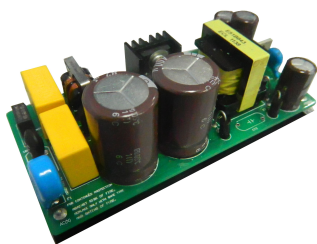


Three-phase three wire or four wire open frame  
switched-mode power supply  
High isolated, ultra wide input voltage range  
AC-DC converter for electric meters



RoHS



## FEATURES

- Ultra wide input voltage range: 65~460VAC/90~650VDC
- Any two wires connection from the three-phase three wire or four-wire system is available
- Conduction/Radiation: Class B
- Burst/Surge: Class 4
- Input over-voltage protections
- Output short circuit, over-current, over-voltage protections
- High efficiency, high reliability, low ripple & noise, low standby power consumption
- Long-life low-impedance electrolytic capacitors
- Multi-output, customized available

LO10-26D0512-04—Ultra wide input voltage range open frame switched-mode power supply for electric-meter application. This AC-DC converter is designed for electric-meter application and operates over a very wide input voltage range: 65-460VAC or 90-650VDC. It means that this converter can operate with any two wires connection from the three-phase three wire or four-wire system. When failures happen in the lines system resulting in input over-voltage, the converter will shut down to protect itself and the terminal devices from damage, improving the reliability of the system. The isolation voltage is 4000VAC between input and output, and two outputs. The product meets IEC/EN61000 "Burst (4kV)", "Surge (2kV)" and "EN55022 Class B Conduction/ Radiation". So it is a design solution for electric-meter application sourced from a three-phase AC supply with the requirement of high isolation voltage and rigorous EMC.

## Selection Guide

Part No.	Output Power	Nominal Output Voltage and Current(Vo/Io)		Efficiency (220VAC, %/Typ.)	Max. Capacitive Load (μF)	
		(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
LO10-26D0512-04	10.92W	5.1VDC/1.2A	12VDC/0.4A	78	4000	1200

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	65	--	460	VAC
	DC input	90	--	650	VDC
Input Frequency		47	--	440	Hz
Input Current	100VAC	--	--	0.4	A
Inrush Current	115VAC	--	25	--	
	220VAC	--	40	--	
Leakage current	220VAC	--	0.3	--	mA
Input Over-voltage Protection	AC input	470	--	540	VAC
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Balance load	Main circuit (Vo1)	--	±2	--	%
		Auxiliary circuit (Vo2)	--	±10	--	
Line Regulation	Full load	Main circuit (Vo1)	--	±0.5	--	
		Auxiliary circuit (Vo2)	--	±1.5	--	
Load Regulation	10%-100% load	Main circuit (Vo1)	--	±3	--	
		Auxiliary circuit (Vo2)	--	±5	--	
Ripple & Noise*	20MHz bandwidth (peak-peak value)	Main circuit (Vo1)	--	--	100	mV
		Auxiliary circuit (Vo2)	--	--	200	
Temperature Coefficient	Main circuit (Vo1)		--	±0.02	--	%/℃
	Auxiliary circuit (Vo2)		--	±0.06	--	
Stand-by Power Consumption	220VAC		--	0.55	--	W
Short Circuit Protection			Hiccup, continuous, self-recovery			

Over-current Protection		110~250% I <sub>o</sub> , self-recovery			
Over-voltage Protection		(Feedback-clamp) Voltage limited			
Min. Load		10	--	--	%
Hold-up Time	220VAC input, I <sub>o</sub> =100%	--	200	--	ms

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	Test time: 1min	4000	--	--	VAC
	Output-output		4000	--	--	
Insulation Resistance			100	--	--	M Ω
Operating Temperature			-40	--	+70	℃
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	90	%RH
Altitude			--	--	3000	m
Welding Temperature		Wave-soldering	260±5℃; time:5~10s			
		Manual-welding	360±10℃; time:3~5s			
Switching Frequency			--	65	--	KHz
Power Derating		-40℃~0℃	0.75	--	--	% /℃
		+60℃~+70℃	3.00	--	--	
Safety Class			CLASS II			
MTBF			MIL-HDBK-217F@25℃ > 300,000 h			

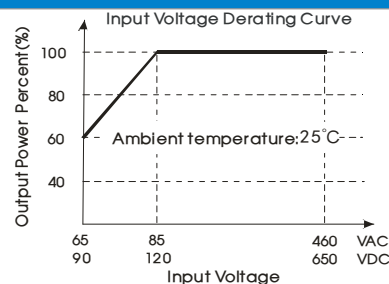
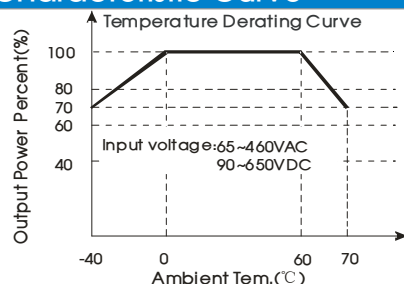
## Physical Specifications

Dimension	100.00*50.00*35.00 mm
Weight	95g (Typ.)
Cooling Method	Free convection

## EMC Specifications

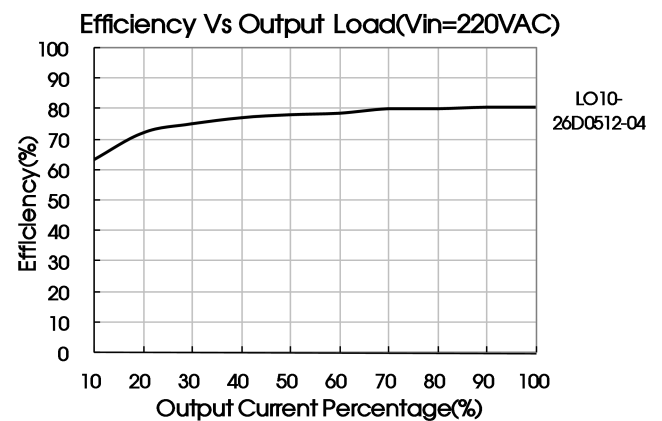
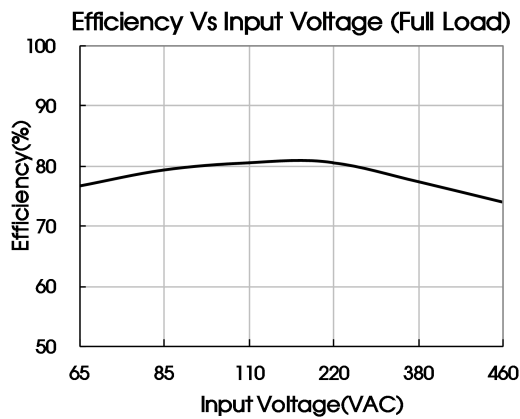
EMI	CE	CISPR22/EN55022, CLASS B		
	RE	CISPR22/EN55022, CLASS B		
EMS	ESD	IEC/EN61000-4-2	±6KV/8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±4KV	perf. Criteria B
		IEC/EN61000-4-4	±4.4KV (See Fig. 2 or Fig. 3 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B
		IEC/EN61000-4-5	±4.4KV (See Fig. 2 or Fig. 3 for recommended circuit)	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 interruptions and voltage variations immunity	IEC/EN61000-4-11	0%-70%	perf. Criteria B

## Product Characteristic Curve



Note: ① Input voltage should be derated based on temperature derating when it is 65~85VAC/90~120VDC;

② This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company's FAE.



## Design Reference

### 1. Typical application circuit

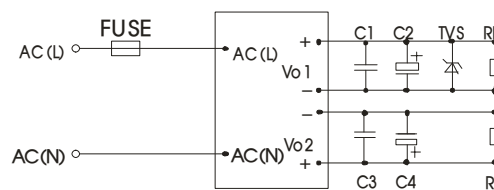


Fig. 1

Note: Output filtering capacitor C2/C4 is electrolytic capacitor, it is recommended to use high frequency and low impedance electrolytic capacitor (recommended value, C2:220 $\mu$ F/10V; C4:100 $\mu$ F/25V). Capacitor withstand voltage derating should be 80% or above. C1/C3 is ceramic capacitor, which is used to filter high-frequency noise, recommended to use 0.1 $\mu$ F/50V. It is recommended that the 5.1V main output circuit adds TVS to protect post-circuits (if converter fails); and the 12V auxiliary output circuit has had TVS inside so it needs no external TVS.

### 2. EMC solution-recommended circuit

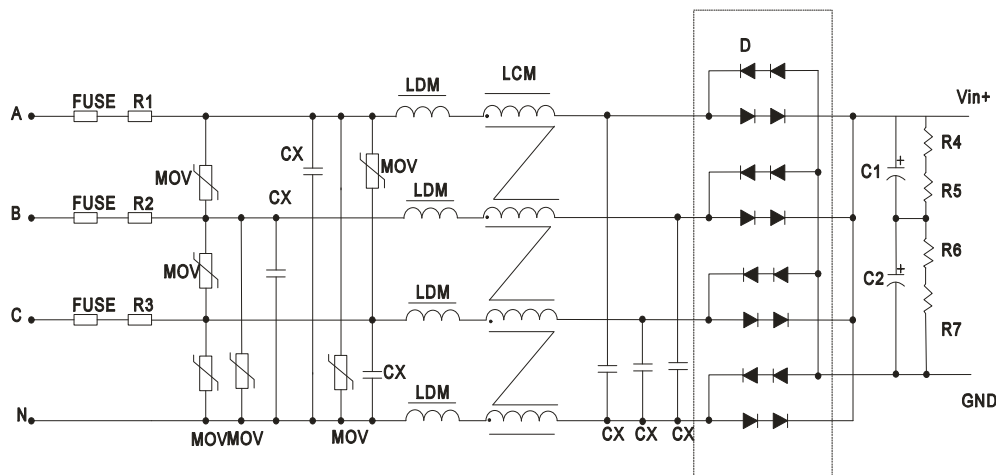


Fig. 2: Recommended circuit for applications which require 4.4KV differential-mode inrush standard (full-wave rectification)

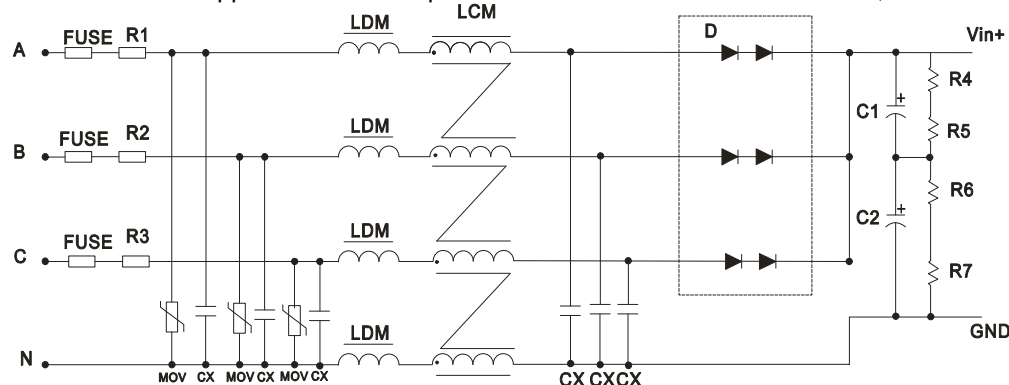
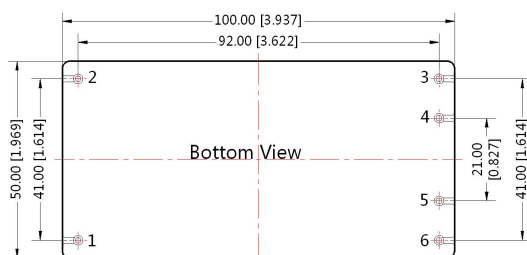
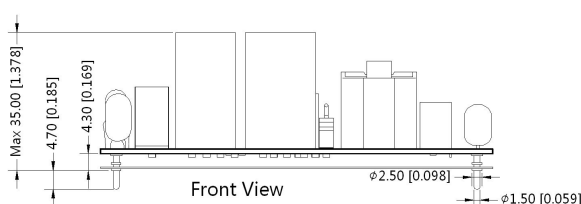


Fig. 3: Recommended circuit for applications which require 4.4KV differential-mode inrush standard (half-wave rectification)

Recommend Components	Parameter For Higher EMC Standard Circuit
MOV	S20K550
CX	0.15 $\mu$ F
LDM	56 $\mu$ H
LCM	3mH
C1/C2	47 $\mu$ F/400VDC
R4/R5/R6/R7	560k $\Omega$ /1206
D	2A/1000V
R1/R2/R3	5 $\Omega$ /5W
FUSE	3.15A/250V, slow blow, it must be connected to FUSE

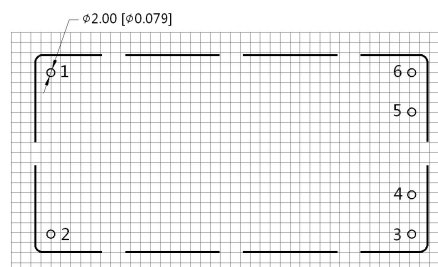
3. For more information about Mornsun EMC Filter products, please visit [www.mornsun-power.com](http://www.mornsun-power.com) to download the Selection Guide of EMC Filter

## Dimensions and Recommended Layout



Note:  
1. Unit: mm[inch]  
2. General tolerances:  $\pm 0.50[\pm 0.020]$   
3. FR-4, 1.6mm thick double sided glass fiber PCB  
4. 0.40mm black MYLAR insulating sheet material

THIRD ANGLE PROJECTION



Note : Grid 2.54\*2.54mm

Pin	Name	Function Define
1	AC(L)	AC voltage line wire(L wire) or DC voltage positive
2	AC(N)	AC voltage neutral wire(N wire) or DC voltage negative
3	+Vo2	The second output positive(+)
4	-Vo2	The second output negative(-)
5	-Vo1	The first output voltage negative(-)
6	+Vo1	The first output voltage positive (+)

### Notes:

- Packing information please refer to Product Packing Information which can be downloaded from [www.mornsun-power.com](http://www.mornsun-power.com). Packing bag number: 58220010;
- 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;
- The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
- We can provide product customization service;
- Specifications are subject to change without prior notice.

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