POWER MATE TECHNOLOGY CO., LTD.

P-DUKE

PDL06 SERIES

DC-DC CONVERTER

2:1 ULTRA WIDE INPUT RANGE
UP TO 6Watts



FEATURES

- **SIP PACKAGE, 0.86 x 0.36x 0.44 INCH**
- **1600VDC INPUT TO OUTPUT ISOLATION AND 3000VDC FOR OPTION**
- **CONTINUOUS SHORT CIRCUIT PROTECTION**
- **SAFETY MEETS UL60950-1, EN60950-1, IEC60950-1**
- **CE MARK MEETS 2006/95/EC, 2011/95/EC and 2004/108/EC**
- **COMPLIANT TO RoHS EU DIRECTIVE 2011/65/EU**

APPLICATIONS

WIRELESS NETWORK
TELECOM/DATACOM
INDUSTRY CONTROL SYSTEM
MEASUREMENT EQUIPMENT
SEMICONDUCTOR EQUIPMENT

TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25 ºC 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
PDL06-05S3P3	4.5 ~ 9	3.3	1300	65mA	77	6600
PDL06-05S05	4.5 ~ 9	5	1200	105mA	81	3300
PDL06-05S09	4.5 ~ 9	9	666	105mA	83	2000
PDL06-05S12	4.5 ~ 9	12	500	105mA	84	1600
PDL06-05S15	4.5 ~ 9	15	400	105mA	84	1400
PDL06-05S24	4.5 ~ 9	24	250	105mA	84	680
PDL06-05D05	4.5 ~ 9	±5	±600	105mA	81	±2000
PDL06-05D12	4.5 ~ 9	±12	±250	105mA	84	±900
PDL06-05D15	4.5 ~ 9	±15	±200	105mA	84	±660
PDL06-12S3P3	9 ~ 18	3.3	1300	40mA	78	6600
PDL06-12S05	9 ~ 18	5	1200	55mA	83	3300
PDL06-12S09	9 ~ 18	9	666	55mA	85	2000
PDL06-12S12	9 ~ 18	12	500	55mA	85	1600
PDL06-12S15	9 ~ 18	15	400	55mA	85	1400
PDL06-12S24	9 ~ 18	24	250	55mA	84	680
PDL06-12D05	9 ~ 18	±5	±600	55mA	82	±2000
PDL06-12D12	9 ~ 18	±12	±250	55mA	84	±900
PDL06-12D15	9 ~ 18	±15	±200	55mA	85	±660
PDL06-24S3P3	18 ~ 36	3.3	1300	20mA	78	6600
PDL06-24S05	18 ~ 36	5	1200	28mA	83	3300
PDL06-24S09	18 ~ 36	9	666	28mA	85	2000
PDL06-24S12	18 ~ 36	12	500	28mA	86	1600
PDL06-24S15	18 ~ 36	15	400	28mA	86	1400
PDL06-24S24	18 ~ 36	24	250	28mA	85	680
PDL06-24D05	18 ~ 36	±5	±600	28mA	82	±2000
PDL06-24D12	18 ~ 36	±12	±250	28mA	85	±900
PDL06-24D15	18 ~ 36	±15	±200	28mA	85	±660
PDL06-48S3P3	36 ~ 75	3.3	1300	14mA	78	6600
PDL06-48S05	36 ~ 75	5	1200	14mA	82	3300
PDL06-48S09	36 ~ 75	9	666	14mA	84	2000
PDL06-48S12	36 ~ 75	12	500	14mA	85	1600
PDL06-48S15	36 ~ 75	15	400	14mA	86	1400
PDL06-48S24	36 ~ 75	24	250	14mA	84	680
PDL06-48D05	36 ~ 75	±5	±600	14mA	82	±2000
PDL06-48D12	36 ~ 75	±12	±250	14mA	84	±900
PDL06-48D15	36 ~ 75	±15	±200	14mA	85	±660

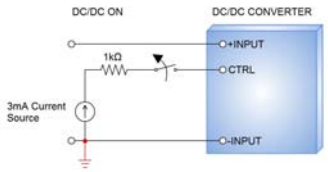
PART NUMBER STRUCTURE

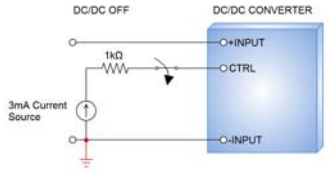
PDL06 - 48 S 05 H

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Assembly Option
	05:4.5~9 **12:**9~18 **24:**18~36 **48:**36~75	**S:**Single	**3P3:**3.3 **05:**5 **09:**9 **12:**12 **15:**15 **24:**24	□:Standard **H:**Plastic case with 3000VDC isolation **M:**Metal case with 1600VDC isolation
		D:Dual	**05:**±5 **12:**±12 **15:**±15	

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 voltage		5Vin(nom)			4.5	VDC
		12Vin(nom)			9	
		24Vin(nom)			18	
		48Vin(nom)			36	
Shutdown voltage		5Vin(nom)		3.5		VDC
		12Vin(nom)		7		
		24Vin(nom)		15		
		48Vin(nom)		33		
Start up time	Constant resistive load	Power up		30		ms
		Remote ON/OFF		30		
Input surge voltage	1 second, max.	5Vin(nom)			15	VDC
		12Vin(nom)			25	
		24Vin(nom)			50	
		48Vin(nom)			100	
Input reflected ripple current(1)		5Vin(nom)		30		mAp-p
		12Vin(nom)		30		
		24Vin(nom)		30		
		48Vin(nom)		30		
Input filter						Capacitor type
Remote ON/OFF	Referenced to –INPUT pin and CTRL pin applied current	DC-DC ON	Open or high impedance			
		DC-DC OFF	2	3	4	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		-0.2		+0.2	%
Load regulation	No Load to Full Load	Single	-1.0		+1.0	%
		Dual	-1.0		+1.0	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Ripple and noise	Measured by 20MHz bandwidth			50	75	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			
			Suffix ”M”	1600			
		Input (Output) to Case	Suffix ”M”	1000			
Isolation resistance	500VDC			1			GΩ
Isolation capacitance			Standard Type			50	pF
			Suffix ”H”			50	
			Suffix ”M”			50	
Switching frequency				100			kHz
Design meet safety standard				IEC60950-1, UL60950-1, EN60950-1			
Case material			Standard Type	Non-conductive black plastic			
			Suffix ”H”	Non-conductive black plastic			
			Suffix ”M”	Copper			
Base material				None			
Potting material				Silicon (UL94-V0)			
Dimensions				0.86 X 0.36 X 0.44 Inch (21.8 X 9.1 X 11.2 mm)			
Weight			Standard Type	4.8g (0.17oz)			
			Suffix ”H”	4.8g (0.17oz)			
			Suffix ”M”	5.9g (0.21oz)			
MTBF	BELLCORE TR-NWT-000332 Case 1: 50% Stress, Ta= 40℃.		Standard Type	2.097×10^6 hrs			
	MIL-HDBK-217F Ta=25℃, Full load (G/B, controlled environment)		Suffix ”H”	7.705×10^5 hrs			
			Suffix ”M”	7.705×10^5 hrs			
				9.987×10^5 hrs			

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Without derating	Standard Type	-40		+65	℃
		Suffix "H"	-40		+65	℃
		Suffix "M"	-40		+70	℃
Storage temperature range		Standard Type	-55		+125	℃
Thermal shock					MIL-STD-810F	
Vibration					MIL-STD-810F	
Relative humidity					5% to 95% RH	

EMC SPECIFICATIONS

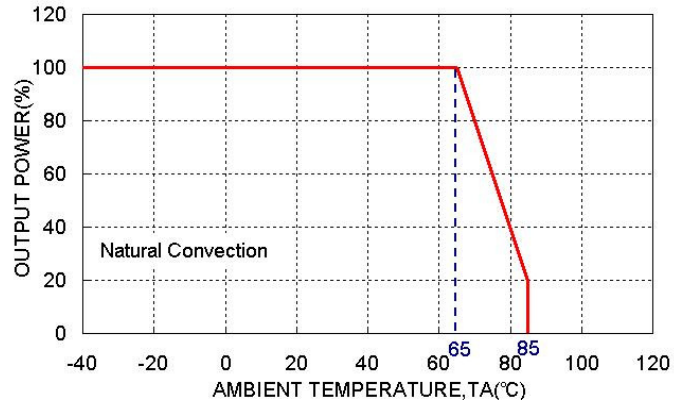
Parameter	Conditions		Level
EMI (1)	EN55022		Class A, ClassB
ESD	EN61000-4-2	Air ± 8kV Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient (2)	EN61000-4-4	± 2kV	Perf. Criteria A
Surge (2)	EN61000-4-5	± 1kV	Perf. Criteria A
Conducted immunity	EN61000-4-6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

Note:

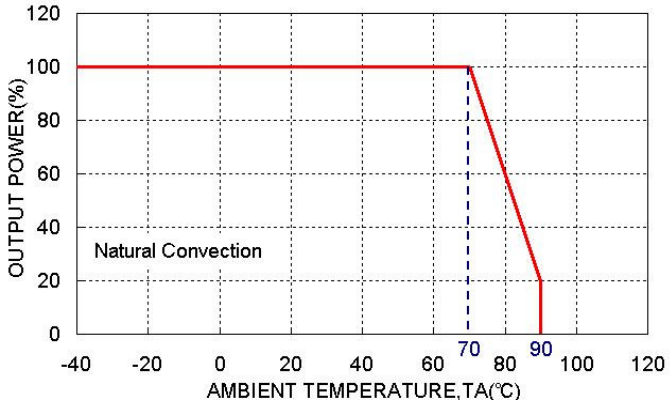
1. The PDL06 series standard module meets EMI Class A or Class B and input reflected ripple current only with external components. For more detail information, please contact with P-DUKE.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Power Mate suggest: 5 VDC input : Nippon chemi-con KY series, 330μF/50V. Others : Nippon chemi-con KY series, 220μF/100V.

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

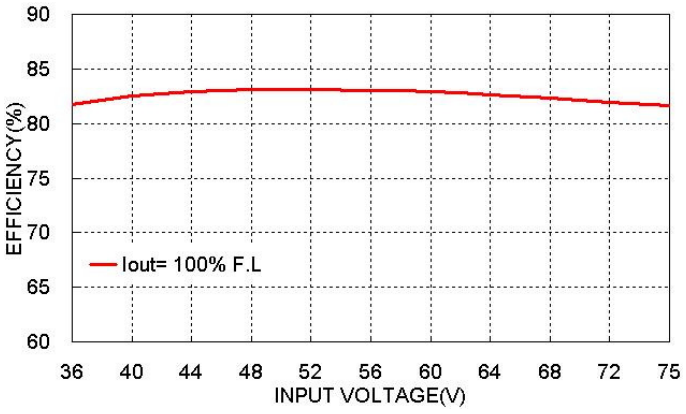
CHARACTERISTIC CURVE



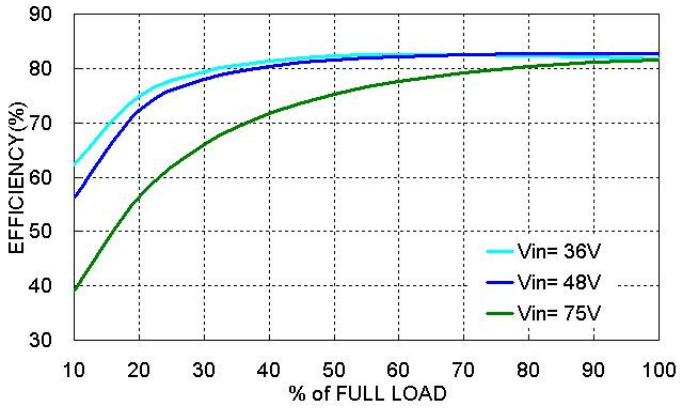
PDL06-48S05 Derating Curve



PDL06-48S05-M Derating Curve



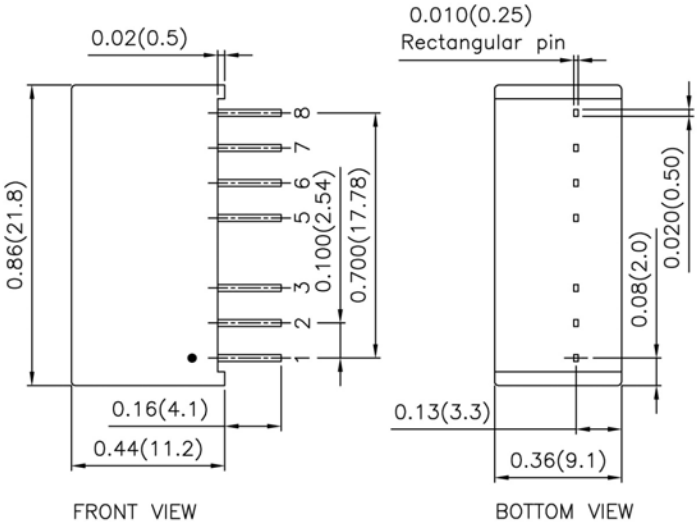
PDL06-48S05 Efficiency VS Input Voltage



PDL06-48S05 Efficiency VS Output Load

MECHANICAL DRAWING

Standard plastic case

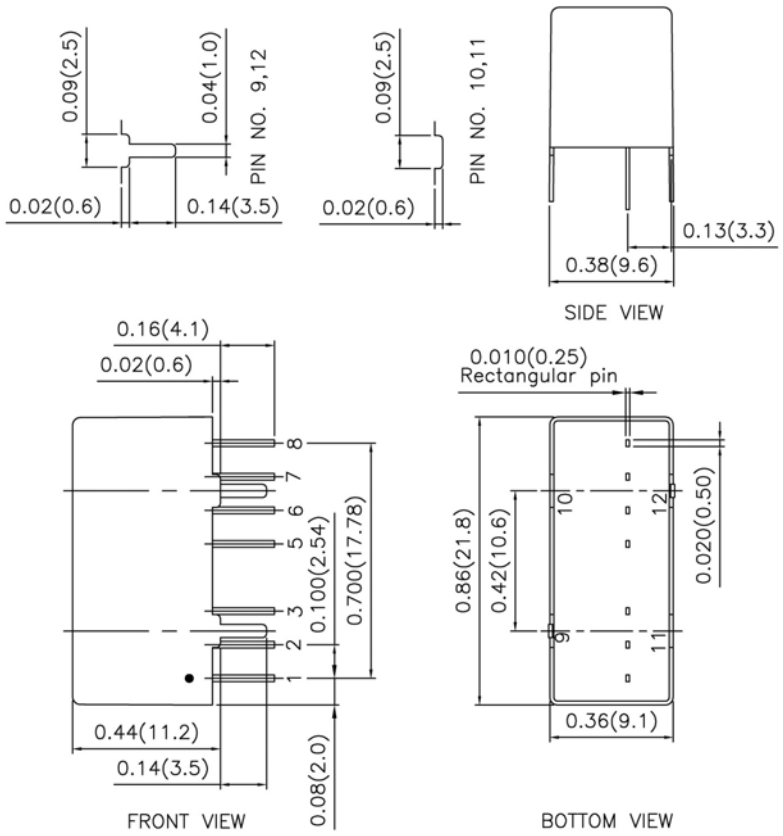


PIN CONNECTION		
PIN	SINGLE	DUAL
1	-INPUT	-INPUT
2	+INPUT	+INPUT
3	CTRL	CTRL
5	NC*/NO PIN**	NC*/NO PIN**
6	+OUTPUT	+OUTPUT
7	-OUTPUT	COMMON
8	NC	-OUTPUT

*NC pin for standard.
**NO pin for 3KV isolation. (P/N suffix "H")

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)

Option suffix "M" metal case



PIN CONNECTION		
PIN	SINGLE	DUAL
1	-INPUT	-INPUT
2	+INPUT	+INPUT
3	CTRL	CTRL
5	NC	NC
6	+OUTPUT	+OUTPUT
7	-OUTPUT	COMMON
8	NC	-OUTPUT
9	CASE	CASE
10	STAND OFF	STAND OFF
11	STAND OFF	STAND OFF
12	CASE	CASE

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)