

# Transistor NPN, TO-3



## Features:

- Power dissipation -  $P_D = 115W$  at  $T_C = 25^\circ C$
- DC current gain  $h_{FE} = 20 \sim 70$  at  $I_C = 4A$
- $V_{CE(Sat)} = 1.1V$  (max.) at  $I_C = 4A$ ,  $I_B = 400mA$
- Designed for use in general-purpose amplifier and switching applications

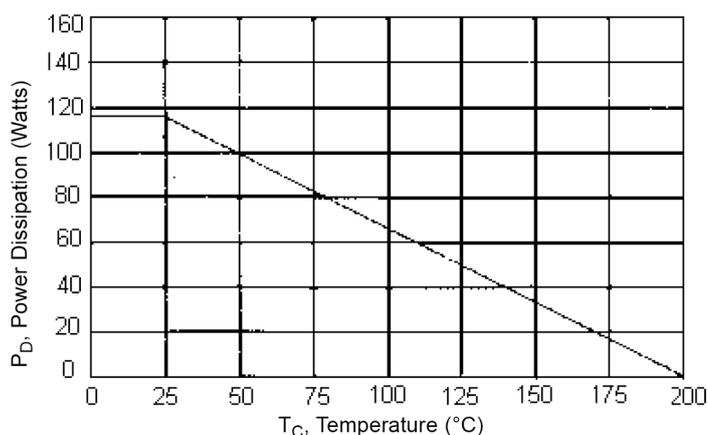
## Maximum Ratings

| Rating   | Symbol         | Value        | Unit               |
|--|----------------|--------------|--------------------|
| Collector-Emitter Voltage  | $V_{CEO}$      | 60           | V                  |
| Collector-Emitter Voltage  | $V_{CEX}$      | 70           |                    |
| Collector-Base Voltage   | $V_{CBO}$      | 100          |                    |
| Emitter-Base Voltage   | $V_{EBO}$      | 7            |                    |
| Collector Current-Continuous   | $I_C$          | 15           | A                  |
| Base Current   | $I_B$          | 7            |                    |
| Total Device Dissipation at $T_C = 25^\circ C$ Derate above $25^\circ C$ | $P_D$          | 115<br>0.657 | W<br>W/ $^\circ C$ |
| Operating and Storage Junction Temperature Range                         | $T_J, T_{STG}$ | -65 to +150  | $^\circ C$         |

## Thermal Characteristics

| Characteristics                      | Symbol          | Max. | Unit         |
|--------------------------------------|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.52 | $^\circ C/W$ |

Power Derating



# Transistor

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### Electrical Characteristics ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min. | Max. | Unit |
|----------------|--------|------|------|------|
|----------------|--------|------|------|------|

#### Off Characteristics

|   |                |    |        |    |
|---|----------------|----|--------|----|
| Collector-Emitter Sustaining Voltage (1)<br>( $I_C = 200\text{mA}$ , $I_B = 0$ )  | $I_{EO(sus)}$  | 60 | -      | V  |
| Collector-Base Sustaining Voltage (1)<br>( $I_C = 200\text{mA}$ , $R_{BE} = 100\Omega$ )  | $V_{CER(sus)}$ | 70 | -      |    |
| Collector Cut off Current<br>( $V_{CE} = 30\text{V}$ , $I_B = 0$ )  | $I_{CEO}$      | -  | 0.7    | mA |
| Collector Cut off Current<br>( $V_{CE} = 100\text{V}$ , $V_{BE(off)} = 1.5\text{V}$ )<br>( $V_{CE} = 100\text{V}$ , $V_{BE(off)} = 1.5\text{V}$ , $T_C = 150^\circ\text{C}$ ) | $I_{CEX}$      | -  | 1<br>5 |    |
| Emitter Cut off Current<br>( $V_{EB} = 7\text{V}$ , $I_C = 0$ )   | $I_{EBO}$      | -  | 5      |    |

#### On Characteristic (1)

|   |               |         |          |   |
|---|---------------|---------|----------|---|
| DC Current Gain<br>( $I_C = 4\text{A}$ , $V_{CE} = 4\text{V}$ )<br>( $I_C = 10\text{A}$ , $V_{CE} = 4\text{V}$ )                    | $h_{FE}$      | 20<br>5 | 70       | - |
| Collector-Emitter Saturation Voltage<br>( $I_C = 4\text{A}$ , $I_B = 0.4\text{A}$ )<br>( $I_C = 10\text{A}$ , $I_B = 3.3\text{A}$ ) | $V_{CE(sat)}$ | -       | 1.1<br>3 | V |
| Base-Emitter On Voltage<br>( $I_C = 4\text{A}$ , $V_{CE} = 4\text{V}$ )   | $V_{BE(sat)}$ | -       | 1.5      |   |

#### Dynamic Characteristics

|  |          |     |     |     |
|--|----------|-----|-----|-----|
| Current Gain - Bandwidth Product (2)<br>( $I_C = 500\text{mA}$ , $V_{CE} = 10\text{V}$ , $f = 1\text{MHz}$ ) | $f_T$    | 2.5 | -   | MHz |
| Small-Signal Current Gain<br>( $I_C = 1\text{A}$ , $V_{CE} = 4\text{V DC}$ , $f = 1\text{MHz}$ )             | $h_{fe}$ | 15  | 120 | -   |

#### Second Breakdown Characteristics

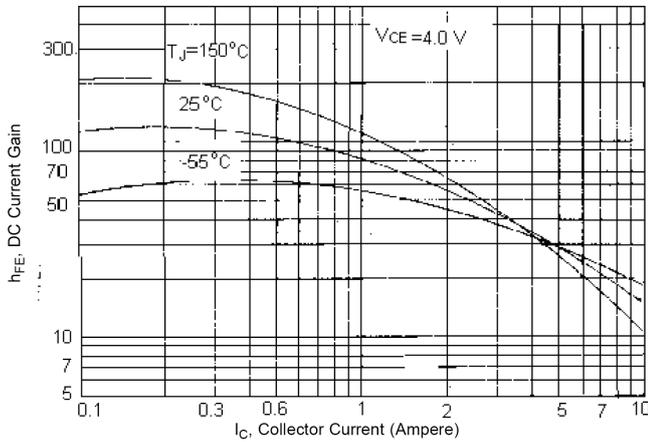
(1). Pulse Test: Pulse Width =  $300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

(2).  $f_T = |h_{fe}| \cdot f_{test}$

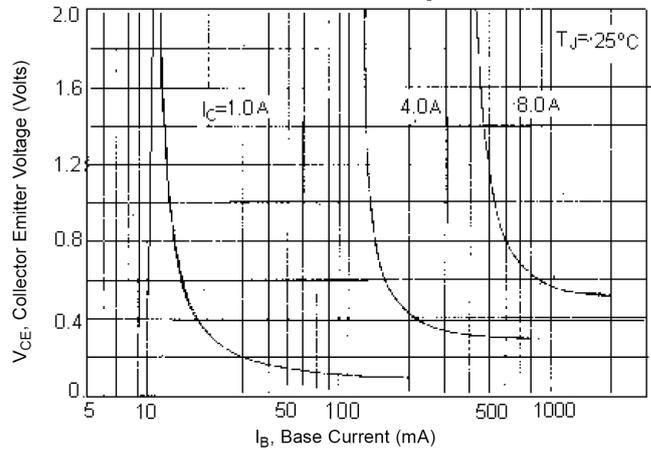
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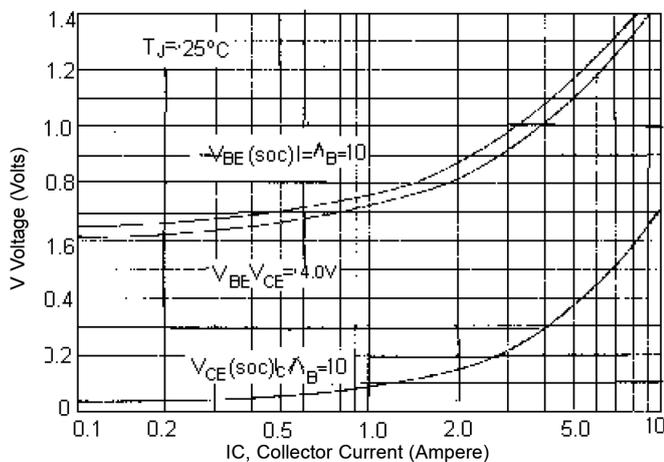
DC Current Gain



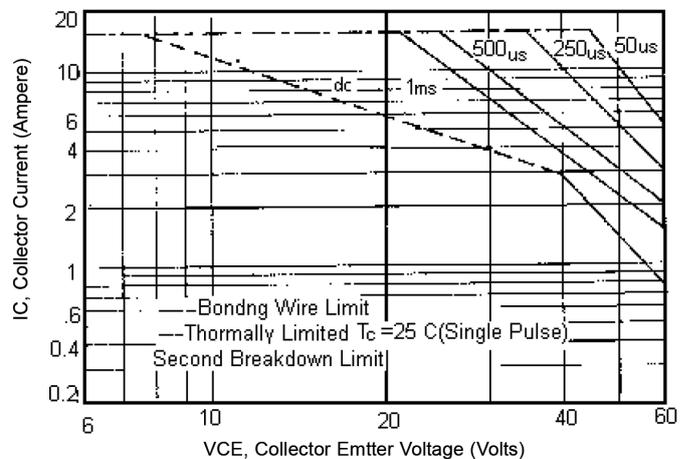
Collector Saturation Region



"On Voltage"



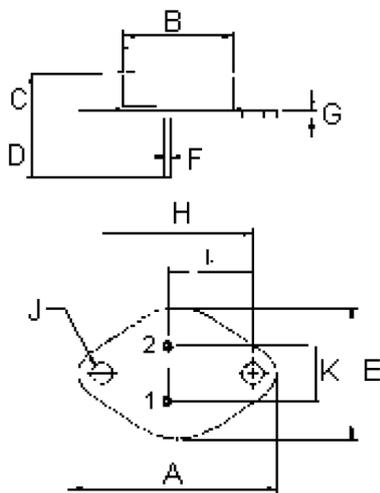
Active Region Sage Operating Area (SOA)



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  $T_{J(PK)} = 200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} = 200^\circ\text{C}$ , At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.



# Transistor NPN, TO-3



Pin 1. Base  
2. Emitter  
3. Collector (Case)

| Dimensions | Min.  | Max.  |
|------------|-------|-------|
| A          | 38.75 | 39.96 |
| B          | 19.28 | 22.23 |
| C          | 7.96  | 9.28  |
| D          | 11.18 | 12.19 |
| E          | 25.2  | 26.67 |
| F          | 0.92  | 1.09  |
| G          | 1.38  | 1.62  |
| H          | 29.9  | 30.4  |
| I          | 16.64 | 17.3  |
| J          | 3.88  | 4.36  |
| K          | 10.67 | 11.18 |

Dimensions : Millimetres

## Part Number Table

| Description           | Part Number |
|-----------------------|-------------|
| Transistor, NPN, TO-3 | 2N3055      |

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