

## SWITCHMODE SERIES NPN POWER TRANSISTORS

... designed for use in high-voltage, high-speed, power switching in inductive circuit, they are particularly suited for 115 and 220 V switchmode applications such as switching regulator's, inverters, DC -DC and converter

### FEATURES:

\*Collector-Emitter Sustaining Voltage-

$$V_{CE(sus)} = 400 \text{ V (Min)}$$

\* Collector-Emitter Saturation Voltage -

$$V_{CE(sat)} = 1.0 \text{ V (Max.) @ } I_C = 4.0 \text{ A, } I_B = 0.8 \text{ A}$$

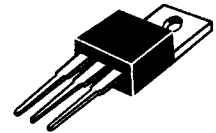
\* Switching Time -  $t_f = 1.0 \text{ us (Max.) @ } I_C = 5.0 \text{ A}$

**NPN**  
**2SC3039**

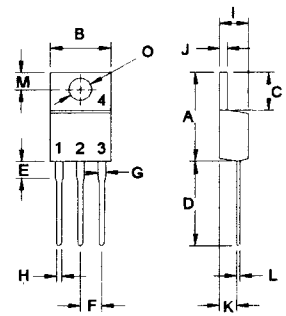
**7.0 AMPERE**  
**SILICON POWER**  
**TRANSISTORS**  
**400 VOLTS**  
**50 WATTS**

### MAXIMUM RATINGS

Characteristic	Symbol	2SC3039	Unit
Collector-Emitter Voltage	$V_{CEO}$	400	V
Collector-Base Voltage	$V_{CBO}$	500	V
Emitter-Base Voltage	$V_{EBO}$	7.0	V
Collector Current - Continuous - Peak	$I_C$ $I_{CM}$	7.0 14	A
Base current	$I_B$	3.0	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	50 0.4	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$



**TO-220**

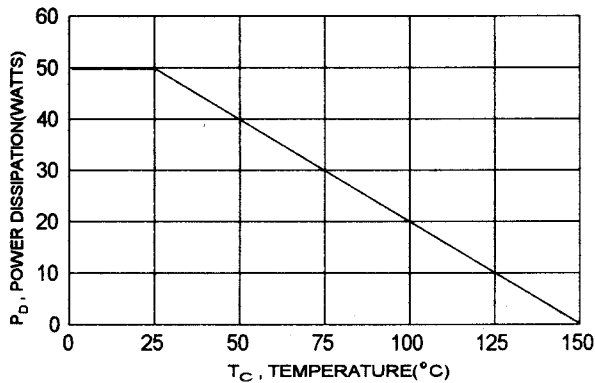


PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	2.5	$^\circ\text{C/W}$

FIGURE -1 POWER DERATING



DIM	MILLIMETERS	
	MIN	MAX
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

**ELECTRICAL CHARACTERISTICS ( T<sub>c</sub> = 25°C unless otherwise noted )**

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Sustaining Voltage ( I <sub>C</sub> = 7.0 A, I <sub>B1</sub> = 1.4 A, L = 50 μH )	V <sub>CEO(sus)</sub>	400		V
Collector-Base Breakdown Voltage ( I <sub>C</sub> = 1.0 mA, I <sub>E</sub> = 0 )	V <sub>(BR)CBO</sub>	500		V
Collector-Emitter Breakdown Voltage ( I <sub>C</sub> = 5.0 mA, I <sub>B</sub> = 0 )	V <sub>(BR)CEO</sub>	400		V
Emitter-Base Breakdown Voltage ( I <sub>E</sub> = 1.0 mA, I <sub>C</sub> = 0 )	V <sub>(BR)EBO</sub>	7.0		V
Collector Cutoff Current ( V <sub>CB</sub> = 400 V, I <sub>E</sub> = 0 )	I <sub>CBO</sub>		10	μA
Emitter Cutoff Current ( V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0 )	I <sub>EBO</sub>		10	μA

**ON CHARACTERISTICS (1)**

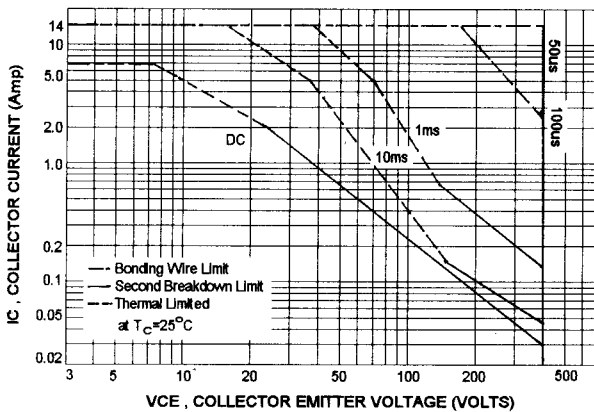
DC Current Gain ( I <sub>C</sub> = 0.8 A, V <sub>CE</sub> = 5.0 V ) ( I <sub>C</sub> = 4.0 A, V <sub>CE</sub> = 5.0 V )	hFE(2) hFE	15 8.0	50	
Collector-Emitter Saturation Voltage ( I <sub>C</sub> = 4.0 A, I <sub>B</sub> = 800 mA )	V <sub>CE(sat)</sub>		1.0	V
Base-Emitter Saturation Voltage ( I <sub>C</sub> = 4.0 A, I <sub>B</sub> = 800 mA )	V <sub>BE(sat)</sub>		1.5	V

**SWITCHING CHARACTERISTICS**

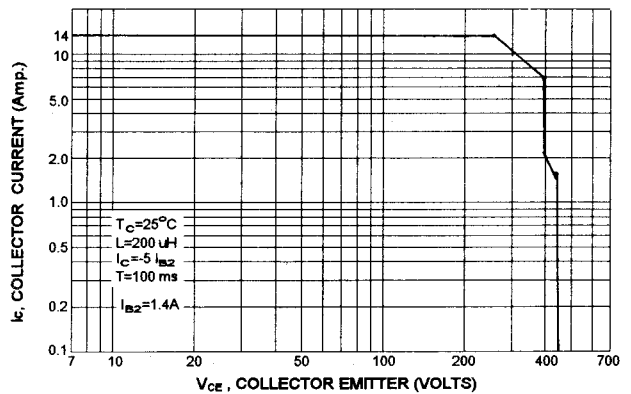
On Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 5.0A I <sub>B1</sub> = -I <sub>B2</sub> = 1.0A R <sub>L</sub> = 40 ohm	t <sub>on</sub>	1.0	us
Storage Time		t <sub>s</sub>	2.5	us
Fall Time		t <sub>f</sub>	1.0	us

(1) Pulse Test: Pulse Width = 300 us, Duty Cycle ≤ 2.0%,  
\* hFE(2) Classification: L : 15 — 30 ; M : 20 — 40 ; N : 30 — 50

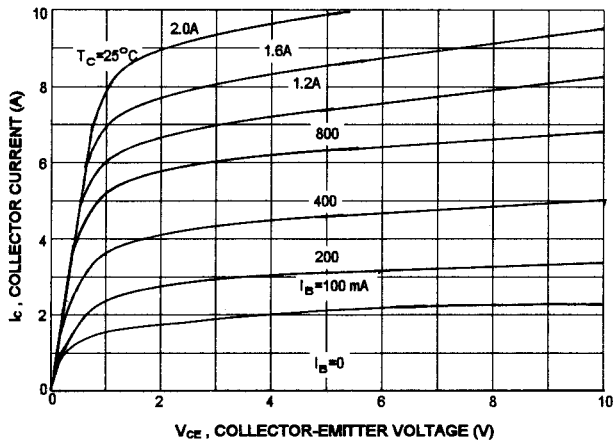
SAFE OPERATING AREA



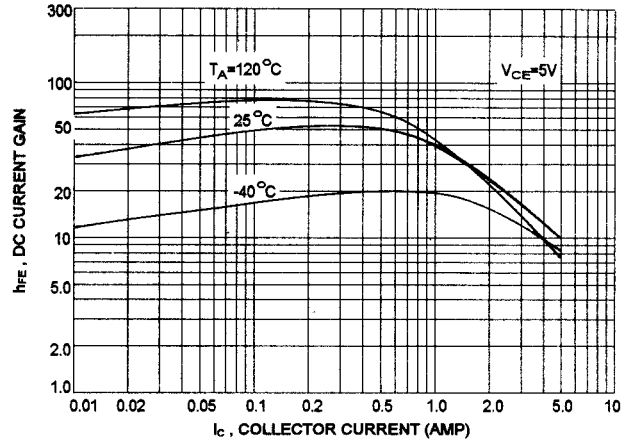
REVERSE BIASE SAFE OPERATING AREA



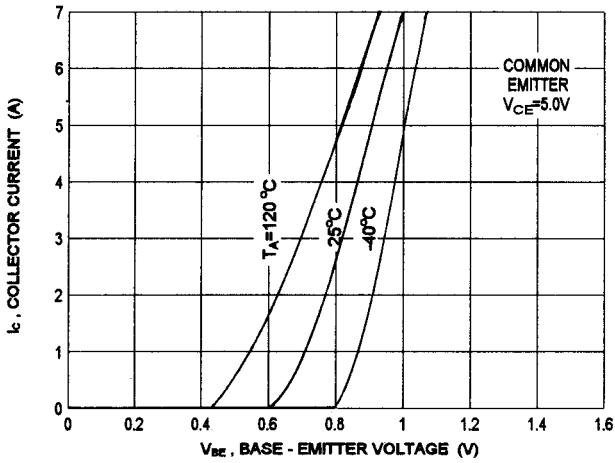
$I_c - V_{ce}$



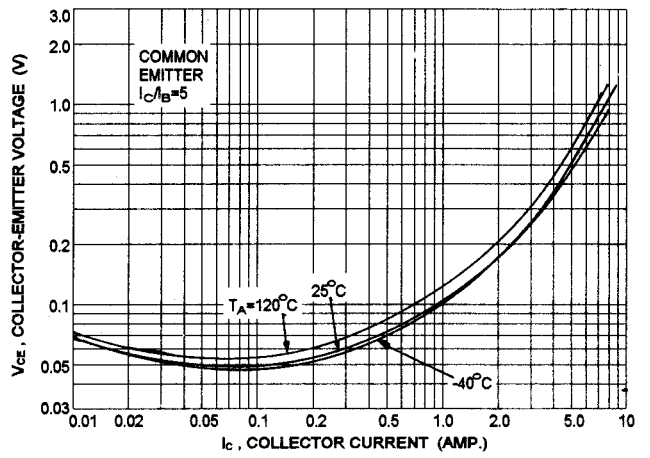
DC CURRENT GAIN



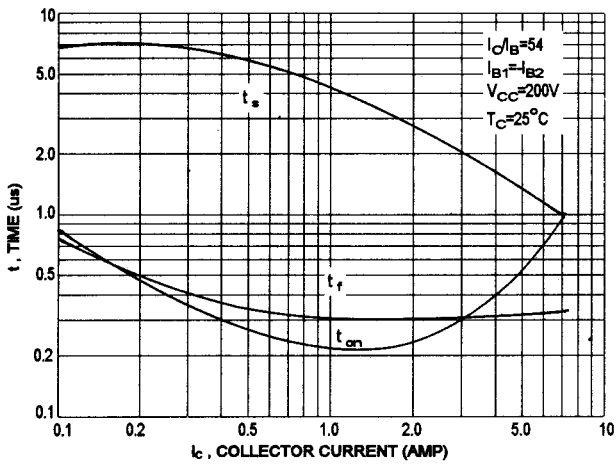
$I_c - V_{be}$



$V_{ce} - I_c$



SWITCHING TIME



$V_{be} - I_c$

