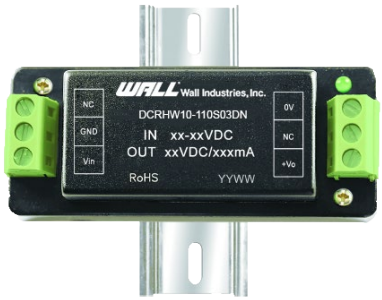
Through Hole

Size: 2 x 1 x 0.46in (50.8 x 25.4 x 11.8mm)

Chassis Mount “CM” Suffix

Size: 2.99 x 1.24 x 0.84in (76 x 31.5 x 21.2mm)

DIN Rail “DN” Suffix



Size: 2.99 x 1.24 x 1.02in (76 x 31.5 x 25.8mm)

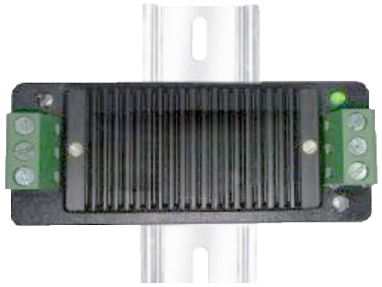
Through Hole with Heatsink “H” Suffix

Size: 2 x 1 x 0.64in (50.8 x 25.4 x 16.3mm)

Chassis Mount with Heatsink “CMH” Suffix

Size: 2.99 x 1.24 x 0.99in (76 x 31.5 x 25.1mm)

DIN Rail with Heatsink “DNH” Suffix



Size: 2.99 x 1.24 x 1.17in (76 x 31.5 x 29.7mm)

OPTIONS

- Package Type
  -Through Hole
  -Chassis Mount
  -DIN Rail
- Heatsink

FEATURES

- Ultra-Wide Input Voltage Range
- High Efficiency
- Enhanced Isolation
- Low Ripple & Noise
- Isolated and Regulated Single Outputs
- Through Hole, Chassis Mount, or DIN Rail Packages Available
- Optional Heatsink Available
- Reverse Protection Available with Chassis or DIN Rail Mounting
- International Standard Pin-Out
- Over Voltage, Over Current, and Short Circuit Protection
- Designed to Meet Railway Standard EN50155
- Designed to Meet IEC60950, UL60950, and EN60950 Approvals

APPLICATIONS

- Railway

DESCRIPTION

The DCRHW10 series of DC/DC converters offers up to 10 watts of output power in a very compact package. This series consists of single output models with an ultra-wide 4:1 input voltage range in either a through hole, chassis mount, or DIN rail package. Each model in this series features enhanced isolation, low ripple & noise, high efficiency, and protection against over voltage, over current, and short circuit conditions. This series is designed to meet both railway standard EN50155 and IEC60950, UL60950, and EN60950 approvals. Reverse protection is available with chassis and DIN rail mounting and optional heatsink is available. Please contact factory for order information.

MODEL SELECTION TABLE

Model Number[1]	Input Voltage Range	Output Voltage	Output Current		No Load Input Current		Maximum Capacitive Load	Efficiency		Output Power
			Min Load	Max Load	Typ.	Max.		Typ.	Max.	
DCRHW10-110S03	110VDC (40~160VDC)	3.3VDC	0mA	2400mA	3mA	8mA	5400µF	74%	76%	10W
DCRHW10-110S05		5VDC	0mA	2000mA	3mA	8mA	5400µF	78%	80%	
DCRHW10-110S12		12VDC	0mA	833mA	3mA	8mA	470µF	82%	84%	
DCRHW10-110S15		15VDC	0mA	667mA	3mA	8mA	330µF	82%	84%	
DCRHW10-110S24		24VDC	0mA	417mA	3mA	8mA	100µF	83%	85%	

SPECIFICATIONS

All specifications are based on 25°C, Humidity <75%RH, Nominal Input Voltage, and Rated 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			40	110	160	VDC
	Absolute Maximum[2]				170	VDC
Input Current	Full Load, Nominal Input Voltage	3.3VDC Output		95	98	mA
		Others		110	117	
Reflected Ripple Current	Nominal Input Voltage			25		mA
Input Surge Voltage (1sec. max.)			-0.7		180	VDC
Starting Voltage	100% Load				40	VDC
Shutdown Voltage			28	33		VDC
Input Filter			Pi Filter			
Hot Plug			Unavailable			
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
Voltage Accuracy	0%-100% Load			±1	±3	%
Line Regulation	Full Load, Input Voltage from Low to High Voltage			±0.2	±0.5	%
Load Regulation	0%-100% Load			±0.5	±1	%
Output Power			See Table			
Output Current			See Table			
Minimum Load			0			mA
Maximum Capacitive Load	@Input Voltage Range and Full Load		See Table			
Ripple & Noise[3]	20MHz bandwidth, 5%-100% Load			50	100	mVp-p
Transient Recovery Time	25% load step change, nominal input voltage			300	500	µs
Transient Response Deviation	25% load step change, nominal input voltage	3.3VDC, 5VDC Output		±3	±8	%
		Others		±3	±5	
Starting Time	Nominal Input Voltage & Constant Resistance Load			10		ms
Temperature Coefficient	Full Load			±0.02	±0.03	%/ºC
PROTECTION						
Short Circuit Protection	Input Voltage Range		Continuous, Self-Recovery			
Over Current Protection	Input Voltage Range		120		210	%Io
Over Voltage Protection	Input Voltage Range		110		160	%Vo
ENVIRONMENTAL SPECIFICATIONS						
Operating Temperature			-40		+85	ºC
Storage Temperature			-55		+125	ºC
Storage Humidity	Non-Condensing		5		95	%RH
Pin Welding Resistance Temp.	Welding Spot is 1.5mm Away from Casing, 10 Seconds				+300	ºC
Vibration			IEC61373 Car Body 1 B Mold			
MTBF	MIL-HDBK-217F@25ºC		1000			KHours
GENERAL SPECIFICATIONS						
Efficiency	@Full Load		See Table			
Switching Frequency[4]	PWM Mode			300		KHz
Isolation Voltage	Input-Output, with the test time of 1 minute and leak current lower than 1mA		2250			VDC
	Input and output respectively on the shell with test time of 1 minute and leak current lower than 1mA		1600			
Insulation Resistance	Input-Output, Insulation Voltage 500VDC		1000			MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V			2200		pF
PHYSICAL SPECIFICATIONS						
Weight	Through Hole Package		0.92oz (26g)			
	Chassis Mount Package (“CM” Suffix)		1.69oz (48g)			
	DIN Rail Package (“DN” Suffix)		2.40oz (68g)			
	Through Hole with Heatsink (“H” Suffix)		1.20oz (34g)			
	Chassis Mount Package with Heatsink (“CMH” Suffix)		1.98oz (56g)			
	DIN Rail Package with Heatsink(“DNH” Suffix)		2.68oz (76g)			
Dimensions (L x W x H)	Through Hole Package		2 x 1 x 0.46in (50.8 x 25.4 x 11.8mm)			
	Chassis Mount Package (“CM” Suffix)		2.99 x 1.24 x 0.83in (76 x 31.5 x 21.2mm)			
	DIN Rail Package (“DN” Suffix)		2.99 x 1.24 x 1.02in (76 x 31.5 x 25.8mm)			
	Through Hole with Heatsink (“H” Suffix)		2 x 1 x 0.64in (50.8 x 25.4 x 16.3mm)			
	Chassis Mount Package with Heatsink (“CMH” Suffix)		2.99 x 1.24 x 0.99in (76 x 31.5 x 25.1mm)			
	DIN Rail Package with Heatsink (“DNH” Suffix)		2.99 x 1.24 x 1.17in (76 x 31.5 x 29.7mm)			
Cooling Methods			Free Air Convection			

SPECIFICATIONS

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

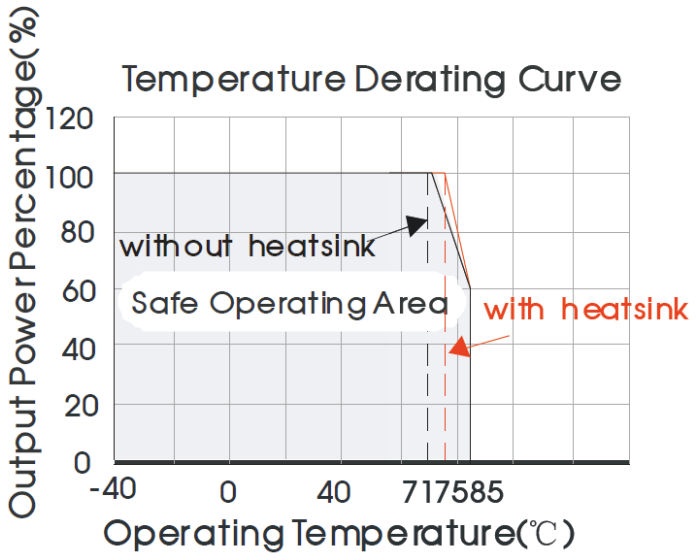
SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
SAFETY CHARACTERISTICS							
Safety Approvals	Designed to Meet IEC60950, UL60950(6), EN60950						
EMI	CE		CISPR/EN55022			Class A (without external components) Class B (see Fig.3 for recommended circuit)	
	RE		CISPR/EN55022			Class A (without external components) Class B (see Fig.3 for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±6kV/Air ±8kV			Perf. Criteria B	
	RS	IEC/EN61000-4-3	10V/m			Perf. Criteria A	
	EFT	IEC/EN61000-4-4	±4kV (See Fig. 2 or 3 for recommended circuit)			Perf. Criteria B	
	Surge	IEC/EN61000-4-5	Line to Line ±2kV (2Ω 0.5uF see Fig. 2 for recommended circuit Line to Ground ±4kV (12Ω 0.5uF see Fig. 2 for recommended circuit)			Perf. Criteria B	
		EN50121-3-2	Line to Line ±1kV (42Ω 0.5uF see Fig. 3 for recommended circuit Line to Ground ±2kV (42Ω 0.5uF see Fig. 3 for recommended circuit.			Perf. Criteria B	
	CS	IEC/EN61000-4-6	10 Vr.m.s			Perf. Criteria A	

NOTES

1. Several package options are available for this series. The standard package type is through hole. To indicate chassis mount package, add “CM” suffix to model number. To indicate DIN Rail package, add “DN” suffix to model number.
   Heatsink can also be applied to any package. To indicate heatsink option, add “H” suffix to model number. Heatsink is recommended for applications with a higher requirement for heat dissipation.
2. This is the absolute maximum rating that can be used without damage to the converter, but it is not recommended.
3. 0%-5% load ripple & noise is no more than 5%Vo. Ripple and noise are measured by “parallel cable” method. Contact factory for more information.
4. This series of products uses reduced frequency technology, switching frequency is test value of full load. When the load is reduced to below 50%, the switching frequency decreases with decreasing load.
5. Customization is available.
6. This product is Listed to applicable standards and requirements by UL.

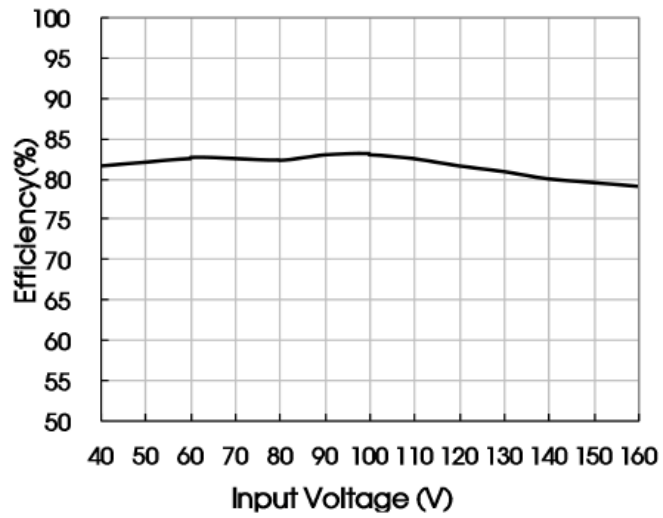
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVE

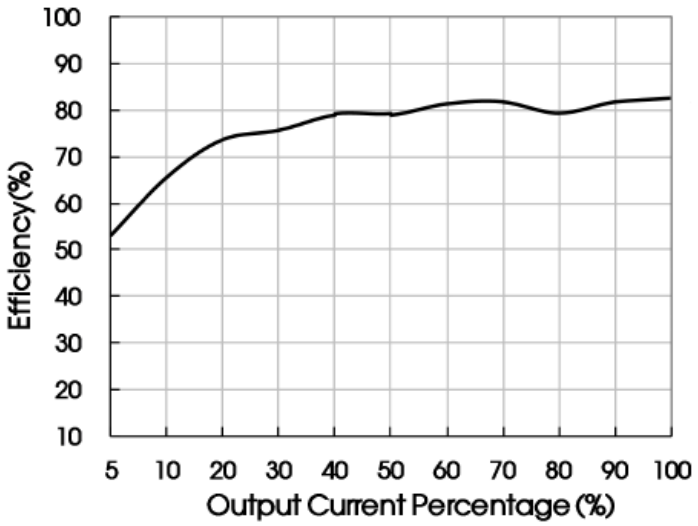


EFFICIENCY GRAPHS

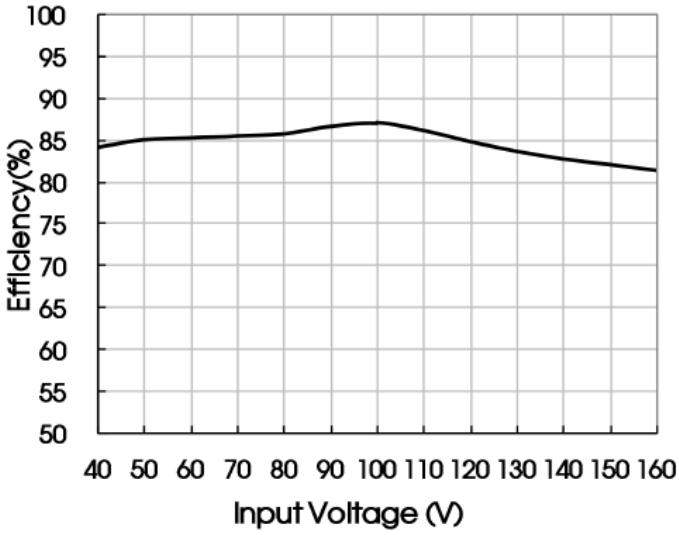
Efficiency vs Input Voltage (Full Load)
DCRHW10-110S05



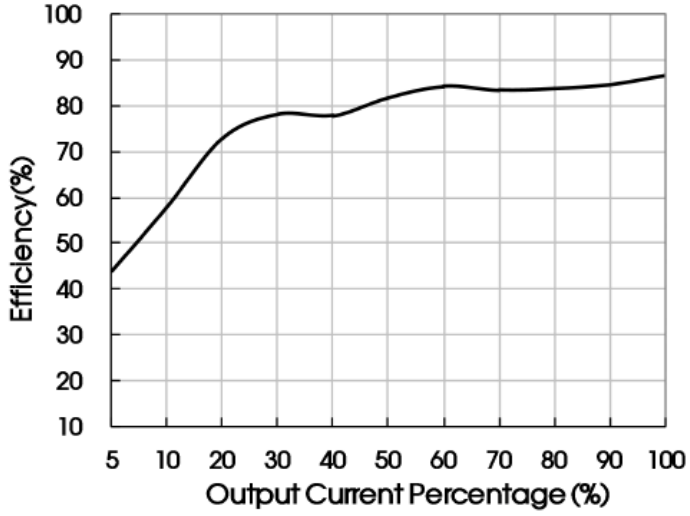
Efficiency vs Output Load (Vin=110V)
DCRHW10-110S05



Efficiency vs Input Voltage (Full Load)
DCRHW10-110S24

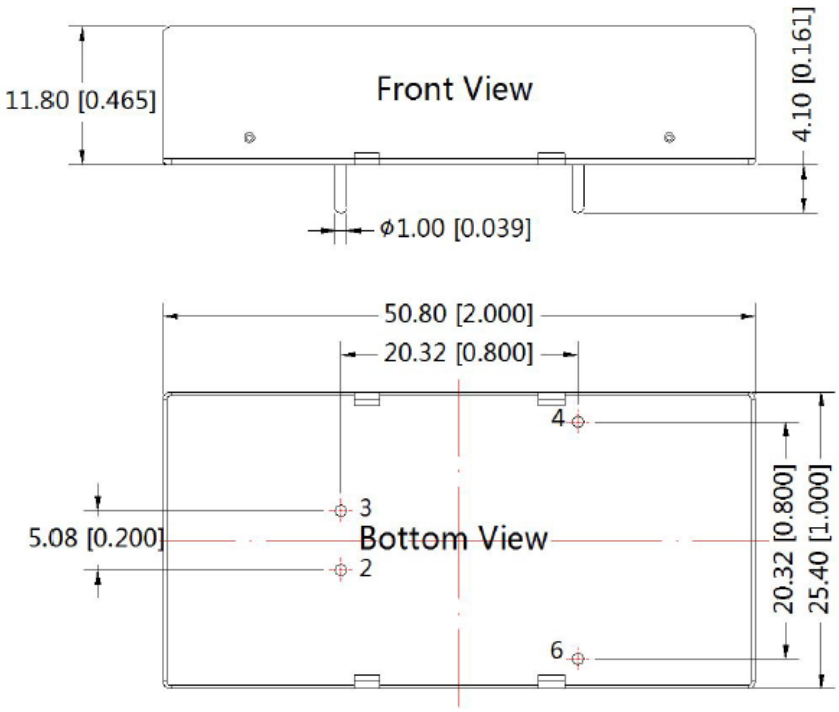


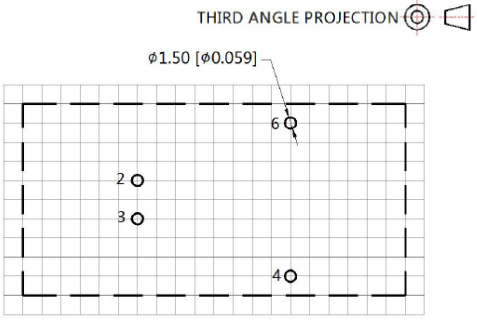
Efficiency vs Output Load (Vin=110V)
DCRHW10-110S24



MECHANICAL DRAWINGS

Through Hole Package





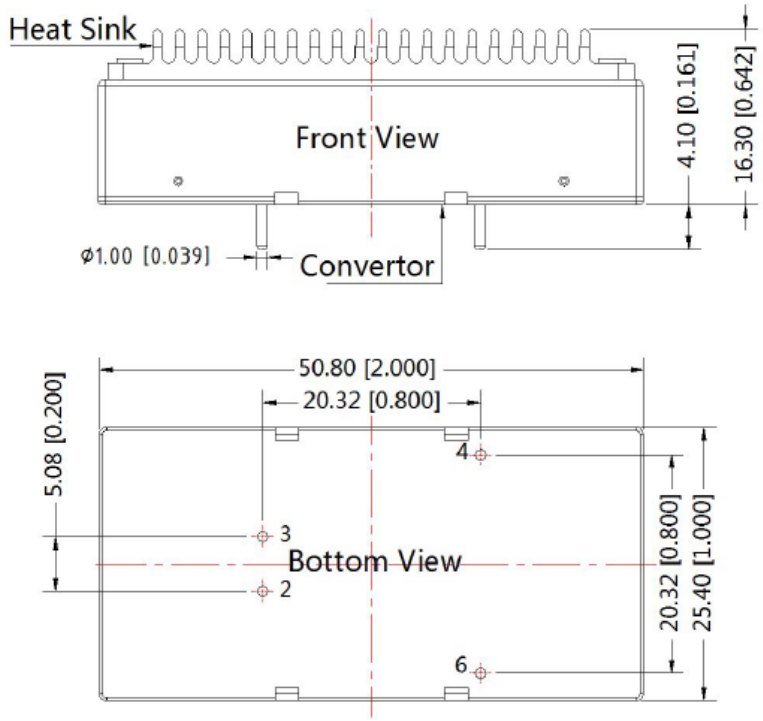
Note: Grid 2.54*2.54mm

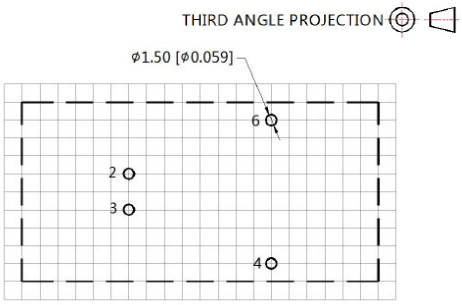
Pin Out

Pin	Function
2	GND
3	Vin
4	+Vo
6	0V

Note:
Unit: mm [inch]
Pin diameter tolerances: ±0.10 [±0.004]
General Tolerances: ±0.50 [±0.020]

Through Hole Package with Heat Sink (“H” Suffix)





Note: Grid 2.54*2.54

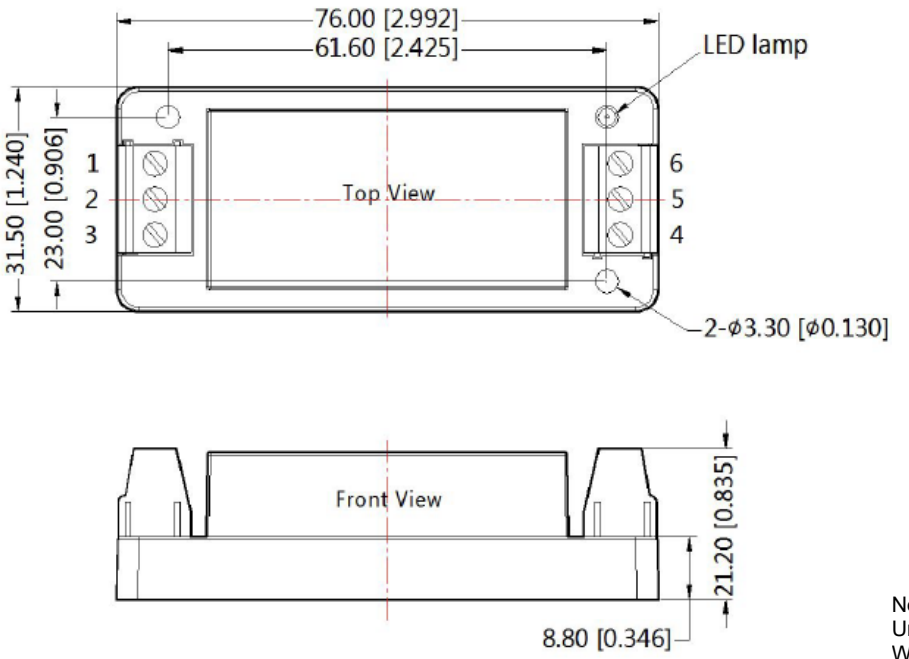
Pin Out

Pin	Function
2	GND
3	Vin
4	+Vo
6	0V

Note:
Unit: mm [inch]
Pin diameter tolerances: ±0.10 [±0.004]
General Tolerances: ±0.50 [±0.020]

Chassis Mount Package ("CM" Suffix)

THIRD ANGLE PROJECTION



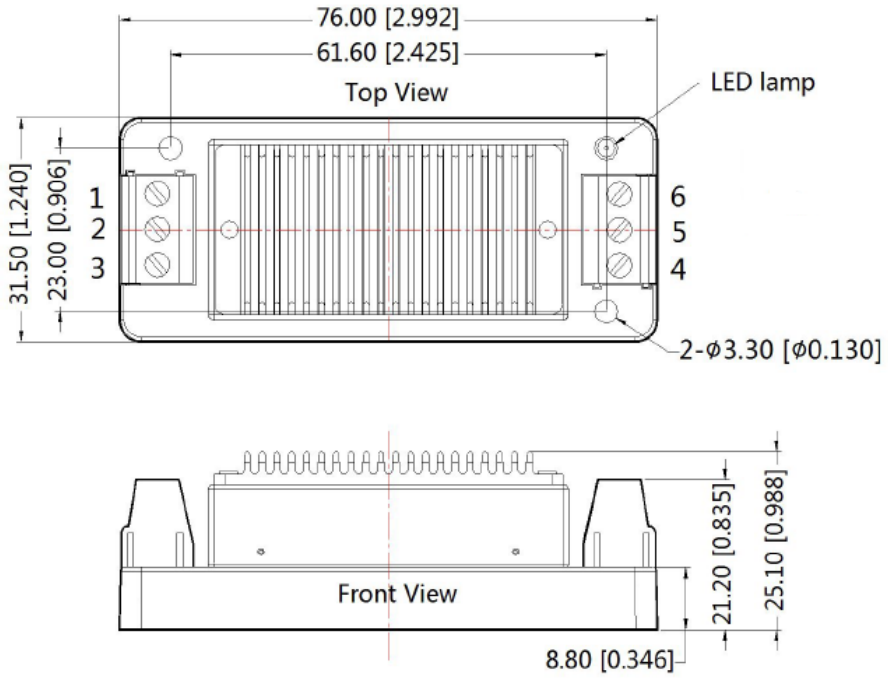
Pin Out

Pin	Function
1	NC
2	GND
3	Vin
4	+Vo
5	NC
6	0V

Note:
Unit: mm [inch]
Wire Range: 24-12AWG
Tightening Torque: Max 0.4 N·m
General Tolerances: ±0.50 [±0.020]

Chassis Mount Package with Heatsink ("CMH" Suffix)

THIRD ANGLE PROJECTION

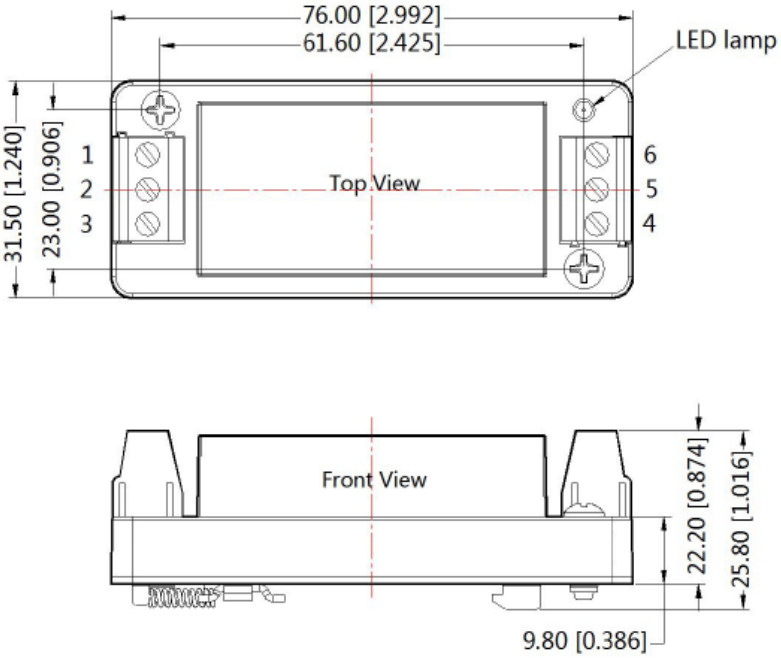


Pin Out

Pin	Function
1	NC
2	GND
3	Vin
4	+Vo
5	NC
6	0V

Note:
Unit: mm [inch]
Wire range: 24-12AWG
Tightening Torque: Max 0.4 N·m
General Tolerances: ±1.00 [±0.039]

DIN Rail Package ("DN" Suffix)



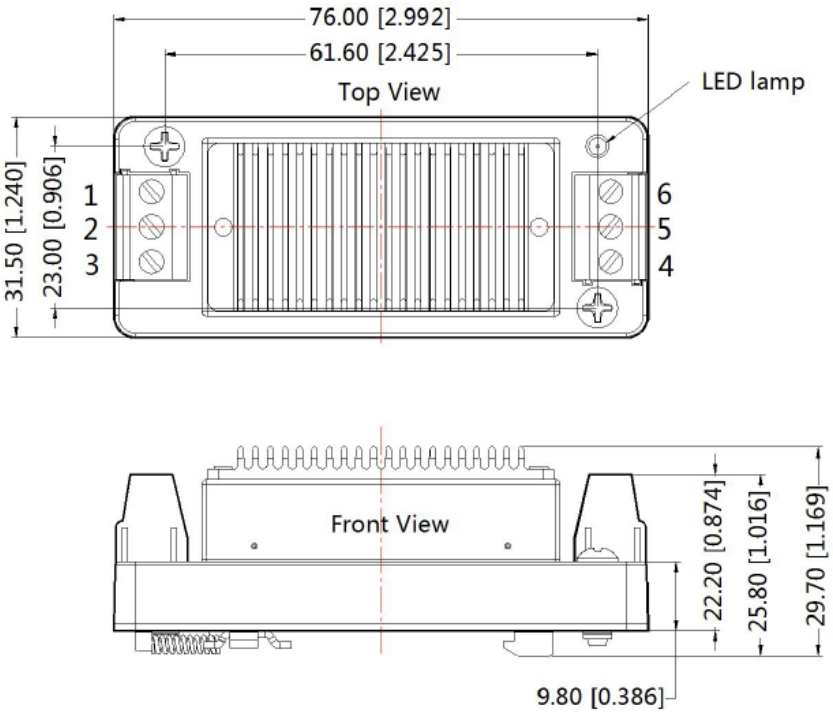
THIRD ANGLE PROJECTION

Pin Out

Pin	Function
1	NC
2	GND
3	Vin
4	+Vo
5	NC
6	0V

Note:
Unit: mm [inch]
Mounting Rail: TS35
Wire Range: 24-12AWG
Tightening Torque: Max 0.4 N·m
General Tolerances: ±1.00 [±0.039]

DIN Rail Package with Heatsink ("DNH" Suffix)



THIRD ANGLE PROJECTION

Pin Out

Pin	Function
1	NC
2	GND
3	Vin
4	+Vo
5	NC
6	0V

Note:
Unit: mm [inch]
Mounting rail: TS35
Wire Range: 24-12 AWG
Tightening Torque: Max. 0.4 N·m
General tolerances: ±1.00 [±0.039]

DESIGN REFERENCE

1. Typical Application

All DC/DC converters in this series area tested according to the recommended circuit (see Fig. 1) before delivery. If a further decrease of the input and output ripple is required, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance, and ensure the capacitance should be lower than the maximum capacitive load of the product.

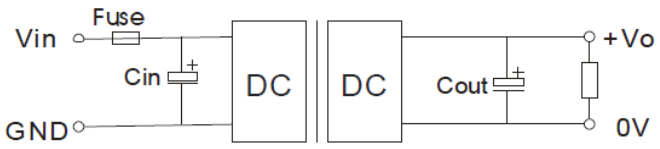


Fig. 1

Vout (VDC)	Fuse	Cin	Cout
3.3/5	2A, slow blow	10μF-47μF	100μF
12/15			47μF
24			22μF

2. EMC Solution-Recommended Circuit

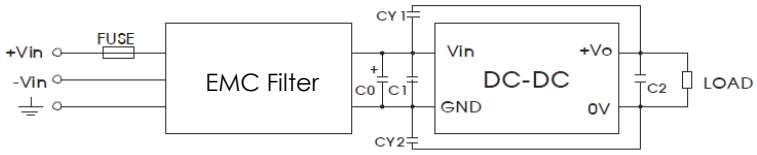


Fig. 2

Fig. 2 Parameter Description

FUSE	Choose According to Actual Input Current
EMC Filter	Contact factory for recommendation. Input voltage range 40V-160V
C0	100μF/200V
C1	Refer to Cin in Fig. 1
C2	Refer to the Cout in Fig. 2
CY1, CY2	1000pF/400VAC

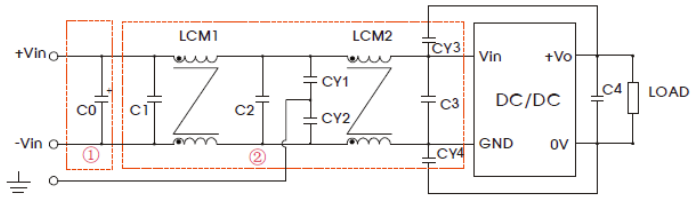


Fig. 3

Note: Part ① in Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs

Fig. 3 Parameter Description

C0	100μF/200V
C1, C2	0.22μF/250V
C3	Refer to the Cin In Fig. 2
LCM1	2.2mH (Contact Factory for Recommendation)
LCM2	1.1mH (material: TN150P-RH12.7*12.7*7.9)
CY1, CY2, CY3, CY4	1000pF/400VAC
C4	Refer to the Cout in Fig. 1

3. Modules cannot be connected in parallel to enlarge power.

MODEL NUMBER SETUP

DCRHW	10	-	110	S	05	CM	H
Series Name	Output Power		Input Voltage	Output Quantity	Ouptut Voltage	Package Type	Heatsink Option
			110: 40-160VDC	**S:** Single	**03:** 3.3VDC **05:** 5VDC **12:** 12VDC **15:** 15VDC **24:** 24VDC	**None:** Through Hole **CM:** Chassis Mount **DN:** DIN Rail	**None:** No Heatsink **H:** Heatsink

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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