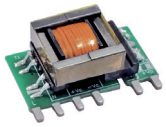
5ACFE1W_4R series

5W - AC-DC converter



AC-DC Converter 5 Watt

- **Input range: 90–528 VAC / 100–745 VDC**
- **No-load power: ≤0.3W (230VAC)**
- **Up to 78% efficiency**
- **Operating temperature: -40° C to +85° C**
- **Switching frequency: 50 kHz**
- **Up to 4300 VAC isolation**
- **Short circuit protection (SCP)**
- **Overcurrent protection**
- **Complies with IEC/UL 62368-1, IEC/EN 60335-1, IEC/EN 61558-1**
- **Ultra-compact industrial grade design**
- **PCB mounting (through-hole)**

Introducing our versatile 5ACFE1W_4R series: featuring a wide input voltage range of 90-528VAC/100-745VDC, this converter ensures flexibility and adaptability across various applications. With no-load power consumption of ≤0.3W (230VAC) and a typical transfer efficiency of 78% (230VAC), it delivers reliable and efficient performance.

Operating at a typical switching frequency of 50KHz, the converter includes essential protections against short circuit and over-current. It provides robust isolation with a voltage of up to 4300VAC and is designed for easy PCB mounting, ensuring seamless integration into your projects.

Common specifications

Short circuit protection	Full input voltage range - continuous, self recovery
Output over-current protection (OCP)	Input 230 VAC - 120% Io ≤ Io ≤ 200% - isolated
Switching frequency	50 kHz
Operating temperature	-40°C - +85°C (with derating)
Storage temperature	-40°C - +105°C
Soldering temperature	Wave soldering, 260°C (±4°C), duration 5–10 s Manual soldering, 360°C (±8°C), duration 4–7 s
Relative humidity	10~95% RH
Hot plug	N/A
Remote control (CNT)	N/A
Safety standard	Complies with IEC/UL 62368-1, IEC/EN 60335-1, IEC/EN 61558-1
Vibration	10–55 Hz, 10G, 30 min, along X, Y, Z
Safety standard	CLASS II
MTBF (MIL-HDBK-217F@25°C)	>500,000 Hours
Weight	6.5 g (typ.)
Dimensions	33.5 x 20.0 x 13.0 mm

Input specifications

Item	Operating condition	Min	Typ	Max	Units
Input voltage range	AC input DC input	85 100	230 -	528 745	VAC VDC
Input frequency range		47	50	63	Hz
Input current	115 VAC 230 VAC 480 VAC			0.20 0.10 0.07	A
Inrush current	115 VAC 230 VAC 480 VAC		10 17 28	15 25 40	A
No load power consumption	230 VAC 380 VAC			0.3 0.5	A
Leakage current	480 VAC/50 Hz	0.6 mA RMS Max			
Recommended fuse rating	1A, slow-Blow (required)				

Example:
5ACFE1W_05S4R
5 = 5Watt; AC = AC-DC; F = Open Frame; E1 = Cost effective; W = Wide input; 05 = 5Vout; S = Single output; 4 = 4kVAC isolation; R = revised version

Output specifications

Item	Operating condition	Min	Typ	Max	Units
Voltage accuracy	Input voltage range, 10%–100% load (stable operation achievable at 0%–10% load) • 3.3V output • Other outputs		 ±3.0 ±2.5	 ±6.0 ±5.0	%
Linearity	Rated load		±1.5	±3.0	%
Load regulation	10%–100% of nominal input voltage load		±3.0	±4.0	%
Minimum load	Single Output				%
Ripple & noise	5%–100% load, 20 MHz bandwidth		100	180	mVp-p
Dynamic Response	25%–50%–25% overshoot 50%–75%–50% recovery time	-5.0 -		+5.0 +5.0	% ms
Minimum load	Single Output	10			%
Temperature coefficient	-		±0.03		%/°C
Start-up delay time	Input 115 VAC (full load) Input 230 VAC (full load) Input 380 VAC (full load)			2000 800 700	ms
Power-off hold time	Input 115 VAC (full load) Input 230 VAC (full load) Input 380 VAC (full load)	5 30 90	8 35 100		mS
Output startup overshoot	Full input voltage range		≤10		%Vo

Isolation specifications

Item	Operating conditions	Min	Typ	Max	Units
Isolation voltage	I/P-O/P, test 1min, leakage current <5mA	4300			VAC

1. The product must be operated within the specified parameters; otherwise, permanent damage may occur.
2. If the product operates below the minimum load requirement, we cannot guarantee that all performance specifications in this datasheet will be met.
3. If the product operates beyond its specified load range, we cannot guarantee that all performance specifications in this datasheet will be met.
4. Unless otherwise specified, all specifications are measured at Ta = 25°C, humidity < 75%, nominal input voltage, and rated output load (resistive load).
5. All testing methods for the specifications listed above are based on our corporate standards.
6. The specifications listed above apply to the standard models in this datasheet. For specific details, please contact our technical team directly.

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Specifications subject to change without notice.

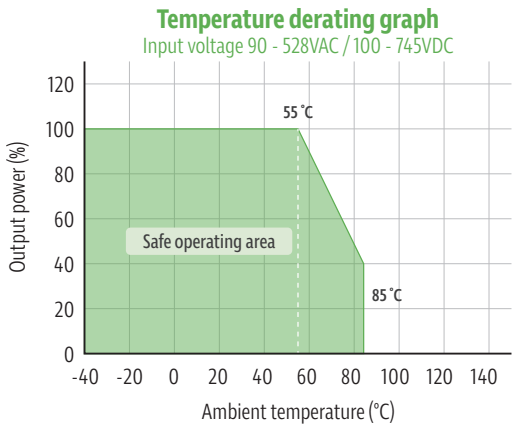
EMC specifications				
EMC	EMI	CE	CISPR 32/EN 55032	CLASS A (recommended circuit shown in figures 2 and 5) CLASS B (see figure 3 for recommended circuit)
EMC	EMI	RE	CISPR 32/EN 55032	CLASS A (recommended circuits shown in figures 2 and 5) CLASS B (See figure 3 for recommended circuit)
EMC	EMS	RS	IEC/EN61000-4-3	10V/m Perf. criteria B
EMC	EMS	ESD	IEC/EN 61000-4-2	Contact ±6 kV - Performance criteria B
EMC	EMS	Radiated immunity	IEC/EN 61000-4-3	10 V/m - Performance criteria A
EMC	EMS	EFT	IEC/EN 61000-4-4	±2 kV - Performance criteria B (recommended circuits shown in figures 2 and 5) ±4 kV - Performance criteria B (see figures 2 and 5 for recommended circuits)
EMC	EMS	Surge immunity	IEC/EN 61000-4-5	Line-to-line ±2 kV - Performance criteria B (see figure 1 for recommended circuit) Line to ground ±4 kV - Performance criteria B (see figure 2 for recommended circuit)
EMC	EMS	CS	IEC/EN 61000-4-6	10 Vrms Performance criteria A
EMC	EMS	Immunity to voltage dips and interruptions	IEC/EN 61000-4-11	0%–70% Performance criteria B

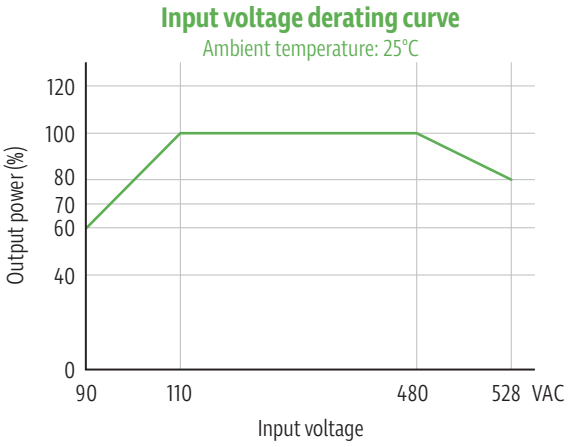
Product Selection Guide

Approval	Part number	Input Voltage Nom. (VAC)	Input Voltage Range (VAC)	Output Power P (W)	Output Voltage Vo (VDC)	Output Current Io (mA)	Max. Capacitive Load @230VAC (uF)	Ripple & Noise 20MHz (Max)	Efficiency Nom. Input, Full Load (Typ.) (%)
	5ACFE1W_03S4R	230	90-528	3.3	3.3	1000	2000	180	70
	5ACFE1W_05S4R	230	90-528	5	5	1000	1500	180	72
	5ACFE1W_09S4R	230	90-528	5	9	560	680	180	72
	5ACFE1W_12S4R	230	90-528	5	12	420	470	180	78
	5ACFE1W_15S4R	230	90-528	5	15	340	330	180	78
	5ACFE1W_24S4R	230	90-528	5	24	210	100	180	78

Note
1: Typical output efficiency is measured after 30 minutes of operation at full load (burn-in).
2: The tolerance for typical full-load efficiency (%, typ.) is ± 2%. Efficiency is calculated as total output power divided by the module's input power.

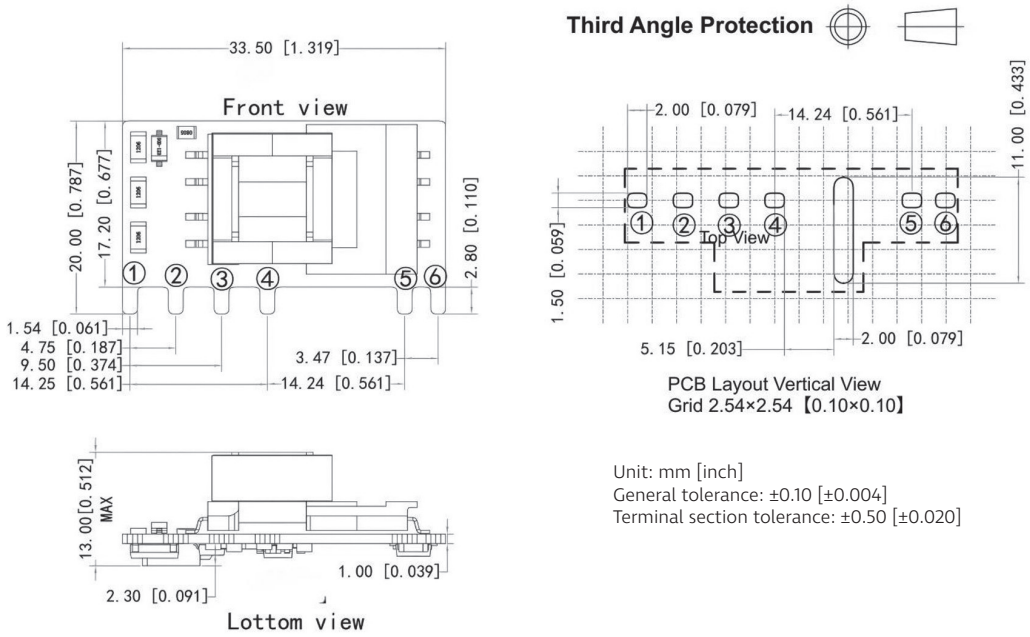
Product characteristic curve





Notes
1: When operating at input voltages of 90 – 110VAC / 480 – 528VAC / 100 – 155VDC / 675 – 745VDC, the output must be derated according to the input voltage derating curve.
2: This product is designed for natural convection cooling. For applications in enclosed environments, please contact our technical support.

Dimensions and recommended layout



Unit: mm [inch]
General tolerance: ±0.10 [±0.004]
Terminal section tolerance: ±0.50 [±0.020]

Pin	1	2	3	4	5	6
Function	AC (L)	AC (N)	+V (CAP)	-V (CAP)	-Vo	+Vo
	AC Line	AC Neutral	External Capacitor (+)	External Capacitor (-)	Negative Output	Positive Output

Typical application circuit

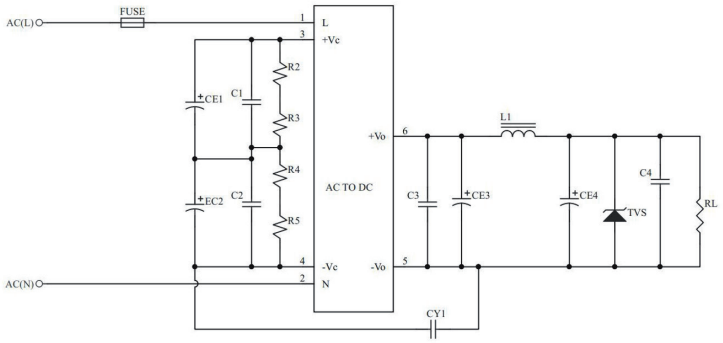
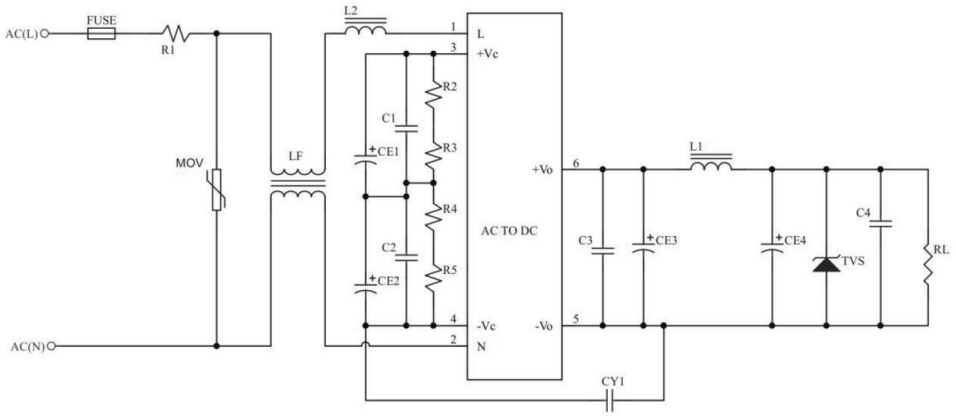


Figure 1

Products Number	CE1, CE2 (*)	R2, R3, R4, R5 (*)	CE3 (*)	L1 (*)	CE4 (Electrolytic capacitor must be connected)	C1, C2	C3, C4	TVS
5ACFE1W_03S4R	47µF/400V	1M Ω/1206	1500µF/6.3V (solid cap.)	2.2 µH/5 A	680µF/25V	0.1µF/630 V	0.1µF/50 V	SMBJ7.0A
5ACFE1W_05S4R			820µF/16V (solid cap.)		330 µF/25 V			SMBJ7.0A
5ACFE1W_09S4R			470µF/16V (solid cap.)		1000µF/16V			SMBJ12A
5ACFE1W_12S4R			470µF/16V (solid cap.)		330µF/16V			SMBJ20A
5ACFE1W_15S4R			470µF/25V (solid cap.)		100µF/35V			SMBJ20A
5ACFE1W_24S4R			470µF/35V (E-cap)		100µF/35V			SMBJ30A

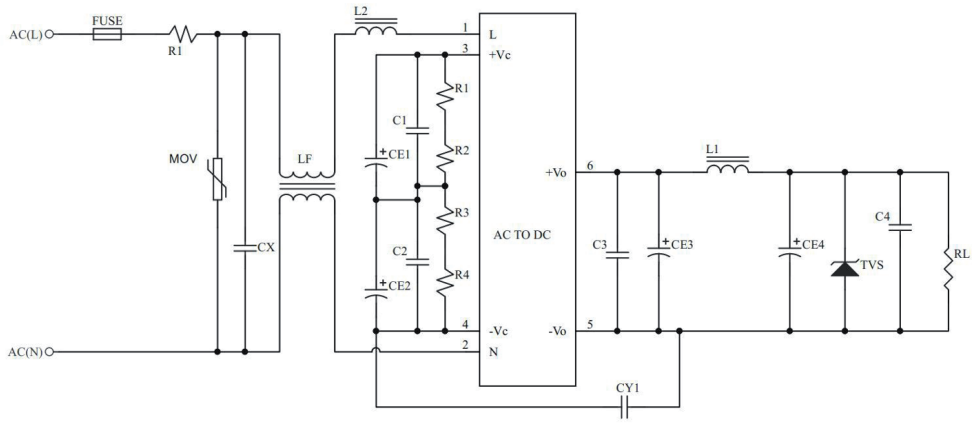
Note:
1. * Mandatory component / connection
2. FUSE refers to a fuse; the recommended rating is 2A/600VAC, slow-blow (required);
3. CE1 and CE2 are electrolytic capacitors; we recommend using a series with high ripple current and low ESR, 47µF/400V (required);
4. R2, R3, R4, and R5 are voltage-balancing resistors, 1MΩ/1206 (required);
5. CY1 is a Y-capacitor, 1nF/400V (required).

Recommended EMC circuit: basic application environment



Recommended Parameters:
1. FUSE is a fuse; recommended rating is 2A/600VAC, slow-blow (required);
2. MOV is a varistor, 14D911K (required);
3. R1 is a wire-wound resistor, 6.8Ω/3W (required);
4. CY1 is a Y-capacitor, 1nF/400VAC (required);
5. LF is a Common Mode Choke, 30 mH/0.5 A (required);
6. L2 is a drum core inductor, 900 µH/0.5 A (required);
Note: Recommended values for other components should be determined based on the specific application, referring to typical application circuits.

EMC Recommended Circuit: Indoor Industrial Environment



Recommended Parameters:
1. FUSE refers to a fuse; the recommended specification is 2A/600VAC, slow-blow (mandatory);
2. MOV is a varistor, 14D911K (required);
3. R1 is a wire-wound resistor, 6.8Ω/3W (required);
4. CY1 is a Y-capacitor, 1nF/400VAC (required);
5. CX1 is an X-capacitor, 0.22µF/530VAC (required);
6. LF is a Common Mode Choke, 30 mH/0.5 A (required);
7. L2 is a drum core inductor, 900 µH/0.5 A (required);
Note: For recommended values of other components, refer to typical application circuits based on actual usage.

Recommended EMC circuit: severe lightning surge environment

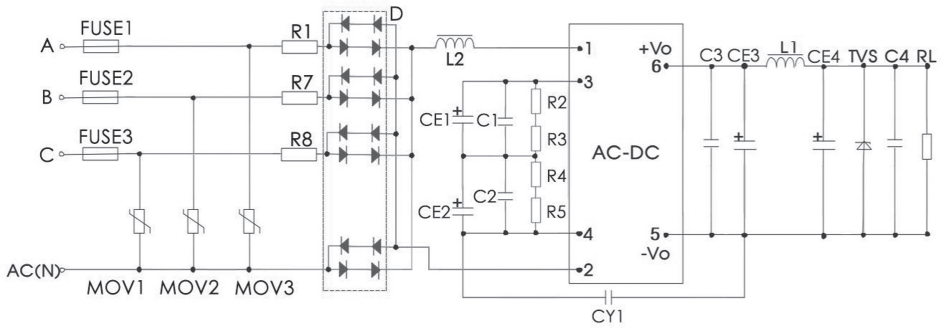


Figure 4.1: Recommended External Circuit for 4kV Differential Mode Surge (Full-wave Rectification)

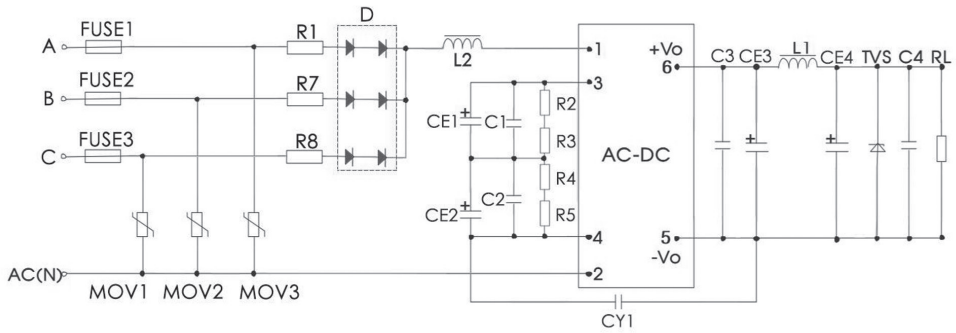
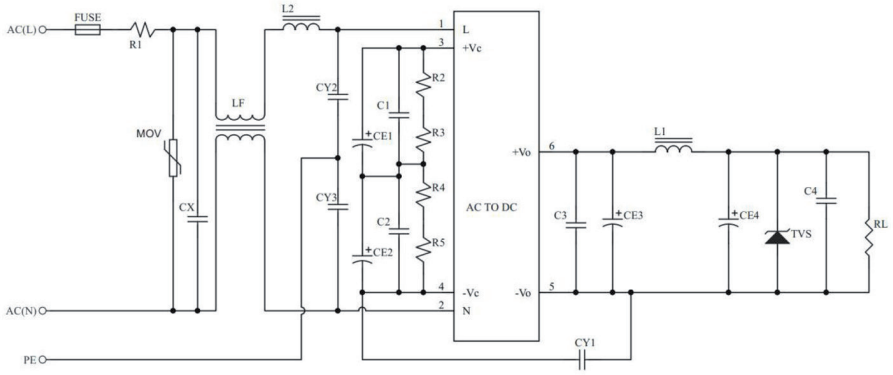


Figure 4.2: Recommended External Circuit for 4kV Differential Mode Surge (Half-wave Rectification)

Recommended EMC circuit: outdoor industrial environment



Recommended Parameters:
1. FUSE is a fuse; the recommended specification is 2A/600VAC, slow-blow (mandatory);
2. MOV is a varistor, 14D911K (required);
3. R1 is a wire-wound resistor, 6.8Ω/3W (required);
4. CY1, CY2, and CY3 are Y-capacitors, 1nF/400VAC (required);
5. CX1 is an X-capacitor, 0.22μF/530VAC (required);
6. LF is a Common Mode Choke, 30 mH/0.5 A (required);
7. L2 is a drum core inductor, 900 μH/0.5 A (required);
Note: For recommended values of other components, refer to Typical Application Circuits based on the actual application.