

## bq27510-G2 to bq27510-G3 Change List

### ABSTRACT

This document describes the changes made from bq27510-G2 to bq27510-G3. The latest ordering information and data sheet is available on the Texas Instruments (TI) Web site.

**NOTE:** bq27510-G2 uses FW version 1.23 and the bq27510-G3 uses FW version 4.00.

bq27510-G2 ICs can be upgraded with bq27510-G3 firmware to achieve identical functionality.

## 1 Introduction

bq27510-G3 firmware version 4.00 has been released to enable several feature additions and performance improvements. The following new orderable part numbers have been released which ship pre-programmed with this new version of firmware:

- bq27510DRZR-G3
- bq27510DRZT-G3

The latest version of the evaluation software is required to be able to read and write all locations of the data flash configuration. The necessary GaugeStudio and the corresponding v4.00 SENC file can be downloaded from the [bq27510-G3](#) product folder on ti.com. Existing bq27510 (including EVMs) can be upgraded to the latest firmware version by following the instructions in application note [SLUA453A](#).

**NOTE:** If a golden image created for another version of bq27510 is loaded into an IC running firmware version 4.00, the IC becomes non-functional and must be replaced. Please ensure all instructions in SLUA453A are followed if upgrading ICs or converting your production line to bq27510-G3.

The best practice is to generate a new golden image (DFI file) for bq27510-G3.

## 2 Change Details

**Table 1. Change Details**

Change	bq27510-G2	bq27510-G3	Comments
Support for larger capacity batteries	Support battery capacity up to 8 Ah.	Support battery capacities up to 14.5 Ah using <b>Des Energy Scale</b> feature. <b>Design Energy</b> and <b>Avg Power Last Run</b> register units are mWh or cWh depending on the setting of <b>Des Energy Scale</b> (1 or 10). <b>T Rise</b> is also multiplied by <b>Des Energy Scale</b> .	New feature
Reserve Capacity register change	<b>Reserve Capacity-mW</b> label used.	<b>Reserve Cap-m/cW</b> label used because units depend on setting of <b>Des Energy Scale</b> .	New feature
User Rate register change	<b>User Rate-mW</b> label used.	<b>User Rate-m/cW</b> label used because units depend on setting of <b>Des Energy Scale</b> .	New feature

**Table 1. Change Details (continued)**

Change	bq27510-G2	bq27510-G3	Comments
SOC Smoothing	SOC Smoothing feature not present.	SOC Smoothing added to facilitate smooth transition of reported SOC during charge and discharge. Added register bits to new <b>Operation Configuration D</b> register: <ul style="list-style-type: none"> <li>• <b>[SMTHEN]</b></li> <li>• <b>[RCJUMPOK]</b></li> </ul>	New feature
Fast Resistance Scaling	Fast Resistance Scaling feature not present.	Add Fast Resistance Scaling feature to algorithm to improve accuracy of the <i>RemainingCapacity()</i> calculations during corner cases. This improvement is most noticeable for high discharge rates (> C/2) and low temperature as 0% is approached. Added <b>Fast Scale Start SOC</b> register.	New feature
Change in Delta Voltage Algorithm	Agnostic to load type.	Enhance <b>Delta Voltage</b> determination for various system load conditions. Improve gauging accuracy under spiky load conditions.	New feature
Voltage Consistency	Voltage Consistency feature not present.	Add Voltage Consistency feature to algorithm to improve accuracy of calculations during corner cases. This improvement is most noticeable for low temperatures as 0% is approached. Added data flash register bit: <b>VconsEN</b> in <b>Pack Configuration B</b>	New feature
SystemDown Set	Feature not present.	Added data flash registers: <b>SysDown Set Volt Threshold</b> , <b>SysDown Set Volt Time</b> , <b>SysDown Clear Volt</b> .	New feature
Terminate Voltage Valid Time	Feature not present.	Prevent SOC from jumping to 0% early under spiky load conditions. Added data flash register: <b>Terminate Valid Time</b>	New feature
Battery insertion detect	Feature not present.	Added data flash register bit: <b>[BLE]</b> in <b>Operation Configuration B</b> and <b>BAT_INSERT</b> and <b>BAT_REMOVE Control()</b> subcommands.	New feature
Remove maximum load simulation	<i>MaxLoadTimeToEmpty()</i> standard command and data flash register <b>Initial MaxLoad</b> present.	Feature not available.	Feature removal
Change the SOC1 and SOCF to %SOC threshold values	Feature uses mAh units.	Feature uses % unit	Feature change
Maximum and minimum resolution factors	Feature not present.	Improved the impedance update performance. Added data flash registers: <b>Max Res Factor</b> and <b>Min Res Factor</b> .	New feature
Maximum and minimum simulation rates	Feature not present.	Improve the algorithm performance in very heavy or very light load. Added data flash registers: <b>Max Sim Rate</b> and <b>Min Sim Rate</b> .	New feature
Qmax update condition	Feature not present.	User can change the Qmax update condition. Added data flash registers: <b>Min % Passed Chg for Qm</b> , <b>Qmax Filter</b> , and <b>Max % Default Qmax</b> .	New feature
Manufacturer Info Block reduce	Manufacturer Info Block was 64 bytes.	Reduced size of Manufacturer Info Block from 64 to 32 bytes	Feature change

**Table 1. Change Details (continued)**

Change	bq27510-G2	bq27510-G3	Comments
Calibration Mode Changed.	Calibration algorithm performed by gauge.	Calibration restructured so that bq27510-G3 external PC software now performs most computations for data flash Calibration class parameters. This change was needed to free up firmware code space for the other algorithm improvements.	Feature change
Improved Overcharge Handling	Possibility to get into overcharge condition due to change in temperature after charge termination or more accumulated charge after charge termination.	DODatEOC is updated after charge termination and not updated if a significant temperature change occurs after charge termination. Charge accumulation after charge termination is tracked for a more accurate calculation of DODO. Added data flash register bit: <b>[CHGDODEOC]</b> in <b>Operation Configuration D</b> .	New feature
Additional SOC_INT configuration flexibility	Some SOC_INT trigger events could not be individually enabled or disabled. <b>Operation Configuration D</b> register did not exist.	New data flash register <b>Operation Configuration D</b> contains configuration bits to enable and disable individual SOC_INT trigger events with more flexibility. This includes separate enable and disable bits for over-temperature interrupts, algorithm state change interrupts, and data flash update interrupts.	New feature
New configuration registers	<b>Pack Configuration C</b> , <b>Pack Configuration D</b> , and <b>Pack Configuration E</b> data flash registers did not exist.	<b>Pack Configuration C</b> , <b>Pack Configuration D</b> , and <b>Pack Configuration E</b> data flash registers added for additional options.	New feature
Larger thresholds for low battery warning	<b>SOC1 Set Threshold</b> and <b>SOC1 Clear Threshold</b> are each 1 byte in size.	<b>SOC1 Set Threshold</b> and <b>SOC1 Clear Threshold</b> are each 2 bytes in size to support needs of larger capacity battery packs.	Feature change
State Of Health feature	Feature not available.	State Of Health added to indicate the health of battery Added <b>SOH LoadI</b> register and <b>StateOfCharge( )</b> standard command.	New feature
Wake from HIBERNATE	Can possibly wake from HIBERNATE upon rising edge of I <sup>2</sup> C bus.	Device will only wake from HIBERNATE if I <sup>2</sup> C traffic is addressed to the fuel gauge.	Bug fix
Standard Command removal	<b>TimeToFull( )</b> , <b>MaxLoadCurrent( )</b> , <b>MaxLoadTimeToEmpty( )</b> , <b>AvailableEnergy( )</b> , <b>AveragePower( )</b> , and <b>TTEatConstantPower( )</b> commands present.	<b>TimeToFull( )</b> , <b>MaxLoadCurrent( )</b> , <b>MaxLoadTimeToEmpty( )</b> , <b>AvailableEnergy( )</b> , <b>AveragePower( )</b> , and <b>TTEatConstantPower( )</b> commands removed to recover code space for new features.	Feature removal
Standard Command updated	<b>StateOfHealth( )</b> , <b>InstantaneousCurrent( )</b> , <b>InternalTemperature( )</b> , <b>ResistanceScale( )</b> , and <b>DesignCapacity( )</b> commands not available.	Added <b>StateOfHealth( )</b> , <b>InstantaneousCurrent( )</b> , <b>InternalTemperature( )</b> , <b>ResistanceScale( )</b> , and <b>DesignCapacity( )</b> commands.	New feature
Standard Command	<b>StandbyCurrent( )</b> , <b>StandbyTimeToEmpty( )</b> , <b>CycleCount( )</b> , <b>StateOfCharge( )</b> command addresses are 0x1A and 0x1B, 0x1C and 0x1D, 0x2A and 0x2B, 0x2C and 0x2D, respectively.	<b>StandbyCurrent( )</b> , <b>StandbyTimeToEmpty( )</b> , <b>CycleCount( )</b> , <b>StateOfCharge( )</b> command addresses are 0x18 and 0x19, 0x1A and 0x1B, 0x1E and 0x1F, 0x20 and 0x21, respectively.	Feature change
Subcommand Update	<b>HW_VERSION</b> , <b>DF_CHECKSUM</b> , <b>BOARD_OFFSET</b> , and <b>CAL_MODE Control( )</b> subcommands present.	<b>HW_VERSION</b> , <b>DF_CHECKSUM</b> , <b>BOARD_OFFSET</b> , and <b>CAL_MODE Control( )</b> subcommands removed. Added <b>BAT_INSERT</b> and <b>BAT_REMOVE Control( )</b> subcommands.	Feature change

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