

45V NPN HIGH GAIN MEDIUM POWER TRANSISTOR

Features

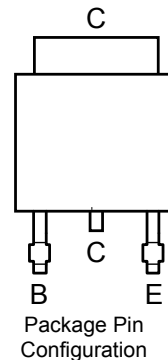
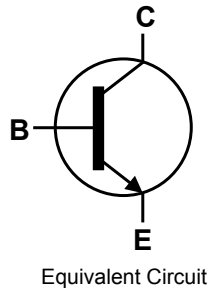
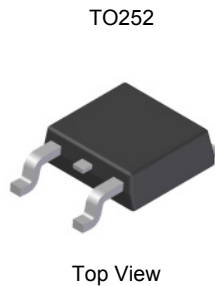
- $BV_{CEO} > 45V$
- $I_C = 3A$ high Continuous Collector Current
- $I_{CM} = 6A$ Peak Pulse Current
- High gain device $>400 @1A$
- $R_{CE(sat)} = 77m\Omega$ for low equivalent On-Resistance
- h_{FE} specified up to 6A for a high gain hold up
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen 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

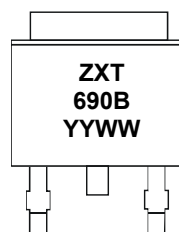


Ordering Information (Note 5)

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 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



ZXT690B = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 13 = 2013)
 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.)

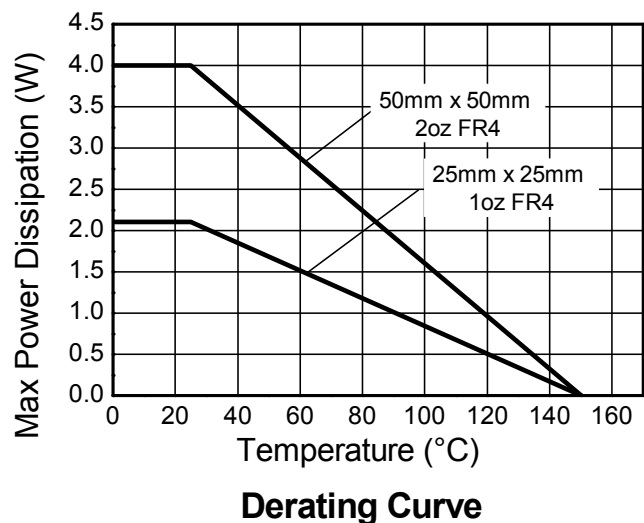
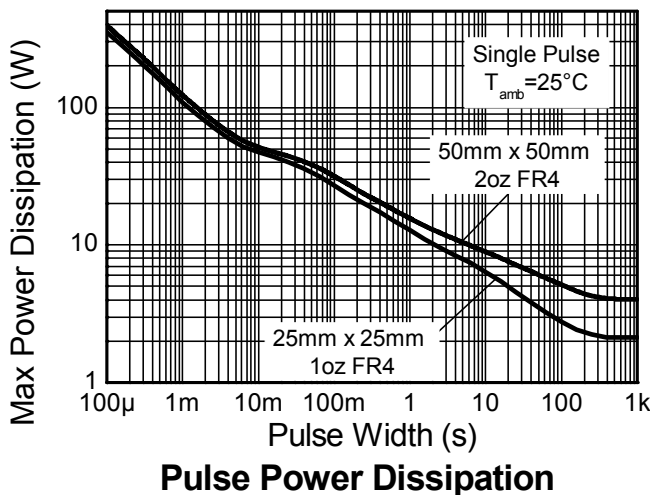
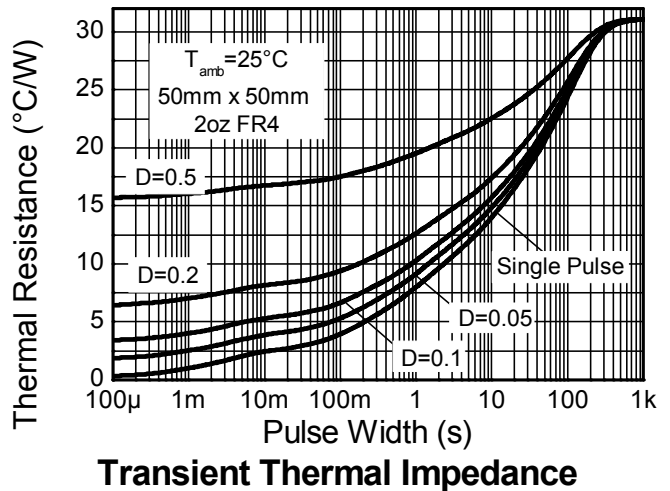
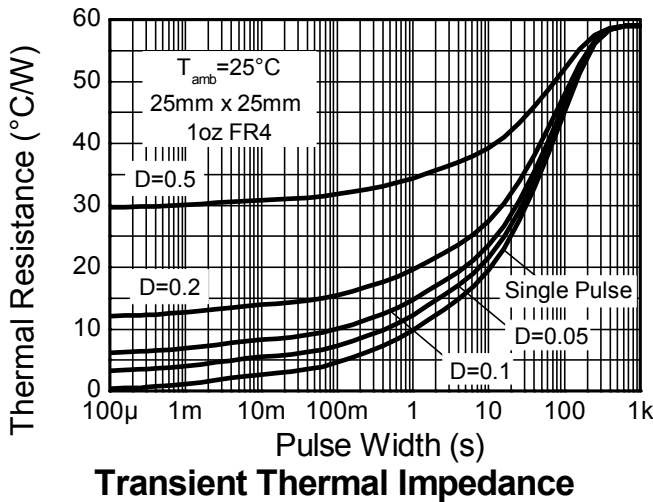
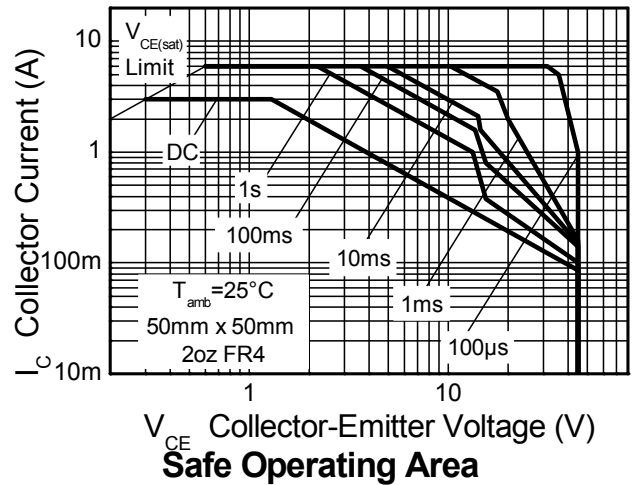
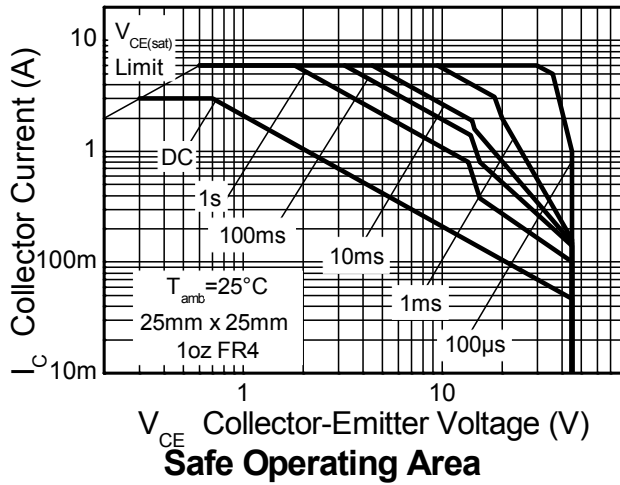
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 6)	4.0
		(Note 7)	3.4
		(Note 8)	2.1
		(Note 9)	1.6
Thermal Resistance, Junction to Ambient Air	R _{θJA}	(Note 6)	32
		(Note 7)	36
		(Note 8)	59
		(Note 9)	80
Thermal Resistance, Junction to Leads	R _{θJL}	3	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	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

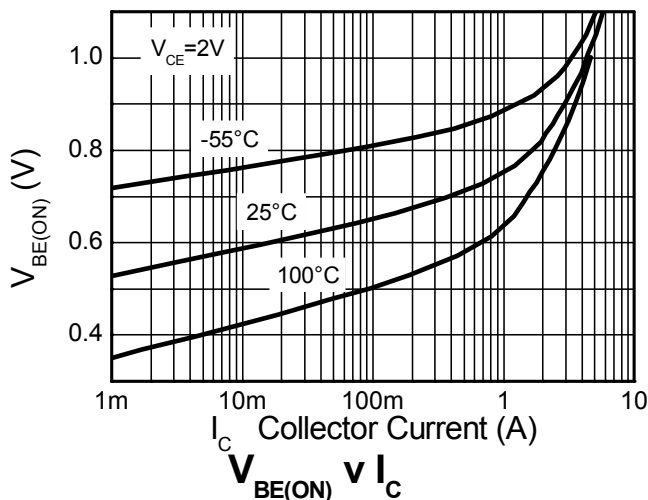
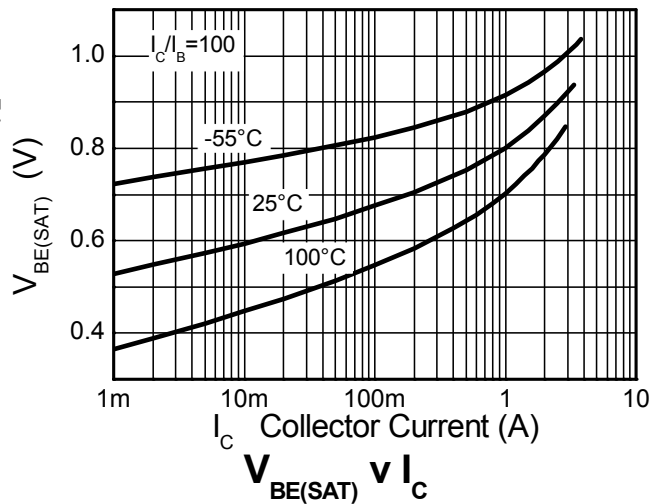
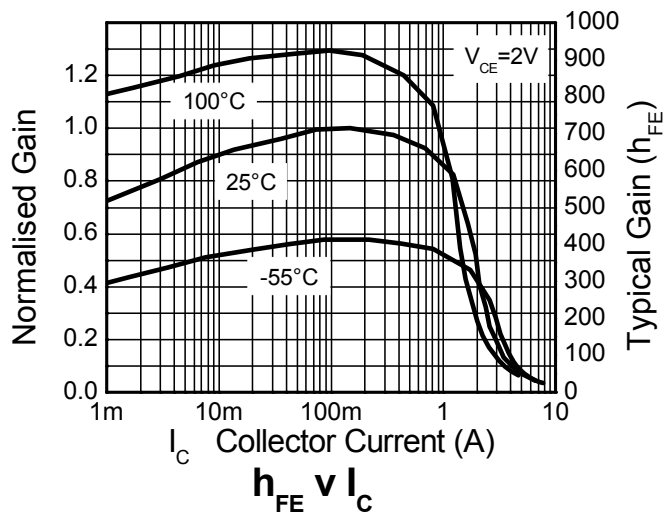
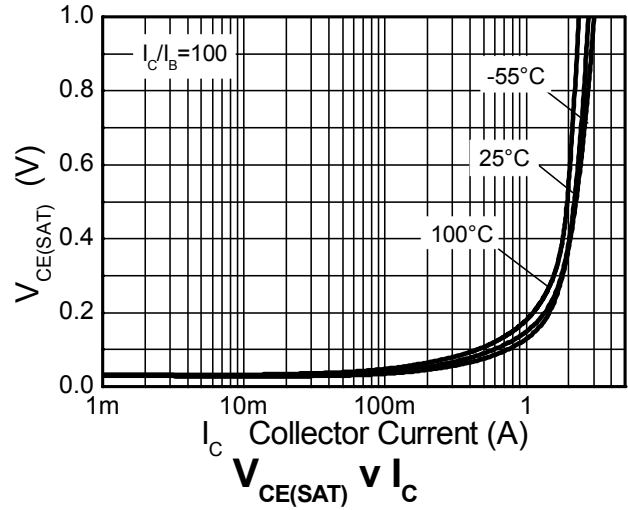
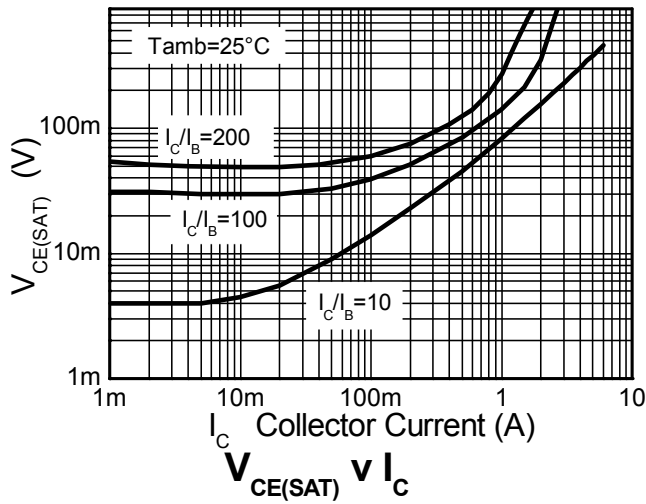


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
Collector-Base Breakdown Voltage	BV_{CBO}	60	145	—	V	$I_C = 100\mu\text{A}$	
Collector-Emitter Breakdown Voltage (Note 13)	BV_{CEO}	45	65	—	V	$I_C = 10\text{mA}$	
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.2	—	V	$I_E = 100\mu\text{A}$	
Collector Cutoff Current	I_{CBO}	—	<1	20	nA	$V_{CB} = 35\text{V}$	
Collector Cutoff Current	I_{CES}	—	<1	20	nA	$V_{CB} = 35\text{V}$	
Emitter Cutoff Current	I_{EBO}	—	<1	20	nA	$V_{EB} = 5.6\text{V}$	
Collector-Emitter Saturation Voltage (Note 13)	$V_{CE(sat)}$	—	50	85	mV	$I_C = 0.1\text{A}, I_B = 0.5\text{mA}$	
			240	360		$I_C = 1\text{A}, I_B = 5\text{mA}$	
			210	320		$I_C = 2\text{A}, I_B = 40\text{mA}$	
			230	350		$I_C = 3\text{A}, I_B = 150\text{mA}$	
Base-Emitter Saturation Voltage (Note 13)	$V_{BE(sat)}$	—	1.0	1.2	mV	$I_C = 3\text{A}, I_B = 150\text{mA}$	
Base-Emitter Turn-On Voltage (Note 13)	$V_{BE(on)}$	—	0.9	1.1	mV	$I_C = 3\text{A}, V_{CE} = 2\text{V}$	
DC Current Gain (Note 13)	h_{FE}	—	500	700	—	—	$I_C = 100\text{mA}, V_{CE} = 2\text{V}$
			400	600			$I_C = 1\text{A}, V_{CE} = 2\text{V}$
			150	350			$I_C = 2\text{A}, V_{CE} = 2\text{V}$
			60	120			$I_C = 3\text{A}, V_{CE} = 2\text{V}$
Current Gain-Bandwidth Product	f_T	150	—	—	MHz	$I_C = 50\text{mA}, V_{CE} = 5\text{V}, f = 50\text{MHz}$	
Output Capacitance	C_{obo}	—	16	—	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$	
Turn-On Time	t_{on}	—	33	—	ns	$I_C = 500\text{mA}, V_{CC} = 10\text{V}$,	
Turn-Off Time	t_{off}	—	1300	—	ns	$I_{B1} = -I_{B2} = 50\text{mA}$	

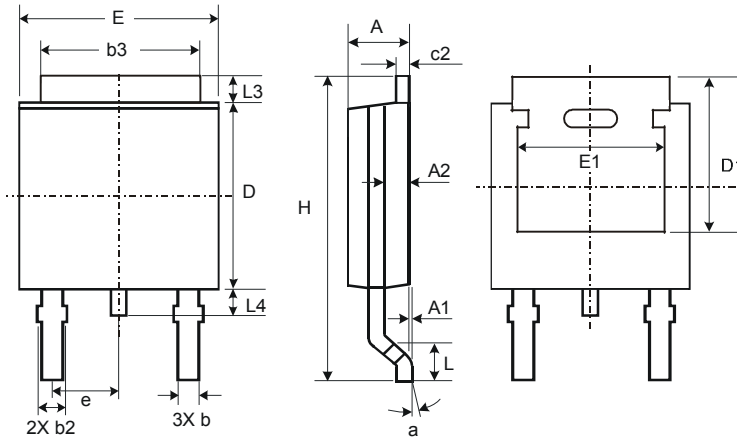
Note: 13. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

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



Package Outline Dimensions

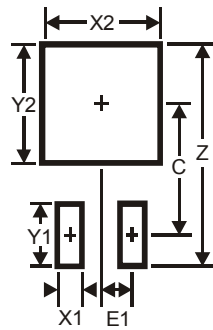
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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