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Diodes Incorporated
DXT690BP5-13

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sales@integrated-circuit.com

Lead-free Green

A Product Line of
Diodes Incorporated

DXT690BP5

45V NPN HIGH GAIN TRANSISTOR IN POWERDI®5

Features

- BV_{CEO} > 45V
- I_C = 3A High Continuous Collector Current
- I_{CM} = 6A Peak Collector Current
- High gain device >400 @1A
- $R_{CE(sat)}$ = 77mΩ for low equivalent On-Resistance
- h_{FE} specified up to 6A for a high gain hold up
- 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**
- **PPAP Capable (Note 4)**

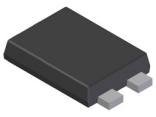
Mechanical Data

- 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 annealed over Copper leadframe Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.093 grams (approximate)

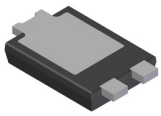
Applications

- LED driver
- Motor driver
- Power Switches
- DC-DC Converters
- IGBT & MOSFET Gate Drivers
- Automotive Circuits

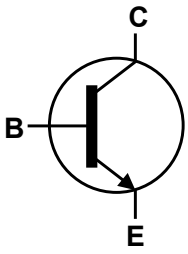
POWERDI5



Top View



Bottom View



Device Schematic

Top View
Pin-Out

Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DXT690BP5-13	AEC-Q101	DXT690B	13	16	5,000
DXT690BP5Q-13	Automotive	DXT690B	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. 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/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html

Marking Information

DXT690B = 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)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	45	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	3	A
Peak Pulse Current	I_{CM}	6	A
Base Current	I_B	0.5	A

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

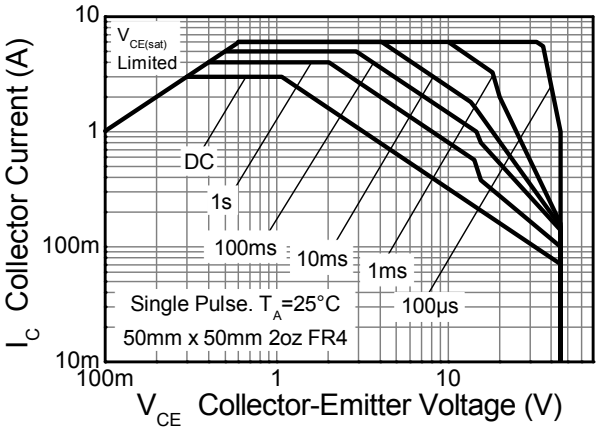
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	3.2	W
	(Note 7)		1.7	
	(Note 8)		0.74	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	39	°C/W
	(Note 7)		75	
	(Note 8)		169	
Thermal Resistance, Junction to Leads	(Note 9)	$R_{\theta JL}$	9	
Thermal Resistance, Junction to Case	(Note 10)	$R_{\theta JC}$	10	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 11)

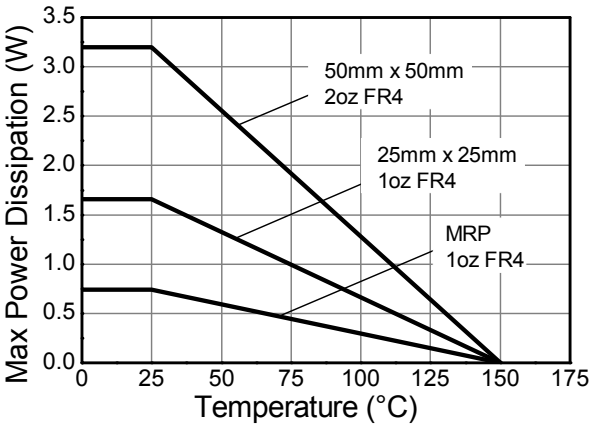
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
6. For a device mounted with 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.
7. Same as note (6), except mounted on 25mm x 25mm 1oz copper.
8. Same as note (6), except mounted on minimum recommended pad (MRP) layout.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Thermal resistance from junction to the top of the case.
11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

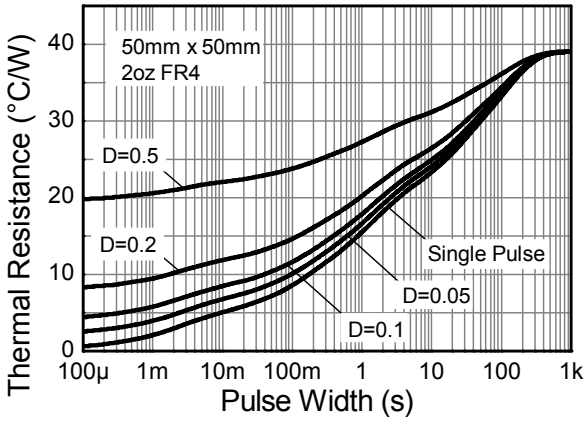
Thermal Characteristics and Derating Information



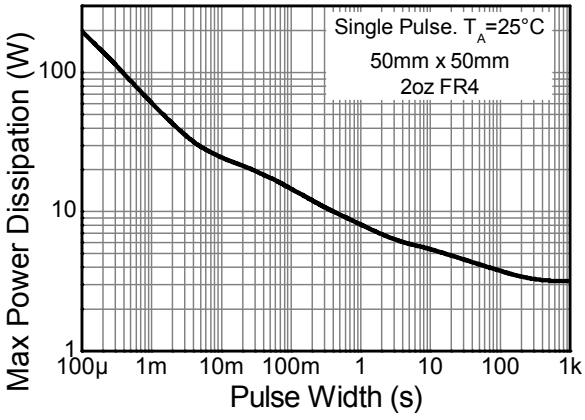
Safe Operating Area



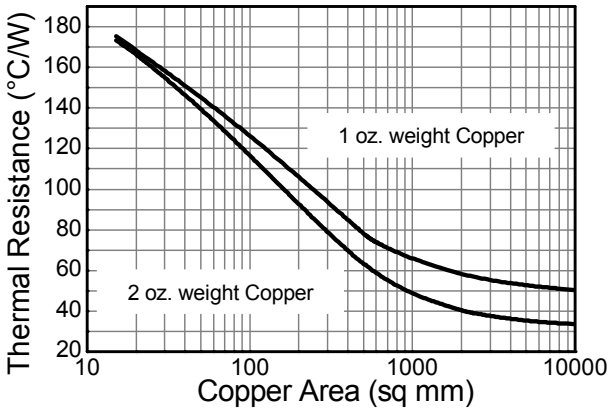
Derating Curve



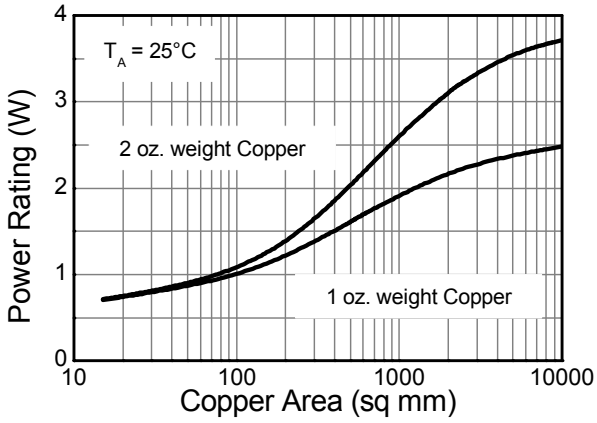
Transient Thermal Impedance



Pulse Power Dissipation



Thermal Resistance vs. Cu Area



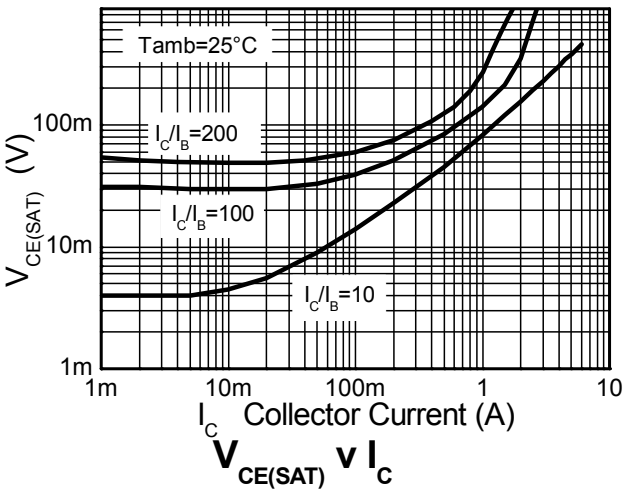
Power Rating vs. Cu Area

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

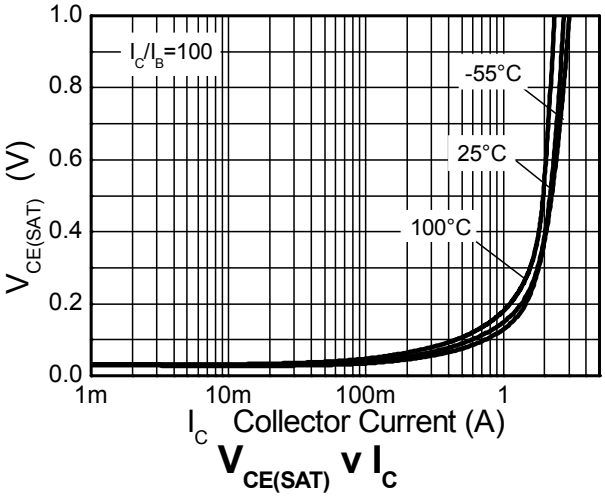
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	60	145	—	V	I_C = 100μA, I_E = 0
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	45	65	—	V	I_C = 10mA, I_B = 0
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.2	—	V	I_E = 100μA, I_C = 0
Collector-Base Cutoff Current	I_{CBO}	—	<1	20	nA	V_{CB} = 35V, I_E = 0
Collector-Emitter Cutoff Current	I_{CES}	—	<1	20	nA	V_{CB} = 35V, V_{BE} = 0
Emitter-Base Cutoff Current	I_{EBO}	—	<1	20	nA	V_{EB} = 5.6V, I_C = 0
ON CHARACTERISTICS (Note 12)						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	— — — —	50 240 210 230	85 360 320 350	mV	I_C = 100mA, I_B = 0.5mA I_C = 1A, I_B = 5mA I_C = 2A, I_B = 40mA I_C = 3A, I_B = 150mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	1.0	1.2	V	I_C = 3A, I_B = 150mA
Base-Emitter Turn-On Voltage	$V_{BE(ON)}$	—	0.9	1.1	V	I_C = 3A, V_{CE} = 2V
DC Current Gain	h_{FE}	500 400 150 60	700 600 350 120	— — — —	—	I_C = 100mA, V_{CE} = 2V I_C = 1A, V_{CE} = 2V I_C = 2A, V_{CE} = 2V I_C = 3A, V_{CE} = 2V
AC CHARACTERISTICS						
Transition Frequency	f_T	150	—	—	MHz	I_C = 50mA, V_{CE} = 5V, f = 50MHz
Output Capacitance	C_{obo}	—	16	—	pF	V_{CB} = 10V, f = 1MHz
Switching Times	t_{on} t_{off}	— —	33 1300	— —	ns ns	V_{CC} = 10V, I_C = 500mA, I_{B1} = -I_{B2} = 50mA

Note: 12. Pulse Test: Pulse width ≤300μs. Duty cycle ≤2.0%.

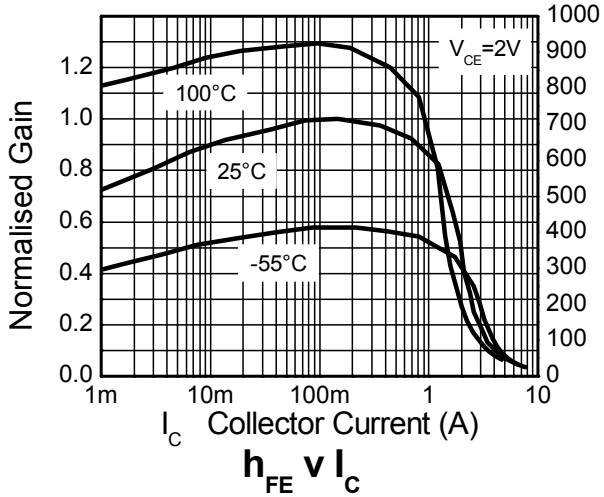
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



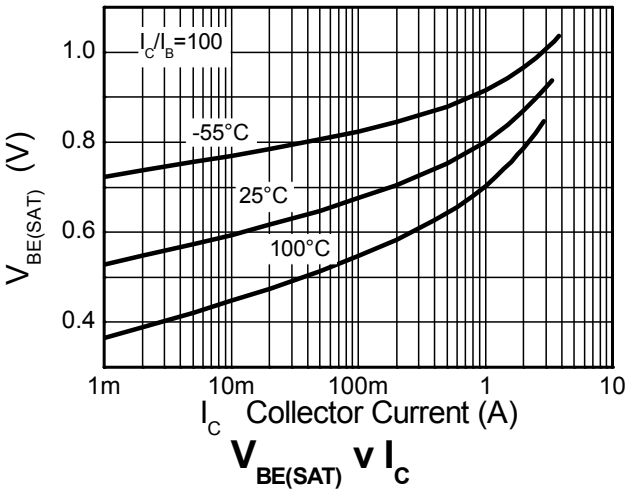
$V_{CE(SAT)}$ v I_C



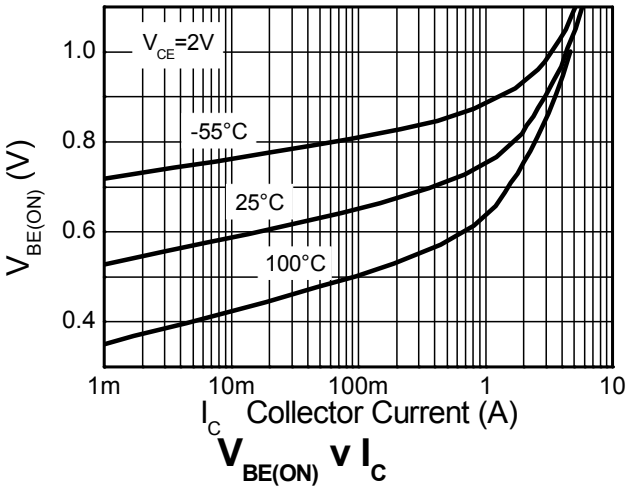
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



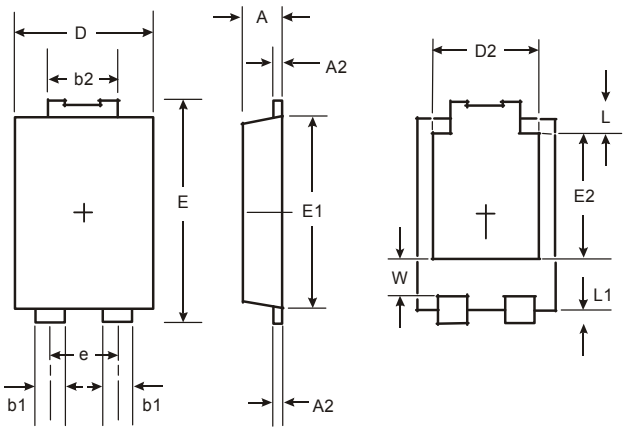
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

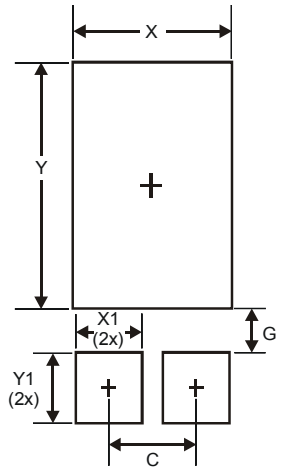
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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

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