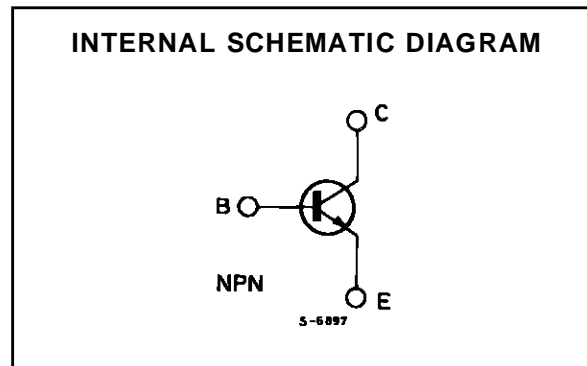
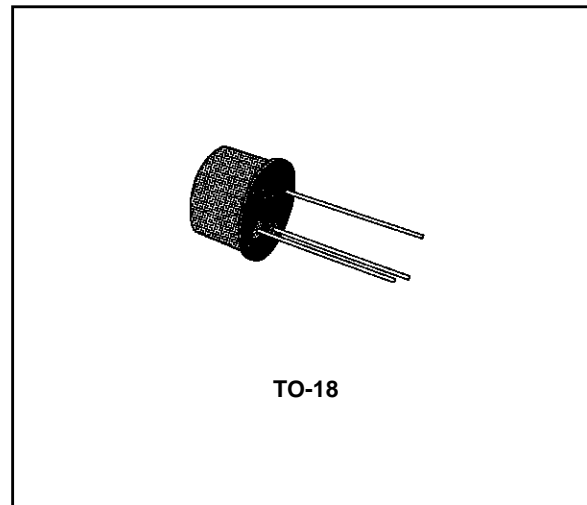


**HIGH SPEED SATURATED SWITCHES**

**DESCRIPTION**

The 2N3013 is a silicon planar epitaxial NPN transistor in Jedec TO-18 metal case intended for high speed low saturation switching application up to 300 mA.



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CBO}$	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 ( $I_C = 0$ )	5	V
$I_C$	Collector Current	200	mA
$I_C$	Collector Peak Current ( $t < 10 \mu s$ )	500	mA
$P_{tot}$	Total Power Dissipation at $T_{amb} < 25 \text{ }^\circ\text{C}$	360	mW
	at $T_{case} < 25 \text{ }^\circ\text{C}$	1200	mW
	at $T_{case} < 100 \text{ }^\circ\text{C}$	680	mW
$T_{stg}$	Storage Temperature	- 55 to 200	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	200	$^\circ\text{C}$

## THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	146	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	486	$^{\circ}C/W$

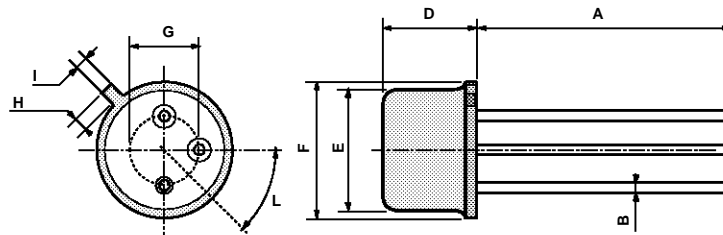
ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\ ^{\circ}C$  unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CES}$	Collector Cutoff Current ( $V_{BE} = 0$ )	$V_{CE} = 20\ V$ $V_{CE} = 20\ V$ $T_{amb} = 125\ ^{\circ}C$			300 40	nA $\mu A$
$V_{(BR)CBO}$	Collector-base Breakdown Voltage	$I_C = 100\ \mu A$ $I_E = 0$	40			V
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage	$I_C = 10\ mA$ $I_B = 0$	15			V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage	$I_E = 100\ \mu A$ $I_C = 0$	5			V
$h_{FE}^*$	DC Current Gain	$V_{CE} = 0.4\ V$ $I_C = 30\ mA$ $V_{CE} = 0.5\ V$ $I_C = 100\ mA$ $V_{CE} = 1\ V$ $I_C = 300\ mA$ $V_{CE} = 0.4\ V$ $I_C = 30\ mA$ $T_{amb} = 55\ ^{\circ}C$	30 25 15 12		120	
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 30\ mA$ $I_B = 3\ mA$ $I_C = 100\ mA$ $I_B = 10\ mA$ $I_C = 300\ mA$ $I_B = 30\ mA$ $I_C = 30\ mA$ $I_B = 3\ mA$ $T_{amb} = 125\ ^{\circ}C$			0.18 0.28 0.50 0.25	V V V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 30\ mA$ $I_B = 3\ mA$ $I_C = 100\ mA$ $I_B = 10\ mA$ $I_C = 300\ mA$ $I_B = 30\ mA$	0.75		0.95 1.20 1.70	V V V
$f_T$	Transition Frequency	$V_{CE} = 10\ V$ $I_C = 30\ mA$ $f = 100\ MHz$	350			MHz
$C_{CBO}$	Collector-base Capacitance	$V_{CB} = 5\ V$ ; $I_E = 0$ $f = 1\ MHz$			5	pF
$C_{EBO}$	Emitter-base Capacitance	$V_{EB} = 0.5\ V$ ; $I_C = 0$ $f = 1\ MHz$			8	pF
$t_{on}$	Turn-on Time	$V_{CC} = 15\ V$ $I_C = 300\ mA$ $I_{B1} = 30\ mA$			15	ns
$t_{off}$	Turn-off Time	$V_{CC} = 15\ V$ $I_C = 300\ mA$ $I_{B1} = -I_{B2} = 30\ mA$			25	ns
$t_s$	Storage Time	$V_{CC} = 10\ V$ $I_C = 10\ mA$ $I_{B1} = -I_{B2} = 10\ mA$			18	ns

\* Pulsed : pulse duration = 300  $\mu s$ , duty cycle = 1.5 %.

## TO39 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	12.7			0.500		
B			0.49			0.019
D			6.6			0.260
E			8.5			0.334
F			9.4			0.370
G	5.08			0.200		
H			1.2			0.047
I			0.9			0.035
L	45° (typ.)					



P008B

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