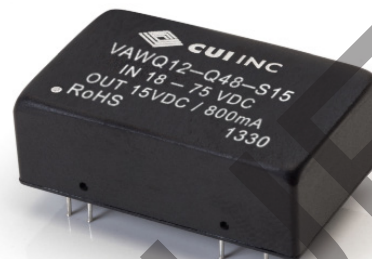


**SERIES: VAWQ12 | DESCRIPTION: DC-DC CONVERTER**
**FEATURES**

- up to 12 W isolated output
- wide input (4:1)
- industry standard 24 pin DIP package
- single regulated outputs
- 1,500 V isolation
- short circuit and over voltage protection
- wide temperature (-40~85°C)
- efficiency up to 88%


**MODEL**

| MODEL           | input voltage |                | output voltage<br>(Vdc) | output current<br>max<br>(mA) | output power<br>max<br>(W) | ripple and noise <sup>1</sup><br>max<br>(mVp-p) | efficiency<br>typ<br>(%) |
|-----------------|---------------|----------------|-------------------------|-------------------------------|----------------------------|-------------------------------------------------|--------------------------|
|                 | typ<br>(Vdc)  | range<br>(Vdc) |                         |                               |                            |                                                 |                          |
| VAWQ12-Q24-S3R3 | 24            | 9.0~36.0       | 3.3                     | 3,500                         | 11.55                      | 85                                              | 85                       |
| VAWQ12-Q24-S5   | 24            | 9.0~36.0       | 5                       | 2,400                         | 12                         | 85                                              | 86                       |
| VAWQ12-Q24-S12  | 24            | 9.0~36.0       | 12                      | 1,000                         | 12                         | 85                                              | 86                       |
| VAWQ12-Q24-S15  | 24            | 9.0~36.0       | 15                      | 800                           | 12                         | 85                                              | 86                       |
| VAWQ12-Q48-S3R3 | 48            | 18.0~75.0      | 3.3                     | 3,500                         | 11.55                      | 85                                              | 85                       |
| VAWQ12-Q48-S5   | 48            | 18.0~75.0      | 5                       | 2,400                         | 12                         | 85                                              | 87                       |
| VAWQ12-Q48-S12  | 48            | 18.0~75.0      | 12                      | 1,000                         | 12                         | 85                                              | 87                       |
| VAWQ12-Q48-S15  | 48            | 18.0~75.0      | 15                      | 800                           | 12                         | 85                                              | 88                       |

Notes: 1. ripple and noise are measured at 20 MHz BW

**PART NUMBER KEY**

**VAWQ12 - QXX - SXX**

Base Number

Input Voltage

Output Voltage

## INPUT

| parameter               | conditions/description | min  | typ | max  | units |
|-------------------------|------------------------|------|-----|------|-------|
| operating input voltage |                        | 9.0  | 24  | 36.0 | Vdc   |
|                         |                        | 18.0 | 48  | 75.0 | Vdc   |
| CTRL <sup>1</sup>       | module on              | 3    |     | 40   | Vdc   |
|                         | or open circuit        |      |     |      |       |
|                         | module off             | 0    |     | 1.2  | Vdc   |

Note: 1. Control pin voltage referenced to GND

## OUTPUT

| parameter               | conditions/description              | min | typ   | max  | units |
|-------------------------|-------------------------------------|-----|-------|------|-------|
| output power            |                                     | 1.2 |       | 12   | W     |
| line regulation         | input voltage from low to high      |     | ±0.2  | ±0.5 | %     |
| load regulation         | measured from 10% load to full load |     | ±0.5  | ±1.5 | %     |
| voltage accuracy        |                                     |     | ±1    | ±3   | %     |
| switching frequency     | measured from 10% load to full load | 350 | 400   | 450  | kHz   |
| temperature coefficient |                                     |     | ±0.02 |      | %/°C  |

## PROTECTIONS

| parameter                | conditions/description         | min        | typ  | max  | units |
|--------------------------|--------------------------------|------------|------|------|-------|
| over voltage protection  | 3.3 V model                    |            | 4.3  |      | Vdc   |
|                          | 5 V model                      |            | 6    |      | Vdc   |
|                          | 12 V model                     |            | 13   |      | Vdc   |
|                          | 15 V model                     |            | 16   |      | Vdc   |
| under voltage protection | 24 V input                     | module on  | 8.8  | 9    | Vdc   |
|                          |                                | module off | 8.3  | 8.5  | Vdc   |
|                          | 48 V input                     | module on  | 17   | 17.5 | Vdc   |
|                          |                                | module off | 16.5 | 17   | Vdc   |
| short circuit protection | continuous, automatic recovery |            |      |      |       |

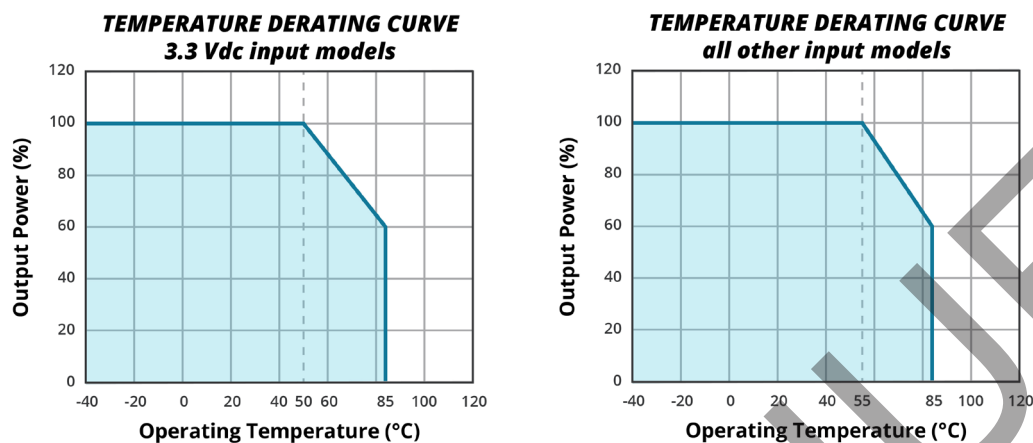
## SAFETY AND COMPLIANCE

| parameter            | conditions/description    | min       | typ | max | units |
|----------------------|---------------------------|-----------|-----|-----|-------|
| isolation voltage    | for 1 minute at 1 mA max. | 1,500     |     |     | Vdc   |
| isolation resistance | at 500 Vdc                | 1,000     |     |     | MΩ    |
| MTBF                 | MIL-HDBK-217F, at 25°C    | 1,000,000 |     |     | hours |
| RoHS compliant       | yes                       |           |     |     |       |

## ENVIRONMENTAL

| parameter             | conditions/description          | min | typ | max | units |
|-----------------------|---------------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves             | -40 |     | 85  | °C    |
| storage temperature   |                                 | -55 |     | 125 | °C    |
| case temperature      |                                 |     | 95  | 105 | °C    |
| storage humidity      | non-condensing                  |     |     | 95  | %     |
| lead temperature      | 1.5 mm from case for 10 seconds |     |     | 300 | °C    |

## DERATING CURVES

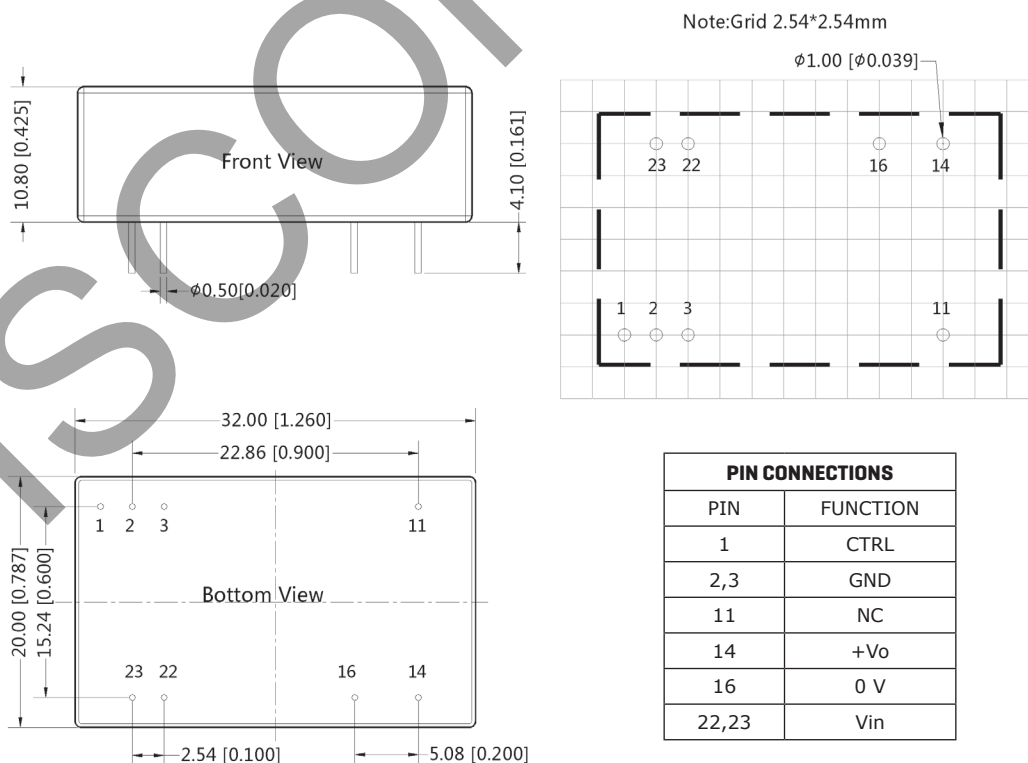


## MECHANICAL

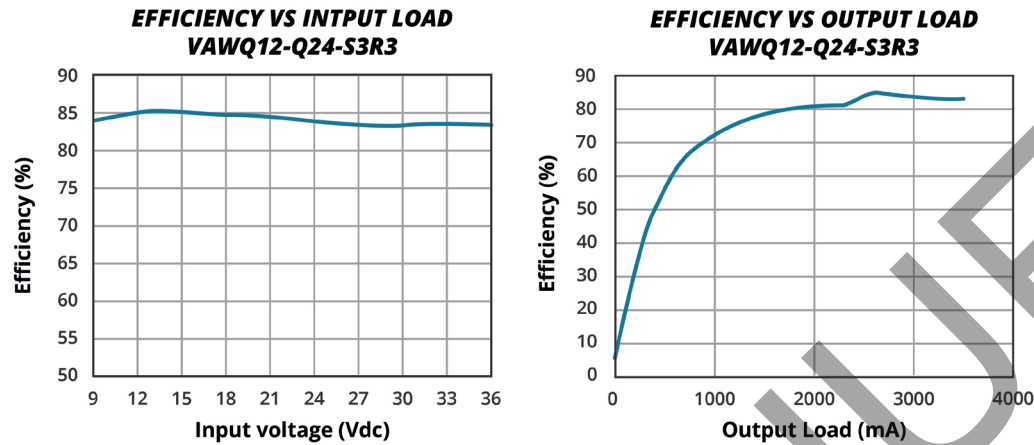
| parameter     | conditions/description                             | min | typ | max | units |
|---------------|----------------------------------------------------|-----|-----|-----|-------|
| dimensions    | 32.00 x 20.00 x 10.80 (1.260 x 0.787 x 0.425 inch) |     |     |     | mm    |
| case material | aluminum alloy                                     |     |     |     |       |
| weight        |                                                    |     | 14  |     | g     |

## MECHANICAL DRAWING

units: mm [inches]

tolerance:  $\pm 0.25$  [ $\pm 0.010$ ]pin section tolerance:  $\pm 0.10$  mm [ $\pm 0.004$ ]

## EFFICIENCY CURVES

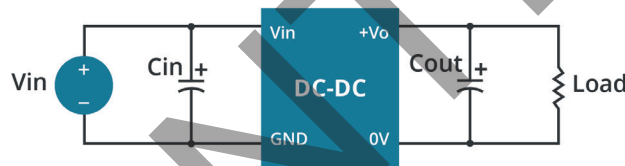


## APPLICATION NOTES

### 1. Recommended Circuit

All of the VAWQ12 models have been tested according to the following recommended testing circuit before leaving factory. If you want to further decrease the input ripple,  $C_{in}$  is recommended to use 100  $\mu F$ . If ripple and noise are required, you can increase capacitance of  $C_{out}$  properly. However, the capacitance should not be higher than Max capacitance. (see Figure 1).

Figure 1



### 2. Recommended Capacitance

Table 1

| Vout (Vdc) | Cin ( $\mu F$ ) | Cout ( $\mu F$ ) |
|------------|-----------------|------------------|
| 3.3/5      | 100             | 220              |
| 12/15      | 100             | 100              |

Note:

1. All specifications measured at  $T_a$ : 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified
2. When product begins to work, the temperature may rise slowly until the unit is stabilized. It is normal that the output voltage, derating, and efficiency may reduce during this time.
3. Min. load shouldn't be less than 10%, otherwise ripple maybe increased dramatically. If the product operates under min. load may not meet all specifications listed. Operation under minimum load will not damage the converter.

## REVISION HISTORY

| rev. | description                                                               | date       |
|------|---------------------------------------------------------------------------|------------|
| 1.0  | initial release                                                           | 09/10/2009 |
| 1.01 | new template applied                                                      | 04/17/2012 |
| 1.02 | V-Infinity branding removed                                               | 09/11/2012 |
| 1.03 | case material changed to aluminum alloy, dimensions changed, spec updated | 07/19/2013 |
| 1.04 | added minimum load note                                                   | 09/19/2013 |
| 1.05 | company logo updated                                                      | 02/15/2021 |
| 1.06 | derating curves, efficiency curves and circuit figure updated             | 07/28/2021 |

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.