

MVK3S Series

3W, Wide 2:1 Input, 3KV Isolation, SIP8 DC/DC Converters



Features

- Rated power: 3W Max
- Input voltage range: 2:1
- Regulated output
- High efficiency up to 83%
- Isolation voltage 3KVDC
- Operating temperature range: -40 ~ +85°C ambient
- No external components required for operating
- RoHS compliant
- Compact SIP8 package
- Optional remote ON/OFF
- Continuous short circuit protection
- Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- 3 year warranty



Overview

The MVK3S series are 3KV isolated 3Watt DC/DC converters with a miniature SIP8 package. Designed with high efficiency, they operate in a wide temperature range from -40°C to +85°C. Other features include wide input voltage range, optional remote on/off control, and continuous 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.
	Nominal	Range	*Max.		Max.	Min.		
MVK3S-0503	5	4.5~9	11	3.3	758	38	68	1800
MVK3S-0505	5	4.5~9	11	5	500	25	73	2200
MVK3S-0512	5	4.5~9	11	12	208	10	77	680
MVK3S-0515	5	4.5~9	11	15	167	8	74	470
MVK3S-0524	5	4.5~9	11	24	104	5	76	330
MVK3S-0505D	5	4.5~9	11	±5	±250	±13	74	1000
MVK3S-0512D	5	4.5~9	11	±12	±104	±5	77	470
MVK3S-0515D	5	4.5~9	11	±15	±83	±4	77	330
MVK3S-0524D	5	4.5~9	11	±24	±52	±3	76	220
MVK3S-1203	12	9~18	20	3.3	758	38	75	2700
MVK3S-1205	12	9~18	20	5	600	30	76	2200
MVK3S-1212	12	9~18	20	12	250	13	82	680
MVK3S-1215	12	9~18	20	15	200	10	83	470
MVK3S-1224	12	9~18	20	24	125	6	81	330
MVK3S-1205D	12	9~18	20	±5	±300	±15	78	1000
MVK3S-1212D	12	9~18	20	±12	±125	±6	79	470
MVK3S-1215D	12	9~18	20	±15	±100	±5	80	330

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Model Numbers [continued]

Model Number	Input Voltage [VDC]			V _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] *Max.
	Nominal	Range	*Max.		Max.	Min.		
MVK3S-2403	24	18~36	40	3.3	758	38	74	2700
MVK3S-2405	24	18~36	40	5	600	30	81	2200
MVK3S-2409	24	18~36	40	9	333	17	83	2200
MVK3S-2412	24	18~36	40	12	250	13	83	1000
MVK3S-2415	24	18~36	40	15	200	10	83	680
MVK3S-2424	24	18~36	40	24	125	6	83	470
MVK3S-2405D	24	18~36	40	±5	±300	±15	79	1000
MVK3S-2412D	24	18~36	40	±12	±125	±6	83	470
MVK3S-2415D	24	18~36	40	±15	±100	±5	83	330
MVK3S-4803	48	36~75	80	3.3	758	38	75	2700
MVK3S-4805	48	36~75	80	5	600	30	76	2200
MVK3S-4812	48	36~75	80	12	250	13	80	680
MVK3S-4815	48	36~75	80	15	200	10	84	470
MVK3S-4824	48	36~75	80	24	125	6	82	330
MVK3S-4805D	48	36~75	80	±5	±300	±15	79	1000
MVK3S-4812D	48	36~75	80	±12	±125	±6	82	470
MVK3S-4815D	48	36~75	80	±15	±100	±5	82	330

* Only typical models are listed. Other models may be available upon request.

* Input voltage exceed the Max. value may cause permanent damage.

* For dual output models, max capacitive load stipulated in the above list is for each output.

* Add suffix "N" to the model numbers for optional Ctrl pin removed, e.g. MVK3S-2405-N.

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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 current Full load	$V_{IN, Nom} = 5V$	-	805	-	mA	
	$V_{IN, Nom} = 12V$		314			
	$V_{IN, Nom} = 24V$		154			
	$V_{IN, Nom} = 48V$		78			
Input current No load	$V_{IN, Nom} = 5V$	-	60	-	mA	
	$V_{IN, Nom} = 12V$		25			
	$V_{IN, Nom} = 24V$		8			
	$V_{IN, Nom} = 48V$		3			
Input reflected ripple current	$V_{IN, Nom} = 5V, 12V$	-	20	-	mA	
	$V_{IN, Nom} = 24V, 48V$		55			
Input voltage surge 1 second max	$V_{IN, Nom} = 5V$	-0.7	-	12	Vdc	
	$V_{IN, Nom} = 12V$	-0.7		25		
	$V_{IN, Nom} = 24V$	-0.7		50		
	$V_{IN, Nom} = 48V$	-0.7		100		
Startup input voltage	$V_{IN, Nom} = 5V$	-	-	4.5	Vdc	
	$V_{IN, Nom} = 12V$			9		
	$V_{IN, Nom} = 24V$			18		
	$V_{IN, Nom} = 48V$			36		
Remote On/Off control "Ctrl" pin open or logic high [ON] "Ctrl" pin grounded or logic low [OFF]	Logic high	3.5	-	12	VDC	Positive Logic
	Logic low	0	-	0.7	VDC	
	Ctrl pin current	-	5	10	mA	
Output voltage accuracy	$V_{OUT}=3.3V, 5V$	-	± 2	± 5	%	
	All others		± 1	± 3		
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 $I_{OUT, rated}$		-	± 0.5	± 1.0	%	
Temperature coefficient	Full load	-	0.02	0.03	%/ $^{\circ}\text{C}$	
Dynamic load response $I_{OUT}=25\%\sim 50\%\sim 75\%$ of $I_{OUT, rated}$	Peak deviation	-	± 2.5	± 5	% V_{OUT}	
	Recovery time		0.5	3	mS	
Output ripple and noise	20MHz bandwidth	-	100	150	mVp-p	
Output short circuit protection		Continuous, automatic recovery				

* 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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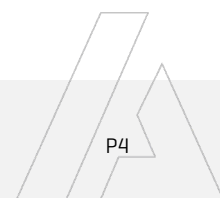
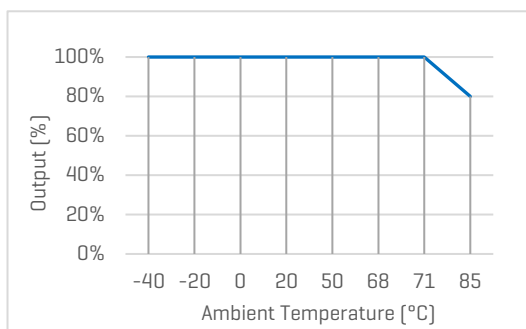
General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage Tested for 1 minute	Input to Output	3000	-	-	VDC	
Isolation resistance Tested at 500VDC	Input to Output	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	Input to Output	-	30	-	pF	
Operating temperature	No derating	-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	None condensing	5	-	95	%RH	
Switching frequency	Full load	-	200	-	KHz	
Pin soldering resistance 1.5mm away from case for 10 sec		-	-	300	°C	
Vibration		10-150Hz, 5G, 0.75mm along X, Y and Z				
Case material		Black plastic UL94-V0				
Cooling method		Free air convection				
Design based on standards		IEC/EN/UL 62368-1				
Safety certifications		IEC/EN 62368-1				
EMC	Emission Immunity	CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6, 29				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T _A =25°C				
Size & Weight		22x9.5x12mm, 4g				

Characteristic Curves

Derating Curve

Output vs Ambient Temperature



Recommended Application Circuit

Typical External Circuit

*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.

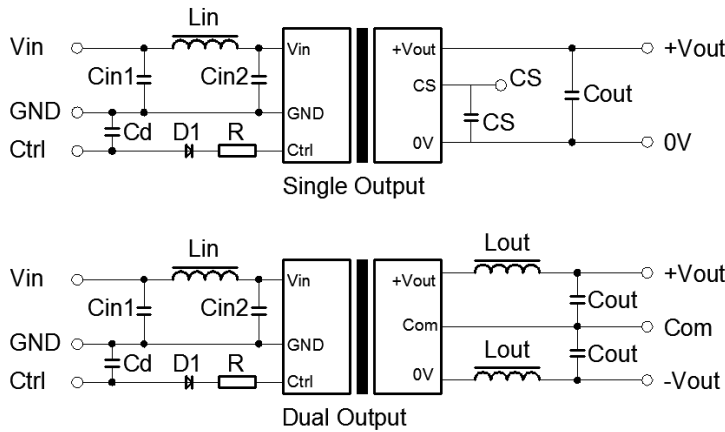


Figure 1. Typical external circuit

Recommended Component Spec

Item	V _{IN} =5V, 12V	V _{IN} =24V, 48V
Cin1	100uF	10uF
Cin2	47uF	1uF
Cout	100uF	100uF
Cd	47nF, 100V	47nF, 100V
Cs	10uF~22uF	10uF~22uF
Lin	4.7uH~12uH	4.7uH~12uH
Lout	2.2uH~10uH	2.2uH~10uH

EMC Enhancement for EN55032 Class B

*External circuits within block "Part 1" is to improve EMS, "Part 2" to improve EMI test performance, "Part 3" to use the remote on/off control function.

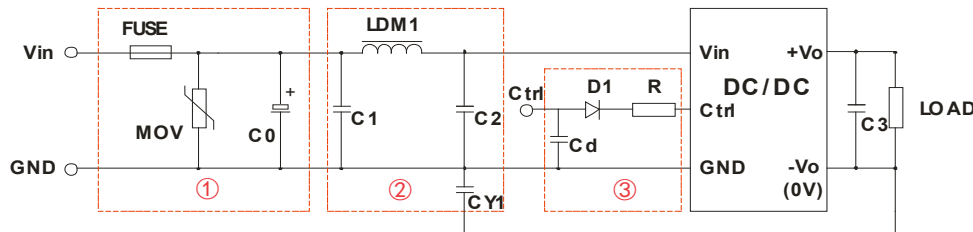


Figure 2. Recommended circuit diagram

Recommended component spec

Items	C0	C1, C2	Cd	CY1	D1	LDM1	MOV
V _{IN} =5V	1000uF, 16V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	-
V _{IN} =12V	1000uF, 25V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	S14K25
V _{IN} =24V	330uF, 50V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	S14K35
V _{IN} =48V	330uF, 100V	4.7uF, 100V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	S14K60

*C3 refer to C_{OUT} in above Figure 1, FUSE to be selected according to application needs.

*Resistor R may be calculated using following formula:
$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

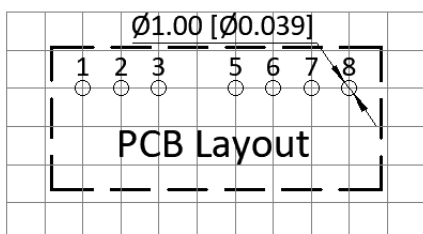
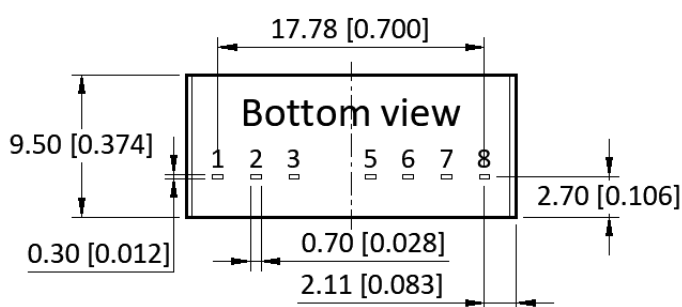
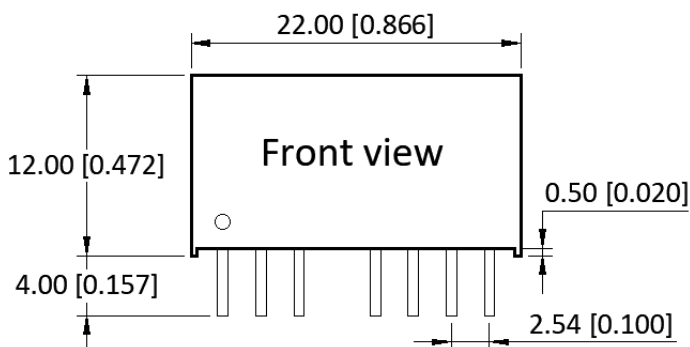
*V_C is the Ctrl to GND voltage, V_D is voltage drop on D1, I_C is current flow into Ctrl.

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Mechanical Specifications



Pin Definition

Pin #	Single Out	Dual Out
1	GND	GND
2	V _{IN}	V _{IN}
3	Ctrl*	Ctrl*
5	No connection	No connection
6	+V _{OUT}	+V _{OUT}
7	OV	COM
8	CS	-V _{OUT}

* Add suffix "N" to the model numbers for optional Ctrl pin removed

* Unless otherwise specified unit: mm [inch]

* General tolerance: ± 0.25 [± 0.010]

* Pin thickness: ± 0.10 [± 0.004]

* Footprint grid 2.54 x 2.54 mm