5ACEW_4 series

5Watt - AC-DC converter

AC-DC Converter 5 Watt

- Ultra-wide 85-305VAC and 100-430VDC input voltage range
- 1 × 1 inch compact size
- Operating ambient temperature range: -40°C to +85°C
- Up to 81.5% efficiency
- No-load power consumptio 0.1W
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014
- IEC/EN/UL62368/EN60335/EN61558 safety approval

5ACEW_4 series AC-DC converters is one of GAPTEC's compact size power converter. It features ultra-wide AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368/EN60335/EN61558 standards. The converters are widely used in industrial, power, home appliances, instrumentation, communication and civil applications. For extremely harsh EMC environment, we recommend using the application circuit show in design reference of this datasheet.

UL-62368-1 (E347551)

Common specifications

Item	Operating condition	Min	Typ	Max	Units
Short circuit protection:		Hiccup, continuous, self-recovery			
Cooling:		Free air convection			
Operating temperature:		-40		+85	°C
Operation temperature range:	Wave-soldering Manual-welding	260 ± 5°C; time: 5 - 10s 360 ± 10°C; time: 3 - 5s			
Storage humidity range:				< 95	%RH
Switching Frequency			65		kHz
Power derating:	-40°C to -25°C +50°C to +70°C: 3.3V +55°C to +70°C: 5V/9V/12V +60°C to +70°C: 5V/9V/12V +70°C to +85°C: 3.3V +70°C to +85°C: Others 85VAC - 100VAC: 277VAC - 305VAC: 2000m - 5000m:	3.0 1.67 2.33 3.5 1.67 1.0 1.0 1.33 0.67			%/°C %/°C %/°C %/°C %/°VAC %/°VAC %/°VAC %/°VAC %/Km
Safety standard:		IEC/EN/UL62368/EN60335/EN61558			
Safety Certification:		IEC/EN/UL62368/EN60335/EN61558			
Safety Class:		Class II			
MTBF:		MIL-HDBK-217F@25°C > 2602,000 h			
Hot plug:		Unavailable			
Case material:		Black plastic, flame-retardant and heat-resistant (UL94V-0)			
Designed Life: (230VAC)	Ta: 25°C 100% load Ta: 55°C 100% load	>130x10³ h >41x10³ h			
Dimension	Horizontal pack. chasis mounting DIN rail mounting	25.40 x 25.40 x 17.60 mm 76.00 x 31.50 x 26.40 mm 76.00 x 31.50 x 31.00 mm			
Weight: (Horizontal package)	3.3V/5V/9V/12V 15V/24V	18.0			g
Weight: (Chasis mounting)		38.0			g
Weight: (DIN rail mounting)		58.0			g

Input specifications

Item	Operating condition	Min	Typ	Max	Units
Input voltage range	• AC Input • DC Input	85 100		305 430	VAC VDC
Input frequency		47		63	Hz
Input current	• 115VAC • 230VAC			0.13 0.07	A A
Inrush current	• 115VAC • 230VAC		15 25		A A
Leakage Current	277VAC/50Hz		0.25mA RMS Max.		
Recommended External Input Fuse	1A, slow-blow, required (The actual use needs to be selected according to the application enviroment)				

Isolation specifications

Item	Operating Conditions	Min	Typ	Max	Units
Isolation (Input-Output)	Electric Strength Test for 1min, leakage current <5mA	4000			VAC

Example:
5ACEW_03S4
5 = 5Watt; AC = AC-DC; E = case style ; W = wide input
03 = 3.3Vout; S = single output; 4 = 4 kVAC isolation

Note:

1. 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;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. 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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Output specifications					
Item	Operating condition	Min	Typ	Max	Units
Output voltage accuracy*	3.3V output others		±3 ±2		%
Line regulation	Full load		±0.5		%
Load regulation	10% - 100% load		±1		%
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		50	100	mV
Stand-by Power Consumption	230VAC		0.1		W
Temperature Coefficient			±0.02		
Over-current Protection	≥130%Io, self-recovery				
Over-voltage Protection	3.3/5VDC output 9VDC output 12VDC output 15VDC output 24VDC output		≤7.5VDC ≤15VDC ≤16VDC ≤20VDC ≤30VDC		
Min. load		0			%
Hold-up Time	115VAC input 230VAC input		5 50		ms
Soldering Temperature	Wave-soldering Manual-welding	260 ± 5°C; time: 5 - 10s 360 ± 10°C; time: 3 - 5s			

Note: *The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information.

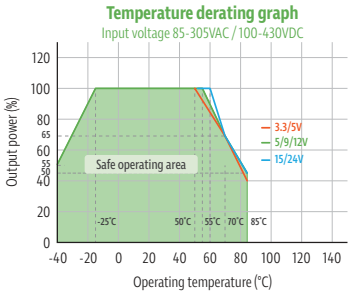
Product Selection Guide

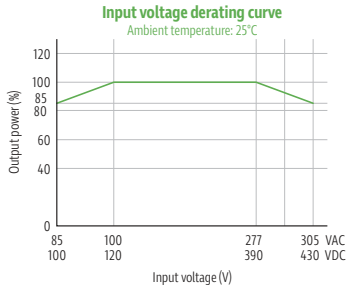
Approval	Model	Power [W]	Output [Vo]	Output [Io]	Efficiency [%, typ]	Capacitive load [µF, max]
UL	5ACEW_03S4	5	3.3V	1515mA	71.5	4000
UL	5ACEW_05S4	5	5V	1000mA	77.5	3000
UL	5ACEW_09S4	5	9V	555mA	80.5	1200
UL	5ACEW_12S4	5	12V	416mA	80.5	1200
UL	5ACEW_15S4	5	15V	333mA	81.5	680
UL	5ACEW_24S4	5	24V	208mA	79	220

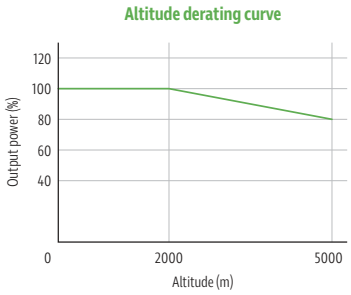
Note: * Use suffix "/CM" for chassis and suffix "/DR" for DIN-Rail mounting.

EMC specifications				
Emissions	CE	CISPR32/EN55032 CLASS B EN55014-1		
Emissions	RE	CISPR32/EN55032 CLASS B EN55014-1		
Immunity	ESD	IEC/EN 61000-4-2 EN55014-2	Contact ±6KV/Air ±8KV	perf. Criteria B perf. Criteria B
Immunity	RS	IEC/EN 61000-4-3 EN55014-2	10V/m	perf. Criteria A perf. Criteria B
Immunity	EFT	IEC/EN61000-4-4 ±2KV (See Fig.1 for typical application circuit) IEC/EN61000-4-4 ±4KV (See Fig.2 for recommended circuit) EN55014-2		perf. Criteria B perf. Criteria B perf. Criteria B
Immunity	Surge	IEC/EN61000-4-5 line to line ±1KV (See Fig.1 for typical application circuit) IEC/EN61000-4-5 line to line ±2KV (See Fig.2 for recommended circuit) EN55014-2		perf. Criteria B perf. Criteria B perf. Criteria B
Immunity	CS	IEC/EN 61000-4-6 EN55014-2	10 Vr.m.s	perf. Criteria A perf. Criteria A
Immunity	Voltage dip, short interruption and voltage variation	IEC/EN 61000-4-11 EN55014-2	0%-70%	perf. Criteria B perf. Criteria B

Product Characteristic Curve

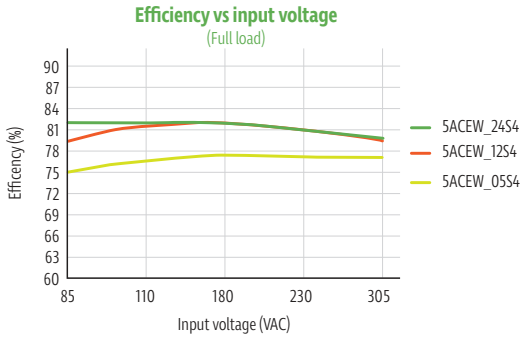


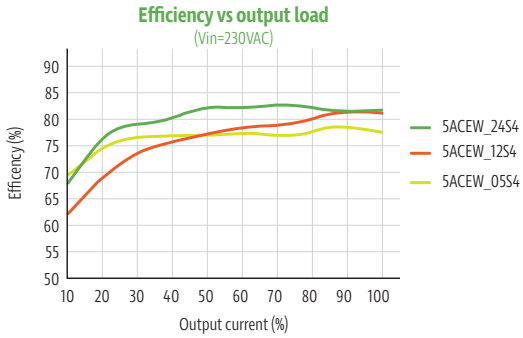




Note:
① With an AC input between 85-100V/277-305VAC and a DC input between 100-120VDC/390-430VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.

Efficiency





Typical application

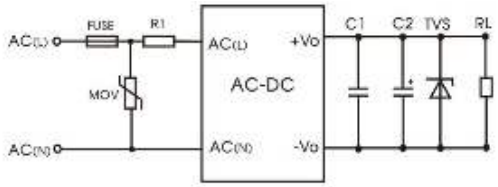
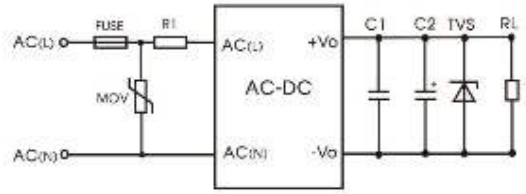


Fig. 1: Typical circuit diagram

Part No.	C1 (μF)	C2 (μF)	FUSE	R1	TVS	MOV
5ACEW_03S4	1	150	1A/300V, slow-blow, required	12Ω/3W	SMBJ7.0A	S10K350
5ACEW_05S4		150				
5ACEW_09S4		120			SMBJ12A	
5ACEW_12S4					SMBJ20A	
5ACEW_15S4						
5ACEW_24S4		68			SMBJ30A	

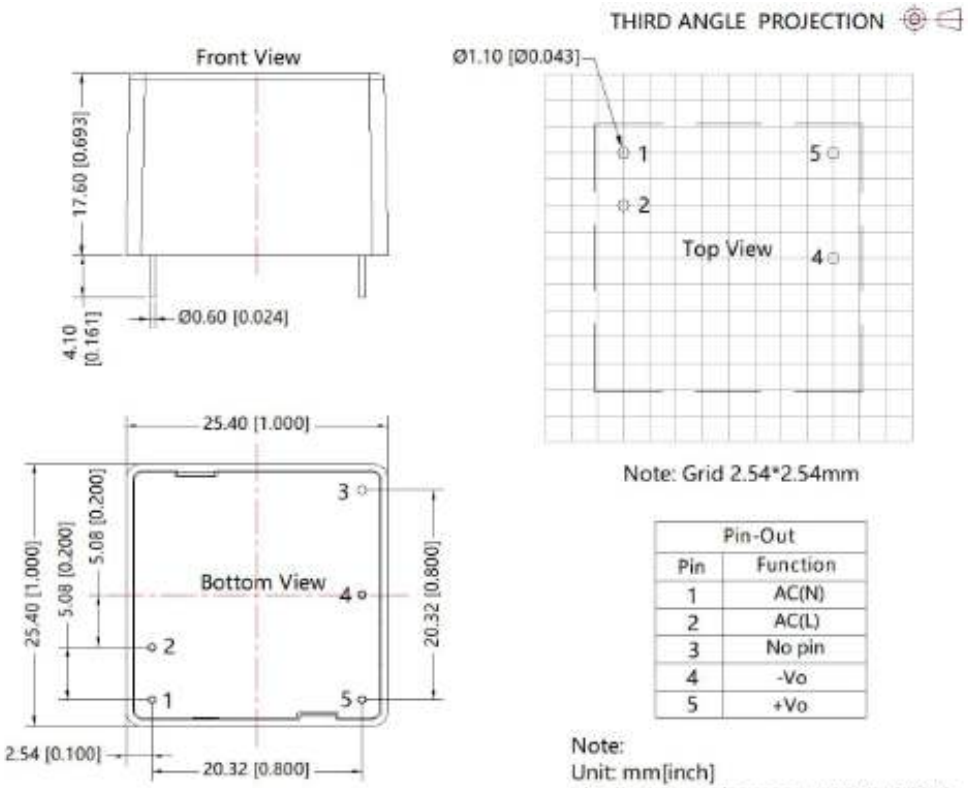
Output Filter Components:
We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2 (refer to manufacture's datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure.

EMC compliance recommended



Component	Recommended value
MOV	S14K350
R1	33Ω/3W
FUSE	2A/300V, slow-blow, required

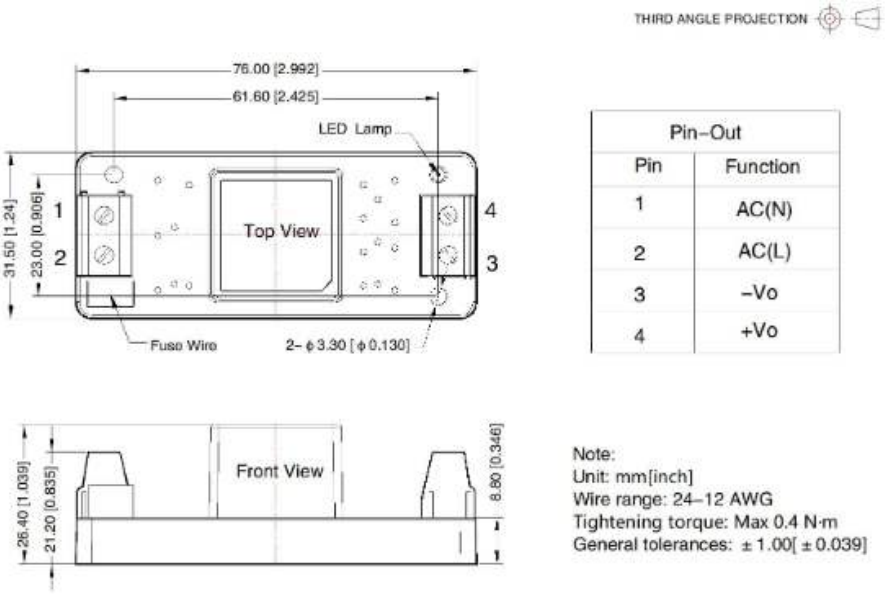
Dimensions and Recommended Layout



Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	No pin
4	-Vo
5	+Vo

Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

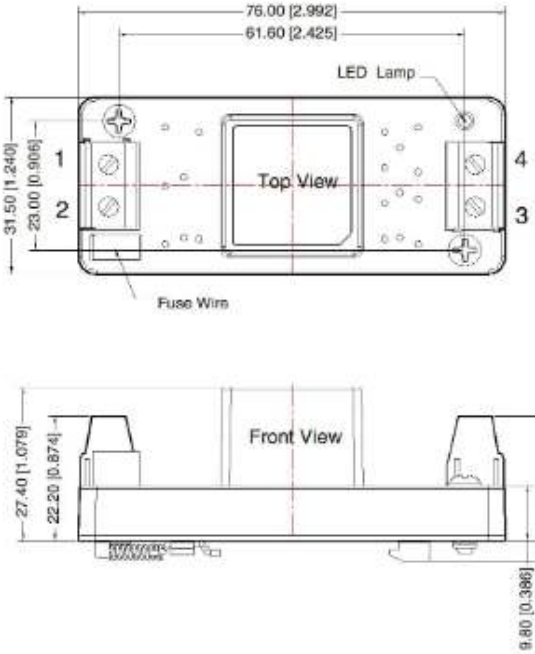
Chassis mounting



Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo

Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 1.00[± 0.039]

DIN rail mounting



THIRD ANGLE PROJECTION

Pin–Out	
Pin	Function
1	AC(N)
2	AC(L)
3	–Vo
4	+Vo

Note:
Unit: mm[inch]
Wire range: 24–12 AWG
Tightening torque: Max 0.4 N·m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00[± 0.039]