

MOTIX™ MCU BSL Tool

User guide

About this document

Scope and purpose

This document describes the user interface of the MOTIX™ MCU BSL Tool.

The tool is the user interface to control the firmware of a MOTIX™ MCU target via the provided BSL commands interactively.

Typical use cases for the MOTIX™ MCU BSL Tool are:

- Connect to the target device
- Get or Set the NAC/NAD values
- Erase the full chip or only a specific NVM module
- Program and verify
- Read the whole device or a specific NVM range
- Set or remove protection
- Execute code
- Read and Write 100TP pages
- UBSL Configuration

Currently, the following devices are supported by the MOTIX™ MCU BSL Tool:

- MOTIX™ MCU TLE988x/9x (Design step: AK)

Intended audience

This document is addressed to embedded hardware and software developers as documented in the MOTIX™ MCU TLE988x/9x firmware user manual.

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1 Introduction

1 Introduction

1.1 How to get the tool

The MOTIX™ MCU BSL Tool is a tool available in the Infineon Developer Center (IDC). Open this [link](#) to access the Infineon Developer Center.

A detailed description of installing and using the IDC is available [here](#).

Once the tool is installed, it appears as follows in the IDC and is ready to start.

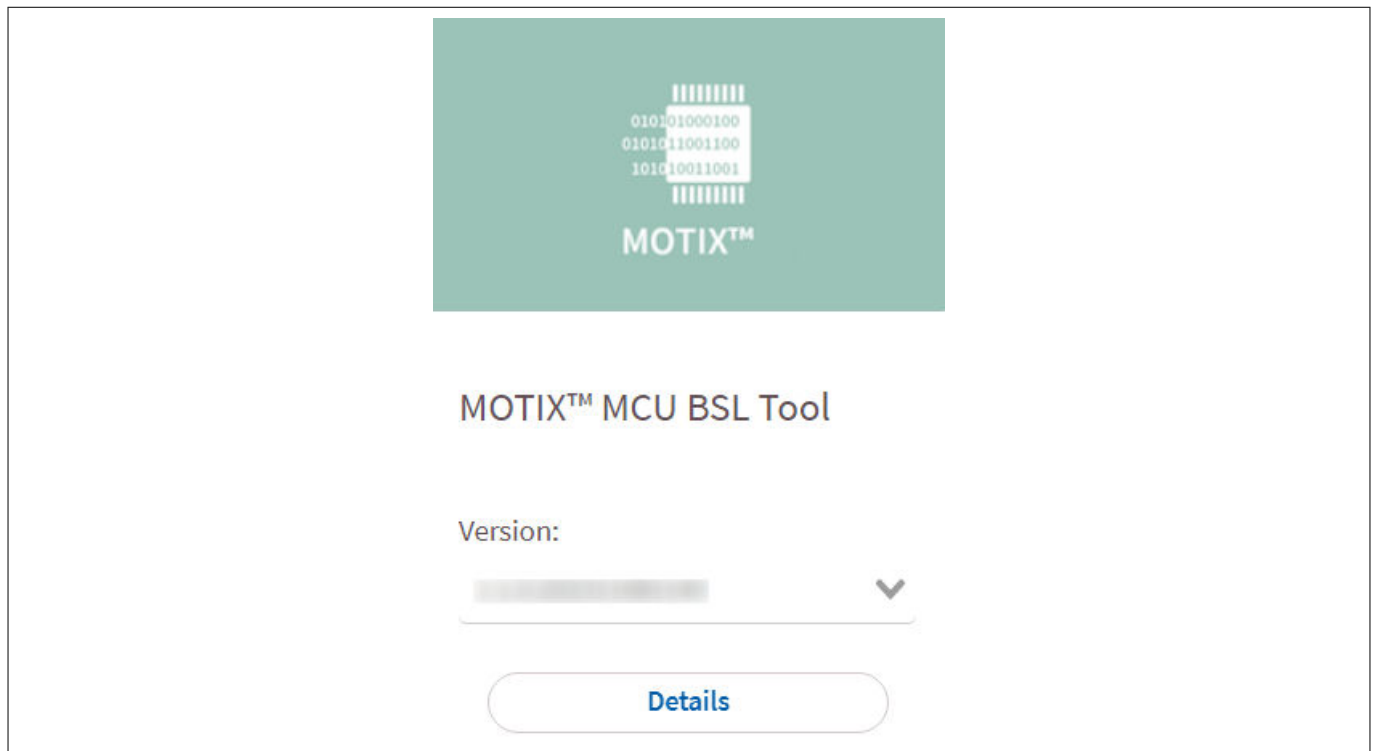


Figure 1 MOTIX™ MCU BSL Tool in IDC

1 Introduction

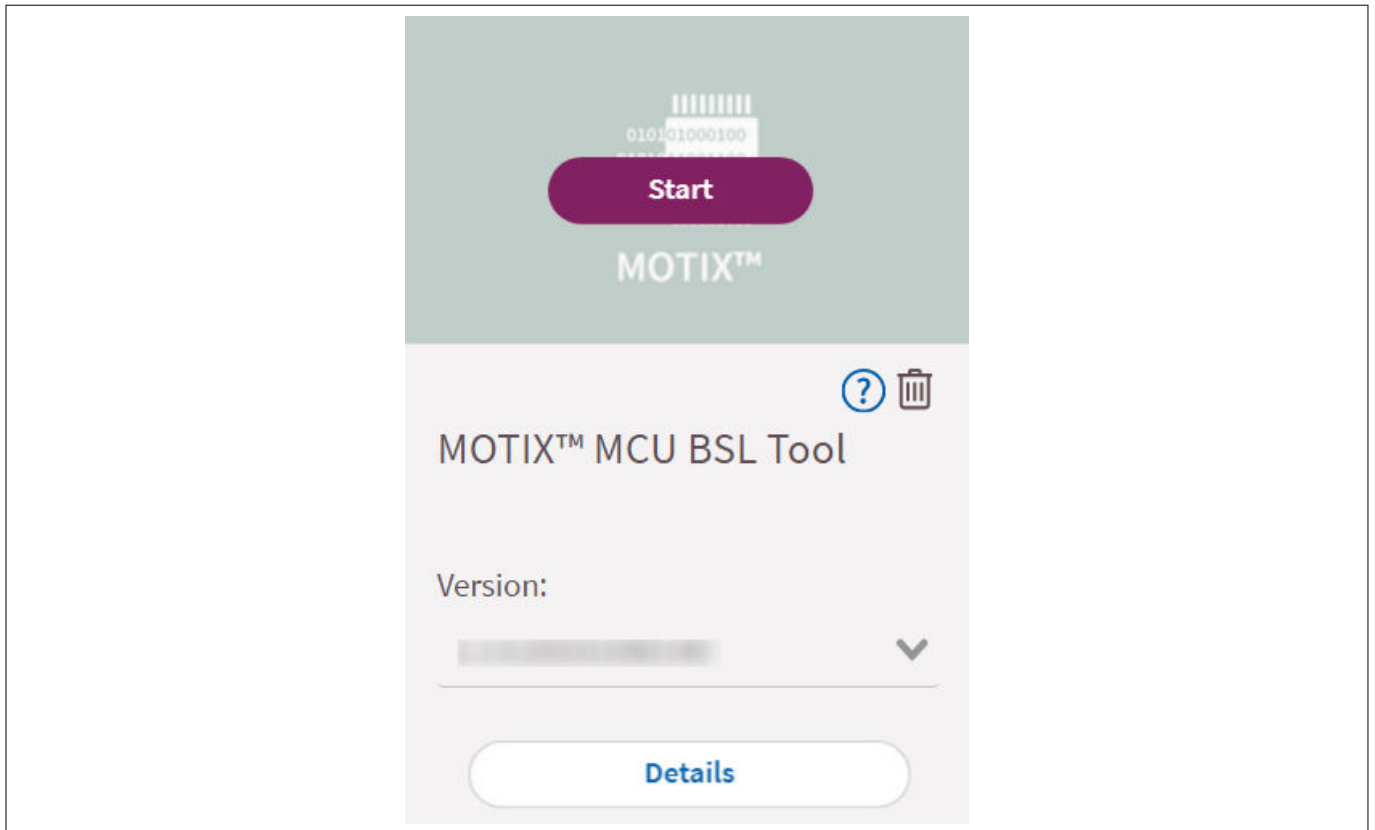


Figure 2 Start MOTIX™ MCU BSL Tool

1.2 Getting help

The tool header bar offers various ways of getting help on the tool. You can access help from any screen in the tool.



Access the support page, including expert help



Access the tool forum to exchange information with peers



Open the tool user guide

1.3 Setup

This section describes the required hardware and software to use the MOTIX™ MCU BSL Tool.

Requirements:

- MOTIX™ MCU BSL Tool
- [uIO-Stick v2](#) with CAN connectivity with uIO firmware version 3.0.0 or higher. To update the firmware chose **Extras** → **Update uIO** and select the corresponding firmware

1 Introduction

- Ensure that there are no other communication devices that might interfere with CAN/LIN communication with the uIO-Stick v2.
- Target-specific board: see below the TLE988x_TLE989x evaluation board

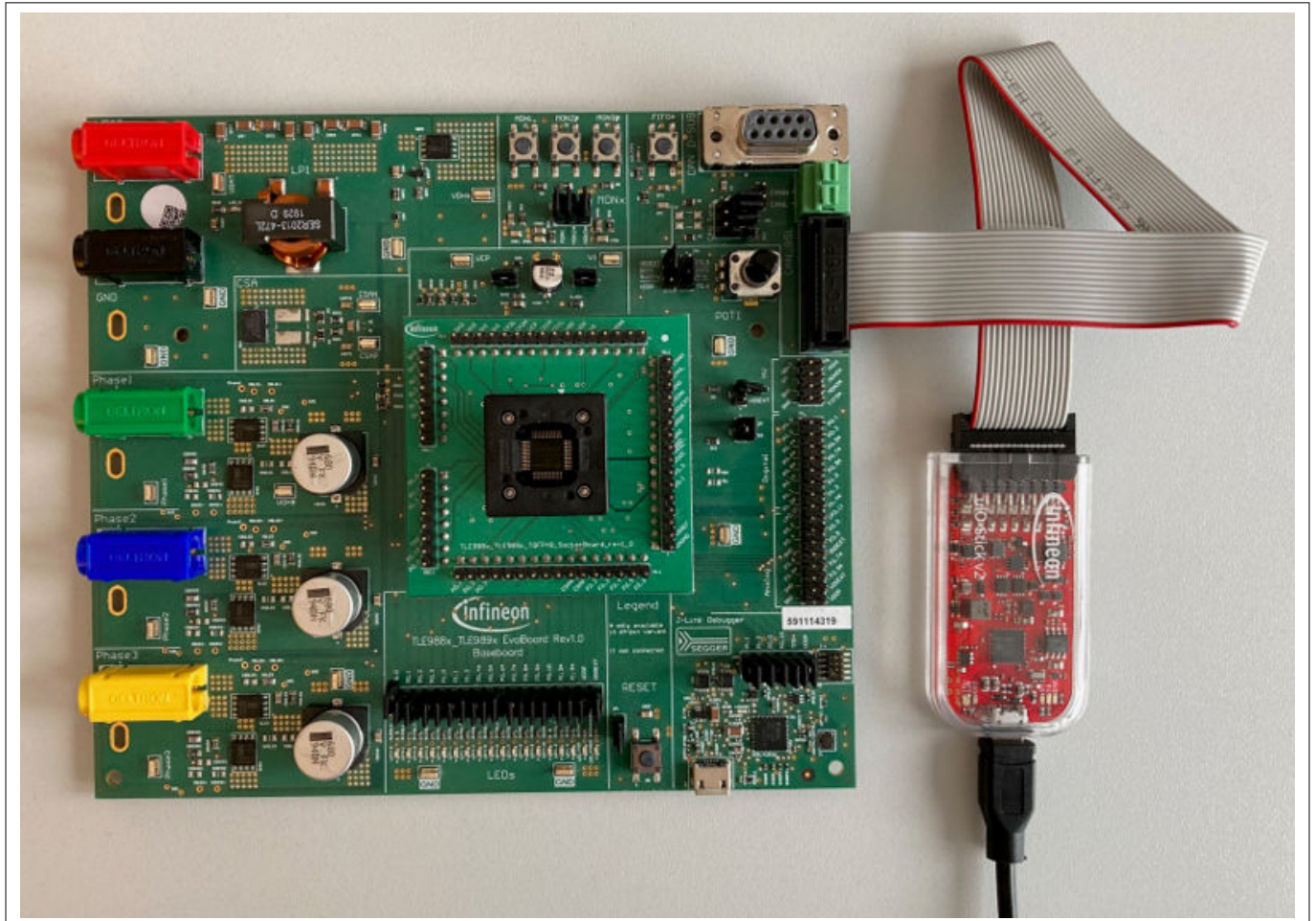


Figure 3 TLE988x_TLE989x evaluation board connected with uIO-Stick v2

2 BSL Tool navigation and configuration

2 BSL Tool navigation and configuration

To start using the tool, connect the uIO-Stick v2 to the target board and to the PC using a USB cable. Open the MOTIX™ MCU BSL Tool from the Infineon Developer Center (IDC) and choose a target device family. The supported device families are:

- TLE988x
- TLE989x

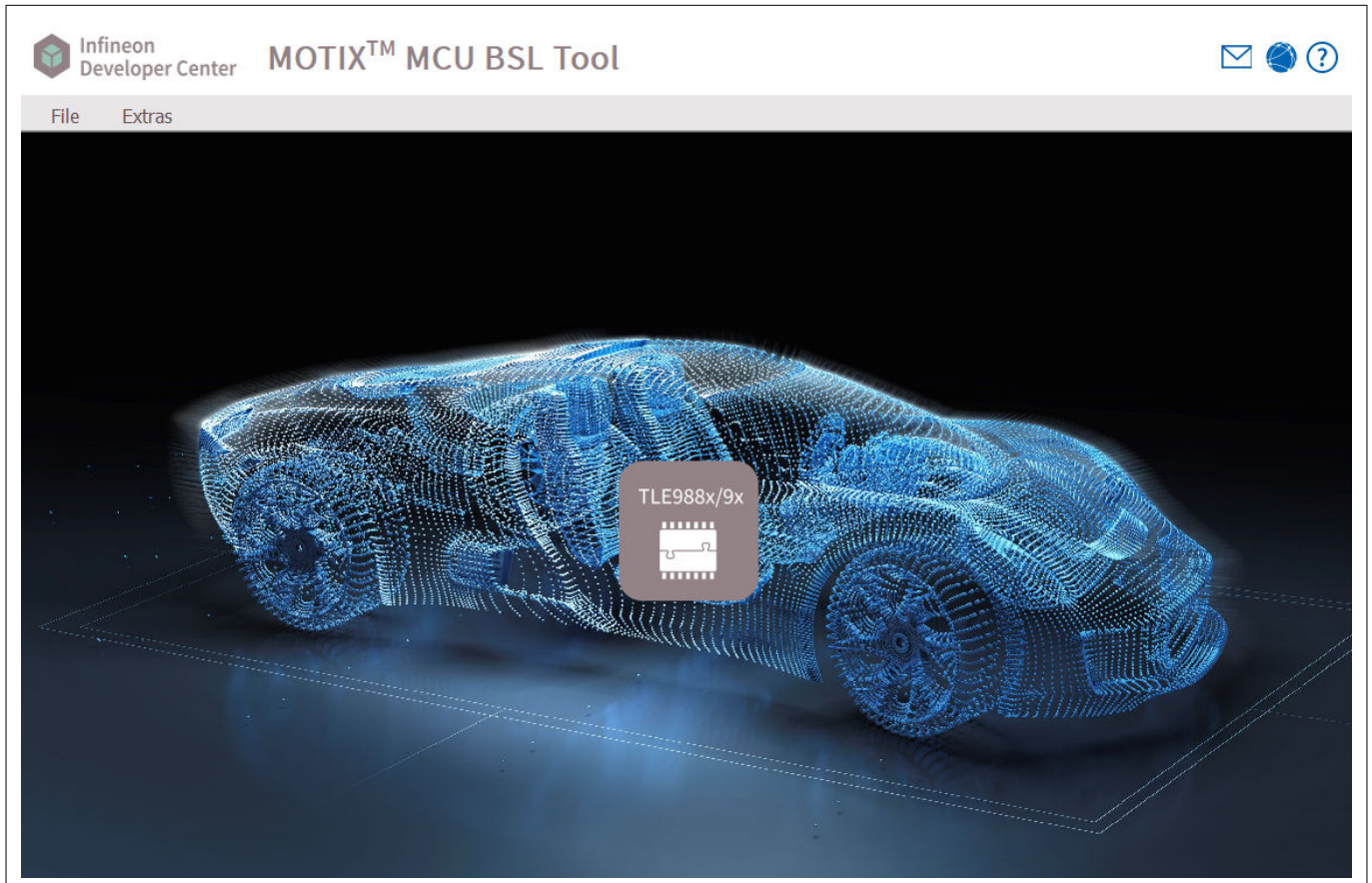


Figure 4 MOTIX™ MCU BSL Tool device family selection

To open a target-specific GUI, select the device family. Then select the specific target device or return to the previous screen to select a different device family.



Figure 5 BSL Tool Navigation and Config section

3 uIO-Stick v2 connection

3 uIO-Stick v2 connection

This section shows the connection status of the uIO-Stick v2, the target family, and firmware information. The status lights indicate whether the connection was successful and whether the uIO BSL task was loaded successfully (green: ok, red: error).



Figure 6 uIO connection section

The BSL task is a prerequisite for all the other MOTIX™ MCU device-specific operations using the uIO-Stick v2. The BSL task is a standalone executable loaded dynamically by the uIO-Stick v2. This task enables the uIO-Stick v2 to handle with MOTIX™ MCU device-specific details. The BSL task must be properly loaded and running. All tool operations will fail if the BSL task is loaded incorrectly (for example, the uIO-Stick v2 is removed from the USB port after the application was started). In the log console, this error appears: `ERROR: μIO command not implemented!` To resolve this issue, the MOTIX™ MCU BSL Tool must be restarted.

4 Tool functionalities

4 Tool functionalities

The following chapter describes the different functionalities available in the tool. Note that the status indicators in the command status section show whether the latest action was successfully configured.

4.1 Device connection

The BSL mode is a special mode for operating the target. The target can be set into BSL mode by sending a connection sequence after a reset via the on-target interface within the on-target defined NAC time. For more information about the NAC time and the interface selection, refer to the firmware user manual for the target device.



Figure 7 Device connection section

As can be seen in [Figure 7](#) there are multiple connection options that can be selected in the drop-down menu:

Table 1 Connection options

Connection options	Description
VS and reset pins	Both the VS pin (to power cycle) and reset pin are used in an attempt to restart the target device.
Reset pin only	Using the reset pin only has the advantage that it is independent of other hardware interferences. However, the reset pin must be properly routed and configured.
VS pin only	VS pin only is used to power cycle the target device. The target board must be powered exclusively by the uIO-Stick v2.

The reset time defines the duration of the reset pulse in ms. This setting is applied to the reset pulse of both the reset and VS pins according to the selection in the **Connection Option** setting.

The connection delay time defines the delay between the release of the reset pulse and the connection sequence. This setting should be made under the consideration of the configured NAC time of the connected target device.

The status lights shows whether the connection to the target device was successful (green: connected, red: not connected). A correctly established connection to the target device is a prerequisite for all the other BSL services.

Note: The MOTIX™ MCU BSL Tool uses the broadcast NAD (NAD = 255) for connection.

4.2 Configure NAC/NAD

The NAD value identifies a specific target in a larger network. Each target can be accessed independently. The NAD address range includes values from 0 to 255. Valid NAD values are target-specific. For more information about the NAD value, refer to the firmware user manual of the target device.

The NAC defines the time window after a reset for which the target device waits for the BSL connection sequence to be received before entering the user mode. If the NAC value is too small, a connection with the MOTIX™ MCU BSL Tool might not work properly. For a NAC value = 0 a BSL connection is not possible anymore. The recommended NAC window for connecting with the MOTIX™ MCU BSL Tool is 30 ms. For more information about the NAC refer to the Firmware user manual of the target device.

4 Tool functionalities

In the NAC/NAD section of the MOTIX™ MCU BSL Tool the values for NAC and NAD of the connected device can be read and set using **Set NAC/NAD** and **Get NAC/NAD**.



Figure 8 NAC/NAD section and Command Status

When a new connection is established, the field for NAC shows "unknown" and the field for NAD shows "0". By clicking **Get NAC/NAD**, the values of the connected device are read and shown in the according input fields. By changing the values in the input fields and clicking **Set NAC/NAD**, new values can be set in the connected target device.

4.3 Erase

The NVM erase operation can be executed on a specific NVM module or on the whole target. To erase a specific flash module, select the module and click **Erase Module**. To erase the whole target, click **Erase full Chip**.



Figure 9 Erase section

4.4 Program and verify

This section of the tool allows flashing a hex file to the target as well as verifying the data in target flash.



Figure 10 Program and verify section

Clicking on **Select input HEX file** opens the file browser to select the user's hex file that is to be flashed. By clicking **Program**, the selected hex file is flashed to the connected device. By clicking on **Verify**, the selected hex file is matched against the data in the target flash.

4.5 Read

In this section of the tool, the NVM of the connected device is read out.



Figure 11 Read section

By clicking **Select output HEX file**, a file can be selected to which the read content is exported. By clicking **Read NVM range**, an NVM range defined by the fields for start address and length, which is read and exported.

4 Tool functionalities

4.6 Protection

This section of the GUI handles target-specific protection features.

For the MOTIX™ MCU TLE988x/9x devices protection can be activated on specific areas of the flash. Therefore three options are available in the drop-down menu for Flash segment(s):

Table 2 Flash segment options

Option	Description
UBSL	The protection is set for UBSL.
UDATA	The protection is set for UDATA.
UCODE	The protection is set for UCODE.



Figure 12 Protection section for MOTIX™ MCU TLE988x/9x

Clicking **Set Protection** or **Remove Protection**, sets or removes protection for the selected flash segment; for the allowed sequence, refer to the MOTIX™ MCU TLE988x/9x user manual chapter 7.8.1.1 Permanent protection. If the check-box **Erase on removing protection** is flagged when the protection is set, the flash region will be erased if the protection is removed again. This is a specific feature of the MOTIX™ MCU TLE988x/9x devices.

4.7 Execute code

This function launches already programmed code on the connected target device.



Figure 13 Execute code

The code located in UBSL is started when clicking **Execute**. In the address field, the corresponding address from which the code was launched is displayed. The BSL connection between the target device and the MOTIX™ MCU BSL Tool is terminated upon executing the user code.

4.8 100TP memory editor

The 100TP editor allows reading and writing of 100TP memory pages.

When a new connection is established, the field for the selected 100TP page is set to 0 by default and all input fields for the page content is filled with question marks. By clicking **Read page**, the selected 100TP page is read and the content is loaded into the input fields. The values in the input fields can be changed by the user and can be written to the selected 100TP page by clicking **Write page**.

4 Tool functionalities

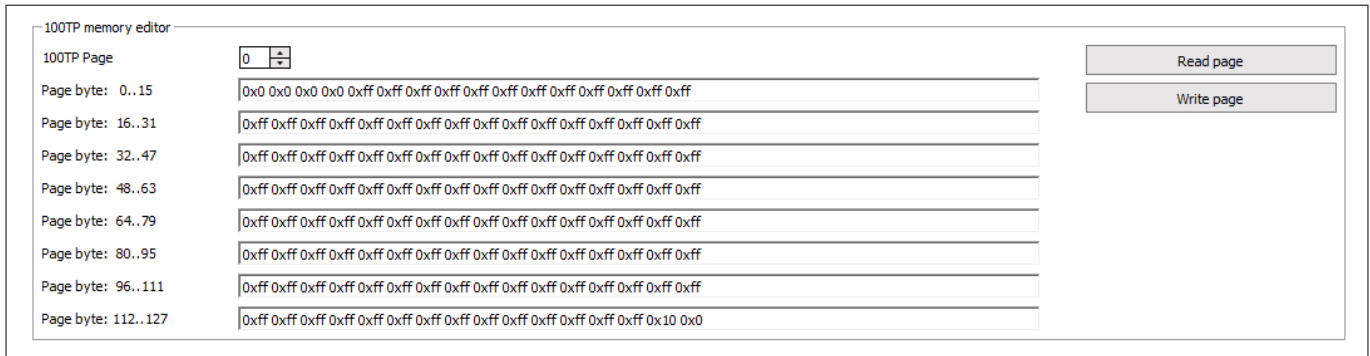


Figure 14 100TP memory editor

The second last byte of each 100TP page contains the page write counter. The target device will reject any further write attempts to the according page if the page writes counter value already has reached 100.

4.9 UBSL configuration

The MOTIX™ MCU TLE988x/9x devices provide commands to configure the UBSL section. These commands can only be executed once per device. To avoid executing them by accident, the buttons to perform the actions need to be enabled by flagging the checkboxes left of the buttons.

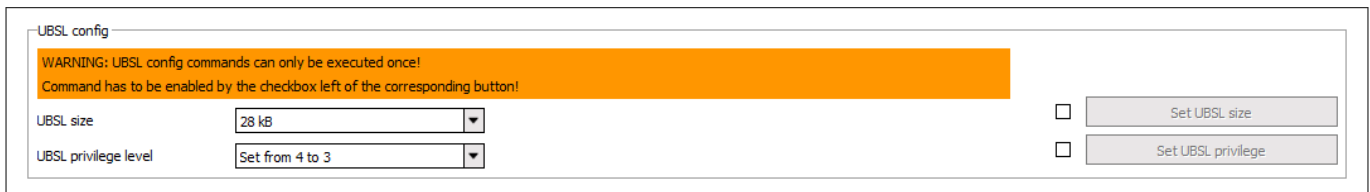


Figure 15 Buttons not enabled

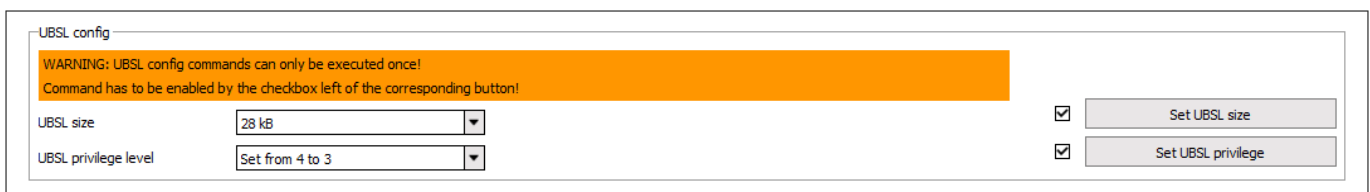


Figure 16 Buttons enabled

The commands can be executed, once the buttons are enabled. For further information about UBSL size and UBSL privilege level, refer to the Firmware user manual of MOTIX™ MCU TLE988x/9x.

5 Troubleshooting

5 Troubleshooting

This chapter describes relevant hints that might be helpful when troubleshooting issues related to the BSL Tool.

5.1 How to report problems

The BSL Tool has a console area where messages are visible. Activate the logging of the USB communication with the uIO-Stick v2 to get more information.

ConfigWizard → **Extras** → **Settings** → **uIO Logging** → **Log to console**

To apply the settings, perform a tool restart. When reporting issues, use the resulting log data.

5.2 Communication issues due to other connected devices

The uIO-Stick v2 connection to the TLE98xx target is a point-to-point connection, via UART protocol, but does not use a standard serial port physical layer (such as RS232). Instead, the physical layer is CAN. It is important to understand that the uIO-Stick v2 assumes to be the only participant on the communication bus.

Please make sure that no other device is connected to the CAN bus. Otherwise, the communication might be affected, for example, by checksum errors.

5.3 Connection issues for small NAC time

If the NAC time is too small, typically less than 10 ms, the BSL Tool may have issues establishing a connection to the target. Make sure to use NAC values > 10 ms.

5.4 Connection issues with TLE988x/9x reset pin

The TLE988x/9x has a configurable reset pin. By the default configuration of the device, the reset pin is disabled. Therefore, an application needs to be already flashed on the device with the reset pin enabled in order for the BSL Tool to work with the **Reset pin** option from **Connection** → **Connection options**.

When unsure whether the reset pin is properly configured, please use the uIO-Stick v2 to power the target and use the **VS only** or VS and **Reset pin** option to connect to the target.

5.5 Connection issues with an external power supply

The recommended way to use the BSL Tool is by using the uIO-Stick v2 to power the development board, nevertheless, using an external power supply is also possible. In this case, the user must be sure that the target reset pin is connected to the uIO-Stick v2 and that the reset pin is configured properly, refer to [Connection issues with TLE988x/9x reset pin](#).

5.6 Connection issues due to capacitors on VS

The BSL Tool connection to target using VS only or VS and reset pin methods need to perform a power cycle on the development board. Any capacitors and other devices connected to the board influence the power cycle timing. The BSL Tool offers the option to set different delay times that can be used to achieve a fitting connection timing for different hardware setups.

As an example, the evaluation board for the TLE988x/9x without any other device attached to it has been proven to work with 500 ms delay time.

5.7 uIO-Stick connection issues

If the uIO-Stick v2 connection status lights are not detected in a USB port when the BSL tool is started please try with a different port. Other USB devices may also influence the uIO connection. If the uIO-Stick v2 is correctly detected, then a USB HID device must be visible in the Windows device manager.

6 Contact us

To get in contact with our support about the following topics, click the link www.infineon.com/services:

- A bug
- An improvement idea
- A new feature request
- A support request

7 Abbreviations

Table 3 **Abbreviations**

100TP	100 times programmable
BSL	Bootstrap loader
NAC	No activity counter
NAD	Network address
NVM	Non volatile memory
UBSL	User bootstrap loader
VS	Supply voltage

Revision history

Revision history

Table 4 Revision history

Document version	Date of release	Description of changes
1.34	2023-11-15	<ul style="list-style-type: none">• Editorial changes• Document updated to reflect new tool name MOTIX™ MCU BSL Tool• Chapter Getting help updated
1.33	2023-04-21	<ul style="list-style-type: none">• Figures in How to get the tool and BSL Tool navigation and configuration updated
1.32	2023-03-22	<ul style="list-style-type: none">• Figure 11 in chapter Read changed
1.31	2023-03-07	<ul style="list-style-type: none">• Restructured document• Added chapter FAQ• Editorial changes
1.30	2022-12-23	<ul style="list-style-type: none">• Added chapter Read• Editorial changes
1.21	2022-03-01	<ul style="list-style-type: none">• Updated to MOTIX™ MCU TLE988x/9x only
1.20	2022-01-24	<ul style="list-style-type: none">• Added chapter Troubleshooting• Updated various screenshots
1.10	2022-01-19	<ul style="list-style-type: none">• Added chapter 100TP memory editor• Adjusted to multiple target chips
1.00	2021-09-15	<ul style="list-style-type: none">• Initial version

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