

VALVE ELECTRONIC CV2412.

ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

Specification AD/CV2412 Issue No. 1 dated 1.1.57 To be read in conjunction with K1006	<u>SECURITY</u>	
	<u>Specification</u> Unclassified	<u>Valve</u> Unclassified

<u>TYPE OF VALVE:</u> Magnetron, Pulse Type.	<u>MARKING</u>
<u>PROTOTYPE:</u> 4J50 but with different frequency range.	See K1001/4. Additional Marking:- Serial No.

<u>RATINGS</u> (All limiting values are absolute.)					<u>CONNECTIONS AND DIMENSIONS</u>			
Heater Voltage	(V)				See drawings on Pages 6 & 7			
Heater Current	(A)							
Peak Anode Current (A)	27.5	18.0	14.5	9.5	B,C			
Max. Mean Power Input (W)	635	380	635	380				
Max. Peak Power Input (kW)	635	380	320	190				
Max. Duty Cycle	.001	.001	.002	.002				
Max. Pulse Duration (μS)	0.3 to 1.2	6.0	0.3 to 1.2	6.0				
Max. Voltage Rate of Rise (kV/μS)							110	
Min. Voltage Rate of Rise (kV/μS)							70	
Min. Cathode Heating Time (Secs.)							240	
Max. Anode Temperature (°C)					150			
Nominal Operating Frequency (Mc/s)					9642			
					D			

- NOTES
- A. For input powers greater than 100W, it is essential to reduce the heater voltage according to the following formula:

$$V_h = 14 \frac{(1 - W_{input})}{1120}$$
 The heater current surge shall be limited to 4 times normal operating current.
 - B. The maximum values of peak power input, mean power input and peak anode current for pulse lengths between 1.2 and 6.0 μS are to be determined by linear interpolation.
 - C. Maximum values of peak power input between 0.001 and 0.002 are to be determined by linear interpolation.
 For values of Duty Cycle less than 0.001, the value of peak power input shall not exceed the rating determined at 0.001 duty cycle for the applicable value of pulse width.
 - D. Forced air cooling shall be provided to maintain the cathode terminal temperature below 165°C.
 - E. The product of pulse length in seconds and FRF in cycles per second must not exceed 0.002 at maximum input power. The valve shall not be operated longer than 6 μS in any 100 μS interval.
 - F. The valve shall not be operated at maximum peak input power at pressure less than 600 mms Hg.
 - G. No technical information shall appear on the valve or packaging.

Z.13608.R.

CV2412/1/1

Description: Magnetron, Pulse Type, Integral Magnet
 Ratings: Simultaneous Operating Conditions

	Ef	ib	pi	Pi	Du	tp	rrv	Anode T	tk
Absolute	V	a	kw	W	—	us	kv/us	°C	sec
Maximum:	Note 1e	27.5	635	635	.001	.3-1.2	110	150	—
Maximum:		18	380	380	.001	6.0	110	150	—
Maximum:		14.5	320	635	.002	.3-1.2	110	150	—
Maximum:		9.5	190	380	.002	6.0	110	150	—
Minimum:		—	—	—	—	—	70	—	240

- Notes: (a) Maximum values of pi, Pi and ib for pulse durations between 1.2 and 6.0 us are to be determined by linear interpolation.
 (b) Maximum values of pi for duty cycle between .001 and .002 are to be determined by linear interpolation. For values of duty cycle less than .001, the value of pi shall not exceed the rating determined at .001 duty cycle for the applicable value of pulse width.

Pulsing Service: Notes 1 and 2

Ref.	Test	Conditions	Min.	Max.
D-2	Qualification Approval:	Required for JAN Marking		
F-5h	**Salt Spray Corrosion:	Omit		
F-2	Electrode Insulation:	Omit		
F-3	Holding Period:	t=168 hours		
F-6a	Drop:	Note 7		
F-6b(1)	*Vibration:	No voltages; t=60; F=25; Note 7		
F-6b(2)	**Vibration:	No voltage; t=60; F=50; G=10		
F-5d	Dimensions:	Per Outline		
E-7c	Marking:			
F-5n	Pressurizing	40 to 45 lbs/sq. in. abs.; input & output assemblies		
F-6i	Heater Current:	Ef=13.75V	If: 3.00	3.75 A

<u>Ref.</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>
F-10e	<u>Oscillation (1)</u>	Note 3, 4		
F-10e(2)	Heater:	tk=240(max.);Note 1e		
F-10e(3)	Pulse Characteristics:	tp=0.9 to 1.1us rrv=110kv/us(min.) Dum.001		
F-10e(4)	Average Anode Current:	Ib=27.5 mAdc		
F-10e(5)	Pulse Voltage:		epy: 20.0	23.0 kv
F-10e(6)	Power Output (A):	t=300(max.)	Po: 225	— W
F-6h(3)	Frequency:	T of anode block Approx. 100°C.	F: 9580	9705 Mc
F-10e(8)	R.F. Bandwidth:		Bandwidth: —	3.0 Mc
F-10k	Pulling Factor:		ΔF: —	15 Mc
—	Stability:	Note 5	Ares: —	0.25 %
F-5p	**Thermal Factor		ΔF/ΔT: —	.25 mc/°C
F-10e	<u>Oscillation (2)</u>	Note 3,4		
F-10e(2)	Heater:	tk=240(max.);Note 1e		
F-10e(3)	Pulse Characteristics:	tp=5.0 to 6.0us rrv=110kv/us(min.); tf=2.4us(max.); Dum.001		
F-10e(4)	Average Anode Current:	Ib=18 mAdc		
F-10e(6)	*Power Output (A):	t=300(max.)	Po: 140	— W
F-10e(8)	*R.F. Bandwidth:		Bandwidth: —	1.0 Mc
—	† Stability:	Note 5, 6	Ares: —	0.25 %
F-5q	*Low Temperature Operation:	tk=240(max.);		

<u>Ref.</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>
F-10e	<u>Oscillation(3)</u>	Notes 3, 4		
F-10e(2)	Heater:	tk=240(max.); Note 1e		
F-10e(3)	Pulse Characteristics:	tp=2.7 to 3.3 us rrv=110kv/us(min.); Du=.001		
F-10e(4)	Average Anode Current:	Ib=23.5 mA dc		
F-10e(6)	*Power Output(A):	t=300(max.)	Po: 185	--- W
F-10e(8)	*R.F. Bandwidth:		Bandwidth: ---	1.0 Mc
---	*Stability:	Note 5	Arcs: ---	0.25%
F-4	Life Test:	Oscillation (3); σ=1.50; Group D: Note 8	t: 250	--- hrs.
F-4b	Life Test End Point:	Oscillation (3)	Po: 140	--- W
			F: 9580	9705 Mc
			Bandwidth: ---	1.5 Mc
			Stability Arcs: ---	0.5%

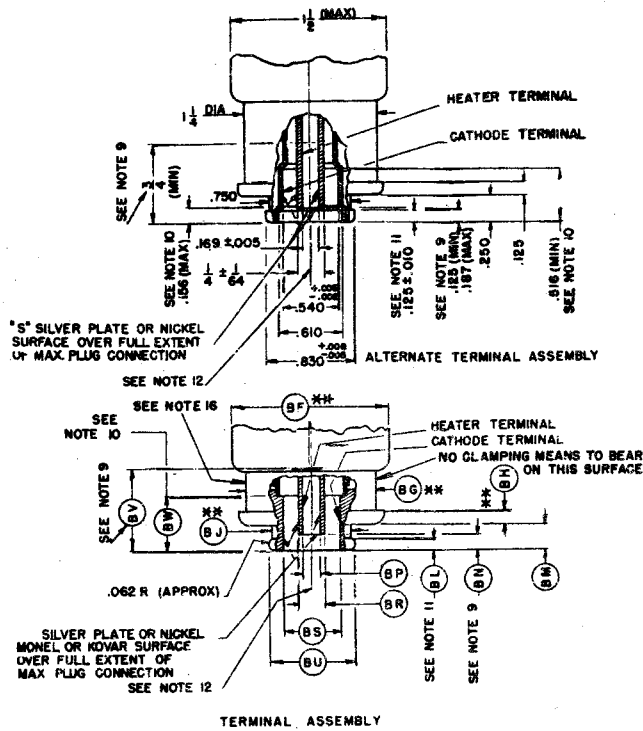
- Note 1: (a) The tube shall not be operated at maximum peak input power at pressure less than 600 mmHg.
 (b) The tube shall not be operated longer than 6 us in any 100 us interval.
 (c) Adequate means shall be provided to limit the temperature of the cooling fins and to maintain the cathode terminal temperature below 165°C maximum as measured along dimension BH of the outline drawing.
 (d) The product of pulse duration in seconds and the pulse recurrence rate in cycles per second must not exceed .002 at maximum peak input power.
 (e) The pulse recurrence rate must be greater than 175 pps. During high voltage pulsed operation, it is essential to reduce the heater voltage according to the following schedule:

Average Power input 0-100 watts, Ef=13.75 Volts
 For Pi greater than 100 watts, Ef=14 (1 - $\frac{Pi}{1120}$)

The filament voltage should be applied gradually when putting tube into operation, or some other equivalent means used to limit surge current to less than four times normal current.

- Note 2: For conditions of operation not included in the maximum ratings, the equipment designer shall confer with manufacturer through the appropriate Service.

- Note 3: The termination of the magnetron during this test shall be equivalent to a waveguide line with a VSWR not greater than 1.05 except where specifically noted.
- Note 4: A pulser of the discharging network type shall be employed for this measurement.
- Note 5: The tube shall be operated into a transmission line with a VSWR of 1.5 to 1 adjusted in phase to produce maximum instability. The tube shall be considered stable when it shows less than the maximum allowable percentage of arcs during the last five minute interval of a test period of fifteen minutes. The percentage of arcs is defined as the number of arcs in the five minute interval divided by the total number of magnetron pulses during that interval. Arcs shall be recorded by an electronic counter which is adjusted to respond to 10% above operating peak current.
- Note 6: This measurement shall be performed as the first test following the holding period.
- Note 7: On evidence of satisfactory quality, the inspector may limit this test to ten tubes per month when the tube is in continuous production.
- Note 8: The load shall be a transmission line of VSWR 1.5 to 1 with the phase varying through 1 cycle of 360 electrical degrees each 15 minutes.



NOTES:

- ** 1. ALL METAL SURFACES COVERED BY BLACK FINISH EXCEPT THOSE MARKED S.B.D. ("S" SHALL BE SILVER, NICKEL PLATED OR BRASS SURFACES)
2. HERMETIC CONNECTIONS CAN BE MADE TO SURFACE "D".
3. THE AXIS OF THE CATHODE TERMINAL SHALL BE WITHIN A RADIUS OF $\frac{1}{8}$ OF THE SPECIFIED LOCATION. (NOTE 4 APPLIES)
4. THE LIMITS INCLUDE ANGULAR AS WELL AS LATERAL DEVIATIONS.
- * 5. ALL POINTS ON THE MOUNTING SURFACE SHALL BE WITHIN .005 OF REFERENCE PLANE I
- ** 6. DIMENSIONS WITHOUT LIMITS ARE FOR EQUIPMENT DESIGN AND QUALIFICATION APPROVAL ONLY AND NEED NOT BE CHECKED.
- * 7. WITH THE FLANGE ON A PLANE SURFACE, A .005 THICKNESS GAUGE $\frac{1}{8}$ WIDE SHALL NOT ENTER.
8. ANY PORTION OF THE ASSEMBLY EXTENDING BELOW REFERENCE PLANE I SHALL BE WITHIN A $\frac{1}{8}$ RADIUS OF THE SPECIFIED AXIS OF THE INPUT.
9. THESE DIMENSIONS DEFINE THE EXTREMITIES OF THE CYLINDRICAL SECTION GIVEN BY THE "BP" DIMENSION.
10. THESE DIMENSIONS DEFINE THE EXTREMITIES OF THE CYLINDRICAL SECTION GIVEN BY THE "BS" DIMENSION.
- ** 11. NO CLAMPING MEANS TO BEAR BEYOND THIS DIMENSION.
12. THE HEATER TERMINAL SHALL BE CONCENTRIC WITH THE CATHODE TERMINAL WITHIN .010
13. **WARNING - MAINTAIN MINIMUM CLEARANCE 2 INCHES BETWEEN THIS MAGNET AND MAGNETIC MATERIAL (MAGNETS, STEEL TOOLS, PLATES, ETC.).**
- ** 14. THE OPENING IN THE WAVEGUIDE SHALL BE ENCLOSED BY A DUST COVER WHEN TUBE IS NOT IN USE.
15. MEANS OTHER THAN SOFT SOLDER SHALL BE USED FOR MECHANICAL STRENGTH.
16. THE INCLUSION OF A CYLINDRICAL RIB $\frac{1}{8}$ WIDE, 1.312 ± .018 DIAMETER WITH CENTER LOCATED $\frac{1}{8}$ FROM THE BOTTOM EDGE OF THE FLANGE MAY BE USED AS AN ALTERNATE DESIGN.

DIMENSION	DESIGN TEST	QUALIFICATION APPROVAL TEST	PRODUCTION TEST	REMARKS
A		4.000		
B		1 1/2		
C		1 1/2		
D		2		
E		2		FLANGE
F			1.230	
G		2		
H		3 1/2		} MAX
J		7 1/2		
K		3 1/2		
L		2 1/2		
N		1.830		
P			1.474 ± .004	
R			737 ± .005	
S		1 1/2 R		
T		.497		
V		2 R		
W		1 1/2 R		
Y		2 1/2		
Z			1.250	
AB		1 1/2		MIN GLASS LENGTH
AC	3 1/2			MAX
AD			1.553 ± .020	
AE	3 ± 1/32			
AF			2 1/2 ± 1/16	
AG		1 1/2 ± 1/32		
AH		1 1/2 ± 1/32		
AJ		1.122		
AK			.676 ± .005	
AL			1.352 ± .004	
AM		1.830 ± .010		
AN			2.500 ± .010	
AP		1 1/2 R		
AR		.291 ± .005 DIA		
AU	3 1/2			MAX
AV			.907 ± .025	
AW	3 1/2			} MAX
AX	3 1/2			
AY	2 1/2			
AZ			1.500	
BA	3.000			} MAX
BC	2 1/2			
BD	1 1/2			
BE			3.000 ± .00	
BF		1 1/2		MAX
BG		1 1/2 DIA		
BH		.125		
BJ		750 DIA		
BL			.125 ± .010	
BM			.250	
BN			.125	MIN
BP			.169 ± .005	MAX
BR			1 ± .01	
BS			.540 ± .005	
BU			.830 ± .005	
BV			3 ± .005	MIN
BW			.516	MIN
BX	1 1/2 DIA			MAX

DIMENSIONS AND NOTES MARKED * ARE DESIGN TESTS. DIMENSIONS AND NOTES MARKED ** ARE QUALIFICATION APPROVAL TESTS. ALL OTHER DIMENSIONS AND NOTES ARE PRODUCTION TESTS.

