

FEATURES

- 2 WATTS MAXIMUM OUTPUT POWER
- OUTPUT CURRENT UP TO 500mA
- SIP PACKAGE, 0.86 x 0.36x 0.44 INCH
- HIGH EFFICIENCY UP TO 84%
- 2:1 WIDE INPUT VOLTAGE RANGE
- SWITCHING FREQUENCY (100KHz, MIN)
- SINGLE AND DUAL OUTPUT
- NO EXTERNAL INPUT AND OUTPUT CAPACITOR NEEDED
- LOW RIPPLE & NOISE
- UL94-V0 CASE POTTING MATERIALS
- INPUT TO OUTPUT ISOLATION: 1600VDC
- CONTINUOUS SHORT CIRCUIT PROTECTION
- EXTERNAL ON/OFF CONTROL
- CE MARK MEETS 2006/95/EC, 93/68/EEC AND 2004/108/EC
- UL60950-1, EN60950-1 AND IEC60950-1 LICENSED
- ISO9001 CERTIFIED MANUFACTURING FACILITIES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC

APPLICATIONS

Wireless Network
Telecom/Datacom
Industry Control System
Measurement Equipment
Semiconductor Equipment

DESCRIPTION

The PDL02 series offer 2 watts of output power from a 21.8 x 9.1 x 11.2 mm package without derating to 85°C and without external input/output capacitors. The PDL02 series have 2:1 wide input voltage of 4.5~9, 9~18, 18~36 and 36~75VDC and features 1600VDC of isolation, short-circuit protection.

TECHNICAL SPECIFICATION

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

OUTPUT SPECIFICATIONS			
Output power	2 Watts max		
Voltage accuracy	± 1%		
Minimum load	0%		
Line regulation	LL to HL at Full Load	± 0.2%	
Load regulation	No load to Full load	Single	±1.0%
		Dual	±1.0%
	10% load to 90% load	Single	±0.5%
		Dual	±0.8%
Cross regulation (Dual)	Asymmetrical load 25%/100% FL	±5%	
Ripple and noise	20MHz bandwidth	See table	
Temperature coefficient	±0.02% / °C, max.		
Transient response recovery time	25% load step change	500µS	
Short circuit protection	Continuous, automatics recovery		

GENERAL SPECIFICATIONS			
Efficiency	See table		
Isolation voltage	1600VDC, min. 1minute		
Isolation resistance	10 ⁹ ohms, min.		
Isolation capacitance	200pF, max.		
Switching frequency	Full load to minimum load	100KHz, min.	
Approvals and standard	IEC60950-1, UL60950-1, EN60950-1		
Case material	Non-conductive black plastic		
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	4.8g (0.17oz)		
MTBF (Note 1)	BELLCORE TR-NWT-000332	5.107 x 10 ⁶ hrs	
	MIL-HDBK-217F	2.886 x 10 ⁶ hrs	

INPUT SPECIFICATIONS			
Input voltage range	5VDC nominal input	4.5 ~ 9VDC	
	12VDC nominal input	9 ~ 18VDC	
	24VDC nominal input	18 ~ 36VDC	
	48VDC nominal input	36 ~ 75VDC	
Input filter	Capacitor type		
Input surge voltage	5VDC input	15VDC 100mS, max.	
	12VDC input	36VDC 100mS, max.	
	24VDC input	50VDC 100mS, max.	
	48VDC input	100VDC 100mS, max.	
Input reflected ripple current	5VDC input (10µF/MLCC)	400mA-p-p, max.	
	12VDC input (10µF/MLCC)	150mA-p-p, max.	
	24VDC input (2.2µF/MLCC)	380mA-p-p, max.	
	48VDC input (2.2µF/MLCC)	170mA-p-p, max.	
Start up time	Nominal input and constant resistive load	Power up	5mS
		Remote ON/OFF	5mS
Remote ON/OFF	DC-DC ON	Open or high impedance	
	DC-DC OFF	Control pin applied current 2 ~ 4mA max(via 1KΩ)	
Remote off state input current	Nominal input	2.5 mA, max.	

Application circuit



ENVIRONMENTAL SPECIFICATIONS

Operating ambient temperature	-40°C ~ +85°C (non-derating)		
Storage temperature range	-55°C ~ +125°C		
Thermal shock	MIL-STD-810F		
Vibration	MIL-STD-810F		
Relative humidity	5% to 95% RH		

EMC CHARACTERISTICS

EMI (Note 7)	EN55022	Class A	
ESD	EN61000-4-2	Air	± 8KV
		Contact	± 6KV
Radiated immunity	EN61000-4-3	10 V/m	Perf. Criteria A
Fast transient (Note 8)	EN61000-4-4	± 2KV	Perf. Criteria A
Surge (Note 8)	EN61000-4-5	± 1KV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A





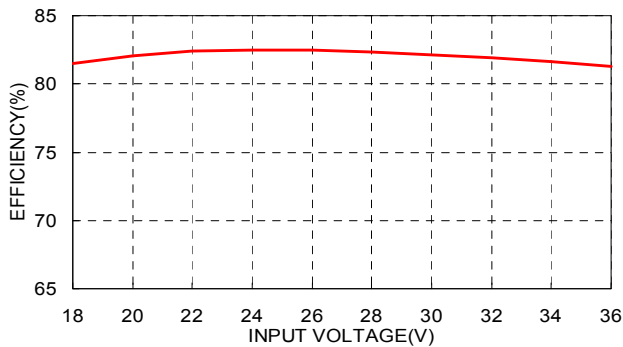
Model Number	Input Range	Output Voltage	Output Current		Output ⁽⁴⁾ Ripple & Noise	Input Current		Eff ⁽⁴⁾ (%)	Capacitor ⁽⁵⁾ Load max
			Min Load	Full Load		No load ⁽³⁾	Full load ⁽²⁾		
PDL02-05S33	4.5 ~ 9 VDC	3.3 VDC	0mA	500mA	50mVp-p	35mA	458mA	76	2200µF
PDL02-05S05	4.5 ~ 9 VDC	5 VDC	0mA	400mA	50mVp-p	35mA	526mA	80	1000µF
PDL02-05S09	4.5 ~ 9 VDC	9 VDC	0mA	222mA	50mVp-p	40mA	513mA	82	470µF
PDL02-05S12	4.5 ~ 9 VDC	12 VDC	0mA	167mA	50mVp-p	40mA	519mA	81	170µF
PDL02-05S15	4.5 ~ 9 VDC	15 VDC	0mA	134mA	50mVp-p	40mA	506mA	83	110µF
PDL02-05D05	4.5 ~ 9 VDC	±5 VDC	0mA	±200mA	50mVp-p	40mA	533mA	79	±470µF
PDL02-05D12	4.5 ~ 9 VDC	±12 VDC	0mA	±83mA	50mVp-p	40mA	513mA	82	±100µF
PDL02-05D15	4.5 ~ 9 VDC	±15 VDC	0mA	±67mA	50mVp-p	40mA	519mA	81	±47µF
PDL02-12S33	9 ~ 18 VDC	3.3 VDC	0mA	500mA	50mVp-p	20mA	188mA	77	2200µF
PDL02-12S05	9 ~ 18 VDC	5 VDC	0mA	400mA	50mVp-p	20mA	216mA	81	1000µF
PDL02-12S09	9 ~ 18 VDC	9 VDC	0mA	222mA	50mVp-p	20mA	214mA	82	470µF
PDL02-12S12	9 ~ 18 VDC	12 VDC	0mA	167mA	50mVp-p	20mA	211mA	83	170µF
PDL02-12S15	9 ~ 18 VDC	15 VDC	0mA	134mA	50mVp-p	20mA	208mA	84	110µF
PDL02-12D05	9 ~ 18 VDC	±5 VDC	0mA	±200mA	50mVp-p	30mA	216mA	81	±470µF
PDL02-12D12	9 ~ 18 VDC	±12 VDC	0mA	±83mA	50mVp-p	30mA	211mA	83	±100µF
PDL02-12D15	9 ~ 18 VDC	±15 VDC	0mA	±67mA	50mVp-p	30mA	208mA	84	±47µF
PDL02-24S33	18 ~ 36 VDC	3.3 VDC	0mA	500mA	50mVp-p	15mA	93mA	78	2200µF
PDL02-24S05	18 ~ 36 VDC	5 VDC	0mA	400mA	50mVp-p	15mA	108mA	81	1000µF
PDL02-24S09	18 ~ 36 VDC	9 VDC	0mA	222mA	50mVp-p	15mA	107mA	82	470µF
PDL02-24S12	18 ~ 36 VDC	12 VDC	0mA	167mA	50mVp-p	15mA	105mA	83	170µF
PDL02-24S15	18 ~ 36 VDC	15 VDC	0mA	134mA	50mVp-p	15mA	104mA	84	110µF
PDL02-24D05	18 ~ 36 VDC	±5 VDC	0mA	±200mA	50mVp-p	15mA	110mA	80	±470µF
PDL02-24D12	18 ~ 36 VDC	±12 VDC	0mA	±83mA	50mVp-p	15mA	105mA	83	±100µF
PDL02-24D15	18 ~ 36 VDC	±15 VDC	0mA	±67mA	50mVp-p	15mA	107mA	82	±47µF
PDL02-48S33	36 ~ 75 VDC	3.3 VDC	0mA	500mA	50mVp-p	8mA	48mA	76	2200µF
PDL02-48S05	36 ~ 75 VDC	5 VDC	0mA	400mA	50mVp-p	8mA	56mA	78	1000µF
PDL02-48S09	36 ~ 75 VDC	9 VDC	0mA	222mA	50mVp-p	8mA	52mA	84	470µF
PDL02-48S12	36 ~ 75 VDC	12 VDC	0mA	167mA	50mVp-p	8mA	53mA	83	170µF
PDL02-48S15	36 ~ 75 VDC	15 VDC	0mA	134mA	50mVp-p	8mA	53mA	83	110µF
PDL02-48D05	36 ~ 75 VDC	±5 VDC	0mA	±200mA	50mVp-p	8mA	55mA	80	±470µF
PDL02-48D12	36 ~ 75 VDC	±12 VDC	0mA	±83mA	50mVp-p	8mA	54mA	81	±100µF
PDL02-48D15	36 ~ 75 VDC	±15 VDC	0mA	±67mA	50mVp-p	8mA	54mA	81	±47µF

Note

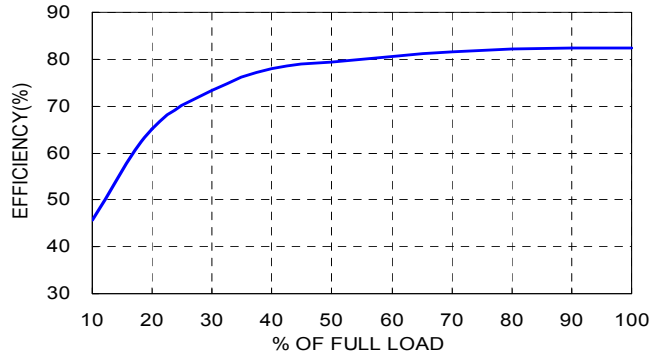
- BELLCORE TR-NWT-000332. Case 1: 50% Stress. Temperature at 40°C.
MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
- Maximum value at nominal input and full load.
- Typical value at nominal input and no load.
- Typical value at nominal input and full load.
- Test by minimum input and constant resistive load.
- It will not damage the device without inserting external input capacitors. There is a smaller reflected ripple current when put a capacitor at input.
- The PDL02 series meet EN55022 Class A with external L-C filter before the input pins to the converter. (Connect networks following Class B figure.)
Recommend: 5 VDC input: C1=10µF/25V 1812 MLCC. L1=2.2µH 0504 SMD Inductor P/N:PMT-059
12 VDC input: C1=10µF/25V 1812 MLCC. L1=2.2µH 0504 SMD Inductor P/N:PMT-059
24 VDC input: C1=6.8µF/50V 1812 MLCC. L1=3.3µH 0504 SMD Inductor P/N:PMT-044.
48 VDC input: C1=2.2µF/100V 1812 MLCC. L1=10µH 0504 SMD Inductor P/N:PMT-047.
- 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: Nippon chemi-con KY series, 220µF/100V, ESR 48mΩ.

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

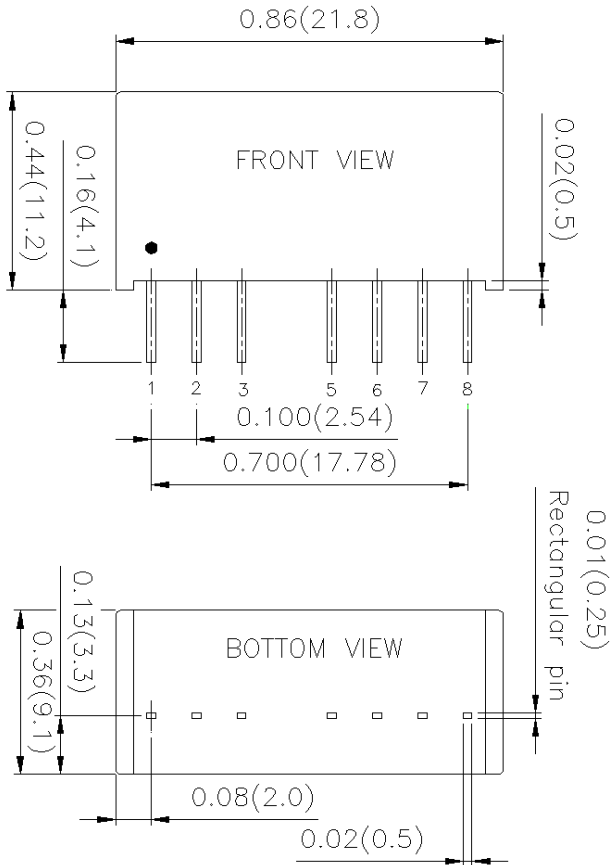
PDL02-24S05 Efficiency VS Input voltage



PDL02-24S05 Efficiency VS Output Load



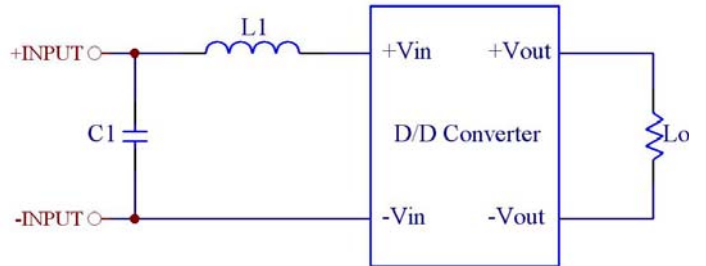
Mechanical Drawing:



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)

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

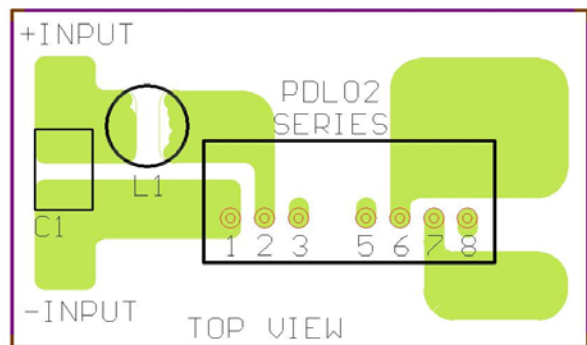
Recommended EMI Filter:



Recommended Filter for EN55022 Class B Compliance

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

	C1	L1
PDL02-05XXX	22µF/25V 1812 MLCC	3.3µH 2.0A 0.06Ω 0504 SMDInductor,P/N:PMT-044
PDL02-12xxx	22µF/25V 1812 MLCC	3.3µH 2.0A 0.06Ω 0504 SMDInductor,P/N:PMT-044
PDL02-24xxx	4.7µF/50V 1812 MLCC	12µH 1.4A 0.12Ω 0504 SMDInductor,P/N:PMT-062
PDL02-48xxx	2.2µF/100V 1812 MLCC	27µH 0.9A 0.2Ω 0504 SMDInductor,P/N:PMT-063



Recommended EN55022 Class B Filter Circuit Layout