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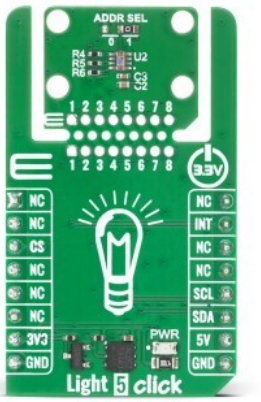
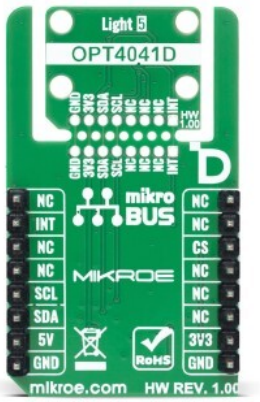
Light 5 Click





PID: MIKROE-6905

Light 5 Click is a compact add-on board designed for high-speed digital ambient light measurement in applications that require human-eye-matched illumination sensing and broad spectral light detection. This board is based on the OPT4041, a dual-channel light-to-digital ambient light sensor from Texas Instruments that measures both visible and wide-band spectral content through independent sensing paths. Featuring engineered optical filters for strong near-infrared rejection on the visible channel, a wide-band channel with extended NIR sensitivity, a semi-logarithmic output structure with automatic range selection, and configurable conversion times Light 5 Click delivers high resolution, wide dynamic range, and reliable performance across varying lighting conditions. It is ideally suited for IP network cameras, video doorbells, analog security systems, door and window sensors, and embedded systems that rely on accurate and responsive ambient light sensing.

For more information about **Light 5 Click** visit the official product page.

How does it work?

Light 5 Click is based on the OPT4041, a dual-channel light-to-digital ambient light sensor from Texas Instruments that measures visible light and wide-band spectral content through two independent sensing paths, enabling both accurate lux readings and broad-spectrum light analysis. The visible ALS channel features a spectral response that closely matches the photopic response of the human eye and incorporates a specially engineered optical filter to strongly reject near-infrared components from common light sources, ensuring consistent lux measurements even when the sensor is placed behind dark or tinted glass. Complementing this, the wide-band channel delivers a broad spectral response that extends into near-infrared wavelengths, including 850nm and 940nm, allowing the system to detect and evaluate a wide

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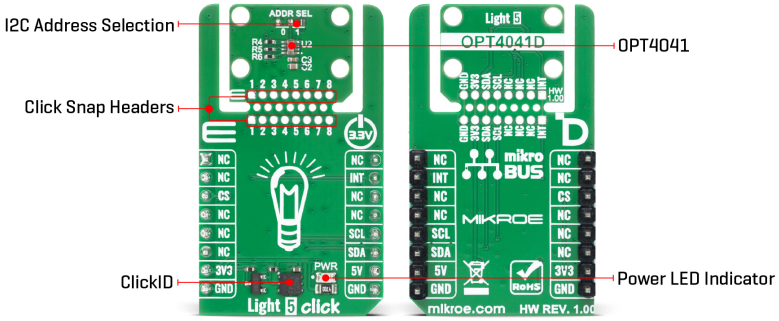
range of spectral content beyond standard visible light. Light 5 Click is well suited for IP network cameras, video doorbells, analog security cameras, door and window sensors, and a wide range of embedded systems that demand a high-resolution and spectrally accurate ambient light sensing.



The OPT4041 provides a semi-logarithmic digital output structure with binary logarithmic full-scale light ranges and highly linear response within each range, offering exceptional dynamic performance and resolution across changing lighting conditions. The visible channel supports nine binary light ranges spanning from ultra-low levels of 585µlux up to 157klux, delivering an effective dynamic range of 28 bits, while the wide-band channel supports seven ranges from 192.3pW/cm² to 12.91mW/cm² with 26 bits of effective dynamic range. An integrated automatic range selection engine continuously optimizes the internal gain settings based on ambient light levels, ensuring maximum resolution and measurement fidelity without the need for user intervention.

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/IC/module area to become movable by breaking the PCB, opening many new possibilities for implementation. Thanks to the Snap feature, the OPT4041 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.

Designed to replace traditional low-accuracy photodiodes, photoresistors, and conventional ambient light sensors, the OPT4041 significantly improves system performance in applications that rely on precise light detection to enhance user experience and operational reliability. The device supports configurable light conversion times from 600µs to 800ms per channel across 12 programmable steps, combining light integration and analog-to-digital conversion to provide system designers with fine control over speed, resolution, and power consumption.

This Click board™ uses an I2C interface ensuring fast communication with the host MCU. The I2C address of the OPT4041 can be easily configured via onboard jumper marked ADDR SEL in the Snap area, allowing multiple devices to coexist on the same bus. Beyond communication pins, this board is also equipped with an interrupt pin (INT) that signals the host MCU when a specific light condition is met, such as when the light levels exceeds a predefined threshold. This allows the system to respond immediately to changes in ambient light without constantly polling the sensor, thereby saving processing power and energy.

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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	Ambient Light,Optical
Applications	Ideal for IP network cameras, video doorbells, analog security systems, door and window sensors, and embedded systems that rely on accurate and responsive ambient light sensing
On-board modules	OPT4041 - high-speed dual-channel digital ambient light sensor from Texas Instruments
Key Features	Dual-channel light-to-digital ambient light sensing for visible and wide-band spectral content, human-eye-matched ALS channel with strong near-infrared rejection, wide-band channel with extended NIR sensitivity, semi-logarithmic digital output with binary logarithmic full-scale light ranges, automatic gain and range selection for optimal resolution across changing light conditions, ultra-wide dynamic range, I2C communication, Click Snap format, 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 Light 5 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

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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	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	ADDR SEL	Right	I2C Address Selection 0/1: Left position 0, Right position 1

Light 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Visible Channel Light Range	0.000585	-	157000	lux
Wide-Band Channel Light Power Density	0.0000001923	-	12.91	mW/cm²
Near-Infrared Sensitivity (WB Channel)	850	-	940	nm

Software Support

Light 5 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 Light 5 Click board for ambient light measurement. The application waits for a data-ready interrupt and then reads illuminance (lux) and wide-band light intensity values via the I2C interface, displaying the results on the serial terminal.

Key Functions

- light5_cfg_setup This function initializes Click configuration structure to initial values.
- light5_init This function initializes all necessary pins and peripherals used for this Click board.
- light5_default_cfg This function executes a default configuration of Light 5 Click board.
- light5_get_int_pin This function returns the INT pin logic state.
- light5_read_data This function reads the light intensity in lux and wide band measurement in uW/cm2.

Application Init

Initializes the logger and Light 5 Click driver and applies the default device configuration.

Application Task

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Waits for the interrupt signal indicating new measurement data and reads light measurement results, which are then logged to the serial terminal.

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

Downloads

Light 5 click example package

Light 5 click 2D and 3D files v100

Light 5 click schematic v100

OPT4041 datasheet