# 40V PNP MEDIUM POWER TRANSISTOR IN SOT23

## Features

- $BV_{CEO}$ > -40V
- $BV_{ECO}$ > -3V
- $I_C$ = -3A Continuous Collector Current
- $V_{CE(sat)}$ < -85mV @ -1A
- $R_{CE(sat)}$ = 55mΩ typical
- $P_D$ = 1.25W
- High Power Dissipation SOT23 Package
- High Peak Current
- Low Saturation Voltage
- 3V Reverse Blocking Voltage
- Complementary Part Number: ZXTN25040DFH
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

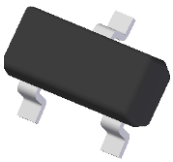
## Mechanical Data

- Case: SOT23
- 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 e3
- Weight: 0.008 grams (Approximate)

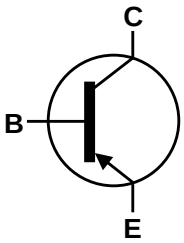
## Applications

- MOSFET and IGBT gate driving
- DC-DC converters
- Motor drives
- High-side drivers

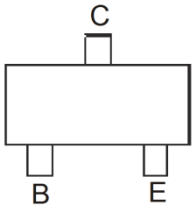
SOT23



Top View




Device Symbol



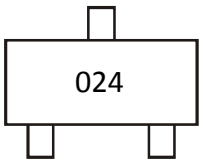

Top View
Pin-Out

## Ordering Information (Note 4)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| ZXTP25040DFHTA | 024 | 7 | 8 | 3,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information




024 = Product Type Marking Code

## Absolute Maximum Ratings @ $T_A$ = +25°C, unless otherwise specified.

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -45 | V |
| Collector-Emitter Voltage (Forward Blocking) | $V_{CEO}$ | -40 | V |
| Emitter-collector voltage (Reverse Blocking) | $V_{ECO}$ | -3 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -7 | V |
| Continuous Collector Current | $I_C$ | -3 | A |
| Peak Pulse Current | $I_{CM}$ | -9 | A |

## Thermal Characteristics @ $T_A$ = +25°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation<br>Linear derating factor | (Note 5) | $P_D$ | 0.73<br>5.84 | W<br>mW/°C |
| | (Note 6) | | 0.78<br>6.24 | |
| | (Note 7) | | 1.05<br>8.4 | |
| | (Note 8) | | 1.25<br>9.6 | |
| | (Note 9) | | 1.81<br>14.5 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 171 | °C/W |
| | (Note 6) | | 160 | |
| | (Note 7) | | 119 | |
| | (Note 8) | | 100 | |
| | (Note 9) | | 69 | |
| Thermal Resistance, Junction to Lead | (Note 10) | $R_{\theta JL}$ | 74.95 | °C/W |
| Thermal Resistance, Junction to Case | (Note 11) | $R_{\theta JC}$ | 45 | °C/W |
| Operating and Storage Temperature Range | — | $T_J$, $T_{STG}$ | -55 to +150 | °C |

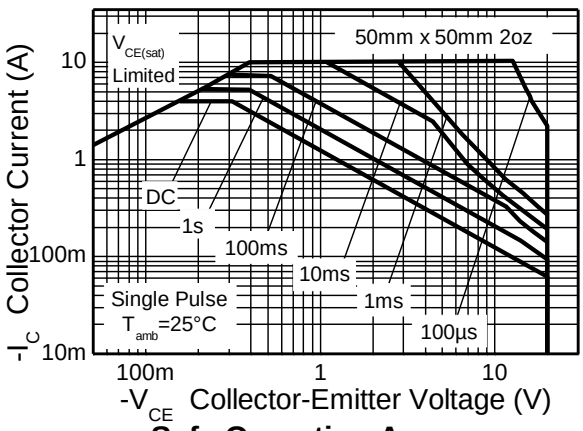
Notes:
5. For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
6. Same as note (5), except the device is mounted on FR4 substrate PCB layout with minimum recommended pad layout.
7. Same as note (5), except the device is surface mounted on 25mm x 25mm with 2 oz copper.
8. Same as note (5), except the device is surface mounted on 50mm x 50mm with 2 oz copper.
9. Same as note (8), except the device is measured at t<5secs.
10. Thermal resistance from junction to solder-point (at the end of the collector lead).
11. Thermal resistance from junction to the top of the case.

## ESD Ratings (Note 12)

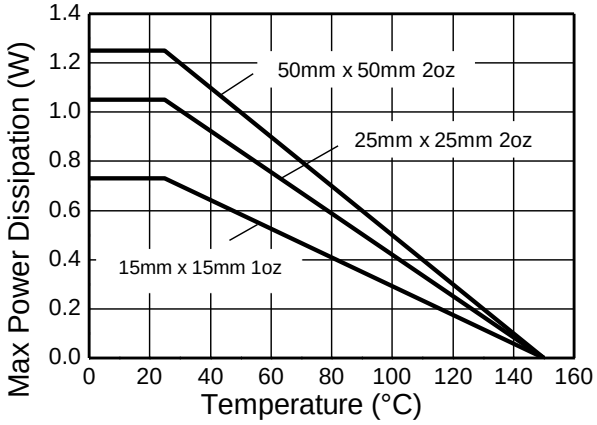
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Note: 12. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

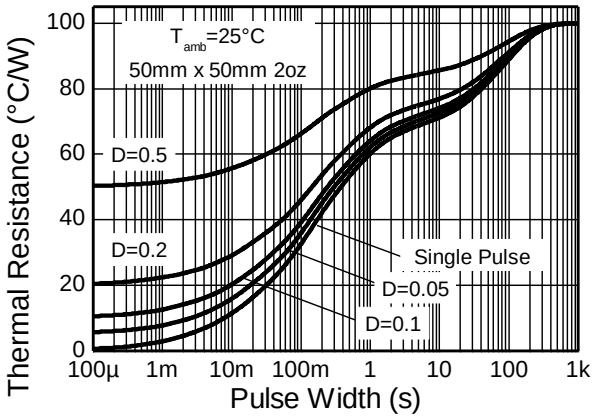
## Thermal Characteristics and Derating Information



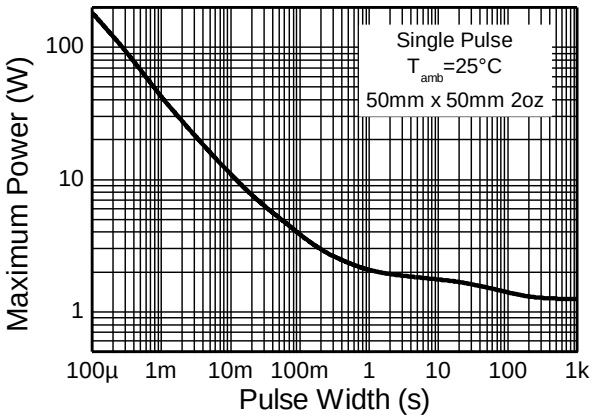

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**



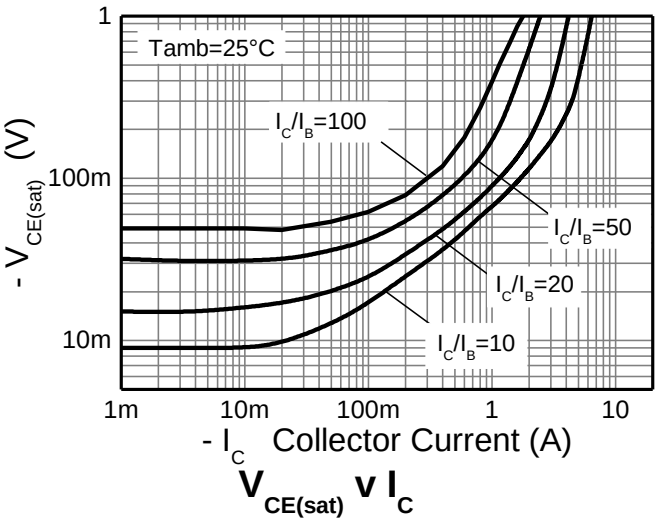

**Pulse Power Dissipation**

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

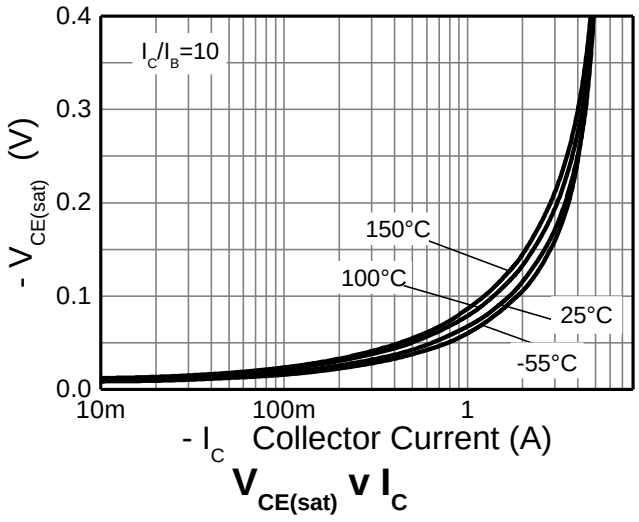
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -45 | -75 | - | V | $I_C$ = -100µA |
| Collector-Emitter Breakdown Voltage (Note 13) | $BV_{CEO}$ | -40 | -65 | - | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -7 | -8.2 | - | V | $I_E$ = -100µA |
| Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | -3 | -8.7 | - | V | $I_E$ = -100µA |
| Collector-Base Cutoff Current | $I_{CBO}$ | - | < -1 | -50 | nA | $V_{CB}$ = -45V |
| | | - | - | -0.5 | µA | $V_{CB}$ = -45V, $T_{amb}$ = +100°C |
| Emitter-Base Cutoff Current | $I_{EBO}$ | - | < -1 | -50 | nA | $V_{EB}$ = -5.6V |
| Static Forward Current Transfer Ratio (Note 13) | $h_{FE}$ | 300 | 450 | 900 | - | $I_C$ = -10mA, $V_{CE}$ = -2V |
| | | 200 | 300 | - | | $I_C$ = -1A, $V_{CE}$ = -2V |
| | | 30 | 60 | - | | $I_C$ = -3A, $V_{CE}$ = -2V |
| Collector-Emitter Saturation Voltage (Note 13) | $V_{CE(sat)}$ | - | -170 | -260 | mV | $I_C$ = -1A, $I_B$ = -20mA |
| | | - | -65 | -85 | | $I_C$ = -1A, $I_B$ = -100mA |
| | | - | -165 | -220 | | $I_C$ = -3A, $I_B$ = -300mA |
| Base-Emitter Saturation Voltage (Note 13) | $V_{BE(sat)}$ | - | -930 | -1000 | mV | $I_C$ = -3A, $I_B$ = -300mA |
| Base-Emitter Saturation Voltage (Note 13) | $V_{BE(on)}$ | - | -830 | -900 | mV | $I_C$ = -3A, $V_{CE}$ = -2V |
| Output Capacitance | $C_{obo}$ | - | 17.4 | | pF | $V_{CB}$ = -10V, f = 1MHz |
| Transition Frequency | $f_T$ | - | 270 | - | MHz | $V_{CE}$ = -10V, $I_C$ = -50mA, f = 100MHz |
| Turn-on Time | $t_{(on)}$ | - | 75.5 | - | ns | $V_{CC}$ = -15V, $I_C$ = -750mA, $I_{B1}$ = -$I_{B2}$ = -15mA |
| Turn-off Time | $t_{(off)}$ | - | 320 | - | ns | |

Note: 13. Measured under pulsed conditions. Pulse width ≤ 300 µs. Duty cycle ≤ 2%.

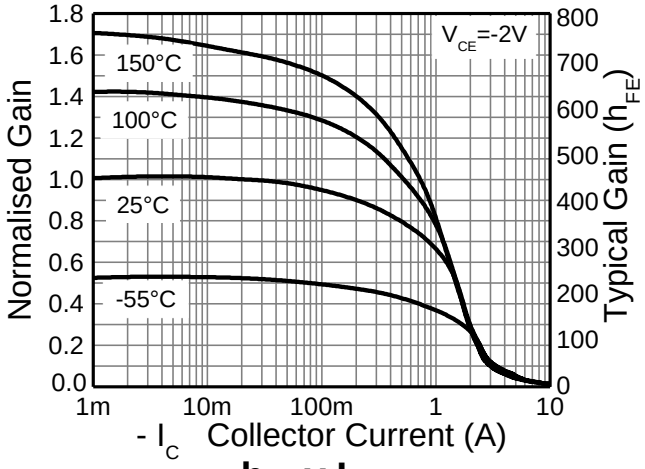
## Typical Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)



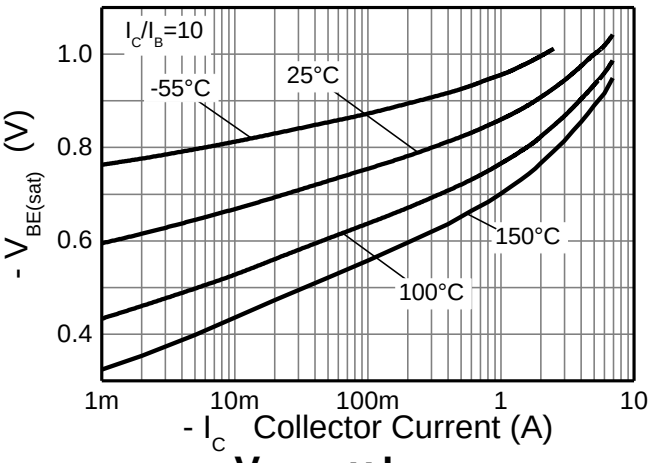

**$V_{CE(sat)}$ v $I_C$**



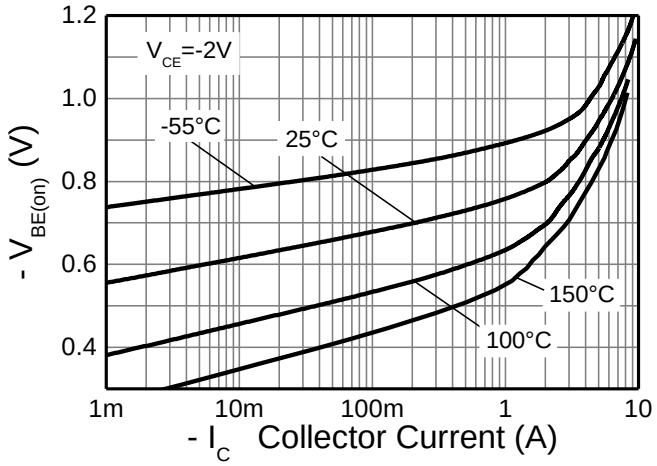

**$V_{CE(sat)}$ v $I_C$**




**$h_{FE}$ v $I_C$**




**$V_{BE(sat)}$ v $I_C$**

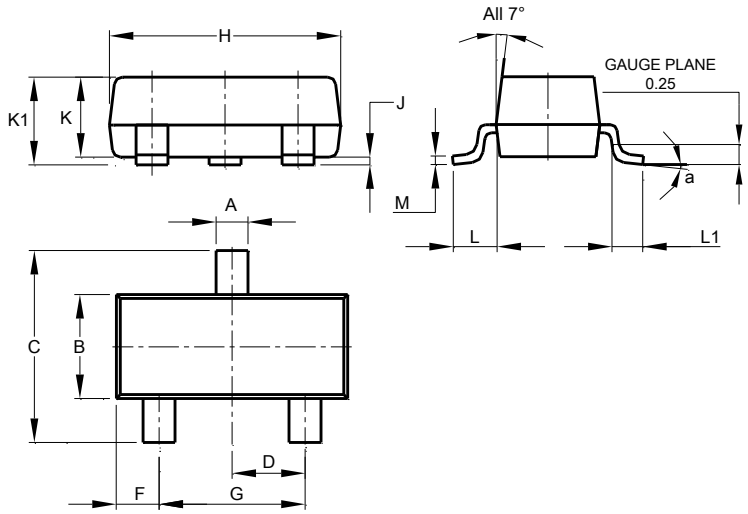



**$V_{BE(on)}$ v $I_C$**

## Package Outline Dimensions

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

**SOT23**

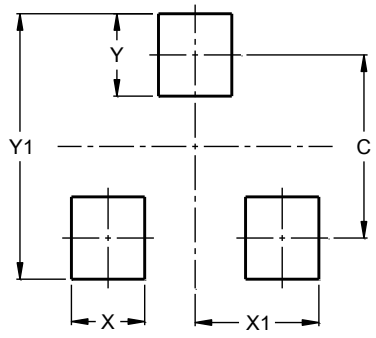



| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.890 | 1.00 | 0.975 |
| **K1** | 0.903 | 1.10 | 1.025 |
| **L** | 0.45 | 0.61 | 0.55 |
| **L1** | 0.25 | 0.55 | 0.40 |
| **M** | 0.085 | 0.150 | 0.110 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT23**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.0 |
| **X** | 0.8 |
| **X1** | 1.35 |
| **Y** | 0.9 |
| **Y1** | 2.9 |

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