

## SWITCHMODE SERIES NPN SILICON POWER TRANSISTORS

These devices are designed for high-voltage, high-speed power switching inductive circuits where fall time is critical. They are particularly suit for 115 and 220 V SWICHMODE applications such as Switching Regulators, lverters

### FEATURES:

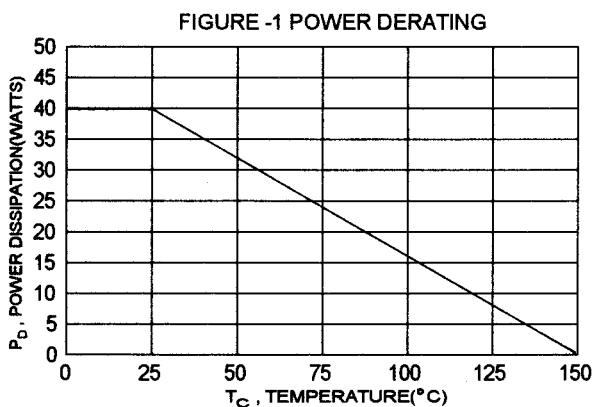
- \* Collector-Emitter Sustaining Voltage-  
 $V_{CEO(sus)} = 500V(\text{Min})$
- \* SOA and Switching Application Information.

### MAXIMUM RATINGS

| Characteristic   | Symbol            | Rating       | Unit                      |
|--|-------------------|--------------|---------------------------|
| Collector-Emitter Voltage  | $V_{CEO}$         | 500          | V                         |
| Collector-Base Voltage   | $V_{CBO}$         | 800          | V                         |
| Emitter-Base Voltage   | $V_{EBO}$         | 7.0          | V                         |
| Collector Current - Continuous<br>-peak  | $I_C$<br>$I_{CM}$ | 3.0<br>6.0   | A                         |
| Base Current - Continuous  | $I_B$             | 1.0          | A                         |
| Total Power Dissipation@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$             | 40<br>320    | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                  | $T_J, T_{STG}$    | - 55 to +150 | $^\circ\text{C}$          |

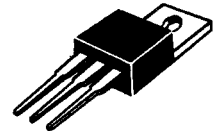
### THERMAL CHARACTERISTICS

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

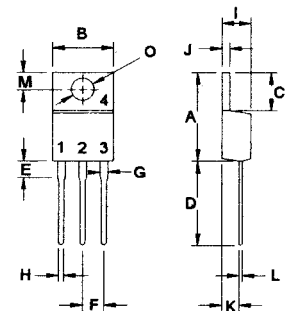


**NPN**  
**2SC3086**

**3 AMPERE**  
**SILICON POWER**  
**TRANSISTORS**  
**500 VOLTS**  
**40 WATTS**



**TO-220**



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

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 14.68       | 15.32 |
| 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 |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

## OFF CHARACTERISTICS

|  |               |     |    |               |
|--|---------------|-----|----|---------------|
| Collector-Emitter Breakdown Voltage<br>( $I_C = 1.0\text{ mA}$ , $I_E = 0$ ) | $V_{(BR)CEO}$ | 500 |    | V             |
| Collector-Base Breakdown Voltage<br>( $I_C = 1.0\text{ mA}$ , $I_E = 0$ )    | $V_{(BR)CBO}$ | 800 |    | V             |
| Emitter-Base Breakdown Voltage<br>( $I_C = 1.0\text{ mA}$ , $I_C = 0$ )      | $V_{(BR)EBO}$ | 7.0 |    | V             |
| Collector Cutoff Current<br>( $V_{CB} = 500\text{ V}$ , $I_E = 0$ )          | $I_{CBO}$     |     | 10 | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )            | $I_{EBO}$     |     | 10 | $\mu\text{A}$ |

## ON CHARACTERISTICS (1)

|   |                         |           |     |   |
|---|-------------------------|-----------|-----|---|
| DC Current Gain<br>( $V_{CE} = 5.0\text{ V}$ , $I_C = 0.3\text{ A}$ )<br>( $V_{CE} = 5.0\text{ V}$ , $I_C = 1.5\text{ A}$ ) | $h_{FE(2)}$<br>$h_{FE}$ | 15<br>8.0 | 50  |   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 1.5\text{ A}$ , $I_B = 0.3\text{ A}$ )                                     | $V_{CE(sat)}$           |           | 1.0 | V |
| Base-Emitter Saturation Voltage<br>( $I_C = 1.5\text{ A}$ , $I_B = 0.3\text{ A}$ )  | $V_{BE(sat)}$           |           | 1.5 | V |

## DYNAMIC CHARACTERISTICS

|   |       |     |  |     |
|---|-------|-----|--|-----|
| Current-Gain Bandwidth Product<br>( $I_C = 300\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ ) | $f_T$ | 5.0 |  | MHz |
|---|-------|-----|--|-----|

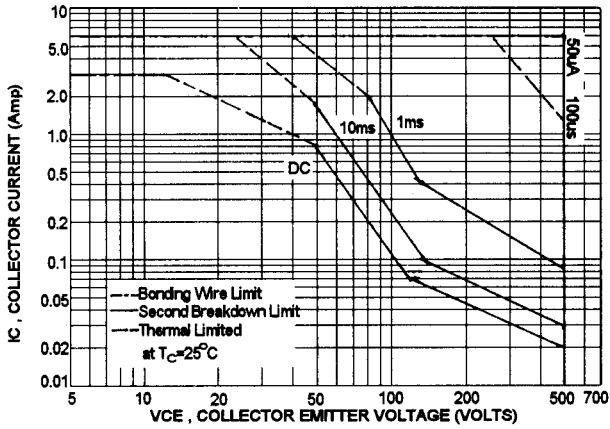
## SWITCHING CHARACTERISTICS

|              |   |          |     |               |
|--------------|---|----------|-----|---------------|
| Turn On Time | $V_{CC} = 200\text{ V}$ , $I_C = 2.0\text{ A}$<br>$I_{B1} = -I_{B2} = 0.3\text{ A}$<br>$R_L = 100\text{ ohm}$ | $t_{on}$ | 1.0 | $\mu\text{s}$ |
| Storage Time |   | $t_s$    | 3.0 | $\mu\text{s}$ |
| Fall Time    |   | $t_f$    | 1.0 | $\mu\text{s}$ |

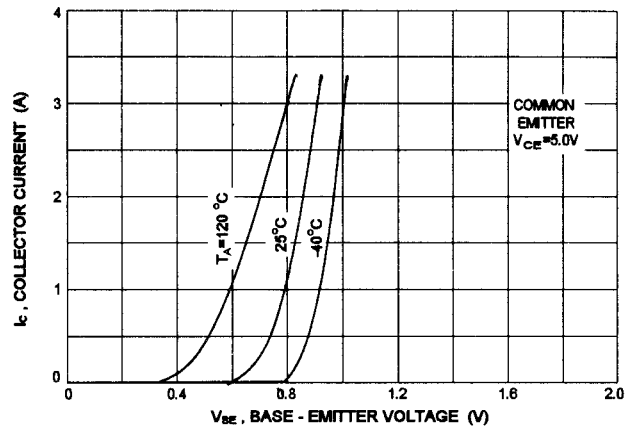
(1)Pulse Test: Pulse width  $\approx 300\text{ us}$ , Duty Cycle  $\leq 2\%$ \* $h_{FE(2)}$  Classification:

|    |   |    |    |   |    |    |   |    |
|----|---|----|----|---|----|----|---|----|
| 15 | L | 30 | 20 | M | 40 | 30 | N | 50 |
|----|---|----|----|---|----|----|---|----|

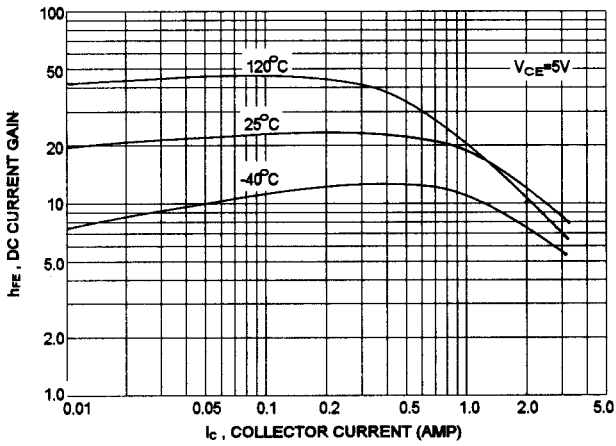
SAFE OPERATING AREA



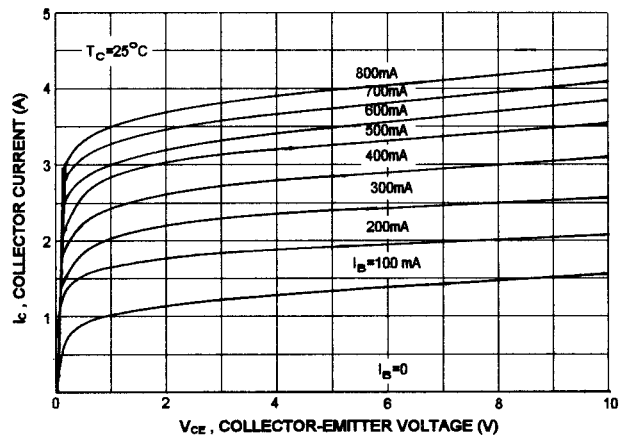
$I_c - V_{be}$



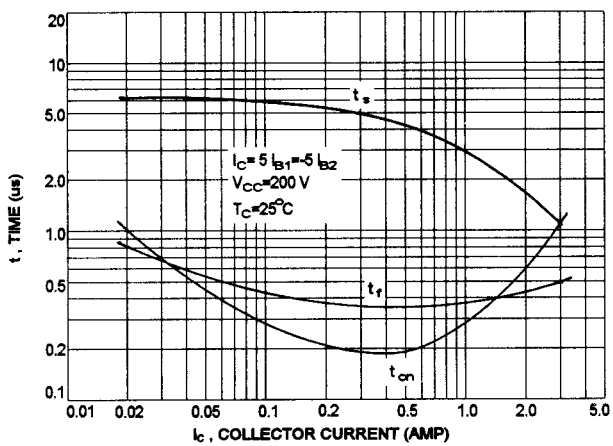
DC CURRENT GAIN



$I_c - V_{ce}$



SWITCHING TIME



"ON" VOLTAGES

