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# AudioAMP 11 Click

PID: MIKROE-5584

**AudioAMP 11 Click** is a compact add-on board reproducing input audio signals with desired volume and power levels at sound-producing output elements. This board features the NAU8224, a high-performance stereo Class-D audio amplifier from Nuvoton Technology. This flexible I2C configurable audio amplifier can drive a 4Ω load with up to 3.1W output power. In addition to the possibility of digital control (using only one enable pin), the NAU8224 also has many useful gain settings from 6dB to 24dB. Besides, it is equipped with protection features, allowing a reliable operation. This Click board™ is suited for various types of consumer audio equipment applications.

## How does it work?

AudioAMP 11 Click is based on the NAU8224, a stereo Class-D audio amplifier from Nuvoton Technology. Besides an excellent quantity performance, such as high efficiency, the NAU8224 is also characterized by high output power and low quiescent current. It can drive a 4Ω load with up to 3.1W output power. This audio amplifier is designed to reduce high-frequency emissions with the ferrite bead filters on its outputs (speaker channels). The ferrite beads have a low impedance in the audio range, and because of that, they act as a pass-through filter in the audio frequency range. Furthermore, the NAU8224 has several protection features like thermal overload, short circuit, and supply under-voltage protection allowing a reliable operation.
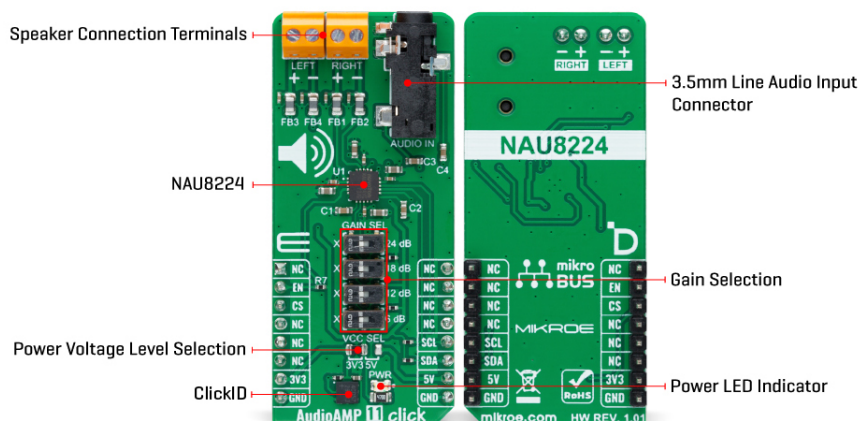
This Click board™ communicates with MCU using the standard I2C 2-Wire interface to read data and configure settings, supporting a Fast Mode operation up to 400kHz. The NAU8224 can be enabled or disabled using the EN pin of the mikroBUS™ socket, offering a switch operation to turn ON/OFF the audio amplifier. In addition to its possible digital control, the NAU8224 also has several gain settings, such as 6dB, 12dB, 18dB, and 24dB, selectable via onboard switches labeled as GAIN SEL. This audio amplifier also provides register-programmable volume control next to the hardware gain selection.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. 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 | Amplifier |
|---|---|
| Applications | Can be used for various types of consumer audio equipment applications such as personal media players, portable MP3 players, and more |
| On-board modules | NAU8224 - audio amplifier from Nuvoton Technology |
| Key Features | Powerful stereo audio amplifier, Class-D, selectable gain and volume, 4Ω load drive, high efficiency and performance, I2C interface, low power consumption, click-and-pop suppression, Shutdown mode, and more |
| Interface | I2C |
| Feature | ClickID |
| Compatibility | mikroBUS™ |
| Click board size | L (57.15 x 25.4 mm) |
| Input Voltage | 3.3V or 5V |

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ISO 27001: 2013 certification of informational security management system.
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## Pinout diagram

This table shows how the pinout on AudioAMP 11 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

| Notes | Pin | mikro BUS | | Pin | Notes |
|---|---|---|---|---|---|
| | NC | 1 | AN | PWM | 16 | NC | |
| Enable | **EN** | 2 | RST | INT | 15 | NC | |
| ID COMM | **CS** | 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 |
| JP1 | VCC SEL | Left | Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V |
| SW1 | GAIN SEL | Left | 24dB Gain Selection |
| SW2 | GAIN SEL | Left | 18dB Gain Selection |
| SW3 | GAIN SEL | Left | 12dB Gain Selection |
| SW4 | GAIN SEL | Left | 6dB Gain Selection |

## AudioAMP 11 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | 3.3 | - | 5 | V |
| Load Impedance | - | 4 | - | Ω |
| Output Power | - | - | 3.1 | W |
| Gain | 6 | - | 24 | dB |

## Software Support

We provide a library for the AudioAMP 11 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 AudioAMP 11 Click driver.

Key functions

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Time-saving embedded tools

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- audioamp11_enable_device AudioAMP 11 enable device function.

- audioamp11_check_gain AudioAMP 11 check gain function.

- audioamp11_set_output_volume_level AudioAMP 11 set output volume level function.

**Example Description**

This library contains API for the AudioAMP 11 click driver. This demo application shows use of a AudioAMP 11 Click board™.

The complete 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.AudioAMP11

**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. A UART terminal is available in all Mikroe compilers.

## mikroSDK

This Click board™ is supported with mikroSDK - Mikroe Software Development Kit, which needs to be downloaded from the LibStock and installed for the compiler you are using to ensure proper operation of mikroSDK compliant Click board™ demo applications.

For more information about mikroSDK, visit the official page.

## Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

ClickID

## Downloads

AudioAmp 11 click example on Libstock

NAU8224 datasheet

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[AudioAmp 11 click 2D and 3D files v101](#)

[AudioAmp 11 click schematic v101](#)

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