Thank you for choosing MIKROE!

We present you the ultimate solution for embedded development. Elegant on the surface, yet extremely powerful on the inside, we have designed it to inspire outstanding achievements. And now, it’s all yours.

Enjoy premium.
# Table of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>1. MCU Features</td>
<td>6</td>
</tr>
<tr>
<td>2. MCU Programming</td>
<td>7</td>
</tr>
<tr>
<td>3. MCU Reset</td>
<td>9</td>
</tr>
<tr>
<td>4. Buttons and LEDs</td>
<td>10</td>
</tr>
<tr>
<td>5. Power Supply</td>
<td>11</td>
</tr>
<tr>
<td>6. Connectivity</td>
<td>12</td>
</tr>
<tr>
<td>7. Click boards™</td>
<td>14</td>
</tr>
</tbody>
</table>
**Clicker 4 for TMPM3H** is a compact development board designed as a complete solution, you can use it to quickly build your own gadgets with unique functionalities.

Featuring a TMPM3HQF10BFG MCU, four mikroBUS™ sockets for Click boards™ connectivity, power management, and more, it represents a perfect solution for the rapid development of many different types of applications.

At its core, there is a TMPM3HQF10BFG MCU, a powerful microcontroller by Toshiba, based on the high-performance Arm® Cortex®-M3 32-bit processor core operating at up to 120 MHz frequency.

It provides sufficient processing power for the most demanding tasks, allowing Clicker 4 to adapt to any specific application requirements.

Besides two 1x20 pin headers, four improved mikroBUS™ sockets represent the most distinctive connectivity feature, allowing access to a huge base of Click boards™, growing on a daily basis.

Each section of Clicker 4 is clearly marked, offering an intuitive and clean interface. This makes working with the development board much simpler and thus, faster.

The usability of Clicker 4 doesn’t end with its ability to accelerate the prototyping and application development stages: it is designed as a complete solution which can be implemented directly into any project, with no additional hardware modifications required. Four mounting holes [4.2mm/0.165”] at all four corners allow simple installation by using mounting screws. For most applications, a nice stylish casing is all that is needed to turn the Clicker 4 development board into a fully functional, custom design.
1. Key microcontroller features

At its core, Clicker 4 for TMPM3H uses the **TMPM3HQF10BFG** MCU.

**TMPM3HQF10BFG** is the 32-bit ARM® Cortex®-M3 core. This MCU is produced by Toshiba, featuring a DMA Controller (DMAC), memory protection unit (MPU), and advanced features ideal for motor control and industrial equipment applications. Among many peripherals available on the host MCU, key features include:

- 1024kB Code Flash
- 32kB Data Flash
- 128kB of SRAM
- Operating frequency up to 120 MHz
- Advanced programmable motor control circuit (A-PMD)
- Advanced Encoder input circuit (32-bit) (A-ENC32)

For the complete list of MCU features, please refer to the **TMPM3HQF10BFG datasheet**.
2. MCU Programming

2.1 Programming with on-board debug unit

Clicker 4 for TMPM3H uses Toshiba’s TMPM067FWQG as the on-board Debug Unit. It is compliant with an on-board emulator standard called CMSIS-DAP.

CMSIS-DAP is the interface firmware for a Debug Unit that connects the Debug Port to USB. Debuggers, which execute on a host computer, connect via USB to the Debug Unit and to the Device that runs the application software. The Debug Unit connects via JTAG or SWD to the target Device. Once Clicker 4 is powered up, and PWR/DBG connector is connected to the PC, it takes a few seconds for the on-board Debug Unit to initialize. After the on-board CMSIS-DAP is initialized, two LEDs RUN and COM blink one time.
The microcontroller can be programmed with an external programmer and supported software. The external programmer is connected to the development board via a 2x5 JTAG/SWD connector soldered on the J2 connector pads.

Before usage, please check if the programmer pinout and the 2x5 pin header pinout are compatible. Based on the used programmer/debugger tool pinout, a corresponding adapter might be needed.

**NOTE**
3. MCU reset

Clicker 4 for TMPM3H development board is equipped with the reset button labeled as RST [1], located on the front of the board. It is used to generate a LOW logic level on the MCU reset pin.

The RST pin of the host MCU is also routed to the pin 40 of the 1x20 pin header [2], allowing an external signal to reset the MCU.

Figure 4: Clicker 4 for TMPM3H front view
4. Buttons and LEDs

The board also contains six buttons and LEDs, located on the front side. Buttons [1] can be used to apply the desired logic state to pins of the MCU they are routed to. Pressing any of the six buttons can change the logic state of the microcontroller pins from logic high [1] to logic low [0].

LEDs [2] can be used to visually indicate a logic state of the specific pin. The maximum current through a single LED is limited with the 4.7k resistor. Each LED is connected to a MCU pin, and an active LED indicates that a logic high [1] is present.
5. Power Supply

After a valid power supply source is connected [1 – 2 – 3 - 4], Clicker 4 for TMPM3H can be powered on by sliding switch SW1 to the ON position. A LED indicator labeled as PWR [5] indicates that the board is powered ON.

The power supply unit (PSU) provides clean and regulated power, necessary for proper operation of the Clicker 4 for TMPM3H development board. It is equipped with four different power supply inputs, offering all the flexibility that Clicker 4 for TMPM3H needs, and a reliable and safe battery charging circuit, which allows a single-cell Li-Po/Li-Ion battery to be charged.

As explained, the advanced design of the PSU allows four 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. 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 five power supply connectors available, each with its unique purpose:

- **CN1, CN2**: USB-C connector [1]
- **J1**: Standard 2.5mm pitch XH battery connector [2]
- **TB1, TB2**: A place for a standard 2.54mm terminal block [3,4]
6. Connectivity

Clicker 4 offers a variety of connectivity options including USB-UART, four standardized mikroBUS™ sockets, and two 1x20 pin headers which are used to directly access the host MCU pins.

Clicker 4 supports USB to serial UART interface, allowing the development of a wide range of various USB-based applications.

Figure 7: mikroBUS™ sockets view
A lot of the host MCU pins are routed to two 1x20 pin headers, making them available for further connectivity. In addition to MCU pins, some additional peripheral pins are also routed to this header.
7. Click boards™

Click boards™ are standardized add-on boards that carry a variety of different electronic devices. They are designed to perfectly fit the mikroBUS™ socket. Engineered to deliver the best performances for the used components, they save developers of testing and troubleshooting often associated with the prototyping phase. They enhance rapid development and accelerate time to market. These ready-to-use boards require no additional hardware configuration.

More information at [www.mikroe.com/click](http://www.mikroe.com/click)
DISCLAIMER

All the products owned by MikroElektronika are protected by copyright law and international copyright treaty. Therefore, this manual is to be treated as any other copyright material. No part of this manual, including product and software described herein, must be reproduced, stored in a retrieval system, translated or transmitted in any form or by any means, without the prior written permission of MikroElektronika. The manual PDF edition can be printed for private or local use, but not for distribution. Any modification of this manual is prohibited.

MikroElektronika provides this manual ‘as is’ without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties or conditions of merchantability or fitness for a particular purpose.

MikroElektronika shall assume no responsibility or liability for any errors, omissions and inaccuracies that may appear in this manual. In no event shall MikroElektronika, its directors, officers, employees or distributors be liable for any indirect, specific, incidental or consequential damages (including damages for loss of business profits and business information, business interruption or any other pecuniary loss) arising out of the use of this manual or product, even if MikroElektronika has been advised of the possibility of such damages. MikroElektronika reserves the right to change information contained in this manual at any time without prior notice, if necessary.

HIGH RISK ACTIVITIES

The products of MikroElektronika are not fault – tolerant nor designed, manufactured or intended for use or resale as on – line control equipment in hazardous environments requiring fail – safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines or weapons systems in which the failure of Software could lead directly to death, personal injury or severe physical or environmental damage (‘High Risk Activities’). MikroElektronika and its suppliers specifically disclaim any expressed or implied warranty of fitness for High Risk Activities.

TRADEMARKS

The MikroElektronika name and logo, the MikroElektronika logo, mikroC, mikroBasic, mikroPascal, mikroProg, mikromedia, Fusion, Click boards™ and mikroBUS™ are trademarks of MikroElektronika. All other trademarks mentioned herein are property of their respective companies.

All other product and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are only used for identification or explanation and to the owners’ benefit, with no intent to infringe.

Copyright © MikroElektronika, 2023, All Rights Reserved.
If you want to learn more about our products, please visit our website at www.mikroe.com
If you are experiencing some problems with any of our products or just need additional information, please place your ticket at www.mikroe.com/support
If you have any questions, comments or business proposals, do not hesitate to contact us at office@mikroe.com