

# AC/DC Converter

## LD05-20BxxMU Series

# MORNSUN®

5W, AC/DC converter



CE Report  
EN60101-1

UK  
BS EN60601-1

RoHS



## FEATURES

- Universal input: 85 - 264VAC/100 - 370VDC
- AC and DC dual-use(input from the same terminal)
- High efficiency, high power density
- Output short circuit, over-current, over-voltage protection
- EN60601-1, ANSI/AAMI ES60601-1 approval (2xMOPP)

LD05-20BxxMU series is a compact size power converter offered by Mornsun. It features universal input voltage, taking both DC and AC input voltage, low power consumption, high efficiency, high reliability, safer isolation. It offers good EMC performance, and widely used in medical, industrial, instruments, telecommunication and civil applications. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.

## Selection Guide

| Certification | Part No.     | Output Power | Nominal Output Voltage and Current (Vo/Io) | Efficiency (230VAC, %/Typ.) | Max. Capacitive Load*(uF) |
|---------------|--------------|--------------|--|-----------------------------|---------------------------|
| EN            | LD05-20B05MU | 5 W          | 5V/1000mA                                  | 76                          | 4000                      |
|               | LD05-20B12MU |              | 12V/420mA                                  | 80                          | 820                       |
|               | LD05-20B15MU |              | 15V/333mA                                  | 81                          | 820                       |
|               | LD05-20B24MU | 5.5 W        | 24V/230mA                                  | 81                          | 330                       |

Note: 1. \*Test without external circuit.

2. 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          | --   | 264  | VAC  |
|                     | DC input             | 100         | --   | 370  | VDC  |
| Input frequency     |                      | 47          | --   | 63   | Hz   |
| Input current       | 115VAC               | --          | --   | 0.12 | A    |
|                     | 230VAC               | --          | --   | 0.07 |      |
| Inrush current      | 115VAC               | --          | 10   | --   |      |
|                     | 230VAC               | --          | 20   | --   |      |
| Leakage Current     | 264VAC               | --          | --   | 80   | uA   |
| Hot Plug            |                      | Unavailable |      |      |      |

## Output Specifications

| Item                       | Operating Conditions              | Min.                       | Typ.  | Max. | Unit |
|----------------------------|-----------------------------------|----------------------------|-------|------|------|
| Output Voltage Accuracy    |                                   | --                         | ±2    | --   | %    |
| Line Regulation            | Full load                         | --                         | ±0.5  | --   |      |
| Load Regulation            | 10%-100% load                     | --                         | ±1    | --   |      |
| Ripple & Noise*            | 20MHz bandwidth (peak-peak value) | --                         | 50    | 100  | mV   |
| Temperature Coefficient    |                                   | --                         | ±0.02 | --   | %/°C |
| Stand-by Power Consumption |                                   | --                         | --    | 0.3  | W    |
| Short Circuit Protection   |                                   | Continuous, self-recover   |       |      |      |
| Over-current Protection    |                                   | 110%Io~280%Io self-recover |       |      |      |
| Over-voltage Protection    | LD05-20B05MU                      | --                         | --    | 7.5  | V    |
|                            | LD05-20B12MU                      | --                         | --    | 16   |      |
|                            | LD05-20B15MU                      | --                         | --    | 20   |      |
|                            | LD05-20B24MU                      | --                         | --    | 30   |      |
| Minimum Load               |                                   | 0                          | --    | --   | %    |

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|              |              |    |    |    |    |
|--------------|--------------|----|----|----|----|
| 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 | Test time: 1min        | 4000  | --   | --   | VAC  |
| Operating Temperature   |              |                        | -25   | --   | +70  | ℃    |
| Storage Temperature     |              |                        | -40   | --   | +85  |      |
| Max. Casing Temperature |              |                        | --  | --   | +95  |      |
| Storage Humidity        |              |                        | --  | --   | 95   | %RH  |
| Welding Temperature     |              | Wave-soldering         | 260±5℃; time:5~10s  |      |      |      |
|                         |              | Manual-welding         | 360±10℃; time:3~5s  |      |      |      |
| Switching Frequency     |              |                        | --  | --   | 140  | kHz  |
| Power Derating          |              | -25℃~0℃                | 1   | --   | --   | %/℃  |
|                         |              | +55℃~+70℃              | 2   | --   | --   | %/℃  |
| Safety Standard         |              |                        | EN/BS EN60601-1 safety approved;<br>Design refer to UL60601-1 |      |      |      |
| Safety Class            |              |                        | CLASS II  |      |      |      |
| Insulation Level        |              | First side-Second side | 2xMOPP  |      |      |      |
| MTBF                    |              |                        | MIL-HDBK-217F@25℃ >300,000 h                                  |      |      |      |

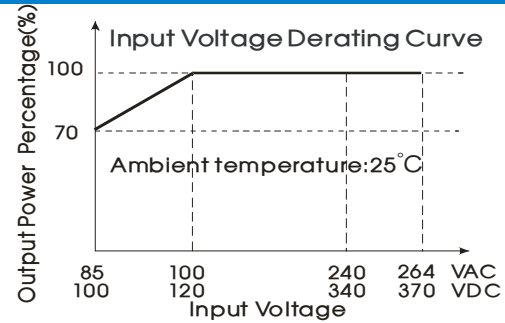
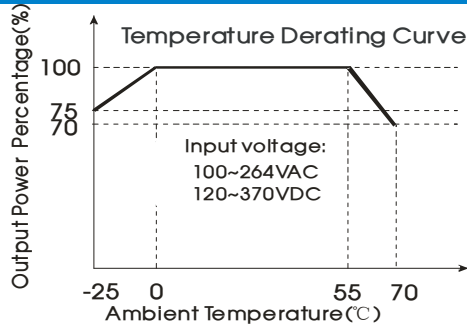
### Physical Specifications

|                    |  |
|--------------------|--|
| Casing Material    | Black flame-retardant and heat-resistant plastic (UL94-V0) |
| Package Dimensions | 53.80 x 28.80 x 19.00 mm                                   |
| Weight             | 43.0g (Typ.)   |
| Cooling method     | Free air convection  |

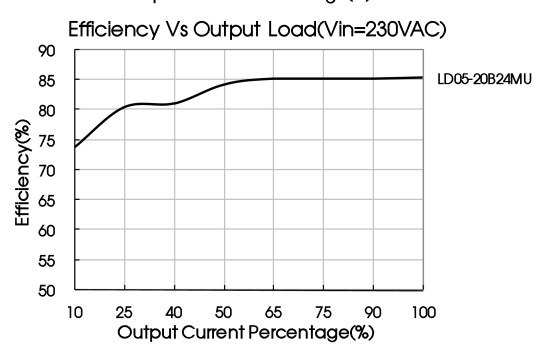
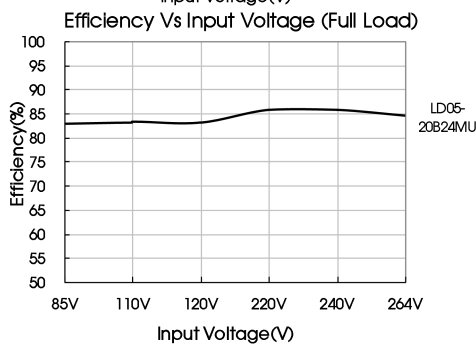
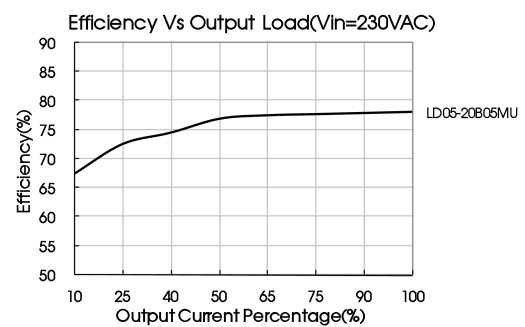
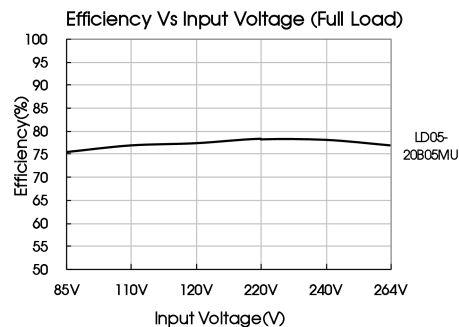
### EMC Specifications

|     |   |                 |   |
|-----|---|-----------------|---|
| EMI | CE  | CISPR11/EN55011 | CLASS B   |
|     | RE  | CISPR11/EN55011 | CLASS B   |
| EMS | ESD   | IEC/EN61000-4-2 | Contact±6KV/Air±8KV perf. Criteria B                            |
|     | RS  | IEC/EN61000-4-3 | 10V/m perf. Criteria A  |
|     | EFT   | IEC/EN61000-4-4 | ±2KV perf. Criteria B   |
|     |   | IEC/EN61000-4-4 | ±4KV (See Fig. 2 for recommended circuit) perf. Criteria B      |
|     | Surge   | IEC/EN61000-4-5 | ±1KV perf. Criteria B   |
|     |   | IEC/EN61000-4-5 | ±2KV/±4KV (See Fig. 2 for recommended circuit) perf. Criteria B |
|     | CS  | IEC/EN61000-4-6 | 10 Vr.m.s perf. Criteria A                                      |
|     | PFM   | IEC/EN61000-4-8 | 10A/m 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 85-100VAC 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 Mornsun FAE.



## Design Reference

## 1. Typical application circuit

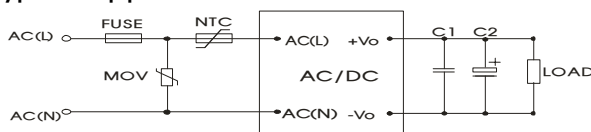


Fig. 1: Typical application circuit

| Model        | C1(μF) | C2(μF) |
|--------------|--------|--------|
| LD05-20B05MU | 1      | 220    |
| LD05-20B12MU |        | 100    |
| LD05-20B15MU |        | 100    |
| LD05-20B24MU |        | 47     |

Note:

Output filtering capacitor C2 is electrolytic capacitor, it is recommended to apply electrolytic capacitor with high frequency and low resistance. For capacitance and current of capacitor please refer to manufacture's datasheet. Capacitance withstand voltage derating should be 80% or above. C1 is ceramic capacitor, which is used to filter high-frequency noise. External input NTC is recommended to use 5D-9. External input MOV is recommended to use S14K300. External input FUSE is recommended to use 2A/250V, slow-blow.

## 2. EMC solution-recommended circuit

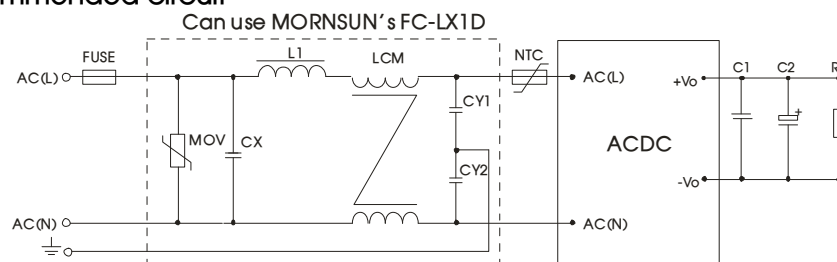
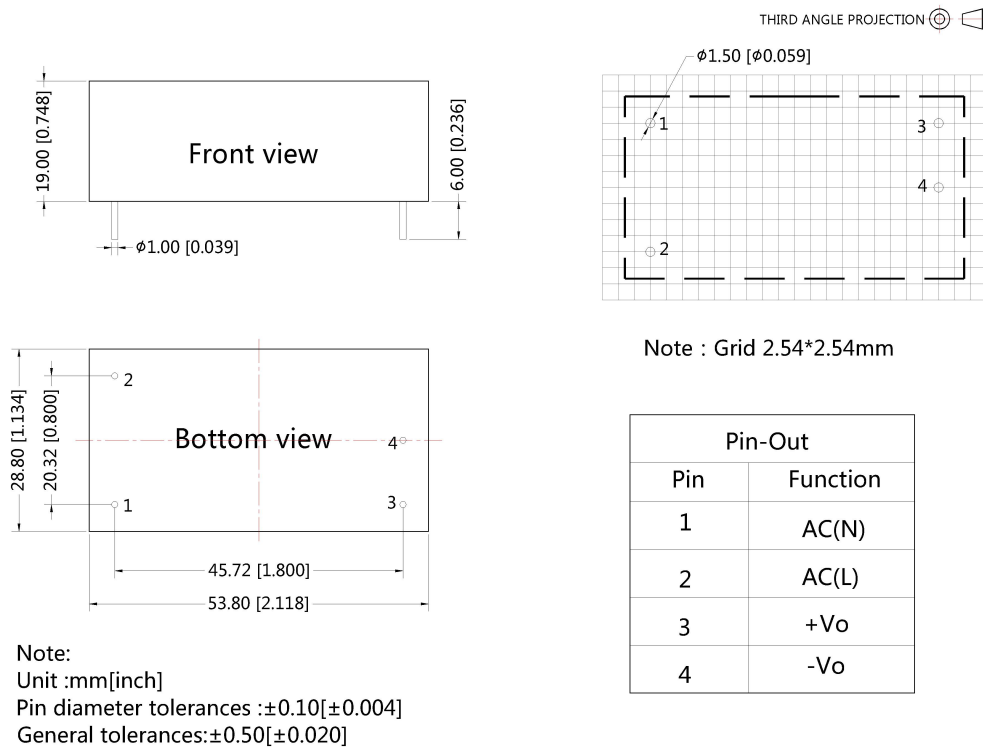


Fig 2: EMC Recommended circuit with higher requirements

| Components | Recommended value                                |
|------------|--|
| MOV        | S14K300  |
| CX         | 0.1 $\mu$ F/275VAC                               |
| L1         | 4.7 $\mu$ H/2.0A                                 |
| CY1        | 1nF/400VAC                                       |
| CY2        | 1nF /400VAC                                      |
| NTC        | 5D-9   |
| LCM        | 2.2mH, P/N: FL2D-10-222 (MORNSUN) is recommended |
| FUSE       | 2A/250V, slow-blow, required                     |
| FC-LX1D    | EMC Filter                                       |

3. For more information please find application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

## Dimensions and Recommended Layout



### Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220005;
- 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's corporate standards;
- The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
- We can provide product customization service, please contact our technicians directly for specific information;
- Specifications are subject to change without prior notice.
- 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.

## Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 8 Nanyun 4th Road, Huangpu District, Guangzhou, China

Tel: 86-20-38601850

Fax: 86-20-38601272

E-mail: [info@mornsun.cn](mailto:info@mornsun.cn)

[www.mornsun-power.com](http://www.mornsun-power.com)