

**SERIES:** P78-2000-S | **DESCRIPTION:** NON-ISOLATED SWITCHING REGULATOR

**FEATURES**

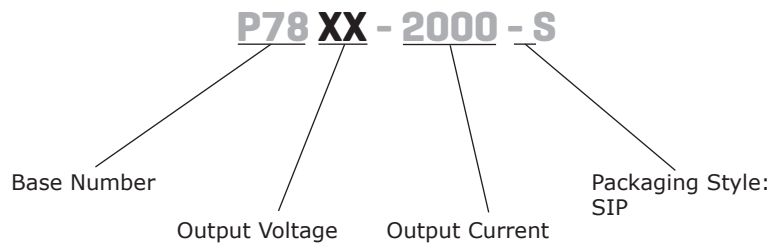
- 2 A of output current
- high efficiency up to 95%
- no-load input current as low as 0.1 mA
- wide temperature range: -40°C ~ +85°C
- output short circuit protection
- pin-out compatible with linear regulators
- designed to meet EN/BS EN 62368



MODEL	input voltage		output voltage	output current	output power	ripple and noise <sup>1,2</sup>	efficiency
	typ (Vdc)	range (Vdc)	(Vdc)	max (mA)	max (W)	max (mVp-p)	typ (%)
P7803-2000-S	24	6~36	3.3	2000	6.6	75	87
P7805-2000-S	24	8~36	5	2000	10	120	90
P7809-2000-S	24	13~36	9	2000	18	75	93
P7812-2000-S	24	16~36	12	2000	24	120	94
P7815-2000-S	24	19~36	15	2000	30	120	95

Notes: 1. Ripple and noise are measured at 20 MHz BW by "parallel cable" method with 1 μF ceramic and 10 μF electrolytic capacitors on the output.  
2. 20~100% load ripple & noise ≤ 100 mVp-p. 0~20% load ripple & noise ≤ 180 mVp-p

**PART NUMBER KEY**



## INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	3.3 Vdc output model	6	24	36	Vdc
	5.0 Vdc output model	8	24	36	Vdc
no load input current	input voltage range		0.1	1	mA
	3.3 & 9 Vdc output models 5, 12 & 15 Vdc output models		1.5	4	mA
filter	capacitance filter				

## OUTPUT

parameter	conditions/description	min	typ	max	units
capacitive load	3.3 Vdc output model			1800	μF
	5 Vdc output model			1000	μF
	9 Vdc output model			680	μF
	12 & 15 Vdc output models			470	μF
line regulation	input voltage range, full load		±0.4	±0.8	%
load regulation	from 10% to 100% load		±0.5	±1.5	%
voltage accuracy	100% load, input voltage range		±2	±4	%
	3.3 Vdc output model all other models		±2	±3	%
switching frequency	100% load, nominal input				
	5 Vdc output model		200		kHz
	12 Vdc output model		270		kHz
	15 Vdc output model all other models		300 400		kHz kHz
transient recovery time	25% load step change		0.2	1	mS
transient response deviation	25% load step change		50	150	mV
temperature coefficient	-40°C ~ 85°C			±0.03	%/°C

## PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				

## SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
safeties approval	designed to meet 62368: EN, BS EN				
conducted emissions	CISPR32/EN55032 class B (see fig. 4-② for recommended circuit)				
radiated emissions	CISPR32/EN55032 class B (see fig. 4-② for recommended circuit)				
ESD	IEC/EN 61000-4-2, contact ± 6kV, perf. Criteria B				
radiated immunity	IEC/EN 61000-4-3, 10V/m, perf. Criteria A				
EFT/burst	IEC/EN 61000-4-4, ± 1kV (see fig. 4-① for recommended circuit), perf. Criteria B				
surge	IEC/EN 61000-4-5, line to line ± 1kV (see fig. 4-① for recommended circuit), perf. Criteria B				
conducted immunity	IEC/EN 61000-4-6, 3 Vr.ms, perf. Criteria A				
MTBF	as per MIL-HDBK-217F @ 25°C	2,000			K hours
RoHS	2011/65/EU				

## ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		85	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%

## SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	1.5mm from case for 10 seconds			260	°C

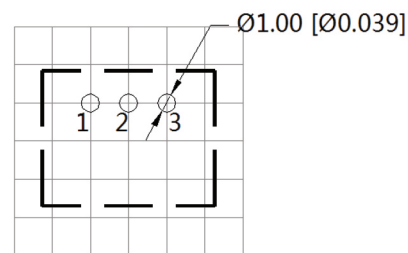
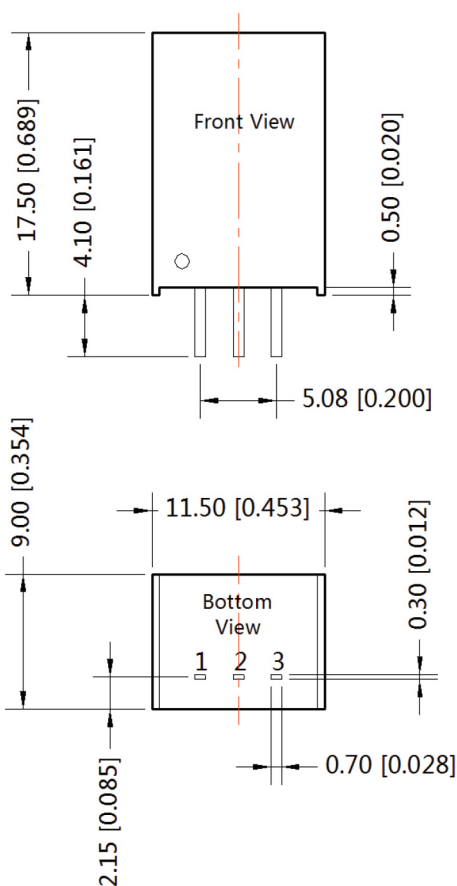
## MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	11.50 x 9.00 x 17.50 (0.457 x 0.297 x 0.400 inch)				mm
case material	Black flame-retardant and heat-resistant plastic (UL94-V0)				
weight			3.8		g

## MECHANICAL DRAWING

units: mm [inches]  
 tolerance:  $\pm 0.25$  [ $\pm 0.010$ ]  
 pin section tolerance:  $\pm 0.10$  [ $\pm 0.004$ ]

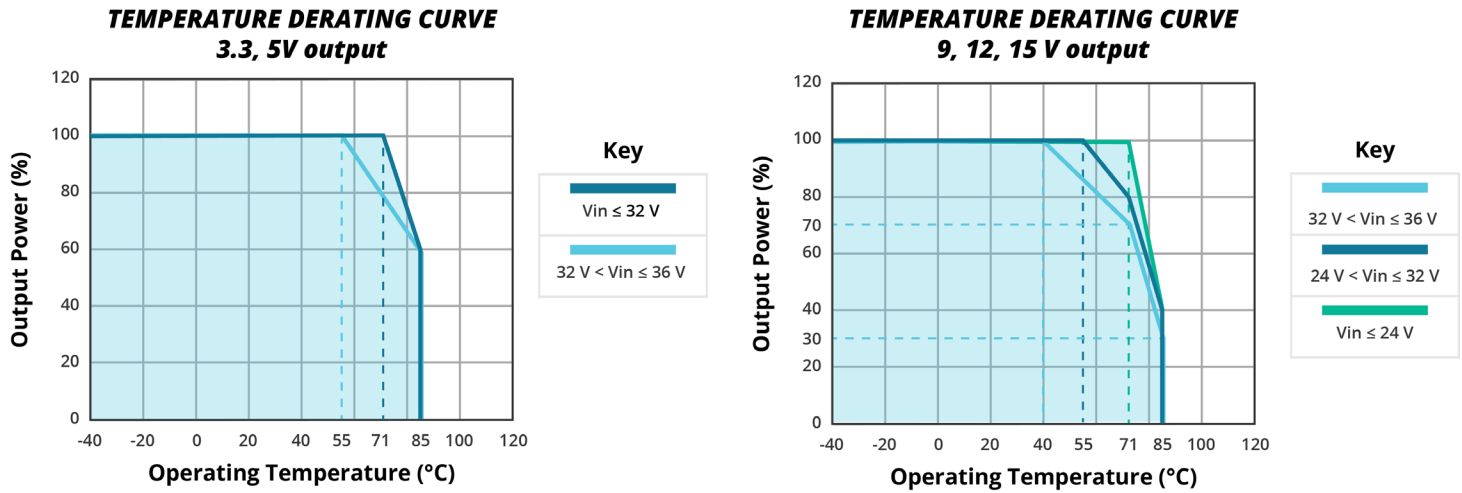
PIN CONNECTIONS	
Pin	Function
1	+Vin
2	GND
3	+Vo



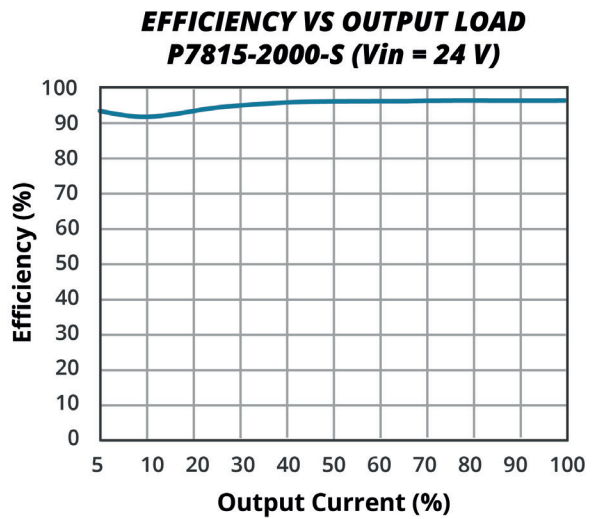
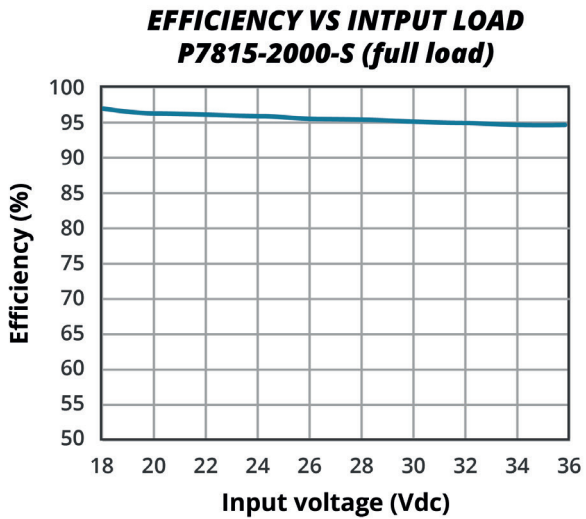
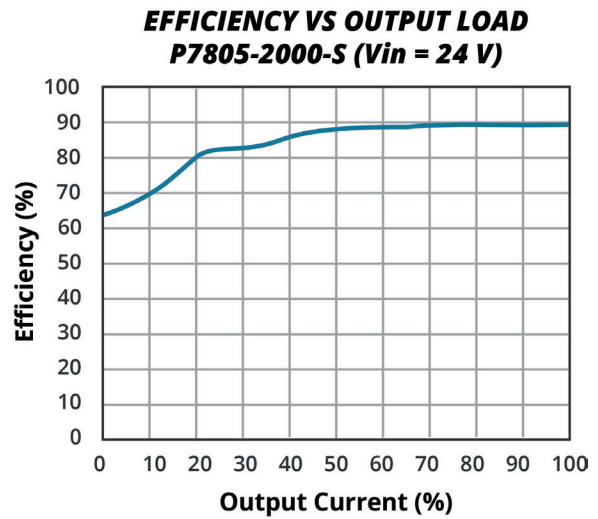
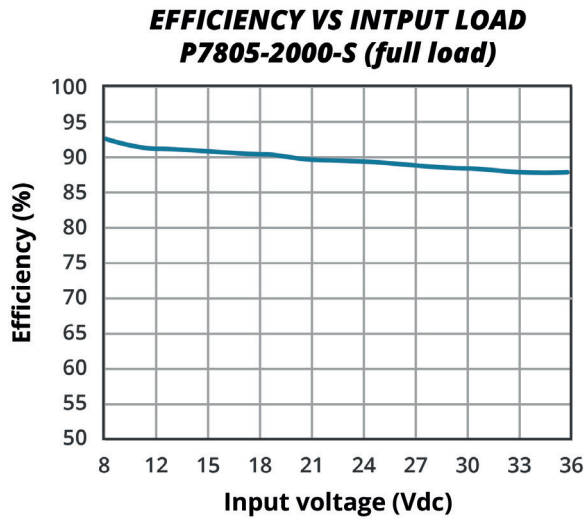
Note : Grid 2.54\*2.54mm

## DERATING CURVES

Figure 1



## EFFICIENCY CURVES



## TYPICAL APPLICATION CIRCUIT

Figure 2

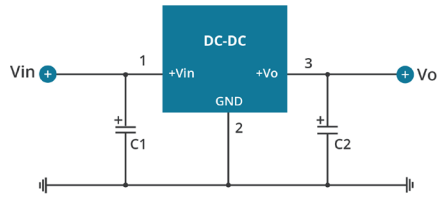


Table 1

Part No.	C1 (ceramic capacitor)	C2 (ceramic capacitor)
P7803-2000-S	22 $\mu$ F/50V	22 $\mu$ F/10V
P7805-2000-S	22 $\mu$ F/50V	22 $\mu$ F/10V
P7809-2000-S	22 $\mu$ F/50V	22 $\mu$ F/16V
P7812-2000-S	22 $\mu$ F/50V	22 $\mu$ F/25V
P7815-2000-S	22 $\mu$ F/50V	22 $\mu$ F/25V

- Note:
1. C1 and C2 are required and should be connected close to the pin terminal of the module.
  2. The capacitance of C1 and C2 refer to Sheet 1.
  3. To reduce the output ripple furtherly, C2 can be increased properly if required, tantalum capacitor and aluminum electrolytic capacitor of low ESR may also suffice.
  4. Cannot be used in parallel to enlarge the power for output and hot swap.

## EMC RECOMMENDED CIRCUIT

Figure 3

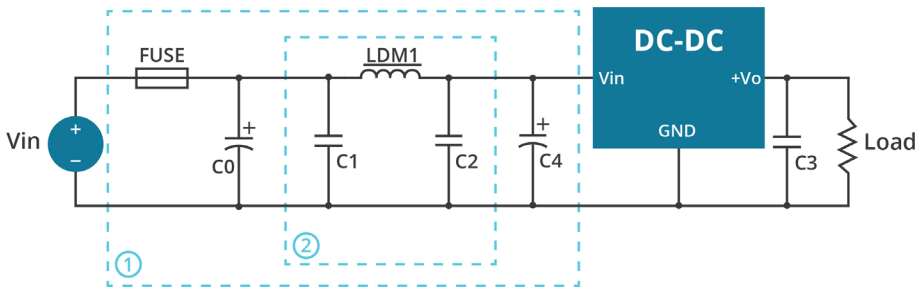


Table 2

Recommended external circuit components	
FUSE	choose according to practical input current
C0	100 $\mu$ F /100V
LDM1	22 $\mu$ H
C4	680 $\mu$ F /50V
C1/C2	10 $\mu$ F /50V
C3	22 $\mu$ F/25V

- Note: Part ① in the Fig. 4 is for EMS test, part ② is for EMI filtering; parts ① and ② can be added based on actual requirement.

## REVISION HISTORY

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rev.	description	date
1.0	initial release	01/22/2020
1.01	logo update	02/21/2020
1.02	derating curve, efficiency curves and circuit figures updated	09/23/2021
1.03	datasheet updated	05/24/2022
1.04	CE certification removed	11/02/2022

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



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