


**CUI INC**

a bel group

date 01/15/2024

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**SERIES: V78W-500 | DESCRIPTION: NON-ISOLATED SWITCHING REGULATOR**
**FEATURES**

- up to 500 mA current output
- extremely high efficiency up to 95%
- no heatsink required
- pin comparable to LM78 linear regulators
- available in straight and right angle SIP packages
- up to 8:1 ultra wide input
- low ripple and noise
- short circuit protections
- wide temperature (-40°C ~ 85°C)



| MODEL                     | input<br>voltage<br>range<br>(Vdc) | output<br>voltage<br>(Vdc) | output<br>current |             | output<br>power<br>max<br>(W) | ripple and<br>noise <sup>1</sup><br>max<br>(mVp-p) | efficiency<br>level <sup>2</sup><br>typ<br>(%) |
|---------------------------|------------------------------------|----------------------------|-------------------|-------------|-------------------------------|----------------------------------------------------|------------------------------------------------|
|                           |                                    |                            | min<br>(mA)       | max<br>(mA) |                               |                                                    |                                                |
| V7803W-500 <sup>5</sup>   | 9 ~ 72                             | 3.3                        | 10                | 500         | 1.65                          | 60                                                 | 82                                             |
| V7805W-500                | 9 ~ 72                             | 5                          | 10                | 500         | 2.5                           | 60                                                 | 87                                             |
| V7806W-500 <sup>4,5</sup> | 9 ~ 72                             | 6.5                        | 10                | 500         | 3.25                          | 60                                                 | 91                                             |
| V7809W-500 <sup>4,5</sup> | 14 ~ 72                            | 9                          | 10                | 500         | 4.5                           | 60                                                 | 92                                             |
| V7812W-500 <sup>4</sup>   | 17 ~ 72                            | 12                         | 10                | 500         | 6                             | 60                                                 | 93                                             |
| V7815W-500                | 20 ~ 72                            | 15                         | 10                | 500         | 7.5                           | 60                                                 | 94                                             |
| V7824W-500 <sup>3,4</sup> | 36 ~ 72                            | 24                         | 6                 | 300         | 7.2                           | 60                                                 | 95                                             |

Notes:

1. 20MHz bandwidth, from 10% to 100% load
2. Measured at Vin min and 100% load
3. V7824W-500 output current is 300 mA (max)
4. Standard option discontinued.
5. Bent pin option discontinued.

**PART NUMBER KEY**
**V78 XX W - XXX X**

Base Number

Output Voltage

Output Current

 blank = standard  
R = Right Angle

## INPUT

| parameter               | conditions/description | min | typ | max | units |
|-------------------------|------------------------|-----|-----|-----|-------|
| operating input voltage | 3, 5, 6.5 V models     | 9   | 48  | 72  | Vdc   |
|                         | 9 V model              | 14  | 48  | 72  | Vdc   |
|                         | 12 V model             | 17  | 48  | 72  | Vdc   |
|                         | 15 V model             | 20  | 48  | 72  | Vdc   |
|                         | 24 V model             | 36  | 48  | 72  | Vdc   |

## OUTPUT

| parameter               | conditions/description              | min | typ  | max         | units    |
|-------------------------|-------------------------------------|-----|------|-------------|----------|
| line regulation         | measured from low line to high line |     | ±0.4 | ±1.0        | %        |
| load regulation         | measured from 10% to full load      |     | ±0.3 | ±0.6        | %        |
| voltage accuracy        | at 100% load                        |     | ±2   | ±3          | %        |
| switching frequency     | 100% load                           | 120 |      | 800         | kHz      |
| temperature coefficient | -40°C ~ +85°C ambient               |     |      | ±0.015      | %/°C     |
| quiescent current       | Vin = nominal, min. load            |     | 1    | 5           | mA       |
| tendencies load         | at 10% to 100% load                 |     | 1.0  | ±100<br>1.5 | mV<br>ms |
| max capacitance load    |                                     |     |      | 100         | µF       |

## PROTECTIONS

| parameter                 | conditions/description         | min | typ  | max  | units |
|---------------------------|--------------------------------|-----|------|------|-------|
| short circuit protection  | continuous, automatic recovery |     |      |      |       |
| short circuit input power | Vin = nominal                  |     | 0.72 | 1.2  | W     |
| thermal shutdown          |                                |     | 160  |      | °C    |
| current limit             | Vin = nominal                  |     | 700  | 1200 | mA    |

## SAFETY AND COMPLIANCE

| parameter          | conditions/description                                       | min       | typ | max | units |
|--------------------|--------------------------------------------------------------|-----------|-----|-----|-------|
| thermal resistance |                                                              |           |     | 60  | °C/W  |
| EMI/EMC            | EN55022, class B (refer to page 4), IEC/EN 61000-4-2 level 4 |           |     |     |       |
| RoHS compliant     | yes                                                          |           |     |     |       |
| MTBF               | 25°C (MIL-HDBK-217K)                                         | 3,500,000 |     |     | hours |
|                    | 71°C (MIL-HDBK-217K)                                         | 1,500,000 |     |     | hours |

## ENVIRONMENTAL

| parameter                  | conditions/description    | min | typ | max | units |
|----------------------------|---------------------------|-----|-----|-----|-------|
| case operating temperature |                           |     | 65  | 100 | °C    |
| operating temperature      | power derating above 71°C | -40 |     | 85  | °C    |
| storage temperature        |                           | -55 |     | 125 | °C    |
| storage humidity           | non-condensing            |     |     | 95  | %     |

| parameter     | conditions/description                         | min | typ | max | units |
|---------------|------------------------------------------------|-----|-----|-----|-------|
| dimensions    | 11.5 x 9.0 x 17.5 mm (0.45 x 0.35 x 0.69 inch) |     |     |     |       |
| case material | Plastic (UL94-V0)                              |     |     |     |       |
| weight        |                                                |     | 4   |     | g     |

## MECHANICAL DRAWING

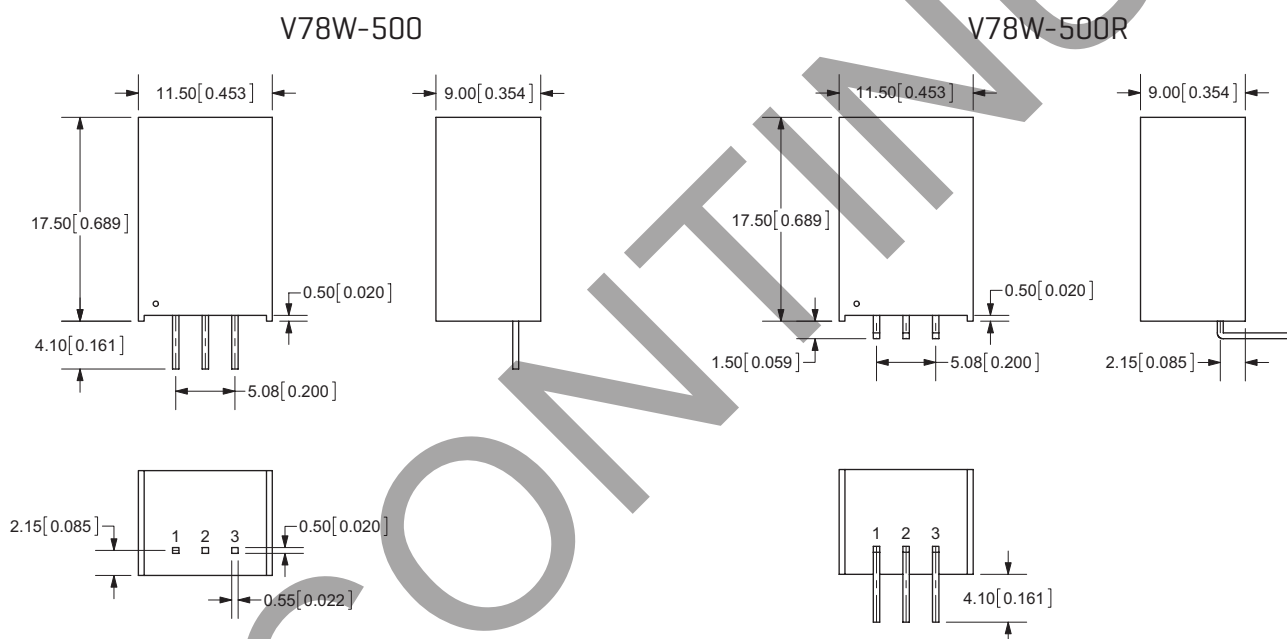
Units: mm [in]

All pins on a 2.54mm pitch

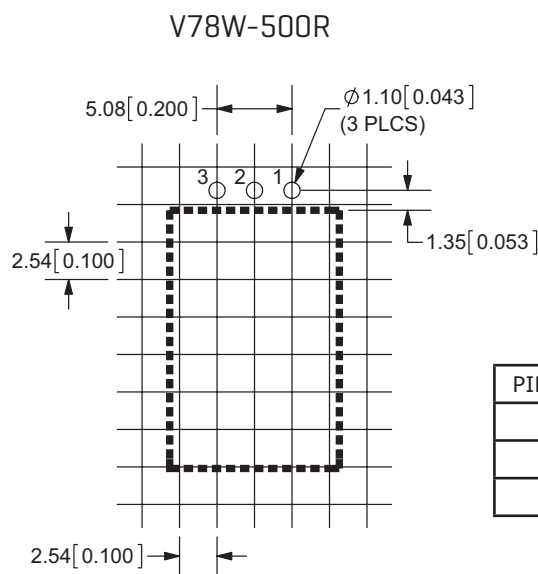
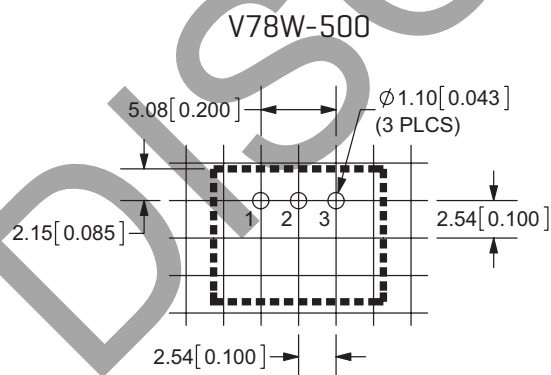
pin tolerance:  $\pm 0.10\text{mm}[\pm 0.004\text{in}]$

general tolerance:  $\pm 0.25\text{mm}$  [ $\pm 0.010\text{in}$ ]

general tolerance (right angle):  $\pm 0.50\text{mm}[\pm 0.020\text{in}]$

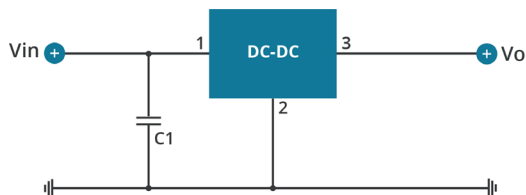


## RECOMMENDED FOOTPRINT



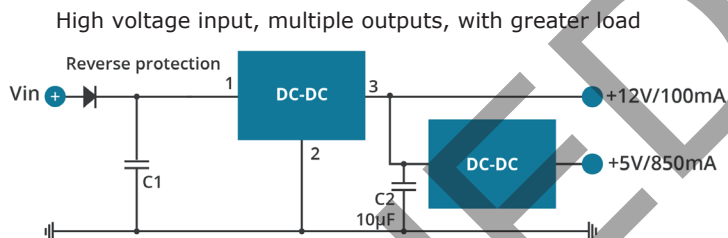
| PIN CONNECTIONS |       |
|-----------------|-------|
| 1               | +Vin  |
| 2               | GND   |
| 3               | +Vout |

## TYPICAL APPLICATION CIRCUIT



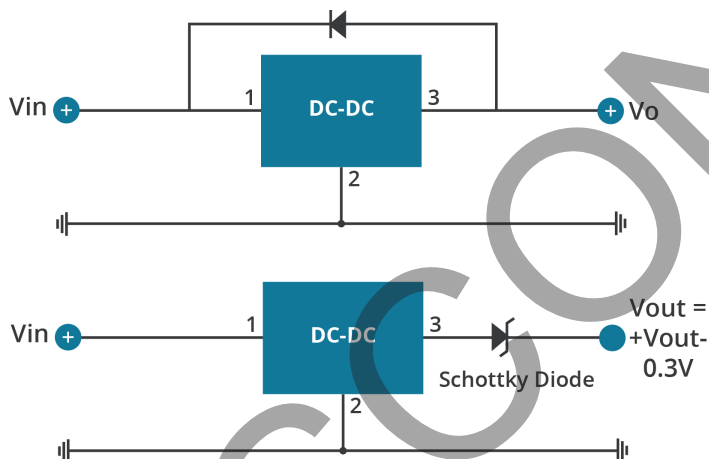
1. The regulator proposed to establish the input voltage by soft-start, no plug and play, if the input voltage changes from low voltage to high voltage abruptly, the regulator might be damaged.
2. If the applications is high-voltage input, the regulator must add an external capacitor  $C1$  ( $\leq 47\mu\text{F}/100\text{V}$ ) to prevent voltage spikes caused by damage to the module.
3. No parallel connection.

## APPLICATION EXAMPLE



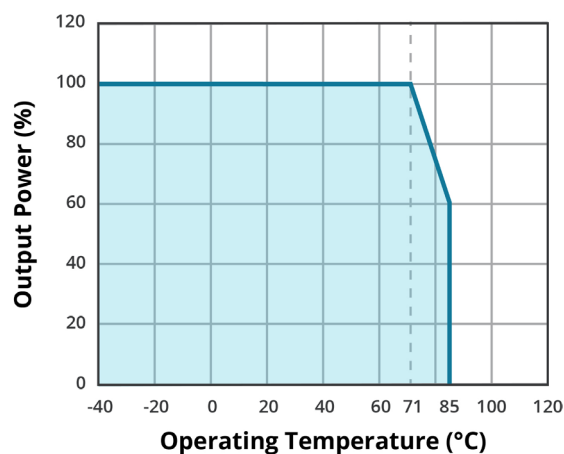
1. The input current amount of the back-grade regulator and the pre-class load should be less than or equal the max load current of the pre-class regulator.
2. If further filtering is required, please add components as per the above circuit (We recommend not to add components), if request, please make sure the capacitors  $C1 \leq 47\mu\text{F}$ ,  $C2 \leq 10\mu\text{F}$  more close to the back-grade regulator.

## MODULES PROTECT RECOMMENDED CIRCUIT

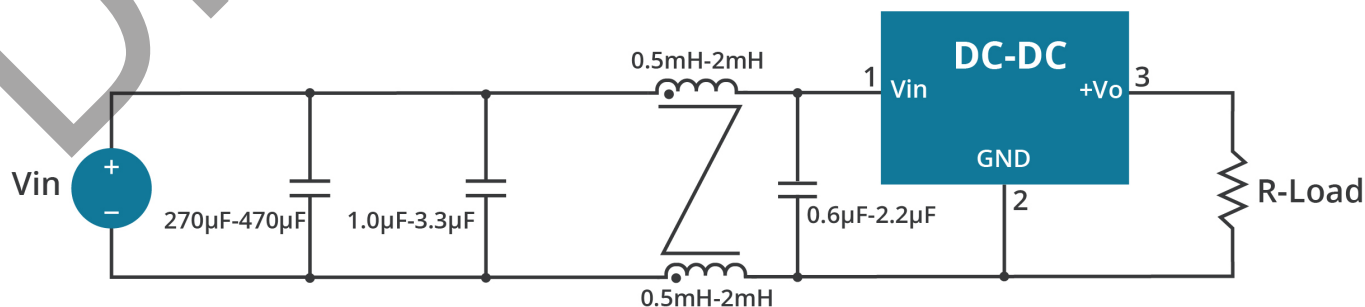


## DERATING CURVE

TEMPERATURE DERATING CURVE



## EMC RECOMMENDED CIRCUIT



## REVISION HISTORY

| rev. | description                                                                                               | date       |
|------|-----------------------------------------------------------------------------------------------------------|------------|
| 1.0  | initial release                                                                                           | 09/28/2011 |
| 1.01 | V-Infinity branding removed                                                                               | 09/06/2012 |
| 1.02 | updated datasheet                                                                                         | 04/21/2015 |
| 1.03 | company logo updated                                                                                      | 04/14/2021 |
| 1.04 | derating curve and circuit figures updated                                                                | 09/21/2021 |
| 1.05 | discontinued model V7803W-500R, V7806W-500, V7806W-500R, V7809W-500, V7809W-500R, V7812W-500 & V7824W-500 | 01/15/2024 |

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.

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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.