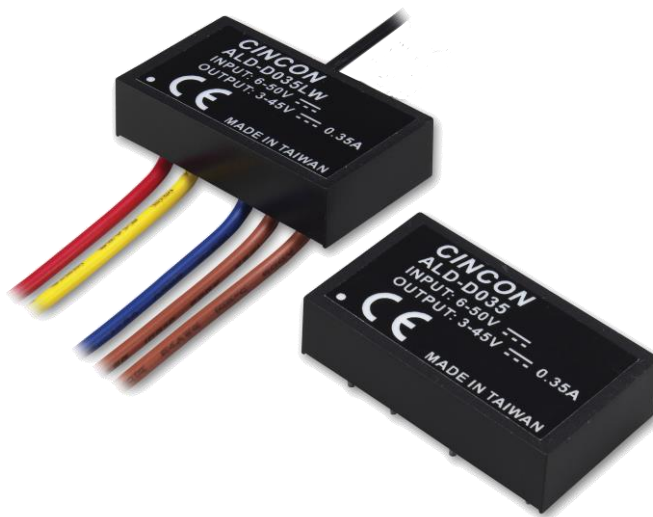




ALD-D SERIES DC-DC LED DRIVER

Application Note V11 November 2022

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



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1. Introduction

ALD-D series is a constant current DC-DC LED driver, Digital dimming with single output. For example tube light, panel light, down light, Hi-bay, flood light and street light. ALD-D provides output current 350mA, 700mA, 1050mA and 1400mA. ALD-D also feature short circuit protection, compact size, high reliability and very high efficiency 95% (typical).

2. Features

- LED Driver Current up to 1400mA
- Constant Current Output
- High Efficiency up to 95%
- Continuous Short Circuit Protection
- DIP24 package
- High Reliability
- IP67



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3. Technical Specifications For ALD-D 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-D140	6	28	40	V _{dc}
		Others	6	48	50	
Operating Temperature	see derating curve	All	-40		+85	°C
Storage Temperature		All	-55		+125	°C
Temperature Coefficient	T _c =0°C to 50°C	All			±0.05	%/°C

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Operating Voltage Range		ALD-D140	6	28	40	V _{dc}
		Others	6	48	50	
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All		4.2		V _{dc}
Turn-Off Voltage Threshold		All		3.8		V _{dc}
Input Surge Voltage	1 second	ALD-D140			50	V _{dc}
		Others			60	

OUTPUT CHARACTERISTIC

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Operating Voltage	V _{in} =Nominal V _{in} , I _o =I _{o_max} T _c =25°C	ALD-D035	3		45	V _{dc}
		ALD-D070	3		45	
		ALD-D100	3		45	
		ALD-D140	3		36	
Output Rated Current	V _{in} =Nominal V _{in} , Full Load T _c =25°C	ALD-D035		350		mA
		ALD-D070		700		
		ALD-D100		1050		
		ALD-D140		1400		
Output Rated Power	V _{in} =50Vdc, V _o =3-45Vdc I _o =I _{o_max} .	ALD-D035			15.75	W
		ALD-D070			31.50	
	ALD-D100			47.25		
	ALD-D140			50.4		
Output Constant Current Accuracy	3V<V _{in} -V _{out} <30V _{dc} to keep current accuracy	All			±5	%
Current Load Regulation	measured from high line to low operating voltage	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	$V_{in}=48V_{dc}$, $V_o=36V_{dc}$, 20MHz bandwidth 0.1uF ceramic with 100% output current	ALD-D035			300	mV
		ALD-D070 ALD-D100			500	
	$V_{in}=28V_{dc}$, $V_o=24V_{dc}$, 20MHz bandwidth 0.1uF ceramic with 100% output current	ALD-D140			500	
Start-Up Time	V_{in} =Nominal, Full Load	All			60	ms
Digital Dimming Control	Output Current Range	All	5		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		500		KHz
Operating Humidity		All	10		95	%
Operating Altitude		All			3000	m
Vibration	2G 60min./1cycle, period for 3hours, 3 axes	All	10		500	Hz
Shock	half sine, 6 axes	All			30	g
MTBF	Ambient temperature is 25°C per MIL-HDBK-217F	All		700		K hours
Weight		All		23		grams



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4. Main Features and Functions

4.1 Operating Temperature Range

The highly efficient design of ALD-D series module has resulted in their ability to operate within ambient temperature environments from -40°C to 85°C. The derating curve was drawn from the ALD-D module.

4.2 Short Protection

The ALD-D 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-D series is -40°C to 85°C. The maximum ambient temperature under any operating condition should not exceed 85°C. The following chart is the derating curve of ALD-D series.

ALD-D Series Power De-Rating Curves

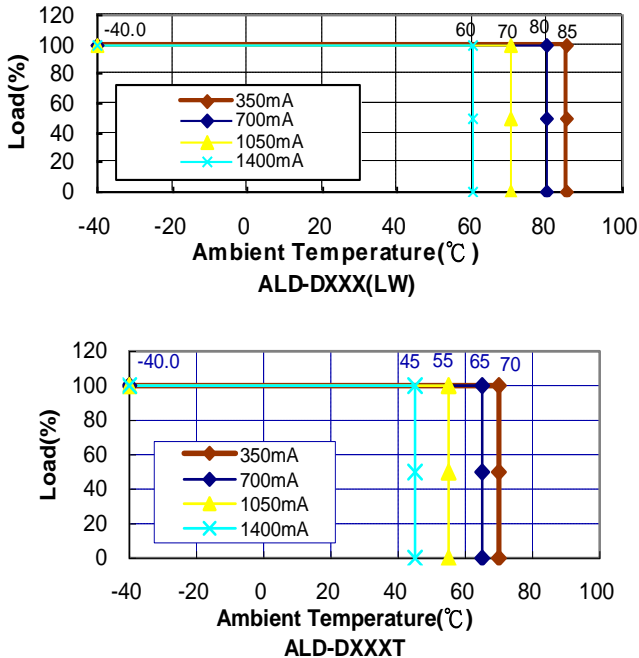


Figure 1. Typical Output power of ALD-DXXX(LW)& ALD-DXXX(T)

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.

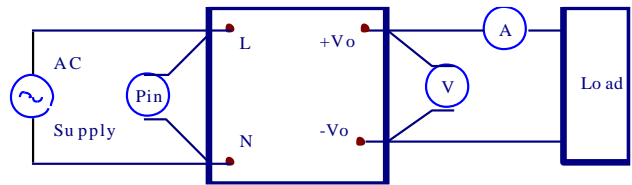


Figure 2. ALD-D Series Test Setup

- 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.

6.3 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 4. Measured method: 20MHz band width 0.1uF ceramic with 100% output current for ALD-D Series

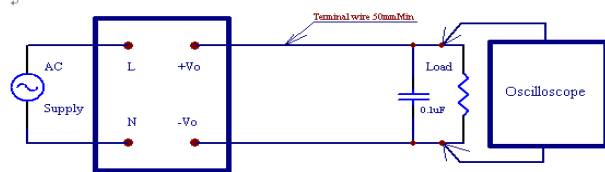


Figure 3. Output Voltage Ripple and Noise Measurement Set-Up



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6.4 Dimming Control Output Installation Drawing

■ ALD-D Series

Digital Dimming Lighting Application

Installation Drawing

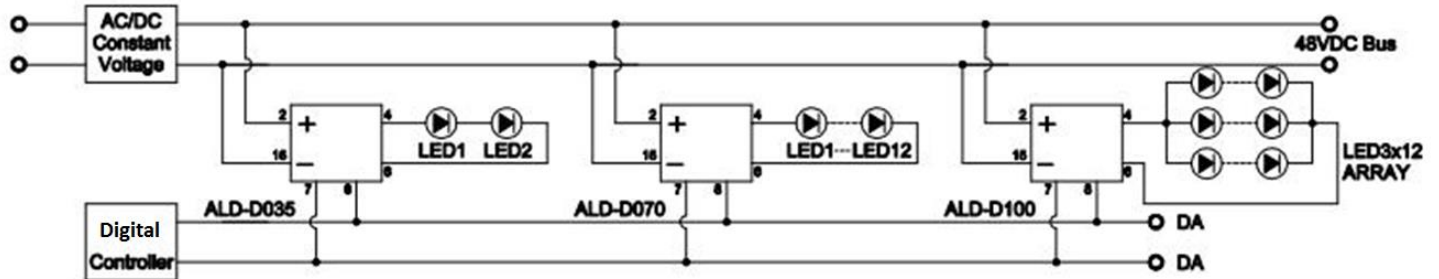
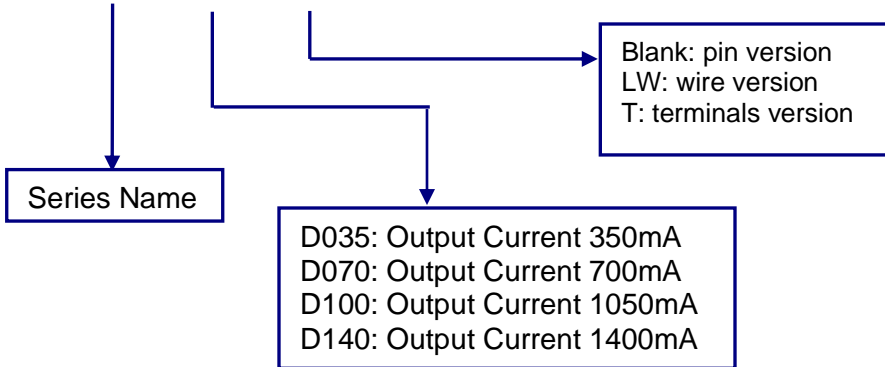


Figure 4 Installation Drawing

7. Part Number

ALD-XXX XX





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8. Mechanical Outline Diagrams

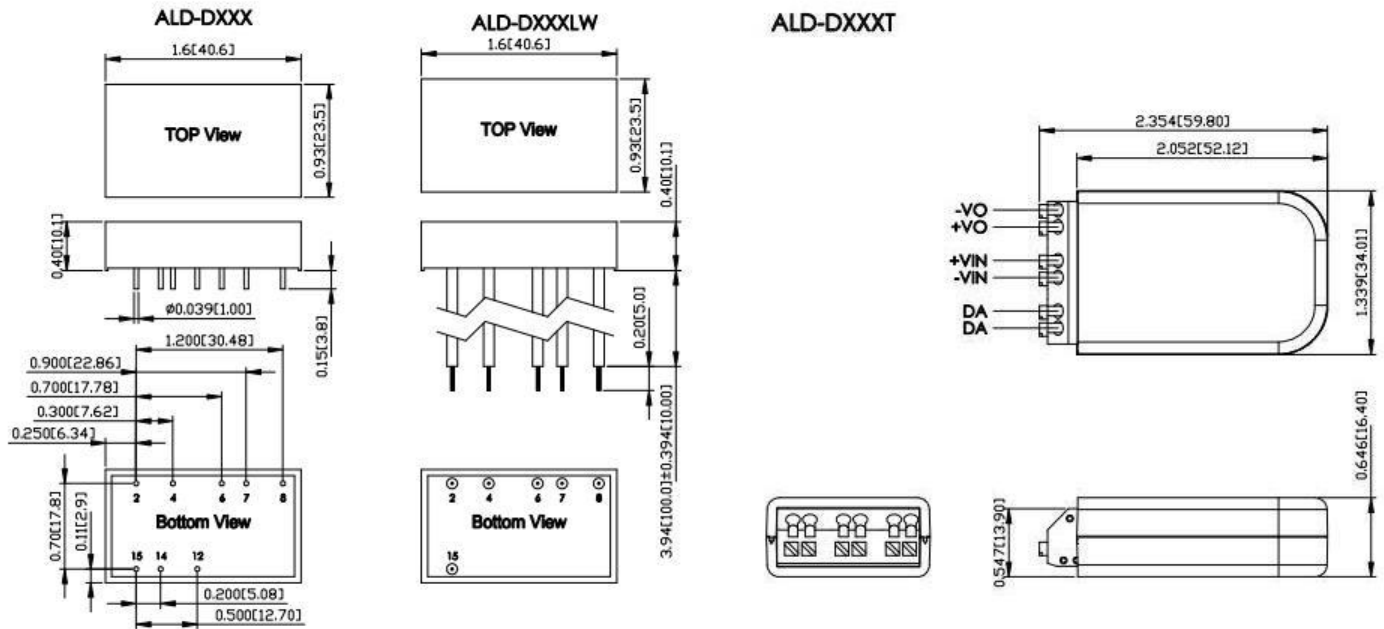
8.1 ALD-D Mechanical Outline Diagrams

NOTE: Pin Size is 0.020" Inch (0.5mm) DIA±0.05

All Dimensions in Inches[mm]

Tolerance Inches: x.xx=±0.02, x.xxx=±0.010

Millimeters: x.x=±0.5, x.xx=±0.25



ALD CONNECTION		
Function	ALD-DXXX	ALD-DXXXLW
+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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