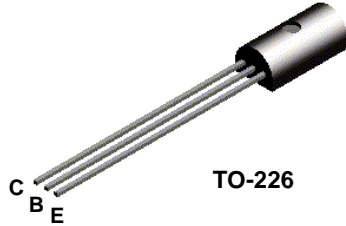


## TN3019A



### NPN General Purpose Amplifier

This device is designed for general purpose medium power amplifiers and switches requiring collector currents to 500 mA and collector voltages up to 80 V. Sourced from Process 12.

#### 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	140	V
V <sub>EBO</sub>	Emitter-Base Voltage	7.0	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
		TN3019A	
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

# NPN General Purpose Amplifier

(continued)

TN3019A

## 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 Breakdown Voltage*	$I_C = 30 \text{ mA}, I_B = 0$	80		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \mu\text{A}, I_E = 0$	140		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100 \mu\text{A}, I_C = 0$	7.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 90 \text{ V}, I_E = 0$ $V_{CB} = 90 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$		0.01 10	$\mu\text{A}$ $\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 5.0 \text{ V}, I_C = 0$		0.01	$\mu\text{A}$

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 0.1 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 150 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 150 \text{ mA}, V_{CE} = 10 \text{ V}, T_A = -55^\circ\text{C}$ $I_C = 500 \text{ mA}, V_{CE} = 10 \text{ V}^*$ $I_C = 1.0 \text{ A}, V_{CE} = 10 \text{ V}^*$	50 90 100 40 50 15	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$		0.2 0.5	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$		1.1	V

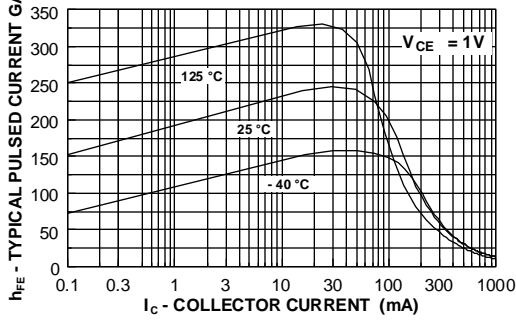
### SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 50 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 20 \text{ MHz}$	100		MHz
$C_{obo}$	Output Capacitance	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$		12	pF
$C_{ibo}$	Input Capacitance	$V_{BE} = 0.5 \text{ V}, I_C = 0, f = 1.0 \text{ MHz}$		60	pF
$h_{fe}$	Small-Signal Current Gain	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 1.0 \text{ MHz}$	80	400	
$rb'C_c$	Collector Base Time Constant	$I_E = 10 \text{ mA}, V_{CB} = 10 \text{ V},$ $f = 4.0 \text{ MHz}$		400	pS
NF	Noise Figure	$I_C = 100 \text{ mA}, V_{CE} = 10 \text{ V},$ $R_S = 1.0 \text{ k}\Omega, f = 1.0 \text{ kHz}$		4.0	dB

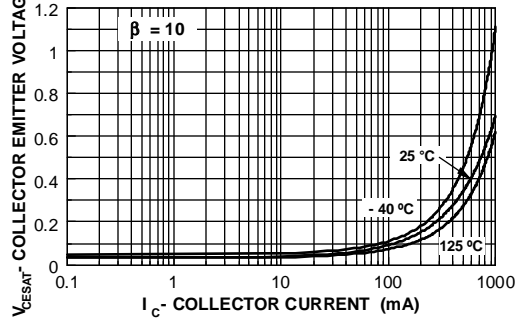
\*Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 1.0\%$

Typical Characteristics

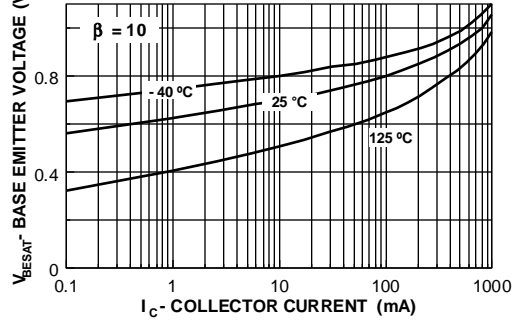
Typical Pulsed Current Gain vs Collector Current



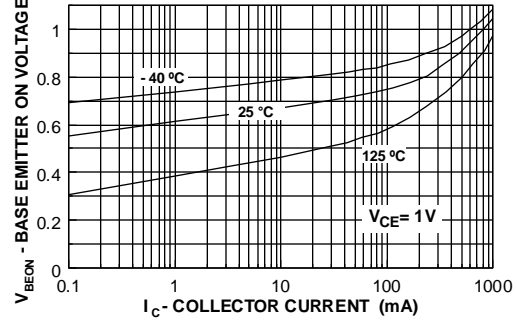
Collector-Emitter Saturation Voltage vs Collector Current



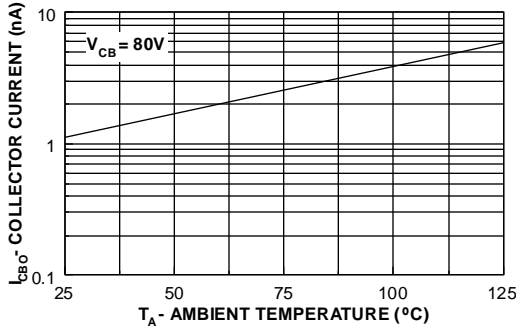
Base-Emitter Saturation Voltage vs Collector Current



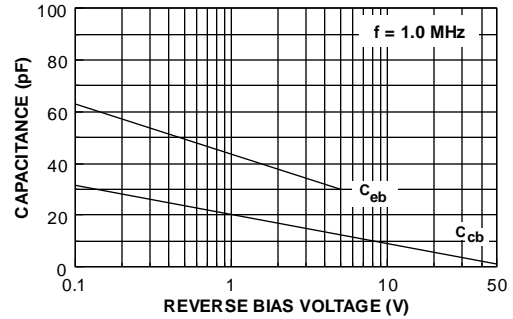
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs. Ambient Temperature

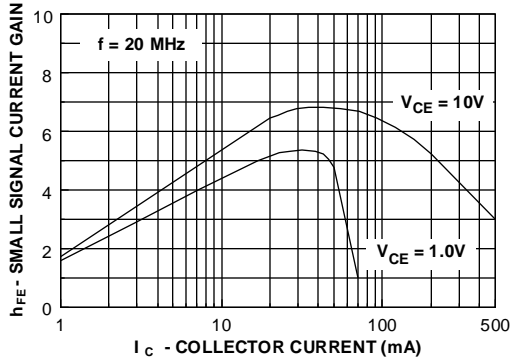


Collector-Base and Emitter-Base Capacitance vs Reverse Bias Voltage

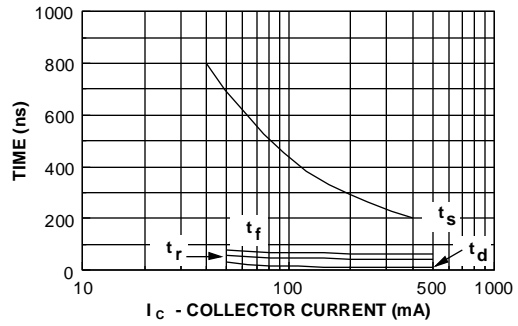


Typical Characteristics (continued)

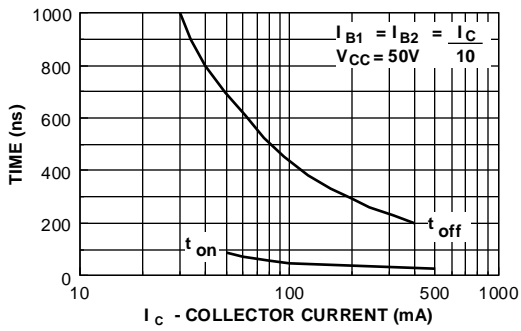
Small Signal Current Gain at 20 MHz



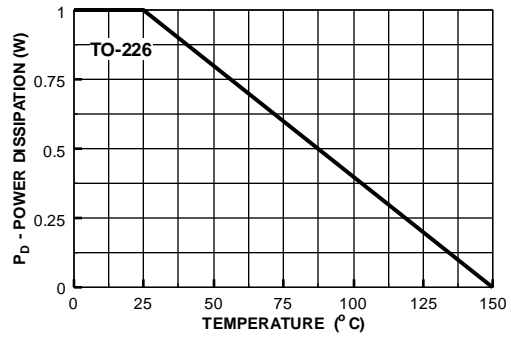
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current



Power Dissipation vs Ambient Temperature



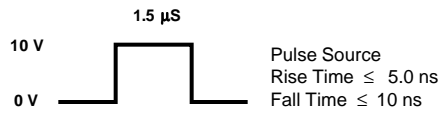
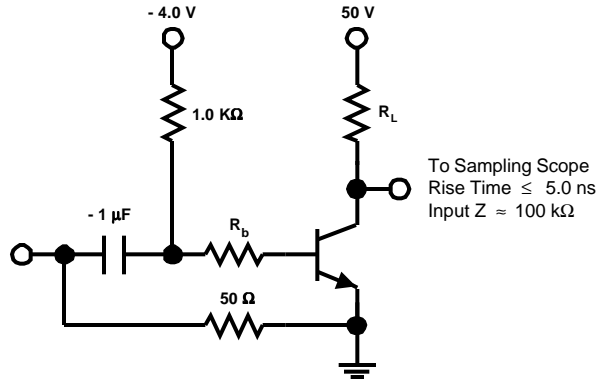
# NPN General Purpose Amplifier

(continued)

TN3019A

## Test Circuit

$I_C$	$R_b$	$R_L$
150 mA	314 $\Omega$	330 $\Omega$
200 mA	157 $\Omega$	167 $\Omega$
500 mA	94 $\Omega$	100 $\Omega$



**FIGURE 1:  $t_{ON}$ ,  $t_{OFF}$  Test Circuit**