


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

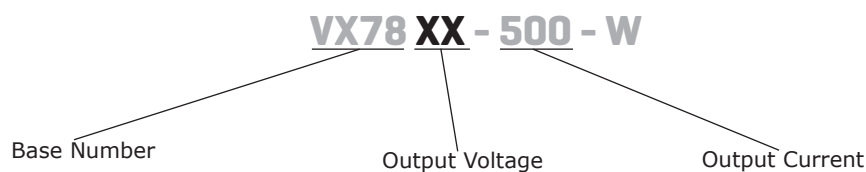
**FEATURES**

- 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 <sup>1</sup>		output voltage (Vdc)	output current max (mA)	output power max (W)	ripple & noise <sup>2</sup> max (mVp-p)	efficiency <sup>3</sup> 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  $\mu$ F / 50 V input capacitor is required.
  2. Tested at nominal input, 10~100% load, 20 MHz bandwidth, with 10  $\mu$ F electrolytic and 1  $\mu$ 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%  $V_o$ .
  3. Measured at min  $V_{in}$ , full load.
  4. All specifications are measured at  $T_a=25^\circ\text{C}$ , 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 <sup>2</sup>	for positive output applications for negative output applications			680 330	$\mu$ F $\mu$ F
voltage accuracy	at full load, input voltage range 3.3 Vdc output model all other models		$\pm 2$ $\pm 2$	$\pm 4$ $\pm 3$	% %
line regulation	at full load, input voltage range		$\pm 0.2$	$\pm 0.4$	%
load regulation	at nominal input, 10~100% load		$\pm 0.4$	$\pm 1.5$	%
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			$\pm 0.03$	%/°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	EN62368-1				
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 $\pm 4$ kV, perf. Criteria B				
radiated immunity	IEC/EN61000-4-3, 10V/m, perf. Criteria A				
EFT/burst	IEC/EN61000-4-4, $\pm 1$ kV, perf. Criteria B (see Figure 5-① for recommended circuit)				
surge	IEC/EN61000-4-5, line-line $\pm 1$ 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

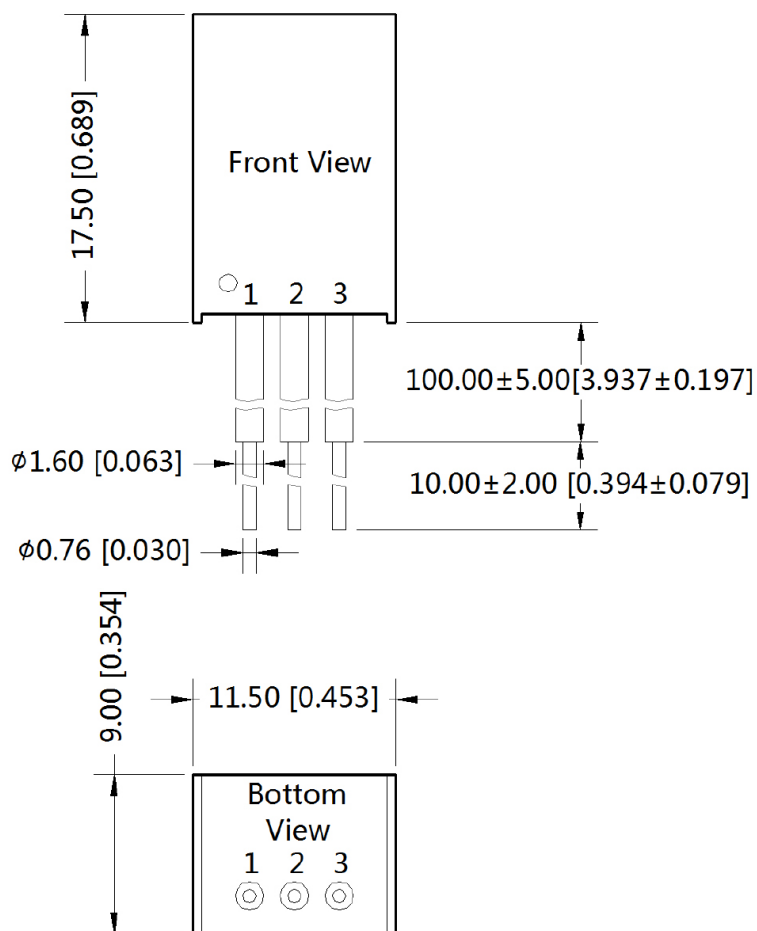
## MECHANICAL DRAWING

units: mm [inch]

tolerance:  $\pm 0.50$  [ $\pm 0.020$ ]

wire type: UL1569 AWG22 (300V 105°C)

PIN CONNECTIONS		
PIN	+OUTPUT	-OUTPUT
1 (red)	V <sub>in</sub>	V <sub>in</sub>
2 (black)	GND	-V <sub>o</sub>
3 (yellow)	+V <sub>o</sub>	GND



## DERATING CURVE

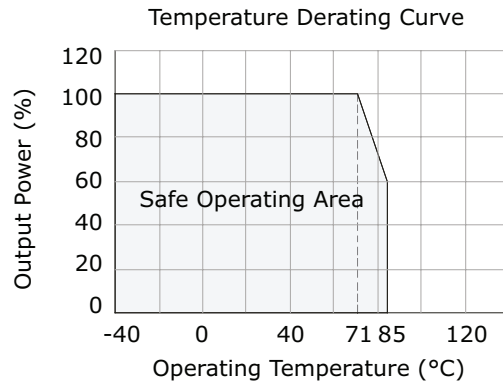
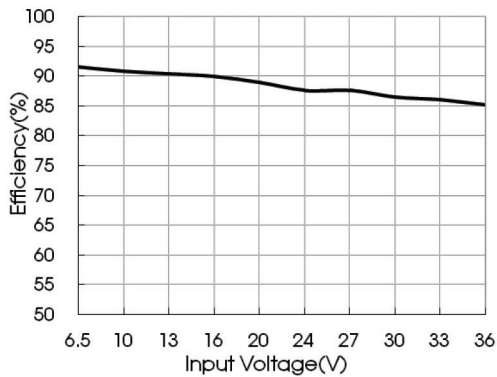


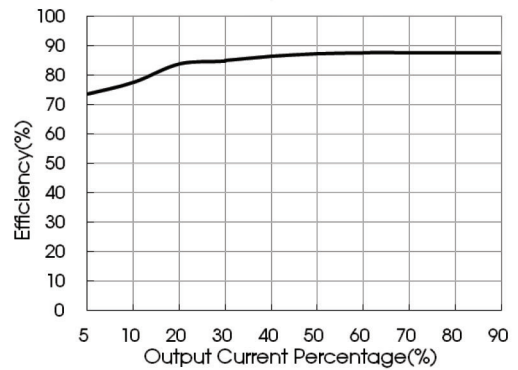
Figure 1

## EFFICIENCY CURVES

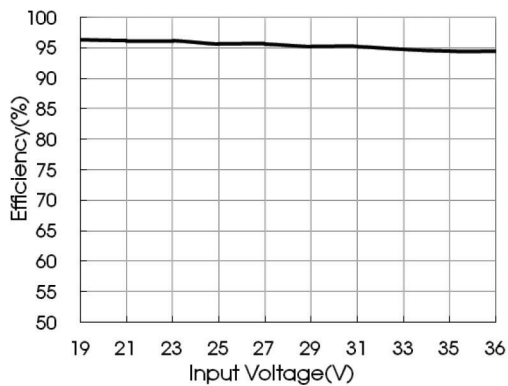
VX7805-500-W Efficiency Curve  
Efficiency vs. Input Voltage  
(at full load)



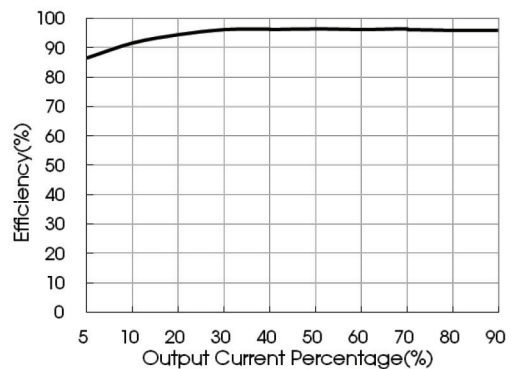
VX7805-500-W Efficiency Curve  
Efficiency vs. Output Load  
(Vin = 24V)



VX7815-500-W Efficiency Curve  
Efficiency vs. Input Voltage  
(at full load)

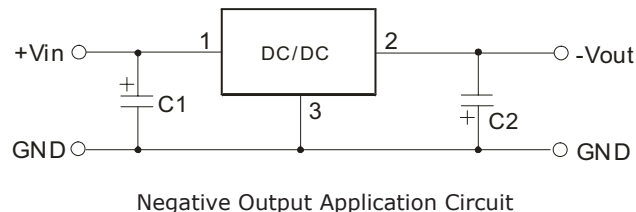
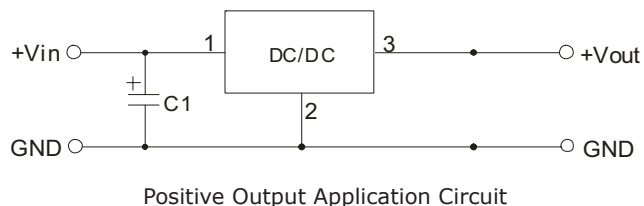


VX7815-500-W Efficiency Curve  
Efficiency vs. Output Load  
(Vin = 24V)



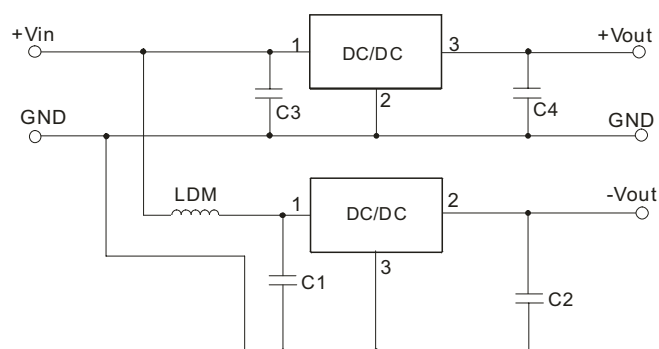
## TYPICAL APPLICATION CIRCUIT

**Figure 2**



**Figure 3**

Positive and Negative Output Paralleling Application Circuit



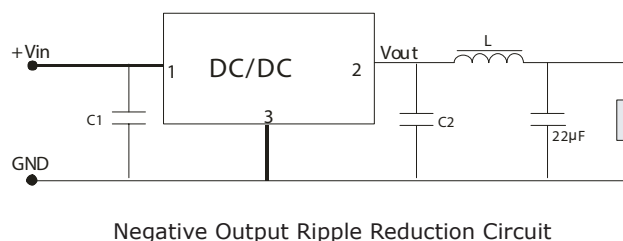
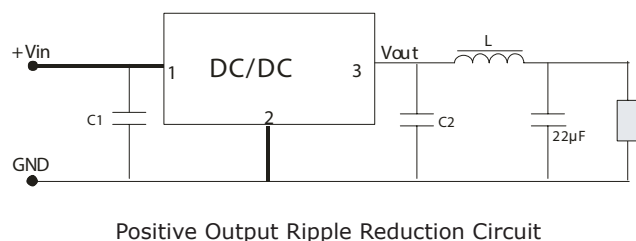
**Table 1**

External Capacitor Table		
Model Number	C1, C3 (ceramic capacitor)	C2, C4 (ceramic capacitor)
VX7803-500-W	10 $\mu$ F/50 V	22 $\mu$ F/10 V
VX7805-500-W	10 $\mu$ F/50 V	22 $\mu$ F/10 V
VX7809-500-W	10 $\mu$ F/50 V	22 $\mu$ F/16 V
VX7812-500-W	10 $\mu$ F/50 V	22 $\mu$ F/25 V
VX7815-500-W	10 $\mu$ F/50 V	22 $\mu$ 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 $\mu$ H is recommended in the circuit to reduce the mutual interference.
  - 4.Cannot be used in parallel for output and hot swap.

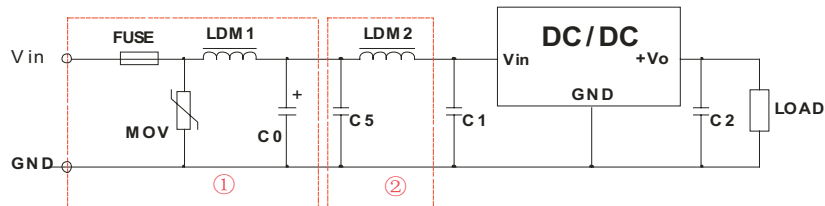
To reduce the output ripple furtherly, it is suggested to connect a "LC" filter at the output terminal, and recommended value of L is 10 $\mu$ H-47 $\mu$ H.

**Figure 4**



## EMC RECOMMENDED CIRCUIT

**Figure 5**



**Table 2**

Recommended external circuit components	
FUSE	choose according to actual input current
MOV	S20K30
LDM1	82 $\mu$ H
C0	680 $\mu$ F/50 V
C1, C2	see Table 1
C5	4.7 $\mu$ F/50 V
LDM2	12 $\mu$ 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

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rev.	description	date
1.0	initial release	01/22/2020

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



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