

Datasheet

RS Pro LHE25-20Bxx AC/DC Converter

25W, AC-DC converter



Features

- Universal 85 - 264V AC and wide 100 - 370V DC Input
- Operating ambient temperature range -40°C to +70°C
- High I/O isolation test voltage up to 4000VAC
- Regulated output, Low output ripple & noise
- Output short circuit, over-current, over-voltage protection
- High efficiency, high reliability
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32 / EN55032 CLASS B
- IEC62368, UL62368 and EN62368 approval

UL US CE CB RoHS

LHE25-20Bxx series features a universal AC and DC input voltage, low power consumption, high efficiency, high reliability. The converters meet IEC/EN61000-4, CISPR32/EN55032, UL62368 and EN62368 standards, and are widely used in industrial, office and civil applications. For harsh EMC environment, the application circuit in the datasheet is recommended.

Certification	RS Stock no. (Standard Pack)	Part No.*	Output Power	Nominal Output Voltage and Current	Efficiency (230VAC, %/Typ.)	Max. Capacitive Load(μF)
UL/CE/CB	1812127	LHE25-20B05	20.5W	5V/4100mA	79	12240
	1812128	LHE25-20B12	25W	12V/2100mA	83	5400
	1812130	LHE25-20B24		24V/1100mA	85	1440
	1812131	LHE25-20B48		48V/500mA	87	600

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	--	63	Hz
Input current	115VAC	--	--	0.6	A
	230VAC	--	--	0.34	
Inrush current	115VAC	--	20	--	
	230VAC	--	40	--	
Recommended External Input Fuse		3.15A/250V, slow fusing, necessary			
Hot Plug		Unavailable			

AC/DC Converter


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Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	3.3V output	--	±3	--	%
	Others output	--	±2	--	
Line Regulation	Full load	--	±0.5	--	
Load Regulation	0%-100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-peak value)	--	50	100	mV
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccups, Continuous, self-recovery			
Over-current Protection		≥140%Io self-recovery			
Over-voltage Protection	3.3 / 5VDC Output	≤7.5VDC			
	9VDC Output	≤15VDC			
	12 / 15VDC Output	≤20VDC			
Over-voltage Protection	24VDC Output	≤30VDC			
	48VDC Output	≤60VDC			
Min. Load		0	--	--	%
Hold-up Time	115VAC input	--	10	--	ms
	230VAC input	--	60	--	

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 Voltage	Input-output	4000	--	--	VAC
	Input- 	2500	--	--	
Operating Temperature		-40	--	+85	°C
Storage Temperature		-40	--	+85	
Storage Humidity		--	--	95	%RH
Welding Temperature	Wave-soldering	260 ± 5°C; time:5 -10s			
	Manual-welding	360 ± 10°C; time:3 - 5s			
Switching Frequency		--	65	--	kHz
Power Derating	-40°C to -10°C	2.0	--	--	% / °C
	+50°C to +70°C	3.0	--	--	
	+70°C to +85°C	2.0	--	--	
	85 - 100VAC	1.0	--	--	% / VAC
	240 - 264VAC	0.83	--	--	
Safety Standard		IEC62368/EN62368/UL62368			
Safety Certification		IEC62368/EN62368/UL62368			
Safety Class		CLASS I			
MTBF		MIL-HDBK-217F@25°C > 300,000 h			

Physical Specifications

Casing Material	Black flame-retardant and heat-resistant plastic (UL94V-0)	
Dimension	Horizontal package	70.00*48.00*23.50mm
Weight	Horizontal package	120g (Typ.)
Cooling method	Free air convection	

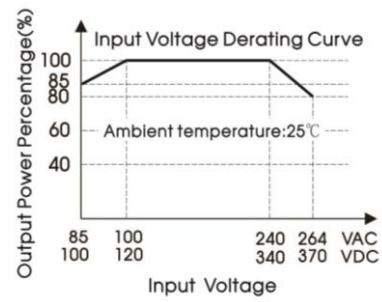
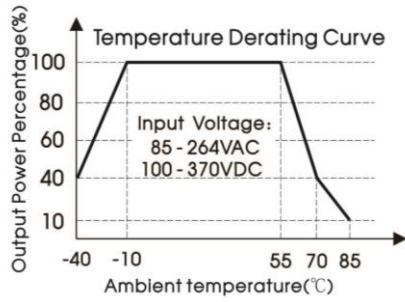
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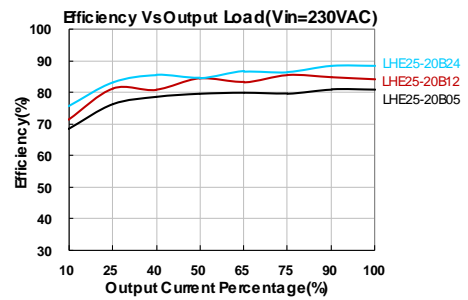
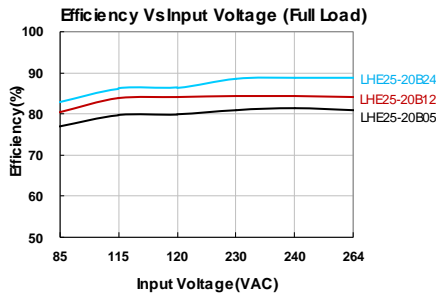
EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	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. 5 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 1\text{KV}$ /line to ground $\pm 2\text{KV}$	perf. Criteria B
		IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ / line to ground $\pm 4\text{KV}$ (See Fig. 5 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
Voltage dips, short interruptions and voltage		IEC/EN61000-4-11	0%,70%	perf. Criteria B

Product Characteristic Curve



Note: Derating when input 85-100VAC/240-264VAC/100-120VDC/340-370VDC.
This product is suitable for use in natural air-cooling environments.



Design Reference

1. Typical application circuit

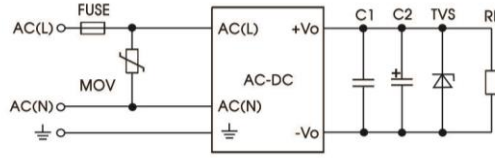


Fig. 1

Model	C2(μF)	FUSE	MOV	TVS
LHE25-20B03	330	3.15A/250V slow fusing, necessary	S14K300	SMBJ7.0A
LHE25-20B05	330			SMBJ7.0A
LHE25-20B09	330			SMBJ12A
LHE25-20B12	330			SMBJ20A
LHE25-20B15	330			SMBJ20A
LHE25-20B24	120			SMBJ30A
LHE25-20B48	68			SMBJ64A

Note:
C2 should be fitted in all applications to achieve low ripple and good dynamic load performance. We recommend using a high frequency, low ESR electrolytic capacitors. Choose a capacitor voltage rating with at least 20% margin. C1 is a ceramic capacitor used for filtering high-frequency noise and the TVS provides optional supplementary overvoltage protection.

2. EMC solution-recommended circuit

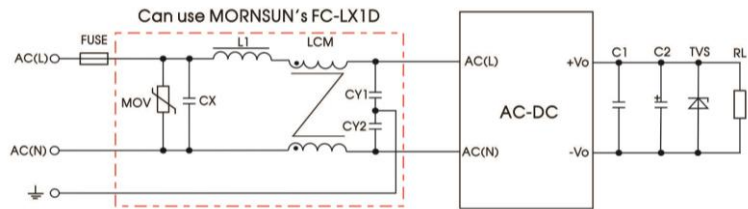


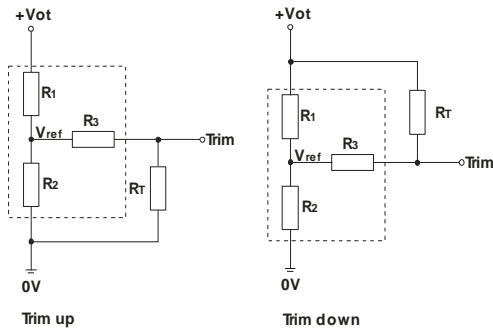
Fig 2: EMC Recommended circuit with higher requirements

Element model	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, recommended to use MORNSUN's FL2D-Z5-103
L1	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	3.15A/250V slow fusing, necessary

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3.Application of Trim and calculation of Trim resistance



Calculation formula of Trim resistance:

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

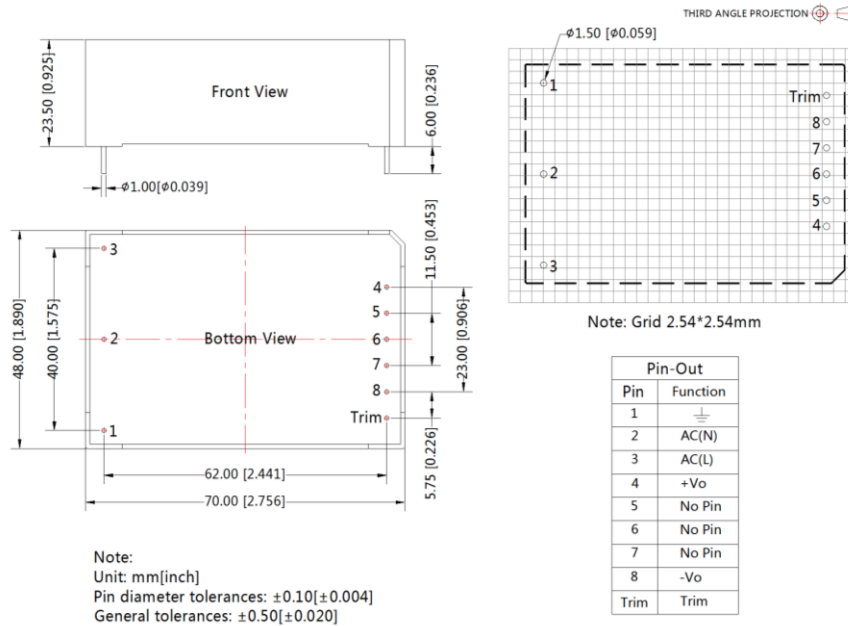
$$\text{down: } R_T = \frac{a R_1}{R_1 - a} - R_3 \quad a = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$$

R_T is Trim resistance
 a is a self-defined parameter, with no real meaning.

Applied circuits of Trim (Part in broken line is the interior of models):

Vout	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)	Vot(V)
3.3V	3.3	1.98	1	1.24	Output voltage after regulation, variation ≤ ±10%
5V	3.3	3.3	1	2.5	
9V	7.5	2.87	1	2.5	
12V	3.83	1	1	2.5	
15V	7.5	1.5	1	2.5	
24V	8.66	1	1	2.5	
48V	68	3.73	1	2.5	

Dimensions and Recommended Layout



- Note:
- 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's corporate standards.
 - Products are related to laws and regulations: see "Features" and "EMC".
 - Products are classified according to ISO14001 and related environmental laws and regulation.