

## FEATURES

- ▶ Industrial SMD Package
- ▶ Unregulated Output Voltage
- ▶ I/O Isolation 3000 VDC
- ▶ Operating Ambient Temp. Range -40°C to +90°C
- ▶ Cleaning-washable Process Available(option)
- ▶ Qualified for Lead-free Reflow Solder Process  
According to IPC/JEDEC J-STD-020D.1
- ▶ Tape & Reel Package Available



## PRODUCT OVERVIEW

The MINMAX MSLU300 series is a range of 1W DC-DC converters in a SMD- Package featuring high I/O isolation of 3000VDC. The very small footprint makes this product the ideal solution for many applications where a voltage has to be isolated i.e for noise reduction, ground loop elimination, in digital interfaces or where a converted voltage is required.

An excellent efficiency allows an operating temperature range of -40°C to +85°C. With a new package design these converters are fully qualified for the higher temperature profile used in lead-free reflow solder processes. For automated SMD production lines the product can be supplied in tape& reel package.

### Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Load Regulation	Max. capacitive Load	Efficiency (typ.)
				Max.	@No Load			
	VDC	VDC	mA	@Max. Load	@No Load	% (max.)	µF	@Max. Load
MSLU301	5 (4.5 ~ 5.5)	3.3	260	238	30	10	33	72
MSLU302		5	200	267		10	33	75
MSLU304		12	84	255		7	4.7	79
MSLU305		15	67	251		7	4.7	80
MSLU306		±5	±100	267		10	10#	75
MSLU308		±12	±42	255		7	2.2#	79
MSLU309		±15	±34	255		7	2.2#	80
MSLU311	12 (10.8 ~ 13.2)	3.3	260	98	15	10	33	73
MSLU312		5	200	110		8	33	76
MSLU314		12	84	105		5	4.7	80
MSLU315		15	67	103		5	4.7	81
MSLU316		±5	±100	110		8	10#	76
MSLU318		±12	±42	105		5	2.2#	80
MSLU319		±15	±34	106		5	2.2#	80
MSLU321	24 (21.6 ~ 26.4)	3.3	260	51	8	10	33	70
MSLU322		5	200	57		8	33	73
MSLU324		12	84	53		5	4.7	79
MSLU325		15	67	53		5	4.7	79
MSLU326		±5	±100	57		8	10#	73
MSLU328		±12	±42	53		5	2.2#	79
MSLU329		±15	±34	54		5	2.2#	79

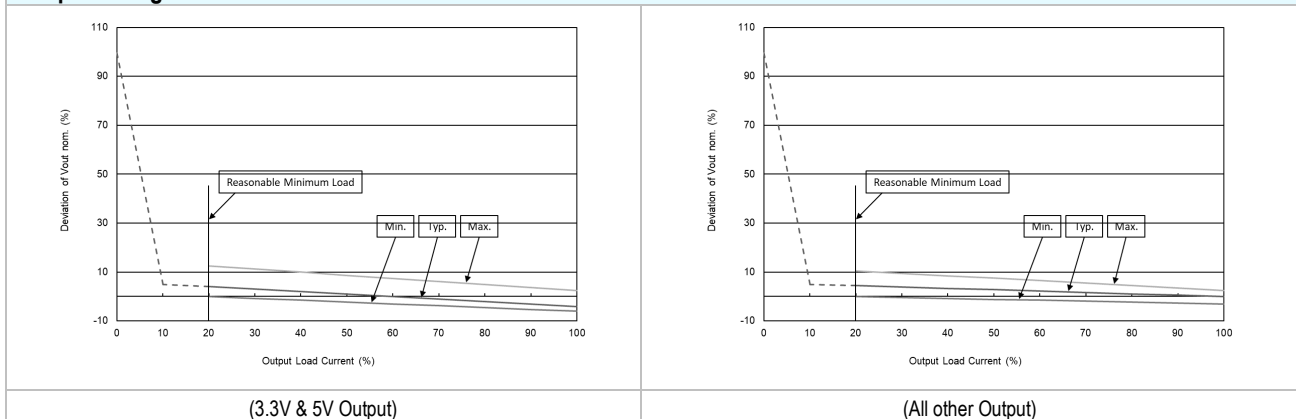
# For each output

**Input Specifications**

Parameter	Model	Min.	Typ.	Max.	Unit
Input Voltage Range	5V Input Models	4.5	5	5.5	VDC
	12V Input Models	10.8	12	13.2	
	24V Input Models	21.6	24	26.4	
Input Surge Voltage (1 sec. max.)	5V Input Models	-0.7	---	9	VDC
	12V Input Models	-0.7	---	18	
	24V Input Models	-0.7	---	30	
Input Filter	All Models	Internal Capacitor			

**Output Specifications**

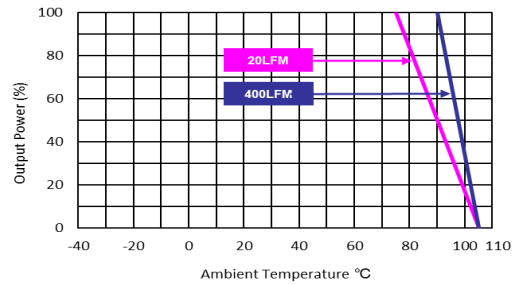
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.1	±1.0	%
Line Regulation	For Vin Change of 1%	---	±1.2	±1.5	%
Load Regulation	Io=20% to 100%	See Model Selection Guide (Operation at lower load will not damage the converter, but it may not meet all specifications)			
Ripple & Noise	0-20 MHz Bandwidth	---	---	100	mV <sub>P-P</sub>
Temperature Coefficient		---	±0.01	±0.02	%/°C
Short Circuit Protection	0.5 Second Max., Automatic Recovery				

**Output Voltage Tolerance**

**General Specifications**

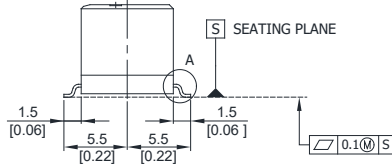
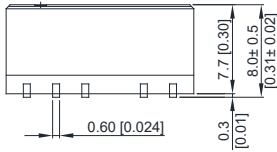
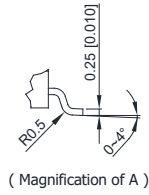
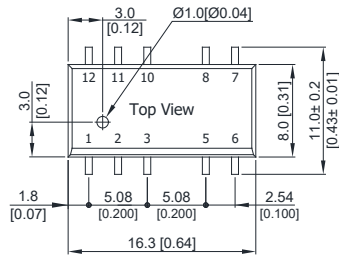
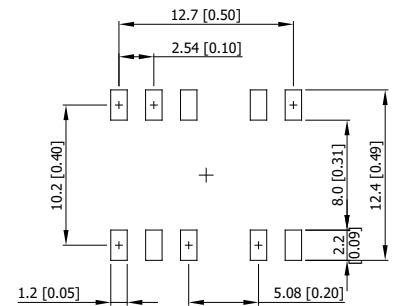
Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	3000	---	---	VDC
I/O Isolation Resistance	500 VDC	10	---	---	GΩ
I/O Isolation Capacitance	100kHz, 1V	---	60	100	pF
Switching Frequency		50	100	150	kHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	2,000,000			Hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 2			

**Environmental Specifications**

Parameter	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	-40	+90	°C
Case Temperature	---	+105	°C
Storage Temperature Range	-50	+125	°C
Humidity (non condensing)	---	95	% rel. H
Lead-free Reflow Solder Process	IPC/JEDEC J-STD-020D.1		

**Power Derating Curve**

**Notes**

- 1 Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however they may not meet all specifications listed.
- 3 We recommend to protect the converter by a fast blow fuse in the input supply line.
- 4 Other input and output voltage may be available, please contact MINMAX.
- 5 Specifications are subject to change without notice.
- 6 The repeated high voltage isolation testing of the converter can degrade isolation capability, to a lesser or greater degree depending on materials, construction, environment and reflow solder process. Any material is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage. Furthermore, the high voltage isolation capability after reflow solder process should be evaluated as it is applied on system.

**Package Specifications**
**Mechanical Dimensions**

**Connecting Pin Patterns**


- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.25 (X.XX±0.01)  
X.XX±0.13 (X.XXX±0.005)
- ▶ Pins ±0.05 (±0.002)

**Pin Connections**

Pin	Single Output	Dual Output
1	-Vin	-Vin
2	+Vin	+Vin
3	NA	NA
5	-Vout	Common
6	NA	-Vout
7	NA	NA
8	+Vout	+Vout
10	NA	NA
11	NA	NA
12	NA	NA

NA : Not Available for Electrical Connection

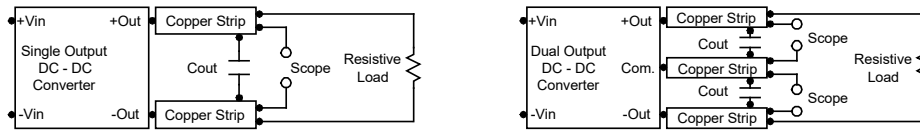
**Physical Characteristics**

Case Size	: 16.3x8.0x7.7mm (0.64x0.31x0.30 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Pin Material	: Phosphor Bronze
Weight	: 2g

Order Code Table	
Standard	For cleaning-washable process
MSLU301	MSLU301-W
MSLU302	MSLU302-W
MSLU304	MSLU304-W
MSLU305	MSLU305-W
MSLU306	MSLU306-W
MSLU308	MSLU308-W
MSLU309	MSLU309-W
MSLU311	MSLU311-W
MSLU312	MSLU312-W
MSLU314	MSLU314-W
MSLU315	MSLU315-W
MSLU316	MSLU316-W
MSLU318	MSLU318-W
MSLU319	MSLU319-W
MSLU321	MSLU321-W
MSLU322	MSLU322-W
MSLU324	MSLU324-W
MSLU325	MSLU325-W
MSLU326	MSLU326-W
MSLU328	MSLU328-W
MSLU329	MSLU329-W

**Test Setup**
**Peak-to-Peak Output Noise Measurement Test**

Use a  $C_{out}$  0.33 $\mu$ F ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20 MHz. Position the load between 50 mm and 75 mm from the DC-DC Converter.


**Technical Notes**
**Maximum Capacitive Load**

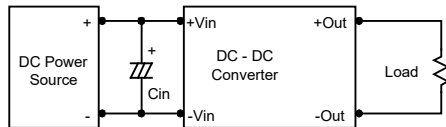
The MSLU300 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

**Input Source Impedance**

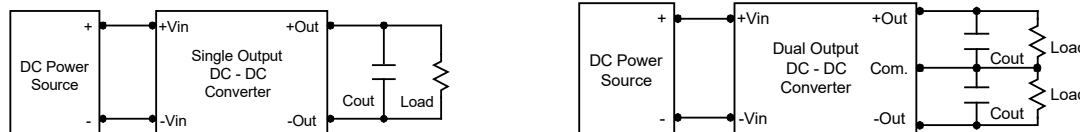
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.

In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0 $\Omega$  at 100 kHz) capacitor of a 2.2 $\mu$ F for the 5V input devices, a 1.0 $\mu$ F for the 12V input devices and a 0.47 $\mu$ F for the 24V devices.


**Output Ripple Reduction**

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 1.0 $\mu$ F capacitors at the output.


**Thermal Considerations**

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 105°C. The derating curves are determined from measurements obtained in a test setup.

