

## ◆ Description

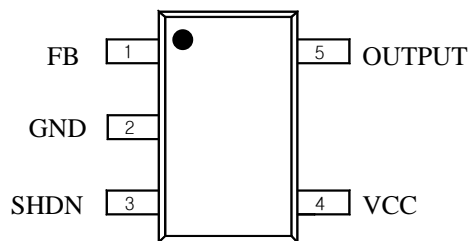
The S8200 is an integrated adjustable constant-current source, driving loads up to 150mA, The output current level can be adjusted via an external resistor. The integrated SHDN input of the S8200 permits LED brightness regulation by pulse width modulation (PWM), with the SHDN input, the LED brightness can be regulated via duty cycle. Also, SHDN low sets the S8200 in sleep mode, the SHDN pin also can be used as an enable input.

This discrete integration technology eliminates individual components by combining them into a single package, which results in a significant reduction of both system cost and board space. The device is a small surface mount package (SOT-25)

## ◆ Features

- Supplies stable bias current for LEDs
- LED drive current adjustable via single external resistor (Max 150mA)
- Low Cost, Low External Parts Count
- Small Surface-Mount SOT-25 Package
- Halogen-Free Package is Available

## ◆ Pin Assignment & Description



**Package : SOT-25**

| Pin | Symbol | Description               |
|-----|--------|---------------------------|
| 1   | FB     | Feedback / 0.6V Reference |
| 2   | GND    | Ground                    |
| 3   | SHDN   | Disable On/Off            |
| 4   | VCC    | Power Supply              |
| 5   | OUTPUT | Open Collector Output     |

## ◆ Ordering Information

| Package Type | Device Name | Marking |
|--------------|-------------|---------|
| SOT-25       | S8200       | 82□**   |

※ □ : Year&Week Code

## ◆ Absolute maximum ratings

[Ta=25°C]

| Characteristic                      | Symbol                 | Rating     | Unit |
|-------------------------------------|------------------------|------------|------|
| Power Supply Voltage                | V <sub>CC(MAX)</sub>   | 25         | V    |
| Output Voltage                      | V <sub>OUT(MAX)</sub>  | 25         | V    |
| Output Sink Current                 | I <sub>OUT(MAX)</sub>  | 150        | mA   |
| Thermal Resistance Junction-Ambient | R <sub>th(j-a)</sub> * | 250        | °C/W |
| Power Dissipation                   | P <sub>D</sub> *       | 0.5        | W    |
| Operating Temperature Range         | T <sub>opr</sub>       | -40 ~ +85  | °C   |
| Storage Temperature Range           | T <sub>stg</sub>       | -55 ~ +125 | °C   |

\* Mounted on a glass epoxy circuit board of 30x30mm Pad dimension of 50mm<sup>2</sup>

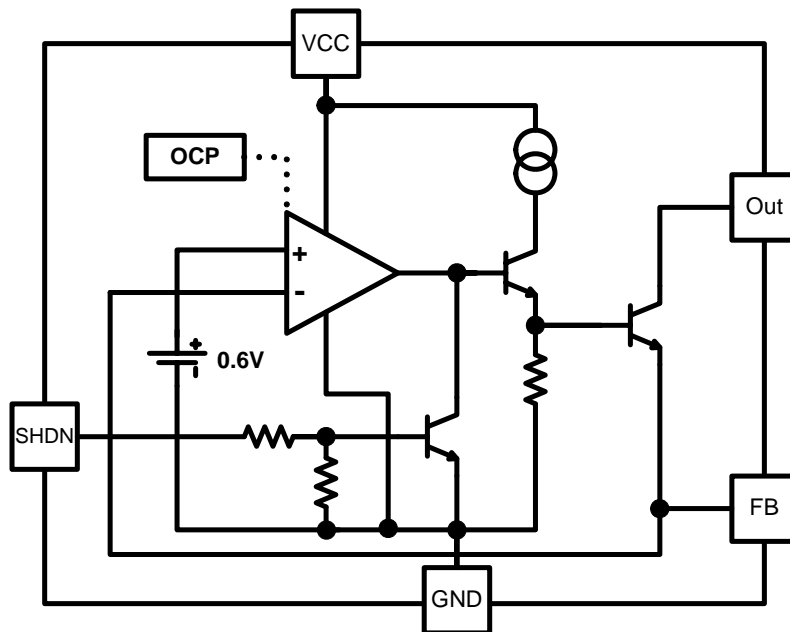
## ◆ Recommended operating conditions

| Characteristic           | Symbol           | Rating |                 | Unit |
|--------------------------|------------------|--------|-----------------|------|
|                          |                  | Min    | Max             |      |
| Power Supply Voltage     | V <sub>CC</sub>  | 3      | 24              | V    |
| Output Voltage           | V <sub>OUT</sub> | 1.5    | V <sub>CC</sub> | V    |
| Output Sink Current      | I <sub>OUT</sub> | -      | 100             | mA   |
| Shut Down Voltage        | SHDN             | -0.3   | V <sub>CC</sub> | V    |
| Dimming Frequency (SHDN) | F <sub>DIM</sub> | -      | 10              | kHz  |

## ◆ Electrical Characteristics (Ta=25°C, unless otherwise noted.)

| Characteristic        | Symbol               | Condition  | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------|--|------|------|------|------|
| Supply Current 1      | I <sub>Q1</sub>      | V <sub>CC</sub> =5V, I <sub>out</sub> =10mA, V <sub>out</sub> =open            | -    | 2.0  | 3.0  | mA   |
| Supply Current 2      | I <sub>Q2</sub>      | V <sub>CC</sub> =22V, I <sub>out</sub> =10mA, V <sub>out</sub> =open           | -    | 2.2  | 3.5  | mA   |
| Vo Leak Current       | I <sub>leak</sub>    | V <sub>CC</sub> =5V, V <sub>out</sub> =22V                                     | -    | 0.1  | 1    | μA   |
| Feedback Voltage      | V <sub>FB</sub>      | V <sub>CC</sub> =5V, I <sub>out</sub> =10mA                                    | 586  | 600  | 614  | mV   |
| Dropout Voltage       | V <sub>drop</sub>    | V <sub>CC</sub> =5V, I <sub>out</sub> =100mA                                   | -    | 0.8  | 1.5  | V    |
| Line Regulation       | ΔV <sub>FB1</sub>    | V <sub>CC</sub> =3V~22V, I <sub>out</sub> =10mA                                | -    | 3    | 10   | mV   |
| Load Regulation       | ΔV <sub>FB2</sub>    | V <sub>CC</sub> =5V, I <sub>out</sub> =1mA~100mA                               | -    | 2    | 10   | mV   |
| SHDN Voltage On       | V <sub>dis on</sub>  | V <sub>CC</sub> =5V, I <sub>out</sub> =10mA, V <sub>out</sub> =V <sub>CC</sub> | 1.5  | -    | -    | V    |
| SHDN Voltage Off      | V <sub>dis off</sub> | V <sub>CC</sub> =5V, I <sub>out</sub> =10mA, V <sub>out</sub> =V <sub>CC</sub> | -    | -    | 0.5  | V    |
| SHDN Pin Current      | I <sub>dis</sub>     | V <sub>CC</sub> =5V, SHDN=5V   | 230  | 430  | 630  | μA   |
| Short Circuit Current | I <sub>SC</sub>      | R <sub>FB</sub> =0Ω  | -    | 250  | -    | mA   |

### ◆ Functional block diagram



### ◆ Design Consideration

1) Calculation for  $R_{FB}$

$$- R_{FB} = 0.6V / I_{LED}$$

2) Calculation for  $V_{drop}$

$$- V_{drop} = V_{CC} - V_{LED}$$

3) Calculation for Power Dissipation on the S8200

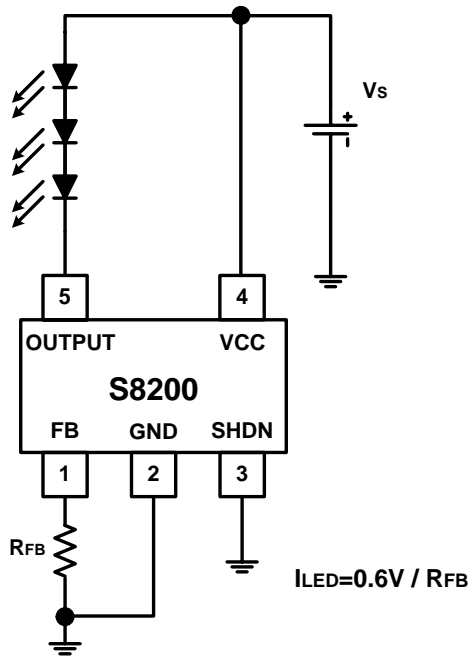
$$- P_{D1} = (V_{drop} - V_{FB}) \times I_{LED}$$

$$- P_{D2} = V_{CC} \times I_Q$$

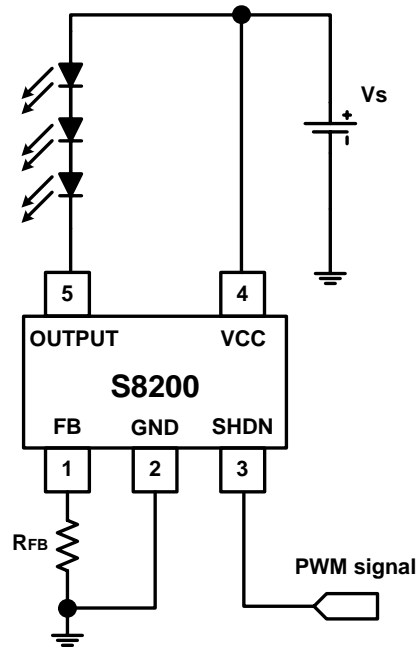
$$- P_{D(total)} = P_{D1} + P_{D2}$$

4) If does not use an Dimming function, connect SHDN Pin with the ground.

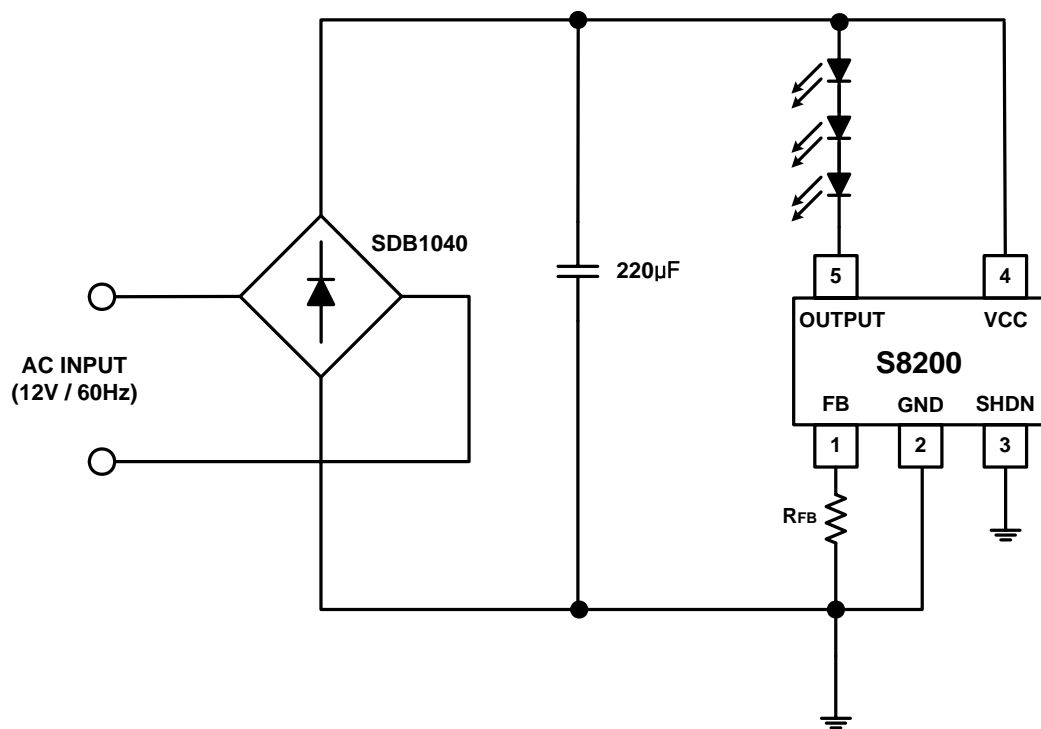
◆ Typical Applications



<APP1. Constant Current LED Driver Circuit>

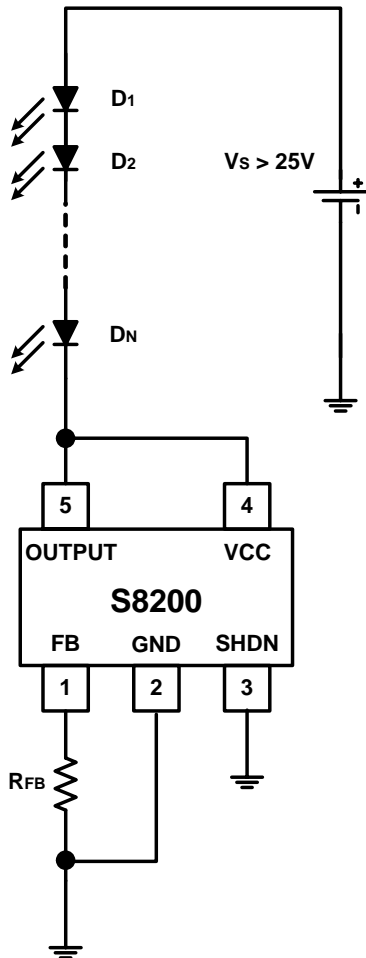


<APP2. PWM Dimming LED Driver Circuit>

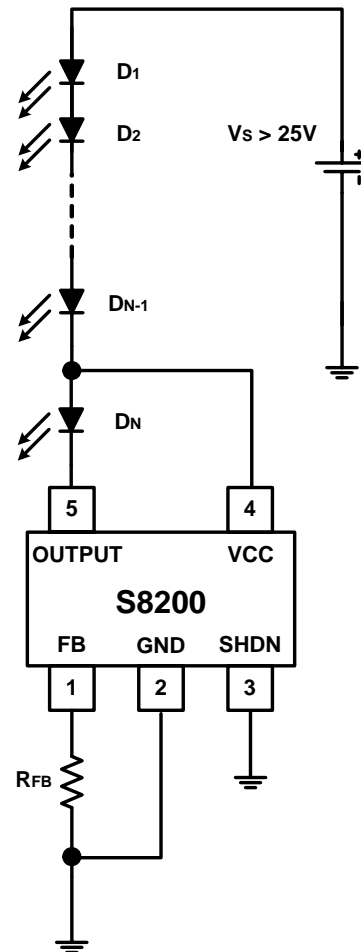


<APP3. V<sub>AC</sub> Landscape Lighting Application Circuit>

## ◆ Typical Applications



<APP4. High Voltage Operation of S8200 (1) >



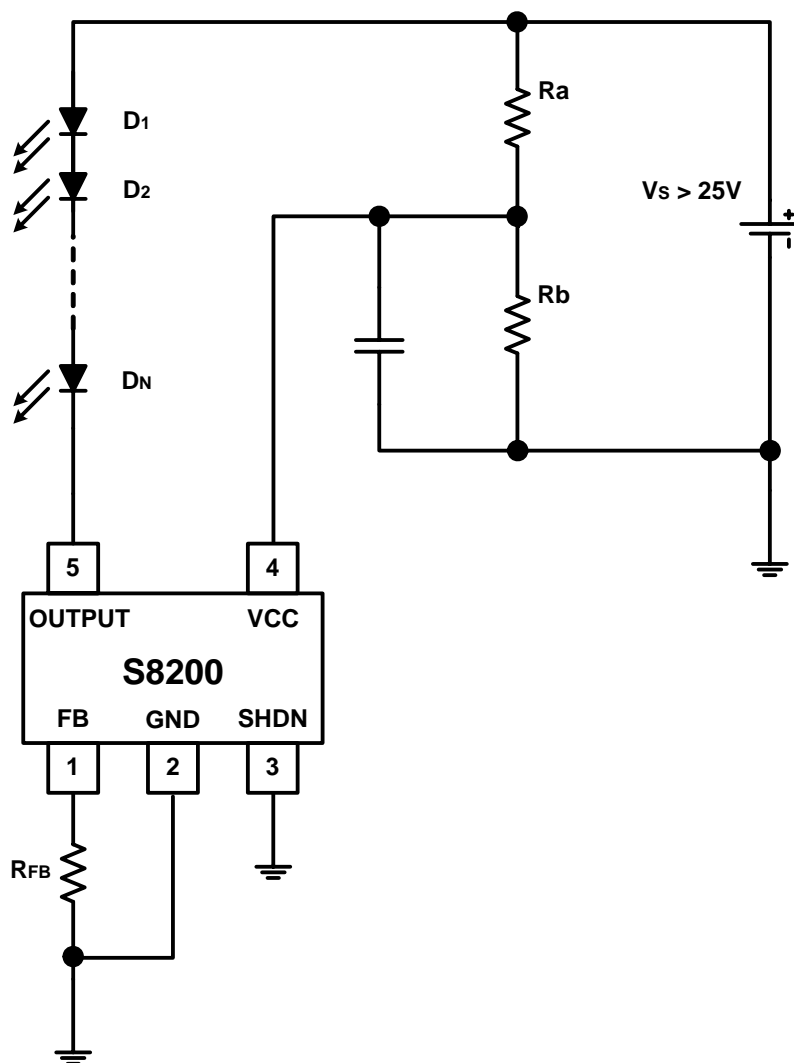
<APP5. High Voltage Operation of S8200 (2) >

For operation in excess of S8200 specified maximum voltage ( $V_{CC}$  &  $V_{OUT}$ ) of 25V, one way is to connect a sufficient number of LEDs between the power supply voltage and the DC input of the  $V_{CC}$ & $V_{OUT}$  (pin 4, 5) such that the voltage seen at pin 4, 5 is less than 25V.

That is to say, use additional LEDs to drop the voltage fed to the S8200 below its maximum rating, in the usual way. Refer to **APP4,5** Note that the exact number of diodes required will depend on the supply voltage  $V_{CC}$  and output voltage  $V_{OUT}$ , the voltage drops across the particular LEDs being used. (Red, Blue and White LEDs have different forward voltage drop.) Use enough LEDs such that voltage at pin4,5 of S8200 is < 25V

※ Attention : When  $V_S$  uses to exceed 25V, Dimming functions the use is impossible.

◆ Typical Applications



<APP6. Power Supply Where Separates Operation of S8200 >

◆ Electrical Characteristic Curves

Fig.1  $V_{FB}$  vs  $T_A$

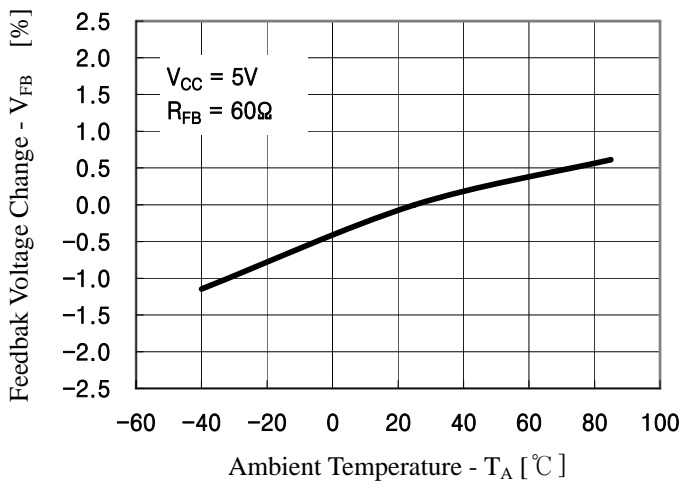


Fig.2 Line Regulation vs  $T_A$

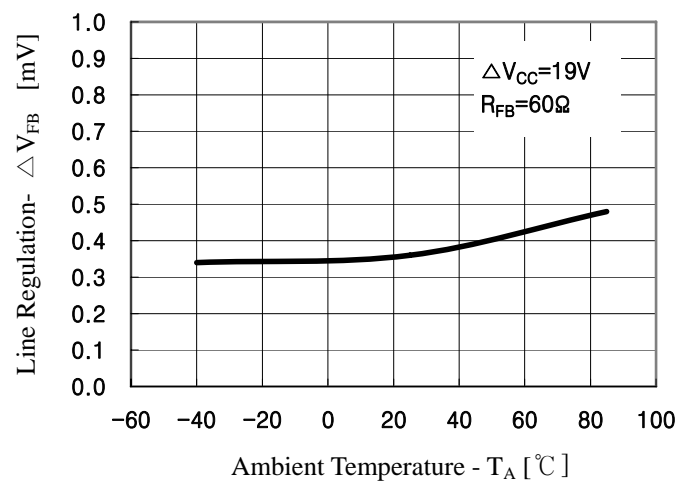


Fig.3 Load Regulation vs  $T_A$

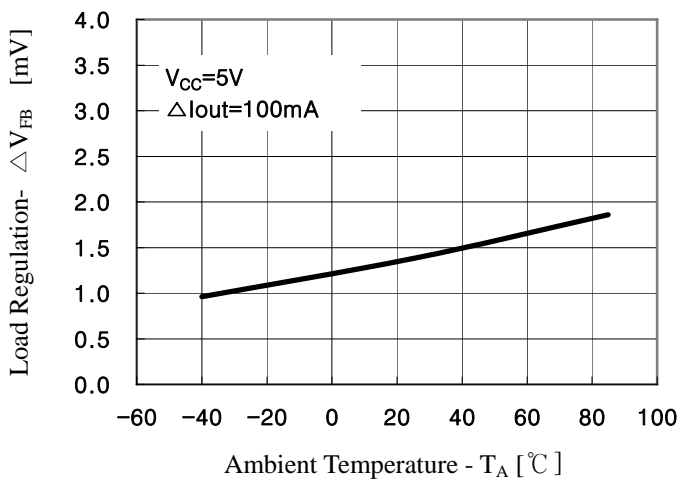


Fig.4 Quiescent Current vs  $T_A$

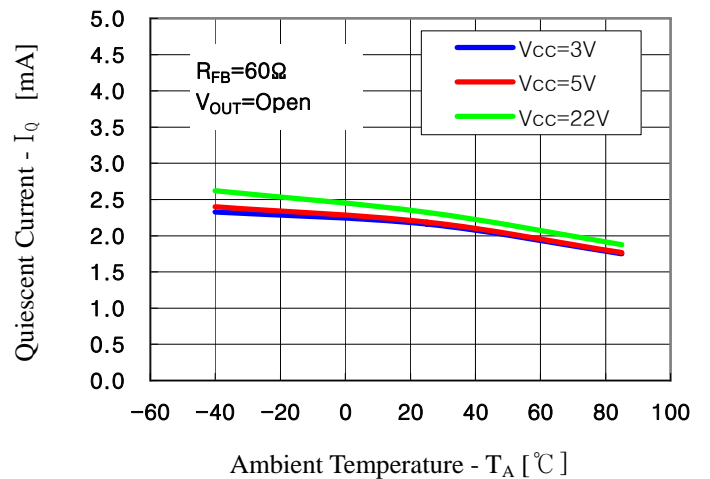


Fig.5 Dropout Voltage vs  $T_A$

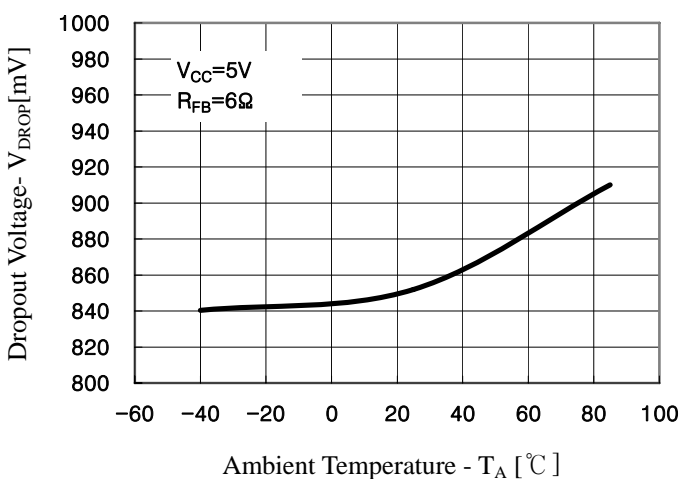
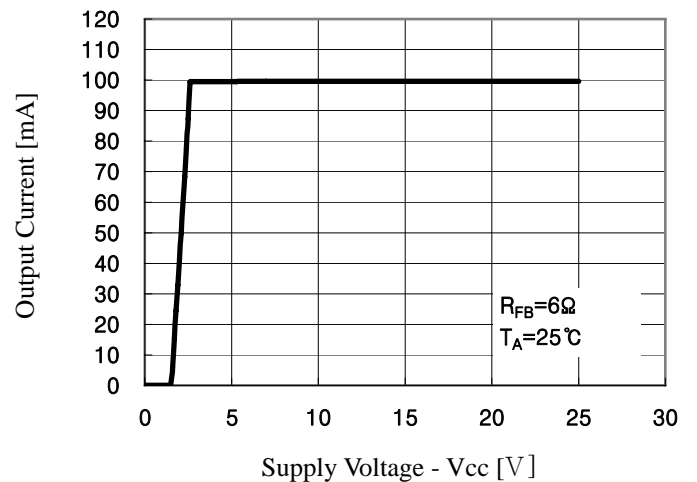
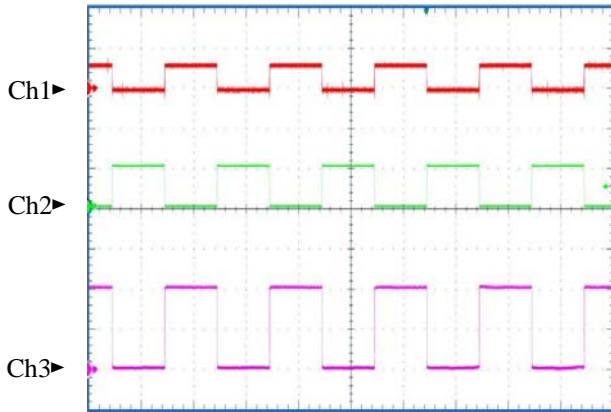


Fig.6 Output Current vs Supply Voltage



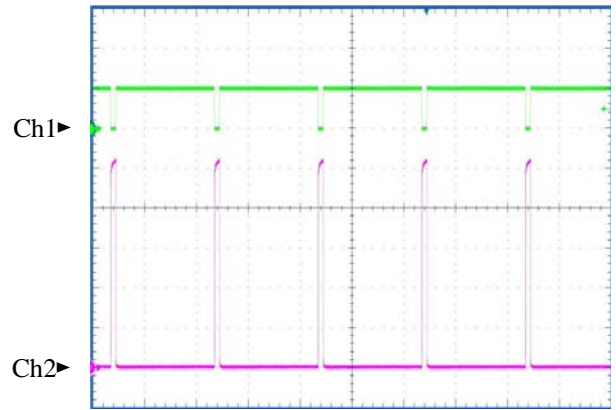
◆ Electrical Characteristic Curves

Fig.7 Dimming Waveform



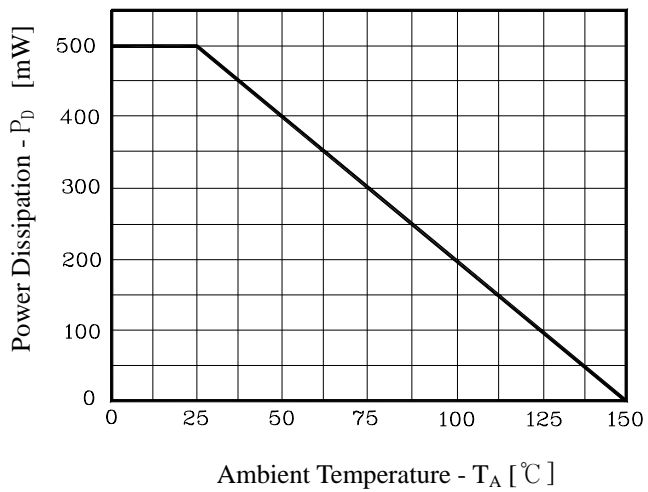
Ch1 :  $V_{FB}$ , 1V/Div  
 Ch2 : SHDN, 5V/Div  
 Ch3 :  $I_{OUT}$ , 5mA/Div

Fig.8 Short Circuit Current



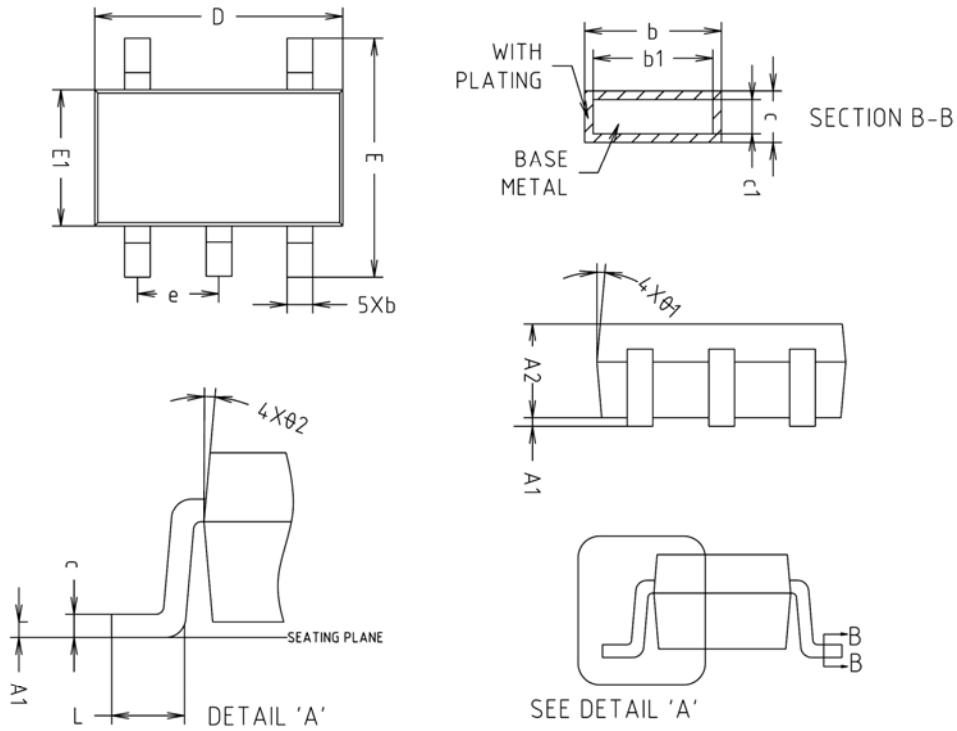
Ch1 : SHDN, 5V/Div  
 Ch2 :  $I_{OUT}$ , 50mA/Div

Fig.9 Power Dissipation vs  $T_A$



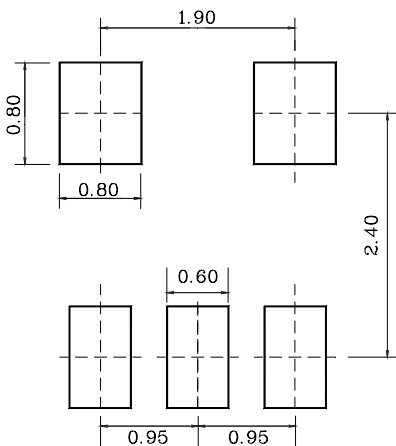


SOT-25 Outline Dimension(mm)



| SYMBOL | MILLIMETERS |         |         | NOTE |
|--------|-------------|---------|---------|------|
|        | MINIMUM     | NOMINAL | MAXIMUM |      |
| A1     | 0.000       | 0.050   | 0.100   |      |
| A2     | 1.000       | 1.100   | 1.200   |      |
| b      | -           | 0.400   | 0.450   |      |
| b1     | -           | 0.375   | 0.425   |      |
| c      | 0.110       | 0.150   | 0.190   |      |
| c1     | 0.085       | 0.125   | 0.165   |      |
| D      | 2.800       | 2.900   | 3.000   |      |
| E      | 2.600       | 2.800   | 3.000   |      |
| E1     | 1.500       | 1.600   | 1.700   |      |
| e      | 0.930       | 0.950   | 0.970   |      |
| L      | 0.400       | -       | -       |      |
| Ø1     | 5° REF      |         |         |      |
| Ø2     | 5° REF      |         |         |      |

※ Recommend PCB solder land [Unit: mm]



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