

25W, AC/DC converter



## FEATURES

- Universal 85-305VAC or 100-430VDC input voltage
- Operating ambient temperature range: -40°C to +85°C
- High I/O isolation test voltage up to 4200VAC
- Up to 84% efficiency
- Output short circuit, over-current, over-voltage protection
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B
- Over-voltage category OVC III (meet IEC62477-1) (2000m altitude)



CB Report

RoHS



UL62368-1 EN62368-1

LH25-23B05/12R2-C AC-DC converters are highly efficient, environmental-friendly 25W power modules. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368 standards. The converters are widely used in industrial, power and office applications. 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	LH25-23B05R2-C	20.5W	5VDC/4100mA	82	12240
UL/EN/IEC	LH25-23B12R2-C	25.2W	12VDC/2100mA	84	5400

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	305	VAC
	DC input	100	--	430	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.6	A
	230VAC	--	--	0.34	
Inrush Current	115VAC	--	20	--	
	230VAC	--	40	--	
Leakage Current	277VAC/50Hz	0.25mA RMS Max.			
Recommended External Input Fuse		3.15A/300V, slow-blow, required			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±2	--	%
Line Regulation	Rated load	--	±0.5	--	
Load Regulation	0% - 100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	50	100	mV
Temperature Coefficient		--	±0.02	--	%/°C
Stand-by Power Consumption	230VAC	--	--	0.3	W
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥150%, self-recovery			
Over-voltage Protection	5V output	≤7.5VDC (Hiccup)			
	12V output	≤20VDC (Hiccup)			
Minimum Load		0	--	--	%

Hold-up Time	115VAC input	--	10	--	ms
	230VAC input	--	60	--	
Adjustable Output Voltage (Trim)					±10%Vo

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	4200	--	--	VAC
	Input - PE	2500	--	--	
	Output - PE	1250	--	--	
Impulse Withstand Voltage	Input - output	6000	--	--	VDC
	Input - PE	6000	--	--	
	Output - PE	6000	--	--	
Insulation Resistance	Input - output	100	--	--	MΩ
	Input - PE	100	--	--	
	Output - PE	100	--	--	
Operating Temperature		-40	--	+85	℃
Storage Temperature		-40	--	+105	
Storage Humidity		--	--	95	%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 -25℃	3.33	--	--	% /℃
	+50℃ to +70℃	2.5	--	--	
	+70℃ to +85℃	0.67	--	--	
	85VAC - 100VAC	1.00	--	--	% /VAC
	277VAC - 305VAC	0.715	--	--	
2000m - 5000m	6.67	--	--	% /Km	
Safety Standard	12V output	IEC/UL62368-1 & EN62368-1 (Report); Design refer to IEC62477-1			
	5V output	EN62368-1 (Report); Design refer to IEC/UL62368-1, IEC62477-1			
Safety Class		CLASS I			
MTBF		MIL-HDBK-217F@25℃ > 300,000 h			

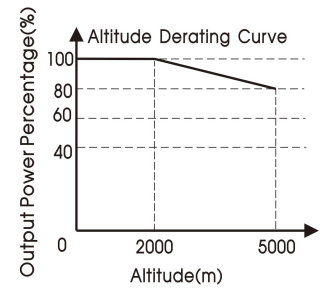
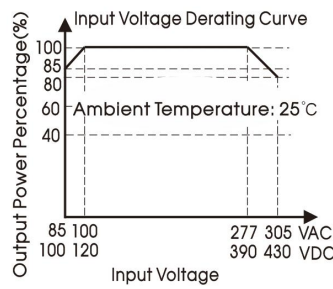
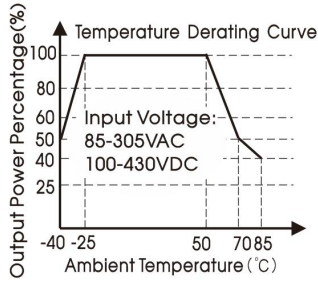
## Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	70.00 x 48.00 x 23.50 mm
Weight	120g (Typ.)
Cooling Method	Free air convection

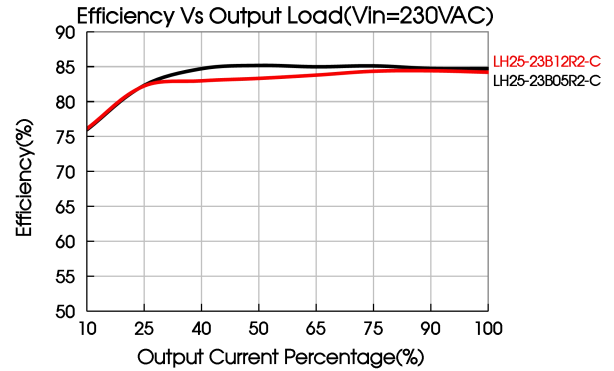
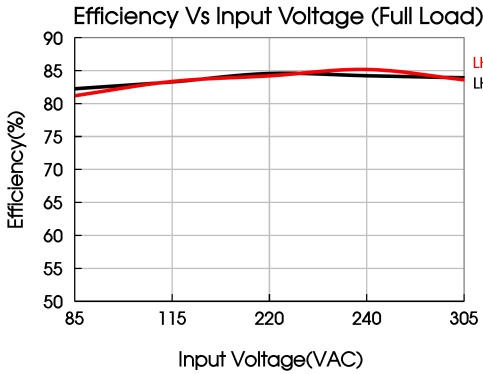
## Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B		
	RE	CISPR32/EN55032	CLASS B		
Immunity	ESD	IEC/EN61000-4-2	Contact ±8KV/Air ±15KV	Perf. Criteria A	
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A	
	EFT	IEC/EN61000-4-4	±4KV	Perf. Criteria A	
	Surge		IEC/EN61000-4-5	line to line ±1KV/ line to ground ±2KV	Perf. Criteria A
			IEC/EN61000-4-5	line to line ±2KV/ line to ground ±4KV (See Fig. 2 for recommended circuit)	Perf. Criteria A
	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/277 - 305VAC and a DC input between 100 - 120VDC/390 - 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 factory or one of our FAE.



Design Reference

1. Typical application

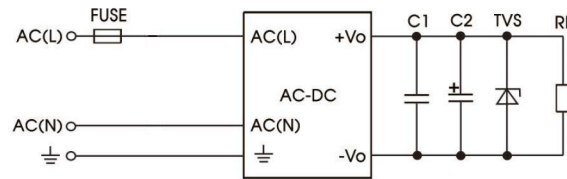


Fig. 1: Typical circuit diagram

Part No.	C1	C2	FUSE	TVS
LH25-23B05R2-C	1UF/50V	330uF/16V	3.15A/300V, slow-blow, required	SMBJ7.0A
LH25-23B12R2-C		330uF/25V		SMBJ20A

Output Filter Components:

We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2 (refer to manufacture's datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

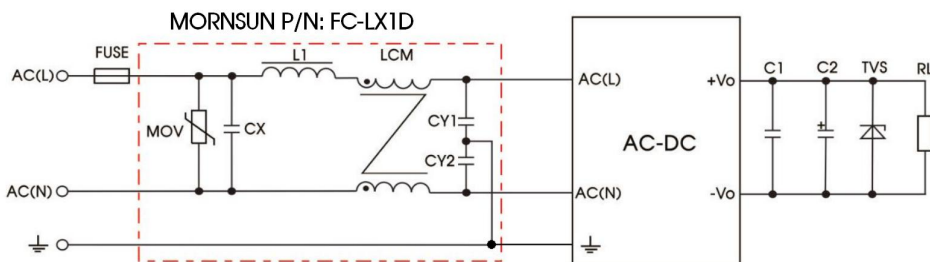
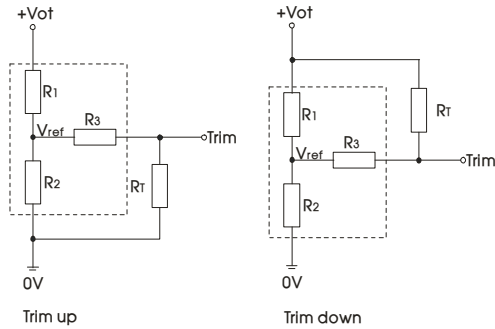


Fig 2: EMC application circuit with higher requirements

Component	Recommended value
MOV	S14K350
CY1/CY2	1000pF/400VAC
CX	0.1uF/310VAC
LCM	10mH, we recommended using part no. FL2D-Z5-103 (MORNSUN)
L1	4.7uH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	3.15A/300V, slow-blow, required

### 3. Trim Function for Output Voltage Adjustment (open if unused)



Calculation formula of Trim resistance:

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

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

$R_T$  = Trim Resistor value;

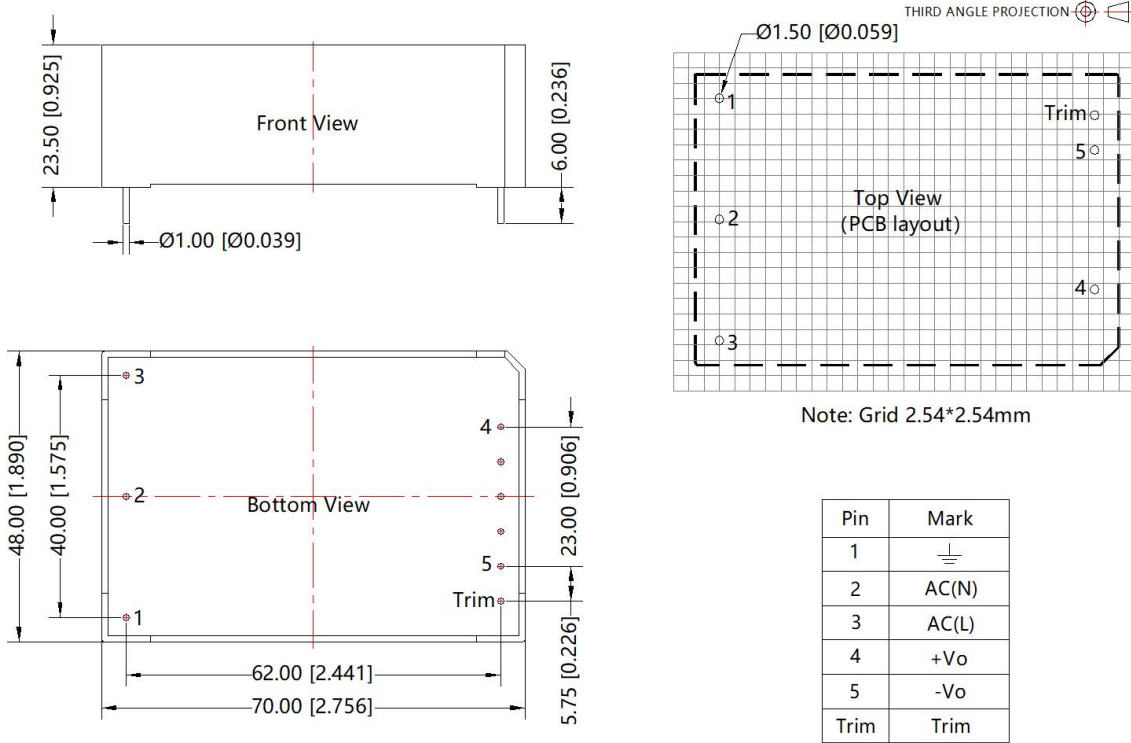
$\alpha$  = Self-defined parameter;

Trim resistor connection (dashed line shows internal resistor network)

V <sub>out</sub>	R1(K $\Omega$ )	R2(K $\Omega$ )	R3(K $\Omega$ )	V <sub>ref</sub> (V)	V <sub>ot</sub> (V)
5V	7.5	7.33	1	2.5	Output voltage after regulation, variation $\leq \pm 10\%$
12V	24	6.28	1	2.5	

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

Dimensions and Recommended Layout



Note:  
Unit: mm[inch]  
Pin diameter tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$

- Note:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number : 58220006;
  - Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^\circ\text{C}$ , humidity<75% with nominal input voltage and rated output load;
  - All index testing methods in this datasheet are based on our company 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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