

10W, AC-DC converter



CE Report  
EN62368-1

UK  
BS EN62368-1

RoHS

## FEATURES

- Ultra-wide 85 - 264VAC and 100 - 370VDC input voltage range
- Accepts AC or DC input (dual-use of same terminal)
- Operating ambient temperature range: -40°C to +85°C
- High I/O isolation voltage up to 4000VAC
- No-load power consumption as low as 0.15W
- Output short circuit, over-current, over-voltage protection
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B

LD10-20BxxR2-AU series is one of Mornsun's compact AC-DC power converters. It features ultra-wide AC input voltage ranges and compatible with DC input voltage, low power consumption, low ripple & noise, high efficiency, high reliability, reinforced insulation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368 safety standard. The converters are widely used in industrial, electric automation, home appliances and instrumentation applications. For extremely harsh EMC environment, we recommend to use the application circuit shown in Design Reference of this datasheet.

## Selection Guide

| Certification | Part No.        | Output Power | Nominal Output Voltage and Current (Vo/Io) | Efficiency at 230VAC (%) Typ. | Capacitive Load (uF) Max. |
|---------------|-----------------|--------------|--------------------------------------------|-------------------------------|---------------------------|
| EN            | LD10-20B03R2-AU | 6.6W         | 3.3V/2000mA                                | 74                            | 6000                      |
|               | LD10-20B05R2-AU | 7.5W         | 5V/1500mA                                  | 76                            | 6000                      |
|               | LD10-20B12R2-AU | 10W          | 12V/830mA                                  | 82                            | 2000                      |
|               | LD10-20B24R2-AU |              | 24V/410mA                                  | 83                            | 500                       |

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                           | --   | 264  | VAC  |
|                                 | DC Input             | 100                          | --   | 370  | VDC  |
| Input Frequency                 |                      | 47                           | --   | 63   | Hz   |
| Input Current                   | 115VAC               | --                           | --   | 0.23 | A    |
|                                 | 230VAC               | --                           | --   | 0.15 |      |
| Inrush Current                  | 115VAC               | --                           | 10   | --   |      |
|                                 | 230VAC               | --                           | 20   | --   |      |
| Leakage Current                 | 240VAC/50Hz          | 0.5mA RMS Max.               |      |      |      |
| Recommended External Input Fuse |                      | 2A/250V, slow-blow, required |      |      |      |
| Hot Plug                        |                      | Unavailable                  |      |      |      |

## Output Specifications

| Item                       | Operating Conditions                 | Min.                                      | Typ.  | Max. | Unit |
|----------------------------|--------------------------------------|-------------------------------------------|-------|------|------|
| Output Voltage Accuracy    | All load range                       | --                                        | ±2    | --   | %    |
| Line Regulation            | Full load                            | --                                        | ±0.5  | --   |      |
| Load Regulation            | Rated Input Voltage                  | --                                        | ±1    | --   |      |
| Ripple & Noise*            | 20MHz bandwidth (peak-to-peak value) | 3.3V/5V/12V                               | 50    | 100  | mV   |
|                            |                                      | 24V                                       | 100   | 150  |      |
| Temperature Coefficient    |                                      | --                                        | ±0.02 | --   | %/°C |
| Stand-by Power Consumption | 230VAC                               | --                                        | 0.1   | 0.15 | W    |
| Short Circuit Protection   |                                      | Hiccup, continuous, self-recovery         |       |      |      |
| Over-current Protection    |                                      | ≥ 130% Io, self-recovery                  |       |      |      |
| Over-voltage Protection    | 3.3V/5V output                       | ≤ 7.5VDC (Output voltage clamp or hiccup) |       |      |      |
|                            | 12V output                           | ≤ 16VDC (Output voltage clamp or hiccup)  |       |      |      |

|              |              |                                          |    |    |    |
|--------------|--------------|------------------------------------------|----|----|----|
|              | 24V output   | ≤30VDC (Output voltage clamp or hiccup ) |    |    |    |
| Minimum Load |              | 0                                        | -- | -- | %  |
| Hold-up Time | 115VAC input | --                                       | 8  | -- | ms |
|              | 230VAC input | --                                       | 40 | -- |    |

Note: \*The "parallel cable" 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.,<br>leakage current<5mA | 4000                                                                        | --   | --   | VAC    |
| Insulation<br>Resistance | Input-output | At 500VDC                                                | 100                                                                         | --   | --   | M Ω    |
| Operating Temperature    |              |                                                          | -40                                                                         | --   | +85  | ℃      |
| Storage Temperature      |              |                                                          | -40                                                                         | --   | +85  |        |
| Storage Humidity         |              |                                                          | --                                                                          | --   | 95   | %RH    |
| Soldering Temperature    |              | Wave-soldering, Max. 10 seconds                          | 255                                                                         | 260  | 265  | ℃      |
|                          |              | Manual-welding, Max. 5 seconds                           | 350                                                                         | 360  | 370  |        |
| Switching Frequency      |              |                                                          | --                                                                          | 65   | --   | kHz    |
| Power Derating           |              | -40℃ to -25℃                                             | 4.0                                                                         | --   | --   | % /℃   |
|                          |              | +65℃ to +75℃                                             | 5.0                                                                         | --   | --   |        |
|                          |              | +75℃ to +85℃                                             | 2.0                                                                         | --   | --   |        |
|                          |              | 85VAC - 100VAC                                           | 1.33                                                                        | --   | --   | % /VAC |
|                          |              | 240VAC - 264VAC                                          | 0.83                                                                        | --   | --   |        |
| Safety Standard          |              |                                                          | EN/BS EN62368-1(Report) safety approved;<br>Designed refer to UL/IEC62368-1 |      |      |        |
| Safety Class             |              |                                                          | CLASS II                                                                    |      |      |        |
| MTBF                     |              | MIL-HDBK-217F@25℃                                        | ≥300,000 h                                                                  |      |      |        |

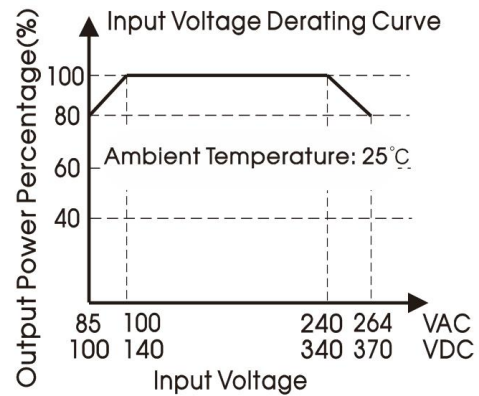
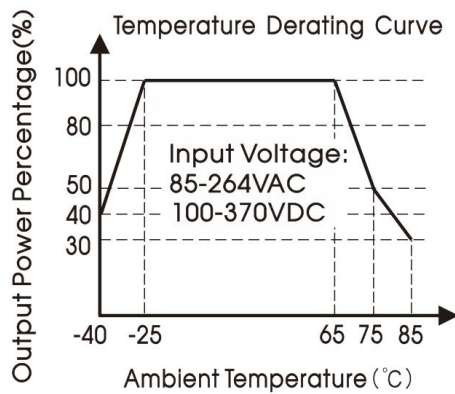
### Mechanical Specifications

|                |                                                             |
|----------------|-------------------------------------------------------------|
| Case Material  | Black plastic, flame-retardant and heat-resistant (UL94V-0) |
| Dimension      | 53.80 x 28.80 x 19.00 mm                                    |
| Weight         | 35g (Typ.)                                                  |
| Cooling method | Free air convection                                         |

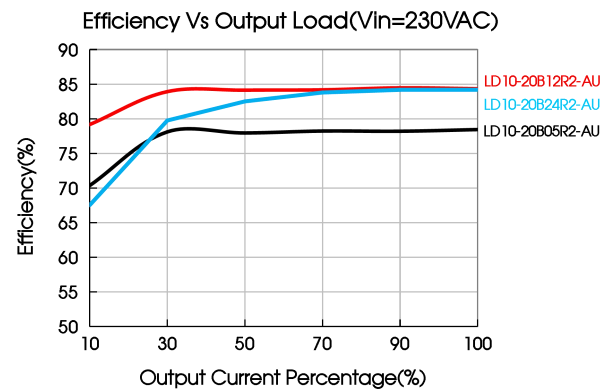
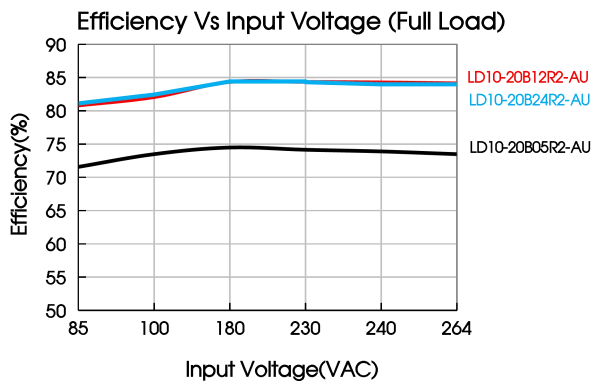
### Electromagnetic Compatibility (EMC)

|           |                                                       |                  |                                                                           |                  |
|-----------|-------------------------------------------------------|------------------|---------------------------------------------------------------------------|------------------|
| Emissions | CE                                                    | CISPR32/EN55032  | CLASS B                                                                   |                  |
|           | RE                                                    | CISPR32/EN55032  | CLASS B                                                                   |                  |
|           | Harmonic current                                      | IEC/EN6100-3-2   | CLASS A                                                                   |                  |
| Immunity  | 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 (See Fig. 1 for recommended circuit)                                 | perf. Criteria B |
|           |                                                       | IEC/EN61000-4-4  | ±4KV (See Fig. 2 for recommended circuit)                                 | perf. Criteria B |
|           | Surge                                                 | IEC/EN61000-4-5  | line to line ±1KV<br>(See Fig. 1 for recommended circuit)                 | perf. Criteria B |
|           |                                                       | IEC/EN61000-4-5  | line to line ±2KV/line to PE ±4KV<br>(See Fig. 2 for recommended circuit) | perf. Criteria B |
|           | CS                                                    | IEC/EN61000-4-6  | 10Vr.m.s                                                                  | perf. Criteria A |
|           | PFMF                                                  | IEC/EN6100-4-8   | 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/240-264VAC and a DC input between 100-140VDC/340-370VDC, 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

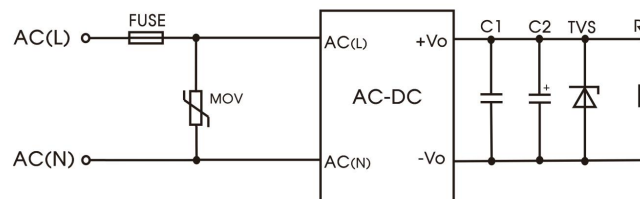


Fig.1: Typical circuit diagram

| Part No.        | C1      | C2        | FUSE                               | MOV     | TVS      |
|-----------------|---------|-----------|------------------------------------|---------|----------|
| LD10-20B03R2-AU | 1uF/50V | 470uF/10V | 2A/250V,<br>slow-blow,<br>required | S14K300 | SMBJ7.0A |
| LD10-20B05R2-AU |         | 470uF/10V |                                    |         | SMBJ7.0A |
| LD10-20B12R2-AU |         | 220uF/25V |                                    |         | SMBJ20A  |
| LD10-20B24R2-AU |         | 100uF/35V |                                    |         | 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

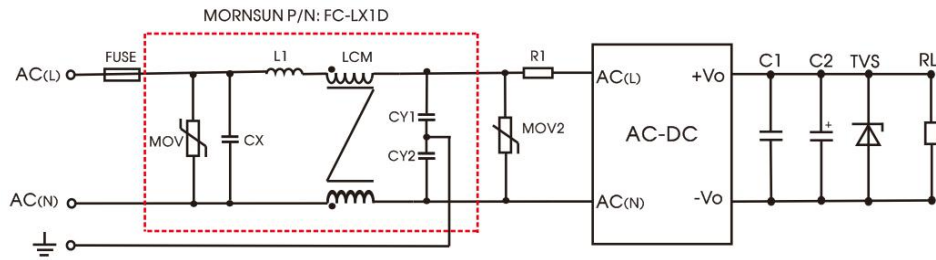
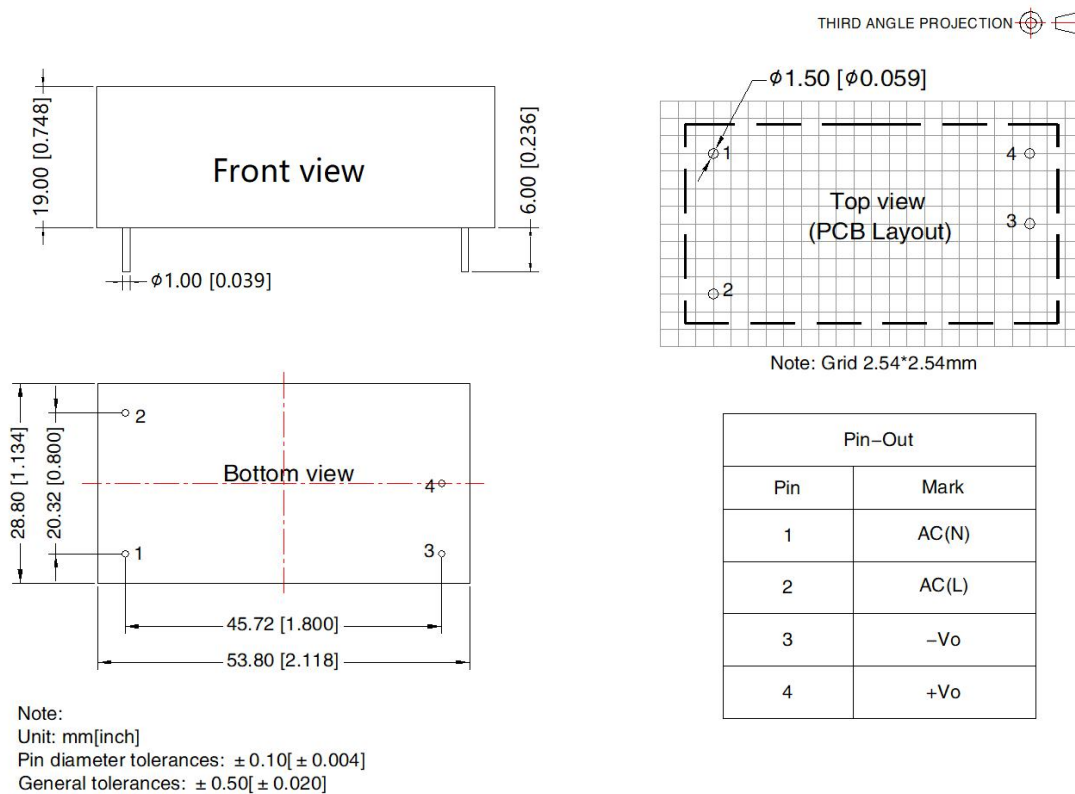


Fig. 2: EMC application circuit with higher requirements

| Component | Recommended value                                |
|-----------|--------------------------------------------------|
| FUSE      | 3.15A/250V, slow-blow, required                  |
| MOV       | S14K350                                          |
| CY1/CY2   | 1000pF/400VAC                                    |
| CX        | 0.1uF/310VAC                                     |
| L1        | 4.7uH/2A                                         |
| LCM       | 2.2mH, P/N: FL2D-10-222 (MORNSUN) is recommended |
| MOV2      | S14K300                                          |
| R1        | 24 $\Omega$ /5W (wire-wound resistor, required)  |

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

## Dimensions and Recommended Layout



Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220005;
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. If product involves multi-brand materials and there are differences in color etc, please refer to the standards of each manufacturer;
8. 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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