

3W, AC-DC converter



FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- 1 x 1 inch compact size
- Operating ambient temperature range: -40°C to +85°C
- Up to 79% efficiency
- No-load power consumption 0.1W
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- Wire package
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014
- Design to meet UL62368

LD03-23BxxWR2 series AC-DC converters is one of Mornsun's compact size power converter. It features ultra-wide AC input and at the same time accepts DC input voltage, low power consumption, 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. |
|---------------|---------------|--------------|------------------------------------|-------------------------------|---------------------------|
| IEC/EN | LD03-23B03WR2 | 3W | 3.3V/900mA | 72 | 4000 |
| | LD03-23B05WR2 | | 5V/600mA | 76 | 3000 |
| | LD03-23B09WR2 | | 9V/333mA | 78 | 1200 |
| | LD03-23B12WR2 | | 12V/250mA | 78 | 1200 |
| | LD03-23B15WR2 | | 15V/200mA | 79 | 680 |
| | LD03-23B24WR2 | | 24V/125mA | 79 | 220 |

Note: The product picture is for reference only. For details, please refer to the actual product.

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 | -- | -- | 0.08 | A |
| | 230VAC | -- | -- | 0.06 | |
| Inrush Current | 115VAC | -- | 15 | -- | |
| | 230VAC | -- | 25 | -- | |
| Leakage Current | 277VAC/50Hz | 0.25mA RMS Max. | | | |
| Recommended External Input Fuse | | 1A, slow-blow, required (The actual use needs to be selected according to the application environment) | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|----------------------------|--------------------------------------|------|------|------|------|
| Output Voltage Accuracy | 3.3V output | -- | ±3 | -- | % |
| | others | -- | ±2 | -- | |
| Line Regulation | Full load | -- | ±0.5 | -- | |
| Load Regulation | 0%-100% load | -- | ±1 | -- | mV |
| Ripple & Noise* | 20MHz bandwidth (peak-to-peak value) | -- | 50 | 100 | |
| Stand-by Power Consumption | 230VAC | -- | 0.10 | -- | W |

| | | | | | |
|--------------------------|-----------------|-----------------------------------|-------|----|------|
| Temperature Coefficient | | -- | ±0.02 | -- | %/°C |
| Short Circuit Protection | | Hiccup, continuous, self-recovery | | | |
| Over-current Protection | | ≥200%Io, self-recovery | | | |
| Over-voltage Protection | 3.3/5VDC output | ≤7.5VDC | | | |
| | 9VDC output | ≤15VDC | | | |
| | 12VDC output | ≤16VDC | | | |
| | 15VDC output | ≤20VDC | | | |
| | 24VDC output | ≤30VDC | | | |
| Minimum Load | | 0 | -- | -- | % |
| Hold-up Time | 115VAC input | -- | 5 | -- | ms |
| | 230VAC input | -- | 50 | -- | |

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 |
| Operating Temperature | | | -40 | -- | +85 | °C |
| Storage Temperature | | | -40 | -- | +105 | |
| 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 | +70°C to +85°C | 3.3V | 2.33 | -- | -- | % / °C |
| | | Others | 1.33 | -- | -- | |
| | 85VAC - 100VAC | | 1.33 | -- | -- | %/VAC |
| Altitude | | | -- | -- | 5000 | m |
| Safety Standard | | | IEC/EN/BS EN62368-1 safety approved; Design refer to UL62368-1 | | | |
| Safety Class | | | CLASS II | | | |
| MTBF | | | MIL-HDBK-217F@25°C > 2,799,000 h | | | |
| Designed Life | 230VAC | Ta: 25°C 100% load | > 150x10 ³ h | | | |
| | | Ta: 70°C 100% load | > 27x10 ³ h | | | |

Mechanical Specifications

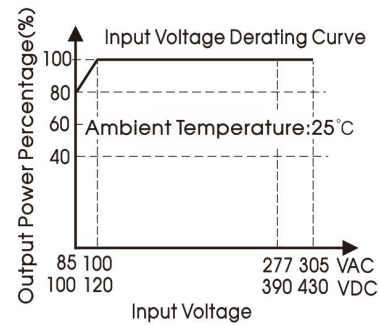
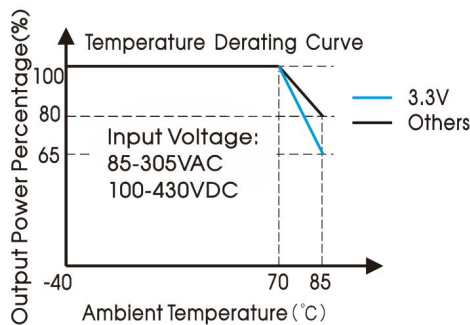
| | | |
|----------------|---|--------------|
| Case Material | Black plastic, flame-retardant and heat-resistant (UL94V-0) | |
| Dimension | 25.40 x 25.40 x 17.60 mm | |
| Weight | 3.3V/5V/9V/12V | 18.0g (Typ.) |
| | 15V/24V | 18.3g (Typ.) |
| Cooling method | Free air convection | |

Electromagnetic Compatibility (EMC)

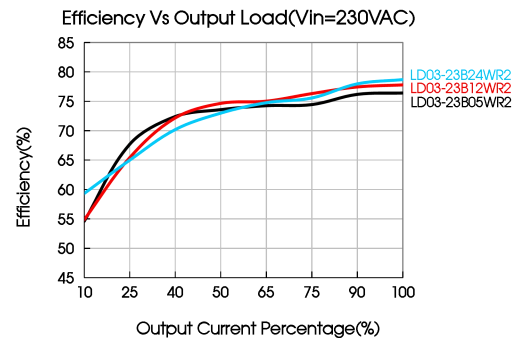
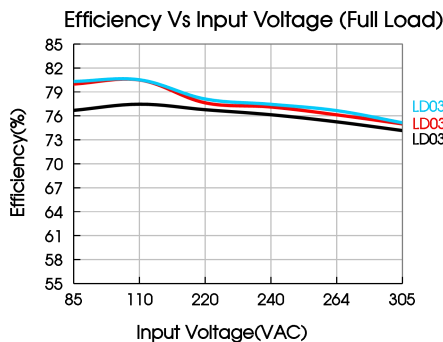
| | | | |
|-----------|-----|--|------------------|
| Emissions | CE | CISPR32/EN55032 CLASS B | |
| | | EN55014-1 | |
| | RE | CISPR32/EN55032 CLASS B | |
| | | EN55014-1 | |
| Immunity | ESD | IEC/EN 61000-4-2 Contact ±6KV/Air ±8KV | perf. Criteria B |
| | | EN55014-2 | perf. Criteria B |
| | RS | IEC/EN61000-4-3 10V/m | perf. Criteria A |
| | | EN55014-2 | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 ±4KV | perf. Criteria B |

| | | | |
|---|------------------|--|------------------|
| Surge | EN55014-2 | | perf. Criteria B |
| | IEC/EN61000-4-5 | line to line $\pm 1\text{KV}$ (See Fig.1 for typical application circuit) | perf. Criteria B |
| | IEC/EN61000-4-5 | line to line $\pm 2\text{KV}$ (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 85-100V/ a DC input between 100-120VDC, 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 MornsunFAE.



Design Reference

1. Typical application

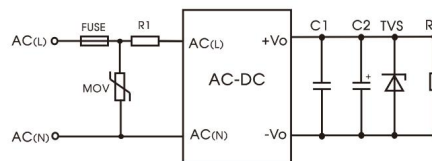


Fig. 1: Typical circuit diagram

| Part No. | C1(μF) | C2(μF) | FUSE | R1 | TVS | MOV |
|---------------|--------|--------|------------------------------------|--|----------|---------|
| LD03-23B03WR2 | 1 | 150 | 1A/300V, slow-blow, required | 12 Ω /3W(wire-wound resistor, required) | SMBJ7.0A | S10K350 |
| LD03-23B05WR2 | | 150 | | | SMBJ7.0A | |
| LD03-23B09WR2 | | 120 | | | SMBJ12A | |
| LD03-23B12WR2 | | 120 | | | SMBJ20A | |
| LD03-23B15WR2 | | 120 | | | SMBJ20A | |
| LD03-23B24WR2 | | 68 | | | 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

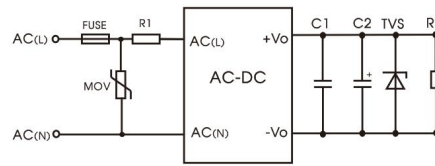


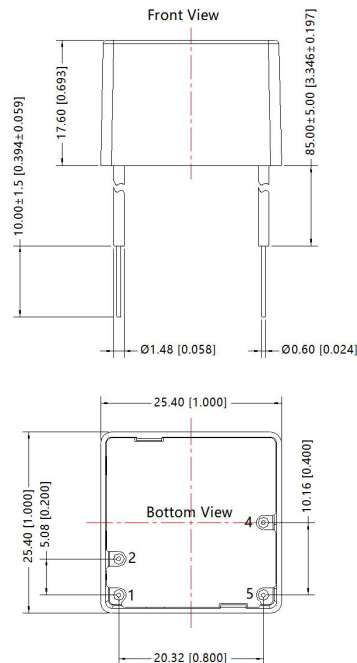
Fig. 2: EMC application circuit with higher requirements

| Component | Recommended value |
|-----------|---|
| MOV | S14K350 |
| R1 | 33 Ω /3W (wire-wound resistor, required) |
| FUSE | 2A/300V, slow-blow, required |

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



| Pin-Out | | |
|---------|---------------|----------|
| Pin | Wire Type | Function |
| 1 blue | UL-1330 AWG26 | AC(N) |
| 2 brown | UL-1330 AWG26 | AC(L) |
| 4 black | UL-1330 AWG26 | -Vo |
| 5 red | UL-1330 AWG26 | +Vo |

Note:
Unit: mm[inch]
Wire diameter tolerances: $\pm 0.30[\pm 0.012]$
General tolerances: $\pm 0.50[\pm 0.020]$
About wire spacing tolerances: $\pm 2.00[0.079]$

Note:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220051;
- 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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