Descriptions

DC/DC Converter



CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- High efficiency up to 97%
- Ultra wide input voltage range (6-36 VDC)
- Output current stability (±1%)
- Drive current: 300/350/700/1000/1200 mA
- Continuous short-circuit protection
- PWM / Analogue Dimming
- Remote On/Off, continuous short-circuit protection
- Operating ambient temperature range: -40℃ to 85℃

Applications

- backlight and automobile 12V, 24V lighting, landscape lighting, commercial lighting, street lighting, family lighting

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Nominal half load Typ./Max.input full load Typ.(%)	Capacitive Load (μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA)		
EN/ BA EN	DNKCD0.3-U24	24 (6-36)	3.3-33	300	93/97	1000
--	DNKCD0.35-U24			350	93/96	
	DNKCD0.7-U24			700	93/96	
	DNKCD1-U24			1000	94/96	
	DNKCD1.2-U24			1200	95/96	

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage Limit	<10 seconds		0	--	38	VDC
	Input-output Voltage Drop			2	3	--	
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
Output Specifications	Output Power	DNKCD0.3-U24, Io=300mA		--	--	9.9	W
		DNKCD0.35-U24, Io=350mA		--	--	11.6	
		DNKCD0.7-U24, Io=700mA		--	--	23.1	
		DNKCD1-U24, Io=1000mA		--	--	33.0	
		DNKCD1.2-U24, Io=1200mA		--	--	39.6	
	Current Accuracy	Vin=36V, 1-10 LEDs		--	±2	±5	%
	Current Stability	Vin=36V, 1-10 LEDs		--	--	±1	
	Temperature Coefficient	DNKCD0.3/0.35/0.7-U24	-40℃ to +85℃	--	--	±0.05	
		DNKCD1/1.2-U24	-40℃ to +85℃	--	--	±0.03	
	Ripple & Noise*	Vin=36V, 1-10 LEDs	DNKCD0.3/0.35/0.7-U24	--	45	100	mVp-p
			DNKCD1/1.2-U24	--	70	200	
	Internal power consumption	Vin=24V, 5 LEDs		--	--	1.2	W
	Short-circuit Protection			Continuous, self-recovery			
General Specifications	Operating Temperature	DNKCD0.3/0.35/0.7/1/1.2-U24		-40	--	85	℃
	Storage Temperature			-55	--	125	
	Switching Frequency	DNKCD0.3/0.35/0.7-U24		--	600	--	kHz
		DNKCD1/1.2-U24		--	300	--	
	MTBF	MIL-HDBK-217F@25℃		1000	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)					
	Dimensions	DNKCD0.3/0.35/0.7-U24		22.80 x 10.20 x 9.00mm			
		DNKCD1/1.2-U24		31.70 x 20.30 x 12.65mm			
	Weight	DNKCD0.3/0.35/0.7-U24		4.2g(Typ.)			
		DNKCD1/1.2-U24		14.5g(Typ.)			
	Cooling Method	Free air convection					

Notes: *The "Tip and barrel" method is used for ripple and noise test.

PWM Dimming

Remote On/Off	Off	Pulled low (0 < Vc < 0.75VDC)			
	On	Open or pulled high (> 5VDC)			
PWM dimming frequency		--	--	200	Hz
Turn-off-mode Static Input Current	Vin=24V, Vc<0.6V	--	400	--	μA

Analogue Dimming

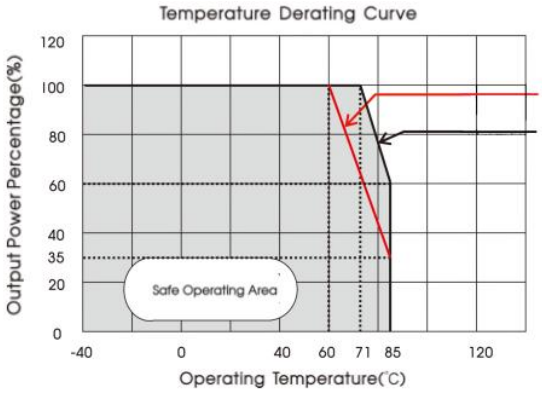
Input voltage range	Vin=6-36V	0-15V
Output current range	Vin=6-36V	0%-100%

Control Voltage Range	On	0.75V ± 50mV
	Off	4.7V ± 200mV

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 8-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig. 8-② for recommended circuit)	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±4kV	perf. Criteria B
	RS	IEC/EN 61000-4-3 10V/m	perf. Criteria B
	EFT	IEC/EN 61000-4-4 ±1kV (see Fig. 8-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN 61000-4-5 ±1kV (see Fig. 8-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN 61000-4-6 3Vr.m.s	perf. Criteria B

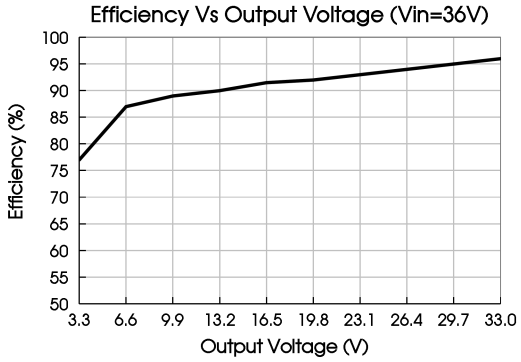
Characteristic Curve



DNKCD0.7-U24

DNKCD0.3/0.35/1/1.2-U24

Fig. 1



DNKCD1.2-U24

Design Reference

1. Input and output

Table 1 input and output

Input voltage	Output Voltage range
36 VDC	2.8-33.0 VDC
24 VDC	2.8-18.0 VDC
6 VDC	2.8-3.3 VDC

2. Typical application circuit

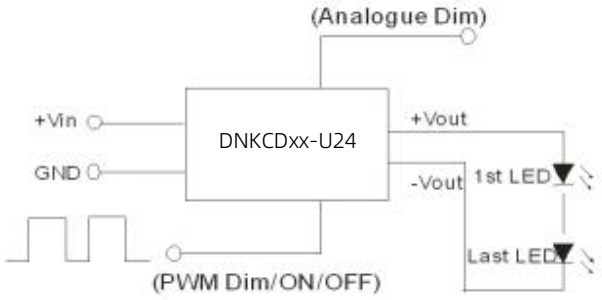


Fig. 2 Series application

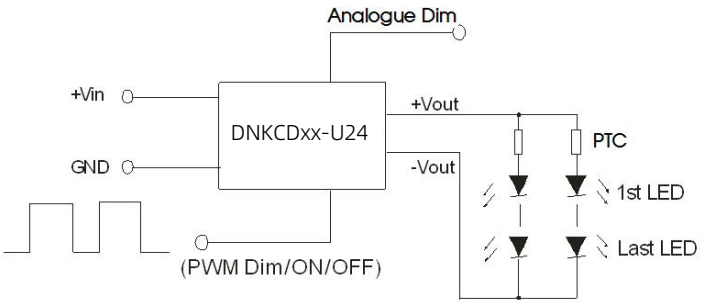


Fig. 3 Parallel application

In actual use, if need to protect the LED, please add a PTC with a positive temperature coefficient in front of each branch as shown in Figure 3.

Note: The -Vout cannot be grounded, otherwise the product will be damaged.

3. PWM Dimming

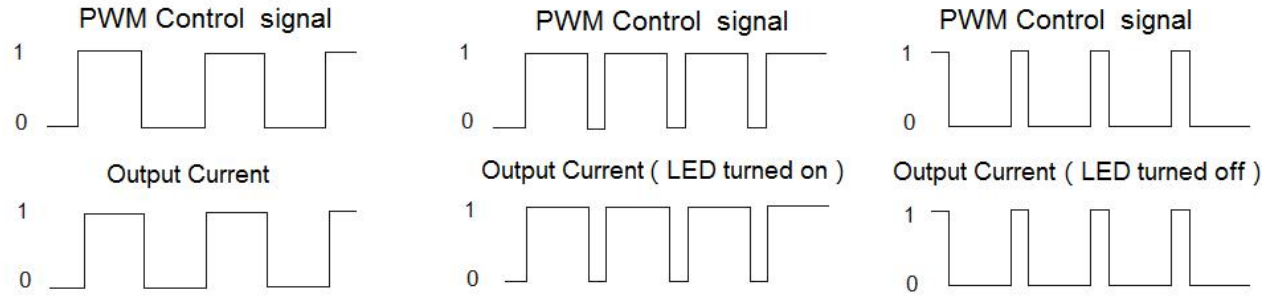


Fig. 4 PWM Dimming control

For PWM dimming of a certain frequency, the output current of the driver is proportional to the duty cycle of the PWM signal, and the brightness of the LED can be adjusted by controlling the duty cycle of the PWM signal.

PWM Dimming positive logic application circuit diagram

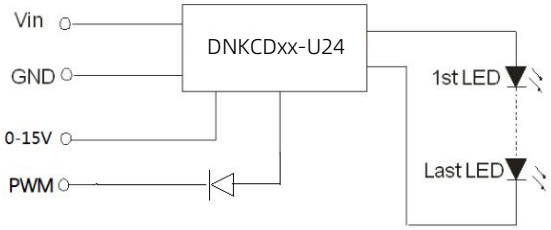


Fig. 5 PWM Dimming control circuit diagram

For PWM dimming at a certain frequency, the output current of the driver is proportional to the duty cycle of the PWM signal, please refer to the following formula for the calculation:

$$I_{o_set} = (D - 0.02) \cdot I_{o_norm}$$

Io_set: the desired output current value (mA)

D: the duty cycle of the PWM signal (%)

T: the period of the PWM signal (ms)

Io_norm: the rated output value of the driver (mA).

Note: The above formula is for reference only, and the output current may vary due to different loads. The minimum on-time of the PWM signal cannot be less than 0.75ms, otherwise the product will not work normally. It is normal to hear a slight sound from the driver during

PWM dimming, because the PWM dimming frequency is within the auditory frequency range of the human ear (usually 20Hz-20KHz). In order to prevent the human eyes from observing the flicker of the LED, it is recommended to set the PWM dimming frequency above 200Hz. PWM voltage shall be free of spikes.

PWM voltage needs to be free of spikes.

4. Analogue Dimming and typical applications

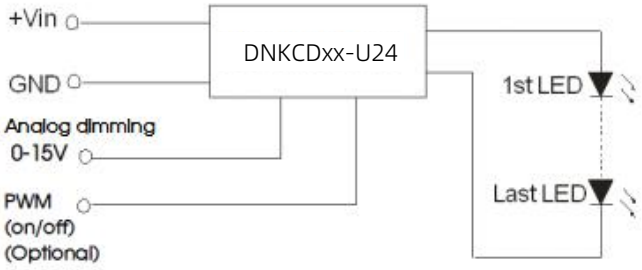


Fig. 6 Analogue Dimming circuit diagram

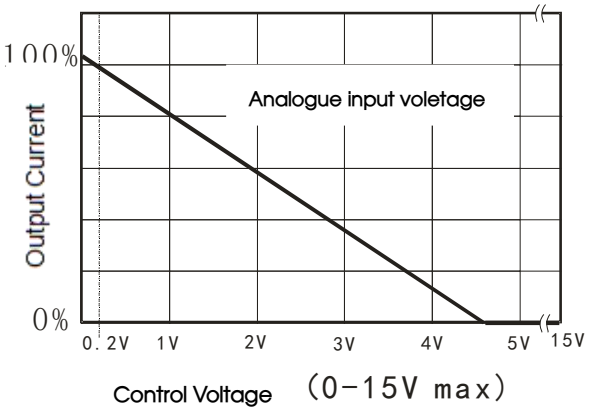
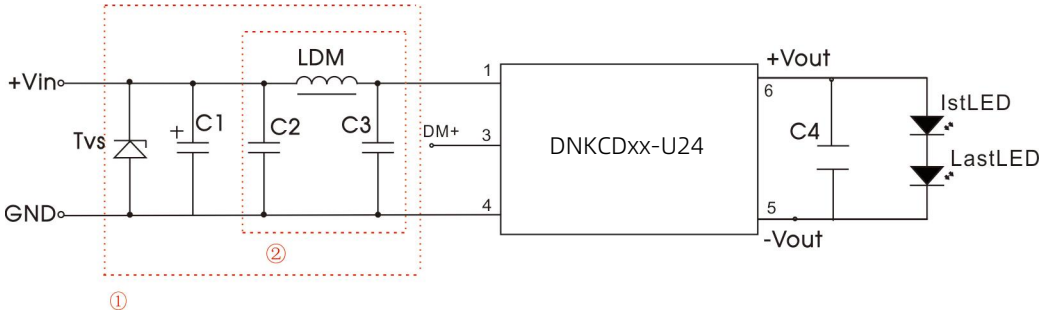
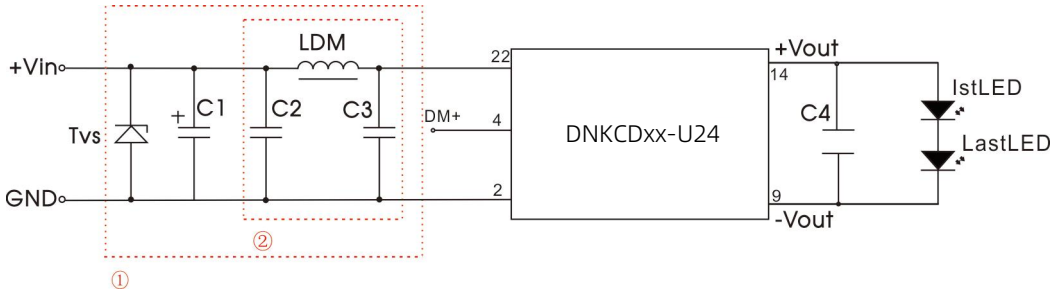


Fig. 7 Analogue input voltage and output current

5. EMC solution-recommended circuit



DNKCD0.3/0.35/0.7-U24



DNKCD1/1.2-U24

Fig. 8 EMC recommended circuit

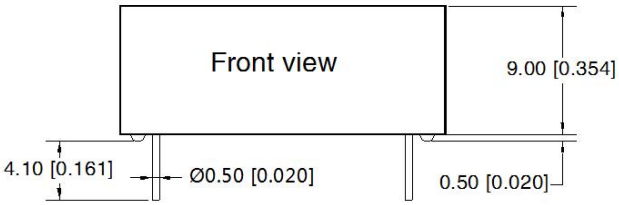
Table. 2 EMC components list

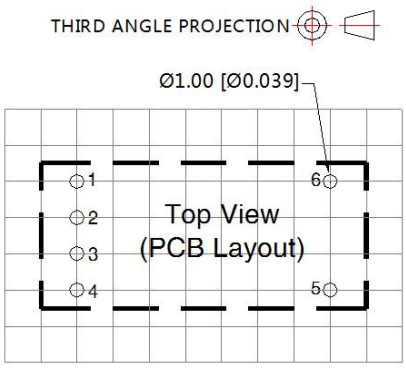
Components	Specification
Tvs	SMC51A, 1500W (GOODARK)
LDM	CD53-82μH (CEAIYA)
C1	1000μF /63V (NCC)
C2	2.2μF /50V 1210 X7R (TORCH)
C3	0.1μF /50V 0805 X7R (TORCH)
C4	1μF /50V 1210 X7R (TORCH)

6. The rated voltage drop of all LED in this technical manual is 2.8-3.3V. In practical application, the number of LED can be determined according to the actual voltage drop and output voltage of LED

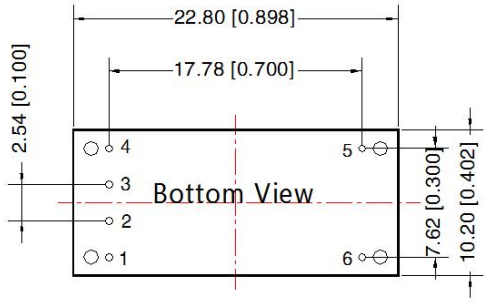
7. The product does not support hot swap

Dimensions and Recommended Layout





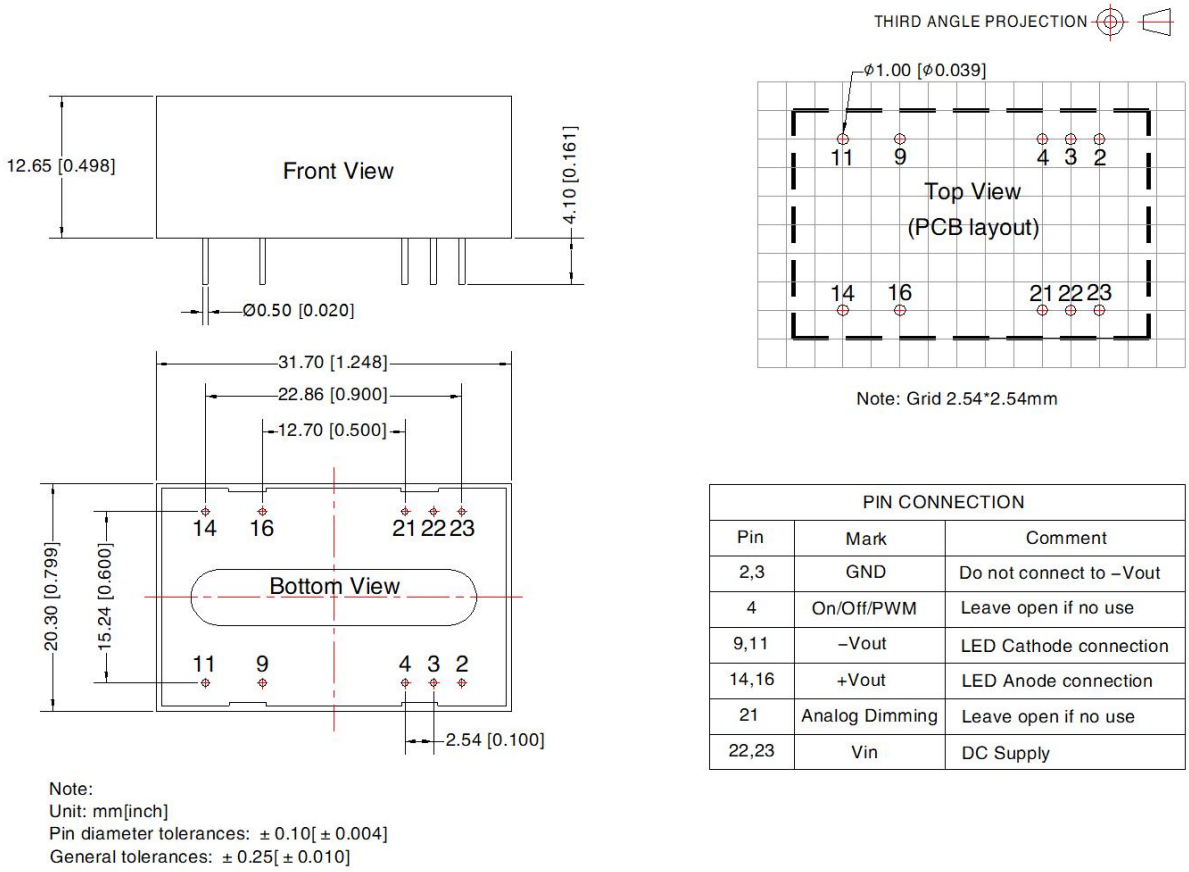
Note: Grid 2.54*2.54mm



Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]

PIN CONNECTION		
Pin	Mark	Comment
1	Vin	DC Supply
2	Analog dimming	Leave open if not use
3	On/Off/PWM	Leave open if not use
4	GND	Do not connect to –Vout
5	–Vout	LED Cathode connection
6	+Vout	LED Anode connection

DNKCD0.3/0.35/0.7-U24



PIN CONNECTION		
Pin	Mark	Comment
2,3	GND	Do not connect to –Vout
4	On/Off/PWM	Leave open if no use
9,11	–Vout	LED Cathode connection
14,16	+Vout	LED Anode connection
21	Analog Dimming	Leave open if no use
22,23	Vin	DC Supply

Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]

DNKCD1/1.2-U24

Notes:

1. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
2. All index testing methods in this datasheet are based on our company corporate standards;
3. Products are related to laws and regulations: see "Features" and "EMC";
4. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.