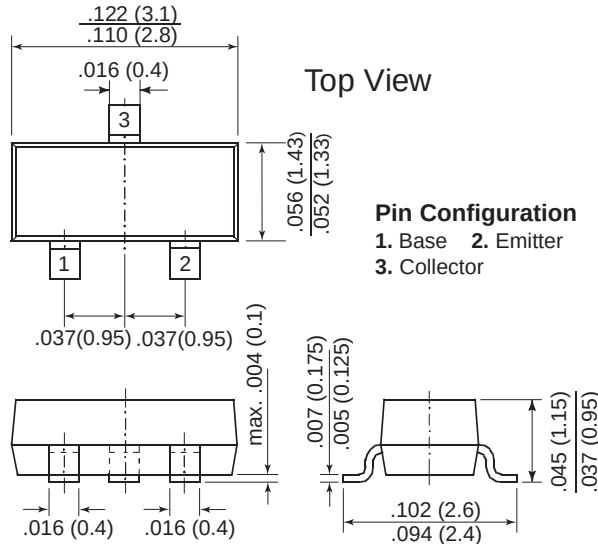




Small Signal Transistors (NPN)

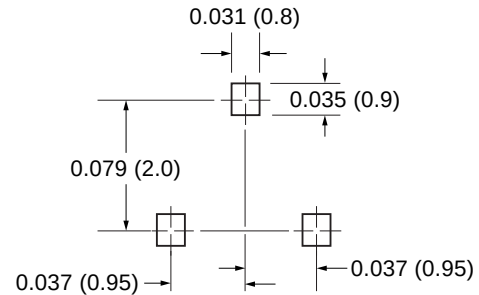


TO-236AB (SOT-23)



Dimensions in inches and (millimeters)

Mounting Pad Layout



Mechanical Data

Case: SOT-23 Plastic Package

Weight: approx. 0.008g

Marking BCW60A = AA

Code: 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

Features

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

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-circuit board.

Electrical Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter		Symbol	Min.	TYP.	Max.	Unit
DC Current Gain						
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60A	h_{FE}	—	—	—	—
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60B	h_{FE}	20	—	—	—
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60C	h_{FE}	40	—	—	—
at $V_{CE} = 5V$, $I_C = 10 \mu A$	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 $V_{CE} = 5V$, $I_C = 10 \mu A$		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 $V_{CE} = 32V$, $V_{BE} = 0V$, $T_A = 150^\circ C$		I_{CES}	—	—	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 $V_{CE} = 5V$, $I_C = 200 \mu A$, $R_S = 2 k\Omega$, $f = 1 kHz$, $B = 200 Hz$		F	—	2	6	dB
Small Signal Current Gain						
at $V_{CE} = 5V$, $I_C = 2 mA$, $f = 1.0 kHz$	BCW60A	h_{fe}	—	200		
	BCW60B	h_{fe}	—	260		
	BCW60C	h_{fe}	—	330		
	BCW60D	h_{fe}	—	520		
Turn-on Time at $R_L = 990\Omega$ (see fig. 1)						
$V_{CC} = 10V$, $I_C = 10 mA$, $I_{B(on)} = -I_{B(off)} = 1 mA$		t_{on}	—	85	150	ns
Turn-off Time at $R_L = 990\Omega$ (see fig. 1)						
$V_{CC} = 10V$, $I_C = 10 mA$, $I_{B(on)} = -I_{B(off)} = 1 mA$		t_{off}	—	480	800	ns

Fig. 1 - Switching Waveforms

