

## 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

### MAXIMUM RATINGS

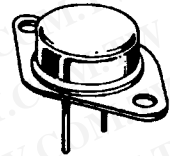
Characteristic	Symbol	2N4398	2N4399	2N5745	Unit
Collector-Emitter Voltage	$V_{CBO}$	40	60	80	V
Collector-Emitter Voltage	$V_{CEO}$	40	60	80	V
Emitter-Base Voltage	$V_{EB}$	5.0			V
Collector Current-Continuous -Peak	$I_c$	30 50	30 50	20 50	A
Base current - Continuous - Peak	$I_B$	7.5 15			A
Total Power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

### THERMAL CHARACTERISTICS

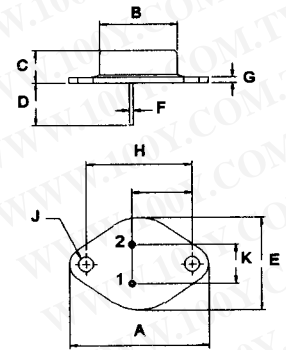
Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	0.875	$^\circ\text{C/W}$

**PNP**  
**2N4398**  
**2N4399**  
**2N5745**

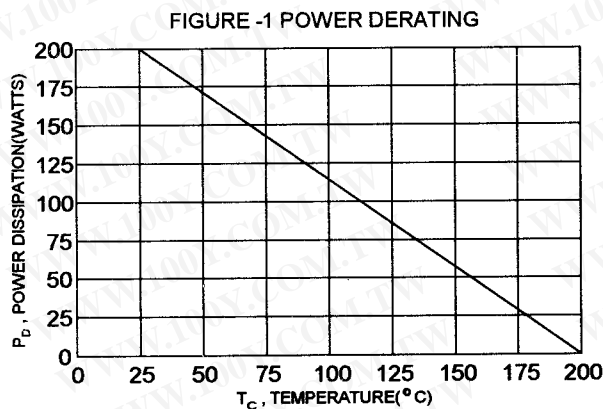
**20, 30 AMPERE**  
**PNP SILICON**  
**POWER TRANSISTORS**  
 40-80 Volts  
 200 Watts



**TO-3**



PIN 1.BASE  
 2.EMITTER  
 COLLECTOR(CASE)



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

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

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

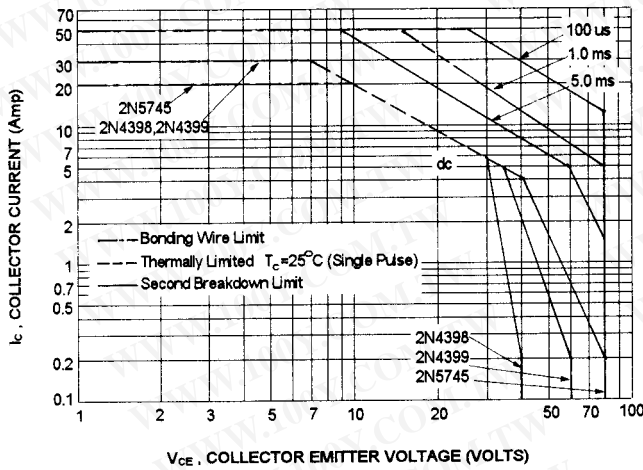
Current-Gain-Bandwidth Product (2) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )	2N4398, 2N4399 2N5745	$f_T$	4.0 2.0	MHz
Small-Signal Current Gain ( $I_C = 1.0\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ KHz}$ )		$h_{fe}$	40	

SWITCHING CHARACTERISTICS

Rise Time	$V_{CC} = 30\text{ V}$ $I_C = 10.0\text{ A}$	2N4398, 2N4399 2N5745	$t_r$	0.4 1.0	us
Storage Time	$I_{B1} = I_{B2} = 1.0\text{ A}$ $t_p = 0.1\text{ ms}$ Duty Cycle $\leq 2.0\%$	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)  $f_T = |h_{fe}| \cdot f_{\text{test}}$

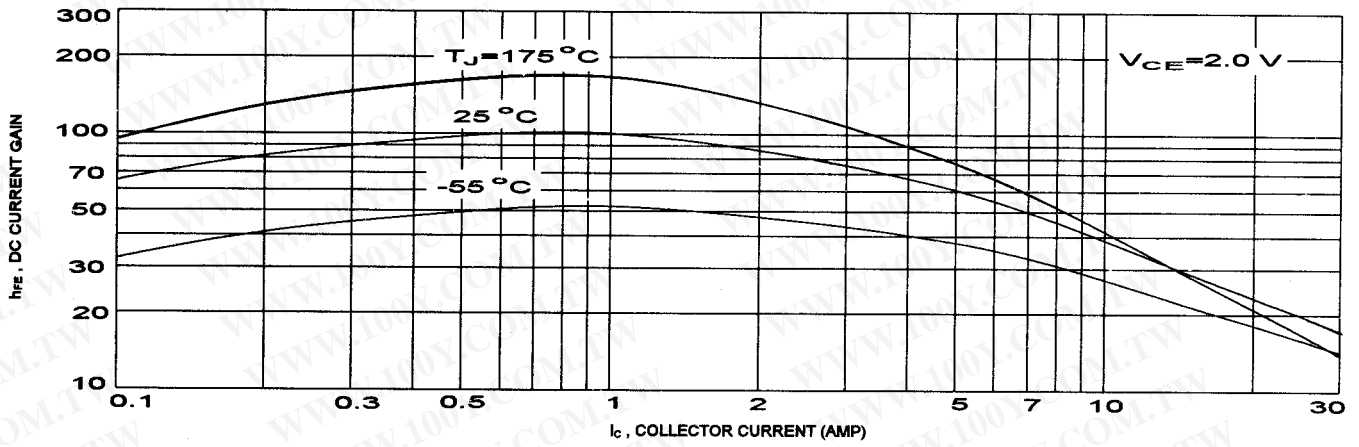
ACTIVE REGION SAFE OPERATING AREA (SOA)



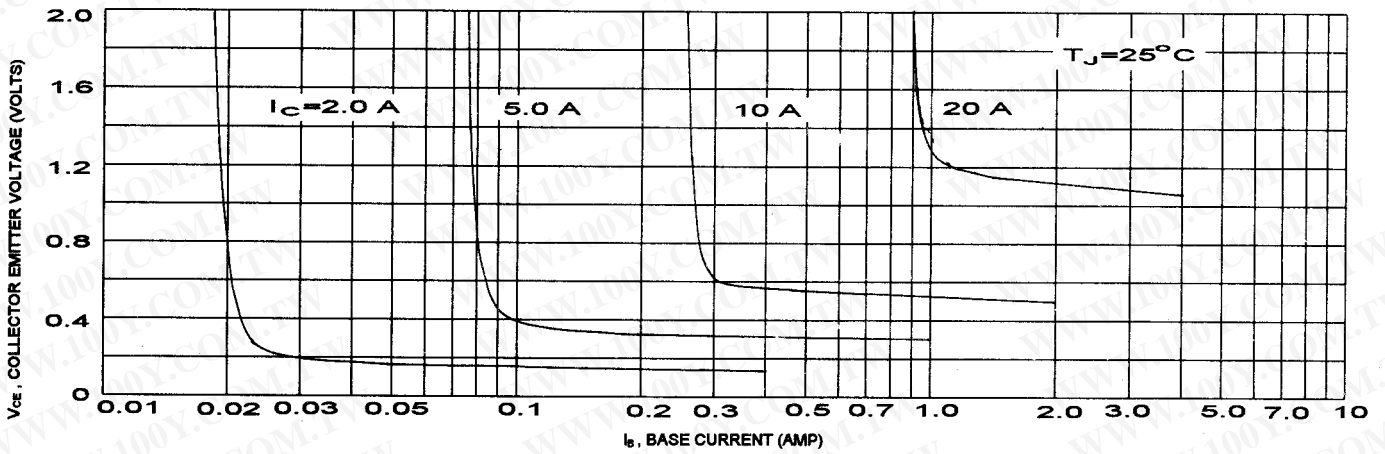
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater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

