

## Description

The ZXTR2008K monolithically integrates a transistor, Zener diode and resistor to function as a high voltage linear regulator. The device regulates with an 8.2V nominal output at 15mA. It is designed for use in high voltage applications where standard linear regulators cannot be used. This function is fully integrated into a single TO252 package, minimizing PCB area and reducing number of components when compared with a multi-chip discrete solution.

## Applications

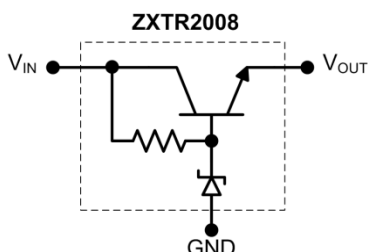
Supply voltage regulation in::

- Networking
- Telecom
- Power Over Ethernet (PoE)

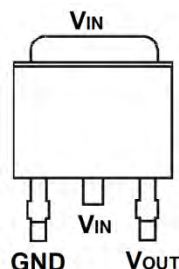
TO252 (DPAK)



Top View



Internal Device  
Schematic




Top View  
Pin-Out

Pin Name	Pin Function
V <sub>IN</sub>	Input Supply
GND	Power Ground
V <sub>OUT</sub>	Voltage Output

## Features

- Series Linear Regulator Using Emitter-Follower Stage
- Input Voltage = 12V to 100V
- Output Voltage = 8.2V  $\pm$ 10%
- Fully integrated into a single TO252 package
- **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**

## Mechanical Data

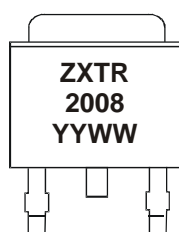
- Case: TO252 (DPAK)
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 
- Weight: 0.34 grams (approximate)

## Ordering Information (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTR2008K-13	TO252 (DPAK)	ZXTR 2008	13	16	2,500

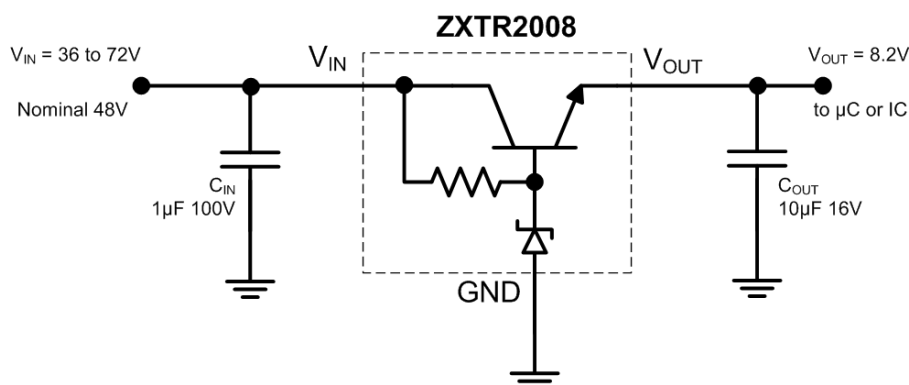
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

## Marking Information



ZXTR2008 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year, (ex: 13 = 2013)  
 WW = Week Code 01 - 52

## Typical Application Circuit



Example of an 8.2V regulated supply from a nominal 48V for powering a Controller IC.

## Absolute Maximum Ratings (Voltage relative to GND, @T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Input Voltage	V <sub>IN</sub>	100	V
Continuous Input & Output Current	I <sub>IN</sub> , I <sub>OUT</sub>	550	mA

## Maximum Current at V<sub>IN</sub> = 48V (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Continuous Output Current	I <sub>OUT</sub>	55	mA
Pulsed Output Current	I <sub>OM</sub>	900	mA
		190	mA

## Thermal Characteristics

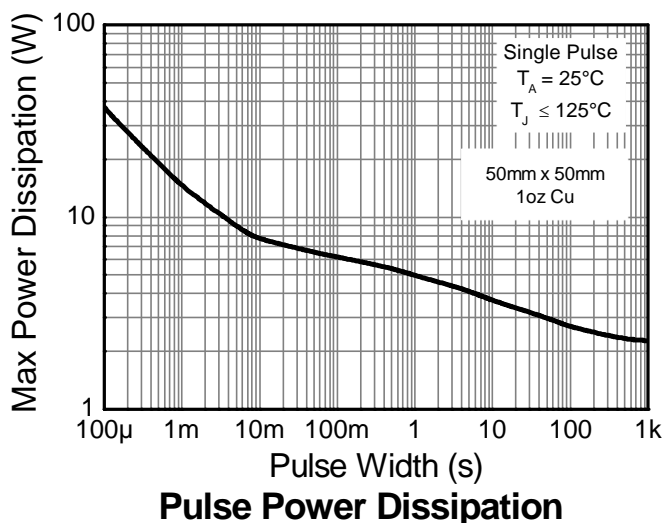
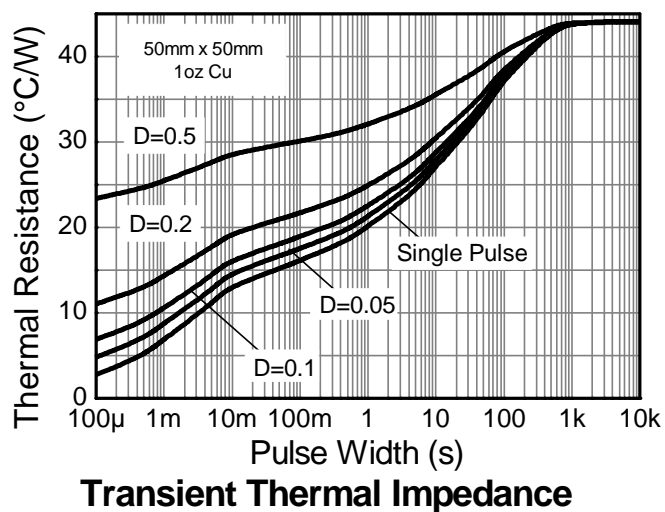
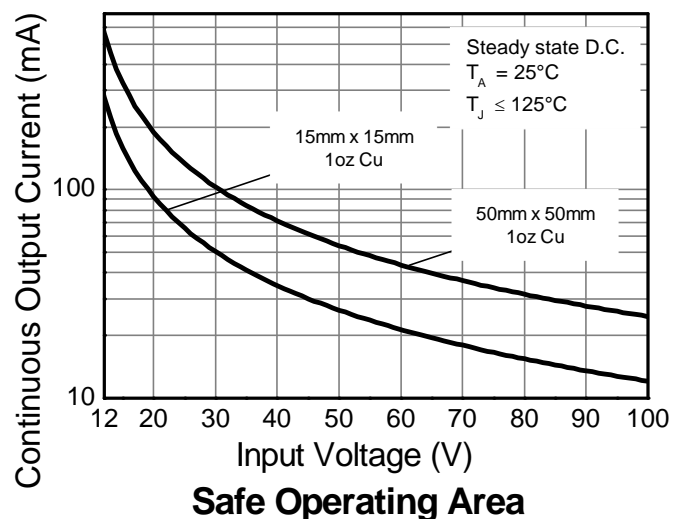
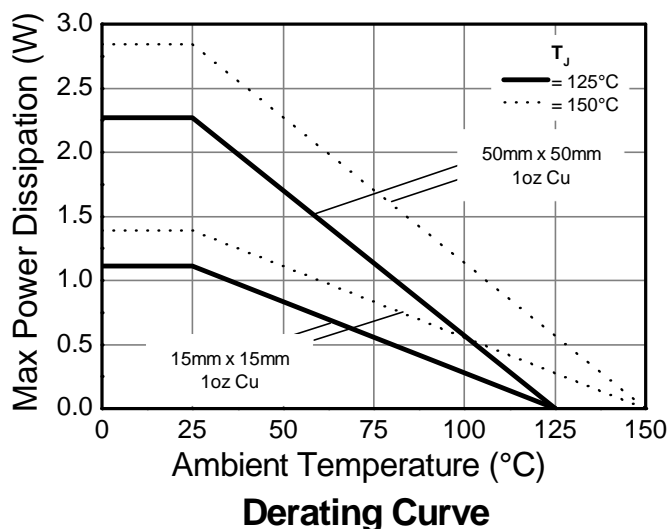
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	2.3	W
		1.1	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	44	°C/W
		90	°C/W
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	8.39	°C/W
Recommended Operating Junction Temperature Range	T <sub>J</sub>	-40 to +125	°C
Maximum Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

## ESD Ratings (Note 11)

Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	≥ 4000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	≥ 300	V	B

- Notes:
- For a device mounted with the exposed V<sub>IN</sub> pad on 50mm x 50mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  - Same as note 5, except mounted on 15mm x 15mm 1oz copper.
  - Same as note 5, whilst operating at V<sub>IN</sub>=48V. Refer to Safe Operating Area for other Input Voltages.
  - Same as note 5, except measured with a single pulse width = 100µs and V<sub>IN</sub>=48V.
  - Same as note 5, except measured with a single pulse width = 10ms and V<sub>IN</sub>=48V.
  - Thermal resistance from junction to solder-point (on the exposed V<sub>IN</sub> pad).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information

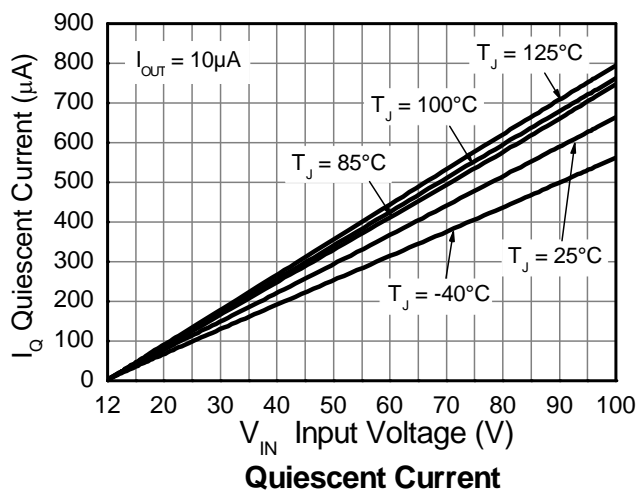
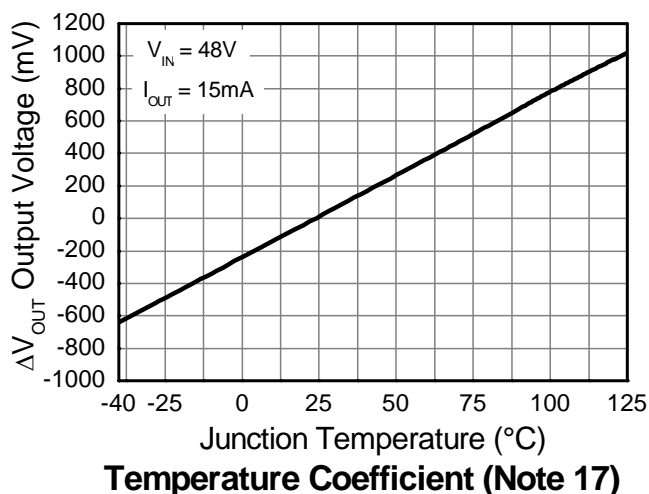
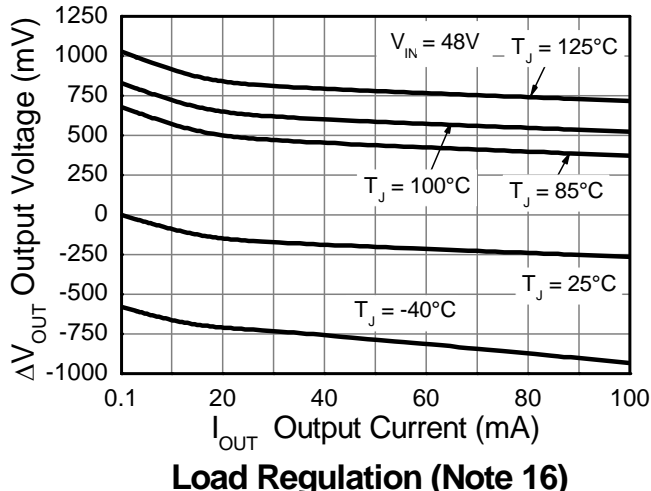
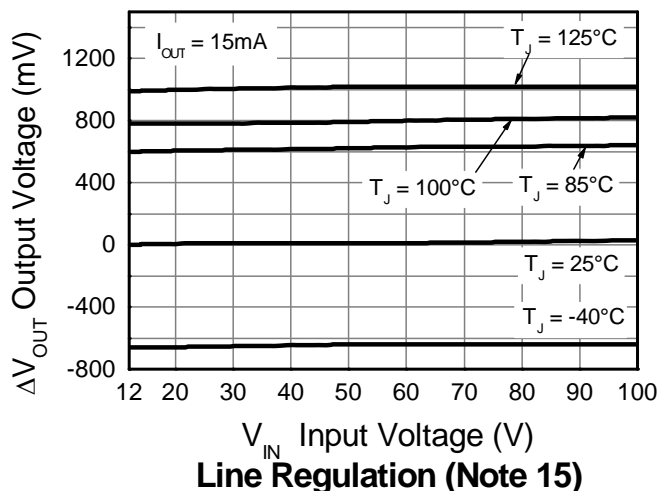
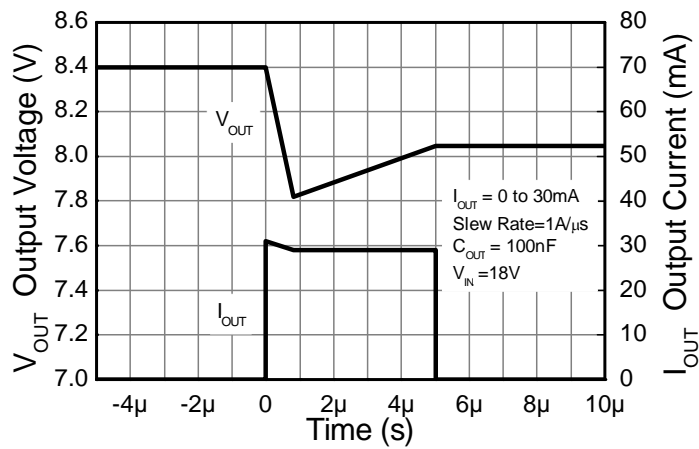
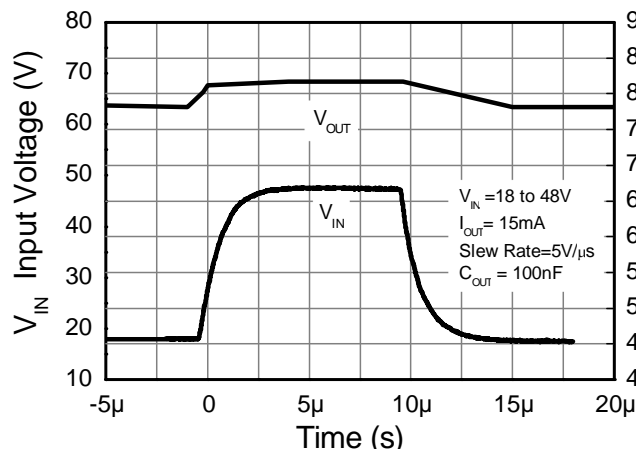


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage (Note 12)	V <sub>OUT</sub>	7.38	8.2	9.02	V	V <sub>IN</sub> = 48V, I <sub>OUT</sub> = 15mA
Line Regulation (Notes 12 & 13)	ΔV <sub>OUT</sub>	—	10	300	mV	V <sub>IN</sub> = 12 to 100V, I <sub>OUT</sub> = 15mA
Temperature Coefficient	ΔV <sub>OUT</sub> /ΔT	—	10	—	mV/°C	T <sub>J</sub> = -40°C to +125°C V <sub>IN</sub> = 48V, I <sub>OUT</sub> = 15mA
Load Regulation (Notes 12 & 14)	ΔV <sub>OUT</sub>	—	-180 -250	-300 -500	mV	I <sub>OUT</sub> = 0.1 to 30mA, V <sub>IN</sub> = 48V I <sub>OUT</sub> = 0.1 to 100mA, V <sub>IN</sub> = 48V
Minimum Value of Input Voltage Required to Maintain Line Regulation	V <sub>IN(MIN)</sub>	12	—	—	V	—
Quiescent Current	I <sub>Q</sub>	—	275 650	500 900	μA	V <sub>IN</sub> = 48V, I <sub>OUT</sub> = 10μA V <sub>IN</sub> = 100V, I <sub>OUT</sub> = 10μA
Power Supply Rejection Ratio	ΔV <sub>IN</sub> /ΔV <sub>OUT</sub>	—	38	—	dB	C <sub>OUT</sub> = 100nF, I <sub>OUT</sub> = 15mA, V <sub>OUT</sub> = 8.2V, V <sub>IN</sub> = 12 to 100V, f = 100Hz

- Notes:
- 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.
  - 13. Line regulation     ΔV<sub>OUT</sub> = V<sub>OUT</sub>(@ V<sub>IN</sub> = 100V) – V<sub>OUT</sub>(@ V<sub>IN</sub> = 12V)
  - 14. Load regulation    ΔV<sub>OUT</sub> = V<sub>OUT</sub>(@ I<sub>OUT</sub> = 30mA) – V<sub>OUT</sub>(@ I<sub>OUT</sub> = 0.1mA)  
                               ΔV<sub>OUT</sub> = V<sub>OUT</sub>(@ I<sub>OUT</sub> = 100mA) – V<sub>OUT</sub>(@ I<sub>OUT</sub> = 0.1mA)

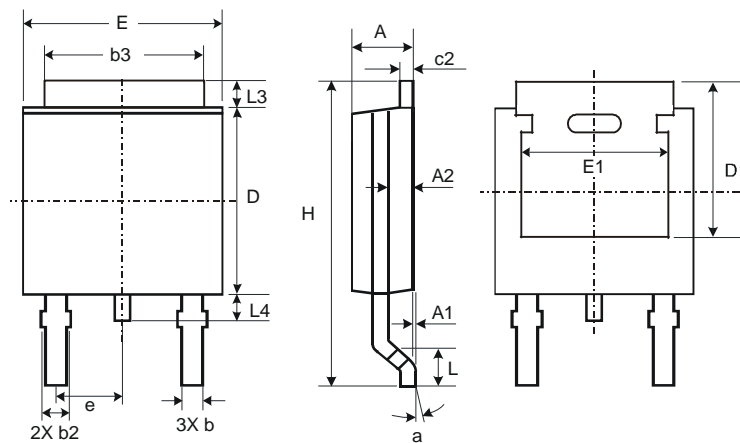
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



- Notes:
- 15. Line regulation  $\Delta V_{OUT} = V_{OUT} - V_{OUT}(@ V_{IN} = 12V, I_{OUT} = 15mA, T_J = 25^\circ\text{C})$
  - 16. Load regulation  $\Delta V_{OUT} = V_{OUT} - V_{OUT}(@ V_{IN} = 48V, I_{OUT} = 0.1mA, T_J = 25^\circ\text{C})$
  - 17. Temperature Coefficient  $\Delta V_{OUT} = V_{OUT} - V_{OUT}(@ V_{IN} = 48V, I_{OUT} = 15mA, T_J = 25^\circ\text{C})$

## Package Outline Dimensions

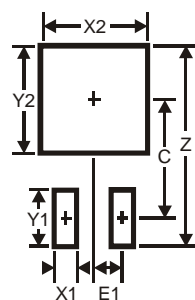
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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