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UWB 3 Click

PID: MIKROE-5898

UWB 3 Click is a compact add-on board that brings Ultra-Wideband communication to your application. This board features the DWM3001, a fully integrated UWB transceiver module from Qorvo. The module integrates the DW3110 IC, nRF52833 MCU, planar UWB antenna, accelerometer, power management, and crystal. It is a fully calibrated, tested, and validated design. This Click board™ makes the perfect solution for the development of precision real-time location systems (RTLS) using two-way ranging or TDoA schemes in various markets, location-aware wireless sensor networks (WSNs), and more.

UWB 3 Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the mikroBUS™ standard. It comes with the mikroSDK open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this Click board™ apart is the groundbreaking ClickID feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

UWB 3 Click is based on the DWM3001, a fully integrated UWB transceiver module from Qorvo. The module can be used in two-way ranging and TDoA applications. It is designed to comply with the FiRa™ PHY and MAC specifications, enabling interoperability with other FiRa™-compliant devices. It supports channels 5 (6.5GHz) and 9 (8GHz) and data rates of 850Kbps up to 6.8Mbps with a maximum packet length of 1023 bytes for high data throughput applications. Besides the planar UWB printed antenna, there is also a Bluetooth chip antenna for an onboard Nordic Cortex-M4 32-bit MCU with 64MHz clock speed for utilizing a BLE radio transceiver. This Nordic MCU is the brain of the module. The nRF52833 has advanced on-chip interfaces, such as NFC-A and USB 2.0 (full-speed 12Mbps), available on UWB 3 Click in a USB C

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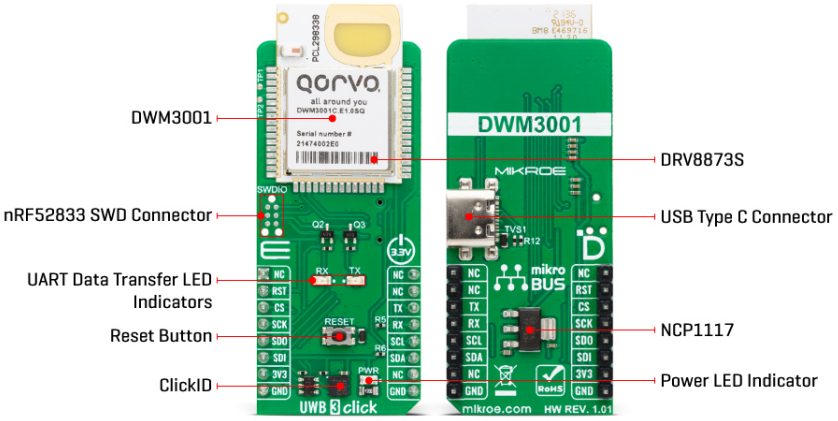

The DWM3001 UWB transceiver also incorporates the LIS12DH, a low-power three-axis linear accelerometer from STMicroelectronics. It is necessary as RTLS tags commonly use accelerometers to initiate UWB ranging only when a tag moves so that battery life can be extended by staying in the lowest power mode by default. Near-field communication type 2 (NFC-A) can be used by adding an NFC antenna to the TP1 and TP2 pads.

UWB 3 Click can use a standard 2-Wire UART interface of the nRF52833 to communicate with the host MCU with commonly used UART RX and TX pins and baud rates of 115200bps. There are RX and TX LEDs for visual presentation of data flow. It can also use a 4-Wire SPI serial interface on 32MHz for communication. The I2C interface, besides the communication with the Nordic MCU, allows you to read the data from the accelerometer. You can reset the module over the RST pin but also over the RESET button. The nRF52833 firmware can be updated over the SWDIO 6-pin needle connector.

NOTE: The current module firmware does not support the SPI and I2C serial interfaces; these interfaces are reserved for future use.

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. Also, this Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used as a reference for further development.

Specifications

Applications	Can be used for the development of precision real-time location systems (RTLS) using two-way ranging or TDoA schemes in various markets, location-aware wireless sensor networks (WSNs), and more
On-board modules	DWM3001 - fully integrated UWB transceiver module from Qorvo
Key Features	Support IEEE 802.15.4 – 2015, and IEEE 802.15.4z BPRF, fully aligned with FiRaTM PHY, MAC, and certification development, supports

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	channels 5 and 9, Bluetooth, AES-128/256 security block, low power consumption, and more
Interface	I2C,SPI,UART,USB
ClickID	Yes
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on UWB 3 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	
Reset / ID SEL	**RST**	2	RST	INT	15	NC	
SPI Select / ID COMM	**CS**	3	CS	RX	14	**TX**	UART TX
SPI Clock	**SCK**	4	SCK	TX	13	**RX**	UART RX
SPI Data OUT	**SDO**	5	MISO	SCL	12	**SCL**	I2C Clock
SPI Data IN	**SDI**	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
LD2	RX	-	RX LED Indicator
LD3	TX	-	TX LED Indicator
T1	Reset	-	Reset Button

UWB 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Operating Frequency	6250	-	8250	MHz
Channel Bandwidth	-	500	-	MHz
Data Rates	850	-	6800	Kbps

Software Support

We provide a library for the UWB 3 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.

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Library Description

This library contains API for UWB 3 Click driver.

Key functions

- uwb3_send_cmd This function sends a specified command to the click module.
- uwb3_send_cmd_with_parameter This function sends a command with specified parameter to the click module.
- uwb3_reset_device This function resets the device by toggling the RST pin state.

Example Description

This example demonstrates the use of an UWB 3 Click board™ by showing the communication between the two click boards.

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.UWB3

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

ClickID

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Downloads

NCP1117 datasheet

UWB 3 click example on Libstock

UWB 3 click schematic

UWB 3 click 2D and 3D files

DWM3001C datasheet