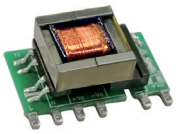
5ACFE1W_3.6 series

5W - AC-DC converter



AC-DC Converter 5 Watt

- **Wide input voltage range: 85-305VAC/70-430VDC**
- **No load power consumption ≤0.2W**
- **Up to 83% efficiency**
- **Switching frequency: 65kHz**
- **Short circuit and over current**
- **Isolation voltage: 3600VAC**
- **IEC62368/UL62368/EN62368 approved**
- **Small size open frame board**
- **PCB mounting**
- **Altitude during operation 5000m Max**

Introducing our latest 5ACFE1W_3.6 series with a wide input voltage range of 85-305VAC/70-430VDC. This module boasts a no-load power consumption of ≤0.2W and a transfer efficiency of up to 83% (typical). Operating at a switching frequency of 65kHz, it features protections against short circuits and over current. With an isolation voltage of 3600VAC, it meets the IEC62368/UL62368/EN62368 test standards and comes with a CE Certificate. Designed for industrial applications, this ultra-small size bare board is perfect for PCB mounting.

UL62368 - E347551

Common specifications

Short circuit protection	Full input voltage range - Continuous, self-recovery Hiccup
Over current protection	Input 220VAC, ≥110% Io self-recovery - Hiccup
Switching frequency	65 kHz
Operating temperature	-40°C - +85°C (with derating)
Storage temperature	-40°C - +110°C
Soldering temperature	Wave soldering 260°C (±4°C), time 5-10S Manual soldering 360°C (±8°C), time 4-7S
Relative humidity	10~90% RH
Hot plug	Unavailable
Remote control terminal	Unavailable
Safety standard	IEC/EN62368, UL62368
Vibration	10-55Hz, 10G, 30Min, along X, Y, Z
Safety standard	CLASS II
Weight	5g (Typ.)
Dimensions	26.40 x 17.50 x 12.00 mm
MTBF (MIL-HDBK-217F@25°C)	>300,000 Hours

Input specifications

Item	Operating condition	Min	Typ	Max	Units
Input voltage range	AC input DC input	85 70	220 310	305 430	VAC VDC
Input frequency range		47	50	63	Hz
Input current	115VAC 220VAC			0.10 0.08	A
Surge current	115VAC 220VAC			11 21	A
Leakage current	0.25mA typ./230VAC/50Hz				
Recommended external input fuse	1A-3A/250VAC slow fusing				

Example:
5ACFE1W_05S3.6
5 = 5Watt; AC = AC-DC; F = Open Frame; E1 = Cost effective;
W = Wide input; 05 = 5Vout; S = Single output; 3.6 = 3.6kVAC isolation

Output specifications

Item	Operating condition	Min	Typ	Max	Units
Voltage accuracy*	Full input voltage range, 10~100% load (the unit can work stably at <10% load)		±2.0	±5.0	%
Line regulation	Nominal load - Vo		±1.0	±2.0	%
Load regulation	Nominal input voltage, 20%~100% load - Vo		±1.0	±5.0	%
No load consumption	Input 115VAC Input 220VAC			0.2	W
Minimum load	Single Output	10			%
Turn-on Delay Time	Input 115VAC (full load) Input 220VAC (full load)		300		mS
Power-off holding time	Input 115VAC (full load) Input 220VAC (full load)		50 100		mS
Dynamic response	Overshoot range 25%~50%~25% Recovery time 50%~75%~50%	-5.0 -5.0		+5.0 +5.0	% mS
Output overshoot	Full input voltage range		≤10%Vo		%
Temperature drift			±0.03%		%/°C
Ripple & noise	Full input voltage range		50	100	mV

Note: * Full input voltage range, 10-100% load (0%-10% load with stable output, could work)

Isolation specifications

Item	Operating Conditions	Min	Typ	Max	Units
Isolation voltage	I/P-O/P - Test 1min, leakage current ≤5mA	3600			VAC
Insulation resistance	I/P-O/P @ DC500V	100			MΩ

1. The product should be used within the specification range, or it will cause permanent damage to it;
2. The input terminal should connect to fuse;
3. If the product is worked under the minimum requested load, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
4. 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;
5. 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 (pure resistance load);
6. All index testing methods in this datasheet are based on our company's corporate standards;
7. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, please directly contact our technician for specific information;
8. Specifications are subject to change without prior notice.

EMC specifications					
EMC	EMI	CE	CISPR22/EN55032	CLASS B (See Recommended Circuit on photo 2)	
EMC	EMI	RE	CISPR22/EN55032	CLASS B (See Recommended Circuit on photo 2)	
EMC	EMS	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria B (See Recommended Circuit on photo 1)
EMC	EMS	CS	IEC/EN61000-4-6	3Vr.m.s	Perf. Criteria B (See Recommended Circuit on photo 1)
EMC	EMS	ESD	IEC/EN61000-4-2	Contact ±6kV / Air ±8kV	Perf. Criteria B
EMC	EMS	Surge	IEC/EN61000-4-5	±1kV	Perf. Criteria B
EMC	EMS	EFT	IEC/EN61000-4-4	±2kV	Perf. Criteria B
EMC	EMS	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11	0%~70%	Perf. Criteria B

Product Selection Guide

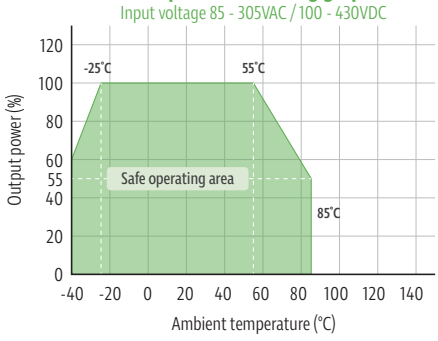
Approval	Model	Output Power (W)	Output Voltage (uF)	Output Current (mVp-p)	Max. Capacitive Load (%)	Ripple & Noise 20MHz (Max)	Efficiency Full Load, 220VAC Typ. (%)
UL	5ACFE1W_03S3.6	3.3	3.3	1000	5000	100	70
UL	5ACFE1W_05S3.6	5	5	1000	5000	100	77
UL	5ACFE1W_09S3.6	5	9	556	5000	100	79
UL	5ACFE1W_12S3.6	5	12	416	3000	100	81
UL	5ACFE1W_15S3.6	5	15	333	3000	100	82
UL	5ACFE1W_24S3.6	5	24	208	800	100	83

Note:
1: The typical value of output efficiency is based on module is full loaded and burned-in after half an hour.
2: The fluctuation range of full load efficiency (%,typ) in table is ±2%, full load efficiency= output power/module's input power.
3: Ripple & noise is tested by twisted pair method, details please refer to ripple & noise test at back.

Product characteristic curve

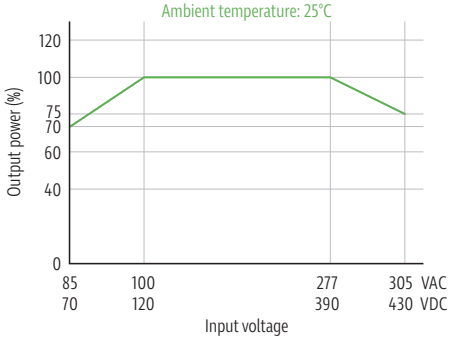
Temperature derating graph

Input voltage 85 - 305VAC / 100 - 430VDC

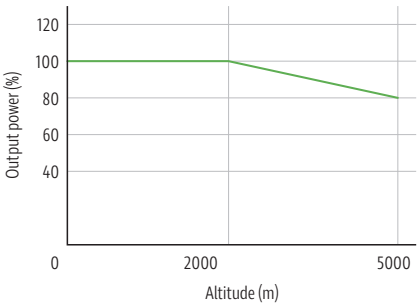


Input voltage derating curve

Ambient temperature: 25°C

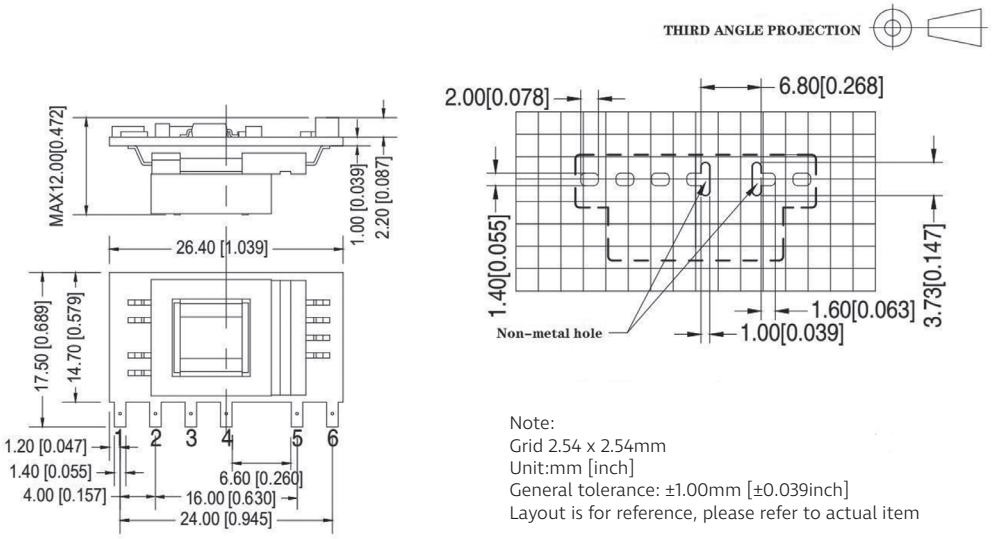


Altitude derating curve



Note 1: The output power should be derated based on the input voltage derating graph at 85~100VAC/277~305VAC/70~120VDC/ 390~430VDC.
2: This product should operate at the natural air condition, please contact us if it could be used at a closed space.

Dimensions and recommended layout



Note:
Grid 2.54 x 2.54mm
Unit:mm [inch]
General tolerance: ±1.00mm [±0.039inch]
Layout is for reference, please refer to actual item

Pin	1	2	3	4	5	6
Single	AC (L)	AC (N)	+Vcap	-Vcap	-Vo	+Vo

Typical application circuit

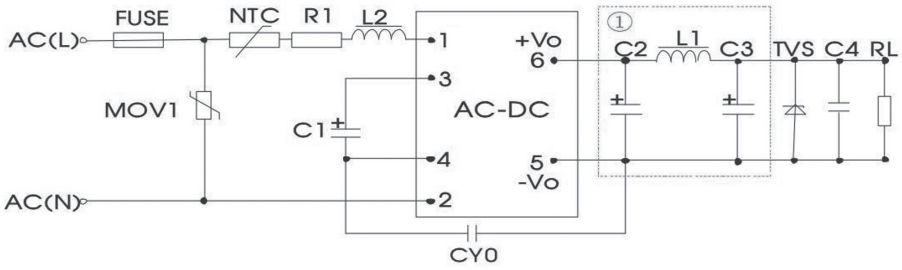


Figure - Circuit 1 (Note ① is a π Type filtering circuit)

Products Number	C1 (Necessary)	C2 (Necessary to connect to external electrolytic capacitor)	L1 (Necessary)	C3 (Necessary to connect to external electrolytic capacitor)	C4	L2	NTC	CY0	FUSE (Necessary)	TVS Tube
5ACFE1W_03S3.6	22uF/450V	470uF/10V	2.0uH	100uF/10V	0.1uF/50V	4.7mH	5D-9	102M/400V	1A/300V	SMBJ7.0A
5ACFE1W_05S3.6	22uF/450V	470uF/10V	2.0uH	100uF/10V	0.1uF/50V	4.7mH	5D-9	102M/400V	1A/300V	SMBJ7.0A
5ACFE1W_09S3.6	22uF/450V	220uF/16V	2.0uH	220uF/16V	0.1uF/50V	4.7mH	5D-9	102M/400V	1A/300V	SMBJ12A
5ACFE1W_12S3.6	22uF/450V	220uF/16V	2.0uH	68uF/16V	0.1uF/50V	4.7mH	5D-9	102M/400V	1A/300V	SMBJ20A
5ACFE1W_15S3.6	22uF/450V	220uF/35V	2.0uH	68uF/35V	0.1uF/50V	4.7mH	5D-9	102M/400V	1A/300V	SMBJ20A
5ACFE1W_24S3.6	22uF/450V	100uF/35V	2.0uH	47uF/35V	0.1uF/50V	4.7mH	5D-9	102M/400V	1A/300V	SMBJ30A

EMC recommended circuit (used under high EMC requirement)

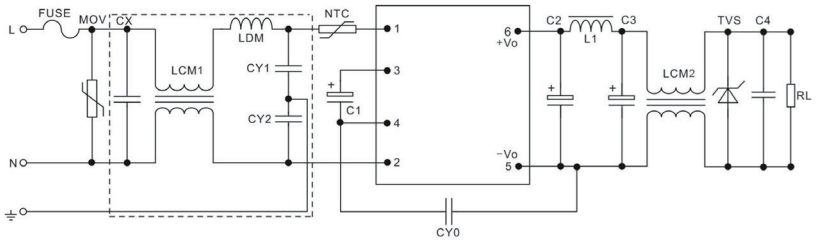


Figure - Circuit 2/1

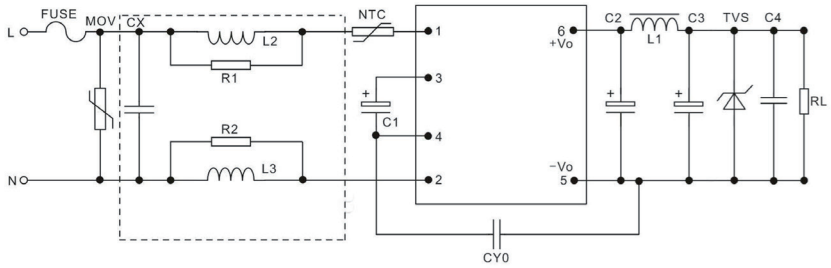


Figure - Circuit 2/2

FUSE	1A/300VAC (Necessary) NTC 5D-9	NTC	5D-9
MOV	10D561K	CY1, CY2	Y1/102M/400VAC
CX	X2/224K/310VAC LDM 330uH/ 0.3A	LDM	330uH
LCM1	40mH/0.3A	L2, L3	Color ring inductor 1mH, 1W
LCM2	40uH/2A	R1, R2	Resistor 2.2K, above 1/8W