Contents

Overview

GaugeStudio is a Windows-based suite of tools and applications designed to guide and assist the user through the entire process of evaluating, implementing, programming, calibrating, configuring, and validating BMS Fuel Gauges.

Requirements

System

- Microsoft® Windows™ XP (SP3), Vista, Win7 or later
- Microsoft® .NET Framework Version 4.0

Hardware

- Gauge EVM
- USB Interface Adapter:
  - EV2300
  - EV2400

Installation

Execute the installer and a series of installation dialogs will guide you through the installation process of GaugeStudio.

- Welcome screen – (Click Next)
- License Agreement – (Click I Agree)
- Install Location – (Click Install)
- Install Complete – (Click Close)

Getting Started

Connect the USB adapter and EVM to PC, *(See EVM instructions for wiring diagram).* Double click the GaugeStudio application icon located on the desktop. GaugeStudio will load and auto-detect the connected hardware. At this point, no further configuration is necessary and the application is ready for evaluation.

GaugeStudio Interface

GaugeStudio consists of many sub-applications or plug-ins that implements an intuitive and highly configurable interface intended to support any combination of features the user is interested in at one time.

Getting to know the environment

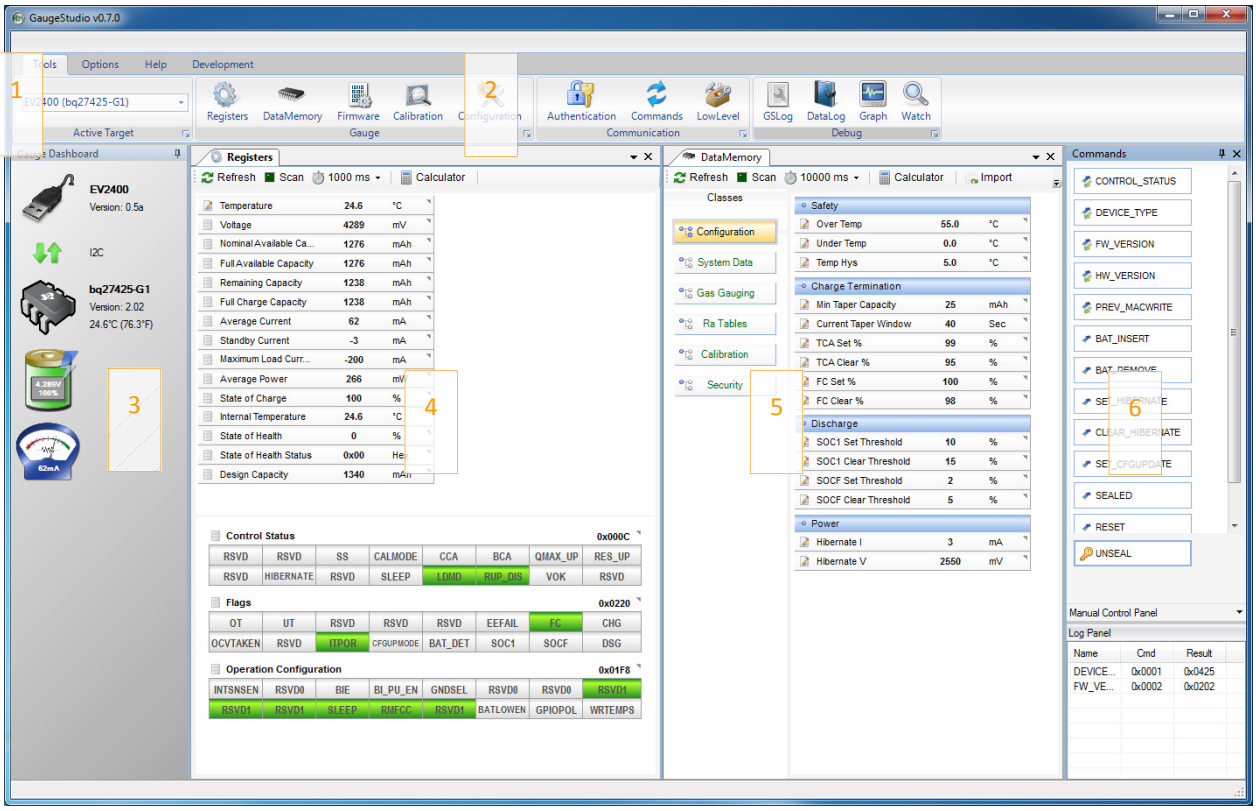


Figure 1

The default view of GaugeStudio is shown in *figure 1* displaying the most common view into the gauge. Note: the image may look slightly different depending on your version of Windows and screen resolution.

GaugeStudio Core Components

Always available

1. Target Selector – Shows the active target connection.
2. Plug-In Selector – Loads the various plug-ins.
3. Gauge Dashboard – Shows adapter, protocol and gauge information.

GaugeStudio Plug-ins

Loaded by default

4. Registers – Used to scan, view and edit register settings.
5. DataMemory – Used to scan, view and edit data flash parameter settings.
6. Commands – Used to send commands to the gauge.

To view any of the available plug-ins, simply click the desired icon on the Plug-in Selector. Most of the plug-ins will load as a floating window which can be docked inside the parent application by dragging the window to the desired location.

There is no restriction on which plug-in can be loaded at any given time. Each plug-in can operate independently from one another further increasing the overall user experience.

A look at the Plug-ins

GaugeStudio installs with the following plug-ins:

Gauge

- Registers
- DataMemory
- Firmware
- Calibration

Communications

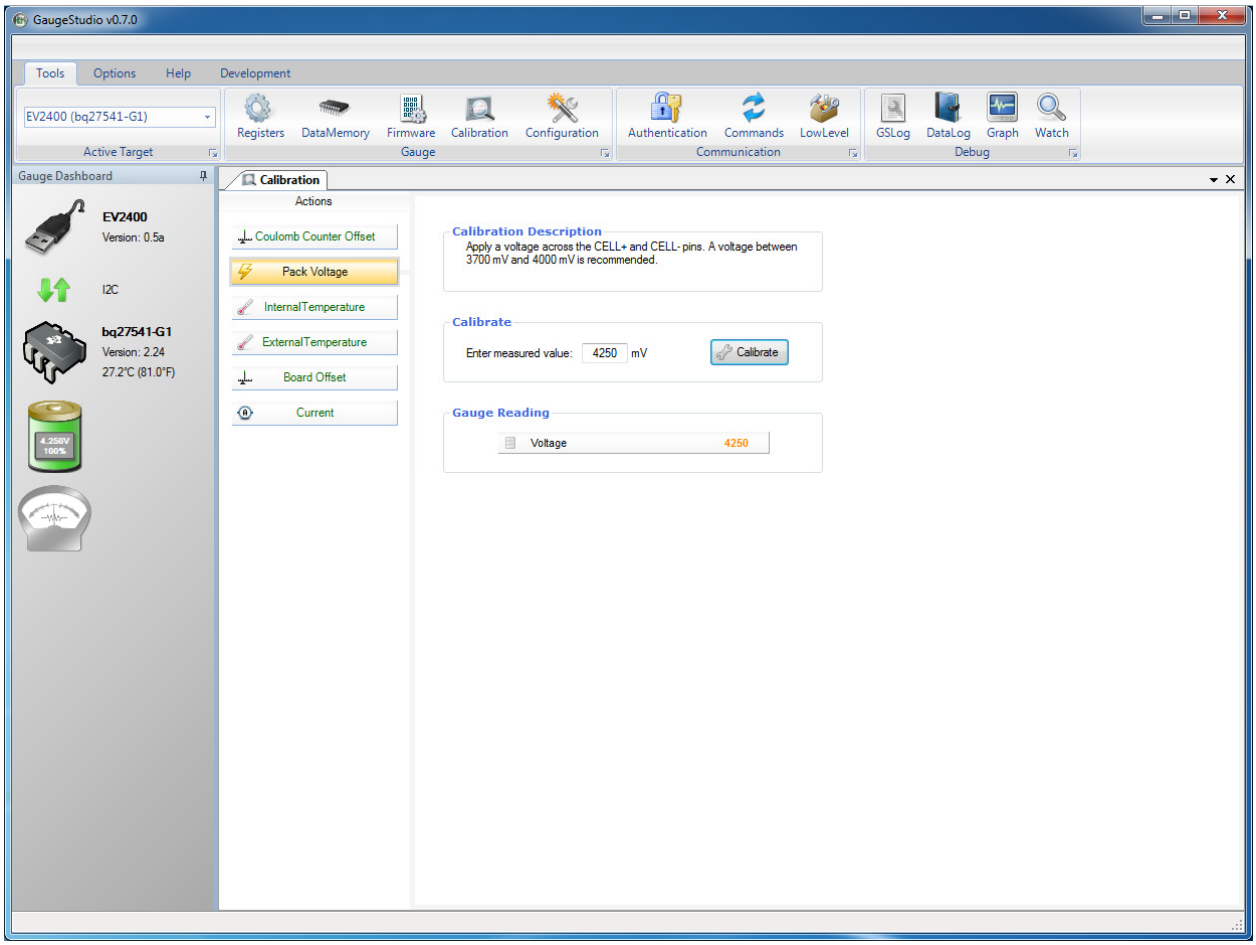
- Authentication
- Commands
- LowLevel

Debug

- GSLog
- DataLog
- Graph
- Watch

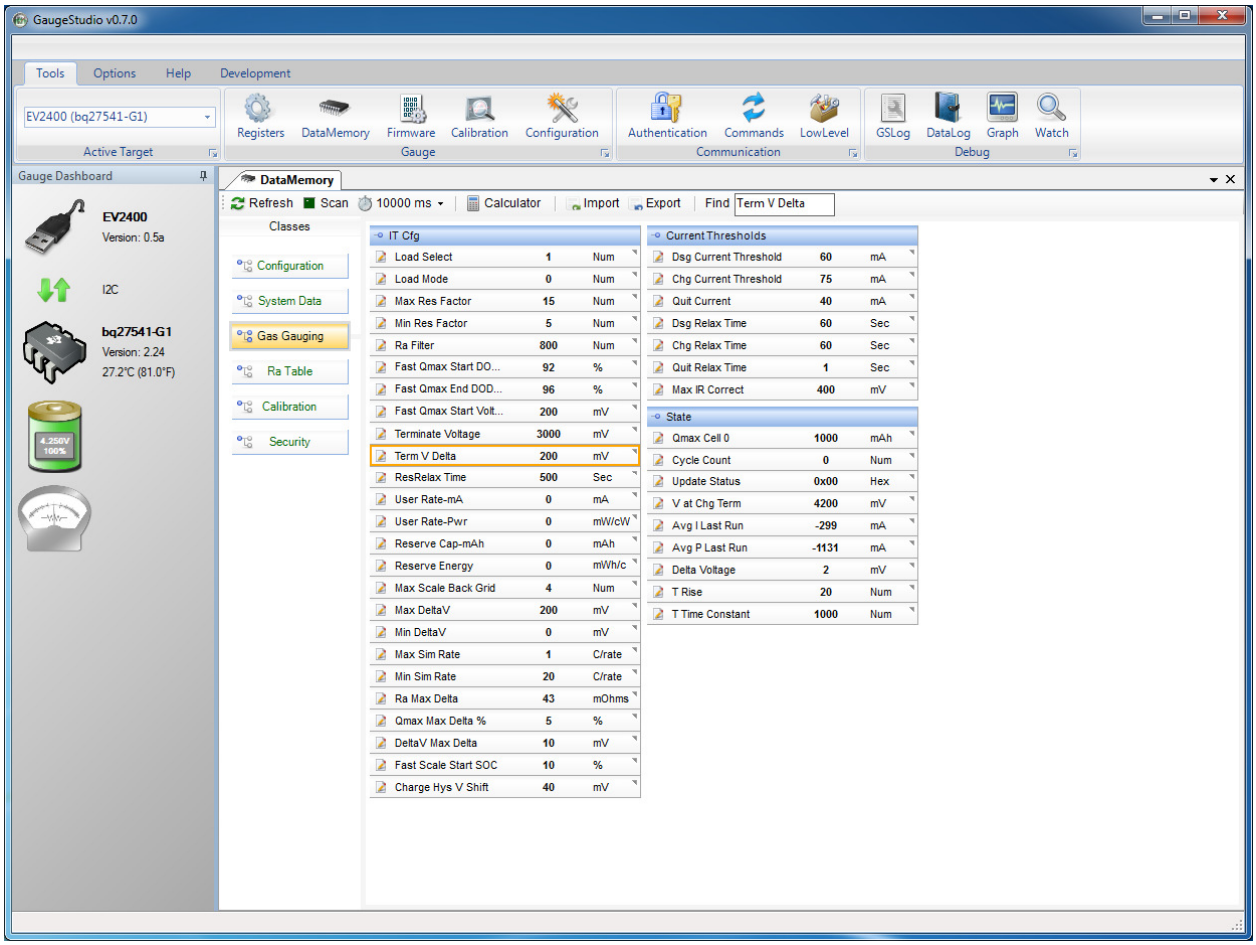
Calibration

The Calibration plug-in is used to calibrate the gauge. Navigate through the various calibration actions by clicking on the desired button. Each action will describe the procedure necessary to calibrate the gauge.



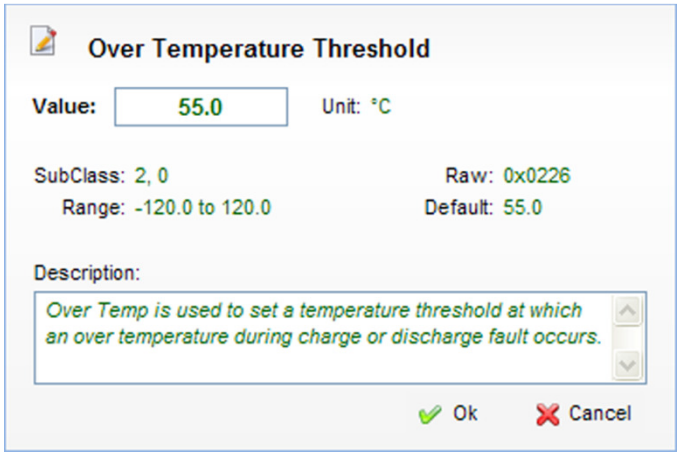
DataMemory

The DataMemory plug-in is used to view and configure the gauge's parameters. Editing can be performed directly by clicking on a parameter which instantiates a pop-up editor or by using the file based features Import/Export.



The Parameters are categorized in a hierarchical fashion by Class -> SubClass -> Parameter. The user interface makes it easy to navigate through the classes by clicking on the desired button to access its parameters.

To make direct changes to a parameter simply click the name for the desired parameter to instantiate the pop-up editor *(Shown below)*. Not all parameters are writable; an icon is used to determine the following access. Readonly, Read/Write, Sealed parameters are treated as read only.

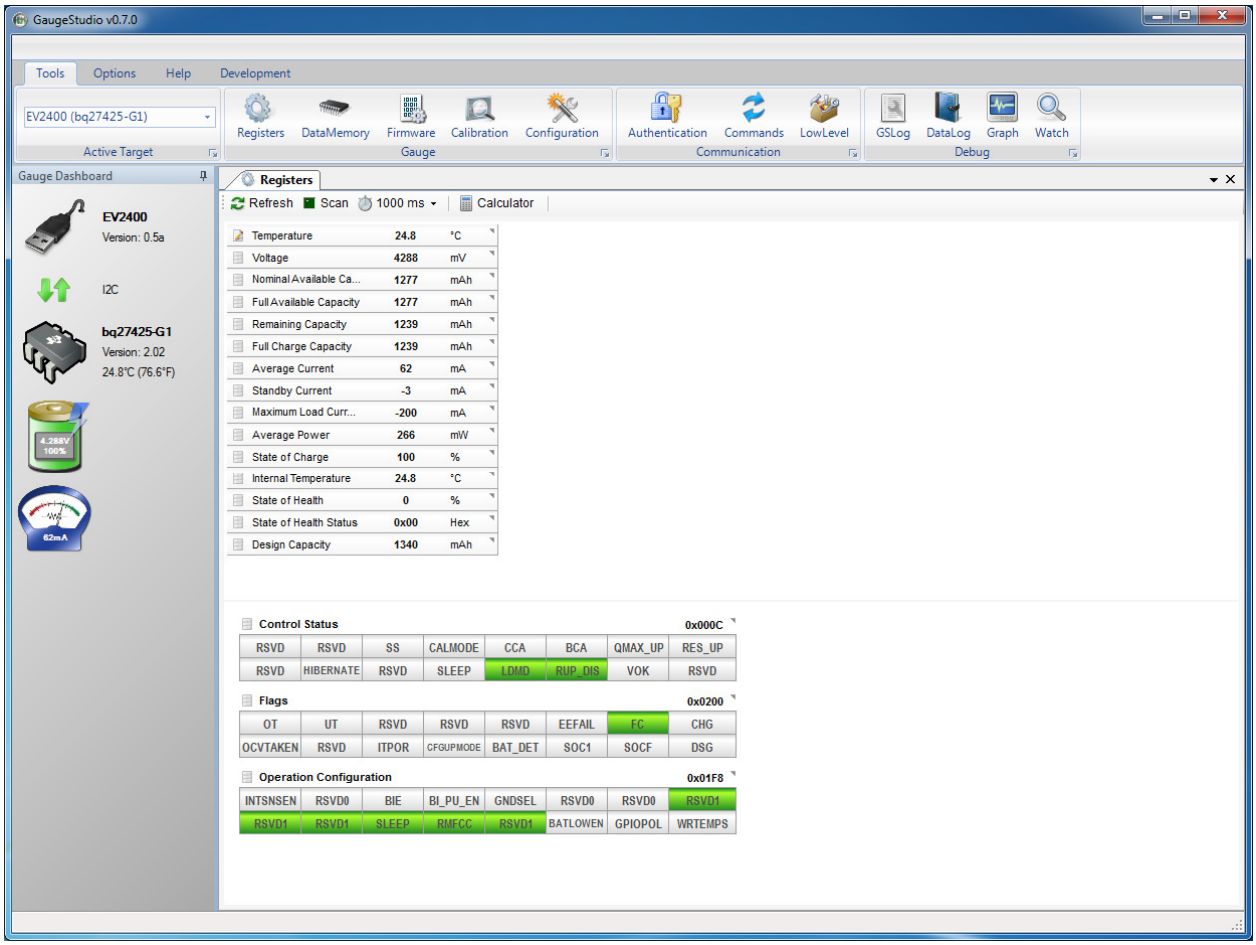


Parameters can be saved and loaded using the Import and Export features. Various file formats are supported.

Parameters can also be dragged and dropped to other plug-in windows that support this feature. For instance, you can drag a parameter by clicking on the arrow in the upper right corner and dragging it directly to the Watch window.

Registers

The Registers plug-in is used to view the gauge's dynamic data which is stored in RAM. Most of this data is readonly, however sometimes there are gauge specific writable registers that are used for various features. See the gauge's datasheet for details on these registers.



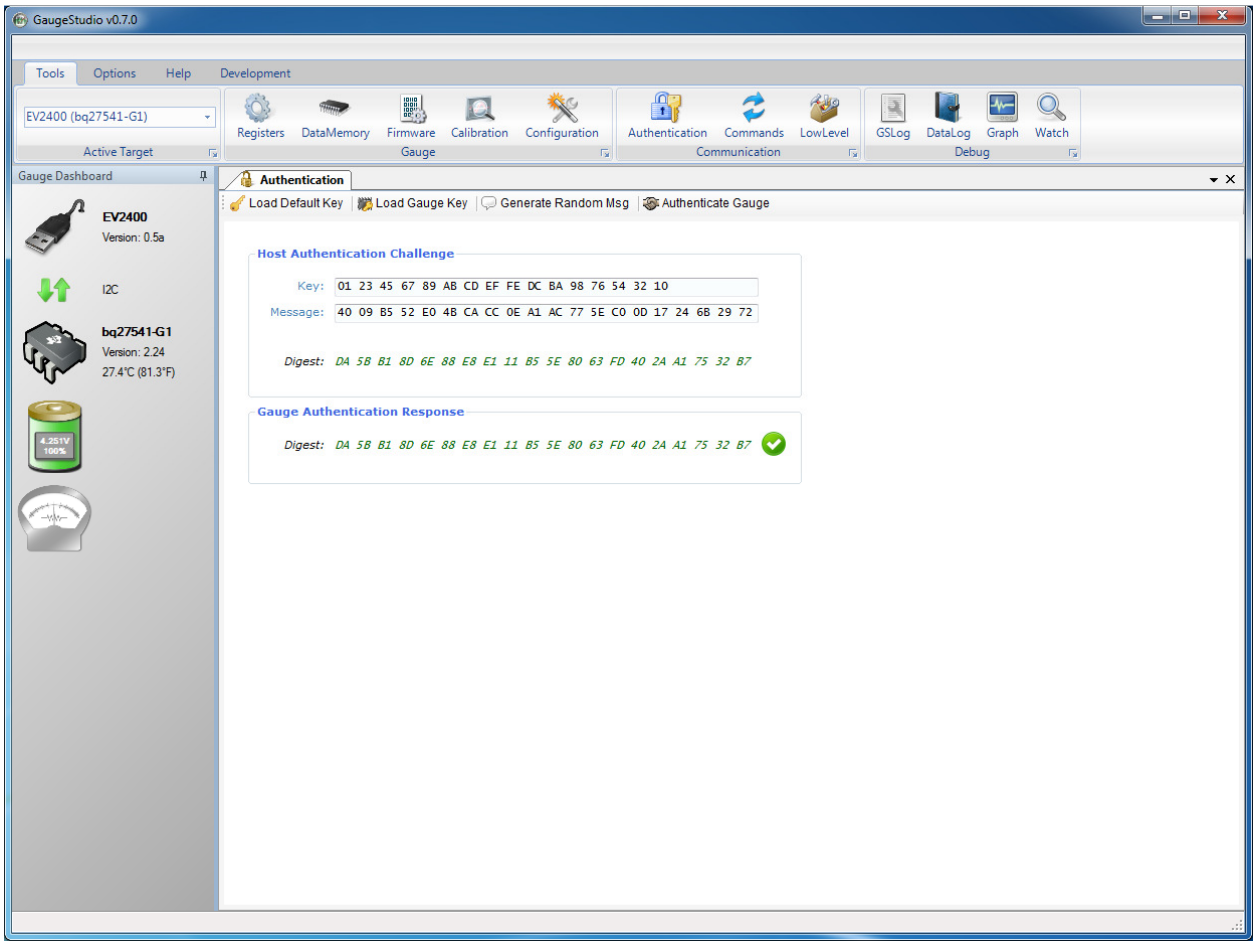
The interface displays registers that contain bit level information in a separate view which makes it easy to visually see which bits are set at any given time. The image above shows set bits in green (ON) and cleared bits in gray (OFF). Hover the mouse over an individual bit to display a tooltip description of that bit.

Scanning the registers for constant fresh data can be performed by clicking the Scan button on the ToolStrip at the top of the plug-in.

Set the desired interval by clicking the Interval dropdown button on the ToolStrip.

Authentication

The Authentication plug-in is used to verify the authenticity of a gauge. A SHA1 based HMAC challenge *message* is sent to the gauge and the gauge's computed response *digest* based on a shared private *key* is returned.



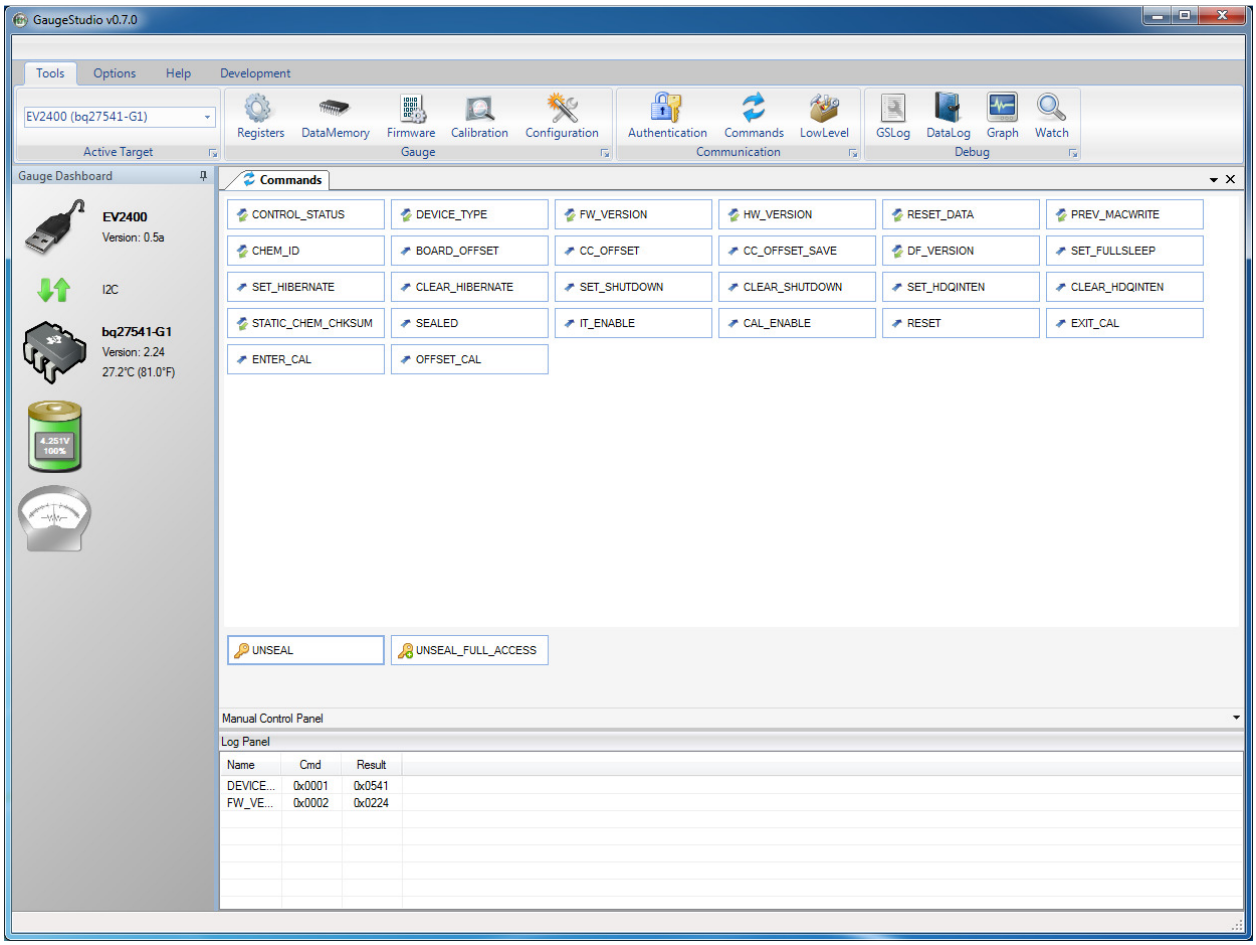
TI gauges that support authentication are preprogrammed with a default authentication key. This authentication key must be shared by the system host.

To initiate the authentication process, a key and message input is required by the host (plug-in). Assuming the gauge has the default key, using the ToolStrip; click the 'Load Default Key' button to load the TI default authentication key. Then click the 'Generate Random Message' button to produce a unique challenge message. The host (plug-in) will automatically compute a digest based on the loaded key. Now click the 'Authenticate Gauge' button to send the challenge message to the gauge. The gauge will return a response digest based on the message received and its programmed authentication key. The host (plug-in) will compare its computed digest to the returned computed digest to authenticate the device.

The gauge's authentication key can be changed using the DataMemory plug-in. The 'Load Gauge Key' button can be used to load the host's (plug-in) key as an evaluation feature only. In a real system the host would not need to read the gauge's key.

Commands

The Commands plug-in is used to send commands to the gauge and receive command results from the gauge. Commands are specific to each gauge; please see the gauge's datasheet for details for each command.

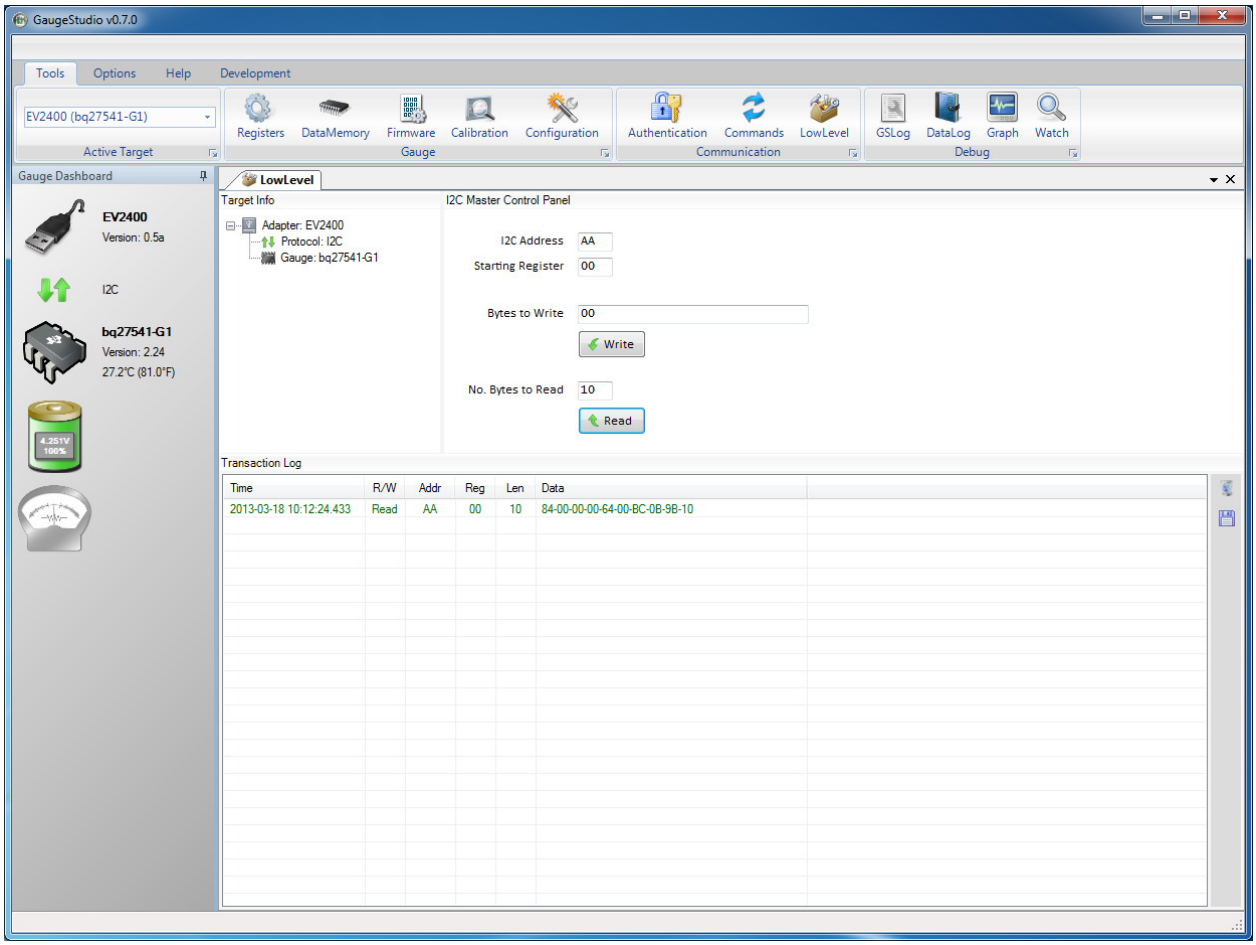


Context sensitive help is available by hovering the mouse over an individual command button. Commands are executed by clicking the desired command button or by manually entering the commands in the Manual Control Panel. The command and result if any are logged in the Actions Panel at the bottom of the plug-in window.

Some commands may not be available when the gauge is in the Sealed state. See datasheet for details.

LowLevel

The LowLevel plug-in is used to perform direct, low level protocol specific communications to the gauge. This is more of an advanced plug-in requiring a sound understanding of the gauge's communication interface and should be used with caution.



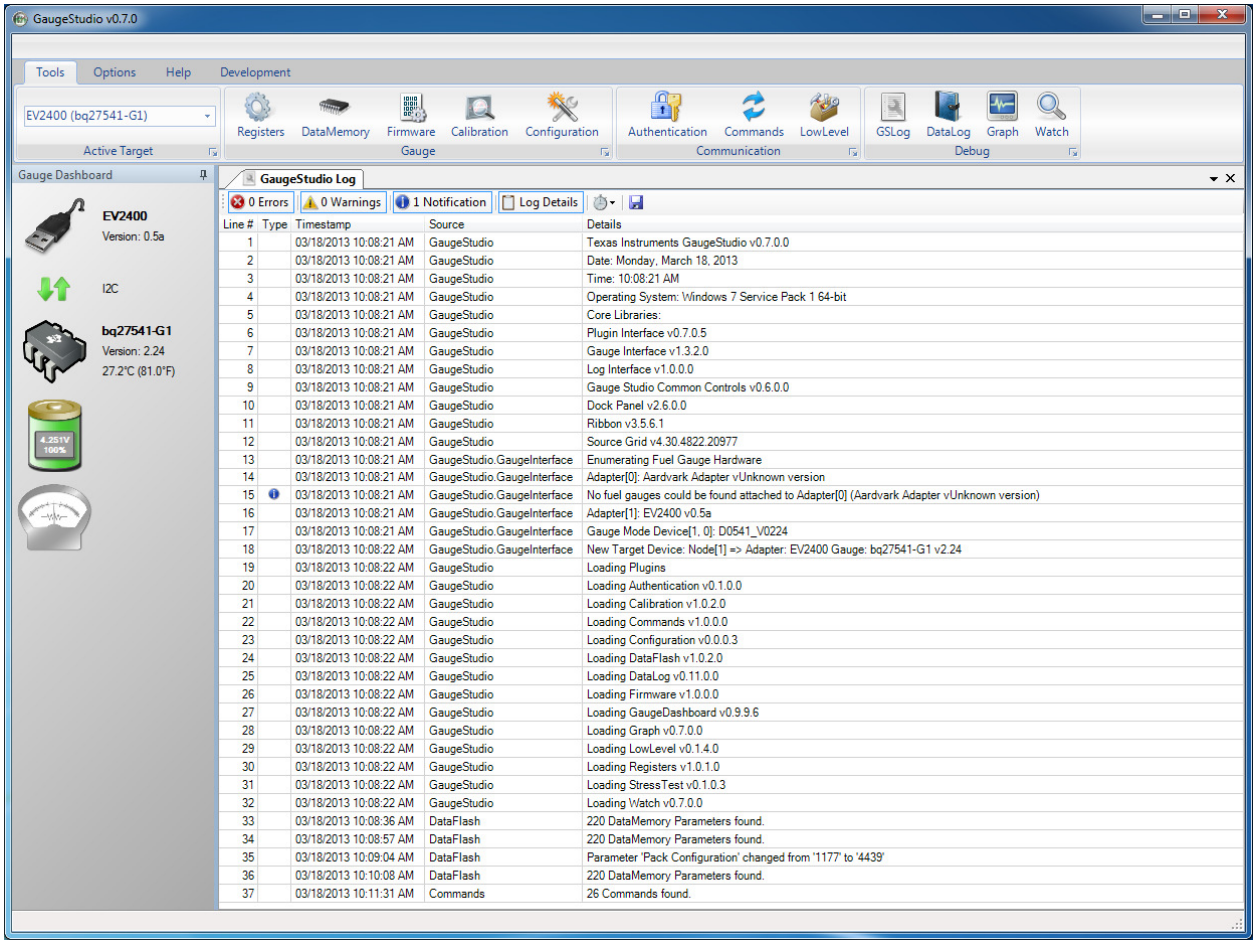
To read data from the gauge, enter the Address, Starting Register and No. Bytes to Read in the plug-ins input fields and then click the Read button.

To write data to the gauge, enter the Address, Starting Register and Bytes to Write in the plug-ins input fields and then click the Write button.

The results are shown in the Transaction Log. The Transaction Log can be Cleared or Saved to file using the right side Tool Buttons.

GSLog

The GSLog plug-in is a centralized application log and categorized event viewer which contains data from each plug-in including GaugeStudio itself.

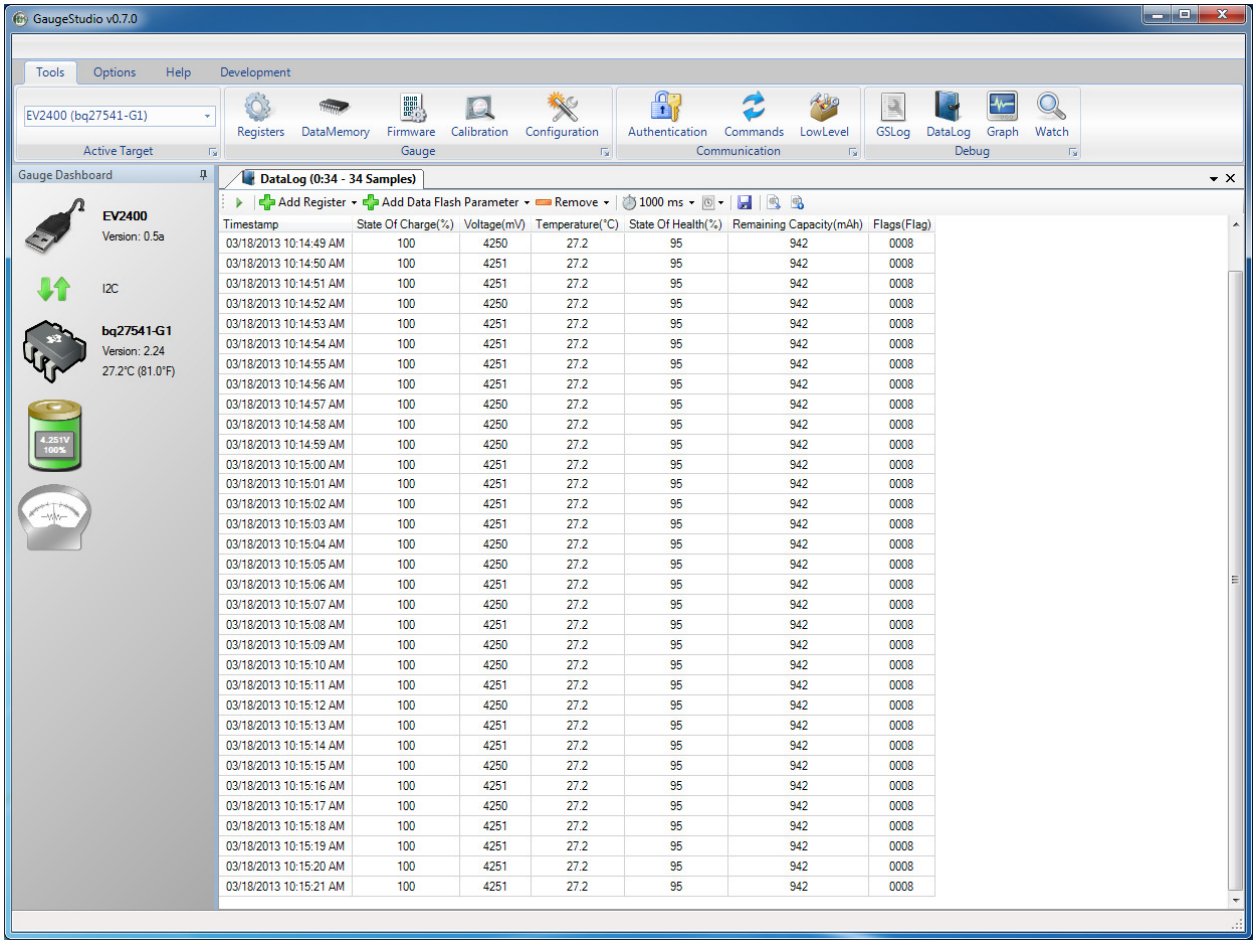


GSLog is configurable allowing the user to sort events by Errors, Warnings and Notifications for easy identification of any issues as well as showing and hiding the application log.

The log can be saved to a file which can be used as an aid for debugging various issues that may arise.

DataLog

The DataLog plug-in is used to log runtime gauge data which is essential for properly configuring a gauge for a particular application. Gauge configuration is beyond the scope of this document.



To log data simply select the Registers and/or DataMemory Parameters you wish to log by clicking the Add buttons on the ToolStrip located at the top of the plug-in window.

This configuration can be saved to disk and reloaded at a later date for easy setup. Use the Load and Save Configuration buttons on the ToolStrip.

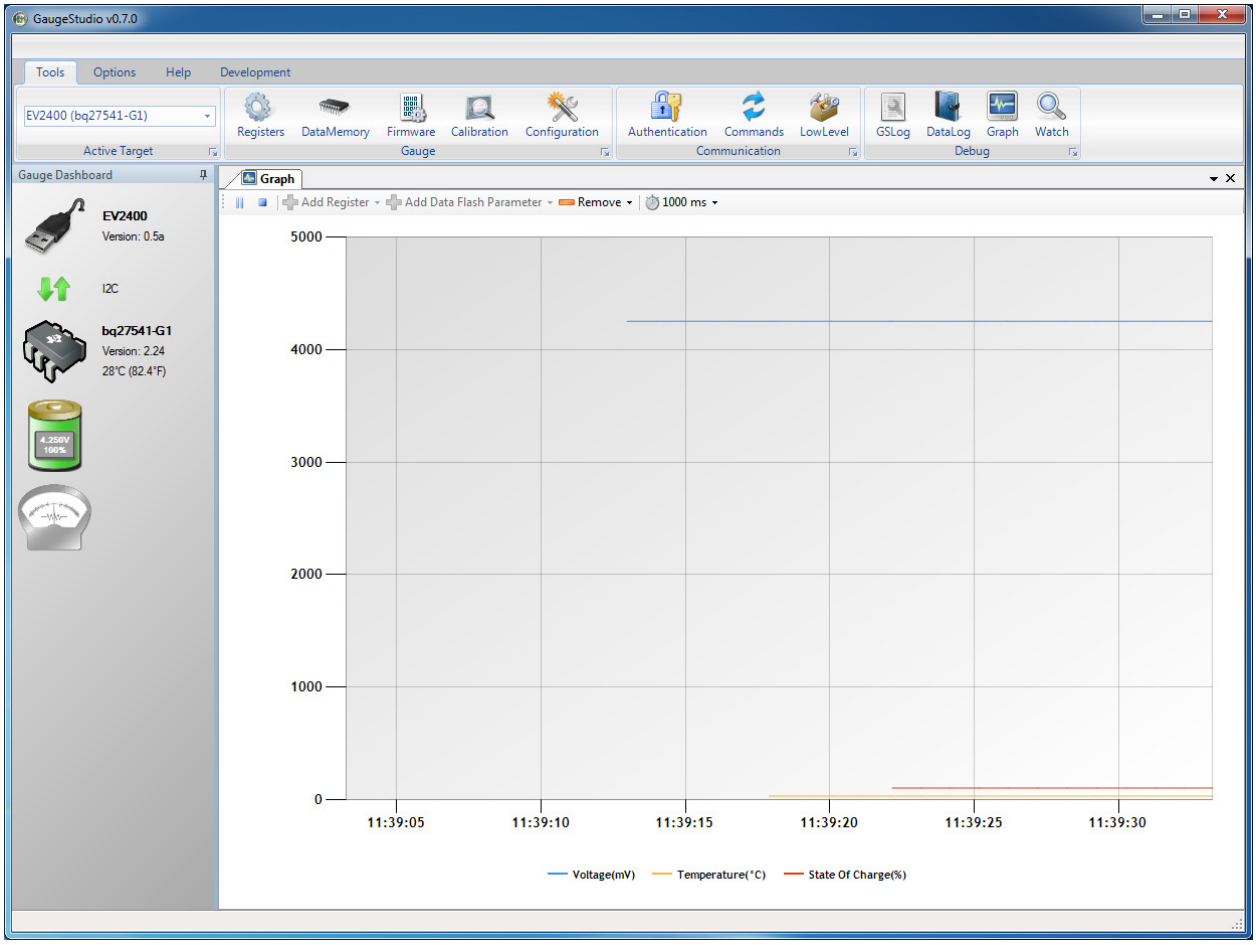
Start the log by clicking the start button identified with a *Play* icon on the ToolStrip.

Stop the log by clicking the same button however the icon will now appear as a *Stop* icon.

The log results can be saved to a file in several file formats using the *Save* button on the ToolStrip.

Graph

The Graph plug-in is used to plot Registers and/or DataMemory Parameters in a graph which can be used for visual analysis of gauge functionality.



To plot data simply select the Registers and/or DataMemory Parameters you wish to log by click the Add buttons on the ToolStrip located at the top of the plug-in window.

Start the plot by clicking the start button identified with a Play icon on the ToolStrip.

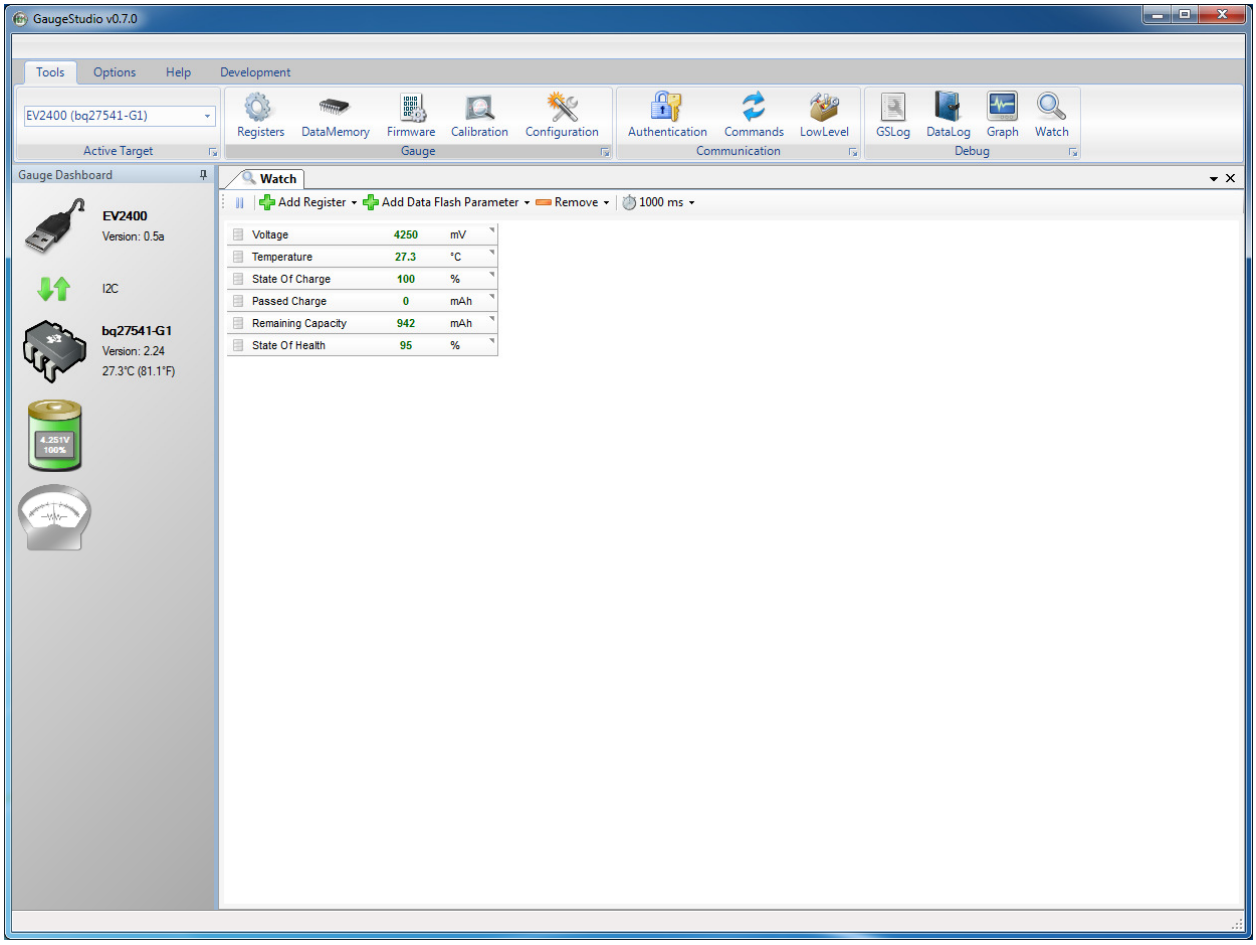
Pause the plot by clicking the same button however the icon will now appear as a Pause icon.

Stop the plot by clicking the stop button identified with a Stop icon on the ToolStrip.

Set the desired interval by clicking the Interval dropdown button on the ToolStrip.

Watch

The Watch plug-in is used to monitor specific Registers and/or DataMemory Parameters in one or many Watch windows.



To watch data simply select the Registers and/or DataMemory Parameters you wish to watch by click the  Add buttons on the ToolStrip located at the top of the plug-in window.

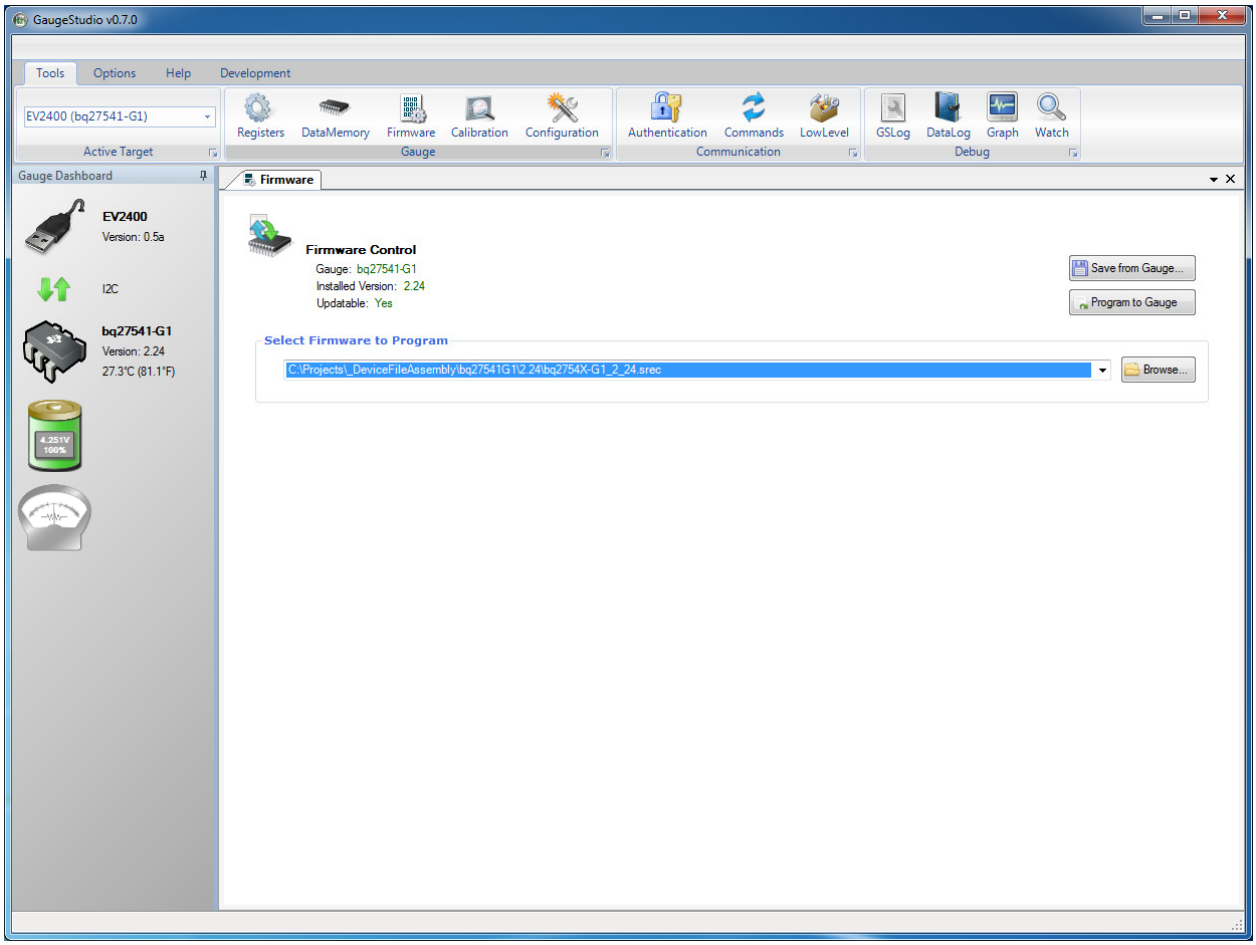
Start the watch by clicking the start button identified with a  *Play* icon on the ToolStrip.

Pause the watch by clicking the same button however the icon will now appear as a  *Pause* icon.

Set the desired interval by clicking the  Interval dropdown button on the ToolStrip.

Firmware

The Firmware plug-in is used to import and export firmware to and from an updatable device.



To export firmware simply click the Export button and a save file dialog box will appear. Give the file a name and location, then click Save. A progress dialog will appear during the process and disappear when complete.

To import firmware, first click the Browse button to locate the firmware file or select a recently used file from the drop down menu. Once a firmware file is selected, click the Import button. A progress dialog will appear during the process and disappear when complete.