

10W, AC-DC converter



FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- Operating ambient temperature range: -40°C to +85°C
- Up to 85% efficiency
- No-load power consumption < 0.1W
- 5000m altitude application
- Overvoltage category OVC III (meet EN61558)
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014
- IEC/EN/UL62368/EN60335/EN61558 safety approval

LD10-23BxxR2 series AC-DC converters is one of Mornsun's new generation compact size power converter. It features ultra-wide AC input and at the same time accepts DC input voltage, low power consumption, low ripple & noise, high efficiency, high reliability, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368/EN60335/EN61558 standards. The converters are widely used in industrial, power, home appliances, instrumentation, communication and civil applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

| Certification | Part No.* | Output Power | Nominal Output Voltage and Current | Efficiency at 230VAC (%) Typ. | Capacitive Load (µF) Max. |
|---------------|--------------|--------------|------------------------------------|-------------------------------|---------------------------|
| UL/CE/CB | LD10-23B03R2 | 10W | 3.3V/2600mA | 74 | 6600 |
| | LD10-23B05R2 | | 5V/2000mA | 79 | 5000 |
| | LD10-23B09R2 | | 9V/1100mA | 81 | 3600 |
| | LD10-23B12R2 | | 12V/830mA | 84 | 2000 |
| | LD10-23B15R2 | | 15V/660mA | 84 | 820 |
| | LD10-23B24R2 | | 24V/410mA | 85 | 470 |

Note: * Use suffix "A2S" for chassis and suffix "A4S" for DIN-Rail mounting.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------------|----------------------|------------------------------|------|------|------|
| Input Voltage Range | AC input | 85 | -- | 305 | VAC |
| | DC input | 100 | -- | 430 | VDC |
| Input Frequency | | 47 | -- | 63 | Hz |
| Input Current | 115VAC | -- | -- | 0.23 | A |
| | 230VAC | -- | -- | 0.15 | |
| Inrush Current | 115VAC | -- | 25 | -- | A |
| | 230VAC | -- | 40 | -- | |
| Leakage Current | 277VAC/50Hz | 0.1mA RMS Max. | | | |
| Fuse(A2S/A4S package series include fuse) | | 2A/300V, slow-blow, required | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|----------------------------|--------------------------------------|----------------|-------|------|------|----|
| Output Voltage Accuracy | | -- | ±2 | -- | % | |
| Line Regulation | Full load | -- | ±0.5 | -- | | |
| Load Regulation | 0%-100% load | -- | ±1 | -- | | |
| Ripple & Noise* | 20MHz bandwidth (peak-to-peak value) | | -- | 50 | 100 | mV |
| Stand-by Power Consumption | 230VAC | 3.3/5/9/12/15V | -- | 0.10 | -- | W |
| | | 24V | -- | 0.12 | -- | |
| Temperature Coefficient | | -- | ±0.02 | -- | %/°C | |

| | | | | | |
|--------------------------|---------|------------------------------------------|----|----|----|
| Short Circuit Protection | | Hiccup, continuous, self-recovery | | | |
| Over-current Protection | | ≥110%Io, self-recovery | | | |
| Over-voltage Protection | 3.3/5 V | ≤7.5VDC (Output voltage clamp or hiccup) | | | |
| | 9 V | ≤15VDC (Output voltage clamp or hiccup) | | | |
| | 12/15 V | ≤20VDC (Output voltage clamp or hiccup) | | | |
| | 24 V | ≤30VDC (Output voltage clamp or hiccup) | | | |
| Minimum Load | | 0 | -- | -- | % |
| Hold-up Time | 115VAC | -- | 8 | -- | ms |
| | 230VAC | -- | 40 | -- | |

Note: *The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information.

General Specifications

| Item | | Operating Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|----------------|--------------------------------------------------------|----------------------------------|------|------|--------|
| Isolation | Input-output | Electric Strength Test for 1min., leakage current <5mA | 4000 | -- | -- | VAC |
| Insulation Resistance | Input-output | At 500VDC | 100 | -- | -- | MΩ |
| Operating Temperature | | | -40 | -- | +85 | °C |
| Storage Temperature | | | -40 | -- | +85 | |
| Storage Humidity | | | -- | -- | 95 | %RH |
| Soldering Temperature | | Wave-soldering | 260 ± 5°C; time: 5 - 10s | | | |
| | | Manual-welding | 360 ± 10°C; time: 3 - 5s | | | |
| Switching Frequency | | | -- | 65 | -- | kHz |
| Power Derating | -40°C to -25°C | 85VAC - 115VAC | 2.2 | -- | -- | % / °C |
| | +50°C to +70°C | 3.3/5V | 2.5 | -- | -- | |
| | +55°C to +70°C | 9/12/15/24V | 3.33 | -- | -- | |
| | +70°C to +85°C | | 0.66 | -- | -- | |
| | 85VAC - 100VAC | | | 0.83 | -- | -- |
| 2000m - 5000m | | | 6.7 | -- | -- | %/Km |
| Safety Standard | | | UL/EN/IEC62368/EN60335/EN61558 | | | |
| Safety Certification | | | UL/EN/IEC62368/EN60335/EN61558 | | | |
| Safety Class | | | CLASS II | | | |
| MTBF | | | MIL-HDBK-217F@25°C > 3,200,000 h | | | |
| Designed life | 230VAC | Ta: 25°C 100% load | >130x10 ³ h | | | |
| | | Ta: 55°C 100% load | >20x10 ³ h | | | |
| | | Ta: 55°C 80% load | >27x10 ³ h | | | |

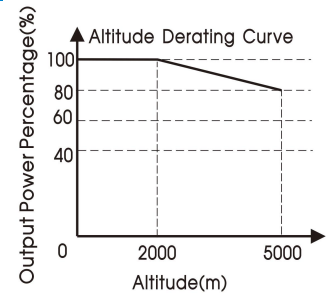
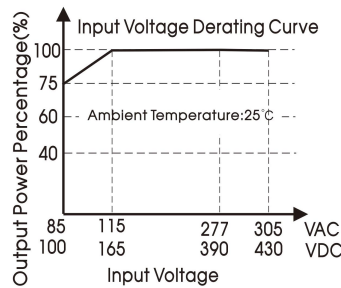
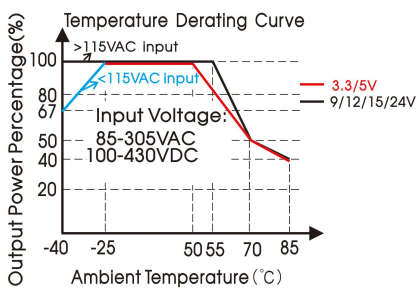
Mechanical Specifications

| | | |
|----------------|-----------------------|-------------------------------------------------------------|
| Case Material | | Black plastic, flame-retardant and heat-resistant (UL94V-0) |
| Dimension | DIP package | 40.00 x 25.40 x 21.00 mm |
| | A2S chassis mounting | 76.00 x 31.50 x 29.80 mm |
| | A4S Din-Rail mounting | 76.00 x 31.50 x 34.40 mm |
| Weight | DIP mounting | 34g (Typ.) |
| | A2S chassis mounting | 54g (Typ.) |
| | A4S Din-Rail mounting | 74g (Typ.) |
| Cooling method | | Free air convection |

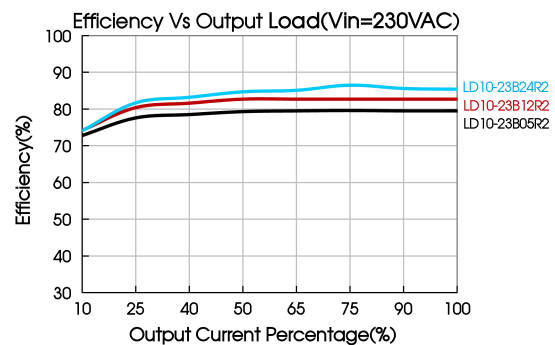
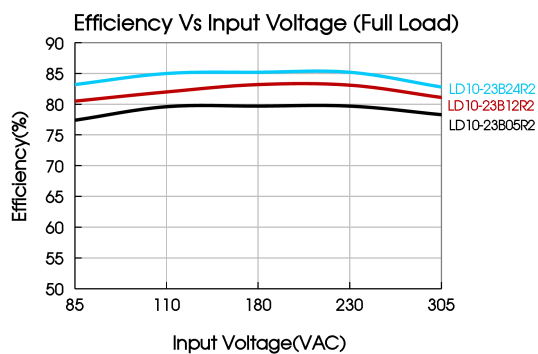
Electromagnetic Compatibility (EMC)

| | | | |
|-------------------------------------------------------|--------------------------|----------------------------------------------------------------------------|------------------|
| Emissions | CE | CISPR32/EN55032 CLASS B | |
| | | EN55014-1 | |
| RE | | CISPR32/EN55032 CLASS B | |
| | | EN55014-1 | |
| Immunity | ESD | IEC/EN 61000-4-2 Contact $\pm 8KV$ /Air $\pm 15KV$ | Perf. Criteria B |
| | | EN55014-2 | Perf. Criteria B |
| | RS | IEC/EN61000-4-3 10V/m | perf. Criteria A |
| | | EN55014-2 | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 $\pm 2KV$ | perf. Criteria B |
| | | IEC/EN61000-4-4 $\pm 4KV$ (See Fig.2 for recommended circuit) | perf. Criteria B |
| | | EN55014-2 | perf. Criteria B |
| | Surge | IEC/EN61000-4-5 line to line $\pm 1KV$ | perf. Criteria B |
| | | IEC/EN61000-4-5 line to line $\pm 2KV$ (See Fig.2 for recommended circuit) | perf. Criteria B |
| | | EN55014-2 | perf. Criteria B |
| CS | IEC/EN61000-4-6 10Vr.m.s | perf. Criteria A | |
| | EN55014-2 | perf. Criteria A | |
| Voltage dip, short interruption and voltage variation | IEC/EN61000-4-11 0%, 70% | perf. Criteria B | |
| | EN55014-2 | perf. Criteria B | |

Product Characteristic Curve



Note: ① With an AC input between 85-115VAC and a DC input between 100-165VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.



Design Reference

1. Typical application

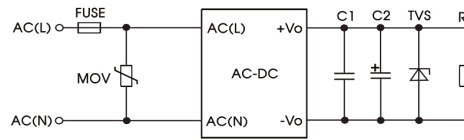


Fig. 1: Typical circuit diagram

| Part No. | FUSE | MOV | C1(μF) | C2(μF) | TVS |
|--------------|------------------------------------|---------|---------|-----------|----------|
| LD10-23B03R2 | 2A/300V, slow-blow, required | S10K350 | 1μF/50V | 220μF/16V | SMBJ7.0A |
| LD10-23B05R2 | | | | 220μF/16V | SMBJ7.0A |
| LD10-23B09R2 | | | | 100μF/25V | SMBJ12A |
| LD10-23B12R2 | | | | 100μF/25V | SMBJ20A |
| LD10-23B15R2 | | | | 100μF/25V | SMBJ20A |
| LD10-23B24R2 | | | | 100μF/35V | SMBJ30A |

Output Filter Components:

We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2 (refer to manufacture’s datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

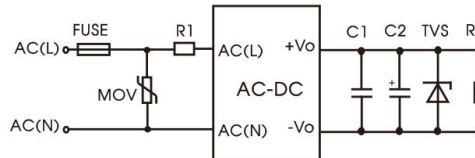


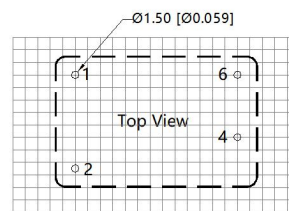
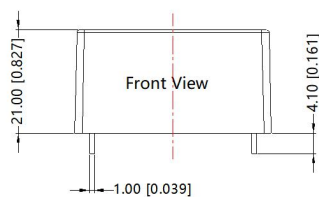
Fig 2: EMC application circuit with higher requirements

| Component | Recommended value |
|-----------|------------------------------|
| FUSE | 2A/300V, slow-blow, required |
| MOV | S14K350 |
| R1 | 6.8Ω/3W |

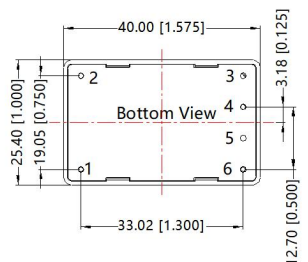
3. For additional information please refer to application notes on www.mornsun-power.com.

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

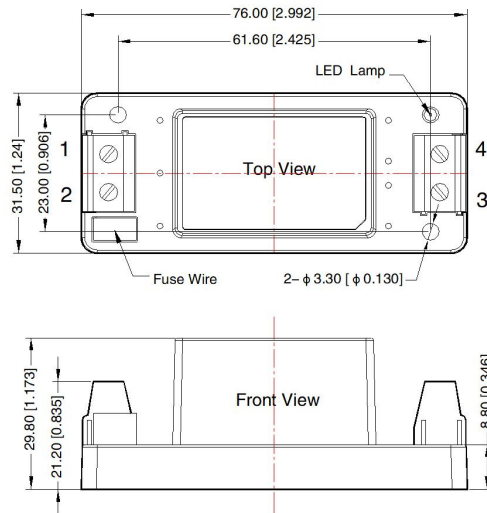


| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | No Pin |
| 4 | +Vo |
| 5 | No Pin |
| 6 | -Vo |

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

A2S Dimensions

THIRD ANGLE PROJECTION

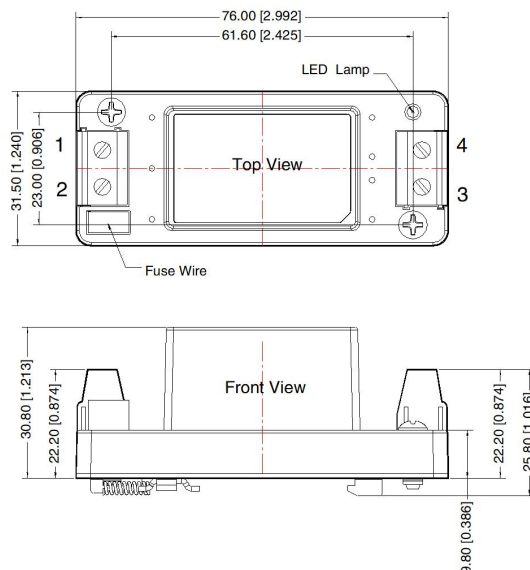


| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1 | AC(N) |
| 2 | AC(L) |
| 3 | -Vo |
| 4 | +Vo |

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 1.00 [± 0.039]

A4S Dimensions

THIRD ANGLE PROJECTION



| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1 | AC(N) |
| 2 | AC(L) |
| 3 | -Vo |
| 4 | +Vo |

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00 [± 0.039]

- Note:
- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220135 (DIP package); 58220022 (A2S/A4S package);
 - If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
 - Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75% with nominal input voltage and rated output load;
 - All index testing methods in this datasheet are based on our company corporate standards;
 - We can provide product customization service, please contact our technicians directly for specific information;
 - Products are related to laws and regulations: see "Features" and "EMC";
 - 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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