MV20H Series

20W, Wide 2:1 Input, 1.5KV Isolation, DIP2"x1" DC/DC Converters

Features

- Rated power: 20W 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 MV20H series are 1.5KV isolated 20Watt 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.		
MV20H-1215D	12	9~18	20	±15	±667	0	87	625
MV20H-1224D	12	9~18	20	±24	±417	0	88	220
MV20H-2403	24	18~36	40	3.3	5000	0	86	10000
MV20H-2405	24	18~36	40	5	4000	0	90	10000
MV20H-2409	24	18~36	40	9	2222	0	87	4700
MV20H-2412	24	18~36	40	12	1667	0	87	1600
MV20H-2415	24	18~36	40	15	1333	0	88	1000
MV20H-2424	24	18~36	40	24	834	0	88	500
MV20H-2405D	24	18~36	40	±5	±2000	0	84	4800
MV20H-2409D	24	18~36	40	±9	±1111	0	86	1000
MV20H-2412D	24	18~36	40	±12	±834	0	86	800
MV20H-2415D	24	18~36	40	±15	±667	0	86	625
MV20H-2424D	24	18~36	40	±24	±417	0	86	500
MV20H-4803	48	36~75	80	3.3	5000	0	86	10000
MV20H-4805	48	36~75	80	5	4000	0	90	10000
MV20H-4809	48	36~75	80	9	2222	0	89	470
MV20H-4812	48	36~75	80	12	1667	0	89	1600
MV20H-4815	48	36~75	80	15	1333	0	90	1000

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	Nom.	Range	*Max.		Max.	Min.		
MV20H-4824	48	36~75	80	24	834	0	90	500
MV20H-4805D	48	36~75	80	±5	±2000	0	86	4800
MV20H-4812D	48	36~75	80	±12	±834	0	88	800
MV20H-4815D	48	36~75	80	±15	±667	0	89	625

* 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°C, nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Reflected ripple current		-	30	-	mA	
Input voltage surge 1 second max	$V_{IN, Nom}$=12V $V_{IN, Nom}$=24V $V_{IN, Nom}$=48V	-0.7 -0.7 -0.7	-	25 50 100	VDC	
Startup input voltage	$V_{IN, Nom}$=12V $V_{IN, Nom}$=24V $V_{IN, Nom}$=48V	-	-	9 18 36	VDC	
Startup time	Resistive load	-	10	-	mS	
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%	Main output Other output	-	±1 ±2	±3 ±4	%	
Line regulation Full load, V_{IN}=$V_{IN, Min}$ to $V_{IN, Max}$	Main output Other output	-	±0.2 ±0.5	±0.5 ±1.0	%	
Load regulation I_{OUT}=5% to 100% of I_{OUT}, V_{IN}=12V	Main output Other output	-	±0.5 ±1.0	±1.0 ±1.5	%	
Load regulation I_{OUT}=5% to 100% of I_{OUT}, V_{IN}=24, 48V	Main output Other output	-	±0.5 ±1.0	±1.0 ±1.5	%	
Cross regulation +I_{OUT}=50%, -I_{OUT}=10% to 100%	Dual output models	-	-	±5	%	
Output ripple and noise	20MHz bandwidth	-	50	100	mVp-p	
Temperature coefficiency	Full load	-	-	±0.03	%/°C	
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation** Peak deviation Recovery time	-	±5 ±3 300	±8 ±5 500	% V_{OUT} % V_{OUT} uS	**V_{OUT}=3.3, 5, ±5V

Electrical Specifications [continued]

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
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				

* 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

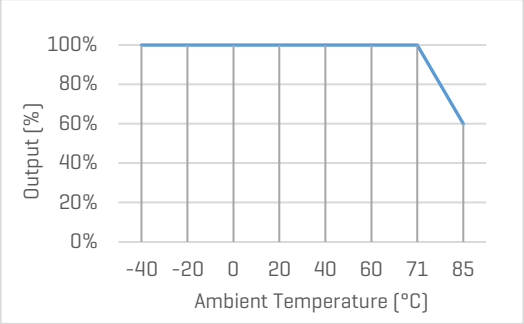
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V, I/P to O/P	MV20H-2424 Others	-	2050 1050	-	pF	
Switching frequency*	Full load	-	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		10-150Hz, 5G, 90 Min, along X, Y and Z				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T_A=25°C				
Design based on standards		UL/EN/IEC 62368-1				
Safety certifications		IEC/EN 62368-1				
EMC		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6, 29				
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

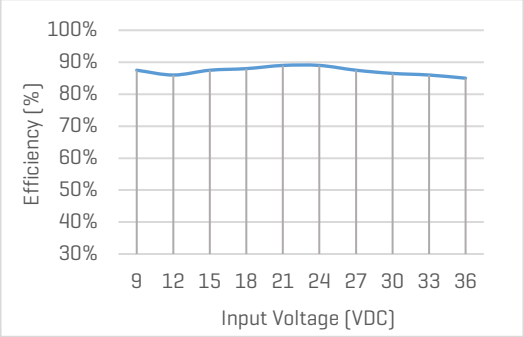
Output vs Ambient Temperature



Efficiency Curve

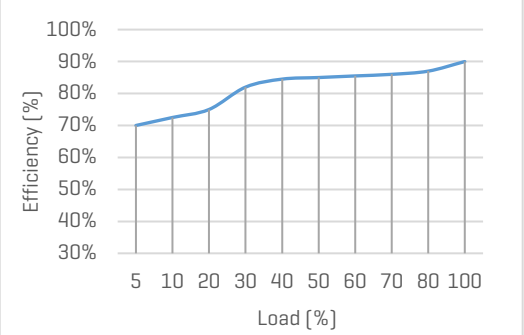
Efficiency vs Input Voltage

MV20H-2405, with full Load

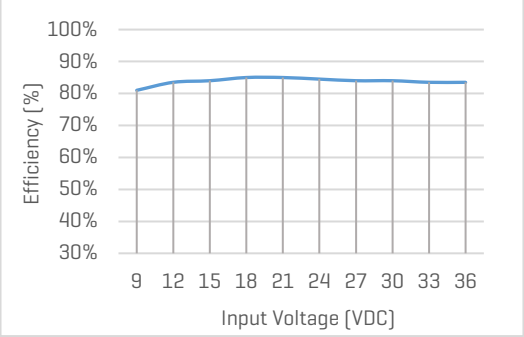


Efficiency vs Load

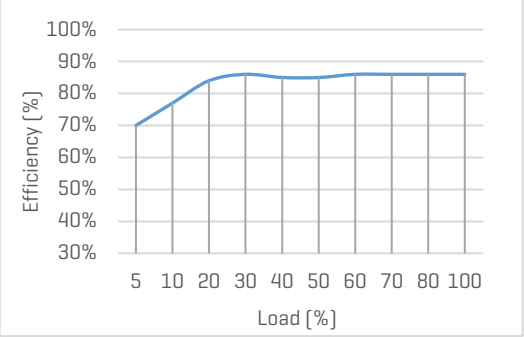
MV20H-2405, with nominal input voltage



MV20H-4805, with full Load



MV20H-4805, with nominal input voltage



Recommended Application Circuit

Typical Application Circuit

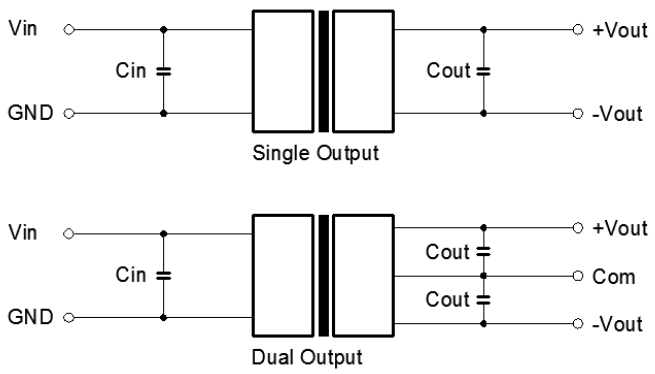


Figure 1. Typical external circuit

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	12V	24V	48V
C_{IN}	100uF, 25V	100uF, 50V	100uF, 100V

[Table 2] Recommended component spec

Output voltage	3.3, 5V	9, 12, 15V	24V	±5V	±9 ... ±24V
C_{OUT}	470uF	220uF	100uF	220uF	100uF

EMC Enhancement for EN55032 Class B

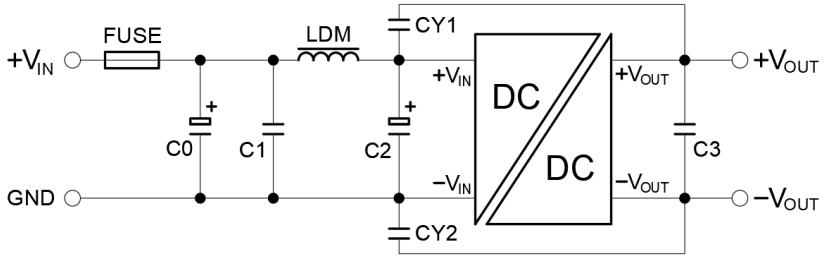


Figure 2. Circuit for EMC Enhancement

[Table 3] Recommended component spec

Component	LDM	C0	C2	C1	CY1, CY2
V_{IN}=12, 24V	4.7uH	680uF, 50V	330uF, 50V	1uF, 50V	1nF, 2KV
V_{IN}=48V	4.7uH	680uF, 100V	330uF, 100V	1uF, 100V	1nF, 2KV

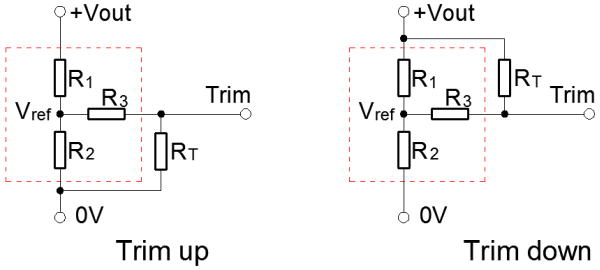
* Fuse to be selected according to application needs.

* 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.



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

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

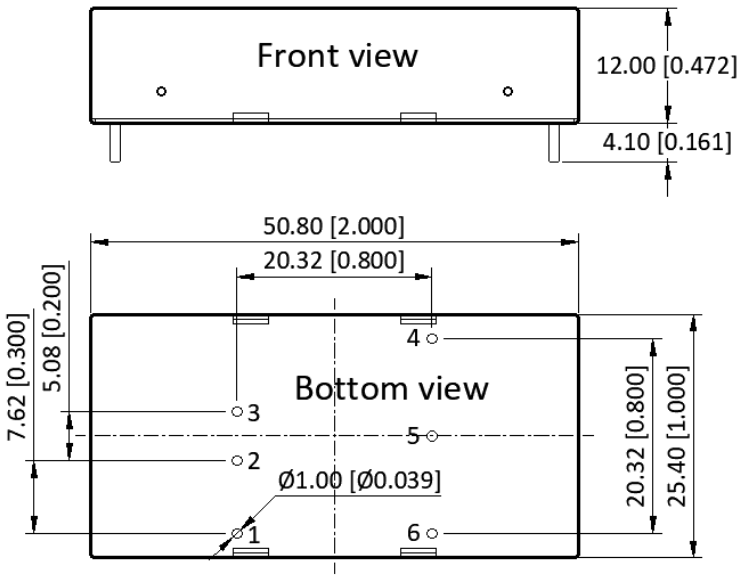
Trim down: $R_T = \frac{a\,R_1}{R_1 - a} - R_3$ $\quad a = \frac{V_{OUT} - V_{ref}}{V_{ref}} R_2$

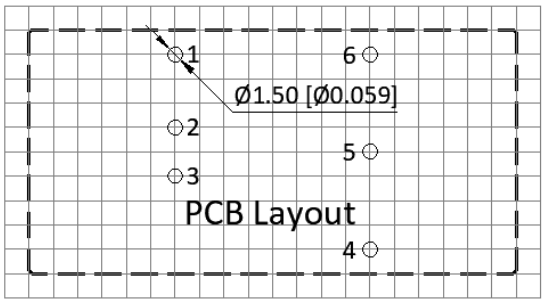
[Table 4] Internal Component Spec

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
9	7.50	2.87	15	2.5
12	11.00	2.87	15	2.5
15	14.95	2.87	15	2.5
24	24.87	2.87	17.8	2.5

Mechanical Specifications

No Suffix, Default Package





Pin Definition

Pin #	Single Out	Dual Out
1	Ctrl	Ctrl
2	GND	GND
3	V_{IN}	V_{IN}
4	$+V_{OUT}$	$+V_{OUT}$
5	Trim	0V
6	0V	$-V_{OUT}$

* 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