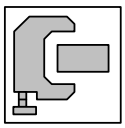
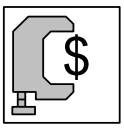
MDHU100 Series

2W, Ultra-High Isolation DIP, Single & Dual Output DC/DC Converters

Key Features

- *Efficiency up to 75%*
- *4000VAC Isolation*
- *MTBF > 2,000,000 Hours*
- *Low Cost*
- *Input 5 , 12 and 24VDC*
- *Output 5, 12, 15, ±12 and ±15VDC*
- *Temperature Performance −25℃ to +60℃*
- *UL60950−1, UL60601−1 Safety Approval*
- *Internal SMD Construction*
- *Low Leakage Current*


Low Profile



Low Cost

I/O Isolation

Minmax's MDHU100 2W DC/DC's are specially designed to provide ultra-high levels of isolation 4000VAC in a miniature DIP package.

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

The MDHU100 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	℃
Internal Power Dissipation		−−−	650	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	−25	+60	℃
Operating Temperature	Case	−25	+90	℃
Storage Temperature		−40	+125	℃
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.)
MDHU102	5 (4.5 ~ 5.5)	5	400	8	606	60	12	66
MDHU104		12	165	3	600		10	66
MDHU105		15	133	2.5	605		10	66
MDHU108		±12	±83	±1.5	553		10	72
MDHU109		±15	±66	±1	542		10	73
MDHU112	12 (10.8 ~ 13.2)	5	400	8	253	30	12	66
MDHU114		12	165	3	250		10	66
MDHU115		15	133	2.5	252		10	66
MDHU118		±12	±83	±1.5	224		10	74
MDHU119		±15	±66	±1	220		10	75
MDHU122	24 (21.6 ~ 26.4)	5	400	8	126	15	12	66
MDHU124		12	165	3	125		10	66
MDHU125		15	133	2.5	126		10	66
MDHU128		±12	±83	±1.5	112		10	74
MDHU129		±15	±66	±1	110		10	75

Capacitive Load

Models by Vout	5V	12V	15V	±12V #	±15V #	Unit
Maximum Capacitive Load	330	330	330	100	100	uF

 # For each output

Input Fuse Selection Guide

5V Input Models	12V Input Models	24V Input Models
1000mA Slow − Blow Type	500mA Slow − Blow Type	200mA 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		---	±2.0	±4.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.1	±1.0	%
Line Regulation	Vin = Min.to Max.	---	±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

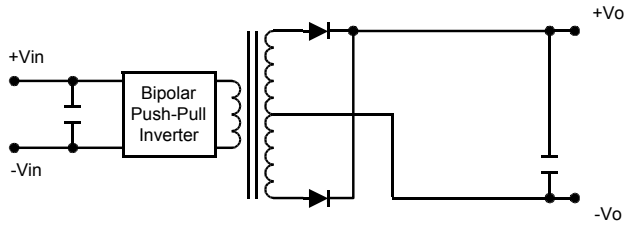
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	4000	---	---	VAC
Isolation Voltage Test	Flash Tested for 1 Second	6000	---	---	VDC
Leakage Current	240VAC, 60Hz	---	---	2	uA
Isolation Resistance	500VDC	10	---	---	GΩ
Isolation Capacitance	100KHz,1V	---	15	20	pF
Switching Frequency		50	80	100	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	2000	---	---	K Hours

Notes :

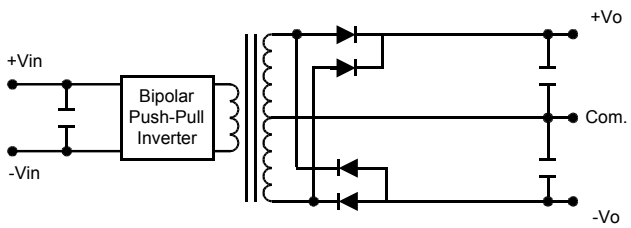
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Ripple & Noise measurement bandwidth is 0-20 MHz.
3. These power converters require a minimum output loading to maintain specified regulation.
4. Operation under no-load conditions 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.

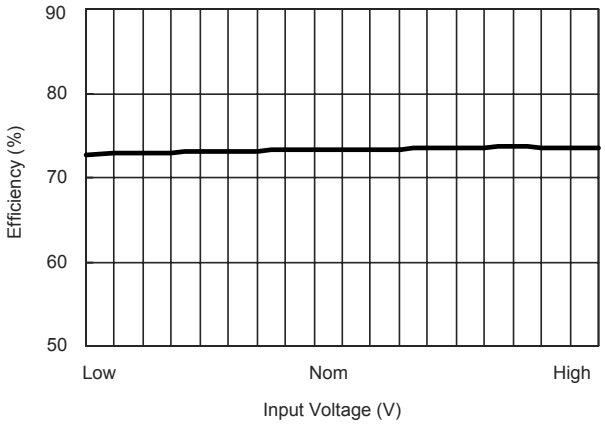
Block Diagram

Single Output

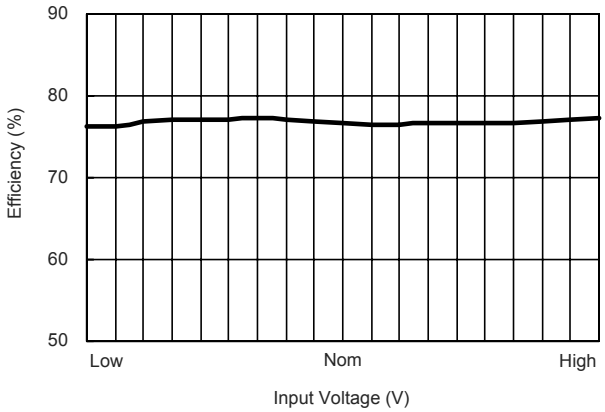


Dual Output

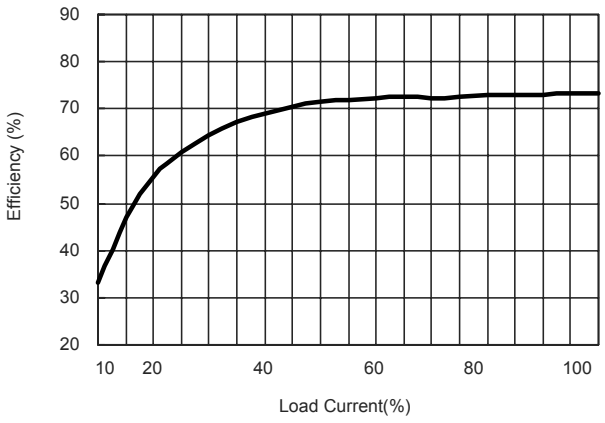




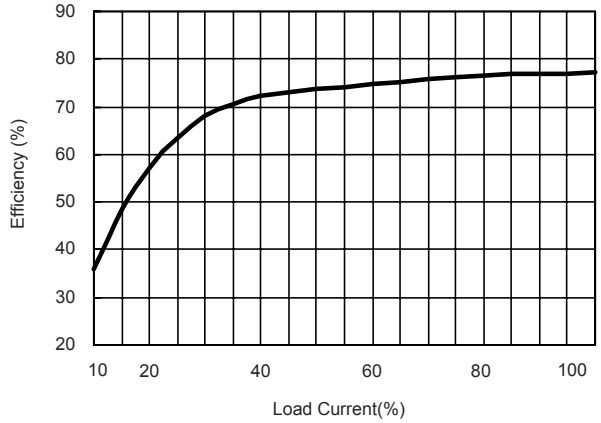
Efficiency vs Input Voltage (Single Output)



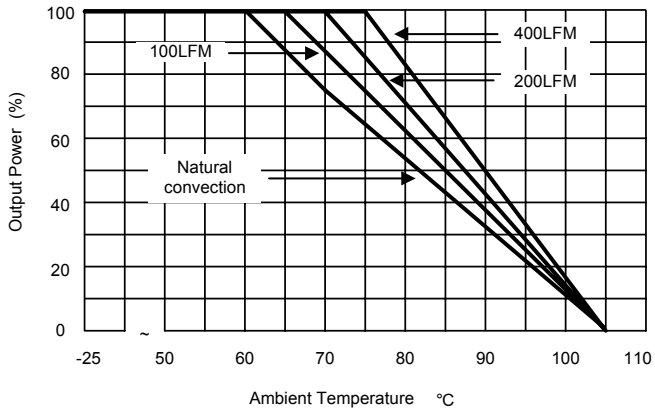
Efficiency vs Input Voltage (Dual Output)



Efficiency vs Output Load (Single Output)



Efficiency vs Output Load (Dual Output)



Derating Curve

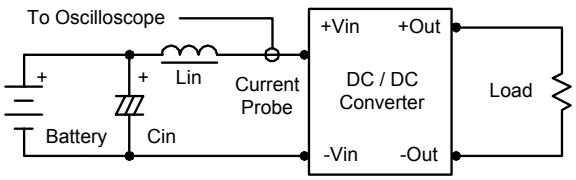
Test Configurations

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.

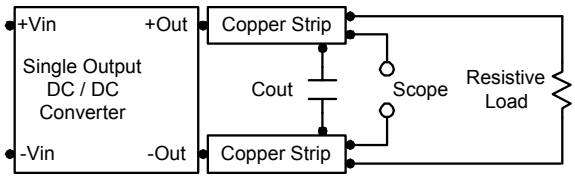
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.

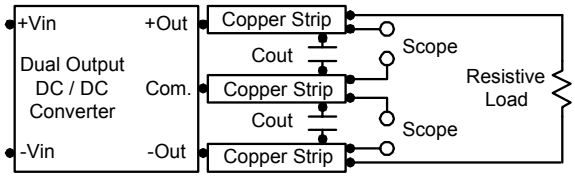


Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.47uF 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 MDHU100 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 100uF maximum capacitive load for dual outputs and 330uF capacitive load for single outputs.

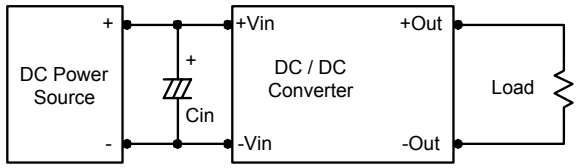
The maximum capacitance can be found in the data sheet.

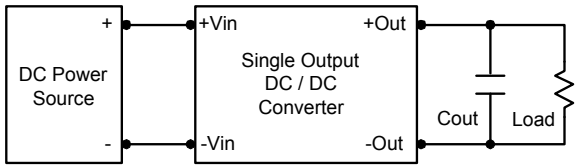
Input Source Impedance

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 2.2uF for the 5V input devices, a 1.0uF for the 12V input devices and a 0.47uF for the 24V input devices.

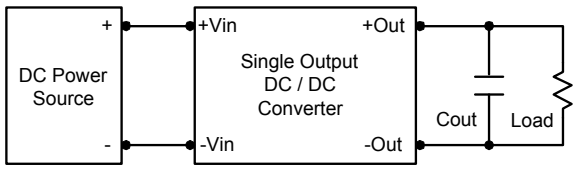


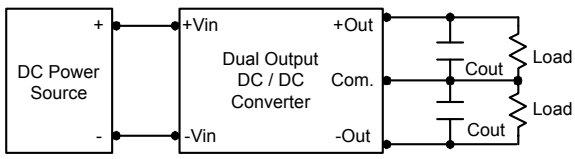


Output Ripple Reduction

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 3.3uF capacitors at the output.

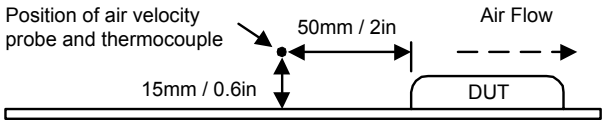




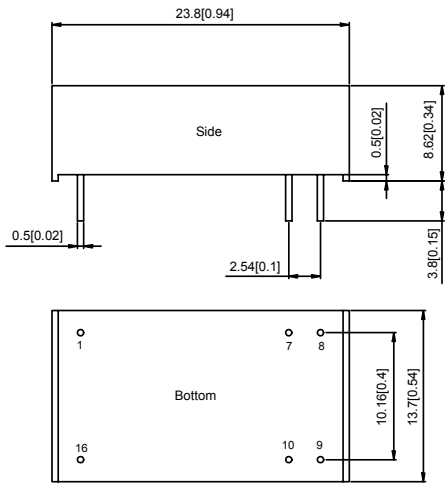
Thermal Considerations

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



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	:	23.8×13.7×8.62 mm 0.94×0.54×0.34 inches
Case Material	:	Non−Conductive Black Plastic
Weight	:	5.1g
Flammability	:	UL94V−0

Pin Connections

Pin	Single Output	Dual Output
1	−Vin	−Vin
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	−Vout	−Vout
16	+Vin	+Vin

NC: No Connection