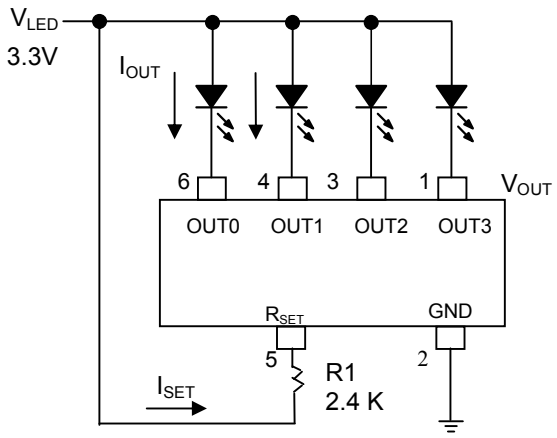
General Description

MBI1008 is designed for LED backlighting applications. Except an extra resistor, neither a capacitor, an inductor nor Schottky diode is needed; thus, it is easy and simple for customers to apply MBI1008 to LED backlighting applications. MBI1008 accepts a minimum input voltage down to 2.7V. MBI1008 has four constant-current outputs and the maximum current of each output can be 25mA. The output current of MBI1008 can be adjusted through an external resistor.

Customers can get very high efficiency (more than 92%) by well matching the input supply voltage, V_{LED}, and the LED forward voltage, Vf. MBI1008 adopts 6-pin SOT26 package.

Typical Application Circuit



※Neither an inductor, a capacitor nor Schottky diode is needed.

Application

In the cellular phone market, monochrome displays are still applied in a very high percentage. In the monochrome displays, green or amber LEDs, whose forward voltages, Vf, are lower than 2.3V, are applied. MBI1008 is well suited for being applied in the monochrome displays because the output current among 4 output channels is almost the same (the maximum error is less than 5%) so that MBI1008 can satisfy the requirements for the even current applied in the LED backlight. In addition, the power input, V_{LED}, can be easily supported by 3.3V of the existing cellular phone power supply rails.

As for the cellular phones with color displays, white LEDs are applied to be the backlight source and its forward voltage, Vf, is usually between 3.0V ~ 3.6V. An adequate voltage supply, 4.5V, is required to be V_{LED} for MBI1008.

In the traditional design, each of LEDs needs connecting to one resistor so that the current of each LED can be adjusted. But the traditional design cannot meet the productive efficiency because it requires lots of time to trim the resistor and the uniformity of LED current output cannot be ensured to be constant in various environments. However, MBI1008 can adjust the output current through one external resistor so as to balance the brightness of respective LED.

Quantity of LEDs applied in digital cameras, cellular phones, and PDAs:

Application	PDAs	DSCs	Cellular Phones
Quantity of LEDs	4 ~ 6 (Suited to 3"~ 4" screen)	2 (Suited to1.5" screen)	2 ~ 3 (Suited to 2.0" screen)

※MBI1008 satisfies all needs because it has four constant-current output ports.

Comparison Table

LED Backlighting	MBI1008	Resistors in parallel
Uniform LED Illuminiation	**Extremely Excellent** (The maximum current variation between LEDs is less than 5%.)	**Not Stable** (Need to adjust the resistor values connected to each LED to match the current.)
Adjust the Brightness	**Achivable** (By means of adjusting the resistor of the R_{SET} port or changing the input current, I_{SET}. Please refer to **Typical Application Circuit**.)	**Hardly Achivable**
Mass Production	**Convenient and Effective**	**Waste Labor Hours**
Expense	**Low and Competitive** (For details, please contact Macroblock sales staff.)	**Low**

Application Information

Selection of Resistor

R1 is used to regulate the LED current. For the best accuracy, a resistor with ±1% precision should be used.

LED Output Current

The LED output current values can be set by the formula:

$I_{OUT} \approx 22.85 \times (V_{LED} - V_{RSET}) / R1$,

where R1 is an external resistor connected to R_{SET} pin and V_{RSET} is the voltage value at the R_{SET} input pin (refer to **Typical Application Circuit**).

For example, if V_{LED} = 3.3V, V_{RSET} = 1.17V (typical value), what is the R1 value in order to have I_{OUT} = 20mA?

Calculated by the formula: $R1 \approx 22.85 \times (V_{LED} - V_{RSET}) / I_{OUT}$;

then, $R1 \approx 22.85 \times (3.3 - 1.17) / 20 = 2.4$ KΩ

For other LED current values, customers can use the above formula to choose R1 value.

Power Efficiency

MBI1008 can provide high efficiency. The efficiency value can be calculated by the formula: $(V_{LED} - V_{OUT}) / V_{LED}$ where V_{OUT} is the voltage value of the output port OUT0 ~ OUT3 (refer to **Typical Application Circuit**).