



# P-DUKE POWER

## PDL03 Series

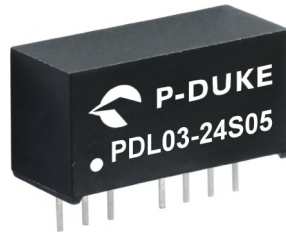
DC-DC Converter  
Up to 3 Watts

### 3

YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway



**3000**  
VDC  
Isolation  
Voltage

**1600**  
VDC  
Isolation  
Voltage

**2 : 1**  
Input  
Range

**NO**  
Min. Load  
Required

**REMOTE**  
**ON**  
**OFF**

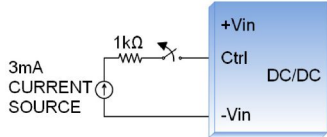
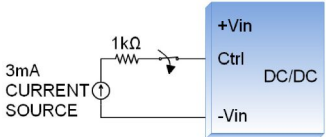
**SCP**

### PART NUMBER STRUCTURE

PDL03 -	48	S	05	H
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Isolation Options
	05:4.5~9 12:9~18 24:18~36 48:36~75	S:Single    D:Dual	3P3:3.3 05:5 09:9 12:12 15:15  05:±5 12:±12 15:±15	□:Standard type 1600VDC isolation H:3000VDC isolation

**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
PDL03-05S3P3	4.5 ~ 9	3.3	700	45	75	3300
PDL03-05S05	4.5 ~ 9	5	600	45	79	1680
PDL03-05S09	4.5 ~ 9	9	333	55	80	1000
PDL03-05S12	4.5 ~ 9	12	250	55	81	820
PDL03-05S15	4.5 ~ 9	15	200	55	82	680
PDL03-05D05	4.5 ~ 9	±5	±300	55	78	±1000
PDL03-05D12	4.5 ~ 9	±12	±125	60	81	±470
PDL03-05D15	4.5 ~ 9	±15	±100	60	81	±330
PDL03-12S3P3	9 ~ 18	3.3	700	25	77	3300
PDL03-12S05	9 ~ 18	5	600	25	81	1680
PDL03-12S09	9 ~ 18	9	333	30	80	1000
PDL03-12S12	9 ~ 18	12	250	30	83	820
PDL03-12S15	9 ~ 18	15	200	30	83	680
PDL03-12D05	9 ~ 18	±5	±300	30	82	±1000
PDL03-12D12	9 ~ 18	±12	±125	30	83	±470
PDL03-12D15	9 ~ 18	±15	±100	30	83	±330
PDL03-24S3P3	18 ~ 36	3.3	700	16	76	3300
PDL03-24S05	18 ~ 36	5	600	16	82	1680
PDL03-24S09	18 ~ 36	9	333	17	82	1000
PDL03-24S12	18 ~ 36	12	250	18	83	820
PDL03-24S15	18 ~ 36	15	200	18	84	680
PDL03-24D05	18 ~ 36	±5	±300	17	80	±1000
PDL03-24D12	18 ~ 36	±12	±125	18	83	±470
PDL03-24D15	18 ~ 36	±15	±100	18	85	±330
PDL03-48S3P3	36 ~ 75	3.3	700	10	74	3300
PDL03-48S05	36 ~ 75	5	600	10	79	1680
PDL03-48S09	36 ~ 75	9	333	11	80	1000
PDL03-48S12	36 ~ 75	12	250	12	81	820
PDL03-48S15	36 ~ 75	15	200	12	82	680
PDL03-48D05	36 ~ 75	±5	±300	12	79	±1000
PDL03-48D12	36 ~ 75	±12	±125	12	82	±470
PDL03-48D15	36 ~ 75	±15	±100	12	83	±330

INPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	5Vin(nom)		4.5	5	9	VDC
	12Vin(nom)		9	12	18	
	24Vin(nom)		18	24	36	
	48Vin(nom)		36	48	75	
Start up time	Constant resistive load	Power up	30			ms
		Remote ON/OFF	30			
Input surge voltage	100 ms, max.	5Vin(nom)	15			VDC
		12Vin(nom)	36			
		24Vin(nom)	50			
		48Vin(nom)	100			
Input filter	Capacitor type					
Remote ON/OFF	Ctrl pin applied current via 1k $\Omega$	DC-DC ON	Open or high impedance			mA
		DC-DC OFF	2	3	4	
		Remote off input current	2.5			mA
Application circuit						
DC-DC ON		DC-DC OFF				
						

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	
	5% Load to 100% Full Load	Single	-0.5		+0.5	%
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	20MHz bandwidth			50		mVp-p
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			500		$\mu$ s
Short circuit protection	Continuous, automatics recovery					

GENERAL SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	1600		3000	VDC
Isolation resistance	500VDC		1			G $\Omega$
Isolation capacitance					200	pF
					40	
Switching frequency	Full load to minimum load		100			kHz
Safety approvals	IEC /EN /UL 62368-1		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		4.871 x 10 <sup>6</sup> hrs			

## ENVIRONMENTAL SPECIFICATIONS

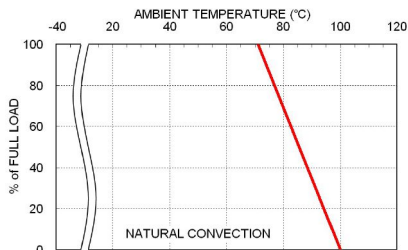
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+100	°C
Maximum case temperature				100	°C
Storage temperature range		-55		+125	°C
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

## EMC SPECIFICATIONS

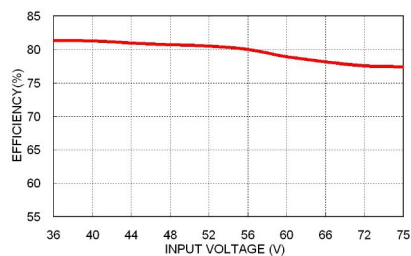
Parameter	Conditions	Level
EMI	EN55032 With external components	Class A · Class B
EMS	EN55024	
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 ± 2kV With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V.)	Perf. Criteria A
Surge	EN61000-4-5 ±1kV With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V.)	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.

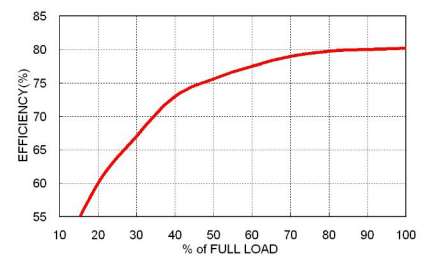
## CHARACTERISTIC CURVE



PDL03-48S05 Derating Curve



PDL03-48S05 Efficiency vs. Input Voltage



PDL03-48S05 Efficiency 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.

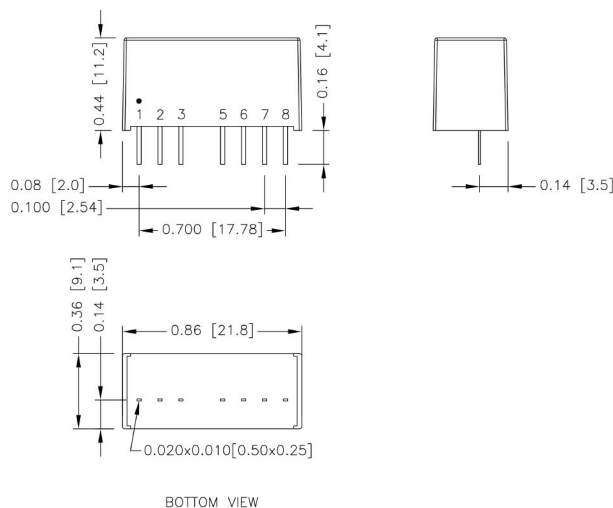
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
PDL03-05S□□、PDL03-05D□□	2	Slow-Blow
PDL03-12S□□、PDL03-12D□□	1.6	Slow-Blow
PDL03-24S□□、PDL03-24D□□	1	Slow-Blow
PDL03-48S□□、PDL03-48D□□	1	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

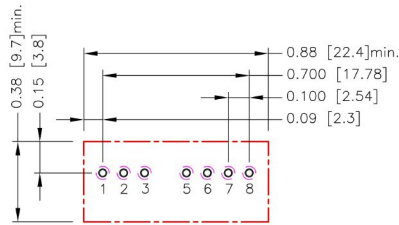


PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
5	NC*/No pin**	NC*/No pin**
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

\*NC pin for standard type model.

\*\*No pin for 3kVDC isolation model (suffix "H").

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

**RECOMMENDED PAD LAYOUT**


All dimensions in inch[mm]  
 Pad size(lead free recommended)  
 Through hole 1.2.3.5.6.7.8:  $\Phi 0.031[0.80]$   
 Top view pad 1.2.3.5.6.7.8:  $\Phi 0.039[1.00]$   
 Bottom view pad 1.2.3.5.6.7.8:  $\Phi 0.063[1.60]$

**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.

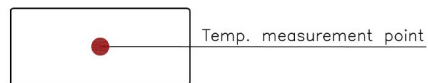
Proper cooling can be verified by measuring the point as the figure below.

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