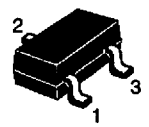
SGS-THOMSON MICROELECTRONICS

BCW60
BCX70

SMALL SIGNAL NPN TRANSISTORS

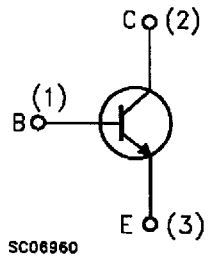
Type	Marking
BCW60A	AA
BCW60B	AB
BCW60C	AC
BCX70G	AG
BCX70H	AH
BCX70J	AJ

- SILICON EPITAXIAL PLANAR NPN TRANSISTORS
- MINIATURE PLASTIC PACKAGE FOR APPLICATION IN SURFACE MOUNTING CIRCUITS
- LOW LEVEL AF AMPLIFICATION AND SWITCHING
- NPN COMPLEMENTS ARE RESPECTIVELY BCW61 AND BCX71



SOT-23

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BCW60	BCX70	
V_{CES}	Collector-Emitter Voltage (V_{BE} = 0)	-32	-45	V
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	-32	-45	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	-5		V
I_C	Collector Current	-0.2		A
I_B	Base Current	-0.05		A
P_{tot}	Total Dissipation at T_c = 25 °C	310		mW
T_{stg}	Storage Temperature	-65 to 150		°C
T_j	Max. Operating Junction Temperature	150		°C

THERMAL DATA

$R_{thj\text{-}amb}$ •	Thermal Resistance Junction-Ambient	Max	450	°C/W
$R_{thj\text{-}SR}$ •	Thermal Resistance Junction-Substrate	Max	320	°C/W

• Mounted on a ceramic substrate area = 0.7 mm x 2.5 cm^2

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current (V_{BE} = 0)	V_{CE} = Rated V_{CES} V_{CE} = Rated V_{CES} T_{amb} = 150 °C			20 20	nA µA
I_{EBO}	Collector Cut-off Current (I_E = 0)	V_{EB} = 4 V			20	nA
$V_{(BR)CEO}$*	Collector-Emitter Breakdown Voltage (I_B = 0)	I_C = 2 mA for **BCW60** for **BCX70**	 32 45			 V V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_C = 0)	I_C = 1 µA	5			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 10 mA I_B = 0.25 mA I_C = 50 mA I_B = 1.25 mA			0.35 0.55	V V
$V_{BE(sat)}$*	Collector-Base Saturation Voltage	I_C = 10 mA I_B = 0.25 mA I_C = 50 mA I_B = 1.25 mA			0.85 1.05	V V
$V_{BE(on)}$	Collector-Base On Voltage	I_C = 2 mA V_{CE} = 5 V	0.55		0.75	V
h_{FE}*	DC Current Gain	I_C = 0.01 mA V_{CE} = 5 V for **group A, G** for **group B, H** for **group C, J** I_C = 2 mA V_{CE} = 5 V for **group A, G** for **group B, H** for **group C, J** I_C = 50 mA V_{CE} = 1 V for **group A, G** for **group B, H** for **group C, J**	 20 40 120 180 250 50 70 90	 80 145 220	 220 310 460	
f_T	Transition Frequency	I_C = 10 mA V_{CE} = 5V f = 100 MHz	125			MHz
C_{CB}	Collector Base Capacitance	I_E = 0 V_{CB} = 10 V f = 1 MHz			4.5	pF
C_{EB}	Emitter Base Capacitance	I_C = 0 V_{CE} = 0.5 V f = 1 MHz		8		pF
NF	Noise Figure	V_{CE} = 5 V I_C = 0.2 mA f = 1KHz Δf = 200 Hz R_G = 2 KΩ		2	6	dB
h_{ie}	Input Impedance	V_{CE} = 5 V I_C = 2 mA f = 1KHz for **group A, G** for **group B, H** for **group C, J**	 1.6 2.5 3.2	 2.7 3.6 4.5	 4.5 6 8.5	 KΩ KΩ KΩ
h_{re}	Reverse Voltage Ratio	V_{CE} = 5 V I_C = 2 mA f = 1KHz for **group A, G** for **group B, H** for **group C, J**		 1.5 2 2		 10^{-4} 10^{-4} 10^{-4}

* Pulsed: Pulse duration = 300 µs, duty cycle ≤ 2 %

ELECTRICAL CHARACTERISTICS (Continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
h_{fe}	Small Signal Current Gain	V_{CE} = 5 V I_C = 2 mA f = 1KHz				
		for **group A, G**		200		
		for **group B, H**		260		
		for **group C, J**		330		
h_{oe}	Output Admittance	V_{CE} = 5 V I_C = 2 mA f = 1KHz				
		for **group A, G**		18	30	µs
		for **group B, H**		24	50	µs
		for **group C, J**		30	60	µs
t_d	Delay Time	I_C = 10 mA $I_{B1} = I_{B2}$ = 1mA		35		ns
t_r	Rise Time	V_{BB} = 3.6 V $R_1 = R_2$ = 5 KΩ		50		ns
t_{on}	Switching On Time	R_L = 990 Ω		85	150	ns
t_s	Storage Time			400		ns
t_f	Fall Time			80		ns
t_{off}	Switching Off Time			480	800	ns

* Pulsed: Pulse duration = 300 µs, duty cycle ≤ 2 %

SOT-23 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.85		1.1	33.4		43.3
B	0.65		0.95	25.6		37.4
C	1.20		1.4	47.2		55.1
D	2.80		3	110.2		118
E	0.95		1.05	37.4		41.3
F	1.9		2.05	74.8		80.7
G	2.1		2.5	82.6		98.4
H	0.38		0.48	14.9		18.8
L	0.3		0.6	11.8		23.6
M	0		0.1	0		3.9
N	0.3		0.65	11.8		25.6
O	0.09		0.17	3.5		6.7