# TPS32 Programmer User Guide

3PEAK

**Version:** A0

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# Chapter 1 Introduction

TPS32 Programmer is a user-friendly graphical user interface (GUI) tool for programming the on-chip non-volatile memories of TPS32 devices. It supports both the debug port interface (DAPLink) and the bootloader interface (UART).

## 1.1 Key Features

TPS32 Programmer is an all-in-one software tool for programming TPS32 devices. It offers the following features:

- Configure option bytes
- Read and write image files
- Erase Flash memory
- Modify Flash memory

## 1.2 Software Requirements

| | |
|---|---|
| **Operating Systems** | Windows® 10 and 11, 64-bit (x64) or 32-bit (x86) |
| **Screen Resolution** | Minimum supported resolution is 1200 x 800 pixels. |

## 1.3 Licensing

The TPS32 software is released under the 3PEAK license. See the license manifest in the installation directory for details.

## 1.4 Documentation Conventions

| Convention | Usage |
|---|---|
| **Bold** | Displays commands, menu paths, and icon names in procedures.<br>For example:<br>Click the **File** icon and then click **Open**. |
| **File** > **New** | Represents menu path.<br>For instance:<br>**File** > **New** > New Project |
| `Courier New` | Displays file locations, user entered text, and source code. |

| Convention | Usage |
| --- | --- |
| | For example:<br><your_sdk_path>/example/tpsensor/tpsensor_exp/source |

# Chapter 2 Main Window

Upon initiating the software, the **Option Byte** configuration page will be displayed.

The main window includes the components described in the subsequent sections.

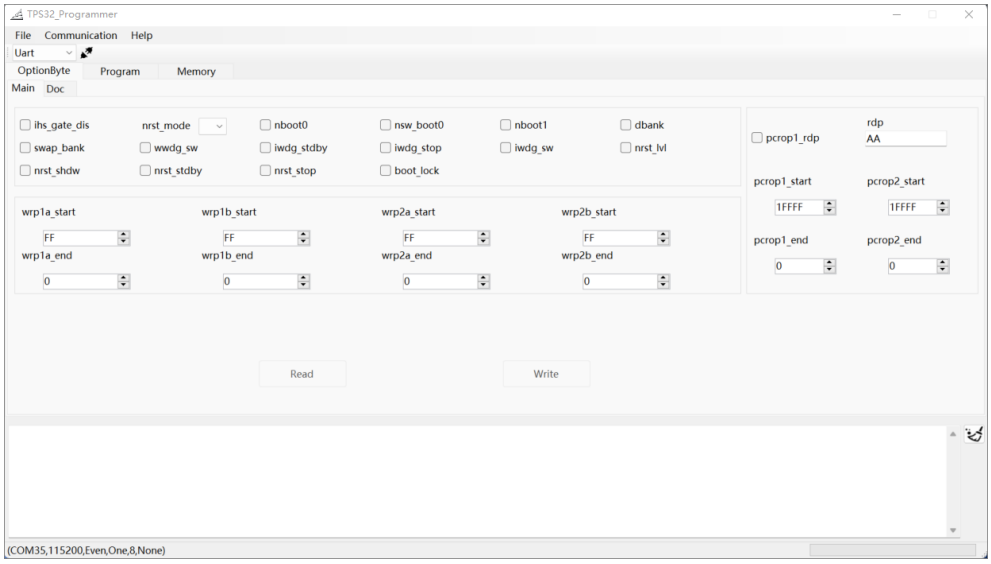



**Figure 2-1 Main Window**

## 2.1 Main Menu

Figure 2-2 shows the main menu.

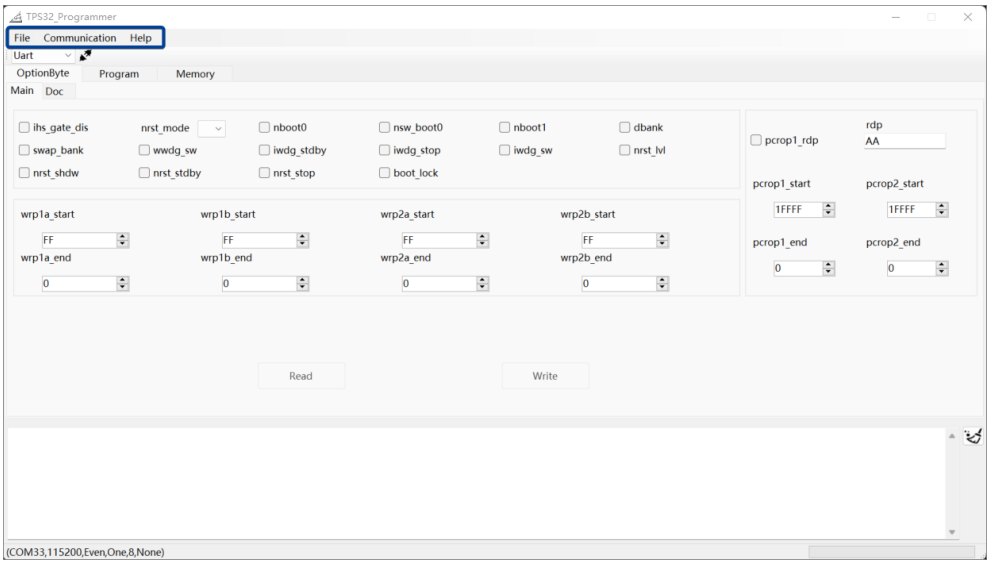



**Figure 2-2 Main Menu**

## 2.1.1 File

Figure 2-3 shows the **File** menu.

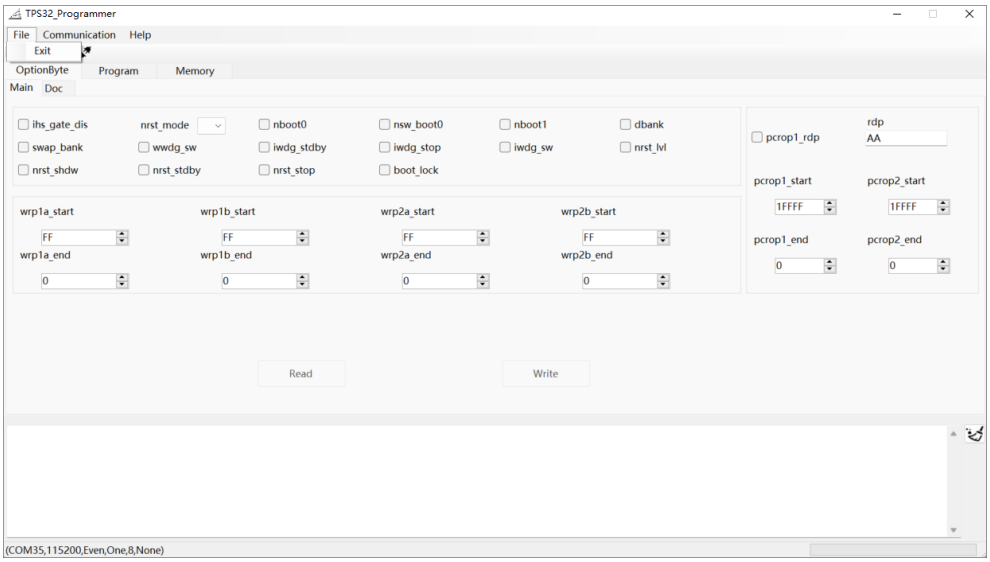



**Figure 2-3 File Menu**

To exit the application, click **File** > **Exit**.

## 2.1.2 Communication

Figure 2-4 shows the **Communication** menu.

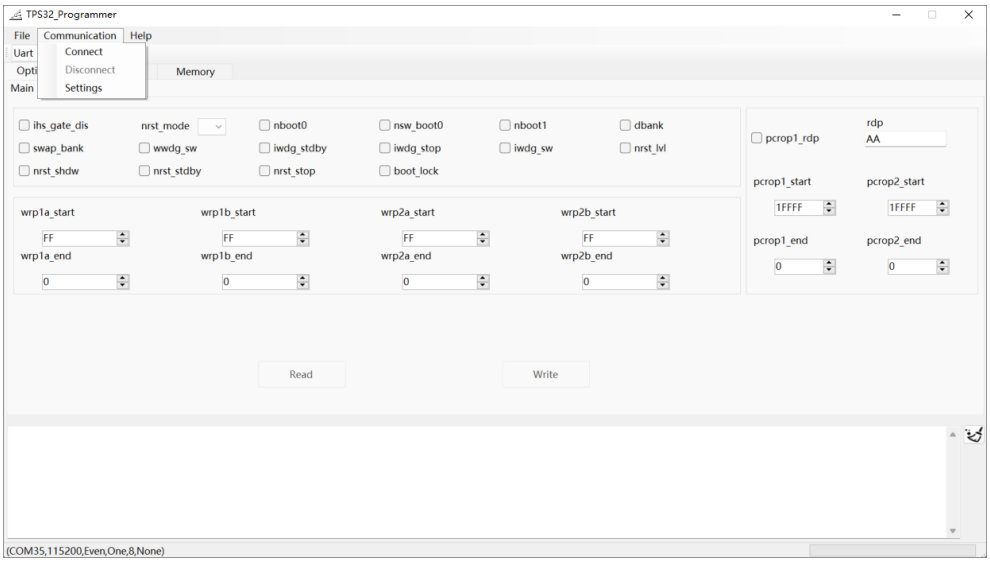



**Figure 2-4 Communication Menu**

This menu has three submenus:

- **Connect**: Used to establish connection with the target board. This option will be grayed out when target board has been already connected.
- **Disconnect**: Used to disconnect from the target board. This option will be grayed out when target board has been already disconnected.
- **Settings**: Used to configure UART parameters.

Figure 2-5 shows the Communication Window for UART.

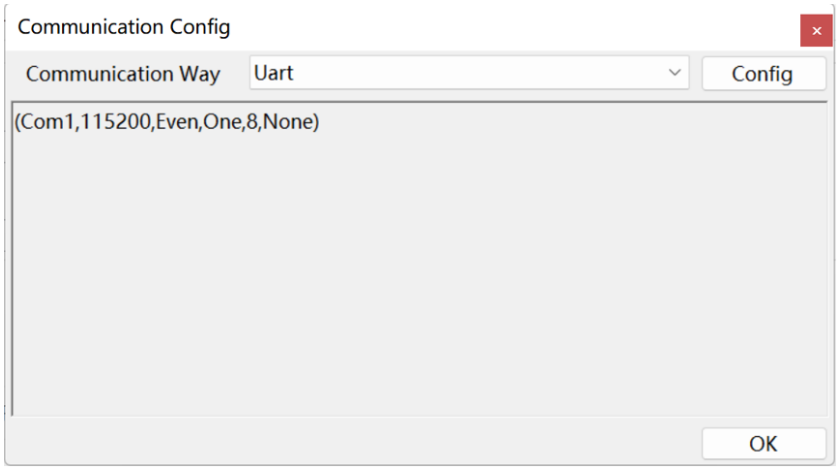



**Figure 2-5 Configuration Window for UART**

Figure 2-6 shows the configuration parameters for UART.

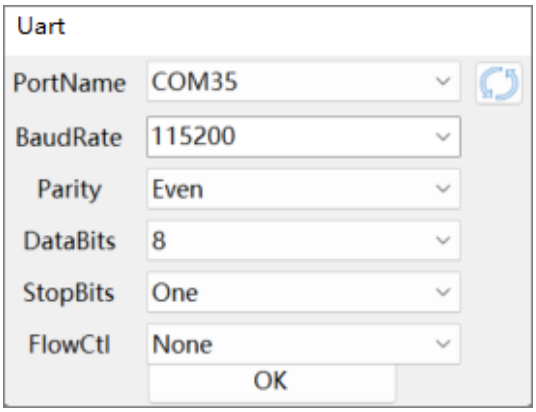



**Figure 2-6 Configuration Parameters for UART**

### 2.1.3 Help

Figure 2-7 shows the **Help** menu.

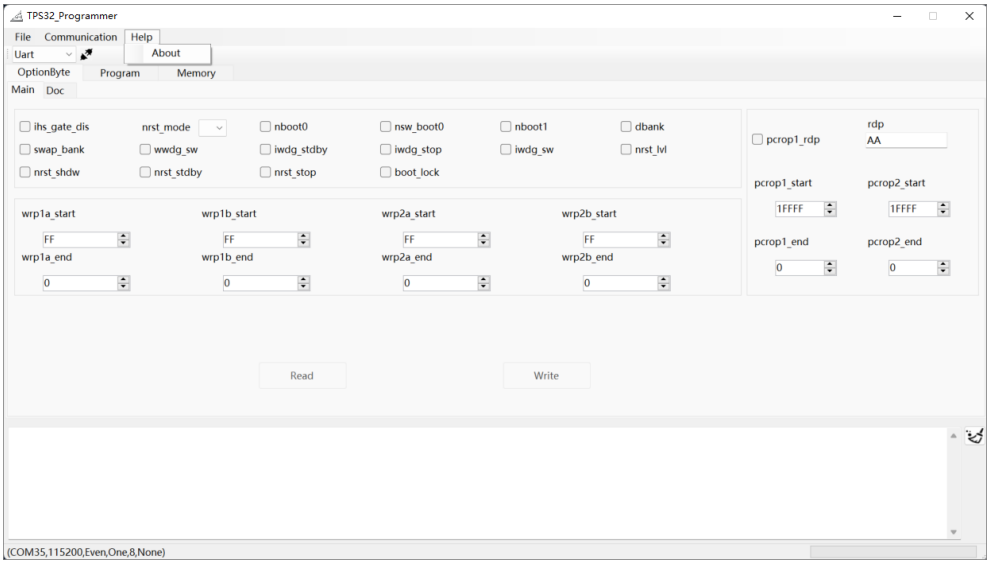
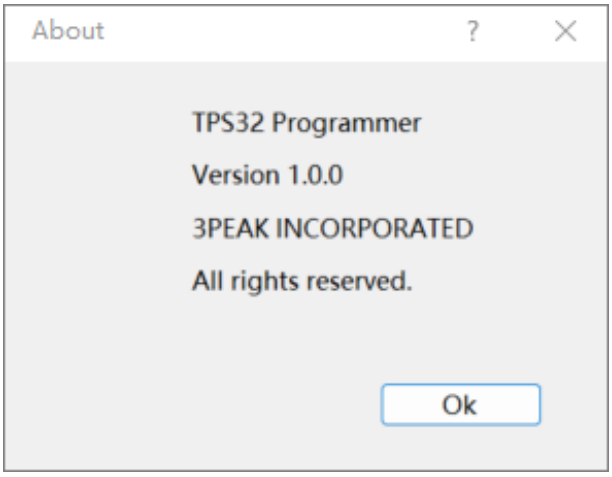



**Figure 2-7 Help Menu**

This menu displays the software version and copyright information.




## 2.2 Tool Bar

Figure 2-8 shows the tool bar. The tool bar has two items, a combo box is used to select the communication way, and a button is used to connect/disconnect the target board.

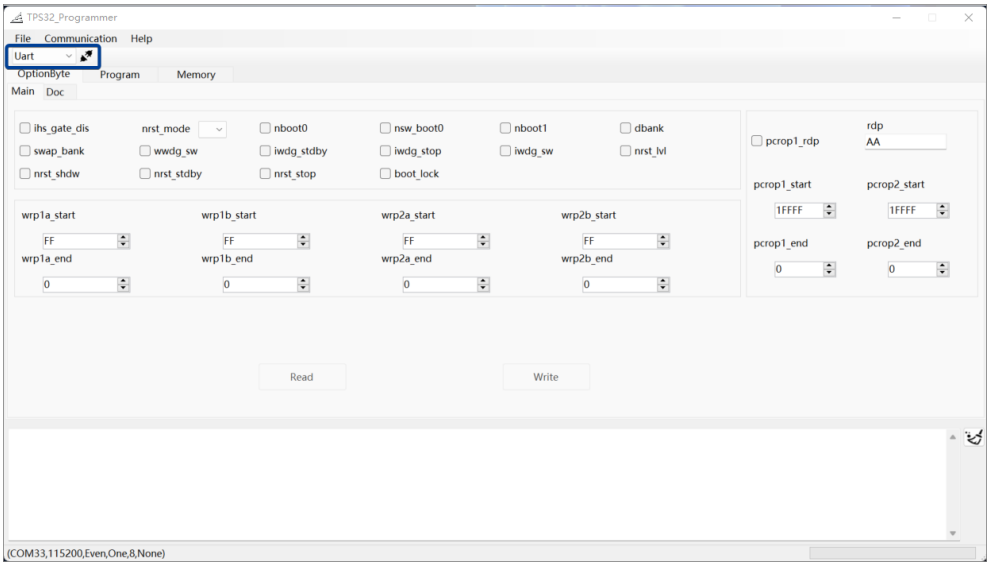



**Figure 2-8 Tool Bar**

## 2.2.1 Connection Mode

Figure 2-9 shows the connection mode.

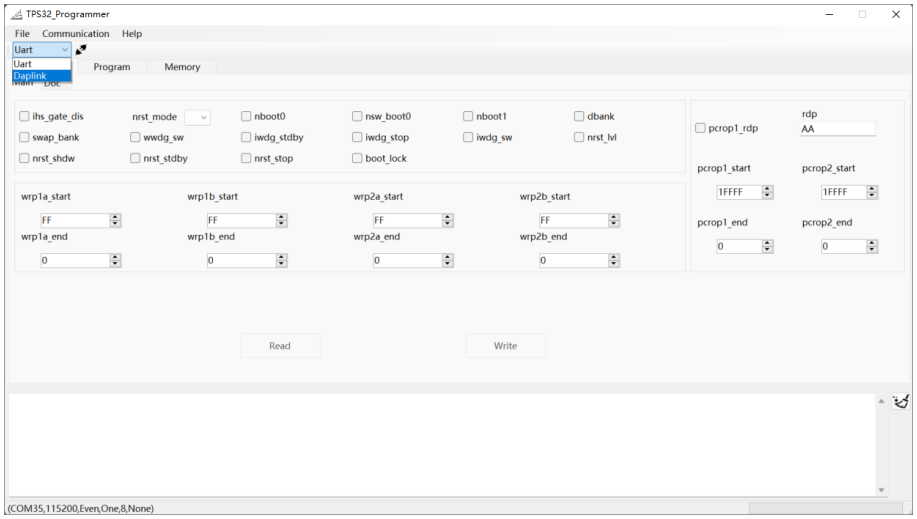



**Figure 2-9 Connection Mode**

- **UART**: Connect the target board using the serial port.

  **NOTE:** When the RDP level is not equal to 0 (0xAA), all operations via the UART connection are prohibited.

- **DAPLink**: Connect the target board using the CMSIS DAPLink with OpenOCD.

## 2.2.2 Connect Button

Figure 2-10 shows the connect button.

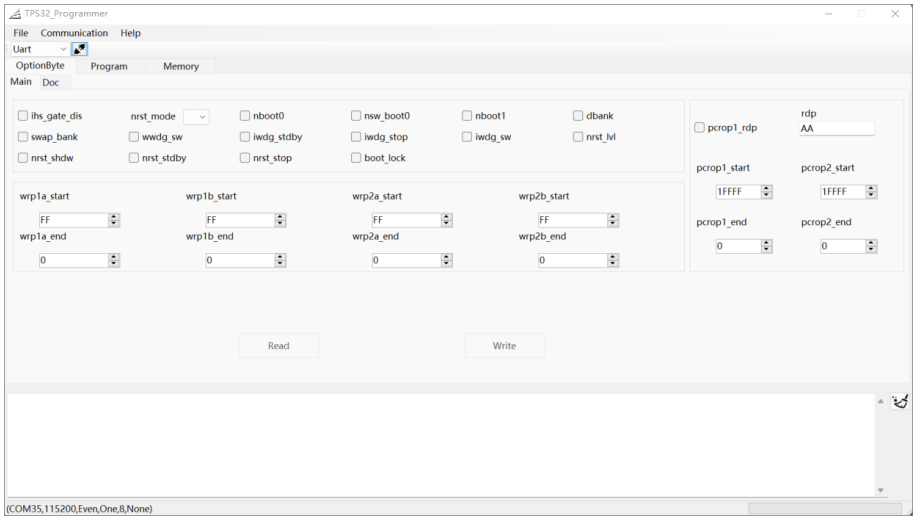



**Figure 2-10 Connect Button**

To connect or disconnect with the target board, toggle the button icon. The button icon will change to reflect the current connection status.

When a device is connected, its ID is sent to the TPS32 Programmer. The tool then configures and displays the memory map based on the connected device type.

## 2.3 Log Panel

Figure 2-11 shows the log panel.

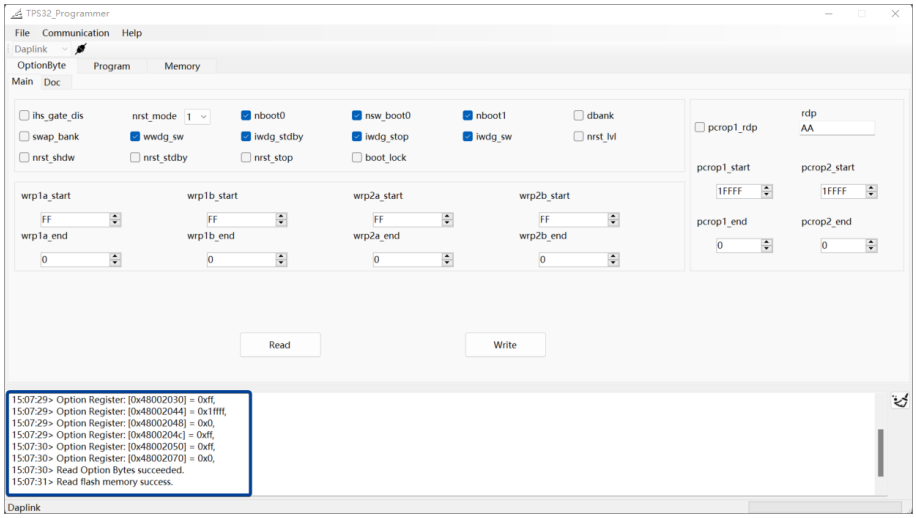



**Figure 2-11 Log Panel**

The panel displays errors, warnings, and informational events related to the operations executed by the tool.

## 2.4 Clear Button

Figure 2-12 shows the clear button.

**Figure 2-12 Clear Button**

Click on the button to clear the log.

## 2.5 Status & Progress Bar

Figure 2-13 shows the status bar.

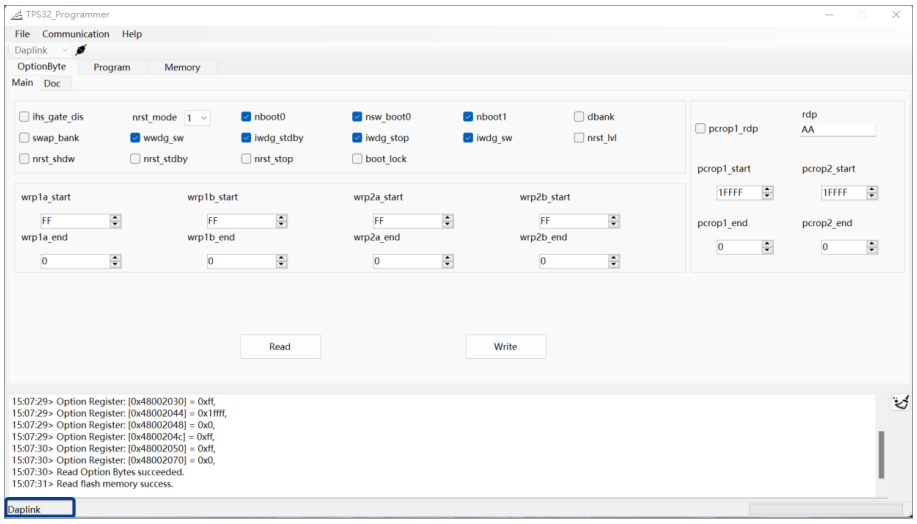



**Figure 2-13 Status Bar**

The status bar displays some connection information and progress information.

# Chapter 3 Option Bytes

The **Option Bytes** panel is a feature that allows users to view and modify target option bytes. Option bytes are typically used in microcontrollers to configure various hardware options and features.

With this panel, users can see the option bytes organized into categories, making it easier to navigate and understand their purpose. The values of these option bytes can be modified by updating the corresponding value fields. After making the desired changes, users can click the **Write** button to program and verify that the modified option bytes are correctly programmed.

Additionally, users can click the **Read** button at any time to refresh and display the current values of the option bytes.

## 3.1 Main Page

This page provides the functionality to read and write option bytes. When the mouse hovers over a specified label, a help prompt is displayed, as shown in Figure 3-1.

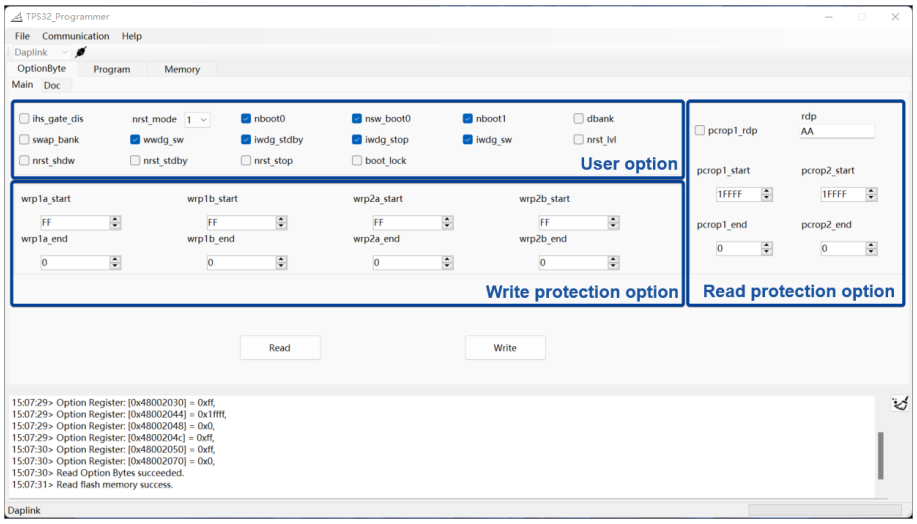



**Figure 3-1 Option Bytes Page**

All the option bytes configurations can be classified into three categories:

- User option: Users can configure boot mode, watchdog mode and reset behavior under low-power mode, and more.
- Write protection option: Users can set up to four write protection areas to prevent accidental code erasure.

  **NOTE:** The minimum granularity of write protection is one sector (4KB in dual bank mode and 8KB in single bank mode).

- Read protection option: Users can configure two proprietary code read out protection areas or global RDP level to l to prevent code from being read out.

**NOTE:** Proprietary code read out protection (PCROP area) can be deactivated through global RDP degrading. When pcrop1_rdp bit is set to 1 and RDP level degrades from 1 (0xBB) to 0 (0xAA), the PCROP area will be reset to unprotected initial value and all Flash area has been erased.

If RDP has been set to 0xCC (level 2), the device internal memory can't be accessed any more.

The minimum granularity of read protection are double words in dual bank mode and four words in single bank mode.

## 3.2 Document Page

Figure 3-2 shows the **Option Bytes** document page.

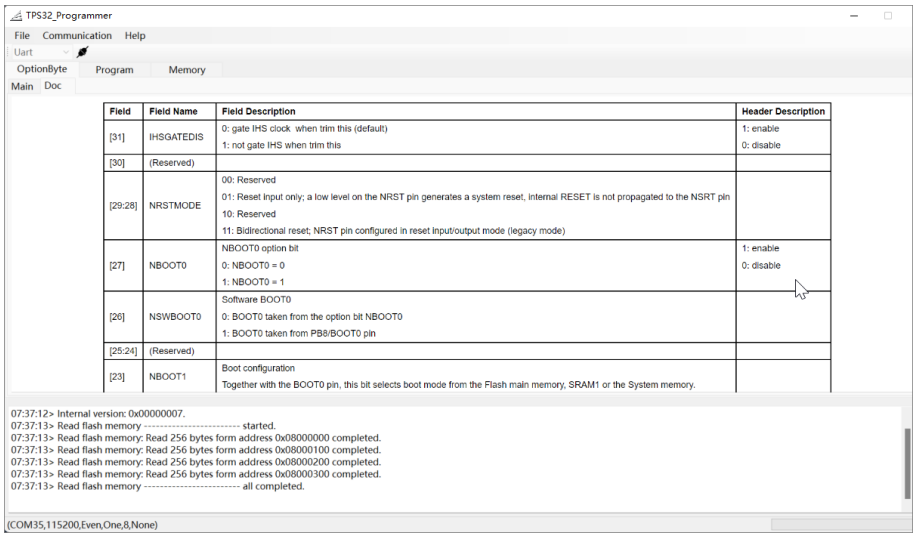



**Figure 3-2 Option Bytes Document**

This page shows registers documentation for option bytes. For more information, refer to the TPS325M Technical Reference Manual.

# Chapter 4 Program

Figure 4-1 shows the **Program** page.

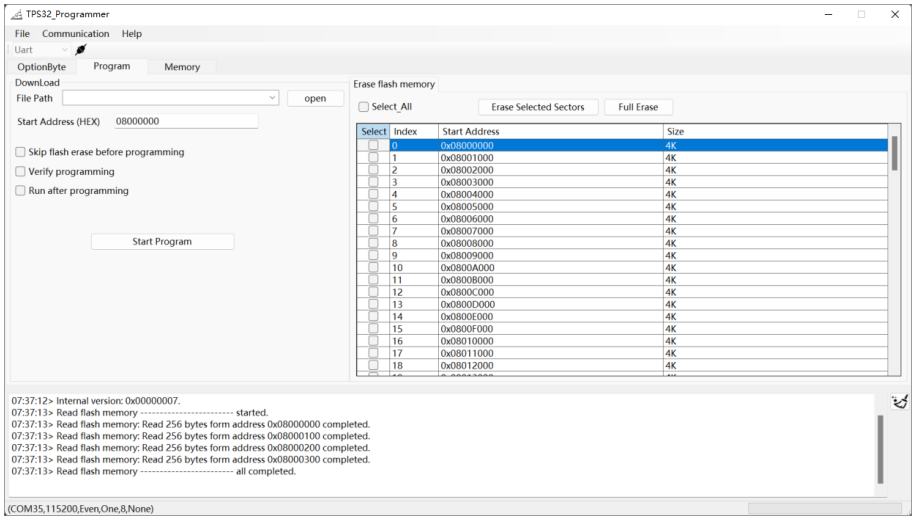



**Figure 4-1 Program Page**

## 4.1 Memory Erasing

When connected to a target device, the memory sectors are shown in the right panel, displaying the starting address and size of each sector.

### Partial Erase

1. Locate the memory map list on the right panel, and choose the row you want to erase.
2. Click **Erase Selected Sectors**.

### Full Erase

1. In the **Erase Flash Memory** area, click **Select All**.
2. Click **Full Erase** to complete the process.

**NOTE:** The **Full Erase** button will erase the whole memory, so exercise caution while using it.

## 4.2 Image Programming

To program a memory, follow these steps:

1. Click the **Open** button and select the file that you want to program.

   Supported file formats are binary (.bin) and Intel hex (.hex).

- For .bin files, assigning the correct Start Address is necessary.

  **NOTE:** When programming a binary file, ensure the Start Address is correctly set.

- For .hex files, configuring the Start Address is not required as the programming address is embedded within the .hex file.

2. Select the programming options:

   - **Skip flash erase before programming**: if checked, the memory will not be erased before programming. This option must be checked only when you are sure that the target memory is already erased.
   - **Verify programming**: this option reads back the programmed memory and compares it byte by byte with the file.
   - **Run after programming**: this option starts the application immediately after programming.

   **NOTE:** DAPLink doesn't support Run after programming function.

3. Click the **Start Programming** button to begin the programming process.

   The progress bar at the bottom of the window will show the progress of the erase and programming operations.

# Chapter 5 Memory

## 5.1 Reading and Displaying Target Memory

This panel is used to display Flash data read back from the target MCU.

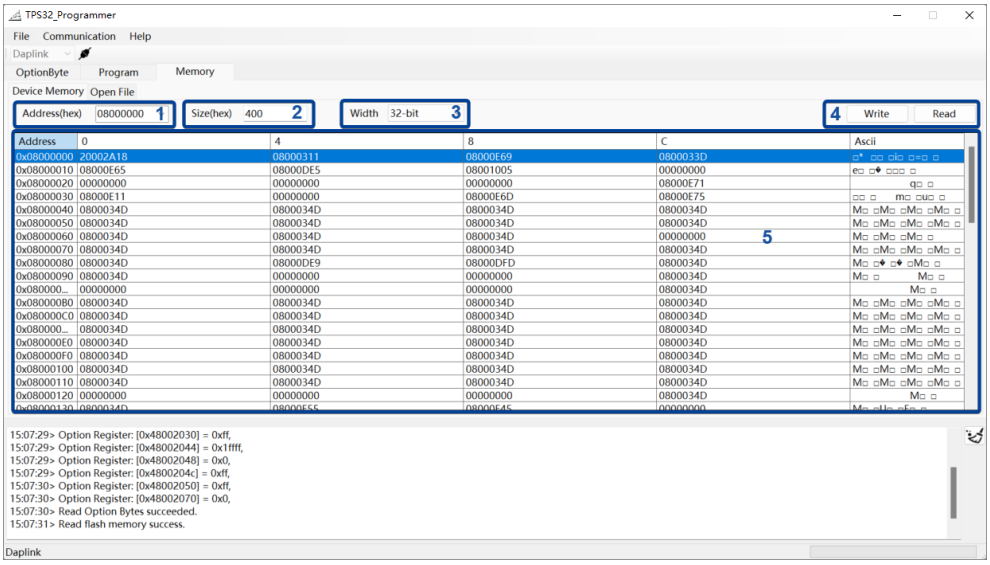



**Figure 5-1 Device Memory**

The table below provides descriptions of the various areas depicted in Figure 5-1.

| Area No. | Description |
|---|---|
| 1 | Indicate the start address. |
| 2 | Indicate the size of memory to read. |
| 3 | Indicate the display width. |
| 4 | Indicate the Write and Read buttons. |
| 5 | Display memory data. |

## 5.2 Editing Memory

To edit a memory, follow these steps:

1. Double-click the cell to enter edit mode.
2. Modify the data.
3. Click outside the cell to remove focus.

After modifying the cell, it will be displayed with a green background color, indicating that it is marked to be written.

4. Click the Write button to write the changed data.

   The progress bar at the bottom of the window will show the progress of the erase and programming operations.

5. Once the data is successfully written, the interface will be refreshed.

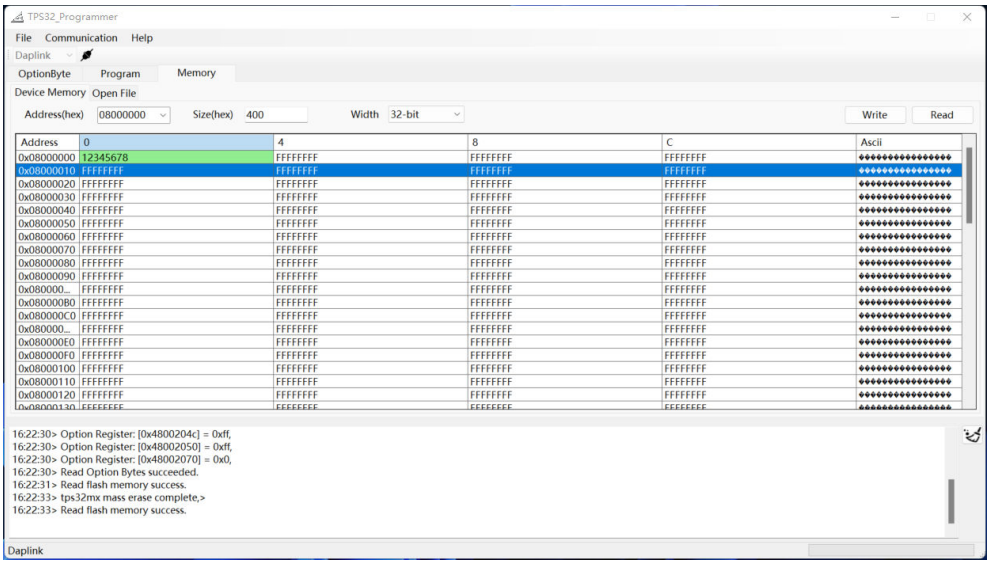



**Figure 5-2 Memory Edit**

**NOTE:** Memory erase must be executed before memory program.

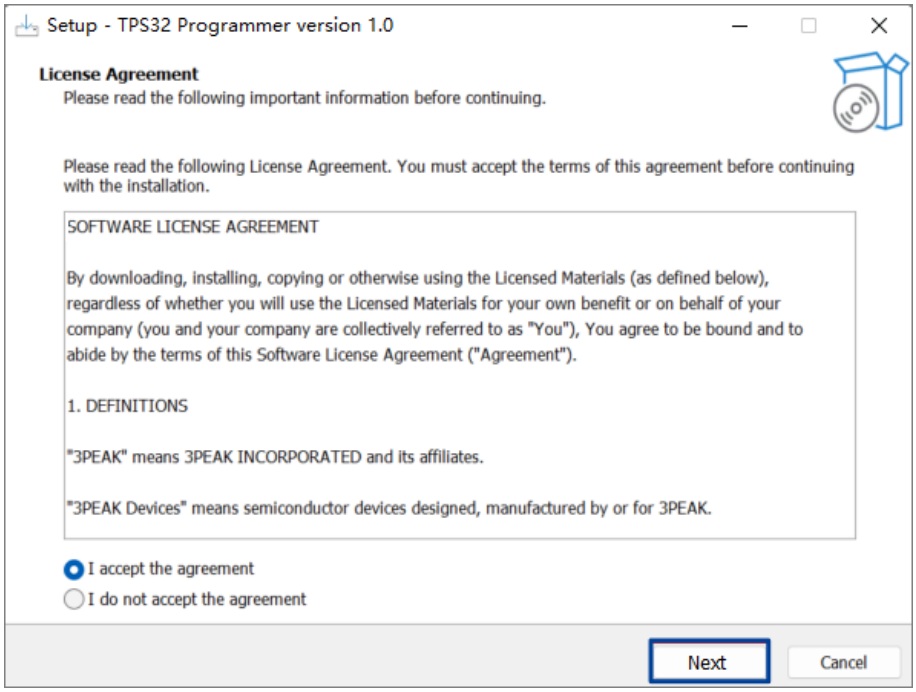
When using UART, 64-bit write in dual bank mode and 128-bit write in single bank mode are supported; When using DAPLink, only 64-bit write in dual bank is supported.

# Chapter 6 Software Installation

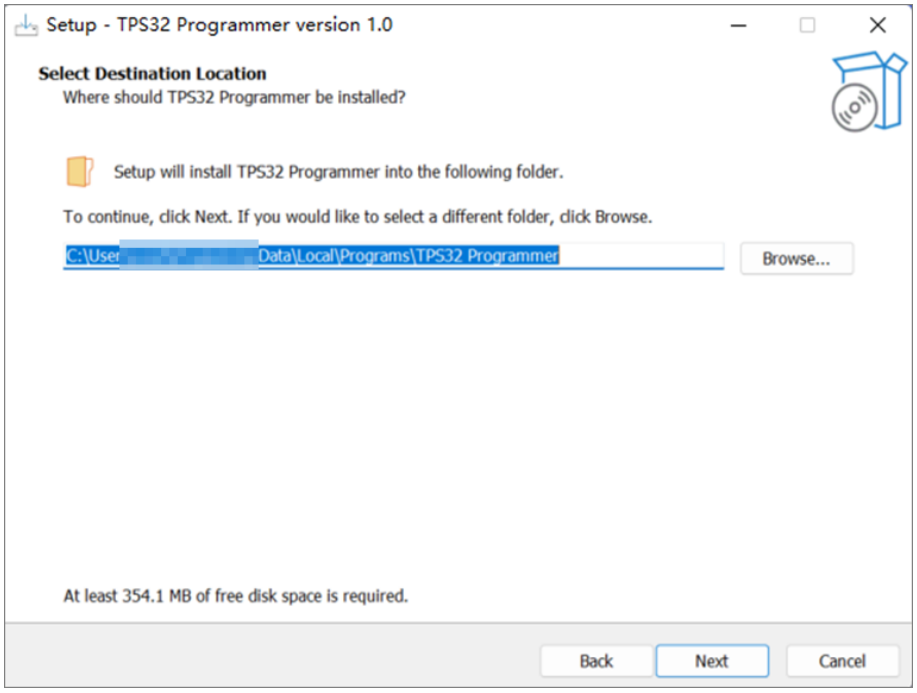
## 6.1 Installation Procedures

1. Double-click on the installation file.

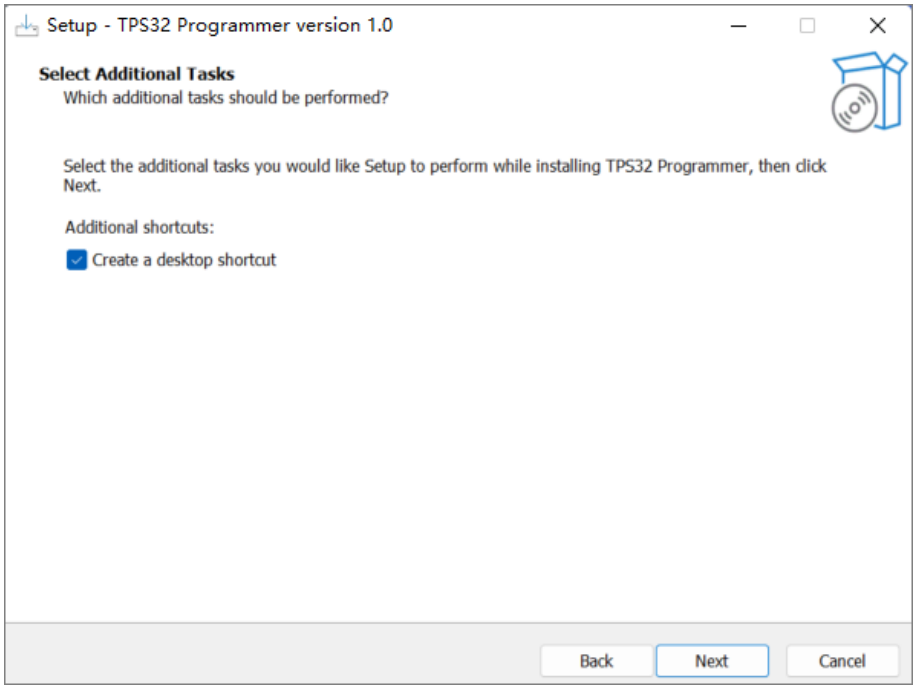
2. Read and accept the license agreement, then click **Next** to continue.



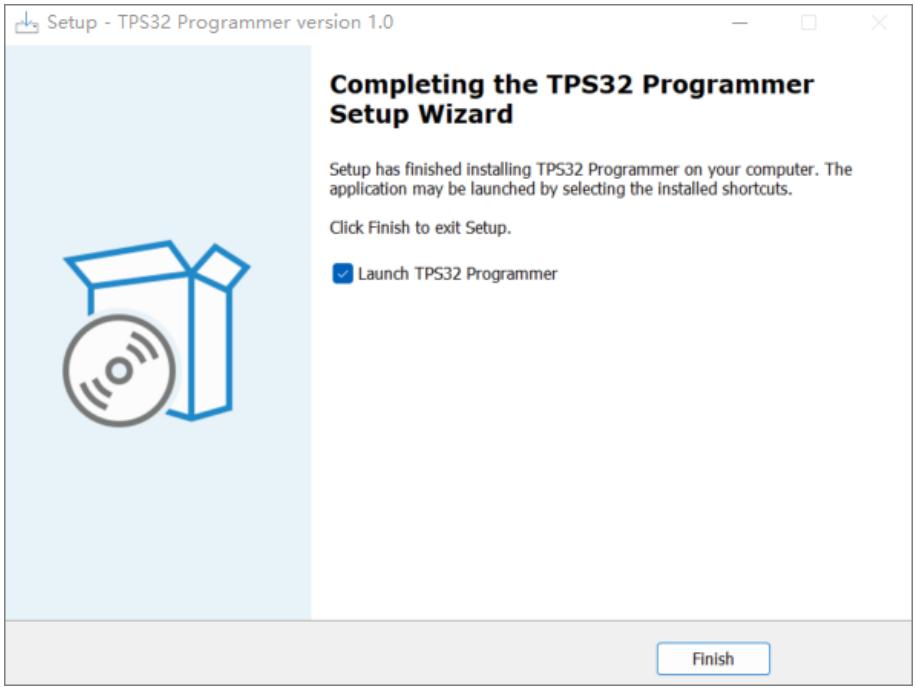

3. Choose the desired installation directory.




4. Opt to create a desktop shortcut for easy access if desired.



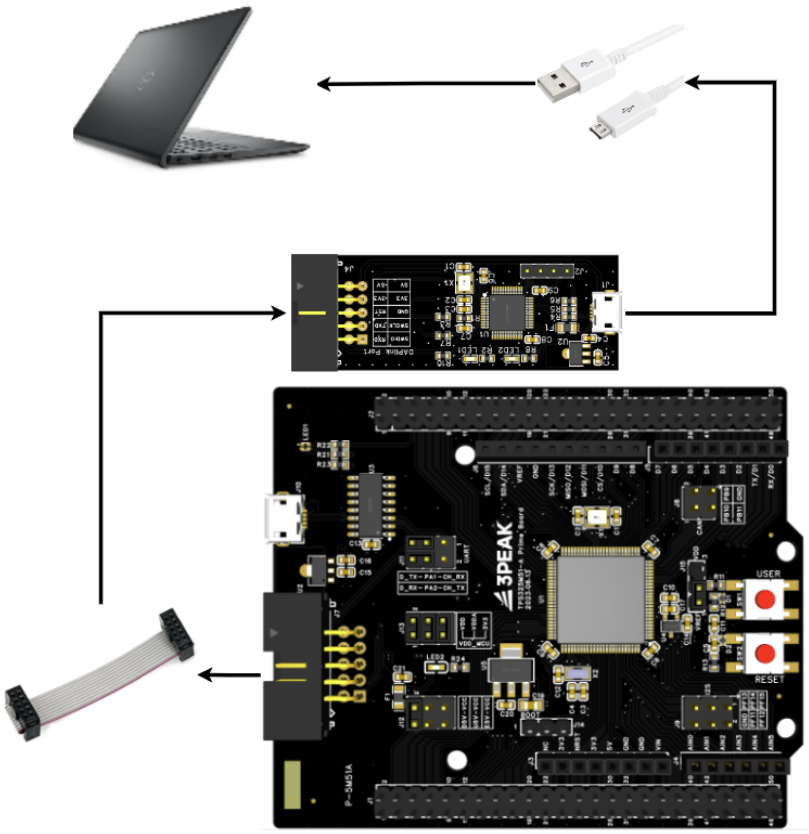

5. Complete the installation process. Select to launch TPS32 Programmer automatically when finished if preferred.


Setup - TPS32 Programmer version 1.0
Completing the TPS32 Programmer Setup Wizard
Setup has finished installing TPS32 Programmer on your computer. The application may be launched by selecting the installed shortcuts.
Click Finish to exit Setup.
Launch TPS32 Programmer
Finish

# Chapter 7 Start the TPS32 Programmer

## 7.1 Setup Procedures

1. Connect target board with DAPLink (CMSIS-DAP) debugger or UART0 PA1 and PA2 pins.



2. Launch the TPS32 Programmer by double-clicking its desktop shortcut.

3. Select the desired connection type and click the connect button.

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