MLSR7805 Series

Miniature Surface Mount Low Cost, 0.5A POL Switching Regulators

Key Features:

- Efficiency to 95%
- 0.5A Output Current
- Meets EN 62368
- Miniature SMT Case
- Short Circuit Protected
- 0.2 mA No-Load Input Current
- -40°C to +85°C Operation
- Wide Input Range
- Adjustable Output Voltage

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy, See Note 2	1.5, 1.8, 2.5 & 3.3V Output Models		±2.0	±4.0	%
	All Other Models		±2.0	±3.0	
Output Volage Adjust			±10		%
Line Regulation	VIN = Min to Max		±0.2	±0.4	%
Load Regulation, IOUT = 10% to 100%	1.5, 1.8, 2.5, 3.3 & 5V Output Models		±0.6		%
	All Other Models		±0.3		
Ripple & Noise (20 MHz) See Note 3	1.5V-3.3V Output Models 20-100% Load		20	50	mV P - P
	All Other Models 10-100% Load				
Temperature Coefficient				0.03	%/°C
Transient Response Time	See Note 4		0.2	1.0	mS
Transient Response Deviation			50	200	mV
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Not Isolated				
Switching Frequency	1.5 Output Models		370		kHz
	Other Output Models		700		

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Storage Temperature Range		-55		+125	°C
Peak Reflow Temperature	See Note 5			245	°C
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 1 (See Note 6)			
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Remote On/Off

Parameter	Conditions	Min.	Typ.	Max.	Units
Unit On	See Note 7	3.2		8.0	VDC
Unit Off	See Note 7	0		0.8	VDC

Physical

Case Size	See Mechanical Diagram (Page 5)
Case Material	Non-Conductive Black Plastic (UL-94V0)
Weight	0.052 Oz (1.5g)

Reliability Specifications

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

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Easton, MA 02375
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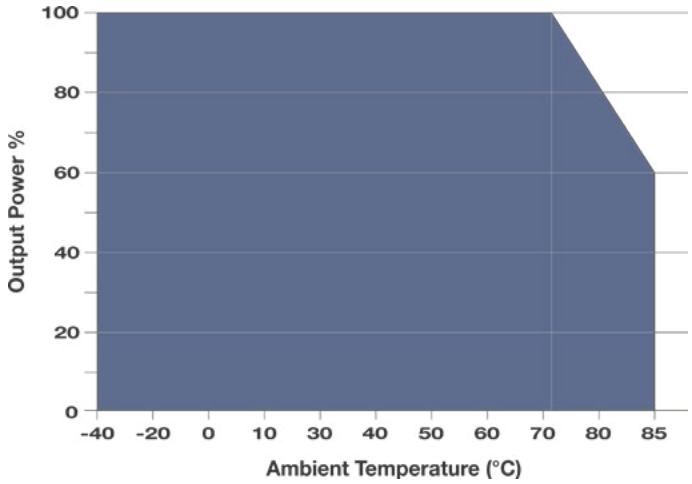
Model Selection Guide

Model Number	Input Voltage (VDC)		Output		Efficiency (%, Typ)		Capacitive Load (µF, Max)
	Nom.	Range	Voltage (VDC)	Current (mA, Max)	Min VIN	Max VIN	
MLSR7805-015W	12	4.75 - 28.0	1.5	500	76	67	680
MLSR7805-018W	12	4.75 - 28.0	1.8	500	76	69	680
MLSR7805-02W	12	4.75 - 32.0	2.5	500	81	74	680
MLSR7805-03W	24	4.75 - 36.0	3.3	500	86	80	680
MLSR7805-05W	24	6.50 - 36.0	5.0	500	90	84	680
MLSR7805-06W	24	8.0 - 36.0	6.5	500	92	87	680
MLSR7805-09W	24	12.0 - 36.0	9.0	500	93	90	680
MLSR7805-12W	24	15.0 - 36.0	12.0	500	94	91	680
MLSR7805-15W	24	19.0 - 36.0	15.0	500	95	93	680

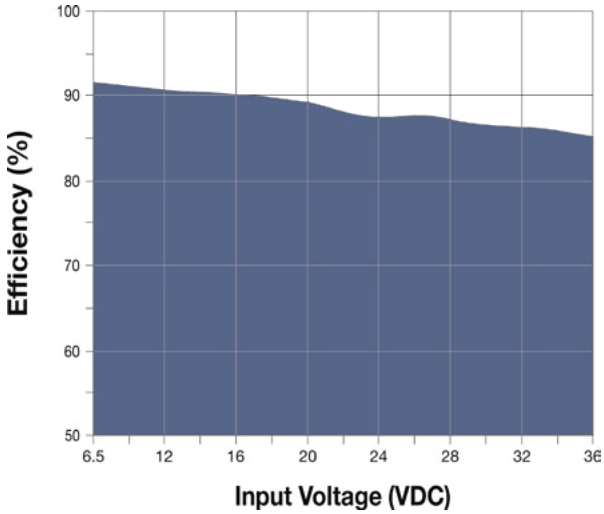
Notes:

1. For input voltages over 30VDC, a 22 µF/50V input capacitor is required.
2. Specified at full load over the full input voltage range specified for the model being tested.
3. Specified with the output filter components shown in the typical application circuit on page 4.
4. Transient recovery is measured to within a 1% error band for a load step change of 25%.
5. The recommended reflow settings are a peak temperature of 245 °C for a maximum period (TPK) of 10S and a time above liquidous (TL) of ≤60 seconds at 217 °C. For more information, please contact the factory.
6. Any units that are not packaged in a vacuum sealed container should be stored in a controlled environment. Contact the factory for more information.
7. If the remote On/Off pin is left open, the unit is on. If it is grounded, the unit shuts off.
8. This regulator is not designed to be used in parallel with another unit to increase output power.
9. The input should not exceed the range given in the model selection chart. Exceeding this limit could damage the unit.
10. 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.

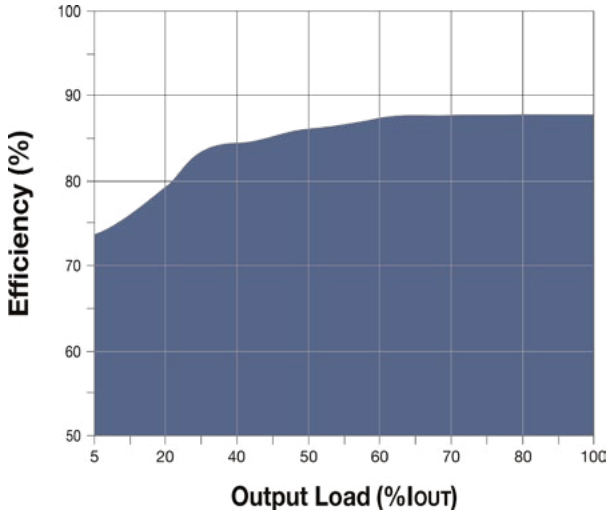
Temperature Derating



Characteristic Curves

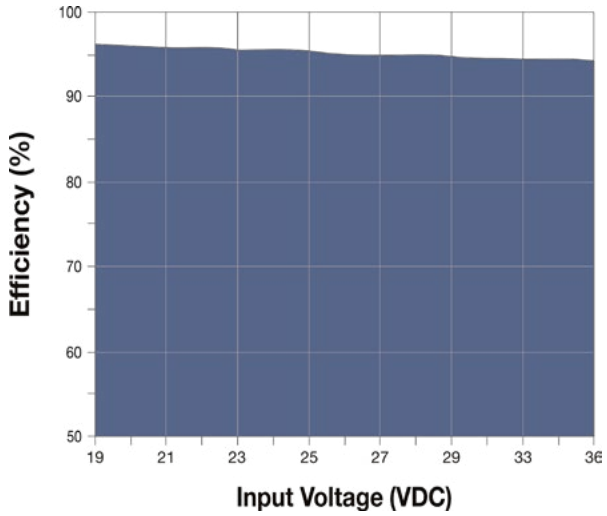


Efficiency vs Input Voltage (MLSR7805-05W)

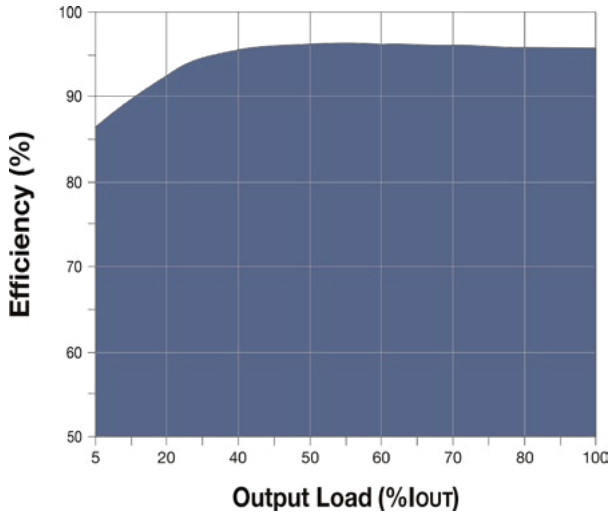


Efficiency vs Output Load, VIN = 24V (MLSR7805-05W)

Characteristic Curves

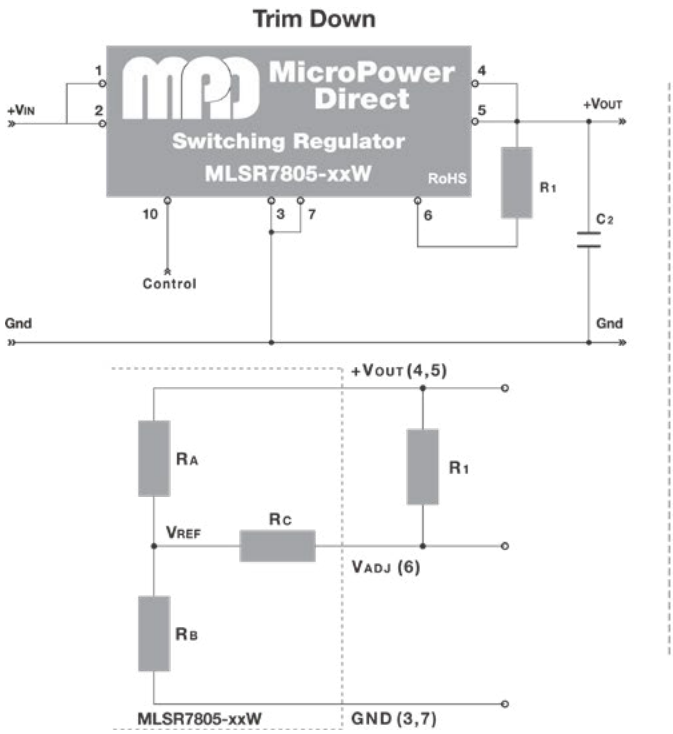


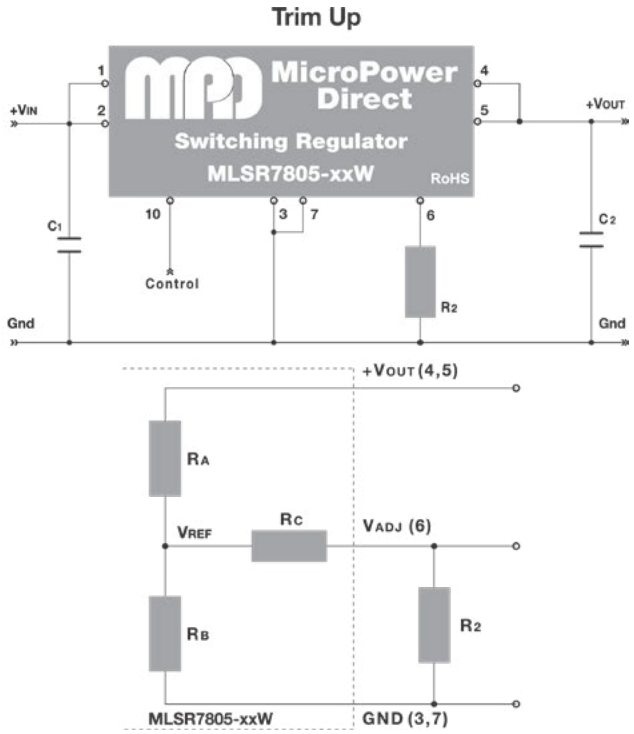
Efficiency vs Input Voltage (MLSR7805-15W)



Efficiency vs Output Load, VIN = 24V (MLSR7805-15W)

Output Adjustment





The output of the MLSR7805-xxW series may be adjusted by connecting eiither resistor R1 or R2 to the VADJ pin as shown above. Approximate resistor values are given in the table at right. If the output adjust is not required, pin (6) should be left open.

If the output is adjusted, it is important to stay within the specified adjustment range, or the unit could be damaged. The required resistor value is calculated by the formulas:

Trim Down = $R_1 = \frac{A \times R_A}{R_A - A} - R_C$ Where $A = \frac{V_{OUT} - V_{REF}}{V_{REF}} \times R_B$

Trim Up = $R_2 = \frac{A \times R_B}{R_B - A} - R_C$ Where $A = \frac{V_{REF}}{V_{OUT} - V_{REF}} \times R_A$

Where R_1, R_2 = The value of the external trim resistor
A = A is defined as shown above

The values of R_A, R_B, R_C and V_{REF} are given in the table at right.

Output Trim Resistor Values

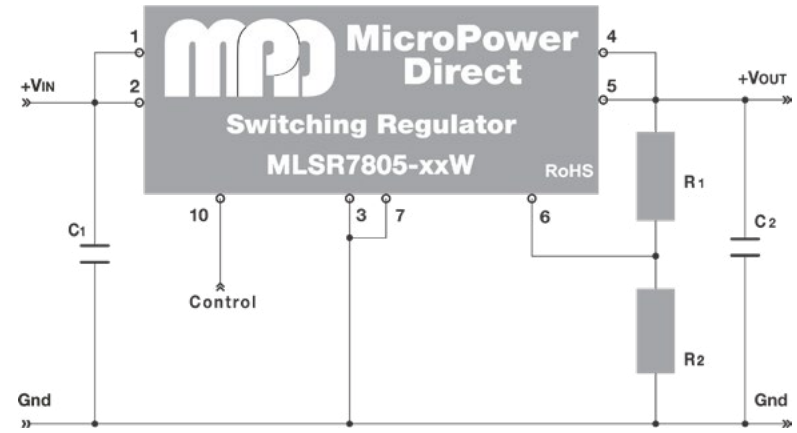
Output Voltage	Resistor Value			
	RA (kV)	RB (kV)	RC (kV)	VREF (V)
1.5 VDC	7.500	7.500	15.00	0.750
1.8 VDC	35.70	26.29	100.0	0.765
2.5 VDC	27.00	11.858	51.00	0.765
3.3 VDC	33.00	9.900	47.00	0.765
5.0 VDC	75.00	13.50	75.00	0.765
6.5 VDC	75.00	10.00	51.00	0.765
9.0 VDC	51.00	4.700	27.00	0.765
12.0 VDC	75.00	5.100	27.00	0.765
15.0 VDC	82.00	4.423	27.00	0.765

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 1	CISPR32/EN 55032		Class B
Conducted Emissions, See note 2	CISPR32/EN 55032		Class B
ESD	EN 61000-4-2	B	±4 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 3	EN 61000-4-4	B	±1 kV
Surge, See Note 3	EN 61000-4-5	B	±1 kV (L-L)
CS	EN61000-4-6	A	3V rms

Notes:
1. The unit meets radiated emissions to class B with the addition of external components C2 and LDM2 as shown in the typical connection with external EMC components below.
2. The unit meets conducted emissions to class B with the addition of external components C2 and LDM2 as shown in the typical connection with external EMC components below.
3. The unit meets EFT & surge EMS specifications with the addition of external components MOV1, LDM1 and C1 as shown in the typical connection with external EMC components below.

Typical Connection

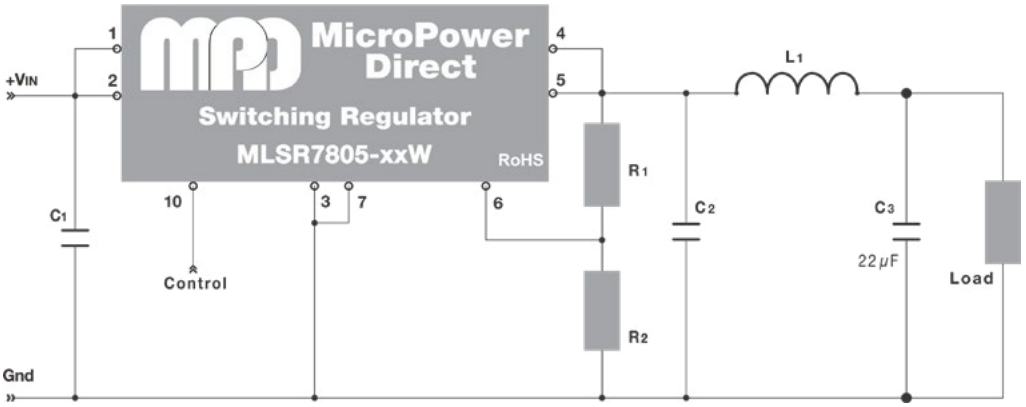


Component Values

Model Number	C_1	C_2	R_1/R_2
MLSR7805-015W	10 µF/50V	22 µF/10V	The resistors R_1 and R_2 are used to adjust the output voltage of the unit. See page 3.
MLSR7805-018W	10 µF/50V	22 µF/10V	
MLSR7805-02W	10 µF/50V	22 µF/10V	
MLSR7805-03W	10 µF/50V	10 µF/10V	
MLSR7805-05W	10 µF/50V	10 µF/16V	
MLSR7805-06W	10 µF/50V	10 µF/16V	
MLSR7805-09W	10 µF/50V	22 µF/25V	
MLSR7805-12W	10 µF/50V	10 µF/25V	
MLSR7805-15W	10 µF/50V	10 µF/25V	

Notes:
1. C1 & C2 are low ESR ceramic capacitors used to minimize noise at the regulator. A tantalum or low ESR electrolytic capacitor may also be used.
2. C1 & C2 are required and should be mounted as close to the regulator pins as possible.

Typical Connection: With Output Filter

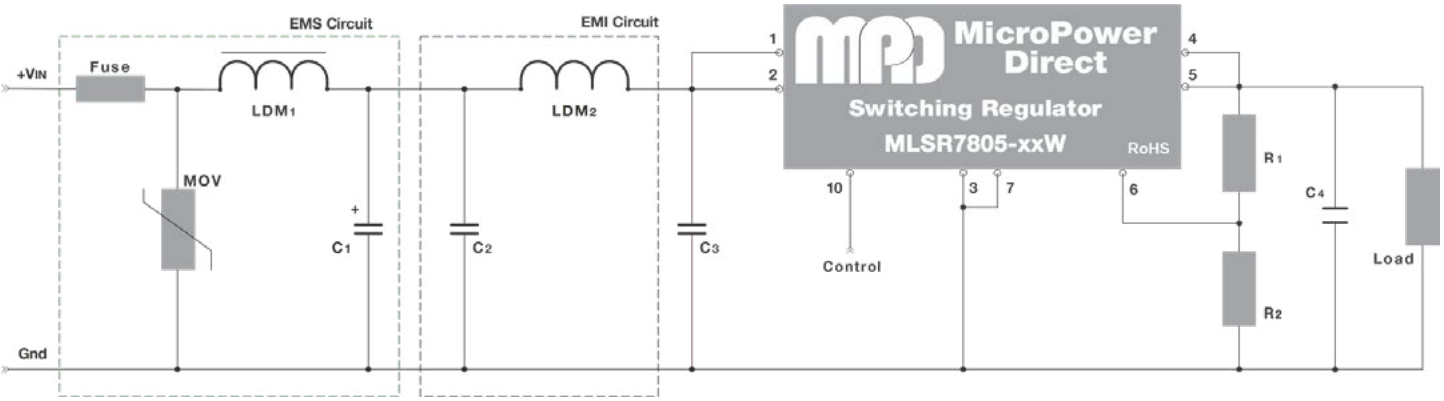


If required, the output ripple may be reduced by adding a simple LC filter, as shown at left. The recommended component values are as follows:

L1 - 10 µH to 47 µH

C3 - 22 µF

Typical Connection: With External EMC Components



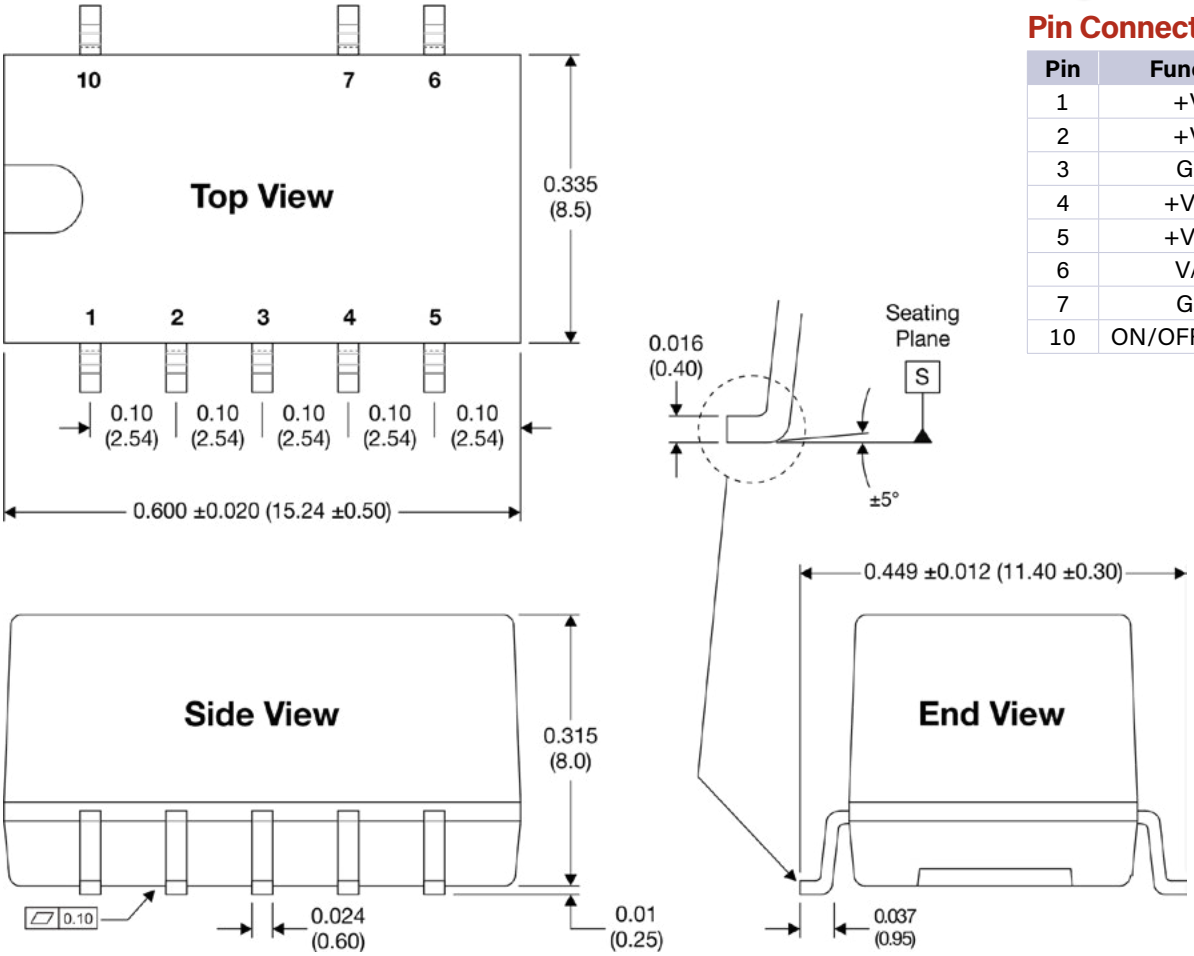
The diagram above illustrates a typical connection of the MLSR7805-xxW series for applications that require meeting EMC standards. This circuit will typically meet the requirements of EN 55032 class B. Some notes on this diagram (starting with the input circuit) are:

1. It is recommended that an external fuse be used. The fuse should be selected based upon the actual input current of the application. For more information please call the factory.
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	C_2	4.7 µF/50V
LDM_1	82 µH	LDM_2	12 µH
C_1	680 µF/50V	C_3	10µF/50V

4. In many applications simply adding input/output capacitors will enhance the input surge protection and reduce output ripple sufficiently. The input capacitor C_1 and output capacitors C_2 and C_3 shown in the typical connection diagrams above.

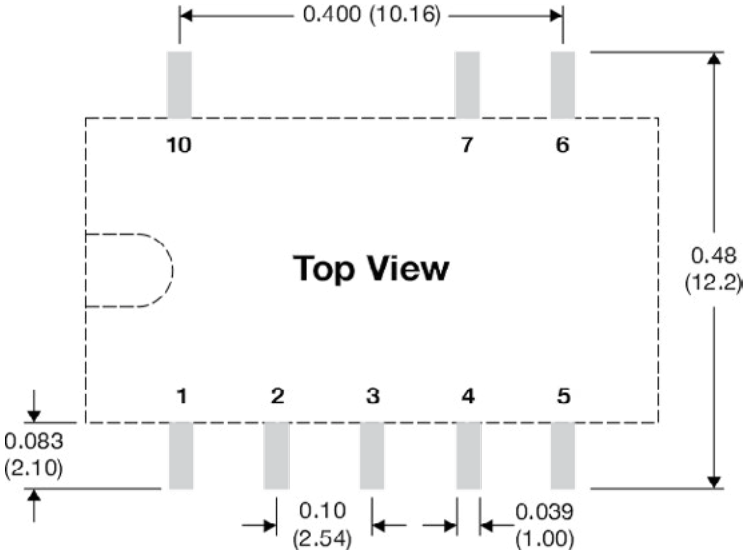
Mechanical Dimensions



Pin Connection

Pin	Function
1	+VIN
2	+VIN
3	Gnd
4	+VOUT
5	+VOUT
6	VADJ
7	Gnd
10	ON/OFF Control

Board Layout



The MLSR7805 series is available on Tape/Reel or packed in tubes. Contact the factory for more information.

MicroPower Direct offers a very wide range of power products, including a full line of switching regulators. Find what you need at:
www.micropowerdirect.com

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

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