

ZXTR2008P5

**100V INPUT, 8.2V 40mA REGULATOR TRANSISTOR
POWERDI®5**

Description

The ZXTR2008P5 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 PowerDI-5 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 = 12V to 100V
- Output Voltage = 8.2V ± 10%
- Fully integrated into a PowerDI-5 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**

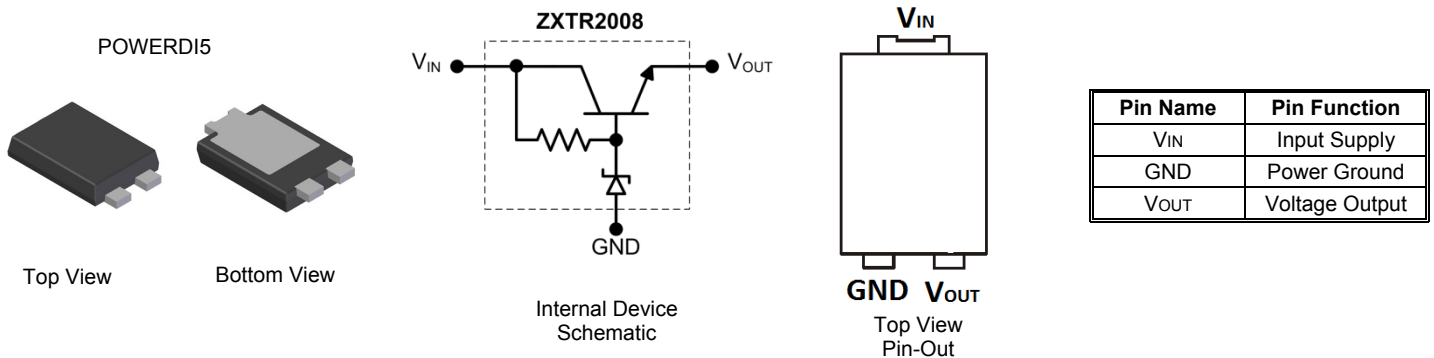
Applications

Supply voltage regulation in:

- Networking
- Telecom
- Power Over Ethernet (PoE)

Mechanical Data

- Case: PowerDI-5
- 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: 0.100 grams (approximate)



Ordering Information (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTR2008P5-13	PowerDI-5	ZXTR2008	13	16	5,000

- 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



- ZXTR2008 = Product Type Marking Code
- = Manufacturers' Code Marking
- K = Factory Designator
- YYWW = Date Code Marking
- YY = Last Two Digits of Year (ex: 14 for 2014)
- WW = Week code (01 to 53)

Absolute Maximum Ratings (Voltage relative to GND, @ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Input Supply Voltage	V_{IN}	-0.3 to 100	V
Continuous Input & Output Current	I_{IN}, I_{OUT}	450	mA
Peak Pulsed Input & Output Current	I_{IM}, I_{OM}	2	A
Maximum Voltage applied to V_{OUT}	$V_{OUT(max)}$	14.5	V

Maximum Current at $V_{IN} = 48\text{V}$ (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Continuous Output Current (Note 7)	I_{OUT}	45	mA
Pulsed Output Current (Note 8, Note 9)	I_{OM}	800	mA
		160	

Thermal Characteristics

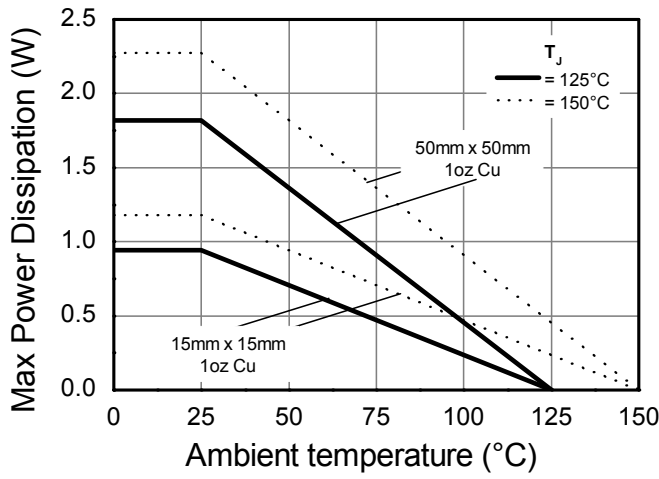
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5, Note 6)	P_D	1.82	W
		0.94	
Thermal Resistance, Junction to Ambient (Note 5, Note 6)	$R_{\theta JA}$	55	$^\circ\text{C/W}$
		107	
Thermal Resistance, Junction to Lead (Note 10)	$R_{\theta JL}$	20	$^\circ\text{C}$
Thermal Resistance, Junction to Case (Note 10)	$R_{\theta JC}$	17.8	
Recommended Operating Junction Temperature Range	T_J	-40 to +125	$^\circ\text{C}$
Maximum Operating Junction and Storage Temperature Range	T_J, T_{STG}	-65 to +150	

ESD Ratings (Note 11)

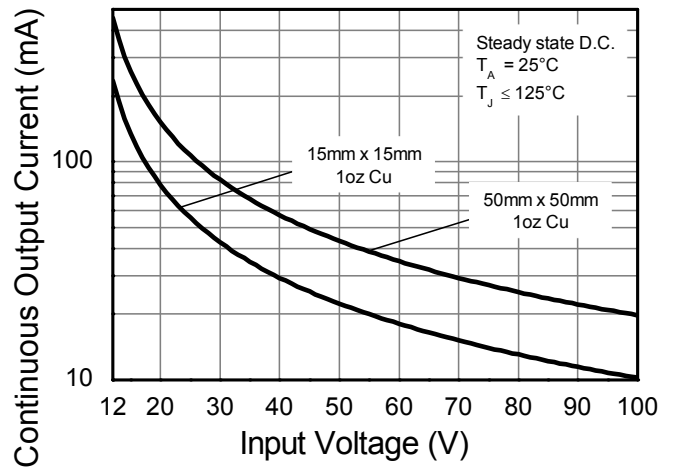
Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

- Notes:
- 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.
 - Same as Note 5, except mounted on 15mm x 15mm 1oz copper.
 - Same as Note 5, while operating at $V_{IN} = 48\text{V}$. Refer to Safe Operating Area for other Input Voltages.
 - Same as Note 5, except measured with a single pulse width = 100 μs and $V_{IN} = 48\text{V}$.
 - Same as Note 5, except measured with a single pulse width = 10ms and $V_{IN} = 48\text{V}$.
 - $R_{\theta JL}$ = Thermal resistance from junction to solder-point (on the exposed V_{IN} pad).
 - $R_{\theta JC}$ = Thermal resistance from junction to the top of case.
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

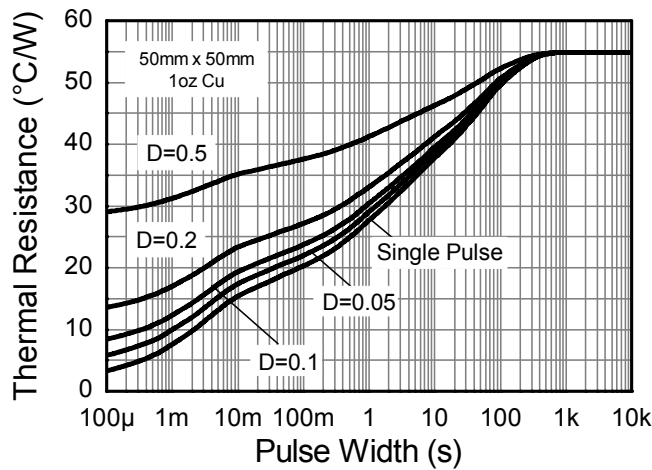
Thermal Characteristics and Derating Information



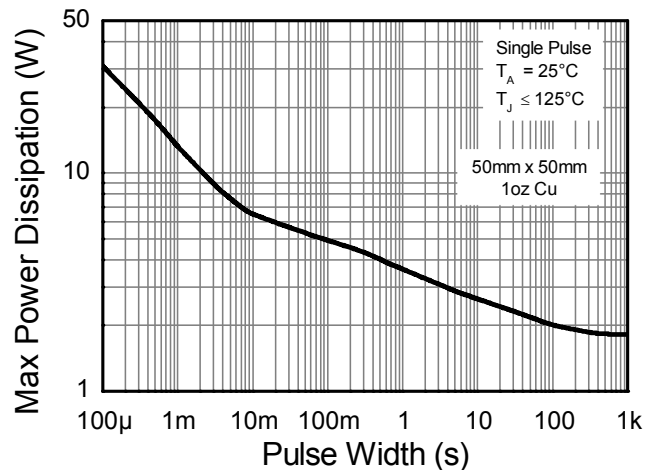
Derating Curve



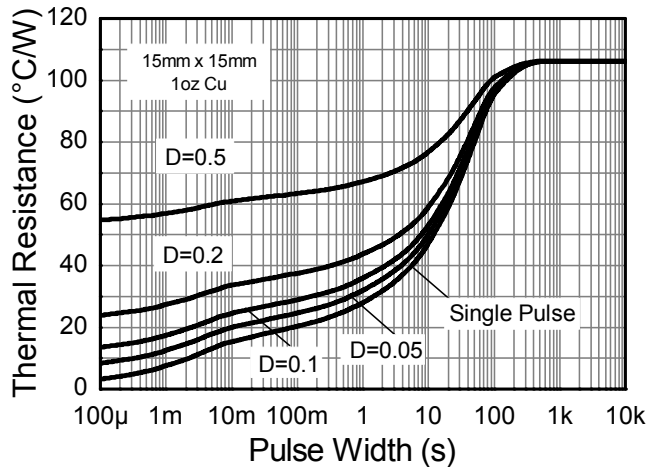
Safe Operating Area



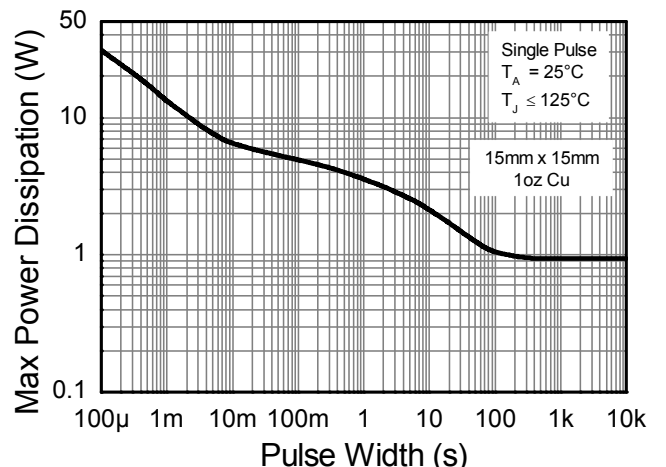
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



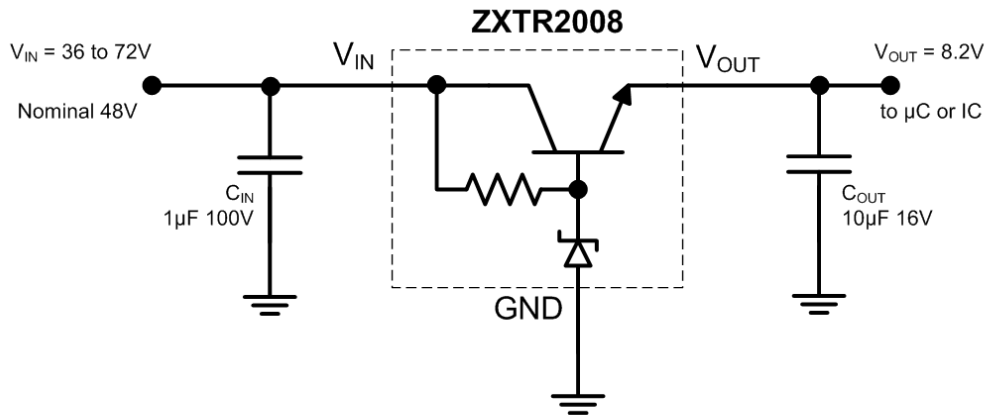
Pulse Power Dissipation

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage (Note 12)	V _{OUT}	7.38	8.2	9.02	V	V _{IN} = 48V, I _{OUT} = 15mA
Line Regulation (Notes 12 & 13)	ΔV _{OUT}	—	10	300	mV	V _{IN} = 12 to 100V, I _{OUT} = 15mA
Temperature Coefficient	ΔV _{OUT} /ΔT	—	10	—	mV/°C	T _J = -40°C to +125°C V _{IN} = 48V, I _{OUT} = 15mA
Load Regulation (Notes 12 & 14)	ΔV _{OUT}	—	-180 -250	-400 -500	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)}	12	—	—	V	—
Quiescent Current	I _Q	—	275 650	500 900	μA	V _{IN} = 48V, I _{OUT} = 10μA V _{IN} = 100V, I _{OUT} = 10μA
Power Supply Rejection Ratio	ΔV _{IN} /ΔV _{OUT}	—	38	—	dB	C _{OUT} = 100nF, I _{OUT} = 15mA, V _{OUT} = 8.2V, V _{IN} =12 to 100V, f=100Hz

Notes: 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.
 13. Line regulation ΔV_{OUT} = V_{OUT}(@ V_{IN} = 72V) – V_{OUT}(@ V_{IN} = 15V)
 14. Load regulation ΔV_{OUT} = V_{OUT}(@ I_{OUT} = 30mA) – V_{OUT}(@ I_{OUT} = 0.1mA)
 ΔV_{OUT} = V_{OUT}(@ I_{OUT} = 100mA) – V_{OUT}(@ I_{OUT} = 0.1mA)

Typical Application Circuit

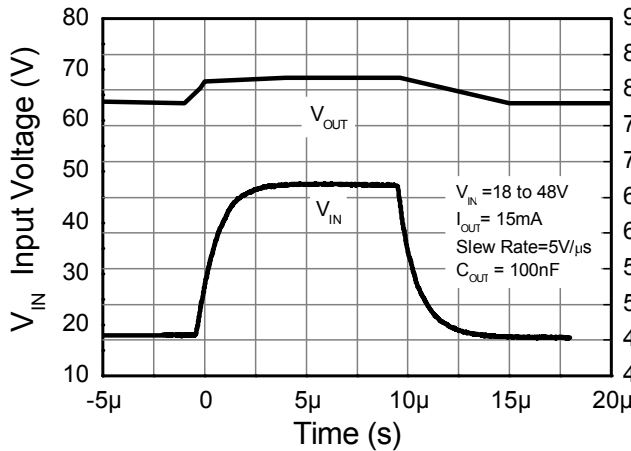


Example of an 8.2V regulated supply from a nominal 48V for powering a Controller IC.

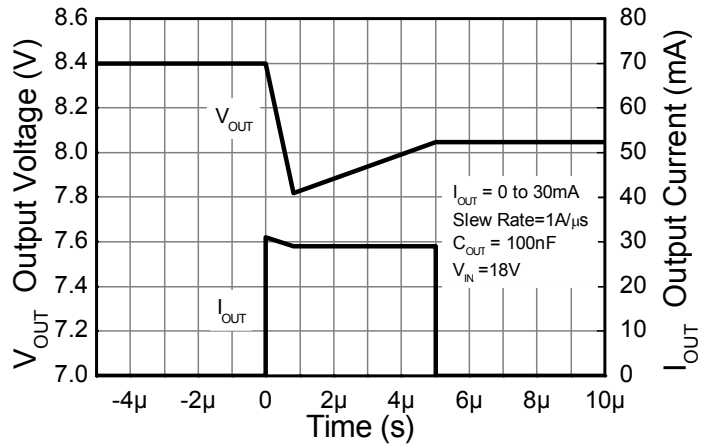
Pin Functions

Pin Name	Pin Function	Notes
V _{IN}	Input Supply	To maintain output regulation the input voltage can vary from 12V to 100V with respect to the GND pin. It is recommended to connect a 1μF capacitor to GND.
GND	Power Ground	This pin should be tied to the system ground.
V _{OUT}	Voltage Output	Outputs a regulated 8.2V. It is recommended to connect a 10μF capacitor to GND. Minimum of 10μA must be drawn from V _{OUT} to maintain regulation. The pin can be pulled high to a maximum of 14.5V with respect to ground.

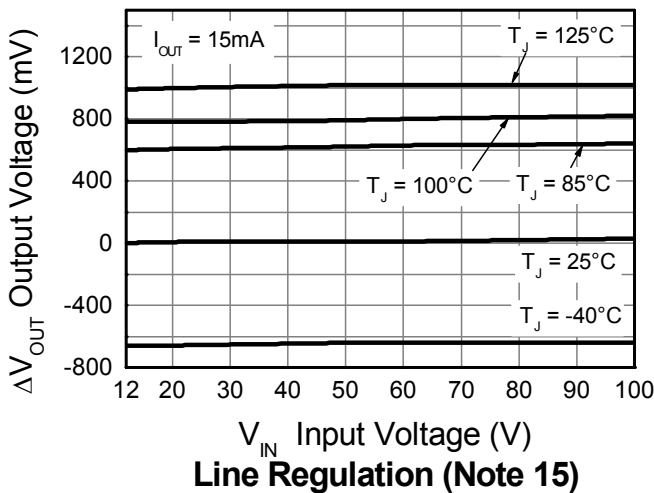
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



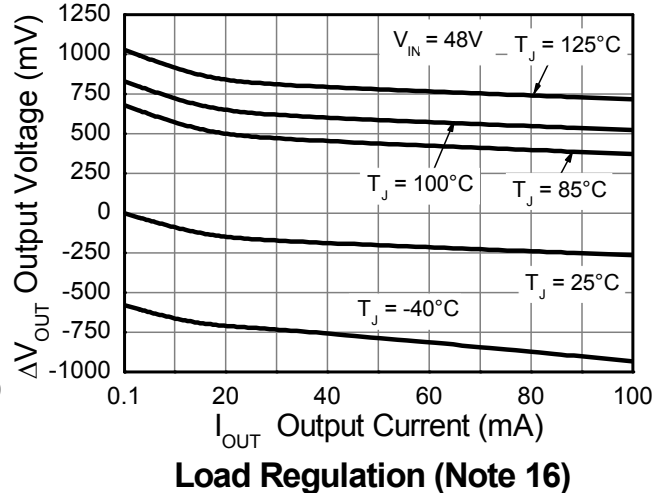
Line transient response



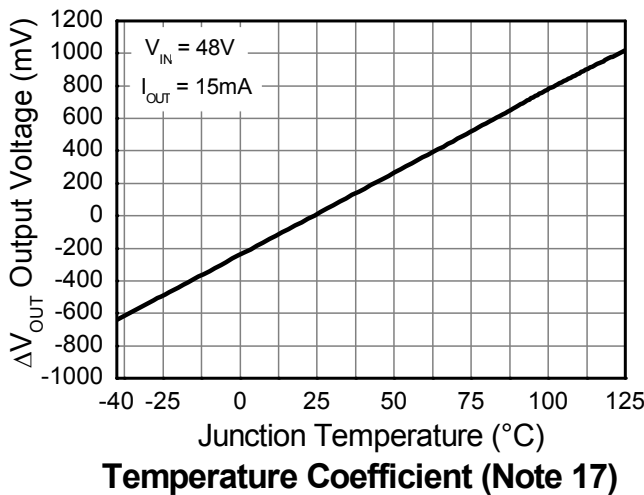
Load transient response



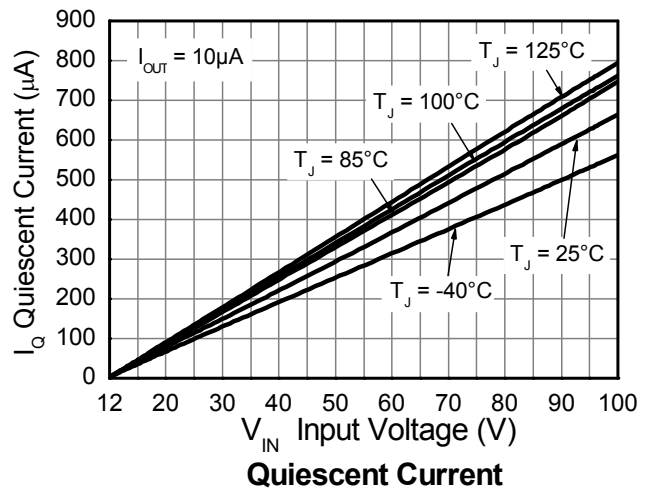
Line Regulation (Note 15)



Load Regulation (Note 16)



Temperature Coefficient (Note 17)

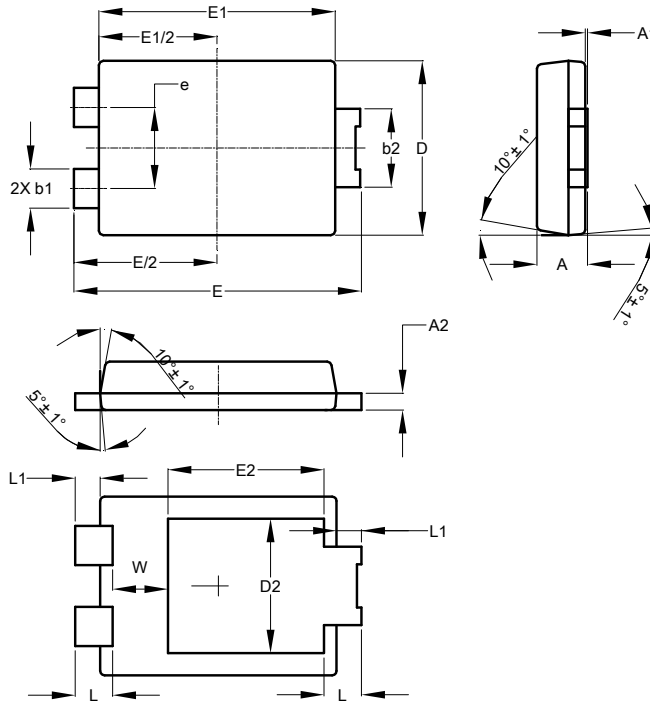


Quiescent Current

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

Package Outline Dimensions

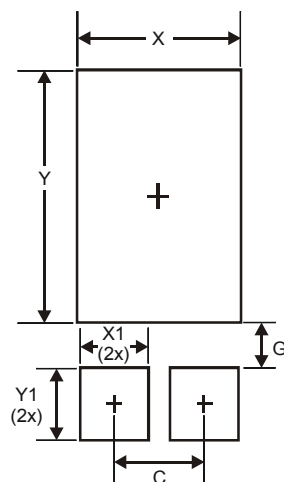
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI [®] 5			
Dim	Min	Max	Typ
A	1.05	1.15	1.10
A2	0.33	0.43	0.381
b1	0.80	0.99	0.89
b2	1.70	1.88	1.78
D	3.90	4.05	3.966
D2	-	-	3.054
E	6.40	6.60	6.504
e	-	-	1.84
E1	5.30	5.45	5.37
E2	-	-	3.549
L	0.75	0.95	0.85
L1	0.50	0.65	0.57
W	1.10	1.41	1.255
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)
C	1.840
G	0.852
X	3.360
X1	1.390
Y	4.860
Y1	1.400

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