Size: 2in x 1in x 0.47in (50.8mm x 25.4mm x 12mm)

FEATURES

- Wide 2:1 Input Voltage Range
- Fully Regulated Output Voltage
- Low Leakage Current
- No Minimum Load Requirement
- I/O Isolation of 4200VAC
- 3 Year Warranty
- RoHS & REACH Compliant
- Over Load, Over Voltage, and Short Circuit Protection
- ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1 and IEC/EN 60601-1 3rd Edition 2xMOPP Safety Standards

DESCRIPTION

The DCMRH15 series of medical DC/DC converters offers up to 15 watts of output power in a very compact 2" x 1" x 0.47" package. This series consists of fully regulated single and dual output models with a wide 2:1 input voltage range. Each model in this series features low leakage current, no minimum load requirement, I/O isolation of 4200VAC, as well as protection against over load, over voltage, and short circuit conditions. This series is RoHS and REACH compliant and it also has ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1 and IEC/EN 60601-1 3rd edition 2xMOPP safety standards.

MODEL SELECTION TABLE

Single Output Models

Model Number	Input Voltage Range	Output Voltage	Output Current	Input Current		Ripple & Noise	Maximum Capacitive Load	Efficiency	Output Power
				No Load	Max. Load				
DCMRH15-12S05	12VDC (9~18VDC)	5VDC	3000mA	20mA	1453mA	50mVp-p	5100µF	86%	15W
DCMRH15-12S051		5.1VDC	3000mA		1483mA	50mVp-p	5100µF	86%	
DCMRH15-12S12		12VDC	1250mA		1404mA	100mVp-p	870µF	89%	
DCMRH15-12S15		15VDC	1000mA		1420mA	100mVp-p	560µF	88%	
DCMRH15-12S24		24VDC	625mA		1420mA	150mVp-p	220µF	88%	
DCMRH15-24S05	24VDC (18~36VDC)	5VDC	3000mA	15mA	710mA	50mVp-p	5100µF	88%	15W
DCMRH15-24S051		5.1VDC	3000mA		724mA	50mVp-p	5100µF	88%	
DCMRH15-24S12		12VDC	1250mA		702mA	100mVp-p	870µF	89%	
DCMRH15-24S15		15VDC	1000mA		702mA	100mVp-p	560µF	89%	
DCMRH15-24S24		24VDC	625mA		694mA	150mVp-p	220µF	90%	
DCMRH15-48S05	48VDC (36~75VDC)	5VDC	3000mA	10mA	355mA	50mVp-p	5100µF	88%	15W
DCMRH15-48S051		5.1VDC	3000mA		362mA	50mVp-p	5100µF	88%	
DCMRH15-48S12		12VDC	1250mA		355mA	100mVp-p	870µF	88%	
DCMRH15-48S15		15VDC	1000mA		347mA	100mVp-p	560µF	90%	
DCMRH15-48S24		24VDC	625mA		351mA	150mVp-p	220µF	89%	

MODEL SELECTION TABLE

Dual Output Models

Model Number	Input Voltage Range	Output Voltage	Output Current	Input Current		Ripple & Noise	Maximum Capacitive Load(1)	Efficiency	Output Power
				No Load	Max. Load				
DCMRH15-12D12	12VDC (9~18VDC)	±12VDC	±625mA	20mA	1420mA	100mVp-p	440#µF	88%	15W
DCMRH15-12D15		±15VDC	±500mA		1404mA	100mVp-p	280#µF	89%	
DCMRH15-24D12	24VDC (18~36VDC)	±12VDC	±625mA	15mA	694mA	100mVp-p	440#µF	90%	15W
DCMRH15-24D15		±15VDC	±500mA		702mA	100mVp-p	280#µF	89%	
DCMRH15-48D12	48VDC (36~75VDC)	±12VDC	±625mA	10mA	351mA	100mVp-p	440#µF	89%	15W
DCMRH15-48D15		±15VDC	±500mA		355mA	100mVp-p	280#µF	88%	

SPECIFICATIONS

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

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range	12VDC Nominal Input Models		9	12	18	VDC
	24VDC Nominal Input Models		18	24	36	
	48VDC Nominal Input Models		36	48	75	
Input Surge Voltage	100mS max.	12VDC Nominal Input Models	-0.7		25	VDC
		24VDC Nominal Input Models	-0.7		50	
		48VDC Nominal Input Models	-0.7		100	
Start-Up Threshold Voltage	12VDC Nominal Input Models				9	VDC
	24VDC Nominal Input Models				18	
	48VDC Nominal Input Models				36	
Under Voltage Shutdown	12VDC Nominal Input Models			75		VDC
	24VDC Nominal Input Models			15		
	48VDC Nominal Input Models			33		
Input Filter	All Models			Internal Pi Type		
OUTPUT SPECIFICATIONS						
Output Voltage				See Table		
Voltage Setting Accuracy					±1.0	%Vnom.
Line Regulation	Vin =Min. to Max. @Full Load				±0.5	%
Load Regulation	Io=0% to 100%	Single Output			±0.5	%
		Dual Output			±1.0	
Voltage Balance	Dual Output, Balanced Loads				±2.0	%
Output Power				See Table		
Output Current				See Table		
Minimum Load				No Minimum Load Requirement		
Maximum Capacitive Load				See Table		
Ripple & Noise	0-20MHz bandwidth, Measured with a MLCC: 4.7µF			See Table		
Reflected Ripple Current	12VDC Nominal Input Models			100		mA
	24VDC Nominal Input Models			50		
	48VDC Nominal Input Models			30		
Transient Recovery Time[2]	25% Load Step Change				300	µsec
Transient Response Deviation[2]	25% Load Step Change			±3	±5	%
Temperature Coefficient					±0.02	%/ºC
Start Up Time (Power On)	Nominal Vin and Constant Resistive Load				30	ms
PROTECTION						
Short Circuit Protection	Hiccup Mode 0.7Hz typ.			Automatic Recovery		
Over Load Protection	Hiccup			150		%
Over Voltage Protection	5VDC & 5.1VDC Output Models			6.2		VDC
	12VDC Output Models			15		
	15VDC Output Models			18		
	24VDC Output Models			27		
	±12VDC Output Models			±15		
	±15VDC Output Models			±18		
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	Natural Convection[3], Nominal Vin, Load 100% Inom	DCMRH15-24S24, DCMRH15-24D12, & DCMRH15-48S15	-40		73	ºC
		DCMRH15-12S12, DCMRH15-12D15, DCMRH15-24S12, DCMRH15-24S15, DCMRH15-24D15, DCMRH15-48S24, & DCMRH15-48D12	-40		70	
		DCMRH15-12S15, DCMRH15-12S24, DCMRH15-12D12, DCMRH15-24S05, DCMRH15-24S051, DCMRH15-48S05, DCMRH15-48S051, DCMRH15-48S12, & DCMRH15-48D15	-40		67	
		DCMRH15-12S05 & DCMRH15-12S051	-40		62	
Storage Temperature			-50		+125	ºC
Thermal Impedance	Natural Convection		13			ºC/W
Case Temperature					95	ºC
Humidity	Non Condensing				95	%RH
Altitude					4000	M
Lead Temperature	1.5mm from case for 10Sec		260			ºC
MTBF	Calculated, MIL-HDBK-217F, 25ºC, Ground Benign		1,428,181			Hours

SPECIFICATIONS

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

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
GENERAL SPECIFICATIONS						
Efficiency			See Table			
Switching Frequency				285		KHz
I/O Isolation Voltage	60 Seconds, Reinforced insulation, rated for 300Vrms working voltage		4200			VACrms
I/O Isolation Resistance	500VDC		10			GΩ
I/O Isolation Capacitance	100KHz, 1V				80	pF
Leakage Current	240VAC, 60Hz				5	µA
PHYSICAL SPECIFICATIONS						
Weight			1.06oz (30g)			
Dimensions (L x W x H)			2in x 1in x 0.47in (50.8mm x 25.4mm x 12mm)			
Case Material			Non-Conductive Black Plastic (Flammability to UL 94V-0 rated)			
Pin Material			Tinned Copper			
Cooling			Natural Convection			
SAFETY CHARACTERISTICS						
Safety Standards	ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1 IEC/EN 60601-1 3rd Edition 2xMOPP					
Safety Approvals (Pending)	ANSI/AAMI ES6060-1-1 2xMOPP recognition (UL Certificate) IEC/EN 60601-1 3rd Edition (CB Report)					
EMI	Conduction & Radiation	EN55011, FCC Part 15	Performance: Class A			
EMS	EN6060-1-1-2 4th					
	ESD	EN61000-4-2 Air ±15kV, Contact ±8kV	Performance: A			
	Radiated Immunity	EN61000-4-3 10V/m	Performance: A			
	Fast Transient(4)	EN61000-4-4 ±2kV	Performance: A			
	Surge(4)	EN61000-4-5 ±1kV	Performance: A			
	Conducted Immunity	EN61000-4-6 10Vrms	Performance: A			
	PFMF	EN61000-4-8 30A/m	Performance: A			

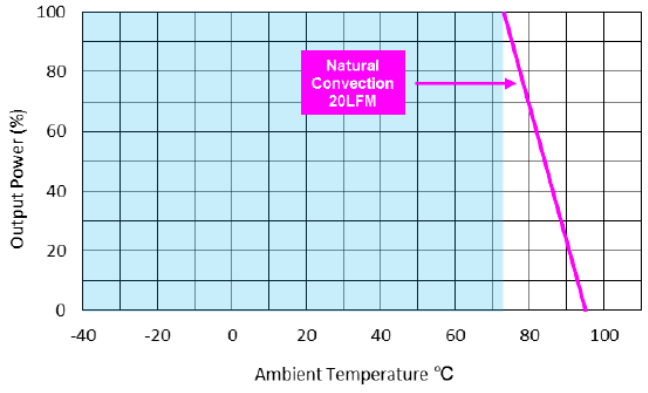
NOTES

1. Maximum Capacitive Load: # for each output
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Natural convection is about 20LFM but is not equal to still air (0 LFM).
4. To meet EN61000-4-4 & EN61000-4-5 and external capacitor across the input pins is required. Suggested capacitor: 330µF/100V
5. It is recommended to protect the converter by a slow blow fuse in the input supply line.
6. Other input and output voltages may be available, please contact factory.

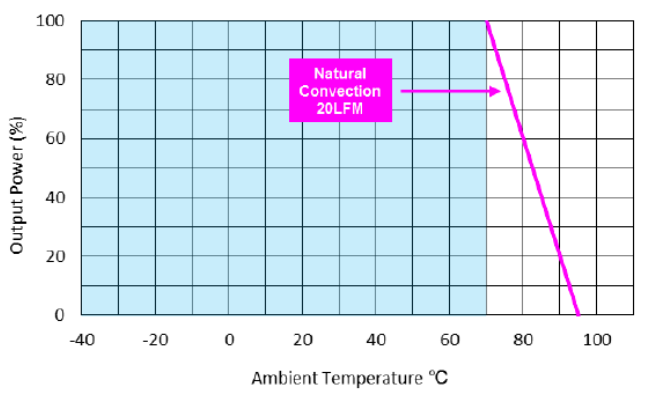
**Due to advances in technology, specifications subject to change without notice.*

POWER DERATING CURVES

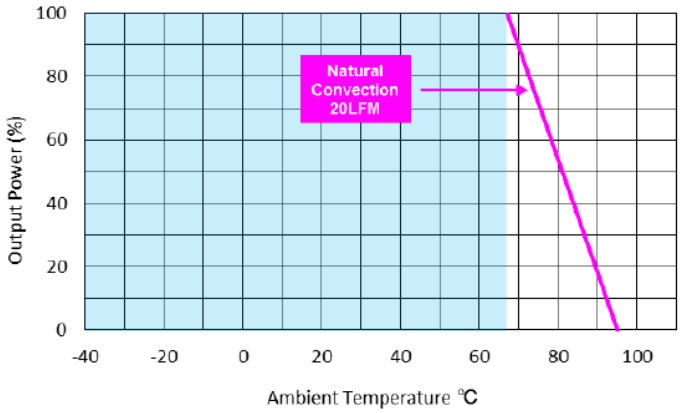
DCMRH15-24S24, DCMRH15-24D12, & DCMRH15-48S15



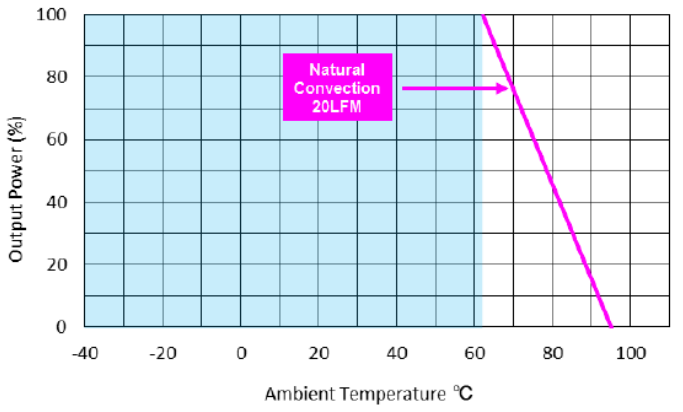
DCMRH15-12S12, DCMRH15-12D15, DCMRH15-24S12, DCMRH15-24S15, DCMRH15-24D15, DCMRH15-48S24, & DCMRH15-48D12



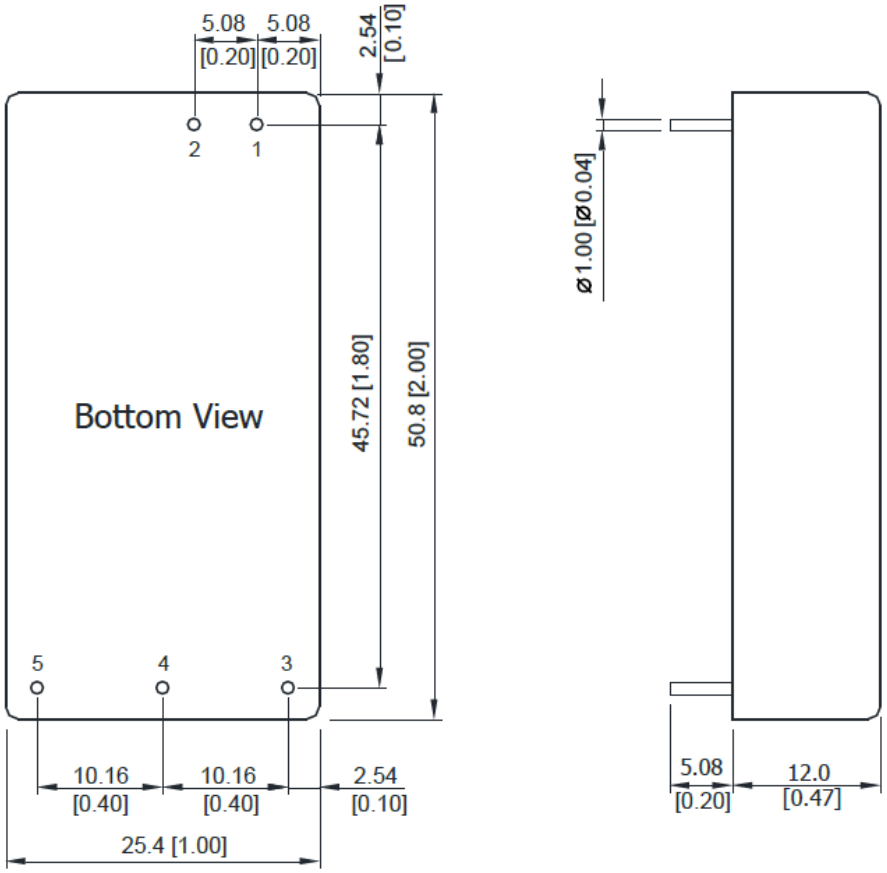
DCMRH15-12S15, DCMRH15-12S24, DCMRH15-12D12, DCMRH15-24S05, DCMRH15-24S051, DCMRH15-48S05, DCMRH48S051, DCMRH15-48S12, & DCMRH15-48D15



DCMRH15-12S05, DCMRH15-12S051



MECHANICAL DRAWINGS



Pin Connections

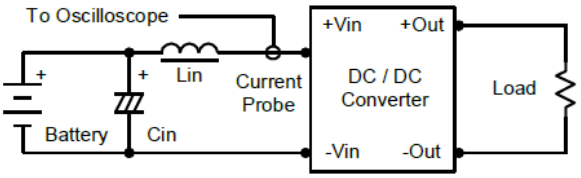
Pin	Single Output	Dual Output
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No Pin	Common
5	-Vout	-Vout

Notes:
All dimensions in mm (inches)
Tolerance: X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.01)
Pin Diameter Ø 1.0 ±0.05 (0.04±0.002)

TEST SETUP

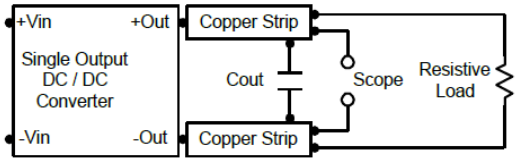
Input Reflected-Ripple Current Test Setup

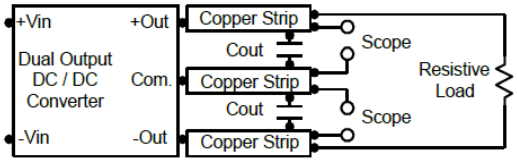
Input reflected-ripple current is measured with an inductor Lin (4.7µH) and Cin (220µF, ESR <1.0Ω at 100KHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500Khz.



Peak-to-Peak Output Noise Measurement Test

Use a Cout 4.7µF ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20MHz. Position the load between 50mm and 75mm from the DC/DC Converter.





TECHNICAL NOTES

Over Load Protection

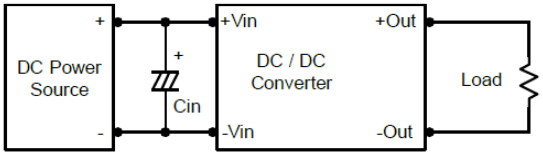
To provide hiccup model protection in a fault (output over load) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration.

Over Voltage Protection

The output over voltage clamp consists of control circuitry, which is independent of the primary regulation loop that monitors the voltage on the output terminals. The control loop of the clamp has a higher voltage set point than the primary loop. This provides a redundant voltage control that reduces the risk of output over voltage. The OVP level can be found in data sheet.

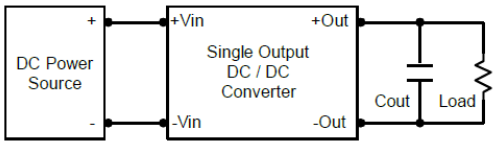
Input Source Impedance

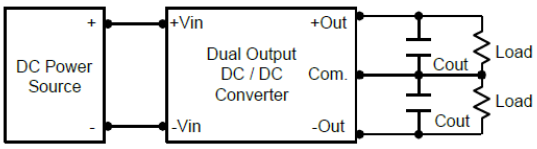
The power module should be connected to a low ac-impedance source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor on the input to ensure startup. By using a good quality low Equivalent Series Resistance (ESR <1.0 at 100kHz) capacitor of 10µF for 12V input devices, a 4.7µF for 24V input devices, and a 2.2µF for the 48V devices, capacitor mounted close to the power module helps ensure stability of the unit.



Output Ripple Reduction

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 4.7µF capacitors at the output.



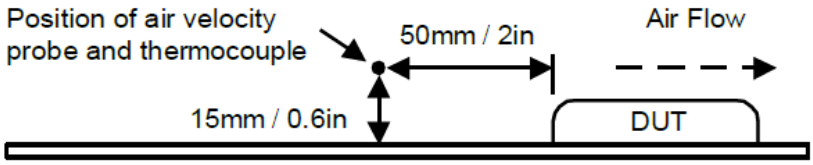


Maximum Capacitive Load

THE DCMRH15 series has limitation of maximum connected capacitance on the output. The power module may operate in current limiting mode during start-up, affecting the ramp-up and the startup time. Connect capacitors at the point of load for best performance. The maximum capacitance can be found in the data sheet.

Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module, and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 95ºC. The derating curves are determined from measurements obtained in a test setup.



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 ISO9001-2008 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.

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