



## TO-220 Plastic-Encapsulate Transistors

### 3DD13003 TRANSISTOR (NPN)

#### FEATURES

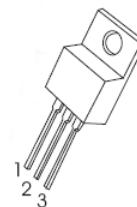
- power switching applications

#### MAXIMUM RATINGS (Ta=25°C unless otherwise noted)

| Symbol           | Parameter                     | Value   | Units |
|------------------|-------------------------------|---------|-------|
| V <sub>CBO</sub> | Collector-Base Voltage        | 700     | V     |
| V <sub>CEO</sub> | Collector-Emitter Voltage     | 400     | V     |
| V <sub>EBO</sub> | Emitter-Base Voltage          | 9       | V     |
| I <sub>C</sub>   | Collector Current -Continuous | 1.5     | A     |
| P <sub>C</sub>   | Collector Power Dissipation   | 2       | W     |
| T <sub>J</sub>   | Junction Temperature          | 150     | °C    |
| T <sub>stg</sub> | Storage Temperature           | -55-150 | °C    |

#### TO-220

1. BASE
2. COLLECTOR
3. EMITTER



#### ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)

| Parameter                            | Symbol               | Test conditions  | MIN | TYP | MAX | UNIT |
|--------------------------------------|----------------------|--|-----|-----|-----|------|
| Collector-base breakdown voltage     | V <sub>(BR)CBO</sub> | I <sub>C</sub> =5mA, I <sub>E</sub> =0   | 700 |     |     | V    |
| Collector-emitter breakdown voltage  | V <sub>(BR)CEO</sub> | I <sub>C</sub> =10mA, I <sub>B</sub> =0  | 400 |     |     | V    |
| Emitter-base breakdown voltage       | V <sub>(BR)EBO</sub> | I <sub>E</sub> =2mA, I <sub>C</sub> =0   | 9   |     |     | V    |
| Collector cut-off current            | I <sub>CBO</sub>     | V <sub>CB</sub> =700V, I <sub>E</sub> =0   |     |     | 1   | mA   |
| Collector cut-off current            | I <sub>CEO</sub>     | V <sub>CE</sub> =400V, I <sub>B</sub> =0   |     |     | 0.5 | mA   |
| Emitter cut-off current              | I <sub>EBO</sub>     | V <sub>EB</sub> =9V, I <sub>C</sub> =0   |     |     | 1   | mA   |
| DC current gain                      | h <sub>FE1</sub>     | V <sub>CE</sub> =5V, I <sub>C</sub> = 0.5 A  | 8   |     | 40  |      |
|                                      | h <sub>FE2</sub>     | V <sub>CE</sub> =5V, I <sub>C</sub> = 1.5A   | 5   |     |     |      |
| Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =1A, I <sub>B</sub> =0.25A  |     |     | 0.6 | V    |
| Base-emitter saturation voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> =1A, I <sub>B</sub> =0.25A  |     |     | 1.2 | V    |
| Transition frequency                 | f <sub>T</sub>       | V <sub>CE</sub> =10V, I <sub>C</sub> =100mA, f =1MHz                               | 5   |     |     | MHz  |
| Fall time                            | t <sub>f</sub>       | I <sub>C</sub> =1A, I <sub>B1</sub> =-I <sub>B2</sub> =0.2A, V <sub>CC</sub> =100V |     |     | 0.5 | μs   |
| Storage time                         | t <sub>s</sub>       | I <sub>C</sub> =250mA (UI9600)   | 2   |     | 4   | μs   |

#### CLASSIFICATION OF h<sub>FE1</sub>

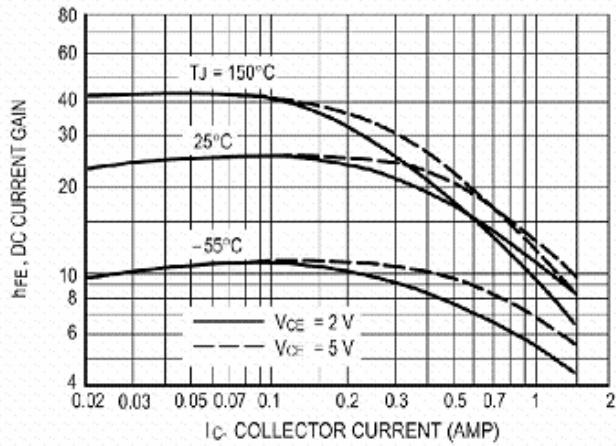
| Range | 8-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35-40 |
|-------|------|-------|-------|-------|-------|-------|-------|
|-------|------|-------|-------|-------|-------|-------|-------|

#### CLASSIFICATION OF t<sub>s</sub>

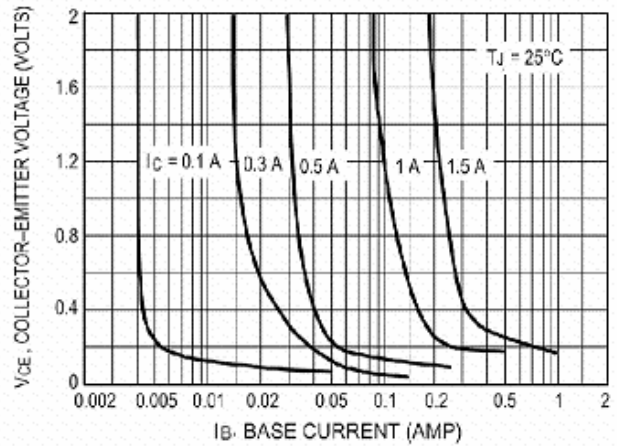
| Rank  | A1            | A2           | B1           | B2            |
|-------|---------------|--------------|--------------|---------------|
| Range | 2-2.5 ( μ s ) | 2.5-3( μ s ) | 3-3.5( μ s ) | 3.5-4 ( μ s ) |

## Typical Characteristics

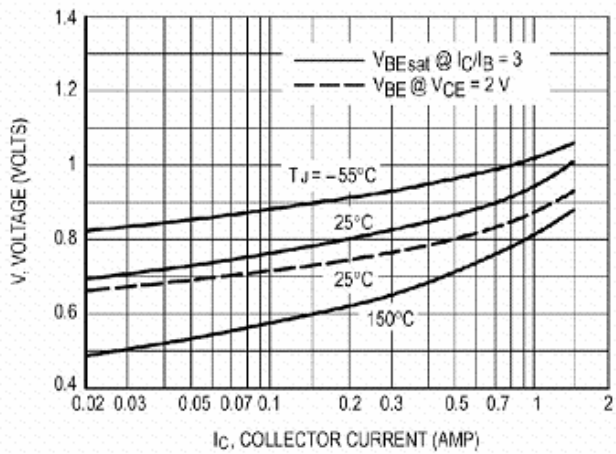
3DD13003



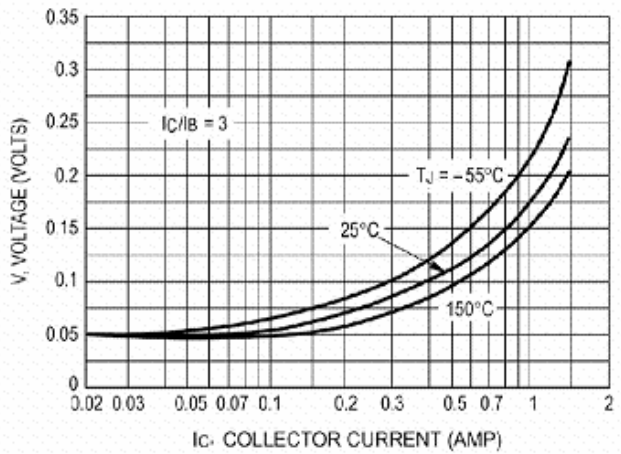
DC Current Gain



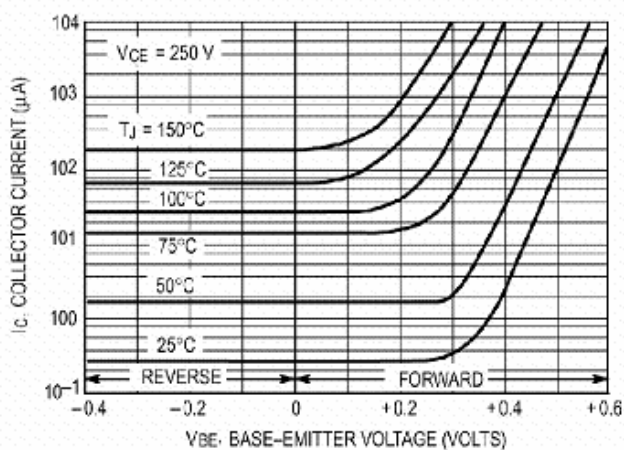
Collector Saturation Region



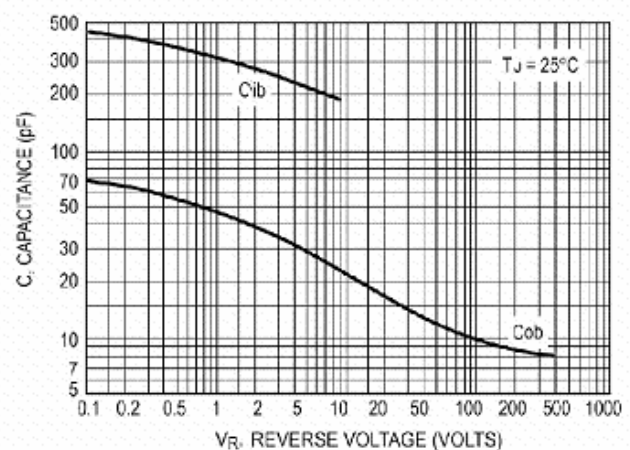
Base-Emitter Voltage



Collector-Emitter Saturation Region



Collector Cutoff Region



Capacitance