MU6G Series

6W, Wide 4:1 Input, 1.5KV Isolation, DIP"1x1" DC/DC Converters

Features

- Rated power: 6W
- Input voltage range: 9~36VDC or 18~75VDC
- Regulated output
- High efficiency up to 88%
- Isolation voltage 1.5KVDC
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Compact 1"x1" package
- Under voltage, over voltage, over current, and short circuit protection
- Designed to meet UL/EN/IEC 62368-1
- 3 year warranty

Overview

The MU6G series are 1.5KV isolated 6Watt DC/DC converters with compact DIP1"x1" footprint, and optional chassis for chassis mount or DIN rail installation. Designed with high efficiency, they operate in a wide temperature range from -40°C to +85C. 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 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.
	Nom.	Range	*Max.		Max.	Min.		
MU6G-2403	24	9-36	40	3.3	1500	0	79	1800
MU6G-2405	24	9-36	40	5	1200	0	83	1000
MU6G-2409	24	9-36	40	9	667	0	85	680
MU6G-2412	24	9-36	40	12	500	0	87	470
MU6G-2415	24	9-36	40	15	400	0	87	220
MU6G-2424	24	9-36	40	24	250	0	88	100
MU6G-2405D	24	9-36	40	±5	±600	0	83	470
MU6G-2412D	24	9-36	40	±12	±250	0	87	100
MU6G-2415D	24	9-36	40	±15	±200	0	87	100
MU6G-2424D	24	9-36	40	±24	±125	0	87	100
MU6G-4803	48	18-75	80	3.3	1500	0	79	1800
MU6G-4805	48	18-75	80	5	1200	0	83	1000
MU6G-4812	48	18-75	80	12	500	0	87	470
MU6G-4815	48	18-75	80	15	400	0	88	220
MU6G-4824	48	18-75	80	24	250	0	88	100
MU6G-4805D	48	18-75	80	±5	±600	0	83	470
MU6G-4812D	48	18~75	80	±12	±250	0	87	100
MU6G-4815D	48	18~75	80	±15	±200	0	88	100

* 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
Input current Full load, $V_{IN, Nom}$ = 24V	V_{OUT}=3.3V Others	-	261 292	-	mA	
Input current Full load, $V_{IN, Nom}$ = 48V	V_{OUT}=3.3V Others	-	130 146	-	mA	
Input current No load		-	5	12	mA	
Reflected ripple current		-	20	-	mA	
Input voltage surge 1 second max	$V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-0.7 -0.7	-	50 100	VDC	
Startup input voltage	$V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	-	-	9 18	VDC	
Input under voltage shutdown	$V_{IN, Nom}$ = 24V $V_{IN, Nom}$ = 48V	5.5 12	6.5 15.5	-	VDC	
Output voltage accuracy	I_{OUT}=0 to 100%	-	±1	±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	Main output Other output	-	±0.5 ±0.5	±1.0 ±1.5	%	
Cross regulation +I_{OUT}=50%, -I_{OUT}=10% to 100%	Dual output models	-	-	±5	%	
Output ripple and noise I_{OUT}=5% to 100% of $I_{OUT, rated}$	20MHz bandwidth	-	60	85	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, ±5V
Output over voltage protection		110	-	160	% V_{OUT}	
Output over current protection		110	140	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

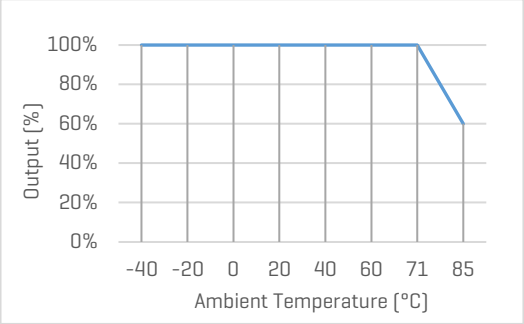
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	I/P to O/P	-	1000	-	pF	
Switching frequency	Full load	-	300	-	KHz	PWM mode
Operating temperature	See "Derating Curve"	-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	None condensing	5	-	95	%RH	
Pin soldering temperature		-	-	300	°C	
Vibration		IEC/EN61373 – Category 1, Grade B				
Cooling method		Free air convection				
Case material		Aluminum alloy				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T_A=25°C				
Design based on standards		UL/EN/IEC 62368-1				
Safety certifications		EN/IEC 62368-1				
EMC		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
Size, and Weight		25.4 x 25.4 x 12 mm, 12g				

Characteristic Curves

Derating Curve

Output vs Ambient Temperature

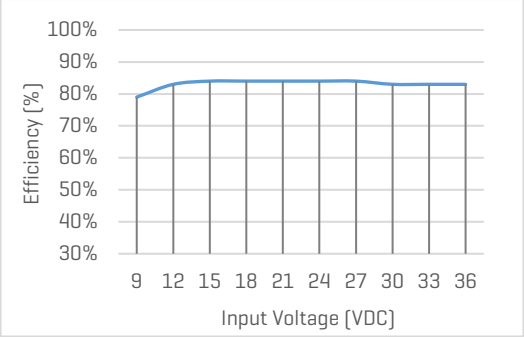
No heatsink



Efficiency Curve

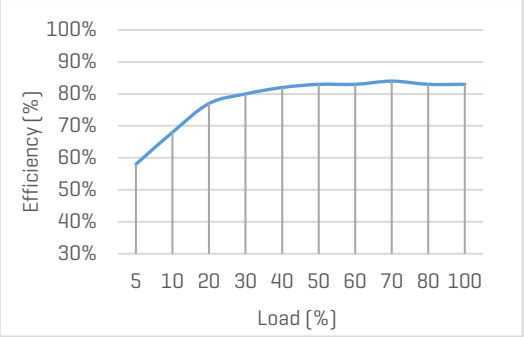
Efficiency vs Input Voltage

MU6G-2405, with full Load

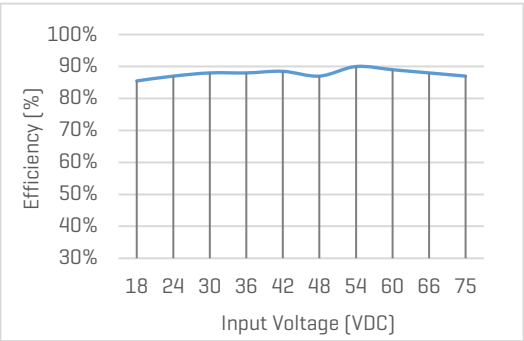


Efficiency vs Load

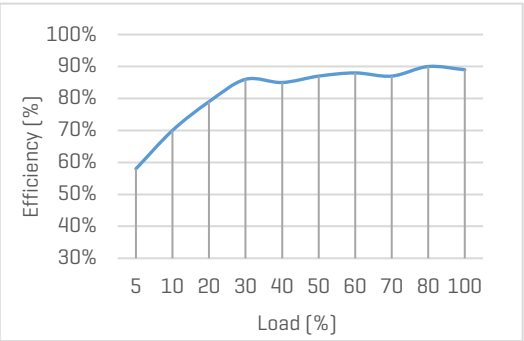
MU6G-2405, with nominal input voltage



MU6G-4815D, with full Load



MU6G-4815D, with nominal input voltage



Recommended Application Circuit

Typical Application Circuit

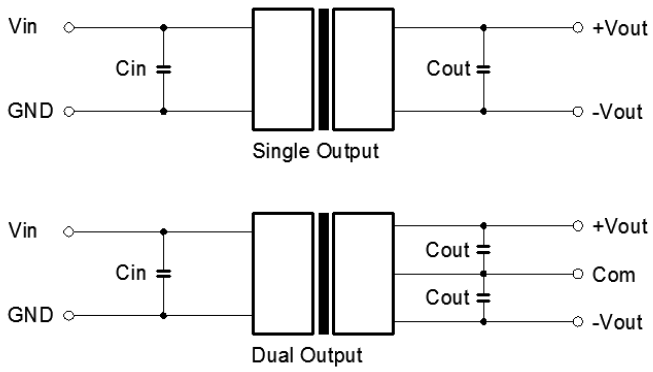


Figure 1. Typical external circuit

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	5, 12, 24V	48V
C_{IN}	100uF, 50V	10...47uF, 100V
C_{OUT}	10uF, 50V	

Circuit for EMC Enhancement

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

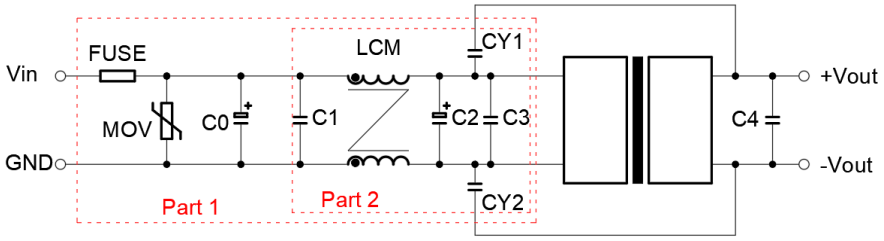


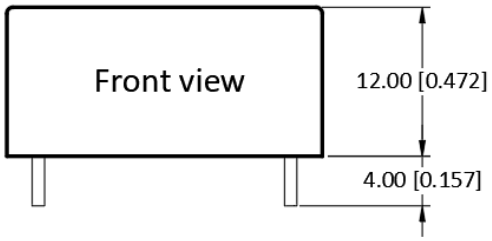
Figure 2. Circuit for EMC enhancement

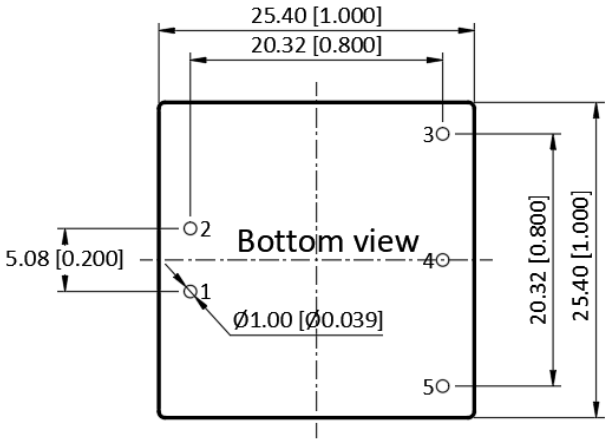
[Table 2] Recommended component spec

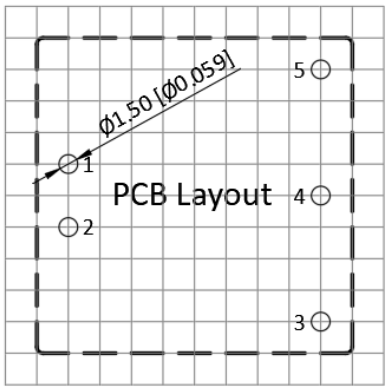
Component	MOV	LCM	C0	C1	C2	C3	CY1, CY2
V_{IN}=24V	20D470K	4.7mH	680uF, 50V	1uF, 50V	330uF, 50V	4.7uF, 50V	1nF, 2KV
V_{IN}=48V	14D101K	4.7mH	680uF, 100V	1uF, 100V	330uF, 100V	4.7uF, 100V	1nF, 2KV

* "Fuse" to be selected according to application needs. "C4" refer to relative C_{OUT} values in Table 1.

Mechanical Specifications







Pin Definition

Pin #	Single Out	Dual Out
1	GND	GND
2	V_{IN}	V_{IN}
3	$+V_{OUT}$	$+V_{OUT}$
4	No pin	COM
5	0V	$-V_{OUT}$

* 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