

ELECTRONIC VALVE SPECIFICATIONS  
SPECIFICATION CV.7108-9  
ISSUE NO. 1 DATED 10.2.1961  
AMENDMENT NO. 1

Page 1, Marking.

Amend to read "CV number and Factory Code; and, if possible the Date Code".

Page 2, Group C, Forward Current.

Delete 5 mA in Min column  
Insert 4 mA in Min column

Page 3, Group F, Post Storage Tests.

Amend to read "Repeat Group B tests to Group F limits".

Ministry of Aviation/RRE.

December, 1963.

152573

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV7108-9

ISSUE 1. DATED 10th FEBRUARY 1961

AMENDMENT NO. 2.

Page 1. Delete the word "Germanium" from Type of Valve.

Ministry of Aviation/R.R.E.

February, 1965.  
(310263)

Specifications: MOA/CV7108/9	<u>SECURITY</u>
Dated: 10th February 1961. Issue 1.	Specification                      Valve
To be read in conjunction with K1007	Unclassified                      Unclassified

\_\_\_\_\_ > Indicates a change

<b>TYPE OF VALVE:</b> Germanium coaxial mixer crystal diode		<b>MARKING</b>	
<b>PROTOTYPE:</b> CV7108 - VX3303 CV7109 - VX3304		C.V. Number and if possible, the Factory Code and Date Code - see K1007/4	
<b>RATINGS and CHARACTERISTICS</b> (Not for inspection purposes) ALL limiting values are absolute		<b>DIMENSIONS</b> As K1007/A1/012A & 12B	
		See Note A	
	Note		
Max. operating temperature	(°C)	100	
Max. storage temperature	(°C)	100	
Min. storage temperature	(°C)	-55	
Max. burnout, (a) r.f. spikes	(ergs)	0.3	B
(b) d.c. spikes	(ergs)	0.1	
Max. pulse input (r.f.)	(W)	3	
Max. Load resistance	(ohms)	20	C
Max. forward resistance (at 0.5 V)	(ohms)	200	D
Min. reverse resistance (at -0.5 V)	(kohms)	10	D
Frequency range: up to	(Mc/s)	12	E
Max. noise factor (a) up to 25°C	(dB)	8.5	F
(b) up to 100°C	(dB)	10.5	F
Typical operating rectified current	(mA)	0.6	G
<b>NOTES</b>			
A. When plugged into a holder contact is made to the open face of the outer. The end of the pin socket of the holder must not exceed 0.247 inches from the open end of the diode.			
B. For min. of 90% survival, i.e. due to transmitter spikes. The user is warned that the crystal can also be damaged by excessive voltage of an oscillatory or transient nature.			
C. This includes resistance of meter and that of any filter network in series with diode.			
D. It is recommended that the crystal diode is replaced in service when the d.c. characteristics fall outside either of these values.			
E. The nominal rectifier admittance at a plane 0.247 inches back from the open end of the diode (inside the body) at a rectified current of 0.8 mA is :-			
$\frac{1}{67} (0.8 + 0.2 j)$ mhos at 9375 Mc/s.			
F. For i.f. amplifier noise factor of 2 dB. The overall noise factor applies when transmitter is operating i.e. temporary deterioration is negligible with these crystals.			
G. Rectified current for optimum performance depends on noise factor of i.f. amplifier and amount of local oscillator noise. With negligible local oscillator noise and i.f. noise factor of about 2 dB, the rectified current should be between 0.5 and 1.0 mA.			
H. The Joint Services Catalogue Numbers are :- CV7108: 5960-99-037-2226 CV7109: 5960-99-037-2227			

CV7108/9

GENERAL TEST CONDITIONS

TEMPERATURE : 15-30°C

SOURCE IMPEDANCE : V.S.W.R. 1.05 max. at signal and image frequencies

LOAD RESISTANCE : 15 ohms max.

TEST HOLDERS : Note 1

STANDARD : Note 2

K1007	Test	Test Conditions	AQL %	Insp. Level	Sym.	Limits		Units
						Min.	Max.	
	<u>GROUP A</u> - omitted							
	<u>GROUP B</u>							
5B.2	Reverse current	$V_r = -0.5$ V	0.65	II	I <sub>r</sub>	-	25	μA
5A.4	Noise Factor	Local Oscillator = 9,500 ± 500 Mc/s $I_o = 0.8 \pm .05$ mA i.f. amplifier noise factor = 2 dB Note 3	0.65	II	N	-	8.5	dB
	<u>GROUP C</u>							
5A.3	Rectifier Admittance (1)	$f = 9,375 \pm 25$ Mc/s r.f. power = 500 ± 15% μW	2.5	I	VSWR	-	1.43	Ratio
5A.3	Rectifier Admittance (2)	$f = 3,000 \pm 10$ Mc/s Note 1 r.f. power = 400 ± 15% μW	2.5	I	VSWR	-	2.0	Ratio
5A.5	i.f. impedance	$f = 9,375 \pm 100$ Mc/s L.O power = 500 ± 15% μW i.f. frequency = 45 ± 15 Mc/s Note 4	2.5	I	R <sub>if</sub>	250	450	ohms
	Forward current	$V_f = 0.5$ V	2.5	I	I <sub>f</sub>	5	-	mA
	<u>GROUP D</u>							
	Resistance to voltage breakdown (burnout)	r.f. level = 0.5 ergs Note 5	Note 6		N ΔN	- -	8.5 1.0	dB dB
	<u>GROUP E</u>							
10.2	TEMPERATURE CYCLING	Combined AQL 3 cycles: -55°C to +100°C	10		IC			
10.3.1.	CLIMATIC CYCLING	Duration 28 cycles			IC			
	<u>Post Temperature and climatic cycling tests</u>							
8	Inoperatives		6.5					
	Reverse current	As in Group B	6.5		I <sub>r</sub>	-	40	μA
	Noise factor	As in Group B Note 5	6.5		N ΔN	- -	8.5 1	dB dB
11.1	AXIAL TENSION	No voltages	6.5		IC			
11.3	FATIGUE	No. voltages			IC			

K1007	Test	Test Conditions	AQL %	Insp. Level	Sym.	Limits		Units
						Min.	Max.	
8	<u>Post fatigue tests</u>							
	Inoperatives		6.5					
	Reverse current	As in Group B	6.5		I <sub>r</sub>	-	40	$\mu$ A
	Noise factor	As in Group B	6.5		N	-	8.5	dB
11.4	SHOCK	Note 5 Hammer angle - 30 <sup>0</sup>			N		1	dB
				T.A.				
13	<u>GROUP F</u> LIFE	To be agreed			IA			
13.3	<u>Post life tests</u>							
8	Inoperatives		6.5					
	Reverse current	As in Group B	6.5		I <sub>r</sub>	-	40	$\mu$ A
	Noise factor	As in Group B	6.5		N	-	8.5	dB
		Note 5			$\Delta$ N	-	1	dB
13.4	STORAGE LIFE (1)	No voltages T <sub>amb</sub> = -55 <sup>0</sup> C t = 150 h			I			
13.5	STORAGE LIFE (2)	No voltages T <sub>amb</sub> = +100 <sup>0</sup> C t = 150 h			I			
	<u>Post storage tests</u>	Combined AQL for						
	Repeat Group B tests	(a) Storage Life (1) (b) Storage Life (2)	4.0 4.0					
5.3.2.11	<u>GROUP G</u> Retest after 28 days holding period							
8	Inoperatives		0.5%	100%				
	Noise Factor	As in Group B	2.0%	100%	N	-	8.5	dB

NOTES

1. All test and standard holders shall conform to RRE Drawing CTR213278 (9,375 Mc/s) or DTR217221 (3,000 Mc/s). The latter holder was designed for the CV2154/5 and is not a good match to the CV7108/9 crystals. The spread of admittance of these crystals in a holder designed for their use is better than 1.43 VSWR. Test holders should give the same VSWR as the appropriate standard holders within  $\pm 2\%$ .

Test and standard holders for use at 9,375 Mc/s may alternatively be tested as follows. The crystal shall be replaced by a 67 ohm coaxial line with matched termination and the admittance measured with respect to a reference plane corresponding to a short circuit at a plane within the crystal body 0.247 inches from the open end. The normalised admittance at  $9,375 \pm 25$  Mc/s shall then be within limits defined by the following co-ordinates:- 1.22 - .30j, 1.28 - .30j, 1.22 - .34j and 1.28 - .34j.

2. Crystals shall not be used as standards for measurement of any parameter, but may be used as transfer standards. The standard admittance shall be defined by holders supplied by the Approving Authority. Calibrated crystals will also be supplied for the noise factor test (Note 3).
3. The standard of reference shall be a noise tube type CV1881, assuming a noise level of 15.5 dB above thermal for a discharge current of 180 mA. Any approved method of measurement may be used with allowance for experimental error.
4. The standard of reference shall be a RC7K resistor within the range 330-390 ohms, mounted axially in a holder having the same socket dimensions as a CV7108, with lead lengths less than 0.125 inch. The resistance shall be assumed equal to the d.c. value. The limit may be increased to 550 ohms if an approved bridge method is used.
5. The limit applied shall be that which is more favourable to the crystal, i.e. a crystal that changes from say 6.6 dB to 8.4 dB is acceptable as is one that changes from say 8.3 dB to 9.3 dB.
6. The crystal diodes for subjecting to this test shall be obtained by either of the following methods:-

(a) 100 completed diodes selected at random from the diodes made from each ingot of semiconductor material which are satisfactory after Group B tests.

or (b) random slices from each ingot of semiconductor material are subjected to all normal processing and sufficient semiconductor elements, (wafers) are selected at random and assembled to provide 100 completed diodes satisfactory after Group B tests.

The burnout test of 5,000 pulses may be at a level of 0.5 erg r.f. or 0.16 erg d.c. (K1007/5A.2) at the discretion of the diode manufacturer.

If more than 50 diodes (of the 100 above) fail this test the ingot and all diodes subjected to the test shall be rejected.

Crystal diodes from an acceptable ingot which pass this test and are also satisfactory on Group B tests will be accepted for delivery but not for tests subsequent to Group B.