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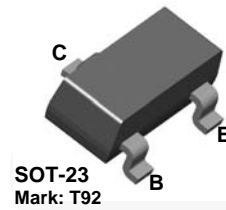


March 2014

# BSR18A PNP General-Purpose Amplifier

## Description

This device is designed as a general-purpose amplifier for switching applications at collector currents of 10  $\mu$ A to 100 mA. Sourced from process 66.



## Ordering Information

Part Number	Marking	Package	Packing Method
BSR18A	T92	SOT-23 3L	Tape and Reel

## Absolute Maximum Ratings<sup>(1),(2)</sup>

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{CEO}$	Collector-Emitter Voltage	-40	V
$V_{CBO}$	Collector-Base Voltage	-40	V
$V_{EBO}$	Emitter-Base Voltage	-5	V
$I_C$	Collector Current - Continuous	-200	mA
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

### Notes:

1. These ratings are based on a maximum junction temperature of 150 $^\circ\text{C}$ .
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

### Thermal Characteristics<sup>(3)</sup>

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Max.	Unit
$P_D$	Total Device Dissipation	350	mW
	Derate Above $T_A = 25^\circ\text{C}$	2.8	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	$^\circ\text{C}/\text{W}$

**Note:**

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

### Electrical Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit	
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = -10 \mu\text{A}, I_B = 0$	-40		V	
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -1.0 \text{ mA}, I_E = 0$	-40		V	
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = -10 \mu\text{A}, I_C = 0$	-5.0		V	
$I_{CBO}$	Collector Cut-Off Current	$V_{CB} = -30 \text{ V}, I_E = 0$		-50	nA	
$I_{EBO}$	Emitter Cut-Off Current	$V_{EB} = -3.0 \text{ V}, I_C = 0$		-50	nA	
$h_{FE}$	DC Current Gain <sup>(4)</sup>	$I_C = -0.1 \text{ mA}, V_{CE} = -1.0 \text{ V}$	60			
		$I_C = -1.0 \text{ mA}, V_{CE} = -1.0 \text{ V}$	80			
		$I_C = -10 \text{ mA}, V_{CE} = -1.0 \text{ V}$	100	300		
		$I_C = -50 \text{ mA}, V_{CE} = -1.0 \text{ V}$	60			
		$I_C = -100 \text{ mA}, V_{CE} = -1.0 \text{ V}$	30			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage <sup>(4)</sup>	$I_C = -10 \text{ mA}, I_B = -1.0 \text{ mA}$		-0.25	V	
		$I_C = -50 \text{ mA}, I_B = -5.0 \text{ mA}$		-0.40		
$V_{BE(sat)}$	Base-Emitter Saturation Voltage <sup>(4)</sup>	$I_C = -10 \text{ mA}, I_B = -1.0 \text{ mA}$	-0.65	-0.85	V	
		$I_C = -50 \text{ mA}, I_B = -5.0 \text{ mA}$		-0.95		
$f_T$	Transition Frequency	$I_C = -10 \text{ mA}, V_{CE} = -20 \text{ V}, f = 100 \text{ MHz}$	250		MHz	
$C_{cb}$	Collector-Base Capacitance	$V_{CB} = -5.0 \text{ V}, I_E = 0, f = 100 \text{ kHz}$		4.5	pF	
$C_{eb}$	Emitter-Base Capacitance	$V_{EB} = -0.5 \text{ V}, I_C = 0, f = 100 \text{ kHz}$		10	pF	
$h_{ie}$	Input Impedance	$V_{CE} = -10 \text{ V}, I_C = -1.0 \text{ mA}, f = 1.0 \text{ kHz}$	2	12	k $\Omega$	
$h_{ie}$	Small-Signal Current Gain	$V_{CE} = -10 \text{ V}, I_C = -1.0 \text{ mA}, f = 1.0 \text{ kHz}$	100	400		
$h_{ie}$	Output Admittance	$V_{CE} = -10 \text{ V}, I_C = -1.0 \text{ mA}, f = 1.0 \text{ kHz}$	3	60	$\mu\text{S}$	
$t_d$	Delay Time	$I_C = -10 \text{ mA}, I_{B1} = -1.0 \text{ mA}, V_{EB} = -0.5 \text{ V}$		35	ns	
$t_r$	Rise Time			35	ns	
$t_s$	Storage Time		$I_C = -10 \text{ mA}, I_{Bon} = I_{Boff} = -1.0 \text{ mA}$		275	ns
$t_f$	Fall Time				75	ns

**Note:**

4. Pulse test: pulse width 300  $\mu\text{s}$ , duty cycle 0.01%.

## Typical Performance Characteristics

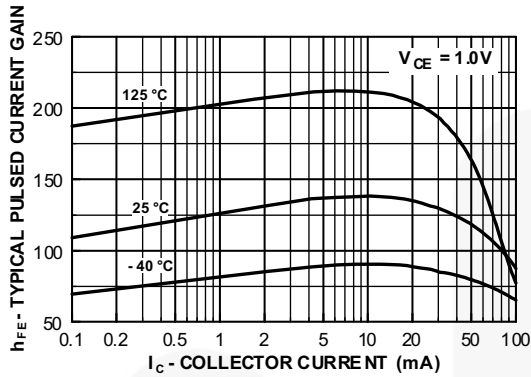


Figure 1. Typical Pulsed Current Gain vs. Collector Current

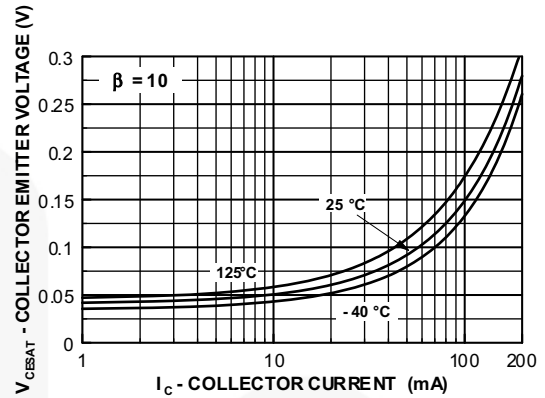


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

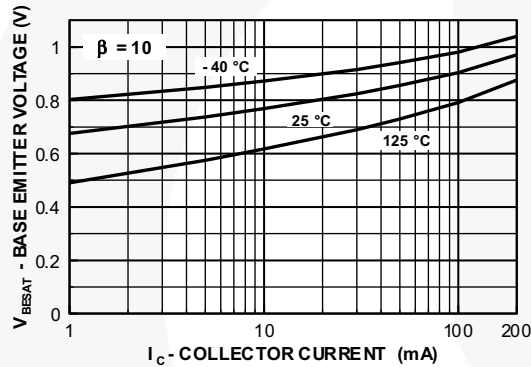


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

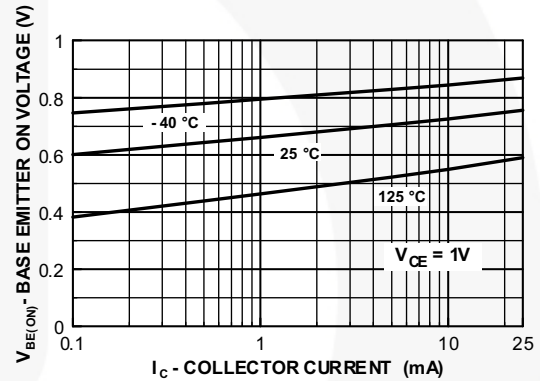


Figure 4. Base-Emitter On Voltage vs. Collector Current

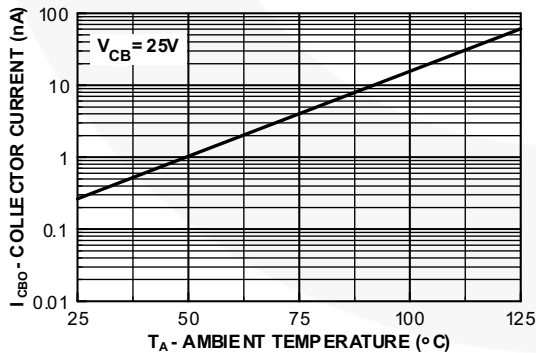


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

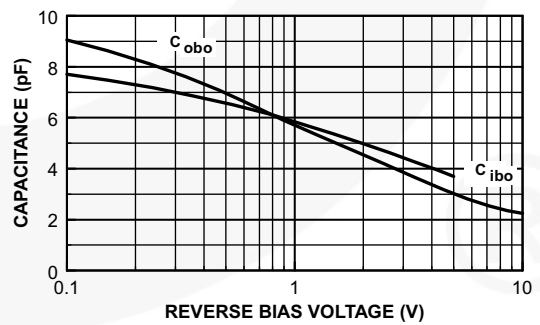
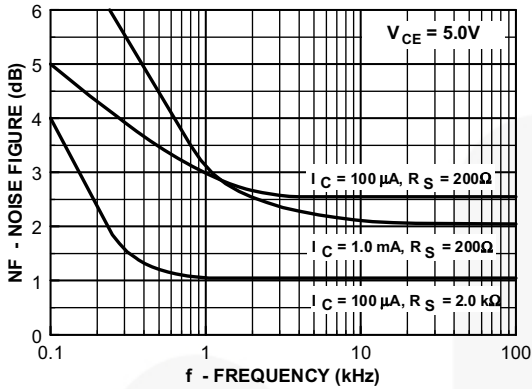
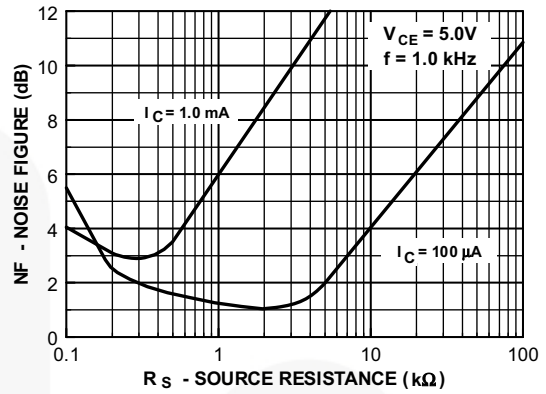


Figure 6. Common-Base Open Circuit Input and Output Capacitance vs. Reverse Bias Voltage

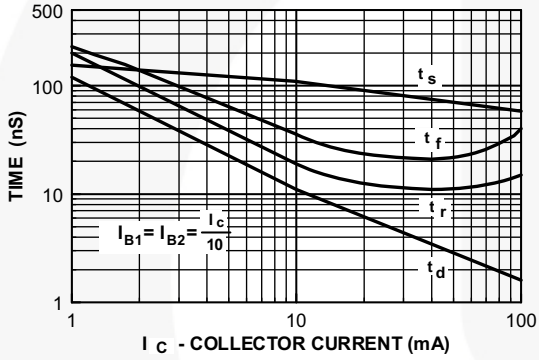
**Typical Performance Characteristics** (Continued)



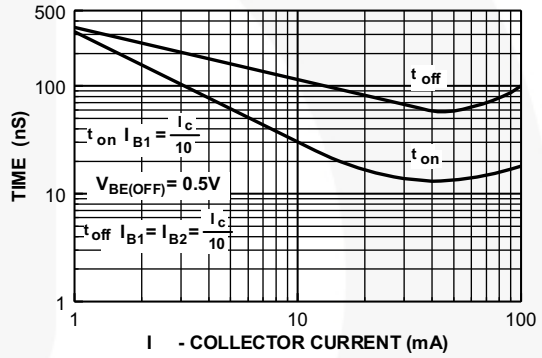
**Figure 7. Noise Figure vs. Frequency**



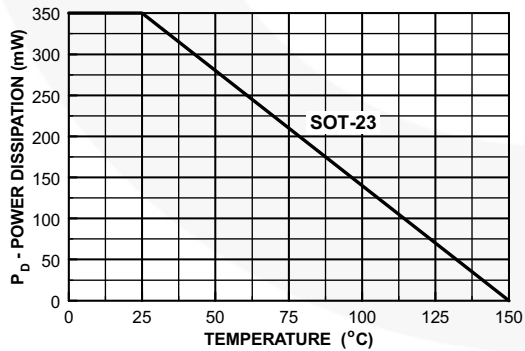
**Figure 8. Noise Figure vs. Source Resistance**



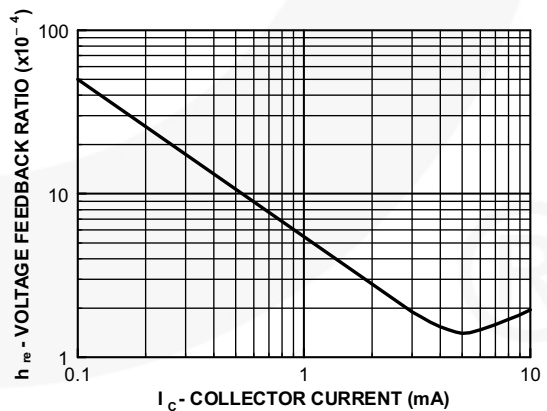
**Figure 9. Switching Times vs. Collector Current**



**Figure 10. Turn-On and Turn-Off Times vs. Collector Current**



**Figure 10. Power Dissipation vs. Ambient Temperature**



**Figure 11. Voltage Feedback Ratio**

Typical Performance Characteristics (Continued)

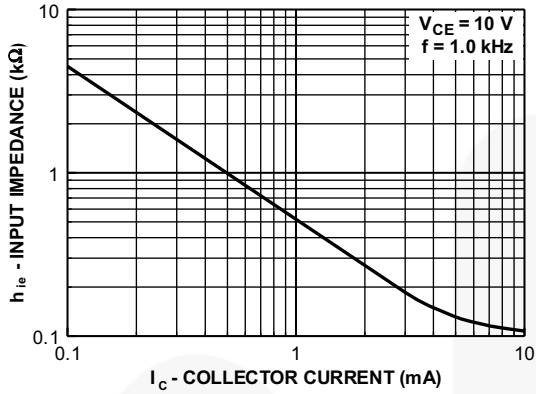


Figure 13. Input Impedance

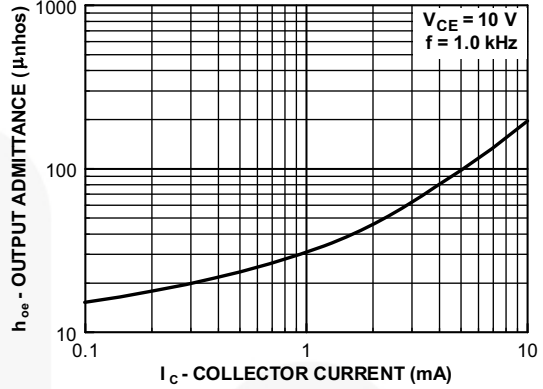


Figure 14. Output Admittance

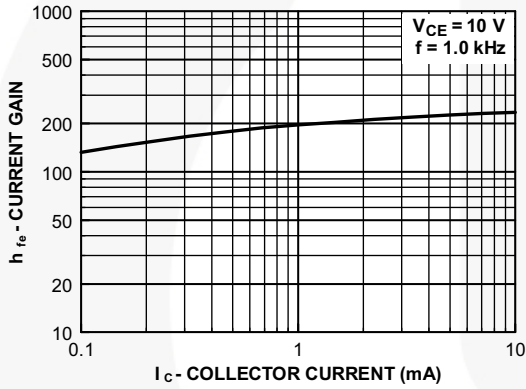


Figure 15. Current Gain

Physical Dimensions

SOT-23

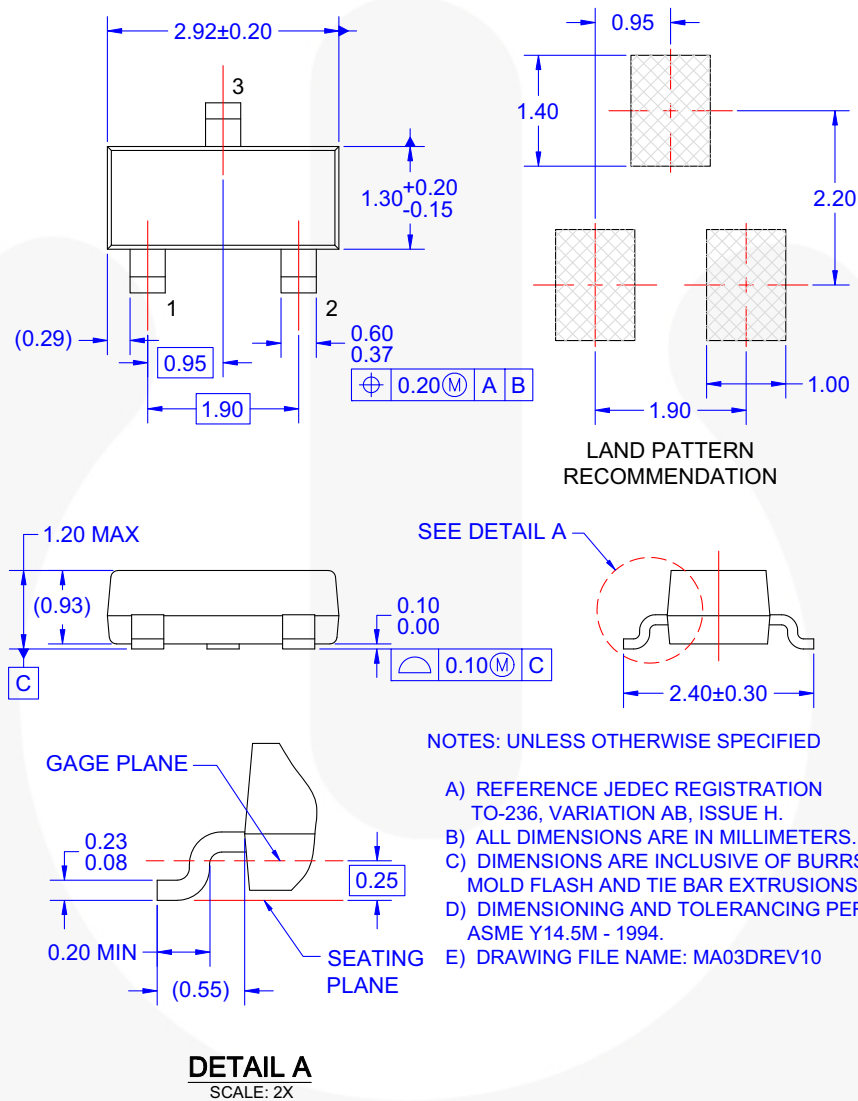


Figure 16. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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