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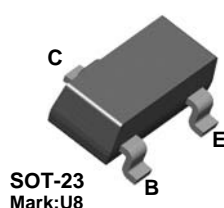
September 2012

# BSR14

## NPN General Purpose Amplifier

### Features

- This device is for use as a medium power amplifier and switch requiring collector currents up to 500 mA.
- Sourced from Process 19.
- See BCW65C for characteristics.



### Absolute Maximum Ratings\* $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CEO}$	Collector-Emitter Voltage	40	V
$V_{CBO}$	Collector-Base Voltage	75	V
$V_{EBO}$	Emitter-Base Voltage	6.0	V
$I_C$	Collector Current - Continuous	800	mA
$T_J, T_{stg}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

\* 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 $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Max.	Units
		*BSR14	
$P_D$	Total Device Dissipation Derate above $25^\circ\text{C}$	350 2.8	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	$^\circ\text{C/W}$

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

**Electrical Characteristics**  $T_a = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Max.	Units
<b>OFF CHARACTERISTICS</b>					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\mu\text{A}, I_B = 0$	40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\mu\text{A}, I_E = 0$	75		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\mu\text{A}, I_C = 0$	6.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 60\text{V},$ $V_{CB} = 60\text{V}, T_a = 150^\circ\text{C}$		10 10	nA $\mu\text{A}$
$I_{CEX}$	Collector-Cutoff Current	$V_{CE} = 60\text{V}, V_{EB} = 3.0\text{V}$		10	nA
$I_{BEX}$	Reverse Base Current	$V_{CE} = 60\text{V}, V_{EB} = 3.0\text{V}$		20	nA
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 3.0\text{V}, I_C = 0$		15	nA
<b>ON CHARACTERISTICS</b>					
$h_{FE}$	DC Current Gain	$I_C = 0.1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 1.0\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ $I_C = 150\text{mA}, V_{CE} = 10\text{V}$ $I_C = 150\text{mA}, V_{CE} = 1.0\text{V}$ $I_C = 500\text{mA}, V_{CE} = 10\text{V}$	35 50 75 100 50 40	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$		0.3 1.0	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$	0.6	1.2 2.0	V V
<b>SMALL SIGNAL CHARACTERISTICS</b>					
$f_T$	Current Gain - Bandwidth Product	$I_C = 20\text{mA}, V_{CE} = 20\text{V},$ $f = 100\text{MHz}$	300		MHz
$C_{CB}$	Collector-Base Capacitance	$V_{CB} = 10\text{V}, I_E = 0,$ $f = 1.0\text{MHz}$		8.0	pF
$h_{ie}$	Input Impedance	$V_{CE} = 10\text{V}, I_C = 1.0\text{mA},$ $f = 1.0\text{kHz}$	2.0	8.0	k $\Omega$
$h_{fe}$	Small-Signal Current Gain	$V_{CE} = 10\text{V}, I_C = 1.0\text{mA},$ $f = 1.0\text{kHz}$	50	300	
$h_{oe}$	Output Admittance	$V_{CE} = 10\text{V}, I_C = 1.0\text{mA},$ $f = 1.0\text{kHz}$	5	35	$\mu\text{S}$
<b>SWITCHING CHARACTERISTICS</b>					
$t_d$	Delay Time	$V_{CC} = 30\text{V}, V_{BE(OFF)} =$ $0.5\text{V}, I_C = 150\text{mA},$ $I_{B1} = 15\text{mA}$		10	ns
$t_r$	Rise Time			25	ns
$t_s$	Storage Time	$V_{CC} = 30\text{V}, I_C = 150\text{mA},$ $I_{B1} = I_{B2} = 15\text{mA}$		225	ns
$t_f$	Fall Time			60	ns





**Spice Model**

NPN (Is=14.34f Xti=3 Eg=1.11 Vaf=74.03 Bf=255.9 Ne=1.307 Ise=14.34f Ikf=.2847 Xtb=1.5 Br=6.092 Nc=2 Isc=0 Ikr=0 Rc=1 Cjc=7.306p Mjc=.3416 Vjc=.75 Fc=.5 Cje=22.01p Mje=.377 Vje=.75 Tr=46.91n Tf=411.1p Itf=.6 Vtf=1.7 Xtf=3 Rb=10)



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