

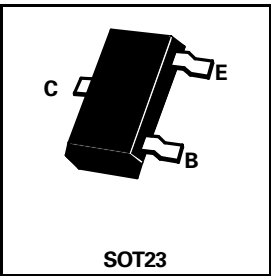
# SOT23 NPN SILICON PLANAR SMALL SIGNAL TRANSISTORS

# BCW60

## ISSUE 2 – AUGUST 1995

### PARTMARKING DETAILS

BCW60A – AA	BCW60AR – CR
BCW60B – AB	BCW60BR – DR
BCW60C – AC	BCW60CR – AR
BCW60D – AD	BCW60DR – BR



### COMPLEMENTARY TYPE

BCW61

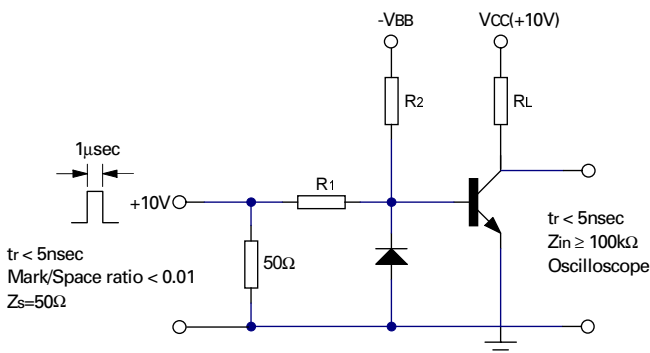
### ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	$V_{CBO}$	32	V
Collector-Emitter Voltage	$V_{CEO}$	32	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Continuous Collector Current	$I_C$	200	mA
Base Current	$I_B$	50	mA
Power Dissipation at $T_{amb}=25^{\circ}C$	$P_{TOT}$	330	mW
Operating and Storage Temperature Range	tj:tstg	-55 to +150	$^{\circ}C$

### FOUR TERMINAL NETWORK DATA ( $I_C=2mA, V_{CE}=5V, f=1kHz$ )

	$h_{FE}$ Group A			$h_{FE}$ Group B			$h_{FE}$ Group C			$h_{FE}$ Group D			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
$h_{11e}$	1.6	2.7	4.5	2.5	3.6	6.0	3.2	4.5	8.5	4.5	7.5	12	$k\Omega$
$h_{12e}$		1.5			2			2			3		$10^{-4}$
$h_{21e}$		200			260			330			520		
$h_{22e}$		18	30		24	50		30	60		50	100	$\mu S$

### SWITCHING CIRCUIT



# BCW60

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	32			V	$I_C = 2\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	$I_{EBO} = 1\mu\text{A}$
Collector-Emitter Cut-off Current	$I_{CES}$			20 20	nA $\mu\text{A}$	$V_{CES} = 32\text{V}$ $V_{CES} = 32\text{V}, T_{amb} = 150^{\circ}\text{C}$
Emitter-Base Cut-Off Current	$I_{EBO}$			20	nA	$V_{EBO} = 4\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		0.12 0.20	0.35 0.55	V V	$I_C = 10\text{mA}, I_B = 0.25\text{mA}$ $I_C = 50\text{mA}, I_B = 1.25\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.60 0.70	0.70 0.83	0.85 1.05	V V	$I_C = 10\text{mA}, I_B = 0.25\text{mA}$ $I_C = 50\text{mA}, I_B = 1.25\text{mA}$
Base - Emitter Voltage	$V_{BE}$	0.55	0.52 0.65 0.78	0.75	V V V	$I_C = 10\mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{mA}, V_{CE} = 5\text{V}$ $I_C = 50\text{mA}, V_{CE} = 1\text{V}$
Static BCW60A Forward Current Ratio BCW60B  BCW60C  BCW60D	$h_{FE}$	120 50	78 170	220		$I_C = 10\mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{mA}, V_{CE} = 5\text{V}$ $I_C = 50\text{mA}, V_{CE} = 1\text{V}$
		20 180 70	145 250	310		$I_C = 10\mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{mA}, V_{CE} = 5\text{V}$ $I_C = 50\text{mA}, V_{CE} = 1\text{V}$
		40 250 90	220 350	460		$I_C = 10\mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{mA}, V_{CE} = 5\text{V}$ $I_C = 50\text{mA}, V_{CE} = 1\text{V}$
		100 380 100	300 500	630		$I_C = 10\mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{mA}, V_{CE} = 5\text{V}$ $I_C = 50\text{mA}, V_{CE} = 1\text{V}$
Transition Frequency	$f_T$	125	250		MHz	$I_C = 10\text{mA}, V_{CE} = 5\text{V}$ $f = 100\text{MHz}$
Emitter-Base Capacitance	$C_{ebo}$		8		pF	$V_{EBO} = 0.5\text{V}, f = 1\text{MHz}$
Collector-Base Capacitance	$C_{cbo}$			4.5	pF	$V_{CBO} = 10\text{V}, f = 1\text{MHz}$
Noise Figure	N		2	6	dB	$I_C = 0.2\text{mA}, V_{CE} = 5\text{V}$ $R_G = 2\text{K}\Omega, f = 1\text{KH}$ $\Delta f = 200\text{Hz}$
Switching times: Delay Time Rise Time Turn-on Time Storage Time Fall Time Turn-Off Time	$t_d$ $t_r$ $t_{on}$ $t_s$ $t_f$ $t_{off}$		35 50 85 400 80 480	150	ns ns ns ns ns ns	$I_{C1} : I_{B1} : I_{B2} = 10 : 1 : 1\text{mA}$ $R_1 = 5\text{K}\Omega, R_2 = 5\text{K}\Omega$ $V_{BB} = 3.6\text{V}, R_L = 990\Omega$

\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  
 Spice parameter data is available upon request for this device

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