

Printable Help Document



Protocol Trigger and Decode Application

077-0025-00

Adapted from Online Help, version 3.0.0

Copyright © Tektronix. All rights reserved. Licensed software products are owned by Tektronix or its suppliers and are protected by United States copyright laws and international treaty provisions.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supercedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Protocol Trigger and Decode Application Online Help, 077-0025-00, Version 3.0.0

Contacting Tektronix

Tektronix, Inc.

14200 SW Karl Braun Drive or P.O. Box 500

Beaverton, OR 97077 USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Table of Contents

| | |
|--|-----------|
| General Safety Summary | iii |
| Introduction to the PTD Application | v |
| Related Documentation..... | v |
| Application CD Contents..... | v |
| Access to PDF Files..... | vi |
| Conventions | vi |
| Feedback..... | vii |
| Getting Started..... | 1 |
| Protocol Trigger and Decode Control Window | 1 |
| Basic Operation | 3 |
| Application Controls..... | 3 |
| Symbolic Window Controls..... | 4 |
| Waveform Window Controls..... | 5 |
| Trigger Setup Controls | 5 |
| Character Entry Dialog Box | 7 |
| How To? | 9 |
| Synchronize Data in the Symbolic and Waveform Windows..... | 9 |
| Synchronize Data with the Host Oscilloscope..... | 10 |
| Define Your Own Standard | 10 |
| Show and Hide Windows | 11 |
| Change the Window Size..... | 11 |
| Index..... | 13 |

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury:

Connect and Disconnect Properly: Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Observe All Terminal Ratings: To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do Not Operate With Suspected Failures: If you suspect there is damage to this product, have it inspected by qualified service personnel.

Symbols and Terms: The following terms and symbols may appear in the online help.



WARNING. *Warning statements identify conditions or practices that could result injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product: The following terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product: The following symbol(s) may appear in the product:



CAUTION

Refer to Help

Introduction to the PTD Application

The Protocol Trigger and Decode (PTD) application enables you to decode and simultaneously display protocol-level information and physical layer signaling.

The PTD application includes the following features:

- Simultaneously view signal, characters, and protocol
- Decode 8b/10b encoded serial data
- Correlate events across physical and link layers
- Synchronize your oscilloscope and protocol views

Related Documentation

Refer to the *Optional Applications Software on Windows-Based Oscilloscope Installation Manual* for the following information:

- Software warranty
- List of all available applications, compatible oscilloscopes, and relevant software and firmware version numbers
- Applying a new label
- Installing an application
- Enabling an application
- Downloading updates from the Tektronix Web site

Note: You can view PDF file of the installation manual from the CD Installation Browser and from the Documents directory on the Optional Applications Software on a Windows-Based Oscilloscope CD-ROM.

Application CD Contents

The *Optional Applications Software on a Windows Based Oscilloscope CD-ROM* includes files for the following types of documentation:

- Printable file of the RT-Eye Serial Data Compliance and Analysis online help
- Printable file of the Protocol Trigger and Decode Tool online help
- PDF files of the Methods of Implementation (MOI) for the InfiniBand, PCI Express, and FB-DIMM serial data standards as they apply to the corresponding compliance modules
- Reference guides
- Optional Applications Installation manual

Access to PDF Files

You can use any of the following methods to view the various PDF files associated with this application:

- Access a file in the Documents directory on the Applications CD from any PC
- Select a file from the Start menu in the oscilloscope task bar; you may need to first minimize the application
- Access a file from the Help drop-down list in the PTD application

Conventions

Online help topics use the following conventions:

- The term "click" is used to indicate choosing an option either with a mouse or by tapping as you would with a Touch Screen
- The term "Compliance Module" refers to optional "plug-in applications" from Tektronix used for compliance testing to specific serial data standards
- The term "channel" is context dependent. It can refer to the transmit channel of the device under test or to an oscilloscope channel
- The term "DUT" is an abbreviation for Device Under Test
- When steps require a sequence of selections using the application interface, the ">" delimiter marks each transition between a menu and an option. For example, one of the steps to recall a setup file would appear as File> Recall

Feedback

Tektronix values your feedback on our products. To help us serve you better, please send us suggestions, ideas, or other comments you may have about your application or oscilloscope.

You can email your feedback to techsupport@tektronix.com, FAX at (503) 627-5695, or by phone. Please be as specific as possible and include the following information:

General Information

- Oscilloscope model number and hardware options, if any
- Probes used
- Serial data standard
- Signaling rate
- Your name, company, mailing address, phone number, FAX number

Note: Please indicate if you would like to be contacted by Tektronix regarding your suggestion or comments.

Application Specific Information

- Software version number
- Description of the problem such that technical support can duplicate the problem
- If possible, save the oscilloscope waveform file as a .wfm file
- If possible, save the oscilloscope and application setup files from the application to obtain both the oscilloscope .set file and the application .ini file. Refer to Saving a Setup File

Once you have gathered this information, you can contact technical support by phone or through e-mail. If using e-mail, be sure to enter "TDSJIT3 v2 Problem" in the subject line, and attach the .set, .ini, and .wfm files.

Note: To include screen shots, from the oscilloscope menu bar, select File > Export. In the Export dialog box, enter a file name with a .bmp extension and select Save. The file is saved in the C:\TekScope\Images directory. You can then attach the file to your email (depending on the capabilities of your email editor).

Getting Started

Protocol Trigger and Decode Control Window

The Protocol Trigger and Decode control window consists of three windows, which you can show or hide from view. Use the Display Window drop-down list in the application window to select which windows to show and which ones to hide from view.

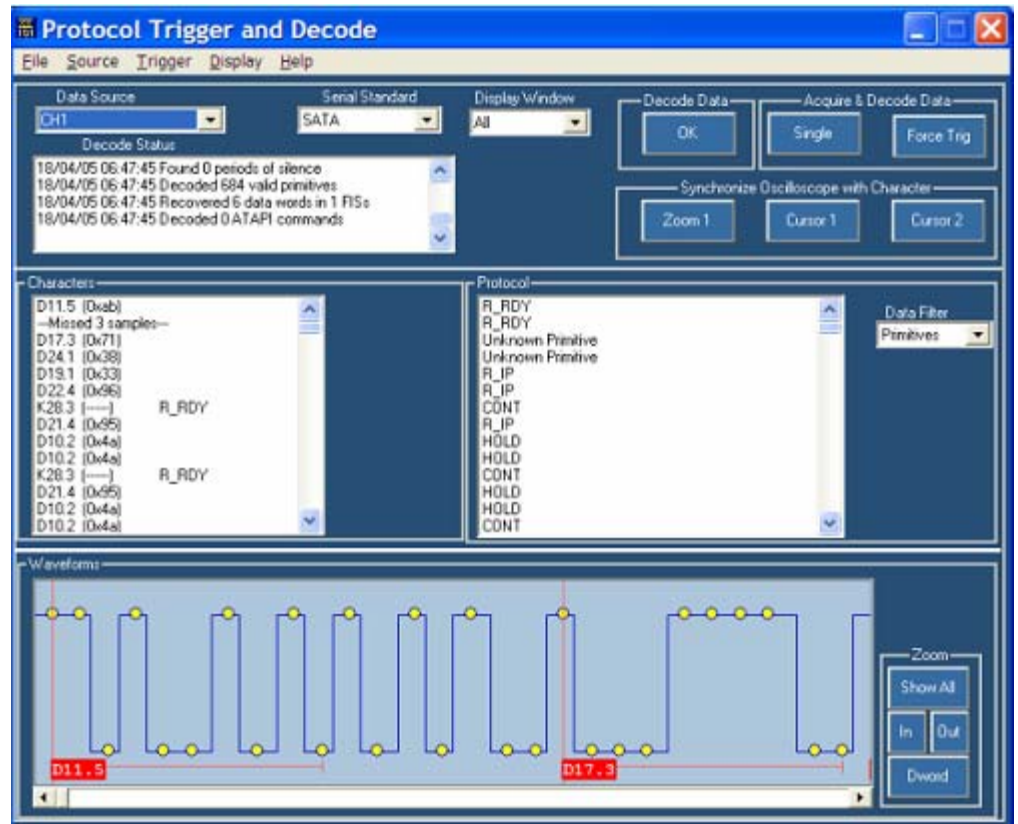


Figure 1: Protocol Trigger and Decode control window

The application window includes:

- Controls for selecting data sources and serial standards
- Controls for the type of information displayed
- Controls for oscilloscope acquisitions
- Controls for synchronization
- Status readout of the decode process

The symbolic window includes:

- Character and protocol displays
- Controls for configuring information display

The waveform window includes:

- Waveform display
- Horizontal zoom controls

Basic Operation

Application Controls

The application window includes controls for selecting data sources and serial standards, the type of information displayed, and oscilloscope acquisitions and synchronization.

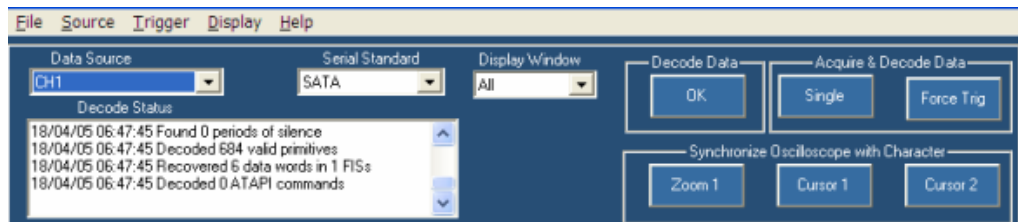


Figure 2: Application view

Use the **Data Source** drop-down list to select your data source. Data sources can be Channels 1-4, or Ref 1-4. Selecting File allows you to browse for waveforms stored in .wfm format.

The **Decode Status** is a scrolling area that displays information about the decoding process.

Use the **Serial Standard** drop-down list to select the serial standard that you want to use in your analysis. You can select PCI Express, SATA, or a user-defined standard. The standard that you select will also determine what appears in the Character and Protocol displays.

Use the **Display Window** drop-down list to display or hide the Waveform and Symbolic windows. Select All from the list to display both the Waveform and Symbolic windows.

Click the **Decode Data** button to analyze the data that is currently selected in the Data Source drop-down list.

If you need to acquire data, click the **Single** button. This button works similarly to the Single button on the front panel of an oscilloscope. Clicking the Single button in the application starts an acquisition, analyzes the acquired data, and then updates the display windows. Use the **Force Trig** button if you need to simulate a trigger event to complete the acquisition. After the acquisition is complete, the application analyzes the acquired data and updates the display windows.

To synchronize the host oscilloscope with the data that is displayed by the application, use the buttons under Synchronize Oscilloscope with Character. If you want to see the same area on your oscilloscope that is displayed in the Waveform window of the PTD application, click **Zoom 1**. The oscilloscope will zoom in on the portion of the waveform that you have displayed in the PTD application.

To synchronize the host oscilloscope using cursors, be sure that you have cursors turned on and set to V-bars on the host instrument. Select a line in either the Character or Protocol display, and then click **Cursor 1**. The position of Cursor 1 on the oscilloscope will be updated to match the selection in the PTD application.

Symbolic Window Controls

The symbolic window controls character and word displays as well as configuring information displays.

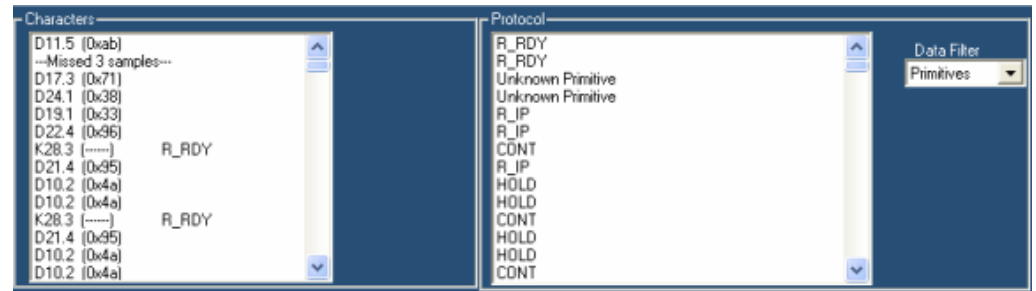


Figure 3: Symbolic window control

Use the **Data Filter** drop-down list to select the level of abstraction that you want in the Protocol display.

The Data Filter drop-down list contains the following choices:

- Primitives—Dwords (four-character sequences) beginning with a control character
- FIS—Frame Information Structure, disassembly includes frame header information
- ATAPI—AT Attachment Packet Interface

Note: The protocol window will be blank if you select FIS or ATAPI with standards other than SATA. Only SATA contains FIS and ATAPI.

Waveform Window Controls

The waveform window displays the waveform and annotations and allows you to zoom on a displayed waveform.

To display the entire waveform, click the **Show All** button. To magnify the waveform horizontally, click the **In** button. To reduce the waveform, click the **Out** button. Click the **Dword** button to set the waveform window to contain four 10b symbols of data.



Figure 4: Waveform window controls

Trigger Setup Controls

Use the Trigger Setup control window to set up direct hardware triggering on 8b/10b characters and words. This enables you to fill the memory of the instrument with an event of interest rather than taking a random snapshot. Serial protocol triggering allows you to isolate a variety of link layer control sequences, or faults. To open this control window, go to the PTD Trigger menu and select Setup.



Figure 5: Trigger Setup control window

Use the **Trigger On** drop-down list to select different serial trigger types: 8b/10b Word, 8b/10b Character, 8b/10b Code Error, or Bit Pattern. Selecting 8b/10b Word allows you to specify a four-character sequence of 8b/10b-coded characters to trigger on. This can be either from a list of predefined words or as individual characters. To select predefined primitives, select Word from the Edit group box, and then use the 8b/10b Word drop-down list to select the word. The standard determines which predefined words are available in the list.

To select individual characters, you must choose Character from the Edit group box. The Character 1-4 buttons display the value for the currently selected word. You can change the character values by clicking a Character button.

Select 8b/10b Character from the Trigger On drop-down list to trigger on only one character. Selecting Specific Character from the Edit group box allows you to trigger on one specific character. Click the Character button to change the character value that you want to trigger on. Selecting Any Valid Control Character allows you to trigger on the first valid control character found.



Figure 6: Trigger Setup with Code Error selected

By default, the trigger system is loaded with patterns for both positive and negative running disparity. You can use the Pattern drop-down list to select only characters that arrive after a positive or a negative running disparity. Note that the Trigger Patterns reflect your selection in the Pattern drop-down list.

To trigger on a code error select 8b/10b Code Error from the Trigger On drop-down-list, and then select the type of errors that you want to trigger on. You can select any combination of errors from the list.

To trigger on a specific bit pattern, select Bit Pattern from the Trigger On drop-down list, and then select either Binary or Hex from the Format drop-down list. Enter the bit pattern, and then click Apply.

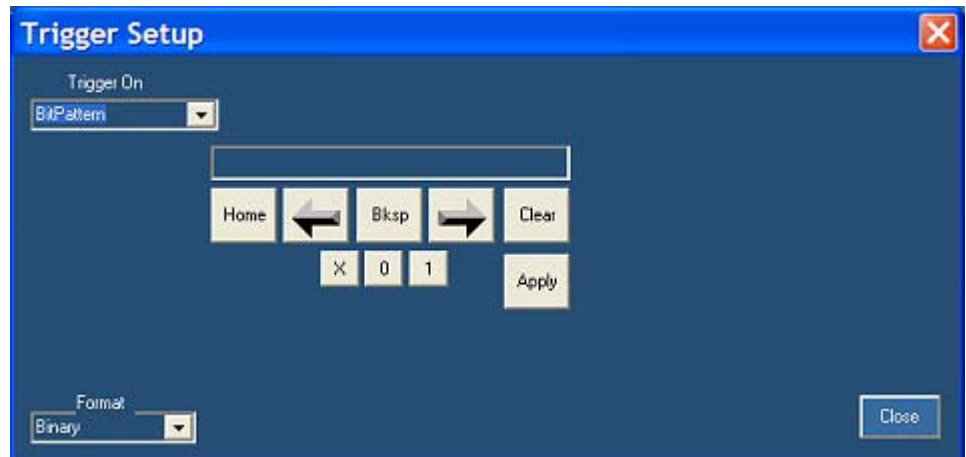


Figure 7: Trigger Setup with Binary Bit Pattern selected

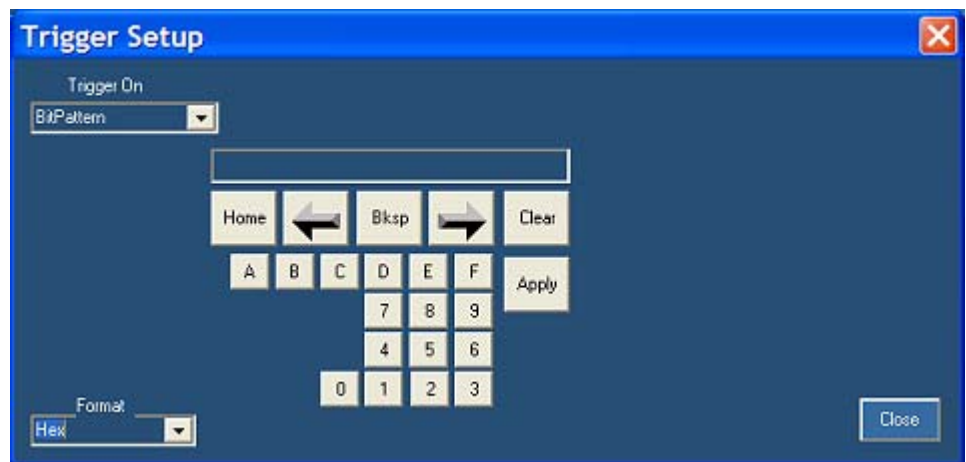


Figure 8: Trigger Setup with Hex Bit Pattern selected

Character Entry Dialog Box

Use the Character Entry dialog box to modify or change the characters that you want to trigger on. To access this dialog box, click a Character button in the Trigger Setup control window.

Select either Character or Hex Data Format. In Character format, click either K or D, and then enter the decimal values for the character. If you entered a K-character, its symbolic name is shown in the Value/Name field. If you entered a D-character, its hexadecimal value is shown in the Value/Name field. You can also click a Control Symbol button, and the Character field will show the value of that control symbol.



Figure 9: Character Entry dialog box

In Hex Data format, enter the Hex Data Byte using the keypad. The corresponding code value is shown in the Character field. You can also click a Control Symbol button, and the Character field will show the value of that control symbol. The Value/Name field displays the 8b/10b character equivalent.

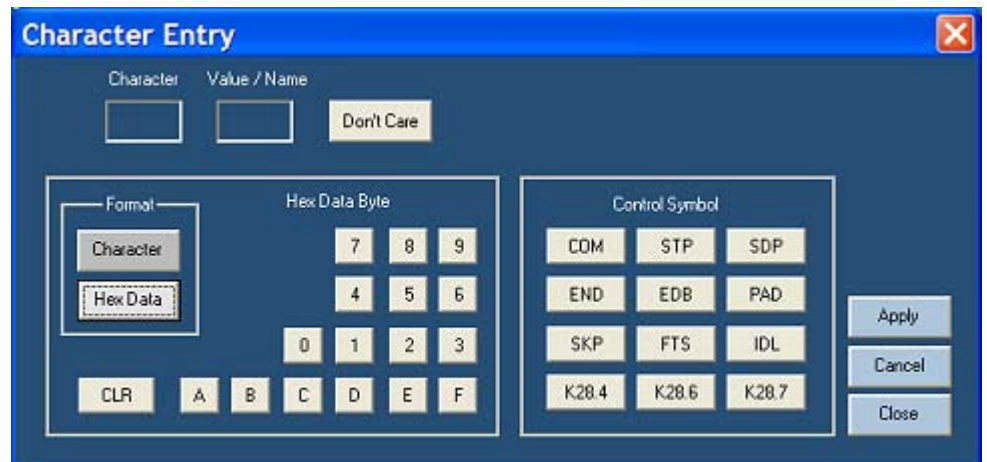


Figure 10: Character Entry dialog box when Hex Data format selected

How To?

Synchronize Data in the Symbolic and Waveform Windows

When you click any word in the Protocol field, the Waveform displays the beginning of that sequence, starting at the left. The corresponding character in the Character field is highlighted.

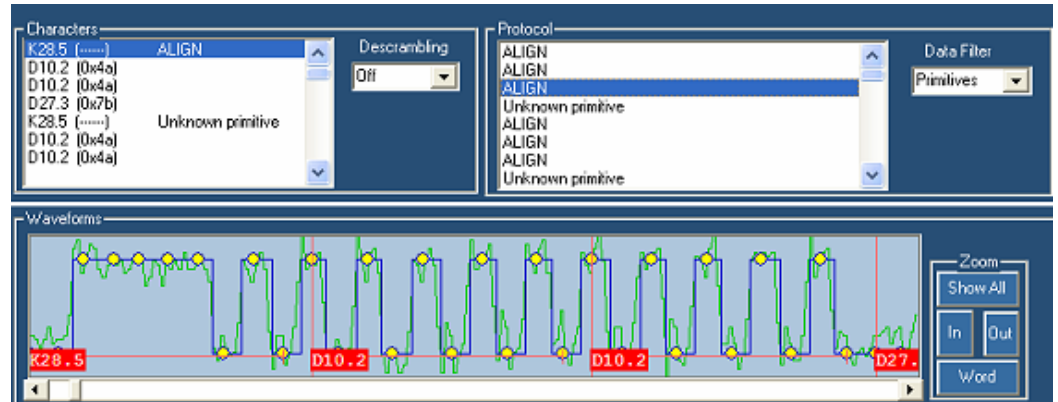


Figure 11: Waveform with character in the character field highlighted

When you click any character in the character field, the Waveform displays the beginning of that sequence, starting at the left. The word in the Protocol field will be highlighted.

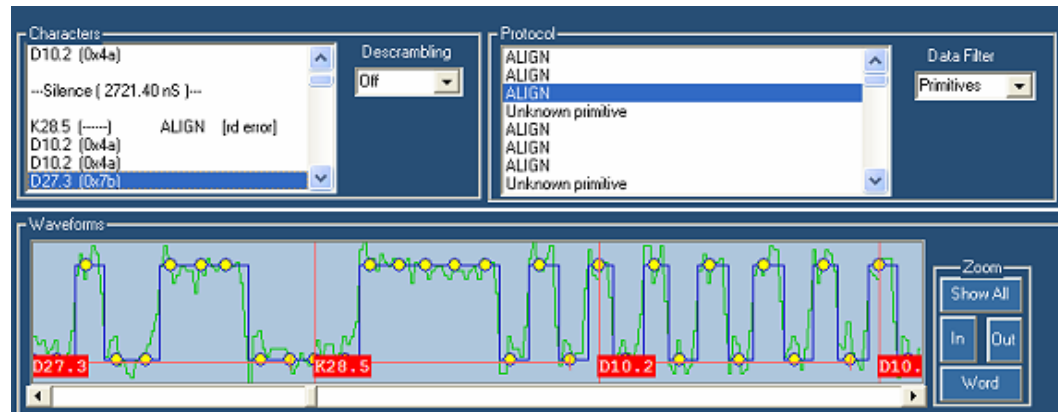


Figure 12: Waveform with word in the protocol field highlighted

Synchronize Data with the Host Oscilloscope

To synchronize a zoom window on the host oscilloscope with the data that is displayed by the PTD application, do the following:

Click **Zoom 1** under **Synchronize Oscilloscope with Character**. The oscilloscope **Zoom 1** display changes to match the area of the waveform that you have displayed in the PTD application.

To synchronize cursors in the host oscilloscope with the data that is displayed by the PTD application, do the following:

1. From the protocol window in PTD, click a character or primitive.
2. From the application window in PTD, click **Cursor 1** or **Cursor 2**. The corresponding cursor in the host oscilloscope moves to the same location.

Define Your Own Standard

To define your own standard, do the following:

1. Open the User file located in `C:\TekApplications\TSDPTD\Macros`.
2. Use Microsoft Excel or a similar application to edit the file. The file is in .CSV format.
3. Select **Save As** from the File menu and type in a unique name in the File name text box.
4. Select **.CSV** format from the Save as type drop-down list.

Your file will appear in the **Standard** drop-down list in the PTD application.

Show and Hide Windows

To show or hide windows, do the following:

1. Click the Display Window drop-down list.
2. Select the window(s) that you want to show.
 - **All** displays both the Symbolic and Waveform windows
 - **Symbolic** displays the Symbolic window but hides the Waveform window
 - **Waveform** displays the Waveform window but hides the Symbolic window
 - **None** hides both the Symbolic and Waveform windows

Change the Window Size

To change the size of the symbolic window or the waveform window, do the following:

1. Click the white line that separates the window from other windows. The white line will change color.
2. Drag the line either up or down.

Index

A

| | |
|-------------------------------------|----|
| Access to PDF Files | vi |
| Acquire data | 3 |
| Application | v |
| CD Contents | v |
| Starting from an Oscilloscope | 4 |
| Application Controls | 3 |
| Application window | 11 |

B

| | |
|-------------------|---|
| Bit pattern | 5 |
|-------------------|---|

C

| | |
|----------------------------------|---|
| CD contents | v |
| Character | 6 |
| Character Entry Dialog Box | 7 |
| Character format | 7 |
| Code error | 6 |

D

| | |
|----------------------------|-------|
| Data source | 3 |
| Data synchronized | 9, 10 |
| with host instrument | 10 |
| Decode status | 3 |
| Define standard | 10 |
| Disparity | 6 |
| Display window | 11 |
| Documentation | v |
| DUT Definition | vi |

F

| | |
|----------------|-----|
| FAX | vii |
| Feedback | vii |
| Filter | 4 |

G

| | |
|------------------------------|-----|
| General Safety Summary | iii |
|------------------------------|-----|

H

| | |
|-------------------|----|
| Hex format | 7 |
| Hide window | 11 |

L

| | |
|--------------------------------|----|
| Log Worst Case Waveforms | 11 |
| Dialog to Save | 11 |

M

| | |
|--|---|
| Menu Map in the Reference Guide | v |
| Mini-Tutorial in the Reference Guide | v |

O

| | |
|----------------|---|
| Overview | 1 |
|----------------|---|

P

| | |
|--|---|
| PDF Files | v |
| On the Applications CD | v |
| Primitives | 4 |
| Product Description | v |
| Protocol Area Controls | 4 |
| Protocol Trigger and Decode Control Window | 1 |
| PTD Application | |
| Description | v |
| PTD window | 1 |

R

| | |
|-----------------------------|----|
| Related Documentation | v |
| Resize window | 11 |

S

| | |
|--------------------------------|-----|
| Safety Summary | iii |
| Serial standards | 3 |
| Show window | 11 |
| Software | vii |
| Starting the Application | 4 |
| Symbolic Area Controls | 4 |

T

| | |
|---|---------|
| Techsupport@tektronix.com | vii |
| Terminology in Online Help Topics | vi |
| Trigger | 5, 6, 7 |
| bit pattern | 6, 7 |
| character | 5 |
| code error | 5 |
| word | 5 |

Trigger Setup Controls..... 5
Tutorial 10
 Taking a Clock Period Measurement 10
 Waveform Files 10

U
User standard 10

W
Waveform Area Controls.....5
Window11
Window size11
Word.....6

Z
Zoom.....5