

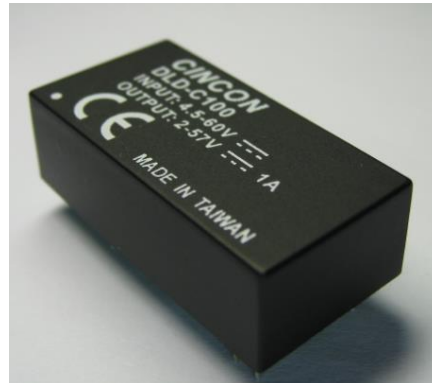


DLD SERIES DC-DC LED DRIVER

Application Note V12 March 2022

DC-DC LED DRIVER WITH DIMMING INTERFACE MODULE DLD Series

DLD



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1. Introduction

DLD series is a constant current LED DC-DC driver which is suitable for tube light, panel light, down light, etc. When you look for single output model, DLD series provides output current 350mA, 700mA, 1000mA and 1400mA. DLD also features short circuit protection, compact size, high reliability and very high efficiency 96% (typical).

2. Features

2-1. DLD Series

- LED Driver Current up to 1400mA
- Constant Current Output
- Digital PWM Dimming
- Analog Dimming Control
- High Efficiency up to 96%
- Continuous Short Circuit Protection
- DIP16 package and Wired Version
- High Reliability
- IP67 Protection



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3. Technical Specifications For DLD 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		DLD-C140	10	28	36	V _{dc}
		Others	4.5	48	60	
Operating Temperature	see derating curve	All	-40		+85	°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		DLD-C140	10	28	36	V _{dc}
		Others	4.5	48	60	
Input Under Voltage Lockout						
Turn-On Voltage Threshold		DLD-C140		8.0		V _{dc}
		Others		4.0		
Turn-Off Voltage Threshold		DLD-C140		6.9		V _{dc}
		Others		3.7		
Input Surge Voltage	1 second	DLD-C140			50	V _{dc}
		Others			65	

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	DLD-C035	2		57	V _{dc}
		DLD-C070	2		57	
		DLD-C100	2		57	
		DLD-C140	8		33	
Output Rated Current	V _{in} =Nominal V _{in} , Full Load Tc=25°C	DLD-C035		350		mA
		DLD-C070		700		
		DLD-C100		1000		
		DLD-C140		1400		
Output Rated Power	V _{in} =Nominal V _{in} , V _o =2-57Vdc I _o =I _{o,max}	DLD-C035			20	W
		DLD-C070			40	
	V _{in} =Nominal V _{in} , V _o =8-33Vdc I _o =I _{o,max}	DLD-C100			57	
		DLD-C140			46.2	
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	%
Output Voltage Ripple and Noise						
Peak-to-Peak	36V _{dc} V _o =XXV _{dc} , 20MHz bandwidth 0.1uF ceramic with 100% output current	DLD-C035			300	mV
		DLD-C070 DLD-C100			500	
	24V _{dc} V _o =XXV _{dc} , 20MHz bandwidth 0.1uF ceramic with 100% output current	DLD-C140			500	



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Start-Up Time	Vin=Nominal, Full Load	All			60	ms
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EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
100% Load		All		96		%

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		DLD-C140	50	500		KHz
		Others		300		
Operating Humidity		All	10		95	%
Operating Altitude		All			3000	m
Vibration	2G 60min./1cycle, period for 3hours, 3 axis	All	10		500	Hz
Shock	half sine, 6 axes, 11ms, each axis 3 times	All			30	g
MTBF	Ambient temperature is 25 °C per MIL-HDBK-217F	All		TBD		M hours
Weight		All		18		grams

PWM Dimming SPECIFICATIONS (Leave Open if not Use)

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input Voltage Range	TTL logic compatibility	All		5		V _{dc}
Threshold Voltage		All				
Module On		All		1.75		V _{dc}
Module Off		All		0.5		V _{dc}
Switching Frequency		All			1	KHz
Output Current Range		All	10		100	%
Minimum On Time		All		100		ns

Analogue Dimming SPECIFICATIONS (Leave Open if not Use)

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Control Voltage Range		DLD-C140	1		5	V _{dc}
		Others	1.25		5	V _{dc}
Analogue Pin Drive Current		All			0.4	mA



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4. Main Features and Functions

4.1 Operating Temperature Range

The highly efficient design of DLD 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 DLD module.

4.2 Short Protection

The DLD 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

6. Applications

6.1 Power De-Rating Curves

The operating temperature range of DLD 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 DLD series.

■ DLD Series Power De-Rating Curves

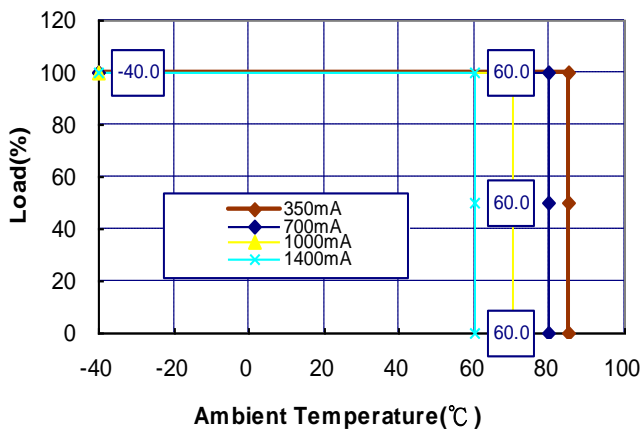


Figure 1. Typical Output power of DLD

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.

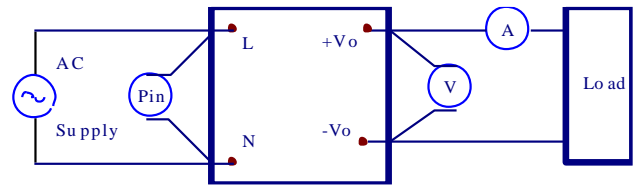


Figure 2. DLD Series Test Setup

- 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 3. Measured method: 20MHz band width 0.1uF ceramic with 100% output current for DLD Series

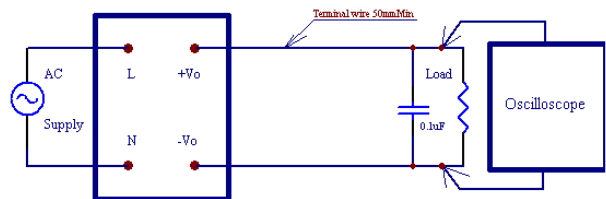


Figure 3. Output Voltage Ripple and Noise Measurement Set-Up



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6.4 Dimming Control Output Installation Drawing

■ DLD Series

Lighting Application

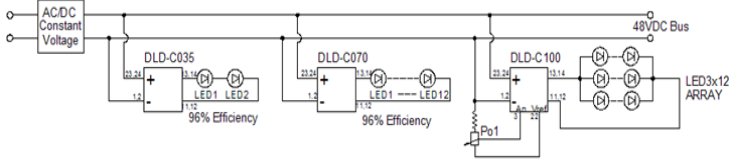


Figure 4 Installation Drawing

Lighting Wall Application

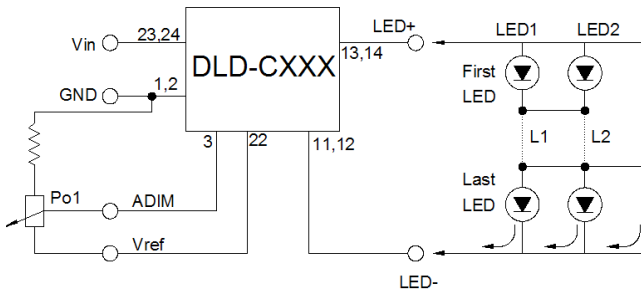


Figure 5 Installation Drawing

Dimming Controlled by Analog Voltage

Dimming Controlled by Analog Voltage

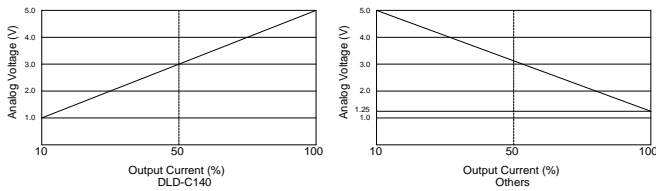
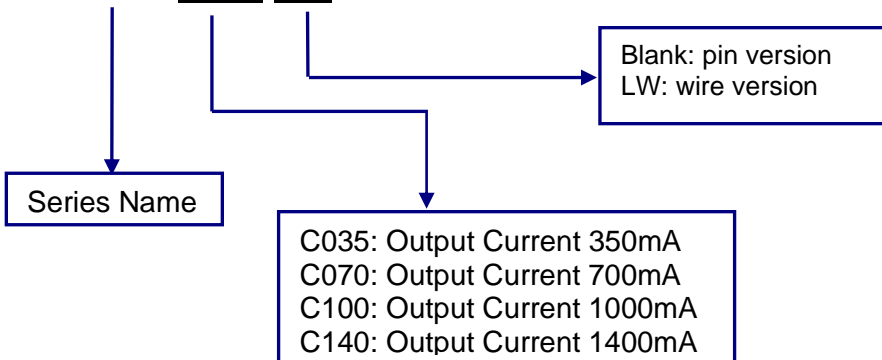


Figure 6 Installation Drawing

7. Part Number

DLD-XXX XX





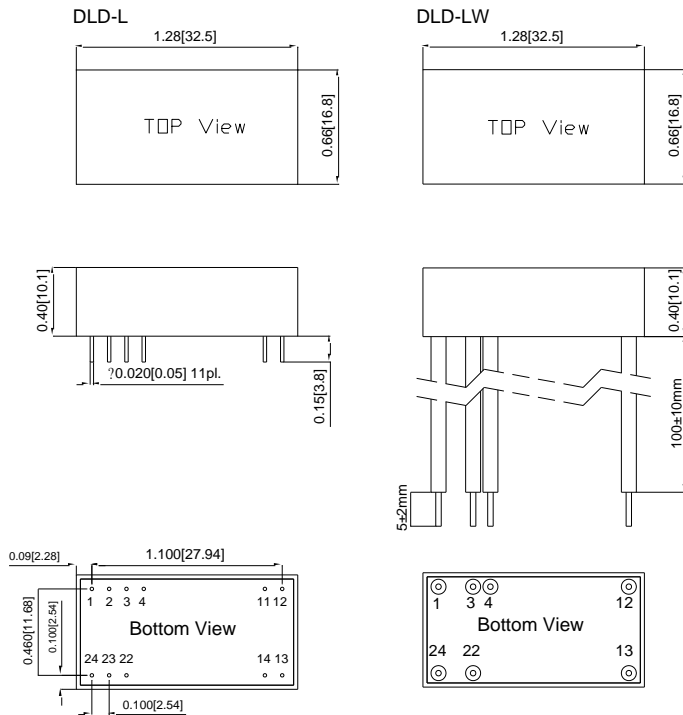
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8. Mechanical Outline Diagrams

8.1 DLD 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



DLD Connections		
DLD-CXXX	DLD-CXXXLW	Function
1&2	1(Black)	-V Input
3	3(White)	Analogue DIMming
4	4(Green)	PWM/ON/OFF
11&12	12(Blue)	-V Output
13&14	13(Yellow)	+V Output
22	22(Brown)	Vref/NP
23&24	24(Red)	+V Input

NP: No Pin for DLD-C140

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