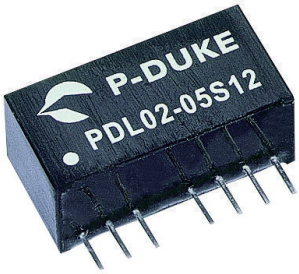
POWER MATE TECHNOLOGY CO.,LTD.

P-DUKE

PDL02 SERIES



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 81%
- 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 UP TO 1KVDC
- 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 85ºC 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 1000VDC of isolation, short-circuit protection.

TECHNICAL SPECIFICATION

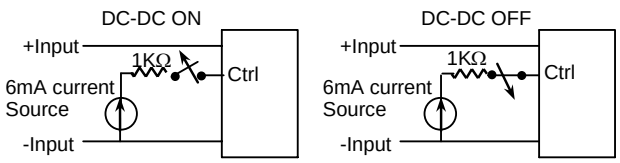
All specifications are typical at nominal input, full load and 25ºC unless otherwise noted

OUTPUT SPECIFICATIONS			
Output power			2 Watts max
Voltage accuracy	Full load and nominal Vin		± 1%
Minimum load (Note 6)			See Table
Line regulation	LL to HL at Full Load		± 0.5%
Load regulation	Min.load to Full load	Single 3.3Vout	± 0.85%
		Single Others	± 0.75%
		Dual	± 1%
Cross regulation (Dual)	Asymmetrical load 25%/100% FL		±5%
Ripple and noise	20MHz bandwidth		See table
Temperature coefficient			±0.02% / ºC, max.
Transient response recovery time	25% load step change		500µS, typ.
Short circuit protection			Continuous, automatics recovery

GENERAL SPECIFICATIONS		
Efficiency		See table
Isolation voltage		1000VDC, min.
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	5.107×10^6 hrs
	MIL-HDBK-217F	2.886×10^6 hrs

INPUT SPECIFICATIONS		
Input voltage range	5V nominal input	4.5 – 9VDC
	12V nominal input	9 – 18VDC
	24V nominal input	18 – 36VDC
	48V nominal input	36 – 75VDC
Input filter		Capacitor type
Input surge voltage 100mS max	5V input	15VDC
	12V input	36VDC
	24V input	50VDC
	48V input	100VDC
Input reflected ripple current There is an external capacitor at input (Note 7)	5V input (10µF/MLCC)	400mAp-p, max.
	12V input (10µF/MLCC)	150mAp-p, max.
	24V input (2.2µF/MLCC)	380mAp-p, max.
	48V input (2.2µF/MLCC)	170mAp-p, max.
Start up time	Nominal Vin and constant resistive load	Power up 1mS, typ.
		Remote ON/OFF 1mS, typ.
Remote ON/OFF	DC-DC ON	Open or high impedance
	DC-DC OFF	Control pin applied current 4 ~ 8mA max(via 1KΩ)
Remote off state input current	Nominal Vin	2.5 mA, max.

Application circuit



ENVIRONMENTAL SPECIFICATIONS	
Operating ambient temperature	-40ºC to +85ºC(with derating)
Storage temperature range	-55ºC to +105ºC
Thermal shock	MIL-STD-810F
Vibration	MIL-STD-810F
Relative humidity	5% to 95% RH

EMC CHARACTERISTICS				
EMI (Note 8)	EN55022			Class A
ESD	EN61000-4-2	Air	± 8KV	Perf. Criteria A
		Contact	± 6KV	
Radiated immunity	EN61000-4-3		10 V/m	Perf. Criteria A
Fast transient (Note 9)	EN61000-4-4		± 2KV	Perf. Criteria B
Surge (Note 9)	EN61000-4-5		± 1KV	Perf. Criteria A
Conducted immunity	EN61000-4-6		10 Vr.m.s	Perf. Criteria A

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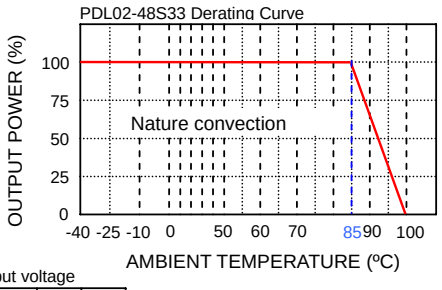
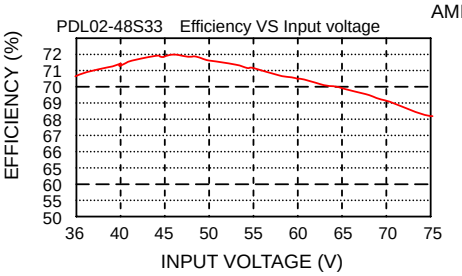
2 WATTS DC-DC CONVERTER

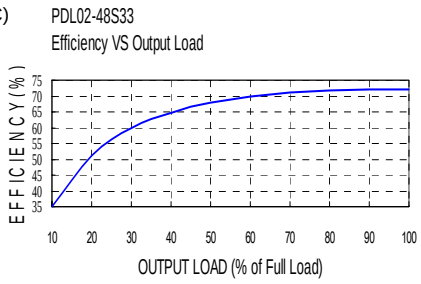
Model Number	Input Range	Output Voltage	Output Current		Output [4] Ripple & Noise	Input Current		Eff [4] (%)	Capacitor[5] Load max
			Min Load	Full Load		No load[3]	Full load[2]		
PDL02-05S33	4.5 – 9 VDC	3.3 VDC	50mA	500mA	50mVp-p	60mA	540mA	65	2200µF
PDL02-05S05	4.5 – 9 VDC	5 VDC	40mA	400mA	50mVp-p	55mA	615mA	69	1000µF
PDL02-05S09	4.5 – 9 VDC	9 VDC	22mA	222mA	50mVp-p	55mA	596mA	71	470µF
PDL02-05S12	4.5 – 9 VDC	12 VDC	17mA	167mA	50mVp-p	75mA	588mA	72	170µF
PDL02-05S15	4.5 – 9 VDC	15 VDC	13mA	134mA	50mVp-p	40mA	582mA	73	110µF
PDL02-05D05	4.5 – 9 VDC	±5 VDC	±20mA	±200mA	50mVp-p	75mA	645mA	77	±470µF
PDL02-05D12	4.5 – 9 VDC	±12 VDC	±8mA	±83mA	50mVp-p	75mA	595mA	78	±100µF
PDL02-05D15	4.5 – 9 VDC	±15 VDC	±7mA	±67mA	50mVp-p	90mA	598mA	78	±47µF
PDL02-12S33	9 – 18 VDC	3.3 VDC	50mA	500mA	50mVp-p	20mA	202mA	72	2200µF
PDL02-12S05	9 – 18 VDC	5 VDC	40mA	400mA	50mVp-p	25mA	234mA	75	1000µF
PDL02-12S09	9 – 18 VDC	9 VDC	22mA	222mA	50mVp-p	25mA	222mA	79	470µF
PDL02-12S12	9 – 18 VDC	12 VDC	17mA	167mA	50mVp-p	30mA	219mA	80	170µF
PDL02-12S15	9 – 18 VDC	15 VDC	13mA	134mA	50mVp-p	30mA	220mA	80	110µF
PDL02-12D05	9 – 18 VDC	±5 VDC	±20mA	±200mA	50mVp-p	50mA	242mA	73	±470µF
PDL02-12D12	9 – 18 VDC	±12 VDC	±8mA	±83mA	50mVp-p	40mA	224mA	78	±100µF
PDL02-12D15	9 – 18 VDC	±15 VDC	±7mA	±67mA	50mVp-p	40mA	226mA	78	±47µF
PDL02-24S33	18 – 36 VDC	3.3 VDC	50mA	500mA	50mVp-p	10mA	102mA	71	2200µF
PDL02-24S05	18 – 36 VDC	5 VDC	40mA	400mA	50mVp-p	10mA	115mA	76	1000µF
PDL02-24S09	18 – 36 VDC	9 VDC	22mA	222mA	50mVp-p	15mA	109mA	80	470µF
PDL02-24S12	18 – 36 VDC	12 VDC	17mA	167mA	50mVp-p	15mA	109mA	80	170µF
PDL02-24S15	18 – 36 VDC	15 VDC	13mA	134mA	50mVp-p	15mA	108mA	81	110µF
PDL02-24D05	18 – 36 VDC	±5 VDC	±20mA	±200mA	50mVp-p	15mA	117mA	75	±470µF
PDL02-24D12	18 – 36 VDC	±12 VDC	±8mA	±83mA	50mVp-p	20mA	112mA	78	±100µF
PDL02-24D15	18 – 36 VDC	±15 VDC	±7mA	±67mA	50mVp-p	20mA	110mA	80	±47µF
PDL02-48S33	36 – 75 VDC	3.3 VDC	50mA	500mA	50mVp-p	10mA	52mA	70	2200µF
PDL02-48S05	36 – 75 VDC	5 VDC	40mA	400mA	50mVp-p	10mA	60mA	74	1000µF
PDL02-48S09	36 – 75 VDC	9 VDC	22mA	222mA	50mVp-p	10mA	56mA	78	470µF
PDL02-48S12	36 – 75 VDC	12 VDC	17mA	167mA	50mVp-p	10mA	55mA	80	170µF
PDL02-48S15	36 – 75 VDC	15 VDC	13mA	134mA	50mVp-p	10mA	55mA	79	110µF
PDL02-48D05	36 – 75 VDC	±5 VDC	±20mA	±200mA	50mVp-p	10mA	62mA	75	±470µF
PDL02-48D12	36 – 75 VDC	±12 VDC	±8mA	±83mA	50mVp-p	10mA	57mA	77	±100µF
PDL02-48D15	36 – 75 VDC	±15 VDC	±7mA	±67mA	50mVp-p	12mA	57mA	77	±47µF

Note

1. BELLCORE TR-NWT-000332. Case 1: 50% Stress. Temperature at 40ºC.
   MIL-HDBK-217F Notice2 @Ta=25 ºC, Full load(Ground, Benign, controlled environment).
2. Maximum value at nominal input voltage and full load.
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load.
5. Test by minimum Vin and constant resistive load.
6. The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
7. It will not damage the device without inserting external input capacitors. There is a smaller reflected ripple current when put a capacitor at input.
8. 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: 05 Vin : C1=10µF/25V 1812 MLCC. L1=2.2µH 0504 SMD Inductor P/N:PMT-059
   12 Vin : C1=10µF/25V 1812 MLCC. L1=2.2µH 0504 SMD Inductor P/N:PMT-059
   24 Vin : C1=6.8µF/50V 1812 MLCC. L1=3.3µH 0504 SMD Inductor P/N:PMT-044.
   48 Vin : C1=2.2µF/100V 1812 MLCC. L1=10µH 0504 SMD Inductor P/N:PMT-047.
9. 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.







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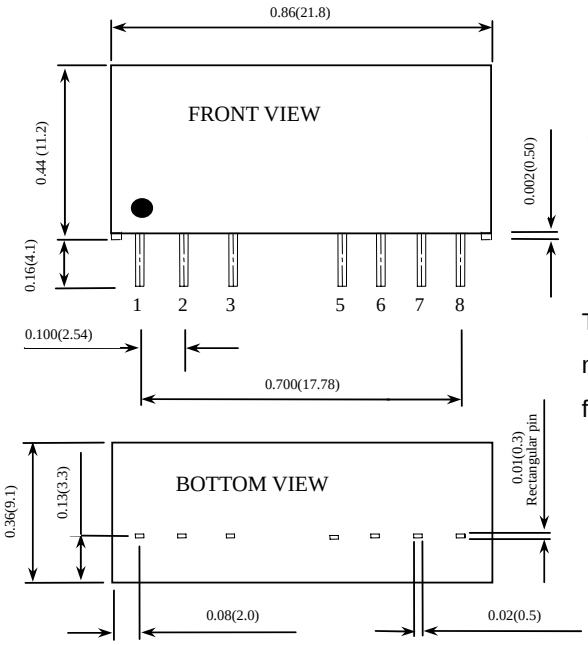
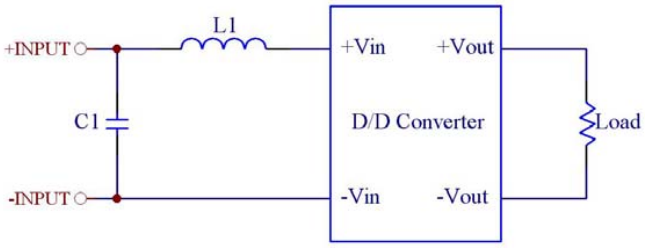
2 WATTS DC-DC CONVERTER



1. All dimensions in Inches (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)

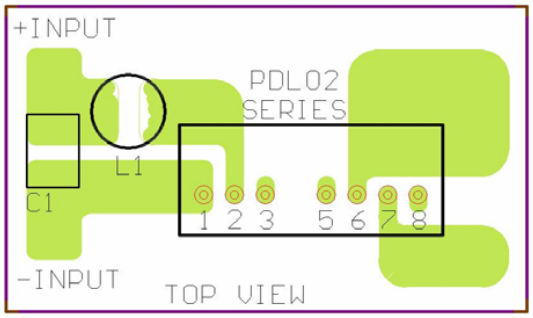


Recommended Filter for EN55022 Class B Compliance

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

PIN CONNECTION		
PIN	SINGLE	DUAL
1	- INPUT	- INPUT
2	+ INPUT	+ INPUT
3	CTRL	CTRL
5	NC	NC
6	+ OUTPUT	+ OUTPUT
7	- OUTPUT	COM
8	NC	- OUTPUT



Recommended EN55022 Class B Filter Circuit Layout

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