ADQ7
Quick Start Guide for Windows
1 Introduction

Congratulations on having purchased a Teledyne SP Devices digitizer product. To get the most out of the digitizer we recommend that you read the documentation set carefully.

Disclaimers and Safety

**Caution!**
Ground the antistatic package before removing the board from the package. Electrostatic discharge may damage the card. Be sure to ground yourself by touching the grounded frame and avoid touching any components on the card.

**Caution!**
Before connecting any equipment to the digitizer, please check the absolute maximum ratings in the digitizer data sheet to assure that the connected equipment cannot damage the digitizer.

2 Installing the Software

Before connecting the digitizer to the host computer for the first time, the software development kit (SDK) must be installed. To install the SDK, run `ADQ-setup.exe` found on the USB flash drive delivered with the digitizer. This will install all software, including drivers, and add shortcuts to the start menu.

**Important**
Make sure the digitizer is connected to the host computer before you begin the installation process.

1. The screen below is shown when the installer is started.

![ installer screen image ]

2. Press Next to continue.
3. Read the license agreement, and then press *I Agree* to continue.

4. Choose the components to be installed, and then press *Next*. We recommend installing all the preselected components.
5. Accept or change the installation directory (using the **Browse** button), then press **Install** to start the installation.

![ADQ Software Setup](image)

**ADQAPI**

The ADQAPI is the application programming interface (API) used by the host computer to communicate with digitizers from the ADQ product range. The API functions are detailed in the ADQAPI reference guide [1] and general usage is documented in the ADQAPI user guide [2]. There are two different interfaces available: a C interface and a C++ interface. Most programming languages, e.g. Python, have a foreign function interface granting the ability to call functions from C dynamic link libraries directly, making this the more general interface of the two.

For Matlab, .NET, and Labview, the installer provides tailored interfaces for accessing the API. However, please note that only a subset of the full functionality is available via these interfaces.

**ADCaptureLab**

ADCaptureLab is an easy-to-use standalone program which allows for configuration and operation of ADQ digitizers from Teledyne SP Devices. The application is able to collect and plot data, and to calculate key performance metrics such as SNR and SFDR. Collected data can be stored on disk for later use, e.g. to compare measurements. ADCaptureLab is only available for Windows and does not support the pulse detection firmware (FWPD) or the advanced time-domain firmware (FWATD). Please note that only a subset of the digitizer’s full functionality is controllable from ADCaptureLab. The application exists for diagnostic purposes and to simplify the process of getting started with the digitizer. For more information, see the ADCaptureLab user guide [3].

**Note**

Firmware options FWATD and FWPD have separate GUIs.

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1. For example, streaming is not available in ADCaptureLab.
3 Connecting the Digitizer to the Host Computer

After the SDK has been installed, it is time to connect your digitizer to the host computer. The connection procedure depends on the form-factor.

USB

For USB units you need:

• A main power supply, 12 V (delivered together with the digitizer)
• A USB cable (delivered together with the digitizer)
• A host computer with a USB port (USB 2.0 or later)

Connect the digitizer to the power supply and to the host computer.

PXie

For PXie units you need a host computer with a free PXie or cPCIe slot. With the host computer powered off, plug in the digitizer. Power on the host computer.

MTCA

For a MTCA unit you need a host computer with an available MTCA slot. With the host computer powered off, plug in the digitizer. Power on the host computer.

PCle

For PCIe units you need:

• A host computer with an available PCIe slot
• A PCIe 6-pin power connector like the one below. Please note that an adapter may be required for some systems. The adapter can be purchased from a computer accessory supplier.

With the host computer powered off, plug in the digitizer and connect the power cable. Make sure that the digitizer is mechanically supported by screws through the front panel. Power on the host computer.

Manual Installation of Drivers

With a Windows operating system, the driver for the digitizer is installed automatically when running ADQ-setup.exe. Manual installation is only needed if the automatic installation fails. The driver installation is similar for all supported Windows operating systems. Below is an example of installing the drivers for
an ADQ412 (USB) on Windows 7. There may be minor differences between different product types and interfaces.

1. Power on the digitizer and connect the USB cable between the digitizer and the host computer. The message below will be shown.

2. Open the Device Manager by typing *Device Manager* in the search field of the start menu.

3. Locate and right click on the *Unknown device*. Select *Update Driver Software*.
4. Select *Browse my computer for driver software.*

5. Press *Browse* and select `Drivers\ADQUSB\X64_WIN7` in the installation directory, then press *Next.*

**Note**

If you are running a 32-bit version of Windows, select `Drivers\ADQUSB\x86_win7` instead.

6. Your ADQ digitizer will now appear in the device manager.
PXie Front Panel

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RDY</strong></td>
<td>Not used</td>
</tr>
<tr>
<td><strong>STA/STAT</strong></td>
<td>Blinking red light in combination with PWR LED off indicates that the device has overheated and partially powered down to prevent damage.</td>
</tr>
<tr>
<td><strong>PWR</strong></td>
<td>Solid green light indicates power and status OK.</td>
</tr>
<tr>
<td><strong>USR/USER</strong></td>
<td>Solid blue light when the digitizer is acquired by an application using the ADQAPI.</td>
</tr>
<tr>
<td><strong>ATN</strong></td>
<td>PXie attention LED</td>
</tr>
</tbody>
</table>
## MTCA Front Panel

<table>
<thead>
<tr>
<th>MMC Error</th>
<th>Solid red light if the MMC detected an error.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMC Operation</td>
<td>Solid green light while the device is running.</td>
</tr>
<tr>
<td>Hotswap</td>
<td>Linux only</td>
</tr>
</tbody>
</table>

- **Solid**—OK to disconnect the device.
- **Flashing**—wait before disconnecting the device.
- **Off**—normal mode: pull hot swap pin gently to activate indicator.
4 Using the Digitizer

To introduce you to the interface for our digitizers: the ADQAPI, there are source code examples provided in the installation directory, by default

```
C:\Program Files\SP Devices
```

The installation directory is specified in step 5 in the installation process (Section 2). This is also the location of the available GUIs. We recommended you to browse through the contents of this directory to get an overview of the available example code.

**Note**

Please note that there are different source code examples for different products and firmwares.

```
<Path to installation directory>/
  | SP Devices/
  |   | C_examples/
  |   | Cpp_examples/
  |   | CSharp_examples/
  |   | Matlab_examples/
  |   | Python_examples/
  |   | VisualBasic_examples/
```

It is also helpful to familiarize yourself with the documentation for your specific product. Which documents to read depend on which firmware your digitizer is running. Refer to p. 10 for an overview of the available resources. Additional documentation is available on our [web site](https://www.spdevices.com/documentation).

References


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2 GUIs for FWATD and FWPD have separate installers.

3 https://www.spdevices.com/documentation
### Common resources

<table>
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<tr>
<th>Resource</th>
<th>Description</th>
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<tbody>
<tr>
<td>MAN 16-1796</td>
<td>The ADQ7 product manual</td>
</tr>
<tr>
<td>UG 18-2059</td>
<td>Describes how to manage firmware files.</td>
</tr>
<tr>
<td>UG 08-0214</td>
<td>The ADQAPI user guide</td>
</tr>
<tr>
<td>RG 14-1351</td>
<td>The ADQAPI reference guide, documents the functions in the ADQAPI.</td>
</tr>
</tbody>
</table>

### Firmware-specific resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>FWDAQ</th>
<th>FWSDR</th>
<th>FWPD</th>
<th>FWATD</th>
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<tr>
<td>User guides</td>
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<td>UG 17-2043</td>
<td>UG 18-2132</td>
<td>UG 17-1957</td>
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<tr>
<td>Source code examples in C</td>
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<td>ADQAPI_FWSDR_example fwsdr_example</td>
<td>ADQAPI_FWPD_example fwpd_example</td>
<td>ADQAPI_FWATD_example fwatd_example</td>
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<td>GUIs</td>
<td>ADCaptureLab (UG 18-2207)</td>
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<td>Application notes</td>
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<td>AN 18-2118</td>
<td>AN 18-2104</td>
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