

RGB LED Observations

Chris Isaacson

6/22/05

Description:

5mm (T1-3/4) common cathode RGB LED. Purchased qty of 50 on ebay 5/27/05 from Chi Wing. No documentation came with the package.

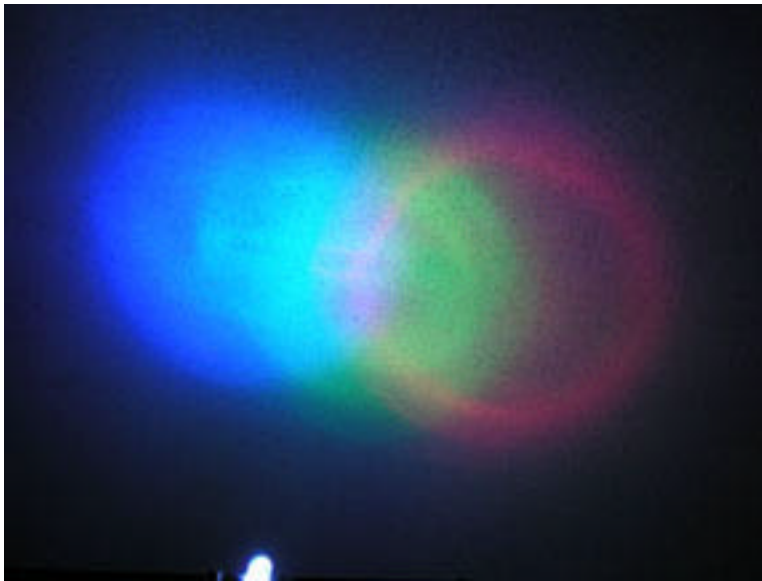
5 units were visually compared and all 5 seemed identical in brightness, color, and pattern. I assumed that the allowable constant current for each color is 20mA. I also assume allowable pulsed current will be higher. One unit was used to complete the following observations. Each color was driven separately with individual bench power supplies (Circuit Specialists Model CSI1802X). All grounds were tied together.

Beam Spread and Offset:

Red beam spread: Approximately 44 degrees. The circular pattern was offset from the axis of the LED by about 20 degrees. The pattern of the red beam was not uniform in that there is a bright ring around a dimmer center.

Green beam spread: Approximately 40 degrees. The circular pattern was aligned axially with the LED and was fairly uniform.

Blue beam spread: Approximately 34 degrees. The circular pattern was offset from the axis of the LED by about 12 degrees in a direction almost directly opposite that of the red beam. The beam is fairly uniform.



LED is 5 inches away from wall. Photo appears more blue than actual.

Brightness:

I measured brightness with an inexpensive foot-candle meter. The LED was held 1.75 inches away (so the beam filled the sensor area). Brightness measurements were taken at 5mA current increments. It seems as if the meter is much more sensitive to the green wavelengths. The green color is definitely brighter to the human eye but not by as much as the meter would indicate. The red seems very inadequate compared to the blue and green



Red Brightness (FC)

Current (mA)	Foot-Candles	Forward voltage
0	0	1.65
5	1.8	1.80
10	3.9	1.83
15	5.8	1.86
20	7.6	1.87
25	9.8	1.89
30	11.5	1.90

Green Brightness (FC)

Current (mA)	Foot-Candles	Forward voltage
0	0	2.50
5	47.2	2.93
10	76.8	3.01
15	99.9	3.07
20	121.8	3.13
25	137.2	3.18
30	155.2	3.23

Blue Brightness (FC)

Current (mA)	Foot-Candles	Forward voltage
0	0	2.35
5	3.1	2.75
10	5.7	2.89
15	9.9	3.03
20	11.2	3.15
25	13.1	3.21
30	15.5	3.30

Colors:

I don't have access to any spectral analysis equipment so I don't have wavelength data. All colors seemed to be consistent with most individual LEDs I've seen. As mentioned before, color seems uniform from one unit to the next.

As seen from above, the beam patterns do not lend themselves well to uniform color mixing. I was able to get good color mixing by coupling the LED with a bundle of plastic optical fiber and pointing the other end of the bundle toward. The brightness is definitely diminished.



The color of this beam is actually as white as I could achieve. The camera is more sensitive to blues at the settings I used. Brightness is 7.2 FC

I achieved some pretty good color mixes with the following current settings (in mA).

Color	Red Current	Green Current	Blue Current
Orange	29	2	0
Yellow	29	4	0
Chartreuse	29	12	0
White	29	7	12
Purple	29	0	19
Rose/Pink	29	0	8
Aqua	0	22	18