A Product Line of
Diodes Incorporated

Lead-free Green

DXT2010P5

60V NPN MEDIUM POWER TRANSISTOR
PowerDI®5

Features

- 43% smaller than SOT223; 60% smaller than TO252
- Maximum height just 1.1mm
- Rated up to 3.2W
- V_{CEO} = 60V
- I_C = 6A; I_{CM} = 20A
- Low Saturation voltage
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**

Mechanical Data

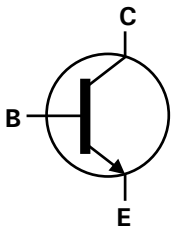
- Case: PowerDI®5
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.093 grams (approximate)

Applications

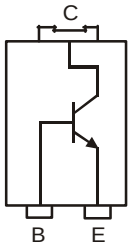
- Motor driver
- Regulator circuit

Top View

Bottom View



Device Schematic



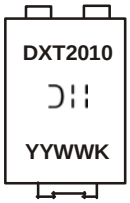
Pin-out diagram

Ordering Information (Note 3)

Part Number	Case	Packaging
DXT2010P5-13	PowerDI®5	5000/Tape & Reel

Notes:
1. No purposefully added lead. Halogen and Antimony Free.
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/datasheets/ap02007.pdf.

Marking Information



DXT2010 = Product Type Marking Code
= Manufacturers' Code Marking
K = Factory Designator
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 09 for 2009)
WW = Week code (01 to 53)

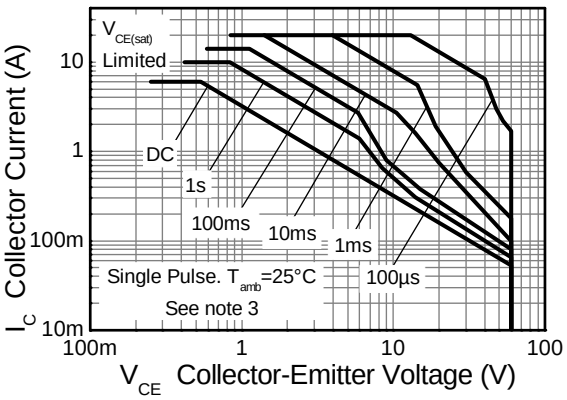
Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	6	A
Peak Pulse Current	I_{CM}	20	A

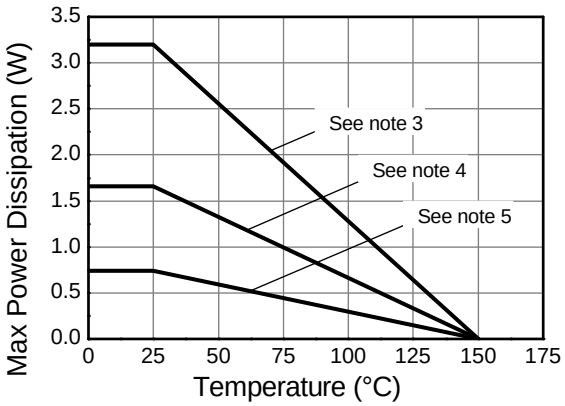
Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation @ T_A = 25°C (Note 4)	P_D	3.2	W
Thermal Resistance, Junction to Ambient Air (Note 4) @T_A = 25°C	$R_{\theta JA}$	39	°C/W
Power Dissipation @ T_A = 25°C (Note 5)	P_D	1.7	W
Thermal Resistance, Junction to Ambient Air (Note 5) @T_A = 25°C	$R_{\theta JA}$	75	°C/W
Power Dissipation @ T_A = 25°C (Note 6)	P_D	0.74	W
Thermal Resistance, Junction to Ambient Air (Note 6) @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

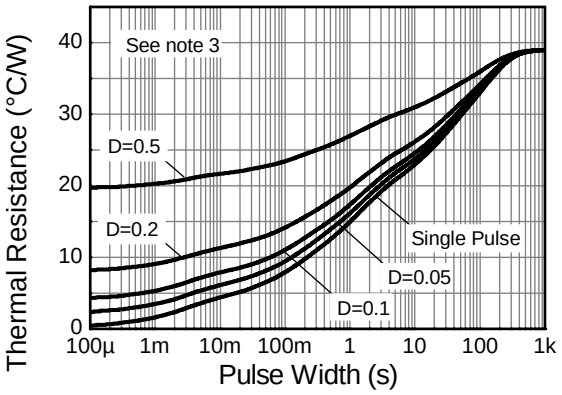
Notes: 4. Device mounted on FR-4 PCB, single sided 2 oz. copper, collector pad dimensions 25mm x 25mm.
5. Device mounted on FR-4 PCB, single sided 1 oz. copper, collector pad dimensions 50mm x 50mm.
6. Device mounted on FR-4 PCB, single sided 1 oz. copper, minimum recommended pad layout.



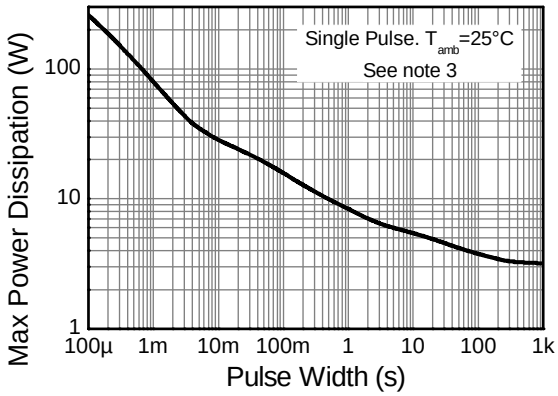
Safe Operating Area



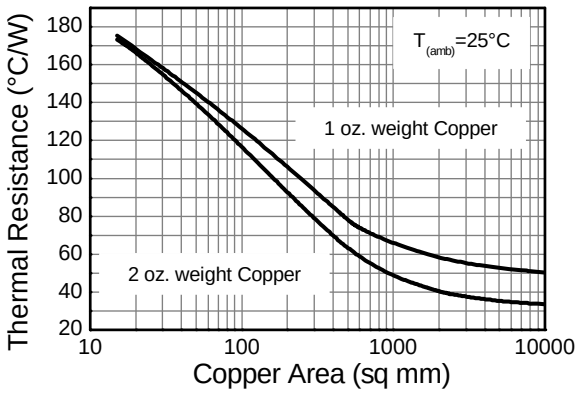
Derating Curve



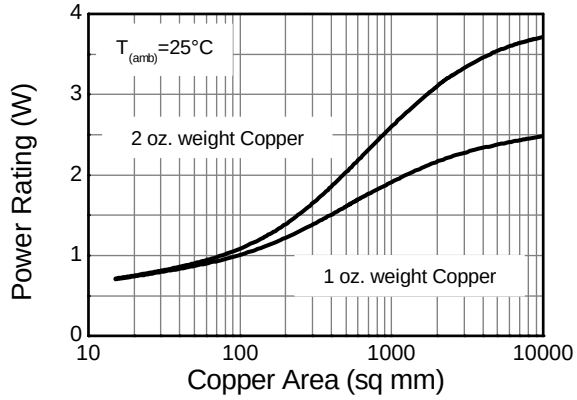
Transient Thermal Impedance



Pulse Power Dissipation



Thermal Resistance vs. Cu Area



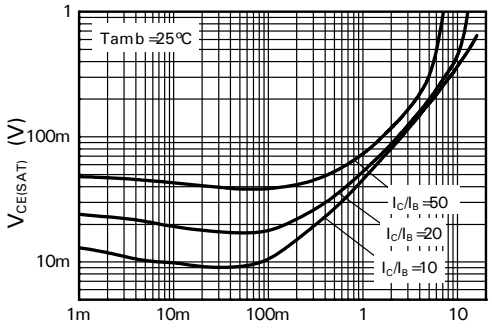
Power Rating vs. Cu Area

Electrical Characteristics @T_A = 25°C unless otherwise specified

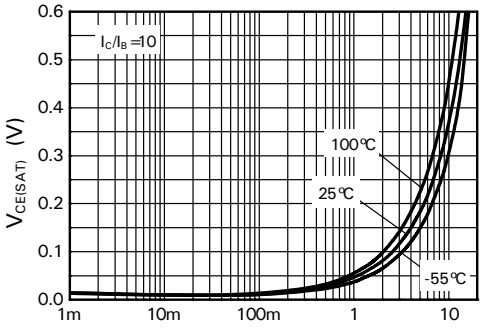
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	150	190	—	V	I_C = 100μA
Collector-Emitter Breakdown Voltage (Note 7)	$V_{(BR)CEO}$	60	80	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7.0	8.1	—	V	I_E = 100μA
Collector Cutoff Current	I_{CBO}	—	—	20 0.5	nA μA	V_{CB} = 120V V_{CB} = 120V, T_{amb} = 100 °C
Collector Cutoff Current	I_{CER} R≤1kΩ	—	—	20 0.5	nA μA	V_{CB} = 120V V_{CB} = 120V, T_{amb} = 100 °C
Emitter Cutoff Current	I_{EBO}	—	—	10	nA	V_{EB} = 6V
Collector-Emitter Saturation Voltage (Note 7)	$V_{CE(sat)}$	—	20 45 50 100 210	30 60 70 135 260	mV	I_C = 100mA, I_B = 5mA I_C = 1A, I_B = 100mA I_C = 1A, I_B = 50mA I_C = 2A, I_B = 50mA I_C = 6A, I_B = 300mA
Base-Emitter Saturation Voltage (Note 7)	$V_{BE(sat)}$	—	1000	1100	mV	I_C = 6A, I_B = 300mA
Base-Emitter Turn-On Voltage (Note 7)	$V_{BE(on)}$	—	940	1050	mV	V_{CE} = 1V, I_C = 6A
DC Current Gain (Note 6)	h_{FE}	100 100 55 20	200 200 105 40	— 300 — —	—	I_C = 10mA, V_{CE} = 1V I_C = 2A, V_{CE} = 1V I_C = 5A, V_{CE} = 1V I_C = 10A, V_{CE} = 1V
Transition Frequency	f_T	—	130	—	MHz	I_C = 100mA, V_{CE} = 10V f = 50MHz
Output Capacitance (Note 7)	C_{obo}	—	31	—	pF	V_{CB} = -10A, f = 1MHz
Switching Times	t_{on} t_{off}	— —	42 760	— —	ns ns	I_C = 1A, V_{CC} = 10V, I_{B1} = I_{B2} = 100mA

Notes: 7. Pulse Test: Pulse width ≤300μs. Duty cycle ≤2.0%.

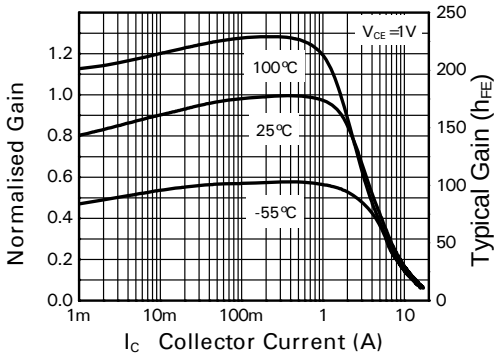
Typical Characteristic



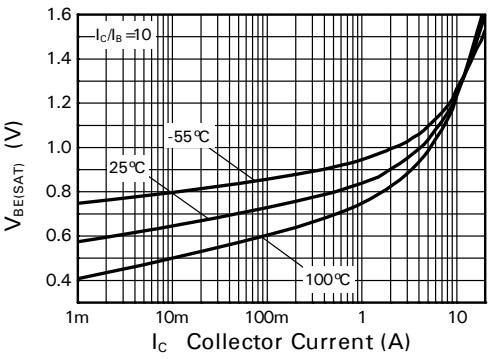
$V_{CE(SAT)}$ v I_C



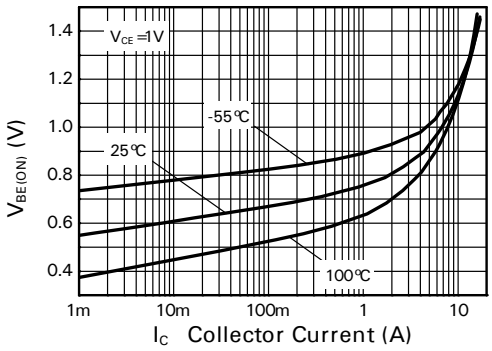
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C

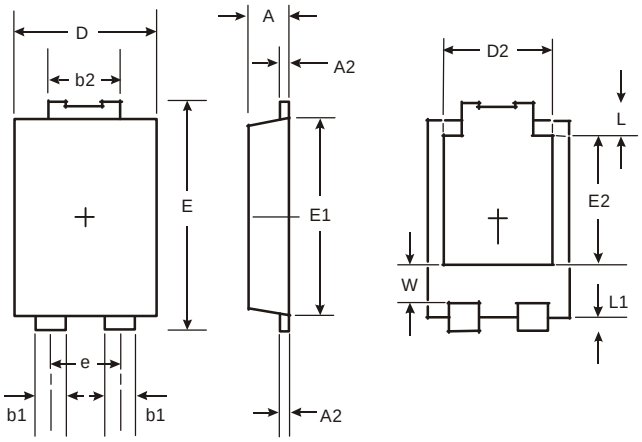


$V_{BE(SAT)}$ v I_C



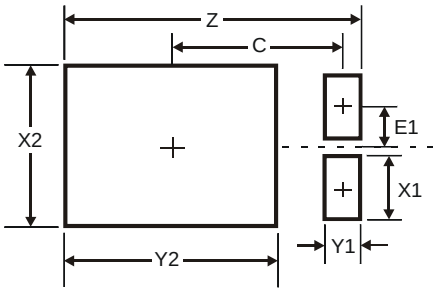
$V_{BE(ON)}$ v I_C

Package Outline Dimensions



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)
Z	6.6
X1	1.4
X2	3.6
Y1	0.8
Y2	4.7
C	3.87
E1	0.9

PowerDI is a registered trademark of Diodes Incorporated.

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

www.diodes.com