POWER MATE TECHNOLOGY CO., LTD.

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

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25ºC 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
MOP03-05S3P3A/B	4.5 ~9	3.3	1000	10	81	1050
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

Model Number	Input Range VDC	Output Voltage VDC	Output Current @ Full Load mA	Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load µF
MOP03-24S3P3WA/B	9 ~ 36	3.3	1000	6	82	1050
MOP03-24S05WA/B	9 ~ 36	5	600	6	84.5	750
MOP03-24S12WA/B	9 ~ 36	12	250	6	87	130
MOP03-24S15WA/B	9 ~ 36	15	200	6	87	100
MOP03-24S24WA/B	9 ~ 36	24	125	6	87	39
MOP03-24D05WA/B	9 ~ 36	±5	±300	6	83	± 430
MOP03-24D12WA/B	9 ~ 36	±12	±125	6	87	± 75
MOP03-24D15WA/B	9 ~ 36	±15	±100	6	86	± 56
MOP03-48S3P3WA/B	18 ~ 75	3.3	1000	4	81	1050
MOP03-48S05WA/B	18 ~ 75	5	600	4	83	750
MOP03-48S12WA/B	18 ~ 75	12	250	4	87	130
MOP03-48S15WA/B	18 ~ 75	15	200	4	87	100
MOP03-48S24WA/B	18 ~ 75	24	125	4	86	39
MOP03-48D05WA/B	18 ~ 75	±5	±300	4	83	± 430
MOP03-48D12WA/B	18 ~ 75	±12	±125	4	86	± 75
MOP03-48D15WA/B	18 ~ 75	±15	±100	4	86	± 56

PART NUMBER STRUCTURE

MOP03 - 48 S 05 W A - P T

Series name: MOP03

Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Pin Connection Option	Remote On/Off Option	Trim Option
05: 4.5~9 **12:** 9~18 **24:** 18~36 **48:** 36~75	**S:** Single	**3P3:** 3.3 **05:** 5V **12:** 12 **15:** 15 **24:** 24	□: 2:1 **W:** 4:1	**A:** A type(Standard) **B:** B type	□: No On/Off control **P:** Remote On/Off (Only for B type Pin connection)	□: No Trim **T:** Trim (Only for B type Pin connection)
W: **24:** 9~36 **48:** 18~75	**D:** Dual	**05:** ±5 **12:** ±12 **15:** ±15				

INPUT SPECIFICATIONS

Parameter	Conditions			Min.	Typ.	Max.	Unit
Operating input voltage range		2:1	5Vin(nom)	4.5	5	9	VDC
			12Vin(nom)	9	12	18	
			24Vin(nom)	18	24	36	
			48Vin(nom)	36	48	75	
		(W) 4:1	24Vin(nom)	9	24	36	VDC
			48Vin(nom)	18	48	75	
Start-up voltage		2:1	5Vin(nom)			4.5	VDC
			12Vin(nom)			9	
			24Vin(nom)			18	
			48Vin(nom)			36	
		(W) 4:1	24Vin(nom)			9	VDC
			48 Vin(nom)			18	
Shutdown voltage		2:1	5Vin(nom)		4		VDC
			12Vin(nom)		8		
			24Vin(nom)		16		
			48Vin(nom)		33		
		(W) 4:1	24Vin(nom)		8		VDC
			48Vin(nom)		16		
Start up time	Constant resistive load		Power up		30		ms
			Remote ON/OFF		30		
Input surge voltage	3 second, max.	2:1	5Vin(nom)			16	VDC
			12Vin(nom)			25	
			24Vin(nom)			50	
			48Vin(nom)			100	
	3 second, max.	(W) 4:1	24Vin(nom)			50	VDC
			48Vin(nom)			100	
Input filter					Pi type		
Remote ON/OFF (Only for B-type Pin connection option)	Referenced to - INPUT pin		DC-DC ON		OPEN or 0 ~ 1.2VDC		
			DC-DC OFF		2.2 ~ 12VDC		
			Input current of CTRL pin	-0.5		1	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	Single Dual	-0.2 -0.5		+0.2 +0.5	%
Load regulation	No Load to Full Load	Single Dual	-0.2 -1.0		+0.2 +1.0	%
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Voltage adjustability (Only for B-type Pin connection option)	Single output	3.3Vout, 5Vout, 12Vout 15Vout, 24Vout	-10 -10		+10 +20	%
	Dual output	±5Vout, ±12Vout, ±15Vout	-10		+10	%
Ripple and noise	Measured by 20MHz bandwidth With a 10μF/25V X7R MLCC With a 4.7μF/50V X7R MLCC	 3.3Vout, 5Vout 12Vout, 15Vout 24Vout		 30 40 50		mVp-p
Temperature coefficient			-0.02		+0.02	%/ºC
Transient response recovery time	25% load step change			250		μs
Over voltage protection	Continuous clamp	3.3Vout 5Vout 12Vout 15Vout 24Vout	3.7 5.6 13.5 18.3 29.1		5.4 7.0 19.6 22.0 32.5	VDC
Over load protection	% of Iout rated; Hiccup mode			150		%
Short circuit protection					Continuous, automatics 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=25ºC, 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	ºC
	With derating	+94		+105	ºC
Storage temperature range		-55		+125	ºC
Thermal impedance	Natural convection (20LFM)		18		ºC/W
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

EMC SPECIFICATIONS

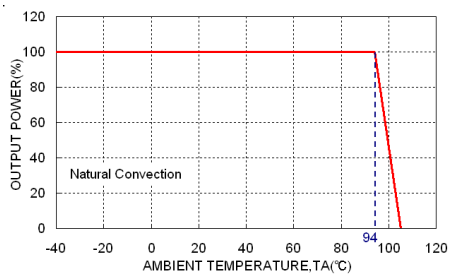
Parameter	Conditions		Level
EMI (1)	EN55011,EN55022 and FCC Part 18		Class A ,Class B
ESD	EN61000-4-2	Air ± 8kV Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient (2)	EN61000-4-4	± 2kV	Perf. Criteria A
Surge (2)	EN61000-4-5	± 2kV	Perf. Criteria A
Conducted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

Note:

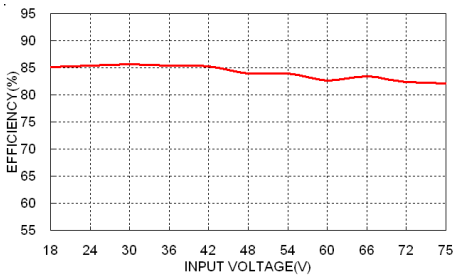
1. The MOP03 (W) series can meet EMI Class A with no external filter. And Class B only with external components. For more detail information, please contact with P-DUKE.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   The MOP03-05S□□□□ recommended 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.

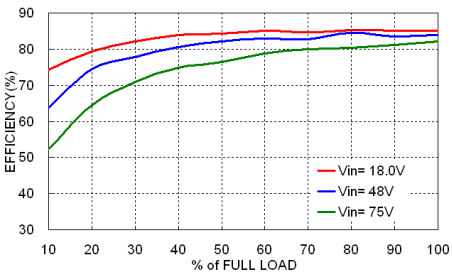
CHARACTERISTIC CURVE



MOP03-48S05WA Derating Curve



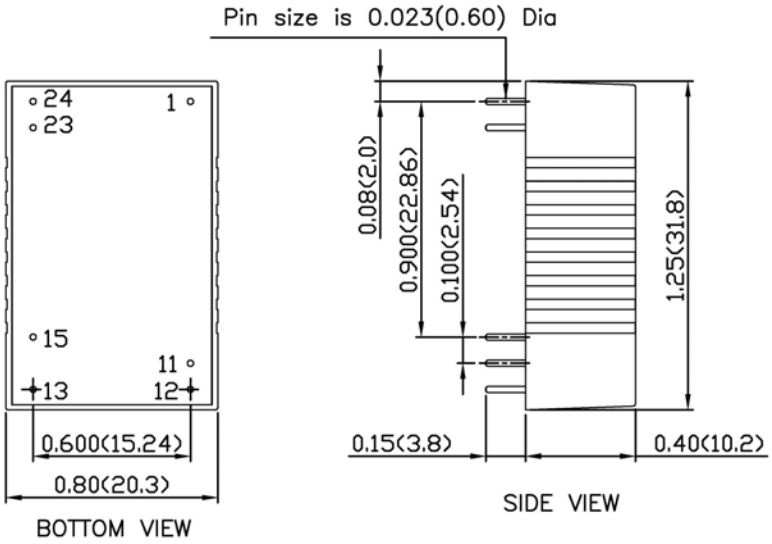
MOP03-48S05WA Efficiency VS Input Voltage



MOP03-48S05WA Efficiency VS Output Load

MECHANICAL DRAWING

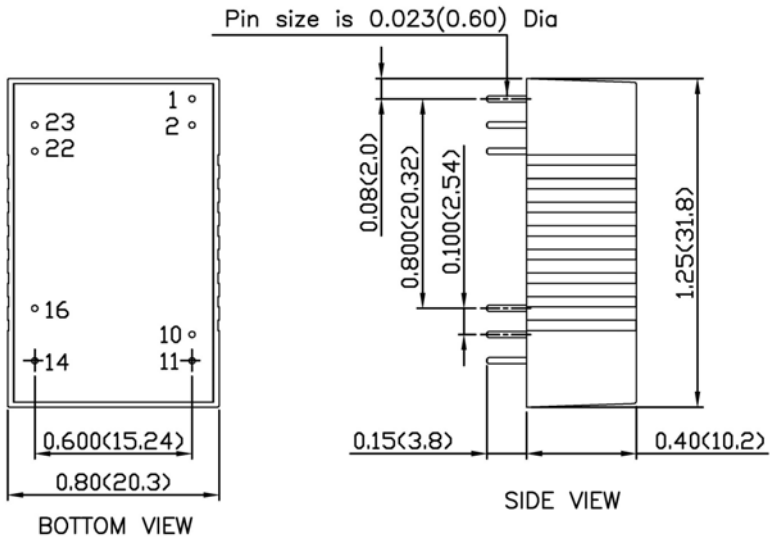
A type Pin connection (Standard)



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

1. All dimensions in Inch (mm)
   Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
2. Pin pitch tolerance ±0.01 (0.25)
3. 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.

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