

MV20G Series

20W, Wide 2:1 Input, 1.5KV Isolation, DIP1"x1" DC/DC Converters



Features

- Rated power: 20W Max
- Input voltage range 2:1
- Regulated single or dual out
- High efficiency up to 91%
- Isolation voltage 1.5KVDC
- Remote On/Off control
- Output trimming $\pm 10\%$
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Compact 1"x1" package
- Under voltage, over voltage, over current, and short circuit protection
- Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- 3 year warranty



Overview

The MV20G series are 1.5KV isolated 20Watt DC/DC converters with standard DIP1"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, under voltage, over voltage, over current, and short circuit protections. These converters are ideally suitable for battery operated equipment, measurement equipment, telecom, wireless network, industrial control system.

Model Numbers

Model Number	Input Voltage [VDC]			V _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max.	Min.		
MV20G-1203	12	9~18	20	3.3	5000	0	86	10000
MV20G-1205	12	9~18	20	5.0	4000	0	89	10000
MV20G-1212	12	9~18	20	12	1667	0	89	1600
MV20G-1215	12	9~18	20	15	1333	0	89	1000
MV20G-1224	12	9~18	20	24	833	0	89	500
MV20G-1248	12	9~18	20	48	417	0	89	100
MV20G-1212D	12	9~18	20	± 12	± 833	0	90	800
MV20G-1215D	12	9~18	20	± 15	± 667	0	90	600
MV20G-1224D	12	9~18	20	± 24	± 417	0	90	300
MV20G-2403	24	18~36	40	3.3	5000	0	88	10000
MV20G-2405	24	18~36	40	5	4000	0	90	10000
MV20G-2412	24	18~36	40	12	1667	0	90	1600
MV20G-2415	24	18~36	40	15	1333	0	91	1000
MV20G-2424	24	18~36	40	24	833	0	91	500
MV20G-2405D	24	18~36	40	± 5	± 833	0	90	800
MV20G-2412D	24	18~36	40	± 12	± 667	0	90	600
MV20G-2415D	24	18~36	40	± 15	± 417	0	90	300

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Model Numbers [continued]

Model Number	Input Voltage [VDC]			V _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max.	Min.		
MV20G-4803	48	36~75	80	3.3	5000	0	88	4700
MV20G-4805	48	36~75	80	5	4000	0	90	2200
MV20G-4812	48	36~75	80	12	1667	0	91	330
MV20G-4815	48	36~75	80	15	1333	0	91	220
MV20G-4824	48	36~75	80	24	833	0	91	500
MV20G-4805D	48	36~75	80	±5	±833	0	90	800
MV20G-4812D	48	36~75	80	±12	±667	0	90	600
MV20G-4815D	48	36~75	80	±15	±417	0	90	300

* 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 voltage surge 1 second max	$V_{IN, Nom} = 12\text{V}$ $V_{IN, Nom} = 24\text{V}$ $V_{IN, Nom} = 48\text{V}$	-0.7 -0.7 -0.7	-	25 50 100	VDC	
Startup input voltage	$V_{IN, Nom} = 12\text{V}$ $V_{IN, Nom} = 24\text{V}$ $V_{IN, Nom} = 48\text{V}$	-	-	9.0 18 36	VDC	
Input under voltage shutdown	$V_{IN, Nom} = 12\text{V}$ $V_{IN, Nom} = 24\text{V}$ $V_{IN, Nom} = 48\text{V}$	5.5 12 26	6.5 15.5 30	-	VDC	
Startup time			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 -	- - 2	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 $V_{IN, Max}$	Main Out Others	-	± 0.2 ± 0.5	± 0.5 ± 1.0	%	
Load regulation $I_{OUT}=5\%$ to 100% of $I_{OUT, rated}$	Main Out Others	-	± 0.5 ± 0.5	± 1.0 ± 1.5	%	
Cross regulation $+I_{OUT}=50\%$, $-I_{OUT}=10\%$ to 100%	Dual output models	-	-	± 5	%	
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 Recovery time	-	± 5 300	± 8 500	% V_{OUT} μS	
Output voltage trim	Trim range	-	-	± 10	% V_{OUT}	
Output over voltage protection		110		160	% V_{OUT}	
Output over current protection		110	150	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.

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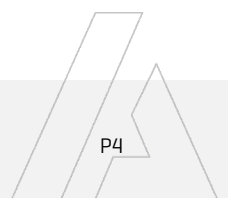
20W, Wide 2:1 Input, 1.5KV Isolation, DIP1"X1" DC/DC Converters



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	-	1000	-	pF	
Switching frequency	Full load	-	300	-	KHz	PWM mode
Operating temperature		-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		IEC/EN61373 – Category 1, Grade B				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T _A =25°C				
Design based on standards		UL/EN/IEC 62368-1				
Safety certifications		EN/IEC 62368-1				
EMC		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
Size, and Weight		25.4 x 25.4 x 12mm, 16g				

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

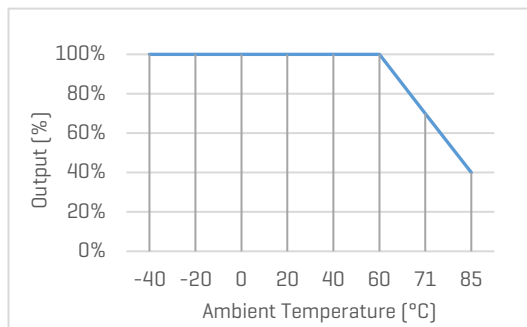


Characteristic Curves

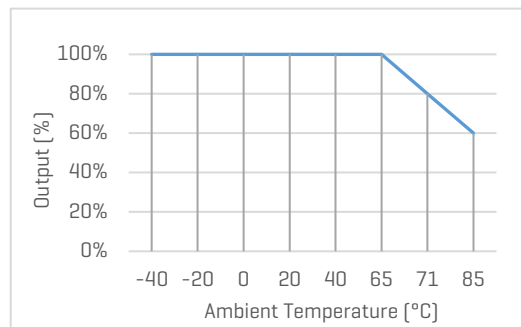
Derating Curve

Output vs Ambient Temperature

$V_{OUT}=3.3 \dots 5V$



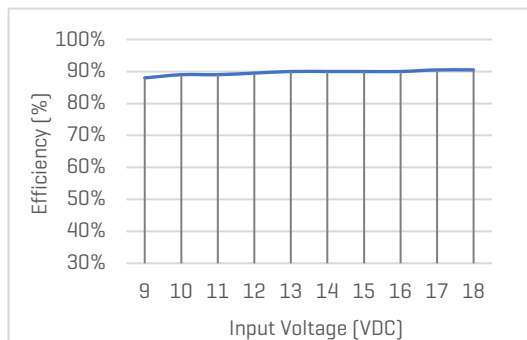
$V_{OUT}=12 \dots 48V$



Efficiency Curve

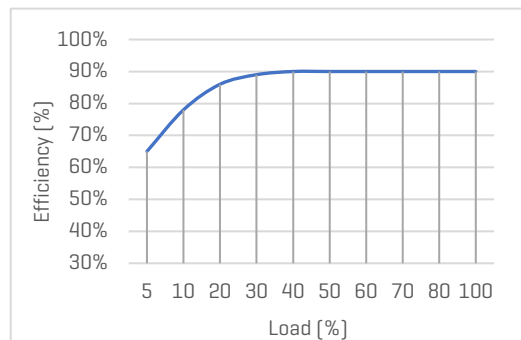
Efficiency vs Input Voltage

MV20G-1205, with full Load

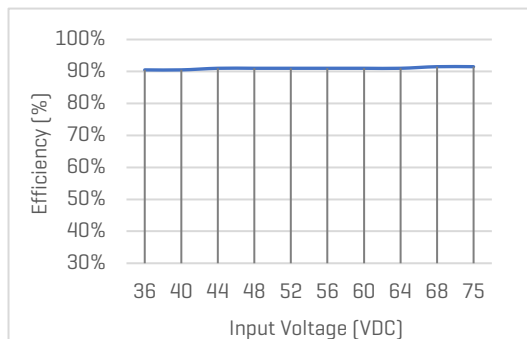


Efficiency vs Load

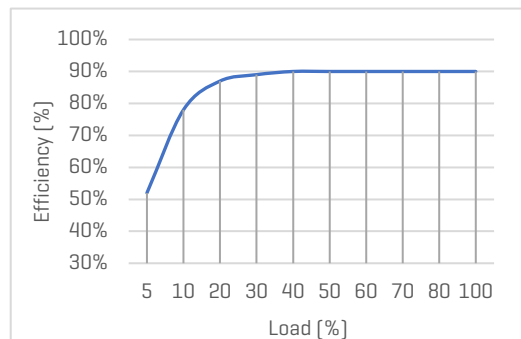
MV20G-1212, with full Load



MV20G-2405, with full Load



MV20G-2415, with full Load



Recommended Application Circuit

Typical Application Circuit

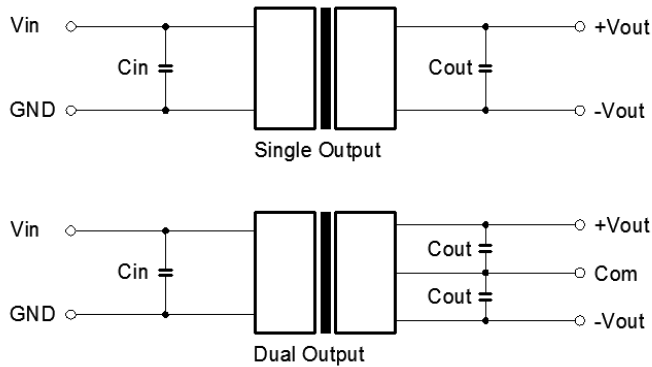


Figure 1. Typical external circuit

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

C_{IN}	100uF
C_{OUT}	47...100uF

EMC Enhancement for EN55032 Class B

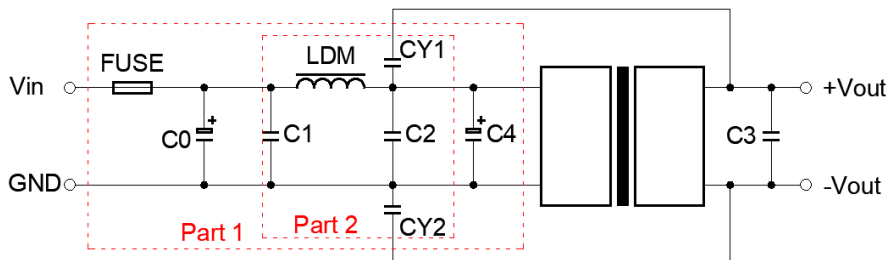


Figure 2. Circuit for EMC enhancement

[Table 2] Recommended component spec

Item	LDM	C0, C4	C1, C2	CY1, CY2
Spec	2.2uH	330uF, 100V	4.7uF, 100V	1nF, 2KV

* Fuse to be selected according to application needs.

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

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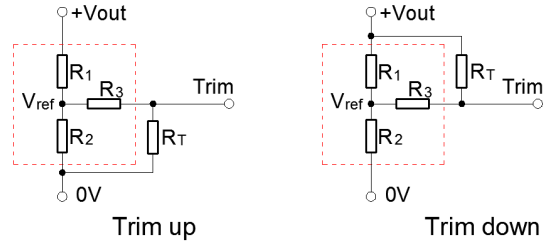
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Recommended Application Circuit [continued]

Circuits for Output Trim

* Items in the red blocks are internal components of the converter.



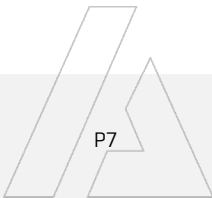
* The formulas to calculate the desired resistance of Trim resistor “RT”.

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

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

[Table 3] Internal component spec

V _{OUT} [V]	R1 [K Ohm]	R2 [K Ohm]	R3 [K Ohm]	V _{ref} [V]
3.3	10	6.064	13.622	1.24
5	2.4	2.344	17.346	2.5
12	8.2	2.153	21.016	2.5
15	12	2.388	21.016	2.5
24	10	1.158	10.714	2.5

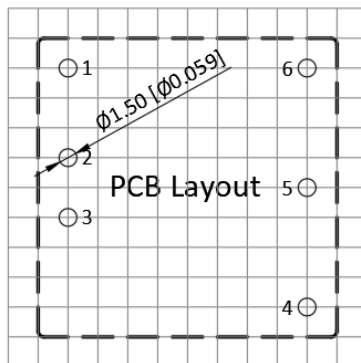
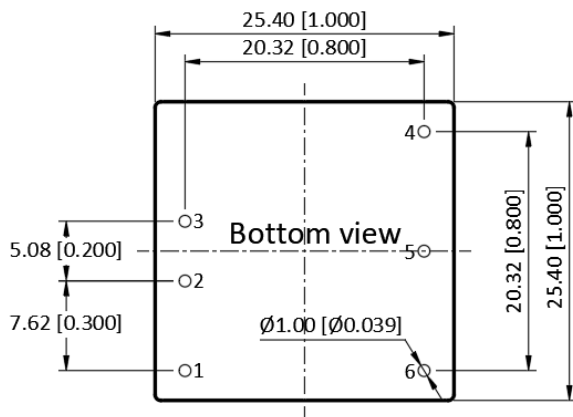
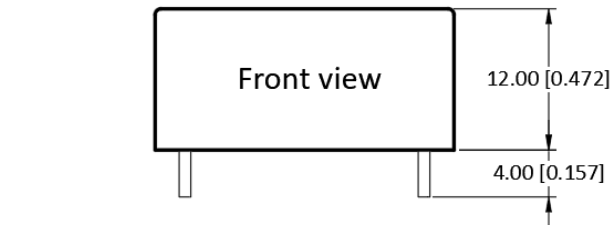


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Mechanical Specifications



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	OV
6	OV	-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