

# MWK1S Series

1W, Ultra-wide 8:1 Input Range, 3KV Isolation, SIP8 Package DC/DC Converters

## Features

- ▶ Rated power: 1W Max
- ▶ Input voltage range: 4.5~36VDC
- ▶ Regulated single or dual out
- ▶ High efficiency up to 74%
- ▶ Isolation voltage 3KVDC
- ▶ Operating temperature range: -40 ~ +85°C ambient
- ▶ RoHS compliant
- ▶ Compact SIP8 package
- ▶ Under voltage, over current and short circuit protection
- ▶ Meet UL/EN/IEC 62368-1
- ▶ 3 year warranty



## Model Numbers

Model Number	Input Voltage [VDC]			V <sub>OUT</sub> [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nominal	Range	*Max.		Max.	Min.		
MWK1S-1205	12	4.5~36	40	5	200	0	71	470
MWK1S-1209	12	4.5~36	40	9	111	0	72	220
MWK1S-1212	12	4.5~36	40	12	83	0	74	220
MWK1S-1215	12	4.5~36	40	15	67	0	74	220
MWK1S-1224	12	4.5~36	40	24	42	0	74	220
MWK1S-1205D	12	4.5~36	40	±5	±100	0	71	220
MWK1S-1212D	12	4.5~36	40	±12	±42	0	74	150
MWK1S-1215D	12	4.5~36	40	±15	±33	0	74	68

\* Input voltage exceed the Max. value may cause permanent damage.

\* Only typical models are listed. Other models may be available upon request.

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## Electrical Specifications

Unless otherwise indicated, specifications are measured at  $T_A=25^{\circ}\text{C}$ , nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
<b>Input current</b> Full load		-	116	-	mA	
<b>Input current</b> No load		-	10	-	mA	
<b>Input reflected ripple current</b>		-	50	-	mA	
<b>Input voltage surge</b> 1 second max		-0.7	-	50	Vdc	
<b>Startup input voltage</b>		-	-	4.5	Vdc	
<b>Input under voltage shutdown</b>		2.5	3.5	-	VDC	
<b>Output voltage accuracy</b>		-	$\pm 1$	$\pm 3$	%	
<b>Line regulation</b> Full load, $V_{IN} = V_{IN, Min}$ to $V_{IN, Max}$	Main output Other output	-	-	$\pm 0.5$ $\pm 1.0$	%	
<b>Load regulation</b> $I_{OUT}=5\%$ to $100\%$ of $I_{OUT, rated}$	Main output Other output	-	-	$\pm 1.0$ $\pm 1.5$	%	
<b>Output ripple and noise</b> 20MHz bandwidth, peak to peak		-	60	100	mVp-p	
<b>Temperature coefficient</b>	Full load	-	-	$\pm 0.03$	%/ $^{\circ}\text{C}$	
<b>Dynamic load response</b> $I_{OUT}=25\% \sim 50\% \sim 75\%$ of $I_{OUT, rated}$	Peak deviation* Peak deviation Recovery time	-	$\pm 5$ $\pm 3$ 300	$\pm 8$ $\pm 5$ 500	% $V_{OUT}$ % $V_{OUT}$ $\mu\text{S}$	* $V_{OUT}=5, \pm 5\text{V}$
<b>Output over current protection</b>		110	-	300	% $I_{OUT}$	
<b>Output short circuit protection</b>		Continuous, automatic recovery				
<b>Input filter</b>		Capacitive				
<b>Hot plug</b>		None				

\* Operating with less than 5% of rated load will not cause damage to the converters, but the performances data may not fall into the specifications, and stable operating is not assured.

## General Specifications

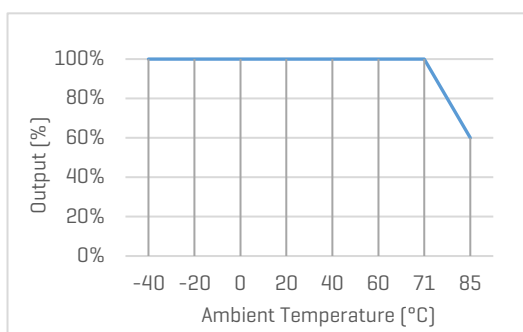
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
<b>Isolation voltage</b> 1 minute, leakage current 1mA max.	Input to Output	3000	-	-	VDC	
<b>Isolation resistance</b> Tested at 500VDC	Input to Output	1000	-	-	M ohm	
<b>Isolation capacitance</b> 100KHz, 0.1V	Input to Output	-	40	-	pF	
<b>Switching frequency</b>	Full load	-	300	-	KHz	PWM mode
<b>Operating temperature</b>	No derating	-40	-	+85	°C	
<b>Storage temperature</b>		-55	-	+125	°C	
<b>Storage humidity</b>	None condensing	5	-	95	%RH	
<b>Pin soldering resistance</b> 1.5mm away from case for 10 sec		-	-	300	°C	
<b>Case material</b>		Black plastic UL94-V0				
<b>Cooling method</b>		Free air convection				
<b>Vibration</b>		10-150Hz, 5G, 0.75mm along X, Y and Z				
<b>MTBF</b>	MIL-HDBK-217F	>1,000,000 Hours, T <sub>A</sub> =25°C				
<b>Design based on standards</b>		IEC/EN/UL 62368-1				
<b>Safety certifications</b>		IEC/EN 62368-1				
<b>EMC</b>	Emission Immunity	CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
<b>Size &amp; Weight</b>		22x9.5x12mm, 4.0g				

\*External circuit is required in order to meet Class B, refer to Figure 2 in Recommended External Circuit

## Characteristic Curves

### Derating Curve

#### Output vs Ambient Temperature

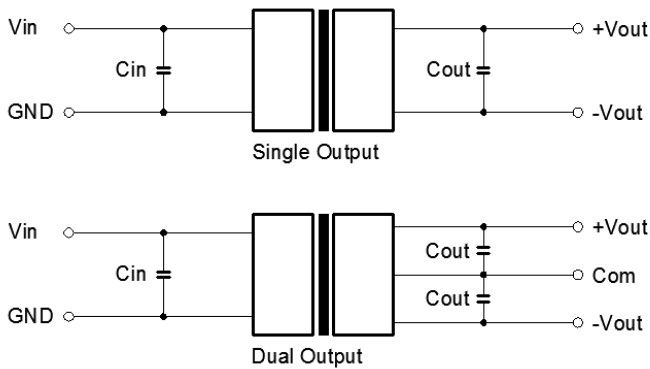


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## Recommended Application Circuit

### Typical Application Circuit



#### Note

\*Typical application circuit is to further lower the input and output ripple. It is not required for general use.

\*Recommended component specifications are typical values. Excessive external capacitive load may cause startup problem.

[Table 1] Recommended component spec

$C_{IN}$	100uF, 50V
$C_{OUT}$	22uF, 50V

Figure 1. Typical external circuit

### Circuit for EMC Enhancement

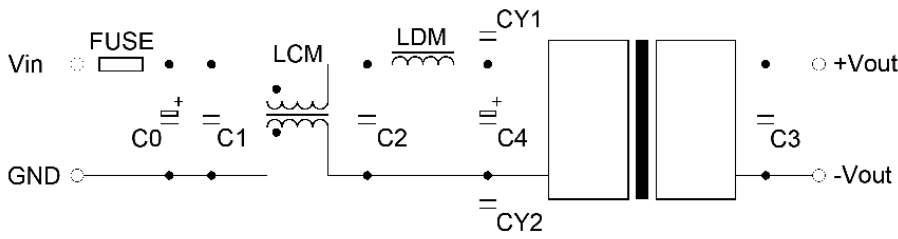


Figure 2. Recommended circuit diagram

### Recommended component spec

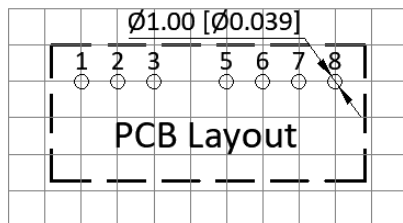
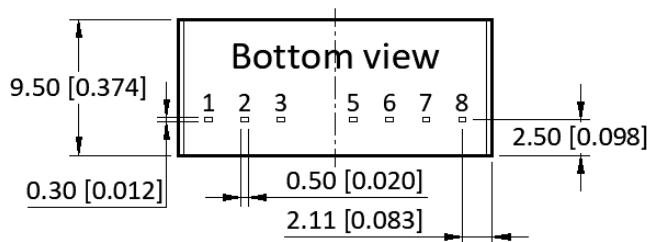
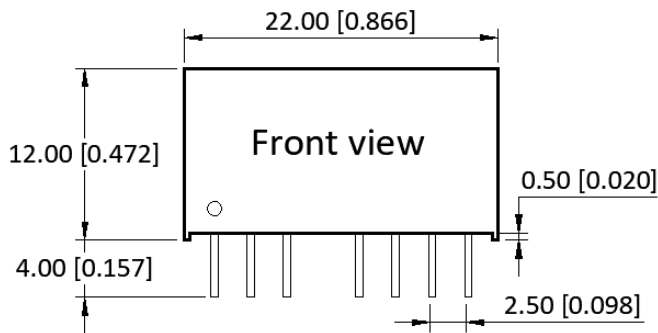
Items	C0	C1, C2	C3	C4	LCM	LDM	CY1, CY2
Spec	1000uF, 50V	4.7uF, 50V	22uF, 50V	100uF, 50V	2.2mH	4.7uH	1nF, 3KV

\*FUSE to be selected according to application needs.

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## Mechanical Specifications



### Pin Definition

Pin #	Single Out	Dual Out
1	GND	GND
2	V <sub>IN</sub>	V <sub>IN</sub>
3	NC	NC
5	NC	NC
6	+V <sub>OUT</sub>	+V <sub>OUT</sub>
7	OV	COM
8	NC	-V <sub>OUT</sub>

\* Unless otherwise specified unit: mm [inch]

\* General tolerance: ±0.50 [±0.020]

\* Pin thickness: ±0.10 [±0.004]

\* Footprint grid 2.54 x 2.54 mm

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