



LDP25 SERIES AC-DC LED DRIVER

Application Note V15 DEC 2017

LDP25 SERIES LED Power Supply Application Note



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1. Introduction

This application note describes the features and functions of Cincon's LDP25 series of LED Driver driver, Isolated AC-DC power supply. These are highly efficient, reliable and compact power supply with high power density, The drivers are fully protected against short circuit and over-voltage conditions. Cincon's world class automated manufacturing methods, together with an extensive testing and qualification program; ensure that all LDP25 series converters are extremely reliable.

2. LDP25 Series LED Driver Features

- Universal Input : 90 ~ 305Vac
- High Active PFC, > 0.9
- Low Inrush Current < 5A
- Fully Isolated Plastic Case
- Dimming Function with PWM/1-10Vdc (Optional)
- Short Circuit / Over Voltage / Over Current / Over Temperature Protection
- Active PFC Meets EN6100-3-2
- Conductive EMI Meets FCC PART 18/EN55015 Class B
- IP67 design for indoor or outdoor installations (Optional)

3. General Description

A block diagram of the LDP25 series led driver is shown in Figure 1. The LDP25 series topology is based on an isolated one stage flyback converter. The control loop is optimized for unconditional stability, a very tight line and load regulation.

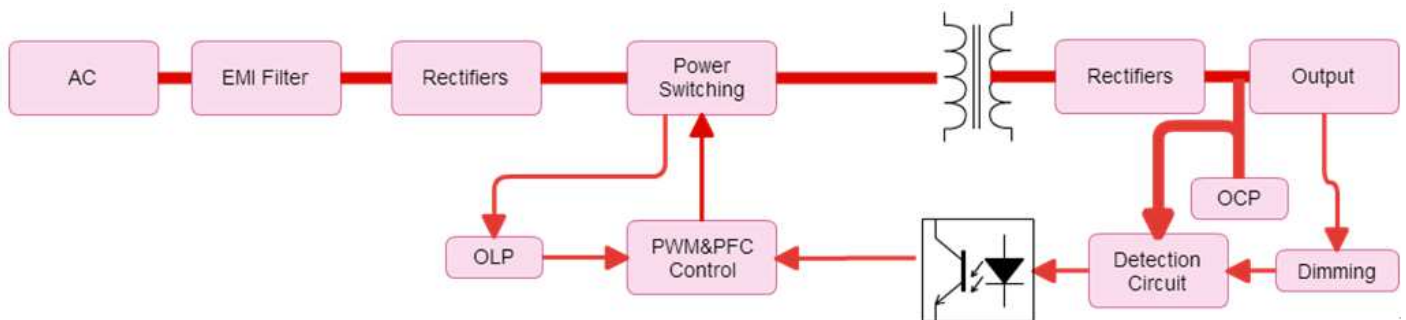


Figure 1. Electrical Block Diagram



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4. Technical Specifications

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
ABSOLUTE MAXIMUM RATINGS						
Input Voltage			90		305	Vac
			170		300	Vdc
Operating Temperature	see derating curve		-40		+70	°C
Storage Temperature			-40		+85	°C
INPUT CHARACTERISTICS						
Operating Voltage Range			100		277	Vac
Input Frequency Range			47		63	Hz
Maximum Input Current	100% output current @115Vac				0.3	A
	100% output current @230Vac				0.14	
Power factor correction	115Vac/230Vac at 75%~100% Load 277Vac at 100% Load		0.9			
Leakage Current	Maximum Input voltage is 277Vac				0.5	mA
Inrush Current	@Vin=240Vac, cold start at 25°C after 100uS.				5	A
OUTPUT CHARACTERISTIC						
Output Voltage	Vin=Nominal Vin, No Load Tc=25°C	LDP25X240			29	Vdc
		LDP25X360			43	
		LDP25X480			56	
Output Current		LDP25X240			1100	mA
		LDP25X360			700	
		LDP25X480			530	
Output Constant Current Accuracy			-5		+5	%
Output Constant Region		LDP25X240-XXXXB	16		24	V
		LDP25X240-XXXXBR	9		24	
		LDP25X360-XXXXB	24		36	V
		LDP25X360-XXXXBR	9		36	
Load Regulation	measured minimum to maximum of the constant Current region		-5		+5	%
			-5		+5	%
Line Regulation	measured from High Line to Low Line with full load		-5		+5	%
Output Voltage Ripple and Noise Peak-to-Peak	20MHz bandwidth , Full load, 0.1uF ceramic and 10uF aluminum capacitor with 100% output current	LDP25X240-XXXXXR			240	mV
		LDP25X360-XXXXXR			360	
		LDP25X480-XXXXXR			480	
Start-Up Time	Vin=90Vac				0.5	s
No load Consumption					1	W
EFFICIENCY						
100% Load		LDP25X240-C070B		86		%
		LDP25X240-C105B		87		
		LDP25X240-C110B		88		
		LDP25X360-C070B		88		
		LDP25X480-C035B		86		
		LDP25X480-C053B		88		
		LDP25X240-C070BR		84		
		LDP25X240-C105BR		85		
		LDP25X240-C110BR		86		
		LDP25X360-C070BR		86		
		LDP25X480-C035BR		84		
		LDP25X480-C053BR		86		
		LDP25X240-P070BR		84		
		LDP25X240-P105BR		85		
		LDP25X240-P110BR		86		



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		LDP25X360-P070BR LDP25X480-P035BR LDP25X480-P053BR		86 84 86		
ISOLATION CHARACTERISTICS						
Input to Output	1 minute				3750	Vac
Isolation Resistance			100			MΩ
FEATURE CHARACTERISTICS						
Switching Frequency				60		KHz
Harmonic	EN61000-3-2 Class C					
Surge	EN6100-4-2 Criteria Line to line				±1	KV
GENERAL SPECIFICATIONS						
Life time	Ambient temperature is 25°C		130			k hours
MTBF	Ambient temperature is 25°C per MIL-HDBK-217F			200		k hours
Weight				100		g
Dimension	140.00x30.00x20.00mm ((W*L*H)					



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5. Main Features and Functions

5.1 Operating Temperature Range

The LDP25 series led driver highly efficient converter design has resulted in its ability to operate ambient temperature environment -40°C ~ 70°C (see derating curve). Due consideration must be given to the de-rating curves when ascertaining maximum power that can be drawn from the converter. The maximum power drawn is influenced by a number of factors, such as:

- Input voltage range.
- Permissible Output load (per derating curve)

5.2 Short Protection

All different voltage models have a full continuous short-circuit protection. The unit will auto recover once the short circuit is removed. To provide protection in a fault condition, the unit is equipped with internal over-current protection. The unit operates normally once the fault condition is removed. In the event of an over current converter will go into a hiccup mode protection.

5.3 Over Voltage Protection

All different voltage models have over voltage protection. In the event of an over voltage converter will be clamped by a TVS component.

5.4 Dimming Function

Please refer to section 9.

6. Safety

- CB Approval (IEC61347-1,EN61347-2-13)
- TUV Approval (EN61347-1,EN61347-2-13)
- UL Approval (UL8750)

7. Applications

7.1 Power De-Rating Curves

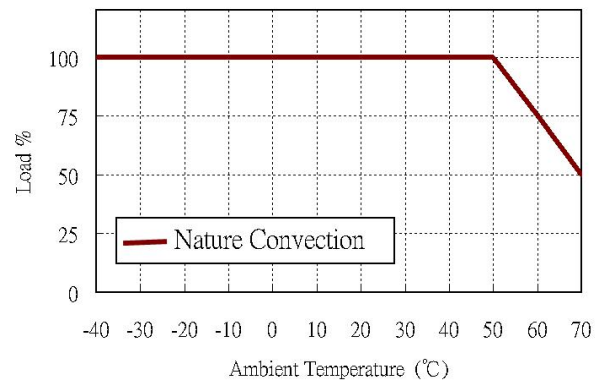
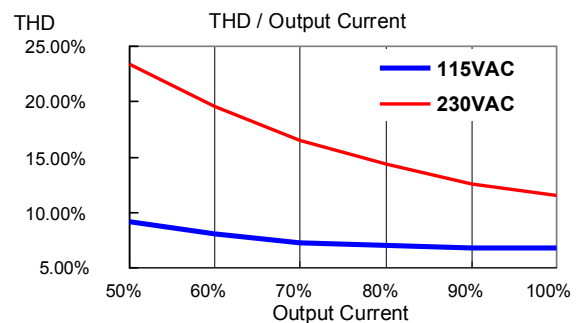
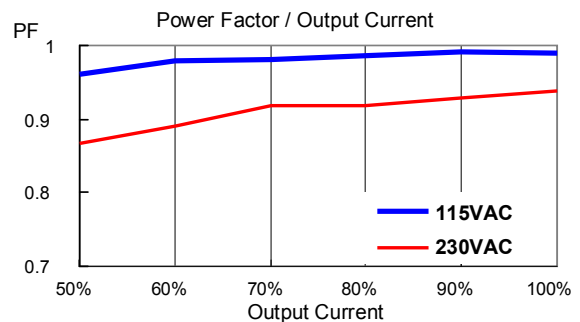


Figure 2. Typical Output power of LDP25

7.2 Power Factor & THD Vs. Output Voltage



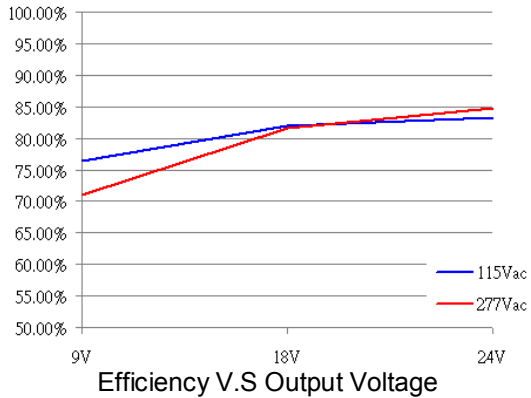


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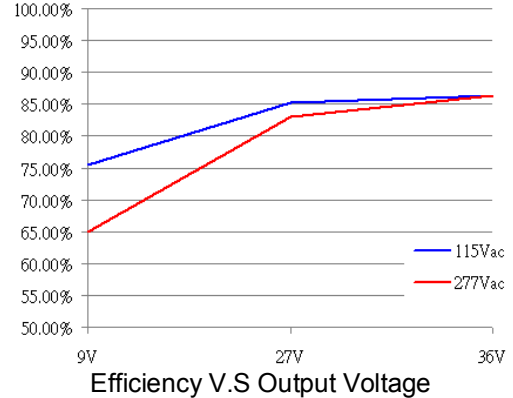
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7.3 Efficiency

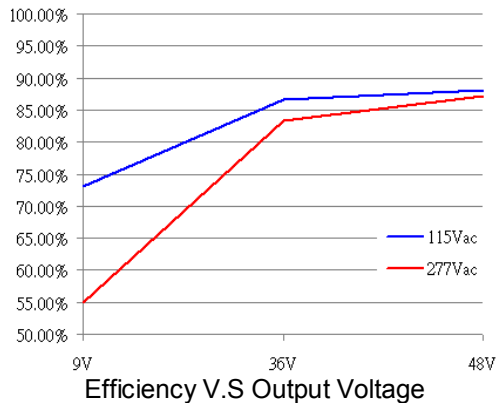
LDP25S240-CBR



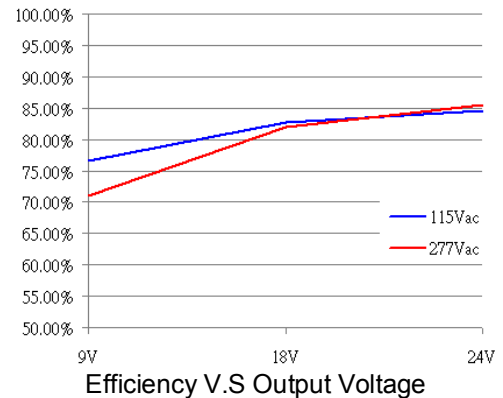
LDP25S360-CBR



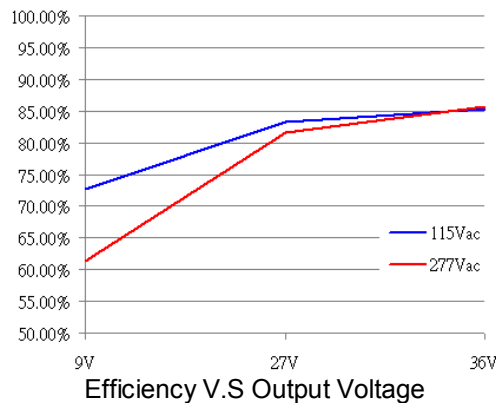
LDP25S480-CBR



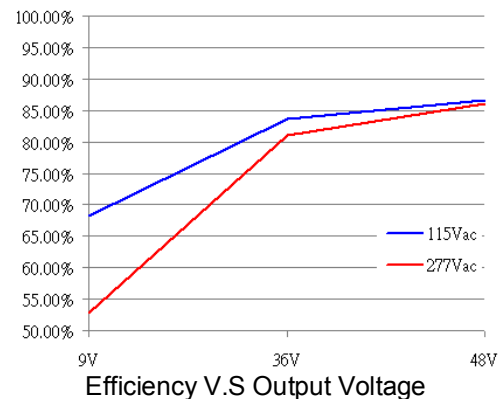
LDP25S240-PBR



LDP25S360-PBR



LDP25S480-PBR





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7.4 Test Set-Up

The basic test set-up to measure parameters such as efficiency and load regulation is shown in Figure 3. When testing the Cincon's LDP series under any transient conditions please ensure that the transient response of the source is sufficient to power the equipment under test. We can calculate the

- Efficiency
- Load regulation and line regulation

The value of efficiency is defined as:

$$\eta = \frac{V_o \times I_o}{P_{in}} \times 100\%$$

Where: V_o is output voltage,
 I_o is output current,
 P_{in} is input power,

The value of load regulation is defined as:

$$Load.reg = \frac{I_{m\ max} - I_{m\ in}}{I_{m\ in}} \times 100\%$$

Where: I_{max} is the output current at maximum rated output voltage
 I_{min} is the output current at minimum rated output voltage

The value of line regulation is defined as:

$$Line.reg = \frac{I_{HL} - I_{LL}}{I_{LL}} \times 100\%$$

Where: I_{HL} is the output current of maximum input voltage at full load.
 I_{LL} is the output current of minimum input voltage at full load.

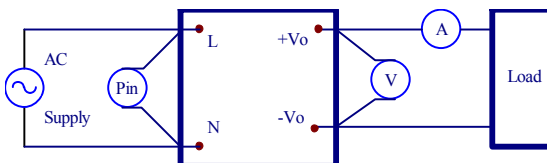


Figure 3. LDP Series Test Setup

7.5 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 4. Measured method :

Add a 0.1 uF ceramic capacitor and a 10uF aluminum capacitor to output at 20 MHz Band Width for LDP Series

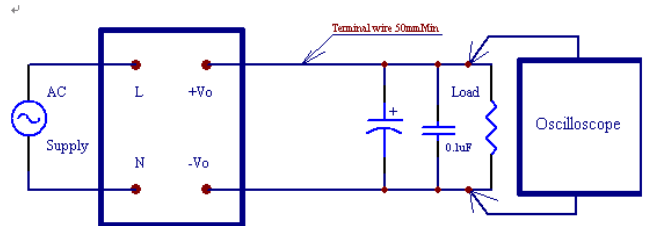


Figure 4. Output Voltage Ripple and Noise Measurement Set-Up

7.6 EMI

- Conductive EMI meets
- FCC PART 18
- EN55015 Class B



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8. Mechanical Outline Diagrams

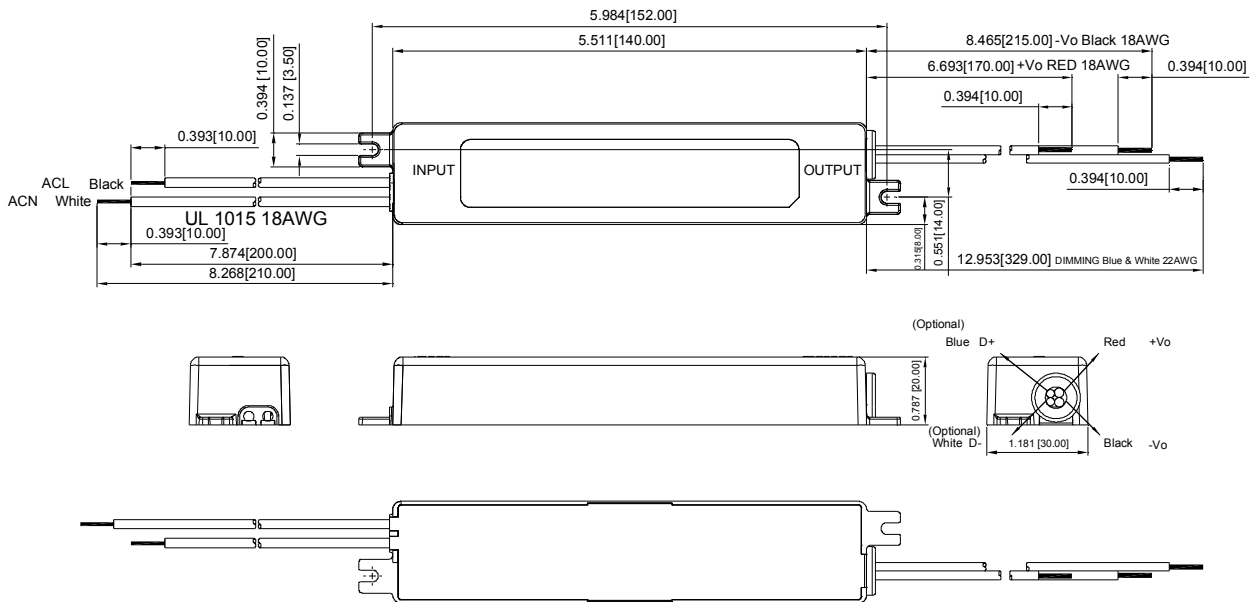
8.1 LDP25 Mechanical Outline Diagrams

Dimensions are in inches (mm)

Tolerance :Inches:X.XXX±0.02 Millimeters:X.XX±0.5, unless otherwise noted

Annotations : LDP25 height does not exceed 20mm MAX

All Dimensions are in inches(mm)
 Tolerance:Inches:X.XXX±0.02
 Millimeters:X.XX±0.5
 UNIT : inches(mm)



8.2 LDP25 Wire Color Description

WIRE CONNECTION		
COLOR	NO DIMMING	PWM DIMMING
BLUE	(N.A.)	D+
WHITE	(N.A.)	D-
RED	+VO	+VO
BLACK	-VO	-VO



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9. Installation Instruction

9.1 The maximum number of circuit breakers

LDP25 Series calculated values are based on MCB S200 Series manufactures by ABB

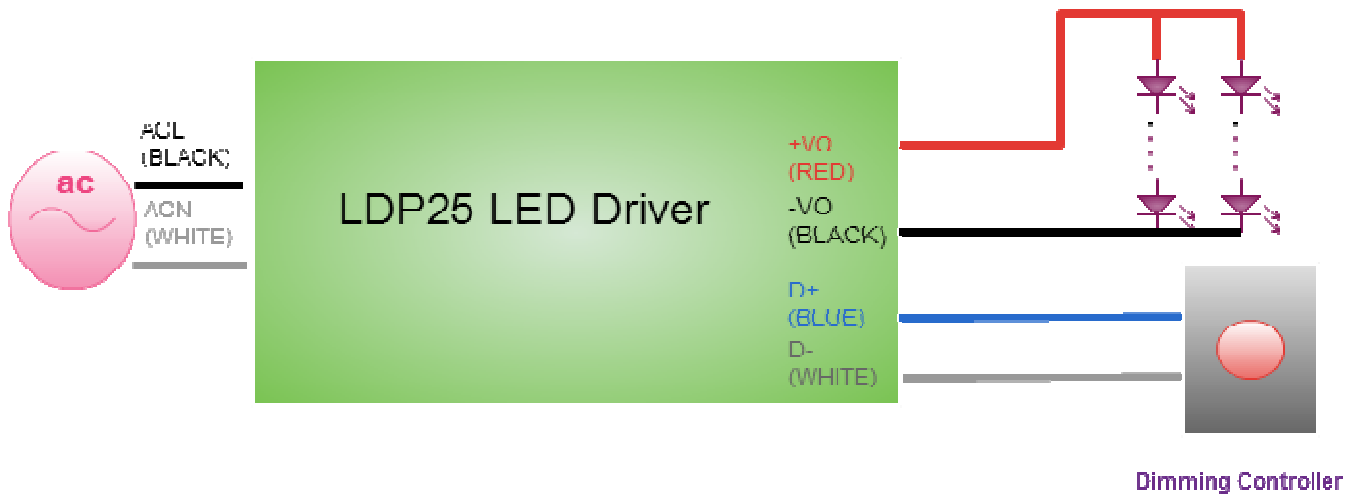
Application Area	Series	Max units connected to 10A Breaker used	Max units connected to 16A Breaker used
230Vac area	LDP25	47	76
115Vac area	LDP25	23	38

The maximum number of

$$230VAC \frac{\text{breaker rated current}}{\text{AC input current labeled (@90Vac)}} \quad *230Vac/90Vac*75\%(\text{Safe margin ,TBD})$$

$$115VAC \frac{\text{breaker rated current}}{\text{AC input current labeled (@90Vac)}} \quad *115Vac/90Vac*75\%(\text{Safe margin ,TBD})$$

9.2 Dimming Function (optional); needs the from dimming controller with PWM Or 1-10Vdc



1. 1-10V Dimming

Volatge	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V(OPEN)
Output Current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

2. PWM Dimming @1kHz,10V

Duty Cycle	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%(Open)
Output Current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%



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10. Order Information:

Series	Output(W)	IP Code	Output Voltage	Dimming Function	Rated Output Current		Input Voltage	Ripple Noise
LDP	25	X	XXX	X	XXX		B	X
		S : Single O/P with IP64	240 : 24V	C : No dimming P : PWM /1-10V	24V	110: 1100mA 105: 1050mA 070: 700mA	B : 100-277 Vac	R : 1% output ripple and noise or Blank : 10% output ripple and noise
			360 : 36V		36V	070: 700mA		
			480 : 48V		48V	053: 530mA 035: 350mA		
		A : Single O/P with IP67	240 : 24V		24V	110: 1100mA 105: 1050mA 070: 700mA		
			360 : 36V		36V	070: 700mA		
			480 : 48V		48V	053: 530mA 035: 350mA		

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