Application Report
SLUA874A–January 2019–Revised July 2019

BQ40Z50-R2 to BQ40Z50-R3 Change List

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ABSTRACT

This document describes the changes made from the BQ40Z50-R2 device to the BQ40Z50-R3 firmware. The latest ordering information and the *BQ40Z50-R3 Technical Reference Manual* (SLUUBU5) are available on TI.com.

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2 Introduction

The BQ40Z50-R3 firmware is released to enable several feature additions and performance improvements.

To work with BQ40Z50-R3, download the latest version of the Battery Management Studio (BQSTUDIO) evaluation software from TI.com.

The existing BQ40Z50, BQ40Z50-R1, and BQ40Z50-R2 integrated circuits and evaluation modules (EVMs) can be upgraded to BQ40Z50-R3 firmware by downloading the .srec firmware file from TI.com.

3 Change Details

Table 1. Change Details

Change Description	BQ40Z50-R3	BQ40Z50-R2	Comments
Intel® Dynamic Battery Power Technology (Intel® DBPT) Version 3	New Feature	Turbo Mode 2 (Intel® DBPTv2)	This new feature adds Vload and Rhf_Effective to support Intel® DBPTv3 for 10-ms and 10-s power and current calculation.
Total Time Charging Count for Reduced Charging Voltage, Elevated RSOC, or Elevated Temperature	Expanded Feature	Charge voltage degradation can be on ***Cycle Count*** or SOH only.	The charging voltage degradation process can now be by cycle count, SOH, elevated RSOC, elevated temperature, or run time.
New Error Code for SMBus Protocol Violations	New Feature	Only reported in 0x7	*BatteryStatus()[3:0]* now includes code 0x8 for an incomplete transaction.
Expanded Lifetime Logging	Added customer configurable boundaries	Fixed boundaries	Expanded ***Lifetime Data Collection*** allows configuring different thresholds for time spent at various RSOC and temperature regions, up to 56 values.
Manual Permanent Failure in SEALED Mode	New Feature	Feature does not exist.	The *ForcePF()* command initiates a permanent fail of the pack in SEALED mode. This provides safeguarding against accidental use by requiring a separate two-word command for execution.
Lifetime Data Enable in SEALED Mode	Modified Feature	Feature is not allowed in SEALED mode.	*LifetimeDataCollection()* is modified so it can be sent while in SEALED mode. It cannot be disabled in SEALED mode. *LifetimeClear()* can be sent in SEALED mode with a separate two-word command for execution.
Individual Cell Balancing Status	Expanded Feature	The *[CB]* flag only provides an indication if any cell balancing is underway.	*OperationStatus()* provides individual status bits for *[CB1]*, *[CB2]*, *[CB3]*, and *[CB4]*.
GPIO Control During Permanent Fail (PF)	New Feature	Feature does not exist.	***[GPIO_PF]*** is added to toggle a GPIO pin if the FUSE signal is asserted.
RSOC Adjustment During Charging at High Temperatures	New Feature	Feature does not exist.	***[TAPER_VOLT]*** is added to address the possibility of an RSOC jump up to 100% when operating at an elevated temperature.
GPIO Capability on LED Pins	New Feature	Feature does not exist.	If the LED pins are not used, the GPIOs can be mapped to display status or flag conditions.

Table 1. Change Details (continued)

Change Description	BQ40Z50-R3	BQ40Z50-R2	Comments
Accumulated Charge Measurement	New Feature	Feature does not exist.	*AccumulatedCharge()* is added to integrate the total charge into or out of the battery. It is user-configurable to select thresholds and total time.
Cell Interconnect Resistances Used in IT	Modified Existing Implementation	Cell Interconnect Resistance is used in select cases only.	The BQ40Z50-R3 device consistently uses the Cell Interconnect Resistance to calculate EDV, TD, CUV.
Lifetime Timers as Seconds Using 32 Bits	Modified Existing Implementation	2-hour resolution only	Firmware runtime is 32 bits in seconds, allowing for greater resolution.
Terminate Charge (TC) Checks for UTC	Expanded Feature	Only checks OTC	TC now checks for UTD and OTD.
Terminate Discharge (TD) Checks for UTD	Expanded Feature	Only checks OTD	TD now checks for UTD and OTD.
1% RSOC Hold Feature Added	New Feature	Feature does not exist.	The RSOCHOLD1 feature prevents *StateofCharge()* from reporting 0% until *Voltage()* is less than or equal to ***Terminate Voltage***.
System Disconnect Feature Added	New Feature	Feature does not exist.	The System Disconnect feature is similar to the EMSHUT feature, but requires the $\overline{\text{PRES}}$ pin to be high and a charger to be present to reenable the FETs.
Charging Voltage Override in SEALED Mode	New Feature	Feature does not exist.	The *ChargingVoltageOverride()* command enables the writing of the five Advanced Charge Algorithm Charging Voltage values in SEALED mode to data flash.
Static Taper Voltage Threshold Added	New Feature	Feature does not exist.	Setting ***[TAPER_VOLT]*** causes ***Charge Term Charging Voltage*** to be used in place of *ChargingVoltage()* / the number of cells in series for a valid charge termination condition.
Configuration Bit to Disable High Temperature (HT) Inhibit from Zeroing *ChargingVoltage()* and *ChargingCurrnet()*	New Feature	Feature does not exist.	High Temperature (HT) charge inhibit is enabled by default, but can be disabled by setting ***[HT_INHIB_DIS]***.
IO-Based SHUTDOWN	New Feature	Feature does not exist.	The BQ40Z50-R3 device can shut down upon the assertion of the $\overline{\text{DISP}}$ pin when the configuration bits ***[IO_SHUT]*** = 1 and ***[LED_EN]*** = 0.

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (January 2019) to A Revision	Page
• Deleted System Deep Sleep Enhancement	2

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