



## SERIES: V78-500 | DESCRIPTION: NON-ISOLATED SWITCHING REGULATOR

### FEATURES

- 0.5 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)

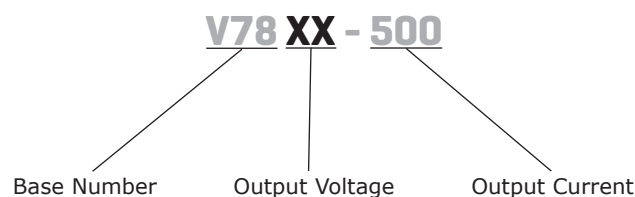


| MODEL      | input voltage |                | output voltage<br>(Vdc) | output current<br>max<br>(mA) | output power<br>max<br>(W) | ripple and noise <sup>1</sup><br>max<br>(mVp-p) | efficiency     |                |
|------------|---------------|----------------|-------------------------|-------------------------------|----------------------------|-------------------------------------------------|----------------|----------------|
|            | typ<br>(Vdc)  | range<br>(Vdc) |                         |                               |                            |                                                 | Vin min<br>(%) | Vin max<br>(%) |
| V7801-500  | 12            | 4.75~26        | 1.5                     | 500                           | 0.75                       | 35                                              | 76             | 66             |
| V78X2-500* | 12            | 4.75~28        | 1.8                     | 500                           | 0.9                        | 35                                              | 79             | 67             |
| V7802-500  | 12            | 4.75~28        | 2.5                     | 500                           | 1.25                       | 35                                              | 85             | 73             |
| V7803-500  | 24            | 4.75~28        | 3.3                     | 500                           | 1.65                       | 35                                              | 90             | 80             |
| V7805-500  | 24            | 6.5~32         | 5.0                     | 500                           | 2.5                        | 35                                              | 93             | 84             |
| V78X6-500  | 24            | 8~32           | 6.5                     | 500                           | 3.25                       | 35                                              | 94             | 87             |
| V7809-500  | 24            | 11~32          | 9.0                     | 500                           | 4.5                        | 35                                              | 95             | 91             |
| V7812-500  | 24            | 15~32          | 12                      | 500                           | 6                          | 35                                              | 95             | 92             |
| V7815-500  | 24            | 18~32          | 15                      | 500                           | 7.5                        | 35                                              | 96             | 93             |

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

\*, Discontinued model

### PART NUMBER KEY



## INPUT

| parameter               | conditions/description | min  | typ | max | units |
|-------------------------|------------------------|------|-----|-----|-------|
| operating input voltage | 1.5 V output           | 4.75 | 12  | 26  | Vdc   |
|                         | 1.8 V output           | 4.75 | 12  | 28  | Vdc   |
|                         | 2.5 V output           | 4.75 | 12  | 28  | Vdc   |
|                         | 3.3 V output           | 4.75 | 24  | 28  | Vdc   |
|                         | 5 V output             | 6.5  | 24  | 32  | Vdc   |
|                         | 6 V output             | 8    | 24  | 32  | Vdc   |
|                         | 9 V output             | 11   | 24  | 32  | Vdc   |
|                         | 12 V output            | 15   | 24  | 32  | Vdc   |
|                         | 15 V output            | 18   | 24  | 32  | Vdc   |

## OUTPUT

| parameter               | conditions/description         | min                                 | typ  | max   | units |
|-------------------------|--------------------------------|-------------------------------------|------|-------|-------|
| line regulation         | Vin = min ~ max,               |                                     | ±0.5 | ±1.0  | %     |
|                         | at full load                   | 1.5~2.5 V models<br>3.3~15 V models | ±0.2 | ±0.4  | %     |
| load regulation         | measured from                  |                                     | ±0.4 | ±0.75 | %     |
|                         | 10% load to full load          | 1.5~2.5 V models<br>3.3~15 V models | ±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  |

## PROTECTIONS

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

## SAFETY AND COMPLIANCE

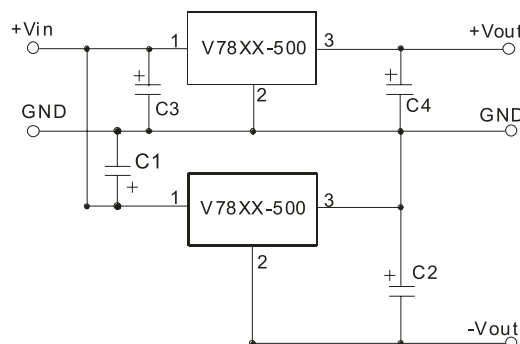
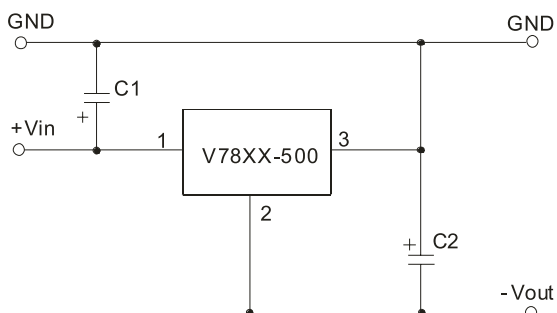
| parameter      | conditions/description | min       | typ | max | units |
|----------------|------------------------|-----------|-----|-----|-------|
| MTBF           |                        | 2,000,000 |     |     | hours |
| RoHS compliant | yes                    |           |     |     |       |

## ENVIRONMENTAL

| parameter             | conditions/description          | min | typ | max | units |
|-----------------------|---------------------------------|-----|-----|-----|-------|
| operating temperature |                                 | -40 |     | 85  | °C    |
| storage temperature   |                                 | -55 |     | 125 | °C    |
| case temperature      |                                 |     |     | 100 | °C    |
| storage humidity      | non-condensing                  |     |     | 95  | %     |
| temperature rise      | at full load                    |     | 25  |     | °C    |
| lead temperature      | 1.5 mm from case for 10 seconds |     |     | 300 | °C    |

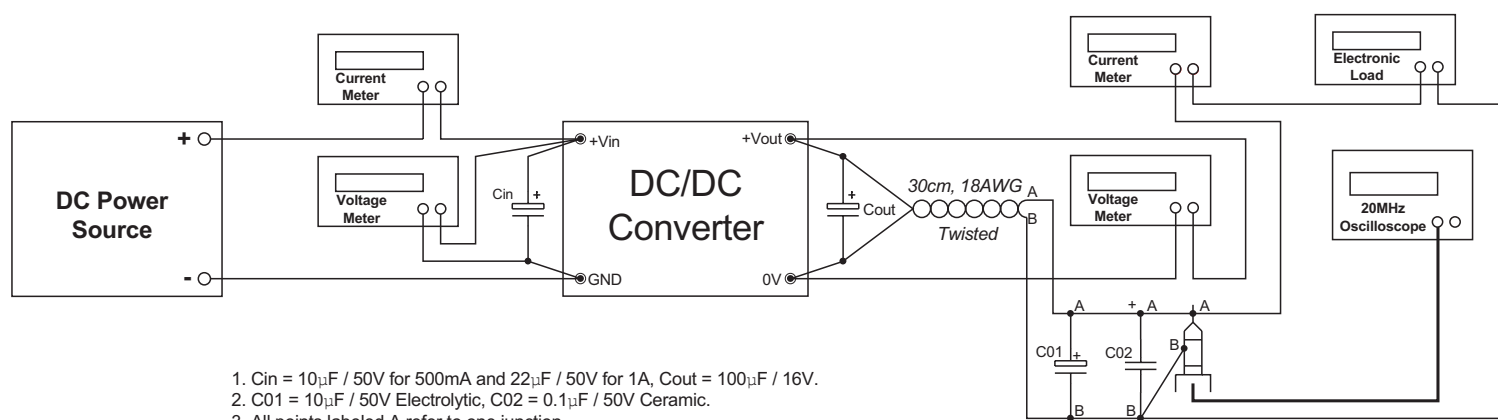


## TYPICAL APPLICATION CIRCUIT



1. C1 and C2 are required and should be fitted close to the converter pins
2. For the capacitance of C1 and C2, see the external capacitor table. Low ESR types should be chosen
3. C3: a low ESR capacitor is required to keep the noise at the converter to a minimum. Ceramic capacitors are preferred, but tantalum or low ESR electrolytic capacitors may also suffice; General use 10 $\mu$ F/50V ceramic capacitor. C4 Optional, General use 100 $\mu$ F/25V electrolytic capacitor.
4. No parallel connection or plug and play

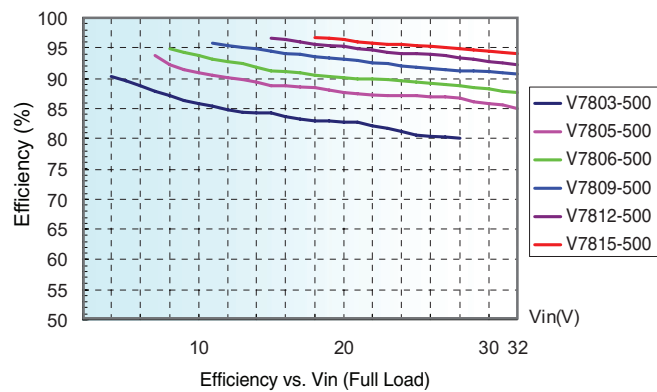
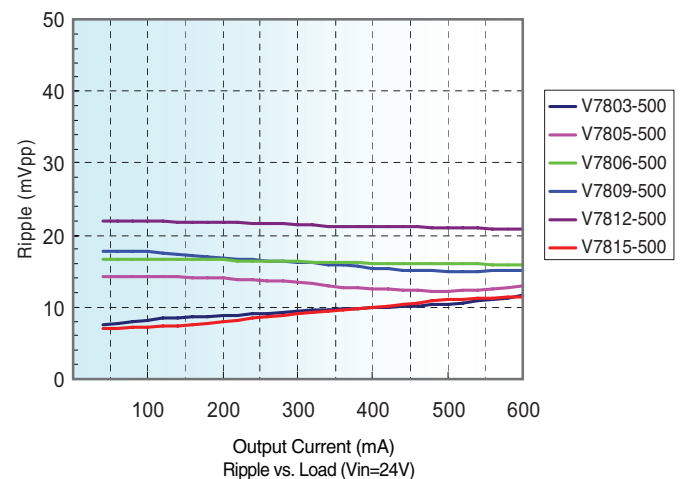
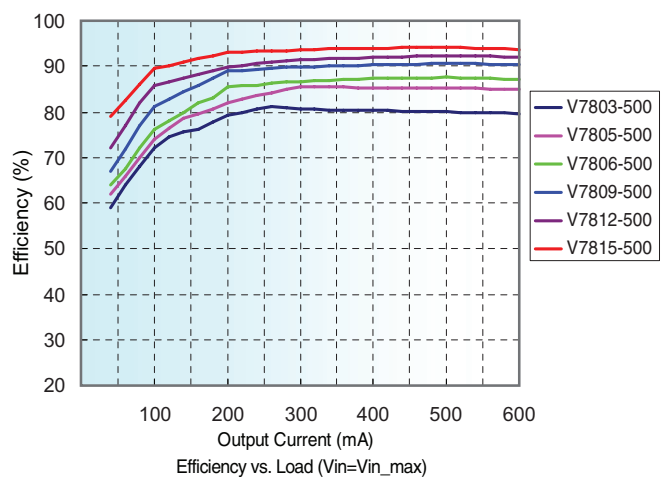
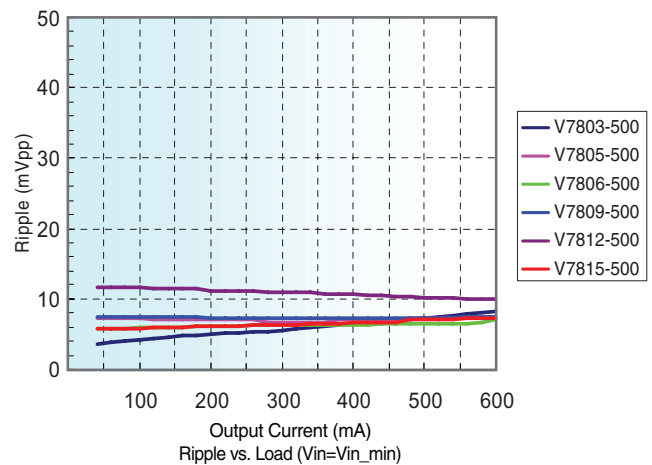
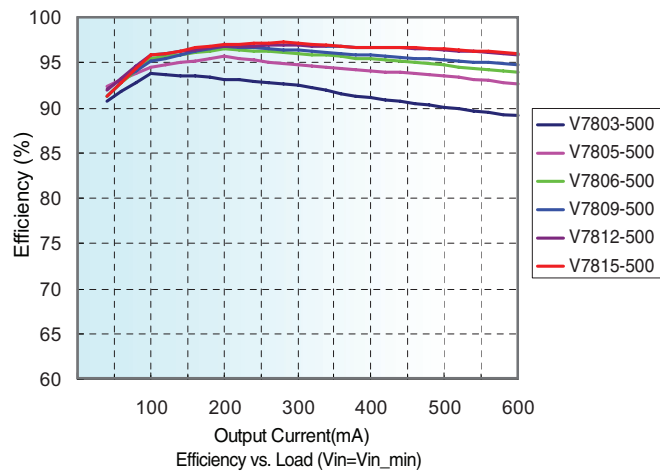
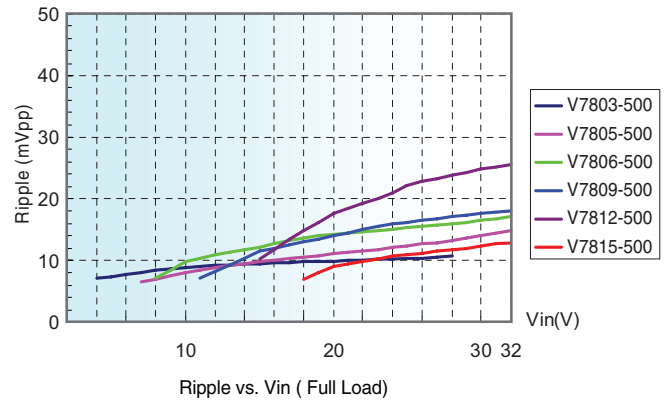
## TEST CIRCUIT



1.  $C_{in} = 10\mu\text{F} / 50\text{V}$  for 500mA and  $22\mu\text{F} / 50\text{V}$  for 1A,  $C_{out} = 100\mu\text{F} / 16\text{V}$ .
2. C01 = 10 $\mu$ F / 50V Electrolytic, C02 = 0.1 $\mu$ F / 50V Ceramic.
3. All points labeled A refer to one junction.
4. All points labeled B refer to one junction.
5. Use a short ground loop for probing. Do not use a wired ground clip.

## EFFICIENCY AND RIPPLE

## Efficiency

Output  
Ripple

## EXTERNAL CAPACITOR TABLE

| Part      | C1,C3               | C2,C4               |
|-----------|---------------------|---------------------|
| Number    | (Ceramic Capacitor) | (Ceramic Capacitor) |
| V7801-500 | 10 $\mu$ F/50V      | 22 $\mu$ F/6.3V     |
| V78X2-500 | 10 $\mu$ F/50V      | 22 $\mu$ F/6.3V     |
| V7802-500 | 10 $\mu$ F/50V      | 22 $\mu$ F/6.3V     |
| V7803-500 | 10 $\mu$ F/50V      | 22 $\mu$ F/6.3V     |
| V7805-500 | 10 $\mu$ F/50V      | 22 $\mu$ F/10V      |
| V78X6-500 | 10 $\mu$ F/50V      | 10 $\mu$ F/10V      |
| V7809-500 | 10 $\mu$ F/50V      | 10 $\mu$ F/16V      |
| V7812-500 | 10 $\mu$ F/50V      | 10 $\mu$ F/25V      |
| V7815-500 | 10 $\mu$ F/50V      | 10 $\mu$ F/25V      |

## REVISION HISTORY

| rev. | description                          | date       |
|------|--------------------------------------|------------|
| 1.0  | initial release                      | 07/13/2010 |
| 1.01 | new template applied                 | 04/18/2012 |
| 1.02 | V-Infinity branding removed          | 09/04/2012 |
| 1.03 | updated typical application circuits | 09/25/2012 |
| 1.04 | updated external capacitor values    | 11/08/2012 |
| 1.05 | discontinued V78X2-500 model         | 06/24/2019 |

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

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