

CMLV12S12-150

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



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

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

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.

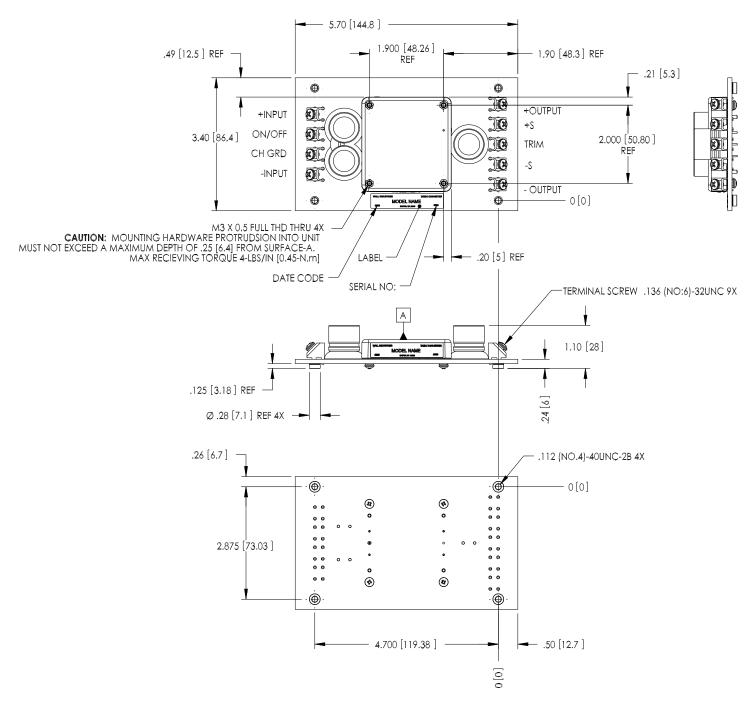
Rev. A

TECHNICAL DATASHEET CMLV12S12-150

Technical Specifications		Model No.	CMI	LV12S1	2-150
	°C, Nominal Input Voltage and Maximum Output Cu		rwise not	ed.	
We reserve the	right to change specifications based on technological	advances.			
SPECIFICATION	Related condition	Min	Nom	Max	Unit
Switching Frequency		-	350	-	kHz
INPUT (V _{in})					
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	100 G	-	225	-	mA
Input Surge Voltage	100 mS		0.0	50	Vdc
EFFICIENCY		- +	90	-	%
OUTPUT (V _o)		11.00		10.10	37.1
Voltage Set Point	$\pm RS$ shorted to $\pm Vo$	11.88	12.0	12.12	Vdc
•		-1%		+1%	%
Voltage Adjustment	Max Output limited to 150W	10.8 -10%	12.0	13.2 +10%	Vdc
Load Pagulation	±RS shorted to ±Vo		0.1		0/-
Load Regulation Line Regulation	±RS shorted to ±Vo ±RS shorted to ±Vo	-	0.1	0.2	% %
Temperature Drift	±RS shorted to ±vo	-	0.1	-	% / °C
Temperature Difft		-	0.2	13.2	Vdc
Remote Sense Compensation	Max Output limited to 150W	-		10%	%
Ripple	1μF Ceramic &10μF Tantalum	-	120	-	mV_{pk-pk}
Spikes	1μF Ceramic &10μF Tantalum	_	120	_	mV_{pk-pk}
Current	The comme corone running	0	-	12.5	А
	Power Limited-Dependent upon SENSE				
Current Limit	compensation and TRIM adjustment	-	16.2	-	Α
Over Voltage Limit	Output Clamped	-	-	-	Vdc
DYNAMIC RESPONSE	1μF Ceramic & 10μF Tantalum				
Load step / Δ V	50% to 100% Io, di/dt=1A/μS	-	300	-	mV
Recovery Time	Recovery to within 1% Nominal Vo	_	4	-	ms
Turn On Delay	From Vin(min) to Vout (nom)	-	14	-	ms
Turn On Overshoot	Full Load Resistive	-	0	-	%
Hold Up Time	From Vin (min) to V _{UVLO_Turn_Off}	0	-	-	mS
REMOTE ON/OFF	Active High				
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 _{ON/OFF} Sink to pull low – Active Low or High	V _{ON/OFF} =0V, Vin=36V	-	-	0.38	mA
I _{ON/OFF} Source to drive high – Active High	V _{ON/OFF} =5V, Vin=36V	-	-	0.03	mA
I _{ON/OFF} Source to drive high – Active Low	V _{ON/OFF} =5V, Vin=36V	-	-	-	mA
Turn On Delay – Active High	ON/OFF (max Low) to Vout (min)	-	9	-	ms
Turn Off Delay - Active High	ON/OFF (0V) to Vout (min)	-	160	-	μS
ISOLATION					
Input-Output	1 minute	-	1500	-	Vdc
Input-Case	1 minute	-	500	-	Vdc
Output-Case	1 minute	-	500	-	Vdc
THERMAL					
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
MECHANICAL			See Fi	gure 1	

Figure 1: Mechanical Dimensions

Unit inches [mm]



NOTES:

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

TO ORDER:

4. 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

DESIGN CONSIDERATIONS

Under Voltage Lock Out (UVLO)

The converter output is disabled until the input voltage exceeds the UVLO turn-on limit. The converter will remain ON until the input voltage falls below the UVLO turn-off limit.

Over Current Protection

The converter is protected from short circuit and over current conditions. During these fault conditions, the converter output will 'hiccup'. The converter output will recover once the short or over current fault is removed.

Over Temperature Protection (OTP)

The converter has internal thermal protection that will shut the converter OFF once the case temperature exceeds the OTP turn-off limit. The converter will resume operation when the case temperature has dropped below the OTP turn-on limit.

Output Filter

No additional output capacitor is needed for the power supply to operate. However, to reduce the ripple and noise on the output, additional capacitance may be added. A low ESR Ceramic capacitor may be added across the +Vo and –Vo pins to reduce the ripple and spike noise. Additional capacitance in the form of a tantalum or aluminum electrolytic may also be placed across these pins in order reduce ripple and improve the transient peak-to-peak voltage deviation.

Remote Sense

To improve the regulation at the load, route the connections from the -RS and the +RS pins to the -Vo and +Vo connections at the load. This will force the converter to regulate the voltage at the load and not at the pins of the converter (refer to Graph 8). If it is not desired to use the Remotes Sense feature, the -RS and +RS pins may be left open or they may be shorted to the -Vo and +Vo pins respectively. Shorting the RS pins to the Vo pins will reduce the voltage drops through the converter pins.

Remote ON/OFF

The converter has the ability to be remotely turned ON or OFF. The CMLV series is Active-High. Active-High means that a logic high at the ON/OFF pin will enable the supply (Figure 2). With Active-High, if the ON/OFF pin is left floating, the supply will be enabled.

VIN CMLV Series Converter

Figure 2: Active-High

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

The output is adjustable $\pm 10\%$ 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).

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

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

Figure 3: Trim Up

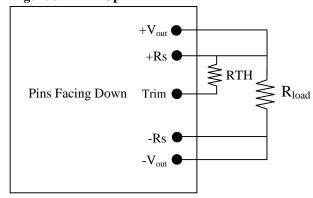


Figure 4: Trim Down

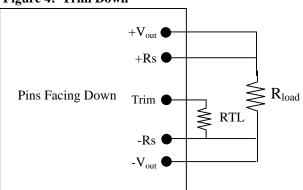


Table 2: Trim Equations for CMLV Series (5V, 12V, 15V, and 20V Models)

Vonom	U1	R1	Rlim	RTH to +Rs
12,000	2.500	5.11	5.11	RTL to -Rs

Percent	Trim Low		<u>Trim High</u>		
Trim	Vo	RTL	Vo	RTH	
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	

All in Kohms

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.

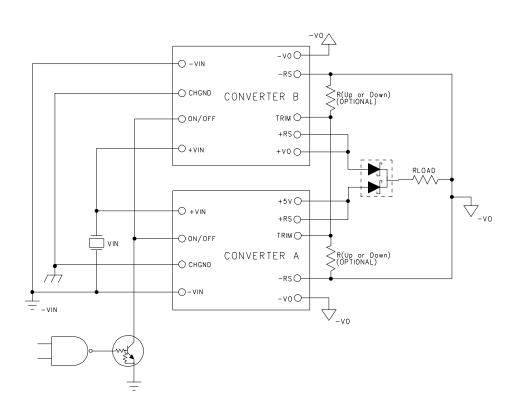
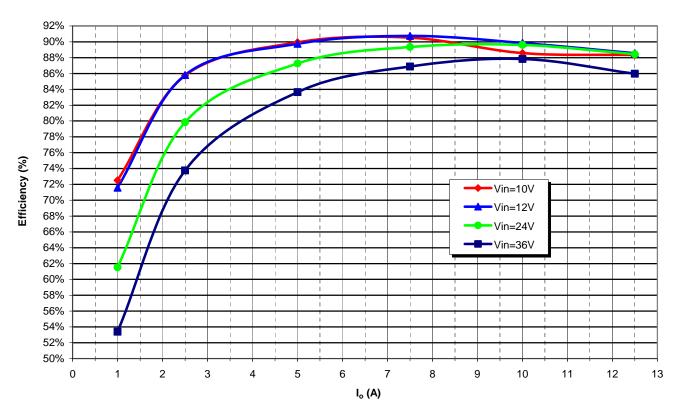
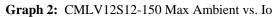
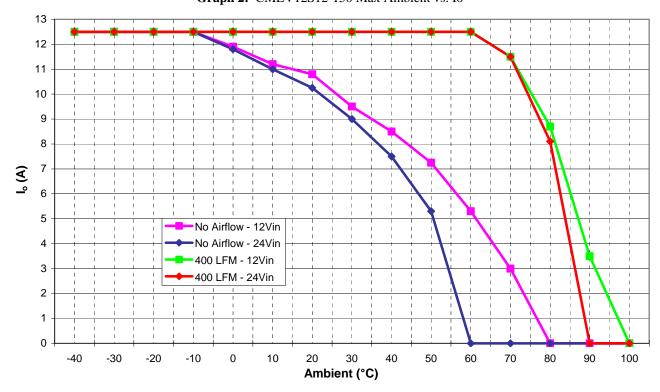


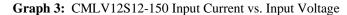
Figure 5: Paralleling Converters

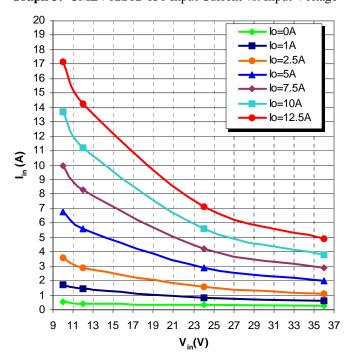


Graph 1: CMLV12S12-150 Efficiency vs. Output Current

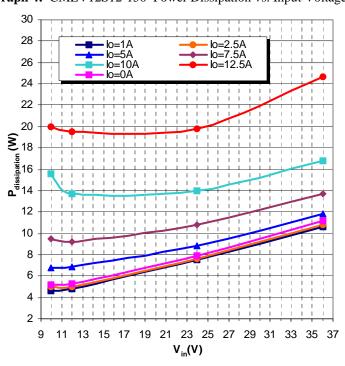




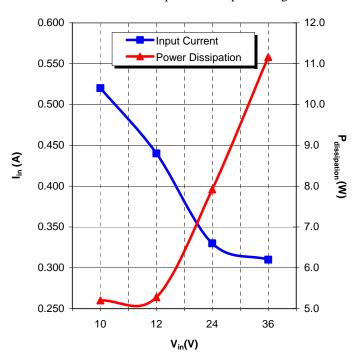




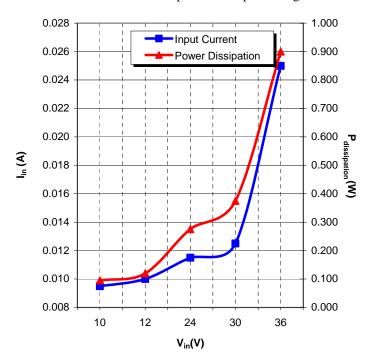
Graph 4: CMLV12S12-150 Power Dissipation vs. Input Voltage



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

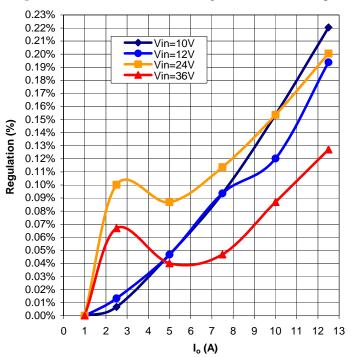


Graph 6: CMLV12S12-150 "Remote Off" Input Current and Power Dissipation vs. Input Voltage

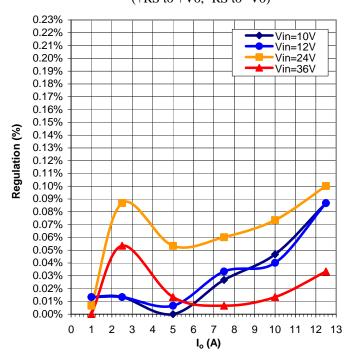


Note: Voltage measurements taken where the output pins are soldered into test board.

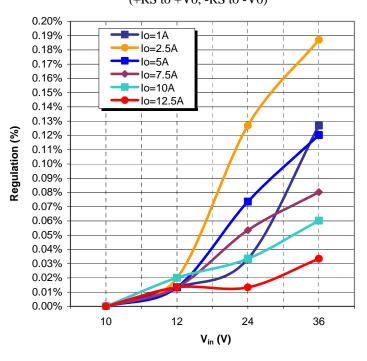
Graph 7: CMLV12S12-150 Load Regulation (±RS Pins Open)



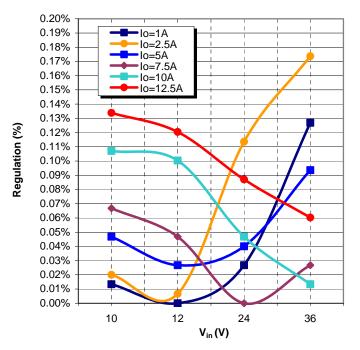
Graph 8: CMLV12S12-150 Load Regulation (+RS to +Vo, -RS to -Vo)



Graph 9: CMLV12S12-150 Line Regulation (+RS to +Vo, -RS to -Vo)



Graph 10: CMLV12S12-150 Line Regulation (±RS Pins Open)



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

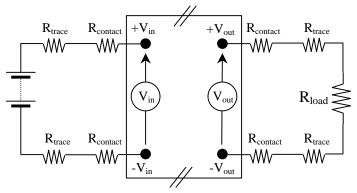
TEST SETUP:

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

Regulation and Efficiency Setup

To ensure that accurate measurement 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.

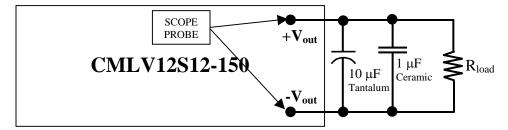
Figure 6: Regulation and Efficiency Probe Setup



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.

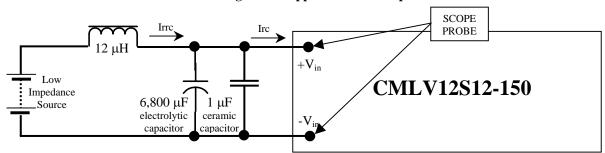
Figure 7: Ripple Voltage Probe Setup



Input Reflected Ripple Current and Input Ripple Current Setup

The module is tested for input reflected ripple current (Irrc) and input ripple current (Irc). 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



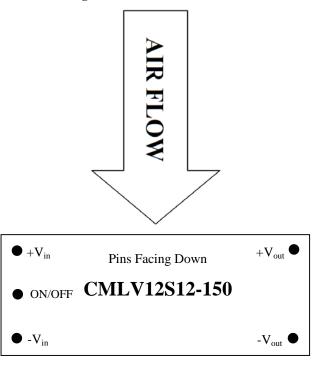
Rev. A

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Converter Thermal Consideration

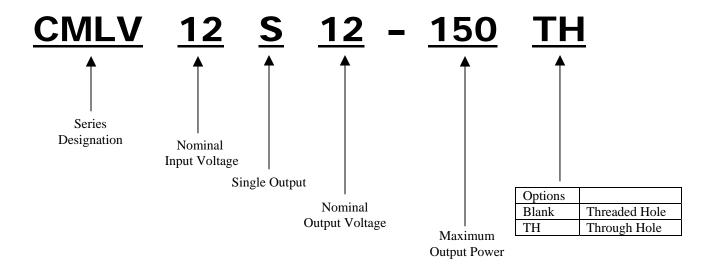
The converter is designed to operate without convective cooling if the derating curves are followed. The converter can operate at higher temperatures if airflow is applied. Airflow should be aligned lengthwise to the converter for optimum heat transfer. Contact Factory for derating curves.

Figure 9: Airflow Orientation



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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