Granite River Labs Quick Start Guide

For Using GRL-V-UP API Test Software with GRL USB Power Delivery & Data Loopback Volume Tester

GRL V - UP API Test Software v1.	1.0.3.8											- 0 X
Home Function	onality											:
API Sele	nection : Devices List : GRL-PWR-20200012 lected Device : GRL-PWR-	* Select	Reset									Î
Graph Cropback Loopback Help	et Selection : Une Update Graph Pol Vocum Sol 100 / 100 (Sol 100 / 100) Sol 100 / 100 (Sol 100 / 100) Sol 100 / 100 (Sol 100 / 100) VIDUS : 0.0000 / 100 / 100 Sol 100 / 100 (Sol 100 / 100) VIDUS : 0.0000 / 100 Sol 100 / 100 (Sol 100 / 100)	GRL-USB-PD-TC Port 2 Port 2 Port 5 Port 5 Po	GRL-USB-PD-TC Port 3 Point 2 0 Dt Point 2 0 Dt Point 2 0 Dt Dt LK 0 DT D	GRL-USB-PD-TC Port 4 Power 32 004 Disc 22	GRL-USB-PD-TC Port 5 0 0 Peret © V1V/5 EVO FX © H0/5 SC 12 4 0 FO N Sc 12 4 0 FO N 0.0180 A VCONN © 0.0000 V 0.0000 A	GRL-USB-PD-TC Port 6 Port 12 0 01 Pores 9 VVIS BUD TX 0 Hoss 91 KX 0 Hoss 51 KA Art 7 No VBUS 1, 43780 V VBUS 1, 43780 V 0,0000 A VCONN 1, 0,0000 A	GRL-USB-PD-TC Port 7 Pove: 12 © 00 Power © V1VIS END-TK © MICIS DI CK © PO-N S-Rin-Adart © No/NO VBUS: 4.5810 V 0.0000 A VCONN © 0.0000 A	GRL-USE-PD-TC Port 8 Polici 12 © DE mere © 0405 DNO-TX © 0505 DE LX © PTO N Scille Adm (PTO N Scille Adm (PTO N 0.0010 A VCONN : 0.0000 V 0.0020 A	GRL-USB-PD-TC Port 9 Pover 12 © DE Pover 20 Pover DE 12 © DE DE 12 © DE 12 © DE 12 © DE DE 12 © DE 12 © D	GRL-USB-PD-TC Port 10 Poyet 12 © 00 Power © VV05 EN-0-TC © HeV55 EN-0-TC © HEV555 EN-0-TC © HEV555 EN-0-TC © H	All Ports	
	PD Contract: Attach DUT : Read Sou Maaurment : VUUS Select PDO : Unknown Max Current / Velt : 0 Opp Current : 0 VEUS Current : 0 VEUS Current : 0 VEUS Current : 0 Test PDO's: VEUS	Detach Tree Capabilities VCONN Request Con Con Con Con Con Con Con Co	A CMode *	A	App Command : Cable Selection : VBUS Selection : Auto Eload : Polling : Tester Card Power : VCONN Switch : Ra Assert : Heatsink Temp Limit	None Pype C Cable Pype C VBUS Disable Disable VCONN Load RaDisable VCONN Load C RaDisable C C C C C C C C C C C C C	Special Cable Co D Ext VBUS Co Enable Co Stop : Off Apply Set Limit (Send onfigure onfigure Status Status	Attach - Attach - Porti Att Porti Att	-20200012 Selected succ API: GriVPdApiLib Instan- tach command sent tach command sent	ssfully 	
	FW Update : <u>None</u> Update	v Version										

This material is provided as a reference to use the GRL-V-UP API Test Software for programming the Granite River Labs (GRL) USB Power Delivery & Data Loopback Volume Tester (GRL-V-UP) using API commands.

For customer support, contact support@graniteriverlabs.com.

TABLE OF CONTENTS

1	SC	COPE OF THIS QUICK START GUIDE	4
2	C	ONNECTION SETUP OF GRL-V-UP	4
	2.1	TURN ON TESTER AND CONNECT CONTROL COMPUTER	5
3	Gl	ETTING STARTED WITH GRL-V-UP API TEST SOFTWARE	5
	3.1	INSTALL GRL-V-UP API TEST SOFTWARE	6
4	ST	TART UP AND NAVIGATE GRL-V-UP API TEST SOFTWARE	9
	4.1	АРІ Тав	9
	4.1	1.1 (1) GRL-V-UP Connection Pane	9
	4.1	1.2 (2) GRL-V-UP Port Selection & Live Data Update Pane	9
	4.1	1.3 (3) GRL-V-UP USB Power Delivery Programming Pane	10
	4.1	1.4 (4) GRL-V-UP Firmware Update Pane	10
	4.1	1.5 (5) GRL-V-UP Miscellaneous API Configuration Pane	10
	4.1	1.6 (6) GRL-V-UP API Activity Log Pane	11
	4.2	GRAPH TAB	11
	4.3	LOOPBACK ТАВ	11
	4.4	Help Tab	12

LIST OF FIGURES

Figure 2.1: Hardware Connection Setup for GRL-V-UP API Test Software and Device Under Test4	1
Figure 2.2: Power On GRL-V-UP	5
Figure 3.1: GRL Support Download Center Page	5
Figure 3.2: Download Information	5
Figure 3.3: GRL-V-UP API Test Software Installation in Progress	7
Figure 3.4: GRL-V-UP USB Drivers Installation in Progress #1	7
Figure 3.5: GRL-V-UP USB Drivers Installation in Progress #2	3
Figure 3.6: GRL-V-UP Arduino Drivers Installation in Progress	3
Figure 3.7: GRL-V-UP API Test Software Installation Completed	3
Figure 4.1: GRL-V-UP API Test Software API Tab Screen)
Figure 4.2: Check Firmware Version on GRL-V-UP API Test Software Help Tab Screen 10)
Figure 4.3: GRL-V-UP API Test Software Graph Tab Screen	l
Figure 4.4: GRL-V-UP API Test Software Loopback Tab Screen	2
Figure 4.5: GRL-V-UP API Test Software Help Tab Screen	2

1 Scope of this Quick Start Guide

This Quick Start Guide helps you to familiarize with the GRL-V-UP API Test software to control the GRL USB Power Delivery & Data Loopback Volume Tester (GRL-V-UP) through API programming.

The GRL-V-UP tester supports concurrent USB Power Delivery 3.0 negotiation, 1000W max power loading and USB 2.0 & USB 3.1 data loopback testing. The GRL-V-UP tester in modular form can add up to 10 test cards in a single 3U rack unit chassis. Each test card supports loading of a single 100W USB Type-C port or dual 60W USB Type-C ports.

For more information on GRL-V-UP, please refer to https://graniteriverlabs.com/grl-v-up/.

For purchase orders, licensing questions and concerns, please contact Granite River Labs support at support@graniteriverlabs.com.

2 Connection Setup of GRL-V-UP

Figure 2.1 shows an example hardware setup for testing a USB Type-C/Power Delivery host, hub module, dock, monitor or charger using the GRL-V-UP API Test software running on a control computer and connected via USB to the GRL-V-UP tester that is attached to the USB device to be tested through the tester USB Type-C test port.



FIGURE 2.1: HARDWARE CONNECTION SETUP FOR GRL-V-UP API TEST SOFTWARE AND DEVICE UNDER TEST

The GRL-V-UP API Test software loaded on a Windows 10 computer (note this will be referred to as the control computer here onwards) allows the user to control the operation of the GRL-V-UP tester using API commands. Below is a procedure for connecting the hardware and verifying proper hardware connections.

1. Connect a Power Supply to the GRL-V-UP Tester Power Interface using the power cord accessory included with the tester.

2. Connect the GRL-V-UP Tester to the control computer using a physical USB Type-A to Type-B cable.

Notes:

- For hardware setup procedure of the GRL-V-UP Tester, refer to the GRL-V-UP user documentation in http://graniteriverlabs.com/download-center/.
- For detailed list of API commands and custom test cases creation, refer to the GRL-V-UP API Help documentation in http://graniteriverlabs.com/download-center/.

2.1 Turn On Tester and Connect Control Computer

1. Turn on the GRL-V-UP tester using the Power button on the front of the tester.



FIGURE 2.2: POWER ON GRL-V-UP

- 2. Make sure the GRL-V-UP tester is powered on and completely booted up, and then connect a USB Type-A to Type-B cable from the GRL-V-UP tester's USB (To PC) connector to one of the control computer's USB ports.
- 3. To make sure the USB connection is set up properly, on the control computer open the Device Manager window from the Control Panel.
- 4. In Device Manager, from the top menu select "View" -> "Devices by connection". The GRL-V-UP tester should appear in the list if connected properly to the control computer.

3 Getting Started with GRL-V-UP API Test Software

This section describes how to get started with the GRL-V-UP API Test software. If you are installing for the first time, please make sure to follow all the steps in this section to verify your setup prior to testing a DUT (device under test). The procedure is as follows:

- 1. Install the latest version of GRL-V-UP API Test software on the control computer (laptop or desktop) connected to the GRL-V-UP Tester. (Note: All the necessary drivers, API libraries and helper functions will also be installed along with the software. The software can also be downloaded and installed from http://graniteriverlabs.com/download-center/.)
- 2. Make sure the GRL-V-UP Tester has been updated to the latest firmware version. Refer to Section 4.1.4 for details.

If this procedure is followed and any issues arise, please contact support@graniteriverlabs.com.

3.1 Install GRL-V-UP API Test Software

1. Download the GRL-V-UP API Test software from: <u>http://graniteriverlabs.com/download-center/</u>.

GRL GRANITE F	LIVER LABS		HON	Æ 简体中文 素體中文 日本	吾 I WORLDWII	DE LOCATIONS	CONTACT Search
	ENGINEERING SEI	RVICES	TEST SOLUTIONS	TECHNICAL EXPERTISE	EVENTS	SUPPORT	ABOUT
SUPPORT	Dow GRI GRI	mload GR L USB Pov L V-UP API L V-UP Driv	Dad Center RL software, user man ver Delivery & Data Loop Test Software	uals and other detailed pro pback Volume Tester (GRL-V-t v1.0 v1.2.3.20	duct informa JP)	tion Down	nload

FIGURE 3.1: GRL SUPPORT DOWNLOAD CENTER PAGE

2. On the Windows 10 control computer to be used for running the GRL-V-UP API Test software, create a folder and download the software installer compressed archive (ZIP file). On the Download Center page, select the "Download" button associated with the latest GRL-V-UP API Test software version. Enter the required information and select the "Download" button:

Downloa	d GRL software, user manuals and other deta	niled p
USB Po	Download SW/FW	L-USI
Software	Email (required)	1.
GRL US		re (G
Control	First name (required)	
Software		1.
Method	Last name <i>(required)</i>	1.
GRL HD	Title	
Software		1.
_	Company (<i>required</i>)	
GRL Dis		UX-D
Software	Download	1.
GRL SA	4 F	GRL
User Gui	ide	1.

FIGURE 3.2: DOWNLOAD INFORMATION

- 3. Save the ZIP archive in a convenient folder and extract the GRL-V-UP API Test software installer by right-clicking the downloaded archive and selecting "Extract All".
- 4. Run the installer by double clicking the extracted executable.
- 5. Make sure to click "Yes" when the system prompt asks if you want to allow the installer to make changes to your system. Then follow the on-screen instructions to run installation for the GRL-V-UP API Test software.

GRL V-Up API Test Software	V1.0.3.8 Setup — 🗆 🗙	🕅 GRL V-Up API Test Software V1.0.3.8 Setup —	
	Welcome to GRL V-Up API Test Software V1.0.3.8 Setup	Installing Please wait while GRL V-Up API Test Software V1.0.3.8 is being installed.	GRL
	Setup will guide you through the installation of GRL V-Up API Test Software V1.0.3.8.	Extract: WUDFUpdate_01009.dll	
	It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.	Show details	
R	Click Install to start the installation.	Mullenit Testall Sustam v2 04	
	Install Cancel	Kalison Caristan System Votor	Cancel

FIGURE 3.3: GRL-V-UP API TEST SOFTWARE INSTALLATION IN PROGRESS

6. While installation is running, a Command prompt window for GRL-V-UP USB drivers installation will pop up as shown in Figure 3.4. Type "YES" and press the "Enter" key to install the USB drivers. Once the drivers have been installed, the user will be asked to press any key as shown in Figure 3.5. This will complete the driver installation and will go on to begin installation for GRL-V-UP Arduino drivers.

C:\GRL\GRL-USB_Drivers\DriverInstall.exe	- 🗆 🗙	🔞 GRL V-Up API Test Software V1.0.3.8 Setup - 🗆 🗙
Installing USB Drivers MOTE: Unplug V-UP controler card USB connection before installation begins. Enter Yes to Continue or No to Exit	^	Installing Please wait while GRL V-Up API Test Software V1.0.3.8 is being installed.
		Execute: C:\GRL\GRL-USB_Drivers\DriverInstall.exe
		Show details
		Nulsoft Install System v3.04
		< Back Next > Cancel
	~	

FIGURE 3.4: GRL-V-UP USB DRIVERS INSTALLATION IN PROGRESS #1



FIGURE 3.5: GRL-V-UP USB DRIVERS INSTALLATION IN PROGRESS #2

7. When prompted for GRL-V-UP Arduino drivers installation as shown in Figure 3.6, type "YES" and press the "Enter" key to install the drivers.



FIGURE 3.6: GRL-V-UP ARDUINO DRIVERS INSTALLATION IN PROGRESS

8. Once the drivers installation is completed, click on the "Finish" buttons to complete the GRL-V-UP API Test software installation as shown in Figure 3.7.

Device Driver Installation Wiza	rd	GRL V-Up API Test Software	V1.0.3.8 Setup — 🗆 🗙
	Completing the Device Driver Installation Wizard		Completing GRL V-Up API Test Software V1.0.3.8 Setup
	The drivers were successfully installed on this computer.		GRL V-Up API Test Software V1.0.3.8 has been installed on your computer.
	You can now connect your device to this computer. If your device came with instructions, please read them first.		Click Finish to dose Setup.
	Driver Name Status ✓ Adafruit Industries LLC (Ready to use ✓ Arduino Sif (www.arduin Ready to use ✓ Arduino LLC (www.arduin Ready to use		
	< Back Finish Cancel		< Back Finish Cancel

FIGURE 3.7: GRL-V-UP API TEST SOFTWARE INSTALLATION COMPLETED

4 Start Up and Navigate GRL-V-UP API Test Software

Once installed, launch the GRL-V-UP API Test software. There are four main tabs on the left side of the software screen as follows:

- API
- Graph
- Loopback
- Help

Each of these tabs will display its respective functional screen when selected.

4.1 API Tab

Select this tab to access all API components for controlling the GRL-V-UP tester.

GRL V - UP API T	JP API Test Software v10.3.8	- 0 ×
🕈 Home	ome Functionality	:
API	V-UP Connection : Devices List : GRL-PWR-20200012 × Select Selected Device : GRL-PWR-20200012 Reset	Î
Graph Loopback	C GRL-USE-PD-TC Port 1 GRL-USE-PD-TC Port 1	LUSE PD-TC Port 5 ● ■ K ● ● ■ K ■ ■ 0 = K ■ ■ K ■ ■ 0 = K ■ 0 = K
	Heat Sink Temperature : 26 deg C	
	3 PD Contract: Attach Detach DUT : Read Source Capabilities Messument : VBUS VCONN Select PDO : Unknown ~ Request Opp Carrent : Opp Carrent : VUDN Carrent : Off ~ VCONN Carrent : Off ~ VCONN Carrent : Off ~ Seter PDO : Unknown ~ Read Source (Cabled *) A VCONN Carrent : Off ~ Collade * Off ~ Seter PDO : Unknown ~ Seter PDO : None * USE Corrent : Under * Off Used * None * USE Corrent : Under * Option * Version * App Contract : Get	OIL-PVR-20200112 Selected successfully OIL-PVR-2020012 Selected successfully OIL-PVR-2020012 Selec
		Save Clear V

FIGURE 4.1: GRL-V-UP API TEST SOFTWARE API TAB SCREEN

Below describes each pane (as numbered in Figure 4.1 above) on the API tab screen:

4.1.1 (1) GRL-V-UP Connection Pane

In this pane the user can select to control a GRL-V-UP tester unit connected to the control computer from the **Devices List** drop-down menu. Click on the **Select** button and the selected tester unit will be displayed in the **Selected Device** field. The user can also perform a reset for the selected tester unit by clicking on the **Reset** button.

4.1.2 (2) GRL-V-UP Port Selection & Live Data Update Pane

In this pane the user can select active tester card port(s) on the GRL-V-UP tester or all ports (by clicking on the **All Ports** button) to perform live data update and plot graphs.

- Select the Live Update checkbox and click on the Update Data button to perform live updates of all LED components on the tester cards, VBUS voltage & current, VCONN voltage & current, Source Re-Advertise and Heat Sink Temperature data of the tester for the selected port(s).
- Select the **Graph Plot** checkbox and click on the **Update Data** button to plot live graph traces for the selected port(s).

4.1.3 (3) GRL-V-UP USB Power Delivery Programming Pane

In this pane the user can perform USB Power Delivery (PD) related operations such as Attach / Detach the DUT during PD contract negotiation, read the Source Capabilities of the DUT, request PDO's, set Load current and test PDO's.

4.1.4 (4) GRL-V-UP Firmware Update Pane

In this pane the user can select from the **FW Update** drop-down menu to perform firmware updates for the controller card, tester card, USB Power Delivery controller and E-Load on the GRL-V-UP tester. Click on the **Update** button to start updating the firmware for the selected component.

The user can also click on the **Version** button to verify the current firmware version on the GRL-V-UP tester. Alternatively, the user can access through the Help tab screen as shown in Figure 4.2 below.



FIGURE 4.2: CHECK FIRMWARE VERSION ON GRL-V-UP API TEST SOFTWARE HELP TAB SCREEN

4.1.5 (5) GRL-V-UP Miscellaneous API Configuration Pane

In this pane the user can configure and apply various API controls / functionalities such as controller fan switch, tester card power, USB cable selection, VCONN switch and so on.

4.1.6 (6) GRL-V-UP API Activity Log Pane

This pane will display a log of all user activity carried out through the API Tab screen.

4.2 Graph Tab

Select this tab to view a graphical representation of the VBUS voltage & current for all active ports on the GRL-V-UP tester. The user can also select to view traces for specific ports using the checkboxes at the top right of each graph plot.



FIGURE 4.3: GRL-V-UP API TEST SOFTWARE GRAPH TAB SCREEN

4.3 Loopback Tab

Select this tab to perform data loopback testing. The user can select from the **Devices List** drop-down menu the DUT's with loopback capability that are connected to the tester cards on the GRL-V-UP tester. Click on the **Select** button and the selected loopback device will be displayed in the **Selected Device** field.

Click on the **Start** button to run the loopback testing and **Stop** button to terminate the process. The data transfer, speed and status will be updated continuously as the loopback test is running.

GRL V - UP API Test	Software v1.0.3.8		
🕈 Home 📘	oopBack		
	Loop Back Testing		
API	Devices List :	GRL-LoopBack-1	× Select
	Selected Device :	GRL-LoopBack-1	
Graph	Transferd Bytes :	262144000 b	
	Received Bytes :	262144000 b	
	Speed :	247.259 Mbps	
Loopback	Satus :	Running in GRL-LoopBack-1 Speed : HighSpeed	
?			
Help		Start	Stop

FIGURE 4.4: GRL-V-UP API TEST SOFTWARE LOOPBACK TAB SCREEN

4.4 Help Tab

Select this tab access GRL support information as well as related documentation, C# & Python API user documentation, sample scripts, software release notes, firmware update documentation and latest firmware released version.



FIGURE 4.5: GRL-V-UP API TEST SOFTWARE HELP TAB SCREEN

END_OF_DOCUMENT