

AC/DC Converter

LDE03-20Bxx-O Series

Steady power 3W, transient power up to 12W, AC-DC converter



UL US CE CB RoHS



LDE03-20Bxx-O Series is one of Mornsun's compact size power converters. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability and reinforced isolation. It offers good EMC performance, and meets CISPR32/EN55032, IEC/EN/UL62368 standards, and they are widely used in industrial, power, instrumentation, communication and civil applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

FEATURES

- Universal 85-264VAC or 100-370VDC input voltage
- Operating ambient temperature range: -40°C to +80°C
- High I/O isolation test voltage up to 4000VAC
- Output short circuit, over-current, over-voltage protection, over temperature protection
- High efficiency, high reliability
- Regulated output, low ripple & noise
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32 / EN55032 CLASS B
- Continuous steady output power 3W, transient output power 12W and up to 10S
- IEC/EN/UL62368 safety approval

Selection Guide

| Certification | Part No.* | Nominal Power | Transient Power** | Nominal Output Voltage and Current (Vo/Io) | Transient Output Voltage and Current (Vo/Ip) | Efficiency at 230VAC (%) Typ. | Capacitive Load (μF)Max. |
|---------------|---------------|---------------|-------------------|--|--|-------------------------------|--------------------------|
| CB/CE/UL | LDE03-20B03-O | 3W | 12W | 3.3V/700mA | 3.3V/2800mA | 68 | 6000 |
| | LDE03-20B05-O | | | 5V/600mA | 5V/2400mA | 72 | 6000 |
| | LDE03-20B09-O | | | 9V/330mA | 9V/1320mA | 73 | 1500 |
| | LDE03-20B12-O | | | 12V/250mA | 12V/1000mA | 78 | 1500 |
| | LDE03-20B15-O | | | 15V/200mA | 15V/800mA | 78 | 1000 |
| | LDE03-20B24-O | | | 24V/125mA | 24V/500mA | 80 | 330 |

Note: ①* Use suffix "A2S" for chassis mounting and suffix "A4S" for Din-Rail mounting.
 ②**For the using of transient power, please refer to the product characteristic curve.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|----------------------|------------------------------|------|------|------|
| Input Voltage Range | AC input | 85 | -- | 264 | VAC |
| | DC input | 100 | -- | 370 | VDC |
| Input frequency | | 47 | -- | 63 | Hz |
| Input current | 115VAC Steady state | -- | -- | 90 | mA |
| | 230VAC Steady state | -- | -- | 60 | |
| Inrush current | 115VAC | -- | 10 | -- | A |
| | 230VAC | -- | 20 | -- | |
| Leakage current | 240VAC/50Hz | 0.25mA RMS typ. | | | |
| Recommended External Input Fuse | | 1A/250V, slow-blow, required | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------|----------------------|---------------|------|------|------|
| Transient Maximum Output Power | 110VAC | 3.3VDC output | -- | 6.2 | W |
| | | Others | -- | 8 | |
| | 220VAC | 3.3VDC output | -- | 9.2 | |
| | | Others | -- | 12 | |
| Output Voltage Accuracy | 3.3VDC output | -- | ±3 | -- | % |

| | | | | | |
|-------------------------------|--------------------------------------|---|-------|-----|------|
| | Others | -- | ±2 | -- | |
| Line Regulation | Full load | -- | ±0.5 | -- | |
| Load Regulation | 0%-100% load | -- | ±1 | -- | |
| Ripple & Noise* | 20MHz bandwidth (peak-to-peak value) | -- | 50 | 100 | mV |
| Temperature Drift Coefficient | | -- | ±0.02 | -- | %/°C |
| Stand-by Power Consumption | 230VAC | -- | 0.2 | 0.3 | W |
| Short Circuit Protection | | Hiccup, continuous, self-recovery | | | |
| Over Temperature Protection | | When the chip is overheated, the output is turned off and self-recovery after cooling | | | |
| Over-current Protection | 85VAC - 165VAC input | ≥267% Io, self-recovery | | | |
| | 165VAC - 264VAC input | ≥400% Io, self-recovery | | | |
| Over-voltage Protection | 3.3/5VDC output | ≤7.5VDC | | | |
| | 9VDC output | ≤15VDC | | | |
| | 12/15VDC output | ≤20VDC | | | |
| | 24VDC output | ≤30VDC | | | |
| Minimum Load | | 0 | -- | -- | % |
| Hold-up Time | 115VAC input | -- | 10 | -- | ms |
| | 230VAC input | -- | 80 | -- | |

Note: * The "parallel cable" method is used for ripple and noise test, 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 | -- | +80 | °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 | | | |
| Power Derating | -40°C to -25°C | 1.0 | -- | -- | % / °C |
| | +60°C to +70°C | 1.5 | -- | -- | |
| | +70°C to +80°C | 4.5 | -- | -- | |
| | +70°C to +80°C | 4.0 | -- | -- | |
| | 85VAC - 100VAC | 1.0 | -- | -- | % / VAC |
| Safety Standard | | IEC/EN/UL62368 | | | |
| Safety Certification | | IEC/EN/UL62368 | | | |
| Safety Class | | CLASS II | | | |
| MTBF | | MIL-HDBK-217F@25°C > 300,000 h | | | |

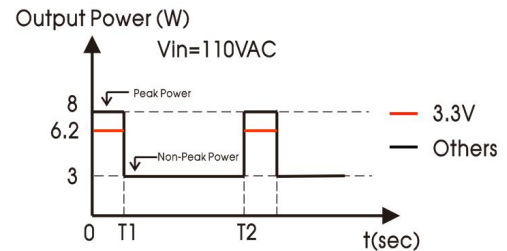
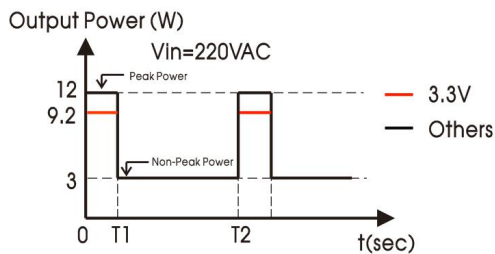
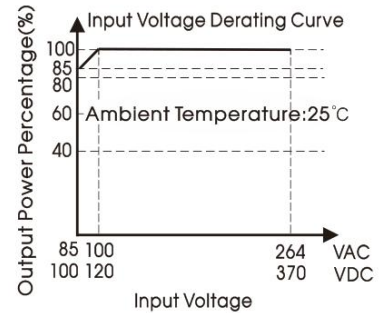
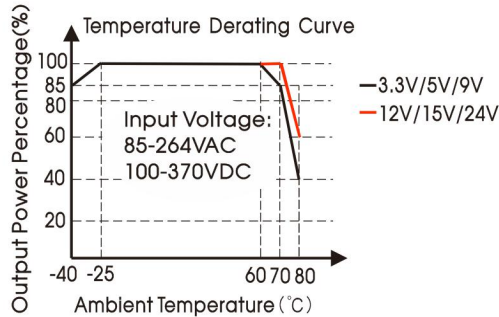
Mechanical Specifications

| | | |
|--------------------|-----------------------|---|
| Case Material | | Black plastic, flame-retardant and heat-resistant (UL94V-0) |
| Package Dimensions | DIP | 37.00 x 24.50 x 18.00 mm |
| | A2S chassis mounting | 76.00 x 31.50 x 26.80 mm |
| | A4S Din-Rail mounting | 76.00 x 31.50 x 31.40 mm |
| Weight | DIP | 25g(Typ.) |
| | A2S chassis mounting | 47g(Typ.) |
| | A4S Din-Rail mounting | 69g(Typ.) |
| Cooling method | | Free air convection |

Electromagnetic Compatibility (EMC)

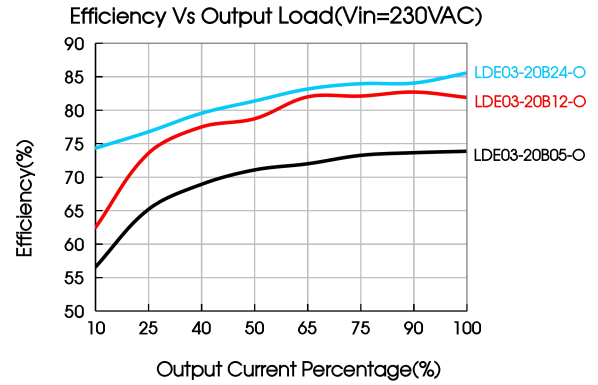
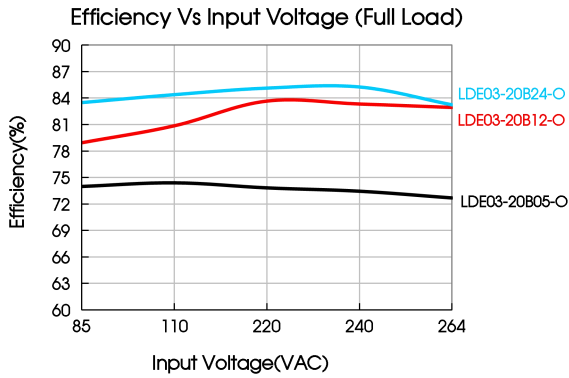
| | | | | |
|---|-------|------------------|--|------------------|
| Emissions | CE | CISPR32/EN55032 | CLASS A | |
| | | CISPR32/EN55032 | CLASS B (See Fig. 2 for recommended circuit) | |
| | RE | CISPR32/EN55032 | CLASS A | |
| | | CISPR32/EN55032 | CLASS B (See Fig. 2 for recommended circuit) | |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

Product Characteristic Curve



| Part No. | Input Voltage | Peak Power Ratio | Peak Power | Non-Peak Power | Peak Power Working Duration(T1) | Duty Cycle(T1/T2) | Ultimate Overload Time | Recovery Time After Extreme Overload |
|-------------|---------------|------------------|------------|----------------|---------------------------------|-------------------|------------------------|--------------------------------------|
| 3.3V | 110VAC | 267% | 6.2W | 2.3W | $\leq 10S$ | 10% | 30S | 4H |
| | 220VAC | 400% | 9.2W | 2.3W | $\leq 10S$ | 10% | 30S | 4H |
| 5V/9V | 110VAC | 267% | 8W | 3W | $\leq 10S$ | 10% | 30S | 4H |
| | 220VAC | 400% | 12W | 3W | $\leq 10S$ | 10% | 30S | 4H |
| 12V/15V/24V | 110VAC | 267% | 8W | 3W | $\leq 10S$ | 50% | 300S | 1H |
| | 220VAC | 400% | 12W | 3W | $\leq 10S$ | 50% | 300S | 1H |

Note: ① With an AC input between 85-100VAC and 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 factory or one of our FAE.
 ③ The product goes into over-temperature protection when exceeds the limit overload range, turns off the output and self-recovery.



Design Reference

1. Typical application

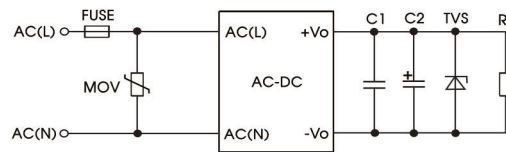


Fig. 1: Typical circuit diagram

| Part No. | C1(μF) | C2(μF) | FUSE | MOV |
|------------------------|--------|-----------|------------------------------------|-----------------------|
| LDE03-20B03/05-O | 1 | 16V/220μF | 1A/250V, slow-blow, required | S10K300 (required) |
| LDE03-20B09/12/15/24-O | | 35V/100μF | | |

Output Filter Components:

① 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 The product in the application must connect external electrolytic capacitors C2, to achieve lower ripple noise and better dynamic load performance.

2. EMC compliance recommended circuit

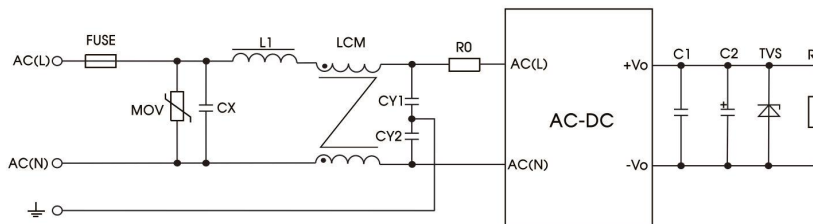
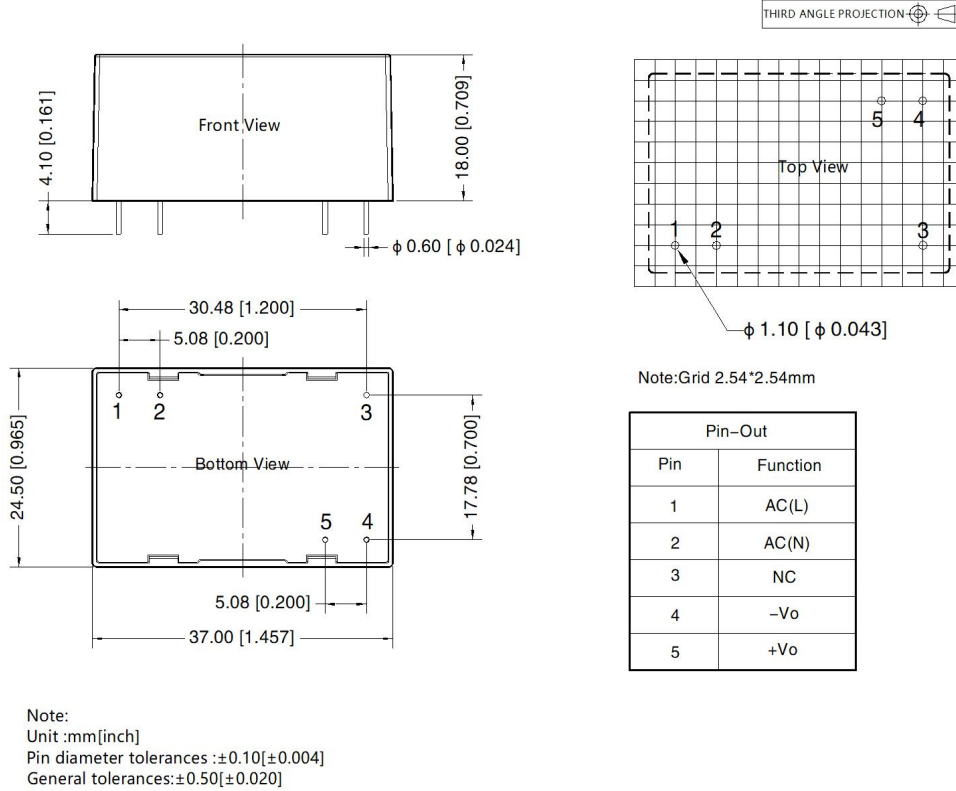


Fig 2: EMC application circuit with higher requirements

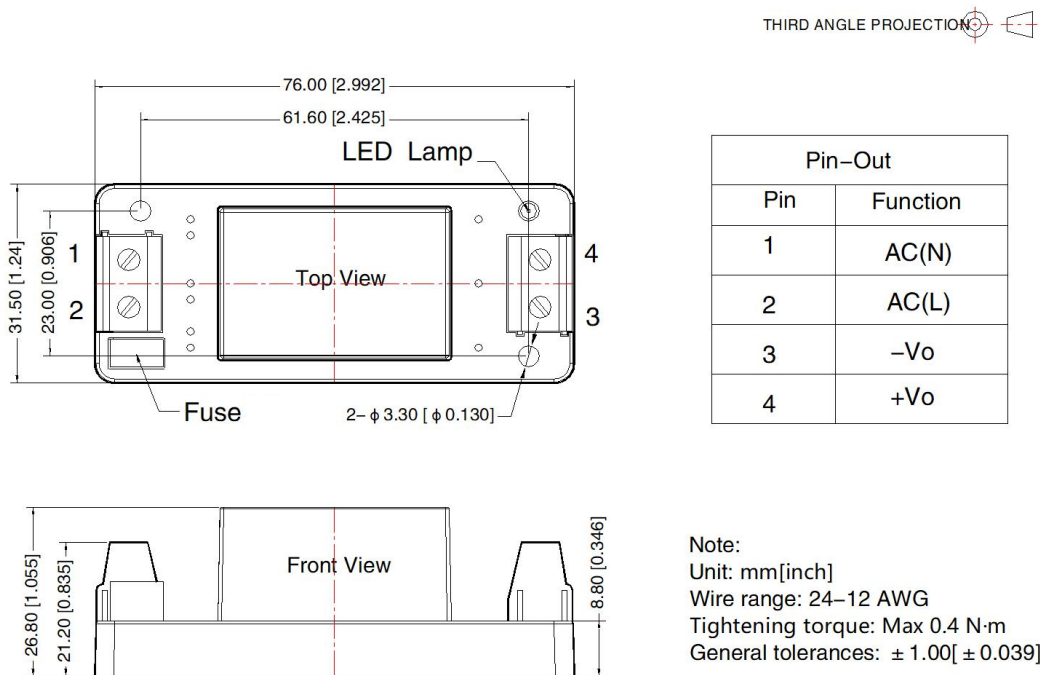
| Element model | Recommended value |
|---------------|--|
| MOV | S14K350 |
| CX | 0.1μF/275VAC |
| L1 | 330uH/2.0A |
| LCM | 10mH - 30mH, we recommend using part no. FL2D-Z5-103 (MORNSUN) |
| CY1/CY2 | 1nF/400VAC |
| FUSE | 2A/250V, slow-blow, required |
| R0 | 12Ω/3W |

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

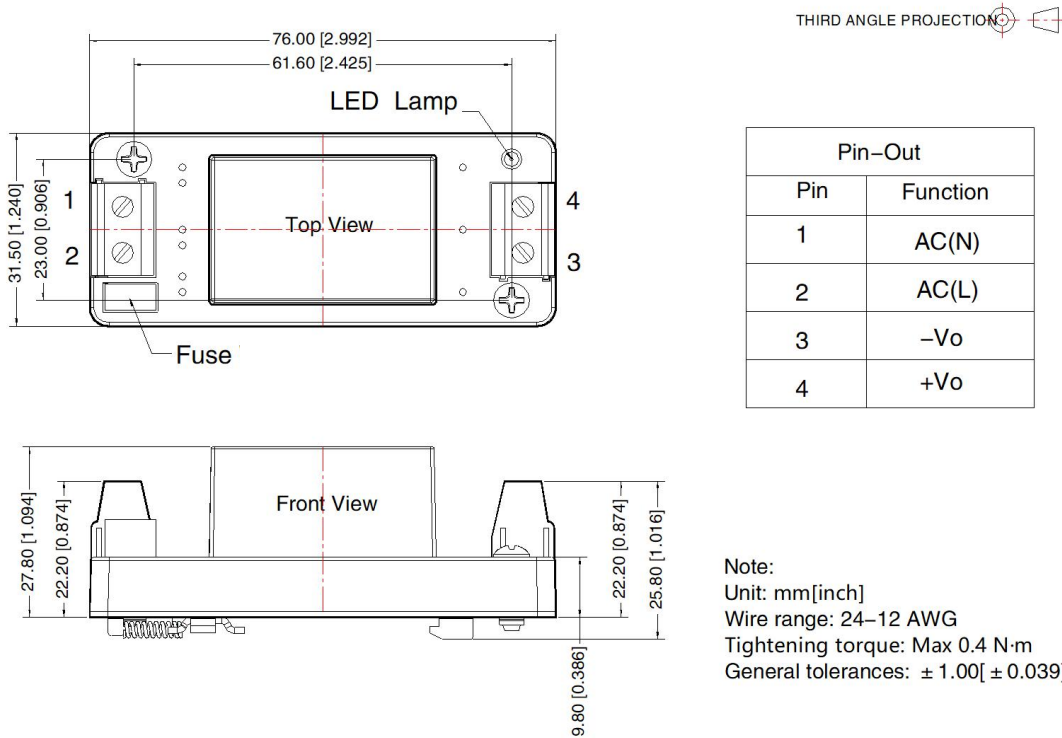
Dimensions and Recommended Layout



A2S Dimensions



A4S Dimensions



Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200055 (DIP package); 58220022(A2S/A4S package);
2. 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;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com