

SCHMID-M

DC/DC Power Supply Module

SURH_P-6WR3 Series



6W, Ultra wide input, isolated & regulated single output, DIP packaging, DC-DC converter



FEATURES

- Ultra wide range of input voltage (4:1)
- Efficiency up to 85%
- No-load power consumption as low as 0.2W
- Enhanced isolation, 6KVDC isolation
- Operating temperature range: -40°C to +85°C
- Input under-voltage protection, output short circuit, over-voltage, over-load protection
- Meets EN60601-1/UL60601-1 certification
- International standard pin-out

SURH_P-6WR3 series products are of 6W output power, extremely ultra wide range of voltage input of 9-36VDC, 18-75VDC, isolation voltage of 6000VDC, output over-voltage protection and output short circuit protection, Meets EN60601-1/UL60601-1 certification; these products are dedicated to medical field. Low no-load power consumption widely used in energy storage system.

Selection Guide

| Part No. | Input Voltage (VDC) | | Output | | Efficiency (%Typ.) @ Full Load | Max. Capacitive Load(μF) |
|----------------|---------------------|-------|-------------------------|------------------------------------|-----------------------------------|-----------------------------|
| | Nominal (Range) | Max.* | Output Voltage (VDC) | Output Current (mA) (Max./Min.) | | |
| SURH2405P-6WR3 | 24 (9-36) | 40 | 5 | 1200/60 | 79/81 | 2700 |
| SURH2406P-6WR3 | | | 6 | 1000/50 | 79/81 | 2200 |
| SURH2409P-6WR3 | | | 9 | 667/33 | 81/83 | 1800 |
| SURH2412P-6WR3 | | | 12 | 500/25 | 82/84 | 1000 |
| SURH2415P-6WR3 | | | 15 | 400/20 | 83/85 | 680 |
| SURH2424P-6WR3 | | | 24 | 250/13 | 82/84 | 470 |
| SURH4805P-6WR3 | 48 (18-75) | 80 | 5 | 1200/60 | 79/81 | 2700 |
| SURH4809P-6WR3 | | | 9 | 667/33 | 81/83 | 1800 |
| SURH4812P-6WR3 | | | 12 | 500/25 | 82/84 | 1000 |
| SURH4815P-6WR3 | | | 15 | 400/20 | 83/85 | 680 |
| SURH4824P-6WR3 | | | 24 | 250/13 | 82/84 | 470 |

Note:*Absolute maximum rating without damage on the converter, but it isn't recommended.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|-----------|-------|------|------|
| Input Current (full load / no-load) | 24VDC input | -- | 308/5 | -- | mA |
| | 48VDC input | -- | 154/4 | -- | |
| Reflected Ripple Current | 24VDC input | -- | 20 | -- | mA |
| | 48VDC input | -- | 20 | -- | |
| 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 | 15.5 | -- | |
| Input Filter | | PI filter | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|--|------|------|------|------|
| Output Voltage Accuracy | | -- | ±1 | ±3 | % |
| Line Voltage 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 | % |

DC/DC Power Supply Module

SURH_P-6WR3 Series

| | | | | | |
|---------------------------------|---------------------|---------------------------|-----|-------|-------|
| Temperature Drift Coefficient | Full load | -- | -- | ±0.03 | %/°C |
| Ripple & Noise* | 20MHz bandwidth | -- | 100 | 180 | mVp-p |
| Output Over-current Protection | | 110 | 150 | 260 | %Io |
| Output Over-voltage Protection | Input voltage range | 110 | -- | 160 | %Vo |
| Output Short circuit Protection | | Continuous, self-recovery | | | |

Note: * Ripple and noise tested with "parallel cable" method, oscilloscope using the 1X probe, 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 | 6000 | -- | -- | VDC |
| Insulation Resistance | Input-output, insulation voltage 500VDC | 10000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 13 | 20 | pF |
| Enhanced Isolation | Transformer creepage | 5.0 | -- | -- | mm |
| | Transformer clearance | 2.4 | -- | -- | |
| | PCB creepage & clearance | 6.0 | -- | -- | |
| | Optocoupler creepage | 6.0 | -- | -- | |
| Operating Temperature | Derating if the temperature is $\geq 71^\circ\text{C}$ (see Fig. 1) | -40 | -- | 85 | °C |
| Storage Humidity | Without condensation | 5 | -- | 95 | % |
| Storage Temperature | | -55 | -- | 125 | |
| 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(nominal, full load) | -- | 300 | -- | KHz |
| MTBF | MIL-HDBK-217F@25°C | 1000 | -- | -- | K hours |

Note: * This series of products using reduced frequency technology, the switching frequency is test value for full load, When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Physical Specifications

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

EMC Specifications

| | | | | |
|-----|--|------------------|--|------------------|
| EMI | Conducted disturbance | CISPR22/EN55022 | CLASS A (Bare component) | |
| EMS | Electrostatic discharge | IEC/EN61000-4-2 | Contact ±6KV Air ±8KV | perf. Criteria B |
| | 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

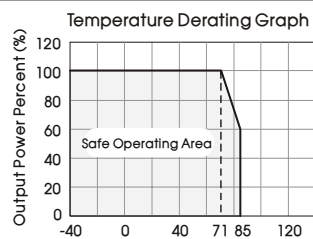
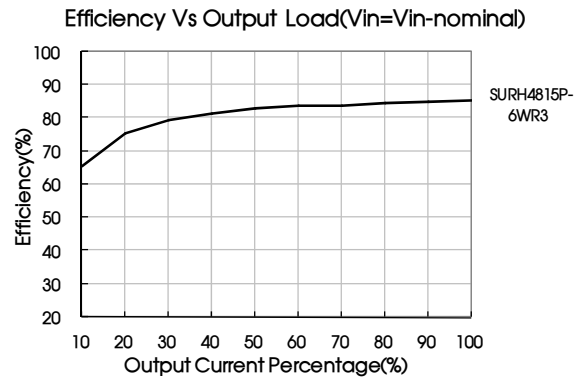
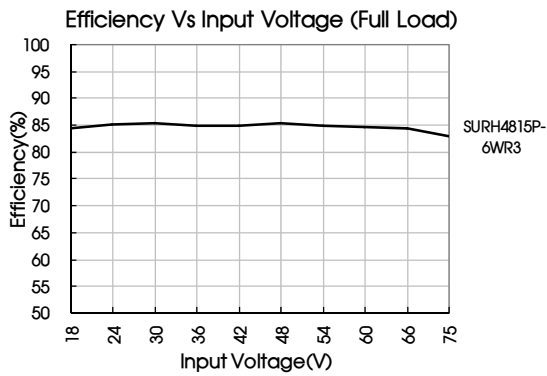
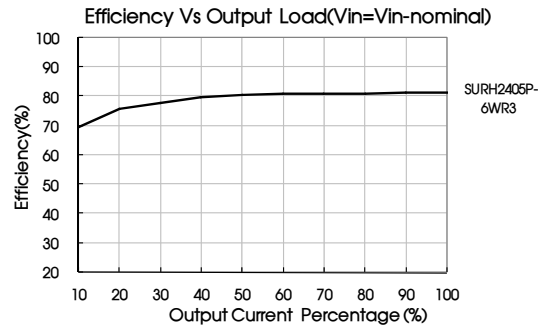
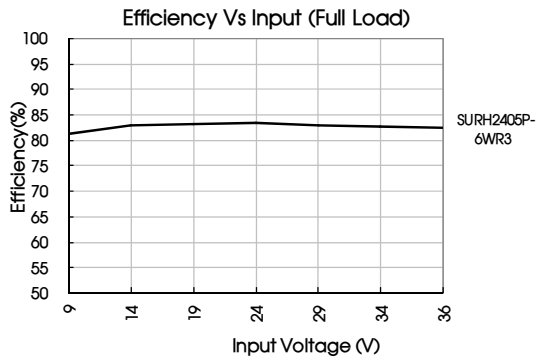


Fig. 1

DC/DC Power Supply Module

SURH_P-6WR3 Series

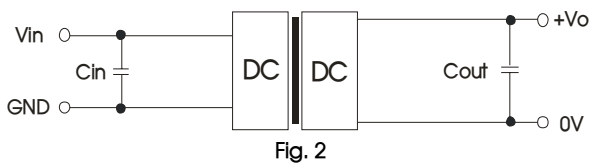


Design Reference

1. Typical application

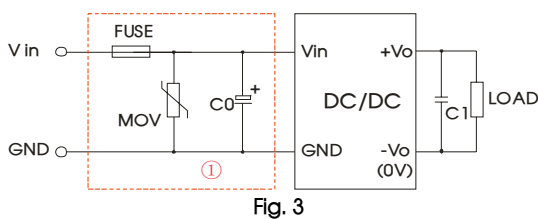
All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.

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



| V_{in} | C_{in} | C_{out} |
|----------|-------------------------|------------|
| 24VDC | 100 μ F | 10 μ F |
| 48VDC | 10 μ F - 47 μ F | 10 μ F |

2. EMC solution-recommended circuit

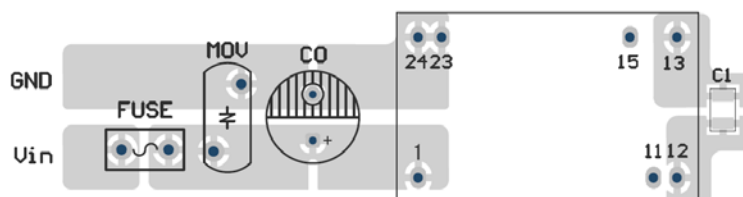


Notes: Part ① in the Fig. 3 is used for EMS test.

Parameter description

| Model | V_{in} :24V | V_{in} :48V |
|-------|--|------------------|
| FUSE | Choose according to actual input current | |
| MOV | S14K35 | S14K60 |
| C0 | 330 μ F/50V | 330 μ F/100V |
| C1 | Refer to the C_{out} in Fig.2 | |

EMC solution-recommended circuit PCB layout

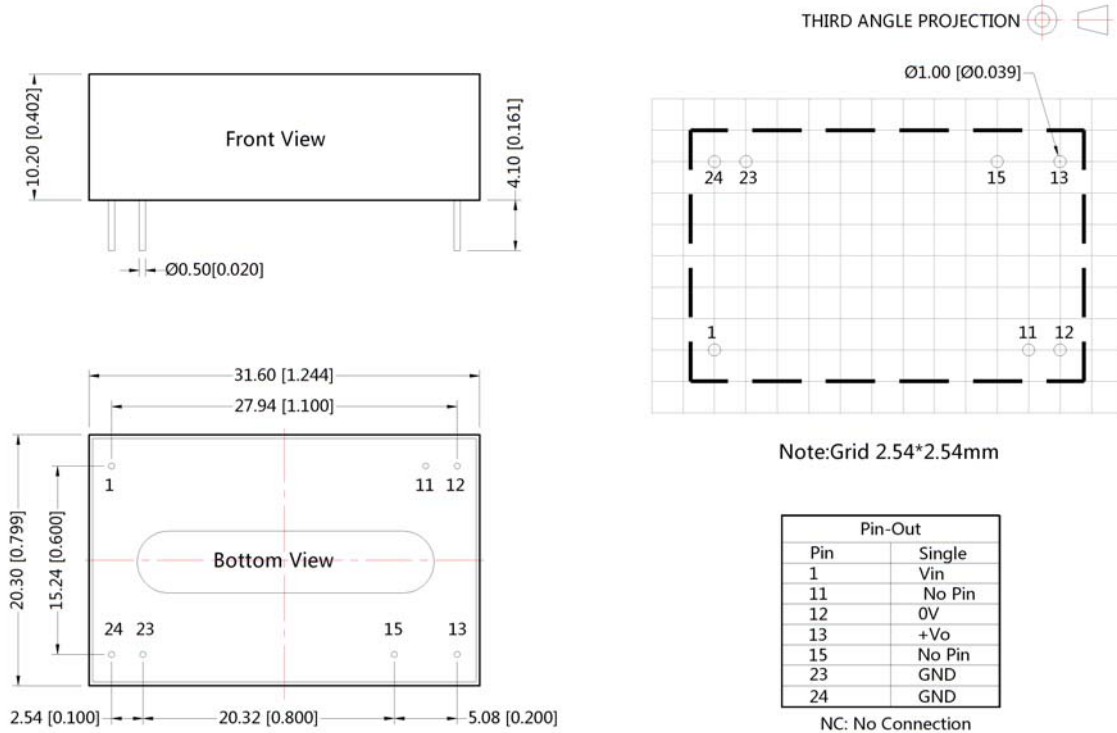


DC/DC Power Supply Module

SURH_P-6WR3 Series

- The product does not support output in parallel with power per liter or hot-plug use
- For more information Please find the application note on www.schmid-m.com

Dimensions and Recommended Layout



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

1104003403-A0

- Note:
- Packing Information please refer to 'Product Packing Information'. The Packing bag number: 58210008;
 - 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;
 - The max. capacitive load should be tested within the input voltage range and under full load conditions;
 - Unless otherwise specified, data in this datasheet should be tested under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75% when inputting nominal voltage and outputting rated load;
 - All index testing methods in this datasheet are based on our Company's corporate standards;
 - 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;
 - We can provide product customization service;
 - Specifications of this product are subject to changes without prior notice.