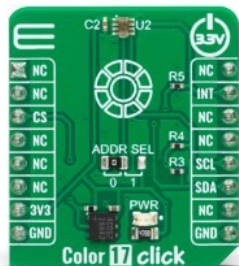


Color 17 Click



PID: MIKROE-5702

Color 17 Click is a compact add-on board representing an accurate color-sensing solution. This board features the [OPT4048](#), a high-speed precision tristimulus XYZ color sensor from [Texas Instruments](#). The sensor has four sensing channels and uses precision optical filters to mimic the normal vision of the human eye. The OPT4048 also has 12 configurable conversion times that range from 600µs up to 800ms, with measurements that can be read synchronously or asynchronously. It is not excessively sensitive to micro-shadows and the small particles on the optical surface. This Click board™ makes the perfect solution for the development of applications for camera image correction, auto-white balancing, lighting control systems, building automation and control, or general display brightness and color adjustments.

How does it work?

Color 17 Click is based on the OPT4048, a high-speed precision tristimulus XYZ color sensor from Texas Instruments, designed to mimic the human eye's normal vision. The human eye has spectral sensitivity in a range of short, middle, and long wavelengths but in a correlation with a range of brightness. The CIE XYZ color space represents all color sensations visible to an average human eye, where the X is a mix of the three CIE RGB curves, the Y is the illuminance, and the Z is a quasi-equal to blue, according to the CIE 1931 model. The CIE XYZ is fixed color space, and one must note that there is a difference between the objects that emits light (and color) and objects that reflect light (and color). To put it more clearly, the monitor you look at and the wall behind it.

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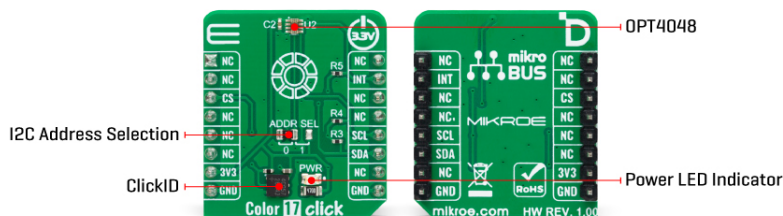
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The OPT4048 has three channels closely matching the CIE tristimulus spectra and a fourth with a wide-band spectral response. Measures from these channels give us the characteristics of the lighting environment, such as the light intensity, color, LUV coordinates, and correlated color temperature. While closely mimicking the human eye, the OPT4084 rejects the wavelengths from their peaks, especially the NIR region (infrared) that the human eye does not see, which is a crucial part of this sensor.

To achieve excellent filter performance even at higher angles of light incidence, the OPT4084 uses advanced filter technology, high-resolution color measurements, and built-in automatic full-scale light range selection logic. By default, the OPT4048 is configured to operate in an automatic full-scale range detection mode that always selects the best full-scale range setting for the given lighting conditions. There are seven full-scale range settings, one of which can also be selected manually. Setting the device to operate in automatic full-scale range detection mode frees the user from having to program their software for potential iterative cycles of measurement and readjustment of the full-scale range until good for any given measurement. It also shows excellent linearity over the entire 26-bit dynamic range of measurement from 2.15mlux up to 144klux, with a highly linear response within each range.

The Color 17 Click uses an I2C 2-Wire interface supporting a Fast mode of up to 400KHz, and I2C burst mode to communicate with the host MCU. The I2C address can be selected via the ADDR_SEL jumper with 0 selected by default. The sensor has several modes of operation: Power-Down mode, Continuous mode as a normal mode of operation, and a one-shot mode in which the sensor can be triggered to work depending on the user setup. One of the triggers can be the interrupt functionality, where the INT pin is used for hardware-synchronized triggers and interrupts. The OPT4084 features a threshold detection logic that allows MCU to sleep or do other things while the sensor watches when an appropriate interrupt event occurs.

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

Specifications

Type	Optical
Applications	Can be used for the development of applications for camera image correction, auto

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	white balancing, lighting control systems, building automation and control, or general display brightness and color adjustments
On-board modules	OPT4048 - high-speed precision tristimulus XYZ color sensor from Texas Instruments
Key Features	Four channels for close mimic of the human eye spectra, high precision and resolution, built-in automatic full-scale light range selection, configurable conversion times, reject the NIR region, interrupt and hardware synchronized triggers, low power consumption, and more
Interface	I2C
Feature	ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Color 17 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					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
JP1	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1

Color 17 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Lux Detection Range	-	-	144	klux
Peak Wavelength (X/Y/Z/W)	600/550/460/500			nm

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Resolution	9	-	20	bits
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Software Support

We provide a library for the Color 17 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Library Description

This library contains API for Color 17 Click driver.

Key functions

- color17_get_cct Color 17 gets correlated color temperature data function.
- color17_get_measurement Color 17 gets light and color measurement data function.
- color17_set_config Color 17 set the configuration function.

Example Description

This library contains API for the Color 17 Click driver. This example displays CCT data, Light intensity level and the light color names.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Color17

Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART 2 Click](#) or [RS232 Click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MIKROE [compilers](#).

mikroSDK

This Click board™ is supported with [mikroSDK](#) - MIKROE Software Development Kit, that needs to be downloaded from the [LibStock](#) and installed for the compiler you are using to ensure proper operation of mikroSDK compliant Click board™ demo applications.

For more information about mikroSDK, visit the [official page](#).

Resources

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[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[OPT4048 datasheet](#)

[Color 17 click 2D and 3D files v100](#)

[Color 17 click example on Libstock](#)

[Color 17 click schematic v100](#)

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