

**45V NPN HIGH GAIN MEDIUM POWER TRANSISTOR**

**Features**

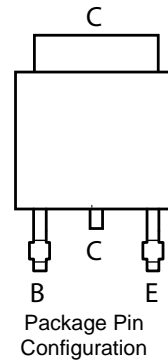
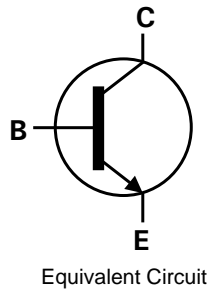
- $BV_{CEO} > 45V$
- $I_C = 3A$  high Continuous Collector Current
- $I_{CM} = 6A$  Peak Pulse Current
- High gain device  $>400 @1A$
- $R_{CE(sat)} = 77m\Omega$  for low equivalent On-Resistance
- $h_{FE}$  specified up to 6A for a high gain hold up
- **Totally Lead-Free & Fully RoHS Compliant (Notes 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: TO252 (DPAK)
- 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: 0.34 grams (approximate)

**Applications**

- DC – DC converters
- Power Switches
- IGBT & MOSFET gate drivers
- Motor Control
- Automotive Circuits
- Siren drivers

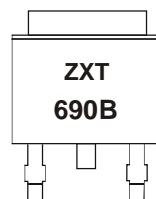


**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXT690BKTC	AEC-Q101	ZXT690B	13	16	2,500
ZXT690BKQTC	Automotive	ZXT690B	13	16	2,500

- 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> 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.
  5. For packaging details, go to our website at <http://www.diodes.com>

**Marking Information**



ZXT690B = Product Type Marking Code

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

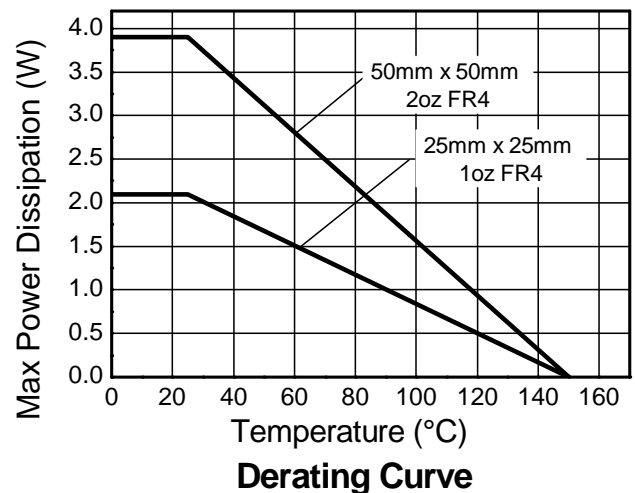
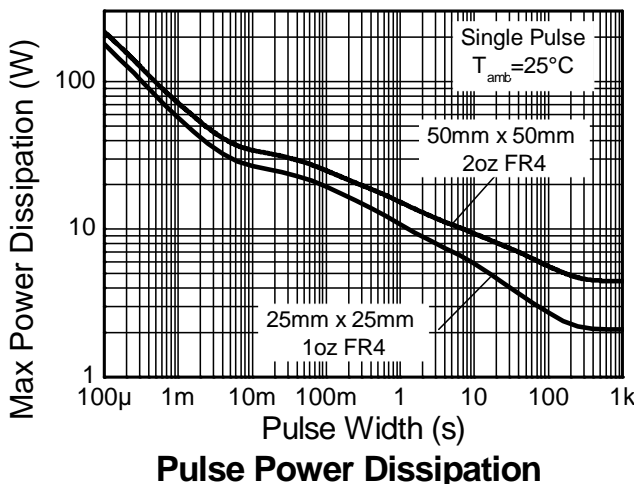
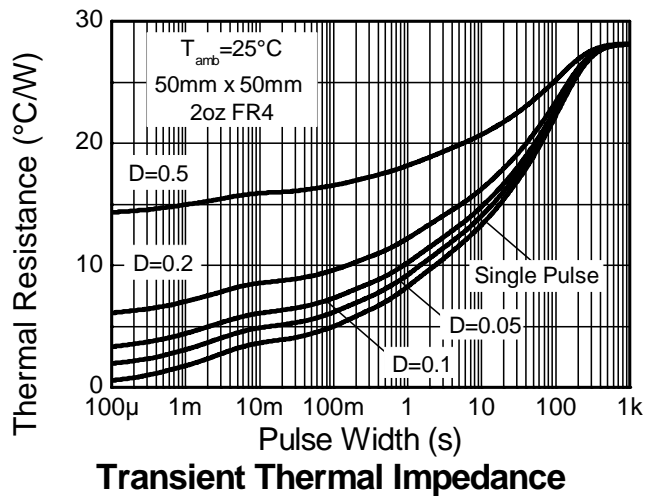
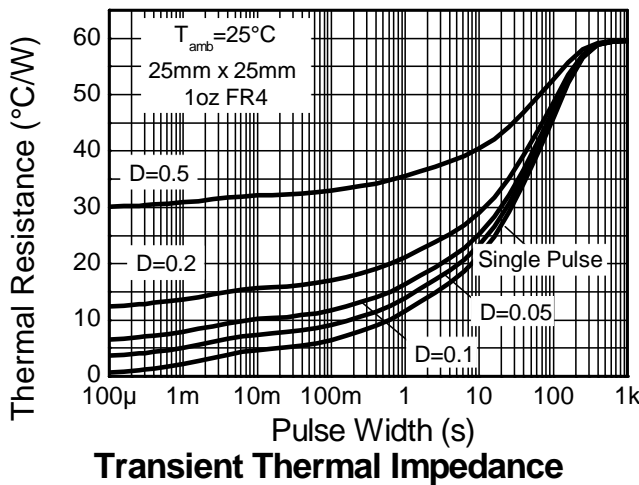
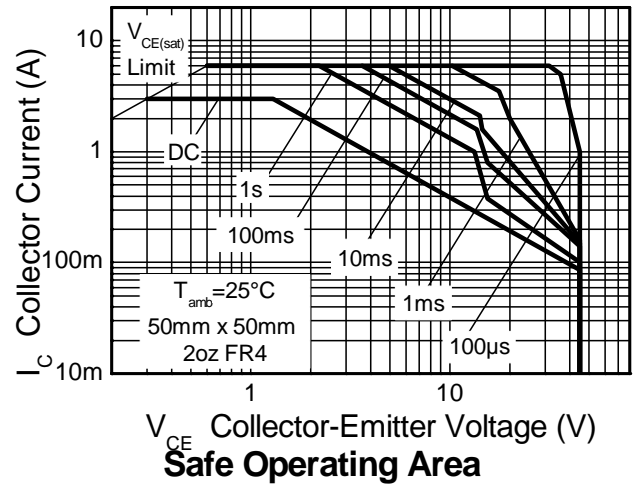
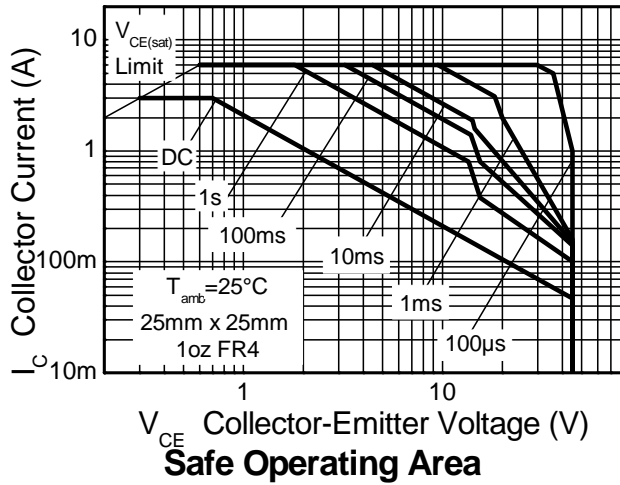
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	BV <sub>CBO</sub>	60	V
Collector-Emitter Voltage	BV <sub>CEO</sub>	45	V
Emitter-Base Voltage	BV <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	3	A
Peak Pulse Current	I <sub>CM</sub>	6	A
Base Current	I <sub>B</sub>	0.5	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 6)	2.1
		(Note 7)	3.4
		(Note 8)	3.9
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 6)	59
		(Note 7)	36
		(Note 8)	32
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	2.97	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  7. Same as note (6), except the device is surface mounted on 25mm x 25mm with 2oz copper.
  8. Same as note (6), except the device is surface mounted on 50mm x 50mm with 2oz copper.
  9. Thermal resistance from junction to solder-point (at the end of the collector lead).

**Thermal Characteristics and Derating Information**

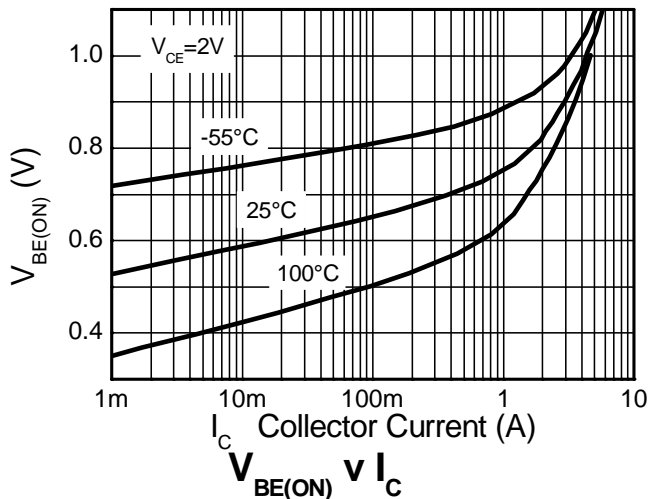
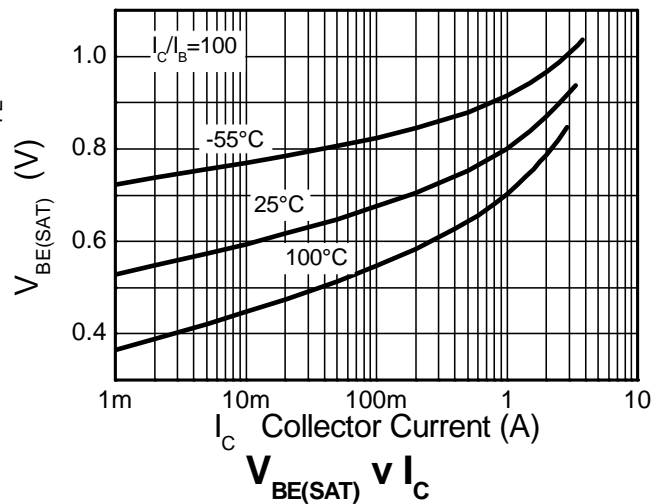
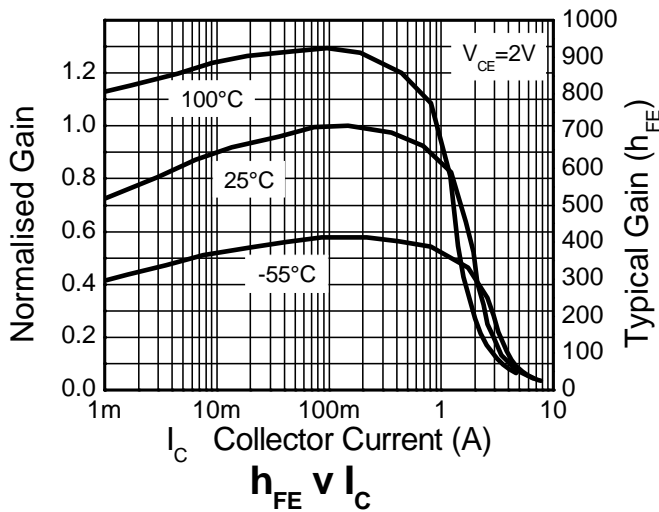
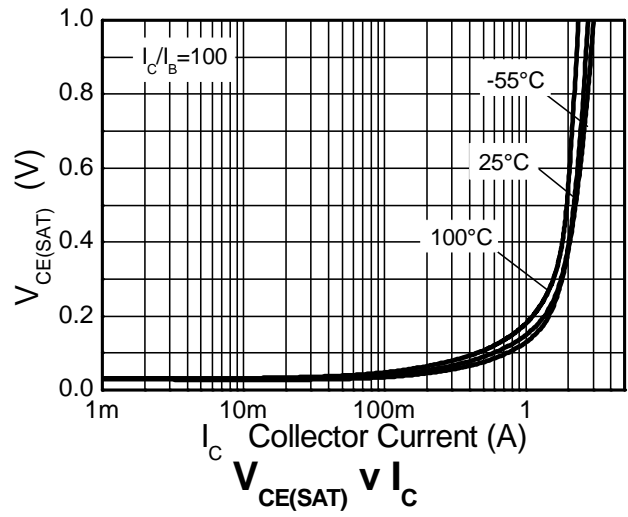
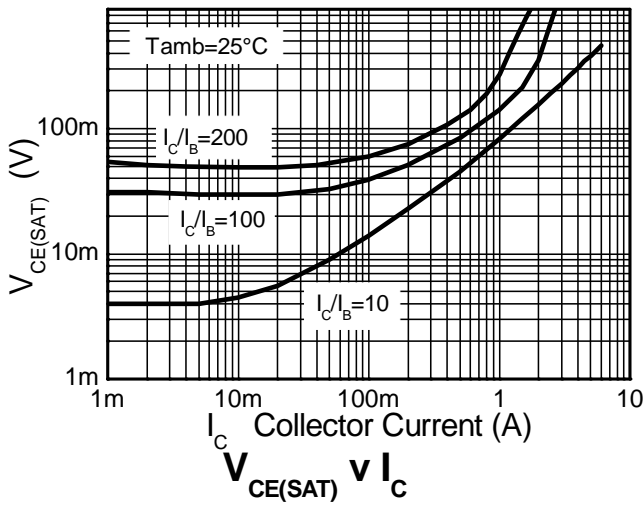


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	60	145	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	45	65	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.2	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	<1	20	nA	V <sub>CB</sub> = 35V
Collector Cutoff Current	I <sub>CES</sub>	—	<1	20	nA	V <sub>CB</sub> = 35V
Emitter Cutoff Current	I <sub>EBO</sub>	—	<1	20	nA	V <sub>EB</sub> = 5.6V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	—	50	85	mV	I <sub>C</sub> = 0.1A, 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 (Note 9)	V <sub>BE(sat)</sub>	—	1.0	1.2	mV	I <sub>C</sub> = 3A, I <sub>B</sub> = 150mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	—	0.9	1.1	mV	I <sub>C</sub> = 3A, V <sub>CE</sub> = 2V
DC Current Gain (Note 9)	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
Current Gain-Bandwidth Product	f <sub>T</sub>	150	—	—	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 5V, f = 50MHz
Output Capacitance (Note 9)	C <sub>obo</sub>	—	16	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Turn-On Time	t <sub>on</sub>	—	33	—	ns	I <sub>C</sub> = 500mA, V <sub>CC</sub> = 10V,
Turn-Off Time	t <sub>off</sub>	—	1300	—	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 50mA

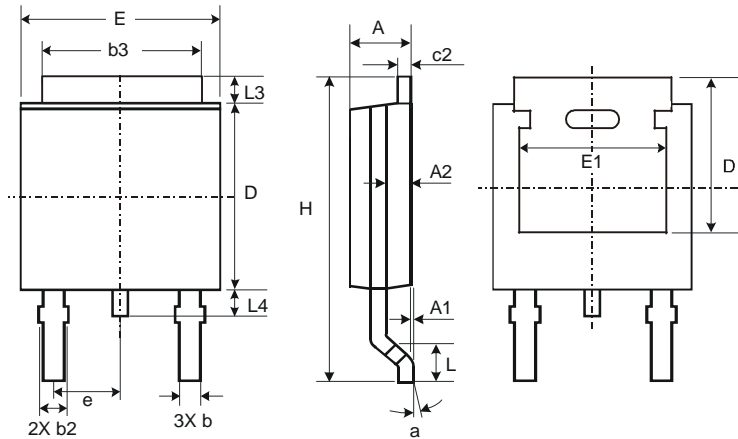
Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.

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



## Package Outline Dimensions

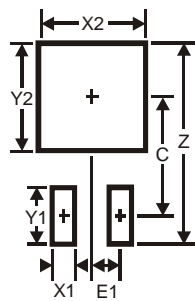
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
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)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3

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