Size: 1.6in x 1in x 0.40in
(40.6mm x 25.4mm x 10.2mm)

FEATURES

- 4:1 Input Range or 2:1 Input Range
- 5000VAC Reinforced Insulation
- Low Leakage Current
- Low Standby Power
- No Minimum Load Required
- Remote ON/OFF Positive or Negative Logic
- 2xMOPP
- 5000 Meter Operating Altitude
- Over Voltage, Over Load, Over Temperature, and Short Circuit Protection
- Non-Conductive Black Plastic Case
- RoHS & REACH Compliant
- Internal EN55032 Class A Filter
- IEC/EN/ANSI/AAMI ES 60601-1 and IEC/EN/UL 60950-1, 62368-1 and CB: UL (Demko) Safety Approvals

APPLICATIONS

- Medical
- PV
- Automation
- Datacom
- IPC
- Industry
- Measurement
- Telecom

DESCRIPTION

The DCMHIR20 series of DC/DC converters offers up to 15 watts of output power in a very compact 1.6” x 1” x 0.40” through hole package. This series consists of single and dual output models with either a 2:1 input range or 4:1 input range. Each model features low leakage current and standby power, 5000VAC reinforced isolation, no minimum load requirement, and remote on/off with positive or negative logic. The DCMHIR15 series also has protection against over voltage, over load, over temperature, and short circuit conditions and is RoHS and REACH compliant. This series has IEC/EN/ANSI/AAMI ES 60601-1 and IEC/EN/UL 60950-1, 62368-1 and CB: UL (Demko) safety approvals.

MODEL SELECTION TABLE
Single Output Models

Model Number	Input Voltage Range	Output Voltage	Output Current	No Load Input Current	Ripple & Noise	Maximum Capacitive Load	Efficiency	Output Power
DCMHIR20-12S05	12VDC (9~18VDC)	5VDC	4000mA	8mA	50mVp-p	5000µF	88.5%	Up to 20 Watts
DCMHIR20-12S12		12VDC	1670mA	12mA	75mVp-p	850µF	88.5%	
DCMHIR20-12S15		15VDC	1330mA	13mA	75mVp-p	700µF	89%	
DCMHIR20-12S24		24VDC	833mA	11mA	100mVp-p	220µF	89%	
DCMHIR20-24S05	24VDC (18~36VDC)	5VDC	4000mA	8mA	50mVp-p	5000µF	90%	Up to 20 Watts
DCMHIR20-24S12		12VDC	1670mA	9mA	75mVp-p	850µF	90%	
DCMHIR20-24S15		15VDC	1330mA	9mA	75mVp-p	700µF	90%	
DCMHIR20-24S24		24VDC	833mA	9mA	100mVp-p	220µF	90%	
DCMHIR20-244S05	24VDC (9~36VDC)	5VDC	4000mA	8mA	50mVp-p	5000µF	88.5%	Up to 20 Watts
DCMHIR20-244S12		12VDC	1670mA	11mA	75mVp-p	850µF	88.5%	
DCMHIR20-244S15		15VDC	1330mA	10mA	75mVp-p	700µF	89%	
DCMHIR20-244S24		24VDC	833mA	10mA	100mVp-p	220µF	88.5%	
DCMHIR20-48S05	48VDC (36~75VDC)	5VDC	4000mA	9mA	50mVp-p	5000µF	89.5%	Up to 20 Watts
DCMHIR20-48S12		12VDC	1670mA	9mA	75mVp-p	850µF	88.5%	
DCMHIR20-48S15		15VDC	1330mA	9mA	75mVp-p	700µF	89%	
DCMHIR20-48S24		24VDC	833mA	9mA	100mVp-p	220µF	88.5%	
DCMHIR20-484S05	48VDC (18~75VDC)	5VDC	4000mA	9mA	50mVp-p	5000µF	89.5%	Up to 20 Watts
DCMHIR20-484S12		12VDC	1670mA	9mA	75mVp-p	850µF	88.5%	
DCMHIR20-484S15		15VDC	1330mA	9mA	75mVp-p	700µF	89%	
DCMHIR20-484S24		24VDC	833mA	9mA	100mVp-p	220µF	88.5%	

MODEL SELECTION TABLE
Dual Output Models

Model Number	Input Voltage Range	Output Voltage	Output Current	No Load Input Current	Ripple & Noise	Maximum Capacitive Load	Efficiency	Output Power
DCMHIR20-12D05	12VDC (9~18VDC)	±5VDC	±2000mA	11mA	50mVp-p	±2500µF	86%	Up to 20 Watts
DCMHIR20-12D12		±12VDC	±833mA	11mA	75mVp-p	±500µF	89%	
DCMHIR20-12D15		±15VDC	±667mA	14mA	75mVp-p	±350µF	89%	
DCMHIR20-24D05	24VDC (18~36VDC)	±5VDC	±2000mA	11mA	50mVp-p	±2500µF	86%	Up to 20 Watts
DCMHIR20-24D12		±12VDC	±833mA	9mA	75mVp-p	±500µF	90%	
DCMHIR20-24D15		±15VDC	±667mA	11mA	75mVp-p	±350µF	90%	
DCMHIR20-244D12	24VDC (9~36VDC)	±5VDC	±2000mA	9mA	50mVp-p	±2500µF	86%	Up to 20 Watts
DCMHIR20-244D15		±12VDC	±833mA	10mA	75mVp-p	±500µF	88.5%	
DCMHIR20-244D24		±15VDC	±667mA	11mA	75mVp-p	±350µF	89%	
DCMHIR20-48D05	48VDC (36~75VDC)	±5VDC	±2000mA	9mA	50mVp-p	±2500µF	86%	Up to 20 Watts
DCMHIR20-48D12		±12VDC	±833mA	9mA	75mVp-p	±500µF	88.5%	
DCMHIR20-48D15		±15VDC	±667mA	9mA	75mVp-p	±350µF	89%	
DCMHIR20-484D05	48VDC (18~75VDC)	±5VDC	±2000mA	9mA	50mVp-p	±2500µF	86%	Up to 20 Watts
DCMHIR20-484D12		±12VDC	±833mA	9mA	75mVp-p	±500µF	88.5%	
DCMHIR20-484D15		±15VDC	±667mA	9mA	75mVp-p	±350µF	89%	

SPECIFICATIONS

All specifications are based on 25°C, Nominal Input Voltage, and Full Load 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		2:1	12Vin(nom)	9	12	18	VDC
			24Vin(nom)	18	24	36	
			48Vin(nom)	36	48	75	
		4:1	24Vin(nom)	9	24	36	VDC
			48Vin(nom)	18	48	75	
Start-Up Voltage		2:1	12Vin(nom)			9	VDC
			24Vin(nom)			18	
			48Vin(nom)			36	
		4:1	24Vin(nom)			9	VDC
			48Vin(nom)			18	
Shutdown Voltage		2:1	12Vin(nom)	7.8	8	8.6	VDC
			24Vin(nom)	15.8	16	17.4	
			48Vin(nom)	32	33	34	
		4:1	24Vin(nom)	7.8	8	8.6	VDC
			48Vin(nom)	15.8	16	17.4	
Input Surge Voltage	3 Seconds, Max.	2:1	12Vin(nom)			25	VDC
			24Vin(nom)			50	
			48Vin(nom)			100	
	3 Seconds, Max.	4:1	24Vin(nom)			50	VDC
			48Vin(nom)			100	
Input Current	No Load			See Table			
Input Filter				Pi Type			
OUTPUT SPECIFICATIONS							
Output Voltage				See Table			
Voltage Accuracy				-1.0		+1.0	%
Line Regulation	Low Line to High Line, Full Load		Single Outputs	-0.2		+0.2	%
			Dual Outputs	-0.5		+0.5	
Load Regulation	No Load to Full Load		Single Outputs	-0.2		+0.2	%
			Dual Outputs	-1.0		+1.0	
Voltage Adjustability	Single Outputs		5Vout, 12Vout	-10		+10	%
			15Vout, 24Vout	-10		+20	
Cross Regulation	Asymmetrical load 25%/100% FL		Dual Outputs	-5.0		+5.0	%
Output Power				See Table			
Output Current				See Table			
Maximum Capacitive Load				See Table			
Ripple & Noise (20MHz bandwidth)	With a 10µF/25V X7R MLCC		5Vout		50		mVp-p
	With a 10µF/25V X7R MLCC		12Vout		75		
	With a 10µF/25V X7R MLCC		15Vout		75		
	With a 4.7µF/50V X7R MLCC		24Vout		100		
	With a 10µF/25V X7R MLCC		±5Vout		50		
	With a 10µF/25V X7R MLCC		±12Vout		75		
	With a 10µF/25V X7R MLCC		±15Vout		75		
Transient Response Recovery Time	25% Load Step Change				250		µs
Start-Up Time	Constant Resistive Load		Power Up		30	60	mS
			Remote ON/OFF		30	60	
Temperature Coefficient				-0.02		+0.02	%/ºC
REMOTE ON/OFF CONTROL[1] **(Optional)**							
Positive Logic	DC-DC ON			Open or 3.5~12VDC			
	DC-DC OFF			Short or 0~1.2VDC			
Negative Logic	DC-DC ON			Short or 0~1.2VDC			
	DC-DC OFF			Open or 3.5~12VDC			
Input Current of CTRL Pin				-0.5		1	mA
Remote OFF Input Current					2.5		mA
PROTECTION							
Short Circuit Protection				Continuous, Automatic Recovery			
Over Load Protection	% of Iout rated; Hiccup Mode				150	185	%
Over Voltage Protection	Zener Diode Clamp		5Vout		6.2		VDC
			12Vout		15		
			15Vout		20		
			24Vout		30		
Over Temperature Protection					115		ºC

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
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	With Derating		-40		+105	ºC
Maximum Case Temperature					+105	ºC
Storage Temperature			-55		+125	ºC
Thermal Impedance				14.36		ºC/W
Relative Humidity			5		95	%RH
Thermal Shock				MIL-STD-810F		
Vibration				MIL-STD-810F		
Operating Altitude					5000	m
MTBF	MIL-HDBK-217F, Full Load			1,712,000		Hours
GENERAL SPECIFICATIONS						
Efficiency				See Table		
Switching Frequency			225	250	285	kHz
Isolation Voltage	1 minute, Input to Output, Reinforced insulation for 250VAC working voltage		5000			VAC
Isolation Capacitance				20		pF
Leakage Current	240VAC, 60Hz			2	2.5	µA
Clearance/Creepage			8			mm
PHYSICAL SPECIFICATIONS						
Weight				0.85oz (24g)		
Dimensions (L x W x H)				1.6in x 1in x 0.40in (40.6mm x 25.4mm x 10.2mm)		
Case Material				Non-Conductive Black Plastic		
Base Material				Non-Conductive Black Plastic		
Potting Material				Silicone (UL94 V-0)		
SAFETY CHARACTERISTICS						
Safety Approvals[3]	IEC/EN/ANSI/AAMI ES 60601-1 IEC/EN/UL 60950-1, 62368-1					UL CB:UL (Demko)
EMI	EN55011, EN55032, and FCC Part 18	Without External Components				Class A
		With External Components				Class B
ESD	EN61000-4-2	Air ± 15kV and Contact ±8kV				Perf. Criteria A
Radiated Immunity	EN61000-4-3	10 V/m				Perf. Criteria A
Fast Transient[2]	EN61000-4-4	±2kV				Perf. Criteria A
Surge[2]	EN61000-4-5	±2kV				Perf. Criteria A
Conducted Immunity	EN61000-4-6	10 Vr.m.s				Perf. Criteria A
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 1000A/m 1 Second				Perf. Criteria A

NOTES

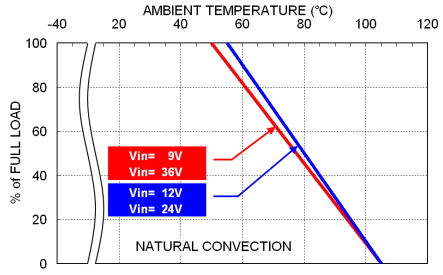
1. Referred to –Vin pin.
   To order positive logic remote on/off, add the suffix “P” to the model number.
   To order negative logic remote on/off, add the suffix “R” to the model number.
2. - DCMHIR15-12xxx: With 2pcs of aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ36A, 36V, 3000 Watt peak pulse power) in parallel.
   - DCMHIR15-24xxxx: With 2pcs of aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) in parallel.
   - DCMHIR15-48xxxx: With 2pcs of aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) in parallel.
3. This product is Listed to applicable standards and requirements by UL.

CAUTION: Power modules not internally fused. An input line fuse must always be used.

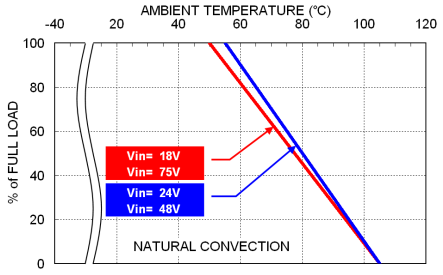
**Due to advances in technology, specifications subject to change without notice.*

CHARACTERISTIC CURVES

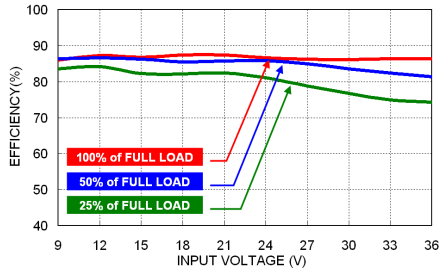
DCMHIR20-244xxx Derating Curve



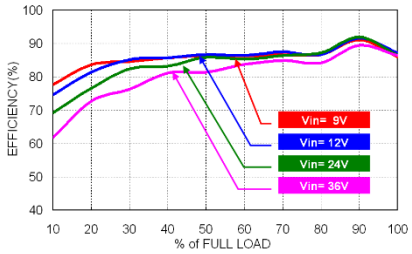
DCMHIR20-484xxx Derating Curve



DCMHIR20-244S05 Efficiency vs. Input Voltage



DCMHIR20-244S05 Efficiency vs. Output Load



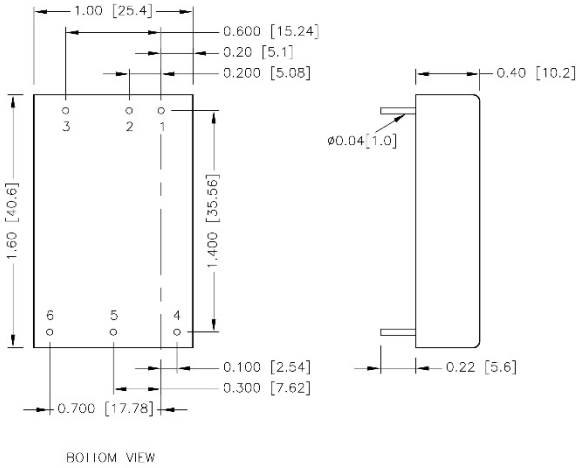
FUSE CONSIDERTION

This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.
The input line fuse suggestion is below:

Model	Fuse Rating	Fuse Type
DCMHIR20-12xxx, DCMHIR20-244xxx	4A	Slow-Blow
DCMHIR20-24xxx, DCMHIR20-484xxx	2A	Slow-Blow
DCMHIR20-48xxx	1A	Slow-Blow

The table is based on information provided in the data sheet on inrush energy and maximum DC input current at low Vin.

MECHANICAL DRAWINGS

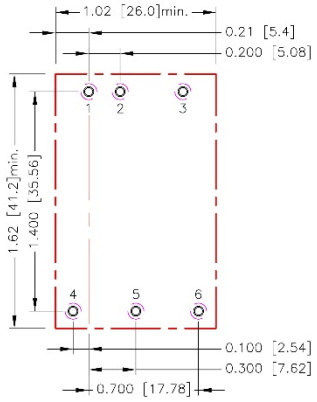


Pin Connection

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl (Option)	Ctrl (Option)
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

Notes:
1. All dimensions in inch [mm]
2. Tolerance: x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]]
3. Pin dimension tolerance ±0.004 [0.10]

RECOMMENDED PAD LAYOUT

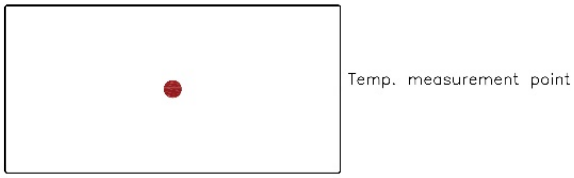


Note:
All dimensions in inch [mm]
Pad size (lead free recommended)
Through hole 1.2.3.4.5.6: Ø0.051[1.30]
Top view pad 1.2.3.4.5.6: Ø0.064[1.63]
Bottom view pad 1.2.3.4.5.6: Ø0.102[2.60]

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation, to the surrounding environment.
Proper cooling can be verified by measuring the point in the figure below.
The temperature at this location should not exceed “Maximum Case Temperature”.
When operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”.
You can limit this temperature to a lower value for extremely high reliability.

▪ Thermal test condition with vertical direction by natural convection (20LFM).



Top View

OUTPUT VOLTAGE ADJUSTMENT

It allows the user to increase or decrease the output voltage of the module.
This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or –Vout pins.
With an external resistor between the Trim and –Output pin, the output voltage increases.
With an external resistor between the Trim and +Output pin, the output voltage decreases.
The external Trim resistor needs to be at least 1/16W of rated power.

▪Trim Up Equation

$$\mathbf{Ru} = \left[\frac{\mathbf{G\ x\ L}}{(\mathbf{V_{O,up}} - \mathbf{L} - \mathbf{K})} - \mathbf{H}\right]\Omega$$

▪Trim Down Equation

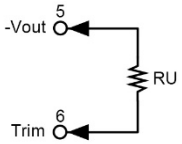
$$\mathbf{R_D} = \left[\frac{(\mathbf{V_{o,down}} - \mathbf{L})\ \mathbf{x}\ \mathbf{G}}{(\mathbf{V_o} - \mathbf{V_{o,down}})} - \mathbf{H}\right]\Omega$$

▪ Trim Constants

Model	G	H	K	L
5V Models	5110	2050	2.5	2.5
12V Models	10000	5110	9.5	2.5
15V Models	10000	5110	12.5	2.5
24V Models	56000	13000	21.5	2.5

EXTERNAL OUTPUT TRIMMING
Output can be externally trimmed by using the method shown below.

Trim Up



5V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.05	5.1	5.15	5.2	5.25	5.3	5.35	5.4	5.45	5.5
Ru (kΩ)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

12V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2
Ru (kΩ)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

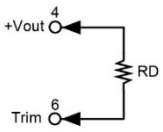
15V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.3	15.45	15.6	15.75	15.9	16.05	16.2	16.35	16.5
Ru (kΩ)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557
ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	16.65	16.8	16.95	17.1	17.25	17.4	17.55	17.7	17.85	18
Ru (kΩ)	10.042	8.779	7.711	6.795	6.001	5.307	4.694	4.149	3.662	3.223

24V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.2	25.44	25.68	25.92	26.16	26.4
Ru (kΩ)	570.333	278.667	181.444	132.833	103.667	84.222	70.333	59.917	51.815	45.333
ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.64	26.88	27.12	27.36	27.6	27.84	28.08	28.32	28.56	28.8
Ru (kΩ)	40.030	35.611	31.872	28.667	25.889	23.458	21.314	19.407	17.702	16.167

Trim Down



5V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	4.95	4.9	4.85	4.8	4.75	4.7	4.65	4.6	4.55	4.5
Ru (kΩ)	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

12V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.88	11.76	11.64	11.52	11.4	11.28	11.16	11.04	10.92	10.8
Ru (kΩ)	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

15V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.85	14.7	14.55	14.4	14.25	14.1	13.95	13.8	13.65	13.5
Ru (kΩ)	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

24V Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.76	23.52	23.28	23.04	22.8	22.56	22.32	22.08	21.84	21.6
Ru (kΩ)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667

MODEL NUMBER SETUP

DCMHIR	20	-	12	S	05	P
Series Name	Output Power		Input Voltage	Output Quantity	Ouptut Voltage	Remote On/Off & Pin Length
			12: 9~18VDC **24:** 18~36VDC **244:** 9~36VDC **48:** 36~75VDC **484:** 18~75VDC	**S:** Single **D:** Dual	**05:** 5VDC **12:** 12VDC **15:** 15VDC **24:** 24VDC **05:** ±05VDC **12:** ±12VDC **15:** ±15VDC	**Blank:** No Pin **P:** Positive Logic **R:** Negative Logic

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:

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