AC – DC

Features

- Ultra-wide 85~305V AC or 70~430V DC input voltage range
- Operating Temperature Range: -40°C~+85°C
- Approved to UKCA, CE, CB, cURus, RoHS
- Safety Standards to IEC/EN/UL 62368-1, IEC/EN 60335-1 & IEC/EN 1558-1
- Efficiency up to 81%
- EMC Class A & B
- Single output 3.3~24V DC

Ideal Power's 36LS05-13BxxR3-F 5W Open Frame PCB Mount AC/DC Power Supply Converter Series are certified to UKCA, CE, CB, cURus, RoHS & EN 62368-1/IEC 62368-1/UL 62368-1/BS EN 62368-1/EN 60335-1/IEC 60335-1/EN 61558-1/IEC 61558-1 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

Certification	Model Number*	Output Power	Nominal Output Voltage and Current (Vo1/Io1)	Efficiency at 230V AC (%) Typ	Capacitive Load (µF) Max
UL/EN/IEC	36LS05-13B03R3	3.3W	3.3V/1000mA	69	2200
	36LS05-13B05R3	5W	5V/1000mA	76	1500
	36LS05-13B09R3		9V/560mA	77	680
	36LS05-13B12R3		12V/420mA	79	470
	36LS05-13B15R3		15V/340mA	79	330
	36LS05-13B24R3		24V/210mA	81	100
EN	36LS05-13B03R3-F	3.3W	3.3V/1000mA	69	2200
	36LS05-13B05R3-F	5W	5V/1000mA	76	1500
	36LS05-13B09R3-F		9V/560mA	77	680
	36LS05-13B12R3-F		12V/420mA	79	470
	36LS05-13B15R3-F		15V/340mA	79	330
	36LS05-13B24R3-F		24V/210mA	81	100

Note:
1. The nominal output voltage refers to the voltage applied to the load terminal after adding external circuits.
2. If the product is used in a severe vibration application, it needs to be glued and fixed.
3. *An “-F” suffix designates horizontal package vs. standard vertical mounting

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	10% - 100% load	--	±5	--	%
Line Regulation	Rated load	--	±1.5	--	
Load Regulation	10% - 100% load	--	±3	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value), 10% - 100% load	--	80	150	mV
Temperature Coefficient		--	±0.15	--	%/℃
Stand-by Power Consumption	230VAC		0.10	0.15	
Short Circuit Protection	Hiccup, Continuous, self-recovery				
Over-current Protection	≥ 110%Io, self-recovery				
Minimum Load		10	--	--	%

Note: 1. * The “parallel cable” method is used for ripple and noise tests. Please refer to AC-DC Converter Application Notes for specific information.
2. The product can work with 0% - 10% load and with stable output.

General Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Isolation test	Electric Strength Test for 1min, (Leakage current <5mA)	3600	--	--	V AC
		5000	--	--	V DC
Operating Temperature		-40	--	+85	ºC
Storage Temperature		-40	--	+105	
Storage Humidity		--	--	95	%RH
Soldering Temperature	Wave-soldering	260 ± 5℃; time: 5 - 10s			
	Manual-welding	360 ±10℃; time: 3 - 5s			
Power Derating	+55℃to +85℃	1.67	--	--	%/ºC
	85VAC - 100VAC	1.33	--	--	%/V AC
	277VAC - 305VAC	0.72	--	--	
Safety Standard	36LS05-13BxxR3 series	IEC/UL62368-1 Safety Approval & BS EN/EN62368-1 (Report) Design refers to IEC/EN60335-1, IEC/EN61558-1			
	36LS05-13BxxR3-F series	BS EN/EN62368-1 (Report) Safety Approval; Design refers to IEC/EN60335-1, IEC/EN61558-1			
Safety Class	Class II				
MTBF	MIL-HDBK-217F@25℃≥ 1,000,000 h				

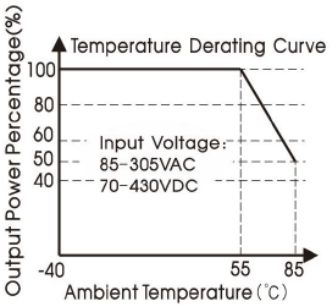
Mechanical Specifications

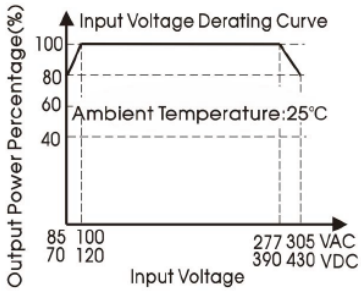
Dimension	36LS05-13BxxR3	26.40 x 14.73 x 11.00 mm
	36LS05-13BxxR3-F	27.84 x 11.60 x 17.60 mm
Weight	36LS05-13BxxR3	5.2g (Typ.)
	36LS05-13BxxR3-F	5.6g (Typ.)
Cooling method	Free air convection	

Electromagnetic Compatibility (EMC)

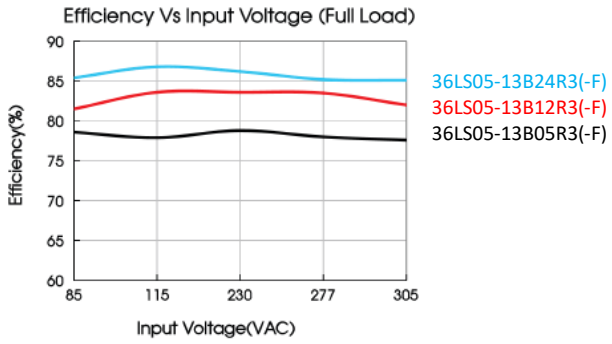
Emissions	CE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
		CISPR32/EN55032 CLASS B (Application circuit 2, 3)	
	RE	CISPR32/EN55032 CLASS A (Application circuit 1, 4)	
		CISPR32/EN55032 CLASS B (Application circuit 2, 3)	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±6KV	Perf. Criteria B
	RS	IEC/EN 61000-4-3 10V/m	Perf. Criteria A
	EFT	IEC/EN 61000-4-4 ±2KV (Application circuit 1,2)	Perf. Criteria B
		IEC/EN 61000-4-4 ±4KV(Application circuit 3, 4)	
	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

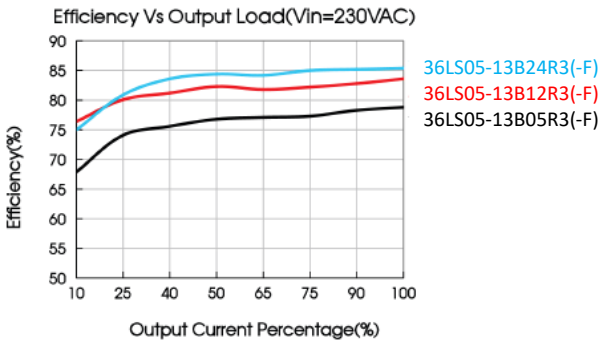
Characteristic Curve



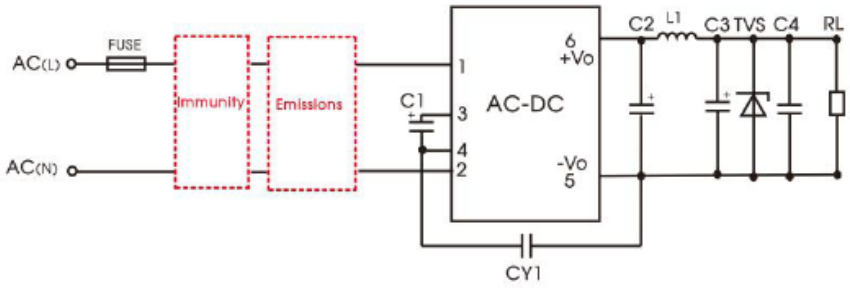


Note:
① With an AC input between 85 -100VAC/277- 305VAC and a DC input between 70 - 120VDC/390 - 430VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling;





Additional Circuits Design Reference



LS series additional circuits design reference

36LS05(-F) series additional components selection guide (No EMC devices)

Part No.	C1(required)	C2 (required)	L1 (required)	C3 (required)	C4	CY1 (required)	TVS
36LS05-13B03R3(-F)	10uF/450V (-25℃ to +85℃, 85-305VAC input; -40℃ to +85℃, 165-305VAC input) 22uF/450V (-40℃ to +85℃, 85-305VAC input)	820uF/6.3V (solid-state capacitor)	4.7uH/60mΩ /2.2A	100uF/35V	0.1uF/ 50V	1.0nF/ 400VAC	SMBJ7.0A
36LS05-13B05R3(-F)		470uF/16V (solid-state capacitor)					
36LS05-13B09R3(-F)		270uF/16V (solid-state capacitor)		47uF/35V			SMBJ12A
36LS05-13B12R3(-F)							SMBJ20A
36LS05-13B15R3(-F)		220uF/35V					
36LS05-13B24R3(-F)							SMBJ30A

Note:

1. C1 is used as a filter capacitor with AC input (must be connected externally) and as an EMC filter capacitor with DC input (must be connected), and it is recommended to use the capacitor with ripple current ＞200mA@100KHz.

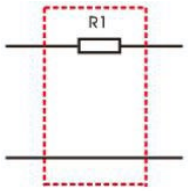
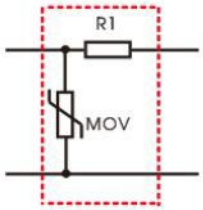
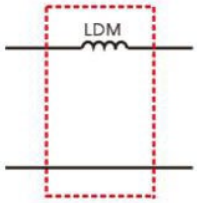
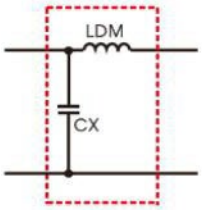
2. We recommend using an electrolytic capacitor with high frequency and low ESR (ESR of C3 at low temperature of -40℃≤1.1Ω) rating for C3 (refer to manufacturer's datasheet), the electrolytic capacitor can be used for C2 when applied in normal and high-temperature environments. Combined with C2, L1, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, not exceeding 80%. C4 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)

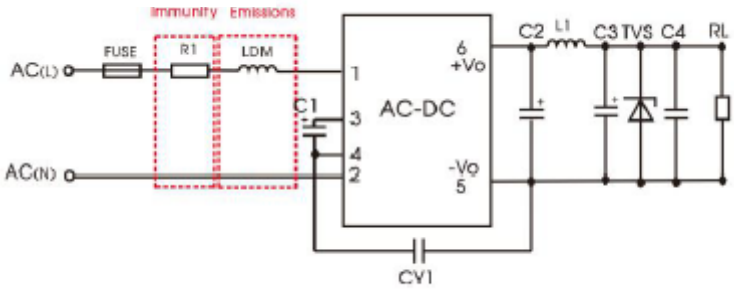
Environmental Application EMC Solution Selection Table

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	Level 3
2	Indoor civil environment	Smart home/Home appliances (2Y)		-25 °C to +55 °C	CLASS B	Level 3
	Indoor general environment	Intelligent building/Intelligent agriculture				
3	Indoor industrial environment	Manufacturing workshop		-25 °C to +55 °C	CLASS B	Level 4
4	Outdoor general environment	ITS/Video monitoring/Charging point/Communication/Security and protection		-40 °C to +85 °C	CLASS A	Level 4

Immunity design circuits for reference		Emissions design circuits for reference	
Level 3	Level 4	Class A	Class B
			

Electromagnetic Compatibility Solution--Recommended Circuit

1. Application Circuit1 – Basic application

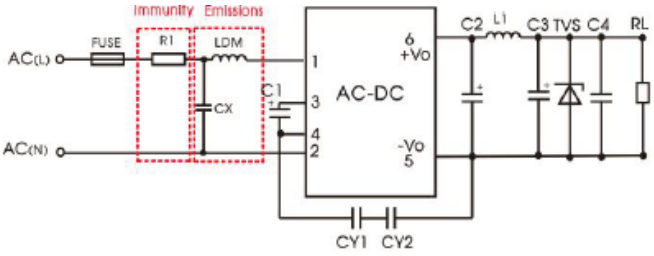


recommended circuit 1

Application Environmental	Ambient Temperature Range	Immunity CLASS	Emissions CLASS
Basic application	-40 °C to +85 °C	Level 3	CLASS A

FUSE	1A/300V, slow blow, required
R1	12Ω/2W (wire-wound resistor, required)
LDM	4.7mH/Max: 15Ω/Min: 0.2A

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



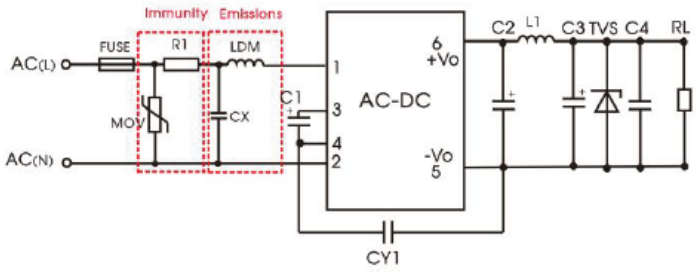
Recommended circuit 2

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/3W (wire-wound resistor, required)	
LDM		1.2mH	
CX		1.2mH/Max: 4.0Ω/Min: 0.2A	
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/CY2, 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 SMD resistor or carbon film resistor.

Electromagnetic Compatibility Solution--Recommended Circuit

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



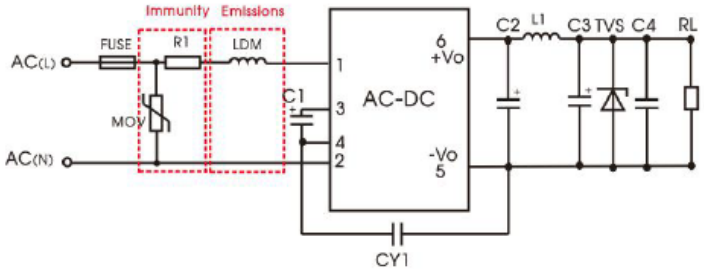
Recommended circuit 3

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		1.2mH/Max: 4.0Ω/Min: 0.2A	
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 SMD resistor or carbon film resistor.

Electromagnetic Compatibility Solution--Recommended Circuit

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



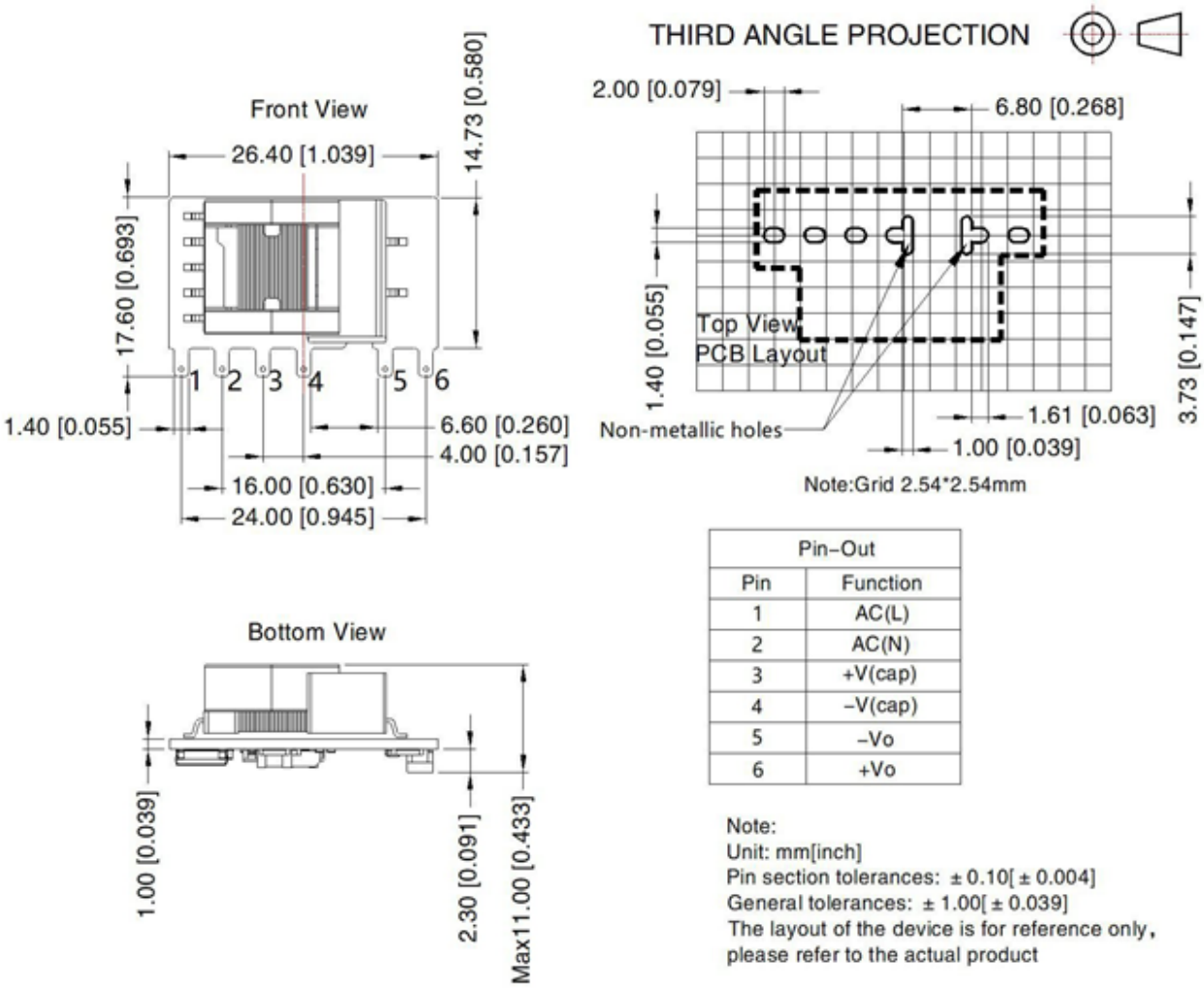
Recommended circuit 4

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/Max: 15Ω/Min: 0.2A	
R1		12Ω/2W (wire-wound resistor, required)	
FUSE		2A/300V, slow-blow, required	

Note: R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistor or carbon film resistor.

Dimensions and Recommended Layout

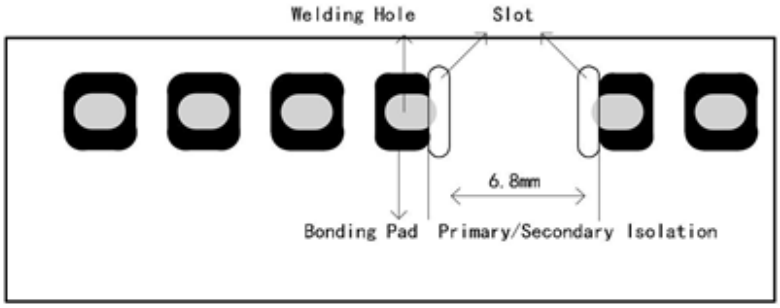
36LS05-13BxxR3 series dimensions



Pin-Out	
Pin	Function
1	AC(L)
2	AC(N)
3	+V(cap)
4	-V(cap)
5	-Vo
6	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±1.00[±0.039]
The layout of the device is for reference only, please refer to the actual product

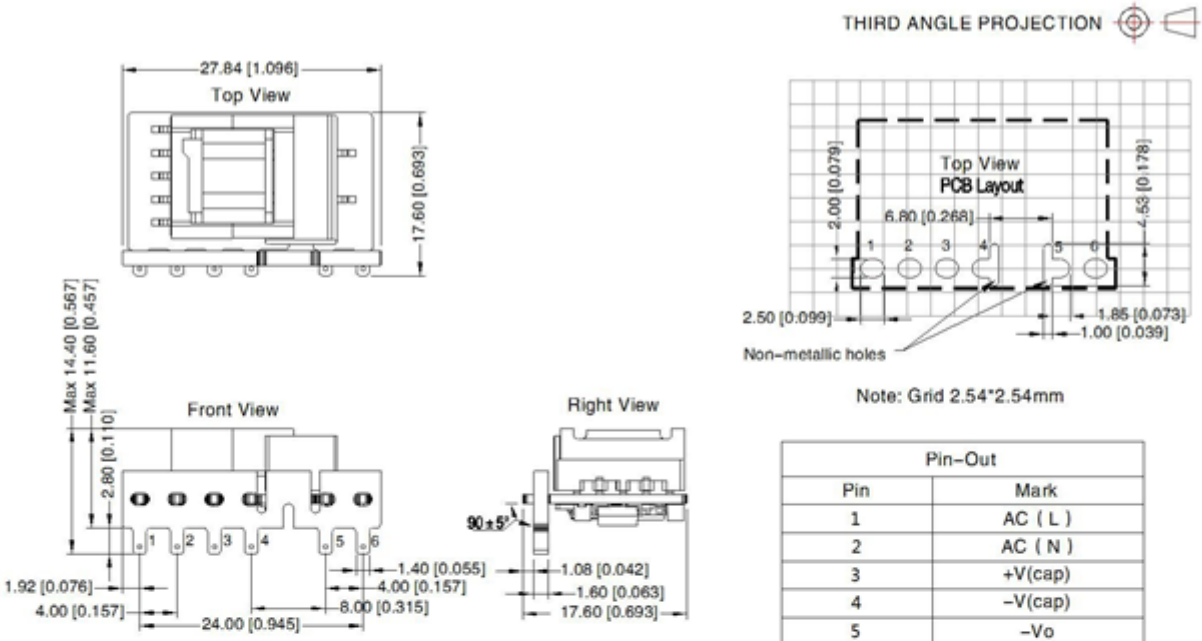
36LS05-13BxxR3 series recommended pad



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.

Dimensions and Recommended Layout

36LS05-13BxxR3-F series dimensions

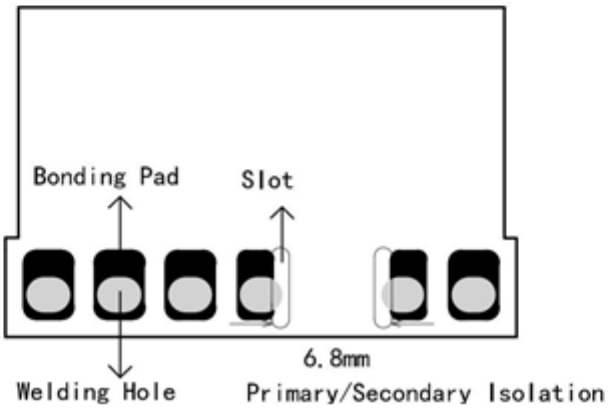


Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	AC (L)
2	AC (N)
3	+V(cap)
4	-V(cap)
5	-Vo
6	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 1.0[± 0.040]
The layout of the device is for reference only,
please refer to the actual product

36LS05-13BxxR3-F series recommended pad



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.idealpower.co.uk. Packaging bag number: 58220084(36LS05-13BxxR3); 58220093(36LS05-13BxxR3-F);
2. External electrolytic capacitors are required to modules; more details refer to typical applications.
3. This part is an 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%, nominal input voltage (115V and 230V) and rated output load.
5. All index testing methods in this datasheet are based on our company's corporate standards.
6. We can provide product customisation service. Please contact our technicians directly for specific information.
7. Products are related to laws and regulations: see "Features" and "EMC";
8. If the product involves multi-brand materials and there are differences in colour etc, please refer to the standards of each manufacturer.
9. Our products shall be classified according to ISO14001 and related environmental laws and regulations and shall be handled by qualified units.