

NPN power Darlington transistor

Features

- Monolithic Darlington transistor with integrated antiparallel collector-emitter diode
- Very high DC current gain

Applications

- Electronic ignition
- AC-DC motor control
- Alternator regulator

Description

The 2STP535FP is a planar NPN power transistor in monolithic Darlington configuration mounted in TO-220FP fully isolated package.

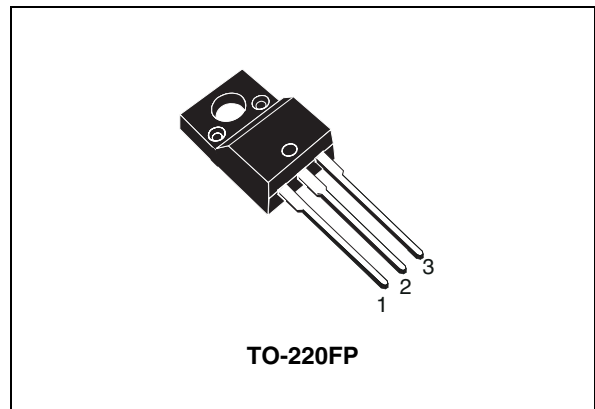


Figure 1. Internal schematic diagram

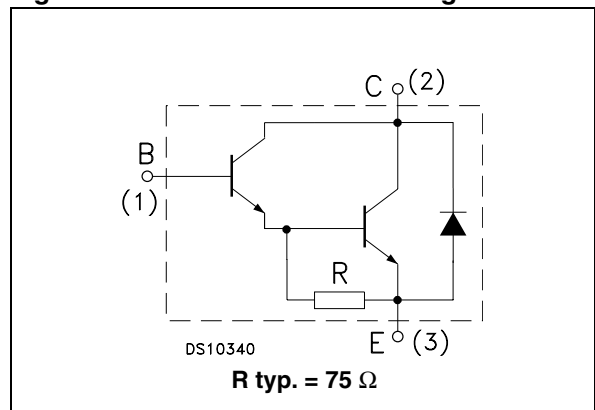


Table 1. Device summary

| Order code | Marking | Package | Packaging |
|------------|-----------|----------|-----------|
| 2STP535FP | 2STP535FP | TO-220FP | Tube |

1 Electrical ratings

Table 2. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|-----------|---|------------|------|
| V_{CBO} | Collector-base voltage ($I_E = 0$) | 180 | V |
| V_{CEO} | Collector-emitter voltage ($I_B = 0$) | 180 | V |
| V_{EBO} | Emitter-base voltage ($I_C = 0$) | 5 | V |
| I_C | Collector current | 8 | A |
| I_{CM} | Collector peak current ($t_p < 5$ ms) | 15 | A |
| I_B | Base current | 1 | A |
| P_{tot} | Total dissipation at $T_C \leq 25$ °C | 37 | W |
| T_{stg} | Storage temperature | -65 to 150 | °C |
| T_J | Max. operating junction temperature | 150 | °C |

Table 3. Thermal data

| Symbol | Parameter | Value | Unit |
|----------------|--------------------------------------|-------|------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 3.4 | °C/W |

2 Electrical characteristics

($T_{\text{case}} = 25\text{ °C}$ unless otherwise specified)

Table 4. Electrical characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------------------------|---|---|-------------|------|----------|---------------|
| I_{CEO} | Collector cut-off current ($I_{\text{B}} = 0$) | $V_{\text{CE}} = 180\text{ V}$ | | | 50 | μA |
| I_{CBO} | Collector-base cut-off current ($I_{\text{E}} = 0$) | $V_{\text{CB}} = 180\text{ V}$ | | | 50 | μA |
| I_{EBO} | Emitter-base cut-off current ($I_{\text{C}} = 0$) | $V_{\text{EB}} = 5\text{ V}$ | | | 100 | μA |
| $V_{\text{CEO(sus)}}^{(1)}$ | Collector-emitter sustaining voltage ($I_{\text{B}} = 0$) | $I_{\text{C}} = 30\text{ mA}$ | 180 | | | V |
| $V_{\text{CE(sat)}}^{(1)}$ | Collector-emitter saturation voltage | $I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 6\text{ mA}$ $I_{\text{C}} = 8\text{ A}$ $I_{\text{B}} = 80\text{ mA}$ | | | 2 2.5 | V V |
| $V_{\text{BE(on)}}^{(1)}$ | Base-emitter (on) voltage | $I_{\text{C}} = 8\text{ A}$ $V_{\text{CE}} = 4\text{ V}$ | | | 2.8 | V |
| $h_{\text{FE}}^{(1)}$ | DC current gain | $I_{\text{C}} = 3\text{ A}$ $V_{\text{CE}} = 4\text{ V}$ $I_{\text{C}} = 8\text{ A}$ $V_{\text{CE}} = 4\text{ V}$ | 1000 200 | | 20000 | |
| $V_{\text{F}}^{(1)}$ | Diode forward voltage | $I_{\text{F}} = 10\text{ A}$ | | | 2.8 | V |

1. Pulse test: pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

2.1 Electrical characteristics (curves)

Figure 2. Collector-emitter saturation voltage ($h_{FE} = 500$)

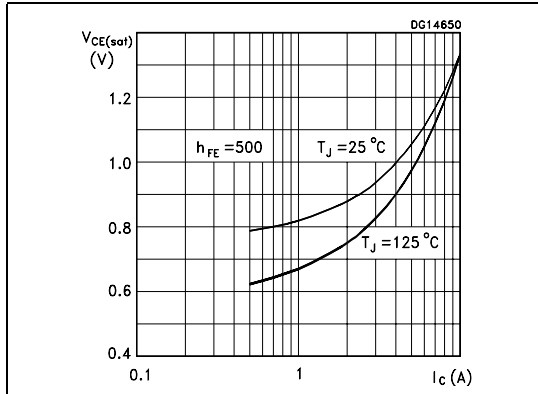


Figure 3. Collector-emitter saturation voltage ($h_{FE} = 100$)

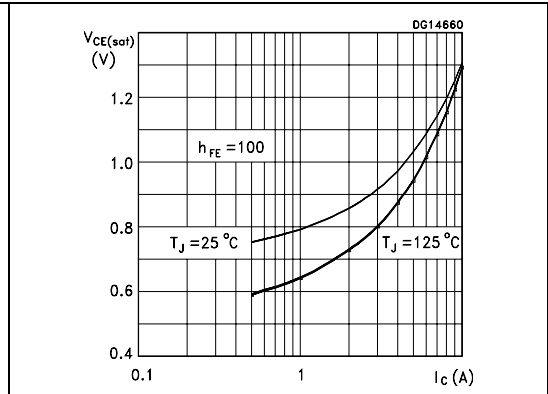
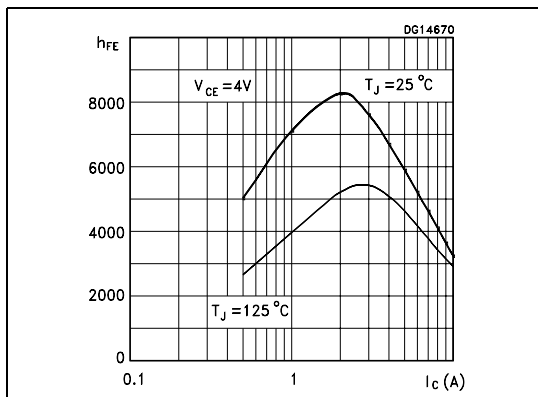


Figure 4. DC current gain

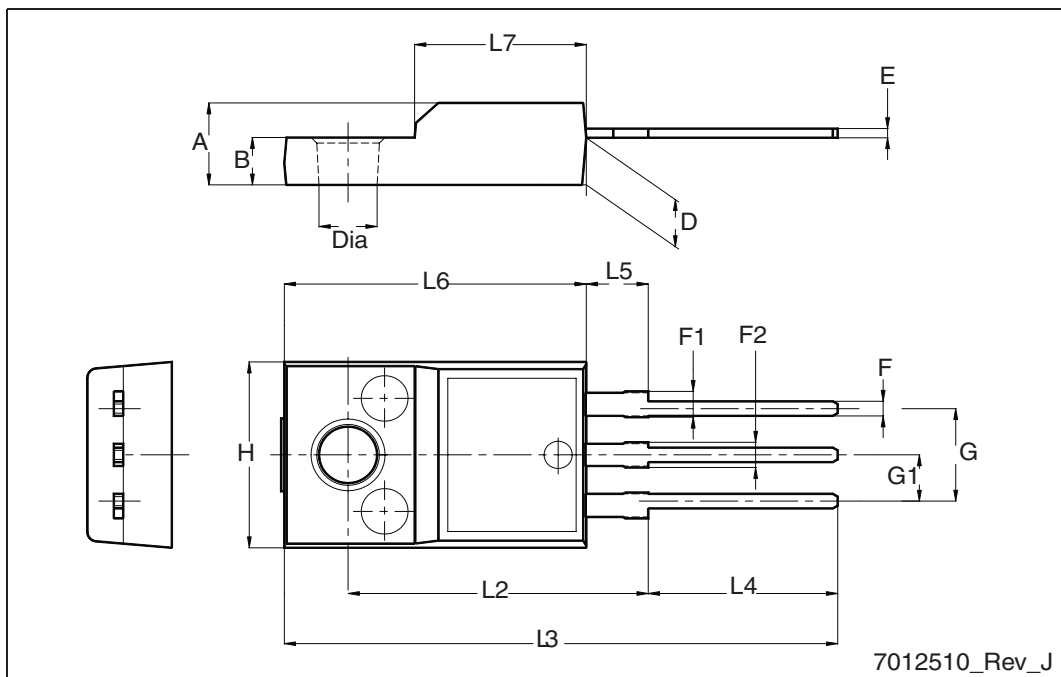


3 Package mechanical data

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TO-220FP mechanical data

| Dim. | mm | | |
|------|------|------|------|
| | Min. | Typ. | Max. |
| A | 4.4 | | 4.6 |
| B | 2.5 | | 2.7 |
| D | 2.5 | | 2.75 |
| E | 0.45 | | 0.7 |
| F | 0.75 | | 1 |
| F1 | 1.15 | | 1.70 |
| F2 | 1.15 | | 1.5 |
| G | 4.95 | | 5.2 |
| G1 | 2.4 | | 2.7 |
| H | 10 | | 10.4 |
| L2 | | 16 | |
| L3 | 28.6 | | 30.6 |
| L4 | 9.8 | | 10.6 |
| L5 | 2.9 | | 3.6 |
| L6 | 15.9 | | 16.4 |
| L7 | 9 | | 9.3 |
| Dia | 3 | | 3.2 |



4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|-----------------|
| 17-Aug-2009 | 1 | Initial release |

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