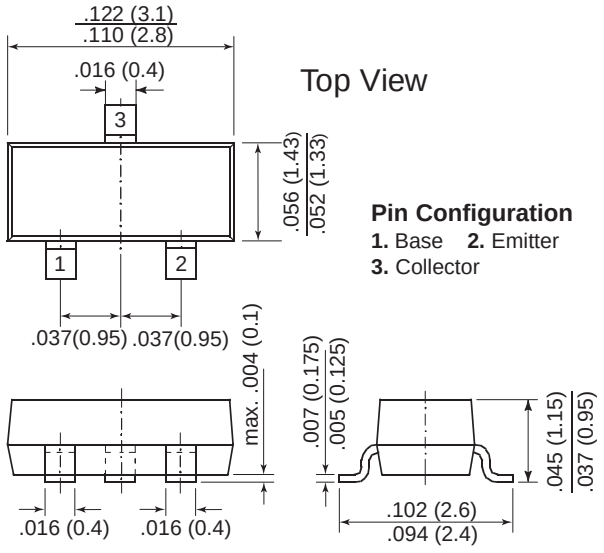
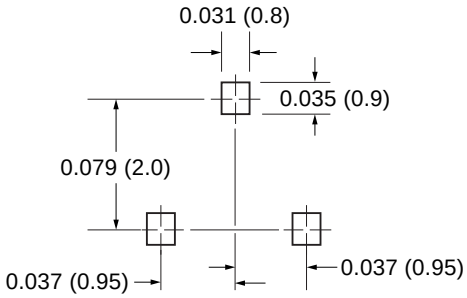
Small Signal Transistors (NPN)

TO-236AB (SOT-23)



Pin Configuration
1. Base **2.** Emitter
3. Collector

Mounting Pad Layout



Dimensions in inches and (millimeters)

Features

- NPN Silicon Epitaxial Planar Transistors
- Suited for low level, low noise, low frequency applications in hybrid cicuits.
- Low Current, Low Voltage.
- As complementary types, BCW61 Series PNP transistors are recommended.

Mechanical Data

Case: SOT-23 Plastic Package

Weight: approx. 0.008g

Marking Code: BCW60A = AA
BCW60B = AB
BCW60C = AC
BCW60D = AD

Packaging Codes/Options:
E8/10K per 13” reel (8mm tape), 30K/box
E9/3K per 7” reel (8mm tape), 30K/box

Maximum Ratings & Thermal Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage (V_{BE}=0)	V_{CES}	32	V
Collector-Emitter Voltage	V_{CEO}	32	V
Emitter-Base Voltage	V_{EBO}	5.0	V
Collector Current (DC)	I_C	100	mA
Peak Collector Current	I_{CM}	200	mA
Base Current (DC)	I_B	50	mA
Power Dissipation	P_{tot}	250	mW
Maximum Junction Temperature	T_j	150	°C
Storage Temperature Range	T_S	–65 to +150	°C
Thermal Resistance Junction to Ambient Air	$R_{\Theta JA}$	500(1)	°C/W

Note:
(1) Mounted on FR-4 printed-ciruit board.

Electrical Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter		Symbol	Min.	TYP.	Max.	Unit
DC Current Gain						
at V_{CE} = 5V, I_C = 10 µA	BCW60A	h_{FE}	–	–	–	–
at V_{CE} = 5V, I_C = 10 µA	BCW60B	h_{FE}	20	–	–	–
at V_{CE} = 5V, I_C = 10 µA	BCW60C	h_{FE}	40	–	–	–
at V_{CE} = 5V, I_C = 10 µA	BCW60D	h_{FE}	100	–	–	–
at V_{CE} = 5V, I_C = 2 mA	BCW60A	h_{FE}	120	–	220	–
at V_{CE} = 5V, I_C = 2 mA	BCW60B	h_{FE}	180	–	310	–
at V_{CE} = 5V, I_C = 2 mA	BCW60C	h_{FE}	250	–	460	–
at V_{CE} = 5V, I_C = 2 mA	BCW60D	h_{FE}	380	–	630	–
at V_{CE} = 1V, I_C = 50 mA	BCW60A	h_{FE}	50	–	–	–
at V_{CE} = 1V, I_C = 50 mA	BCW60B	h_{FE}	70	–	–	–
at V_{CE} = 1V, I_C = 50 mA	BCW60C	h_{FE}	90	–	–	–
at V_{CE} = 1V, I_C = 50 mA	BCW60D	h_{FE}	100	–	–	–
Collector-Emitter Saturation Voltage						
at I_C = 10 mA, I_B = 0.25 mA		V_{CEsat}	50	–	350	mV
at I_C = 50 mA, I_B = 1.25 mA		V_{CEsat}	100	–	550	mV
Base-Emitter Saturation Voltage						
at I_C = 10 mA, I_B = 0.25 mA		V_{BEsat}	600	–	850	mV
at I_C = 50 mA, I_B = 1.25 mA		V_{BEsat}	700	–	1050	mV
Base-Emitter Voltage						
at V_{CE} = 5V, I_C = 2 mA		V_{BE}	550	650	750	mV
at V_{CE} = 5V, I_C = 10 µA		V_{BE}	–	520	–	mV
at V_{CE} = 1V, I_C = 50 mA		V_{BE}	–	780	–	mV
Collector-Emitter Cut-off Current						
at V_{CE} = 32V, V_{BE} = 0V		I_{CES}	–	–	20	nA
at V_{CE} = 32V, V_{BE} = 0V, T_A = 150°C			–	–	20	µA
Emitter-Base Cut-off Current at V_{EB} = 4V, I_C = 0		I_{EBO}	–	–	20	nA
Gain-Bandwidth Product at V_{CE} = 5V, I_C = 10 mA, f = 100 MHz		f_T	100	250	–	MHz
Collector-Base Capacitance at V_{CB} = 10V, f = 1 MHz, I_E=0		C_{CBO}	–	2.5	–	pF
Emitter-Base Capacitance at V_{EB} = 0.5V, f = 1 MHz, I_C=0		C_{EBO}	–	8	–	pF
Noise Figure at V_{CE} = 5V, I_C = 200 µA, R_S = 2 kΩ, f = 1kHz, B = 200Hz		F	–	2	6	dB
Small Signal Current Gain at V_{CE} = 5V, I_C = 2 mA, f = 1.0 kHz	BCW60A BCW60B BCW60C BCW60D	h_{fe}	– – – –	200 260 330 520		
Turn-on Time at R_L = 990Ω (see fig. 1) V_{CC} = 10V, Ic = 10mA, $I_{B(on)}$ = –$I_{B(off)}$ = 1mA		t_{on}	–	85	150	ns
Turn-off Time at R_L = 990Ω (see fig. 1) V_{CC} = 10V, Ic = 10mA, $I_{B(on)}$ = –$I_{B(off)}$ = 1mA		t_{off}	–	480	800	ns

Fig. 1 - Switching Waveforms