MVK3P Series

3W, Wide 2:1 Input Range, 3KV Isolation, DIP24 Package DC/DC Converters

Features

- Rated power: 3W Max
- Input voltage range 2:1
- Regulated single or dual out
- High efficiency up to 86%
- Isolation voltage 3KV
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Compact DIP24 package
- Continuous short circuit protection
- Meet IEC/EN/UL 62368
- 3 year warranty

Model Numbers

Model Number	Input Voltage [VDC]			V_{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	*Range	*Max.		Max.	Min.		
MVK3P-0505	5	4.5~9	11	5	600	30	74	4700
MVK3P-0512	5	4.5~9	11	12	250	12	77	2700
MVK3P-0515	5	4.5~9	11	15	200	10	77	220
MVK3P-0505D	5	4.5~9	11	±5	±300	±15	76	2200
MVK3P-0509D	5	4.5~9	11	±9	±166	±8	76	1800
MVK3P-0512D	5	4.5~9	11	±12	±125	±6	78	1800
MVK3P-0515D	5	4.5~9	11	±15	±100	±5	78	1000
MVK3P-1203	12	9~18	20	3.3	909	46	74	4700
MVK3P-1205	12	9~18	20	5	600	30	81	4700
MVK3P-1212	12	9~18	20	12	250	12	83	2700
MVK3P-1215	12	9~18	20	15	200	10	82	2200
MVK3P-1224	12	9~18	20	24	125	6	83	1800
MVK3P-1205D	12	9~18	20	±5	±300	±15	81	2200
MVK3P-1209D	12	9~18	20	±9	±166	±8	84	2000
MVK3P-1212D	12	9~18	20	±12	±125	±6	84	1800
MVK3P-1215D	12	9~18	20	±15	±100	±5	85	1000
MVK3P-2403	24	18~36	40	3.3	909	46	78	4700
MVK3P-2405	24	18~36	40	5	600	30	81	4700
MVK3P-2409	24	18~36	40	9	333	16	81	2700
MVK3P-2412	24	18~36	40	12	250	12	86	2700
MVK3P-2415	24	18~36	40	15	200	10	86	2200
MVK3P-2424	24	18~36	40	24	125	6	85	1800

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.		
MVK3P-2405D	24	18~36	40	±5	±300	±15	82	2200
MVK3P-2412D	24	18~36	40	±12	±125	±6	84	1800
MVK3P-2415D	24	18~36	40	±15	±100	±5	84	1000
MVK3P-4803	48	36~75	80	3.3	909	46	76	4700
MVK3P-4805	48	36~75	80	5	600	30	82	4700
MVK3P-4812	48	36~75	80	12	250	12	86	2700
MVK3P-4815	48	36~75	80	15	200	10	86	2200
MVK3P-4824	48	36~75	80	24	125	6	84	1000
MVK3P-4805D	48	36~75	80	±5	±300	±15	82	2200
MVK3P-4812D	48	36~75	80	±12	±125	±6	84	1800
MVK3P-4815D	48	36~75	80	±15	±100	±5	85	1000
MVK3P-4824D	48	36~75	80	±24	±63	±3	84	680

* Input voltage exceed the Max. value may cause permanent damage.
* Only typical models are listed. Other models may be available upon request.

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	-	789 316 152 77	-	mA	
Input current No load	$V_{IN, Nom}$=5V $V_{IN, Nom}$=12V $V_{IN, Nom}$=24V $V_{IN, Nom}$=48V	-	40 30 15 5	-	mA	
Reflected ripple current	$V_{IN, Nom}$=5V Others	-	20 30	-	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	-	12 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	
Output voltage accuracy	Load=5%~100% No load	-	±1.0 ±1.5	±3 ±5	%	
Output voltage balance Dual output with balanced load		-	±0.5	±1	%	
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 $I_{OUT, rated}$	-	-	±0.2	±0.5	%	
Cross regulation Dual output, $I_{OUT, main}$=50% of $I_{OUT, rated}$, $I_{OUT, other}$=10% to 100% of $I_{OUT, rated}$		-	-	±5	%	
Output ripple and noise 20MHz bandwidth	V_{OUT}=24V Others	-	100 50	120 80	mVp-p	
Temperature coefficiency	Full load	-	±0.03	±0.03	%/°C	
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation Recovery time	-	±2 0.5	±5 2	% V_{OUT} mS	
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	3000	-	-	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	-	200	-	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	
Case material		Plastic 94-V0				
Cooling method		Free air convection				
Vibration		IEC/EN61373 – Category 1, Grade B				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T_A=25°C				
Design based on standards		IEC/EN/UL 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		32 x 20 x 12 mm, 13g				

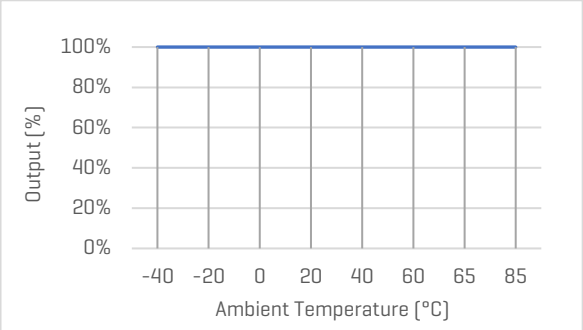
* Switching frequency is measured at full load. The converter reduces the switching frequency at low load (less than 50% load) for better efficiency.

Characteristic Curves

Derating Curve

Output vs Ambient Temperature

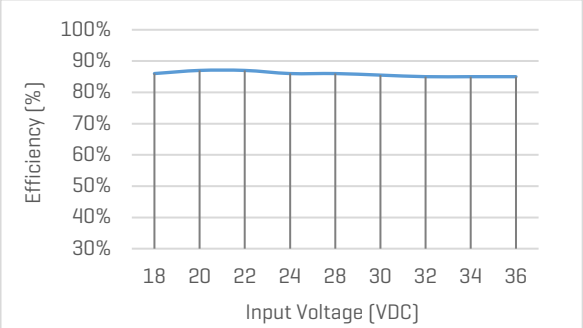
No heatsink



Efficiency Curve

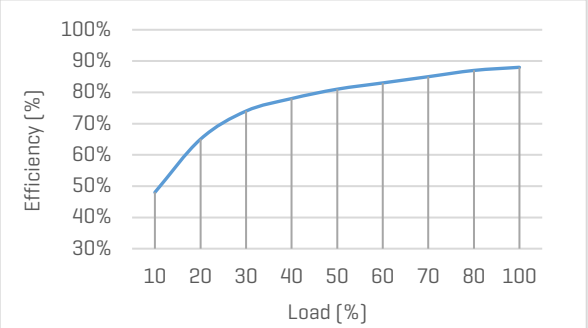
Efficiency vs Input Voltage

MVK3P-2405, with full Load

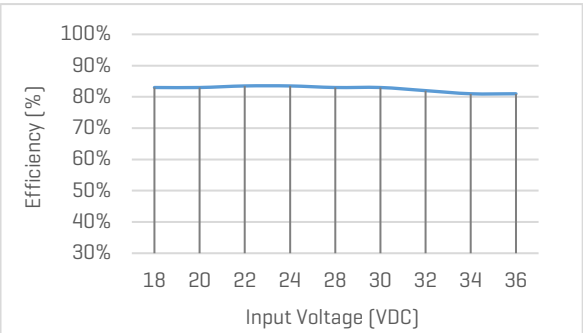


Efficiency vs Load

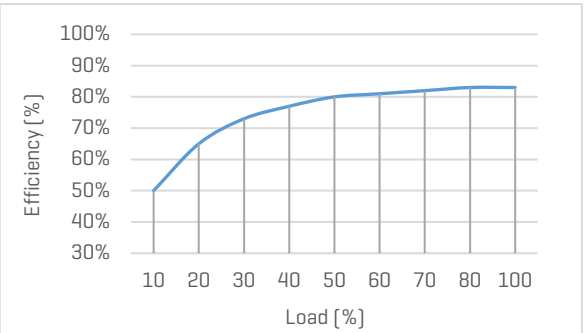
MVK3P-2405, with nominal input voltage



MVK3P-2415D, with full Load



MVK3P-2415D, with nominal input voltage



Recommended Application Circuit

Typical Application Circuit

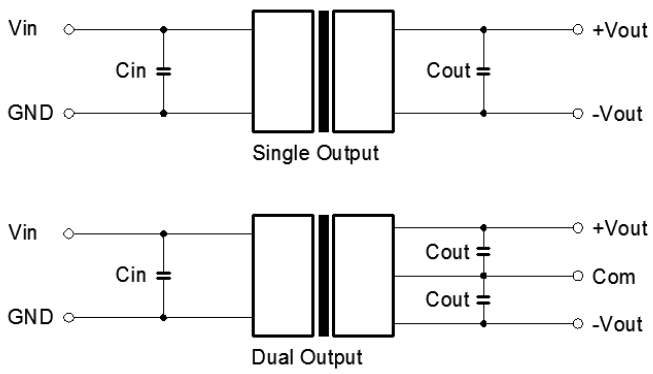


Figure 1. Typical external circuit

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, 12V	24, 48V
C_{IN}	100uF, 25V	10...47uF, 100V
C_{OUT}	10uF, 50V	

EMC Enhancement to Meet EN55032 Class B

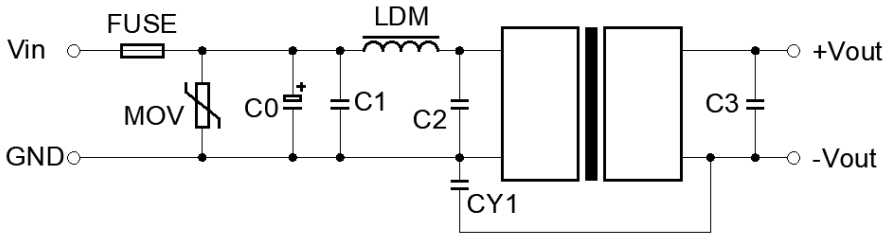


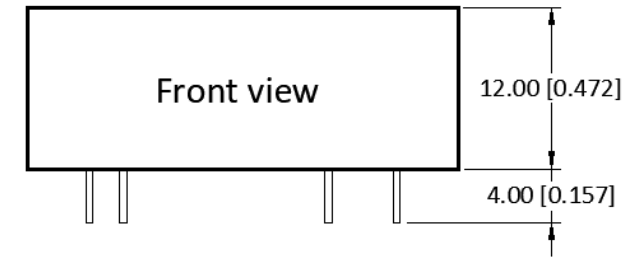
Figure 2. Circuit for EMC enhancement

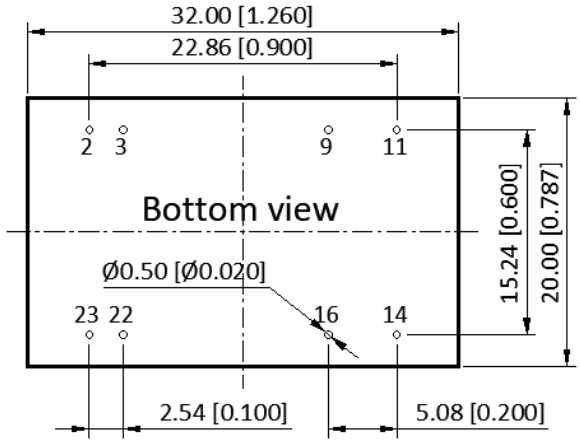
[Table 2] Recommended component spec

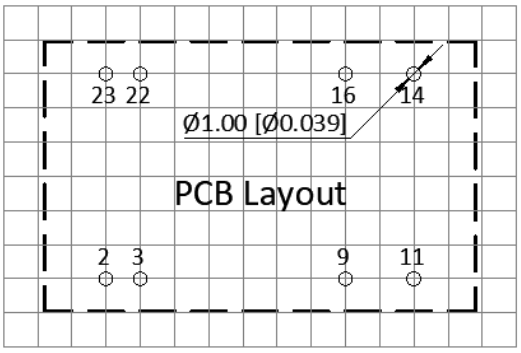
Items	MOV	LDM	C0	C1, C2	CY1
V_{IN}=5V	-	12uH	1000uF, 16V	4.7uF, 50V	1nF, 3KV
V_{IN}=12V	14D330K	12uH	1000uF, 25V	4.7uF, 50V	1nF, 3KV
V_{IN}=24V	20D470K	12uH	330uF, 50V	4.7uF, 50V	1nF, 3KV
V_{IN}=48V	14D101K	12uH	330uF, 100V	4.7uF, 100V	1nF, 3KV

* Fuse to be selected according to application needs.
* C3 refer to C_{OUT} 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

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