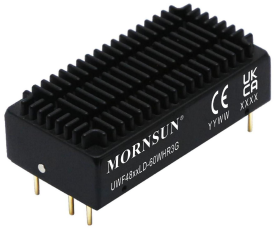
60W isolated DC-DC converter in DIP package
Ultra-wide input and regulated single output



Patent Protection

CE Report EN62368-1

UKCA Report BS EN62368-1

RoHS

FEATURES

- Ultra-wide 9-75VDC input voltage range
- High efficiency up to 92%
- I/O isolation test voltage 3k VDC
- Input under-voltage protection, output short-circuit, over-current, over–voltage protection
- Operating ambient temperature range: -40℃ to +105℃
- Industry standard pin-out

UWF48_LD-60W(H)R3G series of isolated 60W DC-DC converter products with an ultra-wide 9-75VDC input voltage range. They feature efficiencies up to 92%, input to output isolation is tested with 3000VDC and the converter safety operate ambient temperature of -40℃ to +105℃, 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 fields.

Selection Guide

Certification	Part No.①	Input Voltage (VDC)		Output		Full Load Efficiency③ (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	UWF4805LD-60W(H)R3G	48 (9-75)	80	5	12000/0	88/90	20000
	UWF4812LD-60W(H)R3G			12	5000/0	88/90	6000
	UWF4815LD-60W(H)R3G			15	4000/0	88/90	4000
	UWF4824LD-60W(H)R3G			24	2500/0	89/91	2000
	UWF4828LD-60W(H)R3G			28	2143/0	90/92	2000

Notes:
① Use "H" suffix for heat sink mounting, We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
② Exceeding the maximum input voltage may cause permanent damage;
③ Efficiency is measured at nominal input voltage and rated output load.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	48VDC input voltage	--	1389/15	1420/25	mA
Surge Voltage (1sec. max.)		-0.7	--	100	VDC
Start-up Voltage		--	--	9	
Input Filter		Capacitance filter			
Hot Plug		Unavailable			
Ctrl①	Module on	Ctrl pin open or pulled high TTL (3-12VDC)			
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)			
	Input current when off, 48VDC input voltage	--	6	12	mA

Note: ①The Ctrl pin voltage is referenced to input GND.

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	5%-100% load	--	±1	±2	%
	0%-5% load	--	±2	±5	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation①	5%-100% load	--	±0.5	±1	

Transient Response Deviation	25% load step change, input voltage range	5V output	--	±3	±10	%
		Other output	--	±3	±5	
Transient Recovery Time	25% load step change, nominal input voltage		--	250	500	μs
Ripple & Noise②	20MHz bandwidth, nominal input voltage 5%-100% load		--	130	200	mVp-p
Trim	Input voltage range		90	--	110	%Vo
Over-voltage Protection			110	140	160	
Over-current Protection			110	--	250	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:
①Load regulation for 0% -100% load increases to ±3%;
②Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "Tip and barrel method" is used for ripple and noise test, please refer to Fig. 2. for recommended circuit.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	3000	--	--	VDC
	Input/output-Case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1600	--	--	
Insulation Resistance	Input-output resistance at 500VDC	100	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig. 1	-40	--	+105	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	℃
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency①	PWM mode	--	255	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours

Note: ①Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

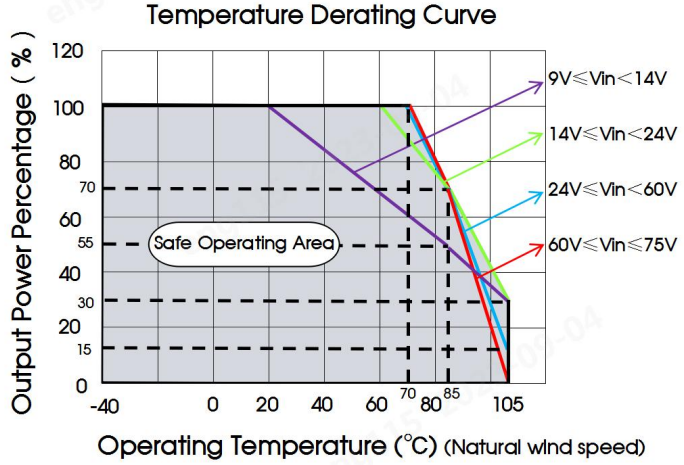
Case Material	Aluminum alloy	
Dimensions	Without heat sink	50.80 x 25.40 x 11.80 mm
	Heat sink	51.40 x 26.20 x 16.50 mm
Weight	Without heat sink	37.3g(Typ.)
	Heat sink	47.1g(Typ.)
Cooling Method	Free air convection	

Electromagnetic Compatibility (EMC)

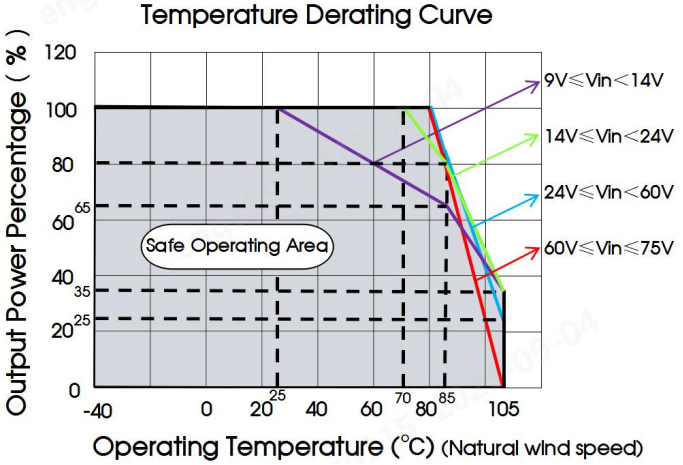
Emissions	CE	CISPR32/EN55032	CLASS A (see Fig. 3-① for recommended circuit) /CLASS B (see Fig. 3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (see Fig. 3-① for recommended circuit) / CLASS B (see Fig. 3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV/Air ±8kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	100kHz ±2kV (see Fig. 3-② for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig. 3-② for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

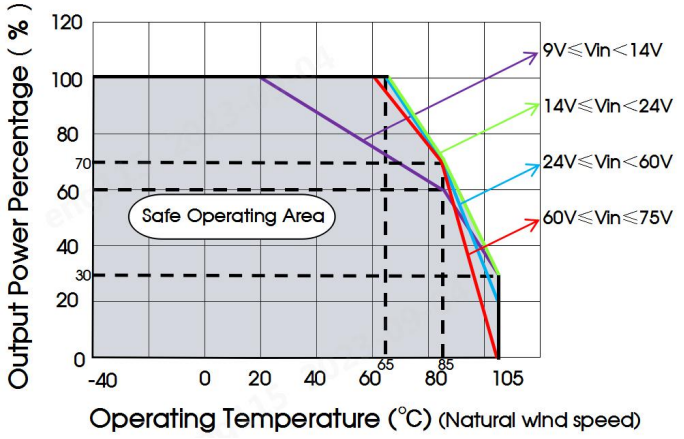
UWF4805LD-60WR3G
Temperature Derating Curve



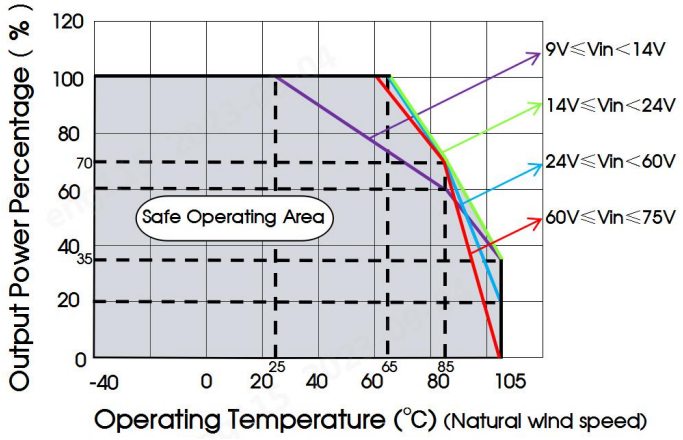
UWF4805LD-60WHR3G
Temperature Derating Curve



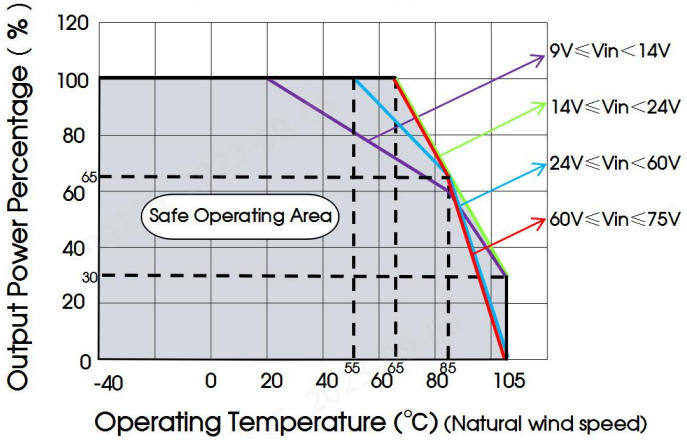
UWF4812LD-60WR3G
Temperature Derating Curve



UWF4812LD-60WHR3G
Temperature Derating Curve



UWF4815LD-60WR3G
Temperature Derating Curve



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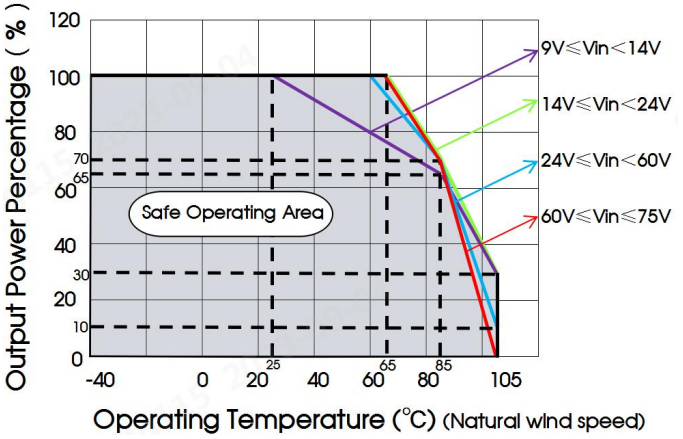
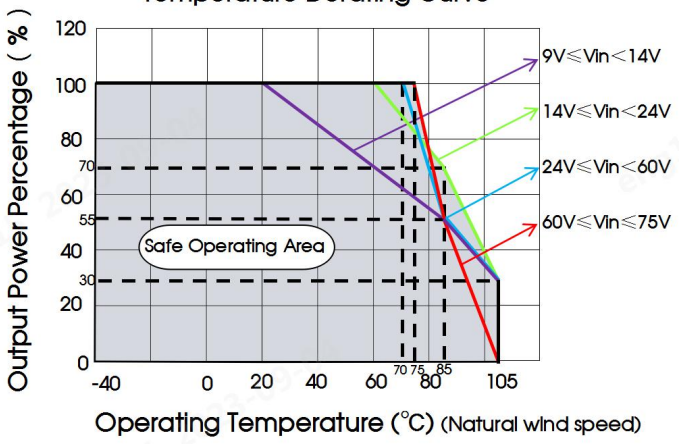
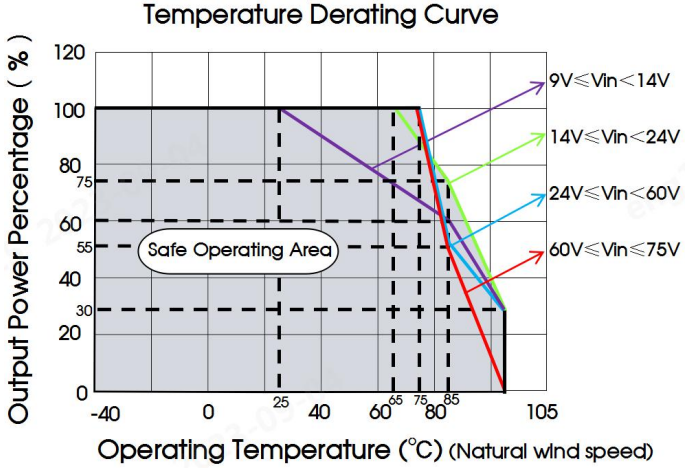
Temperature Derating Curve



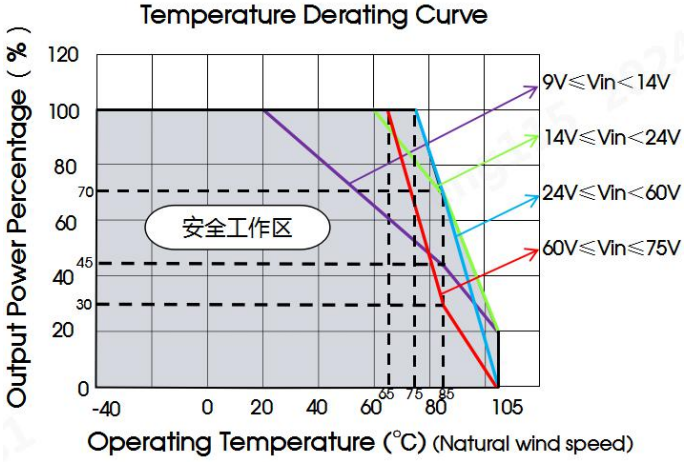
UWF4824LD-60WR3G
Temperature Derating Curve



UWF4824LD-60WHR3G
Temperature Derating Curve



UWF4828LD-60WR3G
Temperature Derating Curve



UWF4828LD-60WHR3G
Temperature Derating Curve

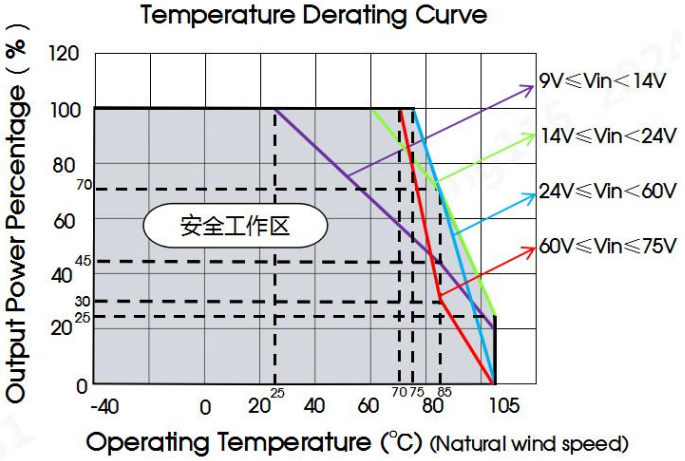


Fig. 1

Design Reference

1. Typical application

All the 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 Cin and Cout 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.

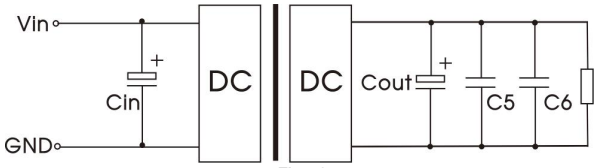


Fig. 2

Vout (VDC)	Cin	Cout	C5	C6
5	100μF/ 100V	220μF/ 50V	1μF/16V	10μF/16V
12/15			1μF/25V	10μF/25V
24/28			1μF/50V	10μF/50V

2. EMC compliance circuit

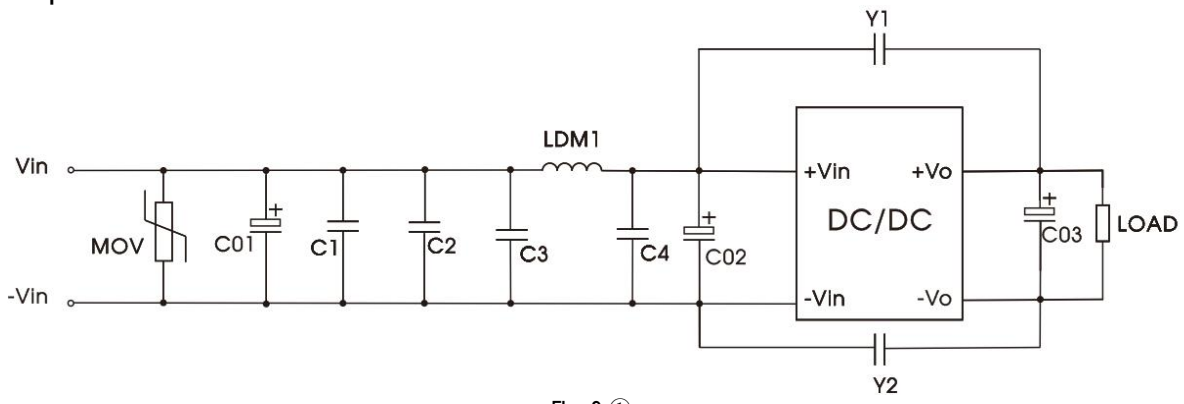


Fig. 3-①

Table 1：recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7μF	100V
C3/C4	20μF	100V
C01	1000μF	100V
C02	470μF	100V
C03	330μF	50V
Y1/Y2	2.2nF	3000VDC
LDM1	2.2μH	/
MOV	/	/

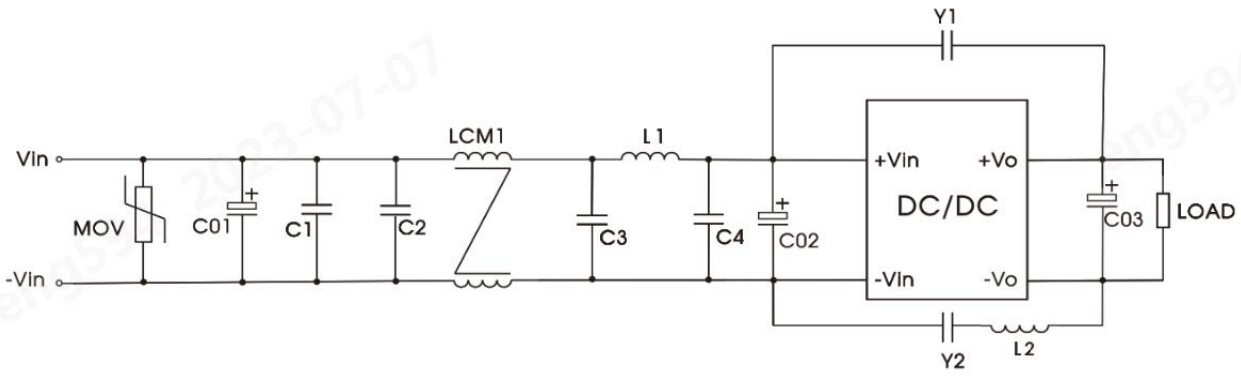
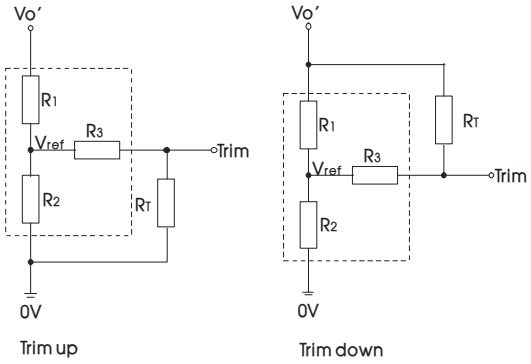


Fig. 3-②

Table 2：recommended component parameters

Model	Parameter	Parameter description
C1/C2	4.7uF	100V
C3/C4	20uF	100V
C01	1000uF	100V
C02	470uF	100V
C03	330uF	50V
Y1/Y2	4.7nF	3000VDC
LCM1	80uH	Recommend using our common mode inductors: FL2D-A0-900
L1	2.2uH	/
L2	0.3uH	/
MOV	/	/

3. Trim Function for Output Voltage Adjustment (open if unused)



Trim resistor connections (dashed line shows internal resistor network)

Calculating Trim resistor values:

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

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

RT = Trim Resistor value
a = self-defined parameter
Vo' = desired output voltage

Vout(VDC)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
05	2.97	2.87	8.1	2.5
12	10.91	2.87	15	2.5
15	14.35	2.87	12.1	2.5
24	24.77	2.87	6.1	2.5

4. Recommended solution for thermal testing

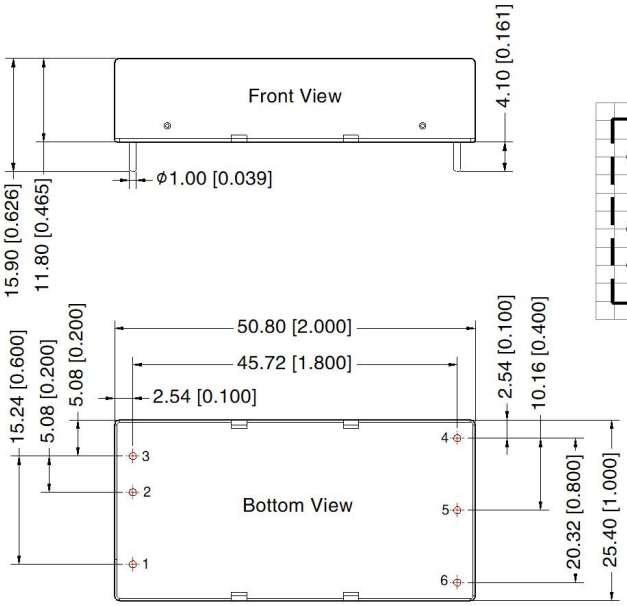
During the application process, the thermal design of the product can be evaluated in combination with the temperature derating curve of the product, or it can be determined by testing the temperature at point A, it is an safe operating area if the temperature lower than 100℃.

Fig.4

5. The products do not support parallel connection of their output

6. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

UWF48_LD-60WR3G Dimensions and Recommended Layout

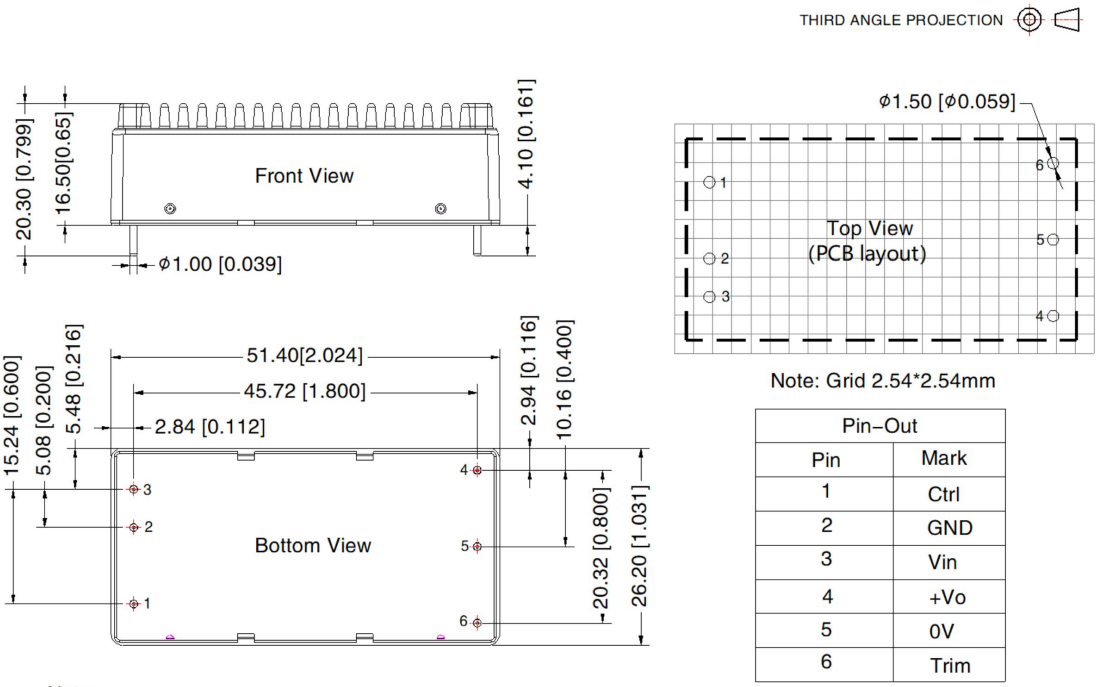


Pin-Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V
6	Trim

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

The layout of the device is for reference only, please refer to the actual product

UWF48_LD-60WHR3G Dimensions and Recommended Layout



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

The layout of the device is for reference only, please refer to the actual product

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging number: 58200035(without heat sink), 58200051(with heat sink);
2. Recommended used in more than 5% load, if the load is lower than 5%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;
3. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
4. The maximum capacitive load offered were tested at input voltage range and full load;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
6. All index testing methods in this datasheet are based on company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Products are related to laws and regulations: see "Features" and "EMC";
9. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Mornsun Guangzhou Science & Technology Co., Ltd.
Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com