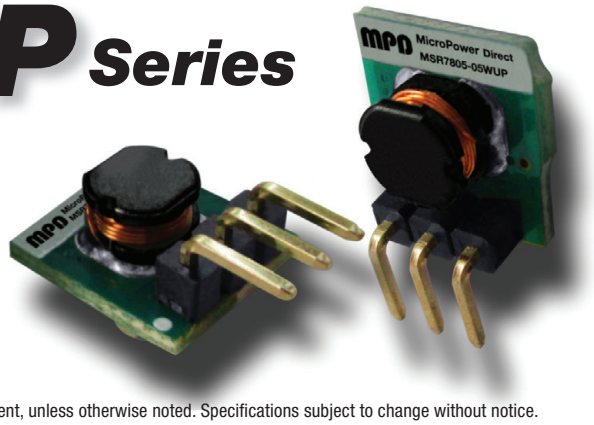
MSR7805WUP Series

Low Cost, Non-isolated UnPotted, Single Output POL Switching Regulators



Key Features:

- Efficiency to 95%
- 0.5A Output Current
- Miniature Construction
- EN 60950 Approved
- LM78xx Replacement
- Wide Input Range
- Negative Output Capability
- Short Circuit Protected
- Low Noise
- ***Low Low Cost***

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
No-Load Input Current	Positive Ouput Connection		0.2	1.5	mA
Input Filter	Capacitor Filter				
Reverse Polarity Input	Not Allowed, Could Damage the Unit				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	3.3 VDC Output		±2.0	±4.0	%
	All Other Outputs		±2.0	±3.0	
Line Regulation	V_{IN} = Min to Max		±0.2	±0.4	%
Load Regulation	I_{OUT} = 10% to 100%		±0.4	±0.6	%
Ripple & Noise (20 MHz)	See Note 2		20	75	mV P - P
Temperature Coefficient				0.03	%/°C
Transient Recovery Time, See Note 3	25% Load Step Change		0.2	1.0	mS
Transient Response Deviation			50	250	mV
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Not Isolated				
Switching Frequency		550		850	kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 4	EN 55022	B	
Conducted Emissions, See note 4	EN 55022	B	
ESD	EN 61000-4-2	B	±6 kv Air, ±4 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 5	EN 61000-4-4	B	±1 kV
Surge, See Note 5	EN 61000-4-5	B	±1 kV
CS	EN61000-4-6	A	3V rms

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Storage Temperature Range		-55		+125	°C
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Size	See Mechanical Diagram (Page 4)
Weight	0.035 Oz (1.0g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.0			MHours
Safety Standards	EN 60950				

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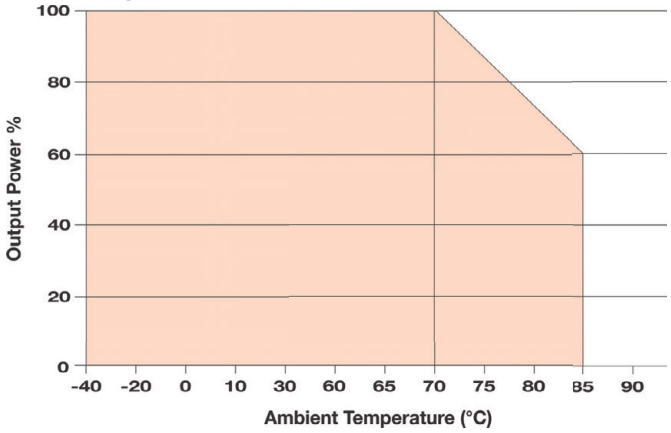
Model Selection Guide

Model Number	Input Voltage (VDC)		Output		Efficiency (%, Typ)		Capacitive Load (µF, Max)	Fuse Rating Slow Blow (mA, Max
	Nom.	Range	Voltage (VDC)	Current (mA, Max)	Min V_{IN}	Max V_{IN}		
MSR7805-033WUP	24	4.75 - 36.0	3.3	500.0	86	80	680	1,000
MSR7805-05WUP	24	6.50 - 36.0	5.0	500.0	90	84	680	1,000
	12	7.00 - 31.0	-5.0	-300.0	80	81	330	
MSR7805-12WUP	24	15.0 - 36.0	12.0	500.0	94	91	680	1,000
	12	8.00 - 24.0	-12.0	-150.0	84	85	330	
MSR7805-15WUP	24	19.0 - 36.0	15.0	500.0	95	93	680	1,000
	12	8.00 - 21.0	-15.0	-150.0	85	87	330	

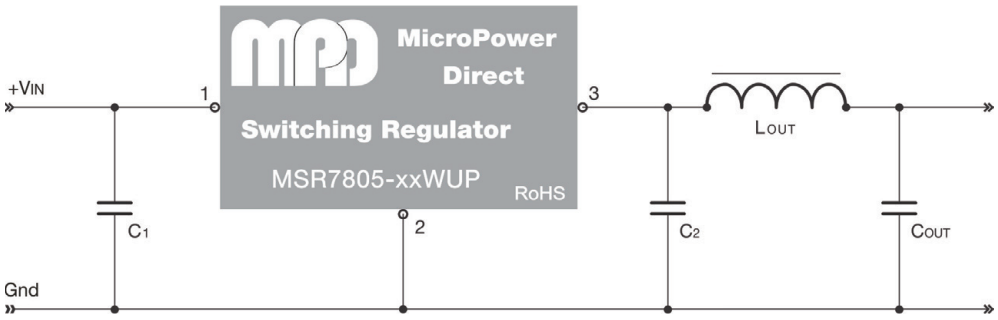
Notes:

1. For many applications, no external components are required. If the input is over 30V, a 22 µF/50V input capacitor (C_1) is required. See the typical application note below.
2. Output ripple is measured with a nominal input and is specified for a load range of 10% to 100%. When measuring output ripple, two external capacitors (1 µF and 10 µF) must be placed from the V_{OUT} to the Gnd pins.
3. Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
4. The unit may not meet emissions to class A without the addition of external capacitors (C_1, C_2 & C_3) as shown in the typical circuit 4 diagram on page 4.
5. The unit meets EFT & surge EMS specifications with the addition of external components as shown in the typical circuit 4 diagram on page 4.
6. This regulator is not designed to be used in parallel with another unit to increase output power.
7. A reverse polarity connection on the input could damage the unit.
8. The input should not exceed the range given in the model selection chart. Exceeding this limit could damage the unit.

Derating Curve



Typical Application Circuit 1, Positive Output



For many applications, the **MSR7805-xxWUP** can be used without external components. However, if the application requires meeting EMC/EMI standards or operation at inputs over 30V, a minimum of external components is needed.

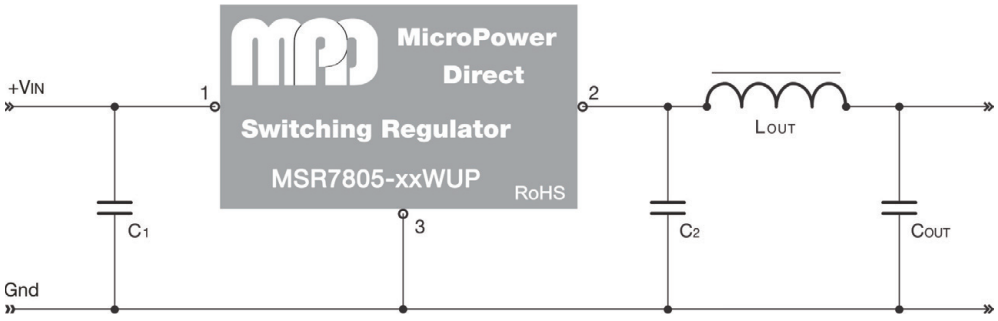
A typical connection (for a positive output voltage) is shown at right. Here, C_1 has been added to improve stability over the input range (and over the operating temperature range). Capacitor C_2 is added to reduce the output ripple.

Suggested values for these capacitors are given in the "Component Values" table below. These capacitors are ceramic and should be placed as close to the unit as possible. Tantalum or low ESR electrolytic capacitors may also be used.

If very low noise is required, the LC filter may be added (L_{OUT} & C_{OUT}). The recommended value for L_{OUT} is 10 µH - 47 µH. For C_{OUT}, a 22 µF. is recommended. To meet EMI standards, see the typical circuit 4 diagram on page 4.

Model Number	C_1	C_2
MSR7805-033WUP	22 µF/50V	22 µF/6.3V
MSR7805-05WUP	22 µF/50V	22 µF/10V
MSR7805-12WUP	22 µF/50V	22 µF/25V
MSR7805-15WUP	22 µF/50V	22 µF/25V

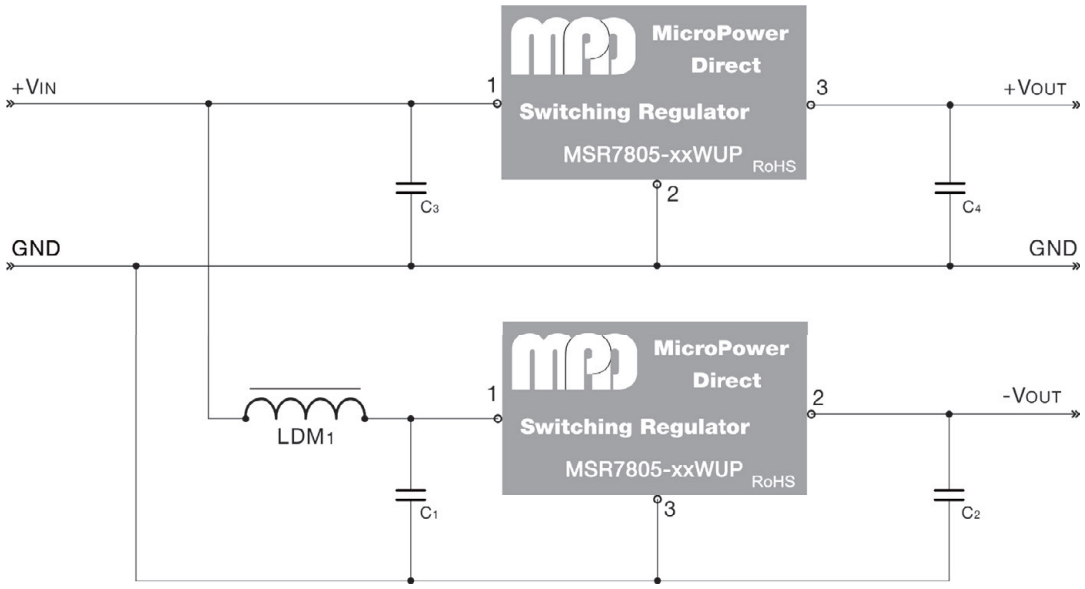
Typical Application Circuit 2, Negative Output



To produce a negative output, connect the output to pin 2 and ground to pin 3, as shown in the diagram above.

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Typical Application Circuit 3, Pos/Neg Output

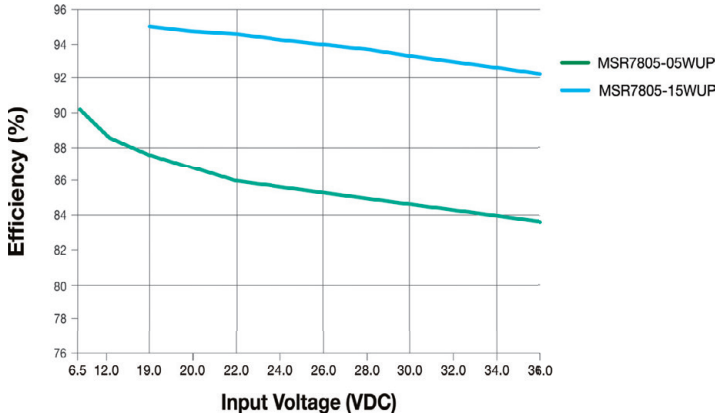


Typical application circuit 3 shows two units configured with a common input connection to produce positive and negative outputs. The inductor LDM1 is added to reduce interference between the units. The recommended values for all the external components are given in the table at right.

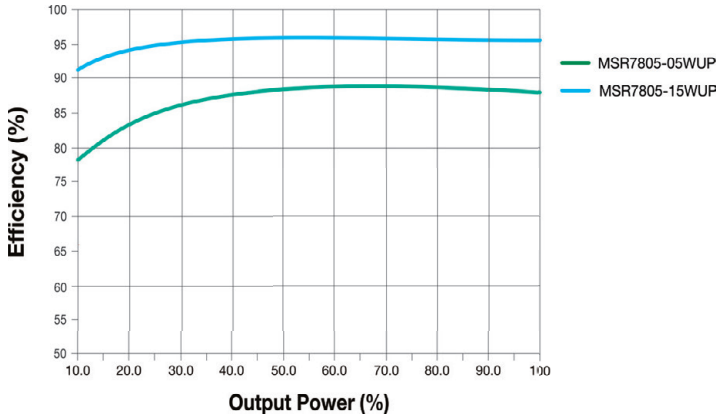
Model Number	C_1/C_3	C_2/C_4	L_{DM1}
MSR7805-033WUP	10 µF/50V	10 µF/6.3V	10 µH
MSR7805-05WUP	10 µF/50V	10 µF/6.3V	10 µH
MSR7805-12WUP	10 µF/50V	10 µF/6.3V	10 µH
MSR7805-15WUP	10 µF/50V	10 µF/6.3V	10 µH

Characteristic Curves, Positive Output

Efficiency vs Input Voltage - (Full Load)

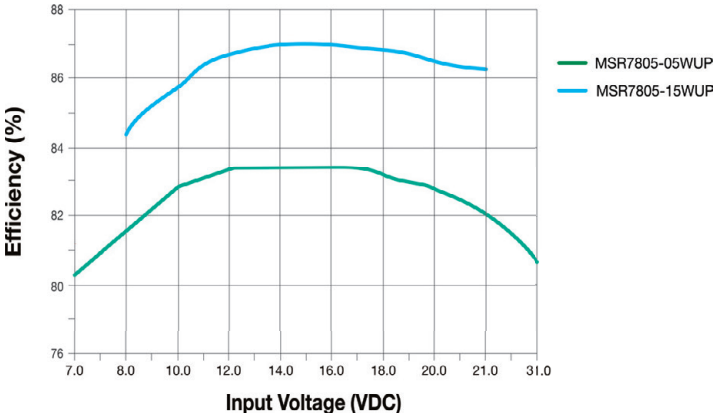


Efficiency vs Output Power - (V_{IN} = Nominal)

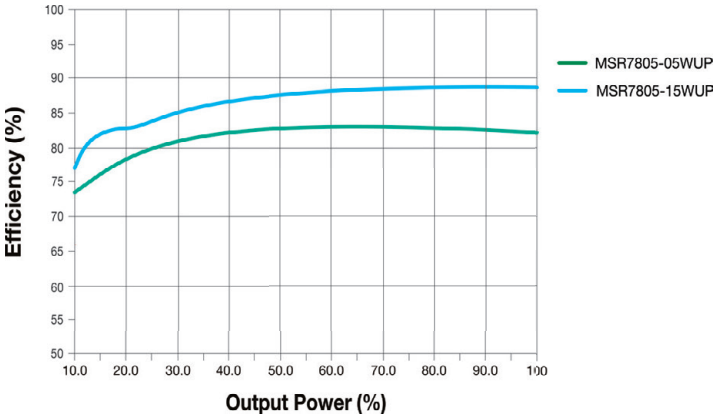


Characteristic Curves, Negative Output

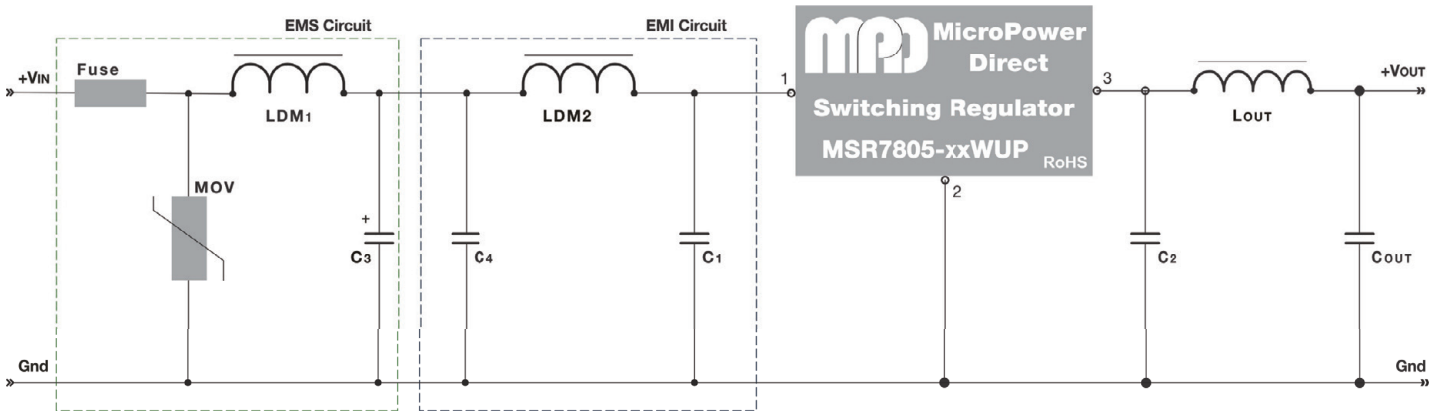
Efficiency vs Input Voltage - (Full Load)



Efficiency vs Output Power - (V_{IN} = Nominal)



Typical Application Circuit 2: External EMC Components



The diagram above illustrates a typical connection of the **MSR7805WUP** series for applications that require meeting EMC standards. Some notes on this diagram (starting with the input circuit) are:

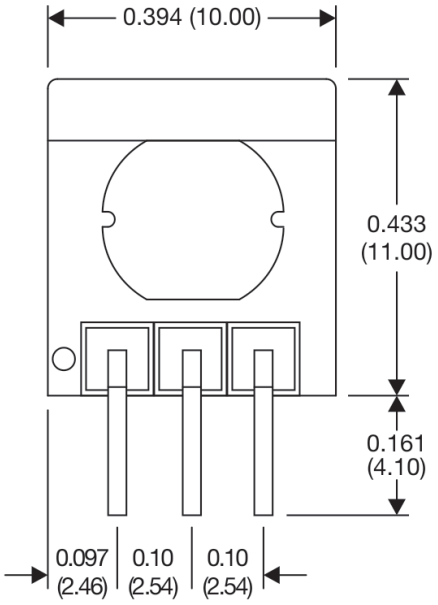
1. It is recommended that an external fuse be used. The recommended fuse is shown in the model chart on page 2.
2. An external MOV is recommended on the input to protect the unit in the event of a surge. A recommended value is given in the table at right.

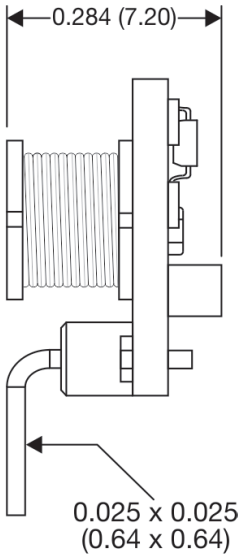
3. Recommended values for components are:

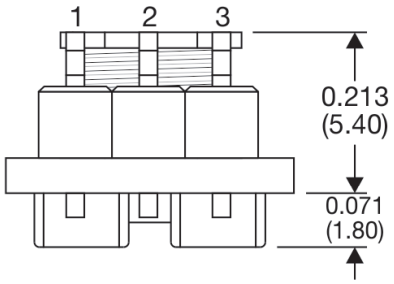
Component	Value	Component	Value
MOV	S20K30	LDM_2	12 µH
LDM_1	82 µH	C_1	See Note 4
C_3	680 µF/50V	C_2	See Note 4
C_4	4.7 µF/50V		

4. The values for C_1 and C_2 are given in the "Component Values" table on page 2.
5. The LC filter L_{OUT} & C_{OUT} is only needed if very low ripple is required. Recommended values for these components are given on page 2.

Mechanical Dimensions







Pin Connection

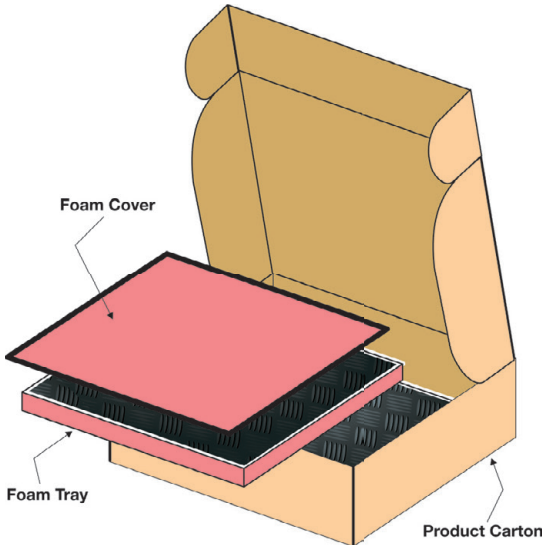
Positive Output

Pin	Function
1	+VIN
2	GND
3	VOUT

Negative Output

Pin	Function
1	+VIN
2	VOUT
3	GND

Packing Carton



Notes:

1. **MSR7805WUP** units are shipped in a product carton (inner carton) which is then paced into a shipping carton. The shipping carton will hold two product cartons.
2. Products are placed into individual slots cut into foam trays. A foam cover is then secured to the tray. Each tray will hold 140 units. Up to four trays will fit into a product carton.

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)
- Pin 1 is marked by a "dot" on the front of the unit

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