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ISM 9 Click

PID: MIKROE-6911

ISM 9 Click is a compact add-on board for long-range sub-GHz wireless communication operating in the 868MHz Short Range Device (SRD) frequency band. It is based on the Tarvos-e (2609051181000) RF radio module from Würth Elektronik, which integrates the CC1310 wireless microcontroller from Texas Instruments. The CC1310 combines an ultra-low-power Arm® Cortex®-M3 processor with a high-performance sub-GHz RF transceiver, supporting communication distances of up to 3km line-of-sight with RF output power up to 14dBm. Key features include integrated Flooding Mesh networking functionality, flexible addressing supporting up to 65,535 nodes across 255 networks, multiple operating modes including command and transparent modes, as well as wake-up and status signaling for power and communication management. This Click board™ is ideal for wireless sensor networks, industrial automation, smart agriculture, environmental monitoring, building automation, and Industrial Internet of Things (IIoT) applications.

For more information about **ISM 9 Click** visit the official product page.

How does it work?

ISM 9 Click is based on the Tarvos-e (2609051181000), an RF radio module from Würth Elektronik that incorporates the CC1310 wireless microcontroller from Texas Instruments. The CC1310 device is built around an ultra-low-power Arm® Cortex®-M3 core combined with a high-performance sub-GHz RF transceiver, enabling energy-efficient data transmission over long distances. This Click board™ is intended for applications that require wireless connectivity while maintaining minimal power consumption, making it suitable for battery-powered and remote sensing devices used in industrial automation, smart agriculture, environmental monitoring, building automation, and Industrial Internet of Things (IIoT) systems.

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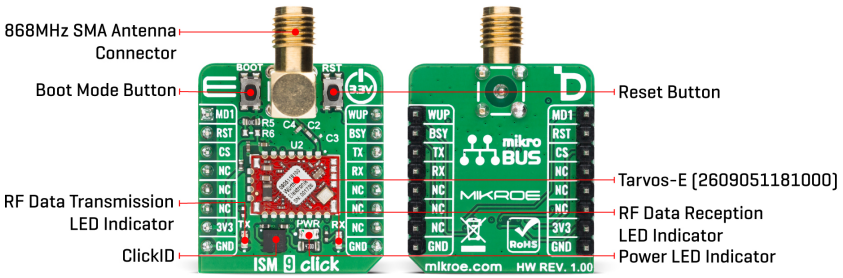

The Tarvos-e module supports operation within the 868MHz Short Range Device (SRD) frequency band and delivers an RF output power of up to 14dBm, allowing communication distances of up to 3 kilometers in line-of-sight conditions depending on the antenna configuration and environmental factors. One of the key features of this module is its integrated Flooding Mesh functionality, which enables the creation of self-organizing wireless networks where messages are automatically propagated across multiple nodes to ensure reliable data delivery even in challenging environments or large installations. The addressing scheme implemented by the module provides exceptional flexibility, supporting up to 65,535 nodes organized within 255 independent networks, which makes it well suited for scalable distributed sensor networks and large device deployments.

The ISM 9 Click communicates with the host MCU through a UART interface using the TX and RX pins, enabling serial communication for configuration, control, and data exchange with the Tarvos-e radio module. In addition to the UART communication lines, the board also uses several control and status pins that allow the user to manage the module's operating modes, firmware update process, and power behavior. The RST pin provides a hardware reset function for the module, allowing the user to restart the device when required, and this functionality is mirrored by the onboard RST push-button that performs the same reset operation manually. The board also includes a BOOT button used to control the module's boot mode. When this button is pressed during startup, the UART bootloader is enabled, allowing firmware updates to be performed through the UART interface, while the default startup behavior loads and runs the application firmware already stored in the module.

Another important control signal is the MD1 pin, which determines the module's operating mode during boot. When the MD1 pin is held at a LOW logic level during startup, the module initializes in command mode, allowing the user to configure communication parameters and network settings through serial commands. When the MD1 pin is held at a HIGH logic level during startup, the module enters transparent mode, in which incoming UART data is transmitted directly over the RF link without command interpretation. The board also provides the WUP pin, which is used for the module wake-up functionality. Applying a falling edge signal to this pin wakes the module from either shutdown or standby mode, allowing systems to conserve power when the radio is inactive and quickly resume operation when communication is required.

To provide clear feedback about the internal state of the radio module, the BSY pin is available as a status indicator. When this pin is at a HIGH logic level, it indicates that the module is currently busy processing data or handling RF communication, while a LOW logic level signals

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that the module is idle and ready to receive new commands or transmit data. For additional visual feedback, the ISM 9 Click board includes two onboard LED indicators that reflect RF communication activity. A yellow TX LED indicates RF data transmission, lighting up whenever the module is sending wireless data, while a blue RX LED indicates RF data reception, providing a clear visual signal when wireless data packets are received by the module.

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.

Specifications

Type	Sub-1 GHz Transceievers
Applications	Ideal for wireless sensor networks, industrial automation, smart agriculture, environmental monitoring, building automation, and Industrial Internet of Things (IIoT) applications
On-board modules	Tarvos-e (2609051181000) - 868MHz radio module from Würth Elektronik
Key Features	868MHz SRD band wireless communication, CC1310 ultra-low-power wireless MCU with Arm® Cortex®-M3 core, sub-GHz RF transceiver, communication range up to 3km line-of-sight, integrated Flooding Mesh networking capability, addressing supporting up to 65,535 nodes across 255 networks, UART bootloader support for firmware updates, RF transmission and reception LED indicators, and more
Interface	UART
Feature	ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

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

Notes	Pin	mikroBUS				Pin	Notes
Mode Control	**MD1**	1	AN	PWM	16	**WUP**	Wake Up
Reset	**RST**	2	RST	INT	15	**BSY**	Busy Indicator
ID COMM	**CS**	3	CS	RX	14	**TX**	UART TX
	NC	4	SCK	TX	13	**RX**	UART RX
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	

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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	TX	-	RF Data Transmission LED Indicator
LD3	RX	-	RF Data Reception LED Indicator
T1	RST	-	Reset Button
T2	BOOT	-	Boot Mode Button

ISM 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Frequency Range	863	868	870	MHz
Line-of-Sight Range	-	-	2700	m
Output Power	-	-	14	dBm

Software Support

ISM 9 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 ISM 9 Click board by showing the communication between two Click boards.

Key Functions

- ism9_cfg_setup This function initializes Click configuration structure to initial values.
- ism9_init This function initializes all necessary pins and peripherals used for this Click board.
- ism9_send_cmd This function sends a desired command packet from the Click context object.
- ism9_read_event This function reads an event packet from the ring buffer and stores it in the Click context object.
- ism9_get_user_setting This function reads data from the desired user settings index and stores it in the Click context event packet object.

Application Init

Initializes the driver, resets the Click board, reads the device info, and sends a message to initiate the communication with other Click board.

Application Task

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Reads and parses all the received event packets and displays them the USB UART. All incoming data messages received from the connected device will be echoed back.

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

ISM 9 click example package

ISM 9 click 2D and 3D files v100

ISM 9 click schematic v100

Tarvos-e (2609051181000) datasheet