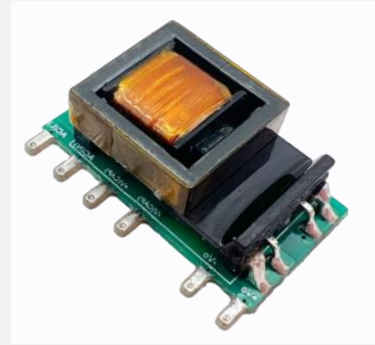


AC/DC CONVERTER — LS03-13BxxR3 Series **AMCHARD**

Product Feature

- ◆ Universal Input: 85-305VAC / 100-430VDC
- ◆ Operating temperature range: -40°C - +85°C
- ◆ Isolation: 4000VAC
- ◆ SIP ultra-small size, high power density, flexible application
- ◆ The mechanism has input undervoltage protection, output short circuit protection and over current protection
- ◆ Design meet IEC/EN61558、IEC/EN60335



Selection Guide

| Part No. | Input Voltage (VAC) | Out Power (W) | Out Voltage (VDC) | Out Current (mA)MAX | Full Load Efficiency % (Typ.) | Capacitive Load(μF) Max. |
|--------------|---------------------|---------------|-------------------|---------------------|-------------------------------|--------------------------|
| LS03-13B03R3 | 85-305 | 1.98 | 3.3 | 600 | 72 | 860 |
| LS03-13B05R3 | | 3 | 5 | 600 | 75 | 1500 |
| LS03-13B12R3 | | 3 | 12 | 250 | 78 | 470 |
| LS03-13B15R3 | | 3 | 15 | 200 | 78 | 330 |
| LS03-13B24R3 | | 3 | 24 | 125 | 79 | 100 |

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-----------------|----------------------|-------------------------|------|------|------|
| Input Voltage | AC Input | 85 | -- | 305 | VAC |
| | DC Input | 100 | -- | 430 | VDC |
| Input Current | 110VAC | -- | 0.10 | -- | A |
| | 230VAC | -- | 0.07 | -- | |
| Input Frequency | | 47 | -- | 63 | Hz |
| Fuse | | 1A, slow-blow, required | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------|----------------------|-------|------|------|------|
| Output Voltage Accuracy | 10% - 100%load | -- | ±5 | -- | % |
| Linear Regulation | Rated load | 3.3V | ±2.5 | -- | |
| | | Other | ±1.5 | -- | |

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| | | | | | |
|----------------------------|---------------------------------|---------------------------|-------|-----|------|
| Load Regulation | 10% - 100%load | -- | ±3.0 | -- | |
| Ripple & Noise | 20MHz bandwidth, 10% - 100%load | -- | 80 | 180 | mV |
| Temperature Coefficient | | -- | ±0.15 | -- | %/°C |
| Stand-by Power Consumption | 230VAC | -- | 0.10 | -- | W |
| Min. Load | | 10 | -- | -- | % |
| Over Current Protection | | 110 | -- | -- | %Io |
| Short-Circuit Protection | | Continuous, Self-Recovery | | | |
| Hold-up Time | 115VAC | -- | 8 | -- | ms |
| | 230VAC | -- | 40 | -- | |

General Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|-----------------------------------------------------------------|--------------------------|------|------|-------|
| Isolation Voltage | Input-output, test time 1 minute, leakage current less than 5mA | 4000 | -- | -- | VAC |
| Insulation Resistance | Input-output, insulated voltage 500VDC | 1000 | -- | -- | MΩ |
| Power Derating | +55°C - +85°C | 1.67 | -- | -- | %°C |
| | 85VAC - 100VAC | 1.33 | -- | -- | %/VAC |
| Operating Temperature | | -40 | -- | +85 | °C |
| Storage Temperature | | -40 | -- | +85 | |
| Soldering Profile | Wave-soldering | 260 ± 5°C; time: 5 - 10s | | | |
| | Manual-welding | 360 ± 8°C; time: 3 - 5s | | | |
| Safety Standard | IEC/UL62368-1、IEC/EN60335-1、IEC/EN61558-1 | | | | |
| Safety Class | CLASS II | | | | |
| MTBF | MIL-HDBK-217F@25°C | >1000Kh | | | |

Mechanical Specification

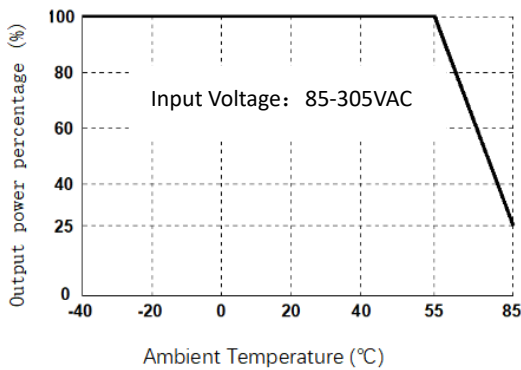
| | |
|--------------------|--------------------------|
| Package Dimensions | 26.40 x 14.73 x 11.00 mm |
| Weight | 5.9g (TYP.) |
| Cooling Method | Free air convection |

EMC Specifications

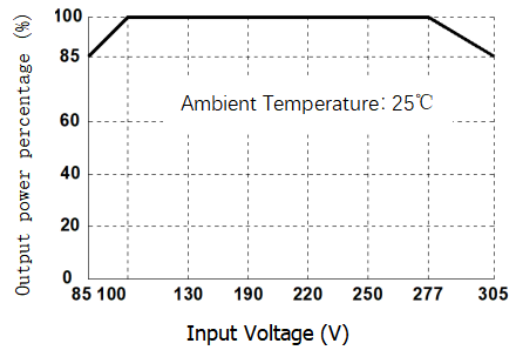
| | | | |
|-----|-----------------------------------------|--------------------------------------------------------------|------------------|
| EMI | CE | CISPR32/EN55032 CLASS A (application circuit1, 4) | |
| | | CISPR32/EN55032 CLASS B (application circuit2, 3) | |
| | RE | CISPR32/EN55032 CLASS A (application circuit1, 4) | |
| | | CISPR32/EN55032 CLASS B (application circuit2, 3) | |
| EMS | RS | IEC/EN61000-4-3 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 ±2KV (application circuit 1、 2) | perf. Criteria B |
| | | IEC/EN61000-4-4 ±4KV (application circuit 3、 4) | perf. Criteria B |
| | Surge | IEC/EN61000-4-5 line to line ±1KV (application circuit 1、 2) | perf. Criteria B |
| | | IEC/EN61000-4-5 line to line ±2KV (application circuit 3、 4) | perf. Criteria B |
| | CS | IEC/EN61000-4-6 10Vr.m.s | perf. Criteria A |
| ESD | IEC/EN61000-4-2 Contact ±6KV / Air ±8KV | perf. Criteria B | |

Typical Characteristic Curves

Input voltage Derating Curve

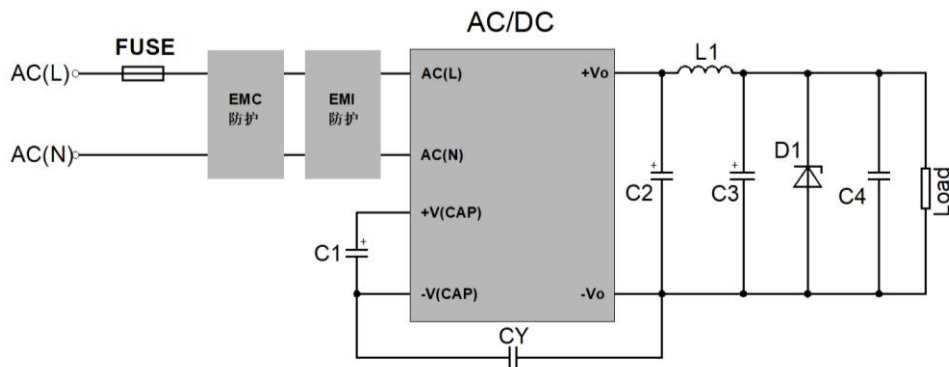


Temperature Derating Curve



Typical Circuit Design And Application

Application circuit



AC/DC CONVERTER — LS03-13BxxR3 Series **AMCHARD**

Reference Table for Selection of Peripheral Devices

| Output voltage | C1 (required) | C2 (required) | L1 (required) | C3 (required) | C4 | CY (required) | D1 |
|----------------|---------------|---------------|-----------------------|---------------|-----------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.3/5VDC 10W | 22uF/450V | 820uF/16V | 2.2uH 6.5A 15mΩMAX | 150uF/25V | 0.1uF/50V | 1nF/400VAC | D1 is a TVS transistor that can protect the downstream circuit in case of module abnormalities. It is recommended to choose a model that is 1.2 times the output voltage |
| 9/12VDC 10W | | 470uF/25V | | | 0.1uF/50V | | |
| 15/24VDC 10W | | 470uF/35V | 3.3uH 5A 25mΩMAX | 100uF/35V | 0.1uF/50V | | |
| 3.3/5VDC 15W | 33uF/450V | 1000uF/16V | 2.0uH 6.5A 15mΩMAX | 470uF/25V | 0.1uF/50V | 2.2nF/400VA | |
| 9/12VDC 15W | | 470uF/25V | | | 220uF/25V | 0.1uF/50V | |
| 15/24VDC 15W | | 470uF/35V | 3.3uH 5A 25mΩMAX | 150uF/35V | 0.1uF/50V | | |

Note:

1. FUSE, EMC protection, and EMI protection are selected based on actual application needs;
2. C1 is a filtering electrolytic capacitor, which is a required component. It is recommended to use ripple current > 400mA@100KHz Electrolytic capacitors.
3. C2, C4, and L1 form a Pi type filtering circuit, and it is recommended to use high-frequency low resistance electrolytic capacitors or solid-state capacitors.
4. When selecting L1, ripple requirements can be considered, while paying attention to current and internal resistance values.

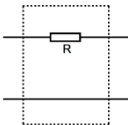
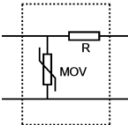
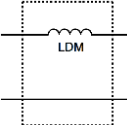
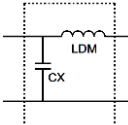
EMS Solutions - Recommended Circuits

Environmental Application - EMC Solution Selection Table

| Recommended circuit | Application environment | Application industry | Input Voltage | Ambient Temperature | EMI | EMS |
|---------------------|-------------------------|----------------------------------------------------------|---------------|---------------------|---------|-----------|
| 1 | Basic applications | - | 85-305VAC | -40°C - +85°C | Class A | III level |
| 2 | Indoor civil | Intelligent household electrical appliance | | -25°C - +55°C | Class B | III level |
| | Indoor ordinary | Intelligent building | | -25°C - +55°C | Class B | III level |
| 3 | Outdoor industry | Manufacturing workshop | | -25°C - +55°C | Class B | IV level |
| 4 | Outdoor ordinary | ITS/Charging point/Communication/Security and protection | | -40°C - +85°C | Class A | IV level |

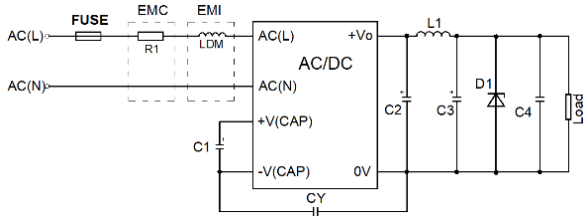
EMS protection circuit design reference

EMI protection circuit design reference

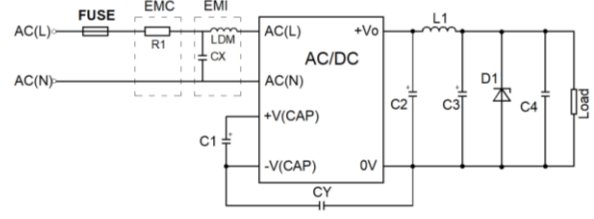
| III level | IV level | Class A | Class B |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |

EMC Solutions - Recommended Circuits

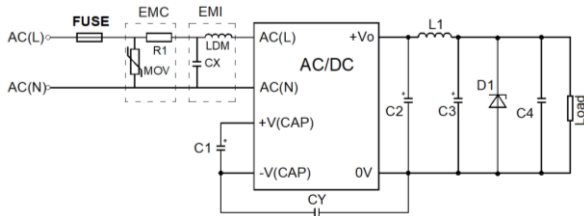
Recommended circuit 1



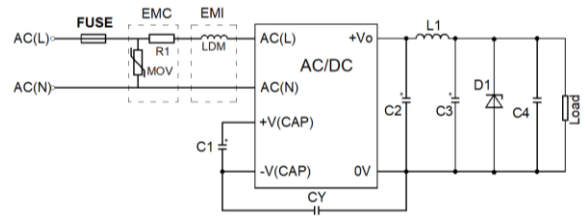
Recommended circuit 2



Recommended circuit 3



Recommended circuit 4



EMC Recommended Circuit Device Selection Reference Table

| Components | Recommended circuit 1 | Recommended circuit 2 | Recommended circuit 3 | Recommended circuit 4 |
|------------------------------------|-----------------------|-----------------------|-------------------------|-----------------------|
| FUSE (required) | 1A/300V, Slow melting | | 2A/300V, Slow melting | |
| Re1(wire-wound resistor, required) | | | 6.8 Ω /3W | |
| MOV | | | 14D561 | |
| LDM | | | 2.2mH/Max: 4Ω/Min:0.24A | |
| CX | | | 0.1uF/310VAC | |

Dimensions and Recommended Layout

Dimensions

PCB Printing Layout

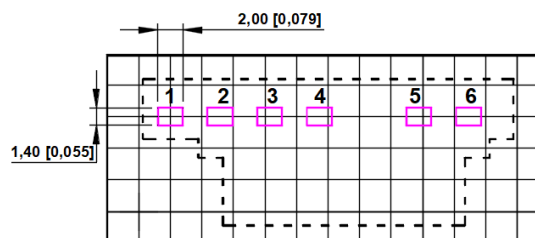
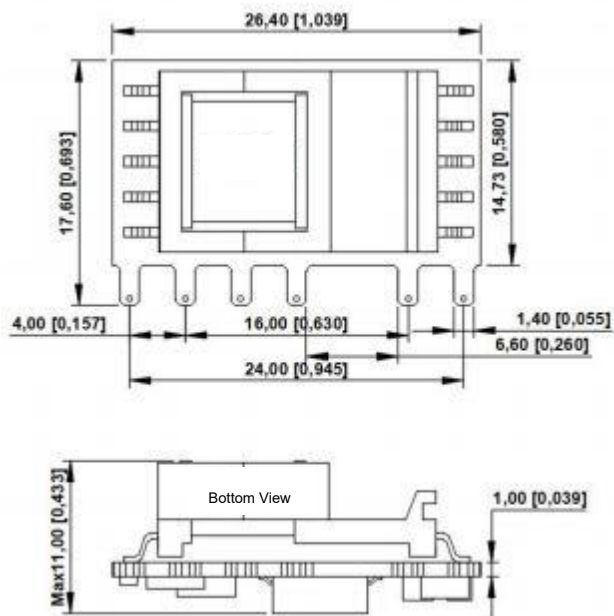
Grid size: 2.54 x 2.54 mm

Note:

Unit: mm[inch]

Pin section tolerances: $\pm 0.10[\pm 0.004]$

General tolerances: $\pm 0.50[\pm 0.020]$



注: 栅格距离尺寸 2.54mm*2.54mm

Pin Function Table

| Pin | Function |
|-----|----------|
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | +V(CAP) |
| 4 | -V(CAP) |
| 5 | -Vo |
| 6 | +Vo |

Note:

1. The input voltage cannot exceed the specified range value, otherwise permanent and irreparable damage may be caused;
2. Unless otherwise specified, the parameters in this datasheet were measured at 25°C, humidity 40%~75%, input nominal voltage and output pure resistance mode under full load;
3. All index test methods are based on our company's enterprise standards.