



ALD-E SERIES DC-DC LED DRIVER

Application Note V11 March 2022

DC-DC LED DRIVER WITH DIGITAL DIMMING INTERFACE ALD-E SERIES



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1. Introduction

ALD-E series is a constant current DC-DC LED driver, Digital dimming with single output. Suitable for tube light, panel light, down light, track light and lights on DC bus system. When you look at single output model, ALD-E provides output current 350mA, 500mA, 700mA, 1050mA and 1400mA. ALD-E also feature short circuit protection, compact size, high reliability and very high efficiency 95% (typical).

2. Features

2-1. ALD-E Series

- LED Driver Current up to 1400mA
- Constant Current Output
- High Efficiency up to 95%
- Continuous Short Circuit Protection
- Digital Dimming Interface meets IEC 62386
- Digital Dimming Range 1-100%
- High Reliability
- IP65



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3. Technical Specifications For ALD-E Series

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

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input Voltage		ALD-E140	11	36	40	V _{dc}
		Others	11	36	50	
Operating Temperature	see derating curve	All	-40		+80	°C
Storage Temperature		All	-55		+125	°C
Temperature Coefficient	Tc=0°C to 50°C	All			±0.05	%/°C

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Operating Voltage Range		ALD-E140	11	36	40	V _{dc}
		Others	11	36	50	
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All		8.1		V _{dc}
Turn-Off Voltage Threshold		All		6.9		V _{dc}
Input Surge Voltage	1 second	All			50	V _{dc}

OUTPUT CHARACTERISTIC

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Operating Voltage	V _{in} =Nominal V _{in} , I _o =I _{o_max} Tc=25°C	ALD-E035	8		45	V _{dc}
		ALD-E050	8		45	
		ALD-E070	8		45	
		ALD-E100	8		45	
		ALD-E140	8		36	
Output Rated Current	V _{in} =Nominal V _{in} , Full Load Tc=25°C	ALD-E035		350		mA
		ALD-E050		500		
		ALD-E070		700		
		ALD-E100		1050		
		ALD-E140		1400		
Output Rated Power	V _{in} =50V _{dc} , V _o =8-45V _{dc} I _o =I _{o_max} .	ALD-E035			15.75	W
		ALD-E050			22.5	
		ALD-E070			31.50	
		ALD-E100			47.25	
	V _{in} =40V _{dc} , V _o =8-36V _{dc} I _o =I _{o_max} .	ALD-E140			50.4	
Output Constant Current Accuracy	3V<V _{in} -V _{out} <20V _{dc} to keep current accuracy	All			±5	%
Current Load Regulation	measured from high line to low operating	All			±5	%
Current Line Regulation	measured from high line to low line	All		±5		%



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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Ripple and Noise						
Peak-to-Peak	$V_{in}=36V_{dc}$, $V_o=33V_{dc}$, 20MHz bandwidth 0.1uF ceramic with 100% output current	ALD-E035			300	mV
		Others			500	
Start-Up Time	V_{in} =Nominal, Full Load	All			150	ms
Digital Dimming Control	Output Current Range (Hybrid Dimming)	All	1		100	%

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
100% Load		All		95		%

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		All	40		700	KHz
Operating Humidity		All	10		95	%
Operating Altitude		All			3000	m
MTBF	Ambient temperature is 25 °C per MIL-HDBK-217F	All		700		K hours
Weight		All		24		grams
Shock/Vibration	MIL-STD-810F					



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4. Main Features and Functions

4.1 Operating Temperature Range

The highly efficient design of ALD-E series module has resulted in their ability to operate within ambient temperature environments from -40°C to 80°C. The derating curve was drawn from the ALD-E module.

4.2 Short Protection

The ALD-E Series provide fully continuous short-circuit protection. The unit will auto recover until the short circuit is removed.

5. Safety and Emissions

- CE
- EMI EN55015 Class B
- EMS EN61547, EN61000-4-2, 3, 4, 6, 8

6. Applications

6.1 Power De-Rating Curves

The operating temperature range of ALD-E series is -40°C to 80°C. The maximum ambient temperature under any operating condition should not exceed 80°C. The following chart is the derating curve of ALD-E series.

■ ALD-E Series Power De-Rating Curves

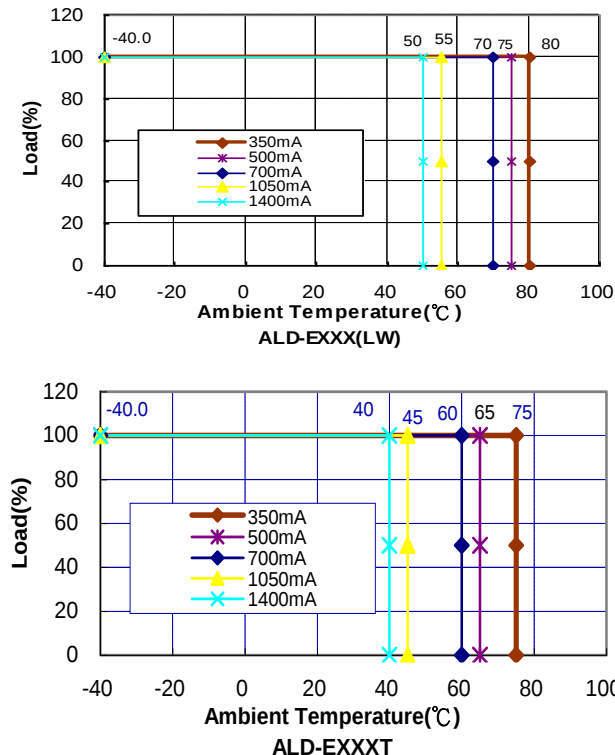


Figure 1. Typical Output power of ALD-E

6.2 Test Set-Up

The basic test set-up to measure parameters such as efficiency, line regulation and load regulation is shown in Figure 2

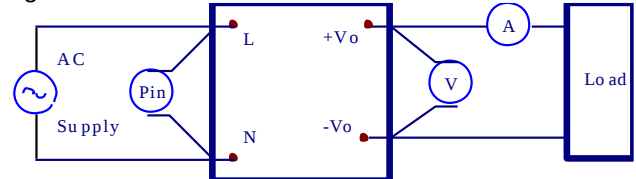


Figure 2. ALD-E Series Test Set up

- 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:

$$Load.reg = \frac{I_{high} - I_{low}}{I_{low}} \times 100\%$$

Where: I_{high} is the high output current of nominal input voltage

I_{low} is the low output current of nominal 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.



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6.3 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 3. Measured method: 20MHz band width 0.1uF ceramic with 100% output current for ALD-E series.

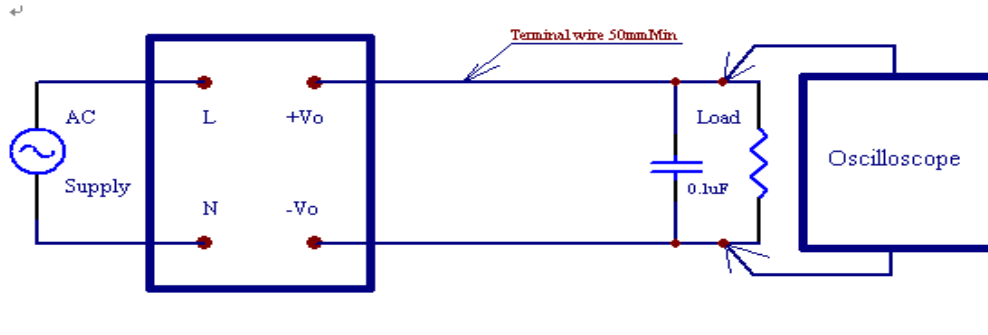


Figure 3. Output Voltage Ripple and Noise Measurement Set-Up

6.4 Dimming Control Output Installation Drawing

■ ALD-E Series

Digital Dimming Application

Installation Drawing

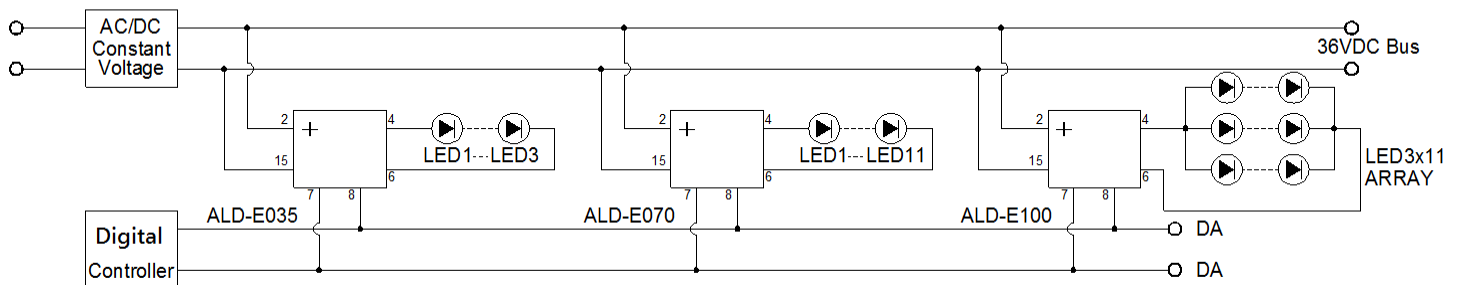


Figure 4 Installation Drawing

7. Part Number

ALD-XXXX XX

Series Name

Blank: pin version
LW: wire version
T: terminals version

E 035: Output Current 350mA
E 050: Output Current 500mA
E 070: Output Current 700mA
E 100: Output Current 1050mA
E 140: Output Current 1400mA



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8. Mechanical Outline Diagrams

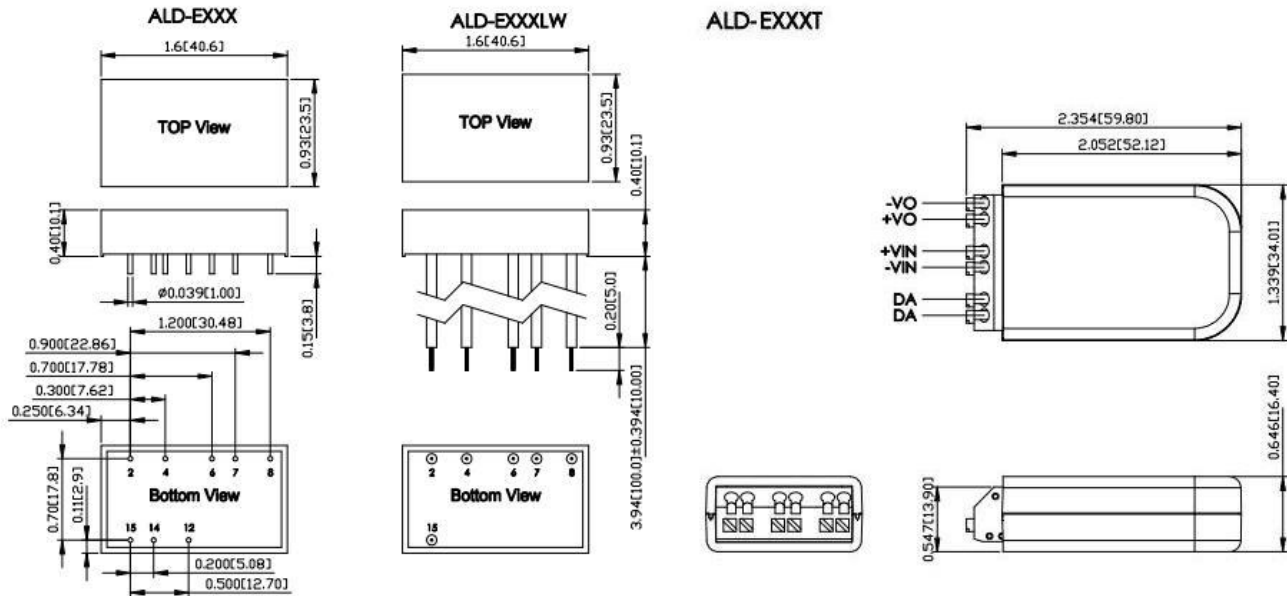
8.1 ALD-E Mechanical Outline Diagrams

NOTE: Pin Size is 0.039" Inch (1.00mm) DIA $\pm$ 0.05

All Dimensions In Inches[mm]

Tolerance Inches: x.xx= $\pm$ 0.02, x.xxx= $\pm$ 0.010

Millimeters: x.x= $\pm$ 0.5, x.xx= $\pm$ 0.25



ALD CONNECTION		
Function	ALD-EXXX	ALD-EXXXLW
+V Input	2	2 (Red)
+V Output	4	4 (Yellow)
-V Output	6	6 (Blue)
DA	7	7 (Brown)
DA	8	8 (Brown)
Analogue Dimming	12	NC
PWM DIM	14	NC
-V Input	15	15 (Black)

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