



60ACBE_4 series

60W - Single Output AC-DC Converter - Universal Input - Isolated & Regulated

AC-DC Converter

60 Watt

- ⊕ Universal input: 85-264VAC/100-370VDC
- ⊕ Operating temperature range: -40°C to +70°C
- ⊕ High isolation 4000VAC
- ⊕ Short circuit protection (SCP)
- ⊕ High efficiency, high reliability
- ⊕ Low ripple and noise
- ⊕ Output over voltage, over current protection
- ⊕ Meets EMI CLASS B and surge $\pm 2\text{KV}/\pm 4\text{KV}$ (level 4) without additional circuits
- ⊕ EN62368 safety approval

The 60ACBE_4 series are compact size power converters are highly efficient, environmental-friendly 60W power modules. It features universal 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 standards.

The converters are widely used in industrial, power, instrumentation, communication and civil applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.



Certification	Model	Output power [W]	Output [V]	Output [mA]	Efficiency [%, typ]	Capacitive load [μF , max]
EN62368	60ACBE_05S4	50	5	10000	82	50000
EN62368	60ACBE_12S4	60	12	5000	86	10000
EN62368	60ACBE_15S4	60	15	4000	86	8000
EN62368	60ACBE_24S4	60	24	2500	86	2700
EN62368	60ACBE_48S4	60	48	1250	86	680

Input specifications

Input voltage range	85-264VAC, 100-370VDC	
Input frequency	47-63Hz	
Input current (full load)	115VAC • 1.4A (typ)	230VAC • 0.80A (typ)
Inrush current (<2ms, cold start)	115VAC • 45A (typ)	230VAC • 90A (typ)
Leakage current	0.25mA max.	
External fuse (recommended)	3.15A/250V slow-blow, required	
Hot plug	Unavailable	

Example:

60ACBE_05S4

60 = 60Watt; AC = AC-DC; B = case style; E = Cost effective; 25Vout; S = Single Output; 4 = 4kVAC

Output specifications

Voltage set accuracy	$\pm 2\%$ (typ)
Line regulation (Rated load)	$\pm 0.5\%$ (typ)
Load regulation (0% to 100%)	$\pm 1\%$
Ripple & Noise*	150mV max.
Stand-by power consumption	• 5V/12V/15V/ 24V: 0.5W • 48V: 0.65W
Short circuit protection	Hiccup mode, indefinite (automatic recovery)
Over current protection	$\geq 110\%I_o$, self-recovery
Over voltage protection (Output voltage clamp or turn off)	• 5V: $\leq 9\text{V}$ • 12V: $\leq 16\text{V}$ • 15V: $\leq 24\text{V}$ • 24V: $\leq 35\text{V}$ • 48V: $\leq 60\text{V}$
Hold-up time	• 115VAC: 8ms (typ) • 230VAC: 65ms (typ)

* The "parallel cable" method is used for ripple and noise test.

Note:

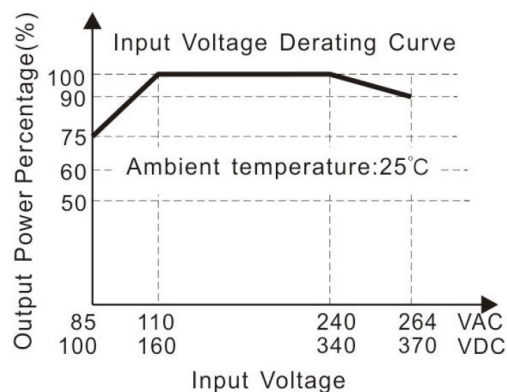
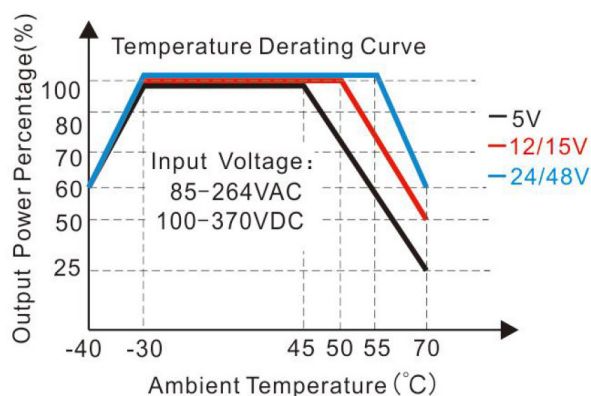
1. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a = 25^\circ\text{C}$, humidity <75% with nominal input voltage and rated output load;
2. All index testing methods in this datasheet are based on our company corporate standards;
3. We can provide product customization service, please contact our technicians directly for specific information;
4. Products are related to laws and regulations: see „Features“ and „EMC“;
5. 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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Common specifications			
Operating temperature range	-40°C ~ +70°C		
Storage temperature range	-40°C ~ +85°C		
Power derating	<ul style="list-style-type: none"> -40°C ~ -30°C: 4.00 %/°C (min) +45°C ~ +70°C: 3.00 %/°C (min) +50°C ~ +70°C (12V, 15V output): 2.50 %/°C (min) +55°C ~ +70°C (24V, 48V output): 2.50 %/°C (min) 85VAC-100VAC: 1.00 %/VAC (min) 240VAC-264VAC: 0.42 %/VAC (min) 		
Humidity	95% MAX		
Temperature coefficient	0.02%/°C		
Soldering temperature	Wave-soldering: 260 ± 5°C; time: 5 - 10s Manual-welding: 360 ± 10°C; time: 3 - 5s		
Isolation voltage (Electric strength test for 1min, leakage current <5mA)	<ul style="list-style-type: none"> Input-PE: 2000VAC Input-Output: 4000VAC Output-PE: 500VAC 		
EMC / EMI / CE	CISPR32/EN55032	CLASS B	
EMC / EMI / RE	CISPR32/EN55032	CLASS B	
EMC / EMS / ESD	IEC/EN 61000-4-2	Contact ±6KV / Air ±8KV	perf. Criteria B
EMC / EMS / RS	IEC/EN 61000-4-3	10V/m	perf. Criteria A
EMC / EMS / EFT	IEC/EN 61000-4-4	± 4kV	perf. Criteria B
EMC / EMS / Surge	<ul style="list-style-type: none"> IEC/EN 61000-4-5 IEC/EN 61000-4-5 	line to line ±2KV/ line to ground ±4KV line to line ±4KV/ line to ground ±6KV (see EMC recommended circuit)	perf. Criteria B perf. Criteria B
EMC / EMS / CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A
EMC / EMS / Voltage dips, short and interruptions immunity	IEC/EN61000-4-11	0%-70%	perf. Criteria B
Safety standards	IEC62368/EN62368/UL62368		
Safety certification	IEC62368/EN62368/UL62368 (pending)		
Safety class	CLASS I		
Case material	UL94V-0		
MTBF (MIL-HDBK-217F@25°C)	>300,000h		
Cooling	Free air convection		
Package	109.00 x 58.50 x 30.00mm 135.00 x 70.00 x 38.50mm (Chassis mounting) 137.00 x 70.00 x 44.00mm (DIN Rail mounting)		
Weight	300g 390g (Chassis mounting) 460g (DIN Rail mounting)		

Typical characteristics



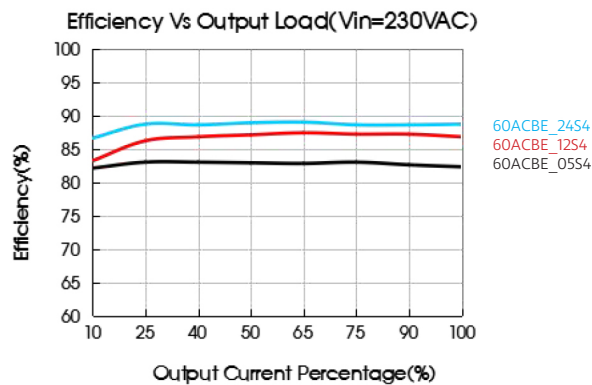
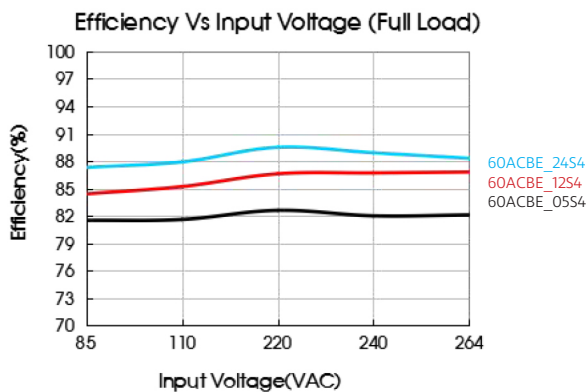
Note:

- ①When input 85-110VAC/240-264VAC/100-120VDC/340-370VDC, it need to be voltage derated on basis of temperature derating;
- ②This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company.

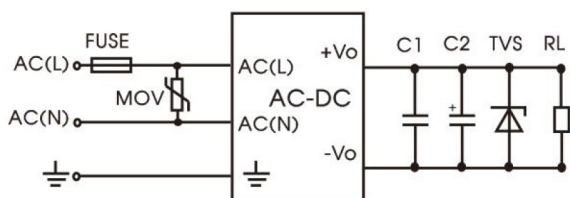
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Efficiency



Typical application circuit



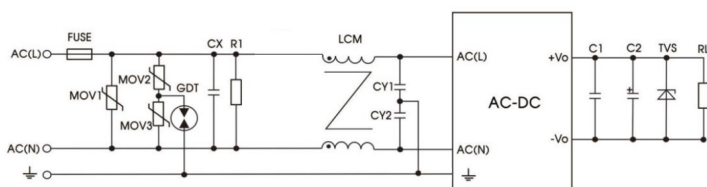
Output filter components:

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.

Model	C1 (μF)	C2 (μF)	Fuse	MOV	TVS
60ACBE_05S4	1	680	3.15A/250V slow-blow, required	S14K300	SMBJ7.0A
60ACBE_12S4	1	330	3.15A/250V slow-blow, required	S14K300	SMBJ20A
60ACBE_15S4	1	330	3.15A/250V slow-blow, required	S14K300	SMBJ20A
60ACBE_24S4	1	200	3.15A/250V slow-blow, required	S14K300	SMBJ30A
60ACBE_48S4	1	100	3.15A/250V slow-blow, required	S14K300	SMBJ64A

EMC solution recommended circuit

EMC recommended circuit with higher requirements



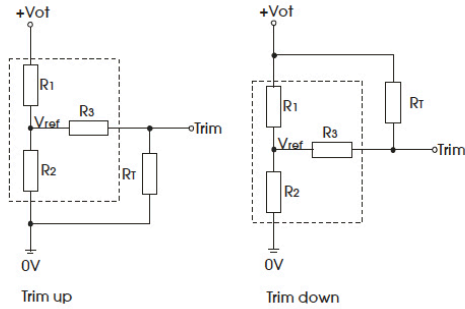
Component	Recommended value
MOV1	S20K300
MOV2	S14K350
MOV3	S14K350
CX	0.15μF/300VAC
CY1, CY2	2.2nF/400VAC
LCM	2.2mH
R1	1MΩ/2W
GDT	B5G3600
FUSE	6.3A/250V slow-blow, required

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Trim

Trim Function for Output Voltage Adjustment (open if unused)



Calculation formula of Trim resistance:

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_{ot} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$$

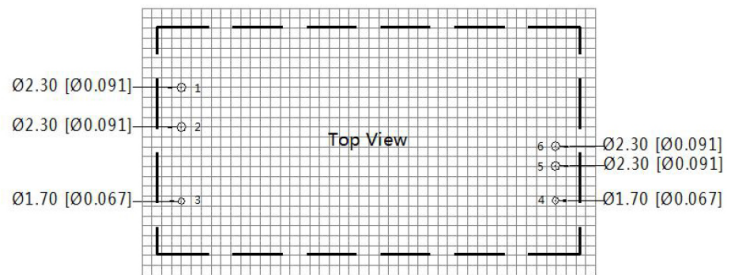
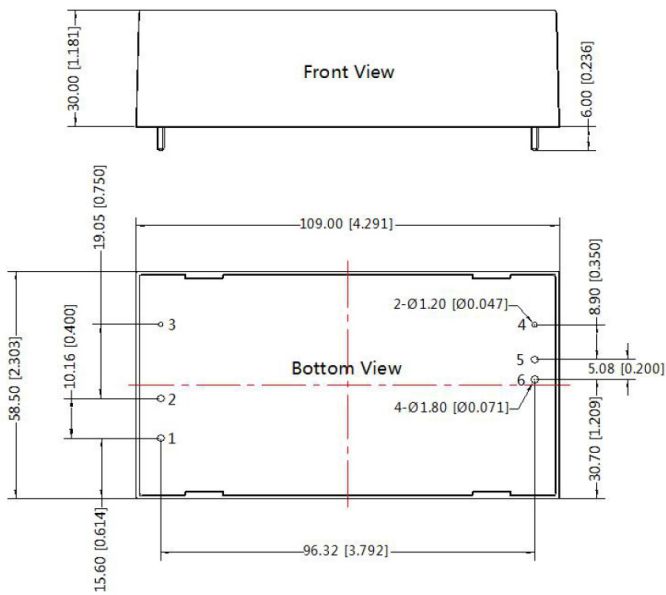
R_T = Trim Resistor value;
 a = self-defined parameter;
 V_{ot} = desired output voltage ($\pm 10\%$ max.).

Applied circuits of Trim (Part in broken line is the interior of models):

Vout nominal	R1 (kΩ)	R2 (kΩ)	R3 (kΩ)	Vref (V)	Vot (V)
5V	3.3	3.3	1	2.5	Resulting Trimmed Output voltage; range $\leq \pm 10\%$
12V	3.83	1	1	2.5	
15V	7.5	1.5	1	2.5	
24V	8.66	1	1	2.5	
48V	33	1.8	1	2.5	

Mechanical dimensions

THIRD ANGLE PROJECTION



Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	\perp
4	Trim
5	-Vo
6	+Vo

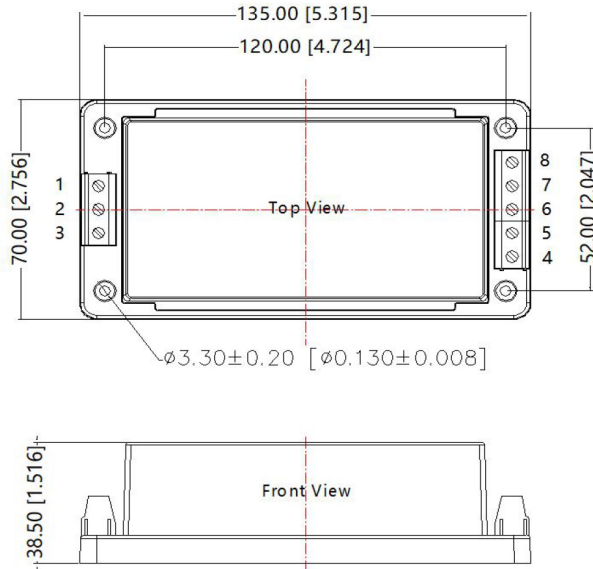
Note:
 Unit: mm[inch]
 Pin1,2,5,6's diameter: 1.80[0.071], pin 3,4's diameter: 1.20[0.047]
 Pin diameter tolerances: $\pm 0.10[\pm 0.004]$
 Pin tolerances(H): $\pm 1.50[\pm 0.059]$
 General tolerances: $\pm 0.50[\pm 0.020]$

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Chassis mounting

THIRD ANGLE PROJECTION 

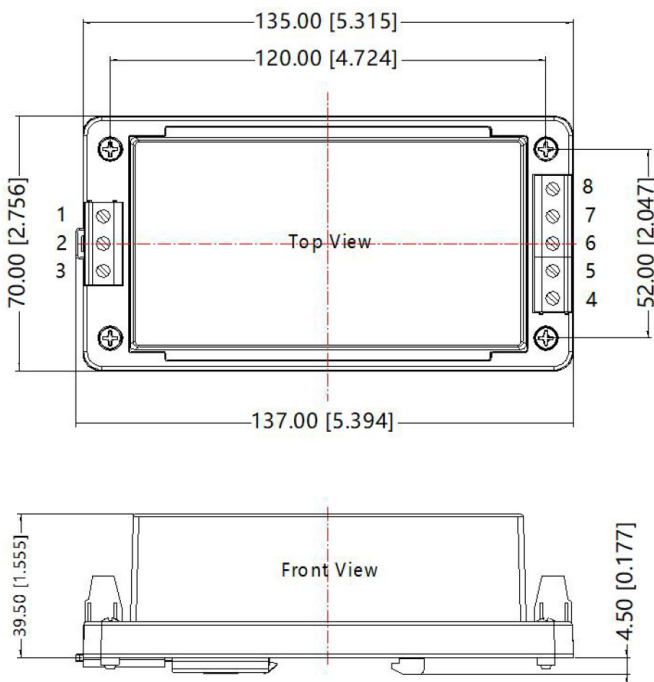


Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	\perp
4	Trim
5	-Vo
6	+Vo
7	NC
8	NC

Note:
 Unit: mm[inch]
 Wire range: 24~12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: $\pm 1.00[\pm 0.040]$

Din Rail mounting

THIRD ANGLE PROJECTION 



Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	\perp
4	Trim
5	-Vo
6	+Vo
7	NC
8	NC

Note:
 Unit: mm[inch]
 Mounting rail: TS35, rail needs to connect safety ground
 Wire range: 24~12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: $\pm 1.00[\pm 0.040]$