

15W, AC-DC converter



FEATURES

- Ultra-wide 176 - 418VAC and 248 - 591VDC input voltage range
- Operating ambient temperature range: -40℃ to +85℃
- Up to 85% efficiency
- No-load power consumption 0.3W
- 5000m altitude application
- Industrial-grade design
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014

LD15-25BxxR2 series AC-DC converter is one of Mornsun's new generation compact size power converters. They feature wide input range accepting either AC or DC voltage, high reliability, low power consumption and reinforced isolation. The product corresponds to the use of three-phase alternating current with two phases to achieve ground fault protection, while meeting the power supply requirements of the system board in the power system, such as the application of charging point. All models are particularly suitable for industrial control, electric power, instrumentation and smart home applications which have high requirement for dimension and don't have high requirement on EMC. 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 220VAC (%) Typ.	Capacitive Load (uF) Max.
EN	LD15-25B05R2	15W	5V/3000mA	81	3000
	LD15-25B09R2		9V/1670mA	83	1500
	LD15-25B12R2		12V/1250mA	84	1000
	LD15-25B15R2		15V/1000mA	84	560
	LD15-25B24R2		24V/625mA	85	150

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	176	--	418	VAC
	DC input	248	--	591	VDC
Input Certified Voltage Range	AC input	176	--	380	VAC
	DC input	248	--	550	VDC
Input Frequency		47	--	63	Hz
Input Current	220VAC	--	--	0.30	A
Inrush Current	220VAC	--	30	--	
Leakage Current	277VAC/50Hz	0.25mA RMS Max.			
Recommended External Input Fuse		2A, slow-blow, required (The actual use needs to be selected according to the application environment)			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±3	±5	%
Line Regulation	Full load	--	±1	±1.5	
Load Regulation	10%-100% load	--	±1.5	±3	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value), 10%-100% load	--	--	150	mV
Stand-by Power Consumption	220VAC	--	0.3	0.5	W
Short Circuit Protection		Hiccup, continuous, self-recover			
Over-current Protection		≥110%Io, self-recover			
Minimum Load*		10	--	--	%

Hold-up Time	220VAC	--	8	--	ms
Note: 1. *The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information. 2. *The product is able to work with 0%-10% load and with stable output.					

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output	Electric Strength Test for 1min., leakage current <5mA			
		4000	--	--	VAC
Insulation Resistance	Input - output	At 500VDC			
		100	--	--	M Ω
Operating Temperature		-40	--	+85	$^{\circ}\text{C}$
Storage Temperature		-40	--	+85	
Storage Humidity		--	--	95	%RH
Thermal Shock	-40 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$, Temperature Holding Time: t=30min.	500	--	--	H
Soldering Temperature	Wave-soldering, Max. 10 seconds	255	260	265	$^{\circ}\text{C}$
	Manual-welding, Max. 5 seconds	350	360	370	
Switching Frequency		--	85	--	kHz
Power Derating	-40 $^{\circ}\text{C}$ to -25 $^{\circ}\text{C}$ ($\geq 200\text{VAC}$)	1.33	--	--	%/ $^{\circ}\text{C}$
	+50 $^{\circ}\text{C}$ to +70 $^{\circ}\text{C}$	3.00	--	--	
	+70 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$	0.66	--	--	
	380VAC - 418VAC	0.526	--	--	%/VAC
	2000 - 5000m	6.7	--	--	%/km
Safety Standard		EN62368-1 (Report) safety approved			
Safety Class		CLASS II			
MTBF	MIL-HDBK-217F@25 $^{\circ}\text{C}$	>1,000,000 h			

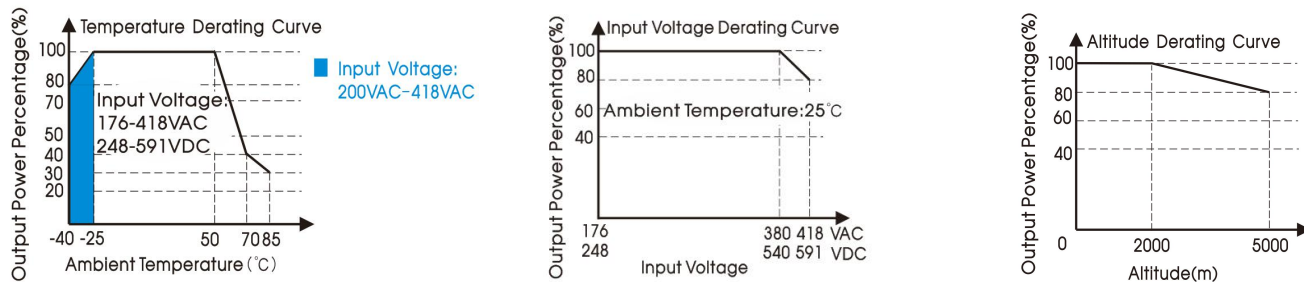
Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	52.40 x 27.20 x 24.00 mm
Weight	55g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B	
		EN55014-1	
	RE	CISPR32/EN55032 CLASS B	
		EN55014-1	
Immunity	ESD	IEC/EN61000-4-2 Contact $\pm 8\text{KV}$ /Air $\pm 10\text{KV}$	perf. Criteria A
		IEC/EN55014-2	perf. Criteria A
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
		IEC/EN55014-2	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
		IEC/EN55014-2	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line $\pm 1\text{KV}$	perf. Criteria A
		IEC/EN61000-4-5 line to line $\pm 2\text{KV}$ /line to PE $\pm 4\text{KV}$ (See Fig. 2 for recommended circuit)	perf. Criteria A
		IEC/EN55014-2	perf. Criteria A
	CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A
		IEC/EN55014-2	perf. Criteria A
	Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11 0%, 70%	perf. Criteria B
		IEC/EN55014-2	perf. Criteria B

Product Characteristic Curve



Note: ① With an AC input between 380-418VAC and a DC input between 540-591VDC, 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 Mornsun FAE.



Design Reference

1. Typical application

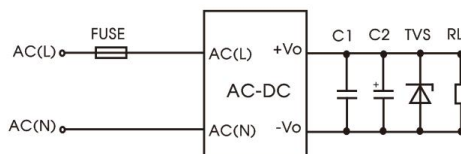


Fig. 1: Typical circuit diagram

Part No.	FUSE	C1	C2	TVS
LD15-25B05R2	2A/300V, slow-blow, required (176-305VAC input); 2A/500V, slow-blow, required (176-418VAC input);	1uF/50V	220uF/16V	SMBJ7.0A
LD15-25B09R2			220uF/16V	SMBJ12A
LD15-25B12R2			100uF/25V	SMBJ20A
LD15-25B15R2			100uF/25V	SMBJ20A
LD15-25B24R2			100uF/35V	SMBJ30A

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

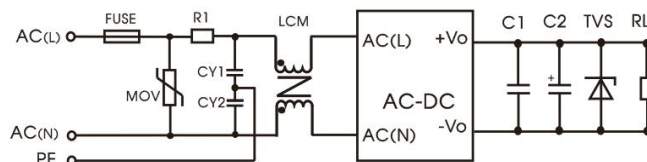
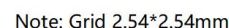


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
FUSE	2A/300V, slow-blow, required (176-305VAC input) 2A/500V, slow-blow, required (176-418VAC input)
MOV	S10K350 (176-305VAC input); S10K510 (176-418VAC input)
R1	6.8 Ω /3W
CY1/CY2	1nF/400VAC (176-305VAC input); 1nF/500VAC (176-418VAC input)
LCM	10mH, P/N: FL2D-Z5-103 (MORNSUN) is recommended

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Function
1	AC(L)
2	AC(N)
3	-V _o
4	+V _o
5	No Pin
6	No Pin

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220011;
2. 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;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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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