DIP Package

Size: 1in x 1in x 0.46in (25.4mm x 25.4mm x 11.70mm)

DIP Package with Heatsink (“H” Suffix)

Size: 1in x 1in x 0.64in (25.4mm x 25.4mm x 16.2mm)

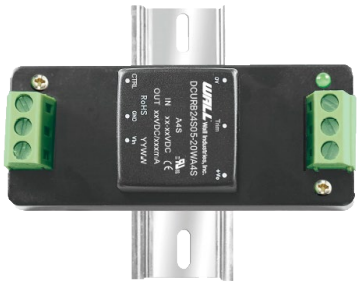
Chassis Mount Package (“A2S” Suffix)

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

Chassis Mount Package with Heatsink (“HA2S” Suffix)

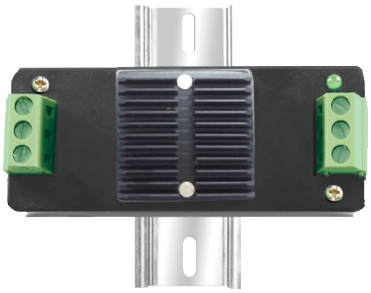
Size: 2.99in x 1.24in x 0.99in (76mm x 31.5mm x 25.2mm)

DIN Rail Package (“A24” Suffix)



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

DIN Rail Package with Heatsink (“HA4S” Suffix)



Size: 2.99in x 31.5mm x 1.17in (76mm x 31.5mm x 29.8mm)

cULus UL62368-1 | CE Report EN62368-1 | UKCA Report BS EN62368-1 | CB IEC62368-1 | RoHS

OPTIONS

- Case Type
  -DIP Case
  -Chassis Mount
  -DIN Rail Case
- Heatsink

FEATURES

- 4:1 Wide Input Voltage Range
- High Efficiency up to 91%
- I/O Isolation Test Voltage: 1500VDC
- DIP Case, Chassis Mount, or DIN Rail Case
- Input Reverse Polarity Protection Available with Chassis (A2S) or 35mm DIN Rail Mounting (A4S)
- RoHS Compliant
- Input Under-Voltage, and Output Over Voltage, Over Current, and Short Circuit Protection
- Cooling by Free Air Convection
- Heat Sink Available
- Meets EN50155 Railway Standard
- IEC62368-1, UL62368-1, EN62368-1, and BS EN62368-1 Safety Approvals

APPLICATIONS

- Industrial
- Robotics
- Railway
- Communications

DESCRIPTION

The DCURB series of DC/DC converters offers up to 20 watts of output power in a compact DIP, chassis mount, or DIN Rail case. This series consists of single output models with a wide 4:1 input voltage range. Each model in this series is RoHS compliant, meets EN50155 railway standard, has low temperature rise, high efficiency, and is cooled by free air convection. This series has input under-voltage, over voltage, over current, over temperature, and short circuit protection as well as IEC62368-1, UL62368-1, EN62368-1, and BS EN62368-1 approvals.

MODEL SELECTION TABLE

Model Number[1]	Input Voltage Range		Output Voltage	Output Current		Input Current				Output Power	Maximum Capacitive Load[4]	Efficiency[5]		Certification
						No Load		Full Load						
	Nominal[2]	Max.[3]		Min	Max	Typ.	Max.	Typ.	Max.			Min.	Typ.	
DCURB2403-20W	24VDC (9-36)	40VDC	3.3VDC	0mA	5000mA	30mA	50mA	782mA	800mA	20W	10000µF	86%	88%	UL/EN/BS EN/IEC
DCURB2405-20W			5VDC	0mA	4000mA	35mA	55mA	926mA	947mA		10000µF	88%	90%	
DCURB2406-20W			6VDC	0mA	3333mA	50mA	70mA	936mA	958mA		10000µF	87%	89%	-
DCURB2412-20W			12VDC	0mA	1667mA	6mA	15mA	926mA	947mA		1600µF	88%	90%	
DCURB2415-20W			15VDC	0mA	1333mA	6mA	15mA	916mA	937mA		1000µF	87%	89%	
DCURB2424-20W			24VDC	0mA	833mA	10mA	20mA	916mA	937mA		500µF	89%	91%	
DCURB4803-20W	48VDC (18-75)	80VDC	3.3VDC	0mA	5000mA	15mA	30mA	391mA	400mA	20W	10000µF	86%	88%	UL/EN/BS EN/IEC
DCURB4805-20W			5VDC	0mA	4000mA	20mA	30mA	463mA	474mA		10000µF	88%	90%	
DCURB4812-20W			12VDC	0mA	1667mA	3mA	15mA	458mA	469mA		1600µF	89%	91%	
DCURB4815-20W			15VDC	0mA	1333mA	3mA	15mA	458mA	469mA		1000 µF	89%	91%	
DCURB4824-20W			24VDC	0mA	833mA	4mA	15mA	458mA	469mA		500µF	89%	91%	

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
INPUT SPECIFICATIONS						
Input Voltage Range	24VDC Input		9	24	36	VDC
	48VDC Input		18	48	75	
Input Current			See Table			
Reflected Ripple Current	Nominal Input			30		mA
Surge Voltage (1 sec. max.)	24VDC Input		-0.7		50	VDC
	48VDC Input		-0.7		100	
Start Up Voltage	24VDC Input				9	VDC
	48VDC Input				18	
Under-Voltage Protection	24VDC Input		5.5	6.5		VDC
	48VDC Input		12	15.5		ms
Ctrl[6]	Module On		Ctrl Pin Open or Pulled High (TTL 3.5-12VDC)			
	Module Off		Ctrl Pin Pulled Low to GND (0-1.2VDC)			
	Input Current When Switched Off			2	7	mA
Input Filter			Pi Filter			
Hot Plug			Unavailable			
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
Voltage Accuracy	0%-100% Load			±1	±3	%
Liner Regulation	Input voltage variation from low to high at full load			±0.2	±0.5	%
Load Regulation	5%-100% Load			±0.5	±1	%
Output Power			See Table			
Output Current			See Table			
Maximum Capacitive Load			See Table			
Ripple & Noise[7]	20MHz bandwidth, 5%-100% Load			50	100	mVp-p
Trim	Input Voltage Range		90		110	%Vo
Transient Response Deviation	25% Load Step Change, Nominal Input Voltage	3.3V, 5V, 6V Output		±5	±8	%
		Others		±3	±5	
Transient Recovery Time	25% Load Step Change, Nominal Input Voltage			300	500	µs
Temperature Coefficient	Full Load				±0.03	%/ºC
Start-Up Time	Nominal input voltage & constant resistance load			10		ms
PROTECTION						
Short Circuit Protection	Input Voltage Range		Hiccup, Continuous, Self-Recovery			
Over Current Protection	Input Voltage Range		110	150	190	%Io
Over Voltage Protection	Input Voltage Range		110		160	%Vo
ENVIRONMENTAL SPECIFICATIONS						
Operating Temperature	See derating curves	3.3V, 5V, 6V Output	-40		95	ºC
		Others	-40		+105	
Storage Temperature			-55		125	ºC
Storage Humidity	Non-Condensing		5		95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds				300	ºC
Vibration			IEC/EN61373 – Category 1, Grade B			
MTBF	MIL-HDBK-217F@25ºC		1000			K hours

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
GENERAL SPECIFICATIONS						
Efficiency	Full Load			See Table		
Switching Frequency[8]	PWM Mode	3.3V, 5V, 6V Output		300		kHz
		Others		270		
Isolation	Electric Strength Test for 1 minute with leakage current of 1mA max.	Input-Output	1500			VDC
		Input/Output-Case	1000			
Insulation Resistance	Input-Output, Resistance at 500VDC		1000			MΩ
Isolation Capacitance	Input-Output capacitance at 100KHz/0.1V			2000		pF
PHYSICAL SPECIFICATIONS						
Weight	Without Heatsink	DIP Package		0.53oz (15g)		
		Chassis Mount		1.34oz (38g)		
		DIN Rail Mount		2.05oz (58g)		
	With Heatsink	DIP Package		0.71oz (20g)		
		Chassis Mount		1.41oz (40g)		
		DIN Rail Mount		2.12oz (60g)		
Dimensions (L x W x H)	Without Heatsink	DIP Package		1in x 1in x 0.46in (25.40mm x 25.40mm x 11.70mm)		
		Chassis Mount		2.99in x 1.24in x 0.83in (76mm x 31.50mm x 21.20mm)		
		DIN Rail Mount		2.99in x 1.24in x 1.02in (76mm x 31.50mm x 25.80mm)		
	With Heatsink	DIP Package		1in x 1in x 0.64in (25.40mm x 25.40mm x 16.20mm)		
		Chassis Mount		2.99in x 1.24in x 0.99in (76mm x 31.50mm x 25.20mm)		
		DIN Rail Mount		2.99in x 1.24in x 1.17in (76mm x 31.50mm x 29.80mm)		
Case Material				Aluminum Alloy		
Cooling Method				Free Convection		
SAFETY CHARACTERISTICS						
Approvals	IEC62368-1, UL62368-1[9], EN62368-1, and BS EN62368-1					
EMC	Emissions	CE	CISPR32/EN55032			Class B[11]
		RE	CISPR32/EN55032			Class B[11]
	Immunity	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	±2kV[10]		Perf. Criteria A
		Surge	IEC/EN61000-4-5	Line to Line ±2kV[10]		Perf. Criteria B
		CS	IEC/EN61000-4-6	3 Vr.m.s		Perf. Criteria A
EMC (EN50155)	Emissions	CE	EN50121-3-2	150kHz-500kHz		99dBuV[11]
			EN55016-2-1	500kHz-30MHz		93dBuV[11]
		RE	EN50121-3-2	30MHz-230MHz		40dBuV/m at 10m[11]
			EN55016-2-1	230MHz-1GHz		47dBuV/m at 10m[11]
	Immunity	ESD	EN50121-3-2	Contact ±6kV, Air ±8kV		Perf. Criteria A
		RS	EN50121-3-2	20V/m		Perf. Criteria A
		EFT	EN50121-3-2	±2kV 5/50ns 5kHz[10]		Perf. Criteria A
		Surge	EN50121-3-2	Line to Line ±1kV (42Ω, 0.5μF)[10]		Perf. Criteria A
		CS	EN50121-3-2	0.15MHz-80MHz 10Vr.m.s		Perf. Criteria A

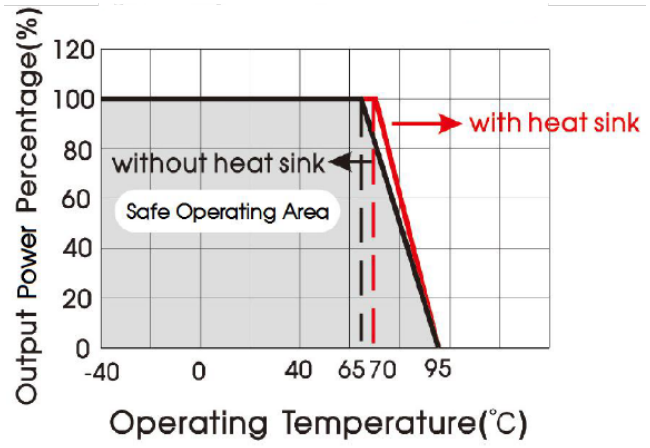
NOTES

1. Part number with suffix “H” are heat sink mounting, parts with suffix “A2S” are chassis mounted, parts with suffix “A4S” are DIN Rail mounted, for example DCURB2405-20WHA2S is chassis mounted with heat sink. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements.
2. The A2S and A24 models start-up and minimum input voltages are increased by 1VDC due to input reverse polarity protection circuit.
3. This is the absolute maximum stress rating without damage (not recommended)
4. Maximum capacitive load offered were tested at nominal input voltage and full load.
5. Efficiency measured at nominal input and rated output load. Efficiency of A2S and A4S is decreased by 2% due to input reverse polarity protection circuit.
6. Ctrl pin voltage is referenced to input GND.
7. Under 0%-5% load conditions, ripple & noise does not exceed 5%Vo. The “parallel cable” method is used for Ripple and Noise test, contact factory for more information.
8. Switching frequency is measured at full load. Module reduces switching frequency for light load (below 50%) efficiency improvement.
9. This product is Listed to applicable standards and requirements by UL.
10. See Fig. 2-① for recommended circuit.
11. See Fig. 2-② for recommended circuit.
12. Customization is available
13. Products shall be classified according to ISO14001 and related environmental laws and regulations and should be handled by qualified units.

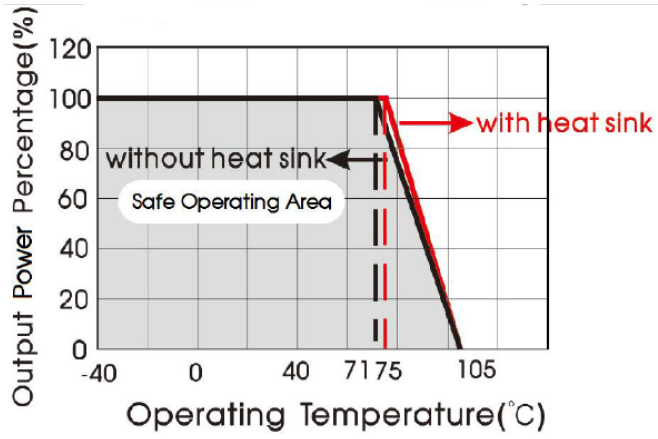
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVES

Temperature Derating Curve
Nominal Input Voltage, 3.3V, 5V, 6V Outputs

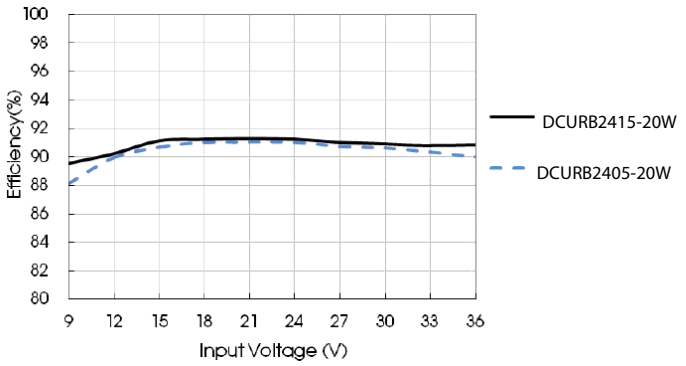


Temperature Derating Curve
Nominal Input Voltage, 12V, 15V, 24V Outputs

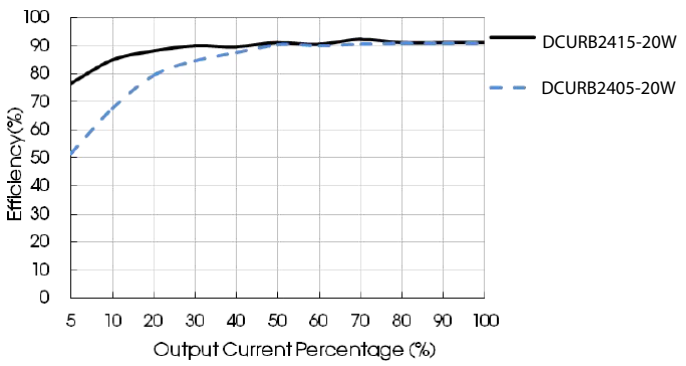


EFFICIENCY GRAPHS

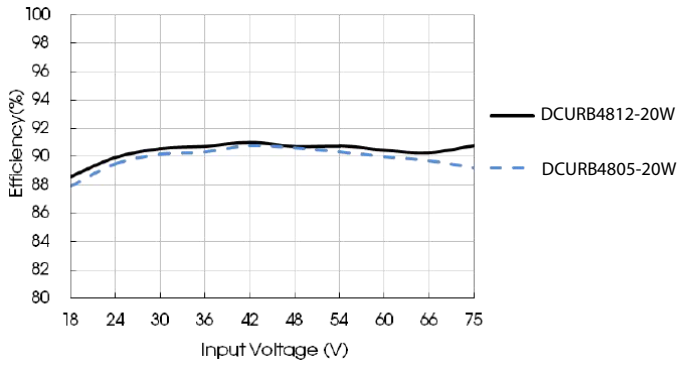
Efficiency vs. Input Voltage (Full Load)



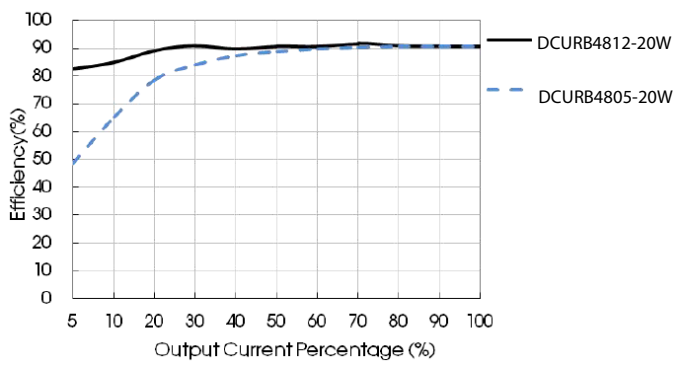
Efficiency vs. Output Load (Vin=24V)



Efficiency vs. Input Voltage (Full Load)

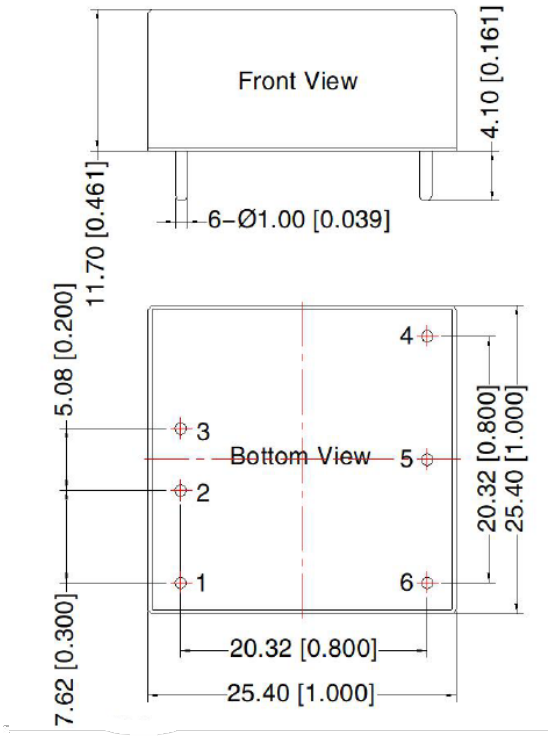


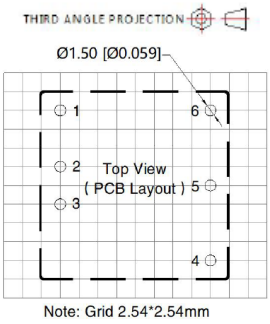
Efficiency vs. Output Load (Vin=48V)



MECHANICAL DRAWINGS

DIP Package

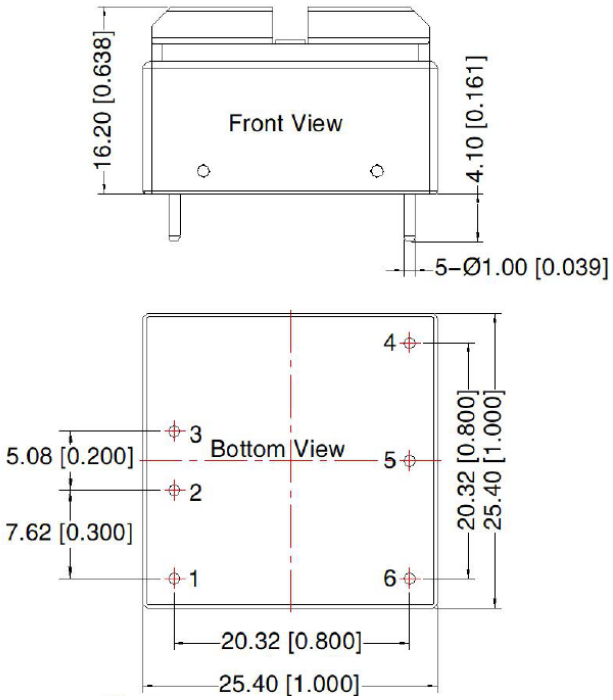


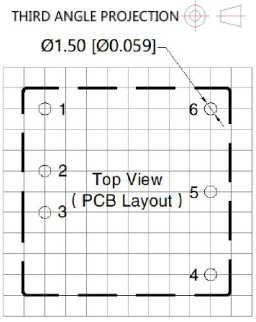


Pin-Out	
PIN	FUNCTION
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

Notes:
Unit: mm [inch]
PIN1/2/3/4/5/6: ϕ1.0mm
Pin diameter tolerances: ±0.10[±0.004]
General Tolerances: ±0.50 [±0.020]

DIP Package with Heatsink (“H” Suffix)



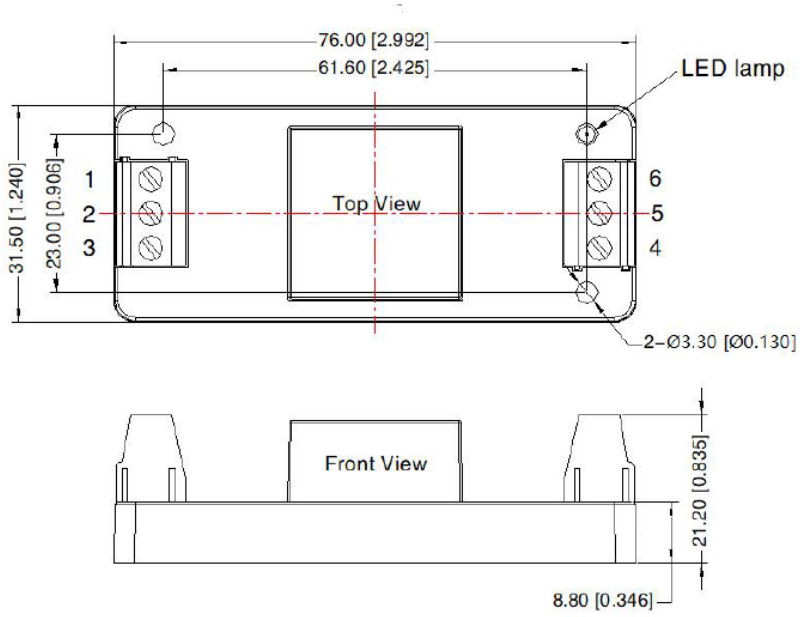


Pin-Out	
Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

Notes:
Unit: mm[inch]
PIN1/2/3/4/5/6: ϕ1.0mm
Pin diameter tolerances: ±0.10 {±0.004]
General Tolerances: ±0.50[±0.020]

Chassis Mounting ("A2S" Suffix)

THIRD ANGLE PROJECTION

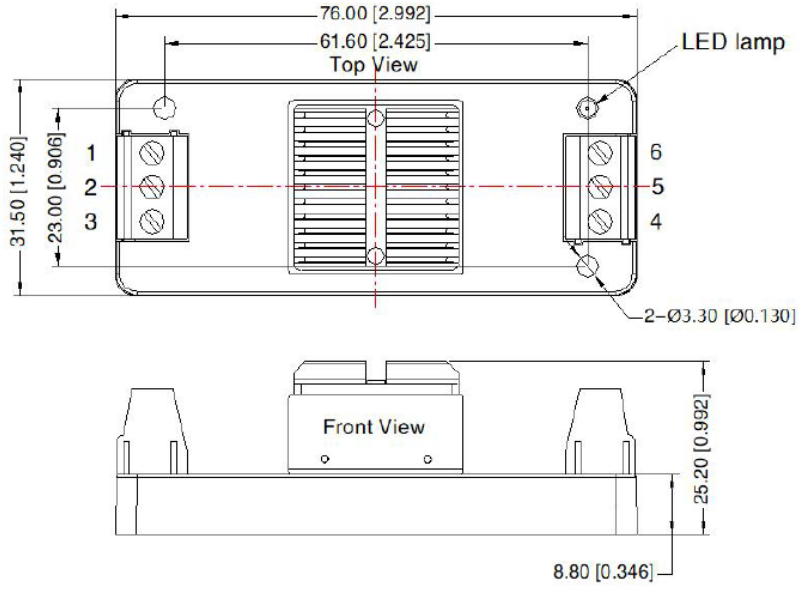


Pin-Out	
PIN	FUNCTION
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

Notes:
Unit: mm [inch]
Wire Range: 24~12AWG
Tightening Torque: Max 0.4 N·m
General Tolerances: ±1.00[±0.039]

Chassis Mounting with Heatsink ("HA2S" Suffix)

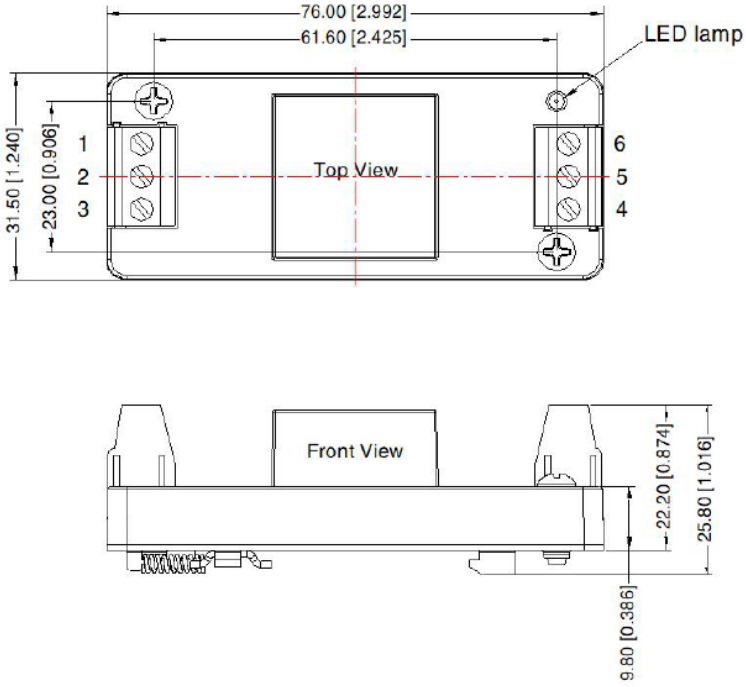
THIRD ANGLE PROJECTION



Pin-Out	
Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

Notes:
Unit: mm[inch]
Wire Range: 24~12AWG
Tightening Torque: Max 0.4 N·m
General Tolerances: ±1.00[±0.039]

DIN Rail Mounting ("A4S" Suffix)

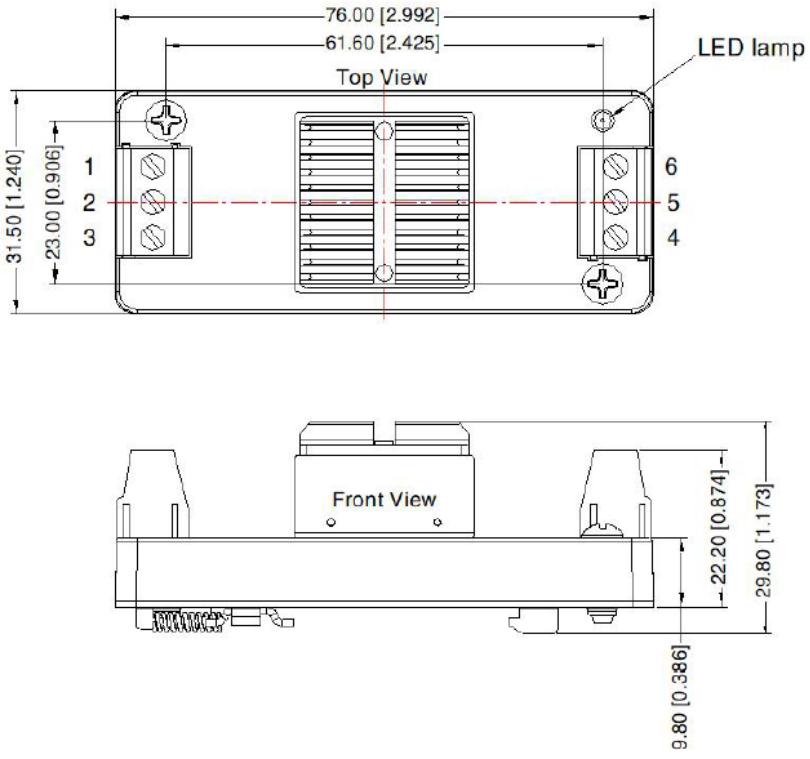


THIRD ANGLE PROJECTION

Pin-Out	
Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

Notes:
Unit: mm[inch]
Mounting Rail: TS35
Wire Range: 24~12AWG
Tightening Torque: Max 0.4 N·m
General Tolerances: ±1.0[±0.039]

DIN Rail Mounting with Heatsink ("HA4S" Suffix)



THIRD ANGLE PROJECTION

Pin-Out	
Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	Trim
6	0V

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

DESIGN REFERENCES

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 Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance does not exceed the specified max. capacitive load value of the product.

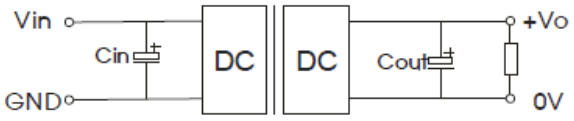


Fig. 1

Vin (VDC)	Vout (VDC)	Cin (μF)	Cout (μF)
24VDC	3.3/5/6	100μF/50V	100μF/16V
	12/15		100μF/25V
	24		47μF/50V
48VDC	3.3/5	100μF/100V	100μF/16V
	12/15		100μF/25V
	24		47μF/50V

2. EMC Compliance Circuit

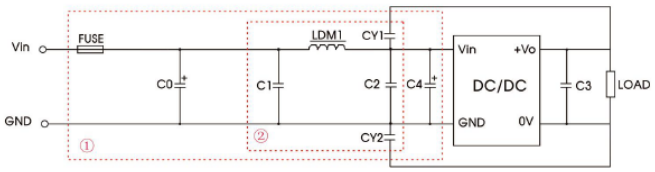


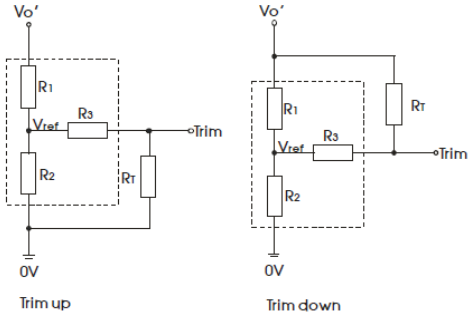
Fig. 2

Note: Part ①in the Fig. 2 is for immunity tests and part ② is for emissions test. Select based on needs.

Parameter Description

Model	Vin:24VDC	Vin:48VDC
Fuse	Select fuse value according to actual input current	
C0, C4	330μF/50V	330μF/100V
C1, C2	4.7μF/50V	4.7μF/100V
C3	Refer to the Cout in Fig. 2	
LDMI	2.2μH/4A	2.2μH/2A
CY1, CY2	1nF/2kV	

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



TRIM Resistor Connection (dashed line shows internal resistor network)

Calculation formula of Trim resistance:

$$up: R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{V_{ref}}{Vo' - V_{ref}} \cdot R_1$$

$$down: R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vo' - V_{ref}}{V_{ref}} \cdot R_2$$

R_T= Trim Resistor Value
a= self-defined paramter
Vo'=desired output voltage

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.775	2.87	15	1.25
5	2.894	2.87	10	2.5
6	4.064	2.87	10	2.5
12	11.000	2.87	17.4	2.5
15	14.494	2.87	17.4	2.5
24	24.872	2.87	20	2.5

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

MODEL NUMBER SETUP

DCURB	24	03	-	20W	H	A2S
Series Name	Input Voltage	Output Voltage		Output Power	Heatsink	Case Type
		03: 3.3VDC **05:** 5VDC **06:** 6VDC **12:** 12VDC **15:** 15VDC **24:** 24VDC			**None:** No Heatsink **H:** Heatsink	**None:** DIP Package **A2S:** Chassis Mount **A4S:** DIN Rail

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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