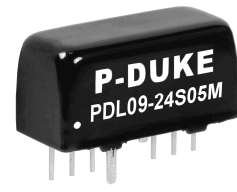
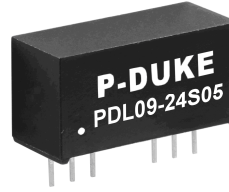


PDL09 SERIES

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	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	mA	mA		
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

PDL09 -	48	S	05	M
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Case Option
	12: 9~18 24: 18~36 48: 36~75	S: Single D: Dual	3P3: 3.3 05: 5 09: 9 12: 12 15: 15 24: 24 05: ±5 12: ±12 15: ±15	□: Standard type Plastic case M: Metal case

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	Ctrl pin applied current via 1kΩ DC-DC ON DC-DC OFF Remote off input current	2	3	4 2.5	mA mA
<p>Application circuit</p> <p>DC-DC ON</p> <p>DC-DC OFF</p>					

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	-1.0		+1.0	%
	Single				
	Dual	-1.0		+1.0	%
Cross regulation	Asymmetrical load 25%/100% FL	-5.0		+5.0	%
Ripple and noise	20MHz bandwidth With a 1μF/50V X7R MLCC		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	1600			VDC
			Suffix "M"	1600			
		Input (Output) to Case	Suffix "M"	1000			
Isolation resistance	500VDC			1			GΩ
Isolation capacitance		Standard Type				50	pF
		Suffix "M"				50	
Switching frequency		Single			400		kHz
		Dual			500		
Safety approvals							EN60950-1 UL60950-1 IEC60950-1 EN62368-1 UL62368-1 IEC62368-1
Case material		Standard Type					Non-conductive black plastic
		Suffix "M"					Copper
Base material							None
Potting material							Silicone (UL94 V-0)
Weight		Standard Type				4.8g (0.17oz)	
		Suffix "M"				5.9g (0.21oz)	
MTBF	MIL-HDBK-217F, Full load	Standard Type				2.696E+06 hrs	
		Suffix "M"				2.939E+06 hrs	

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions			Min.	Typ.	Max.	Unit
Operating ambient temperature	3.3Vout	Standard type	Without derating	-40		+45	°C
			With derating	+45		+100	
		Suffix "M"	Without derating	-40		+50	
			With derating	+50		+100	
	Others	Standard type	Without derating	-40		+55	
			With derating	+55		+100	
		Suffix "M"	Without derating	-40		+60	
			With derating	+60		+100	
Storage temperature range					-55	+125	°C
Thermal shock							MIL-STD-810F
Vibration							MIL-STD-810F
Relative humidity							5% to 95% RH

EMC SPECIFICATIONS

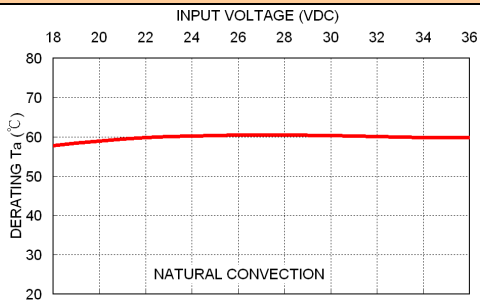
Parameter	Conditions		Level
EMI ⁽¹⁾	EN55022		Class A · Class B
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient ⁽²⁾	EN61000-4-4	± 2kV	Perf. Criteria A
Surge ⁽²⁾	EN61000-4-5	± 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	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:

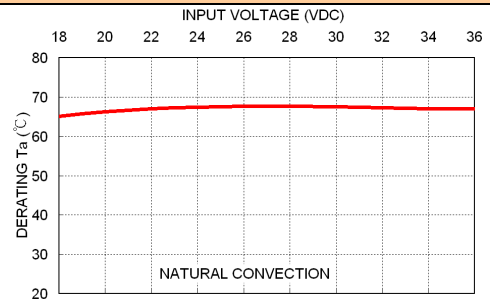
- The standard modules meet either EMI Class A or Class B with external components. For further information, please contact with P-DUKE.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
The filter Power Mate suggested:
The PDL09-12□□□ & PDL09-24□□□ 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.

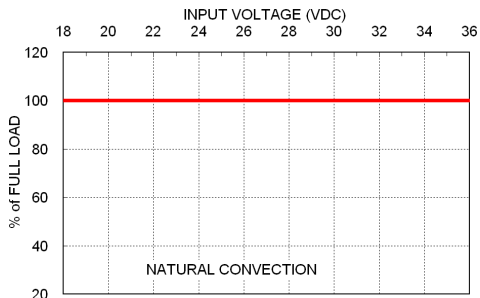
CHARACTERISTIC CURVE



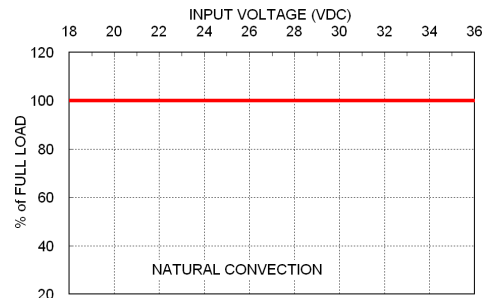
PDL09-24S12 Derating Ta v.s. Input Voltage (at Full Load)



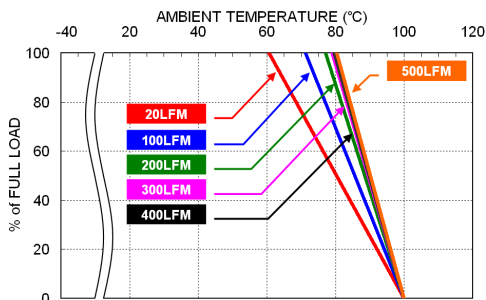
PDL09-24S12M Derating Ta v.s. Input Voltage (at Full Load)



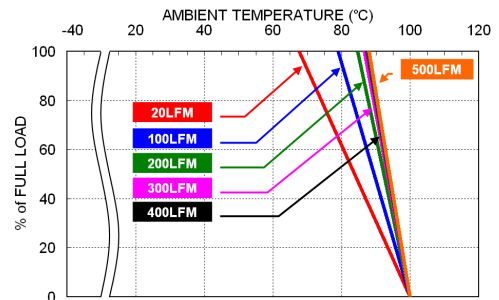
PDL09-24S12 Load Derating v.s. Input Voltage (at Ta=55°C)



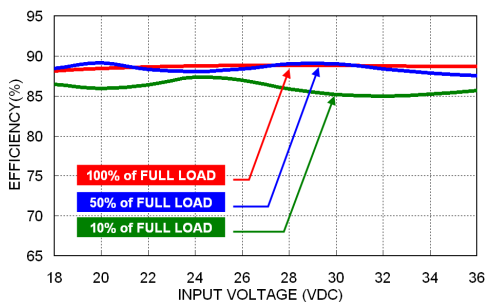
PDL09-24S12M Load Derating v.s. Input Voltage (at Ta=60°C)



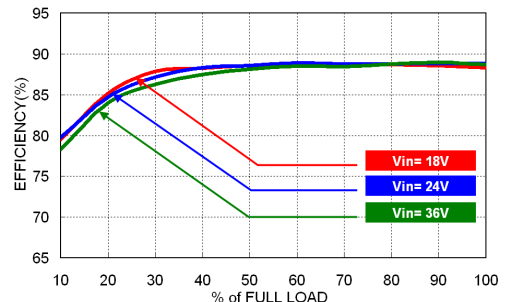
PDL09-24S12 Derating Curve



PDL09-24S12M Derating Curve



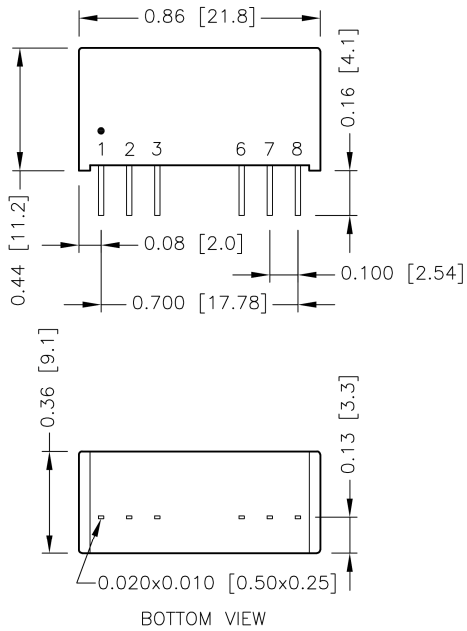
PDL09-24S12 Efficiency vs. Input Voltage



PDL09-24S12 Efficiency vs. Output Load

MECHANICAL DRAWING

Standard type

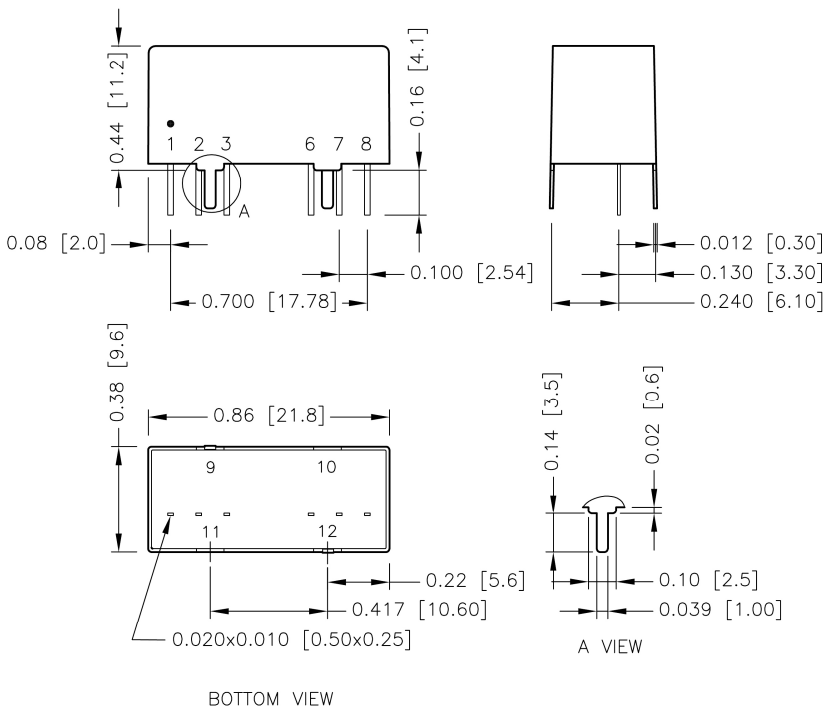


PIN CONNECTION

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

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

- All dimensions in inch [mm]
Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
- Pin pitch tolerance ±0.01 [0.25]
- Pin dimension tolerance ±0.004[0.1]