CMSIS-DAP for XStream Adapters

XStream-Iso &
XStreamPro-Iso
CMSIS-DAP 2.0 Debugger

User Guide

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Chapter 1
Introduction

The XStream (XStream-Iso and XStreamPro-Iso) adapters support the CMSIS-DAP 2.0 debugging protocol. The "debugging software" is designed for IDEs that target ARM MCUs and support the CMSIS-DAP 2.0 protocol from ARM.

The debugging software package comes with a Windows™ USB driver that can register XStream adapters as CMSIS-DAP debuggers or standard Elprotronic Flash/Gang Programmers. The software is available for download online at http://www.elprotronic.com (supported from Windows 7 to Windows 10).

The debugging software enables communication with the IDE at USB full-speed performance with communication up to 12 Mb/s (1.5 MB/s). On the adapter side, the XStream adapter can communicate with the target device via JTAG or SWD protocol with programmable speed ranging from 100kHz to 20 MHz. In addition, when the SWD protocol is selected, the SWO line can be used for tracing the data transferred from debugged target (if supported) via UART protocol with programmable baud rate between 10 kb/s to 12.5 Mb/s.

The remainder of this manual will explain how to use all the different features of the debugging software, and how to configure the XStream adapter to act as a CMSIS-DAP debugger or revert to default Elprotronic Flash/Gang programmer mode.

Chapter 2
Features

XStream-Iso and XStreamPro-Iso adapters can be configured as CMSIS-DAP debuggers supporting the CMSIS-DAP 2.0 protocol for ARM MCUs. Any IDE that supports the CMSIS-DAP 2.0 protocol can then use the XStream adapter in this mode for debugging.

2.1 Key Features

The key features of the CMSIS-DAP setup for XStream adapters:
- Supports the CMSIS-DAP 2.0 communication protocol via USB interface.
- Debugging via JTAG or SWD interface.
- Programmable JTAG/SWD communication speed from 100 kHz to 20 MHz.
- Supports tracing via SWO pin when SWD interface is used.
- Trace via UART with programmable baud rate from 10 kb/s up to 12.5 Mb/s
- Trace buffer size – 32 kB
- Target device can be powered from external power supply or from XStream adapter.
- Programmable power supply from adapter – 1.65V to 4.0V for XStream-Iso adapter and in the range 1.2V to 4.0 V for XStreamPro-Iso adapter. Max current up to 200 mA.
- Galvanic isolation between PC and target device
- Easy to use Windows^{TM} based software for configuration setup.
- **The XS-CMSIS-DAP product is a dedicated low-cost debugging adapter that does not run any other Elprotronic programming software.**
- **XStream-Iso and XstreamPro-Iso adapters that already have the FlashPro-ARM, GangPro-ARM, FlashPro-X and GangPro-X license, can also run the XS-CMSIS-DAP software after they download the latest ARM software package update.**

Hardware details are provided in the below documents:

https://content.elprotronic.ca/docs/Elprotronic-Programmers.pdf

https://content.elprotronic.ca/docs/Elprotronic-Connection%20to%20Programmers.pdf

Chapter 3

Getting Started

The XS-CMSIS-DAP product package contains:

1. One XStream-Iso adapter
2. Runs software available for download from www.elprotronic.com – download page.
3. One 6 feet long USB-A to USB-B cable
4. FPA to ARM 14-pin to 20-pin and 10 pin adapter (PE036X02) and ribbon cables

The CMSIS-DAP debugging software run under Windows 7 to 10. Follow instruction below to install the software
1.   Download XS-CMSIS-DAP-Setup.zip, unzip it and run setup.exe.
2.   The setup wizard appears automatically after clicking setup.exe. Begin the installation process.
3.   Once the installation program starts, on-screen instructions will guide you through the remainder of the installation. You must accept the license agreement before using this software.

3.1 Driver Installation

The installation program will place the USB driver files in Windows directories "Windows\inf" and "Windows\system32\drivers". When the CMSIS-DAP debugging software is installed then by default the drivers are preinstalled automatically. If for any reason the device cannot be seen under Device Manager when the adapter is plugged-in to USB port, then install the drivers manually. Drivers are located in the directory
  C:\Program Files (x86)\Elprotronic\Drivers XStream\WIN64

Chapter 4
Main Graphical User Interface

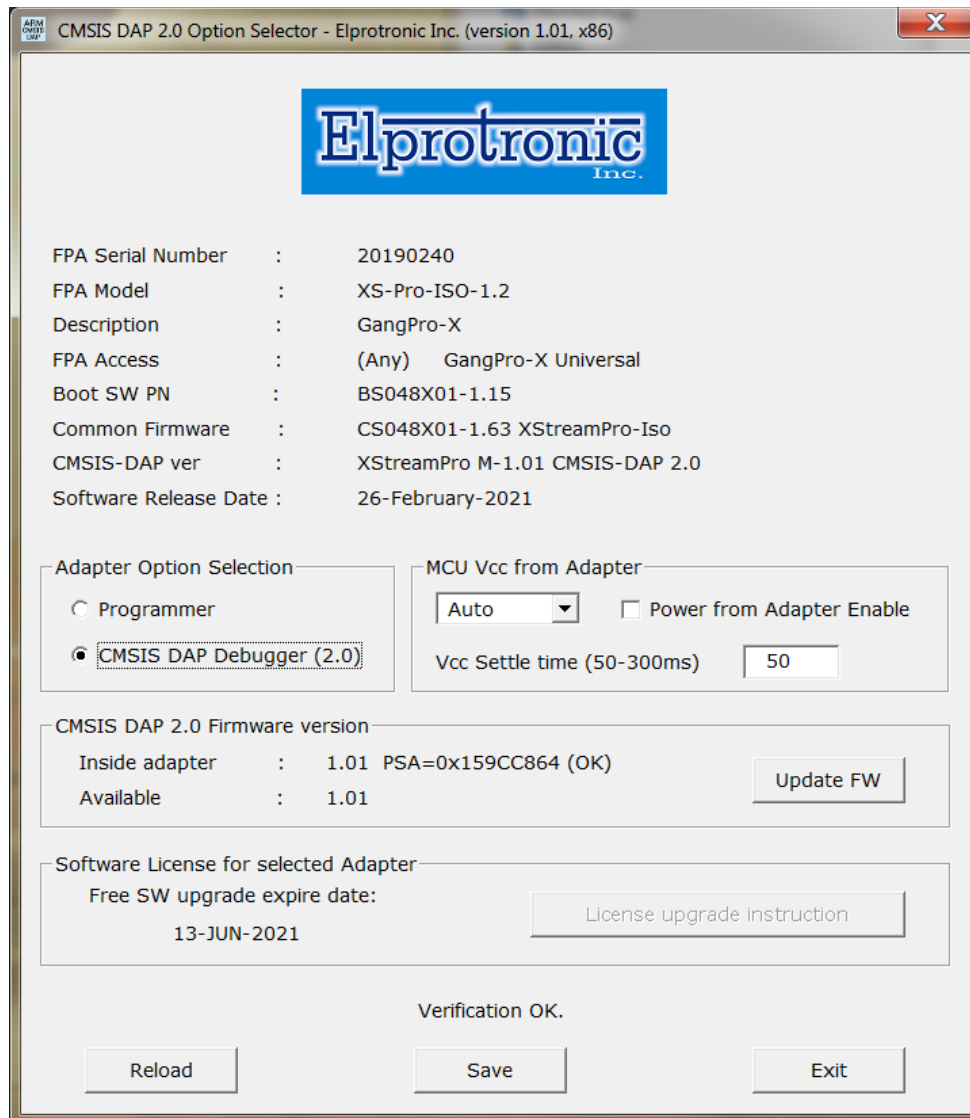The main dialog (see Figure 4.1) contains an adapter's label and setup options.

Figure 4.1: Main Dialog Screen. This label shows a XStreamPro-Iso adapter with the GangPro-X license. It can run in CMSIS-DAP debugger mode, or as an Elprotronic programmer. The user can switch between these two modes at any time.

4.1 CMSIS-DAP debugging software

The XStream adapters (XStream-Iso and XStreamPro-Iso) have the capability to operate as an Elprotronic programmer or as a CMSIS-DAP Debugger. The working mode is selected in the Adapter Option Selector. Each of these two working modes uses different USB communication protocols and different USB drivers, therefore only one mode can be used at one time. Elprotronic programming software like the FlashPro-ARM or GangPro-ARM will not detect the adapter if it is in CMSIS-DAP mode. Conversely, debugging IDEs will not see the adapter if it is in Elprotronic programmer mode. Therefore, make sure to select your desired mode of operation before proceeding to production programming or debugging. When the programming mode is selected then the following USB driver can be seen under Device Manager (see Figure 4.2)
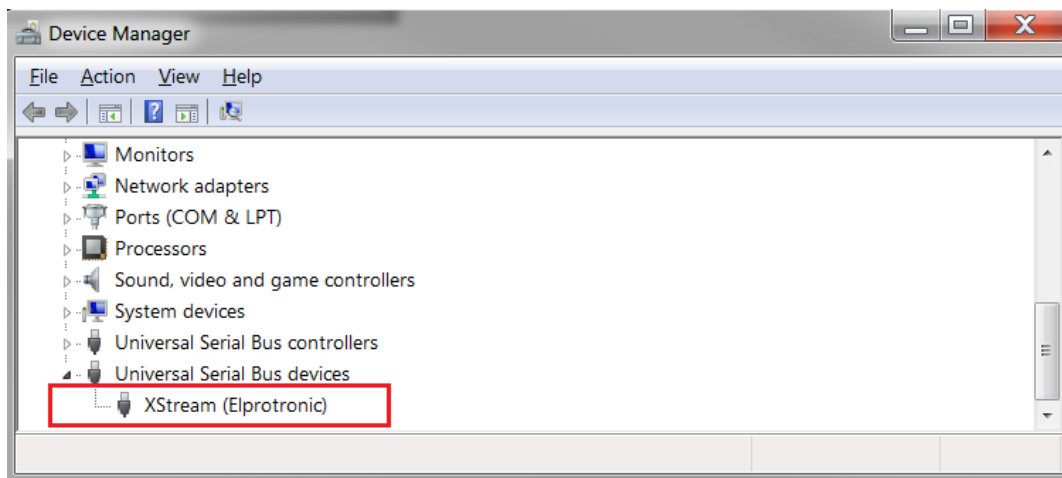

Figure 4.2: USB Driver for adapter working in the programming mode.

When the CMSIS-DAP mode is selected then the following USB driver can be seen under Device Manager (see Figure 4.3)
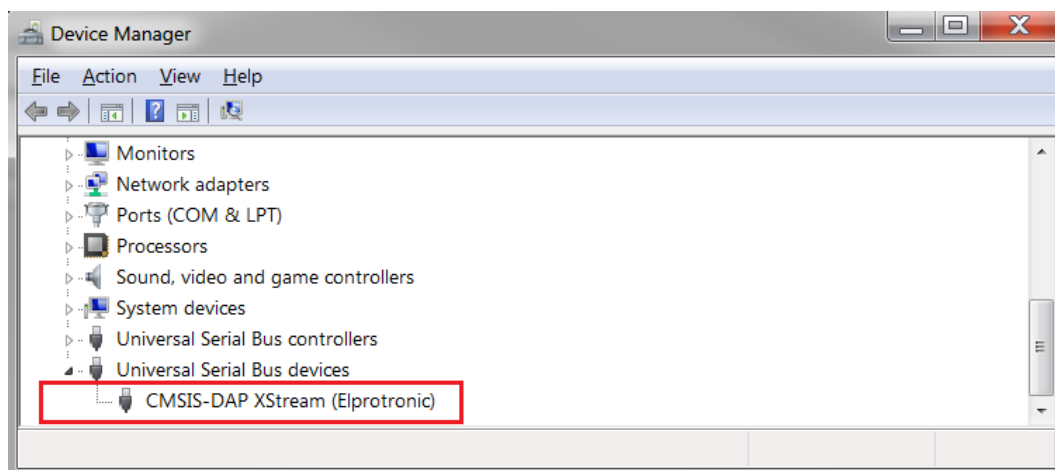

Figure 4.3: USB Driver for adapter working in the CMSIS-DAP mode

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4.2 Configuration setup in the XStream Adapter

Connect XStream adapter to PC and run the CMSIS-DAP configuration software. You should see the adapter's label and selected configuration as seen in Figure 4.1. First check if the CMSIS-DAP firmware version inside the adapter is the same as the available firmware version in the configuration software. If firmware is not the same or the check sum/PSA is not OK, then press the **Update FW** button and the firmware inside the XStream adapter will be updated.

The next option that should be set in the CMSIS-DAP configuration is the power option for the XStream adapter. The CMSIS-DAP 2.0 protocol does not explicitly control power supply, but the XStream adapter has the option to supply the target. That is why the user must choose between external power supply or configure the XStream adapter's output voltage and check the "Power from Adapter Enable" box. The XStream-Iso adapter can supply Vcc from 1.7V to 4.0V, or if the XStreamPro-Iso adapter is used from 1.2V to 4.0. Additionally, the Vcc Settle time should be set to specify the time from when the power-up of the target is initiated to when the other circuits on the target board are stable. The Settle time can be specified in the range from 50 to 300 ms. By, default that time is set to 50 ms. When finished, press the "Save" button to store the configuration inside the XStream adapter.

Chapter 5
Debugging with IDE

When the XStream adapter is set for CMSIS-DAP debugging mode then adapter is ready to be used with IDE software that supports the CMSIS-DAP 2.0 USB protocol. Below is the setup description for two IDEs that support the CMSIS-DAP 2.0 USB protocol – the Keil uVision and the IAR EW-ARM IDE.

5.1 Keil uVision

Run the Keil IDE software uVision 5 or higher and select the **Option for Target** (see Figure 5.1). Then in Tab **Debug** select the option **CMSIS-DAP Debugger.** Press button **Settings** then the following screen should be displayed (see Figure 5.2). On the CMSIS-DAP – JTAG/SWD Adapter should be displayed **XStream-Iso CMSIS-DAP.** Select desired communication protocol, JTAG or SWD and desired communication speed. If target device is connected then in the SW Device Group should be displayed valid IDCODE and Device Name. Now, the XStream adapter is ready for debugging via CMSIS-DAP protocol. Select and set the Trace option if applicable.
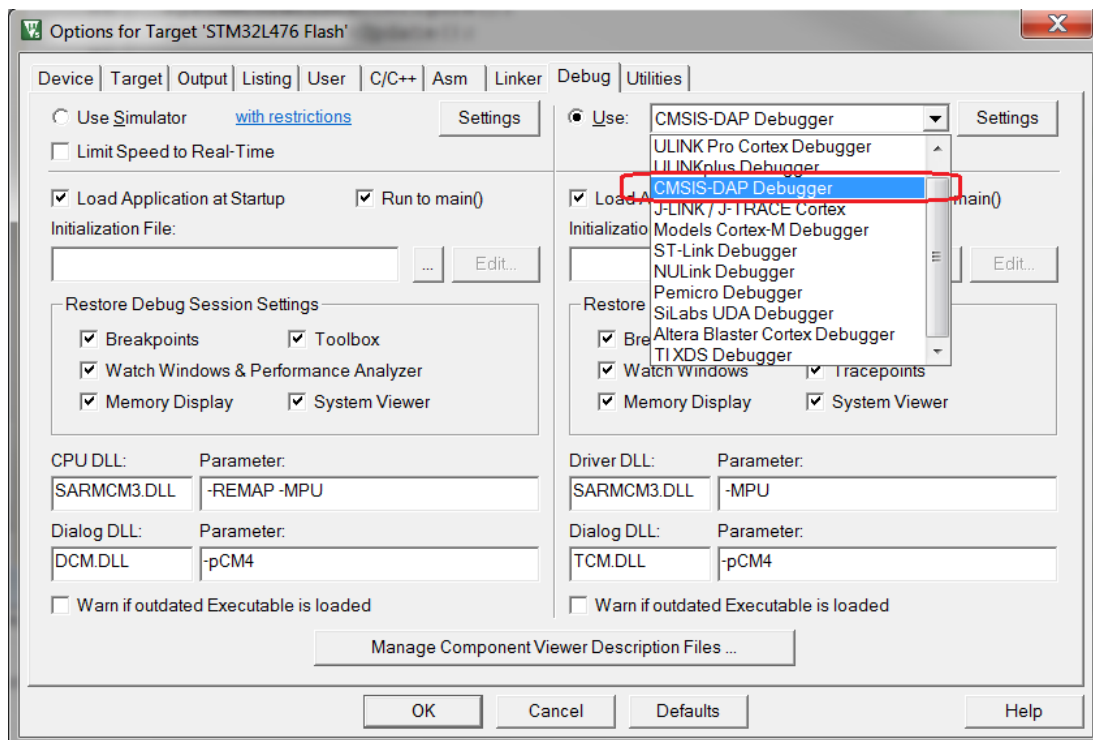

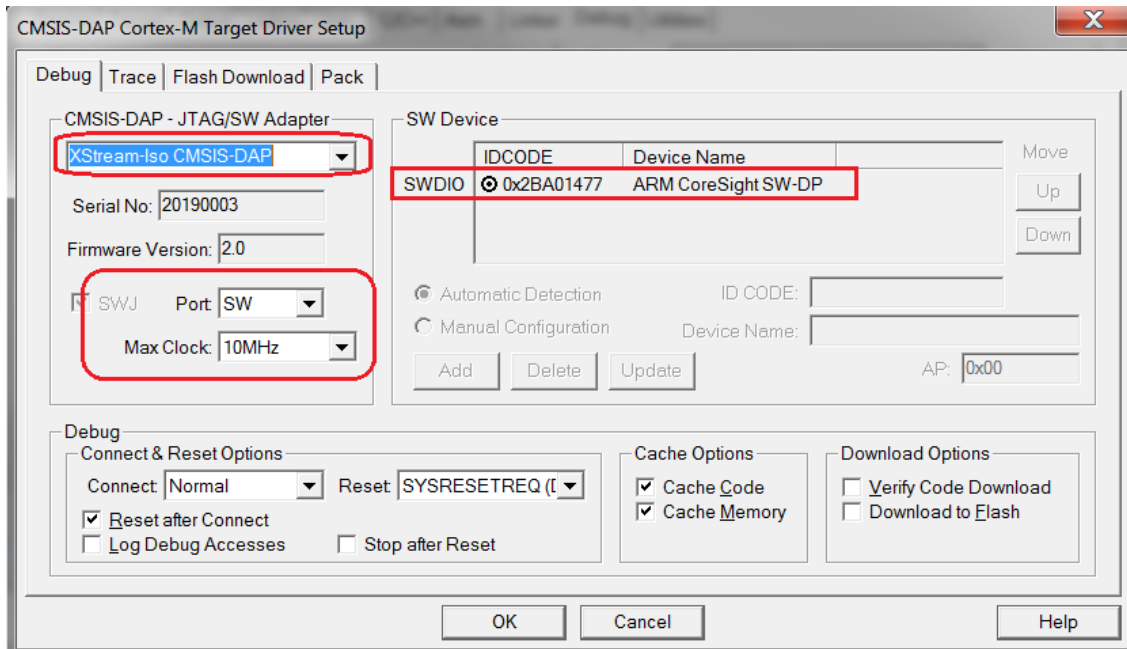*Figure 5.1: Keil uVision 5 with selected CMSIS-DAP Debugger*

Figure 5.2: Keil uVision 5 CMSIS-DAP Target Setup with connected XStream Adapter

5.2 IAR EW-ARM

Run the IAR IDE software EW-ARM version 9.1 or up and select the *Option -> Debugger* (see Figure 5.3).
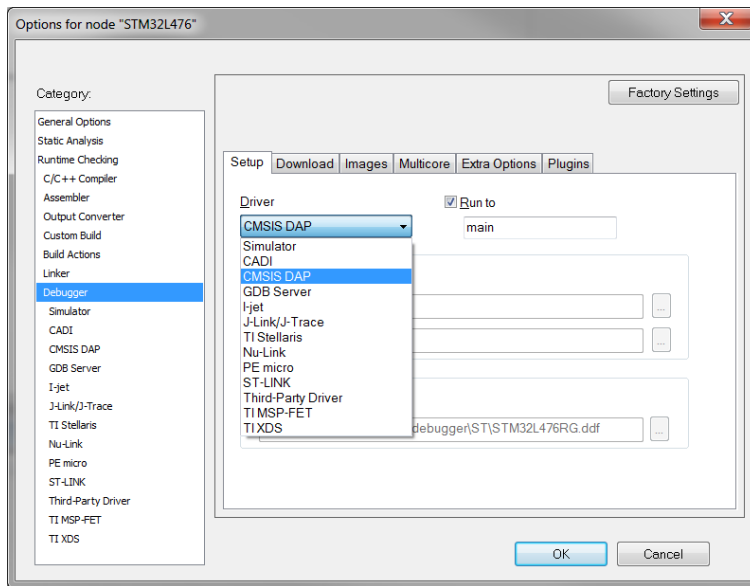

Figure 5.3: IAR EW-ARM with selected CMSIS-DAP Debugger

Select the **CMSIS-DAP Debugger.** Press button OK then go to CMSIS DAP Debugger option setup (see Figure 5.4). Select Interface type JTAG or SWD. The Vcc external or internal is set by the configuration software (see Figure 4.1).
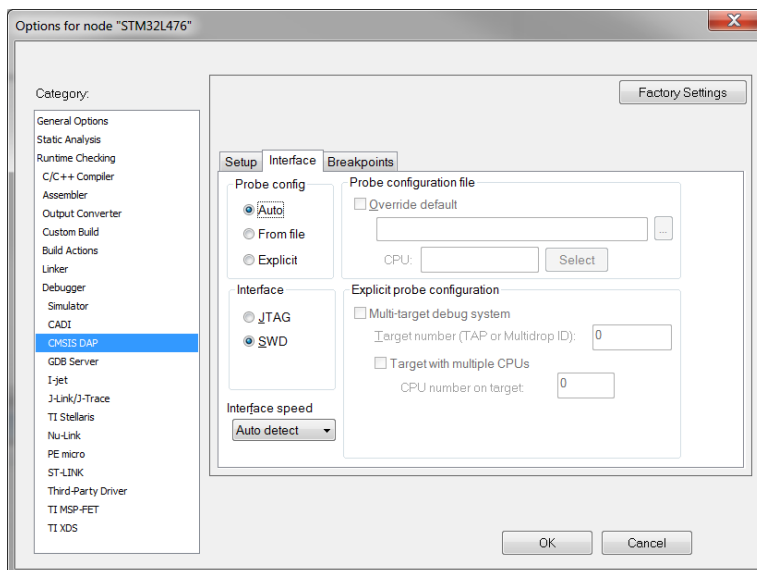

Figure 5.4: IAR EW-ARM CMSIS-DAP Target Setup with connected XStream Adapter