

PART NUMBER: V78XX-500 series

DESCRIPTION: DC switching regulator, non-isolated

description

The V78XX series of switching regulators are designed to replace 78XX linear regulators, with the objective of drop-in replacement without the need for a heatsink, because the V78XX series features high efficiency under all line conditions. Built-in short-circuit and over-temperature protections ensure very rugged operations. Additionally, low ripple and noise performance make the parts useful in a wide range of applications.

features

- efficiency up to 96%
- no need for heatsinks
- wide input range
- short circuit protection
- thermal shutdown
- low ripple and noise
- pin compatible to LM78XX series
- non-isolated



model number	input voltage range	output voltage	output current	efficiency	
				Vin_min	Vin_max
V7803-500	4.75~28 Vdc	3.3 Vdc	500 mA	90%	80%
V7805-500	6.5~32 Vdc	5 Vdc	500 mA	93%	84%
V7806-500	8~32 Vdc	6.5 Vdc	500 mA	94%	87%
V7809-500	11~32 Vdc	9 Vdc	500 mA	95%	91%
V7812-500	15~32 Vdc	12 Vdc	500 mA	95%	92%
V7815-500	18~32 Vdc	15 Vdc	500 mA	96%	93%

*see Application Notes section (page 5) for positive to negative conversion options.

OUTPUT SPECIFICATIONS

item	conditions	min.	typ.	max.	unit
output voltage accuracy	at 100% load		±2	±3	%
line regulation	Vin = min. to max. at full load		±0.2	±0.4	%
load regulation	10% to 100% full load		±0.4	±0.6	%
output ripple	20 MHz bandwidth, output w/ 10µF cap		20	35	mVp-p
short circuit protection	continuous, auto recovery upon removal of short				
short circuit input power	load impedance is ≤ 0.1Ω		0.3	0.8	W
output current limit	subject to over-temp shutdown			2000	mA
switching frequency	fixed switching frequency topology	280	330	450	KHz
dynamic load stability	100% ↔ 10% load			±100	mV
quiescent current	Vin_min to Vin_max at no load		5	7	mA
thermal shutdown	internal IC junction		150		°C
temperature coefficient	-40°C ~ 85°C ambient			0.02	%/°C
max load capacitance				1000	µF

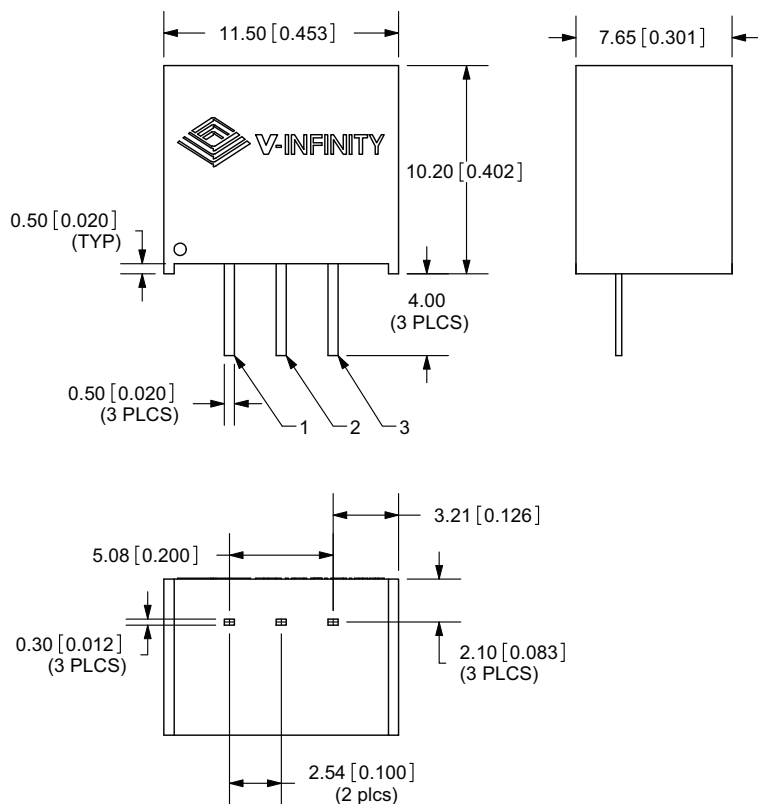
GENERAL SPECIFICATIONS

item	conditions	min.	typ.	max.	unit
operating temperature range	see derating curve	-40		85	°C
operating case temperature		-40		100	°C
storage temperature range		-55		125	°C
cooling	free air convection				
solderability	1.5 mm from case for 10 seconds			300	°C
storage humidity range	relative humidity, non-condensing	10		95	%
case material	plastic (UL94-V0)				
case thermal impedance				70	°C/W
MTBF	at 25°C per MIL-HDBK-217F	2,000,000			hours
package weight			2.0		grams

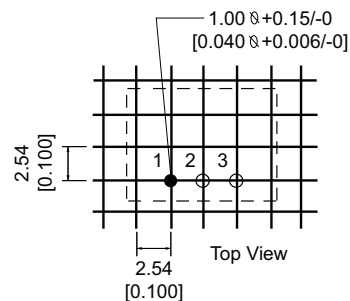
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MECHANICAL DRAWINGS



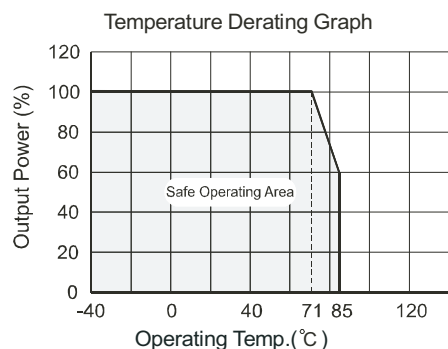
Recommended PCB Layout Pattern



PIN	ASSIGNMENTS
1	+Vin
2	GND
3	+Vout

units: mm(inches)
pin tolerances: $\pm 0.10(\pm 0.004)$
general tolerances: $\pm 0.25(\pm 0.01)$

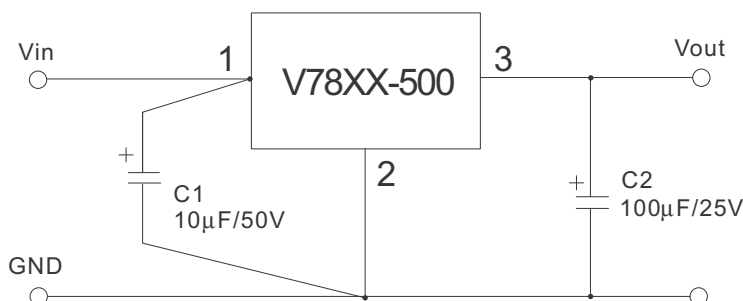
THERMAL DERATING CURVE



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TYPICAL APPLICATION CIRCUIT



INPUT CAPACITOR (C1):

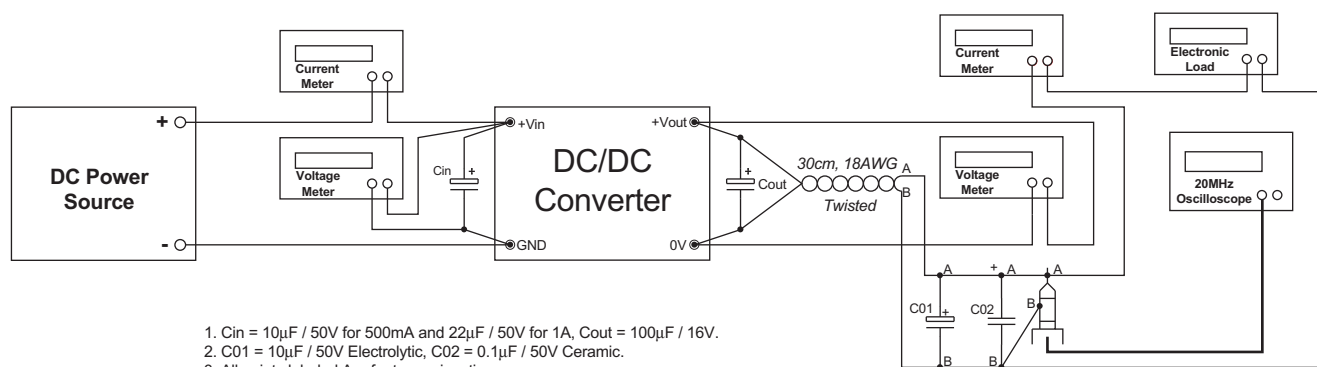
A low ESR capacitor is recommended to keep the noise at the converter to a minimum. Ceramic capacitors are preferred but tantalum or low ESR electrolytic capacitors may also suffice. Place C1 as close as possible to pins 1 & 2.

OUTPUT CAPACITOR (C2):

A 100µF/25V electrolytic capacitor is recommended.

TEST CIRCUIT

FOR EFFICIENCY & RIPPLE GRAPHS (PAGE4)



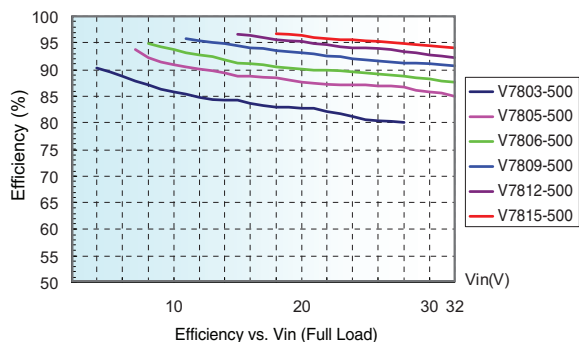
1. Cin = 10µF / 50V for 500mA and 22µF / 50V for 1A, Cout = 100µF / 16V.
2. C01 = 10µF / 50V Electrolytic, C02 = 0.1µF / 50V Ceramic.
3. All points labeled A refer to one junction.
4. All points labeled B refer to one junction.
5. Use a short ground loop for probing. Do not use a wired ground clip.

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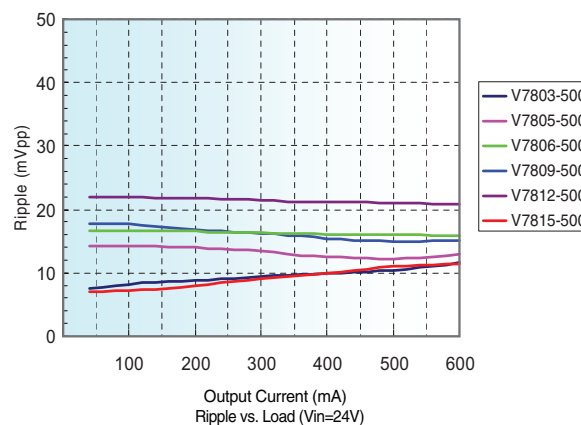
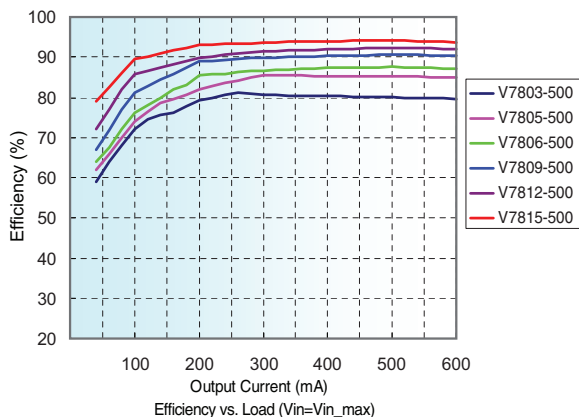
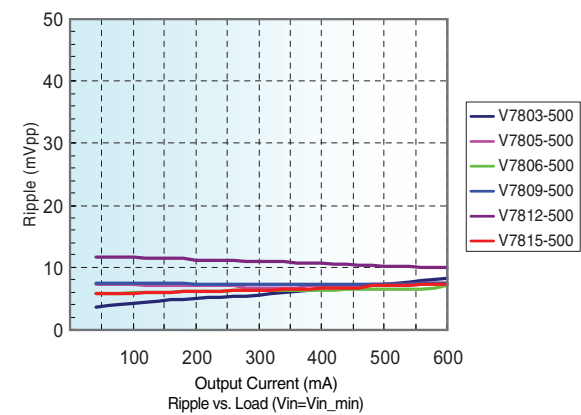
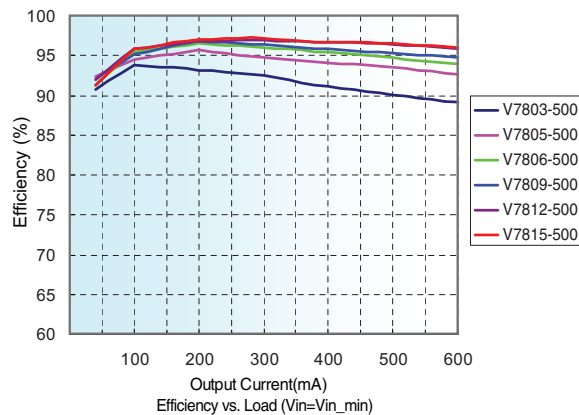
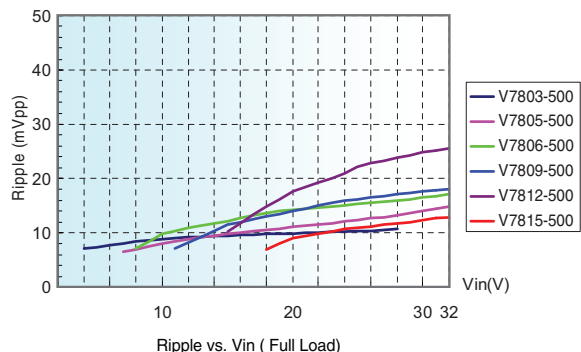
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EFFICIENCY AND RIPPLE

Efficiency



**Output
Ripple**



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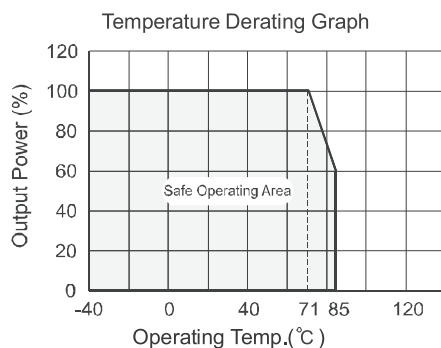
APPLICATION NOTES: Positive to Negative conversion option
application

The V78XX-500 series converters can also be used to convert a positive voltage into a negative voltage with only two extra capacitors needed.

model number	input voltage range	output voltage	output current	efficiency	
				Vin_min	Vin_max
V7803-500	4.75~25 Vdc	-3.3 Vdc	400 mA	73%	78%
V7805-500	6~27 Vdc	-5 Vdc	400 mA	76%	83%
V7806-500	6~25 Vdc	-6.5 Vdc	300 mA	83%	85%
V7809-500	7~23 Vdc	-9 Vdc	200 mA	87%	86%
V7812-500	7~20 Vdc	-12 Vdc	200 mA	85%	87%
V7815-500	7~17 Vdc	-15 Vdc	200 mA	84%	89%

OUTPUT SPECIFICATIONS

item	conditions	min.	typ.	max.	unit
output voltage accuracy	at 100% load		±2	±3	%
line regulation	Vin = min. to max. at full load		±0.2	±0.4	%
load regulation	10% to 100% full load		±0.4	±0.6	%
output ripple	20 MHz bandwidth, output w/ 10µF cap		20	35	mVp-p
short circuit protection	continuous, auto recovery upon removal of short				
short circuit input power			0.5	1.2	W
switching frequency	fixed switching frequency topology	280	330	450	KHz
dynamic load stability	100%↔10% load			±100	mV
quiescent current	Vin_min to Vin_max at no load		7	10	mA
thermal shutdown	internal IC junction		150		°C
temperature coefficient	-40°C ~ 85°C ambient			0.02	%/°C
max load capacitance				1000	µF

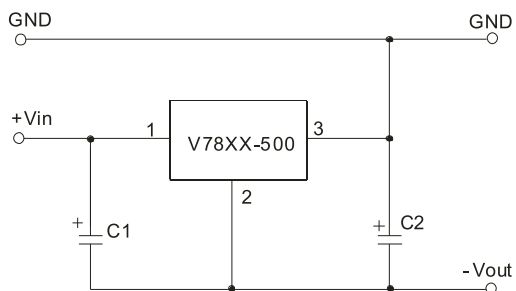
TYPICAL CHARACTERISTICS


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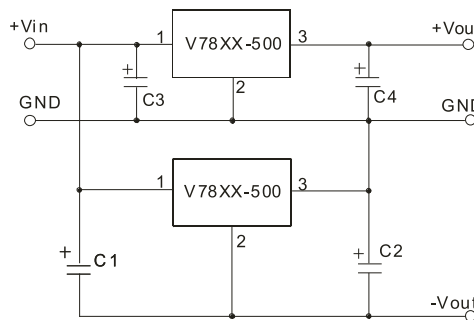
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TYPICAL APPLICATION CIRCUITS

1. Negative output



2. Positive and Negative outputs



Note:

- 1.C1 and C2 are required and should be fitted close to the converter pins.
- 2.For the capacitance of C1 and C2, see the external capacitor table. Low ESR types should be chosen.
- 3.C3: a low ESR capacitor is required to keep the noise at the converter to a minimum. Ceramic capacitors are preferred, but tantalum or low ESR electrolytic capacitors may also suffice; General used 10 μ F/50V ceramic capacitor.C4 Optional, General used 100 μ F/25V electrolytic capacitor.
- 4.No parallel connection or plug and play.

EXTERNAL CAPACITOR TABLE

Part Number	C1	C2
V7803-500	10 μ F/50V	22 μ F/6.3V
V7805-500	10 μ F/50V	22 μ F/10V
V7806-500	10 μ F/50V	10 μ F/10V
V7809-500	10 μ F/50V	10 μ F/16V
V7812-500	10 μ F/50V	10 μ F/25V
V7815-500	10 μ F/50V	10 μ F/25V