibration (1) Notes: 4,5										
	Post Vibration (2) Tests:	Combined AQL	4.0									
	Heater-Cathode Leakage Current	Vhk = ± 150V	2.5		Ihk	-	-	-	-	70	-	μA
	D.C.Output Current	As in Group B Notes: 4,5	1.0		Io	43	-	-	-	-	-	mA
	Catastrophics	Note: 9										
11.4	Shock	Hammer Angle = 30° No Voltages		T/A								
	Post Shock Tests:	As for Post Vibration(2) Tests		T/A								
	GROUP F											
AVI/5	Life	Va = 275V r.m.s. 50 c/s RL = 5000 C = 16μF Vhk = 150V cathode positive Note: 4										
AVI/5.1	Stability Life Change in DC Output Current		1.0	I	ΔIo	-	-	-	-	7	-	%
AVI/5.3	Intermittent Life											
	Test Point 500 hours	Combined AQL	4.0	Code I								
AVI/5.6	Inoperatives		1.0									
	Heater Current		1.0		Ih	370	-	-	-	430	-	mA
	Heater -Cathode Leakage Current	Vhk = ± 150V	2.5		Ihk	-	-	-	-	70	-	μA
	D.C.Output Current	As in Group B Notes: 4,5	1.0		Io	43	-	-	-	-	-	mA
	Insulation	Va - all = -300V	2.5		R	5	-	-	-	-	-	M
	Test Point 1000 hours	Combined AQL	6.5	Code G								
AVI/5.6	Inoperatives		2.5									
	Heater Current		2.5		Ih	370	-	-	-	430	-	mA
	Heater-Cathode Leakage Current	Vhk = ± 150V	4.0		Ihk	-	-	-	-	70	-	μA
	D.C.Output Current	As in Group B Notes: 4,5	2.5		Io	33	-	-	-	-	-	mA

K1001	TEST	TEST CONDITIONS	AQL %	INSP. LEVEL	SYMBOL	LIMITS MIN.	LAL	BOGEY	UAL	MAX.	ALD	UNITS
	GROUP G											
AIX/2.5	Electrical Re-Test after 28 days holding period			100%								
AVI/5.6	Inoperatives		0.5									
	D.C. Output Current	As in Group B Notes: 4,5			Io	47	-	-	-	-	-	mA

NOTES

1. The valve shall be visually inspected for good workmanship. Standards to be defined and agreed later.
2. This test may be done alternatively in Group G.
3. At this stage the lot shall be formed. It shall be an identifiable lot not exceeding 8000 valves. Normal Sampling (Single) shall apply.
4. The valve shall be tested in a half wave circuit with an effective source resistance adjusted to 300 ohms.
5. During this test there shall be no softness or evidence of flashover.
6. The voltage to be applied between each anode base lead and their adjacent leads. There shall be no evidence of corona or arcing.
7. The sample shall be vibrated over the frequency range 60 to 500 c.p.s. Duration of frequency sweep 12 minutes minimum in each direction. One-third of the sample to be mounted in each of three mutually perpendicular planes. The heater supply shall be at 6.3 volts and switched approximately 8 minutes on and 16 minutes off throughout the duration of the test.
8. This test to be applied to the total sample previously subjected to the Vibration Fatigue test. Each valve shall be mounted so that the direction of vibration is parallel to the minor axis of the electrode structure and shall be vibrated over the frequency range 60 to 2,000 c.p.s. swept once only at a rate of change of frequency not greater than 1 octave per 30 seconds.
9. A valve shall be deemed to be a catastrophic if it is either an inoperative as defined in K.1001 App.VI/5.6 or has an Output Current less than 20 mA.
10. This test to be applied to a separate sample to that used for Vibration Fatigue (1).