

# Programming Avalanche Space Grade Dual QSPI P-SRAM Memory ASxxxx208 Using Corelis BusPro-S Programmer

AN000021 provides a simple and easy method to program the Avalanche Dual QSPI P-SRAM using the Corelis BusPro-S SPI programmer

## 1. Introduction

Avalanche's MRAM memory solution offers significant benefits over existing memory solutions in the traditional SRAM based FPGA. These key attributes, including infinite endurance, low latency, low power, high reliability, make MRAM product an ideal memory solution for FPGA configuration bitstream storage and boot code storage for microcontrollers and microprocessors.

For the purpose of this application note, an Avalanche Dual QSPI P-SRAM Kit for Xilinx Versal VCK190 is used to house the Dual QSPI P-SRAM device and to connect the device to the BusPro-S SPI programmer. The BusPro-S SPI programmer can be connected to any development test board that has an Avalanche Dual QSPI P-SRAM device with SPI signal pins as indicated in Section 3 – SPI Signal Pin Connection below.

## 2. Prerequisites

- User is familiar with the Xilinx Vivado Design Suite & the Vitis software development platform
- Xilinx Vivado tools working environment is fully setup
- PetaLinux software tool has been installed
- A bitfile image has been generated from Vivado (e.g. QSPI\_MRAM.bit)

## Splitting the Vivado Bitfile Image into a Primary and Secondary BIN files

The Avalanche Dual QSPI P-SRAM connects two Quad SPI devices with dual-CS# signals (CS1# and CS2#). Each device operates independently with its own memory space and register sets. Each Quad SPI device has to be programmed separately with corresponding BIN files.

From the Vivado prompt, use the command syntax below to split the bitfile image file .bit into a primary and secondary files, each loaded at address 0x00:

```
Write\_cfgmen format bin -size 32 -interface SPIx8 -loadbit {up 0x000000  
"<path>/QSPI_MRAM.bit"} -file"<path>/QSPI_MRAM_Boot.bin"
```

Where: *QSPI\_MRAM.bit* is an input file generated by Vivado and *QSPI\_MRAM\_Boot.bin* is an output file name.

After the [Write\\_cfgmen](#) command is executed, two output files will be generated: *QSPI\_MRAM\_Boot\_Primary.bin* and *QSPI\_MRAM\_Boot\_Secondary.bin*.

The first output file can be used to program to the Quad SPI Device 1 and the second output file can be used to program to the Quad SPI Device 2 (refer to *Figure 1 - SPI Signal Connection between BusPro-S and Avalanche Dual QSPI P-SRAM Kit*).

### 3. Hardware and Software Requirements

#### Hardware

- [Corelis BusPro-S SPI programmer](#)
- Avalanche Gen3 Space Grade Dual QSPI P-SRAM Kit for Xilinx
- Avalanche Gen3 Space Grade Dual QSPI P-SRAM Memory Device
- 3.3V 1.8A AC/DC power supply cord
- Female to Female jumper wires included with the BusPro-S
- USB 2.0 cable included with the BusPro-S
- A PC computer system with one USB port and Windows 11

#### Application Software

- [Correlis BusPro-S SPI programmer](#)

## 4. SPI Signal Pin Connection

Connect the SPI signal pins from the BusPro-S to either Quad SPI Device 1 or Quad SPI Device 2 as illustrated in Figure 1 below.

The Avalanche Dual QSPI P-SRAM board has a dual-row header and each row contains SPI signals for each Quad SPI device as indicated in the Figure 1 below.

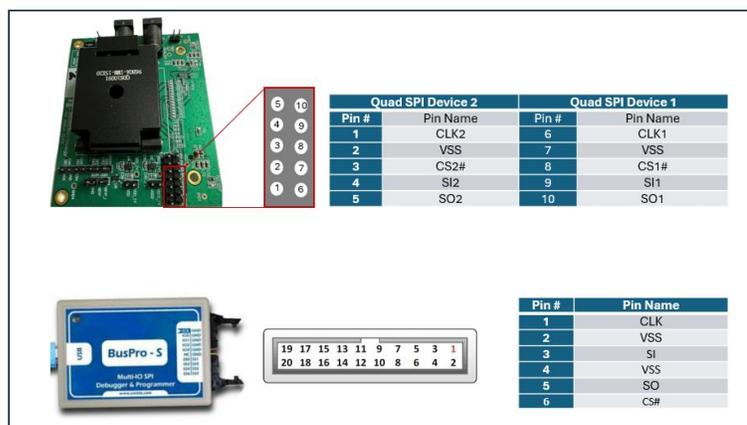


Figure 1: SPI Signal Connection between BusPro-S and Avalanche Dual QSPI P-SRAM Kit

## 5. Hardware and Software Configuration Steps

Follow the following steps to install software driver and connect the BusPro-S to both PC system and to the Avalanche Dual QSPI P-SRAM kit:

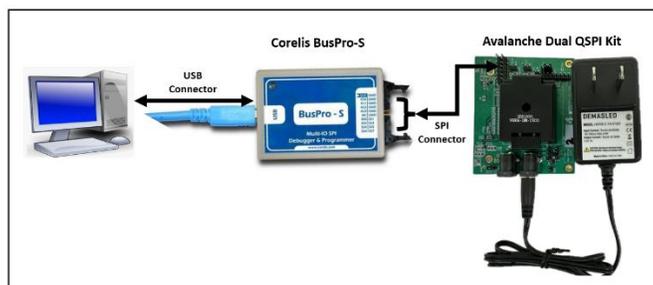


Figure 2: Hardware Connection

1. Install the BusPro-S application software to the Windows PC computer
2. Connect a USB 2.0 cable from the BusPro-S connector to any available USB connector on the PC
3. Connect the 3.3V 1.8V power supply cord to power outlet
4. Follow the Windows instructions to install the BusPro-S drivers on the PC

## 6. Programming the Avalanche Dual QSPI P-SRAM Device

1. Launch the BusPro SPI programmer test program and the main window should appear as Window 1 below. Click on “Programmer” button.
2. From the pull-down menu, select “Avalanche Technology” as manufacturer
3. Select device capacity: 1Gb/2Gb/4Gb
4. Check both the “Program” box and the “Verify” box
5. Select “Clock Rate” of 30MHz
6. Select “3.3V” voltage
7. Click the “Browse” button
8. Select “All File (\*)
9. Select a BIN file to be programmed to Dual QSPI P-SRAM
10. Click “Run” to program and verify
11. Program test and Verify test should report “PASS”

Programmed data on the Dual QSPI P-SRAM can be viewed by selecting the “Read” tab in the main Window

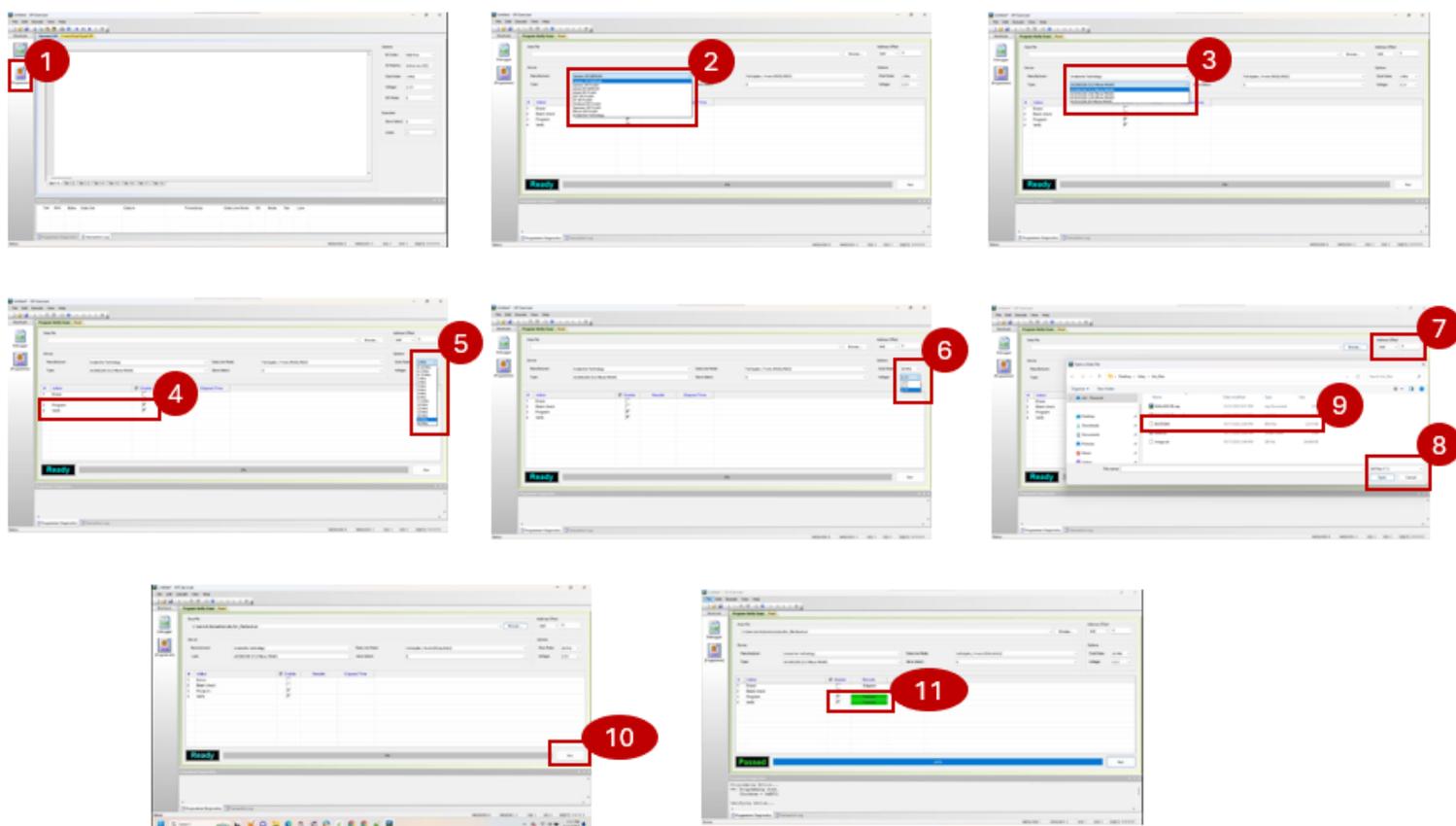


Figure 3: Steps to program the Dual QSPI P-SRAM