

**SERIES:** VX78-1000R | **DESCRIPTION:** NON-ISOLATED DC SWITCHING REGULATOR

**FEATURES**

- wide input
- pin-out compatible with linear regulators
- encapsulated
- UL & CSA approved
- high efficiency up to 96%
- 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
- designed to meet EN/BS EN 62368-1

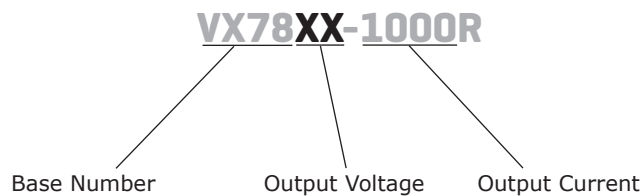


**MODEL**

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 typ (%)
	typ (Vdc)	range (Vdc)					
VX7803-1000R	24	6~36	3.3	1000	3.3	75	90
VX7805-1000R	24	8~36	5	1000	5	75	93
	12	8~27	-5	-500	2.5	75	86
VX7809-1000R	24	13~36	9	1000	9	75	95
VX7812-1000R	24	16~36	12	1000	12	75	96
	12	8~20	-12	-300	3.6	75	89
VX7815-1000R	24	20~36	15	1000	15	75	96
	12	8~18	-15	-300	4.5	75	89

Note: 1. For input voltage exceeding 30 VDC, an input capacitor of 22uF/50V is required  
 2. 20MHz bandwidth, nominal input, 20%-100% load. With light loads at or below 20%, ripple and noise for 3/3V/5V output parts increases to 100mVp-p and for 9V/12V/15V output parts to 2%Vo max.

**PART NUMBER KEY**



## INPUT

parameter	conditions/description	min	typ	max	units
filter	capacitor filter				
no-load input current	positive outputs		0.1	1	mA

## OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load	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		$\pm 0.4$	$\pm 0.6$	%
switching frequency	at nominal input voltage, full load 3.3/5 Vdc output models all other models	420 580	520 680	620 780	kHz kHz
transient recovery time	at nominal input voltage, 25% load step change		0.1	1	ms
transient response deviation	at nominal input voltage, 25% load step change		50	300	mV
temperature coefficient	Operating ambient temperature -40°C to +85°C			$\pm 0.03$	%/°C

## 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 60950: UL designed to meet 62368-1: EN, BS EN				
conducted emissions	CISPR22/EN55022, class B (external circuit required, see Figure 4-b)				
radiated emissions	CISPR22/EN55022, class B (external circuit required, see Figure 4-b)				
ESD	IEC/EN61000-4-2, contact $\pm 4$ kV, criteria B				
radiated immunity	IEC/EN61000-4-3, 10V/m, criteria A				
EFT/burst	IEC/EN61000-4-4, $\pm 1$ kV, criteria B (external circuit required, see Figure 4-a)				
surge	IEC/EN61000-4-5, line-line $\pm 1$ kV, criteria B (external circuit required, see Figure 4-a)				
conducted immunity	IEC/EN61000-4-6, 3 Vr.m.s, criteria A				
MTBF	as per MIL-HDBK-217F, 25°C		2,000,000		hours
RoHS	yes				

## 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	%

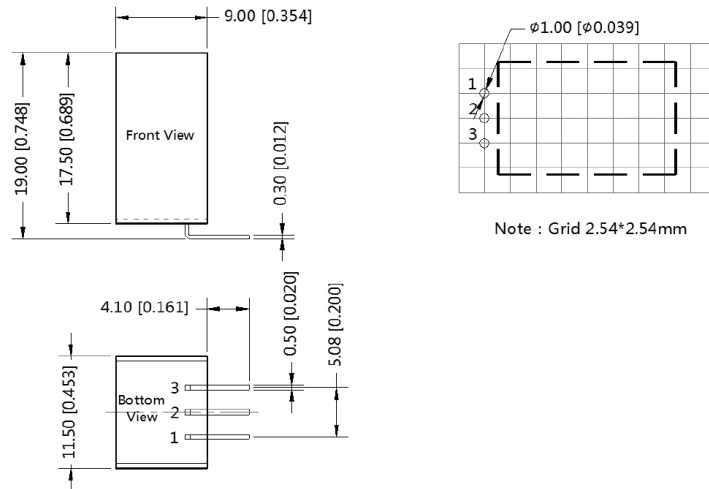
## MECHANICAL

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			3.8		g

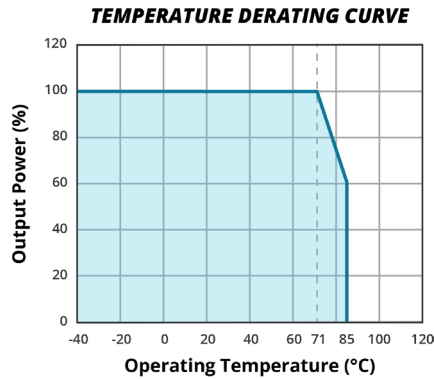
## MECHANICAL DRAWING

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

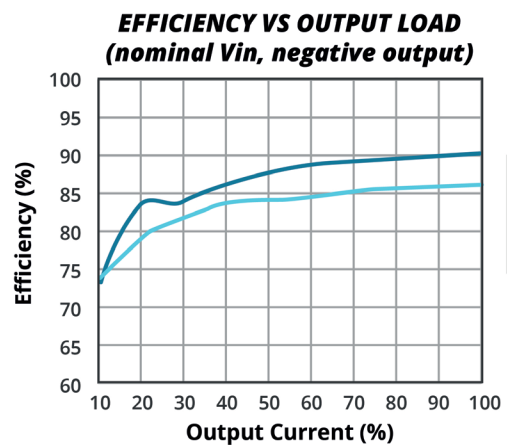
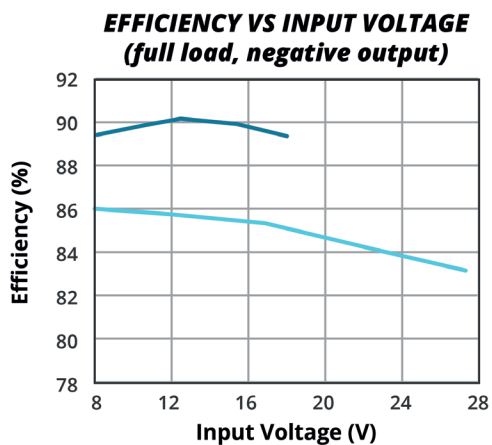
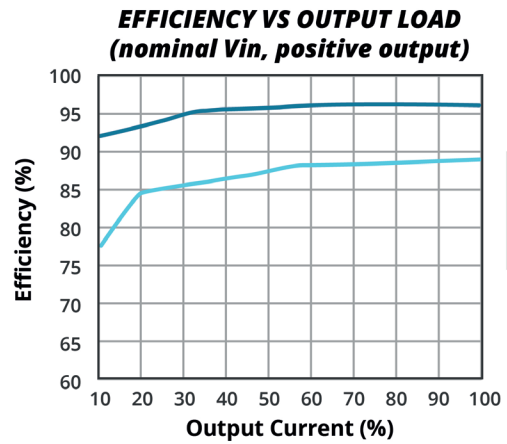
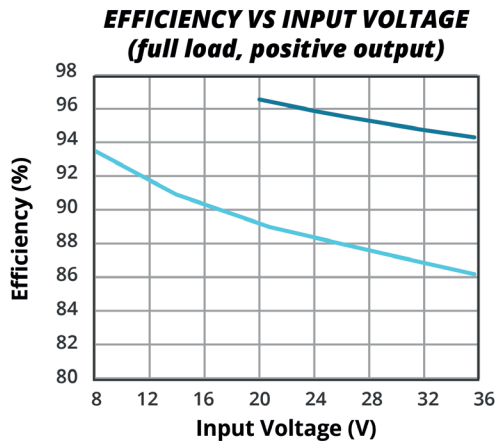
PIN CONNECTIONS		
PIN	+OUTPUT	-OUTPUT
1	+VIN	+VIN
2	GND	-VOUT
3	+VOUT	GND



## DERATING CURVE

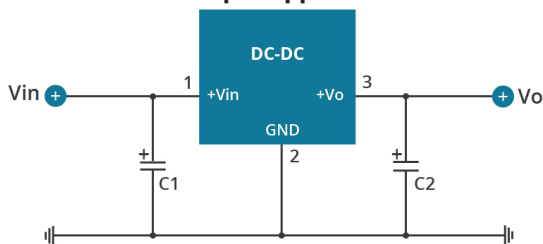


## EFFICIENCY CURVES

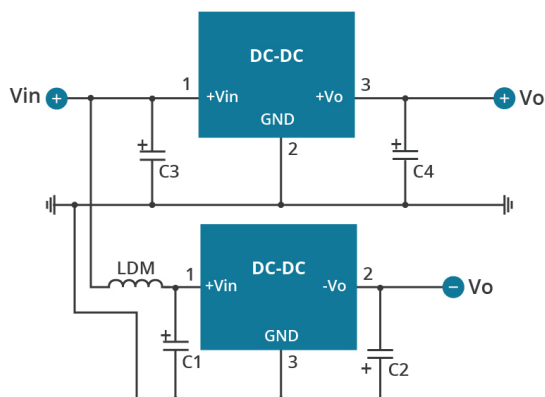


## TYPICAL APPLICATION CIRCUIT

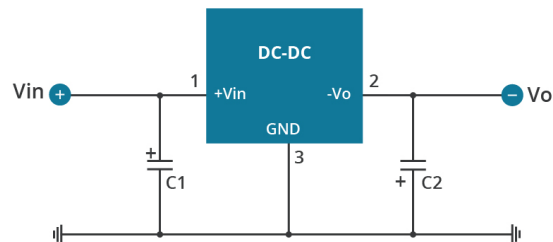
**Figure 1**  
Positive output application circuit



**Figure 3**



**Figure 2**  
Negative output application circuit



**Table 1**

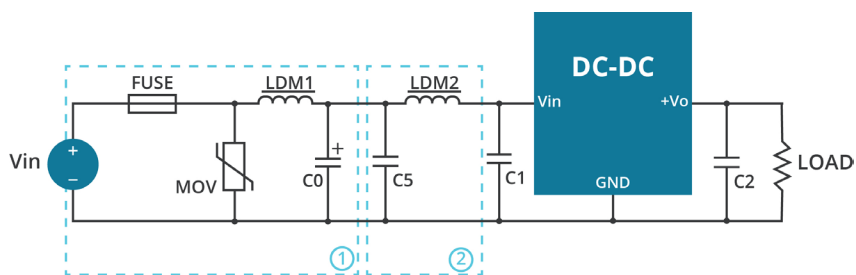
External Capacitor Table

Model Number	C1, C3 (ceramic capacitor)	C2, C4 (ceramic capacitor)
VX7803-1000R	10 $\mu$ F/50 V	22 $\mu$ F/10 V
VX7805-1000R	10 $\mu$ F/50 V	22 $\mu$ F/10 V
VX7809-1000R	10 $\mu$ F/50 V	22 $\mu$ F/16 V
VX7812-1000R	10 $\mu$ F/50 V	22 $\mu$ F/25 V
VX7815-1000R	10 $\mu$ F/50 V	22 $\mu$ F/25 V

- Note:
- C1 & C2 (C3 & C4) are required and should be connected as close to the module pins as possible.
  - Refer to Table 1 for C1 and C2 (C3 and C4) capacitor values. For certain applications, increased values for C2 and C4 and/or tantalum or low ESR electrolytic capacitors may also be used instead;
  - When using configurations as shown in figure 3, we recommended to add an inductor (LDM) with a value of up to 10 $\mu$ H which helps reducing mutual interference;
  - Converter cannot be used for hot swap and with output in parallel.

## EMC RECOMMENDED CIRCUIT

**Figure 4**



- Note:
- Part ① in Fig. 4 shows EMS compliance filter and part ② filter for EMI compliance; depending on requirement both filters ① and ② can be used in series as shown.

**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

## REVISION HISTORY

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rev.	description	date
1.0	initial release	03/09/2020
1.01	safeties updated	02/03/2021
1.02	derating curve, efficiency curves and circuit figures updated	09/21/2021
1.03	safeties updated	12/20/2022
1.04	application circuits updated	03/30/2023

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



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