BLUETAG

Hardware Debugging Tool Manual

> **Complete Guide to Firmware Flashing, Updates, and Usage**

Contents

1 Introduction

> **About Bluetag**
>
> Bluetag is a versatile hardware debugging tool based on RP2040/RP2350 micro-controller that provides multiple functionalities for embedded system development and debugging.

1.1 Key Features

- Detects JTAG & SWD debug pinout (JTAGulator function)

- Functions as a USB-to-Serial adapter

- Reads & writes flash ICs with Flashrom

- Supports OpenOCD with JTAG & SWD modes (BusPirate protocol)

- Acts as a CMSIS-DAP adapter (supports UART & SWD)

- 16 GPIO channels (GPIO0-GPIO15)

- Auto-baudrate detection at 115200 bps

2 Initial Firmware Flashing

> **Step-by-Step Firmware Installation**
>
> Follow these steps carefully to flash the Bluetag firmware for the first time.

2.1 Prerequisites

- RP2040 or RP2350 based development board

- USB cable

- Computer with USB port

2.2 Flashing Process

1. **Connect the Device**

   - Connect Pico USB to laptop or computer USB port
   - You will find an RPI-Drive appearing in your system
   - This indicates successful connection with the RP2040/RP2350

2. **Download Firmware**

- Primary source: https://github.com/madebygyanesh/internship
- Official repository: https://github.com/Aodrulez/blueTag
- Download the `.uf2` file from the releases section (right side corner)

3. **Flash the Firmware**

   - Copy the downloaded `.uf2` file
   - Paste, move, or drag and drop the file into the RPI-drive
   - The device will automatically reboot after flashing

4. **Verify Installation**

   - Check the LED near the BOOTSEL button
   - LED should be ON, indicating successful firmware installation

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Important Notes

- Ensure stable USB connection during flashing

- Do not disconnect the device during the flashing process

- For RP2350 boards, use experimental builds: `blueTag-vX.X.X-RP2350-Experimental.uf2`

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3 Firmware Updates

Updating Existing Firmware

Use this procedure to update Bluetag firmware to newer versions.

3.1 Update Process

1. **Enter Boot Mode**

   - Hold the BOOTSEL button while plugging the device into your computer
   - The device will automatically enter boot mode
   - Release the button once connected

2. **Follow Standard Flashing**

   - Download the latest firmware version
   - Follow the same steps as initial firmware flashing (Section 1)
   - Paste the new `.uf2` file to the RPI-drive

Tip

Always check the official repository for the latest firmware releases before updating.

4 Usage Guide

> **Operating Bluetag**
>
> Complete guide for using Bluetag after successful firmware installation.

4.1 Prerequisites

> **Safety Requirements**
>
> - Ensure firmware flashing is completed (mandatory)
>
> - Verify voltage levels: Maximum 5.5V, Average 5V
>
> - DIP pin switches must be OFF (used for other purposes)
>
> - Connect GND pin to target's GND

4.2 Connection Setup

4.2.1 Hardware Connections

1. Connect Bluetag to laptop/computer via USB

2. Connect GPIO pins (CH0 - CH15) to target test points

3. Connect VREF and GND appropriately

4. Ensure DIP switches are in OFF position

4.2.2 Serial Communication Setup

Windows Systems:

1. Open Device Manager

2. Navigate to Ports section

3. Note the COM port assigned to Bluetag

4. Use terminal software like PuTTY or similar

```
dmesg | tail -n 20
# Look for "Bluetag generic device"
# Note the device path (usually /dev/ttyACM0)
```
Listing 1: Finding Bluetag Device in Linux

```
screen /dev/ttyACM0 115200
```
Listing 2: Connecting via Screen Command

4.3 Communication Parameters

Linux Systems:

Parameter	Value
Baudrate	115200 (auto-detection supported)
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None

4.4 Interface Access

1. After establishing serial connection, you'll see a blank screen

2. Press any key to access the Bluetag interface

3. The UI provides detailed guidance for all commands and hardware modes

4.5 Hardware Boot Modes

> **Boot Mode Selection**
>
> To boot directly into a hardware mode:
>
> - Connect the relevant hardware boot mode selection GPIO to GND
>
> - Reset or reconnect Bluetag to your computer
>
> - Only one boot mode can be active at a time
>
> - Mode remains active as long as GPIO is connected to GND

5 Technical Specifications

5.1 GPIO Configuration

- **Channels:** 16 (GPIO0-GPIO15)

- **Voltage Level:** 3.3V (most RP2040 boards)

- **Maximum Input:** 5.5V

- **Recommended:** 5V average

> **Voltage Compatibility**
>
> For devices operating at different voltage levels, use external level shifters to prevent damage.

5.2   Performance Optimization

> **JTAGulator Function Optimization**
>
> For fastest execution when using JTAGulator function:
>
> - Connect channels sequentially (0 to 15)
>
> - Algorithm verifies channels in order
>
> - Sequential connection minimizes execution time

6   Troubleshooting

6.1   Common Issues

1. **Device Not Recognized**

   - Check USB cable connection
   - Try different USB port
   - Ensure BOOTSEL button is pressed during connection for flashing

2. **Firmware Flashing Failed**

   - Verify RPI-drive appears in system
   - Use different USB cable
   - Try on different computer

3. **Serial Communication Issues**

   - Verify correct COM port/device path
   - Check baudrate settings (115200)
   - Ensure no other applications are using the port

7   Additional Resources

7.1   Official Documentation

For comprehensive technical details and latest updates:

- Official Repository: https://github.com/Aodrulez/blueTag

- Development Repository: https://github.com/madebygyanesh/internship

7.2   Support Contacts

- Hardware Design: madeby.gyanesh@gmail.com (AIAKRP)

- Technical Guidance: Midhya Mathew (KJSCE) - midhya@somaiya.edu

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This manual provides comprehensive guidance for Bluetag usage. For technical support and updates, refer to the official repositories and contact information provided.