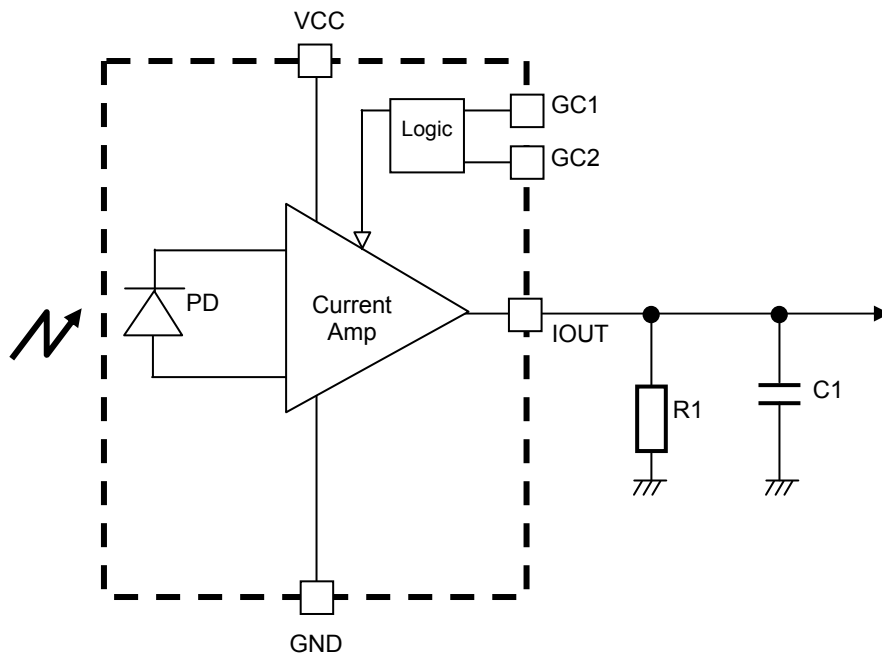


●Block Diagram



●Block Diagram Descriptions

- PD
Photo diode detects the visible light, and cuts the infrared.
- Current AMP
To amplify Photo diode current (H-Gain / M-Gain / L-Gain)
Gain controllable in 3 steps by input voltage from GC1 and GC2.
- Logic
Logic block for mode setting by input voltage from GC1 and GC2

●Mode Setting

GC2	GC1	Mode
0	0	Shutdown
0	1	H-Gain Mode
1	0	M-Gain Mode
1	1	L-Gain Mode

●External parts Setting

1) Gain setting of BH1680FVC

Please select the best gain controlled by 3 and 4pin based on the required illuminance range.
The reference is as follows.

Illuminance detection range [lx]	Gain Mode
~100	H-Gain Mode
~1,000	M-Gain Mode
~50,000	L-Gain Mode

This device will be mounted under the optical window in actual designing. Therefore, there is a possibility that the illuminance to ALS(Ambient Light Sensor) will be less than the illuminance on the final product surface. Please consider the attenuation of light through the optical window. Please set output resistance value(R1) within the range of 1 kΩ~1MΩ which needs to be smaller than the input impedance of the next circuit.

2) Approximate formula of IOUT output voltage in each Gain Mode

(1) H-Gain mode

The output voltage is calculated as below.

$$V_{iout} = 6.1 \times 10^{-6} \times E_v \times R_1$$

V_{iout} is IOUT output voltage [V]. E_v is an illuminance of the ALS surface [lx].

R_1 is IOUT output resistor[Ω].

(For example) In case you want to convert the illuminance value up to 50 lx by ADC.

If the maximum voltage of ADC input is 2V, output resistor value will be as below.

$$\begin{aligned} R_1 &= V_{iout} / (6.1 \times 10^{-6} \times E_v) \\ &= 2 / (6.1 \times 10^{-6} \times 50) = 6557[\Omega] \\ &\Rightarrow 6.8[\text{k}\Omega] \end{aligned}$$

(2) M-Gain mode

$$V_{iout} = 0.61 \times 10^{-6} \times E_v \times R_1$$

(3) L-Gain mode

$$V_{iout} = 0.061 \times 10^{-6} \times E_v \times R_1$$

3) C1

(1) To reject the flicker light.

In case IOUT output is R1 only and an ALS receives the artificial lights such as fluorescent lamps and incandescent lamps synchronized with 50/60 Hz of AC power supplies, the output current has a ripple. If you want to reject this ripple, please add C1 to R1 in parallel. Please set it to $C1 \times R1 =$ about 0.1 as a time constant.

(For example) If the $R1 = 6.8[\text{k}\Omega]$, C1 value will be as below.

$$\begin{aligned} C1 &= 0.1 / R1 \\ &= 0.1 / (6.8 \times 10^3) = 14.7 \times 10^{-6}[\text{F}] \\ &\Rightarrow 15[\mu\text{F}] \end{aligned}$$

(2) To control backlight smoothly by using illuminance value.

C1 is effective to control backlight smoothly for a rapid changing of the illuminance. In this case, please set it to $C1 \times R1 =$ about 1 ~ 10 as a time constant. It is not necessary if you average illuminance value with software to change backlight smoothly.

Please note that the rise time becomes slow at power-on and recovery from shutdown mode to operation mode.