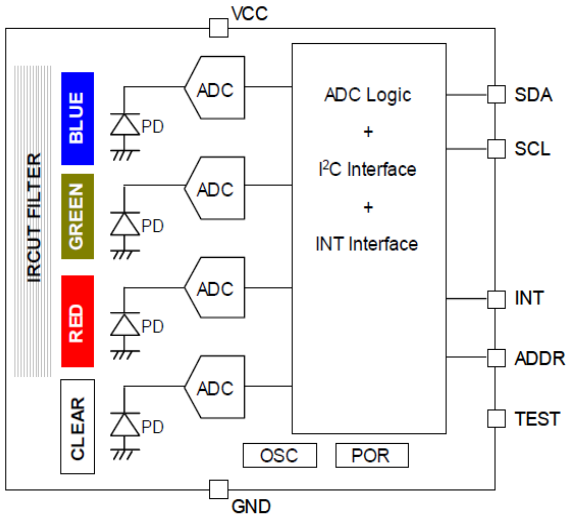
Using the BH1745NUC for Color Detection

General Description

The BH1745NUC is a digital color sensor IC with I^{2}C bus interface. This IC senses Red, Green and Blue light (RGB) and converts them to digital values. High sensitivity, wide dynamic range, and excellent Ircut characteristics makes this IC the most suitable to detect the illuminance and color temperature of ambient light for adjusting LCD backlighting in TVs, mobile phones, and tablet PCs. It is possible to detect a very wide range of light intensities (0.005 to 40k lx).



Advantages

- Excellent Ircut filter characteristics
- High sensitivity and wide dynamic range (0.005 to 40k lx)
- Supports low transmittance (Dark) windows
- I^{2}C bus interface (f/s mode support)
- Low current via Power Down function
- 50Hz/60Hz light noise rejection
- 1.8V logic interface
- Programmable Interrupt function
- I^{2}C bus slave address selection: (ADDR ='L': "0111000", ADDR ='H': "0111001")

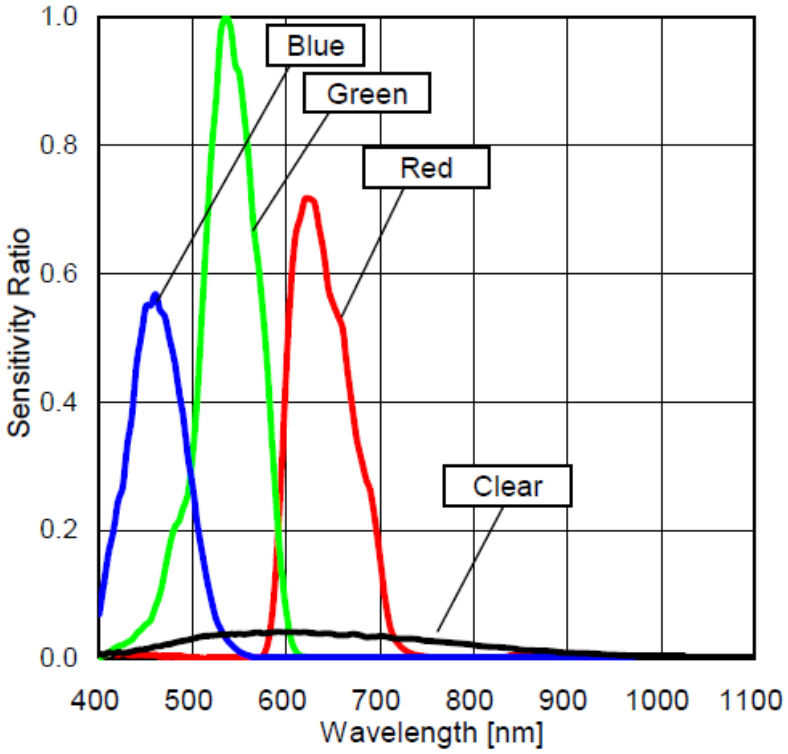


Figure 1. RGBC Spectral Response

Sensor Features

We are using the BH1745NUC to identify colors. Though the concept of 'color' (light spectrum) is determined by the light source along with the adsorption and transmission characteristics of the materials that interact with the light, we are attempting to remove external parameters by shielding the area and providing a known LED light source that will act as a common light source for our measurements.

The BH1745NUC provides 16bit ADC resolution on each of its branches, which should theoretically allow the system to represent gradations in color that might not be so evident to the human eye. By carefully examining the range of colors for identification, tolerance values can be assigned to allow for conclusive color identification even in the presence of noise.

Test Platform:

- BH1745NUC
- LED (light source)
- Color card (ID target)

Sensor Module:

- BH1745NUC Color Sensor
- PSL0210WBCW1 LEDs
- RF4E080 FET

Test Procedure:

1. Calibration

2. Place a sample under the enclosure
3. Wait for output on the LCD screen

The system shines light on a color sample while measuring the Red, Green and Blue responses in each of the internal photodiodes. The casing surrounding the system (enclosure) is included to reduce internal interference that may affect the responses on the photodiodes.

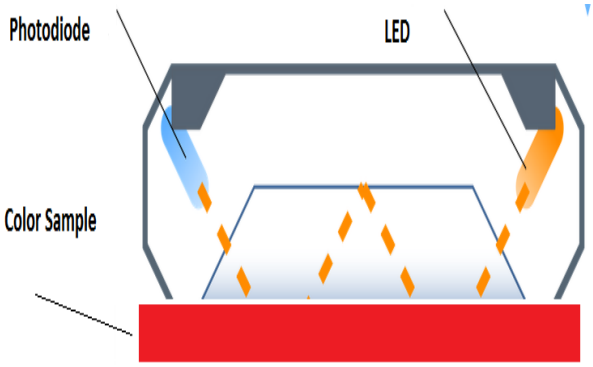


Figure 1- Operating Principle

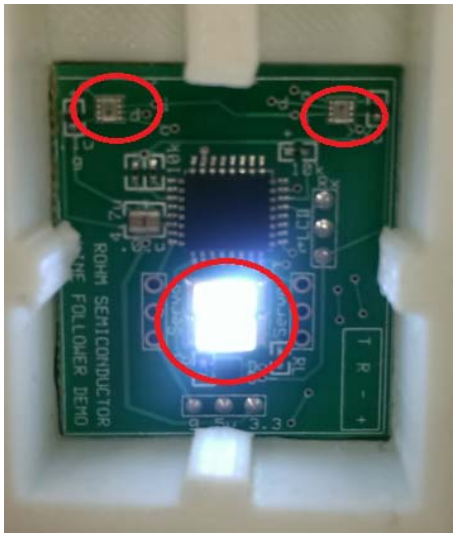
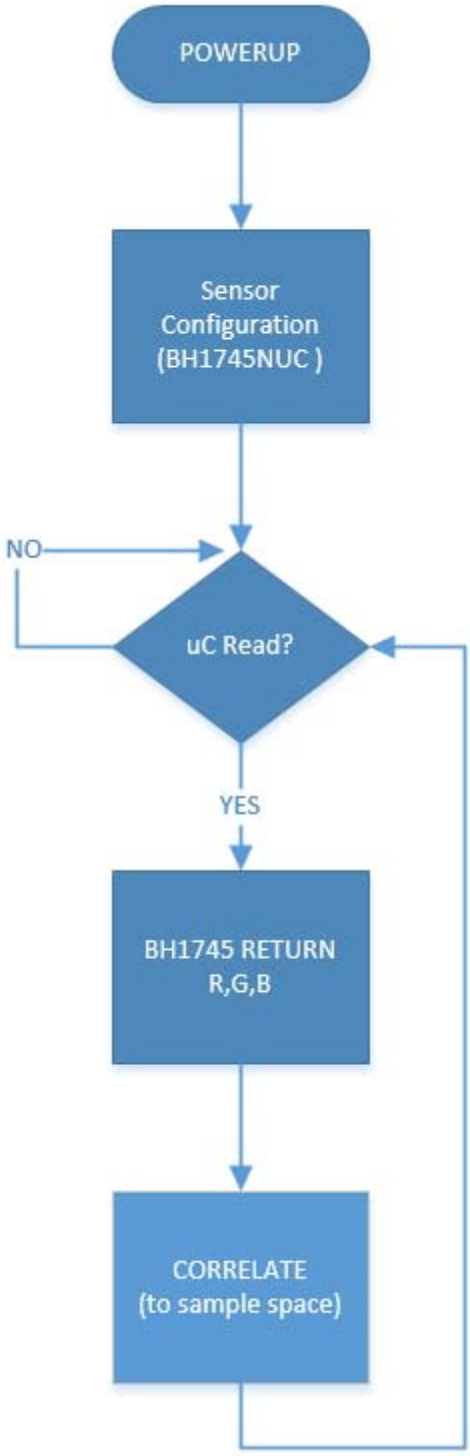


Figure 2- Sensor & LED Enclosure

Figure 3- Sensor and Display



Algorithm

The microcontroller collects several RGB readings from the sensor in an array for processing. At this point, the data is sorted to filter out variations that would skew the readings, then converted to HSL (Hue, Saturation, and Lightness) for better noise immunity. If a match exists, it is displayed on the LCD screen