

# Quickstart Guide for Gauge Development Kit

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The Gauge Development Kit (GDK) is a complete evaluation system for any single-cell fuel gauge developed by Texas Instruments Incorporated. The GDK is a single printed circuit board (PCB) equipped with a programmable load, programmable charger, and an integrated EV2400 for PC interaction via Battery Management Studio. A USB PC cable and an external 6-V power supply capable of supplying at least 2.5-A are not included with the GDK, but are necessary for full functionality. The 6-V power supply can be provided through test points or a dc barrel jack on the PCB. The latest version of Battery Management Studio (bqStudio) should be downloaded from ti.com and installed to communicate with and control the GDK. Once the GDK is powered and connected to a PC via USB cable, bqStudio allows the user to do the following:

- Read the connected fuel gauge data registers
- Configure the connected fuel gauge
- Discharge the connected battery
- Charge the connected battery
- Log cycling data for evaluation
- Automated Learning Cycle(s)
- Evaluate the overall functionality of the connected fuel gauge solution under different charge and discharge conditions

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## 1 Overview

By using the GDK, only a few simple steps are needed to begin fuel gauge evaluation. First, the Battery Management Studio (bqStudio) software suite should be downloaded to the PC connecting to the GDK. Second, the proper hardware connections need to be made between the GDK, a PC running bqStudio, and the EVM under evaluation. Finally, use bqStudio to configure the connected fuel gauge according to application specifications.

## 2 Software Setup

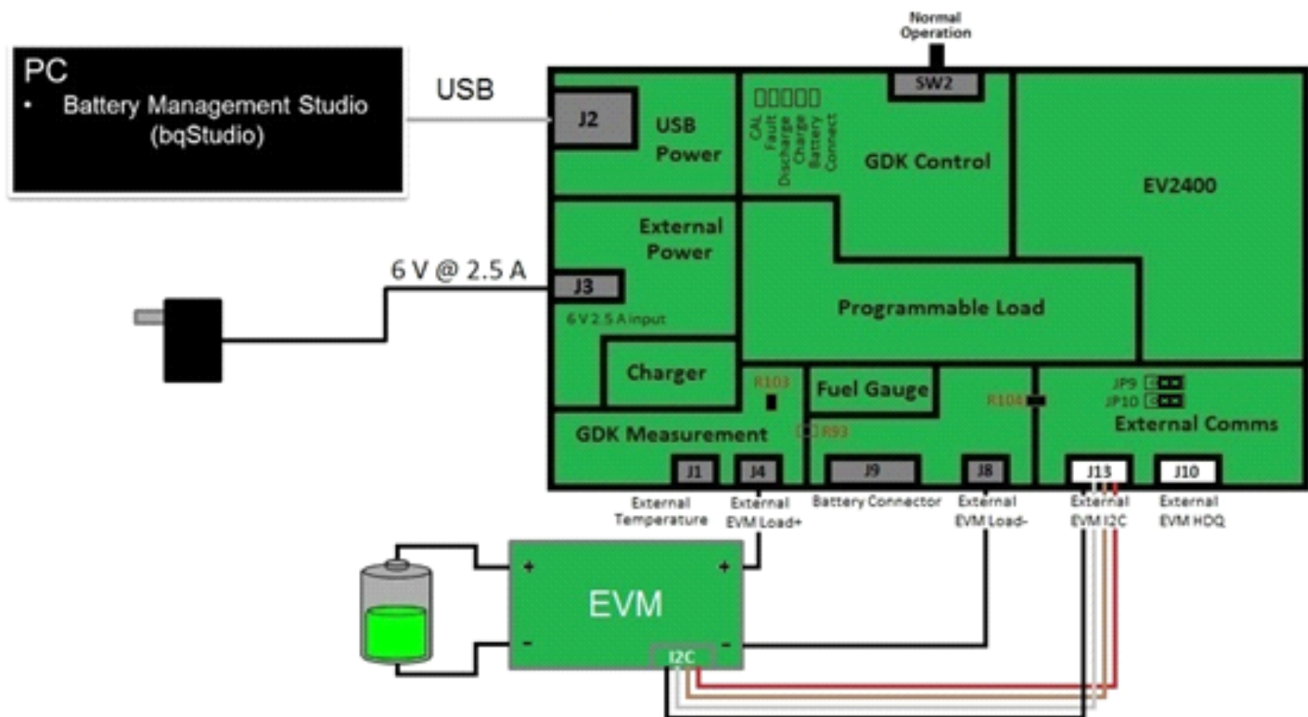
The PC connecting to the GDK is required to be running Battery Management Studio (bqStudio). The latest version of bqStudio can be found at [www.ti.com/tool/bq27gdk000evm](http://www.ti.com/tool/bq27gdk000evm).

Use the following steps to install bqStudio:

1. Ensure that the GDK board is not connected to the PC via the USB cable before starting the procedure.
2. Open the archive containing the installation package, and copy its contents into a temporary directory.
3. Open the software file that was downloaded from the TI website.
4. Follow the instructions on the screen until the software installation is complete.
5. Before starting bqStudio, connect the GDK to the PC with the USB cable.
6. The EV2400 hardware will be detected and drivers will automatically be installed. No separate driver installation is required.

### 3 Hardware Setup

The GDK requires a few hardware connections before gauge evaluation can begin. All the connections can be seen in [Figure 1](#).



**Figure 1. GDK Hardware Setup**

As seen in [Figure 1](#), the GDK requires the following hardware setup:

1. Connect external power to J3 or the corresponding test points (TP18: 6-V plug and TP39: PGND) on the GDK. The external power should be able to supply 6 V at 2.5 A.
2. Connect USB power/communication from the PC running bqStudio to J2 on the GDK.
3. Connect the external load/charge connectors of the EVM to the External Load+/Charger+ (J4) and External Load-/Charger- (J8) connectors of the GDK.

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**NOTE:** If using a Dynamic Voltage Correlation (DVC) fuel gauge, the External Load+/Charger+ (J4) and External Load-/Charger- (J8) connectors of the GDK should be connected directly to the battery. See [Section 5, GDK and DVC Fuel Gauge Configuration](#), for more details.

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4. Connect the external I<sup>2</sup>C bus of the EVM to the external I<sup>2</sup>C (J13) connector of the GDK.
5. Connect the battery to the external EVM. The battery should be connected to the external EVM and not the GDK board.

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**NOTE:** See the GDK User's Guide ([SLUUA01](#)) for more details on the options of the GDK configuration.

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## 4 Using the GDK

After bqStudio has been installed and all hardware connections have been made, launch bqStudio. Launch bqStudio from the Start -> Programs -> Texas Instruments -> Battery Management Studio menu sequence. Once the launch is complete, the bqStudio default GDK perspective (Figure 2) appears. The default GDK perspective consists of a dashboard panel on the left side of the window, a plug-ins panel at the top, and active plug-ins that can be hidden, docked in various positions, or allowed to float as separate windows.

**NOTE:** If bqStudio is launching for the first time, only a welcome window will be displayed. Simply close the welcome window tab to get to the default GDK perspective shown in Figure 2.

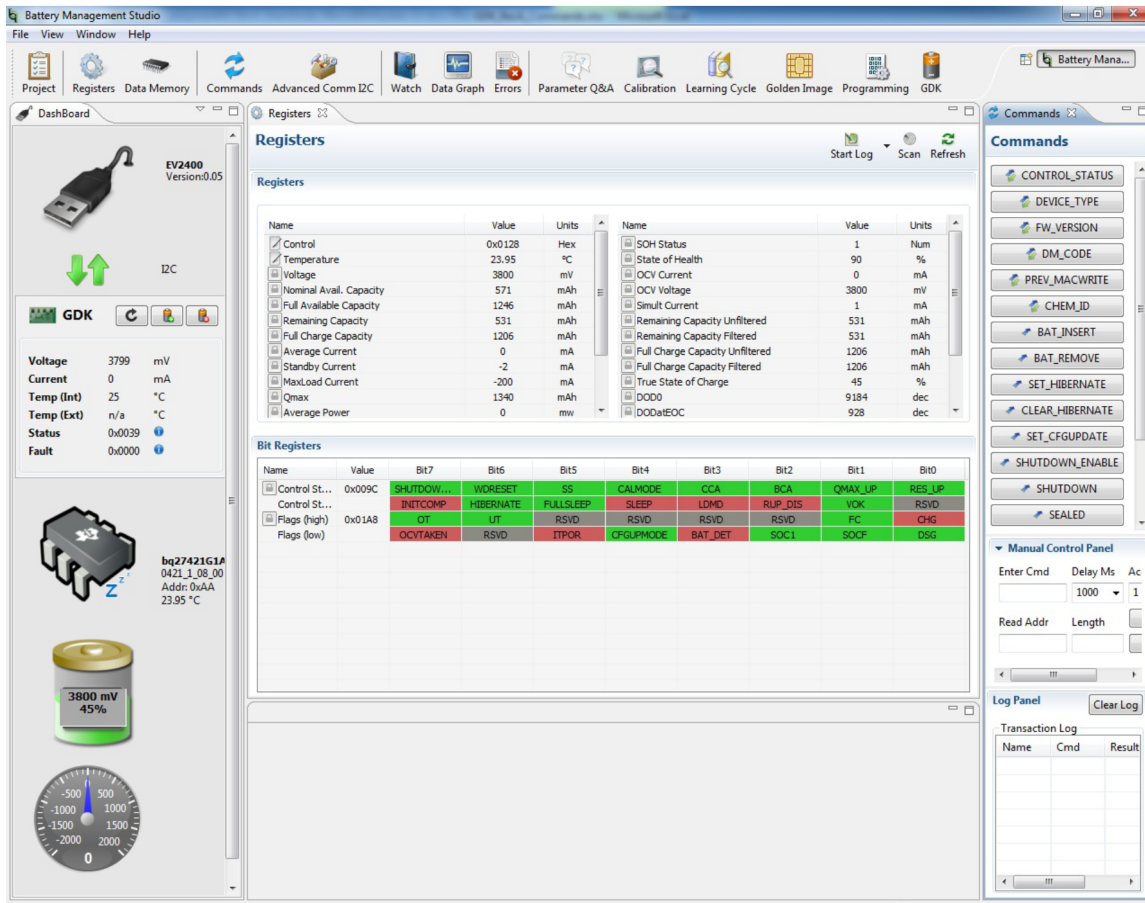
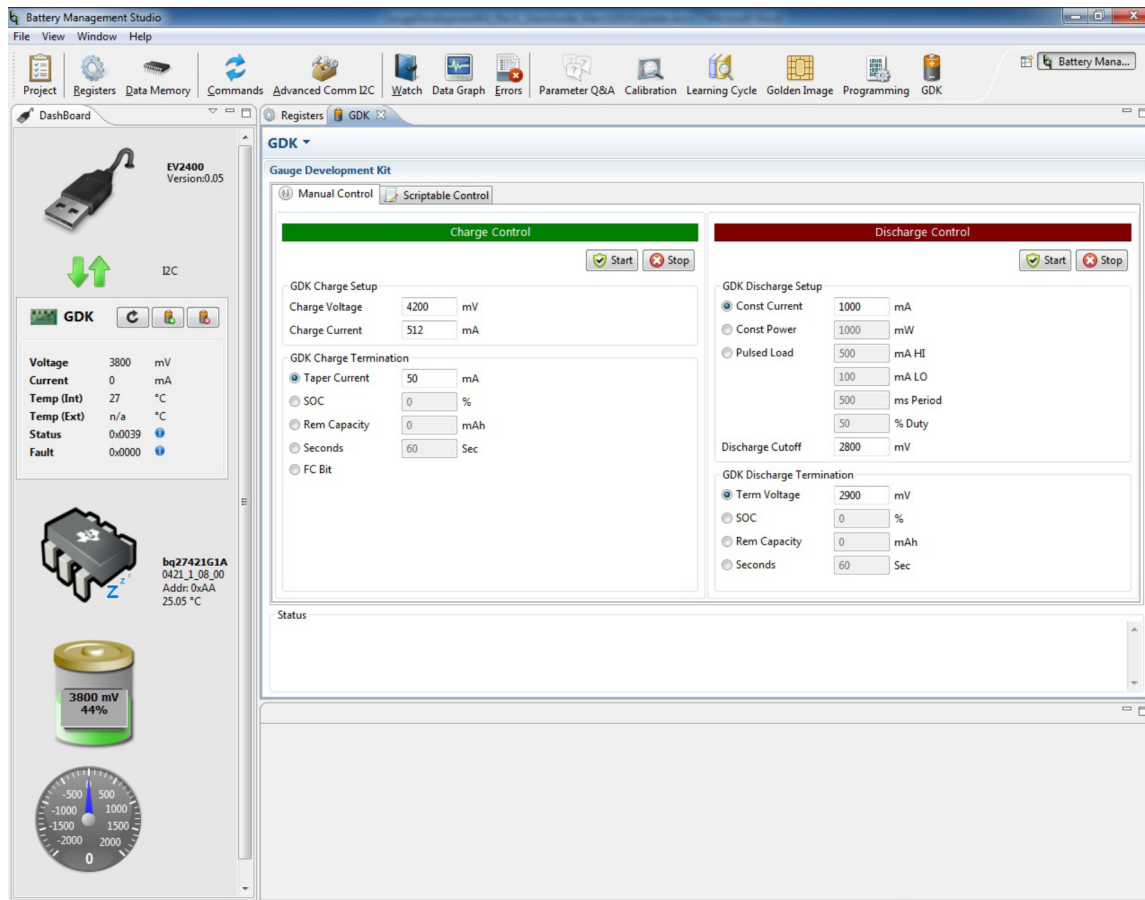


Figure 2. bqStudio Default GDK Perspective

After bqStudio has been launched, the Parameter Q&A plug-in provides an easy way to update the connected fuel gauge data memory to match the application and battery specifications. Alternatively, the DataMemory plug-in can be used to modify the connected fuel gauge data memory.

If evaluating an advanced single-cell fuel gauge, then chemistry identification and a learning cycle after the basic configuration has been completed will be required. If evaluating a lower cost single-cell fuel gauge, then chemistry identification is not required and a learning cycle is optional. Each individual fuel gauge provides documentation with the necessary configuration details. Regardless of connected fuel gauge, the GDK can help complete the necessary testing needed for complete configuration and evaluation with just a few clicks.

After the connected fuel gauge has been configured properly, click on the GDK plug-in in the Plug-ins toolbar at the top of bqStudio. After clicking on the GDK plug-in, the GDK window shown in Figure 3 will be displayed. The GDK plug-in allows the user to access the Manual Control and Scriptable Control tabs.



**Figure 3. GDK Plug-in**

To begin a quick charge, complete the following under the Charge Control panel in the GDK Plug-in Manual Control tab:

1. Enter the Charge Voltage
2. Enter the Charge Current
3. Select a charge termination method
4. Fill in the value for the corresponding charge termination method
5. Click the Start button in the Charge Control panel

To begin a quick discharge, complete the following under the Discharge Control panel in the GDK Plug-in Manual Control tab:

1. Choose the discharge mode (constant current, constant power, or pulsed load)
2. Fill in the corresponding information for the selected discharge mode
3. Select the discharge termination method
4. Fill in the value for the corresponding discharge termination method
5. Click the Start button in the Discharge Control panel

For more details concerning the charge, discharge, and scriptable control offered in bqStudio when using the GDK, please see the GDK User's Guide ([SLUUA01](#)).

## 5 GDK and DVC Fuel Gauge Configuration

When using the GDK with a DVC fuel gauge there should be no current flowing on the lines connecting the DVC fuel gauge to the battery. Therefore, the External Load+/Charger+ (J4) and External Load-/Charger- (J8) connectors of the GDK should be connected directly to the battery under test. Then, a Kelvin connection can be made from the battery terminals to the Pack+ and Pack- connectors on the DVC fuel gauge. See Figure 4 for DVC connection example.

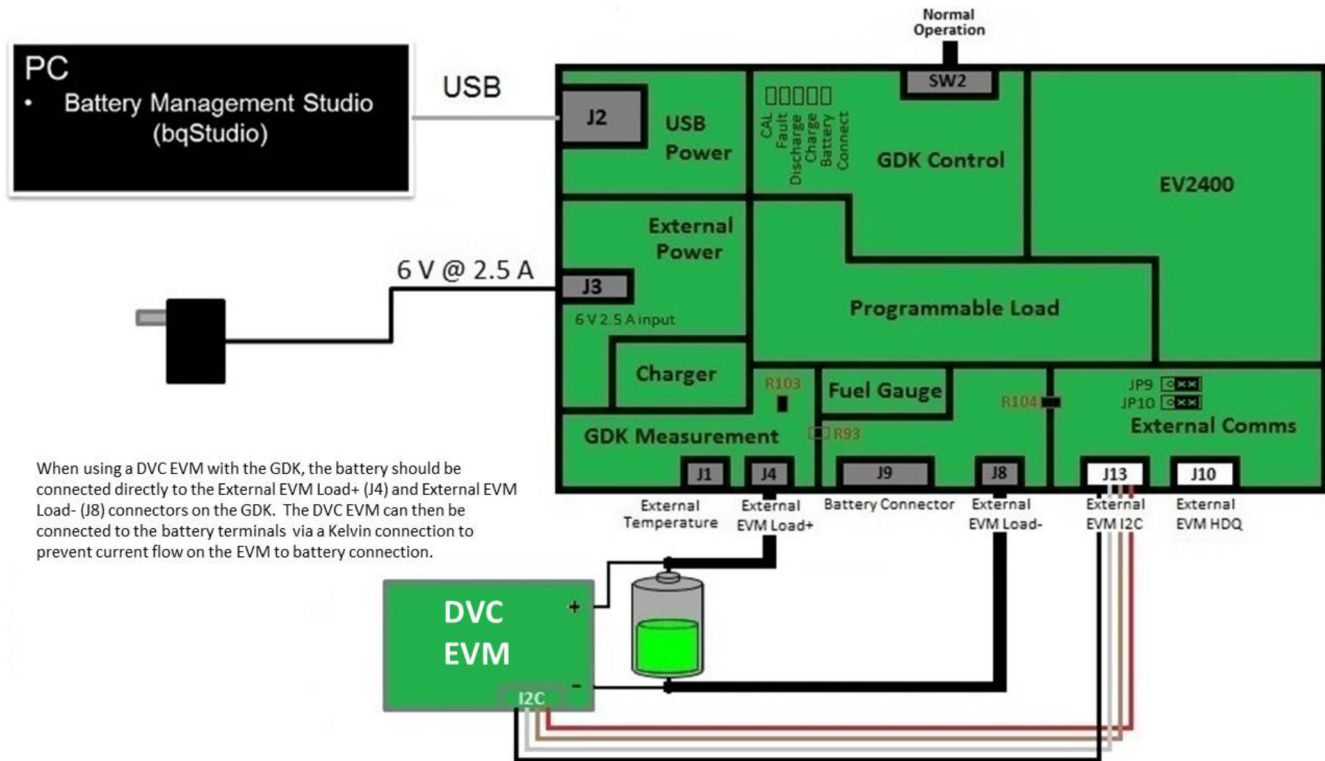


Figure 4. GDK and DVC Fuel Gauge Hardware Connections

## 6 Related Documentation from Texas Instruments

To obtain a copy of any of the following TI documents, call the Texas Instruments Literature Response Center at (800) 477-8924 or the Product Information Center (PIC) at (972) 644-5580. When ordering, identify this document by its title and literature number. Updated documents also can be obtained through the TI Web site at [www.ti.com](http://www.ti.com).

1. *Gauge Development Kit User's Guide* ([SLUUA01](#))

## 7 Revision History

Version	Change Date	Description
—	June 2014	Initial Release

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