P-DUKE POWER

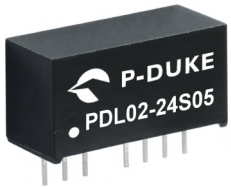
PDL02 Series

DC-DC Converter
Up to 2 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

PDL02 - 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	**33:**3.3 **05:**5 **09:**9 **12:**12 **15:**15	□:Standard type 1600VDC isolation **H:**3000VDC isolation
		D:Dual	**05:**±5 **12:**±12 **15:**±15	

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25℃ unless otherwise noted

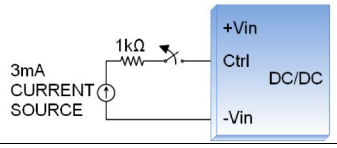
Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	mA	mA	%	μF
PDL02-05S33	4.5 ~ 9	3.3	500	35	76	2200
PDL02-05S05	4.5 ~ 9	5	400	35	80	1000
PDL02-05S09	4.5 ~ 9	9	222	40	82	470
PDL02-05S12	4.5 ~ 9	12	167	40	81	170
PDL02-05S15	4.5 ~ 9	15	134	40	83	110
PDL02-05D05	4.5 ~ 9	±5	±200	40	79	±470
PDL02-05D12	4.5 ~ 9	±12	±83	40	82	±100
PDL02-05D15	4.5 ~ 9	±15	±67	40	81	±47
PDL02-12S33	9 ~ 18	3.3	500	20	77	2200
PDL02-12S05	9 ~ 18	5	400	20	81	1000
PDL02-12S09	9 ~ 18	9	222	20	82	470
PDL02-12S12	9 ~ 18	12	167	20	83	170
PDL02-12S15	9 ~ 18	15	134	20	84	110
PDL02-12D05	9 ~ 18	±5	±200	30	81	±470
PDL02-12D12	9 ~ 18	±12	±83	30	83	±100
PDL02-12D15	9 ~ 18	±15	±67	30	84	±47
PDL02-24S33	18 ~ 36	3.3	500	15	78	2200
PDL02-24S05	18 ~ 36	5	400	15	81	1000
PDL02-24S09	18 ~ 36	9	222	15	82	470
PDL02-24S12	18 ~ 36	12	167	15	83	170
PDL02-24S15	18 ~ 36	15	134	15	84	110
PDL02-24D05	18 ~ 36	±5	±200	15	80	±470
PDL02-24D12	18 ~ 36	±12	±83	15	83	±100
PDL02-24D15	18 ~ 36	±15	±67	15	82	±47
PDL02-48S33	36 ~ 75	3.3	500	8	76	2200
PDL02-48S05	36 ~ 75	5	400	8	78	1000
PDL02-48S09	36 ~ 75	9	222	8	84	470
PDL02-48S12	36 ~ 75	12	167	8	83	170
PDL02-48S15	36 ~ 75	15	134	8	83	110
PDL02-48D05	36 ~ 75	±5	±200	8	80	±470
PDL02-48D12	36 ~ 75	±12	±83	8	81	±100
PDL02-48D15	36 ~ 75	±15	±67	8	81	±47

INPUT SPECIFICATIONS

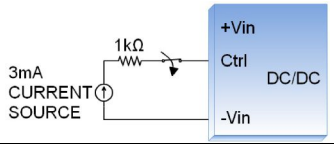
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		5Vin(nom)	4.5	5	9	VDC
		12Vin(nom)	9	12	18	
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
Start up time	Constant resistive load	Power up		5		ms
		Remote ON/OFF		5		
Input surge voltage	100 ms, max.	5Vin(nom)			15	VDC
		12Vin(nom)			36	
		24Vin(nom)			50	
		48Vin(nom)			100	
Input filter				Capacitor type		
Remote ON/OFF		DC-DC ON		Open or high impedance		
	Ctrl pin applied current via 1kΩ	DC-DC OFF	2	3	4	mA
		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	
	10% Load to 90% Full Load	Single	-0.5		+0.5	%
		Dual	-0.8		+0.8	
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	%/℃
Transient response recovery time	25% load step change			500		μs
Short circuit protection				Continuous, automatics recovery		

GENERAL SPECIFICATIONS

Parameter	Conditions			Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	Standard Type	1600			VDC
			Suffix "H"	3000			
Isolation resistance	500VDC			1			GΩ
Isolation capacitance			Standard Type			200	pF
			Suffix "H"			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					4.903×10^6 hrs	

ENVIRONMENTAL SPECIFICATIONS

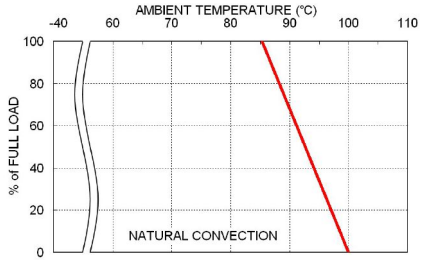
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+100	℃
Maximum case temperature				100	℃
Storage temperature range		-55		+125	℃
Thermal shock				MIL-STD-810F	
Vibration				MIL-STD-810F	
Relative humidity				5% to 95% RH	

EMC SPECIFICATIONS

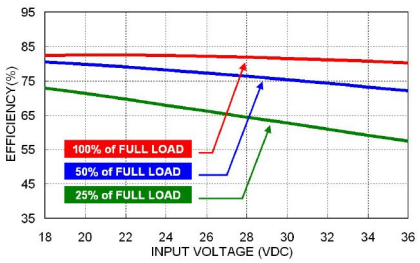
Parameter	Conditions		Level
EMI	EN55032	With external components	Class A，Class B
EMS	EN55024		
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV With an external input filter capacitor (Nippon chemi-con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

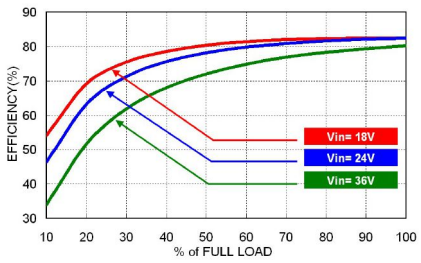
CHARACTERISTIC CURVE



PDL02-24S05 Derating Curve



PDL02-24S05 Efficiency vs. Input Voltage



PDL02-24S05 Efficiency vs. Output Load

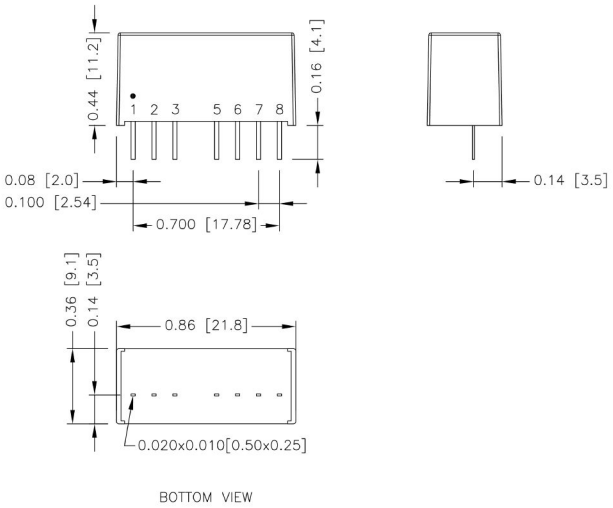
FUSE CONSIDERATION

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
PDL02-05S□□、PDL02-05D□□	1.6	Slow-Blow
PDL02-12S□□、PDL02-12D□□	1	Slow-Blow
PDL02-24S□□、PDL02-24D□□	1	Slow-Blow
PDL02-48S□□、PDL02-48D□□	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

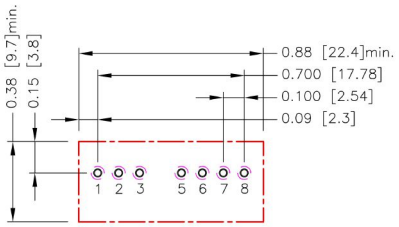


PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
5	NC*/ No pin**	NC*/ No pin**
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

*NC pin for standard type model.
**No pin for 3KVDC isolation model (suffix “H”).

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

RECOMMENDED PAD LAYOUT

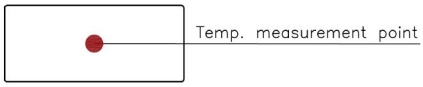


All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.5.6.7.8: Φ0.031[0.80]
Top view pad 1.2.3.5.6.7.8: Φ0.039[1.00]
Bottom view pad 1.2.3.5.6.7.8: Φ0.063[1.60]

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

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