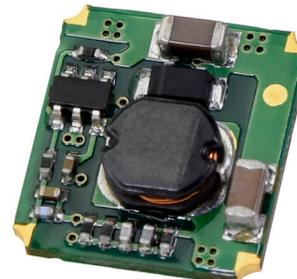


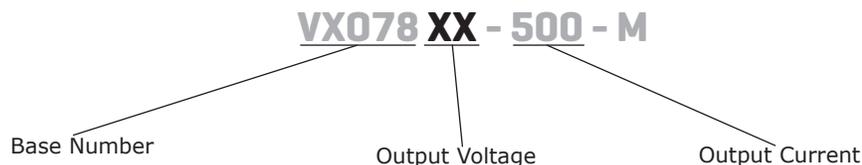
**SERIES: VX078-500-M | DESCRIPTION: NON-ISOLATED DC SWITCHING REGULATOR**
**FEATURES**

- ultra-thin SMD Package, thickness  $\leq 3.5$  mm
- open frame
- high efficiency up to 95%
- no-load input current as low as 0.2 mA
- wide temperature range:  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- 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)					
VX07803-500-M	24	4.75~36	3.3	500	1.65	50	86
VX07805-500-M	24	6.5~36	5	500	2.5	50	90
VX07809-500-M	24	12~36	9	500	4.5	50	93
VX07812-500-M	24	15~36	12	500	6	50	94
VX07815-500-M	24	19~36	15	500	7.5	50	95

- Notes:
1. For input voltages higher than 30 Vdc, a 22  $\mu\text{F}$  / 50 V input capacitor is required.
  2. Tested at nominal input, 20~100% load for 3.3 Vdc model, 20 MHz bandwidth, with 10  $\mu\text{F}$  electrolytic and 1  $\mu\text{F}$  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 <sup>1</sup>	for positive output applications		24	36	Vdc
filter	capacitor filter				
input reverse polarity protection	no				
no-load input current	positive outputs		0.2	1.5	mA
Ctrl* <sup>2</sup>	module on		Ctrl pin open or pulled high (TTL 3.2-8VDC)		
	module off		Ctrl pin pulled low to GND (0-0.8VDC)		
	input current when off		30	100	μA

Note: 1. See Model section on page 1 for specific input voltage ranges.  
2. The Ctrl pin voltage is referenced to input GND.

## OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load <sup>3</sup>	for positive output applications			680	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 3.3 Vdc output model		±0.6		%
	all other models		±0.3		%
switching frequency	at nominal input voltage, full load		700		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	200	mV
temperature coefficient	at full load			±0.03	%/°C

Note: 3. 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 Fig. 4-2 for recommended circuit)				
radiated emissions	CISPR32/EN55032 Class B (see Fig. 4-2 for recommended circuit)				
ESD	IEC/EN61000-4-2, contact ± 4kV, perf. Criteria B				
radiated immunity	IEC/EN61000-4-3, 10V/m, perf. Criteria A				
EFT/burst	IEC/EN61000-4-4, ± 1kV (see Fig. 4-1 for recommended circuit), perf. Criteria B				
surge	IEC/EN61000-4-5, line-line ± 1kV (see Fig. 4-1 for recommended circuit), perf. Criteria B				
conducted immunity	IEC/EN61000-4-6, 3 Vr.m.s, perf. Criteria A				
MTBF	as per MIL-HDBK-217F, 25°C	2,000			K 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
reflow soldering	Peak temp. ≤245°C, maximum duration time ≤60s over 217°C. Please refer to IPC/JEDEC J-STD-020D.1			260	°C

## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	12.50 x 13.50 x 3.50 [0.492 x 0.531 x 0.138 inch]				mm
weight			0.9		g

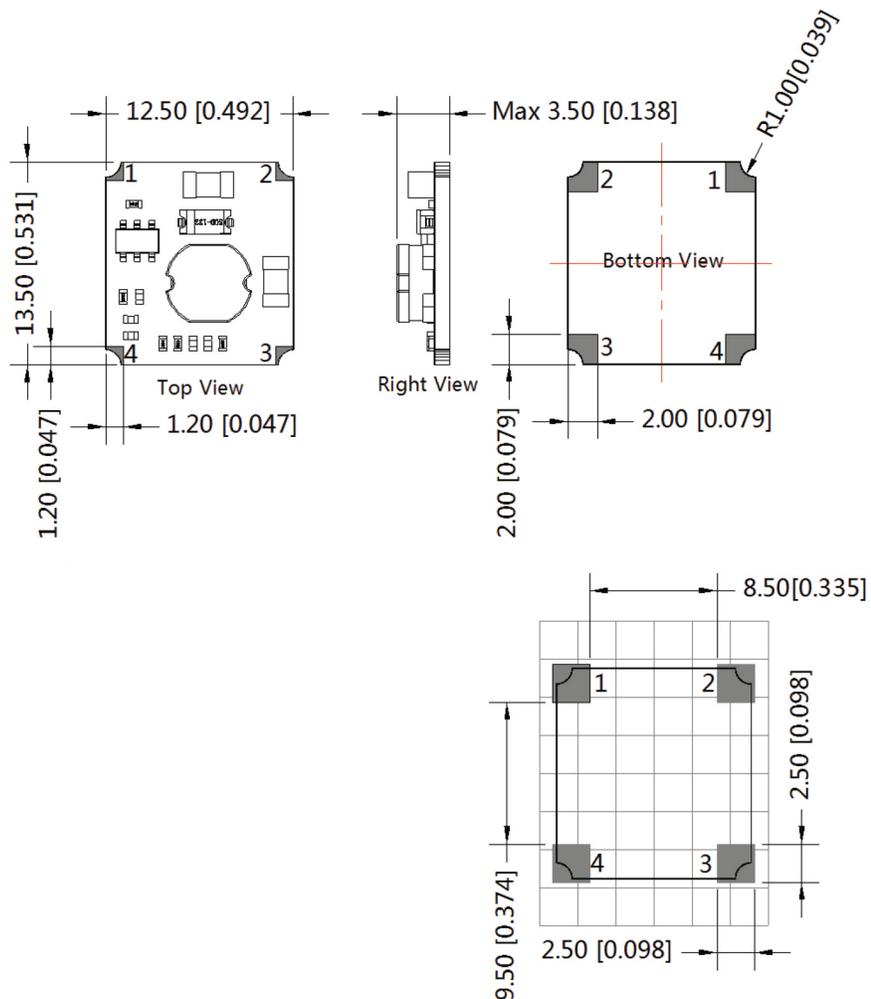
## MECHANICAL DRAWING

units: mm [inch]

tolerance: ±0.25[±0.010]

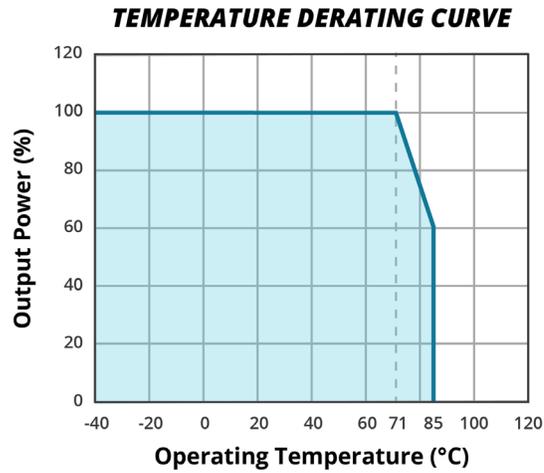
pin diameter tolerance: ±0.10[±0.004]

PIN-OUT	
PIN	FUNCTION
1	+Vin
2	GND
3	+Vo
4	Remote on/off



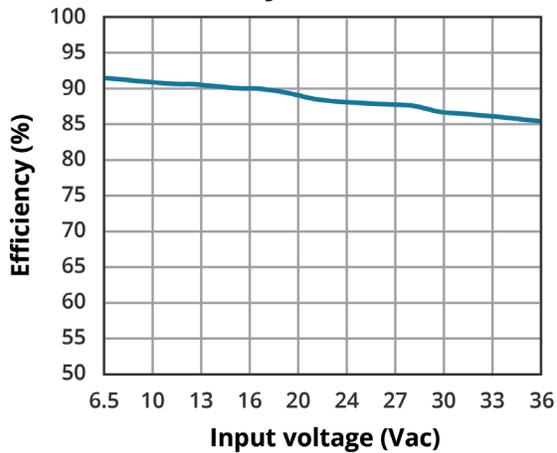
## DERATING CURVE

Figure 1

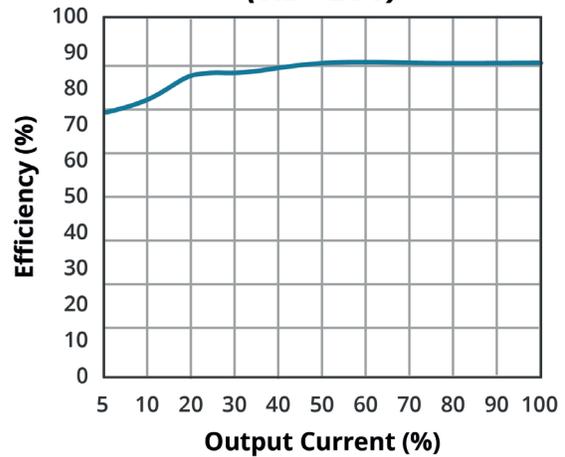


## EFFICIENCY CURVES

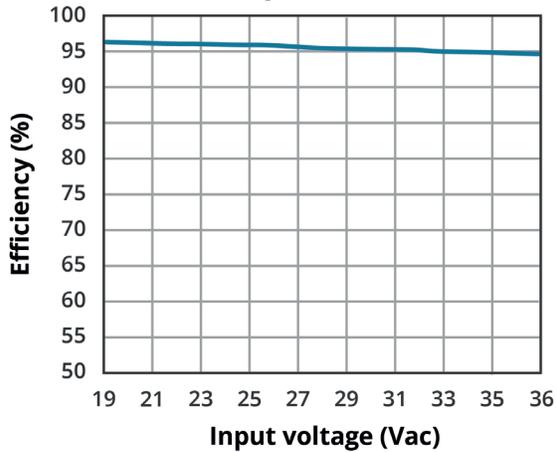
**EFFICIENCY VS INPUT VOLTAGE  
VX07805-500-M  
(full load)**



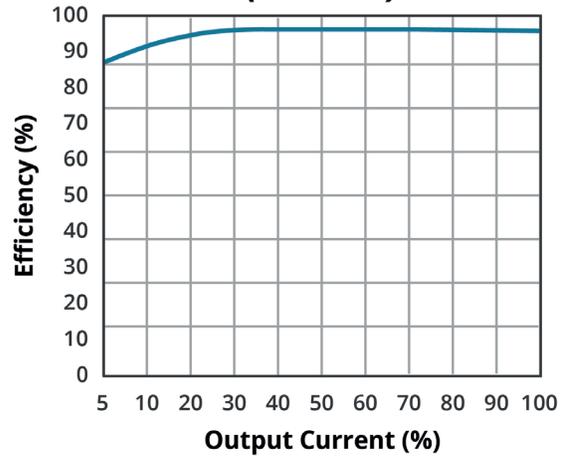
**EFFICIENCY VS OUTPUT LOAD  
VX07805-500-M  
(Vin = 24 V)**



**EFFICIENCY VS INPUT VOLTAGE  
VX078015-500-M  
(full load)**



**EFFICIENCY VS OUTPUT LOAD  
VX078015-500-M  
(Vin = 24 V)**



## TYPICAL APPLICATION CIRCUIT

Figure 2

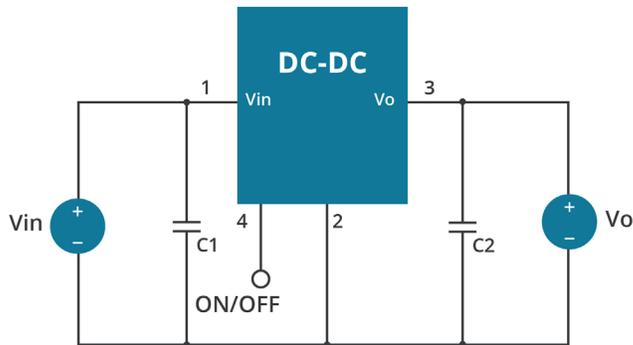


Table 1

External Capacitor Table		
Model Number	C1, C3 (ceramic capacitor)	C2, C4 (ceramic capacitor)
VXO7803-500-M	10 $\mu$ F/50 V	22 $\mu$ F/10 V
VXO7805-500-M	10 $\mu$ F/50 V	22 $\mu$ F/16 V
VXO7809-500-M	10 $\mu$ F/50 V	22 $\mu$ F/25 V
VXO7812-500-M	10 $\mu$ F/50 V	22 $\mu$ F/25 V
VXO7815-500-M	10 $\mu$ F/50 V	22 $\mu$ F/25 V

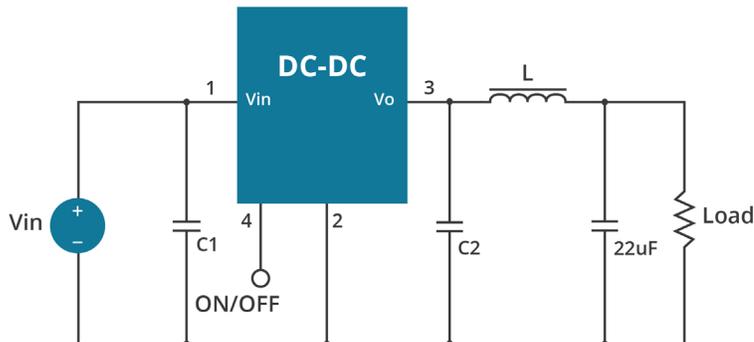
Note:

- 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 3

External "LC" output filter circuit diagram



## EMC RECOMMENDED CIRCUIT

Figure 4

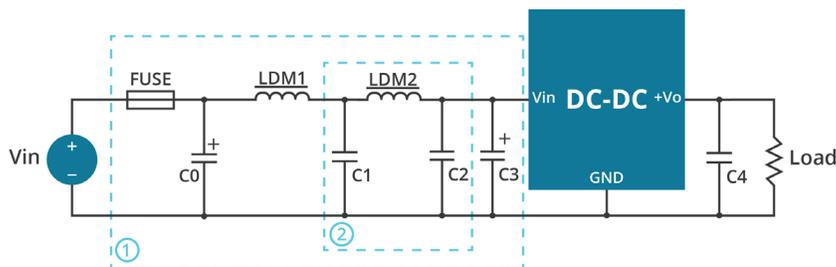


Table 2

Recommended external circuit components	
FUSE	choose according to actual input current
LDM1	82 $\mu$ H
C0, C3	330 $\mu$ F/50 V
C4	see Table 1
C1, C2	10 $\mu$ F/50 V
LDM2	22 $\mu$ H

Note: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

## REVISION HISTORY

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rev.	description	date
1.0	initial release	01/22/2020
1.01	Ctrl added	04/13/2020
1.02	derating curve, efficiency curves and circuit figures updated	09/17/2021

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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[N0.8](#) [3V24-P1](#) [3V24-N1](#) [BMR4672010/001](#) [BMR4652010/001](#) [6AA24-P30-I5-M](#) [6AA24-N30-I5-M](#) [BM2P101X-Z](#) [35A24-P30](#) [2.5M24-P1](#)  
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[1/2AA24-N30-I10](#) [1C24-N125](#) [12C24-N250](#) [V7806-1500](#) [PTV12020LAH](#) [PTV05010WAH](#) [PTN04050CAZT](#) [PTH12020WAD](#)  
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