Ministry of Supply - DLRD(A)/RRE (South) VALVE ELECTRONIC **CV4018**

Specification MOSA/CV4018, incorporating MIL-E-1/83	SECURITY	
	Specification	Valve
Issue 1, Dated 27. 2. 56		
To be read in conjunction with K1006 & BS.448	UNCLASSIFIED	UNCLASSIFIED

TYPE OF VALVE - Gas-filled Tetrode (Reliable)
CATHODE - Indirectly Heated
ENVELOPE - Glass, unmetallised
PROTOTYPE - 5727/2D21W

MARKING
See K1001/4
additional marking
5727/2D21W

RATINGS

		Relay, Grid Controlled Rect.	Modulator	Notes
Heater Voltage	(V)	6.3 ± 10%	6.3 +10% -5%	
Heater Current	(A)	0.6	0.6	
Max Peak AC Anode Voltage	(V)		500	B
Max Peak Forward Anode Voltage	(V)	650	500	
Max Anode P.I.V.	(V)	1300	100	
Max G2 Voltage (Conduction)	(V)	-10	-10	
Max G1 Voltage (Conduction)	(V)	-10	-10	
Max Peak G2 Voltage (Non-conduction)	(V)	-100	-50	
Max Peak G1 Voltage (Non-conduction)	(V)	-100	-100	
Max Peak Heater-Cathode Voltage	(V)	-100 to +25	0	
Max G1 Circuit Resistance	(M)	10	0.5	
Min G2 Series Resistance	(k)		2	
Max G2 Series Resistance	(k)		25	
Max Peak Cathode Current	(A)	0.5	10	
Max Mean Cathode Current	(mA)	100	10	C
Max Peak G2 current	(mA)		20	
Max Peak G1 current	(mA)		20	
Max Mean G2 Current	(mA)	10		C
Max Mean G1 Current	(mA)	10		C
[illegible]	(us)		5	
Max Rate of Rise of Cathode Current	(A/us)		100	
Max p.r.f.	(pps)		500	
Max Duty Cycle	(Du)		0.001	
Max Ambient Temperature Range	(°C)	-75 to +90	-75 to +90	
Min Cathode Heating Time	(Sec)	10	10	

NOTES

A. All limiting values are absolute.

B. After the completion of a pulse, a 20 uSec delay is required before a positive voltage of more than 10V is applied.

C. Average over any interval of 30 seconds minimum.

Connections

Pin	Electrode
1	g1 control grid
2	k cathode
3	h heater
4	h heater
5	g2 auxiliary grid
6	a anode
7	g2 auxiliary grid

Dimensions

See BS.448 Section B7G/2.1.3

Dimension mm	Min.	Max.
A Seated height		54.0
C Diameter	16.0	19.0
D Overall length		61.0

CV4018

Ratings: Absolute Maximum:	Ef V	epp v	epy v	epx v	Conduction Ec2 V	Conduction Ec1 V	Non-Conduction ec2 v	Non-Conduction ec1 v	ehk v	Rg1 Meg	Rg2 Ohms Min.	Rg2 Ohms Max.
Relay, G Controlled Rect.:	6.3±10%	---	650	1300	-10	-10	-100	-100	-100 ±25	10	---	---
Pulse Modulator:	6.3±10% -5%	500 Note 2	500	100	-10	-10	-50	-100	0	0.5	2000	25K
Test Cond.:	6.3	---	---	---	0	---	---	---	---	---	---	---

Ratings: Absolute Maximum:	ik a	Ik mA	ig2 ma	ig1 ma	Ig2 mA	Ig1 mA	tp us	dik/dt a/us	Rep. Rate pps	Du	TA °C	tk sec(min)	Application
		Note 1			Note 1	Note 1							
Relay, G Controlled Rect.:	0.5	100	---	---	10	10	---	---	---	---	-75to+90	10	Note 3
Pulse Modulator:	10	10	20	20	---	---	5	100	500	.001	-75to+90	10	
Test Cond.:	---	---	---	---	---	---	---	---	---	---	---	10	

*Height: Max. 2-1/8 in.
*Diameter: Max. 3/4 in.

Shock Rating: Max. 750 G (for 1 millisecond duration)
**Base: Miniature Button 7-pin, E7-1
**Cathode: Coated Unipotential
**Envelope: T-5 1/2 (6-2)

**Pin No.:	1	2	3	4	5	6	7
Element:	gl	k	h	h	g2	a	g2

Ref.	Test	Conditions	AQL(%)	Insp. Level		Limits Min.	LRLM	Bogie	URLM	Max.	
4.9.6.1	Miniature Tube Base Strain:	No Voltages; Note 4									
	Inoperatives Control:	Epp=220Vac; Ehk=-100Vdc; Ecl=0; Rgl=50,000; Rp/Ik=80mAdc; Note 5									
	Qualification Approval Tests										
3.1	Qualification Approval:	Required for JAN Marking									
4.9.18.1@ F-6a(3f)	Carton Drop:										
4.9.20.3	Vibration(1):	No Voltage									
4.9.20.6	Fatigue:	Note 6									
	Acceptance Tests - Group A Note 4										
4.9.20.5	Shock:	Hammer Angle-48°; Note 7									
---	Post Shock and Fatigue Test End Points:	Heater-Cathode Leakage			Ihk:	---	---	---	---	40	Adc
		Anode Voltage (1)			Ebb:	---	---	---	---	50	Vdc
		Pulse Emission			etd:	---	---	---	---	76	v
		Grid Voltage (1)			Eccl:	-2.9	---	---	---	-4.5	Vdc

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CUSTODIANS:
Army-Signal Corps
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Air Force

PROCUREMENT SPECIFICATION
MIL-E-1

SPECIFICATION SHEET

RELIABLE MINIATURE THYRATRON, GAS TETRODE

5727/2D21W

MIL-E-1/83

SHEET 1 OF 5

Ref.	Test	Conditions	AQL(%)	Insp. Level		Limits Min.	LRLM	Bogie	URLM	Max.	
4.7.5	Acceptance Tests - Group B (Note 4)										
	Short and Continuity:		0.4	II							
	Acceptance Tests - Group C (Notes 4 and 8)										
4.10.8 (F-6i)	Heater Current:		0.65	II	If:	540	567	600	633	660	mA
4.10.15 (F-6q)	Heater-Cathode Leakage:	Ehk= ±25Vdc -100	0.65	II	Ihk:	---	---	---	3	15	Adc
4.10.17.1 (F-6s(1))	±Grid Voltage(1):	Epp=460Vac; Rgl =0.1 Meg; Rp= 3000; Notes 5 and 9	0.65	II	Eccl:	-2.9	-3.3	-3.7	-4.1	-4.5	Vdc
4.10.17.1 (F-6s(1))	Grid Voltage(2):	Epp=460Vac; Rgl =10 Meg; Rp= 3000; Notes 5 and 9	0.65	II	Eccl:	---	---	-4.2	-4.9	-5.6	Vdc
4.10.17.2 (F-6s(2))	Anode Voltage(1):	Eccl=0; Rgl= 0.1Meg; Rp= 1000; Notes 5 and 10	0.65	II	Ebb:	---	---	29	32	38	Vdc
4.10.17.2 (F-6s(2))	Anode Voltage(2):	Ef=0; Eccl=-100 Vdc; Rgl=0; Rp= 10,000; Notes 5 and 11	0.65	II	Ebb:	650	---	---	---	---	Vdc
---	Operation:	Ebb=500Vdc; epy =1000v; egy=100 v; Eccl=-50Vdc; Ecc2-0; Rgl= 10,000; Rg2= 25,000; prr=500 pps; tp=2±0.2us; Zo=25; RL=20; epx =100v(min.); tr= 0.2us(max); tf= 0.4us(max); Note 12	0.65	II	ib:	16	---	---	---	---	a
---	Pulse Emission:	Ef=6.3Vac; epx=100 v(min); epp=eggl= egg2-180±9v; tp= 5±0.25us; tr=0.5us (max); tf=1.0us (max); prr=100±5 pps; tk=5 seconds (min); Note 13	0.65	II	etd:	---	---	---	65	76	v
	Acceptance Tests - Group D (Notes 4 and 21)										
4.8 (F-2)	Electrode Insulation:	Ef=6.3V; Note 14; Rg2-p=±380Vdc	2.5	1A	Rg2-p:	760	---	---	---	---	Meg
4.10.17.2 (F-6s(2))	Anode Voltage(3):	Ef=5.7V; Eccl=0; Rgl=0.1Meg; Rp= 1000; Notes 5,10 and 15	2.5	II	Ebb:	---	---	---	45	50	Vdc

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Ref.	Test	Conditions	AQL(%)	Insp. Level		Limits Min.	LPLM	Bogie	UPLM	Max.	
	Acceptance Tests - Group E Note 4,5,and 22										
4.9.20.4	Vibration(2):	No Voltages	6.5	1A							
4.10.17.1 (F-6s(1))	Grid Voltage(3):	Ef=7.0V; Epp=460Vac; Rgl=10Meg;Rp=3000; Notes 5,9, and 16	6.5	1A	Eccl:	—	—	-4.6	—	-6.4	Vdc
—	Grid #2 Voltage:	Epp=150Vac; Eggl=16Vac; Rp=1000;Rgl=2500; Notes 17 and 18	6.5	1A	Egg2:	1.85	—	2.45	—	3.05	Vac
4.11.5 (F-4c)	Intermittent Life Test:	Epp=460Vac; Rgl=50,000; Ib=80mAdc; ib=500ma; Notes 4 and 5			t:	500					hrs
4.11.4 (F-4b)	Intermittent Life Test End Points(500 hours):	Pulse Emission Anode Voltage(1) Heater-Cathode Leakage Electrode Insulation Notes 4 and 19			etd: Ebb: Ihk: Rg2-p	— — — 380	— — — —	— — — —	— — — —	100 50 20 —	v v μAdc Meg
4.11 (F-4)	Continuous Life Test:	Group A; Ebb=250 Vdc(max); epy=500 v; egy=100v(max); Eccl=-50Vdc;Ecc2=0;Rgl=10,000; Rg2=25,000; prr=1000 pps; tp=2±0.2 us; Zo=12.5; RL=7.5; tr=0.2 us (max); tf=0.4 us(max); Note 20			t:	200	—	—	—	—	hrs
4.11.4 (F-4b)	Continuous Life Test End Points:	Average Life = 90% minimum; Pulse Emission Continuous Life Test Conditions; Note 12			etd: ib:	— 16	— —	— —	— —	100 —	v a
4.11.7	Heater Cycling Life Test:	Ef=7.5V; Eb=Ecl=Ec2=0; Ehk=-100 Vdc; Note 4				2000	—	—	—	—	cycles
—	Heater Cycling Life Test End Point:	Heater-Cathode Leakage			Ihk:	—	—	—	—	20	μAdc

APPROVED 5 Feb 1959

Note 1: Averaged over any interval of 30 seconds maximum.

Note 2: After the completion of a pulse, a 20 us delay is required before a positive voltage of more than 10 v is applied to the tube.

Note 3: The miniature electron tube described in this acceptance specification is intended for use in high quality electronic equipment. Sockets used with these tubes shall meet all requirements outlined in MIL specifications covering miniature electron tube sockets. The wiring of sockets in equipment using these tubes shall include the use of wiring plugs. Connections made to socket contacts shall not result in setting up stresses which restrict the float section of the socket contacts.

Note 4: Refer to Section 5 of Inspection Instructions for Electron Tubes for acceptance Sampling of Reliable Tubes.

Note 5: Connect Pins 5 and 7 to Pin 2.

Note 6: Not more than 10% of the tubes tested shall fail this test.

Note 7: Tubes for Shock Test may be molded in Montan Wax within a steel cylinder that is rigidly mounted on the shock table or as an alternative, may be mounted in test clamp 183-JAN.
The acceptance sampling procedure for Shock Testing shall be in accordance with Section 5 "Inspection Instructions for Electron Tubes." After Shock or Fatigue tests, tubes shall meet Post Shock and Fatigue End Point requirements, as applicable; and , in addition, the tubes shall not show permanent shorts or open circuits when tested per Paragraph 4.7 (F-1e) MIL-E-IB after shock tests.

Note 8: All test items which are specified with an AQL = 0.65% shall be combined as one group which shall meet an AQL of 1%.

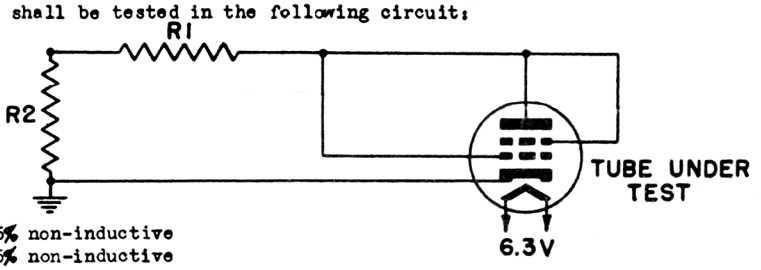
Note 9: Use miniature steatite socket with grounded shield base. Shield the plate power supply. Use short shielded plate and grid leads. Plate and grid resistors shall be non-inductive. Connect the grid resistor directly at the socket.

Note 10: Increase Ebb supply slowly and read Ebb at which conduction occurs.

Note 11: No voltages shall be applied to tube for 20 minutes minimum preceding this test.

Note 12: Thirty (30) seconds shall be the maximum time under test conditions before reading ib. There shall be no evidence of amplitude jitters.

Note 13: The tube shall be tested in the following circuit:



R1=10 ± 5% non-inductive
R2=15 ± 5% non-inductive

(a) A Dummy calibrating tube containing a 5± 5% ohm non-inductive resistance shall be used for calibration and maintenance. The calibrated pulse voltage amplitude shall be within the specified values over 80% of the top portion of the pulse. No portion shall exceed 198 volts maximum amplitude.

(b) The tube shall be preheated in a test socket for a minimum of five seconds immediately before application of pulse voltage. The time between preheating and test shall not exceed five seconds.

(c) The maximum testing time is three seconds.

APPROVED 5 Feb 1953 REVISED

Note 14: Read electrode insulation between G2 and plate with all other elements floating.

Note 15: Preheat using Ef = 6.7V.

Note 16: Preheat for 15 minutes under the following conditions: Ef = 7.0V; Epp=220 Vac; Ecc1=Ecc2=0;Rg1=10 Meg; Ib = 100 mAdc. Two (2) seconds shall be the maximum time between preheat and test.

Note 17: Egg1 supply shall be in phase with Epp supply and Egg2 supply 180°C out of phase with Epp supply.

Note 18: Vary Egg2 supply and read Egg2 at which conduction occurs.

Note 19: The 500 hour life test limits shall be used for acceptance or rejection of lots.

Note 20: Adjust epy for ib=20 a initially and maintain this epy value throughout the life test.

Note 21: All test items which are specified with an A Q L of 2.5% shall be combined as one group which shall meet an A Q L of 1%.

Note 22: All test items which are specified with an AQL of 6.5% shall be combined as one group which shall meet an A Q L of 10%.

Note 23: Referenced specification shall be of the issue in effect on the date of invitation for bids.

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