





100V INPUT, 5V 30mA REGULATOR TRANSISTOR

Description

The ZXTR2005Z monolithically integrates a transistor, Zener diode and resistor to function as a high voltage linear regulator. The device regulates with a 5V 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 SOT89 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)

Features

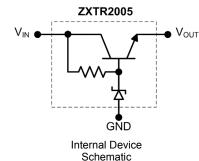
- Series Linear Regulator Using Emitter-Follower Stage
- Input Voltage = 10 to 100V
- Output Voltage = 5V ± 10%
- Fully Integrated Into a SOT89 Package
- Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

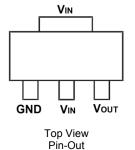
Mechanical Data

- Case: SOT89
- 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 @3
- Weight: 0.052 grams (approximate)



Top View





Pin Name	Pin Function
Vin	Input Supply
GND	Power Ground
Vout	Voltage Output

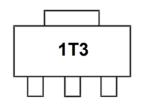
Ordering Information (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTR2005Z-7	SOT89	1T3	7	12	1,000
ZXTR2005Z-13	SOT89	1T3	13	12	2,500

Notes:

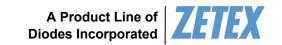
- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



1T3 = Product Type Marking Code





Absolute Maximum Ratings (Voltage relative to GND, @TA = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Input Voltage	V_{IN}	-0.3 to 100	V
Continuous Input & Output Current	I _{IN} , I _{OUT}	350	mA
Peak Pulsed Input & Output Current	I _{IM} , I _{OM}	2	Α
Maximum Voltage applied to V _{OUT}	V _{OUT(max)}	11	V

Maximum Current at V_{IN} = 48V (@ T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Continuous Output Current	(Note 7)	I _{OUT}	38	mA
Duland Output Current	(Note 8)	IOM I	740	A
Pulsed Output Current	(Note 9)		150	mA mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit	
Dower Dissination	(Note 5)	-	1.7	W
Power Dissipation	(Note 6)	P _D	0.89] vv
Thermal Decistance, Junction to Ambient	(Note 5)	Б	59	
Thermal Resistance, Junction to Ambient	(Note 6)	R _{0JA}	112	0004
Thermal Resistance, Junction to Lead (Note 10) Thermal Resistance, Junction to Case (Note 10)		$R_{\theta JL}$	20	°C/W
		R ₀ JC	15.7	
Recommended Operating Junction Temperature Range		TJ	-40 to +125	°C
Maximum Operating Junction and Storage Temperature Range		T _{J,} T _{STG}	-65 to +150	°C

ESD Ratings (Note 11)

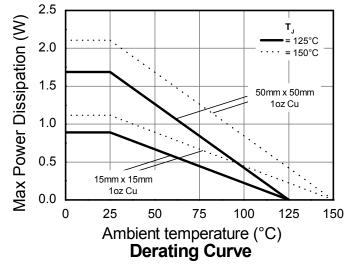
Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	С

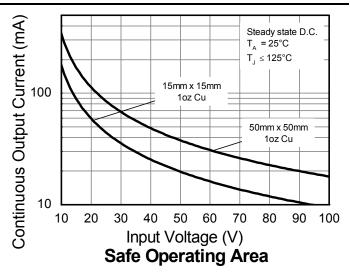
Notes:

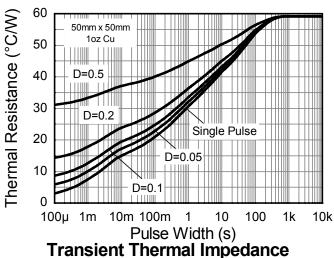
- 5. For a device mounted with the exposed V_{IN} pad on 50mm x 50mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
- 6. Same as note 5, except mounted on 15mm x 15mm 1oz copper.
- 7. Same as note 5, whilst operating at V_{IN} = 48V. Refer to Safe Operating Area for other Input Voltages.
- 8. Same as note 5, except measured with a single pulse width = 100 μ s and V_{IN} = 48V.
- 9. Same as note 5, except measured with a single pulse width = 10ms and V_{IN} = 48V.
- 10. $R_{\theta JL}$ = Thermal resistance from junction to solder-point (on the exposed V_{IN} pad).
 - $R_{ heta JC}$ = Thermal resistance from junction to the top of case.
- 11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

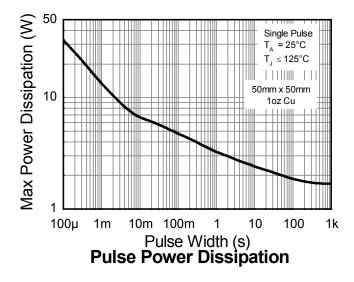


Thermal Characteristics and Derating Information

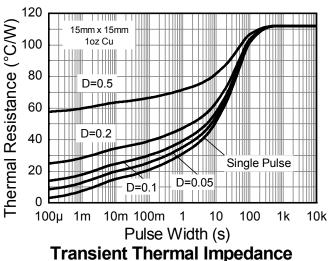


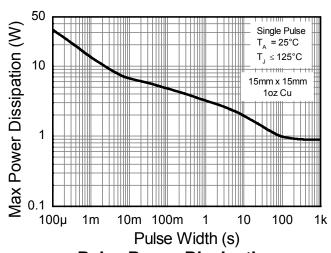
















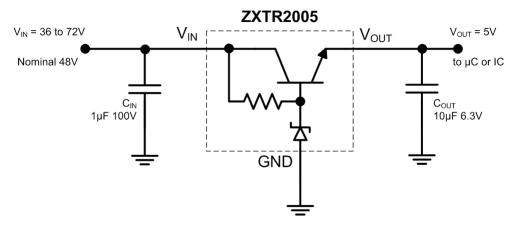
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Output Voltage (Note 12)	V_{OUT}	4.5	5.0	5.5	V	V _{IN} = 48V, I _{OUT} = 15mA
Line Regulation (Notes 12 & 13)	ΔV_{OUT}	I	195	300	mV	V _{IN} = 10 to 72V, I _{OUT} = 15mA
Temperature Coefficient	ΔV _{OUT} /ΔΤ	1	7.0	1	mV/°C	T_J = -40°C to +125°C V_{IN} = 48V, I_{OUT} = 15mA
Load Regulation (Notes 12 & 14)	ΔV_{OUT}	1	-185 -205	-350 -400	mV	I _{OUT} = 0.1 to 30mA, V _{IN} = 48V I _{OUT} = 0.1 to 100mA, V _{IN} = 48V
Minimum Value of Input Voltage Required to Maintain Line Regulation	V _{IN(MIN)}	10		ı	V	_
Quiescent Current	ΙQ	1 1	260 550	500 900	μA	V_{IN} = 48V, I_{OUT} = 10 μ A V_{IN} = 100V, I_{OUT} = 10 μ A
Power Supply Rejection Ratio	$\Delta V_{in} / \Delta V_{out}$		45	_	dB	C _{OUT} = 100nF, I _{OUT} = 15mA, V _{OUT} = 5V, V _{IN} = 10 to 100V, f = 100Hz

Notes:

- 12. Measured under pulsed conditions. Pulse width \leq 300 μ s. Duty cycle \leq 2%.
- 13. Line regulation $\Delta V_{OUT} = V_{OUT}(@V_{IN} = 72V) V_{OUT}(@V_{IN} = 10V)$
- 14. Load regulation $\Delta V_{OUT} = V_{OUT}(@ \ l_{OUT} = 30\text{mA}) V_{OUT}(@ \ l_{OUT} = 0.1\text{mA})$ $\Delta V_{OUT} = V_{OUT}(@ \ l_{OUT} = 100\text{mA}) V_{OUT}(@ \ l_{OUT} = 0.1\text{mA})$

Typical Application Circuit



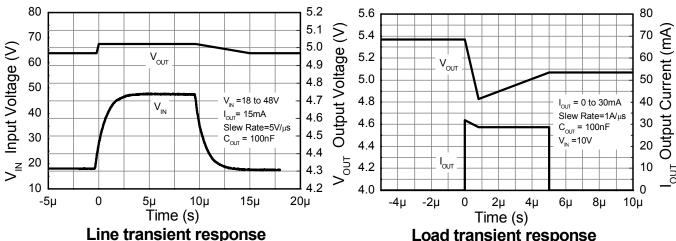
Example of a 5V regulated supply from a nominal 48V for powering a Controller IC.

Pin Functions

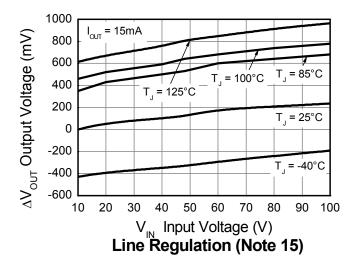
Pin Name	Pin Function	Notes
V _{IN}	Input Supply	To maintain output regulation the input voltage can vary from 10V to 100V with respect to the GND pin. It is recommended to connect a $1\mu F$ capacitor to GND.
GND	Power Ground	This pin should be tied to the system ground.
V _{OUT}	Voltage Output	Outputs a regulated 5V. It is recommended to connect a $10\mu F$ capacitor to GND. Minimum of $10\mu A$ must be drawn from V_{OUT} to maintain regulation. The pin can be pulled high to a maximum of $11V$ with respect to ground.

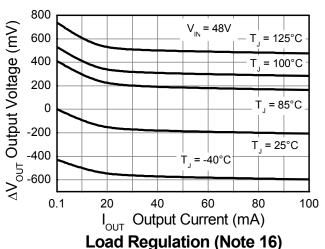


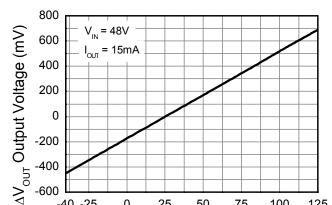




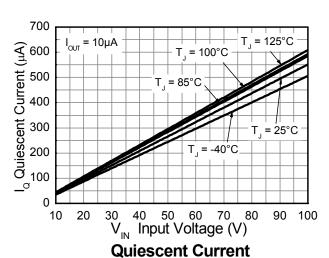








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Junction temperature (°C) **Temperature Coefficient (Note 17)**

Notes: 15. Line regulation $\Delta V_{OUT} = V_{OUT} - V_{OUT} (@V_{IN} = 10V, I_{OUT} = 15mA, T_J = +25^{\circ}C)$

50

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

75

100

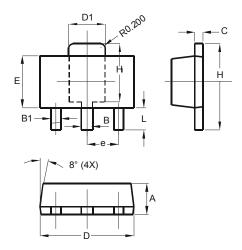
125

-40 -25



Package Outline Dimensions

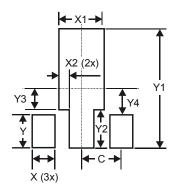
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT89				
Dim	Min	Max		
Α	1.40	1.60		
В	0.44	0.62		
B1	0.35	0.54		
С	0.35	0.44		
D	4.40	4.60		
D1	1.62	1.83		
Е	2.29	2.60		
е	1.50 Typ			
Н	3.94	4.25		
H1	2.63	2.93		
L	0.89	1.20		
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)
Х	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
С	1 500





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