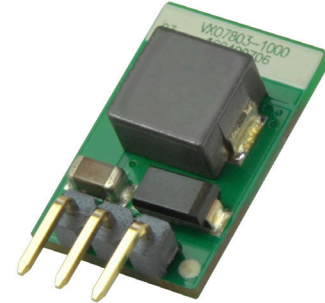


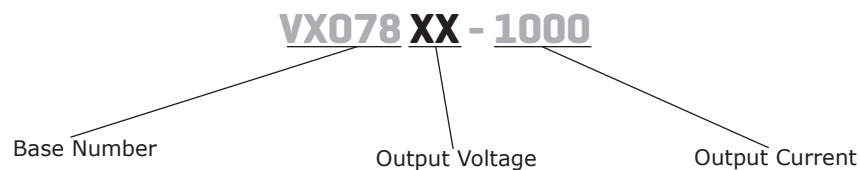
SERIES: VX078-1000 | **DESCRIPTION:** NON-ISOLATED DC SWITCHING REGULATOR
FEATURES

- wide input
- pin-out compatible with linear regulators
- open frame
- UL & CSA approved
- high efficiency up to 96%
- no-load input current as low as 0.2 mA
- wide operating temp: -40°C to +85°C
- supports negative output
- short circuit protection on the output
- EN 62368-1

**MODEL**

| MODEL | input voltage ¹ | | output voltage (Vdc) | output current max (mA) | output power max (W) | ripple & noise ² max (mVp-p) | efficiency ³ typ (%) |
|---------------|----------------------------|----------------|-------------------------|-------------------------------|----------------------------|---|---------------------------------------|
| | typ (Vdc) | range (Vdc) | | | | | |
| VX07803-1000 | 24 | 6~36 | 3.3 | 1000 | 3.3 | 75 | 90 |
| VX07805-1000 | 24 | 8~36 | 5 | 1000 | 5 | 75 | 93 |
| | 12 | 8~27 | -5 | -500 | 2.5 | 75 | 86 |
| VX078012-1000 | 24 | 16~36 | 12 | 1000 | 12 | 75 | 96 |
| | 12 | 8~20 | -12 | -300 | 3.6 | 75 | 89 |
| VX078015-1000 | 24 | 20~36 | 15 | 1000 | 15 | 75 | 96 |
| | 12 | 8~18 | -15 | -300 | 4.5 | 75 | 89 |

- Notes:
1. For input voltages higher than 30 Vdc, a 22 μ F / 50 V input capacitor is required.
 2. Tested at nominal input, 20~100% load, 20 MHz bandwidth, with 10 μ F electrolytic and 1 μ F ceramic capacitor on the output. At loads below 20%, the max ripple and noise of the 3.3 & 5 Vdc outputs will be 100 mVp-p, and the other outputs will be 2% Vo.
 3. Measured at min Vin, full load.
 4. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY

INPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|----------------------------------|-----|-----|-----|-------|
| operating input voltage ¹ | for positive output applications | 6 | 24 | 36 | Vdc |
| | for negative output applications | 8 | 12 | 27 | Vdc |
| filter | capacitor filter | | | | |
| input reverse polarity protection | no | | | | |
| no-load input current | positive outputs | | 0.1 | 1 | mA |

Note: 1. See Model section on page 1 for specific input voltage ranges.

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|--|-----|------|-------|-------|
| maximum capacitive load ² | for positive output applications | | | 680 | μF |
| | for negative output applications | | | 330 | μF |
| voltage accuracy | at full load, input voltage range 3.3 Vdc output model | | ±2 | ±4 | % |
| | all other models | | ±2 | ±3 | % |
| line regulation | at full load, input voltage range | | ±0.2 | ±0.4 | % |
| load regulation | at nominal input, 10~100% load | | ±0.4 | ±0.6 | % |
| switching frequency | at nominal input voltage, full load 3.3/5 Vdc output models | 420 | 520 | 620 | kHz |
| | all other models | 580 | 680 | 780 | kHz |
| transient recovery time | at nominal input voltage, 25% load step change | | 0.1 | 1 | ms |
| transient response deviation | at nominal input voltage, 25% load step change | | 50 | 300 | mV |
| temperature coefficient | at full load | | | ±0.03 | %/°C |

Note: 2. The maximum capacitive load was tested at nominal input voltage, full load.

PROTECTIONS

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

SAFETY AND COMPLIANCE

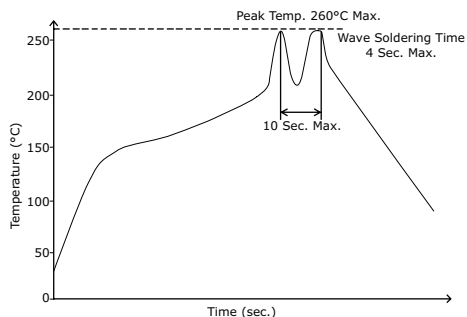
| parameter | conditions/description | min | typ | max | units |
|---------------------|---|-----------|-----|-----|-------|
| safety approvals | certified to 62368-1: EN certified to 60950-1: UL | | | | |
| EMI/EMC | EN 55032, EN 55024 | | | | |
| conducted emissions | CISPR22/EN55022, class B (external circuit required, see Figure 4-b) | | | | |
| radiated emissions | CISPR22/EN55022, class B (external circuit required, see Figure 4-b) | | | | |
| ESD | IEC/EN61000-4-2, contact ± 4kV, class B | | | | |
| radiated immunity | IEC/EN61000-4-3, 10V/m, class A | | | | |
| EFT/burst | IEC/EN61000-4-4, ± 1kV, class B (external circuit required, see Figure 4-a) | | | | |
| surge | IEC/EN61000-4-5, line-line ± 1kV, class B (external circuit required, see Figure 4-a) | | | | |
| conducted immunity | IEC/EN61000-4-6, 3 Vr.m.s, class A | | | | |
| MTBF | as per MIL-HDBK-217F, 25°C | 2,000,000 | | | hours |
| RoHS | 2011/65/EU | | | | |

ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curve | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | 5 | | 95 | % |

SOLDERABILITY

| parameter | conditions/description | min | typ | max | units |
|----------------|----------------------------|-----|-----|-----|-------|
| wave soldering | see wave soldering profile | | | 260 | °C |



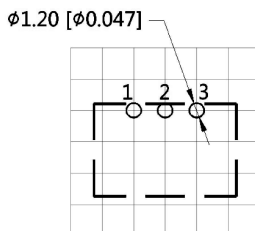
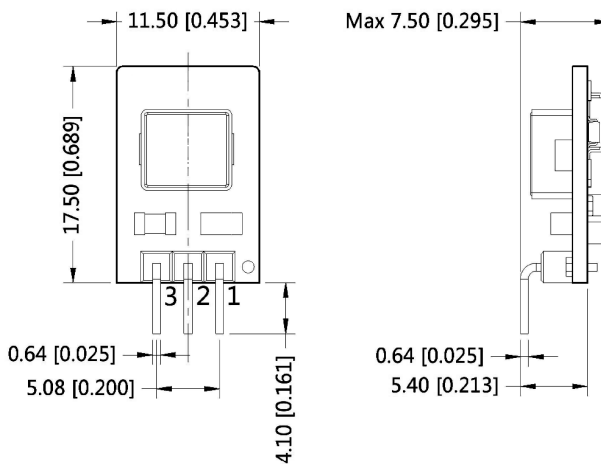
MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|------------|---|-----|-----|-----|-------|
| dimensions | 11.50 x 7.50 x 17.50 [0.453 x 0.295 x 0.689 inch] | | | | mm |
| weight | | | 2.1 | | g |

MECHANICAL DRAWING

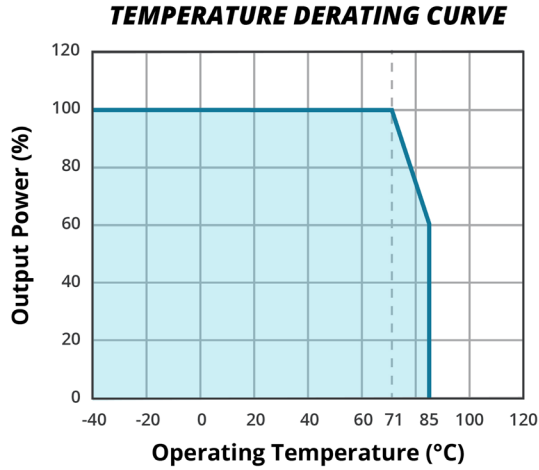
units: mm [inch]
tolerance: ±0.50[±0.020]
pin diameter tolerance: ±0.10[±0.004]

| PIN CONNECTIONS | | |
|-----------------|---------|---------|
| PIN | +OUTPUT | -OUTPUT |
| 1 | +VIN | +VIN |
| 2 | GND | -VOUT |
| 3 | +VOUT | GND |

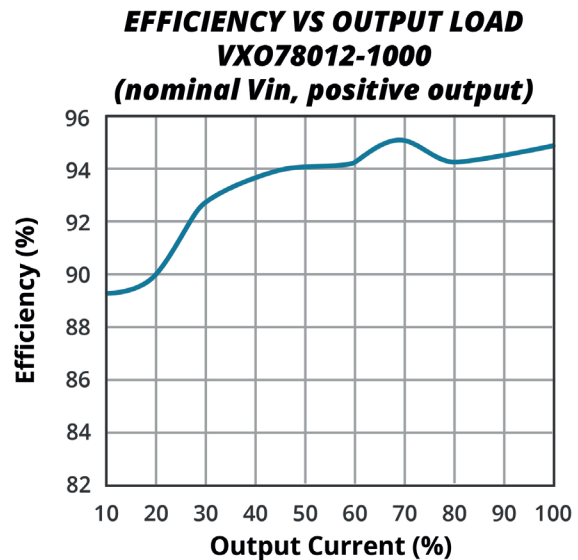
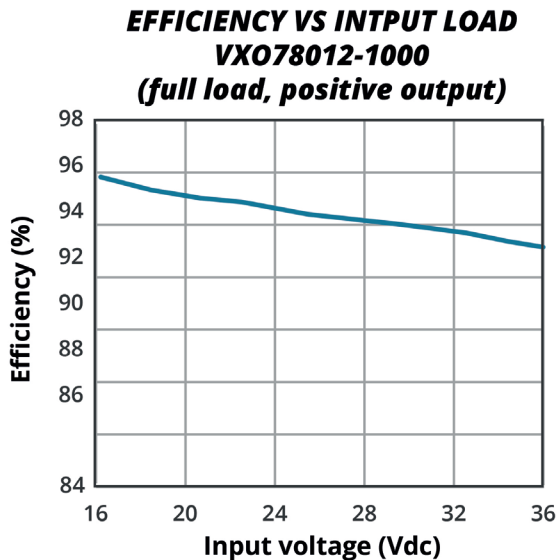
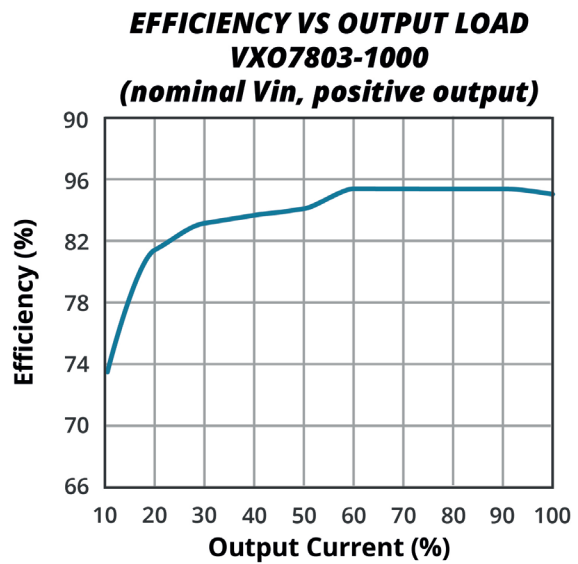
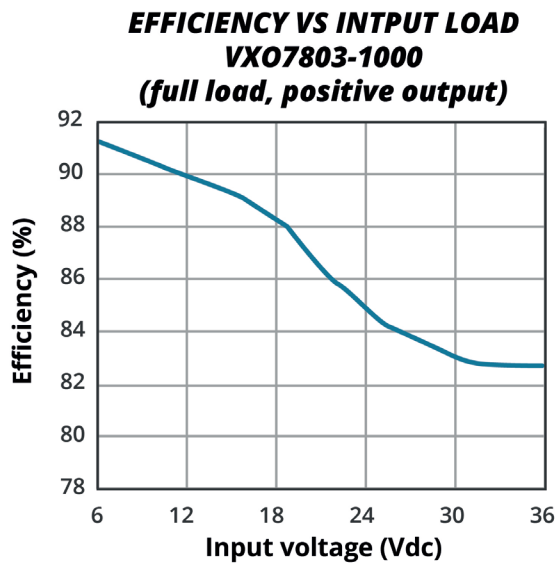


Note : Grid 2.54*2.54mm
Recommended PCB Layout
Top View

DERATING CURVE

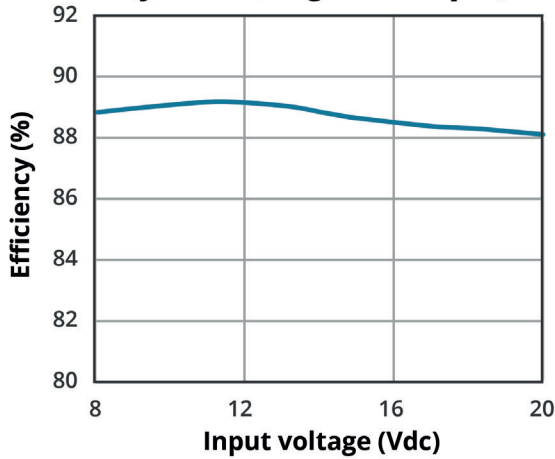


EFFICIENCY CURVES

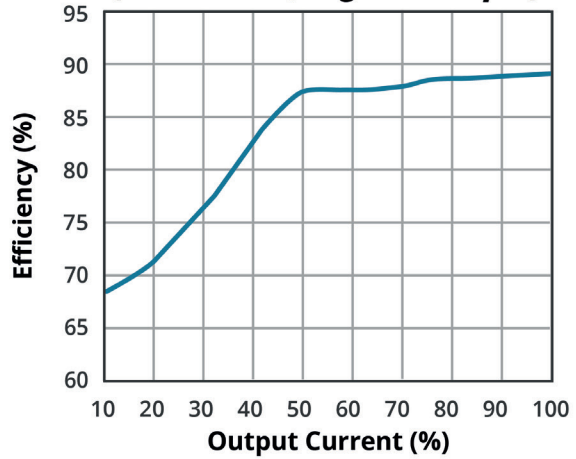


EFFICIENCY CURVES (CONTINUED)

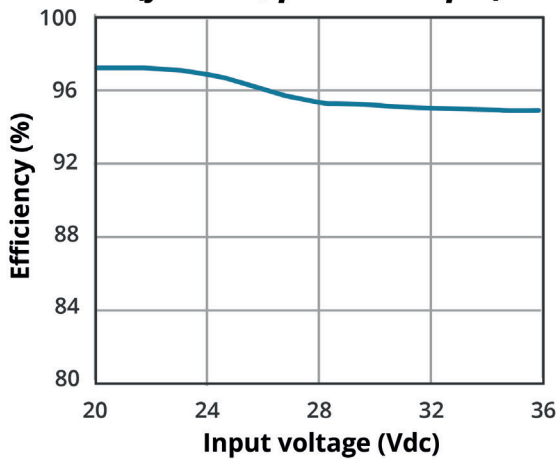
**EFFICIENCY VS INPUT LOAD
VX078012-1000
(full load, negative output)**



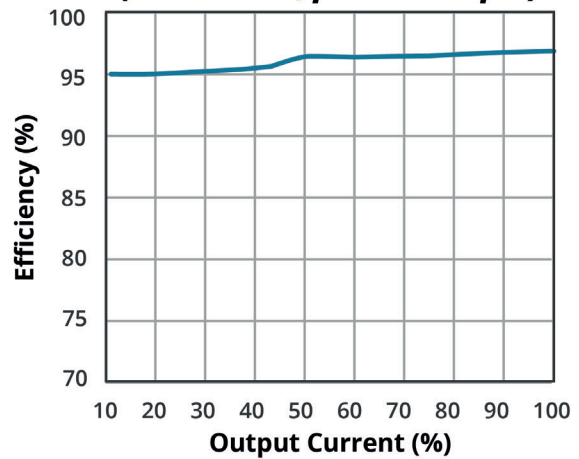
**EFFICIENCY VS OUTPUT LOAD
VX078012-1000
(nominal Vin, negative output)**



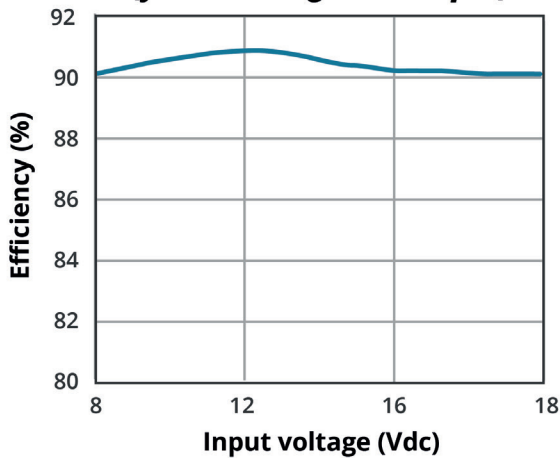
**EFFICIENCY VS INPUT LOAD
VX078015-1000
(full load, positive output)**



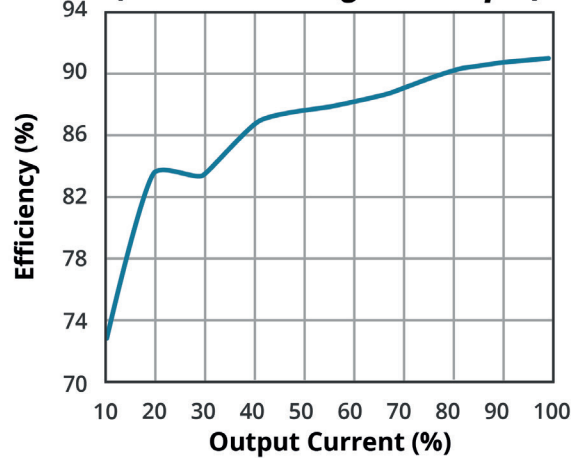
**EFFICIENCY VS OUTPUT LOAD
VX078015-1000
(nominal Vin, positive output)**



**EFFICIENCY VS INPUT LOAD
VX078015-1000
(full load, negative output)**



**EFFICIENCY VS OUTPUT LOAD
VX078015-1000
(nominal Vin, negative output)**



TYPICAL APPLICATION CIRCUIT

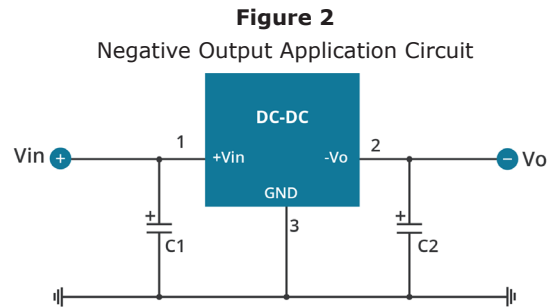
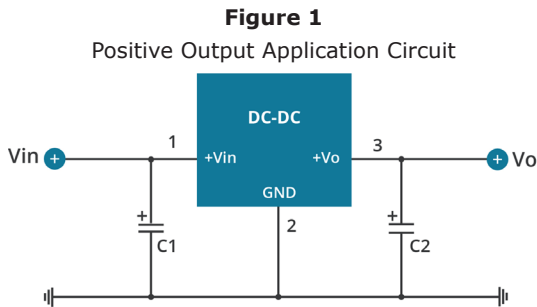


Figure 3
Positive and Negative Output Paralleling Application Circuit

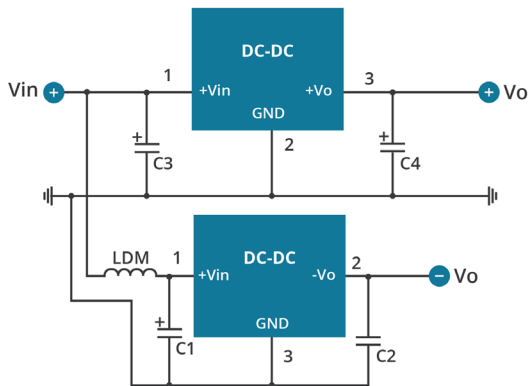


Table 1
External Capacitor Table

| Model Number | C1, C3 (ceramic capacitor) | C2, C4 (ceramic capacitor) |
|---------------|-------------------------------|-------------------------------|
| VX07803-1000 | 10 μ F/50 V | 22 μ F/10 V |
| VX07805-1000 | 10 μ F/50 V | 22 μ F/10 V |
| VX078012-1000 | 10 μ F/50 V | 22 μ F/25 V |
| VX078015-1000 | 10 μ F/50 V | 22 μ F/25 V |

EMC RECOMMENDED CIRCUIT

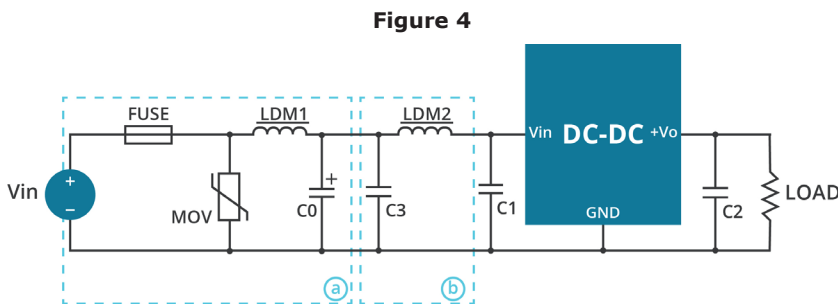


Table 2

| Recommended external circuit components | |
|---|--|
| FUSE | choose according to actual input current |
| MOV | S20K30 |
| LDM1 | 82 μ H |
| C0 | 680 μ F/50 V |
| C1, C2 | see Table 1 |
| C3 | 4.7 μ F/50 V |
| LDM2 | 12 μ H |

- Note:
1. C1 & C2 (C3 & C4) are required and should be connected as close to the module pins as possible.
 2. To reduce the output ripple further, C2 & C4 can be increased as needed and the use of tantalum or low ESR electrolytic capacitors would be recommended.
 3. When using application circuit in Figure 3, a 10 μ H LDM component is recommended to reduce the interference.

REVISION HISTORY

| rev. | description | date |
|------|---|------------|
| 1.0 | initial release | 05/19/2017 |
| 1.01 | logo & packaging updates | 02/21/2020 |
| 1.02 | features and safety line updated | 01/14/2021 |
| 1.03 | derating curve, efficiency curves and circuit figures updated | 09/21/2021 |

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



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

Fax 503.612.2383
cui.com
techsupport@cui.com

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