

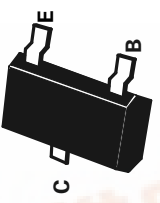


# BCX70

# SOT23 NPN SILICON PLANAR SMALL SIGNAL TRANSISTOR

ISSUE 2 - FEBRUARY 95

# BCX70



PARTMARKING DETAIL -  
 BCX70G - AG  
 BCX70H - AH  
 BCX70J - AJ  
 BCX70K - AK  
 BCX70GR - AW  
 BCX70HR - 9P  
 BCX70JR - AX  
 BCX70KR - P9  
 BCX71

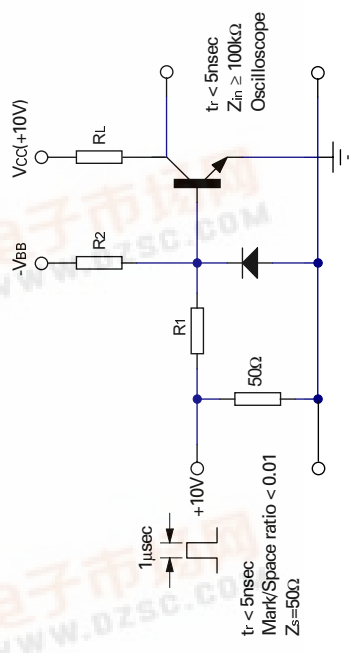
## COMPLEMENTARY TYPE - BCX71 ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Emitter Voltage	$V_{CES}$	45	V
Collector-Emitter Voltage	$V_{CEO}$	45	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:stg	-55 to +150	$^{\circ}C$

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

	$h_{FE}$ Group G		$h_{FE}$ Group H		$h_{FE}$ Group J		$h_{FE}$ Group K		
	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Max.	
$h_{11e}$	1.6	2.7	4.5	2.5	3.6	6.0	4.5	8.5	12
$h_{12e}$		1.5		2		2		3	$10^{-4}$
$h_{21e}$		200		260		330		520	
$h_{22e}$		18		30		50		60	100

## SWITCHING CIRCUIT



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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	45			V	$I_C=2mA$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	$I_{EBO}=1\mu A$
Collector-Emitter Cut-off Current	$I_{CES}$		20	20	nA	$V_{CES}=45V, V_{CES}=45V, T_{amb}=150^{\circ}C$
Emitter-Base Cut-Off Current	$I_{EBO}$		20	20	nA	$V_{EBO}=4V$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	0.12	0.20	0.35	V	$I_C=10mA, I_B=0.25mA, I_C=50mA, I_B=1.25mA$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.60	0.70	0.85	V	$I_C=10mA, I_B=0.25mA, I_C=50mA, I_B=1.25mA$
Base - Emitter Voltage	$V_{BE}$	0.55	0.52	0.65	V	$I_C=10\mu A, V_{CE}=5V, I_C=2mA, V_{CE}=5V, I_C=50mA, V_{CE}=1V$
Static Forward Current Transfer Ratio	$h_{FE}$	120	78	220		$I_C=10\mu A, V_{CE}=5V, I_C=2mA, V_{CE}=5V, I_C=50mA, V_{CE}=1V$
		50	170			
$h_{FE}$	20	145	310			$I_C=10\mu A, V_{CE}=5V, I_C=2mA, V_{CE}=5V, I_C=50mA, V_{CE}=1V$
	180	250				
$h_{FE}$	70	220	460			$I_C=10\mu A, V_{CE}=5V, I_C=2mA, V_{CE}=5V, I_C=50mA, V_{CE}=1V$
	40	350				
$h_{FE}$	100	300	630			$I_C=10\mu A, V_{CE}=5V, I_C=2mA, V_{CE}=5V, I_C=50mA, V_{CE}=1V$
	380	500				
Transition Frequency	$f_T$	125	250		MHz	$I_C=10mA, V_{CE}=5V, f=100MHz$
Emitter-Base Capacitance	$C_{ebo}$		8		pF	$V_{EBO}=0.5V, f=1MHz$
Collector-Base Capacitance	$C_{cbo}$		4.5		pF	$V_{CBO}=10V, f=1MHz$
Noise Figure	N		2	6	dB	$I_C=0.2mA, V_{CE}=5V, R_G=2K\Omega, f=1KH, \Delta f=200Hz$
Switching times:	Delay Time Rise Time Turn-on Time Storage Time Fall Time Turn-Off Time	$t_d$	35		ns	$I_C=10mA, I_B=10:1, I_C=1mA, R_1=5K\Omega, R_2=5K\Omega, V_{BB}=3.6V, R_L=990\Omega$
		$t_r$	50		ns	
		$t_{on}$	85	150	ns	
		$t_s$	400		ns	
		$t_f$	80		ns	
		$t_{off}$	480	800	ns	

Measured under pulsed conditions. Pulse width=300μs. Duty cycle parameter data is available upon request for this device

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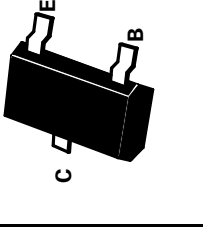
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	45			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	$V_{CES} = 45\text{V}$
		20		20	$\mu\text{A}$	$V_{CES} = 45\text{V}$ , $T_{amb} = 150^{\circ}\text{C}$
Emitter-Base Cut-Off Current	$I_{EBO}$			20	nA	$V_{EBO} = 4\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	0.12		0.35	V	$I_C = 10\text{mA}$ , $I_B = 0.25\text{mA}$
		0.20		0.55	V	$I_C = 50\text{mA}$ , $I_B = 1.25\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	0.60		0.85	V	$I_C = 10\text{mA}$ , $I_B = 0.25\text{mA}$
		0.70		1.05	V	$I_C = 50\text{mA}$ , $I_B = 1.25\text{mA}$
Base - Emitter Voltage	$V_{BE}$	0.52		0.75	V	$I_C = 10\mu\text{A}$ , $V_{CE} = 5\text{V}$
		0.65		0.75	V	$I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$
		0.78		0.78	V	$I_C = 50\text{mA}$ , $V_{CE} = 1\text{V}$
Static Forward Current Transfer Ratio	$h_{FE}$	78		220		$I_C = 10\mu\text{A}$ , $V_{CE} = 5\text{V}$
		120		170		$I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$
BCX70G	$h_{FE}$	50		220		$I_C = 50\text{mA}$ , $V_{CE} = 1\text{V}$
		20		145		$I_C = 10\mu\text{A}$ , $V_{CE} = 5\text{V}$
BCX70H	$h_{FE}$	180		250		$I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$
		70		310		$I_C = 50\text{mA}$ , $V_{CE} = 1\text{V}$
BCX70J	$h_{FE}$	40		220		$I_C = 10\mu\text{A}$ , $V_{CE} = 5\text{V}$
		250		350		$I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$
BCX70K	$h_{FE}$	90		460		$I_C = 50\text{mA}$ , $V_{CE} = 1\text{V}$
		100		300		$I_C = 10\mu\text{A}$ , $V_{CE} = 5\text{V}$
BCX70L	$h_{FE}$	380		500		$I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$
		100		630		$I_C = 50\text{mA}$ , $V_{CE} = 1\text{V}$
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		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:	$t_d$	35			ns	$I_C, I_B, I_{B2} = 10:1:1\text{mA}$ , $R_1 = 5\text{K}\Omega$ , $R_2 = 5\text{K}\Omega$ , $V_{BB} = 3.6\text{V}$ , $R_L = 990\Omega$
		50			ns	
		85		150	ns	
		400			ns	
		80			ns	
		480		800	ns	

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

## PARTMARKING DETAIL -

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## COMPLEMENTARY TYPE - BCX71

## ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Emitter Voltage	$V_{CES}$	45	V
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Emitter-Base Voltage	$V_{EBO}$	5	V
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Base Current	$I_B$	50	mA
Power Dissipation at $T_{amb} = 25^{\circ}\text{C}$	$P_{TOT}$	330	mW
Operating and Storage Temperature Range	$t_{jstg}$	-55 to +150	$^{\circ}\text{C}$

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

	$h_{FE}$ Group G			$h_{FE}$ Group H			$h_{FE}$ Group J			$h_{FE}$ Group K		
	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
$h_{12e}$		1.5			2			2			3	$10^{-4}$
$h_{21e}$		200			260			330			520	
$h_{22e}$		18	30		24	50		30	60		50	100

## SWITCHING CIRCUIT

