

## Wall Industries, Inc.

# CMLV12S12-150

Low Voltage DC-DC Chassis Mount Converter  
10-36 Vdc Input  
12Vdc Output at 12.5A  
Half-Brick Package



### Features:

- Up to 90% Efficient
- Cost Efficient Solution
- Delivering 12.5A at Room Temperature with No Added Heat Sink at 400 LFM
- Fixed Switching Frequency
- High Reliability
- Output Short Circuit Protection
- Output Over Current Protection
- Optional Encapsulation for added

### Ruggedness

- Remote ON/OFF
- Remote Sense Compensation to 10% Vout
- Fast Transient Response
- 100% Burn In
- Soft Start

### Applications:

- For use in 12V and 24V battery applications.
- For use in Intermediate and Distributed Bus Architectures (IBA)
- Telecommunication equipment
- Network (LANs/WANs) Equipment
- Next generation low voltage, high current microprocessors and Ics

### Description:

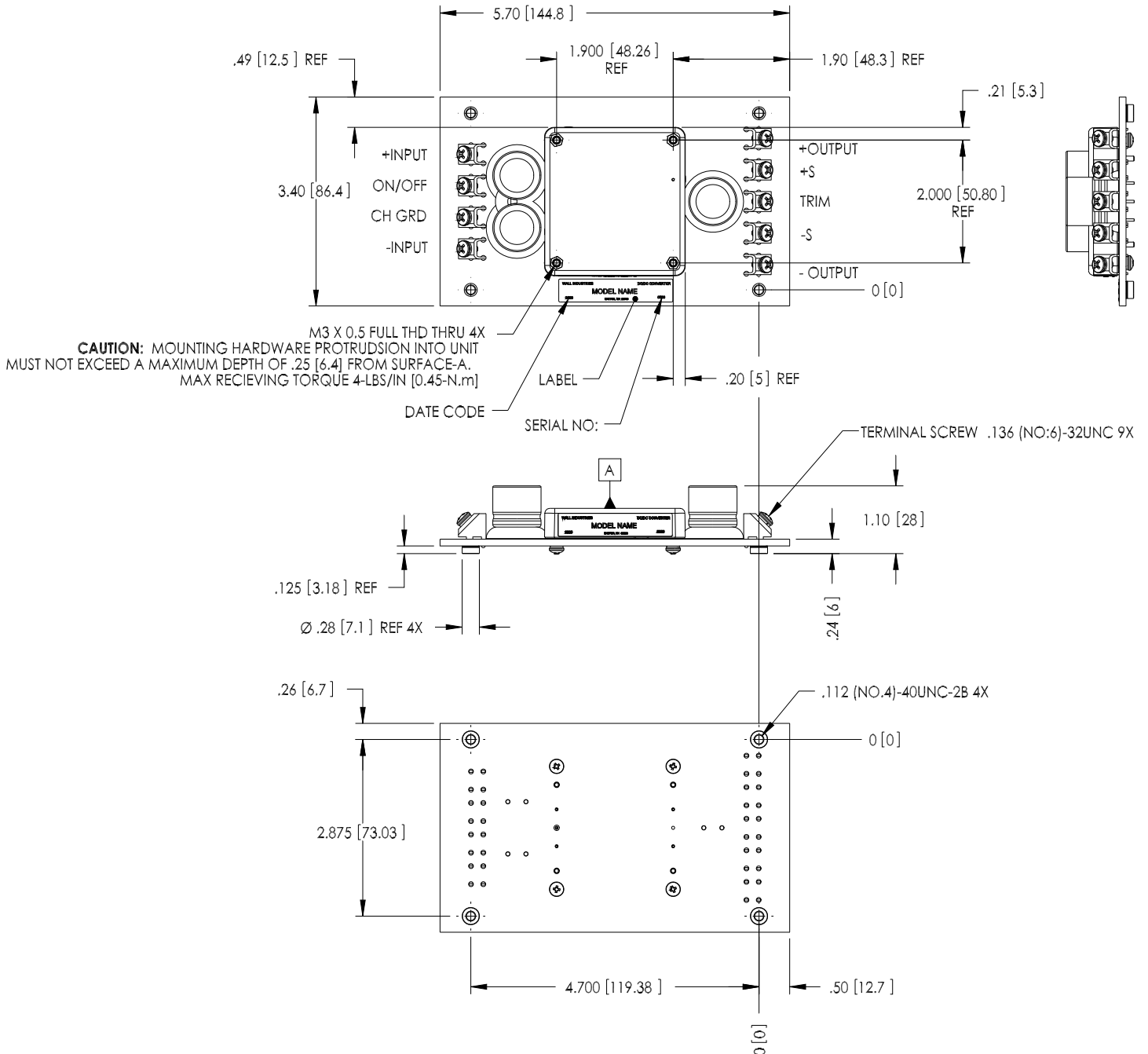
The CMLV12S12-150 is a high density, low input voltage, isolated converter on a chassis mount with a wide input voltage range. Low input voltage converters are uncommon in the industry and the CMLV12S12-150 offers the flexibility of operation with both 12V and 24V busses. This state-of-the-art converter's features include fast transient response, short circuit protection, over current protection, soft start, and many other features that are required for today's demanding applications.

Technical Specifications		Model No. CMLV12S12-150			
<p>All specifications are based on 25°C, Nominal Input Voltage and Maximum Output Current unless otherwise noted. We reserve the right to change specifications based on technological advances.</p>					
SPECIFICATION	Related condition	Min	Nom	Max	Unit
Switching Frequency		-	350	-	kHz
<b>INPUT (V<sub>in</sub>)</b>					
Operating Voltage Range		10	12 / 24	36	Vdc
UVLO Turn On at		9.4	9.5	9.6	Vdc
UVLO Turn Off at		9.3	9.4	9.5	Vdc
Maximum Input Current	Low Line	-	16.6	-	A
No Load Input Current	No Load	-	0.15	-	A
Input Current under "Remote Off"		-	0.0064	-	A
Reflected Ripple Current		-	225	-	mA
Input Surge Voltage	100 mS			50	Vdc
<b>EFFICIENCY</b>					
		-	90	-	%
<b>OUTPUT (V<sub>o</sub>)</b>					
Voltage Set Point	±RS shorted to ±Vo	11.88 -1%	12.0	12.12 +1%	Vdc %
Voltage Adjustment	Max Output limited to 150W	10.8 -10%	12.0	13.2 +10%	Vdc
Load Regulation	±RS shorted to ±Vo	-	0.1	0.2	%
Line Regulation	±RS shorted to ±Vo	-	0.1	0.2	%
Temperature Drift		-	0.2	-	% / °C
Remote Sense Compensation	Max Output limited to 150W	-		13.2 10%	Vdc %
Ripple	1µF Ceramic & 10µF Tantalum	-	120	-	mV <sub>pk-pk</sub>
Spikes	1µF Ceramic & 10µF Tantalum	-	-	-	mV <sub>pk-pk</sub>
Current		0	-	12.5	A
Current Limit	Power Limited-Dependent upon SENSE compensation and TRIM adjustment	-	16.2	-	A
Over Voltage Limit	Output Clamped	-	-	-	Vdc
<b>DYNAMIC RESPONSE</b>					
	1µF Ceramic & 10µF Tantalum				
Load step / Δ V	50% to 100% I <sub>o</sub> , di/dt=1A/µS	-	300	-	mV
Recovery Time	Recovery to within 1% Nominal V <sub>o</sub>	-	4	-	ms
Turn On Delay	From V <sub>in</sub> (min) to V <sub>out</sub> (nom)	-	14	-	ms
Turn On Overshoot	Full Load Resistive	-	0	-	%
Hold Up Time	From V <sub>in</sub> (min) to V <sub>UVLO_Turn_Off</sub>	0	-	-	mS
<b>REMOTE ON/OFF</b>					
<b>Active High</b>					
Remote ON – Active High	Min High (ON/OFF pin)	2.2	-	-	Vdc
Remote ON – Active Low	Max Low (ON/OFF pin)	N/A	-	-	Vdc
Remote OFF – Active High	Max Low (ON/OFF pin)	-	-	1.2	Vdc
Remote OFF – Active Low	Min High (ON/OFF pin)	N/A	-	-	Vdc
Remote ON/OFF pin Floating – Active High	Over Operating Voltage Range	2.5	-	5.0	Vdc
Remote ON/OFF pin Floating – Active Low	Over Operating Voltage Range	N/A	-	-	Vdc
I <sub>ON/OFF</sub> Sink to pull low – Active Low or High	V <sub>ON/OFF</sub> =0V, V <sub>in</sub> =36V	-	-	0.38	mA
I <sub>ON/OFF</sub> Source to drive high – Active High	V <sub>ON/OFF</sub> =5V, V <sub>in</sub> =36V	-	-	0.03	mA
I <sub>ON/OFF</sub> Source to drive high – Active Low	V <sub>ON/OFF</sub> =5V, V <sub>in</sub> =36V	-	-	-	mA
Turn On Delay – Active High	ON/OFF (max Low) to V <sub>out</sub> (min)	-	9	-	ms
Turn Off Delay – Active High	ON/OFF (0V) to V <sub>out</sub> (min)	-	160	-	µS
<b>ISOLATION</b>					
Input-Output	1 minute	-	1500	-	Vdc
Input-Case	1 minute	-	500	-	Vdc
Output-Case	1 minute	-	500	-	Vdc
<b>THERMAL</b>					
Ambient	Max. Ambient limited by OTP	-40	25	OTP	°C
Over Temperature Protection (OTP)	Case Temperature Greater than	-	100	-	°C
Turn On (OTP)	Case Temperature Less than	-	95	-	°C
MTBF	Calculated Using Bellcore TR-332 Method 1 case 3		2,563,116		hours
<b>MECHANICAL</b>					

See Figure 1

**Figure 1: Mechanical Dimensions**

Unit inches [mm]



**NOTES:**

- PIN TO PIN TOLERANCE  $\pm 0.01$  [ $\pm 0.3$ ], PIN DIAMETER TOLERANCE:  $\pm 0.005$  [ $\pm 0.13$ ].
- CASE MATERIAL OF THE CONVERTER: Ø.040 [1.02] THICK, ALUMINUM ALLOY 3003-0, PER: QQA 250/2.
- UNLESS OTHERWISE SPECIFIED.

**TO ORDER:**

- UNIT COMES WITH EITHER 3M x 0.5 THREADED THRU INSERTS OR FOR Ø.125 THRU-HOLE FOR THE CHASSIS MOUNT BOARD ADD: "TH" SUFFIX TO MODEL PART NUMBER. EXAMPLE: CMLV12S12-150TH



**Output Voltage Trim: (5V, 12V, 15V, and 20V Models)**

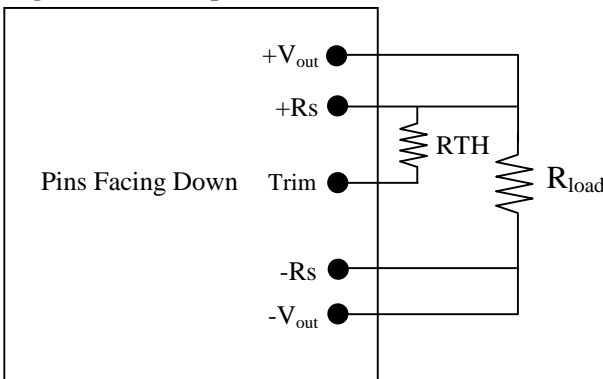
The output is adjustable ±10% of rated output voltage. To trim the output voltage down, place the trim resistor between the Trim and -Rs pins (Figure 4). To trim the output voltage up, place the trim resistor between the Trim and +Rs pins (Figure 3).

The value of the trim resistor with respect to the desired output voltage (Vo) can be derived from the following formulas, or looked up on the trim table (Table 2).

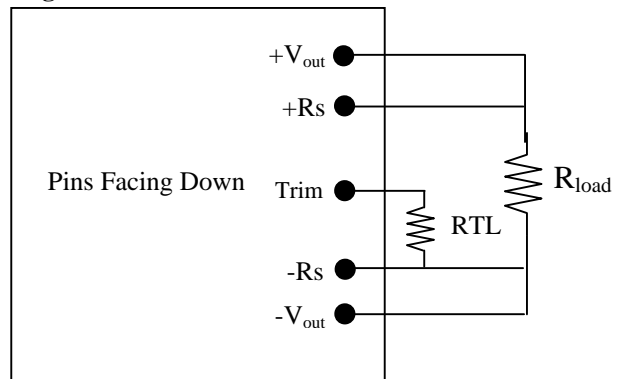
$$R_{TH} = \frac{R_1 \cdot V_o \cdot \frac{V_{onom}}{U_1}}{V_o - V_{onom}} - \frac{R_1 \cdot V_o}{V_o - V_{onom}} - R_{lim} \quad (\text{in Kohms})$$

$$R_{TL} = \frac{R_1 \cdot V_o}{V_{onom} - V_o} - R_{lim} \quad (\text{in Kohms})$$

**Figure 3: Trim Up**



**Figure 4: Trim Down**



**Table 2: Trim Equations for CMLV Series (5V, 12V, 15V, and 20V Models)**

<b>V<sub>onom</sub></b>	<b>U<sub>1</sub></b>	<b>R<sub>1</sub></b>	<b>R<sub>lim</sub></b>	<b>R<sub>TH</sub> to +Rs</b>
12.000	2.500	5.11	5.11	<b>R<sub>TL</sub> to -Rs</b>

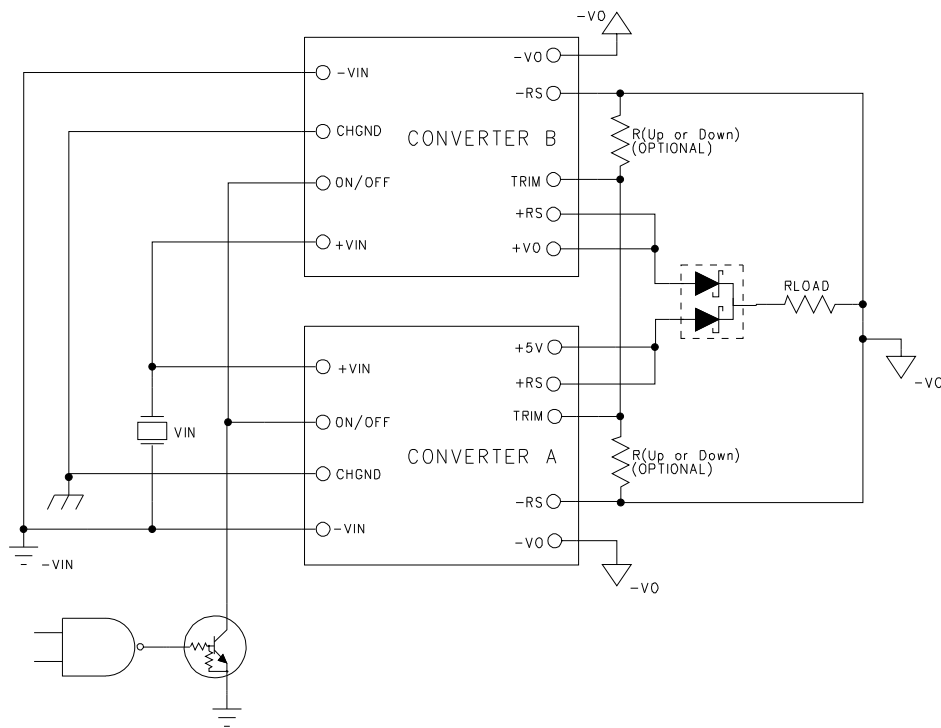
Percent Trim	<u>Trim Low</u>		<u>Trim High</u>		All in Kohms
	V <sub>o</sub>	R <sub>TL</sub>	V <sub>o</sub>	R <sub>TH</sub>	
1%	11.880	500.78	12.120	1956.11	
2%	11.760	245.28	12.240	985.21	
3%	11.640	160.11	12.360	661.57	
4%	11.520	117.53	12.480	499.76	
5%	11.400	91.98	12.600	402.67	
6%	11.280	74.95	12.720	337.94	
7%	11.160	62.78	12.840	291.71	
8%	11.040	53.66	12.960	257.03	
9%	10.920	46.56	13.080	230.06	
10%	10.800	40.88	13.200	208.49	

Note that while decreasing the output voltage, the maximum output current still remains at 12.5A, and while increasing the output voltage, the output current is reduced to maintain a total output power at 150 W.

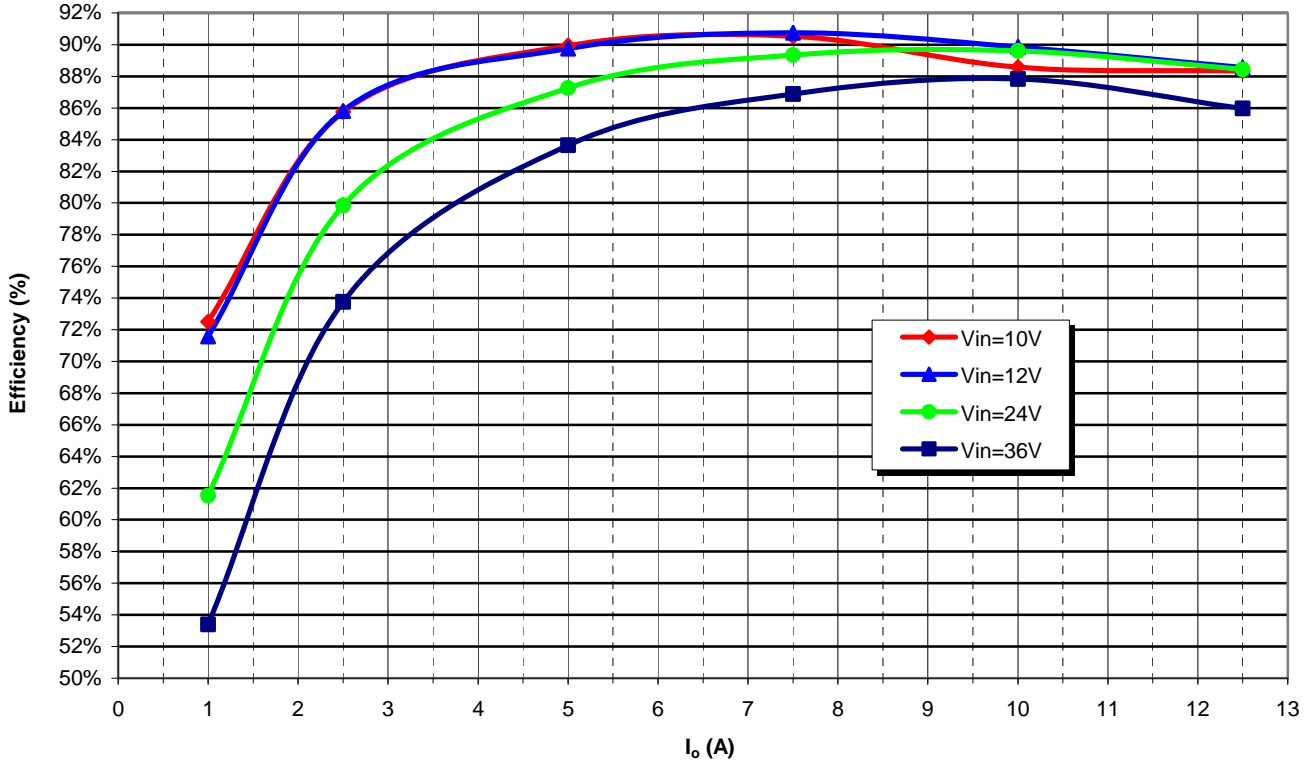
**Paralleling Converters**

The CMLV series converters may be paralleled both for redundancy and for higher output current. However, in order to do this, a high-current, low  $V_f$  schottky diode must be placed at the +Vo pin of each supply as shown in Figure 5. To improve sharing, tie the two TRIM pins together. The converters may be trimmed by adding a resistor value from Table 2 from each TRIM pin to  $\pm RS$  pin, or alternatively, a single resistor of half the value of Table 2 from the common TRIM pins to the common  $\pm RS$  pins.

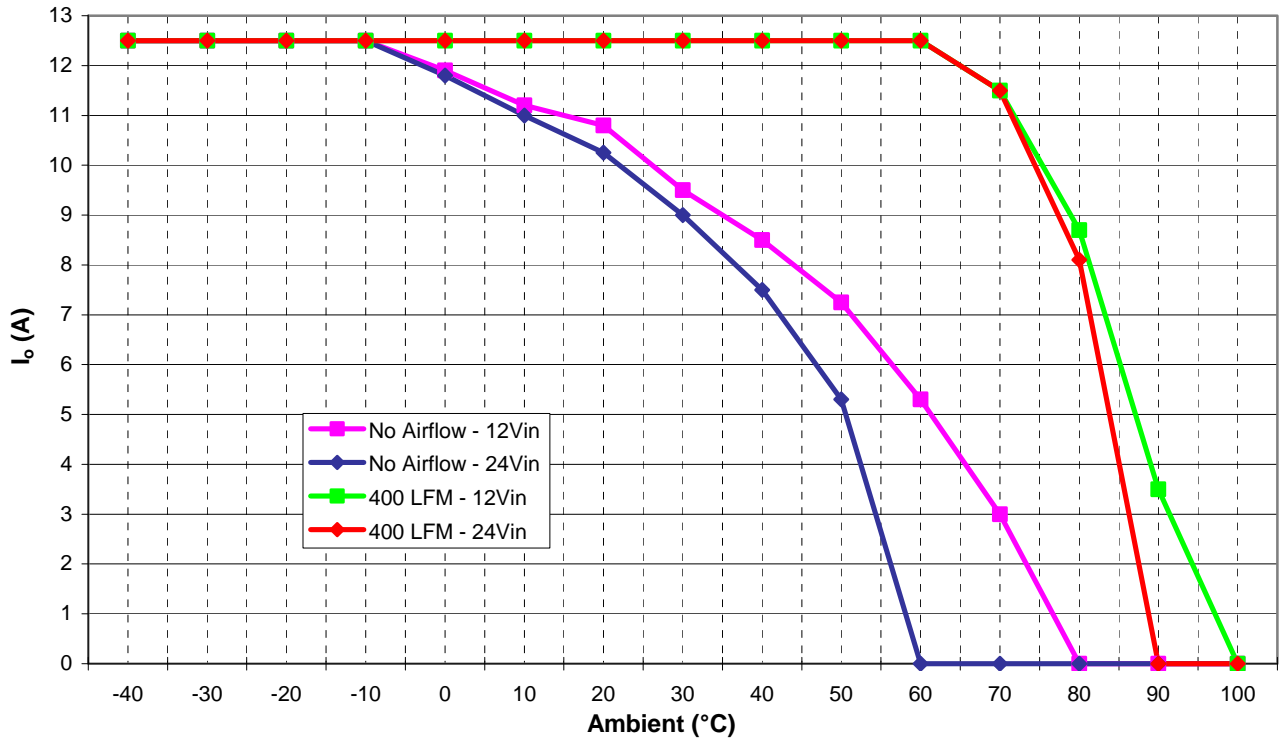
**Figure 5: Paralleling Converters**



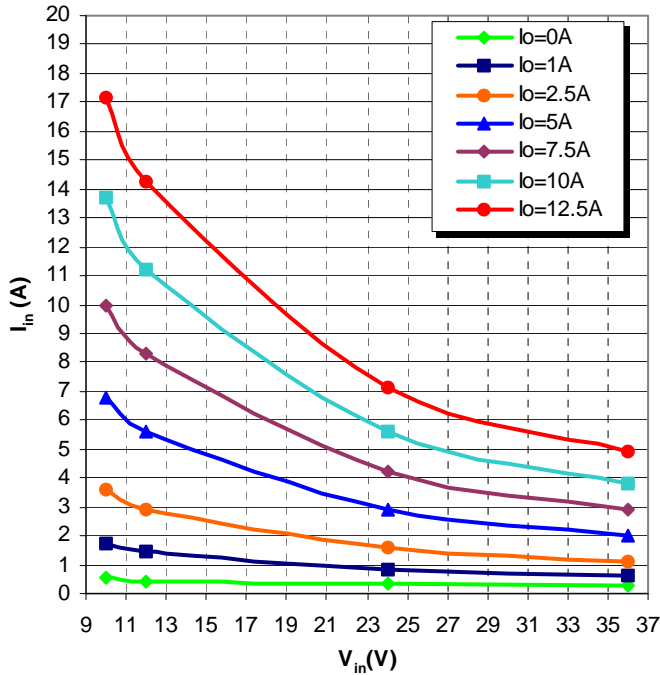
**Graph 1: CMLV12S12-150 Efficiency vs. Output Current**



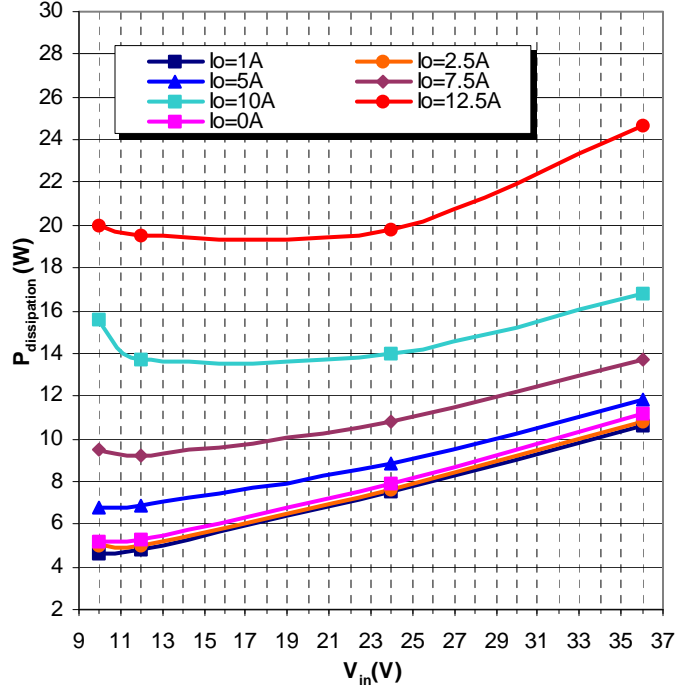
**Graph 2: CMLV12S12-150 Max Ambient vs. Io**



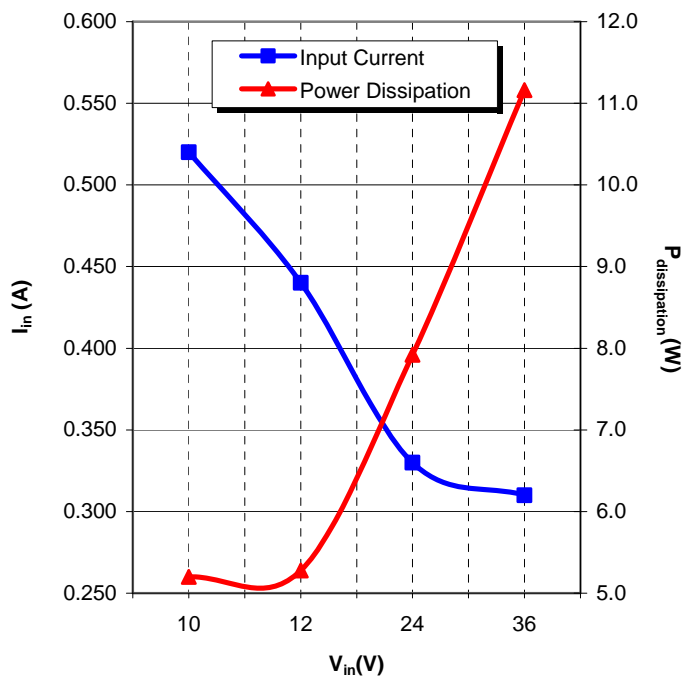
**Graph 3:** CMLV12S12-150 Input Current vs. Input Voltage



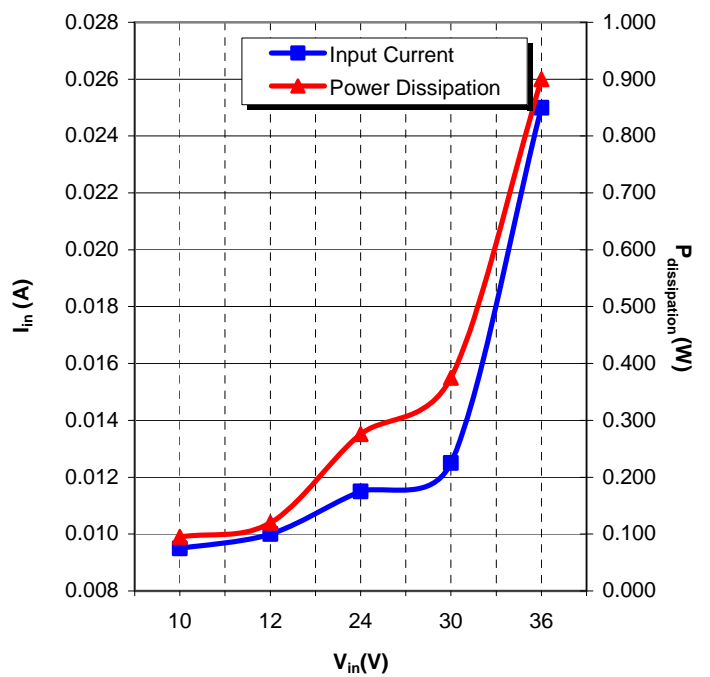
**Graph 4:** CMLV12S12-150 Power Dissipation vs. Input Voltage



**Graph 5:** CMLV12S12-150 Min Load Input Current and Power Dissipation vs. Input Voltage



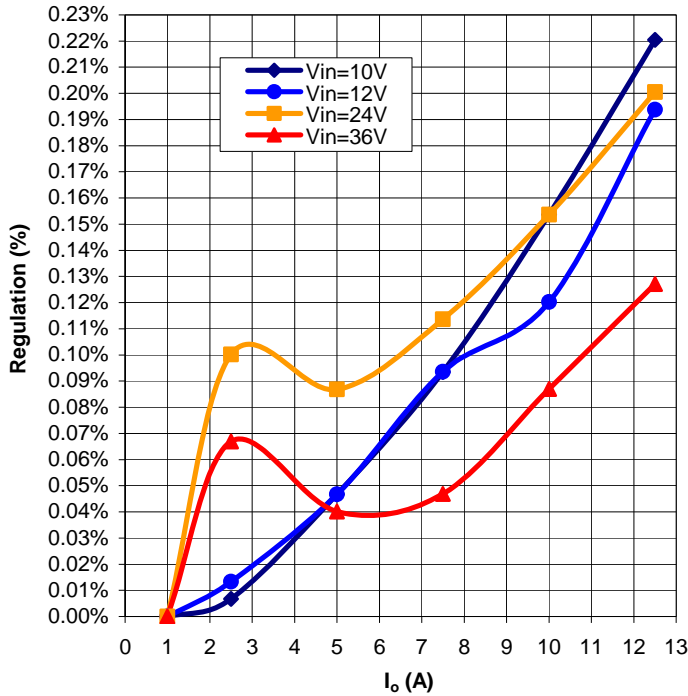
**Graph 6:** CMLV12S12-150 "Remote Off" Input Current and Power Dissipation vs. Input Voltage



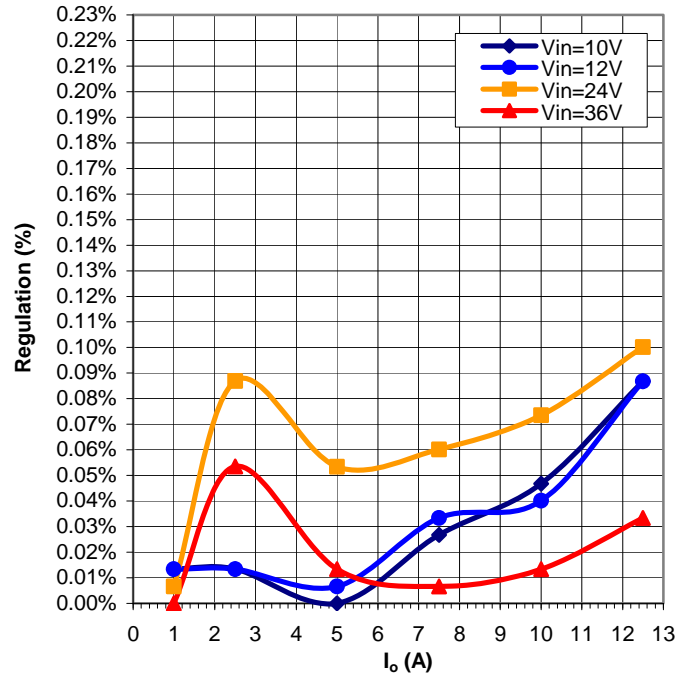
**Note:** Voltage measurements taken where the output pins are soldered into test board.



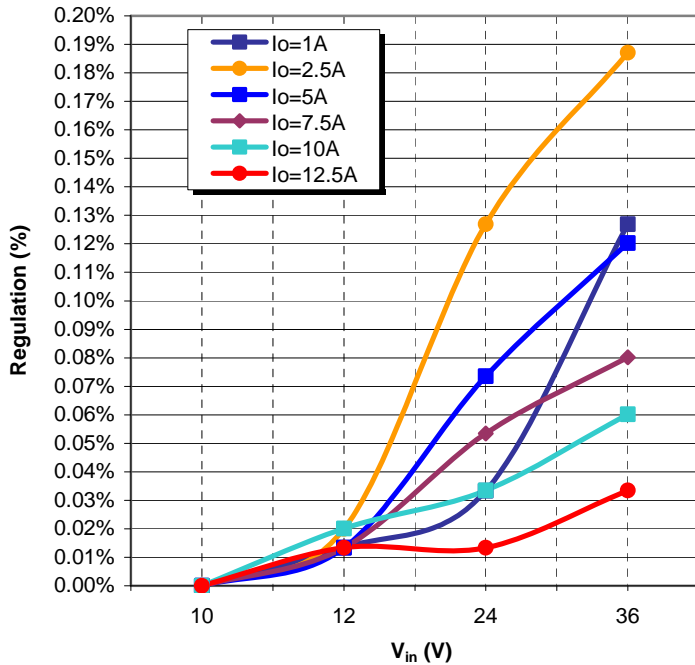
**Graph 7: CMLV12S12-150 Load Regulation ( $\pm$ RS Pins Open)**



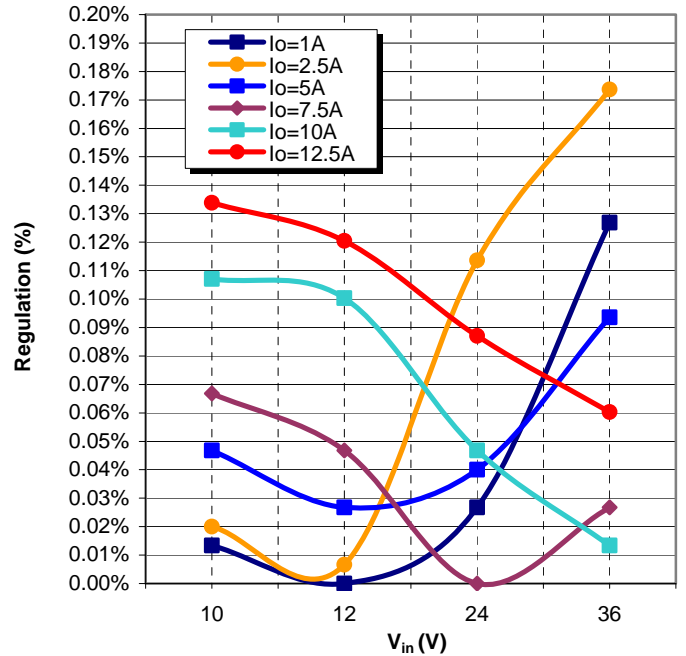
**Graph 8: CMLV12S12-150 Load Regulation ( $\pm$ RS to  $+V_o$ , -RS to  $-V_o$ )**



**Graph 9: CMLV12S12-150 Line Regulation ( $\pm$ RS to  $+V_o$ , -RS to  $-V_o$ )**



**Graph 10: CMLV12S12-150 Line Regulation ( $\pm$ RS Pins Open)**



**Note:** Voltage measurements taken where the output pins are soldered into test board.

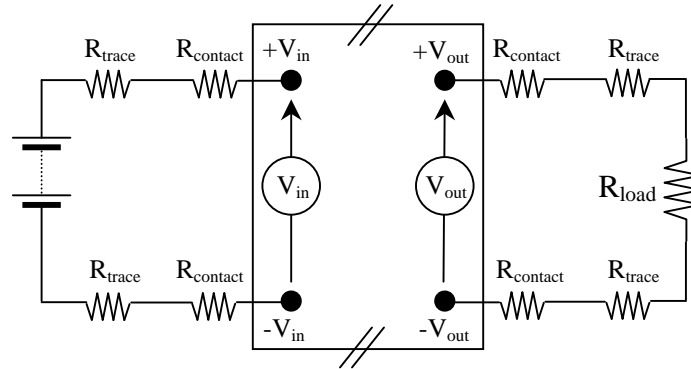
**TEST SETUP:**

The CMLV12S12-150 specifications are tested with the following configurations:

**Regulation and Efficiency Setup**

To ensure that accurate measurements are taken, the voltage measurements are taken directly at the terminal of the module. This minimizes errors due to contact and trace lengths between the load and the output of the supply. The following is a diagram of the test setup.

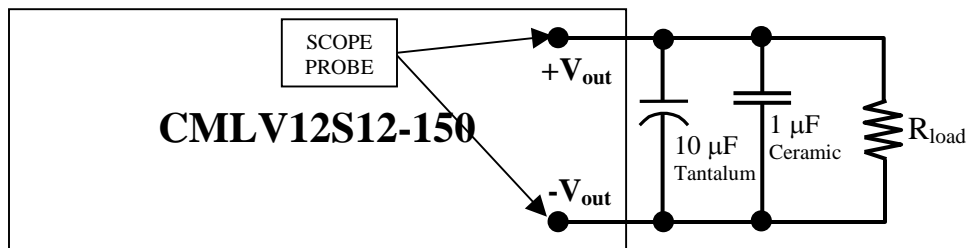
**Figure 6: Regulation and Efficiency Probe Setup**



**Output Ripple Voltage Setup**

The module is tested with a 1 $\mu$ F ceramic capacitor in parallel with a 10 $\mu$ F tantalum capacitor across the output terminals.

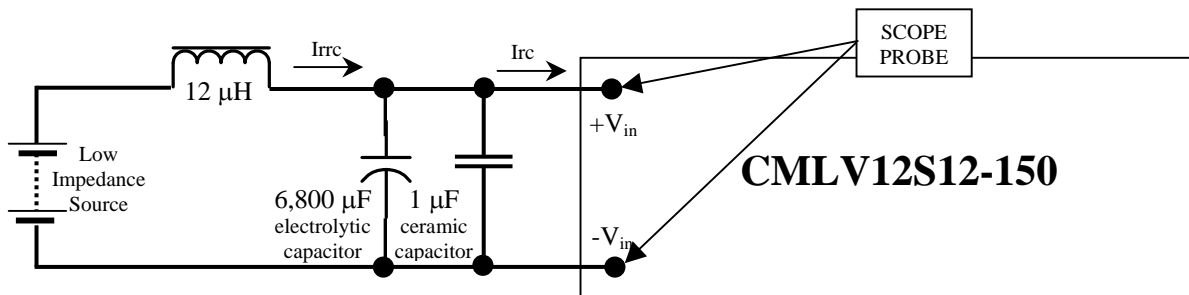
**Figure 7: Ripple Voltage Probe Setup**



**Input Reflected Ripple Current and Input Ripple Current Setup**

The module is tested for input reflected ripple current (I<sub>rrc</sub>) and input ripple current (I<sub>rc</sub>). The input ripple voltage is also measured at the pins with the following input filter. If there is a need to reduce input ripple current/voltage then additional ceramic capacitors can be added to the input of the converter.

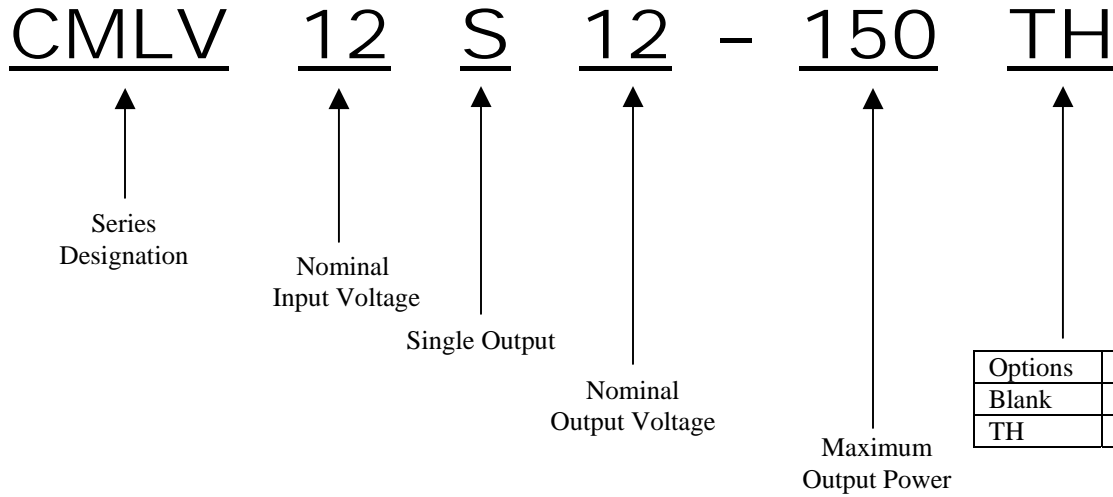
**Figure 8: Ripple Current Setup**





**Ordering Information**

Part Number Example:



**Company Information:**

Wall Industries, Inc. has created custom and modified units for over 40 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001-2000 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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