

MU3S Series

3W, Wide 4:1 Input Range, 1.5KV Isolation, SIP8 Package DC/DC Converters

Features

- ▶ Rated power: 3W Max
- ▶ Input voltage range: 4:1
- ▶ Regulated output
- ▶ High efficiency up to 82%
- ▶ Isolation voltage 1.5KVDC
- ▶ Low ripple and noise
- ▶ Operating temperature range: -40 ~ +85°C ambient
- ▶ RoHS compliant
- ▶ Compact SIP8 package
- ▶ Remote On/Off
- ▶ Under voltage, over current and short circuit protection
- ▶ Meet IEC/EN/UL 62368-1 CISPR32, EN55032
- ▶ 5 year warranty



Overview

The MU3S series are 1.5KV isolated 3Watt 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.
	Nominal	Range	*Max.		Max.	Min.		
MU3S-1203	12	4.5~18	20	3.3	700	0	74	1800
MU3S-1205	12	4.5~18	20	5	600	0	78	2200
MU3S-1212	12	4.5~18	20	12	250	0	80	680
MU3S-1215	12	4.5~18	20	15	200	0	81	470
MU3S-1205D	12	4.5~18	20	±5	±300	0	80	±1000
MU3S-1212D	12	4.5~18	20	±12	±125	0	80	±330
MU3S-1215D	12	4.5~18	20	±15	±100	0	80	±220
MU3S-2403	24	9~36	40	3.3	700	0	75	1800
MU3S-2405	24	9~36	40	5	600	0	80	2200
MU3S-2409	24	9~36	40	9	333	0	81	1000
MU3S-2412	24	9~36	40	12	250	0	81	680
MU3S-2415	24	9~36	40	15	200	0	82	470
MU3S-2424	24	9~36	40	24	125	0	82	330
MU3S-2405D	24	9~36	40	±5	±300	0	79	±1100
MU3S-2412D	24	9~36	40	±12	±125	0	82	±330
MU3S-2415D	24	9~36	40	±15	±100	0	82	±220
MU3S-4803	48	18~75	80	3.3	700	0	74	1800
MU3S-4805	48	18~75	80	5	600	0	79	2200

MU3S Series

3W, Wide 4:1 Input Range, 1.5KV Isolation, SIP8 Package DC/DC Converters

Model Numbers [continued]

Model Number	Input Voltage [VDC]			V _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] *Max.
	Nominal	Range	*Max.		Max.	Min.		
MU3S-4812	48	18~75	80	12	250	0	81	680
MU3S-4815	48	18~75	80	15	200	0	82	470
MU3S-4824	48	18~75	80	24	125	0	82	330
MU3S-4805D	48	18~75	80	±5	±300	0	79	±1000
MU3S-4812D	48	18~75	80	±12	±125	0	80	±330
MU3S-4815D	48	18~75	80	±15	±100	0	80	±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_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} = 12V		306		mA	
	V _{IN, Nom} = 24V	-	140	-		
	V _{IN, Nom} = 48V		82			
Input current No load	V _{IN, Nom} = 12V		60		mA	
	V _{IN, Nom} = 24V	-	25	-		
	V _{IN, Nom} = 48V		15			
Input reflected ripple current		-	15	-	mA	
Input voltage surge 1 second max	V _{IN, Nom} = 12V	-0.7		25	Vdc	
	V _{IN, Nom} = 24V	-0.7	-	50		
	V _{IN, Nom} = 48V	-0.7		100		
Startup input voltage	V _{IN, Nom} = 12V			4.5	Vdc	
	V _{IN, Nom} = 24V	-	-	9		
	V _{IN, Nom} = 48V			18		
Input under voltage protection	V _{IN, Nom} = 12V			4	Vdc	
	V _{IN, Nom} = 24V	-	-	8		
	V _{IN, Nom} = 48V			16		
Output voltage accuracy	V _{OUT} =3.3V, 5V		±2	±5	%	
	All others	-	±1	±3		
Line regulation Full load, V _{IN} = V _{IN, Min} to V _{IN, Max}		-	±0.3	±0.5	%	
Load regulation I _{OUT} =5% to 100% of I _{OUT, rated}		-	±0.5	±1.0	%	
Temperature coefficient	Full load	-	0.02	0.03	%/°C	
Output ripple and noise	20MHz bandwidth	-	50	150	mVp-p	

Electrical Specifications

Unless otherwise indicated, specifications are measured at $T_A=25^{\circ}\text{C}$, nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Dynamic load response $I_{OUT}=25\%\sim 50\%\sim 75\%$ of $I_{OUT, rated}$	Peak deviation Recovery time	-	± 3 300	± 5 500	% V_{OUT} 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	3.5 0 -	- - 5	12 0.7 10	VDC VDC mA	Positive Logic
Output over current protection		110	140	-	% I_{OUT}	
Output short circuit protection		Continuous, automatic recovery				

* 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.

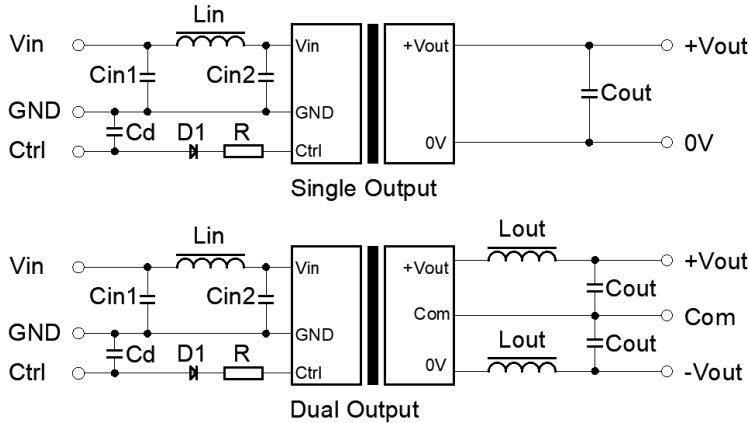
General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage Tested for 1 minute	Input to Output	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	Input to Output	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	Input to Output	-	1000	-	pF	
Switching frequency	Full load	-	330	-	KHz	
Operating temperature	No derating	-40	-	+85	$^{\circ}\text{C}$	
Storage temperature		-55	-	+125	$^{\circ}\text{C}$	
Storage humidity	None condensing	5	-	95	%RH	
Pin soldering resistance	1.5mm, 10 sec	-	-	300	$^{\circ}\text{C}$	
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, $T_A=25^{\circ}\text{C}$				
Design based on standards		IEC/EN/UL 62368-1				
Safety certifications		IEC/EN 62368-1				
EMC [Fig x] means connected with external circuit as shown in the Recommended External Circuit section	CE & RE ESD RS EFT Surge CS	CISPR32, EN55032 Class B with [Fig 2] IEC/EN61000-4-2, Contact $\pm 4\text{kV}$, Criteria B IEC/EN61000-4-3, 10V/m, Criteria A IEC/EN61000-4-4, $\pm 2\text{kV}$, Criteria B [Fig 1] IEC/EN61000-4-5, Line to Line $\pm 2\text{kV}$, Criteria B [Fig 1] IEC/EN61000-4-6, 3Vrms, Criteria A				
Size & Weight		22x9.5x12mm, 4.5g				

Recommended Application Circuit

Typical External Circuit

*Models in this series are 100% tested in production using this circuit.



Recommended Component Spec

Item	V _{IN} =12V	V _{IN} =24V, 48V
Cin1	100uF	10uF
Cin2	47uF	1uF
Cout	100uF	100uF
Cd	47nF, 100V	47nF, 100V
Lin	4.7uH~12uH	4.7uH~12uH
Lout	2.2uH~10uH	2.2uH~10uH

Figure 1. Typical Application Circuit

EMC Enhancement for EN55032 Class B

*External circuits within block "Part 1" is to improve EMS, "Part 2" to improve EMI test performance, "Part 3" to use the remote on/off control function.

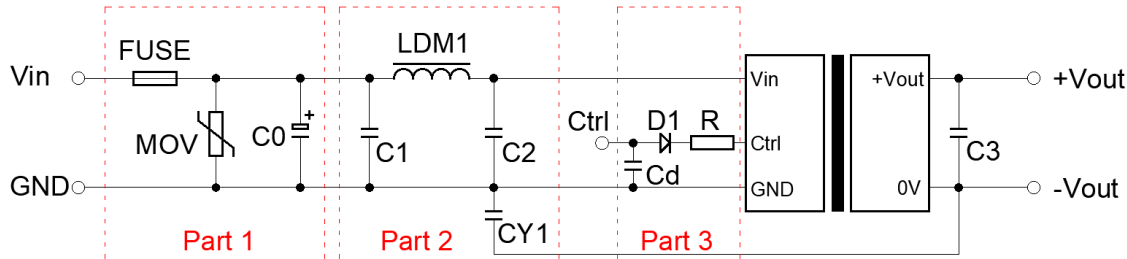


Figure 2. Circuit for EMC Enhancement

Recommended component spec

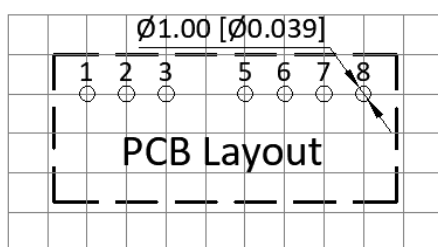
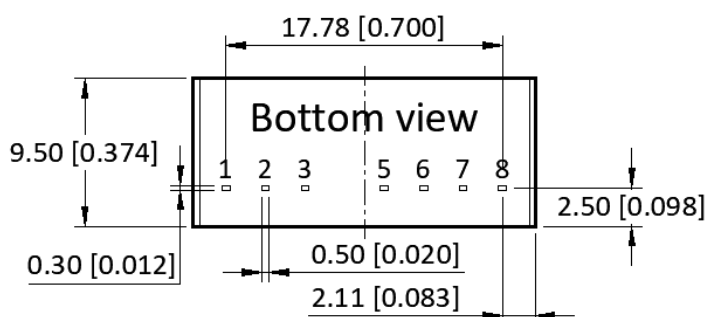
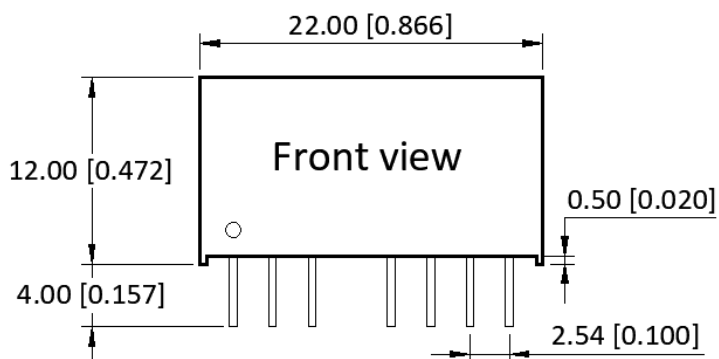
Items	C0	C1, C2	Cd	CY1	D1	LDM1	MOV
V _{IN} =12V	1K uF, 25V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	14D390K
V _{IN} =24V	330uF, 50V	4.7uF, 50V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	14D560K
V _{IN} =48V	330uF, 100V	4.7uF, 100V	47nF, 100V	1nF, 2KV	60V, 1A	12uH	14D101K

*C3 refer to C_{OUT} in above Figure 1, FUSE to be selected according to application needs.

*Resistor R may be calculated using following formula:
$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

*V_C is the Ctrl to GND voltage, V_D is voltage drop on D1, I_C is current flow into Ctrl.

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	-V _{OUT} [0V]	COM
8	NC	-V _{OUT}

* 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