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Speaker 2 Click

PID: MIKROE-6515

Speaker 2 Click is a compact add-on board for high-quality audio playback and voice prompt applications. This board features the ISD2360, a 3-channel digital ChipCorder® from Nuvoton, which integrates flash memory for non-volatile audio storage and playback. The ISD2360 supports up to 64 seconds of audio storage with digital decompression, independent multi-channel playback, and a Class D speaker driver for driving the onboard AS01508AO-SC-R speaker. It features a standard SPI interface, configurable I/O pins, and built-in program verification, ensuring reliable operation with minimal external components. The board also includes selectable logic voltage levels (3.3V or 5V) and a jumper for independent digital power selection. Speaker 2 Click is ideal for embedded applications requiring clear voice prompts, sound effects, or pre-recorded messages, making it suitable for automation systems, consumer electronics, and industrial devices.

For more information about **Speaker 2 Click** visit the official product page.

How does it work?

Speaker 2 Click is based on the ISD2360, a 3-channel digital ChipCorder® from Nuvoton, designed to store and play high-quality audio using integrated flash memory. This Click board™ provides a way to manage and deliver voice prompts, sound effects, or pre-recorded audio messages, making it ideal for applications that require embedded audio playback without the complexity of external components. The ISD2360 features digital decompression, comprehensive memory management, and a fully integrated audio signal path, allowing it to handle up to three concurrent audio streams. Each playback channel operates independently, enabling precise micro-management of voice macro execution, particularly useful for complex audio sequences.

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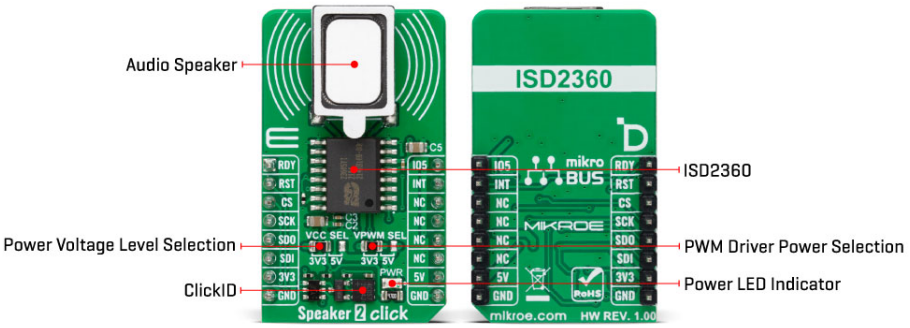

With built-in flash memory, the ISD2360 provides non-volatile storage for audio playback, supporting up to 64 seconds of audio based on an 8kHz/4-bit ADPCM compression format. This eliminates the need for external memory solutions while ensuring efficient storage and high-quality audio reproduction. The device simplifies audio management by offering a straightforward method for storing pre-recorded voice prompts, using an index-based command system that does not require manual address configuration. Additionally, executing pre-programmed macro scripts (Voice Macros) enhances flexibility in controlling playback sequences and system behavior.

One of the standout features of this Click board™ is its integrated Class D speaker driver, which is optimized for driving the onboard speaker, the AS01508AO-SC-R. This allows for clear audio output without requiring additional amplification stages. The ISD2360 is designed to function without external clock sources or supplementary components. Furthermore, it includes built-in non-volatile flash storage in 1Kbyte sectors, eliminating the need for separate EEPROM or flash memory devices for storing configuration data and audio files.

The ISD2360 supports various sampling frequencies, delivering excellent signal-to-noise ratio (SNR) performance while maintaining low power consumption. The fast programming time ensures quick audio storage, while the integrated program verification feature guarantees the reliability of recorded content.

Speaker 2 Click communicates with the host MCU using a standard SPI interface and several other pins, which are also multiplexed with six general-purpose I/O pins, providing additional flexibility in system integration. The ISD2360 is configured by writing to dedicated configuration registers, which can be done by directly sending configuration commands over the SPI interface or executing pre-programmed Voice Macros containing configuration instructions. In addition to standard interface and control pins, the board includes several auxiliary pins that enhance its functionality.

The RDY pin serves as an output to indicate the status of data transfer on the SPI bus, where a HIGH signal means the ISD2360 is ready to receive new SPI commands or data; alternatively, it can function as a general-purpose I/O pin. The INT pin is an active-low interrupt request signal that alerts the MCU to specific events and can also be repurposed as a general-purpose I/O. Additionally, the IO5 pin provides an extra general-purpose I/O option, further expanding the board's customization potential.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC

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SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. Additionally, the board features a VPWM SEL jumper, which allows for selecting the digital power supply for the PWM driver of the ISD2360 independently from the logic power supply of the Click board™ itself. This ensures greater flexibility in power management, enabling the user to optimize the board's operation based on the application's specific requirements. 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

Type	Speakers
Applications	Ideal for embedded applications requiring clear voice prompts, sound effects, or pre-recorded messages for automation systems, consumer electronics, and industrial devices
On-board modules	ISD2360 - 3-channel digital ChipCorder® IC with built-in flash storage from Nuvoton
Key Features	High-quality audio playback for voice prompts and sound effects, up to 64 seconds of non-volatile audio playback, supports up to three concurrent audio streams with independent control, onboard AS01508AO-SC-R speaker, SPI interface, configurable I/O pins, independent digital power selection, pre-programmed voice macros support, and more
Interface	GPIO,SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Speaker 2 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Data Transfer Status / General-Purpose I/O	**RDY**	1	AN	PWM	16	**IO5**	General-Purpose I/O
ID SEL	**RST**	2	RST	INT	15	**INT**	Interrupt / General-Purpose I/O
SPI Select / ID COMM	**CS**	3	CS	RX	14	NC	
SPI Clock / General-Purpose I/O	**SCK**	4	SCK	TX	13	NC	
SPI Data OUT / General-Purpose I/O	**SDO**	5	MISO	SCL	12	NC	
SPI Data IN / General-Purpose I/O	**SDI**	6	MOSI	SDA	11	NC	

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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
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	VPWM SEL	Left	PWM Driver Power Selection 3V3/5V: Left position 3V3, Right position 5V

Speaker 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Playback Duration	-	-	64	sec
Sampling Frequency	4	-	32	kHz

Software Support

Speaker 2 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 the Speaker 2 Click board. It initializes the board and plays predefined voice messages or sound effects through the speaker module. Supported voices include numbers (ONE to SIX) and sound effects like FAST BEEP.

Key Functions

- speaker2_cfg_setup Config Object Initialization function.
- speaker2_init Initialization function.
- speaker2_default_cfg Click Default Configuration function.
- speaker2_play_voice This function plays a voice at the specified index.
- speaker2_play_macro This function executes a macro command at the specified index.
- speaker2_play_voice_loop This function plays a voice in a loop for a specified number of iterations.

Application Init

Initializes the logger module, configures the Speaker 2 Click board, and applies the default settings to reset the device, power it up, verify communication, and load an example audio project into the device memory.

Application Task

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Sequentially plays predefined voice messages and sound effects from the Speaker 2 Click board while logging the playback status (DONE or ERROR) for each sound.

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

Speaker 2 click example package

Speaker 2 click 2D and 3D files v100

ISD2360 datasheet

AS01508AO-SC-R datasheet

Speaker 2 click schematic v100