

Features

- RoHS lead solder exemption compliant
- Surface-mount configuration
- Low-profile 7.4 mm package
- Independently regulated outputs
- Efficiencies above 90%
- 8 A of combined output current at 65°C/200 LFM
- Flexible output load distribution
- Output short circuit protection
- Remote On/Off
- Trimmable output voltages


Applications

- Distributed power architectures
- Telecommunications equipment
- LAN/WAN
- Data processing

Description

The PLD08 Series converters are surface-mount, non-isolated, and have dual outputs. The products provide point-of-load conversion of a single 3.3 V or 5 V input voltage into two independently-regulated low output voltages. Each output can provide up to 5 A of current (8 A total), has independent feedback loop, and independent trim function. Two power trains operate out-of-phase, thus significantly reducing input ripple current and simplifying external filtering. High efficiency, low space requirements, and flexible loading characteristics make the converters an ideal choice for powering multi-voltage ASICs.

Model Selection						
Model	Input Voltage VDC	Output Voltage Vout1, VDC	Output Voltage Vout2, VDC	Output Rated Current I1/I2 rated, ADC (Note 1)	Output Ripple/Noise, mV pk-pk	Typical Efficiency @ I rated, %
PLD08UDB	3.15-3.6	2.5	1.8	5/5	20/50	91
PLD08VED	4.5 - 5.5	3.3	2.5	5/5	20/50	92
PLD08VDB	4.5 - 5.5	2.5	1.8	5/5	20/50	91
PLD08VBA	4.5 - 5.5	1.8	1.5	5/5	20/50	89

 Model numbers highlighted in yellow or shaded are not recommended for new designs.

NOTES

1. Current range of each output is 0.2~5 A, but combined output current must not be greater than 8 A ($I_{out1} + I_{out2} \leq 8A$).

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings may cause performance degradation, adversely effect long-term reliability, and cause permanent damage to the converter.

Parameter	Conditions/Description	Min	Max	Units
Input voltage	PLD08UDB	3.15	3.6	VDC
	PLD08Vxx	4.5	5.5	VDC
Operating Temperature	200 LFM Airflow, Full Load	-25	+65	°C
Storage Temperature		-40	+125	°C
Inhibit Control Voltage	Referenced to GND: PLD08UDB		3.6	VDC
	Referenced to GND: PLD08Vxx		5.5	VDC

Environmental and Mechanical Specifications

All specifications apply over specified input voltage, output load, and temperature range, unless otherwise noted.

Parameter	Conditions/Description	Min	Nom	Max	Units
Operating Temperature Range		-25		65	°C
Storage Temperature Range		-40		+125	°C
Operating Humidity	(Non-Condensing)			95	%
Storage Humidity	(Non-Condensing)			95	%
Shock	Halfsine wave (6ms), 3 axes		50		g
Sinusoidal Vibration	Bellcore GR-63-Core, Section 5.4.3		1		g
Temperature Coefficient				0.01	%/°C
Altitude				10,000	ft.

Input Specifications

All specifications apply over specified input voltage, output load, and temperature range, unless otherwise noted.

Parameter	Conditions/Description	Min	Nom	Max	Units
Input Voltage (Note 2)	PLD08Uxx (Note 3)	3.0	3.3	3.6	VDC
	PLD08Vxx	4.5	5.0	5.5	VDC
Inrush Transient	$V_{in} = V_{in,max}$, $I_{o1} = I_{o2} = 4$ A		0.04		A ² s
External Capacitor (Required)	ESR < 0.1 Ohm	100			µF

NOTES:

2. PLD08 is not internally fused. Use of an external fuse is recommended.
3. For outputs at 2.5 V, minimum input voltage is 3.15 V.

Output Specifications

All specifications apply at 25 °C, unless otherwise noted.

Parameter	Conditions/Description	Min	Nom	Max	Units
Output Voltage Setpoint Accuracy	Vin nom, 50% Load	-1.5		1.5	%Vout
Output Current Range (Note 4)	Individual Output	0.2		5	ADC
	Total Combined Current	0.4		8	ADC
Line Regulation	Vin.Min to Vin.Max, @I _{out} Max			0.2	%Vout
Load Regulation	At Vin.nom, I _{out} 0.2 to 5 A			12	mV
Total Output Voltage Regulation	Over all input voltage, load, and temperature conditions			3.0	%Vout
Dynamic Regulation:	25% load step change with other output at 4 A				
		Peak Deviation		±20	±50
Settling Time	To 1% error band		30	200	µs
Load Capacitance (Required)	Each output, ESR < 0.1 Ohm Vin Nom, I _{out} Max	100		1,000	µF
Output Short-Circuit Protection (Note 5)	Vout ≤ 0.1V	5.2		11.6	A
Temperature Coefficient				0.01	%/°C
Output Ripple and Noise	Vin Nom, I _{out} Max		10	20	mV rms
			30	50	mV p-p
Trim Range (Note 6)	Vin Nom, I _{out} Max	90		110	%Vout

Feature Specifications

All specifications apply over specified input voltage, output load, and temperature range, unless otherwise noted.

Parameter	Conditions/Description	Min	Nom	Max	Units
Inhibit	Inhibit signal low — OFF	0		0.4	VDC
	Inhibit signal high or floating — ON	V _{in_min}		V _{in_max}	
Turn-On Time	To Output Regulation Band; (100% Resistive Load)		25	40	ms
Switching Frequency			550		kHz
Thermal Shutdown	N/A				°C

General Specifications

All specifications apply over specified input voltage, output load, and temperature range, unless otherwise noted.

Parameter	Conditions/Description	Min	Nom	Max	Units
Calculated MTBF	(Bellcore TR-NWT-000332)		5.4		MHrs
Load Capacitance		100			µF
Water Washing			Yes		

NOTES:

- Minimum load is required for proper operation.
- PLD08 is not internally fused. Use of an external fuse is recommended.
- Max is 105% for the PLD08UDB 2.5 V output.

Characteristic Curves

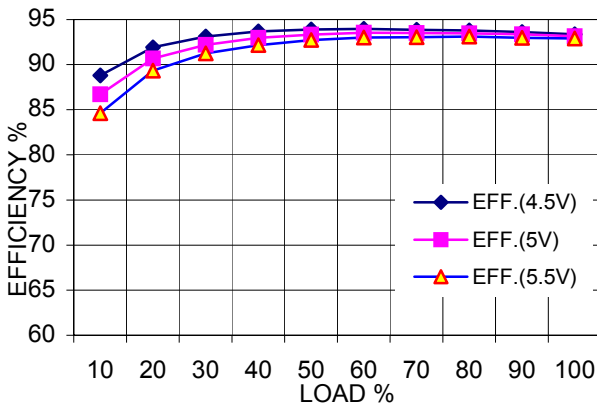


Figure 1. PLD08VED Efficiency vs. Output Load

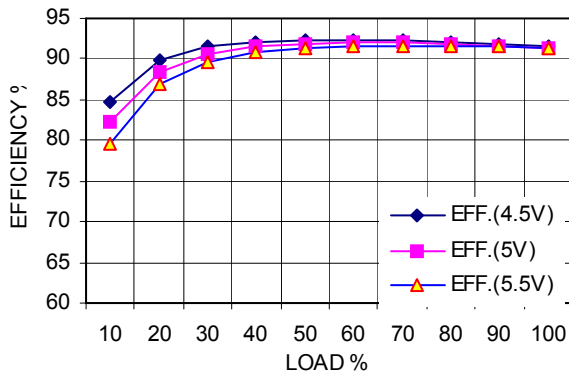


Figure 2. PLD08VDB Efficiency vs. Output Load

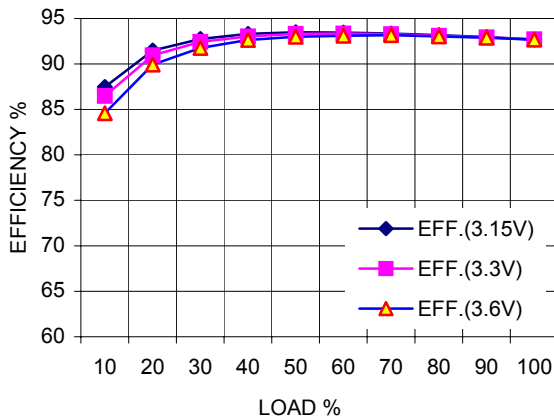


Figure 3. PLD08UDB Efficiency vs. Output Load

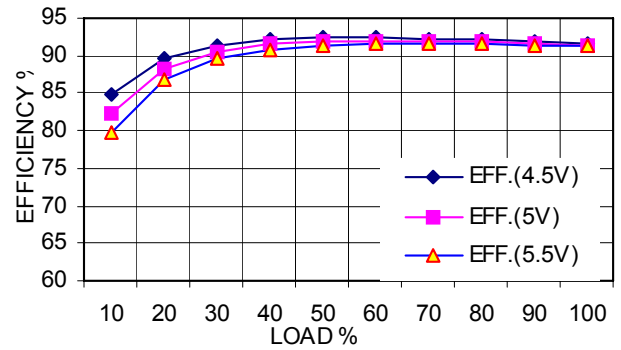


Figure 4. PLD08VBA Efficiency vs. Output Load

Typical Application

Figure 5 shows the recommended connections for the PLD08 Series converter.

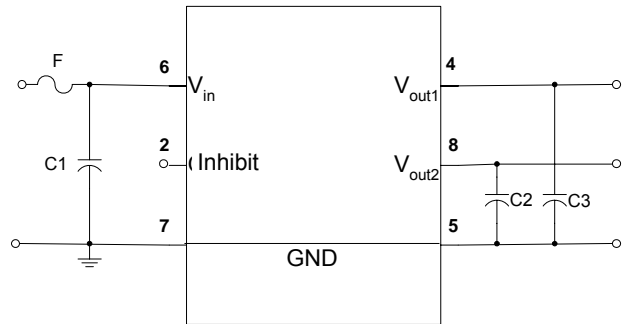


Figure 5. Typical Application of PLD08 Series

The PLD Series converters require external input and output capacitors for proper operation. A minimum of a 100 μ F capacitor with an ESR $<0.1\Omega$ is required at the input and at each of the outputs of the PLD08 Series. Each output has a minimum current requirement.

For output decoupling, it is recommended using small ceramic capacitors connected directly across the output pins of the converter. These bypass capacitors are to be applied in addition to the capacitance described above.

Inhibit Feature

The Inhibit pin of the PLD08 converter, functions as a normal soft shutdown, referenced to the GND pin (see Figure 5). When the Inhibit pin is pulled low to within 0.4 V of ground, the outputs are turned off and the unit goes into low input power mode.

When the pin is left floating or pulled high to V_{in} , the unit is on and operates normally.

An open collector switch is recommended to control the voltage between the Inhibit pin and the GND pin of the converter. The Inhibit pin is pulled up internally, so no external voltage source is required. Avoid connecting a resistor between the Inhibit pin and the +Vin pin.

When the Inhibit pin is used to achieve remote control, the user must take care that the control signal must not be referenced ahead of EMI filtering, or remotely from the unit. Optical couplers placed directly at the module will solve any ground reference problems.

Output Voltage Trim

The trim feature allows the user to adjust each of the output voltages $\pm 10\%$ from the nominal setting. This function can be used for voltage margining, compensation for distribution losses, or other requirements when the output voltage needs to be adjusted.

The Trim Function

The trim mechanism for the PLD08 Series trims up with a resistor from the TRIM pin to the GND pin and trims down with a resistor from the TRIM pin to the respective +Vout pin. See Figures 6 and 7.

The general equation for trimming the output voltage on either output of the PLD08 Series is shown below:

$$R_{TrimUP} = \frac{4.99 * 0.8}{V_{adj} - V_{out}} - 1 \quad \text{kOhm}$$

$$R_{TrimDOWN} = \frac{(V_{adj} - 0.8) * 4.99}{V_{out} - V_{adj}} - 1 \quad \text{kOhm}$$

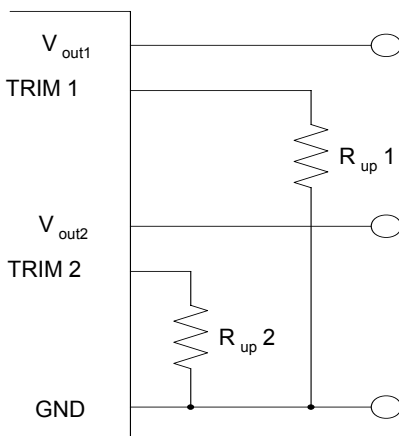


Figure 6. PLD08 Series Trim-Up Schematic

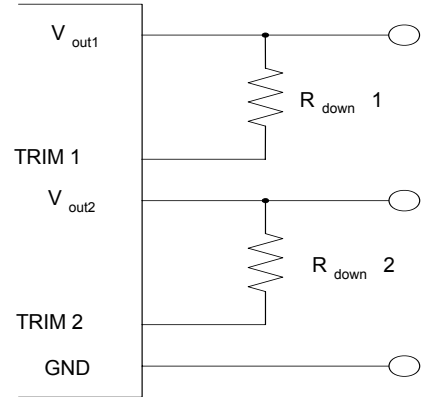


Figure 7. PLD08 Series Trim-Down Schematic

NOTES:

1. When the output voltage is trimmed up, the output power from the converter must not exceed its maximum rating.
2. In order to avoid creating apparent load regulation degradation, it is important that the trim resistors are connected directly to the Vout and output GND pins, and not to the load or to traces going to the load.

Safety Considerations

The PLD08 Series converters do not provide isolation from input to output. Relevant isolation requirements according to all IEC60950 based standards must be provided by the input devices to the PLD08 Series module. Nevertheless, if the system using the converter needs to receive safety agency approval, certain rules must be followed in the design of the system. In particular, all of the creepage and clearance requirements of the end-use safety requirements must be observed. These documents include UL60950 - CSA60950-00 and EN60950, although specific applications may have other or additional requirements.

The PLD08 Series converters have no internal fuse. An external fuse must be provided to protect the system in the event of failure. A fuse with a rating not greater than 7 A, 125 V is recommended. The user can select a lower rating fuse based upon the inrush transient and the maximum input current of the converter, which occurs at the minimum input voltage. Both input traces and the chassis ground trace (if applicable) must be capable of conducting a current of 1.5 times the value of the fuse without opening. The fuse must not be placed in the grounded input line.

In order for the output of the PLD08 Series converter to be considered as SELV (Safety Extra Low Voltage), according to all IEC60950 based standards, the input to the module needs to be

supplied by an isolated secondary source providing a SELV also.

Cooling Rate: not to exceed 3 °C per second
Profile Length: 5 minutes (max)

Thermal Considerations

The PLD08 Series converters are designed for natural or forced convection cooling. The output power of the converters is determined by the maximum semiconductor junction temperature. To provide reliable long-term operation of the converters, Power-One limits maximum allowable junction temperature to 120 °C.

The graph in Figure 8 shows the maximum output current of the PLD08 Series converter at different local ambient temperatures at both natural and forced (longitudinal airflow direction, from pin 3 to pin 1) convection.

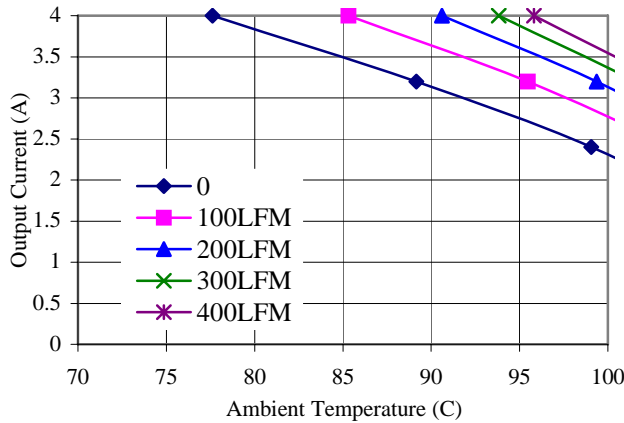
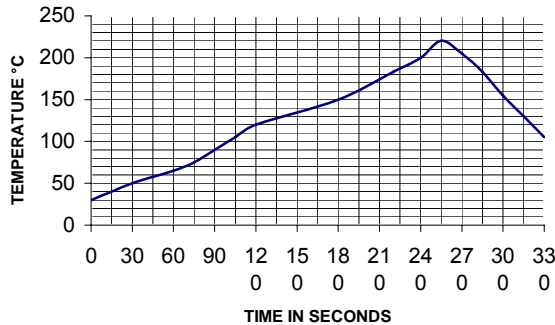


figure 8. PLD08 Derating Curve

Solder Profile

TYPICAL REFLOW PROFILE

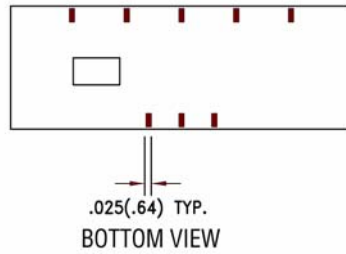
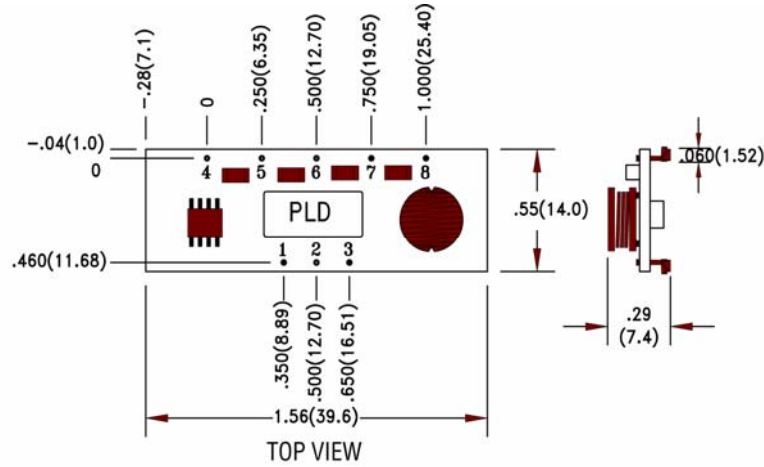


re 9. PLD08 Typical Reflow Solder Profile

NOTES:

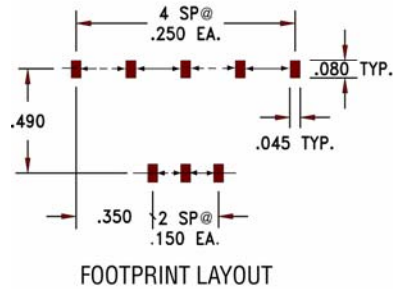
- Preheat 1 minute (min): 150 °C – 183 °C
- Time over Liquidus (183 °C): 1 minute (max)
- Ramp Rate: not to exceed 3 °C per second
- Peak Temperature: 220°

Mechanical Drawing



Tolerances:
.xx ± 0.020" (0.5mm)
.xxx ± 0.010" (0.25mm)

Pin	Function
1	Trim1
2	Inhibit
3	Trim2
4	Vout1
5	GND
6	Vin
7	GND
8	Vout2



NOTES:

1. Consult factory for the complete list of available options.

NUCLEAR AND MEDICAL APPLICATIONS - Power-One products are not designed, intended for use in, or authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of the respective divisional president of Power-One, Inc.

TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.