
LED Backlight
Power Supply Substrate

KSLBC-3

Instruction Manual
(Second Edition)

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■ Installation Precautions

This section covers the precautions when installing the KSLBC-3 (LED backlight power supply substrate).

Static Electricity Precautions

- As CMOS-IC is used in the device, take proper measures to deal with static electricity when handling.
- Consider grounding for workers handling the device. For example, the use of an anti-static wrist strap/mat is recommended.

Handling Precautions

- When connecting the LED backlight, be careful of the polarity (anode, cathode).
- When connecting the power, also be careful of the polarity.
- Always power off before removing and inserting connectors.
- Check the LCD data sheet (lifespan of the backlight LED with forward current, etc.), and use the appropriate settings.

■ Warranty and Disclaimer

Warranty

- From a manufacturing standpoint, in order to warrant the functionality and reliability of the Product, Kenic System (the “Company”) may issue a delivery specification to the purchaser of the Product (the “Customer”). The warranty covers the items outlined in the delivery specification.
- Any modifications to the Product by the Customer will not be covered by the warranty.

Disclaimer

The Customer agrees that the Company shall not be held liable for accidents and damages caused by the Product under the following circumstances.

- Use of the Product in conditions not specified in this instruction manual (the “Manual”).
- Breakdown or damage to the Product caused by third-party products not approved and provided by the Company.
- Maintenance and repair work using parts not approved by the Company.
- The Customer did not follow the precautions or operating instructions as set forth in the Manual.
- Use of the Product in situations where the power source, installation environment, and other conditions are beyond the specifications as outlined in the Manual.
- Accidents and damages caused by natural disasters such as fires, earthquakes, floods, and lightning storms.

※Component specifications and external appearance may change without notice. However, if previously agreed to installation dimensions and electrical interface need to be changed due to unforeseen circumstances, the Company will contact the Customer to resolve the issue.

■ Outline and Feature of Product

1. Option (sold separately)

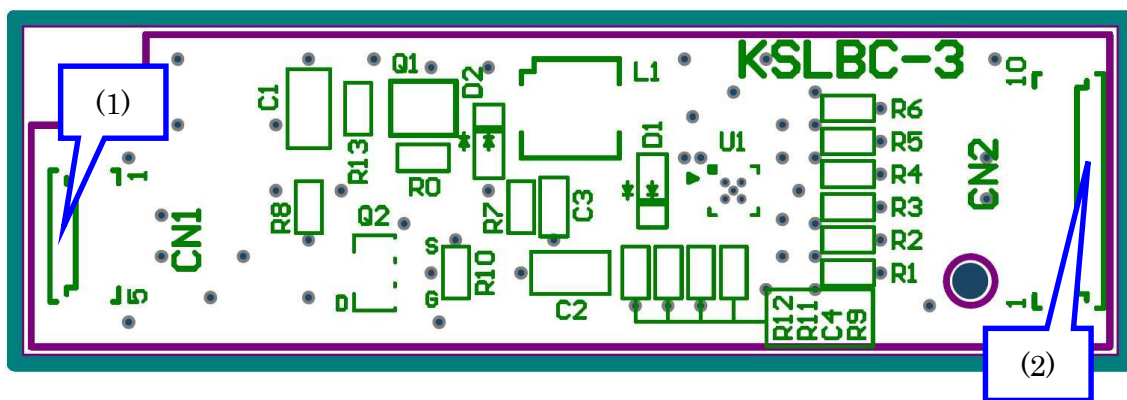
Power supply cable (model number: KSLBC-3-5CB)

For CN1

LED backlight connection cable (model number: KSLBC-3-10CB)

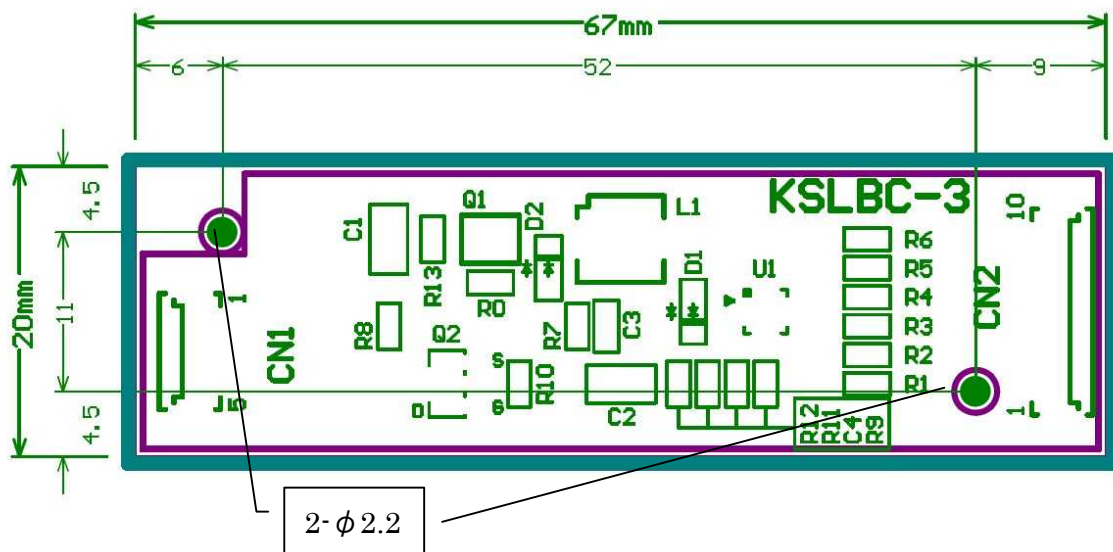
For CN2

2. Name and Function for the Circuit Board Connectors and Substrate Dimensional Drawing



(1) CN1 Connector for power and signal input

(2) CN2 Connector for LED backlight



KSLBC-3 Substrate Dimensional Drawing

- Substrate height : 4.4mm(MAX)
Substrate thick : 1.0mm
Embarkation parts height : 3.4mm (MAX) CN1, 2

3. Intended Purpose of Product

KSLBC-3 is a LED backlight power supply substrate for LED backlight LCD.

It is possible to use for LED backlight up to 6 strings

And, it is possible to control brightness using the PWM signal.

Please refer to the following block diagram.

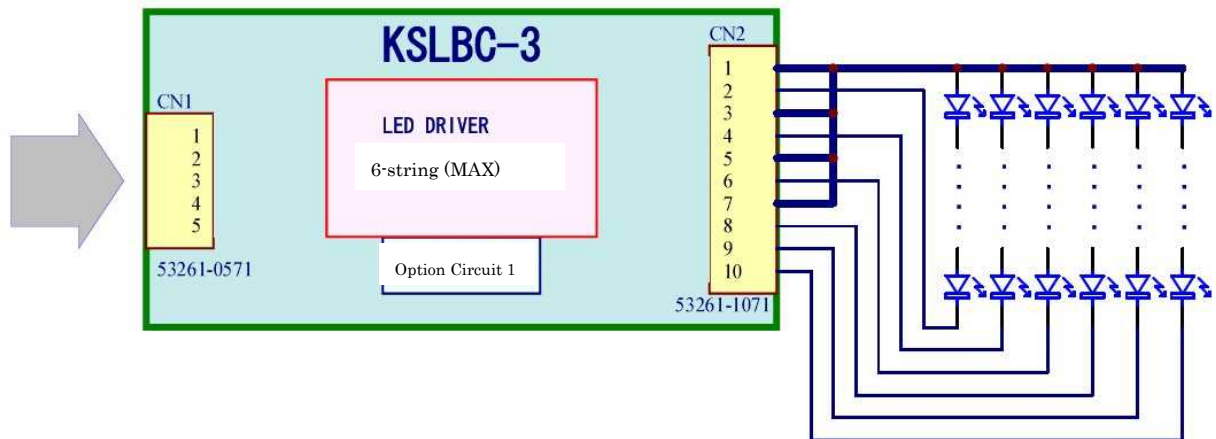
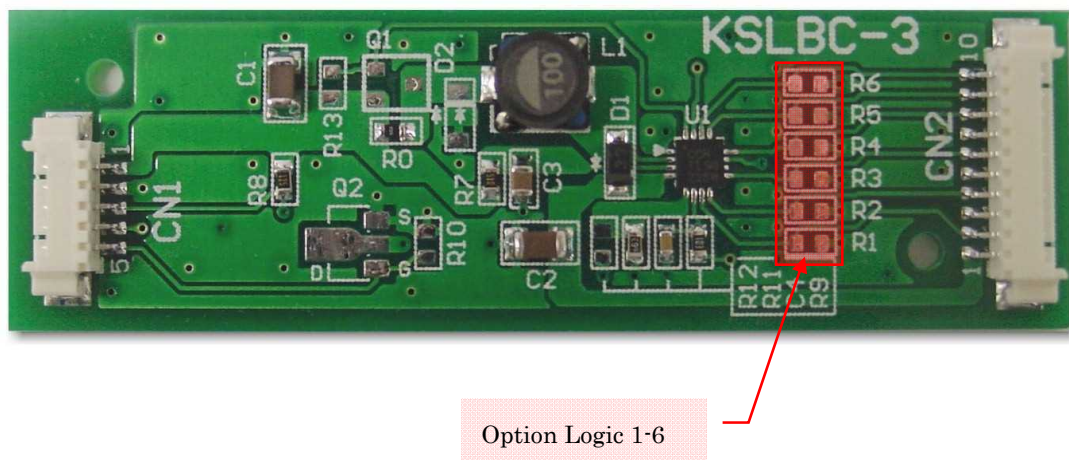


Diagram 1 Block diagram



For details etc. about option circuit, described in “Application Information”.

4. Main Features

- Simultaneous lighting and modulation of up to 6-string LEDs are possible.
- By mounting Option Circuit 1 resistors, it becomes possible to connect 6 strings or less.
(Option Circuit 1: not usually mounted)
- As the device is equipped with a built-in overvoltage protection function, damage to the device is prevented even if the LED is cutoff.
- Since an output ON/OFF function is installed, it is possible to control ON/OFF for the LED backlight by the Host-CPU I/O port.
- Since a brightness control function is installed, it is possible to control the LED backlight brightness by PWM output of the Host-CPU.
- Compact and lightweight, the Product dimensions are 67mm × 20mm.

■ Basic Specifications (SPEC)

1. Absolute Maximum Ratings

Item	Sign	Standard	Units	Notes
Input voltage	LEDVC C	-0.3~14.0	V	CN1-No.1 pin
	Vin	-0.3~7.0	V	CN1-No.3, 4 pin
Output voltage	Vout	-0.3~40.0	V	
Output current	Iout	25.0	mA	About 1 string
Operating temperature limit	TA	-20~75	°C	
Storage temperature limit		-40~85	°C	

2. Recommended Operating Conditions

CN1-1,2 LEDVCC,LEDGND

Item	Sign	Standard	Units	Condition
Input voltage	LEDVC C	4.7~13.0	V	
Input current	Icc	893 *1	mA	TA=25°C, LEDVCC=5V, Iout=115.8mA (6-string total)
		304		TA=25°C, LEDVCC=12V, Iout=115.8mA (6-string total)

*1: When a high output current is used, there is a risk of the connector overheating when operated with an input voltage of LEDVCC: 5V. Operate using LEDVCC: 12V whenever possible.

CN1-3 EN

Item	Sign	Standard	Units	Condition
Input voltage	ENVin	1.2~6.0	V	TA=25°C

CN1-4 PWM

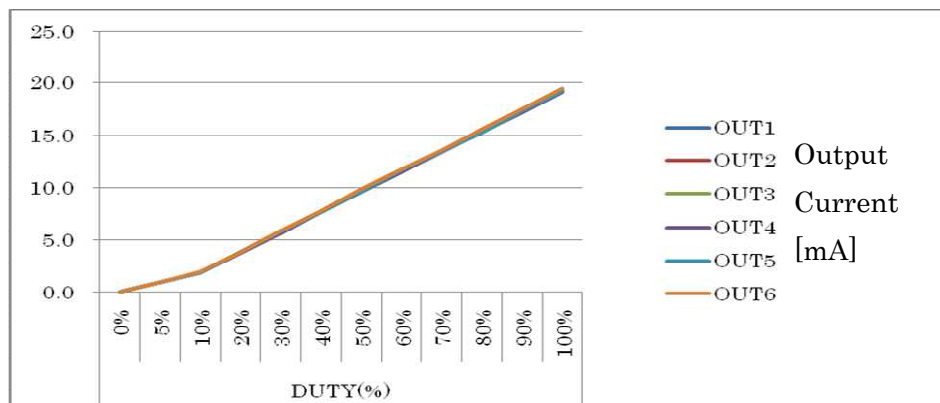
Item	Sign	Standard	Units	Condition
Input voltage	PWMVin	1.2~5.5	V	TA=25°C
Input frequency	PWMin	0.1~1.0	kHz	TA=25°C

CN2 Output

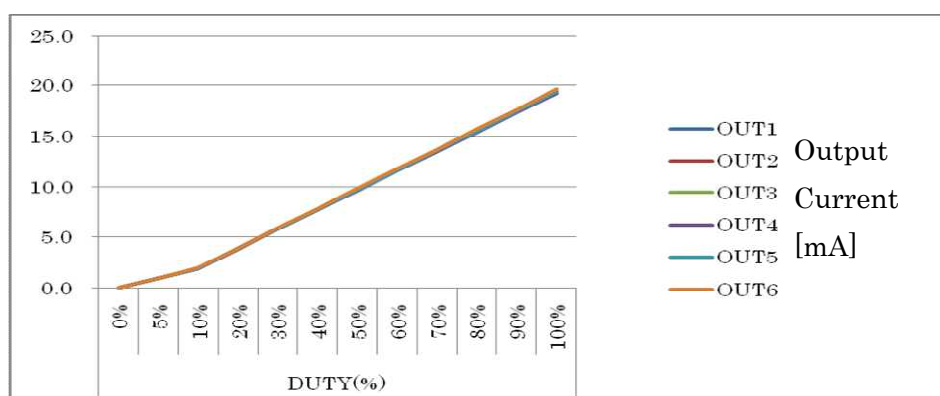
Item	Sign	Standard	Units	Condition
Output voltage	Vout	Vcc~38.0	V	TA=25°C
Output current	Iout	0~18.07	mA	About 1 string

3. Electrical Characteristics

● PWM-Output current characteristics

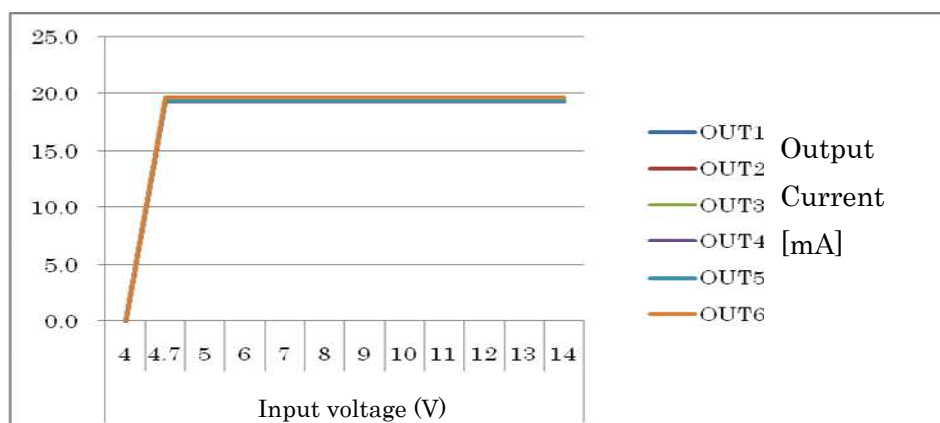


LEDVCC: 5V PWM: 1KHz Setting current: 19.3mA



LEDVCC: 12V PWM: 1KHz Setting current: 19.3mA

● Input voltage (LEDVCC)-Output current characteristics



PWM: 1KHz (Duty:100%) Setting current: 19.3mA

4. About Output Current (Brightness Control)

- The maximum output current per string is decided by the value of resistor R11.

$$I_{outn} = 1000 \times (1.229 / R11)$$

【Example】 R11: at 68K Ω (factory setting)

$$I_{outn} = 1000 \times (1.229 / 68000)$$

$$= 18.07\text{mA}$$

- It is possible to change the maximum current by changing the resistor connected to R11. However, set the implementable R11 resistor value to within the following limits.

$$1.229 / R11 = 15 \times 10^{-6} \leq 25 \times 10^{-6}$$

$$R11 = 1.229 / (15 \times 10^{-6} \leq 25 \times 10^{-6})$$

$$R11 = (49.2 \times 10^3 \leq 81.9 \times 10^3)$$

Accurate setting of the current is not possible if the value deviates from the above limits.

- Detailed setting of the output current can be performed by the PWM signal that inputs to the No. 4 pin (CN1).

When the No. 4 pin (CN1) has no connection, maximum brightness is achieved.

PWM ON Duty 100[%] = maximum brightness

PWM ON Duty 0[%] = minimum brightness

5. CN1 Signal Table for Power and Signal Input Connectors

Pin number	Name of signal	Function
1	LEDVCC	Pin for power. Power supply pin.
2	LEDGND	Pin for power. Ground connection pin.
3	EN	This is the backlight ON/OFF signal.(H:ON, L:OFF) Pull-up to VCC at 1.2M Ω is already set within the board (R8).
4	PWM	This is the brightness control signal for the backlight. PWM signal input (100%: Max. brightness 0%: Min. brightness) Pull-up to internal power supply (3.15V) at 10K Ω is already set within the board (R9).
5	IOGND	Connection to LEDGND within the board (at R10).

Connector used: 53261-0571 (Molex)

Compatible connector: 51021-0500 (Molex)

6. CN2 Signal Table for LED Backlight Connector

Pin number	Name of signal	Function
1	COM1+	Connection to anode side of LED (common anode)
2	LED1-	Connection to cathode side of LED1
3	COM2+	Connection to anode side of LED (common anode)
4	LED2-	Connection to cathode side of LED2
5	COM3+	Connection to anode side of LED (common anode)
6	LED3-	Connection to cathode side of LED3
7	COM4+	Connection to anode side of LED (common anode)
8	LED4-	Connection to cathode side of LED4
9	LED5-	Connection to cathode side of LED5
10	LED6-	Connection to cathode side of LED6

Connector used: 53261-1071 (Molex)

Compatible connector: 51021-1000 (Molex)

Pin number 1, 3, 5, 7 of CN2 (COMn+) are connected all in the KSLBC-3 substrate.

Connect by common anode for connecting LED.

■ Application Information

7. Connection Example and Reference Circuit Diagram

- Standard connection example

Diagram 3 is a standard connection example for KSLBC-3.

The current value below is when the resistor value is at the normal factory setting (R11: 68K Ω).

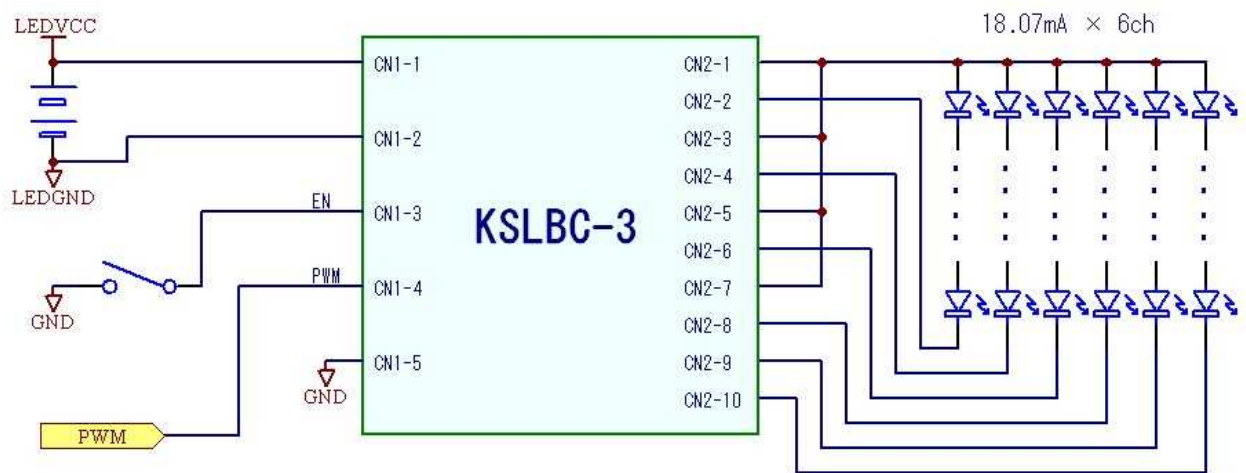


Diagram 3 Entire connection diagram

- **Connection example when using connections of under 6 strings (4 strings)**

Diagram 4 is a connection example when using connections of under 6 strings.
(Example shows 4 strings.)

Option Circuit 1 is used.

The current value below is when the resistor value is at the normal factory setting
(R11: 68K Ω).

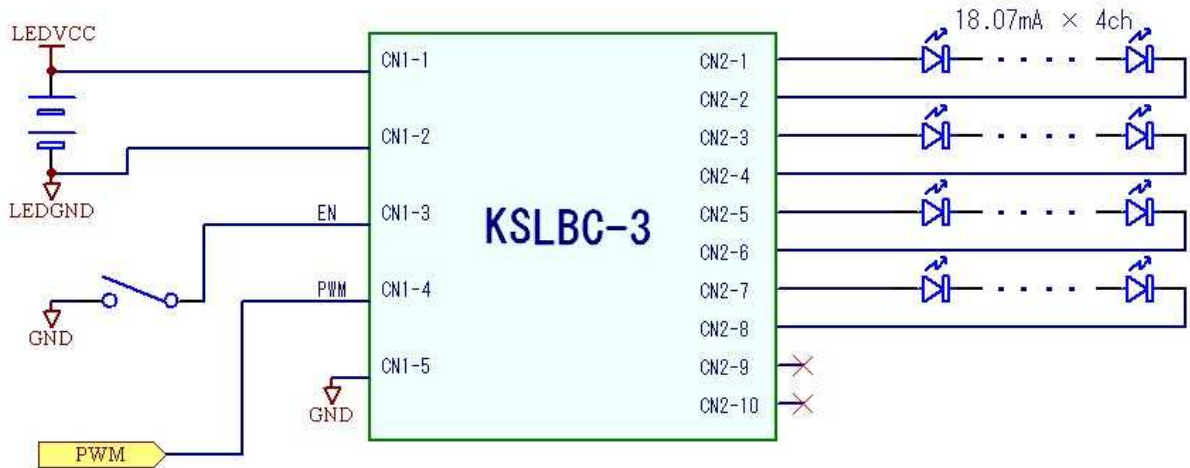


Diagram 4 4-channel connection example

- When using under 6 strings, you need to mount R1~R6 of Option Circuit 1 (0 Ω) which are compatible with unused output pins.
- The relation between each output and Option Circuit 1 is as below.

Mount resistors (0 Ω) which are compatible with unused output.

Output1 (CN2-2): R1

Output2 (CN2-4): R2

Output3 (CN2-6): R3

Output4 (CN2-8): R4

Output5 (CN2-9): R5

Output6 (CN2-10): R6

We recommend 1608 size 0 Ω chip resistors.

- In case of Diagram 4 connection, mount R5, R6.

【Available LCD Example】

- KCG062HVLAK-G000 (Kyocera 6.2 inch HVGA)
- TCG075VGLAE-G00 (Kyocera 7.5 inch VGA)
- NL6448BC18-01F (NEC 5.7 inch VGA)

- **Connection example when passing a current up to 2 times the setting**

Diagram 5 is a connection example when passing a current up to 2 times the setting.

The current value below is when the resistor value is at the normal factory setting (R11: 68K Ω).

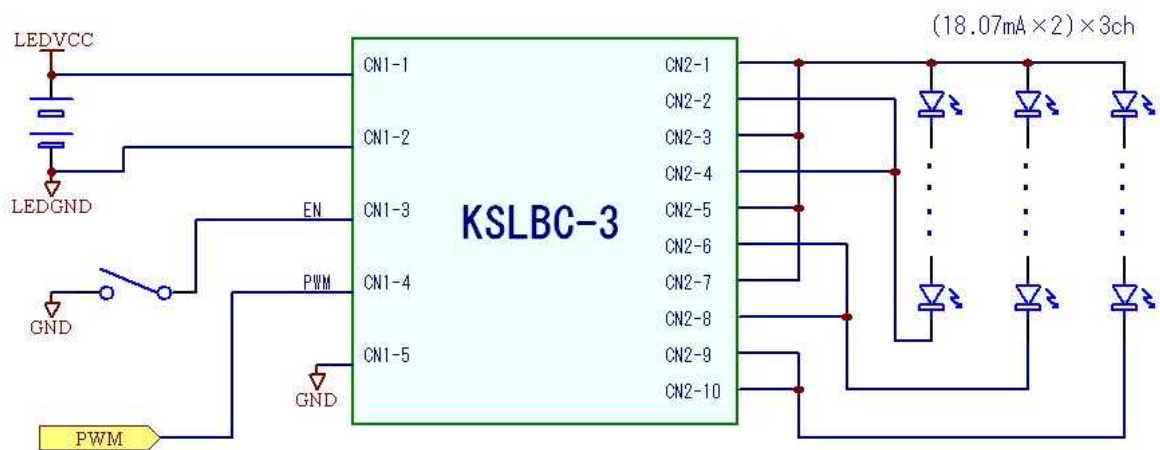


Diagram 5 Connection example when passing a current up to 2 times the setting

- By shorting the pin on the cathode side of CN2, it is possible to pass a current up to 2 times the setting to the connected LED.
- For the above Diagram 5, it is possible to pass a maximum current of 36.14mA to the connected LED.
- However, the number of connectable strings is 3.

【Available LCD Example】

- NL6448BC33-70 (NEC 10.4inch VGA)

- **Connection example when passing a current up to 3 times of the setting**

Diagram 6 is an example of connection in case of passing a current up to 3 times the setting.

The current value below is when the resistor value is at the normal factory setting (R11: 68K Ω).

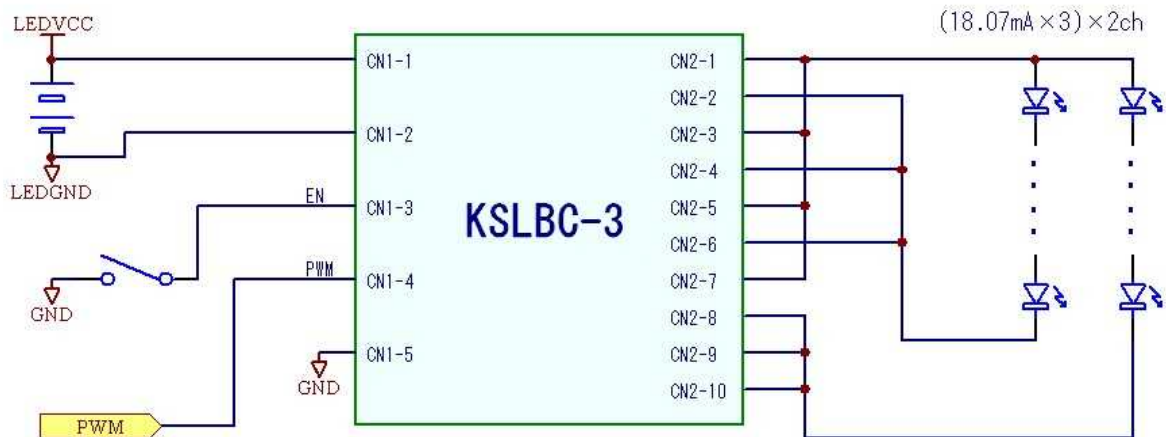


Diagram 6 Connection example when passing a current up to 3 times the setting

- By shorting the pin on the cathode side of CN2, it is possible to pass a current up to 3 times the setting to the connected LED.
- For the above Diagram 6, it is possible to pass a maximum current of 54.21mA to the connected LED.
- However, the number of connectable strings is 2.

【Available LCD Example】

- TCG057QVLCS-H50 (Kyocera 5.7inch QVGA)
- TCG085WVLCB-G00 (Kyocera 8.5inch WVGA)

8. Product Technical Documentation about the Product

Technical information about the Product is continually updated and posted on the Kenic system website. Please feel free to browse at the URL below.

<http://www.kenic.co.jp/w/>