

# AN6884

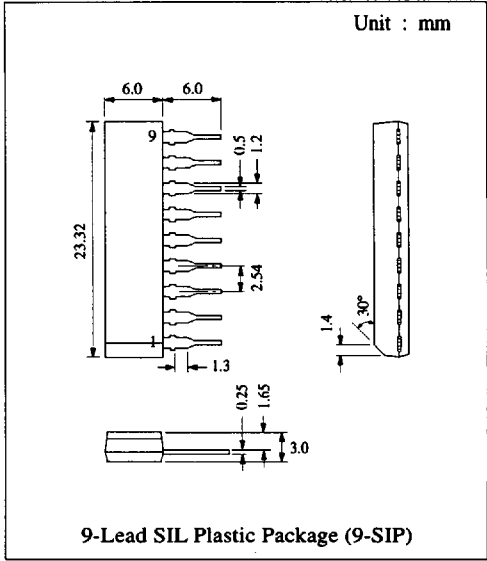
## 5-Dot LED Driver Circuit

### ■ Description

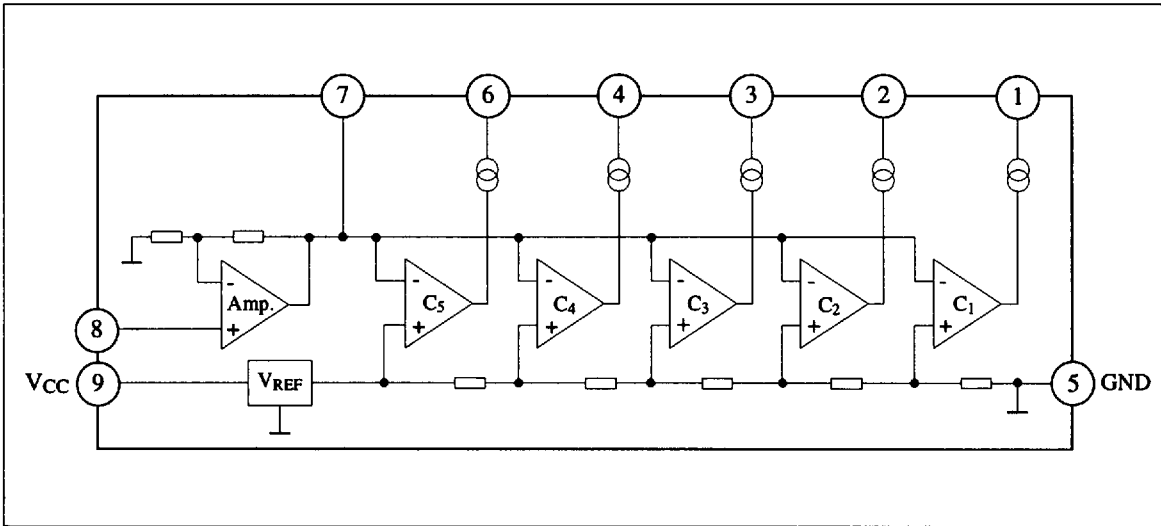
The AN6884 is a monolithic integrated circuit driving 5-LED and is capable of logarithmic (dB) bar graph display for input signal. Incorporating high gain rectification amp. enable to apply AC (UV meter, etc.) / DC (signal meter, etc.) level meter widely.

### ■ Features

- Wide range of operating voltage:  
 $V_{CC(opr.)} = 3.5V \sim 16V$
- Constant current output:  $I_{LED} = 15mA$
- Built-in high gain amp.:  $G_V = 26dB$  typ.
- Low noise when LED ON
- 5-dot LED bar logarithmic response: -10, -5, 0, 3, 6dB
- Fewer external components



### ■ Block Diagram



## ■ Absolute Maximum Ratings (Ta=25°C)

| Item                          |                        | Symbol                | Rating     |          | Unit |
|-------------------------------|------------------------|-----------------------|------------|----------|------|
| Voltage                       | Supply Voltage         | $V_{CC}$              | 18         |          | V    |
|                               | Circuit Voltage        | $V_{7.5}$             | 6          |          | V    |
|                               | Op. Amp. Input Voltage | $V_{8.5}$             | -0.5       | $V_{CC}$ | V    |
|                               | LED Output Pin Voltage | $V_{1, 2, 3, 4, 6-5}$ | $V_{CC}$   |          | V    |
| Current                       | Supply Current         | $I_{CC}$              | 12         |          | mA   |
|                               | LED Output Pin Current | $I_{1, 2, 3, 4, 6}$   | 20         |          | mA   |
| Power Dissipation *           |                        | $P_D$                 | 1100       |          | mW   |
| Operating Ambient Temperature |                        | $T_{opr}$             | -25 ~ +75  |          | °C   |
| Storage Temperature           |                        | $T_{stg}$             | -55 ~ +125 |          | °C   |

Operating Supply Voltage Range:  $V_{CC} = 3.5V \sim 16.0V$

\*Under  $T_a > 25^\circ C$ , reduce at  $-11mW/^\circ C$

## ■ Electrical Characteristics ( $V_{CC}=3V$ , $T_a=25^\circ C$ )

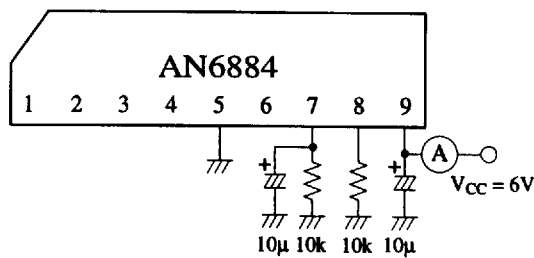
| Item                | Symbol                           | Test Circuit | Condition                                      | min.                  | typ. | max. | Unit |    |
|---------------------|----------------------------------|--------------|------------------------------------------------|-----------------------|------|------|------|----|
| Supply Current      | I <sub>CC</sub>                  | 1            | V <sub>8.5</sub> = 0V                          |                       | 6    | 8.5  | mA   |    |
| Input Bias Current  | I <sub>Bias8</sub>               | 2            |                                                | -1                    |      | 0    | μA   |    |
| Output Sink Current | I <sub>(SINK)1, 2, 3, 4, 6</sub> | 3            | V <sub>8.5</sub> = 0.15V                       | 11                    | 15   | 18.5 | mA   |    |
| Voltage Gain        | G <sub>V</sub>                   | 4            | V <sub>8.5</sub> = 0.1V, R <sub>7</sub> = 10kΩ | 24                    | 26   | 28   | dB   |    |
| Comparator Level    | GD <sub>1</sub>                  | 5            | Pin 1                                          | V <sub>8.5</sub> = 0V | -12  | -10  | -8   | dB |
|                     | GD <sub>2</sub>                  | 5            | Pin 2                                          |                       | -6   | -5   | -4   | dB |
|                     | GD <sub>3</sub>                  | 5            | Pin 3                                          |                       |      | 0    |      | dB |
|                     | GD <sub>4</sub>                  | 5            | Pin 4                                          |                       | 2.5  | 3    | 3.5  | dB |
|                     | GD <sub>5</sub>                  | 5            | Pin 6                                          |                       | 5    | 6    | 7    | dB |

\* $G_{D3}$  LED ON level adjusting point = 0dB, equivalent to  $V_{7.5} = 1.1V$  typ. ( $V_{8.5} = 57mV$ )

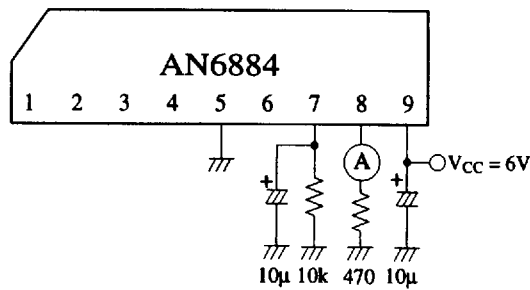
## ■ Pin

| Pin No. | Pin Name     |
|---------|--------------|
| 1       | LED 1 Output |
| 2       | LED 2 output |
| 3       | LED 3 Output |
| 4       | LED 4 Output |
| 5       | GND          |
| 6       | LED 5 Output |
| 7       | AMP. Output  |
| 8       | AMP. Input   |
| 9       | $V_{CC}$     |

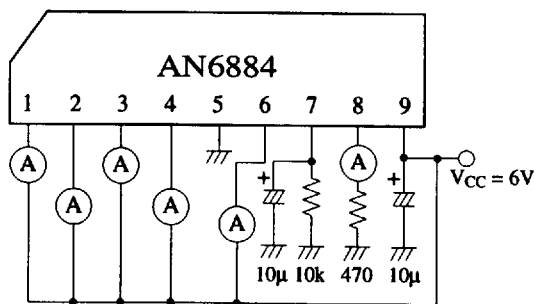
Test Circuit 1 (I<sub>CC</sub>)



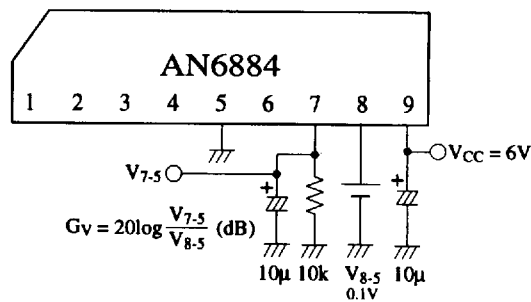
Test Circuit 2 (I<sub>Bias8</sub>)



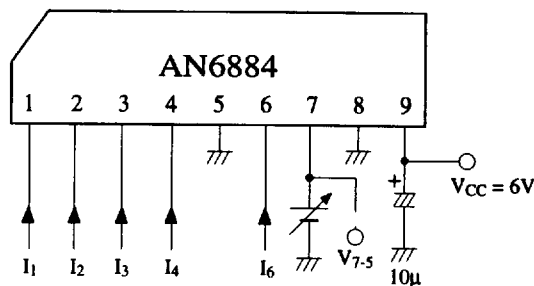
Test Circuit 3 (I<sub>(SINK)1, 2, 3, 4, 6</sub>)



Test Circuit 4 (G<sub>V</sub>)

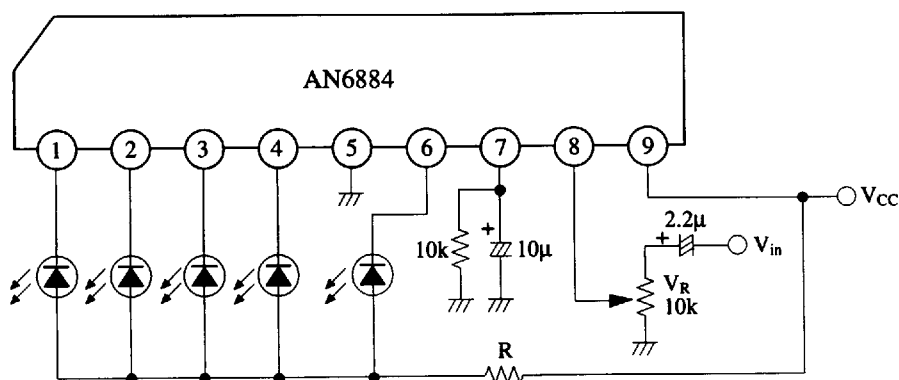


Test Circuit 5 (GD<sub>1-5</sub>)



Note) Measure input voltage V<sub>7-5</sub> of comparator that I<sub>1</sub>-I<sub>5</sub> flow more than 11mA.

## ■ Application Circuit



In case of  $T_a(\text{max}) = 60^\circ\text{C}$

| $V_{CC}(\text{V})$ | $R(\Omega)$ |
|--------------------|-------------|
| 8 ~ 12             | 47          |
| 10 ~ 14            | 68          |
| 12 ~ 16            | 91          |

In case of  $T_a(\text{max.}) = 75^\circ\text{C}$

| $V_{CC}(\text{V})$ | $R(\Omega)$ |
|--------------------|-------------|
| 7 ~ 9              | 27          |
| 8 ~ 10             | 39          |
| 9 ~ 11             | 51          |
| 10 ~ 12            | 62          |
| 11 ~ 13            | 75          |
| 12 ~ 14            | 82          |
| 13 ~ 15            | 100         |
| 14 ~ 16            | 110         |

## $P_D$ and $V_{CC}$

When maximum ambient temperature  $T_a(\text{max.}) = 60^\circ\text{C}$ ,  $V_{CC} > 9\text{V}$  /  $T_a(\text{max.}) = 75^\circ\text{C}$ ,  $V_{CC} > 7\text{V}$ ,  $P_D$  is over at the application circuit above. Select  $R$  value from the right list. And determine  $R$  watt by resistance value and total LED current.

## ■ Characteristics Curve

