

MU15H Series

15W, Wide 4:1 Input, 1.5KV Isolation, DIP2"x1" DC/DC Converters



Features

- Rated power: 15W Max
- Input voltage range 4:1
- Regulated output with 10% trimming range
- High efficiency up to 91%
- Isolation voltage 1.5KVDC
- Remote On/Off control
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Standard 2"x1" package
- Six-sided metal shielding package
- Under voltage, over voltage, over current, and short circuit protection
- Meet IEC/EN/UL 62368-1
- 3 year warranty



Overview

The MU15H series are 1.5KV isolated 15Watt DC/DC converters with standard DIP2"x1" footprint. Designed with high efficiency, they operate in a wide temperature range from -40°C to +85°C. Other features include wide 4:1 input voltage range, remote on/off control, output trimming, under voltage, over voltage, over current, and short circuit protections. These converters are ideally suitable for industrial control system, measurement equipment, telecom, wireless network.

Model Numbers

Model Number	Input Voltage [VDC]			V _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max.	Min.		
MU15H-2403	24	9~36	40	3.3	4000	0	88	4700
MU15H-2405	24	9~36	40	5	3000	0	90	4700
MU15H-2412	24	9~36	40	12	1250	0	90	1000
MU15H-2415	24	9~36	40	15	1000	0	91	820
MU15H-2424	24	9~36	40	24	625	0	91	270
MU15H-4803	48	18~75	80	3.3	4000	0	88	4700
MU15H-4805	48	18~75	80	5	3000	0	90	4700
MU15H-4812	48	18~75	80	12	1250	0	91	1000
MU15H-4815	48	18~75	80	15	1000	0	91	820
MU15H-4824	48	18~75	80	24	625	0	91	270

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

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

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, $V_{IN, Nom}=24\text{V}$	$V_{OUT}=3.3\text{V}$ $V_{OUT}=5\text{V}$ Others	-	625 694 687	-	mA	
Input current Full load, $V_{IN, Nom}=48\text{V}$	$V_{OUT}=3.3\text{V}$ $V_{OUT}=5\text{V}$ Others	-	313 348 344	-	mA	
Input current No load	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$		30 15	-	mA	
Reflected ripple current		-	30	-	mA	
Input voltage surge 1 second max	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$	-0.7 -0.7	-	50 100	VDC	
Startup input voltage	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$	-	-	9 18	VDC	
Startup time	Resistive load	-	10	-	mS	
Input under voltage shutdown	$V_{IN, Nom}=24\text{V}$ $V_{IN, Nom}=48\text{V}$	5.5 12	6.5 15.5	-	VDC	
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 -	- - 2	12 1.2 7	VDC VDC mA	Positive Logic
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 $I_{OUT}=5\%$ to 100% of $I_{OUT, rated}$		-	± 0.5	± 1.0	%	
Output ripple and noise 20MHz bandwidth, peak to peak		-	50	100	mVp-p	
Temperature coefficient	Full load	-	-	± 0.03	%/ $^{\circ}\text{C}$	
Dynamic load response $I_{OUT}=25\%\sim 50\%\sim 75\%$ of $I_{OUT, rated}$	Peak deviation** Peak deviation Recovery time	-	± 3 ± 3 300	± 7 ± 5 500	% V_{OUT} % V_{OUT} μS	** $V_{OUT}=3.3, 5$
Output voltage trim	Trim range	-	-	± 10	% V_{OUT}	
Output over voltage protection		110	-	160	% V_{OUT}	
Output over current protection		110	-	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.

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General Specifications

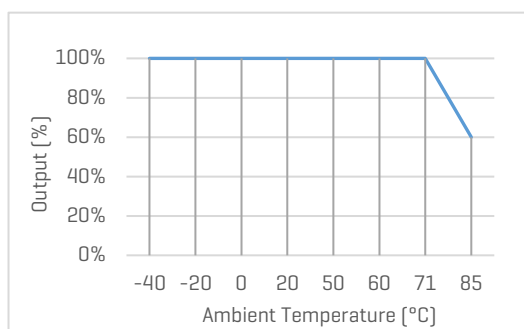
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	I/P to O/P	-	2000	-	pF	
Switching frequency*	Full load	-	300	-	KHz	PWM mode
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		IEC/EN61373 – Category 1, Grade B				
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		50.8 x 25.4 x 12 mm, 28g				

* 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



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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

C_{IN}	100uF
C_{OUT}	47...100uF

EMC Enhancement for EN55032 Class B

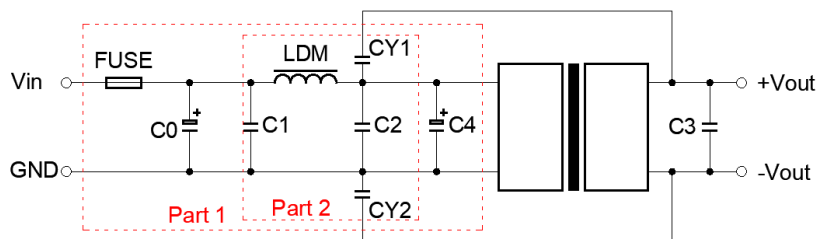


Figure 2. Circuit for EMC enhancement

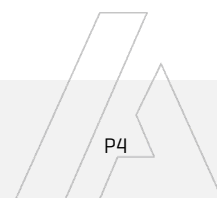
Note

* Fuse to be selected according to application needs.

* C3 refer to C_{OUT} values in Table 1

[Table 2] Recommended component spec

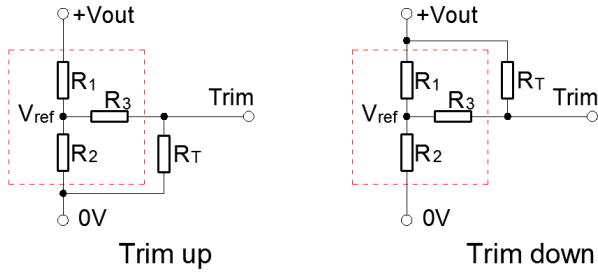
Component	LDM	C0, C4	C1, C2	CY1, CY2
$V_{IN}=24V$	2.2uH, 4A	330uF, 50V	4.7uF, 50V	1nF, 2KV
$V_{IN}=48V$	2.2uH, 2A	330uF, 100V	4.7uF, 100V	1nF, 2KV



Recommended Application Circuit [continued]

Circuits for Output Trim

* Components within the red block are internal components of the converter.



* The formulas to calculate the desired resistance of Trim resistor “ R_T ”.

Trim up: $R_T = \frac{a R_2}{R_2 - a} - R_3$ $a = \frac{V_{ref}}{V_{OUT} - V_{ref}} R_1$

Trim down: $R_T = \frac{a R_1}{R_1 - a} - R_3$ $a = \frac{V_{OUT} - V_{ref}}{V_{ref}} R_2$

[Table 3] Internal Component Spec

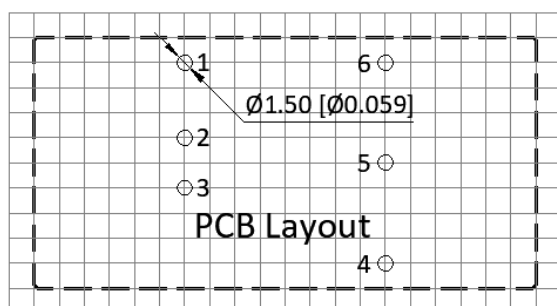
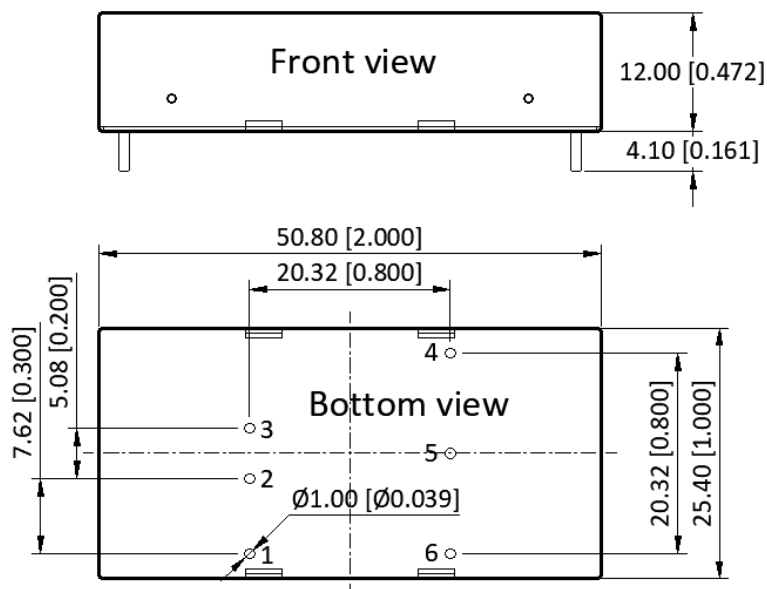
V_{OUT} [V]	R1 [K Ohm]	R2 [K Ohm]	R3 [K Ohm]	V_{ref} [V]
3.3	4.80	2.87	15	1.24
5	2.88	2.87	10	2.5
12	11.00	2.87	17.4	2.5
15	14.95	2.87	17.4	2.5
24	24.87	2.87	20	2.5

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Mechanical Specifications



Pin Definition

Pin #	Single Out
1	Ctrl
2	GND
3	V _{IN}
4	+V _{OUT}
5	Trim
6	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

