# AC/DC Converter

LDE60-20Bxx Series

60W, AC-DC converter

## FEATURES

- Universal 85-264VAC or 100-370VDC input voltage
- Operating ambient temperature range: -40℃ to +70℃
- High I/O isolation test voltage up to 4000VAC
- Regulated output, low ripple & noise, low power consumption
- High efficiency, high power density
- Output short circuit, over-current, over-voltage protection
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32 / EN55032 CLASS B
- IEC/EN/UL62368 safety approval

LDE60–20Bxx series is one of compact size power converter. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability, high power density, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000–4 and CISPR32/EN55032 and meets IEC/UL/EN62368 standards. The converters are widely used in industrial, power, instrumentation, communication and civilapplications. 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/EN/IEC | LDE60-20B05 | 50W | 5V/10000mA | 84 | 20000 |
| | LDE60-20B12 | 60W | 12V/5000mA | 87 | 4000 |
| | LDE60-20B15 | | 15V/4000mA | 88 | 3000 |
| | LDE60-20B24 | | 24V/2500mA | 89 | 1800 |
| | LDE60-20B48 | | 48V/1250mA | 90 | 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 | -- | 264 | VAC |
| | DC input | 100 | -- | 370 | VDC |
| Input Frequency | | 47 | -- | 63 | Hz |
| Input Current | 115VAC | -- | -- | 1.8 | A |
| | 230VAC | -- | -- | 1.0 | |
| Inrush Current | 115VAC | -- | 45 | -- | |
| | 230VAC | -- | 90 | -- | |
| Leakage Current | 240VAC/50Hz | 0.25mA RMS Max. | | | |
| Built-in Fuse | | 3.15A/250V, slow-blow | | | |
| 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) | -- | -- | 120 | mV |
| Stand-by Power Consumption | | -- | -- | 0.5 | W |
| Temperature Coefficient | | -- | ±0.02 | -- | %/°C |
| Short Circuit Protection | | Hiccup, continuous, self-recovery | | | |

| | | | | | |
|---|---|---|---|---|---|
| Over-current Protection | | ⩾110%Io, self-recovery | | | |
| Over-voltage Protection | 5VDC Output | ⩽9VDC (Output voltage clamp or hiccup) | | | |
| | 12VDC Output | ⩽16VDC (Output voltage clamp or hiccup) | | | |
| | 15VDC Output | ⩽25VDC (Output voltage clamp or hiccup) | | | |
| | 24VDC Output | ⩽35VDC (Output voltage clamp or hiccup) | | | |
| | 48VDC Output | ⩽60VDC (Output voltage clamp or hiccup) | | | |
| Minimum Load | | 0 | -- | -- | % |
| Hold-up Time | 115VAC input | -- | 8 | -- | ms |
| | 230VAC input | -- | 65 | -- | |

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 | -- | +70 | ℃ |
| Storage Temperature | | | -40 | -- | +85 | |
| Storage Humidity | | | -- | -- | 95 | %RH |
| Soldering Temperature | | Wave-soldering | 260 ± 5℃; time：5 - 10s | | | |
| | | Manual-welding | 360 ± 10℃; time：3 - 5s | | | |
| Power Derating | | -40℃ to -25℃ (85-220VAC input) | 4.0 | -- | -- | %/℃ |
| | | +40°C to +70°C (5V output) | 1.83 | -- | -- | |
| | | +50°C to +70°C (12V, 15V, 24V, 48V output) | 2.75 | -- | -- | |
| | | 85VAC - 110VAC | 0.8 | -- | -- | %/VAC |
| Safety Standard | | | IEC/UL62368-1 Safety Approval & EN62368-1 (Report) | | | |
| Safety Class | | | CLASS II | | | |
| MTBF | | | MIL-HDBK-217F@25°C > 300,000 h | | | |

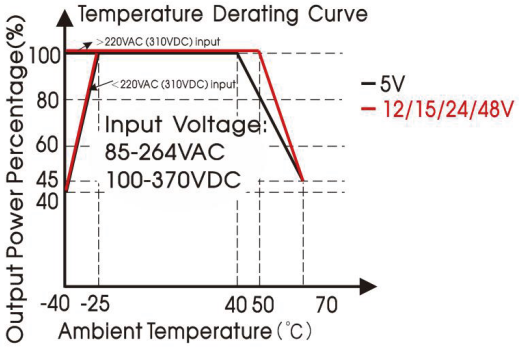
## Mechanical Specifications

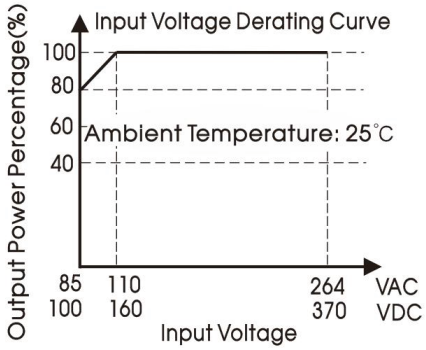
| | | |
|---|---|---|
| Case Material | | Black plastic, flame-retardant and heat-resistant (UL94V-0) |
| Dimension | DIP | 87.00 x 52.00 x 29.50 mm |
| | A2S chassis mounting | 135.00 x 70.00 x 37.90 mm |
| | A4S Din-Rail mounting | 137.00 x 70.00 x 42.40 mm |
| Weight | DIP | 210g (Typ.) |
| | A2S chassis mounting | 290g (Typ.) |
| | A4S Din-Rail mounting | 360g (Typ.) |
| Cooling method | | Free air convection |

## Electromagnetic Compatibility (EMC)

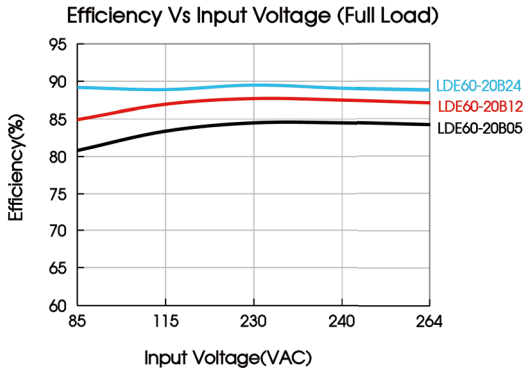
| | | | |
|---|---|---|---|
| Emissions | CE | CISPR32/EN55032 CLASS B | |
| | RE | CISPR32/EN55032 CLASS B | |
| Immunity | ESD | IEC/EN 61000-4-2 Contact ±6KV / Air ±8KV | Perf. Criteria B |
| | RS | IEC/EN61000-4-3 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 ±4KV | perf. Criteria B |
| | Surge | IEC/EN61000-4-5 line to line ±1KV | perf. Criteria B |
| | | IEC/EN61000-4-5 line to line ±2KV/line to ground ±4KV (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 |

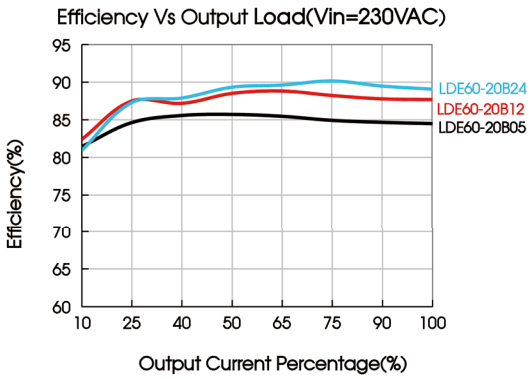
## Product Characteristic Curve




Note: ① With an AC input between 85-110VAC and a DC input between 100-160VDC, 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

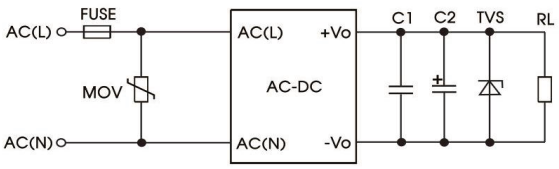



Fig. 1: Typical circuit diagram

| Part No. | C1(μF) | C2(μF) | FUSE | MOV | TVS |
|---|---|---|---|---|---|
| LDE60-20B05 | 1 | 680 | 3.15A/250V, slow-blow | S10K300 | SMBJ7.0A |
| LDE60-20B12 | | 330 | | | SMBJ20A |
| LDE60-20B15 | | 330 | | | SMBJ20A |
| LDE60-20B24 | | 200 | | | SMBJ30A |
| LDE60-20B48 | | 100 | | | SMBJ64A |

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

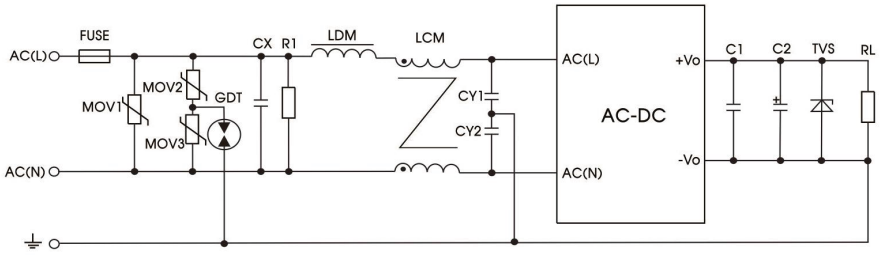
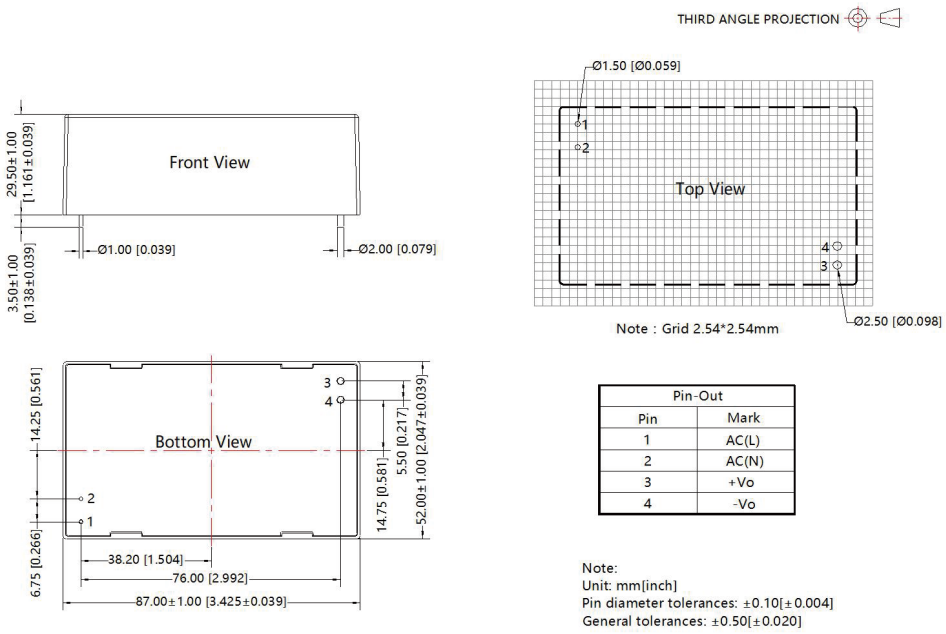



Fig 2: EMC application circuit with higher requirements

| Component | Recommended value |
|---|---|
| MOV1 | S20K300 |
| MOV2/MOV3 | S10K300 |
| CX | 0.22μF/275VAC |
| CY1/CY2 | 1nF/400VAC |
| R1 | 1MΩ/2W |
| LDM | 4.7uH |
| LCM | 2mH |
| GDT | EM3600XS |
| FUSE | 3.15A/250V, slow-blow, required |

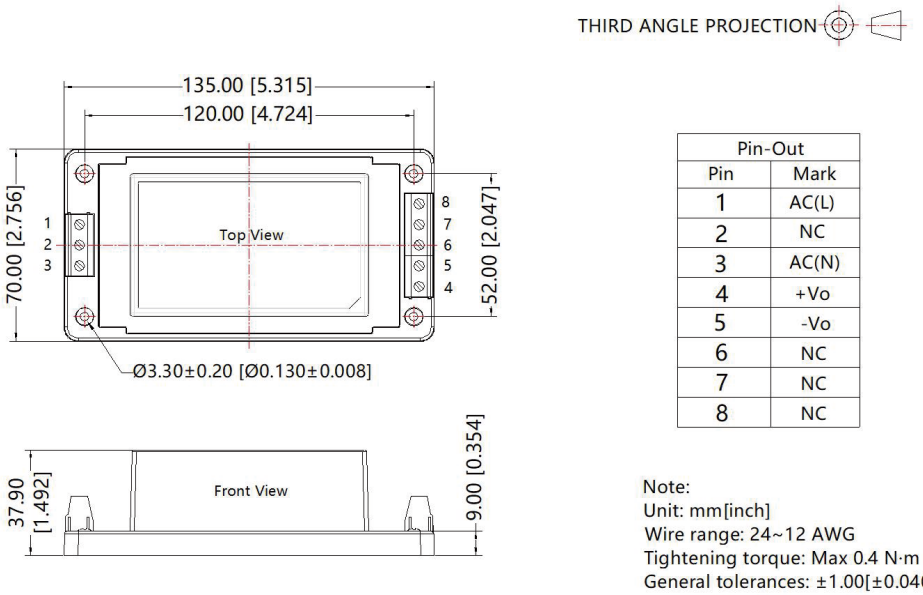
## Dimensions and Recommended Layout




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

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

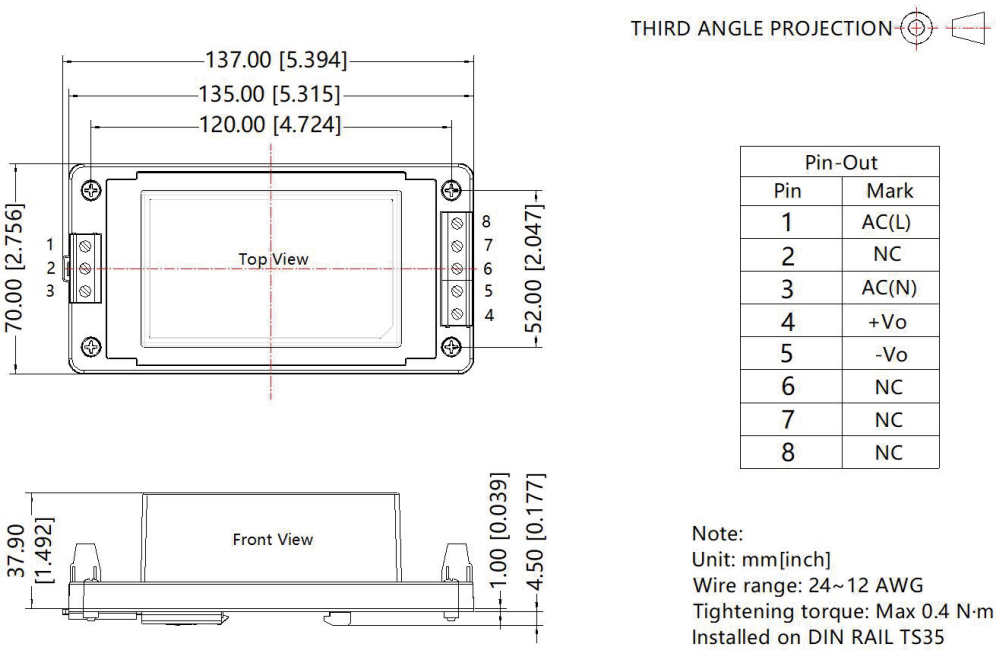
## A2S Dimensions




| Pin-Out | |
|---|---|
| Pin | Mark |
| 1 | AC(L) |
| 2 | NC |
| 3 | AC(N) |
| 4 | +Vo |
| 5 | -Vo |
| 6 | NC |
| 7 | NC |
| 8 | NC |

Note:
Unit: mm[inch]
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.040]

## A4S Dimensions




| Pin-Out | |
|---|---|
| Pin | Mark |
| 1 | AC(L) |
| 2 | NC |
| 3 | AC(N) |
| 4 | +Vo |
| 5 | -Vo |
| 6 | NC |
| 7 | NC |
| 8 | NC |

Note:
Unit: mm[inch]
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N·m
Installed on DIN RAIL TS35
General tolerances: ±1.00[±0.040]

### NOTE:

1. For additional information on Product Packaging please refer to www.szhehuiyuan.com.
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 Ta=25℃, 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.

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