

MILITARY SPECIFICATION

CV 7333 - 4

SEMICONDUCTOR DEVICE, TRANSISTOR

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

Mechanical Dimensions and Outlines:- See Fig. 3. Page 11.

Connections:- See Fig. 3 Page 11, Collector connected to case.

→ Absolute Maximum Ratings:-

Device	Rating	V <sub>CB</sub>	V <sub>CEO</sub>	V <sub>CER</sub>	V <sub>EB</sub>	I <sub>C</sub>	I <sub>B</sub>	P	T <sub>stg</sub>	T <sub>amb</sub>	Peak Power	Shock	Vib:
	Unit	V	V	V	V	A	A	W	°C	°C	W	g	g
CV7333	Min.	-	-	-	-	-	-	-	-65	-	-	-	-
	Max.	150	60	100	10	7.5	2.0	100	+200	+175	450	500	20
CV7334	Min.	-	-	-	-	-	-	-	-65	-	-	-	-
	Max.	200	100	200	10	7.5	2.0	100	+200	+175	500	500	20
	Note			B				A					

Note A. See de-rating curve Fig. 1, Page 9 and TVC Information Sheets No. 9 and 10.

B.  $R_{BE} \leq 33$  ohms.

C. Commercial equivalent 2S025, 2S026

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## Primary Electrical Characteristics:-

Characteristic		$I_{CBO}$		$I_{CEO}$		$I_{EBO}$		$h_{FE}$	$V_{CE\ sat}$	$C_{ob}$	$h_{fe}$	Typ. Therm: Resistance
		mA		mA		mA			V	pF		
CV7333	Min.	-		-		-		30	-	-	8	1°C/W.
	Max.	1.0		10		10		120	0.8	650	-	
CV7334	Min.		-		-		-	30	-	-	8	1°C/W.
	Max.		1.0		10		10	120	0.8	650	-	
CONDITIONS	$T_{case}$ °C	25	25	25	25	25	25	25	25	25	25	
	$V_{CB}$ V	60	100							15		
	$V_{CE}$ V			60	100			15			15	
	$V_{EB}$ V					10	10					
	$I_C$ A							2.0	2.0		0.5	
	$I_B$ A								0.2			
	$I_E$ A									0		
	f Mc/s										1.0	1.0

Reliability Assurance Requirements: Under Discussion

Applicable Documents

TVC Information Sheets Nos. 9 and 10.

RequirementsMarking

The device shall be marked as K1007.  
Section B. 1.3.4.

Quality Assurance Provisions

Destructive Tests The tests listed in Table 2, Group B ←  
Inspection, Sub Group 2 and 3 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, Issue 3, Section A, 1.2.(c). Insulating  
washers shall be packed with each device. (When  
necessary insulation bushes shall be provided by  
the user).

Joint Service Catalogue Numbers

CV7333 = 5960-99-037-3133

CV7334 = 5960-99-037-3134

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	.65	I				
<u>SUB GROUP 2</u> Collector Base Cut-off current	7.2.5.1	CV7333 $V_{CB} = 150V$ $I_E = 0$ CV7334 $V_{CB} = 200V$ $I_E = 0$	.65	II	$I_{CBO}$ $I_{CBO}$	- -	1.0 1.0	mA mA
Collector Emitter Cut-off Current	7.2.5.2	CV7333 $V_{CE} = 150V$ $I_B = 0$ CV7334 $V_{CE} = 200V$ $I_B = 0$			$I_{CBO}$ $I_{CBO}$	- -	10 10	mA mA
Static Forward current transfer ratio.	7.3.4	All devices $V_{CE} = 15V$ $I_C = 2A$			$h_{FE}$	30	120	
Emitter base out-off current	7.2.6	All devices $V_{EB} = 10V$ $I_C = 0$			$I_{EBO}$	-	10	mA
<u>SUB GROUP 3</u> Collector Emitter Saturation Voltage	7.3.3	All devices $I_C = 2.0A$ $I_B = 0.2A$	2.5	I	$V_{CE(sat)}$	-	0.8	V

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 3 Cont'd Base emitter Saturation Voltage	7.3.1	All devices $I_C = 2.0A$ $I_B = 0.2A$			$V_{BE}$ (sat)	8	1.5	V
Small Signal forward current transfer ratio	7.4.2	All devices $V_{CE} = 15V$ $I_C = 0.5A. f = 1Mc/s.$			$h_{FE}$	-	3.5	/uS
Total Switching Time		All devices Note 2	4	IA	$t_{on} + t_{off}$	-	650	pF
SUB GROUP 4 Output capacitance	7.4.8	All devices $V_{CB} = 15V$			$C_{ob}$	12		
Static Forward Current transfer ratio	7.3.4	All devices $T_{case} = -55^\circ C$ $V_{CE} = 15V$ $I_C = 2A$			$h_{FE}$	-		
Collector Base cut-off current	7.2.5.1	CV7333. $V_{CB} = 150V. I_E = 0.$ $T_{case} = 100^\circ C$ CV7334 $V_{CB} = 200V. I_E = 0$ $T_{case} = 100^\circ C$			$I_{CBO}$	-	3.0	mA
					$I_{CBO}$	-	3.0	mA

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 drawing Fig. 3 Page 11	6.5	1C				
<u>SUB GROUP 2</u> Solderability	5.13	-55°C to +150°C 100°C + 0-5°C and 0°C + 5°-0°C	4.0	1A				
Temperature Cycling	5.5							
Thermal Shock	5.6.1							
Moisture resistance	5.3.1							
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1	Non operating 3 cycles	4.0	1A				
<u>SUB GROUP 4</u> Omitted								
<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	$T_{stg} = 200^{\circ}C$ Note 3 Duration = 1000 hours.	4.0	1 Note 1				
	6.6.1.2.2							
<u>SUB GROUP 8</u> Operating Life	6.3	$T_{case}$ at any single temperature between $25^{\circ}C$ and $150^{\circ}C$ with the corresponding $P_{tot}$ given on the derating curve Fig. 1 Page 9 . $V_{CE} = 48V$ . Duration 1000 hours.	4.0	1A				
	6.6.1.2.2							
<u>Post Test End</u> <u>Points for SUB GROUPS</u> <u>2, 3, 6 and 7</u> Collector Base cut-off current	7.2.5.1	As in Group A, Sub Group 2			$I_{CBO}$	-	1.3	mA
	7.3.4	As in Group A. Sub Group 2.			$h_{FE}$	20	130	
Static forward current transfer ratio								

NOTES

- Note 1. The maximum sample size will be 125 devices.
2. For suitable circuit see Figure 2. Page 10.
3. Less clause 1.3.3.2 for this particular test.



DEVICE DISSIPATION ( $P_{TOT}$ ) WATTS (AMBIENT)

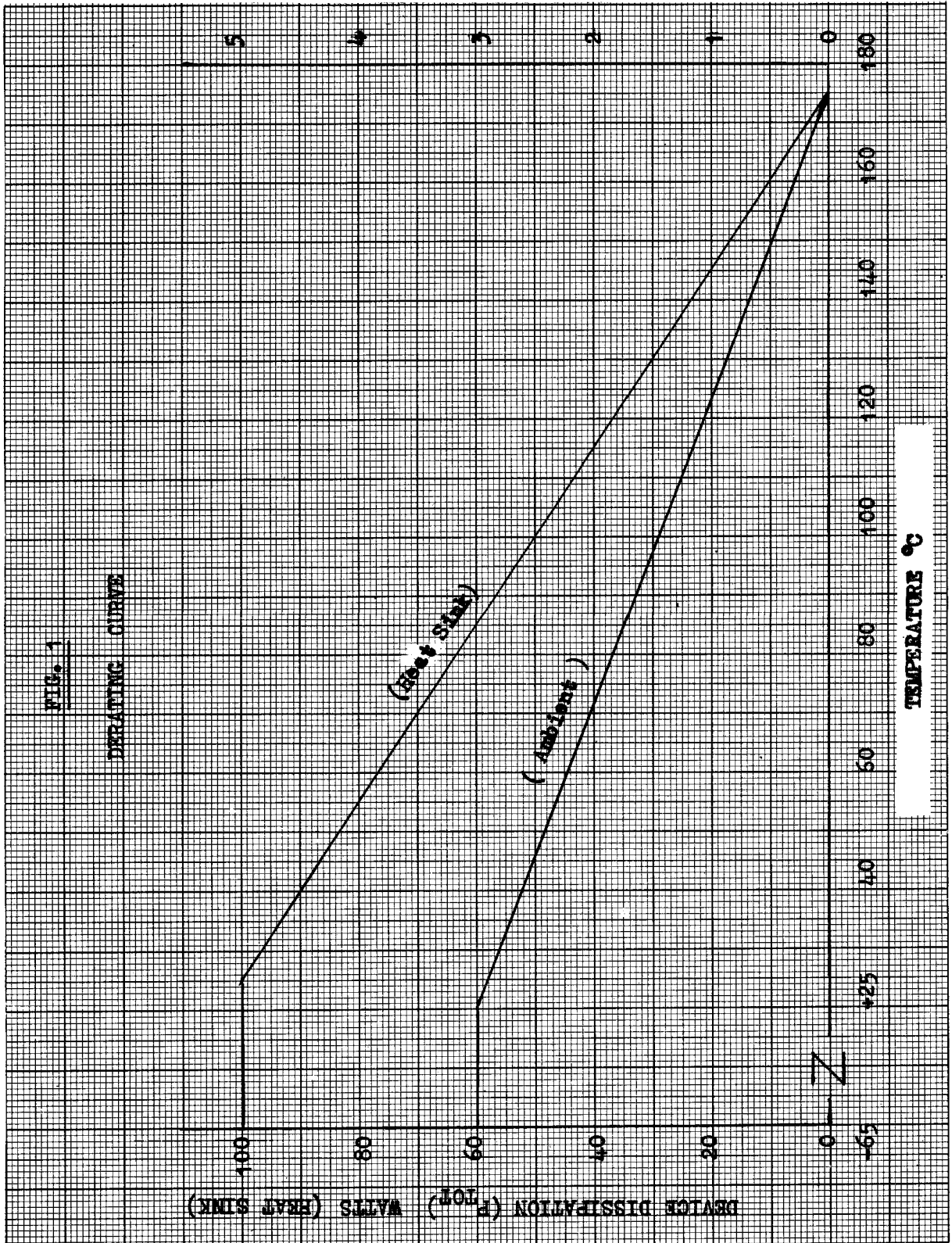
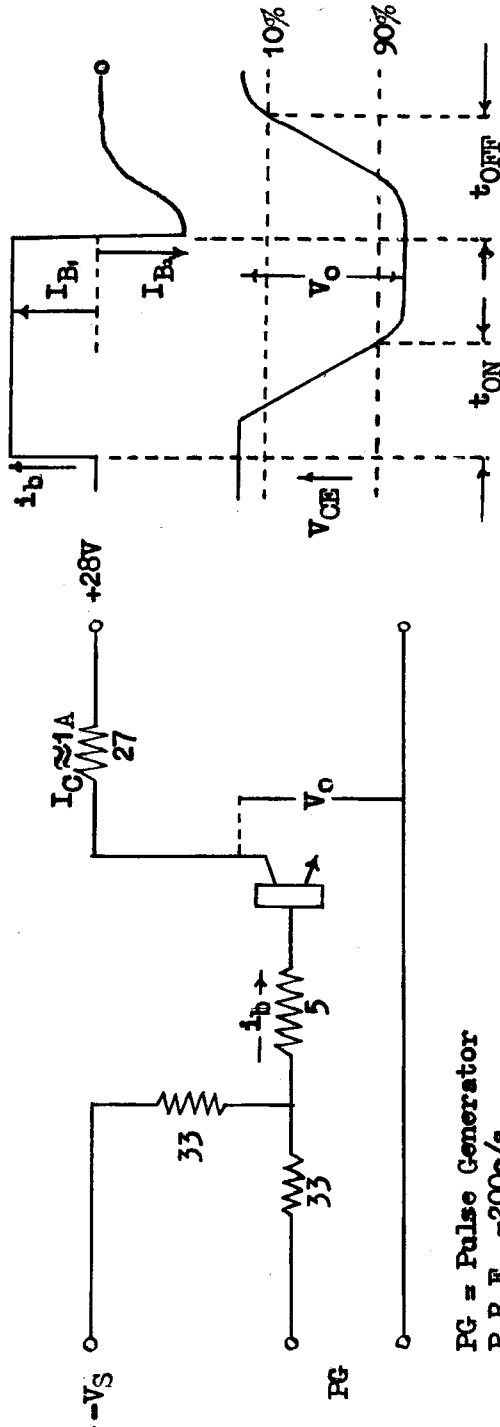


FIG 2.  
SWITCHING TEST CIRCUIT

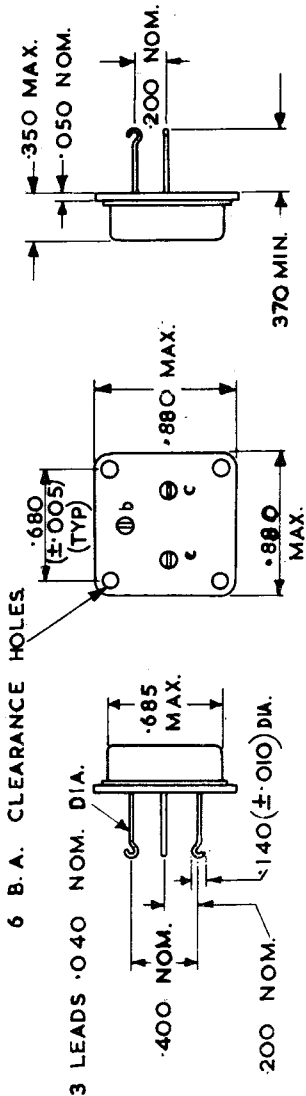


$I_{B1} = 100mA$   
 $I_{B2} = 100mA$

PG = Pulse Generator  
P.R.F. = 200c/s

FIG 3.

DIMENSIONAL DRAWING



ALL DIMENSIONS IN INCHES.

INSULATING WASHER

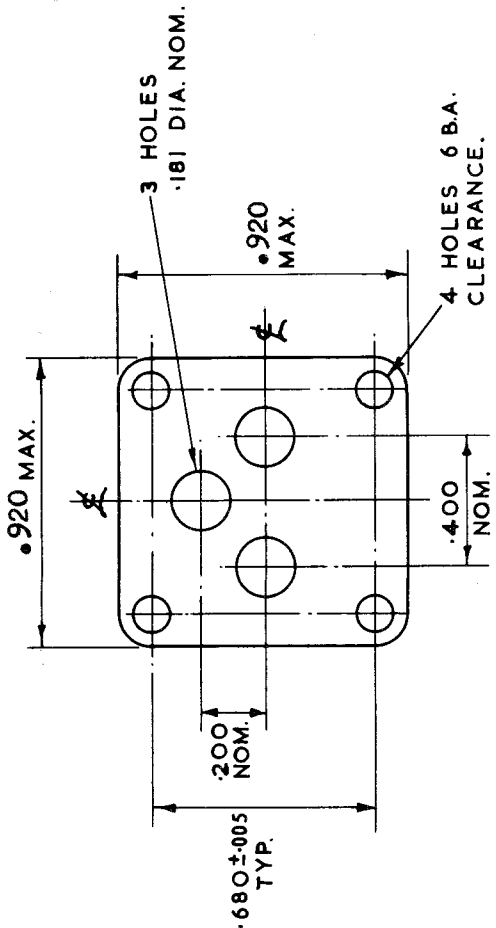
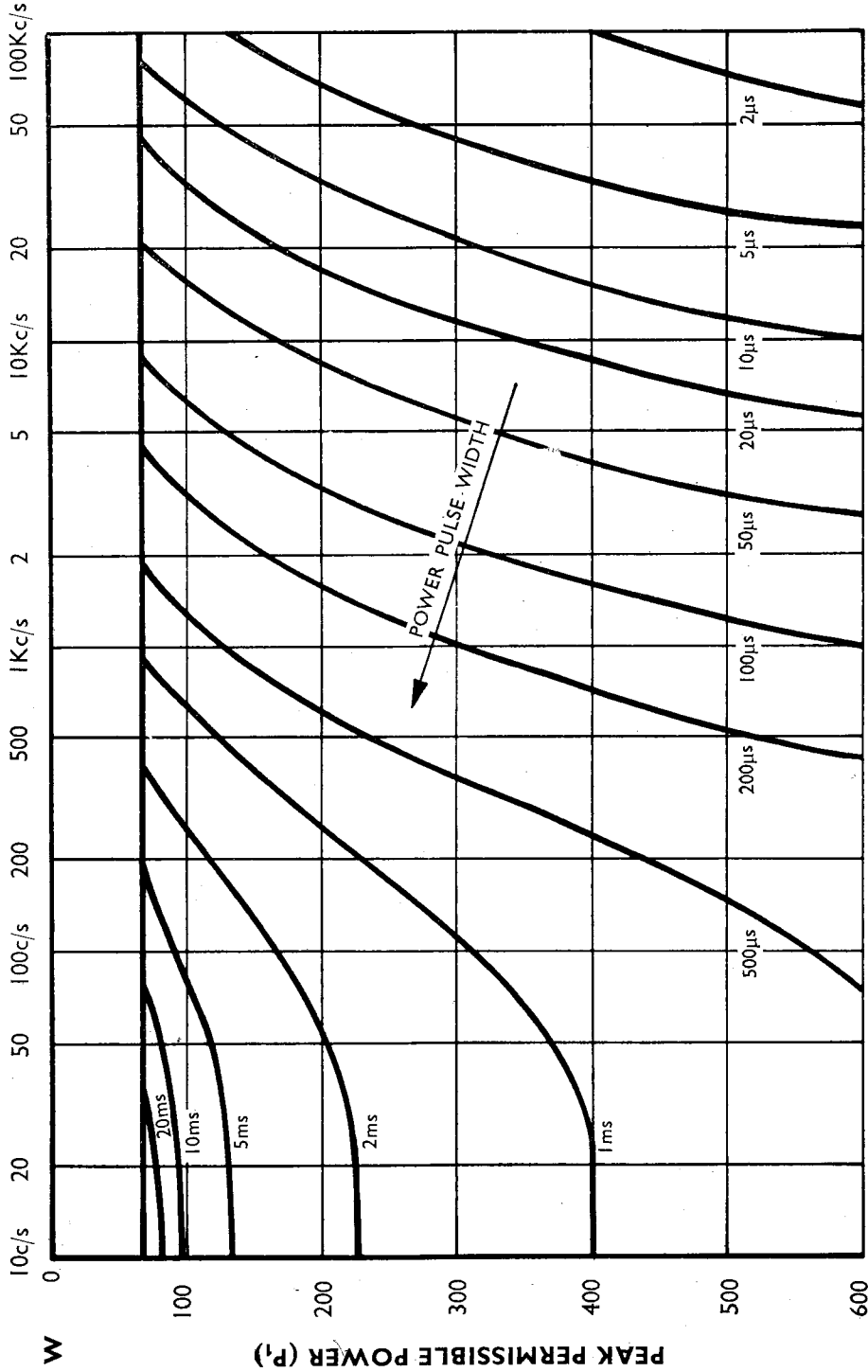


FIG. 4. PERMISSIBLE TRANSIENT POWER RATING.  
POWER PULSE REPETITION FREQUENCY



$$P_p = P_1 \cdot$$

$$P_1 = \frac{T_j(\max) - T_{case}}{T_j(\max) - 75}$$

$$P_1 = \frac{T_j(\max) - T_{case}}{100}$$

where  $P_p$  = Pulse Power  
 $P_1$  = Peak Permissible Power

for CV7333/34

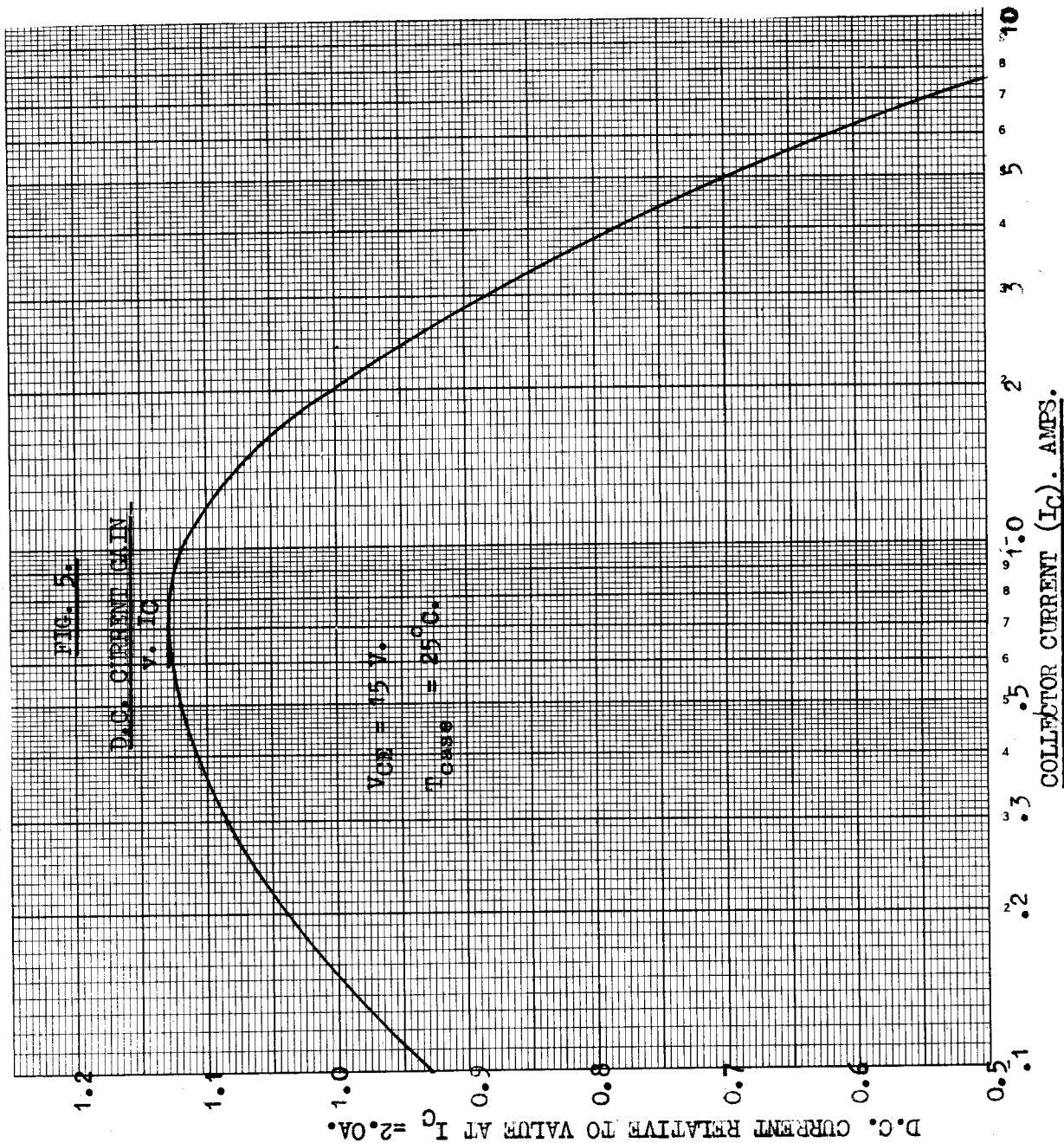
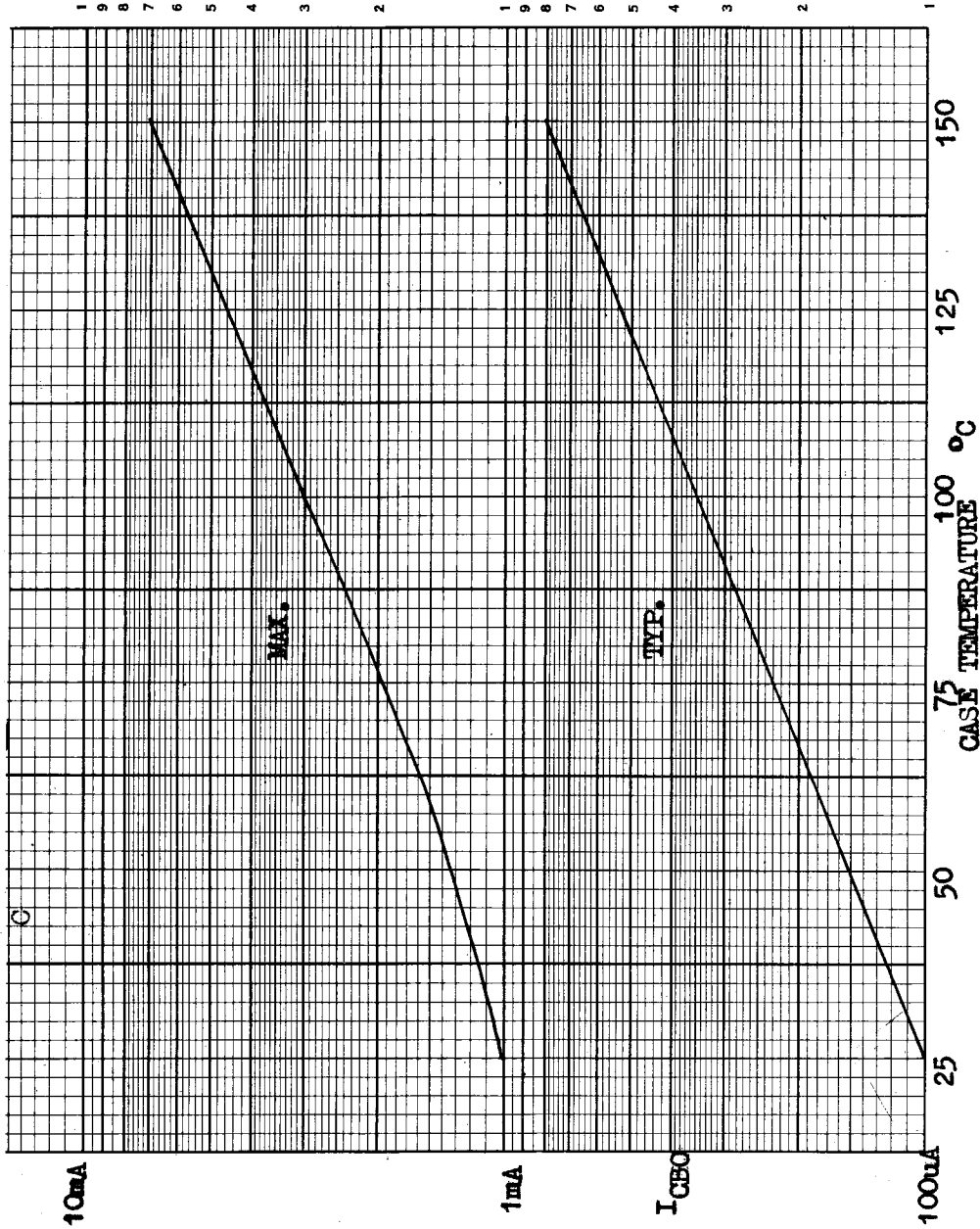


FIG 6.  
 $I_{CBO}$  TEMPERATURE @  $V_{CB} = \text{RATING}$



APPLICATION DATA 4

FIG. 7

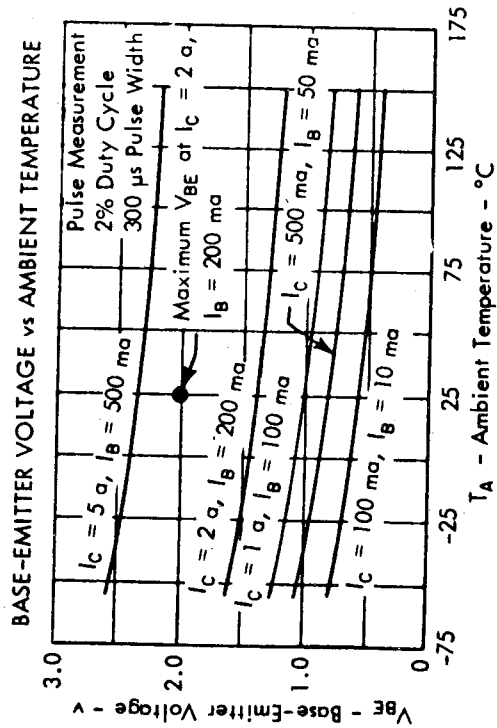


FIG. 8

