

**SERIES:** P78A-0500 | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

- up to 500 mA current output
- pin compatible with LM78XX linear regulators
- non-isolated switching regulator
- high start-up current capability
- wide input voltage range
- efficiency up to 95%
- low ripple and noise
- short circuit protection
- ultra-compact SIP3 package
- -40°C to +85°C temperature range

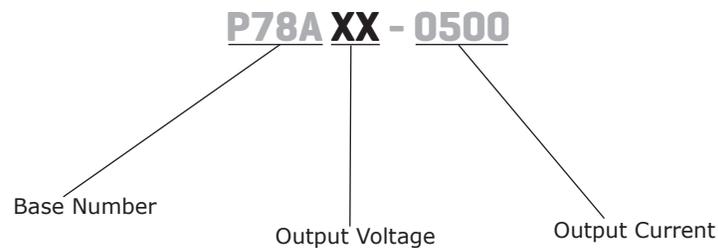


**MODEL**

MODEL	input voltage		output voltage	output current		output power	ripple & noise <sup>1</sup>	efficiency <sup>2</sup>
	typ (Vdc)	range (Vdc)	(Vdc)	min <sup>3</sup> (mA)	max (mA)	max (W)	typ (mVp-p)	typ (%)
P78A03-0500	24	6~28	3.3	10	500	1.65	50	88
P78A05-0500	24	7~28	5	10	500	2.5	50	92

- Notes:
1. At full load, nominal input, 20 MHz bandwidth oscilloscope.
  2. At min Vin.
  3. Operation under minimum load will not affect the reliability of the converter; however, the ripple and noise may exceed the specified values.
  4. All specifications measured at: Ta=25°C, nominal input voltage, rated output load, and after warm up unless otherwise specified.

**PART NUMBER KEY**



## INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	3.3 Vdc model	6	24	28	Vdc
	5 Vdc model	7	24	28	Vdc
no load input current			1.5		mA

## OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load <sup>1</sup>				220	µF
line regulation	measured from low to high line, full load		±0.5		%
load regulation	measured from 10~100% load		±1		%
voltage accuracy			±3		%
switching frequency			570		kHz

Note: 1. Maximum capacitive load is tested at minimum input voltage and 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
conducted emissions	EN55022, class A, class B (external circuit required, see Figure 2)				
radiated emissions	EN55022, class A, class B (external circuit required, see Figure 2)				
MTBF	as per MIL-HDBK-217F, full load, 25 °C	4,185,000			hours
	as per MIL-HDBK-217F, full load, 85 °C	2,182,000			hours
RoHS	yes				

## ENVIRONMENTAL

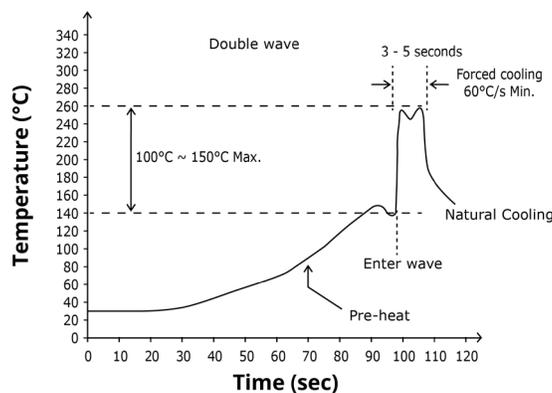
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		85	°C
storage temperature		-55		125	°C
vibration	10~55 Hz, 30 minutes along each axis		2		G

## SOLDERABILITY

parameter	conditions/description	min	typ	max	units
wave soldering	see wave solder profile			260	°C

Note: 2. The wave solder profile is measured on lead temperature.  
3. Need to keep the solder parts internal temperature less than about 210°C.

**WAVE SOLDERING PROFILE (Lead-free)**



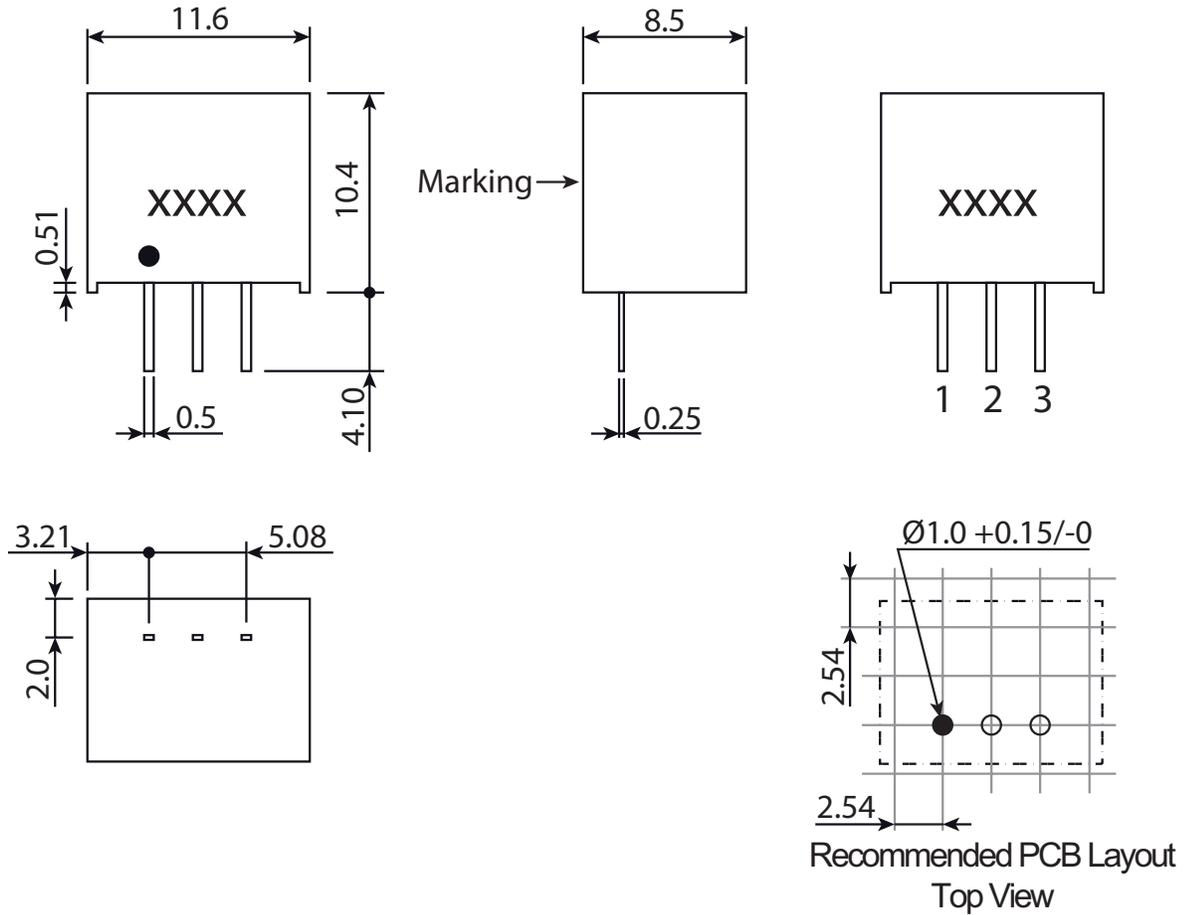
## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	11.6 x 8.5 x 10.4				mm
case material	non-conductive black plastic (UL94V-0)				
potting material	silicone (UL94V-0)				
weight			2		g

## MECHANICAL DRAWING

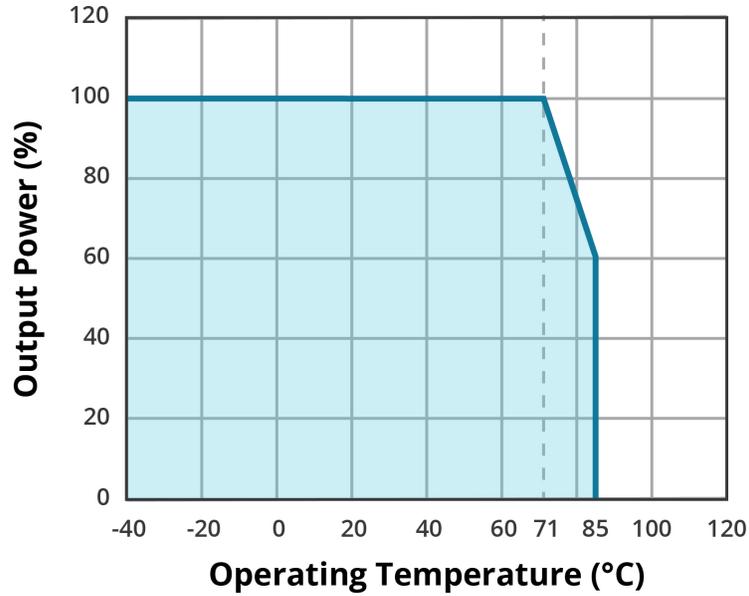
units: mm  
 tolerance: XX.X=±0.50 mm  
 XX.XX=±0.25 mm

PIN CONNECTIONS	
PIN	Function
1	+Vin
2	GND
3	+Vout



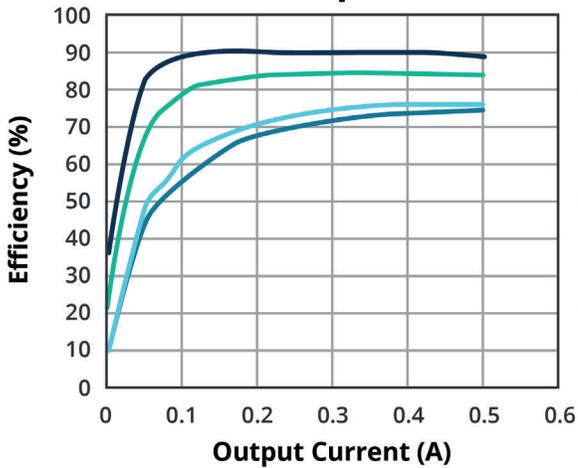
## DERATING CURVE

### TEMPERATURE DERATING CURVE

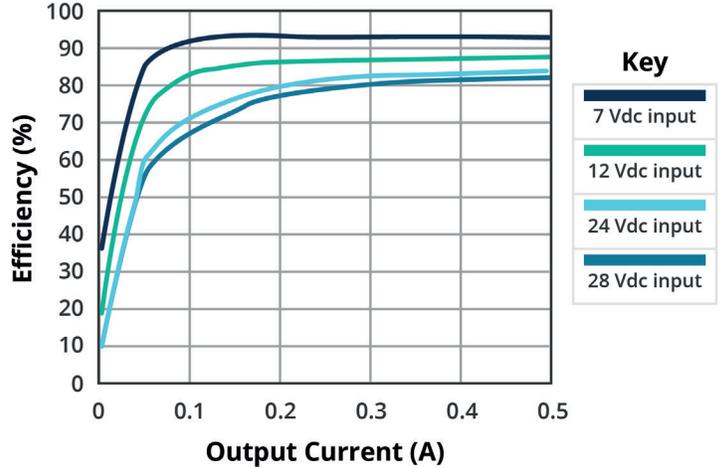


## EFFICIENCY CURVES

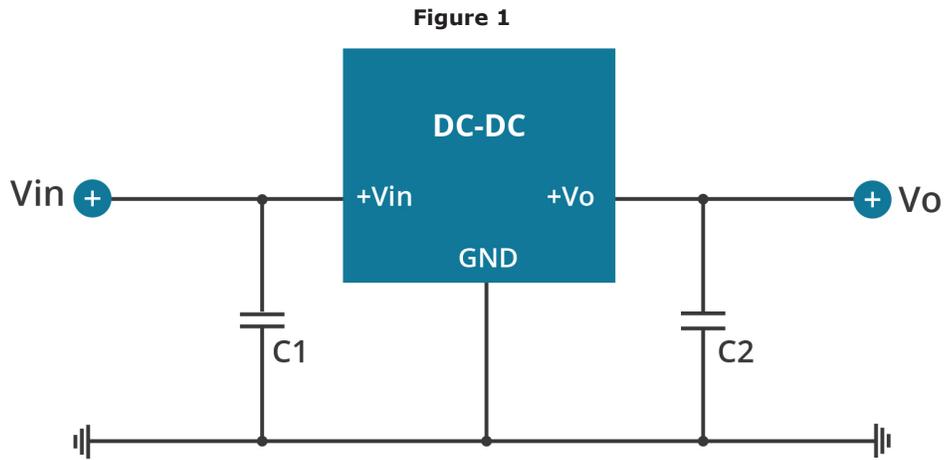
### EFFICIENCY VS OUTPUT LOAD 3.3 Vdc output model



### EFFICIENCY VS OUTPUT LOAD 5 Vdc output model



## APPLICATION CIRCUIT



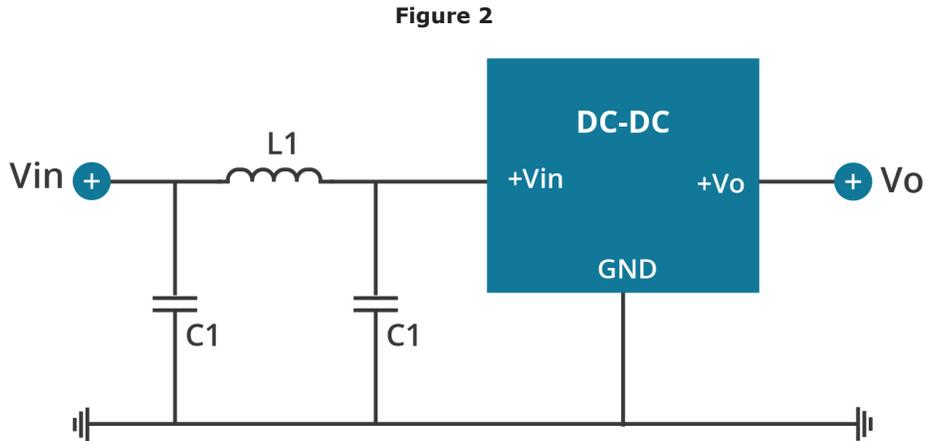
**Table 1**

Optional External Components	
C1	10 $\mu$ F MLCC
C2	10 $\mu$ F MLCC

Notes: 1. The converter cannot be used as a positive to negative converter.

## EMC RECOMMENDED CIRCUIT

### EMC FILTERING



**Table 2**

EN55022 Class A Recommended External Circuit Components		
C1	L1	C2
1206 4.7 $\mu$ F, 50V MLCC	3.3 $\mu$ H	NC

**Table 3**

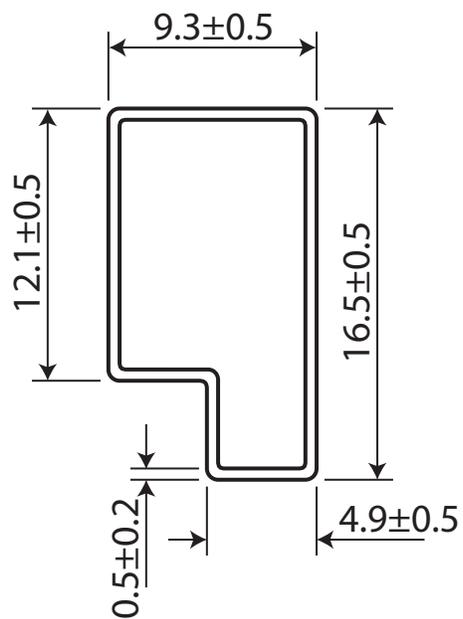
EN55022 Class B Recommended External Circuit Components		
C1	L1	C2
1210 10 $\mu$ F, 50V MLCC	10 $\mu$ H	1206 4.7 $\mu$ F, 50V MLCC

## PACKAGING

units: mm

Tube Size: 520 x 16.5 x 9.3 mm

QTY: 42 pcs



## REVISION HISTORY

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rev.	description	date
1.0	initial release	05/25/2016
1.01	company logo updated	04/14/2021
1.02	derating curve, efficiency curves and circuit figures updated	09/20/2021
1.03	datasheet updated	05/29/2025

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



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