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1. Introduction

Thank you for your interest in the EZ-PD™ Analyzer Utility. This is a Windows-based utility that works in conjunction with the CY4500 EZ-PD™ Protocol Analyzer to capture the Power Delivery traffic occurring on the Configuration Channel (CC) lines of a Type-C connection; this is a very handy debugging tool for developers.

1.1 Getting Started

This user guide describes the features of the EZ-PD™ Analyzer Utility and how to use it. The EZ-PD™ Analyzer Utility section explains how to use the tool. The Troubleshooting section lists the troubleshooting procedure.

1.2 Additional Learning Resources

Visit the CCG web page at www.cypress.com/CCG for the list of Type-C products from Cypress and additional learning resources including datasheets and application notes.

1.3 Technical Support

For assistance, go to www.cypress.com/go/support or contact our live customer support at +1 (800) 858-1810 (in the U.S.) or +1 (408) 943-2600 (international) and follow the voice prompt.

1.4 Document Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courier New</td>
<td>Displays file locations, user-entered text, and source code:</td>
</tr>
<tr>
<td></td>
<td>C:...cd\icc\</td>
</tr>
<tr>
<td><em>Italic</em></td>
<td>Displays file names and reference documentation:</td>
</tr>
<tr>
<td></td>
<td>The “Configuration Options” section of the <em>HX3 datasheet</em> gives more details about the use of pin straps</td>
</tr>
<tr>
<td>File &gt; Open</td>
<td>Represents menu paths:</td>
</tr>
<tr>
<td></td>
<td>File &gt; Open &gt; New Project</td>
</tr>
<tr>
<td><em>Bold</em></td>
<td>Displays commands, menu paths, and icon names in procedures:</td>
</tr>
<tr>
<td></td>
<td>Click the File icon and then click <em>Open</em>.</td>
</tr>
<tr>
<td>Times New Roman</td>
<td>Displays an equation:</td>
</tr>
<tr>
<td></td>
<td>2 + 2 = 4</td>
</tr>
<tr>
<td>Text in gray boxes</td>
<td>Describes Cautions or unique functionality of the product.</td>
</tr>
</tbody>
</table>
1.5 Abbreviations

Table 2. List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>PD</td>
<td>Power Delivery</td>
</tr>
<tr>
<td>SOP</td>
<td>Start Of Packet</td>
</tr>
<tr>
<td>Msg ID</td>
<td>Message Identification</td>
</tr>
<tr>
<td>CC</td>
<td>Configuration Channel</td>
</tr>
<tr>
<td>PC</td>
<td>Personal computer</td>
</tr>
<tr>
<td>Obj Count</td>
<td>Object Count</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
</tbody>
</table>
2. EZ-PD™ Analyzer Utility

2.1 EZ-PD™ Analyzer Utility GUI

- Start the EZ-PD™ Analyzer Utility from Start > All Programs > Cypress > EZ-PD Analyzer Utility > EZ-PD Analyzer Utility. The EZ-PD™ Analyzer Utility GUI is displayed, as shown in Figure 1.

Figure 1. GUI Layout of EZ-PD™ Analyzer Utility
2.2 Capturing and Viewing PD Packets

Before capturing PD Packets, ensure that the CY4500 EZ-PD™ Protocol Analyzer hardware is connected and ready to use. Ensure that the message displayed on the status bar at the bottom shows “EZ-PD Analyzer is connected”.

2.2.1 Capture PD Packets

To capture the PD Packets, click Start Capturing on the tool bar as shown in Figure 2 or select Actions > Start Capturing.

Figure 2. Capturing PD Packets on the EZ-PD™ Analyzer Utility

The status bar indicates that the EZ-PD™ Analyzer is running. The progress bar located at the bottom right corner turns green whenever PD packets are received by the utility. The captured PD packets are displayed in the main panel as shown in Figure 3.

Figure 3. PD Packets Captured Using the EZ-PD™ Analyzer Utility

The various fields of PD packets which are displayed in the Main Panel of the GUI are described in Table 3.
Table 3 Details of captured PD Packets

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL#</td>
<td>Message serial no.</td>
</tr>
<tr>
<td>Status</td>
<td>Overall status of the message</td>
</tr>
<tr>
<td>SOP</td>
<td>K-code marker used to delineate the start of the packet</td>
</tr>
<tr>
<td>Message</td>
<td>PD Message Type</td>
</tr>
<tr>
<td>Msg Id</td>
<td>Identifier for the message</td>
</tr>
<tr>
<td>Data Role</td>
<td>Current Data Role of the Port</td>
</tr>
<tr>
<td>Power Role</td>
<td>Current Power Role of the Port</td>
</tr>
<tr>
<td>Obj Count</td>
<td>Number of 32-bit data object(s) that follow the header</td>
</tr>
<tr>
<td>Data</td>
<td>32-bit data object with header</td>
</tr>
<tr>
<td>Start Time (us)</td>
<td>Start time of PD message</td>
</tr>
<tr>
<td>Duration (us)</td>
<td>Duration of a PD message</td>
</tr>
<tr>
<td>Delta (us)</td>
<td>Time difference between previous and current PD message</td>
</tr>
<tr>
<td>Vbus (mV)</td>
<td>Vbus voltage during the PD message capture</td>
</tr>
</tbody>
</table>

Note that the EZ-PD™ Analyzer Utility supports decoding of PD packets as per USB PD Specification Revision 2.0, V1.2.

Note that VBUS status (Voltage and Current) is displayed live at the right top corner of the GUI as shown in Figure 3.

2.2.2 View Packet Details
Click a packet to view its details in the side panel under the **Detailed View** tab as shown in Figure 4.

Figure 4. Details of the Selected PD Packet
The Detailed View tab lists all the attributes of a selected PD packet. Refer to Section 6 (Protocol Layer) of the USB PD Specification Revision 2.0, V1.2 to get more details about the type of PD messages (Control Messages & Data Messages) and their attributes.

2.2.3 Stop Packet Capture

Click the Stop Capturing icon in the tool bar as shown in Figure 5 or select Actions > Stop Capturing.

![Figure 5 Stop Capturing PD Packets Using the EZ-PD™ Analyzer Utility]

2.2.4 Save PD Packets

Click the Save File icon in the tool bar as shown in Figure 6 or select File > Save to save the captured PD Packets.

![Figure 6 Save PD Packets Using the EZ-PD™ Analyzer Utility]

The packets can be saved in any of the following 3 file formats (.ccgx / .xlsx / .csv) as shown in Figure 7.

![Figure 7 File formats for PD Packets]
Note that .CCGX file is a proprietary Cypress format. Files stored in this format can be opened using the utility.

2.2.5 Clear PD Packets
Click the Clear Data icon in the tool bar as shown in Figure 8 or select Actions > Clear Data to clear all the captured PD Packets

Figure 8 Clearing the captured PD Packets

2.3 Working with PD Packets

2.3.1 Open Saved PD Packet Files
The saved PD Packet files (.ccgx) can be viewed even when the EZ-PD™ Protocol Analyzer hardware is not connected to the PC. Click the Open File button on the tool bar (or select File > Open). Browse and select the saved CCGX file.

2.3.2 Mark PD Packets
The PD Packets displayed in the main panel can be marked for easier debugging.
Right-click a packet and select Add Marker, as shown in Figure 9. The marked Packet is highlighted in red.

Figure 9 Adding Marker to PD Packets

2.3.3 Step through Marked PD Packets
Click the Next Marker button on the toolbar (or, select Actions > Next Marker) to step through marked packets as shown in Figure 10.
2.3.4 Delete Marker

Right-click the marked packet and select **Remove Marker** as shown in Figure 11.

Figure 11 Deleting a Marker

2.3.5 Use Packet Filters

The packets displayed in the main panel can be filtered based on certain parameters, such as **SOP**, **Message**, **Msg ID**, **Data Role**, **Power Role**, and **Obj Count**. For example, if the **Data Filter** for parameter **Message** is specified as ‘**GoodCRC**’ as shown in Figure 12, only the PD Packets with GoodCRC as the value for the Message field are shown in the main viewing panel; the rest of the packets are hidden.

To filter the data packets, enter the filter value in the appropriate field on the Data Filter bar.

Figure 12 Setting up a Data Filter
2.3.6 Set Triggers

For complex debugging where an external system needs to be triggered for a specific PD event or for a combination of PD events, the utility provides an option to set the trigger conditions.

Click on the Trigger Tab and set the trigger criteria as shown in Figure 13. Click Set to activate the trigger.

Figure 13. Setting Trigger condition from the Trigger tab

Following is the procedure to change the trigger criteria which has been activated:

a. Change the trigger criteria in the Trigger Tab
b. Click Set to activate the new trigger criteria

Note: Trigger and PD packet capture are independent activities. Activating a trigger does not require PD packet capture (using Actions > Start Capturing) to be in progress.

You can set six trigger conditions as follows:

- **Start SL#**: This trigger condition is tied to a GPIO (SOM-Start of Message) on the CY4500 EZ-PD™ Protocol Analyzer hardware. Depending on the SL# number set, the GPIO gets triggered. For example, if the Start SL# is set to '2', the GPIO will be triggered when the second PD packet is captured. An Oscilloscope capture on the GPIO under this trigger condition will be as shown in Figure 14.

Figure 14 Trigger waveform output

- **End SL#**: This trigger condition is tied to another GPIO (EOM-End of Message) on the EZ-PD™ Protocol Analyzer Hardware. Depending on the SL# number set, this GPIO gets triggered. For example, if the End SL# is set to '100', the GPIO will be triggered when the 100th CC message is captured.
You can set four more trigger conditions: **SOP, Message, Obj Count** and **Msg ID**. The GPIO (MTR-Message Trigger) pin on the EZ-PD™ Protocol Analyzer Hardware is triggered by a single event or a combination of the events set by **SOP, Message, Obj Count** and **Msg ID**.

- **SOP** (Start of Packet): Select **SOP** and set the type of SOP. The MTR pin is triggered when the selected SOP type occurs. For example, if you set the type of SOP as SOP', then the MTR pin gets triggered each time an SOP' packet is captured on the CC lines.

- **Message**: Select **Msg Type** and set the message type. The MTR pin is triggered when a message of the specified type is captured on the CC line. For example, if you set the message type as VDM, the MTR pin is triggered when a VDM message is captured on the CC lines.

- **Obj Count**: Select **Obj Count** and set its value. The MTR pin is triggered when a packet of the specified Object count is captured on the CC line. For example, if you set the Obj Count as ‘1’, the MTR pin gets triggered each time the Obj Count is ‘1’.

- **Msg ID**: Select **Msg ID** and set the value for the trigger condition. The MTR pin is triggered when a message with the specified message ID appears on the CC line. For example, if you set the Msg ID as ‘1’, the MTR pin gets triggered each time the Msg ID is ‘1’.

You can set these four trigger conditions individually or in combination, such as setting value for **SOP** and **Message** fields at the same time. Trigger occurs when all the specified conditions are met.

### 2.4 Upgrade Firmware

The CY4500 EZ-PD™ Protocol Analyzer Hardware comes with the latest firmware pre-installed during manufacturing. However, if a new firmware version becomes available, the analyzer can be updated directly from the EZ-PD™ Analyzer Utility as described below.

Check the current firmware loaded on the EZ-PD™ Protocol Analyzer Hardware by selecting **Actions > Get Firmware Version** as shown in **Figure 15**.

![Figure 15. Get the current firmware version](image)

Wait for the Firmware version dialog box to appear as shown in **Figure 16**.

![Figure 16. Firmware version dialog box](image)

Click **OK** to return to the main menu. Proceed with rest of the instructions to download the firmware in case a newer version is available.

Select **Actions > Download Firmware** as shown in **Figure 17**.
Figure 17. Enabling Download FW from the Menu Bar

Wait for the Firmware Download dialog box to appear as shown Figure 18 and click **Load File...**

Figure 18. Firmware Download Dialog Box

Select the CY4500 firmware file (.cyacd) as shown in Figure 19 and click **Open.**

Figure 19. Selecting the CY4500 Firmware File

The CY4500 firmware file is included as part of the CY4500 Installer and it can be located at `<Install Directory>`\CY4500 EZ-PD Protocol Analyzer\1.0\Firmware.

Note: On Windows 32-bit platform the default `<Install Directory>` is `C:\Program Files\Cypress`; on the Windows 64-bit platform, it is `C:\Program Files (x86)\Cypress`
Click **Program** to initiate the firmware download as shown in **Figure 20.**

![Figure 20. Initiating firmware download](image)

Wait for the firmware download to complete as shown in **Figure 21.**

![Figure 21. Completion of firmware download](image)

The CY4500 EZ-PD Protocol Analyzer Hardware restarts with the latest firmware once the firmware download is successful. Click **Exit** to return to the main window of the utility.
## 3. Troubleshooting

### 3.1 Troubleshooting Guide

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The EZ-PD™ Analyzer Utility does not detect the CY4500 EZ-PD™ Protocol Analyzer Hardware</td>
<td>Device driver is not bound to the device</td>
<td>Manually bind the driver following the procedure given in the Quick Start Guide provided with the CY4500 EZ-PD™ Protocol Analyzer</td>
</tr>
<tr>
<td>When a saved file is opened, Vbus status is not reflected correctly</td>
<td>Vbus status cannot be saved. This is always live data that is shown with respect to the connected device and the Vbus voltage and current that is consumed at that time.</td>
<td>Do not look for Vbus status information from the saved file</td>
</tr>
<tr>
<td>PD Packets are not getting displayed after connecting the Type-C device under test</td>
<td>The Type-C connector may have loose contact or The Type-C device is not inserted properly into the CY4500 EZ-PD™ Protocol Analyzer Hardware</td>
<td>Check the Type-C plug for any abnormality for loose contact Insert the Type-C device under test or cable fully inside the EZ-PD™ Protocol Analyzer Hardware</td>
</tr>
</tbody>
</table>
## Document Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Issue Date</th>
<th>Origin of Change</th>
<th>Description of Change</th>
</tr>
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<tr>
<td>**</td>
<td>07/07/2016</td>
<td>MKRS</td>
<td>Initial revision</td>
</tr>
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