

1-3W, AC/DC converter



RoHS

### FEATURES

- Input voltage range: 165~264VAC/233~370VDC
- Service life is more than 5 years
- Wide range of Operating temperature range: -40°C~70°C
- EMI Meet CLASS B, Anti surge capacity 4 grade
- Protection of output short circuit, output over-current

LNxx-12Bxx series is a compact size high reliability 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 can work safely and reliability in -40°C~70°C. It 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

| Part No.   | Output Power | Nominal Output Voltage and Current (Vo/Io) | Efficiency (230VAC, %/Typ.) | Max. Capacitive Load*( $\mu$ F) |
|------------|--------------|--|-----------------------------|---------------------------------|
| LN01-12B05 | 1W           | 5V/200mA                                   | 68%                         | 3000                            |
| LN01-12B12 |              | 12V/83mA                                   | 69%                         | 1000                            |
| LN01-12B24 |              | 24V/42mA                                   | 69%                         | 220                             |
| LN02-12B05 | 2W           | 5V/400mA                                   | 70%                         | 3000                            |
| LN02-12B12 |              | 12V/167mA                                  | 76%                         | 1000                            |
| LN02-12B24 |              | 24V/83mA                                   | 78%                         | 220                             |
| LN03-12B05 | 3W           | 5V/600mA                                   | 71%                         | 2200                            |
| LN03-12B12 |              | 12V/250mA                                  | 75%                         | 1000                            |
| LN03-12B24 |              | 24V/125mA                                  | 76%                         | 220                             |

### Input Specifications

| Item                            | Operating Conditions | Min.                 | Typ. | Max. | Unit |    |
|---------------------------------|----------------------|----------------------|------|------|------|----|
| Input Voltage Range             | AC input             | 165                  | --   | 264  | VAC  |    |
|                                 | DC input             | 233                  | --   | 370  | VDC  |    |
| Input frequency                 |                      | 47                   | --   | 63   | Hz   |    |
| Input current                   | 165VAC               | LN01 models          | --   | --   | 20   | mA |
|                                 |                      | LN02 models          | --   | --   | 30   |    |
|                                 |                      | LN03 models          | --   | --   | 40   |    |
|                                 | 230VAC               | LN01 models          | --   | --   | 18   |    |
|                                 |                      | LN02 models          | --   | --   | 25   |    |
|                                 |                      | LN03 models          | --   | --   | 35   |    |
| Inrush current                  | 165VAC               | --                   | 6    | --   | A    |    |
|                                 | 230VAC               | --                   | 10   | --   |      |    |
| Recommended External Input Fuse |                      | 2A/250V, slow fusing |      |      |      |    |
| Hot Plug                        |                      | Unavailable          |      |      |      |    |

### Output Specifications

| Item                    | Operating Conditions              | Min. | Typ.       | Max. | Unit |
|-------------------------|-----------------------------------|------|------------|------|------|
| Output Voltage Accuracy |                                   | --   | $\pm 2$    | --   | %    |
| Line Regulation         | Full load                         | --   | $\pm 1$    | --   |      |
| Load Regulation         | 10%-100% load                     | --   | $\pm 1$    | --   |      |
| Ripple & Noise*         | 20MHz bandwidth (peak-peak value) | --   | 50         | 150  | mV   |
| Temperature Coefficient |                                   | --   | $\pm 0.01$ | --   | %/°C |

|  |                                   |             |    |     |    |    |
|--|-----------------------------------|-------------|----|-----|----|----|
| Stand-by Power Consumption   | LN01/ LN02 models                 | --          | -- | 0.3 | W  |    |
|  | LN03 models                       | --          | -- | 0.4 |    |    |
| Short Circuit Protection   | Hiccup, continuous, self-recovery |             |    |     |    |    |
| Over-current Protection  | ≥110%Io self-recovery             |             |    |     |    |    |
| Min. Load  |                                   |             | 0  | --  | -- | %  |
| Hold-up Time   | 165VAC input                      | LN01 models | -- | 16  | -- | ms |
|  |                                   | LN02 models | -- | 8   | -- |    |
|  |                                   | LN03 models | -- | 6   | -- |    |
|  | 230VAC input                      | LN01 models | -- | 30  | -- |    |
|  |                                   | LN02 models | -- | 16  | -- |    |
|  |                                   | LN03 models | -- | 10  | -- |    |
| Note: * Ripple and noise are measured by "parallel cable" method, please see AC-DC Converter Application Notes for specific operation. |                                   |             |    |     |    |    |

### General Specifications

| Item                  | Operating Conditions            | Min.                | Typ. | Max. | Unit |
|-----------------------|---------------------------------|---------------------|------|------|------|
| Isolation Voltage     | Input-output<br>Test time: 1min | 3000                | --   | --   | VAC  |
| Operating Temperature |                                 | -40                 | --   | +70  | °C   |
| Storage Temperature   |                                 | -40                 | --   | +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   |                                 | --                  | 115  | --   | kHz  |
| Safety Standard       | IEC60950/EN60950/UL60950        |                     |      |      |      |
| Safety Class          | CLASS II                        |                     |      |      |      |
| MTBF                  | MIL-HDBK-217F@25°C >300,000 h   |                     |      |      |      |

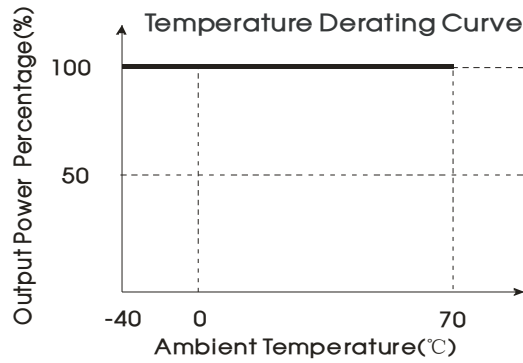
### Physical Specifications

|                 |  |
|-----------------|--|
| Casing Material | Black flame-retardant and heat-resistant plastic (UL94-V0) |
| Dimensions      | 37.00*24.50*18.00 mm                                       |
| Weight          | 25g(Typ.)  |
| Cooling method  | Free convection  |

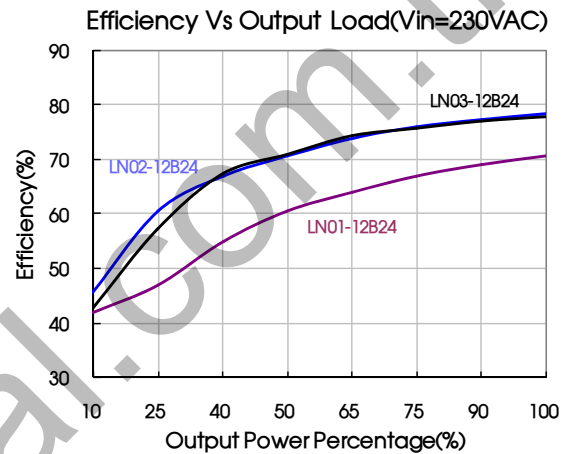
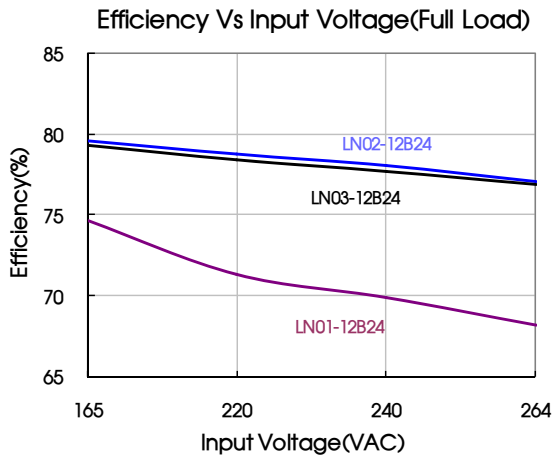
### EMC Specifications

|   |       |                          |   |                  |
|---|-------|--------------------------|---|------------------|
| EMI   | CE    | CISPR22/EN55022, CLASS B |   |                  |
|   | RE    | CISPR22/EN55022, CLASS B |   |                  |
| EMS   | ESD   | IEC/EN61000-4-2          | Contact±6KV/Air8KV                            | 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          | ±2KV  | 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 dips, short interruptions and voltage variations immunity |       | IEC/EN61000-4-11         | 0%-70%  | perf. Criteria B |

Product Characteristic Curve



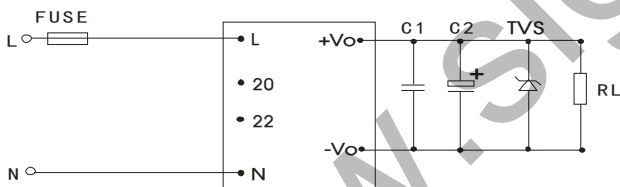
Note: This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company's FAE.



Design Reference

1. Typical application circuit

① Input Voltage Range: 165VAC~264 VAC



② Input Voltage Range: 85VAC~264 VAC

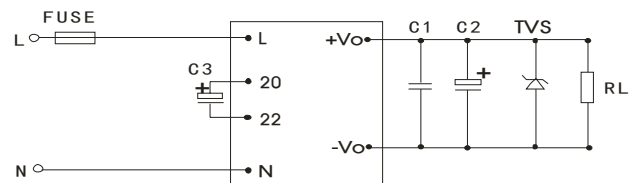


Fig. 1: Typical application circuit

| Model      | C1(μF)                                 | C2(μF)                              | C3(μF)                                   | TVS      |
|------------|--|-------------------------------------|--|----------|
| LN01-12B05 | MURATA SMD capacitor 105K 16V 0805 X7R | Rubycon ZLH series 16YXJ100MEFC5X11 | RUBYCON LLE series 400LLE4.7MEFC 10X12.5 | SMBJ7.0A |
| LN01-12B12 | MURATA SMD capacitor 105K 25V 0805 X7R | RUBYCON ZLH series 25YXJ68MEFC5X11  |  | SMBJ20A  |
| LN01-12B24 | MURATA SMD capacitor 105K 50V 0805 X7R | RUBYCON ZLH series 35YXJ47MEFC5X11  |  | SMBJ30A  |
| LN02-12B05 | MURATA SMD capacitor 105K 16V 0805 X7R | Rubycon ZLH series 16YXJ100MEFC5X11 | RUBYCON LLE series 400LLE6.8MEFC 10X16   | SMBJ7.0A |
| LN02-12B12 | MURATA SMD capacitor 105K 25V 0805 X7R | RUBYCON ZLH series 25YXJ68MEFC5X11  |  | SMBJ20A  |
| LN02-12B24 | MURATA SMD capacitor 105K 50V 0805 X7R | RUBYCON ZLH series 35YXJ47MEFC5X11  |  | SMBJ30A  |
| LN03-12B05 | MURATA SMD capacitor 105K 16V 0805 X7R | Rubycon ZLH series 16YXJ100MEFC5X11 | RUBYCON LLE series 400LLE6.8MEFC 10X16   | SMBJ7.0A |
| LN03-12B12 | MURATA SMD capacitor 105K 25V 0805 X7R | RUBYCON ZLH series 25YXJ68MEFC5X11  |  | SMBJ20A  |
| LN03-12B24 | MURATA SMD capacitor 105K 50V 0805 X7R | RUBYCON ZLH series 35YXJ47MEFC5X11  |  | SMBJ30A  |

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. If operation voltage of the module is lower than 165VAC, then need external capacitor C3, C3 can use film capacitors or electrolytic capacitor. If C3 use electrolytic capacitors, when the film capacitors is under 120HZ, require the LN03-12Bxx series corresponding ripple current rating must be greater than 80mA, the LN02-12Bxx series must be greater than 40mA, the LN01-12Bxx series must be greater than 30mA, and the capacitors' shelf life should more than 5 years.

### 2. EMC solution-recommended circuit

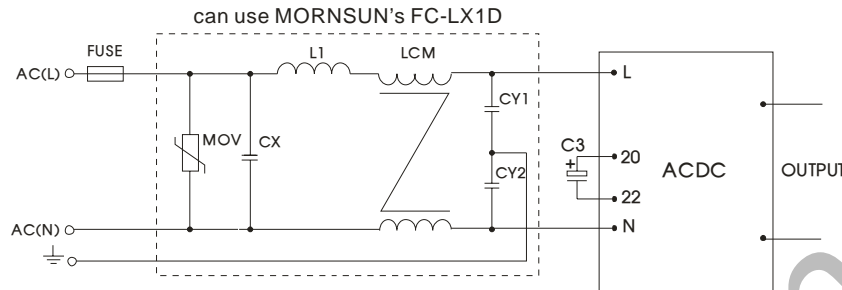


Fig 2: EMC application circuit with higher requirements

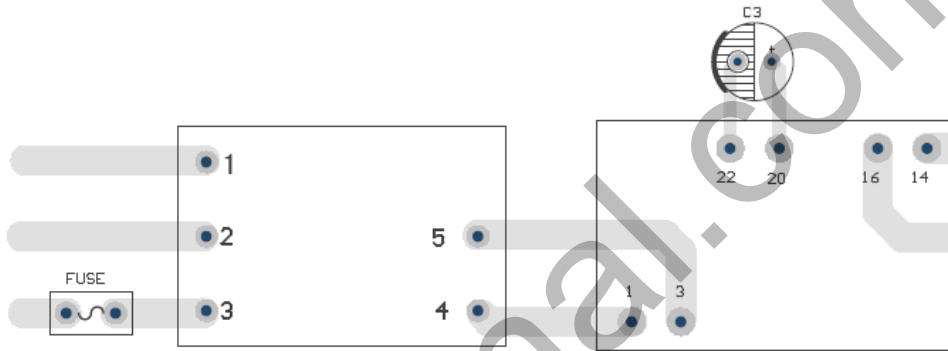


Fig 3: Recommended EMC circuit-PCB layout

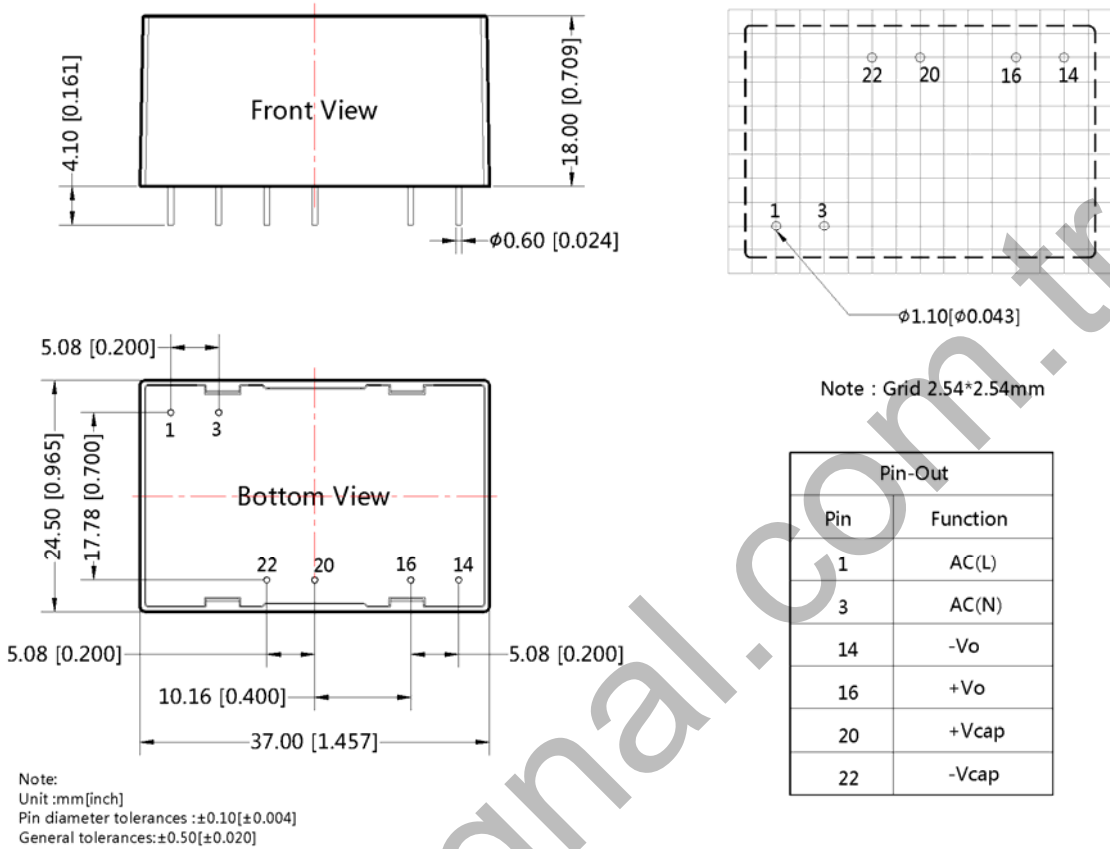
Suggestions for safety regulation and wiring width: wire width  $\geq 3\text{mm}$ , distance between wires  $\geq 6\text{mm}$ , and distance between wire and ground  $\geq 6\text{mm}$

| Element model | Recommended value  |
|---------------|--|
| MOV           | S14K350  |
| CX            | 0.1 $\mu\text{F}$ /275VAC  |
| L1            | 4.7 $\mu\text{H}$ /2.0A  |
| LCM           | 10mH ~30mH, recommended to use MORNSUN's FL2D-Z5-103   |
| CY1, CY2      | 1nF/400VAC   |
| FUSE          | 2A/250V, slow fusing, necessary  |
| C3            | The capacitor is the input voltage range: 85VAC~264 VAC<br>External capacitor, refer to the value in Fig.1 |
| FC-LX1D       | 2KV/4KV 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

THIRD ANGLE PROJECTION



Note:

1. Packing information please refer to Product Packing Information which can be downloaded from [www.mornsun-power.com](http://www.mornsun-power.com). Packing bag number: 58200055;
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25°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.

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