



P-DUKE
POWER

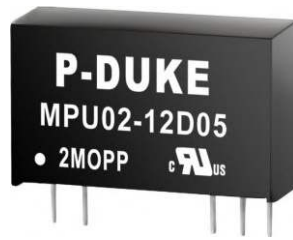
MPU02 Series

DC-DC Converter
 Up to 2 Watts

5
 YEARS
 WARRANTY

ROHS
 COMPLIANT

REACH
 COMPLIANT



Medical



PV



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Railway

UL **CB** **CE** **UK**
CA

2 x MOPP **LOW** Leakage Current **5000 VAC** Reinforced Insulation Operating Altitude **5000** meter **HIGH** Efficiency **SEMI** Regulated **SCP**

PART NUMBER STRUCTURE

MPU02 -	05	S	05
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)
	05: 4.5~7 12: 9.6~14.4 15: 12~18 24: 19.2~28.8	S: Single D: Dual	3P3: 3.3 05: 5 12: 12 15: 15 05: ± 5 12: ±12 15: ±15

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C 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
MPU02-05S3P3	4.5 ~ 7	3.3	600	5	78	2000
MPU02-05S05	4.5 ~ 7	5	400	5	81	820
MPU02-05S12	4.5 ~ 7	12	167	20	83	470
MPU02-05S15	4.5 ~ 7	15	134	20	83	470
MPU02-05D05	4.5 ~ 7	±5	±200	5	82	±470
MPU02-05D12	4.5 ~ 7	±12	±83	20	83	±220
MPU02-05D15	4.5 ~ 7	±15	±67	25	81	±220
MPU02-12S3P3	9.6 ~ 14.4	3.3	600	4	79	2000
MPU02-12S05	9.6 ~ 14.4	5	400	4	81	820
MPU02-12S12	9.6 ~ 14.4	12	167	10	84	470
MPU02-12S15	9.6 ~ 14.4	15	134	10	83	470
MPU02-12D05	9.6 ~ 14.4	±5	±200	4	81	±470
MPU02-12D12	9.6 ~ 14.4	±12	±83	10	83	±220
MPU02-12D15	9.6 ~ 14.4	±15	±67	10	82	±220
MPU02-15S3P3	12 ~ 18	3.3	600	4	79	2000
MPU02-15S05	12 ~ 18	5	400	4	81	820
MPU02-15S12	12 ~ 18	12	167	8	84	470
MPU02-15S15	12 ~ 18	15	134	8	83	470
MPU02-15D05	12 ~ 18	±5	±200	4	81	±470
MPU02-15D12	12 ~ 18	±12	±83	8	83	±220
MPU02-15D15	12 ~ 18	±15	±67	8	80	±220
MPU02-24S3P3	19.2 ~ 28.8	3.3	600	3	78	2000
MPU02-24S05	19.2 ~ 28.8	5	400	3	80	820
MPU02-24S12	19.2 ~ 28.8	12	167	6	82	470
MPU02-24S15	19.2 ~ 28.8	15	134	6	82	470
MPU02-24D05	19.2 ~ 28.8	±5	±200	3	81	±470
MPU02-24D12	19.2 ~ 28.8	±12	±83	6	81	±220
MPU02-24D15	19.2 ~ 28.8	±15	±67	6	80	±220

INPUT SPECIFICATIONS						
Parameter	Conditions	Min.	Typ.	Max.	Unit	
Operating input voltage range		5Vin(nom)	4.5	5	7	VDC
		12Vin(nom)	9.6	12	14.4	
		15Vin(nom)	12	15	18	
		24Vin(nom)	19.2	24	28.8	
Input surge voltage	1 second, max.	5Vin(nom)			15	VDC
		12Vin(nom)			25	
		15Vin(nom)			25	
		24Vin(nom)			35	
		If the input will be switched electromechanically, the input should install an external 47μF/63V E/C. to avoid voltage transient.				

OUTPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Voltage accuracy	Measured by nominal input & 60% FL Measured by nominal input & 90% FL	3.3Vout,5Vout,±5Vout Others	-3		+3 %
Line regulation			-2		+2 %
Load regulation	10% Load to 100% Load		-4		+4 %
Minimum Load	Reference Characteristic Curve		0		%
Cross regulation	Asymmetrical load 25%/100% FL	Dual		±4	%
Ripple and noise	Measured by 20MHz bandwidth	3.3Vout,5Vout,±5Vout Others		100 125	mVp-p
Temperature coefficient			-0.03		+0.03 %/°C
Short circuit protection					Continuous, automatic recovery

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute Input to Output	5000			VAC
Isolation resistance	500VDC	10			GΩ
Isolation capacitance			10	20	pF
Leakage current	240VAC,60Hz			2	μA
Switching frequency		180		360	kHz
Clearance/Creepage		8.0			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					None
Potting material					Silicone (UL94 V-0)
Weight					4.8g (0.17oz)
MTBF	MIL-HDBK-217F, Full load				1.041 x 10 ⁷ hrs

ENVIRONMENTAL SPECIFICATIONS

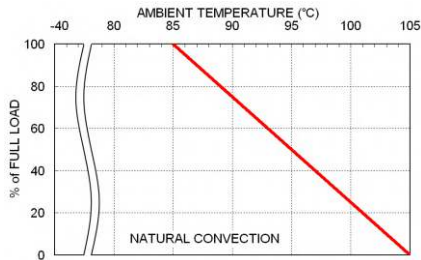
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating	-40		+85	°C
Maximum case temperature				105	°C
Storage temperature range		-55		+125	°C
Operating altitude				5000	m
Thermal shock					MIL-STD-810F
Shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

EMC SPECIFICATIONS

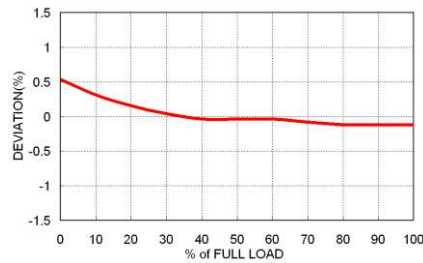
Parameter	Conditions	Level
EMI	EN55011, EN55032, EN60601-1-2 With external components	Class A, Class B
EMS	EN55024 and EN60601-1-2	Perf. Criteria A
ESD	EN61000-4-2 Air ± 15kV and Contact ± 8kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 ± 2kV External input filter circuit is required, for further information, please contact P-DUKE.	Perf. Criteria A
Surge	EN61000-4-5 ± 2kV External input filter circuit is required, for further information, please contact P-DUKE.	Perf. Criteria A
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.

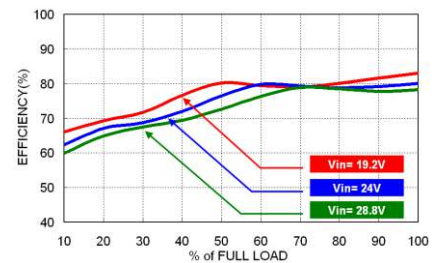
CHARACTERISTIC CURVE



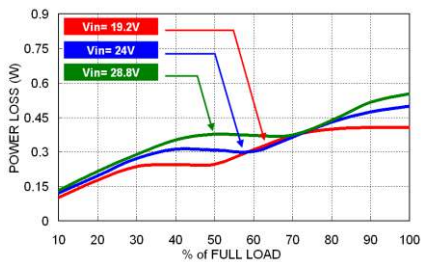
MPU02-24S05 Derating Curve



MPU02-24S05 Vout Deviation vs. Output Load



MPU02-24S05 Efficiency vs. Output Load



MPU02-24S05 Power Dissipation vs. Output Load

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.

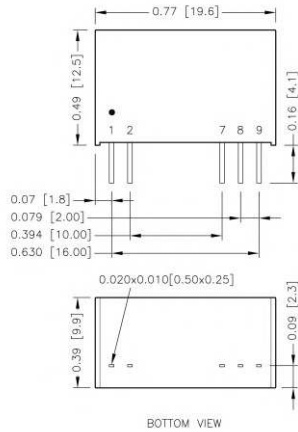
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Modules	Fuse Rating (A)	Fuse Type
MPU02-05S□□、MPU02-05D□□	1.00	Slow-Blow
MPU02-12S□□、MPU02-12D□□	0.50	Slow-Blow
MPU02-15S□□、MPU02-15D□□	0.50	Slow-Blow
MPU02-24S□□、MPU02-24D□□	0.315	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

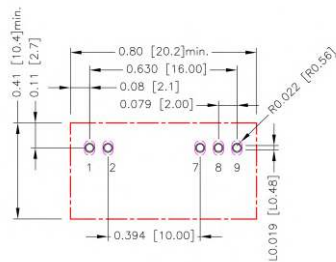


PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
7	-Vout	-Vout
8	No pin	Common
9	+Vout	+Vout

- All dimensions in inch [mm]
- Tolerance: $\cdot x.xx \pm 0.02$ [$x.xx \pm 0.5$]
 $x.xxx \pm 0.01$ [$x.xx \pm 0.25$]
- Pin dimension tolerance ± 0.004 [0.10]

RECOMMENDED PAD LAYOUT



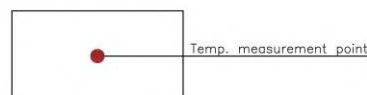
- * There should be at least 8mm distance between primary and secondary circuit.
- ** For further information, please contact P-DUKE.

All dimensions in inch [mm]
 Pad size (lead free recommended)
 Through hole 1.2.7.8.9: $\varnothing 0.031$ [0.80]
 Top view pad 1.2.7.8.9: $\varnothing 0.039$ [1.00]
 Bottom view pad 1.2.7.8.9:
 Groove R0.022 [0.56] L0.019 [0.48]

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