

# MORNSUN



## K78XXT-500 Series

**WIDE INPUT, NON-ISOLATED & REGULATED  
SMD PACKAGE SINGLE OUTPUT**

RoHS

### FEATURES

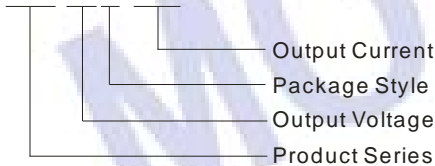
- Efficiency up to 96%
- No need for heat sinks
- 0.5AMP SMD package
- Wide input voltage range(4.5V~28V)
- Adjustable output voltage
- Remote ON/OFF control
- Short circuit protection, Thermal shutdown
- Very low shutdown current
- Super low ripple and noise

### APPLICATIONS

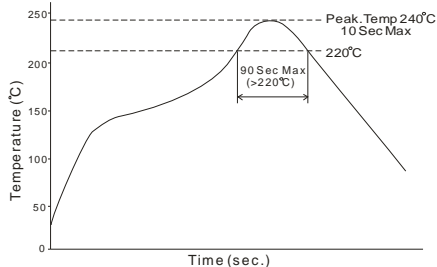
The K78xxT-500 Series with high efficiency switching regulators are ideally supply for space constrained mobile applications. They are no need for any heat sinks, even if operate at +85°C. The additional features include remote ON/OFF control and adjustable output voltage. Super low ripple and noise of typically only 10mV and a shutdown input current of typically only 15uA.

### MODEL SELECTION

**K7805T-500**



### RECOMMENDED REFLOW SOLDERING PROFILE



Remark:  
The curve applies only to the hot air reflow soldering

### PRODUCT PROGRAM

Part Number	Input Voltage (V)		Output Voltage (V)		Current (mA)	Efficiency (%)	
	Nominal	Range	Normal	Adjust Range		Vin (min.)	Vin (max.)
K7803T-500	12	4.5-28	3.3	1.8-5.5	500	90	75
K7805T-500	12	6.0-28	5.0	2.5-8.0	500	94	81
K7809T-500	24	11-28	9.0	3.0-11.5	500	95	87
K7812T-500	24	14-28	12	4.5-13.5	500	95	90
K7815T-500	24	17-28	15	4.5-15.5	500	96	92

Note:

1. Answer for  $V_{in}-V_o > 2V$  if needed to adjust the output voltage;
2. If input voltage above specified may cause permanent damage to the device.
3. K7812T-500, K7815T-500 is not allowed to operate under no load.

### SPECIFICATIONS

Characteristics	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	See selection guide	4.5	12/24	28	V
Output Voltage Adjust range	See selection guide	1.8		15.5	V
Output Voltage accuracy	Input Voltage Range at full Load		±2	±3	
Line regulation	Input Voltage Range at full Load		±0.2	±0.5	%
Load regulation	Nominal Input , 10% to 100% load		±0.3	±0.75	
Ripple and Noise	20MHZ bandwidth		10	25	mVp-p
Short Circuit Protection mode	Hiccup Mode				
Short circuit protection	Continuous, automatic recovery				
Output Current Limit			1.8		A
Dynamic Load Stability	100%<->10% load		±30	±75	mV
Quiescent current	Normal input (3.3V, 5V output)		15		mA
Thermal Shutdown			160		°C
Temperature coefficient	-40°C to +85°C ambient			0.02	%/°C
Max capacitance load				1000	μF
ON/OFF control current	ON: open or $1.5 < V_c \leq 6V$ OFF: GND or $0V < V_c < 1V$		2		μA
Shutdown input current			15	30	μA
ON/OFF Shutdown Threshold Voltage		1.1	1.25	1.4	V
Operating Temperature Range		-40		+85	°C
Operating Case Temperature				+100	
Storage Temperature Range		-55		+125	
Lead Temperature	1.5mm from case for 10 seconds			260	
Storage Humidity Range				95	%
Cooling		Free Air Convection			
Case Material		Plastic (UL94-V0)			
MTBF	(MIL-HDBK-217F,+25°C)	2000			K hours
Package Weight			2.3		g

Note:

1. All specifications measured at  $T_a = 25^\circ C$ , humidity < 75%, nominal input voltage and rated output load unless otherwise specified.
2. In this datasheet, all the test methods of indications are based on corporate standards.

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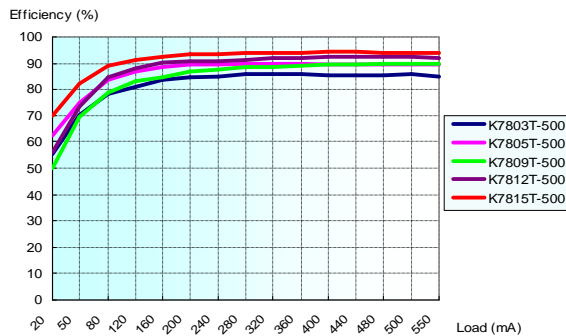
## ADJUSTMENT RESISTOR VALUES

Model	K7803T-500		K7805T-500		K7809T-500		K7812T-500		K7815T-500	
Vo (nominal)	3.3V		5.0V		9V		12V		15V	
Adjusted range	1.8V-5.5V		2.5V-8V		3V-11.5V		4.5V-13.5V		4.5V-15.5V	
Regulated voltage	R1(kΩ)	R2(kΩ)	R1(kΩ)	R2(kΩ)	R1(kΩ)	R2(kΩ)	R1(kΩ)	R2(kΩ)	R1(kΩ)	R2(kΩ)
1.8V	24.31									
2.5V	98.9		25.28							
3.0V	364		47.6		3.1					
3.3V			67.3		5.79					
3.6V		129.1	95.8		8.47					
3.9V		59.1	140.9		11.8					
4.5V		24.3	411		19.14		4.55		2.69	
4.9V		15.25	2.06		25.77		8.05		5.55	
5.0V		14.05			27.3		9.16		6.17	
5.1V		12.8		208.5	29.22		10.41		6.98	
5.5V		8.65		58.5	37.8		15		10	
6.5V				15.57	70.8		29.8		18.5	
7.2V				7.8	115.3		43.5		26.2	
8.0V				3.15	243.1		64.8		36.7	
9.0V							105		52.9	
10.0V						18.84	180.6		76.3	
11.0V						4.47	370		111	
11.5V						1.61	635		134.1	
12.0V									167.7	
13.0V								40.6	277.8	
13.5V								15	385	
14.0V									586	
14.5V									1128	
15.0V										
15.5V										88.2

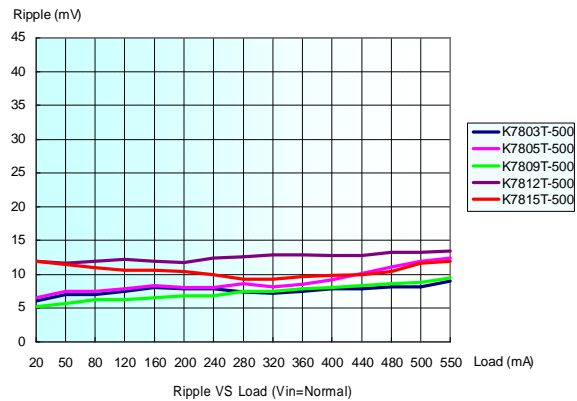
Note: The above dates only are as reference, you could make corresponding adjustment with actual output when they are at practical application.

## CHARACTERISTIC CURVE (TA=25°C)

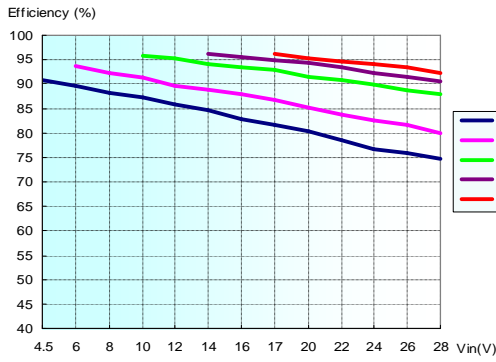
### Efficiency and Output Voltage Ripple



Efficiency VS Output Load (Vin=Norm)

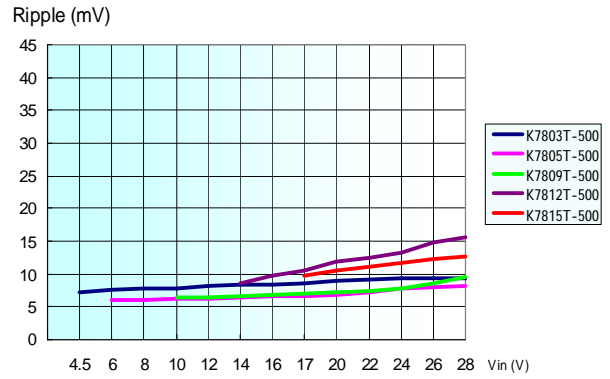


Output Voltage Ripple VS Output Load (Vin=Norm)



Efficiency VS Vin (Full Load)

Efficiency VS Input Voltage (Full Load)

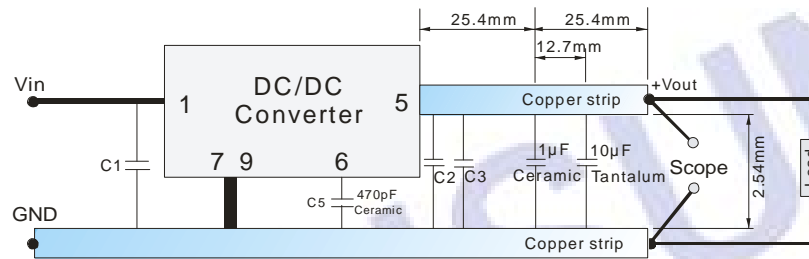


Ripple VS Vin ( Full Load)

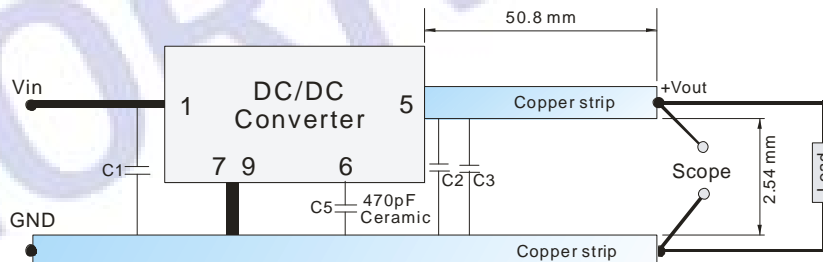
Output Voltage Ripple VS Input Voltage (Full Load)

## TEST CONFIGURATIONS (TA=25°C)

### 1 Efficiency and Output Voltage Ripple Test



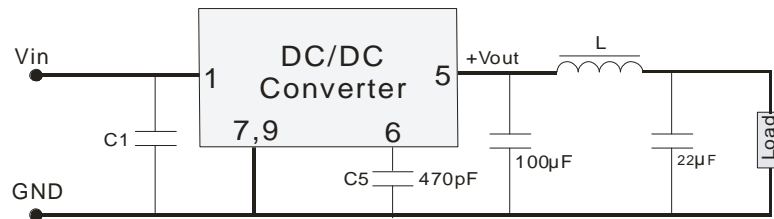
### 2 Start-up and Load Transient Response Test



## APPLICATION EXAMPLE

1. To reduce output ripple, it is recommended to add a LC filter to output port.

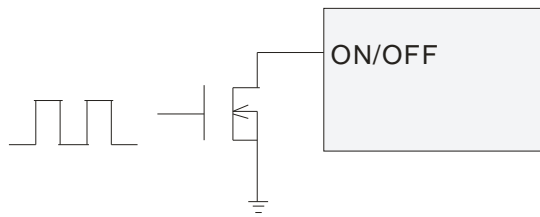
L: Recommended parameter  $10\mu\text{H} \sim 47\mu\text{H}$ .



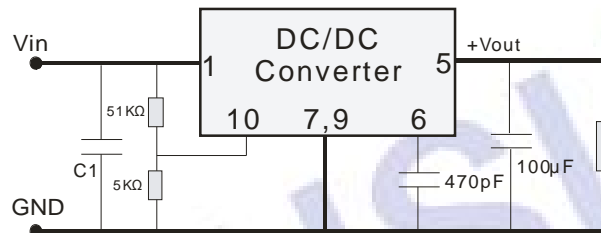
## SHUTDOWN CONTROL

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:

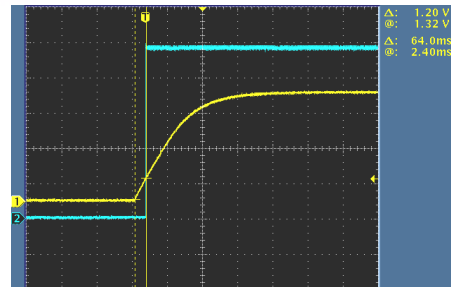
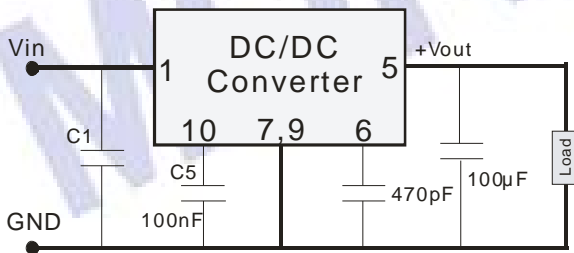
- 1) A digital on/off control by pulling down the ON/OFF pin with an open-drain transistor.



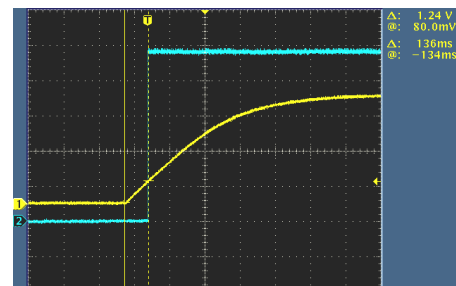
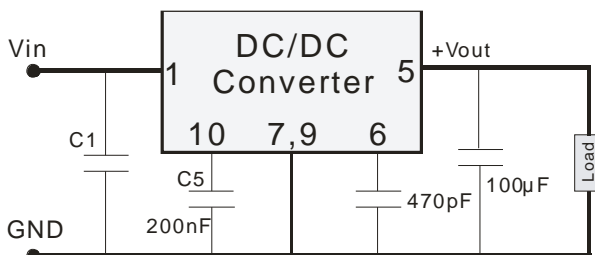
- 2) Line UVLO. If desired to achieve a UVLO voltage, an resistor divider from  $V_{in}$  to ON/OFF to GND can be used to disable the converter until a higher input voltage is achieved. For example, it is not useful for a converter with 12V output to start up with a 12V input voltage, as the output cannot reach regulation. To enable the converter when the input voltage reaches 14V, a 51k $\Omega$ /5k $\Omega$  resistor divider from  $V_{in}$  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 2 $\mu$ A 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