MV6D Series

6W, Wide 2:1 Input Range, 1.5KV Isolation, DIP24 Package 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
- Six side metal shielding
- Compact DIP24 package
- Under voltage, over voltage, over current, and short circuit protection
- Designed to meet UL62368-1, IEC/EN62368-1
- 3 year warranty

Overview

The MV6D series are 1.5KV isolated 6Watt DC/DC converters with standard DIP24 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 measurement equipment, telecom, wireless network, industrial control system, where isolated, tightly regulated voltages are desired.

Model Numbers

Model Number	Input Voltage [VDC]			V_{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	*Range	*Max.		Max.	Min.		
MV6D-0505	5	4.5~9	12	5	1200	0	78	1000
MV6D-0512	5	4.5~9	12	12	500	0	84	470
MV6D-0515	5	4.5~9	12	15	400	0	84	220
MV6D-0524	5	4.5~9	12	24	250	0	84	100
MV6D-0505D	5	4.5~9	12	±5	±600	0	78	1000
MV6D-0512D	5	4.5~9	12	±12	±250	0	84	470
MV6D-0515D	5	4.5~9	12	±15	±200	0	84	220
MV6D-0524D	5	4.5~9	12	±24	±125	0	84	100
MV6D-1203	12	9~18	20	3.3	1500	0	75	1800
MV6D-1205	12	9~18	20	5	1200	0	80	1000
MV6D-1212	12	9~18	20	12	500	0	84	470
MV6D-1215	12	9~18	20	15	400	0	85	220
MV6D-1224	12	9~18	20	24	250	0	85	100
MV6D-1205D	12	9~18	20	±5	±600	0	80	680
MV6D-1212D	12	9~18	20	±12	±250	0	84	330
MV6D-1215D	12	9~18	20	±15	±200	0	85	220
MV6D-1224D	12	9~18	20	±24	±125	0	84	100

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.		
MV6D-2403	24	18~36	40	3.3	1500	0	78	1800
MV6D-2405	24	18~36	40	5	1200	0	82	1000
MV6D-2412	24	18~36	40	12	500	0	85	470
MV6D-2415	24	18~36	40	15	400	0	86	220
MV6D-2424	24	18~36	40	24	250	0	86	100
MV6D-2405D	24	18~36	40	±5	±600	0	83	680
MV6D-2412D	24	18~36	40	±12	±250	0	86	330
MV6D-2415D	24	18~36	40	±15	±200	0	87	220
MV6D-2424D	24	18~36	40	±24	±125	0	85	100
MV6D-4803	48	36~75	80	3.3	1500	0	79	1800
MV6D-4805	48	36~75	80	5	1200	0	83	1000
MV6D-4812	48	36~75	80	12	500	0	87	470
MV6D-4815	48	36~75	80	15	400	0	88	220
MV6D-4824	48	36~75	80	24	250	0	87	100
MV6D-4805D	48	36~75	80	±5	±600	0	83	680
MV6D-4812D	48	36~75	80	±12	±250	0	87	330
MV6D-4815D	48	36~75	80	±15	±200	0	85	220
MV6D-4824D	48	36~75	80	±24	±125	0	85	100

* Only typical models are listed. Other models may be available upon request.
* Input voltage exceed the Max. value may cause permanent damage.
* Standard models in MV6D series are 1.5KV isolation single and dual outputs. See MVK6D series for 3KV isolation models

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	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	1428 607 296 147	-	mA	
Input current No load	$V_{IN, Nom}$ = 5V Others	-	10 7	-	mA	
Reflected ripple current	$V_{IN, Nom}$ = 5V Others	-	50 20	-	mA	
Input voltage surge 1 second max	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-0.7 -0.7 -0.7 -0.7	-	16 25 50 100	Vdc	
Startup input voltage	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	-	4.5 9 18 36	Vdc	
Input under voltage shutdown	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	3.3 5.5 13 26	3.5 6.5 15 30	-	Vdc	
Output voltage accuracy		-	±1	±3	%	
Output voltage balance Dual output with balanced load		-	±0.5	±1.5	%	
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 coefficiency	Full load	-	-	0.03	%/°C	
Output ripple and noise 20MHz bandwidth, peak to peak		-	-	100	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** Peak deviation Recovery time	-	±5 ±3 300	±8 ±5 500	% V_{OUT} % V_{OUT} uS	**V_{OUT}=3.3V, 5V, ±5V

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°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		32 x 20 x 11.1 mm, 14g				

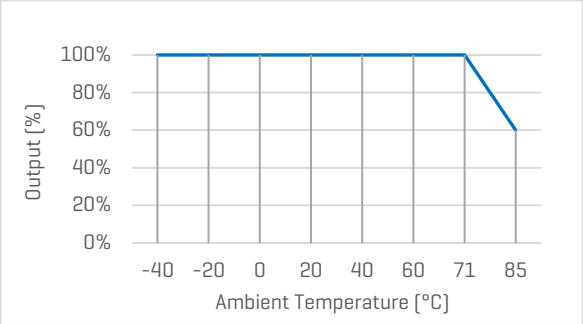
* Switching frequency is measured at full load. The converter reduces the switching frequency at low load (less than 50% load) for better efficiency.

Characteristic Curves

Derating Curve

Output vs Ambient Temperature

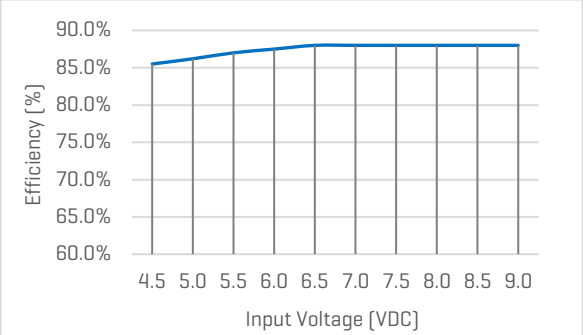
No heatsink



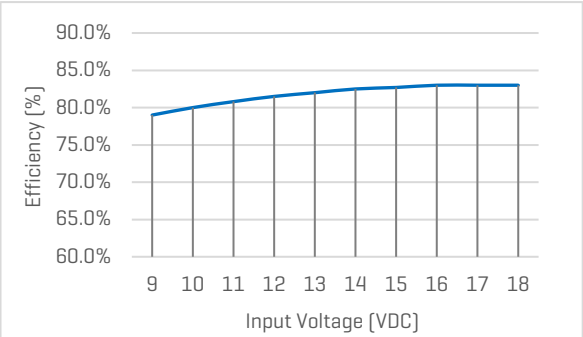
Efficiency Curve

Efficiency vs Input Voltage

MV6D-0524, with full Load

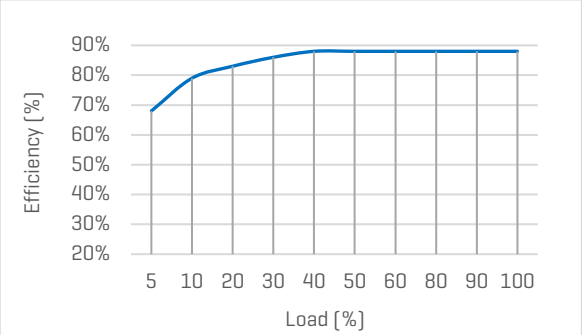


MV6D-1205D, with full Load

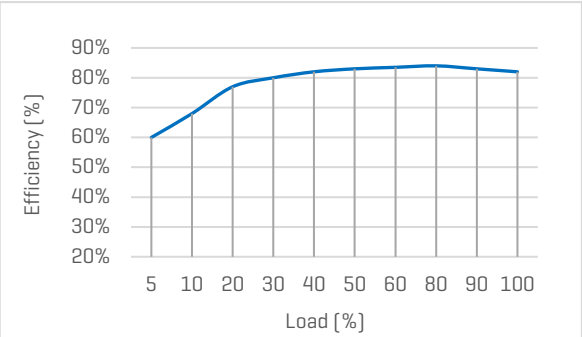


Efficiency vs Load

MV6D-0524, with nominal input voltage



MV6D-1205D, with nominal input voltage



Recommended Application Circuit

Typical Application Circuit

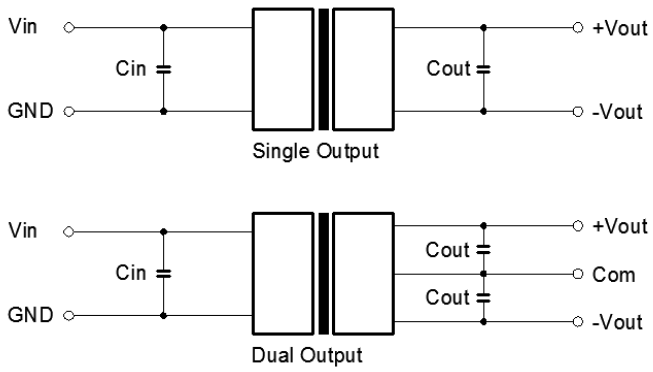


Figure 1. Typical external circuit

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.

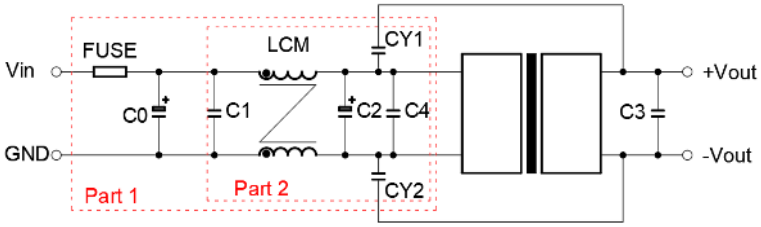
[Table 1] Recommended component spec

Input voltage	5, 12, 24V	48V
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.

V_{IN}=5V



V_{IN}=12, 24, 48V

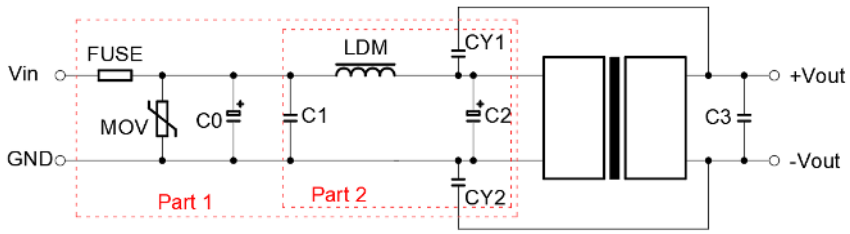


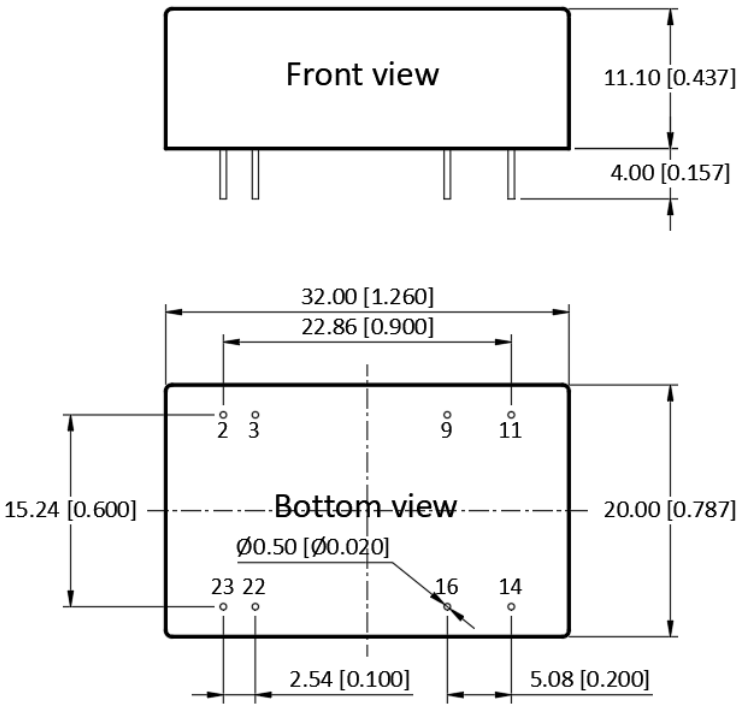
Figure 2. Circuit for EMC enhancement

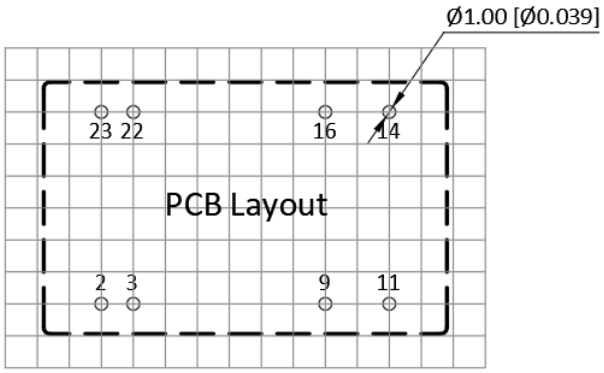
[Table 2] Recommended component spec

Component	MOV	LCM / LDM	C0	C1	C2	C4	CY1, CY2
V_{IN}=5V	-	2.2mH	2200uF, 35V	4.7uF, 50V	4.7uF, 50V	100uF, 35V	2.2nF, 2KV
V_{IN}=12V	14D330K	4.7uH	1000uF, 35V	1uF, 50V	100uF, 35V	-	1nF, 2KV
V_{IN}=24V	20D470K	4.7uH	1000uF, 50V	1uF, 50V	100uF, 50V	-	1nF, 2KV
V_{IN}=48V	14D101K	4.7uH	680uF, 100V	1uF, 100V	100uF, 100V	-	1nF, 2KV

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

Mechanical Specifications





Pin Definition

Pin #	Single Out	Dual Out
2, 3	GND	GND
9	No pin	COM
11	No connection	$-V_{OUT}$
14	$+V_{OUT}$	$+V_{OUT}$
16	0V	COM
22, 23	V_{IN}	V_{IN}

* 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

FAVOTEK LIMITED
#17 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong
Tel: +852 8191 6662
Eml: info@favotek.com

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