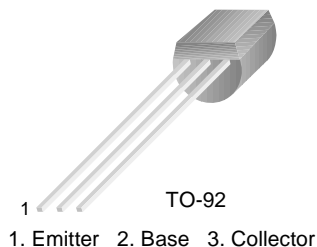


# PN4258

## PNP Switching Transistor

- This device is designed for very high speed saturated switching at collector currents to 100mA.
- Sourced from process 65.



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

Symbol	Parameter	Value	Units
$V_{CEO}$	Collector-Emitter Voltage	-12	V
$V_{CBO}$	Collector-Base Voltage	-12	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	$^\circ\text{C}$

\* 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>					
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage *	$I_C = -100\mu\text{A}, V_{BE} = 0$	-12		V
$V_{CEO(SUS)}$	Collector-Emitter Sustaining Voltage *	$I_C = -3.0\text{mA}, I_B = 0$	-12		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -100\mu\text{A}, I_E = 0$	-12		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = -100\mu\text{A}, I_C = 0$	-4.5		V
$I_{CES}$	Collector Cutoff Current	$V_{CE} = -6.0\text{V}, V_{BE} = 0$ $V_{CE} = -6.0\text{V}, V_{BE} = 0, T_A = 65^\circ\text{C}$		-0.01 -5.0	$\mu\text{A}$ $\mu\text{A}$
<b>On Characteristics</b>					
$h_{FE}$	DC Current Gain	$I_C = -1.0\text{mA}, V_{CE} = -0.5\text{V}$ $I_C = -10\text{mA}, V_{CE} = -3.0\text{V}$ $I_C = -50\text{mA}, V_{CE} = -1.0\text{V}$	15 30 30	120	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$ $I_C = -50\text{mA}, I_B = -5.0\text{mA}$		-0.15 -0.5	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$ $I_C = -50\text{mA}, I_B = -5.0\text{mA}$	-0.75	-0.95 -1.5	V V
<b>Small Signal Characteristics</b>					
$f_T$	Current Gain Bandwidth Product	$I_C = -10\text{mA}, V_{CE} = -5.0\text{V}, f = 100\text{MHz}$ $I_C = -10\text{mA}, V_{CE} = -10\text{V}, f = 100\text{MHz}$	700 700		MHz MHz
$C_{iob}$	Input Capacitance	$V_{BE} = -0.5\text{V}, I_C = 0, f = 1.0\text{MHz}$		3.5	pF
$C_{cb}$	Collector-Base Capacitance	$V_{BE} = -5.0\text{V}, I_E = 0, f = 1.0\text{MHz}$		3.0	pF

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

Symbol	Parameter	Test Condition	Min.	Max.	Units
<b>Switching Characteristics</b>					
$t_{on}$	Turn-on Time	$V_{CC} = -1.5\text{V}$ , $V_{BE(off)} = 0\text{V}$ $I_C = -10\text{mA}$ , $I_{B1} = -1.0\text{mA}$		15	ns
$t_d$	Delay Time			10	ns
$t_r$	Rise Time			15	ns
$t_{off}$	Turn-off Time	$V_{CC} = -1.5\text{V}$ , $I_C = -10\text{mA}$ , $I_{B1} = I_{B2} = -10\text{mA}$		20	ns
$t_s$	Storage Time			20	ns
$t_f$	Fall Time			10	ns
$t_s$	Storage Time	$I_C = -10\text{mA}$ , $I_{B1} = I_{B2} = -10\text{mA}$		20	ns

\* Pulse Test: Pulse Width  $\leq 300\text{ms}$ , 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	$\text{mW}/^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	$^\circ\text{C}/\text{W}$

# Typical Characteristics

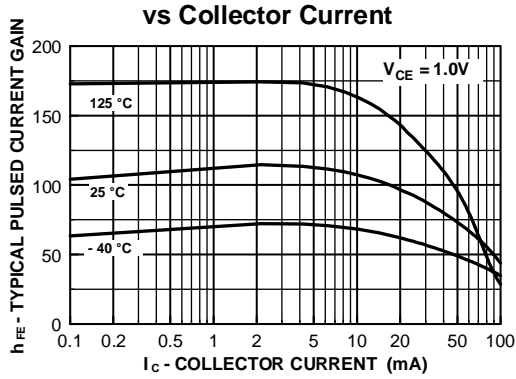


Figure 1. Typical Pulsed Current Gain vs Collector Current

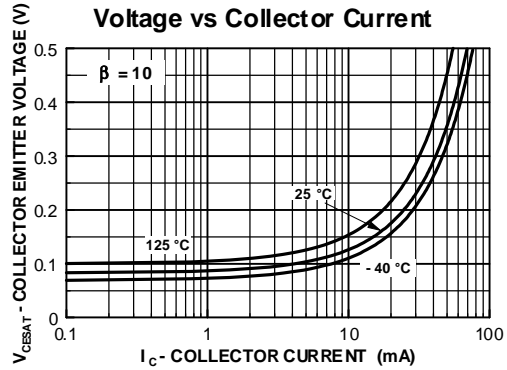


Figure 2. Collector-Emitter Saturation Voltage vs Collector Current

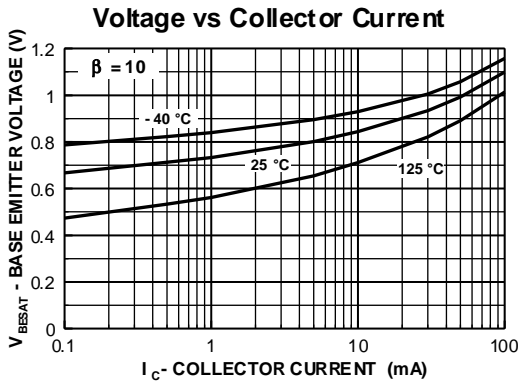


Figure 3. Base-Emitter Saturation Voltage vs Collector Current

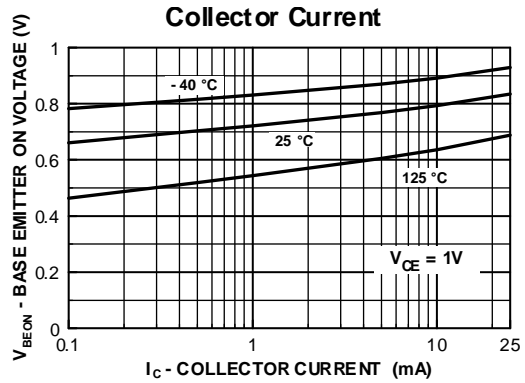


Figure 4. Base-Emitter On Voltage vs Collector Current

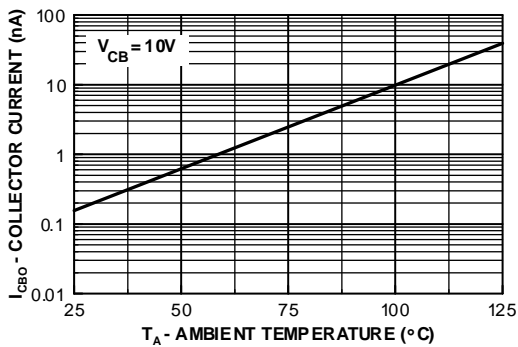


Figure 5. Collector Cutoff Current vs Ambient Temperature

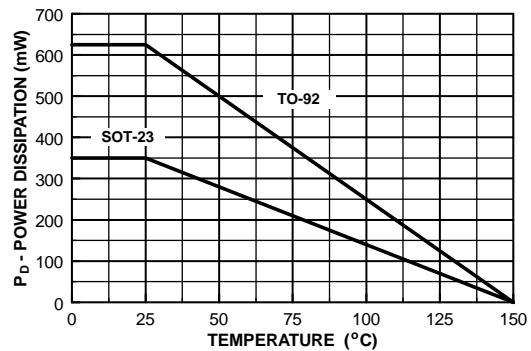


Figure 6. Power Dissipation vs Ambient Temperature

Typical Characteristics (Continued)

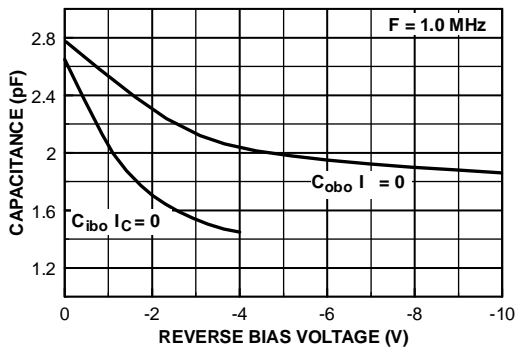


Figure 7. Input/Output Capacitance vs Reverse Bias Voltage

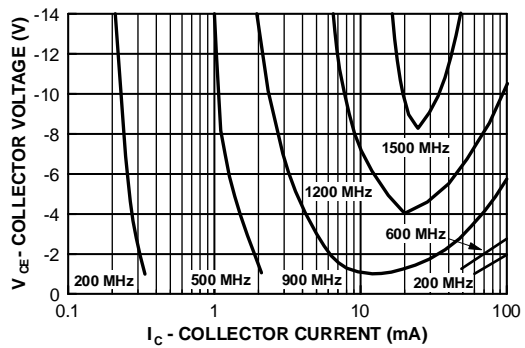


Figure 8. Contours of Constant Gain Bandwidth Product ( $f_T$ )

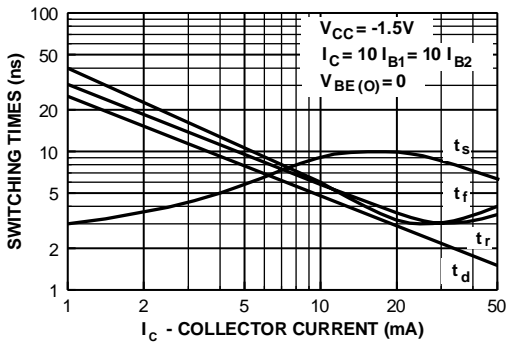


Figure 9. Switching Times vs Collector Current

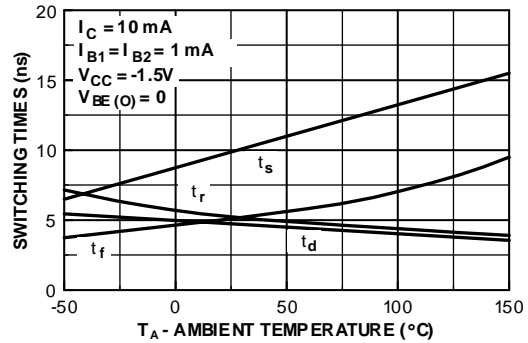


Figure 10. Switching Times vs Ambient Temperature

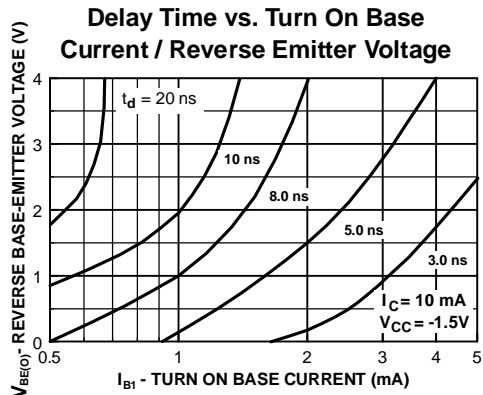


Figure 11. Delay Time vs Turn On Base Current/Reverse Emitter Voltage

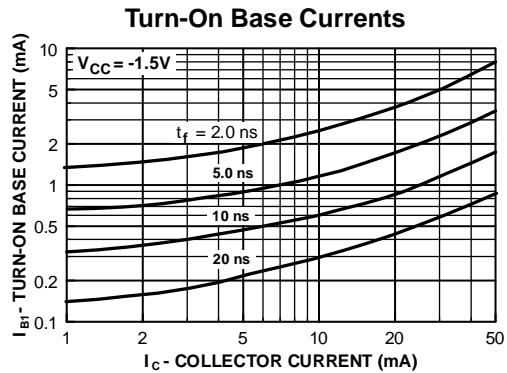


Figure 12. Rise Time vs Collector and Turn-On Base Currents

Typical Characteristics (Continued)

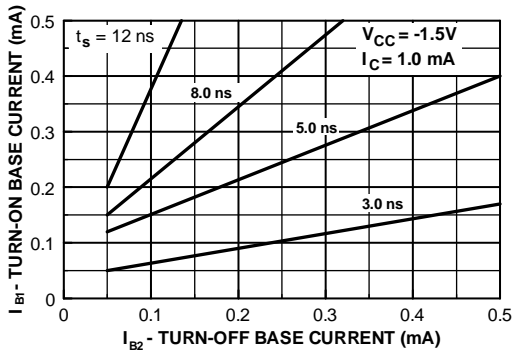


Figure 13. Storage Time vs Turn-On/Turn-Off Base Current

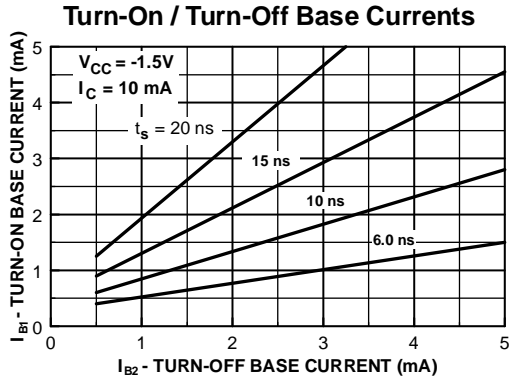


Figure 14. Storage Time vs Turn-On/Turn-Off Base Currents

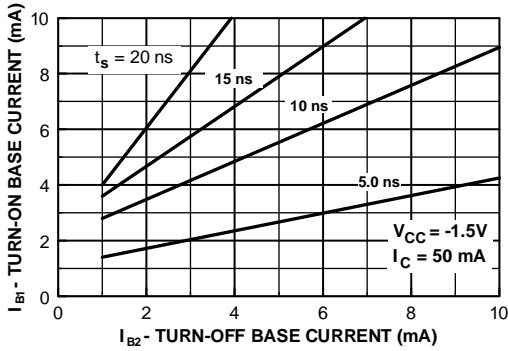


Figure 15. Storage Time vs Turn-On/Turn-Off Base Current

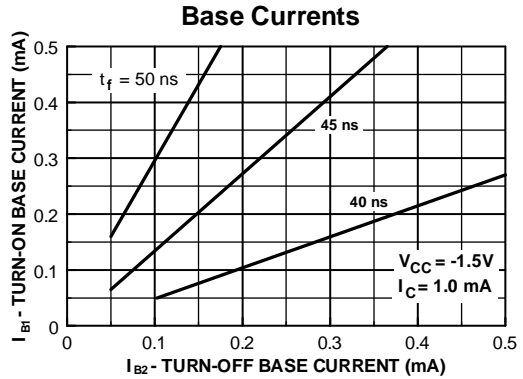


Figure 16. Fall Time vs Turn-On/Turn-Off Base Currents

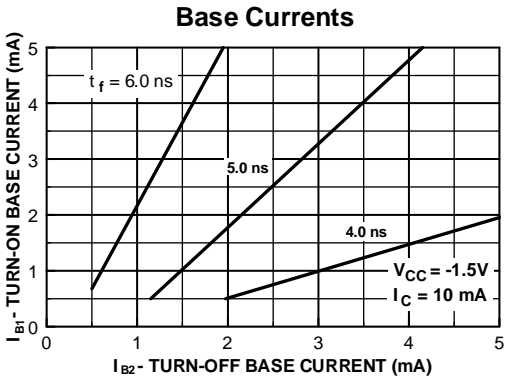


Figure 17. Fall Time vs Turn-On/Turn-Off Base Currents

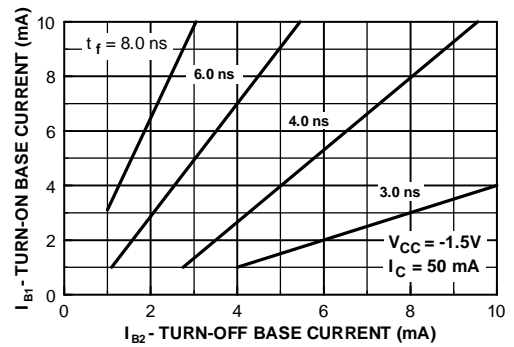


Figure 18. Fall Time vs Turn-On/Turn-Off Base Currents

# Test Circuit

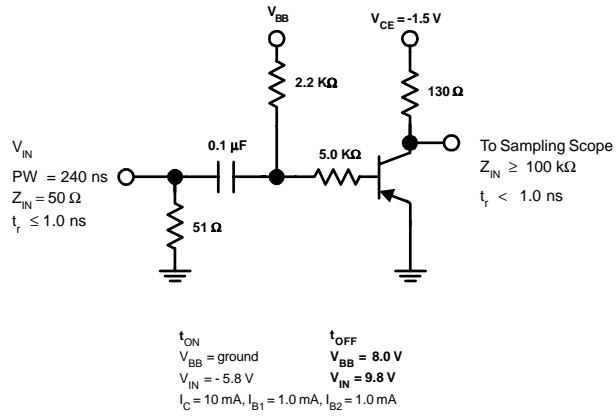
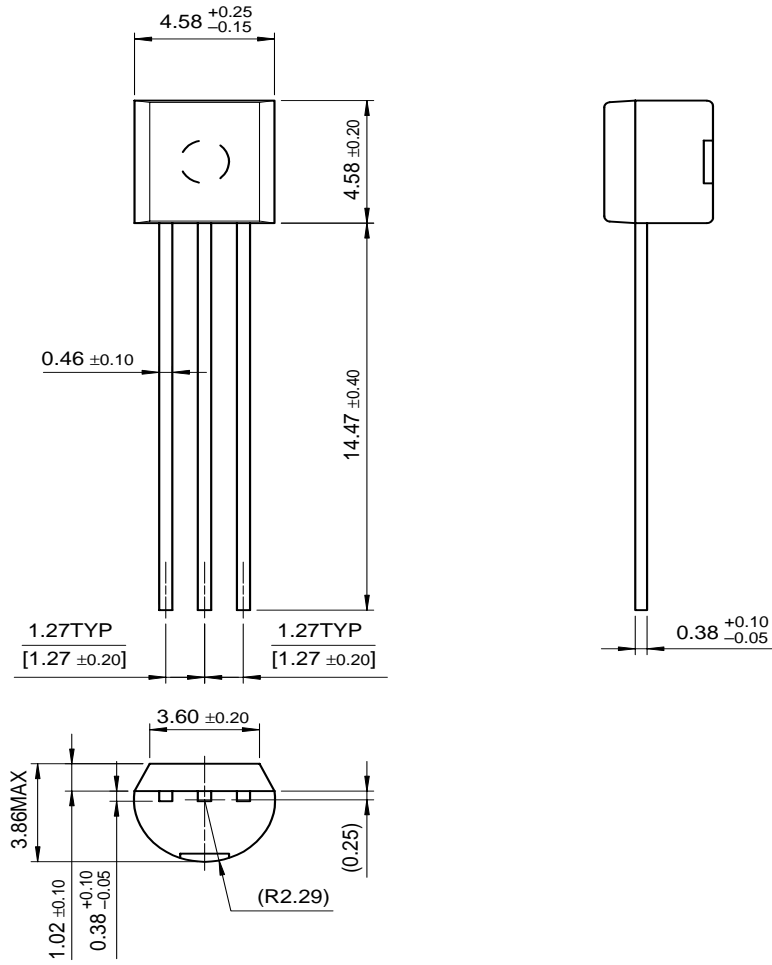


Figure 1.  $t_{on}$ ,  $t_{off}$  Test Circuit

# Package Dimensions

## TO-92



Dimensions in Millimeters

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