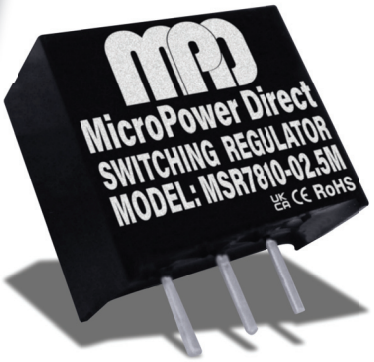
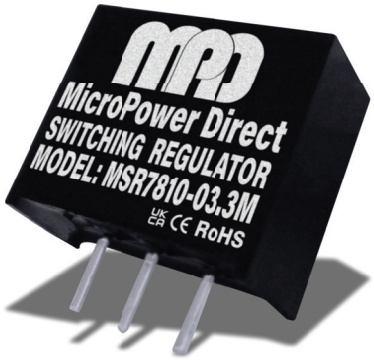
MSR7810M

Miniature 1A Output Miniature, Wide Input Switching Regulators





Key Features:

- Efficiency to 93%
- 1.0A Output Current
- Wide Input Voltage Range
- Meets EN 62368
- Short Circuit Protected
- Compact SIP3 Case
- LM78xx Pin Compatible
- Low No Load Current
- Wide -40 to +93ºC Range
- Low Noise
- Negative Output Capability

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
Input Filter	Capacitor Filter				
Start Up Time			50		mS
Input Reflected Ripple Current	See Note 1		40		mA P - P
Reverse Polarity Input	Not Allowed, Could Damage the Unit				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±2.0	%
Line Regulation	Full Load, V_{IN} = Min to Max			±0.5	%
Load Regulation	Nom Input, I_{OUT} = 10% to 100%			±0.6	%
Ripple & Noise (20 MHz)	See Note 2			60	mV P - P
Temperature Coefficient			±0.02		%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Not Isolated				
Switching Frequency			330		kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 3	EN 55032		B
Conducted Emissions, See Note 3	EN 55032		B
ESD	EN 61000-4-2	A	±8 kV Air
			±6 kV Indirect
RS	EN 61000-4-3	A	10V/m
EFT, See Note 4	EN 61000-4-4	A	±2 kV
CS	EN 61000-4-6	A	10V rms
PFMF	EN 61000-4-8	A	1A/m

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+95	°C
Max Case Temperature				+100	°C
Storage Temperature Range		-55		+125	°C
Thermal Impedance		66			°C/W
Cooling	Natural Convection, 30 to 65 LFM				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagram (Page 4)
Case Material	Non-Conductive Black Plastic (UL-94V0)
Weight	See Mechanical Diagram (Page 4)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	4.5			MHours
Lead Temperature	1.5 mm From Case For 10 Sec			260	°C

CE
UK CA
RoHS

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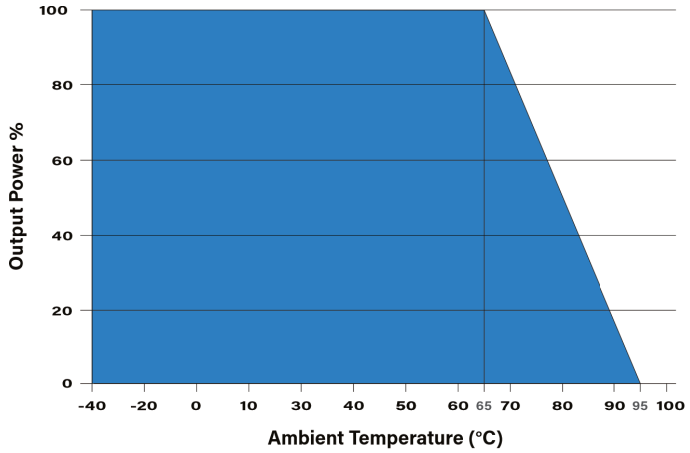
Model Selection Guide

Model Number	Input Voltage Range (VDC)	Input Current (Full Load mA)			Output Voltage (VDC)	Output Current		Efficiency (%, Typ)		Capacitive Load (µF, Max)
		No Load	Full Load (mA, Typ)			Min. Load (mA)	Max. Load (mA)	Min VIN	Max VIN	
		(mA, Typ)	Min VIN	Max VIN						
MSR7810-01.5M	4.75 - 18.0	15	395	113	1.5	100.0	1,000.0	80	74	220
MSR7810-01.8M	4.75 - 18.0	15	462	130	1.8	100.0	1,000.0	82	77	220
MSR7810-02.5M	4.75 - 18.0	15	598	167	2.5	100.0	1,000.0	88	83	220
MSR7810-03.3M	4.75 - 18.0	15	772	216	3.3	100.0	1,000.0	90	85	220
MSR7810-05M	6.50 - 18.0	15	827	309	5.0	100.0	1,000.0	93	90	220

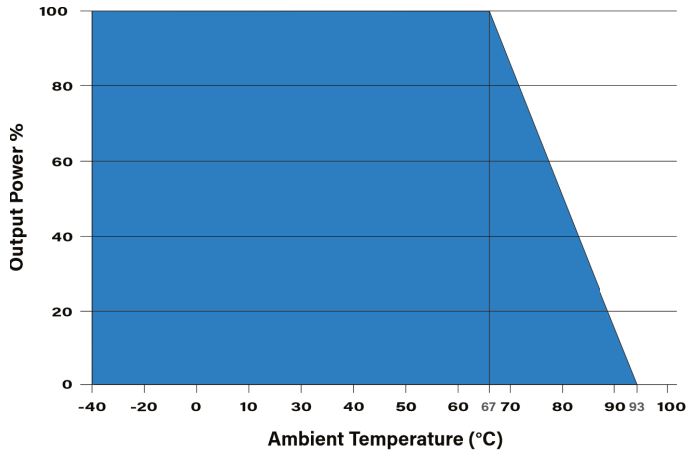
Notes:

1. Input reflected ripple current is measured with a simulated source inductance of 12 µH.
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 VOUT to the Gnd pins. Output noise will rise when the load is less than 10%.
3. The unit may not meet emissions to class B without the addition of external components as shown in the typical circuit diagram on page 3.
4. The unit meets EFT & surge EMS specifications with the addition of external components as shown in the typical circuit diagram on page 3.
5. Soldering temperature is measured 1.5 mm from the pins. Soldering time should not exceed 10S.
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.
9. It is recommended that an external fuse be used. The fuse should be selected based upon the actual input current of the application. For more information please call the factory.

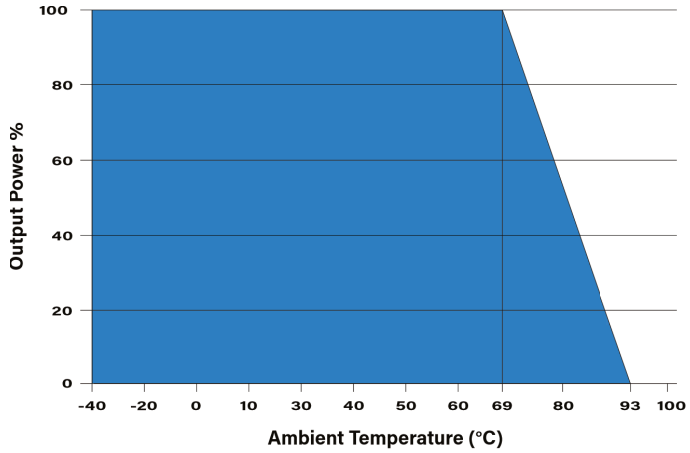
Temperature Derating Curves:



MSR7810-01.5M, MSR7810-03.3M

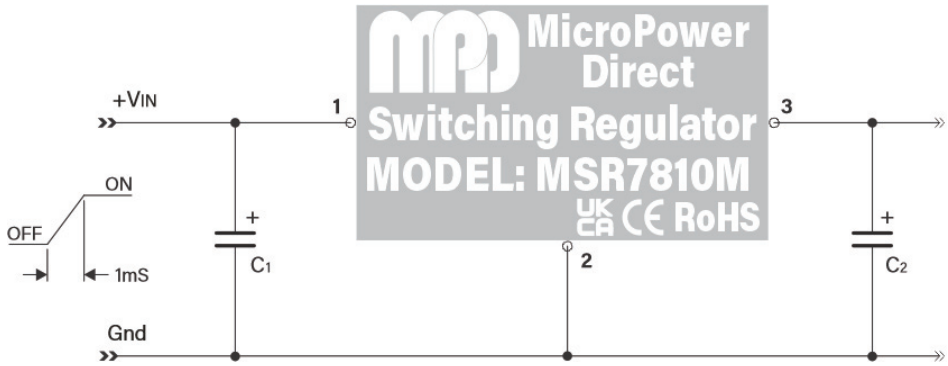


MSR7810-02.5M



MSR7810-01.5M, MSR7810-01.8M

Typical Application Circuit

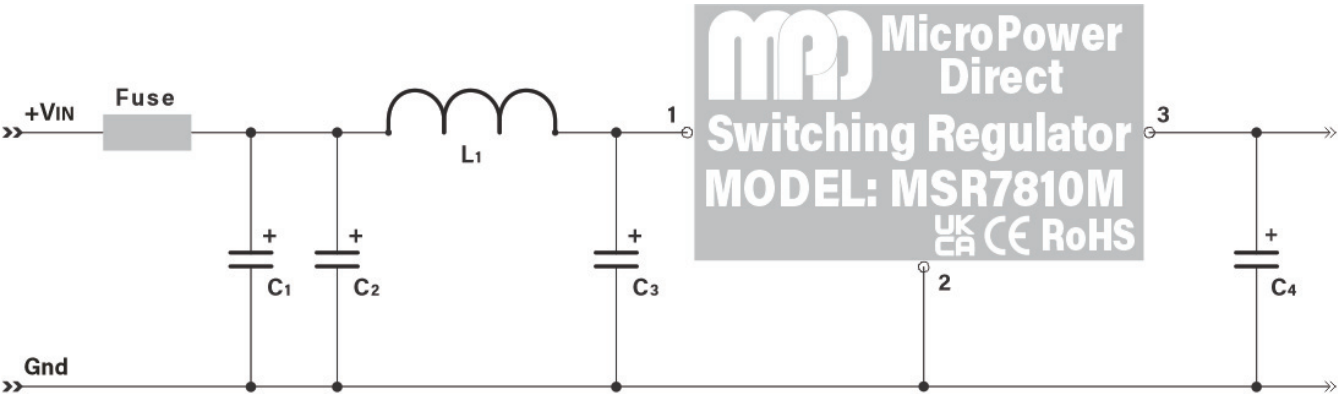


For many applications, the MSR7810M can be used with a minimum of external components. A typical connection is shown at left.

To help protect the unit during start-up, it is suggested that a soft start (1mS) be used. 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 47 μF/100V for C_1 and 100 μF for C_2. 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.

EMC Application Circuit

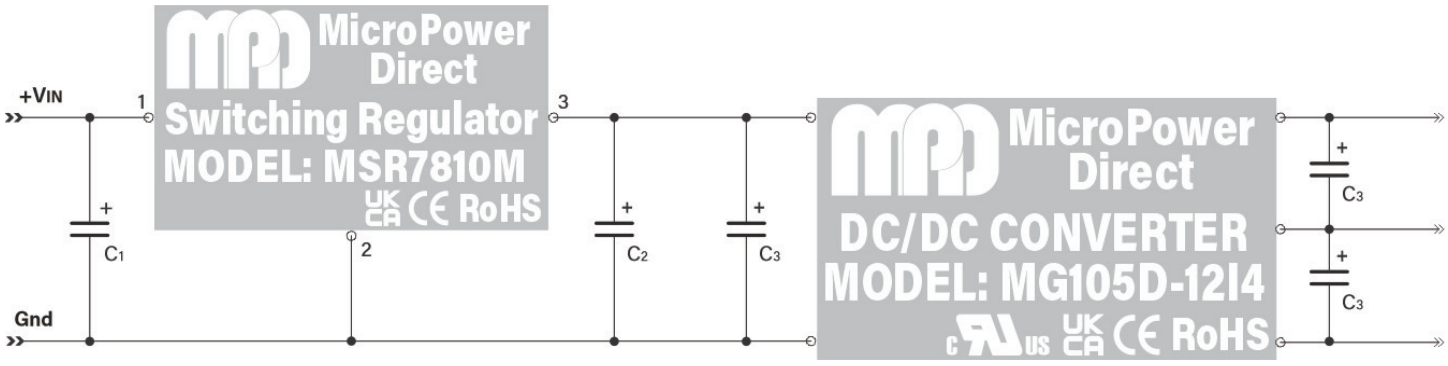


The diagram above illustrates a typical connection of the MSR7810M series for applications that require meeting EFT and Surge standards. Some notes on this diagram (starting with the input circuit) are:

1. It is recommended that an external fuse be used. The fuse should be selected based upon the actual input current of the application. Contact the factory for more information.
4. The values for the input filter C_1, C_2, C_3 and L_1 are given in the table at right.
5. The output capacitor C_4 is not required, but is used to reduce output ripple.
6. Recommended values for components are:

Component	Value
C_1	220 μF/100V
L_1	6.4 μH
C_2	470 μF/35V
C_3	470 μF/35V

Connection with DC/DC



The diagram above illustrates a typical application where the regulator is driving a DC/DC converter. In this example, the DC/DC is an **MG105D-12I4**. This DC/DC is a 1W unit that has a 5VDC input (±10%) and dual, regulated outputs of ±5 VDC. The capacitors are for decoupling.

The combination of the units results in a low cost circuit that provides:

1. Wide Input Range
2. Up to 6 kV I/O isolation
3. Dual Outputs
4. Output regulation
5. Low Cost

If required, it is also possible to connect a DC/DC in front of the regulator. This could provide input isolation, a wider input range and/or tighter regulation.

This type of application flexibility makes the **MSR7810M** series a useful tool for a very wide variety of applications

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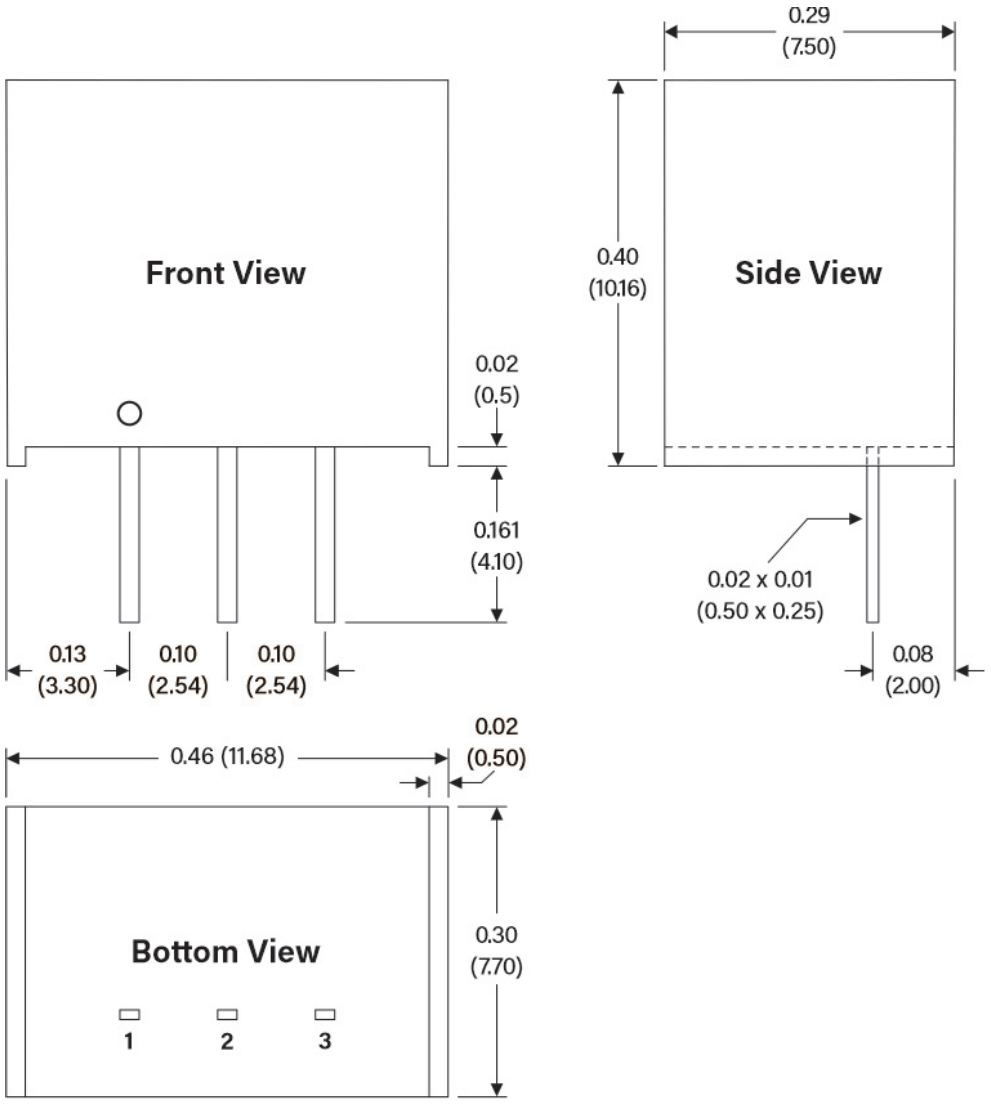
Mechanical Dimensions



Pin Connection

Pin	Function
1	+VIN
2	GND
3	+VOUT

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)
- Pin 1 is marked by a "dot" or indentation on the front of the unit
- Weight = 0.07 Oz (2.0g)

MPD offers a very wide variety of DC/DC converters. Our standard product line includes SMT, SIP, and DIP potted modules, industry standard 1 x 1" & 1 x 2" modules, as well as new models in an ultra miniature DFN package. Our units are used in applications ranging from high speed gate drive circuits to instrumentation to industrial equipment and medical equipment/instrumentation. Units are available over a power range of 0.25 to 60W. Most models meet international EMC/EMI standards and many are fully approved to EN 62368. Call today, or go to our website to find the right DC/DC power module for your application.

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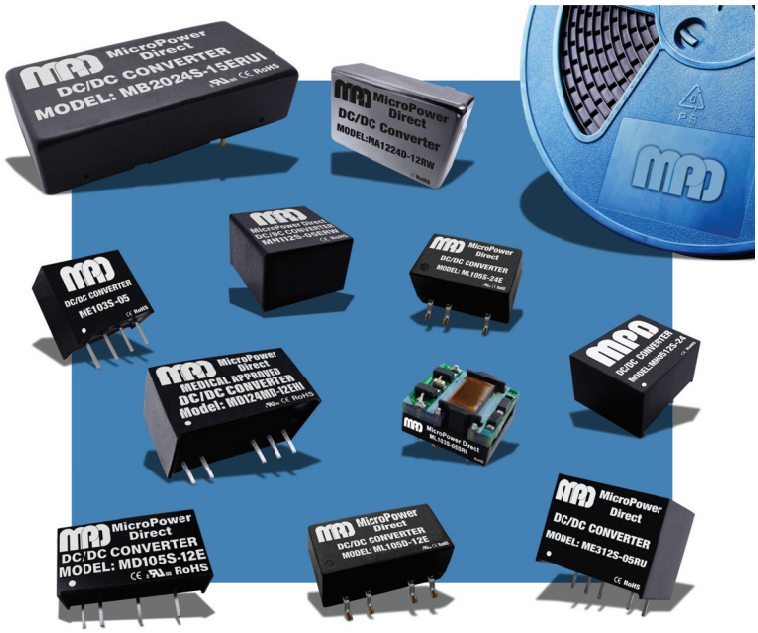

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