



**THE DATASHEET OF  
ZXT13P40DE6TA**



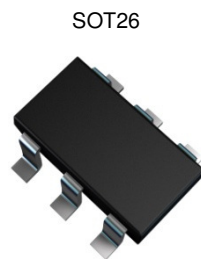
**40V PNP LOW SATURATION SWITCHING TRANSISTOR IN SOT26**

**Features**

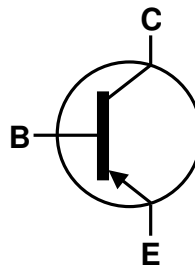
- $BV_{CEO} > -40V$
- $I_C = -3A$  Max Continuous Collector Current
- $I_{CM} = -10A$  Peak Pulse Current
- $R_{CE(SAT)} = 58m\Omega$  for a Low Equivalent On-Resistance
- Low Saturation Voltage (-200mV max @ 1A)
- $h_{FE}$  Characterized up to -5A for High Current Gain Hold-Up
- **Totally Lead-Free & 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**

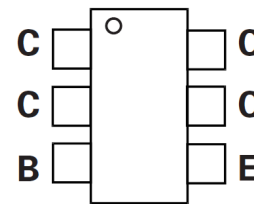
- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.015 grams (Approximate)



Top View



Device Symbol



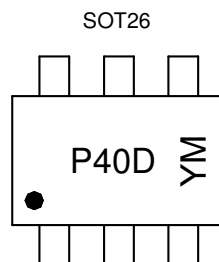
Pin-Out Top

**Ordering Information** (Notes 4 & 5)

| Product        | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|------------|---------|--------------------|-----------------|-------------------|
| ZXT13P40DE6TA  | AEC-Q101   | P40D    | 7                  | 8               | 3,000             |
| ZXT13P40DE6QTA | Automotive | P40D    | 7                  | 8               | 3,000             |

- 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](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/](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**



P40D = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: C = 2015)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

Date Code Key

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | -50   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | -40   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | -7.5  | V    |
| Base Current                 | I <sub>B</sub>   | -500  | mA   |
| Continuous Collector Current | I <sub>C</sub>   | -3    | A    |
| Peak Pulse Collector Current | I <sub>CM</sub>  | -10   | A    |

**Thermal Characteristics** (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

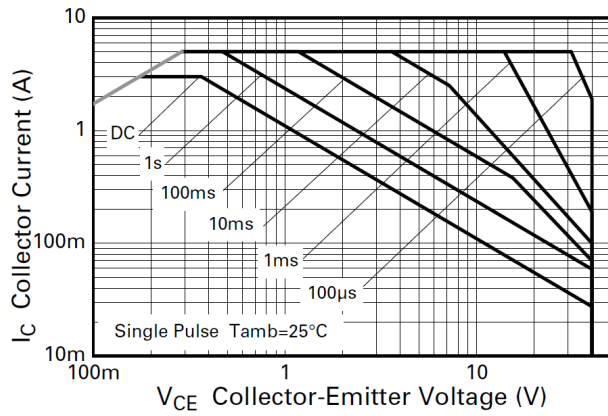
| Characteristic                          | Symbol                            | Value       | Unit  |
|---|-----------------------------------|-------------|-------|
| Power Dissipation                       | P <sub>D</sub>                    | 1.1         | W     |
|   |                                   | 8.8         |       |
| Linear Derating Factor                  |                                   | 1.7         | mW/°C |
|   |                                   | 13.6        |       |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 113         | °C/W  |
|   |                                   | 73          |       |
| Thermal Resistance, Junction to Lead    | R <sub>θJL</sub>                  | 18.6        |       |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**ESD Ratings** (Note 9)

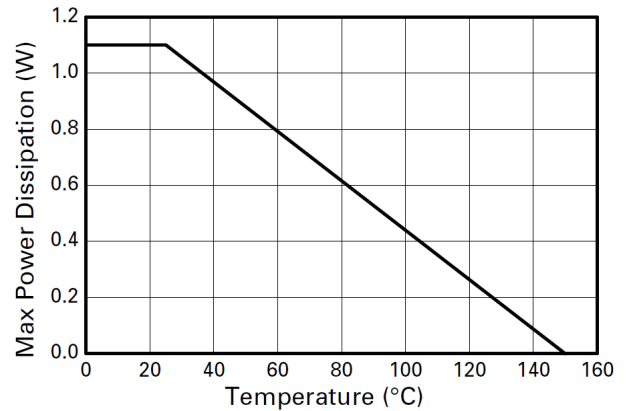
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
6. For a device mounted with collector leads on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Same as Note 6, except the device is measured at t ≤ 5secs.
  8. Thermal resistance from junction to solder-point (at the end of the collector leads).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

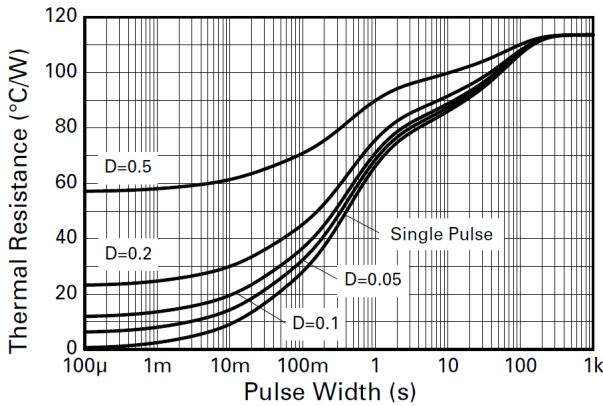
**Thermal Characteristics and Derating Information**



**Safe Operating Area**



**Derating Curve**



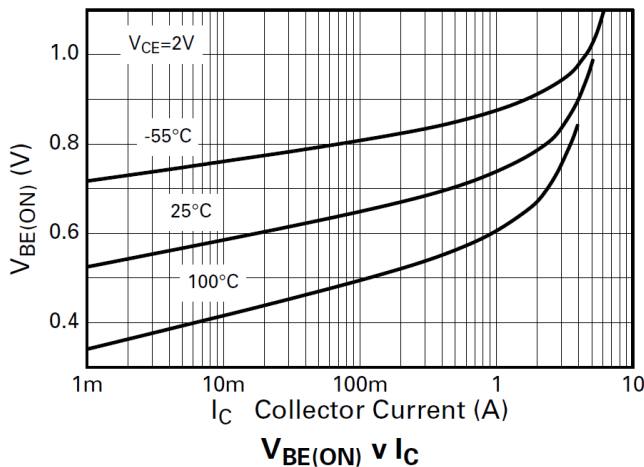
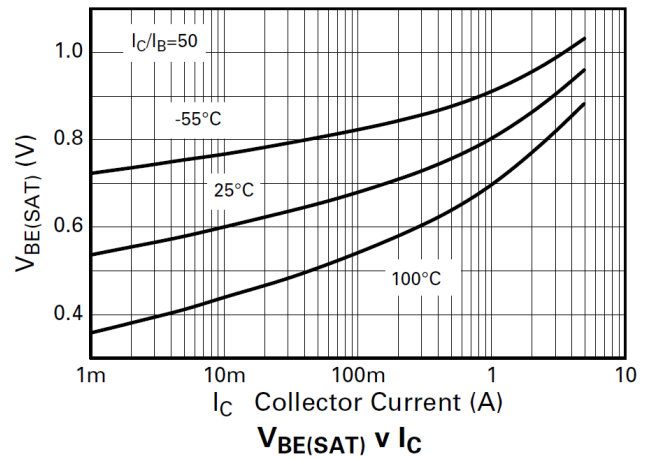
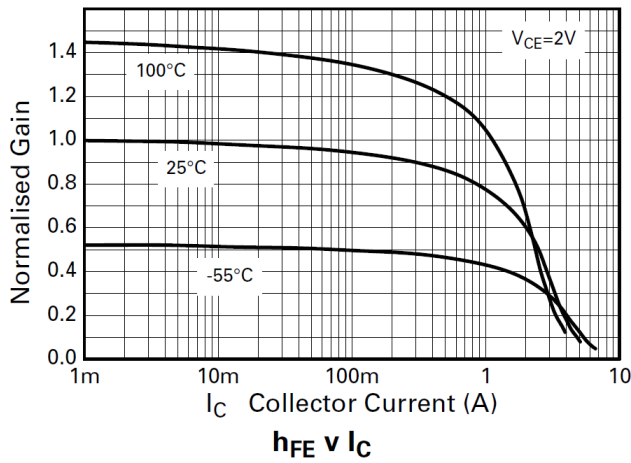
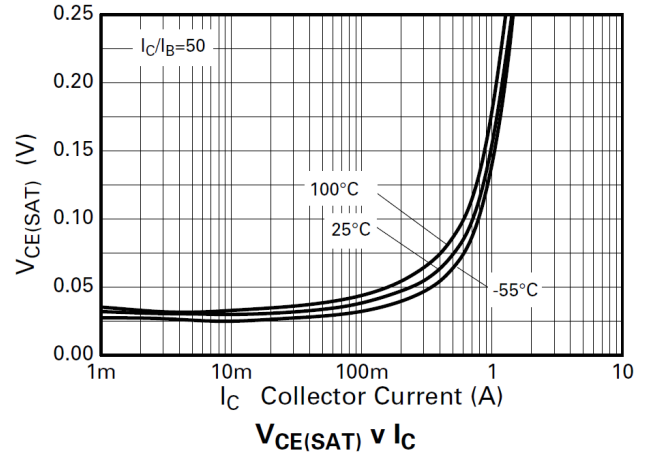
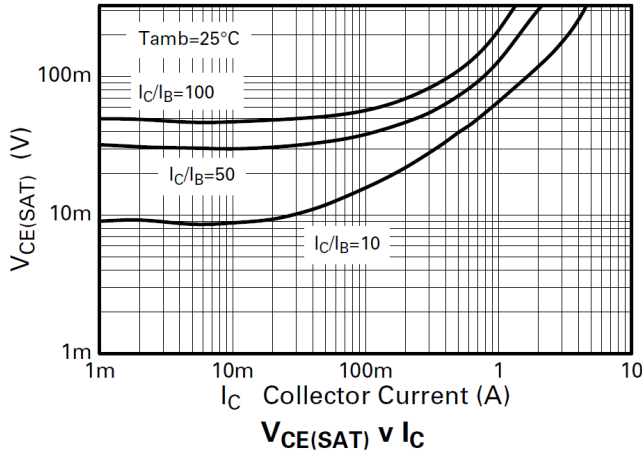
**Transient Thermal Impedance**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                | Symbol               | Min  | Typ  | Max  | Unit | Test Condition  |
|---|----------------------|------|------|------|------|---|
| <b>OFF CHARACTERISTICS</b>                    |                      |      |      |      |      |   |
| Collector-Base Breakdown Voltage              | BV <sub>CBO</sub>    | -50  | -80  | —    | V    | I <sub>C</sub> = -100μA                                   |
| Collector-Emitter Breakdown Voltage (Note 10) | BV <sub>CEO</sub>    | -40  | -70  | —    | V    | I <sub>C</sub> = -10mA                                    |
| Emitter-Base Breakdown Voltage                | BV <sub>EBO</sub>    | -7.5 | -8.5 | —    | V    | I <sub>E</sub> = -100μA                                   |
| Collector-Base Cut-Off Current                | I <sub>CBO</sub>     | —    | —    | -100 | nA   | V <sub>CB</sub> = -40V                                    |
| Emitter Cut-Off Current                       | I <sub>EBO</sub>     | —    | —    | -100 | nA   | V <sub>EB</sub> = -6V                                     |
| Collector-Emitter Cut-Off Current             | I <sub>CES</sub>     | —    | —    | -100 | nA   | V <sub>CES</sub> = -40V                                   |
| <b>ON CHARACTERISTICS (Note 10)</b>           |                      |      |      |      |      |   |
| DC Current Gain                               | h <sub>FE</sub>      | 300  | 500  | —    | —    | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V             |
|   |                      | 300  | 450  | 900  | —    | I <sub>C</sub> = -1A, V <sub>CE</sub> = -2V               |
|   |                      | 100  | 250  | —    | —    | I <sub>C</sub> = -3A, V <sub>CE</sub> = -2V               |
|   |                      | 15   | 50   | —    | —    | I <sub>C</sub> = -5A, V <sub>CE</sub> = -2V               |
| Collector-Emitter Saturation Voltage          | V <sub>CE(sat)</sub> | —    | -16  | -25  | mV   | I <sub>C</sub> = -100mA, I <sub>B</sub> = -10mA           |
|   |                      | —    | -110 | -200 |      | I <sub>C</sub> = -1A, I <sub>B</sub> = -20mA              |
|   |                      | —    | -145 | -190 |      | I <sub>C</sub> = -2A, I <sub>B</sub> = -100mA             |
|   |                      | —    | -175 | -240 |      | I <sub>C</sub> = -3A, I <sub>B</sub> = -300mA             |
| Base-Emitter Saturation Voltage               | V <sub>BE(sat)</sub> | —    | —    | -1.1 | V    | I <sub>C</sub> = -3A, I <sub>B</sub> = -300mA             |
| Base-Emitter Turn-On Voltage                  | V <sub>BE(on)</sub>  | —    | —    | -0.9 | V    | I <sub>C</sub> = -3A, V <sub>CE</sub> = -2V               |
| <b>SMALL SIGNAL CHARACTERISTICS</b>           |                      |      |      |      |      |   |
| Current Gain-Bandwidth Product                | f <sub>T</sub>       | —    | 115  | —    | MHz  | V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA, f = 50MHz |
| Output Capacitance                            | C <sub>obo</sub>     | —    | 42   | —    | pF   | V <sub>CB</sub> = -10V, f = 1MHz                          |
| Turn-On Time                                  | t <sub>(on)</sub>    | —    | 185  | —    | ns   | V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A              |
| Turn-Off Time                                 | t <sub>(off)</sub>   | —    | 400  | —    | ns   | I <sub>B1</sub> = I <sub>B2</sub> = -20mA                 |

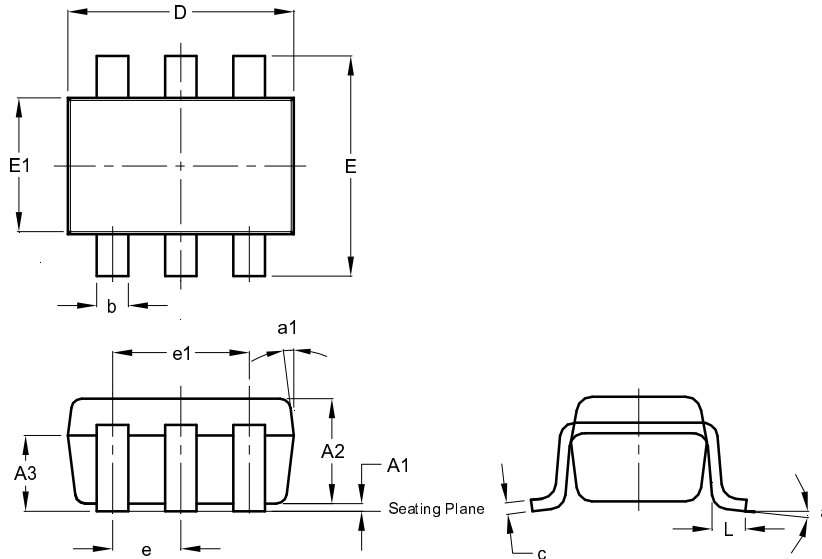
Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



## Package Outline Dimensions

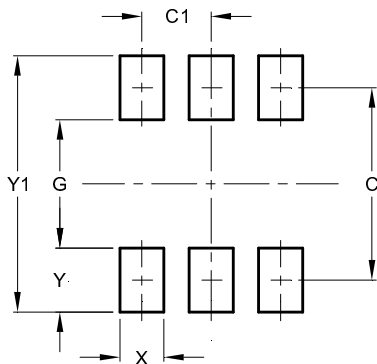
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT26                |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A1                   | 0.013 | 0.10 | 0.05 |
| A2                   | 1.00  | 1.30 | 1.10 |
| A3                   | 0.70  | 0.80 | 0.75 |
| b                    | 0.35  | 0.50 | 0.38 |
| c                    | 0.10  | 0.20 | 0.15 |
| D                    | 2.90  | 3.10 | 3.00 |
| e                    | -     | -    | 0.95 |
| e1                   | -     | -    | 1.90 |
| E                    | 2.70  | 3.00 | 2.80 |
| E1                   | 1.50  | 1.70 | 1.60 |
| L                    | 0.35  | 0.55 | 0.40 |
| a                    | -     | -    | 8°   |
| a1                   | -     | -    | 7°   |
| All Dimensions in mm |       |      |      |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.40          |
| C1         | 0.95          |
| G          | 1.60          |
| X          | 0.55          |
| Y          | 0.80          |
| Y1         | 3.20          |

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