MEGA ELECTRONICS INC.

M78XX05T Series

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

3 years Warranty

Patent Protection RoHS

FEATURES

- High efficiency up to 96%
- No heat sink required
- 0.5AMP SMD package
- Wide input voltage range (4.5V~28V)
- Adjustable output voltage
- Remote On/Off
- Short circuit protection, Thermal shutdown
- Shutdown at low current
- Low ripple & noise

APPLICATIONS

The M78xx05T Series with high efficiency switching regulators are ideally supply for space constrained mobile applications. They are no need for any heat sink, even if it operates 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.

PRODUCT PROGRAM

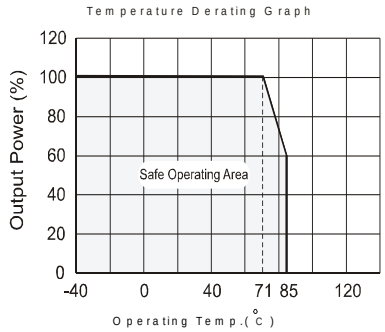
Part Number	Input Voltage (VDC)		Output Voltage (VDC)		Current (mA)	Efficiency (%)(Typ.)	
	Nominal	Range	Normal	Adjust Range		Vin (min.)	Vin (max.)
M780305T	12	4.5-28	3.3	1.8-5.5	500	90	75
M780505T	12	6.0-28	5.0	2.5-8.0	500	94	81
M780905T	24	11-28	9.0	3.0-11.5	500	95	87
M781205T	24	14-28	12	4.5-13.5	500	95	90
M781505T	24	17-28	15	4.5-15.5	500	96	92

Note:
1. Answer for Vin-Vo>2V if needed to adjust the output voltage;
2. If input voltage above specified may cause permanent damage to the device.
3. M781205T, M781505T 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	3.3V output		±2	±4	%
		Others		±2	±3	
Line regulation	Input voltage range at full load			±0.2	±0.5	
Load regulation	Nominal Input voltage,10%-100% load			±0.3	±0.75	
Ripple & 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	Internal IC junction			160		°C
Temperature coefficient	-40°C to +85°C ambient				±0.02	%/°C
Max. capacitive load					1000	μF
ON/OFF control current	ON: open or 1.5<Vc≤6V OFF:GND or 0V<Vc<1V			2		μA
Shutdown input current				15	30	μA
ON/OFF threshold voltage			1.1	1.25	1.4	V
Operating temperature range			-40		+85	°C
Max. Casing Temperature					+100	
Storage temperature			-55		+125	
Pin Welding Resistance Temperature	1.5mm from case for 10 seconds				+300	
Storage humidity					95	%RH
Reflow Soldering Temperature	Peak temp.≤240°C, maximum duration time≤60s at 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1.					
Cooling			Free Air Convection			
Case material			Plastic (UL94 V-0)			
MTBF	(MIL-HDBK-217F,+25°C)		2000			K hours
Weight				2.3		g

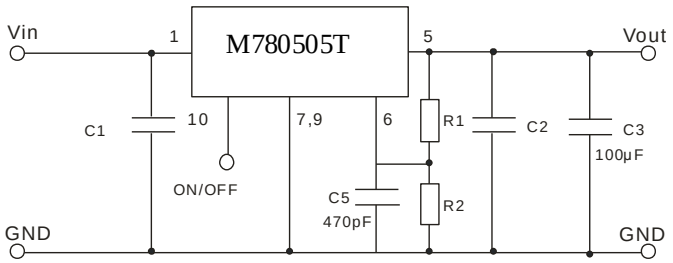
TYPICAL TEMPERATURE CURVE



EXTERNAL CAPACITOR TABLE

	C1 (ceramic capacitor)	C2 (ceramic capacitor)
M780305T	10uF/50V	22uF/16V
M780505T	10uF/50V	22uF/16V
M780905T	10uF/50V	22uF/16V
M781205T	10uF/50V	10uF/25V
M781505T	10uF/50V	10uF/25V

STANDARD APPLICATION CIRCUIT



1. C1, C2: Choose a ceramic type capacitors; C3 is require, for best performance, use a 100µF or more capacitor please.
2. C1, C2 are require and should be placed close to the pins of the converter, with shortest possible traces.
3. No parallel connection or plug and play.

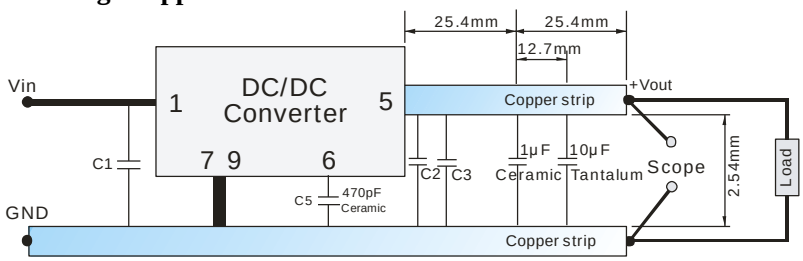
ADJUSTMENT RESISTOR VALUES

Model	M780305T		M780505T		M780905T		M781205T		M781505T	
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	2060		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

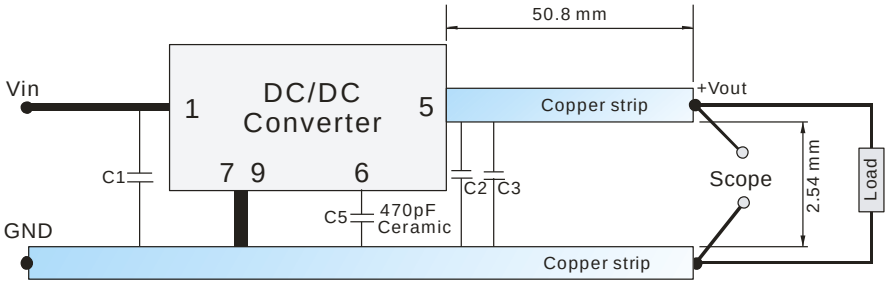
Note: The above dates are only as reference, you could make corresponding adjustments with actual output when they are at practical application.

TEST CONFIGURATIONS (TA=25°C)

1 Efficiency and Output Voltage Ripple Test



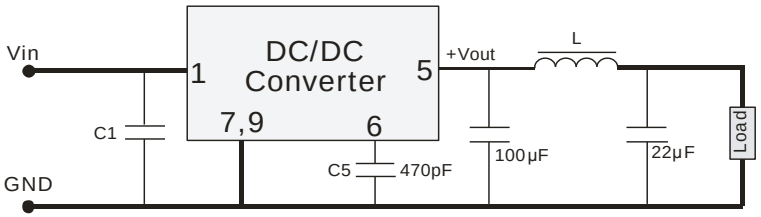
2 Start-up and Load Transient Response Test



APPLICATION EXAMPLE

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

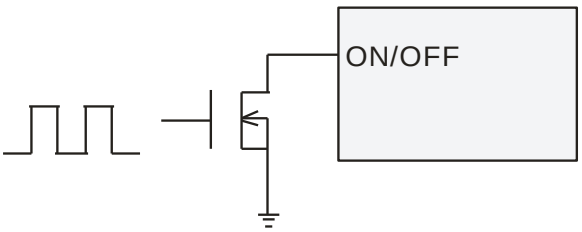
   L: Recommended parameter 10µH ~ 47µH.



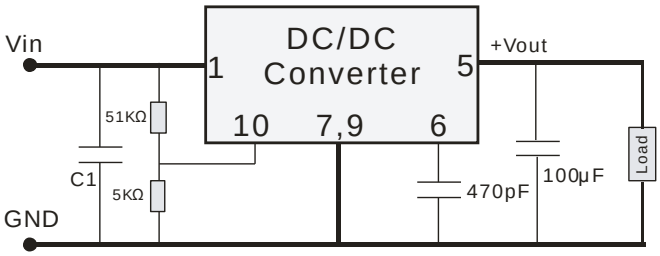
SHUTDOWN CONTROL

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:

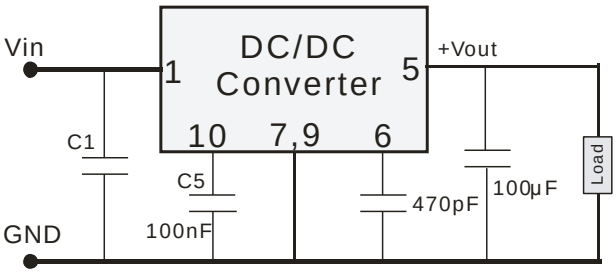
1) A digital on/off control by pulling down the ON/OFF pin with an open-drain transistor.

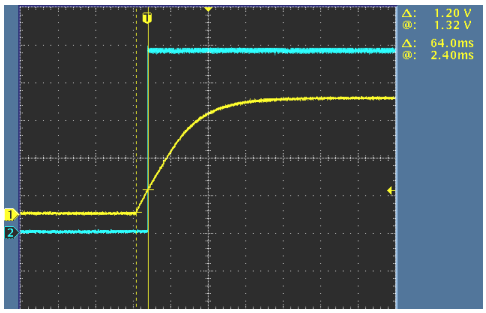


2) Line UVLO. If desired to achieve a UVLO voltage, a resistor divider from Vin to ON/OFF to GND can be used to disable the converter until a higher input voltage is achieved. For example, it is not useful for a converter with 12V output to start up with a 12V input voltage, as the output cannot teach regulation. To enable the converter when the input voltage reaches 14V, a 51kΩ/5kΩ resistor 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.

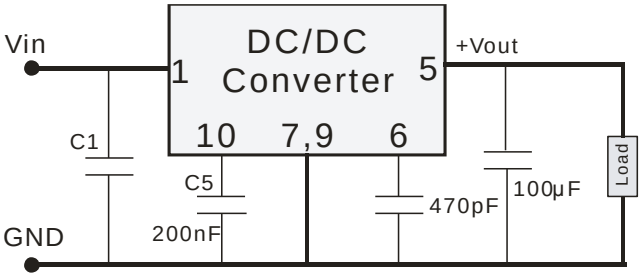


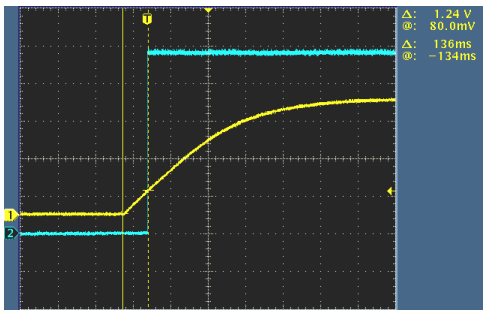
3) Power supply sequencing. By connecting a small capacitor from ON/OFF to GND, the 2μA current source and 1.25V threshold can provide a stable and predictable delay between startup of multiple power supplies. For example, a startup delay of roughly 64mS is provided using 100nF, and roughly 136mS by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





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

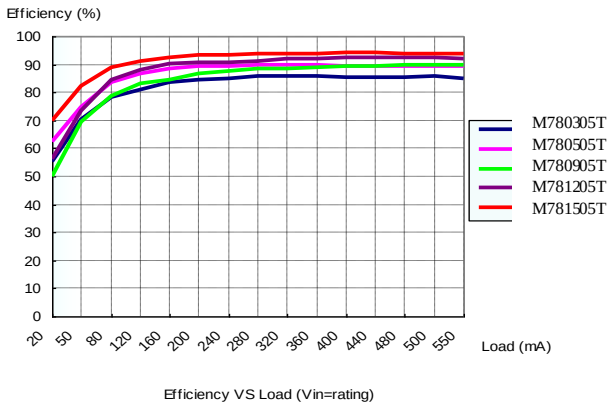




CH1: Von/off
CH2: Vo
Delay time: 136mS

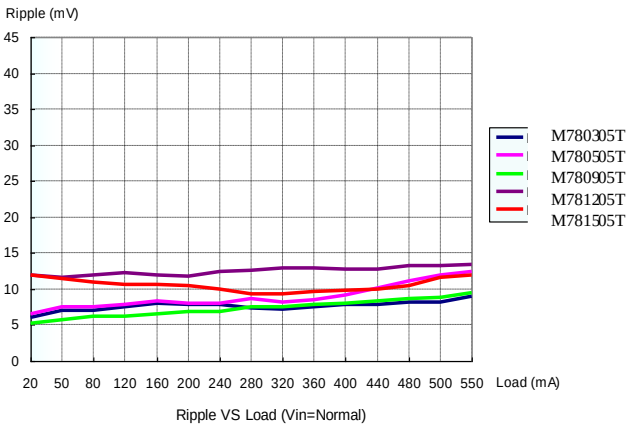
CHARACTERISTIC CURVE (TA=25°C)

Efficiency and Output Voltage Ripple



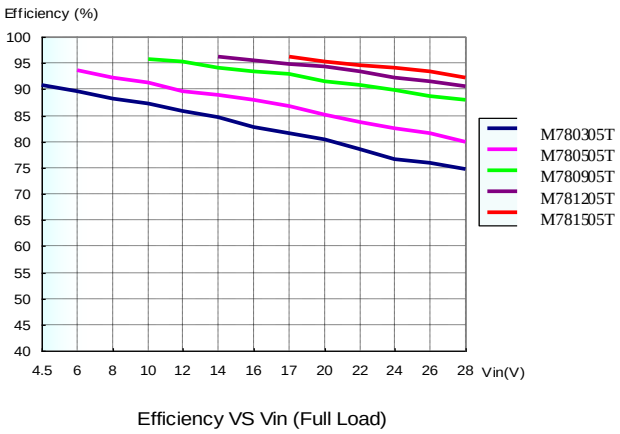
Efficiency VS Load (Vin=rating)

Efficiency VS Output Load (Vin=Norm)

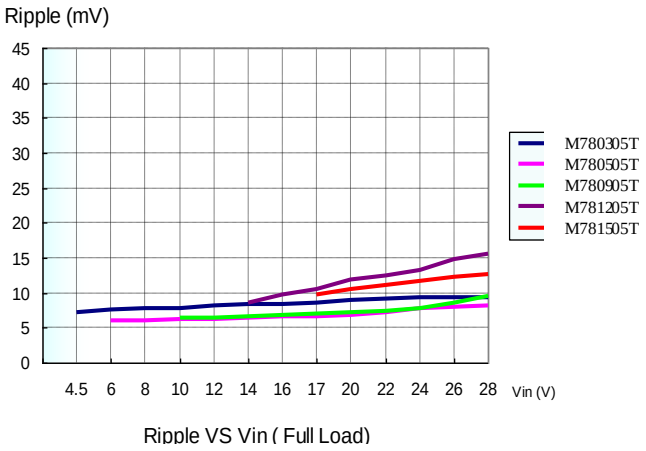


Ripple VS Load (Vin=Normal)

Output Voltage Ripple VS Output Load (Vin=Norm)

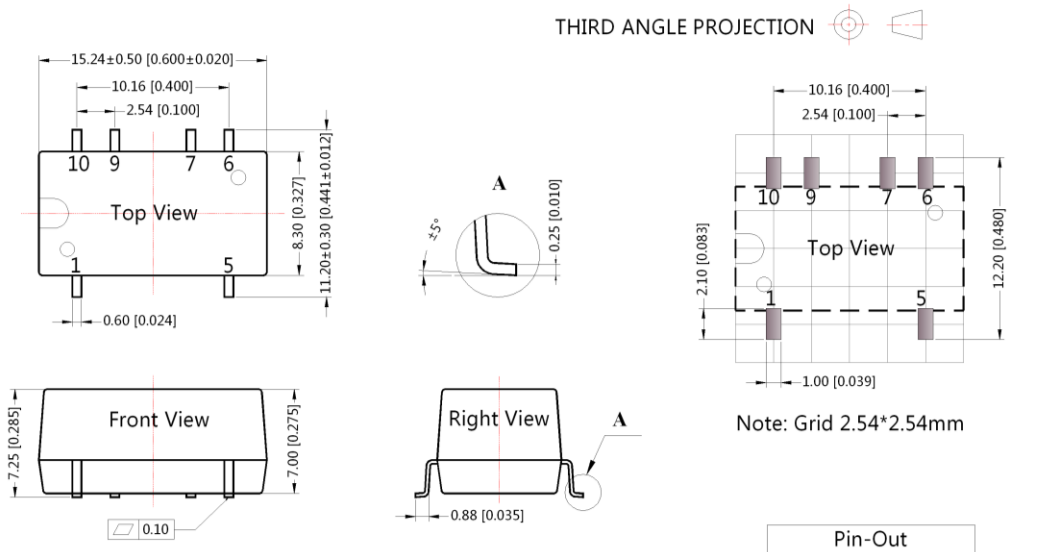


Efficiency VS Input Voltage (Full Load)



Output Voltage Ripple VS Input Voltage (Full Load)

PACKAGE STYLE AND PINNING



Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.25[±0.010]

Pin-Out	
Pin	Function
1	Vin
7、9	GND
5	Vout
6	Vadj
10	ON/OFF

NC: Pin to be isolated from circuitry

Note:
1. Unless **otherwise** specified, **parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with** nominal input voltage and rated output load;
2. All index testing methods in this datasheet are based on Company's corporate standards.