

MV3S Series

3W, Wide 2:1 Input, 1.5KV Isolation, SIP8 DC/DC Converters



Features

- Rated power: 3W Max
- Input voltage range: 2:1
- Regulated single or dual output
- High efficiency up to 83%
- Isolation voltage 1.5KVDC
- 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
- Designed to meet UL/EN/IEC 62368-1
- 3 year warranty



Overview

The MV3S series are 1.5KV 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, where is space critical, and 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.
	Nominal	Range	*Max.		Max.	Min.		
MV3S-0503	5	4.5~9	11	3.3	758	38	68	1800
MV3S-0505	5	4.5~9	11	5	500	25	73	2200
MV3S-0509	5	4.5~9	11	9	278	14	74	1000
MV3S-0512	5	4.5~9	11	12	208	10	77	680
MV3S-0515	5	4.5~9	11	15	167	8	74	470
MV3S-0524	5	4.5~9	11	24	104	5	76	330
MV3S-1203	12	9~18	20	3.3	758	38	75	2700
MV3S-1205	12	9~18	20	5	600	30	76	2200
MV3S-1209	12	9~18	20	9	333	17	79	1000
MV3S-1212	12	9~18	20	12	250	13	82	680
MV3S-1215	12	9~18	20	15	200	10	83	470
MV3S-1224	12	9~18	20	24	125	6	81	330
MV3S-2403	24	18~36	40	3.3	758	38	74	2700
MV3S-2405	24	18~36	40	5	600	30	81	2200

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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.		
MV3S-2409	24	18~36	40	9	333	17	83	2200
MV3S-2412	24	18~36	40	12	250	13	83	1000
MV3S-2415	24	18~36	40	15	200	10	83	680
MV3S-2424	24	18~36	40	24	125	6	83	470
MV3S-4803	48	36~75	80	3.3	758	38	75	2700
MV3S-4805	48	36~75	80	5	600	30	76	2200
MV3S-4812	48	36~75	80	12	250	13	80	680
MV3S-4815	48	36~75	80	15	200	10	84	470
MV3S-4824	48	36~75	80	24	125	6	82	330
MV3S-0505D	5	4.5~9	11	±5	±250	±13	74	1000
MV3S-0509D	5	4.5~9	11	±9	±167	±10	76	680
MV3S-0512D	5	4.5~9	11	±12	±104	±5	77	470
MV3S-0515D	5	4.5~9	11	±15	±83	±4	77	330
MV3S-0524D	5	4.5~9	11	±24	±52	±3	76	220
MV3S-1205D	12	9~18	20	±5	±300	±15	78	1000
MV3S-1209D	12	9~18	20	±9	±167	±8	78	680
MV3S-1212D	12	9~18	20	±12	±125	±6	79	470
MV3S-1215D	12	9~18	20	±15	±100	±5	80	330
MV3S-2405D	24	18~36	40	±5	±300	±15	79	1000
MV3S-2409D	24	18~36	40	±9	±167	±8	81	680
MV3S-2412D	24	18~36	40	±12	±125	±6	83	470
MV3S-2415D	24	18~36	40	±15	±100	±5	83	330
MV3S-4805D	48	36~75	80	±5	±300	±15	79	1000
MV3S-4812D	48	36~75	80	±12	±125	±6	82	470
MV3S-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. MV3S-2405-N.

* Standard models in this series are 1.5KV isolation. See AMVK3S series for 3KV isolation models.

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	$V_{IN, Nom} = 5V$ $V_{IN, Nom} = 12V$ $V_{IN, Nom} = 24V$ $V_{IN, Nom} = 48V$	-	805 314 154 78	-	mA	
Input current No load	$V_{IN, Nom} = 5V$ $V_{IN, Nom} = 12V$ $V_{IN, Nom} = 24V$ $V_{IN, Nom} = 48V$	-	40 30 20 5	85 40 40 15	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 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 Recovery time	-	± 2.5 0.5	± 5 3	% V_{OUT} mS	
Output ripple and noise 20MHz bandwidth, peak to peak	$V_{IN, Nom} = 5V$ $V_{IN, Nom} = 12V$ $V_{IN, Nom} = 24V$ $V_{IN, Nom} = 48V$	-	70 100 70 100	100 150 100 150	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.

MV3S Series

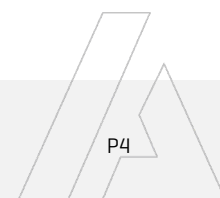
3W, Wide 2:1 Input, 1.5KV Isolation, SIP8 DC/DC Converters



General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage Tested for 1 minute	Input to Output	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	Input to Output	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	Input to Output	-	120	-	pF	
Operating temperature	No derating	-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	None condensing	5	-	95	%RH	
Switching frequency	Full load	-	250	-	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		UL/EN/IEC 62368-1				
Safety certifications		EN/IEC 62368-1				
EMC	Emission Immunity	CISPR32, EN55032 Class B* 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, 4.0g				

*External circuit is required in order to meet Class B, refer to Figure 2 in Recommended External Circuit



MV3S Series

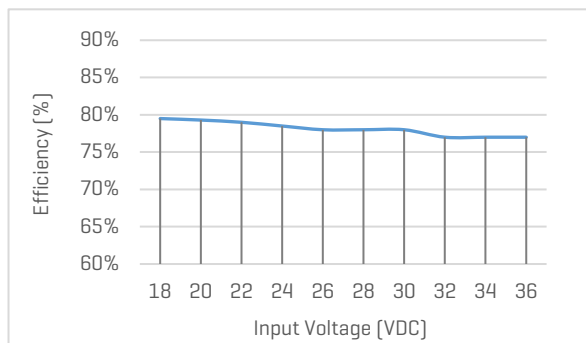
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Characteristic Curves

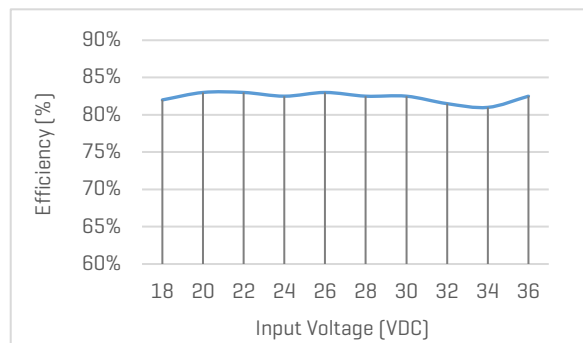
Efficiency vs Input Voltage

MV3S-2405, with full Load



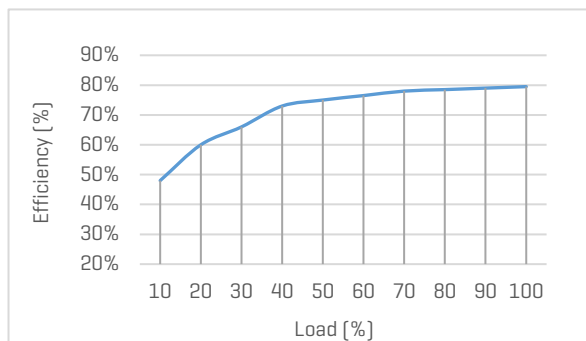
Efficiency vs Load

MV3S-2405, with nominal input voltage



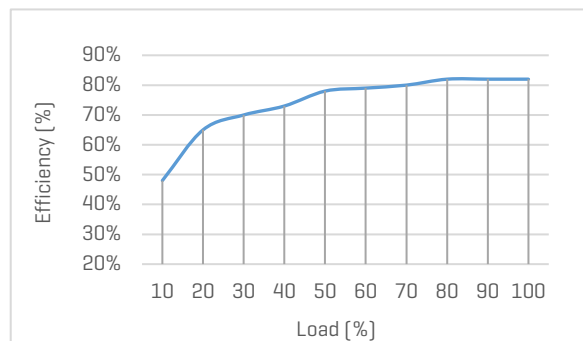
Efficiency vs Input Voltage

MV3S-2405, with full Load



Efficiency vs Load

MV3S-2405, with nominal input voltage



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.

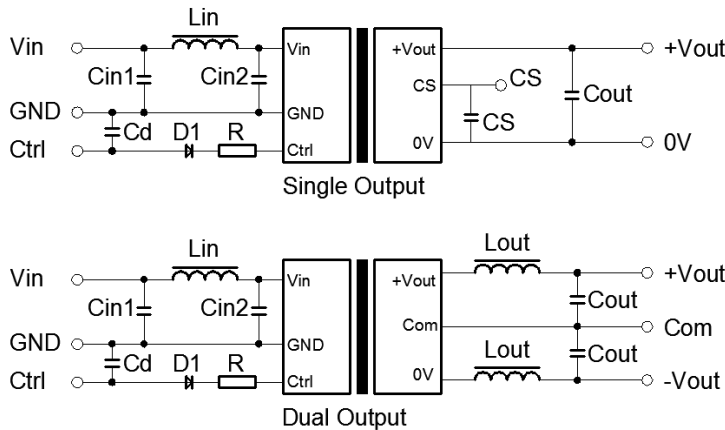


Figure 1. Typical external circuit

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

Circuit for EMC Enhancement

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

*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.

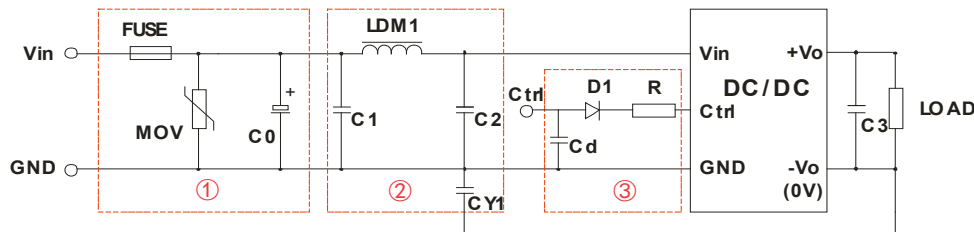


Figure 2. Recommended circuit diagram

Recommended component spec

Items	C0	C1, C2	Cd	CY1	D1	LDM1	MOV
V _{IN} =5V	1K uF, 16V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	-
V _{IN} =12V	1K uF, 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:
$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

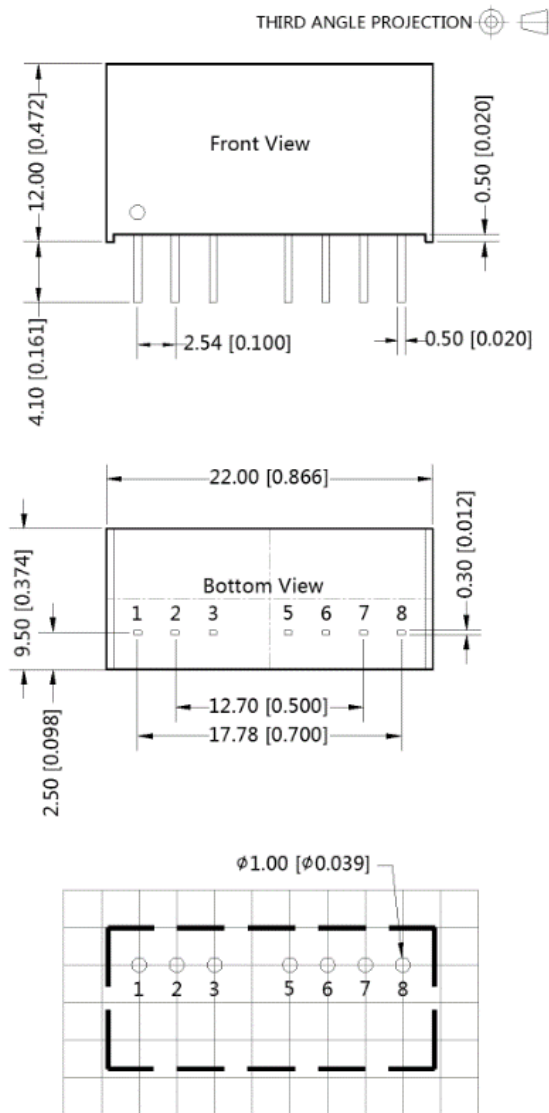
*V_C is the Ctrl to GND voltage, V_D is voltage drop on D1, I_C is current flow into Ctrl.

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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