

MV6G Series

6W, Wide 2:1 Input, 1.5KV Isolation, DIP1"x1" DC/DC Converters



Features

- Rated power: 6W Max
- Input voltage range 2:1
- Regulated single or dual out
- High efficiency up to 88%
- Isolation voltage 1.5KVdc
- Operating temperature range: -40 ~ +85°C ambient
- No external components required for operating
- RoHS compliant
- Compact DIP1"x1" package
- Under voltage, over voltage, over current, and short circuit protection
- Designed to meet UL/EN/IEC 62368-1
- 3 year warranty



Overview

The MV6G series are 1.5KV isolated 6Watt DC/DC converters with compact 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, 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.		
MV6G-1205	12	9~18	20	5	1200	0	81	1000
MV6G-1212	12	9~18	20	12	500	0	85	470
MV6G-1224	12	9~18	20	24	250	0	85	100
MV6G-1205D	12	9~18	20	±5	±600	0	81	470
MV6G-1212D	12	9~18	20	±12	±250	0	85	100
MV6G-1215D	12	9~18	20	±15	±200	0	83	100
MV6G-2403	24	18~36	40	3.3	1500	0	77	1800
MV6G-2405	24	18~36	40	5	1200	0	82	1000
MV6G-2409	24	18~36	40	9	667	0	85	470
MV6G-2412	24	18~36	40	12	500	0	85	470
MV6G-2415	24	18~36	40	15	400	0	86	220
MV6G-2424	24	18~36	40	24	250	0	85	100
MV6G-2405D	24	18~36	40	±5	±600	0	83	470
MV6G-2412D	24	18~36	40	±12	±250	0	87	100
MV6G-2415D	24	18~36	40	±15	±200	0	87	100
MV6G-4803	48	36~75	80	3.3	1500	0	79	1800
MV6G-4805	48	36~75	80	5	1200	0	83	1000

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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.		
MV6G-4812	48	36~75	80	12	500	0	87	470
MV6G-4815	48	36~75	80	15	400	0	88	220
MV6G-4824	48	36~75	80	24	250	0	88	100

* 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
Input current Full load	V _{IN, Nom} = 12V V _{IN, Nom} = 24V V _{IN, Nom} = 48V	-	603 296 150	-	mA	
Input current No load	V _{IN, Nom} = 12V V _{IN, Nom} = 24, 48V	-	10 5	-	mA	
Reflected ripple current		-	20	-	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	
Input under voltage shutdown	V _{IN, Nom} = 12V V _{IN, Nom} = 24V V _{IN, Nom} = 48V	5.5 12 26	6.5 15.5 30	-	Vdc	
Output voltage accuracy		-	±1	±3	%	
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, rated}	Main output Other output	-	±0.5 ±0.5	±1.0 ±1.5	%	
Temperature coefficient	Full load	-	-	0.03	%/°C	
Output ripple and noise 20MHz bandwidth, peak to peak		-	60	85	mV	
Cross regulation Dual output, I _{OUT, main} =50% of I _{OUT, rated} , I _{OUT, other} =10% to 100% of I _{OUT, rated}		-	-	±5	%	
Dynamic load response I _{OUT} =25%~50%~75% of I _{OUT, rated}	Peak deviation Recovery time	-	±3 300	±5 500	% V _{OUT} uS	

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Electrical Specifications [continued]

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Output over voltage protection		110	-	160	% V_{OUT}	
Output over current protection		110	140	190	% I_{OUT}	
Output short circuit protection		Continuous, automatic recovery, hiccup				

* 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	-	1000	-	pF	
Switching frequency*	Full load	-	300	-	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 temperature		-	-	300	°C	
Vibration		IEC/EN61373 – Category 1, Grade B				
Cooling method		Free air convection				
Case material		Aluminum alloy				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, $T_A=25^{\circ}\text{C}$				
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				
Size, and Weight		25.4 x 25.4 x12 mm, 12g				

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

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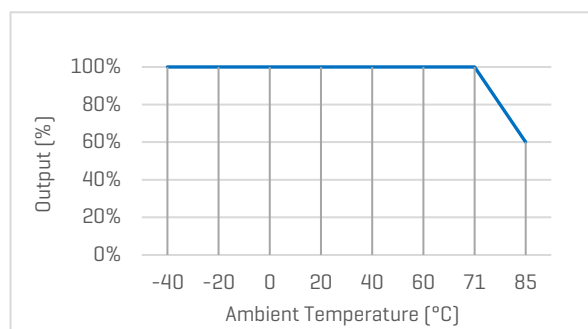


Characteristic Curves

Derating Curve

Output vs Ambient Temperature

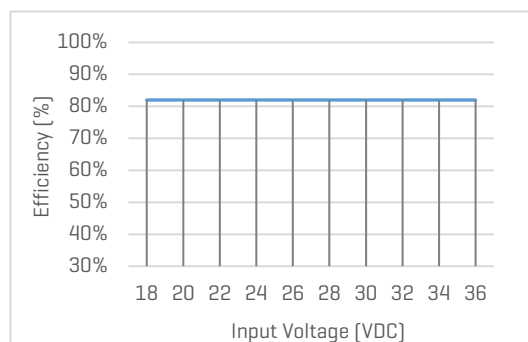
No heatsink



Efficiency Curve

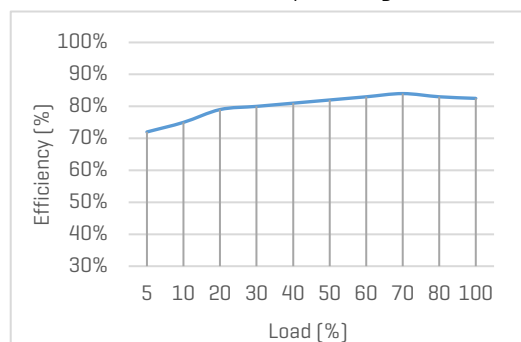
Efficiency vs Input Voltage

MV6G-2405, with full Load

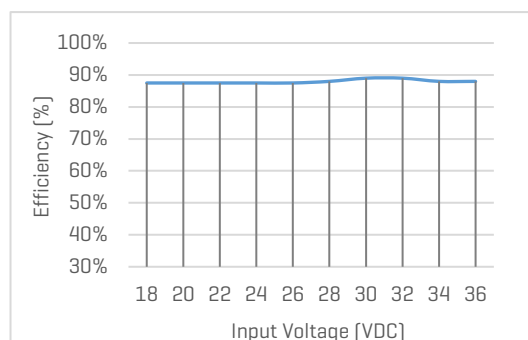


Efficiency vs Load

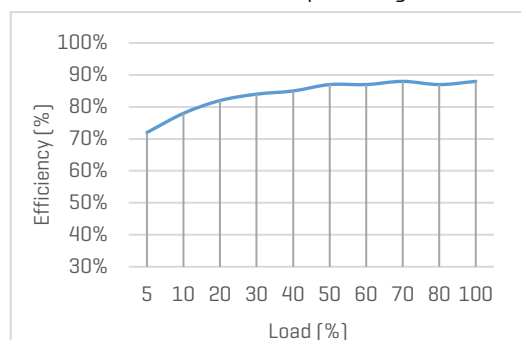
MV6G-2405, with nominal input voltage



MV6G-2415D, with full Load



MV6G-2415D, with nominal input voltage



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Recommended Application Circuit

Typical Application Circuit

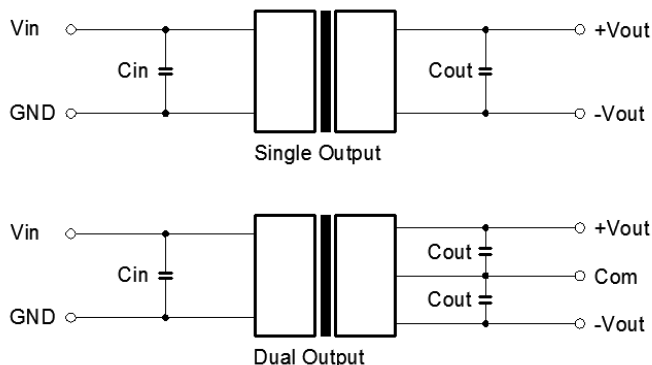


Figure 1. Typical external circuit

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	12, 48V	24V
C _{IN}	100uF, 50V	10...47uF, 100V
C _{OUT}	10uF, 50V	

Circuit for EMC Enhancement

*Use this application circuit to meet Class B EMC performance.

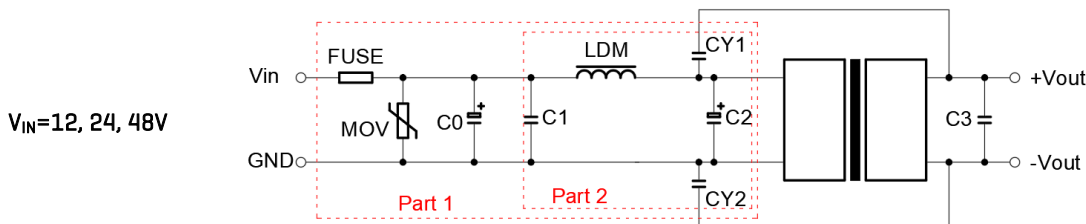


Figure 2. Circuit for EMC enhancement

[Table 2] Recommended component spec

Component	MOV	LDM	C0	C1	C2	CY1, CY2
V _{IN} =12V	14D330K	4.7uH	1000uF, 35V	1uF, 50V	330uF, 35V	1nF, 2KV
V _{IN} =24V	20D470K	4.7uH	1000uF, 50V	1uF, 50V	330uF, 50V	1nF, 2KV
V _{IN} =48V	14D101K	4.7uH	680uF, 100V	4.7uF, 100V	330uF, 100V	1nF, 2KV

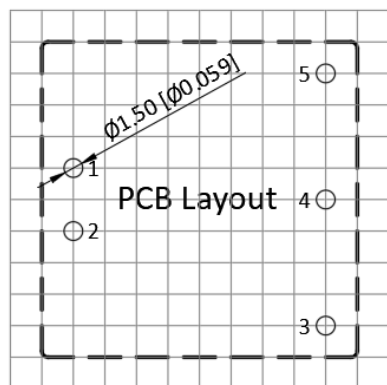
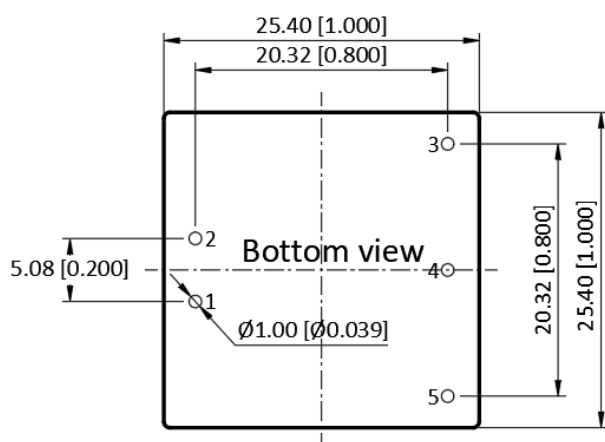
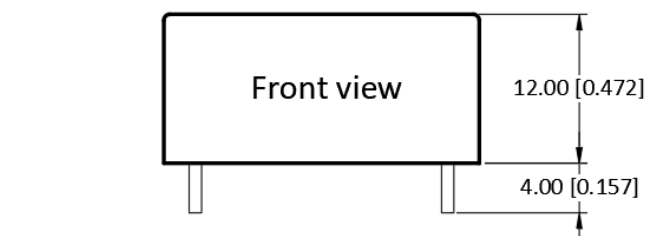
* "Fuse" to be selected according to application needs. "C3" refer to relative C_{OUT} values in Table 1.

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Mechanical Specifications



Pin Definition

Pin #	Single Out	Dual Out
1	GND	GND
2	V _{IN}	V _{IN}
3	+V _{OUT}	+V _{OUT}
4	No pin	COM
5	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