Bq40z50 Data Memory Programming for Mass Production

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ABSTRACT

This application report discusses the preferred method for golden file data memory programming as well as individual configuration parameter programming for the mass production environment. This report is oriented toward users who prefer to design their own system rather than using an existing tool from Texas Instruments, such as bqStudio or bqMTester.

1   Introduction

The preferred method for mass production of the bq40z50 is to load the data memory in each battery pack with the desired configuration pattern for the project. This is done from a master file, often called the "golden image". After the process is complete, individual configuration locations such as the serial number and individual calibration numbers may be written. The method provided here makes use of the block read/write command 0x44.

2   Getting to Know Block Read / Write Command 0x44

It should be helpful to review the advanced communication page of bqStudio in order to gain an understanding of how block command 0x44 works. Start by reading the first row of 32 bytes in the data memory. The data memory starts at address 0x4000.
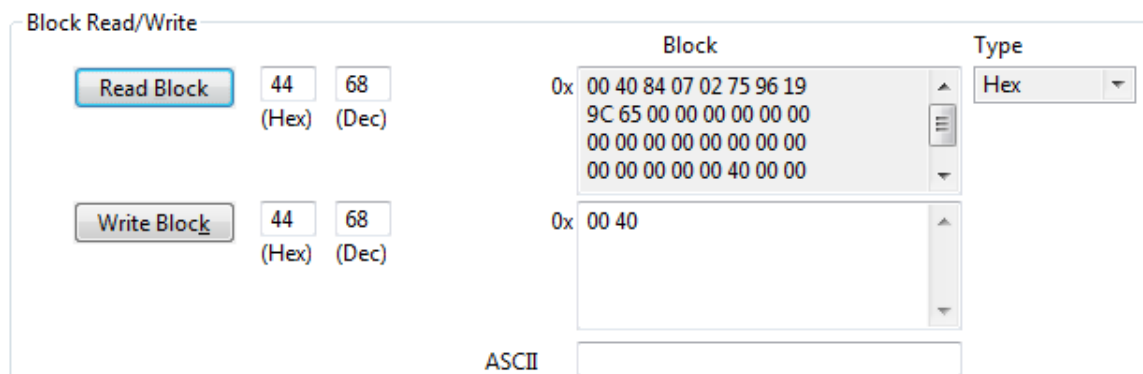

Figure 1. Reading 32 Bytes Starting From 0x4000

In Figure 1 the starting address for a block read has been written to block command 0x44 using the Write Block button. Note the little endian notation where the address 0x4000 is written as 00 then 40. All of the multi-byte values in the data memory, such as addresses, integers, and strings use little endian ordering.

Pressing the Read Block button with command 0x44 returns the 34 bytes as shown in the read block box of Figure 1. Note that the first two bytes are simply the starting address of the block read. The actual data begins with 0x84.

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Now, press the Read Block button again. Figure 2 shows the new read address that has automatically incremented to the next 32 byte row beginning at address 0x4020.
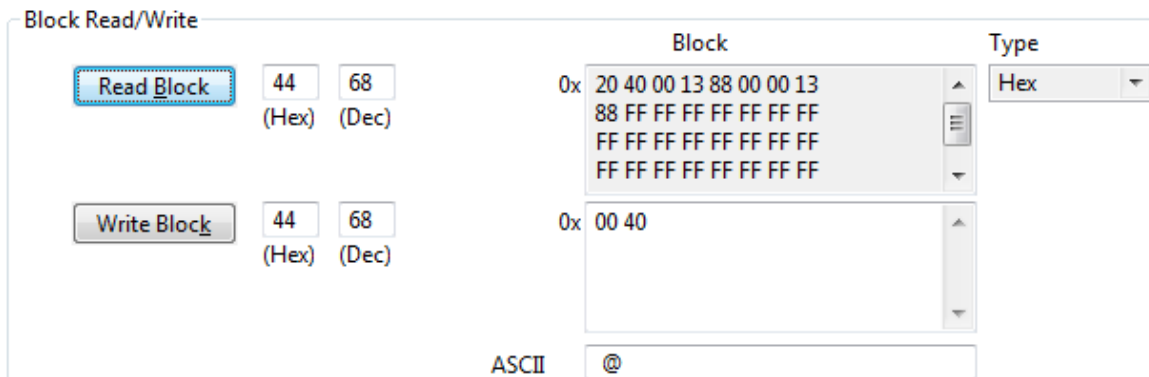

Figure 2. Block Reads are Automatically Incremented by Row.

A simple loop is all that is necessary in order to read out the entire data memory from the bq40z50. The data always start at 0x4000. But where does it end? The user can determine the end by using the Hex Dump feature on the Data Memory screen of bqStudio. The user may in fact prefer to use this file, or a modification of it for the Golden Image. Note that the addresses are in hex, but the addresses are shown as offsets to the beginning location of 0x4000 rather than as absolute addresses. Look at the bottom rows to determine the ending row address of the data memory. Note that it may vary with future enhancements to the bq40z50.

Figure 3. The Bottom of the Hex Dump File Reveals That the Final 32 Byte Row is at Address 0x4580

The user may write to the data memory in single bytes, words, or strings of any length up to 32. In order to write, append the desired bytes after the desired address. The entire data memory may be written as a simple loop of 32 byte rows. Individual parameters may then be overwritten without regard to the beginning row address. For example, in Figure 4 and Figure 5, the serial number for the pack is first being read, and found to be 0x0001.
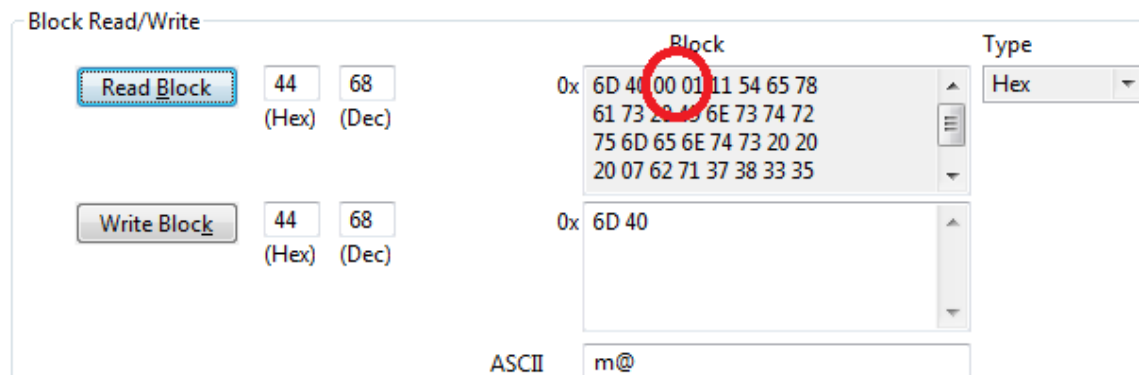

Figure 4. The Serial Number at Address 0x406D is Being Read

Then in Figure 5, the serial number is changed from the default 0x0001 to 0x1234. Note the little endian ordering of bytes.
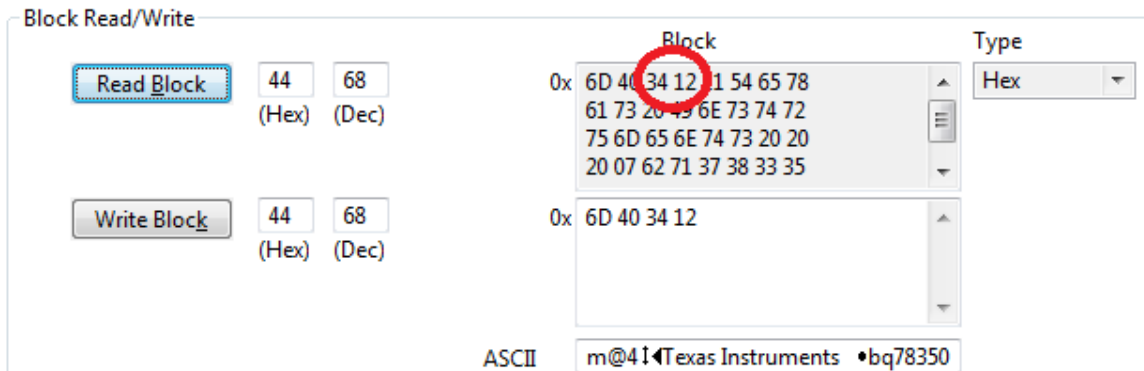

Figure 5. The Serial Number has Been Changed

3   Identifying Individual Addresses and Data Types

In order to understand the complete range of the data memory address, it is helpful to export the data memory from bqStudio using the advanced export feature. BqStudio exports the data memory in a column oriented .csv file where the user can examine the details of the data and have a reference address for each configuration setting. If the file is opened in Microsoft Office Excel, the address offset for each configuration parameter is found as a decimal offset to 0x4000 in column G. The data type and length are in columns E and F respectively.

From bqStudio, use the Window menu to bring up Preferences and then select Data Memory. As shown in Figure 6, insure that the Export All Columns option is selected.
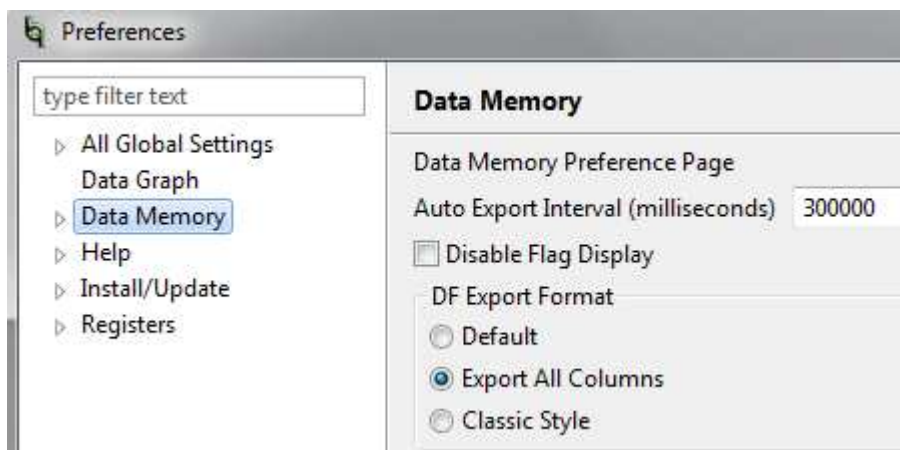

Figure 6. Insure all Data Memory Columns are Exported

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