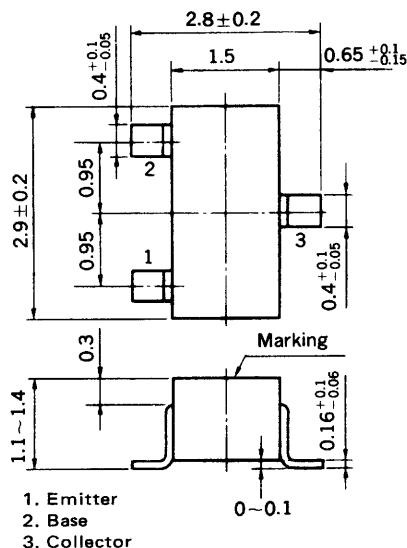


**HIGH SPEED SWITCHING  
NPN SILICON EPITAXIAL TRANSISTOR  
MINI MOLD**

**PACKAGE DIMENSIONS**  
in millimeters



**FEATURE**

- High Speed :  $t_{stg} = 20 \text{ ns MAX.}$

**ABSOLUTE MAXIMUM RATINGS**

Maximum Voltages and Current ( $T_a = 25^\circ\text{C}$ )

Collector to Base Voltage	$V_{CBO}$	40	V
Collector to Emitter Voltage	$V_{CEO}$	20	V
Emitter to Base Voltage	$V_{EBO}$	5	V
Collector Current (DC)	$I_C$	200	mA

Maximum Power Dissipation

Total Power Dissipation at $25^\circ\text{C}$ Ambient Temperature	$P_T$	200	mW
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Maximum Temperatures

Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	$I_{CBO}$			100	nA	$V_{CB} = 30 \text{ V}, I_E = 0$
Emitter Cutoff Current	$I_{EBO}$			100	nA	$V_{EB} = 4.0 \text{ V}, I_C = 0$
DC Current Gain	$h_{FE1}^*$	40	80	180		$V_{CE} = 0.5 \text{ V}, I_C = 1.0 \text{ mA}$
Collector Saturation Voltage	$V_{CE(sat)}^*$		0.13	0.25	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$
Base Saturation Voltage	$V_{BE(sat)}^*$		0.74	0.85	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$
Gain Bandwidth Product	$f_T$	200	500		MHz	$V_{CE} = 10 \text{ V}, I_E = -10 \text{ mA}$
Output Capacitance	$C_{ob}$		3.0	6.0	pF	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$
Turn-on Time	$t_{on}$		12	20	ns	See Test Circuit
Storage Time	$t_{stg}$		7	20	ns	
Turn-off Time	$t_{off}$		18	40	ns	

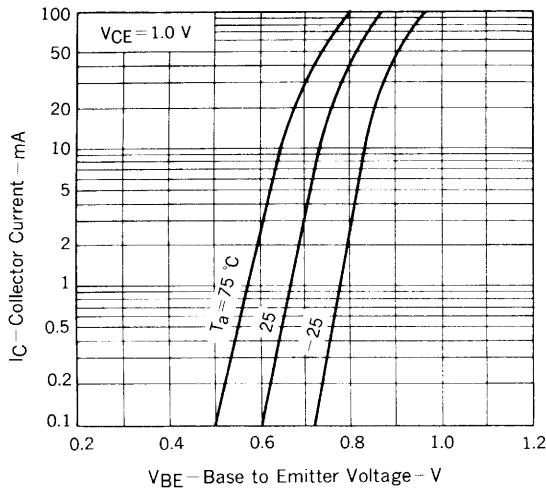
\* Pulsed:  $PW \leq 350 \mu\text{s}$ , Duty Cycle  $\leq 2\%$

$h_{FE}$  Classification

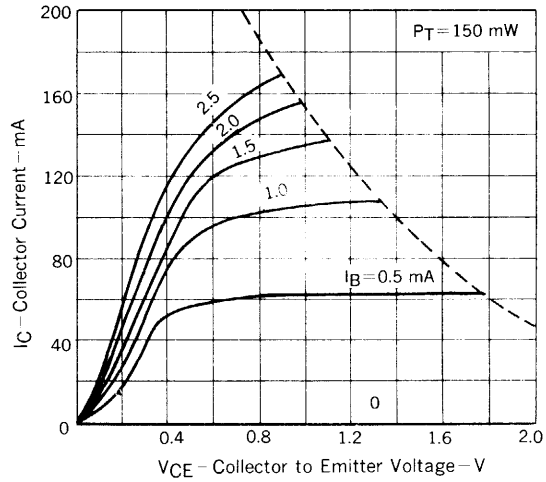
Marking	B2	B3	B4
$h_{FE}$	40 to 80	60 to 120	90 to 180

TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

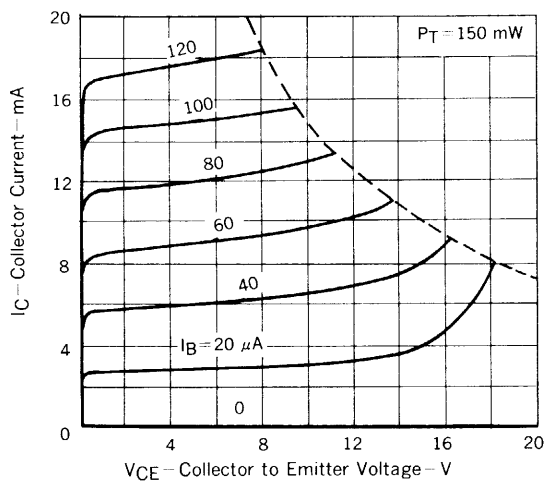
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



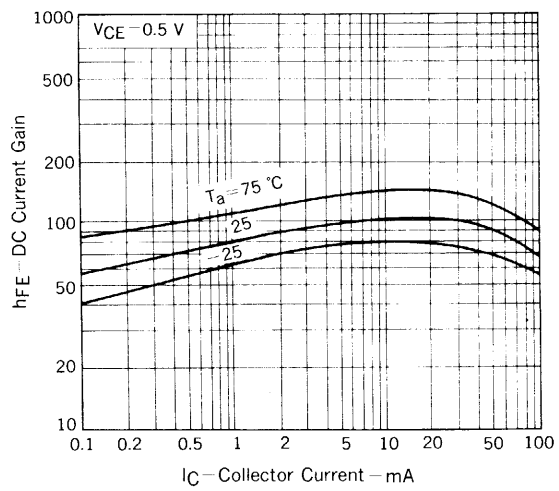
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



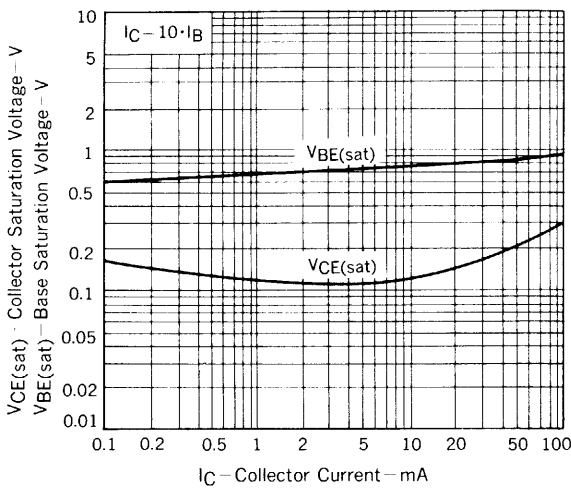
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



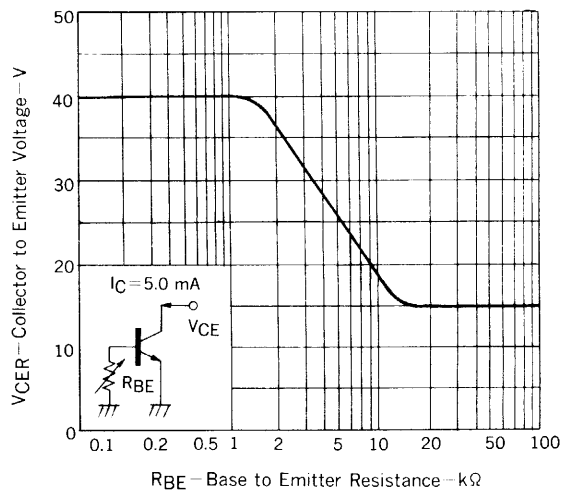
DC CURRENT GAIN vs. COLLECTOR CURRENT



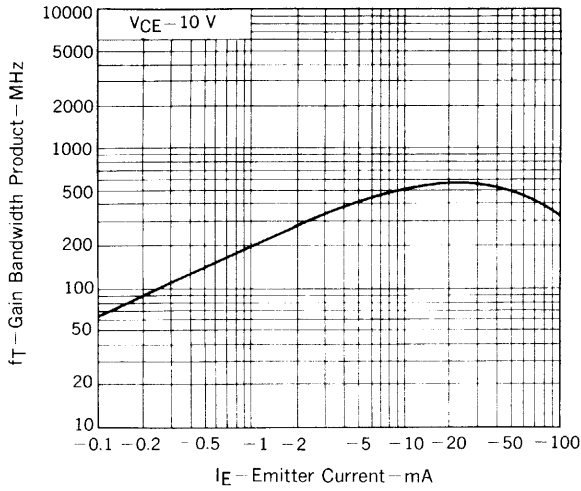
BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



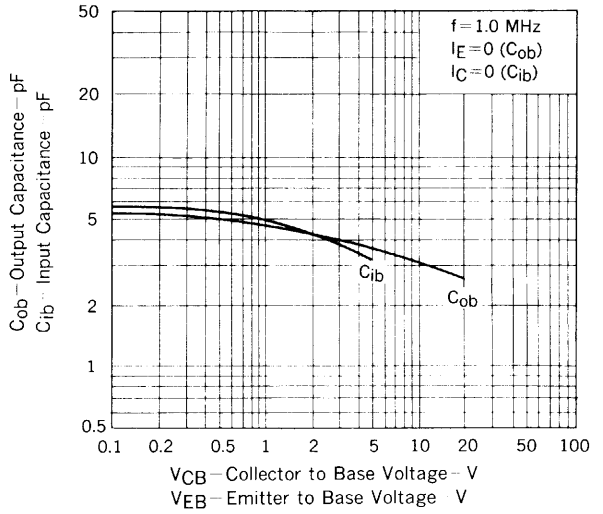
COLLECTOR TO EMITTER VOLTAGE vs. BASE EMITTER RESISTANCE



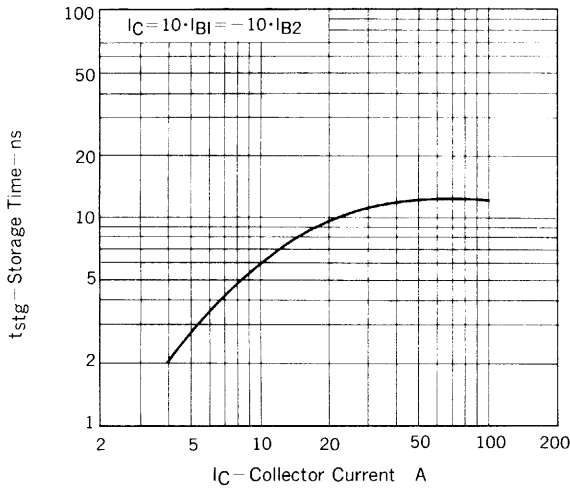
**GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT**



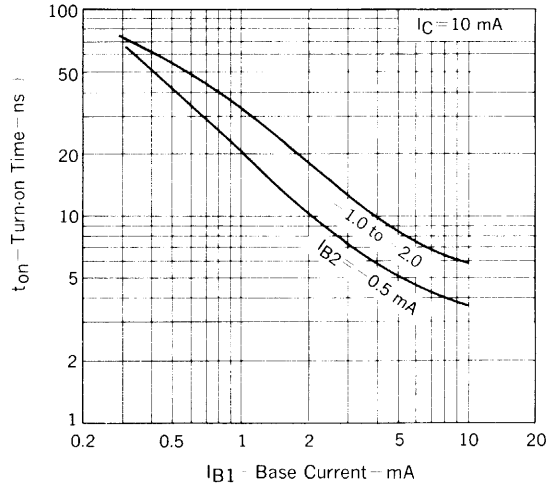
**INPUT AND OUTPUT CAPACITANCE vs. REVERSE VOLTAGE**



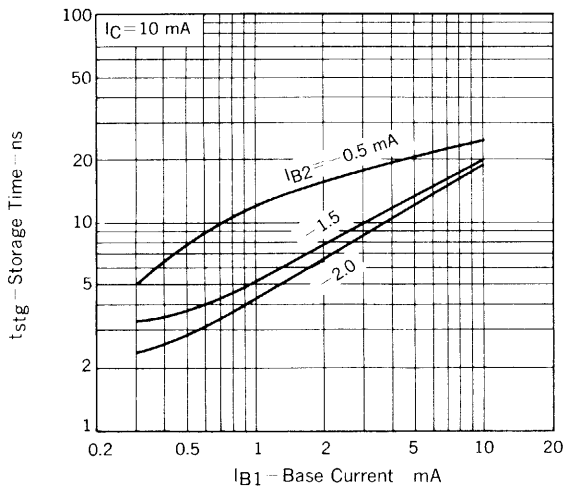
**STORAGE TIME vs. COLLECTOR CURRENT**



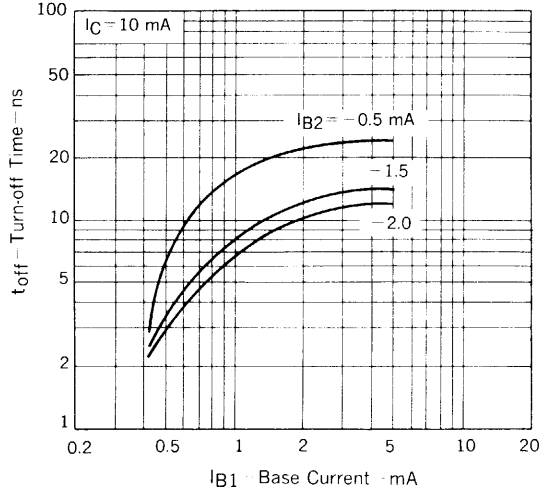
**TURN ON TIME vs. BASE CURRENT**



**STORAGE TIME vs. BASE CURRENT**

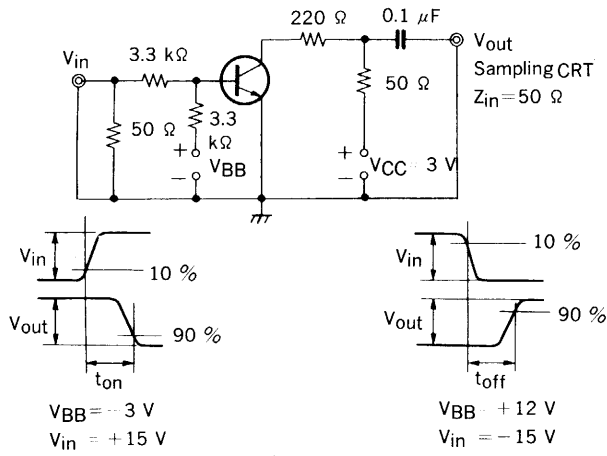


**TURN OFF TIME vs. BASE CURRENT**

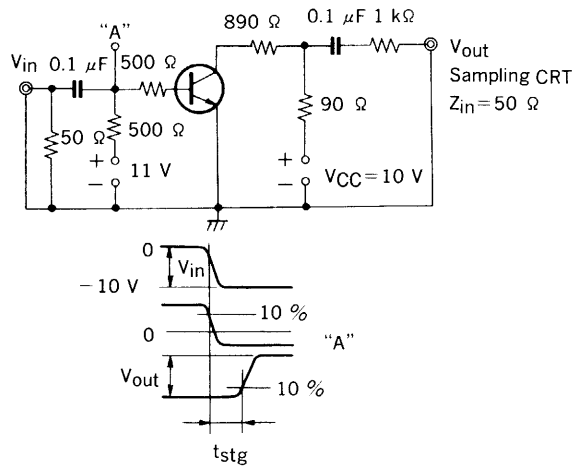


SWITCHING TIME TEST CIRCUIT

$t_{on}$ ,  $t_{off}$  TEST CIRCUIT



$t_{stg}$  TEST CIRCUIT



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