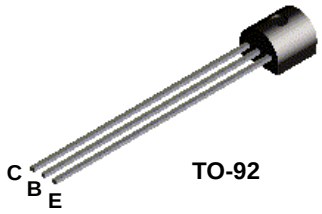
FAIRCHILD SEMICONDUCTOR TM

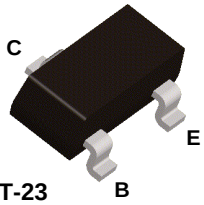
Discrete POWER & Signal Technologies

PN4258



TO-92

MMBT4258



SOT-23
Mark: 78

PNP Switching Transistor

This device is designed for very high speed saturate switching at collector currents to 100 mA. Sourced from Process 65.

Absolute Maximum Ratings*

TA = 25°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 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
		PN4258	*MMBT4258	
P_D	Total Device Dissipation Derate above 25°C	350 2.8	225 1.8	mW mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	556	°C/W

*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage*	I_C = 100 µA, V_{BE} = 0	12		V
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage*	I_C = 3.0 mA, I_B = 0	12		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 µA, I_E = 0	12		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 µA, I_C = 0	4.5		V
I_{CES}	Collector Cutoff Current	V_{CE} = 6.0 V, V_{BE} = 0 V_{CE} = 6.0 V, V_{BE} = 0, T_A = 65°C		0.01 5.0	µA µA
ON CHARACTERISTICS*					
h_{FE}	DC Current Gain	I_C = 1.0 mA, V_{CE} = 0.5 V I_C = 10 mA, V_{CE} = 3.0 V I_C = 50 mA, V_{CE} = 1.0 V	15 30 30	 120 	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA I_C = 50 mA, I_B = 5.0 mA		0.15 0.5	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA I_C = 50 mA, I_B = 5.0 mA	0.75	0.95 1.5	V V
SMALL SIGNAL CHARACTERISTICS					
f_T	Current Gain - Bandwidth Product	I_C = 10 mA, V_{CE} = 5.0 V, f = 100 MHz I_C = 10 mA, V_{CE} = 10 V, f = 100 MHz	700 700		MHz MHz
C_{ibo}	Input Capacitance	V_{BE} = 0.5 V, I_C = 0, f = 1.0 MHz		3.5	pF
C_{cb}	Collector-Base Capacitance	V_{CB} = 5.0 V, I_E = 0, f = 1.0 MHz		3.0	pF
SWITCHING CHARACTERISTICS					
t_{on}	Turn-On Time	V_{CC} = 1.5 V, $V_{BE(off)}$ = 0 V,		15	ns
t_d	Delay Time	I_C = 10 mA, I_{B1} = 1.0 mA		10	ns
t_r	Rise Time			15	ns
t_{off}	Turn-Off Time	V_{CC} = 1.5 V, I_C = 10mA		20	ns
t_s	Storage Time	I_{B1} = I_{B2} = 1.0 mA		20	ns
t_f	Fall Time			10	ns
t_s	Storage Time	I_C = 10 mA, I_{B1} = I_{B2} = 10 mA		20	ns

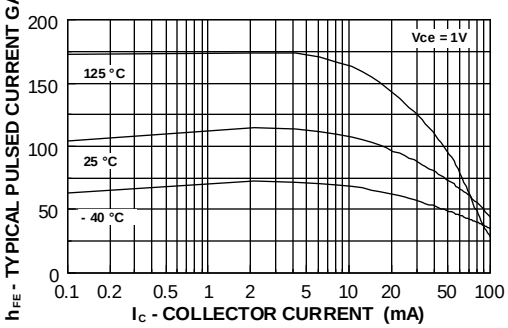
*Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%

Spice Model

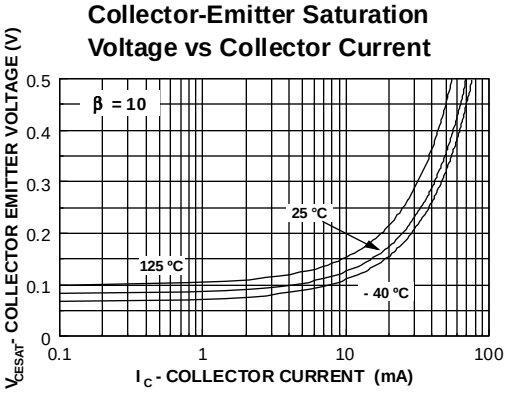
PNP (Is=545.6E-18 Xti=3 Eg=1.11 Vaf=100 Bf=61.42 Ne=1.5 Ise=0 Ikf=50m Xtb=1.5 Br=1.426 Nc=2 Isc=0 Ikr=0 Rc=3.75 Cjc=2.77p Mjc=.1416 Vjc=.75 Fc=.5 Cje=2.65p Mje=.3083 Vje=.75 Tr=4.109n Tf=118.5p Itf=.5 Vtf=3 Xtf=6 Rb=10)

DC Typical Characteristics

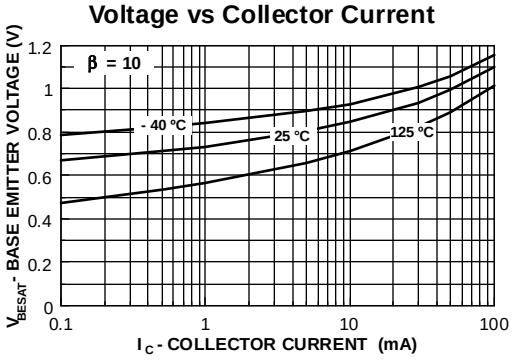
Typical Pulsed Current Gain vs Collector Current



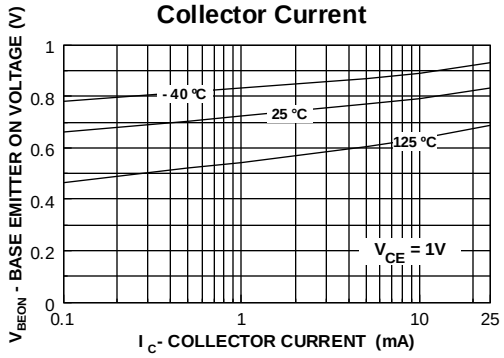
Collector-Emitter Saturation Voltage vs Collector Current



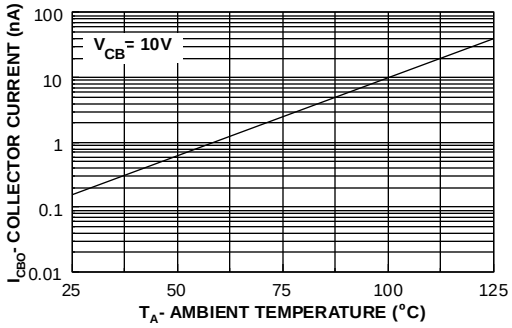
Base-Emitter Saturation Voltage vs Collector Current



Base Emitter ON Voltage vs Collector Current

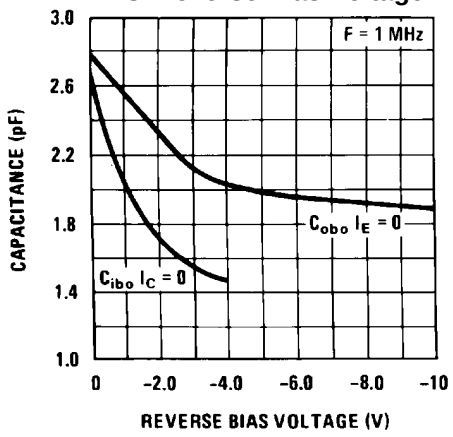


Collector-Cutoff Current vs. Ambient Temperature

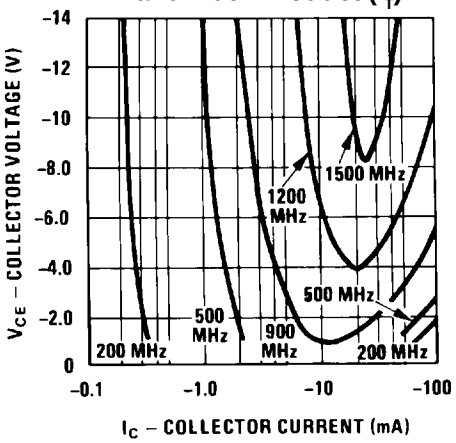


AC Typical Characteristics

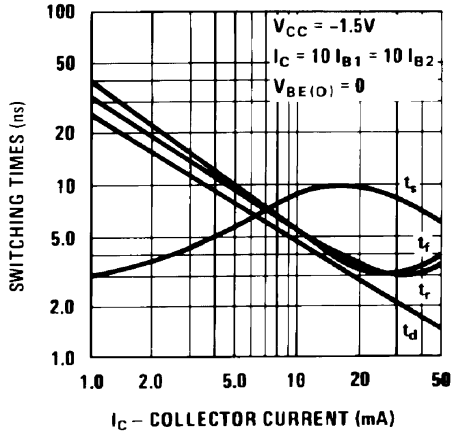
Input / Output Capacitance vs. Reverse Bias Voltage



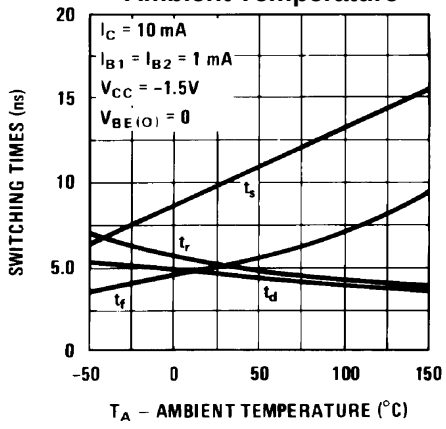
Contours of Constant Gain Bandwidth Product (f_T)



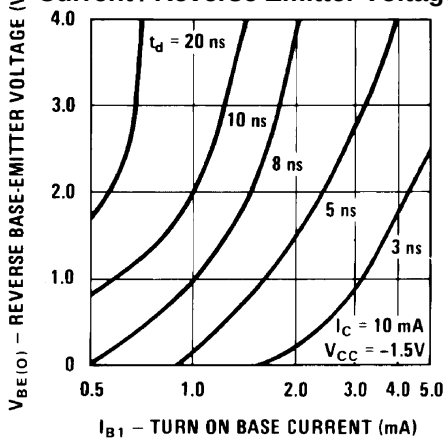
Switching Times vs. Collector Current



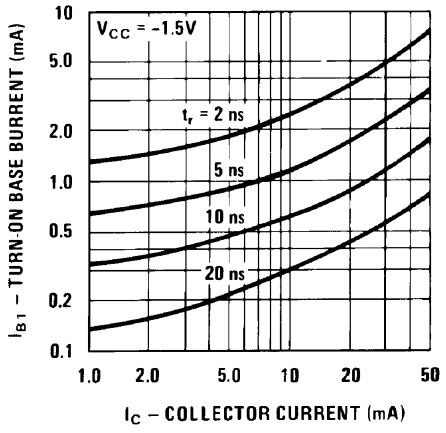
Switching Times vs. Ambient Temperature



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

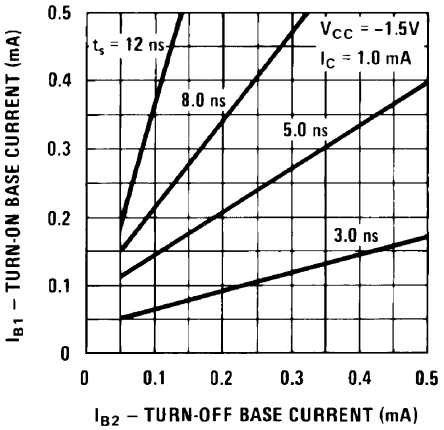


Rise Time vs. Collector and Turn On Base Currents

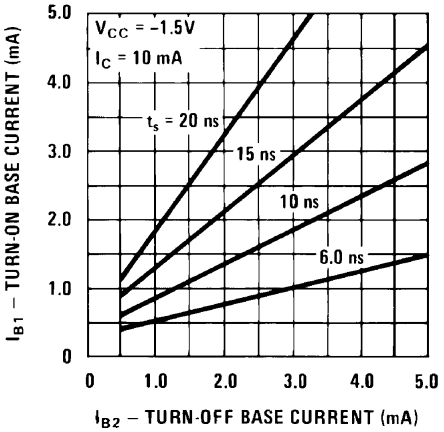


AC Typical Characteristics (continued)

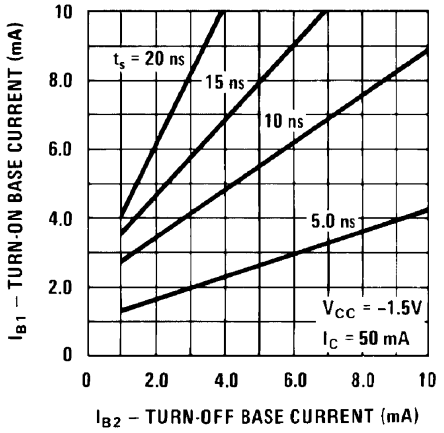
Storage Time vs. Turn On / Turn Off Base Currents



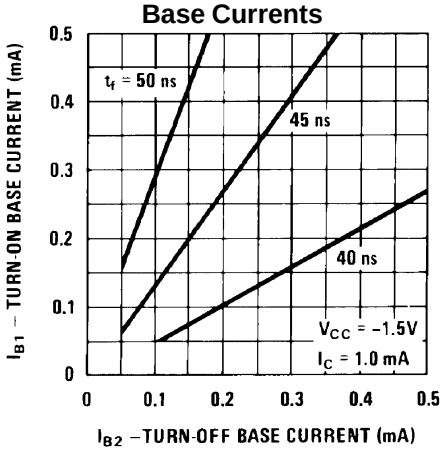
Storage Time vs. Turn On / Turn Off Base Currents



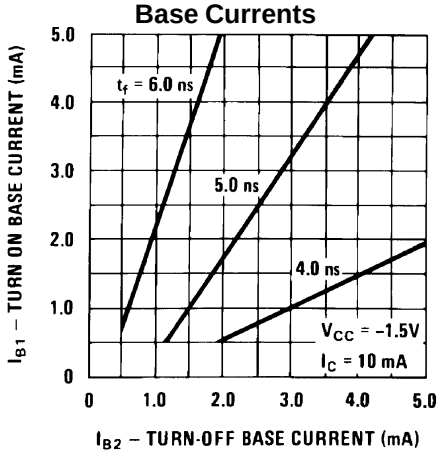
Storage Time vs. Turn On / Turn Off Base Currents



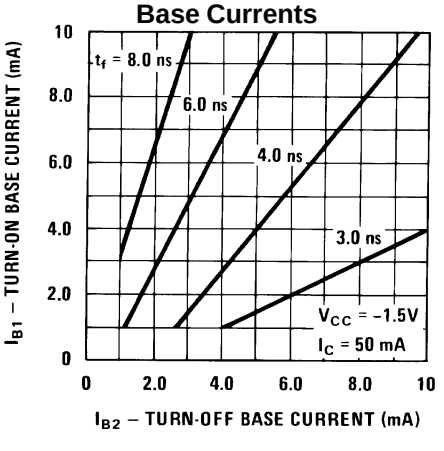
Fall Time vs. Turn On / Turn Off Base Currents



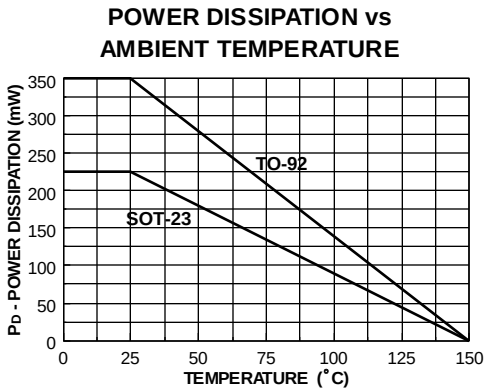
Fall Time vs. Turn On / Turn Off Base Currents



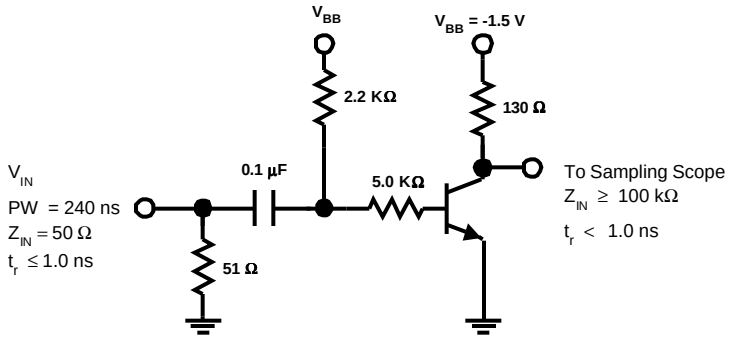
Fall Time vs. Turn On / Turn Off Base Currents



AC Typical Characteristics (continued)



Test Circuit



t_{ON}	t_{OFF}
V_{BB} = ground	V_{BB} = - 8.0 V
V_{IN} = - 5.8 V	V_{IN} = 9.8 V

I_C = 10 mA, I_{B1} = 1.0 mA, I_{B2} = 1.0 mA

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