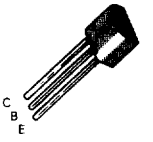
NPN Silicon Planar Medium Power Darlington Transistors

BCX38A
BCX38B
BCX38C

FEATURES

- 1.5W power dissipation
- 0.8A continuous collector current
- h_{FE} up to 10,000 at $I_C = 500mA$
- Fast switching



Plastic E-Line
(TO-92 Compatible)

DESCRIPTION

The BCX38 series of silicon planar Darlington transistors is designed for medium power applications requiring very high current gain and high input impedance. The monolithic construction has the inherent advantages of fast switching times, low saturation voltages and low leakage currents. Application areas include: driver and output stages of audio amplifiers; direct interfacing with integrated circuits; lamp, relay and hammer driving.

The E-line package is formed by transfer moulding a silicone plastic specially selected to provide a rugged one-piece encapsulation resistant to severe environments and allow the high junction temperature operation normally associated with metal can devices.

E-line encapsulated devices are approved for use in military, industrial and professional equipments.

Alternative lead configurations are available as plug-in replacements to TO-5/39 and TO-18 metal can types, and for surface mounting.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage (Note 1)	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	10	V
Peak Pulse Current	I_{CM}	2	A
Continuous Collector Current	I_C	800	mA
Practical Power Dissipation (Note 2)	P_{totp}	1.5	W
Power Dissipation at $T_{amb} = 25°C$ at $T_{case} = 25°C$	P_{tot}	1 2	W W
Operating and Storage Temperature Range (Note 1)		−55 to +200	°C

Note 1: The maximum values of V_{CEO} and Power Dissipation are dependent on operating temperature. See Voltage Derating Graph (Fig. 1) for maximum power dissipation and operating temperature in a given application.

Note 2: The power which can be dissipated assuming device mounted in typical manner on PCB with copper equal to 1 sq. inch minimum.

BCX38A, BCX38B, BCX38C

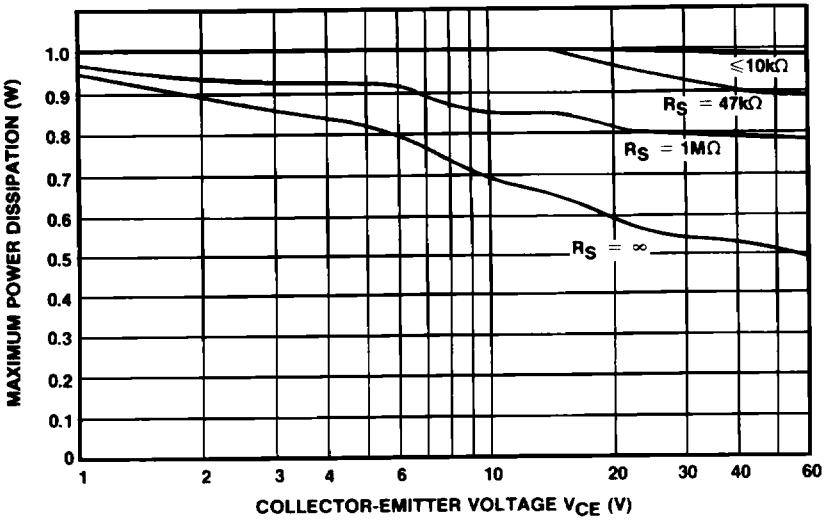
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25°C$).

Parameter	Symbol	Min.	Max.	Unit	Test Conditions
Collector-base breakdown voltage	$V_{(BR)CBO}$	80	–	V	$I_C = 10\mu A$, $I_E = 0$
Collector-emitter sustaining voltage	$V_{CEO(sus)}$	60	–	V	$I_C = 10mA$, $I_B = 0$
Emitter-base breakdown voltage	$V_{(BR)EBO}$	10	–	V	$I_E = 10\mu A$, $I_C = 0$
Collector-base cut-off current	I_{CBO}	–	100	nA	$V_{CB} = 60V$, $I_E = 0$
Emitter-base cut-off current	I_{EBO}	–	100	nA	$V_{EB} = 8V$, $I_C = 0$
Static forward current transfer ratio	h_{FE}				
BCX38A		500	–	–	$I_C = 100mA$, $V_{CE} = 5V$*
		1000	–	–	$I_C = 500mA$, $V_{CE} = 5V$*
BCX38B		2000	–	–	$I_C = 100mA$, $V_{CE} = 5V$*
		4000	–	–	$I_C = 500mA$, $V_{CE} = 5V$*
BCX38C		5000	–	–	$I_C = 100mA$, $V_{CE} = 5V$*
		10000	–	–	$I_C = 500mA$, $V_{CE} = 5V$*
Collector-emitter saturation voltage	$V_{CE(sat)}$	–	1.25	V	$I_C = 800mA$, $I_B = 8mA$*
Base-emitter on voltage	$V_{BE(on)}$	–	1.8	V	$I_C = 800mA$, $V_{CE} = 5V$*

*Measured under pulsed conditions. Pulse width $= 300\mu s$. Duty cycle $\leqslant 2\%$.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max. Value	Unit
Thermal Resistance: Junction to Ambient	$R_{th(j\text{-}amb)}$	175.0	°C/W
Junction to Case	$R_{th(j\text{-}case)}$	87.5	°C/W



Voltage derating graph

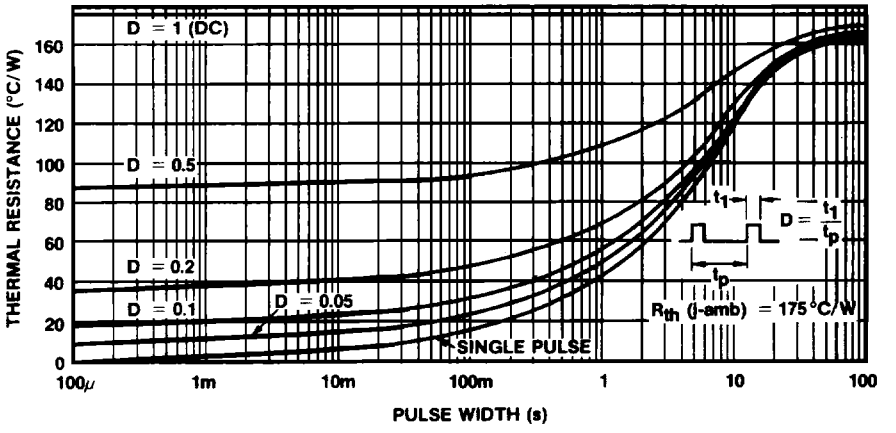
The maximum permissible operational temperature can be obtained from Fig. 1 using the equation:

$$T_{amb(max)} = \frac{\text{Power (max)} - \text{Power (actual)}}{0.0057} + 25°C$$

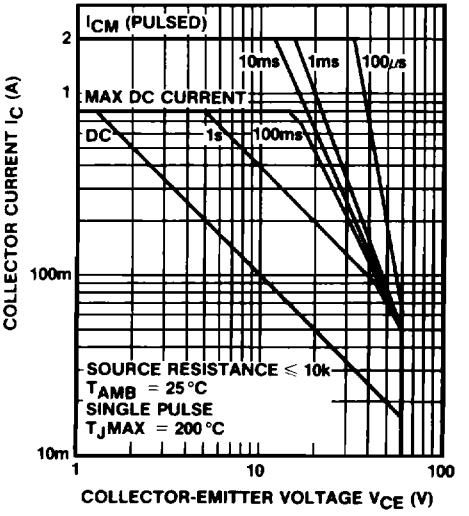
$T_{amb(max)}$ = Maximum operating ambient temperature.

Power (max) = Maximum power dissipation figure, obtained from Fig. 1 for a given V_{CE} and source resistance (R_S).

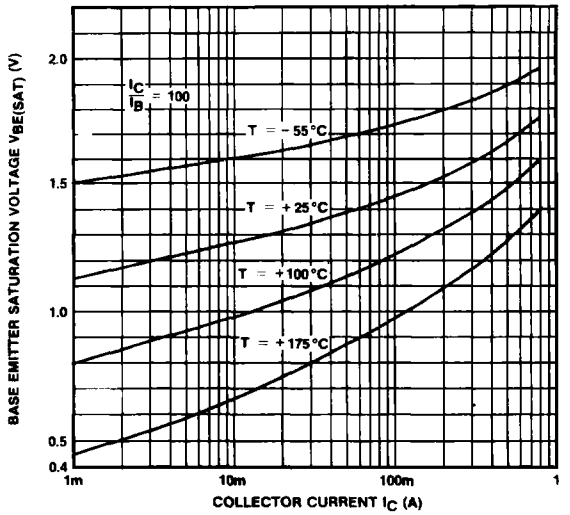
Power (actual) = Actual power dissipation in users circuit.



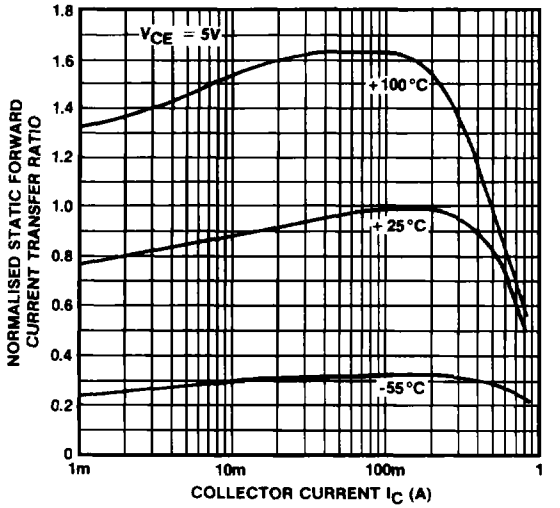
Maximum transient thermal impedance curves



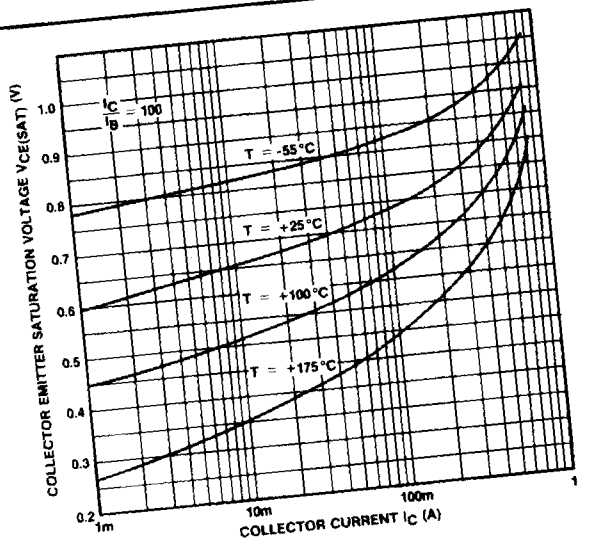
Safe operating area at T_{amb} = 25°C (single pulse)



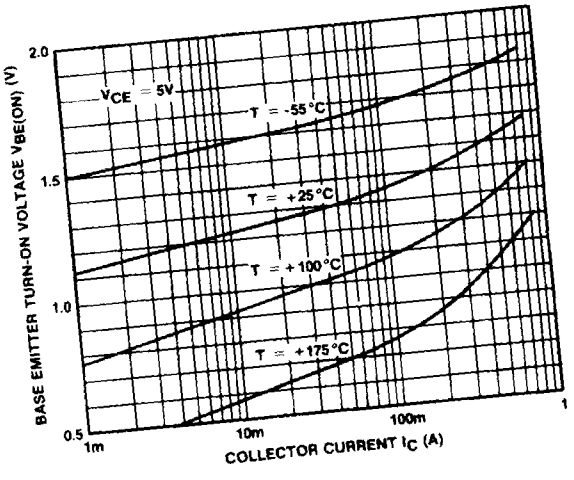
Typical base-emitter saturation voltages plotted against collector current



Typical static forward current transfer ratio plotted against collector current



Typical collector-emitter saturation voltages plotted against collector current



Typical base-emitter turn-on voltages plotted against collector current