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

FEATURES

- 2 A output current
- 3 ~ 12 Vdc output options
- 36 Vdc max input voltage
- -40°C to +85°C temperature range
- pin compatible with LM78XX linear regulators
- wide input voltage range
- no-load input current as low as 0.1 mA
- designed to meet EN/BS EN 62368

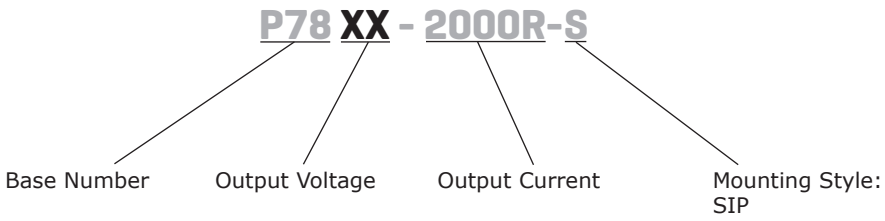
RoHS

MODEL

MODEL	input voltage[1] typ (Vdc)	input voltage[1] range (Vdc)	output voltage (Vdc)	output current max (mA)	output power max (W)	ripple and noise[2] max (mVp-p)	efficiency[3] max (%)
P7803-2000R-S	24	6~36	3.3	2000	6.6	75	89
	12	8~31	-3.3	1000	-3.3	150	83
P7805-2000R-S	24	8~36	5	2000	10	75	92
	12	8~30	-5	1000	-5	150	84
P7806-2000R-S	24	10~36	6.5	2000	13	75	92
	12	8~29	-6.5	1000	-6.5	150	85
P7809-2000R-S	24	13~36	9	2000	18	75	95
	12	8~26	-9	1000	-9	150	84
P7812-2000R-S	24	16~36	12	2000	24	75	96
	12	8~23	-12	1000	-12	150	85

Notes:
1. For input voltage exceeding 30 Vdc, an input capacitor of 22µF/50V is required.
2. The ripple and noise are measured at 20 MHz BW using the parallel cable method at nominal input voltage, full load. See Application notes.
3. Measured at minimum Vin and 100% load.

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
no load input current	positive output at nominal input		0.1	1	mA
	negative output at nominal input -3.3, -5. -6.5 Vdc output all other output models		- -	1 2	mA mA
reverse polarity at input	avoid / not protected				
input filter	capacitance filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
capacitive load	3.3 Vdc output model 5 & 6.5 Vdc output models 9 Vdc output model 12 & 15 Vdc output models			1800 1000 680 470	µF µF µF µF
line regulation	Vin = min ~ max, at full load		±0.4	±0.8	%
load regulation	at nominal input, 10% ~ 100% load		±0.5	±1.5	%
voltage accuracy	at nominal input, 10% ~ 100% load			±3.0	%
switching frequency	at nominal input, full load		400		kHz
temperature coefficient	-40°C ~ 80°C			±0.03	%/°C
transient response deviation	at nominal input, 25% load step change (25%~50%~25%, 50%~75%~50% step) positive output negative output		 ±50 ±50	 ±150 ±150	 mV mV
transient recovery time	at nominal input, 25% load step change (25%~50%~25%, 50%~75%~50% step)		0.2	1	ms

PROTECTIONS

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

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
safety approvals	designed to meet 62368: EN, BS EN				
conducted emissions	CISPR32/EN55032 CLASS B (see Fig. 2-2 for recommended circuit)				
radiated emissions	CISPR32/EN55032 CLASS B (see Fig. 2-2 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, perf. Criteria B (see Fig. 2-1 for recommended circuit)				
surge	IEC/EN 61000-4-5 line to line ±1kV, perf. Criteria B (see Fig. 2-1 for recommended circuit)				
conducted immunity	IEC/EN 61000-4-6 3Vr.m.s, perf. Criteria A				
MTBF	as per MIL-HDBK-217 at 25°C	2,000,000			hours
RoHS compliant	yes				

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		85	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%
pin soldering resistance temperature	for max 10 seconds			260	°C

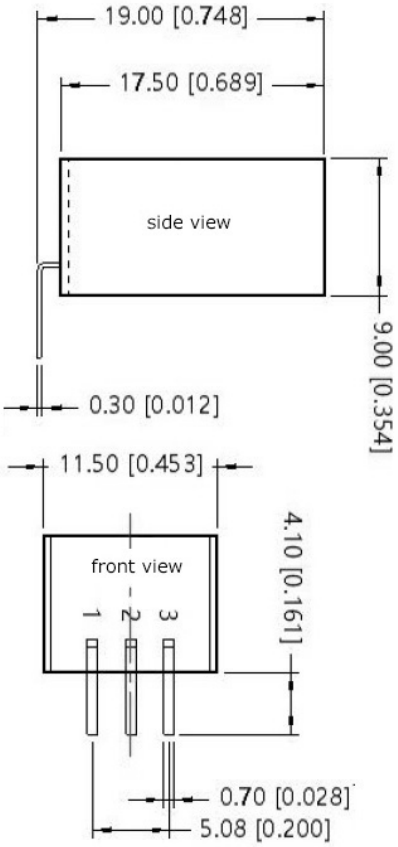
MECHANICAL

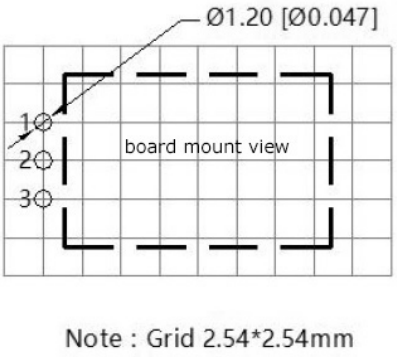
parameter	conditions/description	min	typ	max	units
dimensions	11.50 x 9.00 x 17.50 [0.453 x 0.354 x 0.689 inch]				mm
case material	black plastic, flame retardant and heat resistant (UL94-V0)				
weight			3.8		g
cooling	natural convection				

MECHANICAL DRAWING

units: mm [inches]
tolerance: ±0.50 [±0.020]
pin section tolerance: ±0.10 mm [±0.004]

PIN CONNECTIONS		
Pin	Function (positive output)	Function (negative output)
1	+Vin	+Vin
2	GND	-Vo
3	+Vo	GND





TYPICAL APPLICATION CIRCUIT

Figure 1
positive output

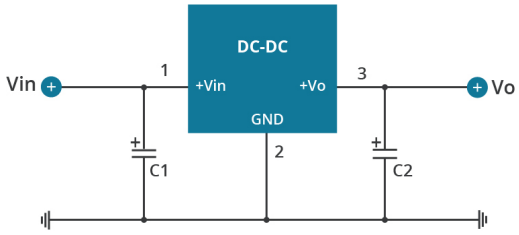


Figure 1
negative output

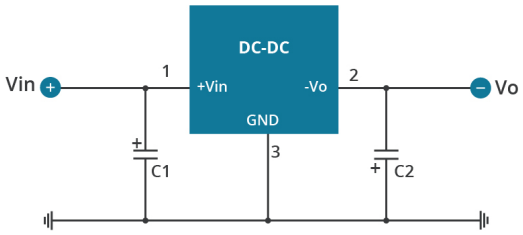


Table 1

Output Voltage (Vdc)	C1 (ceramic capacitor)	C2 (ceramic capacitor)
3.3	22μF/50V	22μF/10V
5		22μF/10V
6.5		22μF/10V
9		22μF/16V
12		22μF/25V

1. The required C1 and C2 capacitors must be connected as close as possible to the module.
2. Refer to Table 1 for C1 and C2 capacitor values. For certain applications, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead.
3. For certain applications, increased values of C2 and/or tantalum or low ESR electrolytic capacitors may also be used instead.
3. Converter cannot be used for hot swap and with output in parallel.

EMC RECOMMENDED CIRCUIT

Figure 2

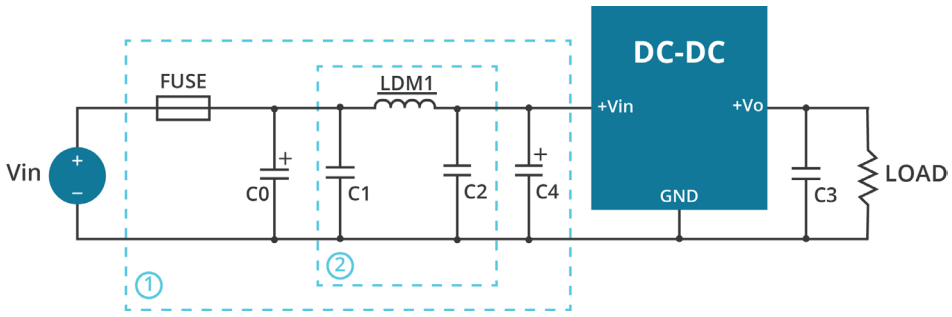
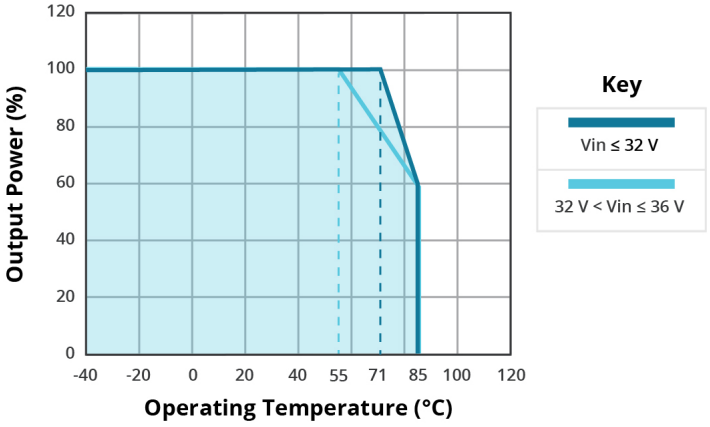


Table 2

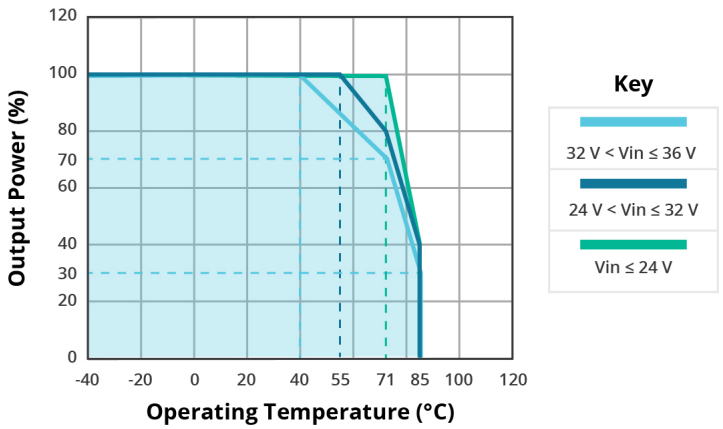
Component	Recommended value
FUSE	selected based on the actual input current in application
C0	100μF/100V
LDM1	22μH
C4	680μF/50V
C1	10μF/50V
C2	10μF/50V
C3	22μF/25V

DERATING CURVES

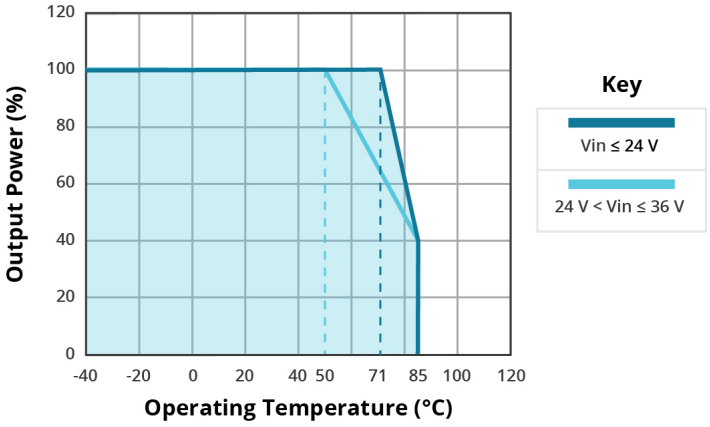
TEMPERATURE DERATING CURVE
3.3, 5V output
(Forced air - 0.6 m/s)



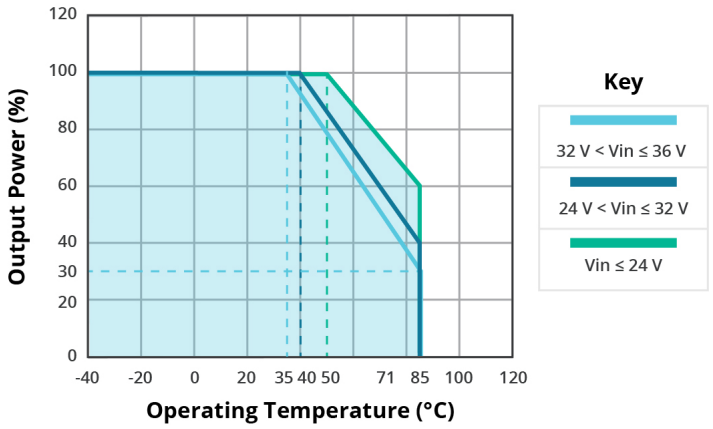
TEMPERATURE DERATING CURVE
6.5, 9, 12 V output
(Forced air - 1.7 m/s)



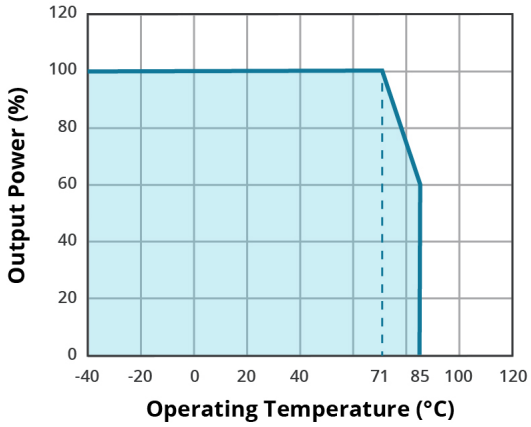
TEMPERATURE DERATING CURVE
3.3, 5, 6.5V output
(Natural convection)



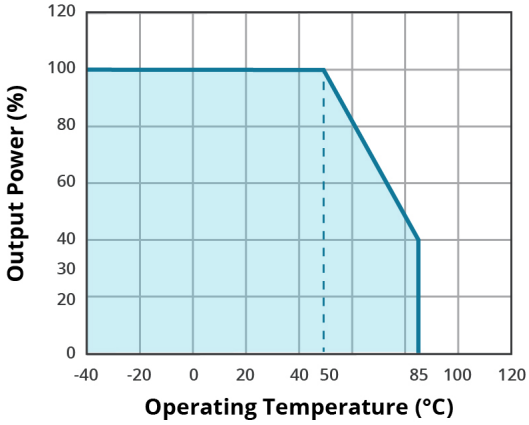
TEMPERATURE DERATING CURVE
9, 12 V output
(Natural convection)



TEMPERATURE DERATING CURVE
-3.3, -5, -6.5V output
(Natural convection)

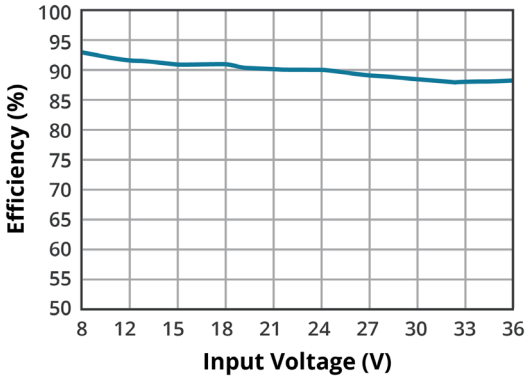


TEMPERATURE DERATING CURVE
-9, -12 V output
(Natural convection)

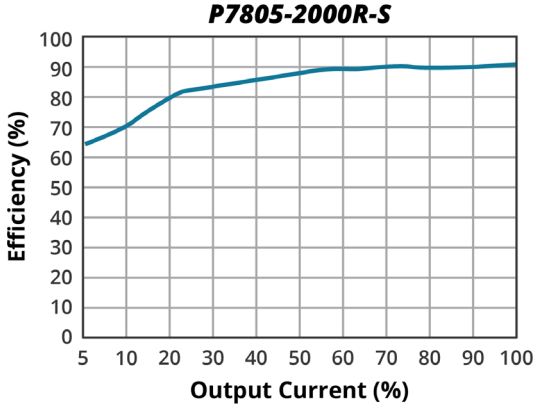


EFFICIENCY CURVES

EFFICIENCY VS INPUT VOLTAGE
(full load)
P7805-2000R-S



EFFICIENCY VS OUTPUT CURRENT
(Vin = 24V)
P7805-2000R-S



REVISION HISTORY

rev.	description	date
1.0	initial release	07/31/2022
1.01	updated efficiency	08/08/2022
1.02	6.5V output model added	03/29/2023
1.03	9V input model added	07/17/2023
1.04	model numbers updated	09/27/2023

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

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