



Size: 2.03in x 1.04in x 0.47in  
(51.5mm x 26.5mm x 12mm)

**FEATURES**

- Ultra-Wide 4:1 Input Voltage
- High Efficiency
- Reinforced Insulation, I/O Isolation Test Voltage: 5KVDC Rated for 250VAC Working Voltage
- Compact DIP Package
- Industry Standard Pin-Out
- Transformer Creepage Distance is 8mm, Transformer Clearance is 8mm
- No-Load Power Consumption as Low as 0.12W
- Leakage Current <5µA
- Input Under Voltage Protection
- Output Short Circuit, Over Current, and Over Voltage Protection
- RoHS Compliant
- Meets CISPR32/EN55032 Class A without extra Components
- EN62368-1, EN60601-1, and BS EN62368-1 Safety Approvals

**DESCRIPTION**

The DCMHPL20 series of DC/DC converters offers 20 watts of output power in a compact DIP package. This series consists of isolated and regulated single output models with ultra wide 4:1 input voltage. Each model features industry standard pin-out, reinforced insulation, and high efficiency. This series is also RoHS compliant and has EN62368-1, EN60601-1, and BS EN62368-1 approvals.

**MODEL SELECTION TABLE**

Model Number	Input Voltage		Output Voltage	Output Current		Max. Capacitive Load <sup>(1)</sup>	Typ. Efficiency @Full Load		Certification	Output Power
	Nominal (Range)	Max. <sup>(1)</sup>		Min.	Max.		Min.	Max.		
DCMHPL20-24S03	24VDC (9-36VDC)	40VDC	3.3VDC	0mA	5000mA	10000µF	83%	85%	EN/BS EN	20W
DCMHPL20-24S05			5VDC	0mA	4000mA	10000µF	84%	86%		
DCMHPL20-24S12			12VDC	0mA	1666mA	4700µF	84%	86%		
DCMHPL20-24S15			15VDC	0mA	1333mA	1600µF	85%	87%		
DCMHPL20-24S24			24VDC	0mA	833mA	470µF	87%	89%		
DCMHPL20-48S03	48VDC (18-75VDC)	80VDC	3.3VDC	0mA	5000mA	10000µF	84%	86%	EN/BS EN	20W
DCMHPL20-48S05			5VDC	0mA	4000mA	10000µF	85%	87%		
DCMHPL20-48S12			12VDC	0mA	1666mA	4700µF	85%	87%		
DCMHPL20-48S15			15VDC	0mA	1333mA	1600µF	86%	88%		
DCMHPL20-48S24			24VDC	0mA	833mA	470µF	87%	89%		

**SPECIFICATIONS**

All specifications are based on 25°C, Humidity <75%RH, Nominal Input Voltage, and Rated Output Load unless otherwise noted. We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
<b>INPUT SPECIFICATIONS</b>							
Input Voltage Range				See Table			
Input Current	No Load	24VDC Input	3.3V, 5V Output		40	50	mA
			Others		8	15	
	Full Load	48VDC Input	3.3V, 5V Output		20	30	mA
			Others		5	10	
Surge Voltage (1 Sec. Max.)	24VDC Input			-0.7		50	VDC
	48VDC Input			-0.7		100	
Input Filter				Pi Filter			
Reflected Ripple Current	24VDC Input				30		mA
	48VDC Input				30		
Hot Plug				Unavailable			
<b>OUTPUT SPECIFICATIONS</b>							
Output Voltage				See Table			
Voltage Accuracy					±1	±2	%
Linear Regulation	Input voltage variation from low to high at full load				±0.2	±0.5	%
Load Regulation <sup>(2)</sup>	5%-100% Load				±0.5	±1	%
Trim					±10		%Vo
Max. Capacitive Load				See Table			
Output Current				See Table			
Ripple & Noise <sup>(3)</sup>	20MHz Bandwidth	3.3V, 5V Output			100	200	mVp-p
		DCMHPL20-24S15, DCMHPL20-24S24, DCMHPL20-48S24			80	150	
		DCMHPL20-24S12, DCMHPL20-48S12, DCMHPL20-48S15			50	100	

**SPECIFICATIONS**

All specifications are based on 25°C, Humidity <75%RH, Nominal Input Voltage, and Rated Output Load unless otherwise noted.  
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS	Min	Typ	Max	Unit
<b>OUTPUT SPECIFICATIONS (CONT.)</b>					
Temperature Coefficient	Full Load			±0.03	%/°C
Start-Up Voltage	24VDC Input			9	VDC
	48VDC Input			18	
Transient Recovery Time	25% Load Step Change, Nominal Input Voltage		300	500	µs
Transient Response Deviation	25% Load Step Change, Nominal Input Voltage	3.3V, 5V Output	±5	±8	%
		Others	±3	±5	
<b>PROTECTION</b>					
Short Circuit Protection	Input Voltage Range	Continuous, Self-Recovery			
Over Current Protection	Input Voltage Range	110	180	260	%Io
Over Voltage Protection	Input Voltage Range	110		160	%Vo
Input Under-Voltage Protection	24VDC Input	5.5	6.5		VDC
	48VDC Input	12	15.5		
<b>CTRL<sup>(4)</sup></b>					
Module On		Ctrl Pin Open or Pulled High (3.5-12VDC)			
Module Off		Ctrl Pin Pulled Low to GND (0-1.2VDC)			
Input Current When Off			4	8	mA
<b>ENVIRONMENTAL SPECIFICATIONS</b>					
Operating Temperature	See Derating Curves	-40		85	°C
Storage Temperature		-55		125	°C
Pin Soldering Resistance Temperature	Wave Soldering (Soldering Time: 10s)			260	°C
	Soldering Spot is 1.5mm Away from Case for 10 Seconds			300	
Storage Humidity	Non-Condensing	5		95	%RH
Vibration		10-150Hz, 5G, 0.75mm along X, Y, and Z			
MTBF	MIL-HDBK-217F@25°C	1000			k hours
<b>GENERAL SPECIFICATIONS</b>					
Efficiency	@Full Load	See Table			
Switching Frequency <sup>(6)</sup>	PWM Mode (Nominal Input Voltage, Full Load)		280		kHz
Isolation	Input-Output Electric Strength Test for 1 minute with a Leakage Current of 1mA max.	5000			VAC
Patient Leakage Current	240VAC, 60Hz		3.6	5	µA
Insulation Resistance	Input-Output, Resistance at 500VDC	10000			MΩ
Isolation Capacitance	Input-Output Capacitance at 100KHz/0.1V		40		pF
Reinforced Insulation	Transformer Creepage	8			mm
	Transformer Clearance	8			
<b>PHYSICAL SPECIFICATIONS</b>					
Weight		0.95oz (27g)			
Dimensions (L x W x H)		2.03in x 1.04in x 0.47in (51.5mm x 26.5mm x 12mm)			
Case Material		Black Plastic; Flame-Retardant and Heat-Resistant (UL94-V0)			
Cooling Method		Free Air Convection			
<b>SAFETY CHARACTERISTICS</b>					
Safety Approval		EN62368-1, EN60601-1, BS EN62368-1			
Emissions	CE	DCMHPL20-24S12	CISPR32/EN55032	Class A (without extra components) Class B <sup>(7)</sup>	
		Others	CISPR32/EN55032	Class A (without extra components) Class B <sup>(9)</sup>	
	RE	DCMHPL20-24S12	CISPR32/EN55032	Class B (without extra components)	
		Others	CISPR32/EN55032	Class A (without extra components) Class B <sup>(9)</sup>	
Immunity	ESD	IEC/EN61000-4-2	Air ±15kV, Contact ±8kV		Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m		Perf. Criteria A
	EFT	IEC/EN61000-4-4	100kHz ±2kV <sup>(8)</sup>		Perf. Criteria B
	Surge	IEC/EN61000-4-5	Line to Line ±2kV <sup>(8)</sup>		Perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s		Perf. Criteria A
	PFM	IEC/EN61000-4-8	30A/m, Continuous		Perf. Criteria A

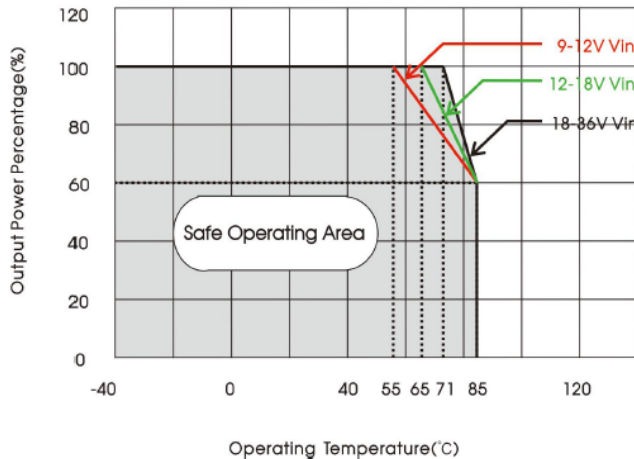
**NOTES**

1. Exceeding the maximum input voltage may cause permanent damage.
2. Load regulations for 0%-100% load is  $\pm 5\%$  max.
3. Ripple & Noise of 3.3VDC/5VD output converter for 0%-5% load is  $\pm 10\%$  max; Ripple & Noise of other output converter for 0%-5% load is  $5\%V_o$  max. The "parallel cable" method is used for Ripple and Noise test, please contact factory for more information.
4. The Ctrl pin voltage is referenced to input GND.
5. It is required to connect an external 270uF electrolytic capacitor for 3.3V output voltage model.
6. Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.
7. See Fig. 2 for recommended circuit.
8. See Fig. 3-① for recommended circuit.
9. See Fig. 3-② for recommended circuit.
10. Maximum capacitive load offered were tested at input voltage range and full load.
11. Product customization is available. Contact factory for more information.
12. Products should be classified according to ISO14001 and related environmental laws and regulations and should be handled by qualified units.

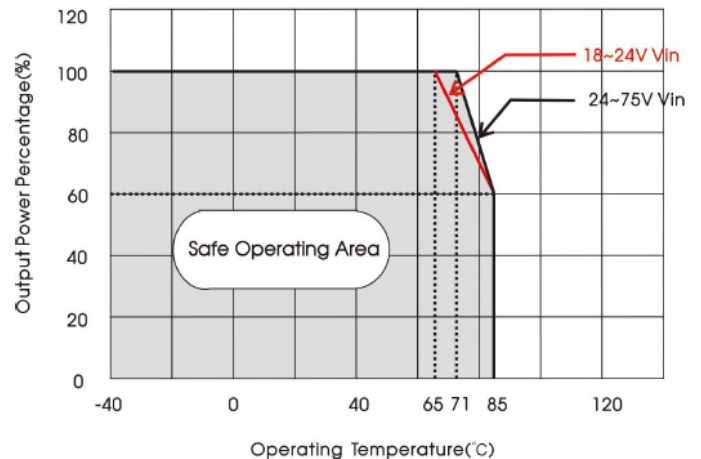
*\*Due to advances in technology, specifications subject to change without notice.*

**CHARACTERISTIC CURVES**

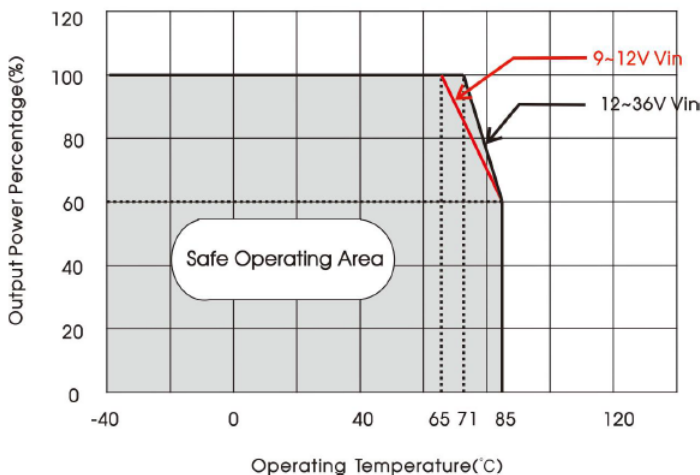
DCMHPL20-24S03, DCMHPL20-24S05 Temperature Derating Curve



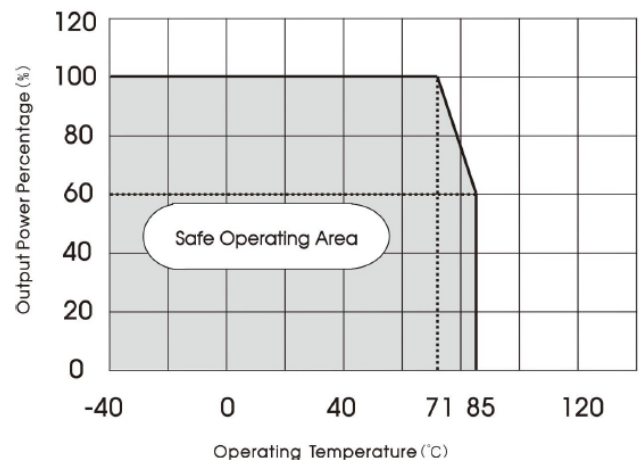
DCMHPL20-48S03, DCMHPL20-48S05 Temperature Derating Curve



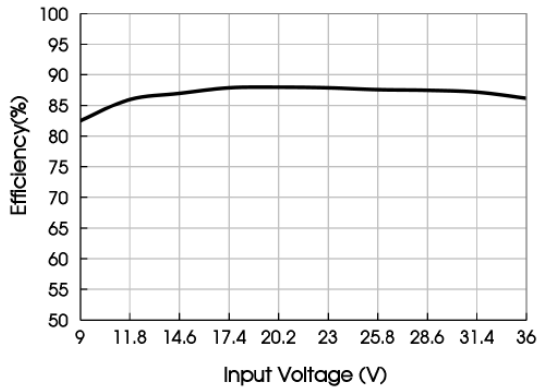
DCMHPL20-24S12, DCMHPL20-24S15 Temperature Derating Curve



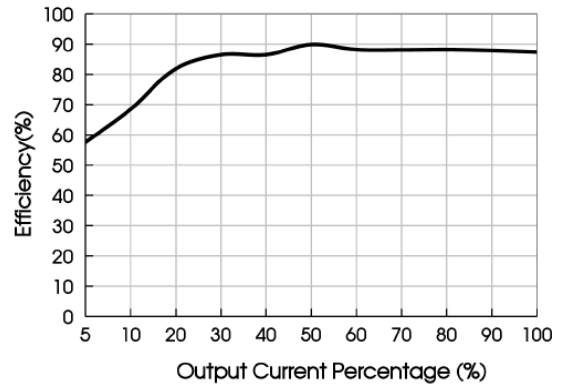
DCMHPL20-24S24, DCMHPL20-48S12, DCMHPL20-48S15, DCMHPL20-48S24 Temperature Derating Curve



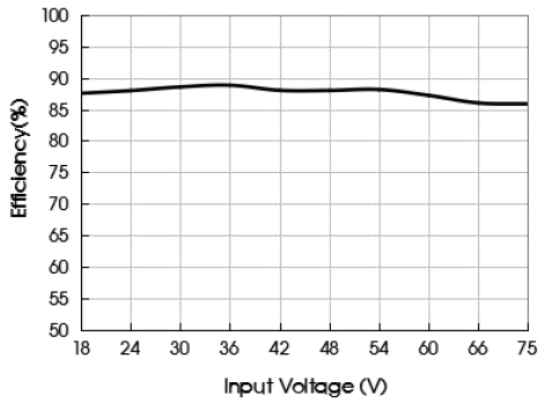
Efficiency vs Input Voltage (Full Load) DCMHPL20-24S05



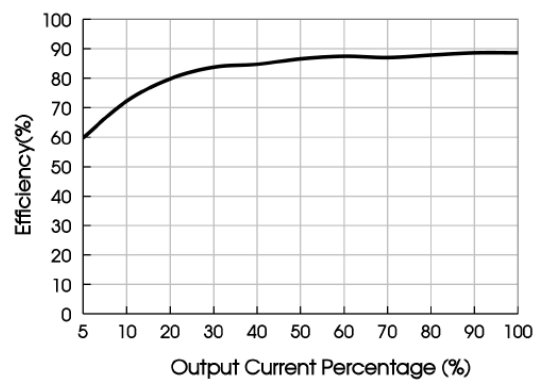
Efficiency vs Output Load (Vin=24V) DCMHPL20-24S05



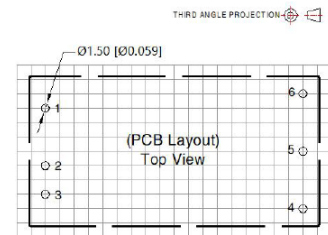
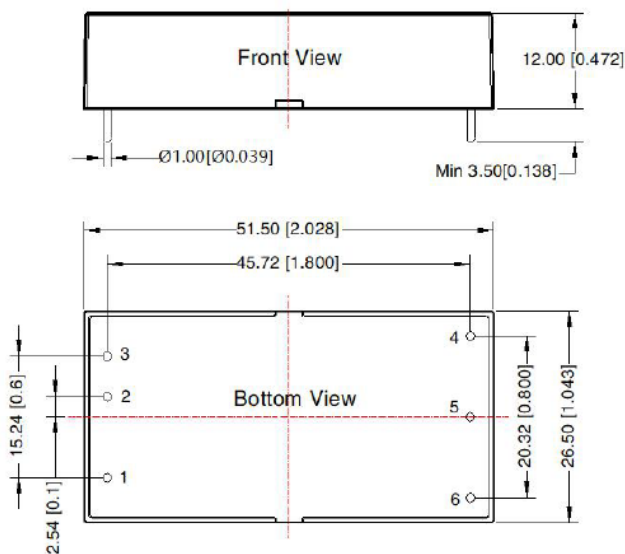
Efficiency vs Input Voltage (Full Load) DCMHPL20-48S24



Efficiency vs Output Load (Vin=48V) DCMHPL20-48S24



**MECHANICAL DRAWINGS**



Note: Grid 2.54\*2.54mm  
Pin Out

Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:  
Unit: mm [inch]  
Pin Diameter Tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]  
General Tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

DESIGN REFERENCE

1. Typical Application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 1. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values  $C_{in}$  and  $C_{out}$  and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load of the product.

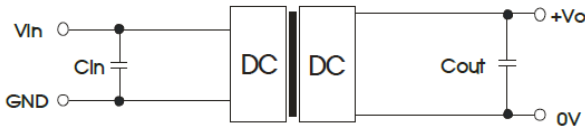


Fig. 1

Vin (VDC)	Vout (VDC)	Cin	Cout
24	3.3	100µF/50VDC	270µF/16VDC
	5		10µF/16VDC
	12/15		10µF/25VDC
	24		10µF/50VDC
48	3.3	10~47µF/100VDC	270µF/16VDC
	5		10µF/16VDC
	12/15		10µF/25VDC
	24		10µF/50VDC

2. EMC Compliance Circuit

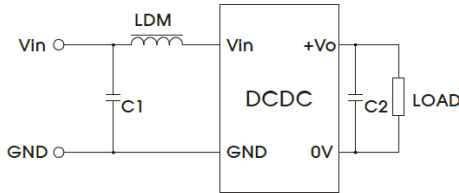


Fig. 2

Parameter Description	
Model	DCMHPL20-24S12
C1	10µF/50V
C2	Refer to Cout in Fig. 1
LDM	4.7µH

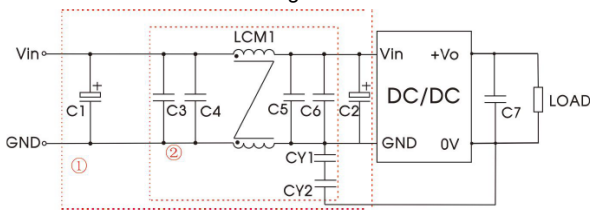
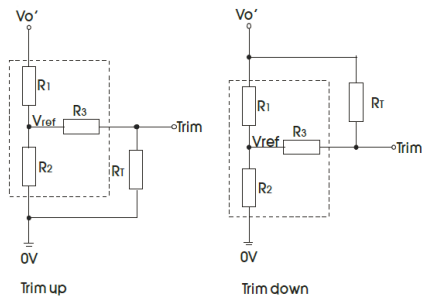


Fig. 3

Parameter Description		
Model	Vin: 24VDC	Vin: 48VDC
C1/C2	680µF/50V	330µF/100V
C3/C4	10uF/50V	10uF/100V
C5/C6		
C7	Refer to Cout in Fig. 1	
LCM1	2.2mH	
CY1/CY2	Y1: 47pF/400VAC (12V/15V/24V Output Not Needed)	

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and Part ② for emissions test. Select based on needs.

3. Trim Function for Output Voltage Adjustment (Open if Unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim Resistor Values:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

$R_T$  = Trim Resistor value;  
 $\alpha$  = self-defined parameter.

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.772	2.87	10	1.25
5	2.883	2.87	8.2	2.5
12	10.909	2.87	15	2.5
15	14.354	2.87	15	2.5
24	24.771	2.87	17.4	2.5

4. Products do not support parallel connection of their output.

---

**COMPANY INFORMATION**

---

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 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:

Phone: ☎ (603)778-2300  
Toll Free: ☎ (888)597-9255  
Fax: ☎ (603)778-9797  
E-mail: [sales@wallindustries.com](mailto:sales@wallindustries.com)  
Web: [www.wallindustries.com](http://www.wallindustries.com)  
Address: 37 Industrial Drive  
Exeter, NH 03833

©2022 Wall Industries, Inc. Specifications subject to change without notice. Wall Industries is not responsible for typographical errors. The information contained herein is for informational purposes only. This information is provided by Wall Industries and we make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the information contained in this document for any purpose. All product and manufacturer names are trademarks or registered trademarks of their respective companies.