ZXTR2005Z

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 and delivers up to 30mA. It is designed for use in high voltage applications where standard linear regulators cannot be used. This function is fully integrated into a single SOT89 package, minimizing PCB area and reducing number of components when compared with a multi-chip discrete solution.

Features

- Series Linear Regulator Using Emitter-Follower Stage
- Input Voltage = 10 to 100V
- Output Voltage = 5V ± 10%
- Continuous Output Current up to 30mA
- Fully Integrated Into a Single 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**

Applications

Supply voltage regulation for the primary side controllers in:

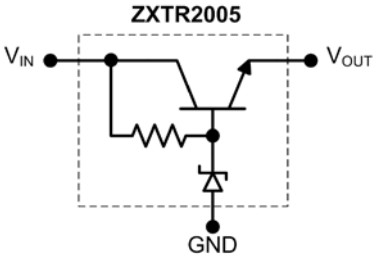
- Networking
- Telecom
- Power Over Ethernet (PoE)

Mechanical Data

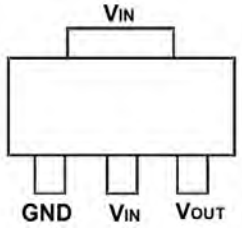
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.052 grams (approximate)

SOT89

Top View



Internal Device Schematic



Top View
Pin-Out

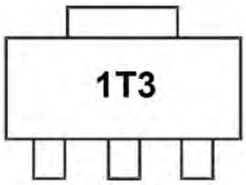
Pin Name	Pin Function
V_{IN}	Input Supply
GND	Power Ground
V_{OUT}	Voltage Output

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

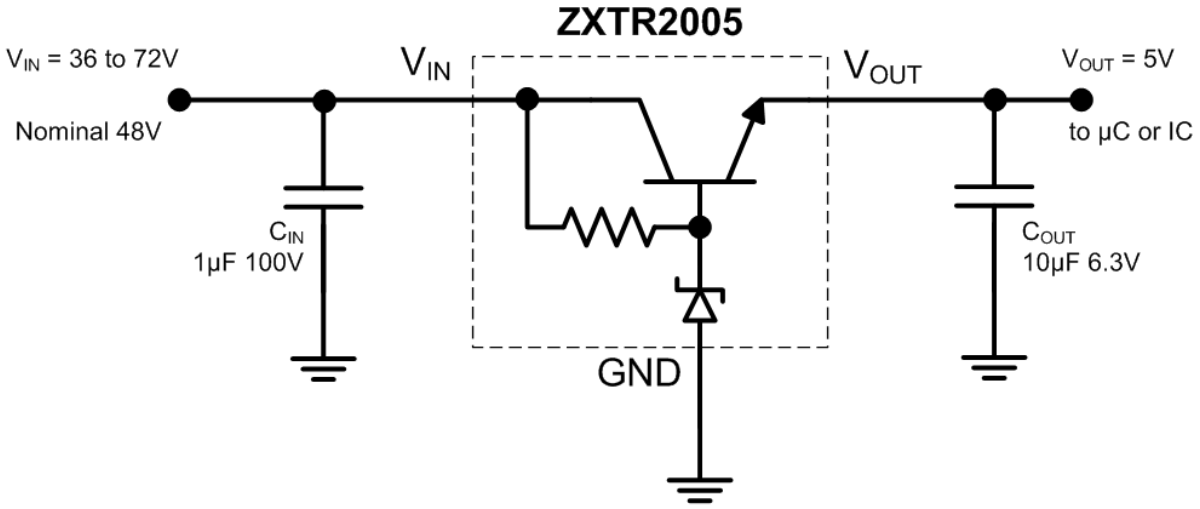
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
3. Halogen- and Antimony-free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

Marking Information



1T3 = Product Type Marking Code

Typical Application Circuit



Example of a 5V regulated supply from a nominal 48V for powering the primary side controller in a DC-DC converter.

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

Characteristic		Symbol	Value	Unit
Input Voltage		V_{IN}	100	V
Input Current		I_{IN}	30	mA
Continuous Output Current		I_{OUT}	30	mA
Pulsed Output Current	(Note 7)	I_{OM}	500	mA
	(Note 8)		150	

Thermal Characteristics

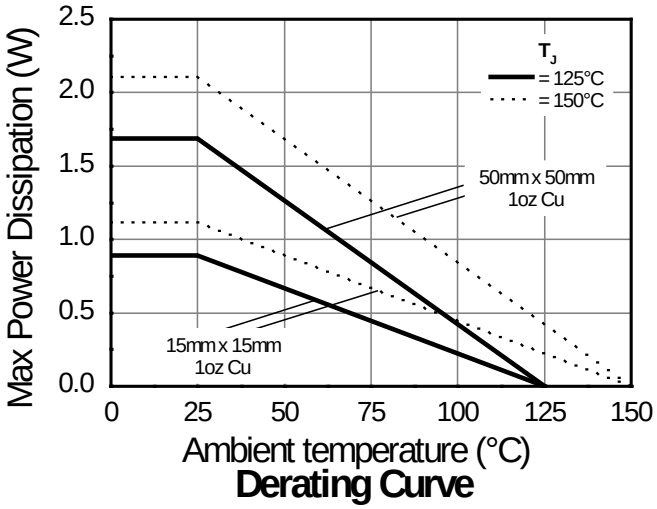
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	1.7	W
	(Note 6)		0.89	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	59	°C/W
	(Note 6)		112	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	20	
Recommended Operating Junction Temperature Range		T_J	-40 to +125	°C
Maximum Operating Junction and Storage Temperature Range		T_J, T_{STG}	-65 to +150	°C

ESD Ratings (Note 10)

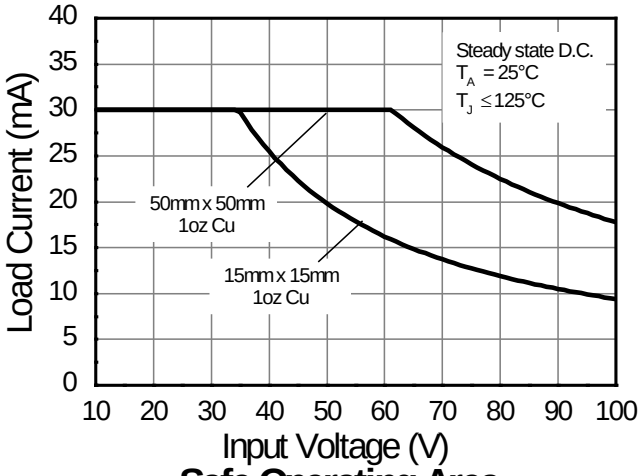
Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	• 4000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	• 300	V	B

Notes:
5. For a device mounted on 50mm X 50mm 1oz copper that is on a single-sided FR4 PCB; device 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 6, except measured with a single pulse width = 100µs and V_{IN}=48V.
8. Same as note 6, except measured with a single pulse width = 10ms and V_{IN}=48V.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

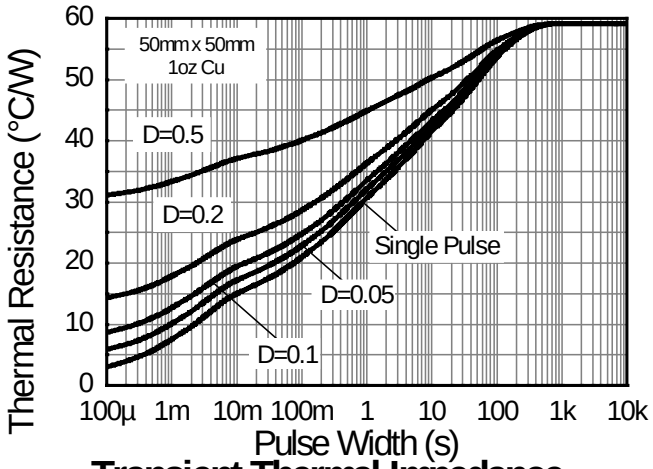
Thermal Characteristics and Derating Information



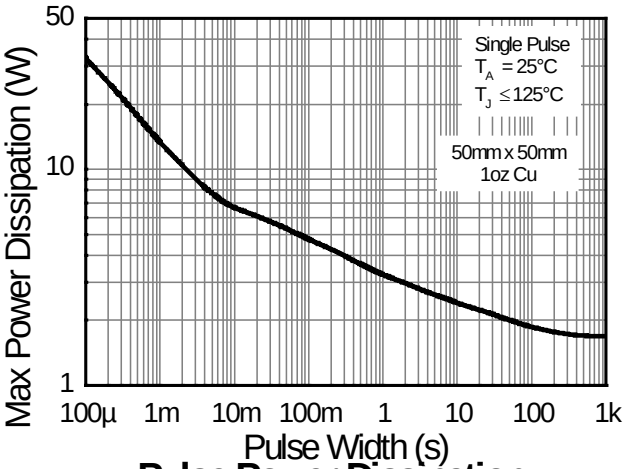
Derating Curve



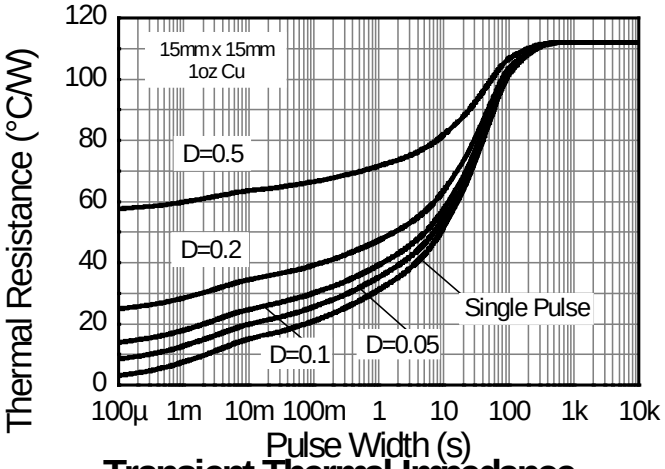
Safe Operating Area



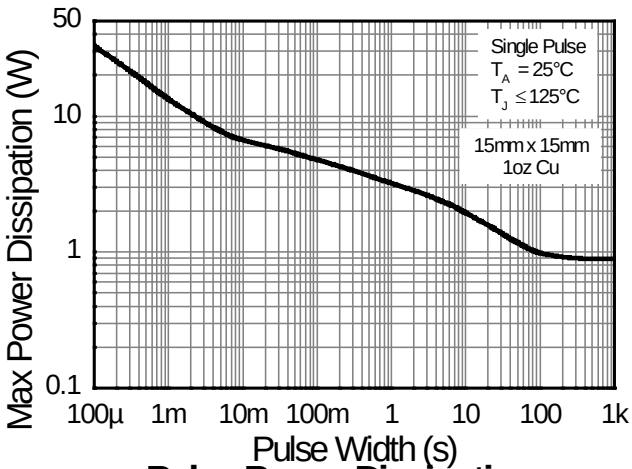
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



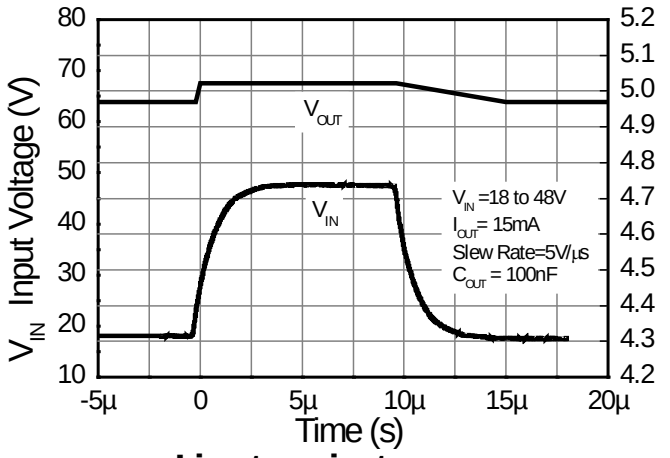
Pulse Power Dissipation

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

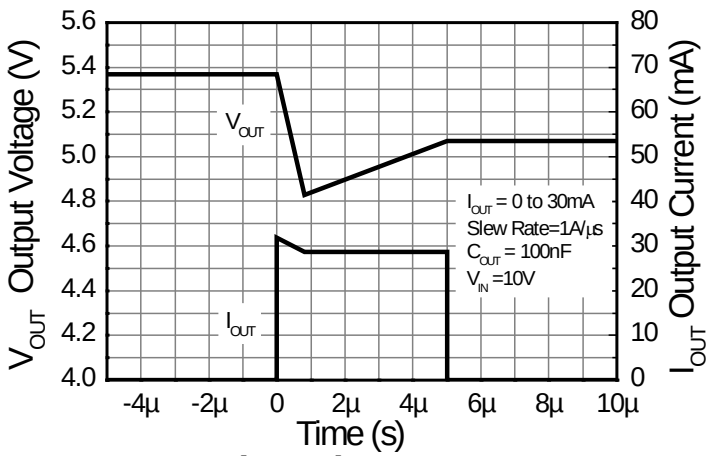
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage	V_{OUT}	4.5	5.0	5.5	V	V_{IN} = 48V, I_{OUT} = 30mA T_J = +25°C
Line Regulation (Note 11)	• V_{OUT}	—	195	300	mV	V_{IN} = 10 to 72V I_{OUT} = 15mA, T_J = +25°C
Temperature Coefficient	• V_{OUT}/• T	—	7.0	—	mV/°C	T_J = -40°C to +125°C V_{IN} = 48V, I_{OUT} = 15mA
Load Regulation (Note 12)	• V_{OUT}	—	-185	-300	mV	I_{OUT} = 1 to 30mA V_{IN} = 48V, T_J = +25°C
Minimum Value of Input Voltage Required to Maintain Line Regulation	$V_{IN(MIN)}$	10	—	—	V	—
Quiescent Current	I_Q	— —	260 550	500 900	µA	V_{IN} = 48V, I_{OUT} = 10µA, T_J = +25°C V_{IN} = 100V, I_{OUT} = 10µA, T_J = +25°C
Power Supply Rejection Ratio	PSRR	—	45	—	dB	C_{OUT} = 100nF, I_{OUT} = 30mA, V_{OUT} = 5V, V_{IN} = 10V,f = 100Hz

Notes: 11. Line regulation • V_{OUT} = V_{OUT}(@ V_{IN} = 72V) – $V_{OUT(NOMINAL)}$(@ V_{IN} = 10V)
12. Load regulation • V_{OUT} = V_{OUT}(@ I_{OUT} = 30mA) – $V_{OUT(NOMINAL)}$(@ I_{OUT} = 1mA)

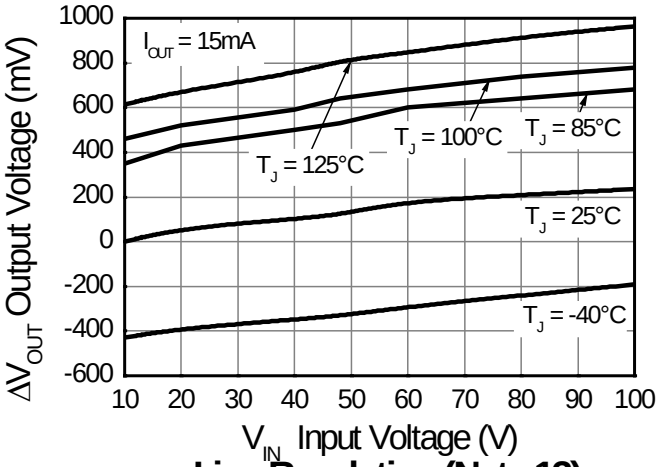
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



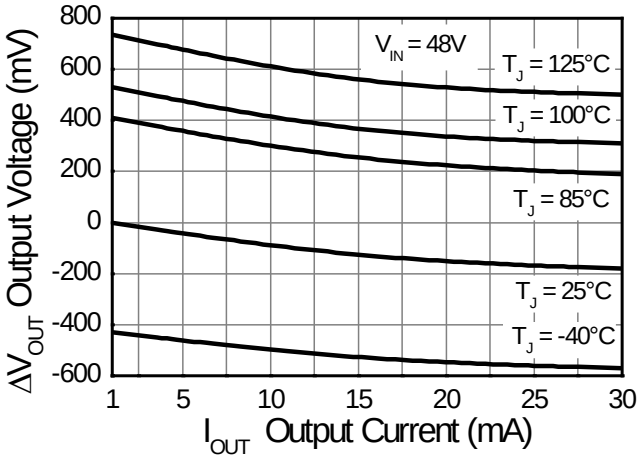
Line transient response



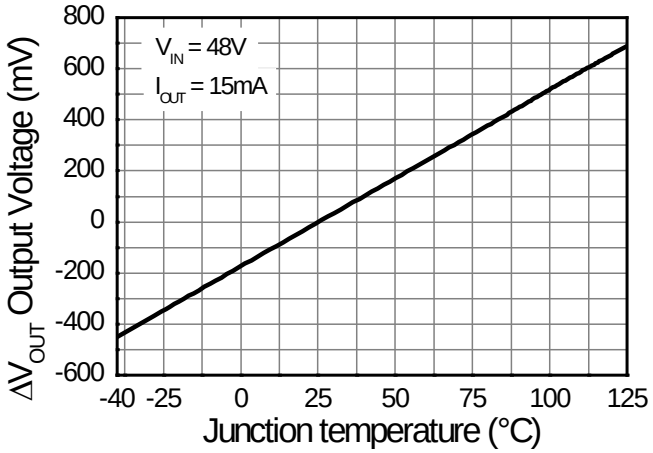
Load transient response



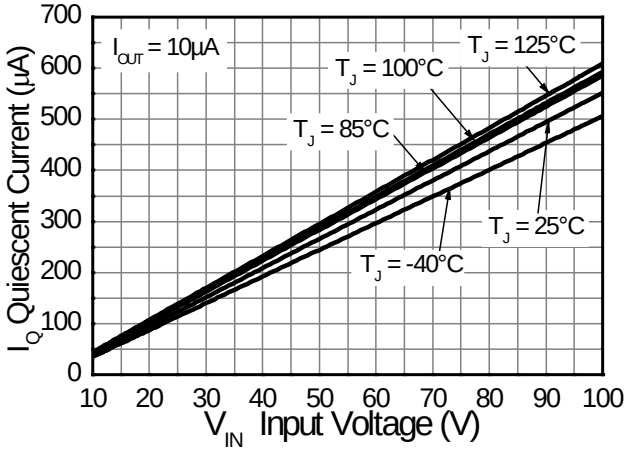
Line Regulation (Note 13)



Load Regulation (Note 14)



Temperature Coefficient (Note 15)

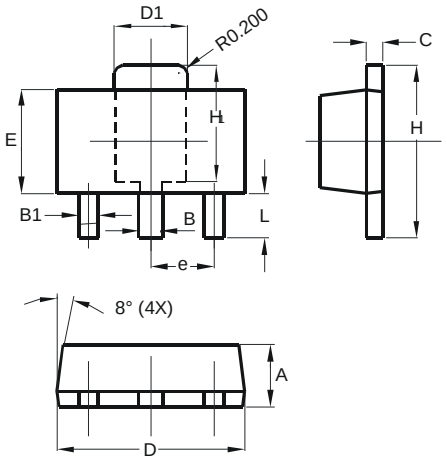


Quiescent Current

Notes: 13. Line regulation • $V_{OUT} = V_{OUT} – V_{OUT(NOMINAL)}$(@ V_{IN} = 10V, I_{OUT} = 15mA, T_J = 25°C)
14. Load regulation • $V_{OUT} = V_{OUT} – V_{OUT(NOMINAL)}$(@ V_{IN} = 48V, I_{OUT} = 1mA, T_J = 25°C)
15. Temperature Coefficient • $V_{OUT} = V_{OUT} – V_{OUT(NOMINAL)}$(@ V_{IN} = 48V, I_{OUT} = 15mA, T_J = 25°C)

Package Outline Dimensions

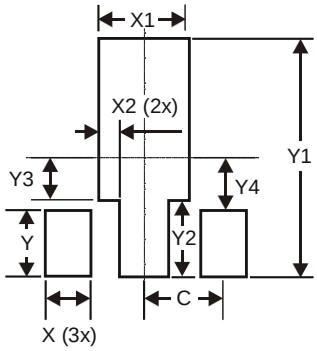
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT89		
Dim	**Min**	**Max**
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	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)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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