

# HIGH POWER NPN SILICON POWER TRANSISTORS

General-purpose linear amplifiers, series pass regulators and inductive switching Applications.

Boca Semiconductor Corp.

BSC

**FEATURES:**

\* Low Collector-Emitter Saturation Voltage-

$$V_{CE(SAT)} = 4.0 \text{ V (Max.) @ } I_C = 30 \text{ A, } I_B = 6.0 \text{ A -- 2N3771}$$

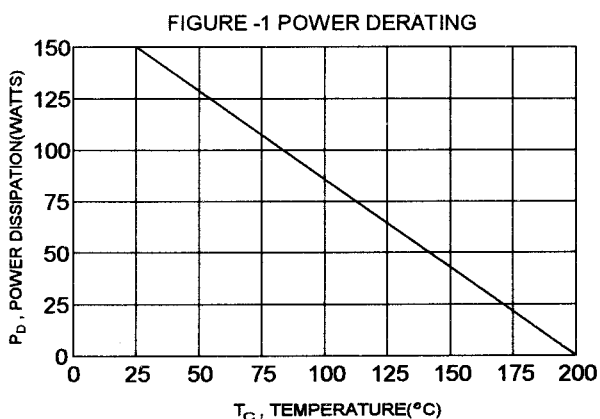
$$V_{CE(SAT)} = 4.0 \text{ V (Max.) @ } I_C = 20 \text{ A, } I_B = 4.0 \text{ A -- 2N3772}$$

**MAXIMUM RATINGS**

Characteristic	Symbol	2N3771	2N3772	Unit
Collector-Emitter Voltage	$V_{CEO}$	40	60	V
Collector-Emitter Voltage	$V_{CEX}$	50	80	V
Collector-Base Voltage	$V_{CBO}$	50	100	V
Emitter-Base Voltage	$V_{EBO}$	5	7	V
Collector Current-Continuous -Peak	$I_C$ $I_{CM}$	30 30	20 3C	A
Base Current-Continuous -Peak	$I_B$ $I_{BM}$	7.5 15	5.0 15	A
Total Power Dissipation @ $T_C=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	150 0.857		W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	- 65 to +200		$^\circ\text{C}$

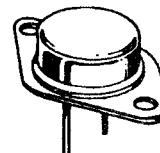
**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.17	$^\circ\text{C/W}$

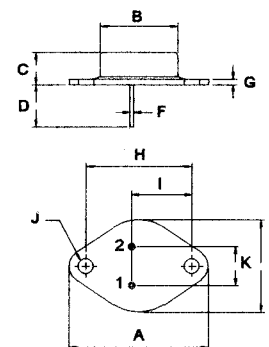


**NPN**  
**2N3771**  
**2N3772**

**20 AND 30 AMPE**  
**NPN SILICON**  
**POWER TRANSISTORS**  
**40 and 60 VOLTS**  
**150 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
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**OFF CHARACTERISTICS**

Collector - Emitter Sustaining Voltage (1) ( $I_c = 200 \text{ mA}$ , $I_B = 0$ )	2N3771 2N3772	$V_{CE(SUS)}$	40 60	V
Collector - Emitter Sustaining Voltage ( $I_c = 0.2 \text{ A}$ , $V_{BE(off)} = 1.5 \text{ V}$ , $R_{BE} = 100 \text{ Ohms}$ )	2N3771 2N3772	$V_{CEX(SUS)}$	50 80	V
Collector Cutoff Current ( $V_{CE} = 30 \text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 50 \text{ V}$ , $I_B = 0$ )	2N3771 2N3772	$I_{CEO}$	10 10	mA
Collector Cutoff Current ( $V_{CE} = 50 \text{ V}$ , $V_{BE(off)} = 1.5 \text{ V}$ ) ( $V_{CE} = 100 \text{ V}$ , $V_{BE(off)} = 1.5 \text{ V}$ )	2N3771 2N3772	$I_{CEV}$	2.0 5.0	mA
Collector Cutoff Current ( $V_{CE} = 50 \text{ V}$ , $I_E = 0$ ) ( $V_{CE} = 100 \text{ V}$ , $I_E = 0$ )	2N3771 2N3772	$I_{CBO}$	2.0 5.0	mA
Emitter Cutoff Current ( $V_{EB} = 5.0 \text{ V}$ , $I_c = 0$ ) ( $V_{EB} = 7.0 \text{ V}$ , $I_c = 0$ )	2N3771 2N3772	$I_{EBO}$	5.0 5.0	mA

**ON CHARACTERISTICS (1)**

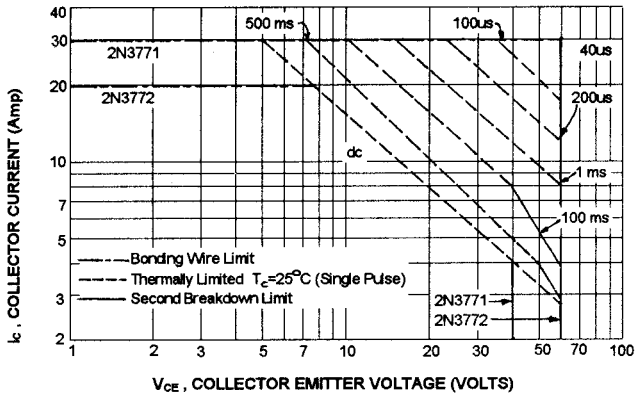
DC Current Gain ( $I_c = 15 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ ) ( $I_c = 10 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ ) ( $I_c = 30 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ ) ( $I_c = 20 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ )	2N3771 2N3772 2N3771 2N3772	hFE	15 15 5.0 5.0	60 60
Collector - Emitter Saturation Voltage ( $I_c = 15 \text{ A}$ , $I_B = 1.5 \text{ A}$ ) ( $I_c = 10 \text{ A}$ , $I_B = 1.0 \text{ A}$ ) ( $I_c = 30 \text{ A}$ , $I_B = 6.0 \text{ A}$ ) ( $I_c = 20 \text{ A}$ , $I_B = 4.0 \text{ A}$ )	2N3771 2N3772 2N3771 2N3772	$V_{CE(sat)}$		2.0 1.4 4.0 4.0
Base - Emitter On Voltage ( $I_c = 15 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ ) ( $I_c = 10 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ )	2N3771 2N3772	$V_{BE(on)}$		2.7 2.2

**DYNAMIC CHARACTERISTICS**

Current Gain - Bandwidth Product (2) ( $I_c = 1.0 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$ , $f = 50 \text{ KHz}$ )		$f_T$	0.2	MHz
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(1) Pulse Test: Pulse width = 300 us , Duty Cycle  $\leq 2.0\%$ (2)  $f_T = |h_{fe}| \cdot f_{test}$

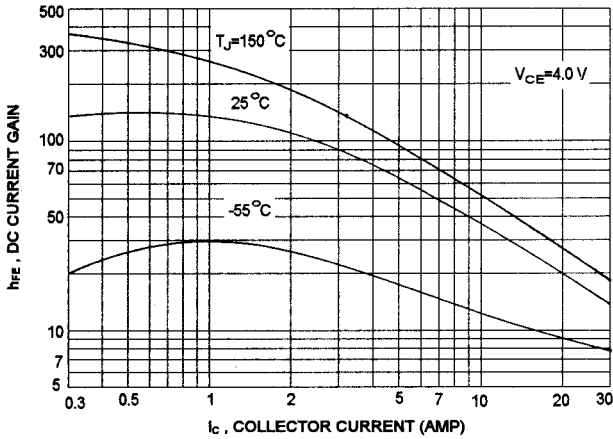
ACTIVE-REGION SAFE OPERATING AREA (SOA)



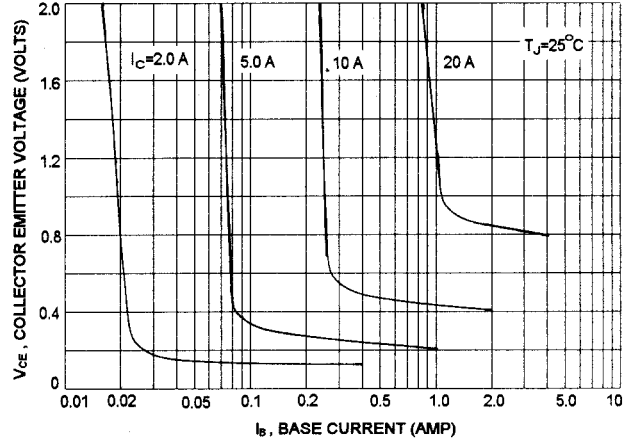
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater 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  $T_{J(PK)} \leq 200^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

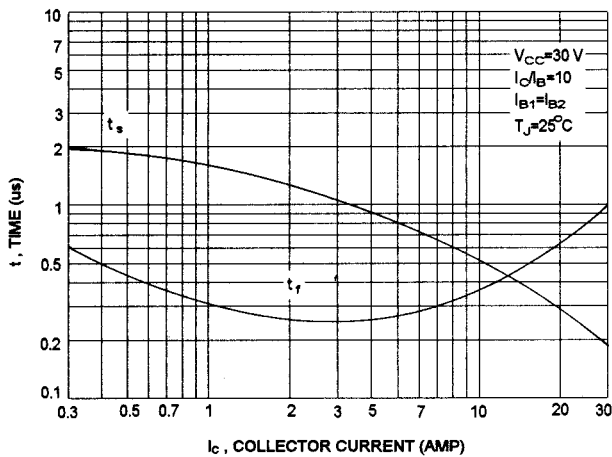
DC CURRENT GAIN



COLLECTOR SATURATION REGION



TURN-OFF TIME



CAPACITANCES

