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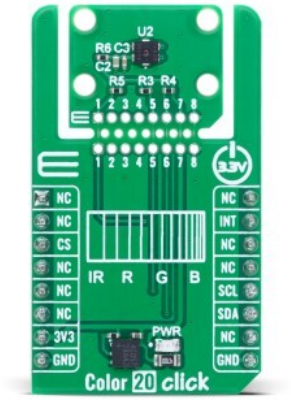
# Color 20 Click





PID: MIKROE-6547

**Color 20 Click** is a compact add-on board used for precise detection of visible and infrared light levels in embedded applications. It is based on the VEML6046X00 sensor from Vishay Semiconductor, a high-accuracy, automotive-grade color sensor with AEC-Q100 qualification. The sensor features integrated photodiodes, a low-noise amplifier, a 16-bit ADC, and communicates via I2C with interrupt support for event-driven designs. It offers peak sensitivity at 600nm (red), 550nm (green), 470nm (blue), and 820nm (IR), with an ambient light range of up to 176,000 lux and fine resolution of 0.0053 lux. Color 20 Click also supports the Click Snap format, allowing the sensor area to be detached for flexible installation. It is ideal for automotive applications such as display backlight control, infotainment optimization, rear-view mirror dimming, CCT measurement, and mood lighting systems.

For more information about **Color 20 Click** visit the official product page.

## How does it work?

Color 20 Click is based on the VEML6046X00, a high accuracy color digital sensor from Vishay Semiconductor that brings advanced color sensing capabilities to embedded applications. This automotive-grade, AEC-Q100 qualified sensor integrates a set of precision photodiodes, a low-noise amplifier, and a high-resolution 16-bit analog-to-digital converter, delivering reliable and consistent color data across a broad range of lighting conditions. It communicates over an I2C interface and supports an additional interrupt feature for responsive system integration. Color 20 Click is especially suited for automotive applications, where precise color and light monitoring is essential. It supports a range of functions such as automatic display backlight adjustment, infotainment system enhancement, rear-view mirror dimming, and interior lighting optimization. Additionally, it is ideal for head-up displays, color recognition tasks, correlated

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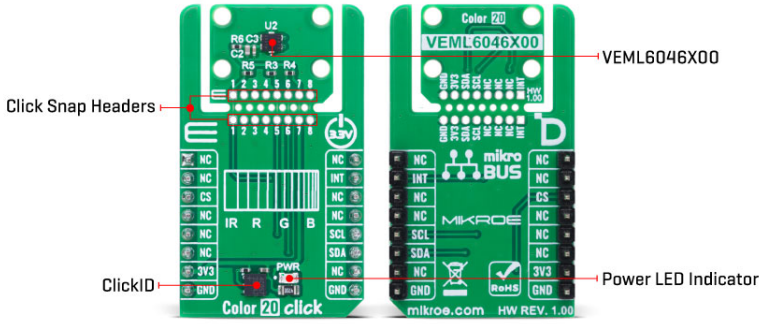
color temperature (CCT) measurements, and mood lighting control.




The VEML6046X00 sensor provides distinct peak sensitivity values at 600nm for red, 550nm for green, 470nm for blue, and 820nm for infrared, enabling accurate RGBIR detection in both natural and artificial light environments. With an impressive ambient light detection range of 0 to 176,000 lux and a fine resolution of just 0.0053 lux, this sensor excels in capturing subtle changes in lighting for dynamic system response.

This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main sensor area to become movable by breaking the PCB, opening up many new possibilities for implementation. Thanks to the Snap feature, the VEML6046X00 can operate autonomously by accessing its signals directly on the pins marked 1-8. Additionally, the Snap part includes a specified and fixed screw hole position, enabling users to secure the Snap board in their desired location.

This Click board™ uses an I2C interface with clock speeds of up to 400kHz, ensuring fast communication with the host MCU. Beyond communication pins, this board is also equipped with an interrupt (INT) pin that enables the host to MCU to sleep or ignore the sensor results until a user-defined event occurs (whether the light is above or below interest levels).

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. It also comes equipped with a library containing functions and example code that can be used as a reference for further development.

## Click Snap

**Click Snap** is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the official page dedicated to this feature.

## Specifications

| | |
|---|---|
| Type | Color Sensing,Optical |

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| | |
|---|---|
| Applications | Ideal for automotive applications such as display backlight control, infotainment optimization, rear-view mirror dimming, CCT measurement, and mood lighting systems |
| On-board modules | VEML6046X00 - digital color sensor from Vishay Semiconductor |
| Key Features | Color sensing for RGB and IR channels, high-precision 16-bit ADC, broad ambient light detection range, fine resolution of 0.0053 lux, I2C communication interface, integrated interrupt output for event-driven systems, Click Snap feature, automotive-grade AEC-Q100 qualified sensor, and more |
| Interface | I2C |
| Feature | Click Snap,ClickID |
| Compatibility | mikroBUS™ |
| Click board size | M (42.9 x 25.4 mm) |
| Input Voltage | 3.3V |

## Pinout diagram

This table shows how the pinout on Color 20 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

| Notes | Pin | mikroBUS | | | | Pin | Notes |
|---|---|---|---|---|---|---|---|
| | NC | 1 | AN | PWM | 16 | NC | |
| | NC | 2 | RST | INT | 15 | **INT** | Interrupt |
| ID COMM | **CS** | 3 | CS | RX | 14 | NC | |
| | NC | 4 | SCK | TX | 13 | NC | |
| | NC | 5 | MISO | SCL | 12 | **SCL** | I2C Clock |
| | NC | 6 | MOSI | SDA | 11 | **SDA** | I2C Data |
| Power Supply | **3.3V** | 7 | 3.3V | 5V | 10 | NC | |
| Ground | **GND** | 8 | GND | GND | 9 | **GND** | Ground |

## Onboard settings and indicators

| Label | Name | Default | Description |
|---|---|---|---|
| LD1 | PWR | - | Power LED Indicator |

## Color 20 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | - | 3.3 | - | V |
| Peak Sensitivity (R/G/B/IR) | | 600/550/470/820 | | nm |
| Ambient Light Range | - | - | 176000 | lx |
| Ambient Light Resolution | - | 0.0053 | - | lx |

## Software Support

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Color 20 Click demo application is developed using the NECTO Studio, ensuring compatibility with mikroSDK's open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a mikroBUS™ socket.

**Example Description**

This example demonstrates the use of the Color 20 Click board by reading and displaying the ambient light levels in the red, green, blue, and infrared (IR) spectrum.

Key Functions

- color20_cfg_setup This function initializes Click configuration structure to initial values.
- color20_init This function initializes all necessary pins and peripherals used for this Click board.
- color20_default_cfg This function executes a default configuration of Color 20 Click board.
- color20_get_data This function the raw IR data and red, green, and blue light intensity in lux based on raw RGB data.

Application Init

Initializes the logger and the Color 20 Click driver, then applies the default configuration.

Application Task

Reads and displays the red, green, blue (in lux), and IR raw values every 200 ms.

**Application Output**

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following this tutorial.
- UART Terminal - Monitor data via the UART Terminal using a USB to UART converter. For detailed instructions, check out this tutorial.

**Additional Notes and Information**

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the NECTO Studio. The application code can also be found on the MIKROE GitHub account.

## Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

ClickID

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## Downloads

Color 20 click example package

Color 20 click 2D and 3D files v100

Color 20 click schematic v100

VEML6046X00 datasheet