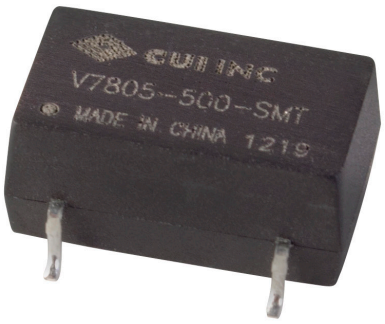
CUI INC®

SERIES: V78-500-SMT | **DESCRIPTION:** NON-ISOLATED SWITCHING REGULATOR

FEATURES

- 500 mA current output
- high efficiency up to 92%
- no heat sink required
- SMT package
- remote on/off control
- low ripple and noise
- short circuit protection, thermal shutdown
- wide temperature (-40°C~+85°C)



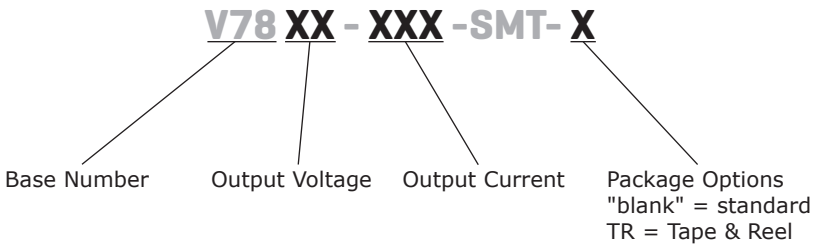
RoHS

MODEL

MODEL	input voltage		output voltage	output current	output power	ripple and noise[1]	efficiency	
	typ (Vdc)	range (Vdc)	(Vdc)	(mA)	max (W)	max (mVp-p)	Vin min (%)	Vin max (%)
V7803-500-SMT	12	4.5 ~ 28	3.3	500	2.5	25	90	75
V7805-500-SMT	12	6 ~ 28	5	500	3.3	25	94	81
V7812-500-SMT[2]	24	14 ~ 28	12	500	5	25	95	90
V7815-500-SMT[2]	24	17 ~ 28	15	500	6.5	25	96	92

Notes: 1. ripple & noise are measured at 20 MHz BW with 10 µF ceramic cap and 100 µF electrolytic capacitors on the output
2. must operate with a minimum of 10% loading

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
input voltage	3.3 V output 5 V output 12 V output 15V output	4.5 6 14 17	12 12 24 24	28 28 28 28	Vdc Vdc Vdc Vdc
input filter	capacitor		10		µF
remote on/off shutdown threshold voltage		1.1	1.25	1.4	Vdc
on/off control current	on: open or 1.5<Vc≤5V off: GND or 0V<Vc<1V		2		µA

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	measured from low line to high line at 100% load		±0.2	±0.5	%
load regulation	measured from 10% to full load at nominal input		±0.3	±0.75	%
voltage accuracy	measured from low line to high line at 100% load		±2	±3	%
temperature coefficient				±0.02	%/°C

Notes: 1. output voltage adjustment must meet Vin-Vo > 2V requirement

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				
thermal shutdown	internal IC junction		160		°C
current limit			1.8		A

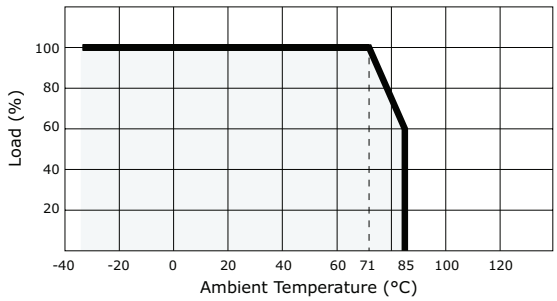
SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
RoHS compliant	yes				
MTBF	25°C (MIL-HDBK-217K)	2,000,000			hours

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
case operating temperature				100	°C
operating temperature		-40		85	°C
storage temperature		-55		125	°C
storage humidity				95	%
lead temperature	1.5 mm from the case for 10 seconds			260	°C

DERATING CURVES

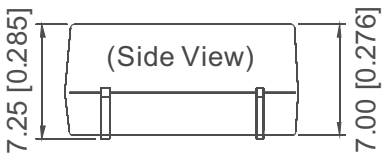


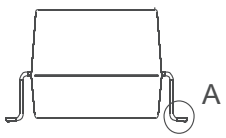
MECHANICAL

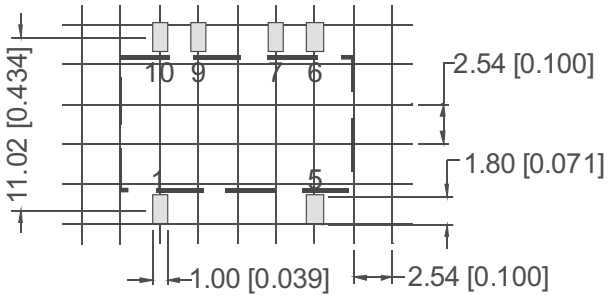
parameter	conditions/description	min	typ	max	units
dimensions	0.600 x 0.466 x 0.285 (15.24 x 11.82 x 7.25 mm)				inch
case material	Plastic (UL94-V0)				
weight			2.3		g

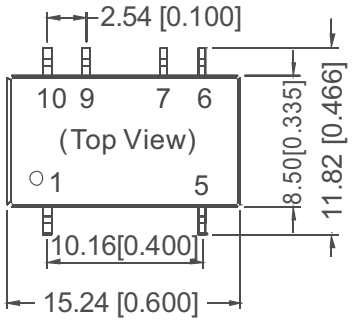
MECHANICAL DRAWING

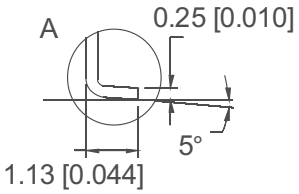
units: mm [in]
pin tolerance: ±0.10 mm [±0.004 in]
general tolerance: ±0.25 mm [±0.010 in]





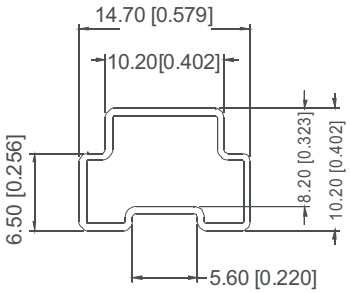






PIN CONNECTIONS	
1	Vin
5	Vout
6	Vadj
7	GND
9	GND
10	On/Off

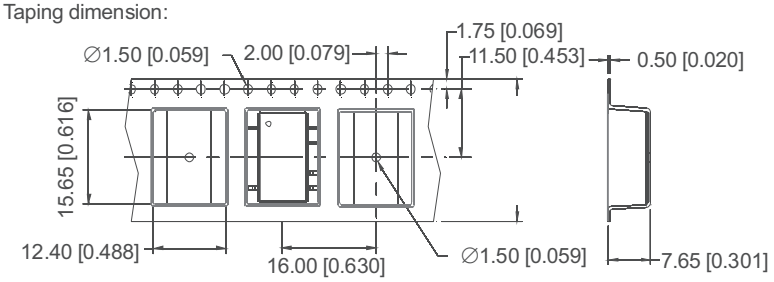
PACKAGING DIMENSIONS



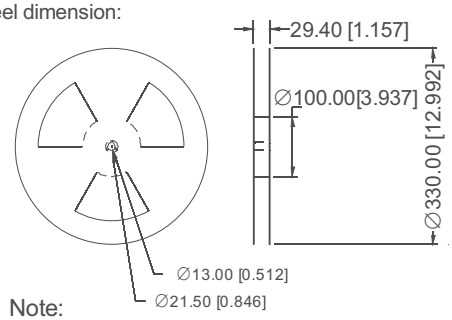
Note:
Unit :mm[inch]
General tolerances: ± 0.50mm[± 0.020inch]

L=530mm[20.866inch] Tube Quantity: 33pcs
L=220mm[8.661inch] Tube Quantity: 13pcs

Taping dimension:



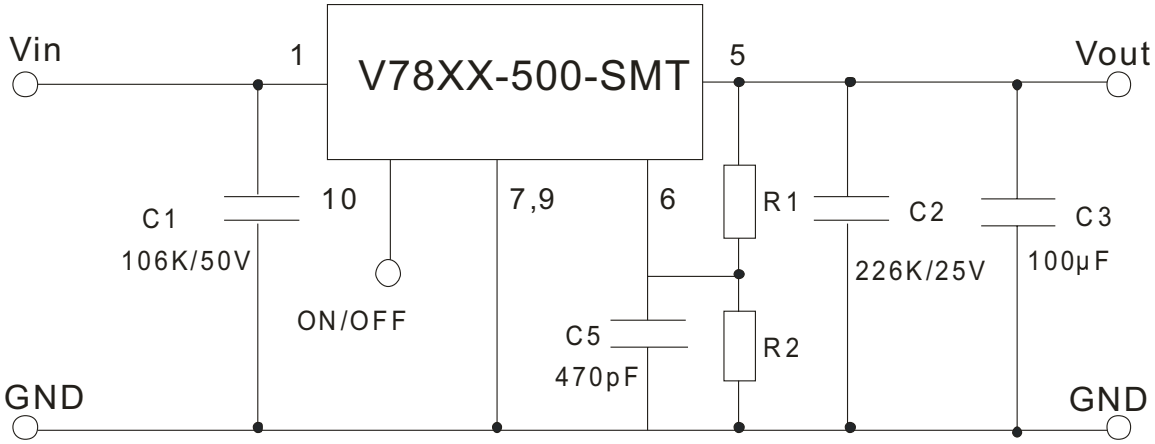
Taping reel dimension:



Note:
Unit :mm[inch]
General tolerances: ±0.50mm[±0.020inch]
Devices per reel quantity:500pcs

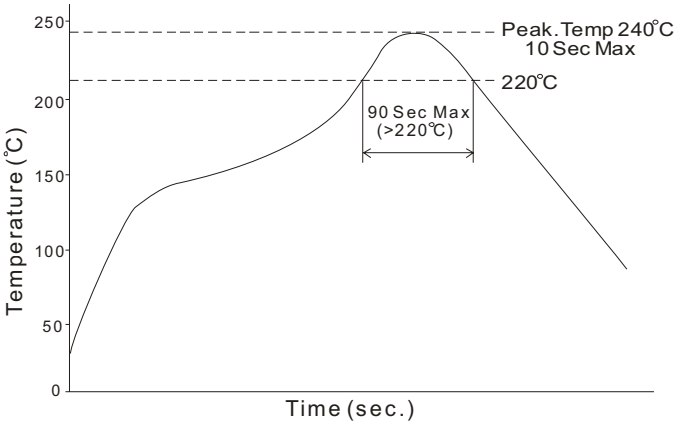
TYPICAL APPLICATION CIRCUIT

Choose a ceramic type capacitors; C3 is required. for best performance, use a 100 F or more capacitor please.



1. C1, C2: Use ceramic capacitors; C3: Use a 100 μF or more capacitor.
2. C1 and C2 are required and should be placed close to the pins of the converter, with shortest possible leads.
3. No parallel connection or plug and play.

SOLDER REFLOW PROFILE



EXTERNAL CAPACITOR TABLE

Part Number	C1 (ceramic capacitor)	C2 (ceramic capacitor)
V7803-500-SMT	10uF/50V	22uF/16V
V7805-500-SMT	10uF/50V	22uF/16V
V7812-500-SMT	10uF/50V	10uF/25V
V7815-500-SMT	10uF/50V	10uF/25V

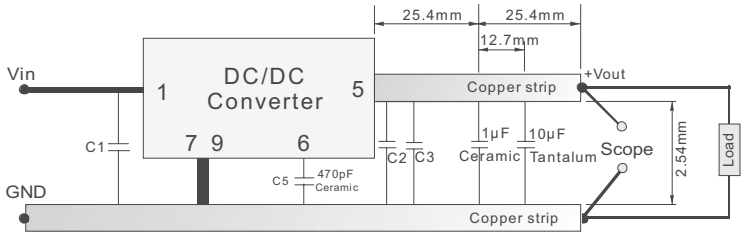
OUTPUT TRIMMING

Part Name	Vo nom	Trim Down R1(KΩ)	Trim Up R2(KΩ)
V7803-500-SMT	3.3V	$=\frac{61*Vo-75.10}{3.3-Vo}$	$=\frac{75.10-10*Vo}{Vo-3.3}$
V7805-500-SMT	5.0V	$=\frac{61*Vo-91.52}{5.0-Vo}$	$=\frac{91.52-10*Vo}{Vo-5.0}$
V7812-500-SMT	12V	$=\frac{71*Vo-287.02}{12-Vo}$	$=\frac{287.02-20*Vo}{Vo-12}$
V7815-500-SMT	15V	$=\frac{66*Vo-269.37}{15-Vo}$	$=\frac{269.37-15*Vo}{Vo-15}$

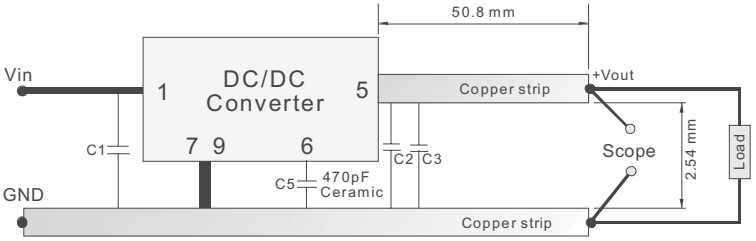
To trim the output of the device input the desired output voltage (Vo) into the proper equation. R1 trims the output voltage down and R2 trims the voltage up. If not using the trim feature place a 470pF ceramic capacitor between pin 6 and GND. Make sure that the desired output voltage is within the trim range.

TEST CIRCUIT

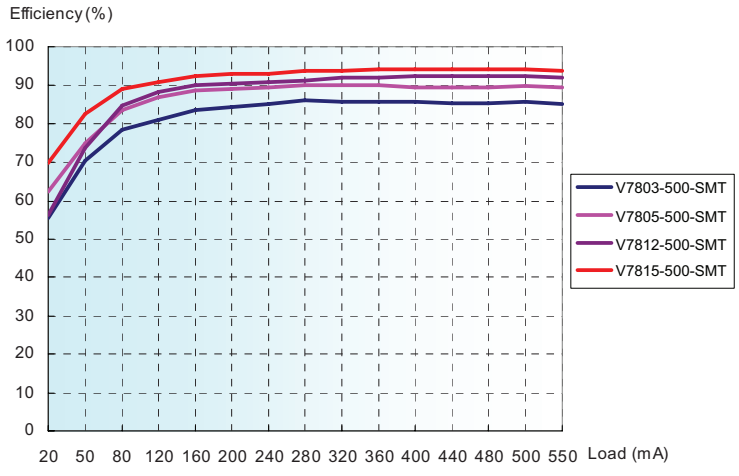
1) Efficiency and Output Voltage Ripple Test



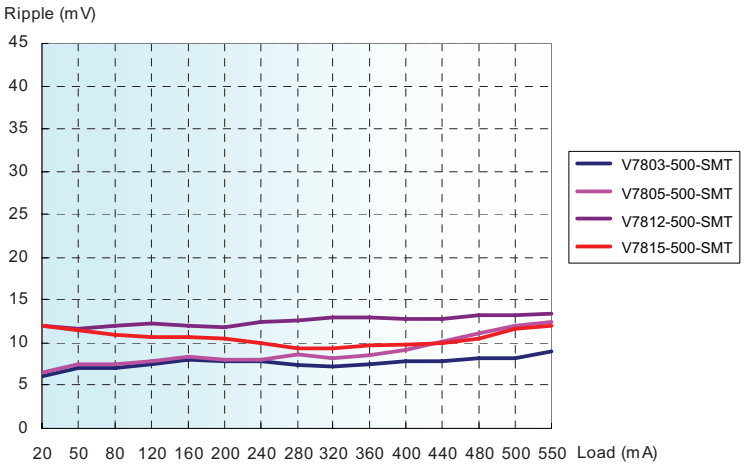
2) Start-up and Load Transient Response Test



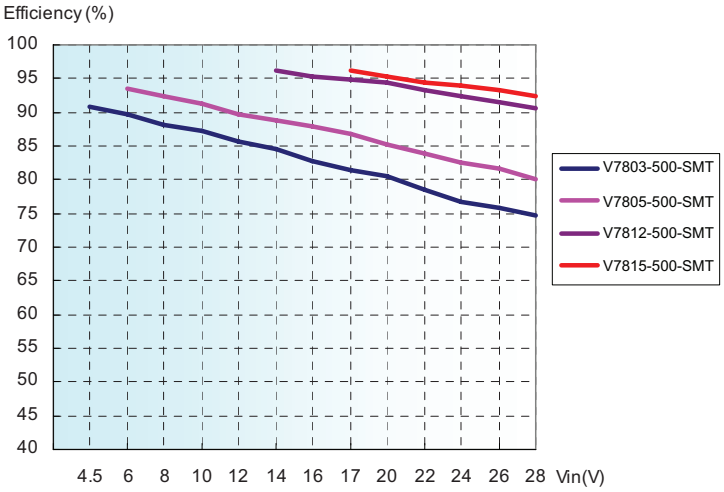
EFFICIENCY AND RIPPLE



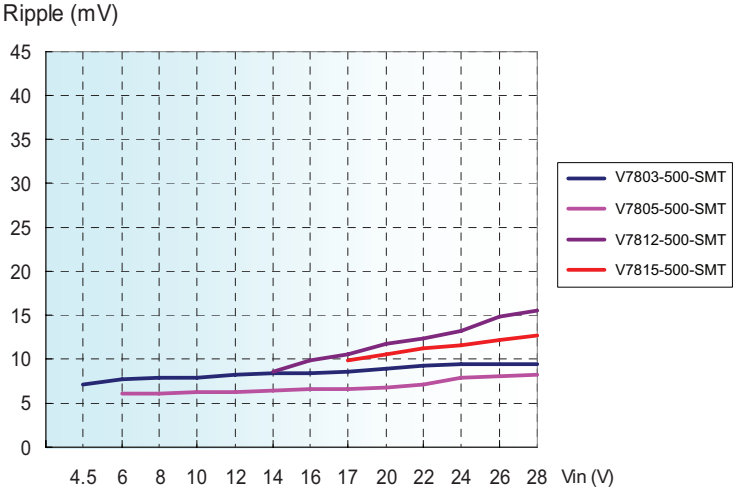
Efficiency VS Output Load (Vin=Norm)



Output Voltage Ripple VS Output Load (Vin=Norm)



Efficiency VS Input Voltage (Full Load)

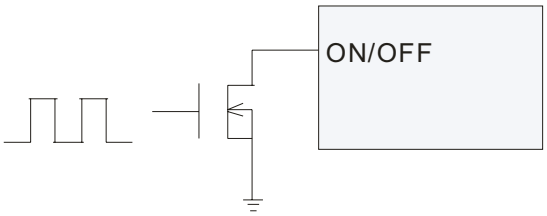


Output Voltage Ripple VS Input Voltage (Full Load)

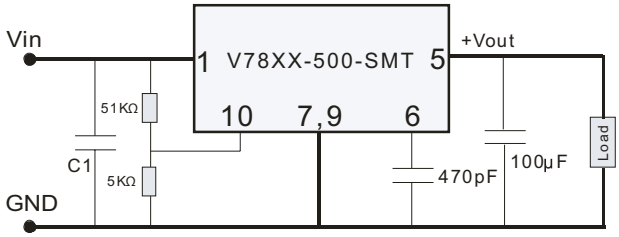
SHUTDOWN CONTROL

The ON/OFF pin provides several features for adjusting and sequencing the power supply, a user has the flexibility of using the ON/OFF pin as:

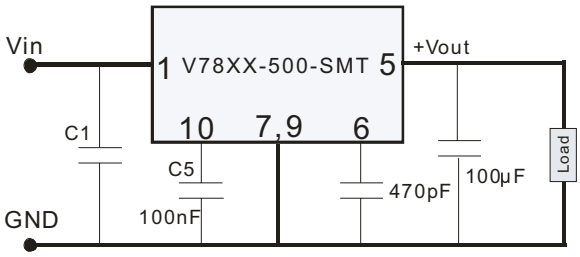
1) A digital on/off control by pulling down the ON/OFF pin with an open-drain transistor.

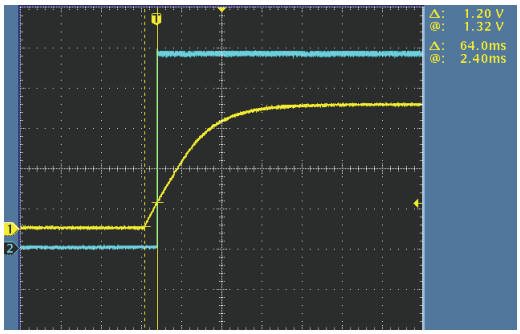


2) Line UVLO. If desired to achieve a UVLO voltage, a resistor divider from Vin to ON/OFF to GND can be used to disable the converter until a higher input voltage is achieved. For example, it is not useful for a converter with 12V output to start up with a 12V input, as the output cannot each regulation. To enable the converter when the input voltage reaches 14V, a 51kΩ/5kΩ voltage divider from Vin to GND can be connected to the ON/OFF pin. Both the precision 1.25V threshold and 150mV hysteresis are multiplied by the resistor ratio, providing a proportional 12% hysteresis for any startup threshold. So, the turn off threshold would be between 12.3V to 15.7V.

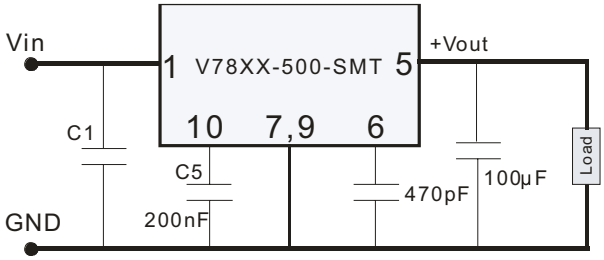


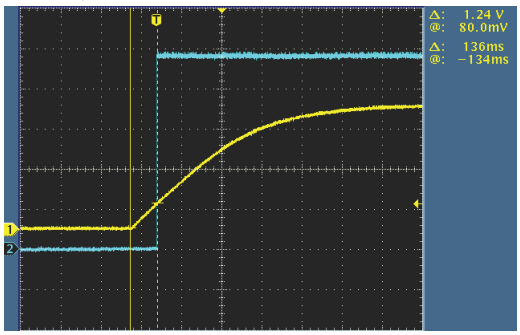
3) Power supply sequencing. By connecting a small capacitor from ON/OFF to GND, the 2µA current source and 1.25V threshold can provide a stable and predictable delay between startup of multiple power supplies. For example, a startup delay of roughly 64mS is provided using 100nF, and roughly 136mS by using 200nF.





CH1: Von/off
CH2: Vo
Delay time: 64mS





CH1: Von/off
CH2: Vo
Delay time: 136mS

REVISION HISTORY

rev.	description	date
1.0	initial release	01/04/2008
1.01	new template applied	04/28/2009
1.02	V-Infinity branding removed	09/06/2012
1.03	added TR package option	10/31/2012
1.04	added minimum loading requirement note	01/30/2013
1.05	updated spec	03/08/2013

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

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