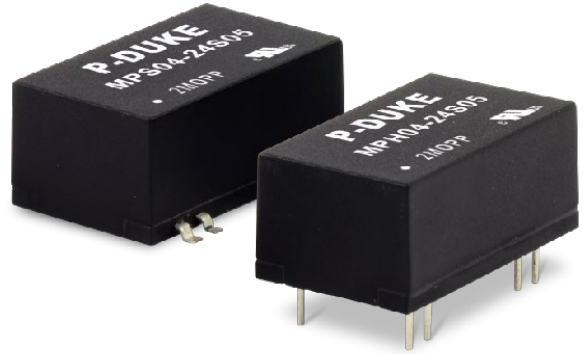


Features

- 2:1 Wide Input 4.5~75V DC
- Operating Temperature Range: -40~105°C
- Approved to cURus, UKCA, CE, RoHS & REACH
- Safety Standards to IEC/UL/EN60601-1-2 and FCC Part 18 / 15
- Efficiency up to 82%
- EMC Class A & B



Ideal Power's 43MPx02-xyz 2W Series DC/DC Converters are certified to cURus, UKCA, CE, FCC, CB, RoHS, REACH & IEC/EN/ES 60601-1-2 & EN55024 Standards and comply with Efficiency Regulations. These are primarily used in ITE, Video & Audio, Medical Industries and customised solutions are available upon request.

Part Number Structure

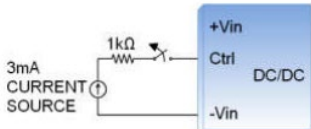
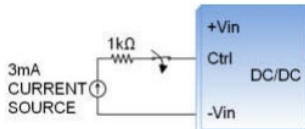
MPx02	-	48	S	05
Series Name		Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)
MP504: SMD type		05: 4.5 ~ 12	S: Single	3P3: 3.3
MPH04: DIP type		12: 9 ~ 18		05: 5
		24: 18 ~ 36		09: 9
		48: 36 ~ 75		12: 12
				15: 15
				24: 24
			D: Dual	12: ±12
				15: ±15

Models

Model Number	Input Range V DC	Output Voltage V DC	Output current @Full Load A	Input Current @ No Load A	Efficiency %	Maximum Capacitor Load μF
43MPS(H)02-05S3P3	4.5 ~ 12	3.3	600	60	75	1000
43MPS(H)02-05S05	4.5 ~ 12	5	400	60	78	1000
43MPS(H)02-05S09	4.5 ~ 12	9	222	60	78	430
43MPS(H)02-05S12	4.5 ~ 12	12	167	70	82	220
43MPS(H)02-05S15	4.5 ~ 12	15	134	80	82	170
43MPS(H)02-05S24	4.5 ~ 12	24	83	80	82	100
43MPS(H)02-05D12	4.5 ~ 12	±12	±83	80	82	±170
43MPS(H)02-05D15	4.5 ~ 12	±15	±67	90	80	±100
43MPS(H)02-12S3P3	9 ~ 18	3.3	600	30	76	1000
43MPS(H)02-12S05	9 ~ 18	5	400	40	78	1000
43MPS(H)02-12S09	9 ~ 18	9	222	40	79	430
43MPS(H)02-12S12	9 ~ 18	12	167	40	82	220
43MPS(H)02-12S15	9 ~ 18	15	134	45	82	170
43MPS(H)02-12S24	9 ~ 18	24	83	45	81	100
43MPS(H)02-12D12	9 ~ 18	±12	±83	45	81	±170
43MPS(H)02-12D15	9 ~ 18	±15	±67	45	81	±100
43MPS(H)02-24S3P3	18 ~ 36	3.3	600	20	76	1000
43MPS(H)02-24S05	18 ~ 36	5	400	20	79	1000
43MPS(H)02-24S09	18 ~ 36	9	222	25	80	430
43MPS(H)02-24S12	18 ~ 36	12	167	25	81	220
43MPS(H)02-24S15	18 ~ 36	15	134	25	81	170
43MPS(H)02-24S24	18 ~ 36	24	83	25	81	100
43MPS(H)02-24D12	18 ~ 36	±12	±83	25	81	±170
43MPS(H)02-24D15	18 ~ 36	±15	±67	25	81	±100
43MPS(H)02-48S3P3	36 ~ 75	3.3	600	10	76	1000
43MPS(H)02-48S05	36 ~ 75	5	400	10	78	1000
43MPS(H)02-48S09	36 ~ 75	9	222	12	79	430
43MPS(H)02-48S12	36 ~ 75	12	167	12	80	220
43MPS(H)02-48S15	36 ~ 75	15	134	12	82	170
43MPS(H)02-48S24	36 ~ 75	24	83	12	81	100
43MPS(H)02-48D12	36 ~ 75	±12	±83	12	81	±170
43MPS(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	V DC	
	12Vin(nom)	9	12	18		
	24Vin(nom)	18	24	36		
	48Vin(nom)	36	48	75		
Start-up voltage	5Vin(nom)	--	--	4.5	V DC	
	12Vin(nom)	--	--	9		
	24Vin(nom)	--	--	18		
	48Vin(nom)	--	--	36		
Shutdown voltage	5Vin(nom)	2	3	4	V DC	
	12Vin(nom)	6	7	8		
	24Vin(nom)	13	15	17		
	48Vin(nom)	29	32	35		
Start-up time	Constant resistive load	Power up	--	10	20	ms
Input surge voltage	1 second, max.	5Vin(nom)	--	--	15	V DC
		12Vin(nom)	--	--	25	
		24Vin(nom)	--	--	50	
		48Vin(nom)	--	--	100	
Input filter	Capacitor Type					
Remote ON/OFF	Referred to -Vin pin and Ctrl pin	DC-DC ON	Open or high impedance			
	Applied current	DC-DC OFF	2.0	3.0	4.0	mA
		Remote off input current		2.5		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	-5.0	--	+5.0		
Ripple and Noise	Measured by 20MHz bandwidth	--	50		mVp-p	
Temperature coefficient		-0.02	--	+0.02	%/°C	
Transient response recovery time	25% Load step change	--	500	--	µs	
Over voltage protection	3.3Vout	4.0	--	6.5	V DC	
	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, automatic recovery				

General Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Isolation voltage	1 minute Reinforced insulation for 250 VAC working voltage	5000	--	--	V AC
Isolation resistance	500V DC	10	--	--	GΩ
Isolation capacitance		--	16	20	pF
Leakage current	240V AC, 60Hz	--		2	μA
Switching frequency		100	--	--	kHz
Clearance/Creepage		8	--	--	mm
Safety approvals	EC/ 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

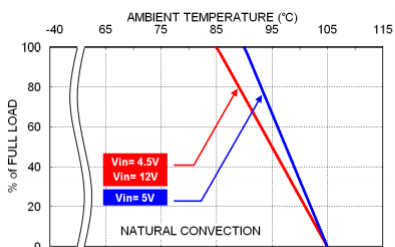
Environmental Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Operating ambient temperature	With derating	-40	--	+105	°C
Maximum case temperature		--	--	105	°C
Storage temperature range		-55	--	+125	°C
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				PC J-STD-020E
Moisture sensitivity level (MSL)	Only for SMD type				IPC J-STD-033C Level 2

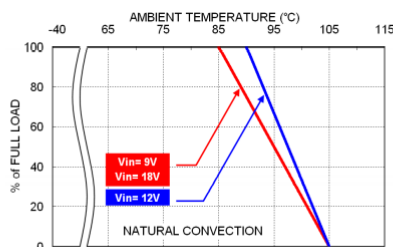
EMC Specifications

Parameter	Conditions		Level
EMI	EN55011, EN55032, EN60601-1-2 and FCC Part 18 / 15 With external components		Class A, Class B
EMS	EN55024 and EN60601-1-2		
ESD	EN61000-4-2	Air ± 15 kV and Contact ± 8 kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2 kV	Perf. Criteria A
	43MPH(S)02-05□□□	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 1000 μ F/25V) and a TVS (SMAJ18A, 18V, 400Watt peak pulse power) in parallel.	
	43MPH(S)02-12□□□	With an external input filter capacitor (Nippon chemi-con KY series, 470 μ F/50V)	
	43MPH(S)02-24□□□	With an external input filter capacitor (Nippon chemi-con KY series, 470 μ F/50V)	
Surge	EN61000-4-5	± 1 kV	Perf. Criteria A
	43MPH(S)02-05□□□	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 1000 μ F/25V) and a TVS (SMAJ18A, 18V, 400Watt peak pulse power) in parallel	
	43MPH(S)02-12□□□ 43MPH(S)02-24□□□	With an external input filter capacitor (Nippon chemi-con KY series, 470 μ F/50V)	
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
	EN61000-4-8	100A/m continuous, 1000A/m 1 second	
Power frequency magnetic field	EN61000-4-8	100A/m continuous, 1000A/m 1 second	Perf. Criteria A

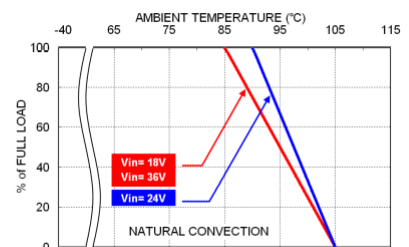
CAUTION: This power module is not internally fused. An input line fuse must always be used.

Characteristic Curve


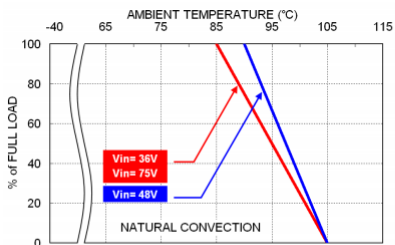
43MPH(S)02-05□□□ Derating Curve



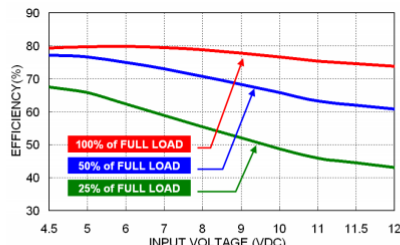
43MPH(S)02-12□□□ Derating Curve



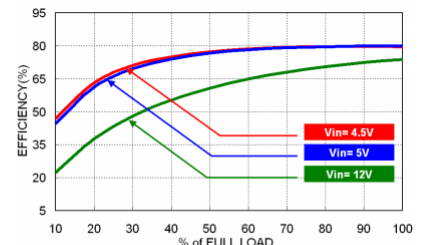
43MPH(S)02-24□□□ Derating Curve



43MPH(S)02-48□□□ Derating Curve



43MPH(S)02-48S05 Efficiency vs. Input Voltage



MPH(S)02-48S05 Efficiency vs. Output Current

Fuse Considerations

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.

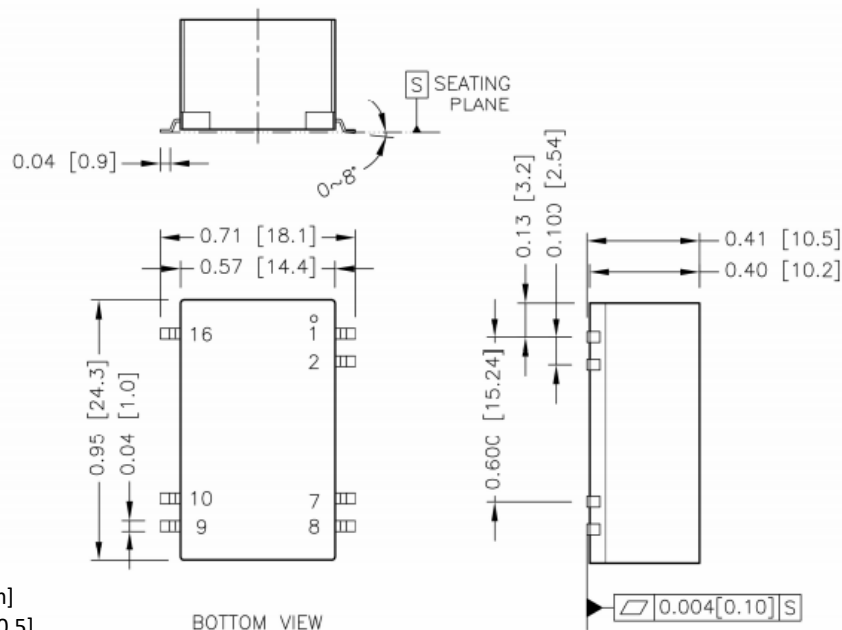
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
43MPH(S)02-05S□□, 43MPH(S)02-05D□□	1	Slow-Blow
43MPH(S)02-12S□□, 43MPH(S)02-12D□□	0.5	Slow-Blow
43MPH(S)02-24S□□, 43MPH(S)02-24D□□	0.315	Slow-Blow
43MPH(S)02-48S□□, 43MPH(S)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 (Continued)

MPH02



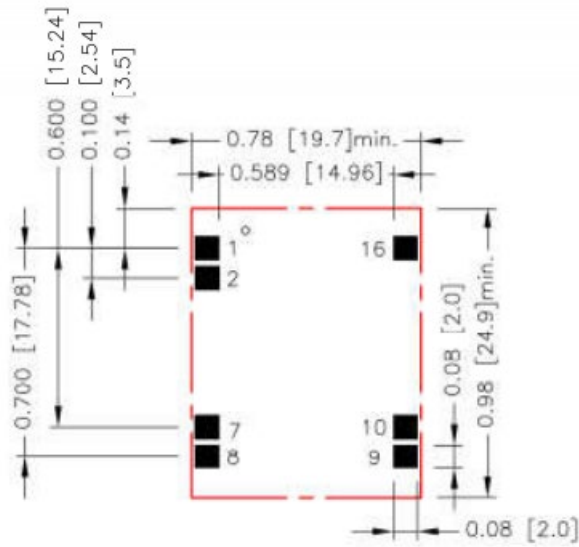
- All dimensions in inch [mm]
- Tolerance: $x.xx \pm 0.02$ [$x.x \pm 0.5$]
 $x.xxx \pm 0.010$ [$x.xx \pm 0.25$]
- Pin pitch tolerance ± 0.010 [0.25]
- Pin dimension tolerance ± 0.004 [0.10]

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

Recommended Pad Layout

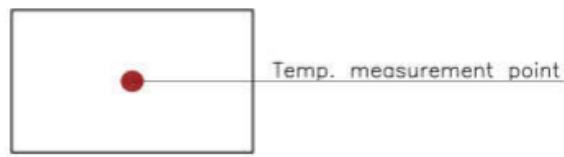
MPH02



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

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.



TOP VIEW