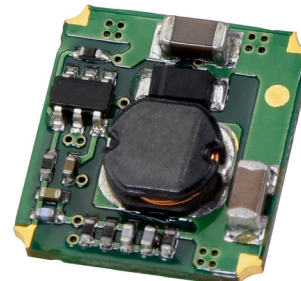


SERIES: VX078-500-M | **DESCRIPTION:** NON-ISOLATED DC SWITCHING REGULATOR

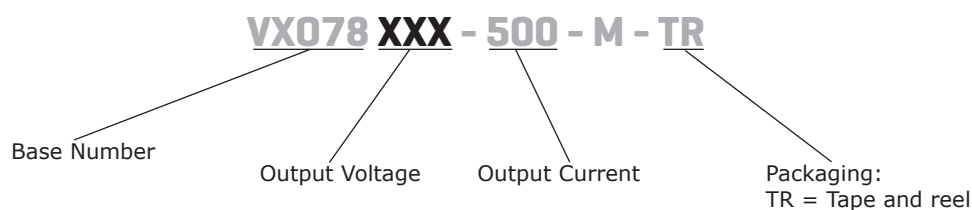
FEATURES

- ultra-thin SMD Package, thickness ≤ 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 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)					
VX07803-500-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
VX078012-500-M	24	15~36	12	500	6	50	94
VX078015-500-M	24	19~36	15	500	7.5	50	95

- Notes:
1. For input voltages higher than 30 Vdc, a 22 μF / 50 V input capacitor is required.
 2. Tested at nominal input, 20~100% load for 3.3 Vdc model, 20 MHz bandwidth, with 10 μF electrolytic and 1 μF 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 ¹	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*2	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 ³	for positive output applications			680	μF
voltage accuracy	at full load, input voltage range		±2	±4	%
	3.3 Vdc output model		±2	±3	%
	all other models				
line regulation	at full load, input voltage range		±0.2	±0.4	%
load regulation	at nominal input, 10~100% load		±0.6		%
	3.3 Vdc output model		±0.3		%
	all other models				
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	designed to meet 62368-1: EN, BS EN				
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. $\leq 245^{\circ}\text{C}$, maximum duration time $\leq 60\text{s}$ over 217°C . Please refer to IPC/JEDEC J-STD-020D.1			260	°C

MECHANICAL

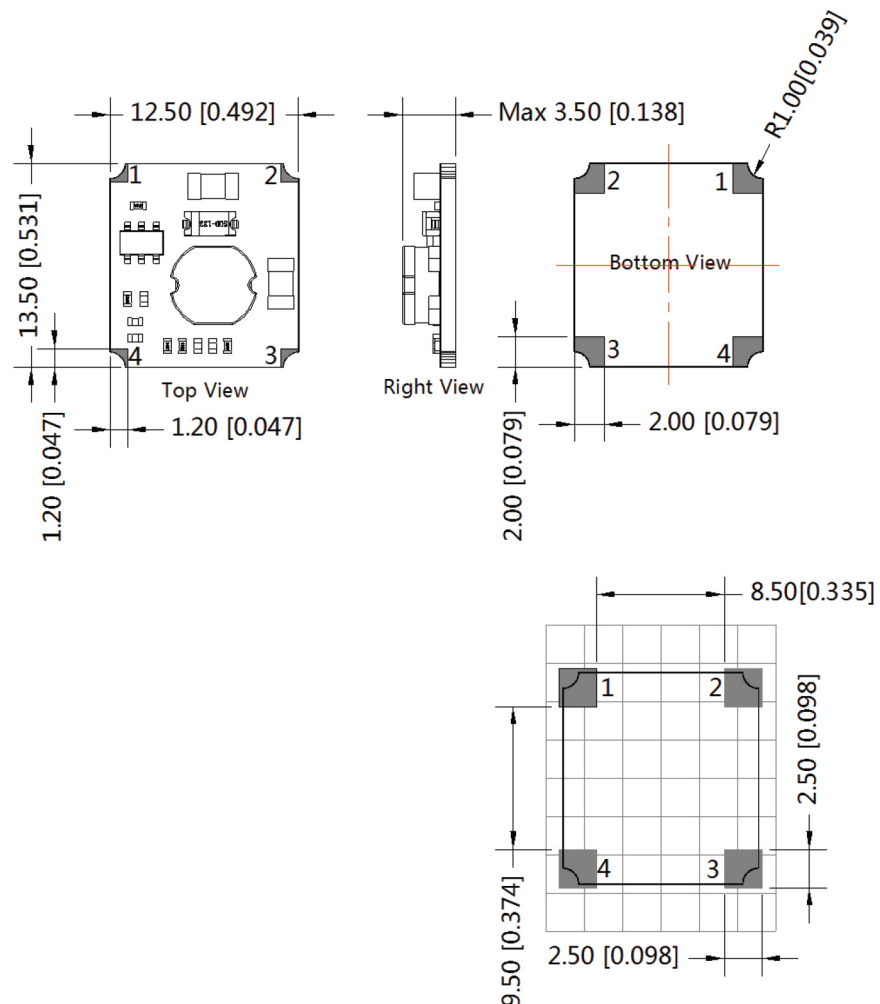
parameter	conditions/description	min	typ	max	units
dimensions	12.50 x 13.50 x 3.50 [0.492 x 0.531 x 0.138 inch]				mm
weight			0.9		g

MECHANICAL DRAWING

units: mm [inch]

tolerance: $\pm 0.25[\pm 0.010]$ pin diameter tolerance: $\pm 0.10[\pm 0.004]$

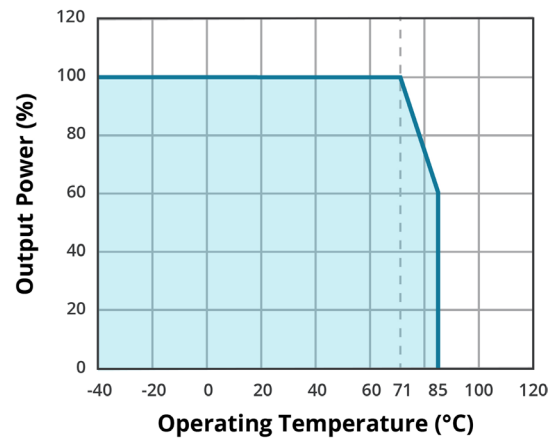
PIN-OUT	
PIN	FUNCTION
1	+Vin
2	GND
3	+Vo
4	Remote on/off



DERATING CURVE

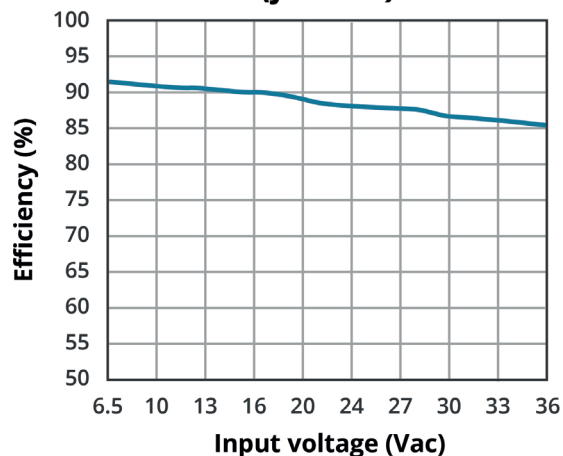
Figure 1

TEMPERATURE DERATING CURVE

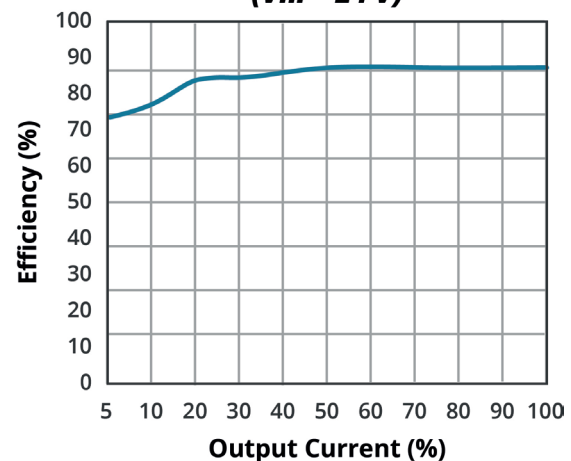


EFFICIENCY CURVES

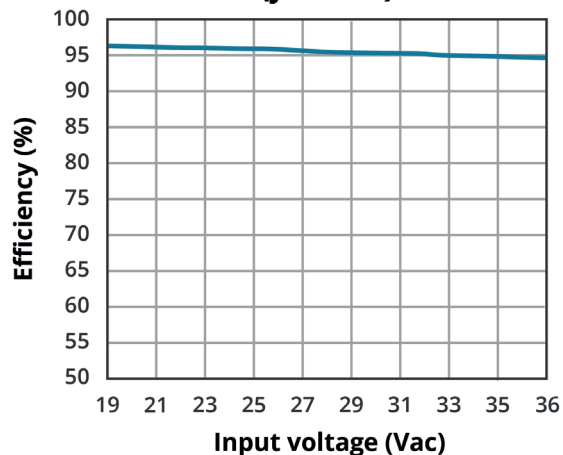
EFFICIENCY VS INPUT VOLTAGE VX07805-500-M (full load)



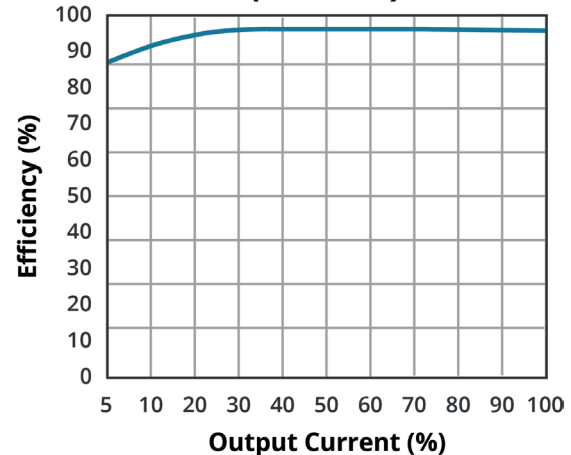
EFFICIENCY VS OUTPUT LOAD VX07805-500-M (Vin = 24 V)



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



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



TYPICAL APPLICATION CIRCUIT

Figure 2

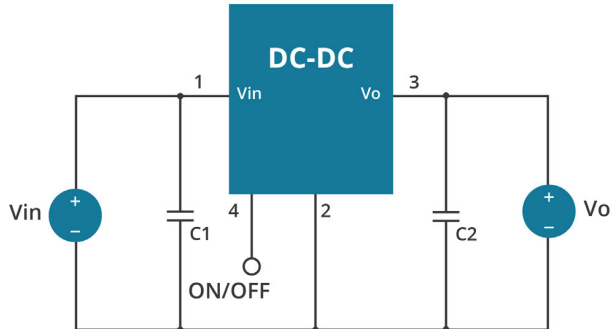


Table 1

External Capacitor Table		
Model Number	C1, C3 (ceramic capacitor)	C2, C4 (ceramic capacitor)
VXO7803-500-M	10 μ F/50 V	22 μ F/10 V
VXO7805-500-M	10 μ F/50 V	22 μ F/16 V
VXO7809-500-M	10 μ F/50 V	22 μ F/25 V
VXO78012-500-M	10 μ F/50 V	22 μ F/25 V
VXO78015-500-M	10 μ F/50 V	22 μ F/25 V

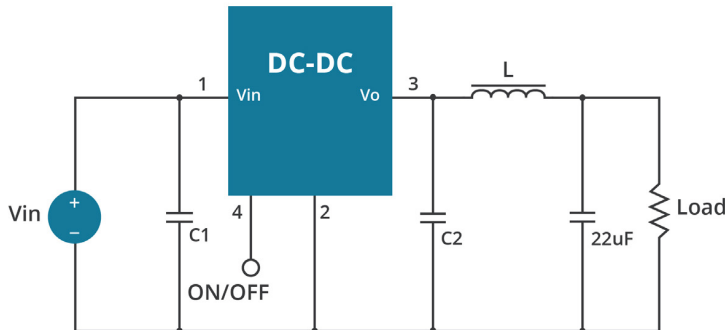
Note:

- 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 3

External "LC" output filter circuit diagram



EMC RECOMMENDED CIRCUIT

Figure 4

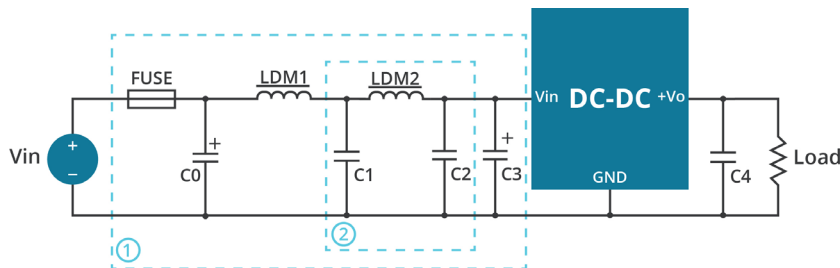


Table 2

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

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
1.03	PN for 12V & 15V model updated	09/04/2022
1.04	PN key updated	01/26/2023
1.05	safeties updated	04/06/2023

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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