

# 2N 2369A

## SILICON PLANAR NPN

### HIGH-SPEED SATURATED SWITCH

The 2N 2369A is a silicon planar epitaxial NPN transistor in Jedec TO-18 metal case. It is designed specifically for high-speed saturated switching applications at current levels from 100  $\mu$ A to 100 mA.

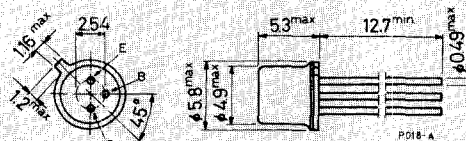
### ABSOLUTE MAXIMUM RATINGS

$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	40	V
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	40	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	15	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	4.5	V
$I_C$	Collector current	0.2	A
$I_{CM}$	Collector current (10 $\mu$ s pulse)	0.5	A
$P_{tot}$	Total power dissipation at $T_{amb} \leq 25^\circ\text{C}$	0.36	W
	at $T_{case} \leq 25^\circ\text{C}$	1.2	W
	at $T_{case} \leq 100^\circ\text{C}$	0.68	W
$T_{stg}, T_j$	Storage and junction temperature	-65 to 200	$^\circ\text{C}$

### MECHANICAL DATA

Dimensions in mm

Collector connected to case



(sim. to TO-18)

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## THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	146	°C/W
$R_{th\ j-amb}$	Thermal resistance junction-ambient	max	486	°C/W

## ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}C$ unless otherwise specified)

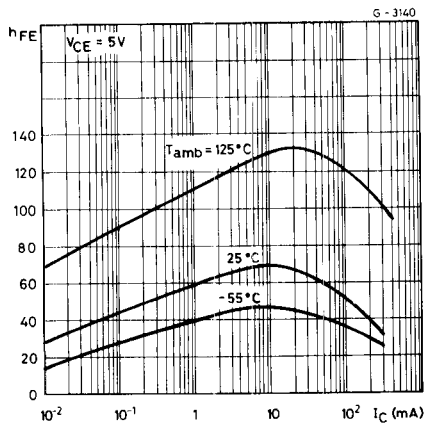
Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector cutoff current ( $I_E = 0$ ) $V_{CB} = 20V$ $T_{amb} = 150^{\circ}C$			30	$\mu A$
$I_{CES}$	Collector cutoff current ( $V_{BE} = 0$ ) $V_{CE} = 20V$			0.4	$\mu A$
$V_{(BR)CBO}$	Collector-base breakdown voltage ( $I_E = 0$ ) $I_C = 10\ \mu A$	40			V
$V_{(BR)CES}$	Collector-emitter breakdown voltage ( $V_{BE} = 0$ ) $I_C = 10\ \mu A$	40			V
$V_{CEO(sus)}^*$	Collector-emitter sustaining voltage ( $I_B = 0$ ) $I_C = 10\ mA$	15			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage ( $I_C = 0$ ) $I_E = 10\ \mu A$	4.5			V
$V_{CE(sat)}^*$	Collector-emitter saturation voltage $I_C = 10\ mA$ $I_B = 1\ mA$ $I_C = 30\ mA$ $I_B = 3\ mA$ $I_C = 100\ mA$ $I_B = 10\ mA$ $I_C = 10\ mA$ $I_B = 1\ mA$ $T_{amb} = 125^{\circ}C$		0.14	0.2	V
			0.17	0.25	V
			0.28	0.5	V
			0.19	0.3	V
$V_{BE(sat)}^*$	Base-emitter saturation voltage $I_C = 10\ mA$ $I_B = 1\ mA$ $I_C = 30\ mA$ $I_B = 3\ mA$ $I_C = 100\ mA$ $I_B = 10\ mA$ $I_C = 10\ mA$ $I_B = 1\ mA$ $T_{amb} = -55\ to\ 125^{\circ}C$	0.7	0.8	0.85	V
			0.9	1.15	V
			1.1	1.6	V
		0.59		1.02	V
$h_{FE}^*$	DC current gain $I_C = 10\ mA$ $V_{CE} = 0.35V$ $I_C = 10\ mA$ $V_{CE} = 1V$ $I_C = 30\ mA$ $V_{CE} = 0.4V$ $I_C = 100\ mA$ $V_{CE} = 1V$	40	63	120	—
		40	66	120	—
		30	71	—	—
		20	—	—	—

## ELECTRICAL CHARACTERISTICS (continued)

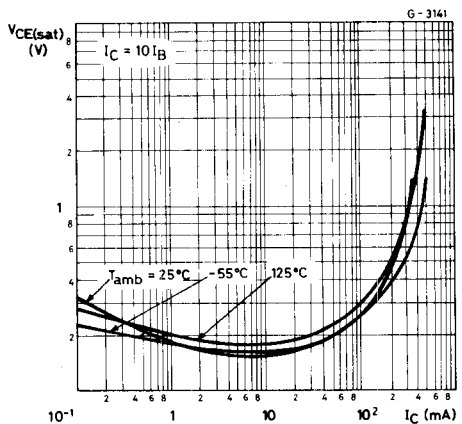
Parameter		Test conditions	Min.	Typ.	Max.	Unit
$h_{FE}^*$	DC current gain	$I_C = 10 \text{ mA}$ $V_{CE} = 0.35 \text{ V}$ $T_{amb} = -55^\circ\text{C}$	20	50		—
$f_T$	Transition frequency	$I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $f = 100 \text{ MHz}$	500	675		MHz
$C_{CBO}$	Collector-base capacitance	$I_E = 0$ $V_{CB} = 5 \text{ V}$ $f = 1 \text{ MHz}$		2.3	4	pF
$t_s$	Storage time	$I_C = 10 \text{ mA}$ $V_{CC} = 10 \text{ V}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$		6	13	ns
$t_{on}$	Turn-on time	$I_C = 10 \text{ mA}$ $V_{CC} = 3 \text{ V}$ $I_{B1} = 3 \text{ mA}$		9	12	ns
$t_{off}$	Turn-off time	$I_C = 10 \text{ mA}$ $V_{CC} = 3 \text{ V}$ $I_{B1} = 3 \text{ mA}$ $I_{B2} = -1.5 \text{ mA}$		13	18	ns

\* Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle = 1%

DC current gain

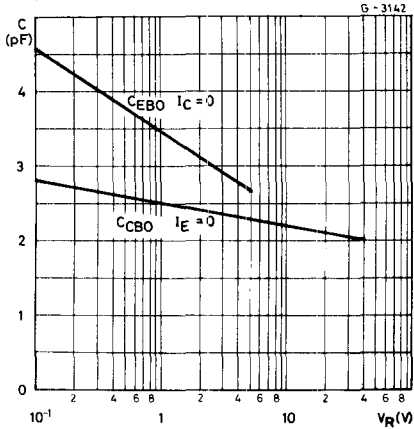


Collector-emitter saturation voltage

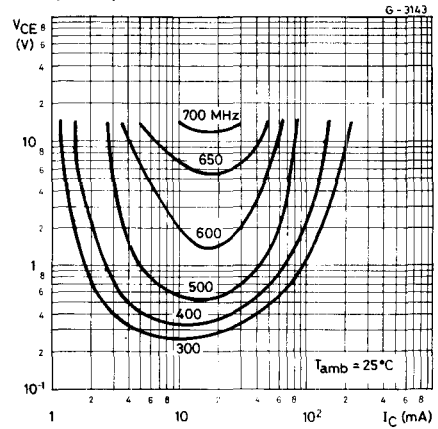


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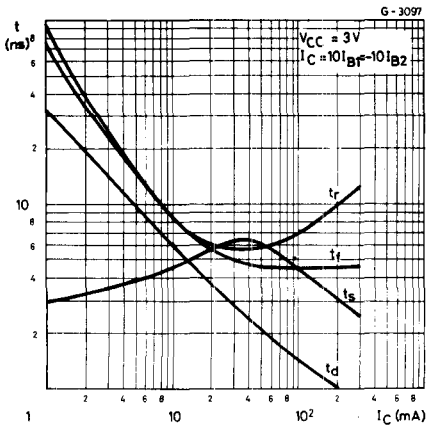
Collector-base and emitter-base capacitances



Contours of constant transition frequency



Switching characteristics



Switching characteristics

