NPN SILICON POWER TRANSISTORS

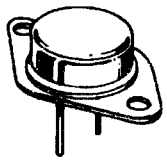
... fast switching speeds and high current capacity ideally suit these parts for use in switching regulators, inverters, wide-band amplifiers and power oscillators in industrial and commercial applications.

FEATURES:
* High Speed -t f = 0.5 us (Max)
* Low $V_{CE(SAT)}$ ≦ 2.5 V @ I_C=20A

Boca Semiconductor Corp. (BSC)

NPN
2N5038
2N5039

20 AMPERE
NPN SILICON
POWER TRANSISTORS
75 - 90 VOLTS
140 WATTS



TO-3

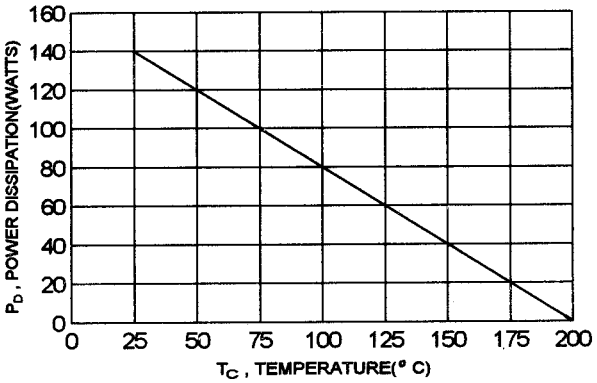
MAXIMUM RATINGS

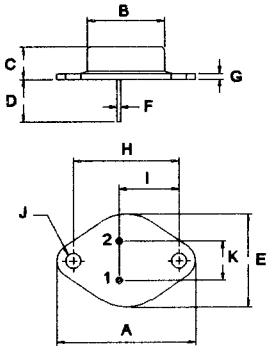
Characteristic	Symbol	2N5038	2N5039	Unit
Collector-Emitter Voltage	V_{CEO}	90	75	V
Collector-Base Voltage	V_{CBO}	150	120	V
Collector-Emitter Voltage	V_{CEV}	150	120	V
Emitter-Base Voltage	V_{EBO}	7		V
Collector Current-Continuous - Peak	I_C	20 30		A
Base Current	I_B	5		A
Total Power Dissipation@T_C=25°C Derate above 25°C	P_D	140 0.8		W W/°C
Operating and Storage Junction Temperature Range	T_J,T_{STG}	- 65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	Rθjc	1.25	°C/W

FIGURE -1 POWER DERATING





PIN 1.BASE
2.EMITTER
COLLECTOR(CASE)

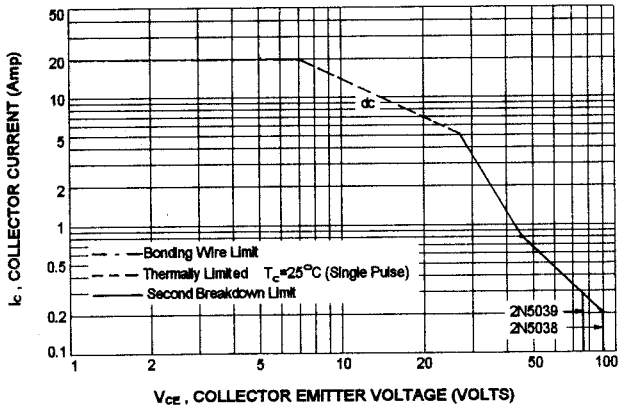
DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector - Emitter Sustaining Voltage (1) (I_C = 200 mA, I_B = 0)	2N5038 2N5039	$V_{CEO(SUS)}$	 90 75		V
Collector Cutoff Current (V_{CE}=140 V, $V_{BE(off)}$ = 1.5 V) (V_{CE}=110 V, $V_{BE(off)}$ = 1.5 V) (V_{CE}=100 V, $V_{BE(off)}$ = 1.5 V, T_C = 150°C) (V_{CE}=85 V, $V_{BE(off)}$ = 1.5 V, T_C = 150°C)	 2N5038 2N5039 2N5038 2N5039	I_{CEX}		 50 50 10 10	mA
Emitter Cutoff Current (V_{EB} = 5.0 V , I_C = 0) (V_{EB} = 7.0 V , I_C = 0)	 2N5038 2N5039 Both	I_{EBO}		 5 15 50	mA
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 12 A , V_{CE} = 5.0 V) (I_C = 10 A , V_{CE} = 5.0 V)	 2N5038 2N5039	hFE	 20 20	 100 100	
Collector - Emitter Saturation Voltage (I_C = 20 A , I_B = 5.0 A)		$V_{CE(sat)}$		 2.5	V
Base - Emitter Saturation Voltage (I_C = 20 A , I_B = 5.0 A)		$V_{BE(sat)}$		 3.3	V
SWITCHING CHARACTERISTICS					
Rise Time	V_{CC} = 30 V (I_C = 12 A, I_{B1} = -I_{B2} = 1.2 A) 2N5038 (I_C = 10 A, I_{B1} = -I_{B2} = 1.0 A) 2N5039	t_r		0.5	us
Storage Time		t_s		1.5	us
Fall Time		t_f		0.5	us

(1) Pulse Test: Pulse width ≦ 300 us , Duty Cycle ≦ 2.0%

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.

Second breakdown pulse limits are valid for duty cycles to 10% ,At high case temperatures, thermal limitations may reduce the power that can be handled to values less than the limitations imposed by second breakdown.