

SILICON PLANAR EPITAXIAL TRANSISTORS

P-N-P silicon transistors, in a microminiature plastic envelope, intended for low level, low noise, low frequency purpose applications in hybrid circuits.

QUICK REFERENCE DATA

Collector-emitter voltage ($V_{BE} = 0$)	$-V_{CES}$	max.	32 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	32 V
Collector current (d.c.)	$-I_C$	max.	200 mA
Total power dissipation	P_{tot}	max.	250 mW
Junction temperature	T_j	max.	150 °C
Transition frequency at $f = 100$ MHz $-V_{CE} = 5$ V; $-I_C = 10$ mA	f_T	typ.	180 MHz
Noise figure at $f = 1$ kHz $-V_{CE} = 5$ V; $-I_C = 200$ μ A	F	typ.	2 dB

MECHANICAL DATA

Fig. 1 SOT-23.

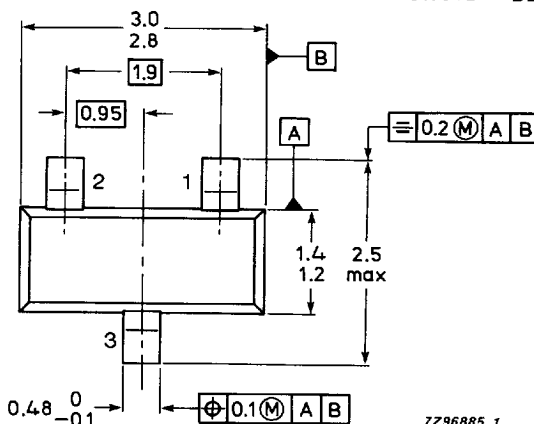
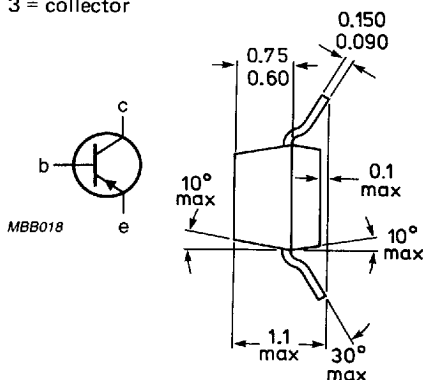
Dimensions in mm

Marking code

BCW61A = BAp
BCW61B = BBp
BCW61C = BCp
BCW61D = BDp

Pinning:

- 1 = base
- 2 = emitter
- 3 = collector



TOP VIEW

See also *Soldering recommendations*.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)	$-V_{CES}$	max.	32 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	32 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5 V
Collector current (d.c.)	$-I_C$	max.	200 mA
Base current	$-I_B$	max.	50 mA
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	250 mW
Storage temperature	T_{stg}		-65 to $+150\text{ }^{\circ}\text{C}$
Junction temperature	T_j	max.	150 $^{\circ}\text{C}$

THERMAL RESISTANCE

From junction to ambient *

$$R_{th\ j-a} = 500\text{ K/W}$$

CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Collector-emitter cut-off current

$$V_{EB} = 0; -V_{CE} = 32\text{ V}$$

$$-I_{CES} < 20\text{ nA}$$

$$V_{EB} = 0; -V_{CE} = 32\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$$

$$-I_{CES} < 20\text{ }\mu\text{A}$$

Emitter-base cut-off current

$$I_C = 0; -V_{EB} = 4\text{ V}$$

$$-I_{EBO} < 20\text{ nA}$$

Saturation voltages

$$-I_C = 10\text{ mA}; -I_B = 0,25\text{ mA}$$

$$-V_{CEsat} \quad 0,06\text{ to }0,25\text{ V}$$

$$-V_{BEsat} \quad 0,6\text{ to }0,85\text{ V}$$

$$-I_C = 50\text{ mA}; -I_B = 1,25\text{ mA}$$

$$-V_{CEsat} \quad 0,12\text{ to }0,55\text{ V}$$

$$-V_{BEsat} \quad 0,68\text{ to }1,05\text{ V}$$

Transition frequency at $f = 100\text{ MHz}$ ▲

$$-V_{CE} = 5\text{ V}; -I_C = 10\text{ mA}$$

$$f_T \quad \text{typ.} \quad 180\text{ MHz}$$

Collector capacitance at $f = 1\text{ MHz}$

$$-V_{CB} = 10\text{ V}; I_E = I_C = 0$$

$$C_C \quad \text{typ.} \quad 4,5\text{ pF}$$

Emitter capacitance at $f = 1\text{ MHz}$

$$-V_{EB} = 0,5\text{ V}; I_C = I_C = 0$$

$$C_e \quad \text{typ.} \quad 11\text{ pF}$$

Noise figure at $R_S = 2\text{ k}\Omega$

$$-V_{CE} = 5\text{ V}; -I_C = 200\text{ }\mu\text{A}; B = 200\text{ Hz}$$

$$F \quad \text{typ.} \quad 2\text{ dB}$$

$$< 6\text{ dB}$$

* Mounted on a ceramic substrate of $8\text{ mm} \times 10\text{ mm} \times 0,7\text{ mm}$.

▲ Measured under pulse conditions.

		BCW61A	61B	61C	61D
D.C. current gain					
$-V_{CE} = 5 \text{ V}; -I_C = 10 \mu\text{A}$	$h_{FE} >$	—	30	40	100
$-V_{CE} = 5 \text{ V}; -I_C = 2 \text{ mA}$	$h_{FE} >$	120	180	250	380
	$h_{FE} <$	220	310	460	630
$-V_{CE} = 1 \text{ V}; -I_C = 50 \text{ mA}$	$h_{FE} >$	60	80	100	110
Input impedance					
$-V_{CE} = 5 \text{ V}; -I_C = 2 \text{ mA}; f = 1 \text{ kHz}$	h_{ie} typ.	2,7	3,6	4,5	7,5 k Ω
Reverse voltage transfer ratio					
$-V_{CE} = 5 \text{ V}; -I_C = 2 \text{ mA}; f = 1 \text{ kHz}$	h_{re} typ.	1,5	2	2	3 10^{-4}
Small-signal current gain					
$-V_{CE} = 5 \text{ V}; -I_C = 2 \text{ mA}; f = 1 \text{ kHz}$	h_{fe} typ.	200	260	330	520
Output admittance					
$-V_{CE} = 5 \text{ V}; -I_C = 2 \text{ mA}; f = 1 \text{ kHz}$	h_{oe} typ.	18	24	30	50 μS
Base-emitter voltage					
$-V_{CE} = 5 \text{ V}; -I_C = 2 \text{ mA}$	V_{BE} typ.	0,6 to 0,75			V
			0,65		V
$-V_{CE} = 5 \text{ V}; -I_C = 10 \mu\text{A}$	V_{BE} typ.		0,55		V
$-V_{CE} = 1 \text{ V}; -I_C = 50 \text{ mA}$	V_{BE} typ.		0,72		V

Switching times

$-I_{Con} = 10 \text{ mA}; -I_{Bon} = I_{Boff} = 1 \text{ mA}$

$-V_{CC} = 10 \text{ V}; R_L = 990 \Omega$

turn-on time ($t_d + t_r$)

t_{on} typ. 85 ns
< 150 ns

turn-off time ($t_s + t_f$)

t_{off} typ. 480 ns
< 800 ns

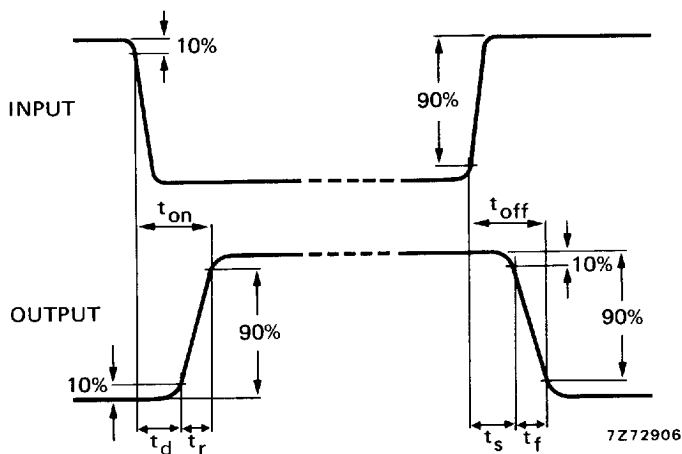


Fig. 2 Switching waveforms.