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Ambient 9 Click

PID: MIKROE-4197

Ambient 9 Click is a compact add-on board that contains an integrated ambient light sensing and proximity detector with IR LED in an optical module. This board features the APDS-9160-003, digital ALS, and IR sensing, an IR LED, and a complete proximity sensing solution from Broadcom Limited, that is fit to be used under a small aperture of the devices cover windows. It has a wide dynamic range, the proximity detection feature operates well from bright sunlight to dark rooms, and both the PS and ALS functions independently provides maximum flexibility in applications. This Click board™ is fitting for display management to extend battery life and provide optimum viewing in diverse lighting conditions.

Ambient 9 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.

How does it work?

Ambient 9 Click is based on the APDS-9160-003, digital proximity, and ambient light sensing sensor from Broadcom Limited. The ambient light sensor provides a photopic response to light intensity in low light conditions or behind a darkened glass. It approximates the response of the human eye providing direct readout where the output count is proportional to the ambient light level. The proximity detection also operates well from bright sunlight to dark rooms. Additionally, the device can be put into a low-power standby mode providing a very low average power consumption.
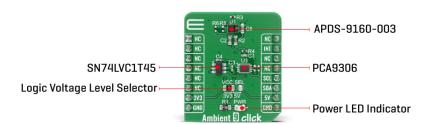
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SN74LVC1T45

Logic Voltage Level Selector

APDS-9160-003

PCA9306

Power LED Indicator

In a proximity sensing system, the included IR LED can be pulsed with more than 100 mA of rapidly switching current. The number of LED pulses can be configured by using the pulse step, and the LED modulation frequency can be set from 60 kHz to 100 kHz in 5 steps. Proximity sensing resolution can vary from 8 to 11 bits, and the measurement rate can vary from 6.25 ms to 400 ms. This Click board™ is easy to program and read data because it does not require an overly demanding configuration. In order to read ambient or proximity data, it is only necessary to enable certain registers which can also be seen in an example code that contains easy to use functions that may be used as a reference for the further development.

Ambient 9 Click communicates with the MCU using the standard I2C 2-wire interface. Standard (100 kHz) and Fast (400 kHz) I2C communication modes are available with the device. The I2C bus lines are routed to the dual bidirectional PCA9306 voltage-level translator from Texas Instruments, which allows interfacing with both 3.3V and 5V MCUs. It also generates flexible ambient and proximity programmable interrupt signals routed on the INT pin of the mikroBUS™, which are triggered if upper or lower threshold values are crossed. It is also possible to deactivate a sensor after a certain interrupt event occurred.

This Click Board™ is designed to be operated with both 3.3V and 5V logic levels that can be selected via VCC SEL jumper. This allows for both 3.3V and 5V capable MCUs to use the I2C communication lines properly.

Specifications

Type	Optical
Applications	Can be used for display management to extend battery life and provide optimum viewing in diverse lighting conditions.
On-board modules	Ambient 9 Click is based on the APDS-9160-003, digital proximity, and ambient light sensing sensor from Broadcom Limited.
Key Features	Low power consumption, high precission, programmable interrupt, high sensitivity in low lux condition, and more.
Interface	I2C
Feature	No ClickID

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Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Ambient 9 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS			Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	**INT**	Interrupt
	NC	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	VCC SEL	Left	Power Supply Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

Ambient 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	-	3.63	V
Peak Wavelength	-	940	-	nm
Output Resolution	-	18	-	bit
Operating Temperature Range	-40	-	+85	°C

Software Support

We provide a library for the Ambient 9 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

Library provides functions for basic reading and writing to device. There are some specific functions for enabling sesnors and reading data from previous enabled sensor.

Key functions:

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- void ambient9_enable_data (uint8_t als_ps) - Enable one of sensors
- uint32_t ambient9_als_data (void) - Read ALS data
- uint16_t ambient9_proxy_data (void) - Read proximity data

Examples description

The application is composed of three sections :

- System Initialization - Initialization of I2C communication module, log and interrupt pin
- Application Initialization - Reads device status if it's power on and part ID, then enables one of two sensor reading values.
- Application Task - Read one of two sleceted sensor values every 100ms.

The full application code, and ready to use projects can be found on our LibStock page.

Other mikroE Libraries used in the example:

- I2C
- Conversions
- UART

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.

Resources

mikroSDK

mikroSDK

Click board™ Catalog

Click boards™

Downloads

Ambient 9 click example on Libstock

Ambient 9 click 2D and 3D files

APDS-9160-003 datasheet

[SN74LVC1T45 datasheet](#)

[PCA9306 datasheet](#)

[Ambient 9 click schematic](#)