



**THE DATASHEET OF  
DXT690BP5-13**



## Features

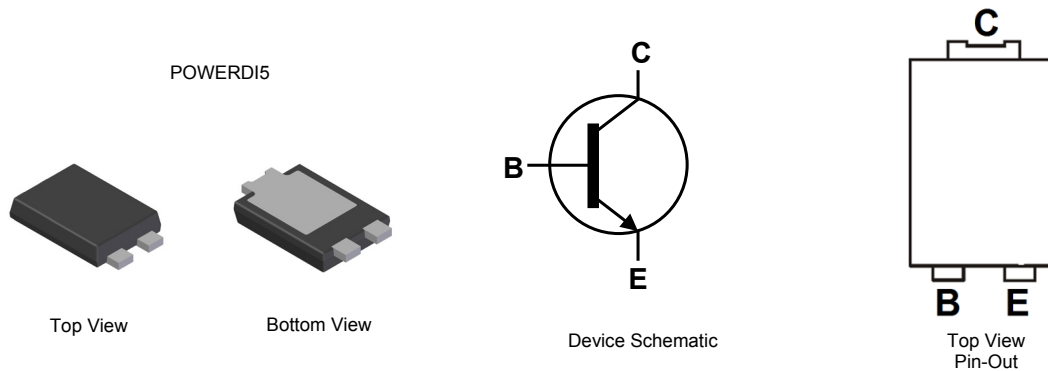
- $BV_{CEO} > 45V$
- $I_C = 3A$  High Continuous Collector Current
- $I_{CM} = 6A$  Peak Collector Current
- High gain device  $>400 @1A$
- $R_{CE(sat)} = 77m\Omega$  for low equivalent On-Resistance
- $h_{FE}$  specified up to 6A for a high gain hold up
- 43% smaller than SOT223; 60% smaller than TO252
- 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 @3
- Weight: 0.093 grams (approximate)

## Applications

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

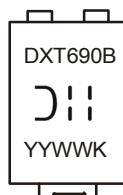


## Ordering Information (Notes 4 & 5)

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](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/](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
- J||| = 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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	45	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	3	A
Peak Pulse Current	I <sub>CM</sub>	6	A
Base Current	I <sub>B</sub>	0.5	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

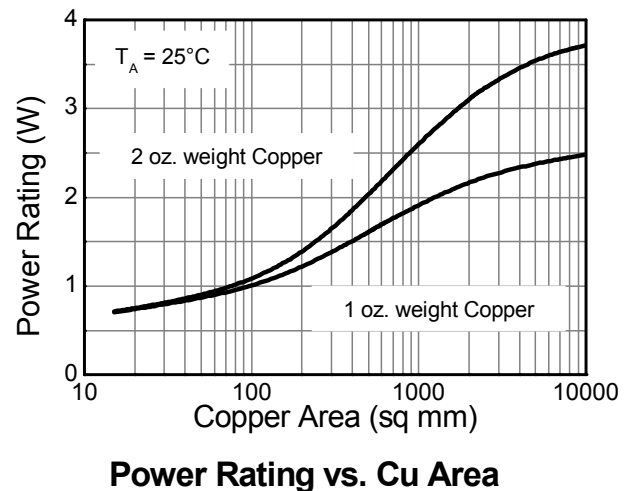
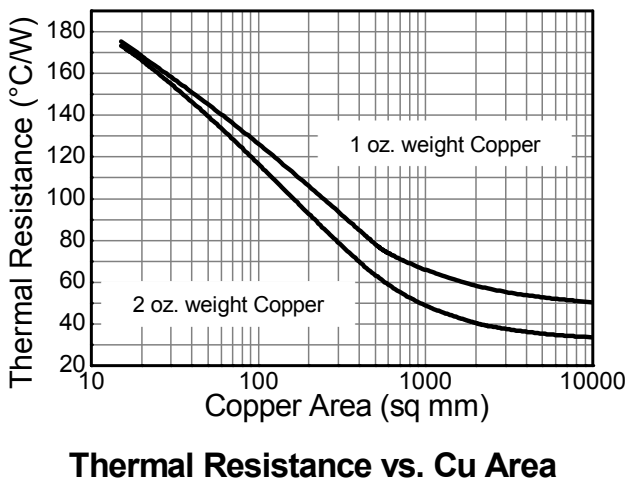
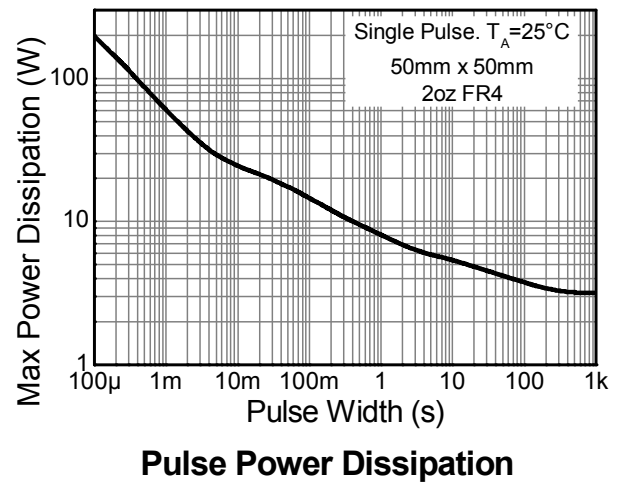
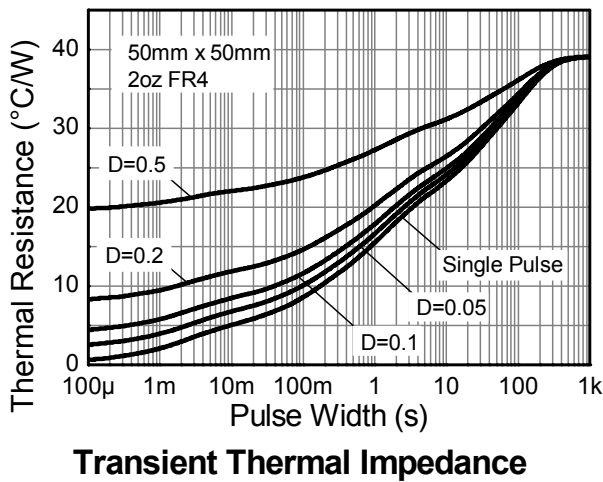
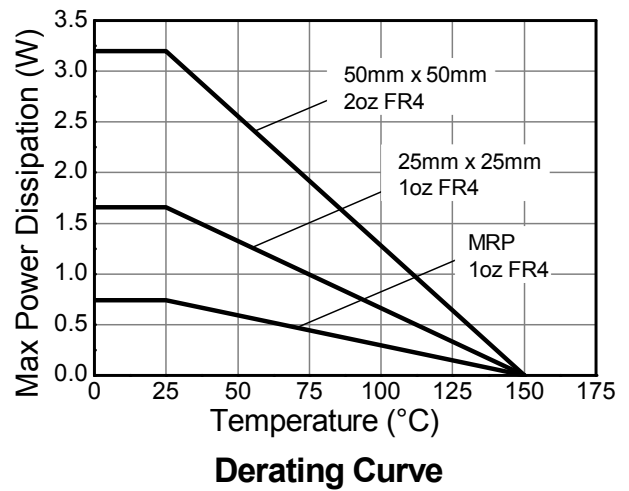
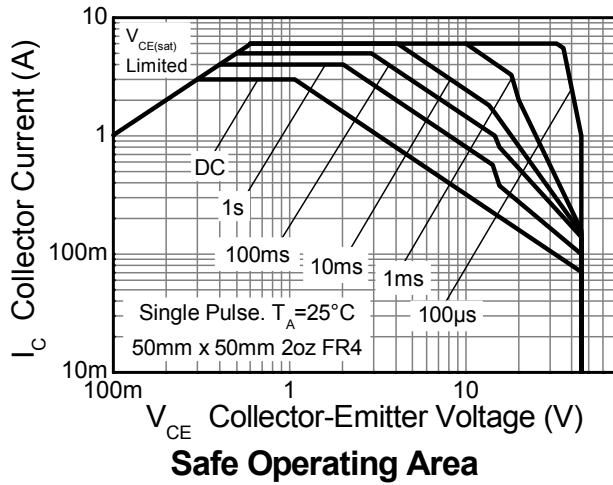
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 6)	3.2
		(Note 7)	1.7
		(Note 8)	0.74
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 6)	39
		(Note 7)	75
		(Note 8)	169
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	9	°C/W
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	10	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-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**

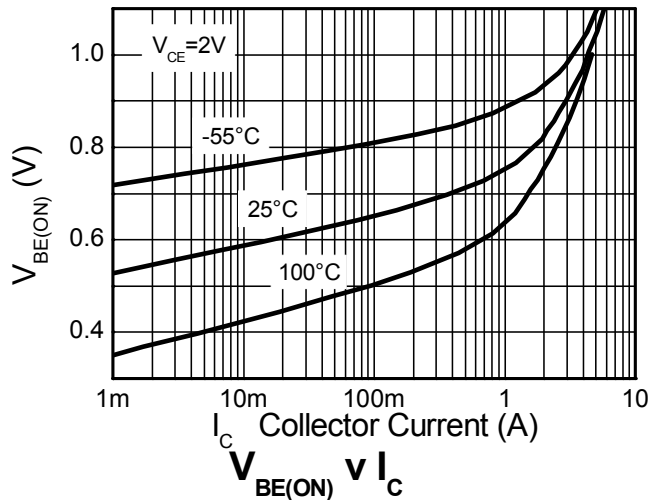
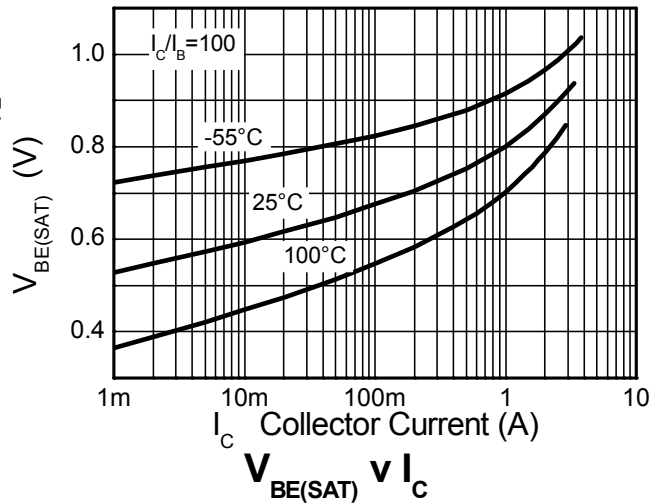
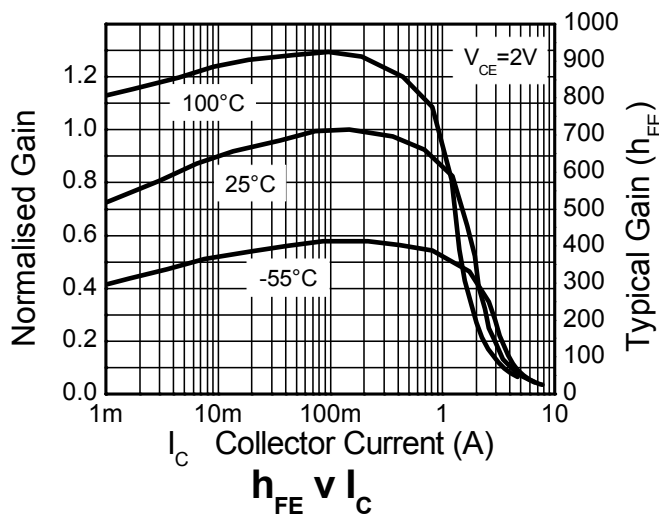
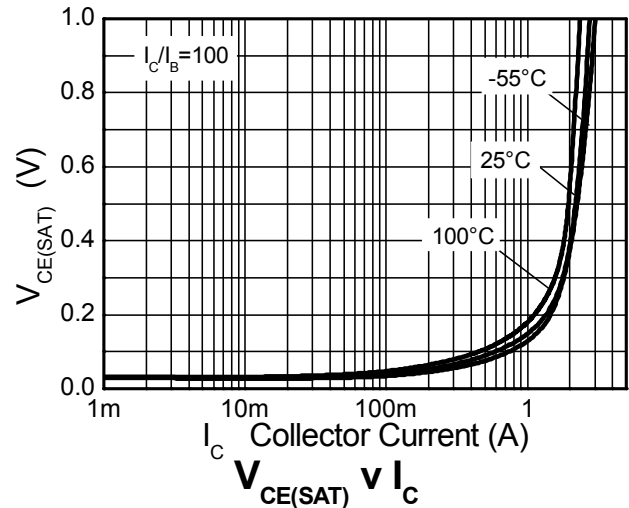
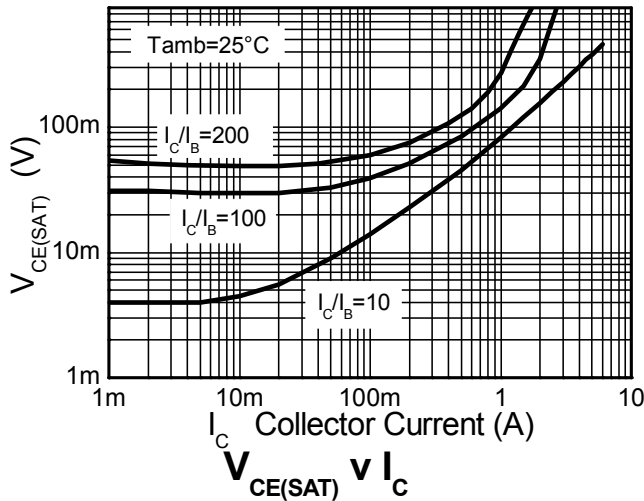


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

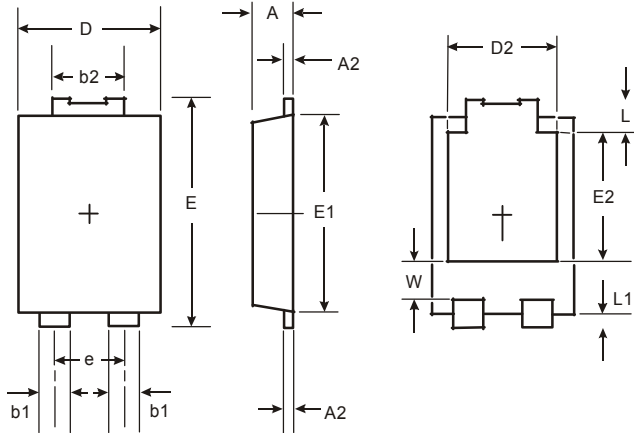
Note: 12. Pulse Test: Pulse width ≤300μs. Duty cycle ≤2.0%.

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



## Package Outline Dimensions

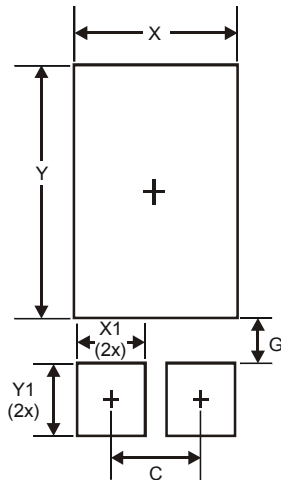
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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

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