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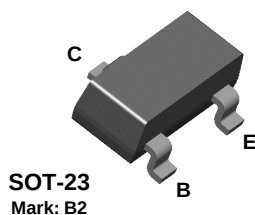
[Fairchild Semiconductor](#)
[BSV52](#)

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BSV52



NPN Switching Transistor

This device is designed for high speed saturated switching at collector currents of 10 mA to 100 mA. Sourced from Process 21.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{CEO}	Collector-Emitter Voltage	12	V
V _{CES}	Collector-Base Voltage	20	V
V _{EBO}	Emitter-Base Voltage	5.0	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
		*BSV52	
P _D	Total Device Dissipation Derate above 25°C	225 1.8	mW mW/°C
R _{θJA}	Thermal Resistance, Junction to Ambient	556	°C/W

*Device mounted on FR-4 PCB 40 mm X 40 mm X 1.5 mm.

NPN Switching Transistor
 (continued)

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	$I_C = 10 \text{ mA}, I_B = 0$	12		V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	20		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100 \text{ } \mu\text{A}, I_C = 0$	5.0		V
I_{CBO}	Collector-Cutoff Current	$V_{CB} = 10 \text{ V}, I_E = 0$ $V_{CB} = 10 \text{ V}, I_E = 0, T_A = 125^\circ\text{C}$		100 5.0	nA μA

ON CHARACTERISTICS

h_{FE}	DC Current Gain	$I_C = 1.0 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1.0 \text{ V}$	25 40 25	120	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA}$ $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$		0.3 0.25 0.4	V V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$	0.7	0.85 1.2	V V

SMALL SIGNAL CHARACTERISTICS

f_T	Transition Frequency	$I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$	400		MHz
C_{cb}	Collector-Base Capacitance	$I_E = 0, V_{CB} = 5.0 \text{ V}, f = 1.0 \text{ MHz}$		4.0	pF
C_{eb}	Emitter-Base Capacitance	$I_C = 0, V_{EB} = 1.0 \text{ V}, f = 1.0 \text{ MHz}$		4.5	pF

SWITCHING CHARACTERISTICS

t_s	Storage Time	$I_{B1} = I_{B2} = I_C = 10 \text{ mA}$		13	ns
t_{on}	Turn-On Time	$V_{CC} = 3.0 \text{ V}, I_C = 10 \text{ mA},$ $I_{B1} = 3.0 \text{ mA}$		12	ns
t_{off}	Turn-Off Time	$V_{CC} = 3.0 \text{ V}, I_C = 10 \text{ mA},$ $I_{B1} = 3.0 \text{ mA}, I_{B2} = 1.5 \text{ mA}$		18	ns

Spice Model

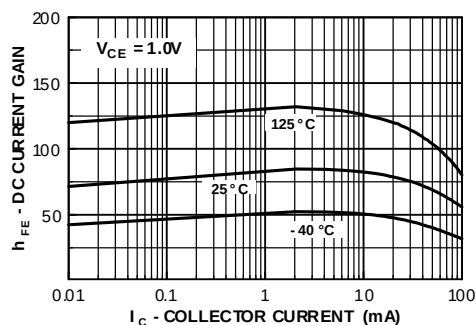
NPN (Is=44.14f Xti=3 Eg=1.11 Vaf=100 Bf=78.32 Ne=1.389 Ise=91.95f Ikf=.3498 Xtb=1.5 Br=12.69m Nc=2
 Isc=0 Ikr=0 Rc=.6 Cjc=2.83p Mjc=86.19m Vjc=.75 Fc=.5 Cje=4.5p Mje=.2418 Vje=.75 Tr=1.073u Tf=227.6p
 Itf=.3 Vtf=4 Xtf=4 Rb=10)

NPN Switching Transistor

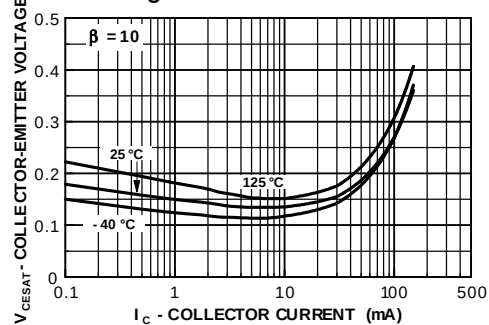
(continued)

Typical Characteristics

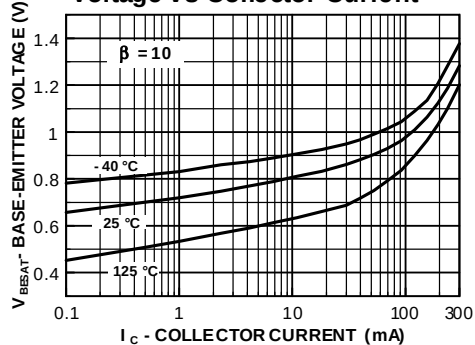
**DC Current Gain
vs Collector Current**



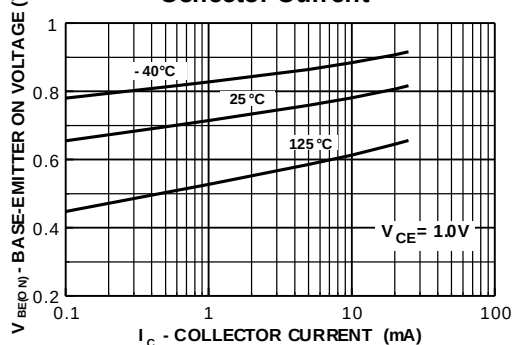
**Collector-Emitter Saturation
Voltage vs Collector Current**



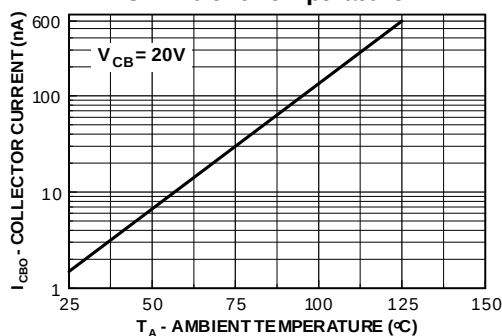
**Base-Emitter Saturation
Voltage vs Collector Current**



**Base-Emitter ON Voltage vs
Collector Current**



**Collector-Cutoff Current
vs Ambient Temperature**

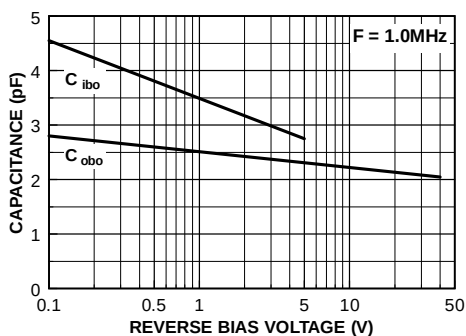


NPN Switching Transistor

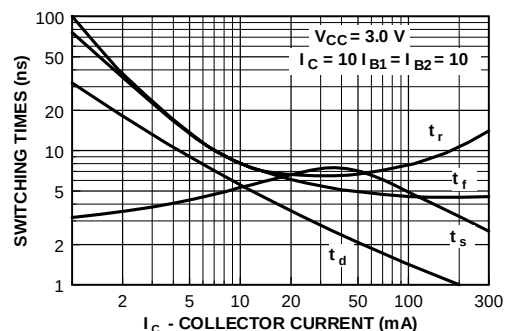
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Typical Characteristics (continued)

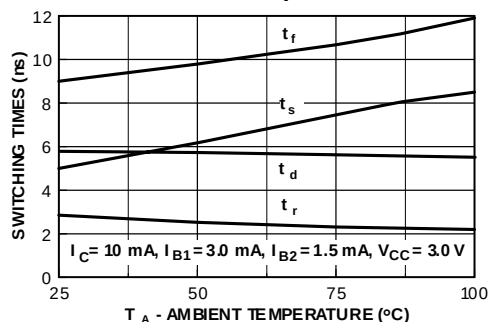
Output Capacitance vs Reverse Bias Voltage



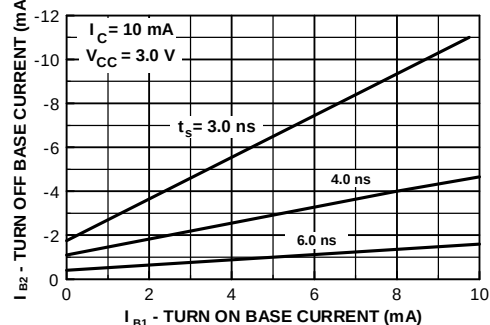
Switching Times vs Collector Current



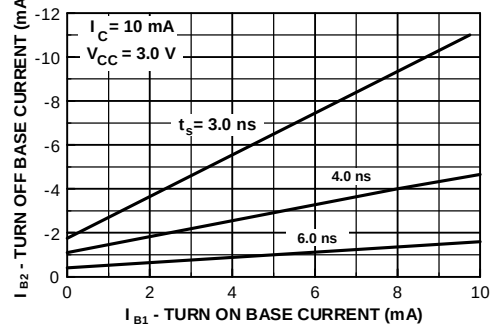
Switching Times vs Ambient Temperature



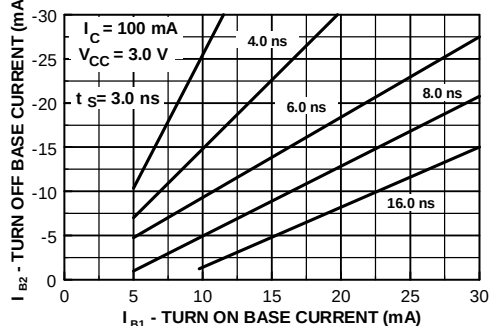
Storage Time vs Turn On and Turn Off Base Currents



Storage Time vs Turn On and Turn Off Base Currents



Storage Time vs Turn On and Turn Off Base Currents

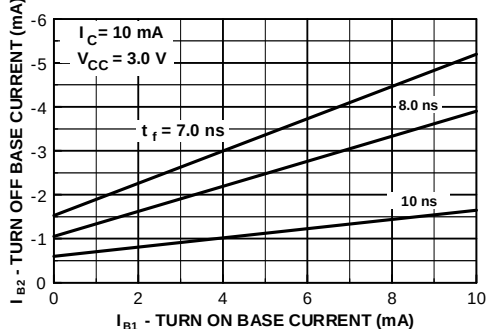


NPN Switching Transistor

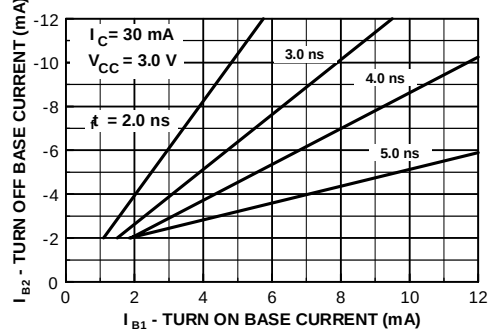
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Typical Characteristics (continued)

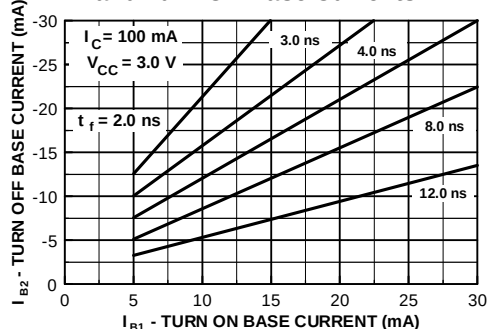
**Fall Time vs Turn On
and Turn Off Base Currents**



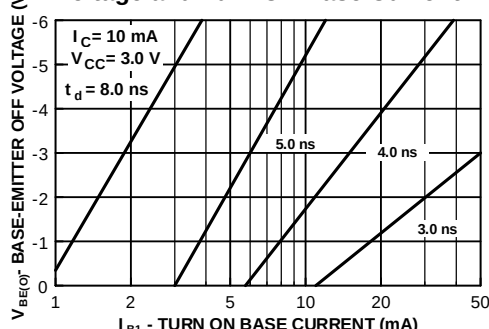
**Fall Time vs Turn On
and Turn Off Base Currents**



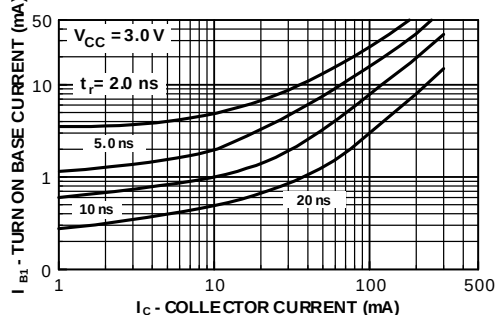
**Fall Time vs Turn On
and Turn Off Base Currents**



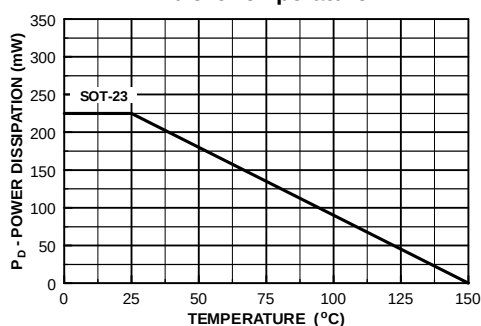
**Delay Time vs Base-Emitter OFF
Voltage and Turn On Base Current**



**Rise Time vs. Turn On Base
Current and Collector Current**



**Power Dissipation vs
Ambient Temperature**



NPN Switching Transistor

Test Circuits

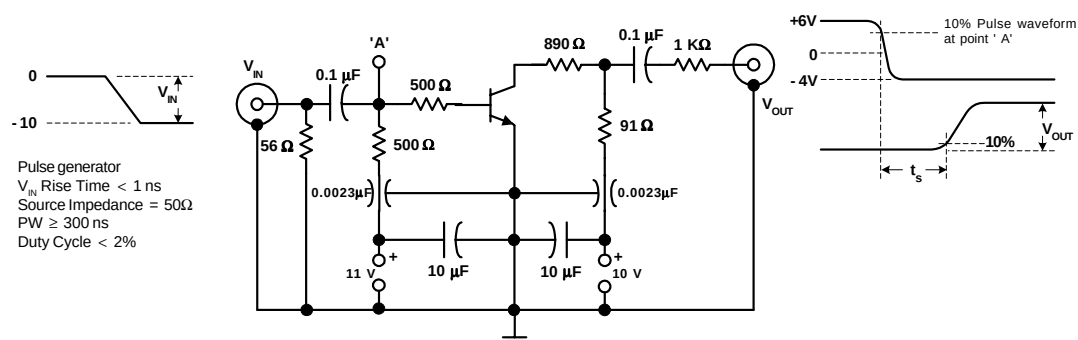


FIGURE 1: Charge Storage Time Measurement Circuit

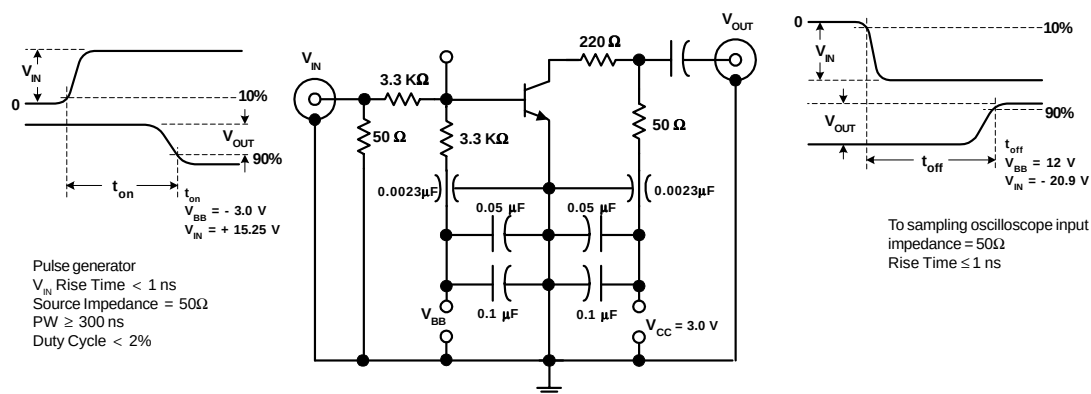


FIGURE 2: t_{ON} , t_{OFF} Measurement Circuit

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