

## 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 conveter.

### FEATURES:

\*Collector-Emitter Sustaining Voltage-

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

\* Collector-Emitter Saturation Voltage -

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

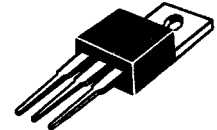
\* Switching Time -  $t_f = 0.5 \text{ us (Max.) @ } I_C = 5.0 \text{ A}$

**NPN**  
**2SC4242**

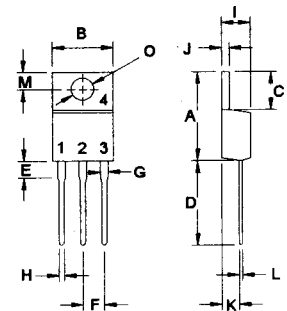
**7 AMPERE**  
**SILICON POWER**  
**TRANSISTORS**  
**400 VOLTS**  
**40 WATTS**

### MAXIMUM RATINGS

Characteristic	Symbol	2SC4242	Unit
Collector-Emitter Voltage	$V_{CEO}$	400	V
Collector-Base Voltage	$V_{CBO}$	450	V
Emitter-Base Voltage	$V_{EBO}$	8.0	V
Collector Current - Continuous - Peak	$I_C$ $I_{CM}$	7.0 14	A
Base current	$I_B$	2.0	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	40 0.32	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$



**TO-220**



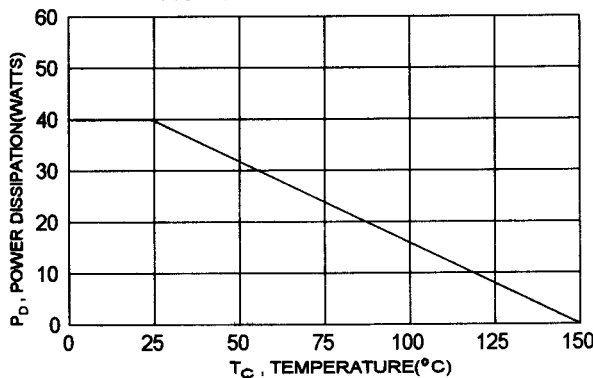
PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	3.125	$^\circ\text{C/W}$

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

FIGURE -1 POWER DERATING



**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 ( $I_C = 100\text{ mA}$ , $I_E = 0$ )	$V_{CEO(sus)}$	400		V
Collector- Base Breakdown Voltage ( $I_C = 1.0\text{ mA}$ , $I_E = 0$ )	$V_{(BR)CBO}$	450		V
Emitter- Base Breakdown Voltage ( $I_E = 1.0\text{ mA}$ , $I_C = 0$ )	$V_{(BR)EBO}$	8.0		V
Collector Cutoff Current ( $V_{CB} = 450\text{ V}$ , $I_E = 0$ )	$I_{CBO}$		100	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 8.0\text{ V}$ , $I_C = 0$ )	$I_{EBO}$		100	$\mu\text{A}$

**ON CHARACTERISTICS (1)**

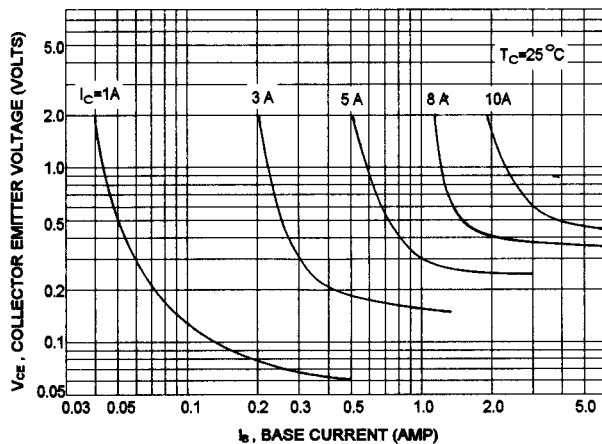
DC Current Gain ( $I_C = 4.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )	hFE	10		
Collector-Emitter Saturation Voltage ( $I_C = 4.0\text{ A}$ , $I_B = 800\text{ mA}$ )	$V_{CE(sat)}$		0.8	V
Base-Emitter Saturation Voltage ( $I_C = 4.0\text{ A}$ , $I_B = 800\text{ mA}$ )	$V_{BE(sat)}$		1.2	V

**SWITCHING CHARACTERISTICS**

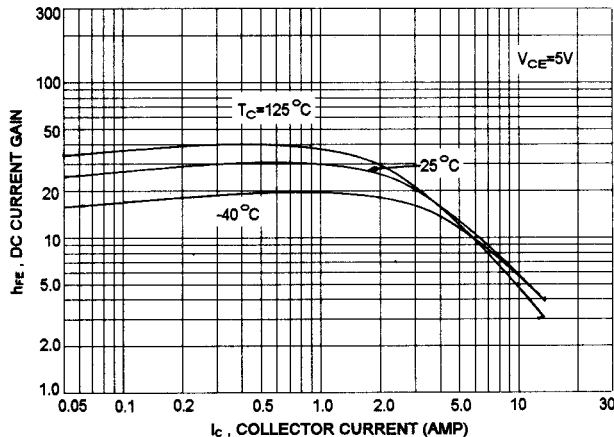
On Time	$V_{CC} = 150\text{ V}$ , $I_C = 5.0\text{ A}$ $I_{B1} = -I_{B2} = 1.0\text{ A}$ $R_L = 30\text{ ohm}$	$t_{on}$	1.0	$\mu\text{s}$
Storage Time		$t_s$	2.5	$\mu\text{s}$
Fall Time		$t_f$	0.5	$\mu\text{s}$

(1) Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

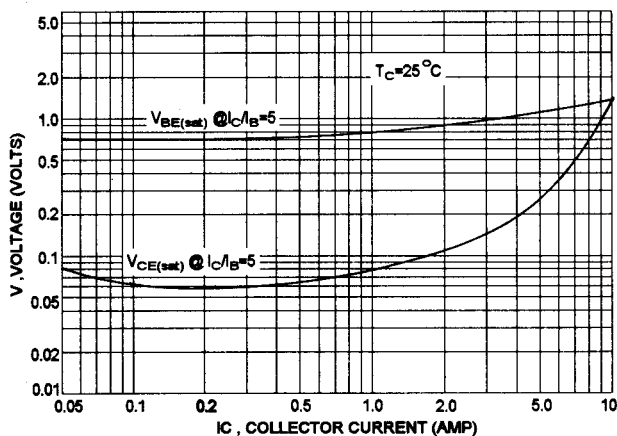
COLLECTOR SATURATION REGION



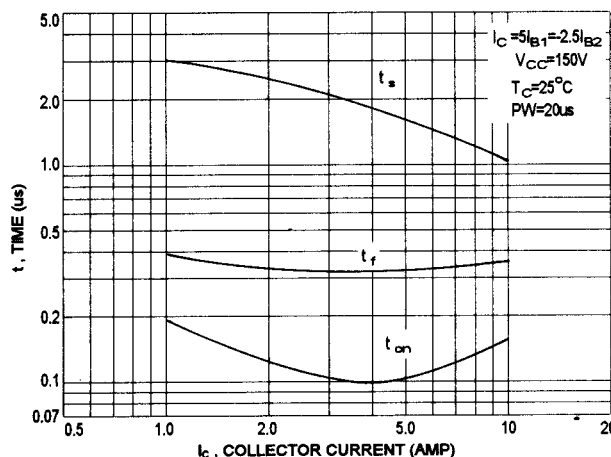
DC CURRENT GAIN



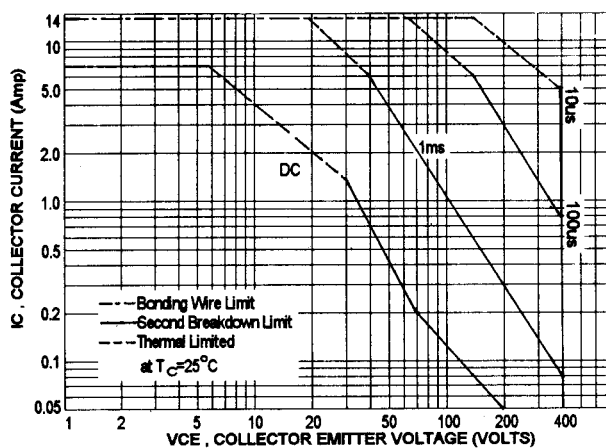
"ON" VOLTAGES



SWITCHING TIME



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  $T_{J(PK)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 150^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.