

## 2N5306



### NPN Darlington Transistor

This device is designed for applications requiring extremely high current gain at currents to 1.0 A. Sourced from Process 05. See MPSA14 for characteristics.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

| Symbol                            | Parameter  | Value       | Units |
|-----------------------------------|--|-------------|-------|
| V <sub>CEO</sub>                  | Collector-Emitter Voltage                        | 25          | V     |
| V <sub>CBO</sub>                  | Collector-Base Voltage                           | 25          | V     |
| V <sub>EBO</sub>                  | Emitter-Base Voltage                             | 12          | V     |
| I <sub>C</sub>                    | Collector Current - Continuous                   | 1.2         | A     |
| T <sub>J</sub> , T <sub>stg</sub> | Operating and Storage Junction Temperature Range | -55 to +150 | °C    |

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

#### Thermal Characteristics

TA = 25°C unless otherwise noted

| Symbol           | Characteristic                                | Max    | Units |
|------------------|---|--------|-------|
|                  |   | 2N5306 |       |
| P <sub>D</sub>   | Total Device Dissipation<br>Derate above 25°C | 625    | mW    |
|                  |   | 5.0    | mW/°C |
| R <sub>θJC</sub> | Thermal Resistance, Junction to Case          | 83.3   | °C/W  |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient       | 200    | °C/W  |

# NPN Darlington Transistor

(continued)

2N5306

## Electrical Characteristics

TA = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|--------|-----------|-----------------|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-------|

### OFF CHARACTERISTICS

|               |                                      |  |    |           |                                |
|---------------|--------------------------------------|--|----|-----------|--------------------------------|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage* | $I_C = 10 \text{ mA}, I_B = 0$   | 25 |           | V                              |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage     | $I_C = 0.1 \text{ }\mu\text{A}, I_E = 0$   | 25 |           | V                              |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage       | $I_E = 0.1 \text{ }\mu\text{A}, I_C = 0$   | 12 |           | V                              |
| $I_{CBO}$     | Collector Cutoff Current             | $V_{CB} = 25 \text{ V}, I_E = 0$<br>$V_{CB} = 25 \text{ V}, I_E = 0, T_A = 100 \text{ }^\circ\text{C}$ |    | 0.1<br>20 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{EBO}$     | Emitter Cutoff Current               | $V_{EB} = 12 \text{ V}, I_C = 0$   |    | 0.1       | $\mu\text{A}$                  |

### ON CHARACTERISTICS\*

|               |                                      |  |                 |        |   |
|---------------|--------------------------------------|--|-----------------|--------|---|
| $h_{FE}$      | DC Current Gain                      | $V_{CE} = 5.0 \text{ V}, I_C = 2.0 \text{ mA}$<br>$V_{CE} = 5.0 \text{ V}, I_C = 100 \text{ mA}$ | 7,000<br>20,000 | 70,000 |   |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 200 \text{ mA}, I_B = 0.2 \text{ mA}$   |                 | 1.4    | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage      | $I_C = 200 \text{ mA}, I_B = 0.2 \text{ mA}$   |                 | 1.6    | V |
| $V_{BE(on)}$  | Base-Emitter On Voltage              | $I_C = 200 \text{ mA}, V_{CE} = 5.0 \text{ V}$   |                 | 1.5    | V |

### SMALL SIGNAL CHARACTERISTICS

|          |                            |   |              |    |    |
|----------|----------------------------|---|--------------|----|----|
| $C_{cb}$ | Collector-Base Capacitance | $V_{CB} = 10 \text{ V}, f = 1.0 \text{ MHz}$  |              | 10 | pF |
| $h_{fe}$ | Small-Signal Current Gain  | $I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$<br>$f = 1.0 \text{ kHz}$<br>$I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$<br>$f = 10 \text{ MHz}$ | 7,000<br>6.0 |    |    |

\*Pulse Test: Pulse Width  $\leq 300 \text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$