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Audio DAC Click





PID: MIKROE-5587

Audio DAC Click is a compact add-on board perfect for upgrading your audio equipment. This board features the PCM5142, a 32-bit 384kHz audio stereo DAC with the DIR9001 digital audio receiver from Texas Instruments. The DIR9001 can receive 24-bit/96kHz signals at the highest via S/PDIF optical cable and complies with various digital audio standards, like IEC60958-3, JEITA CPR-1205, AES3, and EBUtech3250. The DIR9001's output is then processed via a stereo audio DAC, the PCM5142, with the latest generation of TI's advanced segment-DAC architecture to achieve excellent dynamic performance, detailed heights, and an exceptionally good sound stage. This Click board™ is suitable for portable electronics and audio systems, representing a perfect solution for multimedia systems, satellite radio, CD and DVD players, and more.

Audio DAC 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?

Audio DAC Click is based on a combination of DIR9001 and PCM5142, a digital audio interface receiver and audio stereo DAC from Texas Instruments, suitable for upgrading your audio equipment. The DIR9001 audio receiver can accept signals up to a 108kHz sampling rate at the highest, 24-bit data word, biphase-encoded signal, and complies with the jitter specification IEC60958-3, JEITA CPR1205 (Revised version of EIAJ CP-1201), AES3, and EBUtech3250. These signals are brought to the DIR9001 via an onboard fiber optic S/PDIF connector, better known as Sony/Philips digital interface format, a digital audio interface often used in consumer audio equipment. After receiving the signals, the DIR9001 forwards them for further processing by

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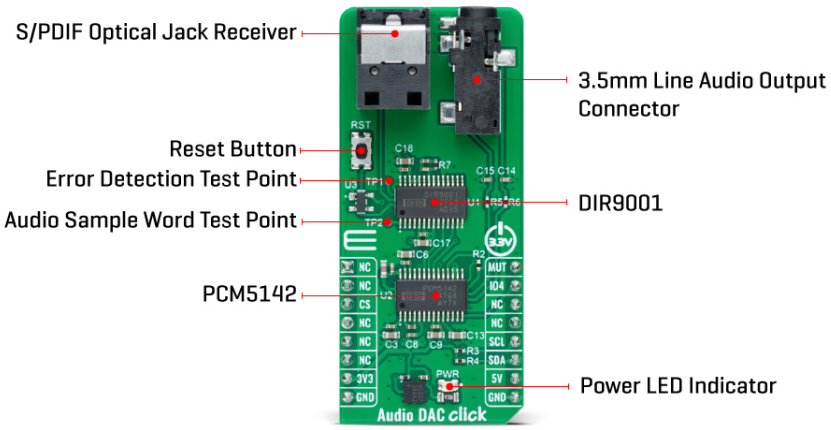
the stereo audio DAC, the PCM5142, also from Texas Instruments.



The PCM5142 has a fully programmable miniDSP core, allowing developers to integrate filters, dynamic range controls, custom interpolators, and other differentiating features into their applications. It uses the latest generation of TI's advanced segment-DAC architecture to achieve excellent dynamic performance, detailed heights, and an exceptionally good sound stage. Compared with existing DAC technology, the PCM5142 offers up to 20dB lower out-of-band noise, reducing EMI and aliasing in downstream amplifiers/ADCs, accept industry-standard audio data formats with 16- to 32-bit data, and sample rates up to 384kHz. After stereo DAC processing, the output audio signal is available to users for further use on the 3.5mm-line output audio jack, making it suitable for various multimedia systems, satellite radio, CD and DVD players, and more.

The PCM5142 communicates with MCU using the standard I2C 2-Wire data transmission protocol that supports Standard-Mode (100 kHz) and Fast-Mode (400 kHz) operations. In addition to communication pins, this board has several additional functions, providing users with application flexibility. Besides the I2C signals, the mikroBUS™ also has an auto-mute function routed to the MUT pin on the mikroBUS™ socket to mute the device upon intentional or unintentional power loss, as well as one user-configurable general-purpose pin, the IO4 pin of the mikroBUS™ socket. The onboard button labeled as RST can reset the DIR9001 audio receiver.

This Click board™ can only be operated 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

Type	Speakers
Applications	Can be used for portable electronics and audio systems, such as multimedia systems, satellite radio, CD and DVD players, and more
On-board modules	PCM5142 - 32-bit 384kHz audio stereo DAC from Texas Instruments DIR9001 - digital audio receiver from Texas Instruments

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Key Features	24-bit/96kHz signals at the highest via S/PDIF optical cable, complies with various digital audio standards, latest generation of TI's advanced segment-DAC architecture, excellent dynamic performance, detailed heights, and an exceptionally good sound stage, soft-mute, and more
Interface	I2C
ClickID	Yes
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Audio DAC 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	**MUT**	Soft-Mute
	NC	2	RST	INT	15	**IO4**	General-Purpose I/O
	NC	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
T1	RST	-	Reset Button

Audio DAC Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Audio Receiver Frequency Range	28	-	108	kHz

Software Support

We provide a library for the Audio DAC 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.

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Library Description

This library contains API for Audio DAC Click driver.

Key functions

- audiodac_get_gpio4_pin This function returns the GPIO4 pin logic state. The GPIO4 pin is mapped to auto mute flag output for both L and R channels by default.
- audiodac_volume_control This function sets the volume level for the selected output channel.

Example Description

This example demonstrates the use of Audio DAC Click board™ by controling the volume level of both output channels.

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.AudioDAC

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

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Downloads

Audio DAC click example on Libstock

DIR9001 datasheet

PCM5142 datasheet

Audio DAC click schematic

Audio DAC click 2D and 3D files

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