

MV1S Series

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

Features

- ▶ Rated power: 1W Max
- ▶ Input voltage range: 2:1
- ▶ Regulated output
- ▶ High efficiency up to 81%
- ▶ Isolation voltage 1.5KVDC
- ▶ Low ripple and noise
- ▶ Operating temperature range: -40 ~ +85°C
- ▶ RoHS compliant
- ▶ Compact SIP8 package
- ▶ Remote On/Off
- ▶ Continuous short circuit protection
- ▶ Meet UL/EN/IEC 62368-1 CISPR32, EN55032
- ▶ 5 year warranty



Overview

The MV1S series are 1.5KV isolated 1Watt 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.		
MV1S-0503	5	4.5~9	11	3.3	303	15	71	1800
MV1S-0505	5	4.5~9	11	5	200	10	72	2200
MV1S-0512	5	4.5~9	11	12	83	4	76	680
MV1S-0515	5	4.5~9	11	15	67	3	75	470
MV1S-0524	5	4.5~9	11	24	42	2	73	330
MV1S-0505D	5	4.5~9	11	±5	±100	±5	73	±1000
MV1S-0512D	5	4.5~9	11	±12	±42	±2	76	±470
MV1S-0515D	5	4.5~9	11	±15	±33	±2	75	±330
MV1S-1203	12	9~18	20	3.3	303	15	75	2700
MV1S-1205	12	9~18	20	5	200	10	77	2200
MV1S-1209	12	9~18	20	9	111	6	79	1000
MV1S-1212	12	9~18	20	12	83	4	78	680
MV1S-1215	12	9~18	20	15	67	3	80	470
MV1S-1224	12	9~18	20	24	42	2	76	330
MV1S-1205D	12	9~18	20	±5	±100	±5	77	±1000
MV1S-1212D	12	9~18	20	±12	±42	±2	81	±470
MV1S-1215D	12	9~18	20	±15	±33	±2	78	±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.		
MV1S-2403	24	18~36	40	3.3	303	15	75	2700
MV1S-2405	24	18~36	40	5	200	10	77	2200
MV1S-2412	24	18~36	40	12	83	4	78	680
MV1S-2415	24	18~36	40	15	67	3	78	470
MV1S-2424	24	18~36	40	24	42	2	77	330
MV1S-2405D	24	18~36	40	±5	±100	±5	79	±1000
MV1S-2412D	24	18~36	40	±12	±42	±2	78	±470
MV1S-2415D	24	18~36	40	±15	±33	±2	78	±330
MV1S-4803	48	36~75	80	3.3	303	15	75	2700
MV1S-4805	48	36~75	80	5	200	10	76	2200
MV1S-4812	48	36~75	80	12	83	4	80	680
MV1S-4815	48	36~75	80	15	67	3	79	470
MV1S-4805D	48	36~75	80	±5	±100	±5	76	±1000
MV1S-4812D	48	36~75	80	±12	±42	±2	78	±470
MV1S-4815D	48	36~75	80	±15	±33	±2	80	±330

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

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

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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	-	281	-	mA	
	V _{IN, Nom} = 12V		111			
	V _{IN, Nom} = 24V		55			
	V _{IN, Nom} = 48V		27			
Input current No load	V _{IN, Nom} = 5V	-	40	60	mA	
	V _{IN, Nom} = 12V		15	30		
	V _{IN, Nom} = 24V		6	10		
	V _{IN, Nom} = 48V		4	6		
Input reflected ripple current	V _{IN, Nom} = 5V, 12V	-	40	-	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		
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}	Main output	-	±0.2	±0.5	%	
	Other output		±0.5	±1.0		
Load regulation I _{OUT} =5% to 100% of I _{OUT, rated}		-	±0.5	±1.0	%	
Temperature coefficient	Full load	-	0.02	0.03	%/°C	
Dynamic load response I _{OUT} =25%~50%~75% of I _{OUT, rated}	Peak deviation	-	±2.5	±5	% V _{OUT}	
	Recovery time		0.5	3	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	3.5	-	12	VDC	Positive Logic
	Logic low	0	-	0.7	VDC	
	Ctrl pin current	-	5	10	mA	
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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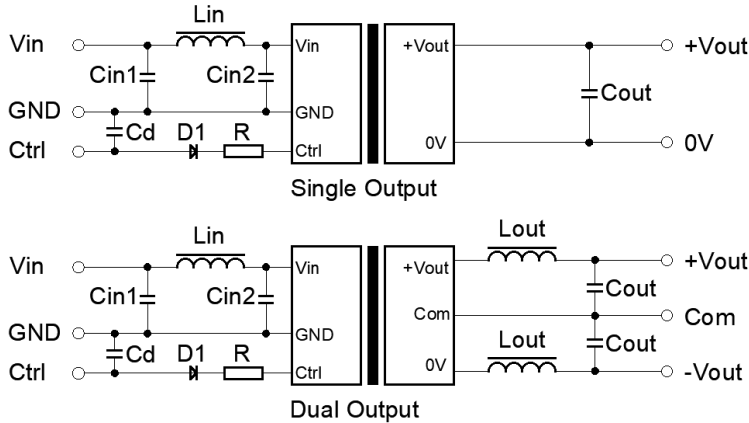
General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage Tested for 1 minute	Input to Output	1500	-	-	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	-	250	-	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 ±4kV, 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.



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

Figure 1. Typical Application Circuit

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.

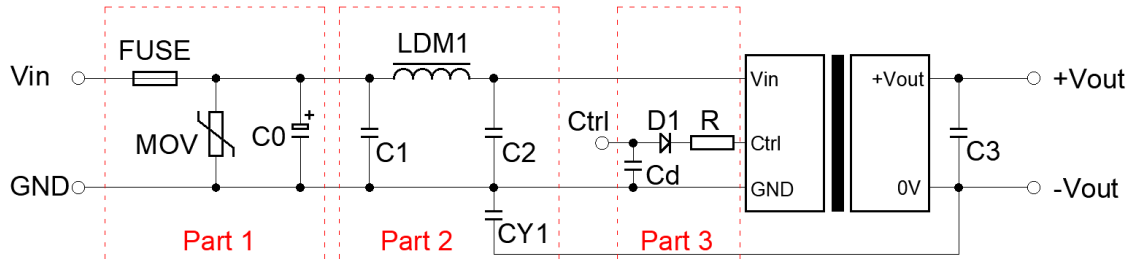


Figure 2. Circuit for EMC Enhancement

Recommended component spec

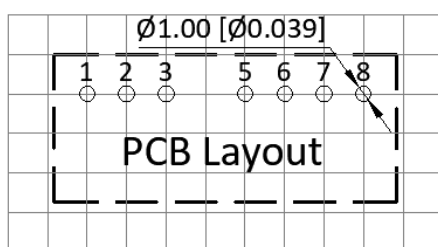
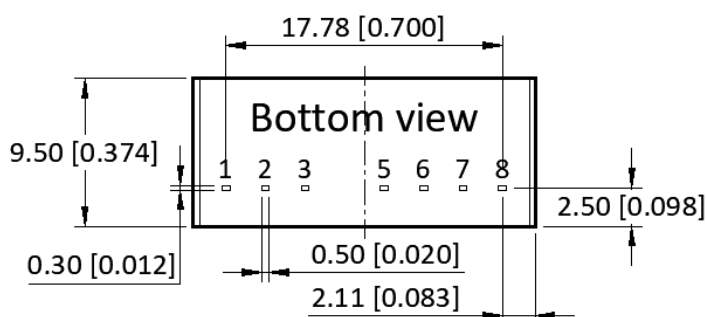
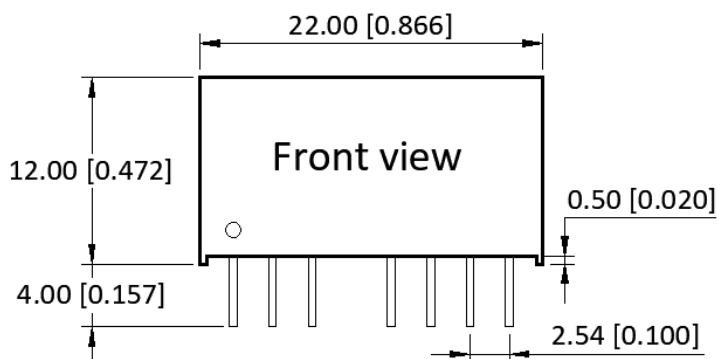
Items	C0	C1, C2	Cd	CY1	D1	LDM1	MOV
V _{IN} =5V	1K uF, 25V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	-
V _{IN} =12V	1K uF, 25V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	14D390K
V _{IN} =24V	330uF, 50V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	14D560K
V _{IN} =48V	330uF, 100V	4.7uF, 100V	47nF, 100V	1nF, 2KV	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} [0V]	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