



## 50DAW\_1.5 series

50W - Single Output - Wide Input - Isolated & Regulated DC-DC Converter

## DC-DC Converter

50 Watt

- ⊕ Wide 2:1 input voltage range
- ⊕ High efficiency up to 92%
- ⊕ 1.5kVDC I/O isolation
- ⊕ Input under-voltage protection, output short circuit, over-current, over-voltage protection
- ⊕ Operating ambient temp. range: -40°C to +105°C
- ⊕ No-load power consumption as low as 0.048W
- ⊕ Six-sided metal shielding package
- ⊕ Input reverse polarity protection available with chassis or DIN-Rail mounting version
- ⊕ Industry standard pin-out
- ⊕ Meets IEC62368, UL62368, EN62368 standards

The 50DAW\_1.5 series of of isolated 50W DC-DC converter products with a wide 2:1 input voltage range. They feature efficiencies up to 92%, input to output isolation is tested with 1500VDC and the converter safety operate ambient temperature of -40° to +105°C, input under-voltage protection, output short-circuit, over-current, over-voltage protection. They are ideally and widely used in applications such as industrial control, electric power, instruments and communications.



### Common specifications

Item	Test condition	Min	Typ	Max	Units
Short circuit protection	Hiccup, continuous, self-recovery				
Operating Temperature	See Fig. 1	-40		+105	°C
Storage Temperature		-40		+125	°C
Storage humidity		5		95	%RH
Soldering Resistance Temperature	Soldering spot is 1.5mm for 10 seconds			+300	°C
Vibration	10-150Hz, 5G, 0.75mm. along X, Y and Z				
Switching Frequency *	PWM mode		300		KHz
MTBF	MIL-HDBK-217F@25°C	> 1000,000			h
Hot plug:	Unavailable				
Case material:	Aluminum alloy				
Dimension (Without heat sink)	• Horizontal package • Chassis mounting • Din-Rail mounting	50.80 × 25.40 × 11.80 mm 76.00 × 31.50 × 21.20 mm 76.00 × 31.50 × 25.80 mm			
Dimension (With heat sink)	• Horizontal package • Chassis mounting • Din-Rail mounting	51.40 × 26.20 × 16.50 mm 76.00 × 31.50 × 25.30 mm 76.00 × 31.50 × 29.90 mm			
Weight (Without heat sink)	• Horizontal package • Chassis mounting • Din-Rail mounting	42g TYP. 65g TYP. 85g TYP.			
Weight (With heat sink)	• Horizontal package • Chassis mounting • Din-Rail mounting	50g TYP. 73g TYP. 93g TYP.			
Cooling:	Free air convection				

Note: \*Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

### Example:

**50DAW\_2415S1.5**  
50 = 50Watt; D = DIP; A = series; W = wide input (2:1); 24 = 18-36Vin;  
15 = 15Vout; S = single output; 1.5 = 1500VDC isolation

### Note:

- It is recommended to use at more than 10% load. If the load is lower than 10%, the ripple of the product may exceed the specifications, but the reliability of the product is not affected.
- The maximum capacitive load offered were tested at nominal input voltage and full load;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see „Features“ and „EMC“;
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

### Input specifications

Item	Test condition	Min	Typ	Max	Units
Input Current (full load /no-load, Nominal input voltage)	• 3.3VDC output • 5VDC output • 12VDC output • 15VDC output • 24VDC output		756/1 1145/2 1133/4 1133/4 1133/3	773/- 1171/- 1158/- 1158/- 1158/-	mA mA mA mA mA
Input surge voltage	(1 sec. max.)	-0.7		80	VDC
Start-up voltage				36	VDC
Input under voltage protection	26		30		VDC
Start-up time	Nominal input voltage & constant resistance load		10	120	ms
Input filter	PI				
Ctrl'	• Models ON • Models OFF • Input current when off			Ctrl pin open or pulled high (TTL 3.0-12VDC) Ctrl pin pulled low to GND (0-1.2VDC) 2	12 mA

Note: \*The Ctrl pin voltage is referenced to input GND.

### Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	5%-100% load		±1	±3	%
Line regulation	Input voltage variation from low to high at full load		±0.2	±0.5	%
Load regulation	5%-100% load		±0.5	±1	%
Transient recovery time	25% load step change, nominal input voltage		250	500	µs
Transient response deviation	25% load step change, input voltage range • 3.3/5VDC output • others		±3 ±3	±8 ±5	% %
Temperature Coefficient	Full load			±0.03	%/°C
Ripple & Noise*	20MHz bandwidth, 5%-100% load • 3.3/5VDC output • 12 /15VDC output • 24VDC output		170 200 180	200 250 350	mVp-p mVp-p mVp-p
Trim		90		110	VDC
Over voltage protection	Input voltage range	110	140	160	%Vo
Over current protection	Input voltage range	110	140	200	%Io

Note: \*The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

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Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	<ul style="list-style-type: none"> <li>Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.</li> <li>Input/output-Housing Electric Strength Test for 1 minute with a leakage current of 1mA max.</li> </ul>	1500			VDC
		1000			
Isolation resistance	Test at 500VDC	100			MΩ
Isolation capacitance	100KHz/0.1V		2200		pF

EMC specifications					
Emissions	CE	CISPR32/EN55032 CLASS B (see Fig.3 for recommended circuit)			
Emissions	RE	CISPR32/EN55032 CLASS B (see Fig.3 for recommended circuit)			
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B	
Immunity	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A	
Immunity	EFT	IEC/EN61000-4-4	100KHz ±2KV (see Fig.3 for recommended circuit)	perf. Criteria B	
Immunity	Surge	IEC/EN61000-4-5	line to line ±2KV (see Fig.3 for recommended circuit)	perf. Criteria B	
Immunity	CS	IIEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A	

### Selection Guide

Part Number	Input Voltage [VDC]			Output Voltage [VDC]	Output Current [mA, Max]	Efficiency [%, Min./Typ.]	Capacitive load [μF, Max]
	Nominal	Range	Max <sup>(1)</sup>				
50DAW_4803S1.5	48	36-75	80	3.3	10000	89/91	27000
50DAW_4805S1.5	48	36-75	80	5	10000	89/91	18900
50DAW_4812S1.5	48	36-75	80	12	4167	90/92	3700
50DAW_4815S1.5	48	36-75	80	15	3333	90/92	2000
50DAW_4824S1.5	48	36-75	80	24	2083	90/92	1000

Notes:

- Recommended to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
- The minimum input voltage and starting voltage of chassis mounting and DIN-Rail mounting Model are 1VDC higher than those of DIP package due to input reverse polarity protection function;
- Exceeding the maximum input voltage may cause permanent damage;
- Efficiency is measured at nominal input voltage and rated output load; efficiencies for chassis mounting and DIN-Rail mounting Model's is decreased by 2% due to the input reverse polarity protection circuit.

## Typical characteristics

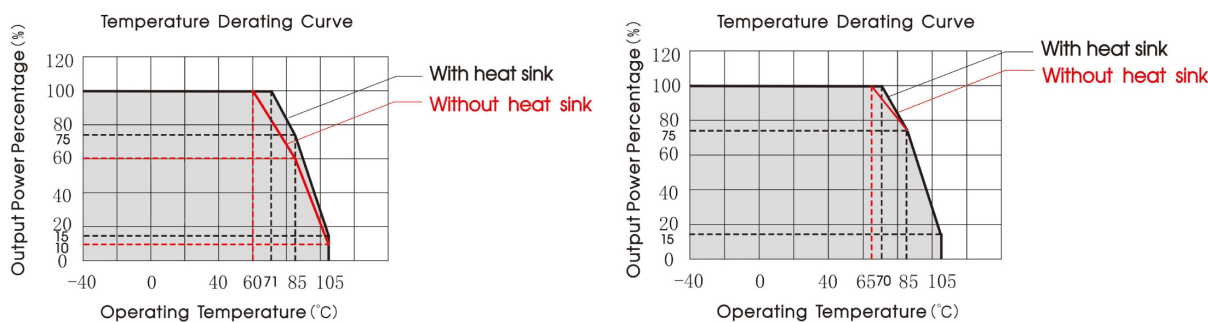


Fig. 1

## Typical application

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values  $C_{in}$  and  $C_{out}$  and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product



Fig. 2

Vout (VDC)	Cin (μF)	Cout (μF)
3.3	200μF/10V	470μF/10V
5	100μF/50V	470μF/10V
12/15	100μF/50V	100μF/25V
24	100μF/50V	47μF/50V

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### EMC compliance circuit

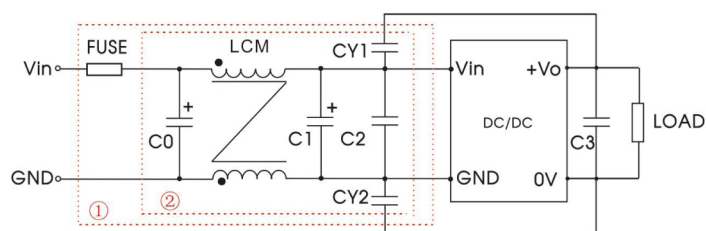


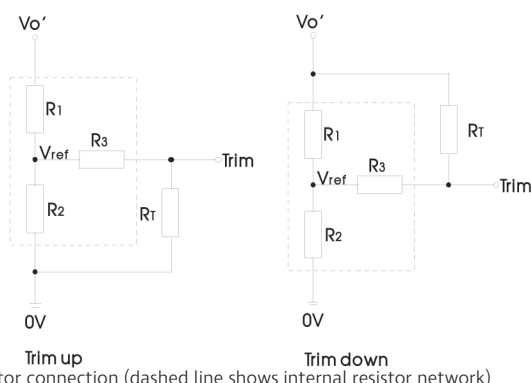
Fig. 3

Notes: We use Part ① in Fig. 3 for Immunity tests and Part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	Vin:48V
FUSE	T/2A/250VAC
C0	330µF/100V
LCM	2.2mH, recommended to use MORNSUN P/N: FL2D-30-222
C1	330µF/100V
C2	2.2µF/100V
CY1, CY2	Y1 Safety capacitor 3.3nF/250VAC
C3	Refer to the Cout in Fig.2

### Trim Function for Output Voltage Adjustment (open if unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3$$

$$\alpha = \frac{V_{ref}}{V_o' - V_{ref}} R_1$$

$$\text{wn: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3$$

$$\alpha = \frac{V_o' - V_{ref}}{V_{ref}} R_2$$

RT is Trim resistance  
a is a self-defined parameter, with no real meaning.

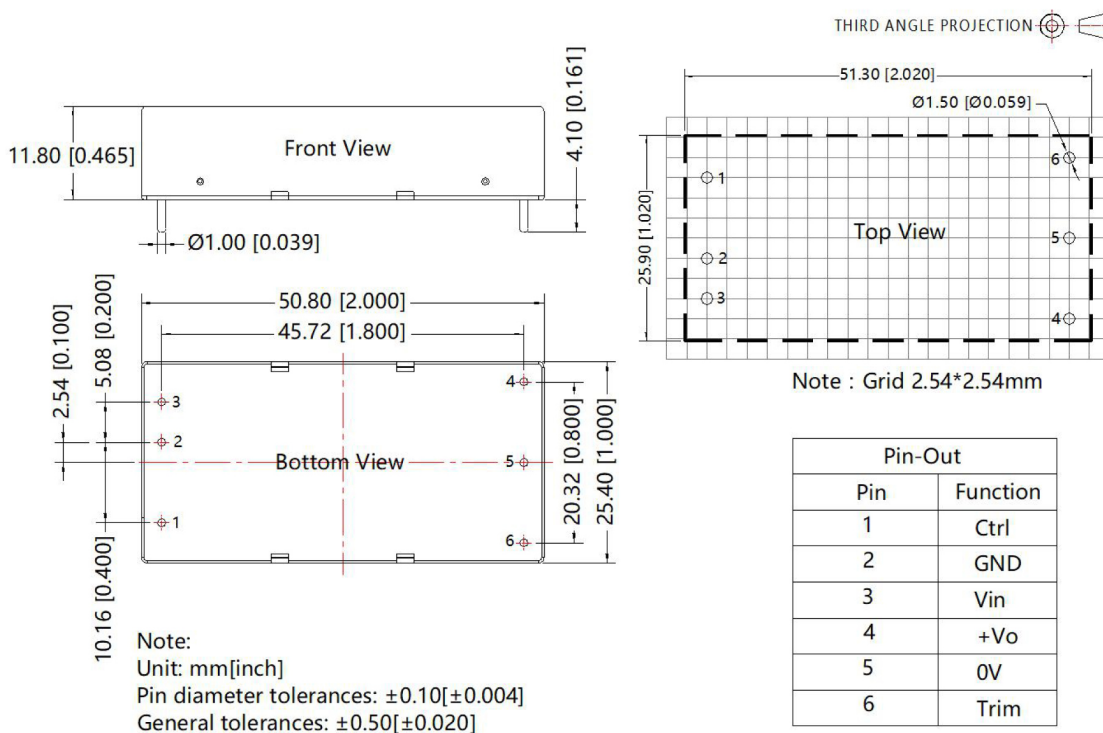
Vout(V)	Vout adjustable value(V)	RT(KΩ)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	Up: 3.63	10	4.83	2.87	10	1.24
3.3	Down: 2.97	13.5	4.83	2.87	10	1.24
5	Up: 5.5	4.3	2.87	2.87	10	2.5
5	Down: 4.5	1.5	2.87	2.87	10	2.5
12	Up: 13.2	7.6	10.90	2.87	15	2.5
12	Down: 10.8	60.7	10.90	2.87	15	2.5
15	Up: 16.5	8.9	14.35	2.87	15	2.5
15	Down: 13.5	90.2	14.35	2.87	15	2.5
24	Up: 26.4	21.6	48.77	2.87	5.1	2.5
24	Down: 21.6	185.9	48.77	2.87	5.1	2.5

The products do not support parallel connection of their output

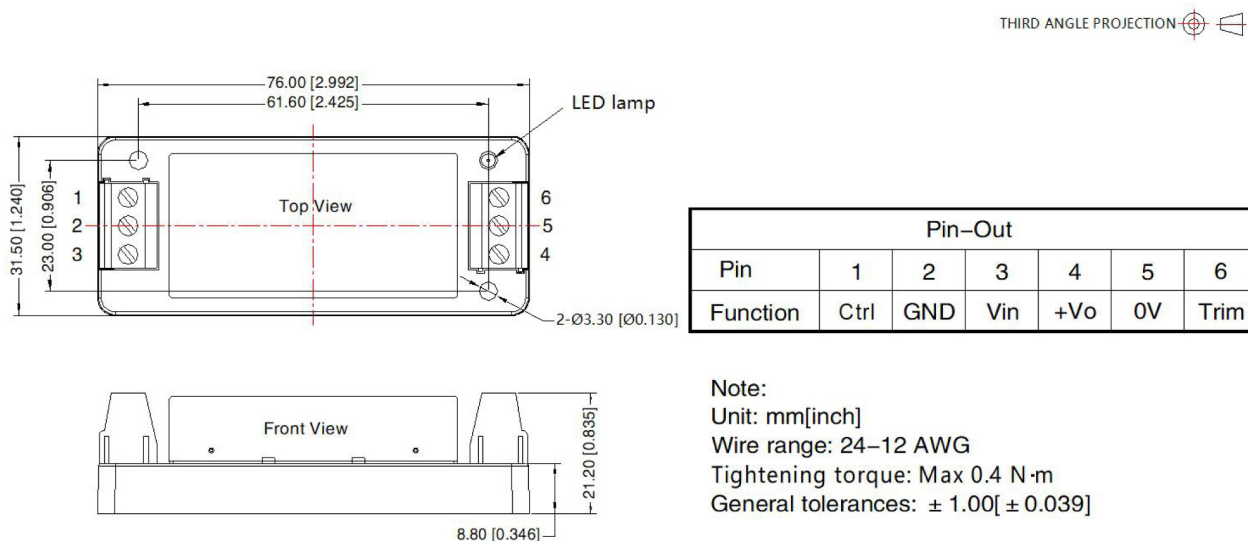
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### Horizontal Package - Dimensions and Recommended Layout



### Chassis Mounting - Dimensions and Recommended Layout

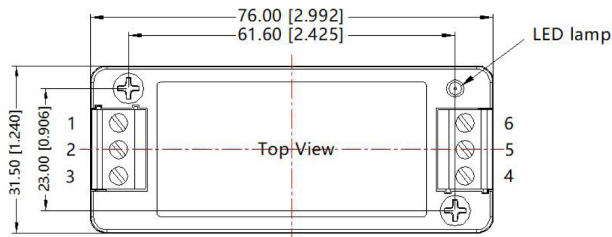


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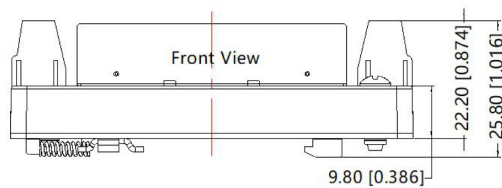
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### Din-Rail mounting - Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



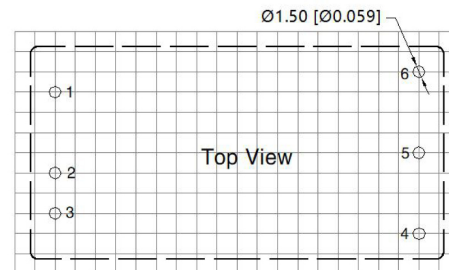
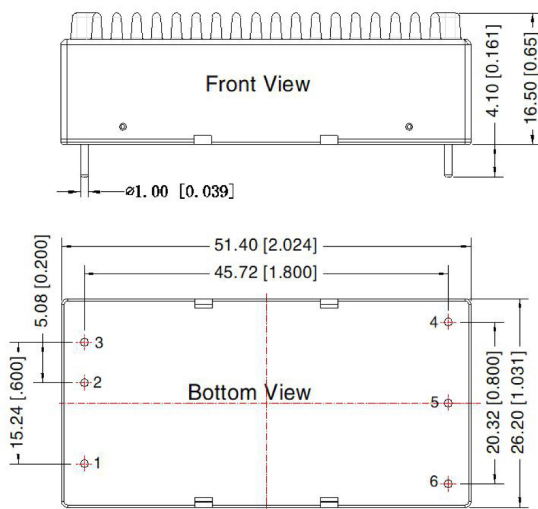
Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	+Vo	0V	Trim



Note:  
Unit: mm[inch]  
Mounting rail: TS35  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances:  $\pm 1.00[\pm 0.039]$

### Horizontal Package- Dimensions and Recommended Layout (With Heat Sink)

THIRD ANGLE PROJECTION 



Note: Grid: 2.54\*2.54mm

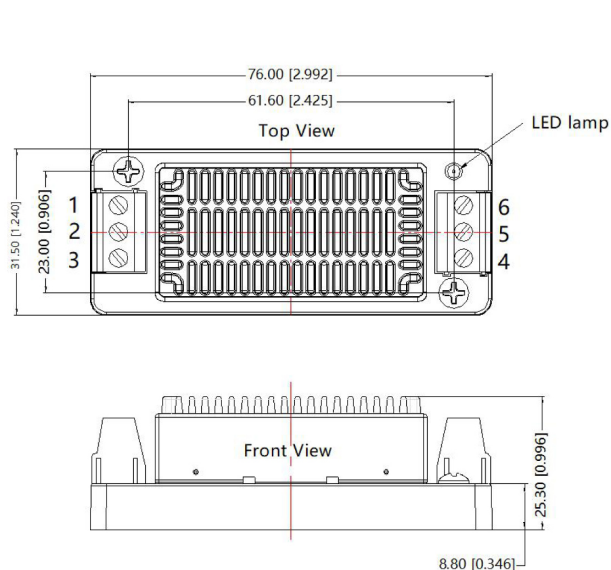
Pin-Out	
Pin	Function
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

Note:  
Unit: mm[inch]  
Pin diameter tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$

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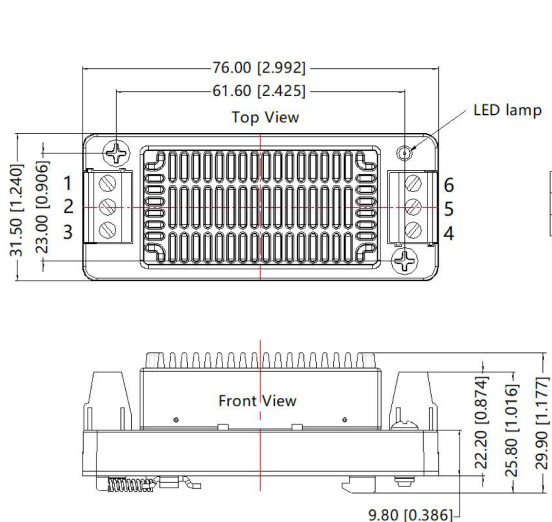
### Chassis Mounting - Dimensions and Recommended Layout (With Heat Sink)



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

Note:  
Unit: mm[inch]  
Mounting rail: TS35  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances:  $\pm 1.00[\pm 0.039]$

### Din-Rail mounting - Dimensions and Recommended Layout (With Heat Sink)



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

Note:  
Unit: mm[inch]  
Mounting rail: TS35  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances:  $\pm 1.00[\pm 0.039]$