MU10G Series

10W, Wide 4:1 Input Range, 1.5KV Isolation, DIP1"X1" Package DC/DC Converters

Features

- Rated power: 10W Max
- Input voltage range 4:1
- Regulated single or dual out
- High efficiency up to 88%
- Isolation voltage 1.5KVDC
- Remote On/Off control
- 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 MU10G series are 1.5KV isolated 10Watt DC/DC converters with standard DIP1"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, 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.		
MU10G-2403	24	9-36	40	3.3	2400	0	77	2200
MU10G-2405	24	9-36	40	5	2000	0	82	2200
MU10G-2409	24	9-36	40	9	1111	0	85	680
MU10G-2412	24	9-36	40	12	833	0	86	470
MU10G-2415	24	9-36	40	15	667	0	86	330
MU10G-2424	24	9-36	40	24	416	0	88	100
MU10G-2405D	24	9-36	40	±5	±1000	0	83	1000
MU10G-2409D	24	9-36	40	±9	±555	0	86	680
MU10G-2412D	24	9-36	40	±12	±416	0	87	470
MU10G-2415D	24	9-36	40	±15	±333	0	87	330
MU10G-2424D	24	9-36	40	±24	±208	0	87	100
MU10G-4803	48	18-75	80	3.3	2400	0	79	2200
MU10G-4805	48	18-75	80	5	2000	0	83	2200
MU10G-4812	48	18-75	80	12	833	0	87	470
MU10G-4815	48	18-75	80	15	667	0	87	330
MU10G-4824	48	18-75	80	24	416	0	88	100

Model Numbers (continued)

Model Number	Input Voltage [VDC]			V_{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max.	Min.		
MU10G-4805D	48	18-75	80	±5	±1000	0	83	1000
MU10G-4812D	48	18~75	80	±12	±416	0	87	470
MU10G-4815D	48	18~75	80	±15	±333	0	87	330
MU10G-4824D	48	18~75	80	±24	±208	0	87	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 $V_{IN, Nom}$ = 48V	-	500 250	-	mA	
Input current No load		-	5	-	mA	
Reflected ripple current		-	30	-	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	
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 Ctrl pin current	2.7 0 -	- - 6	9 1.2 10	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 $V_{IN, Max}$	Main OUT Others	-	±0.2 ±0.5	±0.5 ±1.0	%	
Load regulation I_{OUT}=5% to 100% of $I_{OUT, rated}$	Main OUT Others	-	±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 20MHz bandwidth, peak to peak		-	40	80	mVp-p	
Temperature coefficiency	Full load	-	-	±0.03	%/°C	

Electrical Specifications (continued)

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation** Peak deviation Recovery time	-	±3 ±3 300	±7 ±5 500	% V_{OUT} % V_{OUT} uS	** V_{OUT}=3.3, 5V
Output over voltage protection		110		160	% V_{OUT}	
Output over current protection		110	150	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		-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	
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 12mm, 15g				

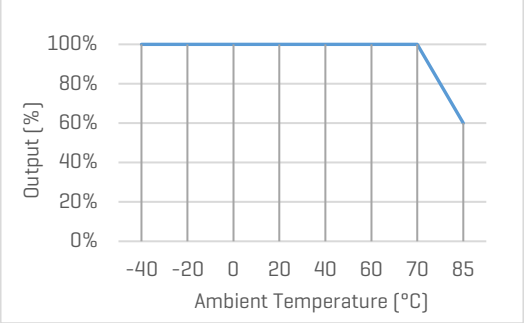
* Switching frequency is measured at full load. The converter reduces the switching frequency at low load (less than 50% load) for better efficiency.

Characteristic Curves

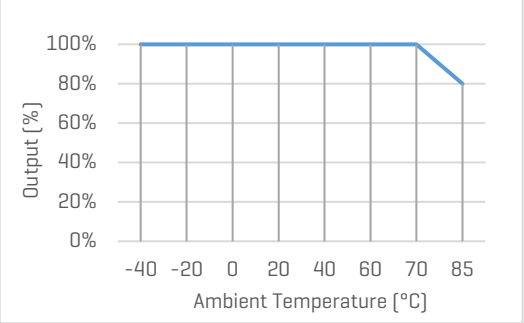
Derating Curve

Output vs Ambient Temperature

V_{OUT}=3.3, 5V, no heatsink



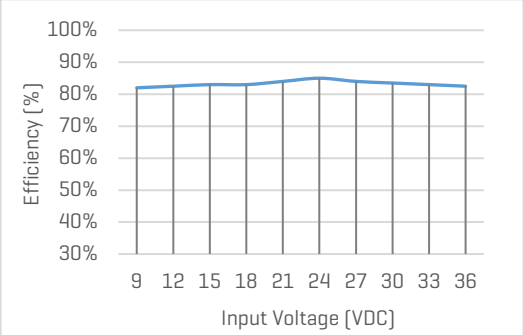
V_{OUT}=12, 15, 24V, no heatsink



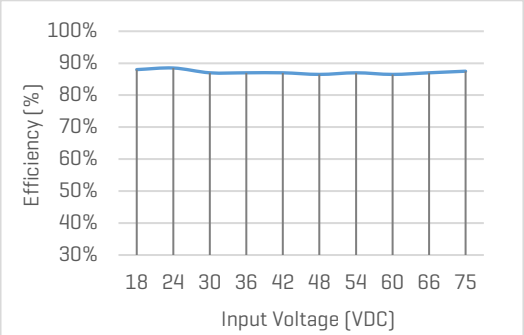
Efficiency Curve

Efficiency vs Input Voltage

MU10G-2405, with full Load

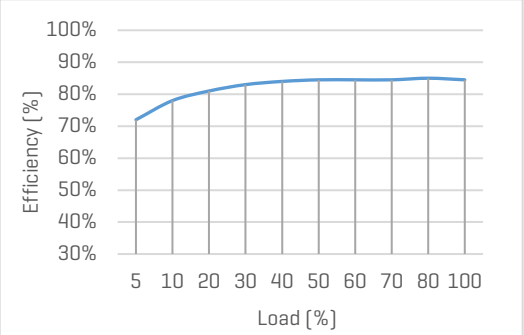


MU10G-4815D, with full Load

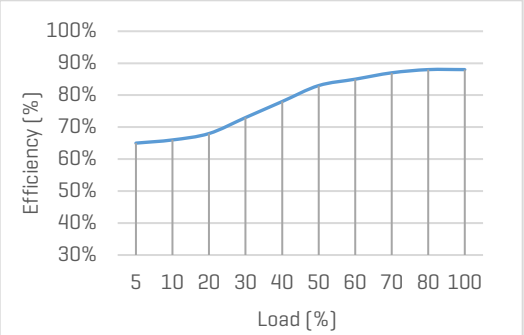


Efficiency vs Load

MU10G-2405, with nominal input voltage



MU10G-4815D, with nominal input voltage



Recommended Application Circuit

Typical Application Circuit

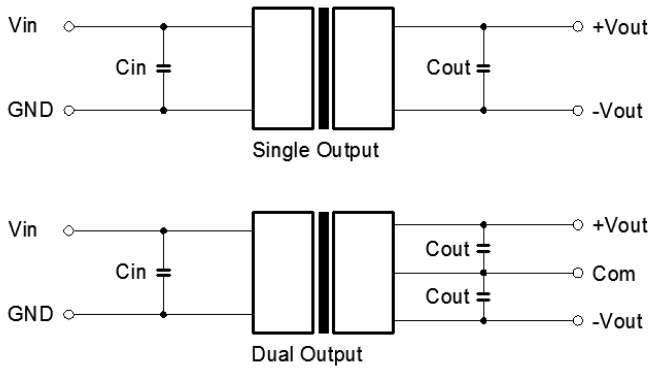


Figure 1. Typical external circuit

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

Circuit for EMC Enhancement

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

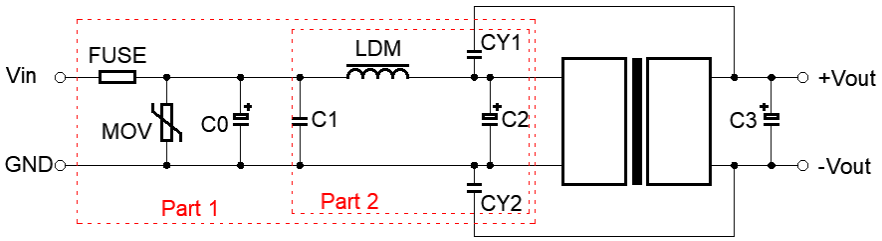


Figure 2. Circuit for EMC enhancement

[Table 2] Recommended component spec

Component	LDM1	MOV	C0, C2	C1	CY1, CY2
V_{IN}=24V	4.7uH	20D470K	330uF, 50V	1uF, 50V	1nF, 2KV
V_{IN}=48V	4.7uH	14D101K	330uF, 100V	1uF, 100V	1nF, 2KV

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

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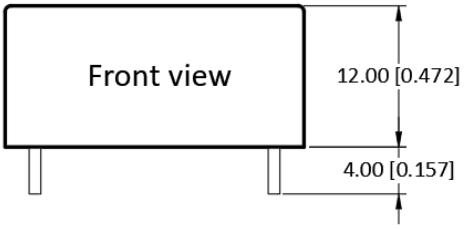
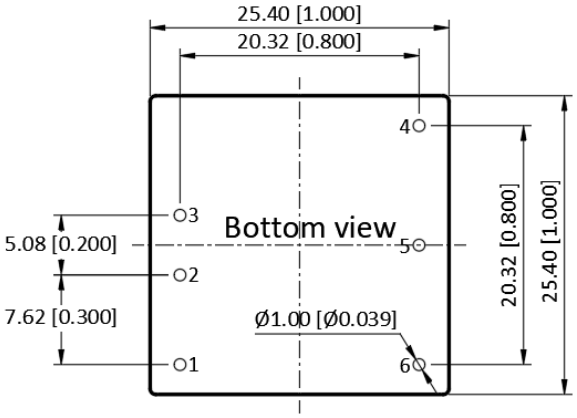
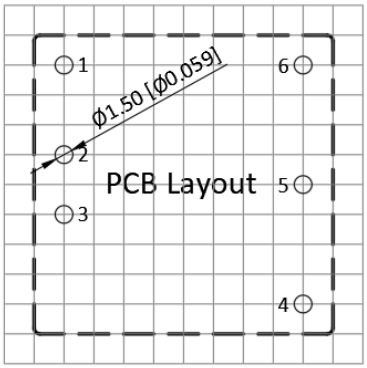
Mechanical Specifications







Pin Definition

Pin #	Single Out	Dual Out
1	Ctrl	Ctrl
2	GND	GND
3	V_{IN}	V_{IN}
4	$+V_{OUT}$	$+V_{OUT}$
5	No Pin	0V
6	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

FAVOTEK LIMITED
#17 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong
Tel: +852 8191 6662
Eml: info@favotek.com