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
- **Lead-Free Finish; 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

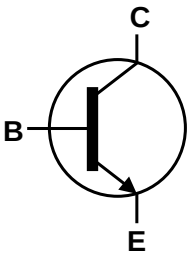
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.34 grams (Approximate)

Applications

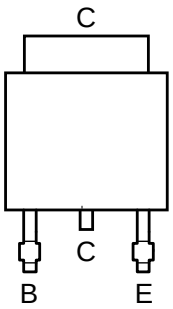
- DC-DC Converters
- Power Switches
- IGBT & MOSFET Gate Drivers
- Motor Control
- Automotive Circuits
- Siren Drivers

TO252 (DPAK)

Top View



Equivalent Circuit



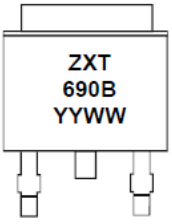
Package Pin Configuration

Ordering Information (Note 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. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/quality/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html

Marking Information



ZXT690B = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 17 = 2017)
WW = Week Code (01 – 53)

Absolute 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.)

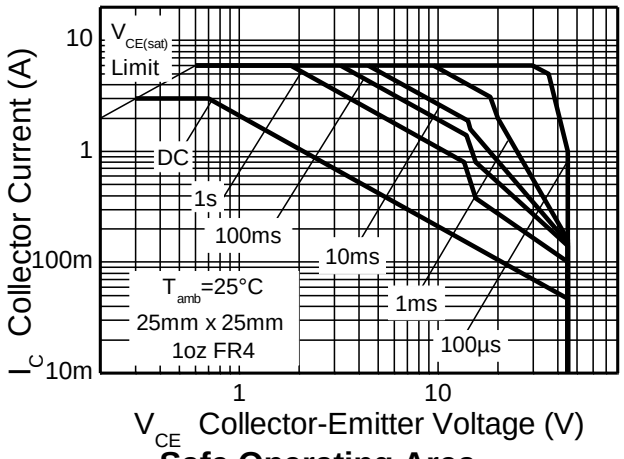
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	4.0	W
	(Note 7)		3.4	
	(Note 8)		2.1	
	(Note 9)		1.6	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	32	°C/W
	(Note 7)		36	
	(Note 8)		59	
	(Note 9)		80	
Thermal Resistance, Junction to Leads	(Note 10)	$R_{\theta JL}$	3	
Thermal Resistance, Junction to Case	(Note 11)	$R_{\theta JC}$	14.6	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 12)

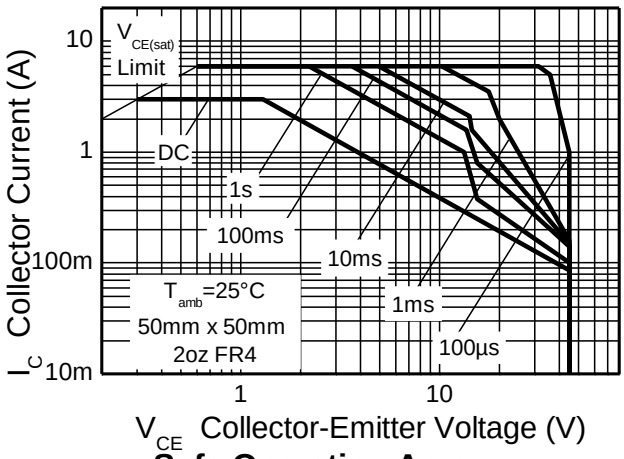
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

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 2oz copper.
8. Same as Note (6), except mounted on 25mm x 25mm 1oz copper.
9. Same as Note (6), except mounted on minimum recommended pad (MRP) layout.
10. Thermal resistance from junction to solder-point (on the exposed collector pad).
11. Thermal resistance from junction to the top of the case.
12. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

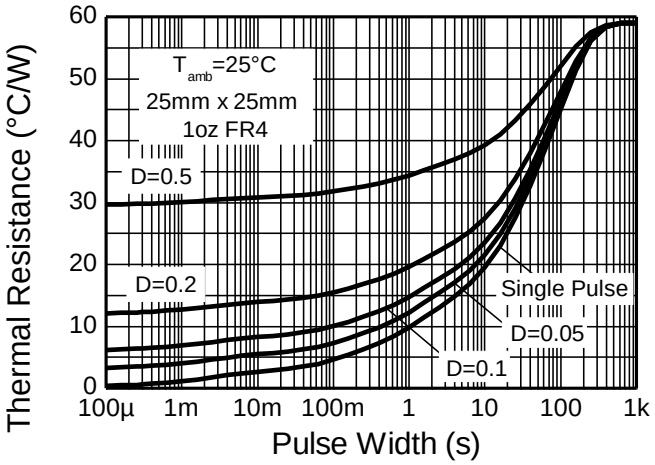
Thermal Characteristics and Derating Information



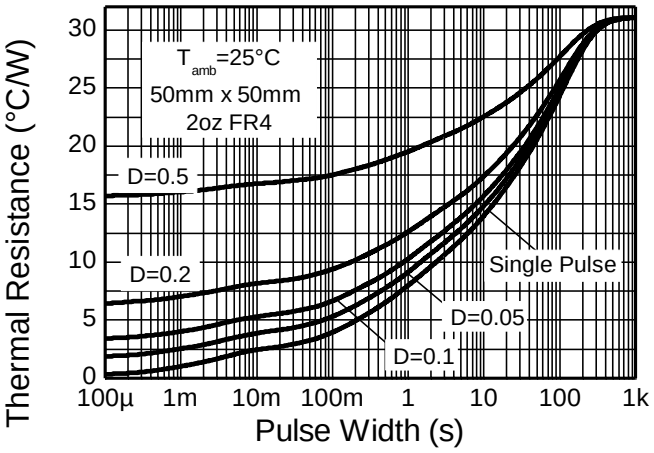
Safe Operating Area



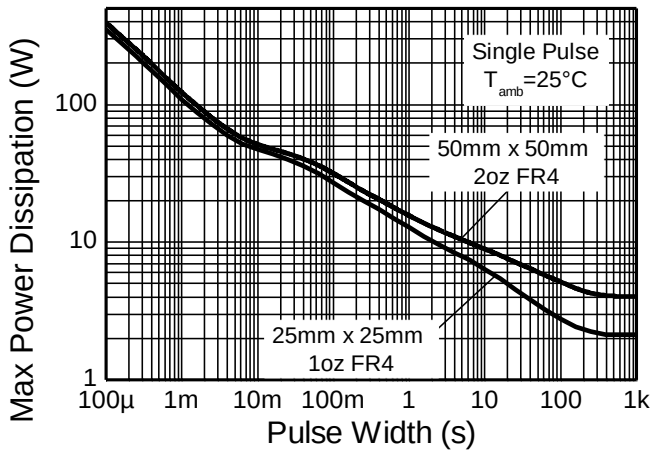
Safe Operating Area



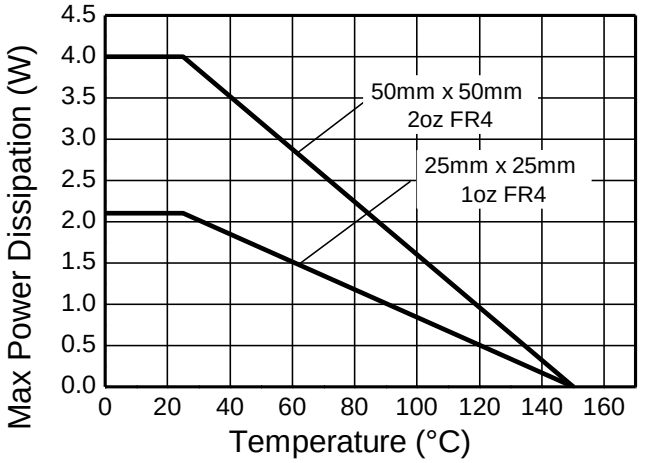
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



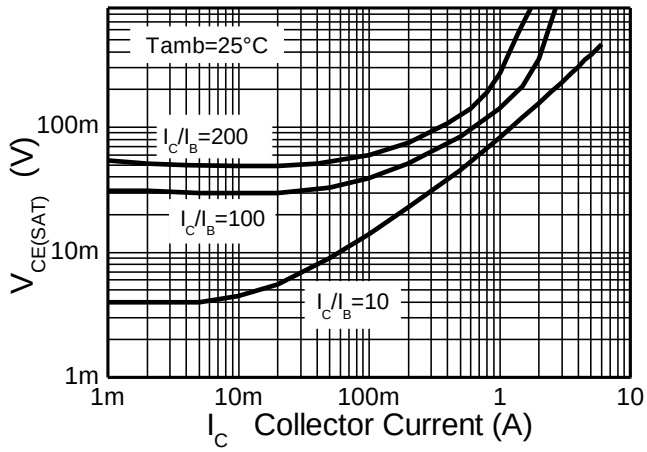
Derating Curve

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

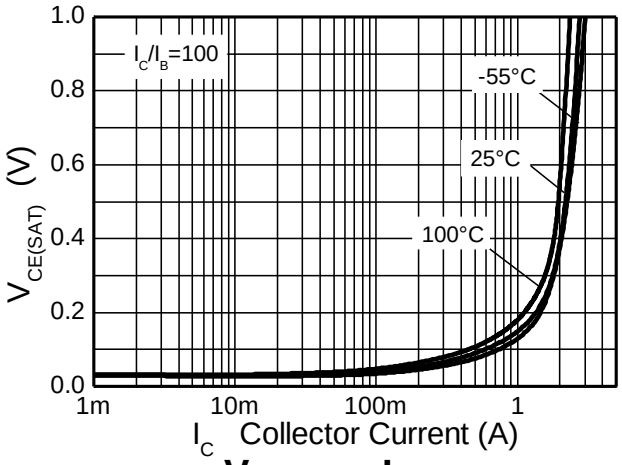
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	60	145	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 13)	BV_{CEO}	45	65	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.2	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	<1	20	nA	V_{CB} = 35V
Collector Cutoff Current	I_{CES}	—	<1	20	nA	V_{CE} = 35V
Emitter Cutoff Current	I_{EBO}	—	<1	20	nA	V_{EB} = 5.6V
Collector-Emitter Saturation Voltage (Note 13)	$V_{CE(SAT)}$	—	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 13)	$V_{BE(SAT)}$	—	1.0	1.2	V	I_C = 3A, I_B = 150mA
Base-Emitter Turn-On Voltage (Note 13)	$V_{BE(ON)}$	—	0.9	1.1	V	I_C = 3A, V_{CE} = 2V
DC Current Gain (Note 13)	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	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}	—	1,300	—	ns	I_{B1} = -I_{B2} = 50mA

Note: 13. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.

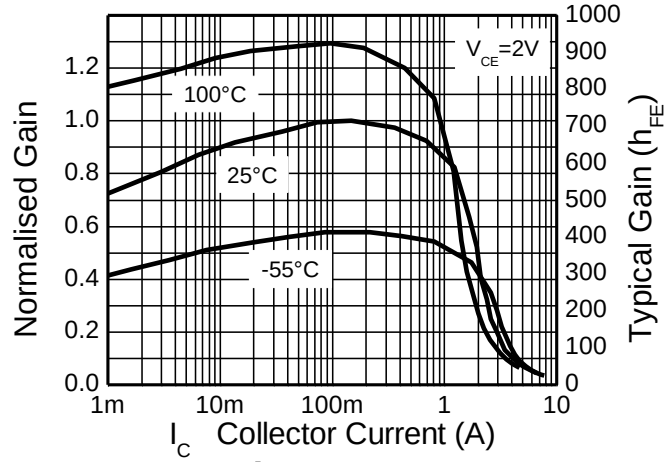
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



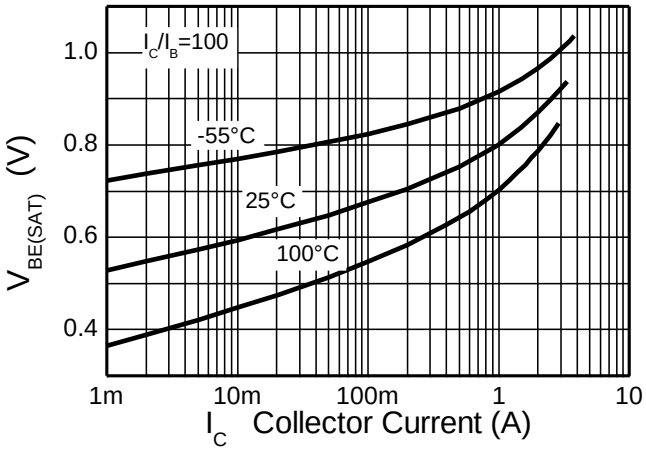
$V_{CE(SAT)}$ v I_C



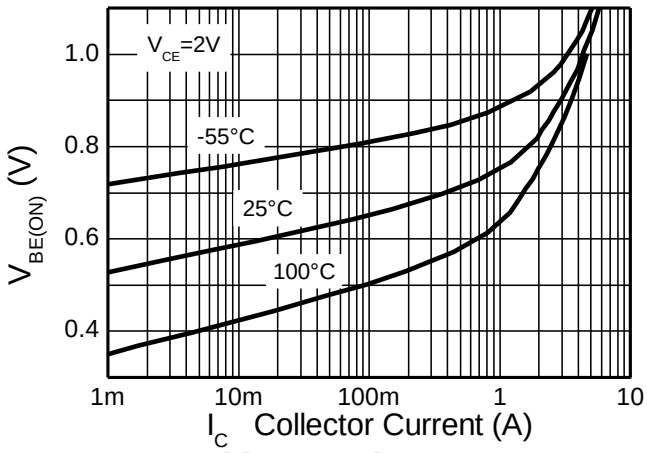
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C

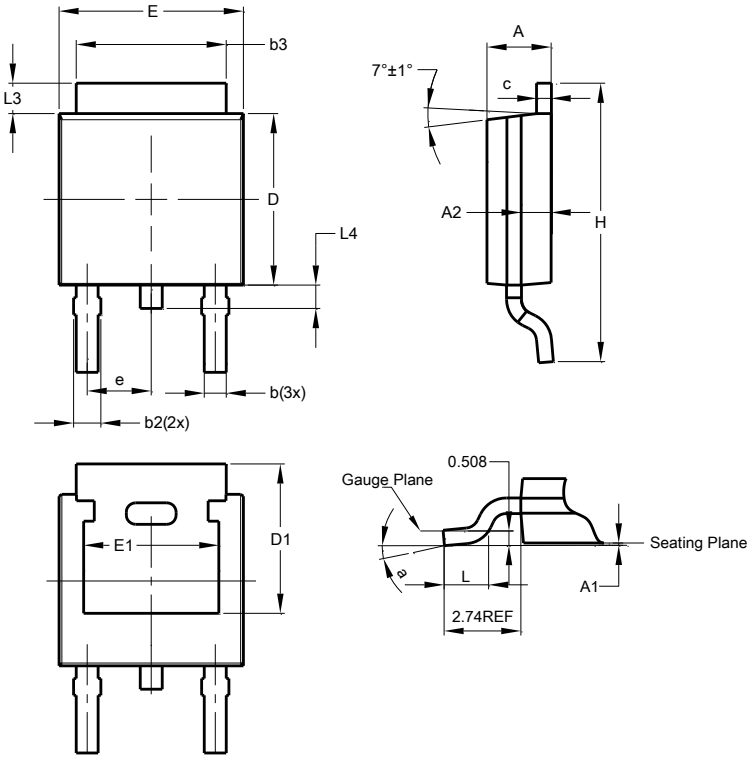


$V_{BE(ON)}$ v I_C

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

TO252 (DPAK)

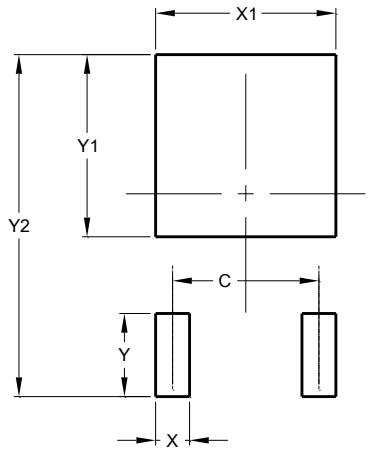


TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

TO252 (DPAK)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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