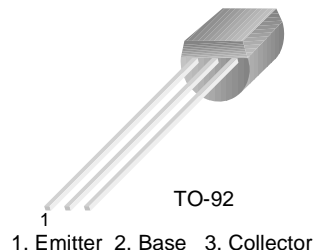


**NPN Switching Transistor**

- This device is designed for high speed saturated switching at collector currents of 10mA to 100mA.
- Sourced from process 21.



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

Symbol	Parameter	Ratings	Units
$V_{CEO}$	Collector-Emitter Voltage	15	V
$V_{CBO}$	Collector-Base Voltage	40	V
$V_{EBO}$	Emitter-Base Voltage	4.5	V
$I_C$	Collector Current - Continuous	200	mA
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 ~ 150	$^{\circ}\text{C}$

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

**NOTES:**

- 1) These rating are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady 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>					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage *	$I_C = 10\text{mA}, I_B = 0$	15		V
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$I_C = 10\mu\text{A}, V_{BE} = 0$	40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\mu\text{A}, I_E = 0$	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\mu\text{A}, I_C = 0$	4.5		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 20\text{V}, I_E = 0$ $V_{CB} = 20\text{V}, I_E = 0, T_a = 125^{\circ}\text{C}$		0.4 30	$\mu\text{A}$
<b>On Characteristics</b>					
$h_{FE}$	DC Current Gain *	$I_C = 10\text{mA}, V_{CE} = 1.0\text{V}$ $I_C = 100\text{mA}, V_{CE} = 2.0\text{V}$	40 20	120	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage *	$I_C = 10\text{mA}, I_B = 1.0\text{mA}$		0.25	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 10\text{mA}, I_B = 1.0\text{mA}$	0.7	0.85	V
<b>Small Signal Characteristics</b>					
$C_{obo}$	Output Capacitance	$V_{CB} = 5.0\text{V}, I_E = 0, f = 1.0\text{MHz}$		4.0	pF
$C_{ibo}$	Input Capacitance	$V_{EB} = 0.5\text{V}, I_C = 0, f = 1.0\text{MHz}$		5.0	pF
$h_{fe}$	Small -Signal Current Gain	$I_C = 10\text{mA}, V_{CE} = 10\text{V}, R_G = 2.0\text{k}\Omega,$ $f = 100\text{MHz}$	5.0		
<b>Switching Characteristics</b>					
$t_s$	Storage Time	$I_{B1} = I_{B2} = I_C = 10\text{mA}$		13	ns
$t_{on}$	Turn-On Time	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}, I_{B1} = 3.0\text{mA}$		12	ns
$t_{off}$	Turn-Off Time	$V_{CC} = 3.0\text{V}, I_C = 10\text{mA}, I_{B1} = 3.0\text{mA},$ $I_{B2} = 1.5\text{mA}$		18	ns

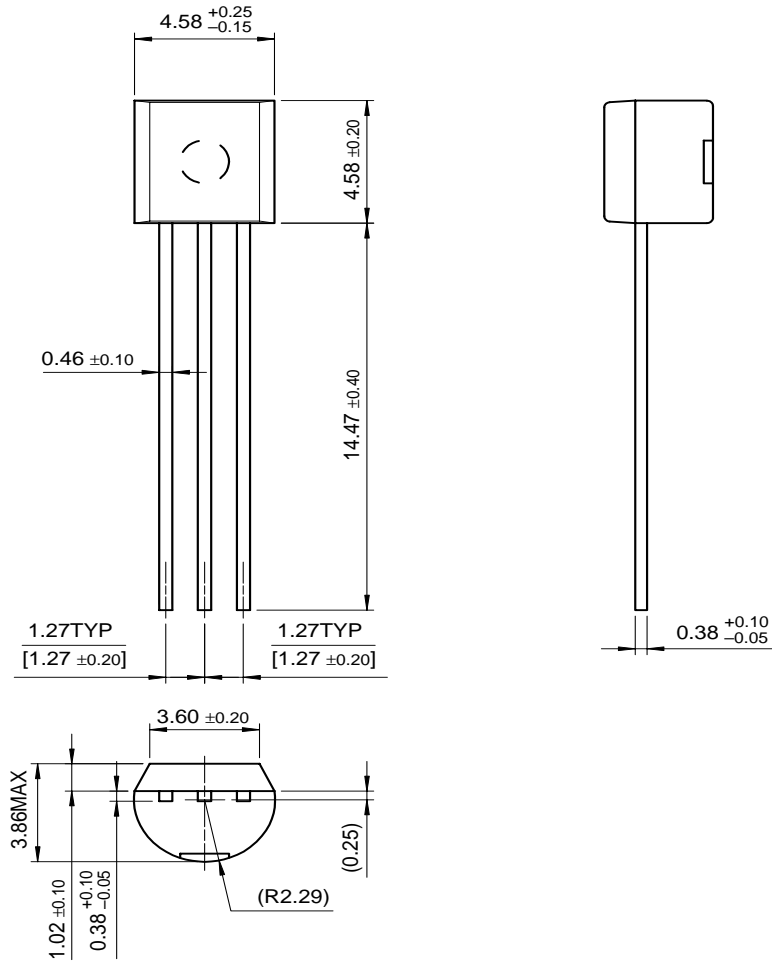
\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

**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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## PRODUCT STATUS DEFINITIONS

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