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 DCMRH20 series of medical DC/DC converters offers up to 20 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				
DCMRH20-12S05	12VDC (9~18VDC)	5VDC	4000mA	20mA	1938mA	50mVp-p	6800µF	86%	20W
DCMRH20-12S051		5.1VDC	4000mA		1977mA	50mVp-p	6800µF	86%	
DCMRH20-12S12		12VDC	1670mA		1876mA	100mVp-p	1160µF	89%	
DCMRH20-12S15		15VDC	1333mA		1893mA	100mVp-p	750µF	88%	
DCMRH20-12S24		24VDC	840mA		1888mA	150mVp-p	295µF	89%	
DCMRH20-24S05	24VDC (18~36VDC)	5VDC	4000mA	15mA	947mA	50mVp-p	6800µF	88%	20W
DCMRH20-24S051		5.1VDC	4000mA		966mA	50mVp-p	6800µF	88%	
DCMRH20-24S12		12VDC	1670mA		938mA	100mVp-p	1160µF	89%	
DCMRH20-24S15		15VDC	1333mA		936mA	100mVp-p	750µF	89%	
DCMRH20-24S24		24VDC	840mA		933mA	150mVp-p	295µF	90%	
DCMRH20-48S05	48VDC (36~75VDC)	5VDC	4000mA	10mA	473mA	50mVp-p	6800µF	88%	20W
DCMRH20-48S051		5.1VDC	4000mA		483mA	50mVp-p	6800µF	88%	
DCMRH20-48S12		12VDC	1670mA		469mA	100mVp-p	1160µF	89%	
DCMRH20-48S15		15VDC	1333mA		463mA	100mVp-p	750µF	90%	
DCMRH20-48S24		24VDC	840mA		472mA	150mVp-p	295µF	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				
DCMRH20-12D12	12VDC (9~18VDC)	±12VDC	±840mA	20mA	1888mA	100mVp-p	590#µF	88%	20W
DCMRH20-12D15		±15VDC	±670mA		1880mA	100mVp-p	280#µF	89%	
DCMRH20-24D12	24VDC (18~36VDC)	±12VDC	±840mA	15mA	933mA	100mVp-p	440#µF	90%	20W
DCMRH20-24D15		±15VDC	±670mA		931mA	100mVp-p	280#µF	90%	
DCMRH20-48D12	48VDC (36~75VDC)	±12VDC	±840mA	10mA	472mA	100mVp-p	440#µF	89%	20W
DCMRH20-48D15		±15VDC	±670mA		465mA	100mVp-p	280#µF	90%	

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 Voltage Models		9	12	18	VDC
	24VDC Nominal Input Voltage Models		18	24	36	
	48VDC Nominal Input Voltage Models		36	48	75	
Input Surge Voltage	100ms Max.	12VDC Nominal Input Voltage Models	-0.7		25	VDC
		24VDC Nominal Input Voltage Models	-0.7		50	
		48VDC Nominal Input Voltage Models	-0.7		100	
Start-up Threshold Voltage	12VDC Nominal Input Voltage Models				9	VDC
	24VDC Nominal Input Voltage Models				18	
	48VDC Nominal Input Voltage Models				36	
Under Voltage Shutdown	12VDC Nominal Input Voltage Models			7.5		VDC
	24VDC Nominal Input Voltage Models			15		
	48VDC Nominal Input Voltage Models			33		
Input Filter				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		
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
Reflected Ripple Current	12VDC Nominal Input Voltage Models			100		mA
	24VDC Nominal Input Voltage Models			50		
	48VDC Nominal Input Voltage Models			30		
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, Nominal Vin, Load 100% Inom.	DCMRH20-24S24, DCMRH20-24D12, DCMRH20-24D15, DCMRH20-48S15, & DCMRH20-48D15	-40		66	ºC
		DCMRH20-12S12, DCMRH20-12S24, DCMRH20-12D12, DCMRH20-12D15, DCMRH20-24S12, DCMRH20-24S15, DCMRH20-48S12, DCMRH20-48S24, & DCMRH20-48D12	-40		62	
		DCMRH20-12S15, DCMRH-24S05, DCMRH-24S051, DCMRH20-48S05, DCMRH-48S051	-40		58	
		DCMRH20-12S05 & DCMRH20-12S051	-40		51	
Storage Temperature			-50		+125	ºC
Case Temperature					+95	ºC
Thermal Impedance	Natural Convection		13.0			ºC/W
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		1,087,344			Hours

SPECIFICATIONS

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.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
GENERAL SPECIFICATIONS						
Efficiency				See Table		
Switching Frequency				285		KHz
I/O Isolation Voltage	60 Seconds, Reinforced Isolation, Rated for 300Vrms Working Voltage		4200			VACrms
Isolation Resistance	500VDC		10			GΩ
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[3]				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 ES60601-1 2xMOPP Recognition (UL Certificate)[7] IEC/EN 60601-1 3rd Edition (CB-Report)					
EMI	Conduction & Radiation	EN55011, FCC Part 15		Performance: Class A		
EMS	EN60601-1-2 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		

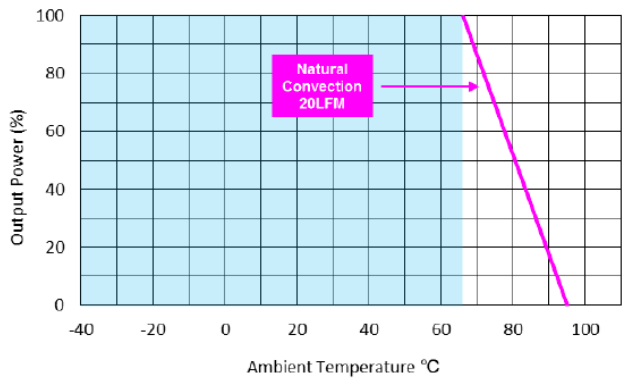
NOTES

1. # 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 an 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 inputs and outputs may be available, please contact factory.
7. This product is Listed to applicable standards and requirements by UL.

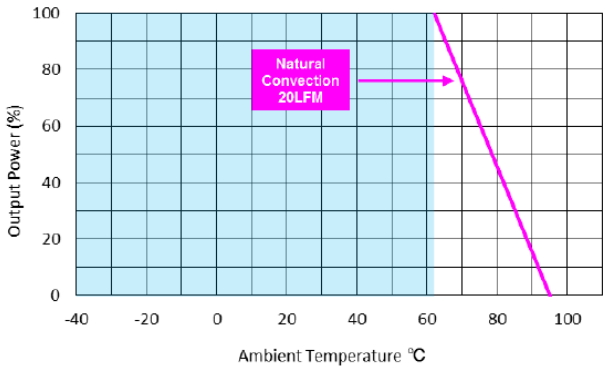
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVES

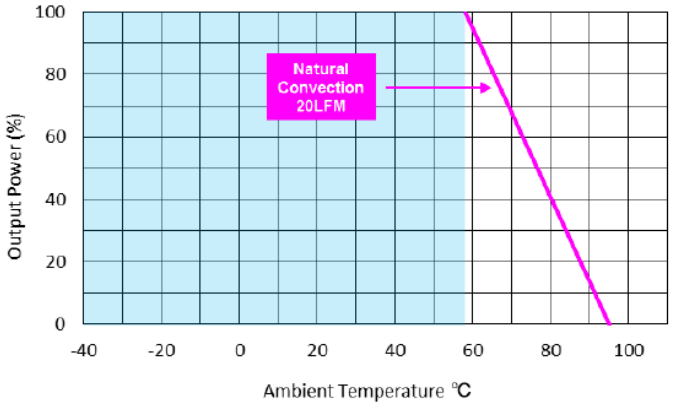
DMRH20-24S24, DCMRH20-24D12, DCMRH20-24D15, DCMRH20-48S15, DCMRH20-48D15



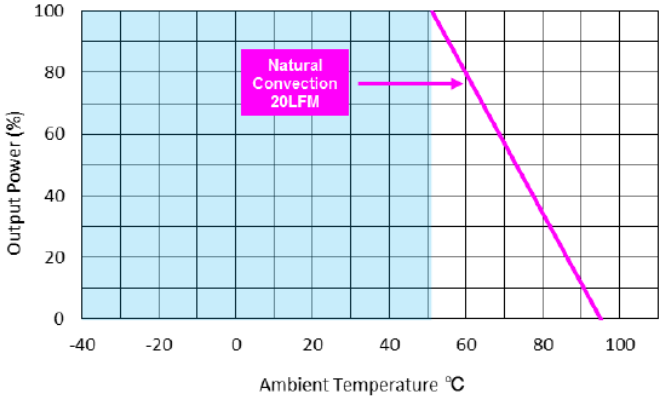
DCMRH20-12S12, DCMRH20-12S24, DCMRH20-12D12, DCMRH20-12D15, DCMRH20-24S12, DCMRH20-24S15, DCMRH20-48S12, DCMRH20-48S24, DCMRH20-48D12



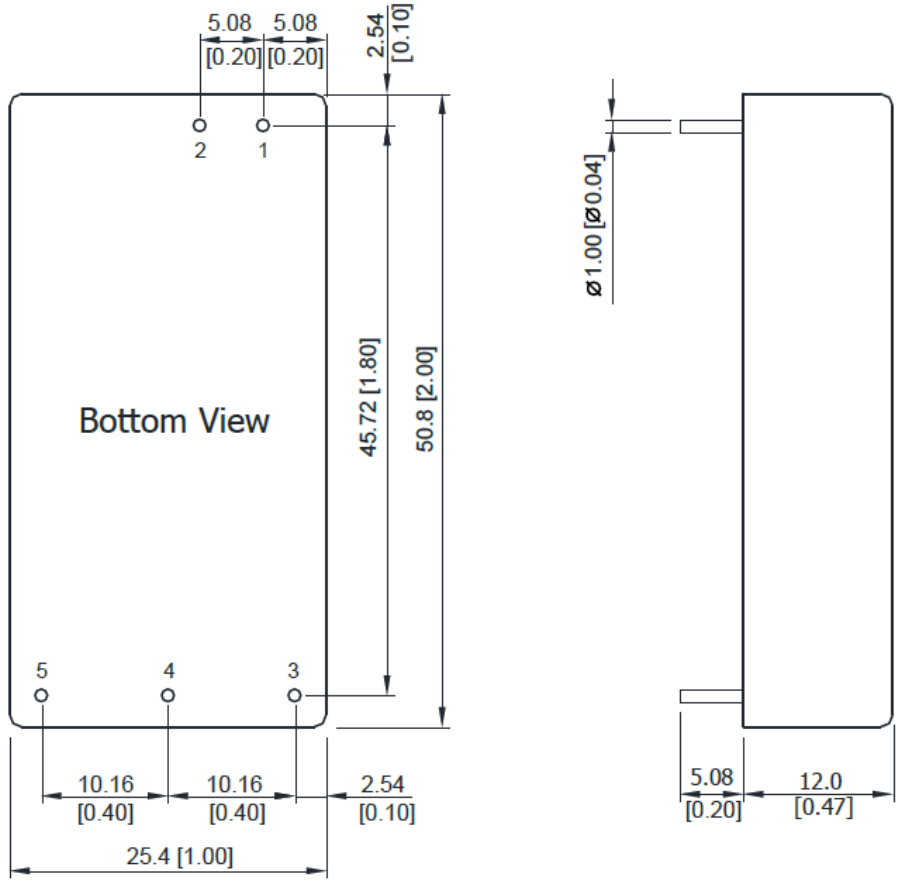
DCMRH20-12S15, DCMRH20-24S05, DCMRH20-24S051, DCMRH20-48S05, DCMRH20-48S051



DCMRH20-12S05, DCMRH20-12S051



MECHANICAL DRAWINGS



Pin Connection

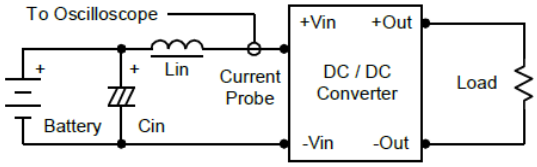
Pin	Single Output	Dual Output
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No Pin	Common
5	-Vout	-Vout

Note:
All dimensions in mm (inch)
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

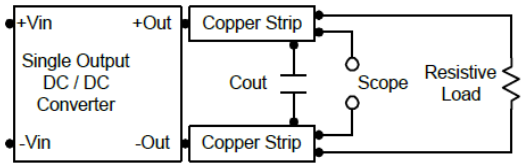
Input Reflected-Ripple Current Test Setup

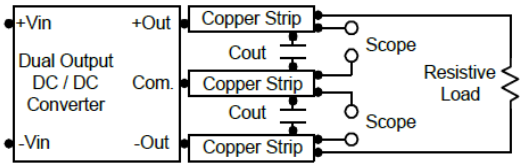
Input reflected-ripple current is measured with an inductor Lin (4.7µF) and Cin (220µF, ESR<1.0Ω at 100KHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500KHz.



Peak-to-Peak Output Noise Measurement

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

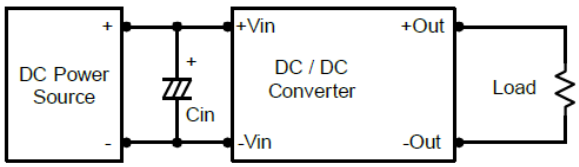
To provide hiccup mode protection in a fault (output over load) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration.

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 the data sheet.

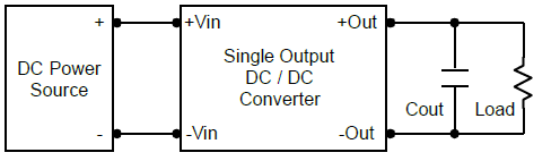
Input Source Impedance

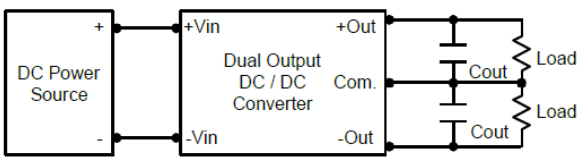
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor on the input to ensure startup.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



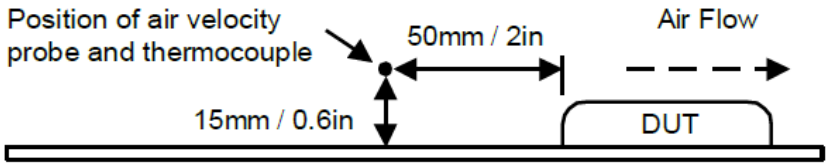


Maximum Capacitive Load

The DCMRH20 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 startup time. Connect capacitors at the point of load for best performance. 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 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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