CUI INC
a bel group

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

FEATURES

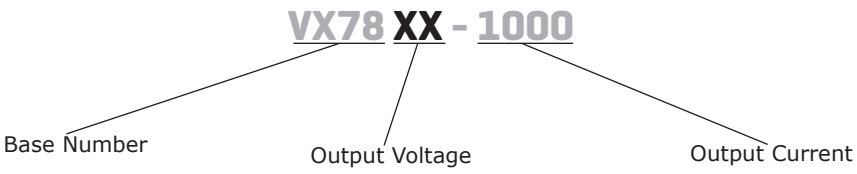
- wide input
- pin-out compatible with linear regulators
- encapsulated
- UL & CSA approved
- high efficiency up to 96%
- no-load input current as low as 0.2 mA
- wide operating temp: -40°C to +85°C
- supports negative output
- short circuit protection on the output
- EN 62368-1

MODEL

MODEL	input voltage[1] typ (Vdc)	input voltage[1] range (Vdc)	output voltage (Vdc)	output current max (mA)	output power max (W)	ripple & noise[2] max (mVp-p)	efficiency[3] typ (%)
VX7803-1000	24	6~36	3.3	1000	3.3	75	90
VX7805-1000	24	8~36	5	1000	5	75	93
	12	8~27	-5	-500	2.5	75	86
VX78039-1000	24	13~36	9	1000	9	75	95
VX78012-1000	24	16~36	12	1000	12	75	96
	12	8~20	-12	-300	3.6	75	89
VX7815-1000	24	20~36	15	1000	15	75	96
	12	8~18	-15	-300	4.5	75	89

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, 20 MHz bandwidth, with 10 µF electrolytic and 1 µF ceramic capacitor on the output. At loads below 20%, the max ripple and noise of the 3.3 & 5 Vdc outputs will be 100 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 for negative output applications	6 8	24 12	36 27	Vdc Vdc
filter	capacitor filter				
input reverse polartiy protection	no				
no-load input current	positive outputs		0.1	1	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 for negative output applications			680 330	µF µF
voltage accuracy	at full load, input voltage range 3.3 Vdc output model all other models		 ±2 ±2	 ±4 ±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 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	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

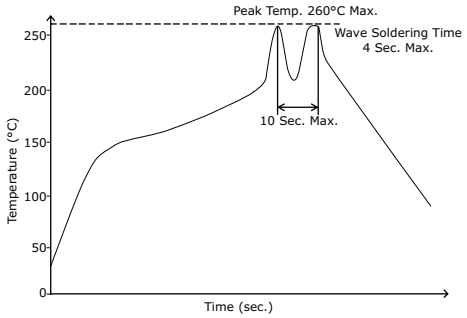
parameter	conditions/description	min	typ	max	units
safety approvals	certified to 62368-1: EN certified to 60950-1: UL				
EMI/EMC	EN 55032, EN 55024				
conducted emissions	CISPR22/EN55022, class B (external circuit required, see Figure 4-b)				
radiated emissions	CISPR22/EN55022, class B (external circuit required, see Figure 4-b)				
ESD	IEC/EN61000-4-2, contact ± 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 4-a)				
surge	IEC/EN61000-4-5, line-line ± 1kV, class B (external circuit required, see Figure 4-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				

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



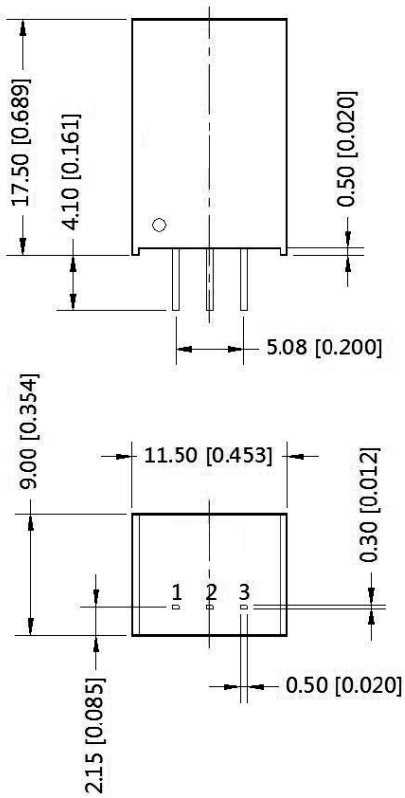
MECHANICAL

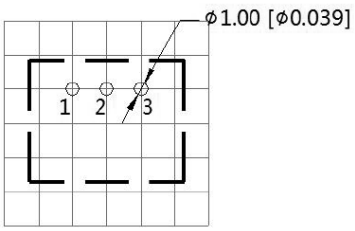
parameter	conditions/description	min	typ	max	units
dimensions	11.50 x 9.00 x 17.50 [0.453 x 0.354 x 0.689 inch]				mm
case material	black flame-retardant heat-proof plastic (UL94V-0)				
weight			3.8		g

MECHANICAL DRAWING

units: mm [inch]
tolerance: ±0.25[±0.010]
pin diameter tolerance: ±0.10[±0.004]

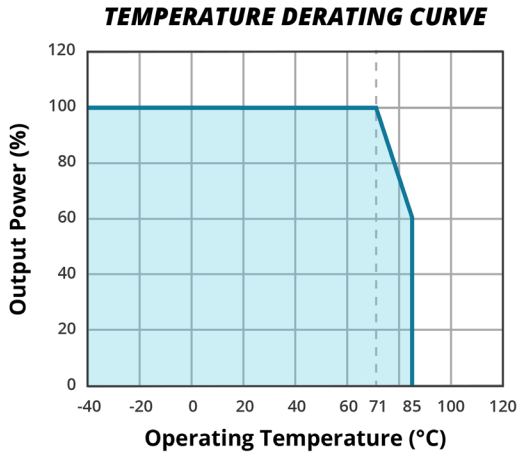
PIN CONNECTIONS		
PIN	+OUTPUT	-OUTPUT
1	+VIN	+VIN
2	GND	-VOUT
3	+VOUT	GND



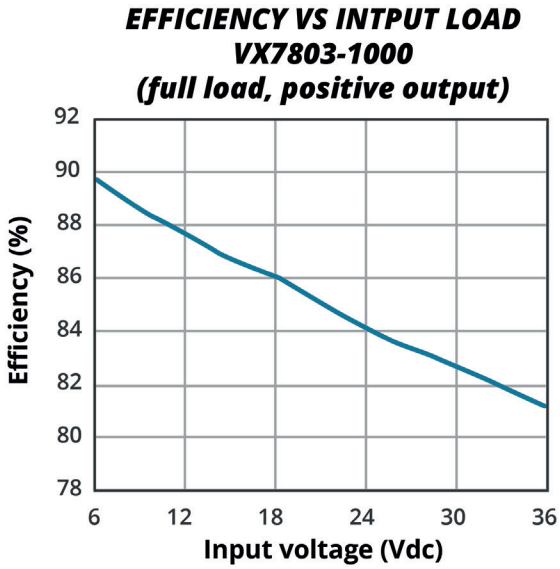


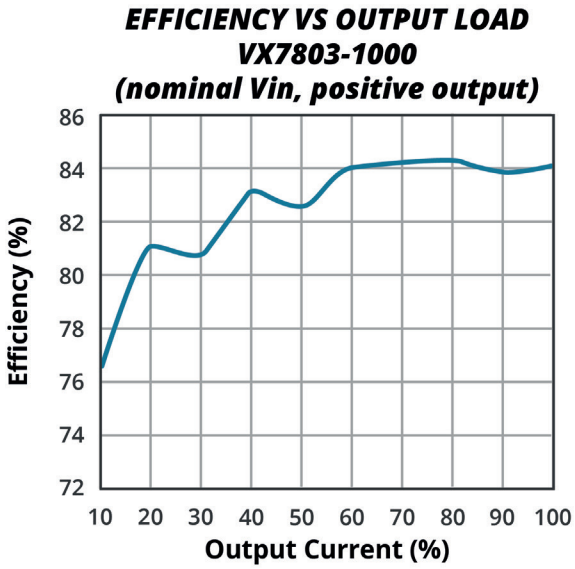
Note : Grid 2.54*2.54mm
Recommended PCB Layout
Top View

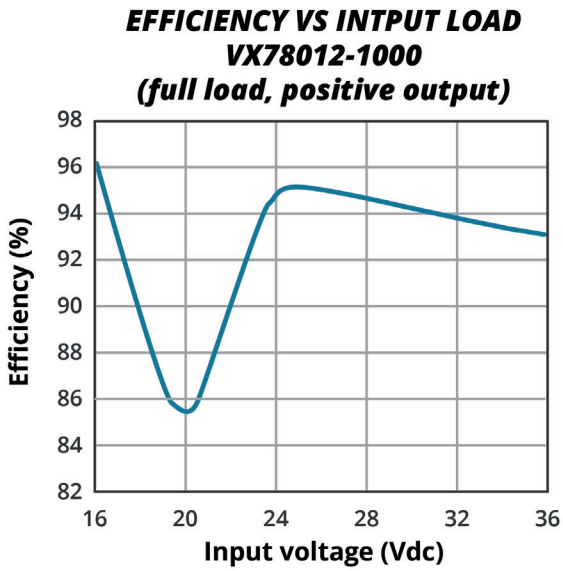
DERATING CURVE

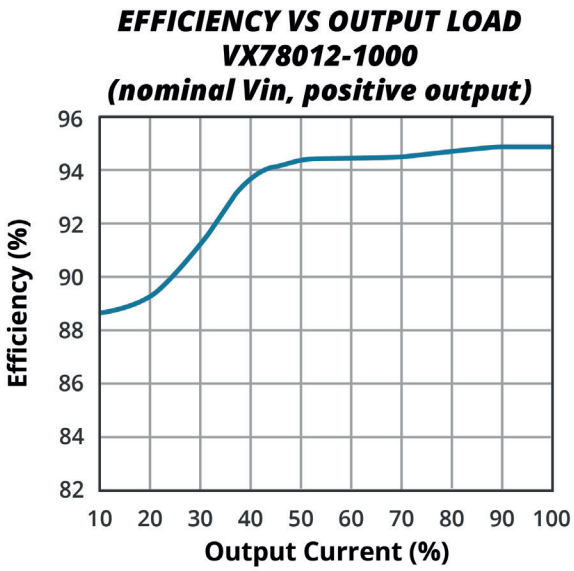


EFFICIENCY CURVES



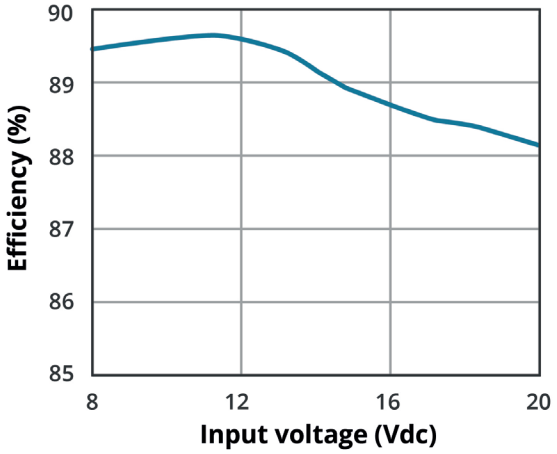




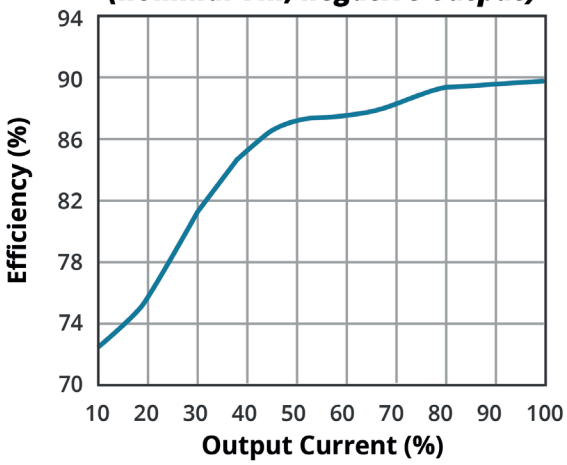


EFFICIENCY CURVES (CONTINUED)

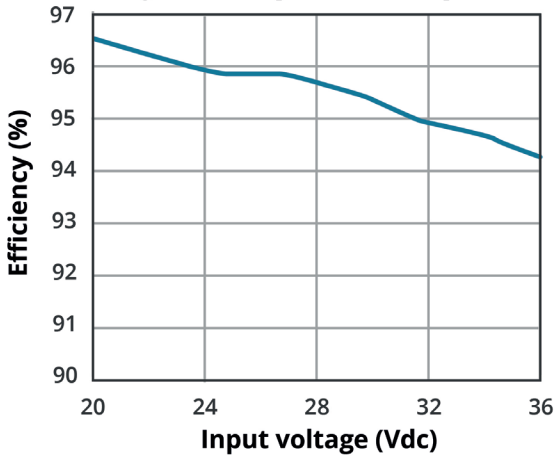
EFFICIENCY VS INTPUT LOAD
VX78012-1000
(full load, negative output)



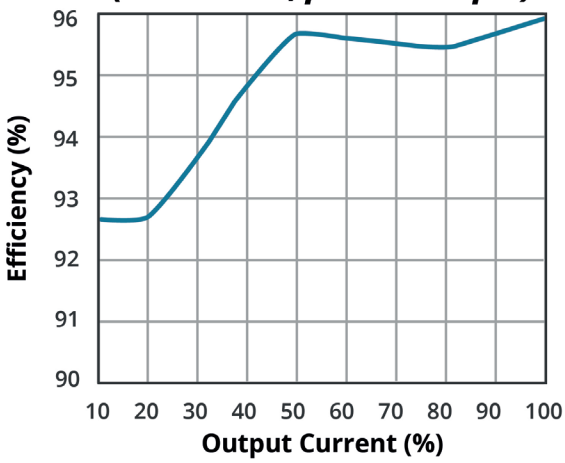
EFFICIENCY VS OUTPUT LOAD
VX78012-1000
(nominal Vin, negative output)



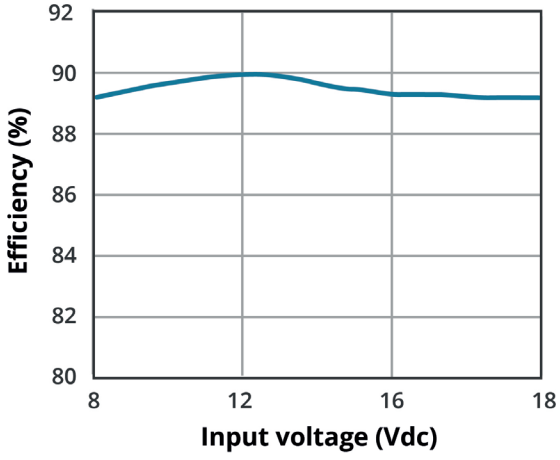
EFFICIENCY VS INTPUT LOAD
VX7815-1000
(full load, positive output)



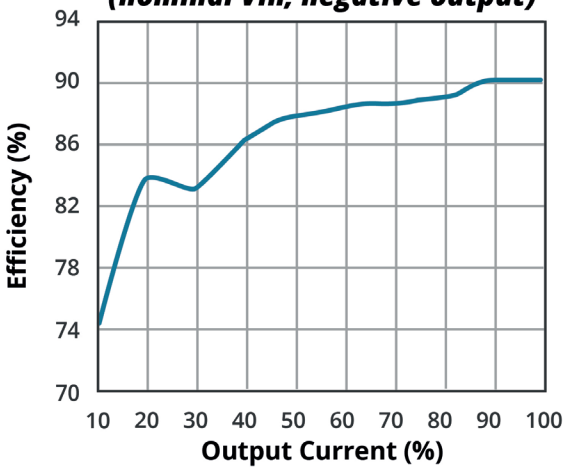
EFFICIENCY VS OUTPUT LOAD
VX7815-1000
(nominal Vin, positive output)



EFFICIENCY VS INTPUT LOAD
VX7815-1000
(full load, negative output)



EFFICIENCY VS OUTPUT LOAD
VX7815-1000
(nominal Vin, negative output)



TYPICAL APPLICATION CIRCUIT

Figure 1
Positive Output Application Circuit

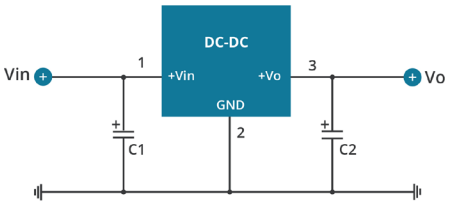


Figure 2
Negative Output Application Circuit

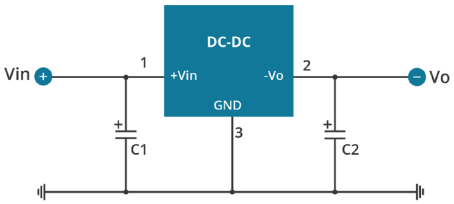


Figure 3
Positive and Negative Output Paralleling Application Circuit

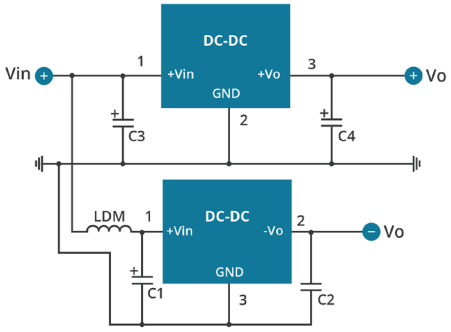


Table 1
External Capacitor Table

Model Number	C1, C3 (ceramic capacitor)	C2, C4 (ceramic capacitor)
VX7803-1000	10 µF/50 V	22 µF/10 V
VX7805-1000	10 µF/50 V	22 µF/10 V
VX78039-1000	10 µF/50 V	22 µF/16 V
VX78012-1000	10 µF/50 V	22 µF/25 V
VX7815-1000	10 µF/50 V	22 µF/25 V

EMC RECOMMENDED CIRCUIT

Figure 4

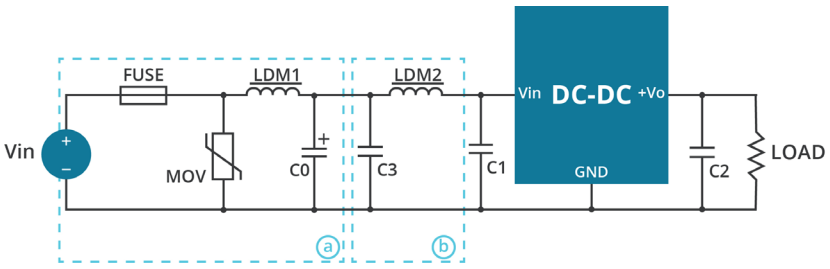


Table 2

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
C3	4.7 µF/50 V
LDM2	12 µH

Note:
1. C1 & C2 (C3 & C4) are required and should be connected as close to the module pins as possible.
2. To reduce the output ripple further, C2 & C4 can be increased as needed and the use of tantalum or low ESR electrolytic capacitors would be recommended.
3. 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	05/18/2017
1.01	features and safety line updated, packaging removed	01/14/2021
1.02	derating curve, efficiency curves and circuit figures updated	09/21/2021

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

CUI INC
a bel group

Headquarters
20050 SW 112th Ave.
Tualatin, OR 97062
800.275.4899

Fax 503.612.2383
cui.com
techsupport@cui.com

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