

C Series Constant Current LED Driver Module



Technical Features

On-board current adjustment

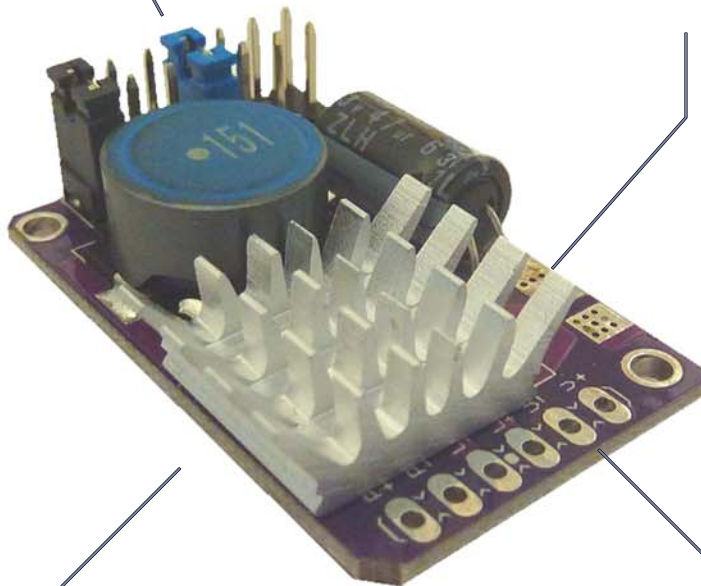
By changing the position of the blue jumper current can be selected as:

350mA, 700mA, 1000mA or 1400mA.

NO NEED TO KEEP STOCK OF EACH DRIVER

Over temperature protection

If the temperature of the integrated circuit reaches a certain value, output current is automatically decreased to ensure reliable operation.



Widest input voltage range in industry

The circuit can operate on 4.5 - 60V DC.
(See the voltage table)

Highest efficiency on the market

If the input and output voltages are close to each other efficiency is higher than 90%.

When the input reverse polarity protection diode is bypassed, efficiency can reach up to 98% for certain conditions.

Voltage Table - Deciding on the minimum input voltage -

C Series LED driver is a buck type power circuit. The input voltage must be higher than the output voltage. As a general rule there should be a 3V margin between them. The minimum voltage level that should be applied can be seen in the table below.

As soon as the minimum voltage is exceeded there is no risk in applying higher voltages. To drive a single LED with a forward voltage of 2.8V, one can apply 6V, 12V, 24V, 48V or 60V to the input of the C Series LED driver.

The efficiency of the driver increases when the input and output voltages are closer to each other.

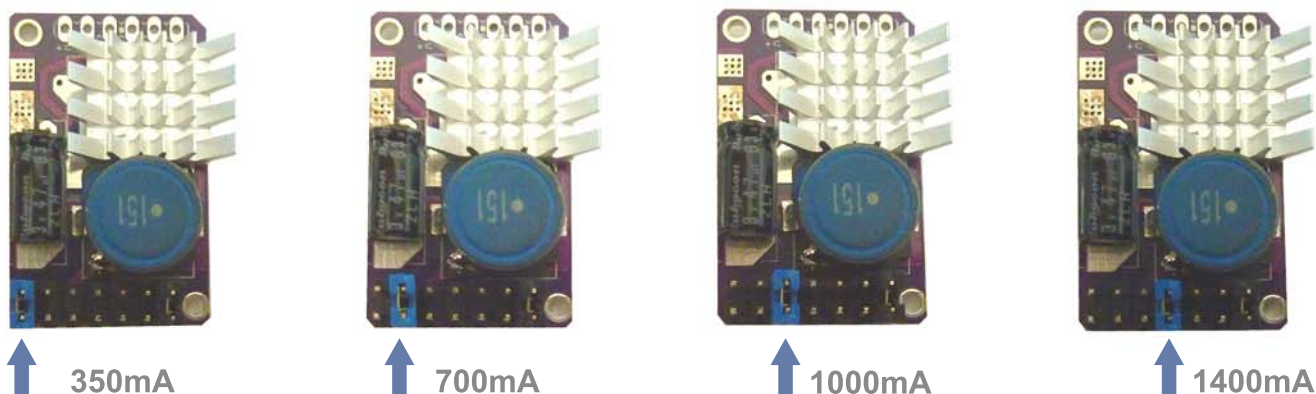
No of LEDs in series	Minimum voltage (350mA output)	Minimum voltage (700mA output)	Minimum voltage (1000mA output)	Minimum voltage (1400mA output)
1 LED	4.97 V	5.13 V	5.33 V	6.01 V
2 LEDs	6.93 V	7.84 V	8.11 V	8.85 V
3 LEDs	9.85 V	10.50 V	11.15 V	11.86 V
4 LEDs	12.46 V	13.30 V	13.95 V	14.80 V
5 LEDs	15.24 V	16.30 V	16.80 V	17.68 V
6 LEDs	18.03 V	19.01 V	19.81 V	20.80 V
7 LEDs	20.90 V	21.86 V	22.62 V	23.68 V
8 LEDs	23.49 V	24.55 V	25.34 V	26.43 V
9 LEDs	26.29 V	27.42 V	28.23 V	29.10 V
10 LEDs	28.99 V	30.14 V	31.01 V	32.08 V
11 LEDs	31.82 V	33.09 V	33.91 V	35.15 V
12 LEDs	34.50 V	35.73 V	36.69 V	37.93 V
13 LEDs	37.42 V	38.67 V	39.47 V	40.65 V
14 LEDs	40.12 V	41.45 V	42.32 V	43.68 V
15 LEDs	42.94 V	44.16 V	45.15 V	46.67 V
16 LEDs	45.53 V	47.05 V	48.17 V	49.49 V
17 LEDs	48.38 V	49.81 V	50.88 V	52.45 V
18 LEDs	51.28 V	52.74 V	53.84 V	55.48 V

LEDs used during tests has the following forward voltages:

$V_f = 2.75V @350mA$, $V_f = 2.83V @700mA$, $V_f = 2.87V @1000mA$, $V_f = 2.91V @1400mA$

Selecting the Output Current / Dimming Methods

C Series LED driver comes with 2 jumpers. The blue jumper is used to set the LED current.

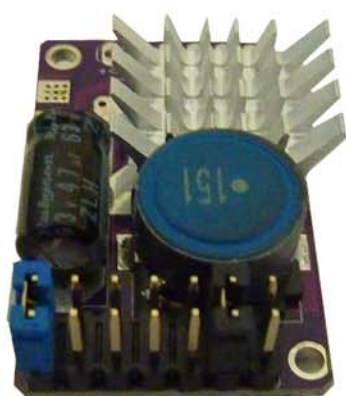


Selecting the Dimming Method and Dimboard

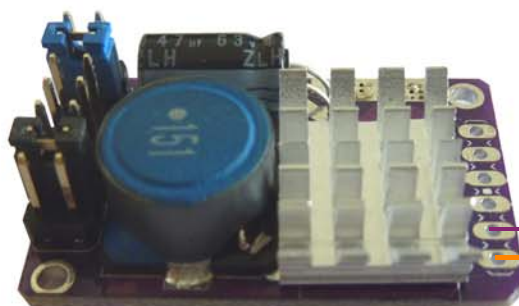
The LED current can be dimmed by 3 methods. The position of the black jumper varies with the type of dimming will be used.

1. Dimming with PWM signal

The black colored jumper must be in the second position to activate PWM. Then the LED current can be dimmed with an external 5V PWM signal.



2 nd position
PWM activated



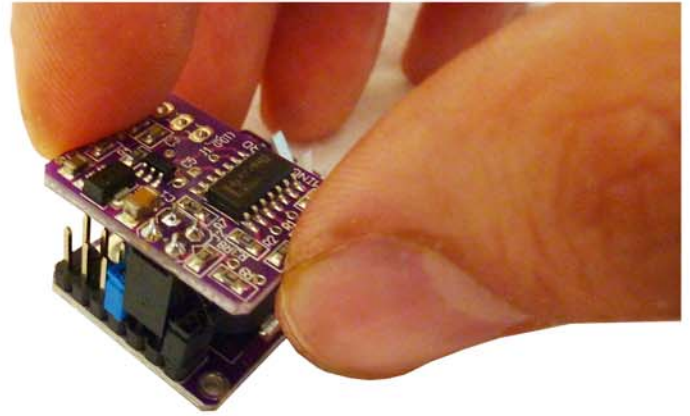
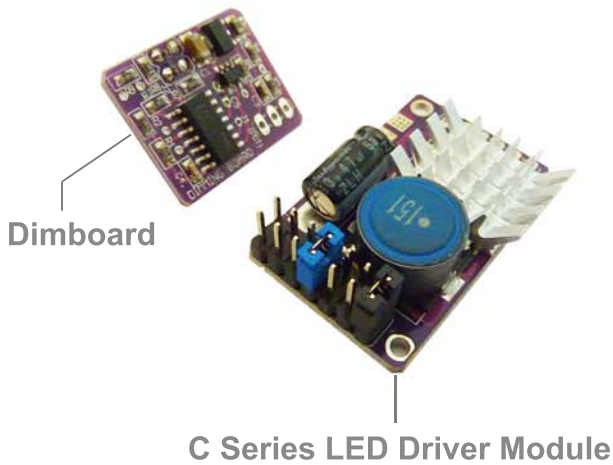
PWM -

PWM +

Dimming Methods

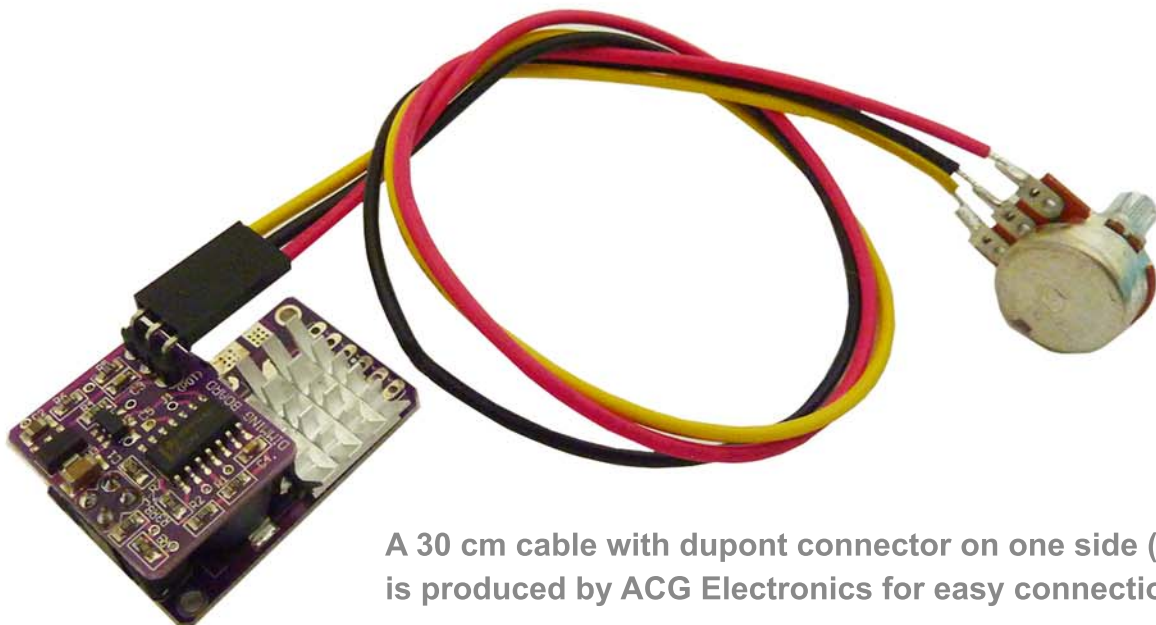
2. Dimming with potentiometer

An additional board (dimboard) is needed for potentiometer dimming. Dimboard comes with a female connector on it and can be directly inserted on the C Series driver as shown.



Black jumper must be in position 1 or removed.

Dimboard is energized by the C Series LED driver and at least 10V must be supplied to LED driver for the dimboard to function properly. A 10k ohm potentiometer must be connected to the dimboard to control the light output. Especially for higher LED currents, dimboard may generate a slight audible noise.



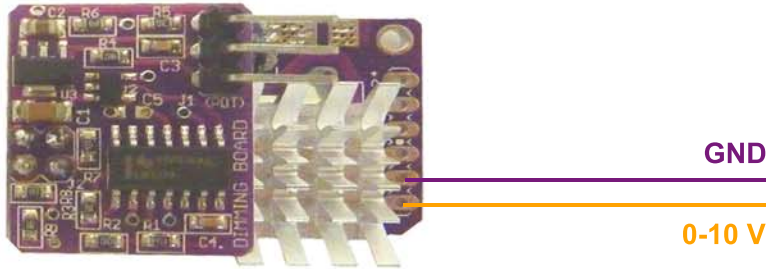
A 30 cm cable with dupont connector on one side (CON-C330) is produced by ACG Electronics for easy connection.

Dimming Methods / Dimensions

3. Dimming with 0-10V analog voltage

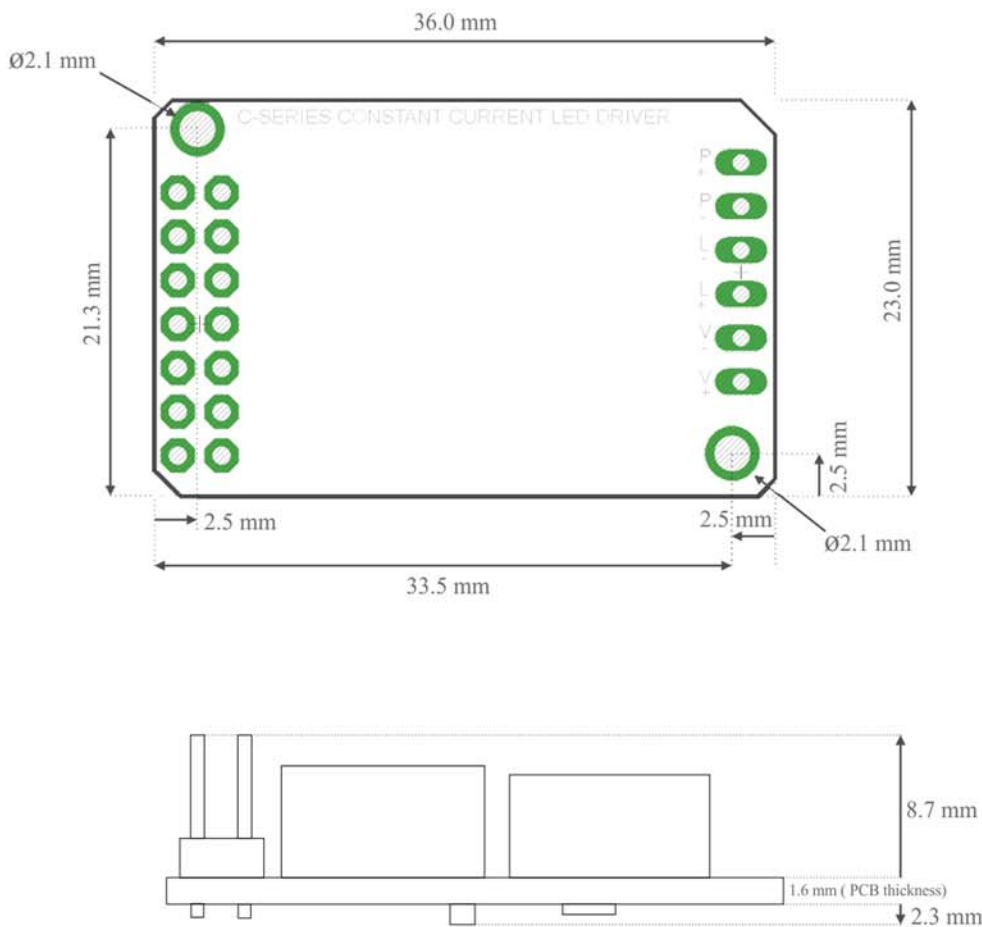
In order to use this method, the black jumper must be in position 1 and the dimboard must be connected to C Series LED driver.

Then a control voltage between 0 and 10V can be applied as shown below to dim the LEDs.



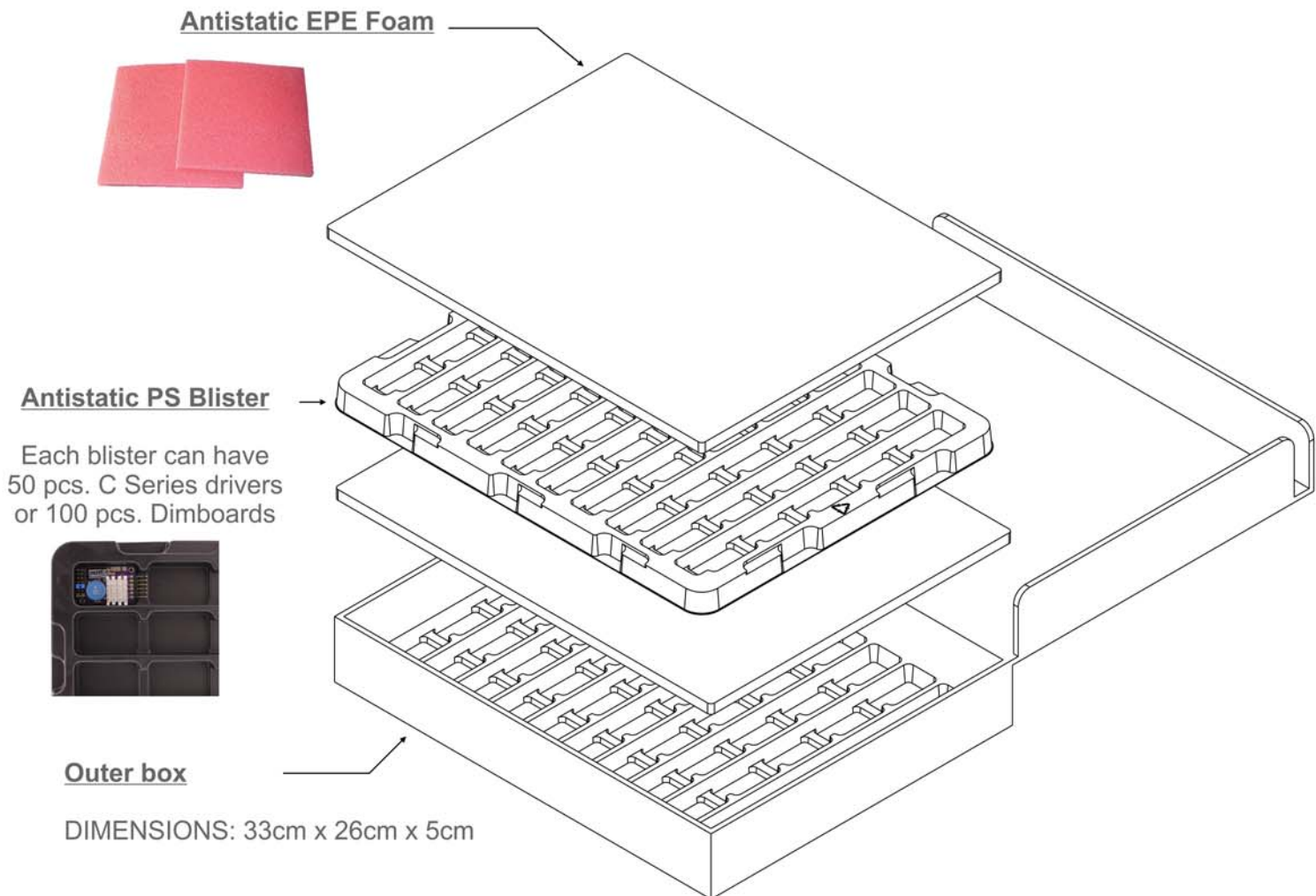
- CONTROL SIGNAL : 0 V (LEDs OFF)
- CONTROL SIGNAL : 4 V (LEDs 40% ON)
- CONTROL SIGNAL : 10 V (LEDs 100% ON)

Dimensions



Packaging and Weight

Standard Packaging

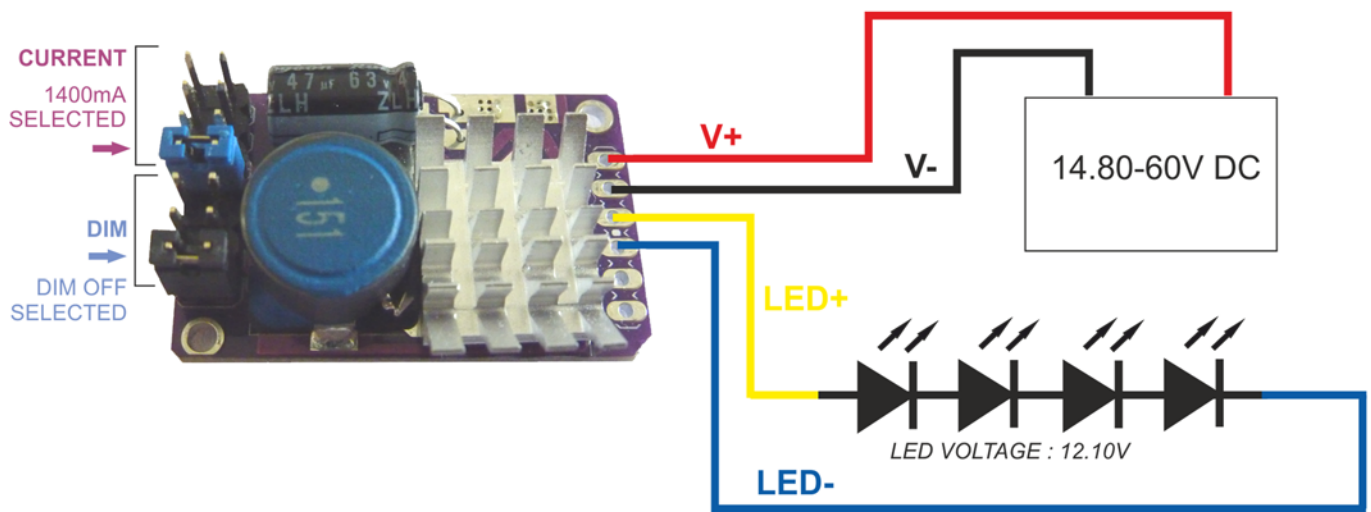


EACH BOX CAN HAVE 100 PCS. C SERIES DRIVERS OR 200 PCS. DIMBOARD

Weight and Dimensions

Shipment weight of 100pcs. drivers in original packaging	: 1.36 kg
Shipment weight of 200pcs. Dimboards in original packaging	: 0.70 kg
Shipment dimensions of 100pcs. drivers or 200pcs. Dimboards	: 33cm x 26cm x 5cm
Volumetric weight for express shipment companies	: 0.86 kg

1. Series Connection



i. **Select the current with the blue jumper.**

(Output current vs jumper position is given on page 3)

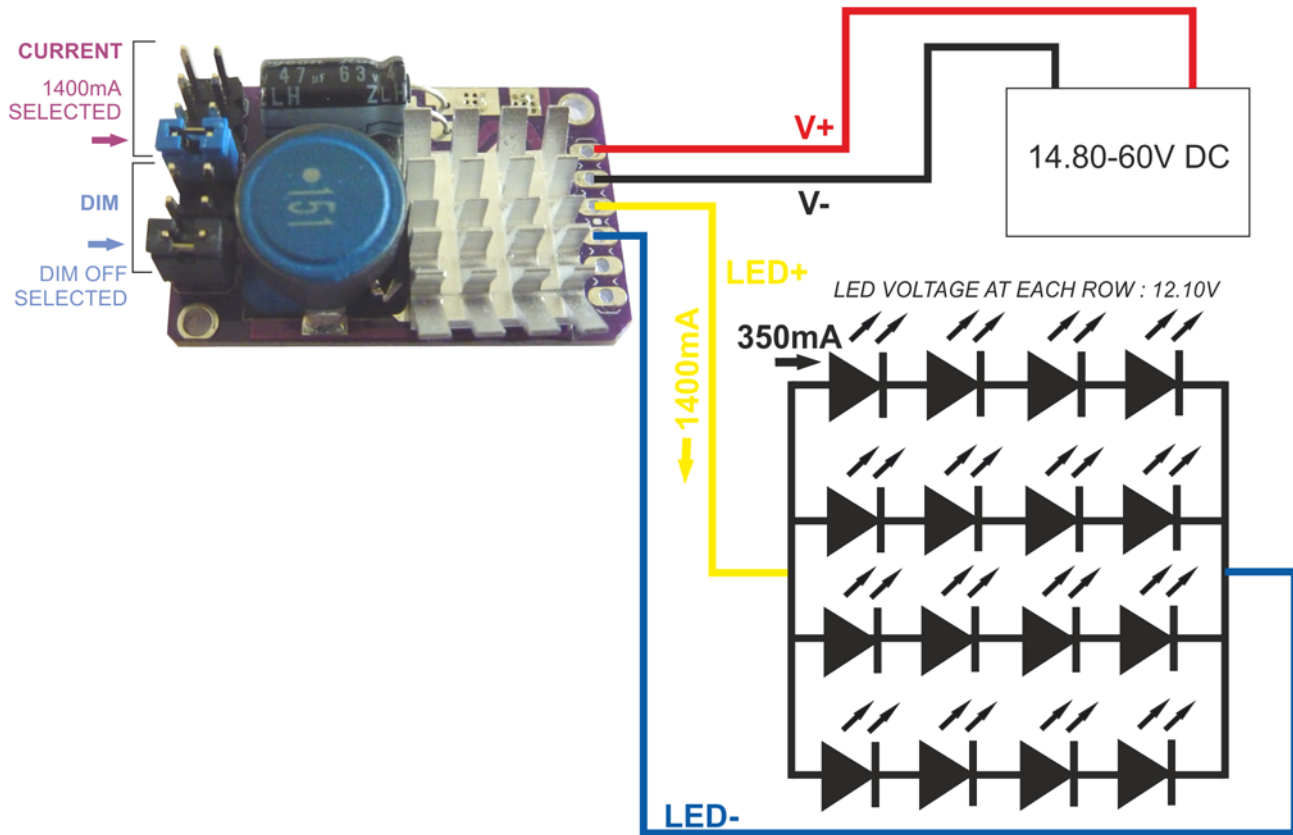
ii. **If PWM dimming will not be used make sure the black jumper is in 1st position or totally removed.**

iii. **Connect LED+ and LED -**

iv. **Connect V+ and V-**

(Check the voltage table for minimum voltage to be applied depending on the LED voltage)

2. Parallel Connection



i. Select the current with the blue jumper.

(Output current vs jumper position is given on page 3)

ii. If PWM dimming will not be used make sure the black jumper is in 1st position or totally removed.

iii. Connect LED+ and LED -

iv. Connect V+ and V-

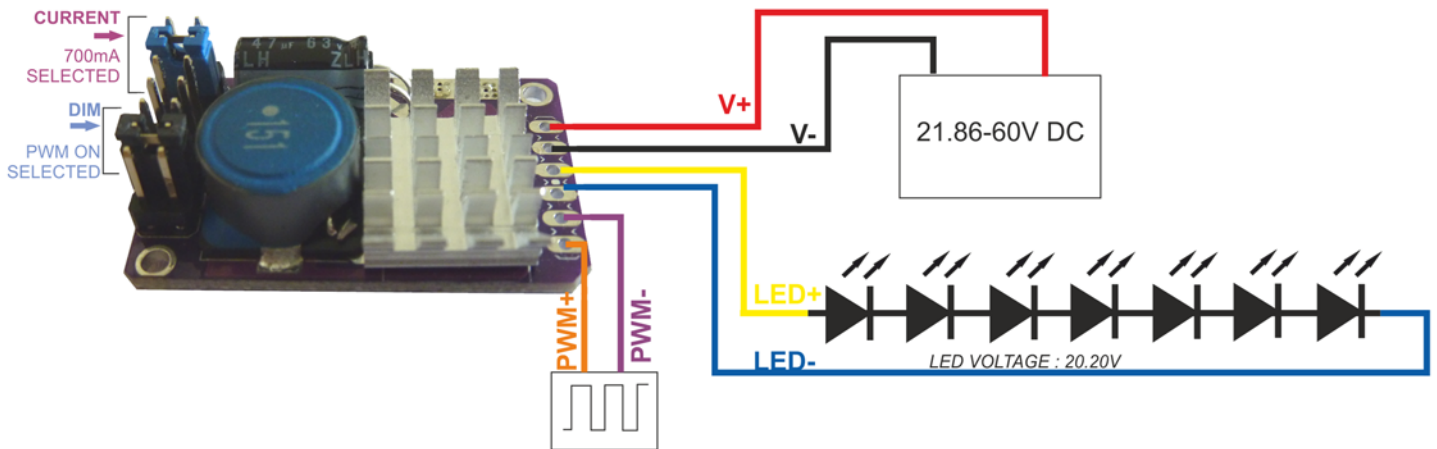
(Check the voltage table for minimum voltage to be applied depending on the LED voltage)

IMPORTANT: Parallel connection has certain drawbacks. The voltage at each LED row must be identical, Otherwise the current at each row will be different. If one of the LEDs fail open or short it will also create a current imbalance between rows. “Open LED protector”'s or “current mirror” technique can be used carefully to avoid the situation.

For more info on current mirror:

http://ledlight.osram-os.com/wp-content/uploads/2010/05/AppGuideCurrentDistributioninParallelLEDStrings.Web_.pdf

3. PWM Dimming



i. **Select the current with the blue jumper.**

(Output current vs jumper position is given on page 3)

ii. **The black jumper must be in 2nd position.**

iii. **Connect LED+ , LED - , PWM- , PWM+**

iv. **Connect V+ and V-**

(Check the voltage table for minimum voltage to be applied depending on the LED voltage)

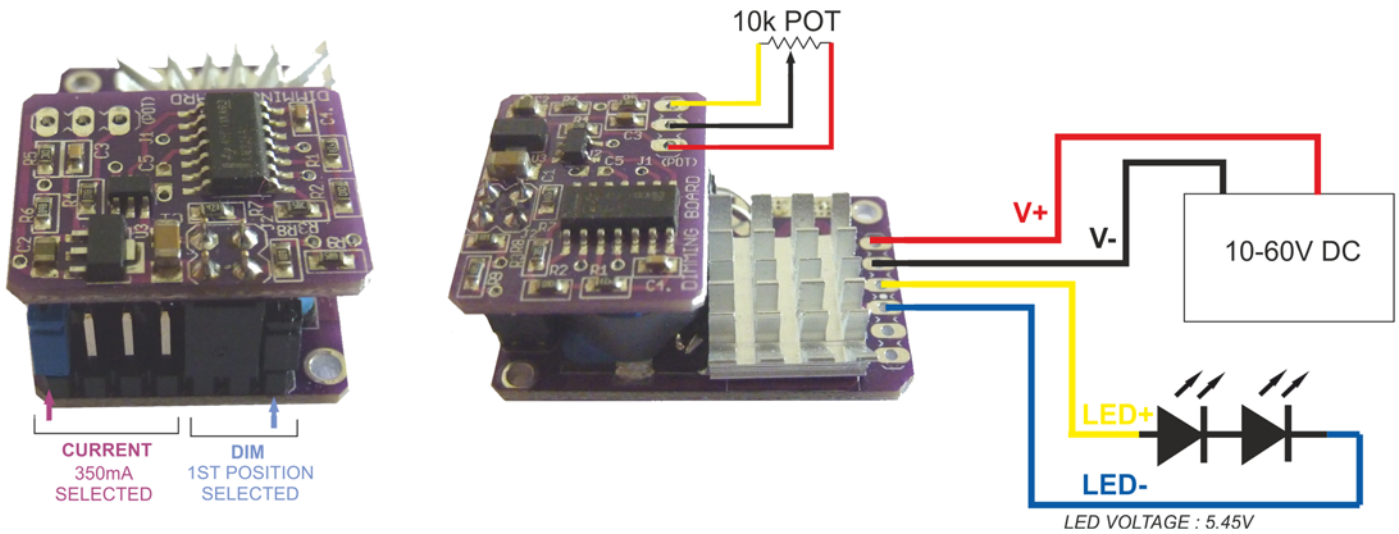
v. **Recommended PWM dimming frequency is 100-1500 Hz.**

(One may have good results up to 20kHz but making trial is highly recommended)

vi. **PWM voltage: 2.7V - 5.0V. Any voltage higher than 5.0V needs a voltage divider to reduce the voltage applied to PWM pin. PWM- and V- inputs are connected to each other on the board.**

vii. **If flicker is observed during PWM dimming, a simple RC low pass filter can be added to the PWM input.**

4. Potentiometer Dimming



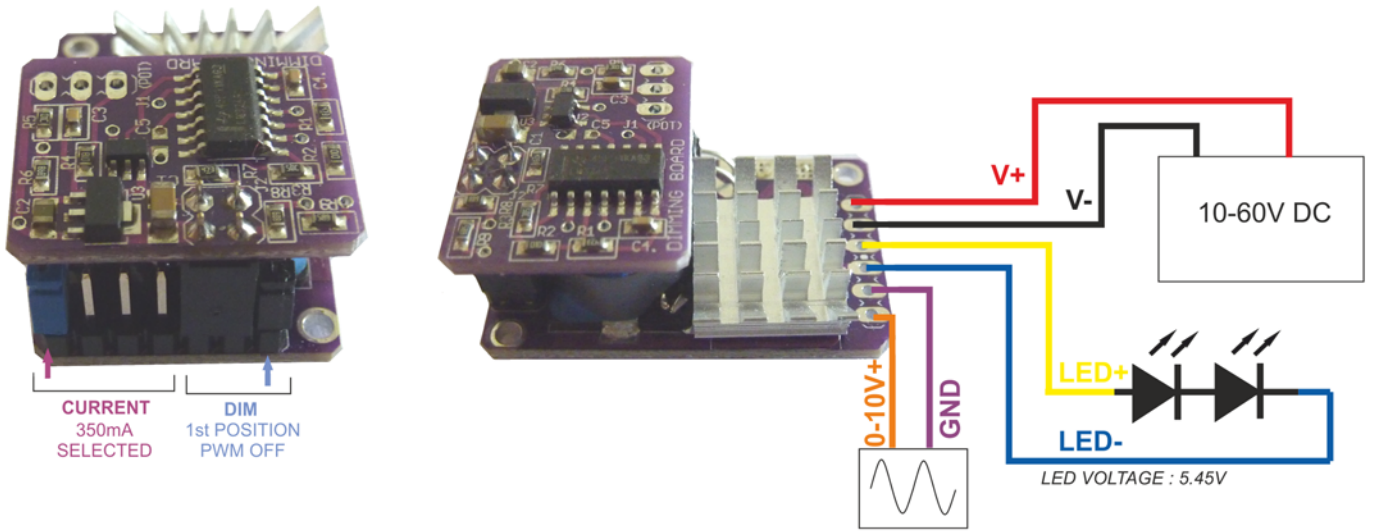
- i. Select the current with the blue jumper.
(Output current vs jumper position is given on page 3)
- ii. The black jumper must be in 1st position or totally removed.
- iii. Mount the dimboard as shown in the photo.
- iv. Connect LED+ and LED -
- v. Connect the 10k potentiometer as shown.
- vi. Connect V+ and V-
(Check the voltage table for minimum voltage to be applied depending on the LED voltage)

IMPORTANT: Make sure you make all the connections before applying the V+ and V-. Do not mount the dimboard to an already powered C Series driver. This may damage the dimboard.

IMPORTANT: Pay attention to the potentiometer connections. If the potentiometer works in the opposite direction of your choice, swap the red and yellow potentiometer connections.

Connection Diagrams

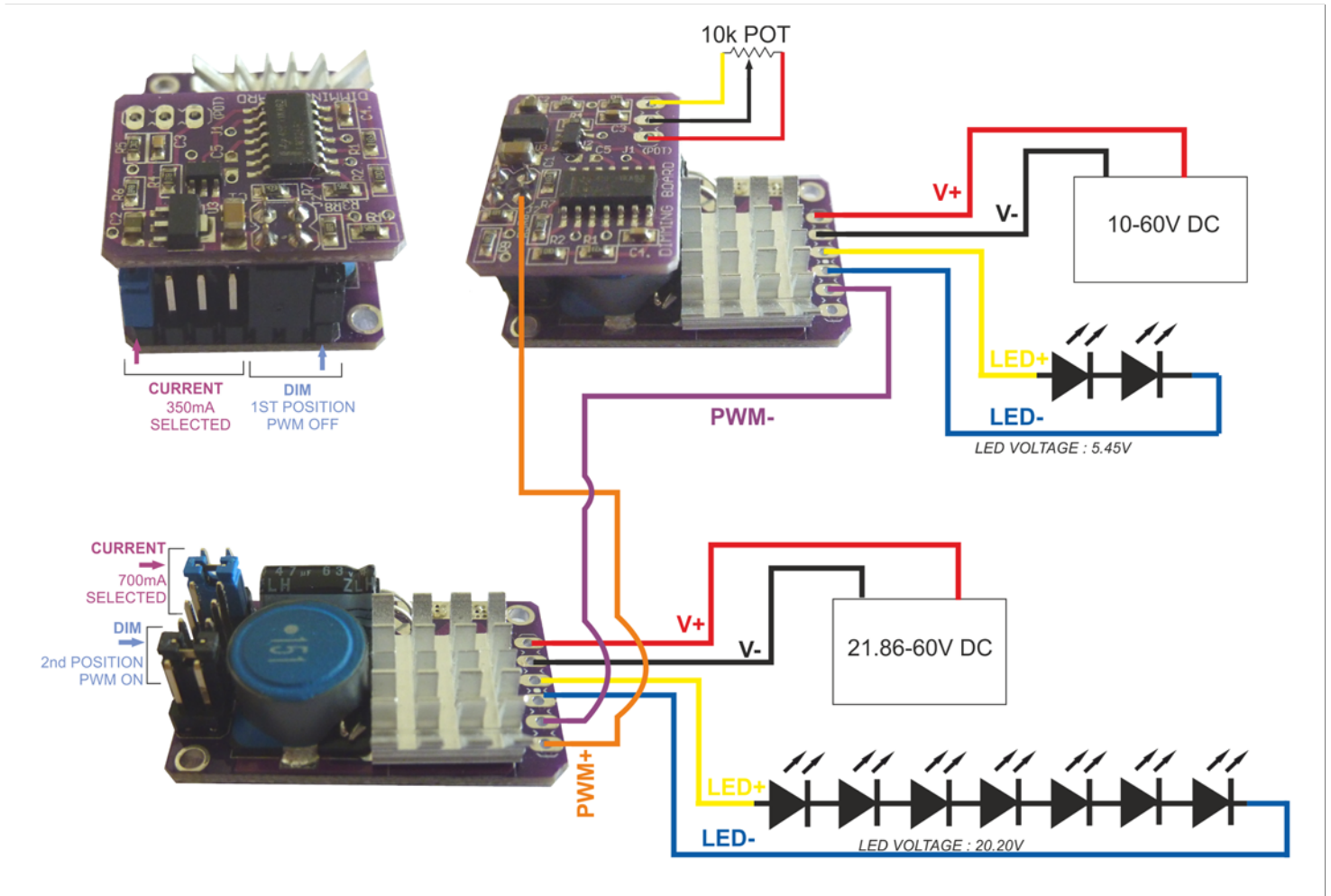
5. 0-10V Dimming



- i. Select the current with the blue jumper.
(Output current vs jumper position is given on page 3)
- ii. The black jumper must be in 1st position or totally removed.
- iii. Mount the dimboard as shown in the photo.
- iv. Connect LED+ and LED -
- v. Connect the 0-10V signal.
- vi. Connect V+ and V-
(Check the voltage table for minimum voltage to be applied depending on the LED voltage)

IMPORTANT: Make sure you make all the connections before applying the V+ and V-. Do not mount the dimboard to an already powered C Series driver. This may damage the dimboard.

6. Potentiometer Dimming of Multiple Drivers



i. Select the currents with the blue jumpers.

(C Series drivers can have different input-output combinations and output currents.)

ii. Black jumper of the masterboard (with dimboard inserted) must be in 1st position or totally removed. Black jumper of slaveboards must be in 2nd position to enable PWM input.

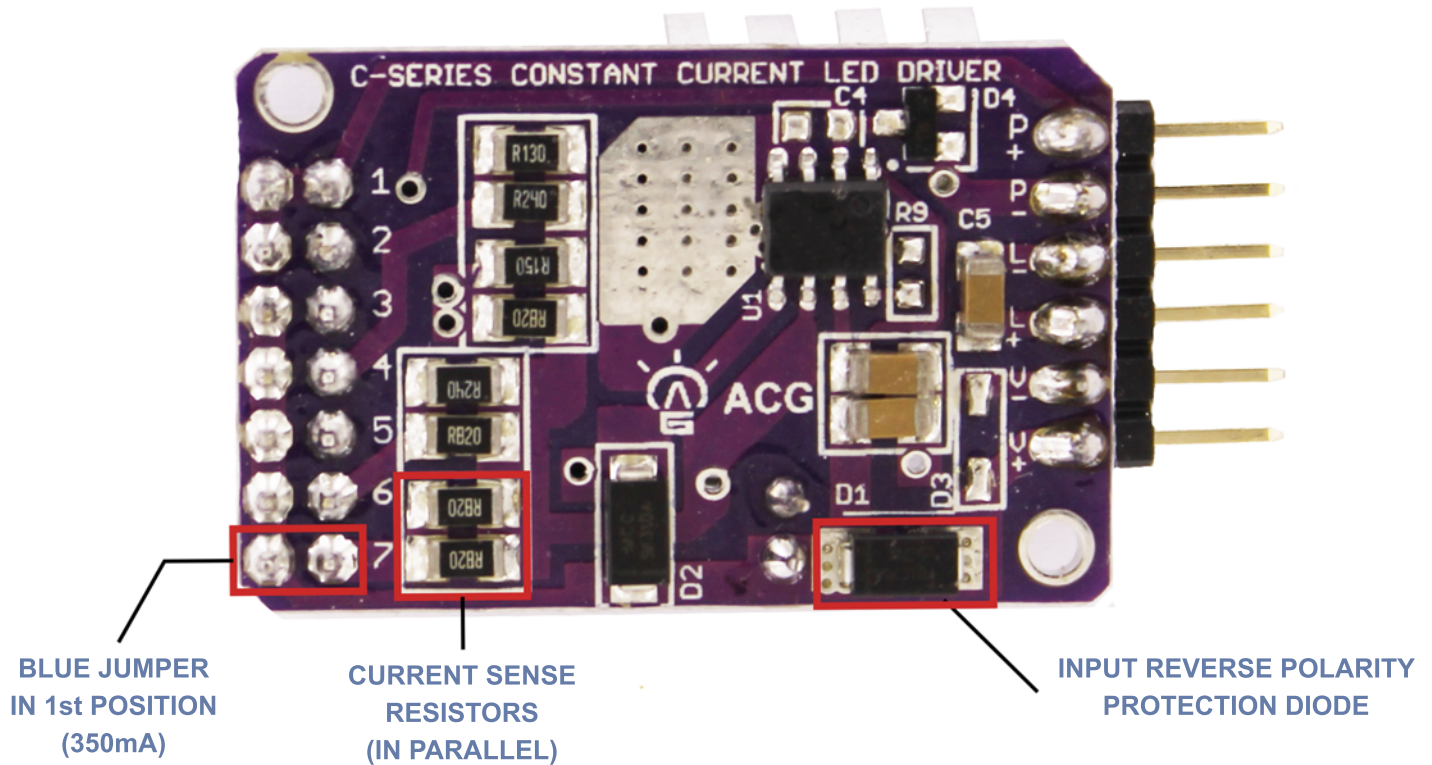
iii. Mount the dimboard to the masterboard.

iv. Connect LED+, LED - to all boards and potentiometer to the masterboard.

v. Connect V+ and V-

(Check the voltage table for minimum voltage to be applied depending on the LED voltage)

IMPORTANT: Make sure you make all the connections before applying the V+ and V-. Do not mount the dimboard to an already powered C Series driver. This may damage the dimboard. Amount of slaveboards can be more than one, they all must be PWM enabled with black jumper.



1. Changing the Output Current

- i. Make sure the blue jumper is in first position to activate the above shown current sense resistors.
- ii. Remove the resistors and solder new ones according to your desired output current. The 2 resistors shown in the photo are in parallel. The total resistance vs current on the board:

0.41 ohm = 350mA

0.185 ohm = 700mA

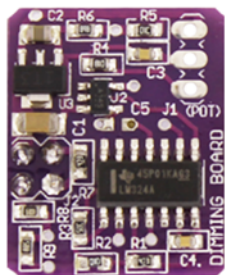
0.127 ohm = 1000mA

0.084 ohm = 1400mA

IMPORTANT: Never solder resistors with resistance lower than 0.084 ohm.

2. Increasing the Efficiency

The input reverse polarity protection diode has a typical forward voltage of 0.65V and dissipates power in the range 0.01-0.85 Watts depending on input/output voltage and output current. It can be bypassed with a jumper to improve efficiency especially for higher output currents and high input voltage/output voltage ratios.



DIMBOARD

A400.1000.50.01

Add-on board for C Series LED driver module. It is required in the case of potentiometer dimming and 0-10V dimming only. It generates a PWM signal from potentiometer or 0-10V signal.

It already has a female connector soldered and can be inserted directly to the C Series LED driver module without soldering.

CON-C620

A400.1000.50.10

20cm cable for input/output connection. 6 wires (UL1007, 20AWG): V+, V-, LED+, LED-, PWM+, PWM- connection

One end is tinned and ready for soldering, other end has a 2.54mm pitch female dupont connector suitable for pin headers.

CON-C630

A400.1000.50.11

30cm cable for input/output connection. 6 wires (UL1007, 20AWG): V+, V-, LED+, LED-, PWM+, PWM- connection

One end is tinned and ready for soldering, other end has a 2.54mm pitch female dupont connector suitable for pin headers.

CON-C330

A400.1000.50.12

30cm cable for potentiometer connection. 3 wires (UL1007, 20AWG): POT pin1, POT pin2, POT pin3 connection

One end is tinned and ready for soldering, other end has a 2.54mm pitch female dupont connector suitable for pin headers.

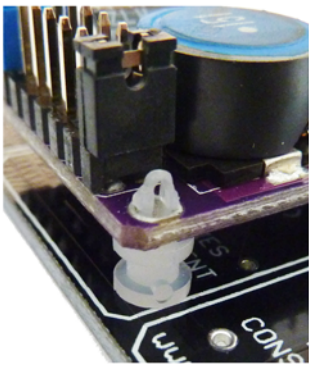


PH-6/90

A400.1000.50.13

6 pin, 1 row, 2.54mm pitch, right angle (90 degrees) pin header

Can be used with CON-C620, CON-C630, CON-C330



SP-C1

A400.1000.50.14

Snap-in mini spacer for 2.0mm holes. It can be used to elevate the C Series LED driver module when connected to a mainboard.

Material: Nylon 66 (PA66), white, UL94V-2



C3-IN-1

A400.1000.50.15

Bare PCB with 3 separate PWM inputs and 3 separate LED+, LED-output. Standard 5.08mm terminals can be fit easily for connections.

It is for easier connection of 3 channel products.

V+, V-, PWM+ 1, PWM+ 2, PWM+ 3, common PWM- (input connections)

LED+ 1, LED - 1, LED+ 2, LED- 2, LED+ 3, LED- 3 (output connections)