CUI INC
a bel group



# SERIES: AE15-UW | DESCRIPTION: DC-DC CONVERTER

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## FEATURES

- 15 watts
- high operating temp -40 to +70°C
- 4,000 Vac isolation
- designed to meet UL 1741; EN 62109 approved
- board mounted
- input voltage range of 200~1,500 Vdc
- low ripple & noise
- OVP protection
- output short circuit protection

## MODEL

| MODEL | input voltage range (Vdc) | output voltage (Vdc) | output current min (A) | output current max (A) | output power max (W) | ripple & noise[1] max (mVp-p) | efficiency[2] typ (%) |
|---|---|---|---|---|---|---|---|
| AE15-UW-S12 | 200~1500 | 12 | 0 | 1.25 | 15 | 300 | 71 |
| AE15-UW-S15 | 200~1500 | 15 | 0 | 1.00 | 15 | 300 | 72 |
| AE15-UW-S24 | 200~1500 | 24 | 0 | 0.625 | 15 | 300 | 74 |

Notes:
1. Measured at nominal input, 20 MHz bandwidth oscilloscope, with 10 µF electrolytic and 1 µF ceramic capacitors on the output.
2. Measured at 800 Vdc input voltage, full load.
3. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

## PART NUMBER KEY

**AE15-UW - SXX**

Base Number — Output Voltage

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## INPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating input voltage | | 200 | | 1500 | Vdc |
| under voltage shutdown | shut-down range<br>turn-on range | 170<br>180 | | 185<br>195 | Vdc<br>Vdc |
| current | at 200 Vdc<br>at 800 Vdc<br>at 1500 Vdc | | | 120<br>30<br>16 | mA<br>mA<br>mA |
| inrush current | at 200 Vdc<br>at 800 Vdc<br>at 1500 Vdc | | 30<br>80<br>150 | | A<br>A<br>A |
| input fuse | 4 A / 1500 Vdc (external) | | | | |

## OUTPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| maximum capacitive load | 12 Vdc output model<br>15 Vdc output model<br>24 Vdc output model | | | 2,000<br>1,200<br>470 | µF<br>µF<br>µF |
| voltage accuracy | | | ±2 | | % |
| line regulation | from low line to high line, full load | | ±1 | | % |
| load regulation | from 0% to full load | | ±1 | | % |
| delay time | from Vin = 0 V to 90% of rated ouptut voltage | | | 2 | s |
| switching frequency | | | 65 | | kHz |
| temperature coefficient | at full load | | ±0.02 | | %/°C |

## PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| over voltage protection | 12 Vdc, 15 Vdc output models<br>24 Vdc output model | | | 20<br>30 | Vdc<br>Vdc |
| over current protection | automatic recovery | 120 | | 320 | % |
| short circuit protection | continuous, automatic recovery | | | | |

## SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| isolation voltage | input to output for 1 minute | 4,000 | | | Vac |
| safety approvals | CSA, EN 62109 | | | | |
| conducted emissions | CISPR22/EN55022, class A (external circuit required, see Figure 2) | | | | |
| radiated emissions | CISPR22/EN55022, class A (external circuit required, see Figure 2) | | | | |
| ESD | IEC/EN61000-4-2, contact ± 6kV/air ± 8kV, class B | | | | |
| radiated immunity | IEC/EN61000-4-3, 10V/m, class A | | | | |
| EFT/burst | IEC/EN61000-4-4, ± 2kV, class B (external circuit required, see Figure 2) | | | | |
| surge | IEC/EN61000-4-5, line-line ± 1kV, class B (external circuit required, see Figure 2) | | | | |
| conducted immunity | IEC/EN61000-4-6, 10 Vr.m.s, class A | | | | |
| magnetic field immunity | IEC/EN61000-4-8, 10 A/m, class A | | | | |
| MTBF | as per MIL-HDBK-217F, 25°C | 300,000 | | | hours |
| RoHS | yes | | | | |

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## ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating temperature | see derating curves | -40 | | 70 | °C |
| storage temperature | | -40 | | 85 | °C |
| storage humidity | non-condensing | | | 95 | % |
| altitude | see derating curves | | | 5000 | m |

## SOLDERABILITY

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| hand soldering | for 3~5 seconds | 350 | 360 | 370 | °C |
| wave soldering | for 5~10 seconds | 255 | 260 | 265 | °C |

## MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| dimensions | 125.00 x 75.00 x 40.00 [4.921 x 2.953 x 1.575 inch] | | | | mm |
| case material | black flame-retardant heat-proof plastic (UL94V-0) | | | | |
| weight | | | 300 | | g |

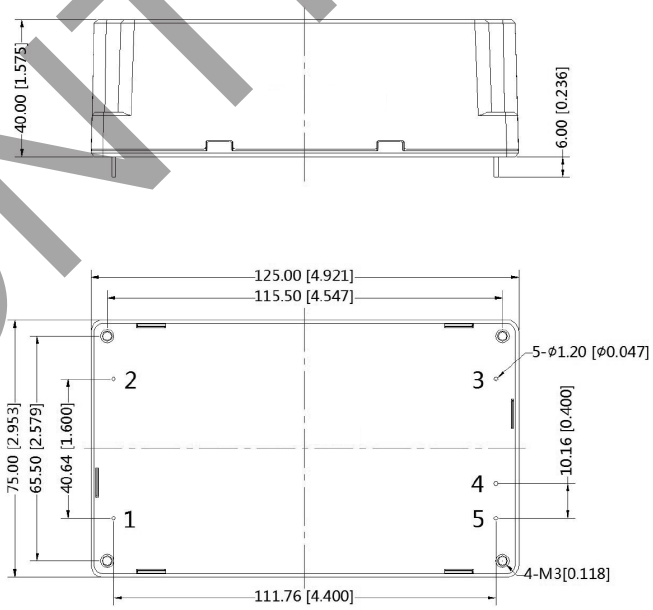
## MECHANICAL DRAWING

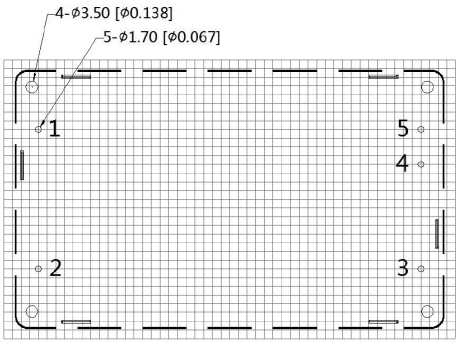
units: mm [inch]
tolerance: ±0.50[±0.020]
pin diameter tolerance: ±0.10[±0.004]
pin height tolerance: ±1.50[±0.059]

In high vibration environments, this series should be mounted with screws.
tightening torque: max 0.4 N*m

| PIN CONNECTIONS | |
|---|---|
| PIN | Function |
| 1 | -Vin |
| 2 | +Vin |
| 3 | NC |
| 4 | -Vout |
| 5 | +Vout |

NC=no connection



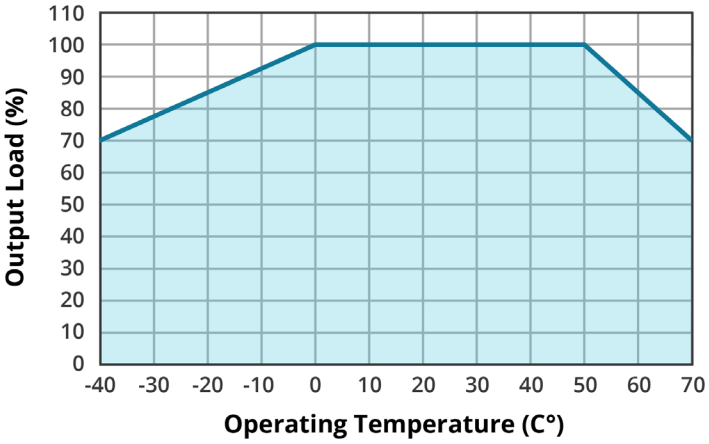




Note : Grid 2.54*2.54mm

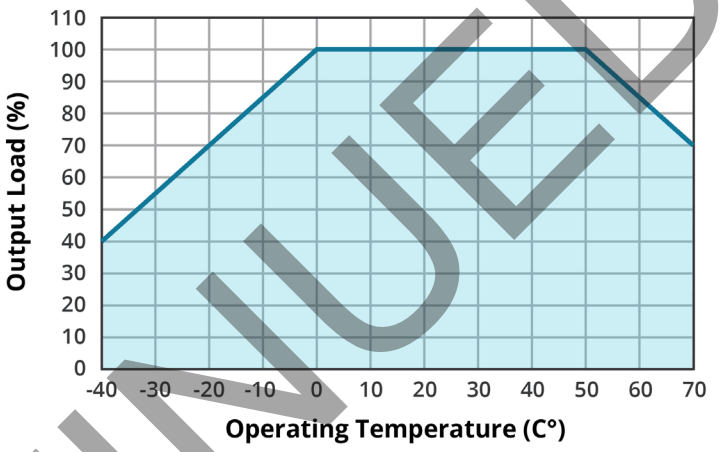
Recommended PCB Layout
Top View

## DERATING CURVES

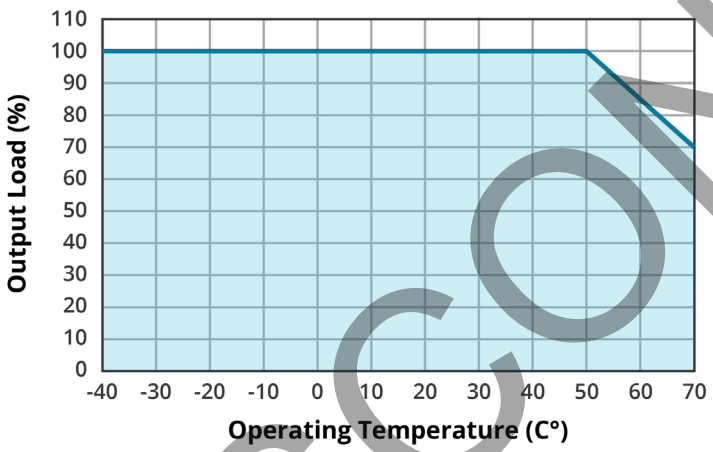
***TEMPERATURE DERATING CURVE***
***12 & 15 Vdc output models***
***(200~300 Vdc Input voltage)***



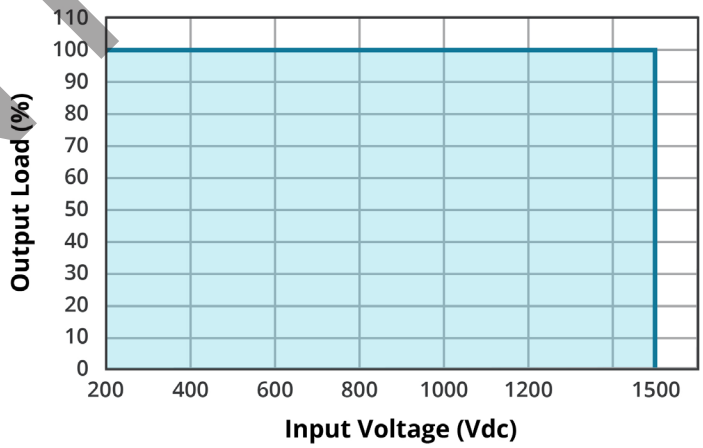

***TEMPERATURE DERATING CURVE***
***24 Vdc output models***
***(200~300 Vdc Input voltage)***



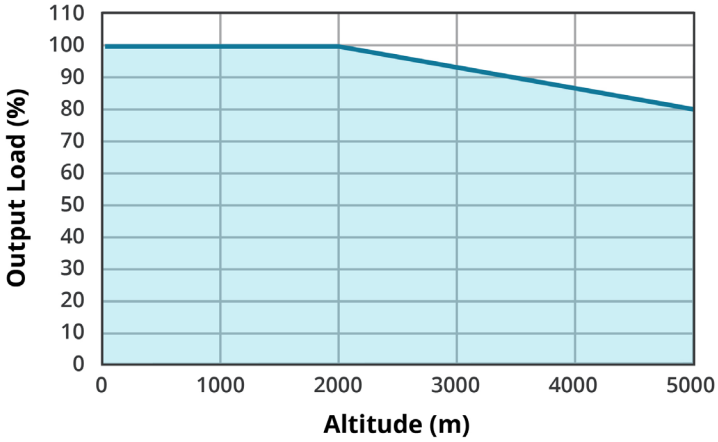

***TEMPERATURE DERATING CURVE***
***(300~1500 Vdc Input voltage)***




***INPUT VOLTAGE DERATING CURVE***
***25°C***




***ALTITUDE DERATING CURVE***

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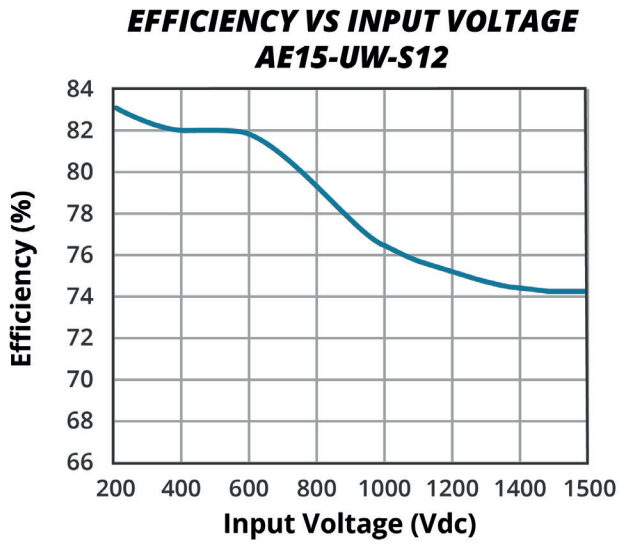
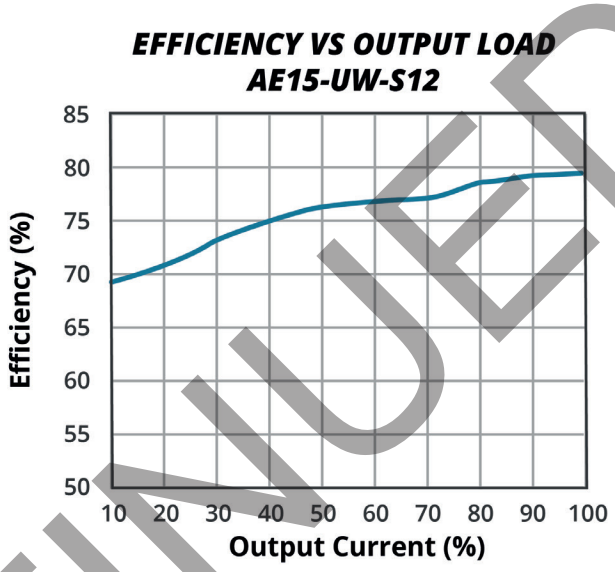
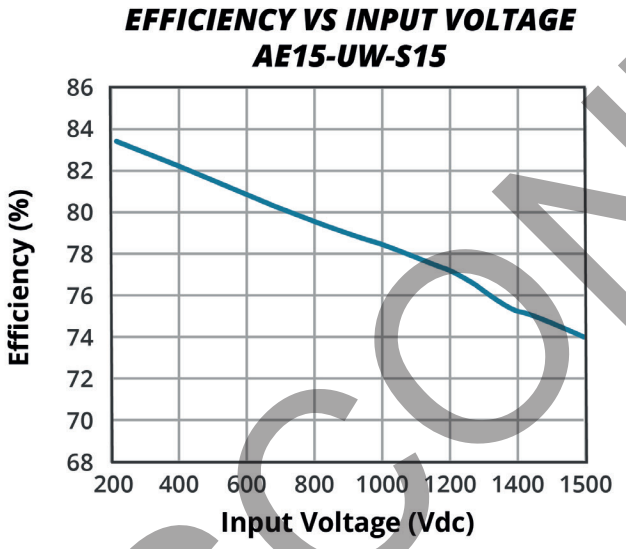
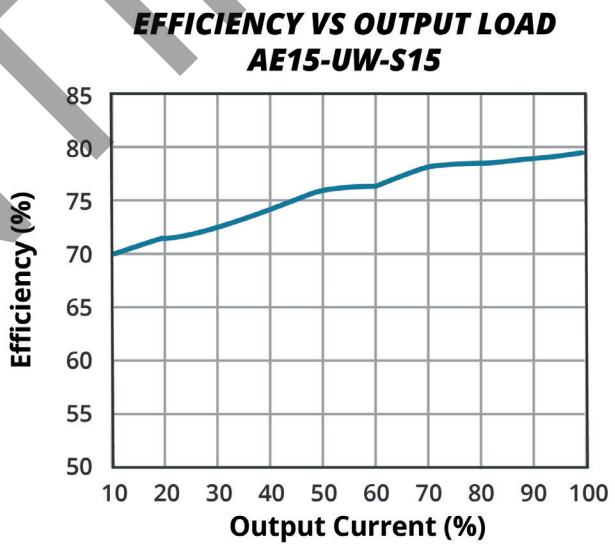
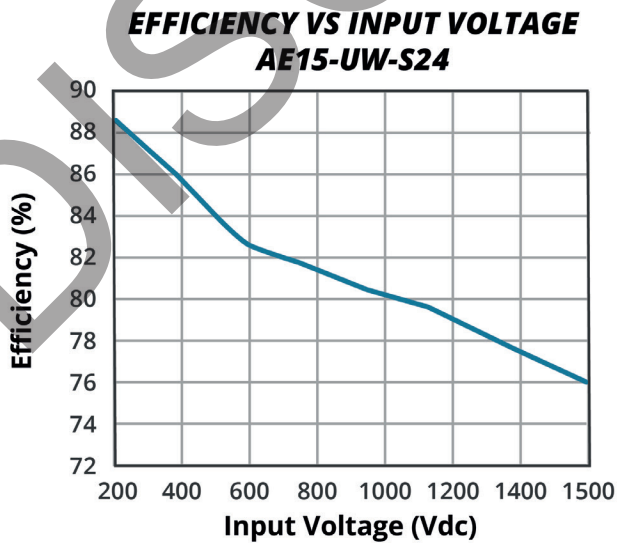
## EFFICIENCY CURVES

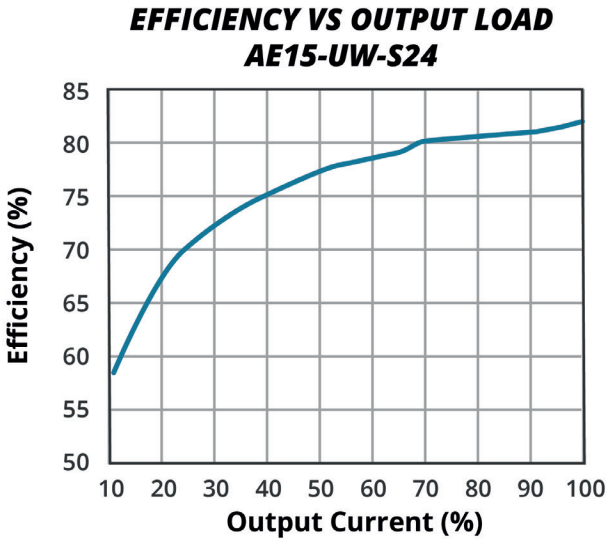
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## APPLICATION CIRCUIT

**Figure 1**

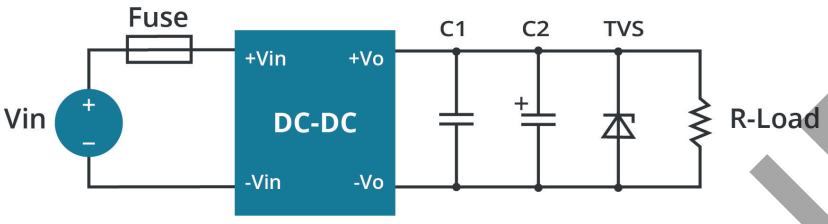


**Table 1**

| Vout (Vdc) | Fuse | C1 (µF) | C2 (µF) | TVS |
|---|---|---|---|---|
| 12 | 4 A / 1500 Vdc | 1 | 120 | SMBJ20A |
| 15 | 4 A / 1500 Vdc | 1 | 120 | SMBJ20A |
| 24 | 4 A / 1500 Vdc | 1 | 68 | SMBJ30A |

## EMC RECOMMENDED CIRCUIT

**Figure 2**

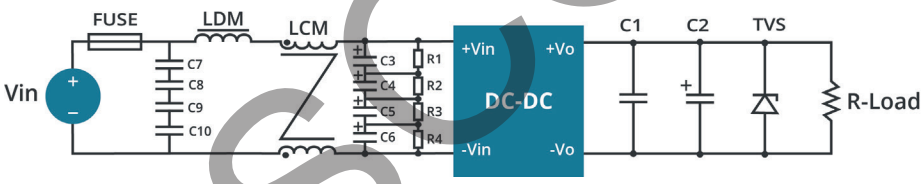


**Table 2**

| Recommended External Circuit Components | |
|---|---|
| FUSE | 4 A/1500 Vdc |
| C7, C8, C9, C10 | 104K/275 Vac |
| C3, C4, C5, C6 | 47 µF/450 Vdc |
| R1, R2, R3, R4 | 1 MΩ/2 W |
| LDM | 330 µH/1 A |
| LCM | 7 mH/1 A |

Note: See also Table 1.

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Notes:
1. C1 is a ceramic capacitor used to filter high frequency noise.
2. C2 is electrolytic and is recommended to be high frequency and low resistance. For capacitance and current of the capacitor, refer to the datasheet provided by the manufacturer. Capacitance withstand voltage derating should be 80% or above.

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 09/13/2017 |
| 1.01 | updated datasheet | 03/05/2018 |
| 1.02 | changed external input fuse recommendation | 07/24/2019 |
| 1.03 | company logo updated | 04/12/2021 |
| 1.04 | derating curves, efficiency curves and circuit figures updated | 08/17/2021 |

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.