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

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;
- Multi-output protection functions: over-current protection, short circuit protection, over-voltage protection;
- Input under voltage lockout and over-voltage protection;
- High efficiency, high reliability, low ripple & noise, low standby power consumption;
- Long-life low-impedance electrolytic capacitors;
- Multi-output, customized available.

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 product has two output voltages: 5V and 12V. The isolation voltage is 4000VAC between input and output, and two outputs. The product meets IEC/EN6100 "Burst (4kV)", "Surge (2kV/4kV)" 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.

INPUT SPECIFICATIONS	
Operating voltage(V)	65~460Vac or 90~650Vdc
Voltage frequency(Hz)	47~440
Input current(A)	0.1 Typ@Vin=220V_{AC},Io=100%
Leakage current(mA)	0.3 Typ@Vin=220V_{AC}
Efficiency (%)	78 Typ@Vin=220V_{AC}, Io=100%
Standby power consumption(W)	0.55W Typ@Vin=220V_{AC},Io=0

OUTPUT SPECIFICATIONS		
Output voltage(V)	OUT1:5.1	OUT2:12
Output current(A)*3	1.2 (Peak 1.8)	0.4 (Peak 0.8)
Input variation	±0.5%	±1.5%
Load variation	±3%	±5%
Ripple voltage(mVp-p)*1 (0~+60℃)	50 Max	120Max
Ripple & noise voltage(mVp-p)*1 (0~+60℃)	100Max	150Max
Temperature drift(%/℃)	±0.02Max	±0.06Max
Capacitor load max(μF)	4000	1200
Output voltage range(V) (balance load)	5.05-5.25	10.8~13.2

OUTPUT SPECIFICATIONS

Start-up time(ms)		180(Typ)	
Hold-on time(ms)		100 (Typ)	
Protection	Input over-voltage shutdown voltage(V)	750±50Vdc	
	Output over-current protection*4	110~250%Peak@Io2=100%,auto-recovery	110~250%Peak@Io1=100%,auto-recovery
	Output short circuit protection	Continual, auto-recovery	
	Output over voltage protection	Feedback-clamp	
Isolation	Input-Output 1or Output 2	4000VAC 1 minute. Isolation resistance>50MΩ@500VDC	
	Output 1-Output 2	4000VAC 1 minute. Isolation resistance>50MΩ@500VDC	
Conduction/ Radiation		EN55022,level B	
EMC Compliance	Surge(impact)	IEC/EN61000-4-5 level 4 2kV	
	Electrical fast transients/bursts on mains line	IEC/EN61000-4-4 level 4 4kV	
Environment	Operating temperature, humidity & altitude	-25~+70℃(refer. Figure 3),20-90%RH(no dewing),3000m(1000inch)Max	
	Storage temperature, humidity & altitude	-25~+85℃, 20-90%RH(no dewing),9000m(3000inch)Max	
	Vibrancy	10~55Hz,19.6m/s^2(2G),3 minutes/cycle, along X,Y,Z axis apiece 60minutes	
	Impact	196.1m/s^2(2G),11ms,Along X,Y,Z axis apiece once	
The others	Work frequency	63kHz Typ	
	Cooling	Free air convection	
	Weight	95g	
	Outline size	100mm(length)×50mm(width)×30mm(height)	

Note: 1. Unless otherwise specified, all specifications above are measured at rated input voltage and rated output load, Ta=25°C, humidity<75%;
2. Ripple and noise were measured by the method of parallel lines, See detailed operation instructions at Testing of Power Converter section, application notes.
3. The both output voltages 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.
4. The test condition of OUT2 output voltage initialization: Io1=10~100%,Io2=10~100%,including OUT1cross modulation and itself load variation bring tolerance.

CHARACTERISTIC CURVE

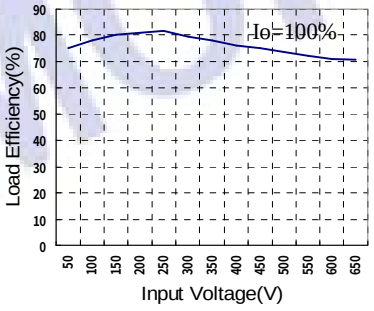


Figure 1:Efficiency V.S. Input Voltage

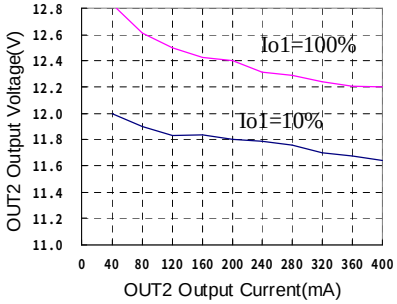


Figure 2:OUT2 Output voltage V.S. OUT2 Output Current

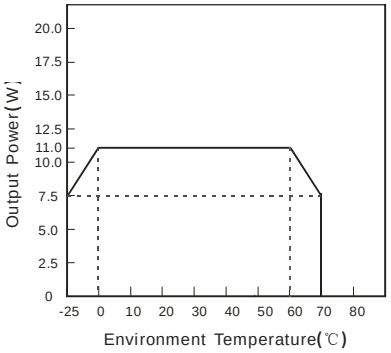


Figure 3: Output Power V.S. Environment Temperature

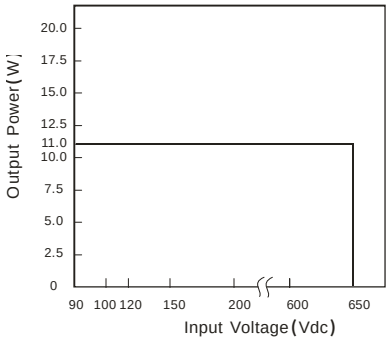
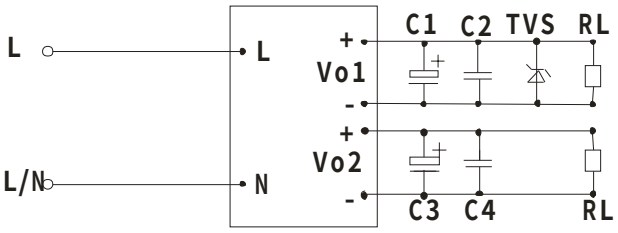


Figure 4: Output Power V.S. Input Voltage

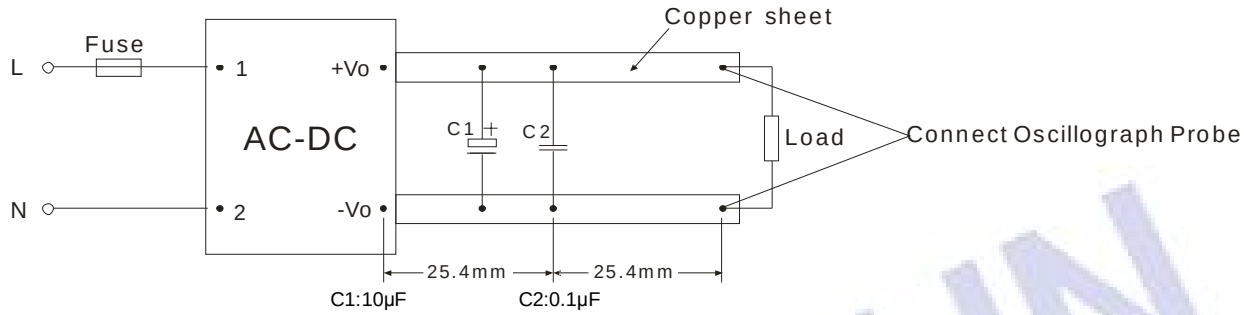
TYPICAL APPLICATIONS



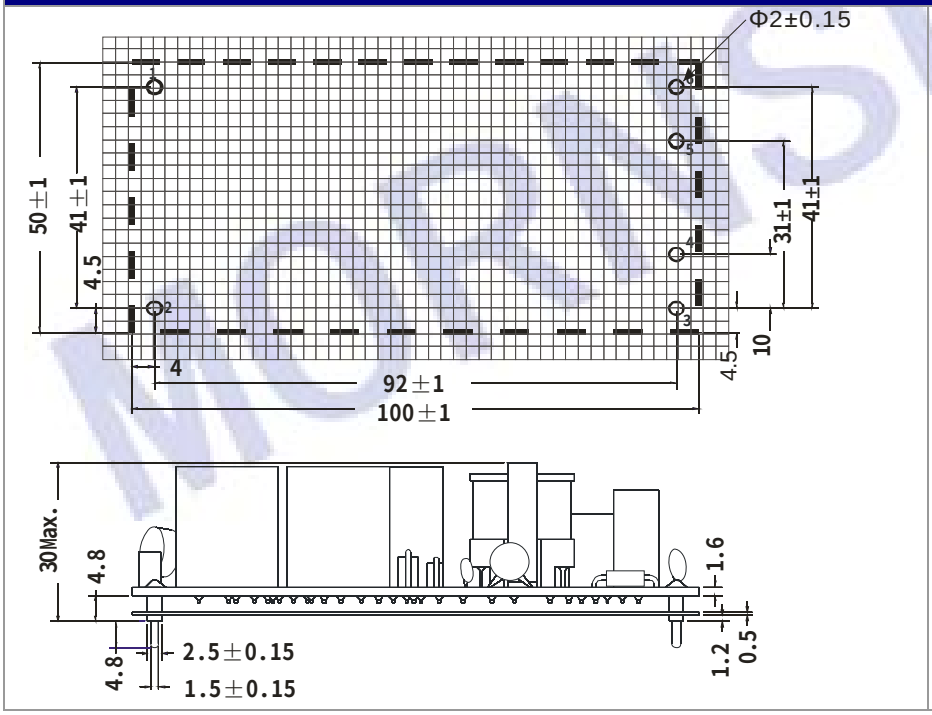
Remark:

Output filtering capacitors C1,C3 is electrolytic capacitors, It is recommended to use high frequency and low impedance electrolytic capacitors. Recommended value (C1:220μF/10V; C3: 100μF/25V); C2, C4 are ceramic capacitors and they used to filter high frequency noise, Recommend value:0.1μF/50V , It is recommended that the 5V main output circuit adds TVS to protect post-circuits (if converter fails),;and the 12V main output circuit has had TVS inside so it needs no external TVS.

PARALLEL LINES MEASURE



OUTLINE AND DIMENSIONS



NOTES:

1. Unit: mm;
2. Except especial explanation, the other tolerances are ±0.30mm;
3. FR-4,1.6mm thick double sided glass fiber PCB;
4. 0.55mm black MYLAR insulating sheet material.

Pin	Name	Function Define
1	ACL	AC voltage line wire(L wire) or DC voltage positive
2	ACN	AC voltage neutral wire(N wire) or DC voltage negative
3	OUT2+	The second output positive(+)
4	OUT2-	The second output negative(-)
5	OUT1-	The first output voltage negative(-)
6	OUT1+	The first output voltage positive (+)