MV10D Series

10W, Wide 2:1 Input, 1.5KV Isolation, DIP 24 DC/DC Converters

Features

- Rated power: 10W Max
- Input voltage range: 2:1
- Regulated output
- High efficiency up to 88%
- Isolation voltage 1.5KVDC
- Remote On/Off control
- Standby power 0.11W
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Compact DIP24 package
- Under voltage, over voltage, over current, and short circuit protection
- Meet UL/EN/IEC 62368-1
- 3 year warranty

Overview

The MV10D series are 1.5KV isolated 10Watt DC/DC converters with compact DIP 24PIN footprint. 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 voltage, over current, and short circuit protections. These converters are ideally suitable for battery operated equipment, measurement equipment, telecom, wireless network, industrial control system, where isolated.

Model Numbers

Model Number	Input Voltage [VDC]			V_{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	*Range	*Max.		Max.	Min.		
MV10D-0503	5	4.5~9	12	3.3	2400	0	83	1200
MV10D-0505	5	4.5~9	12	5	2000	0	83	1000
MV10D-0512	5	4.5~9	12	12	833	0	85	470
MV10D-0515	5	4.5~9	12	15	667	0	85	330
MV10D-0524	5	4.5~9	12	24	416	0	87	100
MV10D-0505D	5	4.5~9	12	±5	±1000	0	82	1000
MV10D-0512D	5	4.5~9	12	±12	±416	0	86	470
MV10D-0515D	5	4.5~9	12	±15	±333	0	87	330
MV10D-1203	12	9-18	20	3.3	2400	0	87	1200
MV10D-1205	12	9-18	20	5	2000	0	83	1000
MV10D-1212	12	9-18	20	12	833	0	87	470
MV10D-1215	12	9-18	20	15	667	0	87	330
MV10D-1224	12	9-18	20	24	416	0	88	100
MV10D-1205D	12	9-18	20	±5	±1000	0	83	1000
MV10D-1212D	12	9-18	20	±12	±416	0	87	470
MV10D-1215D	12	9-18	20	±15	±333	0	87	330

Model Numbers

Model Number	Input Voltage [VDC]			V_{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	*Range	*Max.		Max.	Min.		
MV10D-2403	24	18-36	40	3.3	2400	0	87	1200
MV10D-2405	24	18-36	40	5	2000	0	83	1000
MV10D-2412	24	18-36	40	12	833	0	87	470
MV10D-2415	24	18-36	40	15	667	0	87	330
MV10D-2424	24	18-36	40	24	416	0	88	100
MV10D-2405D	24	18-36	40	±5	±1000	0	83	1000
MV10D-2412D	24	18-36	40	±12	±416	0	87	470
MV10D-2415D	24	18-36	40	±15	±333	0	87	330
MV10D-4803	48	36-75	80	3.3	2400	0	87	1200
MV10D-4805	48	36-75	80	5	2000	0	83	1000
MV10D-4812	48	36-75	80	12	833	0	87	470
MV10D-4815	48	36-75	80	15	667	0	87	330
MV10D-4824	48	36-75	80	24	416	0	88	100
MV10D-4805D	48	36-75	80	±5	±1000	0	83	1000
MV10D-4812D	48	36-75	80	±12	±416	0	87	470
MV10D-4815D	48	36-75	80	±15	±333	0	87	330

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

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

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
Reflected ripple current	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	60 50 40 30	-	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	-	15 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	

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 under voltage shutdown	$V_{IN, Nom}$ = 5V $V_{IN, Nom}$ = 12V $V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	3 5.5 12 25	4 6.5 15.5 30.5	-	VDC	
Startup time		-	10	-	mS	
Remote On/Off control "Ctrl" pin open or logic high [ON] "Ctrl" pin grounded or logic low [OFF]	Logic high Logic low	3.5 0	- -	12 0.7	VDC VDC	Positive Logic
Output voltage accuracy I_{OUT}=0 to 100%	Main output Other output	-	±0.5 ±1.0	±2 ±3	%	
Line regulation Full load, V_{IN} = $V_{IN, Min}$ to $V_{IN, Max}$	Main output Other output	-	±0.2 ±0.5	±0.5 ±1.0	%	
Load regulation I_{OUT}=5% to 100% of $I_{OUT, rated}$	Main output Other output	-	±0.5 ±0.5	±1.0 ±1.5	%	
Output ripple and noise 20MHz bandwidth	V_{OUT}=3.3, 5V Others	-	40 40	80 100	mVp-p	
Cross regulation $I_{OUT, main}$=50% of $I_{OUT, rated}$, $I_{OUT, other}$=10% to 100% of $I_{OUT, rated}$	Dual output	-	-	±5	%	
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, 5V
Output over voltage protection		110	-	160	% V_{OUT}	
Output over current protection	V_{OUT}=3.3, 5V Others	110 110	160 140	230 190	% 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	-	2000	-	pF	
Switching frequency* Full load		-	312.5	-	KHz	PWM mode
Operating temperature	See "Derating Curve"	-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	
Cooling method		Free air convection				
Case material		Aluminum alloy				
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		UL/EN/IEC 62368-1				
Safety certifications		IEC/EN 62368-1				
EMC		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
Size, and Weight	Default option	32.0 x 20.3 x 11.1 mm, 12.7g				

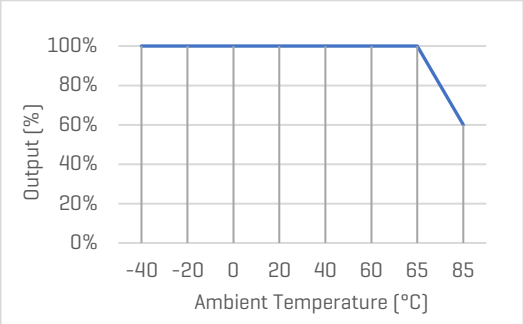
* Switching frequency is measured at full load. The converter reduces the switching frequency at low load (less than 50% load) for better efficiency.

Characteristic Curves

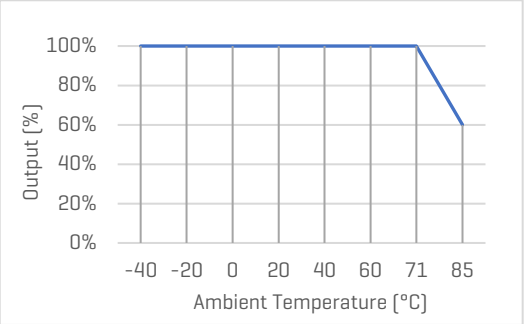
Derating Curve

Output vs Ambient Temperature

V_{OUT}= ±5V



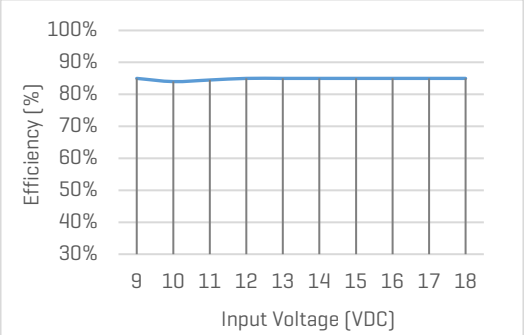
V_{OUT} = Others



Efficiency Curve

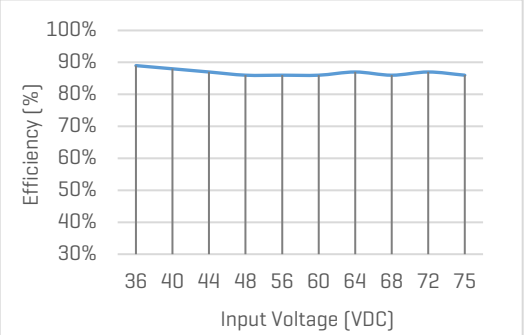
Efficiency vs Input Voltage

MV10D-2405, with full Load

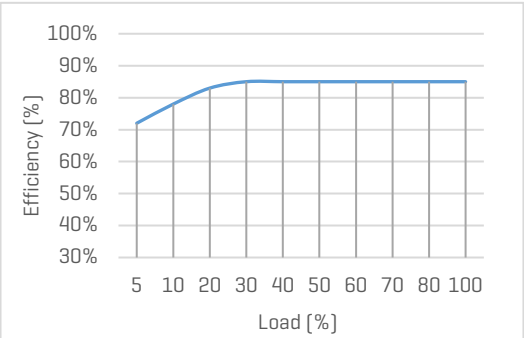


Efficiency vs Load

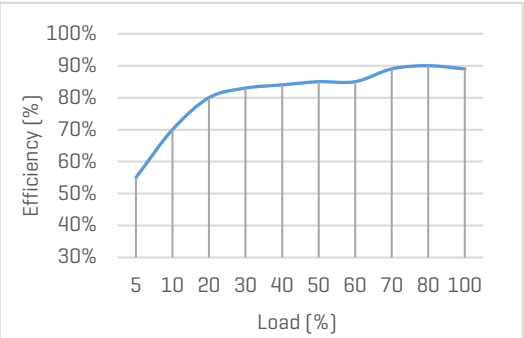
MV10D-2405, with nominal input voltage



MV10D-4812, with full Load



MV10D-4812, with nominal input voltage



Recommended Application Circuit

Typical Application Circuit

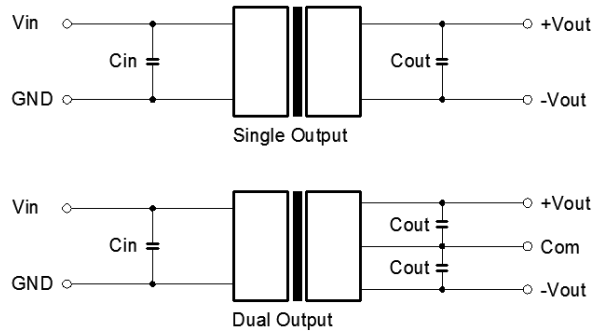


Figure 1. Typical external circuit

Note

*Typical application circuit is to further lower the input and output ripple. It is not required for general use.

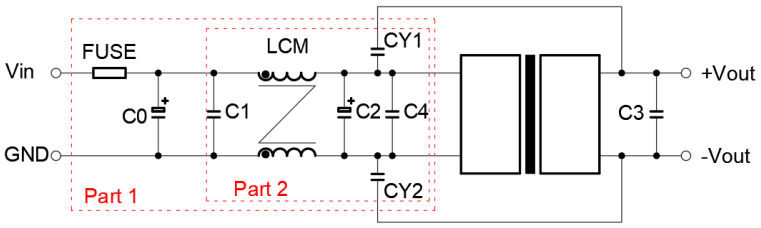
*Recommended component specifications are typical values. Excessive external capacitive load may cause startup problem.

[Table 1] Recommended component spec

Input voltage	12, 24V	48V
C_{IN}	100uF, 35V	10...47uF, 100V
C_{OUT}	10uF	10uF

EMC Enhancement for EN55032 Class B

V_{IN}=3.3, 5V



V_{IN}=Others

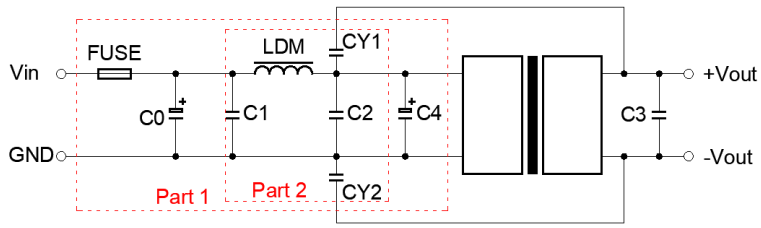


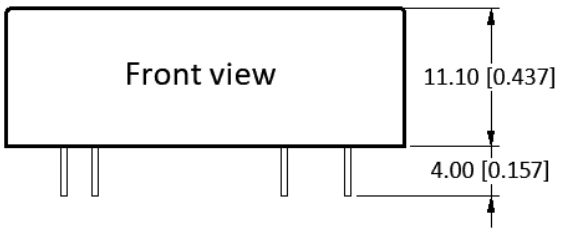
Figure 2. Circuit for EMC enhancement

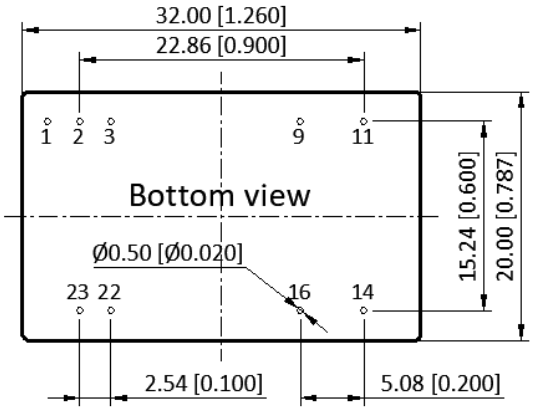
[Table 2] Recommended component spec

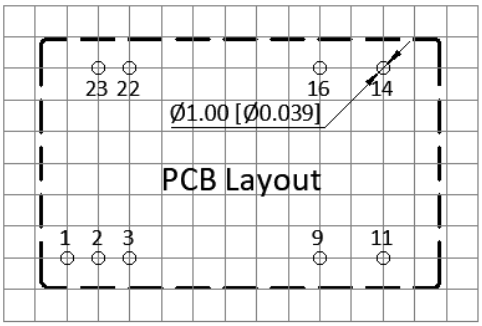
Component	LCM1	LDM1	C0, C4	C1, C2	CY1, CY2
V_{IN}=12V	1.4~1.7mH	10uH	470uF, 35V	10uF, 50V	1nF, 2KV
V_{IN}=24V	1.4~1.7mH	10uH	330uF, 50V	10uF, 50V	1nF, 2KV
V_{IN}=48V	1.4~1.7mH	10uH	330uF, 100V	10uF, 100V	1nF, 2KV

* Fuse to be selected according to application needs.
* C3 refer to C_{OUT} in Table 1

Mechanical Specifications







Pin Definition

Pin #	Single Out	Dual Out
1	Ctrl	Ctrl
2, 3	GND	GND
9	No Pin	0V
11	NC	$-V_{OUT}$
14	$+V_{OUT}$	$+V_{OUT}$
16	0V	0V
22, 23	V_{IN}	V_{IN}

* 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