

MV15H Series

15W, Wide 2:1 Input, 1.5KV Isolation, DIP2"x1" DC/DC Converters



Features

- Rated power: 15W Max
- Input voltage range 2:1
- Regulated output
- High efficiency up to 90%
- Isolation voltage 1.5KVDC
- Remote On/Off control
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Standard 2"x1" package
- Under voltage, over voltage, over current, and short circuit protections
- Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- 3 year warranty



Overview

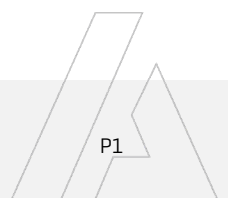
The MV15H series are 1.5KV isolated 15Watt DC/DC converters with standard DIP2"x1" footprint. Designed with high efficiency, they operate in a wide temperature range from -40°C to +85°C. Other features include wide 2:1 input voltage range, remote on/off control, output trimming, under voltage, over voltage, 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 _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max.	Min.		
MV15H-2403	24	18-36	40	3.3	4000	0	83	4700
MV15H-2405	24	18-36	40	5	3000	0	89	4700
MV15H-2412	24	18-36	40	12	1250	0	89	1000
MV15H-2415	24	18-36	40	15	1000	0	89	820
MV15H-2424	24	18-36	40	24	625	0	90	270
MV15H-4803	48	36-75	80	3.3	4000	0	83	4700
MV15H-4805	48	36-75	80	5	3000	0	88	4700
MV15H-4812	48	36-75	80	12	1250	0	88	1000
MV15H-4815	48	36-75	80	15	1000	0	89	820
MV15H-4824	48	36-75	80	24	625	0	89	270

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

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



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
Input current Full load, $V_{IN, Nom}=24\text{V}$		-	702	-	mA	
Input current Full load, $V_{IN, Nom}=48\text{V}$	$V_{OUT}=3.3, 5\text{V}$ Others		355 351	-	mA	
Input current No load, $V_{IN, Nom}=24\text{V}$	$V_{OUT}=5\text{V}$ Others		30 5	-	mA	
Input current No load, $V_{IN, Nom}=48\text{V}$	$V_{OUT}=3.3, 5\text{V}$ Others		20 5	-	mA	
Reflected ripple current		-	30	-	mA	
Input voltage surge 1 second max	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$	-0.7 -0.7	-	50 100	VDC	
Startup input voltage	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$	-	-	18 36	VDC	
Startup time	Resistive load	-	10	-	mS	
Input under voltage shutdown	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$	12 26	16.5 30	- -	VDC	
Remote On/Off control "Ctrl" pin open or logic high [ON] "Ctrl" pin grounded or logic low [OFF]	Logic high Logic low Ctrl pin current	3.5 0 -	- - 4	12 1.2 7	VDC VDC mA	Positive Logic
Output voltage accuracy	$I_{OUT}=0\%$ to 100%	-	± 1	± 3	%	
Line regulation Full load, $V_{IN}=V_{IN, Min}$ to $V_{IN, Max}$		-	± 0.2	± 0.5	%	
Load regulation $I_{OUT}=5\%$ to 100% of $I_{OUT, rated}$		-	± 0.5	± 1.0	%	
Output ripple and noise 20MHz bandwidth, peak to peak		-	50	100	mVp-p	
Temperature coefficient	Full load	-	-	± 0.03	%/ $^{\circ}\text{C}$	
Dynamic load response $I_{OUT}=25\% \sim 50\% \sim 75\%$ of $I_{OUT, rated}$	Peak deviation** Peak deviation Recovery time	-	± 5 ± 3 300	± 8 ± 5 500	% V_{OUT} % V_{OUT} μS	** $V_{OUT}=3.3\text{V}$
Output voltage trim	Trim range	-	-	± 10	% V_{OUT}	
Output over voltage protection		110	-	160	% V_{OUT}	
Output over current protection		110	-	190	% I_{OUT}	
Output short circuit protection		Continuous, automatic recovery				
Input filter		PI filter				
Hot plug		None				

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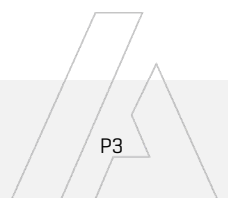
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General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V, I/P to O/P	V _{OUT} =24V Others	-	2050 1050	-	pF	
Switching frequency*	Full load	-	270	-	KHz	PWM mode
Operating temperature	See "Derating Curve"	-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	None condensing	5	-	95	%RH	
Pin soldering resistance 1.5mm away from case for 10 sec		-	-	300	°C	
Cooling method		Free air convection				
Case material		Aluminum alloy				
Vibration		10-55Hz, 2G, 30Min. along X, Y and Z				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T _A =25°C				
Design based on standards		IEC/EN/UL 62368-1				
Safety certifications		IEC/EN 62368-1				
EMC		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
Size, and Weight	Default option	50.8 x 25.4 x 12.0 mm, 26g				

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

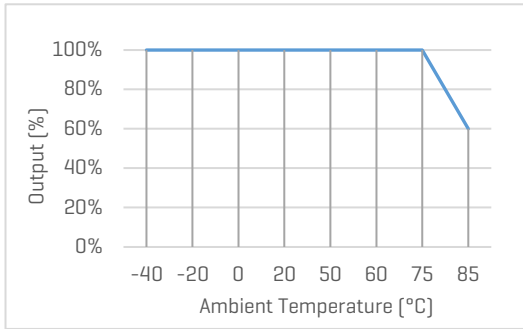


Characteristic Curves

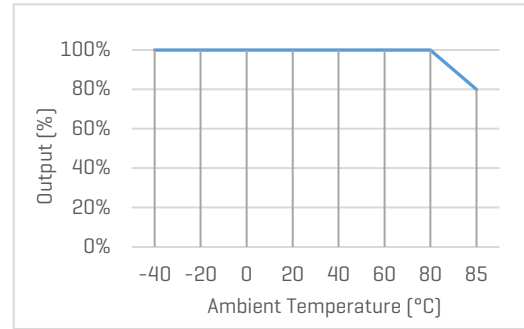
Derating Curve

Output vs Ambient Temperature

No heatsink



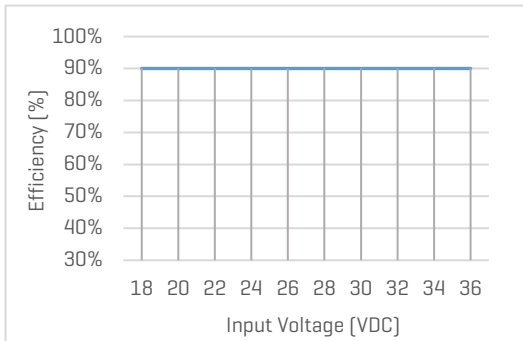
With heatsink



Efficiency Curve

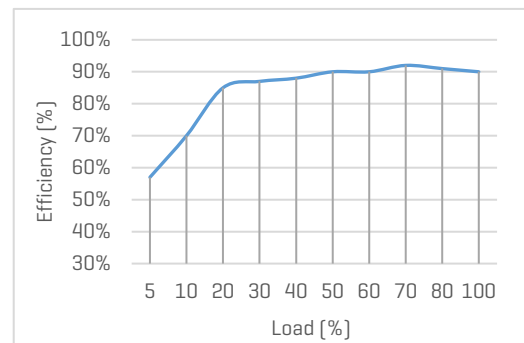
Efficiency vs Input Voltage

MV15H-2405, with full Load

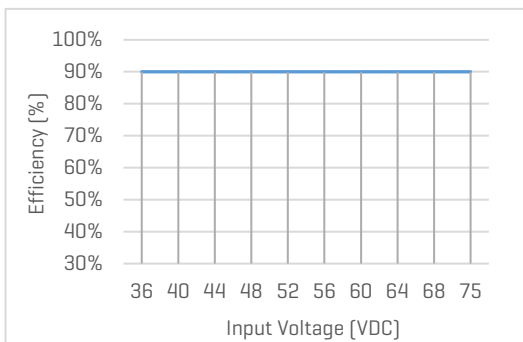


Efficiency vs Load

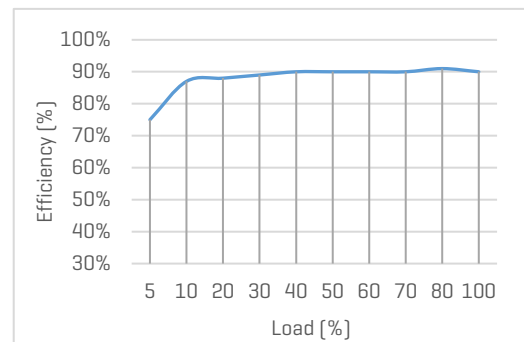
MV15H-2405, with nominal input voltage



MV15H-4815, with full Load



MV15H-4815, with nominal input voltage



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Recommended Application Circuit

Typical Application Circuit

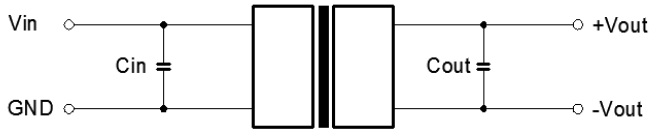


Figure 1. Typical external circuit

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

Input voltage	24V	48V
C _{IN}	100uF, 50V	100uF, 100V

[Table 2] Recommended component spec

Output voltage	3.3, 5V	12, 15V	24V
C _{OUT}	470uF	220uF	100uF

EMC Enhancement for EN55032 Class B

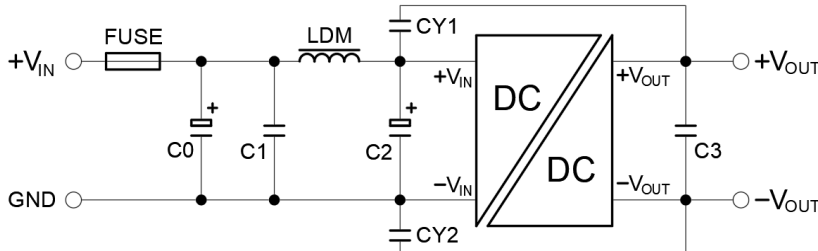


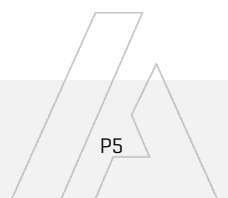
Figure 2. Circuit for EMC Enhancement

[Table 3] Recommended component spec

Component	LDM	C0, C2	C1	CY1, CY2
V _{IN} =24V	4.7uH, 2.2A	330uF, 50V	1uF, 50V	1nF, 2KV
V _{IN} =48V	4.7uH, 2.2A	330uF, 100V	4.7uF, 100V	1nF, 2KV

* Fuse to be selected according to application needs.

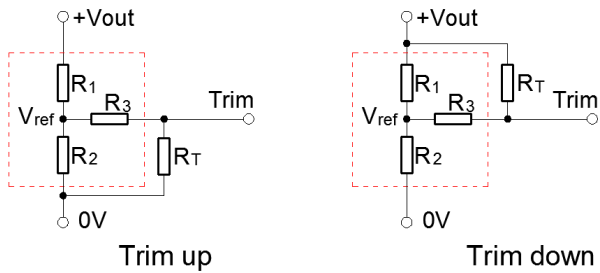
* C3 refer to relative C_{OUT} values in Table 2.



Recommended Application Circuit [continued]

Circuits for Output Trim

* Components within the red block are internal components of the converter.



[Table 4] Internal Component Spec

V _{OUT} [V]	R1 [K Ohm]	R2 [K Ohm]	R3 [K Ohm]	V _{ref} [V]
3.3	4.80	2.87	12.4	1.24
5	2.88	2.87	10	2.5
12	11.00	2.87	15	2.5
15	14.94	2.87	15	2.5
24	24.87	2.87	17.8	2.5

* The formulas to calculate the desired resistance of Trim resistor "R_T".

$$\text{Trim up: } R_T = \frac{a R_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_{OUT} - V_{ref}} R_1$$

$$\text{Trim down: } R_T = \frac{a R_1}{R_1 - a} - R_3 \quad a = \frac{V_{OUT} - V_{ref}}{V_{ref}} R_2$$

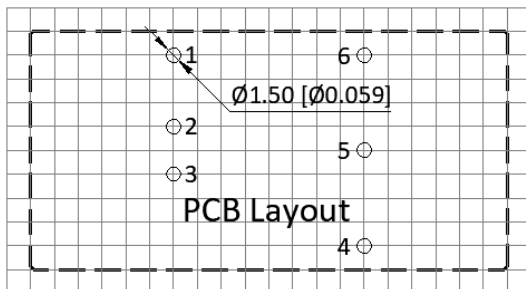
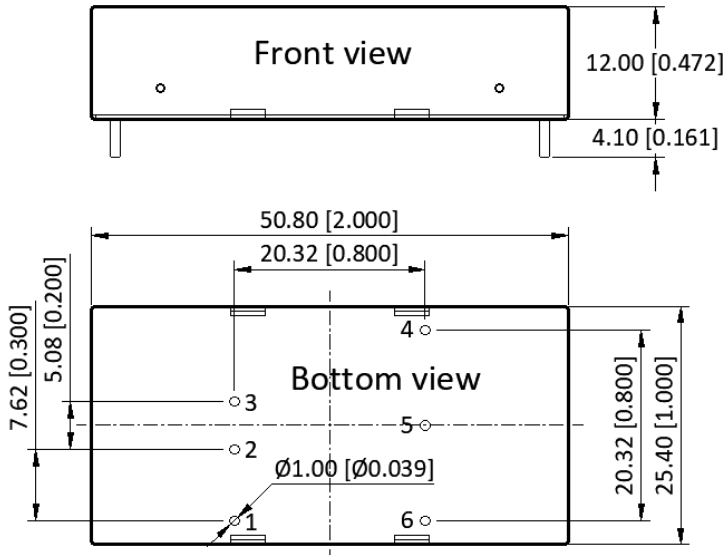
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Mechanical Specifications

No Suffix, Default Package



Pin Definition

Pin #	Single Out
1	Ctrl
2	GND
3	V _{IN}
4	+V _{OUT}
5	Trim
6	OV

* 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

