MSGBB557TA – 7 Color Blinking LED Circuit Setup and Usage

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I was looking to create some LED lighting effects for some holiday decorations. I came across an interesting LED that produced 7 colors and a blinking effect. The Micro Electronics LTD (http://www.microelectr.com.hk/) MSGBB557TA contains a red, green, and blue LEDs tied to an IC chip that controls the current flow to each LED – see Figure 1. The effect is to combine the three colors to get 7 colors: R, G, B, RG, GB, RB, and RGB.
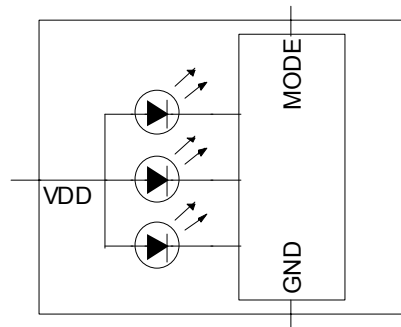

Figure 1 - The MSGBB557TA Internal Model

When power is first applied to the LED, it cycles through all 7 colors four times. First it rotates through all 7 colors at a slow rate twice. It then cycles through the colors again at a higher twice, and then it stops. It doesn't continuously blink or cycle through all the colors. Unfortunately, the datasheet provided little information on the use of the LED. Searching the web provided different clues, ideas, and videos to the operation of the part. I thought it might be interesting to bring all these ideas together.
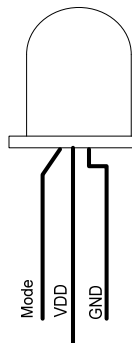

Figure 2 - Pin Out

The LED has three pins: VDD, GND and a Mode. The Mode pin selects the color that is to be displayed after the initial power up sequence. The datasheet shows a switch between the Mode pin and ground. To create the circuit, a series resistor is need on the VDD pin. The basic formula to find the resistor value is, where V_S is the power supply and V_L is the turn on voltage of the LED:

$$R = (V_S – V_L)/I$$

For this circuit I chose to use a 9V battery since I had both the battery connector and battery already available. The LED's forward voltage (operating supply) is 3.2V typical and the forward current is 35mA typical. The resistor value is found using the formula:

$$R = 165\Omega = (9 - 3.2)/0.035$$

180Ω is the closest resistor available. I chose to limit the current further and use 330Ω ½ watt resistor. Figure 3 shows the final circuit.
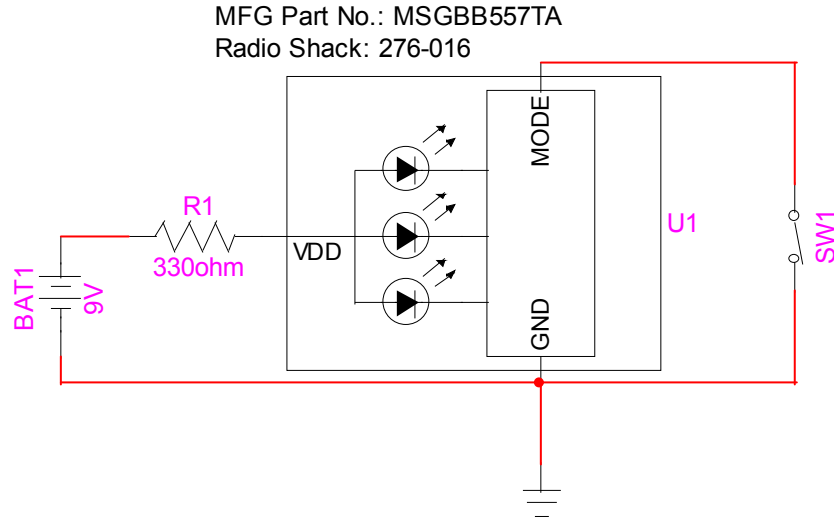
MFG Part No.: MSGBB557TA
Radio Shack: 276-016

Figure 3 - Basic Circuit for the MSGBB57TA

The mode switch (SW1) is a momentary switch, and it is closed to start. After the circuit has powered up and cycled through the colors 4 times (2 slowly and 2 fast), the LED stops with the RED LED on. The mode switch (SW1) is used to set the state of the LED. If the switch is connect so Mode is connected to ground, the LED will turn off. Press the switch again, the Green LED turns on. Another press will turn the LED off. The table below shows the sequence after the RED LED is on:

SW1 Press	LED State
1	Off
2	Green On
3	Off
4	Blue On
5	Off
6	Red and Green On
7	Off
8	Green and Blue On
9	Off
10	Red and Blue On
11	Off
12	Red, Green, and Blue On
13	Off
14	1Hz Cycle through all 7 colors continuously
15	Off
16	Red On – start cycle

Table 1 – Mode Switch Sequencing For Figure 3 Circuit

The LED can be set to cycle through all 7 colors continuously once the proper mode is set. Using the mode switch appears to be what the manufacturer intended. Connecting the Mode switch to the GPIO of a micro controller would make for an interesting exercise.

Someone else on the web found an interesting characteristic. When they used ~600Ω series resistor, the LED would stay in the initial 7 color power on rotation indefinitely. I found the same characteristic using an 800Ω resistor – see Figure 4. The higher resistance starves the internal LED circuit enough so it resets to the initial one shot power on sequence. Probably not the intended use, but it is an interesting trick if you want the 7 colors to continuously rotate on startup.
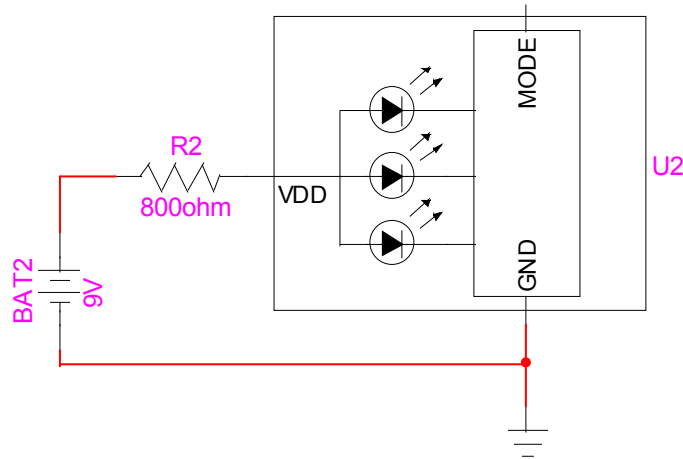

Figure 4 - Continues 7 Color Rotation Circuit

The MSGBB557TA is an interesting LED, but the lack of documentation appears to have stumped some folks. Hopefully, the information provided here will be useful for those using the device in their projects.