

MILITARY SPECIFICATION

**CV 7451-54**

SEMICONDUCTOR DEVICE, TRANSISTORS  
 2N1479, 2N1480, 2N1481, 2N1482

Description:- This specification covers the detail requirements for Silicon NPN medium power transistors and is in accordance with K1007, Issue 3 except as otherwise stated.

Mechanical Dimensions and Outlines:- K1007, Section B. 10.3.2.2 and 10.4.2.2.

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

Absolute Maximum Ratings:-

Device	Rating	V <sub>CBO</sub>	V <sub>EBO</sub>	V <sub>CEO</sub>	V <sub>CEX</sub>	I <sub>CM</sub>	I <sub>EM</sub>	T <sub>stg</sub>	θ <sub>j-c</sub>	T <sub>opr</sub>	P <sub>c</sub>
	Unit	V	V	V	V	A	A	°C	°C/W	°C	W
CV7451 & 7453	Min	-	-	-	-	-	-	-55	-	-	-
	Max	60	12	40	60	1.5	1.0	+200	35	+200	5
CV7452 & 7454	Min	-	-	-	-	-	-	-55	-	-	-
	Max	100	12	55	100	1.5	1.0	+200	35	+200	5

Device	Rating	Shock	Vibration
	Unit	g	g
All	Max	1500	20
	Notes	A	

Note A: Duration 0.5 msec.  
 B: Commercial equivalents ZT1479 - ZT1482.  
 CV numbers run consecutively.

# CV 7451-54

## Primary Electrical Characteristics:-

Characteristic		$I_{CBO}$	$I_{EBO}$	$V_{CE}$ (sat)		$V_{BE}$	$h_{FE}$	$I_{CBO}$	$f_T$
Unit		$\mu A$	$\mu A$	V		V		mA	kc/s
CV7451 & 7452	Min	-	-			-	20	-	800
	Max	10	10	.75		1.5	60	0.75	-
CV7453 & 7454	Min	-	-			-	35	-	800
	Max	10	10	.75		1.5	100	0.75	-
CONDITIONS	$T_{case}$ °C	25	25	25	25	25	25	175	25
	$V_{CB}$ V	30						30	28
	$V_{CE}$ V						4.0		
	$V_{EB}$ V		12						
	$I_C$ mA		0	200	200	200	200		5.0
	$I_E$ mA		0					0	
	$I_B$ mA			20	10				

Reliability Assurance Requirements:- Under discussion

Requirements:-

CV7451-54

Marking: The device shall be marked as K1007. Section B 1.3.4.1.(a), (c), (d) and (f) as space permits, any other marking shall be on the pack.

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 device shall be packed according to K1007, Section A, 1.2(c).

Joint Service Catalogue Number:

CV7451	=	5960-99-037-3574
CV7452	=	5960-99-037-3575
CV7453	=	5960-99-037-3576
CV7454	=	5960-99-037-3577

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

Ministry of Aviation, Royal Radar Establishment, Malvern, Worcs. England.

TABLE 1 GROUP A INSPECTION

Examination or Test	TEST CONDITIONS		AQL %	Insp Level	Sym-bol	LIMITS		Units
	K1007/NATO Ref	SPECIFIC CONDITIONS				Min.	Max.	
<u>SUB GROUP 1</u> Visual and Mechanical Inspection	5.1	Excluding Physical Dimensions	0.65	II				
<u>SUB GROUP 2</u> Collector-Base Cut-off Current	7.2.5.1.	$V_{CB} = 30V$ $I_E = 0$	0.65	II	$I_{CBO}$	-	10	$\mu A$
Collector-Emitter Sustaining Voltage	7.2.2.2.1	$I_C = 50mA$ $I_B = 0$			$V_{CEO}$ (sust)	40	-	V
		$I_C = 0.25mA$ $V_{EB} = 1.5V$			$V_{CEX}$	55	-	V
Emitter-Base Cut-off Current	7.2.6	$V_{EB} = 12V$ $I_C = 0$			$I_{EBO}$	60	-	V
		$I_C = 200mA$ $V_{CE} = 4.0V$			$h_{FE}$	100	-	V
<u>SUB GROUP 3</u> Static Forward Current Transfer Ratio	7.3.4		2.5	I		-	10	$\mu A$
						20	60	
						35	100	

TABLE 1 GROUP A INSPECTION (cont'd)

Examination or Test	K1007/NATO Ref	TEST CONDITIONS		AQL %	Insp Level	Symbol	LIMITS		Units
		SPECIFIC CONDITIONS					Min.	Max.	
Collector-Emitter Saturation Voltage	7.3.3.	$I_C = 200\text{mA}$ CV7451 CV7452 CV7453 CV7454	$I_B = 20\text{mA}$ $I_B = 10\text{mA}$			$V_{CE}(\text{sat})$	-	0.75	V
Base-Emitter Voltage	7.3.2	$I_C = 200\text{mA}$ $V_{CE} = 4.0\text{V}$				$V_{BE}$	-	1.5	V
<u>SUB GROUP 4</u> Collector-Base Cut-off Current	7.2.5.1	$T = 175^\circ\text{C}$ $V_{CB} = 30\text{V}$ $I_E = 0$		4.0	IA	$I_{CBO}$	-	0.75	mA
Static Forward Current Transfer Ratio	7.3.4	$T = -55^\circ\text{C}$ $I_C = 200\text{mA}$ $V_{CE} = 4.0\text{V}$	CV7451 CV7452 CV7453 CV7454			$h_{FE}$	15 25	-	kc/s
Small-signal forward current transfer ratio	7.5.2	$I_C = 5.0\text{mA}$ $V_{CB} = 28\text{V}$				$f_T$	800	-	kc/s

TABLE 2 GROUP B INSPECTION  
 See Page 3, Quality Assurance Provisions, 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 drawings 10.3.2.2 and 10.4.2.2	6.5	1C				
<u>SUB GROUP 2</u> Solderability Temperature Cycling	5.13 5.5	-55°C to +200°C	4.0	1A				
Moisture Resistance	5.3.1							
<u>SUB GROUP 3</u> Vibration fatigue	5.15	Non operating	4.0	IA Note 1				
<u>SUB GROUP 4</u> Lead fatigue	5.10.2	3 cycles	6.5	IA				
<u>SUB GROUP 5</u> Omitted								
<u>SUB GROUP 6</u> Omitted								
<u>SUB GROUP 7</u> High Temperature Life (non-operating)	6.2.1 6.6.1.2.2	T <sub>stg</sub> = +200°C Duration 1000 hours	4.0	I Note 1				

TABLE 2 GROUP B INSPECTION (cont'd)

Examination or Test	K1007/NATO Ref	TEST CONDITIONS		AQL %	Insp Level	Sym- bol	LIMITS		Units
		SPECIFIC CONDITIONS					Min.	Max.	
SUB GROUP 8 Operating Life	6.3 6.6.1.2.2	<p><math>T_{amb}</math> at any single temperature between <math>+100^{\circ}C</math> and <math>+160^{\circ}C</math></p> <p><math>V_{CB}</math> = max for device</p> <p><math>P_C</math> = to wattage shown on derating curve for chosen temperature Fig. 1 Page 9.</p>	4.0	IA					
Post Test End Points for Sub Groups 2, 3, 7 and 8									
Collector-Base Cutoff Current	7.2.5.1	<p><math>V_{CB} = 30V</math></p> <p><math>I_E = 0</math></p>				$I_{CB0}$	-	30	$\mu A$
Static Forward Current Transfer Ratio	7.3.4	<p><math>V_{CB} = 4.0V</math></p> <p><math>I_C = 200mA</math></p>				$h_{FE}$	15	25	

**TABLE 3 GROUP C INSPECTION**

See Page 3, Quality Assurance Provisions, Group C Inspection

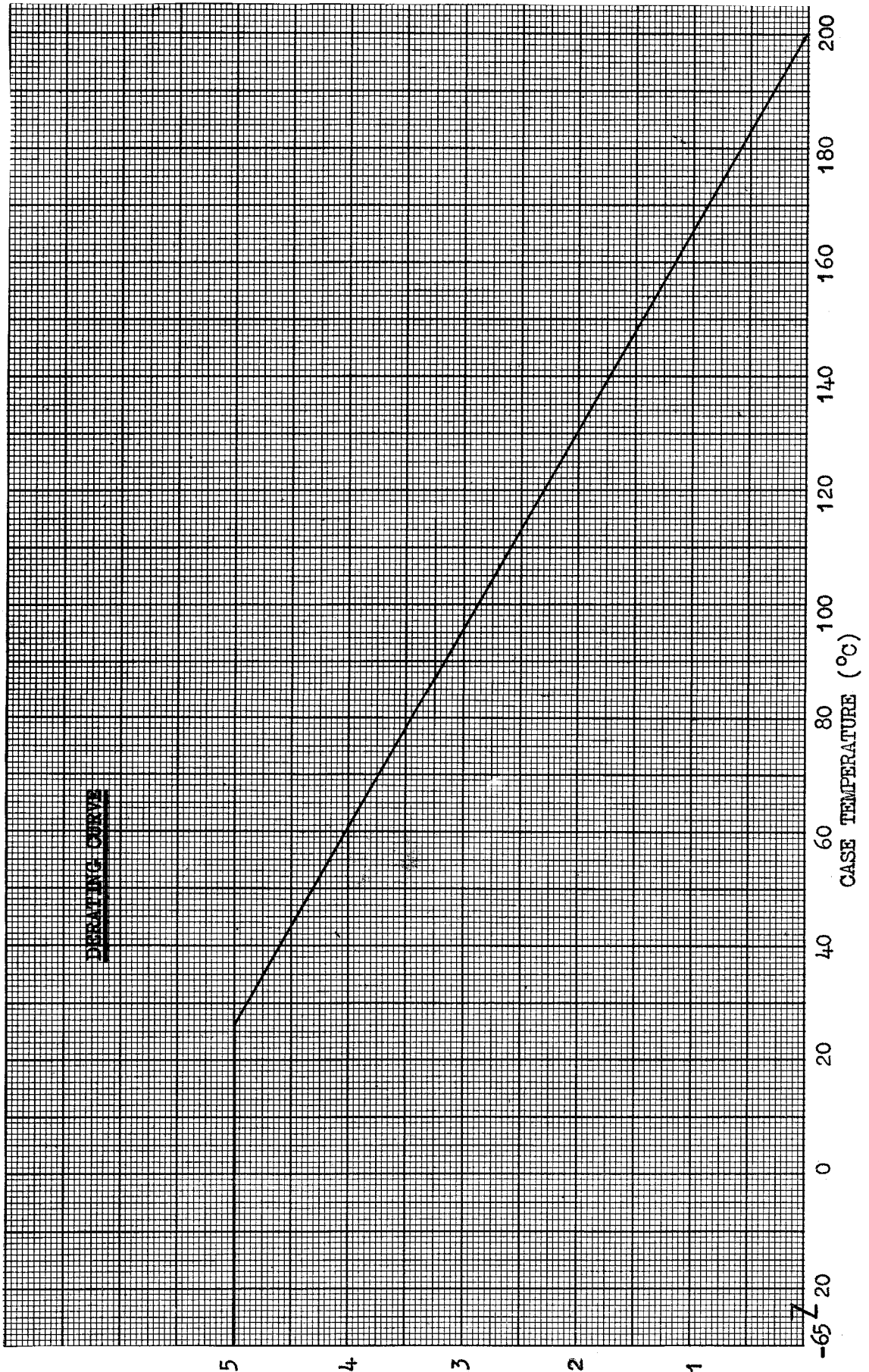
Examination or Test	TEST CONDITIONS		AQL %	Insp Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref	SPECIFIC CONDITIONS				Min.	Max.	
<u>SUB GROUP 1</u> Omitted								
<u>SUB GROUP 2</u> Shock		5 blows in each of three mutually perpendicular directions	6.5	IA				
<u>Post Test End Points for SUB GROUP 2</u> Collector-Base Cut-off Current	7.2.5.1	$V_{CB} = 30V$ $I_E = 0$			$I_{CBO}$	-	30	$\mu A$
Static Forward Current Transfer Ratio	7.3.4	$I_C = 200mA$ $V_{CE} = 4.0V$			$h_{FE}$	15	-	
						25		

NOTES

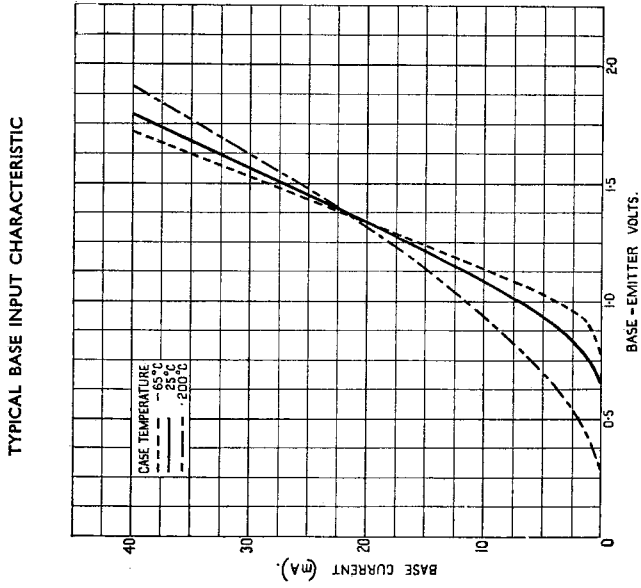
1. The maximum sample size will be 125.



FIG 1

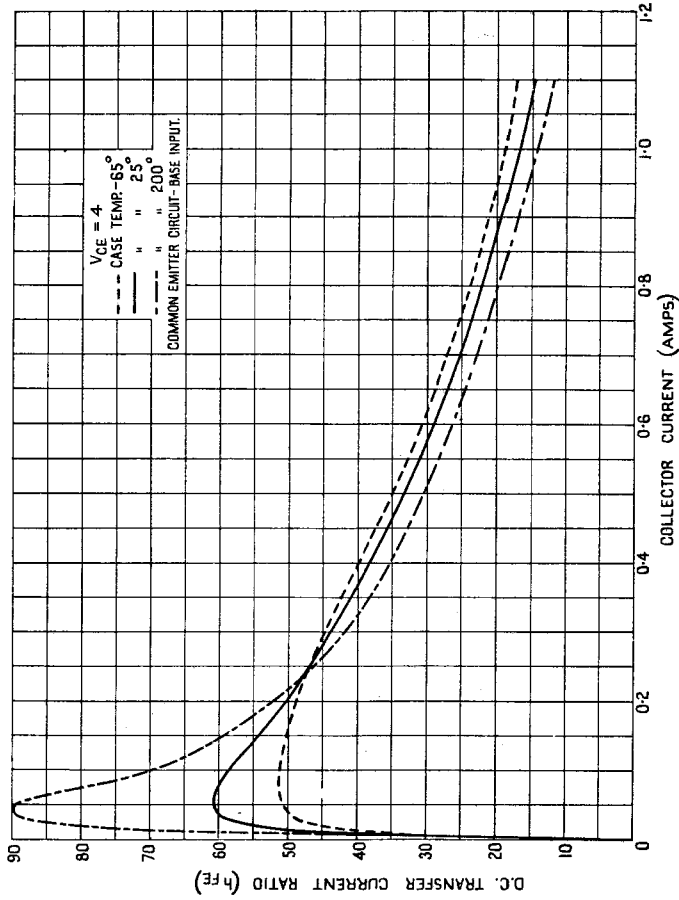


**FIG 3**



TYPICAL VARIATION OF DC CURRENT GAIN ( $h_{FE}$ )  
with Collector current and Ambient Temperature.

**FIG 2**



TYPICAL COLLECTOR CHARACTERISTICS

