

# AC/DC Converter

## LD05-23Bxx Series

**MORNSUN®**

5W, AC-DC converter



**UL** **CE** **CB** **RoHS**

### FEATURES

- Universal input range: 85~305VAC/100~430VDC
- AC and DC all in one (input from the same terminal)
- High efficiency, high power density
- Protection of output short circuit output over-current, over-voltage
- Meets IEC60950/EN60950/UL60950

LD05-23Bxx 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 LED, street lamp control, 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*( $\mu$ F) |
|---------------|------------|--------------|--|-----------------------------|---------------------------------|
| UL/CE         | LD05-23B03 | 4.2 W        | 3.3V/1250mA                                | 74                          | 4000                            |
|               | LD05-23B05 | 5 W          | 5V/1000mA                                  | 78                          | 4000                            |
|               | LD05-23B09 |              | 9V/550mA                                   | 78                          | 1000                            |
|               | LD05-23B12 |              | 12V/420mA                                  | 80                          | 820                             |
|               | LD05-23B15 |              | 15V/333mA                                  | 82                          | 820                             |
|               | LD05-23B24 | 5.5 W        | 24V/230mA                                  | 83                          | 470                             |

Note: \*Test without external circuit.

### 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                   | --   | 440  | Hz   |
| Input current                   | 110VAC               | --                   | --   | 0.12 | A    |
|                                 | 230VAC               | --                   | --   | 0.07 |      |
| Inrush current                  | 110VAC               | --                   | 10   | --   |      |
|                                 | 230VAC               | --                   | 20   | --   |      |
| Recommended External Input Fuse |                      | 1A/300V, slow fusing |      |      |      |
| Hot Plug                        |                      | Unavailable          |      |      |      |

### Output Specifications

| Item                          | Operating Conditions              | Min.           | Typ.       | Max. | Unit |    |
|-------------------------------|-----------------------------------|----------------|------------|------|------|----|
| Output Voltage Accuracy       | 3.3V output                       | --             | $\pm 3$    | --   | %    |    |
|                               | Others                            | --             | $\pm 2$    | --   |      |    |
| Line Regulation               | Full load                         | --             | $\pm 0.5$  | --   |      |    |
| Load Regulation               | 10%-100% load                     | --             | $\pm 1$    | --   |      |    |
| Ripple & Noise*               | 20MHz bandwidth (peak-peak value) | 3.3V/5V output | --         | 60   | 120  | mV |
|                               |                                   | Others         | --         | 50   | 100  |    |
| Temperature Drift Coefficient |                                   | --             | $\pm 0.02$ | --   | %/°C |    |
| Stand-by Power Consumption    |                                   | --             | --         | 0.3  | W    |    |

**ГК КристЭл Системс**  
 тел/факс +7(499) 519-02-80  
 www.crystel.ru  
 info@crystel.ru



|                          |              |                           |    |    |    |
|--------------------------|--------------|---------------------------|----|----|----|
| Short Circuit Protection |              | Continuous, self-recovery |    |    |    |
| Over-current Protection  |              | ≥110%lo self-recovery     |    |    |    |
| Over-voltage Protection  |              | Over-voltage shutdown     |    |    |    |
| Min. Load                |              | 0                         | -- | -- | %  |
| Hold-up Time             | 110VAC input | --                        | 12 | -- | ms |
|                          | 230VAC input | --                        | 80 | -- |    |

Note: \* Ripple and noise tested with "parallel cable" method, please see *AC-DC Converter Application Notes* for specific operation methods.

### General Specifications

| Item                           | Operating Conditions            | Min.                          | Typ. | Max. | Unit   |
|--------------------------------|---------------------------------|-------------------------------|------|------|--------|
| Isolation Voltage              | Input-output<br>Test time: 1min | 4000                          | --   | --   | VAC    |
| Operating Temperature          |                                 | -25                           | --   | +70  | °C     |
| Storage Temperature            |                                 | -25                           | --   | +105 |        |
| Storage Humidity               |                                 | --                            | --   | 95   | %RH    |
| Welding Temperature            | Wave-soldering                  | 260±5°C; time:5~10s           |      |      |        |
|                                | Manual-welding                  | 360±10°C; time:3~5s           |      |      |        |
| Switching Frequency            |                                 | --                            | --   | 140  | kHz    |
| Power Derating                 | +55°C to +70°C                  | 2                             | --   | --   | % / °C |
|                                | -25°C to 0°C                    | 2                             | --   | --   |        |
| Safety Standard                |                                 | IEC60950/EN60950/UL60950      |      |      |        |
| Safety-regulated Certification |                                 | IEC60950/EN60950/UL60950      |      |      |        |
| Safety Class                   |                                 | CLASS II                      |      |      |        |
| MTBF                           |                                 | MIL-HDBK-217F@25°C >300,000 h |      |      |        |

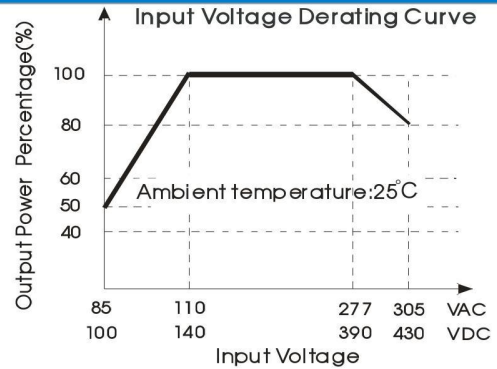
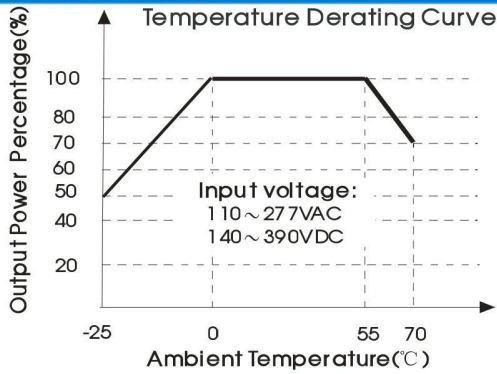
### Physical Specifications

|                    |  |
|--------------------|--|
| Casing Material    | Black flame-retardant and heat-resistant plastic (UL94-V0) |
| Package Dimensions | 50.80*25.40*15.16 mm                                       |
| Weight             | 32 g(Typ.)   |
| Cooling method     | Free air convection  |

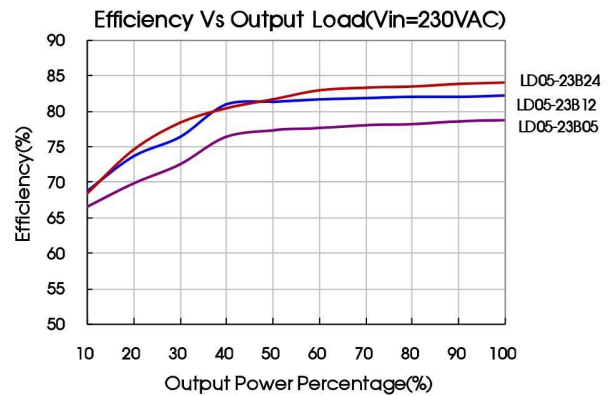
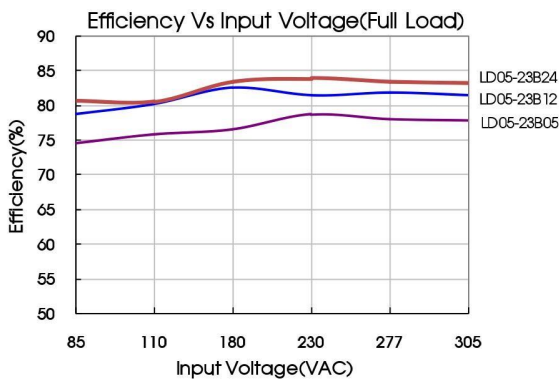
### EMC Specifications

| EMI | CE   | CISPR22/EN55022, CLASS B  |
|-----|--|---|
|     | RE   | CISPR22/EN55022, CLASS B  |
| EMS | ESD  | IEC/EN61000-4-2 ±6KV/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  |
|     | Immunities of voltage dip, drop and short interruption | IEC/EN61000-4-11 0%-70% perf. Criteria B                                      |

Product Characteristic Curve



Note: ① Input voltage should be derated based on temperature derating when it is 85~110VAC/277~305VAC/100~140VDC/390~430VDC;  
② This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company's FAE.



Design Reference

1. Typical application circuit

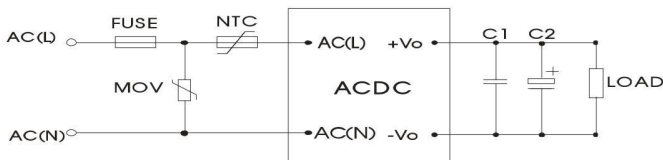


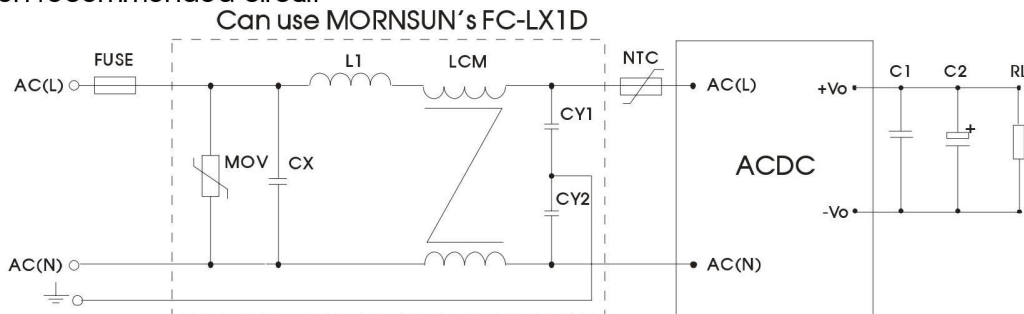
Fig. 1

| Model      | C1(μF) | C2(μF) |
|------------|--------|--------|
| LD05-23B03 | 1      | 220    |
| LD05-23B05 |        | 220    |
| LD05-23B09 |        | 100    |
| LD05-23B12 |        | 100    |
| LD05-23B15 |        | 100    |
| LD05-23B24 |        | 47     |

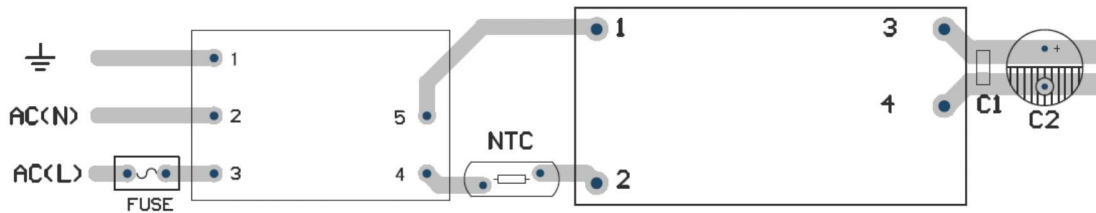
Note:

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 12D-5. External input MOV is recommended to use S14K350.

2. EMC solution-recommended circuit



### EMC solution-recommended circuit PCB layout



FC-LX1D

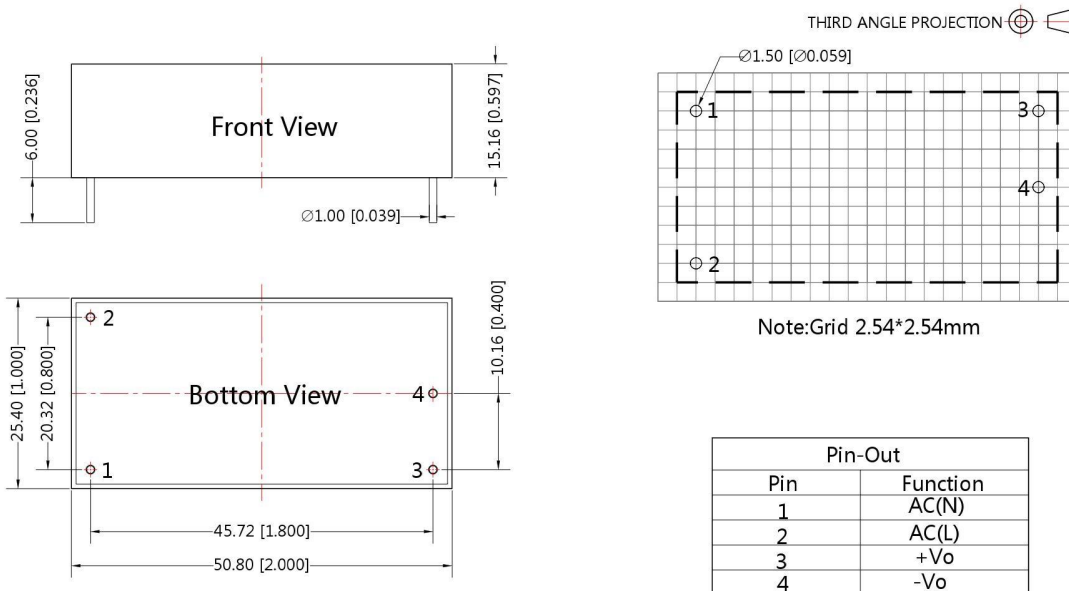
Fig 3

Suggestions for safety regulation and wiring width: wire width  $\geq 3\text{mm}$ , distance between wires  $\geq 6\text{mm}$ , and distance between wire and ground  $\geq 6\text{mm}$

| Element model | Recommended value                               |
|---------------|---|
| MOV           | S14K350   |
| CX            | 0.1 $\mu\text{F}$ /310VAC                       |
| L1            | 4.7 $\mu\text{H}$ /2.0A                         |
| CY1           | 1nF/400VAC                                      |
| CY2           | 1nF /400VAC                                     |
| NTC           | 12D-5   |
| LCM           | 2.2mH, recommended to use MORNSUN's FL2D-10-222 |
| FUSE          | 1A/300V, slow fusing, necessary                 |
| FC-LX1D       | EMC filter                                      |

3. For more information about Mornsun EMC Filter products, please visit [www.mornsun-power.com](http://www.mornsun-power.com) to download the Selection Guide of EMC Filter

### Dimensions and Recommended Layout



Note:  
 Unit :mm[inch]  
 Pin diameter tolerances : $\pm 0.10[\pm 0.004]$   
 General tolerances: $\pm 0.50[\pm 0.020]$

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

Note:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58220003;
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75% when inputting nominal voltage and outputting rated load;
3. All index testing methods in this datasheet are based on our Company's corporate standards;
4. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
5. We can provide product customization service;
6. Specifications of this product are subject to changes without prior notice.