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# MJ10012
# NPN Silicon Power Darlington Transistor
# TO3 Type Package

**Description:**

The MJ10012 is high–voltage, high–current Darlington transistor in a TO3 type package designed for automotive ignition, switching regulation and motor control applications.

**Features:**

- Collector–Emitter Sustaining Voltage: $V_{CEO(sus)}$ = 400Vdc (Min)
- 175 Watts Capability at 50 Volts

**Absolute Maximum Ratings:**

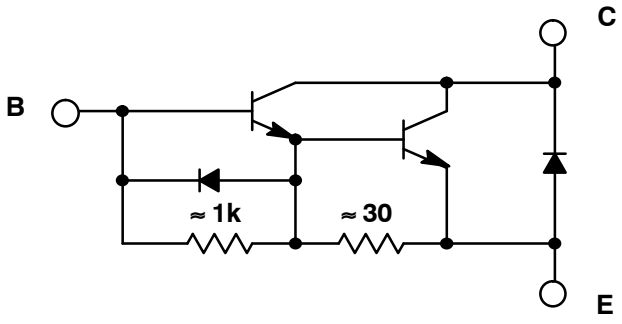
Collector–Emitter Voltage, $V_{CEO}$ . . . . . 400V
Collector–Emitter Voltage ($R_{BE}$ = 27≤ ), $V_{CER}$ . . . . . 550V
Collector–Base Voltage, $V_{CBO}$ . . . . . 600V
Emitter–Base Voltage, $V_{EBO}$ . . . . . 8V
Collector Current, $I_C$
    Continuous . . . . . 10A
    Peak (Note 1) . . . . . 15A
Base Current, $I_B$ . . . . . 2A
Total Power Dissipation, $P_D$
    $T_C$ = +25°C . . . . . 175W
    $T_C$ = +100°C . . . . . 100W
        Derate Above 25°C . . . . . 1.0W/°C
Operating Junction Temperature Range, $T_J$ . . . . . –65° to +200°C
Storage Temperature Range, $T_{stg}$ . . . . . –65° to +200°C
Thermal Resistance, Junction–to–Case, $R_{thJC}$ . . . . . 1.0°C/W
Lead Temperature (During Soldering, 1/8” from case, 5 sec), $T_L$ . . . . . +275°C

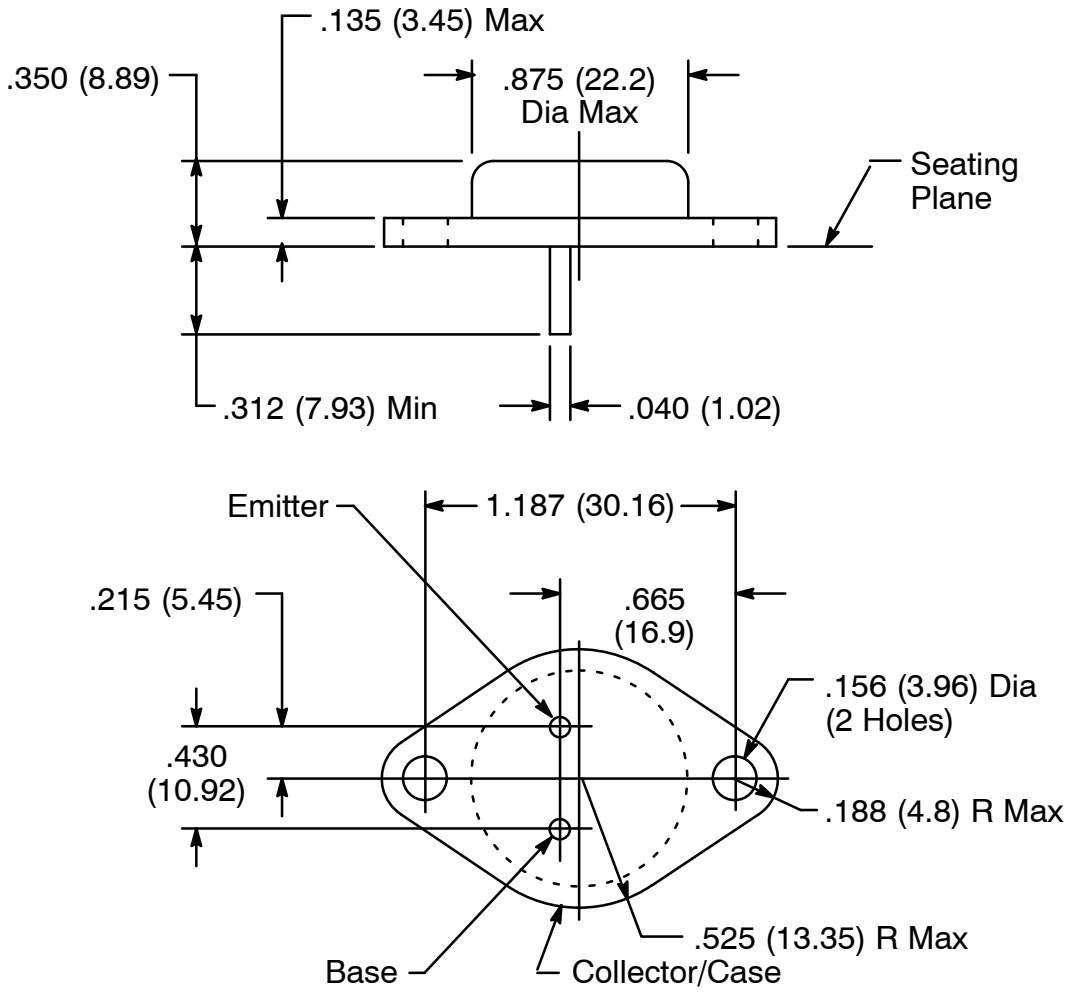
Note 1. Pulse Test: Pulse Width = 5ms, Duty Cycle ≤ 10%.

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF Characteristics** (Note 2) | | | | | | |
| Collector–Emitter Sustaining Voltage | $V_{CEO(sus)}$ | $I_C$ = 200mA, $I_B$ = 0, $V_{clamp}$ = 400V | 400 | – | – | V |
| | $V_{CER(sus)}$ | $I_C$ = 200mA, $R_{BE}$ = 27≤, $V_{clamp}$ = 400V | 425 | – | – | V |
| Collector Cutoff Current | $I_{CER}$ | $V_{CER}$ = 550V, $R_{BE}$ = 27≤ | – | – | 1.0 | mA |
| | $I_{CBO}$ | $V_{CBO}$= 600V, $I_E$ = 0 | – | – | 1.0 | mA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$ = 6V, $I_C$ = 0 | – | – | 40 | mA |
| **ON Characteristics** (Note 3) | | | | | | |
| DC Current Gain | $h_{FE}$ | $V_{CE}$ = 6V, $I_C$ = 3A | 300 | 550 | – | |
| | | $V_{CE}$ = 6V, $I_C$ = 6A | 100 | 350 | 2000 | |
| | | $V_{CE}$ = 6V, $I_C$ = 10A | 20 | 150 | – | |
| Collector–Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = 3A, $I_B$ = 600mA | – | – | 1.5 | V |
| | | $I_C$ = 6A, $I_B$ = 600mA | – | – | 2.0 | V |
| | | $I_C$ = 10A, $I_B$ = 2A | – | – | 2.5 | V |
| Base–Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$ = 6A, $I_B$ = 600mA | – | – | 2.5 | V |
| | | $I_C$ = 10A, $I_B$ = 2A | – | – | 3.0 | V |
| Base–Emitter ON Voltage | $V_{BE(on)}$ | $I_C$ = 10A, $V_{CE}$ = 6V | – | – | 2.8 | V |
| Diode Forward Voltage | $V_F$ | $I_F$ = 10A | – | 2.0 | 3.5 | V |
| **Dynamic Characteristics** | | | | | | |
| Output Capacitance | $C_{ob}$ | $V_{CB}$ = 10V, $I_E$ = 0, $f_{test}$ = 100kHz | 165 | – | 350 | pF |
| **Switching Characteristics** | | | | | | |
| Storage Time | $t_s$ | $V_{CC}$ = 12V, $I_C$ = 6A, $I_{B1}$ = $I_{B2}$ = 300mA | – | 7.5 | 15 | °s |
| Fall Time | $t_f$ | | – | 5.2 | 15 | °s |
| **Functional Tests** | | | | | | |
| Pulsed Energy Test | $I_C2_L/2$ | | – | – | 180 | mJ |

Note 2. Pulse Test: Pulse Width = 300° s, Duty Cycle = 2%.




.135 (3.45) Max
.350 (8.89)
.875 (22.2)
Dia Max
Seating
Plane
.312 (7.93) Min
.040 (1.02)
Emitter
1.187 (30.16)
.215 (5.45)
.665
(16.9)
.156 (3.96) Dia
(2 Holes)
.430
(10.92)
.188 (4.8) R Max
.525 (13.35) R Max
Base
Collector/Case