

## 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 -

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

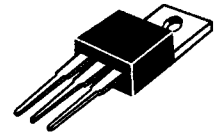
\* Switching Time -  $t_f = 1.0 \text{ us (Max.) @ } I_C = 5.0 \text{ A}$

**NPN**  
**2SC3039**

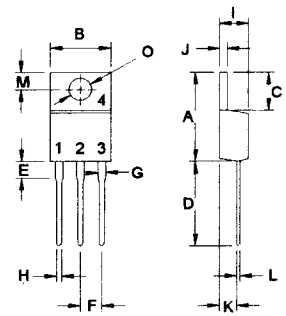
**7.0 AMPERE**  
**SILICON POWER**  
**TRANSISTORS**  
**400 VOLTS**  
**50 WATTS**

### 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**

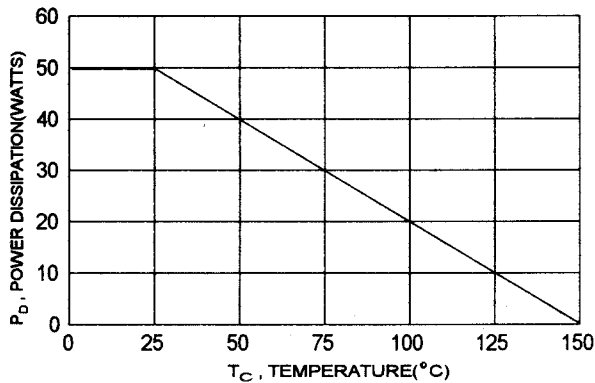


PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

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

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Sustaining Voltage ( $I_c = 7.0\text{ A}$ , $I_{B1} = 1.4\text{ A}$ , $L = 50\text{ }\mu\text{H}$ )	$V_{CE(sus)}$	400		V
Collector-Base Breakdown Voltage ( $I_c = 1.0\text{ mA}$ , $I_E = 0$ )	$V_{(BR)CBO}$	500		V
Collector-Emitter Breakdown Voltage ( $I_c = 5.0\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	400		V
Emitter-Base Breakdown Voltage ( $I_E = 1.0\text{ mA}$ , $I_C = 0$ )	$V_{(BR)EBO}$	7.0		V
Collector Cutoff Current ( $V_{CB} = 400\text{ V}$ , $I_E = 0$ )	$I_{CBO}$		10	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )	$I_{EBO}$		10	$\mu\text{A}$

**ON CHARACTERISTICS (1)**

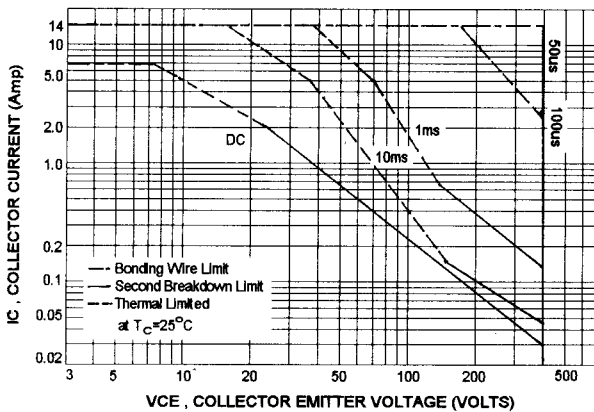
DC Current Gain ( $I_c = 0.8\text{ A}$ , $V_{CE} = 5.0\text{ V}$ ) ( $I_c = 4.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )	$h_{FE(2)}$ $h_{FE}$	15 8.0	50	
Collector-Emitter Saturation Voltage ( $I_c = 4.0\text{ A}$ , $I_B = 800\text{ mA}$ )	$V_{CE(sat)}$		1.0	V
Base-Emitter Saturation Voltage ( $I_c = 4.0\text{ A}$ , $I_B = 800\text{ mA}$ )	$V_{BE(sat)}$		1.5	V

**SWITCHING CHARACTERISTICS**

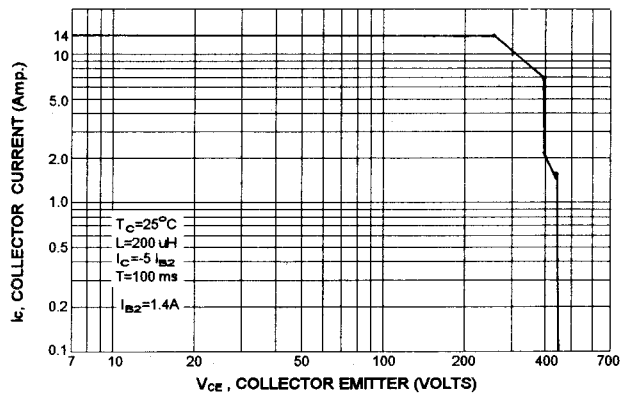
On Time	$V_{CC} = 200\text{ V}$ , $I_c = 5.0\text{ A}$ $I_{B1} = -I_{B2} = 1.0\text{ A}$ $R_L = 40\text{ ohm}$	$t_{on}$	1.0	$\mu\text{s}$
Storage Time		$t_s$	2.5	$\mu\text{s}$
Fall Time		$t_f$	1.0	$\mu\text{s}$

(1) Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ ,  
\*  $h_{FE(2)}$  Classification: L : 15 --- 30 ; M : 20 --- 40 ; N : 30 --- 50

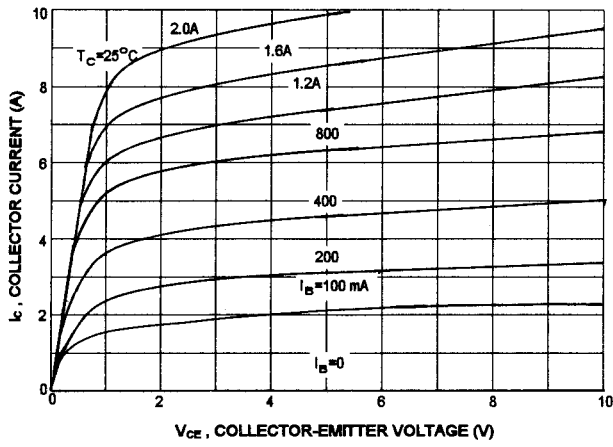
SAFE OPERATING AREA



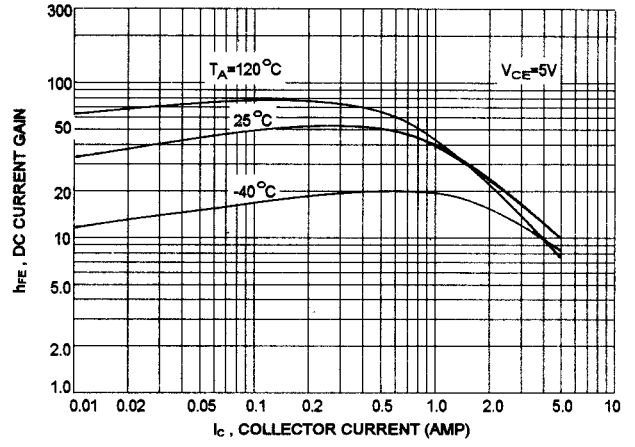
REVERSE BIASE SAFE OPERATING AREA



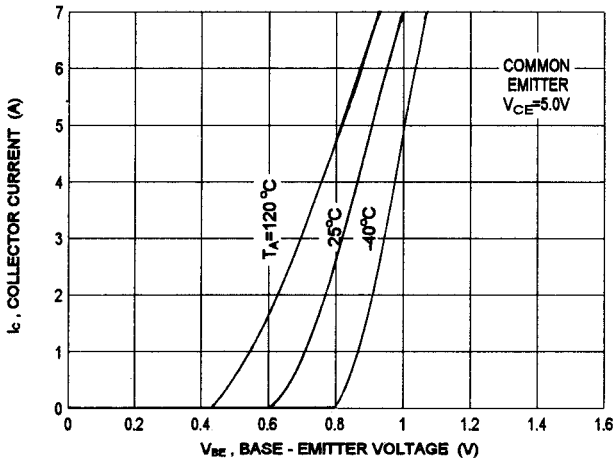
$I_c - V_{ce}$



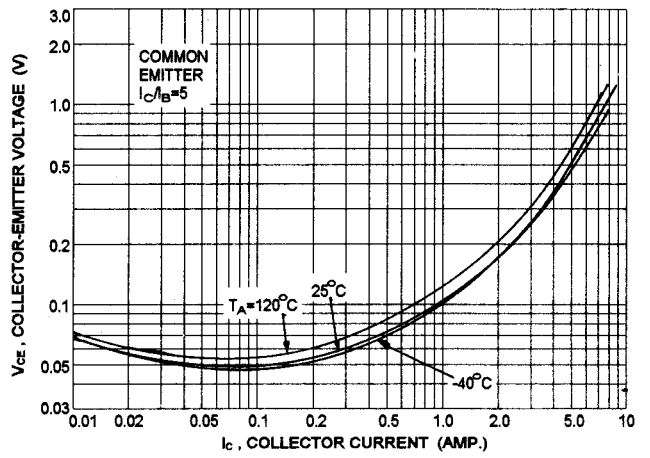
DC CURRENT GAIN



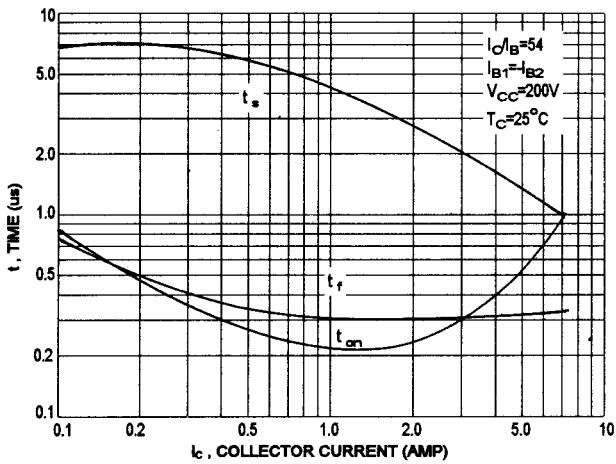
$I_c - V_{be}$



$V_{ce} - I_c$



SWITCHING TIME



$V_{be} - I_c$

