

10W, AC-DC converter



RoHS

## FEATURES

- 85 - 264V Universal AC or wide 100 - 370VDC Input
- Regulated output, low ripple & noise
- Output short circuit, overcurrent, overvoltage protection
- Plastic case meets flammability per UL94V-0
- EMC performance meets CISPR32 / EN55032 standards
- Transient (EFT) and surge meet Level 4 of IEC/EN61000-4 and -5
- Especially designed for power systems
- Mounting options for PCB, chassis and Din-Rail mounting available

LHE10-20DxxER2 series is Mornsun's improved version of power converters especially designed for power systems. It accepts universal AC and wide DC input voltages and features high efficiency, high reliability and I/O isolation test for 3kV. It offers good EMC performance compliant to IEC61000 standards and is widely used in power systems applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

## Selection Guide

Part No.*	Output Power	Nominal Output Voltage and Current		Efficiency at 230VAC(%) Typ.	Capacitive Load (μF Max.)	
		(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
LHE10-20D0512-02ER2	10W	5V/1500mA	12V/200mA	77	4400	260
LHE10-20D0524-02ER2		5V/1000mA	24V/200mA	77	4000	170

Note: \*Part No. with suffix of "A2" means chassis mounting and suffix of "A4" means DIN-Rail mounting.

## 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	--	--	0.26	A
	230VAC	--	--	0.16	
Inrush Current	115VAC	--	13	--	
	230VAC	--	23	--	
Recommended External Input Fuse		3.15A/250V, slow-blow, required			
Hot Plug		Unavailable			



## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Vo1	--	±2	--	%
	Vo2	--	±10	--	
Line Regulation	Full load	Vo1	±0.5	--	
		Vo2	±1.5	--	
Load Regulation	10%-100% load (balanced load)	Vo1	±3	--	
		Vo2	±5	--	
Ripple & Noise*	Vo1, 20MHz bandwidth (peak-to-peak value)	Vo1	--	200	mV
		Vo2	--	200	
Temperature Coefficient	Vo1	--	±0.02	--	%/°C
Short Circuit Protection		Continuous, self-recovery			
Overcurrent Protection		150%-300% Io self-recovery			
Overvoltage Protection	Vo1	5VDC Output		≤7.5VDC (Output voltage clamp)	
Min. Load		10	--	--	%

Hold-up Time	115VAC input	--	8	--	ms
	230VAC input	--	60	--	

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 Voltage	Input - output	4000	--	--	VAC
	Input - 	2500	--	--	
	Output- 	2500	--	--	
	Output- output	500	--	--	VDC
Electric Strength Test for 1min., leakage current <5mA					
Operating Temperature		-40	--	+70	°C
Storage Temperature		-40	--	+85	
Storage Humidity		--	--	95	%RH
Soldering Temperature	Wave-soldering	260 ± 5°C; time: 5 - 10s			
	Manual-welding	360 ± 10°C; time: 3 - 5s			
Switching Frequency		--	100	--	kHz
Power Derating	-40°C to -25°C	2.5	--	--	% / °C
	+55°C to +70°C	3.3	--	--	
	85VAC-100VAC	1.0	--	--	% / VAC
Safety Standard		IEC62368/EN62368/UL62368			
Safety Class		CLASS I			
MTBF		MIL-HDBK-217F@25°C > 300,000 h			

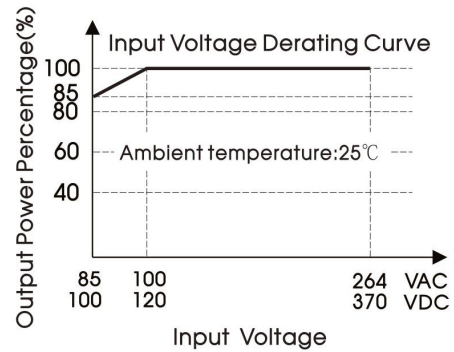
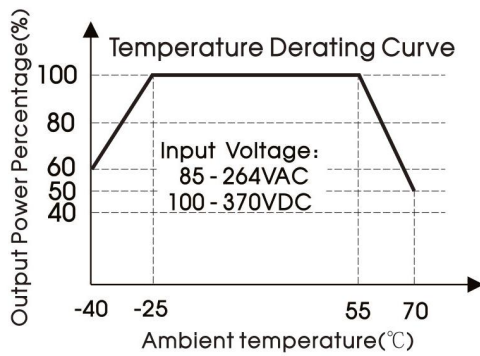
### Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	62.0 x 45.0 x 30.0mm
	A2 chassis mounting	96.1 x 54.0 x 38.5mm
	A4 Din-Rail mounting	96.1 x 54.0 x 43.1mm
Weight	Horizontal package	100g (Typ.)
	A2 chassis mounting	150g (Typ.)
	A4 Din-Rail mounting	190g (Typ.)
Cooling method	Free air convection	

### EMC Specifications

Emissions	CE	CISPR32/EN55032	CLASS A	
		CISPR32/EN55032	CLASS B (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A	
		CISPR32/EN55032	CLASS B (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±6KV / Air ±8KV	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	line to line ±2KV/line to ground ±4KV	perf. Criteria B
		IEC/EN61000-4-5	line to line ±4KV/line to ground ±6KV (See Fig. 2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

Product Characteristic Curve



Note: ① With an input voltage between 85 - 100VAC or 100 - 120VDC the output power must be derated as per the 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

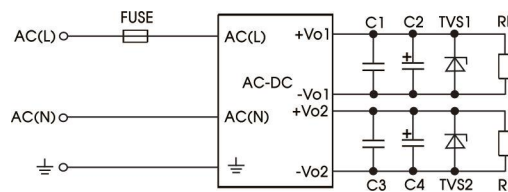


Fig. 1: Typical circuit diagram

Model	FUSE	C1/C3	C2(μF)	C4(μF)	TVS1	TVS2
LHE10-20D0512-02ER2	3.15A/250V	0.1μF/50V	100	47	SMBJ7.0A	SMBJ20A
LHE10-20D0524-02ER2	slow-blow required		100	47	SMBJ7.0A	SMBJ30A

Output Filter Components:

We recommend using electrolytic capacitors with high frequency and low ESR rating for C2 and C4 (refer to manufacture’s datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 and C3 are ceramic capacitors 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

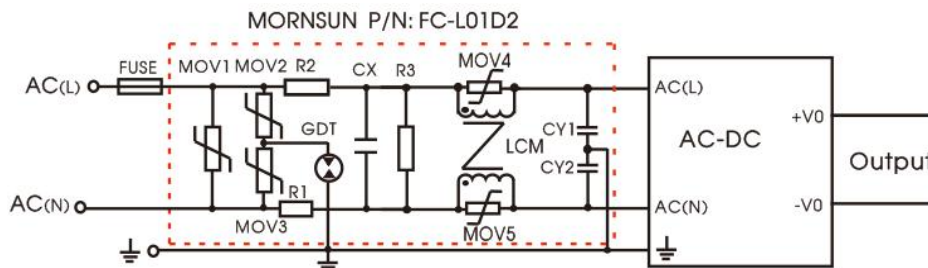
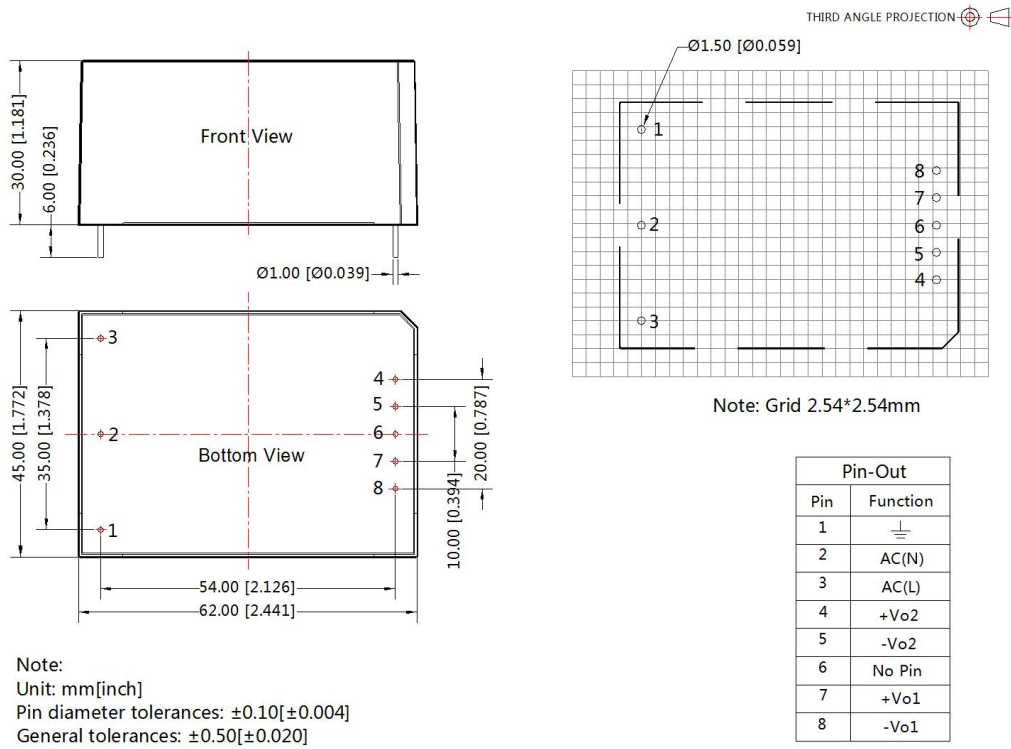


Fig 2: EMC circuit for harsh requirements

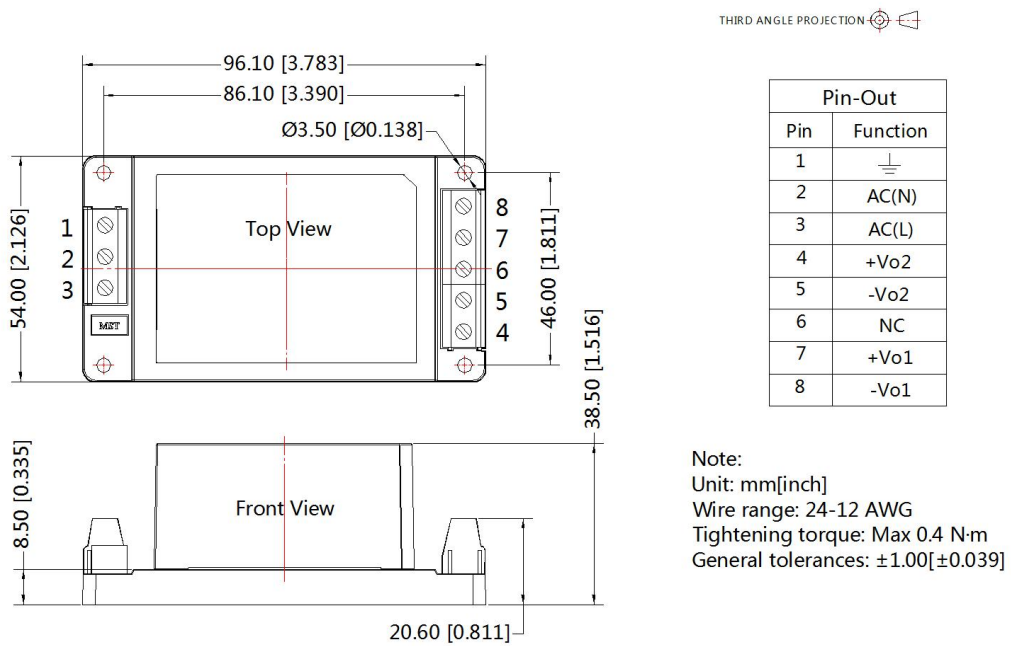
Component	Recommended value
MOV1	S20K350
MOV2/MOV3	S14K350
MOV4/MOV5	S07K350
CX	0.15μF/300VAC
R1、R2	2Ω /3W winding resistance
LCM	10mH, we recommend using part No. FL2D-Z5-153 (MORNSUN)
FC-L01D2	EMC filter
CY1、CY2	2200pF/400VAC
GDT	B5G3600
R3	1MΩ/2W
FUSE	6.3A/250V, slow-blow, required

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

Dimensions and Recommended Layout

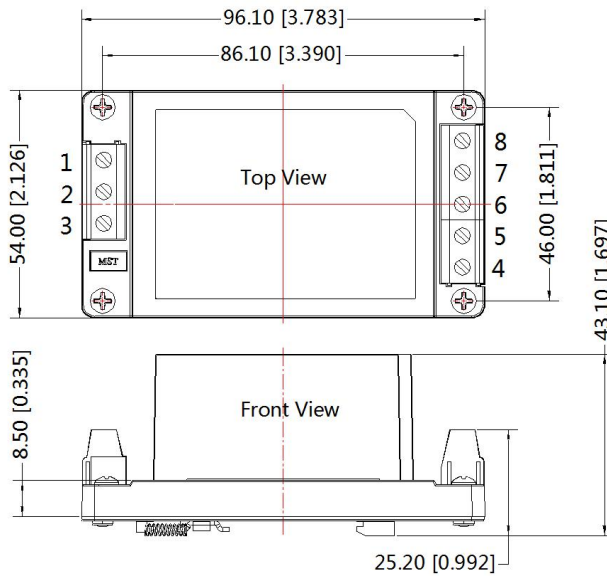


A2 Dimensions



A4 Dimensions

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Function
1	⏏
2	AC(N)
3	AC(L)
4	+Vo2
5	-Vo2
6	NC
7	+Vo1
8	-Vo1

Note:  
Unit: mm[inch]  
Mounting rail: TS35, rail needs to connect safety ground  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
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: 58220017(Horizontal package); 58220019 (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  $T_a=25^{\circ}\text{C}$ , 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;
- 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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