A Product Line of
Diodes Incorporated

Lead-free Green

**DXTP560BP5**

# 500V PNP SILICON PLANAR HIGH VOLTAGE TRANSISTOR POWERDI®5

## Features and Benefits

- $BV_{CEO}$ > -500V
- $I_C$ = -150mA Continuous Collector Current
- 47% smaller than SOT223; 60% smaller than TO252 (D-PAK)
- Profile height just 1.1mm for thin application
- $R_{\theta JA}$ efficient giving high $P_D$ rating up to 2.8W
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free, "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

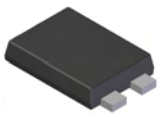
## Mechanical Data

- Case: POWERDI®5
- 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 annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.093 grams (approximate)

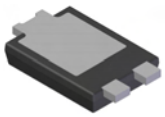
## Applications

- Gate driver
- Startup switch in offline lighting
- Motor Control

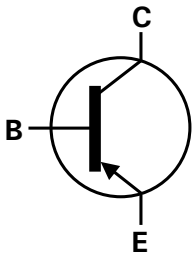
PowerDI®5



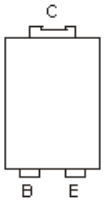
Top View



Bottom View




Device Schematic




Top View
Pin-Out

## Ordering Information (Note 3)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| DXTP560BP5-13 | DXTP560B | 13 | 16 | 5,000 |

Notes:
1. No purposefully added lead.
2. Diodes Inc's "Green" Policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com

## Marking Information




DXTP560B = Product Type Marking Code
= Manufacturers' Code Marking
K = Factory Designator
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 10 for 2010)
WW = Week code (01 - 53)

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## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | -500 | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | -500 | |
| Emitter-Base Voltage | | $V_{EBO}$ | -7 | |
| Continuous Collector Current | (Note 4) | $I_C$ | -150 | mA |
| Peak Pulse Current | | $I_{CM}$ | -500 | |

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

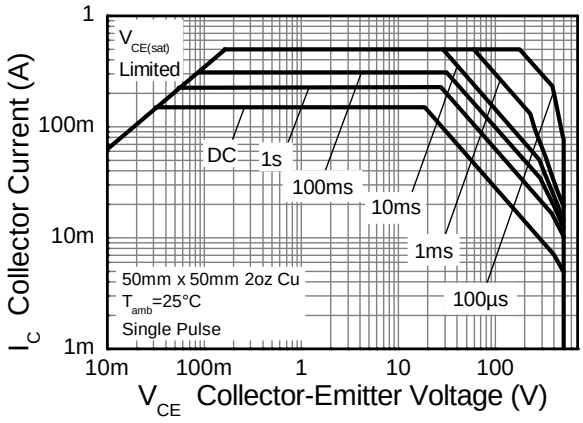
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation<br>Linear Derating Factor | (Note 4) | $P_D$ | 2.8<br>22.4 | W<br>mW/°C |
| | (Note 5) | | 1.3<br>10.4 | |
| | (Note 6) | | 0.7<br>5.6 | |
| Thermal Resistance, Junction to Ambient | (Note 4) | $R_{\theta JA}$ | 45 | °C/W |
| | (Note 5) | | 96 | |
| | (Note 6) | | 179 | |
| Thermal Resistance, Junction to Lead | (Note 7) | $R_{\theta JL}$ | 14 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes:
4. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The entire exposed collector pad is attached to the heatsink.
5. Same as note (4), except the device is mounted on 25mm x 25mm 1oz copper.
6. Same as note (4), except the device is mounted on a minimum recommended pad layout of 1oz copper.
7. Thermal resistance from junction to solder-point (at the end of the collector lead).

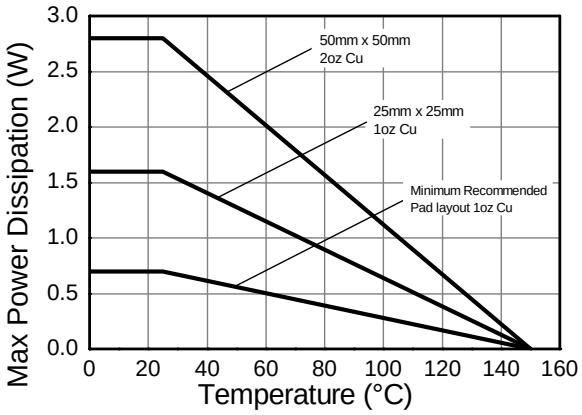
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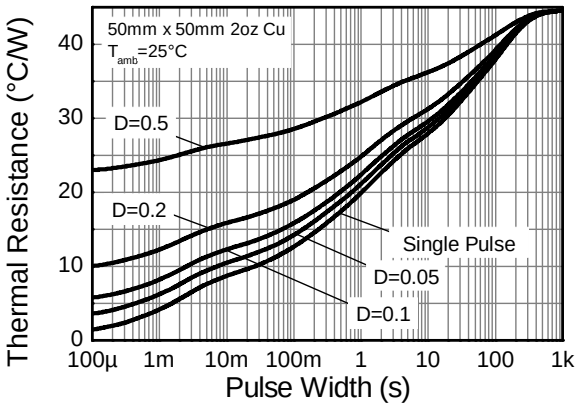
## Thermal Characteristics



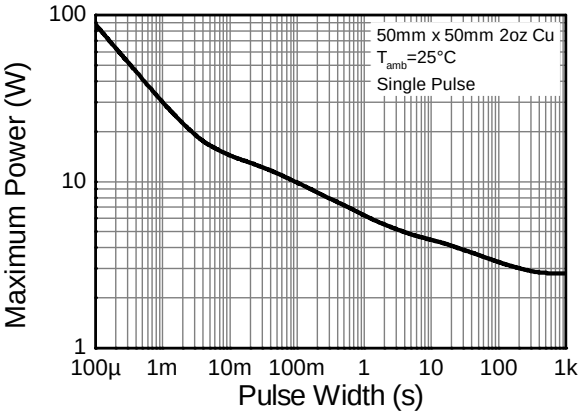

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**




**Pulse Power Dissipation**


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

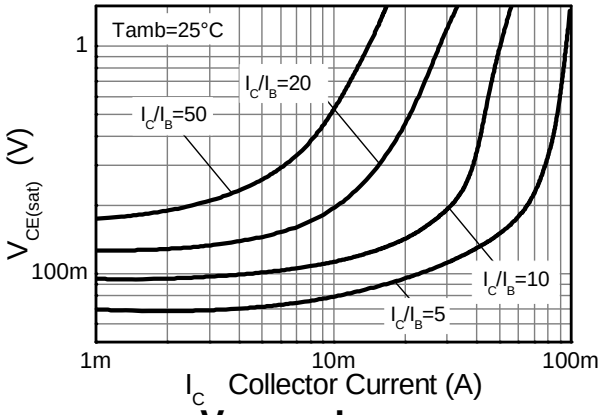
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -500 | — | — | V | $I_C$ = -100μA |
| Collector-Emitter Breakdown Voltage (Note 8) | $BV_{CEO}$ | -500 | — | — | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -7 | — | — | V | $I_E$ = -100μA |
| Collector Cutoff Current | $I_{CBO}$ | — | — | -100 | nA | $V_{CB}$ = -500V |
| Collector Cutoff Current | $I_{CES}$ | — | — | -100 | nA | $V_{CE}$ = -500V |
| Emitter Cutoff Current | $I_{EBO}$ | — | — | -100 | nA | $V_{EB}$ = -5.6V |
| Collector-Emitter Saturation Voltage (Note 8) | $V_{CE(sat)}$ | —<br>— | —<br>— | -200<br>-500 | mV | $I_C$ = -20mA, $I_B$ = -2mA<br>$I_C$ = -50mA, $I_B$ = -10mA |
| Base-Emitter Saturation Voltage (Note 8) | $V_{BE(sat)}$ | — | — | -900 | mV | $I_C$ = -50mA, $I_B$ = -10mA |
| Base-Emitter Turn-On Voltage (Note 8) | $V_{BE(on)}$ | — | — | -900 | mV | $V_{CE}$ = -10V, $I_C$ = -50mA |
| DC Current Gain (Note 8) | $h_{FE}$ | 100<br>80<br>— | —<br>—<br>15 | 300<br>300<br>— | — | $V_{CE}$ = -10V, $I_C$ = -1mA<br>$V_{CE}$ = -10V, $I_C$ = -50mA<br>$V_{CE}$ = -10V, $I_C$ = -100mA |
| Transition Frequency | $f_T$ | 60 | — | — | MHz | $V_{CE}$ = -20V, $I_C$ = -10mA, f = 50MHz |
| Output Capacitance | $C_{obo}$ | — | — | 8 | pF | $V_{CB}$ = -20V, f = 1MHz |
| Switching Times | $t_{on}$<br>$t_{off}$ | —<br>— | 110<br>1500 | —<br>— | ns | $V_{CC}$ = -100V, $I_C$ = -50mA,<br>$I_{B1}$ = 5mA, $I_{B2}$ = -10mA |

Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

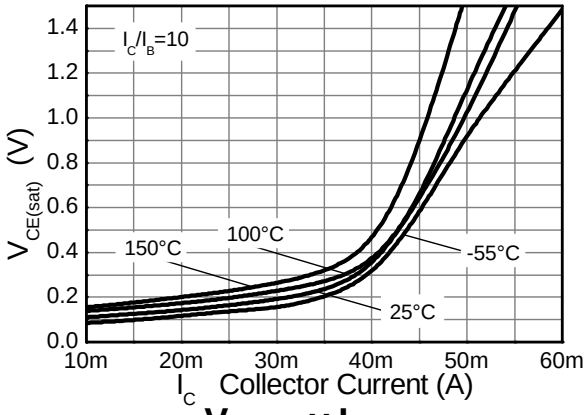
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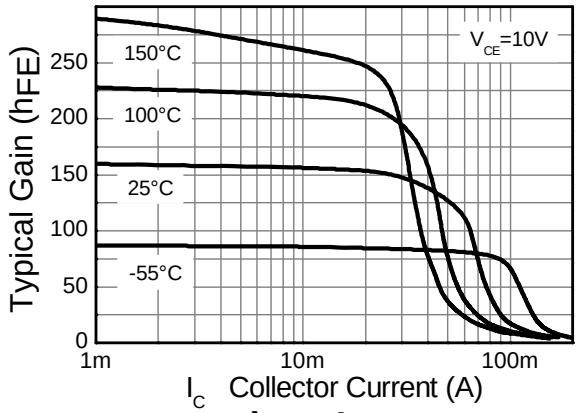
## Typical Electrical Characteristics



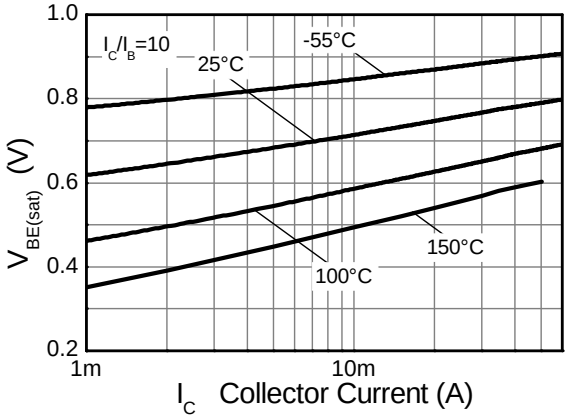

**$V_{CE(sat)}$ v $I_C$**



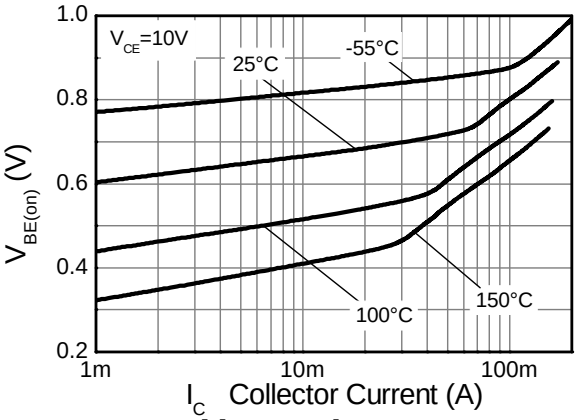

**$V_{CE(sat)}$ v $I_C$**




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




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

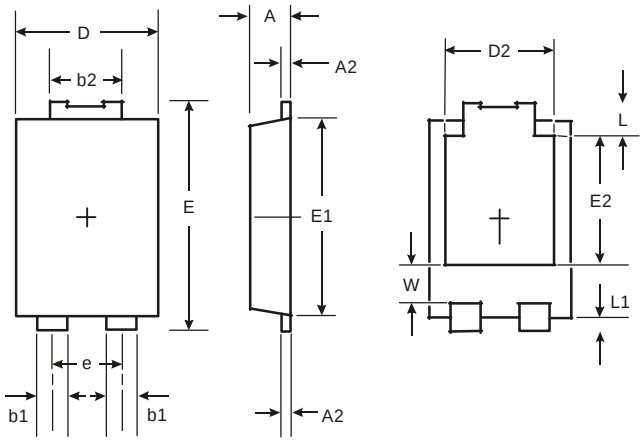



**$V_{BE(on)}$ v $I_C$**

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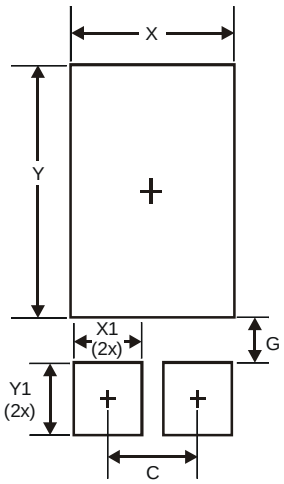

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## Package Outline Dimensions




| POWERDI®5 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 1.05 | 1.15 |
| **A2** | 0.33 | 0.43 |
| **b1** | 0.80 | 0.99 |
| **b2** | 1.70 | 1.88 |
| **D** | 3.90 | 4.05 |
| **D2** | 3.054 Typ | |
| **E** | 6.40 | 6.60 |
| **e** | 1.84 Typ | |
| **E1** | 5.30 | 5.45 |
| **E2** | 3.549 Typ | |
| **L** | 0.75 | 0.95 |
| **L1** | 0.50 | 0.65 |
| **W** | 1.10 | 1.41 |
| **All Dimensions in mm** | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| **C** | 1.840 |
| **G** | 0.852 |
| **X** | 3.360 |
| **X1** | 1.390 |
| **Y** | 4.860 |
| **Y1** | 1.400 |

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