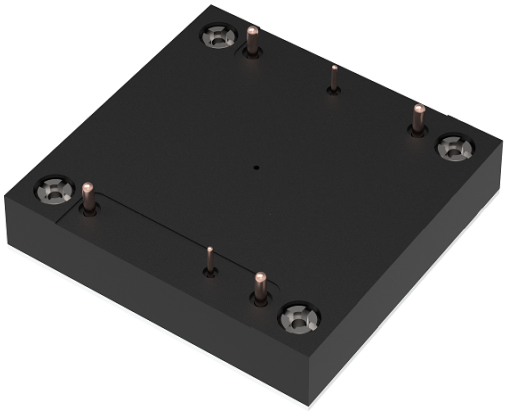
The 4:1 input voltage 500W half brick DC/DC converters includes trim and remote ON/OFF. Threaded through holes are provided to allow easy mounting or addition of a heatsink for extended temperature operation. The converters with high efficiency and high power density are accomplished through use of high-efficiency synchronous rectification technology, advanced electronic circuit, packaging and thermal design thus resulting in a high reliability product. Converter operates at a fixed frequency and follows conservative component de-rating guidelines.



Contents

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Features

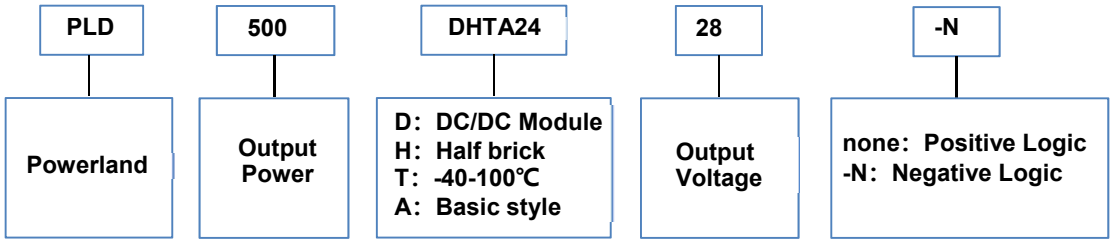
- 4:1 Input voltage range
- Small size: 61*63.5*13.2mm
- High power density
- High efficiency
- Excellent thermal performance with metal baseplate
- Monotonic startup into pre bias
- Remote ON/OFF
- Output trim
- Temperature Range -40ºC to +100ºC Available
- RoHS Compliance

Applications

➢ Industry standard footprint for mobile (12Vin), process control (24Vin), and military COTS (28Vin) applications.

Model List

Part Number Description



Model Number	Vin Range	Vin Normal	Output Power	Output Current Max	Output Voltage	Efficiency @24Vdc
PLD500-DHTA24-12	9-36 Vdc	24Vdc	500W	42A	12V	93%
PLD500-DHTA24-24	9-36 Vdc	24Vdc	500W	21A	24V	93.5%
PLD500-DHTA24-28	9-36 Vdc	24Vdc	500W	18A	28V	94.5%

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Electrical Specifications

Conditions: Ta = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 24VDC, unless otherwise specified.Specifications are subject to change without notice.

All Models					
Parameter	**Notes**	**Min**	**Typ**	**Max**	**Units**
Absolute Maximum Ratings					
Input Voltage	Continuous	0		40	V
	Transient (100ms)			50	V
Operating Temperature	Baseplate (100% load)	-40		100	°C
Storage Temperature		-55		125	°C
Isolation Characteristics					
Isolation Voltage	Input to Output		2250		VDC
	Input to Baseplate & Output to Baseplate		1500		VDC
Isolation Capacitance			4500		pF
Isolation Resistance		10	20		MΩ
Insulation Safety Rating			Basic		
Feature Characteristics					
Fixed Switching Frequency			200		KHz
	Input Current and Output Voltage Ripple		400		KHz
Output Voltage Trim Range	Adjustable via TRIM (Pin 7)	90		110	%
Remote Sense Compensation	This function is not provided		NA		V
Output Overvoltage Protection	Non-latching	117	124	130	%
Over temperature Shutdown	Non-latching (Vin=9V; 12V, 24/36V)	101	108	115	°C
Auto-Restart Period	Applies to all protection features	450	500	550	ms
Turn-On Delay Time from Vin	Time from UVLO to VO=90% VOUT (NOM) Resistive load	480	517	540	ms
Turn-On Delay Time from ON/OFF Control	Time from UVLO to VO=90% VOUT (NOM) Resistive load	20	27	35	ms
Rise Time (Vout from 10% to 90%)	VOUT from 10% to 90%	10	17	25	ms
ON/OFF Control – Positive Logic					
ON state	Pin open = ON or external voltage applied	2		12	V
Control Current				0.16	mA
OFF state	Pin shorted to -INPUT pin or low logic	0		0.8	V
Control current				0.36	mA
ON/OFF Control – Negative Logic					
ON state	Pin shorted to -INPUT pin or low logic	0		0.8	V
OFF state	Pin open = OFF or external voltage applied	2		12	V

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Electrical Specifications

Conditions: Ta = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 24VDC, unless otherwise specified.Specifications are subject to change without notice.

PLD500-DHTA24-12						
Parameter	**Notes**		**Min**	**Typ**	**Max**	**Units**
Input Characteristics						
Operating Input Voltage Range			9	24	36	V
Turn-on Threshold	Non-latching					
Turn-off Threshold			8.2	8.5	8.8	V
Lockout Hysteresis Voltage			7.7	8.0	8.3	V
Lockout Hysteresis Voltage			0.4	0.55	0.7	V
Maximum Input Current	Vin = 9V, 80% Load				52	A
	Vin = 12V, 100% Load				49	A
	Vin = 24V, Output Shorted			75		mA_{RMS}
Input Stand-by Current	Converter Disabled			5	8	mA
Input Current @ No Load	Converter Enabled			240	300	mA
Minimum Input Capacitance (external)	ESR < 0.1 Ω		470			µF
Inrush Transient				0.4	1	A^2s
Input Terminal Ripple Current	20 MHz bandwidth, 100% Load			960		mA_{RMS}
Output Characteristics						
Output Voltage Range	Over Load, Line and temperature		11.64	12.00	12.36	V
Output Voltage Set Point Accuracy	(No load)		11.88	12.00	12.12	V
Output Regulation						
Over Line	Vin = 9V to 36V			0.05	0.15	%
Over Load	Vin = 24V, Load 0% to 100%			0.08	0.15	%
Temperature Coefficient				0.015	0.03	%/03
Over voltage Protection			14		15.6	V
Output Ripple and Noise	Full load, 20 MHz bandwidth			200	320	mV_{PK-PK}
	470uF/70ma*2+10 µF/1210/X7R/100V			50	80	mV_{RMS}
External Load Capacitance	Full Load (resistive)	CEXT	470		4700	µF
	(over operating temp range)	ESR	10		100	mΩ
Output Current Range	Vin = 12V – 36V		0		42	A
	Vin = 9V		0		33.3	A
Current Limit Inception	Vin = 12V – 36V		46.2	50.4	54.6	A
	9V 6 Vin < 12V		40.6		54.6	A
RMS Short-Circuit Current	Non-latching, Continuous			7	10	A_{RMS}
Dynamic Response						
Load Change 50%-75%-50%, di/dt = 1A/µs	470uF/70mΩ*2+10 µF/1210/X7R/100V			±320	±500	mVP-P
Load Change 50%-100%-50%, di/dt = 1A/µs	470uF/70mΩ*2+10 µF/1210/X7R/100V			±700	±960	mVP-P
Settling Time to 1% of VOUT				800		µs
Efficiency						
100% Load	Vin = 24V		92.3	93	93.7	%
	Vin = 12V		90.2	91	91.8	%
50% Load	Vin = 24V		94.2	94.9	95.6	%
	Vin = 12V		93.4	94.1	94.8	%

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Electrical Specifications

Conditions: Ta = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 24VDC, unless otherwise specified.Specifications are subject to change without notice.

PLD500-DHTA24-24

Parameter	Notes		Min	Typ	Max	Units
Input Characteristics						
Operating Input Voltage Range			9	24	36	V
Turn-on Threshold	Non-latching					
Turn-off Threshold			8.2	8.5	8.8	V
Lockout Hysteresis Voltage			7.7	8.0	8.3	V
Lockout Hysteresis Voltage			0.4	0.55	0.7	V
Maximum Input Current	Vin = 9V, 80% Load				50.4	A
	Vin = 12V, 100% Load				47	A
	Vin = 24V, Output Shorted			75		mA_{RMS}
Input Stand-by Current	Converter Disabled			5	8	mA
Input Current @ No Load	Converter Enabled			240	300	mA
Minimum Input Capacitance (external)	ESR < 0.1 Ω		470			μF
Inrush Transient				0.4	1	A^2s
Input Terminal Ripple Current	20 MHz bandwidth, 100% Load			960		mA_{RMS}
Output Characteristics						
Output Voltage Range	Over Load, Line and temperature		23.28	24.00	24.72	V
Output Voltage Set Point Accuracy	(No load)		23.76	24.00	24.24	V
Output Regulation						
Over Line	Vin = 9V to 36V			0.05	0.15	%
Over Load	Vin = 24V, Load 0% to 100%			0.08	0.15	%
Temperature Coefficient				0.015	0.03	%/03
Over voltage Protection			28.1		31.2	V
Output Ripple and Noise	Full load, 20 MHz bandwidth			240	36	mV_{PK-PK}
	470uF/70ma*2+10 μF/1210/X7R/100V			50	80	mV_{RMS}
External Load Capacitance	Full Load (resistive)	CEXT	470		2200	μF
	(over operating temp range)	ESR	10		100	mΩ
Output Current Range	Vin = 12V – 36V		0		21	A
	Vin = 9V		0		16.7	A
Current Limit Inception	Vin = 12V – 36V		23.1	25.2	27.3	A
	9V 3= 12V – 36		20.8		27.3	A
RMS Short-Circuit Current	Non-latching, Continuous			3.8	6	A_{RMS}
Dynamic Response						
Load Change 50%-75%-50%, di/dt = 1A/μs	470uF/70ma*2+10 μF/1210/X7R/100V			±0 μ	±500	mVP-P
Load Change 50%-100%-50%, di/dt = 1A/μs	470uF/70ma*2+10 μF/1210/X7R/100V			±0 μ	±720	mVP-P
Settling Time to 1% of VOUT				800		μs
Efficiency						
100% Load	Vin = 24V		92.8	93.5	94.2	%
	Vin = 12V		91.3	92	92.7	%
50% Load	Vin = 24V		94.3	95.0	95.7	%
	Vin = 12V		94.1	94.8	95.5	%

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Electrical Specifications

Conditions: Ta = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 24VDC, unless otherwise specified.Specifications are subject to change without notice.

PLD500-DHTA24-28						
Parameter	**Notes**		**Min**	**Typ**	**Max**	**Units**
Input Characteristics						
Operating Input Voltage Range			9	24	36	V
Turn-on Threshold	Non-latching					
Turn-off Threshold			8.2	8.5	8.8	V
Lockout Hysteresis Voltage			7.7	8.0	8.3	V
Lockout Hysteresis Voltage			0.4	0.55	0.7	V
Maximum Input Current	Vin = 9V, 80% Load				50.4	A
	Vin = 12V, 100% Load				46.2	A
	Vin = 24V, Output Shorted			55		mA_{RMS}
Input Stand-by Current	Converter Disabled			5	8	mA
Input Current @ No Load	Converter Enabled			240	28	mA
Minimum Input Capacitance (external)	ESR < 0.1 Ω		470			µF
Inrush Transient				0.4	1	A^2s
Input Terminal Ripple Current	20 MHz bandwidth, 100% Load			840		mA_{RMS}
Output Characteristics						
Output Voltage Range	Over Load, Line and temperature		27.16	28.00	28.84	V
Output Voltage Set Point Accuracy	(No load)		27.72	28.00	28.28	V
Output Regulation						
Over Line	Vin = 9V to 36V			0.05	0.15	%
Over Load	Vin = 24V, Load 0% to 100%			0.08	0.15	%
Temperature Coefficient				0.015	0.03	%/03
Over voltage Protection			32.8		36.4	V
Output Ripple and Noise	Full load, 20 MHz bandwidth			280	380	mV_{PK-PK}
	470uF/70ma*2+10 µF/1210/X7R/100V			50	85	mV_{RMS}
External Load Capacitance	Full Load (resistive)	CEXT		2200	4700	µF
	(over operating temp range)	ESR		100	100	mΩ
Output Current Range	Vin = 12V – 36V		0		18	A
	Vin = 9V		0		14.3	A
Current Limit Inception	Vin = 12V – 36V		19.8	21.4	23.4	A
	9V 4= 12V – 36		17.8		23.4	A
RMS Short-Circuit Current	Non-latching, Continuous			2.2	6	A_{RMS}
Dynamic Response						
Load Change 50%-75%-50%, di/dt = 1A/µs	470uF/70mΩ*2+10 µF/1210/X7R/100V			±270	±500	mVP-P
Load Change 50%-100%-50%, di/dt = 1A/µs	470uF/70mΩ*2+10 µF/1210/X7R/100V			±500	±840	mVP-P
Settling Time to 1% of VOUT				800		µs
Efficiency						
100% Load	Vin = 24V		93.8	94.5	95.2	%
	Vin = 12V		92.3	93	93.7	%
50% Load	Vin = 24V		94.8	95.5	96.2	%
	Vin = 12V		93.8	94.5	95.2	%

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Environmental and Mechanical Specifications

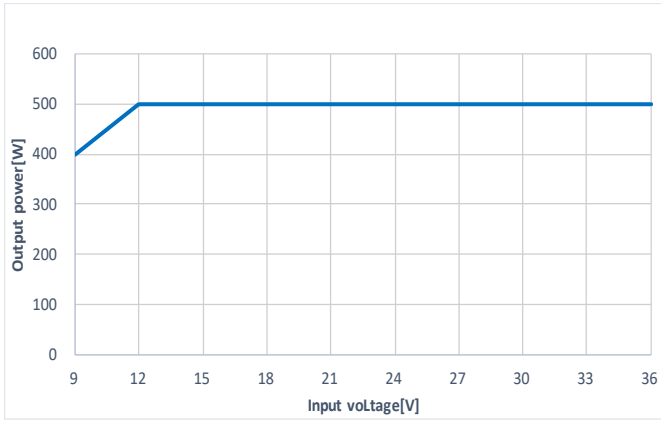
Parameter	Note	Min	Typ	Max	Units
Environmental					
Operating Humidity	Non-condensing			95	%
Storage Humidity	Non-condensing			95	%
ROHS Compliance	See Powerland Website http:// *www.powerlandtech.com* /RoHS.html for the complete RoHS Compliance statement				
Shock and Vibration	Designed to meet MIL-STD-810G for functional shock and vibration.				
Water washability	Not recommended for water wash process. Contact the factory for more information.				
Mechanical					
Weight			130		Grams
Through Hole Pins Diameter	Pins 1,4,5 and 9	0.079	0.081	0.083	Inches
		2.006	2.057	2.108	mm
	Pins 3 and 7	0.038	0.04	0.042	Inches
		0.965	1.016	1.067	mm
Through Hole Pins Material	Pins 1,4,5 and 9	C14500 or C1100 Copper Alloy			
	Pins 3 and 7	Brass Alloy TB3 or “Eco Brass”			
Through Hole Pin Finish	All pins	10μ” Gold over nickel			
Case Dimension		2.4*2.5*0.52			Inches
		61*63.5*13.25			mm
Case Material	Plastic: Vectra LCP FIT30: ½-16 EDM Finish				
Baseplate	Material	Aluminum			
	Flatness		0.010		Inches
			0.25		mm
Reliability					
MTBF	Telcordia SR-332, Method I Case 1	5.4			MHrs
EMI and Regulatory Compliance					
Conducted Emissions	MIL-STD 461F CE102 with external EMI filter network				

Block Diagram

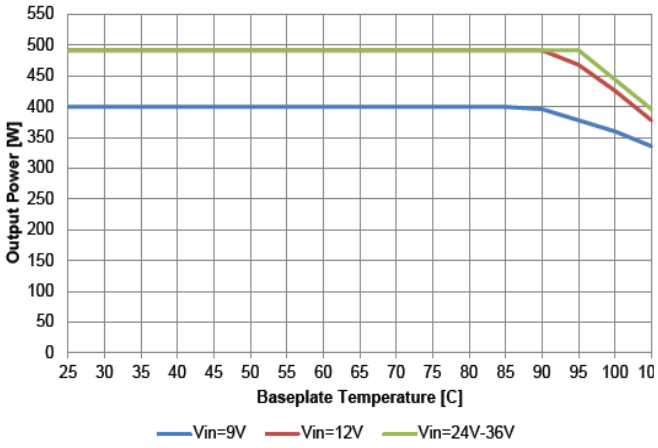
Performance Curve

PLD500-DHTA24-12

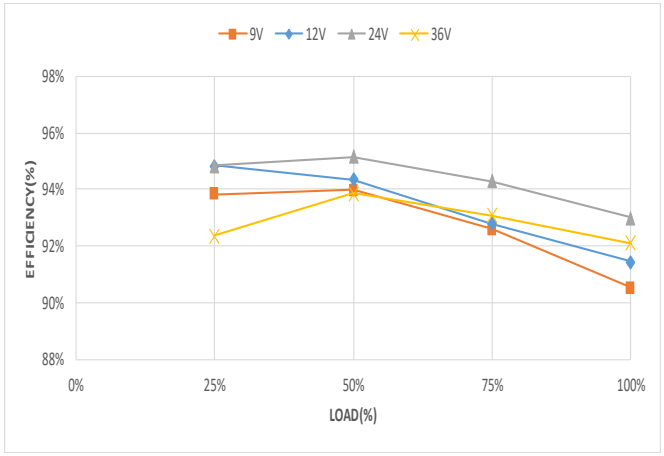
Input Voltage Derating Curve



OUTPUT LOAD vs Tcase

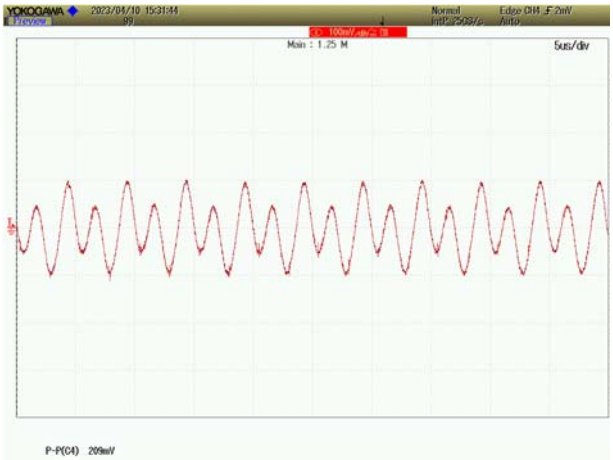


Efficiency vs Different Loads



Turn-on waveform

Output voltage ripple at full rated load current



Output voltage response to load current step change 50% - 100%- 50%

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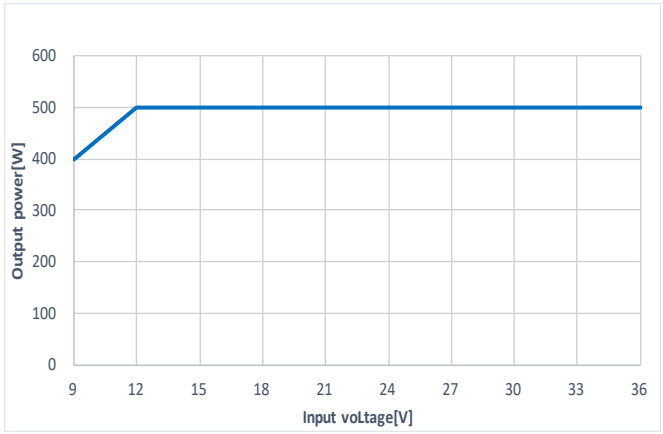
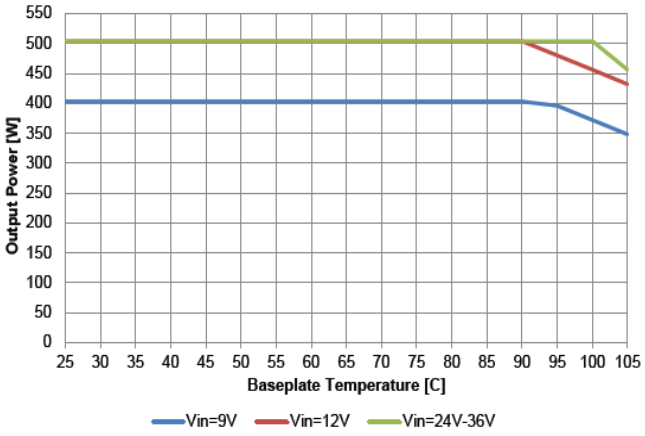
Performance Curve

PLD500-DHTA24-24

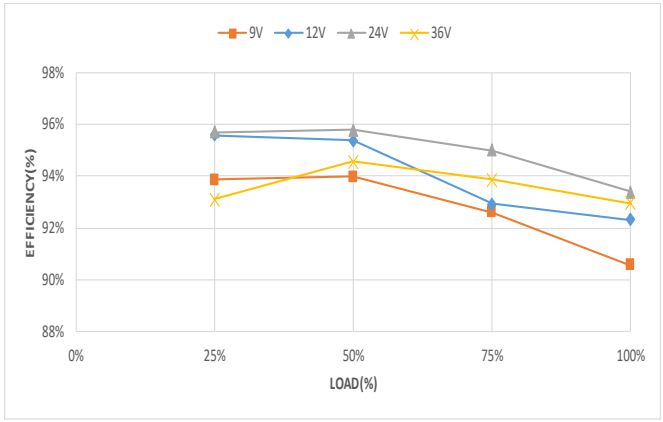
Input Voltage Derating Curve



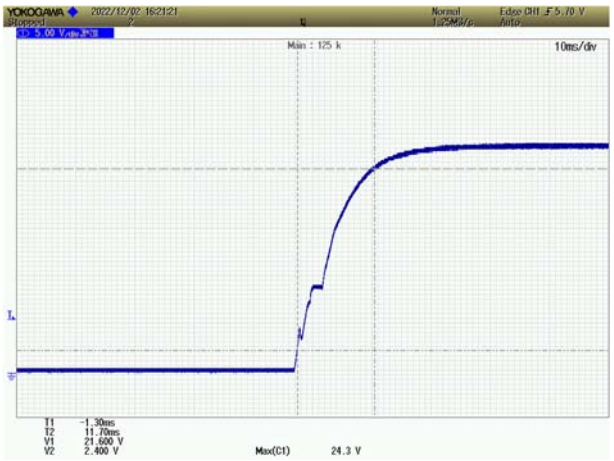
OUTPUT LOAD vs Tcase



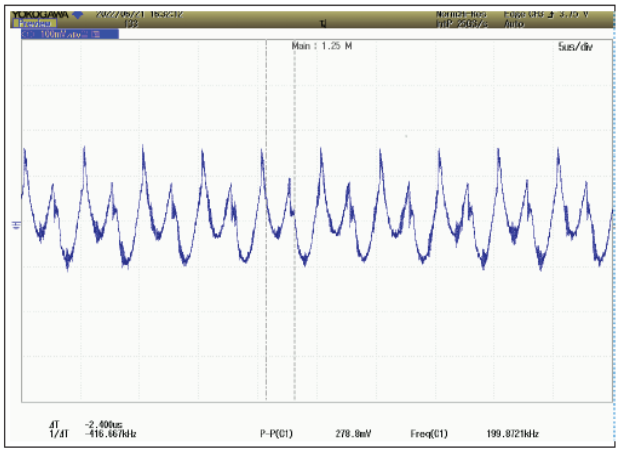
Efficiency vs Different Loads



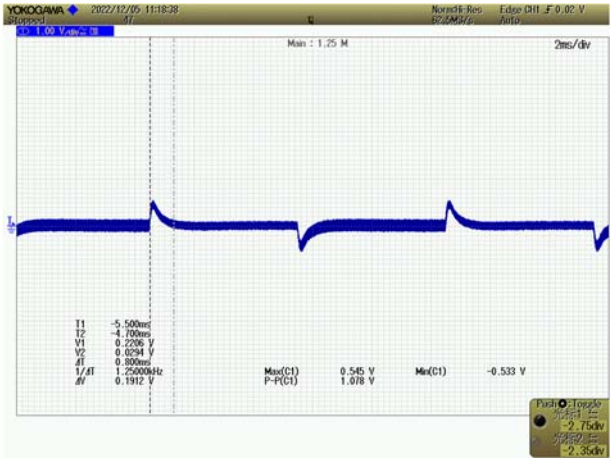
Turn-on waveform



Output voltage ripple at full rated load current



Output voltage response to load current step change 50% - 100%- 50%



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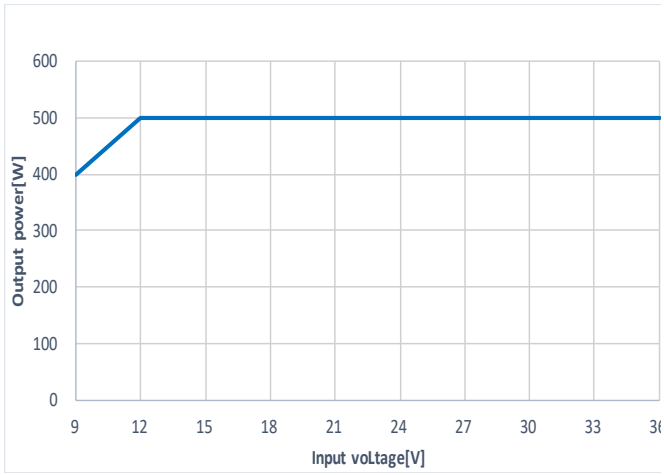
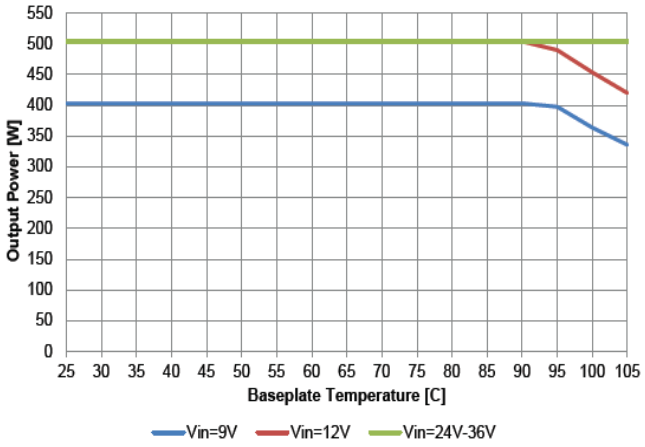
Performance Curve

PLD500-DHTA24-28

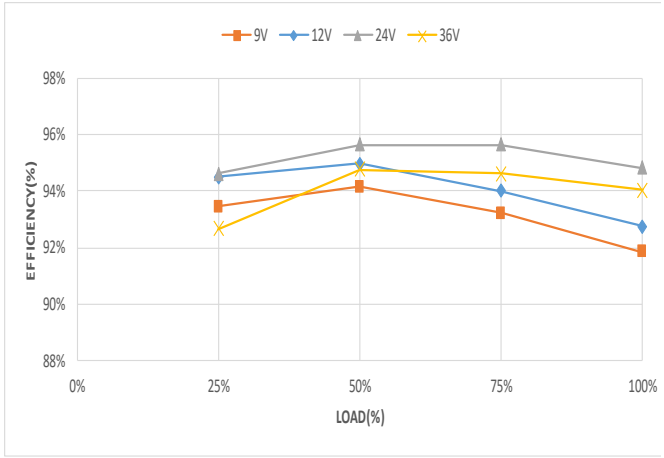
Input Voltage Derating Curve



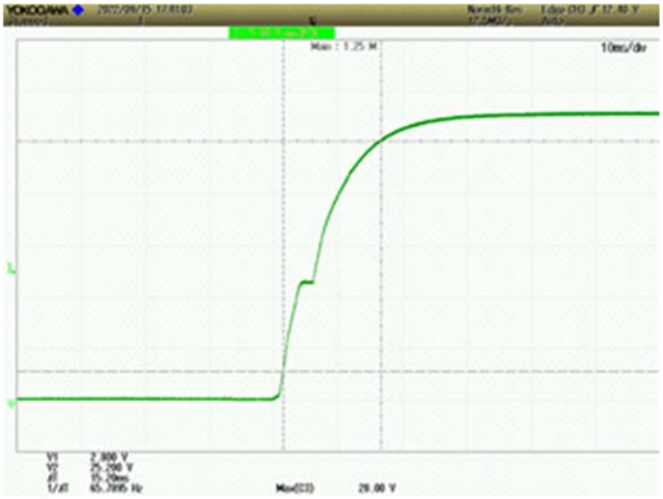
OUTPUT LOAD vs Tcase



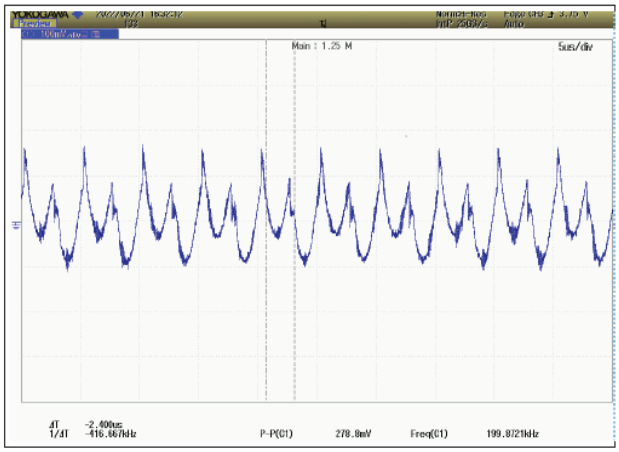
Efficiency vs Different Loads



Turn-on waveform



Output voltage ripple at full rated load current



Output voltage response to load current step change 50% - 100%- 50%

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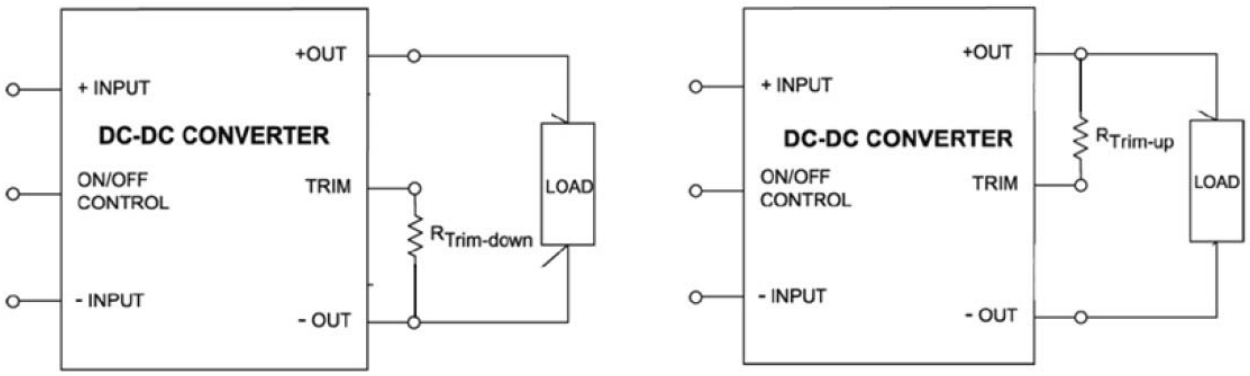
Application circuit

Circuit configuration for Trim function



$$\Delta = \left| \frac{V_{out\_req} - V_{out\_normal}}{V_{out\_normal}} \right|$$

$$R_{TRIM\_DOWN} = 4.99 \cdot 10^3 \cdot \frac{(1 - 2\Delta)}{\Delta}$$

$$R_{TRIM\_UP} = \frac{4.99 \cdot 10^3 \cdot [(1 + \Delta) \cdot (Vnom - 2 \cdot 1.25) + 1.25]}{1.25 \cdot \Delta}$$

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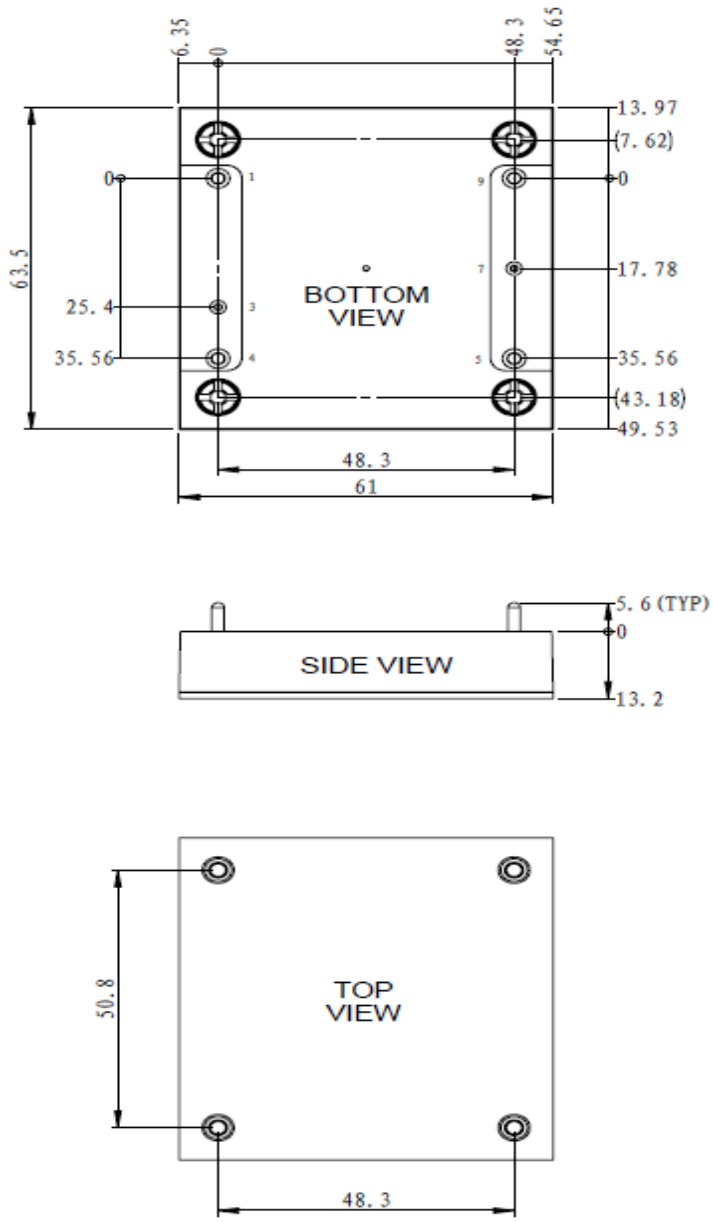
Mechanical Specification



Pin	Lable	Function
1	-INPUT	Negative Input Voltage
3	ON/OFF	TTL input with internal pull up, referenced to –INPUT, used to turn converter on and off
4	+INPUT	Positive Input Voltage
5	+OUTPUT	Positive Output Voltage
7	TRIM	Output voltage trim
9	-OUTPUT	Negative output voltage

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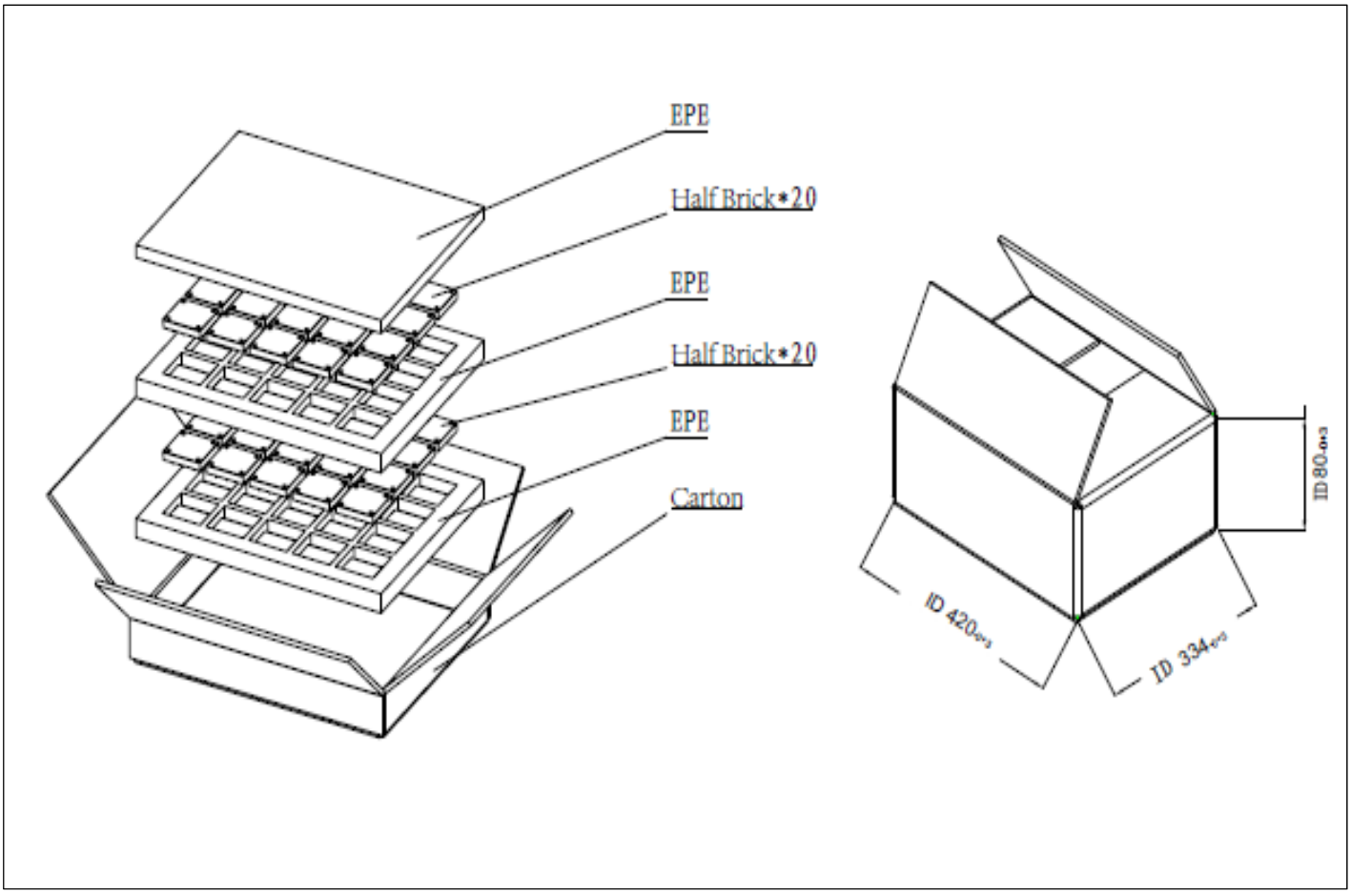
Package

Carton	L×W×H =420mm×334mm×80mm
EPE	2pcs/carton L×W×H =420*334*30mm
EPE	1pcs/carton L×W×H =420*334*20mm
Half brick DC/DC converters	40pcs/carton
Net weight	130 g/pcs
Gross weight	6 kg/carton



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Revision History

Change Date	Rev.	Description of Change		
		Item	From	To
2023.7.12	V1.0	First Released		

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