


**CUI INC**

a bel group

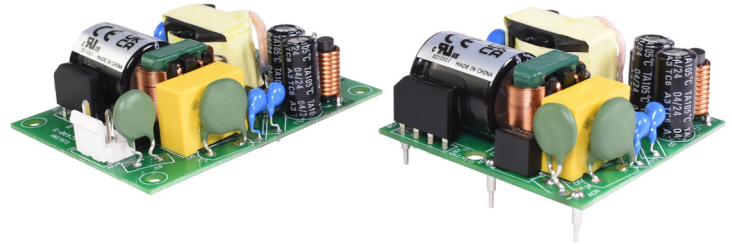
**date** 10/16/2024

**page** 1 of 8

## SERIES: VOF-40E | DESCRIPTION: INTERNAL AC-DC POWER SUPPLY

### FEATURES

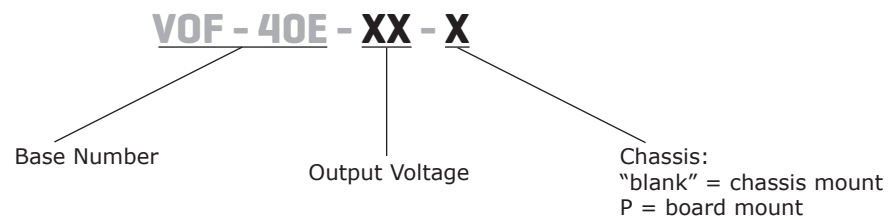
- universal input range (90 ~ 264 Vac)
- Class B emissions (EN 55032/CISPR/FCC)
- certified to IEC/EN/UL 62368-1
- designed to meet IEC/EN 60335
- short circuit, over voltage protection
- <0.15 W no-load power consumption
- Class II
- 5,000 m operating altitude
- 2x peak load capability



| MODEL      | output voltage<br>typ<br>(Vdc) | output current<br>max<br>(A) | output power<br>max<br>(W) | ripple and noise <sup>1</sup><br>max<br>(mVp-p) | efficiency <sup>2</sup><br>typ<br>(%) |
|------------|--------------------------------|------------------------------|----------------------------|-------------------------------------------------|---------------------------------------|
| VOF-40E-5  | 5                              | 6.00                         | 30                         | 100                                             | 87                                    |
| VOF-40E-12 | 12                             | 3.34                         | 40                         | 120                                             | 90                                    |
| VOF-40E-15 | 15                             | 2.67                         | 40                         | 150                                             | 90                                    |
| VOF-40E-24 | 24                             | 1.67                         | 40                         | 240                                             | 90                                    |
| VOF-40E-36 | 36                             | 1.11                         | 40                         | 360                                             | 90                                    |
| VOF-40E-48 | 48                             | 0.83                         | 40                         | 480                                             | 90                                    |

Notes: 1. At full load, nominal input, 20 MHz bandwidth oscilloscope with 0.1µF ceramic capacitor and 10 µF electrolytic capacitor.  
2. At 230 Vac input.  
3. PL (peak load function) Lasting time < 10 seconds with a maximum 10% duty cycle and must add external 68µF / 400V capacitor to BC+& BC-.  
4. All specifications are measured at Ta=25°C, humidity <75%, nominal input voltage, and rated output load unless otherwise specified.

### PART NUMBER KEY



## INPUT

| parameter                 | conditions/description | min | typ   | max  | units |
|---------------------------|------------------------|-----|-------|------|-------|
| voltage                   | ac input               | 90  |       | 264  | Vac   |
|                           | dc input               | 120 |       | 370  | Vdc   |
| frequency                 |                        | 47  | 50~60 | 63   | Hz    |
| current                   | at 100 Vac, full load  |     |       | 1    | A     |
| inrush current            | at 240 Vac, full load  |     |       | 70   | A     |
| leakage current           |                        |     |       | 0.25 | mA    |
| no load power consumption |                        |     |       | 0.15 | W     |

## OUTPUT

| parameter                | conditions/description  | min   | typ | max   | units |
|--------------------------|-------------------------|-------|-----|-------|-------|
| capacitive load          | 5 Vdc output model      |       |     | 6,000 | μF    |
|                          | 12 Vdc output model     |       |     | 3,330 | μF    |
|                          | 15 Vdc output model     |       |     | 2,650 | μF    |
|                          | 24 Vdc output model     |       |     | 1,650 | μF    |
|                          | 36 Vdc output model     |       |     | 1,090 | μF    |
|                          | 48 Vdc output model     |       |     | 810   | μF    |
| output voltage set point | 5 Vdc output model      | 4.90  |     | 5.10  | Vdc   |
|                          | 12 Vdc output model     | 11.88 |     | 12.12 | Vdc   |
|                          | 15 Vdc output model     | 14.85 |     | 15.15 | Vdc   |
|                          | 24 Vdc output model     | 23.76 |     | 24.24 | Vdc   |
|                          | 36 Vdc output model     | 35.64 |     | 36.36 | Vdc   |
|                          | 48 Vdc output model     | 47.52 |     | 48.48 | Vdc   |
| voltage accuracy         | 5 Vdc output model      |       | ±2  |       | %     |
|                          | all other output models |       | ±1  |       | %     |
| line regulation          | high line to low line   |       |     | ±0.5  | %     |
| load regulation          | 10 % to 100 % load      |       |     | ±1.0  | %     |
| hold-up time             | at 115 Vac              |       | 10  |       | ms    |
| switching frequency      |                         |       | 65  |       | kHz   |

## PROTECTIONS

| parameter                | conditions/description                | min | typ  | max | units |
|--------------------------|---------------------------------------|-----|------|-----|-------|
| over voltage protection  | TVS component to clamp output voltage |     |      |     |       |
|                          | 5 Vdc output model                    |     | 6.8  |     | Vdc   |
|                          | 12 Vdc output model                   |     | 15.0 |     | Vdc   |
|                          | 15 Vdc output model                   |     | 18.0 |     | Vdc   |
|                          | 24 Vdc output model                   |     | 30.0 |     | Vdc   |
|                          | 36 Vdc output model                   |     | 43.0 |     | Vdc   |
|                          | 48 Vdc output model                   |     | 56.0 |     | Vdc   |
| short circuit protection | auto recovery                         |     |      |     |       |

## SAFETY & COMPLIANCE

| parameter           | conditions/description                                                                                     | min | typ | max   | units |
|---------------------|------------------------------------------------------------------------------------------------------------|-----|-----|-------|-------|
| isolation voltage   | input to output, for 1 minute                                                                              |     |     | 3,000 | Vac   |
| safety approvals    | certified to 62368-1: IEC, EN, UL<br>designed to meet 60335-1: EN                                          |     |     |       |       |
| safety class        | Class II                                                                                                   |     |     |       |       |
| EMC                 | EN 55032, EN 61000-3-2, EN 61000-3-3, EN 61000-6-3, EN 61000-6-4,<br>47 CFR FCC Part 15 Subpart B, Class B |     |     |       |       |
| EMC immunity        | EN 55035:2017+A11:2020, EN 61204-3:2000, EN 61000-6-1:2019,<br>EN 61000-6-2:2019, perf. Criteria A         |     |     |       |       |
| conducted emissions | EN 55032:2015+A11:2020, EN 61000-6-3:2012, 47 CFR FCC Part 15 Subpart B, Class B                           |     |     |       |       |
| radiated emissions  | EN 55032:2015+A11:2020, EN 61000-6-3:2012, 47 CFR FCC Part 15 Subpart B, Class B                           |     |     |       |       |
| ESD                 | IEC 61000-4-2:2008, Air discharge: ±8 kV, Contact discharge: ±4 kV, perf. Criteria A                       |     |     |       |       |

## SAFETY & COMPLIANCE

| parameter            | conditions/description                                                                   | min                  | typ | max | units          |
|----------------------|------------------------------------------------------------------------------------------|----------------------|-----|-----|----------------|
| EFT/burst            | IEC 61000-4-4:2012, $\pm 2$ kV, perf. Criteria A                                         |                      |     |     |                |
| surge                | IEC 61000-4-5:2014+A1:2017, L-N: $\pm 1$ kV, perf. Criteria A                            |                      |     |     |                |
| voltage dips         | IEC 61000-4-11:2020, Dip: 30% 10 ms, Dip: 60% 100 ms, Dip >95% 5000 ms, perf. Criteria A |                      |     |     |                |
| voltage interruption | IEC 61000-4-11:2020, >95% 5000 ms, perf. Criteria B                                      |                      |     |     |                |
| MTBF                 | as per MIL-HDBK-217F at 25°C<br>as per Telcordia SR 332 at 25°C                          | 390,000<br>3,170,000 |     |     | hours<br>hours |
| RoHS                 | yes                                                                                      |                      |     |     |                |

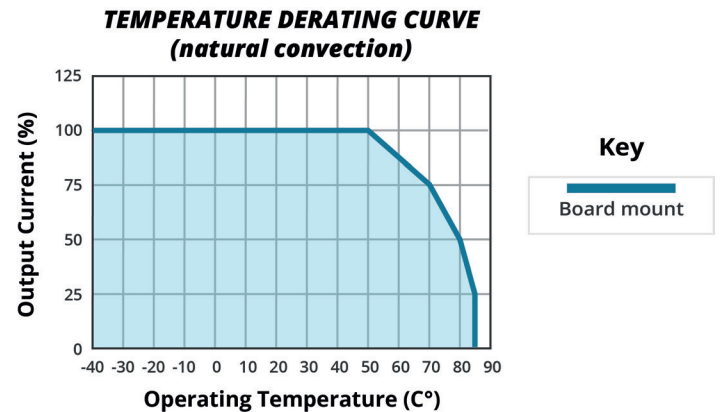
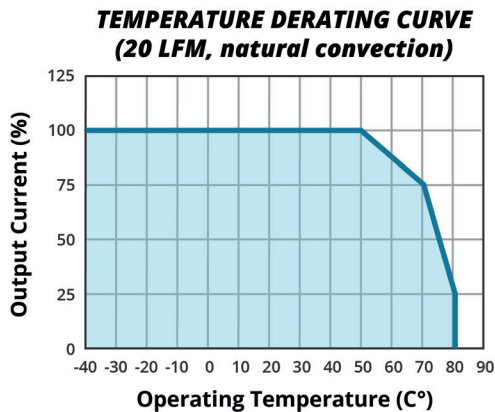
## ENVIRONMENTAL

| parameter             | conditions/description                                         | min | typ | max            | units  |
|-----------------------|----------------------------------------------------------------|-----|-----|----------------|--------|
| operating temperature | see derating curve                                             | -40 |     | 85             | °C     |
| storage temperature   |                                                                | -40 |     | 85             | °C     |
| storage humidity      | non-condensing                                                 | 0   |     | 93             | %      |
| altitude              | IEC/EN/UL 62368-1 OVC II<br>designed to meet EN 60335-1 OVC II |     |     | 5,000<br>2,000 | m<br>m |

## MECHANICAL

| parameter  | conditions/description                                                                                                         | min | typ      | max | units        |
|------------|--------------------------------------------------------------------------------------------------------------------------------|-----|----------|-----|--------------|
| dimensions | chassis mount: 2.700 x 2.000 x 0.941 [68.58 x 50.80 x 23.9 mm]<br>board mount: 2.000 x 2.000 x 1.010 [50.80 x 50.80 x 25.6 mm] |     |          |     | inch<br>inch |
| weight     | chassis mount<br>board mount                                                                                                   |     | 64<br>61 |     | g<br>g       |

## DERATING CURVES



## MECHANICAL DRAWING

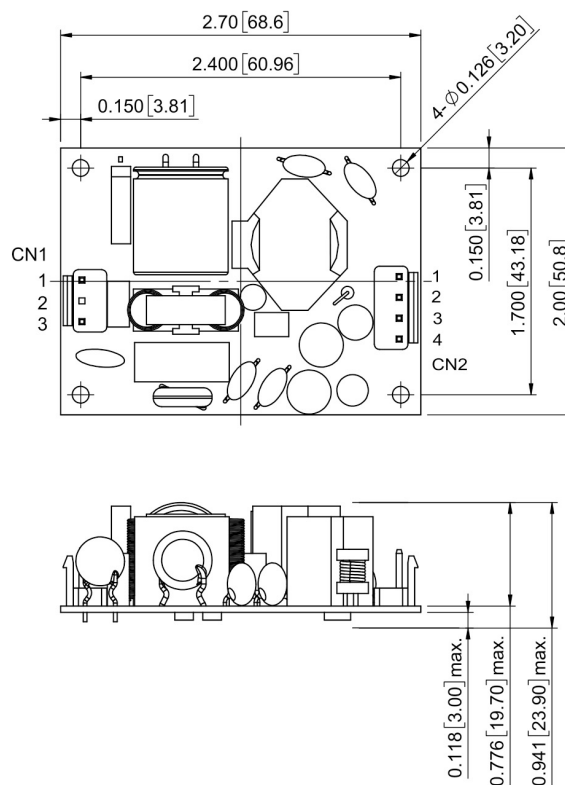
### Chassis mount

units: inch [mm]

tolerance: inches: x.xx =  $\pm 0.03$ , x.xxx =  $\pm 0.02$ mm: x.x -  $\pm 0.7$ , x.xx =  $\pm 0.5$ 

| AC Input Connector (CN1): TKP PVHI-03N2 or equivalent |          |                          |                                |
|-------------------------------------------------------|----------|--------------------------|--------------------------------|
| PIN                                                   | Function | Mating Housing           | Terminal                       |
| 1                                                     | AC(L)    | JST VHR-3N or equivalent | JST SVH-21T-P1.1 or equivalent |
| 2                                                     | -        |                          |                                |
| 3                                                     | AC(N)    |                          |                                |

| DC Output Connector (CN2): TKP PVHI-04 or equivalent |          |                          |                                |
|------------------------------------------------------|----------|--------------------------|--------------------------------|
| PIN                                                  | Function | Mating Housing           | Terminal                       |
| 1                                                    | +Vout    | JST VHR-4N or equivalent | JST SVH-21T-P1.1 or equivalent |
| 2                                                    | +Vout    |                          |                                |
| 3                                                    | -Vout    |                          |                                |
| 4                                                    | -Vout    |                          |                                |

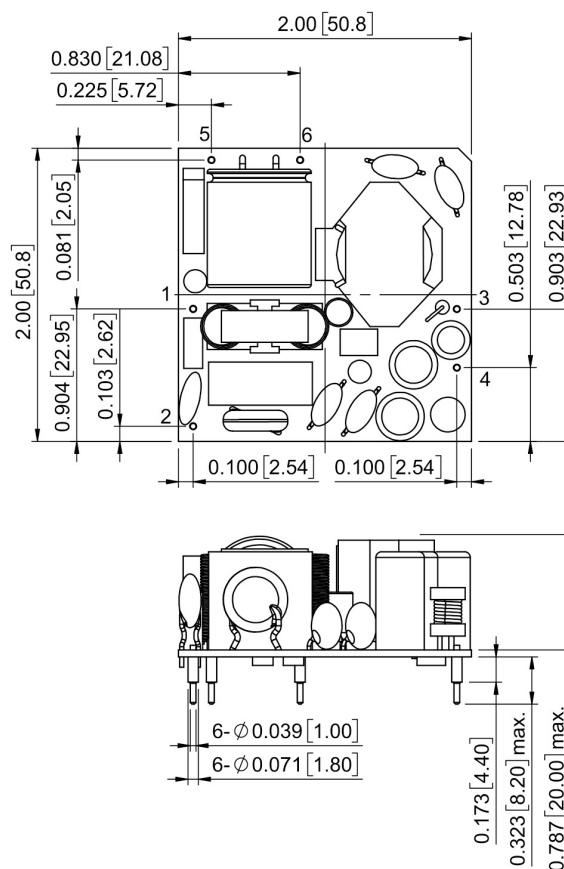


### Board mount

units: inch [mm]

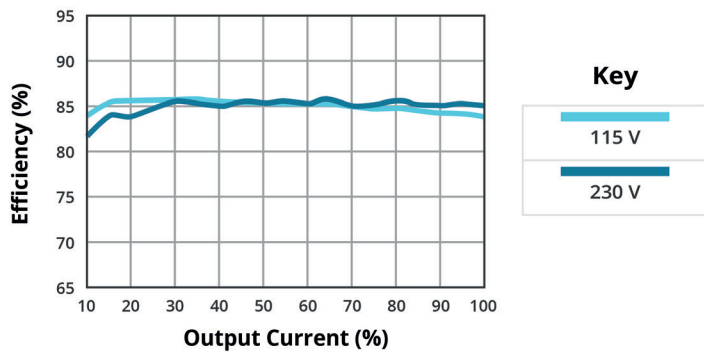
tolerance: inches: x.xx =  $\pm 0.03$ , x.xxx =  $\pm 0.02$ mm: x.x -  $\pm 0.7$ , x.xx =  $\pm 0.5$ 

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | AC(L)    |
| 2               | AC(N)    |
| 3               | +Vout    |
| 4               | -Vout    |
| 5               | BC+      |
| 6               | BC-      |

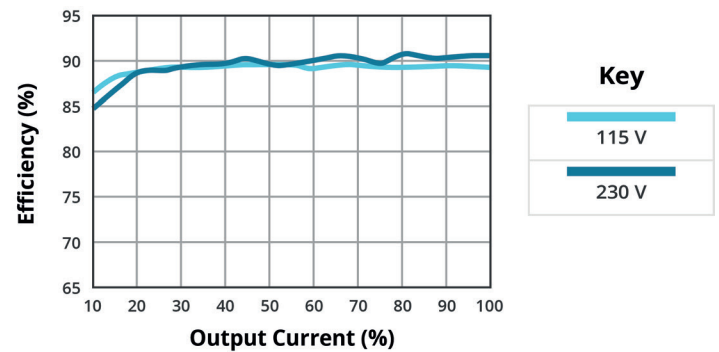


## EFFICIENCY CURVES

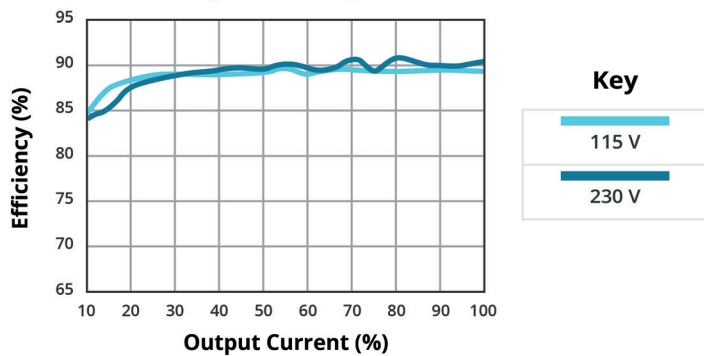
**EFFICIENCY VS OUTPUT LOAD  
(VOF-40E-5)**



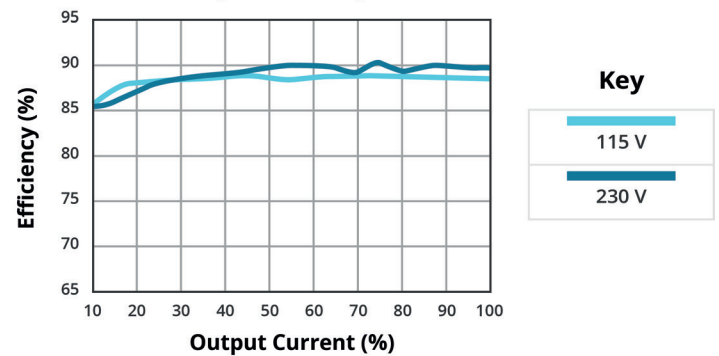
**EFFICIENCY VS OUTPUT LOAD  
(VOF-40E-12)**



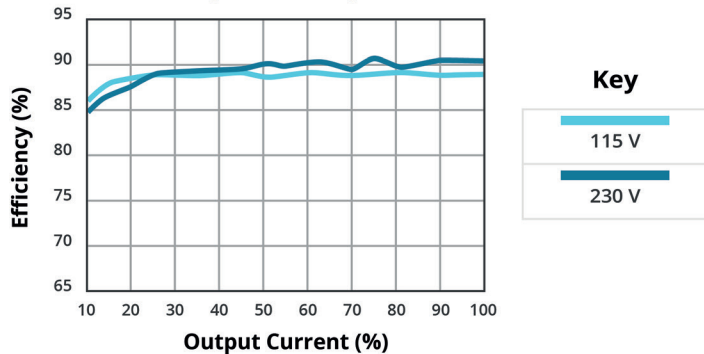
**EFFICIENCY VS OUTPUT LOAD  
(VOF-40E-15)**



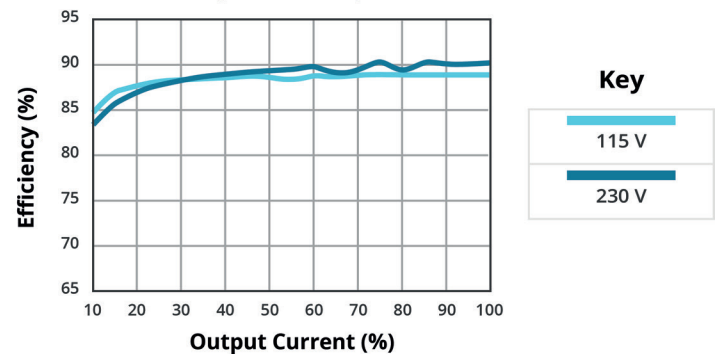
**EFFICIENCY VS OUTPUT LOAD  
(VOF-40E-24)**



**EFFICIENCY VS OUTPUT LOAD  
(VOF-40E-36)**

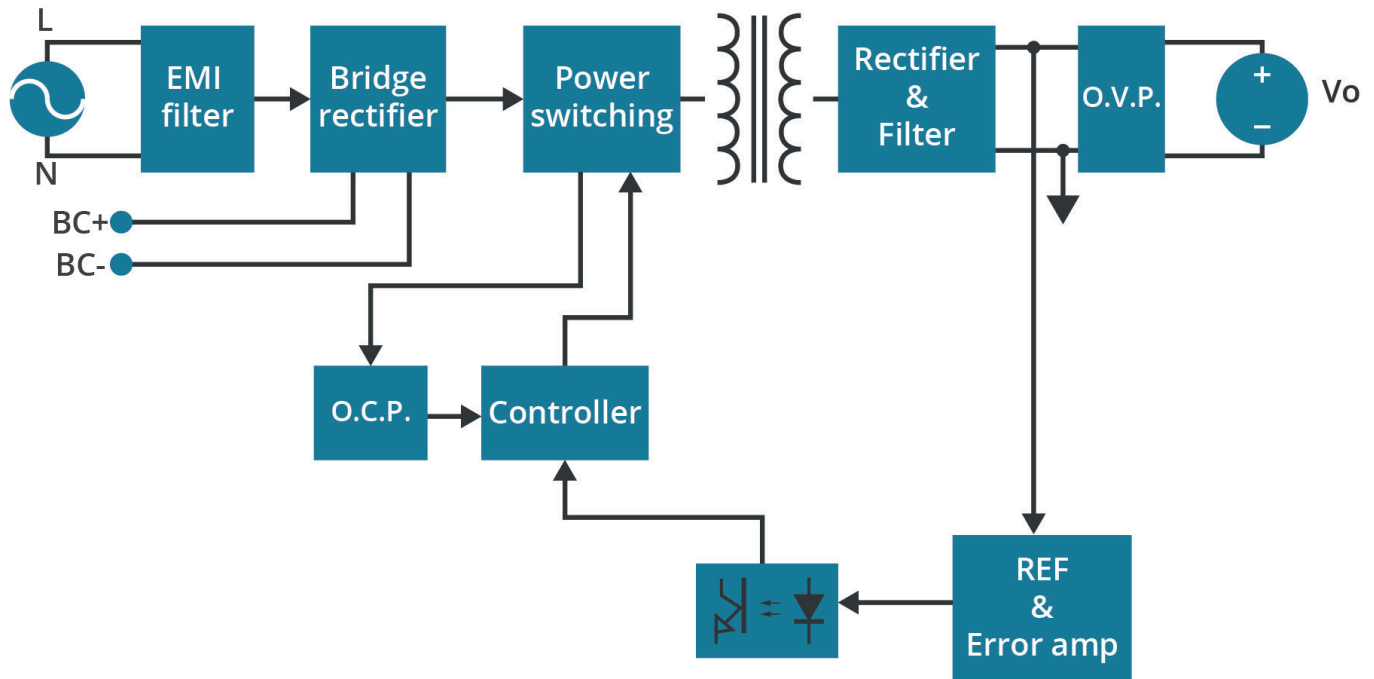


**EFFICIENCY VS OUTPUT LOAD  
(VOF-40E-48)**



## ELECTRICAL BLOCK DIAGRAM

Figure 1



## PEAK LOAD FUNCTION

The board mount option includes a peak load function capable of delivering twice its rated power.

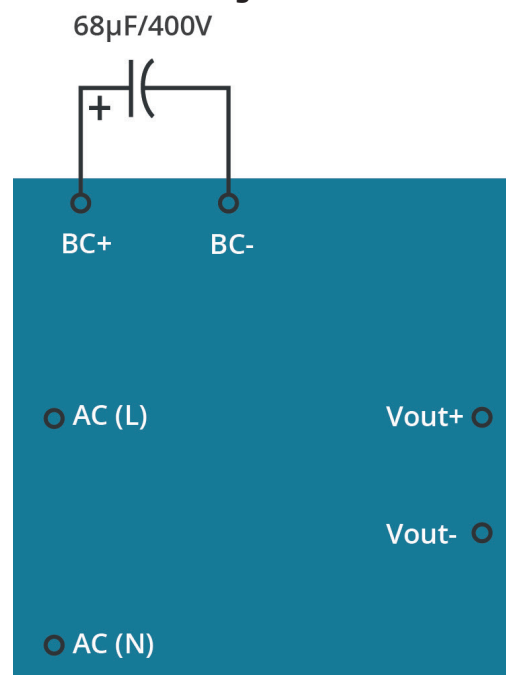
If  $V_{in} < 200 \text{ Vac}$  then a  $68 \mu\text{F}$ ,  $400 \text{ Vdc}$  capacitor needs to be placed on the BC+ and BC- pins to support peak load.

If  $V_{in} > 200 \text{ Vac}$  then the supply supports peak load without the additional capacitor.

The peak load current must be less than 10 seconds and less than 10% duty cycle.

When operating with peak load, the non-peak load level must be less than 80% of the rated output power.

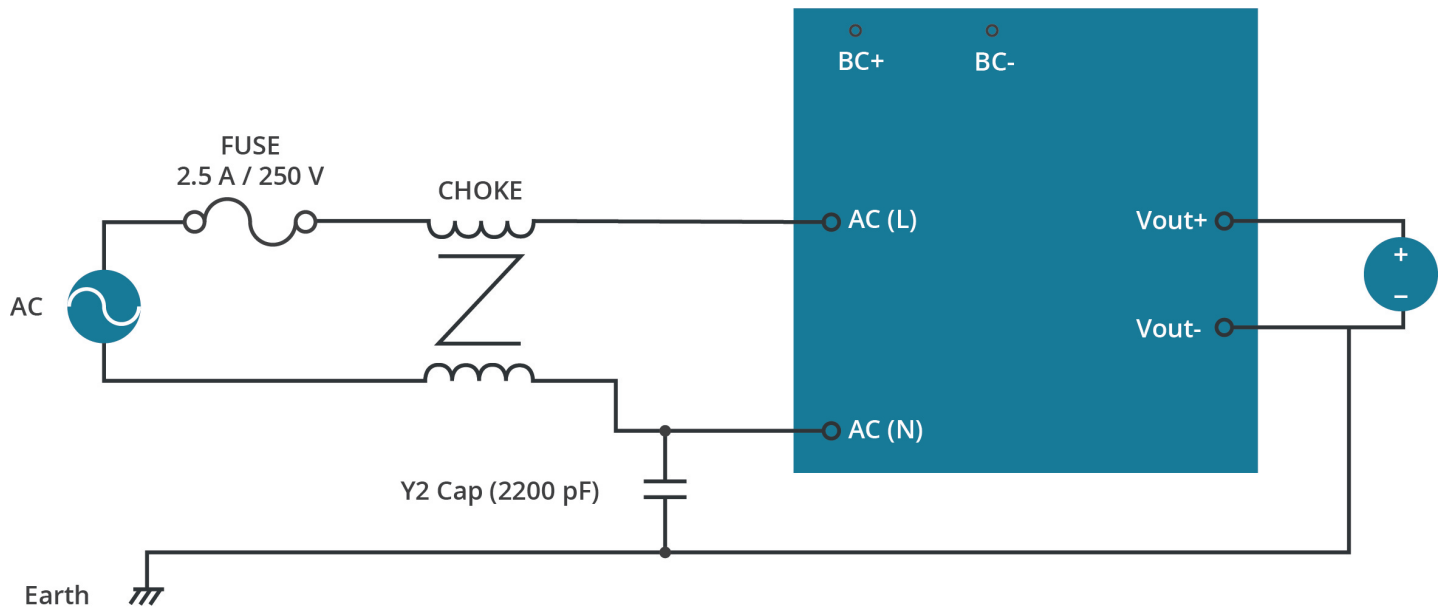
Figure 2



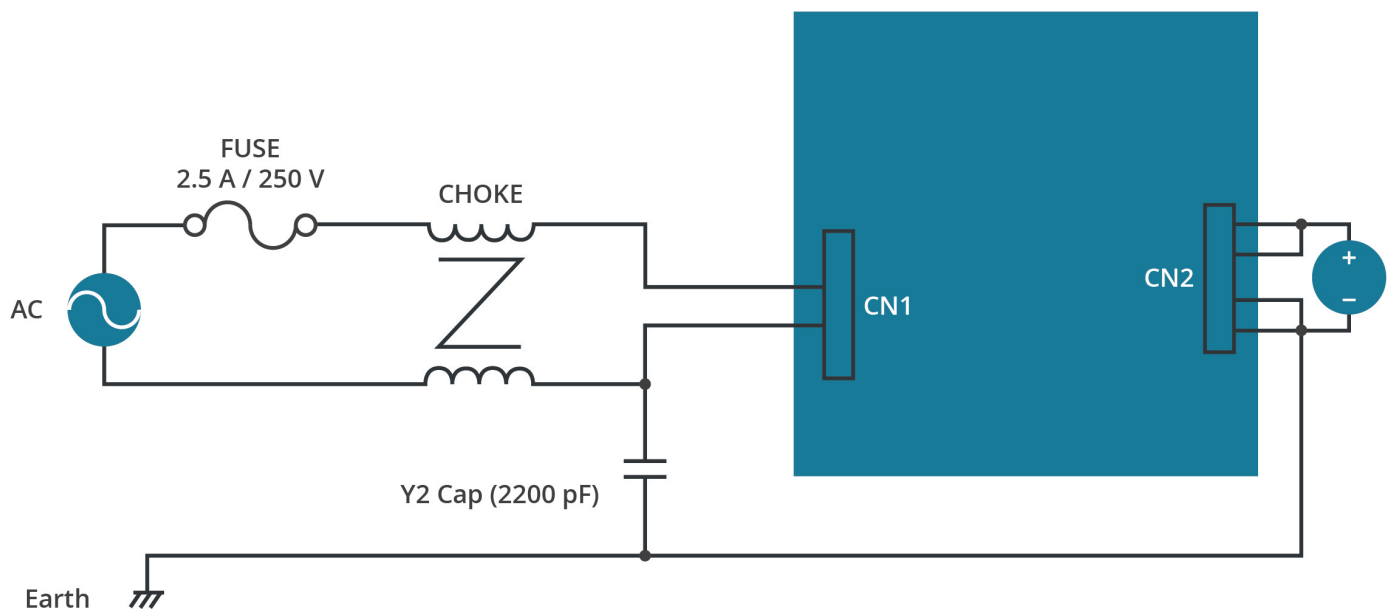
## CLASS I EMI RECOMMENDED CIRCUIT

The series requires additional inductance and YCap to comply with EN 55032 Class B standards under Class I test conditions. If customers are using Class II systems, this section can be disregarded.

**Figure 3**  
**Chassis mount**



**Figure 4**  
**Board mount**



## REVISION HISTORY

| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 10/16/2024 |

The revision history provided is for informational purposes only and is believed to be accurate.



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CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

CUI reserves the right to make changes to the product at any time without notice. Information provided by CUI is believed to be accurate and reliable. However, no responsibility is assumed by CUI for its use, nor for any infringements of patents or other rights of third parties which may result from its use.

CUI products are not authorized or warranted for use as critical components in equipment that requires an extremely high level of reliability. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.