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**ZTX696B**

## NPN SILICON PLANAR MEDIUM-POWER HIGH-GAIN TRANSISTOR

## Features

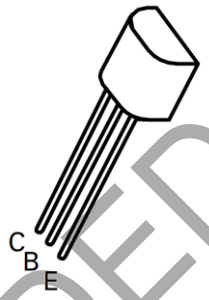
- 180 Volt $V_{CEO}$
- Gain of 500 at $I_C$ = 100mA
- Very Low Saturation Voltage
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

## Applications

- Darlington replacement
- Battery-powered circuits
- Motor drivers
- Relay/solenoid drivers

## Pin Assignments

E-Line (TO92 Compatible)




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## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 180 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 180 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5 | V |
| Peak Pulse Current | $I_{CM}$ | 1 | A |
| Continuous Collector Current | $I_C$ | 0.5 | A |
| Practical Power Dissipation (Note 1) | $P_{itop}$ | 1.5 | W |
| Power Dissipation at $T_{amb}$ = +25°C<br>Derate above +25°C | $P_{tot}$ | 1<br>5.7 | W<br>mW/°C |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +200 | °C |

## Electrical Characteristics (@ $T_{amb}$ = +25°C)

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 180 | — | — | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 180 | — | — | V | $I_C$ = 10mA (Note 2) |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 5 | — | — | V | $I_E$ = 100µA |
| Collector Cutoff Current | $I_{CBO}$ | — | — | 0.1 | µA | $V_{CB}$ = 145V |
| Emitter Cutoff Current | $I_{EBO}$ | — | — | 0.1 | µA | $V_{EB}$ = 4V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —<br>—<br>— | —<br>—<br>— | 0.2<br>0.2<br>0.25 | V | $I_C$ = 50mA, $I_B$ = 0.5mA (Note 2)<br>$I_C$ = 100mA, $I_B$ = 2mA (Note 2)<br>$I_C$ = 200mA, $I_B$ = 5mA (Note 2) |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | — | — | 0.9 | V | $I_C$ = 200mA, $I_B$ = 5mA (Note 2) |
| Base-Emitter Turn-On Voltage | $V_{BE(on)}$ | — | — | 0.9 | V | $I_C$ = 200mA, $V_{CE}$ = 5V (Note 2) |
| Static Forward Current Transfer Ratio | $h_{FE}$ | 500<br>150 | —<br>— | —<br>— | — | $I_C$ = 100mA, $V_{CE}$ = 5V (Note 2)<br>$I_C$ = 200mA, $V_{CE}$ = 5V (Note 2) |

Notes: 1. The power which can be dissipated assuming the device is mounted in a typical manner on a PCB with copper equal to 1-inch square minimum.
2. Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.


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## Electrical Characteristics (@ $T_{amb}$ = +25°C) (continued)

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Transition Frequency | $f_T$ | 70 | — | — | MHz | $I_C$ = 50mA, $V_{CE}$ = 5V<br>f = 50MHz |
| Input Capacitance | $C_{ibo}$ | — | 200 | — | pF | $V_{EB}$ = 0.5V, f = 1MHz |
| Output Capacitance | $C_{obo}$ | — | 6 | — | pF | $V_{CE}$ = 10V, f = 1MHz |
| Switching Times | $t_{on}$<br>$t_{off}$ | —<br>— | 80<br>4400 | —<br>— | ns | $I_C$ = 100mA, $I_{B1}$ = 10mA<br>$I_{B2}$ = 10mA, $V_{CC}$ = 50V |

## Thermal Characteristics

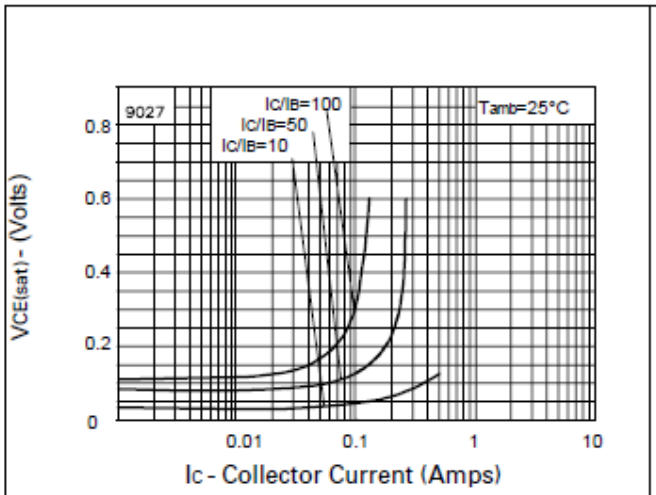
| Parameter | | Symbol | Max | Unit |
|---|---|---|---|---|
| Thermal Resistance | Junction to Ambient$_1$ | $R_{th(j\text{-}amb)1}$ | 175 | °C/W |
| | Junction to Ambient$_2$ | $R_{th(j\text{-}amb)2}$ (Note 3) | 116 | |
| | Junction to Case | $R_{th(j\text{-}case)}$ | 70 | |

Note: 3. Device mounted on PCB with copper equal to 1 sq. inch minimum.

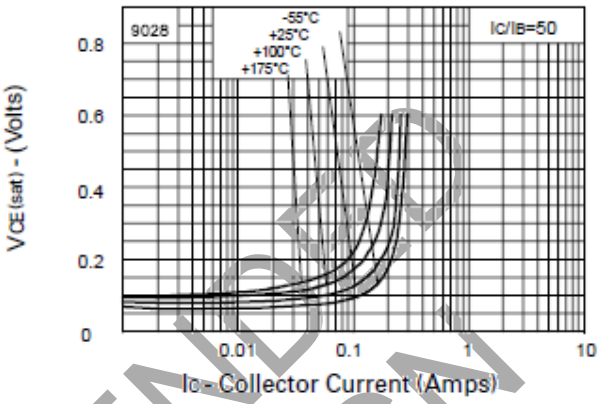
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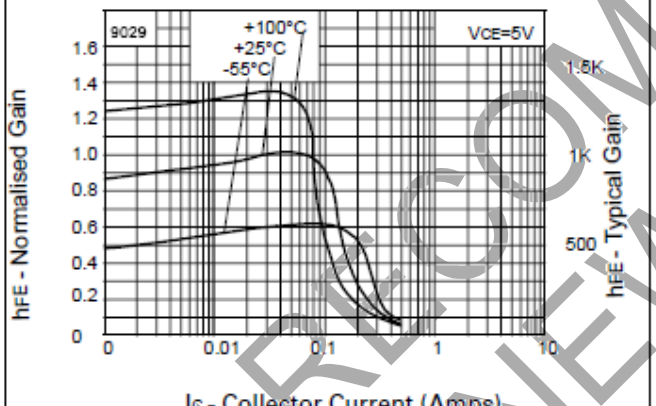
## Typical Characteristics



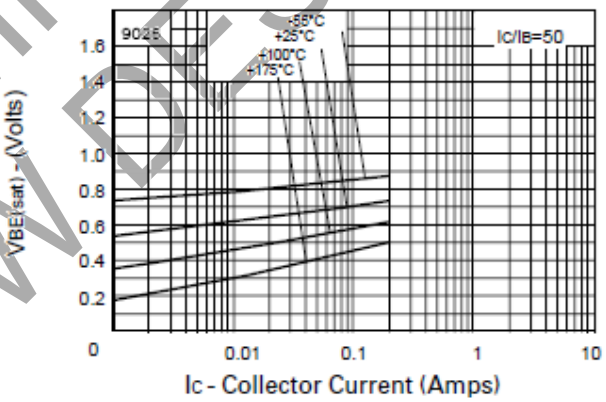

VCE(sat) v IC



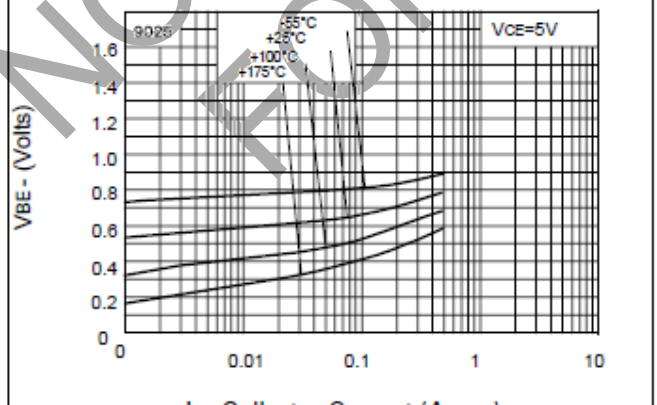

VCE(sat) v IC



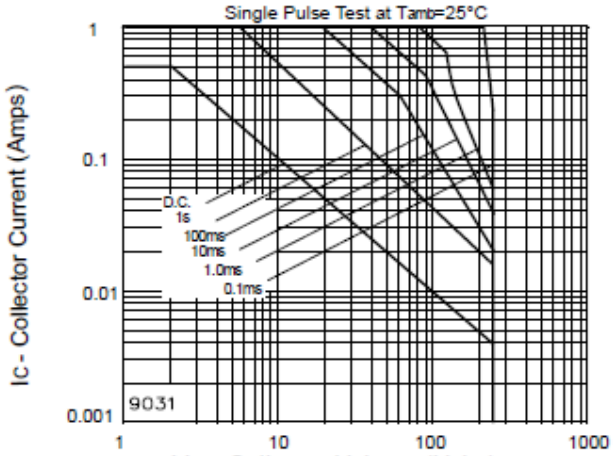

hFE v IC




VBE(sat) v IC




VBE(on) v IC




Safe Operating Area

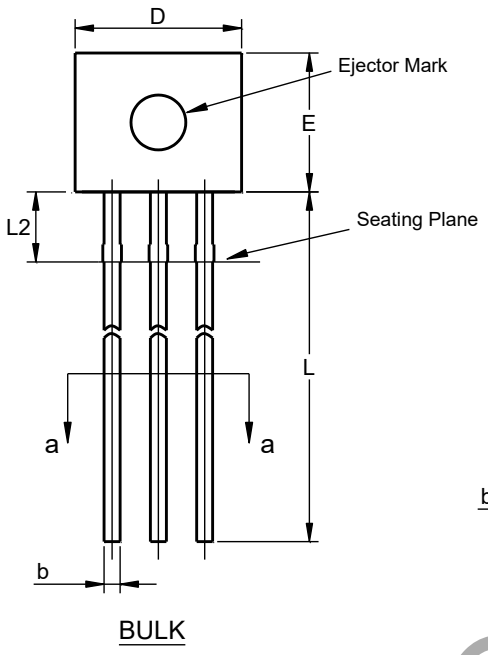
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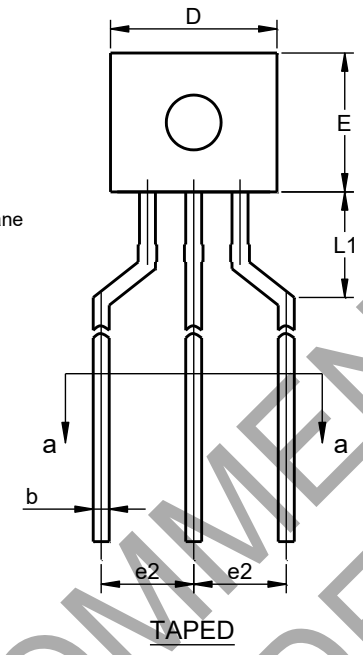

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## Package Outline Dimensions

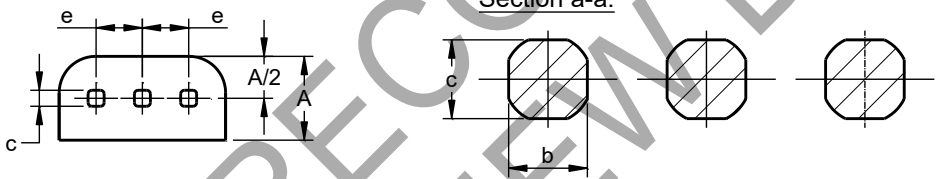
Please see http://www.diodes.com/package-outlines.html for the latest version.

**E-Line**




| E-Line | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 2.16 | 2.41 | 2.28 |
| **b** | 0.41 | 0.49 | 0.44 |
| **c** | 0.41 | 0.49 | 0.44 |
| **D** | 4.37 | 4.77 | 4.57 |
| **E** | 3.61 | 4.01 | 3.90 |
| **e** | 1.27 REF | | |
| **e2** | 2.54 REF | | |
| **L** | 13.00 | 13.97 | 13.50 |
| **L1** | 2.50 | 3.50 | -- |
| **L2** | -- | -- | 2.50 |
| **All Dimensions in mm** | | | |

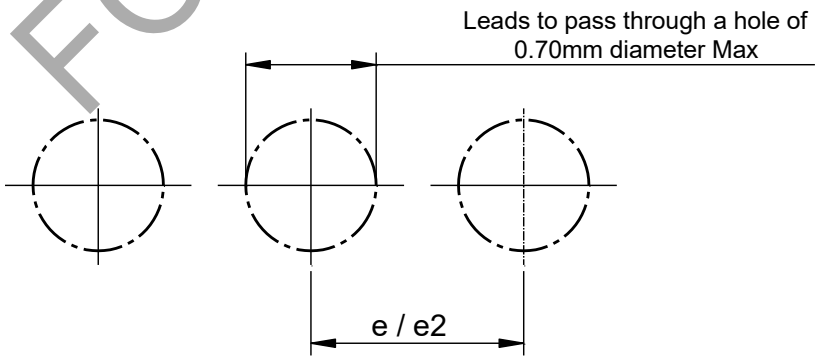



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## Suggested Pad Layout

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

**E-Line**





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