

120V NPN MEDIUM POWER DARLINGTON TRANSISTOR IN POWERDI®5

Features

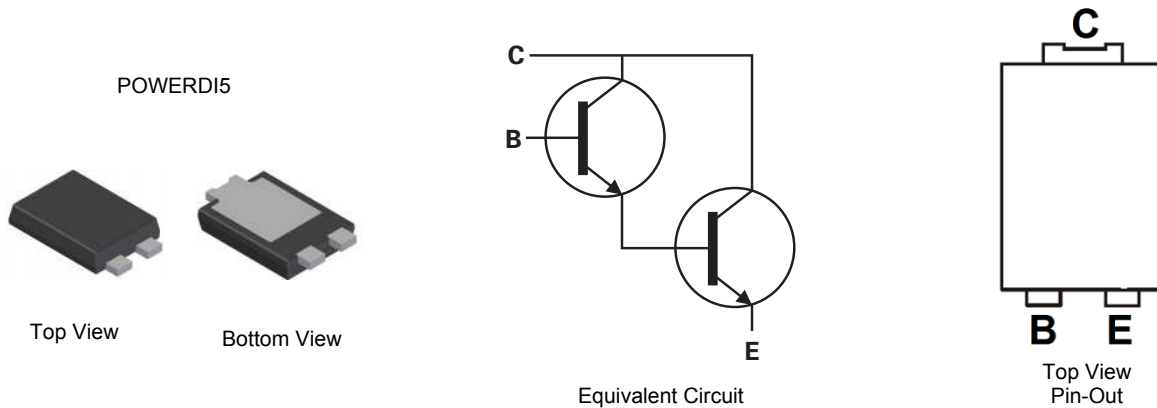
- $BV_{CE0} > 120V$
- $BV_{CBO} > 140V$
- $I_C = 1.5A$ High Continuous current
- $h_{FE} > 2k$ for High Gain @ 1A
- 43% smaller than SOT223; 60% smaller than TO252
- Maximum Height Just 1.1mm
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: POWERDI5
- 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: 0.093 grams (approximate)

Applications

- DC Fans
- Regulator Transistors
- Relays
- Solenoid Driving

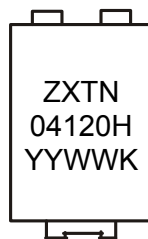


Ordering Information (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN04120HP5TC	POWERDI5	ZXTN04120H	13	16	5,000

- 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 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 <http://www.diodes.com/products/packages.html>.

Marking Information



ZXTN04120H = Product Type Marking Code
 K = Factory Designator
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 13 for 2013)
 WW = Week code (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	140	V
Collector-Emitter Voltage	V _{CEO}	120	V
Emitter-Base Voltage	V _{EBO}	14	V
Continuous Collector Current	I _C	1.5	A
Peak Pulse Current	I _{CM}	4	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

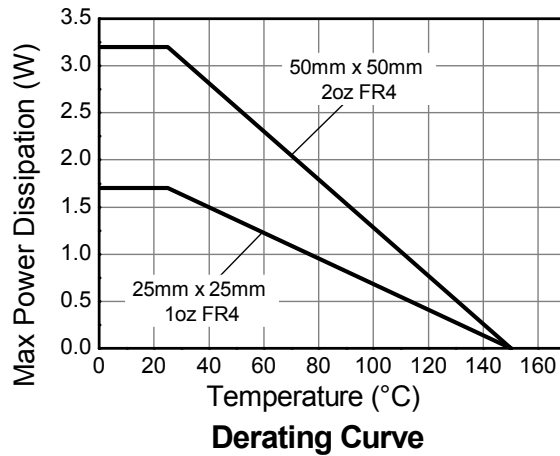
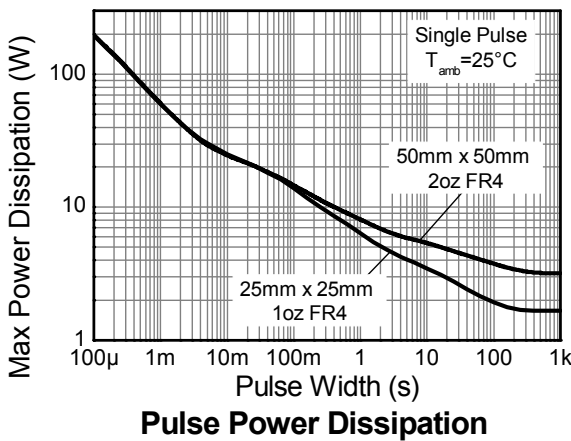
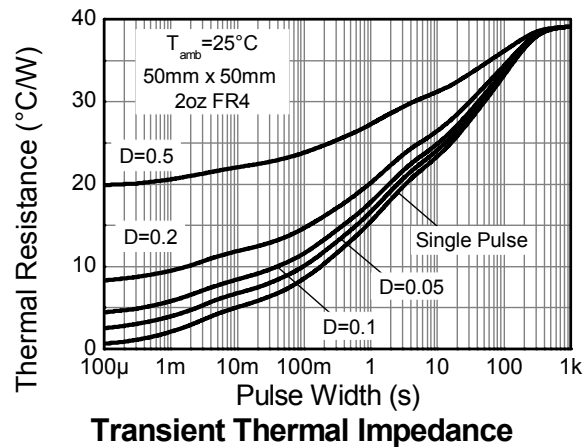
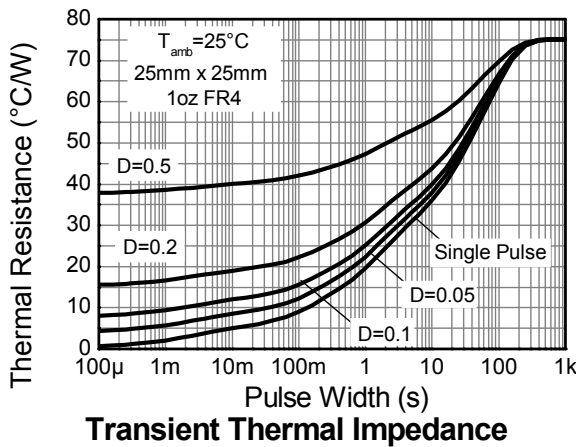
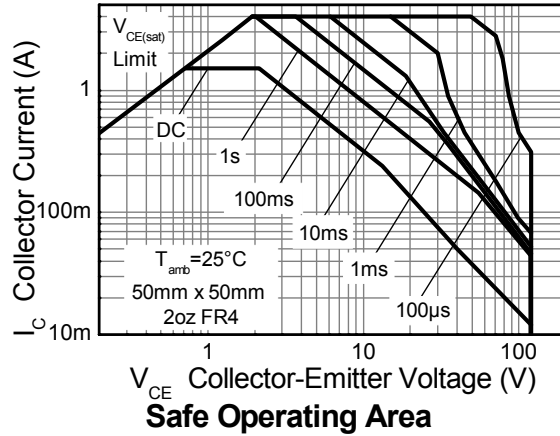
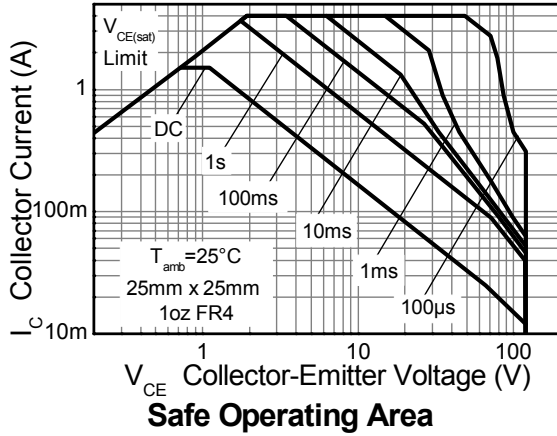
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 5)	3.2
		(Note 6)	1.7
		(Note 7)	0.74
Thermal Resistance, Junction to Ambient Air	R _{θJA}	(Note 5)	39
		(Note 6)	75
		(Note 7)	169
Thermal Resistance, Junction to Leads	R _{θJL}	9	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	10	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 10)

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:
5. For a device mounted with the exposed collector pad on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as note (5), except mounted on 25mm x 25mm 1oz copper.
 7. Same as note (5), except mounted on minimum recommended pad (MRP) layout.
 8. Thermal resistance from junction to solder-point (on the exposed collector pad).
 9. Thermal resistance from junction to the top of the case.
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

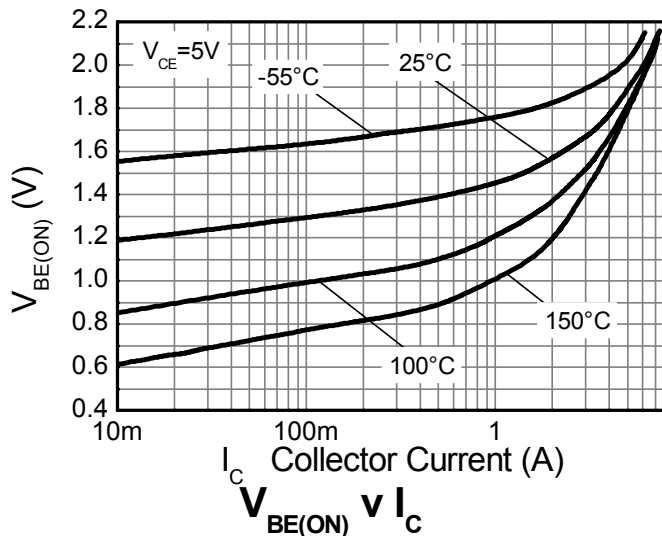
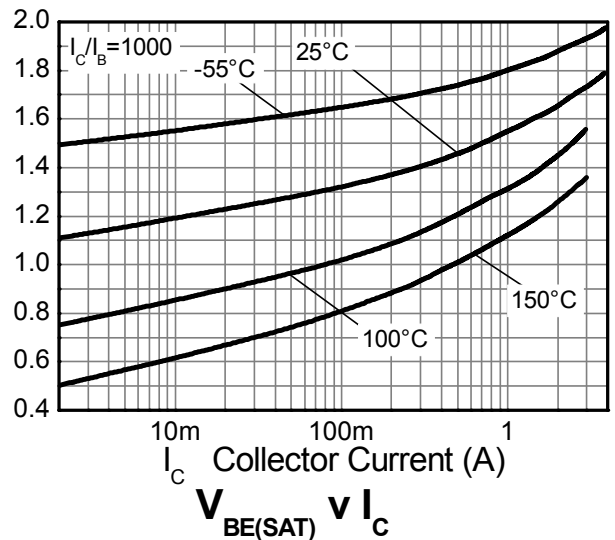
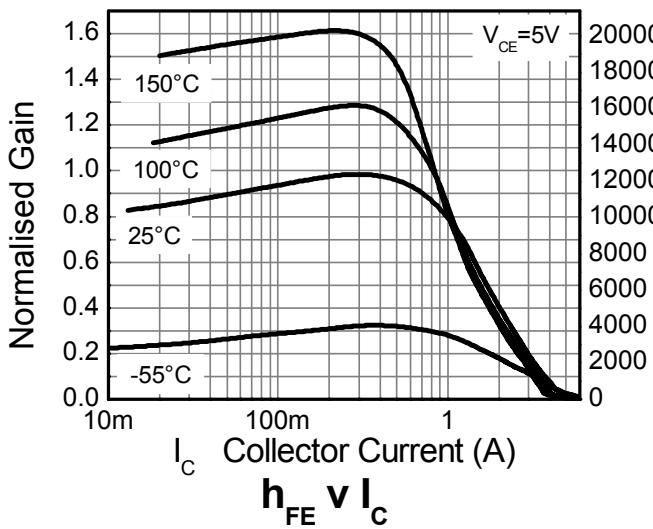
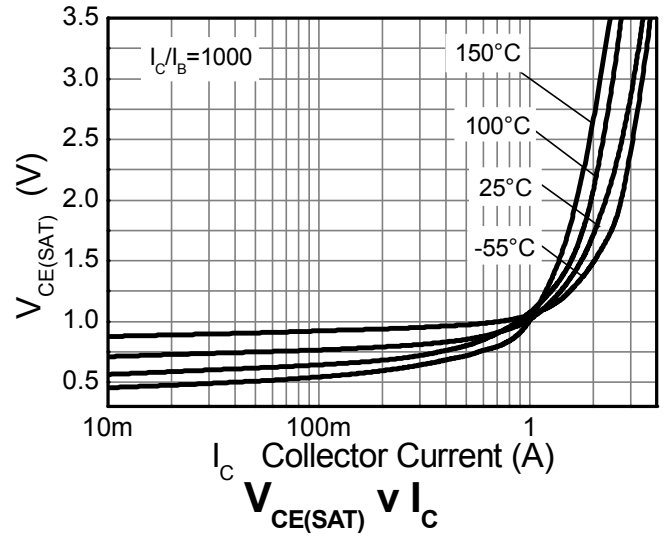
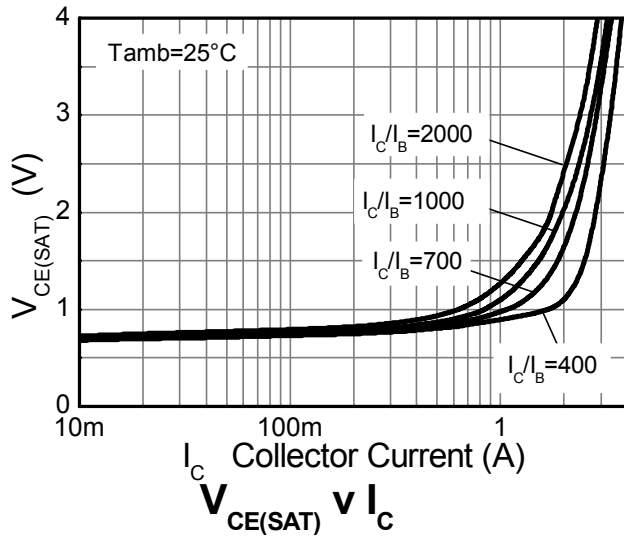


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CBO}	140	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV _{CEO}	120	—	—	V	I _C = 10mA
Emitter-Base Breakdown Voltage	BV _{EBO}	14	—	—	V	I _E = 100μA
Collector-Base Cutoff Current	I _{CBO}	—	—	100 10	nA μA	V _{CB} = 120V V _{CB} = 120V, T _A = +120°C
Collector-Emitter Cutoff Current	I _{CES}	—	—	100	nA	V _{CE} = 120V
Emitter Cutoff Current	I _{EBO}	—	—	100	nA	V _{EB} = 8V
DC Current Gain (Note 11)	h _{FE}	2,000 5,000 2,000 500	— — — —	— — 100,000 —	—	I _C = 50mA, V _{CE} = 5V I _C = 500mA, V _{CE} = 5V I _C = 1A, V _{CE} = 5V I _C = 2A, V _{CE} = 5V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	— —	— —	1 1.5	V	I _C = 250mA, I _B = 0.25mA I _C = 1A, I _B = 1mA
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	—	—	1.8	V	I _C = 1A, I _B = 1mA
Base-Emitter Turn-On Voltage (Note 11)	V _{BE(on)}	—	—	1.7	V	I _C = 1A, V _{CE} = 5V
Input Capacitance (Note 11)	C _{ibo}	—	90	—	pF	V _{EB} = 0.5V, f = 1MHz
Output Capacitance (Note 11)	C _{obo}	—	15	—	pF	V _{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product (Note 11)	f _T	150	—	—	MHz	V _{CE} = 10V, I _C = 100mA, f = 20MHz
Turn-On Time	t _{on}	—	0.5	—	μs	V _{CC} = 10V, I _C = 500mA
Turn-Off Time	t _{off}	—	1.6	—	μs	I _{B1} = -I _{B2} = 0.5mA

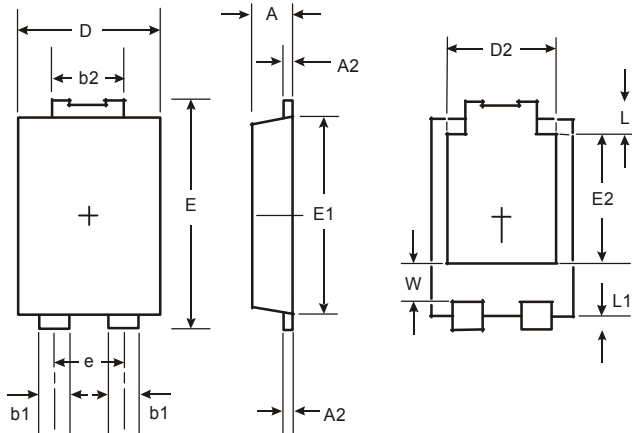
Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

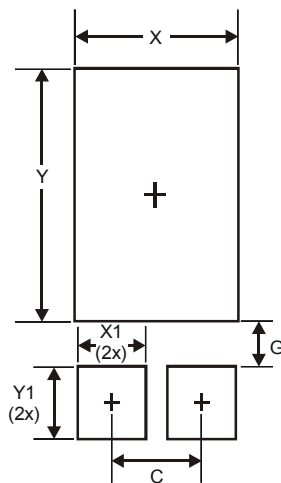
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI5		
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

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



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

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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