MV3F Series

3W, Wide 2:1 Input Range, DIP/SMD Package DC/DC Converters

Features

- Rated power: 3W 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 ambient
- RoHS compliant
- Compact SMD/DIP package
- Under voltage, over voltage, over current, and short circuit protections
- Meet IEC/EN/UL 62368-1
- Meet CISPR32, EN55032
- 5 year warranty

Overview

The MV3F series are 1.5KV isolated 3W DC/DC converters with ultra-compact DIP/SMD 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, 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.
	Nom.	Range	*Max.		Max.	Min.		
MV3F-1203	12	9~18	20	3.3	800	0	76	1800
MV3F-1205	12	9~18	20	5	600	0	77	1000
MV3F-1212	12	9~18	20	12	250	0	79	470
MV3F-1215	12	9~18	20	15	200	0	80	220
MV3F-1224	12	9~18	20	24	125	0	81	100
MV3F-2403	24	18~36	40	3.3	800	0	76	1800
MV3F-2405	24	18~36	40	5	600	0	77	1000
MV3F-2412	24	18~36	40	12	250	0	79	470
MV3F-2415	24	18~36	40	15	200	0	80	220
MV3F-2424	24	18~36	40	24	125	0	81	100
MV3F-4803	48	36~75	80	3.3	800	0	76	1800
MV3F-4805	48	36~75	80	5	600	0	77	1000
MV3F-4812	48	36~75	80	12	250	0	79	470
MV3F-4815	48	36~75	80	15	200	0	80	220
MV3F-4824	48	36~75	80	24	125	0	81	100

* Only typical models are listed. Other models may be available upon request.
* Part numbers in the above list are for default DIP package. Add suffix "T" for optional SMD package, E.g. MV3F-1205T.
* 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	$V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	334 167 84	-	mA	
Input current No load	$V_{IN, Nom}$ = 12V Others	-	20 5	-	mA	
Reflected ripple current		-	20	-	mA	
Input voltage surge 1 second max	$V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-0.7 -0.7 -0.7	-	20 40 80	VDC	
Startup input voltage	$V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	-	9 18 36	VDC	
Startup time	Nominal input	-	19	30	mS	
Input under voltage shutdown	$V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	5 15 31	8 17 35	-	VDC	
Output voltage accuracy	I_{OUT}=0 to 100%	-	±1	±3	%	
Line regulation Full load, V_{IN} = $V_{IN, Min}$ to $V_{IN, Max}$		-	±0.2	±0.5	%	
Load regulation		-	±0.5	±1.0	%	
Output ripple and noise I_{OUT}=5% to 100% of $I_{OUT, rated}$	20MHz bandwidth	-	50	100	mVp-p	
Temperature coefficiency	Full load	-	-	±0.03	%/°C	
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation** Peak deviation Recovery time	-	±5 ±3 300	±8 ±5 500	% V_{OUT} % V_{OUT} uS	**V_{OUT}=3.3, 5
Output over voltage protection		110	-	160	% V_{OUT}	
Output over current protection		110	150	200	% I_{OUT}	
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

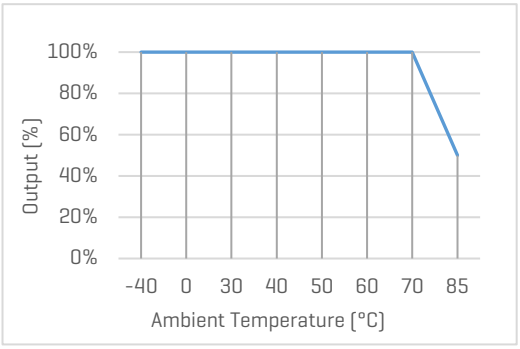
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	I/P to O/P	-	100	-	pF	
Switching frequency*	Full load	-	350	-	KHz	PFM mode
Operating temperature	See "Derating Curve"	-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	None condensing	5	-	95	%RH	
Pin soldering temperature	10 seconds	-	-	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				
EMC [1] With External Circuit as shown in "Figure 1" [2] With External Circuit as shown in "Figure 2"	CE ESD RS EFT Surge CS	CISPR32, EN55032 Class B [2] IEC/EN61000-4-2, Contact ±4kV, Criteria B IEC/EN61000-4-3, 10V/m, Criteria A IEC/EN61000-4-4, ±2kV, Criteria B [1] IEC/EN61000-4-5, Line to Line ±2kV, Criteria B [1] IEC/EN61000-4-6, 3Vrms, Criteria A				
Size & Weight	DIP Package SMD Package	14x14x9mm, 2.2g Typ. 15x14x9.1mm, 2.2g Typ.				

* 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



Recommended Application Circuit

Typical Application Circuit

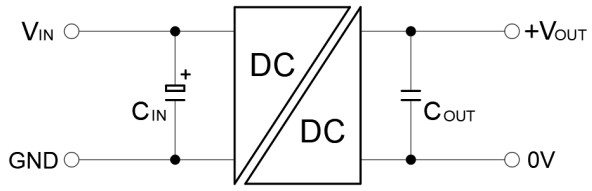


Figure 1. Typical external circuit

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

Item	C_{IN}	C_{OUT}
Spec	100 ... 220uF	10uF

EMC Enhancement for EN55032 Class B

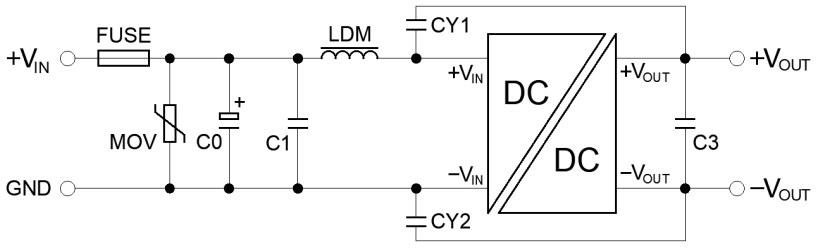


Figure 2. Circuit for EMC enhancement

[Table 2] Recommended component spec

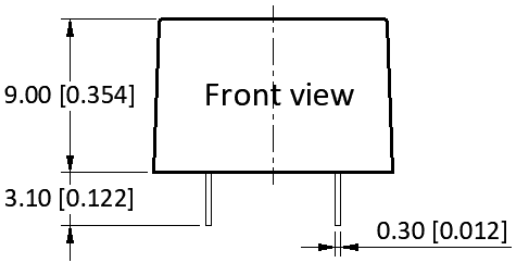
Items	C0	C1	LDM	CY1, CY2	C3
Spec	330uF	1 ... 10uF	4.7uH	1nF, 2KV	10uF

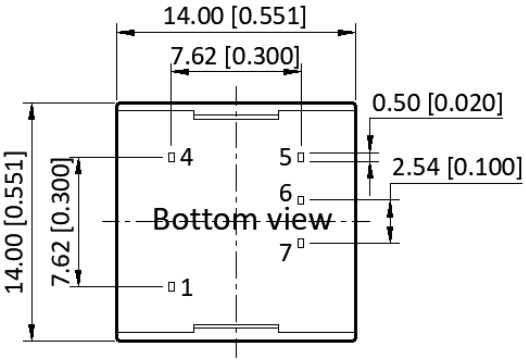
* Fuse to be selected according to application needs. MOV for 12Vin = 14D270K, 24Vin = 14D560K, 48Vin = 14D101K

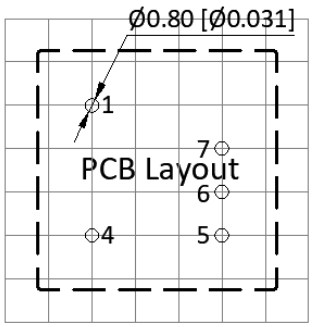
Mechanical Specifications

Default DIP package

*Model numbers with no suffix







Pin Definition

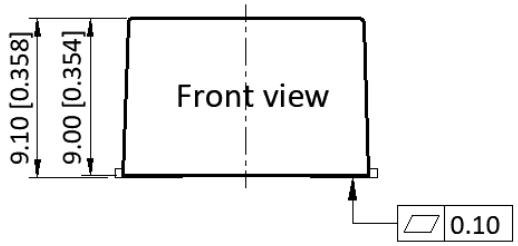
Pin #	Single Out
1	GND
4	V_{IN}
5	$+V_{OUT}$
6	No connection
7	0V

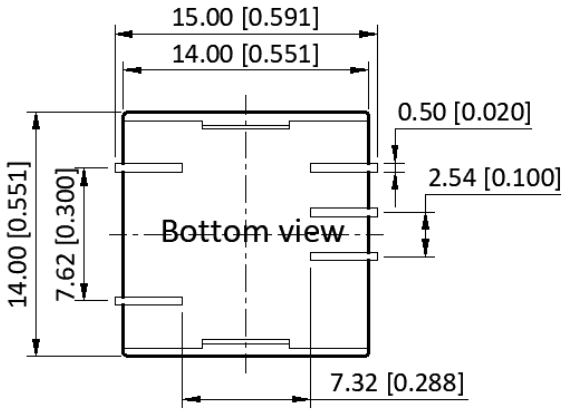
* Unless otherwise specified unit: mm [inch]
* General tolerance: ±0.50 [±0.020]
* Pin thickness: ±0.10 [±0.004]
* Footprint grid 2.54 x 2.54 mm

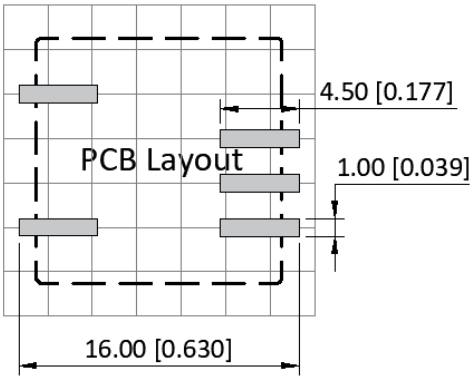
Mechanical Specifications

Optional SMD package

*Model numbers with "T" suffix







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