



# 1. Introduction

This Quickstart Card applies to the Microchip Silicon Sculptor 4 (SS4). Silicon Sculptor 4 is an FPGA programming tool equipped to deliver high data throughput and promote ease of use. It incorporates the industry's widely accepted high-speed USB v2.0 standards bus communication. It is a highly reliable programmer for Microchip's portfolio of FPGAs.

## 1.1. Initial Setup for Silicon Sculptor 4

To make the initial setup for Silicon Sculptor 4, perform the following steps:

1. Download the latest version of the Silicon Sculptor software (SculptW) from [Microchip website](#).
2. Install SculptW using the admin login and restart the PC.
3. Connect the accompanying 24V switching power supply to the programmer.



If the accompanying power supply is lost or damaged, contact Microchip for a replacement. Using an incompatible power supply may cause damage to the programmer.

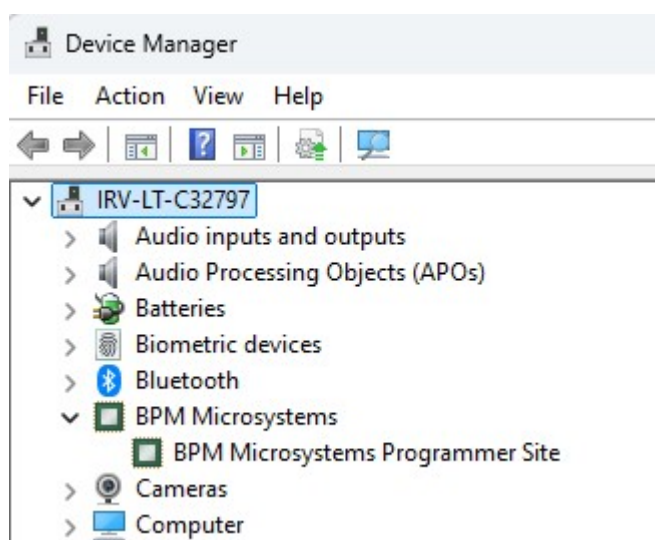
4. To the back of the programmer, connect the USB cable to type-B USB port.
5. Connect the USB cable to type-A USB port on PC. To verify the driver installation, see the on-screen information.



**Important:** The Found New Hardware Wizard launches for the connected SS4 programmer. After installing the USB drivers, the PC recognizes that the SS4 programming site is connected at a later time. If a different USB port on the PC is used, the Found New Hardware Wizard launches and installs new USB drivers.

6. After the USB driver installation, click **Finish**.

**Figure 1-1.** Device Manager after USB Driver Installation



7. Verify that all USB drivers are loaded correctly, recognized by Windows®. The programmer sites will be listed in Windows Device Manager. Perform the following steps to verify the USB drivers:

- a. Go to **Device Manager**.  
The BPM Microsystems appears in the list as shown in the preceding figure.
- b. Expand the BPM Microsystems node.  
There must be a BPM Microsystems programmer site for the programmer attached.

## 1.2. Powering-up the Programmer

To power-up the programmer, perform the following steps:



**CAUTION** When using this equipment, follow ESD prevention procedures. Adapter modules and devices are ESD susceptible.

1. Silicon Sculptor 4 does not have any power ON/OFF switch. Connect the accompanying switching power supply to the programmer.
2. To the back of the programmer, connect the USB cable to type-B USB port.
3. Connect the USB cable to type-A USB port on PC.
4. To launch SculptW software, double click the **SculptW desktop** icon or go to **Windows Start > Programs list** and select the **SculptW** icon. When running the software for the first time after installation, run the application as administrator.

The programmer powers-up.

The programmer LEDs turn on for a brief amount of time while the software is being initialized. The green LED light must stay on after the initialization process is completed. If the programmer does not power-up, close the software and check the USB and power connections (and/or use another USB port of the PC) and try again.

Check the software screen to ensure that the software recognizes the programmer. Programmer and adapter module (if attached to the programmer) must appear on the status bar at the bottom of the SculptW software.

## 1.3. Testing the Programmer

Before programming any FPGA, you must run two tests: programmer diagnostic test (see [Perform Programmer Diagnostics Test](#) section) followed by verification of calibration test (see [Verification of Calibration Procedure](#) section).

Programmer diagnostic test must be performed two times—with and without programming adapter module. Programmer diagnostic test must pass with and without programming adapter module. If you have any failures during either of two tests, stop using the Programmer and contact [Microchip Tech Support](#) (provide the log file from C:\BP\DATA\LOG folder). For the complete list of programming adapter module, see [SILICON -SCULPTOR -ADAPTOR-MODULE](#).

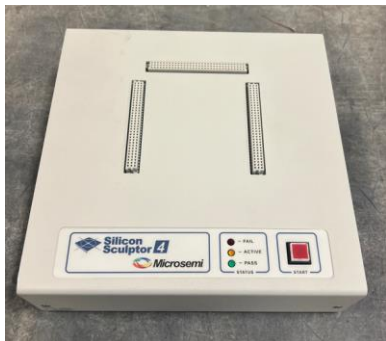
If both tests pass, continue to [Verification of Calibration Procedure](#).

Before using the programmer for the first time, calibration verification test must be performed. Before programming any batch of RT FPGAs, you must run this test.

### 1.3.1. Hardware Required to Perform the Verification of Calibration Test

The following hardware items are required for this test:

- SS4 programmer



- Power supply that is provided with the programmer (Do not use your own power supply.)



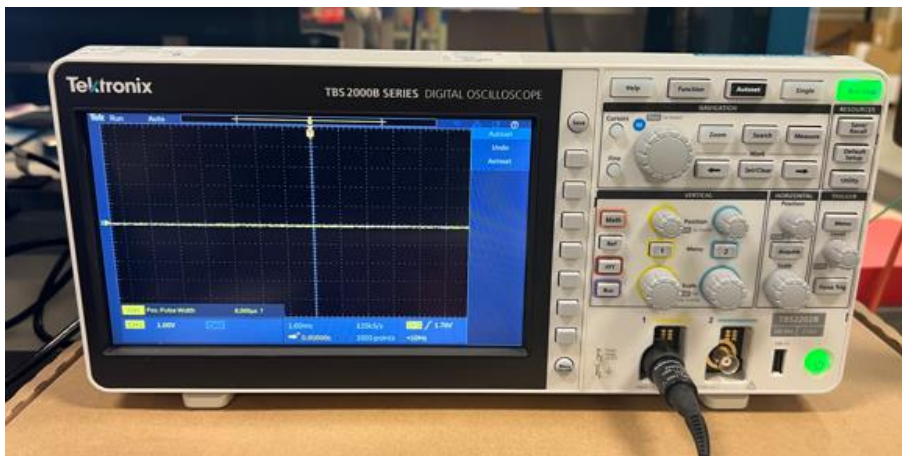
- SM48D or SM48DB adapter module



- Voltmeter



- Oscilloscope



### 1.3.2. Perform Programmer Diagnostics Test

To perform the programmer diagnostics test, follow these steps:

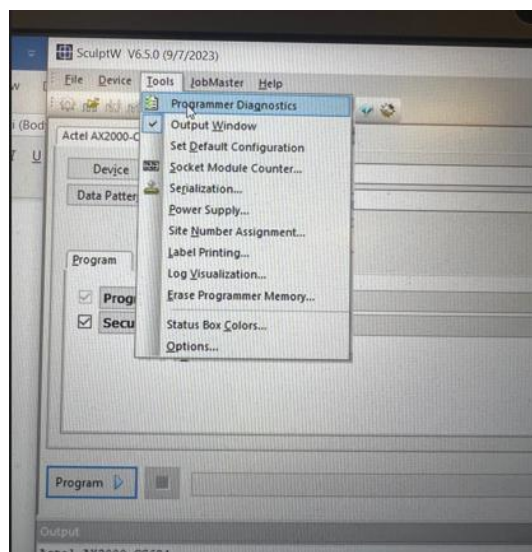
1. Connect the SS4 programmer to the PC using the USB cable.  
**Note:** Programmer must be powered-off during the next step.
2. Connect the programmer power supply to SS4 programmer and power outlet.
3. Install the latest version of the SculptW software on your computer if it is not already installed.
4. Launch the SculptW software. Wait for the programmer to power-up. The programmer LEDs turn on for a brief amount of time while the software is being initialized, but the green LED light must stay on after the initialization process is completed. If the programmer does not power-up, close the software, check the USB and power connections, and try again.

- Without installing any programming adapter module on the SS4 programmer, go to **Tools > Programmer Diagnostics** and run the programmer diagnostics test.

Figure 1-2. SS4 Programmer

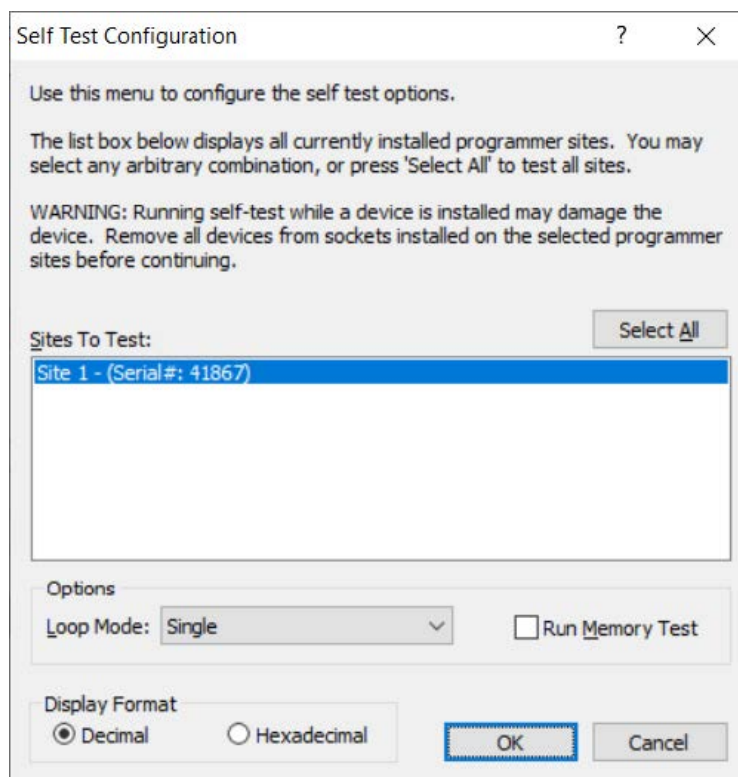


Figure 1-3. Programmer Diagnostics Option



Self Test Configuration pop-up appears.

Figure 1-4. Self Test Configuration Pop-up



- To continue, click **OK** and wait for the test to complete.



**Note:** If you are programming an FPGA, repeat [step 5](#) after attaching programming adapter module.

### 1.3.3. Verification of Calibration Procedure

Before proceeding to the programmer verification of calibration test, the programmer must pass diagnostic test without any adapter module.

To verify the calibration, perform the following steps:

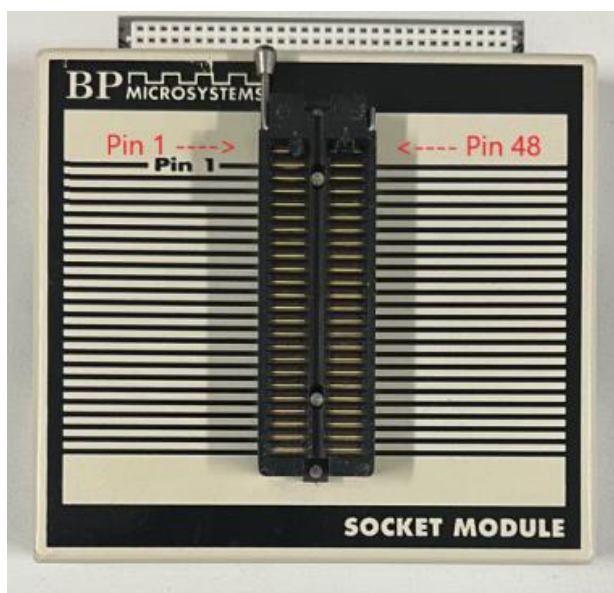
1. Place SM48D or SM48DB on the SS4 programmer, see the following figure.

**Figure 1-5.** SM48D or SM48DB on the SS4 Programmer

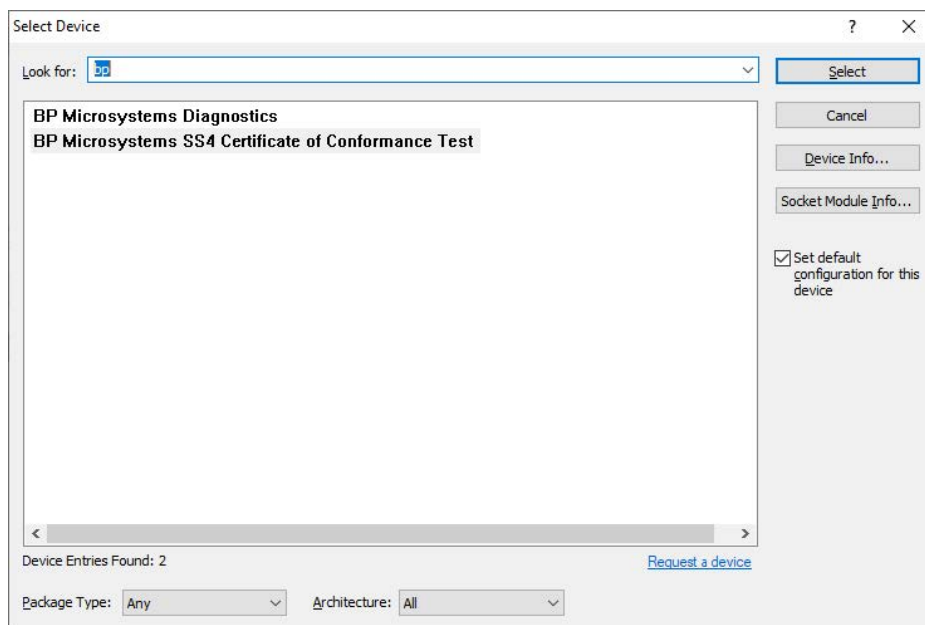


**Note:** Ensure to note the location of pins 1 (Test pin) and 48 (GND) of the SM48D/SM48DB adapter module (see the following figure) as these pins perform the actual voltage and waveform measurements.

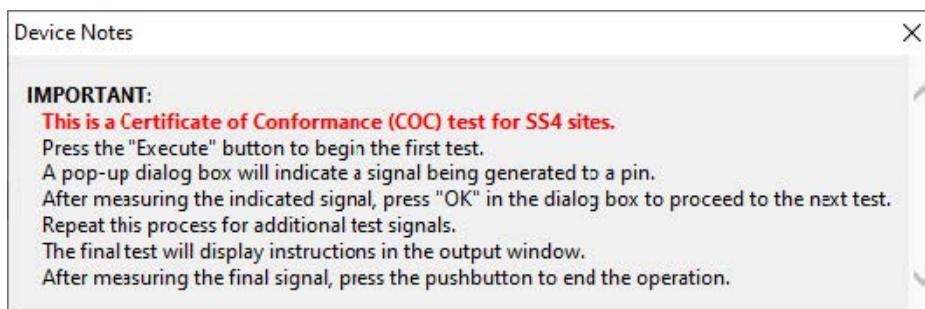
**Figure 1-6.** Test Pin and GND Pin



2. Click **Device** icon and type BP in the **Look for:** field.
3. Select **BP Microsystems SS4 Certificate of Conformance Test** option and click **Select**.

**Figure 1-7.** BP Microsystems SS4 Certificate of Conformance Test Option

4. Once selected, the following window appears which explains about how to run the test. To close this window, press the **Enter** key.

**Figure 1-8.** Test Run Instructions Window

5. Connect the voltmeter probes to pins 1 and 48.  
**Note:** Ensure special attention to avoid shorting pin 1 and pin 48.
6. To start the test, on the software, click **Execute** icon.

### 1.3.3.1. High Voltage Test

To perform high voltage test, follow these steps:

1. Measure the voltage of pin 1, see the following figure. Voltage reading must be within the specified range. Otherwise, the programmer is out of calibration and needs servicing.



**Figure 1-9.** Measuring the Voltage of Pin 1

The following figure shows the allowable range of the high voltage test.

**Figure 1-10.** Test Output—High Voltage Test

```

Output

Socket D will not be used in the job session.

Performing Functional Test...
1: High Voltage Test:
19.0 V is now applied to pin 1.
Ground is applied to pin 48.
Valid voltage range: 18.9 V to 19.1 V.
Please measure and record the voltage.
Press the pushbutton to continue to next test.

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Silicon_Sculptor_IV/240 SM48D USB Manual

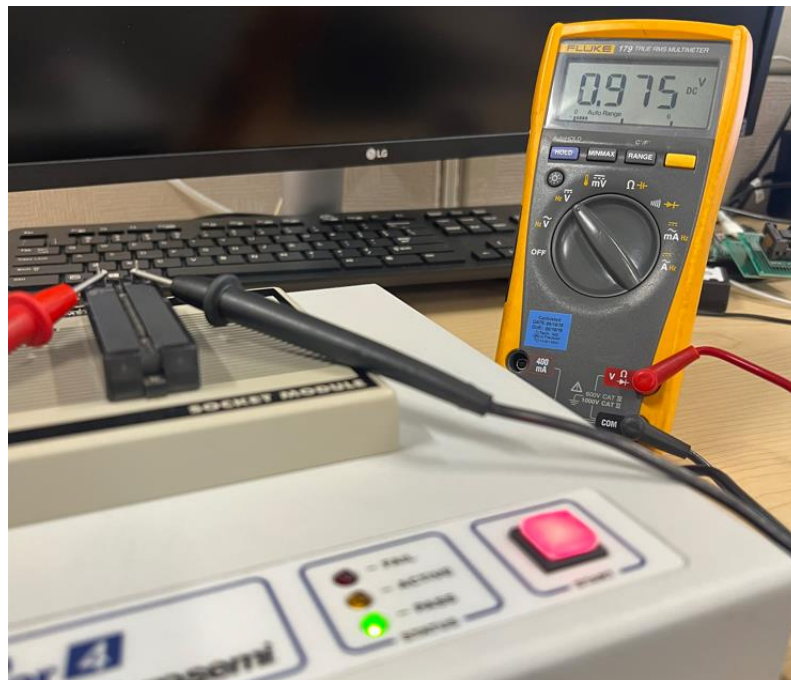
```

2. To proceed to the next test, on the SS4 programmer, press the **START** push button.

### 1.3.3.2. Low Voltage Test

To perform the low voltage test, follow these steps:

1. Measure the voltage of pin 1, see the following figure. Voltage reading must be within the specified range. Otherwise, the programmer is out of calibration and needs servicing.

**Figure 1-11.** Measure the Voltage of Pin 1

The following figure shows the allowable range of the low voltage test.

**Figure 1-12.** Test Output—Low Voltage Test

```

1: Low Voltage Test:
1.0 V is now applied to pin 1.
Ground is applied to pin 48.
Valid voltage range: 0.95 V to 1.05 V.
Please measure and record the voltage.
Press the pushbutton to continue to next test.

```

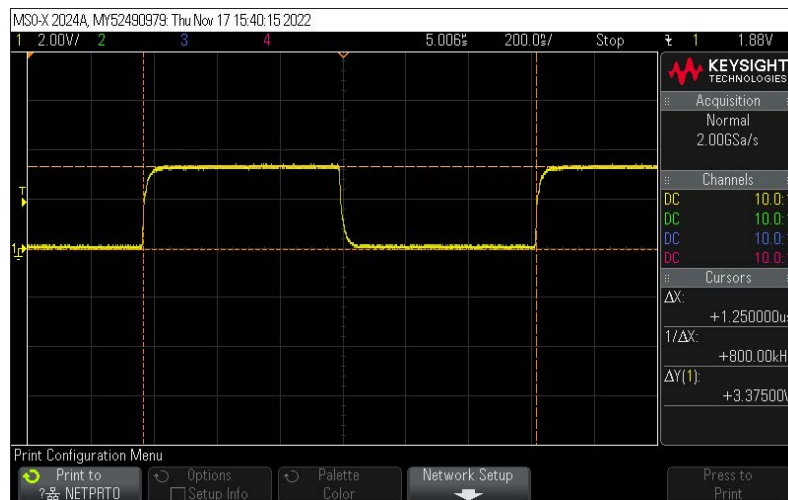
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 Silicon\_Sculptor\_IV/240 SM48D USB Manual

2. Remove the voltmeter probe pins from the SM48D adapter module.  
**Note:** Ensure special attention to avoid shorting pin 1 and 48.
3. Connect the scope probe to pin 1 and ground to pin 48.  
**Notes:**
  - Ensure to give special attention to avoid shorting pin 1 and 48.
  - Do not connect the ground pin of the scope to pin 1 of the SM48D adapter module.
4. To proceed to the next test, on the SS4 programmer, press the **START** push button.

### 1.3.3.3. Low Frequency Test

To perform the low frequency test, follow these steps:

1. Set the probe voltage of the oscilloscope to 2V/Div.
2. Adjust the timing to see an entire wave period, see the following figure.

**Figure 1-13.** Entire Wave Period

3. Measure the frequency of one period of the wave form. Frequency measured must be within the specified range. Otherwise, the programmer is out of calibration and needs servicing. The following figure shows the allowable range of the of low frequency test.

**Figure 1-14.** Test Output—Low Frequency Test

```

1: Low Frequency Test:
FCLK with 800 kHz frequency is now applied to pin 1.
Ground is applied to pin 48.
Valid frequency range: 798 kHz to 802 kHz.
Please measure and record the frequency.
Press the pushbutton to continue to next test.

```



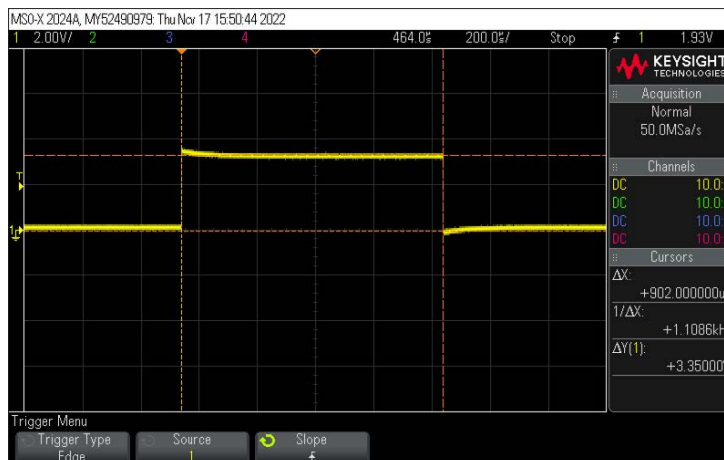
4. To proceed to the next test, on the SS4 programmer, press the **START** push button.

#### 1.3.3.4. Pulse Width Test

To perform the pulse width test, follow these steps:

1. To capture the signal on the rising edge of the signal, set the trigger of the oscilloscope.
2. Measure the pulse width. Measured pulse width must be within the specified range. Otherwise, the programmer is out of calibration and needs servicing.

Figure 1-15. Pulse Width



The following figure shows the allowable range of the pulse width test.

Figure 1-16. Test Output—Pulse Width Test

```

1: Pulse Width Test:
Now toggling pin 1 every 900 us.
Ground is applied to pin 48.
Valid pulse width range: 890 us to 910 us.
Please measure and record the pulse width.
Press the pushbutton to end the operation.
  
```

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Silicon\_Sculptor\_IV/240 SM48D USB Manual

3. To terminate the test, on the SS4 programmer, press the **START** push button.
4. Remove the test probes from the SM48D adapter module.
5. To ensure that there was no programmer damage during the verification of calibration test, perform programmer diagnostics test with the SM48D.

**Figure 1-17.** Output of Programmer Diagnostics Test with the SM48D

```

Output
Port:      USB
Serial Number: 41867
Enabled Software Features: CBpProgrammer, CJobControl, CJobMonitor, Lase Serial Number & Lase Date, Serialization
Pin drivers: 240
BIOS:      V3.00 in RAM (ROM version undetected)
Speed:     50.0MHz
RAM:       59768832KB
WNAVSTEPA: Software Revision 1
Free Mem Addr: 00000000
Analog:    48
Digital:   192
Misc:      0000 1 0 1 0 0 0
Socket D will not be used in the job session.
Model:     Silicon_Sculptor_IV/240
Tech. Adapter: TA240GEN9
Socket Module: SM48D (F90B0C88)
Package Type: DIP
Package size: 0...48
Socket D will not be used in the job session.

----- Site #1 -----

Running Self Test [2024-05-16 13:45:51 -0800]...

Testing Communications...PASSED.

Performing Functional Test...
1:
1: The following boards have been detected: FWB-108-108, MB, PMU-109, IPR-10A.
1: Socket module is present on the site.
.

1: Temperature Sensor Readings:
1: FWB Temp Sensor 1: 29.5C
1: FWB Temp Sensor 2: 46.7C
1: FWB Temp Sensor 3: 39.7C
1: MB Temp Sensor 1: 39.7C
1: MB Temp Sensor 2: 34.6C
1: PMU Temp Sensor 1: 27.3C
1: PMU Temp Sensor 2: 33.0C
1:
100% 1: Fans..... # PASS #
100% 1: Pinoc..... # PASS #
100% 1: Static Voltage Supplies..... # PASS #
100% 1: VCC1..... # PASS #
100% 1: VCC2..... # PASS #
100% 1: 10A Circuit..... # PASS #
100% 1: Digital Pin Drivers..... # PASS #
100% 1: Analog Drivers..... # PASS #
100% 1: Vcc Relays..... # PASS #
100% 1: Vcc2_SS4 Relays..... # PASS #
100% 1: Ground Transistors and PD Trace..... # PASS #
100% 1: LED Cycle..... # PASS #
Finished Functional Test...

Self Test Summary
Unit 1 (41867): PASSED

Operation "Test" completed.
H < > M \Actel Diagnostics/
Silicon_Sculptor_IV/240 SM48D USB Manual Supervisor Sites: 1, Enabled: 1, Master: 1

```

- To exit the Sculptor Software, close its window or go to **File** and click **Exit**. At this point, the programmer turns-off.

## 1.4. Programming a Device

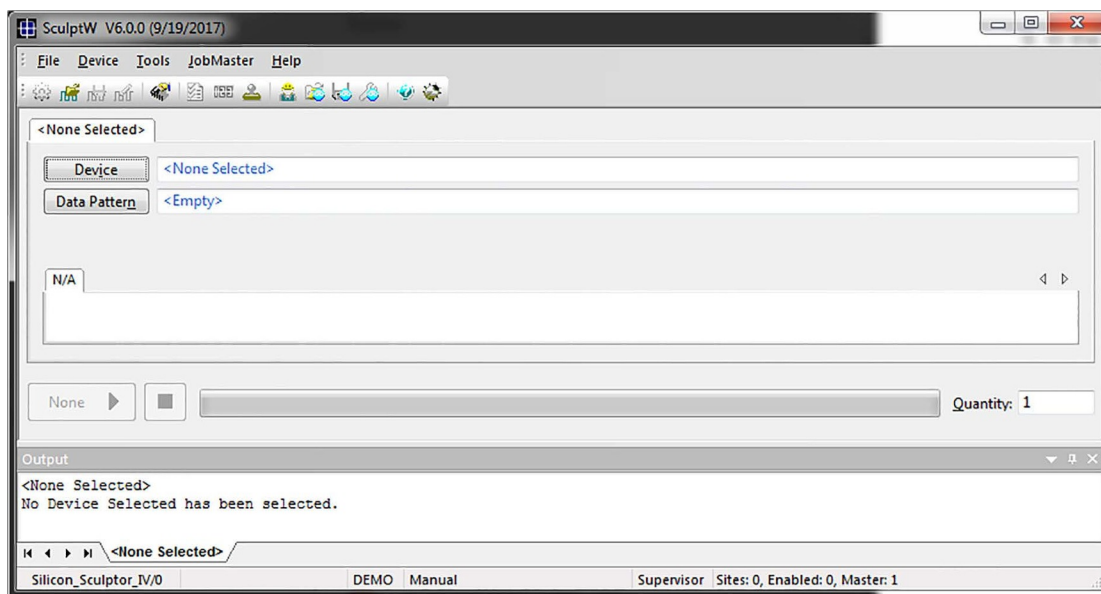
To program a device, follow these steps:

**Note:** Prior to handling ESD components, attach a grounding strap to your wrist and the antistatic connection on the side of the programmer.

- Click **Device**.

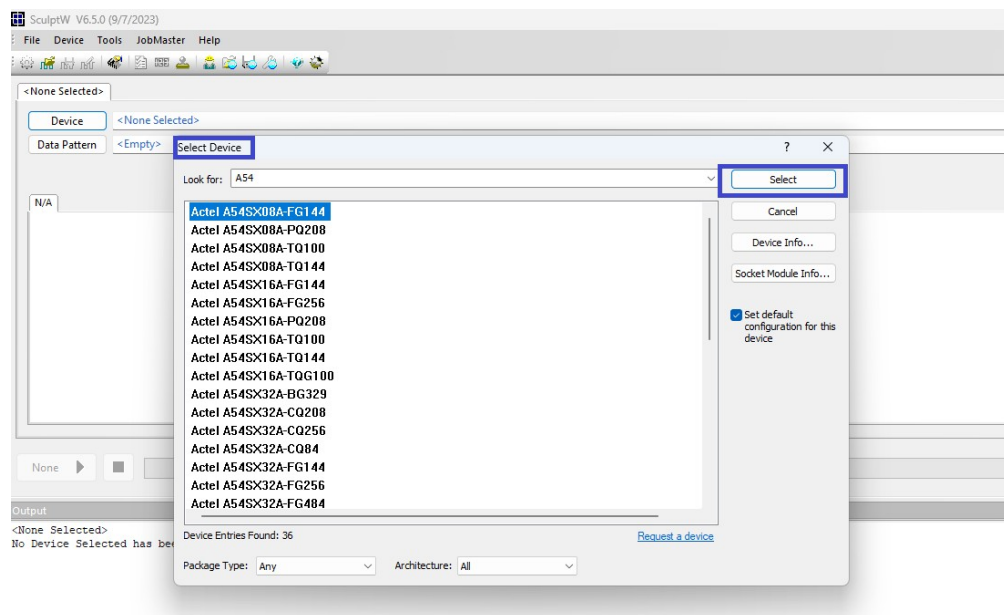


Figure 1-18. Device Selection Window



2. Select the intended device from the list.

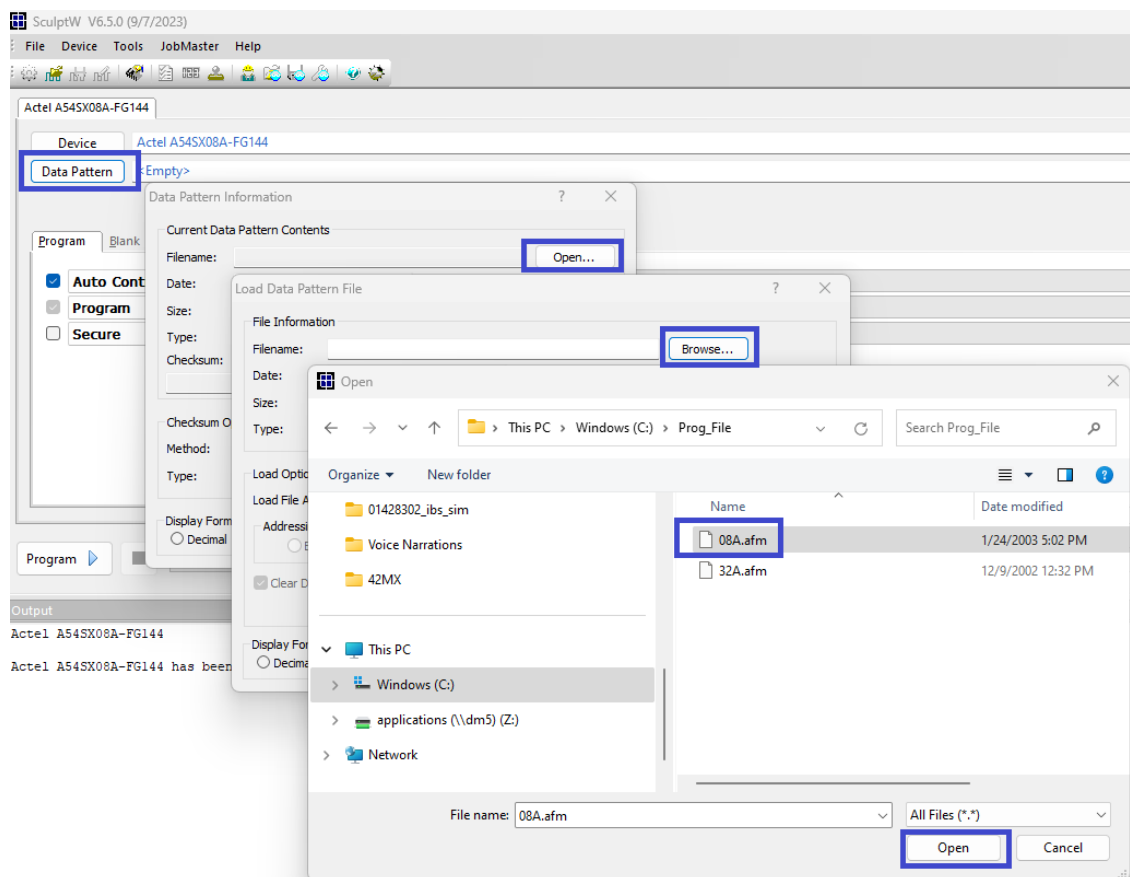
Figure 1-19. Device and Data Pattern (Programming File) Selection



3. Click **Data Pattern**.
  - a. To open a file, click **Open**.
  - b. To search a file, click **Browse**.
  - c. Select the file to load.
  - d. Select the appropriate settings.
  - e. Click **Open**.
  - f. Click **OK**.
  - g. Click **OK**.

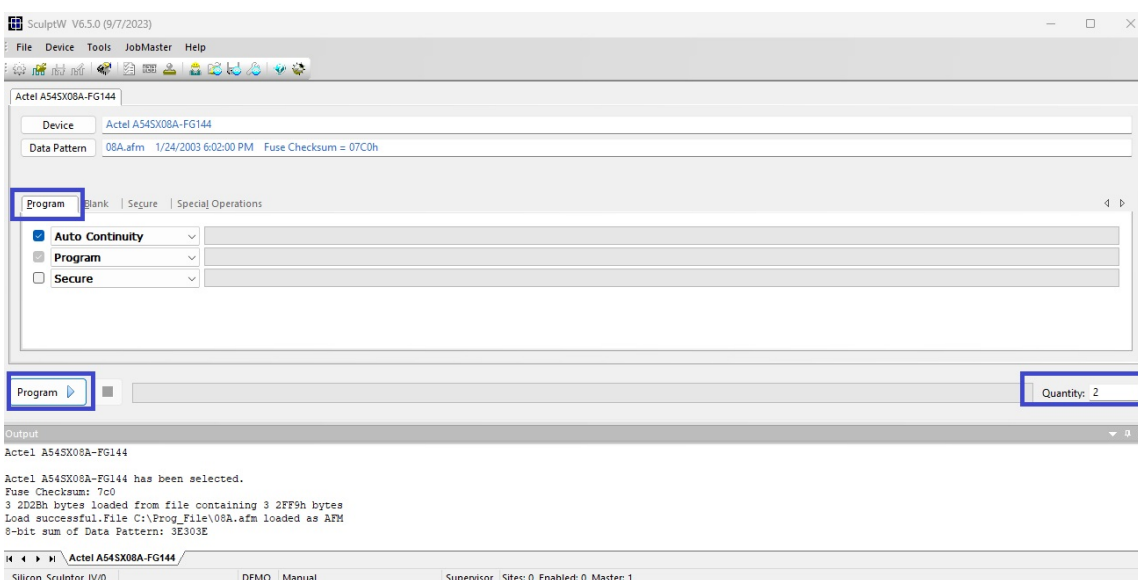


Figure 1-20. Loading Programming File



4. On the **Program** tab, select the appropriate settings for device operations.

Figure 1-21. Program Tab



5. On the **Quantity** field, select the number of devices to program.
  - a. Place the first device in the programming adapter module.
  - b. Click **Program**.

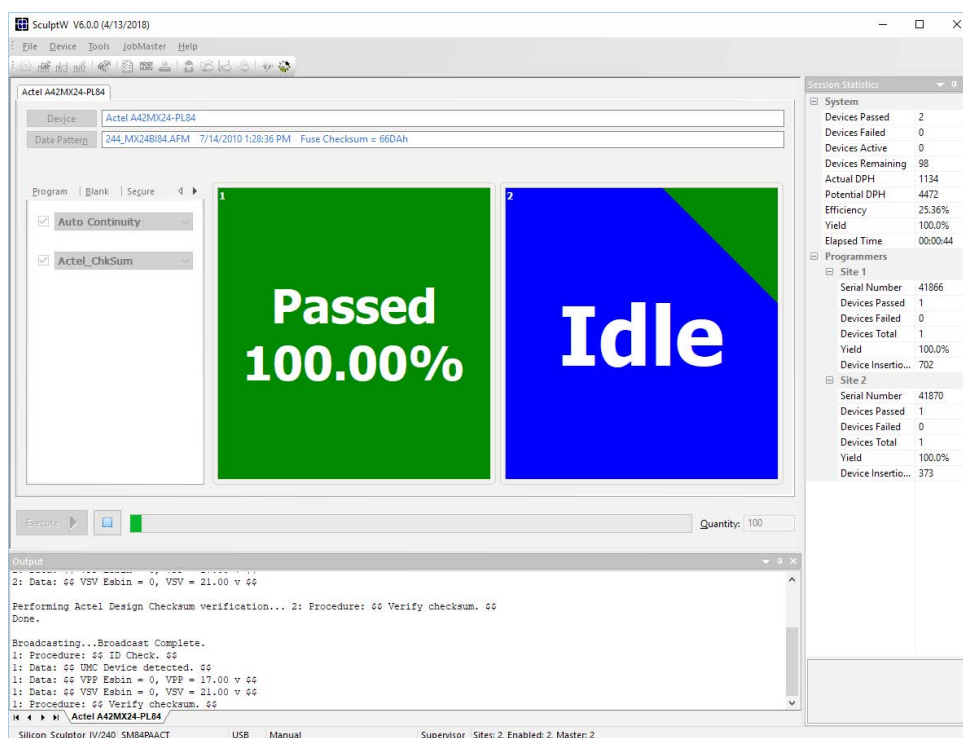
- c. If the quantity field is set greater than one, on the SS4 programmer, press the **START** push button.

**Figure 1-22.** START Push Button



6. After the green Pass or red Fail LED is lit, place another device (if the quantity field is greater than 1) in the programming adapter module.
  7. On the programmer, press the **START** push button.
- The following figure shows the output after programming the device.

**Figure 1-23.** Output—Programing Device



## 1.5. Handling Programming Failure

If there is any programming failure outside the guideline provided in [Programming and Functional Failure Guidelines User Guide](#), create a tech support case at [Microchip support](#) and attach the programming log (C:\BP\DATALOG) in the case.

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