MUK6S Series

6W, Wide 4:1 Input Range, 3KV 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 3KVDC
- Standby power 0.12W
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Compact SIP package
- Remote On/Off control
- Under voltage, over current, and short circuit protection
- Meet UL/EN/IEC 62368-1
- 5 year warranty

Overview

The MUK6S series are 3KV isolated 6Watt DC/DC converters with compact SIP8 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 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.		
MUK6S-2403	24	9-36	40	3.3	1350	0	78	1800
MUK6S-2405	24	9-36	40	5	1200	0	82	1000
MUK6S-2406	24	9-36	40	6	1000	0	82	680
MUK6S-2409	24	9-36	40	9	667	0	84	470
MUK6S-2412	24	9-36	40	12	500	0	86	470
MUK6S-2415	24	9-36	40	15	400	0	87	220
MUK6S-2424	24	9-36	40	24	250	0	85	100
MUK6S-2405D	24	9~36	40	±5	600	0	80	470
MUK6S-2409D	24	9~36	40	±9	333	0	83	220
MUK6S-2412D	24	9~36	40	±12	250	0	83	120
MUK6S-2415D	24	9~36	40	±15	200	0	83	100
MUK6S-2424D	24	9~36	40	±24	125	0	82	68
MUK6S-4803	48	18-75	80	3.3	1600	0	79	1200
MUK6S-4805	48	18-75	80	5	1200	0	83	680
MUK6S-4809	48	18-75	80	9	667	0	84	330
MUK6S-4812	48	18-75	80	12	500	0	86	330
MUK6S-4815	48	18-75	80	15	400	0	87	150
MUK6S-4824	48	18-75	80	24	250	0	87	68

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.		
MUK6S-4805D	48	18-75	80	±5	600	0	80	470
MUK6S-4809D	48	18-75	80	±9	333	0	83	220
MUK6S-4812D	48	18-75	80	±12	250	0	83	120
MUK6S-4815D	48	18-75	80	±15	200	0	83	100
MUK6S-4824D	48	18-75	80	±24	125	0	82	68

* Input voltage exceed the Max. value may cause permanent damage.
* Only typical models are listed. Other models may be available upon request.
* Add suffix "X" to the model numbers for optional Ctrl pin removed, e.g. MUK6S-2405X.

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
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	-	158 143	-	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 14.5	-	VDC
Remote On/Off control Ctrl pin logic high or open [ON] Ctrl pin logic low or grounded [OFF]	Logic high Logic low Ctrl pin current	3.5 0 -	- - 6	12 1.2 10	VDC VDC mA
Output voltage accuracy	I_{OUT}=0 to 100%	-	±1	±3	%
Line regulation Full load, V_{IN} = $V_{IN, Min}$ to $V_{IN, Max}$		-	±0.5	±1.0	%
Load regulation		-	±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
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation *V_{OUT}=3.3V, 5V Peak deviation *Others Recovery time	-	±5 ±3 300	±8 ±5 500	% V_{OUT} % V_{OUT} uS
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

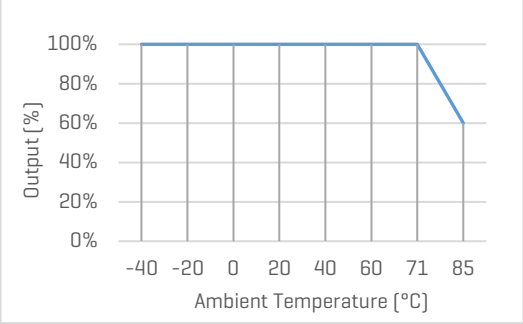
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P	3000	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	I/P to O/P	-	1000	-	pF	
Switching frequency*	Full load	-	300	-	KHz	PWM mode
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	
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, 4.5g				

* 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

*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.

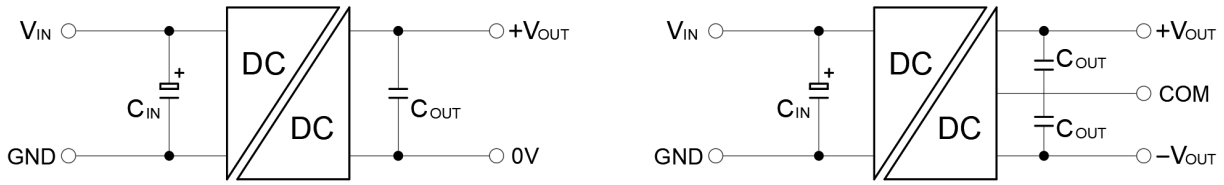


Figure 1. Typical Application Circuit

[Table 1] Recommended component spec

Item	C_{IN}	C_{OUT}
Spec	100uF, 100V	22uF, 50V

EMC Enhancement for EN55032 Class B

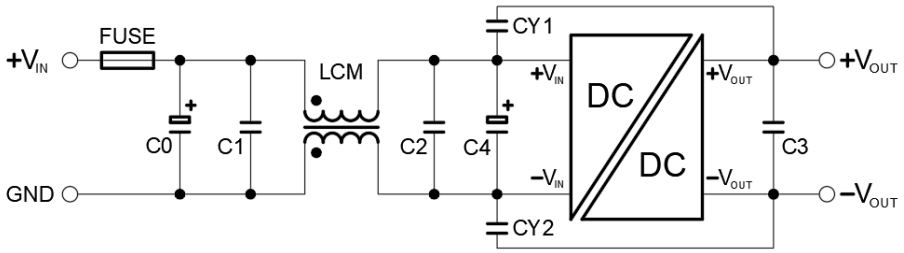


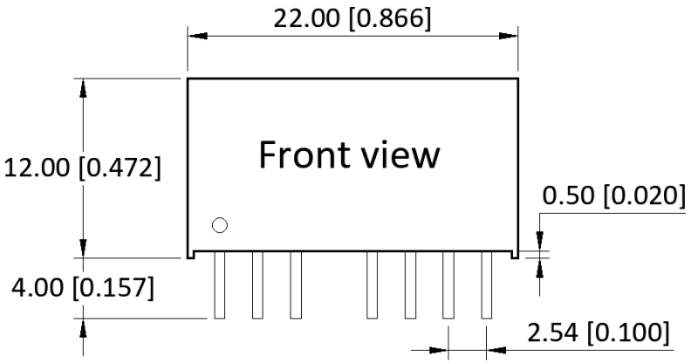
Figure 2. Circuit for EMC enhancement

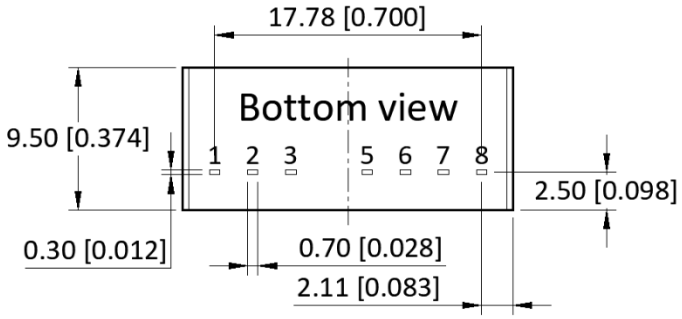
[Table 2] Recommended component spec

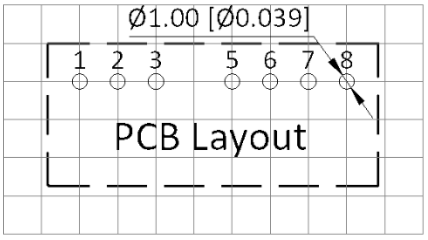
Items	LCM	C0, C4	C1, C2	CY1, CY2	C3
Spec	1.4...1.7mH	330uF, 100V	10uF, 100V	1nF, 400VAC	22uF, 50V

* 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	NC	NC
6	$+V_{OUT}$	$+V_{OUT}$
7	0V	COM
8	NC	$-V_{OUT}$

* Add suffix "X" to the model numbers for optional Ctrl pin removed
* Unless otherwise specified unit: mm [inch]
* General tolerance: ±0.25 [±0.010]
* Pin thickness: ±0.10 [±0.004]
* Footprint grid 2.54 x 2.54 mm