bq2084-V1.40 to bq2084-V1.43

Battery Management

ABSTRACT

This document describes the design considerations required to change a bq2084-V140 design to a bq2084-143 solution and summarizes all the changes since the bq2084-V140 release.

1 Introduction

The bq2084V1.43 firmware upgrade has been released to enable two new feature additions which enhance the operation of the Charge Termination Function. These changes have been built on top of the previously released bq2084-V142 device and are summarized below:

- Changes since bq2084-V140 include:
  - (V141) Added an additional EDV parameter for age correction
  - (V141) Corrected Charge Max Timer so that the charge FET does not turn ON when *SBS.RSOC()* is below *DF:FullyCharged Clear %* after max charge time has been detected
  - (V142) Added a periodic test of the state of two registers required to produce the 32kHz signal to the AFE
  - (V143) Setting *DF:Max Charge Time* to 0 will now disable this feature
  - (V143) Setting Bit 7 (0x80) of *DF:MiscConfig2* will suspend the Charge Timer when the SBS.Current < *DF:Chg Detection* threshold
- Details of V141 Changes
  1. The bq2084-v141 added a new aging factor called *DF: Age Factor* which will scale cell impedances as the cycle count increases. This new factor is used to accommodate for much higher impedances observed in larger capacity and/or aged cells. For most applications the default value of zero is sufficient. However, for some very specific applications, this new aging factor may be required. In those cases, experimental data must be taken at the 0, 100, 200, and 300 cycle read points using a typical discharge rate while at ambient temperature. Entering this data into a TI provided MathCAD program will yield the appropriate DF: Age Factor value. Contact TI Applications Support at http://www-k.ext.ti.com/sc/technical-support/email-tech-support.asp?AAP for more detailed information
  2. Corrected logic in Charge Max Timer per spec.
- Details of V142 Changes
  1. The two registers which configure a 32kHz clock output to the AFE are checked once per second in normal operation, sleep mode, and permanent failure mode. If the register contents are incorrect, they will be corrected, up to a maximum number of corrections, as set by a new data flash configuration constant called *DF:Max 32K Reinit*. After the maximum number of corrections has been exceeded, if the 32kHz clock output is lost, then a watchdog failure (WDF) will occur in the AFE. As a result of the WDF, the AFE will turn all the FETS off. At this point the WDF can only be corrected by a full reset.
- Details of V143 Changes
  1. Disabling the Charge Timer by setting the *DF:Max Charge Time* to 0 is inline with the logic used in TI's newer gas gauge solutions and provides the end user with additional flexibility.
  2. Allowing the suspension of the Charge Timer by monitoring the SBS:Current in comparison with the

DF:Chg Detection threshold further enhances the users flexibility when utilizing the Charge Timer function. It should be noted that upon a full reset or entry into Sleep Mode, the Charge Timer can no longer be suspended and will reset to zero.

New orderable part numbers will be released to support this firmware upgraded device. Until then a firmware updater tool is available upon request.

- bq2084DBT-V143
- bq2084DBTR-V143

Note that the latest version of the evaluation software is required to be able to read and write all the data flash configuration locations.

2 Summary

These changes are provided in order to enhance the functionality of the previous generation firmware.

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