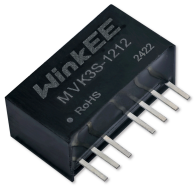
MVK3S Series

3W, Wide 2:1 Input Range, 3KV Isolation, SIP8 Package 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
- Remote ON/OFF
- Continuous short circuit protection
- Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- 5 year warranty



Overview

The MVK3S series are 3KV isolated 3Watt DC/DC converters with a compact SIP8 package. 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 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.
	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-0509	5	4.5~9	11	9	278	14	74	1000
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-0509D	5	4.5~9	11	±9	±167	±10	76	680
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-1209	12	9~18	20	9	333	17	79	1000
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

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-1205D	12	9~18	20	±5	±300	±15	78	1000
MVK3S-1209D	12	9~18	20	±9	±167	±8	78	680
MVK3S-1212D	12	9~18	20	±12	±125	±6	79	470
MVK3S-1215D	12	9~18	20	±15	±100	±5	80	330
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-2409D	24	18~36	40	±9	±167	±8	81	680
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.

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	-	805 314 154 78	-	mA	
Input current No load	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	60 25 8 3	-	mA	
Input reflected ripple current	$V_{IN, Nom}$ = 5V, 12V $V_{IN, Nom}$ = 24V, 48V	-	20 55	-	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	V_{OUT}=3.3V, 5V All others	-	±2 ±1	±5 ±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 coefficiency	Full load	-	0.02	0.03	%/°C	
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation Recovery time	-	±2.5 0.5	±5 3	% V_{OUT} mS	
Output ripple and noise	20MHz bandwidth	-	80	150	mVp-p	
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 -	- - 5	12 0.7 10	VDC VDC mA	Positive Logic
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.

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	-	120	-	pF	
Switching frequency	Full load	-	200	-	KHz	
Operating temperature	No derating	-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	
Case material		Black plastic UL94-V0				
Cooling method		Free air convection				
Vibration		10-150Hz, 5G, 0.75mm along X, Y and Z				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T_A=25°C				
Design based on standards		IEC/EN/UL 62368-1				
Safety certifications		IEC/EN 62368-1				
EMC [Fig x] means connected with external circuit as shown in the Recommended External Circuit section	CE & RE ESD RS EFT Surge CS	CISPR32, EN55032 Class B with [Fig 2] IEC/EN61000-4-2, Contact ±6kV, Criteria B IEC/EN61000-4-3, 10V/m, Criteria A IEC/EN61000-4-4, ±2kV, Criteria B [Fig 1] IEC/EN61000-4-5, Line to Line ±2kV, Criteria B [Fig 1] IEC/EN61000-4-6, 3Vrms, Criteria A				
Size & Weight		22x9.5x12mm, 4.5g				

Recommended Application Circuit

Typical External Circuit

*Models in this series are 100% tested in production using this circuit.

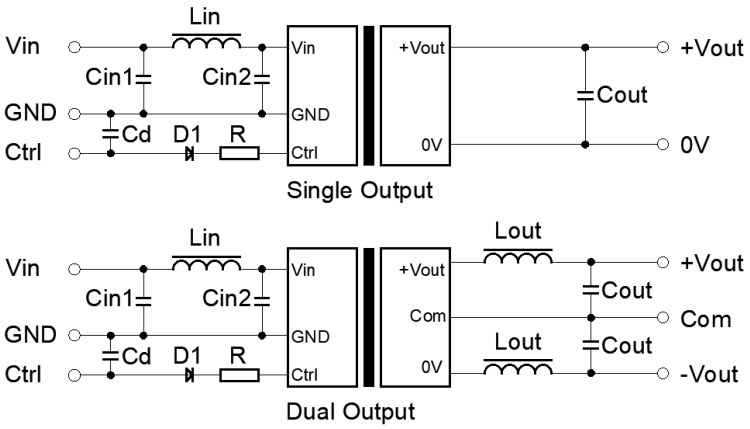


Figure 1. Typical Application Circuit

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
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.

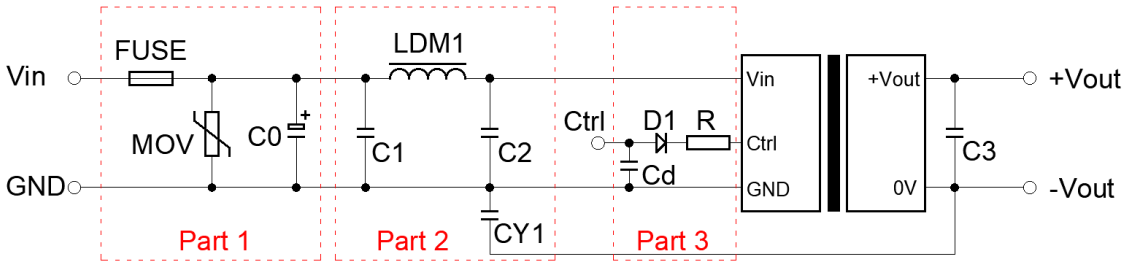


Figure 2. Circuit for EMC Enhancement

Recommended component spec

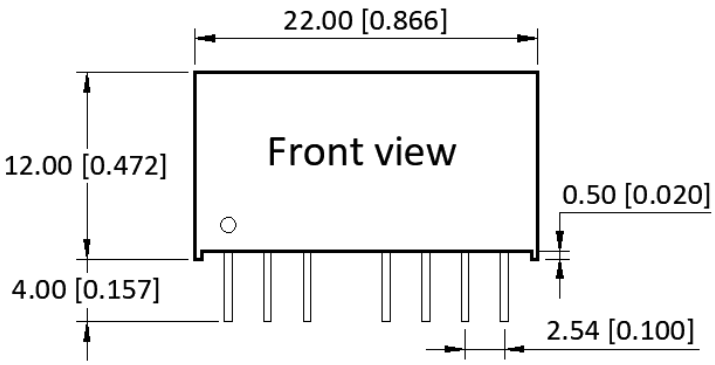
Items	C0	C1, C2	Cd	CY1	D1	LDM1	MOV
V_{IN}=5V	1K uF, 25V	4.7uF, 50V	47nF, 100V	1nF, 4KV	60V, 1A	12uH	-
V_{IN}=12V	1K uF, 25V	4.7uF, 50V	47nF, 100V	1nF, 4KV	60V, 1A	12uH	14D390K
V_{IN}=24V	330uF, 50V	4.7uF, 50V	47nF, 100V	1nF, 4KV	60V, 1A	12uH	14D560K
V_{IN}=48V	330uF, 100V	4.7uF, 100V	47nF, 100V	1nF, 4KV	60V, 1A	12uH	14D101K

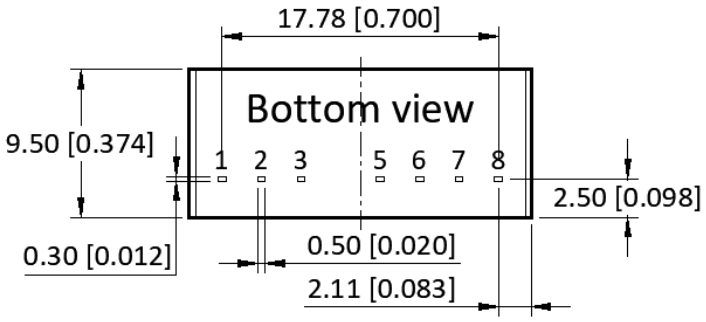
*C3 refer to C_{OUT} in above Figure 1, FUSE to be selected according to application needs.

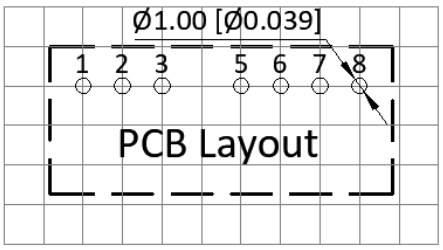
*Resistor R may be calculated using following formula: $R = \frac{V_C - V_D - 1.0}{I_C} - 300$

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

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	$-V_{OUT}$ [OV]	COM
8	NC	$-V_{OUT}$

* 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