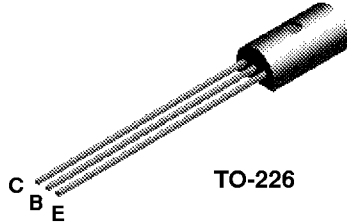


# TN4033A



## PNP General Purpose Amplifier

This device is designed for general purpose amplifier and switching applications at currents to 500 mA and collector voltages up to 70V. Sourced from Process 67.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	80	V
V <sub>CBO</sub>	Collector-Base Voltage	80	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	1.0	A
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°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.

### Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max	Units
		TN4033A	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	1.0	W
		8.0	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	125	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	50	°C/W

# PNP General Purpose Amplifier

(continued)

TN4033A

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Sustaining Voltage*	$I_C = 10 \text{ mA}, I_B = 0$	80		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	80		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \text{ } \mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 60 \text{ V}, I_E = 0$ $V_{CB} = 60 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$		50 50	nA $\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 5.0 \text{ V}, I_C = 0$		10	$\mu\text{A}$

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 100 \text{ } \mu\text{A}, V_{CE} = 5.0 \text{ V}$ $I_C = 100 \text{ mA}, V_{CE} = 5.0 \text{ V}, T_A = -55^\circ\text{C}$ $I_C = 100 \text{ mA}, V_{CE} = 5.0 \text{ V}$ $I_C = 500 \text{ mA}, V_{CE} = 5.0 \text{ V}$ $I_C = 1.0 \text{ A}, V_{CE} = 5.0 \text{ V}$	75 40 100 70 25	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$		0.15 0.5	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$		0.9	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 500 \text{ mA}, V_{CE} = 0.5 \text{ V}$		1.1	V

### SMALL SIGNAL CHARACTERISTICS

$C_{obo}$	Output Capacitance	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$		20	pF
$C_{ibo}$	Input Capacitance	$V_{EB} = 0.5 \text{ V}, I_C = 0, f = 1.0 \text{ MHz}$		110	pF
$h_{fe}$	Small-Signal Current Gain	$I_C = 50 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$	1.0	4.0	

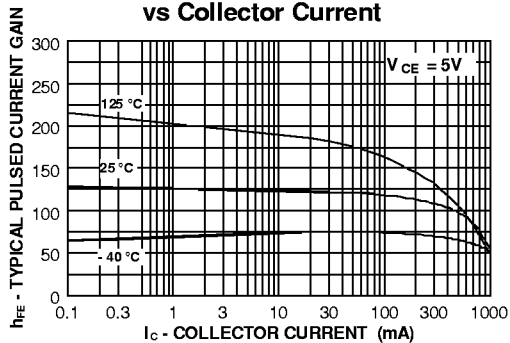
### SWITCHING CHARACTERISTICS

$t_s$	Storage Time	$I_C = 500 \text{ mA}, I_{B1} = I_{B2} = 50 \text{ mA}$		350	ns
$t_{on}$	Turn-On Time	$I_C = 500 \text{ mA}, I_{B1} = 50 \text{ mA}$		100	ns
$t_f$	Fall Time	$I_C = 500 \text{ mA}, I_{B1} = I_{B2} = 50 \text{ mA}$		50	ns

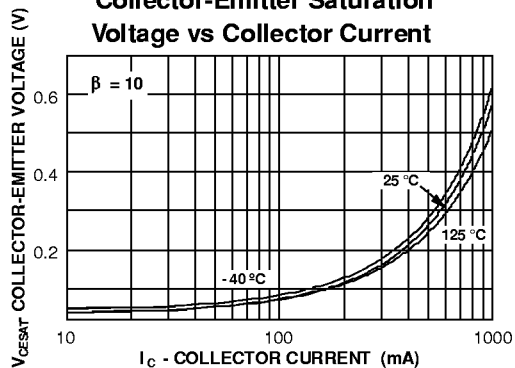
\*Pulse Test: Pulse Width  $\leq 300 \text{ } \mu\text{s}$ , Duty Cycle  $\leq 1.0\%$

Typical Characteristics

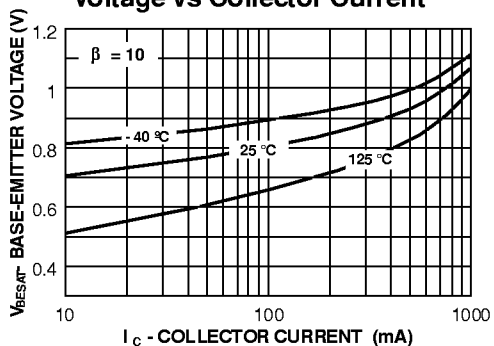
Typical Pulsed Current Gain vs Collector Current



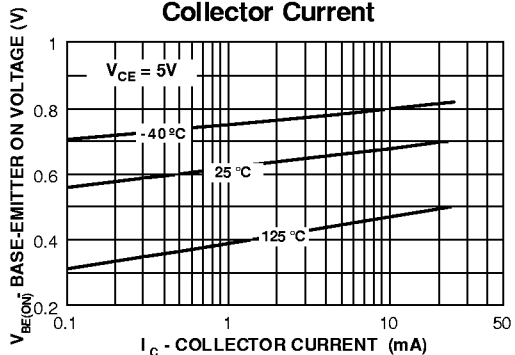
Collector-Emitter Saturation Voltage vs Collector Current



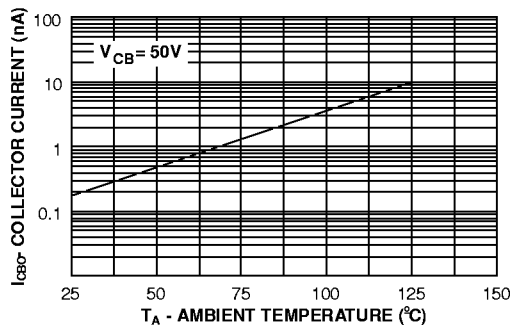
Base-Emitter Saturation Voltage vs Collector Current



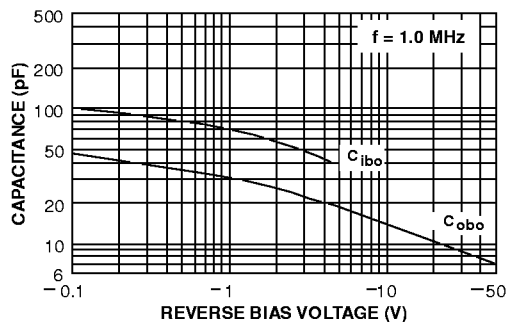
Base-Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

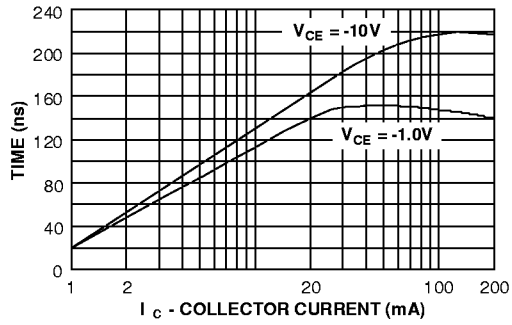


Collector-Base and Emitter-Base Capacitance vs Reverse Bias Voltage

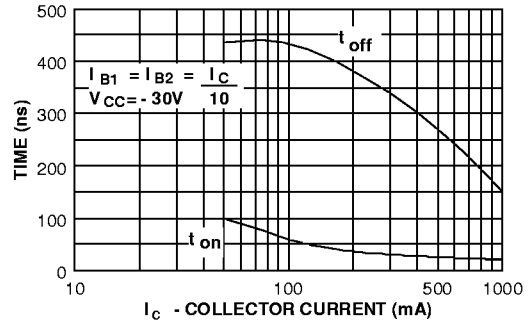


Typical Characteristics (continued)

Switching Times vs  
Collector Current



Turn On and Turn Off Times vs  
Collector Current



Power Dissipation vs  
Ambient Temperature

