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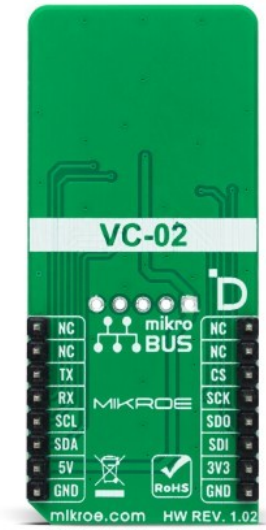
SpeakUp 3 Click



PID: MIKROE-5420

SpeakUP 3 Click is a compact add-on board providing an offline speech recognition solution. This board features the VC-02, a low-cost pure offline speech recognition module developed by Ai-Thinker Technology. The VC-02 module uses an integrated voice chip US516P6 based on a 32-bit RSIC architecture core, a DSP instruction set for signal processing and speech recognition, an FPU arithmetic unit, and an FFT accelerator. The VC-02 supports offline identification of 150 local instructions, RTOS lightweight system, firmware update feature, as well as the selection of the communication method with the module. This Click board™ provides customers with offline speech recognition suitable for all kinds of smart small household appliances, toys, lamps, and other products that need voice control.

SpeakUP 3 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.

NOTE: An appropriate Microphone and Speaker with PH2.0 female connector come in the same package as the Click board™ or can be acquired as a solo version in our shop.

How does it work?

SpeakUp 3 Click is based on the VC-02, an offline voice recognition AI module from Ai-Thinker Technology, characterized by high reliability and robust versatility. The VC-02 module uses an integrated voice chip US516P6 from Unisound, which continuously optimizes and innovates algorithms in speech recognition technology. The offline recognition algorithm is deeply integrated with the chip architecture, providing customers with an ultra-low-cost offline voice recognition solution. This board can be widely and quickly applied to all smart small household

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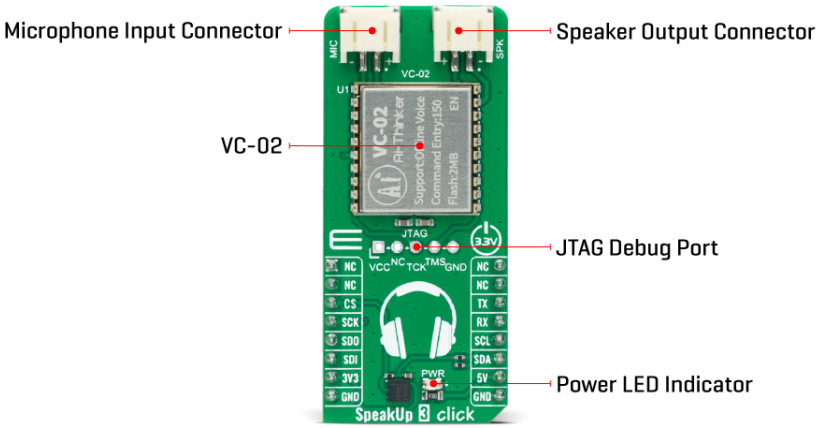
appliances and products requiring voice control.



The US516P6 chip uses a 32-bit RISC architecture core, running at 240MHz, and incorporates a DSP instruction set specifically for signal processing and speech recognition, an FPU arithmetic unit that supports floating-point operations, and an FFT accelerator (support 1024-point complex FFT/IFFT operations, or 2048-point real FFT/IFFT operations). What makes this module unique are features like offline identification of 150 local instructions and self-learning of wake-up words, RTOS lightweight system, 90% recognition rate in a far field distance from 1 up to 5m, firmware update feature, as well as the selection of the communication method with the module (Chinese and English language support).

This Click board™ comes with a configurable host interface allowing communication with the MCU using the chosen interface. The VC-02 can communicate with the MCU using the UART interface, a default communication interface with commonly used UART RX and TX pins, and a default baud rate of 115200bps. Users can also use other interfaces, such as SPI and I2C, to configure the module and write the library themselves.

At the center of the SpeakUp 3 Click, an additional unpopulated header offers full support for debugging and programming capabilities. The Ai-Thinker has provided its users with a VC series development page, where with a simple registration, they get the opportunity to create their own command list/SDK/firmware for this module quickly and easily for free. With this header, the user can use a JTAG interface, in addition to the UART interface, for programming and debugging available through the JTAG interface pins (TCK and TMS). For more information and help when creating custom firmware, you can contact their help center.

A special addition to this Click board™ are connectors, marked as MIC and SPK, for an analog omnidirectional microphone and 8Ω 2W cavity speaker from Shenzhen Anxinke Technology. These parts can be found in the same package as the Click board or can be acquired as a solo version in our shop.

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

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Type	Speech recognition
Applications	Can be used for offline speech recognition suitable for all kinds of smart small household appliances, toys, lamps, and other products that need voice control
On-board modules	VC-02 - offline voice recognition AI module from Ai-Thinker Technology
Key Features	Pure offline speech recognition module, high reliability, robust versatility, widely applied to smart home, offline identification of 150 local instructions, RTOS lightweight system, selectable communication interface, Chinese and English language support, low power consumption, and more
Interface	I2C,SPI,UART
ClickID	Yes
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V,5V

Pinout diagram

This table shows how the pinout on SpeakUp 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	
	NC	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	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
J1	JTAG	Unpopulated	JTAG Debug Header

SpeakUp 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Data Rate	-	-	3	Mbps
Flash Memory Size	-		2	MB

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SRAM Memory Size	-	-	242	kB

Software Support

We provide a library for the SpeakUp 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.

Library Description

This library contains API for SpeakUp 3 Click driver.

Key functions

- speakup3_generic_read This function reads a desired number of data bytes by using UART serial interface.
- speakup3_wait_for_reply This function waits up to @b wait_ms for a reply to the voice command.

Example Description

This example demonstrates the use of the SpeakUp 3 Click board™ by reading and displaying the voice commands reply messages.

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.SpeakUp3

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.

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Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

ClickID

Downloads

SpeakUp 3 click example on Libstock

VC-02 datasheet

SpeakUp 3 click 2D and 3D files

SpeakUp 3 click schematic