

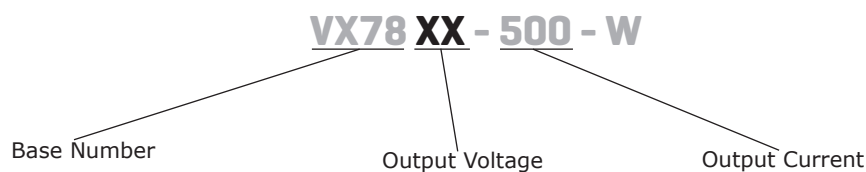
SERIES: VX78-500-W | **DESCRIPTION:** NON-ISOLATED DC SWITCHING REGULATOR
FEATURES

- low Profile
- pin-out compatible with linear regulators
- high efficiency up to 95%
- no-load input current as low as 0.2 mA
- wide temperature range: -40°C ~ +85°C
- support negative output
- output short circuit protection

**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) | | | | | |
| VX7803-500-W | 24 | 4.75~36 | 3.3 | 500 | 1.65 | 75 | 86 |
| VX7805-500-W | 24 | 6.5~36 | 5 | 500 | 2.5 | 75 | 90 |
| | 12 | 7~31 | -5 | -300 | 1.5 | 75 | 80 |
| VX7809-500-W | 24 | 12~36 | 9 | 500 | 4.5 | 75 | 93 |
| VX7812-500-W | 24 | 15~36 | 12 | 500 | 6 | 75 | 94 |
| | 12 | 8~24 | -12 | -150 | 1.8 | 75 | 84 |
| VX7815-500-W | 24 | 19~36 | 15 | 500 | 7.5 | 75 | 95 |
| | 12 | 8~21 | -15 | -150 | 2.25 | 75 | 85 |

- Notes:
1. For input voltages higher than 30 Vdc, a 22 μ F / 50 V input capacitor is required.
 2. Tested at nominal input, 10~100% load, 20 MHz bandwidth, with 10 μ F electrolytic and 1 μ F ceramic capacitor on the output. At loads below 10%, the max ripple and noise of the 3.3 & 5 Vdc outputs will be 150 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 | see Model section on page 1 for specific input voltage ranges | | | | |
| filter | capacitor filter | | | | |
| input reverse polarity protection | no | | | | |
| no-load input current | positive outputs | | 0.2 | 1.5 | mA |

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|---|-----|--------------------|--------------------|--------------------|
| maximum capacitive load ² | for positive output applications for negative output applications | | | 680 330 | μ F μ F |
| voltage accuracy | at full load, input voltage range 3.3 Vdc output model all other models | | ± 2 ± 2 | ± 4 ± 3 | % % |
| line regulation | at full load, input voltage range | | ± 0.2 | ± 0.4 | % |
| load regulation | at nominal input, 10~100% load | | ± 0.4 | ± 1.5 | % |
| switching frequency | at nominal input voltage, full load | 550 | | 850 | kHz |
| transient recovery time | at nominal input voltage, 25% load step change | | 0.2 | 1 | ms |
| transient response deviation | at nominal input voltage, 25% load step change | | 50 | 250 | 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 | designed to meet 62368-1: EN, BS EN | | | | |
| conducted emissions | CISPR32/EN55032, class B (see Figure 5-② for recommended circuit) | | | | |
| radiated emissions | CISPR32/EN55032, class B (see Figure 5-② for recommended circuit) | | | | |
| ESD | IEC/EN61000-4-2, contact ± 4 kV, perf. Criteria B | | | | |
| radiated immunity | IEC/EN61000-4-3, 10V/m, perf. Criteria A | | | | |
| EFT/burst | IEC/EN61000-4-4, ± 1 kV, perf. Criteria B (see Figure 5-① for recommended circuit) | | | | |
| surge | IEC/EN61000-4-5, line-line ± 1 kV, perf. Criteria B (see Figure 5-① for recommended circuit) | | | | |
| conducted immunity | IEC/EN61000-4-6, 3 Vr.m.s, perf. Criteria 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 | | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | 5 | | 95 | % |

SOLDERABILITY

| parameter | conditions/description | min | typ | max | units |
|----------------|--------------------------|-----|-----|-----|-------|
| hand soldering | welding time: 10s (Max.) | | | 260 | °C |

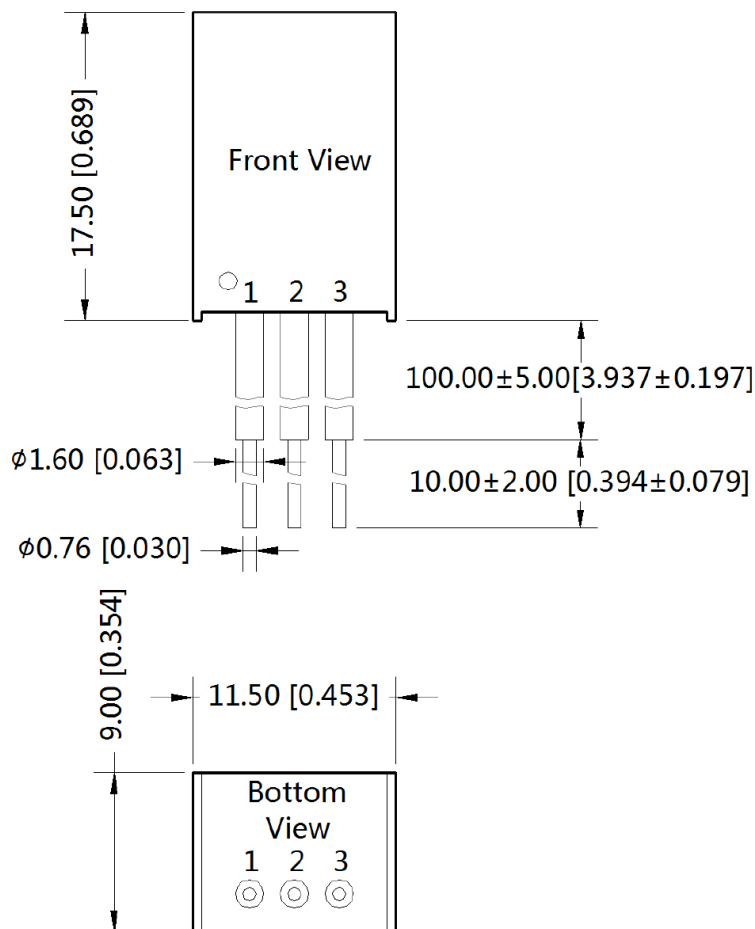
MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---------------|--|-----|-----|-----|-------|
| dimensions | 11.50 x 9.00 x 17.50 [0.453 x 0.354 x 0.689 inch] | | | | mm |
| case material | black flame-retardant heat-proof plastic (UL94V-0) | | | | |
| weight | | | 5 | | g |

MECHANICAL DRAWING

units: mm [inch]
 tolerance: ±0.50[±0.020]
 wire type: UL1569 AWG22 (300V 105°C)

| PIN CONNECTIONS | | |
|-----------------|-----------------|-----------------|
| PIN | +OUTPUT | -OUTPUT |
| 1 (red) | V _{in} | V _{in} |
| 2 (black) | GND | -V _o |
| 3 (yellow) | +V _o | GND |



DERATING CURVE

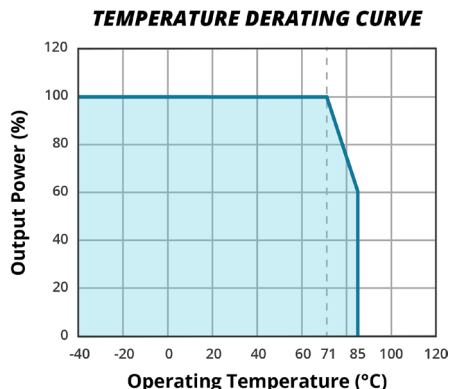
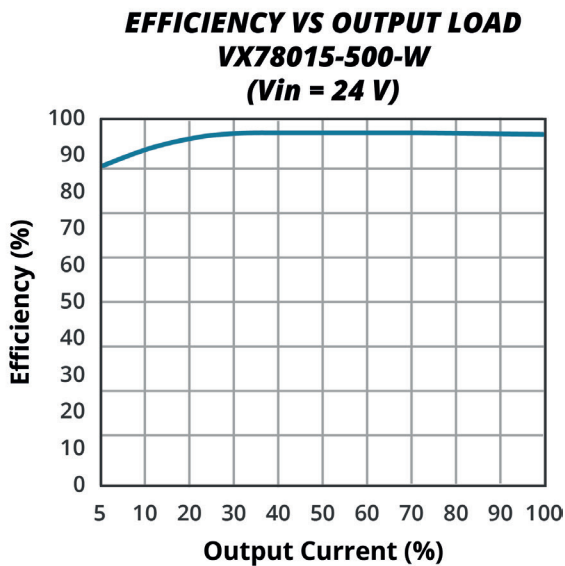
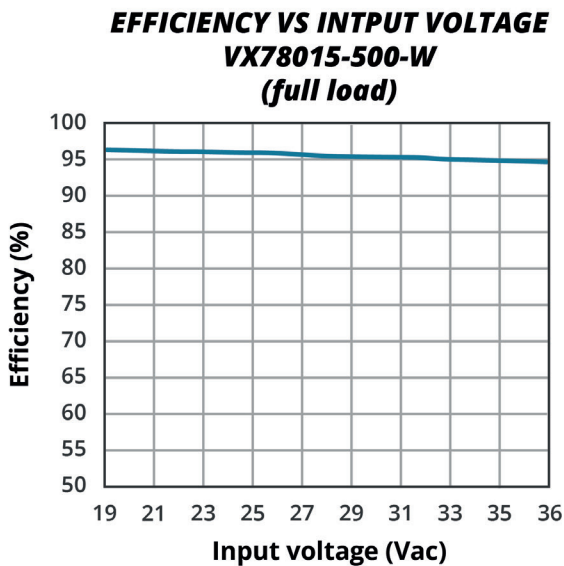
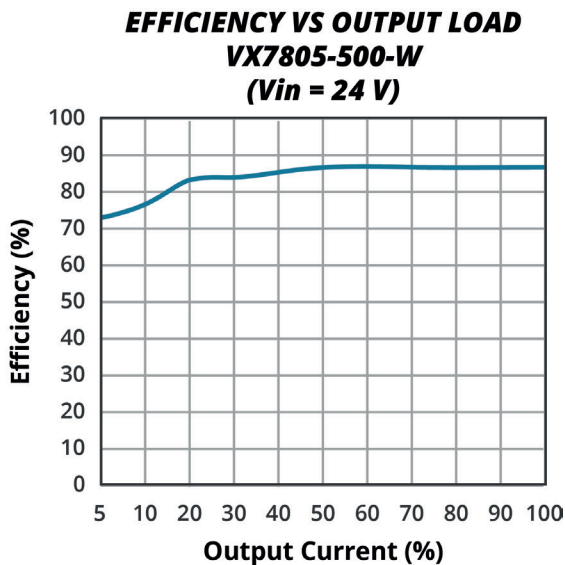
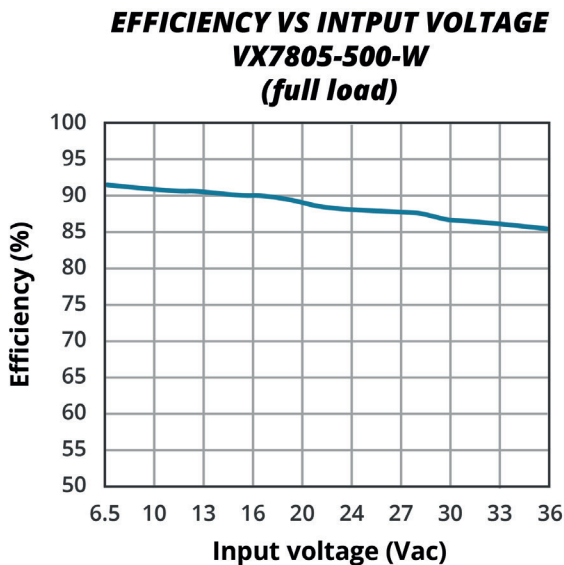


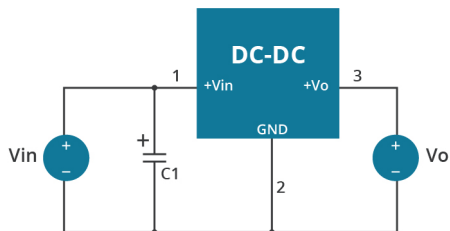
Figure 1

EFFICIENCY CURVES

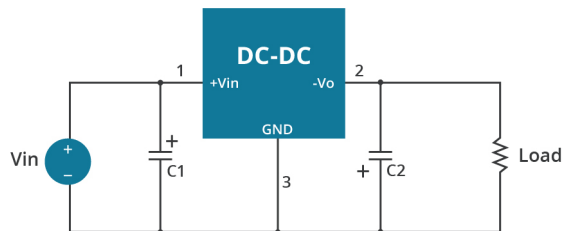


TYPICAL APPLICATION CIRCUIT

Figure 2



Positive Output Application Circuit



Negative Output Application Circuit

Figure 3

Positive and Negative Output Paralleling Application Circuit

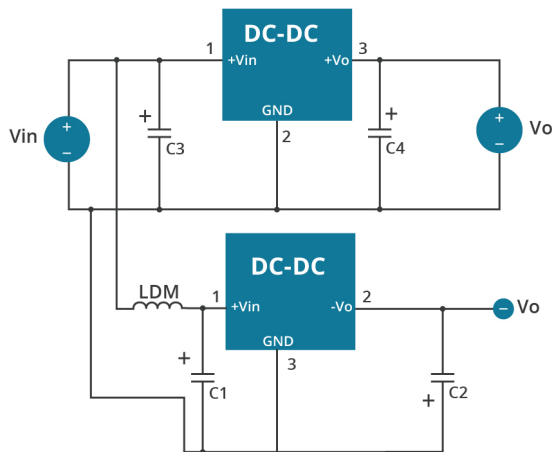


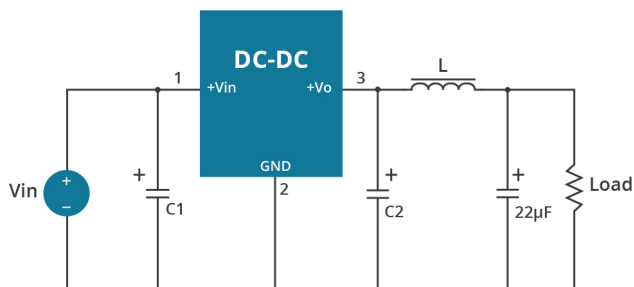
Table 1

| External Capacitor Table | | |
|--------------------------|-------------------------------|-------------------------------|
| Model Number | C1, C3 (ceramic capacitor) | C2, C4 (ceramic capacitor) |
| VX7803-500-W | 10 μ F/50 V | 22 μ F/10 V |
| VX7805-500-W | 10 μ F/50 V | 22 μ F/10 V |
| VX7809-500-W | 10 μ F/50 V | 22 μ F/16 V |
| VX7812-500-W | 10 μ F/50 V | 22 μ F/25 V |
| VX7815-500-W | 10 μ F/50 V | 22 μ F/25 V |

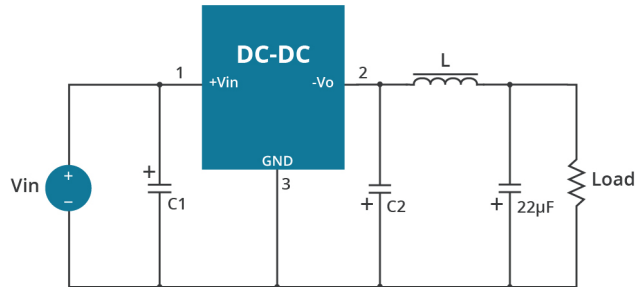
- Note:
- 1.C1 and C2 (C3 and C4) are required and should be connected close to the pin terminal of the module.
 - 2.The capacitance of C1 and C2 (C3 and C4) refer to Sheet 1, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
 - 3.When the products used as the circuit like figure 3, an inductor named as LDM up to 10 μ H is recommended in the circuit to reduce the mutual interference.
 - 4.Cannot be used in parallel for output and hot swap.

To reduce the output ripple furtherly, it is suggested to connect a "LC" filter at the output terminal, and recommended value of L is 10 μ H-47 μ H.

Figure 4



Positive Output Ripple Reduction Circuit



Negative Output Ripple Reduction Circuit

EMC RECOMMENDED CIRCUIT

Figure 5

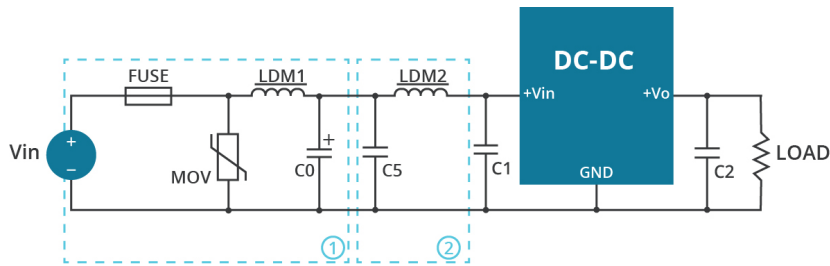


Table 2

| 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 |
| C5 | 4.7 μ F/50 V |
| LDM2 | 12 μ H |

Note: 1. Part ① in Fig. 5 is for EMS test, part ② is for EMI filtering; parts ① and ② can be added based on actual requirement.

REVISION HISTORY

| rev. | description | date |
|------|---|------------|
| 1.0 | initial release | 01/22/2020 |
| 1.01 | company logo updated | 04/14/2021 |
| 1.02 | derating curve, efficiency curves and circuit figures updated | 09/17/2021 |
| 1.03 | safeties updated | 12/20/2022 |
| 1.04 | application circuits updated | 04/04/2023 |

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



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