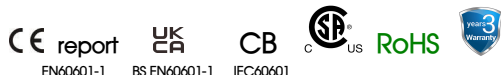


15W, AC-DC converter



## FEATURES

- Universal Input: 85 - 264VAC or 100 - 370VDC, 50/60Hz
- Regulated output, Low ripple & noise
- Low no-load power consumption < 0.1W
- High efficiency up to 86%
- Output short circuit, over-current, over-voltage protection
- IEC60601-1, EN60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1 approval (2xMOPP)
- Mounting: PCB mounting, Chassis mounting, DIN-Rail mounting available
- Meets 5000m altitude requirements

LH15-20BxxMU 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. Meets IEC60601-1, EN60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1 standards (2xMOPP), and widely used in medical, industrial, 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(uF) |
|---------------|--------------|--------------|--------------------------------------------|-----------------------------|--------------------------|
| CSA/EN/IEC    | LH15-20B05MU | 14W          | 5V/2800mA                                  | 78                          | 8000                     |
|               | LH15-20B12MU | 15W          | 12V/1250mA                                 | 83                          | 4000                     |
|               | LH15-20B15MU |              | 15V/1000mA                                 | 83                          | 3000                     |
|               | LH15-20B18MU |              | 18V/833mA                                  | 84                          | 2000                     |
|               | LH15-20B24MU |              | 24V/625mA                                  | 86                          | 800                      |

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                 | --   | 440  | Hz   |
| Input current                                                                                     | 115VAC               | --                 | --   | 0.37 | A    |
|                                                                                                   | 230VAC               | --                 | --   | 0.22 |      |
| Inrush current                                                                                    | 115VAC               | --                 | 10   | --   |      |
|                                                                                                   | 230VAC               | --                 | 20   | --   |      |
| Leakage current                                                                                   | 264VAC/60Hz          | 0.1mA RMS typ.     |      |      |      |
| Recommended External Input Fuse (Chassis mounting, DIN-Rail mounting package series include fuse) |                      | 2A/250V, slow-blow |      |      |      |
| Hot Plug                                                                                          |                      | Unavailable        |      |      |      |

Note: \*Medical Certification Input frequency range: 47-63 Hz

## Output Specifications

| Item                     | Operating Conditions              | Min.                      | Typ.  | Max. | Unit |
|--------------------------|-----------------------------------|---------------------------|-------|------|------|
| Output Voltage Accuracy  |                                   | --                        | ±2    | --   | %    |
| Line Regulation          | Full load                         | --                        | ±0.5  | --   |      |
| Load Regulation          |                                   | --                        | ±1    | --   |      |
| Ripple & Noise*          | 20MHz bandwidth (peak-peak value) | --                        | 50    | 100  | mV   |
| Temperature Coefficient  |                                   | --                        | ±0.02 | --   | %/°C |
| Short Circuit Protection |                                   | Continuous, self-recovery |       |      |      |

|                            |                   |                            |    |     |    |
|----------------------------|-------------------|----------------------------|----|-----|----|
| Over-current Protection    |                   | $\geq 110\%$ self-recovery |    |     |    |
| Over-voltage Protection    | 5VDC Output       | $\leq 7.5\text{VDC}$       |    |     |    |
|                            | 12 / 15VDC Output | $\leq 20\text{VDC}$        |    |     |    |
|                            | 18VDC Output      | $\leq 25\text{VDC}$        |    |     |    |
|                            | 24VDC Output      | $\leq 30\text{VDC}$        |    |     |    |
| Stand-by Power Consumption |                   | --                         | -- | 0.1 | W  |
| Min. Load                  |                   | 0                          | -- | --  | %  |
| Hold-up Time               | 115VAC Input      | --                         | 15 | --  | ms |
|                            | 230VAC Input      | --                         | 80 | --  |    |

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             | Input-output | Electric Strength Test for 1min.,<br>leakage current ≤5mA | 4000                                                                                           | --   | --   | VAC  |
| Operating Temperature |              |                                                           | -40                                                                                            | --   | +70  | ℃    |
| 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℃                                              | 3.3                                                                                            | --   | --   | % /℃ |
|                       |              | +55℃ to +70℃                                              | 3.3                                                                                            | --   | --   |      |
| Safety Standard       |              |                                                           | IEC60601-1, EN60601-1, CAN/CSA-C22.2<br>No. 60601-1 and ANSI/AAMI ES60601-1<br>safety approved |      |      |      |
| Safety Class          |              |                                                           | CLASS II                                                                                       |      |      |      |
| Insulation Level      |              | Primary to secondary                                      | 2xMOPP                                                                                         |      |      |      |
| MTBF                  |              | MIL-HDBK-217F@25℃                                         | ≥ 300,000 h                                                                                    |      |      |      |

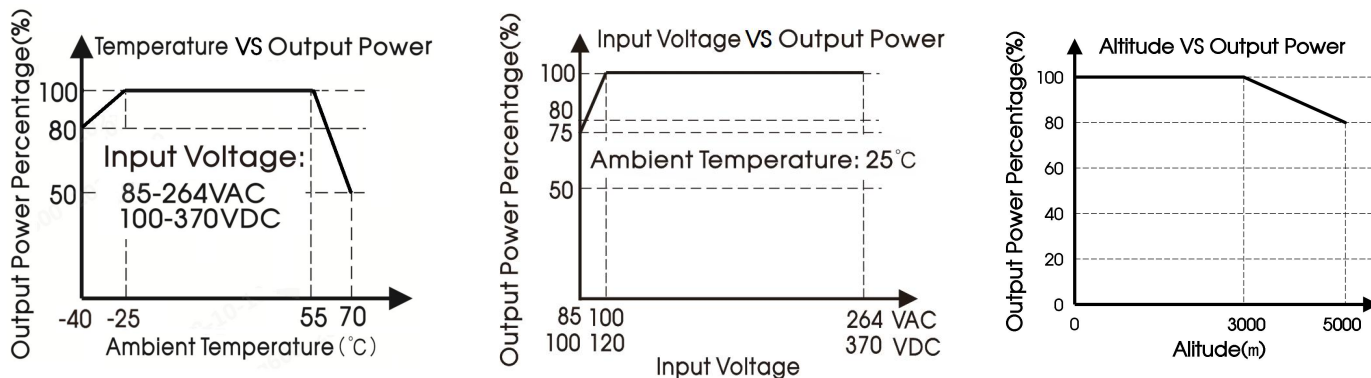
## Physical Specifications

|                 |                                                             |                          |
|-----------------|-------------------------------------------------------------|--------------------------|
| Casing Material | Black flame-retardant and heat-resistant plastic (UL94 V-0) |                          |
| Dimension       | Horizontal package                                          | 62.00 x 45.00 x 22.50 mm |
|                 | A2 chassis mounting                                         | 96.10 x 54.00 x 31.00mm  |
|                 | A4 Din-Rail mounting                                        | 96.10 x 54.00 x 35.60 mm |
| Weight          | Horizontal package                                          | 85g (Typ.)               |
|                 | A2 chassis mounting                                         | 135g (Typ.)              |
|                 | A4 Din-Rail mounting                                        | 175g (Typ.)              |
| Cooling method  | Free air convection                                         |                          |

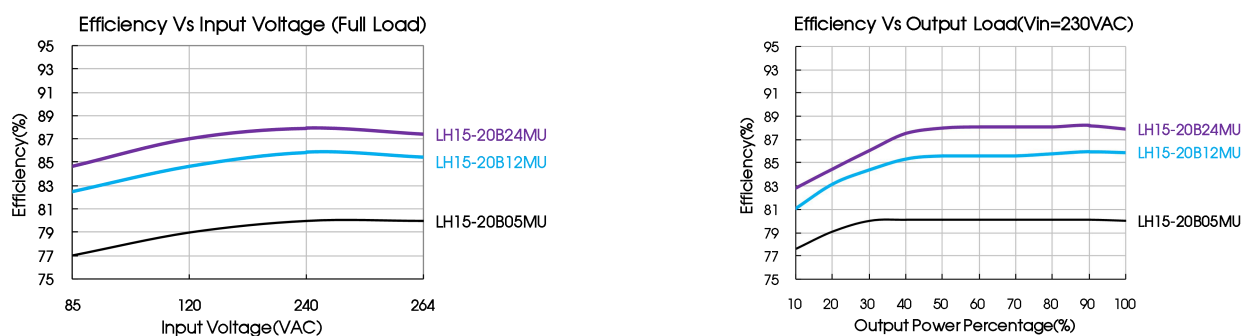
## EMC Specifications

|     |                                                       |                                             |                                                                    |                  |  |
|-----|-------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------|------------------|--|
| EMI | CE                                                    | EN55011(CISPR11) / EN55032(CISPR32) CLASS B |                                                                    |                  |  |
|     | RE                                                    | EN55011(CISPR11) / EN55032(CISPR32) CLASS B |                                                                    |                  |  |
| EMS | ESD                                                   | IEC/EN61000-4-2                             | Contact $\pm 6\text{KV}$ /Air $\pm 8\text{KV}$                     | perf. Criteria B |  |
|     | RS                                                    | IEC/EN61000-4-3                             | 10V/m                                                              | perf. Criteria A |  |
|     | EFT                                                   | IEC/EN61000-4-4                             | $\pm 2\text{KV}$                                                   | perf. Criteria B |  |
|     |                                                       | IEC/EN61000-4-4                             | $\pm 4\text{KV}$ (See Fig. 2 for recommended circuit)              | perf. Criteria B |  |
|     | Surge                                                 | IEC/EN61000-4-5                             | line to line $\pm 1\text{KV}$                                      | perf. Criteria B |  |
|     |                                                       | IEC/EN61000-4-5                             | line to line $\pm 2\text{KV}$ (See Fig. 2 for recommended circuit) | perf. Criteria B |  |
|     | 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 85-100VAC and a DC input between 100-120VDC, the output power must be derated as per temperature derating curves;
  - ② Altitude should be derated based on temperature derating when it is 3000 - 5000m;
  - ③ This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.



### Design Reference

#### 1. Typical application circuit

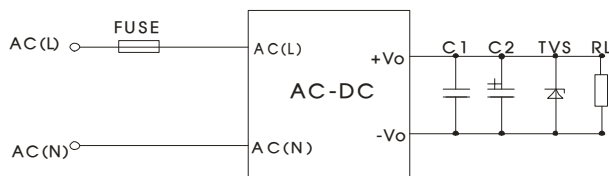


Fig. 1: Typical application circuit

| Element model | C2(uF) | TVS1     |
|---------------|--------|----------|
| LH15-20B05MU  | 680    | SMBJ7.0A |
| LH15-20B12MU  | 470    | SMBJ20A  |
| LH15-20B15MU  | 220    | SMBJ20A  |
| LH15-20B18MU  | 220    | SMBJ30A  |
| LH15-20B24MU  | 68     | SMBJ30A  |

- Note:
- Note: Output filtering capacitors C2 is electrolytic capacitor, it is recommended to use high frequency and low impedance electrolytic capacitor. For capacitance and current of capacitor please refer to manufacture's datasheet. Capacitor voltage reduced to at least 80%. C1 is ceramic capacitor, which is used to filter high-frequency noise, advice use 1uF. TVS is a recommended component to protect post-circuits if converter fails. External input FUSE model is recommended to use 2A/250V slow fusing.

#### 2. EMC solution-recommended circuit

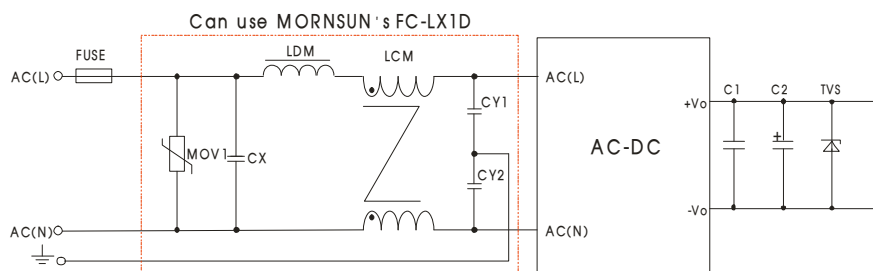
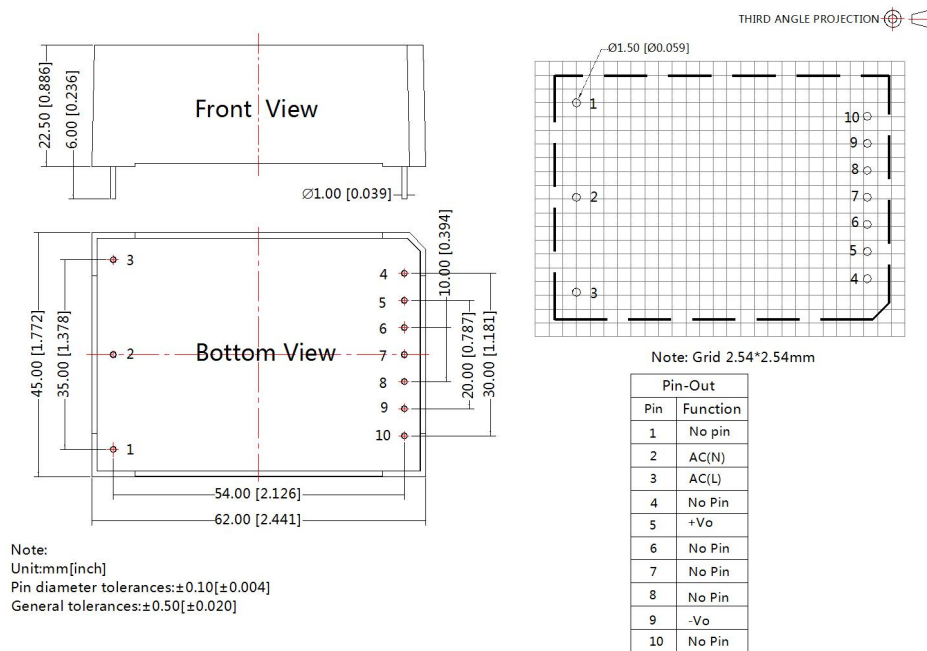


Fig. 2: EMC Recommended circuit with higher requirements

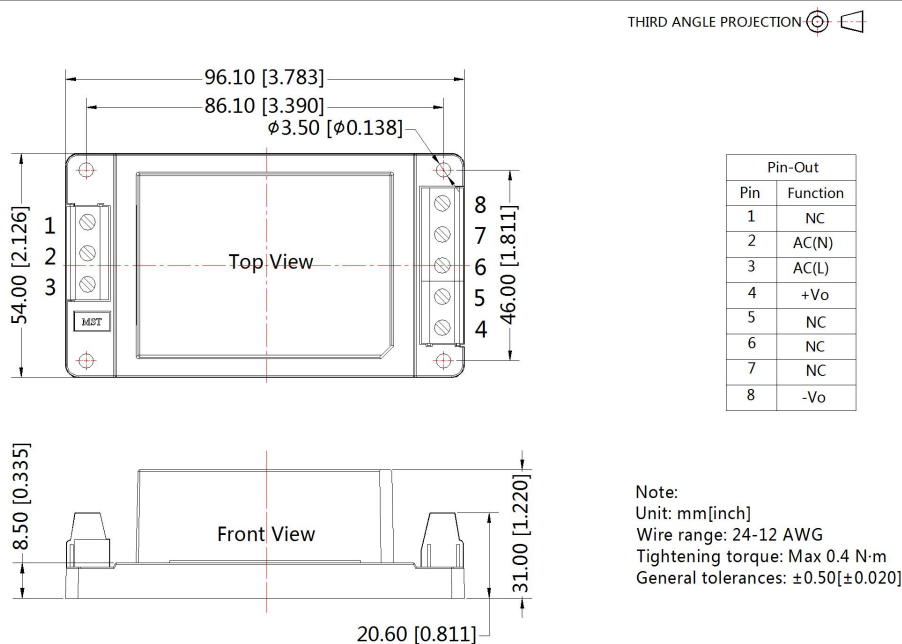
| Element model | Recommended value                               |
|---------------|-------------------------------------------------|
| MOV1          | S14K300                                         |
| CY1, CY2      | 1nF/400VAC                                      |
| CX            | 0.1uF/275VAC                                    |
| LCM           | 10mH, P/N: FL2D-Z5-103 (MORNSUN) is recommended |
| LDM           | 4.7uH/2A                                        |
| FC-LX1D       | 2KV/4KV EMC filter                              |
| FUSE          | 2A/250V, slow-blow, required                    |

3. For more information Please find the application note on [www.mornsun-power.com](http://www.mornsun-power.com)

## Dimensions and Recommended Layout

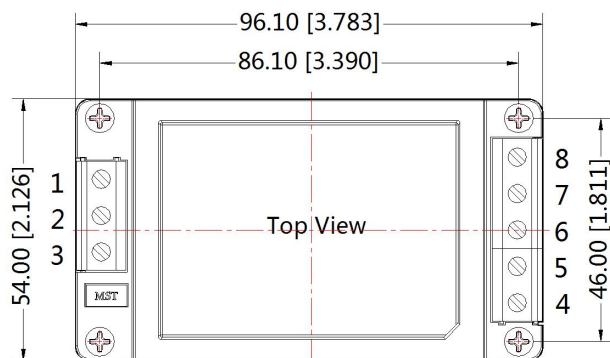


## A2 Dimensions

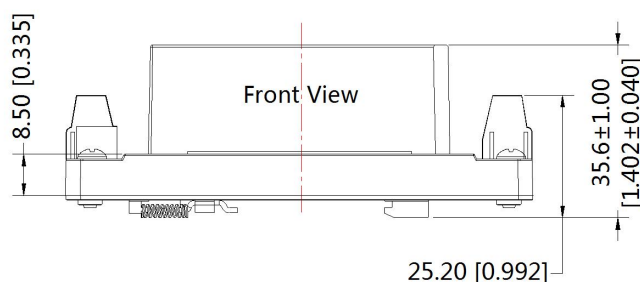


A4 Dimensions

THIRD ANGLE PROJECTION 



| Pin-Out |          |
|---------|----------|
| Pin     | Function |
| 1       | NC       |
| 2       | AC(N)    |
| 3       | AC(L)    |
| 4       | +Vo      |
| 5       | NC       |
| 6       | NC       |
| 7       | NC       |
| 8       | -Vo      |



Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
Mounting rail: TS35, rail needs to connect safety ground  
General tolerances: ±1.00[±0.039]

Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220006 (Horizontal package), 58220010(A2/A4 package);
- 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;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25 °C, humidity<75% with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on our Company's corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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