



5ACFE1W_3.6 series

5W - AC-DC converter

AC-DC Converter

5 Watt

- ⊕ Wide input voltage range: 85-305VAC/120-430VDC
- ⊕ No load power consumption $\leq 0.3W$
- ⊕ Transfer efficiency up to 78% (typ.)
- ⊕ Switching frequency: 65kHz
- ⊕ Protections: short circuit and over current
- ⊕ Isolation voltage: 3600VAC
- ⊕ Meets IEC62368/UL62368/EN62368 test standards
- ⊕ Ultra small size bare board, industrial level design PCB mounting

Introducing our latest 5ACFE1W_3.6 series with a wide input voltage range of 85-305VAC/120-430VDC. This module boasts a no-load power consumption of $\leq 0.3W$ and a transfer efficiency of up to 78% (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.



| Common specifications | |
|---------------------------|---|
| Short circuit protection | Full input voltage range - Continuous, self-recovery Hiccup |
| Over current protection | Input 220VAC, $\geq 110\%$ Io self-recovery - Hiccup |
| Switching frequency | 65 kHz |
| Operating temperature | -40°C - +85°C (with derating) |
| Storage temperature | -40°C - +90°C |
| Soldering temperature | Wave soldering 260°C ($\pm 4^\circ\text{C}$), time 5-10S Manual soldering 360°C ($\pm 8^\circ\text{C}$), time 4-7S |
| Relative humidity | 10-90% RH |
| Hot plug | Unavailable |
| Remote control terminal | Unavailable |
| Safety standard | EN62368, IEC62368, UL62368 |
| Vibration | 10-55Hz, 10G, 30Min, along X, Y, Z |
| Safety standard | CLASS II |
| MTBF (MIL-HDBK-217F@25°C) | >300,000 Hours |

| Input specifications | | | | | |
|---------------------------------|--------------------------|-----|-----|------|-------|
| Item | Operating condition | Min | Typ | Max | Units |
| Input voltage range | AC input | 85 | 220 | 305 | VAC |
| | DC input | 120 | 310 | 430 | VDC |
| Input frequency range | | 47 | 50 | 63 | Hz |
| Input current | 115VAC | | | 0.10 | A |
| | 220VAC | | | 0.08 | |
| Surge current | 115VAC | | | 11 | A |
| | 220VAC | | | 21 | |
| 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* | 3.3V | | ± 2.0 | ± 8.0 | % |
| | Others | | ± 2.0 | ± 6.0 | |
| 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 | | | 0.3 | W |
| Minimum load | Single Output | 10 | | | % |
| Start up delay time | Nominal input voltage (full load) | | 600 | | mS |
| Power-off holding time | Input 115VAC (full load) | | 50 | | mS |
| | Input 220VAC (full load) | | 80 | | |
| Dynamic response | Overshoot range 25%-50%-25% | -5.0 | | +5.0 | % |
| | Recovery time 50%-75%-50% | -5.0 | | +5.0 | |
| Output overshoot | Full input voltage range | | $\leq 10\%V_o$ | | % |
| Temperature drift | | | $\pm 0.03\%$ | | %/°C |

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 Imin, leakage current $\leq 5\text{mA}$ | 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. We can provide product customization service,
9. Specifications are subject to change without prior notice, please follow up with our website for latest manual.

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| 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 | 2000 | 100 | 68 |
| UL | 5ACFE1W_05S3.6 | 5 | 5 | 1000 | 2000 | 100 | 74 |
| UL | 5ACFE1W_09S3.6 | 5 | 9 | 556 | 1000 | 120 | 76 |
| UL | 5ACFE1W_12S3.6 | 5 | 12 | 416 | 68 | 120 | 78 |
| UL | 5ACFE1W_15S3.6 | 5 | 15 | 333 | 68 | 120 | 78 |
| UL | 5ACFE1W_24S3.6 | 5 | 24 | 208 | 47 | 120 | 80 |

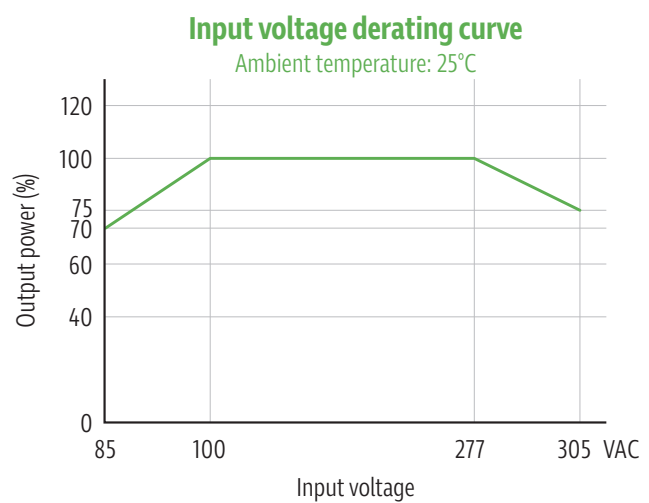
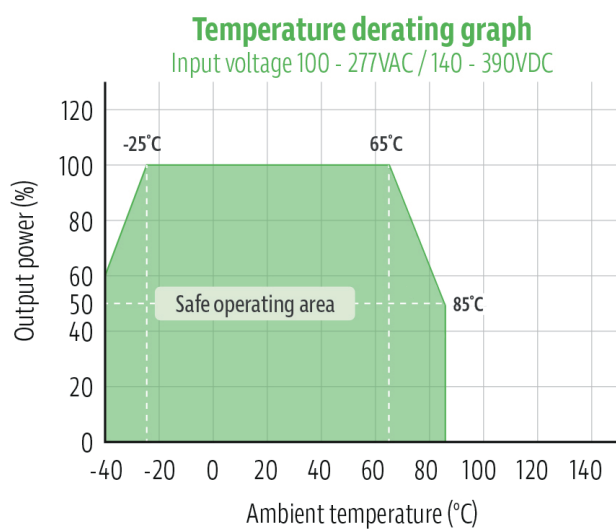
Note:

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.

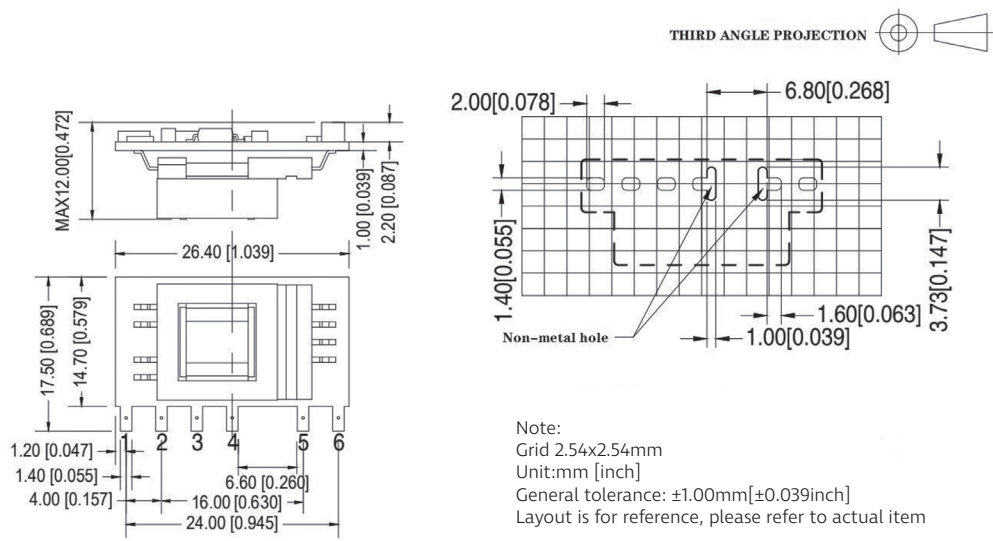
Product characteristic curve



Note 1: Input Voltage should be derated based on Input voltage derating curve when it is 85~100VAC/277~305VAC/120~140VDC/ 390~430VDC.

Note 2: Our product is suitable to use under natural air cooling environment, if use it under closed condition, please contact us.

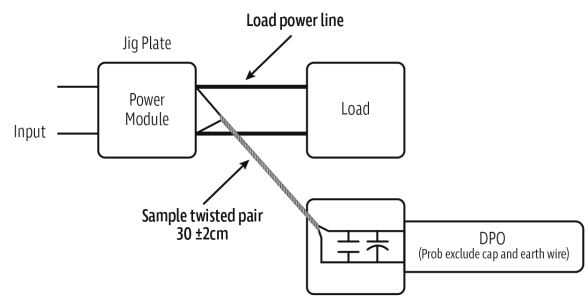
Dimensions and recommended layout



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

Ripple & noise test: (twisted pair method 20mHZ bandwidth)

Twisted pair method (20MHz bandwidth)



Test Method:

1. Connect the twisted pair, set the oscilloscope bandwidth to 20MHz, use a 100M bandwidth probe, and terminate with a 0.1uF polypropylene capacitor and a 10uF high-frequency low-resistance electrolytic capacitor in parallel. Configure the oscilloscope to sample mode.
2. Connect the input terminal to the power supply and the output terminal to the electronic load using a jig plate. Use a 30cm (±2 cm) sampling line, and select the power line from appropriately insulated wires of the corresponding diameter according to the output current flow.

Typical application circuit

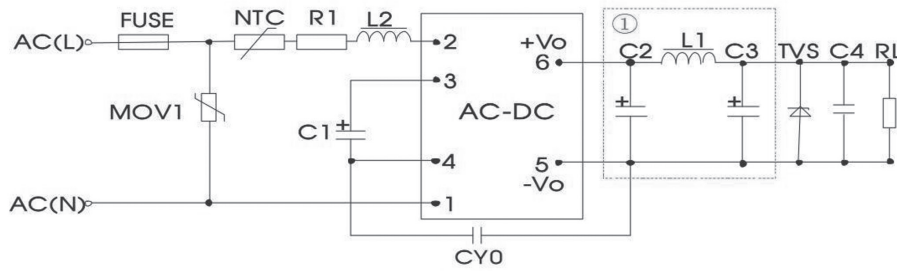


Photo 1
Note : 1 is Pi type filter

| 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/250V | SMBJ7.0A |
| 5ACFE1W_05S3.6 | 22uF/450V | 470uF/10V | 2.0uH | 100uF/10V | 0.1uF/50V | 4.7mH | 5D-9 | 102M/400V | 1A/250V | SMBJ7.0A |
| 5ACFE1W_09S3.6 | 22uF/450V | 220uF/16V | 2.0uH | 220uF/16V | 0.1uF/50V | 4.7mH | 5D-9 | 102M/400V | 1A/250V | SMBJ12A |
| 5ACFE1W_12S3.6 | 22uF/450V | 220uF/16V | 2.0uH | 68uF/16V | 0.1uF/50V | 4.7mH | 5D-9 | 102M/400V | 1A/250V | SMBJ20A |
| 5ACFE1W_15S3.6 | 22uF/450V | 220uF/35V | 2.0uH | 68uF/35V | 0.1uF/50V | 4.7mH | 5D-9 | 102M/400V | 1A/250V | SMBJ20A |
| 5ACFE1W_24S3.6 | 22uF/450V | 100uF/35V | 2.0uH | 47uF/35V | 0.1uF/50V | 4.7mH | 5D-9 | 102M/400V | 1A/250V | SMBJ30A |

EMC recommended circuit (used under high EMC requirement)

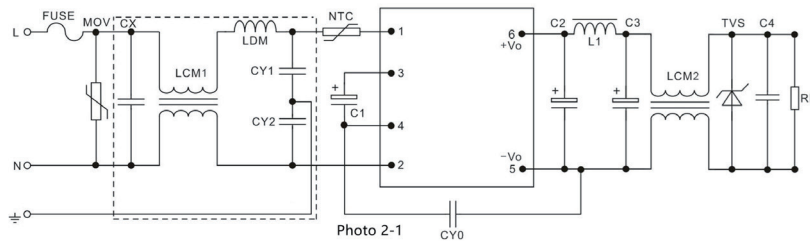


Photo 2-1

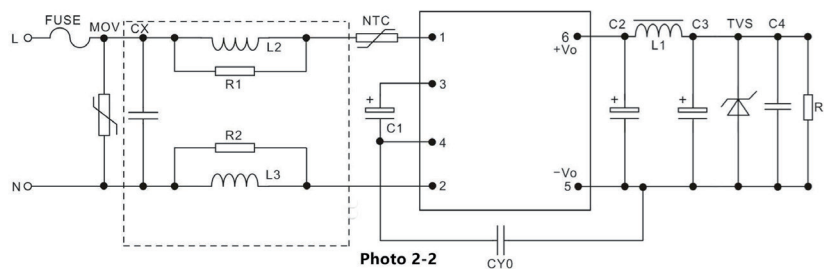


Photo 2-2

| Component | Recommend 1A, 250V (Necessary) | NTC | 5D-9 |
|-----------|--------------------------------|----------|-----------------------------|
| MOV | 10D561K | CY1, CY2 | 1nF/400VAC |
| CX | Recommended 0.22uF/275VAC | LDM | 330uH |
| LCM1 | 40mH min | L2,L3 | Color ring inductor 1mH, 1W |
| LCM2 | 40mH min | R1, R2 | Resistor 2.2K, above 1/8W |