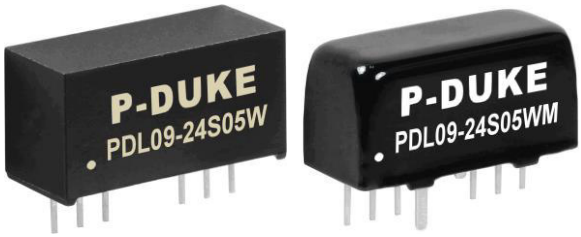
3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT



Automation | Datacom | IPC

Industry | Measurement | Telecom

Automobile | Boat | Charger

Medical | PV | Railway

cULus CB CE UKCA

1600 VDC Isolation Voltage | 4 : 1 Wide Input Range | LOW Standby Power | NO Min. Load Required | REMOTE ON OFF | OCP | SCP

PART NUMBER STRUCTURE

PDL09 - 48 S 05 W M

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Case Options
	24:9~36 **48:**18~75	**S:**Single	**3P3:**3.3 **05:**5 **09:**9 **12:**12 **15:**15 **24:**24	4 : 1	**M:** Standard type Metal case **□:** Plastic case
		D: Dual	**05:**±5 **12:**±12 **15:**±15		

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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
PDL09-24S3P3WM	9 ~ 36	3.3	2000	5	82	2600
PDL09-24S05WM	9 ~ 36	5	1600	5	85	1300
PDL09-24S09WM	9 ~ 36	9	1000	5	88	800
PDL09-24S12WM	9 ~ 36	12	750	5	88	560
PDL09-24S15WM	9 ~ 36	15	600	5	89	560
PDL09-24S24WM	9 ~ 36	24	375	9	89	200
PDL09-24D05WM	9 ~ 36	±5	±800	9	86	±800
PDL09-24D12WM	9 ~ 36	±12	±375	9	88	±390
PDL09-24D15WM	9 ~ 36	±15	±300	9	88	±200
PDL09-48S3P3WM	18 ~ 75	3.3	2000	3	82	2600
PDL09-48S05WM	18 ~ 75	5	1600	3	85	1300
PDL09-48S09WM	18 ~ 75	9	1000	3	89	800
PDL09-48S12WM	18 ~ 75	12	750	3	89	560
PDL09-48S15WM	18 ~ 75	15	600	3	89	560
PDL09-48S24WM	18 ~ 75	24	375	3	89	200
PDL09-48D05WM	18 ~ 75	±5	±800	3	85	±800
PDL09-48D12WM	18 ~ 75	±12	±375	3	88	±390
PDL09-48D15WM	18 ~ 75	±15	±300	4	87	±200

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		24Vin(nom) 48Vin(nom)	9 18	24 48	36 75	VDC
Start up time	Constant resistive load	Power up Remote ON/OFF		50 50		ms
Input surge voltage	1 second, max.	24Vin(nom) 48Vin(nom)			50 100	VDC
Input filter				Capacitor type		
Remote ON/OFF	Referred to –Vin pin	DC-DC ON DC-DC OFF Input current of Ctrl pin Remote off input current	0.5	Open or 0 ~ 0.5VDC 3 ~ 12VDC 2.5	2.5	 mA mA

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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	20MHz bandwidth	3.3Vout ,5Vout, 9Vout		50		mVp-p
	With a 1μF/50V X7R MLCC	12Vout, 15Vout, 24Vout		75		
Temperature coefficient			-0.02		+0.02	%/℃
Transient response recovery time	25% load step change			250		μs
Over load protection	% of Iout rated; Hiccup mode			180		%
Short circuit protection			Continuous, automatics recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions			Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	Metal Case	1600			VDC
			Plastic Case	1600			
	Input (Output) to Case		Metal Case	1000			
Isolation resistance	500VDC			1			GΩ
Isolation capacitance			Metal Case			50	pF
			Plastic Case			50	
Switching frequency			Single		400		kHz
			Dual		500		
Safety approvals	IEC/ EN/ UL62368-1					UL:E193009 CB:UL(Demko)	
Case material			Metal Case				Copper
			Plastic Case				Non-conductive black plastic
Base material							None
Potting material							Silicone (UL94 V-0)
Weight			Metal Case				5.9g (0.21oz)
			Plastic Case				4.8g (0.17oz)
MTBF	MIL-HDBK-217F, Full load		Metal Case				2.939 x 10^6 hrs
			Plastic Case				2.696 x 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	

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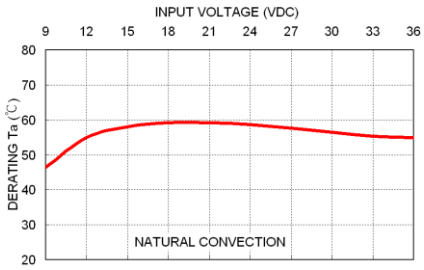
EMC SPECIFICATIONS

Parameter	Conditions		Level
EMI	EN55032	With external components	Class A，Class B
EMS	EN55035		
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	EN61000-4-4	± 2kV	Perf. Criteria A
	PDL09-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS(SMDJ70A, 70V, 3000Watt peak pulse power) in parallel.	
	PDL09-48□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) in parallel.	
Surge	EN61000-4-5	± 2kV	Perf. Criteria A
	PDL09-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS(SMDJ70A, 70V, 3000Watt peak pulse power) in parallel.	
	PDL09-48□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) in parallel.	
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

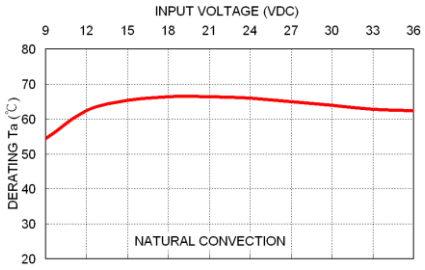
CAUTION: This power module is not internally fused. An input line fuse must always be used.

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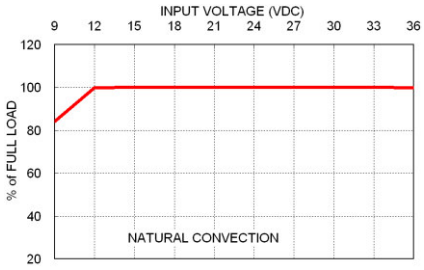
CHARACTERISTIC CURVE



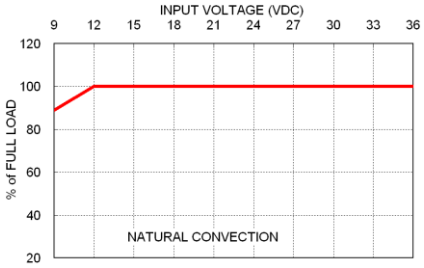
PDL09-24D12W Derating Ta v.s. Input Voltage (at Full Load)



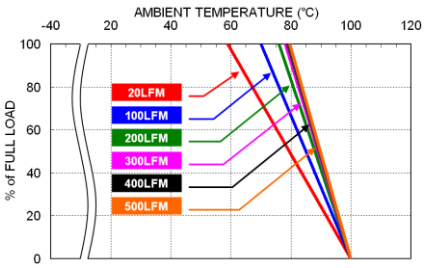
PDL09-24D12WM Derating Ta v.s. Input Voltage (at Full Load)



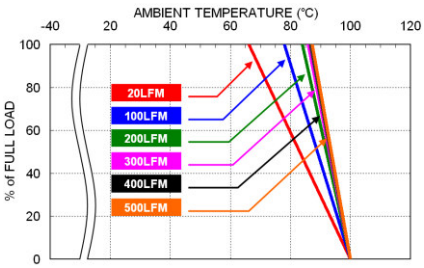
PDL09-24D12W Load Derating v.s. Input Voltage (at Ta=55℃)



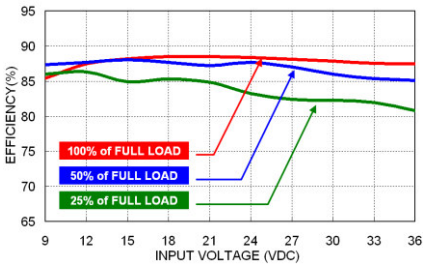
PDL09-24D12WM Load Derating v.s. Input Voltage (at Ta=60℃)



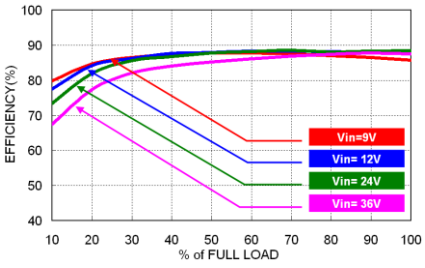
PDL09-24D12W Derating Curve



PDL09-24D12WM Derating Curve



PDL09-24D12W Efficiency vs. Input Voltage



PDL09-24D12W Efficiency vs. Output Load

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FUSE CONSIDERATION

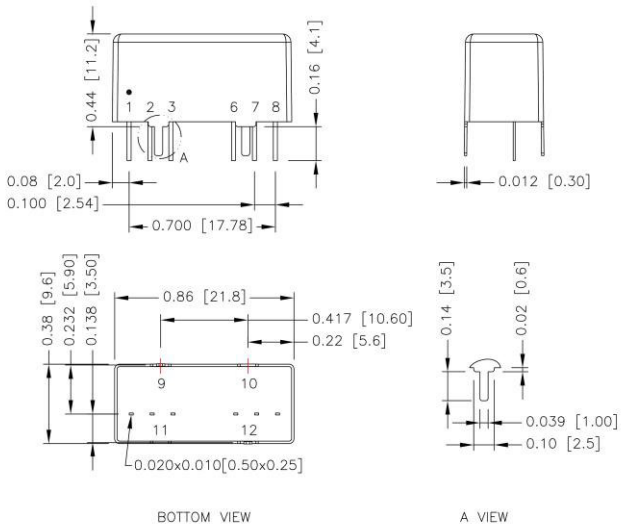
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing 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
PDL09-24S□□W、PDL09-24D□□W	3.15	Slow-Blow
PDL09-48S□□W、PDL09-48D□□W	1.25	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

Standard type Metal Case



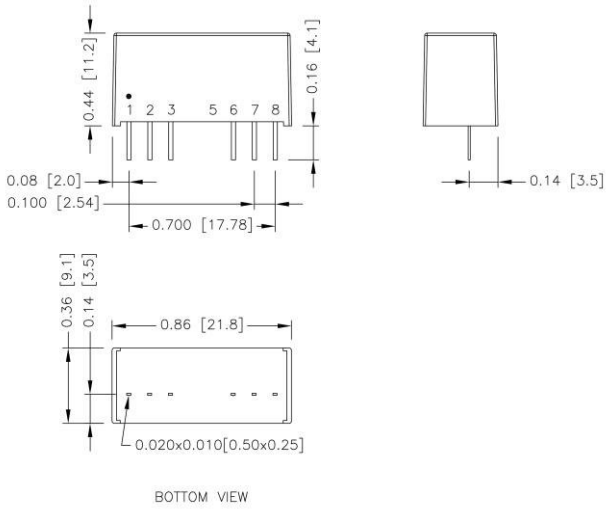
* Case pins should not be connected to any circuit.

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]
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]

Plastic Case



PIN CONNECTION

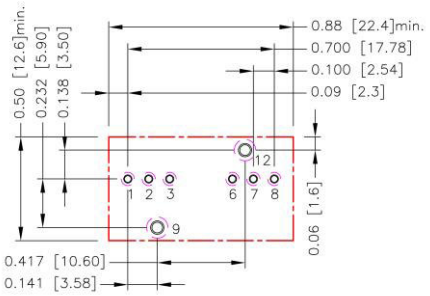
PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

1. All dimensions in inch [mm]
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]

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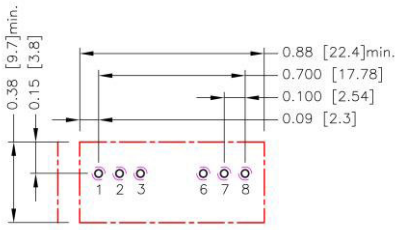
RECOMMENDED PAD LAYOUT

Standard type Metal Case



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.6.7.8: Φ0.031[0.80]
Through hole 9.12: Φ0.051[1.30]
Top view pad 1.2.3.6.7.8: Φ0.039[1.00]
Top view pad 9.12: Φ0.064[1.63]
Bottom view pad 1.2.3.6.7.8: Φ0.063[1.60]
Bottom view pad 9.12: Φ0.102[2.60]

Plastic Case

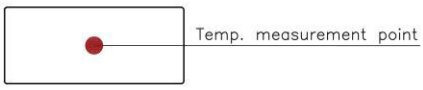


All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.6.7.8: Φ0.031[0.80]
Top view pad 1.2.3.6.7.8: Φ0.039[1.00]
Bottom view pad 1.2.3.6.7.8: Φ0.063[1.60]

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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