

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV.7328

ISSUE NO. 2, DATED 1ST MAY 1963

AMENDMENT NO. 1

Page 1

Mechanical Dimensions and Outlines

After 10.4.2.4. Add - except that dimension '1'  
shall be 1.4 inches (min).

Page 6

Sub Group 1. Physical Dimensions

After 10.4.2.4. Add - except that dimensions '1'  
shall be 1.4 inches (min).

Ministry of Aviation/S.R.D.E.

September 1963.

N.39984

ELECTRONIC VALVE SPECIFICATIONS  
SPECIFICATION CV7328  
ISSUE NO.2 DATE 1.5.1963  
AMENDMENT NO. 2

Pages 7 & 8, Table 2. Group B Inspection (contd.) amend to read:-

Examination or Test	Test Conditions		AQL %	Insp Level	Sym- bol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 8</u> Operating Life (1)	6.3	T <sub>amb</sub> at any single temperature between 25°C and 125°C with the corresponding P <sub>tot</sub> given by the derating curve on page 10. VCE = 30V(min) Duration 72 hrs min.		III				
<u>Post Operating Life (1) Test End Point</u>								
Collector Base Cut-off Current	7.2.5.1	As in Group A sub Group 2	0.65		I <sub>CBO</sub>	-	2	μA
Small Signal Short Circuit Forward Current Transfer Ratio	7.4.2	As in Group A Sub Group 2	0.65		h <sub>fe</sub>	64	300	

Amend "Post Test End Points for Sub Groups 2, 3, 7 and 8" by deleting "and 8".

Page 9: Table 3, Group C Inspection. Add Sub-Group 3 as follows:-

Examination or Test	Test Conditions		AQL %	Insp Level	Sym- bol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 3</u> Operating Life (2)	6.3	As for Operating Life (1)	4.0	IA				
See Note /	6.6	Duration 1000 hours min.						
	4.5.2.1.1.1							
<u>Post Operating Life (2) Test End Point</u>								
Collector Base Cut-off Current	7.2.5.1	As in Group A Sub Group 2			I <sub>CBO</sub>	2	-	μA
Small Signal Short Circuit Forward Current Transfer Ratio	7.4.2	As in Group A Sub Group 2			h <sub>fe</sub>	64	300	

Add Note

1. K1007, Section B, Clause 4.5.3.3. will not apply, however the Inspectorate will inform the Qualification Approval Authority if and when the requirements of Operation Life (2) have not been met.

MILITARY SPECIFICATION

**CV7328**

SEMICONDUCTOR DEVICE, TRANSISTOR TYPE

Description:- This specification covers the detail requirements for a Silicon NPN High Frequency Transistor and is in accordance with K.1007 except as otherwise stated.

Mechanical Dimensions and Outlines:- K1007, Section B, 10.3.1., 10.3.2.4., 10.4.1 and 10.4.2.4.

Connections:- Lead 1. Emitter, Lead 2. Base, Lead 3. Collector and Case.

Absolute Maximum Ratings:-

Rating	V <sub>CB</sub>	V <sub>CE</sub>	V <sub>EB</sub>	I <sub>C</sub>	I <sub>B(av)</sub>	I <sub>B(pk)</sub>	I <sub>E(av)</sub>	I <sub>E(pk)</sub>	P <sub>tot</sub>
Unit	V	V	V	mA	mA	mA	mA	mA	mW
Min	-	-	-	-	-	-	-	-	-
Max	60	45	6	50	15	50	65	150	400
Note	1	1	1						2

  

Rating	T <sub>opr</sub>	T <sub>stg</sub>	Shock	Vibration
Unit	°C	°C	g	g
Min	-55	-55	-	-
Max	+175	+175	1500	20
Note			3	

- Note 1 - d.c. or peak  
 Note 2 - See derating curve. Fig. 1. Page 10.  
 Note 3 - Duration 0.5 msec.  
 Note 4 - Commercial prototype 2S104.

# CV 7328

## Primary Electrical Characteristics:-

Characteristic	$I_{CBO}$ (1)	$I_{CBO}$ (2)	$I_{EBO}$	$V_{CE}$ (sat)	$h_{fe}$ (1)	$h_{fe}$ (2)	$f_T$	$C_{ob}$	
Unit	$\mu A$	$\mu A$	$\mu A$	V			Mc/s	pF	
Min	-	-	-	-	80	40	80	2	
Max	1.0	30	10	1.0	200	-	300	8	
Conditions	$T_{amb}$ °C	25	100	25	25	25	-55	25	25
	$V_{CB}$ V	60	60	-	-	-	-	-	5
	$V_{CE}$ V	-	-	-	-	5	5	5	-
	$V_{EB}$ V	-	-	6	-	-	-	-	-
	$I_C$ mA	-	-	0	10	-	-	-	-
	$I_E$ mA	0	0	-	-	5	5	5	0
	$I_B$ mA	-	-	-	2	-	-	-	-
	f Mc/s	-	-	-	-	-	-	30	1.0

## Reliability Assurance Requirements:-

Under discussion.

## Requirements

Marking K.1007 Section B, 1.3.4.

## Quality Assurance Provisions

Destructive Tests The tests listed in Table 2, Group B Inspection, Sub-Groups 2, 3 and 4, and Table 3, Group C Inspection Sub-Group 2 are considered destructive.

Group C Inspection This inspection shall be conducted on the initial lot, and thereafter every ninety days or every fifth lot, whichever occurs first.

## Preparation for Delivery

Packaging The devices shall be packed according to K.1007, Section A, 1.2(c).

## Joint Service Catalogue Number

5960-99-037-2893

This specification has been prepared by, and the Qualification Approval Authority is:-

Ministry of Aviation, Signals Research and Development Establishment,  
Christchurch, Hampshire, England.

1st May 1963

Page 3

**GROUP A INSPECTION**

**TABLE 1**

Examination or Test	K1007/ NATO Ref.	Test Conditions		AQL %	Insp. Level	Sym- bol	Limits		Units
		Specific Conditions					Min	Max	
<u>SUB GROUP 1</u> Visual and Mechanical Inspection.	5.1	Excluding Physical Dimensions		0.65	I				
<u>SUB GROUP 2</u> Collector - Base Cut-Off Current.	7.2.5.1	$V_{CB} = 60V$ $I_E = 0$		0.65	II	$I_{CBO}$	-	1.0	$\mu A$
Small Signal Short Circuit Forward Current Transfer Ratio.	7.4.2	$V_{CE} = 5V$ $I_E = 5mA$ $f = 1 Kc/s$				$h_{fe}$	80	200	
Transition Frequency.	7.5.2	$V_{CE} = 5V$ $I_E = 5mA$ $f = 30 Mc/s$				$f_T$	80	300	$Mc/s$
<u>SUB GROUP 3</u> Collector - Emitter Saturation Voltage.	7.3.3	$I_C = 10mA$ $I_B = 2mA$		2.5	I	$V_{CE} (sat)$	-	1.0	V
Emitter - Base Cut-Off Current.	7.2.6	$V_{EB} = 6V$ $I_C = 0$				$I_{EBO}$	-	10	$\mu A$

TABLE 1  
GROUP A INSPECTION (Cont'd)

Examination or Test	Test Conditions		AQL %	Insp. Level	Sym-bol	Limits		Units	
	K1007/ NATO Ref.	Specific Conditions				Min	Max		
SUB GROUP 4 Small Signal Short Circuit Forward Current Transfer Ratio. Collector - Base Cut-Off Current. Output Capacitance.	7.4.2	As in Sub-Group 2 $T_{amb} = -55^{\circ}C$	4.0	IA	$h_{fe}$	40	-		
	7.2.5.1	As in Sub-Group 2 $T_{amb} = +100^{\circ}C$				-	30		$\mu A$
	7.4.8	$V_{CB} = 5V$ $I_E = 0$ $f = 1 \text{ Mc/s}$				2	8		pF

TABLE 2      GROUP B INSPECTION  
 See Quality Assurance Provisions Page 3 Destructive Tests

Examination or Test	Test Conditions		AQL %	Insp. Level	Sym- bol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min	Max	
<u>SUB GROUP 1</u> Physical Dimensions	5.1	According to 10.3 and 10.4, drawings 10.3.2.4 & 10.4.2.4.	6.5	IC				
<u>SUB GROUP 2</u> Solderability	5.13		4.0	IA				
Temperature Cycling	5.5	-55°C to +150°C						
Moisture Resistance	5.3							
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1		4.0	I				
<u>SUB GROUP 4</u> Lead Fatigue	5.10.2	2 cycles	6.5	IA				
<u>SUB GROUP 5</u> Omitted.								
<u>SUB GROUP 6</u> Omitted.								



TABLE 2      GROUP B INSPECTION (Cont'd)

Examination or Test	Test Conditions		AQL %	Insp. Level	Sym- bol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min	Max	
<u>SUB GROUP 7</u> High Temperature Life (non-operating).	6.2.1	$T_{stg} = +150^{\circ}C$ Duration = 1000 hours.	4.0	I				
	6.6.1.2.2	$T_{stg} = -55^{\circ}C$ Duration = 1000 hours.						
	6.2.2	$T_{stg} = -55^{\circ}C$ Duration = 1000 hours.						
	6.6.1.2.2	$T_{stg} = -55^{\circ}C$ Duration = 1000 hours.						
<u>SUB GROUP 8</u> Operating Life	6.3	$T_{amb}$ at any single tempera- ture between $25^{\circ}C$ and $125^{\circ}C$ with the corresponding $P_{tot}$ given on the derating curve Page 10.	4.0	IA				
	6.5	$V_{CE} = 30V$ (min) Duration = 1000 hours.						
	6.6.1.1							
	6.6.1.2.2							

TABLE 2      GROUP B INSPECTION (Cont'd)

Examination or Test	Test Conditions		AQL %	Insp. Level	Sym- bol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min	Max	
<u>Post Test End Points</u> <u>for SUB GROUPS 2, 3,</u> <u>7 and 8.</u> Collector - Base Cut-Off Current. Small-Signal Short- Circuit Forward Current Transfer Ratio.	7.2.5.1	As in Group A, Sub-Group 2.			$I_{CBO}$	-	2	$\mu A$
	7.4.2	As in Group A, Sub-Group 2.			$h_{fe}$	64	300	

TABLE 3      GROUP C INSPECTION

See Quality Assurance Provisions Group C Inspection Page 3

Examination or Test	Test Conditions		AQL %	Insp. Level	Sym- bol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min	Max	
<u>SUB GROUP 1</u> Omitted.								
<u>SUB GROUP 2</u> Shock	5.17.1	Non-operating. 5 blows in each of four directions, three of which shall be mutually perpendicular. Two shall be opposite, namely toward the base and away from the base.	6.5	IA				
<u>Post Test End Points</u> Collector - Base Cut-Off Current.	7.2.5.1	As in Group A Sub-Group 2.			I <sub>CBO</sub>	-	2	μA
Small-Signal Short-Circuit Forward Current Transfer Ratio.	7.4.2	As in Group A Sub-Group 2.			h <sub>fe</sub>	64	300	

FIG. I.  
DERATING CURVE.

