MINMAX®

MBU100 SERIES

DC/DC CONVERTER 1W, SIP-Package

FEATURES

- **Miniature SIP-Package with Industry Standard Pinout**
- **Package Dimension:**
  11.5 x 10.2 x *6.1 mm (0.45"x 0.40"x 0.24") 3.3V,5V&12V Models
  11.5 x 10.2 x *7.1 mm (0.45"x 0.40"x 0.28") 24V Models
- **Single and Dual Output Models**
- **I/O-Isolation 1000 VDC**
- **Operating Temp. Range -40°C to +85°C**
- **3 Years Product Warranty**

PRODUCT OVERVIEW

The MINMAX MBU100 series is a range of 1W DC/DC converters in a miniature SIP Package featuring I/O-isolation of 1000VDC.
A high efficiency allows an operating temperature range of –40°C to +85°C.
These converters offer an economical solution for many space critical applications where a voltage has to be isolated i.e for noise reduction, ground loop elimination, digital interfaces or for board level power distribution.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current		Input Current		Load Regulation	Max. capacitive Load	Efficiency (typ.)
			Max.	Min.	@Max. Load	@No Load			@Max. Load
	VDC	VDC	mA	mA	mA(typ.)	mA(typ.)	% (max.)	uF	%
MBU135	3.3 (2.97 ~ 3.63)	3.3	260	6	351	35	14	33	74
MBU131		5	200	4	394		14		77
MBU105	5 (4.5 ~ 5.5)	3.3	260	6	238	30	11	33	72
MBU101		5	200	4	290		11		69
MBU102		9	110	2	260		8		76
MBU103		12	84	1.5	262		7		77
MBU104		15	67	1	258		6		78
MBU111	12 (10.8 ~ 13.2)	5	200	4	117	13	9	33	71
MBU112		9	110	2	107		5		77
MBU113		12	84	1.5	106		5		79
MBU114		15	67	1	105		4		80
MBU121	24 (21.6 ~ 26.4)	5	200	4	60	7	8	33	70
MBU122		9	110	2	54		5		76
MBU123		12	84	1.5	53		4		79
MBU124		15	67	1	53		4		79

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Input Voltage Range	3.3V Input Models	2.97	3.3	3.63	VDC
	5V Input Models	4.5	5	5.5	
	12V Input Models	10.8	12	13.2	
	24V Input Models	21.6	24	26.4	
Input Surge Voltage (1 sec. max.)	3.3V Input Models	-0.7	---	6	
	5V Input Models	-0.7	---	9	
	12V Input Models	-0.7	---	18	
	24V Input Models	-0.7	---	30	
Reverse Polarity Input Current	All Models	---	---	0.3	A
Input Filter		Internal Capacitor			
Internal Power Dissipation		---	---	450	mW

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±1.0	±3.0	%
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			
Ripple & Noise (20MHz)		---	100	150	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	200	mV P-P
Ripple & Noise (20MHz)		---	---	15	mV rms
Temperature Coefficient		---	±0.01	±0.02	%/°C
Short Circuit Protection		0.5 Second Max.			

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage (rated)	60 Seconds	1000	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V	---	60	100	pF
Switching Frequency		50	90	110	KHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	2,000,000	-----	-----	Hours

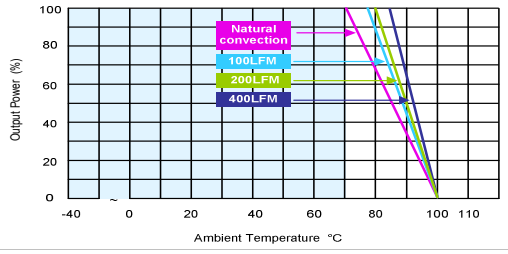
Input Fuse

3.3V Input Models	5V Input Models	12V Input Models	24V Input Models
800mA Slow-Blow Type	500mA Slow-Blow Type	200mA Slow-Blow Type	100mA Slow-Blow Type

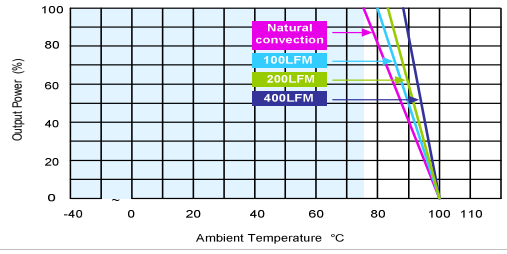
Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature Range (with Derating)	Ambient	-40	+85	°C
Case Temperature		---	+90	°C
Storage Temperature Range		-50	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Free-Air convection			
Lead Temperature (1.5mm from case for 10Sec.)		---	260	°C

Power Derating Curve



(5V Output Only)



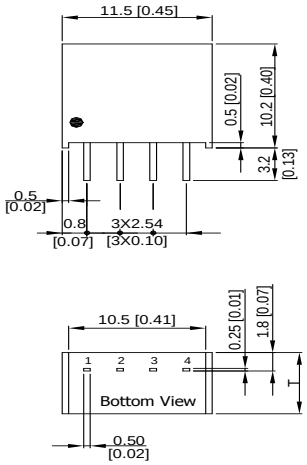
(All Other Output)

Notes

1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
2. Ripple & Noise measurement bandwidth is 0-20MHz.
3. 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.
4. All DC/DC converters should be externally fused at the front end for protection.
5. Other input and output voltage may be available, please contact factory.
6. Specifications subject to change without notice.

Package Specifications

Mechanical Dimensions



Pin Connections

Pin	Function
1	-Vin
2	+Vin
3	-Vout
4	+Vout

T: 6.1mm(0.24 inch) for 3.3V&5V&12V Input Models
T: 7.1mm(0.28 inch) for 24V Input Models

- 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)

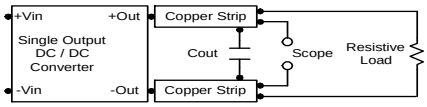
Physical Characteristics

Case Size(3.3V, 5V, 12V Input)	:	11.5x6.1x10.2mm (0.45x0.24x0.40 Inches)
Case Size(24V Input)	:	11.5x7.1x10.2mm (0.45x0.28x0.40 Inches)
Case Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Weight(3.3V, 5V, 12V Input)	:	1.3g
Weight(24V Input)	:	1.7g

Test Configurations

Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.33uF 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.



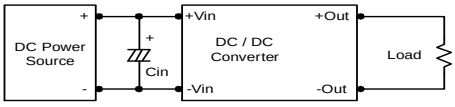
Design & Feature Considerations

Maximum Capacitive Load

The MBU100 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. For optimum performance we recommend 33uF maximum capacitive load for devices. The maximum capacitance can be found in the data sheet.

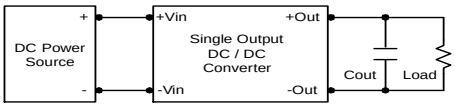
Input Source Impedance

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 comended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 2.2uF for the 3.3V, 5V input devices, a 1.0uF for the 12V input devices and a 0.47uF 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 1uF 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 90°C. The derating curves are determined from measurements obtained in a test setup.