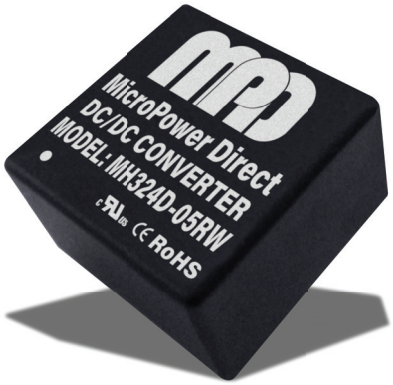
MH300RW

Wide 2:1 Input, 3W Compact DIP-8 Case DC/DC Converters



Key Features:

- 3W Output Power
- Compact DIP-8 Case
- Wide 2:1 Input Range
- UL 62368 Approval
- Meets EN 55032 Class B
- 1,500 VDC Isolation
- >4.2 MHour MTBF
- -40°C to +80°C Operation
- 28 Standard Models

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Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Start Voltage	5 VDC Input			4.5	VDC
	12 VDC Input			9.0	
	24 VDC Input			18.0	
	48 VDC Input			36.0	
Short Circuit Input Power				0.50	W
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±1.5	%
Output Voltage Balance	Dual Output, Balanced Loads			±2.0	%
Line Regulation	VIN = MIN to MAX			±0.2	%
Load Regulation	IOUT = 0% to 100%			±1.0	%
Cross Regulation	See Note 2			±5.0	
Ripple & Noise (20 MHz)	See Note 3		70		mV P - P
Temperature Coefficient			±0.01	±0.02	%/°C
Transient Recovery Time	See Note 4		250	500	µSec
Transient Response Deviation			±3.0	±5.0	%
Overload Protection	See Note 5		170		%
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	1,500			VDC
	1 Second	1,800			
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz, 1.0V		100		pF
Switching Frequency		100			kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+80	°C
	Case			+95	
Storage Temperature Range		-50		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagram (Page 5)
Case Material	Non-Conductive Black Plastic (UL-94V0)
Weight	See Mechanical Diagram (Page 5)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.45			MHours
Safety Standards	UL/cUL 62368 recognition (UL certificate)				

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	5 VDC Input			12.0	VDC
	12 VDC Input			25.0	
	24 VDC Input			50.0	
	48 VDC Input			100.0	
Lead Temperature	1.5 mm From Case For 10 Sec			260	°C

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

Model Selection Guide

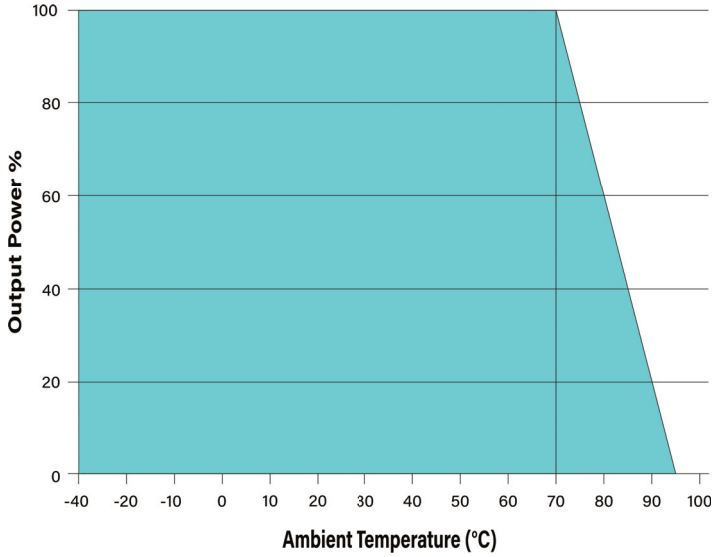
Model Number	Input				Output			Capacitive Load (µF Max)	Efficiency (%, Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)			
	Nominal	Range	Full-Load	No-Load						
MH305S-03RW	5	4.5 - 10.0	501	45	3.3	600.0	0.0	100	79	1,500
MH305S-05RW	5	4.5 - 10.0	741	45	5.0	600.0	0.0	100	81	1,500
MH305S-12RW	5	4.5 - 10.0	706	45	12.0	250.0	0.0	100	85	1,500
MH305S-15RW	5	4.5 - 10.0	706	45	15.0	200.0	0.0	100	85	1,500
MH305D-05RW	5	4.5 - 10.0	732	45	±5.0	±300.0	0.0	100	82	1,500
MH305D-12RW	5	4.5 - 10.0	714	45	±12.0	±125.0	0.0	100	84	1,500
MH305D-15RW	5	4.5 - 10.0	706	45	±15.0	±100.0	0.0	100	85	1,500
MH312S-03RW	12	9.0 - 18.0	206	27	3.3	600.0	0.0	100	80	600
MH312S-05RW	12	9.0 - 18.0	301	27	5.0	600.0	0.0	100	83	600
MH312S-12RW	12	9.0 - 18.0	287	27	12.0	250.0	0.0	100	87	600
MH312S-15RW	12	9.0 - 18.0	287	27	15.0	200.0	0.0	100	87	600
MH312D-05RW	12	9.0 - 18.0	298	27	±5.0	±300.0	0.0	100	84	600
MH312D-12RW	12	9.0 - 18.0	291	27	±12.0	±125.0	0.0	100	86	600
MH312D-15RW	12	9.0 - 18.0	287	27	±15.0	±100.0	0.0	100	87	600
MH324S-03RW	24	18.0 - 36.0	103	16	3.3	600.0	0.0	100	80	300
MH324S-05RW	24	18.0 - 36.0	151	16	5.0	600.0	0.0	100	83	300
MH324S-12RW	24	18.0 - 36.0	144	16	12.0	250.0	0.0	100	87	300
MH324S-15RW	24	18.0 - 36.0	144	16	15.0	200.0	0.0	100	87	300
MH324D-05RW	24	18.0 - 36.0	149	16	±5.0	±300.0	0.0	100	84	300
MH324D-12RW	24	18.0 - 36.0	145	16	±12.0	±125.0	0.0	100	86	300
MH324D-15RW	24	18.0 - 36.0	144	16	±15.0	±100.0	0.0	100	87	300
MH348S-03RW	48	36.0 - 75.0	52	10	3.3	600.0	0.0	100	79	150
MH348S-05RW	48	36.0 - 75.0	76	10	5.0	600.0	0.0	100	82	150
MH348S-12RW	48	36.0 - 75.0	73	10	12.0	250.0	0.0	100	86	150
MH348S-15RW	48	36.0 - 75.0	73	10	15.0	200.0	0.0	100	86	150
MH348D-05RW	48	36.0 - 75.0	76	10	±5.0	±300.0	0.0	100	82	150
MH348D-12RW	48	36.0 - 75.0	74	10	±12.0	±125.0	0.0	100	85	150
MH348D-15RW	48	36.0 - 75.0	74	10	±15.0	±100.0	0.0	100	85	150

Notes:

1. The specified maximum capacitive load is for each output.
2. Cross regulation is measured with the main output set at 100% load. The second output is varied from 75% to 100% load.
3. When measuring output ripple, it is recommended that an external 0.47 µF ceramic capacitor is connected from the +VOUT to the -VOUT pins. If the application is noise sensitive; connecting a low ESR 3.3 µF capcitor should be used. This capacitor should be mounted as close to the converter as possible.
4. Transient recovery is measured to within a 1% error band for a load step change of 25%.
5. Output overload protection is provided by a fold back current limiting circuit with auto-recovery. A long-term overload could damage the unit.
6. To meet the specified EN 61000-4-4 and EN 61000-4-5 limits, an external capacitor must be connected across the input pins of the module. A 220 µF/100V capacitor is recommended. This capacitor should be mounted as close to the module as possible.
7. Operation at no load will not damage these units.
8. It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.

A 2W version of this module is also available
For more information see the **MH200RW** series datasheet.
Or call the factory at 781-344-8226

Derating Curve



EMI Characteristics

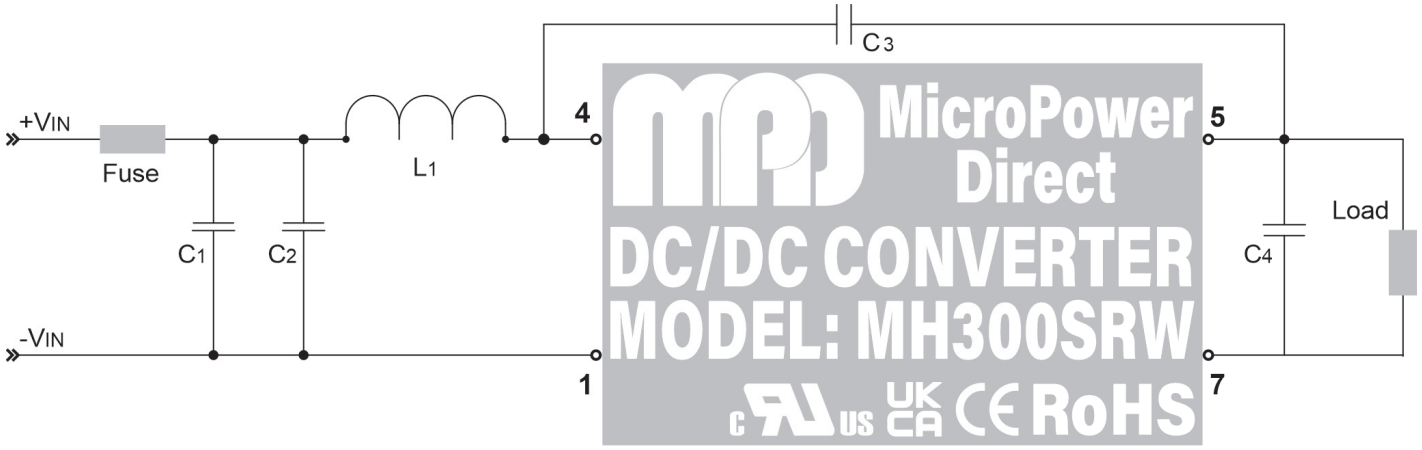
Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 1	EN 55032		Class B
Conducted Emissions, See Note 1	EN 55032		Class B
ESD	EN 61000-4-2	A	±8 kV Air
			±6 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 2	EN 61000-4-4	A	±2 kV
Surge, See Note 2	EN 61000-4-5	A	±1 kV
CS	EN 61000-4-6	A	10 Vrms
PFMF	EN 61000-4-8	A	3A/M

For many applications, the **MH300RW** series will operate fine with minimum external components. However, if meeting the requirements of EMI/EMC standards (such as EN 55032) is required, a simple external filter circuit should be sufficient. This is illustrated in the typical connection diagrams below.

Notes:

1. All input/output filtering capacitors should have a low equivalent impedance. Voltage derating of all capacitors should be 60% or greater. All components should be mounted as close to the converter as possible.
2. To meet EN 55032 Class B, the external components C2 and L1 are required. This is illustrated in the typical connection diagrams below. Values for these components are given in the tables below. Contact the factory for more information.
3. To meet EN 61000-4-4, a larger external input capacitor is needed, as illustrated by the capacitor C1 in the typical connection diagrams below. The value for this capacitor is given in the tables below. Contact the factory for more info.
4. To meet EN 61000-4-5, a larger external input capacitor is needed, as illustrated by the capacitor C1 in the typical connection diagrams below. The value for this capacitor is given in the tables below. Contact the factory for more info.

Typical Connection: Single Output

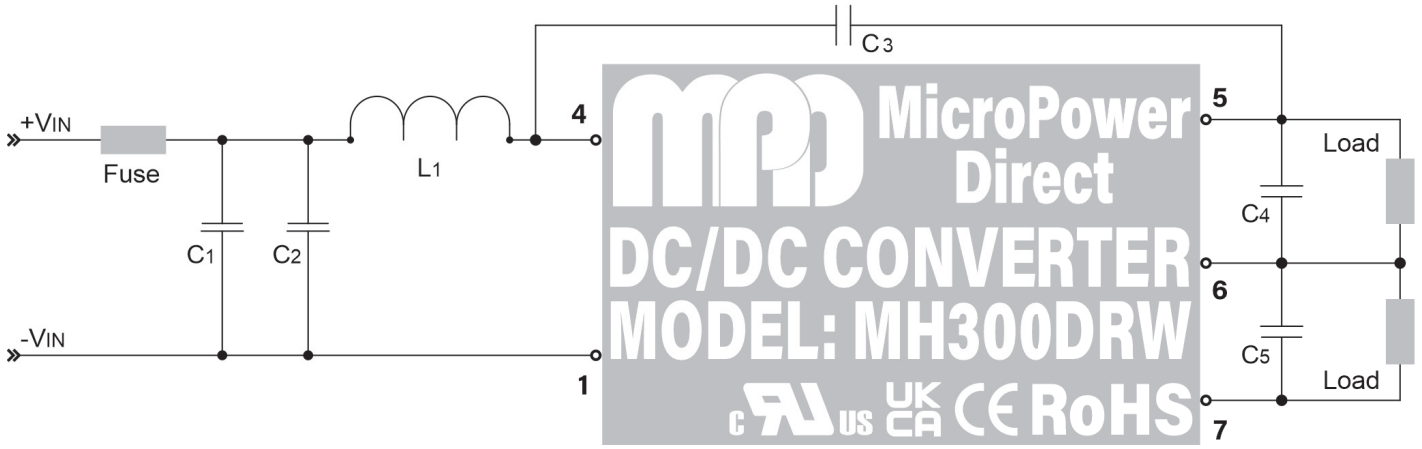


The diagram above illustrates a typical connection of the single output version of the **MH300RW**. These converters are specified for operation without external components. However, in some applications the addition of a few components will enhance stability, reduce noise and reduce output ripple.

This simple connection includes a low ESR capacitor (C1) connected across the input to to provide surge protection. With the filtering circuit (C2, L1, C3) , the unit will meet EN 55032 Class B. For noise sensitive applications, it's recommended that the external capacitor C4 should be placed from the +VOUT pin to the -VOUT pin (care must be taken not to exceed the capacitive load specification for the unit). All components should be mounted as close to the unit as possible. Component values are given in the table below. Contact the factory for more information.

VIN	Fuse	C1	C2	L1	C3	C4
5 VDC	1,500 mA	470 µF/100V	22 µF/16V	10 µH	---	3.3 µF
12 VDC	600 mA	470 µF/100V	22 µF/25V	18 µH	220 pF/2KV	3.3 µF
24 VDC	300 mA	470 µF/100V	10 µF/50V	68 µH	220 pF/2KV	3.3 µF
48 VDC	150 mA	470 µF/100V	3.3 µF/100V	68 µH	220 pF/2KV	3.3 µF

Typical Connection: Dual Output

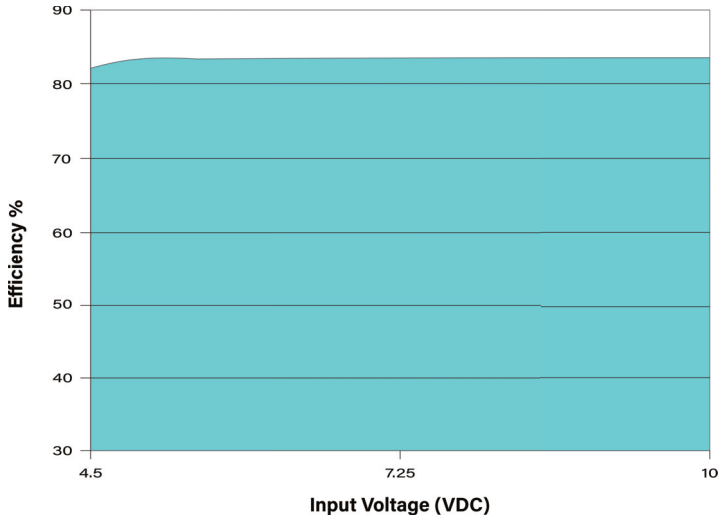


The diagram above illustrates a typical connection of the dual output version of the **MH300RW**. These converters are specified for operation without external components. However, in some applications the addition of a few components will enhance stability, reduce noise and reduce output ripple.

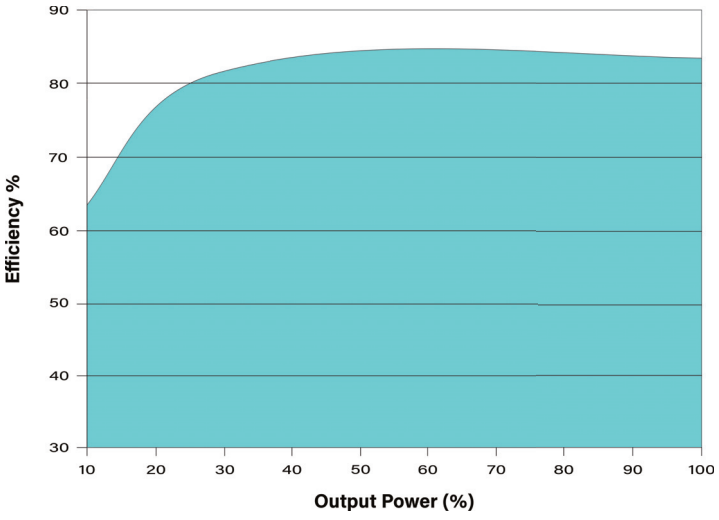
This simple connection includes a low ESR capacitor (C1) connected across the input to to provide surge protection. With the filtering circuit (C2, L1, C3) , the unit will meet EN 55032 Class B. For noise sensitive applications, it's recommended that the external capacitors C4 & C5 should be placed from the +VOUT pin to common and from the -VOUT pin to common (care must be taken not to exceed the capacitive load specification for the unit). All components should be mounted as close to the unit as possible. Component values are given in the table below. Contact the factory for more information.

VIN	Fuse	C1	C2	L1	C3	C4/C5
5 VDC	1,500 mA	470 µF/100V	22 µF/16V	10 µH	---	3.3 µF
12 VDC	600 mA	470 µF/100V	22 µF/25V	18 µH	220 pF/2KV	3.3 µF
24 VDC	300 mA	470 µF/100V	10 µF/50V	68 µH	220 pF/2KV	3.3 µF
48 VDC	150 mA	470 µF/100V	3.3 µF/100V	68 µH	220 pF/2KV	3.3 µF

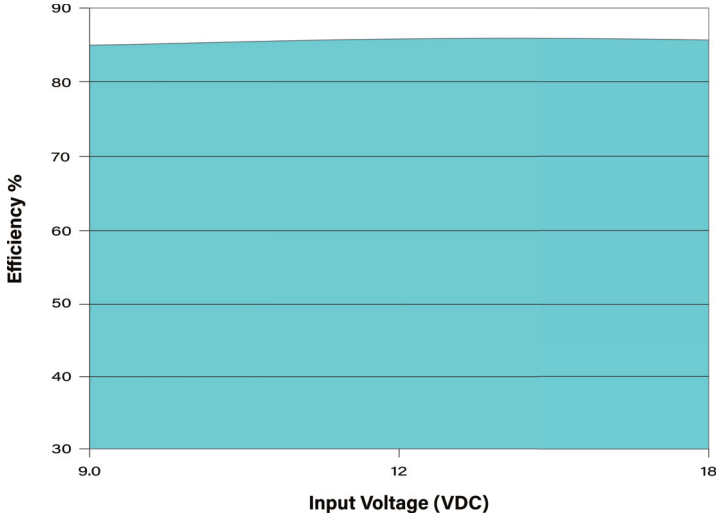
Efficiency Vs Input Voltage, MH305S-05RW



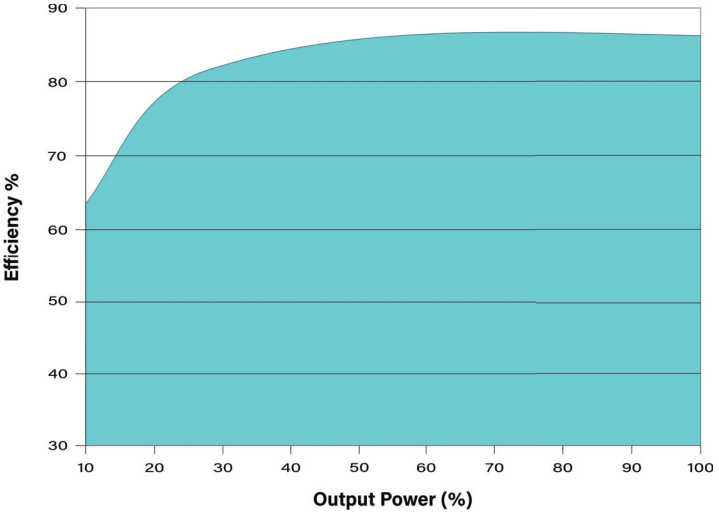
Efficiency Vs Output Power, MH305S-05RW



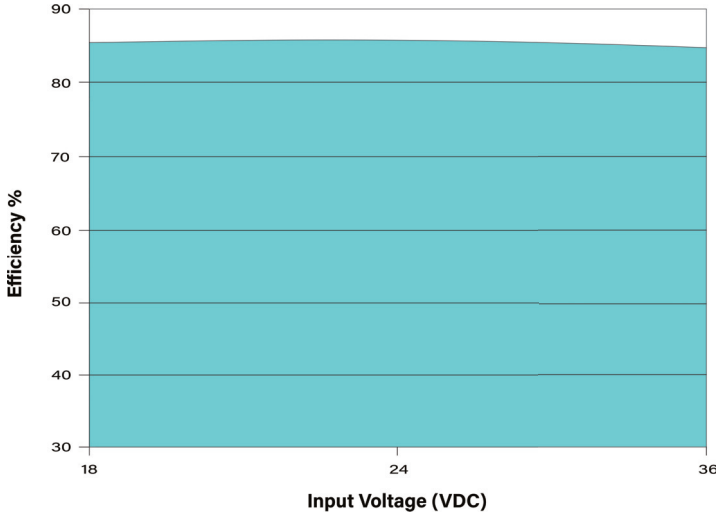
Efficiency Vs Input Voltage, MH312S-05RW



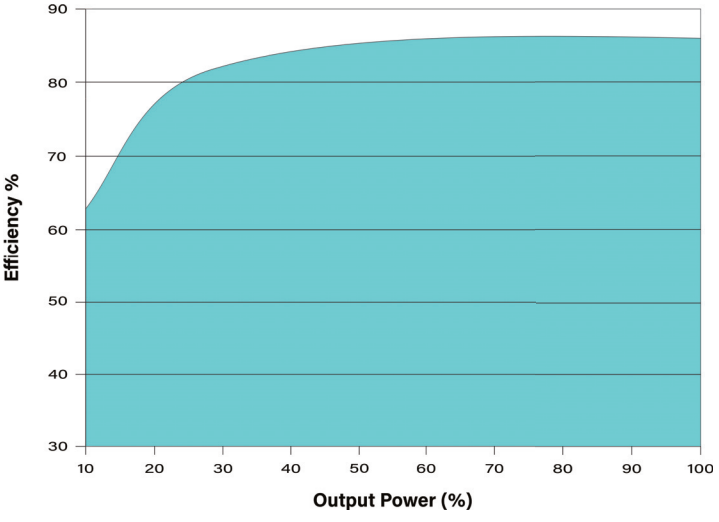
Efficiency Vs Output Power, MH312S-05RW



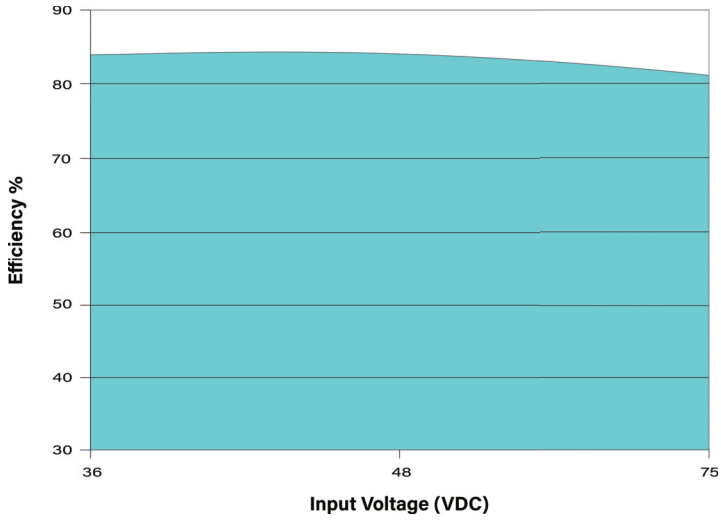
Efficiency Vs Input Voltage, MH324S-05RW



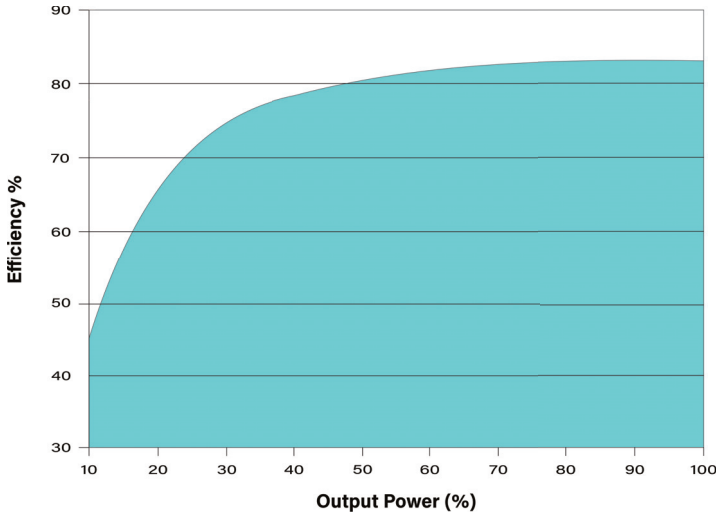
Efficiency Vs Output Power, MH324S-05RW



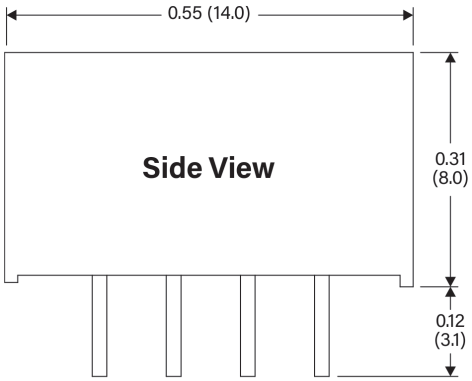
Efficiency Vs Input Voltage, MH348S-05RW

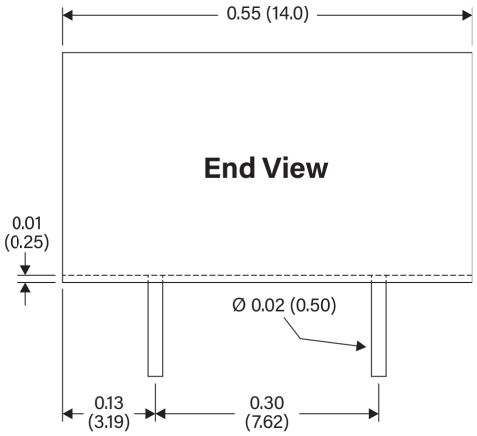


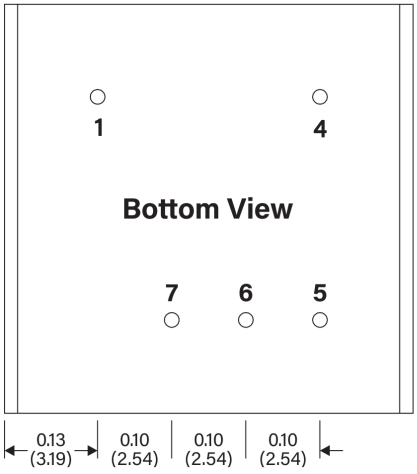
Efficiency Vs Output Power, MH348S-05RW



Mechanical Dimensions







Pin Connections

Pin	Single
1	-VIN
4	+VIN
5	+VOUT
6	No Pin
7	-VOUT

Pin	Dual
1	-VIN
4	+VIN
5	+VOUT
6	Common
7	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance = ±0.010 (±0.25)
- Pin Tolerance = ±0.002 (±0.05)
- Recommended pin hole size (on the application PC Board) is Ø 0.039 (Ø1.00)
- Pin 1 is marked by a "dot" or indentation on the unit
- Weight: 0.14 Oz (3.9g)

Also Available: MH200RW

Key Features:

- 2W Output Power
- Miniature DIP-8 Case
- 2:1 Input Voltage Range
- Single & Dual Outputs
- 1,500 VDC Isolation
- UL 62368 Approved

MicroPower Direct
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