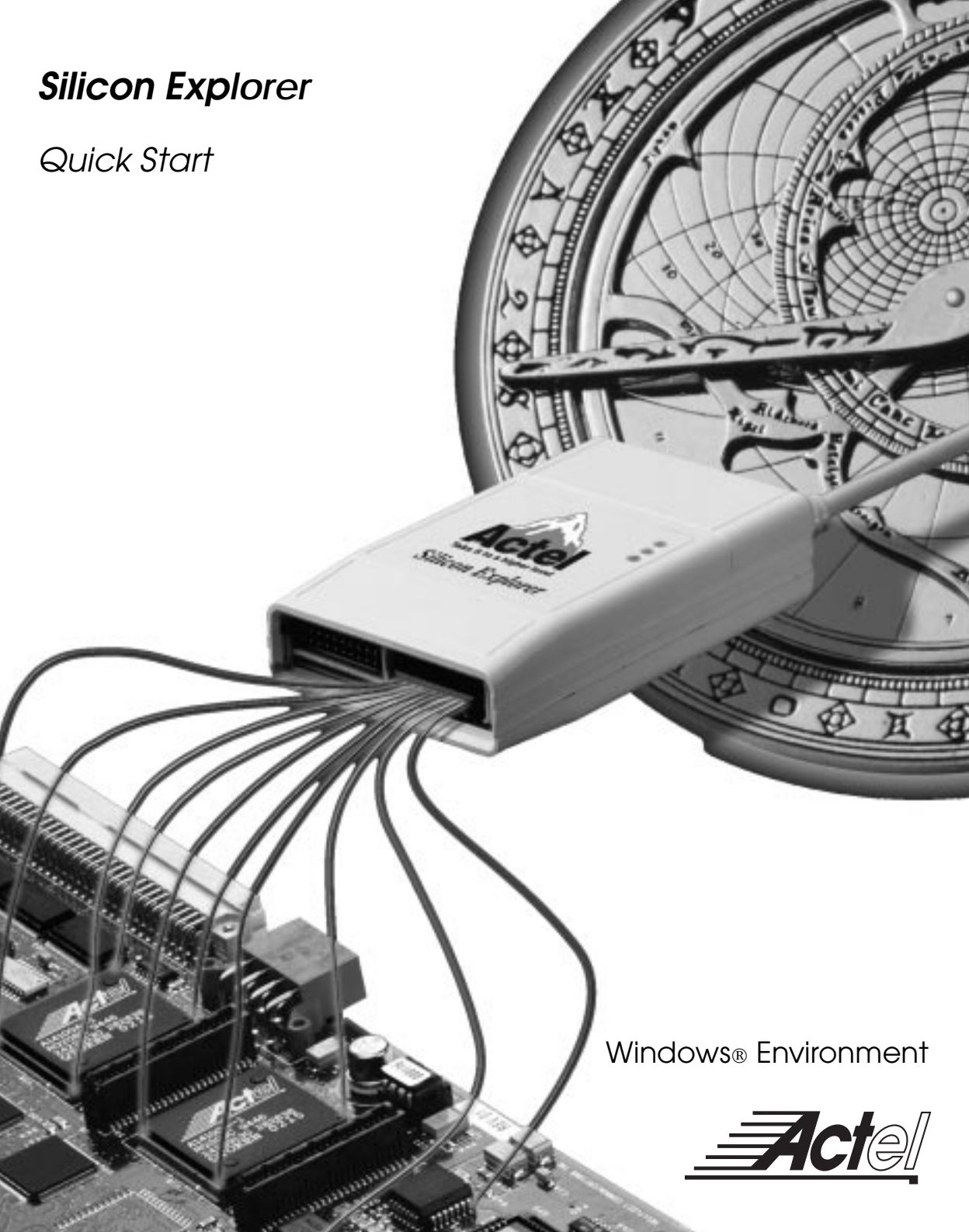


Silicon Explorer

Quick Start



Windows® Environment



Actel Corporation, Sunnyvale, CA 94086

© 1998 Actel Corporation. All rights reserved.

Printed in the United States of America

Part Number: 5199004-1

Release: October 1998

No part of this document may be copied or reproduced in any form or by any means without prior written consent of Actel. Actel makes no warranties with respect to this documentation and disclaims any implied warranties of merchantability or fitness for a particular purpose. Information in this document is subject to change without notice. Actel assumes no responsibility for any errors that may appear in this document. This document contains confidential proprietary information that is not to be disclosed to any unauthorized person without prior written consent of Actel Corporation.

Trademarks

Actel and the Actel logotype are registered trademarks of Actel Corporation.

Microsoft, Windows and Windows NT are trademarks or registered trademark of Microsoft Corporation.

All other products or brand names mentioned are trademarks or registered trademarks of their respective holders.

Table of Contents

Preface	v
Silicon Explorer Quick Start	1
Connecting to the PC	1
Software Settings	1
Connecting Power to the Target	2
Powering the Silicon Explorer	2
Current Consumption	2
Using an External Power Supply	3
Connecting the Probe Pilot to the FPGA	3
Connecting Signals to the Target for Logic Analysis	3
Connecting the Probe Leads	4
Using the Probe Instrument	4
Using the Timing Instrument	5
Troubleshooting FAQs	8
Diagnostic Self Test	10

Preface

This Quick Start manual describes the connections and use of the Silicon Explorer. A more detailed description can be found in the on-line help system.

The system requirements for Silicon Explorer and Silicon Explorer Lite are:

- Designer R3-1998 or later
- 486-66 microprocessor (minimum); Pentium-133 (recommended)
- Microsoft® Windows 95, 98 or NT™ 4.0

Silicon Explorer Quick Start

The Silicon Explorer is the integration of two debugging instruments into a single device that attaches to a PC's standard COM port. The Probe Instrument controls the ActionProbe circuitry, enabling the routing of two internal nodes dynamically to two dedicated pins of Actel devices. The Timing Instrument is an 18-channel logic analyzer that displays timing analysis of both the probe outputs, and up to 16 additional signals on the target system. Each instrument may be used separately.

Actel also offers the Silicon Explorer Lite, which only contains the Probe Instrument and relies on an external scope or logic analyzer for viewing signals.

Connecting to the PC

The Probe Pilot and Probe Pilot Lite connect to a standard serial port using either an 8250 or 16550 UART. Communication is established via the 9-Pin D-Sub connector.

Software Settings

On installation, Silicon Explorer is set to the Demo mode. You may select com1 through 4 by selecting the port from the acquisition menu. The software continuously polls the Probe Pilot for activity. Setting the port to the Demo mode prevents the application from opening any COM ports on your system.

The serial port information is saved in the analyze.ini file found in your Windows directory.

The software defaults to 115,200 baud — at this speed data transfer will be less than 15 seconds for the entire buffer.

Note: Many notebook computers share the external COM port with a built-in infrared (IR) port. You may have to enter your CMOS setup menu to enable the external COM port.

Connecting Power to the Target

The Silicon Explorer is shipped with a replaceable target cable assembly (TCA-8020A) that interfaces the Probe Pilot to your target system. Align the short red wire on the TCA-8020 with the red dot on the case and make certain that the 2mm header is fully inserted. The contacts on the TCA-8020 accept standard 0.025" round or square test accessories.

Powering the Silicon Explorer

The Probe Pilot is powered by the target running at 3.0VDC to 5.5VDC. When power is applied, the yellow "heart beat" LED on the Probe Pilot begins to blink.

The Silicon Explorer is designed to withstand the abuse normally found in a lab environment. However, long term exposure to out-of-range conditions can cause failure. In particular, long term connection to reverse- or over-voltage power conditions can cause thermal failure.

Current Consumption

The Probe Pilot is a CMOS device and exhibits very low current consumption at idle, that rises rapidly to several hundred milliamps during acquisition. If your power supply is unable to supply the necessary current, the Probe Pilot or your target may reset. Table 1 is a guide to typical current consumption based on an acquisition rate at 5V — current will be proportionately higher at 3V.

Table 1. Typical Current Consumption

Acquisition Rate	Current@5V	
IDLE	75ma	Probe Pilot Lite
10MHz	300ma	Probe Pilot
20MHz	400ma	
50MHz	500ma	
100MHz	700ma	

Using an External Power Supply

For those targets that lack the additional current reserves to power the Probe Pilot, an external supply may be connected as follows:

- 1. Connect the Probe Pilot ground and the power supply ground to the target.**
- 2. Connect the 5V lead of the supply to the 5V lead of the Probe Pilot.**

Connecting the Probe Pilot to the FPGA

The Probe Pilot has a 22-pin (18 channels, a clock, VCC, GND, and clock GND) and a 16-pin connector for FPGA debug, using Actel's Action Probe circuitry. The Probe Pilot Lite only has the 16-pin connector.

Connecting Signals to the Target for Logic Analysis

Note: This section does not apply to Silicon Explorer Lite.

Connect any of the Probe Pilot's 18 channel leads to the desired target signals using standard test accessories. To sample synchronously, connect the CLKIN lead to the target's clock which must be a continuous signal. If the clock is greater than 20MHz, connect the CLK GND (twisted pair) to a ground point near the CLK lead.

Connecting the Probe Leads

You can connect the probe leads by attaching one of two supplied cable assemblies.

One cable assembly terminates in individual 0.025 receptacles that can connect to 0.025 headers or micro-clips according to the labels on the wires — the other assembly interfaces directly to the target board when a 16-pin header is installed on the target according to the pin-out shown in Figure 1.

The Probe A and B pins on the probe connector may be selected as the source for logic analyzer channels 1 and 2 respectively, by clicking on the # field in the waveform window and selecting PRA or PRB as the source. Selecting the probe pins as the source disables the CH1 and/or CH2 inputs from the target cable assembly.

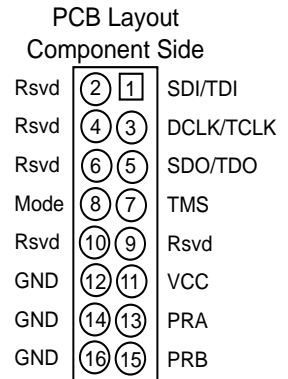


Figure 1. Pinouts

Using the Probe Instrument

The following procedures describe how to use the Probe Instrument.

To open a Probe file:

- 1. Launch The Silicon Explorer software.** Select Silicon Explorer from the Designer menu under Programs in the Start menu.
- 2. Select a Probe (.prb) file to open.** Select the Open command from the File menu. Choose (*.prb) as the Files of type and double click the desired probe file.

The Probe Instrument uses a .prb file during analysis, which is exported from the Designer software. This file contains device information, net names, and node location information. This information is displayed in a tree structure for verification by the user on the left side of the Analyze window after a Probe file is opened.

Once a Probe file is open and a device connection has been made, the checksum of the target device is read and compared to the checksum in the Probe file. If the checksums do not match, probing is disabled and an error message is displayed. Table 2 lists and explains the error messages.

Table 2. Checksum Error Messages

Error Message	Explanation
Checksum: 383A v.s. ????	The checksum cannot be read because the probe is not connected or not powered.
Checksum: 383A v.s. 0000	The checksum does not match the file.

To probe a node:

- Select the node from the tree by clicking the node name.**
- Click the PRA or PRB button.** The selected node is routed to the probe pin and the corresponding analyzer input is switched to the debug connector. The net name is also displayed in the waveform window.

Using the Timing Instrument

Note: This section does not apply to Silicon Explorer Lite.

Select Silicon Explorer from the Designer menu under Programs in the Start menu and check the status in the lower right corner of the display. If the COM port is properly selected and power has been applied, then the status will read IDLE. The Timing Instrument captures 64K samples which are then uploaded to the host over the serial port.

Acquisition parameters may be set from either the tool bar or the pull-down menus. The parameters are shown in Table 3.

Table 3. Acquisition Parameters

Acquisition Speed	10Khz to 100MHz asynchronous or synchronous to 66MHz
Trigger Position	4K Pre Trigger 60K Post Trigger 32K Pre Trigger 32K Post Trigger 60K Pre Trigger 4K Post Trigger
Trigger Pattern	Left click on individual signals in the T column to specify don't care, low, high, rising, falling or either edge. The trigger pattern is the logical AND of the 18 patterns.

Once the acquisition parameters are set, click the Run button (red triangle) in the upper left to begin acquisition. At this point the analyzer will begin capturing data and after the initial 64K samples are acquired, sampling will continue until either the trigger pattern is recognized or the stop button (black square) is pressed (see Figure 2).

During this period, the status window displays PRE for the pre-trigger state (although you may not see it if the trigger pattern is matched quickly).

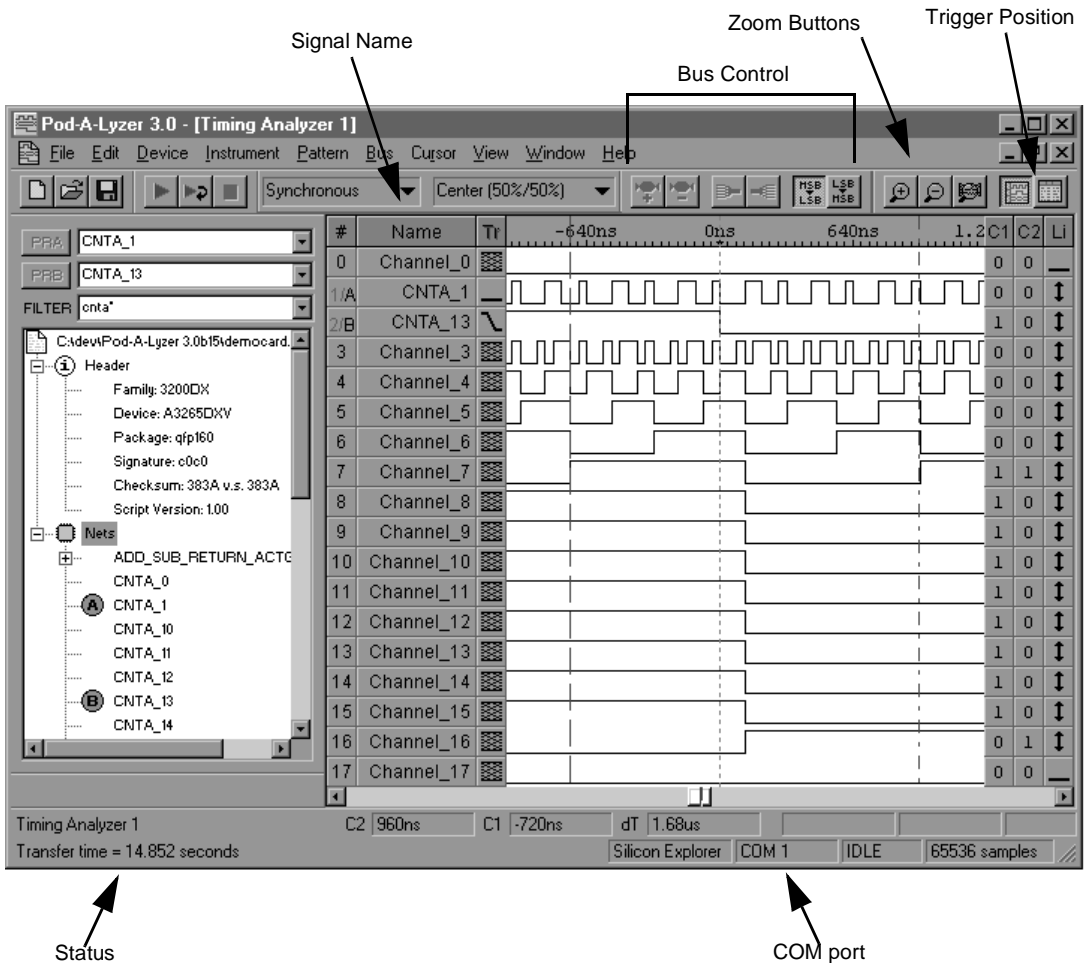


Figure 2. Silicon Explorer Window

Next, the POST state will be entered and data after the trigger pattern (or stop button) will be sampled until the post trigger requirement is fulfilled. Then the data are uploaded to the host (READ State with progress indicator). The entire upload process takes less than 15 seconds, although you may zoom in and view data immediately as the buffer is uploaded as a background task.

At this point the data may be viewed. Panning and zooming are available from either the scroll bars, tool bar, or keyboard control. In addition, dragging a box in the display area will perform a zoom window. Table 4 lists keyboard equivalents.

Table 4. Keyboard Equivalents

Key	Function
Up Arrow	Zoom In 2X
Down Arrow	Zoom Out 2X
Left Arrow	Scroll Earlier (Data moves Right)
Right Arrow	Scroll Later (Data moves Left)
Page Up	Jump One Screen Earlier
Page Down	Jump One Screen Later
Home	Jump to Trigger

Cursors are placed by left-clicking or right-clicking in the display area. The time is displayed below the channel labels while the value is displayed in the C1 and C2 columns. The L or “Live” Column indicates the current state of the 18 channels when the analyzer is in IDLE.

The Timing Instrument offers many convenient features for viewing, saving and printing data. More detailed information is available from the on-line help system.

Troubleshooting FAQs

Q1: I've connected Probe Pilot and the Silicon Explorer window display reads N/C?

A: Look on the top of the Probe Pilot for the flashing yellow “heartbeat,” if it isn't flashing then make sure you have properly connected an adequate power supply.

Q2: It's flashing but still N/C!

A: There are a number of things that can prevent communication from being established. The following lists the most common:

1. Wrong COM port. Try all four COM ports even though you're sure that your mouse is on COM 1.
2. No power to the Probe Pilot (see Q1).
3. Desktop Systems External connector not connected to the COM port internally.
4. Laptop Systems external COM connector disabled (Ir Port Override?). Use your PC's CMOS setup program to enable the COM port.
5. COM port IRQ reassigned for DOS program, control panel not updated.
6. Multiple mouse drivers in system.ini.
7. Third-party serial port "enhancers" not conforming to windows API.

Q3: I've got the IDLE message but when I click on Run, the Silicon Explorer window flashes an error message and returns to IDLE.

A: If the target power is incapable of supplying the necessary current, then the Silicon Explorer window resets and returns to IDLE. Many current-limiting supplies will trip when set too close to the operating current.

Q4: The Timing Instrument acquires data and then indicates errors on read-back?

A: The Timing Instrument bursts data back in blocks at high speeds, with built-in retry for a bad block (both checksum and byte count are used). Some third-party serial programs block all interrupts forcing the analyzer into a retry loop.

Some laptops power down the UART and drop a few characters. Try disabling "Power Saving" in the CMOS setup menu.

Q5: When the Silicon Explorer window is open, my other Windows programs run slow?

- A: If the Silicon Explorer window is open but it is not connected or powered up, then the system is constantly timing out looking for a response. Either close the Silicon Explorer window or change the COM port to DEMO.

Diagnostic Self Test

The Silicon Explorer includes a test header for the Probe Pilot to perform functional tests of the I/O drivers. If you suspect that your Probe Pilot has a failed I/O driver, then you can perform the following test.

- 1. Connect the supplied ribbon cable from the Probe Pilot, or Probe Pilot Lite, to the test header and apply power to the terminals on the test header** (Red is positive — Black is negative).
- 2. Disconnect the target cable assembly and snap the 2mm header into the end of the Probe Pilot, observing polarity** (not applicable on Probe Pilot Lite).
- 3. For both Silicon Explorer and Silicon Explorer Lite: From the Analyze window, with the status IDLE, select the Self-Test command from the Help menu to perform testing on the Probe Pilot port.**
- 4. For Silicon Explorer Lite: From the Explore window select the Self-Test command from the Help menu to perform testing on the Probe Pilot port.**



Actel Corporation
955 East Arques Avenue
Sunnyvale, CA USA 94086

U.S. Toll Free Line	888.99.ACTEL
Customer Service:	408.739.1010
Customer Service FAX:	408.522.8044
Action Facts Technical Documents:	800.262.1062
Customer Applications Center:	800.262.1060
Customer Applications FAX:	408.739.1540

Actel Europe Ltd.

Daneshill House
Lutyens Close, Lychpit
Basingstoke
Hampshire RG24 8AG
United Kingdom
Tel: +44(0) 1256.305600
Fax: +44(0) 1256.355420

Actel Japan

EXOS Ebisu Bldg. 4F
1-24-14 Ebisu Shibuya-ku
Toyko 150, Japan
Tel: +81.(0)3.3445.7671
Fax: +81.(0)3.3445.7668



5199004-1