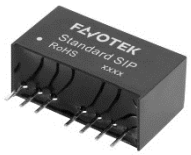
MU6S Series

6W, Wide 4:1 Input Range, 1.5KV Isolation, SIP Package DC/DC Converters

Features

- Rated power: 6W Max
- Input voltage range 4:1
- Regulated output
- High efficiency up to 87%
- Isolation voltage 1.5KVDC
- Remote On/Off control
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Compact SIP package
- Under voltage, over current and short circuit protection
- Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- 3 year warranty



Overview

The MU6S series are 1.5KV isolated 6Watt DC/DC converters with compact SIP8 footprint. Designed with high efficiency, they operate in a wide temperature range from -40°C to +105°C. Other features include wide 4:1 input voltage range, remote On/Off control, 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.		
MU6S-2403	24	9~36	40	3.3	1350	0	78	1800
MU6S-2405	24	9~36	40	5	1200	0	82	1000
MU6S-2409	24	9~36	40	9	667	0	84	470
MU6S-2412	24	9~36	40	12	500	0	86	470
MU6S-2415	24	9~36	40	15	400	0	87	220
MU6S-2424	24	9~36	40	24	250	0	85	100
MU6S-2405D	24	9~36	40	±5	600	0	80	470
MU6S-2409D	24	9~36	40	±9	333	0	83	220
MU6S-2412D	24	9~36	40	±12	250	0	83	120
MU6S-2415D	24	9~36	40	±15	220	0	83	100
MU6S-2424D	24	9~36	40	±24	125	0	82	68
MU6S-4803	48	18~75	80	3.3	1600	0	79	1200
MU6S-4805	48	18~75	80	5	1200	0	83	680
MU6S-4809	48	18~75	80	9	667	0	84	330
MU6S-4812	48	18~75	80	12	500	0	86	330
MU6S-4815	48	18~75	80	15	400	0	87	150
MU6S-4824	48	18~75	80	24	250	0	87	68

6W, Wide 4:1 Input Range, 1.5KV Isolation, SIP Package DC/DC Converters

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	Nom.	Range	*Max.		Max.	Min.		
MU6S-4805D	48	18~75	80	±5	600	0	80	470
MU6S-4809D	48	18~75	80	±9	333	0	83	220
MU6S-4812D	48	18~75	80	±12	250	0	83	120
MU6S-4815D	48	18~75	80	±15	220	0	83	100
MU6S-4824D	48	18~75	80	±24	125	0	82	68

* 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	-	238 305	-	mA	
Input current Full load, $V_{IN, Nom}$ = 48V	V_{OUT}=3.3, 5V Others	-	156 146	-	mA	
Input current No load		-	5	-	mA	
Reflected ripple current		-	50	-	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	
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 -	- - 6	12 1.2 10	VDC VDC mA	Positive Logic
Output voltage accuracy	I_{OUT}=5 to 100%	-	±1	±3	%	
Line regulation Full load, V_{IN} = $V_{IN, Min}$ to $V_{IN, Max}$		-	±0.5	±1.0	%	
Load regulation	I_{OUT}=5 to 100%	-	±0.5	±1.5	%	
Output ripple and noise I_{OUT}=5% to 100% of $I_{OUT, rated}$	20MHz bandwidth	-	50	100	mVp-p	
Temperature coefficiency	Full load	-	-	±0.03	%/°C	

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
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 current protection		110	160	230	% I_{OUT}	
Output short circuit protection		Continuous, automatic recovery				
Input filter		Capacitor				
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

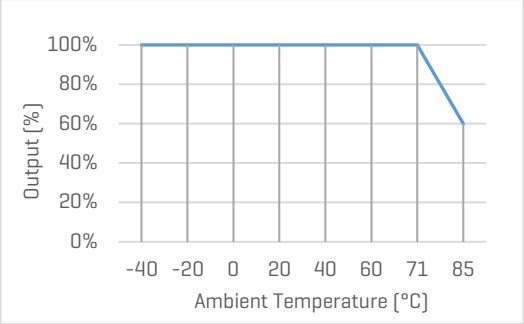
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	I/P to O/P	-	1000	-	pF	
Switching frequency*	Full load	250	312.5	400	KHz	PWM 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	
Case material		Black plastic, UL94-V0				
Cooling method		Free air convection				
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		EN/IEC 62368-1				
EMC		CISPR32, EN55032 Class B with external circuit IEC/EN61000-4-2, 3, 4, 5, 6				
Size, and Weight		22.0x9.5x12.0mm, 4.9g				

* 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



Recommended Application Circuit

Typical Application Circuit

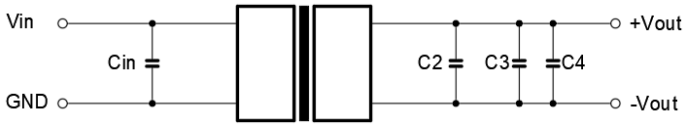


Figure 1. Typical external circuit

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

V_{OUT}	C_{IN}	C2	C3	C4
3.3...9V	100uF, 50V	100uF, 16V	10uF, 50V	0.1uF, 16V
12, 15V	100uF, 50V	47uF, 25V	10uF, 50V	0.1uF, 25V
24V	100uF, 50V	47uF, 50V	10uF, 50V	0.1uF, 50V

EMC Enhancement for EN55032 Class B

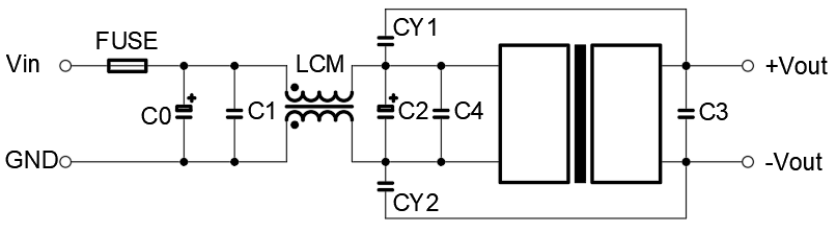


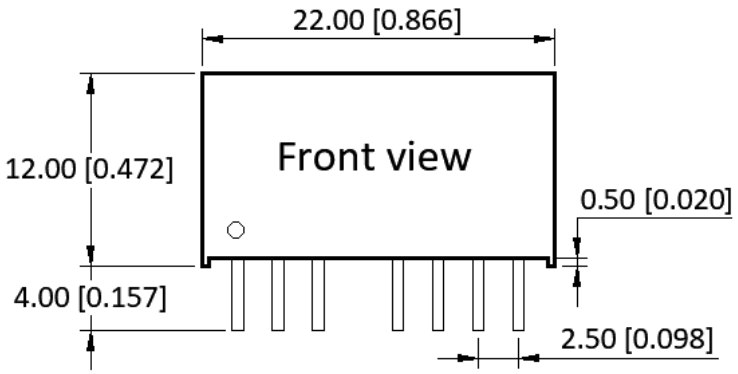
Figure 2. Circuit for EMC enhancement

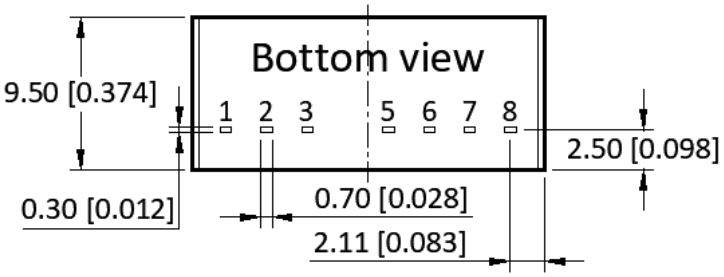
[Table 2] Recommended component spec

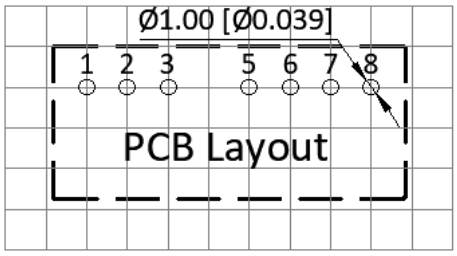
Items	LCM	C0, C4	C1, C2	CY1, CY2	C3
Spec	1.4...1.7mH	330uF, 50V	10uF, 50V	1nF, 400VAC	22uF, 50V

* Fuse to be selected according to application needs.

Mechanical Specifications







Pin Definition

Pin #	Single Out	Dual Out
1	GND	GND
2	V_{IN}	V_{IN}
3	Ctrl	Ctrl
5	No connection	No connection
6	$+V_{OUT}$	$+V_{OUT}$
7	0V	0V
8	No connection	No connection

* 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