

## POWER SYSTEMS SPECIAL POWER SUPPLY LH(E) SERIES

### 5-25W, AC-DC CONVERTER

LH(E) series ----is a compact size power converter offered by Mornsun for PCB mount installation applications. It features universal input voltage, taking both DC and AC input voltage, low power consumption, high efficiency, high reliability, safer isolation. It offers good EMC performance, meets IEC61000 standards, inrush current meets level 4 standards, and widely used in power systems applications.

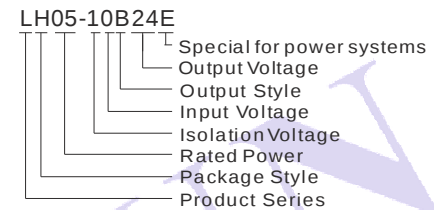
#### PRODUCT FEATURES

1. Universal Input :85 ~ 264VAC,50/60Hz
2. Regulated output, low ripple and noise
3. Low power consumption, high efficiency
4. output short circuit protection, over-current protection and thermal protection
5. UL94V-0; plastic case, meets
6. CLASS II ,safety grade
7. EMC , meets IEC61000
8. Three years warranty



RoHS

#### MODEL SELECTION



#### PRODUCT PROGRAM

| Model            | Package        | Power | Output (Vo1/Io1) | Output (Vo2/Io2) | Ripple and Noise (Typ.) | Efficiency (%) (Typ.) |
|------------------|----------------|-------|------------------|------------------|-------------------------|-----------------------|
| LH05-10B09E      | 48.5X36X20.5mm | 5W    | 9V/550mA         |                  | 50mV                    | 76                    |
| LH05-10B24E      |                |       | 24V/230mA        |                  |                         | 79                    |
| LH05-10D0524-01E |                |       | 5V/600mA         | 24V/100mA        |                         | 75                    |
| LH10-10B12E      | 55X45X21.0mm   | 10W   | 12V/900mA        |                  |                         | 79                    |
| LH10-10B15E      |                |       | 15V/700mA        |                  |                         | 80                    |
| LH10-10D0505-02E |                |       | 5V/1800mA        | 5V/200mA         |                         | 75                    |
| LH10-10D0524-02E |                |       | 5V/1000mA        | 24V/200mA        |                         | 79                    |
| LH15-10B12E      | 62x45x22.5mm   | 15W   | 12V/1250mA       |                  |                         | 80                    |
| LH15-10D0524-02E |                |       | 5V/2000mA        | 24/200mA         |                         | 80                    |
| LH25-10B12E      | 70x48x23.5mm   | 25W   | 12V/2100mA       |                  |                         | 81                    |
| LH25-10B24E      |                |       | 24V/1100mA       |                  |                         | 83                    |

Note :  
 1. Ripple and Noise were measured by the method of parallel lines;  
 2. Unless otherwise specified, all specifications above are measured at rated input voltage and rated output load, Ta=25°C, humidity < 75%;  
 3. All specifications stated in this datasheet are subject to the above listed models only. For specifications of non-standard models, please contact our technical support team.

#### INPUT SPECIFICATIONS

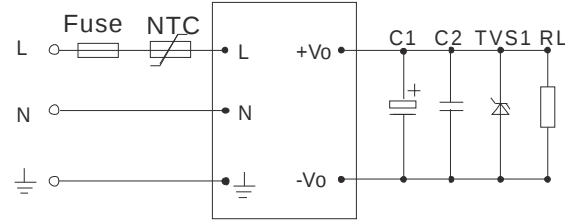
|                                  |                                                          |                                                                        |                                                                       |
|----------------------------------|----------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Input voltage range              |                                                          | 85 ~ 264VAC, 120 ~ 370VDC                                              |                                                                       |
| Input frequency                  |                                                          | 47 ~ 63Hz                                                              |                                                                       |
| Input current                    | LH05 models<br>LH10 models<br>LH15 models<br>LH25 models | 110VAC<br>120mA , typ.<br>230mA , typ.<br>250mA , typ.<br>420mA , typ. | 230VAC<br>70mA , typ.<br>120mA , typ.<br>140mA , typ.<br>230mA , typ. |
| Inrush current                   | LH05 models<br>LH10 models<br>LH15 models<br>LH25 models | 110VAC<br>10A, typ.<br>10A, typ.<br>10A, typ.<br>16A, typ.             | 230VAC<br>20A, typ.<br>20A, typ.<br>20A, typ.<br>30A, typ.            |
| Leakage current                  |                                                          | 0.3mA RMS typ. 230VAC/50Hz                                             |                                                                       |
| External input fuse(recommended) | LH05 models<br>LH10/LH15 models<br>LH25 models           | 1A/250V slow blow<br>2A/250V slow blow<br>3.15A/250V slow blow         |                                                                       |

| OUTPUT SPECIFICATIONS                |                                                                 |                                                        |              |
|--------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------|--------------|
| Voltage set accuracy                 |                                                                 | ±2% (main output)                                      |              |
| Input variation                      |                                                                 | ±0.5% (main output)<br>±1.5% (supplement output)       |              |
| Load variation (10-100%)             | Single output models                                            | ±1%                                                    |              |
|                                      | Isolated and separated twin output (balanced load)              | Vo1: ±3% (main output)<br>Vo2: ±5% (supplement output) |              |
| Minimum load                         | single output models<br>Isolated and separated twin output      | 0%<br>10% (main output)                                |              |
| Ripple & noise(p-p)<br>(main output) | ( 20MHz Bandwidth )                                             | 50mV (Typ.)                                            | 100mV (Max.) |
| Short circuit protection             |                                                                 | Continuous, and auto resume                            |              |
| Over current protection              |                                                                 | ≥110% I <sub>o</sub>                                   |              |
| Over output voltage protection       | 5VDC models<br>9VDC models<br>12 / 15VDC models<br>24VDC models | ≤7.5VDC<br>≤12VDC<br>≤20VDC<br>≤30VDC                  |              |

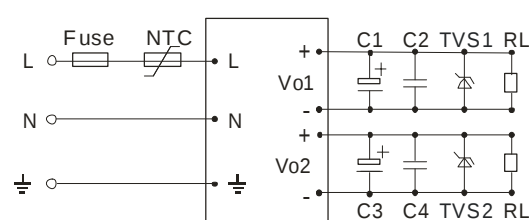
| COMMON SPECIFICATIONS                                                    |                                                                |                                               |                                                              |
|--------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------|
| Temperature ranges                                                       | Operating :<br>Power derating<br>Storage:<br>Case temperature: | above 55°C:                                   | -40°C ~ +70°C<br>3.75% / °C<br>-40°C ~ +105°C<br>+90°C (Max) |
| Hold-up time                                                             | (Vin=230VAC)                                                   |                                               | 80ms (Typ.)                                                  |
| Humidity(non condensing)                                                 |                                                                |                                               | 85% (Max.)                                                   |
| Temperature coefficient                                                  |                                                                |                                               | 0.02%/°C (main output)<br>0.15%/°C (supplement output)       |
| Switching frequency                                                      |                                                                |                                               | 65kHz (Typ.)                                                 |
| I/O-isolation voltage                                                    |                                                                |                                               | 3000VAC/1Min                                                 |
| EMC compliance                                                           | EMI                                                            | RE<br>CE                                      | CISPR22/EN55022 CLASS B<br>CISPR22/EN55022 CLASS B           |
|                                                                          | EMS                                                            | ESD                                           | IEC/EN61000-4-2 Air ±8KV / Contact ±6KV perf. Criteria B     |
|                                                                          |                                                                | RS                                            | IEC/EN61000-4-3 10V/m perf. Criteria A                       |
|                                                                          |                                                                | EFT                                           | IEC/EN61000-4-4 ±4KV perf. Criteria B                        |
|                                                                          |                                                                | Surge                                         | IEC/EN61000-4-5 ±2KV 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 and interruptions immunity | IEC/EN61000-4-11 0%-70% perf. Criteria B                     |
| Safety Class                                                             |                                                                |                                               | CLASS II                                                     |
| Case material                                                            |                                                                |                                               | UL 94V-0                                                     |
| Install                                                                  |                                                                |                                               | PCB                                                          |
| MTBF                                                                     |                                                                |                                               | >300,000h @25°C                                              |
| Package                                                                  | LH05 models<br>LH10 models<br>LH15 models<br>LH25 models       |                                               | 48.5x36x20.5mm<br>55x45x21mm<br>62x45x22.5mm<br>70x48x23.5mm |
| Note: The indicators of EMC compliance are higher than EN55024 standard. |                                                                |                                               |                                                              |

## TYPICAL APPLICATIONS

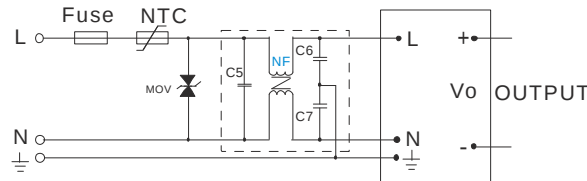
LH\*\*-10B\*\*E( Single Output) (figure 1)



LH\*\*-10D\*\*E(Isolate Twin Output) (figure 2)



LH\*\*-10\*\*\*E series if higher requirement to EMC application circuit (external circuit output as above typical applications) (figure 3):



EXTERNAL CAPACITORS TYPICAL VALUE(Unit: mF)

| MODEL           | C1  | C3 | TVS1     | TVS2    | MODEL            | C1  | C3 | TVS1     | TVS2     |
|-----------------|-----|----|----------|---------|------------------|-----|----|----------|----------|
| LH05-10B09E     | 120 |    | P6KE12A  |         | LH10-10B12E      | 120 |    | P6KE20A  |          |
| LH05-10B24E     | 68  |    | P6KE30A  |         | LH10-10B15E      | 120 |    | P6KE20A  |          |
| LH05-10D0524-01 | 120 | 22 | P6KE6.8A | P6KE30A | LH10-10D0505-02E | 220 | 68 | P6KE6.8A | P6KE6.8A |
| LH15-10B12E     | 220 |    | P6KE20A  |         | LH10-10D0524-02E | 220 | 47 | P6KE6.8A | P6KE30A  |
| LH25-10B12E     | 330 |    | P6KE20A  |         | LH15-10D0524-02E | 470 | 47 | P6KE6.8A | P6KE30A  |
| LH25-10B24E     | 120 |    | P6KE30A  |         |                  |     |    |          |          |

Note:

1. Output filtering capacitors C1, C3 are electrolytic capacitors, It is recommended to use high frequency and low impedance electrolytic capacitors. For capacitance and current of capacitor please refer to manufacture's datasheet. Voltage derating of capacitor should be 80% or above. C2,C4 are use to filter high frequency noise, suggest choose 0.1μF. TVS is recommended component to protect post-circuits (if converter fails).

2. External input NTC is recommended to use 5D-9 ( Only LH10 models and LH15 models)

3. Module recommended external varistor, model: S10K550.

4. If common requirement to EMC performance, refer to figure 1& figure 2, if higher requirement to EMC performance, refer to figure 3.

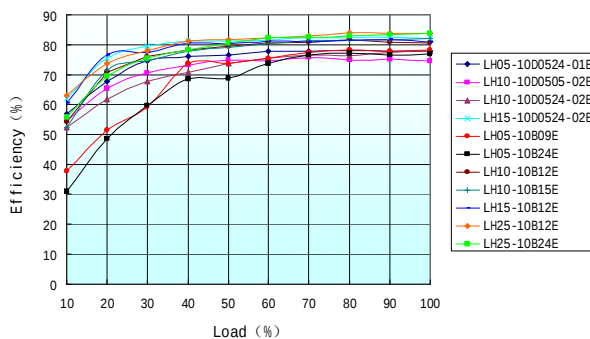
C5:X capacitor, recommended parameter 0.1μF /275V;

C6,C7:Y capacitor, recommended parameter 2200pF/400V;

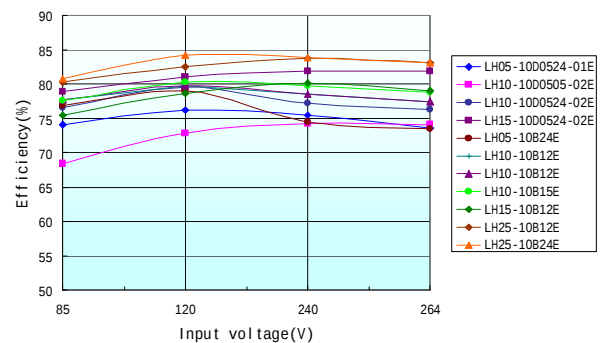
NF: common model choke, recommended inductance is about 10mH-30mH.

## TYPICAL EFFICIENCY CURVE

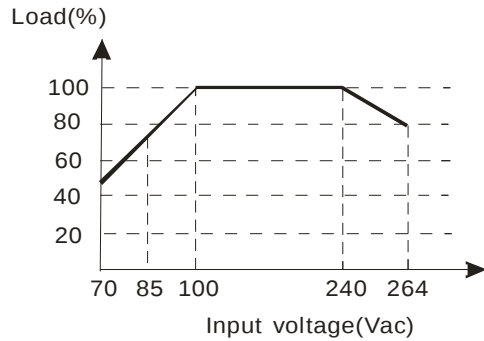
Load VS Efficiency curve (Vin=220Vac)



Input voltage VS Efficiency curve(Load=100%)

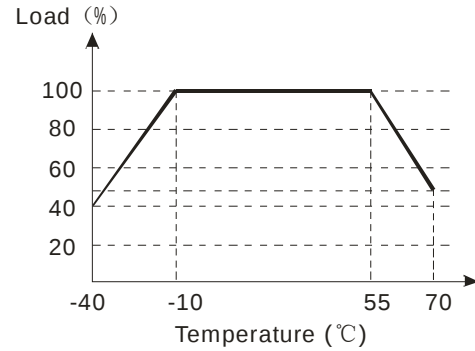


## INPUT VOLTAGE VS LOAD

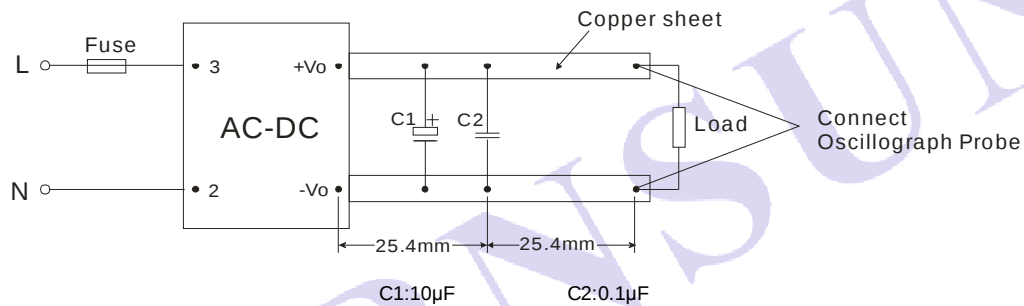


\*Note: When input DC,  $V_{dc}=1.414V_{ac}-20V_{dc}$ .

## TEMPERATURE VS LOAD

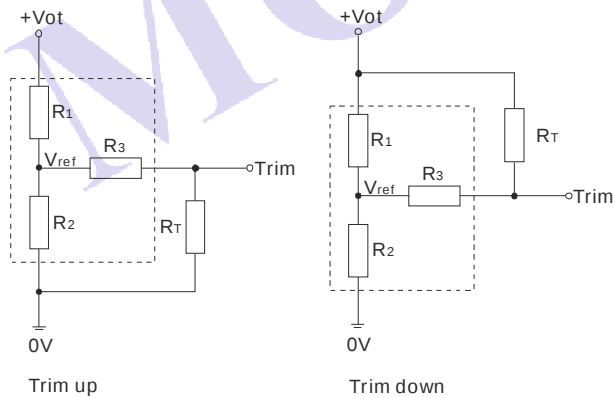


## PARALLEL LINES MEASURE



## TRIM APPLICATION & TRIM CALCULATION

Application circuit for TRIM  
(Part in broken line is the interior of models)



Formula for resistance of Trim

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_{ot} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$$

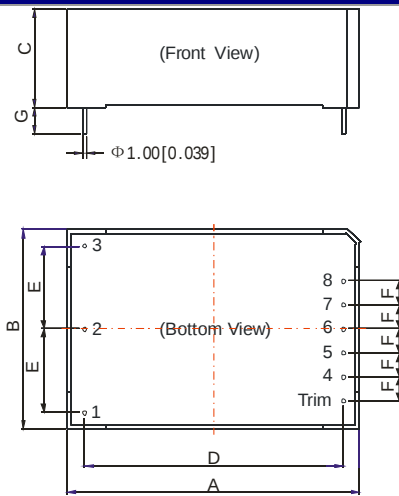
Note: Value for R1, R2, R3, and Vref refer to the following table.

$R_T$ : Resistance of Trim

a: User-defined parameter, no actual meanings.

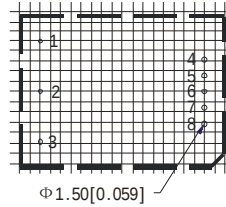
| $V_o(V)$       | 12                                                | 24   |
|----------------|---------------------------------------------------|------|
| Resistance     |                                                   |      |
| $R_1(K\Omega)$ | 3.83                                              | 8.66 |
| $R_2(K\Omega)$ | 1                                                 | 1    |
| $R_3(K\Omega)$ | 1                                                 | 1    |
| $V_{ref}(V)$   | 2.5                                               | 2.5  |
| $V_{ot}(V)$    | Output voltage of Trim, variation $\leq \pm 10\%$ |      |

## OUTLINE AND DIMENSIONS

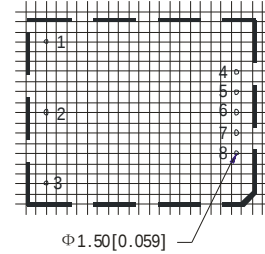


Note:  
Unit:mm[inch]  
Pin diameter tolerances:±0.10mm[±0.004inch]  
General tolerances:±0.50mm[±0.020inch]

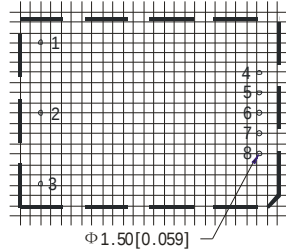
LH05 series



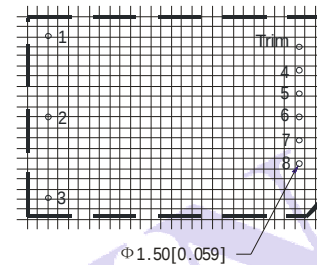
LH10 series



LH15 series



LH25 series



Note: grid 2.54\*2.54mm.

OUTLINE AND DIMENSIONS (Unit: mm)

| NO. | LH05  | LH10  | LH15  | LH25  |
|-----|-------|-------|-------|-------|
| A   | 48.50 | 55.00 | 62.00 | 70.00 |
| B   | 36.00 | 45.00 | 45.00 | 48.00 |
| C   | 20.50 | 21.00 | 22.50 | 23.50 |
| D   | 40.50 | 47.00 | 54.00 | 62.00 |
| E   | 12.50 | 17.50 | 17.50 | 20.00 |
| F   | 4.00  | 5.00  | 5.00  | 5.75  |
| G   | 10.00 | 12.50 | 12.50 | 12.50 |
| I   | 4.00  | 4.00  | 4.00  | 4.00  |

MODLES WEIGHT

| WEIGHT | LH05 | LH10 | LH15 | LH25 |
|--------|------|------|------|------|
| (Typ.) | 50g  | 70g  | 80g  | 120g |

FOOTPRINT DETAILS

| Pin  | LHXX-10B | LHXX-10D |
|------|----------|----------|
| 1    |          |          |
| 2    | AC(N)    | AC(N)    |
| 3    | AC(L)    | AC(L)    |
| 4    | -Vo      | -Vo1     |
| 5    | No Pin   | +Vo1     |
| 6    | No Pin   | No Pin   |
| 7    | No Pin   | -Vo2     |
| 8    | +Vo      | +Vo2     |
| Trim | Trim**   | No Pin   |

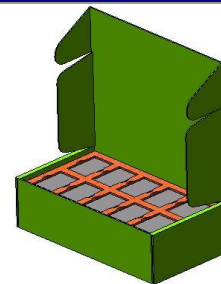
There is no pin "1" on LH15-10BXXE  
Trim\*\*: only for LH25-10BXXE Series.

## PACKAGE DIAGRAM

(LH05 Series)



(Other Series)



Inner packaging box dimensions: L\*W\*H=355\*192\*93mm  
Outer packaging box dimensions: L\*W\*H=405\*380\*305mm

Packaging quantity: 20pcs (LH05 series: 40pcs)  
Packaging quantity: 120pcs (LH05 series: 240pcs)

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