

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



## FEATURES

- Ultra wide input voltage range: 57 - 528VAC/80 -745VDC
- Working well with any two phases
- CE/RE: CISPR22/EN55022 CLASS B
- EFT /Surge: ±4KV Perf. Criteria B
- Output short circuit, over-current, over-voltage protection
- High efficiency, High reliability
- Low ripple & noise, Low standby power consumption
- Long-life, low ESR electrolytic capacitor

LO10-26D0512-04L—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: 57-528VAC or 80-745VDC. It means that this converter can operate with any two wires connection from the three-phase three wire or four-wire 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
LO10-26D0512-04L	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	57	--	528	VAC
	DC input	80	--	745	VDC
Input Frequency		47	--	63	Hz
Input Current	100VAC	--	--	0.4	A
Inrush Current	115VAC	--	25	--	
	220VAC	--	40	--	
Leakage current	220VAC	--	0.3	--	mA
Recommended External Input		3.15A, slow fusing, necessary			
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)	57 - 528 VAC input	Main circuit	--	--	150	mV
			Auxiliary circuit	--	--	250	
		220VAC input	Main circuit	--	60	--	
			Auxiliary circuit	--	120	--	
Temperature Coefficient	Main circuit (Vo1)	--	±0.02	--	% / °C		
	Auxiliary circuit (Vo2)	--	±0.06	--			
Stand-by Power Consumption	220VAC	--	0.30	--	W		
Short Circuit Protection		Hiccup, continuous, self-recovery					
Over-current Protection		120 - 300% Io, self-recovery					

Over-voltage Protection	Main circuit (Vo1)	≤8VDC			
	Auxiliary circuit (Vo2)	≤20VDC			
Min. Load		10	--	--	%
Hold-up Time	220VAC input, Io=100%	--	80	--	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	4000	--	--	VAC
	Output-output	4000	--	--	
Insulation Resistance	Test time: 1min	100	--	--	MΩ
Operating Temperature		-40	--	+70	°C
Storage Temperature		-40	--	+85	
Storage Humidity		--	--	90	%RH
Altitude		--	--	2000	m
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 0°C	0.50	--	--	% / °C
	+60°C to +70°C	3.00	--	--	
Safety Class		CLASS II			
MTBF	MIL-HDBK-217F@25°C	> 300,000 h			

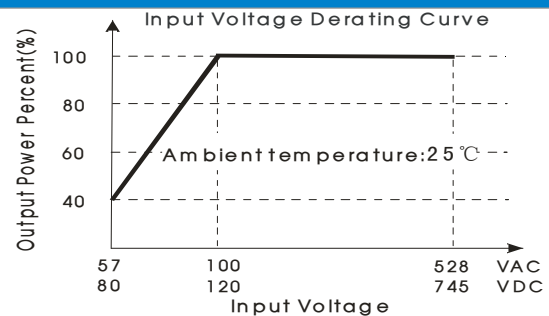
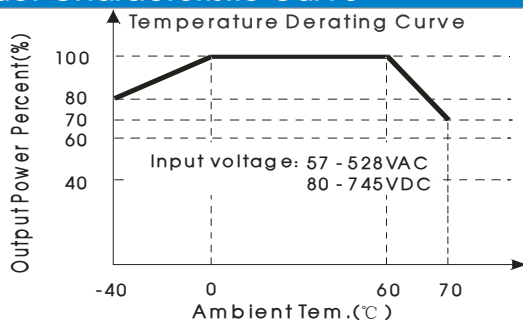
### Physical Specifications

Dimension	80.00*40.00*35.00 mm
Weight	75g (Typ.)
Cooling Method	Free air convection

### EMC Specifications

EMI	CE	CISPR22/EN55022 CLASS B	
	RE	CISPR22/EN55022 CLASS B	
EMS	ESD	IEC/EN61000-4-2 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	perf. Criteria B
		IEC/EN61000-4-5 line to line ±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
Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11 0%,70%	perf. Criteria B	

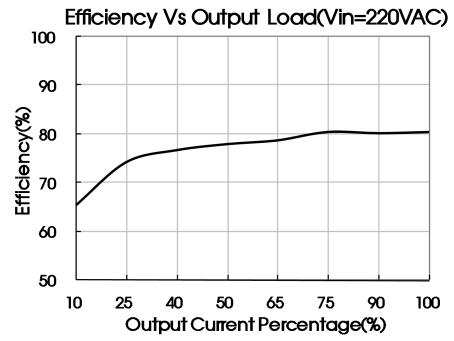
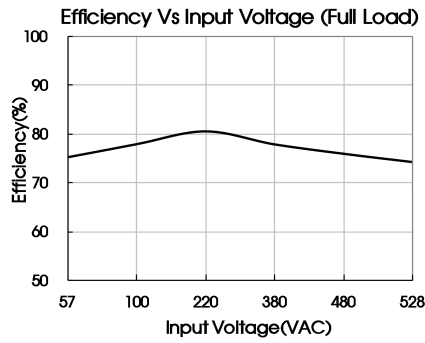
### Product Characteristic Curve



Note:

① Input voltage should be derated based on temperature derating when it is 57 - 100VAC/80 - 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

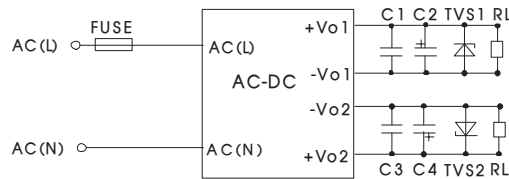


Fig. 1

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 add TVS1 (P6KE6.8A) and the 12V auxiliary output circuit add TVS2 (P6KE15A) to protect post-circuits (if converter fails).

2. EMC solution-recommended circuit

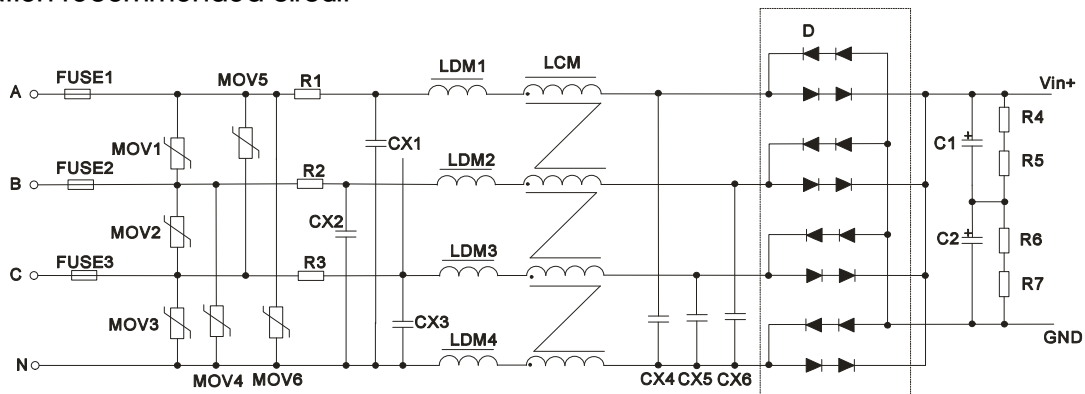


Fig. 2:Recommended circuit for applications which require 4kV differential-mode inrush standard (full-wave rectification)

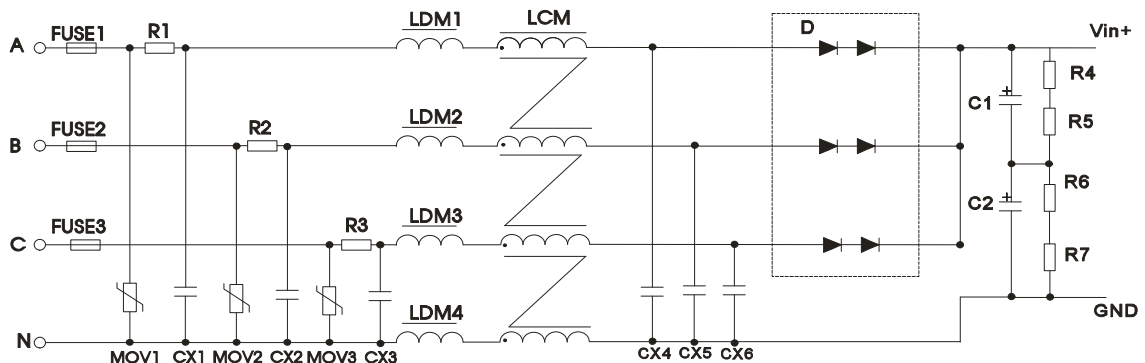
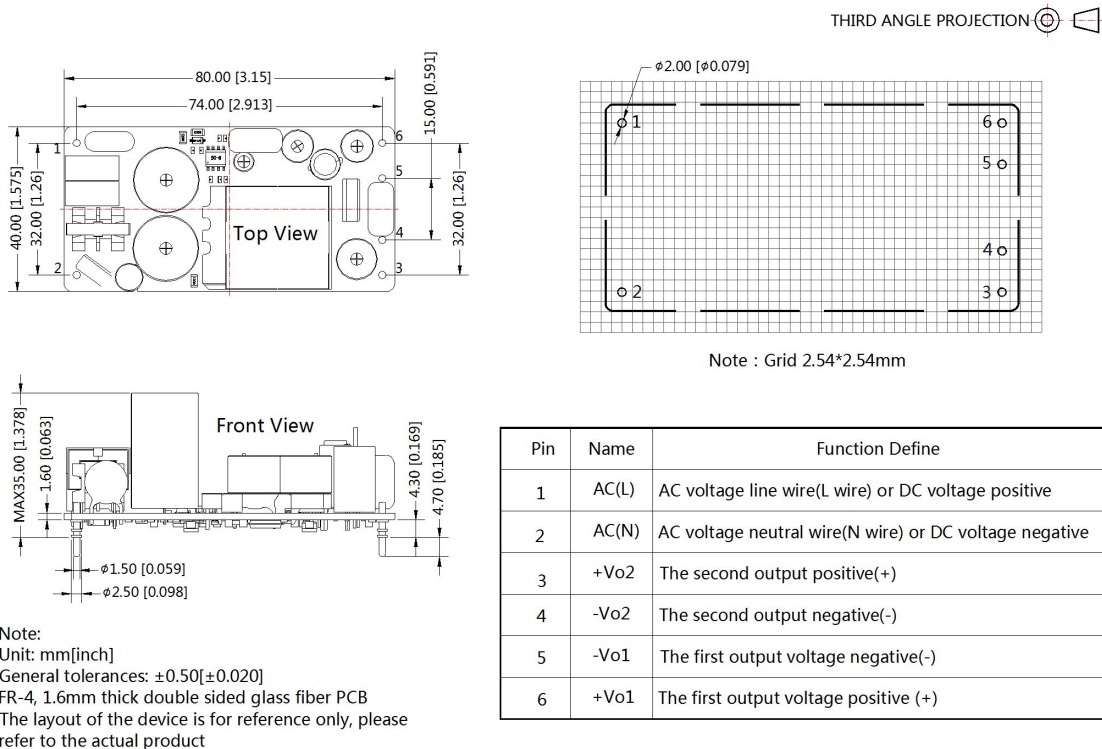


Fig. 3:Recommended circuit for applications which require 4kV differential-mode inrush standard (half-wave rectification)

Recommend Parameter For Higher EMC Standard Circuit	
Element model	Recommended value
MOV1/MOV2/MOV3/MOV4/MOV5/MOV6	S20K550
CX1/CX2/CX3/CX4/CX5/CX6	0.15μF
LDM1/LDM2/LDM3/LDM4	56μH
LCM	3mH
C1/C2	47μF/400VDC
R4/R5/R6/R7	560kΩ/1206
D	2A/1000V
R1/R2/R3	5Ω/5W
FUSE1/FUSE2/FUSE3	3.15A, slow fusing, necessary

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

## Dimensions and Recommended Layout



### Notes:

1. 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: 58220042;
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. In order to improve the conversion efficiency, when the module is working under high pressure, the module may have certain audio noise, but does not affect the reliability of the product;
5. The product picture is for reference only, please refer to the actual product;
6. All index testing methods in this datasheet are based on our Company's corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Specifications are subject to change without prior notice.

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