

100V NPN HIGH VOLTAGE TRANSISTOR IN TO252

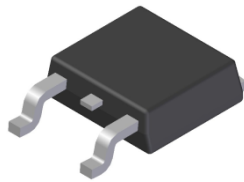
Features

- $BV_{CEO} > 100V$
- $I_C = 3A$ high Continuous Collector Current
- $I_{CM} = 5A$ Peak Pulse Current
- Ideal for Power Switching or Amplification Applications
- Complementary PNP Type: MJD32C
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

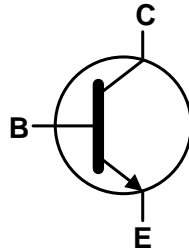
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.34 grams (Approximate)

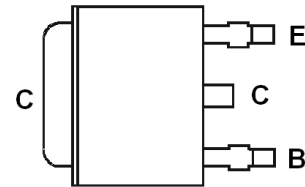
TO252 (DPAK)



Top View



Device Schematic



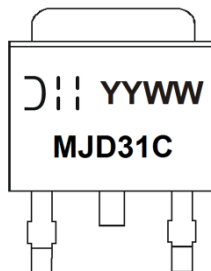
Pin Out Configuration
Top View

Ordering Information (Note 4)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|------------|---------|--------------------|-----------------|-------------------|
| MJD31C-13 | AEC-Q101 | MJD31C | 13 | 16 | 2,500 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
 3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



- MJD31C = Product Type Marking Code
- DII = Manufacturers' code marking
- YYWW = Date Code Marking
- YY = Last Digit of Year (ex: 17 = 2017)
- WW = Week Code (01 – 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 100 | V |
| Collector-Emitter Voltage | V _{CEO} | 100 | V |
| Emitter-Base Voltage | V _{EBO} | 6 | V |
| Continuous Collector Current | I _C | 3 | A |
| Peak Pulse Collector Current | I _{CM} | 5 | A |
| Continuous Base Current | I _B | 1 | A |
| Power Dissipation | P _D | 15 | W |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

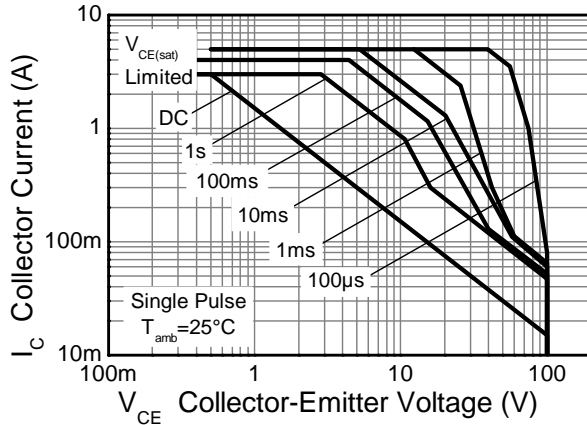
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation | P _D | (Note 5) | 3.9 |
| | | (Note 6) | 2.1 |
| | | (Note 7) | 1.6 |
| Thermal Resistance, Junction to Ambient Air | R _{θJA} | (Note 5) | 32 |
| | | (Note 6) | 59 |
| | | (Note 7) | 80 |
| Thermal Resistance, Junction to Leads | R _{θJL} | 3.6 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

ESD Ratings (Note 9)

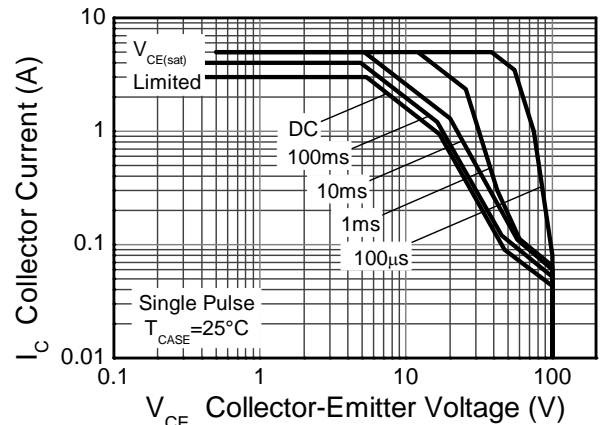
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
- For a device mounted with the exposed collector pad on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as note (5), except mounted on 25mm x 25mm 1oz copper.
 - Same as note (5), except mounted on minimum recommended pad (MRP) layout.
 - Thermal resistance from junction to solder-point (on the exposed collector pad).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

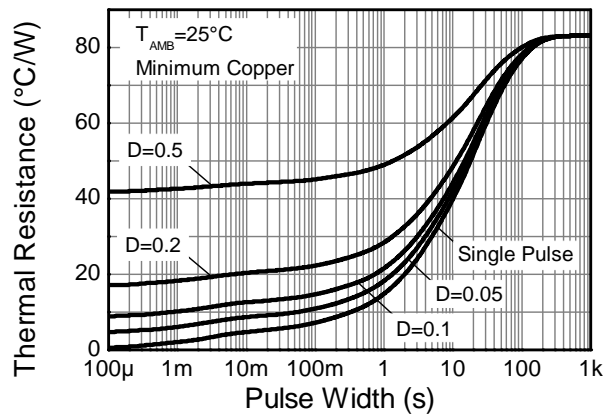
Thermal Characteristics



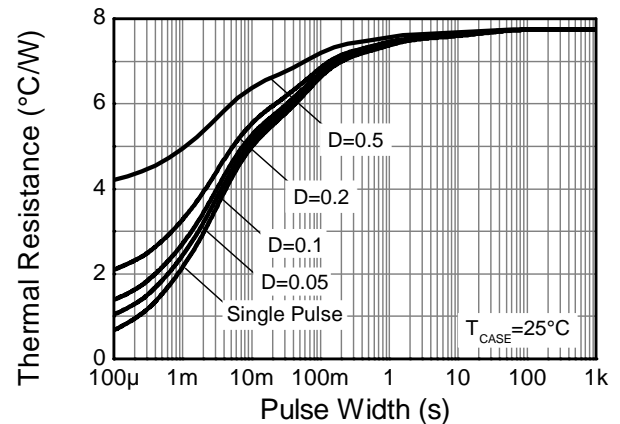
Safe Operating Area



Safe Operating Area



Transient Thermal Impedance



Transient Thermal Impedance

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------|----------|-----|---------|---------------|--|
| Collector-Emitter Breakdown Voltage (Note 10) | BV_{CEO} | 100 | — | — | V | $I_C = 30\text{mA}, I_B = 0$ |
| Collector Cut-off Current | I_{CEO} | — | — | 1 | μA | $V_{CB} = 60\text{V}, I_B = 0$ |
| Collector Cut-off Current | I_{CES} | — | — | 1 | μA | $V_{CE} = 100\text{V}, V_{EB} = 0$ |
| Emitter Cut-off Current | I_{EBO} | — | — | 1 | μA | $V_{EB} = 5\text{V}, I_C = 0$ |
| Collector-Emitter Saturation Voltage (Note 10) | $V_{CE(sat)}$ | — | — | 1.2 | V | $I_C = 3.0\text{A}, I_B = 375\text{mA}$ |
| Base-Emitter Turn-On Voltage (Note 10) | $V_{BE(on)}$ | — | — | 1.8 | V | $I_C = 3\text{A}, V_{CE} = 4\text{V}$ |
| DC Current Gain (Note 10) | h_{FE} | 25 10 | — | — 50 | — | $V_{CE} = 4\text{V}, I_C = 1\text{A}$ $V_{CE} = 4\text{V}, I_C = 3\text{A}$ |
| Current Signal Current Gain | H_{fe} | 20 | — | — | — | $V_{CE} = 10\text{V}, I_C = 0.5\text{A}, f = 1\text{KHz}$ |
| Current Gain-Bandwidth Product | f_T | 3.0 | — | — | MHz | $I_C = 500\text{mA}, V_{CE} = 10\text{V}, f = 1\text{MHz}$ |

Note: 10. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

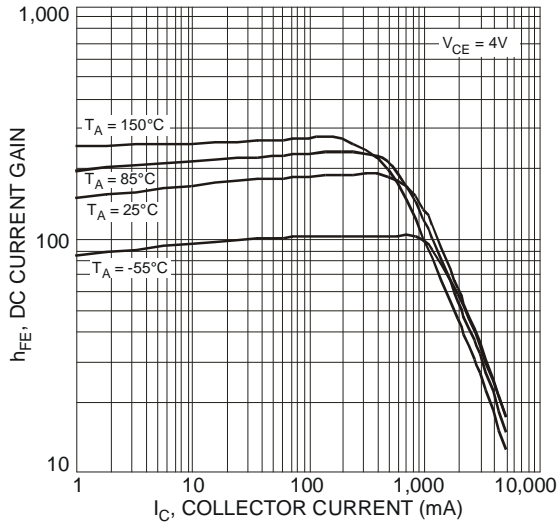


Figure 1 Typical DC Current Gain vs. Collector Current

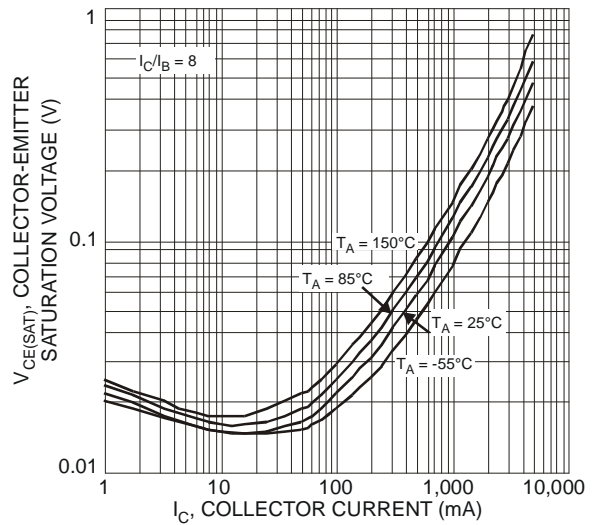


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

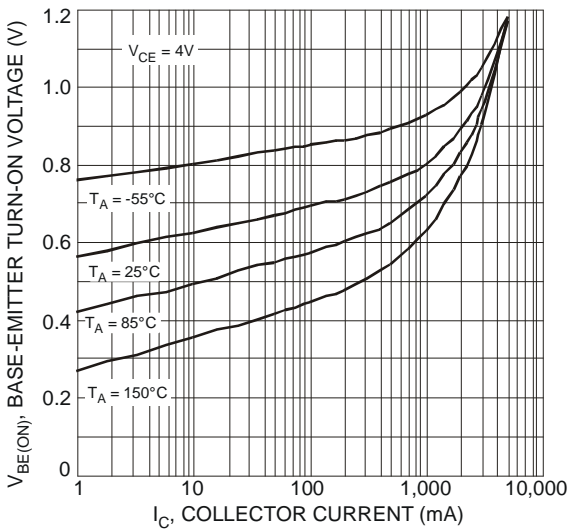


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

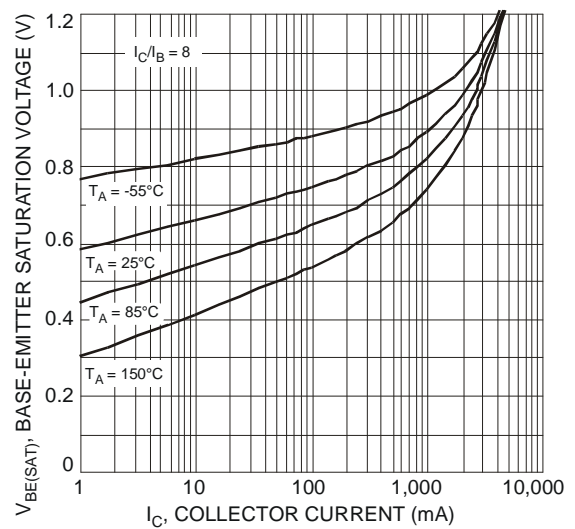


Figure 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

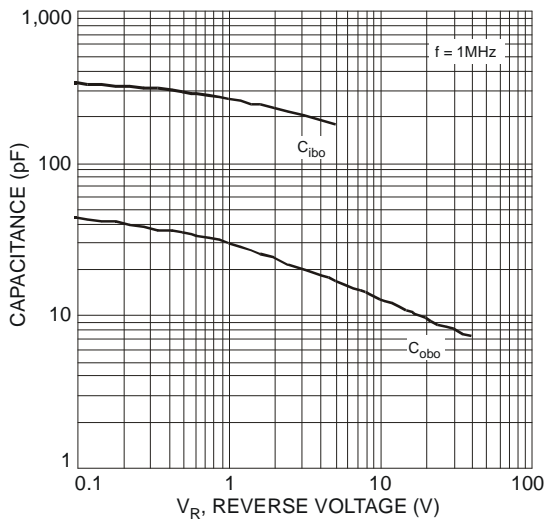
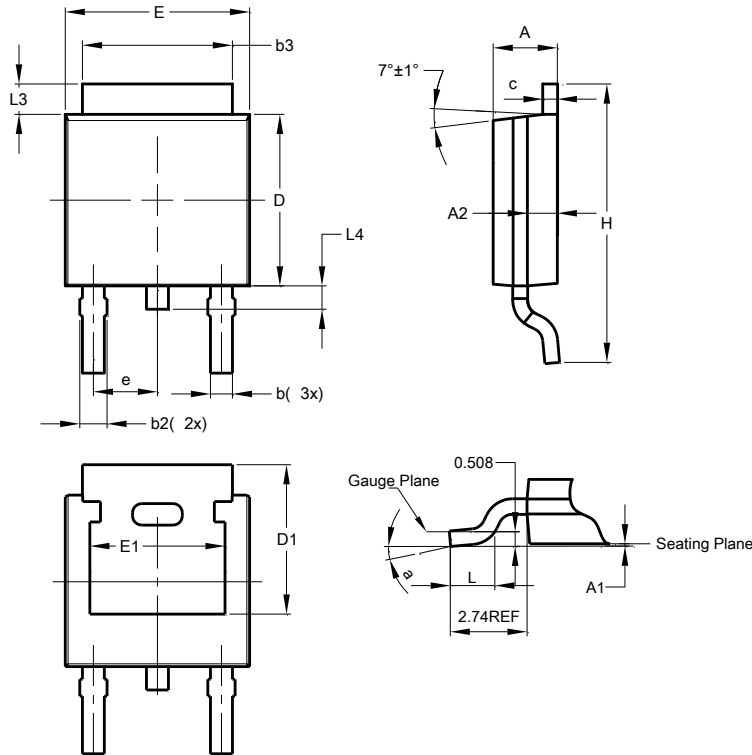


Figure 5 Typical Capacitance Characteristics

Package Outline Dimensions

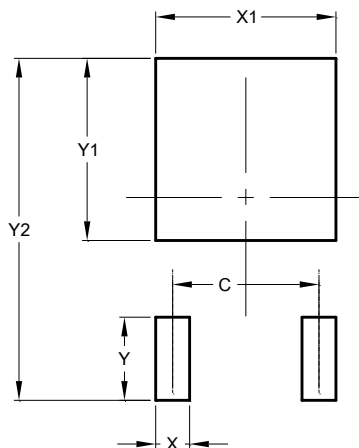
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| TO252 (DPAK) | | | |
|----------------------|------|-------|-------|
| Dim | Min | Max | Typ |
| A | 2.19 | 2.39 | 2.29 |
| A1 | 0.00 | 0.13 | 0.08 |
| A2 | 0.97 | 1.17 | 1.07 |
| b | 0.64 | 0.88 | 0.783 |
| b2 | 0.76 | 1.14 | 0.95 |
| b3 | 5.21 | 5.46 | 5.33 |
| c | 0.45 | 0.58 | 0.531 |
| D | 6.00 | 6.20 | 6.10 |
| D1 | 5.21 | - | - |
| e | - | - | 2.286 |
| E | 6.45 | 6.70 | 6.58 |
| E1 | 4.32 | - | - |
| H | 9.40 | 10.41 | 9.91 |
| L | 1.40 | 1.78 | 1.59 |
| L3 | 0.88 | 1.27 | 1.08 |
| L4 | 0.64 | 1.02 | 0.83 |
| a | 0° | 10° | - |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 4.572 |
| X | 1.060 |
| X1 | 5.632 |
| Y | 2.600 |
| Y1 | 5.700 |
| Y2 | 10.700 |

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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