AMBIENT 7 CLICK

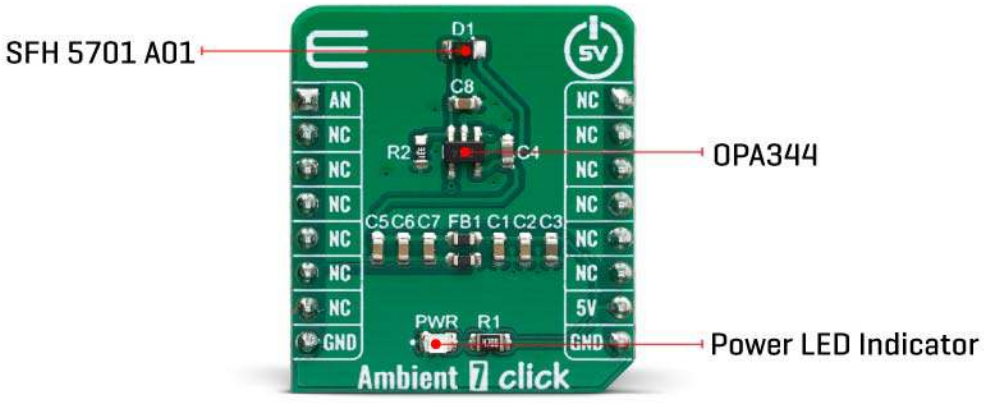
PID: MIKROE-3601
Weight: 25 g

Ambient 7 Click is a light intensity-sensing and measuring Click board™, which features an accurate light-intensity sensor labeled as SFH 5701 A01, made by Osram Opto Semiconductors. It offers a high measurement accuracy in wide range of the actual light intensity. The spectral response of the sensor is calibrated to closely match the spectral response of the human eye. Thanks to its high level of integration, the sensor requires a minimal number of external components.
Ambient 7 click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

The influence of the light source type on the measurement accuracy is quite reduced. The sensor is capable of converting the light intensity from any type of light source, including daylight, fluorescent light, LED light, incandescent light, and so on. It also features Integrated dark current suppression and thermal compensation, which helps eliminating enviromental effects to measurement results. Its low power consumption, compact size, and high sensitivity, make this sensor an ideal solution for both the IoT light-sensing applications, but also for portable or handheld devices which utilize an accurate light intensity sensing, such as the TFT/LCD screens, keypad backlight, Smart TVs, cell phones, digital cameras, and similar.

HOW DOES IT WORK?

As mentioned previously, Ambient 7 click uses the SFH 5701 A01, an accurate light-intensity sensor from Osram Opto Semiconductors. This sensor has many features that make it a perfect solution for small designs such as the Ambient 7 Click board™. One of these features is certainly its high level of integration, that allows a minimal number of external components, leaving room for an additional operational amplifier, labeled as OPA344, made by Texas Instruments, proven in many designs.



As the SFH 5701 A01 limits the output current proportionaly to ambient light intensity, it creates an analog voltage on the R2 resistor (shunt). That voltage is directly proportional to the flowing current and thus the ambient light intensity. The previously mentioned operational amplifier serves as a unity gain amplifier (buffer), to ensure good analog measurement signal integrity. The output of the unity gain amplifier is routed to the mikroBUS™ AN pin. The voltage on the AN pin can be measured bz internal ADC integrated in the main MCU on the development board.

The accuracy of SFH 5701 A01 sensor is not influenced by the light source type. It is calibrated so its spectral response is closely matched to a spectral response of the human eye. It is also worth to mention that the sensor qualification test plan is referenced to the guidelines of AEC-Q102 – a failure mechanism based stress test qualification for discrete optoelectronic semiconductors in automotive applications.

Built in thermal compensation ensures that the measurement results are valid in wide temperature range and thanks to integrated dark current suppression, the output signal while the sensor is exposed to dark environment is as minimal as possible. The sensor is operational in very wide Illuminance range – from 0.01lx up to 10000lx. In other words, it has linear response over 6 decades of illumination range.

This Click Board™ is designed to be operated only with 5V logic level. A proper logic voltage level conversion should be performed before the Click board™ is used with MCUs with logic levels of 3.3V.

SPECIFICATIONS

Type	Optical
Applications	This sensor is an ideal solution for both the IoT light-sensing applications, but also for portable or handheld devices which utilize an accurate light intensity sensing, such as the TFT/LCD screens, keypad backlight, Smart TVs, cell phones, digital cameras, and similar.
On-board modules	SFH 5701 A01, an accurate light-intensity sensor from Osram Opto Semiconductors.
Key Features	A spectral response similar to human eye, low power consumption, Integrated dark current suppression, Built in thermal compensation, Linear response over 6 decades of illumination range
Interface	Analog
Input Voltage	5V
Compatibility	mikroBUS
Click board size	S (28.6 x 25.4 mm)

PINOUT DIAGRAM

This table shows how the pinout on **Ambient 7 click** corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Analog Out	AN	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	NC	
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
	NC	7	3.3V	5V	10	5V	Power supply
Ground	GND	8	GND	GND	9	GND	Ground

ONBOARD JUMPERS AND SETTINGS

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator

SOFTWARE SUPPORT

We provide a library for the **Ambient 7 click** on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Library Description

The library contains ADC functions to completely setting and reading the value from the ADC channel that sends Ambient click. The ambient light measurement resolution depends on the ADC resolution you use.

Key functions:

- `void ambient7_adcInit()` - ADC init.
- `void ambient7_adcSetInputChannel()` - ADC set input channel.
- `uint32_t ambient7_adcRead()` - ADC read data.

Examples description

The application is composed of three sections :

- System Initialization - Initializes UART for logging data.
- Application Initialization - Initialization driver init and ADC init.
- Application Task - Reads ADC value and this data logs to USBUART every 1 sec..
- note - Illuminance range [EV] - from 0.01[lx] to 10k[lx] depending on the ADC you are using.

```
void applicationTask()
{
    uint16_t ADC_value;
    char demoText[ 50 ];

    ADC_value = ambient7_adcRead();

    WordToStr(ADC_value, demoText);
    mikrobus_logWrite(" ADC value: ", _LOG_TEXT);
    mikrobus_logWrite(demoText, _LOG_LINE);
    Delay_ms( 500 );
}
```

The full application code, and ready to use projects can be found on our LibStock page. Other mikroE Libraries used in the example:

- ADC Library.
- Conversions Library.

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. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

MIKROSDK

This click board is supported with mikroSDK - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant click board demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.