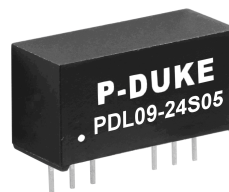
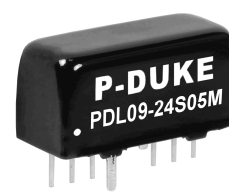


PDL09 SERIES

DC-DC CONVERTER

2:1 WIDE INPUT RANGE
UP TO 9 Watts



FEATURES

- NO MINIMUM LOAD REQUIRED
- 1600VDC INPUT TO OUTPUT INSULATION
- SMALL SIZE AND LOW PROFILE : 0.86 X 0.36 X 0.44 INCH
- UL60950-1, EN60950-1, & IEC60950-1
- UL62368-1, EN62368-1, & IEC62368-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

APPLICATIONS

- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

1600VDC ISOLATION	REMOTE CONTROL	OCP	SCP	LOW STANDBY POWER
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TECHNICAL SPECIFICATION

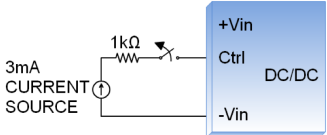
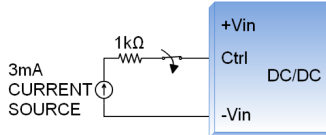
All specifications are typical at nominal input, full load and 25°C otherwise noted

Model Number	Input Range VDC	Output Voltage VDC	Output Current @Full Load mA	Input Current @ No Load mA	Efficiency %	Maximum Capacitor Load μF
PDL09-12S3P3	9 ~ 18	3.3	2000	7	81	2600
PDL09-12S05	9 ~ 18	5	1600	7	85	1300
PDL09-12S09	9 ~ 18	9	1000	10	87	800
PDL09-12S12	9 ~ 18	12	750	10	88	560
PDL09-12S15	9 ~ 18	15	600	10	89	560
PDL09-12S24	9 ~ 18	24	375	13	89	200
PDL09-12D05	9 ~ 18	±5	±800	13	85	±800
PDL09-12D12	9 ~ 18	±12	±375	13	88	±390
PDL09-12D15	9 ~ 18	±15	±300	14	89	±200
PDL09-24S3P3	18 ~ 36	3.3	2000	5	82	2600
PDL09-24S05	18 ~ 36	5	1600	5	85	1300
PDL09-24S09	18 ~ 36	9	1000	5	88	800
PDL09-24S12	18 ~ 36	12	750	5	89	560
PDL09-24S15	18 ~ 36	15	600	5	90	560
PDL09-24S24	18 ~ 36	24	375	7	90	200
PDL09-24D05	18 ~ 36	±5	±800	7	86	±800
PDL09-24D12	18 ~ 36	±12	±375	7	89	±390
PDL09-24D15	18 ~ 36	±15	±300	10	87	±200
PDL09-48S3P3	36 ~ 75	3.3	2000	3	82	2600
PDL09-48S05	36 ~ 75	5	1600	3	85	1300
PDL09-48S09	36 ~ 75	9	1000	3	88	800
PDL09-48S12	36 ~ 75	12	750	3	89	560
PDL09-48S15	36 ~ 75	15	600	3	89	560
PDL09-48S24	36 ~ 75	24	375	3	89	200
PDL09-48D05	36 ~ 75	±5	±800	3	86	±800
PDL09-48D12	36 ~ 75	±12	±375	3	87	±390
PDL09-48D15	36 ~ 75	±15	±300	4	87	±200

PART NUMBER STRUCTURE

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Case Option
PDL09 -	48	S	05	M
	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 type Plastic case M: Metal case
		D: Dual	05: ±5 12: ±12 15: ±15	

INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	12Vin(nom) 24Vin(nom) 48Vin(nom)	9 18 36	12 24 48	18 36 75	VDC
Start up time	Constant resistive load Power up Remote ON/OFF		50 50		ms
Input surge voltage	1 second, max. 12Vin(nom) 24Vin(nom) 48Vin(nom)			36 50 100	VDC
Input filter				Capacitor type	
Remote ON/OFF	DC-DC ON Ctrl pin applied current via 1kΩ DC-DC OFF Remote off input current	2	3	4 2.5	mA 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 Dual	-1.0 -1.0		+1.0 +1.0	%
Cross regulation	Asymmetrical load 25%/100% FL Dual	-5.0		+5.0	%
Ripple and noise	20MHz bandwidth With a 1μF/50V X7R MLCC 3.3Vout, 5Vout, 9Vout 12Vout, 15Vout, 24Vout		50 75		mVp-p
Temperature coefficient		-0.02		+0.02	%/°C
Transient response recovery time	25% load step change		250		μs
Over load protection	% of Iout rated; Hiccup mode		180		%
Short circuit protection				Continuous, automatic recovery	

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute Input to Output Standard Type Input (Output) to Case Suffix "M"	1600 1600 1000			VDC
Isolation resistance	500VDC	1			GΩ
Isolation capacitance	Standard Type Suffix "M"			50 50	pF
Switching frequency	Single Dual		400 500		kHz
Safety approvals				EN60950-1 UL60950-1 IEC60950-1 EN62368-1 UL62368-1 IEC62368-1	
Case material	Standard Type Suffix "M"			Non-conductive black plastic Copper	
Base material				None	
Potting material				Silicone (UL94 V-0)	
Weight	Standard Type Suffix "M"			4.8g (0.17oz) 5.9g (0.21oz)	
MTBF	MIL-HDBK-217F, Full load Standard Type Suffix "M"			2.696E+06 hrs 2.939E+06 hrs	

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	3.3Vout Standard type Without derating With derating Suffix "M" Without derating With derating Others Standard type Without derating With derating Suffix "M" Without derating With derating	-40 +45 -40 +50 -40 +55 -40 +60 +60		+45 +100 +50 +100 +55 +100 +60 +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

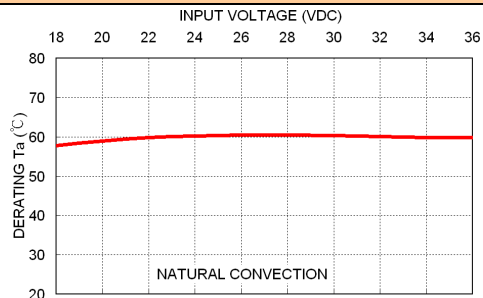
Parameter	Conditions	Level
EMI ⁽¹⁾	EN55022	Class A , Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 20 V/m	Perf. Criteria A
Fast transient ⁽²⁾	EN61000-4-4 ± 2kV	Perf. Criteria A
Surge ⁽²⁾	EN61000-4-5 ± 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

Note:

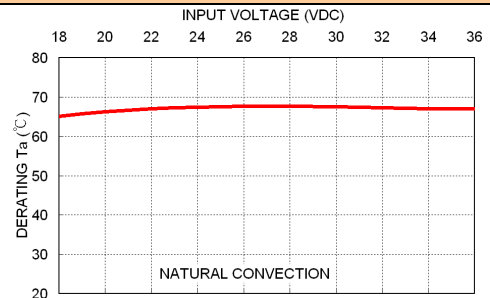
- The standard modules meet either EMI Class A or Class B with external components. For further information, please contact with P-DUKE.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
The filter Power Mate suggested:
The PDL09-12□□□ & PDL09-24□□□ recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.
The PDL09-48□□□ recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.

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

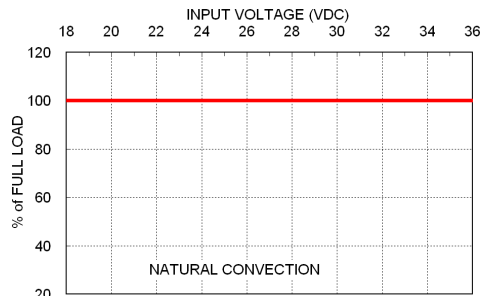
CHARACTERISTIC CURVE



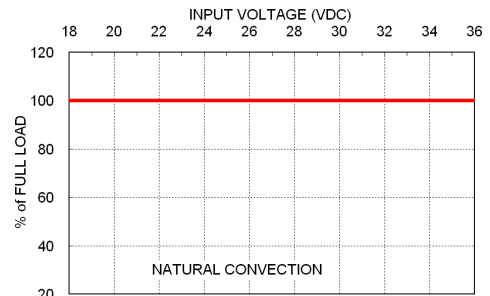
PDL09-24S12 Derating Ta v.s. Input Voltage (at Full Load)



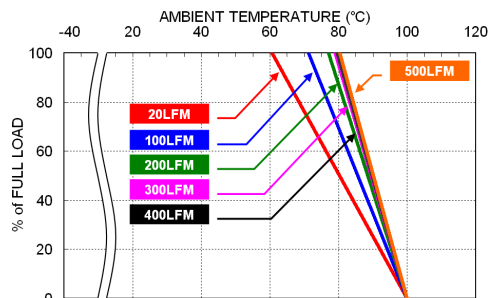
PDL09-24S12M Derating Ta v.s. Input Voltage (at Full Load)



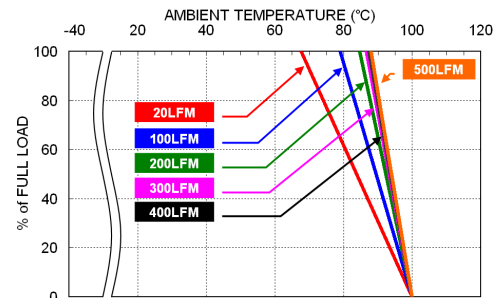
PDL09-24S12 Load Derating v.s. Input Voltage (at Ta=55°C)



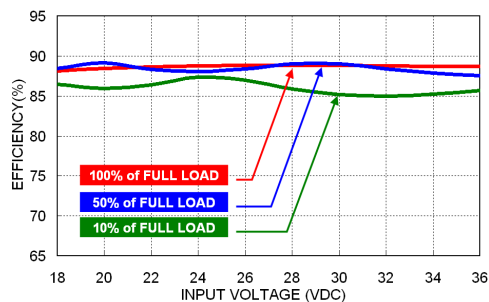
PDL09-24S12M Load Derating v.s. Input Voltage (at Ta=60°C)



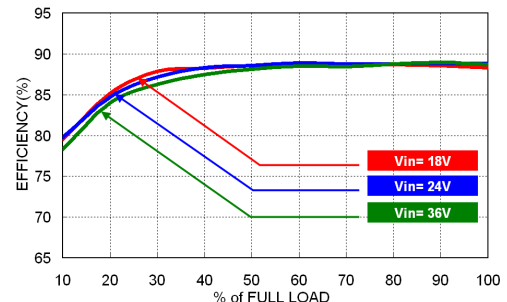
PDL09-24S12 Derating Curve



PDL09-24S12M Derating Curve



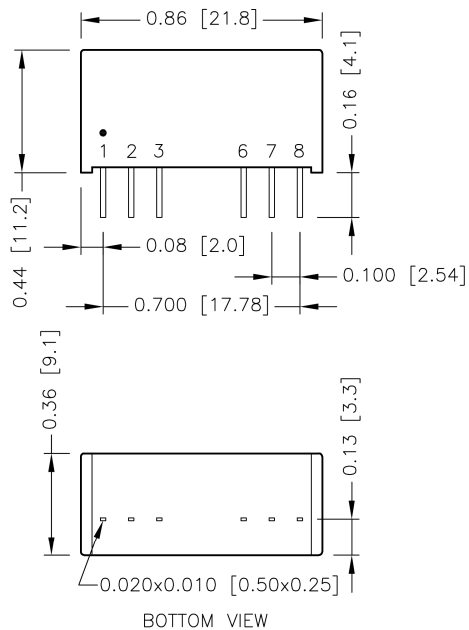
PDL09-24S12 Efficiency vs. Input Voltage



PDL09-24S12 Efficiency vs. Output Load

MECHANICAL DRAWING

Standard type

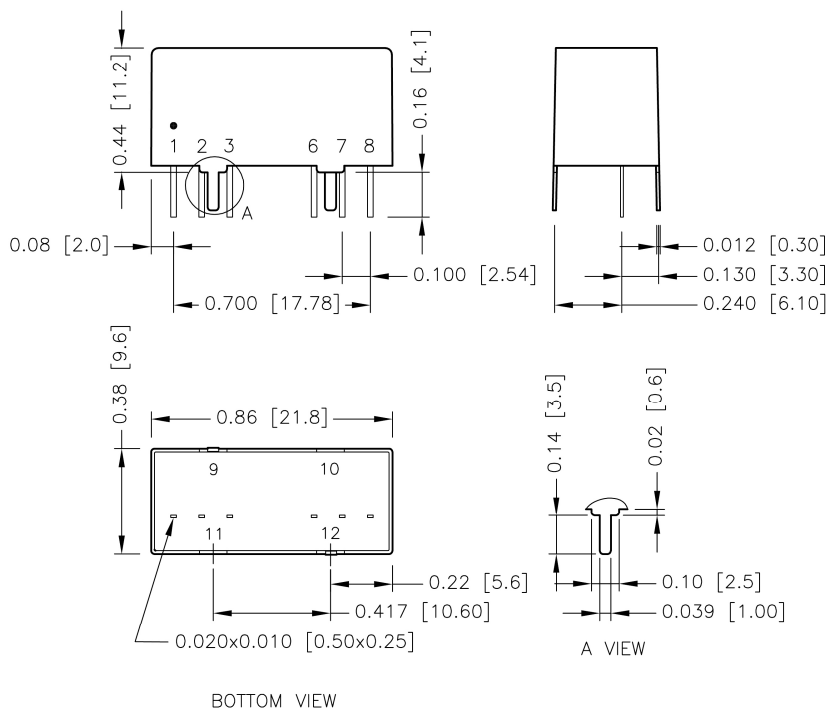


PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

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]

Suffix "M"



PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout
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]