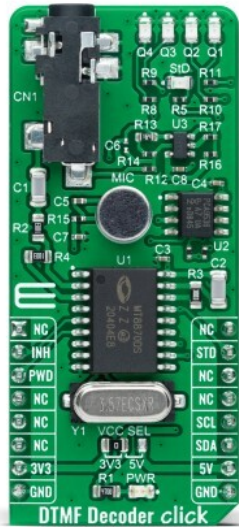


DTMF Decoder Click



PID: MIKROE-4579

DTMF Decoder Click is a compact add-on board that contains an integrated DTMF receiver with enhanced sensitivity. This board features the [MT8870D](#), a complete DTMF receiver integrating the band-split filter and digital decoder functions from [Microchip Technology](#). It offers low power consumption and high performance and uses digital counting techniques to detect and decode all 16 DTMF tone-pairs into a 4-bit code. Whenever a valid tone is detected, it outputs the associated value in binary on four LEDs, with an additional indicator that strobes after each new tone. This Click board™ is suitable for paging systems, remote control, electronic communications circuits, and various other applications.

DTMF Decoder 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?

DTMF Decoder Click as its foundation uses the MT8870D, an integrated DTMF receiver with enhanced sensitivity from Microchip Technology. It offers low power consumption and high performance and consists of a band split filter section, which separates the high and low group tones, followed by a digital counting section that verifies the received tones' frequency and duration before passing the corresponding code to the output bus.

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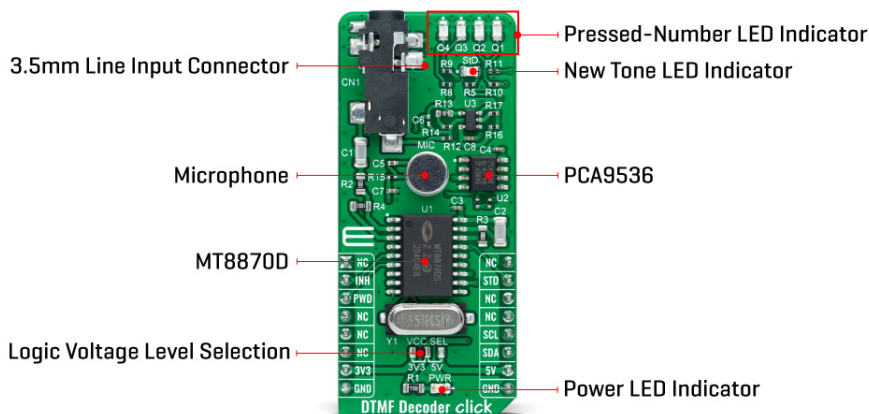
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This Click board™ has two ways to detect tones: with a mobile phone with a 3.5mm jack which provides the DTMF signals to MT8870D decoder, or using an onboard microphone used to listen the DTMF tones generated by the cell phone. The MT8870D uses digital counting techniques to detect and decode all 16 DTMF tone-pairs into a 4-bit code.

DTMF Decoder Click communicates with MCU using standard I2C 2-Wire interface, with a clock frequency up to 100kHz in the Standard and 400kHz in the Fast Mode. Using the [PCA9536](#) port expander that communicates with the MCU via I2C communication, it is possible to visually display, in binary form, the digit of the pressed number. The digit in binary form is then visually displayed using four red LEDs, labeled from Q1 to Q4, located in the board's upper right corner.

This Click board™ also has a power-down feature routed on the CS pin of the mikroBUS™ socket labeled as PWD. A logic high applied to pin PWD will power down the device to minimize the power consumption in a Standby mode, which stops the oscillator and the filters' functions. Also, it uses the interrupt pin of the mikroBUS™ labeled as STD with an additional LED indicator signaling that a received tone pair has been registered, and INH pin, which inhibits the detection of tones representing characters A, B, C, and D. The output code will remain the same as the previously detected code.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to properly use the I2C communication lines. However, the 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

Type	Signal Processing
Applications	Can be used for paging systems, remote control, electronic communications circuits, and various other applications.
On-board modules	MT8870D - an integrated DTMF receiver with enhanced sensitivity from Microchip Technology
Key Features	Low power consumption, complete DTMF receiver, high performance, internal gain

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	setting amplifier, power-down mode, inhibit mode, and more.
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

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

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
Inhibit Mode	INH	2	RST	INT	15	STD	New Tone Indicator
Power Down Mode	PWD	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
LD2	StD	-	New Tone LED Indicator
LD3-LD6	Q1 - Q4	-	Pressed-Number LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

DTMF Decoder Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Frequency	-	3.57954 5	-	MHz
Power Consumption	-	15	-	mW
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the DTMF Decoder Click as well as a demo application (example),

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developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [mikroE github account](#).

Library Description

This library contains API for DTMF Decoder Click driver.

Key functions:

- dtmfdecoder_cfg_setup - Config Object Initialization function.
- dtmfdecoder_init - Initialization function.
- dtmfdecoder_default_cfg - Click Default Configuration function.

Examples description

This example shows the basic tone capture of DTMF frequencies, decoding and representing them on the UART LOG.

The application is composed of three sections :

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [mikroE github account](#).

Other mikroE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.DTMFDecoder

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

[mikroBUS™](#)

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[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

Downloads

[PCA9536 datasheet](#)

[MT8870D datasheet](#)

[DTMF Decoder click 2D and 3D files](#)

[DTMF Decoder click schematic](#)

[DTMF Decoder click example on Libstock](#)

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