CUI INC
a bel group



# SERIES: V78-1000 | DESCRIPTION: NON-ISOLATED SWITCHING REGULATOR

## FEATURES

- 1 A current output
- extremely high efficiency up to 97%
- no heat sink required
- pin compatible to LM78XX linear regulators
- available in straight and right angle SIP packages
- low ripple and noise
- short circuit protection, thermal shutdown
- wide temperature (-40~85°C)

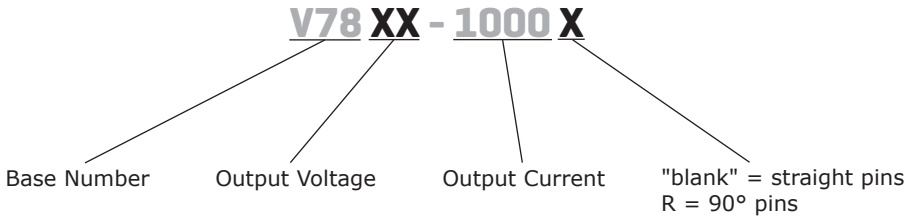
RoHS

## MODEL

| MODEL | input voltage typ (Vdc) | input voltage range (Vdc) | output voltage[1] (Vdc) | output current max (mA) | ripple and noise[2] max (mVp-p) | efficiency Vin min (%) | efficiency Vin max (%) |
|---|---|---|---|---|---|---|---|
| V7803-1000 | 24 | 4.75~28 | 3.3 | 1,000 | 35 | 90 | 83 |
| V7805-1000 | 24 | 6.5~32 | 5 | 1,000 | 35 | 93 | 88 |
| V7806-1000 | 24 | 9~32 | 6.5 | 1,000 | 35 | 94 | 90 |
| V7809-1000 | 24 | 12~32 | 9 | 1,000 | 35 | 95 | 92 |
| V7812-1000 | 24 | 16~32 | 12 | 1,000 | 35 | 96 | 94 |
| V7815-1000 | 24 | 20~32 | 15 | 1,000 | 35 | 97 | 94 |

Notes: 1. Not recommended for use in a negative output mode.
2. Ripple and noise are measured at 20 MHz BW, see Test Configuration section.

## PART NUMBER KEY



## INPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating input voltage | 3.3 Vdc model | 4.75 | 24 | 28 | Vdc |
| | 5 Vdc model | 6.5 | 24 | 32 | Vdc |
| | 6.5 Vdc model | 9.0 | 24 | 32 | Vdc |
| | 9 Vdc model | 12 | 24 | 32 | Vdc |
| | 12 Vdc model | 16 | 24 | 32 | Vdc |
| | 15 Vdc model | 20 | 24 | 32 | Vdc |

## OUTPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| line regulation | Vin = min ~ max, at full load | | ±0.2 | ±0.4 | % |
| load regulation | measured from 10% load to full load | | ±0.4 | ±0.6 | % |
| voltage accuracy | 100% load | | ±2 | ±3 | % |
| switching frequency | 100% load, input voltage range | 280 | 330 | 450 | kHz |
| temperature coefficient | | | ±0.02 | | %/°C |
| load capacitance | | | | 1,000 | µF |

## PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| short circuit protection | continuous, automatic recovery | | | | |
| thermal shutdown | | | 150 | | °C |

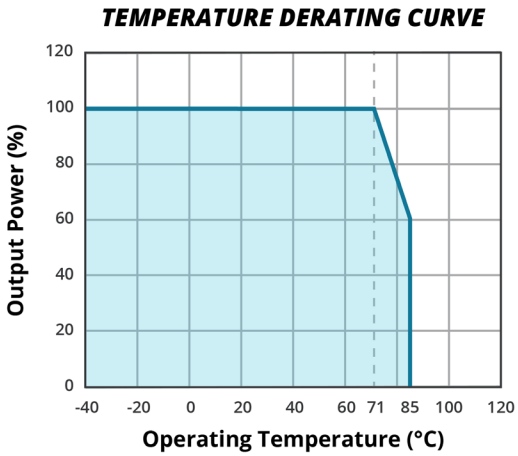
## SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| MTBF | as per MIL-HDBK-217F, 25°C | 2,000,000 | | | hours |
| RoHS compliant | 2011/65/EU | | | | |

## ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating temperature | see derating curve | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| case temperature | | | | 100 | °C |
| storage humidity | non-condensing | | | 95 | % |
| lead temperature | 1.5 mm from case for 10 seconds | | | 300 | °C |

## DERATING CURVES



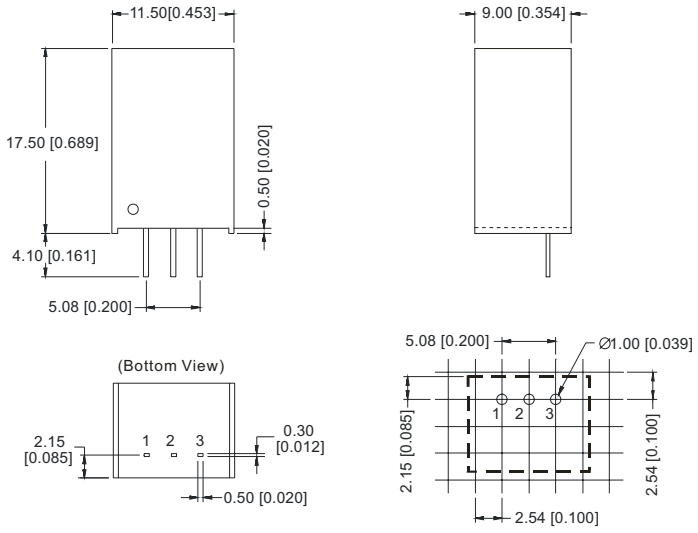

## MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| dimensions | 11.50 x 9.00 x 17.50 (0.689 x 0.354 x 0.453 inch) | | | | mm |
| case material | plastic (UL94-V0) | | | | |
| weight | | | 3.7 | | g |

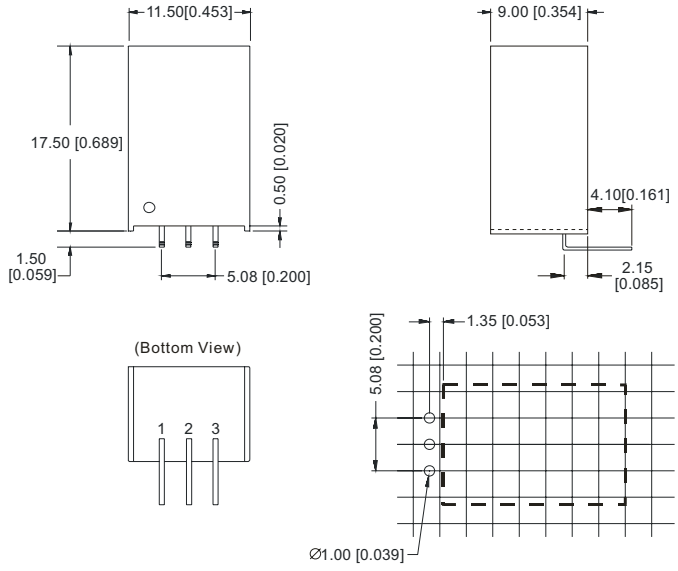
## MECHANICAL DRAWING

units: mm [inches]
tolerance: ±0.25 [0.010]
pin section tolerance: ±0.10 [0.004]

**V78XX-1000**




**V78XX-1000R**

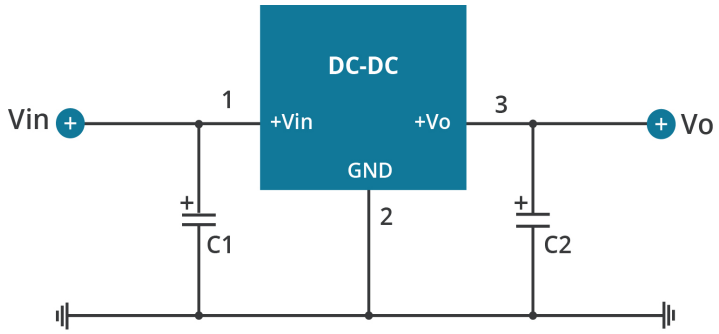



| PIN CONNECTIONS | |
|---|---|
| PIN | FUNCTION |
| 1 | +Vin |
| 2 | GND |
| 3 | +Vo |

## EXTERNAL CAPACITOR TABLE

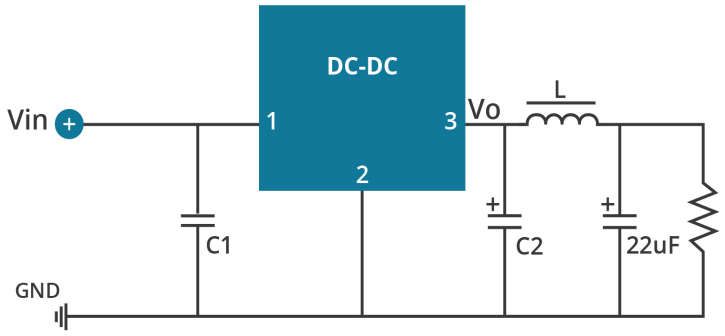
| Part Number | C1[2] (Ceramic capacitor) | C2 (Ceramic capacitor) |
|---|---|---|
| V7803-1000(R) | 10µF/50V | 22µF/6.3V |
| V7805-1000(R) | 10µF/50V | 22µF/16V |
| V7806-1000(R) | 10µF/50V | 10µF/16V |
| V7809-1000(R) | 10µF/50V | 10µF/16V |
| V7812-1000(R) | 10µF/50V | 10µF/25V |
| V7815-1000(R) | 10µF/50V | 10µF/25V |

## TYPICAL APPLICATION CIRCUIT




Notes:
1. C1 and C2 are required and should be fitted close to the converter pins.
2. If the input voltage is greater than 26 Vdc (3.3 Vdc output model) or greater than 28 Vdc (all other models), it is required to have C1 be ≥ 22 µF electrolytic capacitor to protect the part from voltage spikes.

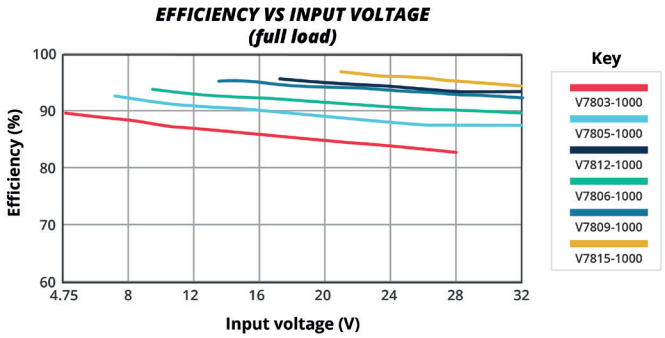
## OUTPUT RIPPLE REDUCTION

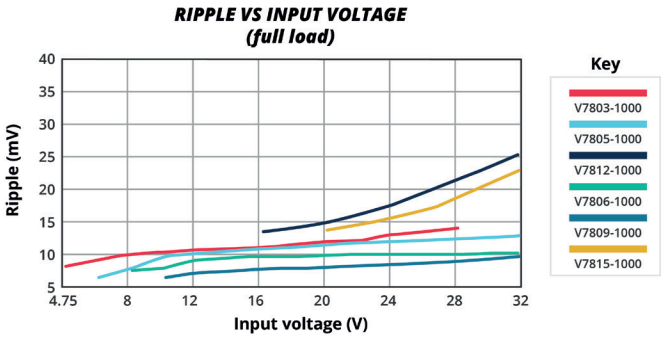


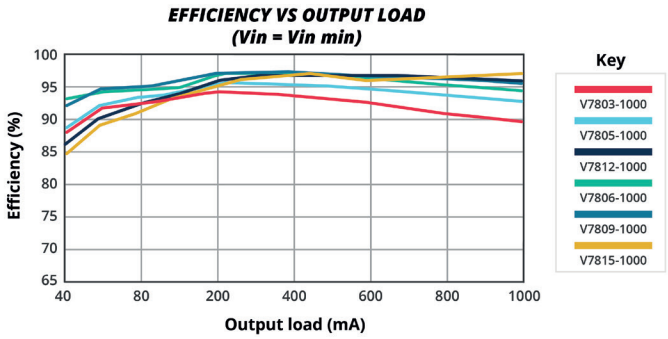

To reduce output ripple, it is recommended to add a LC filter in output port.

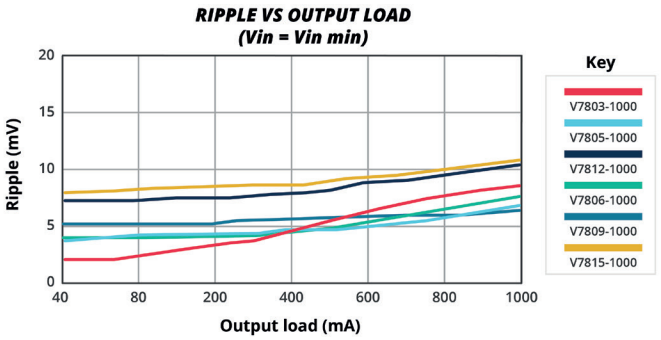
L: Recommended parameter 10µH ~ 47µH.

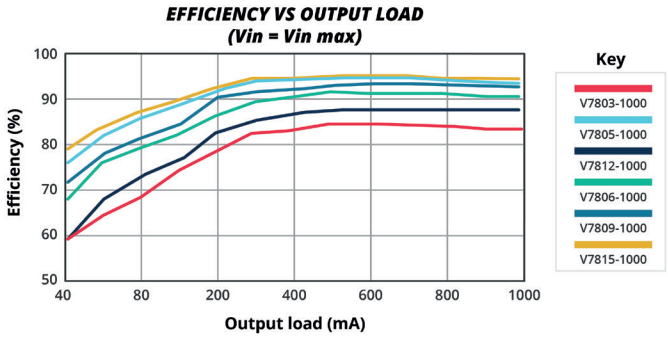
## EFFICIENCY AND RIPPLE CURVES

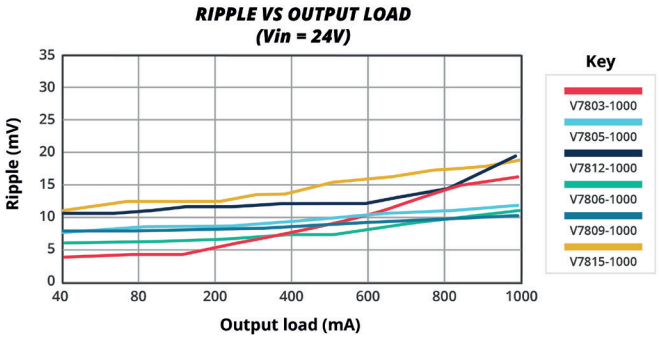


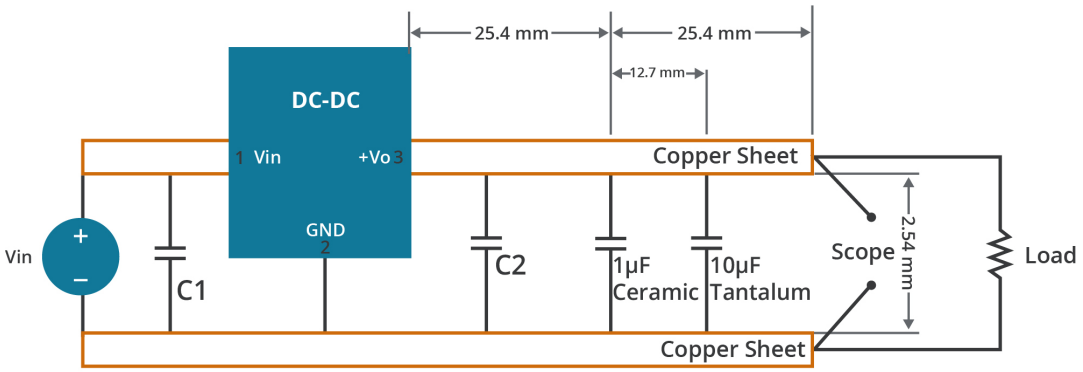



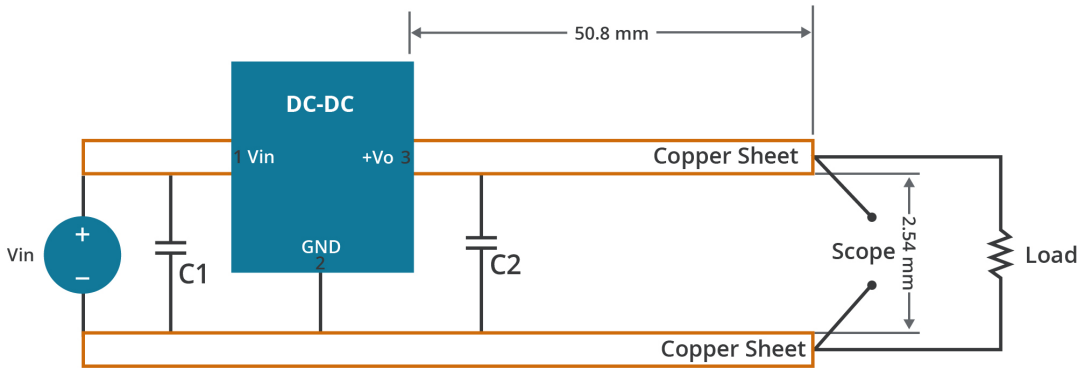



## TEST CONFIGURATION

### Efficiency and Output Voltage Ripple Test




### Start-up and Load Transient Response Test




Note: All specifications measured at 25°C, humidity <75%, nominal input voltage, and full load unless otherwise noted.

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 07/13/2010 |
| 1.01 | V-Infinity branding removed | 09/04/2012 |
| 1.02 | updated typical application circuits | 09/25/2012 |
| 1.03 | corrected switching frequency values | 04/22/2013 |
| 1.04 | not recommended for use as an inverter | 08/27/2014 |
| 1.05 | company logo updated | 04/14/2021 |
| 1.06 | derating curve, efficiency curves and circuit figures updated | 09/22/2021 |

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

CUI INC
a bel group

**Headquarters**
20050 SW 112th Ave.
Tualatin, OR 97062
**800.275.4899**

Fax 503.612.2383
**cui**.com
techsupport@cui.com

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

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