P-DUKE POWER

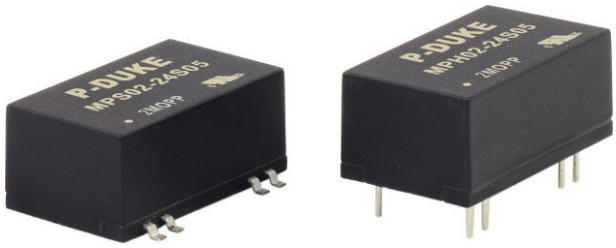
MPS02 • MPH02 Series

DC-DC Converter
Up to 2.01 Watts

5 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT



Medical
PV
Automation
Datacom
IPC
Industry
Measurement
Telecom
Automobile
Boat
Charger
Railway

2 x MOPP
5000 VAC Reinforced Insulation
2 : 1 Input Range
LOW Leakage Current
Operating Altitude 5000 meter
REMOTE ON OFF
OVP
SCP
UVP

PART NUMBER STRUCTURE

MPS02 - 48 S 05

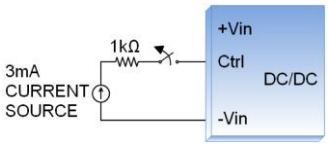
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)
MPS02: SMD type **MPH02:** DIP type	**05:**4.5~12 **12:**9~18 **24:**18~36 **48:**36~75	**S:**Single	**3P3:**3.3 **05:**5 **09:**9 **12:**12 **15:**15 **24:**24
		D: Dual	**12:**±12 **15:**±15

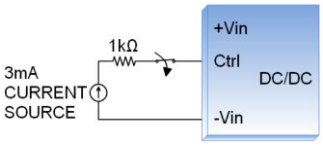
TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25℃ unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	mA	mA	%	μF
MPS(H)02-05S3P3	4.5 ~ 12	3.3	600	60	75	1000
MPS(H)02-05S05	4.5 ~ 12	5	400	60	78	1000
MPS(H)02-05S09	4.5 ~ 12	9	222	60	78	430
MPS(H)02-05S12	4.5 ~ 12	12	167	70	82	220
MPS(H)02-05S15	4.5 ~ 12	15	134	80	82	170
MPS(H)02-05S24	4.5 ~ 12	24	83	80	82	100
MPS(H)02-05D12	4.5 ~ 12	±12	±83	80	82	±170
MPS(H)02-05D15	4.5 ~ 12	±15	±67	90	80	±100
MPS(H)02-12S3P3	9 ~ 18	3.3	600	30	76	1000
MPS(H)02-12S05	9 ~ 18	5	400	40	78	1000
MPS(H)02-12S09	9 ~ 18	9	222	40	79	430
MPS(H)02-12S12	9 ~ 18	12	167	40	82	220
MPS(H)02-12S15	9 ~ 18	15	134	45	82	170
MPS(H)02-12S24	9 ~ 18	24	83	45	81	100
MPS(H)02-12D12	9 ~ 18	±12	±83	45	81	±170
MPS(H)02-12D15	9 ~ 18	±15	±67	45	81	±100
MPS(H)02-24S3P3	18 ~ 36	3.3	600	20	76	1000
MPS(H)02-24S05	18 ~ 36	5	400	20	79	1000
MPS(H)02-24S09	18 ~ 36	9	222	25	80	430
MPS(H)02-24S12	18 ~ 36	12	167	25	81	220
MPS(H)02-24S15	18 ~ 36	15	134	25	81	170
MPS(H)02-24S24	18 ~ 36	24	83	25	81	100
MPS(H)02-24D12	18 ~ 36	±12	±83	25	81	±170
MPS(H)02-24D15	18 ~ 36	±15	±67	25	81	±100
MPS(H)02-48S3P3	36 ~ 75	3.3	600	10	76	1000
MPS(H)02-48S05	36 ~ 75	5	400	10	78	1000
MPS(H)02-48S09	36 ~ 75	9	222	12	79	430
MPS(H)02-48S12	36 ~ 75	12	167	12	80	220
MPS(H)02-48S15	36 ~ 75	15	134	12	82	170
MPS(H)02-48S24	36 ~ 75	24	83	12	81	100
MPS(H)02-48D12	36 ~ 75	±12	±83	12	81	±170
MPS(H)02-48D15	36 ~ 75	±15	±67	12	81	±100

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		5Vin(nom)	4.5	5	12	VDC
		12Vin(nom)	9	12	18	
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
Start up voltage		5Vin(nom)			4.5	VDC
		12Vin(nom)			9	
		24Vin(nom)			18	
		48Vin(nom)			36	
Shutdown voltage		5Vin(nom)	2	3	4	VDC
		12Vin(nom)	6	7	8	
		24Vin(nom)	13	15	17	
		48Vin(nom)	29	32	35	
Start up time	Constant resistive load	Power up Remote ON/OFF		10	20	ms
Input surge voltage	1 second, max.	5Vin(nom)			15	VDC
		12Vin(nom)			25	
		24Vin(nom)			50	
		48Vin(nom)			100	
Input filter				Capacitor type		
Remote ON/OFF	Referred to –Vin pin and Ctrl pin applied current	DC-DC ON DC-DC OFF Remote off input current	Open or high impedance 2.0	 3.0 2.5	 4.0	mA mA





OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load regulation	No Load to Full Load	Single	-1.0		+1.0	%
		Dual	-1.0		+1.0	
	10% Load to 90% Load	Single	-0.5		+0.5	%
		Dual	-0.8		+0.8	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	Measured by 20MHz bandwidth			50		mVp-p
Temperature coefficient			-0.02		+0.02	%/℃
Transient response recovery time	25% load step change			500		μs
Over voltage protection		3.3Vout	4.0		6.5	VDC
		5Vout	6.0		8.0	
		9Vout	10.0		14.0	
		12Vout	13.0		19.0	
		15Vout	16.0		22.0	
		24Vout	25.0		35.0	
Short circuit protection			Continuous, automatics recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute Reinforced insulation for 250VAC working voltage	5000			VAC
Isolation resistance	500VDC	10			GΩ
Isolation capacitance			16	20	pF
Leakage current	240VAC,60Hz			2	μA
Switching frequency		100			kHz
Clearance/Creepage		8			mm
Safety approvals	IEC/ EN/ ANSI/AAMI ES 60601-1 IEC/ EN/ UL 62368-1				UL:E360199 UL:E193009 CB:UL(Demko)
Case material					Non-conductive black plastic
Base material					Non-conductive black plastic
Potting material					Silicone (UL94 V-0)
Weight					7.0g (0.24oz)
MTBF	MIL-HDBK-217F, Full load				6.809 x 10^6 hrs

ENVIRONMENTAL SPECIFICATIONS

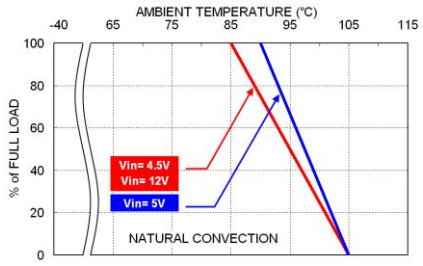
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+105	℃
Maximum case temperature				105	℃
Storage temperature range		-55		+125	℃
Operating altitude				5000	m
Thermal shock					MIL-STD-810F
Shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH
Lead-free reflow solder process	Only for SMD type				IPC J-STD-020E
Moisture sensitivity level(MSL)	Only for SMD type				IPC J-STD-033C Level 2

EMC SPECIFICATIONS

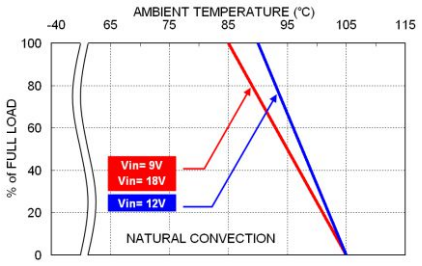
Parameter	Conditions		Level
EMI	EN55011, EN55032, EN60601-1-2 and FCC Part 18 / 15 With external components		Class A, Class B
EMS	EN55035 and EN60601-1-2		
ESD	EN61000-4-2	Air ± 15kV and Contact ± 8kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV	Perf. Criteria A
	MPS(H)02-05□□□	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 1000μF/25V) and a TVS(SMAJ18A, 18V, 400Watt peak pulse power) in parallel.	
	MPS(H)02-12□□□ MPS(H)02-24□□□	With an external input filter capacitor (Nippon chemi-con KY series, 470 μF/50V)	
	MPS(H)02-48□□□	With an external input filter capacitor (Nippon chemi-con KY series, 220 μF/100V)	
Surge	EN61000-4-5	± 1kV	Perf. Criteria A
	MPS(H)02-05□□□	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 1000μF/25V) and a TVS(SMAJ18A, 18V, 400Watt peak pulse power) in parallel.	
	MPS(H)02-12□□□ MPS(H)02-24□□□	With an external input filter capacitor (Nippon chemi-con KY series, 470 μF/50V)	
	MPS(H)02-48□□□	With an external input filter capacitor (Nippon chemi-con KY series, 220 μF/100V)	
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

CAUTION: This power module is not internally fused. An input line fuse must always be used.

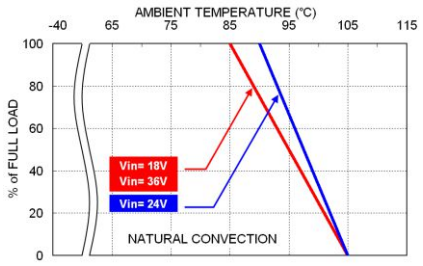
CHARACTERISTIC CURVE



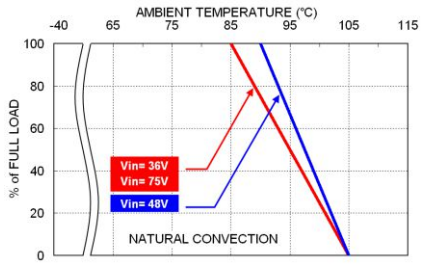
MPS(H)02-05□□□ Derating Curve



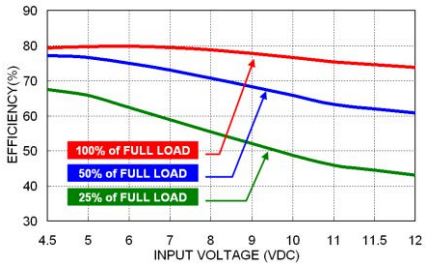
MPS(H)02-12□□□ Derating Curve



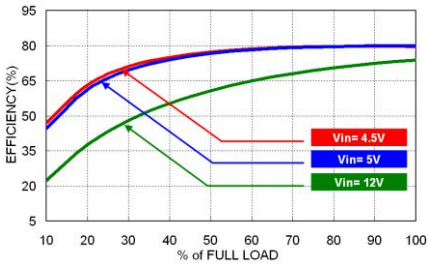
MPS(H)02-24□□□ Derating Curve



MPS(H)02-48□□□ Derating Curve



MPS(H)02-05S05 Efficiency vs. Input Voltage



MPS(H)02-05S05 Efficiency vs. Output Current

FUSE CONSIDERATION

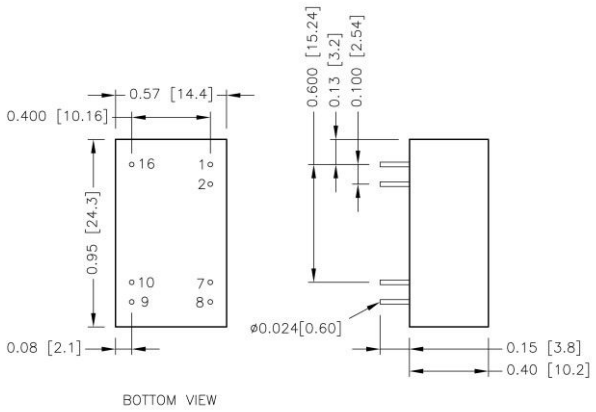
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.
The input line fuse suggest as below：

Modules	Fuse Rating (A)	Fuse Type
MPS(H)02-05S□□、MPS(H)02-05D□□	1	Slow-Blow
MPS(H)02-12S□□、MPS(H)02-12D□□	0.5	Slow-Blow
MPS(H)02-24S□□、MPS(H)02-24D□□	0.315	Slow-Blow
MPS(H)02-48S□□、MPS(H)02-48D□□	0.16	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

MECHANICAL DRAWING

MPH02

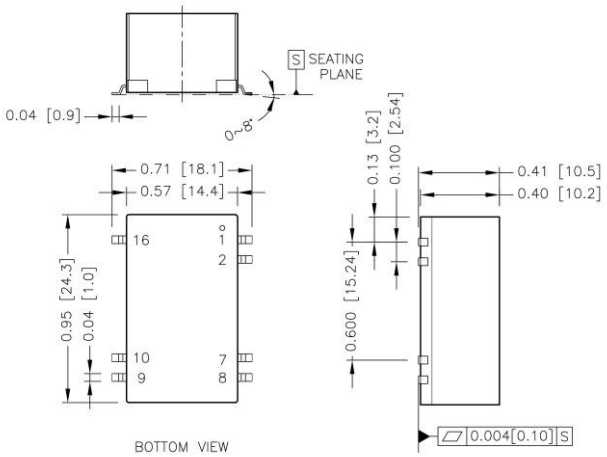


PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	Ctrl	Ctrl
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin

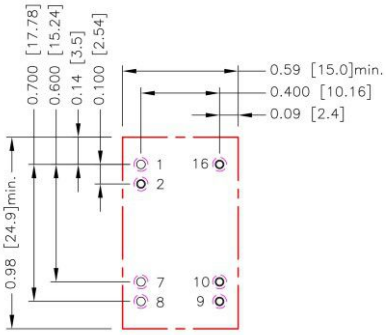
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

MPS02



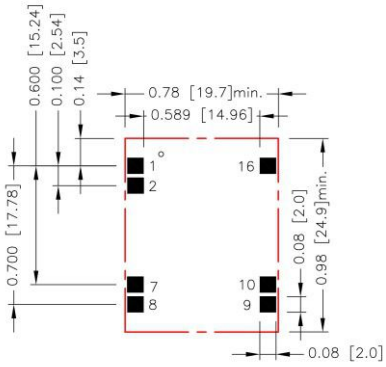
RECOMMENDED PAD LAYOUT

MPH02



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.7.8.9.10.16: ∅0.035[0.90]
Top view pad 1.2.7.8.9.10.16: ∅0.044[1.13]
Bottom view pad 1.2.7.8.9.10.16: ∅0.071[1.80]

MPS02



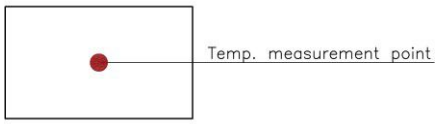
All dimensions in inch[mm]
Pad size(lead free recommended)
Top view pad:0.080x0.080[2.00x2.00]

* There should be at least 8mm distance between primary and secondary circuit.
** For further information, please contact P-DUKE.

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding environment.
Proper cooling can be verified by measuring the point as the figure below.
The temperature at this location should not exceed “Maximum case temperature”.
When operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”.
You can limit this temperature to a lower value for extremely high reliability.

■ Thermal test condition with vertical direction by natural convection (20LFM).



TOP VIEW

P-DUKE Technology Co., Ltd.
Tel +886-4-2359-0668
Fax +886-4-2359-1337
Email sale@pduke.com
Web www.pduke.com
Add No. 36, 22nd Rd., Taichung Industrial Park, Taichung, Taiwan, R.O.C.