



MOP03(W) SERIES

DC-DC CONVERTER
2:1 & 4:1 WIDE INPUT RANGE
UP TO 3.3 WATTS



FEATURES

- REINFORCED INSULATION FOR 300VAC WORKING VOLTAGE
- CLEARANCE AND CREEPAGE DISTANCE : 6.6mm/2MOOP
- 3000VAC INPUT TO OUTPUT 2MOOP ISOLATION
- BUILT-IN EMI CLASS A FILTER
- 2μA PATIENT LEAKAGE CURRENT
- SAFETY MEETS ANSI/AAMI ES60601-1, EN60601-1 AND IEC60601-1
- CE MARK MEETS 2006/95/EC, 2011/95/EC AND 2004/108/EC
- COMPLIANT TO RoHS EU DIRECTIVE 2011/65/EU

APPLICATIONS

MEDICAL EQUIPMENT
TELECOM/DATACOM
INDUSTRY CONTROL SYSTEM
MEASUREMENT EQUIPMENT
SEMICONDUCTOR EQUIPMENT
PV POWER SYSTEM
IGBT GATE DRIVER

3000VAC ISOLATION	UVP	OCP	SCP	OVP	LOW STANDBY POWER
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TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25°C otherwise noted

Model Number	Input Range VDC	Output Voltage VDC	Output Current @ Full Load mA	Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load μF
MOP03-05S05A/B	4.5 ~ 9	5	600	10	84.5	750
MOP03-05S12A/B	4.5 ~ 9	12	250	15	85.5	130
MOP03-05S15A/B	4.5 ~ 9	15	200	15	85	100
MOP03-05S24A/B	4.5 ~ 9	24	125	20	85.5	39
MOP03-05D05A/B	4.5 ~ 9	±5	±300	25	83	± 430
MOP03-05D12A/B	4.5 ~ 9	±12	±125	25	86	± 75
MOP03-05D15A/B	4.5 ~ 9	±15	±100	25	86	± 56
MOP03-12S3P3A/B	9 ~ 18	3.3	1000	10	82	1050
MOP03-12S05A/B	9 ~ 18	5	600	10	84.5	750
MOP03-12S12A/B	9 ~ 18	12	250	10	87	130
MOP03-12S15A/B	9 ~ 18	15	200	10	87	100
MOP03-12S24A/B	9 ~ 18	24	125	10	87	39
MOP03-12D05A/B	9 ~ 18	±5	±300	10	82	± 430
MOP03-12D12A/B	9 ~ 18	±12	±125	10	87.5	± 75
MOP03-12D15A/B	9 ~ 18	±15	±100	10	86	± 56
MOP03-24S3P3A/B	18 ~ 36	3.3	1000	6	82	1050
MOP03-24S05A/B	18 ~ 36	5	600	6	84.5	750
MOP03-24S12A/B	18 ~ 36	12	250	6	87	130
MOP03-24S15A/B	18 ~ 36	15	200	6	87	100
MOP03-24S24A/B	18 ~ 36	24	125	6	87	39
MOP03-24D05A/B	18 ~ 36	±5	±300	6	83	± 430
MOP03-24D12A/B	18 ~ 36	±12	±125	6	87	± 75
MOP03-24D15A/B	18 ~ 36	±15	±100	6	86	± 56
MOP03-48S3P3A/B	36 ~ 75	3.3	1000	4	81	1050
MOP03-48S05A/B	36 ~ 75	5	600	4	83	750
MOP03-48S12A/B	36 ~ 75	12	250	4	87	130
MOP03-48S15A/B	36 ~ 75	15	200	4	87	100
MOP03-48S24A/B	36 ~ 75	24	125	4	86	39
MOP03-48D05A/B	36 ~ 75	±5	±300	4	83	± 430
MOP03-48D12A/B	36 ~ 75	±12	±125	4	86	± 75
MOP03-48D15A/B	36 ~ 75	±15	±100	4	86	± 56

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit	
Voltage accuracy			-1.0		+1.0	%	
Line regulation	Low Line to High Line at Full Load	Single	-0.2		+0.2	%	
		Dual	-0.5		+0.5		
Load regulation	No Load to Full Load	Single	-0.2		+0.2	%	
		Dual	-1.0		+1.0		
Cross regulation	Asymmetrical load 25%/100% FL		-5.0		+5.0	%	
Voltage adjustability (Only for B-type Pin connection option)	Single output		3.3Vout, 5Vout, 12Vout		-10	+10	%
			15Vout, 24Vout		-10	+20	
Ripple and noise	Measured by 20MHz bandwidth With a 10μF/25V X7R MLCC		3.3Vout, 5Vout				mVp-p
			12Vout, 15Vout		30		
	With a 4.7μF/50V X7R MLCC		24Vout		40		
Temperature coefficient			-0.02		+0.02	%/°C	
Transient response recovery time	25% load step change			250		μs	
Over voltage protection	Continuous clamp	3.3Vout	3.7		5.4	VDC	
		5Vout	5.6		7.0		
		12Vout	13.5		19.6		
		15Vout	18.3		22.0		
		24Vout	29.1		32.5		
Over load protection	% of Iout rated; Hiccup mode			150		%	
Short circuit protection						Continuous, automatic recovery	

GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	3000			VAC
Isolation capacitance				12	17	pF
Leakage current	240VAC, 60Hz				2	μA
Switching frequency			135	150	165	kHz
Clearance/Creepage			6.6			mm
Design meet safety standard						ANSI/AAMI ES60601-1 IEC60601-1, EN60601-1
Case material						Non-conductive black plastic
Base material						Non-conductive black plastic
Potting material						Silicon (UL94-V0)
Dimensions						1.25 X 0.80 X 0.40 Inch (31.8×20.3×10.2 mm)
Weight						14g (0.48oz)
MTBF	MIL-HDBK-217F Ta=25°C, Full load (G/B, controlled environment)					1.303 x 10 ⁶ hrs

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating		-40		+94	°C
	With derating		+94		+105	
Storage temperature range			-55		+125	°C
Thermal impedance	Natural convection (20LFM)			18		°C/W
Thermal shock						MIL-STD-810F
Vibration						MIL-STD-810F
Relative humidity						5% to 95% RH

EMC SPECIFICATIONS

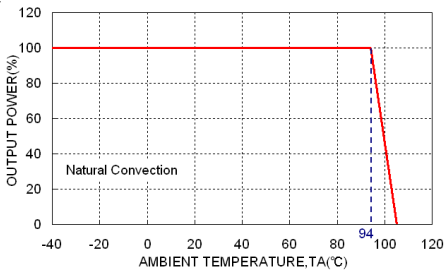
Parameter	Conditions		Level		
EMI ⁽¹⁾	EN55011, EN55022 and FCC Part 18		Class A, Class B		
ESD	EN61000-4-2	Air ± 8kV	Perf. Criteria A		
		Contact ± 6kV			
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A		
Fast transient ⁽²⁾	EN61000-4-4	± 2kV	Perf. Criteria A		
Surge ⁽²⁾	EN61000-4-5	± 2kV	Perf. Criteria A		
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A		

Note:

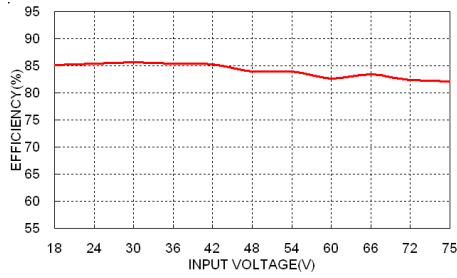
- The MOP03 (W) series can meet EMI Class A with no external filter. And Class B only with external components. For more detail information, please contact with P-DUKE.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The MOP03-05S□□□□ recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 1000μF/25V). And a reverse diode (Vishay V10P45) to connect in parallel. The MOP03-12&24S□□□□□ recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 470μF/50V). The MOP03-48S□□□□□ recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 330μF/100V).

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

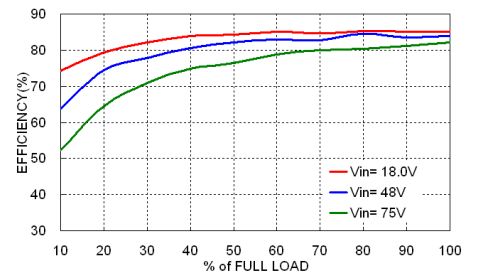
CHARACTERISTIC CURVE



MOP03-48S05WA Derating Curve



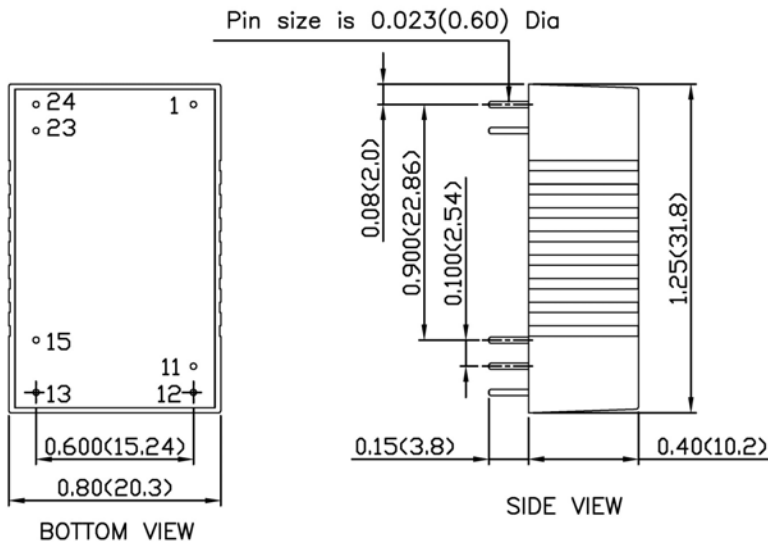
MOP03-48S05WA Efficiency VS Input Voltage



MOP03-48S05WA Efficiency VS Output Load

MECHANICAL DRAWING

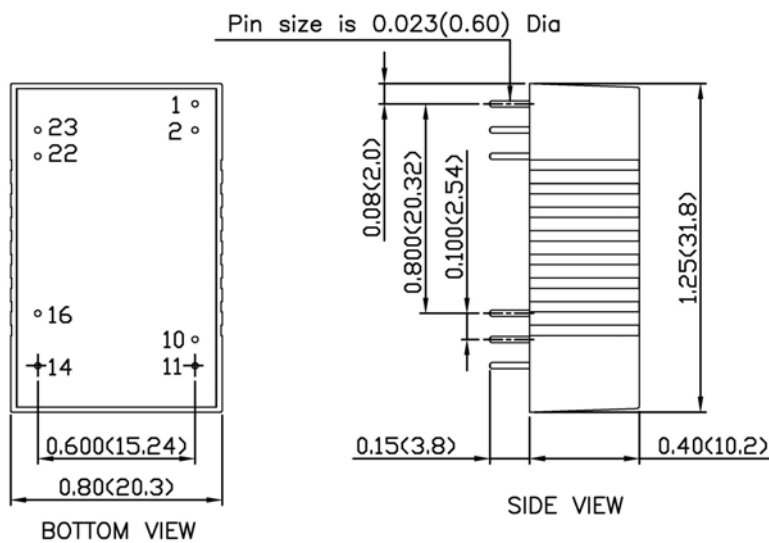
A type Pin connection (Standard)



DIP PIN CONNECTION		
PIN	SINGLE	DUAL
1	+ INPUT	+ INPUT
11	NO PIN	COMMON
12	-OUTPUT	NO PIN
13	+OUTPUT	-OUTPUT
15	NO PIN	+OUTPUT
23	- INPUT	- INPUT
24	- INPUT	- INPUT

- All dimensions in Inch (mm)
Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
- Pin pitch tolerance ±0.01 (0.25)
- Pin dimension tolerance ±0.004 (0.1)

B type Pin connection



DIP PIN CONNECTION		
PIN	SINGLE	DUAL
1	CTRL (Option)	CTRL (Option)
2	- INPUT	- INPUT
10	TRIM (Option)	TRIM (Option)
11	NO PIN / NC (**)	-OUTPUT
14	+OUTPUT	+OUTPUT
16	-OUTPUT	COMMON
22	+INPUT	+INPUT
23	+INPUT	+INPUT

** : The Pin 11 is "NO PIN" when single output with Trim option (Suffix: -T).
The Pin 11 is "NC" when single output without TRIM pin.

- All dimensions in Inch (mm)
Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
- Pin pitch tolerance ±0.01 (0.25)
- Pin dimension tolerance ±0.004 (0.1)