ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION FOR CV7554

ISSUE NO. 1. DATED 1ST OCTOBER, 1964

AMENDMENT NO. 1

Page 2

Amend I_{CBO} (at T_{amb} = 25°C) to read 0.05 micro Amp max.

January, 1965
NM. 253666

Admiralty Surface Weapons Establishment

MILITARY SPECIFICATION

CV 7554

SEMICONDUCTOR DEVICE, TRANSISTOR

Description:- This specification covers the detail requirements for Silicon NPN Planar Epitaxial High Speed Switching Transistors and is in accordance with Specification K1007, Issue 3, except as otherwise stated.

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

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

Absolute Maximum Ratings:-

Rating	V_{CB}	V_{CE}	V_{EB}	P_{tot}	T_{stg}	T_j	Shock	Vibration
Unit	V	V	V	W	°C	°C	g	g
Min.					-65			
Max.	15	6	4	0.30	+150	200	1500	20
Note				A			C	

Notes:-
A. See derating curve, Figure 1.
B. Commercial Equivalents ZT2475, 2N2475.
C. Duration = 0.5 mS

CV 7554

Primary Electrical Characteristics

Characteristic		I_{CBO}	I_{CBO}	V_{CEO} (Sust)	V_{BE} (sat)	h_{FE}		f_T	C_{ob}	C_{ib}	t_{on}	t_{off}	t_s
Unit		µA	µA	V	V			Mc/s	pF	pF	nS	nS	nS
Min.				6	0.8	30	15	600					
Max.		0.5	5.0		1.0	150			2.5	2.5	20	15	6
Conditions	V_{CB} V	5	5						5		See Test Conditions on Page 6 and Fig. 2 and 3.		
	V_{EB} V									0.5			
	V_{CE} V					0.4	0.4	2					
	I_C mA			10	20	20	20	20					
	I_B mA			0	0.66								
	f Mc/s							100	1	1			
	T_{amb} °C	25	150	25	25	25	-55	25	25	25	25		

Reliability Assurance Requirements: To be agreed.

REQUIREMENTS:-

Marking: K1007, Section B.1.3.4.

QUALITY ASSURANCE PROVISIONS:-

Destructive Tests: The tests listed in Table II Group B Inspection, Subgroups 2, 3 and 4 in Table III, Group C Inspection, Subgroup 2 are considered destructive.

Group C Inspection: Inspection shall be conducted on the initial lot and thereafter every 90 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).

NATO STOCK NUMBER:-

5960-99-037-3807

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

Admiralty Surface Weapons Establishment,
Portsdown, Cosham,
Portsmouth, Hants.

Table I

GROUP A INSPECTION

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUBGROUP 1			0.65	I				
Visual and Mechanical Inspection	5.1.1							
SUBGROUP 2			1.0	II				
Collector Base Cut-off Current (1)	7.2.5.1	V_{CB} = 5V I_E = 0			I_{CBO}		0.05	μA
Base Emitter Saturation Voltage	7.3.1	I_C = 20 mA I_B = 0.66 mA			V_{BE} (Sat)	0.8	1.0	V
Static Value of Short Circuit Forward Current Transfer Ratio	7.3.4.2	V_{CE} = 0.4V I_C = 20 mA			h_{FE}	30	150	
Emitter Base Breakdown Voltage	7.2.3	I_C = 0 I_E = 10 μA			BV_{EBO}	4		V
Collector Emitter Sustaining Voltage	7.2.2.2	I_B = 0 I_C = 10 mA Pulse Test Pulse Length 300 μS Duty cycle $\leq$ 1%			V_{CEO} (Sust)	6		V

Table I

GROUP A INSPECTION CONT'D

Examination or Test	K1007/ NATO Ref.	Test Conditions Specific Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
SUBGROUP 3			4.0	I				
Small Signal Short-Circuit Forward Current Transfer Ratio, at High Frequency	7.5.2	V_{CE} = 2V I_C = 20 mA f = 100 Mc/s			$\lvert h_{fe} \rvert$	6		
Output Capacitance	7.4.8	V_{CB} = 5V V_{EB} = 0 f = 1 Mc/s			C_{ob}		2.5	pF
Input Capacitance	7.4.8	V_{EB} = 0.5V V_{CB} = 0 f = 1 Mc/s Emitter and Collector in Fig. 7.4.8/1 interchanged.			C_{ib}		2.5	pF
Static Value of Short-Circuit Forward Current Transfer Ratio	7.3.4.2	V_{CE} = 0.5V I_C = 50 mA			h_{FE}	20		
Static Value of Short-Circuit Forward Current Transfer Ratio	7.3.4.2	V_{CE} = 0.3V I_C = 1 mA			h_{FE}	20		

Table I

GROUP A INSPECTION CONT'D

Examination or Test	K1007/ NATO Ref.	Test Conditions — Specific Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
SUBGROUP 4			6.5	IA				
Switch-on Time		See Fig.3 I_C = 20 mA I_{B1} = 1 mA			t_{on}		20	nS
Switch-off Time		See Fig. 3 I_C = 20 mA I_{B1} = 1 mA I_{B2} = 1 mA			t_{off}		15	nS
Storage Time		See Fig.2 I_C = 5 mA I_{B1} = 5 mA I_{B2} = 5 mA			t_s		6	nS
Collector-Base Cut-off Current (2)	7.2.5.1	V_{CB} = 5V I_E = 0 T_{amb} = 150°C			I_{CBO}		5	μA
Static Value of Short-Circuit Forward Current Transfer Ratio	7.3.4.2	V_{CE} = 0.4V I_C = 20 mA T_{amb} = -55°C			h_{FE}	15		

Table II

GROUP B INSPECTION
(See Page 3, Quality Assurance Provisions)

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUBGROUP 1			6.5	IC				
Physical Dimensions	5.1.2	According to Drawings 10.3.2.4 and 10.4.2.4						
SUBGROUP 2			4.0	IA				
Solderability	5.13							
Temperature Cycling	5.5	-65°C to +175°C						
Moisture Resistance	5.3							
SUBGROUP 3			4.0	IA				
Vibration Fatigue	5.15							
Constant Acceleration	5.14	20,000g						
SUBGROUP 4			6.5	IA				
Lead Fragility	5.10.2	1 cycle						
SUBGROUP 5								
Omitted								
SUBGROUP 6								
Omitted								

Table II — GROUP B INSPECTION CONT'D

Examination or Test	Test Conditions: K1007/ NATO Ref.	Test Conditions: Specific Conditions	AQL %	Insp. Level	Symbol	Limits: Min.	Limits: Max.	Units
SUBGROUP 7			4.0	I				
High Temperature Life (Non-operating)	6.2.1 6.6.1.22	T_{amb} = +150°C t = 1000 hrs						
SUBGROUP 8			4.0	IA				
Operating Life	6.3	T_{amb} between +25°C and 150°C						
	6.5	V_{CB} = 6V Min.						
	6.6.1.1 6.6.1.22	P_{tot} = max. value given by derating curve Fig.1 Page corresponding to the chosen T_{amb}.						
Post Test End Points for Subgroups 2,3 and 7								
Collector-Base Cut-off Current (1)	7.2.5.1	As in Group A Inspection, Subgroup 2.			I_{CBO}		0.1	µA
Static Value of short-circuit Forward Current Transfer Ratio	7.3.4.2	As in Group A Inspection, Subgroup 2.			h_{FE}	20	170	

Table II

GROUP B INSPECTION CONT'D

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
Post Test End Points for Subgroup 8								
Collector Base Cut-off Current (1)	7.2.5.1	As in Group A Inspection, Subgroup 2.			I_{CBO}		0.1	/uA
Change in Static Value of Short-circuit forward current Transfer Ratio	7.3.4.2	As in Group A Inspection, Subgroup 2.			Δh_{FE}		$\pm$15%	

Table III

GROUP C INSPECTION

(See Page 3, Quality Assurance Provisions)

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUBGROUP 1								
Omitted.								
SUBGROUP 2			6.5	IA				
Shock	5.17	Non-operating. Five blows each orientation Y_1, Y_2, X_1 and Z_1						
Post Test End Points								
Collector-Base Cut-off Current (1)	7.2.5.1	As in Group A Inspection, Subgroup 2			I_{CBO}		0.1	/uA
Static Value of Short-Circuit Forward Current Transfer Ratio	7.3.4.2	As in Group A Inspection, Subgroup 2			h_{FE}	20	170	

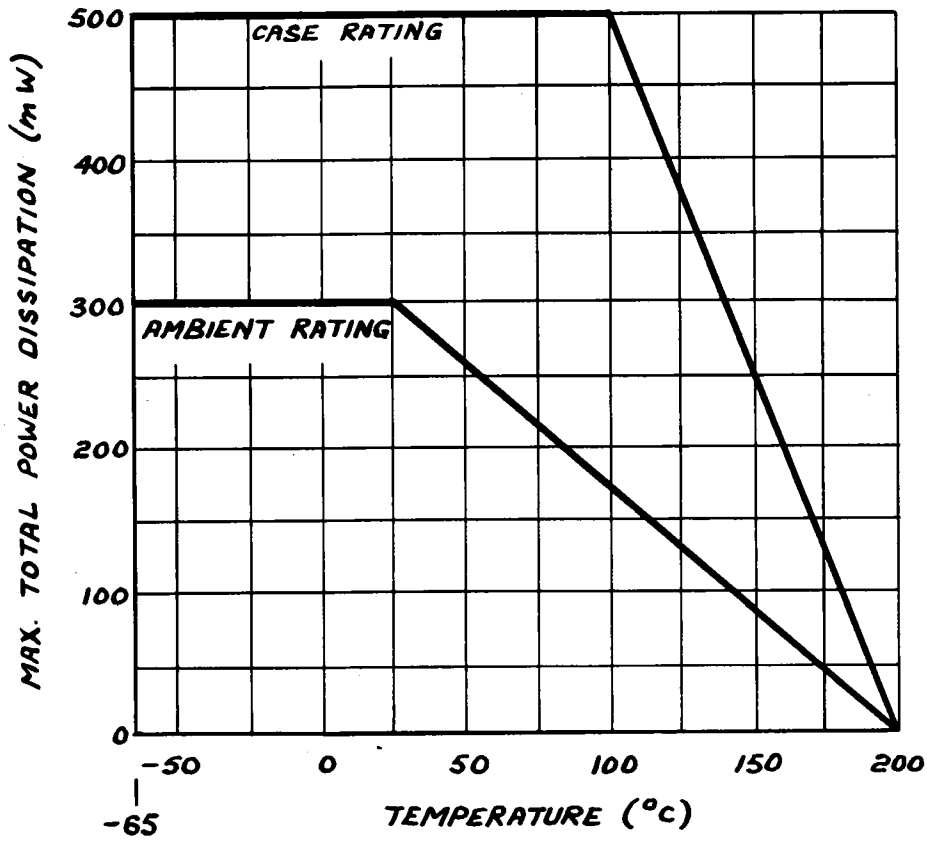
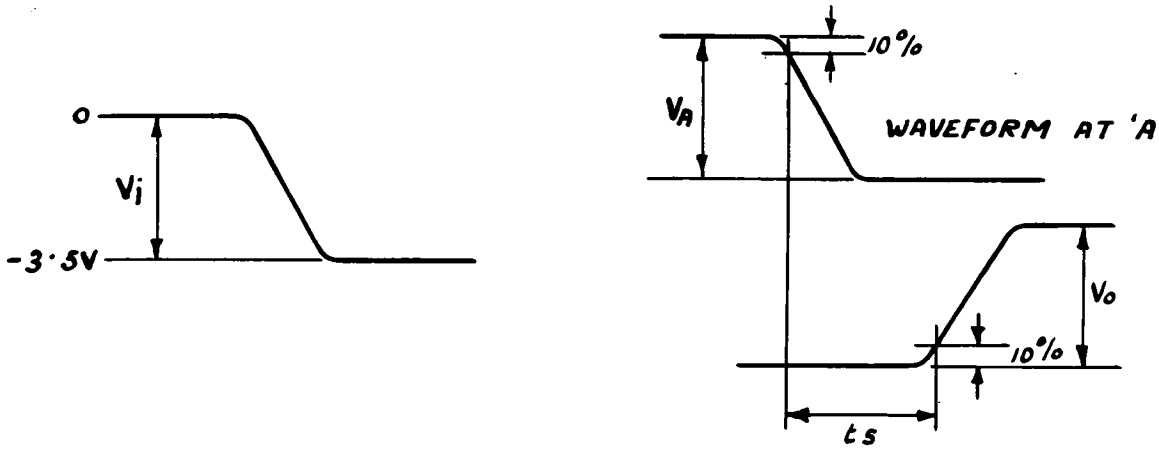
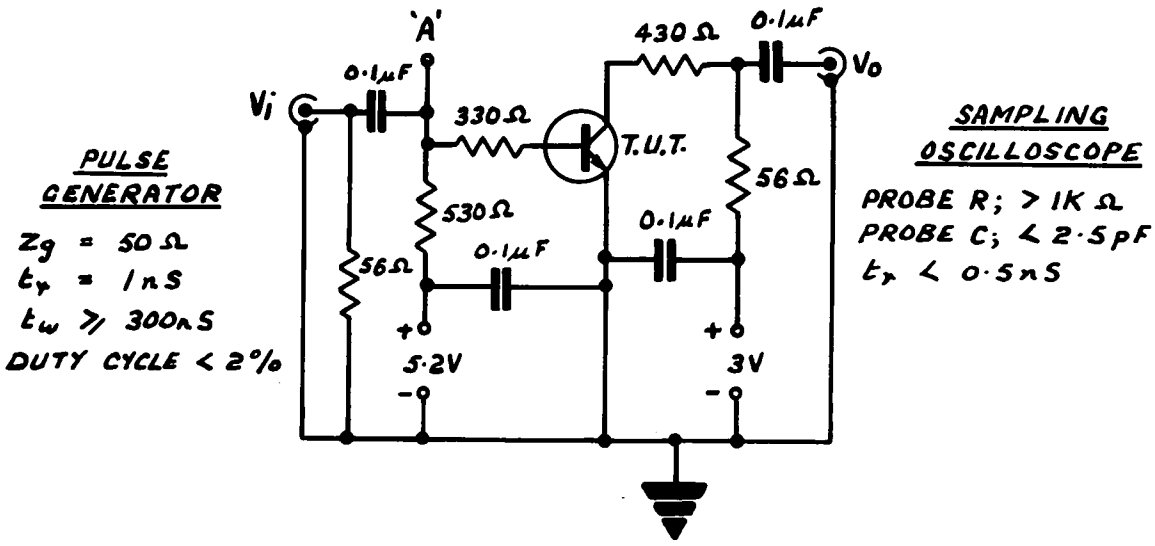


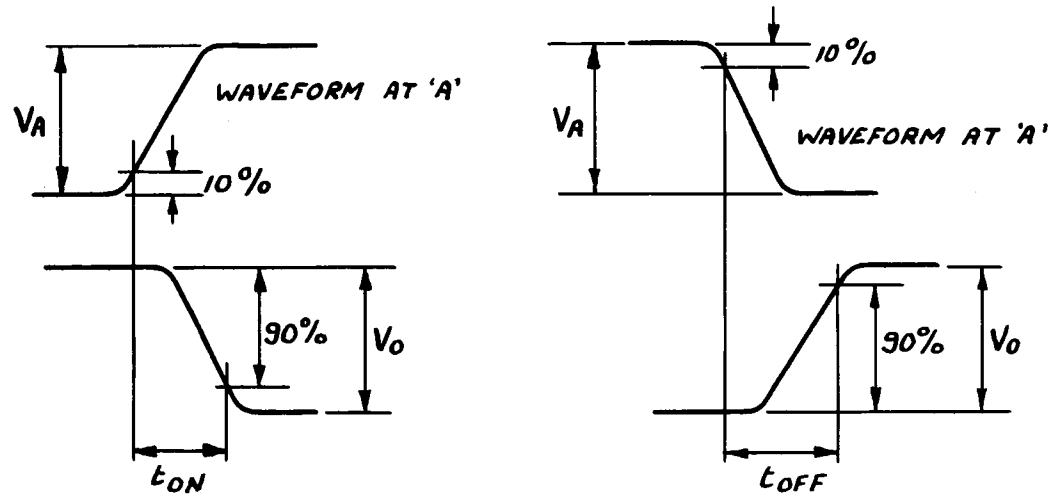
FIG. 1 DERATING CURVE

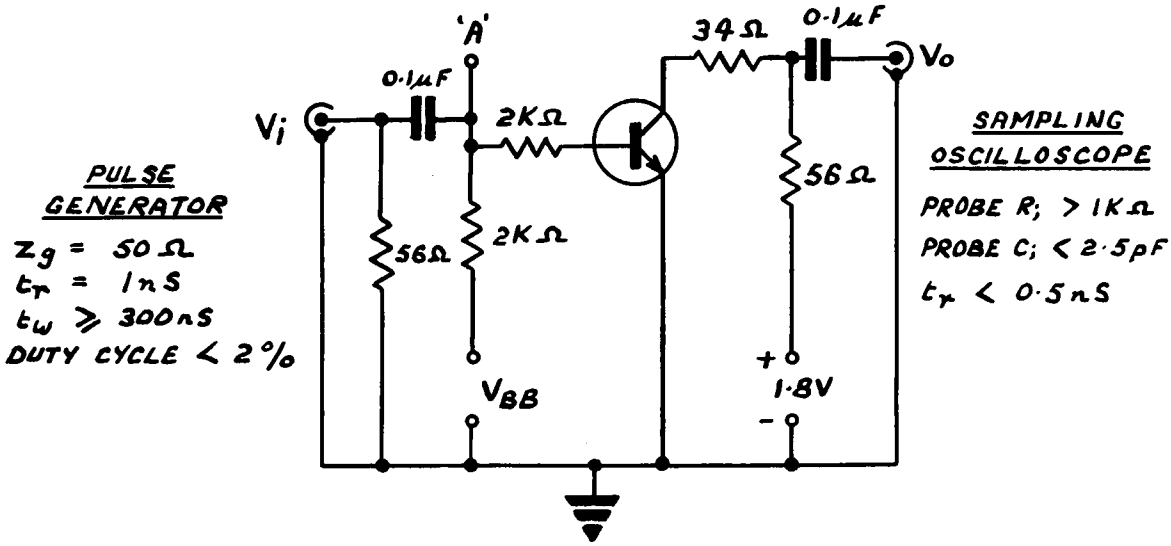




ALL RESISTOR VALUES ± 5%

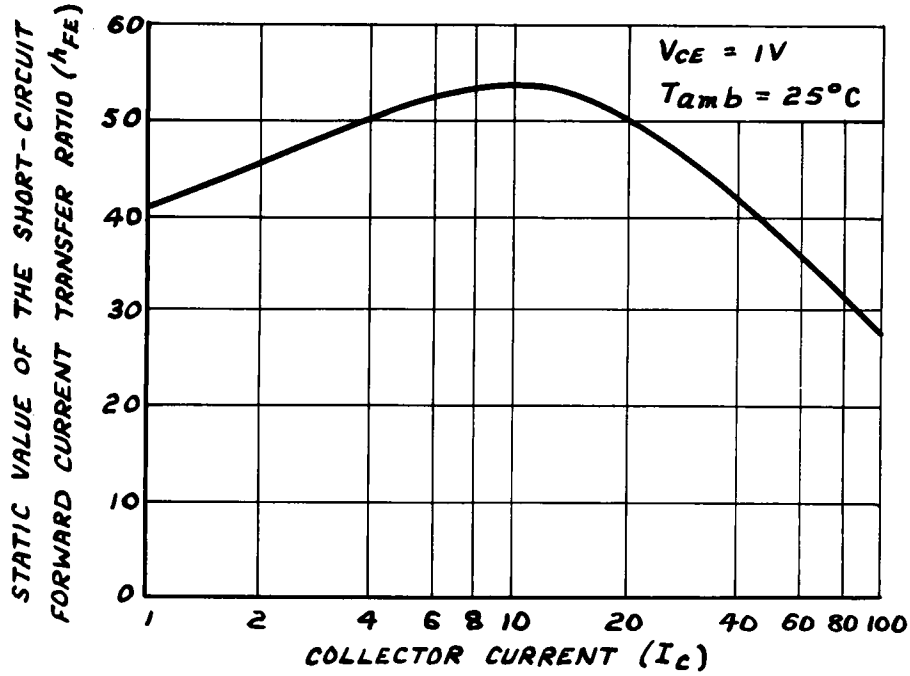
FIG.2. CIRCUIT FOR MEASUREMENT OF STORAGE TIME.



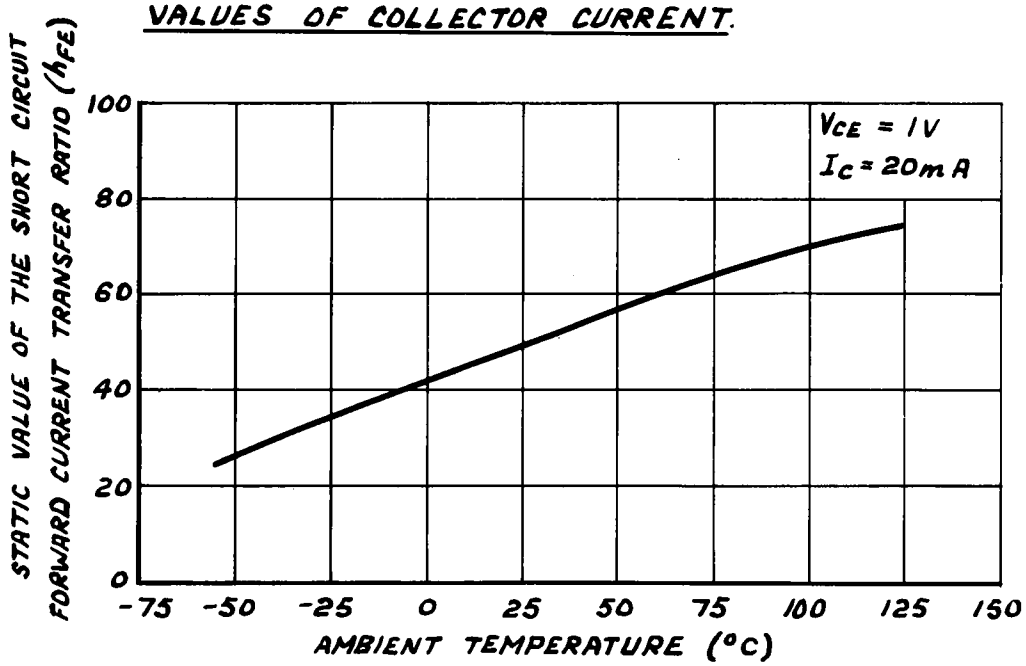


ALL RESISTOR VALUES ± 5%

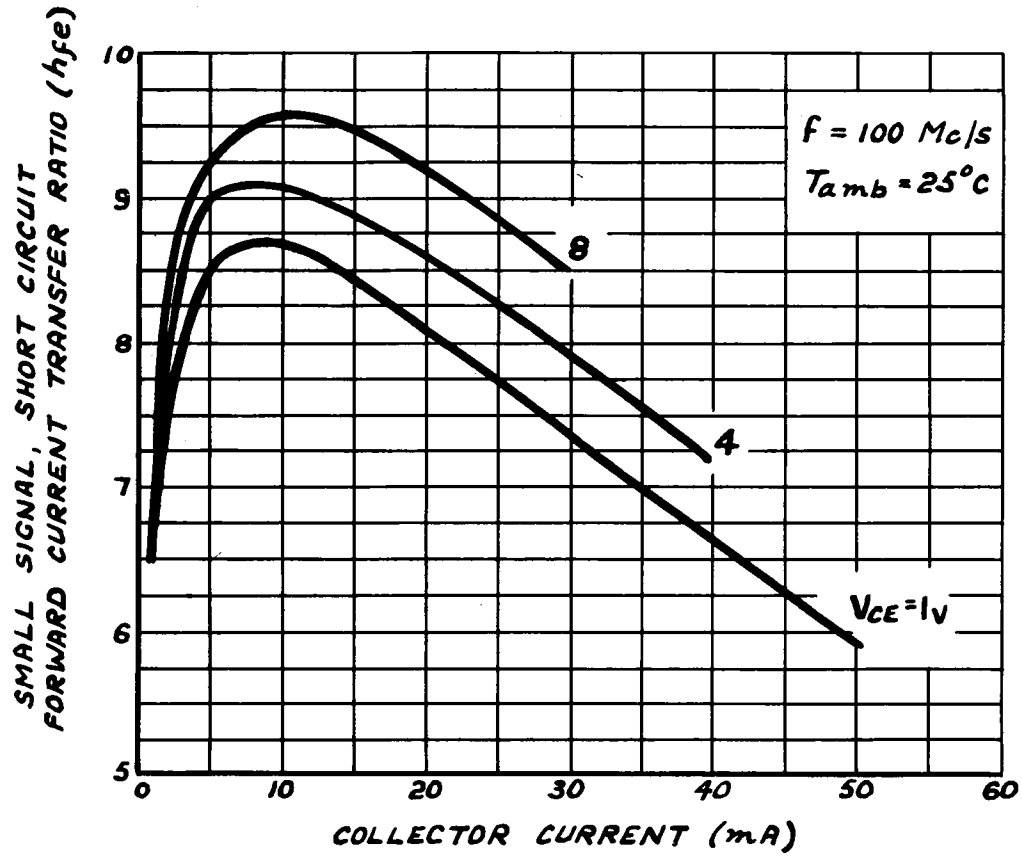
FIG.3. CIRCUIT FOR MEASUREMENT OF "TURN ON" AND "TURN OFF" TIMES



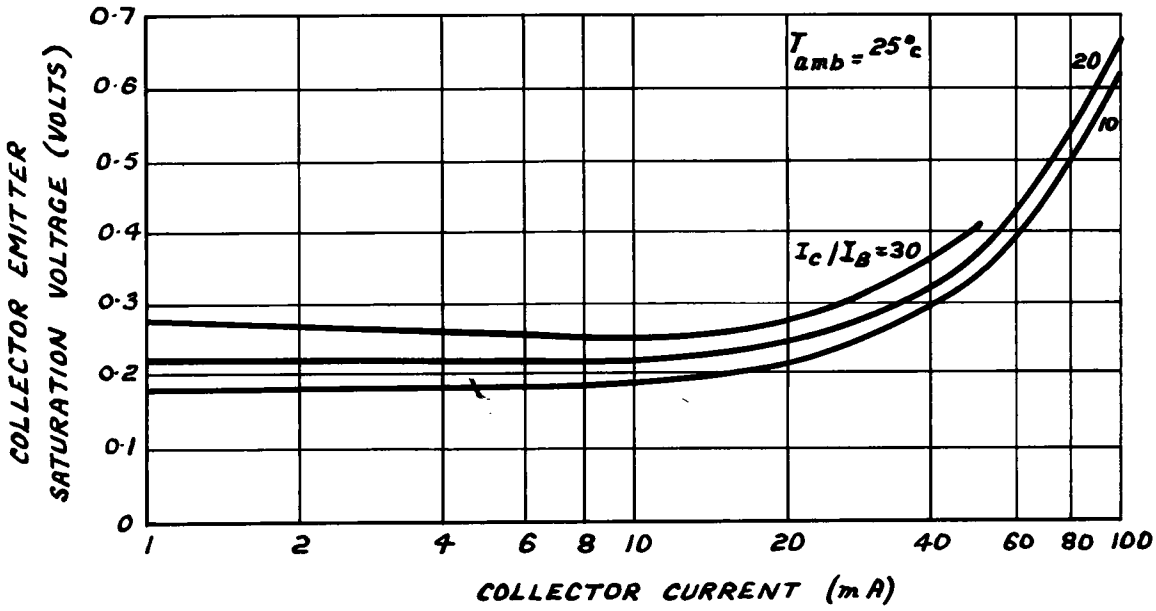
TYPICAL STATIC VALUES OF THE SHORT-CIRCUIT FORWARD CURRENT TRANSFER RATIO FOR VARIOUS VALUES OF COLLECTOR CURRENT.

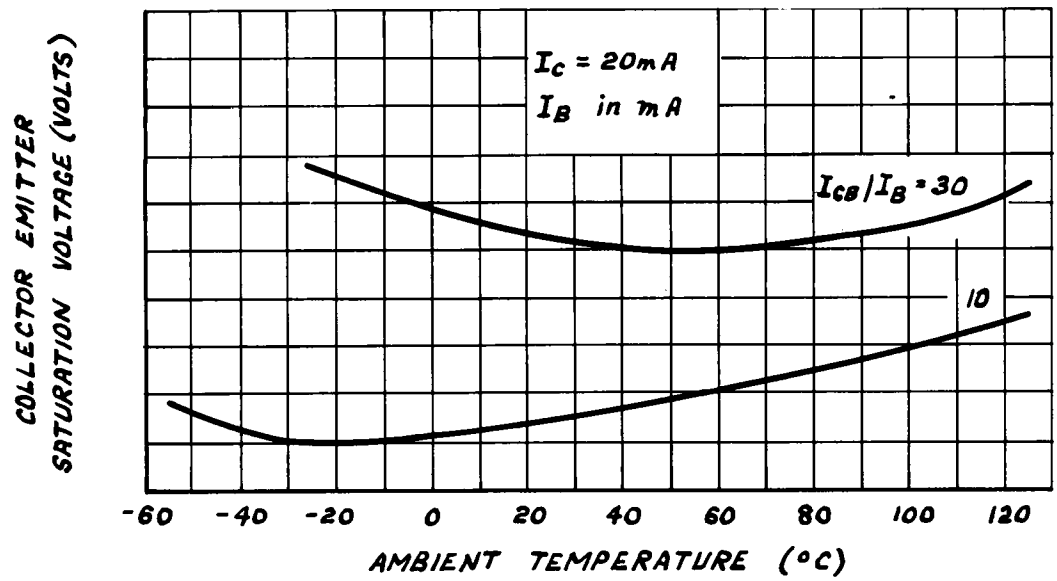


VARIATION WITH AMBIENT TEMPERATURE OF TYPICAL STATIC VALUES OF THE SHORT-CIRCUIT FORWARD CURRENT TRANSFER RATIO

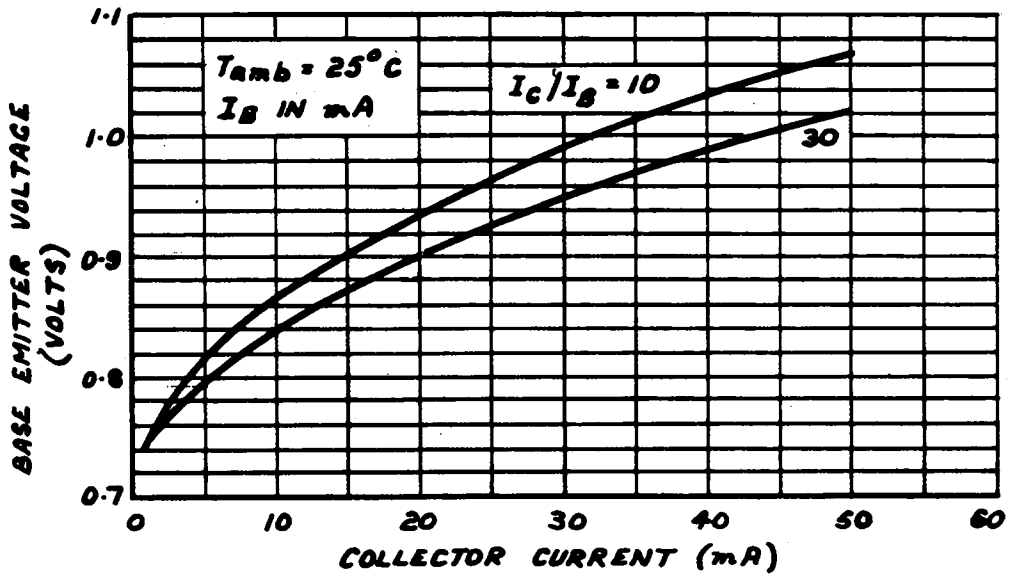


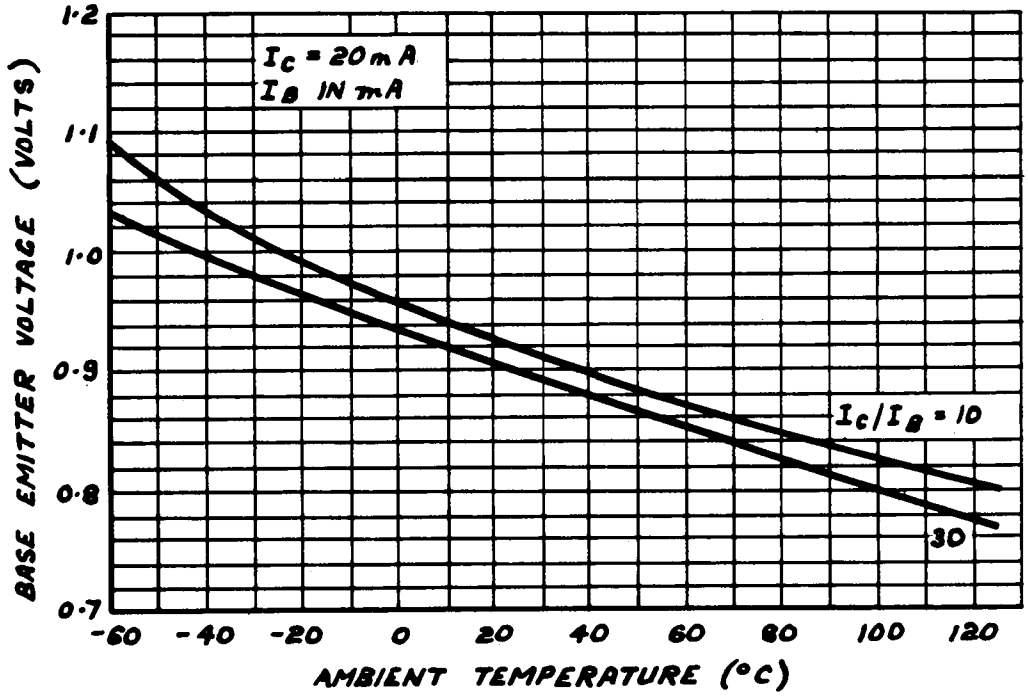
TYPICAL SMALL SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO CHARACTERISTICS



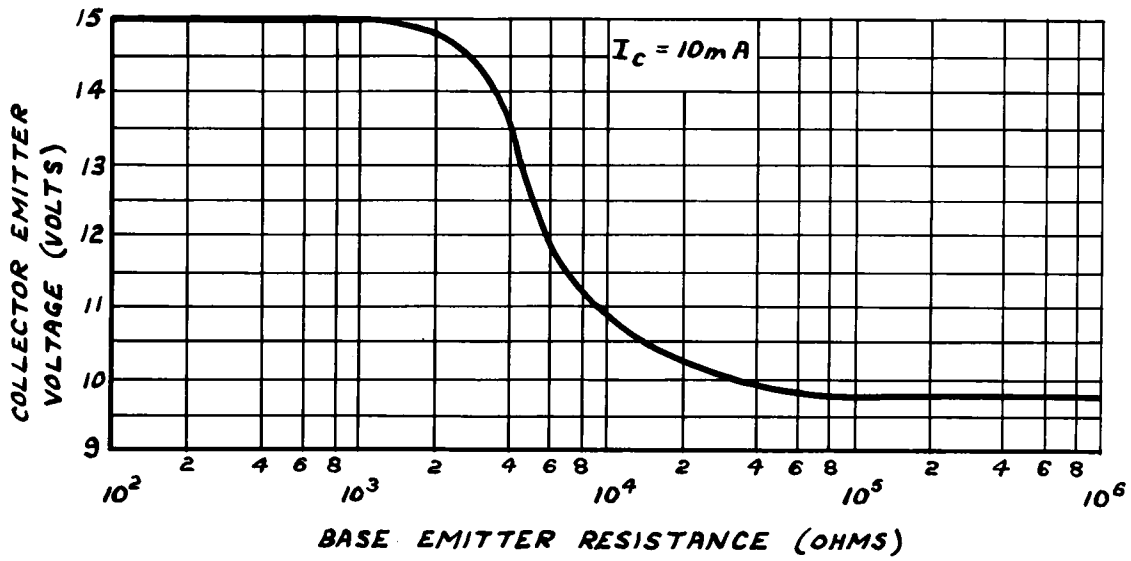


TYPICAL COLLECTOR EMITTER SATURATION VOLTAGE CHARACTERISTICS

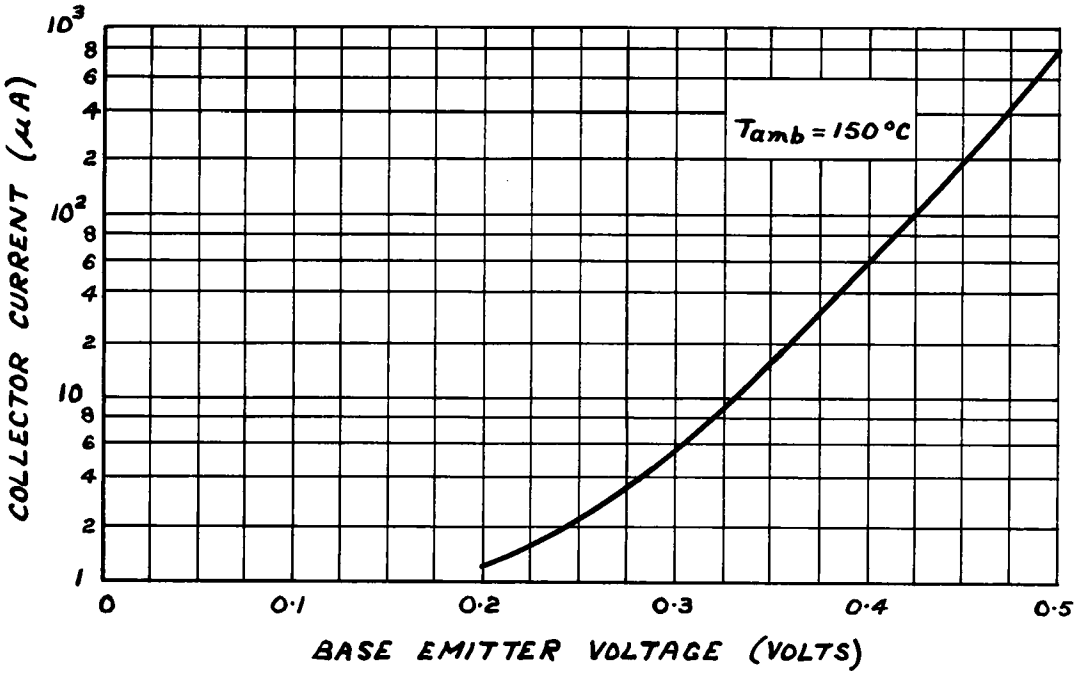




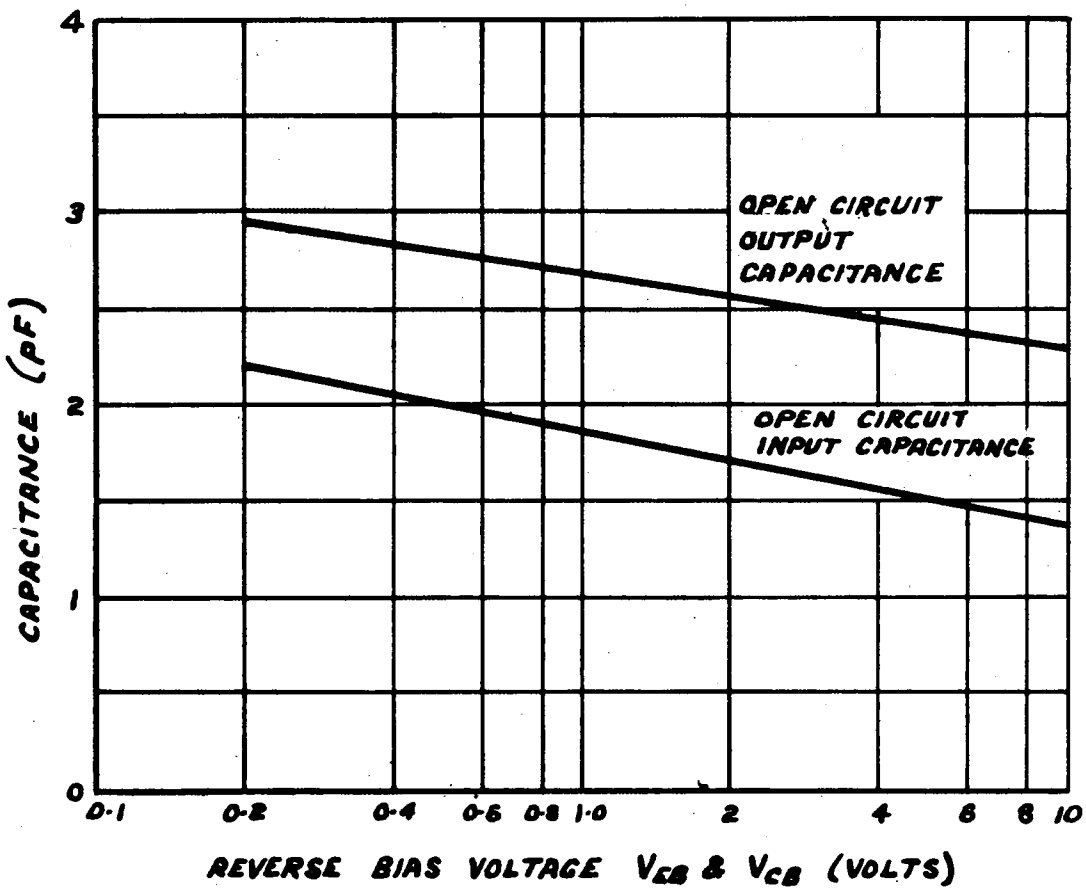
TYPICAL BASE EMITTER VOLTAGE CHARACTERISTICS



TYPICAL COLLECTOR EMITTER VOLTAGE CHARACTERISTICS



TYPICAL COLLECTOR CURRENT CHARACTERISTIC



TYPICAL INPUT & OUTPUT CAPACITANCE CHARACTERISTICS