

ZXTN4004K

## 150V NPN LED DRIVING TRANSISTOR IN TO252

## Features

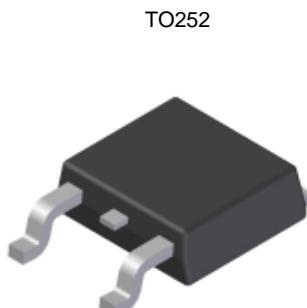
- $BV_{CEO} > 150V$
- $hFE > 100$  for  $I_C = 150mA$ ,  $V_{CE} = 0.25V$
- $I_C$  (cont) = 1A
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

## Applications

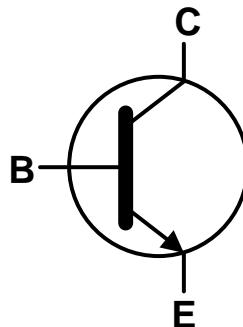
- LED TV Backlight

## Mechanical Data

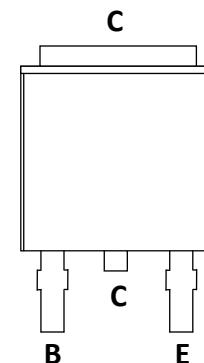
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.34 grams (Approximate)



Top View



Device symbol

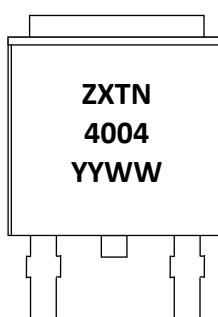

Top View  
Pin Out

## Ordering Information (Notes 4 &amp; 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN4004KTC	AEC-Q101	ZXTN4004	13	16	2,500
ZXTN4004KQTC	Automotive	ZXTN4004	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](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



ZXTN4004 = Product Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 10 = 2010)  
WW = Week Code (01 – 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	150	V
Collector-Emitter Voltage	V <sub>C0</sub>	150	V
Emitter-Base Voltage	V <sub>E0</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	1	A
Peak Pulse Current	I <sub>CM</sub>	3	A
Base Current	I <sub>B</sub>	500	mA

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

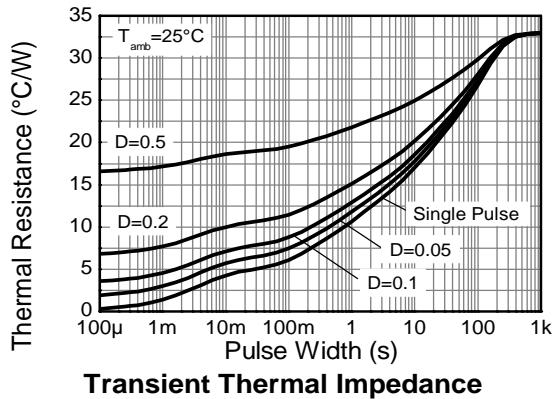
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	3.8	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	33	°C/W
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	12	°C/W
Operating and Storage Temperature Range	T <sub>J, T<sub>STG</sub></sub>	-55 to +150	°C

**ESD Ratings** (Note 8)

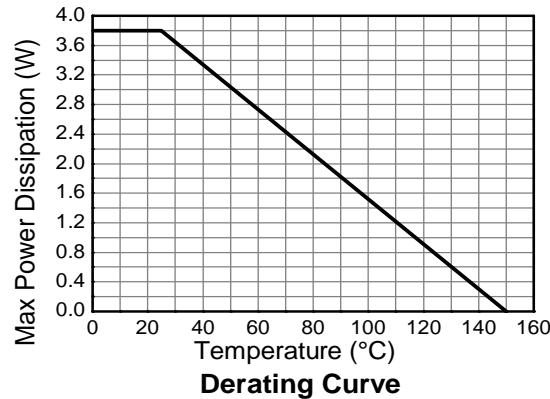
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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. Thermal resistance from junction to solder-point (on the exposed collector pad).
  - 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

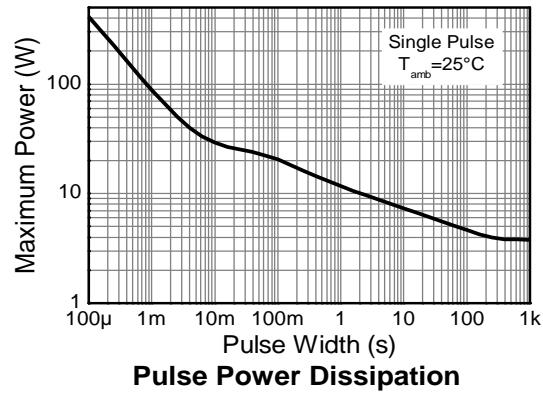
## Thermal Characteristics and Derating Information



**Transient Thermal Impedance**



**Derating Curve**



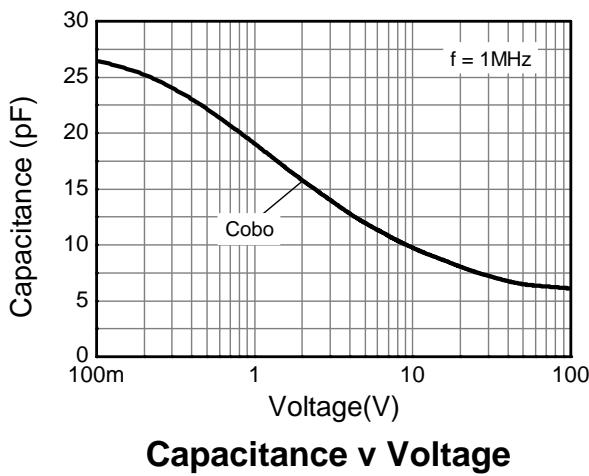
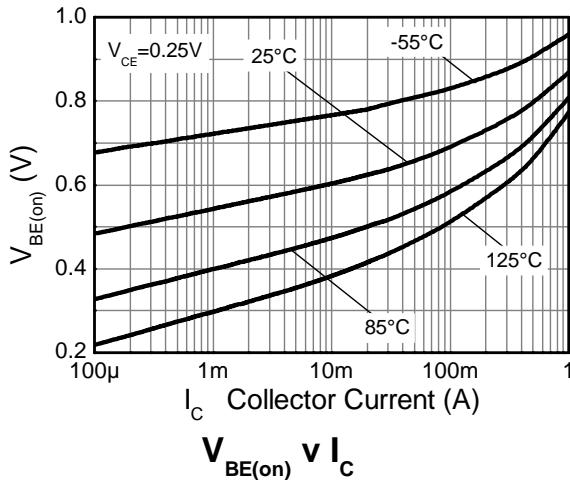
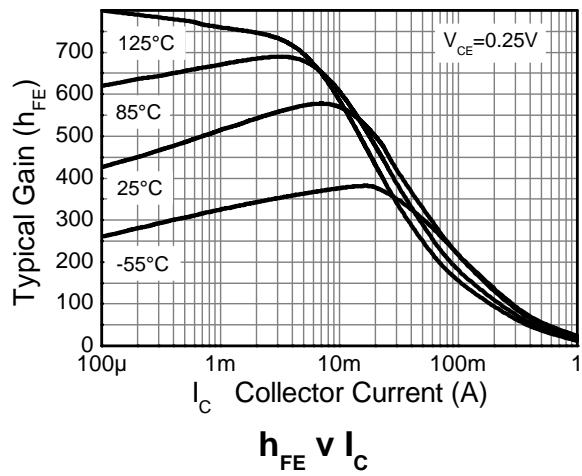
**Pulse Power Dissipation**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage (Note 9)	$\text{BV}_{\text{CBO}}$	150	-	-	V	$I_C = 0.1\text{mA}$
Collector-Emitter Breakdown Voltage (Note 9)	$\text{BV}_{\text{CEO}}$	150	175	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage (Note 9)	$\text{BV}_{\text{EBO}}$	7	-	-	V	$I_E = 0.1\text{mA}$
Collector – Emitter Cut-off Current	$I_{\text{CES}}$	-	-	50	nA	$V_{\text{CE}} = 150\text{V}$
Collector Cut-off Current	$I_{\text{CBO}}$	-	-	50	nA	$V_{\text{CB}} = 150\text{V}$
Emitter Cut-off Current	$I_{\text{EBO}}$	-	-	50	nA	$V_{\text{EB}} = 7\text{V}$
Static Forward Current Transfer Ratio (Note 9)	$\text{h}_{\text{FE}}$	60 100	- -	-	-	$I_C = 85\text{mA}, V_{\text{CE}} = 0.20\text{V}$ $I_C = 150\text{mA}, V_{\text{CE}} = 0.25\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{\text{CE}(\text{sat})}$	-	-	0.25	V	$I_C = 100\text{mA}, I_B = 5\text{mA}$
Base-Emitter Saturation Voltage (Note 9)	$V_{\text{BE}(\text{sat})}$	-	-	0.95	V	$I_C = 100\text{mA}, I_B = 5\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{\text{BE}(\text{on})}$	-	0.71	0.95	V	$I_C = 150\text{mA}, V_{\text{CE}} = 0.25\text{V}$
Delay Time	$t_{(\text{d})}$	-	512	-	ns	
Rise Time	$t_{(\text{r})}$	-	426	-	ns	
Storage Time	$t_{(\text{s})}$	-	3413	-	ns	
Fall Time	$t_{(\text{f})}$	-	321	-	ns	
Storage Time	$t_{(\text{s})}$	-	65	-	ns	$V_{\text{CC}} = 120\text{V}, I_C = 150\text{mA},$
Fall Time	$t_{(\text{f})}$	-	294	-	ns	$-I_{\text{B2}} = 1.5\text{mA}, V_{\text{CE}(\text{ON})} = 4\text{V}$

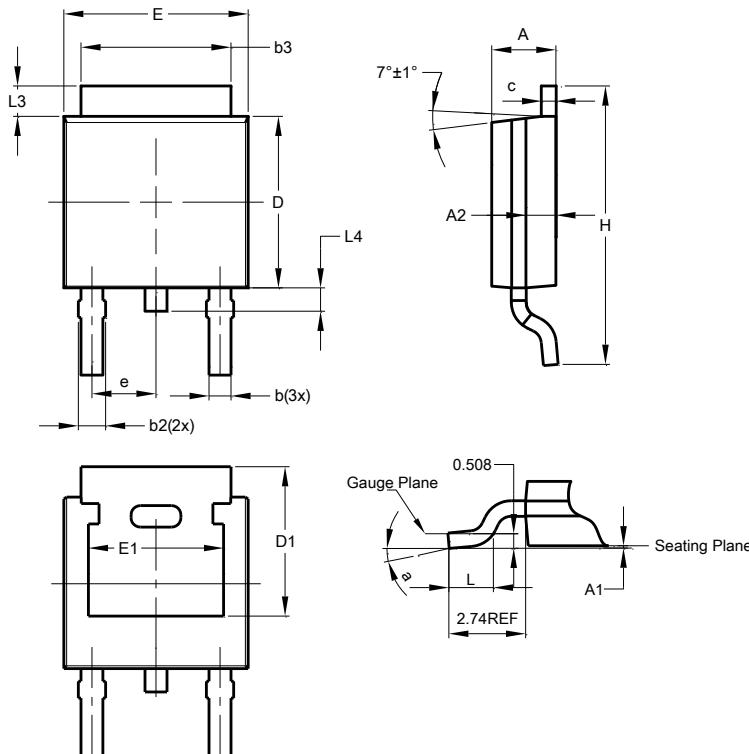
Note: 9. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

## Typical Electrical Characteristics



## Package Outline Dimensions

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

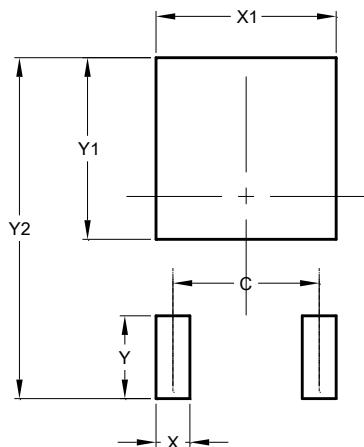


TO252 (DPAK)			
Dim	Min	Max	Typ
<b>A</b>	2.19	2.39	2.29
<b>A1</b>	0.00	0.13	0.08
<b>A2</b>	0.97	1.17	1.07
<b>b</b>	0.64	0.88	0.783
<b>b2</b>	0.76	1.14	0.95
<b>b3</b>	5.21	5.46	5.33
<b>c</b>	0.45	0.58	0.531
<b>D</b>	6.00	6.20	6.10
<b>D1</b>	5.21	-	-
<b>e</b>	-	-	2.286
<b>E</b>	6.45	6.70	6.58
<b>E1</b>	4.32	-	-
<b>H</b>	9.40	10.41	9.91
<b>L</b>	1.40	1.78	1.59
<b>L3</b>	0.88	1.27	1.08
<b>L4</b>	0.64	1.02	0.83
<b>a</b>	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)
<b>C</b>	4.572
<b>X</b>	1.060
<b>X1</b>	5.632
<b>Y</b>	2.600
<b>Y1</b>	5.700
<b>Y2</b>	10.700

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