



# Getting Started with EZ-PD<sup>™</sup> CCG3

# Author: Vihang Trivedi Associated Part Family: CYPD3xxx Associated Software: EZ-PD<sup>™</sup> Configuration Utility Related Application Notes: AN210403

AN200210 introduces the USB Type-C EZ-PD<sup>™</sup> CCG3 controller. It provides a brief overview of the CCG3 architecture and its features and applications and covers the evaluation kit in detail along with the development and debugging tools that can be used. It also references CCG3 resources to help you ramp up quickly with your product designs.

# Contents

1	Introduction1									
	1.1	EZ-PD CCG3 Features1								
	1.2	CCG3 Block Diagram2								
	1.3	Prerequisites2								
	1.4	CCG3 Design Flow								
	1.5	CCG3 Resources5								
2	CCG	3 Hardware Details5								
	2.1	CY4531 EZ-PD CCG3 EVK5								
	2.2	CY4500 EZ-PD Protocol Analyzer6								
3	CCG3 Firmware Details and Build Environment7									
	3.1 CCG3 Firmware Architecture Overview8									
	3.2	Flash Memory Organization9								
	3.3	Firmware Build Environment10								
	3.4	Firmware Configurable Features13								
	3.5	Firmware Operation14								
	3.6	Programming Firmware in CCG3 Devices14								
4	Softw	vare Tools for CCG3 Application Firmware								
De	evelopm	ent and Debugging15								
	4.1 EZ-PD Configuration Utility15									

4.2	EZ-PD A	Analyzer U	tility		17
5 CCG	3 Con	figuration	Paramet	er Mo	dification
Example.					18
5.1	Test C	Y4531 CO	CG3 EVK	Setup	with the
Default	t Configur	ation and	Type-C Pov	ver Adap	oter 19
5.2	Modify C	Configurati	on Parame	ters Usir	ng EZ-PD
Config	uration Ut	ility			21
5.3	Program	n CCG3	Device	with	Updated
Config	uration	Paramete	ers Using	g the	EZ-PD
Config	uration Ut	ility			26
5.4	Re-test	CY4531	CCG3 E	VK Se	tup with
Modifie	ed Configu	uration and	I Type-C Po	ower Ada	apter 30
Document	t History				32
Worldwide	e Sales ar	nd Design	Support		
Products.					
PSoC® S	olutions				
Cypress D	)eveloper	Communi	ty		
Technical	Support.				

# 1 Introduction

EZ-PD CCG3 belongs to Cypress's family of USB Type-C microcontrollers that complies with the latest USB Type-C and Power Delivery (PD) standards. It consists of a dual bank of 64 KB of flash memory, 8 KB of SRAM memory, a crypto engine for authentication, and a pair of VCONN field-effect transistors (FETs). In addition, with the integrated Billboard controller, over-voltage protection (OVP), and over-current protection (OCP), it helps to reduce the need for additional components and the overall cost of a Type-C ecosystem. Typical applications using CCG3 include power adapters, power banks, Type-C dongles, notebooks, Thunderbolt hosts and cables, monitors, and docks.

# 1.1 EZ-PD CCG3 Features

- 32-bit MCU subsystem
  - 48-MHz ARM<sup>®</sup> Cortex<sup>®</sup>-M0 processor
  - Dual 64-KB flash memory with fail-safe firmware updates



- USB Type-C support with PD
  - Integrated transceiver, supporting one Type-C port
  - Integrated upstream facing port—UFP (R<sub>D</sub>), downstream facing port—DFP (R<sub>P</sub>), and electronically marked cable assembly—EMCA (R<sub>A</sub>) termination resistors
  - Compliance with USB PD, supporting all standard power profiles
- Integrated digital blocks
  - <sup>a</sup> Four timers, counters, and pulse-width modulators (PWMs) and up to 20 general-purpose I/Os (GPIOs)
  - Four serial communication blocks (SCBs) for configurable master/slave I<sup>2</sup>C, SPI, or UART
  - Integrated USB Billboard controller with Billboard Device Class support
  - Integrated crypto engine with USB authentication support
- Integrated analog blocks
  - 20-V operation
  - Two V<sub>BUS</sub> gate drivers
  - 2x2 Crossbar switch

#### 1.2 CCG3 Block Diagram

Figure 1 shows a block diagram of the CCG3 architecture. For more details, refer to the CCG3 datasheet.

Figure 1. CCG3 Architecture Block Diagram



#### 1.3 Prerequisites

This section lists the hardware and software required to get started with CCG3 devices.



#### 1.3.1 Hardware

- CY4531 EZ-PD CCG3 Evaluation Kit (EVK)
- PC/laptop with Windows 7 or later platforms; PC with at least one USB port (USB 3.0 port) and Windows 7 or later recommended
- Type-C power adapter that supports a 9-V or higher power profile

**Note:** The CCG3 device works with all Type-C power adapters that support power profiles from 5 V to 20 V. This power profile requirement relates to the CY4531 CCG3 EVK architecture.

- CY4500 EZ-PD<sup>TM</sup> Protocol Analyzer (optional; required only for firmware debugging)
- MiniProg3 device (optional; required only to program the CCG3 device with a file in .hex format)

#### 1.3.2 Software

- EZ-PD CCGx Software Development Kit (SDK) (Version 2.2 or later)
- EZ-PD Configuration Utility (version 1.00 or later)
- PSoC Creator<sup>™</sup> 3.3 SP2 or later with PSoC Programmer 3.24.2 or later (required only if modifying base firmware functionality)

#### 1.4 CCG3 Design Flow

This section describes a typical design flow users would go through during the Type-C application design right from the conceptual stage to manufacturing using CCG3 devices. It also covers how each of the hardware, software, and firmware resources described in this Application Note is used through the design flow. Figure 2 shows a typical design flow using CCG3 devices.

Once the CCG3 based Type-C application is determined and reference designs have been reviewed, the hardware and the application development phase of the design flow can be started in parallel. The hardware flow includes building reference schematics based on the end application and doing the board design to get a few prototypes ready for the next phase. These reference schematics can be based on the reference designs available on the Cypress' CCG3 webpage. The CY4531 EZ-PD CCG3 Evaluation Kit (EVK) design can also be reused especially for Type-C notebook based designs.

The application development flow can get started using the CY4531 EZ-PD CCG3 Evaluation Kit (EVK) in parallel. The EZ-PD Configuration Utility can be used to make minor updates to the configuration table of the CCG3 device (for example, Changing PDOs and Vendor ID changes). For making application specific modifications, users can use the EZ-PD CCGx Software Development Kit (SDK) (Version 2.2 or later).

This EZ-PD CCGx SDK (referred to as CCGx SDK through the rest of the document) along with PSoC<sup>®</sup> Creator<sup>™</sup> (version 3.3 SP2 or later) can be used to build the source projects and create firmware binary files.

Once either configuration changes or firmware changes are made, the EZ-PD Configuration Utility can be used to update the modified configuration table or to program the CCG3 device. More information on which tool can be used for what purpose is covered in detail in Table 2.

Once the hardware and application development flow are completed, the existing system design is ready for the test and validation cycle. The CY4500 EZ-PD<sup>TM</sup> Protocol Analyzer can be used for testing, firmware debugging, and doing performance analysis. Mass production and manufacturing can start once the test and validation flow is over and the system design is final.





Figure 2. CCG3 Design Flow



# 1.5 CCG3 Resources

Table 1 lists the web resources available to help you design end applications using CCG3 devices.

Table 1. CCG3 Design Resources

Category	Available Resources					
Datasheet	CCG3 datasheet					
Hardware	CY4531 CCG3 EVK – Contains documentation and design files					
Application Notes	AN210403 – Hardware Design Guidelines for Dual Role Port Applications Using EZ-PD USB Type-C Controllers					
Programming Specifications Document	Programming specifications – Provides guidelines on how to program the flash memory of CCG3 devices					
	EZ-PD CCGx SDK					
Host PC Software	EZ-PD Configuration Utility – GUI-based Windows application to help you configure CCGx controllers					
	PSoC Creator 3.3 SP2 or later (firmware development tool)					
	PSoC Programmer 3.24.2 or later (firmware programming tool)					
Debugging Tools	CY4500 EZ-PD <sup>™</sup> Protocol Analyzer – Includes EZ-PD Analyzer Utility and documentation					
Videos	USB Type-C Essentials, USB Type-C 101 Video Training Series					
Other Collateral	CCG3 specific Knowledge Base Articles					

**Note:** A basic introduction to Type-C and how to use Cypress' Type-C products can be found in the USB Type-C 101 Video Training Series of short videos (also listed above).

# 2 CCG3 Hardware Details

This section discusses the hardware to be used for getting started with the CCG3 device family. It focuses on the CY4531 EZ-PD CCG3 EVK and the CY4500 EZ-PD Protocol Analyzer.

# 2.1 CY4531 EZ-PD CCG3 EVK

The CY4531 EZ-PD CCG3 EVK consists of a base board and a daughter card. The CCG3 device is mounted on the daughter card, which is connected to the base board to enable the CCG3 device's Type-C port functionality. Figure 3 shows a block diagram of the CY4531 EZ-PD CCG3 EVK architecture.





Figure 3. CY4531 EZ-PD CCG3 EVK Architecture Block Diagram

The CCG base board consists of a DC input power supply, display multiplexer, DisplayPort, SuperSpeed Type-B port, and Type-C port. The CCG3 daughter card consists of the CCG3 device and a USB-Serial IC to provide a USB interface for debugging and programming. The configuration channel (CC) lines of the CCG3 device are connected to the Type-C port. The display multiplexer is controlled by the CCG3 device over an I<sup>2</sup>C interface.

The CY4531 EZ-PD CCG3 EVK includes power provider and consumer path control circuitry on the CCG3 daughter card to showcase EZ-PD CCG3's ability to switch its power role from a provider to a consumer and vice versa. It contains over-voltage protection (OVP) and over-current protection (OCP) circuitry for VBUS and supports EZ-PD CCG3 device programming over SWD and I<sup>2</sup>C interfaces. The EVK supports PCs, notebooks, tablets, and other applications that would host a Type-C interface. It is primarily intended as an evaluation vehicle for USB Host systems that house a Type-C connector. Refer to the CY4531 EZ-PD CCG3 EVK Guide for in-depth information about EVK use cases and a Type-C notebook application using the EVK.

#### 2.2 CY4500 EZ-PD Protocol Analyzer

Cypress's CY4500 EZ-PD Protocol Analyzer supports protocol analysis of the USB PD and USB Type-C specifications. It performs nonintrusive probing, and captures accurate protocol messages on the CC line. This analyzer consists of Cypress's programmable MCU (PSoC 5LP), which monitors the data on the CC line and sends the data to the host application over a USB interface. The Type-C plug and Type-C receptacle on this analyzer provide a pass-through for the Power Delivery (PD) packets transmitted between each Type-C PD connection. The processor MCU taps these PD packets without disturbing the system and transfers them over the USB interface to a PC running the host application. Figure 4 shows the connections between the CY4500 EZ-PD Protocol Analyzer and the CY4531 CCG3 EVK.

PS - Power Supply USB2 - Used only for programming





Figure 4. Connections between CY4500 EZ-PD Protocol Analyzer and CY4531 CCG3 EVK

Downloading and installing the latest analyzer software setup (*CY4500Setup.exe*) from the Cypress website http://www.cypress.com/CY4500 also installs the EZ-PD Analyzer Utility for running the analyzer, required drivers, and all relevant documentation. An overview of this utility is provided in the EZ-PD Analyzer Utility section.

# 3 CCG3 Firmware Details and Build Environment

This section provides an overview of the firmware architecture, organization, and operation, and introduces PSoC Creator and the CCGx SDK which are used as the build environment for firmware development. This section is followed by a section, which has an overview of the software tools that can be used for development and debugging. Before covering the in-depth details regarding the firmware build environment and software tools, a brief summary of which tool can be used for what purpose is provided in Table 2 below. Note that many configuration settings can be changed without the need for modifying the base firmware using the SDK. For a discussion of how the SDK fits into the CCG3 ecosystem, see the CCG3 Design Flow section.

Tool	Purpose	Output and Its Use	Described in
CCGx SDK	It is the build environment for CCGx firmware development. It has application code with Type-C and USB-PD-compliant firmware, which can be used for further development.	Compiling the application source project generates firmware binaries, which can be used to program/reprogram respective CCGx devices.	CCGx SDK section
Firmware Configurable Features in CCGx SDK	Each application firmware in CCGx SDK contains a set of configurable features, which can be modified based on system requirements.	Compiling the application source project generates firmware binaries, which can be used to program/re-program respective CCGx devices.	Firmware Configurable Features section
EZ-PD Configuration Utility	Used for modifying parameters stored in the configuration table area of CCGx device flash. Also used for programming the CCGx device flash.	Configuration parameters can be read, modified, and saved for firmware development and debugging. Modified parameters can be updated in device flash intuitively without firmware development.	EZ-PD Configuration Utility section

Table 2. Firmware, Software Tools & Their Purposes



### 3.1 CCG3 Firmware Architecture Overview

Figure 5 shows a block diagram of the CCG3 firmware architecture. The CCG3 firmware architecture allows users to implement a variety of USB-PD applications using the CCG3 device. It contains the following components:

- Hardware Abstraction Layer (HAL): This includes the low-level drivers for various hardware blocks of the CCG3 device. This includes drivers for the Type-C and USB-PD block, Serial Communication Blocks (SCBs), GPIOs, flash module, and timer module.
- USB Type-C and USB-PD Protocol Stack: This is the complete USB-PD protocol stack that includes the Type-C and USB-PD port managers, USB-PD protocol layer, the USB-PD policy engine, and the device policy manager. The device policy manager is designed to allow all policy decisions to be made at the application level, either on an external Embedded Controller (EC) or in the CCG3 firmware itself.
- Application Layer: This is the layer responsible for managing the functions of the PD port, handling alternate modes, power management, and also manages the Host Processor Interface (HPI). It is further sub-categorized into the following components:
  - Port Management: This module handles all of the PD port management functions including the algorithm for optimal contract negotiations, source and sink power control, source voltage selection, port role assignment, and swap request handling.
  - Alternate Modes: This module implements the alternate mode handling for CCG as a DFP and UFP. A fully
    tested implementation of the DisplayPort alternate mode with CCG as the DFP is provided. The module also
    allows users to implement their own alternate mode support in both DFP and UFP modes.
  - **Low Power:** This module attempts to keep the CCG device in the low power standby mode as often as possible to minimize power consumption.
  - Host Processor Interface (HPI): The Host Processor Interface (HPI) is an I<sup>2</sup>C based control interface that allows an EC to monitor and control the runtime operation of the CCG3 device. CCG3 implements the HPI using an I<sup>2</sup>C interface, with an interrupt line using a GPIO. In a typical CCG3 notebook application, the EC may communicate with the CCG3 device to negotiate the power with the connected Type-C device based on the charge level of the internal battery. CCG3 provides this functionality using commands, responses, events, and asynchronous messages that are modeled as registers. Detailed documentation on CCG3 HPI Interface is available. Contact your local Cypress FAE or contact Cypress Technical Support for this information.
- **Solution Management Layer:** This layer consists of the following components:
  - **External Hardware Control:** This is a hardware design dependent module that controls the external hardware blocks such as FETs, regulators, and Type-C switches.
  - **Solution specific tasks:** This is an application layer module where any custom tasks required by the user solution can be implemented.





#### Figure 5. CCG3 Firmware Architecture Diagram

# 3.2 Flash Memory Organization

The CCG3 device has 128 KB of flash divided into two banks of 64 KB each, which allows support for dual firmware images. Dual firmware images enable firmware updates to be fail-safe; that is, the firmware update does not interrupt the normal operation of the device. All applications supported by CCG3 support dual firmware images. Figure 6 shows the flash map of the CCG3 device.



# FW Metadata FW2: CCG Firmware Application FW2: CCG Firmware Application FW1: CCG Firmware Application FW1: CCG Firmware Application FW1 Configuration Table Bootloader – I2C

#### CCG3 Flash Map





The I<sup>2</sup>C bootloader is used to upgrade the CCG3 application firmware. It is allocated in a fixed area. The bootloader memory area can only be written using the SWD interface. This I<sup>2</sup>C bootloader uses 5kB of memory. The configuration table holds the PD configuration for the CCG3 application, and is located at the beginning of each firmware binary. The size of each configuration table is 1kB. A lot of configurations can be updated by modifying this table using the EZ-PD Configuration Utility. An overview of this utility is provided in the EZ-PD Configuration Utility section. The CCG firmware areas FW1 and FW2 are used for the CCG3 firmware application. The metadata area holds the metadata about both firmware binaries. The firmware metadata follows the definition provided by the PSoC Creator bootloader component, and includes the firmware checksum, firmware size, and the start address.

# 3.3 Firmware Build Environment

The tool used for CCG3 firmware development is PSoC Creator, which is a free, Windows-based Integrated Design Environment (IDE). PSoC Creator 3.3 SP2 or later and the CCGx SDK are required to edit, compile, download, and debug the firmware for the CCG3 Notebook application, as shown in Figure 7. The PSoC Creator compiler tool chain is ARM GCC (build 493, provided along with the PSoC Creator build). Refer to the PSoC Creator User Guide for more details on the PSoC Creator build environment.

Visit the PSoC Creator product page to download and install the latest version of PSoC Creator (3.3 SP2 or later). This web page also contains links to video training and additional documentation. Within the PSoC Creator tool, additional help is available via the following documents:

- Quick Start Guide: Choose Help > Documentation > Quick Start Guide. This guide gives you the basics for developing PSoC Creator projects.
- System Reference Guide: Choose Help > System Reference Guide. This guide lists and describes the system functions provided by PSoC Creator.
- Document Manager: PSoC Creator provides a Document Manager to help you easily find and review document resources. To open the Document Manager, choose Help > Document Manager.



#### Figure 7. PSoC Creator IDE

#### 3.3.1 CCGx SDK

The CCGx Software Development Kit (SDK) is a PSoC Creator project that allows users to harness the capabilities of Cypress's CCG families of Type-C Controllers. It provides a Type-C and USB-PD specification compliant firmware stack along with the necessary drivers and software interfaces required to implement applications using CCG controllers. The CCGx SDK also includes reference projects implementing standard Type-C applications and documentation that guides users in customizing existing applications, or creating new ones. For more information on the CCGx SDK, refer to the CCGx SDK User Guide.



This Application Note references only the notebook application for CCG3 devices. In general, the CCGx SDK consists of the following basic components.

- Source Code
  - PD Stack and Host Processor Interface (HPI) in a pre-compiled library form
  - Firmware sources for other blocks
  - Reference Application
  - □ Integrated UFP (R<sub>D</sub>), DFP (R<sub>P</sub>), and EMCA (R<sub>A</sub>) termination resistors
  - Compliance with USB PD, supporting all standard power profiles
- Firmware Binaries
  - Application specific .hex and .cyacd files (this application note references the CCG3 notebook application only)
- Supporting Documentation
  - CCGx SDK User Guide
  - Firmware API Reference Guide
  - Release Notes

#### 3.3.2 **PSoC Creator Project Structure Overview**

The CCGx SDK includes a reference firmware project for a notebook application of the CCG3 device. Figure 8 shows the PSoC Creator workspace file structure for a CCG3 device–based notebook application. PSoC Creator generates bootloadable *.cyacd* files and a Cypress format *.hex* file every time a project is successfully compiled and built.

In every PSoC Creator project, a system-level design diagram is included. This schematic is located in the *TopDesign.cysch* file. The firmware version is controlled by an 'application type' string and 'application major' and 'application minor' numbers. This information is stored in the *app\_version.h* file of the PSoC Creator project. The application string and the version numbers can be modified by customers based on the updates needed and requirements.





#### Figure 8. PSoC Creator Workspace Structure for CCG3 Notebook Application



# 3.4 Firmware Configurable Features

The notebook application firmware in the CCGx SDK has the following configurable features, which can be modified by individual users based on system requirements. These configurable parameters are located in the *config.h* file. Table 3 lists the compile-time configurable features available in the CCG3 notebook application firmware.

Pre-processor switch	Description	Values (Default values in bold)
VBUS_OVP_ENABLE	Enable overvoltage Protection handling on VBUS. This feature can be turned off using the configuration table, even if it is enabled here.	1 for VBUS OVP enable 0 for VBUS OVP disable
VBUS_OVP_AUTO_CONTROL_ENABLE	Enable automatic FET control by hardware when an OVP event is detected.	1 for automatic hardware cut-off 0 for firmware cut-off
SYS_DEEPSLEEP_ENABLE	Enable flag for the low power module, which keeps CCG3 in deep sleep mode at all possible times.	1 for low power enable 0 for low power disable
DFP_ALT_MODE_SUPP	Enable Alternate Mode handling when CCG3 is used as DFP.	1 for alternate mode enable 0 for alternate mode disable
DP_DFP_SUPP	Enable DisplayPort Alternate mode when CCG3 is used as DFP. This requires DFP_ALT_MODE_SUPP.	<b>1 for DisplayPort enable</b> 0 for DisplayPort disable
APP_FW_LED_ENABLE	Enable toggling of the LED to indicate firmware operation. It is recommended that this be left disabled in production designs to save power and also to free up the GPIO used for LED control.	1 for LED enable 0 for LED disable

Table 3. Configurable Features of CCG3 Notebook Application Firmware (config.h file)



# 3.5 Firmware Operation

The code flow for the application is implemented in the *Source Files\Solution\main.c* file. Figure 9 shows the flow diagram of the firmware operation. Based on this, it is clear that the firmware implementation is a simple round-robin loop that services each of the tasks that the application has to perform. All PD management, HPI command handling, and Vendor Defined Message (VDM) handling is encapsulated in the task handlers in the CCG3 firmware stack.



Figure 9. CCG3 Notebook Firmware Flow Diagram

More details on the CCGx SDK firmware architecture, firmware APIs, and getting started with the CCG3 SDK can be found in the CCGx SDK User Guide. The same guide can also be used for customizing the CCG3 firmware application, that is, modifying and updating the PSoC Creator project for a different hardware design, building and debugging the project, and programming the modified firmware in the CCG3 device.

## 3.6 Programming Firmware in CCG3 Devices

There are two methods to program CCG3 devices:

- Using EZ-PD Configuration Utility
- Using MiniProg3 device and PSoC Creator/PSoC Programmer tool

The EZ-PD Configuration Utility requires a *.cyacd* file as the input for the firmware binary file to be programmed. Refer to Chapter 4 of the CY4531 EZ-PD CCG3 Evaluation Kit User Guide for more details on how to program CCG3 devices using the EZ-PD Configuration Utility. The PSoC Creator/PSoC Programmer tool uses a *.hex* file for programming all devices. Refer to the knowledge base article KBA96477 for more details on how to program CCG3 devices using PSoC Creator/PSoC Programmer along with a MiniProg3 device.



# 4 Software Tools for CCG3 Application Firmware Development and Debugging

This section provides an overview of the EZ-PD Configuration Utility and the EZ-PD Analyzer Utility. In general, the tools can be categorized as follows:

- Firmware development and programming tools
  - EZ-PD Configuration Utility: The EZ-PD Configuration Utility is used to read, modify, and update the configuration parameters of a CCGx device using the I<sup>2</sup>C interface. It is also used to update the application firmware of the CCGx device.
  - PSoC Creator<sup>™</sup> (CCG3 devices are supported from version 3.3 SP2 or later): As described in the Firmware Build Environment section, PSoC Creator is used to modify, debug, and program the firmware into the CCG3 device. This option is required only if the functionality of the CCG3 firmware is being modified from that of the standard firmware, or if the firmware is being modified for a different hardware design.
- Debugging tool for CCGx applications
  - EZ-PD Analyzer Utility: The EZ-PD Analyzer Utility along with a CY4500 EZ-PD Protocol Analyzer is used to capture PD messages between the CCG3 device and an attached Type-C device with the firmware application that is running. An overview of its functionality is provided in the CY4500 EZ-PD Protocol Analyzer section.

# 4.1 EZ-PD Configuration Utility

The EZ-PD Configuration Utility is a Windows application that configures the parameters stored in the configuration table areas of the internal flash memory of the CCGx device. These parameters can be chosen based on customerspecific application or system requirements. The utility allows you to intuitively select and configure the parameters for your specific application and thus saves time on firmware development. This utility also allows programming of the firmware applications.

You can download and install this tool from the Cypress website. After installation, the utility can be executed from the following location: Windows > Start > All Programs > Cypress > EZ-PD Configuration Utility > EZ-PD Configuration Utility. Figure 10 shows the utility running on a Windows machine.



Elaura 40		Configuration	1 14:1:4.		Deere
FIGURE 10	1 F/-PD	CONTINUTATION		/ Staff	Page
i iguio i c		Configuration	Othing	, otait	i ugo

C EZ-PD Configuration Utility
<u>F</u> ile <u>I</u> ools <u>H</u> elp
StartPage
CYPRESS'S USB TYPE-C USB USB SOLUTIONS
USB Type-C is the new USB-IF standard that solves several challenges faced while using today's Type-A and Type-B cables and connectors. USB Type-C uses a slimmer connector - measuring only 2.4-mm in height - to allow for increasing miniaturization of consumer and industrial products. The USB Type-C standard is gaining rapid support by enabling small form-factor, easy-to-use connectors and cables with the ability to transmit multiple protocols and offer power delivery up to 100 W. Cypress offers the EZ-PD <sup>TM</sup> family of USB Type-C controllers with an integrated Type-C transceiver and a programmable ARM® Cortex®-M0 core. These controllers help you bring Type-C compliant cables, cables, notebooks, tablets and monitors to market faster. More information on these devices can be found here: <a href="http://www.cypress.com/Type-C/">http://www.cypress.com/Type-C/</a>
The EZ-PD Configuration Utility is a Windows application that allows users to configure the parameters of a Type-C device implemented using the Cypress EZ-PD <sup>TM</sup> controllers. The tool also allows firmware updates to be flashed onto the controller.
USB Type-C Host Bridge USB Cypress USB to Serial Bridge USB USB Type-C Device Cypress Type-C UFP Controller
Cypress Type-C EMCA Controller USB Type-C Cable (EMCA)
Help Message
Entering Device Discovery
Seve log Searching for Firmware Update Device No USB-Serial Bridge devices found.
Device Discovery failed.
Device Connected: 0

The EZ-PD Configuration Utility can be used to update the application firmware and configure the CCGx device. The utility shows the target application for the CCG3 device as a dual role port (DRP) notebook. The workflow for configuring any CCGx device is completed in three stages:

- 1. Create configuration: Create a new configuration from the File menu of the utility, or read an existing configuration to be modified.
- 2. Select parameters: Select the parameters available for the target application such as a notebook.
- 3. Device configuration: Program the device flash using the Configure Device option.

Refer to the EZ-PD Configuration Utility User Manual for more details on firmware update and configuration of the device. You can open the user manual by choosing **Help** > **User Manual** in the EZ-PD Configuration Utility, as shown in Figure 11.



🖸 EZ-PD Configuration Utility 📃 🔲 💻 🔀	
File Tools Help	٦
🛱 🕒 🔛 🔞 📍 Topics 🛛 F1	
Start Pane User Manual	
i About	
CYPRESS'S USB TYPE-C SOLUTIONS	
USB Type-C is the new USB-IF standard that solves several challenges faced while using today's Type-A and Type-B cables and connectors. USB Type-C uses a slimmer connector - measuring only 2.4-mm in height - to allow for increasing miniaturization of consumer and industrial products. The USB Type-C standard is gaining rapid support by enabling small form-factor, easy-to-use connectors and cables with the ability to transmit multiple protocols and offer power delivery up to 100 W. Cypress offers the EZ-PD™ family of USB Type-C controllers with an integrated Type-C transceiver and a programmable ARM <sup>®</sup> Cortex <sup>®</sup> -MO core. These controllers help you bring Type-C compliant cables, cables, notebooks, tablets and monitors to market faster. More information on these devices can be found here: <u>http://www.cypress.com/Type-C/</u>	
The EZ-PD Configuration Utility is a Windows application that allows users to configure the parameters of a Type-C device implemented using the Cypress EZ-PD <sup>™</sup> controllers. The tool also allows firmware updates to be flashed onto the controller. USB Type-C Host Bridge USB Type-C Host Bridge Cypress USB to Serial Bridge Cypress Type-C USB Type-C Device Cypress Type-C Device USB Type-C Device Cypress Type-C Device USB Type-C Device USB Type-C Device USB Type-C Device USB Type-C Device USB Type-C Device USB Type-C Device	
	-
Help Message	
Set re-enumeration time out.	
Entering Device Discovery.	
Searching for Firmware Update Device No USB-Serial Bridge devices found.	
Device Discovery failed.	
Device Connected: 0	

Figure 11. Opening the EZ-PD Configuration Utility User Manual

# 4.2 EZ-PD Analyzer Utility

The EZ-PD Analyzer Utility is a software application that is run along with a CY4500 EZ-PD Protocol Analyzer. When this utility is run, it shows PD messages over CC (for example, PR\_SWAP, DR\_SWAP, and PDOs) as shown in Figure 12 while the CCG3 device is establishing a PD contract with the connected Type-C device.



File         Artions         Heip           0k         600         Mag0         Mag0         Data Rok         Power Roke         Ogl Court         Statt del 2 Use         Mag0         Use Wat         Statt del 2 Use         Use Wat         Statt del 2 Use	
Line         Line         Unit Wing         Mesoge         Number of the state	
Data File:         Description         Mag B         Data Role         Power Role         Obj Court           SU         Statu         SOP         Message         Mag D         Data Role         Power Role         Obj Court         Description         Message         Message         SOP         Source_Cap         0         DPP         Source         2         AC181 Dec10980* ObAADC8         2.928,843         788         0.655         5,178           3         OK         SOP         Source_Cap         0         DPP         Source         2         0.2116 Doc10980* ObAADC8         2.932,851         788         1.0565         5,178           4         OK         SOP         Source_Cap         0         DPP         Source         2         0.2116 Doc10980* ObAADC8         2.932,851         788         1.0508         5,178           5         OK         SOP         Source_Cap         0         DPP         Source         2         0.02116 Doc1090* ObAADC8         2.932,851         788         1.050.88         5,108           6         OK         SOP         Source_Cap         0         Dr11         Ord1         Source_Cap         0         Dr11         Ord1         Source         0         Dr11	Vbus Current: 0.04 A
Stuf         Stop         Massage         Map         Data Road         Protection         Option         Star Table         Duration (a)         Data (a)         Protection         Star Table           Stuf         SOP         Soures Cape         0         DFP         Source 2         0.2115         0.0216         0.0005         0.0217         2.0215         0.0215         0.0215         0.0216         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         <	
Stufu         Storp         Massange         Meg         Date         Order         Order         Date         Duration (m)         Display (m)         Starp (m)	
OK         SOP         Source_Cap         O         From         From         Current Cap         Curren	
1         0	
I         I         ODD         ODD         ODD         D         ODD         ODD         I         ODD         ODD         ODD         ODD         I         ODD         ODD         I         ODD         ODD         ODD         I         ODD         ODD         I <thi< th=""> <thi< th=""> <thi< th=""> <th< td=""><td></td></th<></thi<></thi<></thi<>	
No.         No. <td></td>	
OK         SOP         Source_Op         O         DFP         Source         2         Dot100 Or000440C8         3.088,012         77         2.638         5.199           OK         SOP         Source_Op         0         DFP         Source         2         0.2181 0x00190 0x4A0C8         3.088,012         777         2.638         5.199           OK         SOP         Source_Op         0         DFP         Source         2         0.2181 0x00190 0x4A0C8         3.041.41         788         150,581         5170           OK         SOP         GoodCRC         0         UFP         Sink         1         0.1042 0x20185A         3.243,277         631         519         5.148           OK         SOP         GoodCRC         0         UFP         Source         0         0.641         3.243,269         611         5.038         161         5.038           1         OK         SOP         GoodCRC         1         DFP         Source         0         0.643         3.34,253         488         146         5.148           3         OK         SOP         GoodCRC         1         DFP         Source         0         0.641         3.337,783         8	
OK         SGP         Source_Cap         O         DPP         Source         2         Ap2161 0x00190/P1 0x4A023         Stoup         PAP         Local         Stoup         Spece	
OK         SOP         Source_Cap         D         DPP         Source         Cap         DPP         Source         Cap         DPP         Source         D         Ox641         Source         Source         D         Ox641         Source         Source         D         Ox641         Source         Source         D         Ox641         Source         Source         D </td <td></td>	
OK         SOP         GoodCRC         0         UPP         Sink         0         Out1000000000000000000000000000000000000	
OK         SOP         Request         0         UPP         Sink         1         0x1042 0x220185A         3244.277         631         519         5,148           OK         SOP         GoodCRC         0         DFP         Source         0         Ax16         544         Mg Type (3.0)         Source Opabli           OK         SOP         Accept 1         DFP         Source         0         Ax16         3244.398         501         611         5,033           OK         SOP         GoodCRC         1         UFP         Source         0         0x463         3244.593         501         611         5,033           OK         SOP         GoodCRC         1         UFP         Sink         0         0x411         323,583         501         90,10         14,740           OK         SOP         GoodCRC         2         UFP         Sink         0         0x441         333,788         631         102         14,824           OK         SOP         VDM         3         DFP         Source         0         0x414         0x424 OrF00000484 0x0 OrF400000         339,583         1022         14,724         14,744         14,744         14,745	
0         0K         SOP         Good/RC         0         DP         Source         0         Attainability         Source         Source         Attainability         Source	lities
0 K         80P         Accept         1         DFP         Source         0         0d63         3,244,983         501         513         5,203           2         0 K         SOP         GoodCRC         1         UP         Sink         0         0,241         3,244,983         501         513         5,203           0 KK         SOP         PS_EDV         2         UP         Sink         0         0,241         3,245,850         489         146         5,142           4         OK         SOP         PS_EDV         2         UP         Sink         0         0,666         3,335,858         501         90,410         14,740           5         OK         SOP         GoodCRC         3         UP         Sink         0         0,441         3,337,183         634         162         14,740           7         OK         SOP         GoodCRC         1         UP         Sink         4         0,4247 0≠F00001         3,339,553         1,029         151         14,745           6         OK         SOP         GoodCRC         4         DPP         Source         0         0,64141         3,342,724         691         149 </td <td></td>	
2         OK         SOP         GoodCRC         1         UFP         Sink         0         0/241         3245,630         498         146         5,142         Duu-Role Power (29)         No (0)           3         OK         SOP         GoodCRC         2         UFP         Sink         0         0/241         33245,630         498         146         5,142         Duu-Role Power (29)         No (0)           4         OK         SOP         GoodCRC         2         UFP         Sink         0         0/641         3337,788         631         190,410         14,704           5         OK         SOP         CodCRC         3         UFP         Sink         0         0/641         3337,788         634         102         14,824           6         OK         SOP         VDM         1         UFP         Sink         0         0/641         3337,788         634         147         14,744           6         OK         SOP         VDM         1         DFP         Sink         0         0/641         0.0000484/0.00         0.339,589         10.90         10.778           6         OK         SOP         VDM         1	
OK         SOP         PS_RDY         2         DFP         Source         0         db666         3.336.833         501         90.410         14.740           OK         SOP         GoodCRC         2         UFP         Sink         0         0x41         3.337.168         498         149         14.707           OK         SOP         CoodCRC         3         UFP         Sink         0         0x411         3.337.168         498         149         14.707           OK         SOP         CoodCRC         3         UFP         Sink         0         0x641         3.337.168         499         147         14,740           OK         SOP         GoodCRC         1         UFP         Sink         0         0x641         0.06940000         3.339.669         499         147         14,740           OK         SOP         GoodCRC         1         UFP         Since         0         0x614         0x0694000         3.339.663         501         84         14,718           OK         SOP         COM         4         UFP         Sink         0         0x196F 0x00002         3.341.699         631         512         13.777 <tr< td=""><td></td></tr<>	
OK         SOP         GoodCRC         2         UFP         Sink         0         bet1         3.337,188         498         149         14,707           OK         SOP         VDM         3         DFP         Source         1         Dk176F 0xF5000011         3.337,788         634         102         144,207           OK         SOP         VDM         1         UFP         Sink         4         0x176F 0xF5000011         3.337,788         634         102         144,207           OK         SOP         VDM         1         UFP         Sink         4         0x424F 0xF500001         3.339,583         1.029         515         14,740           OK         SOP         VDM         1         UFP         Sink         4         0x424F 0xF500002         3.341,656         501         64         14,718           OK         SOP         VDM         4         UFP         Sink         0         0x811         3.342,472         488         149         14,720         10C (defut)         Voit in 50m (19,-10)         100(5V)           OK         SOP         GoodCRC         2         UFP         Sink         0         0x814 f 0xF7000002         3.341,822 <td< td=""><td></td></td<>	
OK         SOP         VDM         3         DFP         Source         1         Dx176F 0xF008001         3.337,788         634         102         14,624         USB Communications C.         No (0)           OK         SOP         GoodCRC         3         UPP         Sink         0         0x641         3.339,569         499         147         14,624           OK         SOP         GoodCRC         1         DPP         Sink         4         0x426 0xF00800148.0x0.0xF640000         3.339,569         499         147         14,740         Reserved (24.22)         0         Reserved (24.22)         0         Reserved (24.22)         0         Voin SGN/1 (300.011,01)         100 (2461001)         Voin SGN/1 (349,678         501         64         14,718         Voin SGN/1 (300.01,01)         100 (2461001)         Voin SGN/1 (349,678         501         64         14,718         Voin SGN/1 (300.01,01)         100 (246,011)         Voin SGN/1 (300.01,01) </td <td></td>	
OK         SOP         GoodCRC         3         UFP         Sink         0         0x841         3.338,569         499         147         14,700         Data Role Swap (25)         No (0)           OK         SOP         VDM         1         UFP         Sink         4         0x42x f0xF00000 3.339,583         10.29         515         14,730         Pasewol (21.2.20)         Dic (sefault)           OK         SOP         GoodCRC         1         DFP         Source         0         0x43t f0xe9000023         3,341.689         634         512         13,777         Mac Current (10.10x (b)         Voit in 50mV (1910)         100(5V)           OK         SOP         VDM         2         UFP         Sink         0         0x6147         3,344,219         501         641         14,718           OK         SOP         VDM         2         UFP         Sink         0         0x6147         3,344,219         501         631         14,208         Voit in 50mV (1910)         100(5V)           OK         SOP         GoodCRC         2         DFP         Sink         1         0x144 F0xF000022         3,343,522         631         552         14,238         Voue Core tot t01,00(6)         Vou	
OK         SOP         VDM         1         UFP         Sink         4         0x424F 0xF008041 0x900004B4 0x0 0xF6400000         3.338,583         1.029         515         14,734         Reserved (24.22)         0           OK         SOP         GoodCRC         1         DFP         Source         0         Add1         3.346,676         501         644         14,718         Peak Current (24.22)         0         Peak Current (24.22)         Peak Peak Peak Peak Peak Peak Peak Peak	
OK         SOP         GoodCRC         1         DFP         Source         0         Dx361         3.340,678         S01         64         14,718         Peak Current (21–20)         DiC (default)           OK         SOP         VDM         4         DFP         Source         1         Dx196F DxF5008002         3.341,689         634         512         13,777         Voin is SOM*(10)         100:00 (default)         Voin is SOM*(10)         100:02 (default)         Voin is SOM*(10)         100:	
OK         SOP         VDM         4         DFP         Source         1         Dx196F 0xF000002         3,341,889         634         512         13,777           OK         SOP         GoodCRC         4         UFP         Sink         0         0x841         3,342,472         498         149         14,762           OK         SOP         GoodCRC         2         UFP         Sink         0         0x44F 0x600802         3,343,282         631         552         14,723           OK         SOP         GoodCRC         2         DFP         Sink         0         0x44F 0x608082         3,343,219         501         561         14,023           OK         SOP         GoodCRC         2         DFP         Source         0         0x561         3,344,219         501         561         14,003           UM-Role Power (20)         No (0)         USB Source         0         0x561         3,344,219         501         661         14,009         100,070           Widt Role Power (20)         No (0)         USB Source         10         0x561         3,344,219         501         661         14,009         100,010         USB Source         100,010         USB Source <td></td>	
OK         SOP         GoodCRC         4         UFP         Sink         0         0x841         3.342,472         488         149         14,762         Max Current in 10nk (0 240(2.40A)           OK         SOP         VDM         2         UFP         Sink         1         0x14#F 0xFF008652         3.343,522         631         552         14,723           OK         SOP         GoodCRC         2         DFP         Source         0         0x661         3.344,219         501         66         14,690         Type (31.30)         Face           USB Supend Source         0         0x661         3.344,219         501         66         14,690         Type (31.30)         Face           USB Supend Source         0         0x661         Source         0         0x661         Source         14,890         14,040         14,090         Type (31.30)         Face           USB Source Source         0         0x661         Source         0         0x661         14,890         14,080         14,080         14,080         14,080         14,080         14,080         14,080         14,080         14,080         14,080         14,080         14,080         14,080         10,010         10,010 <td></td>	
OK         SOP         VDM         2         UFP         Sink         1         0x144F 0xF008082         3.343,522         631         552         14,23           IV         DK         SCP         GoodCRC         Z         DFP         Source         0         0x661         3.343,522         631         552         14,23           VDM         SCP         GoodCRC         Z         DFP         Source         0         0x661         3.344,219         501         86         14,690           VDM	
OK         SCP         QoodCRC         2         DFP         Source         0         bd561         3.344.219         501         86         14.690         Type (31.30)         Final           UM         SOP         QoodCRC         2         DFP         Source         0         bd561         3.344.219         501         86         14.690         Duil-Role Power (20)         No (0)           USB Suspend Support         No (0)         USB Suspend Support         No (0)         USB Suspend Support         No (0)           Data Role Swap (27)         No (0)         USB Communications C         No (0)         USB Communications C         No (0)           Data Role Swap (24.22)         0         Reserved (24.22)         0         Reserved (24.22)         0	
Dual-Role Power (29)         No. (0)           USB Suspend Support         No. (0)           Externally Powered (27)         No. (0)           USB Communications C         No. (0)           USB Communications G         No. (0)           Data Role Swap (25)         No. (0)           Data Role Swap (24)         No. (0)           Reserved (24, 22)         0           Reserved (24, 22)         0           Reserved (24, 22)         10	
USB Surgend Support         No (0)           Externally Powered (27)         No (0)           USB Communications C No (0)         USB Communications C No (0)           Data Role Swap (25)         No (0)           Reserved (24-22)         0           Reserved (24-12)         0	
Externally Powered (27) No (0) USB Communications C No (0) Data Role Swap (25) No (0) Reserved (2422) 0 Reserved (2422) 0 Reserved (2422) 0	
USB Communications C No (0) Data Role Swap (25) No (0) Reserved (2422) 0 Redef Current (2.120) ID/ (default)	
Data Role Swap (25)         No (0)           Reserved (2422)         0           Pack Furger (1212)         10 <sup>-</sup> (default)	
Reserved (24-22) 0 Payle (current (21-20) 100 (default)	
Peak Current (21, 20) IDC (default)	
a dan daman (Litter) ind (Ladada)	
Volt in 50mV (1910) 296(14.80V)	
Max Current in 10mA (9 200(2A)	

#### Figure 12. EZ-PD Analyzer Utility Showing PD Packets Captured on CC Line

EZ-PD Analyzer is running.

Whenever a Type-C device is connected to the Type-C port of the CY4531 CCG3 EVK, a PD contract is established between the CCG3 device and the attached Type-C device. The flow of CC messages as well as source and sink Power Data Objects (PDOs—used to expose source/sink port's power capabilities in the CC messages) between the power port partners can be monitored on the PC by using the EZ-PD Protocol Analyzer and running the EZ-PD Analyzer Utility. This information helps in debugging the CCG3 firmware if there are any issues (errors, delays, no contract, and so on) related to establishing the power contract between the CCG3 device and the attached Type-C device.

# 5 CCG3 Configuration Parameter Modification Example

Many CCG configuration parameters are stored in the configuration tables in the device's internal flash memory. You may need to make changes to these parameters based on system requirements and the end application. This section provides a simple example of a Type-C ecosystem to describe how to change the configuration parameters using the EZ-PD Configuration Utility and how to verify the changes using the CY4500 EZ-PD<sup>TM</sup> Protocol Analyzer.

Consider the example of a Type-C power adapter connected to the CY4531 CCG3 EVK. Assuming this Type-C power adapter supports a custom PDO, the power contract between it and the CCG3 device of CY4531 CCG3 EVK will be successfully established only if the CCG3 device supports the same custom PDO. The EZ-PD Configuration Utility allows you to modify parameters such as the sink or source PDOs without making any changes to the base firmware so that the CY4531 CCG3 EVK can successfully establish a power contract with the power adapter.

From a top-level perspective, the following are the steps to modify the CCG3 device's configuration parameters. The following sections explain each step in detail.

- 1. Test the CY4531 CCG3 EVK in the default configuration with a Type-C power adapter to identify the established power contract.
- 2. Update the configuration parameters (remove a sink PDO supported by the power adapter's custom PDOs such as 14.8V, 2A) using the EZ-PD Configuration Utility.
- 3. Program the updated configuration parameters into the CCG3 device using the EZ-PD Configuration Utility and verify.
- 4. Retest the CY4531 CCG3 EVK setup with a Type-C power adapter to verify the updated PDOs using the CY4500 EZ-PD Protocol Analyzer.



# 5.1 Test CY4531 CCG3 EVK Setup with the Default Configuration and Type-C Power Adapter

This section describes the steps to observe the behavior when the CY4531 CCG3 EVK with the default configuration parameters is connected to a Type-C power adapter. The voltage measured manually at the output header J7 is verified by using the CY4500 EZ-PD Protocol Analyzer as well.

- 1. Ensure that the CCG3 device of the CY4531 CCG3 EVK is programmed with the latest default binaries provided on the CCGx SDK webpage. As shown in Figure 13, ensure jumper J4 is set to 2-3 and jumper J3 is set to 1-2 positions.
- 2. Connect the Type-C power adapter (Apple 29W power adapter used as reference in this example) to the CY4531 CCG3 EVK, as shown in Figure 13. Connect a multimeter to power output header J7 of the CY4531 CCG3 EVK.
- 3. When the Apple Type-C power adapter is connected to the Type-C port of the CY4531 CCG3 EVK, the CCG3 device of the CY4531 CCG3 EVK will be able to establish a power contract with the power adapter, as it is configured for custom PDOs supported by this Type-C power adapter. Due to this, the power adapter will provide 14.8V, which is the established power configuration. This can be verified by measuring the voltage on the power output header J7 of the CCG baseboard using a multimeter. The output voltage on this header will be about 14.8V, which is the negotiated voltage supported by the Type-C power adapter.



Figure 13. CY4531 CCG3 EVK Connected to Type-C Power Adapter

- 4. This output voltage can also be verified using the CY4500 EZ-PD Protocol Analyzer and capturing a CC trace. Ensure that the latest version of the CY4500 EZ-PD Protocol Analyzer is downloaded and installed.
- 5. Disconnect all connections shown in Figure 13, and connect CY4500 EZ-PD Protocol Analyzer to the PC (USB host) using a Micro-USB cable.
- 6. Connect the Type-C plug of the CY4500 EZ-PD Protocol Analyzer to the Type-C port of the CCG3 EVK.
- Launch the EZ-PD Analyzer Utility from Windows > All Programs > Cypress > EZ-PD Analyzer Utility > EZ-PD Analyzer Utility and click on the Start Capturing icon shown in Figure 14 to start capturing the CC traffic.



Figure 14. Start Capturing Traffic in EZ-PD Analyzer Utility

	→ Start Capturing										
🕀 EZ	EZ-PD™ Analyzer Utility										
<u>F</u> ile	Actions	<u>H</u> elp									
<b>-</b> 1			)					Start delta : 0 u	Vbus Volt: 0 V	Detailed View	Vbus Current : 0 A
Dat ∢	a Filter : SC	P	Mess	ade		Msa II	)	Data Role Pow	ver Role 👻	Description	Value
SL#	Status	SOP	Message	Msg Id	Data Role	Power Role	Obj Count	Data	Start Tir (us)		
EZ-P	D Analyz	er is ru	unning.								

 Connect the Apple 29W USB-C power adapter to the Type-C receptacle of the CY4500 EZ-PD Protocol Analyzer (see Figure 15). Observe that the PD traffic is being captured on the EZ-PD Analyzer Utility. The utility running on the host PC should look similar to that in Figure 16.

Figure 15. Connecting CY4500 EZ-PD Protocol Analyzer to CY4531 CCG3 EVK



\_ **1**\_X



F7-PD™ Analyzer Litility

9. A successful PD contract can be seen from the PD message sequence. From Figure 16, it is clear that the Type-C power adapter used in this example (Apple 29W USB-C power adapter) is a DFP (Source/Power Provider) and the Type-C port of the CY4531 CCG3 EVK is a UFP (Sink/Power Consumer). Looking at the 'Vbus' column in Figure 16, it can be seen that the V<sub>BUS</sub> voltage is set to 14.8V at the end of the power contract negotiation.

Eile	Actions	Help												
<u>ا ا</u>											Start del	a: 0 us	Vbus Volt: 14.77 V	Vbus Current: 0.02 A
Data	Filter : SOF		Message			Asa ID		Data Role Power Role	Obi Count				Detailed View Trigger	
			message			ing in			obj obulit				Description	Value
SL#	Status	SOP	Message	Msg	Data	Power	Obj	Data	Start Time	Duration (us)	Delta (us)	Vbus (m)()	SOP Type	SOP
	ок	SOP	Source Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	88.146.676	767	0	5.137	Header	0x2161
2	OK	SOP	Source Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	88.150.089	767	2.646	5.126	Reserved (15)	0
3	ок	SOP	Source Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8			1.217	5.098	Data Objs (1412)	2
4	ок	SOP	Source Cap	0	DFP	Source	2	0x2161 0x80190Pg 0x4A0C8 SRC	2DO1: 5	/. 2.4A	150,552	5,208	Message Id (119)	0
5	ок	SOP	Source Cap	0	DFP	Source	2	0x2161 0x80190F0 0x40C8	88,306,796	767	2,636	5,148	Port Power Role (8)	SOURCE (1)
6	ок	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A008	88,308,780	767	1,217	5,159	Spec Rev (76)	Rev 2.0 (1)
7	ок	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	88,460,122	768	150,575	4,191	Port Data Role (5)	DFP (1)
8	ок	SOP	GoodCRC	0	UFP	Sink	0	0x41	88,461,035	499	145	5,131	Reserved (4)	0
9	ОК	SOP	Request	0	UFP	Sink	1	0x1042 0x2201685A	88,462,020	631	492	5,214	Msg Type (30)	Source Capabilities
10	ОК	SOP	GoodCRC	0	DFP	Source	0	0x161	88,462,719	500	62	5,142	Power Data Obj-Source 1	0x80190F0
11	ок	SOP	Accept	1	DFP	Source	0	0x363	88,463,719	501	500	5,164	Type (3130)	Fixed
12	ок	SOP	GoodCRC	1	UFP	Sink	0	0x241	88,464,367	498	147	5,170	Dual-Role Power (29)	No (0)
13	ок	SOP	PS_RDY	2	DFP	Source	0	0x566	88,555,311	500	90,446	14,701	USB Suspend Supported (28)	No (0)
14	ок	SOP	GoodCRC	2	UFP	Sink	0	0x441	88,555,960	498	149	14,663	Externally Powered (27)	Yes (1)
15	ок	SOP	VDM	3	DFP	Source	1	0x176F 0xFF008001	88,556,559	634	101	14,745	USB Communications Capable (26)	No (0)
16	ок	SOP	GoodCRC	3	UFP	Sink	0	0x641	88,557,342	498	149	14,734	Data Role Swap (25)	No (U)
17	ок	SOP	VDM	1	UFP	Sink	4	0x424F 0xFF008041 0x900004B4 0x0 0xF6400000	88,558,406	1,028	566	14,646	Reserved (2422)	0
18	ок	SOP	GoodCRC	1	DFP	Source	0	0x361	88,559,499	580	65	14,756	Vehic Fornik (2120)	IOC (default)
19	ок	SOP	VDM	4	DFP	Source	1	0x196F 0xFF008002	88,560,512	634	513	14,250	Volt in Somv (1910)	240(2.404)
20	ок	SOP	GoodCRC	4	UFP	Sink	0	0x841	88,561,291	498	145	14,707	Rever Data Obi Source 2	240(2.40A)
21	ок	SOP	VDM	2	UFP	Sink	1	0x144F 0xFF008082	88,562,431	631	642	14,657	Tune (21, 20)	Eived
22	ок	SOP	GoodCRC	2	DFP	Source	0	0x561	88,563,128	501	86	14,756	Dual Data Davias (20)	N= (0)
													LICE Support Supported (29)	No (0)
													Externally Drawsred (27)	No (0)
												、 、	LISB Communications Canable (26)	No (0)
												$\geq$	Data Role Swap (25)	No (0)
									SRC	PD02-1	4 8V 2A	$\neg$ $\land$	Pasarved (24 22)	0
									OILO	1 002. 1	4.0 <b>V</b> , 2A		Peak Current (21 20)	IOC (default)
													Volt in 50mV (19 10)	296(14.80)()
													Max Current in 10mA (9 0)	200(24)
													mat content in rollice (00)	200(23)
EZ-PD	-PD Analyzer is running.													

#### Figure 16. EZ-PD Analyzer Utility Showing PD Packets Captured on CC Line

- 10. The CC trace capture shown in Figure 16 shows that a power contract for 14.8 V is established, and the Type-C power adapter is providing 14.8 V to the device. During the power negotiation phase, the power provider (that is, the Type-C power adapter) sends the Source\_Capabilities message to the attached power consumer device (that is, the CY4531 CCG3 EVK). The Source\_Capabilities message in Figure 16 shows the custom PDOs (Power Data Obj-Source 1 and Power Data Obj-Source 2) supported by the Type-C power adapter.
- 11. The **Request** message after the **Source\_Capabilities** message is always sent by the power consumer device to request the power. Since the CCG3 device can establish a power contract for 14.8 V, it requests the PDO object at position 2, which corresponds to the 14.8V PDO. Refer to USB Power Delivery (PD) Spec Revision 2.0, Version 1.1 for more details on PD messages.
- 12. Looking at the 'Vbus' column in Figure 16 and as mentioned in step 9, it can be seen that the V<sub>BUS</sub> voltage is set to 14.8V at the end of the power contract negotiation. This confirms that at the initial stage of the setup, the power contract of 14.8V is established between the Type-C power adapter and the CY4531 CCG3 EVK.

## 5.2 Modify Configuration Parameters Using EZ-PD Configuration Utility

This section covers the steps for updating the configuration parameters and programming the CCG3 device using the EZ-PD Configuration Utility. Ensure that the latest version of EZ-PD Configuration Utility is downloaded and installed for successfully executing the steps described in this section.

- 1. Disconnect the hardware setup described in Test CY4531 CCG3 EVK Setup with the Default Configuration and Type-C Power Adapter.
- 2. As shown in Figure 17, ensure jumper J4 and J3 of CY4531 CCG3 EVK's daughter card are set to the 2-3 positions. Connect the CY4531 CCG3 EVK setup to the PC using a USB 2.0 Type-A to Mini-B cable. The CY4531 CCG3 EVK's daughter card's USB2.0 receptacle at the J7 connector (on the backside of the CCG3 daughter card) must be used for this setup as shown in Figure 17. Wait for driver detection and binding for the USB-Serial controller on the CY4531 CCG3 EVK.



#### Figure 17. Setting Up the CY4531 CCG3 EVK to Use with EZ-PD Configuration Utility



 Launch the EZ-PD Configuration Utility from Windows > All Programs > Cypress > EZ-PD Configuration Utility > EZ-PD Configuration Utility. If the device driver binding is successful, the GUI should report one device connected on the status bar of the GUI as shown in Figure 18.

Figure 18. EZ-PD Configuration Utility Showing Successful Connection to CY4531 CCG3 EVK

S EZ-PD Configuration Utility	
<u>File T</u> ools <u>H</u> elp	
Start Page	
CYPRESS'S USB TYPE-C SOLUTIONS	
USB Type-C is the new USB-IF standard that solves Type-C uses a slimmer connector - measuring only 2 The USB Type-C standard is gaining rapid support b multiple protocols and offer power delivery up to 100 C transceiver and a programmable ARM® Cortex®-N and monitors to market faster. More information on the	everal challenges faced while using today's Type-A and Type-B cables and connectors. USB 4-mm in height - to allow for increasing miniaturization of consumer and industrial products. 7 enabling small form-factor, easy-to-use connectors and cables with the ability to transmit 10%. Cypress offers the EZ-PD <sup>TM</sup> family of USB Type-C controllers with an integrated Type- 10 core. These controllers help you bring Type-C compliant cables, cables, notebooks, tablets are devices can be found here: <u>http://www.cypress.com/Type-C/</u>
The EZ-PD Configuration Utility is a Windows applic Cypress EZ-PD <sup>TM</sup> controllers. The tool also allows fi	ation that allows users to configure the parameters of a Type-C device implemented using the mware updates to be flashed onto the controller.
	Cypress Type-C EMCA Controller USB Type-C Cable (EMCA)
	*
Help Message	
Apprication Type is setze Setting EVENT, MASK to enable VDM events. RESET_COMPLETE event detected. Waiting for device to enter PD Contract with port partner. Could not establish PD contract USB-Serial [Dual Channel] (0)\$"NOTEBOOK 1&PORT(0)-DRP:	Save log
Device Discovery completed.	Į.
Device Connected: 1	



4. Select File > Read from Device, select NOTEBOOK in the USB-PD Device list as shown in Figure 19. Select the Bootloader Read checkbox and click on the Read button in the popup window to read the existing configuration as shown in Figure 19. The Bootloader Read checkbox causes the configuration to be read from the running firmware rather than the alternate firmware. Note that in your case, the running firmware may be FW1 and the alternate may be FW2. The version that is running does not matter in this case – the CCG device automatically runs whichever one was updated most recently.

Figure 19. Reading the Existing Configuration Table of the CCG3 Device of CY4531 CCG3 EVK

S EZ-PD Configuration Utility	
File Tools Help	
Rew Ctrl+N	
🕒 Open Ctrl+O	
Save As Ctrl+S	
Read from Device Ctrl+R	
U Exit	
Read From Device	2 <b>X</b>
USB Type-C is the new USB	Constant of the second s
cables and connectors. USB Select target:	
increasing miniaturization of Devices	Part Number: CYPD3125-40LQXI
power delivery up to 100 W.	Device Family: CCG3
C transceiver and a program PORT(0)-DRP	Application Type. NOTEBOOK
cables, cables, notebooks, ta	Alternate Einnungen EW(1 (1 0 2 402)
here: http://www.cypress.com	Altemate Firmware. FVV:1 (1.0.3.465)
The EZ-PD Configuration Ut	
device implemented using the	
the controller.	Configuration from FW2 will be read
Help Message	Reating day Read Cancel
Setting EVENT_MASK to enable V	
RESET_COMPLETE event detecte	Ready
Could not establish PD contract.	
USB-Serial [Dual Channel] (0)\$*NOTEBOOK:1&PORT(0)-DRP:1\$	=
Device Discovery completed.	
	·
Device Connected: 1	

5. The existing configuration will now be read, and will be displayed in the utility in a tree under CCGx Configuration in the left panel as shown in Figure 20. Device configuration parameters are classified into Device Parameters, Port Parameters, and User Parameters. For multi-port devices, there will be multiple copies of the port parameter entries. Port parameters are further classified and grouped into a hierarchical tree structure. In this example, select Device Parameters in the left panel.



S EZ-PD Configuration Utility			
<u>File Tools H</u> elp			
Start Page Configuration			
Start Page Configuration  CCGx configuration  CCGx configuration  Port 0  Device Parameters  Port 0  SVID Configuration  PDO  Source PDO 0  Source PDO 1  Source PDO 1  Source PDO 2  Source PDO 3  Sink PDO 0  Sink PDO 0  Sink PDO 1  Sink PDO 1  Sink PDO 2  Sink PDO 3  Sink PDO 4  Port Information  DP Mode Parameters	Parameters Part number	Value CYPD3125-40LQXI	
Lass Decomptore			
Help Message			
The device parameters node selects the the USB-IF VID and Mode value used by	e target device part number and specifies any device le CCG firmware to implement the unstructured flashing co	vel parameters that apply to this applic mmands in EMCA and Power Adapter	:ation. For example, this node will define r applications.
Device Connected: 1			CCG3: Notebook (Type: Peripheral)

#### Figure 20. Existing Configuration Table of the CCG3 Device in CY4531 CCG3 EVK

6. Select the Sink PDO option in the CCGx configuration list for Port 0 (this corresponds to the Type-C port of the CCG3 EVK). It can be seen that the CCG3 supports five sink PDOs listed as Sink PDO 0 – 4 as shown in Figure 21 and the window on the right will show the values of voltage and current corresponding to the selected PDO. For example, clicking on Sink PDO 2 will show the corresponding power profile of 14.8V, 900mA (expressed in units of 50mV, 10mA) in the main window. That is, 296 \* 50mV = 14.8V and 90 \* 10mA = 900mA.



	3				
Section Utility					
<u>F</u> ile <u>T</u> ools <u>H</u> elp					
	Add/	Remove			
Starl Page Configuration	В	uttons			
CCGx configuration		Type: Fixed supply   Fixed supply  Fixed sup	on power-up	Ensure "Enabled of power-up" is check	n ed
Device Parameters		Parameters	Value	power up to offeet	cu
Port 0     Discover Identity		Dual role power	No		
Device IDs		Higher capability	No		
SVID Configuration		Externally powered	No		
		USB communications capability	No		
Source PDO 0		Data role swap	No		
Source PDO 1	_	Voltage in 50mV units	296		
Source PDO 2	=	Operational current in 10mA units	90		
Source PDO 3		Sink give back	No	-	
Sink PDO 0		Min/Max operating current	90		
Sink PDO 1					
Sink PDO 2					
Sink PD0 3 Sink PD0 4					
Port Information					
DP Mode Parameters					
Power Protections	-				
Llaar Daramatara					
Help Message					
Sink Power Data Object (PDO) repres	sents the	e power sink capabilities of the device			
Device Connected: 1				CCG3: Noteb	ook (Type: Peripheral)

Figure 21	Sink PDOs	Supported I	by CCG3	Device o	f CY4531	CCG3 EVK
1 19010 21.		ouppontou i	,	001100 0	011001	0000 - 11

- 7. Select the Sink PDO2 in the left panel and click on the Remove (-) button to delete it.
- 8. Click on the **Save As** icon to save the modified configuration as shown in Figure 22. The modified configuration is saved as an XML file. A *.cyacd* and a *.c* file will be saved in the same location.

For more details on the functionality related to the EZ-PD Configuration Utility, refer to its user manual by clicking here. You can also open the user manual by choosing **Help** > **User Manual** in the EZ-PD Configuration Utility, as shown in Figure 11.



Figure 22.	Saving Modified	Configuration i	in EZ-PD Configuration Utility
0	0	0	

S EZ-PD Configuration Utility	
Eile     Lools     Help       Save As       Button	
Start Page Configuration	
CCGx config	Search CYPD3125-40L 👂
Device F □ Port 0 Organize ▼ New folder	≣ - 2
Disce Arrorites	Date modified Type
SVID ■ PDO ■ PDO ■ CYPD3125-40LQXI-config.xml	6/13/2016 5:23 PM XML Dod
S Downloads	
E Si Elbraries	
S Pictures	
DP M Subversion Powe B Videos	
User Pa	
Help Messan	
Sink Power Data Save as type: XML Files (*.xml;)	
	Save
Hide Folders	
Device Connected: 1	CCG3: Notebook (Type: Peripheral)

# 5.3 Program CCG3 Device with Updated Configuration Parameters Using the EZ-PD Configuration Utility

This section describes how to update the configuration parameters of a CCG3 device using the EZ-PD Configuration Utility. After the modified configuration table is saved, follow the steps below to update the configuration table in the CCG3 device using the EZ-PD Configuration Utility.

- 1. Ensure steps 1 to 8 of the Modify Configuration Parameters Using EZ-PD Configuration Utility section are successfully completed.
- 2. Select Tools > Configure Device as shown in Figure 23. A new window Configure Device opens where the target device to be programmed can be selected. Select Notebook as the target device, select the appropriate *cyacd* file to be programmed, and then click on the Program button as shown in Figure 24. Note that since the Normal Flashing option was selected as shown in Figure 24, the selected configuration file updates the configuration parameters of the firmware that is not running, i.e., the alternate firmware. This option also causes the running firmware to be switched at the end of the configuration update. Therefore, in this case, the alternate mode firmware will become the running firmware after the configuration update is complete and the device is reset.



🕝 EZ-I	PD Configuration Utility	
File	Tools Help	
F	Firmware Update Ctrl+F	
	Configure Device Ctrl+U	
Start P	EMCA Batch Programmer	
+	Dongle Batch Programmer	the root n
= C(	options	
	Device Parameters Port 0 Discover Identity Device IDs SVID Configuration	

Figure 23. Selecting "Configure Device" in EZ-PD Configuration Utility

Figure 24. Updating CCG3 Device's Configuration Table using EZ-PD Configuration Utility

S EZ-PD Configuration Utility	<u> </u>
File Tools Help	
Start Page Configuration	
This is the root node encapsulating all of the configuration settings for the CCGx controller.	
Port0	
Discol De Configuration file: C:\Users\vgt\Desktop\Desktop\CCG\CCG3\Firmware\modified xml 6-13-2016\re	
SVID Firmware file:	
So Select target:	
Devices     Part Number: CYPD3125-40LQXI	
I USB-Serial (Dual Channell (0)     Device Family: CCG3     NOTEBOOK     Application Type: NOTEBOOK	
□ Sir PORT(0)-DRP Running Firmware: FW:2 (1.0.3.463)	
Alternate Firmware: FW:1 (1.0.3.463)	
Portiri	
DP Mi Powel	
User Pan	
Help Message	
Setting EVENT Advanced option: Normal Flashing    Program Cancel Cle	ar
Could not establing Ready	loa
CYPD3125-40LQXIsCCG3\$NOTEBOOK\$FW:2 (1.0.3.463)\$FW:1 (1.0.3.463)	=
	~
Device Connected: 1	

3. The successful programming of the new configuration file will be indicated by a message box with the message **Flashing Configuration Succeeded**. Click **OK**. The **Message** window at the bottom of the utility also shows progress during the update process as shown in Figure 25. This shows that the configuration table of the CCG3 device of the CY4531 CCG3 EVK is successfully updated.



EZ-PD Configuration Utility
ile Tools Help
tart Page Configuration
CCCsx configuration         Device Parameters         Port0         Discover Identity         Device IDs         SVID Configuration         PD0         Source PD0         Source PD01         Source PD02         Source PD03         Sink PD03         Sink PD01         Sink PD01         Sink PD02         Sink PD03         PotInformation         DP Mode Parameters         PotInformation         DP Mode Parameters         Power Protections
elp Message
ilicon ID of the device is 0x1d04 ending enter flashing mode command rogramming data from file: C:\Users\vgt\Desktop\Desktop\CCG\CCG3\Firmware\modified xml 6-13-2016\remove pdo2 463.cyacd If flash rows updated. Validating downloaded firmware checksum alidating firmware image irmware image (FW:1) is valid onfig Table update completed. Please reset device to activate the new configuration. lash update procedure succeeded.
evice Connected: 1 100 %

#### Figure 25. Message Showing Configuration Parameters Successfully Updated

- 4. Reset the CY4531 CCG3 EVK. This can be done by cycling the power to the kit or by pressing the reset switch SW1 on the CCG3 daughter card in order to reflect the modified configuration on the CCG3 device.
- 5. As mentioned previously, in the CCG3 application firmware, two copies of the firmware (FW1 and FW2) are used for fail-safe operation. One is called the running firmware and the other is called the alternate firmware. As shown in Figure 19, FW2 is the one that will be read because the **Bootloader Read** option is checked, which reads the running firmware. As shown in Figure 24, since **Normal Flashing** option is selected, the EZ-PD Configuration Utility updates the alternate firmware while the running firmware is being executed. Hence, it updates FW1 in this example. After the flash configuration is updated successfully and the device is reset, the CCG3 device bootloader is designed in such a way that the last updated firmware image becomes the running firmware. Hence, when the configuration table is read back as shown in Figure 26 with the **Bootloader Read** option selected, the FW1 image will be read, which is the firmware copy that was updated.
- Repeat steps 4 and 5 of the Modify Configuration Parameters Using EZ-PD Configuration Utility section in order to read back the updated configuration table from the CCG3 device and verify. Notice that as shown in Figure 19, FW2 was read, as shown in Figure 24, FW1 was updated, and after recycling power from step 4 above, FW1 will be read as shown in Figure 26.
- As shown in Figure 27, it can be seen that the CCG3 device of the CY4531 CCG3 EVK now only supports four sink PDOs listed as PDO 0 – 3, and not five PDOs as shown in Figure 20 earlier. Also note that PDO 2 no longer supports the power profile of 14.8V, 900mA.



C EZ-PD Configuration Utility		X
Eile Iools Help		
StartPage Configuration		
CCGx configuration     CGx configuration		
Device Parameters		
Discover Identity		
Device IDS     SVID Configuration       SVD Configuration     Pevices       PD0     Devices Family:     CYP03125-40LQXI       Device PC     USB-Serial [Dual Channel] (0)     Device Family:     CCG3       Source PD     PORT(0)-DRP     Application Type:     NOTEBOOK       Source PC     PORT(0)-DRP     Running Firmware:     FW:1 (1.0.3.463)       Source PD     Sink PDO     Sink PDO     Alternate Firmware:     FW:2 (1.0.3.463)       Sink PDO     Sink PDO     Sink PDO     Configuration from FW1 will be read       P Mode Parameters     User Parameters     Configuration from FW1 will be read		
Refresh     Read     Cancel		
Help Message Ready		_
RESET_COMPLETE events	Clear	1
Could not establish PD contract. USB-Serial IDual Channell (/01stNOTEBOOK 18PORT/01-DRP 15	Save log	j
Device Discovery completed CYPD3125-40LQXI\$CCG3\$NOTEBOOK\$FW:1 (1.0.3.463)\$FW:2 (1.0.3.463) Get CCGx firmware version completed.	Jave log	▼ 
Device Connected: 1		

Figure 26. Reading back Updated Configuration Table of CCG3 Device using EZ-PD Configuration Utility

Figure 27. Verifying the Updated Configuration Table in CCG3 device using EZ-PD Configuration Utility

S EZ-PD Configuration Utility			
<u>File Tools H</u> elp			
Start Page Configuration			
	Type: Fixed supply	on power-up	
CCGx configuration	Parameters	Value	
Port 0	Dual role power	No	
Discover identity	Higher capability	No	
SVID Configuration	Externally powered	No	
PD0	USB communications capability	No	
Source PDO 0	Data role swap	No	
Source PDO 1	Voltage in 50mV units	300	
Source PDO 2	Operational current in 10mA units	90	
Sink PDO	Sink give back	No	
Sink PDO 0	Min/Max operating current	90	
Sink PDO 1			
Sink PD02			
Port Information			
DP Mode Parameters			
Power Protections			
Oser Parameters			
·			
Help Message			
Sink Power Data Object (PDO) represent	nts the power sink capabilities of the device		
Device Connected: 1			CCG3: Notebook (Type: Peripheral)



# 5.4 Re-test CY4531 CCG3 EVK Setup with Modified Configuration and Type-C Power Adapter

This section describes the steps to observe the behavior when the CY4531 CCG3 EVK with modified configuration parameters is connected to the Type-C power adapter. The same Apple 29W power adapter referenced in the earlier section is used in this section as well.

- 1. Disconnect all connections shown in Figure 17, and connect CY4500 EZ-PD Protocol Analyzer to the PC (USB Host) using a micro-USB cable. Ensure that jumper J4 of the CY4531 CCG3 EVK's daughter card is set to 2-3 position and its jumper J3 is set to 1-2 position.
- 2. Connect the Type-C plug of the CY4500 EZ-PD Protocol Analyzer to the Type-C port of the CCG3 EVK.
- Launch the EZ-PD Analyzer Utility from Windows > All Programs > Cypress > EZ-PD Analyzer Utility > EZ-PD Analyzer Utility and click on the "Start Capturing" icon shown in Figure 14 to start capturing the CC traffic.
- 4. Connect the Apple 29W USB-C power adapter to the Type-C receptacle of the CY4500 EZ-PD Protocol Analyzer (as shown in Figure 15). Observe that the PD traffic is being captured on the EZ-PD Analyzer Utility.
- From analyzing the CC traffic and looking at the V<sub>BUS</sub> voltage at the end of the captured data as shown in Figure 28, it can be seen that a successful PD contract is established at 5V this time with the Type-C power adapter providing 5V to the Type-C port of the CCG3 EVK.

Figure 28. CC Trace Showing Power Contract Establishment @ 5V with Modified Configuration Parameters

Bill Martine Help       Start with Help       <	Neg D         Data Role         Power Role         Obj Count         Description         Vota Current:         0.05 A           DFP         Source         2         0x1218         Description         Vota Source         2         Description         Vota Current:         0.05 A           DFP         Source         2         0x1218         Description         Vota         Vota Current:         0.05 A           DFP         Source         2         0x1218         Description         Vota         Vota         Vota         Vota         Description         Vota         Vota         Vota         Vota         Description         Vota         Vota         Vota         Vota         Vota         Description         Vota         Vota <th>Bit Matter       Statu bit       Statu bit<th>Article         Link dia Both         Charles         Status         &lt;</th><th>1007077</th><th>TO Minutyp</th><th>er otinty</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>Mercell</th></th>	Bit Matter       Statu bit       Statu bit <th>Article         Link dia Both         Charles         Status         &lt;</th> <th>1007077</th> <th>TO Minutyp</th> <th>er otinty</th> <th></th> <th>Mercell</th>	Article         Link dia Both         Charles         Status         <	1007077	TO Minutyp	er otinty												Mercell
L → E & D × L         Start delta:         Start delta	Nag D         Data Role         Power Role         Olg Court         Usu Voti: 512V         V bus Current: 0.05 A           Ng D         Data Role         Power Role         Olg Court          Power Role         Olg Court           Ng D         Role         Own Role         Data         Olg Court         Power Role         SOP Type         SOP	Link         Start delta:         31.467.us         Una Volt:         31.27.us         Una Volt:         31.27.us<	L → L → L → L → L → L → L → L → L → L →	e	Actions	Help												
Interface         Mg D         Data Role         Power Role         Og Court         Desting Very         Des	Mg D         Data Role         Power Role         Obj Court         Define Version         Output State Tame         Define Version         Object Version         Define Version           DFP         Source         2         0x181 dod1100° 0x4A0C3         10.349.897         707         0         5.192         Reserved (15)         0           DFP         Source         2         0x2161 dod1100° 0x4A0C3         10.349.897         707         0         5.192         Reserved (15)         0           DFP         Source         2         0x2161 dod1100° 0x4A0C3         10.354.396         788         1.217         5.113           DFP         Source         2         0x2161 dod1100° 0x4A0C3         10.056.384         788         1.217         5.112           DFP         Source         2         0x2161 dod1100° 0x4A0C3         10.056.384         788         1.217         5.122           DFP         Source         2         0x2161 dod1100° 0x4A0C3         10.056.387         10.066.90         5.102           DFP         Source         2         0x2161 dod1100° 0x4A0C3         10.066.353         501         6.19         1.49           DFP         Source         0         0x11         0.0653.51         501 <t< td=""><td>Here:SOP         Message         Mg D         Data Role         Power Role         Obj Cout           A         Status         SCP         Message         Mg D         Data         Power Role         Obj Cout         Detain         Detain&lt;</td><td>Here:::::::::::::::::::::::::::::::::::</td><td></td><td></td><td>o Ko Ko</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Start delta</td><td>a: 314,672 u</td><td>Vbus Volt : 5.1</td><td>2 V Vbus Current : 0.05 A</td></t<>	Here:SOP         Message         Mg D         Data Role         Power Role         Obj Cout           A         Status         SCP         Message         Mg D         Data         Power Role         Obj Cout         Detain         Detain<	Here:::::::::::::::::::::::::::::::::::			o Ko Ko									Start delta	a: 314,672 u	Vbus Volt : 5.1	2 V Vbus Current : 0.05 A
#         Bittin         StorP         Mussage         Mg         Order         Power Role         Obj         Dota         Start Time (ts)         Duration (us)         Delta (us)         Venue (ts)         Description         Venue (ts)           OK         SOP         Source, Cap 0         0         DP         Source, Cap 0         0	Protect Robin	#         Brahm         SOP         Massage         Mig         Deal         Data         Data         Statu Time         Duration (w)         Num         Num         Deal         Num           0K         SOP         Source, Cap         0         DFP         Source         2         0d/161 0d/019/0 0eAACC3         10.38/412         787         0.6         5.192         Reserve (1)         0         Deal         0/161 0d/019/0 0eAACC3         10.38/412         787         1.585         5.020         Pice         8.000         Deal         0.0110 000000         Deal         0.0110 000000         Deal         0.0110 0000000         Deal         0.0110 0000000         Deal         0.0110 00000000         Deal         0.0110 00000000         Deal	#         Stear         Sort         Main         Date         Point         Date         Date <thd< td=""><td>ata</td><td>Filter : SOP</td><td></td><td>Message</td><td></td><td>M</td><td>sg ID</td><td></td><td>Data Role Power Role</td><td>Obj Count</td><td></td><td></td><td></td><td>Detailed View Trigger</td><td></td></thd<>	ata	Filter : SOP		Message		M	sg ID		Data Role Power Role	Obj Count				Detailed View Trigger	
Uf         Start         SDP         Message         Mage         Desc         Desc         Start         SDP         Deschange         SDP	Data Press         Work         Obj Communication         Data Communication         Data Communication         Data Communication         Description         Soft Type	Uf         Statu         SOP         Massage         Mail         Produ         Open         Statu         Openation (up)         Deats (up)         Deats (up)         Openation (up)         Deats (u	If the sort is sort if the sort is sort	_		_			-					_	-		Description	Value
OK         SOP         Source, Cap         0         OPP         Source         2         Av211 hd011967 0+4AOC3         10.348.907         797         0         8.182         Reader         Old         Op           OK         SOP         Source, Cap         0         DPP         Source         2         0x2151 hd0119670 0+4AOC3         10.354.366         787         1.655         5.203           OK         SOP         Source, Cap         0         DPP         Source         2         0x2151 hd0119670 0+4AOC3         10.355.34         788         150.670         5.109         Deta O[6] (14.12)         1           OK         SOP         Source, Cap         0         DPP         Source         2         0x2151 hd0119670 0+4AOC3         10.956.534         788         150.670         5.109         Port Power Role (3)         SNU(0)           OK         SOP         Source, Cap         0         DPP         Source         2         0x2151 hd011970 0+4AOC3         10.952.573         198         15.170         Norte Deat Dia (14.170)         Port Power Role (3)         SNU(0)           OK         SOP         Source Cap         0         DPP         Source Cap         0         De1151 hd0119707 0+4AOC3         10.963.531	DPP         Surver         2         0x2161 bd01106F0 0x4A0C3         10.349 0y7         2 F7         0         5,122         Rescurver         0x161 bd01106F0 0x4A0C3         10.349 0y7         2 F7         0         5,122         Rescurver         0x161 bd01106F0 0x4A0C3         10.352 x112         7 F7         1.658         5,023           DFP         Source         2         0x2161 bd01106F0 0x4A0C3         10.352 x112         7 F7         1.658         5,023           DFP         Source         2         0x2161 bd01106F0 0x4A0C3         10.055 834         7 88         12.17         5,162           DFP         Source         2         0x2161 bd01106F0 0x4A0C3         10.055 834         7 88         12.17         5,162           DFP         Source         2         0x2161 bd01106F0 0x4A0C3         10.055 834         7 88         12.17         5,162           DFP         Source         2         0x2161 bd01106F0 0x4A0C3         10.055 837         150         150         67.2         5,120           DFP         Source         0         0x161         10.065 335         501         61.4         1,144           DFP         Source         0         0x656         10.0665.579         501         1.689	OK         SOP         Source_Dap         0         OPP         Source         2         Dot 100 0000 0044003         10.349 987         977         0         5,127           OK         SOP         Source_Dap         0         DPP         Source         2         Dot 151 00010970 044003         10.352,412         767         1,658         5,003           OK         SOP         Source_Dap         0         DPP         Source         2         Dot 151 00010970 044003         10.352,412         767         1,658         5,003           OK         SOP         Source_Dap         0         DPP         Source         2         Dot 151 00010970 044003         10.352,412         768         1,217         5,115           OK         SOP         Source_Dap         0         DPP         Source         2         Dot 151 00010970 044003         10.565,263         768         1,217         5,116         Sone Part Das Reid (5)         UFP (5)         Reservel (1)         Port Das Reid (5)         UFP (5) <th< td=""><td>OK         SOP         Source, Cap         0         DPP         Source         2         Av211 Mo119670 0+4AOC3         10.349.077         797         0         8.182           OK         SOP         Source, Cap         0         DPP         Source         2         0x111 Mo119670 0+4AOC3         10.352,412         787         1.658         5.003           OK         SOP         Source, Cap         0         DPP         Source         2         0x111 Mo119670 0+4AOC3         10.352,412         787         1.658         5.001           OK         SOP         Source, Cap         0         DPP         Source         2         0x111 Mo119670 0+4AOC3         10.056,354         788         10.0670         5.100         Per-Power Pole (7)         Per-Power Pole (7)</td><td></td><td>Status</td><td></td><td>Message</td><td>Msg</td><td>Bole</td><td>Role</td><td>Count</td><td>Data</td><td>Start Time (us)</td><td>Duration (us)</td><td>Delta (us)</td><td>Vbus (mV)</td><td>SOP Type</td><td>SOP</td></th<>	OK         SOP         Source, Cap         0         DPP         Source         2         Av211 Mo119670 0+4AOC3         10.349.077         797         0         8.182           OK         SOP         Source, Cap         0         DPP         Source         2         0x111 Mo119670 0+4AOC3         10.352,412         787         1.658         5.003           OK         SOP         Source, Cap         0         DPP         Source         2         0x111 Mo119670 0+4AOC3         10.352,412         787         1.658         5.001           OK         SOP         Source, Cap         0         DPP         Source         2         0x111 Mo119670 0+4AOC3         10.056,354         788         10.0670         5.100         Per-Power Pole (7)		Status		Message	Msg	Bole	Role	Count	Data	Start Time (us)	Duration (us)	Delta (us)	Vbus (mV)	SOP Type	SOP
OK         SOP         Source, Dap         0         DPP         Source         2         0x2161 Dd0106F0 0x4A0C5         10.352.412         787         1.658         5.028         Reserved (15)         0           OK         SOP         Source, Dap         0         DPP         Source         2         0x2161 Dd01106F0 0x4A0C5         10.352.412         786         1.217         5.115         Description         Description         Description         Description         Description         Source         2         0x2161 Dd01106F0 0x4A0C5         10.505.344         788         10.8070         5.109         Description         Source         2         0x2161 Dd01106F0 0x4A0C5         10.505.242         787         2.840         5.169         Porework 66(10)         SPIN         Source         2         0x2161 Dd01106F0 0x4A0C3         10.505.242         787         19.84         15.00         Porework 66(10)         SPIN         Porework 66(10)         Porework 6	DFP         Surce         2         0x216 1.0d019670 0x4A0C5         10,352,412         747         16.88         5,003         Reserved (15)         0           DFP         Surce         2         0x216 1.0d019670 0x4A0C5         10,352,412         747         1,58         5,003         Reserved (15)         0           DFP         Surce         2         0x216 1.0d019670 0x4A0C5         10,355,834         768         1217         5,116         Port 0x40000         <	OK         SOPE         Source, Dap Source, Dap S	OK         SOP         Source, Dep         0         DPF         Saurce         2         0x161 0x01967 0x440C3         10.352.412         797         1.658         5.203         Reserved (15)         0           OK         SOP         Source, Dap         0         DPF         Source         2         0x2161 0x019760 0x440C3         10.355.814         786         150.070         5.109         Persona (15)         0         Mesong 14 (1.1.9)         0           OK         SOP         Source, Dap         0         DPF         Source         2         0x2161 0x019760 0x440C3         10.505.242         787         2.440         5.140         Persona (1.1.9)         0           OK         SOP         Source, Cap         0         DPF         Source         2         0x2161 0x019760 0x440C3         10.557.277         19         17.27         1.18         Persona (1.0.9)         Persona (1.0.		ОК	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,349,987	767	0	5,192	Header	0x1042
OK         SOP         Source_Opp         0         DPP         Source         2         Dota10109FD 0e4AOC3         10.554.368         788         1.217         5.116         Date Obje(14.12)         1           OK         SOP         Source_Opp         0         DPP         Source 2         0.2151 0.001109FD 0e4AOC3         10.553.45         788         120.877         5.106         Port Power Folder, 0         SNUTC         9         Port Power Folder, 0         SNUTC         Port Power Folder, 0         SNUTC         Port Power Folder, 0         SNUTC         Port Power Folder, 0         Port Power F	DFP         Source         2         0x2161 Dd01196F0 0x4A0C3         10.345.306         7.88         1.217         5.115         Data Clop (1422)         1           DFP         Source         2         0x2161 Dd01196F0 0x4A0C3         10.550.834         768         1.50.670         5.108           DFP         Source         2         0x2161 Dd01196F0 0x4A0C3         10.550.834         768         1.247         5.108           DFP         Source         2         0x2161 Dd01196F0 0x4A0C3         10.051.226         788         1.27         5.102           DFP         Source         2         0x2161 Dd01196F0 0x4A0C3         10.052.578         498         47.2         5.108           UFP         Sink         0         0x14         10.655.381         501         61         4.114           DFP         Source         0         0x161.5010160:A         10.066.303         501         61         4.114           DFP         Source         0         0x665.1010160:A         10.066.303         501         1.08         61           DFP         Source         0         0x614         10.066.572         501         1.08         502           DFP         Source         0	OK         SOP         Source, Cap         0         DIP         Source         2         0x161 0x010970 0x4A0C3         10.354.386         788         1.217         8.118         Data Cig (14.12)         1           OK         SOP         Source, Cap         0         DIP         Source         2         0x2161 0x010970 0x4A0C3         10.559.242         763         5.060         5.164           OK         SOP         Source, Cap         0         DIP         Source         2         0x2161 0x010970 0x4A0C3         10.559.242         763         5.164         10.863.94         10.875         5.164         Nessey 61 (13.27         5.118           OK         SOP         Source, Cap         0         DPP         Source         2         0x2161 0x010970 0x4A0C3         10.852.868         788         15.127         5.118         Nessey 61 (13.27         9.18         Nessey 61 (13.27         Nestex 61 (13.2	OK         SOP         Source_Cap         0         OPP         Source         2         0x111 0x1010F0 0x4A0C3         10.354.306         788         1.217         5.115         Desc Sp(1,4,12)         1           OK         SOP         Source_Cap         0         DFP         Source         2         0x2161 0x1010F0 0x4A0C3         10.505.342         786         150.670         5.164         Per Power Role (3)         SNIK (0)           OK         SOP         Source_Cap         0         DFP         Source         2         0x2161 0x010F0 0x4A0C3         10.512.24         786         1.217         5.182         Per Pow Role (3)         SNIK (0)           OK         SOP         Source_Cap         0         DFP         Source         2         0x2161 0x010F0 0x4A0C3         10.513.248         788         1.217         5.182         Per Over Role (3)         SNIK (0)           OK         SOP         Source_Cap         0         DFP         Source         0         0x118 0x010F0 0x4A0C3         10.683.578         501         5.182         Per Over Role (3)         UP (0)         Per Over Role (3)         UP (0)         Per Over Role (3)         SNIK (0)         Source (50 Carce)         0         0.4121         10.695.505         501		OK	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,352,412	767	1,658	5,203	Reserved (15)	0
OK         SOP         Source_Cape         0         OPP         Source         2         Odd1916/F0 (be4OCS         10,85,814         788         10,8670         5.100         Message 1(1,19)         0         O           OK         SOP         Source_Cape         0         DPP         Source         2         0d2116 100119670 0b4AOCS         10,852,842         787         2,840         5.164         Spec Rev (7,8)         Rescape 10,01         DPP Source         2         0d2116 100119670 0b4AOCS         10,852,857         788         10,869         5.120         Photen Reid (7,8)         Rescape 10,01         Dep Rev (7,8)         Rescape 10,01	DFP         Source         2         0x161 dx011960 0x4A0C8         10,500,834         78.8         150,70         51,00         Message (11.9)         0           DFP         Source         2         0x2161 dx011960 0x4A0C8         10,500,834         78.8         150.8         Pol Twen Toke (10.9)         SMK (0)           DFP         Source         2         0x2161 dx011960 0x4A0C8         10,511,226         78.8         150.89         51.20           DFP         Source         2         0x2161 dx011960 0x4A0C8         10,551,226         78.8         150.89         51.20           DFP         Source         2         0x2161 dx011960 0x4A0C8         10,652,650         78.8         150.89         51.20           DFP         Source         0         0x161 dx011960 0x400C8         10,662,553         501         161         41.47         51.50           DFP         Source         0         0x663         10,666,353         501         61         41.41         50.00           DFP         Source         0         0x664         10,666,252         691         160.01         51.50           DFP         Source         0         0x676 0x671 0.60001         10,666,252         51.1         10.69	OK         SOP         Source, Cap         0         DFP         Source         2         Dot161 dot101670 0+4AOC3         10.050.834         788         150.70         5.108         Message (11.3)         U           OK         SOP         Source, Cap         0         DFP         Source         2         0.2161 dot101670 0+4AOC3         10.052.842         787         2.646         5.164           OK         SOP         Source, Cap         0         DFP         Source         2         0.2161 dot101670 0+4AOC3         10.052.842         786         15.0699         5.120         Port Tose Role (0         JPP To	OK         SOP         Source, Cap         0         DFP         Source         2         Dol210         Dol210         10.505.814         788         10.6070         5.104         Hersage 1(1.19)         0           OK         SOP         Source, Cap         0         DFP         Source         2         Dol210         10.60106/00 AdOC3         10.51228         788         12.017         5.182         Source         2.017         Dol210         Dol2100         Dol2100         Dol		OK	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,354,396	768	1,217	5,115	Data Objs (1412)	1
OK         SOP         Source Cape         0         DPP         Source         2         0.02191 000190F0 0x440C3         10.509.422         787         2.404         5.164         Port Power Role (b)         SMR (b)           OK         SOP         Source, Cape         0         DPP         Source         2         0.02191 000190F0 0x440C3         10.509.422         787         2.404         5.164         Port Power Role (b)         SMR (b)           OK         SOP         Source, Cape         0         DPP         Source         2         0.02191 000190F0 0x440C3         10.562.578         492         147         5.162         Port Power Role (b)         UPP (b)         Rearvad (1)         0         0         493         10.01         5.112         Port Des Role (b)         UP (b)         Rearvad (1)         0         0         1.01         4,114         1.01         5.108         1.01         1.01         Rearvad (1)         0         0         1.01         1.01         1.01         1.01         Rearvad (1)         0         0         0         0         0         0         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01	DFP         Source         2         0x2161 Dd0119670 0x4A0C3         10.0502.42         787         2.480         5,164         Port Power Role (0)         SMR (0)           DFP         Source         2         0x2161 Dd0119670 0x4A0C3         10.511.226         786         1.217         5,162         Spec PC (7.6)         Rev 2.0 (1)           DFP         Source         2         0x2161 Dd0119670 0x4A0C3         10.0626.83         786         150.699         5.126         Spec Port Dole Role (5)         UFP (0)           UFP         Since         0         0x11         10.0625.837         499         147         5.186         Neg Type (3.0)         Request           UFP         Since         0         0x181         10.065.031         501         5.18         Neg Type (3.0)         Request           UFP         Since         0         0x181         10.065.012         493         114         5.48         Neg Type (3.0)         Request           UFP         Since         0         0x641         10.0665.012         493         146         5.104         Neg Type (3.0)         0         Opec Postion (3.0.20)         Ne (0)           UFP         Sink         0         0x614         10.0665.025         499<	OK         SOP         Source_Cap         0         DPP         Source         2         0x2161 0x010967 0x4A0C3         10.056242         787         2.640         5.141         Spec Par, 7.0         5.162           OK         SOP         Source_Cap         0         DPP         Source         2         0x2161 0x010967 0x4A0C3         10.0562482         766         1.217         5.192           OK         SOP         Source_Cap         0         UPP         Source         0         0x161 0x010967 0x4A0C3         10.0562483         766         1.217         5.192           OK         SOP         Source_Cap         0         UPP         Source         0         0x17         Column         10.06531         100         1.017         5.142         Mag 199 0.0         Mag 1	OK         SOP         Source_Cap         0         DPP         Source         2         0x211 0d01967 0x4A0C3         10.509.242         787         2.640         5.14         Port Power 1066 (b)         SNR (b)           OK         SOP         Source_Cap         0         DPP         Source         2         0x211 0d01967 0x4A0C3         10.512.28         788         1.217         5.182         Port Power 1066 (b)         SPR (c)         Det Data Tobic (c)         UP to Table 106		OK	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,505,834	768	150,670	5,109	Message Id (119)	0
OK         SOP         Source_Cap         0         DPP         Source         2         0d2161 0d019670 0x440C8         10.511.28         788         1.217         5.120         Feer V(r, 0)	DFP         Source         2         0x2161 dx01196F0 0x4A0C8         10.511.226         78.8         12.7         5.192         Spec Ter (7.6)         Rer 20 (1)           DFP         Source         2         0x2161 dx01196F0 0x4A0C8         10.962.578         49         10         9.10         PDT DateRels (5)         PPC (0)           PP         Source         0         0x1         10.062.578         49         11         5.10         PDT DateRels (5)         PPC (0)           PP         Source         0         0x1012 0x1xx166A         0x65.51         501         51         51         61         4.11           DFP         Source         0         0x65         10.0665.379         501         516         510         10         PDT DateRel (5)         PDT DateRel (5)         PDT DateRel (5)         10           DFP         Source         0         0x66         10.0665.79         501         516         510         10         10         PDT DateRel (5)         No (0)           DFP         Source         0         0x614         10.067.07         49         145         510         No (0)           UFP         Six A         0x6424 CoF000041 0x0000484 0x0 0x640000         10.077.07         <	OK         SOP         Source, Cop Source, Cop So	OK         SOP         Source, Cap         0         DFP         Source, 2a         0.2411 dd019670 0+4AOC8         10.511.226         788         1.217         5.132         File		OK	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,509,242	767	2,640	5,164	Port Power Role (8)	SINK (0)
OK         SOP         Source Cap         0         UPP         Source         2         0.02161 000199F0 0x440C3         10.082.663         788         150.689         51.20         Port Delta Note (s)         UP (l)           CK         SOP         Good/FC         0         UP         Source         1         10.682.663         788         150.689         51.20         Port Delta Note (s)         UP (l)         0           CK         SOP         Good/FC         0         UP         Source         0         0.611         10.685.51         Sol 1         6.3         4.147         Hearwold (l)         0         Hearwold (l)         0         Hearwold (l)         0         Resurved (l)         0         DOK         SOP         Good/FC         0         UP         Source 1         0.643         10.0685.51         Sol 1         6.11         4.114         Hearwold (l)         0         DOK         SOP         Good/FC         1         UP         Source 1         0.643         10.0687.57         501         1.663         5.189         Good/Good (l)         DOK         SOP         Good/FC         2         UP         Source 1         0.6478         GOOD 1         10.687.627         499         14.5         5.169	DFP         Source         0         Doc161 dod01960 Do4ADCB         10.062.063         7.80         10.06         5.100         Pert Data Role (5)         DFP (0)           UP         Site         0         Dot161 dod01960 Do4ADCB         10.062.063         7.80         10.06         Site         Reserved (4)         0           UP         Site         1         Control Do4DDo4D10016000000000000000000000000000000000	OK         SOP         Source Cop         0         DEP         Source 20         0         DEP (1)         Source 3         0         DEP (1)         Description 40         Description 40 <thdescription 40<="" td=""><td>OK         SOP         Source Cap         0         DPF         Source         2         Dot211 (D01967 D0-440C6)         10.662.663         788         100.669         5,120         Port Ubit Note (5)         UP (0)           CK         SOP         Coord/CRC         0         UP         Sector         10.662.571         631         662         71.05         Rearrowd (1)         0           CK         SOP         Good/CRC         0         UP         Sector         10.662.551         S01         61         4,144           KS         SOP         Good/CRC         1         UP         Sector         0.6668         10.665.351         S01         61         4,144           KS         SOP         Good/CRC         2         UP         Sector         0.6668         10.665.375         S01         518         548         5189           OK         SOP         Good/CRC         2         UP         Sector         0.6441         10.669.225         499         145         5139         Combin Momoth Ca.         Vest (1)         CM-664 (6)         0.07         Codels Momoth Ca.         Vest (1)         Codels Momoth Ca.         Vest (1)         Codels Momoth Ca.         Vest (1)         Codels Momoth Ca.</td><td></td><td>ОК</td><td>SOP</td><td>Source_Cap</td><td>0</td><td>DFP</td><td>Source</td><td>2</td><td>0x2161 0x80190F0 0x4A0C8</td><td>10,511,226</td><td>768</td><td>1,217</td><td>5,192</td><td>Spec Rev (76)</td><td>Rev 2.0 (1)</td></thdescription>	OK         SOP         Source Cap         0         DPF         Source         2         Dot211 (D01967 D0-440C6)         10.662.663         788         100.669         5,120         Port Ubit Note (5)         UP (0)           CK         SOP         Coord/CRC         0         UP         Sector         10.662.571         631         662         71.05         Rearrowd (1)         0           CK         SOP         Good/CRC         0         UP         Sector         10.662.551         S01         61         4,144           KS         SOP         Good/CRC         1         UP         Sector         0.6668         10.665.351         S01         61         4,144           KS         SOP         Good/CRC         2         UP         Sector         0.6668         10.665.375         S01         518         548         5189           OK         SOP         Good/CRC         2         UP         Sector         0.6441         10.669.225         499         145         5139         Combin Momoth Ca.         Vest (1)         CM-664 (6)         0.07         Codels Momoth Ca.         Vest (1)         Codels Momoth Ca.         Vest (1)         Codels Momoth Ca.         Vest (1)         Codels Momoth Ca.		ОК	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,511,226	768	1,217	5,192	Spec Rev (76)	Rev 2.0 (1)
OK         SOP         Good/RC         0         UPP         Sink         0         041         10,653,578         499         1,47         6,189         16,883,478         499         1,47         6,189         16,883,478         499         1,47         6,189         16,883,478         499         1,47         6,189         16,883,478         499         1,47         6,189         16,883,478         499         1,47         6,189         16,883,478         499         1,47         6,189         16,883,478         16,99         16,89         16,99         16,89         16,99         16,89         16,99         16,89         16,99         16,89         16,99         16,99         16,99         16,99         16,99         16,99         16,99	UFP         Sink         0         0.41         10.645.078         489         417         5.480         Intervet(1)         0           DFP         Source         0         bx161         10.665.351         501         61         4,114           DFP         Source         0         bx161         10.665.351         501         61         4,114           DFP         Source         0         0.663         10.066.353         501         61         4,114           DFP         Source         0         0.666         10.066.379         501         1.69         5,150           DFP         Source         0         0.666         10.068.579         501         1.69         5,150           DFP         Source         0         0.641         10.667.070         149         1.500         700           UFP         Snk         0         0.441         10.667.070         149         1.500         700         700           UFP         Snk         0         0.441         10.677.071         1.029         515         500         700           UFP         Snk         0         0.641         0.067640000         10.677.701         1.029	OK         SOP         Good/CC         0         UPP         Sink         0         041         10.665.078         489         1.7         1.86         1         Reserved         Re	OK         SOP         Good/CRC         0         UPP         Sink         0         0412         10683-878         199         147         8.184         Pleanwoid ()         0           OK         SOP         Good/CRC         0         UPP         Sink         0         01102 (057)(055.4)         100.655.31         501         61         4.114           OK         SOP         Accept 1         1         OPP         Source         0         04181         10.665.331         501         61         4.114           OK         SOP         Accept 1         1         OPP         Source         0         04181         10.665.31         501         61         4.114           OK         SOP         Accept 2         UPP         Source         0         0421         10.665.37         501         10.85         512           OK         SOP         Conduct C2         UPP         Source         0         0466         10.068.378         501         1.65         10.057           OK         SOP         Conduct C2         UPP         Source         0         0.661         0.667         10.067.730         10.129         555         5.069         10.0671.7301		OK	SOP	Source_Cap	0	DFP	Source	2	0x2161 0x80190F0 0x4A0C8	10,662,663	768	150,669	5,120	Port Data Role (5)	UFP (0)
OK         SOP         Request Table (Strip)         Output (Strip)         Solution (Strip)         Solution (Strip)         Request Table (Strip)         Request Ta	UPP         Sink         1         On 1042 Dic201663A         10664.569         Isol         Isol         Isol         Mgs Type (3, 0)         Request           DPP         Source         0         0.6101         10.665.531         501         611         5,402         Mgs Type (3, 0)         Request           DPP         Source         0         0.605         10.666.531         501         611         5,402         Reserve(31)         0           DPP         Source         0         0.666         10.666.579         501         116         5,102         Constanting Type (2, 0)         No (0)           UFP         Source         0         0.666         10.666.579         501         1.699         5,150         Constanting Type (2, 0)         No (0)         Constanting Type (2, 0)<	OK         SOP         Bound         0         IMP         Sector         1         On163 Ox00105AA         10 064.000         E31         552         514         Mag 1ye (5.0)         Allegist           OK         SOP         Good/CRC         0         D/FP         Source         0         Acting         10.065.351         501         61         4.114           OK         SOP         Good/CRC         1         D/FP         Source         0         Add33         10.065.378         501         61         4.114           OK         SOP         Good/CRC         2         D/FP         Source         0         Add33         10.065.378         501         61         4.114           OK         SOP         Cood/CRC         2         U/FP         Source         0         Add31         10.065.798         510         5.068         510         5.068         500         5.068         501         5.068         500         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068         5.068 </td <td>OK         SPD         Request         0         URP         Sead         1         Delatification         10664.500         631         502         10         Mog Type (5.0)         Request           OK         SPD         SoudCP (0         0         DPP         Source (0         0.011         10.053.15         501         611         4.144           OK         SOP         GoodCPC (1         UPP         Source (0         0.0455         10.066.335         501         511         6.48         Fearmed(31)         0         -</td> <td></td> <td>OK</td> <td>SOP</td> <td>GoodCRC</td> <td>0</td> <td>UFP</td> <td>Sink</td> <td>0</td> <td>0x41</td> <td>10,663,578</td> <td>499</td> <td>147</td> <td>5,186</td> <td>Reserved (4)</td> <td>8</td>	OK         SPD         Request         0         URP         Sead         1         Delatification         10664.500         631         502         10         Mog Type (5.0)         Request           OK         SPD         SoudCP (0         0         DPP         Source (0         0.011         10.053.15         501         611         4.144           OK         SOP         GoodCPC (1         UPP         Source (0         0.0455         10.066.335         501         511         6.48         Fearmed(31)         0         -		OK	SOP	GoodCRC	0	UFP	Sink	0	0x41	10,663,578	499	147	5,186	Reserved (4)	8
OK         SOP         Geoderance         0         DefP         Source         0         Def1         10.665.351         S01         61         4.114         Hospital Dig         Dig         Dig           OK         SOP         Accept         1         DIP         Source         0         0.6451         10.665.351         S01         61         4.114         Hospital Dig         Dig <td>DFP         Source         0         Dx181         Dx68331         S01         61         4,114         Unspace (bits Duft)         Dx12V10BDx/ (bits Duft)         Dx12V10BDx/(bits Duft)         D</td> <td>OK         SPE         GoodCRC         0         UPP         Source         0         0x141         10.065.351         501         6.1         4.14         Inspection         Inspection</td> <td>OK         SOP         GeoderCh         0         OPP         Source         0         0d13         10         0d13         501         61         4.114         Hodpard Long Long         Deta           OK         SOP         GoodChC         1         OPP         Source         0         0d303         501         611         4.114         Hodpard Long Long         Deta           OK         SOP         GoodChC         1         UPP         Sink         0         0d411         10.667.012         488         148         5120           OK         SOP         GoodChC         2         UPP         Sink         0         0d411         10.667.012         488         148         5120           OK         SOP         GoodChC         2         UPP         Sonk         0         0d411         10.687.010         10.889.255         834         101         5109         UBMERAK (32.20)         No (0)           OK         SOP         GoodChC         1         UPP         Sink         0         0d461         0.076 GoodChC         10.873.736         534         101         518           OK         SOP         GoodChC         2         UPP         Sink</td> <td></td> <td></td> <td></td> <td>Request</td> <td></td> <td></td> <td>Sink</td> <td></td> <td>0x1042 0x1201685A</td> <td></td> <td></td> <td></td> <td>5,142</td> <td>Msg Type (30)</td> <td>Request</td>	DFP         Source         0         Dx181         Dx68331         S01         61         4,114         Unspace (bits Duft)         Dx12V10BDx/ (bits Duft)         Dx12V10BDx/(bits Duft)         D	OK         SPE         GoodCRC         0         UPP         Source         0         0x141         10.065.351         501         6.1         4.14         Inspection	OK         SOP         GeoderCh         0         OPP         Source         0         0d13         10         0d13         501         61         4.114         Hodpard Long Long         Deta           OK         SOP         GoodChC         1         OPP         Source         0         0d303         501         611         4.114         Hodpard Long Long         Deta           OK         SOP         GoodChC         1         UPP         Sink         0         0d411         10.667.012         488         148         5120           OK         SOP         GoodChC         2         UPP         Sink         0         0d411         10.667.012         488         148         5120           OK         SOP         GoodChC         2         UPP         Sonk         0         0d411         10.687.010         10.889.255         834         101         5109         UBMERAK (32.20)         No (0)           OK         SOP         GoodChC         1         UPP         Sink         0         0d461         0.076 GoodChC         10.873.736         534         101         518           OK         SOP         GoodChC         2         UPP         Sink				Request			Sink		0x1042 0x1201685A				5,142	Msg Type (30)	Request
OK         SOP         Accept         1         UPP         Source         0         0d/3         10,666,363         501         51.08         Hearweig(1)         0           OK         SOP         Good/CC         1         UPP         Source         0         0d/41         10,666,363         501         51.08         14.08         51.20           OK         SOP         SourCC         2         UPP         Source         0         0d/41         10.666         51.20         16.66         51.20         Over Pair (0,76,20,30)         1         Over Pair (0,76,20,30)         Over Pair (0,76,20,30)         Over Pair (0,76,20,30)         1         0.066         Source         10         0.666,300         10.666,375         501         1.066         51.00         Over Pair (0,76,20,30)         Over Pair (0,76,20,30)         0.066,300         10,77,770         10.28         55.056         Soperably Meananch (0,76,76,770)         10.28         505         508         No USB Soperad         No (0,76,77,770)         10.28         505         508         Soperad (0,76,77,770)         10.28         505         508         Soperad (0,76,77,770)         10.28         505         508         Soperad (0,76,77,770)         10.28         505         508         Soperaind (0,76	DifP         Source         0         Ox65         0.0663         0.067         91         54.00         Pleast-vel(31)         0           UFP         Source         0         0.424         0.067.00         4.06         1.46         5.10         0         Octanol (32.20)         1           DFP         Source         0         0.441         1.0667.25         501         1.069         5.19         Oppertunit         Oppertunit         0.067         4.90         1.5         5.100         Communication (32.20)         1           DFP         Source         1         0.075 Def Def Ex00001         1.0690.225         8.94         1.01         5.100         No (0)           UFP         Sink         0         0.641         1.0690.225         8.94         1.01         5.100         No (0)           UFP         Sink         0         0.641         1.0070.677         4.94         5.265         No (0)           DFP         Source         0         0.681 Def Orf000012         1.0077.878         5.01         6.4         5.164         No (0)           PP         Source         1         0.616 Def Orf0000022         1.0077.878         5.01         6.4         5.164         5.178 </td <td>OK         SOP         Accept         1         UPP         Source         0         0x633         10,668,363         911         9,48         Pear-vel(31)         0           OK         SOP         CoodCRC         1         UPP         Source         0         0x641         10,667,012         484         146         5,120           OK         SOP         GoodCRC         2         UPP         Source         0         0x64         10,665,579         5011         0,096         5,120           OK         SOP         GoodCRC         3         UPP         Source         0         0x411         10,659,225         490         145         5,120           OK         SOP         GoodCRC         3         UPP         Source         0         0x4176 0x4700001         10,671,701         1,029         565         5,086           OK         SOP         GoodCRC         1         UPP         Source         0         0x431         0x7779         551         644         5,176           OK         SOP         GoodCRC         4         UPP         Source         0         0x431         10,675,379         551         644         5,175           <t< td=""><td>OK         SOP         Accept         1         DPP         Source         0         06/30         10/66/305         501         5.18         Hearward         10         Description           OK         SOP         GoudChC         2         DPP         Source         0         0.646         10.066/378         501         1.069         5.120         1         URGet Position (20.28)         1           OK         SOP         GoudChC         2         DPP         Source         0         0.646         10.066/378         501         1.069         5.120         1         UMe8 At Rig (27)         No (0)           OK         SOP         GoudChC         3         DPP         Source         1         0.6476         0.0411         10.690.225         490         143         5.120         1         Overball Missionath (50. No (0)         0.0411         0.0692.25         490         148         5.120         1         USP Communication Ca Yes (1)         USP Communication Ca Yes</td><td></td><td>OK</td><td>SOP</td><td>GoodCRC</td><td>0</td><td>DFP</td><td>Source</td><td>0</td><td>0x161</td><td>10,665,351</td><td>501</td><td>61</td><td>4,114</td><td>Request Data Obj 1</td><td>0x1201685A</td></t<></td>	OK         SOP         Accept         1         UPP         Source         0         0x633         10,668,363         911         9,48         Pear-vel(31)         0           OK         SOP         CoodCRC         1         UPP         Source         0         0x641         10,667,012         484         146         5,120           OK         SOP         GoodCRC         2         UPP         Source         0         0x64         10,665,579         5011         0,096         5,120           OK         SOP         GoodCRC         3         UPP         Source         0         0x411         10,659,225         490         145         5,120           OK         SOP         GoodCRC         3         UPP         Source         0         0x4176 0x4700001         10,671,701         1,029         565         5,086           OK         SOP         GoodCRC         1         UPP         Source         0         0x431         0x7779         551         644         5,176           OK         SOP         GoodCRC         4         UPP         Source         0         0x431         10,675,379         551         644         5,175 <t< td=""><td>OK         SOP         Accept         1         DPP         Source         0         06/30         10/66/305         501         5.18         Hearward         10         Description           OK         SOP         GoudChC         2         DPP         Source         0         0.646         10.066/378         501         1.069         5.120         1         URGet Position (20.28)         1           OK         SOP         GoudChC         2         DPP         Source         0         0.646         10.066/378         501         1.069         5.120         1         UMe8 At Rig (27)         No (0)           OK         SOP         GoudChC         3         DPP         Source         1         0.6476         0.0411         10.690.225         490         143         5.120         1         Overball Missionath (50. No (0)         0.0411         0.0692.25         490         148         5.120         1         USP Communication Ca Yes (1)         USP Communication Ca Yes</td><td></td><td>OK</td><td>SOP</td><td>GoodCRC</td><td>0</td><td>DFP</td><td>Source</td><td>0</td><td>0x161</td><td>10,665,351</td><td>501</td><td>61</td><td>4,114</td><td>Request Data Obj 1</td><td>0x1201685A</td></t<>	OK         SOP         Accept         1         DPP         Source         0         06/30         10/66/305         501         5.18         Hearward         10         Description           OK         SOP         GoudChC         2         DPP         Source         0         0.646         10.066/378         501         1.069         5.120         1         URGet Position (20.28)         1           OK         SOP         GoudChC         2         DPP         Source         0         0.646         10.066/378         501         1.069         5.120         1         UMe8 At Rig (27)         No (0)           OK         SOP         GoudChC         3         DPP         Source         1         0.6476         0.0411         10.690.225         490         143         5.120         1         Overball Missionath (50. No (0)         0.0411         0.0692.25         490         148         5.120         1         USP Communication Ca Yes (1)         USP Communication Ca Yes		OK	SOP	GoodCRC	0	DFP	Source	0	0x161	10,665,351	501	61	4,114	Request Data Obj 1	0x1201685A
OK         SOP         CoudCAC         1         UPP         Sink         0         0.411         10.667.012         498         148         5,120         Depart Means (30.28)         1           OK         SOP         P5,BDV         2         DFP         Saure         0         66461         10.065.70         501         10.069         5199         CodeSack (30.28)         No (7)           OK         SOP         VOM         3         DFP         Saure         0         6441         10.069.225         499         145         5139         Copability Memorb. (76)         No (7)           OK         SOP         CoodCRC         3         UFP         Saure         1         0.47365 GeFG00001         10.069.225         694         101         5109         No (7)         Hold Scaure         No (7)           OK         SOP         CoodCRC         1         UFP         Sauk         4         04247 GeF0000140:6000410         10.677.701         1.029         508         508         No (7)           OK         SOP         CoodCRC         1         UFP         Sauk         4         04247 GeF0000140:6000410         10.677.771         10.29         50.98         50.98         No (7)	UFP         Sink         0         0.241         10.67.012         483         148         5,120         Colgect Postion (30.29)         1           DFP         Source         0         0.6461         10.666.379         501         1.069         5,129         Graveback fits (27)         No.(0)           UFP         Sink         0         0.441         10.666.379         501         1.45         5,120         Graveback fits (27)         No.(0)           UFP         Sink         0         0.441         10.669.825         4.91         143         5,120         Graveback fits (27)         No.(0)           UFP         Sink         0         0.641         10.670.70         490         148         5,120         No.(0)           UFP         Sink         4         0.424F.0xF500841.0x6000484.6u.0xF6400000         10.671.701         1.029         59.56         50.66         Graves (2320)         0         Operating Current 1.800.0MA           UFP         Sink         0         0.641         10.677.59         63.4         49.4         5.126         Not 09.0MA           UFP         Sink         0         0.641.40 or 00.0052         10.077.59         63.4         49.4         5.126         90.09.0A)	OK         SOP         Good/RC         1         UPP         Sink         0         6/41         10,067,012         488         146         5,120         Cobect/addots (32,28)         1           OK         SOP         Good/RC         2         UPP         Sink         0         6dd66         10,665,29         501         1,069         5,150         Good/RC         4         0,070         Capability Manach (28)         No (0)           OK         SOP         Good/RC         2         UPP         Sink         0         6def00001         10,666,225         491         145         5,120         Good/RC         2         No (0)         Capability Manach (28)         No (0)         Capability Manach (28) <td< td=""><td>OK         SOP         Good/RC         1         UPP         Swine         0         0.241         10.667.012         488         148         5.120         Cliget Hold (30.28)         1           OK         SOP         Good/RC         2         UPP         Swine         0         0.6466         10.669.278         501         1.069         5189           OK         SOP         Good/RC         2         UPP         Swine         0         0.6471         10.669.225         491         145         5.120         Use Hold (30.28)         No (0)           OK         SOP         Good/RC         2         UPP         Swine         0         0.6471         10.689.225         491         143         5.120         Use Hold (30.28)         No (0)           OK         SOP         Good/RC         3         UPP         Same         0         0.6471         10.6707.01         10.28         505         508         Pearing Current in 0.         90(0 50A)           OK         SOP         Good/RC         4         DFP         Source         1         0.4987 fb00002         10.673.789         634         464         5.126           OK         SOP         Good/RC         2</td><td></td><td>OK</td><td>SOP</td><td>Accept</td><td>1</td><td>DFP</td><td>Source</td><td>0</td><td>0x363</td><td>10,666,363</td><td>501</td><td>511</td><td>5,489</td><td>Reserved(31)</td><td>0</td></td<>	OK         SOP         Good/RC         1         UPP         Swine         0         0.241         10.667.012         488         148         5.120         Cliget Hold (30.28)         1           OK         SOP         Good/RC         2         UPP         Swine         0         0.6466         10.669.278         501         1.069         5189           OK         SOP         Good/RC         2         UPP         Swine         0         0.6471         10.669.225         491         145         5.120         Use Hold (30.28)         No (0)           OK         SOP         Good/RC         2         UPP         Swine         0         0.6471         10.689.225         491         143         5.120         Use Hold (30.28)         No (0)           OK         SOP         Good/RC         3         UPP         Same         0         0.6471         10.6707.01         10.28         505         508         Pearing Current in 0.         90(0 50A)           OK         SOP         Good/RC         4         DFP         Source         1         0.4987 fb00002         10.673.789         634         464         5.126           OK         SOP         Good/RC         2		OK	SOP	Accept	1	DFP	Source	0	0x363	10,666,363	501	511	5,489	Reserved(31)	0
OK         SOP         PS.ROY         2         DFP         Source         0         0666         10.686.579         501         1.069         5.199         LiveBoot Registry         No (0)           OK         SOP         GoodChC         2         UFP         Sink         0         0x441         10.686.579         501         1.069         5.190         LiveBoot Registry         No (0)           OK         SOP         VOM         3         DFP         Sauce         1         0.478F 0xFF003011         10.689.225         499         145         5.120         USB Communication Ca.         Yet (1)           OK         SOP         GoodChC         3         UFP         Sink         0         0x411         10.670,677         499         148         5.285         No (0)           OK         SOP         GoodChC         1         UFP         Sink         0         0x411         0.674600001         0.6717.701         1.02         555         5.086         Reserved (23.20)         0         Operating Current in 10. 90(0.90A)           OK         SOP         VOM         4         DFP         Source         1         0.4967005002         10.673.786         634         494         5.126	OFP         Source         0         0x666         10,068,579         501         1069         5,199         Convertant for (27)         No (0)           UFP         six         0         0x4178         Capebo         145         5,109         Capebo         C	OK         SOP         PS. RDY         2         DIP         Saures         0         0.666         10.666.579         501         1.069         5,120         Converting (2/)         No (0)           OK         SOP         Good/CR         3         UFP         Saures         0         0x441         10.692.25         490         145         5,120           OK         SOP         Good/CR         3         UFP         Saures         1         0x1676.0560011         10.695.825         534         101         5,081         0x85         0x85         5,283         0x85         5,283         0x85         5,283         5,085         0x85         0x84         0x424F 0x6700001         10,677,794         531         644         5,184         0x85         5,085         0,084         0x85         0x85         5,085         5,085         0,084         0x85         <	OK         SOP         PS. NOY         2         DFP         Source         0         0666         10.0685.779         50.1         1.0695         51.20         Condensity (2/)         No (0)           OK         SOP         Cond CR         2         UFP         Source         1         0x126 Gef000001         10.695.825         634         101         5.120         US0 Communication Ca.         Yet (1)           OK         SOP         Cond CR         3         UFP         Sink         0         0x42F Gef700001         10.670.507         490         143         5.269         US0 Communication Ca.         Yet (1)           OK         SOP         Cond CR         1         UFP         Sink         0         0x42F Gef700001         10.71.711         1.02         555         5.088         Opening Current 1.0         90(0 904)           OK         SOP         Cond CR         4         UFP         Source         0         0x497         10.072,798         484         494         5.126         Opening Current 1.0         90(0 904)           OK         SOP         Cond CRC         4         UFP         Sonro         0         0.491         0.00002         10.073,598         494         5.126		OK	SOP	GoodCRC	1	UFP	Sink	0	0x241	10,667,012	498	148	5,120	Object Position (3028)	1
OK         SOP         Good/CC         2         UFP         Sink         0         0.441         10.699.25         499         145         5100         Capability Mismatch (28)         No (9)           OK         SOP         VOM         3         DFP         Savera         1         0.478F 0.6760001         10.699.255         634         101         5109         No USB Sommer 10         No (9)           OK         SOP         Good/CPC         3         UFP         Sink         0         0.478F 0.6760001         10.670.607         499         148         5.208         No USB Sommer 10         No USB Sommer 10         No USB Sommer 10         No USB Sommer 10         0.671.771         1.029         550         S09         No USB Sommer 10         0.671.771         1.029         550         S09         No USB Sommer 10         0.671.771         1.029         550         S09         No USB Sommer 10         0.671.771         1.029         550         S08         No USB Sommer 10         0.670.7729         S10         64         S126         Operating Current 10.90.90.90.90         No USB Sommer 10         500.90.90         No USB Sommer 10         500.90         No         S00.90.90         No         S00.90.90         No         S00.90.90         S00.90.90 <td>UFP         Sink         0         0.441         10.669.225         499         145         5,120         Colpositivity Memodic/28)         No (0)           DFP         Source         1         0.478F DuFF000001         10,699.225         634         10         5,109         UBS         UBS         UBS         Visit of the modic/28)         No (0)           UFP         Sink         0         0.4141         10.070.070         499         148         5,285         No USB Suppend         No (0)           UFP         Sink         4         0.424F DuFF000004B4.0d.0x9640000         10,677.70         1.029         565         5,086         Operating Current 1         800.500.40         No (0)           DFP         Source         10         0x196F DuFF000002         10,677.789         634         414         5,128         No (0)         No (0)</td> <td>OK         SOP         CoodCRC         2         UPP         Sink         0         0.441         10.669.225         499         145         5,100         Clapability Manador, (28)         No (0)           OK         SOP         VDM         3         DFP         Source         1         0x1785 0x670001         10.669.225         634         101         5,109           OK         SOP         CoodCRC         3         UPP         Sink         0         0x641785 0x6700001         10.670.607         499         140         5,285           OK         SOP         CoodCRC         1         UPP         Sink         4         0x64700001         10.677,278         501         64         5,184           OK         SOP         CoodCRC         4         UPP         Sink         0         0x641         10.677,678         634         494         5,126           OK         SOP         VDM         4         UPP         Sink         0         0x641         10.675,622         631         494         5,126           OK         SOP         VDM         2         UPP         Sink         0         0x641         10.675,622         631         50.027         50.0</td> <td>OK         SOP         GoodCRC         2         UFP         Switze         0         0.411         10.699.255         499         145         5,100         Capability Memotif (c8)         No (0)           OK         SOP         VOM         3         UFP         Switze         1         0.178/E06700001         0.0698.255         634         101         5,109         USB Communication Can Yes (1)           OK         SOP         CoordCRC         3         UFP         Switze         4         0.4128/E06700001         0.0698.255         634         101         5,109         Vio USB Communication Can Yes (1)           OK         SOP         CoordCRC         1         UFP         Switze         1         0.4247 647000014.6x000444.6x0.6444000010         0.027.771         1.028         505         5.081           OK         SOP         CoordCRC         4         UFP         Switze         1         0.4647 046700002         10.673.278         634         404         5.184           OK         SOP         CoordCRC         2         UFP         Switz         0         0.4647 04700002         10.673.518         501         64         5.175           OK         SOP         GoodCRC         2</td> <td></td> <td>OK</td> <td>SOP</td> <td>PS_RDY</td> <td>2</td> <td>DFP</td> <td>Source</td> <td>0</td> <td>0x566</td> <td>10,668,579</td> <td>501</td> <td>1,069</td> <td>5,159</td> <td>GiveBack flag (27)</td> <td>No (0)</td>	UFP         Sink         0         0.441         10.669.225         499         145         5,120         Colpositivity Memodic/28)         No (0)           DFP         Source         1         0.478F DuFF000001         10,699.225         634         10         5,109         UBS         UBS         UBS         Visit of the modic/28)         No (0)           UFP         Sink         0         0.4141         10.070.070         499         148         5,285         No USB Suppend         No (0)           UFP         Sink         4         0.424F DuFF000004B4.0d.0x9640000         10,677.70         1.029         565         5,086         Operating Current 1         800.500.40         No (0)           DFP         Source         10         0x196F DuFF000002         10,677.789         634         414         5,128         No (0)	OK         SOP         CoodCRC         2         UPP         Sink         0         0.441         10.669.225         499         145         5,100         Clapability Manador, (28)         No (0)           OK         SOP         VDM         3         DFP         Source         1         0x1785 0x670001         10.669.225         634         101         5,109           OK         SOP         CoodCRC         3         UPP         Sink         0         0x641785 0x6700001         10.670.607         499         140         5,285           OK         SOP         CoodCRC         1         UPP         Sink         4         0x64700001         10.677,278         501         64         5,184           OK         SOP         CoodCRC         4         UPP         Sink         0         0x641         10.677,678         634         494         5,126           OK         SOP         VDM         4         UPP         Sink         0         0x641         10.675,622         631         494         5,126           OK         SOP         VDM         2         UPP         Sink         0         0x641         10.675,622         631         50.027         50.0	OK         SOP         GoodCRC         2         UFP         Switze         0         0.411         10.699.255         499         145         5,100         Capability Memotif (c8)         No (0)           OK         SOP         VOM         3         UFP         Switze         1         0.178/E06700001         0.0698.255         634         101         5,109         USB Communication Can Yes (1)           OK         SOP         CoordCRC         3         UFP         Switze         4         0.4128/E06700001         0.0698.255         634         101         5,109         Vio USB Communication Can Yes (1)           OK         SOP         CoordCRC         1         UFP         Switze         1         0.4247 647000014.6x000444.6x0.6444000010         0.027.771         1.028         505         5.081           OK         SOP         CoordCRC         4         UFP         Switze         1         0.4647 046700002         10.673.278         634         404         5.184           OK         SOP         CoordCRC         2         UFP         Switz         0         0.4647 04700002         10.673.518         501         64         5.175           OK         SOP         GoodCRC         2		OK	SOP	PS_RDY	2	DFP	Source	0	0x566	10,668,579	501	1,069	5,159	GiveBack flag (27)	No (0)
OK         SOP         VDM         3         DFP         Saure         1         0x76 F06F00801         10 688 25         634         101         5.109         USB Commutation Ca Yes (1)           OK         SOP         GoodCRC         3         UFP         Sink         0         0x641         10,679,607         499         148         5.205         No (3)         Ne (0)           OK         SOP         VDM         1         UFP         Sink         0         0x6424 6x7000041 0x600x464 0x0 0x6400000         10,677,071         1.029         595         5.088         Ne (0)         Ne (0)         Pearing Current in 0 90(0.96A)         0x600x10         10,677,378         634         494         5.126         Opearing Current in 0 90(0.96A)         0x00x10         0x07,378         634         494         5.126         Opearing Current in 0 90(0.96A)         0x00x10         0x07,378         634         494         5.126         Opearing Current in 0 90(0.96A)         0x01,974         0x04	DFP         Saures         1         0x178F_CMF500001         10.669,825         834         101         5,100         UBS Communication Ca Yes (1)           UFP         Sink         0         0x641         10.677,057         499         148         5,285           UFP         Sink         4         0x424F_0xF5003041 0x6000x4B4 0x0 0xF6400000         10.677,070         1,029         555         5,056           DFP         Source         0         0x681         10.077,770         1,029         554         5,056           DFP         Source         0         0x681         10.077,770         1,029         554         5,056           DFP         Source         0         0x681         10.077,790         534         541         5,164           UFP         Sink         0         0x641         10.077,598         484         5,176           UFP         Sink         0         0x641         10.074,598         481         164         5,176           UFP         Sinu         0.0541         10.074,592         515         5,515         5,120         54	OK         SOP         VDM         3         DFP         Source         1         0x16F0x69001         10.068.025         634         101         5.106         OBB Communication Ca.         Ver (1)           OK         SOP         Good/CRC         3         UFP         Sink         4         0x43F0x6700000         10.077.01         1.029         595         5.058         OM         0         VUM         4         UFP         Sink         4         0x43F0x6700002         10.077.707         19.029         595         5.058         OM         0         OM         0         OM         0         0         Personal (2.3.20)         0         O         O         SOP         SOP<	OK         SOP         VDM         3         DFP         Source         1         0.4786 Gef000001         10.689.025         63.4         101         5.108         DBB Communitation Ca.         Ve (1)           CK         SOP         Goad/CRC         3         UFP         Sink         0         0.6411         10.702.07         490         146         5.285         5.089           CK         SOP         Goad/CRC         1         UFP         Sink         0         0.6411         0.07.7301         1.029         595         5.089           CK         SOP         Goad/CRC         1         UFP         Saure         0         0.6611         10.672.734         501         64         5.164         5.089 </td <td></td> <td>OK</td> <td>SOP</td> <td>GoodCRC</td> <td>2</td> <td>UFP</td> <td>Sink</td> <td>0</td> <td>0x441</td> <td>10,669,225</td> <td>499</td> <td>145</td> <td>5,120</td> <td>Capability Mismatch (26)</td> <td>No (0)</td>		OK	SOP	GoodCRC	2	UFP	Sink	0	0x441	10,669,225	499	145	5,120	Capability Mismatch (26)	No (0)
OK         SOP         GoodCRC         3         UFP         Sink         0         0.611         0.670         499         14.8         528         No USB Suppend         No (0)           OK         SOP         VDM         1         UFP         Sink         4         0.6424 F0.67700041         0.0671         10.29         595         508         No USB Suppend         No (0)           OK         SOP         CoddCRC         1         DFP         Saure         0         0.6424 F0.67700041         10.072,794         501         64         5.168         No USB Suppend         No (0)           OK         SOP         VDM         4         DFP         Saure         1         0.6497 005002         10.673,798         634         494         5.126         Not OBS Suppend         No (0)         Operating Current in 10 90() 90.0         No         Not OBS Suppend         No (0)         Not OBS Suppend         Not OBS Suppend         No (0)	UFP         Sink         0         0x641         10,670,807         499         148         5,283         No USB Support         No (0)           UFP         Sink         4         0x424F         0x610x00004B4 0x00x6464000         10,677,701         1,029         595         5,096         No USB Support         0         0x610x00004B4         0x673,729         501         64         5,161         No USB Support	OK         SOP         Good/RC         3         UFP         Sink         0         06/11         10.673.007         499         148         5.28         No.USB suppend         No.00           OK         SOP         VDM         1         UFP         Sink         4         0x424F 0bf70030010         10.671.201         1.029         595         5.088           OK         SOP         Good/RC         1         DFP         Source         0         0x681         10.672.794         501         64         5.186           OK         SOP         YDM         4         UFP         Sink         1         0x198/06703002         10.673.799         634         494         5.126           OK         SOP         Good/RC         2         UFP         Sink         1         0x149F 0dF00302         10.673.622         631         555         5.012           OK         SOP         Good/RC         2         UFP         Sink         1         0x149F 0dF003012         10.675.519         501         66         5.120           OK         SOP         Good/RC         2         DFP         Source         0         0x681         10.675.319         501         66 <td< td=""><td>OK         SOP         GoodCRC         3         UFP         Sink         0         0.611         0.670         499         14.8         5.28         No USB Support         No (0)           OK         SOP         VDM         1         UFP         Sink         4         0x424F 0xF008041 0x600x6400 0x64400000         10,677,701         1,029         595         5,088         No USB Support         0           OK         SOP         KoodCRC         1         DFP         Source         0         0.661         10,672,778         501         64         5,168         NoteSt Support         0<td></td><td>OK</td><td>SOP</td><td>VDM</td><td>3</td><td>DFP</td><td>Source</td><td>1</td><td>0x176F 0xFF008001</td><td>10,669,825</td><td>634</td><td>101</td><td>5,109</td><td>USB Communication Ca</td><td>. Yes (1)</td></td></td<>	OK         SOP         GoodCRC         3         UFP         Sink         0         0.611         0.670         499         14.8         5.28         No USB Support         No (0)           OK         SOP         VDM         1         UFP         Sink         4         0x424F 0xF008041 0x600x6400 0x64400000         10,677,701         1,029         595         5,088         No USB Support         0           OK         SOP         KoodCRC         1         DFP         Source         0         0.661         10,672,778         501         64         5,168         NoteSt Support         0 <td></td> <td>OK</td> <td>SOP</td> <td>VDM</td> <td>3</td> <td>DFP</td> <td>Source</td> <td>1</td> <td>0x176F 0xFF008001</td> <td>10,669,825</td> <td>634</td> <td>101</td> <td>5,109</td> <td>USB Communication Ca</td> <td>. Yes (1)</td>		OK	SOP	VDM	3	DFP	Source	1	0x176F 0xFF008001	10,669,825	634	101	5,109	USB Communication Ca	. Yes (1)
OK         SOP         VDM         1         UFP         Sink         4         0x424 ft 0xF000041 0x6000484 0x0 0xF400000         10,671,701         1.029         595         508         Heservel(3, 20)         0           OK         SOP         XOM         1         DFP         Source         1         0x434 ft 0xF0000041 0x6000484 0x0 0xF400000         10,671,701         1.029         595         508         Heservel(3, 20)         0           OK         SOP         XOM         4         DFP         Source         1         0x1987 0xF100002         10,673,798         584         494         5.126         Max Operating Current 10.90(0.90A)           OK         SOP         GoodCRC         4         UFP         Sink         0         0x641         10,673,589         498         146         5.175           OK         SOP         GoodCRC         2         UFP         Sink         0         0x641         10,075,522         631         55.082         4304         5.082           OK         SOP         GoodCRC         2         UFP         Sink         1         0x144/ 0xF00002         10,073,38         5.082         5.082         5.082         5.082         5.082         5.082         5.082 <td>UFP         Sink         4         0x424F         0x60004B4         0x60004B4         0x60004B4         0x607         10.027         50.05         50.66         Persenver(2520)         0           DFP         Source         0         0x681         0x601         10.672.794         50.1         64         5.164         Openning Current 1         900.90A)           UFP         Source         1         0x6167         0x67.2789         634         444         5.176         50.0         50.000         5</td> <td>OK         SOP         VDM         1         UPP         Sink         4         0x454706000416x0000484 0x0 0x6400000         10,077,01         1,029         595         5,086         Pleaswed (20)         0           OK         SOP         GoodCRC         1         DIP         Source         1         0x198706700301         10,077,201         10,073,278         501         64         5,164           OK         SOP         VDM         4         DIP         Source         1         0x198706700002         10,673,278         634         494         5,128           OK         SOP         GoodCRC         4         UPP         Sink         0         0x141         10,674,509         488         140         5,128           OK         SOP         GoodCRC         2         UPP         Sink         0         0x147         10,674,509         488         140         5,175           OK         SOP         GoodCRC         2         UPP         Sink         0         0x661         10,676,319         501         66         5,120           OK         SOP         GoodCRC         2         DPP         Source         0         0x661         10,678,319         501<td>OK         SOP         VDM         1         UFP         Swire         4         0x42eF0000110e0000484.0x0.0xF4400.0x0         10.077.01         1.028         50.86         Heatmat (52, 20)         U           OK         SOP         Good/CRC         1         DFP         Source         1         0x1987.0x701         10.029         50.84         51.84         50.98         Foreining Current in 10         90(0 SOL)           OK         SOP         Good/CRC         4         DFP         Source         1         0x1987.0x701         10,073,799         83.4         49.4         5.126           OK         SOP         Good/CRC         4         UFP         Swite         0         0x417         10,073,509         83.4         49.4         5.126           OK         SOP         Good/CRC         2         UFP         Swite         0         0x447         0x1000022         10,073,509         50.1         50.502         50.002<td></td><td>ОК</td><td>SOP</td><td>GoodCRC</td><td>3</td><td>UFP</td><td>Sink</td><td>0</td><td>0x641</td><td>10,670,607</td><td>499</td><td>148</td><td>5,285</td><td>No USB Suspend</td><td>No (0)</td></td></td>	UFP         Sink         4         0x424F         0x60004B4         0x60004B4         0x60004B4         0x607         10.027         50.05         50.66         Persenver(2520)         0           DFP         Source         0         0x681         0x601         10.672.794         50.1         64         5.164         Openning Current 1         900.90A)           UFP         Source         1         0x6167         0x67.2789         634         444         5.176         50.0         50.000         5	OK         SOP         VDM         1         UPP         Sink         4         0x454706000416x0000484 0x0 0x6400000         10,077,01         1,029         595         5,086         Pleaswed (20)         0           OK         SOP         GoodCRC         1         DIP         Source         1         0x198706700301         10,077,201         10,073,278         501         64         5,164           OK         SOP         VDM         4         DIP         Source         1         0x198706700002         10,673,278         634         494         5,128           OK         SOP         GoodCRC         4         UPP         Sink         0         0x141         10,674,509         488         140         5,128           OK         SOP         GoodCRC         2         UPP         Sink         0         0x147         10,674,509         488         140         5,175           OK         SOP         GoodCRC         2         UPP         Sink         0         0x661         10,676,319         501         66         5,120           OK         SOP         GoodCRC         2         DPP         Source         0         0x661         10,678,319         501 <td>OK         SOP         VDM         1         UFP         Swire         4         0x42eF0000110e0000484.0x0.0xF4400.0x0         10.077.01         1.028         50.86         Heatmat (52, 20)         U           OK         SOP         Good/CRC         1         DFP         Source         1         0x1987.0x701         10.029         50.84         51.84         50.98         Foreining Current in 10         90(0 SOL)           OK         SOP         Good/CRC         4         DFP         Source         1         0x1987.0x701         10,073,799         83.4         49.4         5.126           OK         SOP         Good/CRC         4         UFP         Swite         0         0x417         10,073,509         83.4         49.4         5.126           OK         SOP         Good/CRC         2         UFP         Swite         0         0x447         0x1000022         10,073,509         50.1         50.502         50.002<td></td><td>ОК</td><td>SOP</td><td>GoodCRC</td><td>3</td><td>UFP</td><td>Sink</td><td>0</td><td>0x641</td><td>10,670,607</td><td>499</td><td>148</td><td>5,285</td><td>No USB Suspend</td><td>No (0)</td></td>	OK         SOP         VDM         1         UFP         Swire         4         0x42eF0000110e0000484.0x0.0xF4400.0x0         10.077.01         1.028         50.86         Heatmat (52, 20)         U           OK         SOP         Good/CRC         1         DFP         Source         1         0x1987.0x701         10.029         50.84         51.84         50.98         Foreining Current in 10         90(0 SOL)           OK         SOP         Good/CRC         4         DFP         Source         1         0x1987.0x701         10,073,799         83.4         49.4         5.126           OK         SOP         Good/CRC         4         UFP         Swite         0         0x417         10,073,509         83.4         49.4         5.126           OK         SOP         Good/CRC         2         UFP         Swite         0         0x447         0x1000022         10,073,509         50.1         50.502         50.002 <td></td> <td>ОК</td> <td>SOP</td> <td>GoodCRC</td> <td>3</td> <td>UFP</td> <td>Sink</td> <td>0</td> <td>0x641</td> <td>10,670,607</td> <td>499</td> <td>148</td> <td>5,285</td> <td>No USB Suspend</td> <td>No (0)</td>		ОК	SOP	GoodCRC	3	UFP	Sink	0	0x641	10,670,607	499	148	5,285	No USB Suspend	No (0)
OK         SOP         GoodRC         1         DPP         Source         0         0.641         10.672.274         501         64         5.164         Operating Current in 0.         Po(0.960)           OK         SOP         VDM         4         DPP         Source         1         0x1897.047003002         10.673.769         634         494         5.184         Mex Operating Current in 0.         Mex Operating Current in 0.         90(0.96A)           OK         SOP         VDM         4         UPP         Snik         0         0.641         10.673.769         634         494         5.126         Mex Operating Current in 0.         90(0.96A)           OK         SOP         VDM         2         UPP         Snik         0         0.641         10.673.652         631         55.052         431         5.012           OK         SOP         Cound.76         2         DPP         Snik         1         0.6447003002         10.675.622         631         5.002         4144         5.175         5.012         4145         5.012         4145         5.012         4145         5.012         4145         5.012         4145         5.012         4145         5.175         5.012         41	DFP         Source         0         Odd1         10,072,794         501         64         5,164         Operating Current In 0 190,0 KW,           DFP         Source         1         0x196 #0700002         10,077,792         634         484         5,167         McCoperating Current In 0 190,0 KW,           UFP         Sink         0         0x641         10,075,822         631         555         5,012           UFP         Sink         0         0x641         10,075,833         501         68         5,202	OK         SOP         GoodCRC         1         DFP         Source         0         add1         10.672.784         501         64         5,164         Operating Current In 10	OK         SOP         GoodCRC         1         DFP         Source         0         Odd1         10.672.794         501         64         5.164         Operating Current in 10.         BO(1900)           OK         SOP         VDM         4         DFP         Source         0         0.6196 Def TO00022         10.677.2786         634         484         5.126         Max Operating Current in 10.         BO(1900)           OK         SOP         GoodCRC         4         UFP         Sink         0         0.641         10.677.578         634         484         5.126         Max Operating Current in 0.         BO(1900)           OK         SOP         CoodCRC         2         UFP         Sink         1         0.1497 0f700002         10.675.812         631         505         3.082           OK         SOP         GoodCRC         2         DFP         Source         0         0.661         10.675.319         501         68         5.126           OK         SOP         GoodCRC         2         DFP         Source         0         0.661         10.675.319         501         68         5.126		OK	SOP	VDM	1	UFP	Sink	4	0x424F 0xFF008041 0x900004B4 0x0 0xF6400000	10,671,701	1,029	595	5,098	Reserved (2320)	0
OK         SOP         VDM         4         DFP         Source         1         0x198F 0xF7008002         10,673,789         634         494         5,126         Mex Operating Current90(0.90A)           OK         SOP         GoodCRC         4         UFP         Sink         0         0x641         10,673,789         634         494         5,126           OK         SOP         VDM         2         UFP         Sink         0         0x641         10,673,682         631         555         5,002           OK         SOP         ConvCS0         2         DFP         Sink         1         0x144 Dx67000822         10,673,319         501         502         4100	DFP         Source         1         0x196F DxFF008002         10,673,789         634         494         5,126         Mex Operating Current         90(0.90Å)           UFP         Sink         0         0x641         10,074,569         498         140         5,176         50         5,022           UFP         Sink         1         0x144f OxF7000082         10,076,519         501         66         \$120	OK         SOP         VDM         4         DPP         Source         1         0x4/60/4000002         10.073.789         634         494         5,126           OK         SOP         GoodORC         4         UPP         Sink         0         0x641         10.073.789         634         494         5,175           OK         SOP         VDM         2         UPP         Sink         0         0x14/F 0x00002         10.073.622         631         56.02           OK         SOP         GoodORC         2         DPP         Source         0         0x661         10.676.821         501         66         5.175           OK         SOP         GoodORC         2         DPP         Source         0         0x661         10.676.819         501         66         5.120	OK         SOP         VDM         4         DIP         Source         1         0x186F000022         10,673,789         634         494         5,126           OK         SOP         GoodORC         4         UFP         Sink         0         0x641         10,673,589         488         146         5,175           OK         SOP         VDM         2         UFP         Sink         0         0x641         10,673,582         631         555         5,002           OK         SOP         GoodORC         2         DFP         Source         0         0x661         10,673,582         631         555         5,002           OK         SOP         GoodORC         2         DFP         Source         0         0x661         10,675,319         501         66         5,170		OK	SOP	GoodCRC	1	DFP	Source	0	0x361	10,672,794	501	64	5,164	Operating Current in 10	90(0.90A)
OK         SOP         GoodCRC         4         UFP         Sink         0         0x841         10,074,589         498         146         5,175           OK         SOP         VDM         2         UFP         Sink         1         0x1447/000302         10,675,5622         631         550         5,002           OK         SOP         ConvDSC         2         DFP         Sink         1         0x1447/000302         10,673,319         501         68,120	UFP         Sink         0         0.641         10.674.569         48         140         5.175           UFP         Sink         1         0.144 / 0.6700002         10.076.22         631         50.9           DFP         Source         0         0.661         10.676.319         501         68         \$120	OK         SOP         GoodCRC         4         UFP         Sink         0         0x841         10,675,699         483         146         5,175           OK         SOP         VDM         2         UFP         Sink         1         0x144F0xF000082         10,675,622         631         555         5,002           OK         SOP         GoodCRC         2         DFP         Source         0         0x661         10,675,319         501         86         \$120	OK         SOP         GoodCRC         4         UFP         Smk         0         0.641         10.074.569         488         146         5.175           OK         SOP         VDM         2         UFP         Smk         1         0.074.762         631         505         5.002           OK         SOP         GoodCRC         2         DFP         Source         0         0x661         10.076.319         501         66         122		OK	SOP	VDM	4	DFP	Source	1	0x196F 0xFF008002	10,673,789	634	494	5,126	Max Operating Current	90(0.90A)
OK SOP VOM 2 UPP Swk 1 0-144F0/P00002 10.075422 031 555 5.002 OK SOP Gov/G2 2 DPP Swme 0 0-661 10.073-18 501 66 5120	UFP         Sink         1         0x144F OxF7000862         10,675,622         631         555         5,082           DFP         Source         0         0x661         10,676,319         501         66         5.120	OK         SOP         VDM         2         UPP         Sink         1         0x144F 0x4F000082         10.075.822         631         555         5.082           OK         SOP         GoodCRC         2         DFP         Source         0         0x661         10.676.319         501         66         5.120	OK         SOP         VDM         2         UP         Swk         1         0x14# OF7000032         10,075,622         631         545         5.082           OK         SOP         GsodGRC         2         DPP         Source         0         0x661         10,676,319         501         66         5120		ОК	SOP	GoodCRC	4	UFP	Sink	0	0x841	10,674,569	498	146	5,175		
OK SOP GendCRC 2 DEP Source 0 0x661 10.676319 501 86 5120	DFP Source 0 0x661 10,678,319 501 66 0.120	OK SOP GeodCRC 2 DFP Source 0 0x661 10,676.319 501 66 8.320	OK SOP GeodCRC 2 DFP Source 0 0x661 10,676,319 501 66 5120		OK	SOP	VDM	2	UFP	Sink	1	0x144F 0xFF008082	10,675,622	631	555	5,082		
					OK	SOP	GoodCRC	2	DFP	Source	0	0x561	10,676,319	501	66	5,120		

- Also, as seen from Figure 28, the CCG3 device requests the source PDO object 1, i.e., source PDO1. This
  implies that the custom PDO at 14.8V, 900mA (supported by the Type-C power adapter) is no longer supported
  as a sink PDO by the Type-C port of CY4531 CCG3 EVK, because the sink PDOs of the CCG3 device have
  been successfully updated.
- 7. This can also be verified by measuring the voltage on the power output header J7 of the CCG base board using a multimeter. The output voltage on this header will be about 5V, which is the established power contract between the two devices. Also, looking at the 'Vbus' column in Figure 28, it can be seen that the V<sub>BUS</sub> voltage is set to 5V at the end of the power contract negotiation.



This shows that the power contract is successfully established at 5V between the Type-C power adapter and the CY4531 CCG3 EVK, and not at 14.8V. The Type-C power adapter provides 5V to the Type-C port of the CY4531 CCG3 EVK. In order to restore the CY4531 CCG3 EVK back to the default configuration parameters, follow the steps described in section "Programming the CCG3 Device on CY4531 CCG3 EVK" of the CY4531 EZ-PD CCG3 EVK Guide. Once completed, the steps described in the Test CY4531 CCG3 EVK Setup with the Default Configuration and Type-C Power Adapter section can be repeated to verify the kit operation with default configuration parameters.



# **Document History**

Document Title: AN200210 – Getting Started with EZ-PD™ CCG3

Document Number: 002-00210

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5320774	VGT	06/23/2016	New application note.
*A	5857634	HARA	08/18/2017	Updated logo and copyright.



# Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at Cypress Locations.

# Products

ARM <sup>®</sup> Cortex <sup>®</sup> Microcontrollers	cypress.com/arm
Automotive	cypress.com/automotive
Clocks & Buffers	cypress.com/clocks
Interface	cypress.com/interface
Internet of Things	cypress.com/iot
Memory	cypress.com/memory
Microcontrollers	cypress.com/mcu
PSoC	cypress.com/psoc
Power Management ICs	cypress.com/pmic
Touch Sensing	cypress.com/touch
USB Controllers	cypress.com/usb
Wireless Connectivity	cvpress.com/wireless

# **PSoC® Solutions**

PSoC 1 | PSoC 3 | PSoC 4 | PSoC 5LP | PSoC 6

# **Cypress Developer Community**

Forums | WICED IOT Forums | Projects | Videos | Blogs | Training | Components

# **Technical Support**

cypress.com/support

PSoC is a registered trademark and PSoC Creator is a trademark of Cypress Semiconductor Corporation.



Cypress Semiconductor 198 Champion Court San Jose, CA 95134-1709

© Cypress Semiconductor Corporation, 2016-2017. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC ("Cypress"). This document, including any software or firmware included or referenced in this document ("Software"), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you a personal, non-exclusive, nontransferable license (without the right to sublicense) (1) under its copyright rights in the Software (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units, and (2) under those claims of Cypress's patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely for use with Cypress hardware products. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

TO THE EXTENT PERMITTED BY APPLICABLE LAW, CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE OR ACCOMPANYING HARDWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. To the extent permitted by applicable law, Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage ("Unintended Uses"). A critical component is any component of a device or system knobe failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whose failure or in part, and you shall and hereby do release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. You shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, WICED, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.