

DC/DC Converter

SVRB_LD-30WR3 Series



30W, Wide input, isolated & regulated single output DC/DC converter



FEATURES

- wide input voltage range (2:1)
- High efficiency up to 90% with full load
- No-load power consumption as low as 0.14W
- Isolation voltage: 1.5K VDC
- Output short circuit, over-voltage, over-current protection
- Operating temperature range: -40°C to +80°C
- Meet CISPR22/EN55022 CLASS A, without external components
- Six-sided metal shielding package
- Reverse voltage protection available with A2S(Chassis mounting) or A4S(35mm DIN-Rail mounting)
- EN60950 approval

CE Patent Protection RoHS



SVRB_LD-30WR3 series are isolated 30W DC-DC products with 2:1 input voltage. They feature efficiency up to 90%, 1500VDC isolation, operating temperature of -40°C to +80°C, output short circuit protection, over-voltage protection, over-current protection and EMI meets CISPR22/EN55022 CLASS A, which make them widely applied in data transmission device, battery power supply device, tele-communication device, distributed power supply system, remote control system, industrial robot fields. And extension package A2S and A4S also enable them with reverse voltage protection.

Selection Guide

| Certification | Part No. ① | Input Voltage (VDC) | | Output | | Efficiency® (%Min./Typ.) @ Full Load | Max. Capacitive Load(μF) |
|------------------|------------------|---------------------|--------|----------------------|--------------------------------|--------------------------------------|--------------------------|
| | | Nominal® (Range) | Max. ③ | Output Voltage (VDC) | Output Current (mA)(Max./Min.) | | |
| CE | SVRB2403LD-30WR3 | 24 (18-36) | 40 | 3.3 | 6000/0 | 83/85 | 10000 |
| | SVRB2405LD-30WR3 | | | 5 | 6000/0 | 86/88 | 10000 |
| | SVRB2409LD-30WR3 | | | 9 | 3333/0 | 86/88 | 4700 |
| | SVRB2412LD-30WR3 | | | 12 | 2500/0 | 88/90 | 2700 |
| | SVRB2415LD-30WR3 | | | 15 | 2000/0 | 88/90 | 1680 |
| | SVRB2424LD-30WR3 | | | 24 | 1250/0 | 88/90 | 680 |
| | SVRB4803LD-30WR3 | 48 (36-75) | 80 | 3.3 | 6000/0 | 84/86 | 10000 |
| | SVRB4805LD-30WR3 | | | 5 | 6000/0 | 86/88 | 10000 |
| | SVRB4812LD-30WR3 | | | 12 | 2500/0 | 86/88 | 2700 |
| | SVRB4815LD-30WR3 | | | 15 | 2000/0 | 87/89 | 1680 |
| SVRB4824LD-30WR3 | 24 | | | 1250/0 | 87/89 | 680 | |

Notes: ①Series with suffix "H" are heat sink mounting; series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example SVRB2405LD-30WR3A2S is chassis mounting of with heat sink, SVRB2405LD-30WR3A4S is DIN-Rail mounting of without heat sink; If the application has a higher requirement for heat dissipation, you can choose modules with heat sink;
 ②A2S (wiring) and A4S (rail) Model due to input reverse polarity protection function, input voltage range the minimum value and starting voltage is higher than 1VDC DIP package;
 ③Absolute maximum rating without damage on the converter, but it isn't recommended;
 ④Efficiency 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 nominal input series, nominal input voltage | 3.3V output | -- | 970/60 | 993/100 | mA |
| | | 5V output | -- | 1420/60 | 1453/100 | |
| | | Others | -- | 1388/6 | 1453/12 | |

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| | | | | | | |
|-------------------------------------|--|---|----|--------|--------|----|
| Input Current (full load / no-load) | 48VDC nominal input series, nominal input voltage | 3.3V output | -- | 474/20 | 485/30 | mA |
| | | 5V output | -- | 710/20 | 726/35 | |
| | | Others | -- | 702/5 | 726/10 | |
| Reflected Ripple Current | Nominal input voltage | -- | 40 | -- | | |
| Surge Voltage (1sec. max.) | 24VDC nominal input series | -0.7 | -- | 50 | VDC | |
| | 48VDC nominal input series | -0.7 | -- | 100 | | |
| Starting Voltage | 24VDC nominal input series | -- | -- | 18 | | |
| | 48VDC nominal input series | -- | -- | 36 | | |
| Starting Time | Nominal input voltage & constant resistance load | -- | 10 | -- | | ms |
| Input Filter | | PI filter | | | | |
| Hot Plug | | Unavailable | | | | |
| 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 | 5%-100% load | -- | ±1 | ±3 | % | |
| | 0%-5% load | -- | ±1 | ±5 | | |
| Line Regulation | Full load, the input voltage is from low voltage to high voltage | -- | ±0.2 | ±0.5 | | |
| Load Regulation ^① | 5%-100% load | -- | ±0.5 | ±1 | | |
| Transient Recovery Time | | -- | 300 | 500 | μs | |
| Transient Response Deviation | 25% load step change, nominal input voltage | 3.3V/5V output | -- | ±5 | ±8 | % |
| | | Others | -- | ±3 | ±5 | |
| Temperature Coefficient | Full load | -- | -- | ±0.03 | %/°C | |
| Ripple & Noise ^② | 20MHz bandwidth, nominal input voltage, 100% load | -- | 50 | 100 | Mv p-p | |
| Trim | | -- | ±10 | -- | %Vo | |
| Output Over-voltage Protection | | 110 | -- | 160 | | |
| Output Over-current Protection | Input voltage range | 110 | -- | 190 | %Io | |
| Short circuit Protection | | Hiccup, Continuous, self-recovery | | | | |

Note: ①When testing from 0% to 100% load working conditions, load regulation index of ±5%;

②Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.

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 | 1500 | -- | -- | VDC |
| Insulation Resistance | Input-output, insulation voltage 500VDC/60sec., Ta=25°C, humidity=75%RH | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 2000 | -- | pF |
| Operating Temperature | see Fig. 1 and Fig. 2 | -40 | -- | +80 | °C |
| Storage Temperature | | -55 | -- | +125 | |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Pin Welding Resistance Temperature | Welding spot is 1.5mm away from the casing, 10 seconds | -- | -- | +300 | °C |
| Vibration | | 10-55Hz, 10G, 30 Min. along X, Y and Z | | | |
| Switching Frequency * | PWM mode | -- | 300 | -- | KHz |

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| | | | | | |
|------|---|------|----|----|---------|
| MTBF | MIL-HDBK-217F@25°C, Full load(Ground, Benign, controlled environment) | 1000 | -- | -- | K hours |
|------|---|------|----|----|---------|

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

Physical Specifications

| | | |
|--------------------|--|---|
| Casing Material | | Aluminum alloy |
| Package Dimensions | Horizontal package(without heat sink) | 50.80*25.40*11.80 mm |
| | Horizontal package(with heat sink) | 50.80*25.40*16.30 mm |
| | A2S wiring package (without heat sink) | 76.00*31.50*21.20 mm |
| | A2S wiring package(with heat sink) | 76.00*31.50*25.10 mm |
| | A4S rail package(without heat sink) | 76.00*31.50*25.80 mm |
| | A4S rail package(with heat sink) | 76.00*31.50*29.70 mm |
| Weight | without heat sink | Horizontal package/A2S wiring package/A4S rail package 26g/48g/68g(Typ.) |
| | with heat sink | Horizontal package/A2S wiring package/A4S rail package 34g/56g/76g(Typ.) |
| Cooling Method | | Free air convection |

EMC Specifications

| | | | |
|-----|-------|-----------------|--|
| EMI | CE | CISPR22/EN55022 | CLASS A (Bare component)/ CLASS B (see Fig.6-② for recommended circuit) |
| | RE | CISPR22/EN55022 | CLASS A (Bare component)/ CLASS B (see Fig.6-② for recommended circuit) |
| EMS | 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.6-① for recommended circuit) perf. Criteria B |
| | Surge | IEC/EN61000-4-5 | line to line ±2KV (see Fig.6-① for recommended circuit) perf. Criteria B |
| | CS | IEC/EN61000-4-6 | 3 Vr.m.s perf. Criteria A |

Product Characteristic Curve

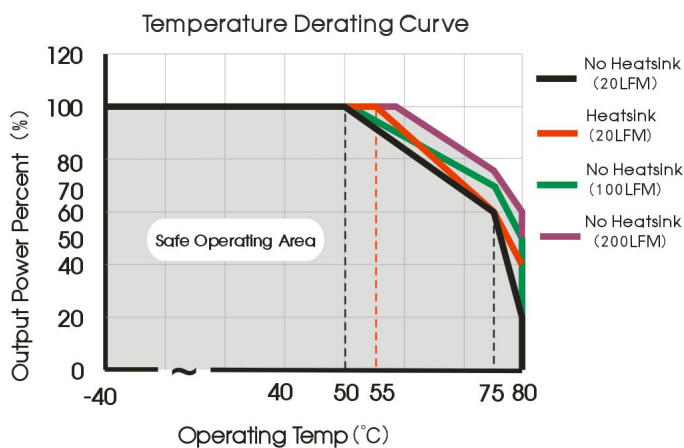


Fig. 3

Apply model: SVRB2403LD-30W(H)R3, SVRB2405LD-30W(H)R3, SVRB4803LD-30W(H)R3, SVRB4805LD-30W(H)R3

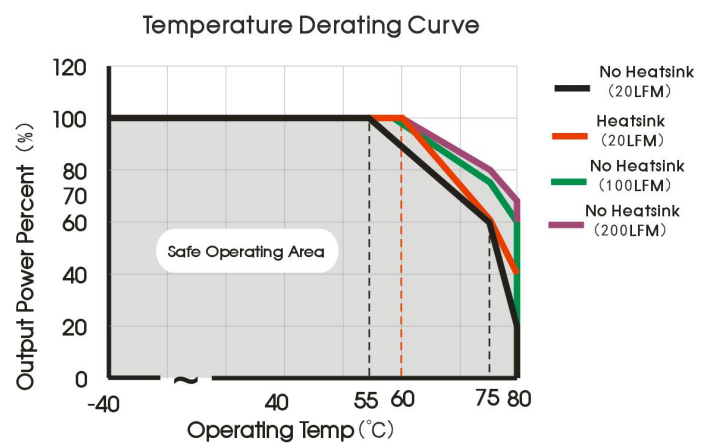
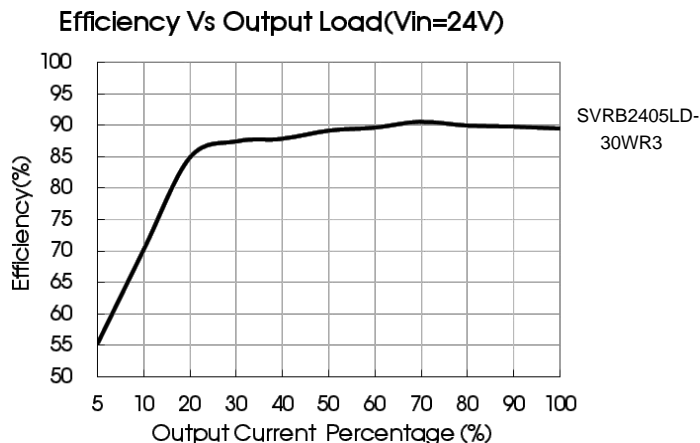
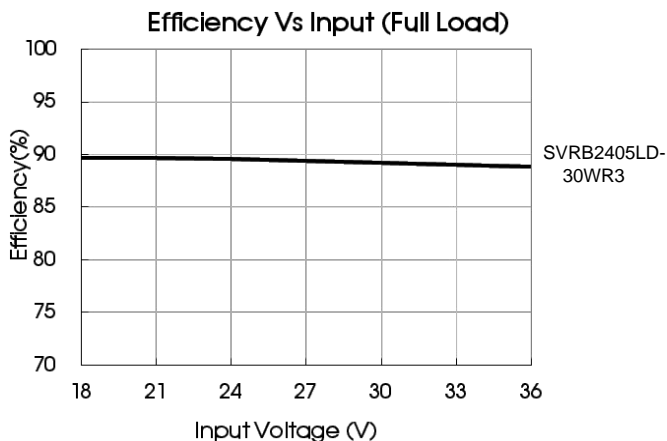


Fig. 4

Apply model: SVRB2409LD-30W(H)R3, SVRB2412LD-30W(H)R3, SVRB2415LD-30W(H)R3, SVRB2424LD-30W(H)R3, SVRB4812LD-30W(H)R3, SVRB4815LD-30W(H)R3, SVRB4824LD-30W(H)R3

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Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 5) 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.



Fig. 5

| output voltage (VDC) | C_{out} (μF) | C_{in} (μF) |
|----------------------|-----------------------|----------------------|
| 3.3/5/9 | 220 | 100 |
| 12/15/24 | 100 | |

2. EMC solution-recommended circuit

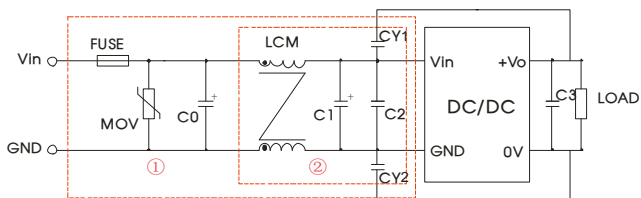


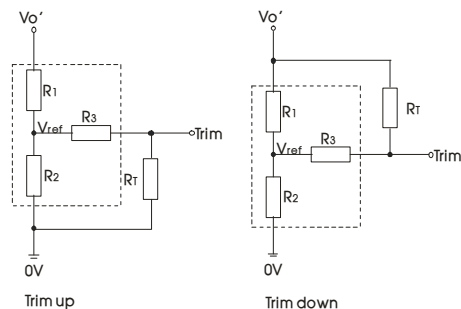
Fig. 6

Notes: Part ① in the Fig. 6 is used for EMS test and part ② for EMI filtering; selected based on needs.

Parameter description

| Model | $V_{in}:24V$ | $V_{in}:48V$ |
|---------|--|-------------------|
| FUSE | Choose according to actual input current | |
| MOV | S20K30 | S14K60 |
| C0 | 680 μF /50V | 330 μF /100V |
| C1 | 330 μF /50V | 330 μF /100V |
| C2 | 4.7 μF /50V | 2.2 μF /100V |
| C3 | Refer to the C_{out} in Fig.5 | |
| LCM | 1mH, recommended to use SCHMID-M's SFL2D-30-102s | |
| CY1、CY2 | 1nF/2KV | |

3. Application of Trim and calculation of Trim resistance



Calculation formula of Trim resistance:

$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

Applied circuits of Trim (Part in broken line is the interior of models)

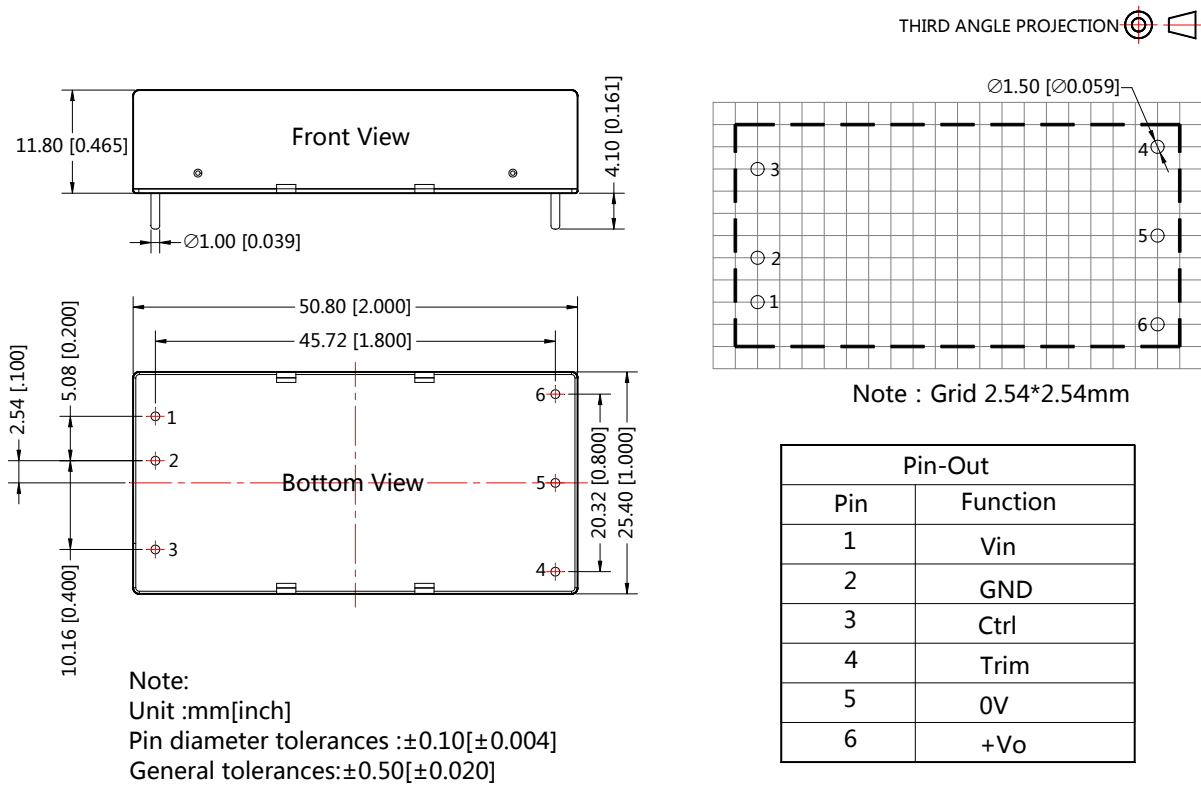
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| Vout(VDC) | R1(K Ω) | R2(K Ω) | R3(K Ω) | Vref(V) |
|-----------|-----------------|-----------------|-----------------|---------|
| 3.3 | 4.801 | 2.87 | 12.4 | 1.24 |
| 5 | 2.883 | 2.87 | 10 | 2.5 |
| 9 | 7.500 | 2.87 | 15 | 2.5 |
| 12 | 11.000 | 2.87 | 15 | 2.5 |
| 15 | 14.494 | 2.87 | 15 | 2.5 |
| 24 | 24.872 | 2.87 | 17.8 | 2.5 |

4. It is not allowed to connect modules output in parallel to enlarge the power

Horizontal Package (without heat sink) Dimensions and Recommended Layout

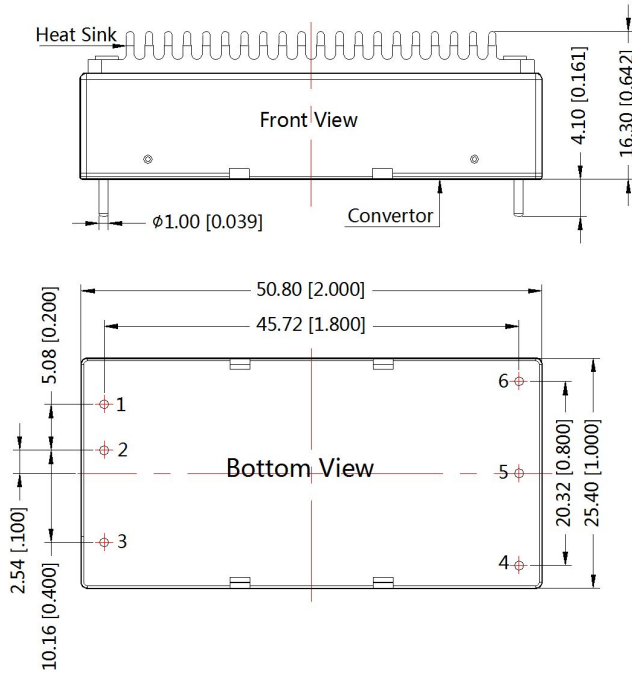


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Horizontal Package (with heat sink) Dimensions

THIRD ANGLE PROJECTION 

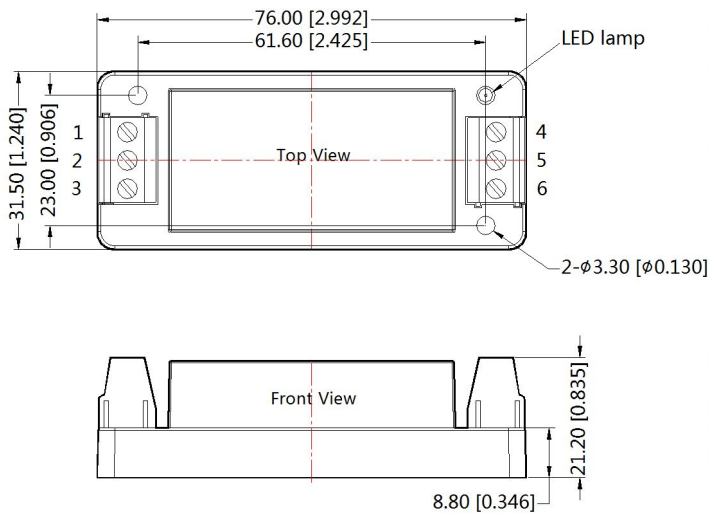


| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1 | Vin |
| 2 | GND |
| 3 | Ctrl |
| 4 | Trim |
| 5 | 0V |
| 6 | +Vo |

Note:
 Unit: mm[inch]
 General tolerances: ± 0.50 [± 0.020]
 If use heatsinks, make sure there is enough space for a special size in ther above graph

SVRB_LD-30WR3A2S(without heat sink) Dimensions

THIRD ANGLE PROJECTION 




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

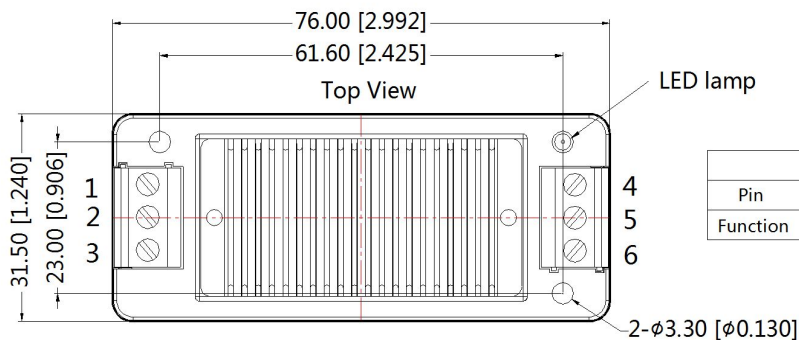
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: ± 0.50 [± 0.020]

DC/DC Converter

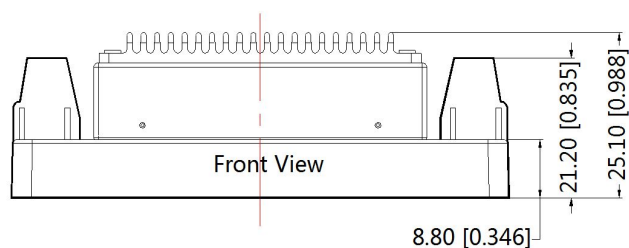
SVRB_LD-30WR3 Series

SVRB_LD-30WR3A2S(with heat sink) Dimensions

THIRD ANGLE PROJECTION 



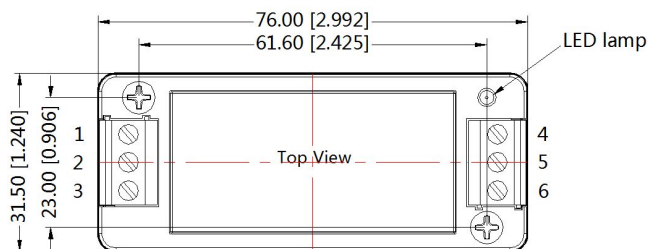
| Pin-Out | | | | | | |
|----------|------|-----|-----|------|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Function | Ctrl | GND | Vin | Trim | 0V | +Vo |



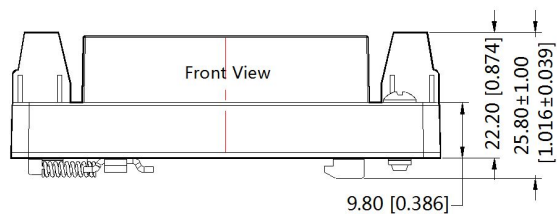
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: $\pm 0.50[\pm 0.020]$

SVRB_LD-30WR3A4S(without heat sink) Dimensions

THIRD ANGLE PROJECTION 



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



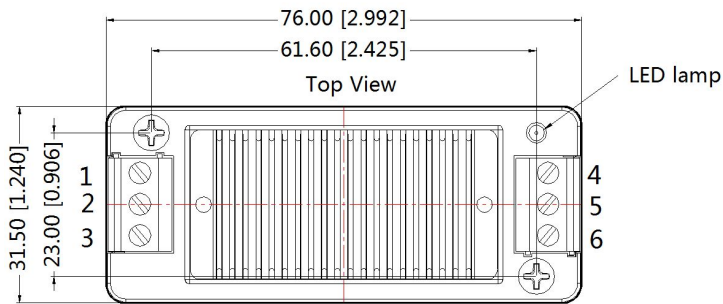
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: $\pm 0.50[\pm 0.020]$

DC/DC Converter

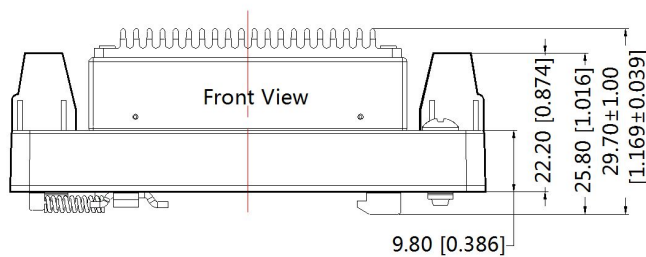
SVRB_LD-30WR3 Series

SVRB_LD-30WR3A4S(with heat sink) Dimensions

THIRD ANGLE PROJECTION 



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



Note:
 Unit: mm[inch]
 Wire range: 24–12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: ±0.50[±0.020]

Notes:

1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on Company's corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Specifications are subject to change without prior notice.