RRC EV2400 SMBus Intelligent Reader

- MANUAL -

Contents

Introduction

This manual describes how to use the EV2400 interface unit from Texas Instrument. After installing the battery management Studio on Windows based PC it is easy to communicate with RRC POWERPAQ over the SMBus, and shows results on screen.

Setup requirements:

- EV2400 evaluation kit, Texim p/n: **EV2400-RRC**
- POWER**PAQ** RRC battery (2020 / 2024 / 2037 / 2040(-2) / 2054(-2) / 2057 - series)
    - The RRC3570 battery has another connector and, is not compatible with the SMBus cable as it is
    - The RRC21xx batteries could be compatible with even another connector, too.
- SMBus cable, Texim p/n: **EV2400-SMBUS-CABLE-RRC**
- Windows 7 or higher based x86 computer

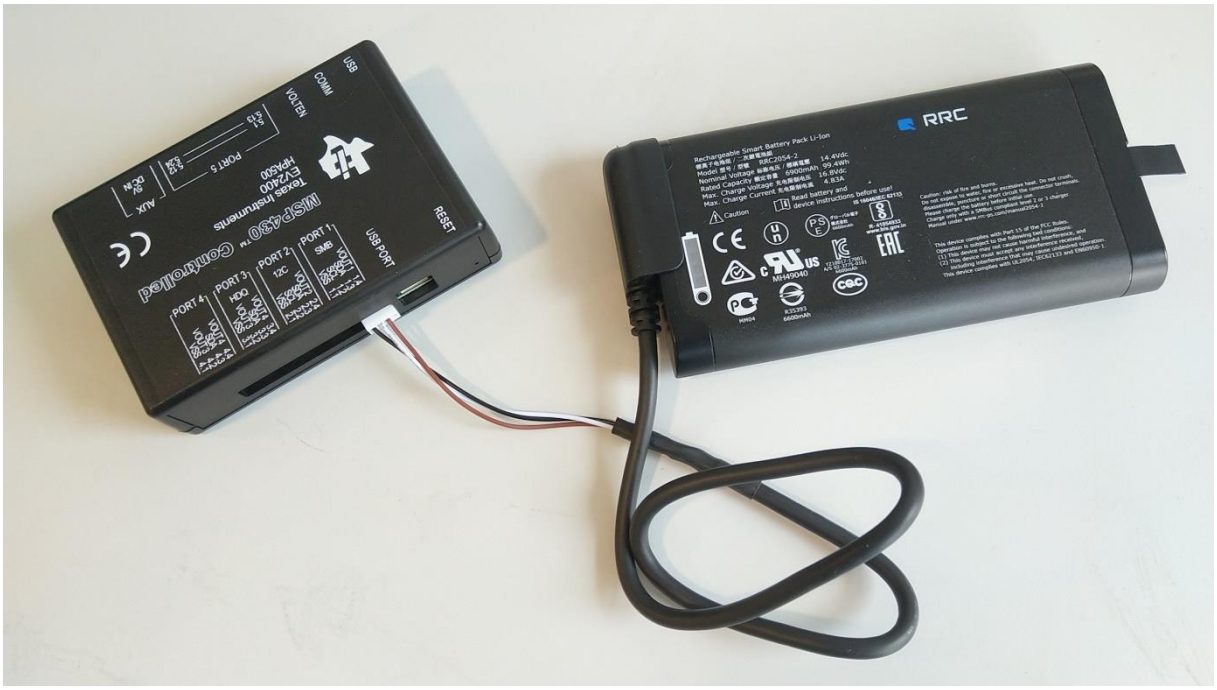
Download Battery Management Studio software from https://www.ti.com/tool/BQSTUDIO

IMPORTANT: By default the battery is delivered in “shipping mode”. To exit this shipping mode and start communication a mating RRC charger is required (e.g. RRC-SMB-UBC) .

Initial Setup

1. First Install Battery Management Studio software from https://www.ti.com/tool/BQSTUDIO.

2. Connect EV2400 (PORT1 - SMB) to the RRC battery with SMBus cable:



3. Then connect EV2400 (USB Type B) to PC with USB-cable (part of EV2400 evaluation kit):

Using Texas Instruments Battery Management Studio

The Overview Screen

When starting the Battery Management Studio Software below image will appear:

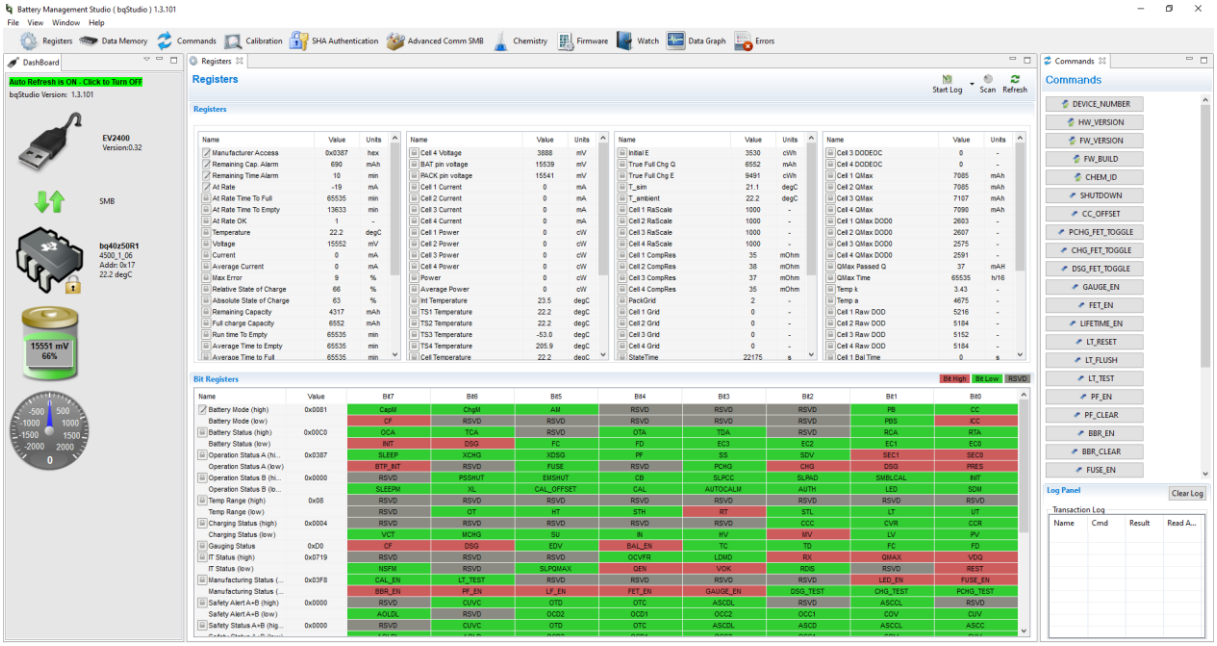


Figure 1 Main overview

On top of the screen is the “Registers” section, it shows main battery parameters:

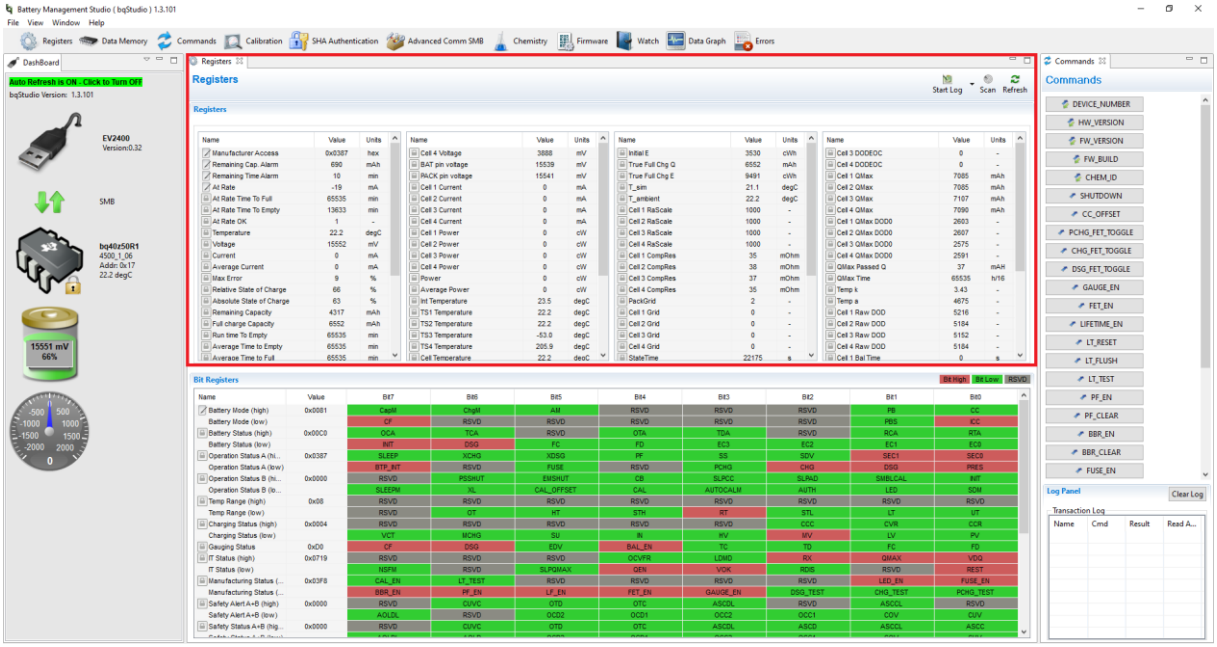


Figure 2 Registers section

If SMBus interface between PC and battery is established this will be confirmed at left side:

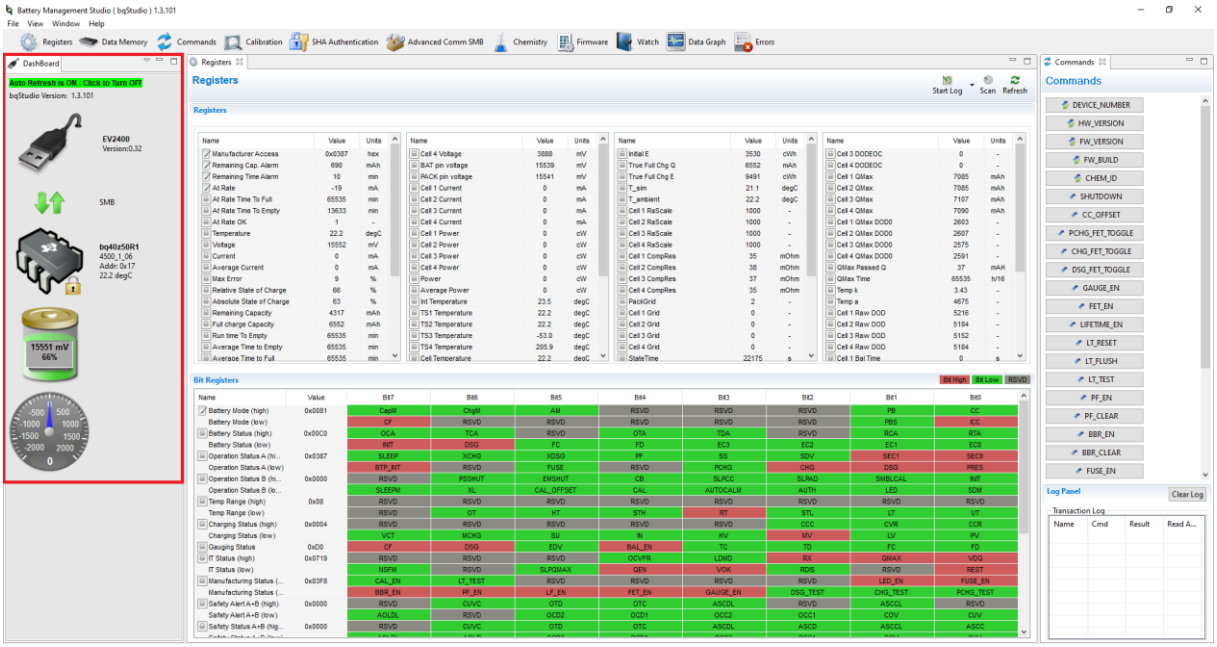


Figure 3 Overview of SMBus connection

Here the connected SMBus Intelligent Reader and the version are specified. Also the Li-Ion Battery pack manager IC's product code inside the connected battery is shown with the battery voltage and charge level just beneath.

At right side there is a Command bar, several buttons and a table

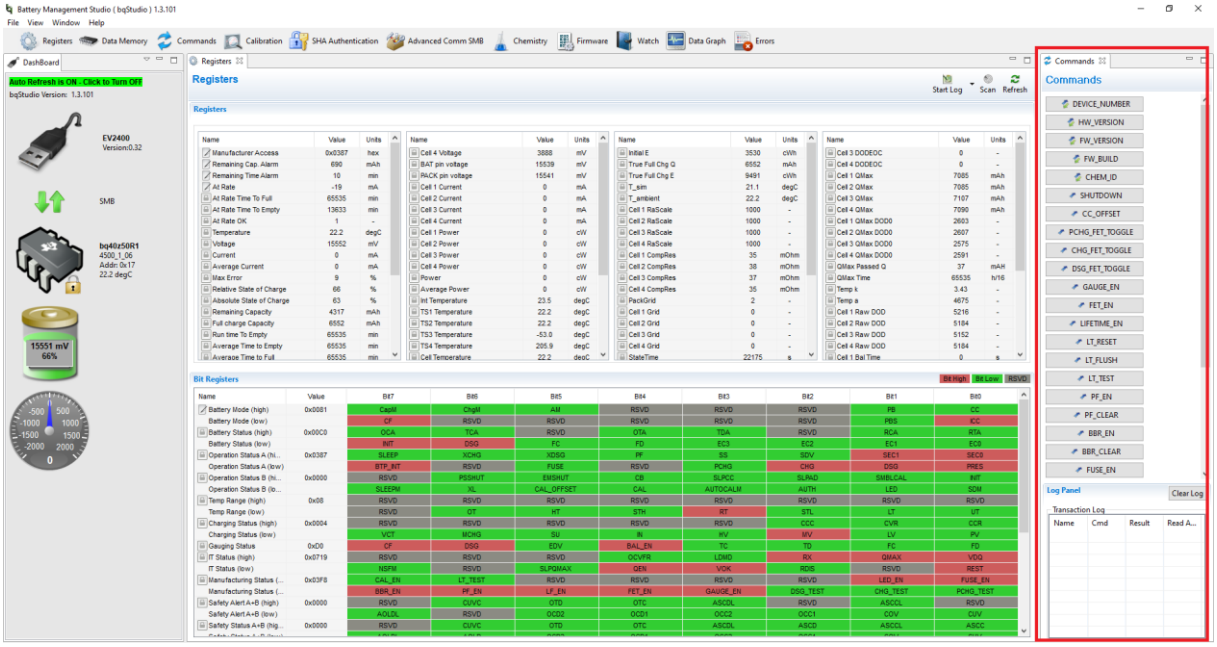


Figure 4 Command

As example here it is possible to set battery in shipping mode for transportation (only if the State of Charge is <30%) or shut it down. The table shows the results of the executed command.

The Command Screen

It is also possible to manually enter commands to receive information from the battery, or set some data. To get to this screen select the Advanced Comm SB tab at the top of the screen:

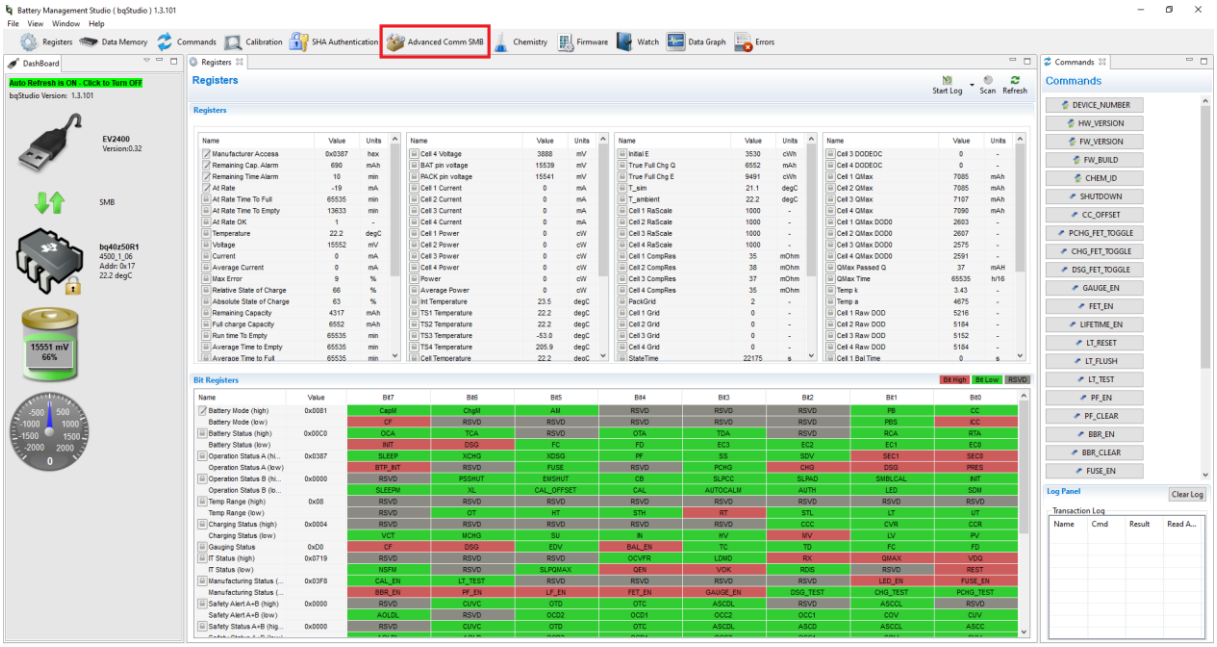


Figure 5 Location of Advanced Comm SMB tab

Below screen with several sections will be opening:

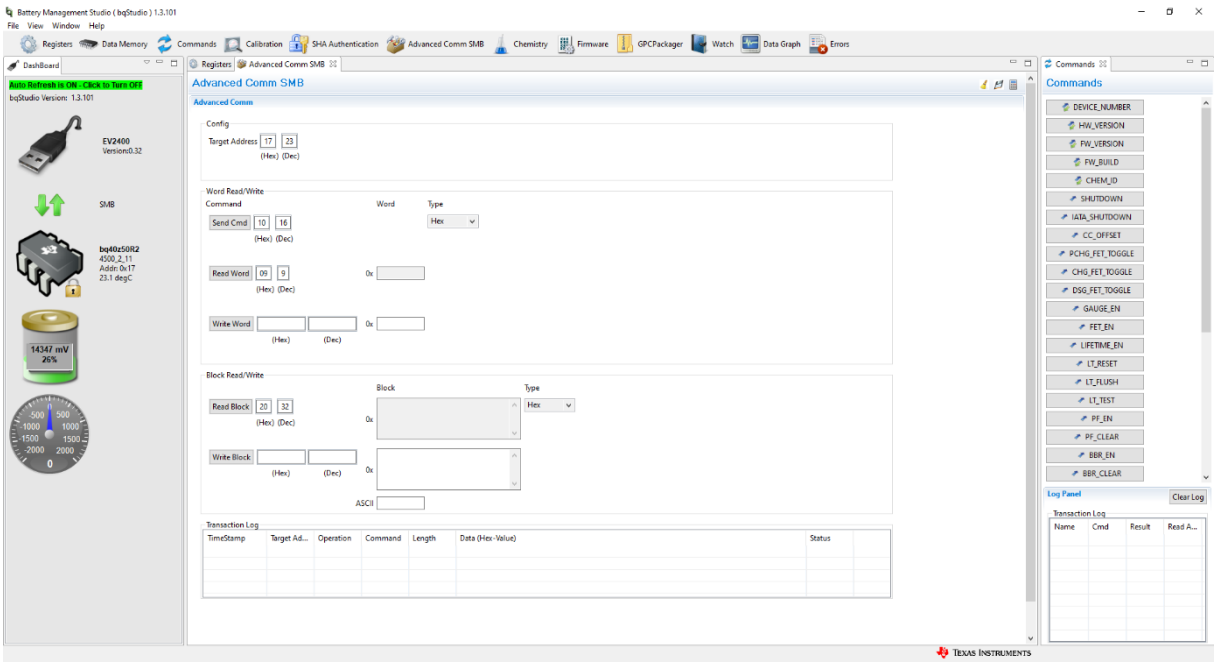


Figure 6 Advanced Comm SMB screen

The first section on top is the Config section, showing the address of the connected battery (17h). Please do not change this address.

The next section is the Word read/write section.

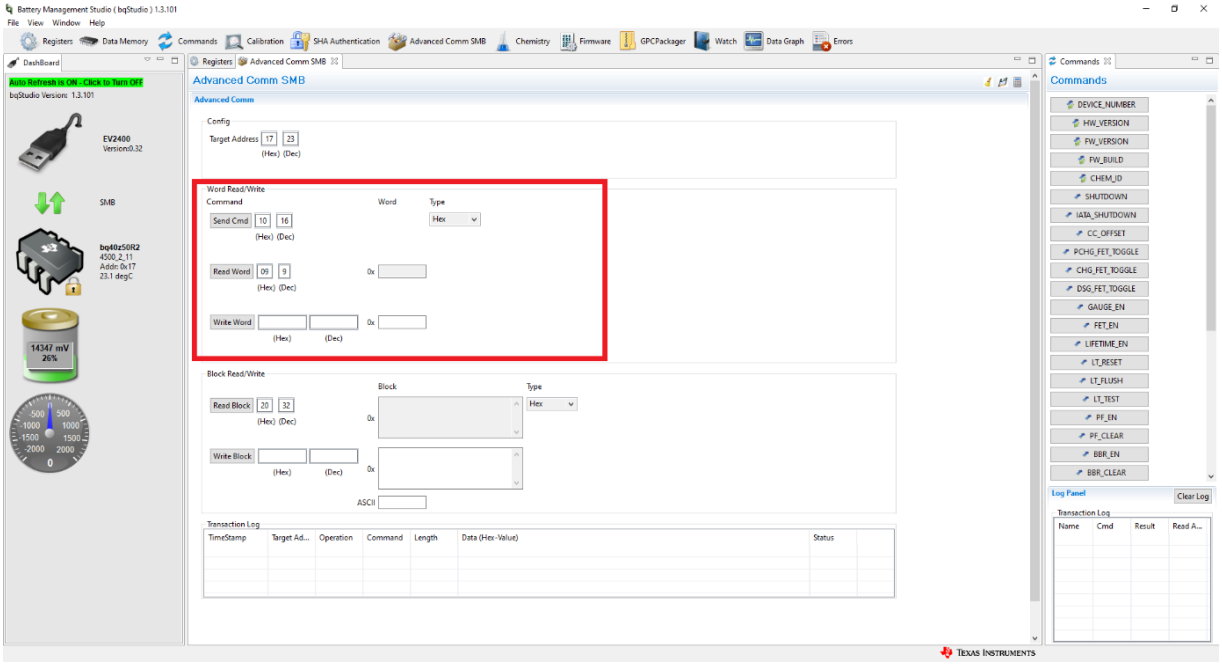


Figure 7 Word Read/Write section

This section allows to insert commands to read or writes words. A word is composed of two hexadecimal letters or numbers, for example 0xA5. The 0x just signifies hexadecimal notation. A hexadecimal command can be entered directly.

For commands that set values, a hexadecimal word of data can be entered, which sets that value to the registers of the battery. More information about this topic can be found on Page 11 of this manual.

The next section is the Block Read/Write section. For read or write multiple bytes of data.

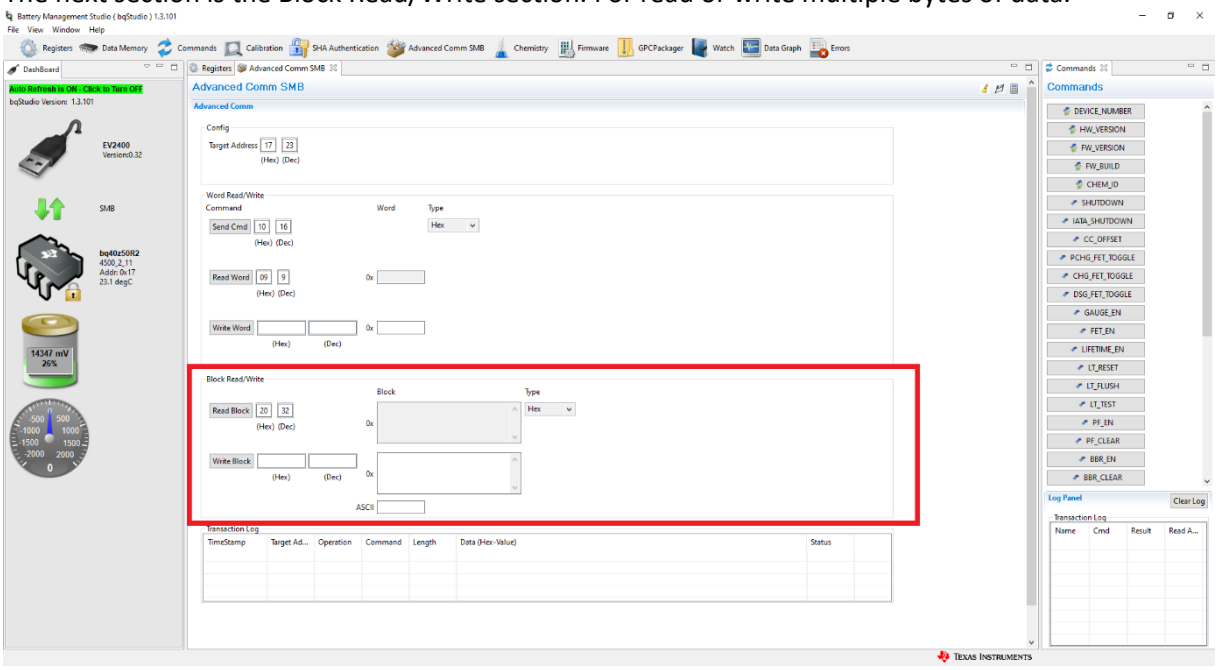


Figure 8 Block Read/Write section

Finally, the Transaction Log shows the results from executed commands:

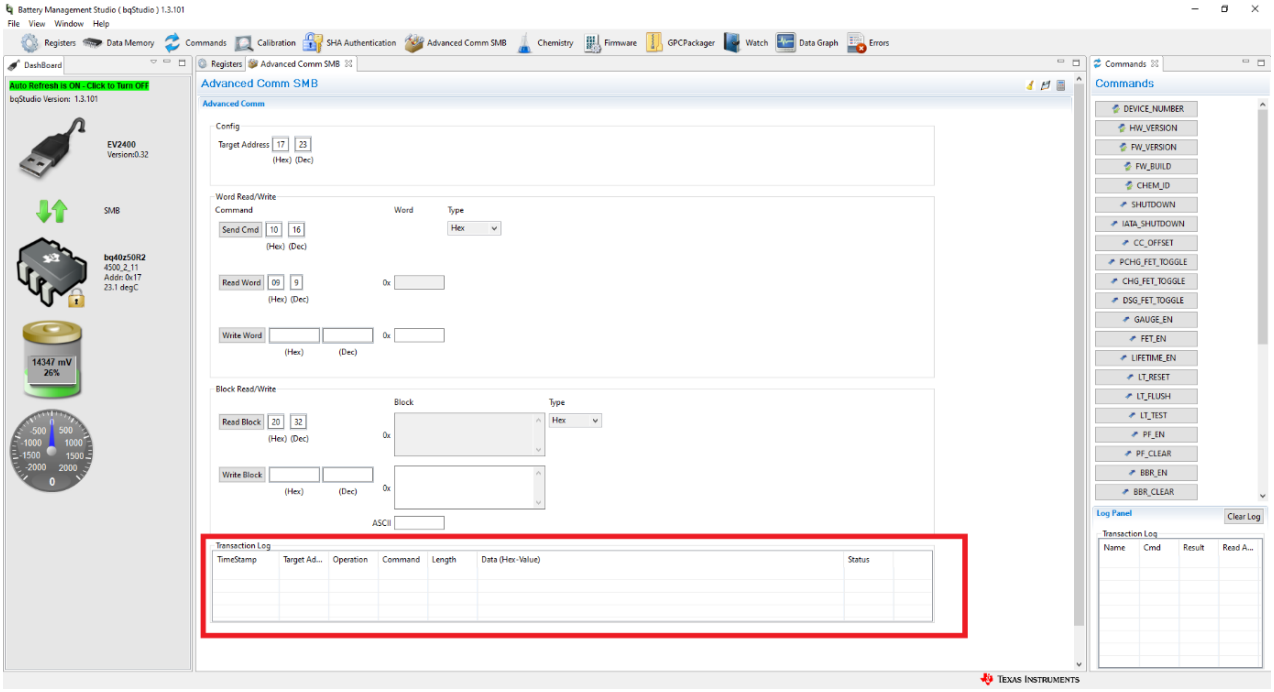


Figure 9 Transaction Log section

As example, when running the RRC Manufacturer Name read command(0x20) the result might be:

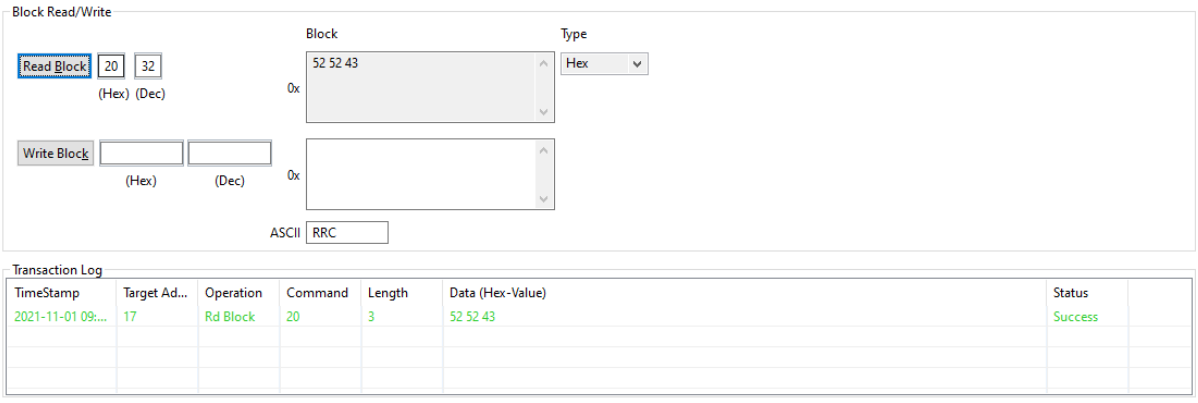


Figure 10 Result for executing Manufacturer Name

In both the Block section and Transaction Log the result is visible. If a RRC battery is connected and command 0x20h (Manufacturer Name) is entered the result will be “0x53 0x53 0x43”. The program converts the responding hex-value in the ASCII field as “RRC”:

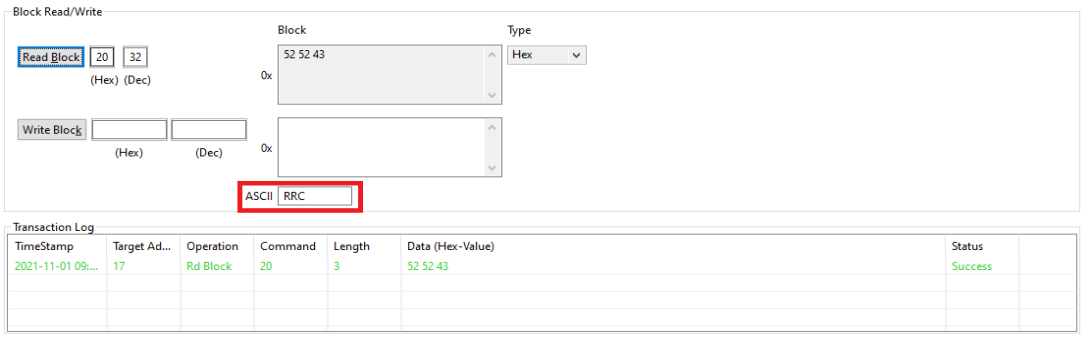


Figure 11 Location of ASCI field

If command is executed successfully this will be confirmed at right side in Status field.

Executing Commands

This chapter explains how you can run your own commands. Below is a table of commands that can be run, as well as what data types the command needs or returns.
Further the R/W Type of this command is shown. This explains where to input the command.

Table 1This table contains the commands that can be run.

Data	Command	Data Type	R/W Type
Manufacturer Name	0x20	Hexadecimal ASCII	Read Block
Battery Name	0x21	Hexadecimal ASCII	Read Block
Chemistry	0x22	Hexadecimal ASCII	Read Block
Specification: ID3.1 VS0 IPs0	0x1a	Unsigned Int	Read Word
Serial Number	0x1c	Number	Read Word
Manufacturing Date	0x1b	Formatted Word	Read Word
Voltage	0x09	Unsigned Int	Read Word
Voltage Measured			
Current	0x0a	Unsigned Int	Read Word
Temperature	0x08	Unsigned Int	Read Word
NTC Measured			
Relative Charge	0x0d	Unsigned Int	Read Word
Remaining Capacity	0x0f	Unsigned Int	Read Word
Full Capacity	0x10	Unsigned Int	Read Word
Absolute Charge	0x0e	Unsigned Int	Read Word
Design Capacity	0x18	Unsigned Int	Read Word
Design Voltage	0x19	Unsigned Int	Read Word
Cycle Count	0x17	Unsigned Int	Read Word
Max Error	0x0c	Unsigned Int	Read Word
Charging Voltage	0x15	Unsigned Int	Read Word
Charging Current	0x14	Unsigned Int	Read Word
Time to empty	0x11	Unsigned Int	Read Word
Time to full	0x13	Unsigned Int	Read Word
Capacity Alarm	0x01	Unsigned Int	Read/Write Word
Time Alarm	0x02	Unsigned Int	Read/Write Word

Troubleshooting

Question: Why does the Battery Management Studio Software not detect the connected battery?

Answer: Check if the cables are all connected properly using the Initial Setup chapter of this manual. If everything is connected properly and it is still not working, press the black circle on the battery shaped indicator:

When pressing on indicator button, and battery is not in shipping mode, one or more green LEDs are active depending on status of charge. If no LED is active the battery can be in shipping mode or empty.

To wake the battery (exit shipping mode) insert it in the RRC charger. The charger will need a few seconds to take the battery out of shipping mode.

When configurations files, for addressing the BQ40Z50 fuel gauge during testing, are needed, please contact Texim Europe. We can provide these files.