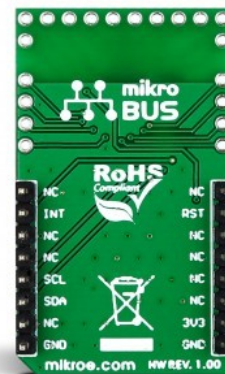# Cap Extend Click

PID: MIKROE-2238

Cap Extend Click is a compact add-on board that brings 12 pins for connecting capacitive inputs. This board features the SX8633, a low-power capacitive button touch controller with enhanced LED drivers and proximity sensing from Semtech. The SX8633 can use any conductive object as an input. In addition, this Click board™ features 8 GPIO pins available on the side edges that can be used as LED drivers. An interesting application where the LEDs slowly fade in as the user's finger approaches can be made by combining the capacitive sensing with the PWM of the LED drivers. This Click board™ makes the perfect solution for the development of touch-activated lighting controls, touch-activated control panels, and other applications that need a switch or a button to power or reset the device or the proximity, and LED applications.

Cap Extend 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?

Cap Extend Click is based on the SX8633, a low-power capacitive button touch controller with enhanced LED drivers and proximity sensing from Semtech. It is a fully integrated 12-channel solution that requires no external components. The SX8633 IC has a 10-bit ADC and up to 100pF offset capacitance compensation at full sensitivity. Thanks to the high resolution, it supports a wide variety of touchpad sizes and shapes to be used with this Click board™. An overlay material up to 5mm thick can also be used for extremely robust ESD immune system design, simplifying integration into touch panels, control units, and similar applications. The SX8633 features auto offset calibration to eliminate false triggers due to temperature and

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humidity and is initiated on power-up.

The principle of touch buttons and proximity sensing operation is almost identical. The only difference is that proximity sensing is done several centimeters through the air above the overlay, while as a button, it has an ON state if a finger or hand touches it and OFF if it is far from the sensor. The Analog Sensing Interface (ASI) converts the sensors' charge into digitally processed ticks in both applications. The ASI consists of an ADC, DAC, multiplexer, analog switches, a reference voltage, and an external integration capacitor. In LED applications, the Auto-light mode can initiate the LED fade effect individually for each GPIO, with 256 PWM steps of linear and logarithmic control.

The SX8633 has three operating modes. The Active mode has fast scan periods with a typical reaction time of up to 30ms, in which interval all enabled sensors are scanned and data is processed. The Doze mode can increase scan period time, thus and the reaction time up to 195ms. In Sleep mode, the SX8633 goes OFF except for the communication interface and GPI peripheral, at which time it does not do any sensor scanning. Users can manipulate those scan periods for Active and Doze modes in relation to power consumption. To enter the Active mode from Doze, the user can simply touch any button.

To communicate with the host microcontroller, the Cap Extend Click uses an I2C 2-Wire interface in standard and fast mode with a maximum clock frequency of 400KHz. The interrupt INT pin is also available and is updated in Active or Doze once every scan period. The interrupt will be asserted when a button event or a GPI edge occurs when entering Active or Doze and will be cleared as soon as the host MCU performs a read. In addition, there is an RST pin for resetting the SX8633 with active LOW.

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. 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	Capacitive
Applications	Can be used for the development of touch-activated lighting controls, touch-activated control panels, and other applications that need a switch or a button to power or reset the device, or the proximity, and LED applications
On-board modules	SX8633 - capacitive button touch controller with enhanced LED drivers and proximity sensing from Semtech
Key Features	12 pins for connecting capacitive inputs, supports wide variety of touch pads, proximity sensing up to several centimeters, 8 GPIO pins that can be used as LED driver with independent PWM source with configurable intensity and fading, low power for optimized application, and more
Interface	I2C

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Time-saving embedded tools

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Feature	No 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 Cap Extend 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	
Reset	**RST**	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	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
-	PWR	-	Power LED Indicator
-	Sense	Unpopulated	Capacitive Sensors Connection Header
-	GPIO	Unpopulated	General-Purpose I/Os Header

Cap Extend Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V

Software Support

We provide a library for the Cap Extend 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 Cap Extend Click driver.

Key functions

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- This function does a software reset of the click module.

- This function reads the MSB button map data.

- This function reads the LSB button map data.

Example Description

This example showcases the initialization and configuration of the logger and click modules and later on shows how to read and display the 16-bit button map (LSB + MSB).

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.CapExtend

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. 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

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

Cap Extend click example on Libstock

SX8633 datasheet

Cap Extend click 2D and 3D files

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[Cap Extend click schematic](#)