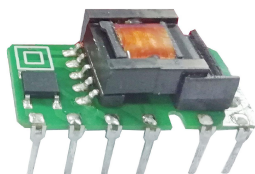
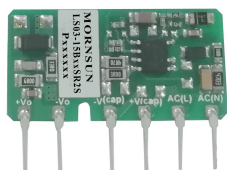


3W, AC/DC converter



CE Report  
EN62368-1

CB  
IEC60950-1

UKA  
BS EN 62368-1

RoHS



## FEATURES

- Ultra-wide 85 - 305VAC and 70 - 430VDC input voltage range
- Output short circuit, over-current protection
- High efficiency, high power density
- Low power consumption, green power
- Industrial-grade design
- Compact size open frame
- Flexible design of peripheral circuit reduces layout problems

LS03-15BxxSR2S(-F) series is one of Mornsun's highly efficient green power AC-DC Converter series. They feature wide input range accepting either AC or DC voltage, high efficiency, low power consumption and CLASS II reinforced insulation. All models are particularly suitable for industrial control, electric power, instrumentation and smart home applications which don't have high requirement for dimension. A variety of EMC external circuits meet the needs of multiple industries. 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 (Vo/Io) | Efficiency at 230VAC (%) Typ. | Capacitive Load (uF) Max. |
|---------------|--------------------|--------------|--|-------------------------------|---------------------------|
| EN/IEC        | LS03-15B03SR2S(-F) | 1.98W        | 3.3V/600mA                                 | 65                            | 820                       |
|               | LS03-15B05SR2S(-F) | 3W           | 5V/600mA                                   | 70                            | 680                       |
|               | LS03-15B09SR2S(-F) |              | 9V/333mA                                   | 73                            | 470                       |
|               | LS03-15B12SR2S(-F) |              | 12V/250mA                                  | 74                            | 470                       |
|               | LS03-15B15SR2S(-F) |              | 15V/200mA                                  | 75                            | 330                       |
|               | LS03-15B24SR2S(-F) |              | 24V/125mA                                  | 77                            | 100                       |

Note: 1. If the product is used in a severe vibration application, it needs to be glued and fixed.  
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                      | --   | 305  | VAC  |
|                              | DC input             | 70                      | --   | 430  | VDC  |
| Input Frequency              |                      | 47                      | --   | 63   | Hz   |
| Input Current                | 115VAC               | --                      | --   | 0.12 | A    |
|                              | 277VAC               | --                      | --   | 0.06 |      |
| Inrush Current               | 115VAC               | --                      | 13   | --   |      |
|                              | 277VAC               | --                      | 23   | --   |      |
| Required External Input Fuse |                      | 1A, slow-blow, required |      |      |      |
| Hot Plug                     |                      | Unavailable             |      |      |      |

## Output Specifications

| Item                    | Operating Conditions                 |                    | Min. | Typ.  | Max. | Unit |
|-------------------------|--------------------------------------|--------------------|------|-------|------|------|
| Output Voltage Accuracy | LS03-15B03SR2S(-F)                   |                    | --   | --    | ±6   | %    |
|                         | LS03-15B05SR2S(-F)                   |                    | --   | --    | ±5   |      |
|                         | LS03-15B09SR2S(-F)                   |                    | --   | --    |      |      |
|                         | LS03-15B12SR2S(-F)                   |                    | --   | --    |      |      |
|                         | LS03-15B15SR2S(-F)                   |                    | --   | --    |      |      |
|                         | LS03-15B24SR2S(-F)                   |                    | --   | --    |      |      |
| Line Regulation         | Full load                            | 3.3V               | --   | ±2.5  | --   |      |
|                         |                                      | 5V/9V/12V/15V/24V  | --   | ±1.5  | --   |      |
| Load Regulation         | 10% - 100% load                      | 3.3V/5V/9V/12V/15V | --   | ±3.0  | --   |      |
|                         |                                      | 24V                | --   | ±6.0  | --   |      |
| Ripple & Noise          | 20MHz bandwidth (peak-to-peak value) |                    | --   | 80    | 150  | mV   |
| Temperature Coefficient |                                      |                    | --   | ±0.15 | --   | %/°C |

|                            |              |  |      |      |   |
|----------------------------|--------------|--|------|------|---|
| Stand-by Power Consumption | 230VAC Input | --                                       | 0.15 | 0.25 | W |
| Short Circuit Protection   |              | Continuous, self-recover                 |      |      |   |
| Over-current Protection    |              | 110 - 500% I <sub>o</sub> , self-recover |      |      |   |
| Minimum Load               |              | 10                                       | --   | --   | % |

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. | 3000  | --   | --   | VAC    |
| Operating Temperature |              |                                  | -40   | --   | +85  | ℃      |
| Storage Temperature   |              |                                  | -40   | --   | +105 |        |
| Storage Humidity      |              |                                  | --  | --   | 85   | %RH    |
| Soldering Temperature |              | Wave-soldering                   | 260 ± 5℃; time: 5 - 10s   |      |      |        |
|                       |              | Manual-welding                   | 360 ± 10℃; time: 3 - 5s   |      |      |        |
| Switching Frequency   |              |                                  | --  | --   | 65   | kHz    |
| Power Derating        |              | -40℃ to -20℃ (85 - 110VAC)       | 2.0   | --   | --   | % /℃   |
|                       |              | +70℃ to +85℃                     | 2.67  | --   | --   |        |
|                       |              | 85VAC - 110VAC                   | 0.8   | --   | --   | % /VAC |
|                       |              | 277VAC - 305VAC                  | 1.1   | --   | --   |        |
| Safety Standard       |              |                                  | IEC60950-1, BS EN/EN62368-1safety approval; design refer to UL60950-1 |      |      |        |
| Safety Class          |              |                                  | CLASS II  |      |      |        |
| MTBF                  |              |                                  | MIL-HDBK-217F@25℃ >1000,000 h   |      |      |        |

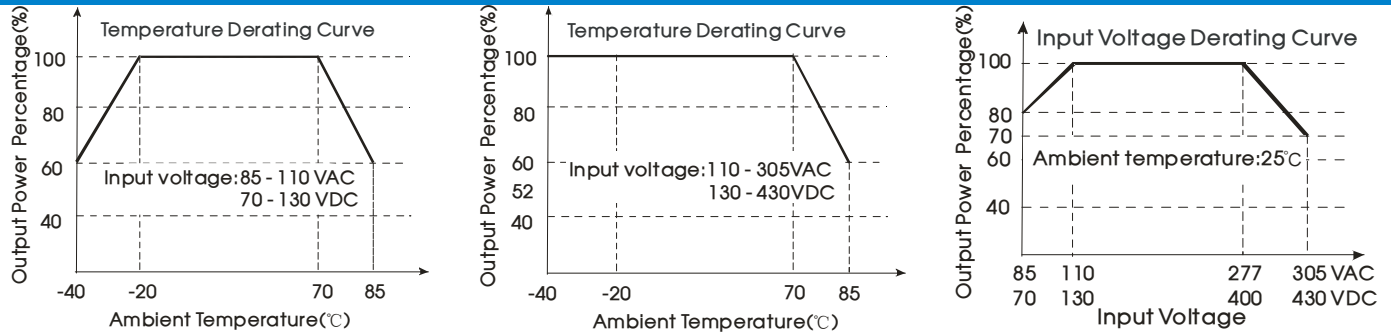
### Mechanical Specifications

|                |                          |
|----------------|--------------------------|
| Dimensions     | 35.00 x 18.00 x 11.00 mm |
| Weight         | 6g (Typ.)                |
| Cooling method | Free air convection      |

### Electromagnetic Compatibility (EMC)

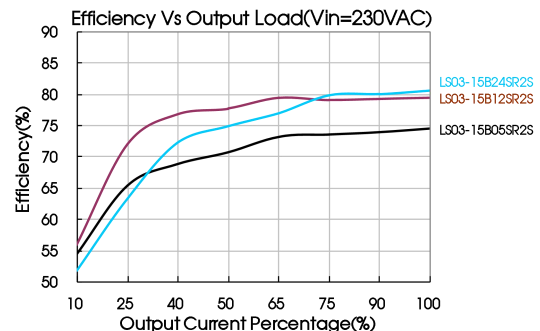
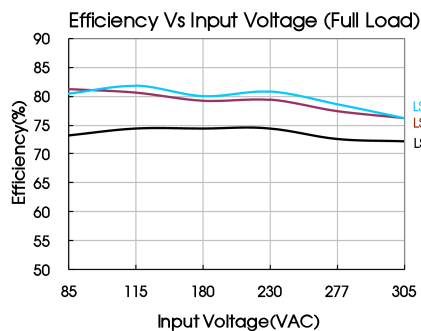
|           |   |                  |  |                  |
|-----------|---|------------------|--|------------------|
| Emissions | CE  | CISPR32/EN55032  | CLASS A (Recommended circuit 1, 2, 6)                        |                  |
|           |   | CISPR32/EN55032  | CLASS B (Recommended circuit 3, 4, 5)                        |                  |
|           | RE  | CISPR32/EN55032  | CLASS A (Recommended circuit 1, 2, 6)                        |                  |
|           |   | CISPR32/EN55032  | CLASS B (Recommended circuit 3, 4, 5)                        |                  |
| Immunity  | ESD   | IEC/EN61000-4-2  | Contact ±4KV   | perf. Criteria B |
|           | RS  | IEC/EN61000-4-3  | 10V/m  | perf. Criteria A |
|           | EFT   | IEC/EN61000-4-4  | ±2KV (Recommended circuit 1, 2, 3)                           | perf. Criteria B |
|           |   | IEC/EN61000-4-4  | ±4KV (Recommended circuit 4, 5, 6)                           | perf. Criteria B |
|           | Surge   | IEC/EN61000-4-5  | line to line ±1KV (Recommended circuit 1, 2)                 | perf. Criteria B |
|           |   | IEC/EN61000-4-5  | line to line ±2KV (Recommended circuit 6)                    |                  |
|           |   | IEC/EN61000-4-5  | line to line ±1KV/line to PE ±2KV (Recommended circuit 3)    | perf. Criteria B |
|           |   | IEC/EN61000-4-5  | line to line ±2KV/line to PE ±4KV (Recommended circuit 4, 5) |                  |
|           | 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

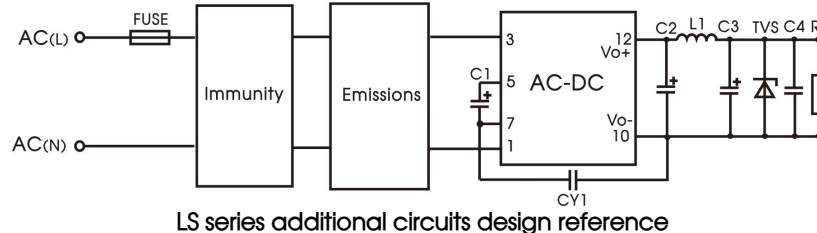


Note:

- ① With an AC input between 85 - 110VAC/277 - 305VAC and a DC input between 70 - 130VDC/400 - 430VDC, 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.



### Additional Circuits Design Reference



| Immunity design circuits for reference |         | Emissions design circuits for reference |         |
|--|---------|---|---------|
| Level 3                                | Level 4 | Class A                                 | Class B |
|  |         |   |         |

LS03 series additional components selection guide

| Part No.           | FUSE (required) | C1 (required)  | C2 (required)  | L1 (required)    | C3 (required) | C4         | CY1 (required) |
|--------------------|-----------------|--|--|------------------|---------------|------------|----------------|
| LS03-15B03SR2S(-F) | 1A/300V         | 10uF/450V (-20°C to +85°C)<br>22uF/450V (-40°C to +85°C) | 270uF/ 16V (solid-state capacitor)<br><br>470uF/ 35V<br>220uF/ 35V | 4.7uH (Max 60mΩ) | 120uF/25V     | 0.1uF/ 50V | 1.0nF/ 400VAC  |
| LS03-15B05SR2S(-F) |                 |  |  |                  | 68uF/35V      |            |                |
| LS03-15B09SR2S(-F) |                 |  |  |                  | 47uF/35V      |            |                |
| LS03-15B12SR2S(-F) |                 |  |  |                  |               |            |                |
| LS03-15B15SR2S(-F) |                 |  |  |                  |               |            |                |
| LS03-15B24SR2S(-F) |                 |  |  |                  |               |            |                |

Note:

1. C1: input capacitors, C2: output storage capacitors, they must be connected externally.
2. We recommend using an electrolytic capacitor with high frequency and low ESR rating for C3 (refer to manufacture's datasheet). Combined with C2, L1, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C4 is a ceramic capacitor, used for filtering high frequency noise. A suppressor diode (TVS) is a recommended to protect the application in case of a converter failure and specification should be 1.2 times of the output voltage.

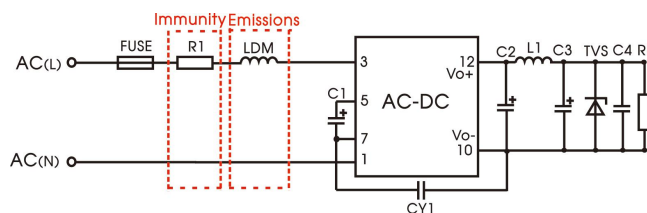
## Environmental Application EMC Solution

LS series environmental application EMC solution selection table

| Recommended circuit | Application environmental     | Typical industry  | Input voltage range | Environment temperature | Emissions | Immunity |
|---------------------|-------------------------------|---|---------------------|-------------------------|-----------|----------|
| 1/2                 | Basic application             | None  | 85-305VAC           | -40℃ to +85℃            | Class A   | Level 3  |
| 3                   | Indoor civil environment      | Smart home/Home appliances (2Y)   |                     | -25℃ to +55℃            | Class B   | Level 3  |
|                     | Indoor general environment    | Intelligent building/Intelligent agriculture                              |                     | -25℃ to +55℃            | Class B   | Level 4  |
| 4/5                 | Indoor industrial environment | Manufacturing workshop  |                     | -25℃ to +55℃            | Class B   | Level 4  |
| 6                   | Outdoor general environment   | ITS/Video monitoring/Charging point/Communication/Security and protection |                     | -40℃ to +85℃            | Class A   | Level 4  |

## Electromagnetic Compatibility Solution--Recommended Circuit

### 1. Recommended circuit 1/2—Basic application

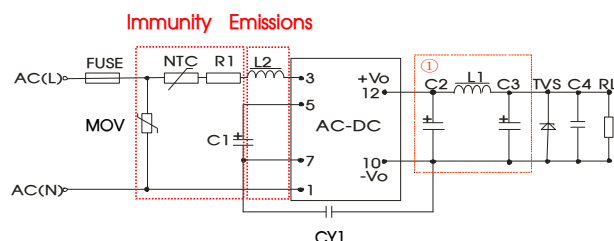


Recommended circuit 1

| Application environmental | Ambient temperature range | Immunity Level | Emissions Class |
|---------------------------|---------------------------|----------------|-----------------|
| Basic application         | -40℃ to +85℃              | Level 3        | Class A         |

| Component                          | Recommended value  |
|------------------------------------|--------------------|
| R1 (wire-wound resistor, required) | 12 Ω /3W           |
| LDM                                | 4.7mH              |
| FUSE (required)                    | 1A/300V, slow-blow |

Note: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.



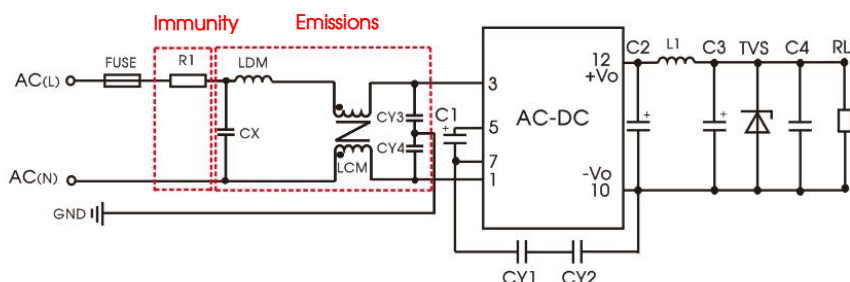
Recommended circuit 2

| Application environmental | Ambient temperature range | Immunity Level | Emissions Class |
|---------------------------|---------------------------|----------------|-----------------|
| Basic application         | -40℃ to +85℃              | Level 3        | Class A         |

| Component                          | Recommended value  |
|------------------------------------|--------------------|
| R1 (wire-wound resistor, required) | 12 Ω /2W           |
| L2                                 | 4.7mH              |
| NTC                                | 13D-5              |
| MOV                                | S14K350            |
| FUSE (required)                    | 1A/300V, slow-blow |

Note: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.

### 2. Recommended circuit 3—Indoor civil/Universal system recommended circuits for general environment



Recommended circuit 3

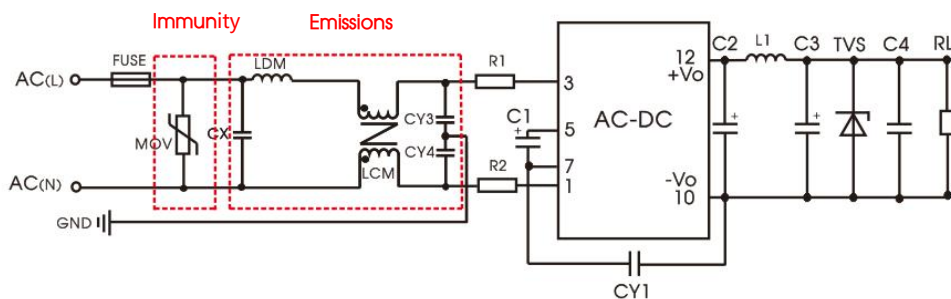
| Application environmental | Ambient temperature range | Immunity Level | Emissions Class |
|---------------------------|---------------------------|----------------|-----------------|
| Indoor civil /general     | -25°C to +55°C            | Level 3        | Class B         |

| Component                          | Recommended value  |
|------------------------------------|--------------------|
| R1 (wire-wound resistor, required) | 12Ω /3W            |
| CY1(CY2)                           | 1.0nF/400VAC       |
| LCM                                | 3.5mH              |
| LDM                                | 0.33mH             |
| CX                                 | 0.1uF/310VAC       |
| CY3/CY4                            | 0.56nF/400VAC      |
| FUSE (required)                    | 1A/300V, slow-blow |

Note 1: In the home appliance application environment, the two Y capacitors of the primary and secondary need to be externally connected (CY1/CY2, value at 2.2nF/400VAC), which can meet the EN60335 certification. In other industries, only one Y capacitor is needed.

Note 2: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.

### 3. Recommended circuit 4/5—Universal system recommended circuits for indoor industrial environment



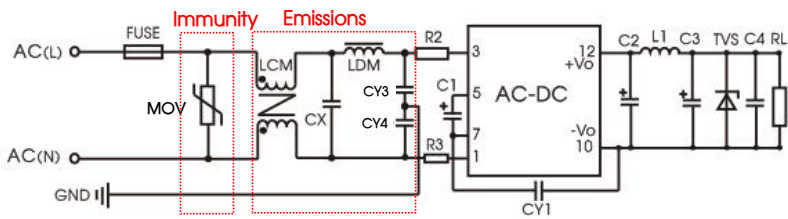
Recommended circuit 4

| Application environmental | Ambient temperature range | Immunity Level | Emissions Class |
|---------------------------|---------------------------|----------------|-----------------|
| Indoor industrial         | -25°C to +55°C            | Level 4        | Class B         |

| Component                             | Recommended value  |
|---------------------------------------|--------------------|
| MOV                                   | S14K350            |
| C1                                    | 450V/22uF          |
| CY1                                   | 2.2nF/400VAC       |
| CX                                    | 0.1uF/310VAC       |
| LCM                                   | 3.5mH              |
| LDM                                   | 0.33mH             |
| R1/R2 (wire-wound resistor, required) | 12Ω /2W            |
| CY3/CY4                               | 0.56nF/400VAC      |
| FUSE (required)                       | 2A/300V, slow-blow |

Note: R1, R2 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.





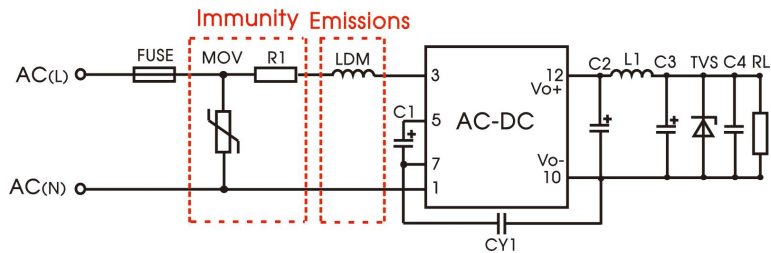
Recommended circuit 5

| Application environmental | Ambient temperature range | Immunity Level | Emissions Class |
|---------------------------|---------------------------|----------------|-----------------|
| Indoor industrial         | -25℃ to +55℃              | Level 4        | Class B         |

| Component                              | Recommended value  |
|--|--------------------|
| MOV                                    | S14K350            |
| C1                                     | 450V/22uF          |
| CY1                                    | 2.2nF/400VAC       |
| CY3/CY4                                | 0.56nF/400VAC      |
| CX                                     | 0.1uF/310VAC       |
| LCM                                    | 3.5mH              |
| LDM                                    | 0.33mH             |
| R2, R3 (wire-wound resistor, required) | 12Ω/2W             |
| FUSE (required)                        | 2A/300V, slow-blow |

Note: R2, R3 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.

4. Recommended circuit 6——Universal system recommended circuits for outdoor general/harsh environment



Recommended circuit 6

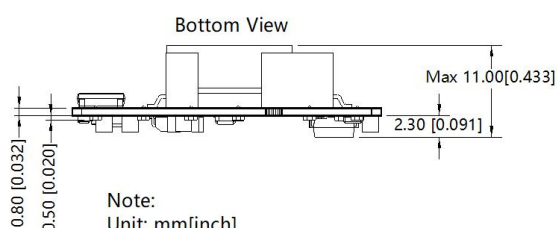
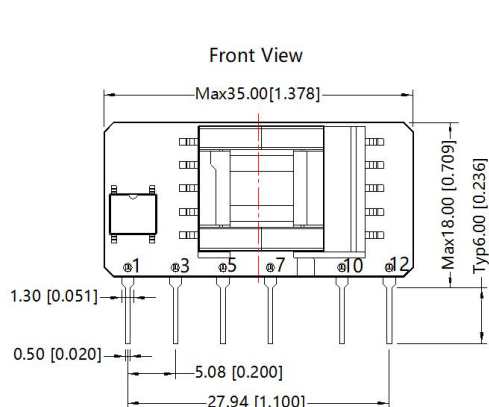
| Application environmental   | Ambient temperature range | Immunity Level | Emissions Class |
|-----------------------------|---------------------------|----------------|-----------------|
| Outdoor general environment | -40℃ to +85℃              | Level 4        | Class A         |

| Component                          | Recommended value  |
|------------------------------------|--------------------|
| MOV                                | S14K350            |
| C1                                 | 450V/22uF          |
| LDM                                | 4.7mH              |
| R1 (wire-wound resistor, required) | 12Ω/3W             |
| FUSE (required)                    | 2A/300V, slow-blow |

Note: R1 is the input plug-in resistor, this resistor needs to be a wire-wound resistor (required), please do not select SMD resistor or carbon film resistor.

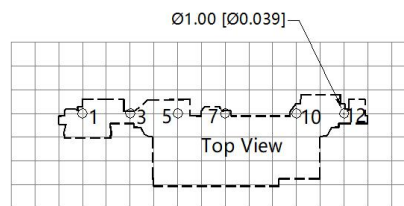
5. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com).

### LS03-15BxxSR2S Dimensions and Recommended Layout



Note:  
Unit: mm[inch]  
Pin section tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$   
The layout of the device is for reference only,  
please refer to the actual product

THIRD ANGLE PROJECTION

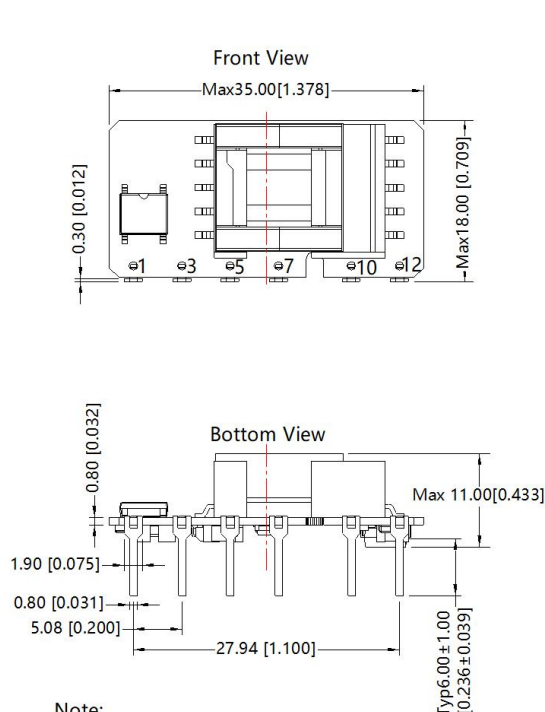


Note: Grid 2.54\*2.54mm

| Pin-Out |          |
|---------|----------|
| Pin     | Function |
| 1       | AC ( N ) |
| 3       | AC ( L ) |
| 5       | +V(cap)  |
| 7       | -V(cap)  |
| 10      | -Vo      |
| 12      | +Vo      |

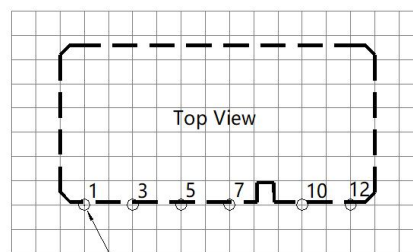
- 1.It is necessary to add C1 between pin5 and pin7.
- 2.It is necessary to add circuit to the output, such as the typical application of Figure 1.
- 3.It is needed to have distance  $\geq 6.4\text{mm}$  for safety between external componets in primary circuit and secondary circuit.

### LS03-15BxxSR2S-F Dimensions and Recommended Layout



Note:  
Unit: mm[inch]  
Pin section tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$   
The layout of the device is for reference only,please  
refer to the actual product

THIRD ANGLE PROJECTION




Note: Grid 2.54\*2.54mm

| Pin-Out |          |
|---------|----------|
| Pin     | Function |
| 1       | AC ( N ) |
| 3       | AC ( L ) |
| 5       | +V(cap)  |
| 7       | -V(cap)  |
| 10      | -Vo      |
| 12      | +Vo      |

- 1.It is necessary to add C1 between pin5 and pin7.
- 2.It is necessary to add circuit to the output, such as the typical application of Figure 1.
- 3.It is needed to have distance  $\geq 6.4\text{mm}$  for safety between external componets in primary circuit and secondary circuit.

Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220084(LS03-15BxxSR2S); 58220025(LS03-15BxxSR2S-F);
2. External electrolytic capacitors are required to modules, more details refer to typical applications;
3. This part is open frame, at least 6.4mm safety distance between the primary and secondary external components of the module is needed to meet the safety requirement;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75%, nominal input voltage (115V and 230V) and rated output load;
5. In order to increase the conversion efficiency of the product with light load in the design, the product will have audio noise when it is operating, but don't affect the product's reliability and performance;
6. All index testing methods in this datasheet are based on our company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Products are related to laws and regulations: see "Features" and "EMC";
9. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.
10.  : It is only suitable for safe use in areas under 2000m above sea level.

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