BotBlox

GigaBlox Rugged

Small 4 port 10/100/1000 Mbps Ethernet Switch

MPN: BB-GGR-C-1

Programming Note

November 2021

Board revision C

Contents

1 General Information

1.1 Introduction

The main ethernet switch IC on GigaBlox Rugged is the VSC7511, a 4 port industrial ethernet switch. This IC requires configuration upon startup to boot into the correct mode. On GigaBlox Rugged, this is achieved by way of an SPI flash device. This flash device is loaded with a hex file in our testing lab to configure the VSC7511 in a default, unmanaged configuration. This hex is compiled from freely available configuration firmware from Microchip.

It is possible for a customer to download and modify this firmware to achieve different configurations on the VSC7511. This compiled firmware (hex file) can then be uploaded to GigaBlox Rugged by way of an external programmer.

This application note details the method to achieve this.

1.2 Requirements

The customer must have the following items to perform any modifications to the firmware.
- Flash programmer tool
  - We recommend the ASIX Presto programmer
- TC2050-IDC-NL Connector
  - An IDC to pogo pin connector, 10 pins, normal orientation
- Hex programming software
  - We recommend the ASIX Program Up, which is freely available.
- Keil PK51 development software
  - This is paid software
- Isopropyl alcohol and a cotton swab
  - For removing conformal coating

1.3 General flow

The high level tasks for this are outlined below.
1. Download the firmware package from Microchip
2. Make modifications to the files
3. Build the modified files into a hex file
4. Upload the new hex file to the GigaBlox Rugged
5. Verify correct operation of the switch using Wireshark (or other networking tool)

2 Modifying the Firmware

2.1 Access

The firmware package required is called VSC6825, and is available from github in the link below.

https://github.com/microchip-ung/ocelot-vsc6825

An application note is available for this software, which can be found in the link below.

https://ww1.microchip.com/downloads/en/Appnotes/VPPD-04413_AN.pdf

2.2 Modifications

Opening the project in Keil PK51 allows modifications to the firmware. The project is relatively complex, however most of the configuration of the VSC7511 is done by modifying the value of specific flags in the firmware.

It is beyond the scope of this document to provide a guide to all the flags. It is also worth noting that support from Microchip on this aspect is relatively limited. As such, we recommend studying the application note and firmware to understand its operation. Thankfully the latter is well documented.

Ensure that the F5 version of the firmware is selected, this corresponds to the VSC7511. Figure 1 below shows how the project should look in Keil PK 51.

2.3 Compilation

Ensuring that the dropdown box is F5, go to Project > Build Target, which will output a Hex file.
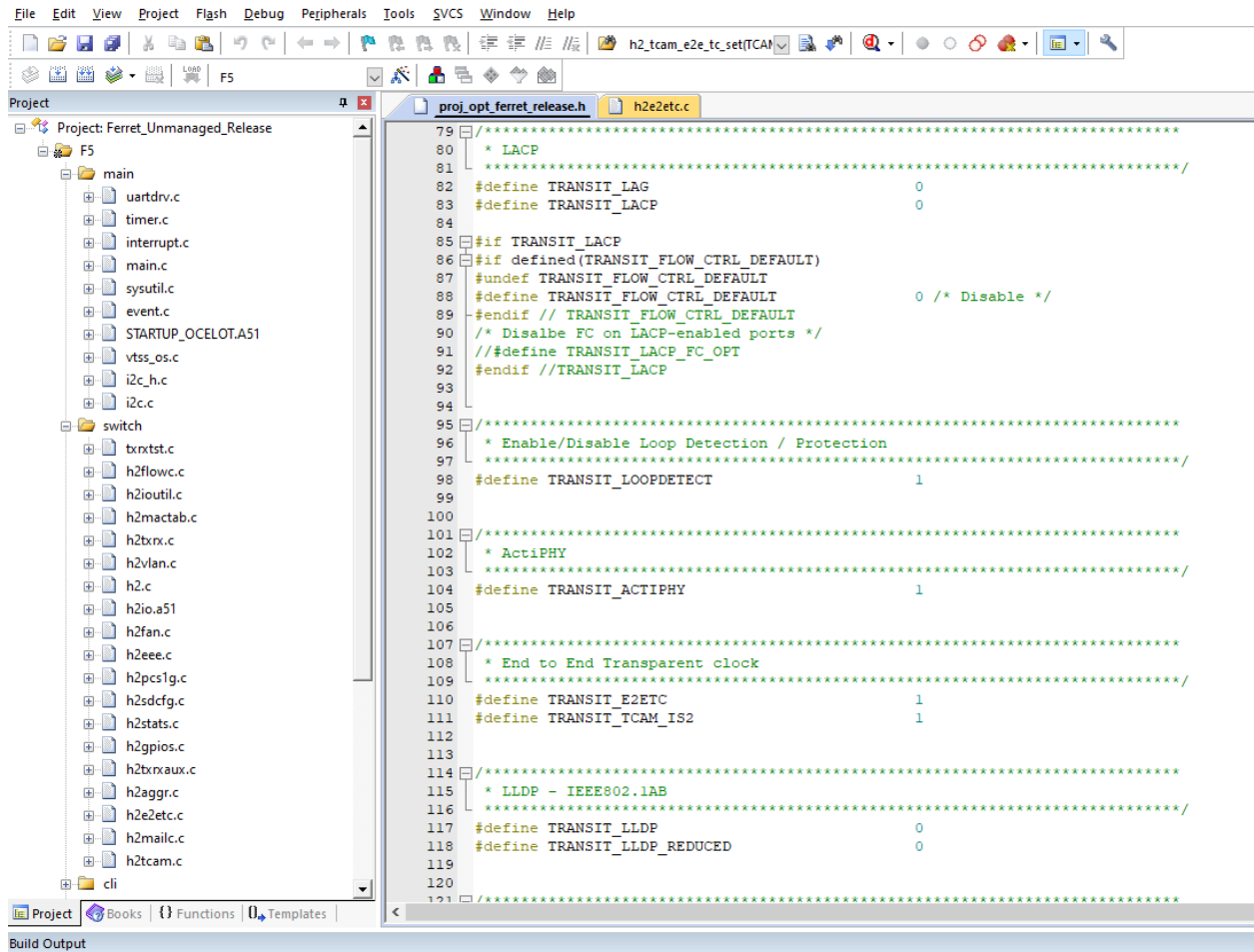
Figure 1: The proj_opt_ferret_release.h file contains most of the flags of interest

3 Uploading the Firmware

3.1 Physical connection

To upload firmware to the SPI flash module on GigaBlox Rugged, you will first need to create a custom mapping between the 10 pin IDC side of the TC2050-IDC-NL Connector and the connector on the Presto programmer.

GigaBlox Rugged has a 10 pin pad array which is designed to accept the TC2050-IDC-NL.

The connection between the board and the pogo pin connector is not locking or permanent, and needs to be physically held in place during the programming process to avoid corruption of the onboard flash.
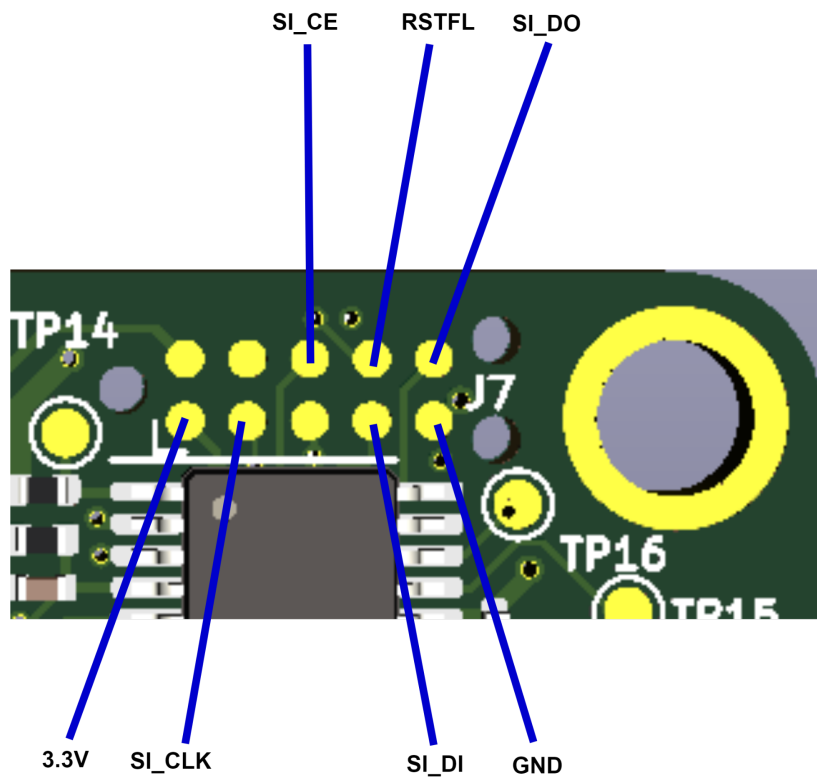

Figure 2: The programming pads on the back of GigaBlox Rugged and their mapping.

Occasionally, the conformal coating applied to GigaBlox Rugged can cover these pads and prevent programming. To remove this coating we suggest dabbing this area with a small amount of isopropyl alcohol applied to a cotton swab.

The IDC connector on the pogo pin cable needs to be connected to the Presto programmer using the mapping shown below. Note that these signals are not high speed, so any jumper wires can be used. We suggest building a small perfboard fixture to implement this mapping if you intend to use this connection a lot.
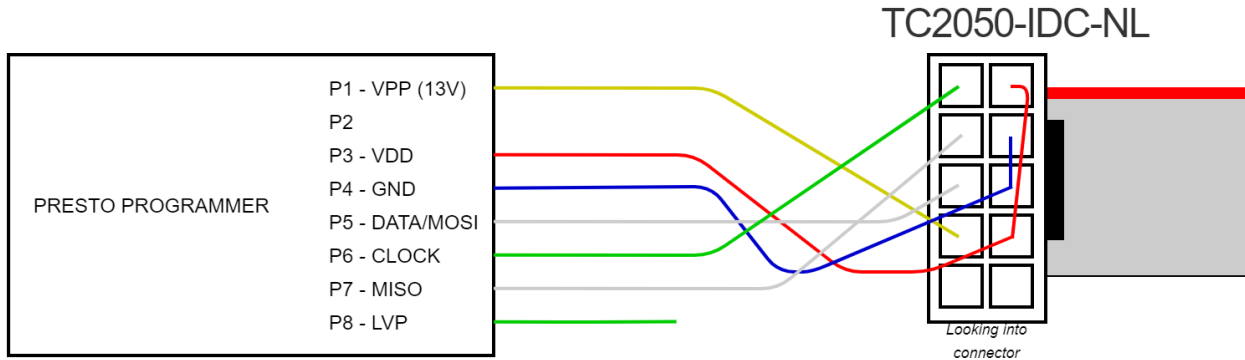

Figure 3: The mapping between the Presto programmer and the TC2050-IDC-NL cable.

You must apply power to the board to program it, we suggest keeping the input voltage low to prevent shorting the cables in a lab environment (though any voltage between 5-60V can be used). You do not need to connect the TC2050-IDC-NL onto the GigaBlox Rugged programming pads until you are ready to program.
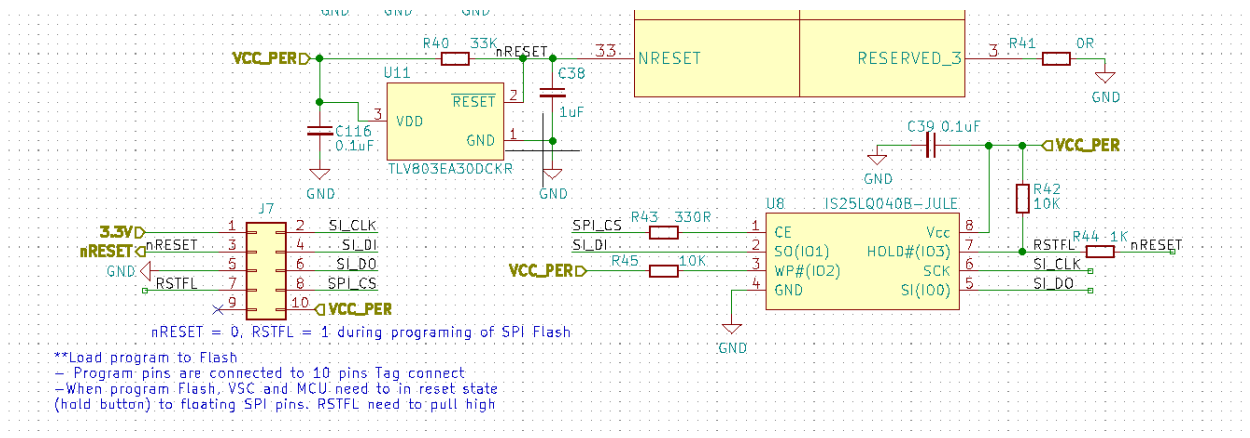

Figure 5: The circuitry showing the onboard flash, programming header and reset circuitry on GigaBlox Rugged

3.2 Uploading the hex file

To program the hex file, you will need to open the ASIX Program UP software. Then open the hex file you just created in the software. It should appear as in figure 5 below.
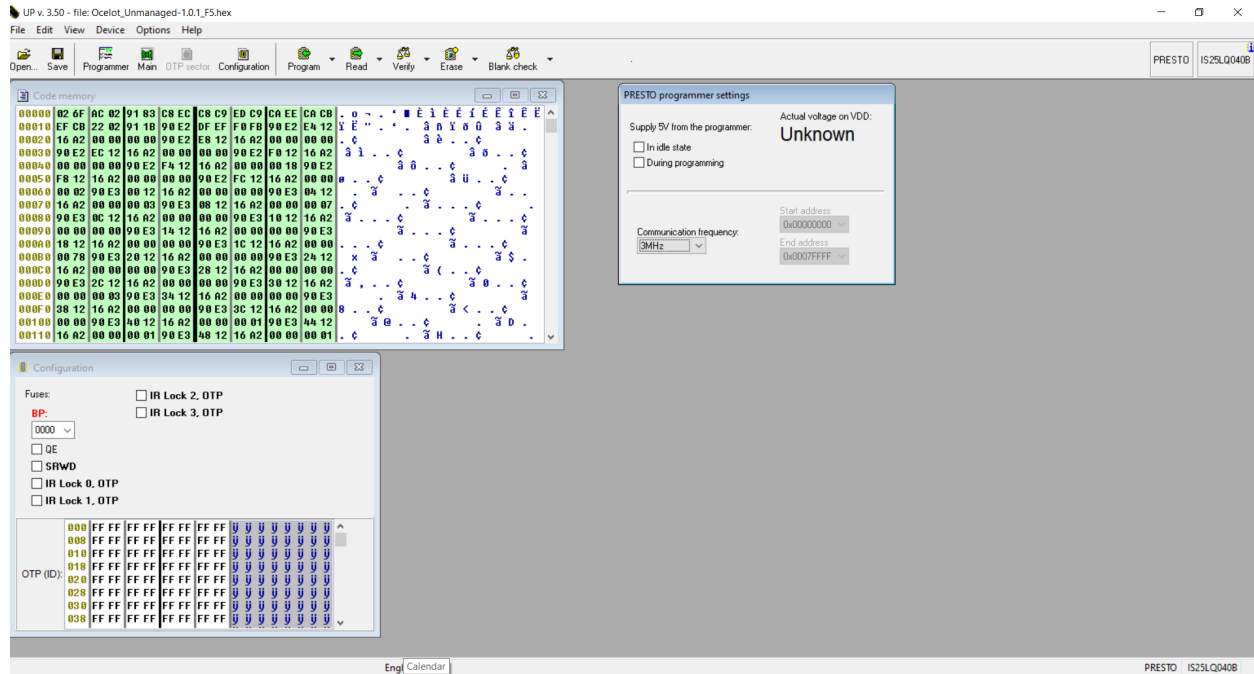

Figure 5: The Asix UP software.

You will need to select the correct flash part number by going to Device > Select Device. Figure 6 shows the correct settings.
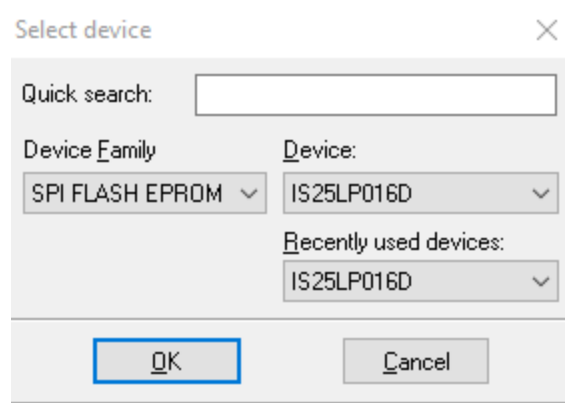

Figure 6: The device settings for the flash chip on GigaBlox Rugged

Older versions of GigaBlox Rugged (Rev B and below) use a slightly different IC, typically the IS25LQ040B or the W25Q128JV. If you are unclear, please get in touch with our support. If you attempt to program the wrong device, the software will warn you first and read out the

actual part number of the flash chip on the board. If this happens, you can simply select the flash chip it suggests.

At this point you are ready to program GigaBlox Rugged. Ensure power is applied and then connect the pogo pin cable to the board. You should see the "Actual voltage on VDD" display >2V, indicating that it detects the 3.3V VDD rail on the board.

You can now click program. You may find some errors in programming the configuration bits, this is expected and normal; what matters is that the code/main memory was correctly programmed.

Make sure the programming cable is securely held in place during the programming process. Typically this takes around 6-10 seconds. Failing to hold it securely can result in a poor connection and a corrupted flash IC.

You can now remove the programming cable and power cycle the board to reset it. Depending on the modifications you made, the orange LEDs should flash once and then turn off. If they stay on, it is usually an indication that the VSC7511 is not booting, which could be due to an invalid hex file.

4 Testing the Operation

If the orange lights on the front of GigaBlox Rugged flash and then turn off, this is usually an indication that the VSC7511 has booted correctly. If you see the orange LEDs stay on, this means the VSC7511 has not booted (unless you have manually changed the firmware to change the LED operation, in which case this might be expected behaviour). If you see this and don't expect it, try programming the hex file again. If you see the same behaviour, you may need to modify the firmware.

If the orange LEDs turn off after bootup, then you can proceed to any specific networking tests.

6 Datasheet Changelog

Date	Datasheet Version	Author	Notes
16/12/2021	A_A	Josh Elijah	Initial release

7 Contact

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