

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

### FEATURES

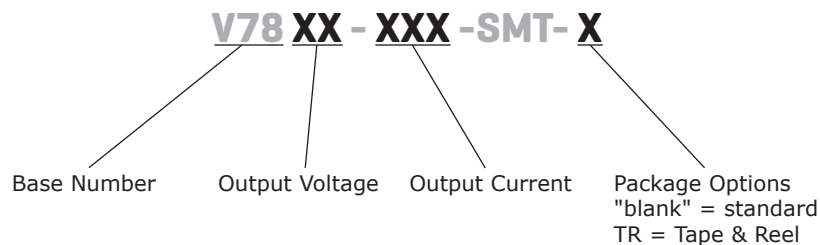
- 1 A current output
- high efficiency up to 93%
- no heat sink required
- SMT package
- remote on/off control
- low ripple and noise
- short circuit protection, thermal shutdown
- wide temperature (-40°C~+85°C)



| MODEL           | input<br>voltage<br>range<br>(Vdc) | output<br>voltage<br>(Vdc) | output<br>current<br>(mA) | 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>(%) |
|-----------------|------------------------------------|----------------------------|---------------------------|-------------------------------|----------------------------------------------------|------------------------------------------------|
| V7801-1000-SMT  | 4.75 ~ 15                          | 1.5                        | 1,000                     | 1.5                           | 35                                                 | 76                                             |
| V7801A-1000-SMT | 4.75 ~ 15                          | 1.8                        | 1,000                     | 1.8                           | 35                                                 | 79                                             |
| V7802-1000-SMT  | 5 ~ 18                             | 2.5                        | 1,000                     | 2.5                           | 35                                                 | 83                                             |
| V7803-1000-SMT  | 5 ~ 18                             | 3.3                        | 1,000                     | 3.3                           | 35                                                 | 84                                             |
| V7805-1000-SMT  | 7 ~ 18                             | 5.0                        | 1,000                     | 5                             | 35                                                 | 90                                             |
| V7806-1000-SMT  | 8.5 ~ 18                           | 6.5                        | 1,000                     | 6.5                           | 35                                                 | 93                                             |

Notes: 1. 20 MHz bandwidth  
2. Measured at Vin min. and 100% load

### PART NUMBER KEY



## INPUT

| parameter               | conditions/description                                                        | min  | typ | max | units |
|-------------------------|-------------------------------------------------------------------------------|------|-----|-----|-------|
| operating input voltage | 1.5, 1.8 Vdc models                                                           | 4.75 | 12  | 15  | Vdc   |
|                         | 2.5, 3.3 Vdc models                                                           | 5.0  | 12  | 18  | Vdc   |
|                         | 5.0 Vdc model                                                                 | 7.0  | 12  | 18  | Vdc   |
|                         | 6.5 Vdc model                                                                 | 8.5  | 12  | 18  | Vdc   |
| input filter            | capacitor                                                                     |      | 10  |     | μF    |
| remote on/off           | on: open or $1.2 < V_c \leq 6 \text{ V}$<br>off: $V_c < 0.6 \text{ V}$        |      |     |     |       |
| on/off control current  | on: open or $1.2 < V_c \leq 6 \text{ V}$<br>off: GND or $V_c < 0.4 \text{ V}$ |      | 100 | 200 | μA    |
| shutdown input current  |                                                                               |      | 120 | 200 | μA    |

## OUTPUT

| parameter                  | conditions/description                           | min | typ  | max   | units |
|----------------------------|--------------------------------------------------|-----|------|-------|-------|
| max capacitive load        |                                                  |     |      | 1,000 | μF    |
| line regulation            | measured from low line to high line at 100% load |     | ±0.2 | ±0.5  | %     |
| load regulation            | measured from 10% to full load at nominal input  |     | ±0.4 | ±1.0  | %     |
| voltage accuracy           | measured from low line to high line at 100% load |     | ±2   | ±3    | %     |
| adjustability <sup>1</sup> | 1.8 Vdc model                                    | 1.5 |      | 3.6   | Vdc   |
|                            | 2.5 Vdc model                                    | 1.5 |      | 3.9   | Vdc   |
|                            | 3.3 Vdc model                                    | 1.8 |      | 5.5   | Vdc   |
|                            | 5.0 Vdc model                                    | 2.5 |      | 6.5   | Vdc   |
| switching frequency        | PWM type                                         |     | 1.4  |       | MHz   |
| temperature coefficient    | -40 °C ~ +85 °C ambient                          |     |      | ±0.02 | %/°C  |

Notes: 1. Output voltage adjustment must meet  $V_{in}-V_o > 2\text{V}$  requirement, see adjustment resistor values on page 4. Not available on 1.5 or 6.5 Vdc output models.

## PROTECTIONS

| parameter                | conditions/description                 | min | typ | max | units |
|--------------------------|----------------------------------------|-----|-----|-----|-------|
| short circuit protection | hiccup, continuous, automatic recovery |     |     |     |       |
| thermal shutdown         | internal IC junction                   |     | 150 |     | °C    |
| current limit            |                                        |     | 1.8 |     | A     |

## SAFETY AND COMPLIANCE

| parameter                    | conditions/description                                                                                                    | min       | typ | max | units |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|-----|-------|
| thermal resistance           |                                                                                                                           |           |     | 90  | °C/W  |
| conducted emissions          | CISPR22/EN55022 class A (without external circuit)<br>CISPR22/EN55022 class B (external circuit required, see Figure 1-b) |           |     |     |       |
| radiated emissions           | CISPR22/EN55022 class A<br>(external circuit required, see Figure 1-b)                                                    |           |     |     |       |
| ESD                          | IEC/EN 61000-4-2, class B, contact ±6KV/ Air<br>±8KV                                                                      |           |     |     |       |
| radiated immunity            | IEC/EN 61000-4-3, class A, 10V/m                                                                                          |           |     |     |       |
| EFT/burst                    | IEC/EN 61000-4-4, class B, ±2KV<br>(external circuit required, see Figure 1-a)                                            |           |     |     |       |
| surge                        | IEC/EN 61000-4-5, class B, ±2KV<br>(external circuit required, see Figure 1-a)                                            |           |     |     |       |
| conducted immunity           | IEC/EN 61000-4-6, class A, 3 Vr.ms                                                                                        |           |     |     |       |
| voltage dips & interruptions | IEC/EN 61000-4-29, class B, 0%-70%                                                                                        |           |     |     |       |
| MTBF                         | as per MIL-HDBK-217F, 25 °C                                                                                               | 1,000,000 |     |     | hours |
| RoHS                         | 2011/65/EU                                                                                                                |           |     |     |       |

## ENVIRONMENTAL

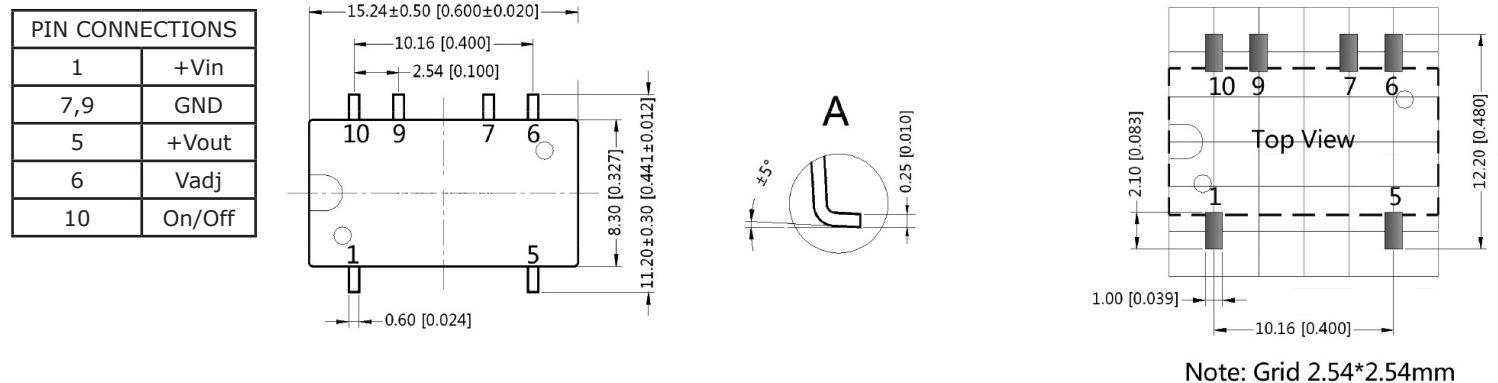
| parameter                  | conditions/description          | min | typ | max | units |
|----------------------------|---------------------------------|-----|-----|-----|-------|
| case operating temperature |                                 |     |     | 100 | °C    |
| operating temperature      | see derating curve              | -40 |     | 85  | °C    |
| storage temperature        |                                 | -55 |     | 125 | °C    |
| storage humidity           |                                 |     |     | 95  | %     |
| hand soldering             | for 10 seconds                  |     |     | 260 | °C    |
| reflow soldering           | refer to IPC/JEDEC J-STD-020D.1 |     |     | 240 | °C    |

## MECHANICAL

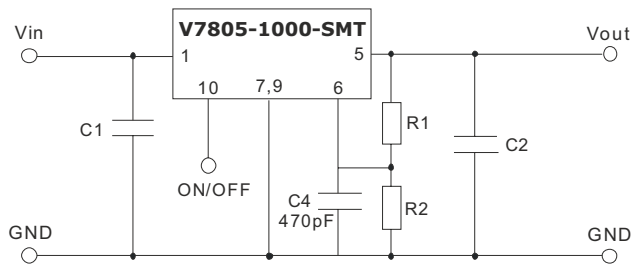
| parameter     | conditions/description                         | min | typ | max | units        |
|---------------|------------------------------------------------|-----|-----|-----|--------------|
| dimensions    | 15.24 x 8.30 x 7.25<br>(0.600 x 0.327 x 0.285) |     |     |     | mm<br>inches |
| case material | Plastic (UL94-V0)                              |     |     |     |              |
| weight        |                                                |     | 2.3 |     | g            |

## MECHANICAL DRAWING

units: mm [in]

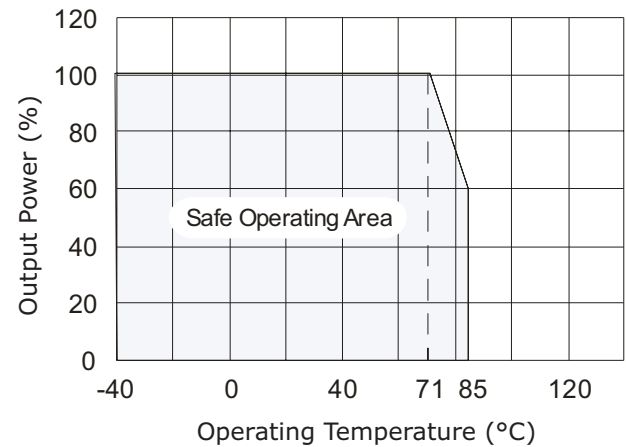
pin tolerance:  $\pm 0.10$  mm [ $\pm 0.004$  in]general tolerance:  $\pm 0.25$  mm [ $\pm 0.010$  in]

## TYPICAL APPLICATION CIRCUIT



1. C1 and C2 are required for best performance and should be fitted close to the converter pins.
2. See the capacitor values for C1 and C2 in the external capacitor table below. These can be increased if required and tantalum or low ESR electrolytic capacitors will also suffice.
3. No parallel connection or plug and play.

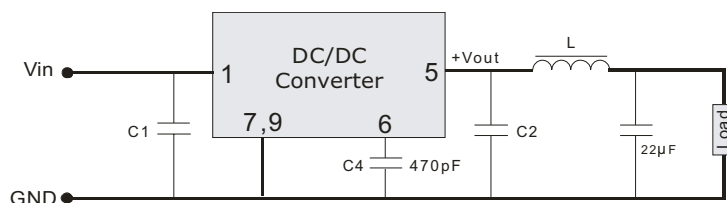
## DERATING CURVE



EXTERNAL CAPACITOR TABLE

| MODEL           | C1 (Ceramic)      | C2 (Ceramic)      |
|-----------------|-------------------|-------------------|
| V7801-1000-SMT  | 10 $\mu$ F / 25 V | 22 $\mu$ F / 16 V |
| V7801A-1000-SMT | 10 $\mu$ F / 25 V | 22 $\mu$ F / 16 V |
| V7802-1000-SMT  | 10 $\mu$ F / 25 V | 22 $\mu$ F / 16 V |
| V7803-1000-SMT  | 10 $\mu$ F / 25 V | 22 $\mu$ F / 16 V |
| V7805-1000-SMT  | 10 $\mu$ F / 25 V | 22 $\mu$ F / 16 V |
| V7806-1000-SMT  | 10 $\mu$ F / 25 V | 22 $\mu$ F / 16 V |

## APPLICATION EXAMPLE



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

L: Recommended parameter 10 ~ 47 $\mu$ H.

## ADJUSTMENT RESISTOR VALUES

| MODEL                | V7801A-1000      |                  | V7802-1000       |                  | V7803-1000       |                  | V7805-1000       |                  |
|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| V <sub>adj</sub> (V) | R1 (k $\Omega$ ) | R2 (k $\Omega$ ) | R1 (k $\Omega$ ) | R2 (k $\Omega$ ) | R1 (k $\Omega$ ) | R2 (k $\Omega$ ) | R1 (k $\Omega$ ) | R2 (k $\Omega$ ) |
| 1.5                  | 188.1            | -                | 15.4             | -                | -                | -                | -                | -                |
| 1.8                  | -                | -                | 68.6             | -                | 15.4             | -                | -                | -                |
| 2.5                  | -                | 81.4             | -                | -                | 87               | -                | 9.7              | -                |
| 3.0                  | -                | 32.2             | -                | 88.7             | 339              | -                | 30.5             | -                |
| 3.3                  | -                | 18.6             | -                | 41.3             | -                | -                | 48.8             | -                |
| 3.6                  | -                | 9.5              | -                | 20.1             | -                | 121              | 75               | -                |
| 3.9                  | -                | -                | -                | 8.0              | -                | 51.0             | 115              | -                |
| 4.5                  | -                | -                | -                | -                | -                | 16.6             | 338              | -                |
| 4.9                  | -                | -                | -                | -                | -                | 8.0              | 1,835            | -                |
| 5.0                  | -                | -                | -                | -                | -                | 6.5              | -                | -                |
| 5.1                  | -                | -                | -                | -                | -                | 5.2              | -                | 426              |
| 5.5                  | -                | -                | -                | -                | -                | 1.1              | -                | 58.7             |
| 6.0                  | -                | -                | -                | -                | -                | -                | -                | 16.9             |
| 6.5                  | -                | -                | -                | -                | -                | -                | -                | 3.2              |

The R1, R2 in the above table are used to set the output voltage. If no need to adjust the output voltage, connect a ceramic capacitor to GND with 470pF typical value for increase immunity. Insure the output voltage is in the adjust range or else may cause permanent damage to the device. Fine-tune output voltage must appease  $V_{in}-V_o > 2V$ .

## EMC RECOMMENDED CIRCUIT

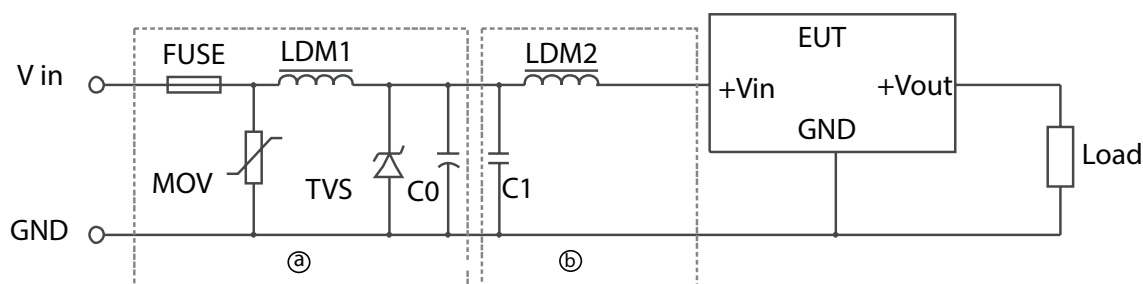


Figure 1

| Recommended External Circuit Components |                                             |
|-----------------------------------------|---------------------------------------------|
| FUSE                                    | choose according to practical input current |
| MOV                                     | 10D560                                      |
| LDM1                                    | 82 $\mu$ H                                  |
| TVS                                     | SMCJ36A                                     |
| C0                                      | 120 $\mu$ F/50V                             |
| C1                                      | 4.7 $\mu$ F/50V                             |
| LDM2                                    | 33 $\mu$ H                                  |

Table 1

## REVISION HISTORY

| rev. | description                                        | date       |
|------|----------------------------------------------------|------------|
| 1.0  | initial release                                    | 11/23/2011 |
| 1.01 | V-Infinity branding removed                        | 09/04/2012 |
| 1.02 | added TR package option                            | 10/31/2012 |
| 1.03 | housing width changed, EMC recommendations updated | 01/26/2016 |

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



**CUI INC®**

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

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

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