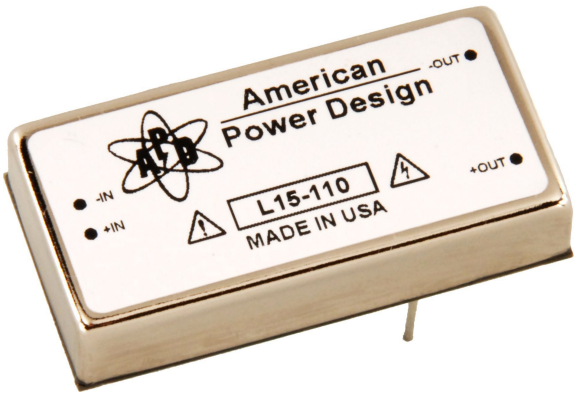
American Power Design, Inc.

"The best high voltage design solution"

RoHS

L1 SERIES 1 WATT HIGH VOLTAGE DC/DC CONVERTERS



FEATURES

- Customer Selects Output Voltage
- Outputs to 500 Vdc
- Low Profile
- Excellent Line & Load Regulation
- Low Output Ripple
- 1000 Vdc Output Isolation
- Continuous Short Circuit Protection
- Economical

The L1 Series Low Profile DC/DC converter offers a 1000 Vdc isolated high voltage output in a six-sided metal case. Their small size, low output ripple, and excellent regulation characteristics make them ideally suited for applications that demand a high degree of performance All models will tolerate a short circuit indefinitely.

ELECTRICAL SPECIFICATIONS

Voltage Accuracy	+/-1%
Line Regulation	+/- 0.1%
Load Regulation	+/- 0.2%
Output Ripple	< 0.05% P-P
Input Filter	Low ESR Capacitor
Efficiency	50% (typ.)
Short Circuit Protection	Continuous
Switching Frequency	60 kHz
Output Isolation	1000 Vdc
Input / Output Capacitance	< 80pF

GENERAL SPECIFICATIONS

Temp. Stability	+/-0.02%/°C
Temp. (Operating , Case)	0 to +70°C
Temp. (Storage)	-40 to +100°C
EMI/RFI	Six Sided Shield
Derating	None
Cooling	Free-Air Convection

PHYSICAL SPECIFICATIONS

Dimensions	1 x 2 x 0.41 inches
Weight	1.2 Oz
Encapsulation Material	UL 94V-0 Epoxy
Case Material	Nickel Plated Metal

(With Non-Conductive Base Plate)

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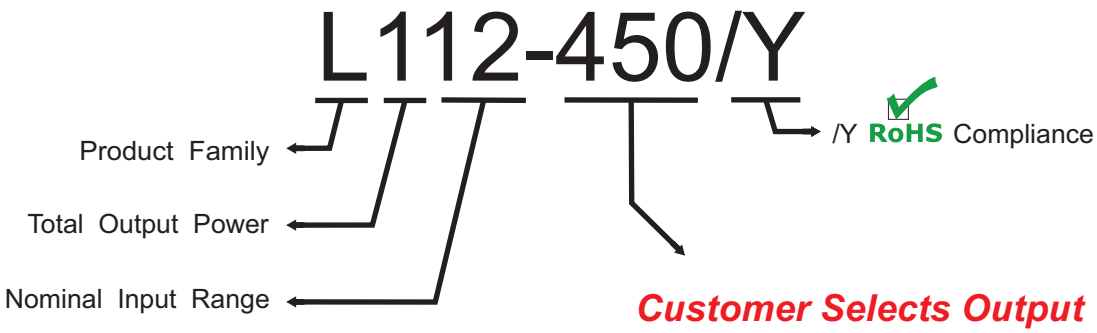
REPRESENTATIVE MODEL LISTING									
OUTPUT SPECIFICATIONS		MODEL NUMBER / INPUT RANGE							
VOLTAGE	CURRENT	4.5-5.5VDC		10-14VDC		21-27VDC		43-53VDC	
		Non-RoHs	RoHs	Non-RoHs	RoHs	Non-RoHs	RoHs	Non-RoHs	RoHs
24 Vdc	42 mA	L15-24	L15-24/Y	L112-24	L112-24/Y	L124-24	L124-24/Y	L148-24	L148-24/Y
48 Vdc	20 mA	L15-48	L15-48/Y	L112-48	L112-48/Y	L124-48	L124-48/Y	L148-48	L148-48/Y
60Vdc	17 mA	L15-60	L15-60/Y	L112-60	L112-60/Y	L124-60	L124-60/Y	L148-60	L148-60/Y
80 Vdc	13 mA	L15-80	L15-80/Y	L112-80	L112-80/Y	L124-80	L124-80/Y	L148-80	L148-80/Y
100 Vdc	10 mA	L15-100	L15-100/Y	L112-100	L112-100/Y	L124-100	L124-100/Y	L148-100	L148-100/Y
110 Vdc	9 mA	L15-110	L15-110/Y	L112-110	L112-110/Y	L124-110	L124-110/Y	L148-110	L148-110/Y
120 Vdc	8 mA	L15-120	L15-120/Y	L112-120	L112-120/Y	L124-120	L124-120/Y	L148-120	L148-120/Y
130 Vdc	7.7 mA	L15-130	L15-130/Y	L112-130	L112-130/Y	L124-130	L124-130/Y	L148-120	L148-120/Y
150 Vdc	6.7 mA	L15-150	L15-150/Y	L112-150	L112-150/Y	L124-150	L124-150/Y	L148-150	L148-150/Y
200 Vdc	5 mA	L15-200	L15-200/Y	L112-200	L112-200/Y	L124-200	L124-200/Y	L148-200	L148-200/Y
250 Vdc	4 mA	L15-250	L15-250/Y	L112-250	L112-250/Y	L124-250	L124-250/Y	L148-250	L148-250/Y
300 Vdc	3.3 mA	L15-300	L15-300/Y	L112-300	L112-300/Y	L124-300	L124-300/Y	L148-300	L148-300/Y
350 Vdc	2.8 mA	L15-350	L15-250/Y	L112-350	L112-350/Y	L124-350	L124-350/Y	L148-350	L148-350/Y
400 Vdc	2.5 mA	L15-400	L15-400/Y	L112-400	L112-400/Y	L124-400	L124-400/Y	L148-400	L148-400/Y
450 Vdc	2.2 mA	L15-450	L15-450/Y	L112-450	L112-450/Y	L124-450	L124-450/Y	L148-450	L148-450/Y
500 Vdc	2 mA	L15-500	L15-500/Y	L112-500	L112-500/Y	L124-500	L124-500/Y	L148-500	L148-500/Y



Customer Selects Output Voltage

The L1 Series are designed such that the customer may order any output voltage from 24Vdc to 500Vdc at no additional charge.

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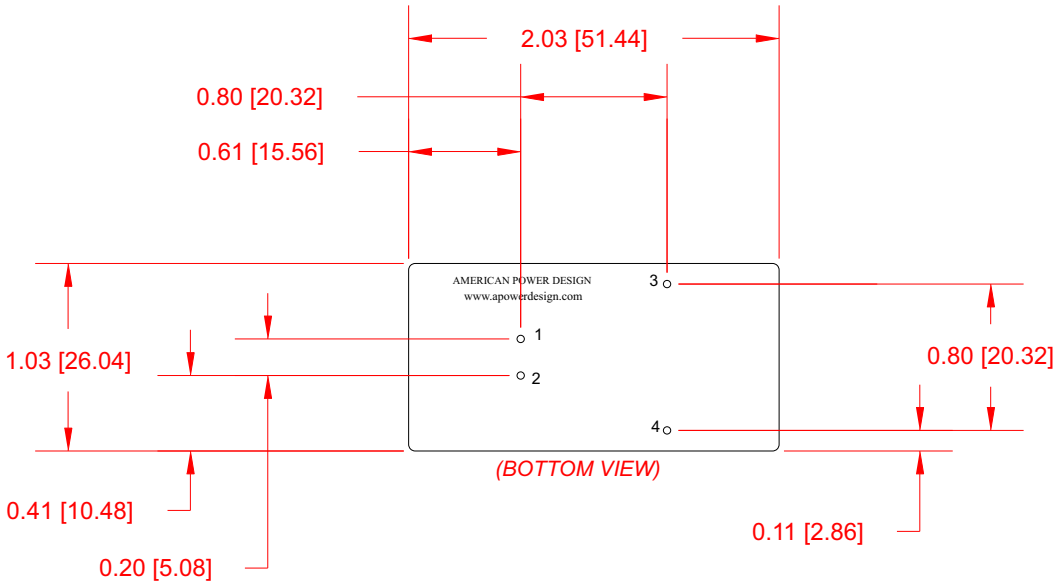
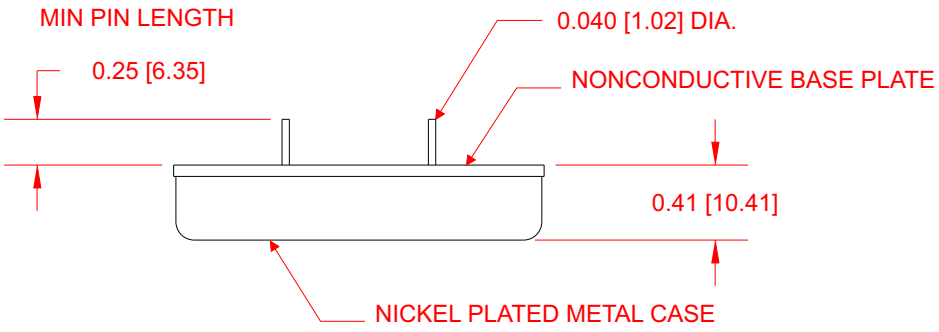


PINS: TIN PLATED BRASS
MATTE FINISH



PIN #	FUNCTION
1	+ Input
2	- Input
3	+Output
4	- Output

Dimensions are in Inches
[Metric equivalents in brackets]

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APPLICATION NOTES

INPUT AND OUTPUT IMPEDANCE

The L1 Series of power converters have been designed to be stable with no external capacitors when used in low inductance input and output circuits. However, in some applications, the inductance associated with the distribution from the power source to the input of the converter can affect the stability of the converter. The addition of a 100 µF electrolytic capacitor with an ESR <1 Ohm across the input helps ensure stability of the converter. In many applications, the user has to use decoupling capacitance at the load.

SHORT CIRCUIT PROTECTION

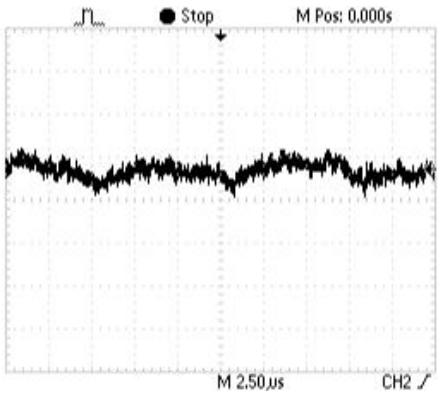
The L1 Series is equipped with short circuit protection. The converter will fold-back the input power whenever a short circuit is applied to its output and automatically recover after the overload condition is removed.

ISOLATION

The output of the L1 Series is galvanically isolated from both the input and case, capacitance is < 80pF and resistance is > 10G Ohm.

RIPPLE AND NOISE

Figure below shows a typical output voltage ripple waveform, measured at full rated load current with no additional output filtering. External low ESR capacitors may be added across output to further reduce ripple.



STARTUP TRANSIENT

Figure below shows a typical output voltage during turn-on, measured at no load current with no additional output filtering.

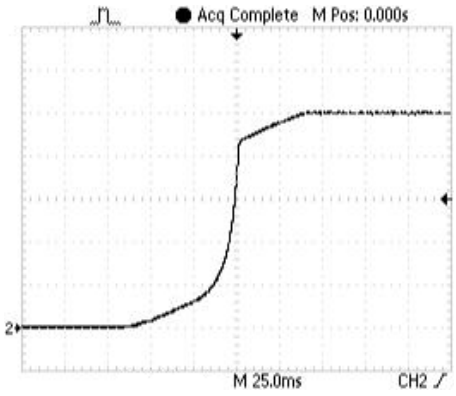
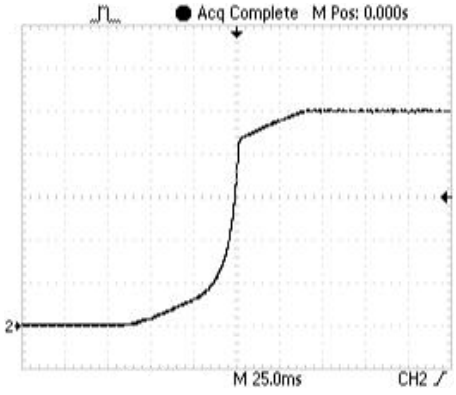


Figure below shows a typical output voltage during turn-on, measured at full rated load current with no additional output filtering.



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APPLICATION NOTES

INRUSH CURRENT

The inrush current of the L1 Series has been kept as low as possible. However, a series resistor may be inserted in the input line to limit this current further.

LOAD TRANSIENT

Figure below shows a typical output voltage response, measured during a transition from full rated load current to no load current with no additional output filtering.

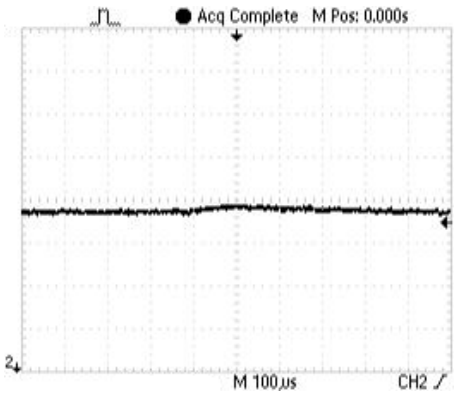
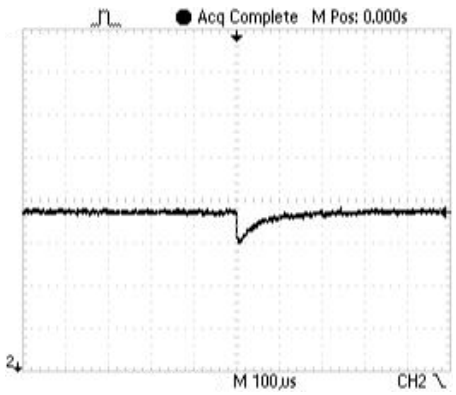
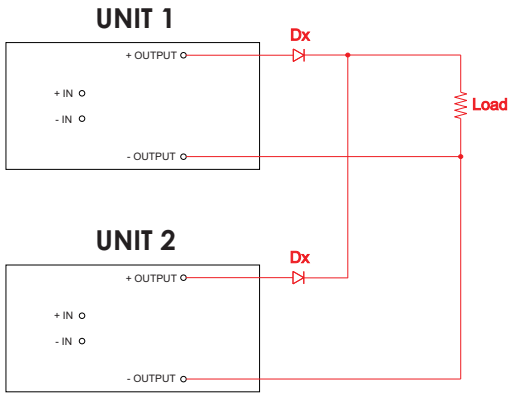


Figure below shows a typical output voltage response, measured during a transition from no load current to full rated load current with no additional output filtering.



CONNECTION IN PARALLEL

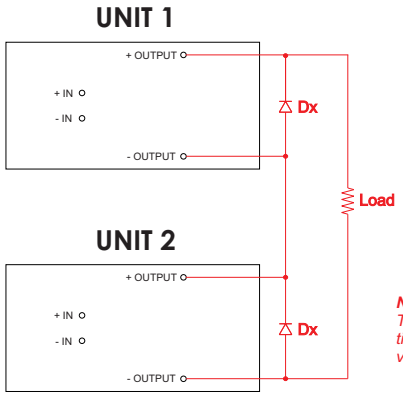
The figure below shows how to connect outputs of several units with equal nominal output voltage in parallel with the use of oring diodes.



NOTE:
The ratings of Dx should be 1.5 times the maximum current and voltage expected in each branch.

CONNECTION IN SERIES

Figure below shows how to connect multiple outputs in series with the use of shunt diodes, taking into consideration that the highest achieved output voltage should remain below the rated isolation voltage.



NOTE:
The ratings of Dx should be 1.5 times the maximum current and voltage expected in each branch.

L1 SERIES 1 WATT HIGH VOLTAGE DC/DC CONVERTERS

APPLICATION NOTES

CLEANING AGENTS

In order to avoid possible damage, any penetration of cleaning fluids must be prevented, since the power supplies are not hermetically sealed.

NUCLEAR AND MEDICAL APPLICATIONS

American Power Design products are not designed, intended for use in, or authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of American Power Design, Inc.

TECHNICAL REVISIONS

The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

SAFETY REQUIREMENTS

The converters are designed to meet North American and International safety regulatory requirements per UL 60950-1/CSA 22.2 No. 60950-1-07 Second Edition, IEC 60950-1: 2005, and EN 60950-1:2006. Basic Insulation is provided between input and output. To comply with safety agencies requirements, an input line fuse must be used external to the converter. The table below provides the recommended fuse rating for use with this family of products.

Input Voltage Range	Fuse Rating
4.5-5.5Vdc	1 A
10-14Vdc	0.5 A
21-27Vdc	0.2 A
43-53Vdc	0.1 A

If one input fuse is used for a group of modules, the maximum fuse rating should not exceed 10A.

WARRANTY

All products manufactured by American Power Design, Inc. (APD) are warranted to be free of defects due to material or workmanship for a period of one year from date of shipment. At our option, APD will repair or replace any non-conforming product.
APD expressly disclaims any liability for consequential or incidental damages resulting from the use or misuse of its products by the purchaser or others.
This warranty is in lieu of all warranties expressed or implied, including the warranties of merchantability. No other warranties, obligations, or liabilities are expressed or implied.
All products being returned for repair require a return material authorization(RMA) assigned by APD prior to return shipment.