

CV6208

Specification AD/CV6208 Issue No. 1 dated 14.12.67 To be read in conjunction with K1001			<u>SECURITY</u> <u>Specification</u> <u>Valve</u> Unclassified      Unclassified																																																																	
<u>TYPE OF VALVE</u> Travelling-wave tube power amplifier X-band  <u>CATHODE</u> Indirectly heated  <u>ENVELOPE</u> Packaged in a periodic permanent magnet focussing system.  <u>PROTOTYPE</u> E.3084			<u>MARKING</u>  See K1001/4 Also Note C and K  <u>BASE</u>  Plessey UK-AN-8000-20-27P 14 pin																																																																	
<u>RATING</u>  All limiting values are absolute and non-simultaneous			<u>CONNECTIONS</u>  <u>PIN LETTER</u> A    Black-collector and capsule body - E B    N.C. C    Blue Grid 2 - g2 D    N.C. E    Green Grid 1 - g1 F    N.C. G    Yellow cathode heater - kh H    Brown heater - h I    N.C. J    Orange helix - hel K    N.C. L    N.C. M    N.C. N    N.C.																																																																	
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<u>TYPICAL WORKING CONDITIONS</u> <table><tr><td>Heater Voltage</td><td>(V)</td><td>4.5±5%</td><td>A</td></tr><tr><td>Heater Current</td><td>(A)</td><td>0.8-1.4</td><td></td></tr><tr><td>Grid 1 Voltage</td><td>(V)</td><td>0- -30</td><td>B C D E</td></tr><tr><td>Grid 2 Voltage</td><td>(V)</td><td>450-700</td><td>B D</td></tr><tr><td>Grid 2 Current</td><td>(mA)</td><td>0-1.0</td><td></td></tr><tr><td>Helix Voltage</td><td>(kV)</td><td>2.2-2.6</td><td>B C</td></tr><tr><td>Helix Current</td><td>(mA)</td><td>0-2.0</td><td></td></tr><tr><td>Collector Voltage</td><td>(kV)</td><td>2.35-2.75</td><td>B</td></tr><tr><td>Collector Current</td><td>(mA)</td><td>6-8</td><td>C</td></tr><tr><td>Frequency Range</td><td>(GHz)</td><td>8.5-9.0</td><td></td></tr><tr><td>Cold Attenuation</td><td>(dB)</td><td>40</td><td></td></tr><tr><td>Power Output (Saturated)</td><td>(W)</td><td>1.0-1.6</td><td></td></tr><tr><td>High Level Noise Output</td><td>(dB)</td><td>55</td><td>F</td></tr><tr><td>High Level Noise Figure</td><td>(dB)</td><td>25</td><td></td></tr><tr><td>V.S.W.R. (Input)</td><td>(Ratio)</td><td>&lt;3.0:1</td><td>G</td></tr><tr><td>V.S.W.R. (Output)</td><td>(Ratio)</td><td>&lt;3.0:1</td><td>G</td></tr></table>			Heater Voltage	(V)	4.5±5%	A	Heater Current	(A)	0.8-1.4		Grid 1 Voltage	(V)	0- -30	B C D E	Grid 2 Voltage	(V)	450-700	B D	Grid 2 Current	(mA)	0-1.0		Helix Voltage	(kV)	2.2-2.6	B C	Helix Current	(mA)	0-2.0		Collector Voltage	(kV)	2.35-2.75	B	Collector Current	(mA)	6-8	C	Frequency Range	(GHz)	8.5-9.0		Cold Attenuation	(dB)	40		Power Output (Saturated)	(W)	1.0-1.6		High Level Noise Output	(dB)	55	F	High Level Noise Figure	(dB)	25		V.S.W.R. (Input)	(Ratio)	<3.0:1	G	V.S.W.R. (Output)	(Ratio)	<3.0:1	G		
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			<u>DIMENSIONS</u>  See Outline drawing Page 7																																																																	
			<u>MOUNTING POSITION</u>  Any (But see Note H and L)																																																																	
			<u>WEIGHT</u>  5½ lb																																																																	

NOTES

- A. The cathode pre-heating time is 3 minutes.
- B. All voltages are measured relative to the cathode. The collector is connected to the body which should be earthed. Helix voltage should never exceed collector voltage. Grid 1 voltage should never be positive.
- C. The operating Grid 1 and helix voltages and collector current are marked on each valve.

Installation accuracy shall be as follows:-

Helix Voltage	$\pm 1\%$
Grid 1 Voltage	$\pm 15\%$
Collector Current	$\pm 2\%$

- D. It must be possible to reduce this voltage to zero.
- E. This voltage must be available at all values of cathode current.
- F. The high level noise figure is measured at 9.0 GHz and is the difference of the high level noise output as measured in Test g and the gain calculated from Test f measurements.
- G. The valve must be operated into an r.f. circuit presenting a v.s.w.r. of less than 5.0:1.
- H. The valve is designed to be mounted horizontally and so that air can circulate freely over the cooling fins.

J. The Setting Up Procedure is as follows:-

- (1) Turn up or switch on the heater supply to the correct voltage ensuring that the surge current does not exceed 3 amps. Wait for at least 3 minutes.
- (2) Set G1 Voltage to the value indicated on the valve.
- (3) Set the collector voltage to  $V_{hel} + 150$  volts. The value of  $V_{hel}$  is indicated on the valve.
- (4) Set the helix voltage to the indicated value.
- (5) Increase G2 voltage until  $I_{col}$  reaches the operating value marked on the valve.
- (6) Readjust  $V_{g1}$ ,  $V_{col}$  and  $V_{hel}$  if necessary.
- (7) Apply r.f. power input.

To switch off

- (1) Reduce  $V_{g2}$  to zero.
- (2) Switch off  $V_{col}$ ,  $V_{hel}$  and  $V_{g1}$  together or in any order.

NOTES (Cont'd)

- K. Warning labels shall be affixed stating:-
- (1) That the valve must be kept at least 8" from magnets.
  - (2) That the valve must only be moved by the centre section.
- L. The valve may be bolted to a steel chassis permanent damage may be caused if the valve is handled by its ends during installation.
- M. NATO Stock No. 5960-99-037-5582

TESTS

To be performed in addition to those applicable in K1001

<u>TEST CONDITIONS - UNLESS OTHERWISE SPECIFIED</u>								
$V_h$ (V)	$V_{col}$ (V)	$V_{hel}$ (kV)	$V_{g1}$ (V)	$I_{col}$ (mA)	VALUES MARKED ON VALVE			
4.5	$V_{hel}+150$							
	Test	Test Conditions	AQL %	Insp. Level	Sym- bol	Limits		Units
						Min.	Max.	
a	Heater Current	No voltages except $V_h$ Note 1		100%	$I_h$	0.8	1.4	A
b	Grid 2 Voltage	At specified operating conditions Note 2		100%	$V_{g2}$	350	700	V
c	Grid 2 Current	As (b)		100%	$I_{g2}$	—	1.0	mA
d	Helix Current	As (b)		100%	$I_{hel}$	—	1.0	mA
e	Hot v.s.w.r.	As (b) Measured over frequency range 8.5-9.5 GHz  (a) Input (b) Output		100%		— —	3.1 3.1	Ratio Ratio
f	R.F. Output Power	As (b) Measure at 8.5 GHz and 9.0 GHz with 250 $\mu$ W drive $V_{hel}$ adjusted for max. power		100%	$P_o$	1.0	1.6	W
g	High level noise output	As (f) at 250 $\mu$ W drive Note 3		100%		—	60	dB
h	High level noise figure	As (g) Note 3		100%		—	30	dB
j	Life	Note 4		SEE NOTE 4				
k	Shock	Note 5		QA		NOTE 6-7		
l	Vibration	Note 8		QA		NOTE 6-7		

NOTES

1. The surge current shall not exceed 3 amps.
2. During adjustment and test the helix current shall not exceed 2 mA.
3. The noise output is measured by comparing the tube noise with that from a standard noise source the detector being a broadband crystal and a receiver having a bandpass of 7-50 MHz. The high level noise figure is derived by subtracting the gain of the tube at 250  $\mu$ W drive from the high level noise output (Test g).
4. LIFE TEST
  - (a) The sample size shall be as follows:-

<u>Lot Size</u>	<u>Sample Size</u>
1-25	1
26-50	2
51-100	3
101 or greater	2%

The manufacturer may test additional samples at his discretion.

- (b) The criterion of acceptance shall be that the average life of the sample shall be at least 500 hours.
  - (c) In the event of a failure the Q.A. Authority shall be notified.
  - (d) The end of life is reached when after adjustment of voltages within the specified limits the valve fails to meet the specification except that the level of r.f. power, noise and gain may have deteriorated by 3 dB.
5. Subject the operating tube with no r.f. input and at the prevailing room temperature to  $\frac{1}{4}$  period sinusoidal shock pulses of  $16.5 \pm 1$  ms duration as indicated below.

<u>No. of shocks in each direction</u>	<u>Shock Level</u>	<u>Direction</u>
3	8G	Along the axis of the tube in 2 directions.
3	24G	Perpendicular to the axis of the tube. Parallel to and towards the waveguides.
3	24G	Perpendicular to the axis of the tube. Perpendicular to and towards the face on which the power connector is mounted.
3	35G	Perpendicular to the axis of the tube. Perpendicular to and towards the base plate.
3	35G	Perpendicular to the axis of the tube. Parallel to the waveguides and towards the face opposite the waveguides.

NOTES

Before and after the test perform Tests f, g and h, there shall be no change greater than the limits of measurement error.

6. Following the test the tube shall meet the limits of Tests a, b, c, d and e.

7. Measurement error is defined as:-

Output Power  $\pm 0.2W$

Noise Output  
and

Noise Figure  $\pm 2$  dB

8. (a) Vibration Endurance Test

Vibrate the non-operating tube as follows:-

<u>Frequency</u>	<u>Amplitude</u>	<u>Time</u>
7 Hz	$\pm 0.010''$	1 hour
25 Hz	$\pm 0.005''$	1 hour

Follow immediately by

(b) Resonance Search Test

The vibration amplitude shall be swept from  $\pm 0.25''$  at 5 Hz to  $\pm 0.002''$  At 30 Hz and back again. The sweep in each direction shall be  $\geq 15$  mins and  $\leq 30$  mins. Intermediate amplitudes shall be estimated by drawing a straight line on a curve of linear amplitude against log frequency (e.g. at 8 Hz the amplitude is  $0.011''$ ).

