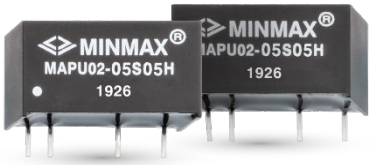
FEATURES

- **Industrial Standard SIP-7 Package**
- **Encapsulated 2W Converter**
- **Unregulated Output Voltage**
- **I/O Isolation 3000VDC**
- **Wide Operating Ambient Temp. Range**
- **Short Circuit Protection**



PRODUCT OVERVIEW

The MINMAX MAPU02H Series is an encapsulated 2W DC-DC converter in an industry-standard SIP-7 package, designed to deliver reliable isolated power in compact industrial and embedded applications. Featuring 3000 VDC I/O isolation, it provides strong electrical protection and ensures stable performance in demanding environments. With unregulated output voltage, short-circuit protection, and a wide operating ambient temperature range, the MAPU02H Series offers a cost-effective and dependable solution for isolated bias supply and signal power in control, sensing, and communication systems.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Load Regulation	Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load			@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	% (max.)	μF	%
MAPU02-05S033H	5 (4.5 ~ 5.5)	3.3	500	446	50	12	440	74
MAPU02-05S05H		5	400	513		10		78
MAPU02-05S09H		9	222	506		8		79
MAPU02-05S12H		12	168	498		8		81
MAPU02-05S15H		15	132	495		8		80
MAPU02-05D05H		±5	±200	519		10	200#	77
MAPU02-05D12H		±12	±84	510		8		79
MAPU02-05D15H		±15	±66	508		8		78
MAPU02-12S033H	12 (10.8 ~ 13.2)	3.3	500	181	30	12	440	76
MAPU02-12S05H		5	400	214		10		78
MAPU02-12S09H		9	222	208		8		80
MAPU02-12S12H		12	168	205		8		82
MAPU02-12S15H		15	132	204		8		81
MAPU02-12D05H		±5	±200	214		10	200#	78
MAPU02-12D12H		±12	±84	207		8		81
MAPU02-12D15H		±15	±66	204		8		81
MAPU02-24S033H	24 (21.6 ~ 26.4)	3.3	500	90	15	12	440	76
MAPU02-24S05H		5	400	107		10		78
MAPU02-24S09H		9	222	105		8		79
MAPU02-24S12H		12	168	104		8		81
MAPU02-24S15H		15	132	104		8		79
MAPU02-24D05H		±5	±200	110		10	200#	76
MAPU02-24D12H		±12	±84	105		8		80
MAPU02-24D15H		±15	±66	104		8		79

*Please refer to the attached graph for the minimum load value. # For each output

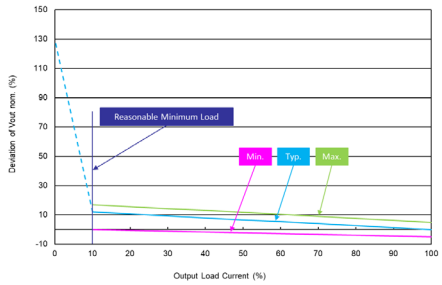
Input Specifications

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	
	12V Input Models	-0.7	---	18	
	24V Input Models	-0.7	---	30	
Input Filter	All Models	Internal Capacitor			

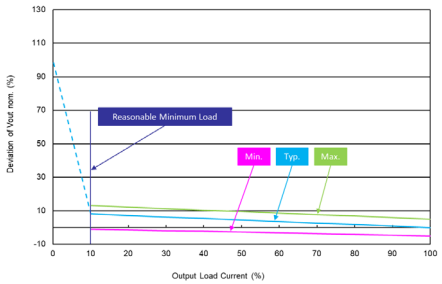
Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	±1.0	±5.0	%
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=10% to 100%	See Model Selection Guide			
Ripple & Noise	0-20 MHz Bandwidth	---	65	100	mV_{P-P}
Temperature Coefficient		---	±0.01	±0.02	%/°C
Short Circuit Protection	Continuous, Automatic Recovery				

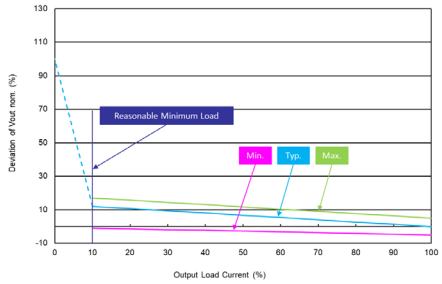
Output Voltage Tolerance



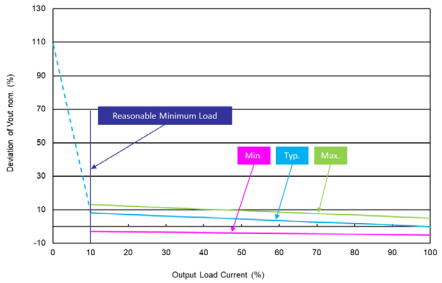
MAPU02-05S033H, MAPU02-05S05H, MAPU02-05D05H



MAPU02-05S09H, MAPU02-05S12H, MAPU02-05S15H
MAPU02-05D12H, MAPU02-05D15H



MAPU02-12S033H, MAPU02-12S05H, MAPU02-12D05H
MAPU02-24S033H, MAPU02-24S05H, MAPU02-24D05H



MAPU02-12S09H, MAPU02-12S12H, MAPU02-12S15H, MAPU02-12D12H
MAPU02-12D15H, MAPU02-24S09H, MAPU02-24S12H, MAPU02-24S15H
MAPU02-24D12H, MAPU02-24D15H

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	---	20	---	pF
Switching Frequency		40	60	100	kHz
MTBF (calculated)	MIL-HDBK-217F@25℃, Ground Benign	1,608,765	---	---	Hours

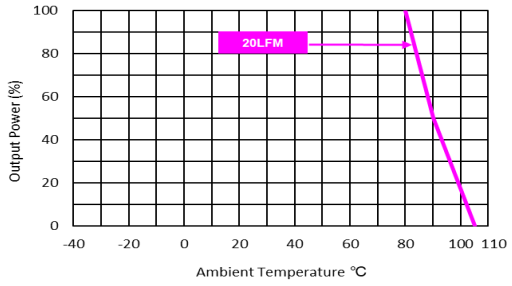
EMC Specifications

Parameter	Standards & Level			Performance
EMI(5)	Conduction	EN 55032	With external components	Class A
EMS(5)	EN 55035			
	ESD	EN 61000-4-2 Air ± 8kV, Contact ± 6kV		A
	Radiated immunity	EN 61000-4-3 10V/m		A
	Fast transient	EN 61000-4-4 ±2kV		A
	Surge	EN 61000-4-5 ±1kV		A
	Conducted immunity	EN 61000-4-6 10Vrms		A
	PFMF	EN 61000-4-8 3A/m		A

Environmental Specifications

Parameter	Min.	Max.	Unit
Operating Ambient Temperature Range (For Power Derating see relative Derating Curve)	-40	+90	℃
Case Temperature	---	+105	℃
Storage Temperature Range	-50	+125	℃
Humidity (non condensing)	---	95	% rel. H
Lead Temperature (1.5mm from case for 10Sec.)	---	260	℃

Power Derating Curve



Notes

1 Specifications typical at Ta=+25℃, resistive load, nominal input voltage and rated output current unless otherwise noted.

2 Please do not operate the product without a minimum load condition.

3 We recommend to protect the converter by a slow blow fuse in the input supply line.

4 Other input and output voltage may be available, please contact MINMAX

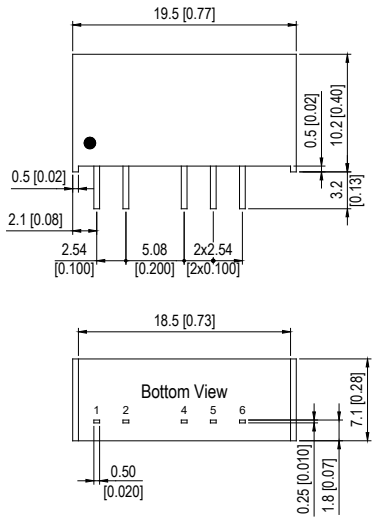
5 The external components might be required to meet EMI/EMS standard for some of test items. Please contact MINMAX for the solution in detail.

6 Specifications are subject to change without notice.

7 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



Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
2	-Vin	-Vin
4	-Vout	-Vout
5	No Pin	Common
6	+Vout	+Vout

- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
  X.XX±0.25 (X.XXX±0.010)
- Pins ±0.05(±0.002)

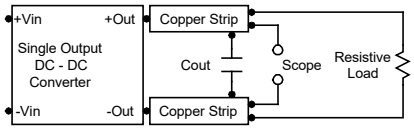
Physical Characteristics

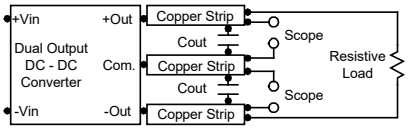
Case Size	:	19.5x7.1x10.2mm (0.77x0.28x0.40 inches)
Case Material	:	Plastic resin (flammability to UL 94V-0 rated
Pin Material	:	Alloy 42
Weight	:	3.1g

Test Setup

Peak-to-Peak Output Noise Measurement Test

Cout uses a 0.47μF 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.





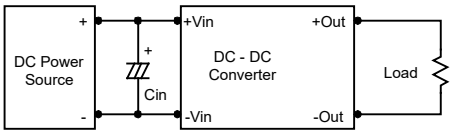
Technical Notes

Overload Protection

To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally once the output current is brought back into its specified range.

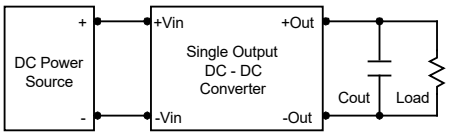
Input Source Impedance

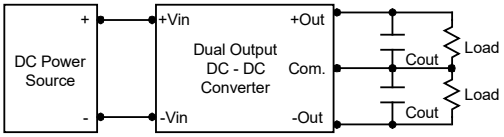
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 2.2μF for all the 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 3.3μF capacitors at the output.





Maximum Capacitive Load

The MAPU02H 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.

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 95°C.
The derating curves are determined from measurements obtained in a test setup.

