High-Volume Flash Programming Guidelines

April 2005

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Introduction

These programming guidelines are for high-volume Flash programming customers and programming houses (PH). The intention is to set up a standard for volume programming.

1. Programmer Calibration

Keep a record of all programmers and set up the calibration schedule accordingly. To verify if a programmer is within calibration, refer to the *Silicon Sculptor Programmer Calibration Verification Procedure* located at http://www.actel.com/documents/SiliSculptProgCali_UG.pdf.

If you need a temporary replacement programmer while doing programmer calibration, contact your local Actel sales representative or distributor to acquire a loaner programmer.

NOTE: The loaner programmer is meant to be a temporary replacement. You should plan to complete your own programmer calibration within a month, the maximum loaner period allowed.

2. Insertion Limits

Every programming adaptor module/socket has a specified number of insertions. Socket manufacturers guaranty the correct functionality of their product under the specified insertion limits. To learn more about the insertion limitation of each adaptor type, refer to

http://www.actel.com/products/hardware/program_debug/ss/modules.aspxl.

Follow the insertion limits below and monitor all their adaptors. Once the limit is reached, replace the old adaptors with new ones.

To learn the current insertion time of the socket:

1. Insert the socket module on the programmer.
2. Select **Tools** (windows version) or **Info** (DOS version) in the Silicon Sculptor software.
3. Go to **SocketModCount**.
4. Select the programmer site. For Silicon Sculptor II (SSII), **1** is the only option available.
5. Click **Enter**, and the following two numbers appear:

    a. Total number of insertions on the socket module – This is the total number of device insertions on this adaptor module, including all sockets used in this module.

    b. Number of insertions since last reset –This number is the device insertion time for the current socket used in the adaptor module. It is meant to be reset when the actual socket on the module is changed. This number is critical and should be no more than the socket maximum allowable insertion limits.

3. Collection of Programming Statistics

To continuously improve programming procedures, Actel compiles and analyzes programming statics from both high-volume Flash programming customers and programming houses. For this reason, Actel requests that you maintain the following records so you can submit them to Actel on a quarterly basis:

- Device type (device name/package, date code, lot code)
- Programming quantity per month for the past quarter
- Failure rate for a particular device type in total for the past quarter
- Failure rate for a particular device type of a particular design for the past quarter

4. Programming Failure Diagnostic Requirements

- The programming log file records all activity in each programming session, including the error messages when there is a programming failure.
  - For 6X / Silicon Sculptor I / Silicon Sculptor II, the log file is located in **C:\BP\DATALOG**.
  - For FlashPro / FlashPro Lite, save the log file from the FlashPro software, **File** > **Save Log**.
- Programming failure checklist-Flash

5. Recommended Programming Flow and Failure Escalation

Flash devices are reprogrammable. Therefore, if there is a programming failure on the first trial at the your site, the following steps are recommended.

6X / Silicon Sculptor I / Silicon Sculptor II Non-In System Programming (ISP)

If you have a programming failure with performing non-ISP, follow the steps listed in Figure 1.
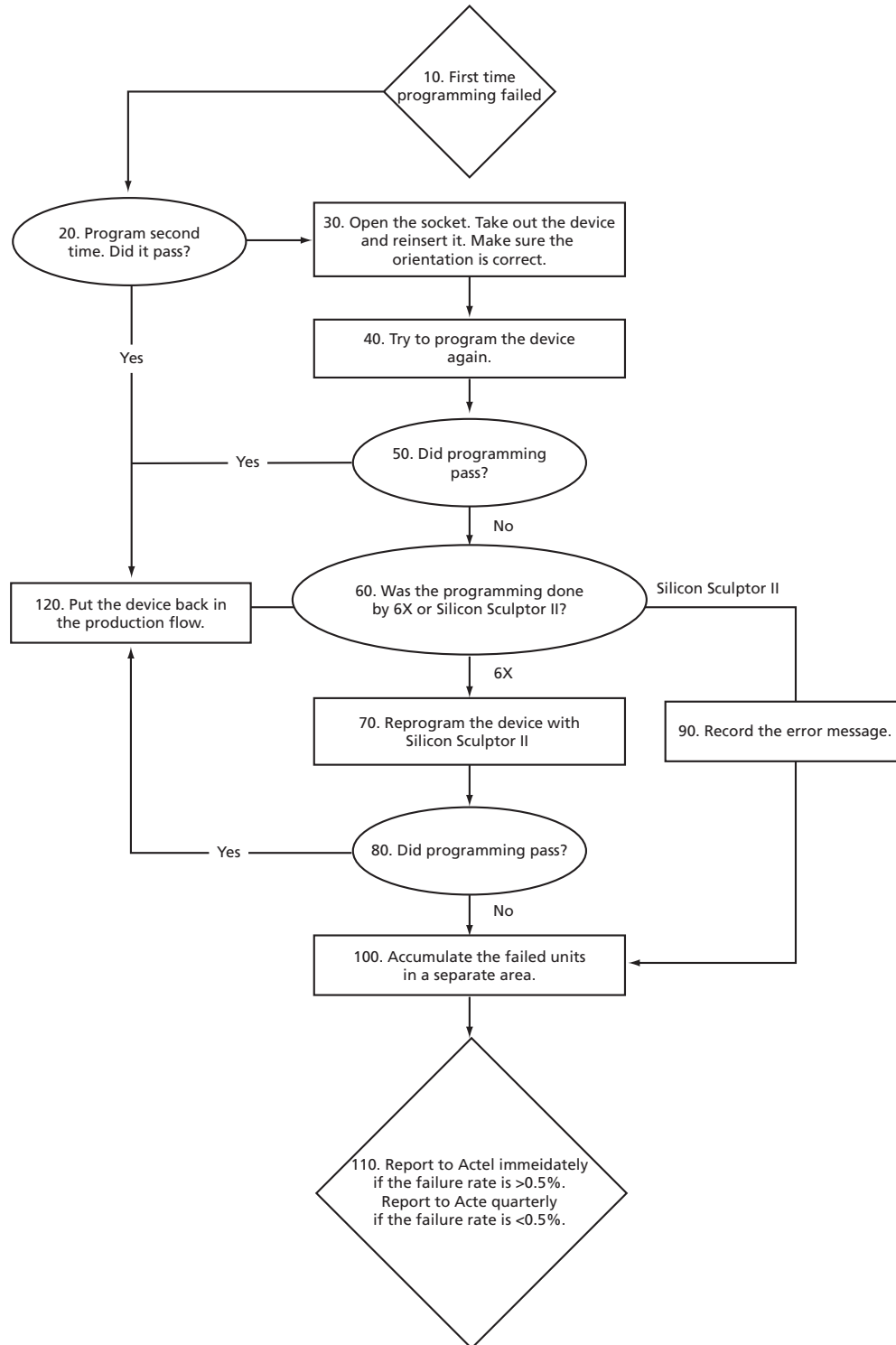
Figure 1: **Flash Device Multi-Step Programming Procedure and Failure Escalation**

FlashPro / FlashPro Lite / Silicon Sculptor II ISP

When a programming failure is experienced during ISP, Actel recommends program the device again. If the device continues to fail programming, then the error message and log file should be documented in addition to completing the checklist below.

Failure Mode

1. Did the programming failure occur during programming or verification?
2. Is the failure mechanism consistent during successive programming attempts?

Programming Setup

1. What kind of programming header is used on the target board?
   a. Actel recommended
   b. Customized
   c. No header is on the board; just vias are on the board.
2. What kind of programming cable is used?
   a. Actel recommended
   b. Customized cable
   c. Customized discrete flying wires
3. What is the length of the cable/flying wires?
4. Is there a header converter used in the setup?
   a. Actel recommended
   b. Customized
5. Are there bypass Caps on the target board for ProASIC$^{\underline{PLUS}}$ V_{PP} and V_{PN} pins?
   a. Type and size of Caps
   b. Distance from Caps to the V_{PP} and V_{PN} pins
6. If a header converter is used, are there bypass Caps on the header converter board for V_{PP} and V_{PN} connections?
7. Are there multiple USB devices, including the programmer connecting to the PC through the USB hub?
   a. What USB standard is used?
   b. What type of USB hub is used?
8. Keep at least two boards wit hthe failed units on them and wait for further instructions from Actel for additional analysis.

Report all programming failure issues for Actel devices to Actel Technical Support.

Actel Technical Support Hotline

Technical Support (800) 262-1060 International (650) 318-4460

Submit new cases to tech@actel.com.

For more information, visit our website at **www.actel.com**

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