

10W, Ultra wide input isolated & regulated
DC-DC converter



Patent Protection RoHS

URF_LP-10WR3 series products are of 10W output power, extremely wide range of voltage input of 9-36VDC, 18-75VDC, isolation voltage of 3000VDC, Input under-voltage protection, output over-voltage protection, output short circuit protection and output over-current protection with the bare component in compliance with CISPR22/EN55022 CLASS A; these products are widely used in fields such as industrial control, electric power, instruments and communication.

FEATURES

- Wide range of input voltage (4:1)
- Efficiency up to 87%
- No-load power consumption as low as 0.2W
- Isolation voltage :3K VDC
- Operating temperature range: -40°C to +85°C
- Input under-voltage protection, output over-voltage protection, short circuit protection, output over-current protection
- Meet CISPR22/EN55022 CLASS A
- International standard pin-out
- A2S (wring mounting) and A4S (TS35 rail mounting) products featuring anti-reverse connection for input

Selection Guide

| Part No. ① | Input Voltage (VDC) | | Output | | Efficiency ② (% Typ.) @ Full Load | Max. Capacitive Load(μF) |
|-----------------|---------------------|--------|-------------------------|------------------------------------|--------------------------------------|-----------------------------|
| | Nominal (Range) | Max. ② | Output Voltage (VDC) | Output Current (mA) (Max./Min.) | | |
| URF2403LP-10WR3 | 24 (9-36) | 40 | 3.3 | 2400/120 | 77/79 | 5400 |
| URF2405LP-10WR3 | | | 5 | 2000/100 | 80/82 | 5400 |
| URF2409LP-10WR3 | | | 9 | 1111/56 | 83/85 | 680 |
| URF2412LP-10WR3 | | | 12 | 833/42 | 84/86 | 470 |
| URF2415LP-10WR3 | | | 15 | 667/33 | 85/87 | 330 |
| URF2424LP-10WR3 | | | 24 | 416/21 | 85/87 | 100 |
| URF4803LP-10WR3 | 48 (18-75) | 80 | 3.3 | 2400/120 | 77/79 | 5400 |
| URF4805LP-10WR3 | | | 5 | 2000/100 | 80/82 | 5400 |
| URF4812LP-10WR3 | | | 12 | 833/42 | 84/86 | 470 |
| URF4815LP-10WR3 | | | 15 | 667/33 | 85/87 | 330 |
| URF4824LP-10WR3 | | | 24 | 416/21 | 85/87 | 100 |

Notes:
 ① Part No. with suffix of "A2S" means chassis mounting and suffix of "A4S" means DIN-Rail mounting (e.g. URF2405LP-10WR3A2S means chassis mounting; URF2405LP-10WR3A4S means DIN-Rail mounting);
 ② Absolute maximum rating without damage on the converter, but it isn't recommended;
 ③ Efficiency is measured in nominal input voltage and rated output load; A2S (wiring) and A4S (rail) Model due to input reverse polarity protection, minimum efficiency greater than Min.-2 is qualified.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|------|-------|------|------|
| Input Current (full load / no-load) | 24VDC input | -- | 508/5 | -- | mA |
| | 48VDC input | -- | 254/4 | -- | |
| Reflected Ripple Current | 24VDC input | -- | 40 | -- | VDC |
| | 48VDC input | -- | 30 | -- | |
| Input Impulse Voltage (1sec. max.) | 24VDC input | -0.7 | -- | 50 | VDC |
| | 48VDC input | -0.7 | -- | 100 | |
| Starting Voltage | 24VDC input | -- | -- | 9 | VDC |
| | 48VDC input | -- | -- | 18 | |
| Input under-voltage Protection | 24VDC input | 5.5 | 6.5 | -- | VDC |
| | 48VDC input | 14.0 | 15.5 | -- | |

| | | | | | |
|---------------|---|---|----|----|----|
| Starting Time | Nominal input& constant resistance load | -- | 10 | -- | ms |
| Input Filter | | Pi filter | | | |
| Ctrl* | Module switch on | Ctrl suspended or connected to TTL high level (3.5-12VDC) | | | |
| | Module switch off | Ctrl pin connected to GND or low level (0-1.2VDC) | | | |
| | Input current when switched off | -- | 5 | 8 | mA |

Note: * the voltage of Ctrl pin is relative to input pin GND.

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|--|---------------------------|------|-------|--------|
| Output Voltage Accuracy | | -- | ±1 | ±3 | % |
| Line Regulation | Full load, the input voltage is from low voltage to high voltage | -- | ±0.2 | ±0.5 | |
| Load Regulation | 5%-100% load | -- | ±0.5 | ±1 | |
| Transient Recovery Time | 25% load step change | -- | 300 | 500 | µs |
| Transient Response Deviation | | -- | ±3 | ±5 | % |
| Temperature Drift Coefficient | Full load | -- | -- | ±0.03 | %/°C |
| Ripple&Noise* | 20MHz bandwidth | -- | 50 | 120 | mV p-p |
| Output Over-voltage Protection | Input voltage range | 110 | 130 | 160 | %Vo |
| Output Over-current Protection | | 110 | 140 | 190 | %Io |
| Output Short circuit Protection | | Continuous, self-recovery | | | |

Note: * Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.

General Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------------|--|--|------|------|---------|
| Insulation Voltage | Input-output, with the test time of 1 minute and the leak current lower than 1mA | 3000 | -- | -- | VDC |
| Insulation Resistance | Input-output, insulation voltage 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 500 | -- | pF |
| Operating Temperature | Derating if the temperature is ≥71°C (see Fig. 1) | -40 | -- | 85 | °C |
| Storage Temperature | | -55 | -- | 125 | °C |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Max. Operating Temperature for casing | Within the operating temperature curve | -- | -- | 105 | °C |
| Lead Temperature | Welding spot is 1.5mm away from the casing, 10 seconds | -- | -- | 300 | |
| Vibration | | 10-55Hz, 10G, 30 Min. along X, Y and Z | | | |
| Switching Frequency | PWM mode | -- | 350 | -- | KHz |
| MTBF | MIL-HDBK-217F@25°C | 1000 | -- | -- | K hours |

Physical Specifications

| | | | | | |
|--------------------|--|-----------------------------|--|--|--|
| Casing Material | Plastic (UL94-V0) | | | | |
| Package Dimensions | Horizontal package | 51.50*26.50*12.00 mm | | | |
| | A2S wiring package | 76.00*31.50*21.20 mm | | | |
| | A4S rail package | 76.00*31.50*25.80 mm | | | |
| Weight | Horizontal package/A2S wiring package/A4S rail package | 24.00g/46.00g/66.00g (Typ.) | | | |
| Cooling method | Free air convection | | | | |

EMC Specifications

| | | | | | |
|-----|-------------------------|---|--------------|------------------|--|
| EMI | Conducted disturbance | CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit) | | | |
| | Radiated emission | CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit) | | | |
| EMS | Electrostatic discharge | IEC/EN61000-4-2 | Contact ±4KV | perf. Criteria B | |
| | Radiation immunity | IEC/EN61000-4-3 | 10V/m | perf. Criteria A | |

| | | | | |
|-----|--|------------------|--|------------------|
| EMS | EFT | IEC/EN61000-4-4 | ±2KV (see Fig.3-① for recommended circuit) | perf. Criteria B |
| | Surge Immunity | IEC/EN61000-4-5 | ±2KV (see Fig.3-① for recommended circuit) | perf. Criteria B |
| | Conducted disturbance immunity | IEC/EN61000-4-6 | 3 Vr.m.s | perf. Criteria A |
| | Immunities of voltage dip, drop and short interruption | IEC/EN61000-4-29 | 0-70% | perf. Criteria B |

Product Characteristic Curve

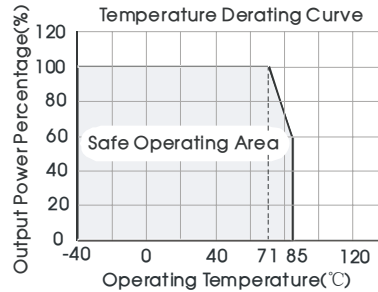
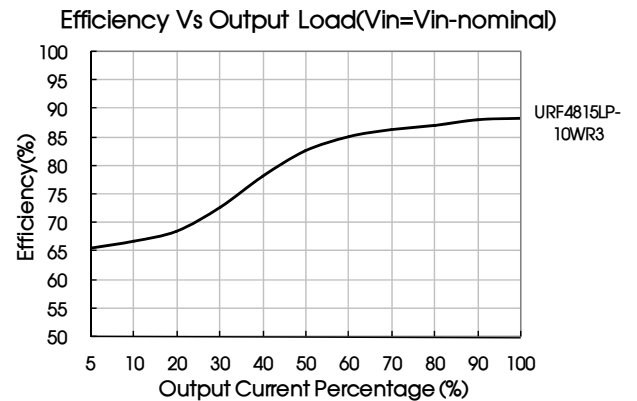
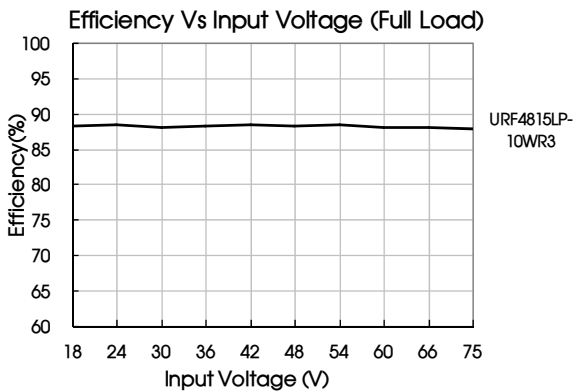
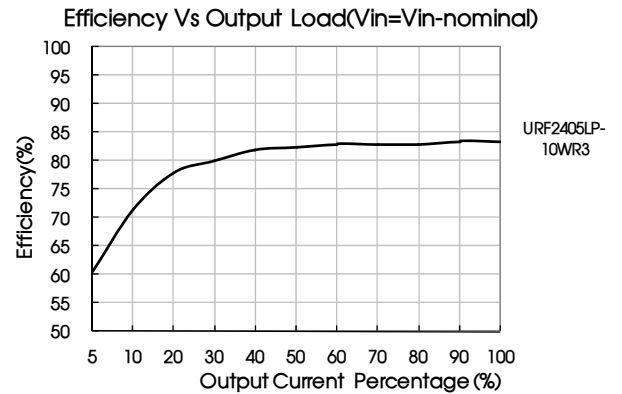
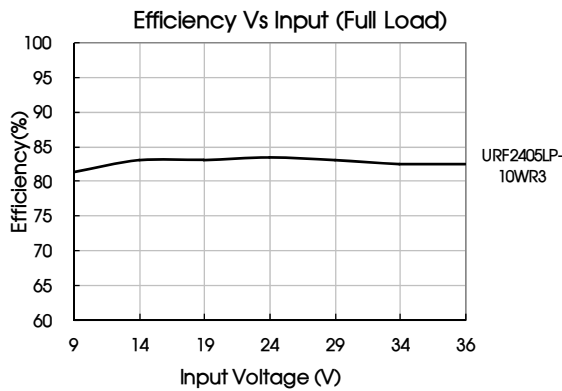


Fig. 1



Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.

If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

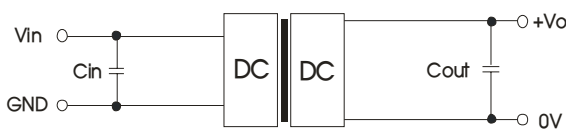


Fig. 2

| Cin | Cout |
|-------------|------|
| 10µF ~ 47µF | 10µF |

2. EMC solution-recommended circuit

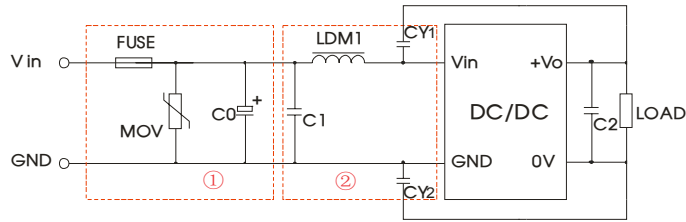


Fig. 3

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

Parameter description

| Model | Vin:24V | Vin:48V |
|-------|--|------------|
| FUSE | Choose according to actual input current | |
| MOV | S14K35 | S14K60 |
| C0 | 330μF/50V | 330μF/100V |
| C1 | 1μF/50V | 1μF/100V |
| C2 | Refer to the Cout in Fig.2 | |
| LDM1 | 4.7μH | |
| CY1 | 1nF/3KV | |
| CY2 | 1nF/3KV | |

EMC solution-recommended circuit PCB layout

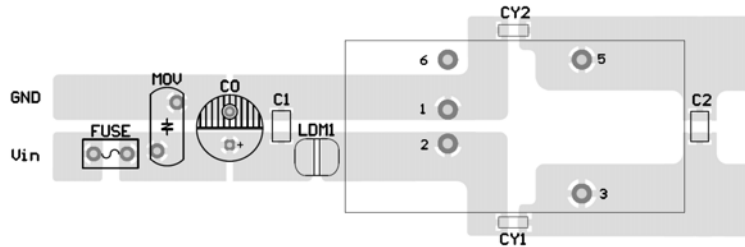
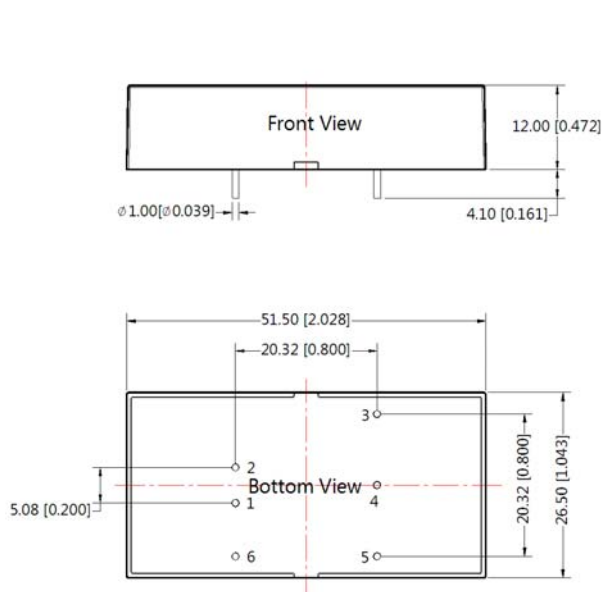


Fig. 4

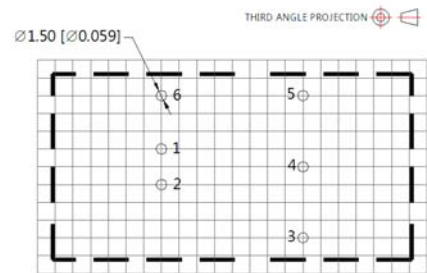
Note: the min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be ≥ 2mm.

- 3. The product does not support output in parallel with power per liter or hot-plug use
- 4. For more information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout



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

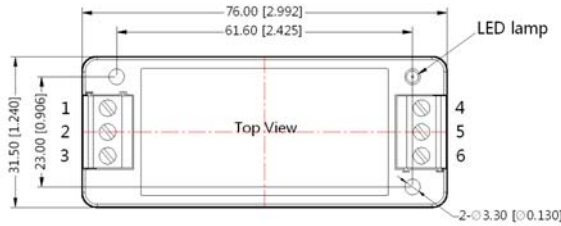


Note : Grid 2.54*2.54mm

| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1 | GND |
| 2 | Vin |
| 3 | +Vo |
| 4 | No Pin |
| 5 | 0V |
| 6 | Ctrl |

URF_LP-10WR3A2S Dimensions

THIRD ANGLE PROJECTION

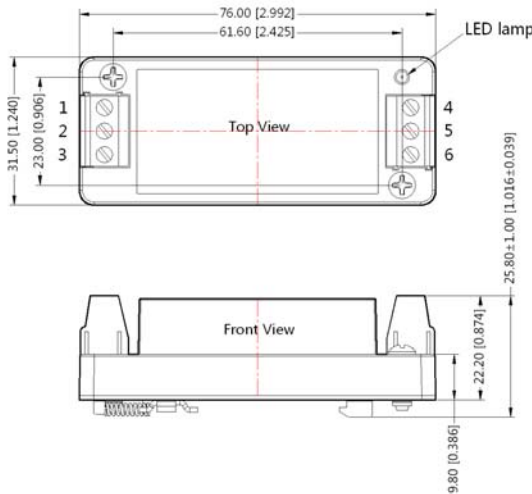


| Pin-Out | | | | | | |
|----------|------|-----|-----|----|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Function | Ctrl | GND | Vin | 0V | NC | +Vo |

Note:
Unit:mm[inch]
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

URF_LP-10WR3A4S Dimensions

THIRD ANGLE PROJECTION



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

Note:
Unit:mm[inch]
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

- Note:
1. Packing Information please refer to 'Product Packing Information'. Packing bag number : 58210039(DIP),58220022(A2S/A4S package);
 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. The max. capacitive load should be tested within the input voltage range and under full load conditions;
 4. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25°C, humidity<75% when inputting nominal voltage and outputting rated load;
 5. All index testing methods in this datasheet are based on our Company's corporate standards;
 6. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
 7. We can provide product customization service;
 8. Specifications of this product are subject to changes without prior notice.

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