# 140V PNP MEDIUM POWER TRANSISTOR PowerDI®5

## Features

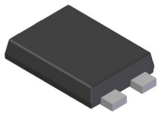
- 43% Smaller than SOT223; 60% Smaller than TO252
- Maximum Height: 1.1mm
- Rated up to 3.2W
- $V_{CEO}$ = -140V
- $I_C$ = -4A; $I_{CM}$ = -10A
- Low Saturation Voltage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q101, PPAP capable, and manufactured in IATF16949 certified facilities), please contact us or your local Diodes representative.**
- **https://www.diodes.com/quality/product-definitions/**

## Mechanical Data

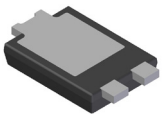
- Case: PowerDI®5
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.093 grams (Approximate)

## Applications

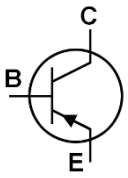
- SLIC DC-DC Converter



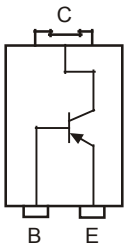
Top View



Bottom View




Device Schematic




Pin-out diagram

## Ordering Information (Note 4)

| Part Number | Marking | Reel Size (Inches) | Tape Width (mm) | Quantity per Reel |
|---|---|---|---|---|
| DXT2014P5-13 | DXT2014 | 13 | 16 | 5000 |

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


DXT2014 = Product Type Marking Code
= Manufacturers' Code Marking
K = Factory Designator
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 19 for 2019)
WW = Week code (01 to 53)

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

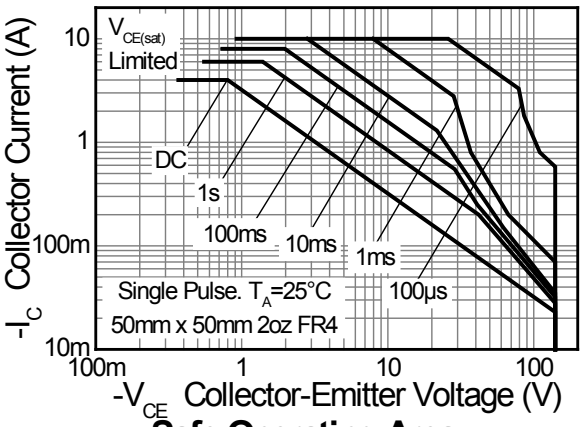
| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -180 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -140 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -7 | V |
| Continuous Collector Current | $I_C$ | -4 | A |
| Peak Pulse Current | $I_{CM}$ | -10 | A |

## Thermal Characteristics

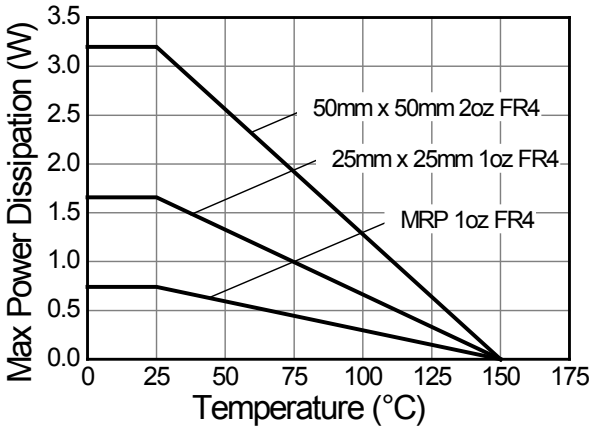
| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation @ $T_A$ = 25°C (Note 5) | $P_D$ | 3.2 | W |
| Thermal Resistance, Junction to Ambient Air (Note 5) @$T_A$ = 25°C | $R_{\theta JA}$ | 39 | °C/W |
| Power Dissipation @ $T_A$ = 25°C (Note 6) | $P_D$ | 1.7 | W |
| Thermal Resistance, Junction to Ambient Air (Note 6) @$T_A$ = 25°C | $R_{\theta JA}$ | 75 | °C/W |
| Power Dissipation @ $T_A$ = 25°C (Note 7) | $P_D$ | 0.74 | W |
| Thermal Resistance, Junction to Ambient Air (Note 7) @$T_A$ = 25°C | $R_{\theta JA}$ | 169 | °C/W |
| Thermal Resistance, Junction to Collector Terminal | $R_{\theta JT}$ | 5.6 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 5. Device mounted on FR-4 PCB, single sided 2 oz. copper, collector pad dimensions 50mm x 50mm.
6. Device mounted on FR-4 PCB, single sided 1 oz. copper, collector pad dimensions 25mm x 25mm.
7. Device mounted on FR-4 PCB, single sided 1 oz. copper, minimum recommended pad layout.

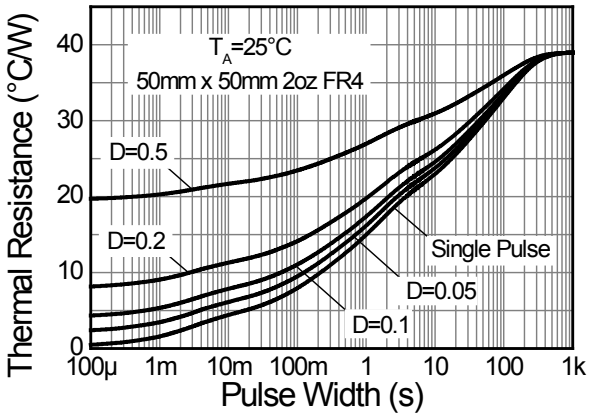
## Thermal Characteristics and Derating Information



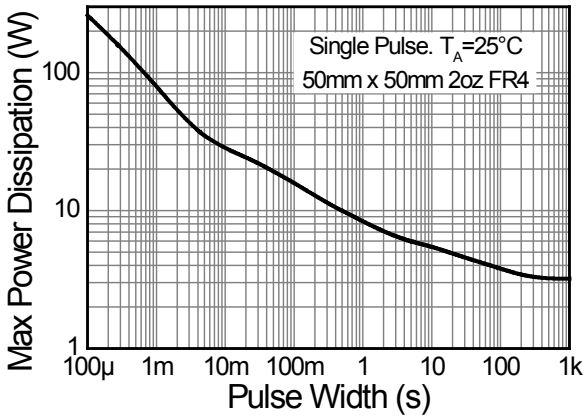

**Safe Operating Area**



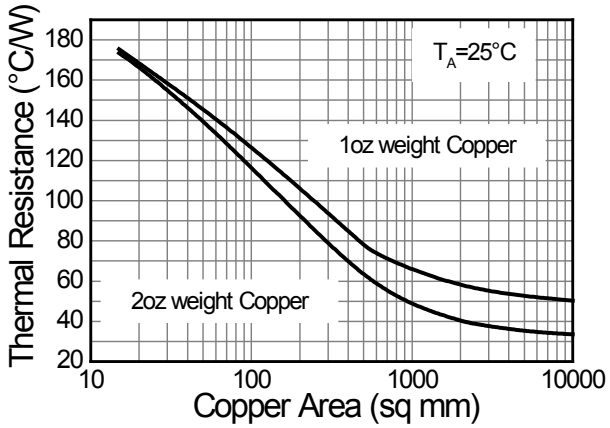

**Derating Curve**



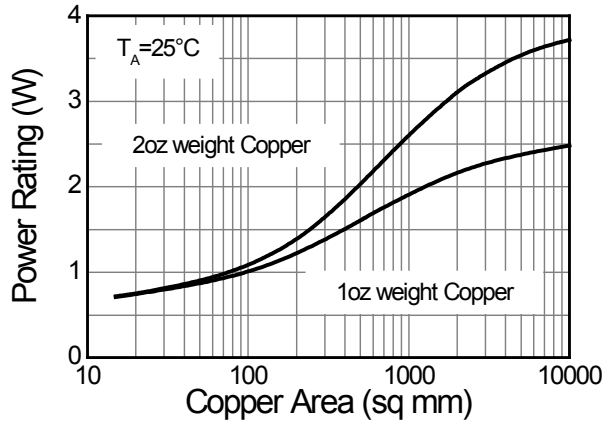

**Transient Thermal Impedance**




**Pulse Power Dissipation**




**Thermal Resistance vs. Cu Area**



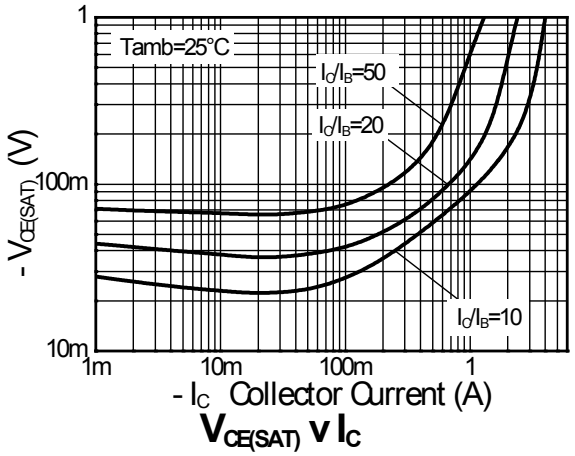

**Power Rating vs. Cu Area**

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

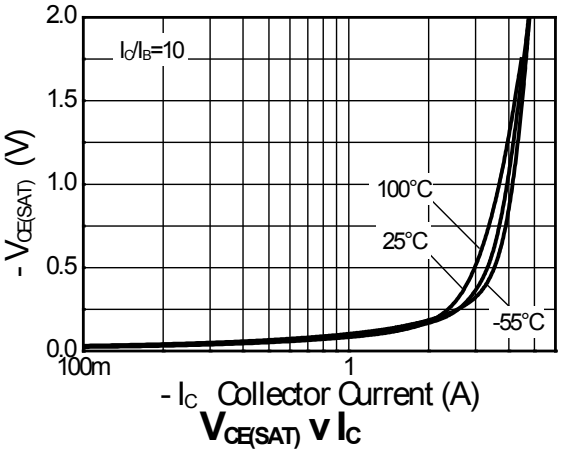
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -180 | -200 | — | V | $I_C$ = -100μA |
| Collector-Emitter Breakdown Voltage (Note 8) | $V_{(BR)CEO}$ | -140 | -160 | — | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | -7.0 | -8.0 | — | V | $I_E$ = -100μA |
| Collector Cutoff Current | $I_{CBO}$ | — | <1<br>— | -20<br>-0.5 | nA<br>μA | $V_{CB}$ = -150V<br>$V_{CB}$ = -150V, $T_{amb}$ = 100°C |
| Collector Cutoff Current | $I_{CER}$<br>R≤1kΩ | — | <1<br>— | -20<br>-0.5 | nA<br>μA | $V_{CB}$ = -150V<br>$V_{CB}$ = -150V, $T_{amb}$ = 100°C |
| Emitter Cutoff Current | $I_{EBO}$ | — | <1 | -10 | nA | $V_{EB}$ = -6V |
| Collector-Emitter Saturation Voltage (Note 8) | $V_{CE(sat)}$ | — | -40<br>-55<br>-85<br>-275 | -60<br>-80<br>-120<br>-360 | mV | $I_C$ = -0.1A, $I_B$ = -5mA<br>$I_C$ = -0.5A, $I_B$ = -50mA<br>$I_C$ = -1A, $I_B$ = -100mA<br>$I_C$ = -3A, $I_B$ = -300mA |
| Base-Emitter Saturation Voltage (Note 8) | $V_{BE(sat)}$ | — | -940 | -1040 | mV | $I_C$ = -3A, $I_B$ = -300mA |
| Base-Emitter Turn-On Voltage (Note 8) | $V_{BE(on)}$ | — | -830 | -930 | mV | $V_{CE}$ = -5V, $I_C$ = -3A |
| DC Current Gain (Note 8) | $h_{FE}$ | 100<br>100<br>45<br>— | 225<br>200<br>100<br>5 | —<br>300<br>—<br>— | — | $V_{CE}$ = -5V, $I_C$ = -10mA<br>$V_{CE}$ = -5V, $I_C$ = -1A<br>$V_{CE}$ = -5V, $I_C$ = -3A<br>$V_{CE}$ = -5V, $I_C$ = -10A |
| Transition Frequency | $f_T$ | — | 120 | — | MHz | $V_{CE}$ = -10V, $I_C$ = -100mA, f = 50MHz |
| Output Capacitance | $C_{obo}$ | — | 33 | — | pF | $V_{CB}$ = -10V, f = 1MHz |
| Switching Times | $t_{on}$<br>$t_{off}$ | —<br>— | 42<br>636 | —<br>— | ns<br>ns | $V_{CC}$ = -50V, $I_C$ = 1A,<br>$I_{B1}$ = -$I_{B2}$ = -100mA |

Notes: 8. Pulse Test: Pulse width ≤ 300μs. Duty cycle ≤ 2.0%.

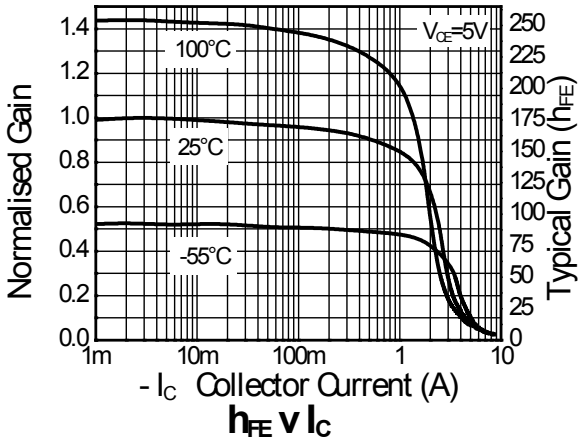
## Typical Characteristic



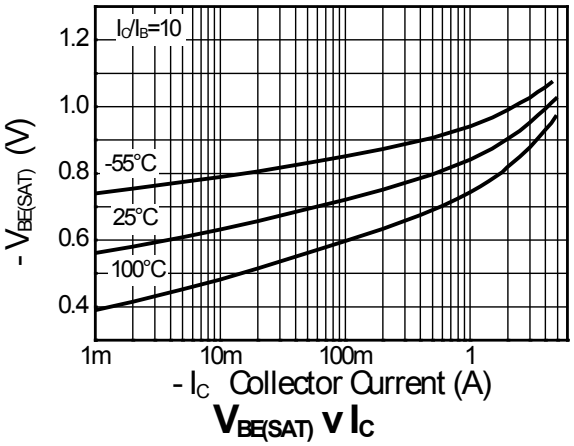

$V_{CE(SAT)}$ v $I_C$



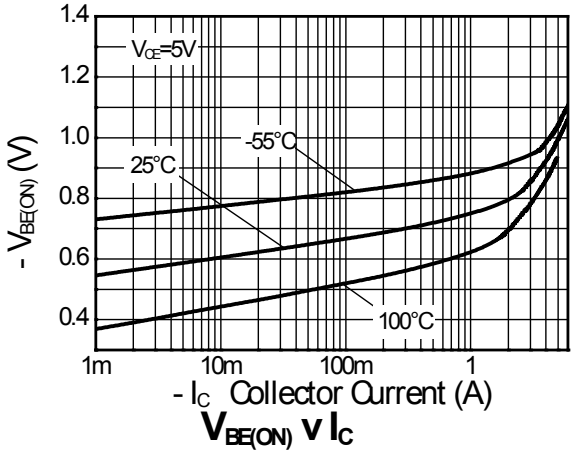

$V_{CE(SAT)}$ v $I_C$




$h_{FE}$ v $I_C$




$V_{BE(SAT)}$ v $I_C$

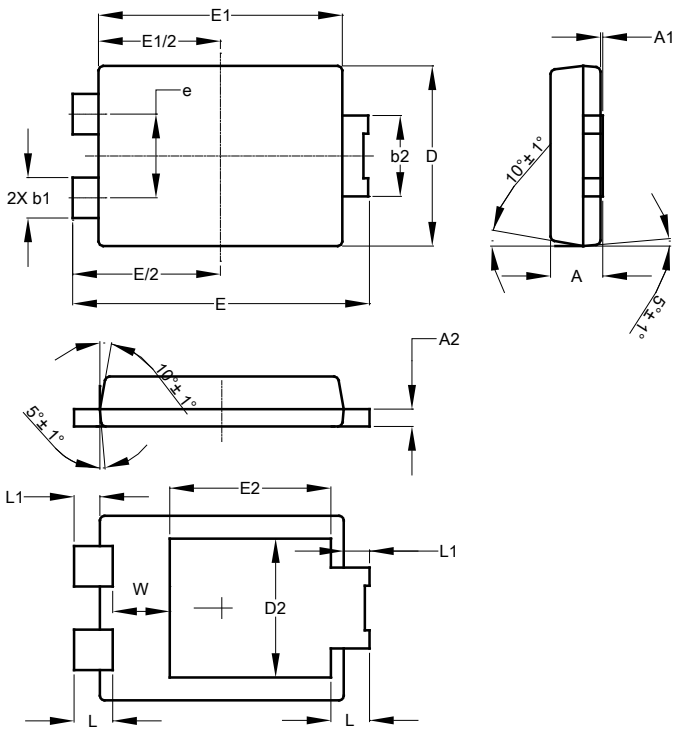



$V_{BE(ON)}$ v $I_C$

## Package Outline Dimensions

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

**PowerDI5**

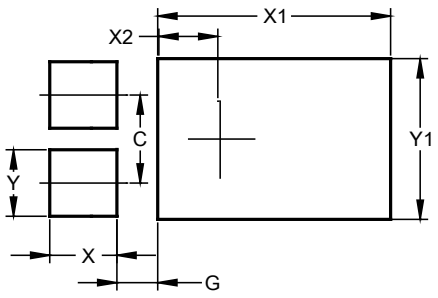



| PowerDI5 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.05 | 1.15 | 1.10 |
| **A1** | 0.00 | 0.05 | -- |
| **A2** | 0.33 | 0.43 | 0.381 |
| **b1** | 0.80 | 0.99 | 0.89 |
| **b2** | 1.70 | 1.88 | 1.78 |
| **D** | 3.90 | 4.05 | 3.966 |
| **D2** | -- | -- | 3.054 |
| **E** | 6.40 | 6.60 | 6.51 |
| **e** | -- | -- | 1.84 |
| **E1** | 5.30 | 5.45 | 5.37 |
| **E2** | -- | -- | 3.549 |
| **L** | 0.75 | 0.95 | 0.85 |
| **L1** | 0.50 | 0.65 | 0.57 |
| **W** | 1.10 | 1.41 | 1.255 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**PowerDI5**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 1.840 |
| **G** | 0.852 |
| **X** | 1.400 |
| **X1** | 4.860 |
| **X2** | 1.310 |
| **Y** | 1.390 |
| **Y1** | 3.360 |

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