

## SPTECH Silicon NPN Power Transistor

MJE13007

## DESCRIPTION

- Collector–Emitter Sustaining Voltage  
:  $V_{CEO(SUS)} = 400V(\text{Min.})$
- Collector Saturation Voltage  
:  $V_{CE(sat)} = 2.0(\text{Max}) @ I_C = 5.0A$
- Switching Time  
:  $t_f = 0.9 \mu s(\text{Max.}) @ I_C = 5.0A$

## APPLICATIONS

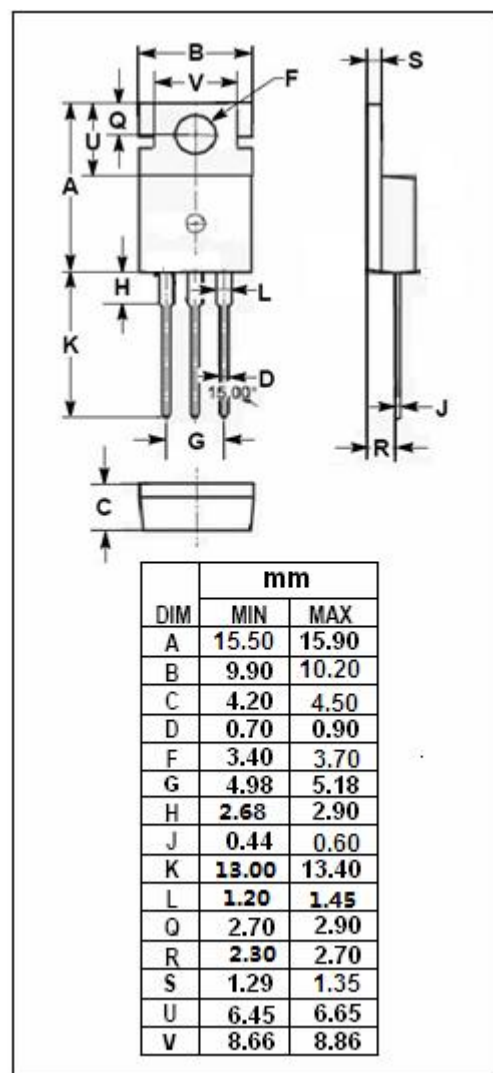
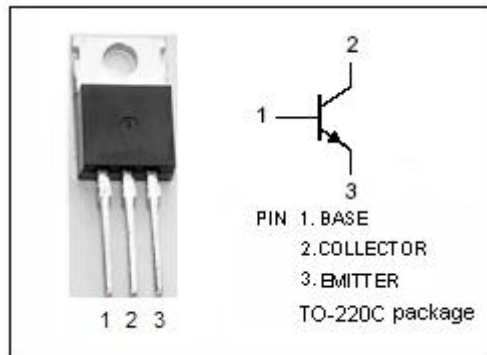
- Designed for use in high-voltage, high-speed, power switching in inductive circuit, they are particularly suited for 115 and 220V switchmode applications such as switching regulators, inverters, Motor controls, Solenoid/Relay drivers and deflection circuits.

ABSOLUTE MAXIMUM RATINGS( $T_a = 25^\circ\text{C}$ )

| SYMBOL    | PARAMETER                                               | VALUE   | UNIT             |
|-----------|---------------------------------------------------------|---------|------------------|
| $V_{CEV}$ | Collector-Emitter Voltage                               | 700     | V                |
| $V_{CEO}$ | Collector-Emitter Voltage                               | 400     | V                |
| $V_{EBO}$ | Emitter-Base Voltage                                    | 9       | V                |
| $I_C$     | Collector Current-Continuous                            | 8       | A                |
| $I_{CM}$  | Collector Current-peak                                  | 16      | A                |
| $I_B$     | Base Current                                            | 4       | A                |
| $I_{BM}$  | Base Current-Peak                                       | 8       | A                |
| $I_E$     | Emitter Current                                         | 12      | A                |
| $I_{EM}$  | Emitter Current-Peak                                    | 24      | A                |
| $P_C$     | Collector Power Dissipation<br>$T_C = 25^\circ\text{C}$ | 80      | W                |
| $T_j$     | Junction Temperature                                    | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage Temperature Range                               | -65~150 | $^\circ\text{C}$ |

## THERMAL CHARACTERISTICS

| SYMBOL       | PARAMETER                               | MAX  | UNIT               |
|--------------|-----------------------------------------|------|--------------------|
| $R_{th j-c}$ | Thermal Resistance, Junction to Case    | 1.56 | $^\circ\text{C/W}$ |
| $R_{th j-a}$ | Thermal Resistance, Junction to Ambient | 62.5 | $^\circ\text{C/W}$ |



## SPTECH Silicon NPN Power Transistor

MJE13007

## ELECTRICAL CHARACTERISTICS

 $T_C = 25^\circ\text{C}$  unless otherwise specified

| SYMBOL          | PARAMETER                            | CONDITIONS                                                      | MIN | TYP. | MAX        | UNIT |
|-----------------|--------------------------------------|-----------------------------------------------------------------|-----|------|------------|------|
| $V_{CEO(SUS)}$  | Collector-Emitter Sustaining Voltage | $I_C = 10\text{mA}; I_B = 0$                                    | 400 |      |            | V    |
| $V_{CE(sat)-1}$ | Collector-Emitter Saturation Voltage | $I_C = 2\text{A}; I_B = 0.4\text{A}$                            |     |      | 1.0        | V    |
| $V_{CE(sat)-2}$ | Collector-Emitter Saturation Voltage | $I_C = 5\text{A}; I_B = 1\text{A}$<br>$T_C = 100^\circ\text{C}$ |     |      | 2.0<br>3.0 | V    |
| $V_{CE(sat)-3}$ | Collector-Emitter Saturation Voltage | $I_C = 8\text{A}; I_B = 2\text{A}$                              |     |      | 3.0        | V    |
| $V_{BE(sat)-1}$ | Base-Emitter Saturation Voltage      | $I_C = 2\text{A}; I_B = 0.4\text{A}$                            |     |      | 1.2        | V    |
| $V_{BE(sat)-2}$ | Base-Emitter Saturation Voltage      | $I_C = 5\text{A}; I_B = 1\text{A}$<br>$T_C = 100^\circ\text{C}$ |     |      | 1.6<br>1.5 | V    |
| $I_{CBO}$       | Collector Cutoff Current             | $V_{CB} = 700\text{V}; I_E = 0$<br>$T_C = 125^\circ\text{C}$    |     |      | 0.1<br>1.0 | mA   |
| $I_{EBO}$       | Emitter Cutoff Current               | $V_{EB} = 9\text{V}; I_C = 0$                                   |     |      | 0.1        | mA   |
| $h_{FE-1}$      | DC Current Gain                      | $I_C = 2\text{A}; V_{CE} = 5\text{V}$                           | 8   |      | 40         |      |
| $h_{FE-2}$      | DC Current Gain                      | $I_C = 5\text{A}; V_{CE} = 5\text{V}$                           | 5   |      | 30         |      |
| $f_T$           | Current-Gain—Bandwidth Product       | $I_C = 0.5\text{A}; V_{CE} = 10\text{V};$                       | 4   |      |            | MHz  |
| $C_{OB}$        | Output Capacitance                   | $I_E = 0; V_{CB} = 10\text{V}; f_{\text{test}} = 0.1\text{MHz}$ |     | 80   |            | pF   |

## Switching Times; Resistive Load

|       |              |                                                                                                                                  |  |  |     |               |
|-------|--------------|----------------------------------------------------------------------------------------------------------------------------------|--|--|-----|---------------|
| $t_d$ | Storage Time | $I_C = 5\text{A}; V_{CC} = 125\text{V};$<br>$I_{B1} = I_{B2} = 1\text{A}; t_p = 25\text{ }\mu\text{s};$<br>Duty Cycle $\leq 1\%$ |  |  | 0.1 | $\mu\text{s}$ |
| $t_r$ | Fall Time    |                                                                                                                                  |  |  | 1.5 | $\mu\text{s}$ |
| $t_s$ | Storage Time |                                                                                                                                  |  |  | 3.0 | $\mu\text{s}$ |
| $t_f$ | Fall Time    |                                                                                                                                  |  |  | 0.7 | $\mu\text{s}$ |