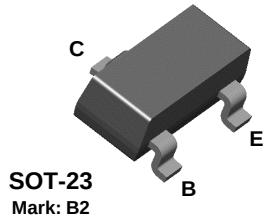


BSV52



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

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

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	$I_C = 10 \text{ mA}, I_B = 0$	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

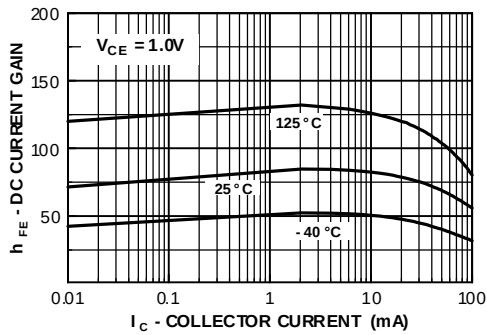
t_s	Storage Time	$I_{B1} = I_{B2} = I_C = 10 \text{ mA}$		13	ns
t_{on}	Turn-On Time	$V_{CC} = 3.0 \text{ V}, I_C = 10 \text{ mA},$ $I_{B1} = 3.0 \text{ mA}$		12	ns
t_{off}	Turn-Off Time	$V_{CC} = 3.0 \text{ V}, I_C = 10 \text{ mA},$ $I_{B1} = 3.0 \text{ mA}, I_{B2} = 1.5 \text{ mA}$		18	ns

Spice Model

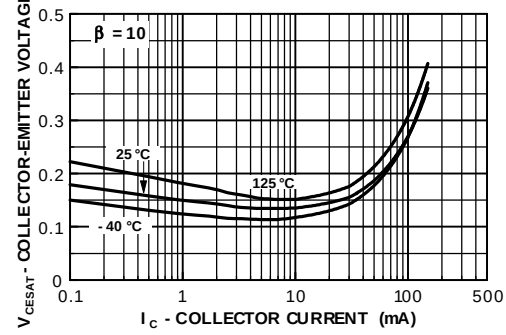
NPN (Is=44.14f Xti=3 Eg=1.11 Vaf=100 Bf=78.32 Ne=1.389 Ise=91.95f Ikf=.3498 Xtb=1.5 Br=12.69m Nc=2 Isc=0 Ikr=0 Rc=.6 Cjc=2.83p Mjc=86.19m Vjc=.75 Fc=.5 Cje=4.5p Mje=.2418 Vje=.75 Tr=1.073u Tf=227.6p Itf=.3 Vtf=4 Xtf=4 Rb=10)

Typical Characteristics

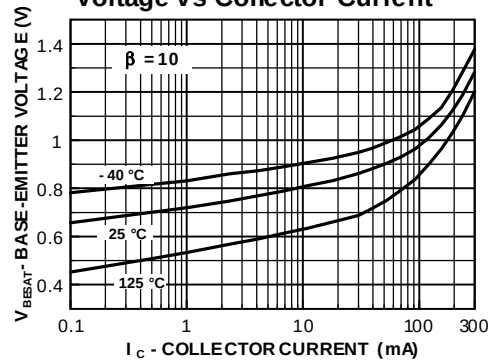
DC Current Gain
vs Collector Current



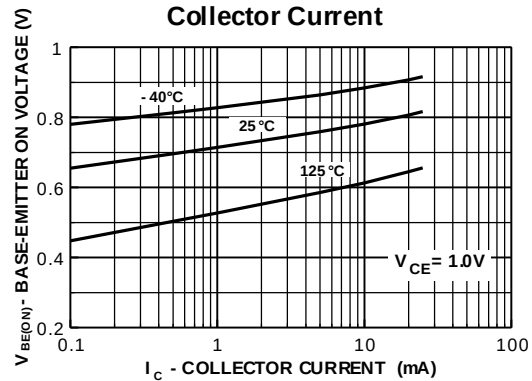
Collector-Emitter Saturation
Voltage vs Collector Current



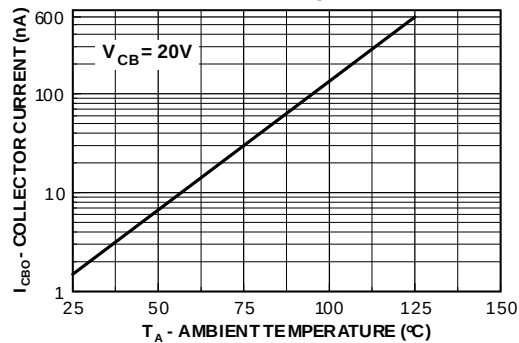
Base-Emitter Saturation
Voltage vs Collector Current



Base-Emitter ON Voltage vs
Collector Current



Collector-Cutoff Current
vs Ambient Temperature

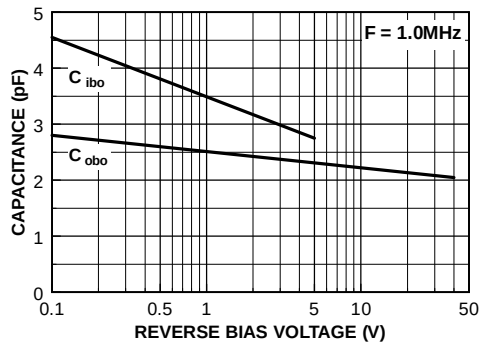


NPN Switching Transistor

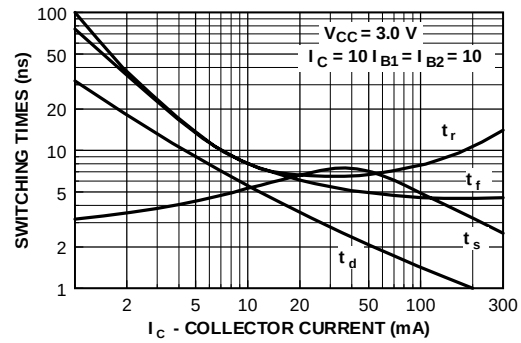
(continued)

Typical Characteristics (continued)

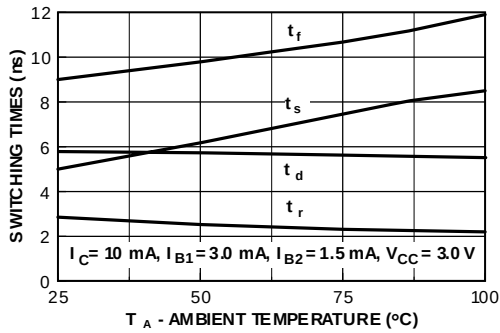
Output Capacitance vs
Reverse Bias Voltage



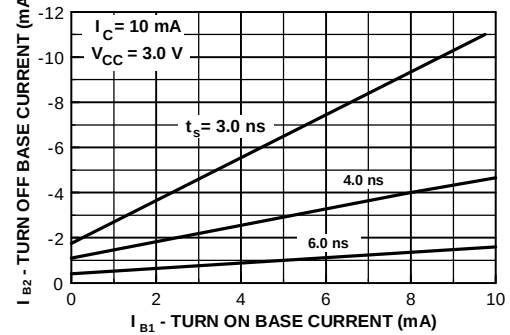
Switching Times vs
Collector Current



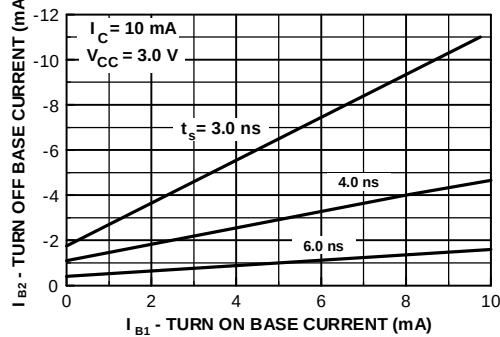
Switching Times vs
Ambient Temperature



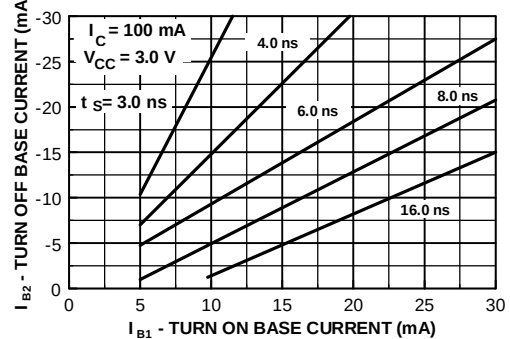
Storage Time vs Turn On
and Turn Off Base Currents



Storage Time vs Turn On
and Turn Off Base Currents



Storage Time vs Turn On
and Turn Off Base Currents

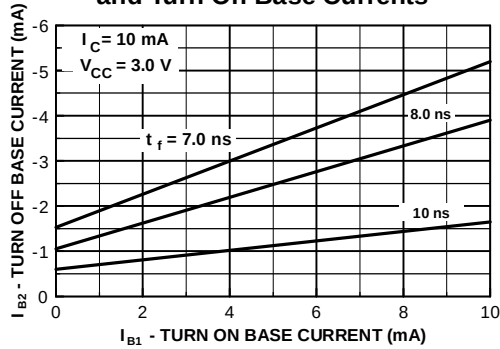


NPN Switching Transistor

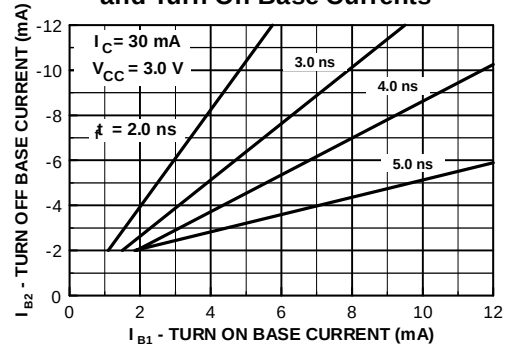
(continued)

Typical Characteristics (continued)

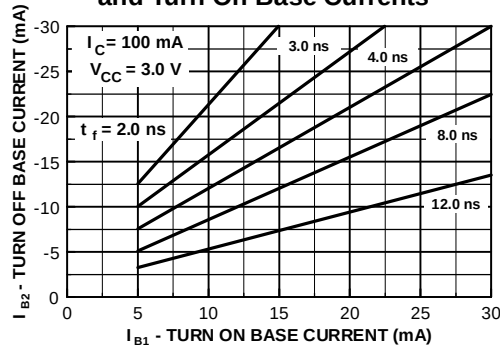
Fall Time vs Turn On
and Turn Off Base Currents



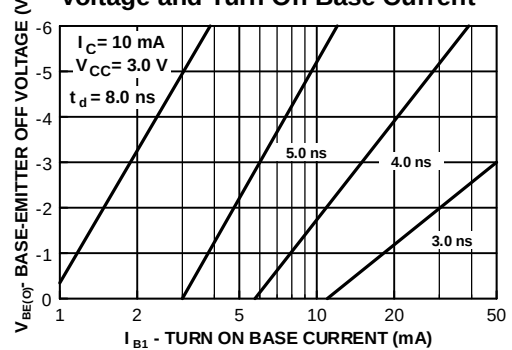
Fall Time vs Turn On
and Turn Off Base Currents



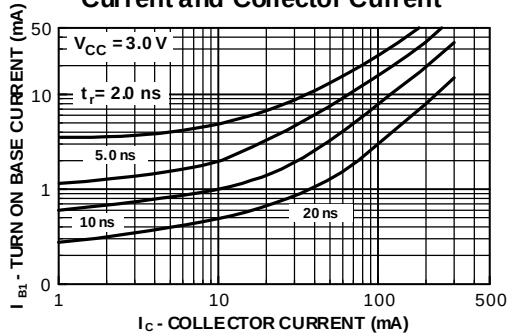
Fall Time vs Turn On
and Turn Off Base Currents



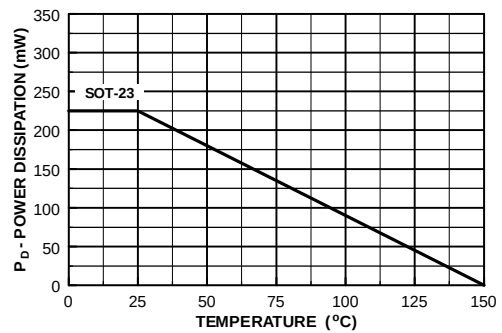
Delay Time vs Base-Emitter OFF
Voltage and Turn On Base Current



Rise Time vs. Turn On Base
Current and Collector Current



Power Dissipation vs
Ambient Temperature



Test Circuits

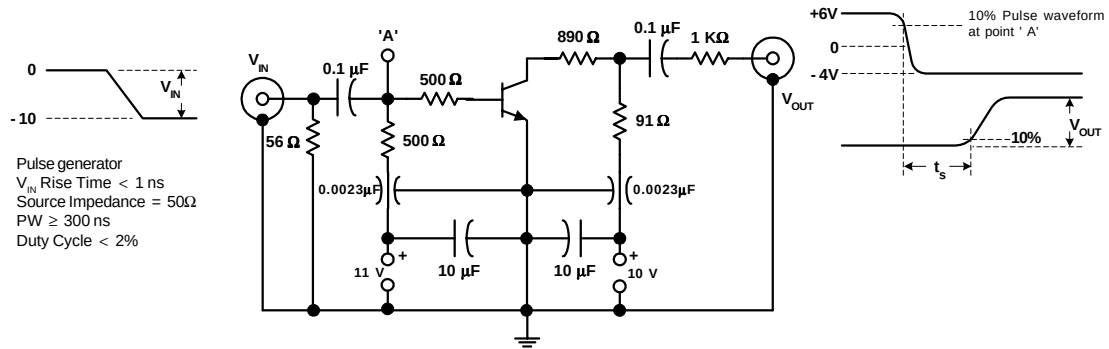


FIGURE 1: Charge Storage Time Measurement Circuit

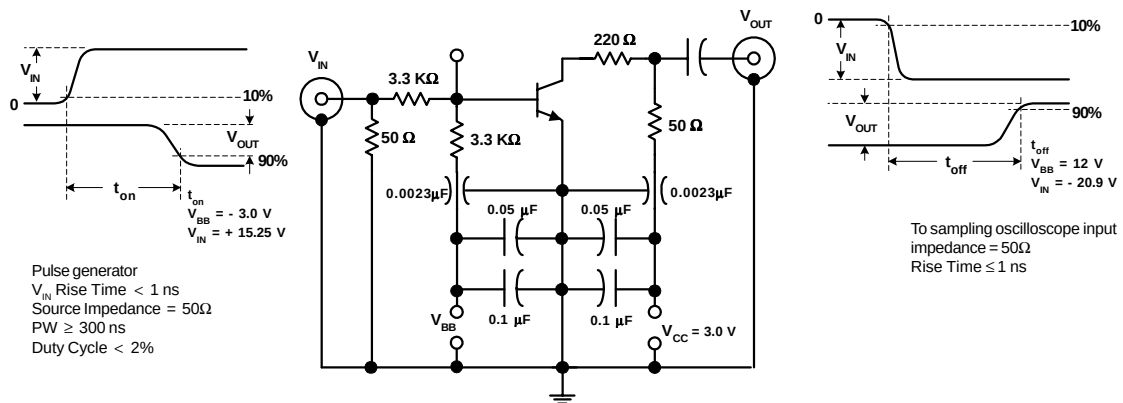


FIGURE 2: t_{ON} , t_{OFF} Measurement Circuit

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACE [™]	FAST [™]	PowerTrench [®]	SyncFET [™]
Bottomless [™]	GlobalOptoisolator [™]	QFET [™]	TinyLogic [™]
CoolFET [™]	GTO [™]	QS [™]	UHC [™]
CROSSVOLT [™]	HiSeC [™]	QT Optoelectronics [™]	VCX [™]
DOVE [™]	ISOPLANAR [™]	Quiet Series [™]	
E ² CMOS [™]	MICROWIRE [™]	SILENT SWITCHER [®]	
EnSigna [™]	OPTOLOGIC [™]	SMART START [™]	
FACT [™]	OPTOPLANAR [™]	SuperSOT [™] -3	
FACT Quiet Series [™]	PACMAN [™]	SuperSOT [™] -6	
FAST [®]	POP [™]	SuperSOT [™] -8	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Diodes Incorporated:](#)

[BSV52RTA](#) [BSV52RTC](#) [BSV52TA](#) [BSV52TC](#)