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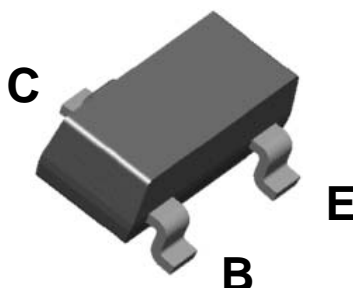
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BSR17A

NPN General Purpose Amplifier



SOT-23
MARK: U92

Features

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 *T_a = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{CBO}	Collector-Base Voltage	60	V
V _{CEO}	Collector-Emitter Voltage	40	V
V _{EB0}	Emitter-Base Voltage	6.0	V
I _C	Collector Current (DC)	200	mA
T _J	Junction Temperature	-55 ~ +150	°C
T _{STG}	Storage Temperature	-55 ~ +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 *T_a = 25°C unless otherwise noted

Symbol	Characteristic	Max	Units
P _D	Total Device Dissipation	350	mW
	Derate above 25°C	2.8	mW/°C
R _{θ JA}	Thermal Resistance, Junction to Ambient	357	°C/W

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

Electrical Characteristics *T_a = 25°C unless otherwise noted

Symbol	Parameter	Test Condition	MIN	MAX	Units
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Off Characteristics

V _{(BR)CEO}	Collector-Emitter Breakdown Voltage	I _C = 1.0 mA, I _B = 0	40		V
V _{(BR)CBO}	Collector-Base Breakdown Voltage	I _C = 10 μA, I _B = 0	60		V
V _{(BR)EBO}	Emitter-Base Breakdown Voltage	I _C = 10 μA, I _B = 0	6.0		V
I _{CBO}	Collector-Cutoff Current	V _{CB} = 30 V, T _A = 150°C		5.0	μA
I _{CEX}	Emitter-Cutoff Current	V _{CE} = 30 V, V _{EB} = 3.0 V		50	nA
I _{BEX}	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	40	300	
		I _C = 1.0 mA, V _{CE} = 1.0 V	70		
		I _C = 10 mA, V _{CE} = 1.0 V	100		
		I _C = 50 mA, V _{CE} = 1.0 V	60		
		I _C = 100 mA, V _{CE} = 1.0 V	30		
V _{CE(sat)}	Collector-Emitter Saturation Voltage *	I _C = 10 mA, I _B = 1.0 mA		0.2	V
		I _C = 50 mA, I _B = 5.0 mA		0.3	V
V _{BE(sat)}	Emitter-Base Breakdown Voltage *	I _C = 10 mA, I _B = 1.0 mA	0.65	0.85	V
		I _C = 50 mA, I _B = 5.0 mA		0.95	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} = 0.5 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

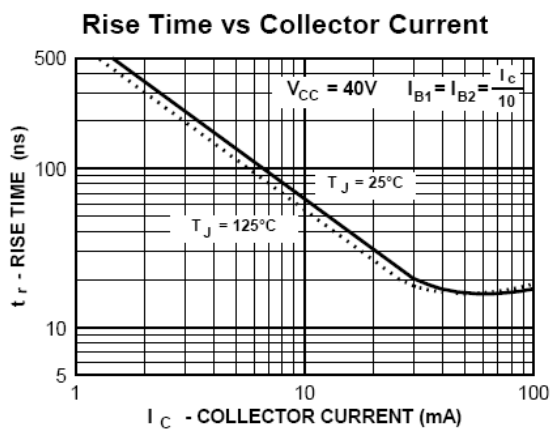
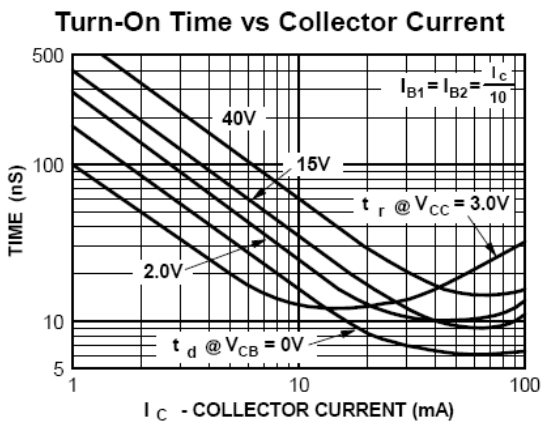
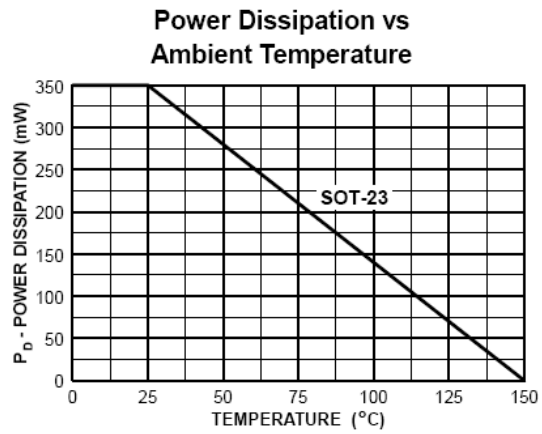
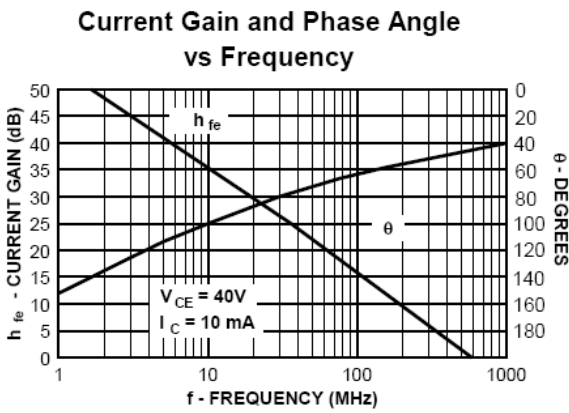
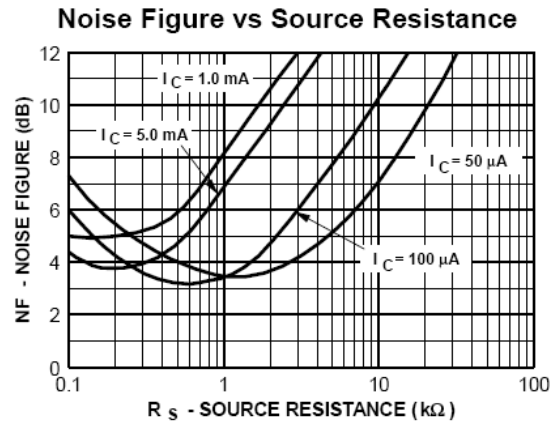
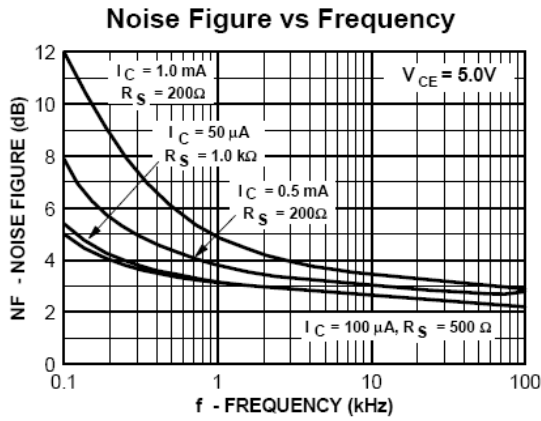
t _d	Delay Time	I _C = 10 mA, I _{B1} = 1.0 mA, V _{EB} = 0.5 V		35	ns
t _r	Rise Time			4.0	pF
t _s	Storage Time	I _C = 10 mA, I _{Bon} = I _{Boff} = 1.0 mA		200	ns
t _f	Fall Time			50	ns

*Pulse Test: Pulse Width 300 s, Duty Cycle 2.0 %

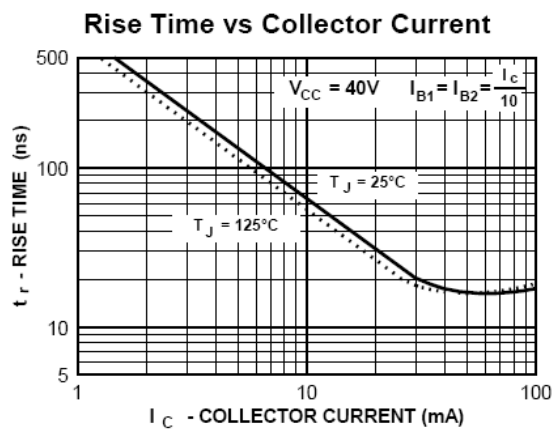
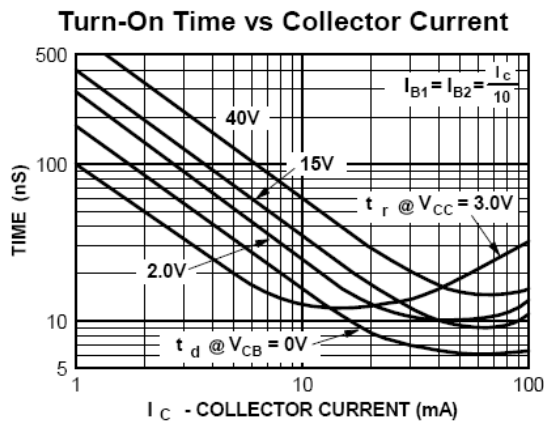
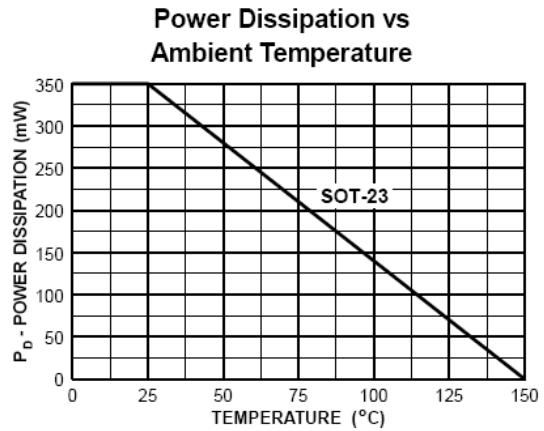
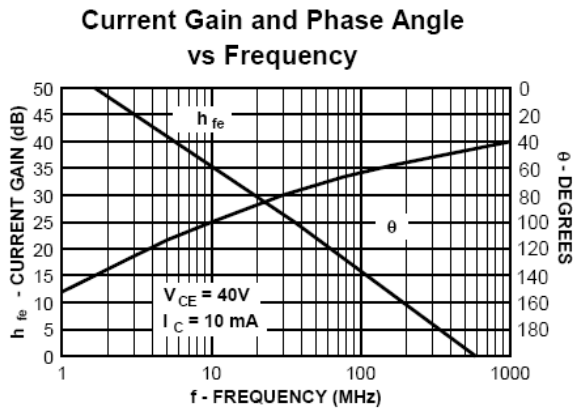
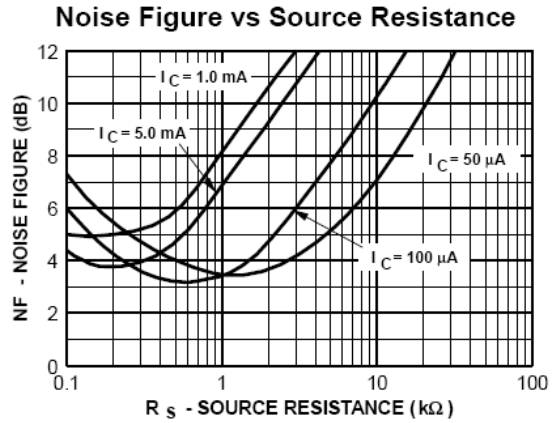
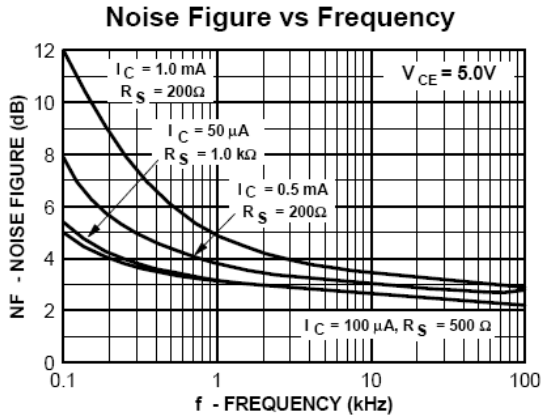
Spice Model

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
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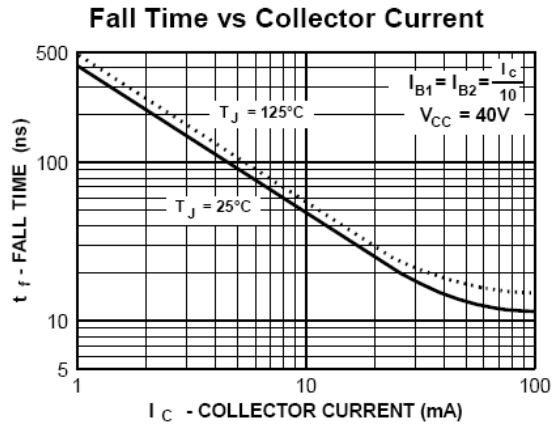
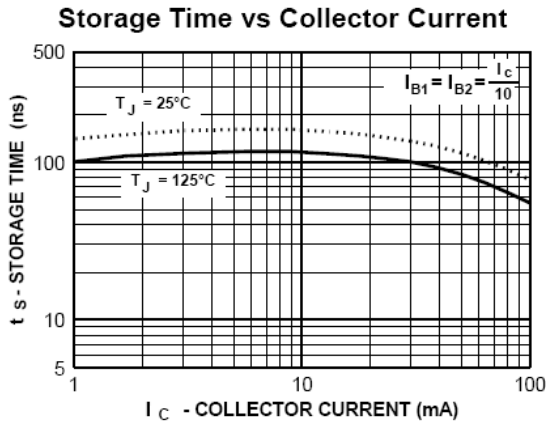
Typical Performance Characteristics



Typical Performance Characteristics (continued)



Typical Performance Characteristics (continued)



Test Circuits

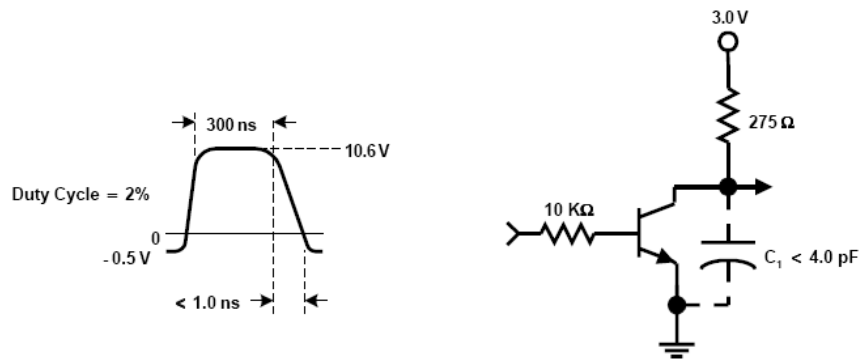


FIGURE 1: Delay and Rise Time Equivalent Test Circuit

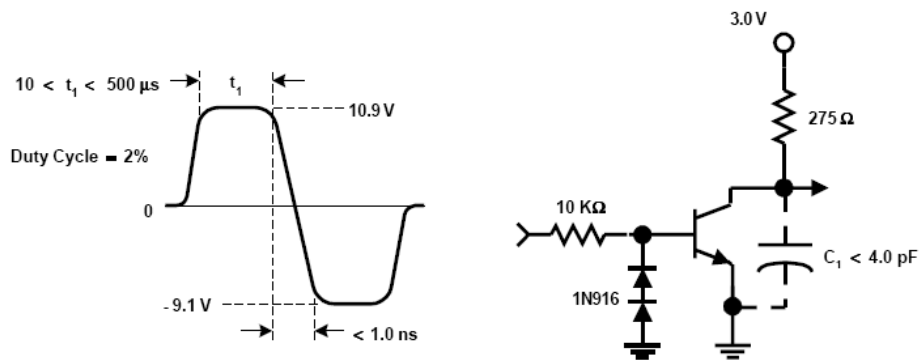


FIGURE 2: Storage and Fall Time Equivalent Test Circuit



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