



TECHNOTE: UPDATING THE A2N20-V2 FPGA FIRMWARE

FOR ALL SYSTEMS: Getting The Firmware

The wiki site for the a2fpga a2n20-v2 at ReactiveMicro hosts the latest and all previous versions of the firmware for the board organized by date. You can stay up to date by visiting <https://wiki.reactivemicro.com/A2FPGA>. Additionally, the GitHub project repository for A2FPGA contains additional information about the board, features, etc. You can access it directly by following this link: https://github.com/a2fpga/a2fpga_core.

FOR MACOS AND LINUX SYSTEMS

1. **Download the version of firmware you wish to program.** See above.
2. **Unpack the ZIP file containing the firmware.** Remember this location!
3. **Install openfpgaloader.** You can find it on GitHub here:
<https://github.com/trabucayre/openFPGALoader>

Instructions for installing on various platforms is located here:
<https://trabucayre.github.io/openFPGALoader/guide/install.html>

If you have a Mac, probably the easiest path is to use HomeBrew:

```
brew install openfpgaloader
```

If you have a Linux system, follow the instructions for installing openfpgaloader for your specific distribution located in the link above. If you want or need to build openfpgaloader by hand, the instructions for doing so are also available in the link above.

4. **Reprogram the Firmware of the Tang Nano 20K Module:** Connect either a USB-A to USB-C or USB-C to USB-C cable to your computer followed by connecting the other end (USB-C) to the Tang Nano 20K module that is mounted on the a2n20-V2 Multicard.

You can now reprogram the firmware of your a2n20-V2 Multicard by issuing the following command:

```
openfpgaloader -b tangnano20k -f <UNZIPPED_DIRECTORY>/a2n20v2-MMDDYYYY.fs
```

Where **<UNZIPPED_DIRECTORY>** is replaced by the directory name or fully qualified path where you unpacked the zip file containing the version of firmware you wish to install, and **MMDDYYYY** is the date stamp of the firmware .fs file.

5. **Staying Up To Date With New Firmware:** As new updates are made to the repository, they will be made available on the wiki page for the A2FPGA at ReactiveMicro which is linked at the top of this document. Simply download the .ZIP file that contains the version you wish to install and repeat the appropriate openfpgaloader command above after connecting your Tang Nano 20K module to your computer and your a2n20-V2 Multicard firmware will be reprogrammed.

FOR WINDOWS SYSTEMS

1. **Download the version of firmware you wish to program.** See above.
2. **Unpack the ZIP file containing the firmware.** Remember this location!
3. **Install the Gowin programmer or the full GoWin IDE and tools** by following this link in your browser:

https://cdn.gowinsemi.com.cn/Gowin_V1.9.9Beta-4_Education_win.zip

4. **Attach a USB cable from your PC to the Tang Nano 20K USB-C socket.**
5. **Launch the Gowin Programmer you installed in step 2.** The Cable Setup dialog will appear and should detect the USB cable and the Tang Nano 20K device. The FPGA will appear in the device list as GW2AR-18C.
6. If any device appears in the device list with anything other than GW2AR-18C then click on it and hit the Delete Device button. If there are no devices showing after doing this, click Scan Device and it will say "Multi-device found", select GW2AR-18C.

7. **Right click on the device and select "Configure Device"**
8. **Select External Flash Mode, choose Generic Flash in External Flash Options, leave address at 0x000000. Select the a2n20v2-MMDDYYYY .fs file in Programming Options where MMDDYYYY is the date portion of the .fs filename that you downloaded in the firmware .ZIP file previously. Click Save.**
9. **Click Program/Configure.** The device will now be programmed with the firmware.
10. **Disconnect the USB cable and proceed with installing your A2FPGA into your Apple II.**
You are ready to go!
11. **Staying Up To Date With New Firmware:** As new updates are made to the repository, they will be made available on the wiki page for the A2FPGA at ReactiveMicro which is linked at the top of this document. Simply download the .ZIP file that contains the version you wish to install and repeat the appropriate openfpgaloader command above after connecting your Tang Nano 20K module to your computer and your a2n20-V2 Multicard firmware will be reprogrammed.