

60V NPN MEDIUM POWER TRANSISTOR IN E-LINE

Features

- $BV_{CEO} > 60V$
- $I_C = 2A$ High Continuous Collector Current
- $I_{CM} = 6A$ Peak Pulse Current
- T_J up to $+200^\circ C$ for High Temperature Operation
- Low Saturation Voltage $< 300mV @ 1A$
- $P_D = 1W$ Power dissipation
- **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**
- **PPAP Capable (Note 4)**

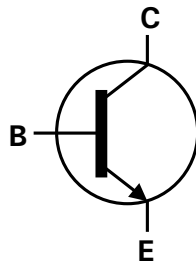
Mechanical Data

- Case: E-Line (TO-92 Compatible)
- Case Material: molded plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.159 grams (approximate)

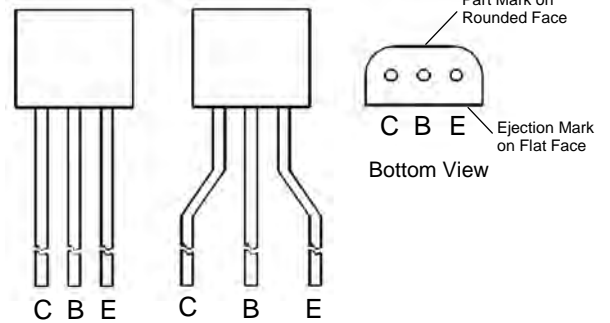
E-Line
(TO-92 Compatible)



Flat Face View

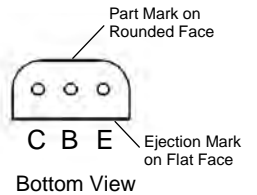


Device Symbol



Rounded Face View

Pin-Out Configuration



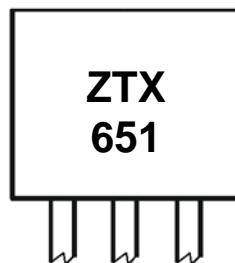
Bottom View

Ordering Information (Notes 4 & 5)

| Part Number | Compliance | Marking | Case | Leads | Quantity |
|-------------|------------|---------|--------|----------|--------------------------|
| ZTX651 | AEC-Q101 | ZTX651 | E-Line | Straight | 4,000 loose in a Box |
| ZTX651Q | Automotive | ZTX651 | E-Line | Straight | 4,000 loose in a Box |
| ZTX651STZ | AEC-Q101 | ZTX651 | E-Line | Joggled | 2,000 taped per Ammo Box |
| ZTX651QSTZ | Automotive | ZTX651 | E-Line | Joggled | 2,000 taped per Ammo Box |

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



Rounded Face View

ZTX651 = Product type Marking Code

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

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 80 | V |
| Collector-Emitter Voltage | V _{CEO} | 60 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Continuous Collector Current | I _C | 2 | A |
| Peak Pulse Current | I _{CM} | 6 | A |

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

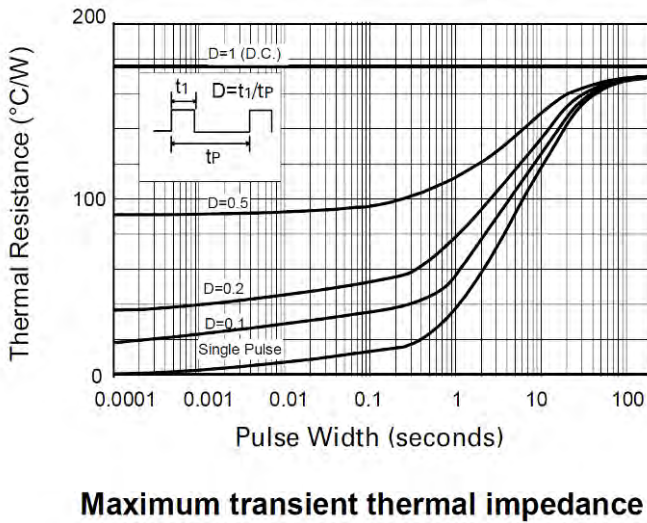
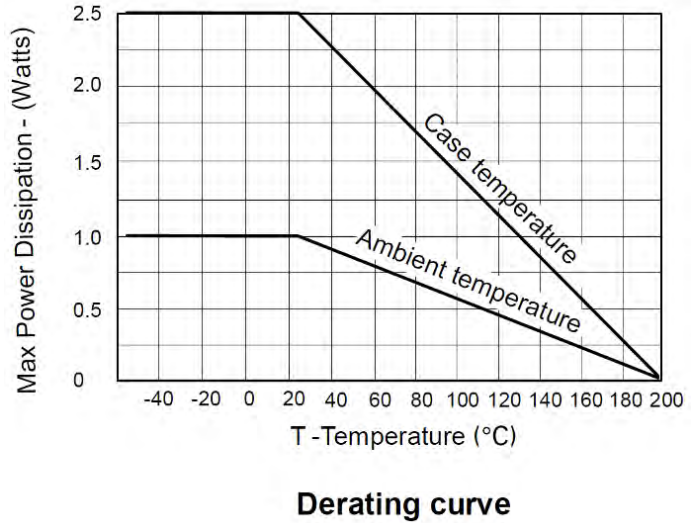
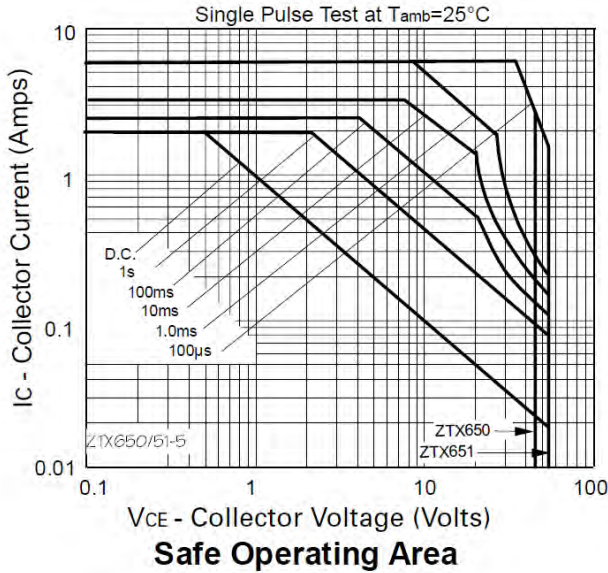
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation (Note 6) | P _D | 1.5 | W |
| Power Dissipation (Note 7) | P _D | 1 | W |
| Thermal Resistance Junction to Ambient (Note 6) | R _{θJA} | 116 | °C/W |
| Thermal Resistance Junction to Ambient (Note 7) | R _{θJA} | 175 | °C/W |
| Thermal Resistance Junction to Lead (Note 8) | R _{θJL} | 70 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +200 | °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:
6. For a through-hole device mounted at the seating plane (2.5mm lead length) with the collector lead on 25mm x 25mm 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 7. Same as note (5), except the device is mounted on minimum recommended pad layout with 12mm lead length from the bottom of package to the board.
 8. Thermal resistance from junction to solder-point at the seating plane (2.5mm from the bottom of package along the collector lead).
 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

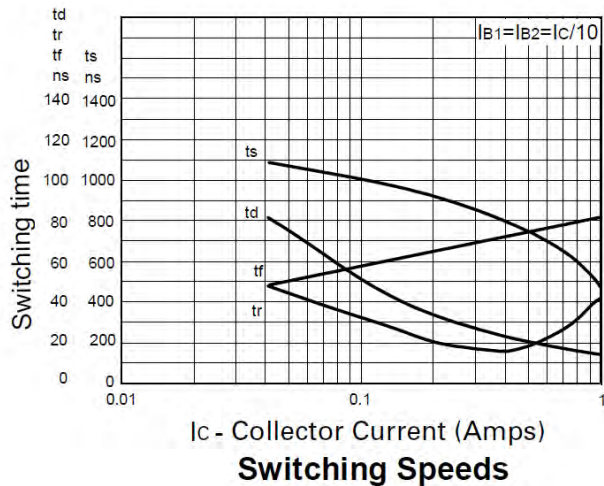
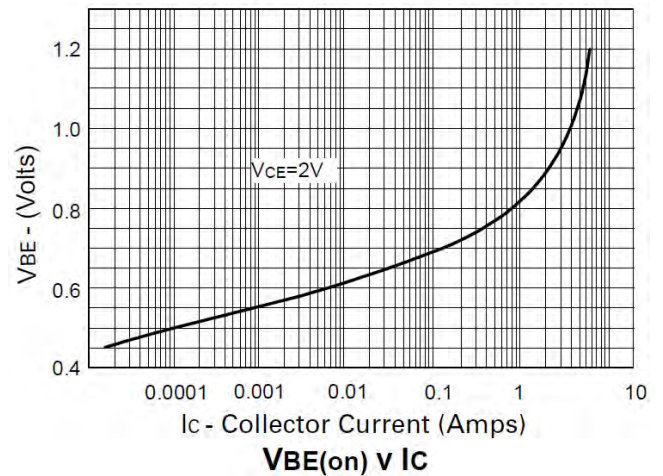
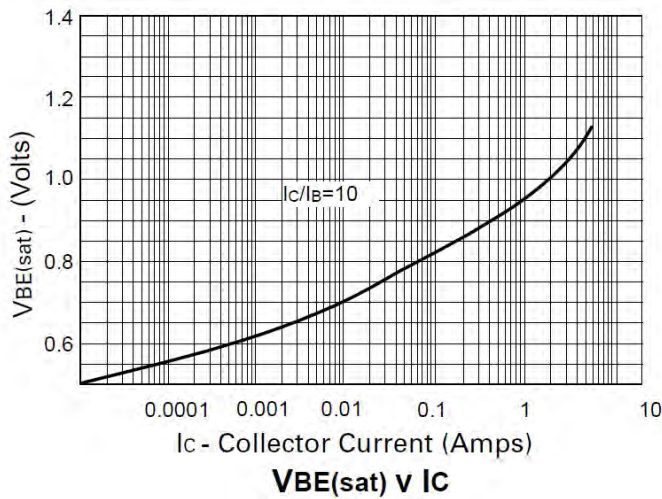
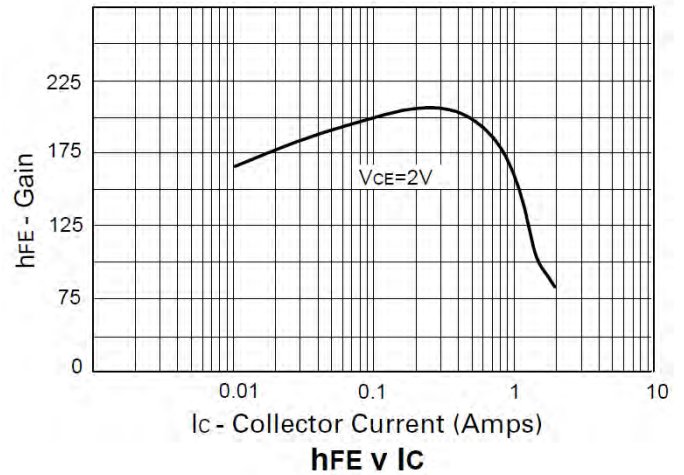
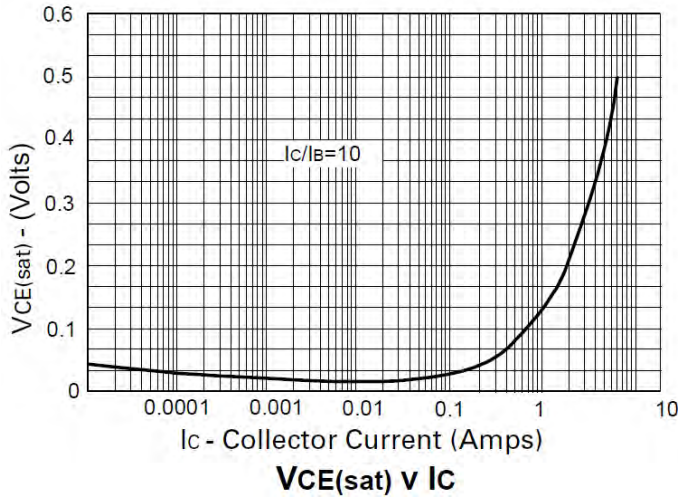


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|-----------------------|-------------------------|--------------------|----------|---|
| Collector-Base Breakdown Voltage | BV _{CBO} | 80 | — | — | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage (Note 10) | BV _{CEO} | 60 | — | — | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 7 | — | — | V | I _E = 100μA |
| Collector Cut-off Current | I _{CBO} | — | — | 0.1 10 | μA μA | V _{CB} = 60V V _{CB} = 60V, T _{amb} = 100°C |
| Emitter Cut-off Current | I _{EBO} | — | — | 0.1 | μA | V _{EB} = 6V |
| Collector-Emitter Saturation Voltage (Note 10) | V _{CE(sat)} | — | 120 230 | 300 500 | mV | I _C = 1A, I _B = 100mA I _C = 2A, I _B = 200mA |
| Base-Emitter Saturation Voltage (Note 10) | V _{BE(sat)} | — | 0.9 | 1.25 | V | I _C = 1A, I _B = 100mA |
| Base-Emitter Turn-On Voltage (Note 10) | V _{BE(on)} | — | 0.8 | 1 | V | I _C = 1A, V _{CE} = 2V |
| DC Current Gain (Note 10) | h _{FE} | 70 100 80 40 | 200 200 170 80 | — 300 — — | — | I _C = 50mA, V _{CE} = 2V I _C = 500mA, V _{CE} = 2V I _C = 1A, V _{CE} = 2V I _C = 2A, V _{CE} = 2V |
| Current Gain-Bandwidth Product (Note 10) | f _T | 140 | 175 | — | MHz | V _{CE} = 5V, I _C = 100mA f = 100MHz |
| Output Capacitance (Note 10) | C _{obo} | — | — | 30 | pF | V _{CB} = 10V, f = 1MHz |
| Turn-On Times | t _{on} | — | 45 | — | ns | I _C = 500mA, I _{B1} = I _{B2} = 50mA, |
| Turn-Off Times | t _{off} | — | 800 | — | ns | V _{CC} = 10V |

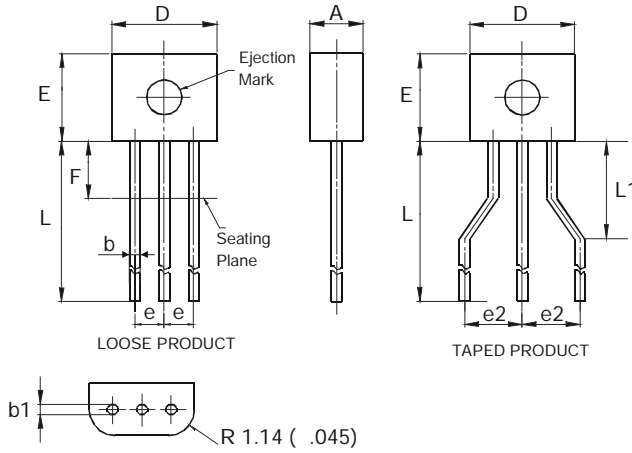
Notes: 10. Measured under pulsed conditions. Pulse width ≤ 300 μs. Duty cycle ≤ 2%

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



Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| E-Line | | | |
|-----------------------------|-------|-------|------|
| Dim | Min | Max | Typ |
| A | 2.16 | 2.41 | - |
| b | 0.41 | 0.495 | - |
| b1 | 0.41 | 0.495 | - |
| D | 4.37 | 4.77 | - |
| E | 3.61 | 4.01 | - |
| e | - | - | 1.27 |
| e2 | - | - | 2.54 |
| F | - | 2.50 | - |
| L | 13.00 | 13.97 | - |
| L1 | 2.50 | 3.50 | - |
| All Dimensions in mm | | | |

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