

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

FEATURES

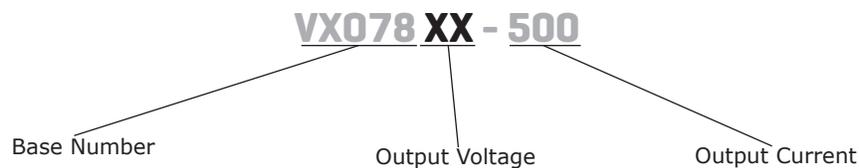
- wide input
- pin-out compatible with linear regulators
- open frame
- UL & CSA approved
- high efficiency up to 95%
- no-load input current as low as 0.2 mA
- wide operating temp: -40°C to +85°C
- supports negative output
- short circuit protection on the output
- EN 62368-1


MODEL

	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	24	4.75~36	3.3	500	1.65	75	86
VX07805-500	24	6.5~36	5	500	2.5	100	90
	12	7~31	-5	-300	1.5	100	80
VX078012-500	24	15~36	12	500	6	75	94
	12	8~24	-12	-150	1.8	75	84
VX078015-500	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 ¹	for positive output applications	4.75	24	36	Vdc
	for negative output applications	7	12	31	Vdc
filter	capacitor filter				
input reverse polarity protection	no				
no-load input current	positive outputs		5.0	8.0	mA
	5 Vdc output model all other output models		0.2	1.5	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		±2	±4	%
	3.3 Vdc output model 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			1,250	kHz
	5 Vdc output model all other output models	750 550		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	certified to 62368-1: EN certified to 60950-1: UL				
EMI/EMC	EN 55032, EN 55024				
conducted emissions ³	CISPR22/EN55022, class B (external circuit required, see Figure 6-b)				
radiated emissions ³	CISPR22/EN55022, class B (external circuit required, see Figure 6-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 6-a)				
surge	IEC/EN61000-4-5, line-line ± 1kV, class B (external circuit required, see Figure 6-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				

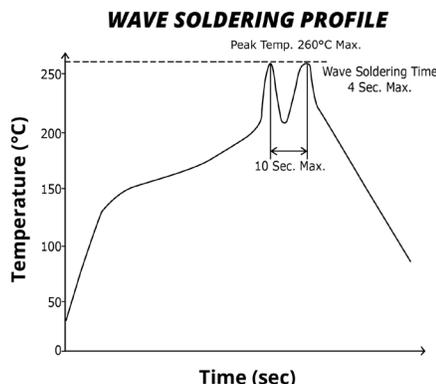
Note: 3. CISPR22/EN55022, class A for the 5 Vdc output model.

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



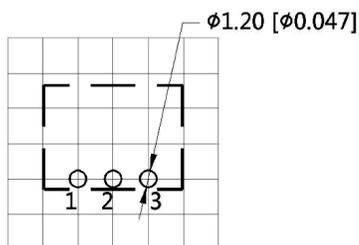
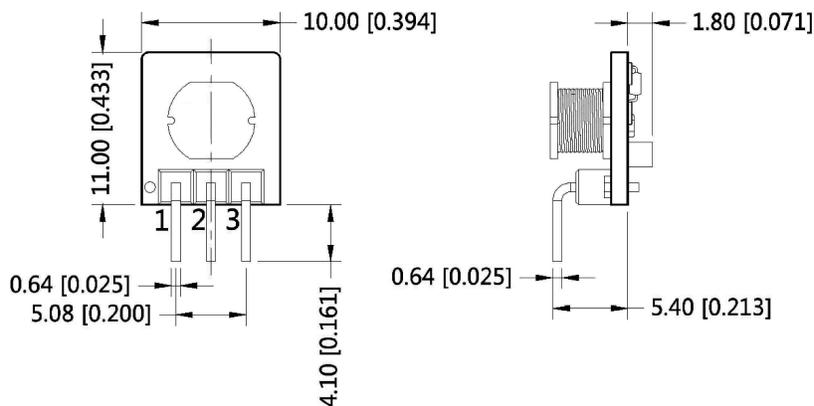
MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	10.00 x 7.20 x 11.00 [0.394 x 0.283 x 0.433 inch]				mm
weight			1.0		g

MECHANICAL DRAWING

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

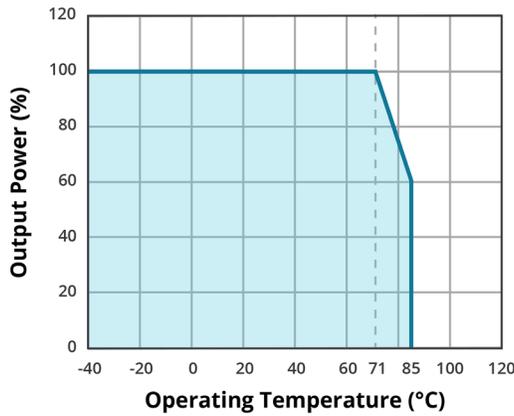
PIN CONNECTIONS		
PIN	+OUTPUT	-OUTPUT
1	+VIN	+VIN
2	GND	-VOUT
3	+VOUT	GND



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

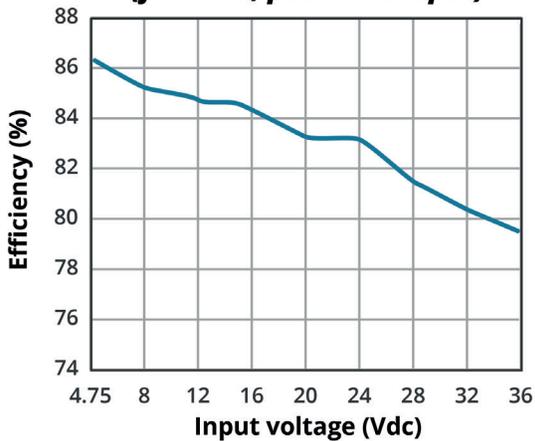
DERATING CURVE

TEMPERATURE DERATING CURVE

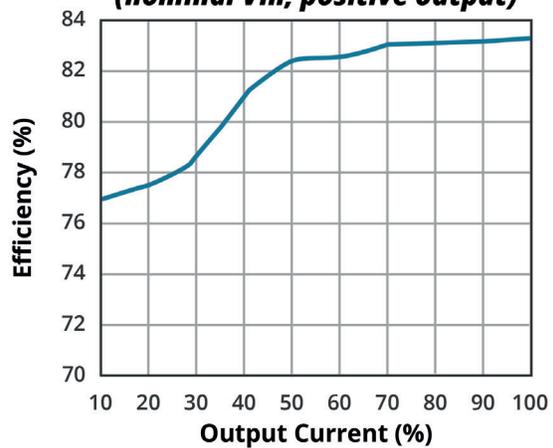


EFFICIENCY CURVES

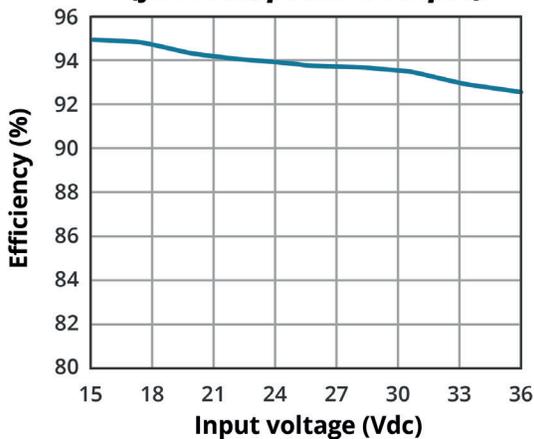
**EFFICIENCY VS INPUT LOAD
VX07803-500
(full load, positive output)**



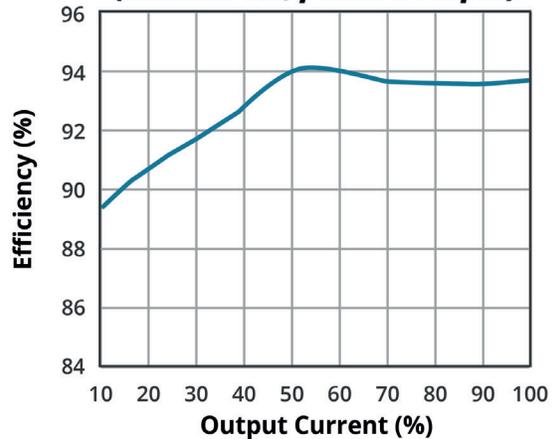
**EFFICIENCY VS OUTPUT LOAD
VX07803-500
(nominal Vin, positive output)**



**EFFICIENCY VS INPUT LOAD
VX078012-500
(full load, positive output)**

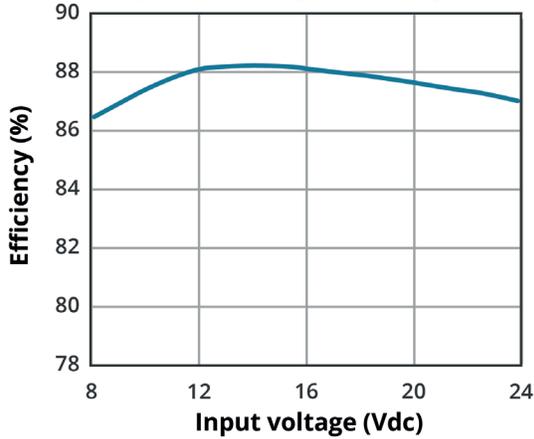


**EFFICIENCY VS OUTPUT LOAD
VX078012-500
(nominal Vin, positive output)**

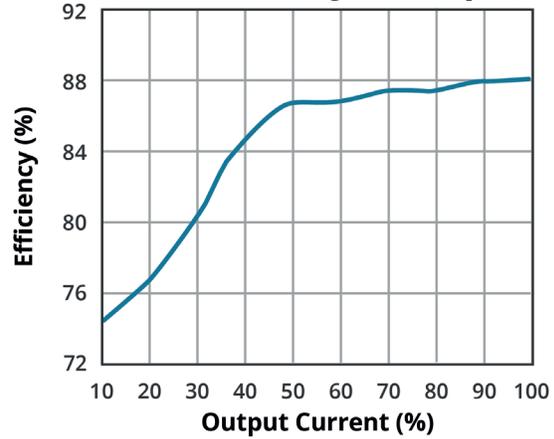


EFFICIENCY CURVES (CONTINUED)

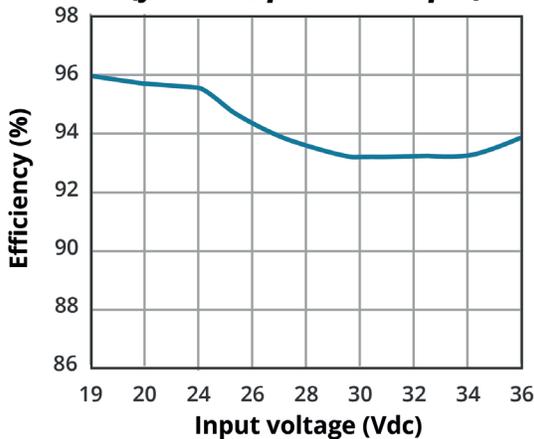
**EFFICIENCY VS INPUT LOAD
VX078012-500
(full load, negative output)**



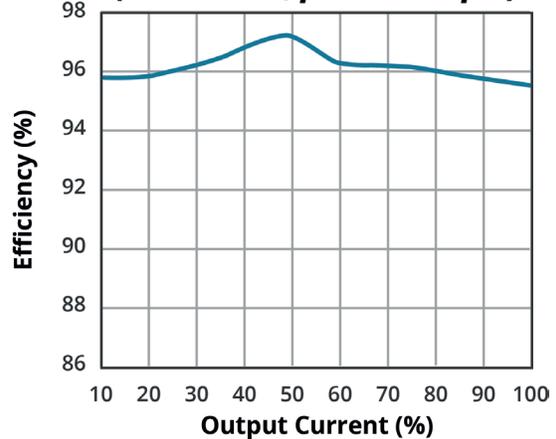
**EFFICIENCY VS OUTPUT LOAD
VX078012-500
(nominal Vin, negative output)**



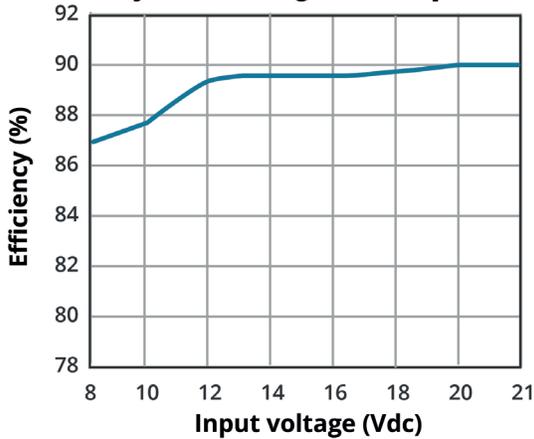
**EFFICIENCY VS INPUT LOAD
VX078015-500
(full load, positive output)**



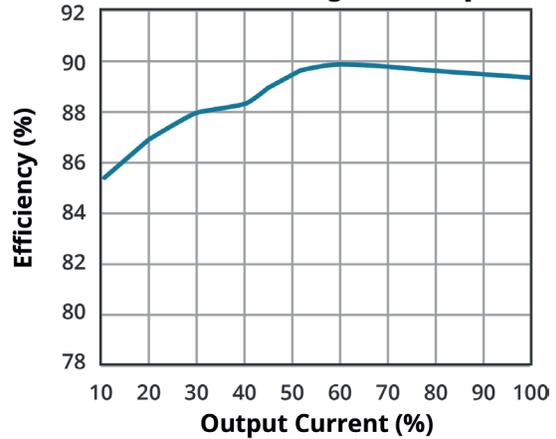
**EFFICIENCY VS OUTPUT LOAD
VX078015-500
(nominal Vin, positive output)**



**EFFICIENCY VS INPUT LOAD
VX078015-500
(full load, negative output)**



**EFFICIENCY VS OUTPUT LOAD
VX078015-500
(nominal Vin, negative output)**



TYPICAL APPLICATION CIRCUIT

Figure 1

Positive Output Application Circuit

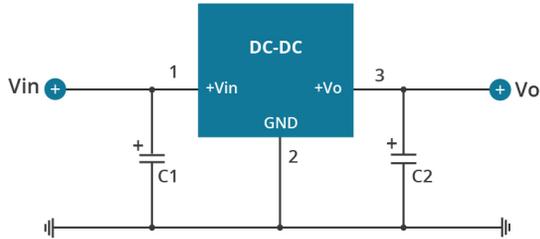


Figure 3

Positive and Negative Output Paralleling Application Circuit

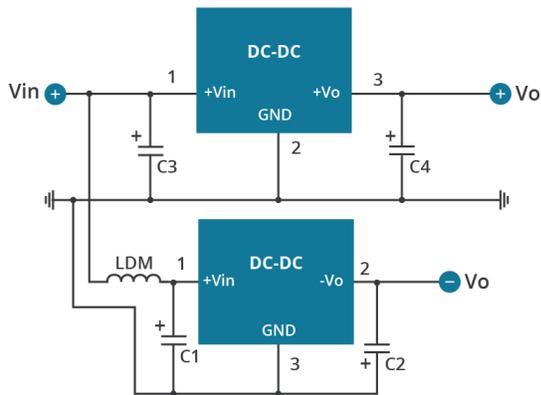


Figure 4

Positive Output Ripple Reduction Circuit

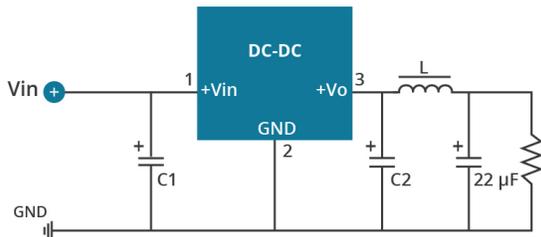


Figure 2

Negative Output Application Circuit

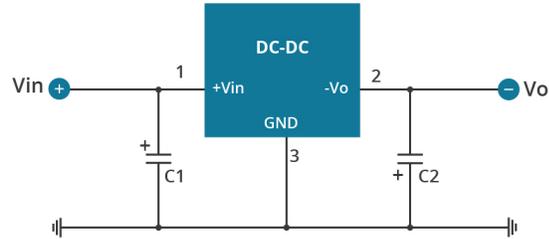


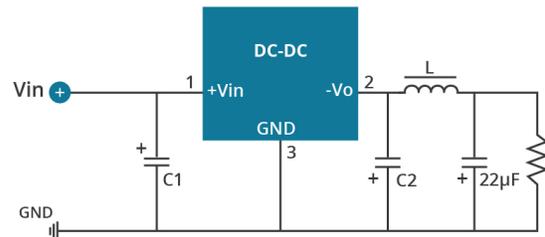
Table 1

External Capacitor Table

Model Number	C1, C3 (ceramic capacitor)	C2, C4 (ceramic capacitor)
VX07803-500	10 μF/50 V	22 μF/10 V
VX07805-500	10 μF/50 V	22 μF/10 V
VX078012-500	10 μF/50 V	22 μF/25 V
VX078015-500	10 μF/50 V	22 μF/25 V

Figure 5

Negative Output Ripple Reduction Circuit



EMC RECOMMENDED CIRCUIT

Figure 6

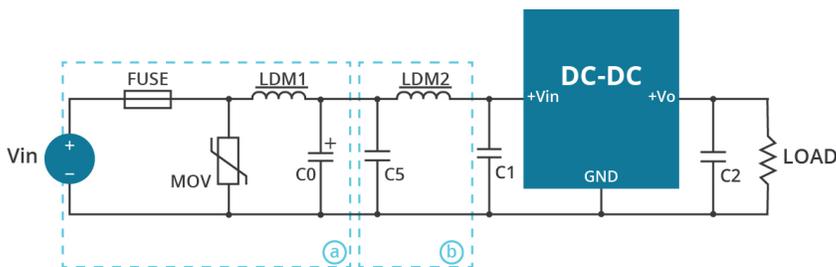


Table 2

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

- Note:
- C1 & C2 (C3 & C4) are required and should be connected as close to the module pins as possible.
 - To reduce the output ripple further, it is recommended to connect an "LC" filter at the output terminal with a recommended value of 10~47 μH for the L component. (See Figures 4 & 5).
 - When using application circuit in Figure 3, a 10 μH 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	09/14/2021
1.04	negative output application circuit updated	04/26/2022
1.05	application circuits updated	04/04/2023
1.06	switching frequency, no load input current, ripple & noise, and emissions updated for 5 Vdc output model	05/23/2023

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



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