MIKROE

mikromedia 4

for STM32 RESISTIVE FPI

USER MANUAL

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Elegant on the surface, yet extremely powerful on the inside, we have designed it to inspire outstanding achievements.
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Pick your own look

Identical in the back, choices up front.

1. *mikromedia 4 for STM32 Resistive FPI with bezel*
2. *mikromedia 4 for STM32 Resistive FPI with frame*

mikromedia 4 for STM32 RESISITVE FPI is a compact development board designed as a complete solution for the rapid development of multimedia and GUI-centric applications. By featuring a 4.3" resisitve touch screen driven by the powerful graphics controller that can display the 24-bit color palette (16.7 million colors), along with a DSP-powered embedded sound CODEC IC, represents a perfect solution for any type of multimedia application.

At its core, there is a powerful 32-bit STM32F407VGT6 or STM32F207VGT6 microcontroller (referred to as "host MCU" in the following text), produced by STMicroelectronics, which provides sufficient processing power for the most demanding tasks, ensuring fluid graphical performance and glitch-free audio reproduction.

However, this development board is not limited to multimedia-based applications only: mikromedia 4 for STM32 RESISTIVE FPI ("mikromedia 4 FPI" in the following text) features USB, RF connectivity options, digital motion sensor, piezo-buzzer, battery charging functionality, SD-Card reader, RTC, and much more, expanding its use beyond the multimedia. Two compact-sized mikroBUS Shuttle connectors represent the most distinctive connectivity feature, allowing access to a huge base of Click boards™, growing on a daily basis.

The usability of mikromedia 4 FPI does not end with its ability to accelerate the prototyping and application development stages: it is designed as the complete solution which can be implemented directly into any project, with no additional hardware modifications required. We offer two types of mikromedia 3 for STM32 RESISITVE FPI boards. The first one has a TFT display with a bezel around it and is ideal for handheld devices. The other mikromedia 3 for STM32 RESISTIVE FPI board has a TFT display with a metal frame, and four corner mounting holes that enable simple installation in various kinds of industrial appliances. Each option can be used in smart home solutions, as well as wall panel, security and automotive systems, factory automation, process control, measurement, diagnostics and many more. With both types, a nice casing is all that you need to turn the mikromedia 4 for STM32 RESISTIVE FPI board into a fully functional design.

NOTE

This manual, in its entirety, showcases just one option of mikromedia 4 for STM32 RESISTIVE FPI for illustration purposes. The manual applies to both options.

1. Key microcontroller features

At its core, mikromedia 4 for STM32 RESISTIVE FPI uses the **STM32F407VGT6** or **STM32F207VGT6** MCU.

STM32F407VGT6 is the 32-bit RISC ARM® Cortex®-M4 core. This MCU is produced by STMicroelectronics, featuring a dedicated floating-point unit (FPU), a complete set of DSP functions, and a memory protection unit (MPU) for elevated application security. Among many peripherals available on the host MCU, key features include:

- 1 MB of Flash memory
- 192 + 4 KB of SRAM (including 64 KB of Core Coupled Memory)
- Adaptive real-time accelerator (ART Accelerator™) allowing 0-wait state execution from Flash memory
- Operating frequency up to 168 MHz
- 210 DMIPS / 1.25 DMIPS/MHz (Dhrystone 2.1)

For the complete list of MCU features, please refer to the STM32F407VGT6 ***datasheet***

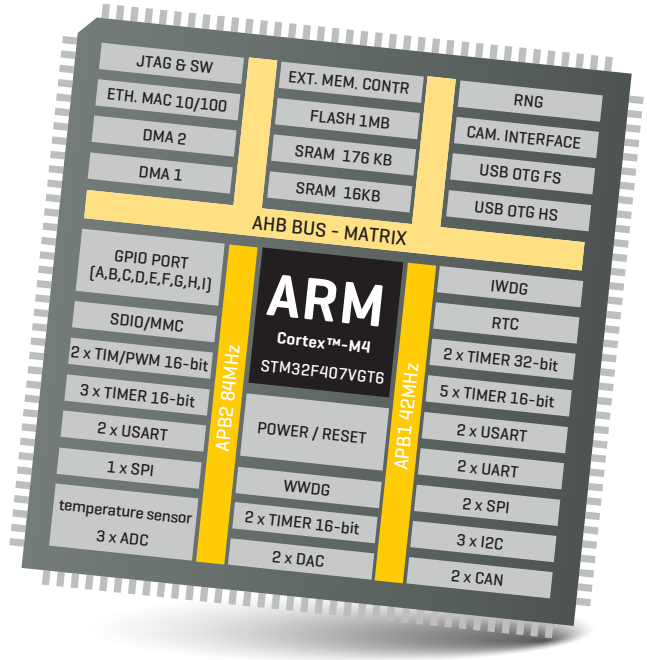


Figure 1: STM32F407VGT6 MCU block schematic

STM32F207VGT6 is the 32-bit RISC ARM® Cortex®-M3 core. This MCU is produced by STMicroelectronics, featuring a dedicated floating-point unit (FPU), a complete set of DSP functions, and a memory protection unit (MPU) for elevated application security. Among many peripherals available on the host MCU, key features include:

- 1 MB Flash memory
- 128 + 4 KB of SRAM
- Adaptive real-time accelerator (ART Accelerator™) allowing 0-wait state execution from Flash memory
- Operating frequency up to 120 MHz
- 150 DMIPS / 1.25 DMIPS/MHz (Dhrystone 2.1)

For the complete list of MCU features, please refer to the STM32F207VGT6 ***datasheet***

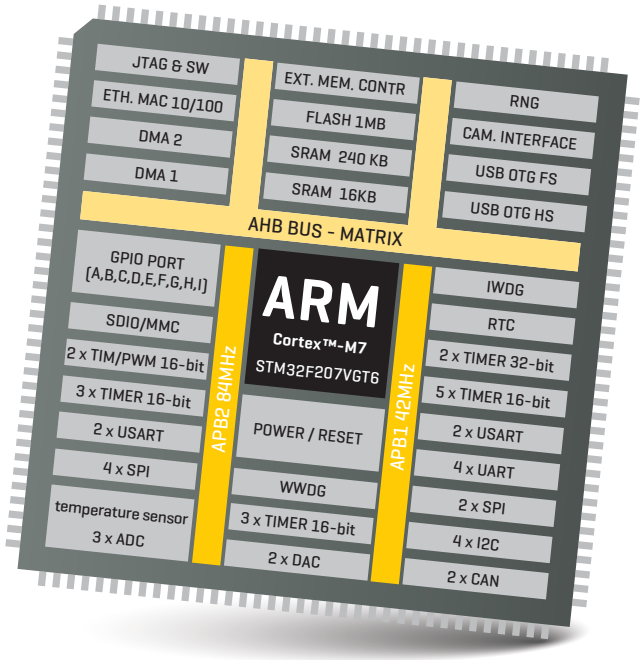


Figure 2: STM32F207VGT6 MCU block schematic

1.1 Microcontroller programming/debugging

The host MCU can be programmed and debugged over the JTAG/SWD compatible 2x5 pin header **(1)**, labeled as PROG/DEBUG. This header allows an external programmer (e.g. CODEGRIP or mikroProg) to be used. To enable the JTAG interface, SMD jumper labeled as JP4 **(2)** must be populated. This jumper is unpopulated by default, optimizing the pin count so that more pins could be used for a large number of onboard modules and peripherals.

Programming the microcontroller can also be done by using the bootloader which is preprogrammed into the device by default. All the informations about the bootloader software can be found on the following page:
www.mikroe.com/mikrobootloader

Figure 3: Front and back partial view

1.2 MCU reset

The board is equipped with the Reset button **(3)**, which is located on the back side of the board. It is used to generate a LOW logic level on the microcontroller reset pin.


mikromedia 4FPI
for STM32
www.mikroe.com
HW REV. 1.02
PROG/DEBUG
BATTERY RTC
REF SEL
3V3 REF
ADDR SEL
CODEGRIP
USB/WiFi PROGRAMMER & DEBUGGER
DATA
ACTIVE
NET-LINK
USB-LINK
POWER
CODEGRIP ADAPT
10-pin 0.1" ARM Cortex Debug
MIKROE

2. Power supply unit

Figure 4: Power supply unit view

The power supply unit (PSU) provides clean and regulated power, necessary for proper operation of the mikromedia 4 FPI development board. The host MCU, along with the rest of the peripherals, demands regulated and noise-free power supply. Therefore, the PSU is carefully designed to regulate, filter, and distribute the power to all parts of mikromedia 4 FPI. It is equipped with three different power supply inputs, offering all the flexibility that mikromedia 4 FPI needs, especially when used on the field or as an integrated element of a larger system. In the case when multiple power sources are used, an automatic power switching circuit with predefined priorities ensures that the most appropriate will be used.

The PSU also contains a reliable and safe battery charging circuit, which allows a single-cell Li-Po/Li-Ion battery to be charged. Power OR-ing option is also supported, providing an uninterrupted power supply (UPS) functionality when an external or USB power source is used in combination with the battery.

2.1 Detailed description

The PSU has a very demanding task of providing power for the host MCU and all the peripherals onboard, as well as for the externally connected peripherals. One of the key requirements is to provide enough current, avoiding the voltage drop at the output. Also, the PSU must be able to support multiple power sources with different nominal voltages, allowing switching between them by priority. The PSU design, based on a set of high-performance power switching ICs produced by Microchip, ensures a very good quality of the output voltage, high current rating, and reduced electromagnetic radiation.

At the input stage of the PSU, the MIC2253, a high-efficiency boost regulator IC with overvoltage protection ensures that the voltage input at the next stage is well-regulated and stable. It is used to boost the voltage of low-voltage power sources (a Li-Po/Li-Ion battery and USB), allowing the next stage to deliver well-regulated 3.3V and 5V to the development board. A set of discrete components are used to determine if the input power source requires a voltage boost. When multiple power sources are connected at once, this circuitry is also used to determine the input priority level: externally connected 12V PSU, power over USB, and the Li-Po/Li-Ion battery. The transition between available power sources is designed to provide uninterrupted operation of the development board.

The next PSU stage uses two MCP16331, highly integrated, high-efficiency, fixed frequency, step-down DC-DC converters, capable of providing up to 1.2A. Each of the two buck regulators is used to supply power to the corresponding power supply rail (3.3V and 5V), throughout the entire development board and connected peripherals.

2.2 Voltage reference

The MCP1501, a high-precision buffered voltage reference from Microchip is used to provide a very precise voltage reference with no voltage drift. It can be used for various purposes: the most common uses include voltage references for A/D converters, D/A converters, and comparator peripherals on the host MCU. The MCP1501 can provide up to 20mA, limiting its use exclusively to voltage comparator applications with high input impedance. Depending on the specific application, either 3.3V from the power rail, or 2.048V from the MCP1501 can be selected. An onboard SMD jumper labeled as REF SEL offers two voltage reference choices:

- REF: 2.048V from the high-precision voltage reference IC
- 3V3: 3.3V from the main power supply rail

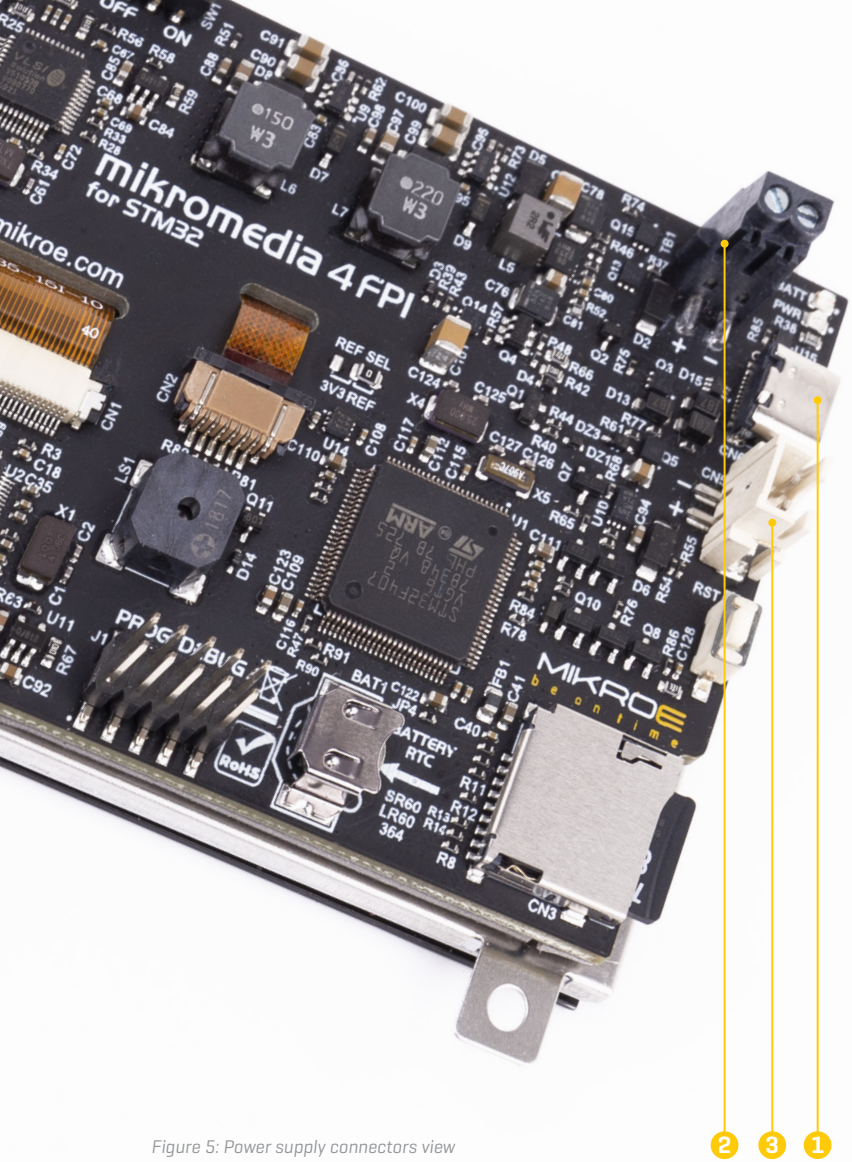


Figure 5: Power supply connectors view

2.3 PSU connectors

As explained, the advanced design of the PSU allows several types of power sources to be used, offering unprecedented flexibility: when powered by a Li-Po/Li-Ion battery, it offers an ultimate degree of autonomy. For situations where the power is an issue, it can be powered by an external 12VDC power supply, connected over the two-pole screw terminal. Power is not an issue even if it is powered over the USB cable. It can be powered over the USB-C connector, using power supply delivered by the USB HOST (i.e. personal computer), USB wall adapter, or a battery power bank.

There are three power supply connectors available, each with its unique purpose:

- CN6: USB-C connector **[1]**
- TB1: Screw terminal for an external 12VDC PSU **[2]**
- CN5: Standard 2.5mm pitch XH battery connector **[3]**

2.3.1 USB-C connector

The USB-C connector (labeled as CN6) provides power from the USB host (typically PC), USB power bank, or USB wall adapter. When powered over the USB connector, the available power will depend on the source capabilities.

Maximum power ratings, along with the allowed input voltage range in the case when the USB power supply is used, are given in the table *Figure 6*:

USB power supply				
Input Voltage [V]		Output Voltage [V]	Max Current [A]	Max Power [W]
MIN	MAX	3.3	1.2	3.96
4.4	5.5	5	1.2	6
		3.3 & 5	0.7 & 0.7	5.81

Figure 6: USB power supply table

When using a PC as the power source, the maximum power can be obtained if the host PC supports the USB 3.2 interface, and is equipped with USB-C connectors. If the host PC uses the USB 2.0 interface, it will be able to provide the least power, since only up to 500 mA (2.5W at 5V) is available in that case. Note that when using longer USB cables or USB cables of low quality, the voltage may drop outside the rated operating voltage range, causing unpredictable behavior of the development board.

NOTE *If the USB host is not equipped with the USB-C connector, a Type A to Type C USB adapter may be used (included in the package).*

2.3.2 12VDC screw terminal

An external 12V power supply can be connected over the 2-pole screw terminal (labeled as TB1). When using an external power supply, it is possible to obtain an optimal amount of power, since one external power supply unit can be easily exchanged with another, while its power and operating characteristics can be decided per application. The development board allows a maximum current of 1.2A per power rail (3.3V and 5V) when using an external 12V power supply. The screw terminal is a good choice when there is no connector installed at the end of the PSU cable.

Maximum power ratings, along with the allowed input voltage range in the case when the external power supply is used, are given in the table *Figure 7*:

External power supply				
Input Voltage [V]		Output Voltage [V]	Max Current [A]	Max Power [W]
MIN	MAX	3.3	1.2	3.96
10.6	14	5	1.2	6
		3.3 & 5	1.2 & 1.2	9.96

Figure 7: External power supply table

NOTE *When connecting an external power supply over the screw terminal, make sure that the polarity of the wires is matched with the 12VDC connector on the development board, according to the marked pins of screw terminal.*

2.3.3 Li-Po/Li-Ion XH battery connector

When powered by a single-cell Li-Po/Li-Ion battery, mikromedia 4 FPI offers an option to be operated remotely. This allows complete autonomy, allowing it to be used in some very specific situations: hazardous environments, agricultural applications, etc.

The battery connector is a standard 2.5mm pitch XH connector. It allows a range of single-cell Li-Po and Li-Ion batteries to be used. The PSU of mikromedia 4 FPI offers the battery charging functionality, from both the USB connector and the 12VDC/external power supply. The battery charging circuitry of the PSU manages the battery charging process, allowing the optimal charging conditions and longer battery life. The charging process is indicated by BATT LED indicator, located on the back of mikromedia 4 FPI.

The PSU module also includes the battery charger circuit. Depending on the operational status of the mikromedia 4 FPI development board, the charging current can be either set to 100mA or 500mA. When the development board is powered OFF, the charger IC will allocate all available power for the battery charging purpose. This results in faster charging, with the charging current set to approximately 500mA. While powered ON, the available charging current will be set to approximately 100 mA, reducing the overall power consumption to a reasonable level.

NOTE *Using low-quality USB hubs, and too long or low-quality USB cables, may cause a significant USB voltage drop, which can obstruct the battery charging process.*

Maximum power ratings along with the allowed input voltage range when the battery power supply is used, are given in the table *Figure 8*:

Battery power supply				
Input Voltage [V]		Output Voltage [V]	Max Current [A]	Max Power [W]
MIN	MAX	3.3	1.2	3.96
3.5	4.2	5	1.1	5.5
		3.3 & 5	0.6 & 0.6	4.98

Figure 8: Battery power supply table

2.4 Power redundancy and uninterrupted power supply (UPS)

The PSU module supports power supply redundancy: it will automatically switch to the most appropriate power source if one of the power sources fails or becomes disconnected. The power supply redundancy also allows for an uninterrupted operation (i.e. UPS functionality, the battery will still provide power if the USB cable is removed, without resetting mikromedia 4 FPI during the transition period).

2.5 Powering up the mikromedia 4 FPI board

After a valid power supply source is connected **(1)** in our case with a single-cell Li-Po/Li-Ion battery, mikromedia 4 FPI can be powered ON. This can be done by a small switch at the edge of the board, labeled as SW1 **(2)**. By switching it ON, the PSU module will be enabled, and the power will be distributed throughout the board. A LED indicator labeled as PWR indicates that the mikromedia 4 FPI is powered ON.

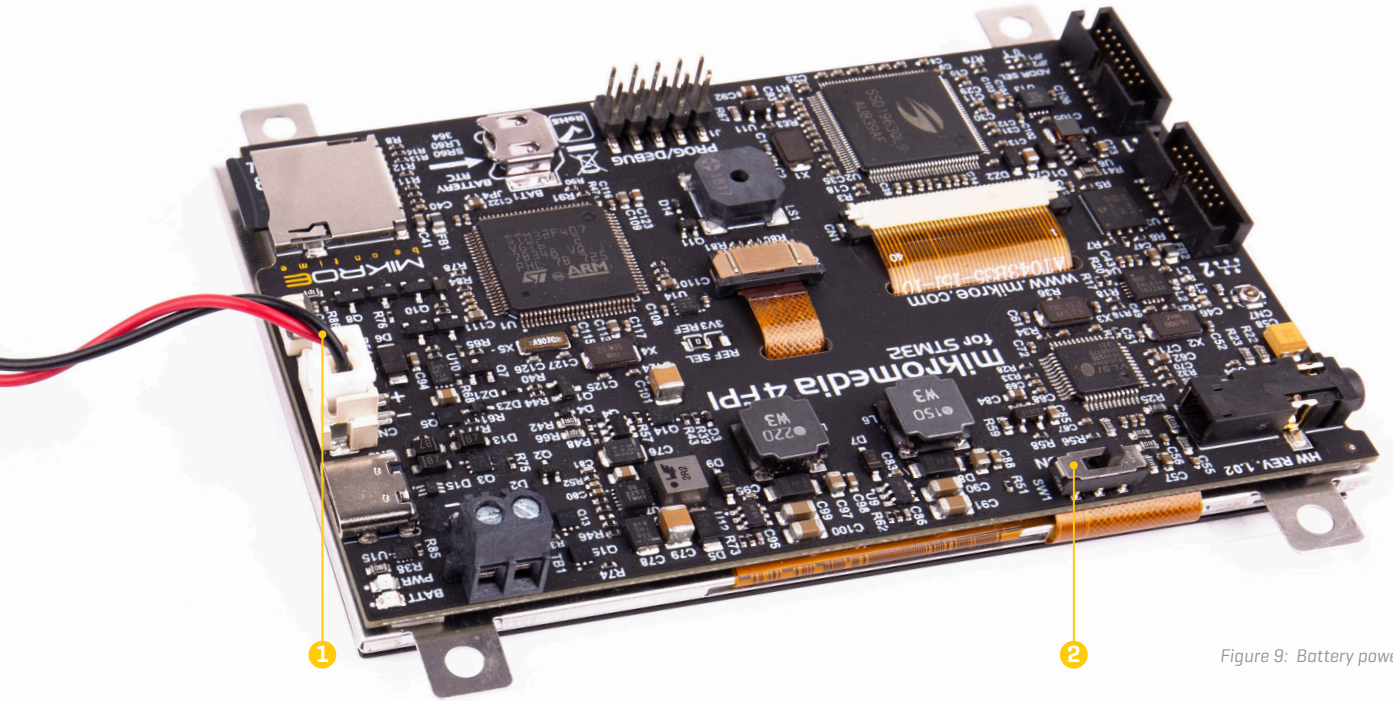


Figure 9: Battery power supply connection

3. Resistive display

A high-quality 4.3" TFT true-color display with a resistive touch panel is the most distinctive feature of the mikromedia 4 FPI. The display has a resolution of 480 by 272 pixels, and it can display up to 16.7M of colors (24-bit color depth). The display of mikromedia 4 FPI features a reasonably high contrast ratio of 500:1, thanks to 10 high-brightness LEDs used for the backlighting.

The display module is controlled by the SSD1963 **(1)** graphics driver IC from Solomon Systech. This is a powerful graphics coprocessor, equipped with 1215KB of frame buffer memory. It also includes some advanced features such as the hardware accelerated display rotation, display mirroring, hardware windowing, dynamic backlight control, programmable color and brightness control, and more.

The resistive panel, based on the TSC2003 RTP controller, allows the development of interactive applications, offering a touch-driven control interface. The touch panel controller uses the I2C interface for the communication with the host controller.

Equipped with high-quality 4.3" display **(2)** mikromedia 4 FPI represents a very powerful hardware environment for building various GUI-centric Human Machine Interface (HMI) applications.

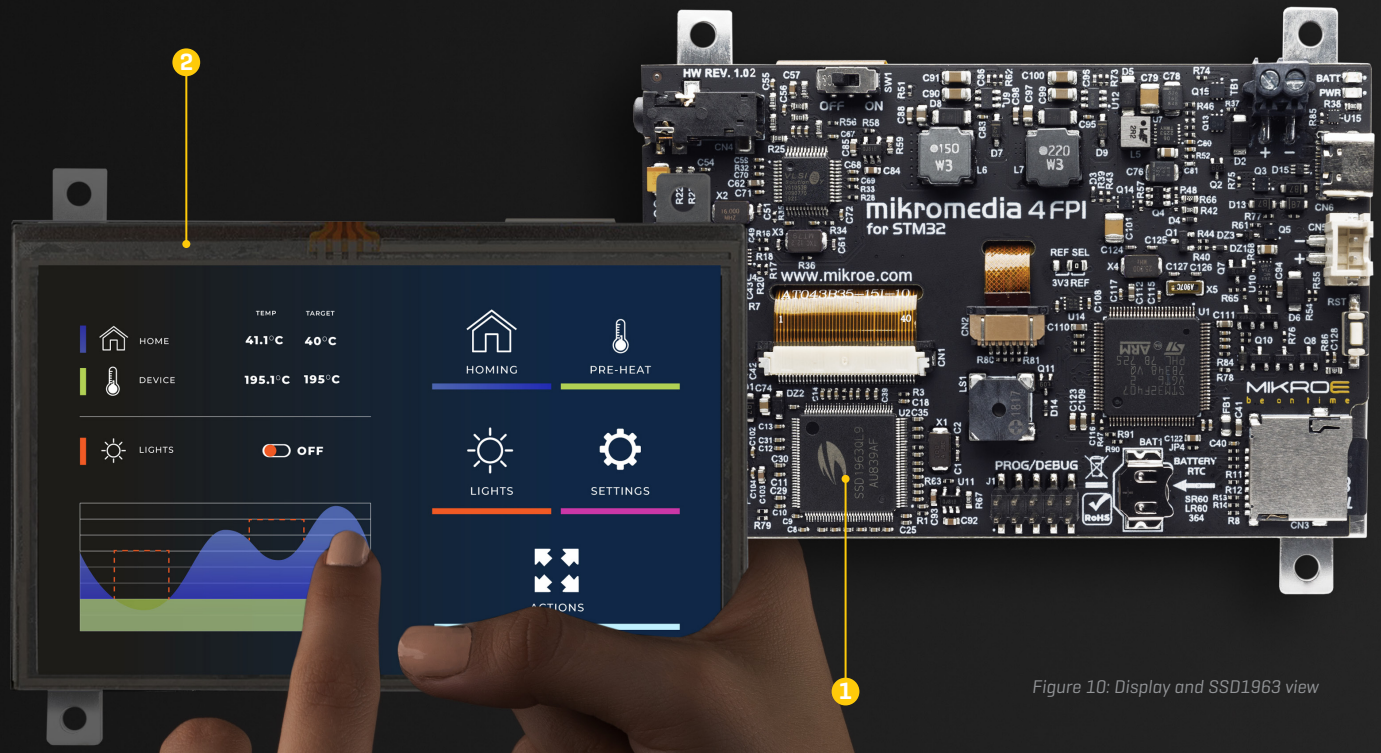


Figure 10: Display and SSD1963 view

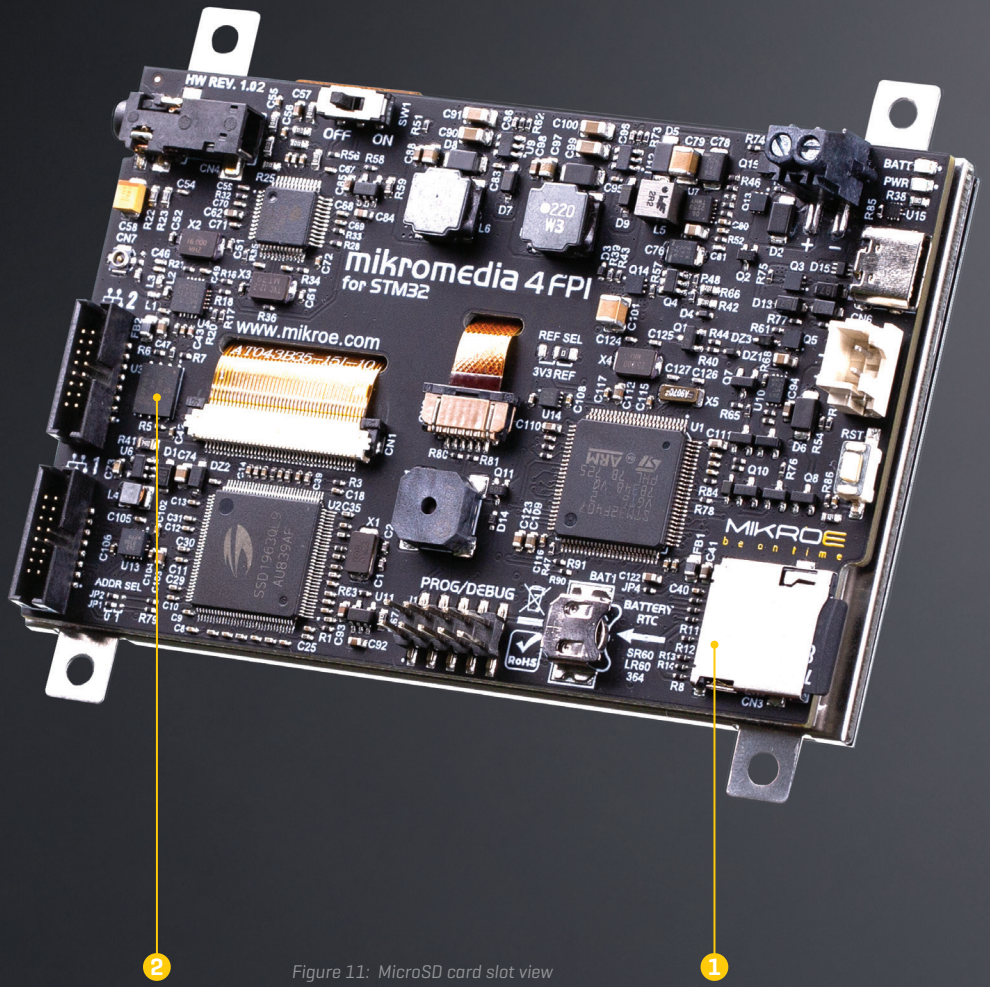


Figure 11: MicroSD card slot view

4. Data storage

The mikromedia 4 FPI development board is equipped with two types of storage memory: with a microSD card slot and a Flash memory module.

4.1 microSD card slot

The microSD card slot **(1)** allows storing large amounts of data externally, on a microSD memory card. It uses the Secure digital input/output interface (SDIO) for communication with the MCU. The microSD card detection circuit is also provided on the board. The microSD card is the smallest SD Card version, measuring only 5 x 11 mm. Despite its small size, it allows tremendous amounts of data to be stored on it. In order to read and write to the SD Card, a proper software/firmware running on the host MCU is required.

4.2 External flash storage

mikromedia 4 FPI is equipped with the SST26VF064B Flash memory **(2)**. The Flash memory module has a density of 64 Mbits. Its storage cells are arranged in 8-bit words, resulting in 8Mb of non-volatile memory in total, available for various applications. The most distinctive features of the SST26VF064B Flash module are its high speed, very high endurance, and very good data retention period. It can withstand up to 100,000 cycles, and it can preserve the stored information for more than 100 years. It also uses the SPI interface for the communication with the MCU.

5. Connectivity

mikromedia 4 FPI offers a huge number of connectivity options. It includes support for the RF and USB [HOST/DEVICE]. Besides those options, it also offers two standardized mikroBUS™ Shuttle connectors. It is a considerable upgrade for the system, as it allows interfacing with the huge base of Click boards™.

5.1 RF

mikromedia 4 FPI offers communication over the world-wide ISM radio band. The ISM band covers a frequency range between 2.4GHz and 2.4835GHz. This frequency band is reserved for industrial, scientific, and medical use [hence the ISM abbreviation]. In addition, it is globally available, making it a perfect alternative to WiFi, when the M2M communication over a short distance is required.

mikromedia 4 FPI uses the nRF24L01+ **(1)**, a single-chip 2.4GHz transceiver with an embedded baseband protocol engine, produced by Nordic Semiconductors. It is a perfect solution for ultra-low power wireless applications. This transceiver relies on the GFSK modulation, allowing data rates in the range from 250 kbps, up to 2 Mbps. The GFSK modulation is the most efficient RF signal modulation scheme, reducing the required bandwidth, thus wasting less power. The nRF24L01+ also features a proprietary Enhanced ShockBurst™, a packet-based data link layer. Besides other functionalities, it offers a 6-channel MultiCeiver™ feature, which allows using the nRF24L01+ in a star network topology.
The nRF24L01+ uses the SPI interface to communicate with the host MCU.

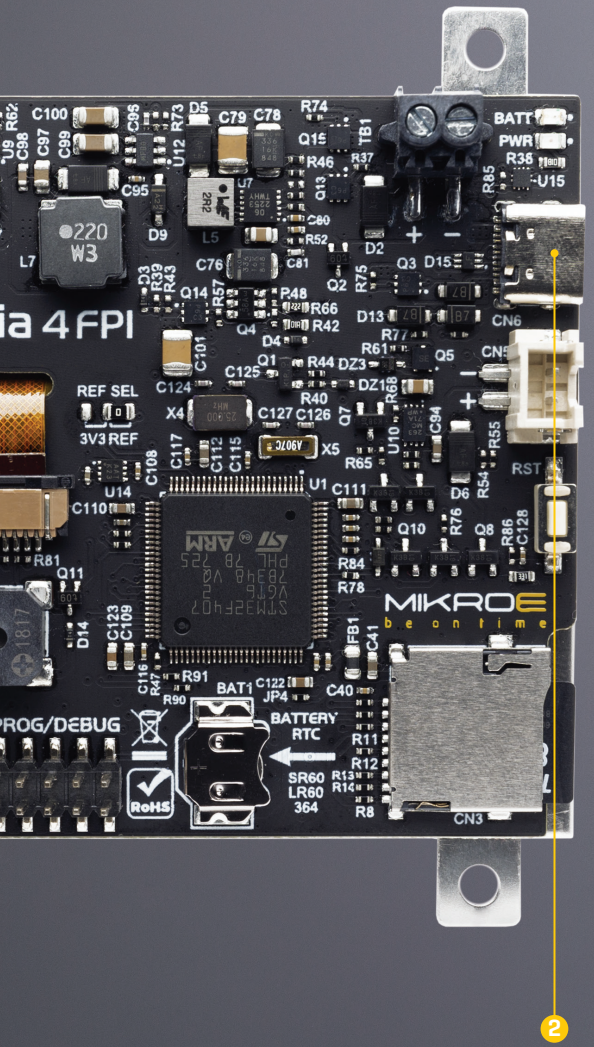


Figure 12: RF and WiFi view

Along the SPI lines, it uses additional GPIO pins for the SPI Chip Select, Chip Enable, and for the interrupt. The RF section of the mikromedia 4 FPI also features a small chip antenna as well as SMA connector for external antenna.

5.2 USB

The host MCU is equipped with the USB peripheral module, allowing simple USB connectivity. USB (Universal Serial Bus) is a very popular industry standard that defines cables, connectors, and protocols used for communication and power supply between computers and other devices. mikromedia 4 FPI supports USB as HOST/DEVICE modes, allowing the development of a wide range of various USB-based applications. It is equipped with the USB-C connector, which offers many advantages, compared to earlier types of USB connectors (symmetrical design, higher current rating, compact size, etc).

The USB mode selection is done using a monolithic controller IC. This IC provides Configuration Channel (CC) detection and indication functions.
To set up mikromedia 4 FPI as the USB HOST, the USB PSW pin should be set to a LOW logic level (0) by the MCU. If set to a HIGH logic level (1), mikromedia 4 FPI acts as a DEVICE. While in HOST mode, mikromedia 4 FPI provides power over the USB-C connector **(2)** for the attached DEVICE. The USB PSW pin is driven by the host MCU, allowing the software to control the USB mode.

The USB ID pin is used to detect the type of the device attached to the USB port, according to the USB OTG specifications: the USB ID pin connected to GND indicates a HOST device, while the USB ID pin set to a high impedance state (HI-Z) indicates that the connected peripheral is a DEVICE.

NOTE

When mikromedia 4 FPI is working in USB HOST mode, it must not be mounted to another USB HOST (such as PC).

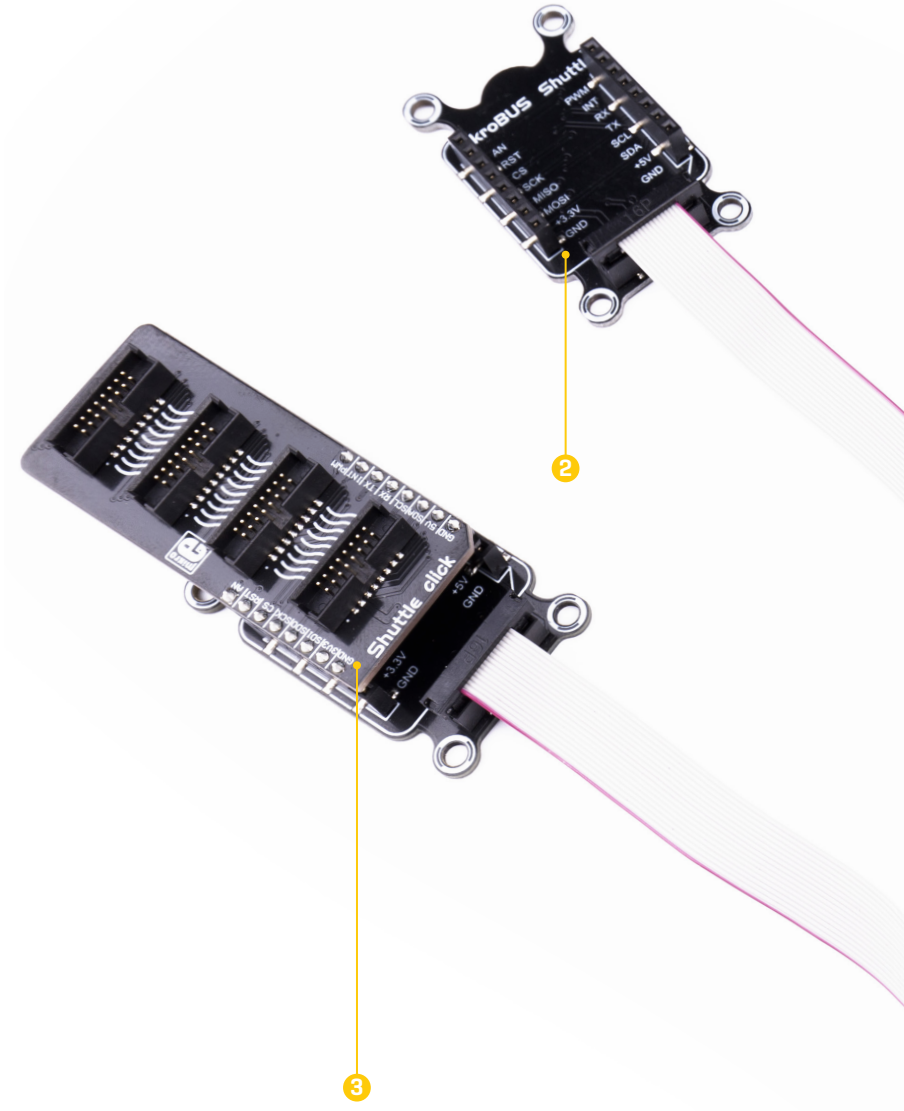
5.3 mikroBUS™ shuttle connector

Mikromedia 4 for STM32 RESISTIVE FPI development board uses the mikroBUS™ Shuttle connector, a brand new addition to the mikroBUS™ standard in the form of a 2x8 pin IDC header with 1.27mm (50mil) pitch. Unlike mikroBUS™ sockets, mikroBUS™ Shuttle connectors take up much less space, allowing them to be used in cases where more compact design is required. There are two mikroBUS™ Shuttle connectors **(1)** on the development board, labeled as MB1 and MB2.

Typically, a mikroBUS™ Shuttle connector can be used in combination with mikroBUS™ Shuttle extension board but is not limited to it.

mikroBUS™ Shuttle extension board **(2)** is an add-on board equipped with the conventional mikroBUS™ socket and four mounting holes. It can be connected to the mikroBUS™ Shuttle connector by a flat cable. This ensures compatibility with the huge base of Click boards™. Using mikroBUS™ Shuttles also provides a number of additional benefits:

- When using flat cables, the position of mikroBUS™ Shuttle is not fixed
- mikroBUS™ Shuttle extension boards contain additional mounting holes for permanent installation
- An arbitrary length of flat cables may be used (depending on the particular use cases)
- Connectivity can be additionally expanded, by cascading these connectors using Shuttle click **(3)**



For more information about mikroBUS™ Shuttle extension board and Shuttle click, please visit web pages:
www.mikroe.com/mikrobus-shuttle
www.mikroe.com/shuttle-click

For additional information about the mikroBUS™, please visit the official web page at ***www.mikroe.com/mikrobus***

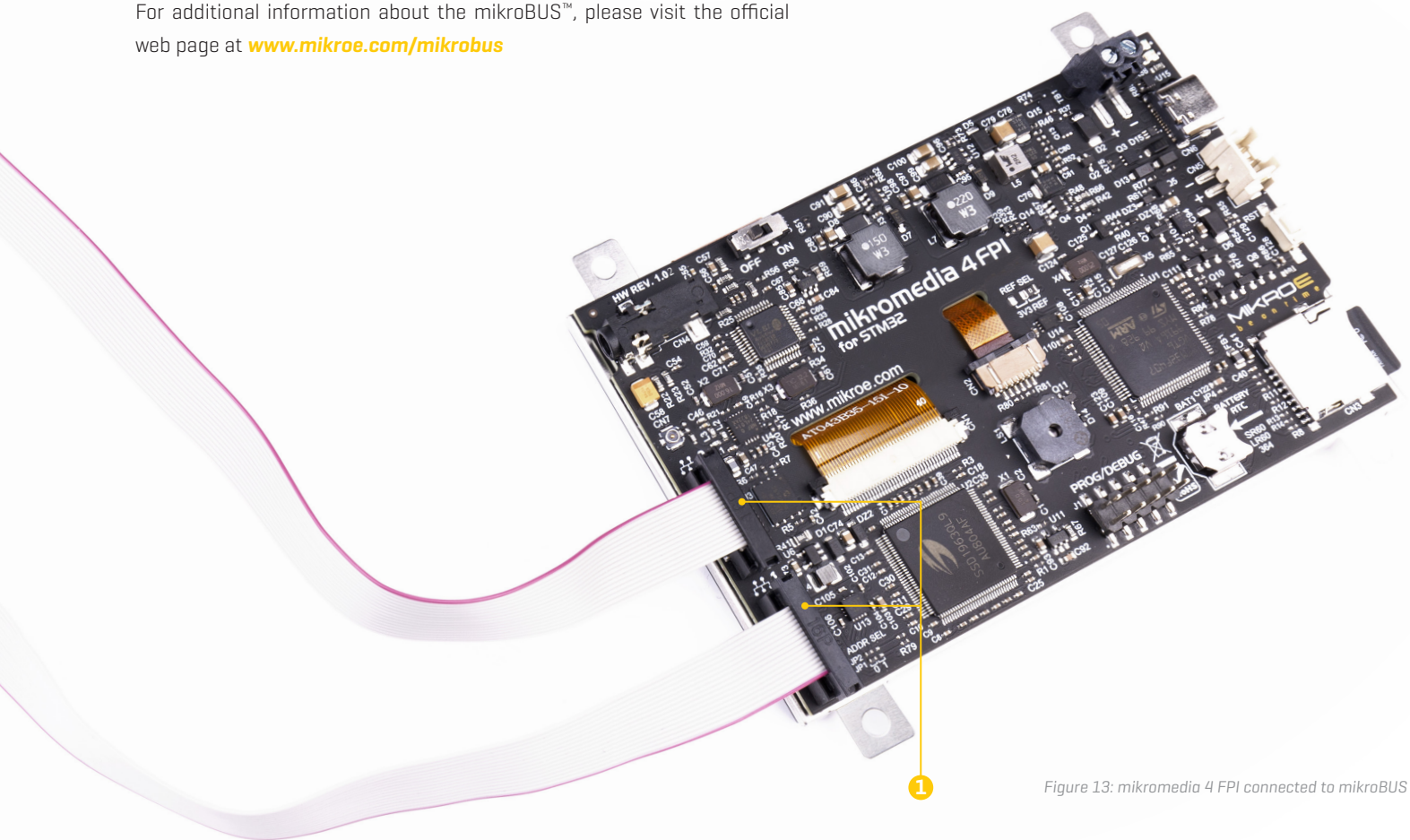
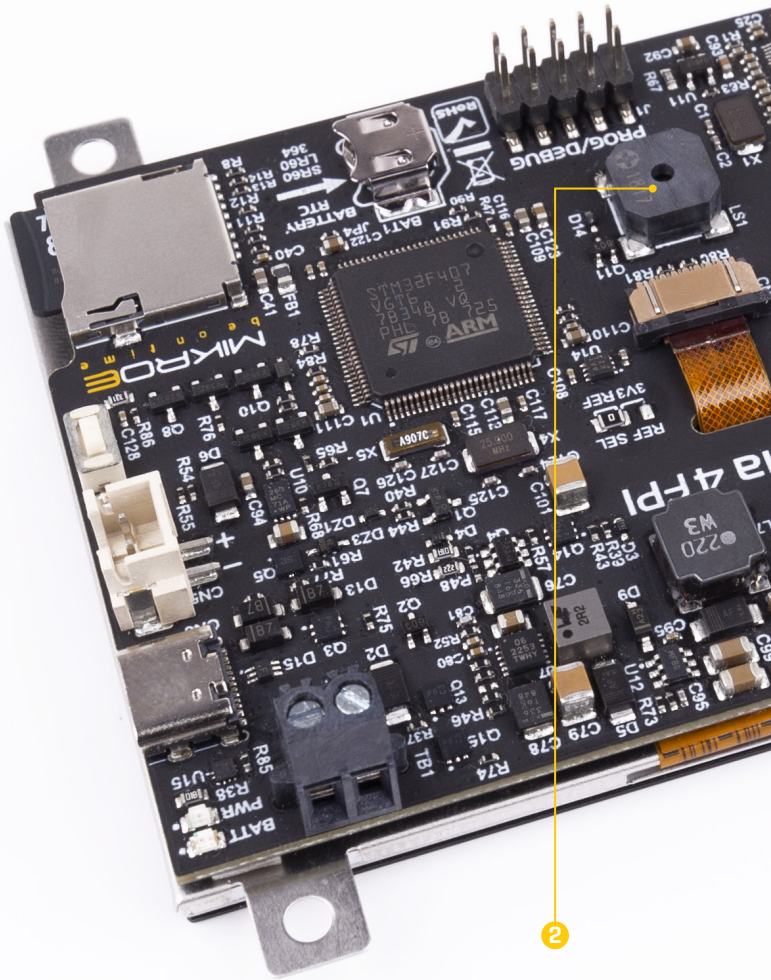


Figure 13: mikromedia 4 FPI connected to mikroBUS Shuttle view

6. Sound-related peripherals

By offering a pair of sound-related peripherals, mikromedia 4 FPI rounds-up its multimedia concept. It features a piezo-buzzer, which is extremely easy to program but can produce only the simplest sounds, useful only for alarms or notifications.

The second audio option is the powerful VS1053B IC **(1)**. It is an Ogg Vorbis/MP3/AAC/WMA/FLAC/WAV/MIDI audio decoder, and a PCM/IMA ADPCM/Ogg Vorbis encoder, both on a single chip. It features a powerful DSP core, high-quality A/D and D/A converters, stereo headphones driver capable of driving a 30Ω load, zero-cross detection with the smooth volume change, bass and treble controls, and much more.



6.1 Piezo buzzer

A piezo buzzer **(2)** is a simple device capable of reproducing sound. It is driven by a small pre-biased transistor. The buzzer can be driven by applying a PWM signal from the MCU at the base of the transistor: the pitch of the sound depends on the frequency of the PWM signal, while the volume can be controlled by changing its duty cycle. Since it is very easy to program, it can be very useful for simple alarms, notifications, and other types of simple sound signalization.

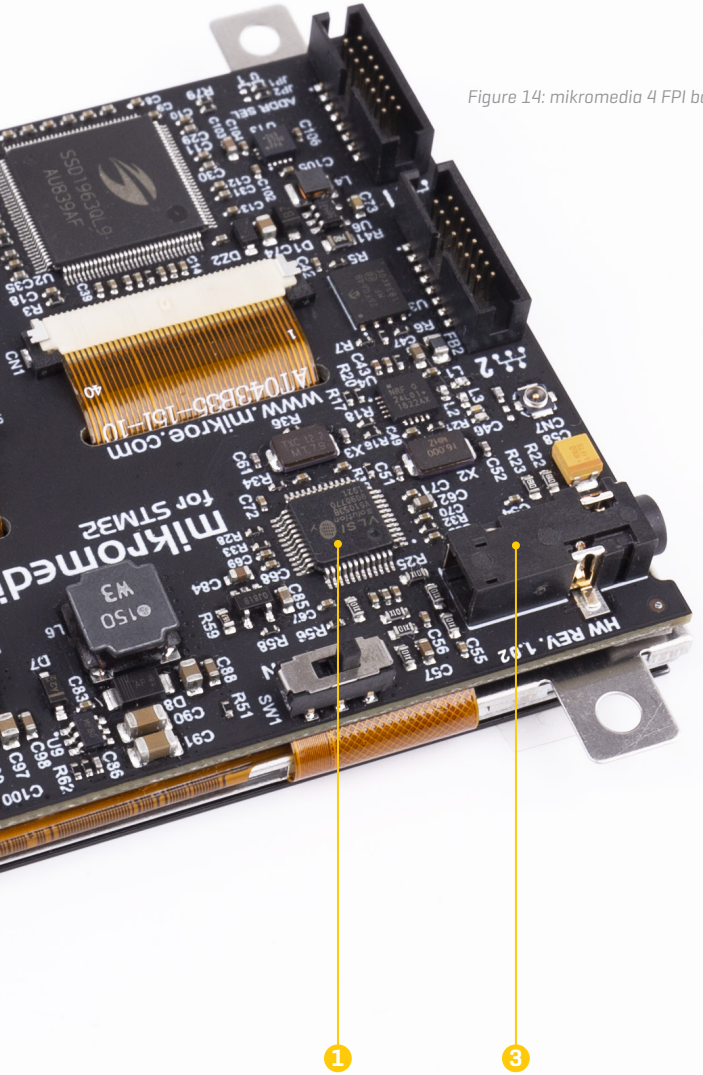


Figure 14: mikromedia 4 FPI back view

6.2 Audio CODEC

Resource-demanding and complex audio processing tasks can be offloaded from the host MCU by utilizing a dedicated audio CODEC IC, labeled as VS1053B **[1]**. This IC supports many different audio formats, commonly found on various digital audio devices. It can encode and decode audio streams independently while performing DSP-related tasks in parallel. The VS1053B has several key features that make this IC very popular choice when it comes to audio processing.

By offering high-quality hardware compression (encoding), the VS1053B allows the audio to be recorded taking up much less space compared to the same audio information in its raw format. In combination with high-quality ADCs and DACs, headphones driver, integrated audio equalizer, volume control, and more, it represents an all-around solution for any type of audio application. Along with the powerful graphics processor, the VS1053B audio processor completely rounds-up the multimedia aspects of the mikromedia 4 FPI development board. The mikromedia 4 FPI board is equipped with the 3.5mm four-pole headphones jack **[3]**, allowing to connect a headset with a microphone.

7. Sensors and other peripherals

A set of additional onboard sensors and devices adds yet another layer of usability to the mikromedia 4 FPI development board.

7.1 Digital motion sensor

The FXOS8700CQ, an advanced integrated 3-axis accelerometer and 3-axis magnetometer, can detect many different motion-related events, including the orientation event detection, freefall detection, shock detection, as well as tap, and double-tap event detection. These events can be reported to the host MCU over two dedicated interrupt pins, while the data transfer is performed over the I2C communication interface. The FXOS8700CQ sensor can be very useful for display orientation detection. It can also be used to turn mikromedia 4 FPI into a complete 6-axis e-compass solution. The I2C slave address can be changed by using two SMD jumpers grouped under the ADDR SEL label **(2)**.

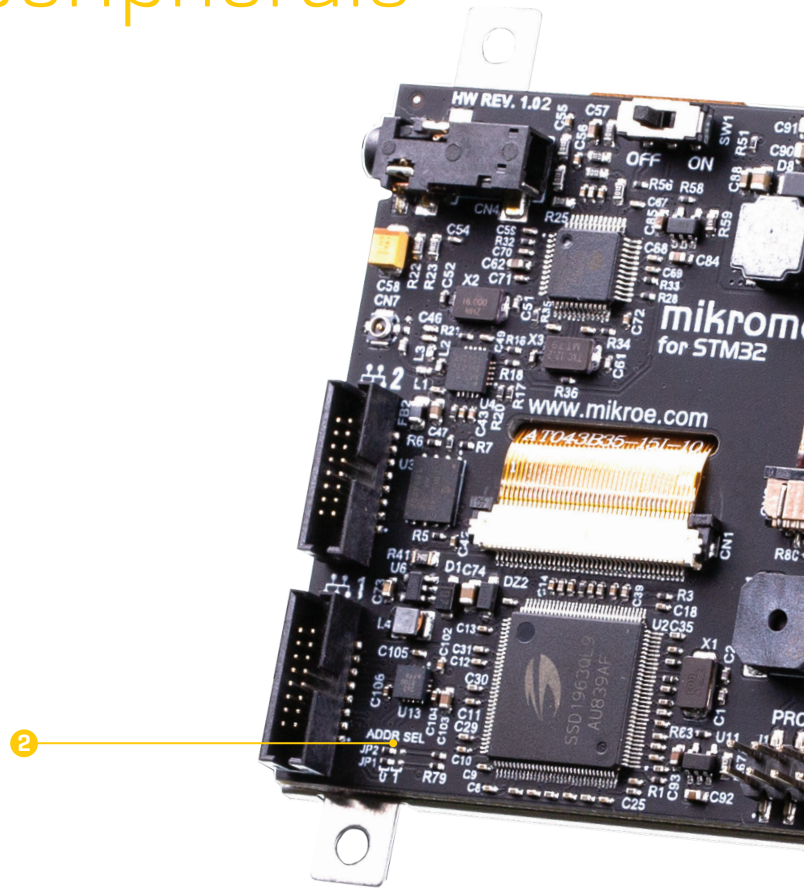
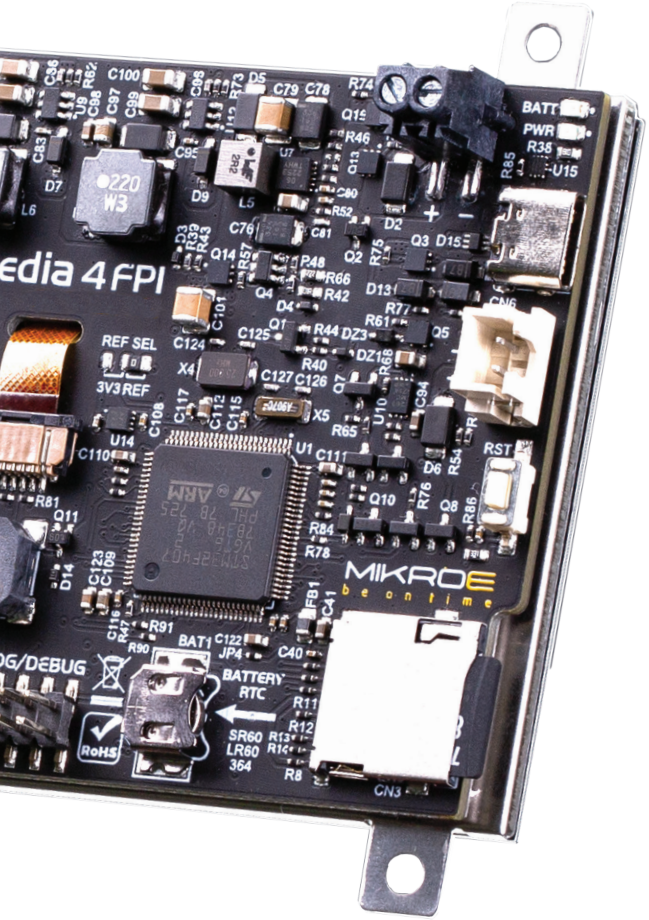


Figure 15: mikromedia 4 FPI back view



7.2 Real-time clock (RTC)

The host MCU contains a real-time clock peripheral module (RTC). The RTC peripheral uses a separate power supply source, typically a battery. To allow continuous tracking of time, mikromedia 4 FPI is equipped with a button cell battery that maintains RTC functionality even if the main power supply is OFF. Extremely low power consumption of the RTC peripheral allows these batteries to last very long. The mikromedia 4 FPI development board is equipped with the button cell battery holder, compatible with the SR60, LR60, 364 button cell battery types, allowing it to include a real time clock within the applications.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What's Next?

You have now completed the journey through each and every feature of mikromedia 4 for STM32 RESISITVE FPI development board. You got to know its modules and organization. Now you are ready to start using your new board. We are suggesting several steps which are probably the best way to begin.

1 COMPILERS

NECTO Studio is a complete, cross-platform integrated development environment (IDE) for embedded applications providing everything necessary to start developing, and prototyping, including Click board™ applications and GUIs for embedded devices. Rapid software development is easily achieved as developers do not need to consider low-level code, freeing them up to focus on the application code itself. This means that changing the MCU or even the whole platform will not require developers to redevelop their code for the new MCU or platform. They can simply switch to the desired platform, apply the correct board definition file, and the application code will continue to run after a single compiling.

www.mikroe.com/necto

2 GUI PROJECTS

Once you have downloaded NECTO Studio, and since you already got the board, you are ready to start writing your first GUI projects. Choose between several compilers for the specific MCU which is on the mikromedia device, and start using one of the most popular graphics library in the embedded industry - LVGL graphics library, an integral part of NECTO Studio. This makes an excellent starting point for future GUI projects.

3 EmbeddedWiki

Your project starts on EmbeddedWiki - world's largest embedded projects platform, with over 1M+ ready-for-use projects, made with pre-designed and standardized hardware and software solutions that serves as a starting point for developing customized products or applications. The platform covers 12 topics and 92 applications. Simply choose the MCU you require, select the application, and receive 100% valid code. Whether you're a novice working on your first project or a seasoned professional on your one 101st, EmbeddedWiki ensures project completion with satisfaction, eliminating unnecessary time wastage. ***www.embeddedwiki.com***

4 SUPPORT

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