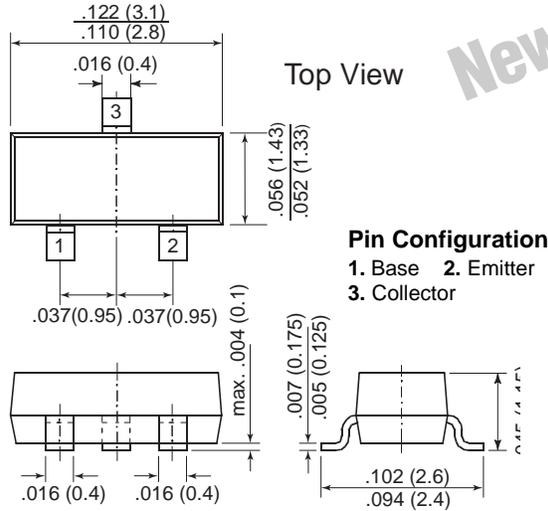
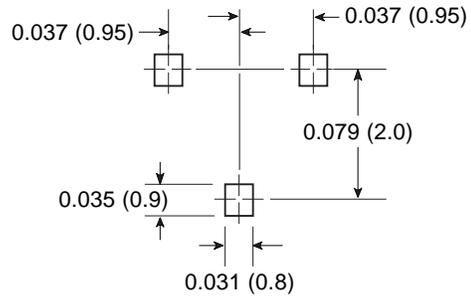



TO-236AB (SOT-23)


Dimensions in inches and (millimeters)

New Product

Mounting Pad Layout


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.

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)

E9/3K per 7" reel (8mm tape)

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

NOTES:

(1) Mounted on FR-4 printed-circuit board.

Small Signal Transistors (NPN)

Electrical Characteristics Ratings at 25°C ambient temperature unless otherwise specified.

	Symbol	Min.	TYP.	Max.	Unit
DC Current Gain					
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60A	hFE	–	–	–
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60B	hFE	20	–	–
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60C	hFE	40	–	–
at $V_{CE} = 5V$, $I_C = 10 \mu A$	BCW60D	hFE	100	–	–
at $V_{CE} = 5V$, $I_C = 2 mA$	BCW60A	hFE	120	–	220
at $V_{CE} = 5V$, $I_C = 2 mA$	BCW60B	hFE	180	–	310
at $V_{CE} = 5V$, $I_C = 2 mA$	BCW60C	hFE	250	–	460
at $V_{CE} = 5V$, $I_C = 2 mA$	BCW60D	hFE	380	–	630
at $V_{CE} = 1V$, $I_C = 50 mA$	BCW60A	hFE	50	–	–
at $V_{CE} = 1V$, $I_C = 50 mA$	BCW60B	hFE	70	–	–
at $V_{CE} = 1V$, $I_C = 50 mA$	BCW60C	hFE	90	–	–
at $V_{CE} = 1V$, $I_C = 50 mA$	BCW60D	hFE	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 $V_{CE} = 32V$, $V_{BE} = 0V$, $T_A = 150^\circ C$		–	–	20	μA
Emitter-Base Cut-off Current					
at $V_{EB} = 4V$, $I_C = 0$	I_{EBO}	–	–	20	nA
Gain-Bandwidth Product					
at $V_{CE} = 5V$, $I_C = 10 mA$, $f = 100 MHz$	fT	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	hfe	–	200	
	BCW60B	hfe	–	260	
	BCW60C	hfe	–	330	
	BCW60D	hfe	–	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

