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# TIP150, TIP151, TIP152
# Silicon NPN Power Darlington Transistor

**Description:**

The TIP150, TIP151, and TIP152 are silicon NPN power Darlington transistors in a TO220 type package designed for use in automotive ignition, switching, and motor control applications.

**Features:**

- Collector–Emitter Sustaining Voltage:
  $V_{CEO(sus)}$ = 300V min (TIP150)
  $V_{CEO(sus)}$ = 350V min (TIP151)
  $V_{CEO(sus)}$ = 400V min (TIP152)
- Collector–Emitter Saturation Voltage: $V_{CE(sat)}$ = 2V max at $I_C$ = 5A
- Reverse–Base SOA: 300V to 400V at 7A

**Absolute Maximum Ratings:**

Collector–Emitter Voltage, $V_{CEO}$
- TIP150 . . . . . 300V
- TIP151 . . . . . 350V
- TIP152 . . . . . 400V

Collector–Base Voltage, $V_{CBO}$
- TIP150 . . . . . 300V
- TIP151 . . . . . 350V
- TIP152 . . . . . 400V

Emitter–Base Voltage, $V_{EBO}$ . . . . . 8V

Collectoer Current, $I_C$
- Continuous . . . . . 7A
- Peak . . . . . 10A

Base Current, $I_B$ . . . . . 1.5A

Total Power Dissipation ($T_C$ = +25°C), $P_D$ . . . . . 80W
- Derate above 25°C . . . . . 0.64W/°C

Operating Junction Temperature Range, $T_J$ . . . . . –65° to +150°C

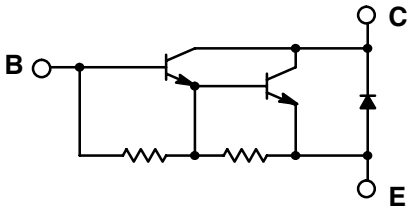
Storage Temperature Range, $T_{stg}$ . . . . . –65° to +150°C

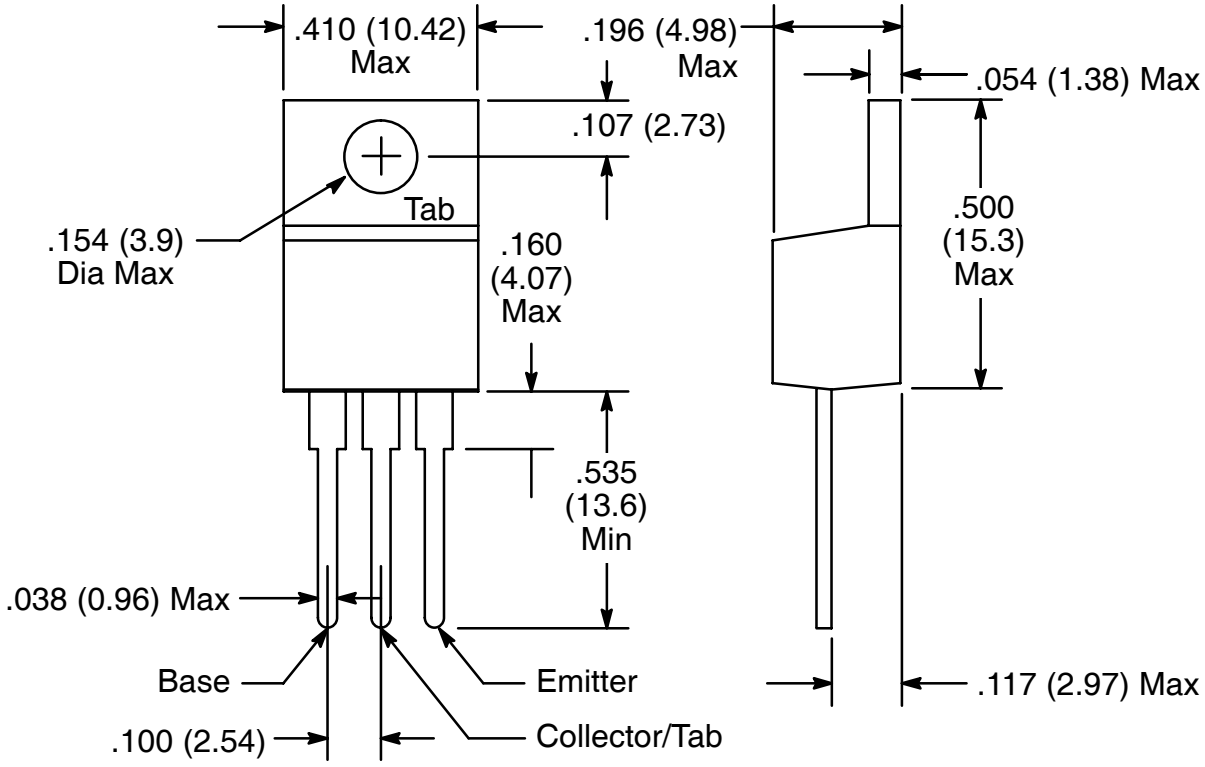
Thermal Resistance, Junction–to–Case, $R_{thJC}$ . . . . . 1.56°C/W

**Electrical Characteristics:** ($T_C$ = +25°C unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF Characteristics** | | | | | | |
| Collector–Emitter Breakdown Voltage TIP150 | $V_{(BR)CEO}$ | $I_C$ = 10mA, $I_B$ = 0, Note 1 | 300 | – | – | V |
| TIP151 | | | 350 | – | – | V |
| TIP152 | | | 400 | – | – | V |
| Collector–Base Breakdown Voltage TIP150 | $V_{(BR)CBO}$ | $I_C$ = 1mA, $I_B$ = 0, Note 1 | 300 | – | – | V |
| TIP151 | | | 350 | – | – | V |
| TIP152 | | | 400 | – | – | V |
| Collector Cutoff Current TIP150 | $I_{CEO}$ | $V_{CE}$ = 300V, $I_B$ = 0 | – | – | 250 | μA |
| TIP151 | | $V_{CE}$ = 350V, $I_B$ = 0 | – | – | 250 | μA |
| TIP152 | | $V_{CE}$ = 400V, $I_B$ = 0 | – | – | 250 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$ = 8V, $I_C$ = 0 | – | – | 15 | mA |
| **ON Characteristics** (Note 1) | | | | | | |
| DC Current Gain | $h_{FE}$ | $V_{CE}$ = 5V, $I_C$ = 2.5A | 150 | – | – | |
| | | $V_{CE}$ = 5V, $I_C$ = 5.0A | 50 | – | – | |
| | | $V_{CE}$ = 5V, $I_C$ = 7.0A | 15 | – | – | |
| Collector–Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = 1A, $I_B$ = 10mA | – | – | 1.5 | V |
| | | $I_C$ = 2A, $I_B$ = 100mA | – | – | 1.5 | V |
| | | $I_C$ = 5A, $I_B$ = 250mA | – | – | 2.0 | V |
| Base–Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$ = 2A, $I_B$ = 100mA | – | – | 2.2 | V |
| | | $I_C$ = 5A, $I_B$ = 250mA | – | – | 2.3 | V |
| Diode Forward Voltage | $V_F$ | $I_F$ = 7A | – | – | 3.5 | V |
| **Dynamic Characteristics** | | | | | | |
| Small–Signal Current Gain | $h_{fe}$ | $V_{CE}$ = 5V, $I_C$ = 500mA, f = 1kHz | 200 | – | – | |
| Output Capacitance | $C_{ob}$ | $V_{CB}$ = 10V, $I_E$ = 0, f = 1MHz | – | – | 150 | pF |
| **Switching Characteristics** | | | | | | |
| Delay Time | $t_d$ | $V_{CC}$ = 250V, $I_C$ = 5A, $I_{B1}$ = $-I_{B2}$ = 250mA, $t_p$ = 20μs, Duty Cycle ≤ 2% | – | 30 | – | ns |
| Rise Time | $t_r$ | | – | 180 | – | ns |
| Storage Time | $t_s$ | | – | 3.5 | – | ns |
| Fall Time | $t_f$ | | – | 1.6 | – | ns |

Note 1. Pulse test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.


B
C
E


.410 (10.42)
Max
.196 (4.98)
Max
.054 (1.38) Max
.107 (2.73)
Tab
.154 (3.9)
Dia Max
.160
(4.07)
Max
.500
(15.3)
Max
.535
(13.6)
Min
.038 (0.96) Max
Base
Emitter
.117 (2.97) Max
.100 (2.54)
Collector/Tab