



Firmware Update Guide

INSTRUCTIONS TO INSTALL OR UPDATE CORE64 AND CORE64C
FIRMWARE WITH A TEENSY® 3.2 OR RASPBERRY PI PICO

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The latest version of this and related Core64 guides are located at:

<https://github.com/ageppert/Core64/tree/master/Documentation>

2. VERSION HISTORY OF THIS GUIDE

Revision	Description	Author	Date
A	First draft.	Andy Geppert	2022-12-23

3. IMPORTANT CAUTIONS AND WARNINGS



These caution symbols point out important things to help ensure your assembly goes smoothly!

Beware the ESD monster!

Sometimes the term “Core64” might refer generally to “Core64c” which is the compact version. Core64 is specifically the larger or full-size version.

Do not place the Core64 circuit boards directly on a metal surface.

4. INTRODUCTION

This guide attempts to make the firmware update as simple as possible. If you'd like more detail so you can modify or create your own firmware for Core64, check out the [Core64 Programmers Reference Guide](#).

Kits with the **Raspberry Pi Pico** (all Core64c kits, and Core64 V0.7+ kits) are not pre-programmed with firmware. However, the Pico is very easy to update because it does not need a special firmware loader. To program or update the Pico, simply drag-n-drop the firmware.uf2 file onto it when it is mounted on the computer's desktop. For details, see section [5. Pico: Firmware Update](#).

The **Teensy® 3.2** (used in early Core64 kits) is pre-programmed with firmware which will get you started with some basic functionality. Updating and programming the Teensy® requires a special firmware loader. A specific firmware upload tool is required for programming the Teensy® 3.2. It is developed and supported by [PJRC](#), who are the makers of the Teensy® series of microcontroller boards. To update the Teensy® 3.2, you'll need the Teensy® Loader. Details for installing the software and updating the Teensy® 3.2 are in Section [6. Teensy®: Firmware Update](#).

Please use the latest firmware. Some limited notes about older versions of the firmware are listed in the appendix, but those versions are incomplete and unsupported. And they aren't as much fun as the latest firmware.

This guide assumes you have the Teensy® or Pico microcontroller installed on the Core64 Logic Board. They can also be programmed as a standalone device.

The next sections describe all the steps in detail. At the time of this writing, the instructions only cover Windows and Mac operating systems. If you are running Linux, I assume you can figure out how to adapt these instructions to your OS. And there are a lot of resources on the web to supplement these instructions if you get stuck.

5. PICO: FIRMWARE UPDATE

The firmware update process is very simple for the Pico. No installers are needed.

Step 1: Connect USB Cable

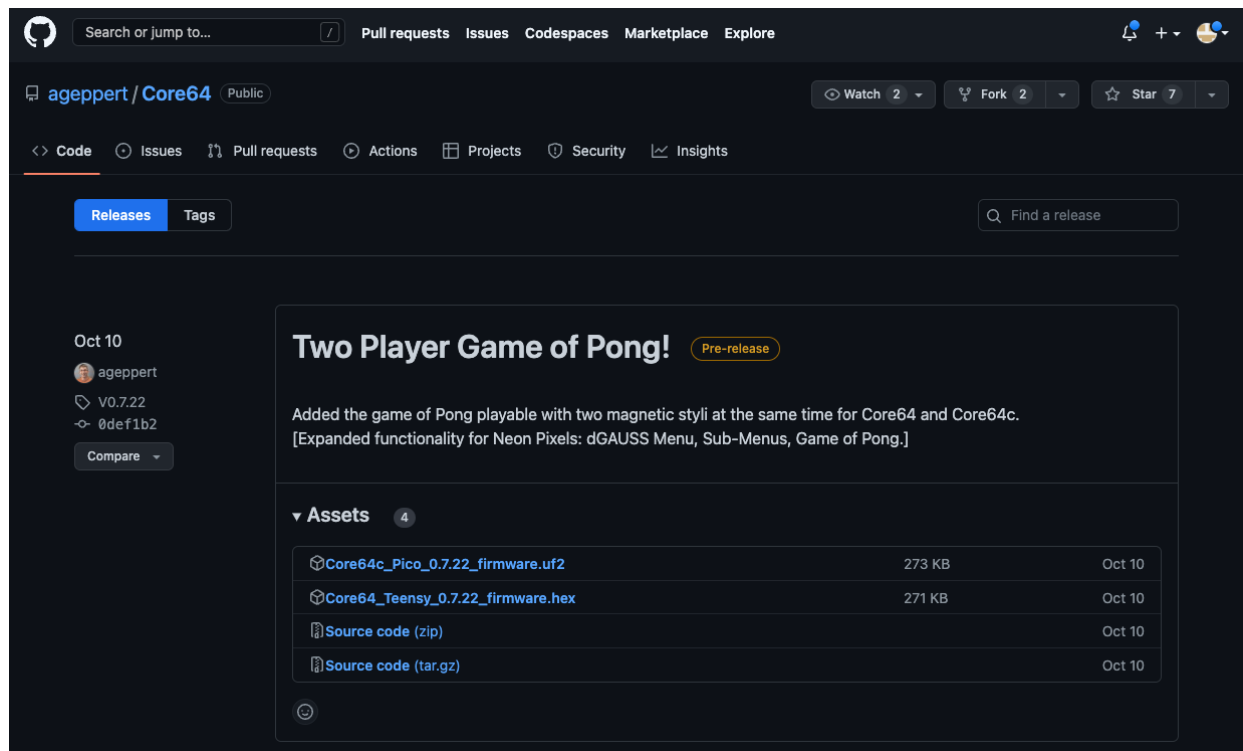
Connect the Pico to your computer with the MicroUSB data cable.

The Pico should now be mounted on the desktop as a USB mass storage device. If it does not show up, unplug it, then hold down the button on the Pico and plug in the USB cable, then release the button. This forces it into bootloader mode.

Step 2: Download Firmware

Download the latest firmware from <https://github.com/ageppert/Core64/releases>

Expand Assets and click on the “Core64_Pico_x.y.z_firmware.uf2” file to save it to your Downloads folder.



Step 3: Install the Firmware

Drag and drop the “Core64_Pico_x.y.z_firmware.uf2” file to copy it into the Pico mass storage device.

The Pico will reboot and run the firmware. You will see text scrolling on the LED Array. If it does not automatically reboot, unplug the USB cable, and plug it back in.

That's it.

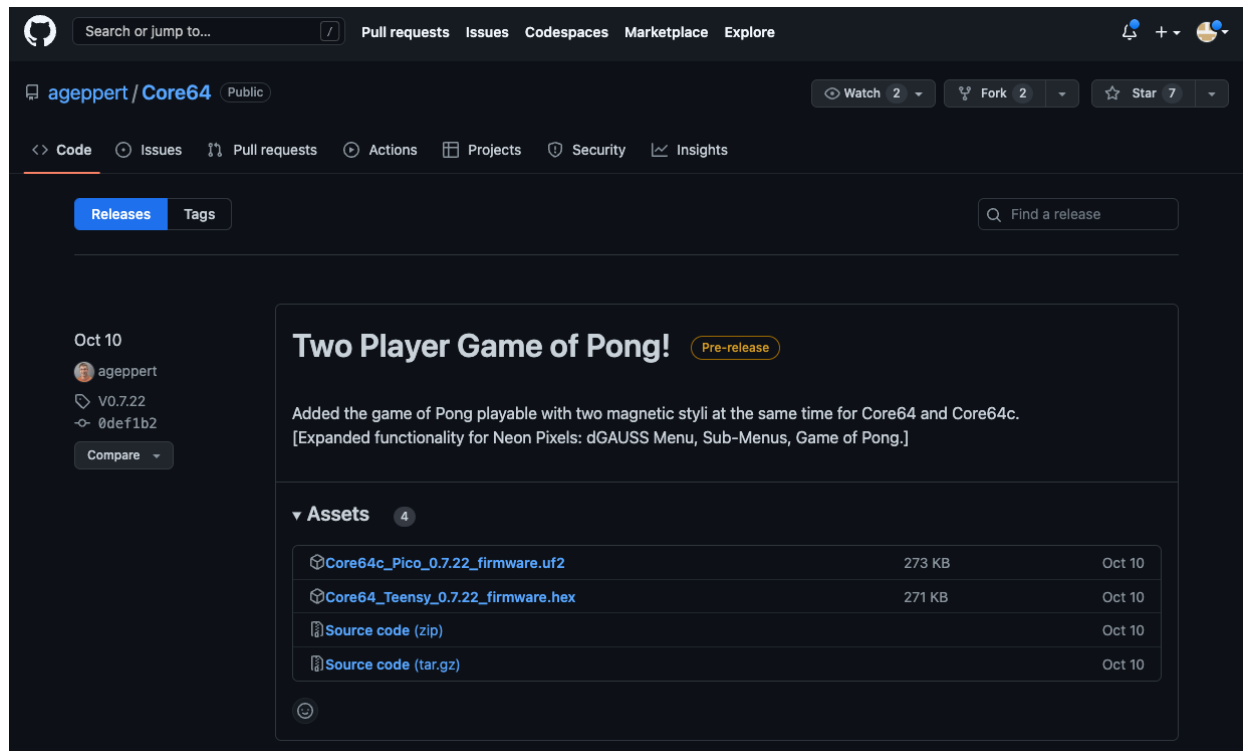
6. TEENSY®: FIRMWARE UPDATE

The firmware update process is a tiny bit more involved for the Teensy® 3.2-based Core64 kits because it requires the Teensy® Loader.

Step 1: Download Firmware

Download the latest firmware from <https://github.com/ageppert/Core64/releases>

Expand Assets and click on the “Core64_Teensy_x.y.z_firmware.hex” file to save it to your Downloads folder.



Step 2: Get the Teensy® Loader

Download/Install the standalone Teensy® Loader from <https://www.pjrc.com/Teensy@/loader.html>

Read the instructions for use with your OS on that page as well.

Run the Teensy® Loader Application.

If you already have Teensy® Loader installed with the Arduino IDE or VS Code and PlatformIO, you can start the Teensy® Loader from within those IDEs.

Step 3: Connect USB Cable

Connect the Teensy® 3.2 to your computer with the MicroUSB data cable.

Step 3: Install the Firmware

Drag and drop the “Core64_Pico_x.y.z_firmware.hex” file onto the Teensy® Loader window.

Press the button on the Teensy® 3.2 and the Teensy® Loader should recognize it and program it with the firmware.

The Teensy® should reboot and text should begin scrolling on the Core64 LED Array.

That's it.

7. TROUBLESHOOTING FIRMWARE UPLOADS

The first thing to check is the cable. Make sure you have a good USB cable, with data wires, and good connections to the ports at each end. The USB cable included in the Core64 Kit meets these criteria. Still, you should verify the cable is working with data by testing it with other known working devices to be sure.

Try a different computer if the USB cable is known to be good, but the microcontroller isn't connecting fully to the computer and showing up as a serial device.

The MicroUSB cable connects in one direction to the Pico or Teensy®. Careful – it only inserts in one orientation.

The MicroUSB cable must be a DATA cable. It's basically impossible to tell if a USB cable is power only or power+data by looking at it from the outside. You have to test it to find out.

The built-in LED on the microcontroller board should be blinking, which indicates it is getting power from the USB cable.

The Core64 power switch can be either On or Off. The microcontroller will be powered and connected via the USB cable, so battery power is not required. But the batteries can be installed.

The next step is to make sure the microcontroller board is connecting to the computer and showing up correctly – usually that means as a USB Serial connection, and/or USB Storage Device.

Check your system USB connections to make sure the microcontroller is showing up as a connected USB device.

- Mac : Apple icon, About This Mac, System Report
- Windows: Windows Key, search for and run Device Manager

The Pico should show up on your desktop as a mass storage device.

The Teensy® should show up as a serial port device. It won't show up on your desktop.

You will likely find similar advice if you search web for these kinds of connection issues.

You may also find support here: <https://discord.gg/nPcTNNfMmd>