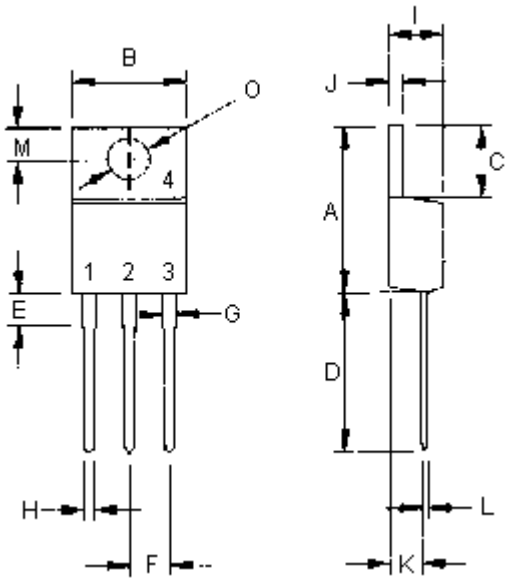
# TIP152

NPN Silicon power darlington transistors are designed for use in automotive ignition. Switching and motor control applications.

## Features:

- Collector-emitter sustaining voltage
  $V_{CEO(SUS)}$ = 400V (minimum).
- Collector-emitter saturation voltage
  $V_{CE(sat)}$ = 2.0V (maximum) at $I_C$ = 5.0A.
- Reverse-base SOA at 300V to 400V at 7A.




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

| Dimensions | Minimum | Maximum |
|---|---|---|
| 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 |

Dimensions : Millimetres

**NPN**
**TIP152**

7 Ampere
Darlingtion
Power Transistors
300 to 400 Volts
80 Watts

**TO-220**

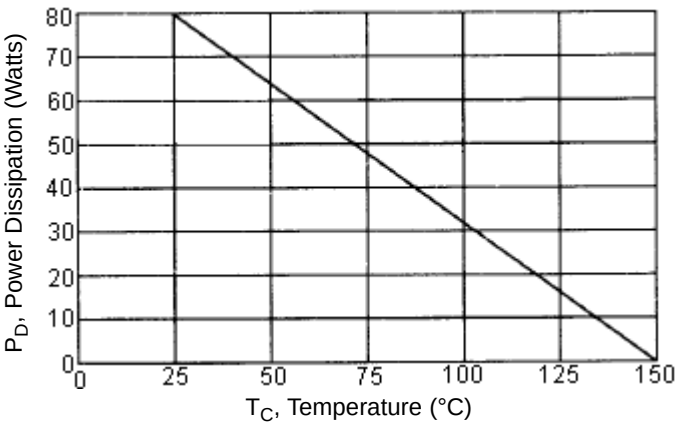
## Maximum Ratings

| Parameter | Symbol | TIP152 | Unit |
|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 400 | V |
| Collector-Base Voltage | $V_{CBO}$ | | |
| Emitter-Base Voltage | $V_{EBO}$ | 8.0 | |
| Collector Current-Continuous<br>-Peak | $I_C$<br>$I_{CM}$ | 7.0<br>1.0 | A |
| Base Current | $I_B$ | 1.5 | |
| Total Power Dissipation at $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 80<br>0.64 | W<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{STG}$ | -65 to +150 | °C |

## Thermal Characteristics

| Characteristic | Symbol | Maximum | Unit |
|---|---|---|---|
| Thermal Resistance Junction to Case | Rθjc | 1.56 | °C/W |

**Power Derating**



## Electrical Characteristics ($T_c$ = 25°C unless otherwise noted

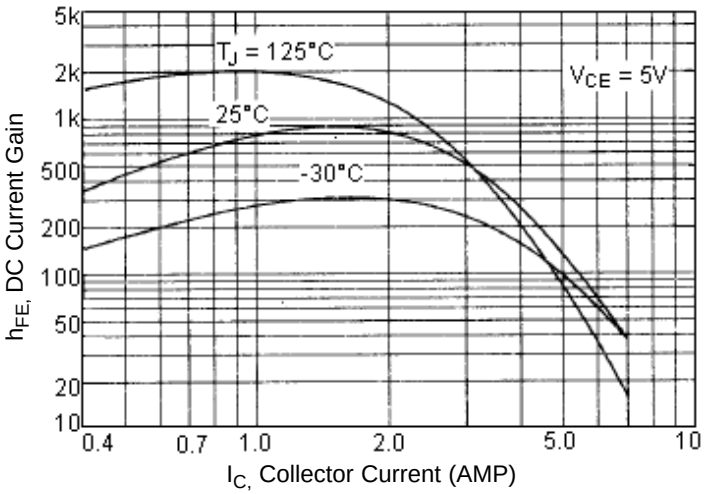
| Parameter | Symbol | Minimum | Maximum | Unit |
|---|---|---|---|---|
| **Off Characteristics** | | | | |
| Collector-Emitter Breakdown Voltage (1) ($I_C$ = 10mA, $I_B$ = 0) **TIP152** | $V_{(BR)\ CEO}$ | 400 | - | V |
| Collector-Base Breakdown Voltage (1) ($I_C$ = 1.0mA, $I_B$ = 0) **TIP152** | $V_{(BR)\ CBO}$ | | - | |
| Collector Cut off Current ($V_{CE}$ = 400V, $I_B$ = 0) **TIP152** | $I_{CEO}$ | - | 250 | µA |
| Emitter Cut off Current ($V_{EB}$ = 8.0V, $I_C$ = 0) | $I_{EBO}$ | - | 15 | mA |
| **On Characteristics (1)** | | | | |
| DC Current Gain ($I_C$ = 2.5A, $V_{CE}$ = 5.0V) ($I_C$ = 5.0A, $V_{CE}$ = 5.0V) ($I_C$ = 7.0A, $V_{CE}$ = 5.0V) | $h_{FE}$ | 150<br>50<br>15 | - | - |
| Collector-Emitter Saturation Voltage ($I_C$ = 1.0A, $I_B$ = 10mA) ($I_C$ = 2.0A, $I_B$ = 100mA) ($I_C$ = 5.0A, $I_B$ = 250mA) | $V_{CE\ (sat)}$ | - | 1.5<br>1.5<br>2.0 | V |
| Base-Emitter Saturation Voltage ($I_C$ = 2.0A, $I_B$ = 100mA) ($I_C$ = 5.0A, $I_B$ = 250mA) | $V_{BE\ (sat)}$ | - | 2.2<br>2.3 | |
| Diode Forward Voltage ($I_F$ = 7.0A) | $V_F$ | - | 3.5 | |
| **Dynamic Characteristics** | | | | |
| Small-Signal Current Gain ($I_C$ = 0.5A, $V_{CE}$ = 5.0V, f = 1.0KHz) | $h_{fe}$ | 200 | - | - |
| Output Capacitance ($V_{CB}$ = 10V, $I_E$ = 0, f = 1.0MHz) | $C_{ob}$ | - | 150 | pF |

**Switching Characteristics**

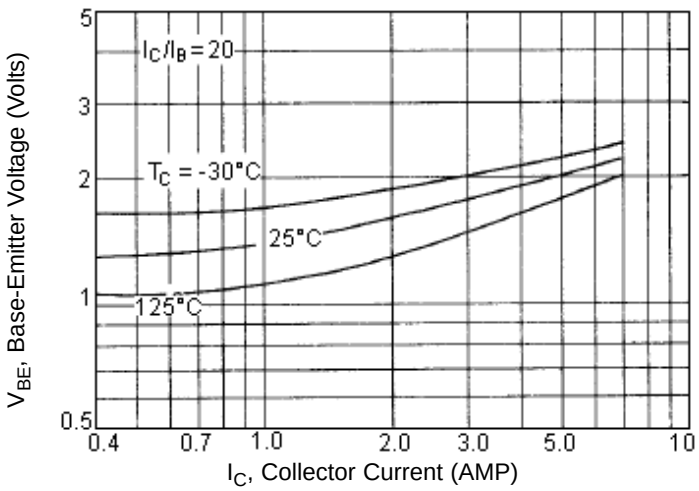
| | | | | | |
|---|---|---|---|---|---|
| Delay Time | $V_{CC}$ = 250V, $I_C$ = 5.0A<br>$I_{B1}$= -$I_{B2}$ = 250mA,<br>tp = 200µS, Duty Cycle ≤2.0% | $t_d$ | 30 (Typical) | - | ns |
| Rise Time | | $t_r$ | 180 (Typical) | - | |
| Storage Time | | $t_s$ | 3.5 (Typical) | - | µs |
| Fall Time | | $t_f$ | 1.6 (Typical) | - | |

(1) Pulse Test : Pulse width: ≤300µs, Duty Cycle ≤2.0%.

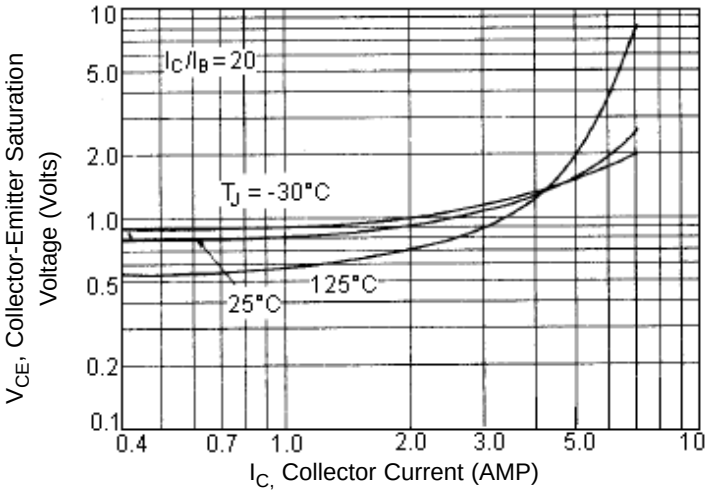
**DC Current Gain**



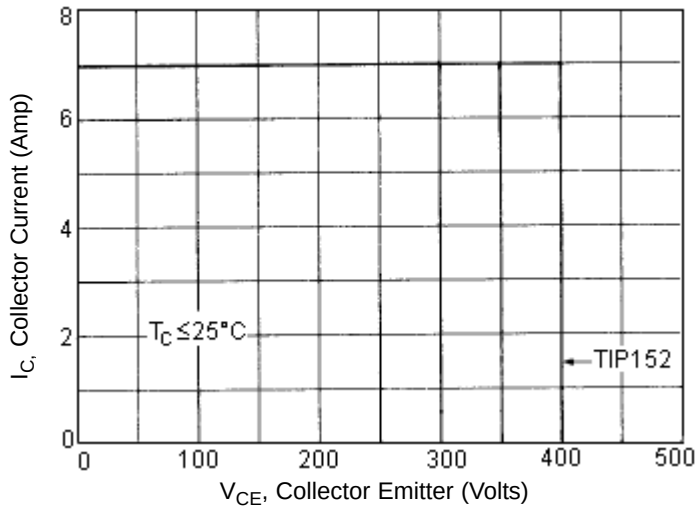

**Baes-Emitter Voltage**



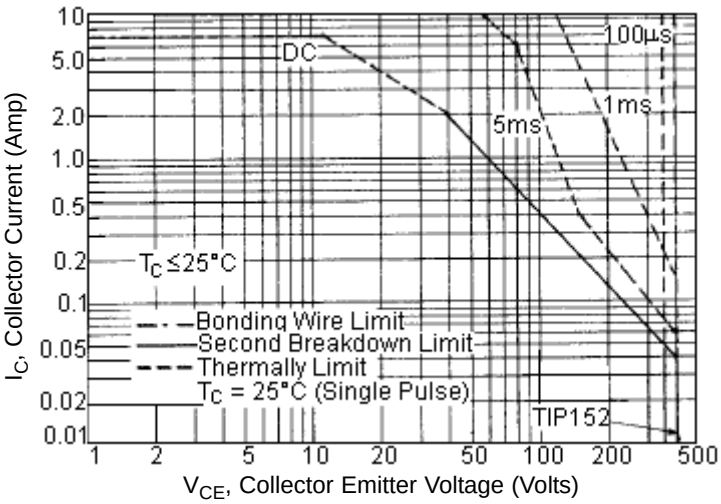

**Collector-Emitter Saturation Voltage**




**Reverse Bias Safe Operating Area**



**Active Region Safe Operating Area**




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 curve is base on $T_{J(PK)}$ = 150°C; $T_C$ is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)}$ ≤150°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.

## Part Number Table

| Description | Part Number |
|---|---|
| Darlington Transistor, TO-220 | TIP152 |

**Notes:**

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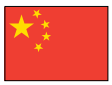

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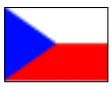

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