

## Features

- ▶ Rated power: 3W Max
- ▶ Input voltage range 4:1
- ▶ Regulated 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
- ▶ Six side metal shielding
- ▶ Compact DIP24 package
- ▶ Short circuit protection
- ▶ Designed to meet UL62368-1, IEC/EN62368-1
- ▶ 5 year warranty



## Overview

The MU3D series are 1.5KV isolated 3Watt DC/DC converters with standard DIP24 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, under voltage, over voltage, over current, and short circuit protections. These converters are ideally suitable for measurement equipment, telecom, wireless network, industrial control system, where isolated, tightly regulated voltages are desired.

## Model Numbers

Model Number	Input Voltage [VDC]			V <sub>OUT</sub> [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	*Range	*Max.		Max.	Min.		
MU3D-2403	24	9~36	40	3.3	909	45	75	2700
MU3D-2405	24	9~36	40	5	600	30	80	2200
MU3D-2409	24	9~36	40	9	333	17	80	1000
MU3D-2412	24	9~36	40	12	250	12	81	680
MU3D-2415	24	9~36	40	15	200	10	82	680
MU3D-2424	24	9~36	40	24	125	6	82	470
MU3D-2405D	24	9~36	40	±5	±300	±15	80	1000
MU3D-2412D	24	9~36	40	±12	±125	±6	81	330
MU3D-2415D	24	9~36	40	±15	±100	±5	82	220
MU3D-4803	48	18~75	80	3.3	909	45	76	2700
MU3D-4805	48	18~75	80	5	600	30	79	2200
MU3D-4809	48	18~75	80	9	333	17	81	1000
MU3D-4812	48	18~75	80	12	250	12	82	680
MU3D-4815	48	18~75	80	15	200	10	83	680
MU3D-4824	48	18~75	80	24	125	6	81	470

## Model Numbers [continued]

Model Number	Input Voltage [VDC]			V <sub>OUT</sub> [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	*Range	*Max.		Max.	Min.		
MU3D-4805D	48	18~75	80	±5	±300	±15	80	1000
MU3D-4812D	48	18~75	80	±12	±125	±6	82	330
MU3D-4815D	48	18~75	80	±15	±100	±5	83	220

\* 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<sub>A</sub>=25°C, nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note	
<b>Input current</b> Full load	V <sub>IN, Nom</sub> =24V V <sub>IN, Nom</sub> =48V	-	155 77	-	mA		
<b>Input current</b> No load	V <sub>IN, Nom</sub> =24V V <sub>IN, Nom</sub> =48V	-	10 8	-	mA		
<b>Reflected ripple current</b>		-	30	-	mA		
<b>Input voltage surge</b> 1 second max	V <sub>IN, Nom</sub> = 24V V <sub>IN, Nom</sub> = 48V	-0.7 -0.7	-	50 100	Vdc		
<b>Startup input voltage</b>	V <sub>IN, Nom</sub> = 24V V <sub>IN, Nom</sub> = 48V	-	-	9 18	Vdc		
<b>Output voltage accuracy</b>	5% to 100% load No load	-	±1.0 ±1.5	±3 ±5	%		
<b>Line regulation</b> Full load, V <sub>IN</sub> = V <sub>IN, Min</sub> to V <sub>IN, Max</sub>	Main output Other output	-	±0.2 ±0.5	±0.5 ±1.0	%		
<b>Load regulation</b> I <sub>OUT</sub> =5% to 100% of I <sub>OUT, rated</sub>	Main output Other output	-	±0.5 ±0.5	±1.0 ±1.5	%		
<b>Temperature coefficient</b>	Full load	-	-	0.03	%/°C		
<b>Output ripple and noise</b> 20MHz bandwidth, peak to peak		-	50	100	mV		
<b>Dynamic load response</b> I <sub>OUT</sub> =25%~50%~75% of I <sub>OUT, rated</sub>	Peak deviation Recovery time	-	±2 0.5	±5 3	% V <sub>OUT</sub> mS		
<b>Output short circuit protection</b>		Continuous, automatic recovery, hiccup					

\* 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

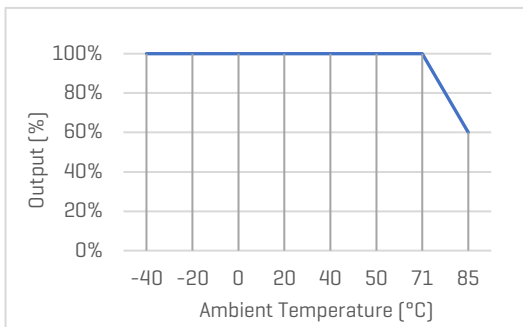
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
<b>Isolation voltage</b> 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
<b>Isolation resistance</b> Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
<b>Isolation capacitance</b> 100KHz, 0.1V	I/P to O/P	-	120	-	pF	
<b>Switching frequency</b>	Full load	-	250	-	KHz	
<b>Operating temperature</b>	See "Derating Curve"	-40	-	+85	°C	
<b>Storage temperature</b>		-55	-	+125	°C	
<b>Storage humidity</b>	None condensing	5	-	95	%RH	
<b>Pin soldering temperature</b>		-	-	300	°C	
<b>Cooling method</b>		Free air convection				
<b>Case material</b>		Aluminum alloy				
<b>Vibration</b>		IEC/EN61373 – Category 1, Grade B				
<b>MTBF</b>	MIL-HDBK-217F	>1,000,000 Hours, T <sub>A</sub> =25°C				
<b>Design based on standards</b>		UL/EN/IEC 62368-1				
<b>Safety certifications</b>		EN/IEC 62368-1				
<b>EMC</b>		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
<b>Size, and Weight</b>		32 x 20 x 11.1 mm, 14g				

## Characteristic Curves

### Derating Curve

#### Output vs Ambient Temperature

No heatsink



## Recommended Application Circuit

### Typical Application Circuit

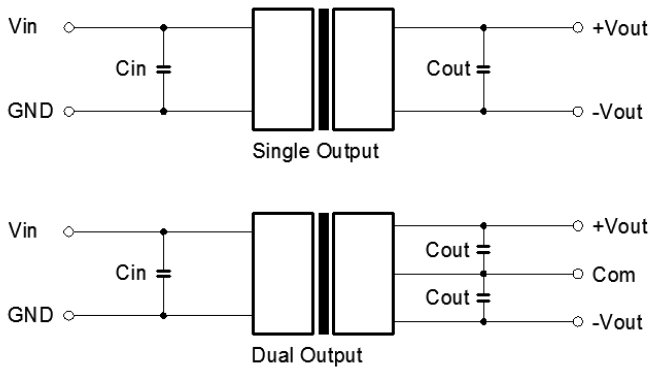


Figure 1. Typical external circuit

#### 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	24, 48V
C <sub>IN</sub>	10...47uF, 100V
C <sub>OUT</sub>	10uF, 50V

### Circuit for EMC Enhancement

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

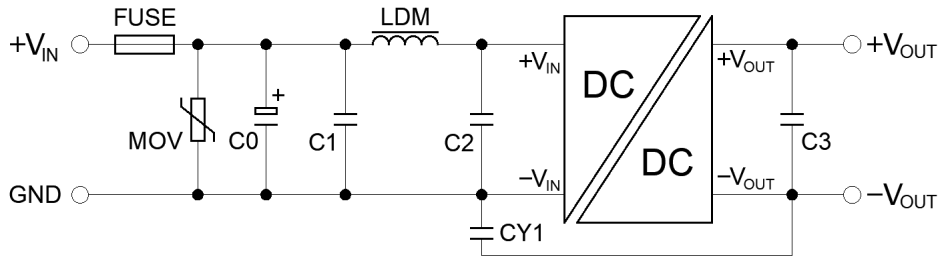


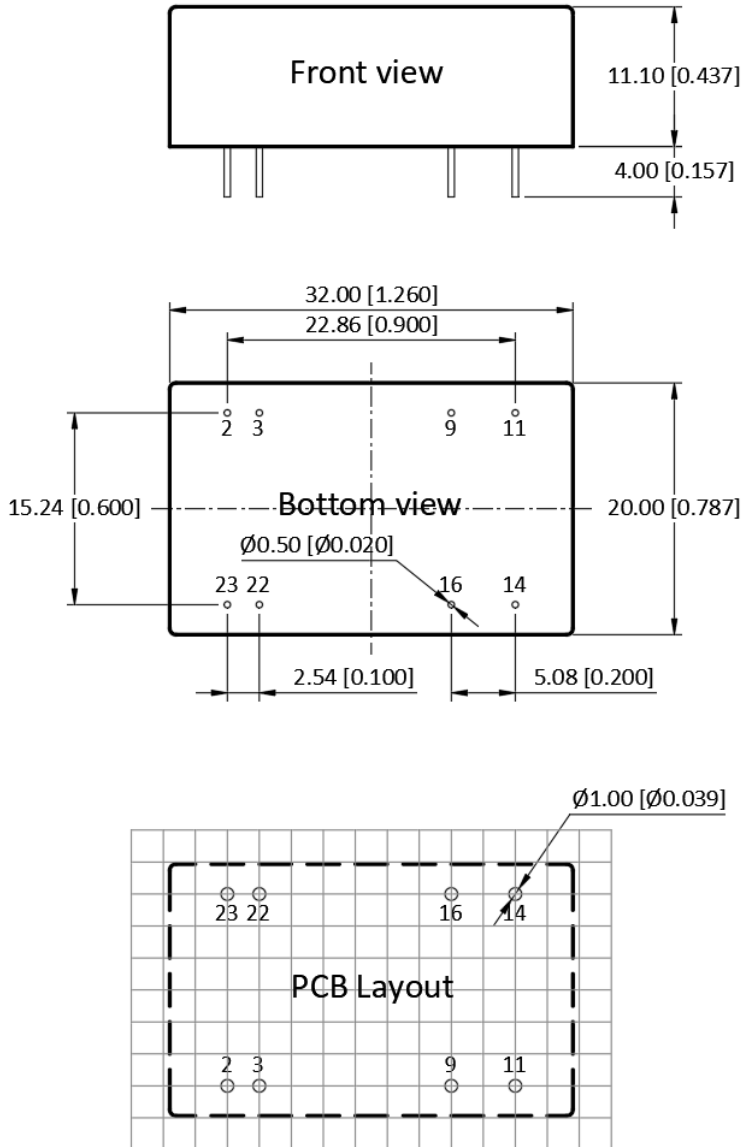
Figure 2. Circuit for EMC enhancement

[Table 2] Recommended component spec

Component	MOV	LDM	C0	C1, C2	C3	CY1
V <sub>IN</sub> =24V	S20K30	12uH	330uF, 50V	4.7uF, 50V	10uF, 50V	1nF, 2KV
V <sub>IN</sub> =48V	S14K60	12uH	330uF, 100V	4.7uF, 100V	10uF, 50V	1nF, 2KV

\* "Fuse" to be selected according to application needs. "C3" refer to relative C<sub>OUT</sub> values in Table 1.

## Mechanical Specifications



### Pin Definition

Pin #	Single Out	Dual Out
2, 3	GND	GND
9	No pin	COM
11	No connection	-V <sub>OUT</sub>
14	+V <sub>OUT</sub>	+V <sub>OUT</sub>
16	0V	COM
22, 23	V <sub>IN</sub>	V <sub>IN</sub>

\* 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