FAIRCHILD SEMICONDUCTOR™

Discrete POWER & Signal Technologies

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_{CEO}	Collector-Emitter Voltage	80	V
V_{CBO}	Collector-Base Voltage	140	V
V_{EBO}	Emitter-Base Voltage	7.0	V
I_C	Collector Current - Continuous	1.0	A
T_J, T_{stg}	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_D	Total Device Dissipation Derate above 25°C	1.0 8.0	W mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	50	°C/W

NPN General Purpose Amplifier
(continued)

Electrical Characteristics

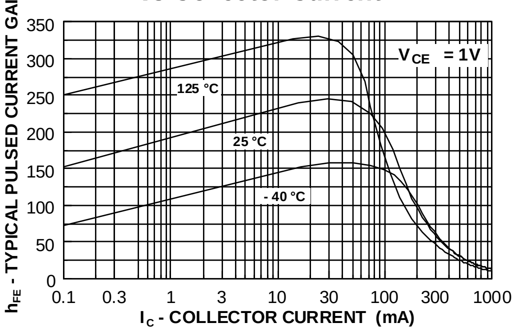
TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	I_C = 30 mA, I_B = 0	80		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 μA, I_E = 0	140		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 μA, I_C = 0	7.0		V
I_{CBO}	Collector-Cutoff Current	V_{CB} = 90 V, I_E = 0 V_{CB} = 90 V, I_E = 0, T_A = 150°C		0.01 10	μA μA
I_{EBO}	Emitter-Cutoff Current	V_{EB} = 5.0 V, I_C = 0		0.01	μA
ON CHARACTERISTICS					
h_{FE}	DC Current Gain	I_C = 0.1 mA, V_{CE} = 10 V I_C = 10 mA, V_{CE} = 10 V I_C = 150 mA, V_{CE} = 10 V I_C=150 mA, V_{CE}=10 V,T_A= -55°C I_C = 500 mA, V_{CE} = 10 V* I_C = 1.0 A, V_{CE} = 10 V*	50 90 100 40 50 15	 300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA		0.2 0.5	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA		1.1	V
SMALL SIGNAL CHARACTERISTICS					
f_T	Current Gain - Bandwidth Product	I_C = 50 mA, V_{CE} = 10 V, f = 20 MHz	100		MHz
C_{obo}	Output Capacitance	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz		12	pF
C_{ibo}	Input Capacitance	V_{BE} = 0.5 V, I_C = 0, f = 1.0 MHz		60	pF
h_{fe}	Small-Signal Current Gain	I_C = 1.0 mA, V_{CE} = 5.0 V, f = 1.0 MHz	80	400	
$rb'C_c$	Collector Base Time Constant	I_E = 10 mA, V_{CB} = 10 V, f = 4.0 MHz		400	pS
NF	Noise Figure	I_C = 100 mA, V_{CE} = 10 V, R_S = 1.0 kΩ, f = 1.0 kHz		4.0	dB

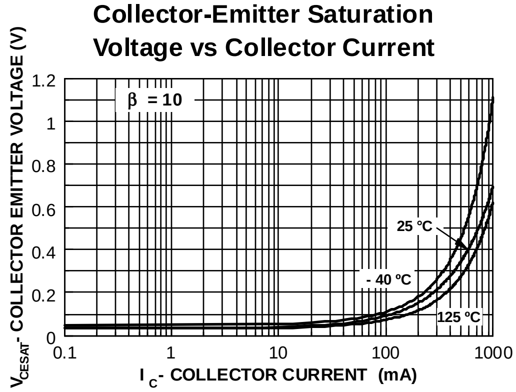
*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 1.0%

Typical Characteristics

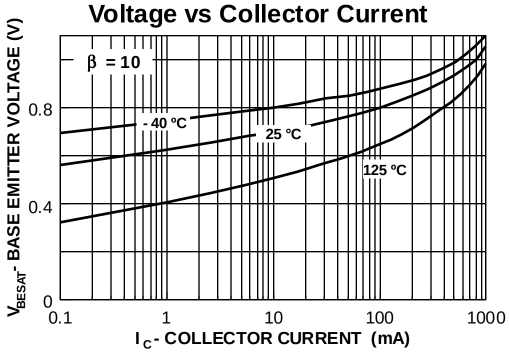
Typical Pulsed Current Gain vs Collector Current



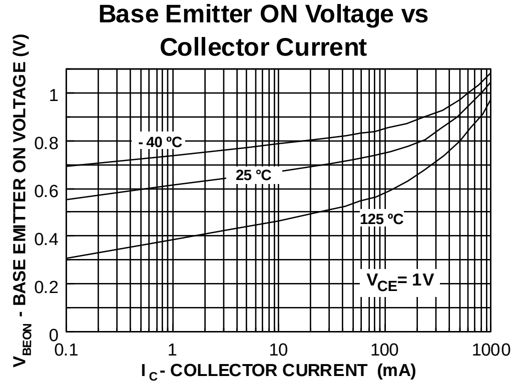
Collector-Emitter Saturation Voltage vs Collector Current



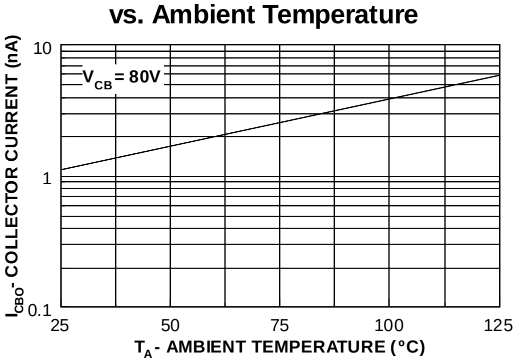
Base-Emitter Saturation Voltage vs Collector Current



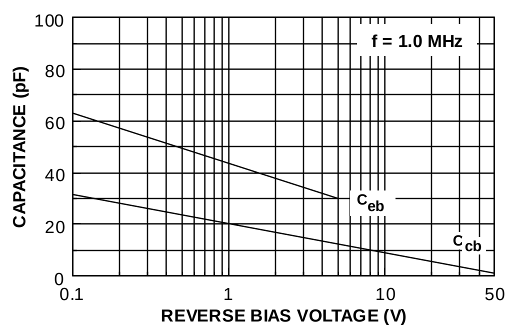
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs. Ambient Temperature

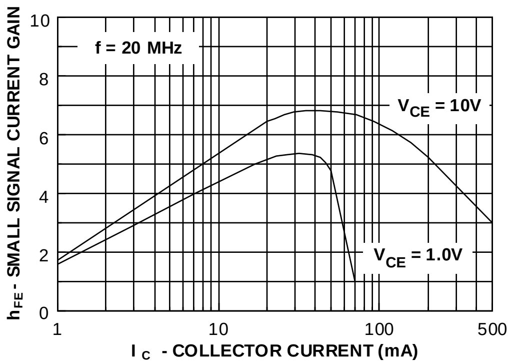


Collector-Base and Emitter-Base Capacitance vs Reverse Bias Voltage

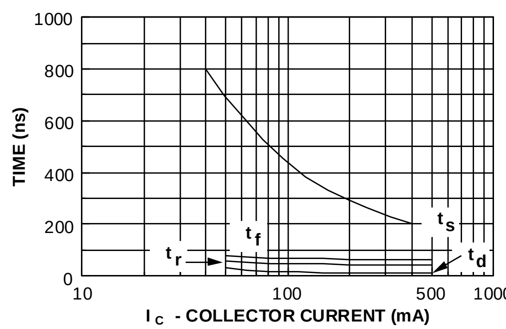


Typical Characteristics (continued)

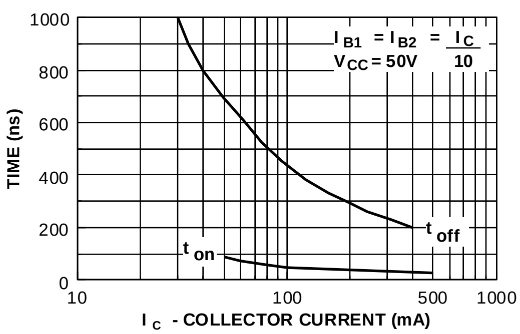
Small Signal Current Gain at 20 MHz



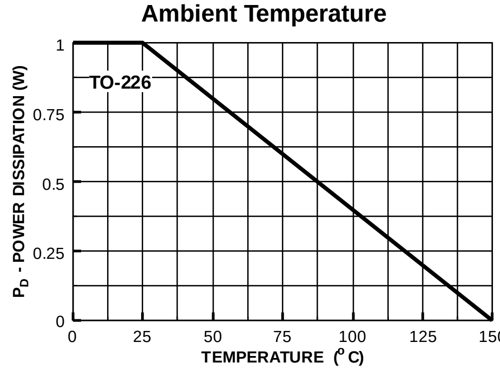
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current



Power Dissipation vs Ambient Temperature



Test Circuit

I_C	R_b	R_L
150 mA	314 Ω	330 Ω
200 mA	157 Ω	167 Ω
500 mA	94 Ω	100 Ω

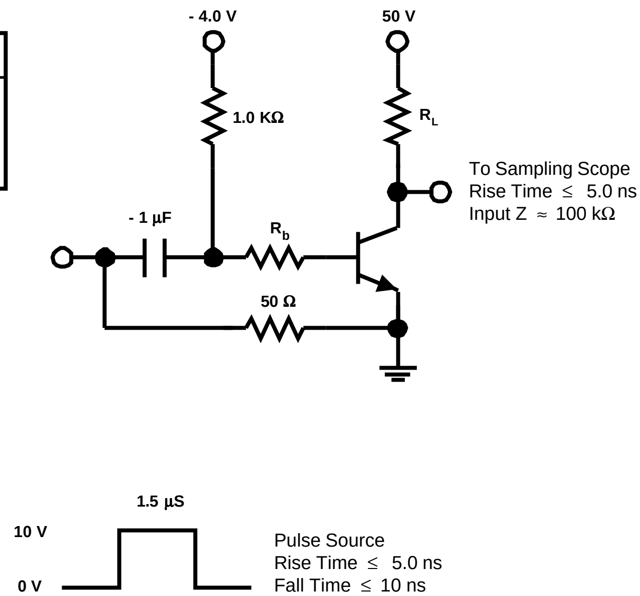


FIGURE 1: t_{ON}, t_{OFF} Test Circuit