DC/DC Converter
URB_MT-3WR3 Series

MORNSUN®

3W isolated DC/DC converter in SMD package
Ultra-wide input & regulated single output

Patent Protection

3 years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

RoHS

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 84%
- No-load power consumption as low as 0.10W
- I/O Isolation test voltage 1.5k VDC
- Input under-voltage protection, output short-circuit protection, over-current protection
- Operating ambient temperature range: -40℃ to +85℃
- Industry standard pin-out

URB_MT-3WR3 series of isolated 3W DC-DC converter products with an ultra-wide range of voltage input of 9-36VDC, 18-75VDC, input to output isolation is tested with 1500VDC, input under-voltage protection, output short-circuit, over-current protection, they are widely used in fields such as industrial control, electric power, instruments and communication.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.①	Voltage (VDC)	Current (mA) Max./Min.		
--	URB2403MT-3WR3	24 (9-36)	40	3.3	728/0	73/75	2200
EN/BS EN	URB2405MT-3WR3			5	600/0	78/80	2200
--	URB2409MT-3WR3			9	333/0	78/80	1000
EN/BS EN	URB2412MT-3WR3			12	250/0	80/82	680
	URB2415MT-3WR3			15	200/0	81/83	470
	URB2424MT-3WR3			24	125/0	80/82	100
EN/BS EN	URB4803MT-3WR3	48 (18-75)	80	3.3	728/0	73/75	2200
	URB4805MT-3WR3			5	600/0	77/79	2200
	URB4812MT-3WR3			12	250/0	80/82	680
	URB4815MT-3WR3			15	200/0	82/84	470
	URB4824MT-3WR3			24	125/0	80/82	100

Note:
①Exceeding the maximum input voltage may cause permanent damage;
②Efficiency 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)	24VDC input series nominal input voltage	3.3V Output	--	134/4	138/7	mA
		24V Output	--	152/4	156/12	
		Others	--	154/4	161/7	
	48VDC input series nominal input voltage	3.3V Output	--	67/4	69/7	
		Others	--	77/4	82/7	
Reflected Ripple Current	Nominal 24VDC input series		--	120	--	
	Nominal 48VDC input series		--	60	--	
Surge Voltage (1sec. max.)	Nominal 24VDC input series		-0.7	--	50	VDC
	Nominal 48VDC input series		-0.7	--	100	
Start-up Voltage	Nominal 24VDC input series		--	--	9	
	Nominal 48VDC input series		--	--	18	
Input Under-voltage Protection	Nominal 24VDC input series		5.5	6.5	--	
	Nominal 48VDC input series		13	15.5	--	
Start-up Time	Nominal input voltage & constant resistance load		--	10	--	ms

Input Filter		C filter			
Ctrl*	Module on	Ctrl pin open or pulled high(3.5-12VDC)			
	Module off	Ctrl pin pulled low to GND(0-1.2VDC)			
	Input current when off	--	6	10	mA
Hot Plug		Unavailable			
Note: *The Ctrl pin voltage is referenced to input GND.					

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation	0%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	--	±0.03	%/℃
Ripple & Noise*	20MHz bandwidth , 5%-100% load	--	30	120	mVp-p
Over-current Protection	Input voltage range	--	150	250	%Io
Short-circuit Protection		Continuous			
Note: *Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.					

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.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	see Fig. 1	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Case Temperature Rise	Ta=25℃, nominal input, full load output	--	+40	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	
Storage Humidity	Non-condensing	5	--	95	%RH
Reflow Soldering Temperature		Peak temp.≤245℃, maximum duration time≤60s at 217℃. For actual application, please refer to IPC/JEDEC J-STD-020D.1.			
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM Mode	--	350	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 1			
Note: *Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.					

Physical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant
Dimensions	19.20 x 18.10 x 10.16 mm
Weight	3.5g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B

Typical Characteristic Curves

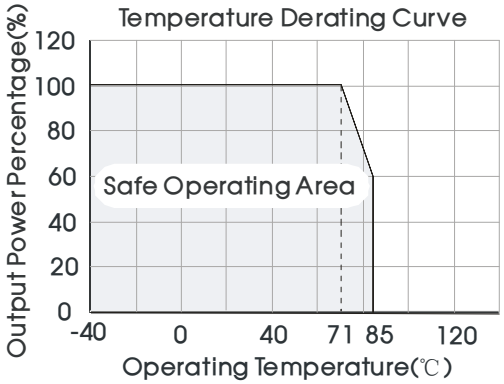
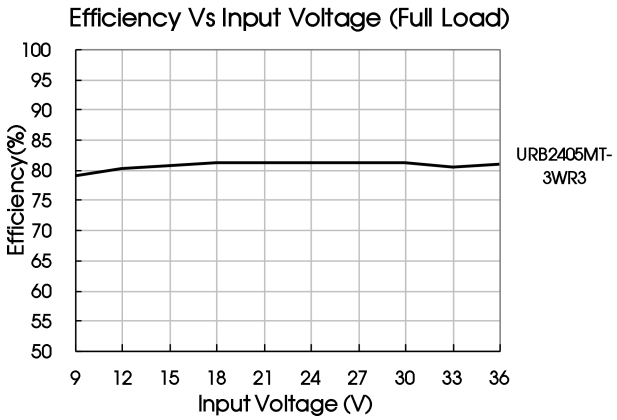
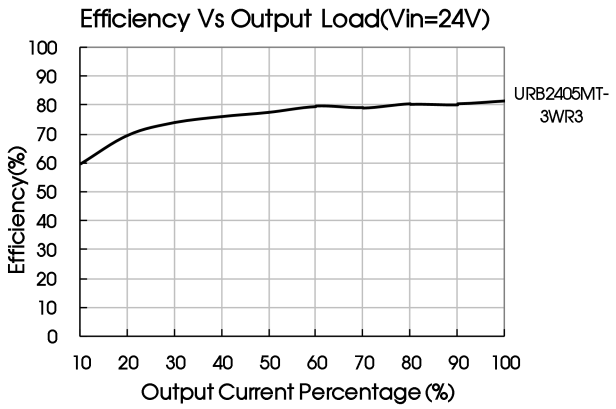
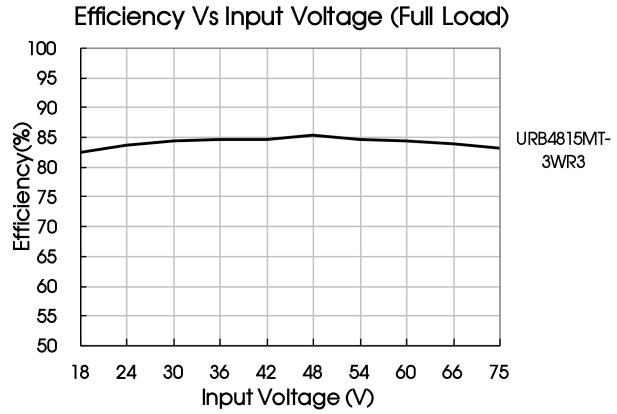
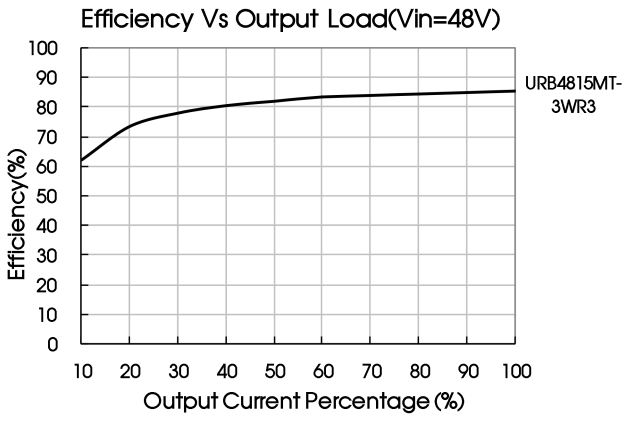


Fig. 1









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.

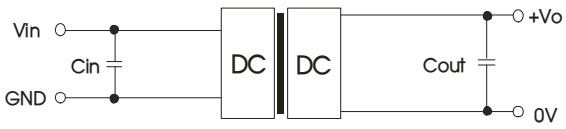


Fig. 2

Vin(VDC)	Cin	Vo(VDC)	Cout
24	100μF/50V	3.3/5/9	10μF/16V
		12/15	10μF/25V
		24	10μF/50V
48	10μF/100V -47μF/100V	3.3/5	10μF/16V
		12/15	10μF/25V
		24	10μF/50V

2. EMC solution-recommended circuit

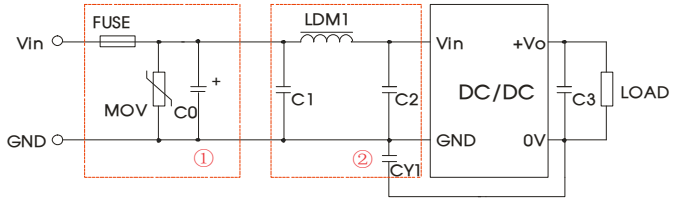


Fig. 3
Note: We use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

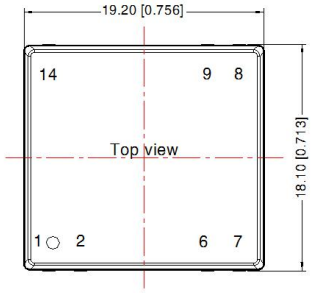
Model	Vin: 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680μF/50V	680μF/100V
C1/C2	4.7μF/50V	4.7μF/100V
C3	Refer to the Cout in Fig.2	
LDM1	12μH	
CY1	1nF/2kV	

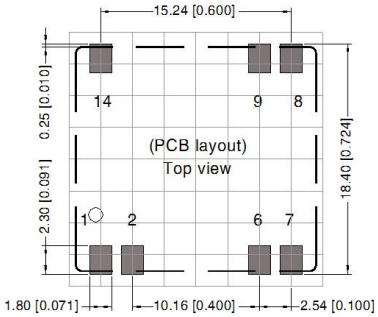
3. The products do not support parallel connection of their output

4. For additional information about Mornsun EMC Filter products, please refer to www.mornsun-power.com to download the Selection Guide of EMC Filter

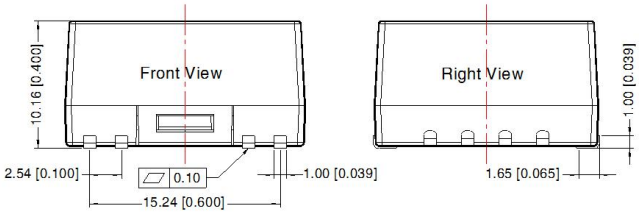
Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





Note: Grid 2.54*2.54mm



Pin-Out	
Pin	Mark
1	GND
2	Ctrl
6	NC
7	NC
8	+Vo
9	0V
14	Vin

NC: Not available for electrical connection

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

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Tube Packaging bag number: 58010114, Roll Packaging bag number: 58010115;
2. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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