Features

- Ultra-wide 85~305V AC or 70~430V DC input voltage range
- Operating Temperature Range: -40°C~+85°C
- Approved to UKCA, CE, RoHS
- Safety Standards to IEC/EN/UL 62368-1, IEC/EN 60335-1 & IEC/EN 1558-1
- Efficiency up to 78%
- EMC Class A & B
- Single output 12~48V DC

Ideal Power's 36LS05-13Dxx 5W Open Frame PCB Mount AC/DC Power Supply Converter Series are certified to UKCA, CE, RoHS & EN 62368-1/IEC 62368-1/UL 62368-1/EN 60335-1/IEC 60335-1/EN 61558-2-16/IEC 61558-2-16 Standards and comply with the relevant Efficiency Regulations. These are primarily used in ITE, Audio & Video Industries and customised solutions are available upon request.

Models

Model Number	Output Power	Nominal Output Voltage and Current		Efficiency at 230V AC	Capacitive Load (µF) Max	
		(Vo1/Io1)	(Vo2/Io2)	(%) Typ	(Vol1/Io1)	(Vol2/Io2)
36LS05-13D0512-03	5W	5V/200mA	12V/330mA	78	680	470
36LS05-13D0524-01	5W	5V/200mA	24V/167mA	78	680	120

Input Specifications

	Conditions	Min	Typ	Max	Unit
Input voltage range	AC input	85	--	305	VAC
	DC input	70	--	430	VDC
Input frequency		47	--	63	Hz
Input current	115V AC	--	--	0.2	A
	230V AC	--	--	0.1	
Inrush current	115V AC	--	20	--	
	230V AC	--	40	--	
Recommended External Input Fuse	1A, Slow blow, required (The actual use needs to be selected according to the application environment)				
Hot Plug	Unavailable				

Output Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Output voltage accuracy	Vo1		--	±2	--	%
	Vo2		--	±5	--	
Line regulation	Full load	Vo1	--	±0.5	--	
		Vo2	--	±1.5	--	
Load regulation	10% - 100% load (Balanced load)	Vo1	--	±1	--	
		Vo2	--	±5	--	
Cross regulation	10% - 100% load		--	--	20	
Ripple and Noise*	20MHz bandwidth (Peak to peak value)	Vo1	--	50	100	mV
		Vo2	--	80	120	
Temperature coefficient	Vo1		--	±0.15	--	%/℃
Short circuit protection	Continuous, self-recovery					
Over current protection	Normal temperature, high temperature		≥ 120%Io, self-recovery			
	Low temperature		≥ 105%Io, self-recovery			
Over-voltage protection	Vo1	5V Output	≤7.5V DC			
	Vo2	12V Output	≤20V DC			
		24V Output	≤35V DC			
Minimum load			10	--	--	%
Hold up time	115V AC		--	8	--	ms
	230V AC		--	4	--	

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

Parameter	Conditions		Min	Typ	Max	Unit
Isolation test	Electric Strength Test for 1min, (Leakage current <5mA)	Input-Output	3600	--	--	V AC
			5000	--	--	V DC
		Vo1-Vo2	500	--	--	
Operating Temperature			-40	--	+85	ºC
Storage Temperature			-40	--	+105	
Storage Humidity			--	--	95	%RH
Soldering Temperature	Wave-soldering Manual-welding		260 ± 5℃; time: 5 - 10s 360 ±10℃; time: 3 - 5s			
Switching Frequency			--	65	--	kHz
Power Derating	+60ºC to +85ºC		2.0	--	--	%/ºC
	85V AC-100V AC		1.33	--	--	%/V AC
	277V AC-305V AC		0.71	--	--	
Safety Standard	EN62368-1 (Report) safety approval. Design refers to IEC/UL62368-1, IEC/EN60335-1, IEC/EN61558-1 standards					
Safety Certification	IEC/EN/UL62368					
Safety Class	Class II					
MTBF	MIL-HDBK-217F@25℃≥ 1,000,000 h					

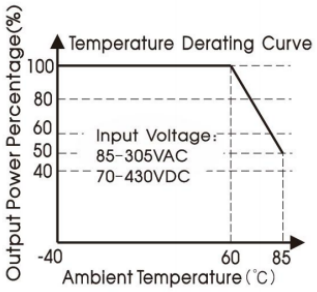
Mechanical Specifications

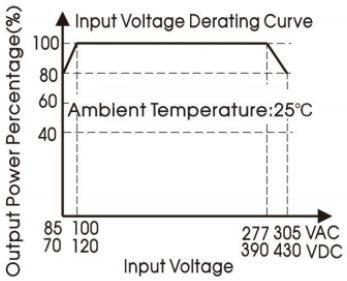
Dimension	29.54 x 15.7 x 12mm
Weight	5.6g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

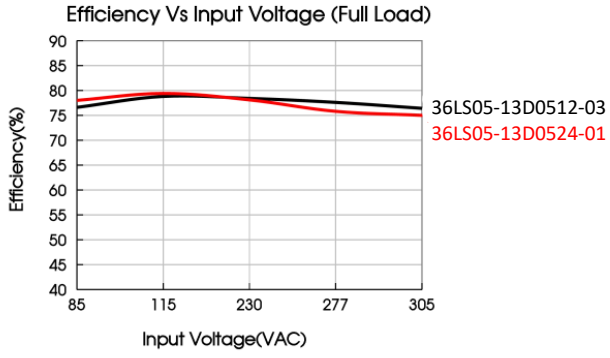
Emissions	CE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
		CISPR32/EN55032 CLASS B (Application circuit 2, 3)	
	RE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
		CISPR32/EN55032 CLASS B (Application circuit 2, 3)	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±6KV/Air ±8K	Perf. Criteria B
	RS	IEC/EN 61000-4-3 10V/m	Perf. Criteria A
	EFT	IEC/EN 61000-4-4 ±2KV (Application circuit 1,2,3,4)	Perf. Criteria B
	Surge	IEC/EN 61000-4-5 line to line ± 1kV (Application circuit 1, 2)	Perf. Criteria B
		IEC/EN 61000-4-5 line to line ± 2KV (Application circuit 3, 4)	Perf. Criteria B
	CS	IEC/EN61000-4-6 10Vr.m.s	Perf. Criteria A
	Voltage dips, short interruptions, and voltage variations immunity	IEC/EN61000-4-11 0%, 70%	Perf. Criteria B

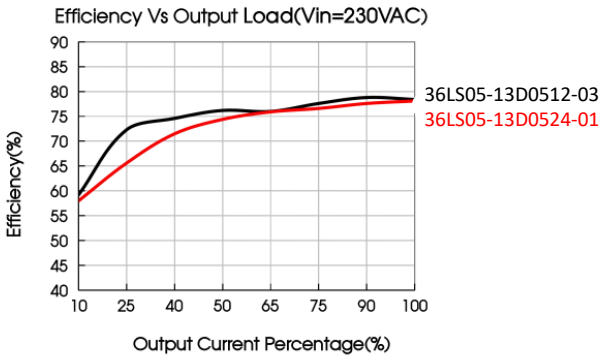
Characteristic Curve





Note:
① With an AC input between 85 -100VAC/277- 305VAC and a DC input between 70 - 120VDC/390 - 430VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling.

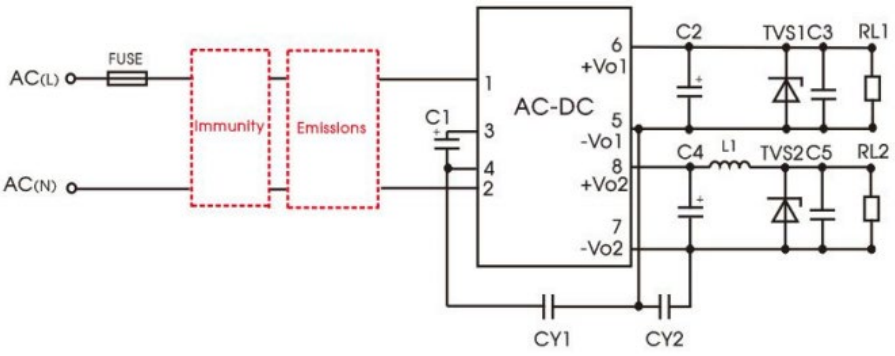




AC – DC

Additional Circuits Design Reference

1. Typical



Additional components selection guide (No EMC devices)

	FUSE	C1	C2	C5	L1	C3/C5	CY1	CY2	TVS1	TVS2
36LS05-13D0512-03	1A/ 300V	10uF/450V (-25°C to +85 °C, 85-305VAC input: -40 °C to -85 °C, 165-305VAC input) (-40 °C to +85 °C, 85-305vac input)	100uF/16V (solid-state capacitor)	270uF/16V (solid-state capacitor)	4.7uH	0.1uF/ 50V	1nF/ 400VAC	1nF/ 250VAC	SMBJ7.0A	SMBJ20A
36LS05-13D0524-01				220uF/35V						SMBJ30A

Note:

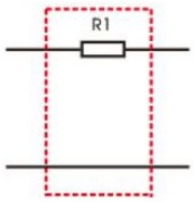
1. C1: AC input DC input must be connected, and it is recommended to use the capacitor with ripple current ＞200mA@100KHz.
2. We recommend using an electrolytic capacitor with high frequency and low ESR (ESR of C2 at low temperature of -40℃≤1.1Ω) rating for C2, C4 (refer to manufacturer's datasheet), electrolytic capacitor can be used for C2 when applied in normal and high-temperature environments. Combined with C4, L1, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, not exceeding 80%. C3, C5 is a ceramic capacitor used for filtering high-frequency noise.
3. A suppressor diode (TVS) is recommended to protect the application in case of converter failure and the specification should be 1.2 times of the output voltage.
4. LDM (1.2mH, P/N: 12050373; 4.7mH, P/N: 12050305); L1 (4.7uH, P/N: 12050181)

Environmental Application EMC Solution Selection Table

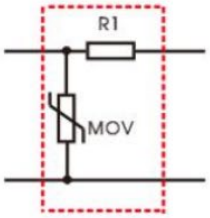
Recommended Circuit	Application Environmental	Typical Industry	Input Voltage Range	Environment Temperature	Emissions	Immunity
1	Basic application	None	85-305 V AC	-40 °C to +85 °C	CLASS A	CLASS III
2	Indoor civil environment	Smart home/Home appliances (2Y)		-25 °C to +55 °C	CLASS B	CLASS III
	Indoor general environment	Intelligent building/Intelligent agriculture		-25 °C to +55 °C	CLASS B	CLASS III
3	Indoor industrial environment	Manufacturing workshop		-25 °C to +55 °C	CLASS B	CLASS IV
4	Outdoor general environment	ITS/Video monitoring/Charging point/Communication/Security and protection		-40 °C to +85 °C	CLASS A	CLASS IV

Immunity design circuits for reference

CLASS III

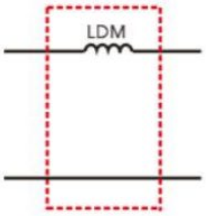


CLASS IV

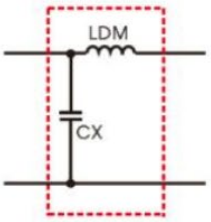


Emissions design circuits for reference

CLASS A

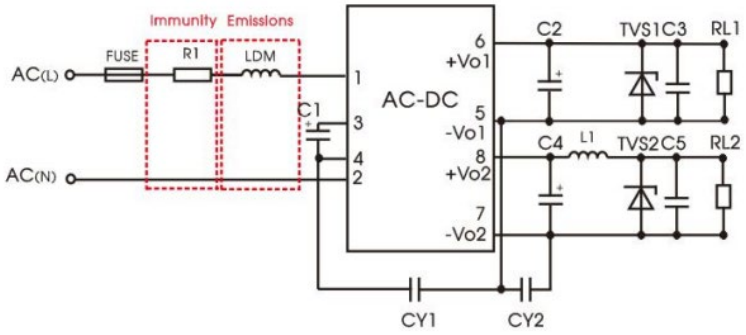


CLASS B



Electromagnetic Compatibility Solution--Recommended Circuit

1. Application Circuit1 – Basic application



recommended circuit 1

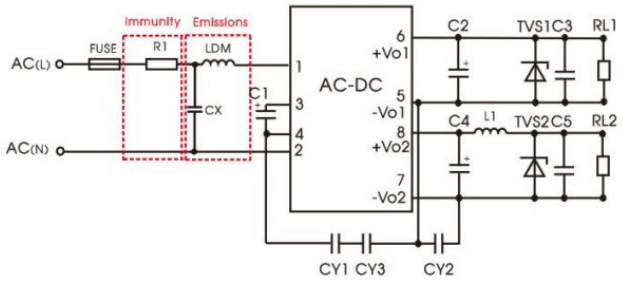
Application Environmental	Ambient Temperature Range	Immunity CLASS	Emissions CLASS
Basic application	-40 °C to +85 °C	CLASS III	CLASS A

FUSE	1A/300V, slow blow, required
R1	12Ω/2W (wire-wound resistor, required)
LDM	1.2mH

Note 1: R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select chip resistor or carbon film resistor.
Note 2: LDM is the inductor of the input plug-in. The inductance with saturation current≥0.2A should be selected.

Electromagnetic Compatibility Solution--Recommended Circuit

2. Application Circuit2 - Indoor civil /Universal system recommended circuits for general environment



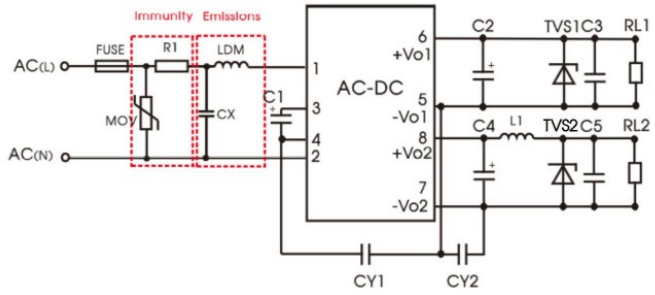
Recommended circuit 2

Application Environmental	Ambient Temperature Range	Immunity Level	Emissions CLASS
Indoor civil/general	-25 °C to +55 °C	Level 3	CLASS B
Component		Recommended value	
R1		12Ω/2W (wire-wound resistor, required)	
LDM		1.2mH	
CX		0.1uF/310VAC	
FUSE		1A/300V, slow-blow, required	

Note 1: In the home appliance application environment, the two Y capacitors of the primary and secondary need to be externally connected (CY1/CY3, value at 2.2nF/250VAC), which can meet the EN60335 certification.
Note 2: According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recommended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard.
Note 3: R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select chip resistor or carbon film resistor.
Note 4: LDM is the inductor of the input plug-in. The inductance with saturation current≥0.2A should be selected.

Electromagnetic Compatibility Solution--Recommended Circuit

3. Application Circuit3 - Universal system recommended circuits for indoor industrial environment



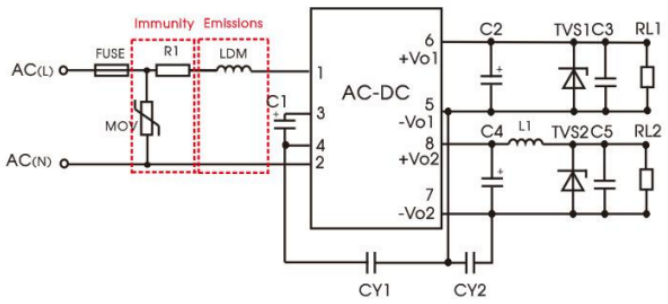
Recommended circuit 3

Application Environmental	Ambient Temperature Range	Immunity Level	Emissions CLASS
Indoor industrial	-25 °C to +55 °C	Level 4	CLASS B
Component		Recommended value	
MOV		S14K350	
CX		0.1uF/310VAC	
LDM		4.7mH	
R1		12Ω/3W (wire-wound resistor, required)	
FUSE		2A/300V, slow-blow, required	

Note 1: According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recommended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard.
Note 2: R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select chip resistor or carbon film resistor.
Note 3: LDM is the inductor of the input plug-in. The inductance with saturation current≥0.2A should be selected.

Electromagnetic Compatibility Solution--Recommended Circuit

4. Application Circuit4 - Universal system recommended circuits for outdoor general environment



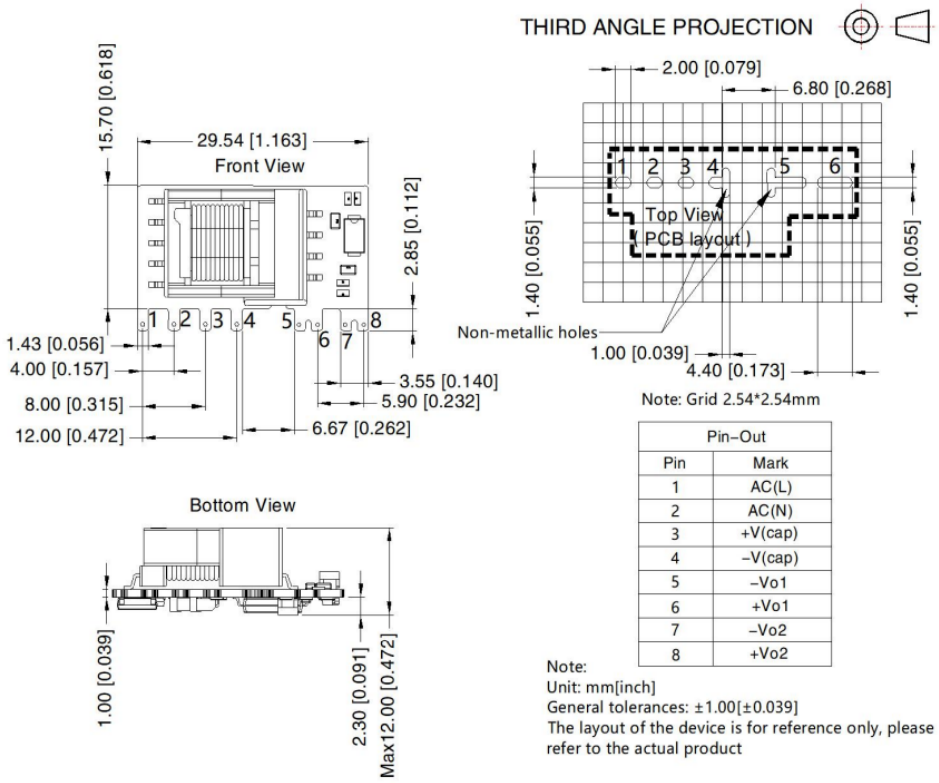
Recommended circuit 4

Application Environmental	Ambient Temperature Range	Immunity Level	Emissions CLASS
Outdoor general environment	-40 °C to +85 °C	Level 4	CLASS A

Component	Recommended value
MOV	S14K350
LDM	4.7mH
R1	12Ω/3W (wire-wound resistor, required)
FUSE	2A/300V, slow-blow, required

Note 1: R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select chip resistor or carbon film resistor.
Note 2: LDM is the inductor of the input plug-in. The inductance with saturation current≥0.2A should be selected.

Dimensions and Recommended Layout

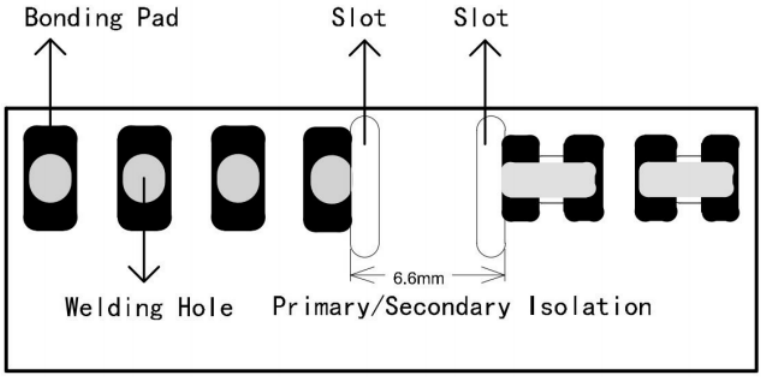


Pin-Out	
Pin	Mark
1	AC(L)
2	AC(N)
3	+V(cap)
4	–V(cap)
5	–Vo1
6	+Vo1
7	–Vo2
8	+Vo2

Note:
Unit: mm[inch]
General tolerances: ±1.00[±0.039]
The layout of the device is for reference only, please refer to the actual product

AC – DC

Recommended Layout



Note: There is a slot (non-metallic hole) between pin 4/5, which the side pad was being cut off. For details, please refer to the recommended dimensions or pad.

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220085.
2. External electrolytic capacitors are required to modules, more details refer to typical applications.
3. This part is open frame, at least 6.4mm creepage distance between the primary and secondary external components of the module is needed to meet the safety requirement, refer to the recommended welding hole design in the external dimension drawing.
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity <75% with nominal input voltage.
5. All index testing methods in this datasheet are based on our company corporate standards.
6. We can provide product customization service, please contact our technicians directly for specific information.
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations and shall be handled by qualified units.