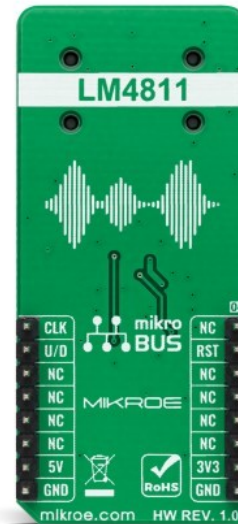
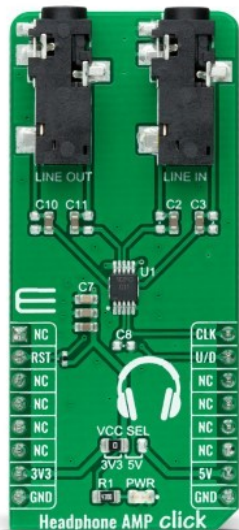


Headphone AMP Click



PID: MIKROE-4766

Headphone AMP Click is a compact add-on board that contains a stereo headphone amplifier. This board features the [LM4811](#), Boomer® audio power amplifier capable of delivering 105mW per channel with digital volume control from [Texas Instruments](#). The Boomer® amplifiers are specifically designed to provide high-quality output power with a minimal amount of external components. Since the LM4811 does not require bootstrap capacitors or snubber networks, it is optimally suited for low-power portable systems. It features a digital volume control that sets the amplifier's gain from +12dB to -33dB in 16 discrete steps, in addition to a micro-power consumption Shutdown mode. This Click board™ is suitable for portable electronics and audio systems, representing a perfect solution for remote, headphone audio-volume control applications.

Headphone AMP 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?

Headphone AMP Click as its foundation uses the LM4811, a stereo, analog input headphone amplifier with digital volume control from Texas Instruments. This headphone amplifier is designed to provide a high-quality output power using few external components and does not require bootstrap capacitors or snubber networks for stability improvement. The maximum power delivered by the LM4811 headphone amplifier is 105mW per one channel into 16Ω and 70mW with 16Ω load impedance. Other prominent features of the LM4811 also include digital volume control, "Click and Pop" suppression circuitry, and a low shutdown current of 0.3μA typical.

Mikroe produces entire development toolchains for all major microcontroller architectures.

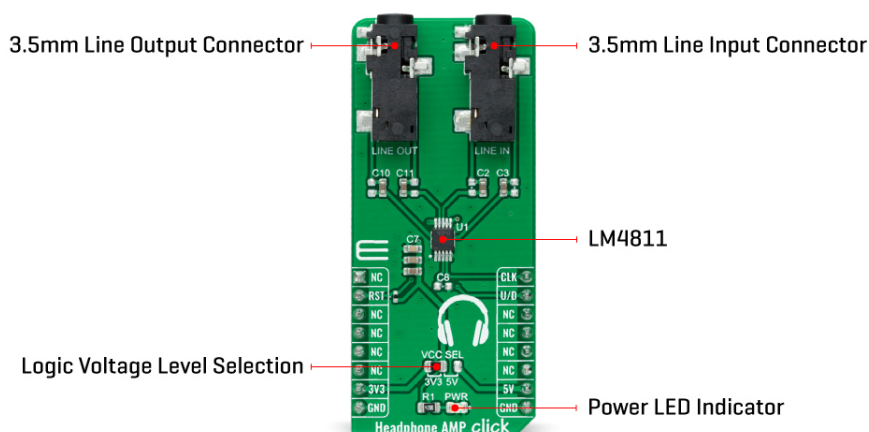
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).



This Click board™ communicates with MCU using several GPIO pins. The signals from the CLK and U/D pins, routed to the PWM and INT pins of the mikroBUS™ socket, controls the LM4811's gain. At each rising edge of the CLK signal, the gain will increase or decrease by a 3dB step depending on the logic voltage level applied to the U/D pin. A logic high voltage level applied to the U/D pin causes the gain to increase by 3dB at each rising edge of the CLK signal and vice versa. Upon devices' Power-On features, the amplifier's gain is set to a default value of 0dB. Sixteen discrete gain settings are available, ranging from +12dB maximum to -33dB minimum.

The unity-gain stable LM4811 also features an externally controlled, active-high, micro-power consumption Shutdown mode, available on the RST pin of the mikroBUS™ socket, to reduce power consumption while not in use. However, when coming out of Shutdown mode, the LM4811 will revert back to its previous gain setting. Alongside all these features, the LM4811 also has an internal thermal shutdown protection mechanism.

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 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	Signal Processing
Applications	Can be used for portable electronics and audio systems, representing a perfect solution for remote, headphone audio-volume control applications
On-board modules	LM4811 - stereo, analog input headphone amplifier with digital volume control from Texas Instruments
Key Features	Low power consumption, digital volume control, "Click and Pop" suppression, high-quality output power, no bootstrap capacitors, Shutdown feature, and more
Interface	GPIO, PWM

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

ClickID	No
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 Headphone AMP 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	CLK	Clock Signal
Shutdown	RST	2	RST	INT	15	U/D	Gain Control
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
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

Headphone Amp Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Output Power (@ 16Ω load)	-	105	-	mW
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the Headphone AMP Click as well as a demo application (example), 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 Headphone AMP Click driver.

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

Key functions:

- `headphoneamp_set_sound_volume` - Headphone AMP set sound volume function.
- `headphoneamp_volume_up` - Headphone AMP set sound volume up function.
- `headphoneamp_volume_down` - Headphone AMP set sound volume down function.

Example description

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

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.HeadphoneAMP

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™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[Headphone AMP click example on Libstock](#)

[Headphone AMP click schematic](#)

[LM4811 datasheet](#)

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

[Headphone AMP click 2D and 3D files](#)

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).