# DC/DC Converter

URF2424P-6WR3G

MORNSUN®

6W isolated DC-DC converter in DIP package
Ultra-wide input and regulated single output


Patent Protection RoHS

## FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 85%
- No-load power consumption as low as 0.12W
- I/O isolation test voltage 3k VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output short-circuit, over-voltage, over-current protection
- Meet CISPR32/EN55032 CLASS A, without extra components
- Industry standard pin-out

*URF2424P-6WR3G of isolated 6W DC-DC converter products with am ultra-wide 4:1 input voltage. They feature efficiencies of up to 85%, operating ambient temperature of -40℃ to +85℃, 3000VDC input to output isolation, input under-voltage protection, output short-circuit, over-voltage, over-current protection. The products meet CLASS A of CISPR32/EN55032 EMI standards, they are widely used in applications such as industrial control, electrical power, instruments and telecommunication fields.*

## Selection Guide

| Certification | Part No. | Input Voltage (VDC) | | Output | | Full Load Efficiency ② (%) Min./Typ. | Capacitive Load (μF) Max. |
|---|---|---|---|---|---|---|---|
| | | Nominal (Range) | Max. ① | Voltage (VDC) | Current (mA) Max./Min. | | |
| -- | URF2424P-6WR3G | 24 (9-36) | 40 | 24 | 250/0 | 83/85 | 680 |

Notes:
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) | | -- | 295/10 | 302/16 | mA |
| Reflected Ripple Current | | -- | 20 | -- | |
| Surge Voltage (1sec. max.) | | -0.7 | -- | 50 | VDC |
| Start-up Voltage | | -- | -- | 9 | |
| Input Under-voltage Protection | | 5.5 | 6.5 | -- | |
| Start-up Time | Nominal input& constant resistance load | -- | 10 | -- | ms |
| Input Filter | | Pi filter | | | |
| Hot Plug | | Unavailable | | | |

## Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Voltage Accuracy | 5%-100% load | -- | ±1 | ±3 | % |
| 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 Recovery Time | 25% load step change | -- | 300 | 500 | μs |
| Transient Response Deviation | | -- | ±3 | ±5 | % |
| Temperature Coefficient | Full load | -- | -- | ±0.03 | %/℃ |
| Ripple&Noise② | 20MHz bandwidth, 5%-100% load | -- | 85 | 120 | mVp-p |
| Over-voltage Protection | Input voltage range | 110 | -- | 160 | %Vo |
| Over-current Protection | | 110 | 220 | 290 | %Io |
| Short-circuit Protection | | Continuous, self-recovery | | | |

Note:①Load regulation for 0%-100% load is ±5%;
②Under 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. | 3000 | -- | -- | VDC |
| Isolation Resistance | Input-output resistance at 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | -- | 1000 | -- | pF |
| Operating Temperature | Derating when operating temperature up to 71℃ (see Fig. 1) | -40 | -- | +85 | ℃ |
| 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 | | 10-55Hz, 2G, 30 Min. along X, Y and Z | | | |
| Switching Frequency | PWM mode | -- | 300 | -- | kHz |
| MTBF | MIL-HDBK-217F@25℃ | 1000 | -- | -- | k hours |

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

## Mechanical Specifications

| | |
|---|---|
| Case Material | Black plastic; flame-retardant and heat-resistant (UL94-V0) |
| Dimensions | 31.60 x 20.30 x 10.20 mm |
| Weight | 13g(Typ.) |
| Cooling method | Free air convection |

## Electromagnetic Compatibility (EMC)

| | | | | |
|---|---|---|---|---|
| Emissions | CE | CISPR32/EN55032 | CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit) | |
| | RE | CISPR32/EN55032 | CLASS A (without extra components)/ 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 | ±2kV (see Fig.3-①for 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

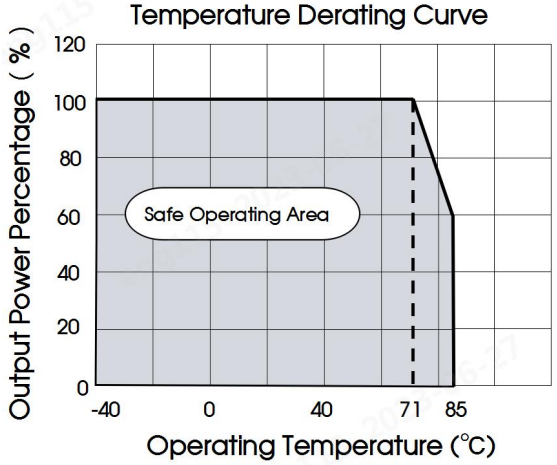



Fig. 1

## 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.

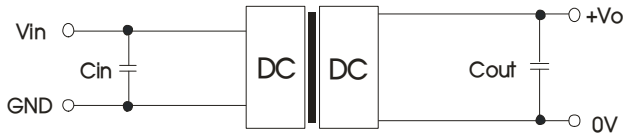



Fig. 2

| Vin(VDC) | Cin | Cout |
|---|---|---|
| 24 | 100μF/50V | 10μF/50V |

### 2. EMC compliance circuit

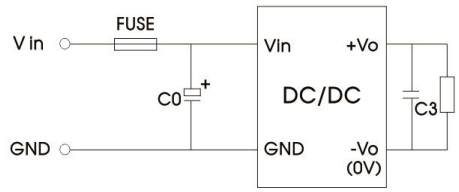



Fig. 3-①

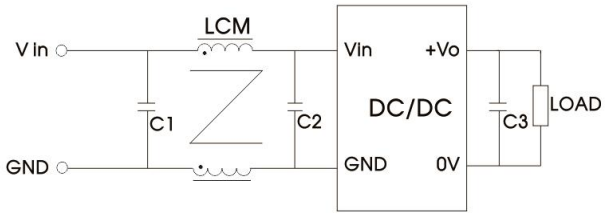



Fig. 3-②

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

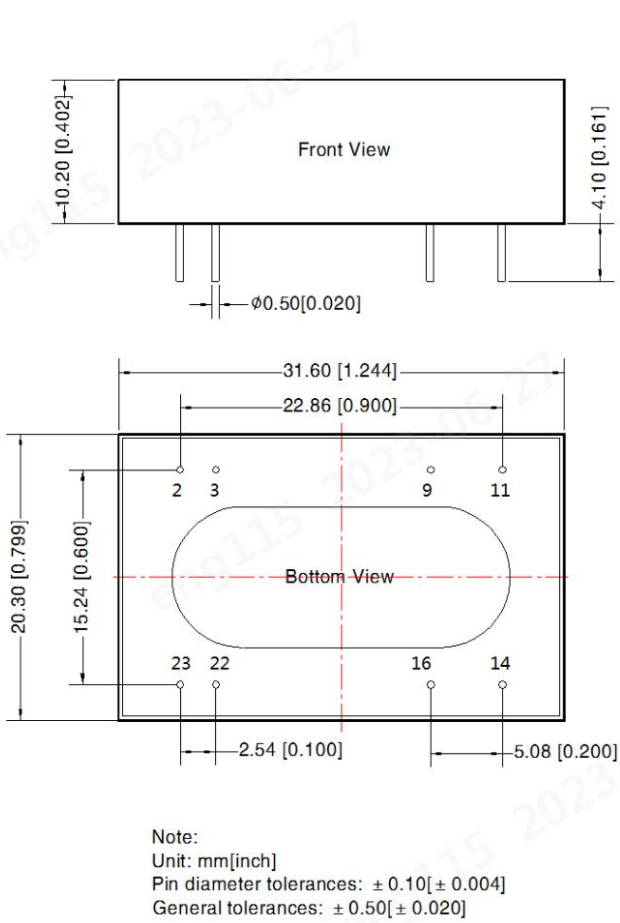
Parameter description

| Model | Vin: 24VDC |
|---|---|
| FUSE | Choose according to actual input current |
| C0 | 1000μF/50V |
| C1/C2 | 2.2μF/50V |
| LCM | 2.2 mH, recommended to use MORNSUN's FL2D-30-222 |
| C3 | Refer to the Cout in Fig.2 |

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

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

## Dimensions and Recommended Layout




| Pin–Out | |
|---|---|
| Pin | Mark |
| 2,3 | GND |
| 9 | No Pin |
| 11 | NC |
| 14 | +Vo |
| 16 | 0V |
| 22,23 | Vin |

Note:
Unit: mm[inch]
Pin diameter 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. Packaging number: 58210008;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. 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;
6. We can provide product customization service;
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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