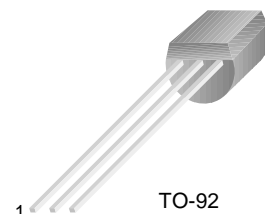


**NPN Switching Transistor**

- Sourced from process 22.



TO-92  
1. Emitter 2. Base 3. Collector

**Absolute Maximum Ratings** \*  $T_a=25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CEO}$	Collector-Emitter Voltage	15	V
$V_{CBO}$	Collector-Base Voltage	40	V
$V_{EBO}$	Emitter-Base Voltage	5.0	V
$I_C$	Collector Current - Continued	300	mA
$T_{STG}$	Operating and Storage Junction Temperature Range	- 55 ~ 150	$^\circ\text{C}$

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired

**NOTES:**

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations

**Electrical Characteristics**  $T_a=25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Max.	Units
<b>Off Characteristics</b>					
$BV_{(BR)CEO}$	Collector-Emitter Breakdown Voltage *	$I_C = 10\text{mA}, I_B = 0$	15		V
$BV_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$I_C = 100\mu\text{A}, V_{BE} = 0$	40		V
$BV_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100\mu\text{A}, I_E = 0$	40		V
$BV_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100\mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 20\text{V}, I_E = 0$		0.5	$\mu\text{A}$
$I_{CES}$	Collector Cutoff Current	$V_{CE} = 20\text{V}, V_{BE} = 0$ $V_{CE} = 20\text{V}, V_{BE} = 0, T_a = 65^\circ\text{C}$		0.5 3.0	$\mu\text{A}$
$I_{EBO}$	Emitter Cutoff Current	$V_{EB} = 5.0\text{V}, I_C = 0$		100	$\mu\text{A}$
<b>On Characteristics *</b>					
$h_{FE}$	DC Current Gain	$V_{CE} = 0.4\text{V}, I_C = 30\text{mA}$ $V_{CE} = 0.5\text{V}, I_C = 100\text{mA}$ $V_{CE} = 1.0\text{V}, I_C = 300\text{mA}$	30 25 15	120	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 30\text{mA}, I_B = 3.0\text{mA}$ $I_C = 100\text{mA}, I_B = 10\text{mA}$ $I_C = 300\text{mA}, I_B = 3.0\text{mA}$		0.2 0.28 0.5	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 30\text{mA}, I_B = 3.0\text{mA}$ $I_C = 100\text{mA}, I_B = 10\text{mA}$ $I_C = 300\text{mA}, I_B = 3.0\text{mA}$	0.73	0.95 1.2 1.7	V
<b>Small Signal Characteristics</b>					
$C_{cb}$	Collector-Base Capacitance	$V_{CB} = 5.0\text{V}, I_E = 0, f = 1\text{MHz}$		5.0	pF
$C_{eb}$	Emitter-Base Capacitance	$V_{CB} = 5.0\text{V}, I_C = 0, f = 1\text{MHz}$		8.0	pF
$h_{fe}$	Small-Signal Current Gain	$I_C = 300\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}$	3.5		

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

**Electrical Characteristics**  $T_a=25^\circ\text{C}$  unless otherwise noted (Continued)

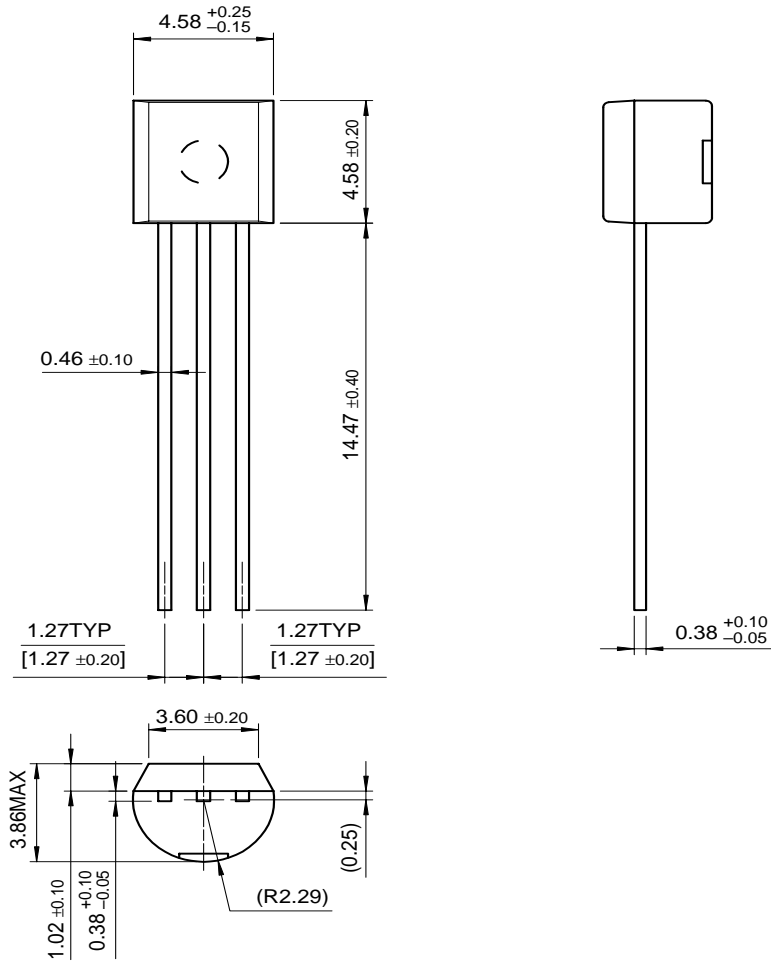
Symbol	Parameter	Test Condition	Min.	Max.	Units
<b>Switching Characteristics</b>					
$t_s$	Storage Time	$I_C = 300\text{mA}$ , $V_{CC} = 10\text{V}$ $I_{B1} = I_{B2} = 30\text{mA}$		20	ns
$t_{on}$	Turn-On Time			18	ns
$t_{off}$	Turn-Off Time			28	ns

**Thermal Characteristics**  $T_a=25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Max.	Units
$P_D$	Total Device Dissipation	350	mW
	Derate above $25^\circ\text{C}$	2.8	mW/ $^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	$^\circ\text{C}/\text{W}$

# Package Dimensions

## TO-92



Dimensions in Millimeters

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