

**SERIES: P78-500 | DESCRIPTION: NON-ISOLATED SWITCHING REGULATOR**
**FEATURES**

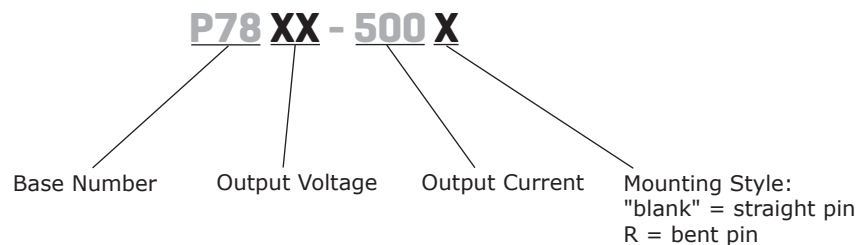
- 0.5 A output current
- up to 10:1 input range (9~90 Vdc)
- straight and bent pin options
- certified to EN/IEC 62368
- no-load input current as low as 1.5 mA
- -40°C to +85°C temperature range



| MODEL     | input voltage <sup>1</sup> |                | output voltage<br>(Vdc) | output current<br>max<br>(mA) | output power<br>max<br>(W) | ripple and noise <sup>2</sup><br>max<br>(mVp-p) | efficiency     |                |
|-----------|----------------------------|----------------|-------------------------|-------------------------------|----------------------------|-------------------------------------------------|----------------|----------------|
|           | typ<br>(Vdc)               | range<br>(Vdc) |                         |                               |                            |                                                 | Vin min<br>(%) | Vin max<br>(%) |
| P7803-500 | 48                         | 9 ~ 90         | 3.3                     | 500                           | 1.65                       | 80                                              | 82             | 69             |
| P7805-500 | 48                         | 9 ~ 90         | 5.0                     | 500                           | 2.50                       | 80                                              | 87             | 75             |
| P7806-500 | 48                         | 9 ~ 90         | 6.5                     | 500                           | 3.25                       | 80                                              | 91             | 78             |
| P7809-500 | 48                         | 14 ~ 90        | 9.0                     | 500                           | 4.50                       | 80                                              | 91             | 80             |
| P7812-500 | 48                         | 18 ~ 90        | 12.0                    | 500                           | 6.0                        | 80                                              | 91             | 83             |
| P7815-500 | 48                         | 20 ~ 90        | 15.0                    | 500                           | 7.50                       | 80                                              | 93             | 84             |
| P7824-500 | 48                         | 36 ~ 90        | 24.0                    | 300                           | 7.2                        | 80                                              | 93             | 85             |

Notes:

1. For input voltage exceeding 80 Vdc, an input capacitor of 22μF/100V is required.
2. The ripple and noise are measured at 20 MHz BW using the parallel cable method at nominal input voltage, full load. See Application notes.

**PART NUMBER KEY**

## INPUT

| parameter                 | conditions/description | min | typ | max | units |
|---------------------------|------------------------|-----|-----|-----|-------|
| no load input current     | at nominal input       |     |     | 1.5 | mA    |
| reverse polarity at input | avoid / not protected  |     |     |     |       |
| input filter              | capacitance filter     |     |     |     |       |

## OUTPUT

| parameter                        | conditions/description                 | min | typ  | max   | units |
|----------------------------------|----------------------------------------|-----|------|-------|-------|
| line regulation                  | Vin = min ~ max, at full load          |     | ±0.6 | ±1.5  | %     |
|                                  | 3.3, 5, 6.5 Vdc output models          |     | ±0.6 | ±2.0  | %     |
|                                  | 9, 12, 15 Vdc output models            |     | ±1.2 | ±2.5  | %     |
|                                  | 24 Vdc output model                    |     |      |       |       |
| load regulation                  | at nominal input, 10% ~ 100% load      |     | ±1.0 | ±2.0  | %     |
| voltage accuracy                 | at nominal input, 10% ~ 100% load      |     | ±3.5 | ±4.5  | %     |
|                                  | 3.3 Vdc output model                   |     | ±2.0 | ±3.0  | %     |
|                                  | all other output models                |     |      |       |       |
| switching frequency <sup>3</sup> | at nominal input, full load            |     | 330  |       | kHz   |
| temperature coefficient          | -40°C ~ 80°C                           |     |      | ±0.03 | %/°C  |
| transient response deviation     | at nominal input, 25% load step change |     | ±0.4 | ±1.5  | %     |
| transient recovery time          | at nominal input, 25% load step change |     | 0.2  | 1     | ms    |

Note: 3. Different output voltage with different switching frequency.

## PROTECTIONS

| parameter                | conditions/description    | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| short circuit protection | continuous, auto recovery |     |     |     |       |

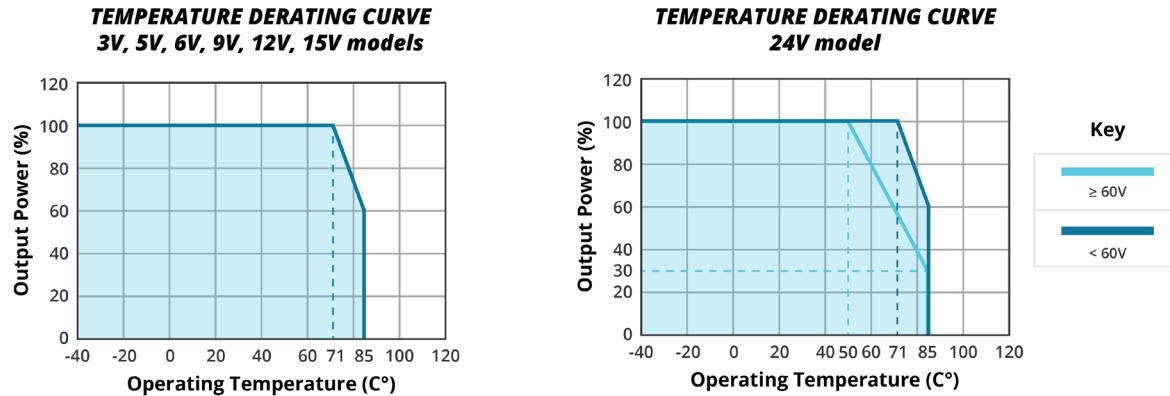
## SAFETY AND COMPLIANCE

| parameter           | conditions/description                                               | min       | typ | max | units |
|---------------------|----------------------------------------------------------------------|-----------|-----|-----|-------|
| safety approvals    | certified to 62368: EN, IEC                                          |           |     |     |       |
| conducted emissions | CISPR32/EN55032 Class B (see Figure 2-2)                             |           |     |     |       |
| radiated emissions  | CISPR32/EN55032 Class B (see Figure 2.2)                             |           |     |     |       |
| ESD                 | IEC/EN 61000-4-2 Contact±4kV, perf. Criteria B                       |           |     |     |       |
| radiated immunity   | IEC/EN 61000-4-3 10V/m, perf. Criteria B                             |           |     |     |       |
| EFT/burst           | IEC/EN 61000-4-4 100kHz±1kV, perf. Criteria B (see Figure 2-1)       |           |     |     |       |
| surge               | IEC/EN 61000-4-5 line to line±1kV, perf. Criteria B (see Figure 2-1) |           |     |     |       |
| conducted immunity  | IEC/EN 61000-4-6 3Vr.m.s, perf. Criteria B                           |           |     |     |       |
| MTBF                | as per MIL-HDBK-217 at 25°C                                          | 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    |
| storage humidity                     | non-condensing                  | 5   |     | 95  | %     |
| pin soldering resistance temperature | 1.5 mm from case for 10 seconds |     |     | 300 | °C    |

## DERATING CURVES



## MECHANICAL

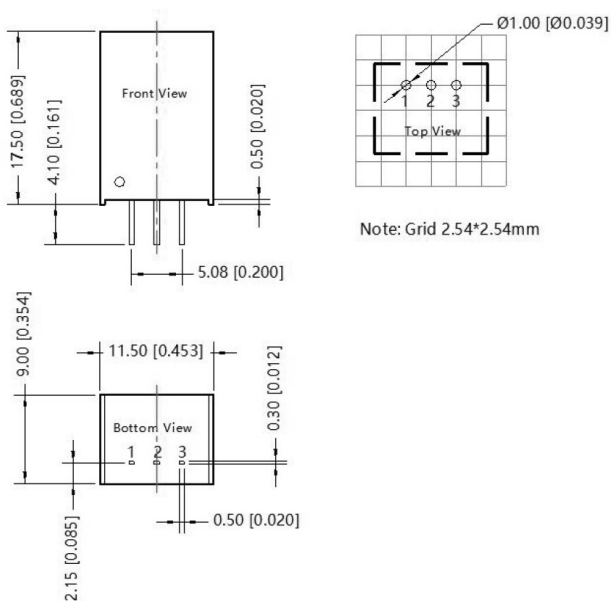
| parameter     | conditions/description                                                                                                                       | min | typ | max | units    |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|----------|
| dimensions    | straight pin models: 17.50 x 11.50 x 9.00 [0.689 x 0.453 x 0.354 inch]<br>bent pin models: 19.00 x 11.50 x 9.00 [0.748 x 0.453 x 0.354 inch] |     |     |     | mm<br>mm |
| case material | black plastic, flame retardant and heat resistant (UL94-V0)                                                                                  |     |     |     |          |
| weight        |                                                                                                                                              |     | 3.8 |     | g        |
| cooling       | natural convection                                                                                                                           |     |     |     |          |

## MECHANICAL DRAWING

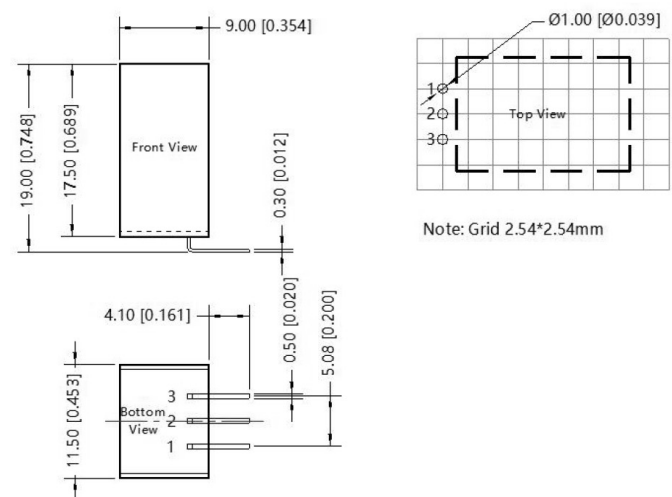
units: mm [inches]

tolerance:  $\pm 0.50$  [ $\pm 0.020$ ]pin section tolerance:  $\pm 0.10$  mm [ $\pm 0.004$ ]

### Straight pin



### Bent pin



### PIN CONNECTIONS

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

## TYPICAL APPLICATION CIRCUIT

Figure 1

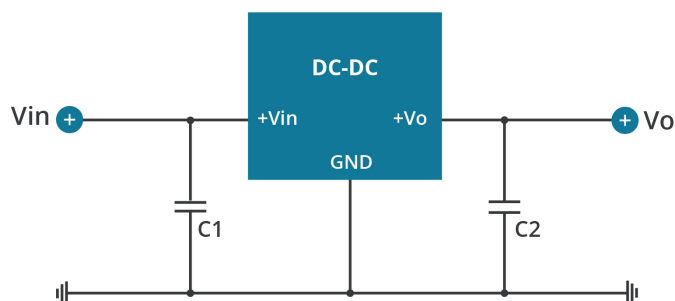


Table 1

| Output Voltage (Vdc) | C1 (ceramic capacitor) | C2 (ceramic capacitor) |
|----------------------|------------------------|------------------------|
| 3.3, 5, 6.5          | 10 $\mu$ F/100V        | 22 $\mu$ F/10V         |
| 9                    |                        | 22 $\mu$ F/16V         |
| 12, 15               |                        | 22 $\mu$ F/25V         |
| 24                   |                        | 10 $\mu$ F/50V         |

1. The required C1 and C2 capacitors must be connected as close as possible to the module.
2. Refer to Table 1 for C1 and C2 capacitor values. For certain applications, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead.
3. Converter cannot be used for hot swap and with output in parallel.

## EMC RECOMMENDED CIRCUIT

Figure 2

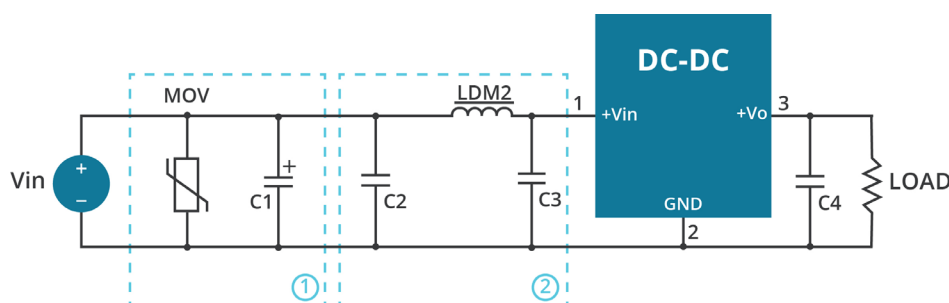


Table 2

| Component | Recommended value |
|-----------|-------------------|
| MOV       | S20K30            |
| C1        | 680 $\mu$ F/100V  |
| C2        | 4.7 $\mu$ F/100V  |
| LDM2      | 120 $\mu$ H       |
| C3        | 4.7 $\mu$ F/100V  |
| C4        | 10 $\mu$ F/50V    |

## REVISION HISTORY

| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 05/26/2022 |

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.

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.