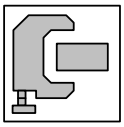
MBU100 Series

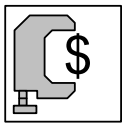
1W, Ultra Miniature SIP, Single Output DC/DC Converter

RoHS compliant

Key Features

- *Efficiency up to 80%*
- *1000VDC Isolation*
- *MTBF > 2,000,000 Hours*
- *Low Cost*
- *Input 5, 12 and 24VDC*
- *Output 5, 9, 12 and 15VDC*
- *Temperature Performance −40°C to +75°C*
- *UL 94V−0 Package Material*
- *Internal SMD Construction*
- *Industry Standard Pinout*


Low Profile


Low Cost

I/O Isolation

Taking up as little as 0.18 square inches of board space, Minmax's MBU100 1W DC/DC's are specially designed to provide power distribution applications where space is critical in an ultra-miniature SIP package.

The series consists of 12 models with input voltages of 5V, 12V and 24VDC which offers standard single output voltages of 5V, 9V, 12V, 15VDC.

The MBU100 series is an excellent selection for a variety of applications including distributed power systems, mixed analog/digital subsystems, portable test equipments, local power networks and battery backed systems.

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Input Surge Voltage (1000 mS)	5VDC Input Models	−0.7	9	VDC
	12VDC Input Models	−0.7	18	VDC
	24VDC Input Models	−0.7	30	VDC
Lead Temperature (1.5mm from case for 10 Sec.)		−−−	260	°C
Internal Power Dissipation		−−−	450	mW

Exceeding the absolute maximum ratings of the unit could cause damage. These are not continuous operating ratings.

Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature	Ambient	−40	+75	°C
Operating Temperature	Case	−40	+90	°C
Storage Temperature		−40	+125	°C
Humidity		−−−	95	%
Cooling	Free−Air Convection			

Model Selection Guide

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Load Regulation	Efficiency
			Max.	Min.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA	mA (Typ.)	mA (Typ.)	% (Max.)	% (Typ.)
MBU101	5 (4.5~5.5)	5	200	4	290	30	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	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	70
MBU122		9	110	2	54		5	76
MBU123		12	84	1.5	53		4	79
MBU124		15	67	1	53		4	79

Capacitive Load

Models by Vout	5V	9V	12V	15V	Unit
Maximum Capacitive Load	33	33	33	33	uF

Input Fuse Selection Guide

5V Input Models	12V Input Models	24V Input Models
500mA Slow − Blow Type	200mA Slow − Blow Type	100mA Slow − Blow Type

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	
Reverse Polarity Input Current	All Models	---	---	0.3	A
Input Filter		Internal Capacitor			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±1.0	±3.0	%
Line Regulation	For Vin Change of 10%	---	±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
Output Short Circuit	0.5 Second Max.				

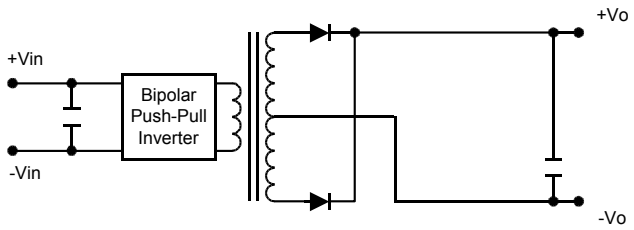
General Specifications

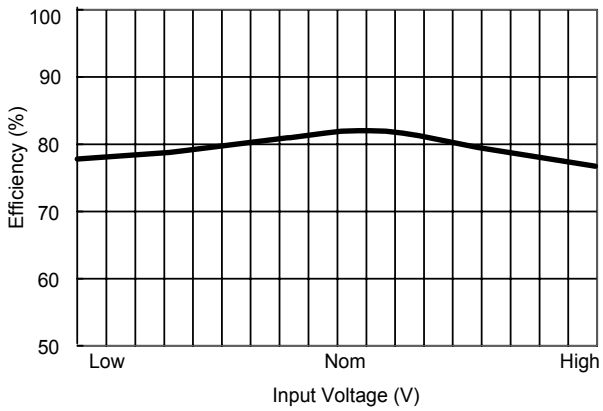
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1000	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1100	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz,1V	---	60	100	pF
Switching Frequency		50	90	110	KHz
MTBF	MIL-HDBK-217F @ 25℃, Ground Benign	2000	---	---	K Hours

Notes:

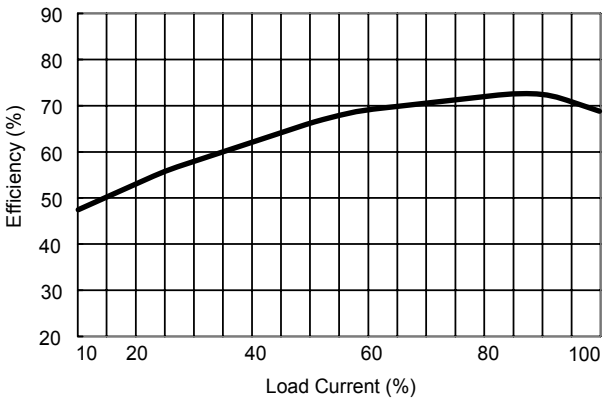
1. Specifications typical at Ta=+25℃, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Ripple & Noise measurement bandwidth is 0-20 MHz.
3. These power converters require a minimum output loading to maintain specified regulation.
4. Operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
5. All DC/DC converters should be externally fused at the front end for protection.
6. Other input and output voltage may be available, please contact factory.
7. Specifications subject to change without notice.

Block Diagram

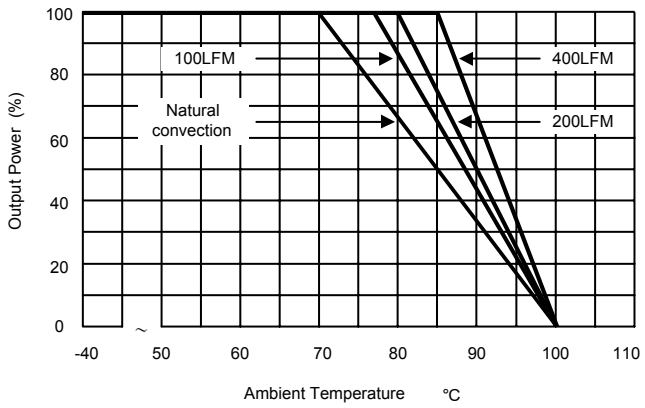




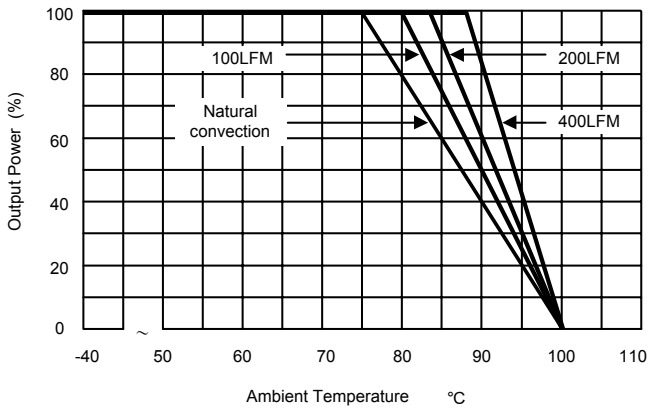
Efficiency vs Input Voltage



Efficiency vs Output Load



Derating Curve (5V Output Only)



Derating Curve (All Other Output)

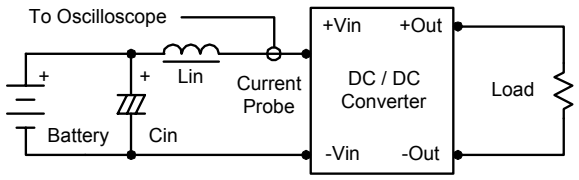
Test Configurations

Input Reflected-Ripple Current Test Setup

Input reflected−ripple current is measured with a inductor Lin (4.7uH) and Cin (220uF, ESR < 1.0Ω at 100 KHz) to simulate source impedance.

Capacitor Cin, offsets possible battery impedance.

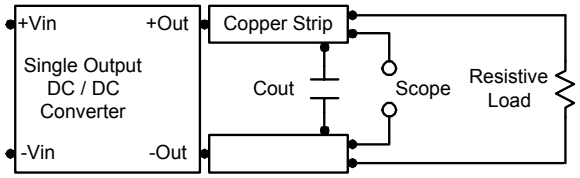
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.



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.

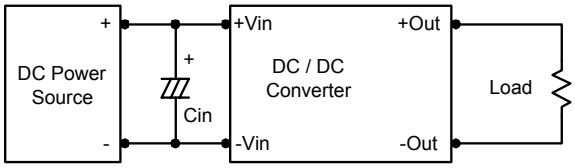
The maximum capacitance can be found in the data sheet.

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.

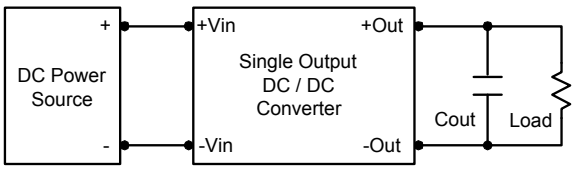
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 1.5uF for the 5V input devices, a 1.0uF for the 12V input devices and a 0.47uF for the 24V devices.



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.

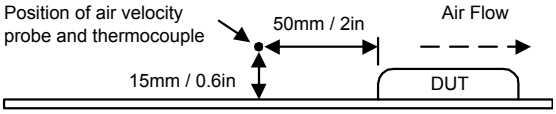
To reduce output ripple, it is recommended to use 1uF capacitors at the output.



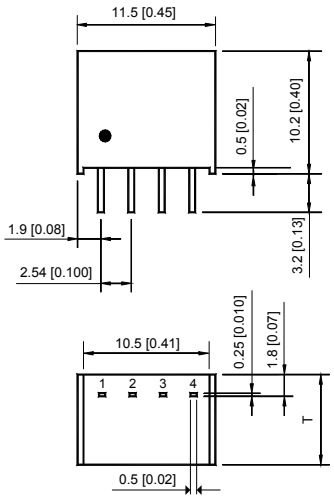
Thermal Considerations

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 an experimental apparatus.



Mechanical Dimensions



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

Tolerance	Millimeters	Inches
	X.X±0.25	X.XX±0.01
	X.XX±0.13	X.XXX±0.005
Pin	±0.05	±0.002

Physical Characteristics

Case Size (5 & 12V Input) : 11.5×6.1×10.2 mm / 0.45×0.24×0.40 inches

Case Size (24V Input) : 11.5×7.1×10.2mm / 0.45×0.28×0.40 inches

Case Material : Non−Conductive Black Plastic

Weight : 1.3g (5 & 12V Input) / 1.7g (24V Input)

Pin Connections

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