

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: 65-460VAC/90-650VDC
- Any two wires connection from the three-phase three wire or four-wire system is available
- CE/RE: Class B
- EFT/Surge: Class 4
- Input over-voltage Protection
- Output short circuit, over-current, over-voltage protections
- High efficiency, high reliability, low ripple & noise, low standby power consumption
- Long-life, low ESR electrolytic capacitor

LO18-26C0513-03—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, 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 strict electromagnetic compatibility. 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(Vo/Io)			Efficiency (230VAC, %/Typ.)	Max. Capacitive Load (μF)		
		(Vo1/Io1)	(Vo2/Io2)	(Vo3/Io3)		Vo1	Vo2	Vo3
LO18-26C0513-03	14.52W	5.6V/1.2A	13V/0.3A	13V/0.3A	80	5000	1000	1000

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	230VAC input, Io=100%	--	0.15	0.25	A
Inrush Current	115VAC	--	25	--	
	230VAC	--	40	--	
Input Over-voltage Protection	AC input	495	530	565	VAC
Leakage current	Vin=220VAC/50HZ	--	0.3	--	mA
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Balance load	Primary output (Vo1)	--	±2	--
		Secondary output (Vo2/ Vo3)	--	±10	--
Line Regulation	Full load	Primary output (Vo1)	--	±0.5	--
		Secondary output (Vo2/ Vo3)	--	±1.5	--
Load Regulation	10%-100% load	Primary output (Vo1)	--	±2	--
		Secondary output (Vo2/ Vo3)	--	±5	--
Ripple & Noise*	20MHz bandwidth (peak-peak value)	Primary output (Vo1)	--	--	100
		Secondary output (Vo2/ Vo3)	--	--	200
Temperature Coefficient	Primary output (Vo1)	--	±0.02	--	% / °C
	Secondary output (Vo2/ Vo3)	--	±0.06	--	

Stand-by Power Consumption	220VAC input, Io=0%	--	0.55	--	W
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		110%-300% Io,Hiccup , self-recovery			
Over-voltage Protection		(Feedback-clamp) Voltage limited			
Minimum Load		10	--	--	%
Starting Time		--	650	1000	ms
Hold-up Time	220VAC input, Io=100%	90	100	--	
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	Electric Strength Test for 1min., (leakage current <5mA)	4000	--	--	VAC
	Output 1-output 2		4000	--	--	
	Output 1-output 3		4000	--	--	
	Output 2-output 3		4000	--	--	
Operating Temperature			-25	--	+70	℃
Storage Temperature			-25	--	+85	
Storage Humidity		Non-condensing	--	--	90	%RH
Altitude	Operating altitude		--	--	3000	m
	Storage altitude		--	--	3000	
Welding Temperature	Wave-soldering		260 ± 5℃; time: 5 - 10s			
	Manual-welding		360 ± 10℃; time: 3 - 5s			
Switching Frequency			--	63	--	KHz
Power Derating	-10℃ to 0℃		3	--	--	% /℃
	-25℃ to -10℃		1.33	--	--	
	+60℃ to +70℃		3	--	--	
Safety Standard			Design refer to IEC60950-1			
Safety Class			CLASS II			
MTBF		MIL-HDBK-217F@25℃	> 300,000 h			

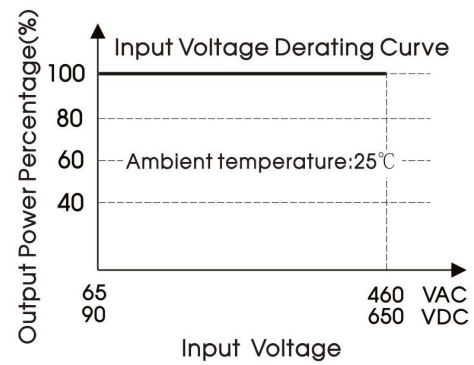
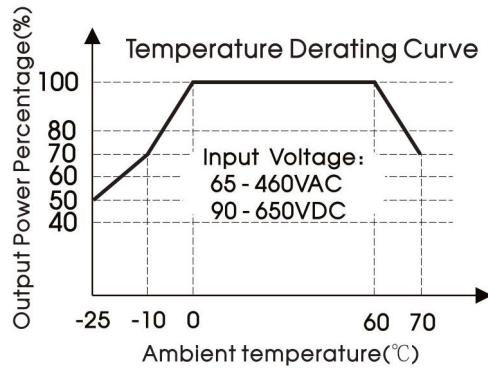
Physical Specifications

Dimension	100.00 x 50.00 x 34.00 mm
Weight	90g (Typ.)
Cooling Method	Free convection

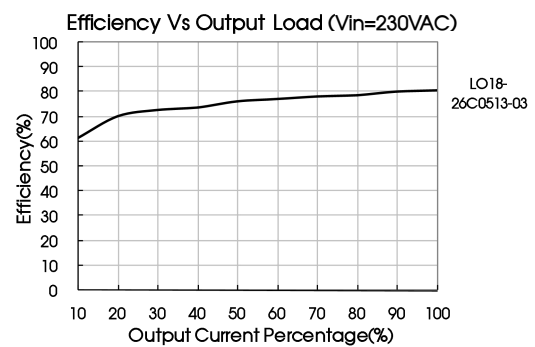
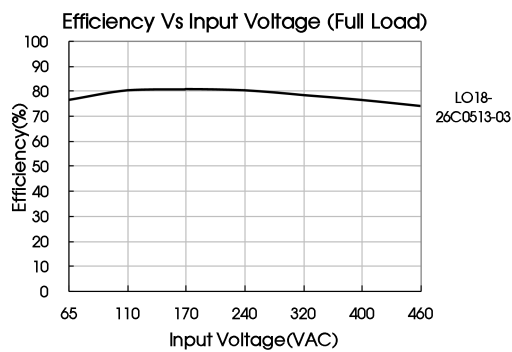
EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
EMS	ESD	IEC/EN 61000-4-2	Contact ±6KV / Air ±8KV	Perf. Criteria B
	RS	IEC/EN 61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN 61000-4-4	±4KV	Perf. Criteria B
	Surge	IEC/EN 61000-4-5	Line to line ±2KV	Perf. Criteria B
	CS	IEC/EN 61000-4-6	10Vr.m.s	Perf. Criteria A
	Voltage Variations*	IEC/EN 61000-4-11	0% Un, 0.5 cycle; 0° / 45° / 90° / 135° / 180° / 225° / 270° / 315° 0% Un, 1 cycle; 70% Un, 25/30 cycle (50/60Hz); Monophase: 0	Perf. Criteria B
	Short interruptions*	IEC61000-4-11	0% Un, 250/300 cycle (50/60Hz)	Perf. Criteria C
Note: * Un Maximum input nominal voltage.				

Product Characteristic Curve



Note: 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

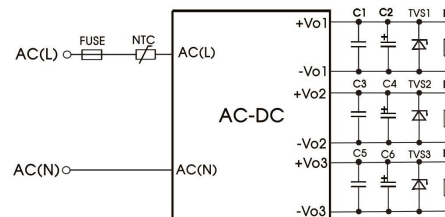


Fig. 1

Model	C1/C3/C5	C2	C4	C6	TVS1	TVS2	TVS3	NTC	FUSE
LO18-26C0513-03	1μF/50V	220μF/10V	120μF/25V	120μF/25V	SMBJ7.0A	SMBJ20A	SMBJ20A	5D-9	3.15A/500VAC, slow fusing, necessary

Note: Output filtering capacitor C2/C4/C6 is electrolytic capacitor, it is recommended to use high frequency and low impedance electrolytic capacitor. Capacitor voltage reduced to at least 80%. C1/C3/C5 is ceramic capacitor, which is used to filter high-frequency noise. TVS is a recommended component to protect post-circuits if converter fails.

2. EMC solution-recommended circuit

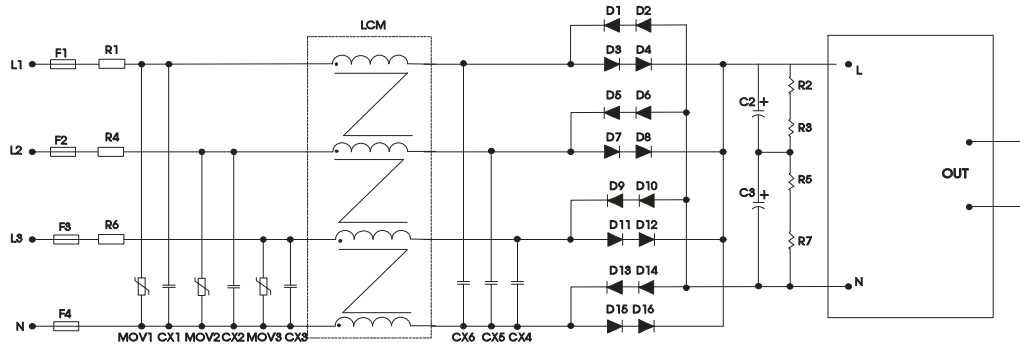


Fig. 2: Three-phase-four-wire full-wave rectification application

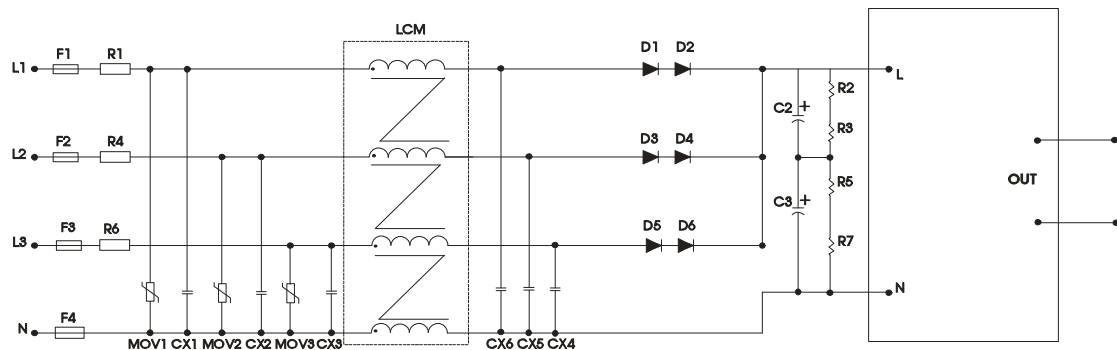


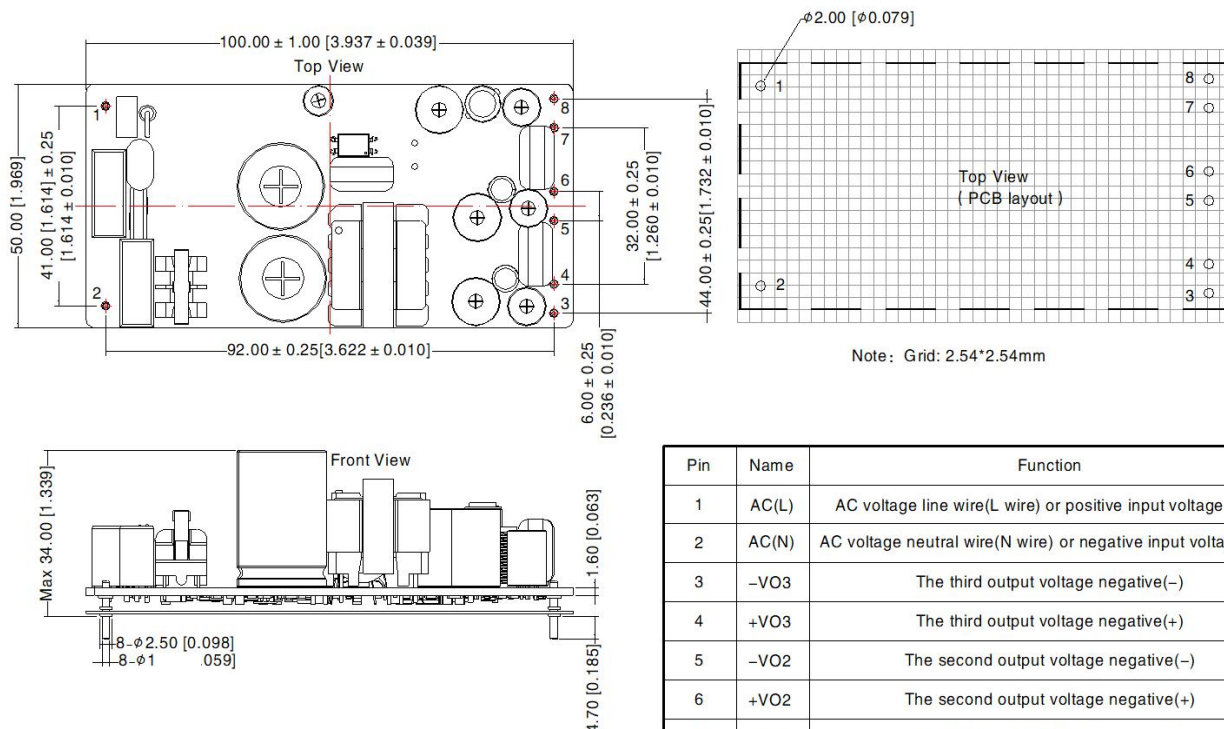
Fig. 3: Three-phase-four-wire half-wave rectification application

Recommend Components	Parameter For Higher EMC Standard Circuit
CX1/CX2/CX3	0.1μF/480VAC
MOV1/MOV2/MOV3	S20K550
F1/F2/ F3/ F4	3.15A/500VAC
R1/R4/R6	5-10Ω/5W
D1-D16	1.5A/1000V
C2/C3	47μF/400V
R2/R3/R5/R7	560KΩ/0.25W
LCM	>3mH

3. For more information about Mornsun EMC Filter products, please visit www.mornsun-power.com to download the Selection Guide of EMC Filter

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid: 2.54*2.54mm

Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10 [± 0.004]
General tolerances: ± 0.50 [± 0.020]
The layout of the device is for reference only, please refer to the actual product

Pin	Name	Function
1	AC(L)	AC voltage line wire(L wire) or positive input voltage (DC)
2	AC(N)	AC voltage neutral wire(N wire) or negative input voltage(DC)
3	-VO3	The third output voltage negative(-)
4	+VO3	The third output voltage negative(+)
5	-VO2	The second output voltage negative(-)
6	+VO2	The second output voltage negative(+)
7	-VO1	The first output voltage negative(-)
8	+VO1	The first output voltage negative(+)

Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220192;
- 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;
- The maximum capacitive load offered were tested at input voltage range and full load;
- 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 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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