

State Grid TTU dedicated power supply  
High isolated, ultra wide input voltage range  
AC-DC converter for electric meters



RoHS



## FEATURES

- Designed for intelligent distribution and transformer terminals, the main technical indicators meet the national network standards
- Ultra wide input voltage range: 165-480VAC / 230-680VDC
- High I/O isolation test voltage of up to 4000VAC
- EFT, Surge:  $\pm 4\text{KV}$  Perf. Criteria B
- Output short circuit, over-current protections
- Any two phase connection is available
- Low output ripple & noise, low standby power consumption
- Satisfies double 380/220 VAC three-phase four-wire over-voltage, duration 1s

LO20-26D1212-05—State Grid TTU dedicated switching power supply. The AC-DC converter is a three-phase four-wire power dedicated switching power supply designed for intelligent distribution terminal, intelligent power distribution detection terminal, etc. According to the latest national grid company enterprise standard and operates over a very wide input voltage range: 165-480VAC or 230-680VDC. It meets the three-phase three wire or four-wire rated voltage. 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, 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( $V_o/I_o$ )		Efficiency at 230VAC (%) Typ.	Capacitive Load ( $\mu\text{F}$ ) Max.	
		( $V_o1/I_o1$ )	( $V_o2/I_o2$ )		$V_o1$	$V_o2$
LO20-26D1212-05	24.2W	12.15VDC/1500mA	12VDC/500mA	80	6000	2200

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	165	--	480	VAC
	DC input	230	--	680	VDC
Input Frequency		47	--	63	Hz
Input Current	165VAC	--	--	0.7	A
	230VAC	--	--	0.4	
Inrush Current	230VAC	--	30	--	
Input Apparent Power	Output power $P_o=12\text{W}$	--	--	20	VA
Power Factor	220VAC input, full load	PF $\geq$ 0.8			
Input Over-voltage Protection	Double 220VAC phase voltage input, testing time 1s, interval 10s	Normal Output			
Leakage Current	240VAC/50Hz	0.25mA RMS Max.			
Recommended External Input Fuse	Three-phase four-wire input	3.15A/250V slow-blow required			
	Any phase input	3.15A/500V slow-blow required			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	$V_o1$	--	$\pm 1$	$\pm 1.5$	
	$V_o2$	--	$\pm 5$	--	
Line Regulation	Full load	$V_o1$	--	$\pm 0.5$	%
		$V_o2$	--	$\pm 1.5$	
Load Regulation	10%-100% load	$V_o1$	--	$\pm 3$	
		$V_o2$	--	$\pm 5$	

Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Vo1	--	--	100	mV
		Vo2	--	--	200	
Temperature Coefficient			--	±0.02	--	%/°C
Stand-by Power Consumption			--	--	0.5	W
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection			110-350%Io, self-recovery			
Minimum Load			10	--	--	%
Hold-up Time	230VAC		--	10	--	ms

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	Input-output	4000	--	--	VAC
	Output-output	2500	--	--	
Operating Temperature		-40	--	+70	°C
Storage Temperature		-40	--	+85	
Storage Humidity		--	--	90	%RH
Soldering 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 -25°C	3.0	--	--	% / °C
	+50°C to +70°C	2.0	--	--	
	420VAC - 480VAC	0.5	--	--	%/VAC
Safety Class		CLASS II			
MTBF		MIL-HDBK-217F@25°C > 300,000 h			

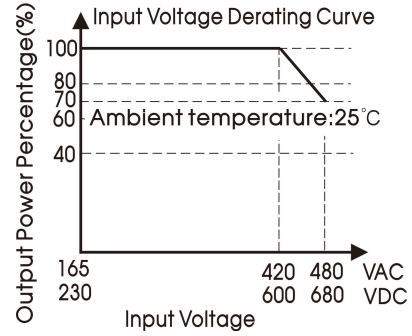
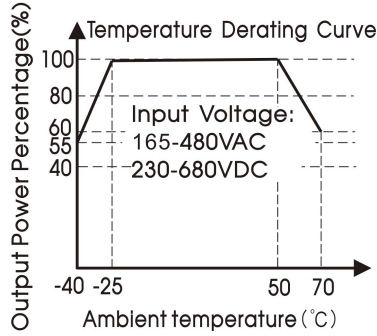
## Mechanical Specifications

Dimension	76.20 x 50.80 x 30.00 mm
Weight	75g (Typ.)
Cooling Method	Free air convection

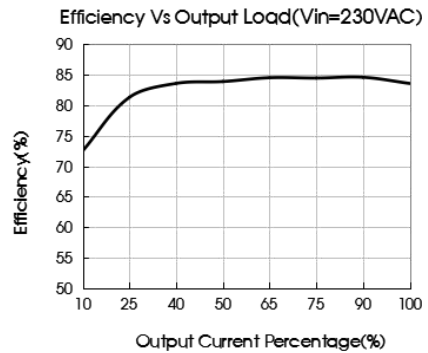
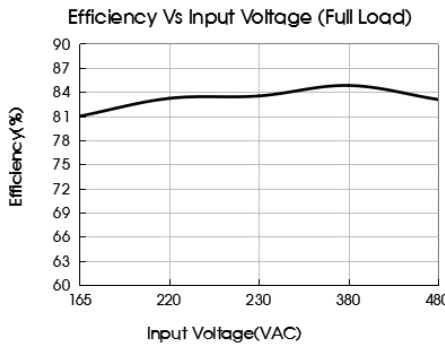
## Electromagnetic Compatibility (EMC)

Immunity	ESD	IEC/EN61000-4-2	Contact ±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 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	Voltage dips, short interruption and voltage variations	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

Product Characteristic Curve



Note: ① With an AC input between 420-480VAC and a DC input between 600-680VDC, the output power must be derated as per 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

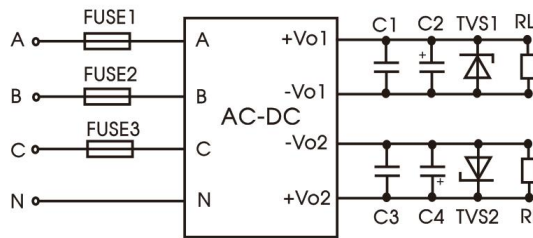


Fig. 1: Typical circuit diagram

Part No.	FUSE1/FUSE2/FUSE3	C1/C3	C2	C4	TVS1	TVS2
LO20-26D1212-05	3.15A/250V (Three-phase four-wire input), slow-blow, required	1μF/50V	100μF/50V	47μF/50V	SMBJ20A	SMBJ20A
	3.15A/500V (Any phase input), slow-blow, required					

Output Filter Components:

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

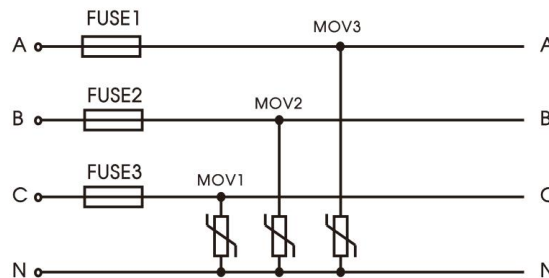
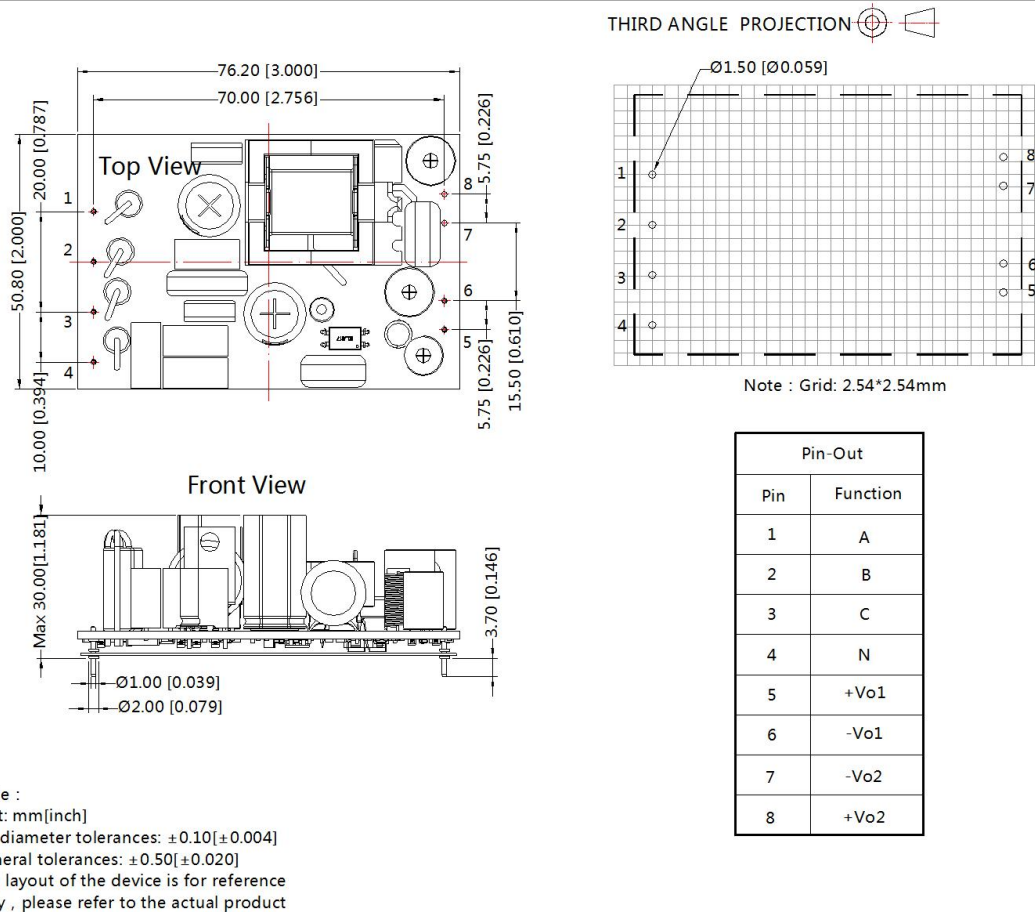


Fig 2: EMC circuit for harsh requirements

Component	Recommended value
MOV1/MOV2/MOV3	S20K510
FUSE1/FUSE2/FUSE3	3.15A/250V (Three-phase four-wire input ), slow-blow, required
	3.15A/500V (Any phase input ), slow-blow, required

3. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

## Dimensions and Recommended Layout



Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220060;
- 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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