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_{CBO}	V_{EBO}	V_{CEO}	V_{CEX}	I_{CM}	I_{BM}	T_{stg}	θ_{j-c}	T_{opr}	P_c
	Unit	V	V	V	V	A	A	°C	°C/W	°C	W
CV7451	Min	-	-	-	-	-	-	-55	-	-	-
& 7453	Max	60	12	40	60	1.5	1.0	+200	35	+200	5
CV7452	Min	-	-	-	-	-	-	-55	-	-	-
& 7454	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		µA	µA	V		V		mA	kc/s
CV7451	Min	-	-			-	20	-	800
& 7452	Max	10	10	.75		1.5	60	0.75	-
CV7453	Min	-	-			-	35	-	800
& 7454	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:-

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: K1007/NATO Ref	TEST CONDITIONS: SPECIFIC CONDITIONS	AQL %	Insp Level	Symbol	LIMITS Min.	LIMITS Max.	Units
SUB GROUP 1			0.65	II				
Visual and Mechanical Inspection	5.1	Excluding Physical Dimensions						
SUB GROUP 2			0.65	II				
Collector-Base Cut-off Current	7.2.5.1.	V_{CB} = 30V I_E = 0			I_{CBO}	-	10	µA
Collector-Emitter Sustaining Voltage	7.2.2.2.1	I_C = 50mA CV7451 & 7453 I_B = 0 CV7452 & 7454			V_{CEO} (sust)	40 55	- -	V V
		I_C = 0.25mA V_{EB} = 1.5V CV7451 CV7453 CV7452 CV7454			V_{CEX}	60 100	- -	V V
Emitter-Base Cut-off Current	7.2.6	V_{EB} = 12V I_C = 0			I_{EBO}	-	10	µA
SUB GROUP 3			2.5	I				
Static Forward Current Transfer Ratio	7.3.4	I_C = 200mA V_{CE} = 4.0V CV7451 CV7452 CV7453 CV7454			h_{FE}	20 35	60 100	

TABLE 1 GROUP A INSPECTION (cont'd)

Examination or Test	TEST CONDITIONS		AQL %	Insp Level	Symbol	LIMITS		Units
	K1007/NATO Ref	SPECIFIC CONDITIONS				Min.	Max.	
Collector-Emitter Saturation Voltage	7.3.3.	I_C = 200mA CV7451 CV7452 I_B = 20mA CV7453 CV7454 I_B = 10mA			V_{CE} (sat)	-	0.75	V
Base-Emitter Voltage	7.3.2	I_C = 200mA V_{CE} = 4.0V			V_{BE}	-	1.5	V
SUB GROUP 4			4.0	IA				
Collector-Base Cut - off Current	7.2.5.1	T = 175°C V_{CB} = 30V I_E = 0			I_{CBO}	-	0.75	mA
Static Forward Current Transfer Ratio	7.3.4	T = -55°C I_C = 200mA V_{CE} = 4.0V CV7451 CV7452 CV7453 CV7454			h_{FE}	15 25	- -	
Small-signal forward current transfer ratio	7.5.2	I_C = 5.0mA V_{CB} = 28V			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	
SUB GROUP 1			6.5	1C				
Physical dimensions	5.1	According to drawings 10.3.2.2 and 10.4.2.2						
SUB GROUP 2			4.0	1A				
Solderability	5.13							
Temperature Cycling	5.5	-55°C to +200°C						
Moisture Resistance	5.3.1							
SUB GROUP 3			4.0	I A Note 1				
Vibration fatigue	5.15	Non operating						
SUB GROUP 4			6.5	IA				
Lead fatigue	5.10.2	3 cycles						
SUB GROUP 5								
Omitted								
SUB GROUP 6								
Omitted								
SUB GROUP 7								
High Temperature Life (non-operating)	6.2.1 6.6.1.2.2	T_{stg} = +200°C Duration 1000 hours	4.0	I Note 1				

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.	
SUB GROUP 8			4.0	IA				
Operating Life	6.3 6.6.1.2.2	T_{amb} at any single temperature between +100°C and +160°C V_{CB} = max for device P_C = to wattage shown on derating curve for chosen temperature Fig. 1 Page 9.						
Post Test End Points for Sub Groups 2, 3, 7 and 8								
Collector-Base Cutt-off Current	7.2.5.1	V_{CB} = 30V I_E = 0			I_{CBO}	-	30	µA
Static Forward Current Transfer Ratio	7.3.4	V_{CB} = 4.0V I_C = 200mA CV7451 CV7452 CV7453 CV7454			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	Symbol	LIMITS		Units
	K1007/NATO Ref	SPECIFIC CONDITIONS				Min.	Max.	
SUB GROUP 1								
Omitted								
SUB GROUP 2								
Shock		5 blows in each of three mutually perpendicular directions	6.5	IA				
Post Test End Points for SUB GROUP 2								
Collector-Base Cut-off Current	7.2.5.1	V_{CB} = 30V I_E = 0			I_{CBO}	-	30	µA
Static Forward Current Transfer Ratio	7.3.4	I_C = 200mA CV7451 CV7452 V_{CE} = 4.0V CV7453 CV7454			h_{FE}	15 25	-	

NOTES

1. The maximum sample size will be 125.

FIG 1

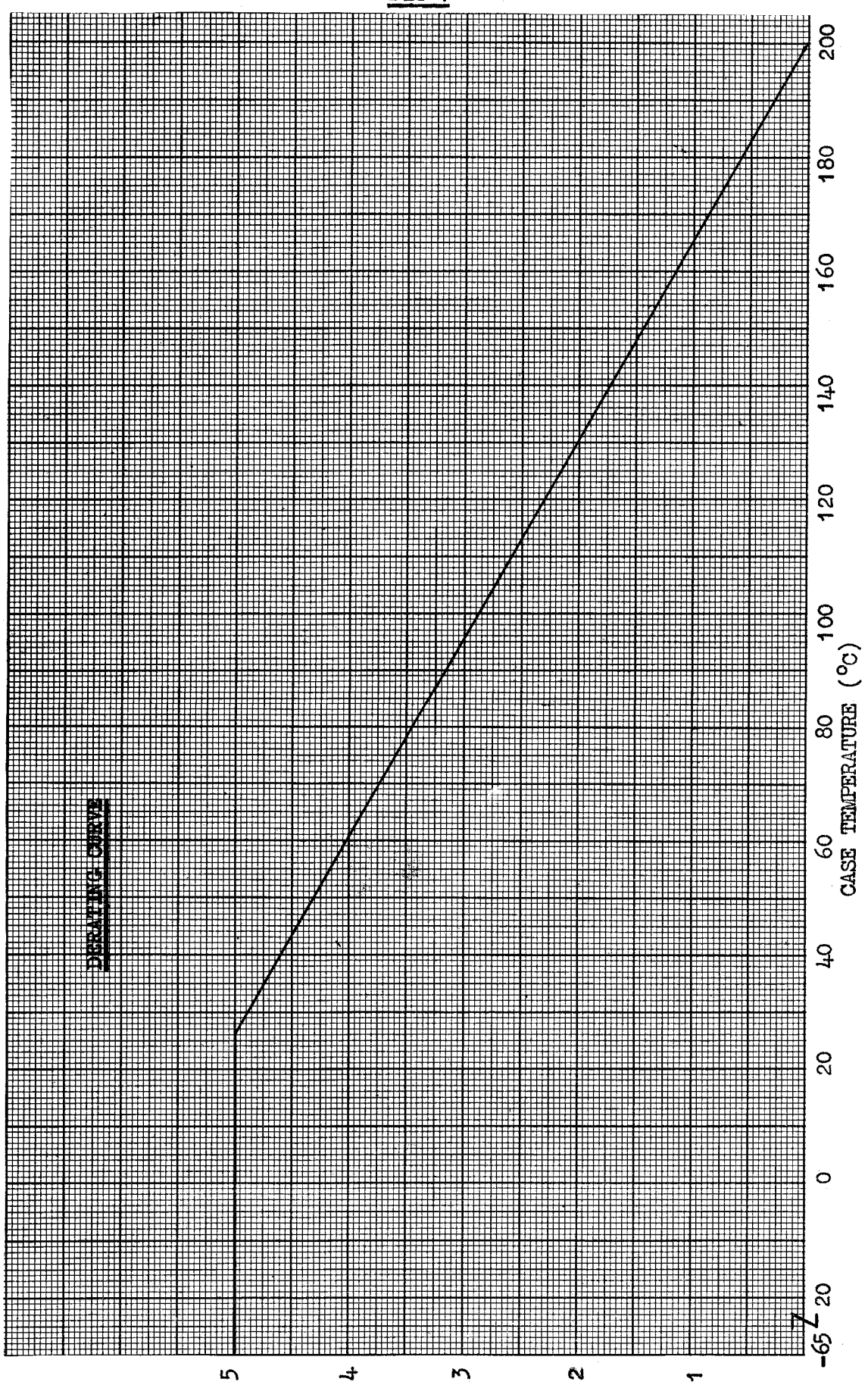
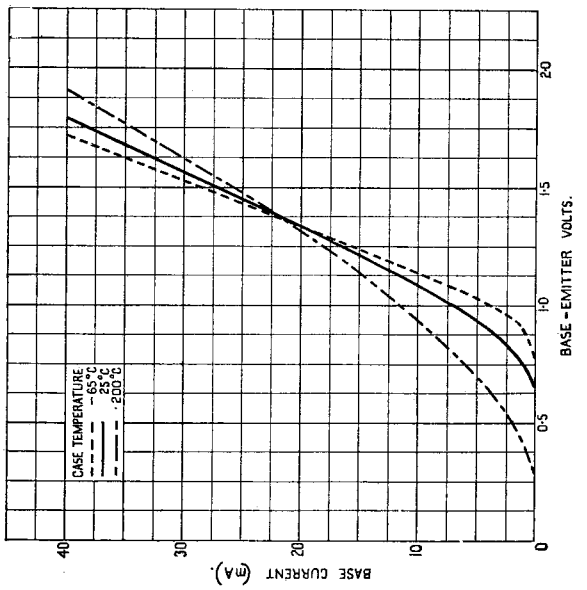

DERATING CURVE
CASE TEMPERATURE (°C)
-65
20
0
20
40
60
80
100
120
140
160
180
200
TOTAL DISSIPATION (WATTS)
1
2
3
4
5

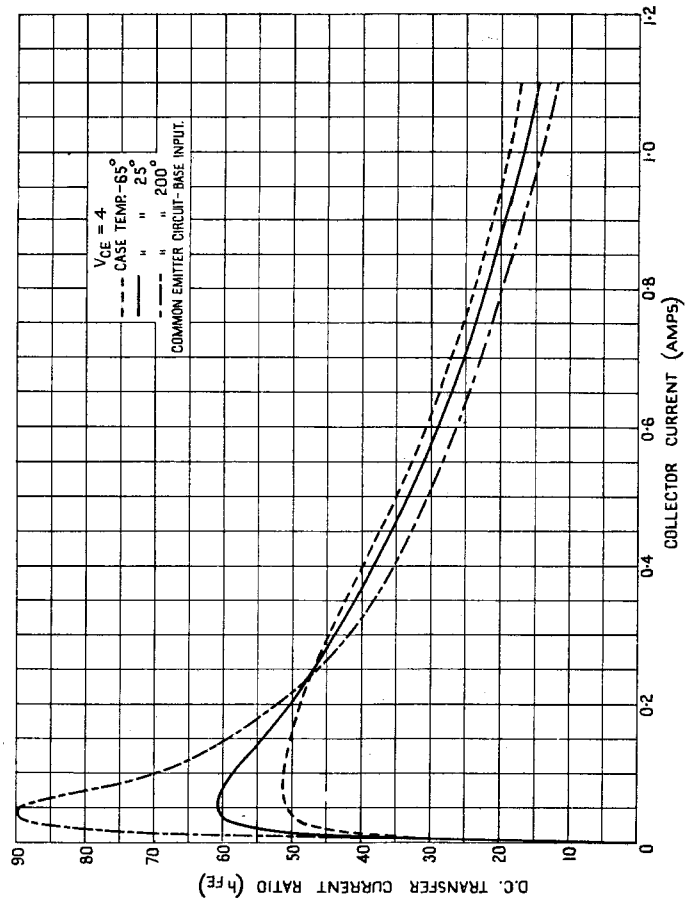
Fig 3

TYPICAL BASE INPUT CHARACTERISTIC



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

Fig 2



TYPICAL COLLECTOR CHARACTERISTICS