

# MV10H Series

10W, Wide 2:1 Input Range, 1.5KV Isolation, DIP2"x1" Package DC/DC Converters

## Features

- ▶ Rated power: 10W Max
- ▶ Input voltage range 2:1
- ▶ Regulated output
- ▶ High efficiency up to 87%
- ▶ Isolation voltage 1.5KVDC
- ▶ Remote On/Off control
- ▶ Operating temperature range: -40 ~ +85°C ambient
- ▶ RoHS compliant
- ▶ Standard 2"x1" package
- ▶ Under voltage, over current, and short circuit protection
- ▶ Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- ▶ 3 year warranty



## Overview

The MV10H series are 1.5KV isolated 10Watt DC/DC converters with standard DIP2"x1" footprint. Designed with high efficiency, they operate in a wide temperature range from -40°C to +85°C. Other features include wide 2:1 input voltage range, remote on/off control, output trimming, under voltage, over current, and short circuit protections. These converters are ideally suitable for industrial control system, measurement equipment, telecom, wireless network.

## Model Numbers

Model Number	Input Voltage [VDC]			V <sub>OUT</sub> [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max.	Min.		
MV10H-0505	5	4.5~9	12	5	2000	0	85	470
MV10H-0512	5	4.5~9	12	12	834	0	83	470
MV10H-0515	5	4.5~9	12	15	667	0	84	330
MV10H-0524	5	4.5~9	12	24	417	0	83	100
MV10H-0505D	5	4.5~9	12	±5	±1000	0	78	1000
MV10H-0512D	5	4.5~9	12	±12	±417	0	83	470
MV10H-0515D	5	4.5~9	12	±15	±334	0	84	330
MV10H-0524D	5	4.5~9	12	±24	±209	0	83	100
MV10H-1205	12	9~18	20	5	2000	0	83	2200
MV10H-1212	12	9~18	20	12	833	0	85	470
MV10H-1215	12	9~18	20	15	667	0	86	330
MV10H-1224	12	9~18	20	24	416	0	86	100
MV10H-1215D	12	9~18	20	±15	±334	0	86	330
MV10H-2405	24	18~36	40	5	2000	0	83	2200
MV10H-2412	24	18~36	40	12	833	0	87	470
MV10H-2415	24	18~36	40	15	667	0	88	330
MV10H-2424	24	18~36	40	24	416	0	88	100

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## Model Numbers

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	Nom.	Range	*Max.		Max.	Min.		
MV10H-4803	48	36~75	80	3.3	2400	0	79	2200
MV10H-4805	48	36~75	80	5	2000	0	83	2200
MV10H-4812	48	36~75	80	12	834	0	87	470
MV10H-4815	48	36~75	80	15	667	0	87	330
MV10H-4824	48	36~75	80	24	416	0	88	100

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

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

## Electrical Specifications

Unless otherwise indicated, specifications are measured at T<sub>A</sub>=25°C, nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Input voltage surge 1 second max	V <sub>IN, Nom</sub> =5V	-0.7		16	VDC	
	V <sub>IN, Nom</sub> =12V	-0.7	-	25		
	V <sub>IN, Nom</sub> =24V	-0.7		50		
	V <sub>IN, Nom</sub> =48V	-0.7		100		
Startup input voltage	V <sub>IN, Nom</sub> =5V			4.5	VDC	
	V <sub>IN, Nom</sub> =12V			9		
	V <sub>IN, Nom</sub> =24V			18		
	V <sub>IN, Nom</sub> =48V			36		
Startup time	Resistive load	-	10	-	mS	
Input under voltage shutdown	V <sub>IN, Nom</sub> =5V	3	3.5		VDC	
	V <sub>IN, Nom</sub> =12V	5.5	6.5	-		
	V <sub>IN, Nom</sub> =24V	12	15.5			
	V <sub>IN, Nom</sub> =48V	26	30			
Remote On/Off control "Ctrl" pin open or logic high [ON] "Ctrl" pin grounded or logic low [OFF]	Logic high	2.7	-	9	VDC	Positive Logic
	Logic low	0	-	1.2	VDC	
Output voltage accuracy	I <sub>OUT</sub> =0% to 100%	-	±1.0	±3.0	%	
Line regulation Full load, V <sub>IN</sub> =V <sub>IN, Min</sub> to V <sub>IN, Max</sub>		-	-	±0.5	%	
Load regulation I <sub>OUT</sub> =5% to 100% of I <sub>OUT, rated</sub>	Main output	-	-	±1.0	%	
	Other output			±1.5		
Cross regulation +I <sub>OUT</sub> =50%, -I <sub>OUT</sub> =10% to 100%	Dual output models	-	-	±5	%	
Output ripple and noise 20MHz bandwidth, peak to peak		-	40	100	mVp-p	
Temperature coefficient	Full load	-	-	±0.03	%/°C	

### Electrical Specifications [continued]

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
<b>Dynamic load response</b> $I_{OUT}=25\% \sim 50\% \sim 75\%$ of $I_{OUT, rated}$	Peak deviation	-	$\pm 3$	$\pm 5$	% $V_{OUT}$	
	Recovery time		300	500	$\mu S$	
<b>Output voltage trim</b>	Trim range	-	-	$\pm 10$	% $V_{OUT}$	
<b>Output over current protection</b>		110	140	190	% $I_{OUT}$	
<b>Output short circuit protection</b>		Continuous, automatic recovery				
<b>Input filter</b>		PI filter				
<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.	I/P to O/P	1500	-	-	VDC	
<b>Isolation resistance</b> Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
<b>Isolation capacitance</b> 100KHz, 0.1V	I/P to O/P	-	1000	-	pF	
<b>Switching frequency*</b>	Full load	-	312.5	-	KHz	PWM mode
<b>Operating temperature</b>	See "Derating Curve"	-40	-	+85	$^{\circ}C$	
<b>Storage temperature</b>		-55	-	+125	$^{\circ}C$	
<b>Storage humidity</b>	None condensing	5	-	95	%RH	
<b>Pin soldering resistance</b> 1.5mm away from case for 10 sec		-	-	300	$^{\circ}C$	
<b>Cooling method</b>		Free air convection				
<b>Case material</b>		Aluminum alloy				
<b>Vibration</b>		IEC/EN61373 - Category 1, Grade B				
<b>MTBF</b>	MIL-HDBK-217F	>1,000,000 Hours, $T_A=25^{\circ}C$				
<b>Design based on standards</b>		IEC/EN/UL 62368-1				
<b>Safety certifications</b>		IEC/EN 62368-1				
<b>EMC</b>		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
<b>Size, and Weight</b>		50.8 x 25.4 x 12 mm, 30g				

\* Switching frequency is measured at full load. The converter reduces the switching frequency at low load [less than 50% load] for better efficiency.

# MV10H Series

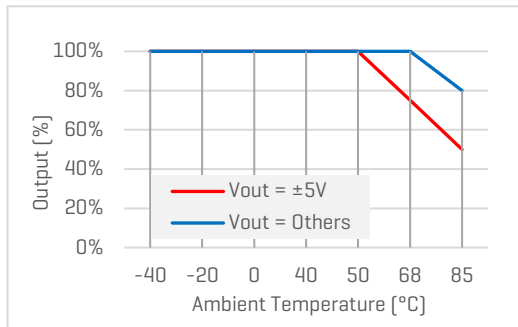
10W, Wide 2:1 Input Range, 1.5KV Isolation, DIP2"X1" Package DC/DC Converters

## Characteristic Curves

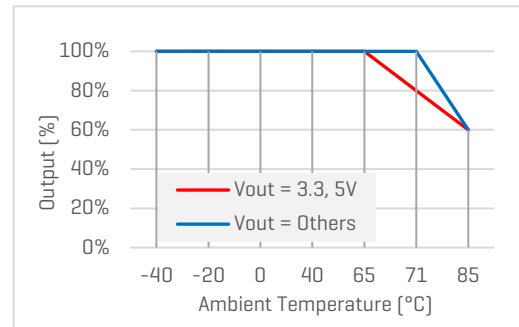
### Derating Curve

#### Output vs Ambient Temperature

$V_{IN}=5V$

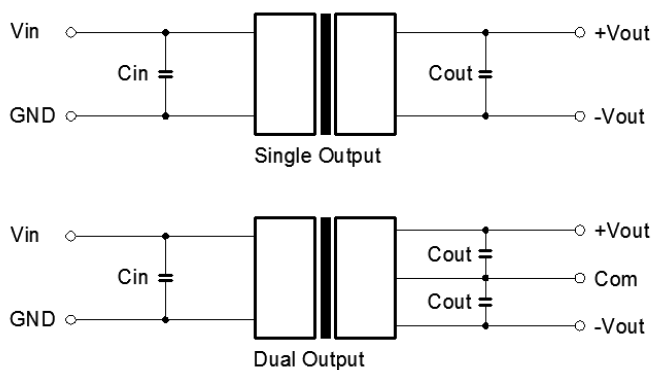


$V_{IN}=Others$



## 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
$C_{OUT}$	10uF

Figure 1. Typical external circuit

## Recommended Application Circuit

### EMC Enhancement for EN55032 Class B

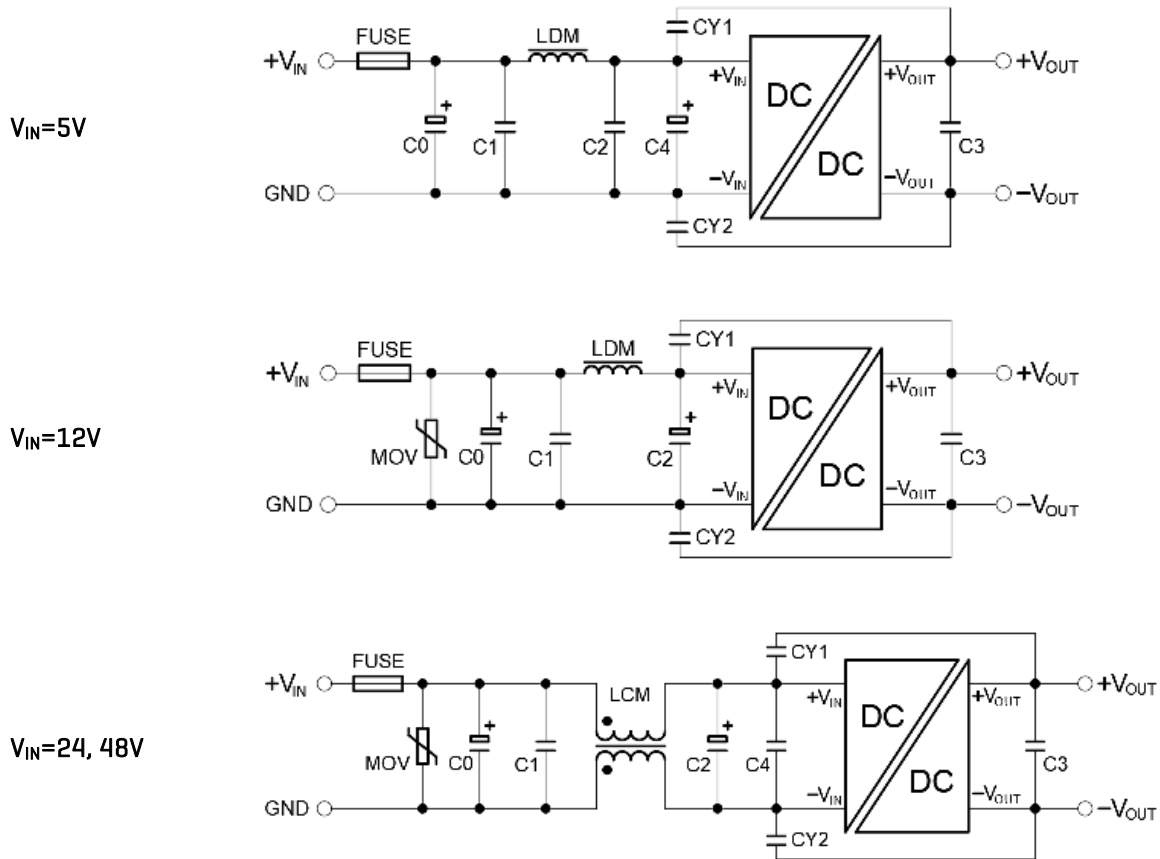


Figure 2. Circuit for EMC enhancement

[Table 2] Recommended component spec

Items	MOV	LCM	LDM	C0	C1	C2	C4	CY1, CY2
$V_{IN}=5V$	-	-	4.7uF	2200uF	4.7uF	4.7uF	1000uF	1nF, 2KV
$V_{IN}=12V$	20D470K	-	4.7uF	330uF	1uF	330uF	-	1nF, 2KV
$V_{IN}=24V$	20D470K	4.7mH	-	680uF	1uF	330uF	4.7uF	1nF, 2KV
$V_{IN}=48V$	14D101K	4.7mH	-	680uF	1uF	330uF	4.7uF	1nF, 2KV

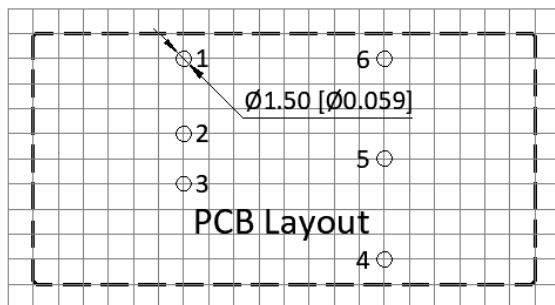
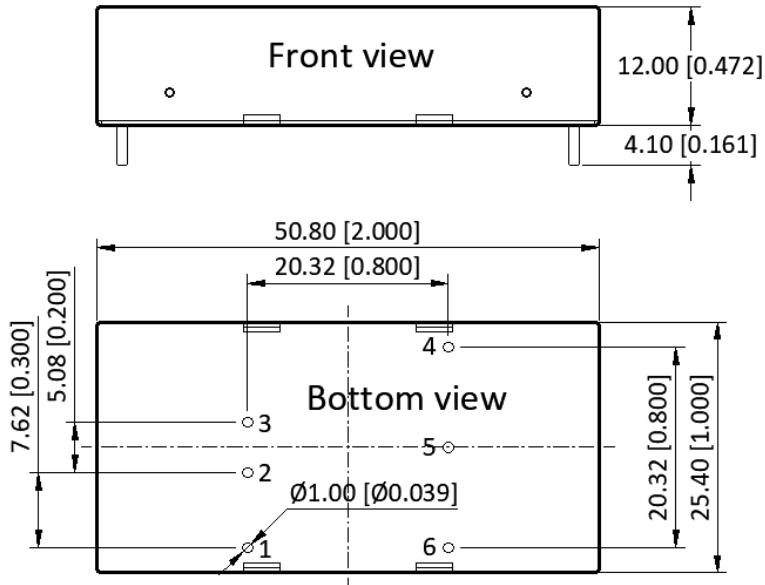
\* Fuse to be selected according to application needs.

\* C3 refer to relative  $C_{OUT}$  values in Table 1.

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## Mechanical Specifications



### Pin Definition

Pin #	Single Out	Dual Out
1	Ctrl	Ctrl
2	GND	GND
3	V <sub>IN</sub>	V <sub>IN</sub>
4	+V <sub>OUT</sub>	+V <sub>OUT</sub>
5	NO Pin	COM
6	0V	-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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