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
- $R_{CE(sat)}$ = 77mΩ 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

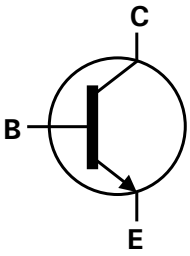
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.34 grams (approximate)

Applications

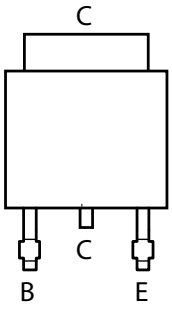
- DC – DC converters
- Power Switches
- IGBT & MOSFET gate drivers
- Motor Control
- Automotive Circuits
- Siren drivers

TO252

Top View



Equivalent Circuit



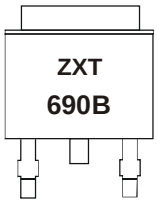
Package Pin Configuration

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_A = +25°C, unless otherwise specified.)

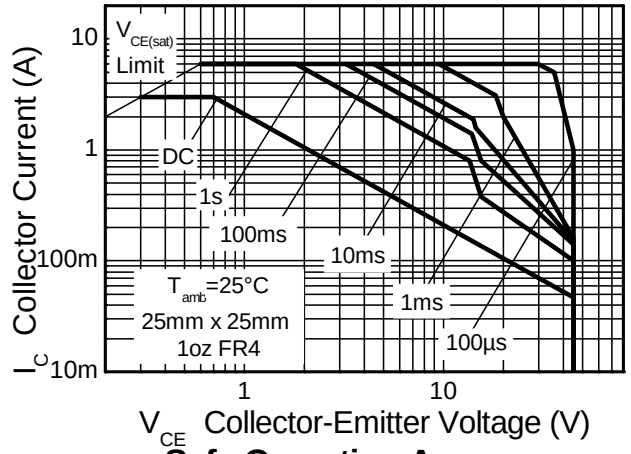
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	BV_{CBO}	60	V
Collector-Emitter Voltage	BV_{CEO}	45	V
Emitter-Base Voltage	BV_{EBO}	7	V
Continuous Collector Current	I_C	3	A
Peak Pulse Current	I_{CM}	6	A
Base Current	I_B	0.5	A

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

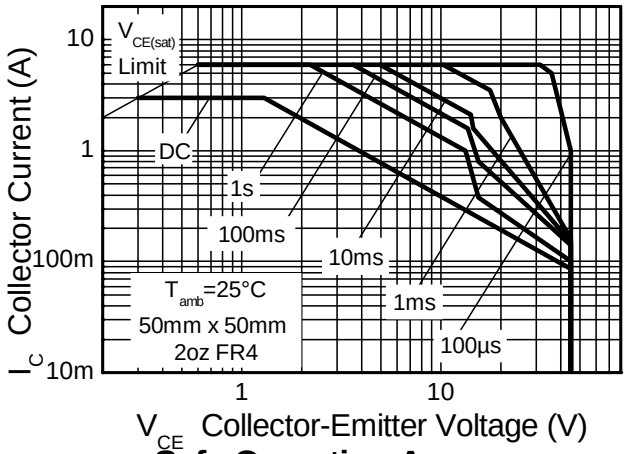
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	2.1	W
	(Note 7)		3.4	
	(Note 8)		3.9	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	59	°C/W
	(Note 7)		36	
	(Note 8)		32	
Thermal Resistance, Junction to Leads	(Note 9)	$R_{\theta JL}$	2.97	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-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).

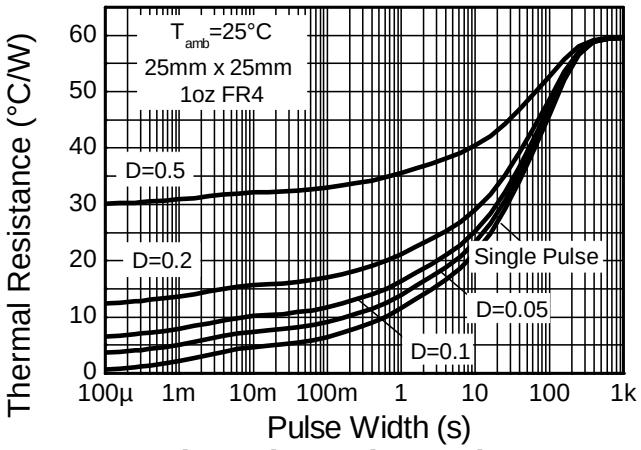
Thermal Characteristics and Derating Information



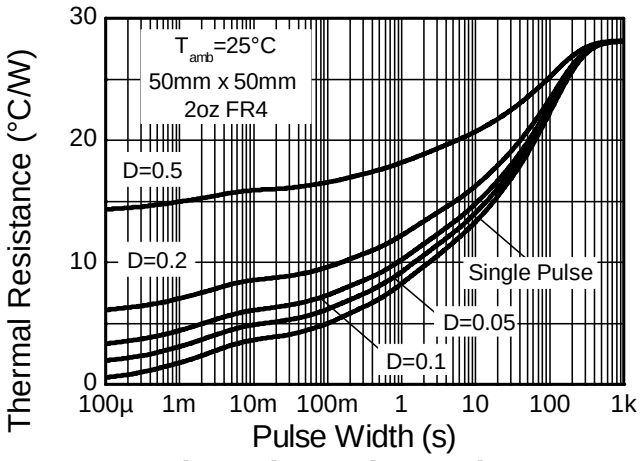
Safe Operating Area



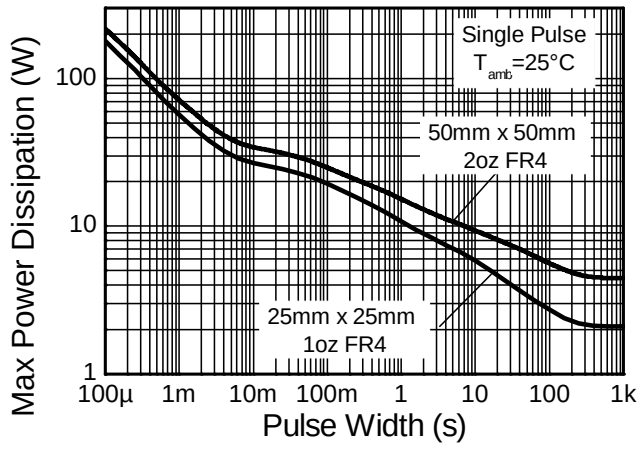
Safe Operating Area



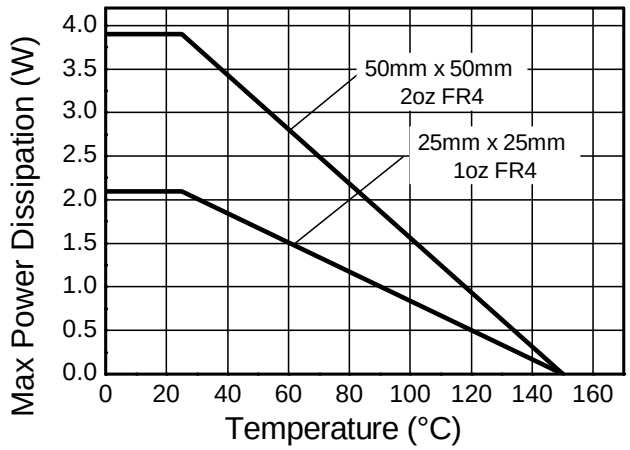
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



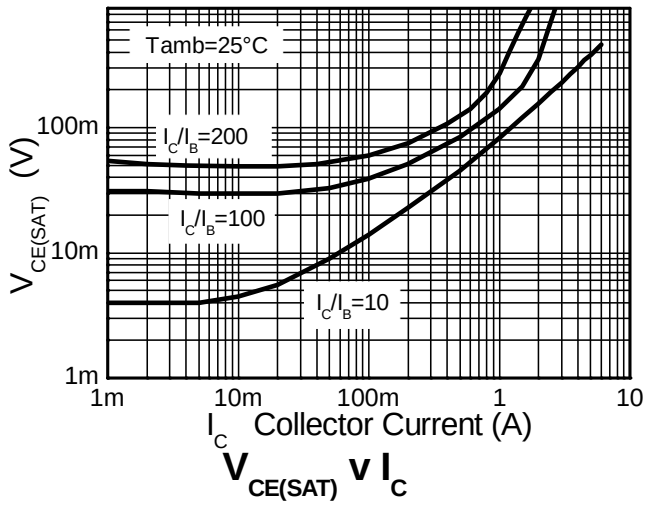
Derating Curve

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

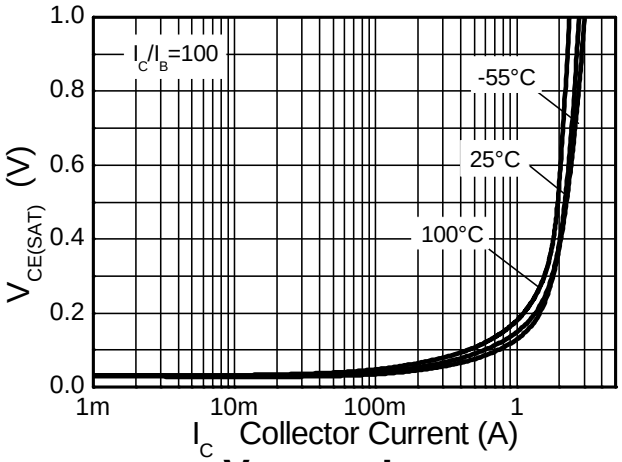
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	60	145	—	V	I_C = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	45	65	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.2	—	V	I_E = 100μA
Collector Cutoff Current	I_{CBO}	—	<1	20	nA	V_{CB} = 35V
Collector Cutoff Current	I_{CES}	—	<1	20	nA	V_{CB} = 35V
Emitter Cutoff Current	I_{EBO}	—	<1	20	nA	V_{EB} = 5.6V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)}$	—	50	85	mV	I_C = 0.1A, I_B = 0.5mA
			240	360		I_C = 1A, I_B = 5mA
			210	320		I_C = 2A, I_B = 40mA
			230	350		I_C = 3A, I_B = 150mA
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)}$	—	1.0	1.2	mV	I_C = 3A, I_B = 150mA
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	—	0.9	1.1	mV	I_C = 3A, V_{CE} = 2V
DC Current Gain (Note 9)	h_{FE}	500	700	—	—	I_C = 100mA, V_{CE} = 2V
		400	600			I_C = 1A, V_{CE} = 2V
		150	350			I_C = 2A, V_{CE} = 2V
		60	120			I_C = 3A, V_{CE} = 2V
Current Gain-Bandwidth Product	f_T	150	—	—	MHz	I_C = 50mA, V_{CE} = 5V, f = 50MHz
Output Capacitance (Note 9)	C_{obo}	—	16	—	pF	V_{CB} = 10V, f = 1MHz
Turn-On Time	t_{on}	—	33	—	ns	I_C = 500mA, V_{CC} = 10V,
Turn-Off Time	t_{off}	—	1300	—	ns	I_{B1} = -I_{B2} = 50mA

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

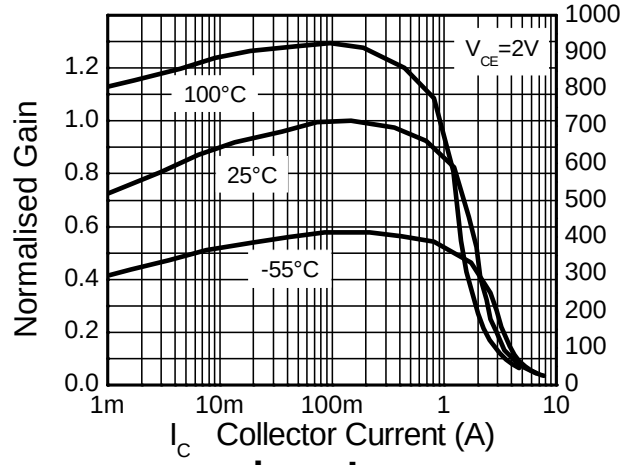
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



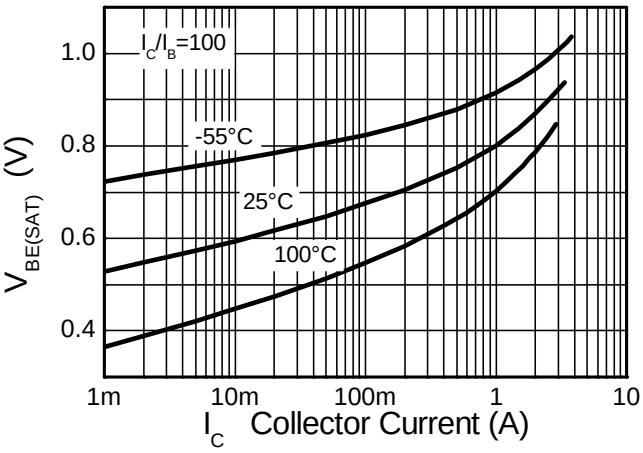
$V_{CE(SAT)}$ v I_C



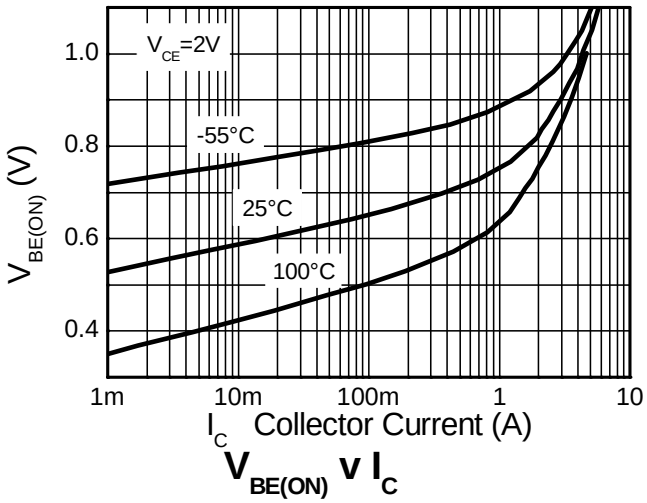
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



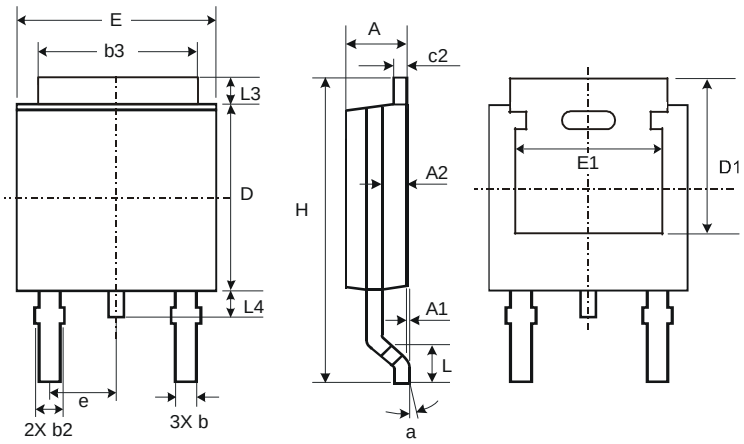
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

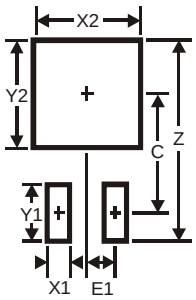
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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