

MIKROE

mikromedia 
HMI CAPACITIVE

USER MANUAL

Thank you for choosing MIKROE!

We present you the ultimate multimedia solution for embedded development.

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

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Time-saving embedded tools



6°

26 November
TUESDAY



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8°	9°	0°

mikromedia 7 HMI Capacitive board is designed as a complete solution for the rapid development of multimedia and GUI-centric applications. By featuring a 7" capacitive touch screen with a multi-touch panel, driven by the powerful graphics controller with advanced features, it represents a perfect solution for any type of Human Machine Interfaces [HMIs].

At its core, there is a powerful MKV58F1M0VLL24 microcontroller [referred to as "host MCU" in the following text], produced by NXP, which provides sufficient processing power for the most demanding tasks, ensuring fluid graphical performance and glitch-free audio reproduction.

The usability of mikromedia 7 HMI 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. TFT display is equipped with a metal frame, and four corner mounting holes that enable simple installation in various kinds of industrial appliances. mikromedia 7 HMI is ideal for smart home solutions, as well as wall panel, security and automotive systems, factory automation, process control, measurement, diagnostics and many more. A nice casing is all that you need to turn the mikromedia 7 HMI CAPACITIVE board into a fully functional design.

1. Key microcontroller features

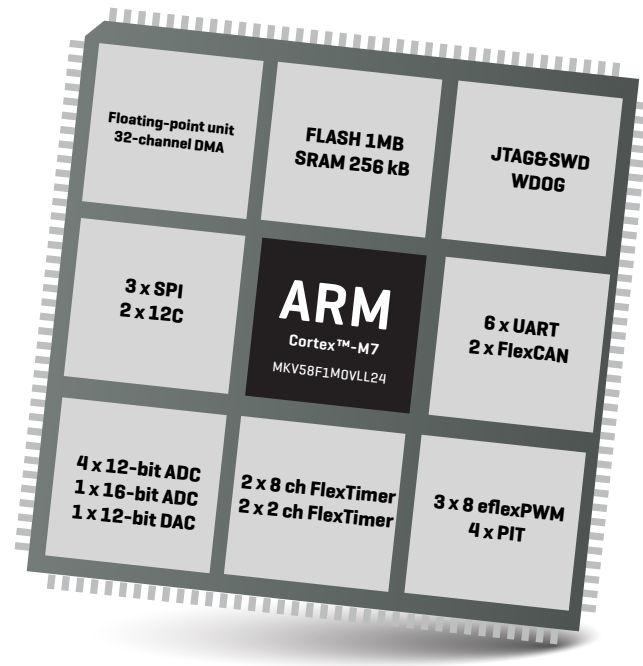
At its core, mikromedia 7 HMI CAPACITIVE uses the **MKV58F1MOVLL24** MCU.

MKV58F1MOVLL24 is the 32-bit ARM® Cortex®-M7 core.

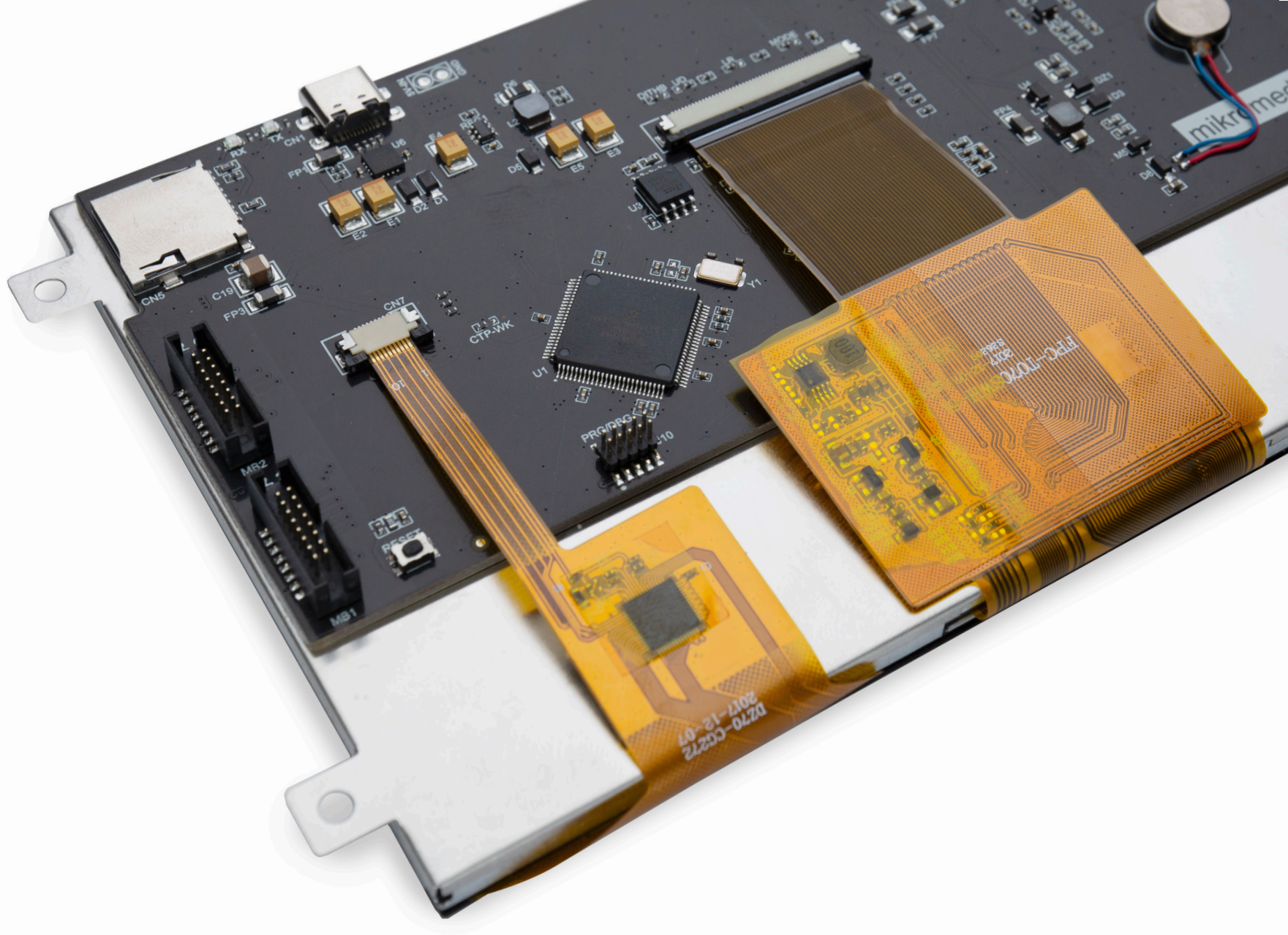
This MCU produced by NXP is a high-performance solution offering exceptional precision, sensing, and control targeting Motor Control, Industrial Drives and Automation applications. Among many peripherals available on the host MCU, key features include:

- 1 MB of Flash Memory
- 256 KB of SRAM
- Operating frequency up to 240 MHz

For the complete list of MCU features, please refer to the MKV58F1MOVLL24 [datasheet](#).



MKV58F1MOVLL24 MCU block schematic



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CTP-WK

U1

PRG18G J10

CN5

C19

FP3

CN7

01

MB2

MB1

FPC-107C
2017-12-01

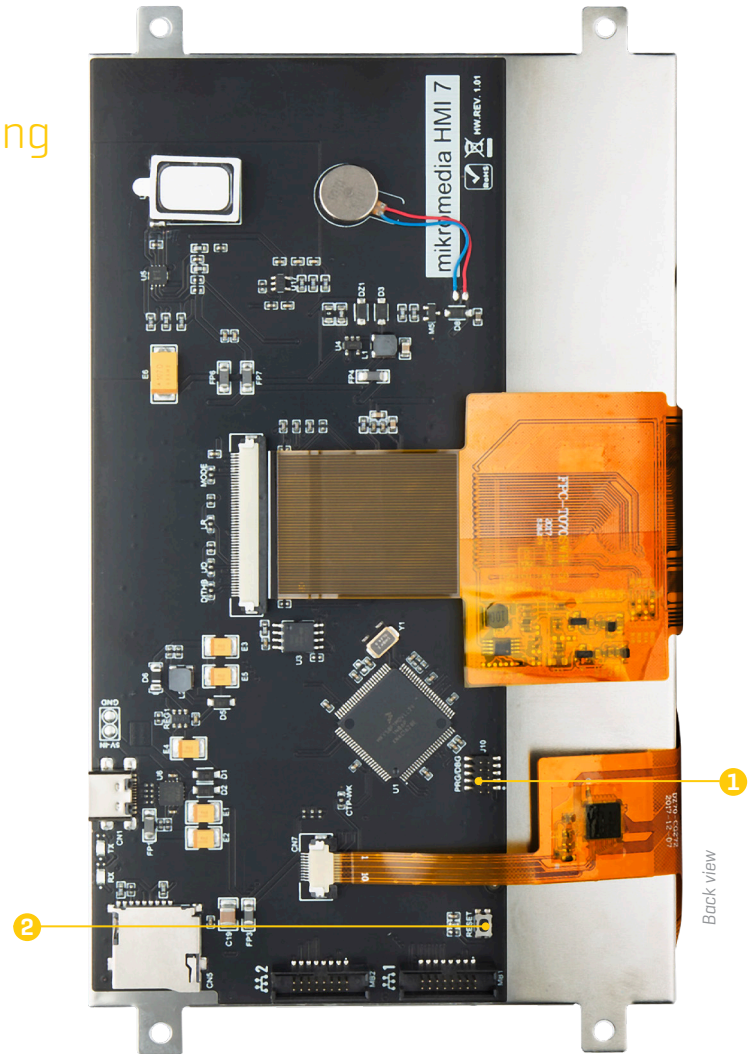
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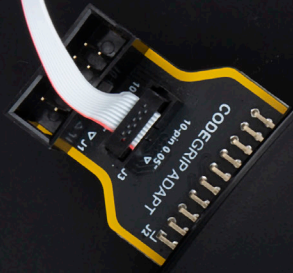
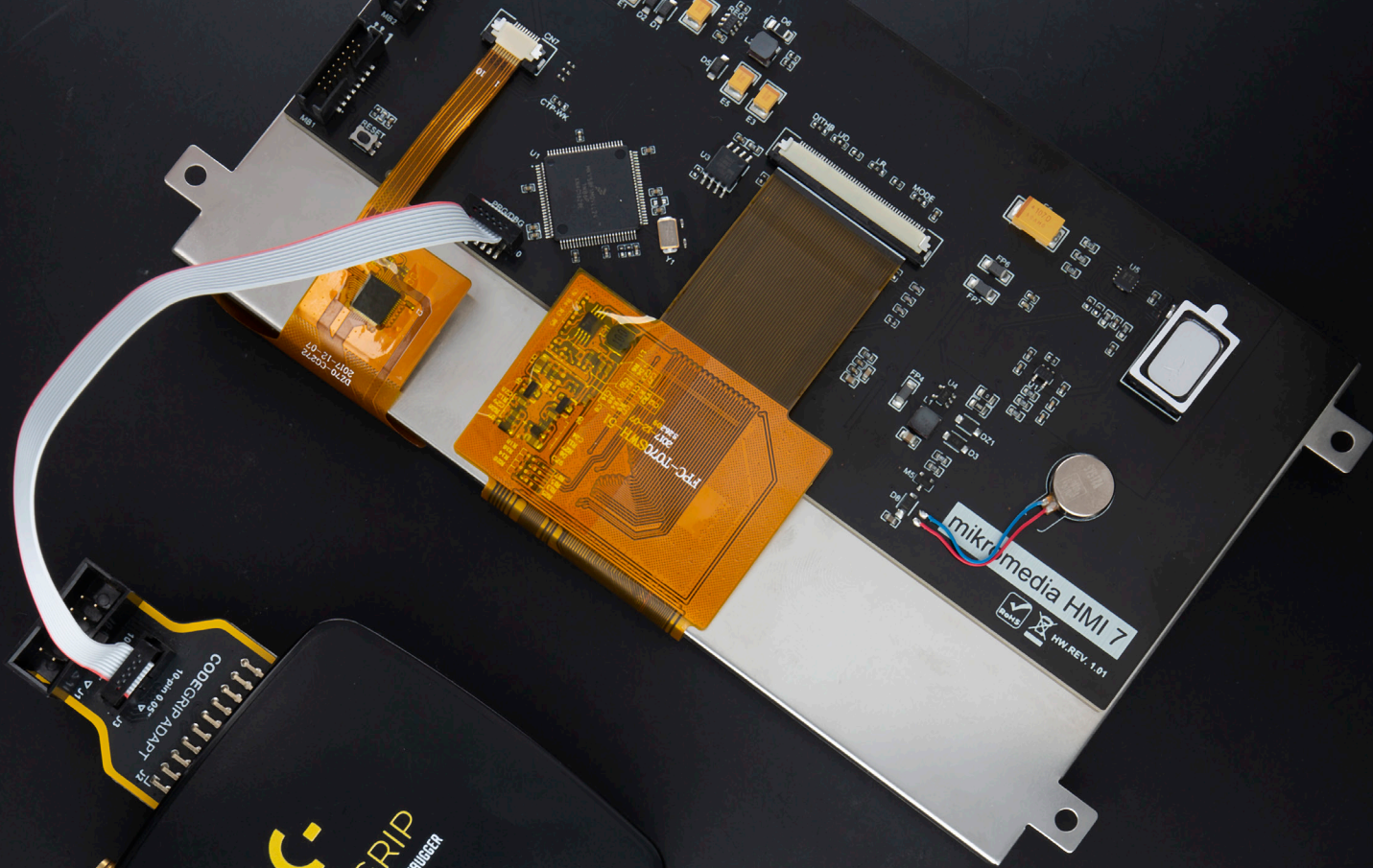
1.1 Microcontroller programming/debugging

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.

1.2 MCU reset

The board is equipped with the Reset button **[2]**, which is located on the front side of the board. It is used to generate a LOW logic level on the microcontroller reset pin.





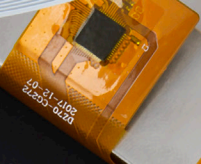
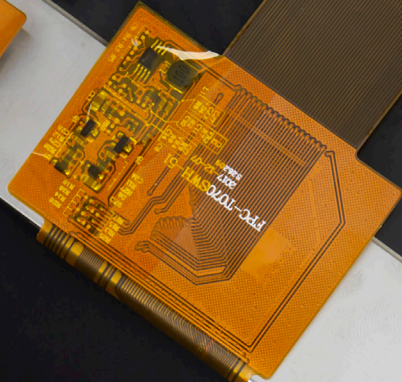
CODEGRIP
USB / NET PROGRAMMER & DEBUSER

- POWER
- USB-LINK
- NET-LINK
- ACTIVE
- DATA

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mikromedia HMI 7
HW.REV. 1.01



2. Capacitive display

A high-quality 7” TFT true-color display with a capacitive touch panel is the most distinctive feature of the mikromedia 7 HMI. The display has a resolution of 800 by 480 pixels, and it can display up to 16.7M of colors [24-bit color depth]. The display of mikromedia 7 HMI features a reasonably high contrast ratio of 500:1, and brightness intensity of 420 Cd/m², thanks to a matrix of 9 x 3 high-brightness LEDs [27 in total] that are used for backlighting.

The display module is controlled by the FT813 graphics driver IC from FTDI. This is a powerful graphics controller targeted at embedded applications to generate high-quality Human Machine Interfaces [HMIs]. It also includes some advanced features such as the embedded video engine, enhanced sketch processing, built-in synthesizer, and more.

The capacitive multi-touch panel, based on the FT5426 CTP 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. This advanced multi-touch panel controller supports gestures, including zoom and swipe in all four directions.

Equipped with high-quality 7” display **[1]** and the multi-touch controller that supports gestures, mikromedia 7 HMI represents a very powerful hardware environment for building various GUI-centric Human Machine Interface [HMI] applications.



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mikromedia HMI 7

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Display and back view

3. Data storage

The mikromedia 7 HMI development board is equipped with two types of storage memory: with a microSD card slot and a Flash memory module.

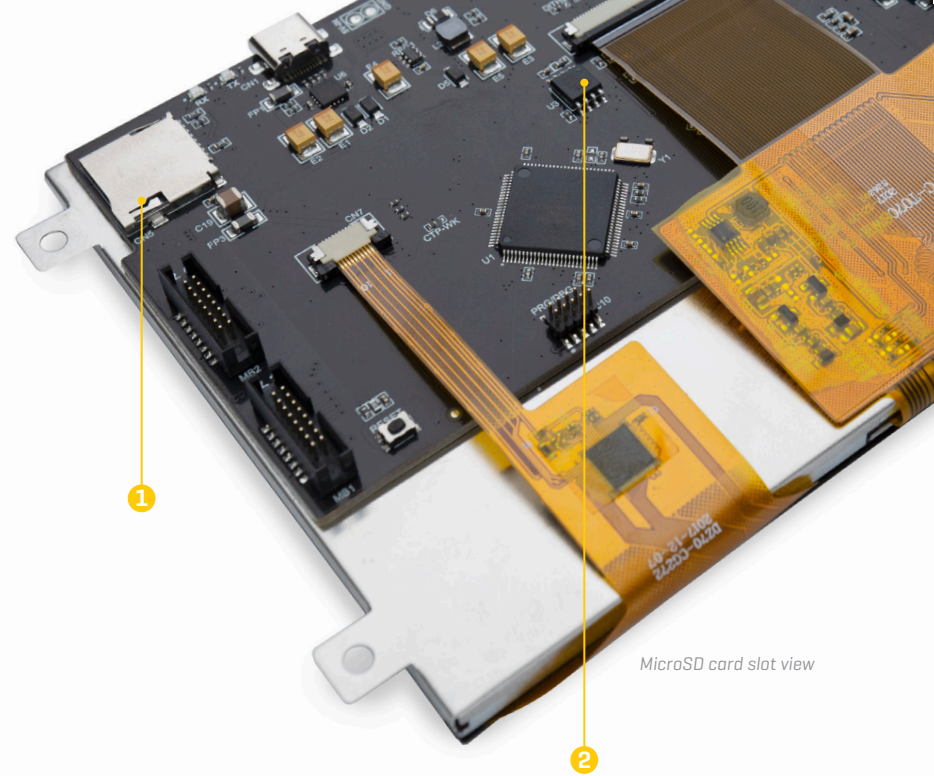
3.1 microSD card slot

The microSD card slot **[1]** allows storing large amounts of data externally, on a microSD memory card. It uses the Serial Peripheral Interface (SPI) 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.

3.2 External flash storage

mikromedia 7 HMI features EN25Q80B Serial Flash Memory **[2]** which uses SPI communication interface and has 8 Mbits of available memory with enhanced write protection mechanisms. The memory can be programmed 1 to 256 bytes at a time, using the Page Program instruction.

The device can sustain a minimum of 100K program/erase cycles on each sector or block. It also uses the SPI interface for the communication with the MCU.



MicroSD card slot view

4. Connectivity

mikromedia 7 HMI offers a USB-UART connectivity option. Besides that, 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™.

4.1 USB-UART

UART [Universal Asynchronous Receiver/Transmitter] interface is one of the most common interfaces for data exchange between the MCU and other external devices. mikromedia HMI 7 board offers the UART connectivity over the USB-C connector [1] by utilizing the FT230XQ, a popular USB-UART bridge IC, produced by FTDI Chip. This IC contains the complete USB stack necessary for the interface bridging between the UART peripheral of the MCU and the USB interface of the PC. FT230XQ drivers are available for download from the mikromedia HMI 7 product web page, as well as from the official FTDI drivers download web page.

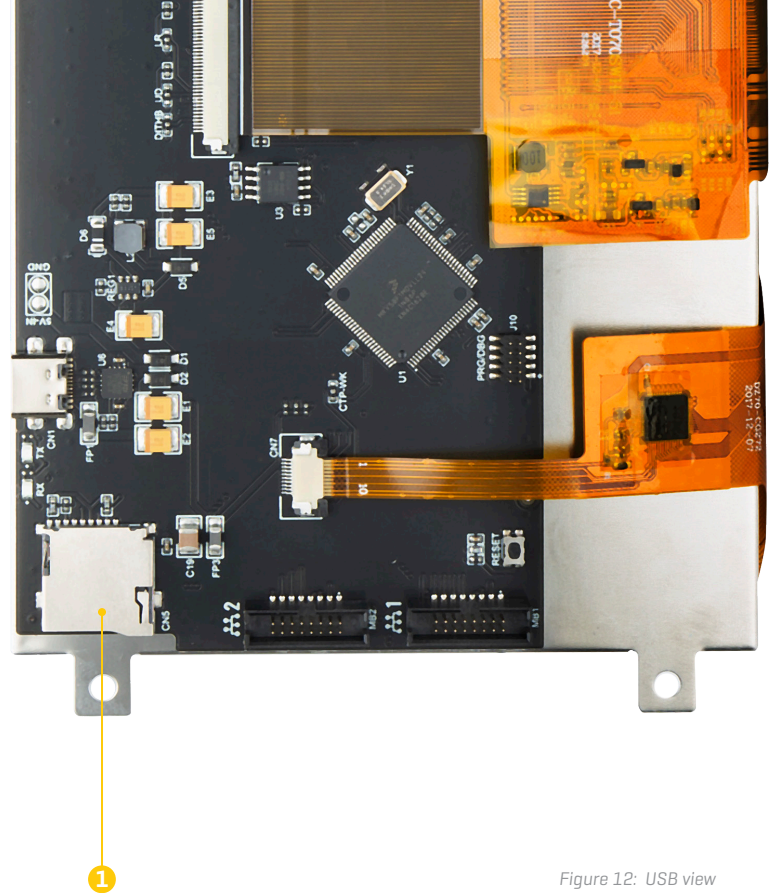


Figure 12: USB view

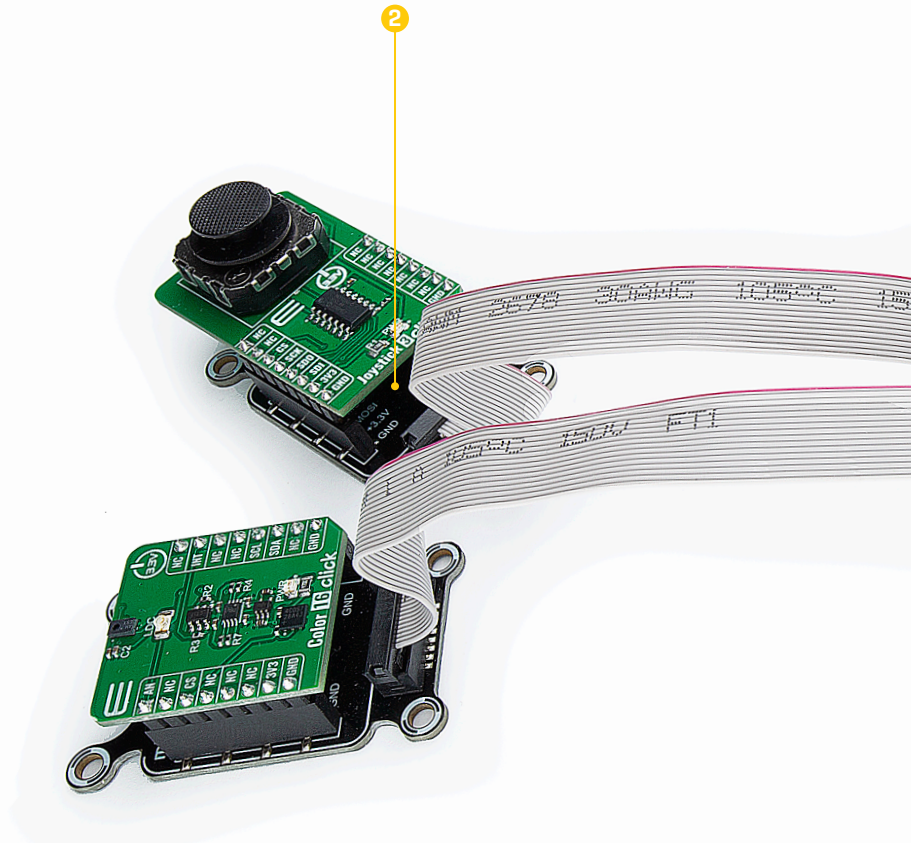
4.2 mikroBUS™ shuttle connectors

mikromedia 7 HMI CAPACITIVE 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 from MB1 to 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

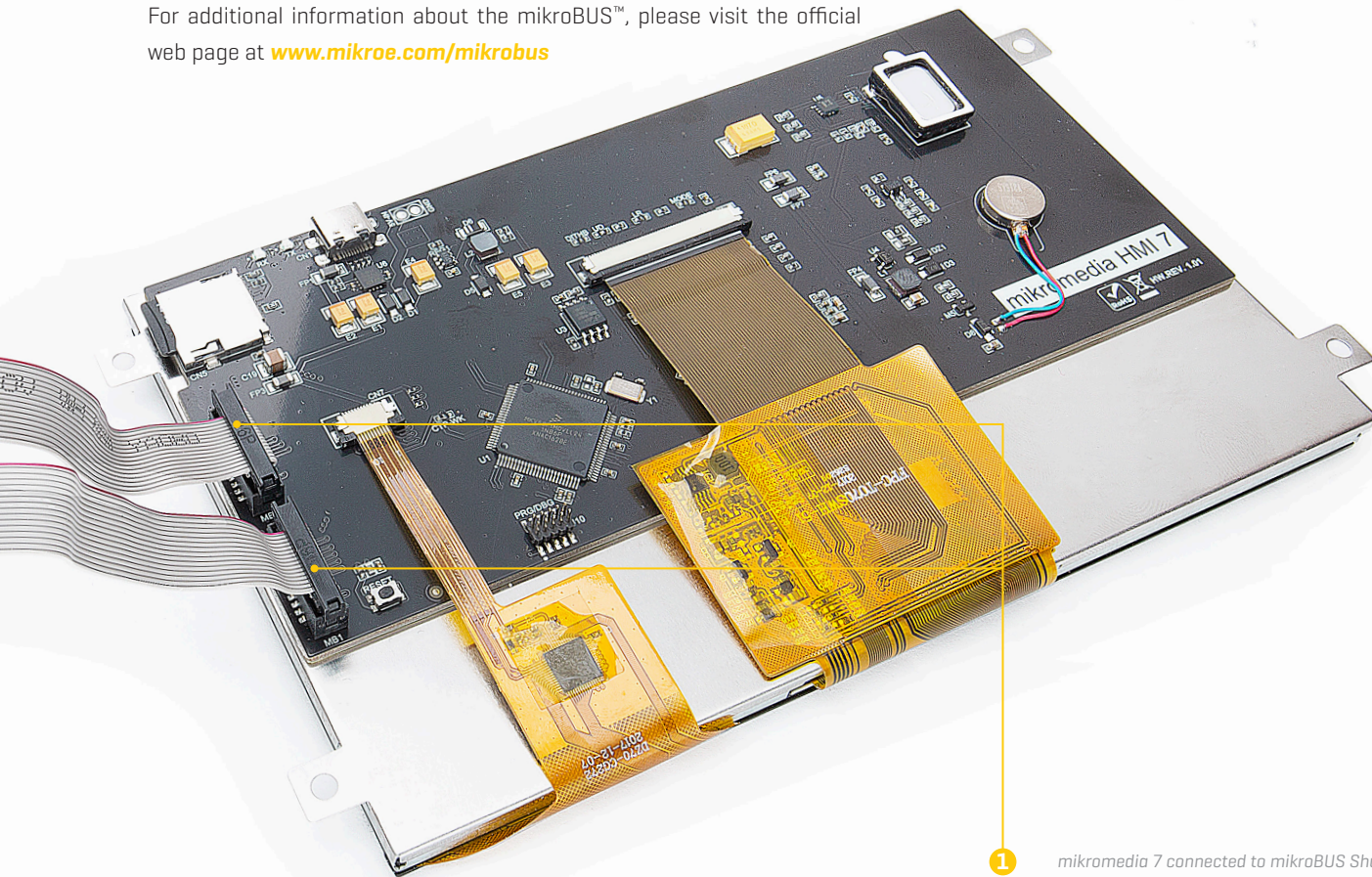


For more information about mikroBUS™ Shuttle extension board and Shuttle click, please visit web pages:

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



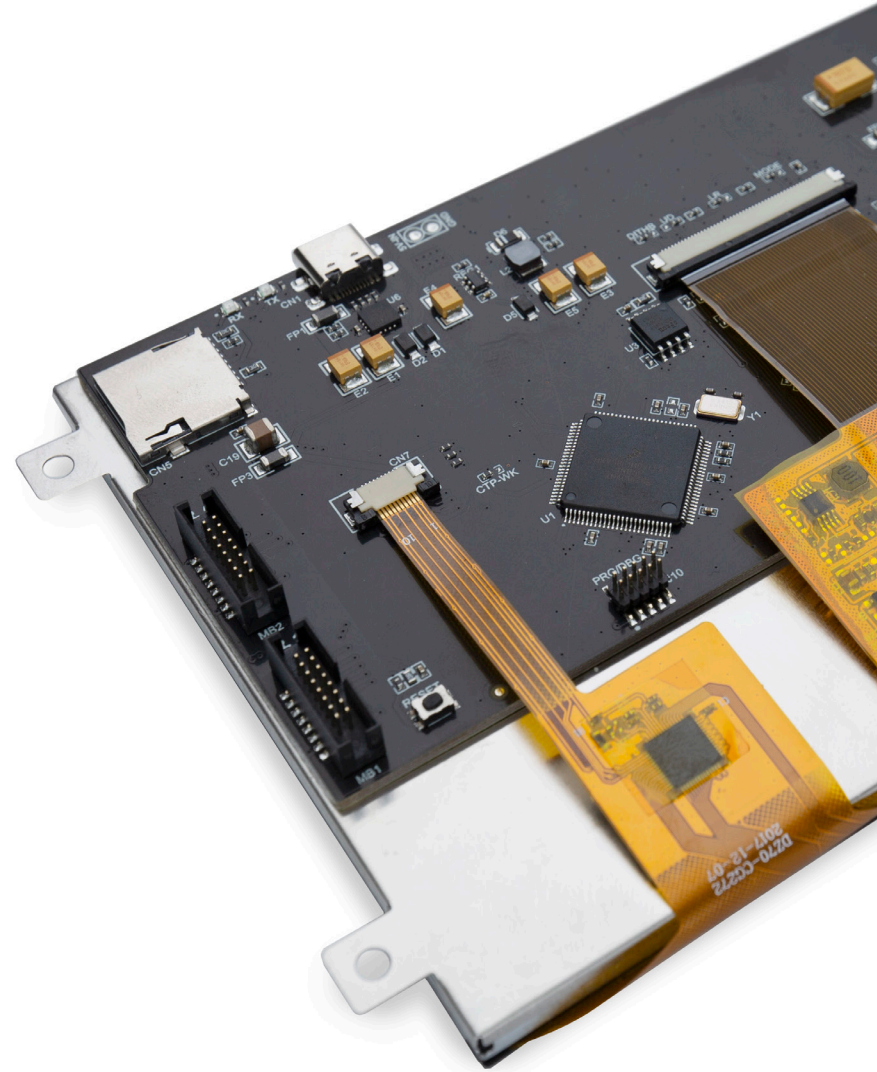
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mikromedia 7 connected to mikroBUS Shuttle view

5. Audio Speaker

To round-up its multimedia concept, mikromedia HMI 7 features an audio speaker paired with a Class-AB audio amplifier.

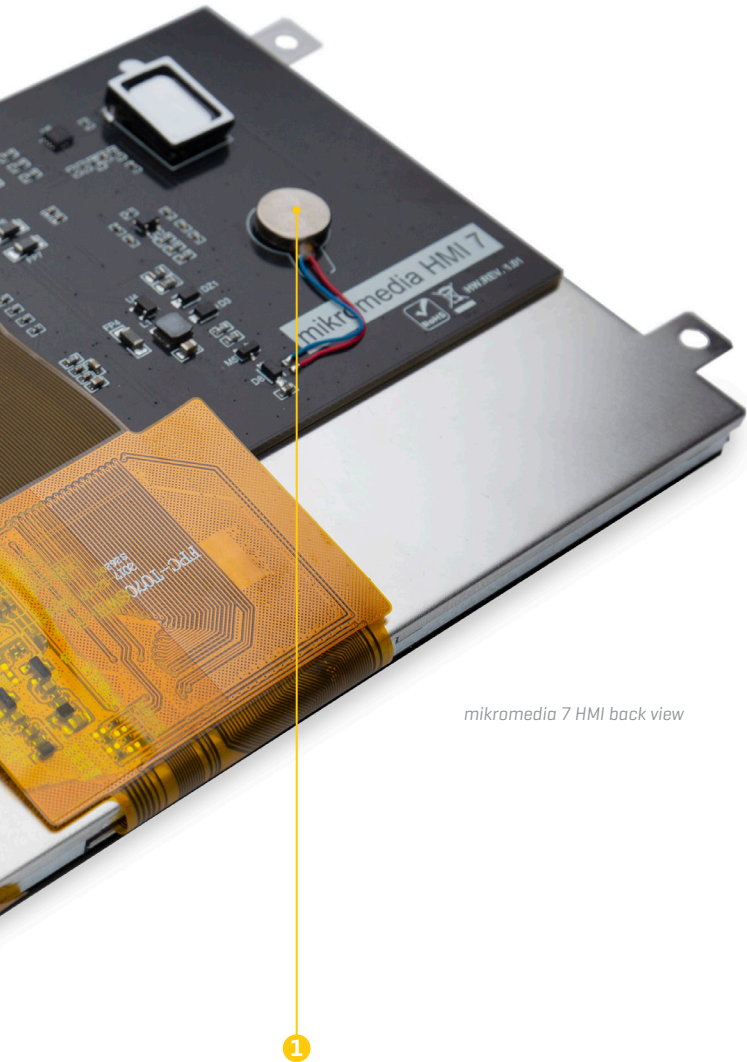
The TPA6203A1 is a 1.25-W mono fully differential amplifier designed to drive a speaker with at least 8Ω impedance. Features like 85-dB PSRR from 90 Hz to 5 kHz and improved RF-rectification immunity, make the TPA6203A1 ideal for multimedia applications.



6. Haptic feedback motor

Haptic feedback motor features a compact size Eccentric Rotating Mass [ERM] motor **(1)**. This type of motor is often used for haptic feedback on many small handheld devices, such as the cellphones, pagers, RFID scanners and similar devices. This motor contains a small eccentric weight on its rotor, so while rotating it also produces vibration effect. This kind of motors is sometimes referred to as coin motors, due to its shape.

This is an ideal solution for adding a simple, one pin driven haptic feedback on any design.



mikromedia 7 HMI back view

RAPID DEVELOPMENT OF
MULTIMEDIA AND GUI-CENTRIC
HMI APPLICATIONS

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What's next?

You have now completed the journey through each and every feature of mikromedia 7 HMI CAPACITIVE 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

Easy programming, clean interface, powerful debugging, great support - our compilers come in three different flavors: mikroC PRO for ARM, mikroBASIC PRO for ARM and mikroPASCAL PRO for ARM, offering a complete rapid embedded development solution for these 3 major programming languages.

www.mikroe.com/compilers/compilers-arm

Fast, professional, multiplatform, and multi-architectural NECTO Studio is already in the air. Support for Kinetis compiler inside the NECTO Studio is ready, for more information, please visit: www.mikroe.com/necto

2 PROJECTS

Once you have chosen your compiler, and since you already got the board, you are ready to start writing your first projects. We have equipped our compilers with dozens of examples that demonstrate the use of each and every feature of the ww. This makes an excellent starting point for future custom projects. Just load the example, read well commented code, and see how it works on hardware.

3 COMMUNITY

We invite you to join thousands of users of MIKROE development tools. You will find useful projects and tutorials and get help from a large user community. If you want to download free projects and libraries, or share your own code, please visit the Libstock website. With user profiles, you can get to know other programmers, and subscribe to receive notifications on their code.

www.libstock.mikroe.com

4 SUPPORT

Mikroe offers free Tech Support to the end of its life span, so if anything goes wrong, we are ready and willing to help. We know how important it is to be able to rely on someone in the moments when we are stuck with our projects for any reason, or facing a deadline. This is why our Support Department, as one of the pillars upon which our company is based, now also offers the Premium Technical Support to business users, ensuring even shorter time-frame for solutions. www.mikroe.com/support

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