MORNSUN®

LO10-26D0512-04

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

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.

FEATURES

1. Ultra wide input voltage range: 65~460VAC/90~650VDC
2. Any two wires connection from the three-phase three wire or four-wire system is available
3. Conduction/Radiation: Class B
4. Burst/Surge: Class 4
5. Multi-output protection functions: over-current protection, short circuit protection, over-voltage protection
6. Input Under Voltage and over-voltage protection
7. High efficiency, high reliability, low ripple & noise, low standby power consumption
8. Long-life low-impedance electrolytic capacitors
9. Multi-output, customized available

PART NUMBER SYSTEM

LO10-26D0512-04

- Supplement Outputt Current
- Supplement Output Voltage
- main output Output Voltage
- Output Style
- Input Voltage
- Isolation Voltage
- Output Power
- Package Style
- Product Series

SELECTION GUIDE

Model	Power (W)	Output		EFFICIENCY (%) (220VAC,typ)	Standby Power (220VAC,typ)
		(Vo1/Io1)	(Vo2/Io2)		
LO10-26D0512-04	10.92	5.1VDC/1.2A	12VDC/0.4A	78	0.55W

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC Input	65	--	460	V
	DC Input	90	--	650	
Input over-voltage Protection	AC Input	470	--	540	
Input Frequency		47	--	440	Hz
Input Current		--	--	0.4	A

OUTPUT SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Balance load	Main output(Vo1)	--	±2	--	%
		Secondary output(Vo2)	--	±10	--	
Line Regulation	Full load	Main output(Vo1)	--	±0.5	--	
		Secondary output(Vo2)	--	±1.5	--	
Load Regulation	(10% to 100%)Balance load	Main output(Vo1)	--	±3	--	
		Secondary output(Vo2)	--	±5	--	

Ripple& Noise(p-p)	20MHz bandwidth	Main output(Vo1)	--	--	100	mV
		Secondary output(Vo2)	--	--	200	
Min Load			10	--	--	%
Capacitor load max	Main output(Vo1)		--	4000	--	μF
	Secondary output(Vo2)		--	1200	--	
Hold-up Time			--	200	--	ms
Short Circuit Protection			Continuous, and auto recovery			
Over Current Protection			110~250% Io and auto recovery			
Over Voltage Protection			Feedback-clamp			

COMMON SPECIFICATIONS

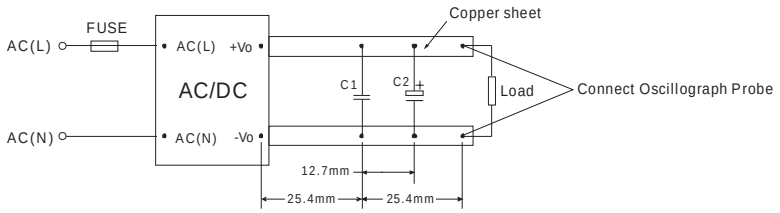
Item	Test Conditions		Min.	Typ.	Max.	Unit
Operating Temperature			-40	--	+70	℃
Storage Temperature			-40	--	+85	
Power derating	-40℃~0℃		0.75	--	--	% / ℃
	+60℃~+70℃		3.00	--	--	
Isolation Resistance			100	--	--	MΩ
Isolation Voltage	input-output1 and output 2	Tested for 1 minute	4000	--	--	VAC
	output 1- output 2		4000	--	--	
Storage Humidity			20	--	90	%RH
Temperature coefficient	Main output（Vo1）		--	±0.02	--	%/℃
	Secondary output（Vo2）		--	±0.06	--	
Altitude			--	--	9000	m
Switching Frequency			--	65	--	kHz
Safety approvals			--			
Safety Class			CLASS Ⅱ			
Safety standards			--			
Hot swap			Forbid			
Vibration			10~55Hz,19.6m/s^2(2G),3min; X,Y,Z 1 time			
Shock			196.1m/s^2(2G),11ms; X,Y,Z axis 1 time			
Weight			95g			
Outline size			100mm（L）×50mm（W）×35mm（H）			
Install			PCB			
Cooling			Free air convection			
MTBF			＞300，000 h @ 25℃			

Note:1. Ripple and Noise are measured by the method of parallel lines;
2. Unless otherwise specified, all specifications above are measured at rated input voltage and rated output load, Ta=25℃, humidity < 75%.
3.The output voltage will drop when over current protection start up, coming into hiccup protection state, and it can auto resume normal operating when the malfunction is eliminated.

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022, CLASS B(without external circuit)	
	RE	CISPR22/EN55022, CLASS B(without external circuit)	
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(without external circuit)	perf. Criteria B
		IEC/EN61000-4-4 ±4.4KV (External Circuit Refer to Figure 2,3)	
	Surge	IEC/EN61000-4-5 ±2KV(without external circuit)	perf. Criteria B
		IEC/EN61000-4-5 ±4.4KV (External Circuit Refer to Figure 2,3)	
	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 and interruptions immunity	IEC/EN61000-4-11 0%-70%	perf. Criteria B

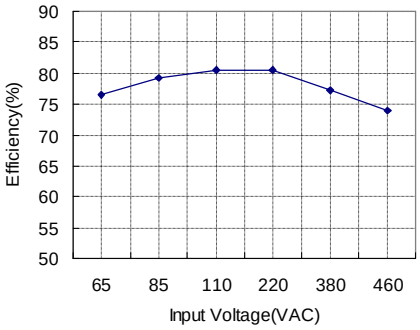
PARALLEL LINES MEASURE



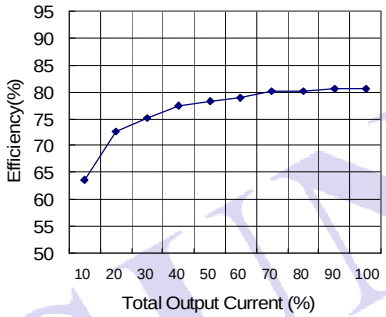
Note: C1: 1μF (Ceramic capacitor) C2: 10μF (Electrolytic capacitor)

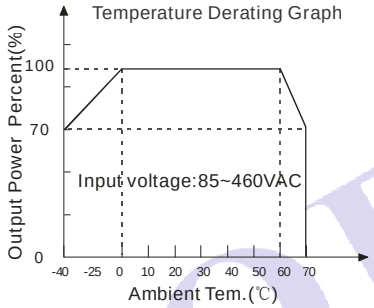
PRODUCT TYPICAL CURVE

Efficiency VS Input Voltage curve
(Full Load)

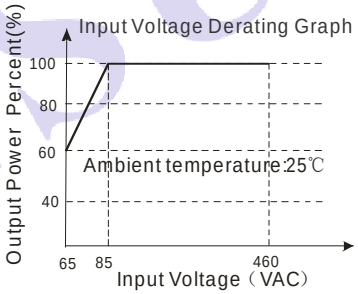


Efficiency VS Output Load curve
(Vin=220VAC)





Note: When input 65~85VAC, it need to be voltage derated on basis of temperature derating.



Note: When input DC, VDC=1.414*VAC-20.

TYPICAL APPLICATIONS

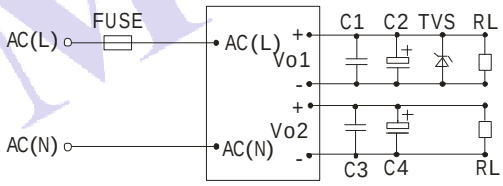


Figure1: Typical application circuit for LO10-26D0512-04

Note:

Output filtering capacitors C2,C4 is electrolytic capacitors, It is recommended to use high frequency and low impedance electrolytic capacitors. Recommended value (C2:220μF/10V; C4:100μF/25V); C1,C3 are ceramic capacitors and they used to filter high frequency noise, Recommend value:0.1μF/50V, It is recommended that the 5.1V main output circuit adds TVS to protect post-circuits (if converter fails);and the 12V supplement output circuit has had TVS inside so it needs no external TVS.

EMC RECOMMENDED CIRCUIT

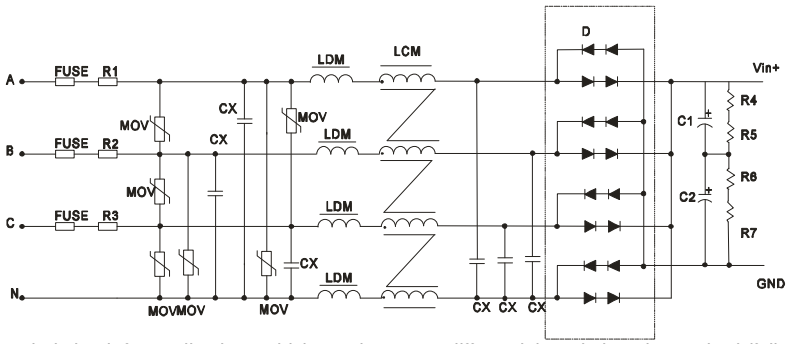


Figure 2:Recommended circuit for applications which require 4.4KV differential-mode inrush standard (full-wave rectification)

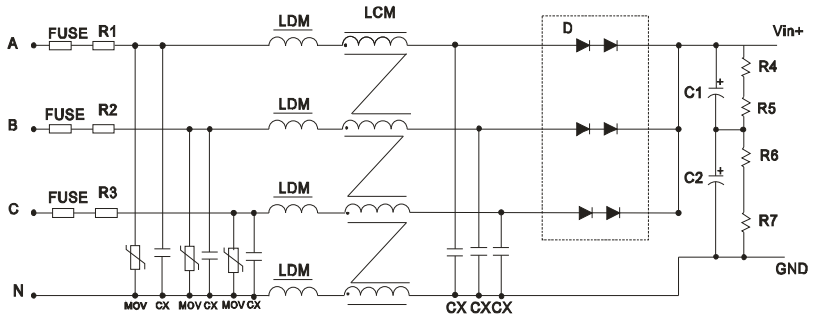
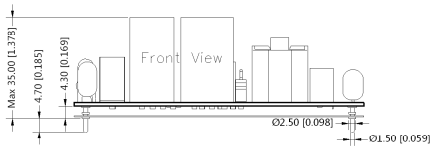


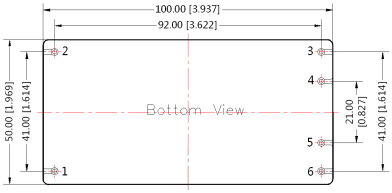
Figure 3:Recommended circuit for applications which require 4.4KV differential-mode inrush standard (half-wave rectification)
If higher EMC requirement ,please refer to figure 2.3, recommended parameters are shown in the table below.

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

DIMENSIONS, RECOMMENDED FOOTPRINT&PACKAGING

MECHANICAL DIMENSIONS



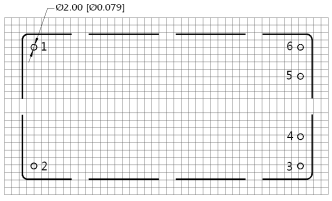


Pin	Name	Function Define
1	AC(L)	AC voltage line wire(L wire) or DC voltage positive
2	AC(N)	AC voltage neutral wire(N wire) or DC voltage negative
3	+Vo2	The second output positive(+)
4	-Vo2	The second output negative(-)
5	-Vo1	The first output voltage negative(-)
6	+Vo1	The first output voltage positive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

Note:
1. Unit: mm;
2. Except especial explanation, the other tolerances are ±0.50mm;
3. FR-4,1.6mm thick double sided glass fiber PCB;
4. 0.40mm black MYLAR insulating sheet material.

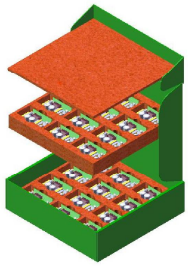
THIRD ANGLE PROJECTION

RECOMMENDED FOOTPRINT DETAILS



Note : Grid 2.54*2.54mm

PACKAGE DIAGRAM



Note:
Inner carton:L*W*H=365*350*105mm Package quantity:24 pcs
Outer carton:L*W*H=390*360*245mm Package quantity:48 pcs

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