






















































































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## BC237/238/239

## NPN EPITAXIAL SILICON TRANSISTOR

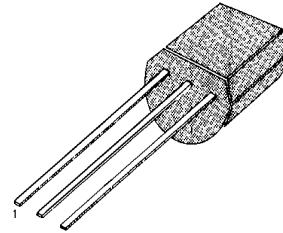
### SWITCHING AND AMPLIFIER APPLICATIONS

- LOW NOISE: BC239

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CES}$		V
: BC237		50	V
: BC238/239		30	
Collector-Emitter Voltage	$V_{CEO}$		V
: BC237		45	V
: BC238/239		25	V
Emitter-Base Voltage	$V_{EBO}$		V
: BC237		6	V
: BC238/239		5	V
Collector Current (DC)	$I_C$	100	mA
Collector Dissipation	$P_C$	500	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ 150	$^\circ\text{C}$

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1. Collector 2. Base 3. Emitter

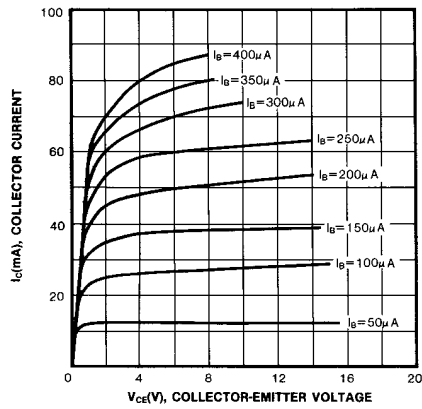
### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2\text{mA}, I_B=0$	45			V
: BC237			25			V
: BC238/239						
Emitter Base Breakdown Voltage	$BV_{EBO}$	$I_E=1\mu\text{A}, I_C=0$	6			V
: BC237			5			V
: BC238/239						
Collector Cut-off Current	$I_{CES}$	$V_{CE}=50\text{V}, I_B=0$		0.2	15	nA
: BC237		$V_{CE}=30\text{V}, I_B=0$		0.2	15	nA
: BC238/239		$V_{CE}=5\text{V}, I_C=2\text{mA}$			800	
DC Current Gain	$h_{FE}$	$I_C=10\text{mA}, I_B=0.5\text{mA}$	120	0.07	0.2	V
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=100\text{mA}, I_B=5\text{mA}$		0.2	0.6	V
Collector Base Saturation Voltage	$V_{BE}(\text{sat})$	$I_C=10\text{mA}, I_B=0.5\text{mA}$		0.73	0.83	V
Base Emitter On Voltage	$V_{BE}(\text{on})$	$I_C=100\text{mA}, I_B=5\text{mA}$		0.87	1.05	V
Current Gain Bandwidth Product	$f_T$	$V_{CE}=5\text{V}, I_C=2\text{mA}$	0.55	0.62	0.7	V
		$V_{CE}=3\text{V}, I_C=0.5\text{mA}$		85		MHz
		$V_{CE}=5\text{V}, I_C=10\text{mA}$	150	250		MHz
Collector Base Capacitance	$C_{CBO}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		3.5	6	pF
Emitter Base Capacitance	$C_{EBO}$	$V_{EB}=0.5\text{V}, f=1\text{MHz}$		8		pF
Noise Figure	NF	$V_{CE}=5\text{V}, I_C=0.2\text{mA}, f=1\text{KHz}, R_G=2\text{kohm}$		2	10	dB
: BC237/238		$V_{CE}=5\text{V}, I_C=0.2\text{mA}$			4	dB
: BC239		$R_G=2\text{kohm}, f=30\sim 15\text{KHz}$			4	dB

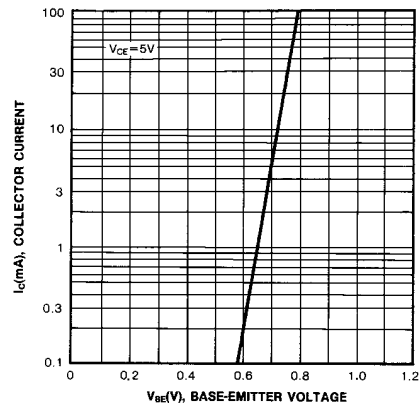
### $h_{FE}$ CLASSIFICATION

Classification	A	B	C
$h_{FE}$	120-220	180-460	380-800

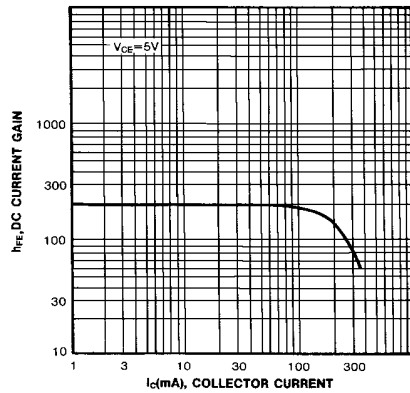
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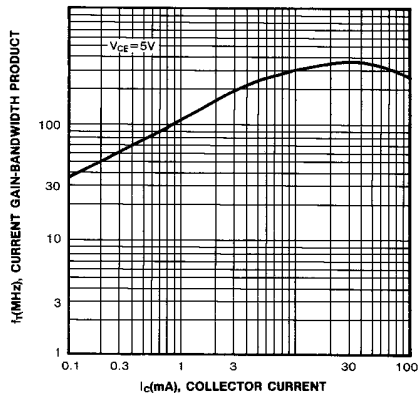
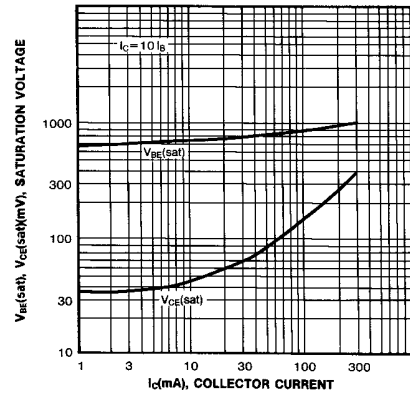
TRANSFER CHARACTERISTIC



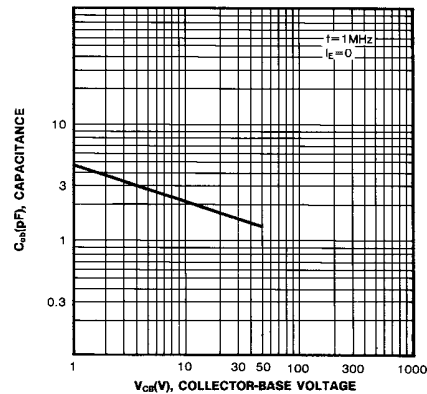
DC CURRENT GAIN



CURRENT GAIN BANDWIDTH PRODUCT

BASE-EMITTER SATURATION VOLTAGE  
COLLECTOR-EMITTER SATURATION VOLTAGE

OUTPUT CAPACITANCE



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FACT™	QS™
FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FAST <sub>r</sub> ™	SuperSOT™-6
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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

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

## BC307/308/309

## PNP EPITAXIAL SILICON TRANSISTOR

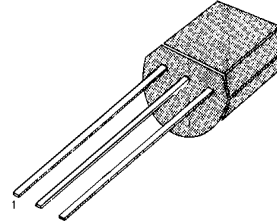
### SWITCHING AND AMPLIFIER APPLICATIONS

- LOW NOISE: BC309

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C)

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage : BC307	V <sub>CES</sub>	-50	V
: BC308/309		-30	V
Collector-Emitter Voltage : BC307	V <sub>CEO</sub>	-45	V
: BC308/309		-25	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5	V
Collector Current (DC)	I <sub>C</sub>	-100	mA
Collector Dissipation	P <sub>C</sub>	500	mW
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ 150	°C

TO-92



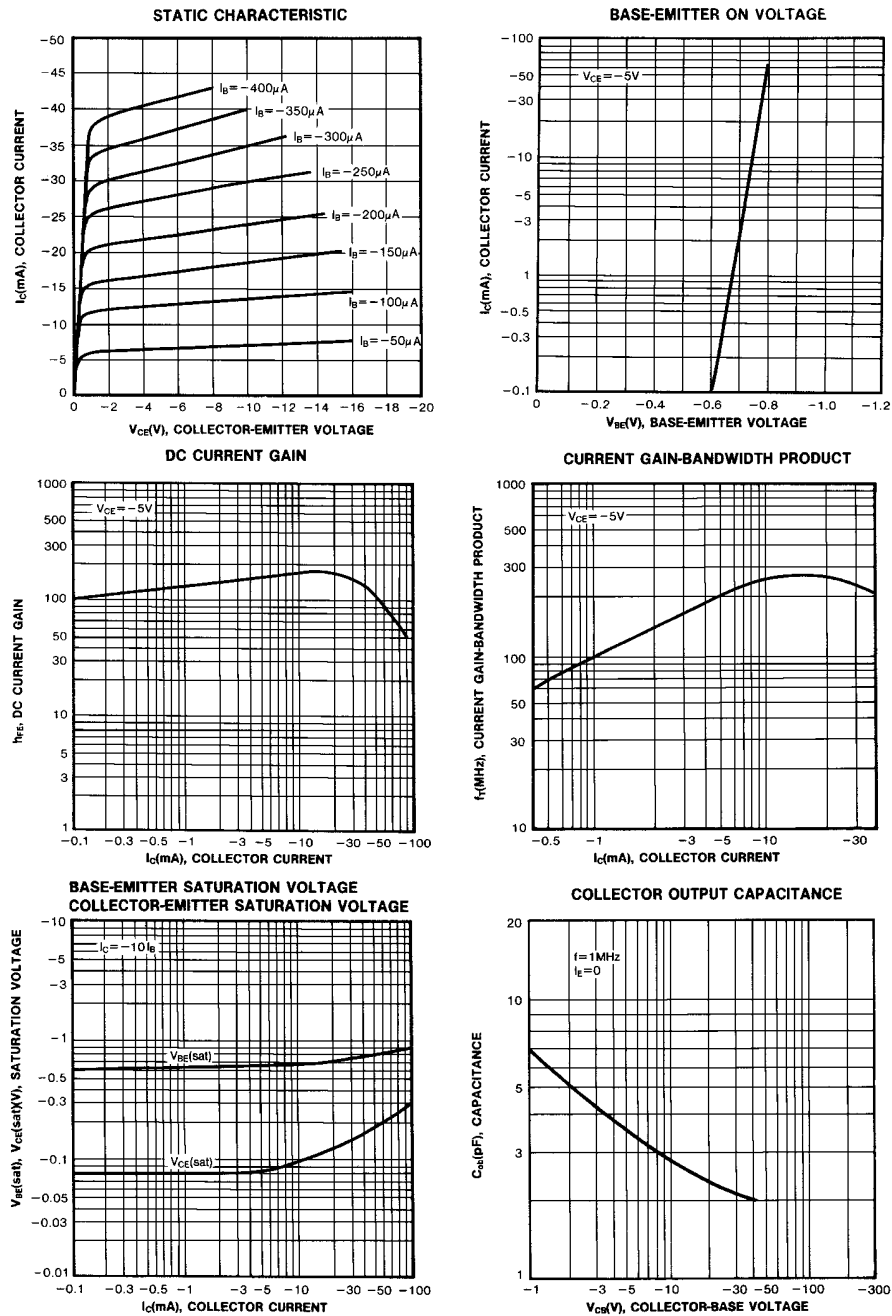
### ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Emitter Breakdown Voltage : BC307	BV <sub>CEO</sub>	I <sub>C</sub> = -2mA, I <sub>B</sub> =0	-45			V
: BC308/309			-25			V
Collector Emitter Breakdown Voltage : BC307	BV <sub>CES</sub>	I <sub>C</sub> = -10μA, I <sub>B</sub> =0	-50			V
: BC308/309			-30			V
Emitter Base Breakdown Voltage	BV <sub>EBO</sub>	I <sub>E</sub> = -10μA, I <sub>B</sub> =0	-5			V
Collector Cut-off Current : BC307	I <sub>CES</sub>	V <sub>CE</sub> = -45V, I <sub>B</sub> =0		-2	-15	nA
: BC238/239		V <sub>CE</sub> = -25V, I <sub>B</sub> =0		-2	-15	nA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = -5V, I <sub>C</sub> = -2mA	120		800	
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA			-0.3	V
		I <sub>C</sub> = -100mA, I <sub>B</sub> = -5mA		-0.5		V
Collector Base Saturation Voltage	V <sub>BE</sub> (sat)	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA		-0.7		V
		I <sub>C</sub> = -100mA, I <sub>B</sub> = -5mA		-0.85		V
Base Emitter On Voltage	V <sub>BE</sub> (on)	V <sub>CE</sub> = -5V, I <sub>C</sub> = -2mA	-0.55	-0.62	-0.7	V
Current Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = -5V, I <sub>C</sub> = -10mA		130		MHz
Collector Base Capacitance	C <sub>CB0</sub>	V <sub>CB</sub> = -10V, f=1MHz			6	pF
Emitter Base Capacitance	C <sub>EB0</sub>	V <sub>EB</sub> = -0.5V, f=1MHz		12		pF
Noise Figure : BC237/238	NF	V <sub>CE</sub> = -5V, I <sub>C</sub> = -0.2mA,			10	dB
: BC239		R <sub>G</sub> =2KΩ, f=1KHz			4	dB
: BC239		V <sub>CE</sub> = -5V, I <sub>C</sub> = -0.2mA		2	4	dB
		R <sub>G</sub> =2KΩ, f=30~15KHz				

### h<sub>FE</sub> CLASSIFICATION

Classification	A	B	C
h <sub>FE</sub>	120-220	180-460	380-800





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FACT™	QS™
FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
GTO™	SuperSOT™-8
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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

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## BC327/328

## PNP EPITAXIAL SILICON TRANSISTOR

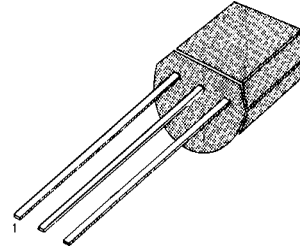
### SWITCHING AND AMPLIFIER APPLICATIONS

- Suitable for AF-Driver stages and low power output stages
- Complement to BC337/BC338

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage : BC327 : BC328	$V_{CES}$	-50 -30	V V
Collector-Emitter Voltage : BC327 : BC328	$V_{CEO}$	-45 -25	V V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current (DC)	$I_C$	-800	mA
Collector Dissipation	$P_C$	625	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ 150	$^\circ\text{C}$

TO-92



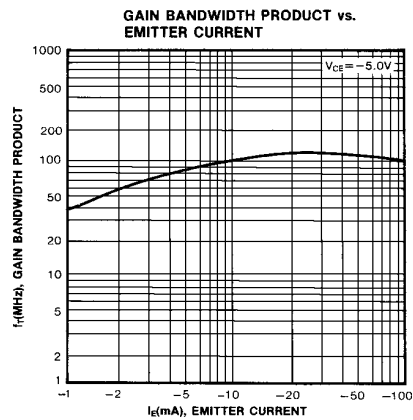
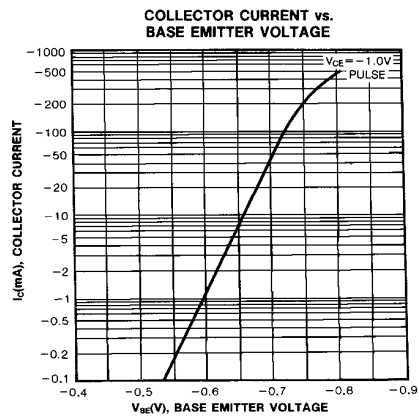
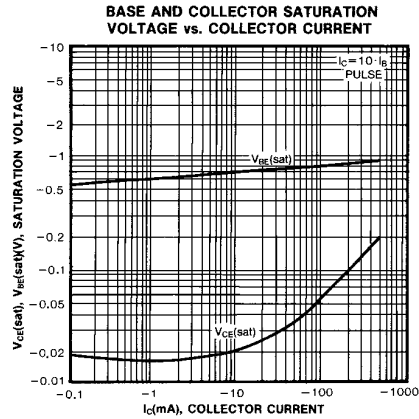
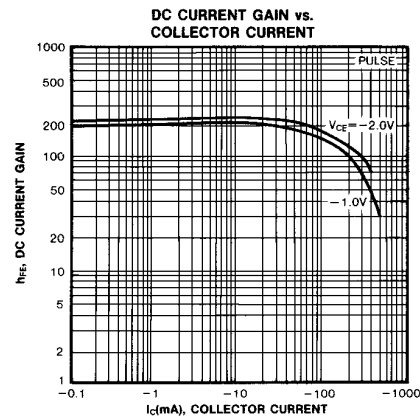
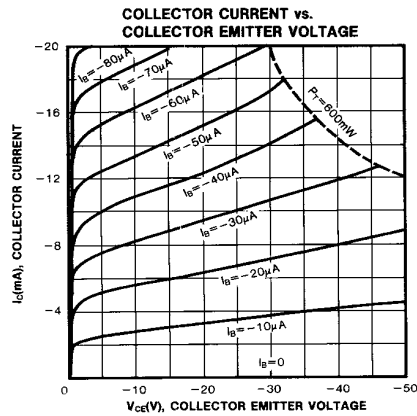
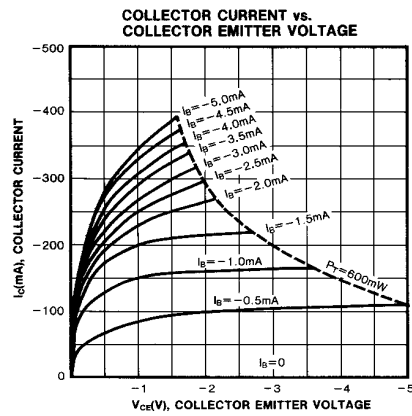
1. Collector 2. Base 3. Emitter

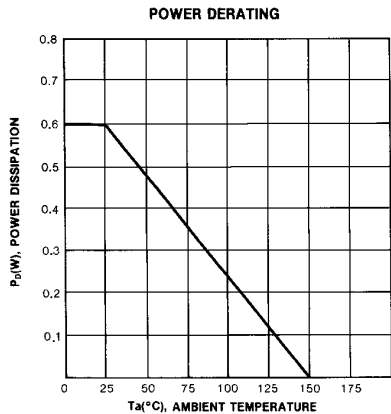
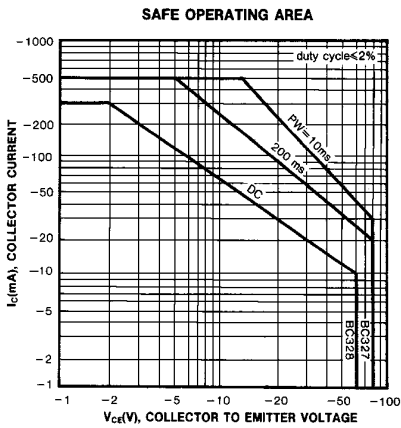
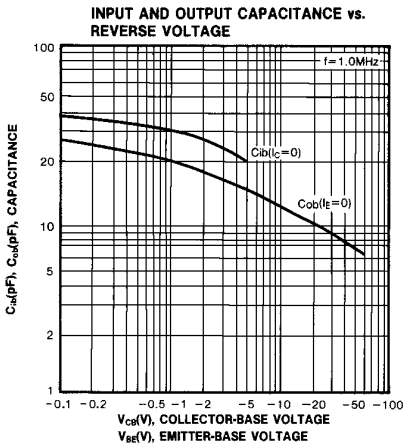
### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Emitter Breakdown Voltage : BC327 : BC328	$BV_{CEO}$	$I_C = -10\text{mA}$ , $I_B = 0$	-45 -25			V V
Collector Emitter Breakdown Voltage : BC327 : BC328	$BV_{CES}$	$I_C = -0.1\text{mA}$ , $I_B = 0$	-50 -30 -5			V V V
Emitter Base Breakdown Voltage	$BV_{EBO}$	$I_E = -10\text{mA}$ , $I_C = 0$				V
Collector Cut-off Current : BC307 : BC338	$I_{CES}$	$V_{CE} = -45\text{V}$ , $I_B = 0$ $V_{CE} = -25\text{V}$ , $I_B = 0$		-2 -2	-100 -100	nA nA
DC Current Gain	$h_{FE}$ $h_{FE2}$	$V_{CE} = -1\text{V}$ , $I_C = -100\text{mA}$ $V_{CE} = -1\text{V}$ , $I_C = -30\text{mA}$	100 60		630	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = -500\text{mA}$ , $I_B = -50\text{mA}$			-0.7	V
Base Emitter On Voltage	$V_{BE(ON)}$	$V_{CE} = -1\text{V}$ , $I_C = -300\text{mA}$			-1.2	V
Current Gain Bandwidth Product	$f_T$	$V_{CE} = -5\text{V}$ , $I_C = -10\text{mA}$		100		MHz
Collector Base Capacitance	$C_{CBO}$	$V_{CB} = -10\text{V}$ , $f = 1\text{MHz}$		12		pF

### $h_{FE}$ CLASSIFICATION

Classification	A	B	C
$h_{FE}$	100-250	160-400	250-630
$h_{FE2}$	60-	100-	170-





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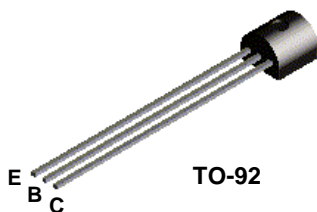
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# BC337-16 BC337-25



## NPN General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500 mA. Sourced from Process 12. See TN3019A for characteristics.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CES</sub>	Collector-Base Voltage	50	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	1.0	A
T <sub>J</sub> , T <sub>stg</sub>	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
		BC337-16 / BC337-25	
P <sub>D</sub>	Total Device Dissipation	625	mW
	Derate above 25°C	5.0	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	°C/W

# NPN General Purpose Amplifier

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
V <sub>(BR)CEO</sub>	Collector-Emitter Breakdown Voltage	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0	45		V
V <sub>(BR)CES</sub>	Collector-Base Breakdown Voltage	I <sub>C</sub> = 100 µA, I <sub>E</sub> = 0	50		V
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage	I <sub>E</sub> = 100 µA, I <sub>C</sub> = 0	5.0		V
I <sub>CBO</sub>	Collector Cutoff Current	V <sub>CB</sub> = 20 V, I <sub>E</sub> = 0, T <sub>A</sub> = +25 °C V <sub>CB</sub> = 20 V, I <sub>E</sub> = 0, T <sub>A</sub> = +150 °C		100 5.0	nA µA
I <sub>EBO</sub>	Emitter Cutoff Current	V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0		10	µA
ON CHARACTERISTICS					
h <sub>FE</sub>	DC Current Gain	V <sub>CE</sub> = 1.0 V, I <sub>C</sub> = 100 mA <b>337-16</b> <b>337-25</b> V <sub>CE</sub> = 1.0 V, I <sub>C</sub> = 500 mA	100 160 40	250 400	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA		0.7	V
V <sub>BE(on)</sub>	Base-Emitter On Voltage	V <sub>CE</sub> = 1.0 V, I <sub>C</sub> = 500 mA		1.2	V

BC337-16 / BC337-25



## BC337/338

## NPN EPITAXIAL SILICON TRANSISTOR

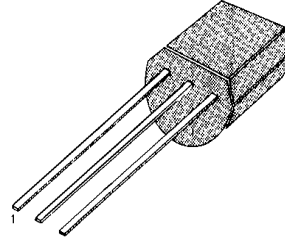
### SWITCHING AND AMPLIFIER APPLICATIONS

- Suitable for AF-Driver stages and low power output stages
- Complement to BC337/BC328

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage : BC337 : BC338	$V_{CES}$	50 30	V V
Collector-Emitter Voltage : BC337 : BC338	$V_{CEO}$	45 25	V V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current (DC)	$I_C$	800	mA
Collector Dissipation	$P_C$	625	mW
Junction Temperature	$T_J$	150	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ 150	$^{\circ}\text{C}$

TO-92



1. Collector 2. Base 3. Emitter

### ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Emitter Breakdown Voltage : BC337 : BC338	$BV_{CEO}$	$I_C=10\text{mA}$ , $I_B=0$	45 25			V V
Collector Emitter Breakdown Voltage : BC337 : BC338	$BV_{CES}$	$I_C=0.1\text{mA}$ , $I_B=0$	50 30			V V
Emitter Base Breakdown Voltage	$BV_{EBO}$	$I_E=0.1\text{mA}$ , $I_C=0$	-5			V
Collector Cut-off Current : BC337 : BC338	$I_{CES}$	$V_{CE}=45\text{V}$ , $I_B=0$ $V_{CE}=25\text{V}$ , $I_B=0$		2 2	100 100	nA nA
DC Current Gain	$h_{FE1}$ $h_{FE2}$	$V_{CE}=1\text{V}$ , $I_C=100\text{mA}$ $V_{CE}=1\text{V}$ , $I_C=300\text{mA}$	100 60		630	
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=500\text{mA}$ , $I_B=50\text{mA}$			0.7	V
Base Emitter On Voltage	$V_{BE}(\text{on})$	$V_{CE}=1\text{V}$ , $I_C=300\text{mA}$			1.2	V
Current Gain Bandwidth Product	$f_T$	$V_{CE}=5\text{V}$ , $I_C=10\text{mA}$		100		MHz
Collector Base Capacitance	$C_{CBO}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		12		pF

### $h_{FE}$ CLASSIFICATION

Classification	16	25	40
$h_{FE}$	100-250	160-400	250-630
$h_{FE2}$	60-	100-	170-

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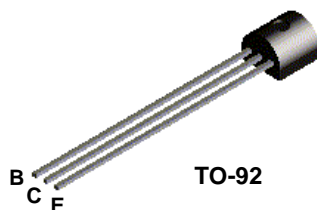
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## BC368



### NPN General Purpose Amplifier

This device is designed for general purpose medium power amplifiers and switches requiring collector currents to 1.5 A.  
Sourced from Process 37.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	20	V
V <sub>CES</sub>	Collector-Base Voltage	25	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	2.0	A
T <sub>J</sub> , T <sub>stg</sub>	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
		BC368	
P <sub>D</sub>	Total Device Dissipation	625	mW
	Derate above 25°C	5.0	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	°C/W

NPN General Purpose Amplifier  
(continued)

Electrical Characteristics TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{ mA}, I_B = 0$	20		V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}, I_E = 0$	25		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\text{ }\mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 25\text{ V}, I_E = 0$ $V_{CB} = 25\text{ V}, I_E = 0, T_A = 150^\circ\text{C}$		10 1.0	$\mu\text{A}$ mA
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 5.0\text{ V}, I_C = 0$		10	$\mu\text{A}$

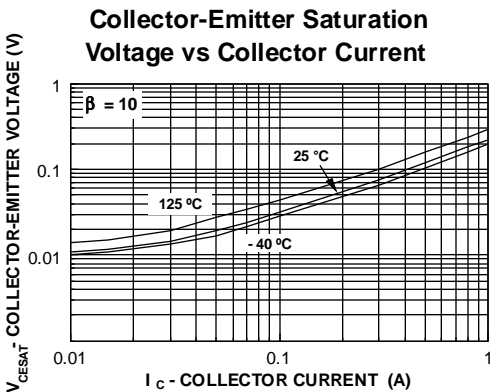
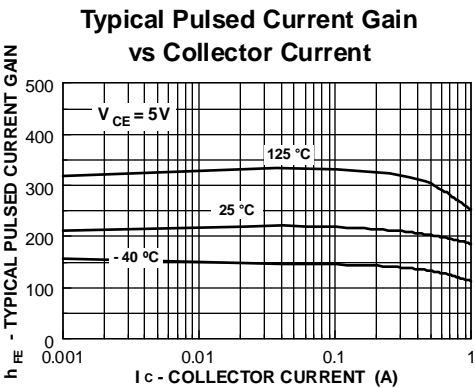
ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 5.0\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 0.5\text{ A}, V_{CE} = 1.0\text{ V}$ $I_C = 1.0\text{ A}, V_{CE} = 1.0\text{ V}$	50 85 60	375	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 1.0\text{ A}, I_B = 100\text{ mA}$		0.5	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 1.0\text{ A}, V_{CE} = 1.0\text{ V}$		1.0	V

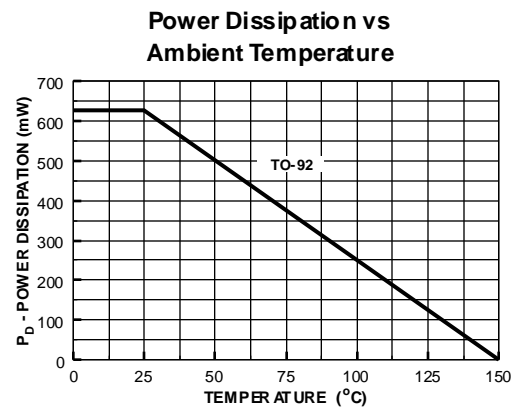
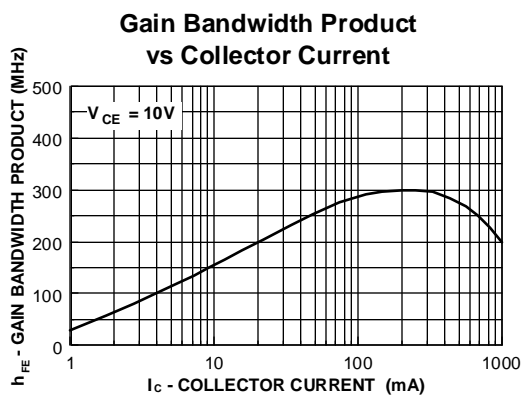
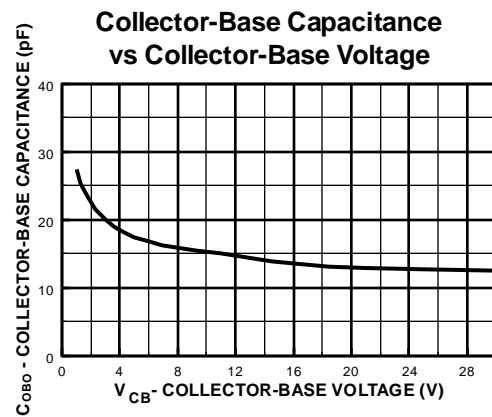
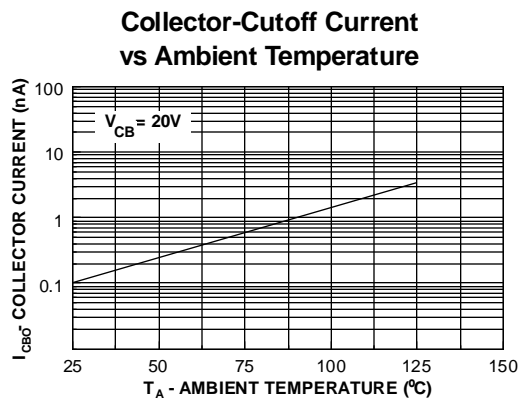
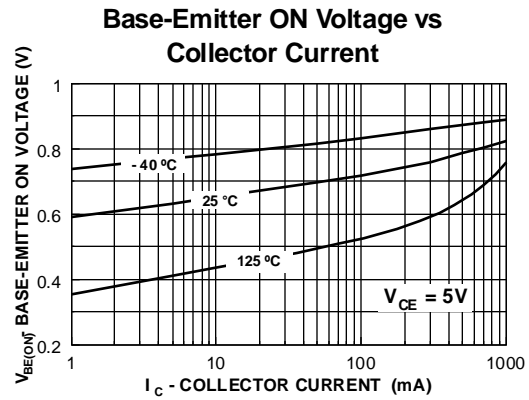
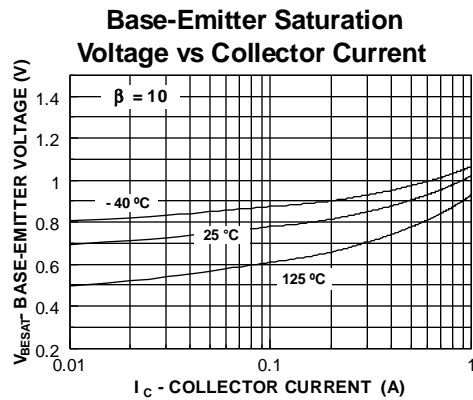
SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 10\text{ mA}, V_{CE} = 5.0\text{ V},$ $f = 35\text{ MHz}$	45		MHz
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Typical Characteristics



**Typical Characteristics** (continued)



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2. A critical component is 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.

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## BC546/547/548/549/550

## NPN EPITAXIAL SILICON TRANSISTOR

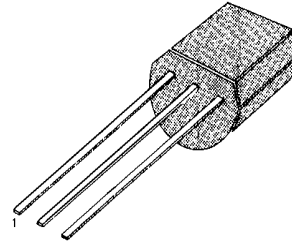
### SWITCHING AND AMPLIFIER

- HIGH VOLTAGE: BC546,  $V_{CE0}=65V$
- LOW NOISE: BC549, BC550
- Complement to BC556 ... BC560

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}C$ )

Characteristic	Symbol	Rating	Unit
Collector Base Voltage	$V_{CBO}$	80	V
: BC546		50	V
: BC547/550		30	V
Collector-Emmitter Voltage	$V_{CEO}$	65	V
: BC546		45	V
: BC547/550		30	V
Emitter-Base Voltage	$V_{EBO}$	6	V
: BC546/547		5	V
: BC548/549/550			
Collector Current (DC)	$I_C$	100	mA
Collector Dissipation	$P_C$	500	mW
Junction Temperature	$T_J$	150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-65 ~ 150	$^{\circ}C$

TO-92



1. Collector 2. Base 3. Emitter

### ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}C$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Cut-off Current	$I_{CBO}$	$V_{CB}=30V, I_E=0$			15	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5V, I_C=2mA$	110		800	
Collector Emmitter Saturation Voltage	$V_{CE(sat)}$	$I_C=10mA, I_B=0.5mA$		90	250	mA
		$I_C=100mA, I_B=5mA$		200	600	mA
Collector Base Saturation Voltage	$V_{BE(on)}$	$I_C=10mA, I_B=0.5mA$		700		mA
		$I_C=100mA, I_B=5mA$		900		mA
Base Emmitter On Voltage	$V_{BE(on)}$	$V_{CE}=5V, I_C=2mA$	580	660	700	mA
		$V_{CE}=5V, I_C=10mA$			720	mA
Current Gain Bandwidth Product	$f_T$	$V_{CE}=5V, I_C=10mA$		300		MHz
Collector Base Capacitance	$C_{CBO}$	$V_{CB}=10V, f=1MHz$		3.5	6	pF
Emmitter Base Capacitance	$C_{EBO}$	$V_{EB}=0.5V, f=1MHz$		9		pF
Noise Figure : BC546/547/548	NF	$V_{CE}=5V, I_C=200\mu A$		2	10	dB
: BC549/550		$f=1KHz, R_G=2K\Omega$		1.2	4	dB
: BC549	NF	$V_{CE}=5V, I_C=200\mu A$		1.4	4	dB
: BC550		$R_G=2K\Omega, f=30\sim 15000MHz$		1.4	3	dB

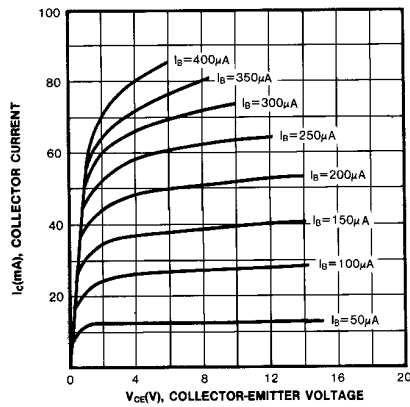
### $h_{FE}$ CLASSIFICATION

Classification	A	B	C
$h_{FE}$	110-220	200-450	420-800

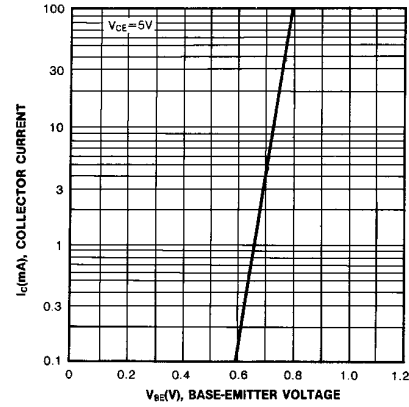
BC546/547/548/549/550

# NPN EPITAXIAL SILICON TRANSISTOR

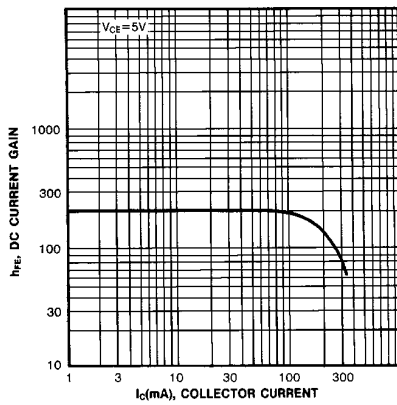
STATIC CHARACTERISTIC



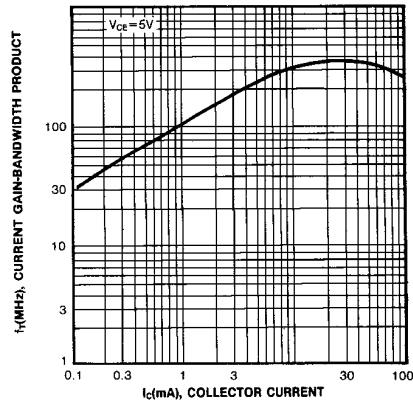
TRANSFER CHARACTERISTIC



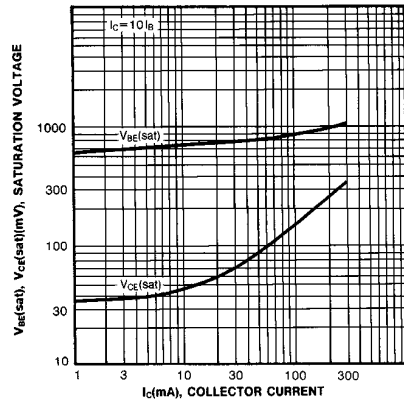
DC CURRENT GAIN



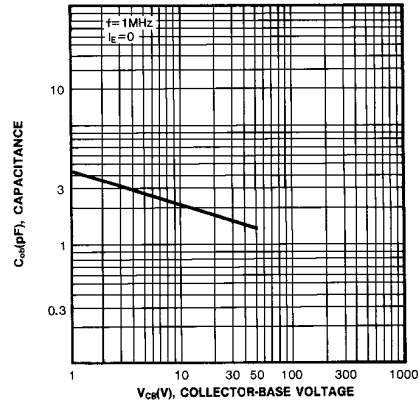
CURRENT GAIN BANDWIDTH PRODUCT



BASE-EMITTER SATURATION VOLTAGE  
COLLECTOR-EMITTER SATURATION VOLTAGE



OUTPUT CAPACITANCE





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FASTr™	SuperSOT™-6
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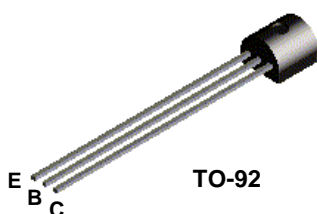
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**BC548  
BC548A  
BC548B  
BC548C**



**NPN General Purpose Amplifier**

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 300 mA. Sourced from Process 10. See PN100A for characteristics.

**Absolute Maximum Ratings\***

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	30	V
V <sub>CES</sub>	Collector-Base Voltage	30	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	500	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		BC548 / A / B / C	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	625 5.0	mW mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	°C/W

# NPN General Purpose Amplifier (continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}, I_B = 0$	30		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	30		V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	30		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \text{ } \mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 30 \text{ V}, I_E = 0$ $V_{CB} = 30 \text{ V}, I_E = 0, T_A = +150 \text{ }^\circ\text{C}$		15 5.0	nA $\mu\text{A}$

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$V_{CE} = 5.0 \text{ V}, I_C = 2.0 \text{ mA}$ <b>548</b> <b>548A</b> <b>548B</b> <b>548C</b>	110 110 200 420	800 220 450 800	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$ $I_C = 100 \text{ mA}, I_B = 5.0 \text{ mA}$		0.25 0.60	V V
$V_{BE(on)}$	Base-Emitter On Voltage	$V_{CE} = 5.0 \text{ V}, I_C = 2.0 \text{ mA}$ $V_{CE} = 5.0 \text{ V}, I_C = 10 \text{ mA}$	0.58	0.70 0.77	V V

### SMALL SIGNAL CHARACTERISTICS

$h_{fe}$	Small-Signal Current Gain	$I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 1.0 \text{ kHz}$	125	900	
NF	Noise Figure	$V_{CE} = 5.0 \text{ V}, I_C = 200 \text{ } \mu\text{A},$ $R_S = 2.0 \text{ k}\Omega, f = 1.0 \text{ kHz},$ $B_W = 200 \text{ Hz}$		10	dB

BC548 / BC548A / BC548B / BC548C

## BC556/557/558/559/560

## PNP EPITAXIAL SILICON TRANSISTOR

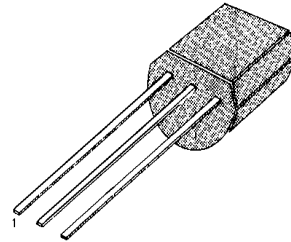
### SWITCHING AND AMPLIFIER

- HIGH VOLTAGE: BC556,  $V_{CE0} = -65V$
- LOW NOISE: BC559, BC560
- Complement to BC546 ... BC 550

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Capacitance	$V_{CBO}$		
: BC556		-80	V
: BC557/560		-50	V
: BC558/559		-30	V
Collector-Emitter Voltage	$V_{CEO}$		
: BC556		-65	V
: BC557/560		-45	V
: BC558/559		-30	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current (DC)	$I_C$	-100	mA
Collector Dissipation	$P_C$	500	mW
Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature	$T_{STG}$	-65 ~ 150	$^\circ C$

TO-92



1. Collector 2. Base 3. Emitter

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ C$ )

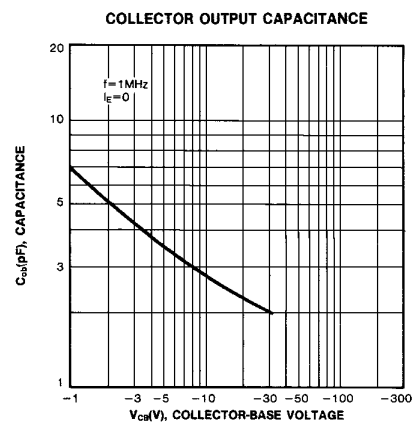
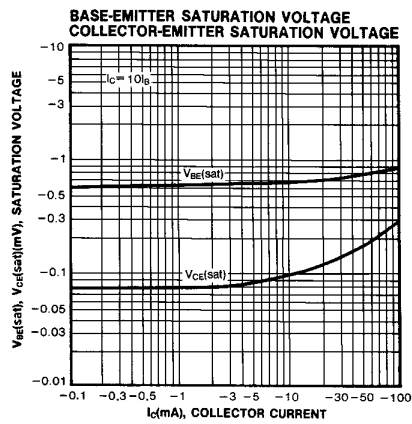
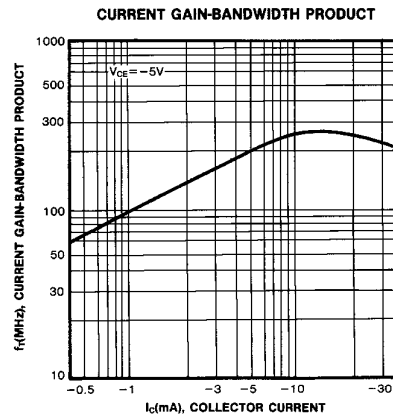
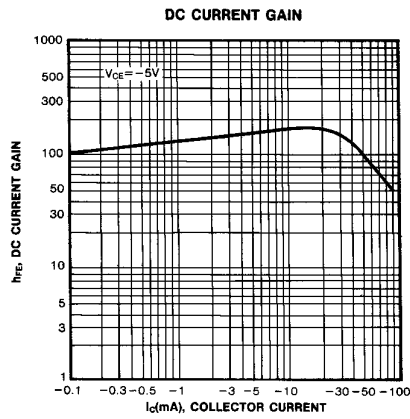
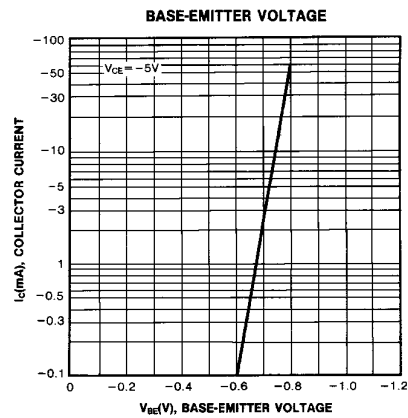
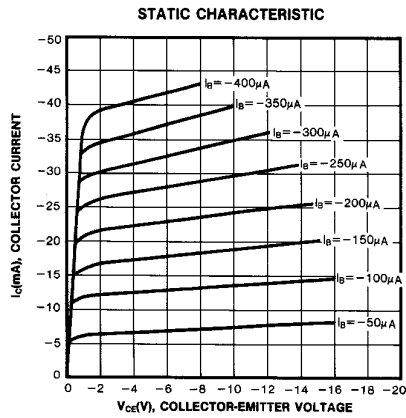
Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = -30V, I_E = 0$			-15	nA
DC Current Gain	$h_{FE}$	$V_{CE} = -5V, I_C = 2mA$	110		800	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = -10mA, I_B = -0.5mA$		-90	-300	mV
		$I_C = -100mA, I_B = -5mA$		-250	-650	mV
Collector Base Saturation Voltage	$V_{BE(on)}$	$I_C = -10mA, I_B = -0.5mA$		-700		mV
		$I_C = -100mA, I_B = -5mA$		-900		mV
Base Emitter On Voltage	$V_{BE(on)}$	$V_{CE} = -5V, I_C = -2mA$	-600	-660	-750	mV
		$V_{CE} = -5V, I_C = -10mA$			-800	mV
Current Gain Bandwidth Product	$f_T$	$V_{CE} = -5V, I_C = -10mA$		150		MHz
Collector Base Capacitance	$C_{CBO}$	$V_{CB} = -10V, f = 1MHz$			6	pF
Noise Figure	NF	$V_{CE} = -5V, I_C = -200\mu A$		2	10	dB
		$f = 1KHz, R_G = 2K\Omega$		1	4	dB
	NF	$V_{CE} = -5V, I_C = -200\mu A$		1.2	4	dB
		$R_G = 2K\Omega$		1.2	2	dB
		$f = 30 \sim 15000MHz$				

### $h_{FE}$ CLASSIFICATION

Classification	A	B	C
$h_{FE}$	110-220	200-450	420-800

BC556/557/558/559/560

# PNP EPITAXIAL SILICON TRANSISTOR



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FACT™	QS™
FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FAST <sub>r</sub> ™	SuperSOT™-6
GTO™	SuperSOT™-8
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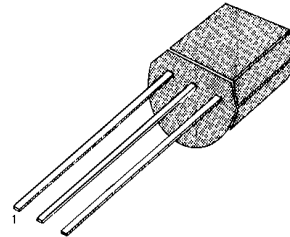
**BC635/637/639****NPN EPITAXIAL SILICON TRANSISTOR****SWITCHING AND AMPLIFIER APPLICATIONS**

- Complement to BC635/638/640

**ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )**

Characteristic	Symbol	Rating	Unit
Collector Emitter Voltage : BC635	$V_{\text{CER}}$	45	V
at $R_{\text{BE}}=1\text{Kohm}$ : BC637		60	V
: BC639		100	V
Collector Emitter Voltage : BC635	$V_{\text{CES}}$	45	V
: BC637		60	V
: BC639		100	V
Collector Emitter Voltage : BC635	$V_{\text{CEO}}$	45	V
: BC637		60	V
: BC639		80	V
Emitter Base Voltage	$V_{\text{EBO}}$	5	V
Collector Current	$I_{\text{C}}$	1	A
Peak Collector Current	$I_{\text{CP}}$	1.5	A
Base Current	$I_{\text{B}}$	100	mA
Collector Dissipation	$P_{\text{C}}$	1	W
Junction Temperature	$T_{\text{J}}$	150	$^\circ\text{C}$
Storage Temperature	$T_{\text{STG}}$	-65 ~ 150	$^\circ\text{C}$

TO-92

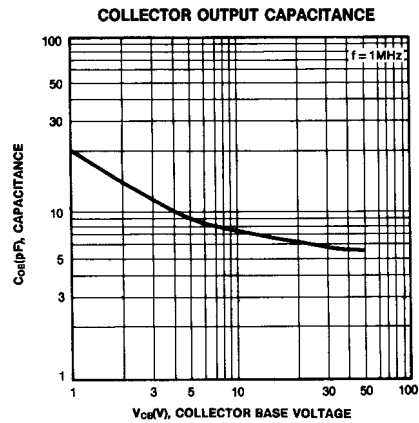
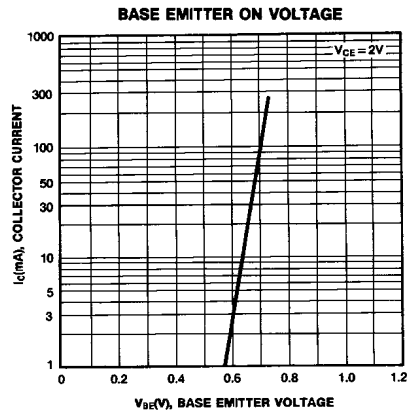
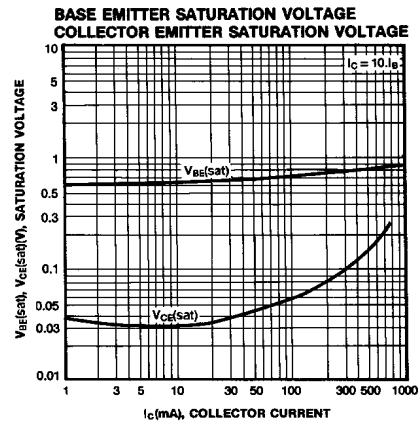
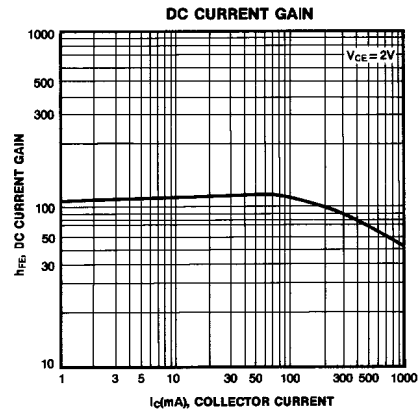
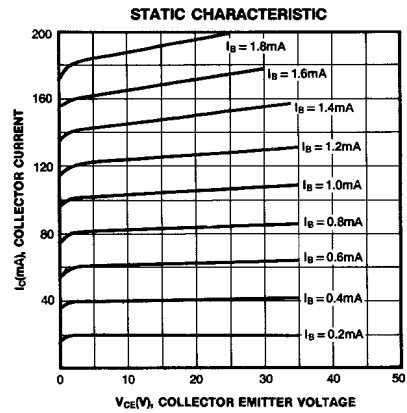


1. Emitter 2. Collector 3. Base

- $PW=5\text{ms}$ , Duty Cycle=10%

**ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )**

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage : BC635	$BV_{\text{CEO}}$	$I_{\text{C}}=10\text{mA}$ , $I_{\text{B}}=0$	45			V
: BC736			60			V
: BC639			80			V
Collector Cut-off Current	$I_{\text{CBO}}$	$V_{\text{CB}}=30\text{V}$ , $I_{\text{E}}=0$			0.1	$\mu\text{A}$
Emitter Cut-off Current	$I_{\text{EBO}}$	$V_{\text{EB}}=5\text{V}$ , $I_{\text{C}}=0$			0.1	$\mu\text{A}$
DC Current Gain : BC635	$h_{\text{FE}}$	$V_{\text{CE}}=2\text{V}$ , $I_{\text{C}}=5\text{mA}$	25			
: BC637/BC639		$V_{\text{CE}}=2\text{V}$ , $I_{\text{C}}=150\text{mA}$	40		250	
			40		160	
Collector Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$V_{\text{CE}}=2\text{V}$ , $I_{\text{C}}=500\text{mA}$	25			V
Base Emitter On Voltage	$V_{\text{BE(on)}}$	$I_{\text{C}}=500\text{mA}$ , $I_{\text{B}}=50\text{mA}$			0.5	V
Current Gain Bandwidth Product	$f_{\text{T}}$	$V_{\text{CE}}=2\text{V}$ , $I_{\text{C}}=500\text{mA}$			1	MHz
		$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=10\text{mA}$ , $f=50\text{MHz}$		100		





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FAST®  
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QS™  
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2. A critical component is 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.

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## BC636/638/640

## PNP EPITAXIAL SILICON TRANSISTOR

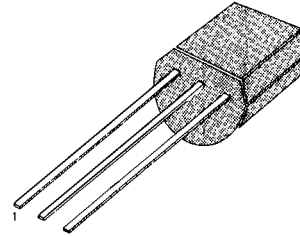
### SWITCHING AND AMPLIFIER APPLICATIONS

- Complement to BC635/637/639

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector Emitter Voltage : BC636 at $R_{BE}=1\text{Kohm}$ : BC638 : BC640	$V_{CER}$	-45 -60 -100	V V V
Collector Emitter Voltage : BC636 : BC638 : BC640	$V_{CES}$	-45 -60 -100	V V V
Collector Emitter Voltage : BC636 : BC638 : BC640	$V_{CEO}$	-45 -60 -80	V V V
Emitter Base Voltage	$V_{EBO}$	-5	V
Collector Current	$I_C$	-1	A
Peak Collector Current	$I_{CP}$	-1.5	A
Base Current	$I_B$	-100	mA
Collector Dissipation	$P_C$	1	W
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ 150	$^\circ\text{C}$

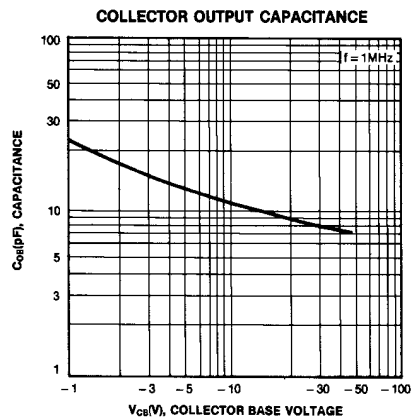
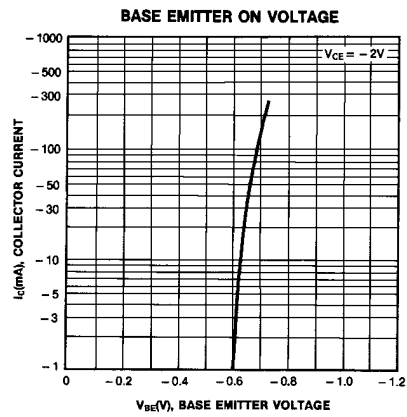
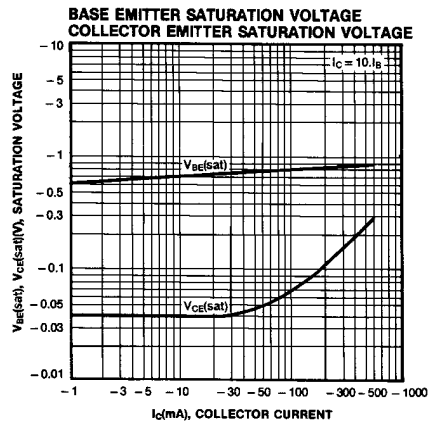
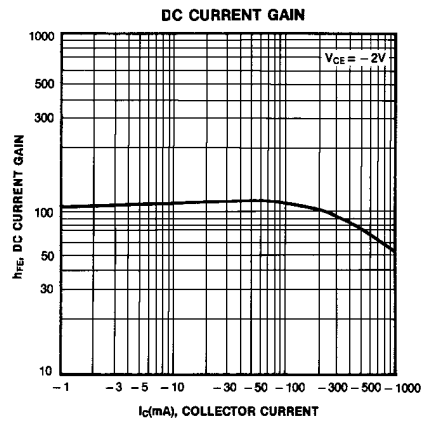
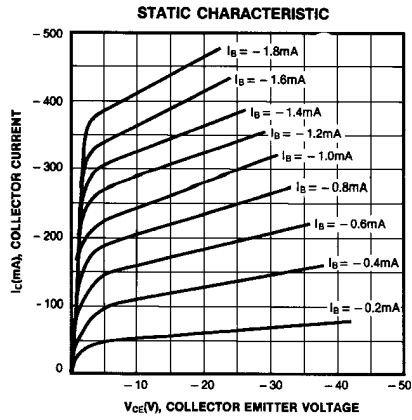
TO-92



1. Emitter 2. Collector 3. Base

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage : BC636 : BC638 : BC640	$BV_{CEO}$	$I_C = -10\text{mA}$ , $I_B = 0$	-45 -60 -80			V V V
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = -30\text{V}$ , $I_E = 0$			-0.1	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = -5\text{V}$ , $I_C = 0$			-0.1	$\mu\text{A}$
DC Current Gain : BC635 : BC637/BC639	$h_{FE}$	$V_{CE} = -2\text{V}$ , $I_C = -5\text{mA}$ $V_{CE} = -2\text{V}$ , $I_C = -150\text{mA}$	25 40 40 25		250 160	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{CE} = -2\text{V}$ , $I_C = -500\text{mA}$ $I_C = -500\text{mA}$ , $I_B = -50\text{mA}$			-0.5	V
Base Emitter On Voltage	$V_{BE(on)}$	$V_{CE} = -2\text{V}$ , $I_C = -500\text{mA}$			-1	V
Current Gain Bandwidth Product	$f_T$	$V_{CE} = -5\text{V}$ , $I_C = -10\text{mA}$ , $f = 50\text{MHz}$		100		MHz



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FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
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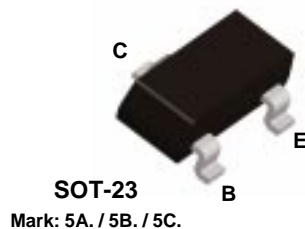
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# BC807-16 BC807-25 BC807-40



## PNP General Purpose Amplifier

This device is designed for general purpose amplifier and switching applications at currents to 1.0 A. Sourced from Process 78.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CES</sub>	Collector-Base Voltage	50	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	1.2	A
T <sub>J</sub> , T <sub>stg</sub>	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
		*BC807-16 / -25 / -40	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	°C/W

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

PNP General Purpose Amplifier  
(continued)

BC807-16 / BC807-25 / BC807-40

Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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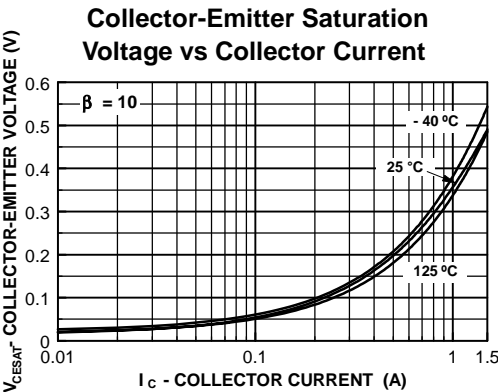
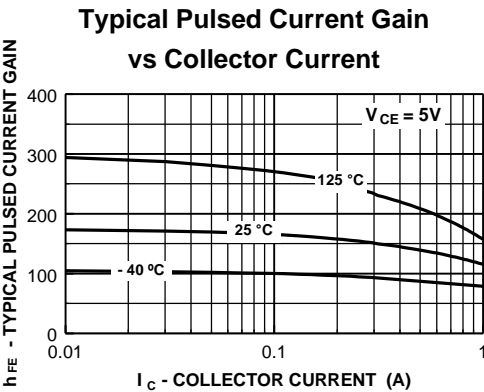
OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{ mA}, I_B = 0$	45		V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}, I_E = 0$	50		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\text{ }\mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 20\text{ V}$ $V_{CB} = 20\text{ V}, T_A = 150^\circ\text{C}$		100 5.0	nA $\mu\text{A}$

ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 100\text{ mA}, V_{CE} = 1.0\text{ V}$ - 16 - 25 - 40 $I_C = 500\text{ mA}, V_{CE} = 1.0\text{ V}$	100 160 250 40	250 400 600	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 500\text{ mA}, I_B = 50\text{ mA}$		0.7	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 500\text{ mA}, V_{CE} = 1.0\text{ V}$		1.2	V

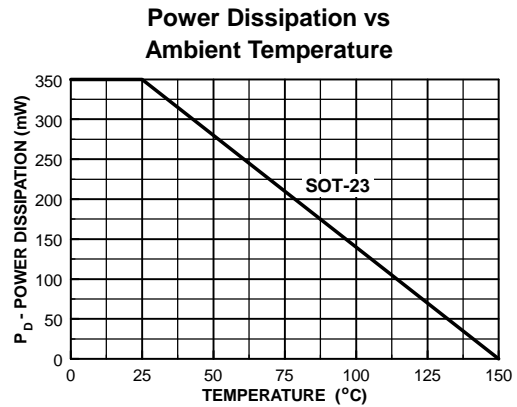
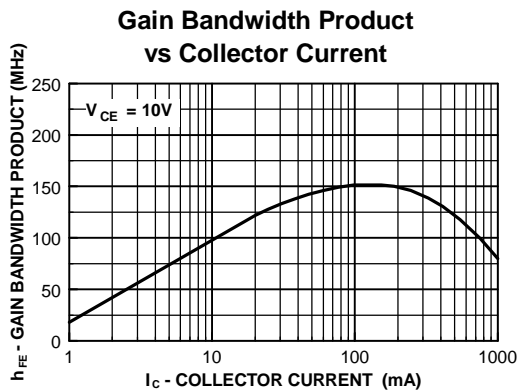
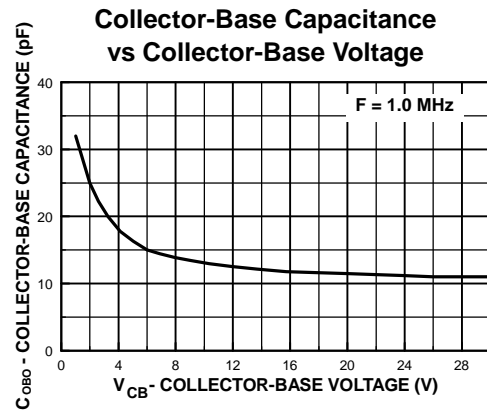
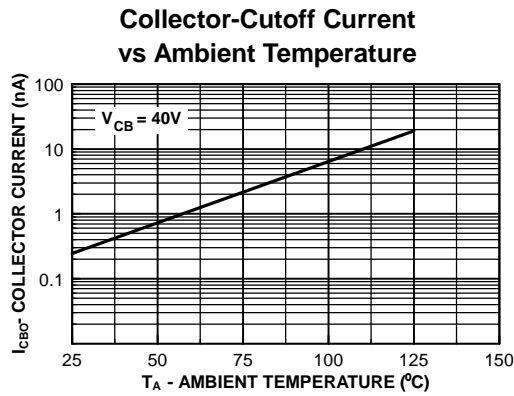
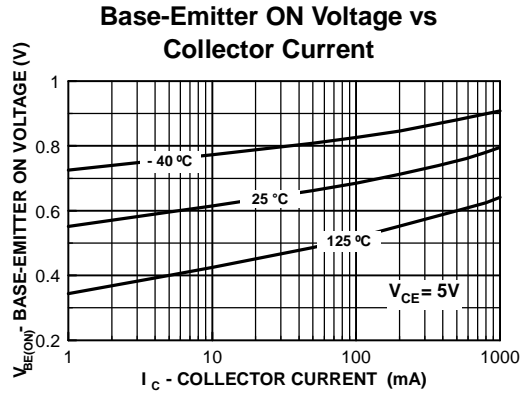
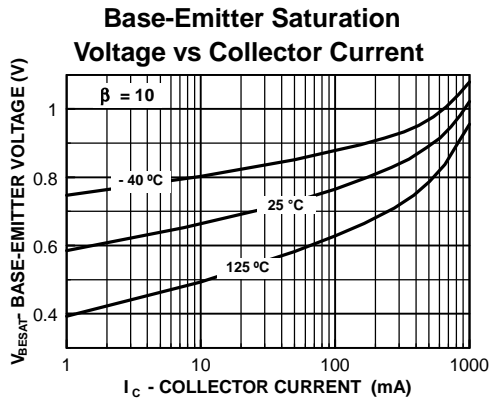
Typical Characteristics



# PNP General Purpose Amplifier (continued)

BC807-16 / BC807-25 / BC807-40

## Typical Characteristics (continued)



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ISOPLANAR™  
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POP™  
PowerTrench™  
QS™  
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SuperSOT™-3  
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## BC807/BC808

## PNP EPITAXIAL SILICON TRANSISTOR

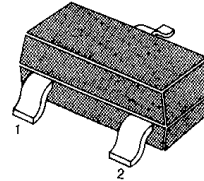
### SWITCHING AND AMPLIFIER APPLICATIONS

- Suitable for AF-Driver stages and low power output stages
- Complement to BC817/BC818

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector Emitter Voltage : BC807	$V_{CES}$	-50	V
: BC808		-30	V
Collector Emitter Voltage : BC807	$V_{CEO}$	-45	V
: BC808		-25	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current (DC)	$I_C$	-800	mA
Collector Dissipation	$P_C$	-310	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ 150	$^\circ\text{C}$

SOT-23



1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

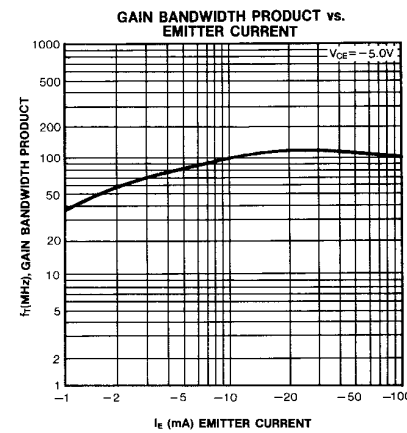
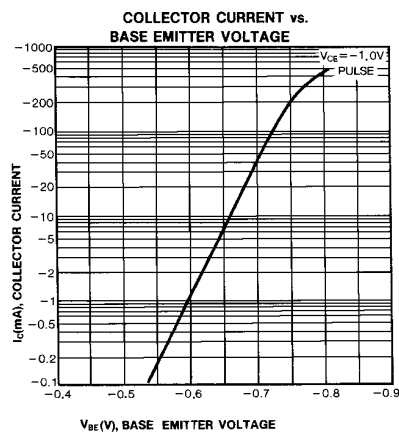
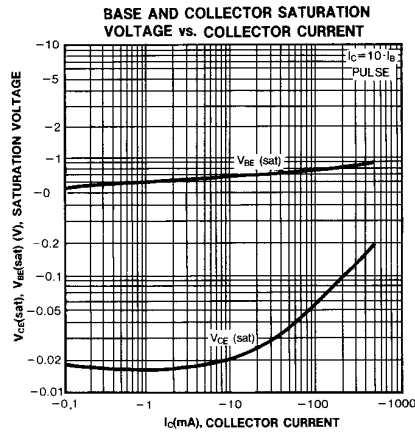
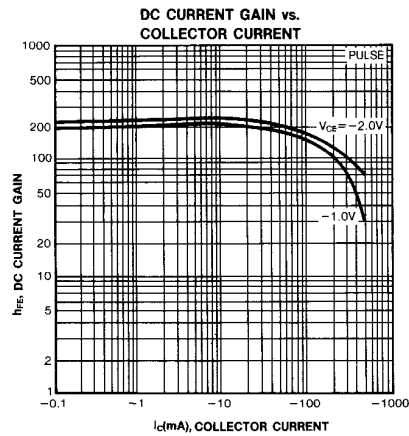
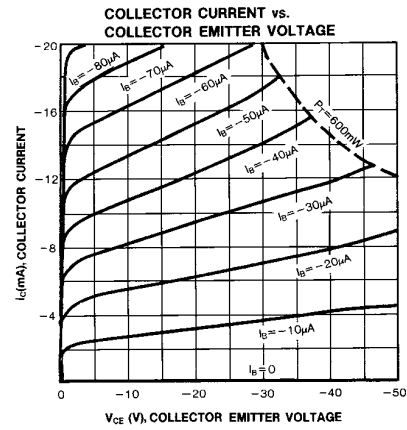
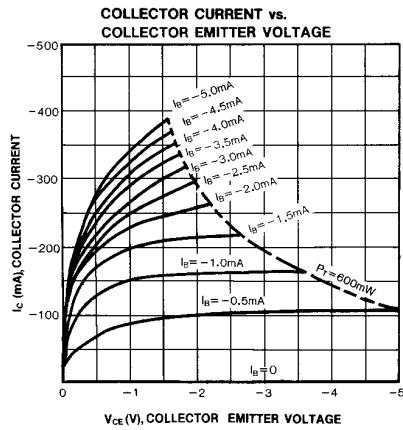
Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage : BC807	$BV_{CEO}$	$I_C = -10\text{mA}, I_B = 0$	-45			V
: BC808			-25			V
Collector-Emitter Breakdown Voltage : BC807	$BV_{CES}$	$I_C = -0.1\text{mA}, I_B = 0$	-50			V
: BC808			-30			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E = -0.1\text{mA}, I_C = 0$	-5			V
Collector Cut-off Current	$I_{CES}$	$V_{CE} = -25\text{V}, I_B = 0$			-100	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = -4\text{V}, I_C = 0$			-100	nA
DC Current Gain	$h_{FE1}$	$V_{CE} = -1\text{V}, I_C = -100\text{mA}$	100		630	
	$h_{FE2}$	$V_{CE} = -1\text{V}, I_C = -300\text{mA}$	60			
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C = -500\text{mA}, I_B = -50\text{mA}$			-0.7	V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$V_{CE} = -1\text{V}, I_C = -300\text{mA}$			-1.2	V
Current Gain Bandwidth Product	$f_T$	$V_{CE} = -5\text{V}, I_C = -10\text{mA}$ $f = 50\text{MHz}$		100		MHz
Collector-Base Capacitance	$C_{CB0}$	$V_{CB} = -10\text{V}, f = 1\text{MHz}$			12	pF

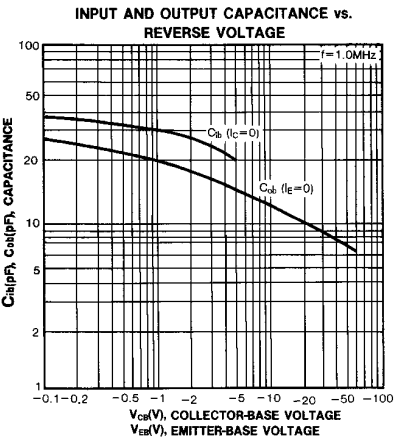
### $h_{FE}$ CLASSIFICATION

Classification	16	25	40
$h_{FE1}$	100-250	160-400	250-630
$h_{FE2}$	60-	100-	170-

### MARKING CODE

TYPE	807-16	807-25	807-40	808-16	808-25	808-40
MARKING	9FA	9FB	9FC	9GA	9GB	9GC





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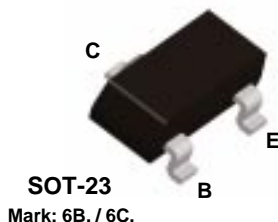
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## BC817-25 BC817-40



### NPN General Purpose Amplifier

This device is designed for general purpose medium power amplifiers and switches requiring collector currents to 1.2 A.  
Sourced from Process 38.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CES</sub>	Collector-Base Voltage	50	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	1.5	A
T <sub>J</sub> , T <sub>stg</sub>	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
		*BC817-25 / BC817-40	
P <sub>D</sub>	Total Device Dissipation	350	mW
	Derate above 25°C	2.8	mW/°C
R <sub>θJA</sub>	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
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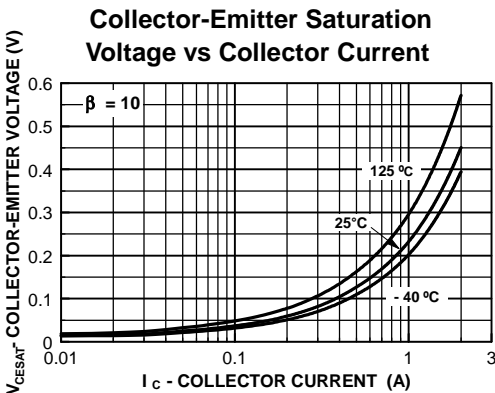
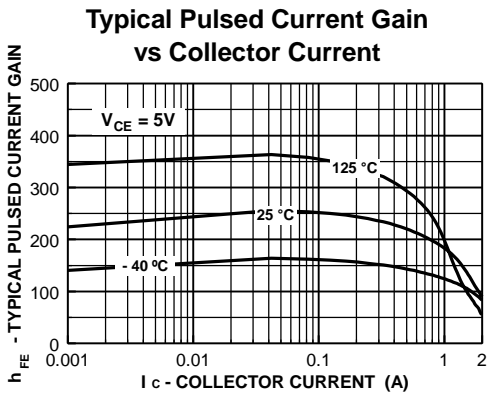
OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{ mA}, I_B = 0$	45		V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}, I_E = 0$	50		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\text{ }\mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 20\text{ V}$ $V_{CB} = 20\text{ V}, T_A = 150^\circ\text{C}$		100 5.0	nA $\mu\text{A}$

ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 100\text{ mA}, V_{CE} = 1.0\text{ V}$ - 25 - 40	160 250 40	400 600	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 500\text{ mA}, I_B = 50\text{ mA}$		0.7	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 500\text{ mA}, V_{CE} = 1.0\text{ V}$		1.2	V

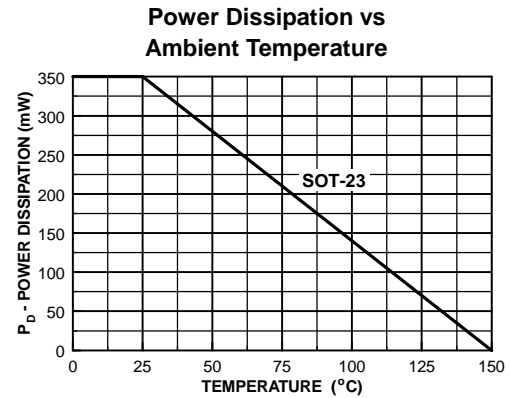
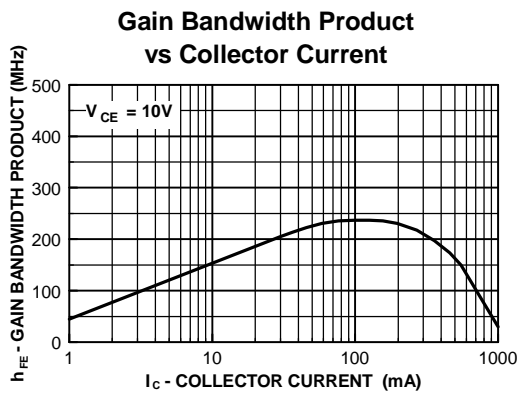
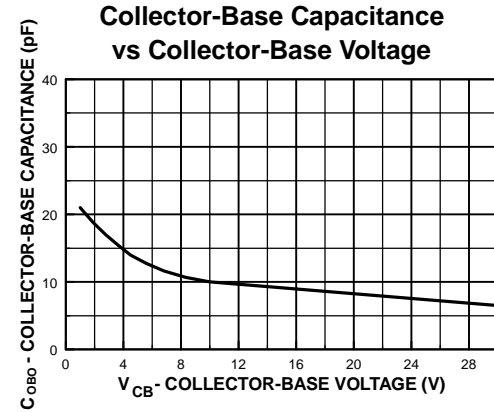
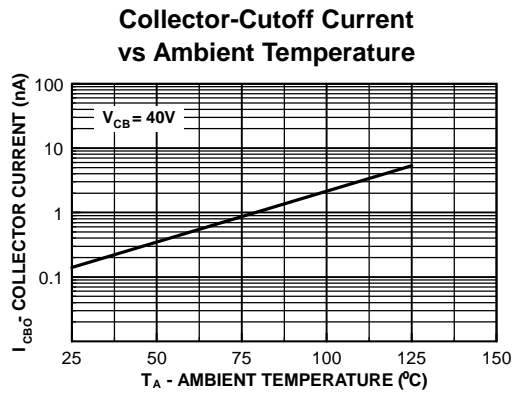
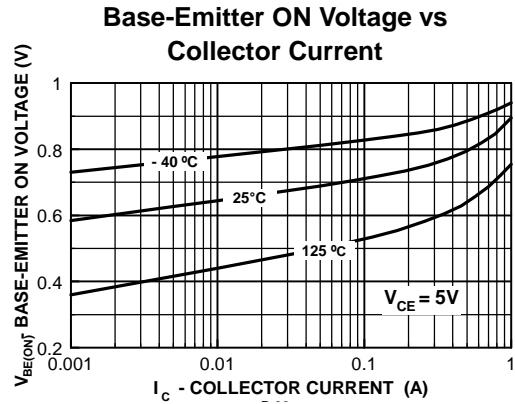
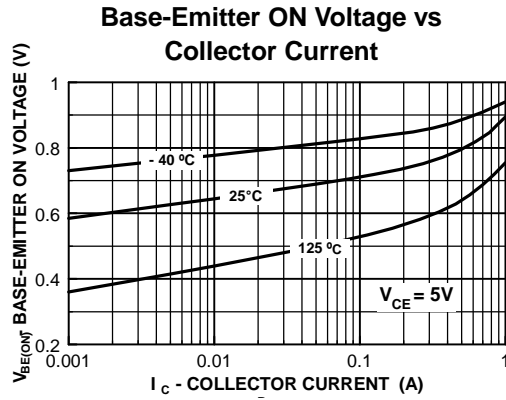
Typical Characteristics



# NPN General Purpose Amplifier (continued)

BC817-25 / BC817-40

## Typical Characteristics (continued)



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E <sup>2</sup> CMOS™	PowerTrench™
FACT™	QS™
FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
GTO™	SuperSOT™-8
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## BC817/BC818

## NPN EPITAXIAL SILICON TRANSISTOR

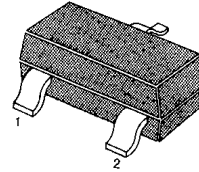
### SWITCHING AND AMPLIFIER APPLICATIONS

- Suitable for AF-Driver stages and low power output stages
- Complement to BC807/BC808

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector Emitter Voltage : BC817	$V_{CES}$	50	V
: BC818		30	V
Collector Emitter Voltage : BC817	$V_{CEO}$	45	V
: BC818		25	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current (DC)	$I_C$	800	mA
Collector Dissipation	$P_C$	310	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ 150	$^\circ\text{C}$

SOT-23



1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage : BC817	$BV_{CEO}$	$I_C=10\text{mA}, I_B=0$	45			V
: BC818			25			V
Collector-Emitter Breakdown Voltage : BC817	$BV_{CES}$	$I_C=0.1\text{mA}, I_B=0$	50			V
: BC818			30			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=0.1\text{mA}, I_C=0$	5			V
Collector Cut-off Current	$I_{CES}$	$V_{CE}=25\text{V}, I_B=0$			100	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=4\text{V}, I_C=0$			100	nA
DC Current Gain	$h_{FE1}$	$V_{CE}=1\text{V}, I_C=100\text{mA}$	100		630	
	$h_{FE2}$	$V_{CE}=1\text{V}, I_C=300\text{mA}$	60			
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=500\text{mA}, I_B=50\text{mA}$			0.7	V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$V_{CE}=1\text{V}, I_C=300\text{mA}$			1.2	V
Current Gain Bandwidth Product	$f_T$	$V_{CE}=5\text{V}, I_C=10\text{mA}$ $f=50\text{MHz}$		100		MHz
Collector-Base Capacitance	$C_{CBO}$	$V_{CB}=10\text{V}, f=1\text{MHz}$			12	pF

### $h_{FE}$ CLASSIFICATION

Classification	16	25	40
$h_{FE1}$	100-250	160-400	250-630
$h_{FE2}$	60-	100-	170-

### MARKING CODE

TYPE	817-16	817-25	817-40	818-16	818-25	818-40
MARKING	8FA	8FB	8FC	8GA	8GB	8GC

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FAST®	SuperSOT™-3
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## BC846/847/848/849/850

## NPN EPITAXIAL SILICON TRANSISTOR

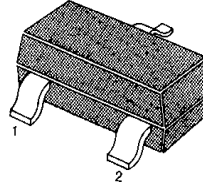
### SWITCHING AND AMPLIFIER APPLICATIONS

- Suitable for automatic insertion in thick and thin-film circuits
- LOW NOISE: BC849, BC850
- Complement to BC856 ... BC860

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector Base Voltage	$V_{\text{CBO}}$	80	V
: BC846		50	V
: BC847/850		30	V
Collector Emitter Voltage	$V_{\text{CEO}}$	65	V
: BC846		45	V
: BC847/850		30	V
Emitter-Base Voltage	$V_{\text{EBO}}$	6	V
: BC846/847		5	V
: BC848/849/850			
Collector Current (DC)	$I_{\text{C}}$	100	mA
Collector Dissipation	$P_{\text{C}}$	310	mW
Junction Temperature	$T_{\text{J}}$	150	$^{\circ}\text{C}$
Storage Temperature	$T_{\text{STG}}$	-65 ~ 150	$^{\circ}\text{C}$

SOT-23



1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Cut-off Current	$I_{\text{CBO}}$	$V_{\text{CB}}=30\text{V}$ , $I_{\text{E}}=0$			15	nA
DC Current Gain	$h_{\text{FE}}$	$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=2\text{mA}$	110		800	
Collector Emitter Saturation Voltage	$V_{\text{CE}}(\text{sat})$	$I_{\text{C}}=10\text{mA}$ , $I_{\text{B}}=0.5\text{mA}$		90	250	mV
		$I_{\text{C}}=100\text{mA}$ , $I_{\text{B}}=5\text{mA}$		200	600	mV
Collector Base Saturation Voltage	$V_{\text{BE}}(\text{sat})$	$I_{\text{C}}=10\text{mA}$ , $I_{\text{B}}=0.5\text{mA}$		700		mV
		$I_{\text{C}}=100\text{mA}$ , $I_{\text{B}}=5\text{mA}$		900		mV
Base Emitter On Voltage	$V_{\text{BE}}(\text{on})$	$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=2\text{mA}$	580	660	700	mV
		$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=10\text{mA}$			720	mV
Current Gain Bandwidth Product	$f_{\text{T}}$	$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=10\text{mA}$ $f=100\text{MHz}$		300		MHz
Collector Base Capacitance	$C_{\text{CBO}}$	$V_{\text{CB}}=10\text{V}$ , $f=1\text{MHz}$		3.5	6	pF
Emitter Base Capacitance	$C_{\text{EBO}}$	$V_{\text{EB}}=0.5\text{V}$ , $f=1\text{MHz}$		9		pF
Noise Figure : BC846/847/848	NF	$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=200\mu\text{A}$		2	10	dB
: BC849/850		$f=1\text{KHz}$ , $R_{\text{G}}=2\text{K}\Omega$		1.2	4	dB
: BC849		$V_{\text{CE}}=5\text{V}$ , $I_{\text{C}}=200\mu\text{A}$		1.4	4	dB
: BC850		$R_{\text{G}}=2\text{K}\Omega$ $f=30\sim 15000\text{Hz}$		1.4	3	dB

### $h_{\text{FE}}$ CLASSIFICATION

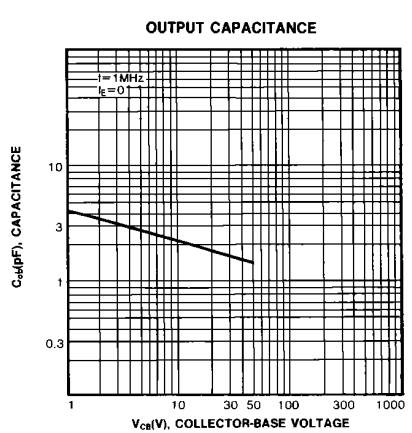
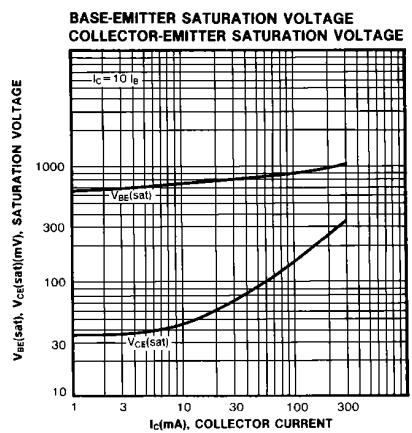
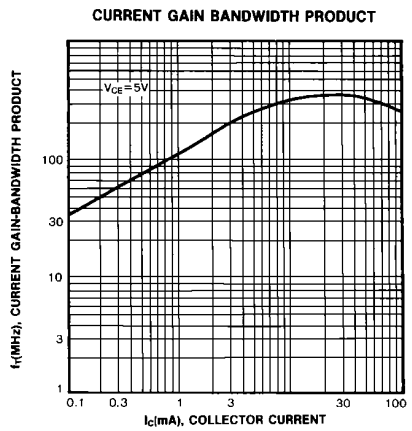
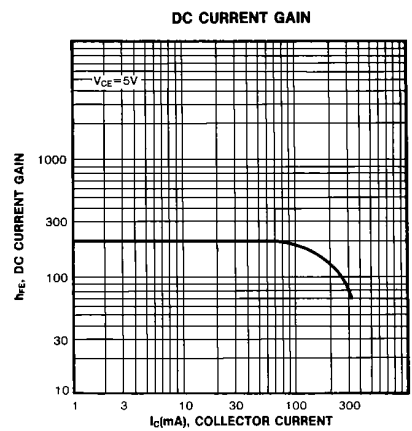
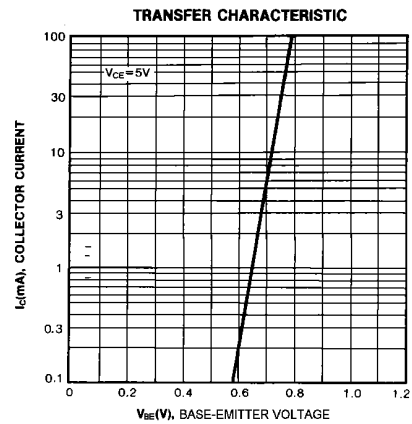
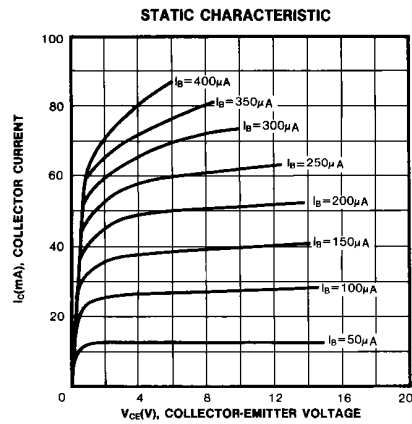
Classification	A	B	C
$h_{\text{FE}}$	110-220	200-450	420-800

### MARKING CODE

TYPE	846A	846B	846C	847A	847B	847C	848A	848B	848C	849A	849B	849C	850A	850B	850C
MARK	8AA	8AB	8AC	8BA	8BB	8BC	8CA	8CB	8CC	8DA	8DB	8DC	8EA	8EB	8EC

BC846/847/848/849/850

# NPN EPITAXIAL SILICON TRANSISTOR



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## BC856/857/858/859/860

## PNP EPITAXIAL SILICON TRANSISTOR

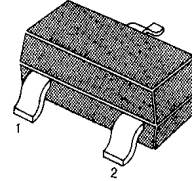
### SWITCHING AND AMPLIFIER APPLICATIONS

- Suitable for automatic insertion in thick and thin-film circuits
- LOW NOISE: BC859, BC860
- Complement to BC846 ... BC850

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-80	V
: BC856		-50	V
: BC857/860		-30	V
Collector-Emitter Voltage	$V_{CEO}$	-65	V
: BC856		-45	V
: BC857/860		-30	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current (DC)	$I_C$	-100	mA
Collector Dissipation	$P_C$	310	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ 150	$^\circ\text{C}$

SOT-23



1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = -30\text{V}, I_E = 0$			-15	nA
DC Current Gain	$h_{FE}$	$V_{CE} = -5\text{V}, I_C = -2\text{mA}$	110		800	
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$		-90	-300	mV
Collector-Base Saturation Voltage	$V_{BE}(\text{sat})$	$I_C = -100\text{mA}, I_B = -5\text{mA}$		-250	-650	mV
		$I_C = -10\text{mA}, I_B = -0.5\text{mA}$		-700		mV
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$I_C = -100\text{mA}, I_B = -5\text{mA}$		-900		mV
		$V_{CE} = -5\text{V}, I_C = -2\text{mA}$	-600	-660	-750	mV
Current Gain Bandwidth Product	$f_T$	$V_{CE} = -5\text{V}, I_C = -10\text{mA}$		150	-800	MHz
Collector-Base Capacitance	$C_{CBO}$	$f = 100\text{MHz}$			6	pF
Noise Figure	NF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$		2	10	dB
: BC856/857/858	NF	$V_{CE} = -5\text{V}, I_C = -200\mu\text{A}$		1	4	dB
		$f = 1\text{KHz}, R_G = 2\text{K}\Omega$		1.2	4	dB
		$V_{CE} = -5\text{V}, I_C = -200\mu\text{A}$		1.2	2	dB
		$R_G = 2\text{K}\Omega$		1.2	2	dB
: BC859/860	NF	$f = 30 \sim 15000\text{Hz}$				
: BC859						
: BC860						

### $h_{FE}$ CLASSIFICATION

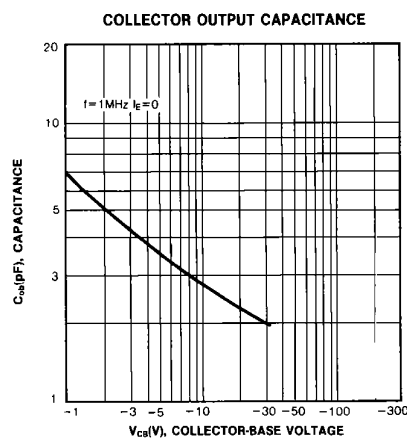
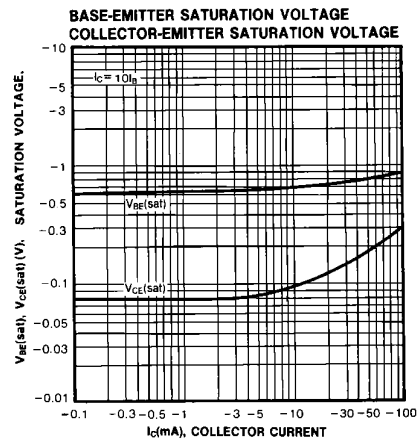
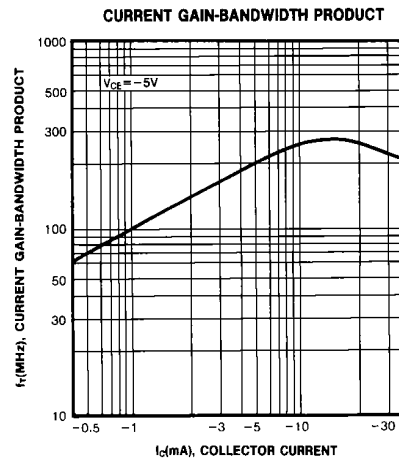
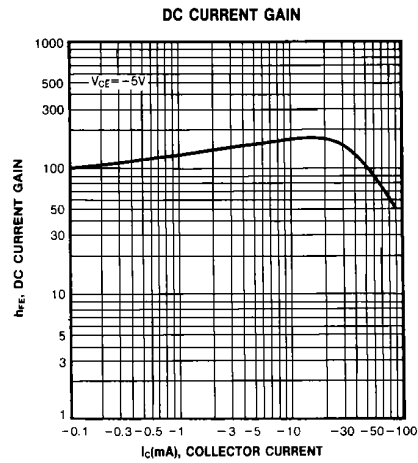
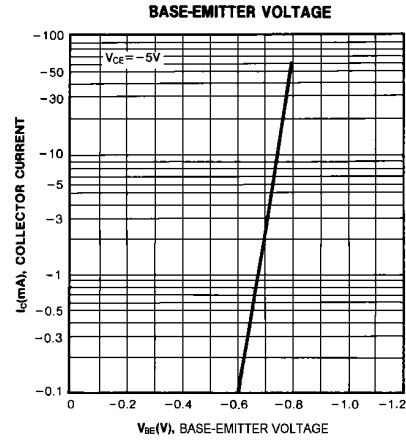
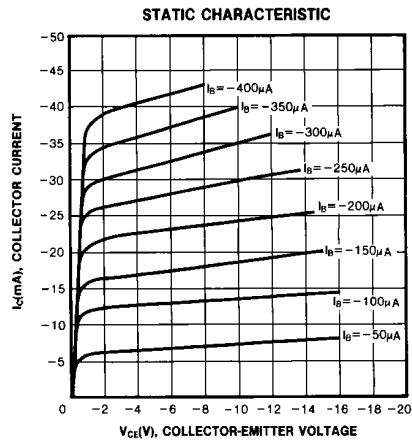
Classification	A	B	C
$h_{FE}$	110-220	200-450	420-800

### MARKING CODE

TYPE	856A	856B	856C	857A	857B	857C	858A	858B	858C	859A	859B	859C	860A	860B	860C
MARK	9AA	9AB	9AC	9BA	9BB	9BC	9CA	9CB	9CC	9DA	9DB	9DC	9EA	9EB	9EC

BC856/857/858/859/860

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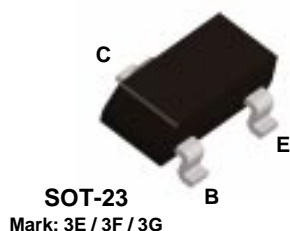
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# BC857A BC857B BC857C



## PNP General Purpose Amplifier

This device is designed for general purpose amplifier applications at collector currents to 300 mA. Sourced from Process 68.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CBO</sub>	Collector-Base Voltage	50	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	500	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		*BC857A / B / C	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	°C/W

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

# PNP General Purpose Amplifier

(continued)

BC857A / BC857B / BC857C

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{ mA}$ , $I_B = 0$	45		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$	50		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 1.0\text{ }\mu\text{A}$ , $I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 30\text{ V}$ $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$		15 4.0	nA $\mu\text{A}$

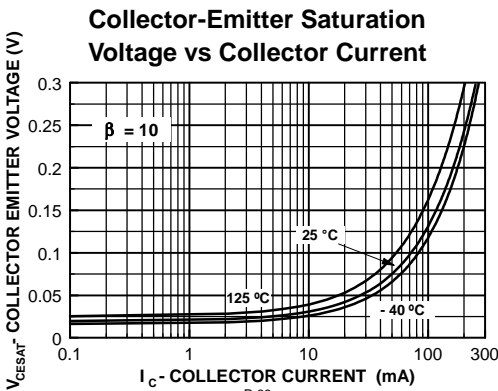
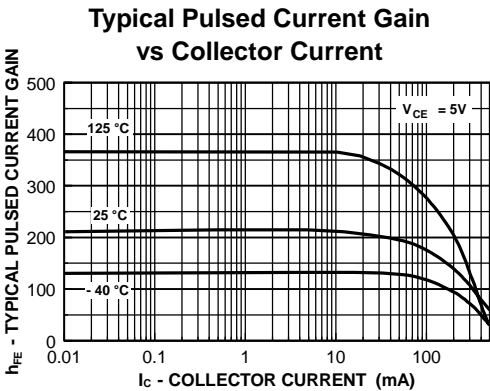
## ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$  <b>BC857A</b> <b>BC857B</b> <b>BC857C</b>	125 220 420	250 475 800	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$		0.3 0.65	V V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$	0.6	0.75 0.82	V V

## SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 10\text{ mA}$ , $V_{CE} = 5.0$ , $f = 100\text{ MHz}$	100		MHz
$C_{obo}$	Output Capacitance	$V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$		4.5	pF
NF	Noise Figure	$I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$		10	dB

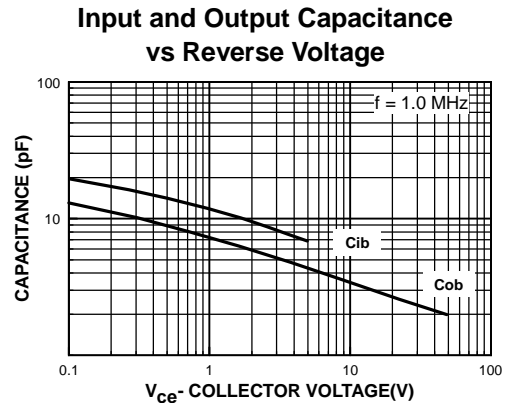
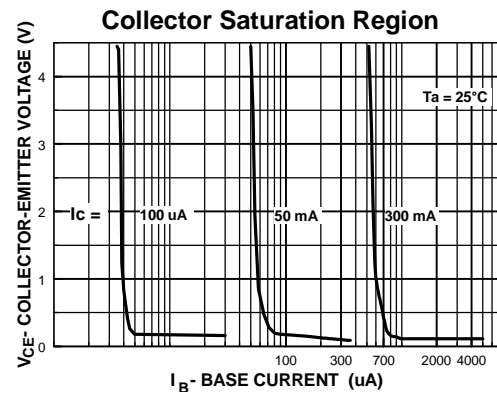
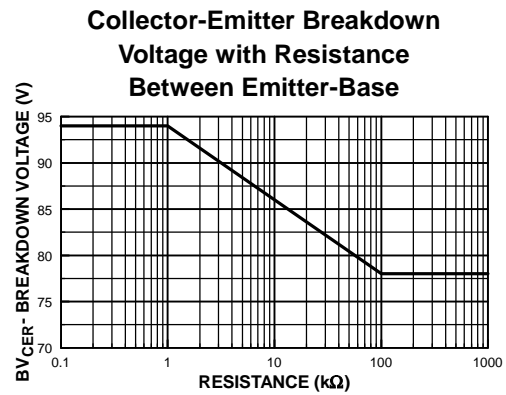
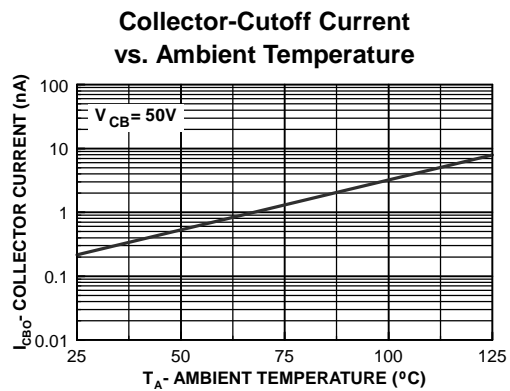
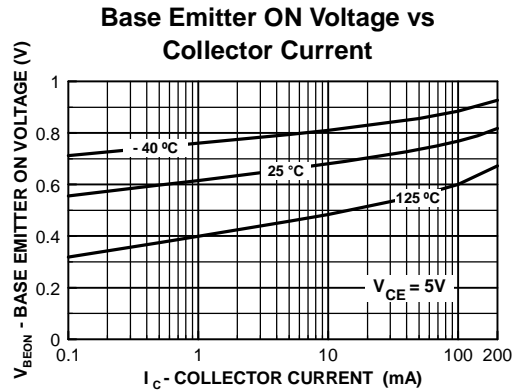
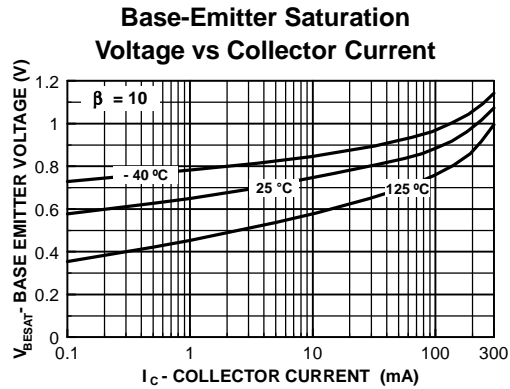
## Typical Characteristics



# PNP General Purpose Amplifier (continued)

BC857A / BC857B / BC857C

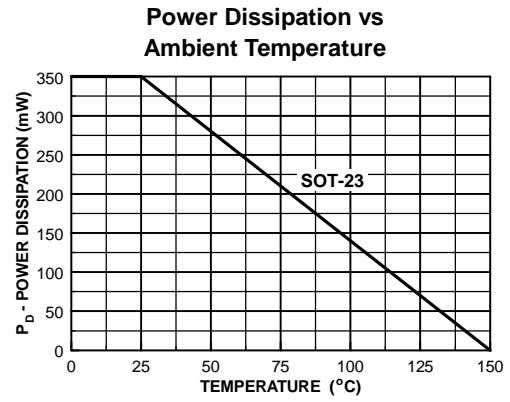
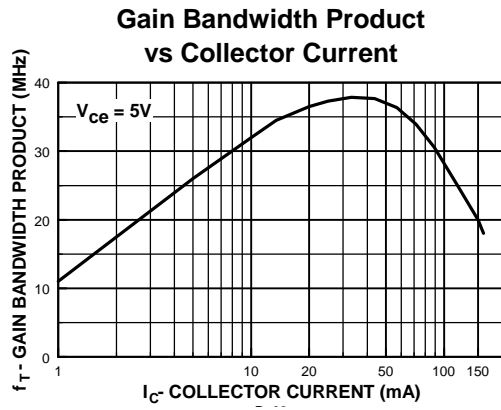
## Typical Characteristics (continued)



# PNP General Purpose Amplifier

(continued)

## Typical Characteristics (continued)



BC857A / BC857B / BC857C

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FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
GTO™	SuperSOT™-8
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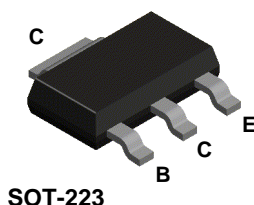
1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

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## BCP52



### PNP General Purpose Amplifier

This device is designed for general purpose medium power amplifiers and switching circuits requiring collector currents to 1.0 A. Sourced from Process 78.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CEO}$	Collector-Emitter Voltage	60	V
$V_{CBO}$	Collector-Base Voltage	60	V
$V_{EBO}$	Emitter-Base Voltage	5.0	V
$I_C$	Collector Current - Continuous	1.2	A
$T_J, T_{stg}$	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
		BCP52	
$P_D$	Total Device Dissipation Derate above 25°C	1.5 12	W mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	83.3	°C/W

## PNP General Purpose Amplifier

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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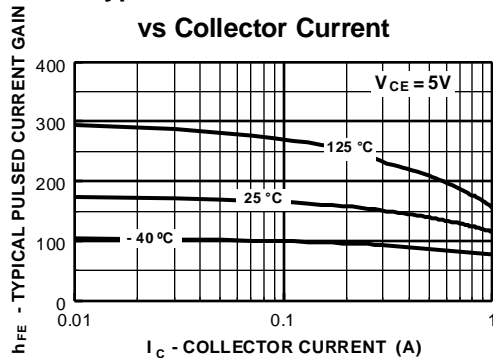
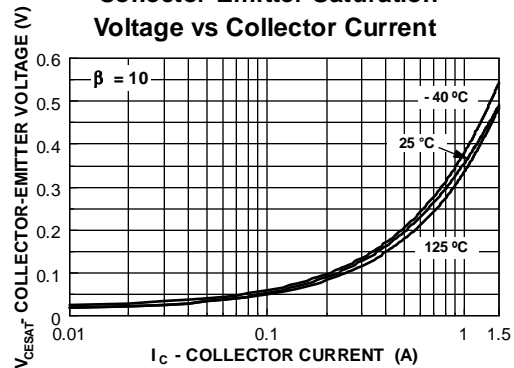
## OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}$ , $I_B = 0$	60		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \text{ } \mu\text{A}$ , $I_E = 0$	60		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \text{ } \mu\text{A}$ , $I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 30 \text{ V}$ , $I_E = 0$		100	nA
		$V_{CB} = 30 \text{ V}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$		10	$\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 5.0 \text{ V}$ , $I_C = 0$		10	$\mu\text{A}$

## ON CHARACTERISTICS

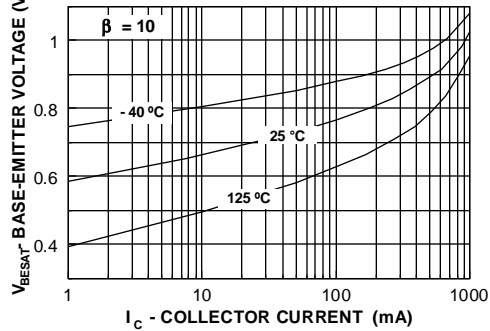
$h_{FE}$	DC Current Gain	$I_C = 5.0 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$ $I_C = 150 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$ $I_C = 500 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$	25 40 25	250	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 500 \text{ mA}$ , $I_B = 50 \text{ mA}$		0.5	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 500 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$		1.0	V

## Typical Characteristics

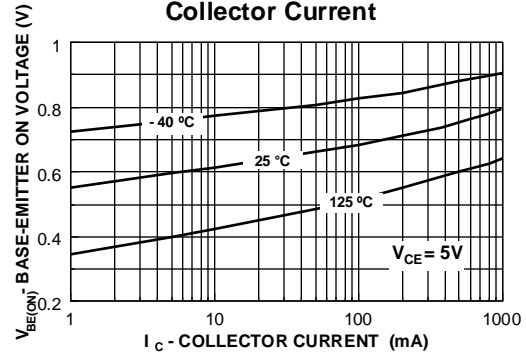
Typical Pulsed Current Gain  
vs Collector CurrentCollector-Emitter Saturation  
Voltage vs Collector Current

## Typical Characteristics (continued)

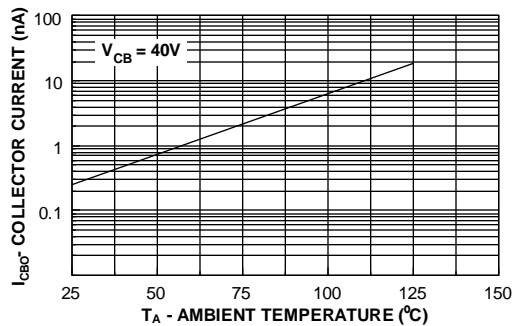
**Base-Emitter Saturation Voltage vs Collector Current**



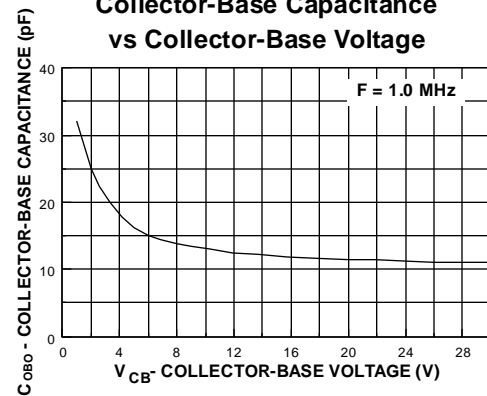
**Base-Emitter ON Voltage vs Collector Current**



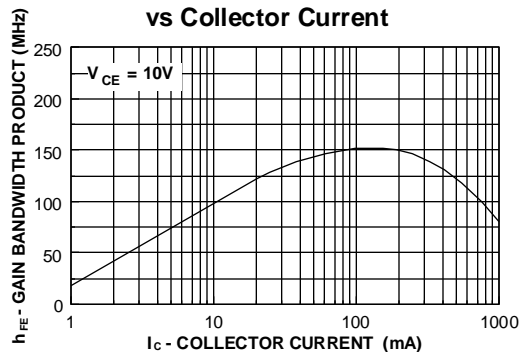
**Collector-Cutoff Current vs Ambient Temperature**



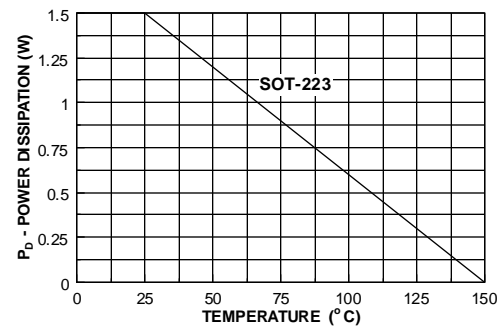
**Collector-Base Capacitance vs Collector-Base Voltage**



**Gain Bandwidth Product vs Collector Current**



**Power Dissipation vs Ambient Temperature**





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FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
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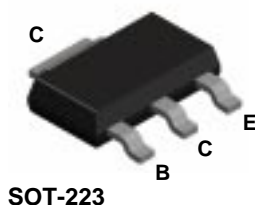
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## BCP54



SOT-223

### NPN General Purpose Amplifier

This device is designed for general purpose medium power amplifiers and switching circuits requiring collector currents to 1.2 A. Sourced from Process 38.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CBO</sub>	Collector-Base Voltage	45	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	1.5	A
T <sub>J</sub> , T <sub>stg</sub>	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
		BCP54	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	1.5 12	W mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	83.3	°C/W

# NPN General Purpose Amplifier

(continued)

## Electrical Characteristics

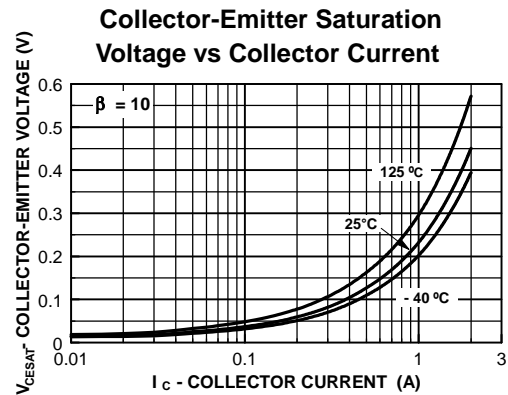
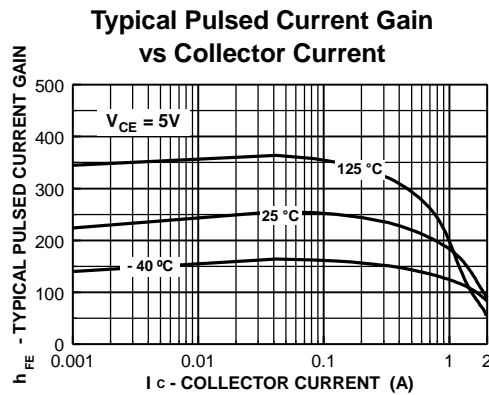
TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
<b>OFF CHARACTERISTICS</b>					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}$ , $I_B = 0$	45		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \text{ } \mu\text{A}$ , $I_E = 0$	45		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \text{ } \mu\text{A}$ , $I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 30 \text{ V}$ , $I_E = 0$		100	nA
		$V_{CB} = 30 \text{ V}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$		10	$\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 5.0 \text{ V}$ , $I_C = 0$		10	$\mu\text{A}$

## ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 5.0 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$ $I_C = 150 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$ $I_C = 500 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$	25 40 25	250	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 500 \text{ mA}$ , $I_B = 50 \text{ mA}$		0.5	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 500 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$		1.0	V

## Typical Characteristics

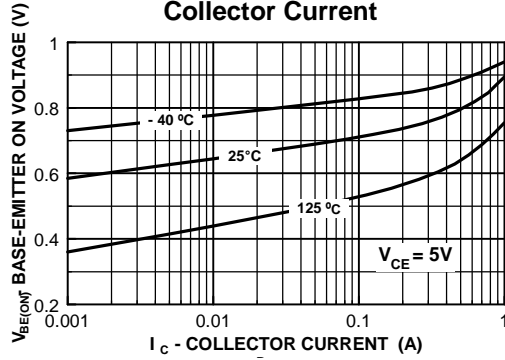


# NPN General Purpose Amplifier (continued)

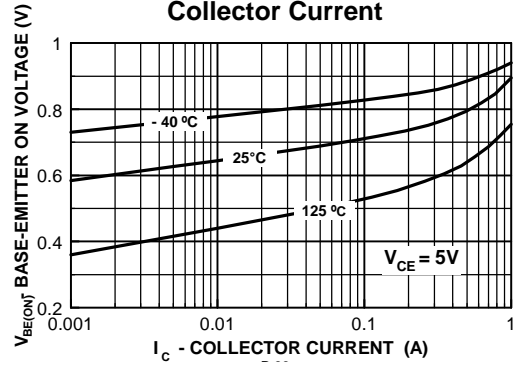
BCP54

## Typical Characteristics (continued)

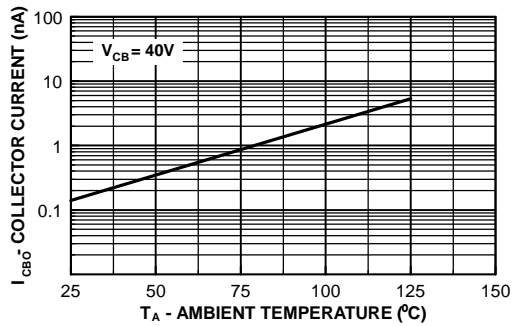
Base-Emitter ON Voltage vs  
Collector Current



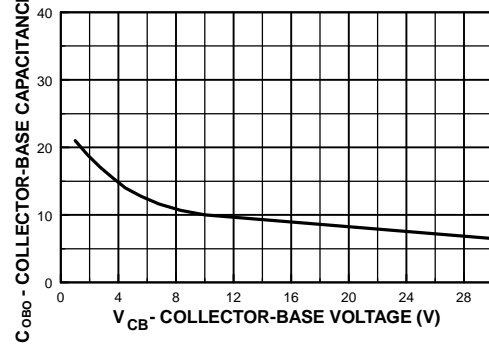
Base-Emitter ON Voltage vs  
Collector Current



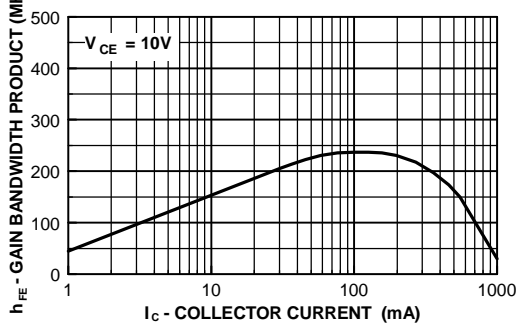
Collector-Cutoff Current  
vs Ambient Temperature



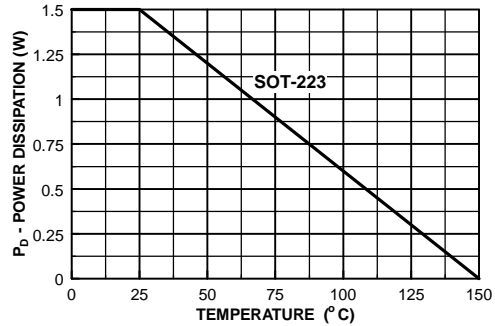
Collector-Base Capacitance  
vs Collector-Base Voltage



Gain Bandwidth Product  
vs Collector Current



Power Dissipation vs  
Ambient Temperature



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FAST<sup>r</sup><sup>TM</sup>  
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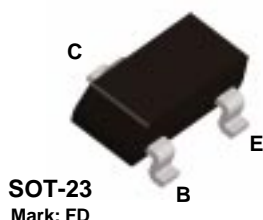
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# BCV26



## PNP Darlington Transistor

This device is designed for applications requiring extremely high current gain at currents to 800 mA. Sourced from Process 61.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	30	V
V <sub>CBO</sub>	Collector-Base Voltage	40	V
V <sub>EBO</sub>	Emitter-Base Voltage	10	V
I <sub>C</sub>	Collector Current - Continuous	1.2	A
T <sub>J</sub> , T <sub>stg</sub>	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
		*BCV26	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	°C/W

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

## PNP Darlington Transistor

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
--------	-----------	-----------------	-----	-----	-----	-------

## OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}$ , $I_B = 0$	30			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ }\mu\text{A}$ , $I_E = 0$	40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100 \text{ nA}$ , $I_C = 0$	10			V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 30 \text{ V}$ , $I_E = 0$			0.1	$\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 10 \text{ V}$ , $I_C = 0$			0.1	$\mu\text{A}$

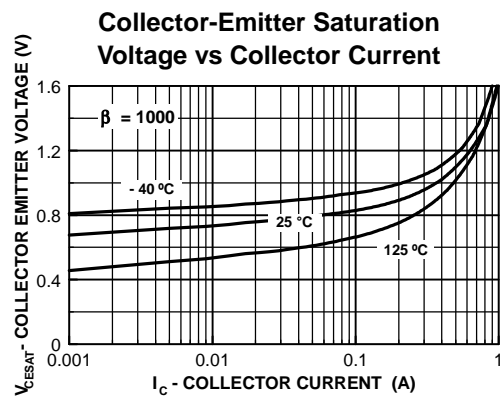
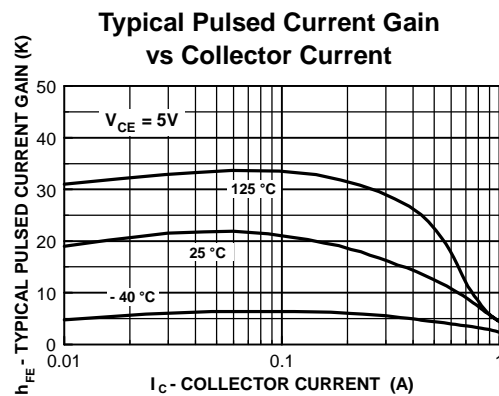
## ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 1.0 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$ $I_C = 10 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$ $I_C = 100 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$	4,000 10,000 20,000			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100 \text{ mA}$ , $I_B = 0.1 \text{ mA}$			1.0	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 100 \text{ mA}$ , $I_B = 0.1 \text{ mA}$			1.5	V

## SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 30 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$ , $f = 100 \text{ MHz}$		220		MHz
$C_C$	Collector Capacitance	$V_{CB} = 30 \text{ V}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$		3.5		pF

## Typical Characteristics

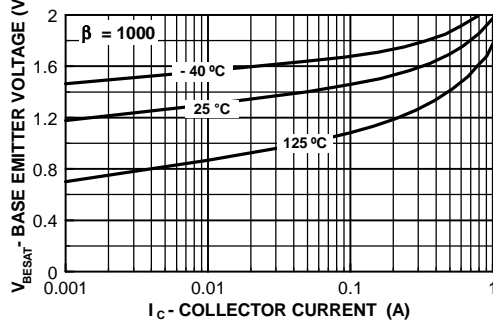


# PNP Darlington Transistor (continued)

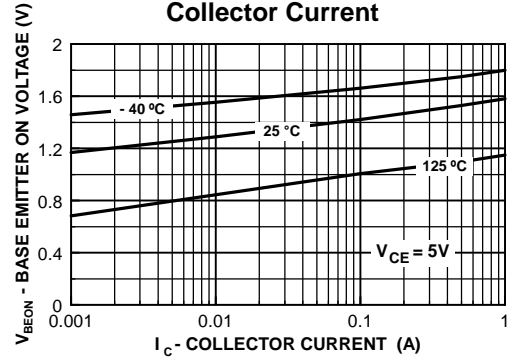
BCV26

## Typical Characteristics (continued)

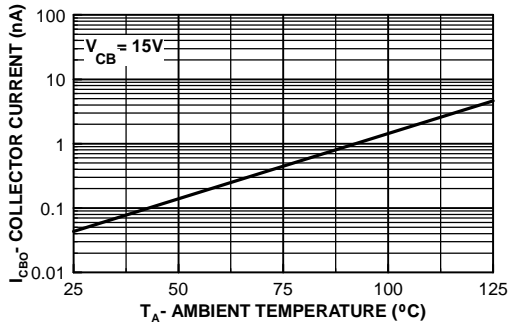
Base-Emitter Saturation  
Voltage vs Collector Current



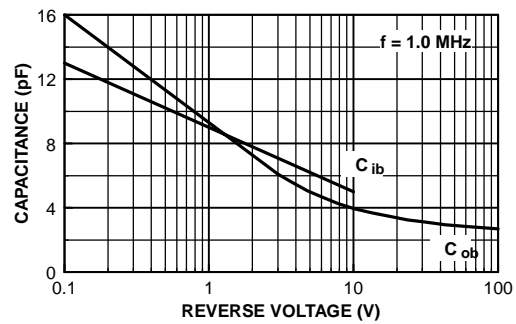
Base Emitter ON Voltage vs  
Collector Current



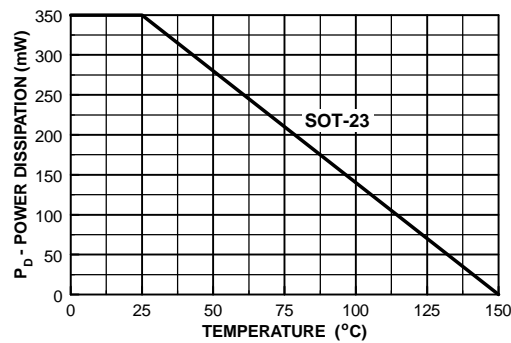
Collector-Cutoff Current  
vs. Ambient Temperature



Input and Output Capacitance  
vs Reverse Bias Voltage



Power Dissipation vs  
Ambient Temperature





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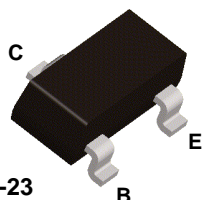
1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

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# BCV27



**SOT-23**  
Mark: FF

## NPN Darlington Transistor

This device is designed for applications requiring extremely high current gain at collector currents to 1.0 A. Sourced from Process 05.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	30	V
V <sub>CBO</sub>	Collector-Base Voltage	40	V
V <sub>EBO</sub>	Emitter-Base Voltage	10	V
I <sub>C</sub>	Collector Current - Continuous	1.2	A
T <sub>J</sub> , T <sub>stg</sub>	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
		*BCV27	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	°C/W

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

NPN Darlington Transistor  
(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{ mA}, I_B = 0$	30			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\text{ }\mu\text{A}, I_E = 0$	40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100\text{ nA}, I_C = 0$	10			V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 30\text{ V}, I_E = 0$			0.1	$\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 10\text{ V}, I_C = 0$			0.1	$\mu\text{A}$

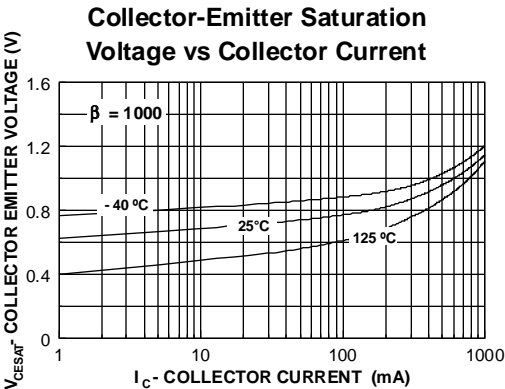
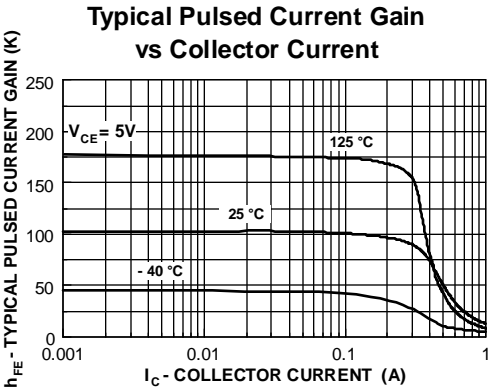
ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 5.0\text{ V}$ $I_C = 100\text{ mA}, V_{CE} = 5.0\text{ V}$	4,000 10,000 20,000			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100\text{ mA}, I_B = 0.1\text{ mA}$			1.0	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 100\text{ mA}, I_B = 0.1\text{ mA}$			1.5	V

SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 30\text{ mA}, V_{CE} = 5.0\text{ V},$ $f = 100\text{ MHz}$		220		MHz
$C_C$	Collector Capacitance	$V_{CB} = 30\text{ V}, I_E = 0, f = 1.0\text{ MHz}$		3.5		pF

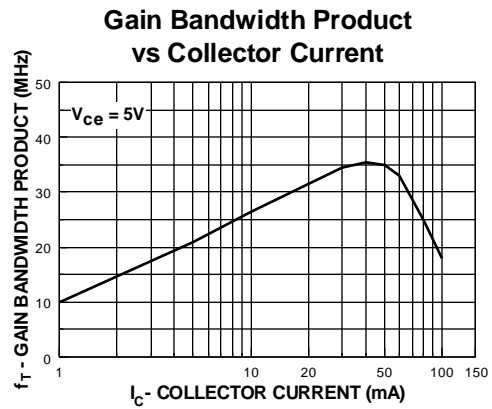
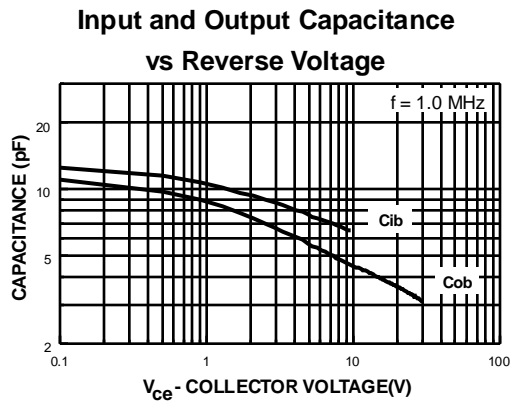
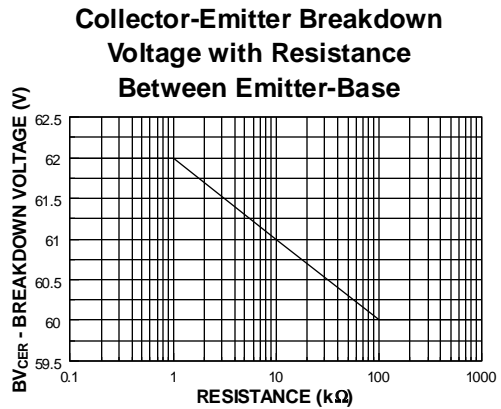
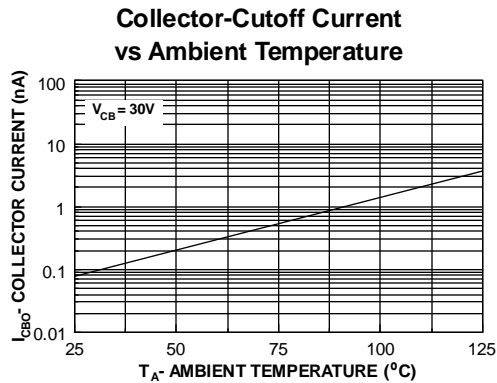
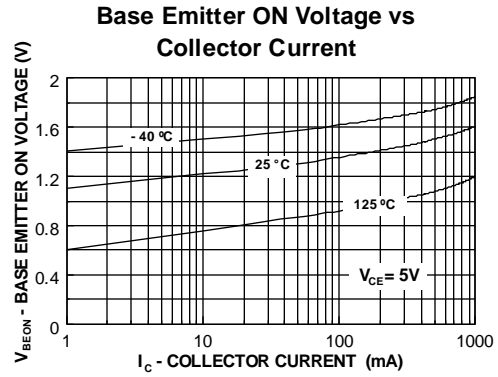
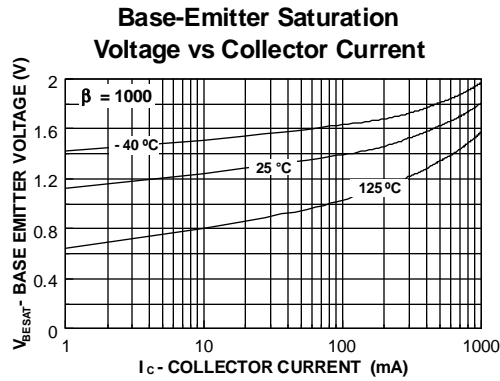
Typical Characteristics



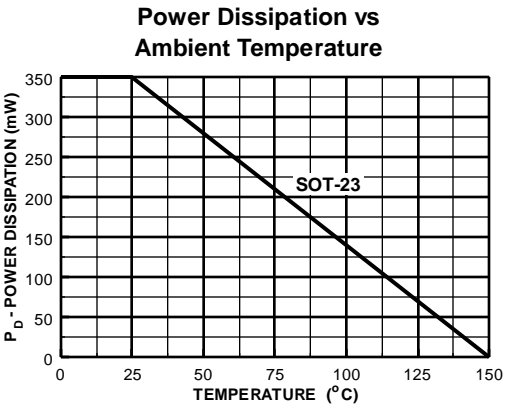
# NPN Darlington Transistor

(continued)

## Typical Characteristics (continued)



Typical Characteristics (continued)



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## BCW29

## PNP EPITAXIAL SILICON TRANSISTOR

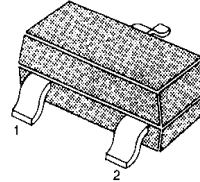
### GENERAL PURPOSE TRANSISTOR

#### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-30	V
Collector-Emitter Voltage	$V_{CEO}$	-20	V
Emitter-Base Voltage	$V_{EBO}$	-5.0	V
Collector Current	$I_C$	-100	mA
Junction Temperature	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KST5088 for graphs

SOT-23

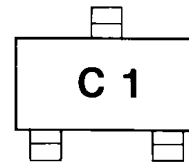


1. Base 2. Emitter 3. Collector

#### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	$BV_{CBO}$	$I_C = -10\mu\text{A}$ , $I_E = 0$	-30			V
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C = -2\text{mA}$ , $I_B = 0$	-20			V
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$I_C = -100\mu\text{A}$ , $V_{EB} = 0$	-30			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E = -10\mu\text{A}$ , $I_C = 0$	-5			V
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = -20\text{V}$ , $I_E = 0$			-100	nA
DC Current Gain	$h_{FE}$	$V_{CE} = -5\text{V}$ , $I_C = -2\text{mA}$	120		260	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = -10\text{mA}$ , $I_B = -0.5\text{mA}$			-0.3	V
Base-Emitter On Voltage	$V_{BE(sat)}$	$V_{CE} = -5\text{V}$ , $I_C = -2\text{mA}$	-0.6		-0.75	V
Output Capacitance	$C_{OB}$	$V_{CB} = -10\text{V}$ , $I_E = 0$ $f = 1\text{MHz}$			7	pF
Noise Figures	NF	$V_{CE} = -5\text{V}$ , $I_C = 0.2\text{mA}$ $R_G = 2\text{K}\Omega$ , $f = 1\text{KHz}$			10	dB

#### Marking



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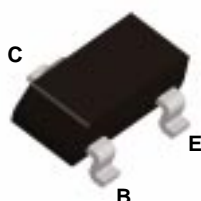
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# BCW30



**SOT-23**  
Mark: C2

## PNP General Purpose Amplifier

This device is designed for general purpose medium power amplifiers and switches requiring collector currents to 300 mA. Sourced from Process 68. See BC857A for characteristics.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	32	V
V <sub>CES</sub>	Collector-Emitter Voltage	32	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	500	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		*BCW30	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	°C/W

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

# PNP General Purpose Amplifier

(continued)

BCW30

## Electrical Characteristics

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

Symbol	Parameter	Test Conditions	Min	Max	Units
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### OFF CHARACTERISTICS

$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\text{ }\mu\text{A}, I_E = 0$	32		V
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 2.0\text{ mA}, I_B = 0$	32		V
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{ }\mu\text{A}, I_E = 0$	32		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\text{ }\mu\text{A}, I_C = 0$	5.0		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 32\text{ V}, I_E = 0$ $V_{CB} = 32\text{ V}, I_E = 0, T_A = +100^\circ\text{C}$		100 10	nA $\mu\text{A}$

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$V_{CE} = 5.0\text{ V}, I_C = 2.0\text{ mA}$	215	500	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$		0.30	V
$V_{BE(on)}$	Base-Emitter On Voltage	$V_{CE} = 5.0\text{ V}, I_C = 2.0\text{ mA}$	0.60	0.75	V

### SMALL SIGNAL CHARACTERISTICS

NF	Noise Figure	$V_{CE} = 5.0\text{ V}, I_C = 200\text{ }\mu\text{A},$ $R_S = 2.0\text{ k}\Omega, f = 1.0\text{ kHz},$ $B_W = 200\text{ Hz}$		10	dB
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## BCW31

## NPN EPITAXIAL SILICON TRANSISTOR

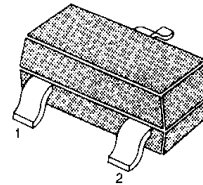
### GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	30	V
Collector-Emitter Voltage	$V_{CEO}$	20	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	100	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

- Refer to KST5088 for graphs

SOT-23

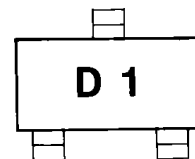


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	$BV_{CBO}$	$I_C=10\mu\text{A}$ , $I_E=0$	30			V
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2\text{mA}$ , $I_B=0$	20			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=10\mu\text{A}$ , $I_C=0$	5			V
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=2\text{mA}$	110		220	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=10\text{mA}$ , $I_B=0.5\text{mA}$			0.25	V
Base-Emitter On Voltage	$V_{BE(on)}$	$V_{CE}=5\text{V}$ , $I_C=2\text{mA}$	0.55		0.7	V
Output Capacitance	$C_{OB}$	$V_{CB}=10\text{V}$ , $I_E=0$ $f=1\text{MHz}$			4	pF
Noise Figures	NF	$V_{CE}=5\text{V}$ , $I_C=0.2\text{mA}$ $R_G=2k\Omega$ , $f=1\text{KHz}$			10	dB

### Marking



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2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

### Definition of Terms

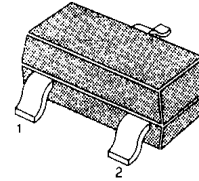
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**BCW60A/B/C/D****NPN EPITAXIAL SILICON TRANSISTOR****GENERAL PURPOSE TRANSISTOR**

SOT-23

**ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )**

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	32	V
Collector-Emitter Voltage	$V_{CEO}$	32	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	100	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$



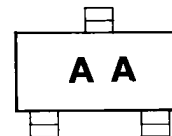
1. Base 2. Emitter 3. Collector

**ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )**

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2\text{mA}$ , $I_B=0$	32		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=1\mu\text{A}$ , $I_C=0$	5		V
Collector Cut-off Current	$I_{CES}$	$V_{CB}=32\text{V}$ , $V_{BE}=0$		20	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=4\text{V}$ , $I_C=0$		20	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=10\mu\text{A}$	20		
			40		
			100		
		$V_{CE}=5\text{V}$ , $I_C=2\text{mA}$	120	220	
			180	310	
			250	460	
			380	630	
		$V_{CE}=1\text{V}$ , $I_C=50\text{mA}$	60		
			70		
			90		
			100		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$		0.55	V
		$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$		0.35	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$	0.7	1.05	V
		$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$	0.6	0.85	V
Base-Emitter On Voltage	$V_{BE(sat)}$	$V_{CE}=5\text{V}$ , $I_C=2\text{mA}$	0.55	0.75	V
Output Capacitance	$C_{OB}$	$V_{CB}=10\text{V}$ , $I_E=0$ $f=1\text{MHz}$		4.5	pF
Current Gain-Bandwidth Product	$f_T$	$I_C=10\text{mA}$ , $V_{CE}=5\text{V}$	125		MHz
Noise Figure	NF	$I_C=0.2\text{mA}$ , $V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ , $f=1\text{KHz}$		6	dB
Turn On Time	$t_{ON}$	$I_C=10\text{mA}$ , $I_B1=1\text{mA}$		150	ns
Turn Off Time	$t_{OFF}$	$V_{BB}=3.6\text{V}$ , $I_B2=1\text{mA}$ $R1=R2=5\text{K}\Omega$ , $R_L=990\Omega$		800	ns

**MARKING CODE****Marking**

TYPE	BCW60A	BCW60B	BCW60C	BCW60D
MARK.	AA	AB	AC	AD



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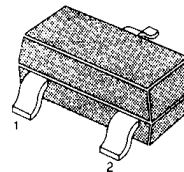
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**BCW61A/B/C/D****PNP EPITAXIAL SILICON TRANSISTOR****GENERAL PURPOSE TRANSISTOR****ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C)**

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-32	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-32	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
Collector Current	I <sub>C</sub>	-100	mA
Collector Dissipation	P <sub>C</sub>	350	mW
Storage Temperature	T <sub>STG</sub>	-55 ~ 150	°C

• Refer to KS5086 for graphs

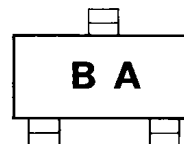
SOT-23



1. Base 2. Emitter 3. Collector

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)**

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	I <sub>C</sub> = -2mA, I <sub>B</sub> =0	-32		V
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	I <sub>E</sub> = -1μA, I <sub>C</sub> =0	-5		V
Collector Cut-off Current	I <sub>CES</sub>	V <sub>CB</sub> = -32V, V <sub>BE</sub> =0		-20	nA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = -5V, I <sub>C</sub> = -10μA	20		
			40		
			100		
		V <sub>CE</sub> = -5V, I <sub>C</sub> = -2mA	120	220	
			140	310	
			250	460	
			380	630	
		V <sub>CE</sub> = -5V, I <sub>C</sub> = -50mA	60		
			80		
			100		
			100		
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = -50mA, I <sub>B</sub> = -1.25mA		-0.55	V
		I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.25mA		-0.25	V
Base-Emitter Saturation Voltage	V <sub>BE</sub> (sat)	I <sub>C</sub> = -50mA, I <sub>B</sub> = -1.25mA	0.68	1.05	V
		I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.25mA	0.6	0.85	V
Base-Emitter On Voltage	V <sub>BE</sub> (on)	V <sub>CE</sub> = -5V, I <sub>C</sub> = -2mA	0.6	0.75	V
Output Capacitance	C <sub>OB</sub>	V <sub>CB</sub> = -10V, I <sub>E</sub> =0 f=1MHz		6	pF
Noise Figure	NF	I <sub>C</sub> = -0.2mA, V <sub>CE</sub> = -5V R <sub>G</sub> =20KΩ, f=1KHz		6	dB
Turn On Time	t <sub>ON</sub>	I <sub>C</sub> = -10mA, I <sub>B1</sub> = -1mA		150	ns
Turn Off Time	t <sub>OFF</sub>	V <sub>BB</sub> = -3.6V, I <sub>B2</sub> = -1mA R1=R2=50KΩ, R <sub>L</sub> =990Ω		800	ns

**Marking**

**BCW61A/B/C/D**

**PNP EPITAXIAL SILICON TRANSISTOR**

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**MARKING CODE**

TYPE	BCW61A	BCW61B	BCW61C	BCW61D
MARK.	BA	BB	BC	BD



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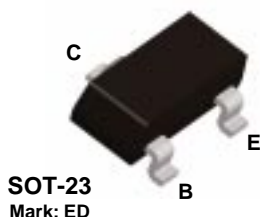
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# BCW65C



## NPN General Purpose Amplifier

This device is designed for general purpose amplifier applications at collector currents to 500 mA. Sourced from Process 19.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	32	V
V <sub>CBO</sub>	Collector-Base Voltage	60	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	1.0	A
T <sub>J</sub> , T <sub>stg</sub>	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
		*BCW65C	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350	mW
		2.8	mW/°C
R <sub>θJA</sub>	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
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## OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}, I_B = 0$	32		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	60		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \text{ } \mu\text{A}, I_C = 0$	5.0		V
$I_{CES}$	Collector-Cutoff Current	$V_{CB} = 32 \text{ V}, I_E = 0$		20	nA
		$V_{CB} = 32 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$		20	$\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 4.0 \text{ V}, I_C = 0$		20	nA

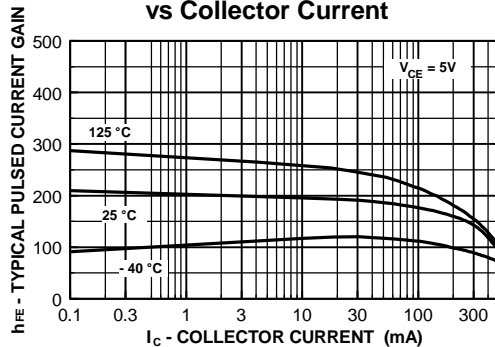
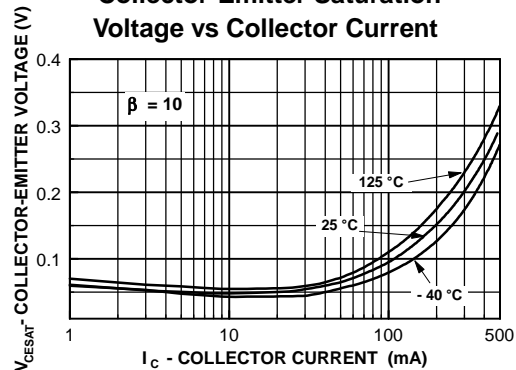
## ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 100 \text{ } \mu\text{A}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 100 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 500 \text{ mA}, V_{CE} = 2.0 \text{ V}$	80 180 250 50	630	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100 \text{ mA}, I_B = 10 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$		0.3 0.7	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$		2.0	V

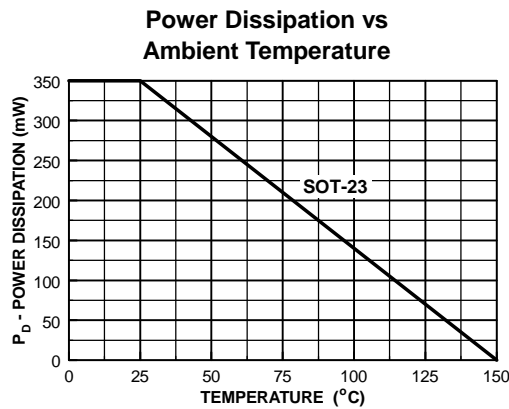
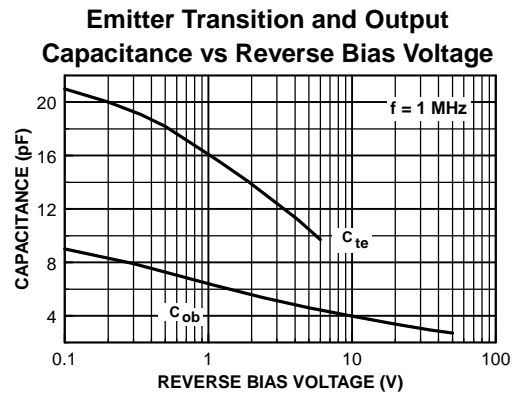
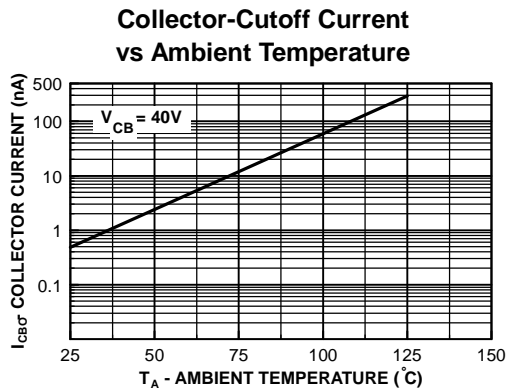
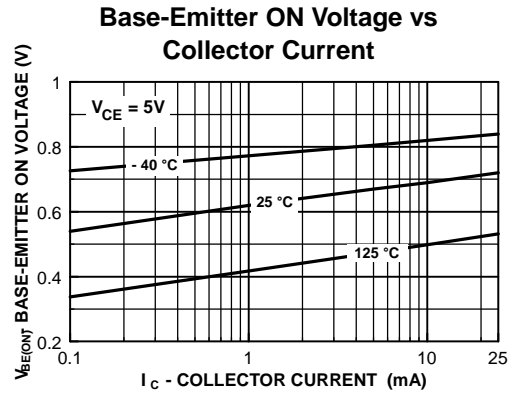
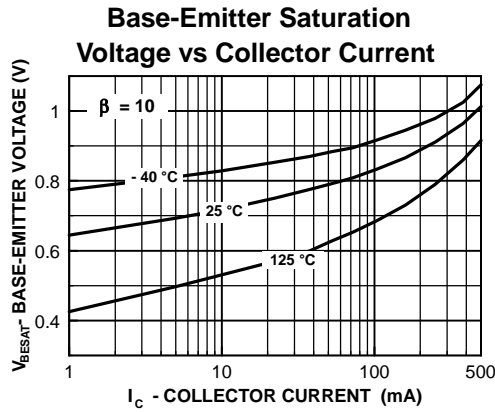
## SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 20 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$	100		MHz
$C_{obo}$	Output Capacitance	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$		12	pF
$C_{ibo}$	Input Capacitance	$V_{EB} = 0.5 \text{ V}, I_C = 0, f = 1.0 \text{ MHz}$		80	pF
NF	Noise Figure	$I_C = 0.2 \text{ mA}, V_{CE} = 5.0,$ $R_S = 1.0 \text{ k}\Omega, f = 1.0 \text{ kHz},$ $BW = 200 \text{ Hz}$		10	dB

## Typical Characteristics

Typical Pulsed Current Gain  
vs Collector CurrentCollector-Emitter Saturation  
Voltage vs Collector Current

## Typical Characteristics



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FACT™	QS™
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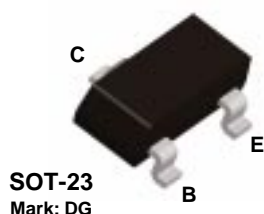
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## BCW68G



### PNP General Purpose Amplifier

This device is designed for general purpose amplifier and switching applications at currents to 500 mA. Sourced from Process 63.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CBO</sub>	Collector-Base Voltage	60	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	800	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		*BCW68C	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350 2.8	mW mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	°C/W

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

# PNP General Purpose Amplifier

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}, I_B = 0$		45	V
$V_{(BR)CES}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}$		60	V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \text{ } \mu\text{A}, I_E = 0$		60	V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \text{ } \mu\text{A}, I_C = 0$		5.0	V
$I_{CES}$	Collector-Cutoff Current	$V_{CE} = 45 \text{ V}$ $V_{CE} = 45 \text{ V}, T_A = 150 \text{ } ^\circ\text{C}$		20 10	nA $\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 4.0 \text{ V}$		20	nA

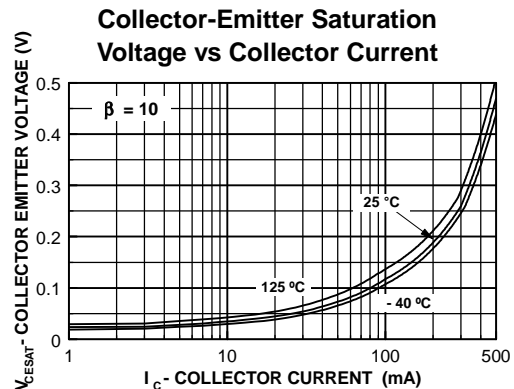
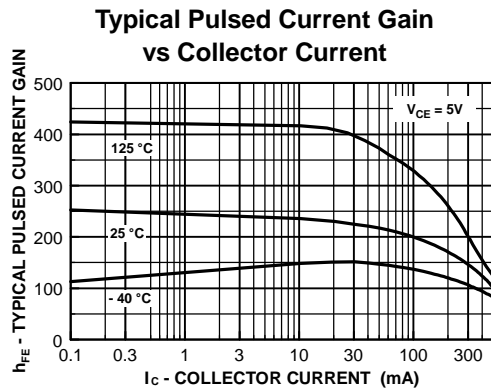
### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 100 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 300 \text{ mA}, V_{CE} = 1.0 \text{ V}$	120 160 60	400	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 300 \text{ mA}, I_B = 30 \text{ mA}$		1.5	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$		2.0	V

### SMALL SIGNAL CHARACTERISTICS

$f_T$	Current Gain - Bandwidth Product	$I_C = 20 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$	100		MHz
$C_{obo}$	Output Capacitance	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$		18	pF
$C_{ibo}$	Input Capacitance	$V_{EB} = 0.5 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$		105	pF
NF	Noise Figure	$I_C = 0.2 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $R_S = 1.0 \text{ k}\Omega, f = 1.0 \text{ kHz},$ $B_W = 200 \text{ Hz}$		10	dB

## Typical Characteristics

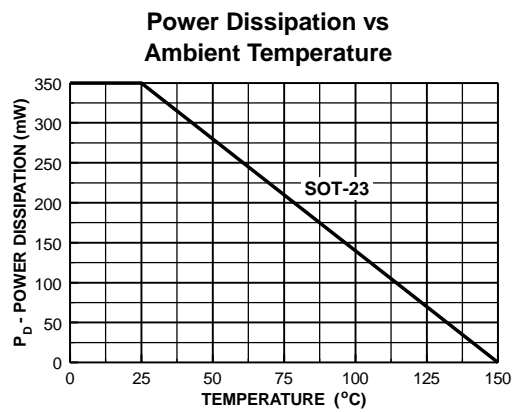
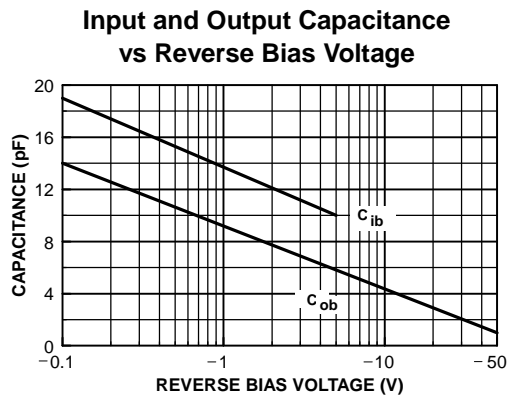
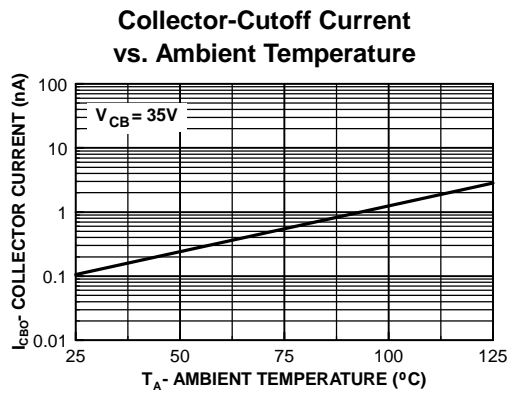
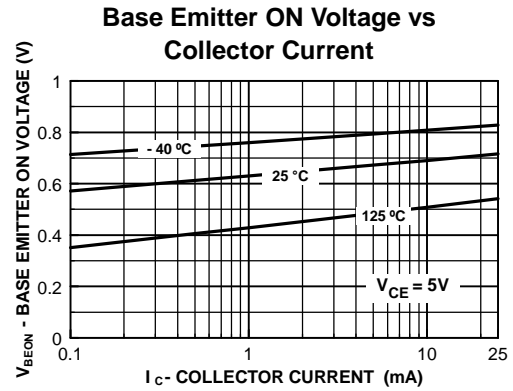
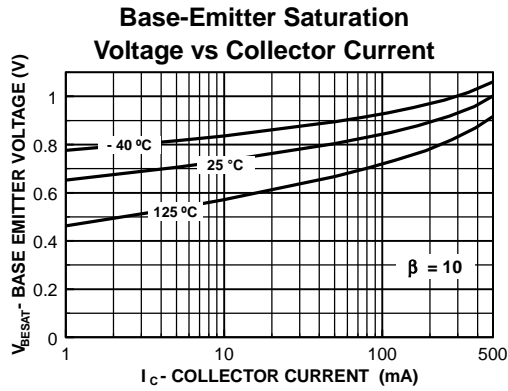


# PNP General Purpose Amplifier

(continued)

BCW68G

## Typical Characteristics (continued)





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## BCW71

## NPN EPITAXIAL SILICON TRANSISTOR

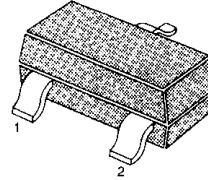
### GENERAL PURPOSE TRANSISTOR

#### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	50	V
Collector-Emitter Voltage	$V_{CEO}$	45	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	100	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

- Refer to KST2222 for graphs

SOT-23

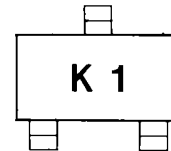


1. Base 2. Emitter 3. Collector

#### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	$BV_{CBO}$	$I_C=10\mu\text{A}$ , $I_E=0$	50			V
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2\text{mA}$ , $I_B=0$	45			V
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$I_C=2\text{mA}$ , $V_{EB}=0$	45			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=10\mu\text{A}$ , $I_C=0$	5			V
Collector Cut-off Current	$I_{CBO}$	$V_{CB}=20\text{V}$ , $I_E=0$			100	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=2\text{mA}$	110		220	
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.5\text{mA}$			0.25	V
		$I_C=50\text{mA}$ , $I_B=2.5\text{mA}$		0.21		V
Base-Emitter Saturation Voltage	$V_{BE}(\text{sat})$	$I_C=50\text{mA}$ , $I_B=2.5\text{mA}$				V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$I_C=2\text{mA}$ , $V_{CE}=5\text{V}$	0.6	0.85	0.75	V
Current Gain Bandwidth Product	$f_T$	$V_{CE}=5\text{V}$ , $I_C=10\text{mA}$				MHz
		$f=35\text{MHz}$		300		
Output Capacitance	$C_{OB}$	$V_{CB}=10\text{V}$ , $I_E=0$				pF
		$f=1\text{MHz}$			4	
Noise Figures	NF	$V_{CE}=5\text{V}$ , $I_C=2.0\text{mA}$			10	dB
		$R_G=2\text{K}\Omega$ , $f=1\text{KHz}$				

#### Marking



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# BCX70G

# NPN EPITAXIAL SILICON TRANSISTOR

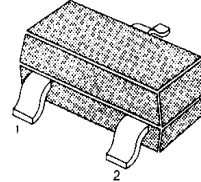
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	45	V
Collector-Emitter Voltage	$V_{CEO}$	45	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	200	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KS5088 for graphs

SOT-23

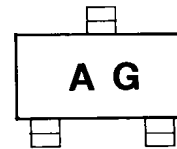


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2\text{mA}$ , $I_B=0$	45		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=1\mu\text{A}$ , $I_C=0$	5		V
Collector Cut-off Current	$I_{CES}$	$V_{CE}=32\text{V}$ , $V_{BE}=0$		20	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=4\text{V}$ , $I_C=0$		20	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=2\text{mA}$	120	220	
		$V_{CE}=1\text{V}$ , $I_C=50\text{mA}$	60		
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$		0.35	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$		0.55	V
Base-Emitter Saturation Voltage	$V_{BE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$	0.6	0.85	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$	0.7	1.05	V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$I_C=2\text{mA}$ , $V_{CE}=5\text{V}$	0.55	0.75	V
Current Gain Bandwidth Product	$f_T$	$V_{CE}=5\text{V}$ , $I_C=10\text{mA}$	125		MHz
Output Capacitance	$C_{OB}$	$V_{CB}=10\text{V}$ , $I_E=0$ $f=1\text{MHz}$		4.5	pF
Noise Figure	NF	$I_C=0.2\text{mA}$ , $V_{CE}=5\text{V}$ $f=1\text{KHz}$ , $R_S=2\text{K}\Omega$		6	dB
Turn On Time	$T_{ON}$	$I_C=10\text{mA}$ , $I_{B1}=1\text{mA}$		150	ns
Turn Off Time	$T_{OFF}$	$I_{B2}=1\text{mA}$ , $V_{BB}=3.6\text{V}$ $R_L=990\Omega$ $R_1=R_2=5\text{K}\Omega$		800	ns

### Marking



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FACT™	QS™
FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
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# BCX70H

# NPN EPITAXIAL SILICON TRANSISTOR

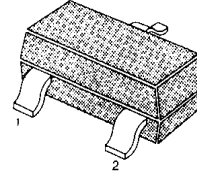
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	45	V
Collector-Emitter Voltage	$V_{CEO}$	45	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	200	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KS3904 for graphs

SOT-23

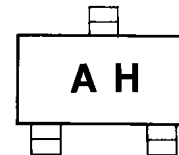


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2.0\text{mA}$ , $I_B=0$	45		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=1.0\mu\text{A}$ , $I_C=0$	5		V
Collector Cut-off Current	$I_{CES}$	$V_{CE}=32\text{V}$ , $V_{BE}=0$		20	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=4\text{V}$ , $I_C=0$		20	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=10\mu\text{A}$	120		
		$V_{CE}=5\text{V}$ , $I_C=2.0\text{mA}$	180	310	
		$V_{CE}=1\text{V}$ , $I_C=50\text{mA}$	70		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$		0.35	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$		0.55	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$	0.6	0.85	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$	0.7	1.05	V
Base-Emitter On Voltage	$V_{BE(on)}$	$I_C=2.0\text{mA}$ , $V_{CE}=5\text{V}$	0.55	0.75	V
Current Gain Bandwidth Product	$f_T$	$I_C=10\text{mA}$ , $V_{CE}=5\text{V}$	125		MHz
Output Capacitance	$C_{OB}$	$V_{CE}=10\text{V}$ , $I_E=0$ $f=1\text{MHz}$		4.5	pF
Noise Figure	NF	$V_{CE}=5\text{V}$ , $I_C=0.2\text{mA}$ $R_S=2\text{K}\Omega$ , $f=1\text{KHz}$		6	dB
Turn On Time	$T_{ON}$	$I_C=10\text{mA}$ , $I_{B1}=1.0\text{mA}$		150	ns
Turn Off Time	$T_{OFF}$	$V_{BB}=3.6\text{V}$ , $I_{B2}=1.0\text{mA}$ $R_1=R_2=5\text{K}\Omega$ , $R_L=990\Omega$		800	ns

### Marking



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# BCX70J

# NPN EPITAXIAL SILICON TRANSISTOR

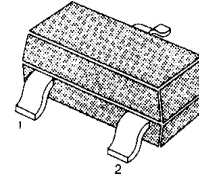
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	45	V
Collector-Emitter Voltage	$V_{CEO}$	45	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	200	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KS3904 for graphs

SOT-23

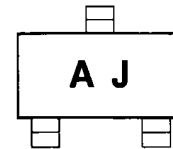


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2.0\text{mA}$ , $I_B=0$	45		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=1.0\mu\text{A}$ , $I_C=0$	5		V
Collector Cut-off Current	$I_{CES}$	$V_{CE}=32\text{V}$ , $V_{BE}=0$		20	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=4\text{V}$ , $I_C=0$		20	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=10\mu\text{A}$	40		
		$V_{CE}=5\text{V}$ , $I_C=2.0\text{mA}$	250	460	
		$V_{CE}=1\text{V}$ , $I_C=50\text{mA}$	90		
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$		0.35	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$		0.55	V
Base-Emitter Saturation Voltage	$V_{BE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$	0.6	0.85	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$	0.7	1.05	V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$I_C=2.0\text{mA}$ , $V_{CE}=5\text{V}$	0.55	0.75	V
Current Gain Bandwidth Product	$f_T$	$I_C=10\text{mA}$ , $V_{CE}=5\text{V}$	125		MHz
Output Capacitance	$C_{OB}$	$V_{CB}=10\text{V}$ , $I_E=0$ $f=1\text{MHz}$		4.5	pF
Noise Figure	NF	$V_{CE}=5\text{V}$ , $I_C=0.2\text{mA}$ $R_S=2\text{K}\Omega$ , $f=1\text{KHz}$		6	dB
Turn On Time	$T_{ON}$	$I_C=10\text{mA}$ , $I_{B1}=1.0\text{mA}$		150	ns
Turn Off Time	$T_{OFF}$	$V_{BB}=3.6\text{V}$ , $I_{B2}=1.0\text{mA}$ $R_1=R_2=5\text{K}\Omega$ , $R_L=990\Omega$		800	ns

### Marking





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FAST®	SuperSOT™-3
FASTr™	SuperSOT™-6
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2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

### Definition of Terms

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# BCX70K

# NPN EPITAXIAL SILICON TRANSISTOR

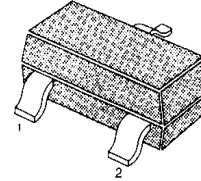
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	45	V
Collector-Emitter Voltage	$V_{CEO}$	45	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	200	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KS3904 for graphs

SOT-23

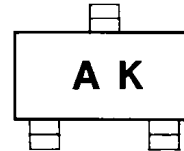


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C=2.0\text{mA}$ , $I_B=0$	45		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E=1.0\mu\text{A}$ , $I_C=0$	5		V
Collector Cut-off Current	$I_{CES}$	$V_{CE}=32\text{V}$ , $V_{BE}=0$		20	nA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=4\text{V}$ , $I_C=0$		20	nA
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=10\mu\text{A}$	100		
		$V_{CE}=5\text{V}$ , $I_C=2.0\text{mA}$	380	630	
		$V_{CE}=1\text{V}$ , $I_C=50\text{mA}$	100		
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$		0.35	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$		0.55	V
Base-Emitter Saturation Voltage	$V_{BE}(\text{sat})$	$I_C=10\text{mA}$ , $I_B=0.25\text{mA}$		0.85	V
		$I_C=50\text{mA}$ , $I_B=1.25\text{mA}$	0.6	0.7	V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$I_C=2.0\text{mA}$ , $V_{CE}=5\text{V}$	0.55	0.75	V
Current Gain Bandwidth Product	$f_T$	$I_C=10\text{mA}$ , $V_{CE}=5\text{V}$	125		MHz
Output Capacitance	$C_{OB}$	$V_{CB}=10\text{V}$ , $I_E=0$ $f=1\text{MHz}$		4.5	pF
Noise Figure	NF	$V_{CE}=5\text{V}$ , $I_C=0.2\text{mA}$ $R_S=2\text{K}\Omega$ , $f=1\text{KHz}$		6	dB
Turn On Time	$T_{ON}$	$I_C=10\text{mA}$ , $I_{B1}=1.0\text{mA}$		150	ns
Turn Off Time	$T_{OFF}$	$V_{BB}=3.6\text{V}$ , $I_{B2}=1.0\text{mA}$ $R_1=R_2=5\text{K}\Omega$ , $R_L=990\Omega$		800	ns

### Marking



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# BCX71G

# PNP EPITAXIAL SILICON TRANSISTOR

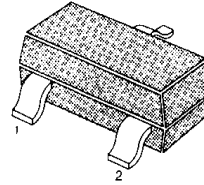
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-45	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-45	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
Collector Current	I <sub>C</sub>	-100	mA
Collector Dissipation	P <sub>C</sub>	350	mW
Storage Temperature	T <sub>STG</sub>	150	°C

• Refer to KS5086 for graphs

SOT-23

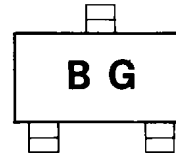


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	I <sub>C</sub> = -2mA, I <sub>B</sub> =0	-45		V
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	I <sub>E</sub> = -1μA, I <sub>C</sub> =0	-5		V
Collector Cut-off Current	I <sub>CES</sub>	V <sub>CE</sub> = -32V, V <sub>BE</sub> =0		-20	nA
DC Current Gain	h <sub>FE</sub>	V <sub>EB</sub> = -5V, I <sub>C</sub> = -2mA V <sub>CE</sub> = -1V, I <sub>C</sub> = -50μA	120 60	220	
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.25mA I <sub>C</sub> = -50mA, I <sub>B</sub> = -1.25mA		-0.25 -0.55	V
Base-Emitter Saturation Voltage	V <sub>BE</sub> (sat)	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.25mA I <sub>C</sub> = -50mA, I <sub>B</sub> = -1.25mA	-0.6 -0.68	-0.85 -1.05	V
Base-Emitter On Voltage	V <sub>BE</sub> (on)	I <sub>C</sub> = -2mA, V <sub>CE</sub> = -5V	-0.6	-0.75	V
Current Gain Bandwidth Product	C <sub>OB</sub>	V <sub>CB</sub> = -10V, I <sub>E</sub> =0 f=1MHz		6	pF
Noise Figure	NF	I <sub>C</sub> =0.2mA, V <sub>CE</sub> =5V R <sub>S</sub> =2KΩ, f=1KHz		6	dB
Turn On Time	T <sub>ON</sub>	I <sub>C</sub> = -10mA, I <sub>B1</sub> = -1mA		150	ns
Turn Off Time	T <sub>OFF</sub>	I <sub>B2</sub> = -1mA, V <sub>BB</sub> =3.6V R <sub>L</sub> =990Ω		800	ns

### Marking



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FASTr™	SuperSOT™-6
GTO™	SuperSOT™-8
HiSeC™	TinyLogic™

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# BCX71H

# PNP EPITAXIAL SILICON TRANSISTOR

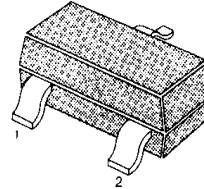
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-45	V
Collector-Emitter Voltage	$V_{CEO}$	-45	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current	$I_C$	-100	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KS5086 for graphs

SOT-23

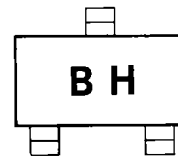


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C = -2\text{mA}$ , $I_B = 0$	-45		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E = -1\mu\text{A}$ , $I_C = 0$	-5		V
Collector Cut-off Current	$I_{CES}$	$V_{CE} = -32\text{V}$ , $V_{BE} = 0$		-20	nA
DC Current Gain	$h_{FE}$	$V_{CE} = -5\text{V}$ , $I_C = -10\mu\text{A}$	30		
		$V_{CE} = -5\text{V}$ , $I_C = -2\text{mA}$	140	310	
		$V_{CE} = -1\text{V}$ , $I_C = -50\text{mA}$	80		
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C = -10\text{mA}$ , $I_B = -0.25\text{mA}$		-0.25	V
		$I_C = -50\text{mA}$ , $I_B = -1.25\text{mA}$		-0.55	V
Base-Emitter Saturation Voltage	$V_{BE}(\text{sat})$	$I_C = -10\text{mA}$ , $I_B = -0.25\text{mA}$	-0.6	-0.85	V
		$I_C = -50\text{mA}$ , $I_B = -1.25\text{mA}$	-0.68	-1.05	V
Base-Emitter On Voltage	$V_{BE}(\text{on})$	$I_C = -2\text{mA}$ , $V_{CE} = -5\text{V}$	-0.6	-0.75	V
Current Gain Bandwidth Product	$C_{OB}$	$V_{CB} = -10\text{V}$ , $I_E = 0$		6	pF
		$f = 1\text{MHz}$			
Noise Figure	NF	$I_C = -0.2\text{mA}$ , $V_{CE} = -5\text{V}$ $f = 1\text{KHz}$ , $R_S = 2\text{K}\Omega$		6	dB
Turn On Time	$T_{ON}$	$I_C = -10\text{mA}$ , $I_{B1} = -1\text{mA}$		150	ns
Turn Off Time	$T_{OFF}$	$I_{B2} = -1\text{mA}$ , $V_{BB} = -3.6\text{V}$ $R_L = 990\Omega$		800	ns

### Marking



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# BCX71J

# PNP EPITAXIAL SILICON TRANSISTOR

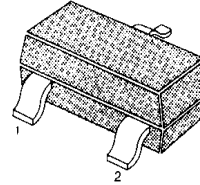
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-45	V
Collector-Emitter Voltage	$V_{CEO}$	-45	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current	$I_C$	-100	mA
Collector Dissipation	$P_C$	350	mW
Storage Temperature	$T_{STG}$	150	$^\circ\text{C}$

• Refer to KS5086 for graphs

SOT-23

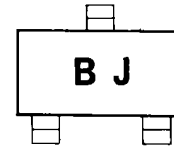


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C = -2\text{mA}$ , $I_B = 0$	-45		V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E = -1\mu\text{A}$ , $I_C = 0$	-5		V
Collector Cut-off Current	$I_{CES}$	$V_{CE} = -32\text{V}$ , $V_{BE} = 0$		-20	nA
DC Current Gain	$h_{FE}$	$V_{CE} = -5\text{V}$ , $I_C = -10\mu\text{A}$	40		
		$V_{CE} = -5\text{V}$ , $I_C = -2\text{mA}$	250	460	
		$V_{CE} = -1\text{V}$ , $I_C = -50\text{mA}$	100		
Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	$I_C = -10\text{mA}$ , $I_B = -0.25\text{mA}$		-0.25	V
		$I_C = -50\text{mA}$ , $I_B = -1.25\text{mA}$		-0.55	V
Base-Emitter Saturation Voltage	$V_{BE}(\text{sat})$	$I_C = -10\text{mA}$ , $I_B = -0.25\text{mA}$	-0.6	-0.85	V
		$I_C = -50\text{mA}$ , $I_B = -1.25\text{mA}$	-0.68	-1.05	V
Base-Emitter On Voltage	$V_{DE}(\text{on})$	$I_C = -2\text{mA}$ , $V_{CE} = -5\text{V}$	-0.6	-0.75	V
Current Gain Bandwidth Product	$C_{OB}$	$V_{CB} = -10\text{V}$ , $I_E = 0$ $f = 1\text{MHz}$		6	pF
Noise Figure	NF	$I_C = -0.2\text{mA}$ , $V_{CE} = -5\text{V}$ $f = 1\text{KHz}$ , $R_S = 2\text{K}\Omega$		6	dB
Turn On Time	$T_{ON}$	$I_C = -10\text{mA}$ , $I_{B1} = -1\text{mA}$		150	ns
Turn Off Time	$T_{OFF}$	$I_{B2} = -1\text{mA}$ , $V_{BB} = -3.6\text{V}$ $R_L = 990\Omega$		800	ns

### Marking





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2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

### Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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# BCX71K

# PNP EPITAXIAL SILICON TRANSISTOR

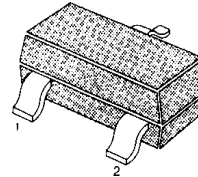
## GENERAL PURPOSE TRANSISTOR

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-45	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-45	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
Collector Current	I <sub>C</sub>	-100	mA
Collector Dissipation	P <sub>C</sub>	350	mW
Storage Temperature	T <sub>STG</sub>	150	°C

• Refer to KST5086 for graphs

SOT-23

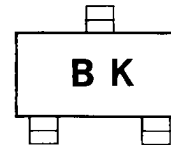


1. Base 2. Emitter 3. Collector

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Characteristic	Symbol	Test Conditions	Min	Max	Unit
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	I <sub>C</sub> = -2mA, I <sub>B</sub> =0	-45		V
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	I <sub>E</sub> = -1μA, I <sub>C</sub> =0	-5		V
Collector Cut-off Current	I <sub>CES</sub>	V <sub>CE</sub> = -32V, V <sub>BE</sub> =0		-20	nA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = -5V, I <sub>C</sub> = -10μA	100		
		V <sub>CE</sub> = -5V, I <sub>C</sub> = -2mA	380	630	
		V <sub>CE</sub> = -1V, I <sub>C</sub> = -50mA	110		
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.25mA		-0.25	V
		I <sub>C</sub> = -50mA, I <sub>B</sub> = -1.25mA		-0.55	V
Base-Emitter Saturation Voltage	V <sub>BE</sub> (sat)	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.25mA		-0.85	V
		I <sub>C</sub> = -50mA, I <sub>B</sub> = -1.25mA		-1.05	V
Base-Emitter On Voltage	V <sub>BE</sub> (on)	I <sub>C</sub> = -2mA, V <sub>CE</sub> = -5V	-0.68	-0.75	V
Current Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = -10V, I <sub>E</sub> =0	-0.6		pF
Noise Figure	NF	f=1MHz		6	dB
Turn On Time	T <sub>ON</sub>	I <sub>C</sub> = -10mA, I <sub>B1</sub> = -1mA		150	ns
Turn Off Time	T <sub>OFF</sub>	I <sub>B2</sub> = -1mA, V <sub>BB</sub> = -3.6V		800	ns
		R <sub>L</sub> =990Ω			

### Marking



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FACT™	QS™
FACT Quiet Series™	Quiet Series™
FAST®	SuperSOT™-3
FAST <sub>r</sub> ™	SuperSOT™-6
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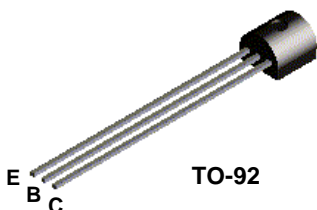
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## BCX79



### PNP General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 300 mA. Sourced from Process 68. See PN200A for characteristics.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CES</sub>	Collector-Base Voltage	45	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	500	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		BCX79	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	625 5.0	mW mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	°C/W

# PNP General Purpose Amplifier

(continued)

BCX79

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}, I_B = 0$	45		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 1.0 \text{ }\mu\text{A}, I_C = 0$	5.0		V
$I_{CEX}$	Collector Cutoff Current	$V_{CE} = 45 \text{ V}, V_{BE} = 0.2 \text{ V}, T_A = +100 \text{ }^\circ\text{C}$		20	$\mu\text{A}$
$I_{CES}$	Collector Cutoff Current	$V_{CE} = 45 \text{ V}, I_E = 0,$ $V_{CE} = 45 \text{ V}, I_E = 0, T_A = +125 \text{ }^\circ\text{C}$		10 2.5	nA $\mu\text{A}$
$I_{EBO}$	Emitter Cutoff Current	$V_{EB} = 4.0 \text{ V}, I_C = 0$		20	nA

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain	$V_{CE} = 5.0 \text{ V}, I_C = 2.0 \text{ mA}$ $V_{CE} = 1.0 \text{ V}, I_C = 10 \text{ mA}$ $V_{CE} = 1.0 \text{ V}, I_C = 100 \text{ mA}$	120 80 40	630 1,000	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100 \text{ mA}, I_B = 2.5 \text{ mA}$		0.6	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 100 \text{ mA}, I_B = 2.5 \text{ mA}$		1.0	V
$V_{BE(on)}$	Base-Emitter On Voltage	$V_{CE} = 5.0 \text{ V}, I_C = 2.0 \text{ mA}$ $V_{CE} = 1.0 \text{ V}, I_C = 100 \text{ mA}$	0.6	0.7 0.9	V V

### SMALL SIGNAL CHARACTERISTICS

$C_{cb}$	Collector-Base Capacitance	$V_{CB} = 10 \text{ V}, f = 1.0 \text{ MHz}$		4.5	pF
$C_{eb}$	Emitter-Base Capacitance	$V_{EB} = 0.5 \text{ V}, f = 1.0 \text{ MHz}$		15	pF
$h_{ie}$	Input Impedance	$I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 1.0 \text{ kHz}$	1.6	8.5	k $\Omega$
$h_{oe}$	Output Admittance	$I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 1.0 \text{ kHz}$		100	$\mu\text{mhos}$
NF	Noise Figure	$V_{CE} = 5.0 \text{ V}, I_C = 0.2 \text{ mA},$ $R_S = 2.0 \text{ k}\Omega, f = 1.0 \text{ kHz}$		6.0	dB

### SWITCHING CHARACTERISTICS

$t_{on}$	Turn-on Time	$V_{CC} = 10 \text{ V}, I_C = 10 \text{ mA},$ $V_{BB} = 3.6 \text{ V}, I_{B1} = I_{B2} = 1.0 \text{ mA}$		150	ns
$t_{on}$	Turn-on Time	$V_{CC} = 10 \text{ V}, I_C = 100 \text{ mA},$ $V_{BB} = 5.0 \text{ V}, I_{B1} = I_{B2} = 10 \text{ mA}$		150	ns
$t_{off}$	Turn-off Time	$V_{CC} = 10 \text{ V}, I_C = 10 \text{ mA},$ $V_{BB} = 3.6 \text{ V}, I_{B1} = I_{B2} = 1.0 \text{ mA}$		800	ns
$t_{off}$	Turn-off Time	$V_{CC} = 10 \text{ V}, I_C = 100 \text{ mA},$ $V_{BB} = 5.0 \text{ V}, I_{B1} = I_{B2} = 10 \text{ mA}$		800	ns