GigaWave™ 6000-Series Firmware Upgrade Guide

Revision B1 · March 20, 2024

The most recent version of the firmware is **Version 14**.

Changelog:

(2024-03-21) Unified v14: New features:

- Adds USB DFU capability for future upgrades.

- Pipelined communication with significantly reduced overhead. Sweeps are 3-10$\times$ faster depending on settings.

- Support for fast update of post-trigger delay ("Fast Mode" in software).

- Firmware support for $N_{\min}$ up to 250 and K up to 500k.

- 16-bit CDF return format for reduced quantization noise.

- CDF monotonicity correction now done in firmware.

(2024-02-21) MCU v13: Hardened serial interface – it is no longer possible to crash or hang the hardware with malformed serial commands. Adds a 64-entry FIFO buffer for serial commands.

(2024-01-27) FPGA v12: Fix for occasional errors (single-point CDF upsets) in the returned data. Only some units exhibit the issue. This version is **not compatible** with MCU v11 and below.

(2024-01-27) MCU v12: Fix for occasional errors (single-point CDF upsets) in the returned data. Only some units exhibit the issue. This version is **not compatible** with FPGA v11 and below.

(2024-01-02) FPGA v11: Initial public release.

(2024-01-02) MCU v11: Initial public release.

Contents

1 Update Instructions

This guide applies if your current firmware revision is **v14 or newer**. Your firmware revision can be viewed using **Tools → Device Information**.

The firmware file is device-specific. You may request a firmware file by providing your device serial number via email to firmware@sjl-instruments.com.

To install the update, go to **Tools → Firmware Update** and select the firmware file.
Do not disconnect the device during the update process.
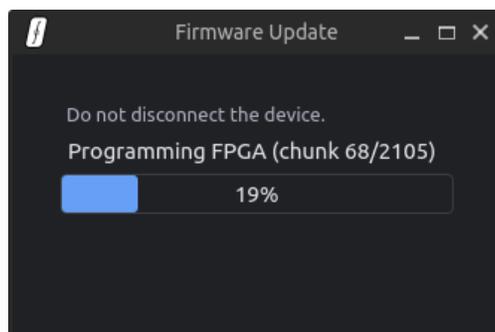
The process should complete in less than one minute.

After the update completes, **disconnect and reconnect** the device before use. It is not necessary to restart the software.

2   Legacy Guide

This guide applies if your current firmware revision is **v13 or lower**. Your firmware revision can be viewed using **Tools → Device Information**.

If you do not wish to perform the firmware upgrade yourself, you may **return the device to us** for a firmware upgrade. We will cover all shipping charges for this service.

2.1   Tag-Connect Pinout

Upgrading the firmware for the GigaWave™ 6000-Series oscilloscopes requires a **Tag-Connect TC2050-IDC-NL** cable. You may request one from us at no charge.

The pinout of the corresponding Tag-Connect header is shown below. Explicit pin numbers are provided in later sections.
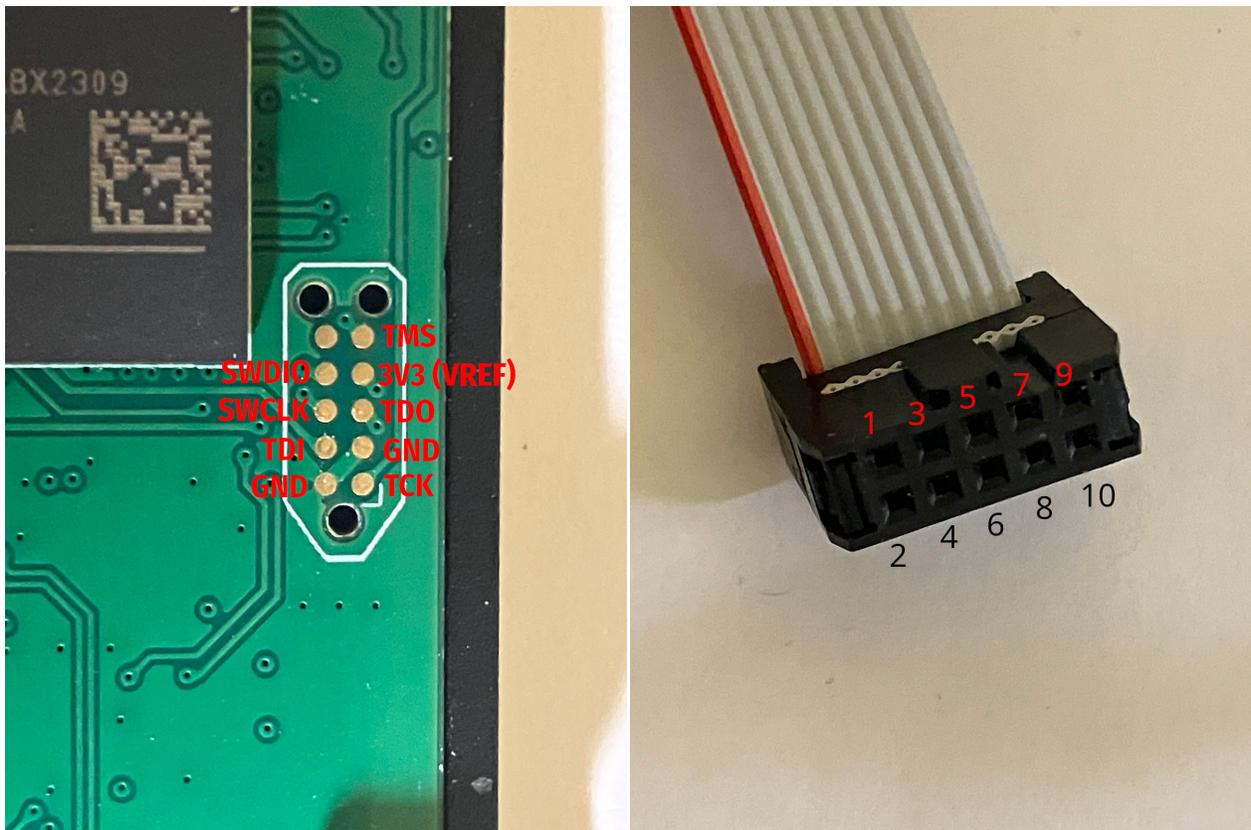
2.2 FPGA Upgrade

For updating FPGA firmware, you will need a **Xilinx Platform Cable USB** adapter (version I or II). You may request one from us at no charge.

The latest version of the FPGA bitstream can be downloaded from the links below:

6200: `https://gigawave-releases.s3.us-east-2.amazonaws.com/GigaWave_6200_FPGAbitstream_v14.bin`

6400: `https://gigawave-releases.s3.us-east-2.amazonaws.com/GigaWave_6400_FPGAbitstream_v14.bin`

6800: `https://gigawave-releases.s3.us-east-2.amazonaws.com/GigaWave_6800_FPGAbitstream_v14.bin`

Connect the following pins to the Platform Cable USB through the Tag-Connect cable, using 0.1" male-to-female header cables:

1 TCK

2 GND

3 TDO

4 3V3 (VREF)

5 TMS

9 TDI

Your Platform Cable USB may have an adapter PCB which already exposes the correct pinout.

Ensure the GigaWave™ is powered over USB. Download, install, and open the AMD Xilinx Vivado Design Suite. Click on **Tasks → Hardware Manager**.

Connect the Tag-Connect cable to the GigaWave™ PCB, then click on "Auto-Connect." The software should detect the XC7S15 FPGA automatically.
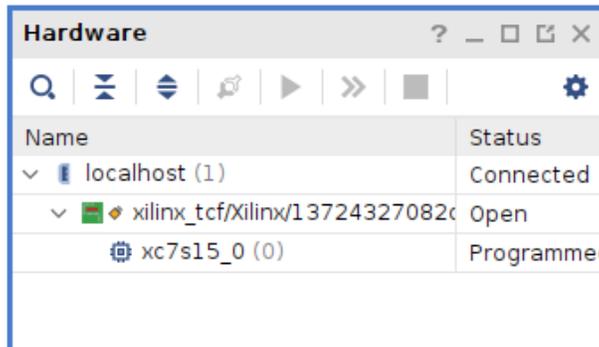
Right-click on the `xc7s15_0` entry and click **Add Configuration Memory Device...**. Choose `mx25l3273f-spi-x1_x2_x4`. The hardware configuration should appear as below:
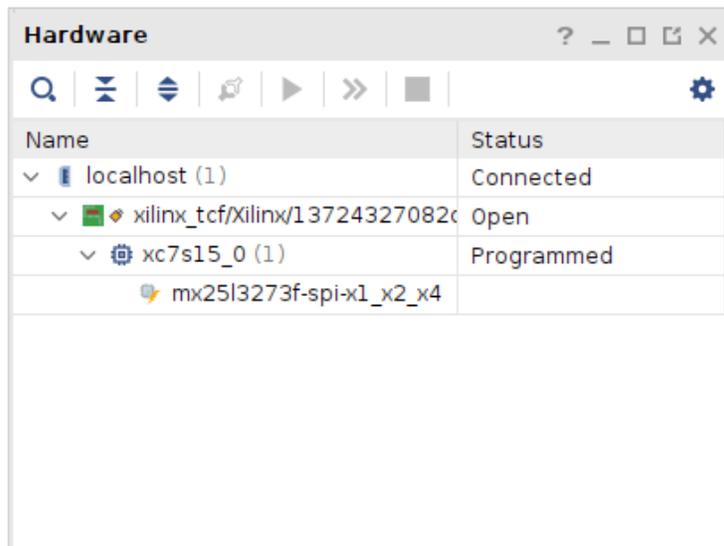
When asked whether to program the configuration memory device, click **OK** and select the previously downloaded `.bin` file.

After upgrading the FPGA firmware, unplug the GigaWave™ and plug it back in prior to use.

2.3 STM32 MCU Upgrade

For updating the STM32 microcontroller firmware, you will need an **ST-Link** adapter.
You may request one from us at no charge.

The STM32 firmware file is device-specific. You may request a customized firmware file by providing your device serial number via email to firmware@sjl-instruments.com.

Connect the following pins to the ST-Link adapter through the Tag-Connect cable, using 0.1" male-to-female header cables:

2 GND

7 SWDIO

8 SWCLK

Ensure the GigaWave™ is powered over USB. Download, install, and open the STM32CubeProgrammer. Connect the Tag-Connect cable to the GigaWave™ PCB, then click on **Connect**. If a problem occurs during connection, lower the frequency in the ST-Link configuration and try again.

On some units, a "Data read failed" error may appear. If this occurs, keep the device connected, and set the **RDP** (Read Out Protection) option byte to **AA** (Level 0, no protection). **Do not select CC**, as this will permanently disable firmware upgrades.
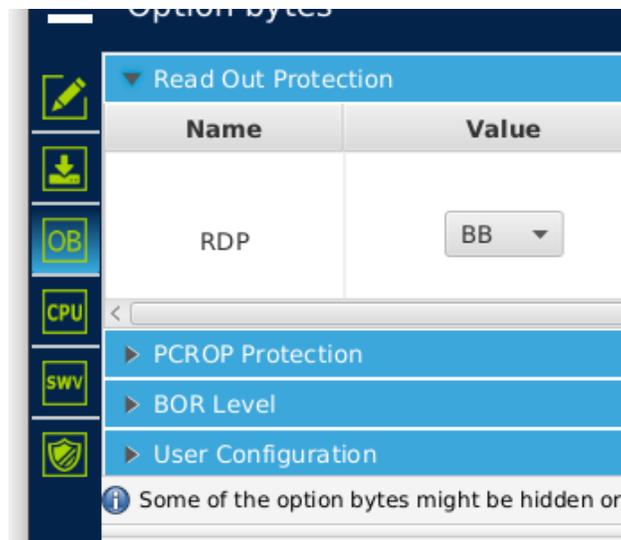
Click on the "Erasing & Programming" option in the menu on the left. Select the provided `.elf` file, and click **Start Programming**.

After upgrading the MCU firmware, unplug the GigaWave™ and plug it back in prior to use.