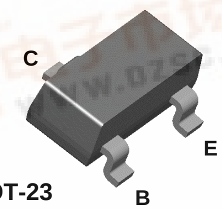
FAIRCHILD
SEMICONDUCTOR TM

BSR17A



SOT-23
Mark: U92

NPN General Purpose Amplifier

This device is designed as a general purpose amplifier and switch. The useful dynamic range extends to 100 mA as a switch and to 100 MHz as an amplifier. Sourced from Process 23.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	60	V
V_{EBO}	Emitter-Base Voltage	6.0	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
		*BSR17A	
P_D	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	°C/W

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

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 = 10 μA, I_B = 0	60		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 1.0 mA, I_E = 0	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10 μA, I_C = 0	6.0		V
I_{CBO}	Collector-Cutoff Current	V_{CB} = 30 V, T_A = 150°C		5.0	μA
I_{CEX}	Collector-Cutoff Current	V_{CE} = 30 V, V_{EB} = 3.0 V		50	nA
I_{BEX}	Reverse Base Current	V_{CE} = 30 V, V_{EB} = 3.0 V		50	nA
ON CHARACTERISTICS					
h_{FE}	DC Current Gain	I_C = 0.1 mA, V_{CE} = 1.0 V 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 I_C = 100 mA, V_{CE} = 1.0 V	40 70 100 60 30	 300 	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage*	I_C = 10 mA, I_B = 1.0 mA I_C = 50 mA, I_B = 5.0 mA		0.2 0.3	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	0.65	0.85 0.95	V V
SMALL SIGNAL CHARACTERISTICS					
f_T	Transition Frequency	I_C = 20 mA, V_{CE} = 20 V, f = 100 MHz	300		MHz
C_{cb}	Collector-Base Capacitance	V_{CB} = 5.0 V, I_E = 0, f = 1.0 MHz		4.0	pF
C_{eb}	Emitter-Base Capacitance	V_{EB} = 0.5 V, I_C = 0, f = 1.0 MHz		8.0	pF
h_{ie}	Input Impedance	V_{CE}= 10 V,I_C= 1.0 mA,f=1.0 kHz	1.0	10	kΩ
h_{fe}	Small-Signal Current Gain	V_{CE}= 10 V,I_C= 1.0 mA,f=1.0 kHz	100	400	
h_{oe}	Output Admittance	V_{CE}= 10 V,I_C= 1.0 mA,f=1.0 kHz	1.0	40	μS
SWITCHING CHARACTERISTICS					
t_d	Delay Time	I_C = 10 mA, I_{B1} = 1.0 mA, V_{EB} = 0.5 V		35	ns
t_r	Rise Time			35	ns
t_s	Storage Time	I_C = 10 mA, I_{Bon} = I_{Boff} = 1.0 mA		200	ns
t_f	Fall Time			50	ns

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

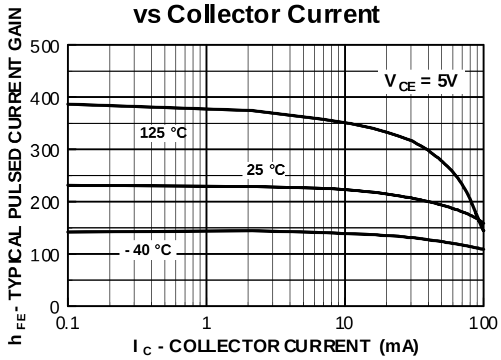
Spice Model

NPN (Is=6.734f Xti=3 Eg=1.11 Vaf=74.03 Bf=416.4 Ne=1.259 Ise=6.734 Ikf=66.78m Xtb=1.5 Br=.7371 Nc=2 Isc=0 Ikr=0 Rc=1 Cjc=3.638p Mjc=.3085 Vjc=.75 Fc=.5 Cje=4.493p Mje=.2593 Vje=.75 Tr=239.5n Tf=301.2p Itf=.4 Vtf=4 Xtf=2 Rb=10)

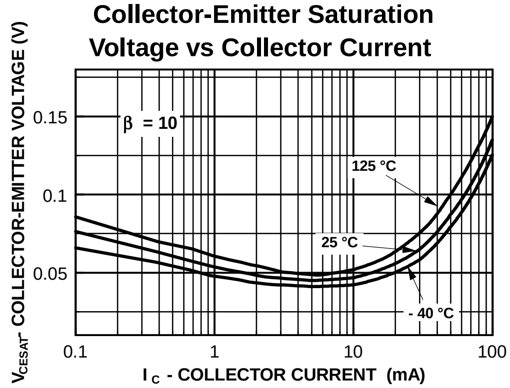
NPN General Purpose Amplifier
(continued)

Typical Characteristics

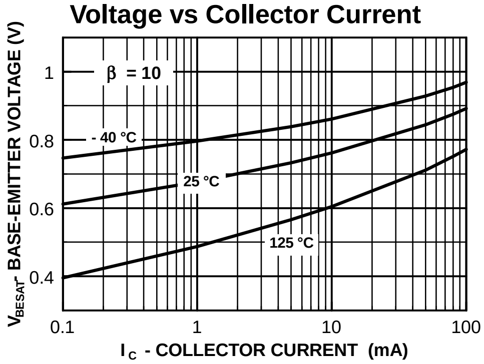
Typical Pulsed Current Gain vs Collector Current



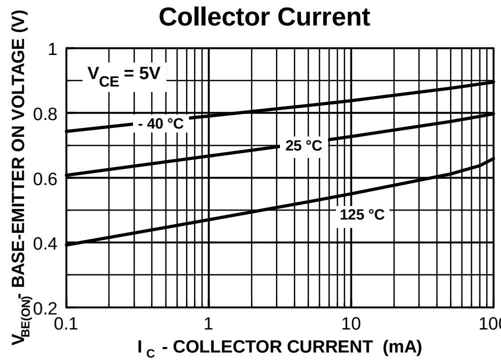
Collector-Emitter Saturation Voltage vs Collector Current



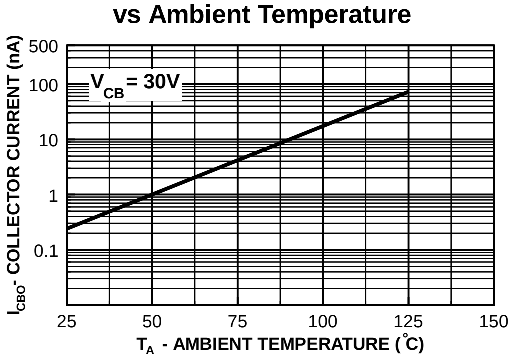
Base-Emitter Saturation Voltage vs Collector Current



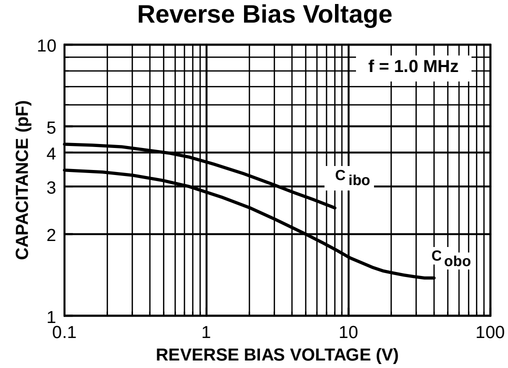
Base-Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

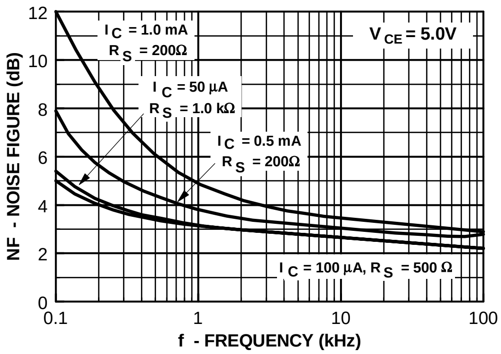


Capacitance vs Reverse Bias Voltage

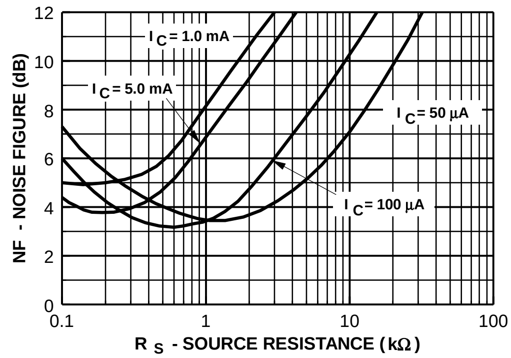


Typical Characteristics (continued)

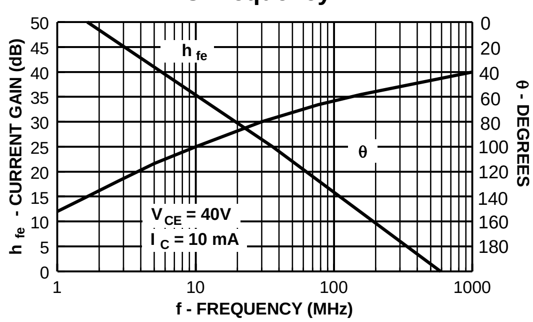
Noise Figure vs Frequency



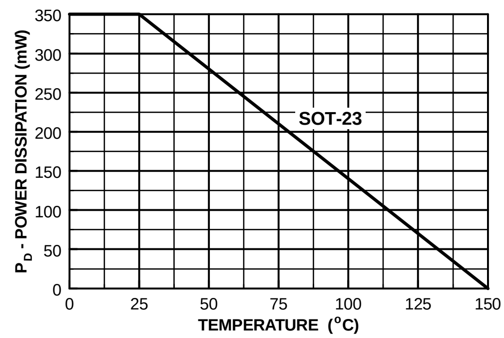
Noise Figure vs Source Resistance



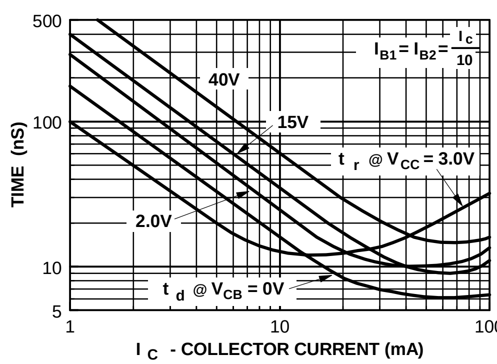
Current Gain and Phase Angle vs Frequency



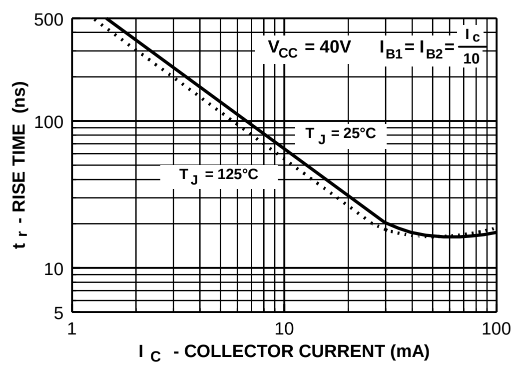
Power Dissipation vs Ambient Temperature



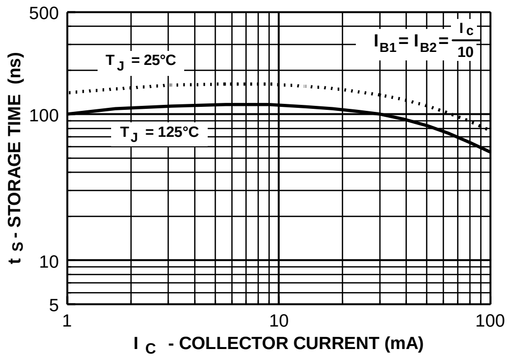
Turn-On Time vs Collector Current

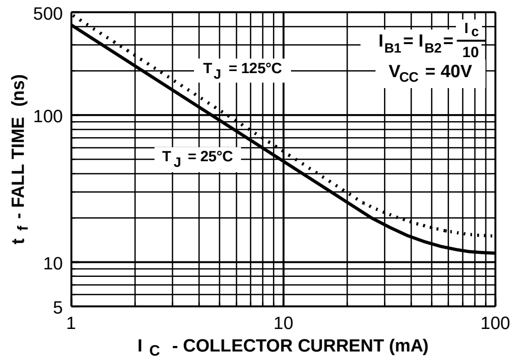


Rise Time vs Collector Current



Typical Characteristics (continued)





Test Circuits

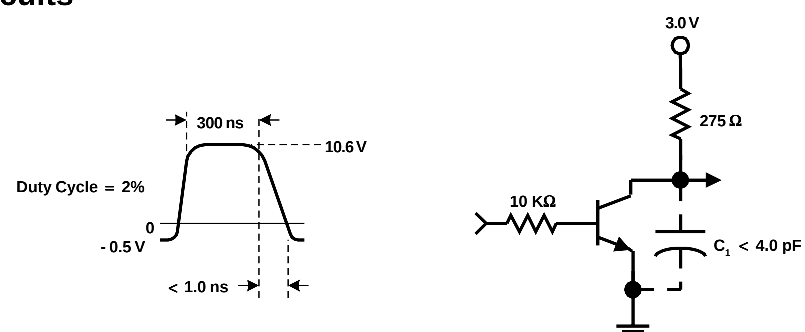


FIGURE 1: Delay and Rise Time Equivalent Test Circuit

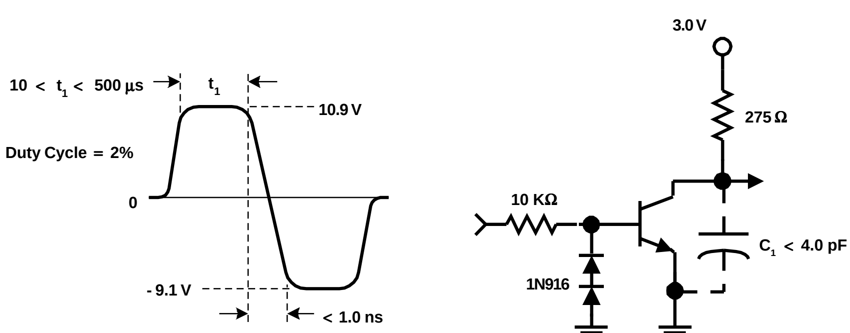


FIGURE 2: Storage and Fall Time Equivalent Test Circuit

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