

PNP SILICON HIGH-POWER TRANSISTORS

General Purpose use in amplifier and switching applications.

FEATURES:

- *DC Current Gain Specified- 1.0 to 30 A
- * Low Collector-Emitter Saturation Voltage -
 $V_{CE(sat)} = 0.75 \text{ V (Max.) @ } I_C = 10 \text{ A - 2N4398, 2N4399}$
 $V_{CE(sat)} = 1.0 \text{ V (Max.) @ } I_C = 10 \text{ A - 2N5745}$
- * Complements to NPN 2N5301,2N5302,2N5303

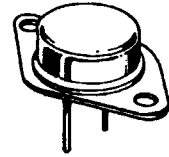
Boca Semiconducotor Corp.
BSC

PNP
2N4398
2N4399
2N5745

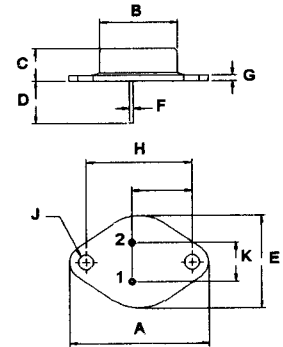
20, 30 AMPERE
PNP SILICON
POWER TRANSISTORS
40-80 Volts
200 Watts

MAXIMUM RATINGS

Characteristic	Symbol	2N4398	2N4399	2N5745	Unit
Collector-Emitter Voltage	V_{CBO}	40	60	80	V
Collector-Emitter Voltage	V_{CEO}	40	60	80	V
Emitter-Base Voltage	V_{EB}	5.0			V
Collector Current-Continuous -Peak	I_C	30 50	30 50	20 50	A
Base current - Continuous - Peak	I_B	7.5 15			A
Total Power Dissipation @ $T_c=25^\circ\text{C}$ Derate above 25°C	P_D	200 1.15			W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_{J, T_{STG}}$	- 65 to +200			$^\circ\text{C}$



TO-3



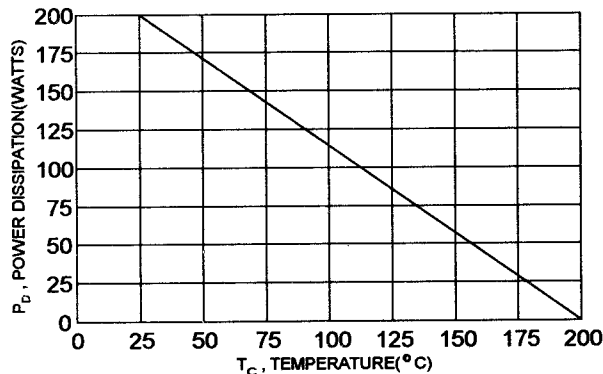
PIN 1.BASE
2.EMITTER
COLLECTOR(CASE)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	0.875	$^\circ\text{C/W}$

DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

FIGURE -1 POWER DERATING



ELECTRICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector - Emitter Sustaining Voltage (1) ($I_c = 200 \text{ mA}$, $I_B = 0$)	2N4398 2N4399 2N5745	$V_{CEO(sus)}$	40 60 80	V
Collector Cutoff Current ($V_{CE} = 40 \text{ V}$, $I_B = 0$) ($V_{CE} = 60 \text{ V}$, $I_B = 0$) ($V_{CE} = 80 \text{ V}$, $I_B = 0$)	2N4398 2N4399 2N5745	I_{CEO}	5.0 5.0 5.0	mA
Collector Cutoff Current ($V_{CE} = 40 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 60 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 80 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 30 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$, $T_c = 150^\circ\text{C}$) ($V_{CE} = 80 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$, $T_c = 150^\circ\text{C}$)	2N4398 2N4399 2N5745 2N4398, 2N4399 2N5745	I_{CEX}	5.0 5.0 5.0 10 10	mA mA
Emitter Cutoff Current ($V_{EB} = 5.0 \text{ V}$, $I_c = 0$)	All Types	I_{EBO}	5.0	mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_c = 1.0 \text{ A}$, $V_{CE} = 2.0 \text{ V}$) ($I_c = 10 \text{ A}$, $V_{CE} = 2.0 \text{ V}$) ($I_c = 15 \text{ A}$, $V_{CE} = 2.0 \text{ V}$) ($I_c = 20 \text{ A}$, $V_{CE} = 2.0 \text{ V}$) ($I_c = 30 \text{ A}$, $V_{CE} = 4.0 \text{ V}$)	All Types 2N5745 2N4398, 2N4399 2N5745 2N4398, 2N4399	h_{FE}	40 15 15 5.0 5.0	60 60
Collector-Emitter Saturation Voltage ($I_c = 10 \text{ A}$, $I_B = 1.0 \text{ A}$) ($I_c = 15 \text{ A}$, $I_B = 1.5 \text{ A}$) ($I_c = 20 \text{ A}$, $I_B = 2.0 \text{ A}$) ($I_c = 20 \text{ A}$, $I_B = 4.0 \text{ A}$) ($I_c = 30 \text{ A}$, $I_B = 6.0 \text{ A}$)	2N4398, 2N4399 2N5745 2N4398, 2N4399 2N5745 2N4398, 2N4399 2N5745 2N4398, 2N4399	$V_{CE(sat)}$	0.75 1.0 1.0 1.5 2.0 2.0 4.0	V
Base-Emitter Saturation Voltage ($I_c = 10 \text{ A}$, $I_B = 1.0 \text{ A}$) ($I_c = 15 \text{ A}$, $I_B = 1.5 \text{ A}$) ($I_c = 20 \text{ A}$, $I_B = 2.0 \text{ A}$) ($I_c = 20 \text{ A}$, $I_B = 4.0 \text{ A}$)	2N4398, 2N4399 2N5745 2N4398, 2N4399 2N5745 2N4398, 2N4399 2N5745	$V_{BE(sat)}$	1.6 1.7 1.85 2.0 2.5 2.5	V
Base-Emitter On Voltage ($I_c = 10 \text{ A}$, $V_{CE} = 2.0 \text{ V}$) ($I_c = 15 \text{ A}$, $V_{CE} = 2.0 \text{ V}$) ($I_c = 20 \text{ A}$, $V_{CE} = 4.0 \text{ V}$) ($I_c = 30 \text{ A}$, $V_{CE} = 4.0 \text{ V}$)	2N5745 2N4398, 2N4399 2N5745 2N4398, 2N4399	$V_{BE(on)}$	1.5 1.7 2.5 3.0	V

(1) Pulse Test: Pulse width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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DYNAMIC CHARACTERISTICS

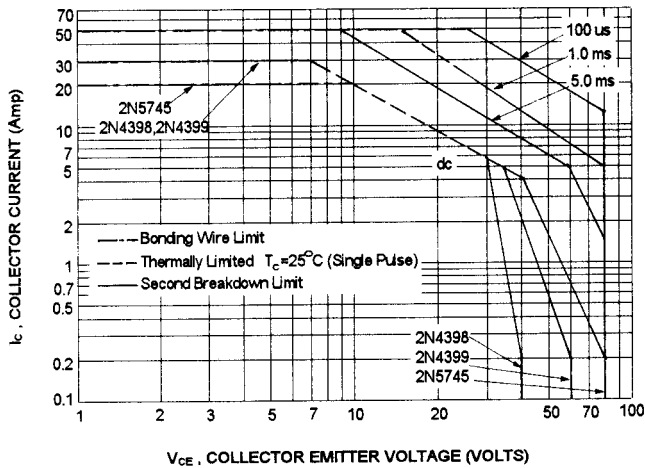
Current-Gain-Bandwidth Product (2) ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ MHz}$)	2N4398, 2N4399 2N5745	f_T	4.0 2.0	MHz
Small-Signal Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ KHz}$)		h_{fe}	40	

SWITCHING CHARACTERISTICS

Rise Time	$V_{CC} = 30\text{ V}$ $I_C = 10.0\text{ A}$ $I_{B1} = I_{B2} = 1.0\text{ A}$ $t_p = 0.1\text{ ms}$ Duty Cycle $\leq 2.0\%$	2N4398, 2N4399 2N5745	t_r	0.4 1.0	us
Storage Time		2N4398, 2N4399 2N5745	t_s	1.5 2.0	us
Fall Time		2N4398, 2N4399 2N5745	t_f	0.6 1.0	us

- (1) Pulse Test: Pulse width = 300 us , Duty Cycle $\leq 2.0\%$
- (2) $f_T = |h_{fe}| \cdot f_{test}$

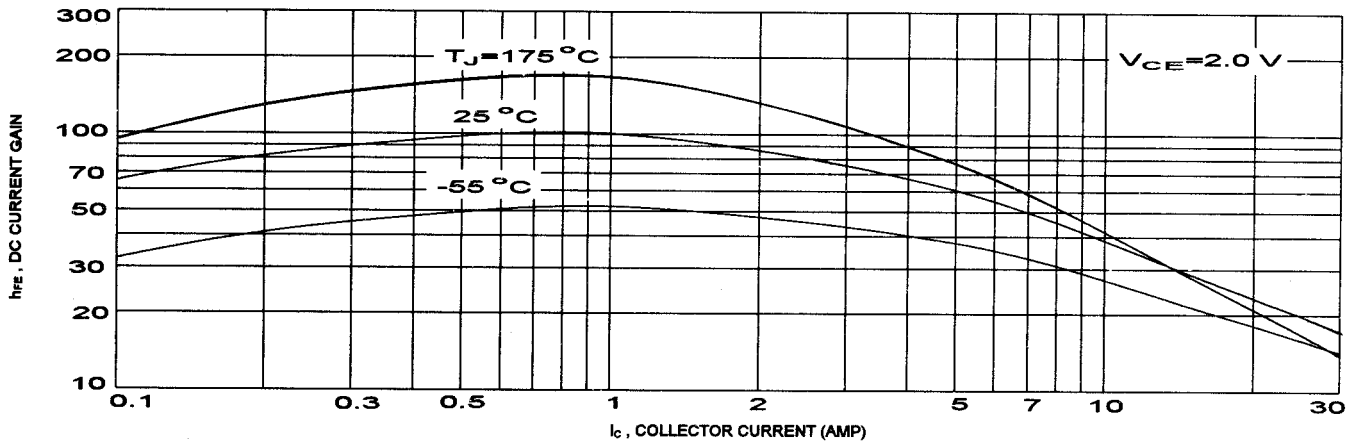
ACTIVE REGION SAFE OPERATING AREA (SOA)



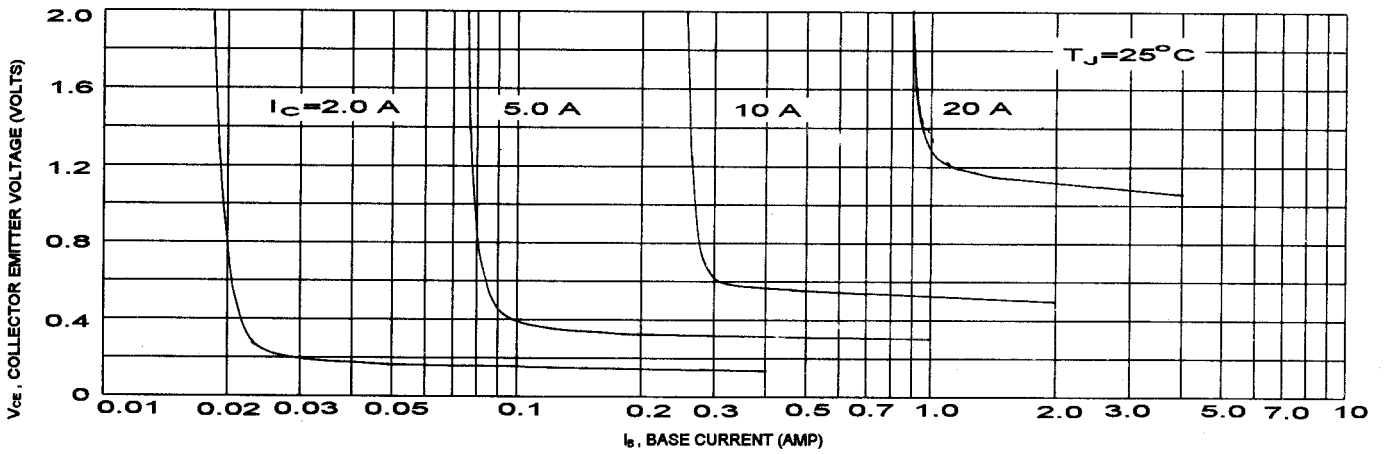
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data of SOA curve is base on $T_{J(PK)} = 200^\circ\text{C}$; T_C is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)} < 200^\circ\text{C}$. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

DC CURRENT GAIN



COLLECTOR SATURATION REGION



"ON" VOLTAGES

