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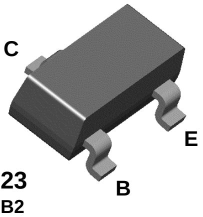
BSV52



SOT-23
Mark: B2

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
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	556	°C/W

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

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NPN Switching Transistor

(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

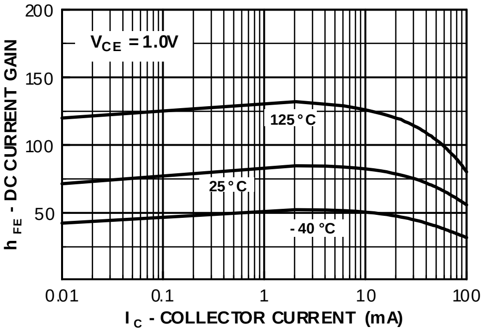
Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = 10 mA, I_B = 0	12		V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	I_C = 10 µA, I_E = 0	20		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 µA, I_C = 0	5.0		V
I_{CBO}	Collector-Cutoff Current	V_{CB} = 10 V, I_E = 0 V_{CB} = 10 V, I_E = 0, T_A = 125°C		100 5.0	nA µA
ON CHARACTERISTICS					
h_{FE}	DC Current Gain	I_C = 1.0 mA, V_{CE} = 1.0 V I_C = 10 mA, V_{CE} = 1.0 V I_C = 50 mA, V_{CE} = 1.0 V	25 40 25	 120 	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.3 mA I_C = 10 mA, I_B = 1.0 mA I_C = 50 mA, I_B = 5.0 mA		0.3 0.25 0.4	V 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	0.7	0.85 1.2	V V
SMALL SIGNAL CHARACTERISTICS					
f_T	Transition Frequency	I_C = 10 mA, V_{CE} = 10 V, f = 100 MHz	400		MHz
C_{cb}	Collector-Base Capacitance	I_E = 0, V_{CB} = 5.0 V, f = 1.0 MHz		4.0	pF
C_{eb}	Emitter-Base Capacitance	I_C = 0, V_{EB} = 1.0 V, f = 1.0 MHz		4.5	pF
SWITCHING CHARACTERISTICS					
t_S	Storage Time	I_{B1} = I_{B2} = I_C = 10 mA		13	ns
t_{on}	Turn-On Time	V_{CC} = 3.0 V, I_C = 10 mA, I_{B1} = 3.0 mA		12	ns
t_{off}	Turn-Off Time	V_{CC} = 3.0 V, I_C = 10 mA, I_{B1} = 3.0 mA, I_{B2} = 1.5 mA		18	ns

Spice Model

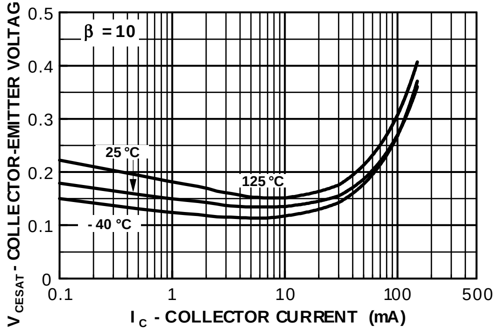
NPN (Is=44.14f Xti=3 Eg=1.11 Vaf=100 Bf=78.32 Ne=1.389 Ise=91.95f Ikf=.3498 Xtb=1.5 Br=12.69m Nc=2 Isc=0 Ikr=0 Rc=.6 Cjc=2.83p Mjc=86.19m Vjc=.75 Fc=.5 Cje=4.5p Mje=.2418 Vje=.75 Tr=1.073u Tf=227.6p Itf=.3 Vtf=4 Xtf=4 Rb=10)

Typical Characteristics

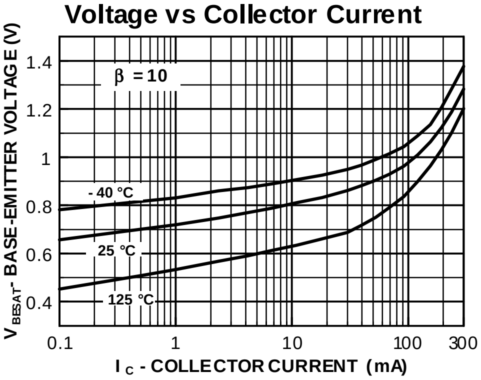
DC Current Gain
vs Collector Current



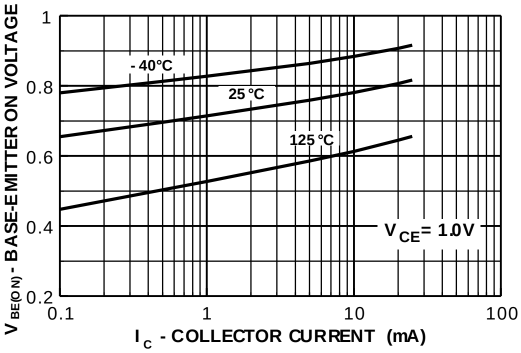
Collector-Emitter Saturation
Voltage vs Collector Current



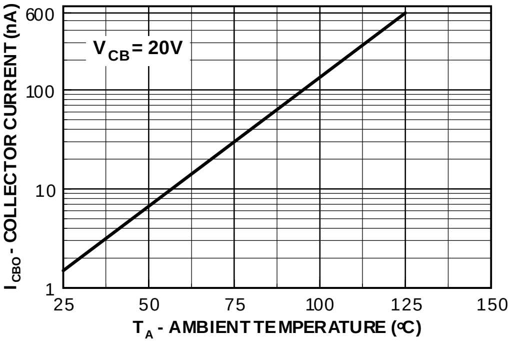
Base-Emitter Saturation
Voltage vs Collector Current



Base-Emitter ON Voltage vs
Collector Current

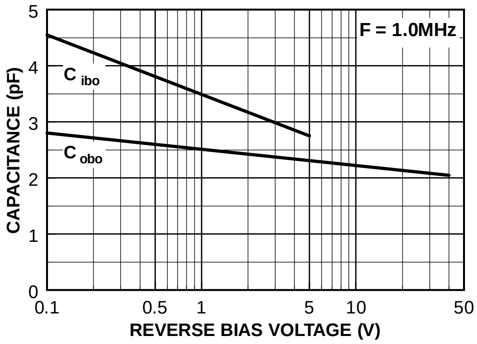


Collector-Cutoff Current
vs Ambient Temperature

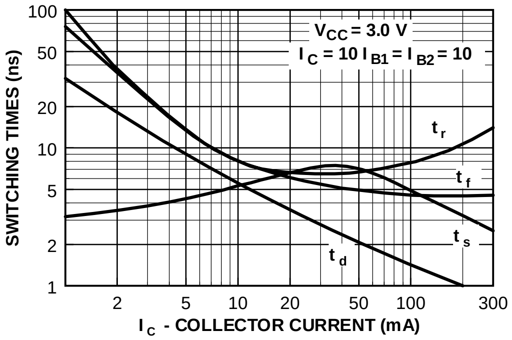


Typical Characteristics (continued)

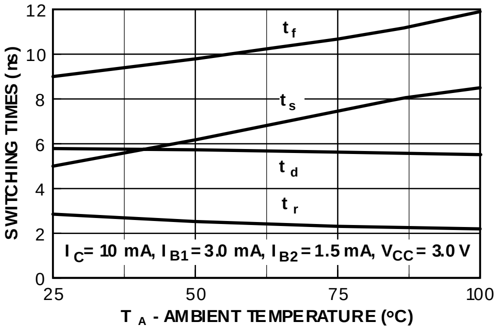
Output Capacitance vs Reverse Bias Voltage



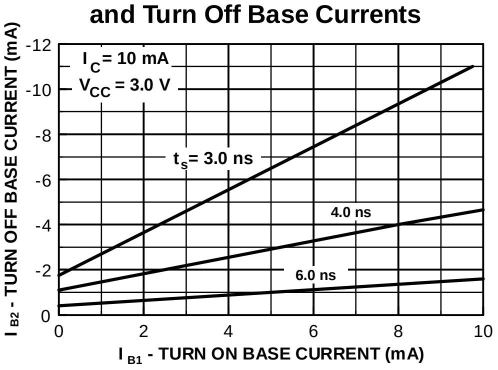
Switching Times vs Collector Current



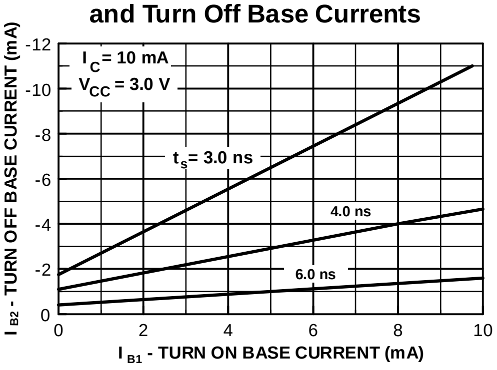
Switching Times vs Ambient Temperature



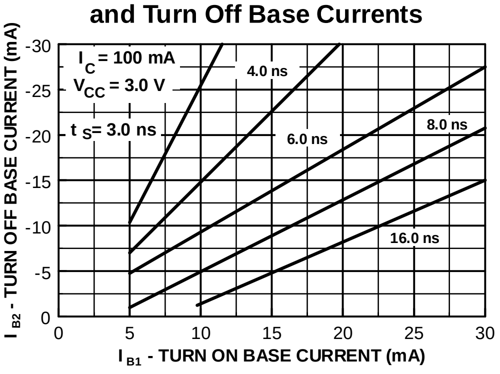
Storage Time vs Turn On and Turn Off Base Currents



Storage Time vs Turn On and Turn Off Base Currents

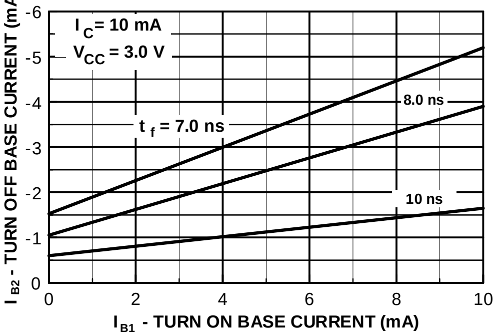


Storage Time vs Turn On and Turn Off Base Currents

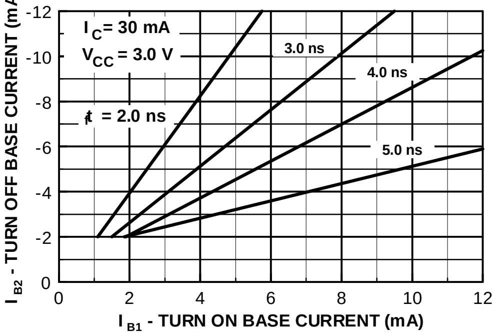


Typical Characteristics (continued)

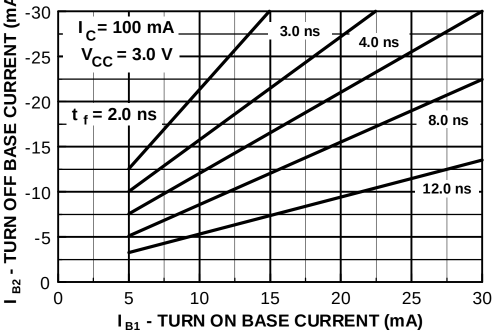
Fall Time vs Turn On and Turn Off Base Currents



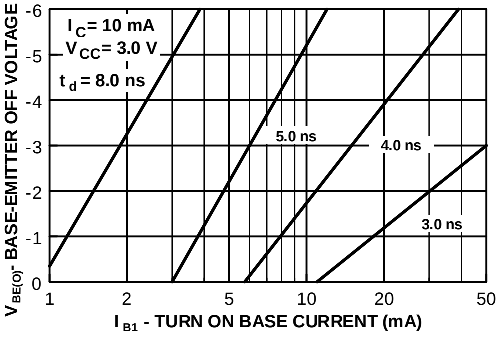
Fall Time vs Turn On and Turn Off Base Currents



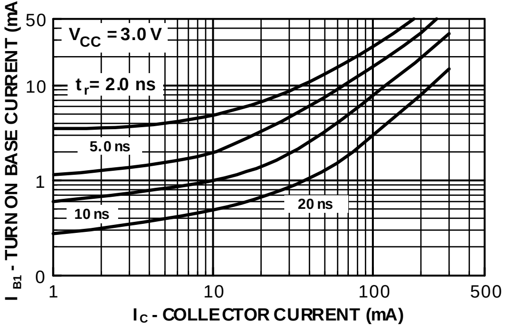
Fall Time vs Turn On and Turn Off Base Currents



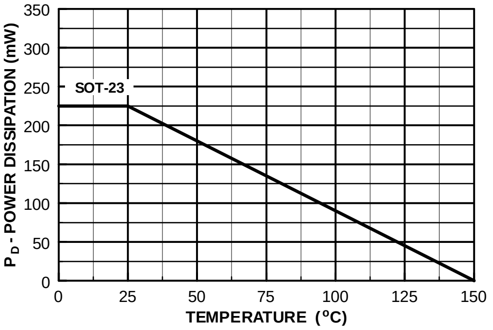
Delay Time vs Base-Emitter OFF Voltage and Turn On Base Current



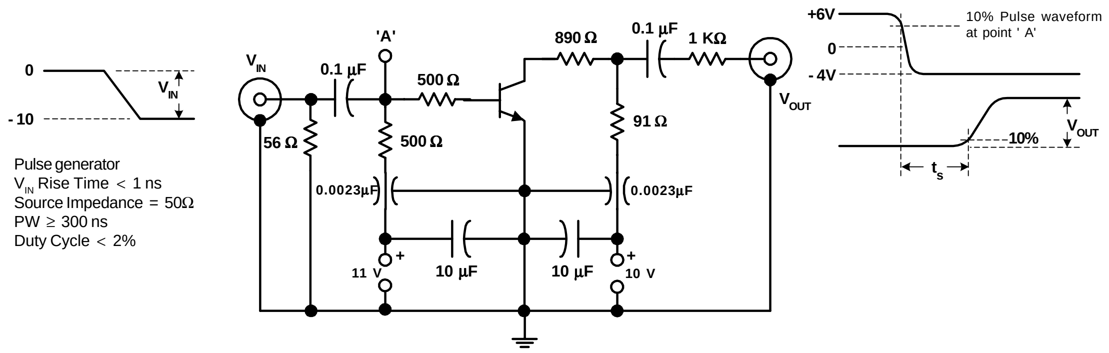
Rise Time vs. Turn On Base Current and Collector Current



Power Dissipation vs Ambient Temperature

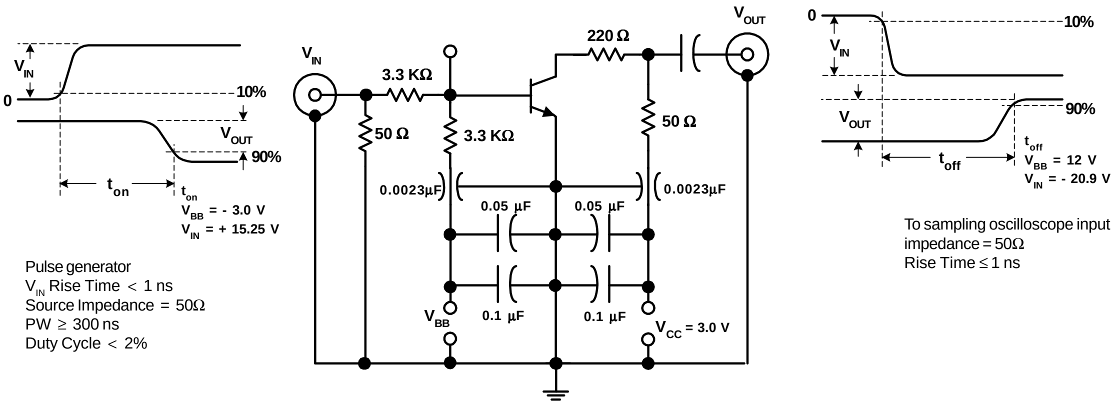


Test Circuits



Pulse generator
V_{IN} Rise Time < 1 ns
Source Impedance = 50Ω
PW ≥ 300 ns
Duty Cycle < 2%

FIGURE 1: Charge Storage Time Measurement Circuit



Pulse generator
V_{IN} Rise Time < 1 ns
Source Impedance = 50Ω
PW ≥ 300 ns
Duty Cycle < 2%

To sampling oscilloscope input
impedance = 50Ω
Rise Time ≤ 1 ns

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

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