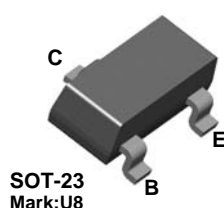


# BSR14

## 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	mW
		2.8	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	$^\circ\text{C}/\text{W}$

\* 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



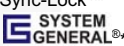
**Spice Model**

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)



**TRADEMARKS**

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- |                          |  |   |   |
|--------------------------|--|---|---|
| 2Cool™                   | F-PFS™   | PowerTrench®  | The Power Franchise®  |
| AccuPower™               | FRFET®   | PowerXS™  | the <b>power</b> franchise  |
| AX-CAP™*                 | Global Power Resource™                         | Programmable Active Droop™  | TinyBoost™  |
| BitSiC™                  | GreenBridge™                                   | QFET®   | TinyBuck™   |
| Build it Now™            | Green FPS™                                     | QS™   | TinyCalc™   |
| CorePLUS™                | Green FPS™ e-Series™                           | Quiet Series™   | TinyLogic®  |
| CorePOWER™               | Gmax™  | RapidConfigure™   | TINYOPTO™   |
| CROSSVOLT™               | GTO™   |  | TinyPower™  |
| CTL™                     | IntelliMAX™                                    | Saving our world, 1mW/W/kW at a time™   | TinyPWM™  |
| Current Transfer Logic™  | ISOPLANAR™                                     | SignalWise™   | TinyWire™   |
| DEUXPEED®                | Making Small Speakers Sound Louder and Better™ | SmartMax™   | TranSiC™  |
| Dual Cool™               | MegaBuck™                                      | SMART START™  | TriFault Detect™  |
| EcoSPARK®                | MICROCOUPLER™                                  | Solutions for Your Success™   | TRUECURRENT®*   |
| EfficientMax™            | MicroFET™                                      | SPM®  | μSerDes™  |
| ESBC™                    | MicroPak™                                      | STEALTH™  |  |
| <b>F</b> ®               | MicroPak2™                                     | SuperFET®   | UHC®  |
| Fairchild®               | MillerDrive™                                   | SuperSOT™-3   | Ultra FRFET™  |
| Fairchild Semiconductor® | MotionMax™                                     | SuperSOT™-6   | UniFET™   |
| FACT Quiet Series™       | mWSaver™                                       | SupreMOS®   | VCX™  |
| FACT®                    | OptoHiT™                                       | SyncFET™  | VisualMax™  |
| FAST®                    | OPTOLOGIC®                                     | Sync-Lock™  | VoltagePlus™  |
| FastvCore™               | OPTOPLANAR®                                    |  | XS™   |
| FETBench™                |  |   |   |
| FlashWriter®*            |  |   |   |
| FPS™                     |  |   |   |

\* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

**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. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

**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, and (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 a significant injury of the user.
2. A critical component in 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.

**ANTI-COUNTERFEITING POLICY**

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

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

Rev. I62