Application Report
SLUA652–September 2012

# Configuring the bq27425G1-v2.02

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**ABSTRACT**

The bq27425G1-v2.02 has different RAM and EEPROM parameters that can configure the device. The RAM and EEPROM parameters of the bq27425G1-v2.02 are split into sections, which are described in detail in this document.

**Contents**



**List of Figures**



## 1 Introduction

The bq27425-G1 is built with a new technology that allows for a simplified setup. The bq27425-G1 has a ROM-based architecture that includes some nonvolatile (NVM) EEPROM for user configuration. The user can also update certain parameters in RAM. All user-configurable parameters, both EEPROM and RAM, are described in detail in this document. It must be noted that all RAM values are reset to their default value if the bq27425-G1 sees a RESET subcommand (0x0041) or experiences a loss in power (POR). Therefore, any RAM values that should be different than the default value should be updated by the host whenever the bq27425-G1 powers up. EEPROM parameters do not reset on a RESET subcommand (0x0041) or POR.

Impedance Track is a trademark of Texas Instruments.

# 2 Configuration

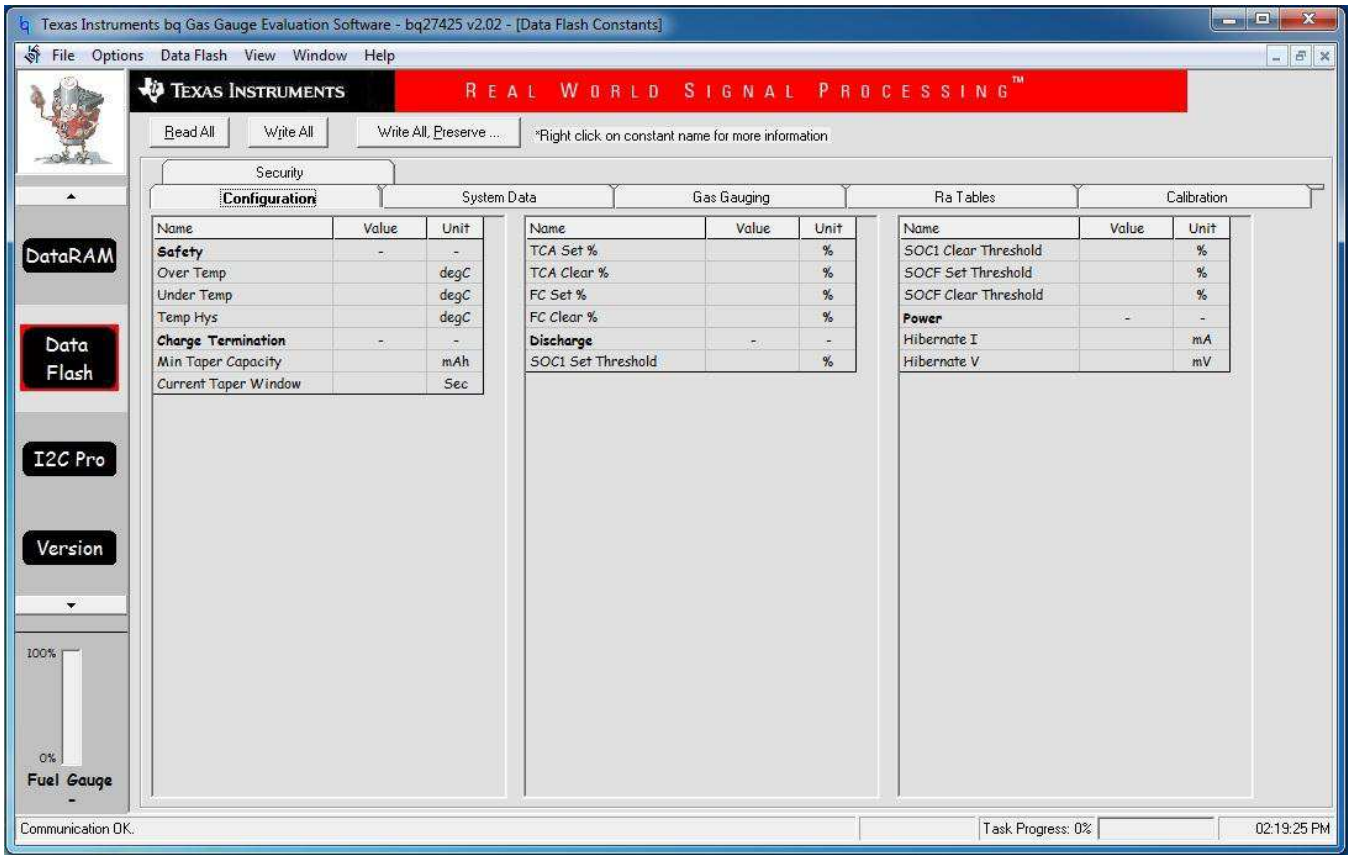


**Figure 1. Configuration**

## 2.1 Safety

*Over Temp [RAM]*

*Over Temp* is used to set a temperature threshold at which an over temperature during charge or discharge fault occurs. At any time, if the pack temperature measured by ***Temperature()*** rises to or above the Over Temperature (*Over Temp*) threshold, the Over Temperature [OT] bit is set in the ***Flags()*** register. The value of this bit has no effect on the operation of the gauge and is for information purposes only.

**Normal Setting:** The *Over Temp* value depends on the environment temperature and the battery specification. Verify that the battery specification allows temperatures up to this setting while charging or discharging, and verify that this setting is sufficient for the application temperature. The default value is set to 55°C.

*Under Temp [RAM]*

*Under Temp* is used to set a temperature threshold at which an under temperature during charge or discharge fault occurs. At any time, if the pack temperature measured by ***Temperature()*** falls to or below the Under Temperature (*Under Temp*) threshold, the Under Temperature [UT] bit is set in Flags() register. The value of this bit has no effect on the operation of the gauge and is for information purposes only.

**Normal Setting:** The Under Temp value depends on the environment temperature and the battery specification. Verify that the battery specification allows temperatures down to this setting while charging or discharging, and verify that this setting is sufficient for the application temperature. The default value is set to 0°C.

*Temp Hys [RAM]*

*Temp Hys* is the temperature delta threshold defined to provide hysteresis to recovery from an *Over Temp* or *Under Temp* condition.

**Normal Setting:** The Temp Hys value depends on the volatility of the environmental temperature and the battery specifications. The default value is set to 5°C.

## 2.2 Charge Termination

*Min Taper Capacity [RAM]*

*Min Taper Capacity* sets an accumulated capacity threshold that is used as one of the three requirements to detect charge termination. The minimum taper capacity requirement for charge termination detection is that the gauge must detect an accumulated charge that is greater than the *Min Taper Capacity* threshold during two consecutive periods of the *Current Taper Window.* In order for the bq27425-G1 to detect charge termination, during two consecutive periods of *Current Taper Window*, the following requirements must be satisfied:

1. ***AverageCurrent()*** < *Taper Current*.
2. Accumulated capacity is > *Min Taper Capacity*
3. ***Voltage()*** > *Taper Voltage*

**Normal Setting:** Do not modify *Min Taper Capacity*. The default value is set to 25 mAh.

*Current Taper Window [RAM]*

*Current Taper Window* sets a length of time that is used to determine if all three requirements for charge termination detection have been satisfied. Refer to *Min Taper Capacity*, *Taper Current and Taper Voltage* for more information on charge termination detection.

**Normal Setting:** Do not modify *Current Taper Window*. The default value is set to 40 seconds.

*TCA Set % [RAM]*

TCA Set % is the Terminate Charge Alarm Set Percentage threshold. *TCA Set %* is used to set a ***StateOfCharge()*** percentage level at which the (Fast) Charge Allowed [CHG] bit in the ***Flags()*** register is cleared. When *TCA Set %* is set to (–)1, it disables the use of the Charge Alarm threshold. When *TCA Set %* is set to (–)1, the (Fast) Charge Allowed [CHG] bit in the ***Flags()*** register is cleared when the taper condition is detected.

**Normal Setting:** *TCA Set %* only affects the (Fast) Charge Allowed [CHG] bit in the ***Flags()*** register which does not affect the charge termination process. The default value is set to 99%.

*TCA Clear % [RAM]*

TCA Clear % is the Terminate Charge Alarm Clear Percentage threshold. TCA Clear % is used to set a ***StateOfCharge()*** percentage level at which the (Fast) Charge Allowed [CHG] bit in the Flags() register is set.

**Normal Setting:** *TCA Clear %* only affects the (Fast) Charge Allowed [CHG] bit in the ***Flags()*** register which does not affect the charge termination process. The default value is set to 95%.

*FC Set % [RAM]*

*FC Set %* is the Full Charge Set Percentage threshold. *FC Set %* is used to set a ***StateOfCharge()*** percentage threshold at which the Full Charge [FC] bit in the ***Flags()*** register is set. When *FC Set %* is a value other than (–)1, the Full Charge [FC] bit is set based on the amount of passed charge detected by the gauge and not charge termination detection. If *FC Set %* is set to (–)1, the Full Charge [FC] bit is set based on charge termination detection (refer to *Min Taper Capacity*, *Taper Current* and *Taper Voltage*).

**Normal Setting:***FC Set %* only affects the Full Charge [FC] bit in the ***Flags()*** register which does not affect the charge termination process. The default value is set to 100%.

*FC Clear % [RAM]*

*FC Clear %* is the Full Charge Clear Percentage threshold.*FC Clear %* is used to set a ***StateOfCharge()*** percentage threshold at which the Full Charge [FC] bit in the ***Flags()*** register is cleared.

**Normal Setting:** FC Clear % only affects the Full Charge [FC] bit in the Flags() register which does not affect the charge termination process. The default value is set to 98%.

## 2.3 Discharge

*SOC1 Set Threshold [RAM]*

*SOC1 Set Threshold* is used to set a ***StateOfCharge()*** percentage threshold used to indicate when ***StateOfCharge()*** falls to or below a defined ***StateOfCharge()***. The *SOC1 Set Threshold* is typically used as an initial low ***StateOfCharge()*** warning. When ***StateOfCharge()*** falls below the*SOC1 Set Threshold*, the State of Charge Initial [SOC1] bit in the Flags() register is set. The State of Charge Initial [SOC1] bit is cleared once ***StateOfCharge()*** rises above the *SOC1 Clear Threshold*. If *SOC1 Set Threshold* is set to (–)1, then the State of Charge Initial [SOC1] bit becomes inoperative.

**Normal Setting:** The default value is set to 10%.

*SOC1 Clear Threshold [RAM]*

*SOC1 Clear Threshold* is used to set a ***StateOfCharge()*** percentage threshold used to indicate when ***StateOfCharge()*** rises above a defined ***StateOfCharge()***. When ***StateOfCharge()*** rises above the *SOC1 Clear Threshold*, the State of Charge Initial [SOC1] bit in the ***Flags()*** register is cleared.

**Normal Setting:** *SOC1 Clear Threshold* is normally set to 5% above the *SOC1 Set Threshold*. The default value is set to 15%.

*SOCF Set Threshold [RAM]*

The *SOCF Set Threshold* is the ***StateOfCharge()*** percentage threshold used to indicate when ***StateOfCharge()*** falls to or below a defined ***StateOfCharge()***. The *SOCF Set Threshold* is typically used as a final low ***StateOfCharge()*** warning. When ***StateOfCharge()*** falls below the *SOCF Set Threshold*, the State of Charge Final [SOCF] bit in the Flags() register is set. The State of Charge Final [SOCF] bit is cleared once ***StateOfCharge()*** rises above the *SOCF Clear Threshold*. If SOCF Set Threshold is set to (–)1, then the State of Charge Final [SOCF] bit becomes inoperative.

**Normal Setting:** The default value is set to 2%.

*SOCF Clear Threshold [RAM]*

The *SOCF Clear Threshold* is the ***StateOfCharge()*** percentage threshold used to indicate when ***StateOfCharge()*** rises above a defined ***StateOfCharge()***. When ***StateOfCharge()*** rises above the *SOCF Clear Threshold*, the State of Charge Final [SOCF] bit in the ***Flags()*** register is cleared.

**Normal Setting:** *SOCF Clear Threshold* is normally set to 3% above the *SOC1 Set Threshold*. The default value is set to 5%.

## 2.4 Power

*Hibernate I [RAM]*

*Hibernate*, is used to set the current threshold the bq27425-G1 uses as a possible condition to enter HIBERNATE mode. If the Hibernate [HIBERNATE] bit in the ***Control_Status()*** register is set, the gauge has taken a valid OCV measurement and ***AverageCurrent()*** is less than Hibernate I or ***Voltage()*** is less than *Hibernate V*, the gauge enters HIBERNATE mode.

**Normal Setting:** *Hibernate*, should be below any normal application currents. The default value is set to 3 mA. Refer to the bq27425-G1 datasheet for more details on HIBERNATE mode.

*Hibernate V [RAM]*

*Hibernate V* is used to set the voltage threshold the bq27425-G1 uses as a possible condition to enter HIBERNATE mode. If the Hibernate [HIBERNATE] bit in the***Control_Status()*** register is set, the gauge has taken a valid OCV measurement and ***Voltage()*** is less than *Hibernate V* or ***AverageCurrent()*** is less than *Hibernate I*, the gauge enters HIBERNATE mode.

**Normal Setting:** *Hibernate V* should be below any normal application voltages. The default value is set to 2550 mV. Refer to the bq27425-G1 datasheet for more details on HIBERNATE mode.

# 3 System Data

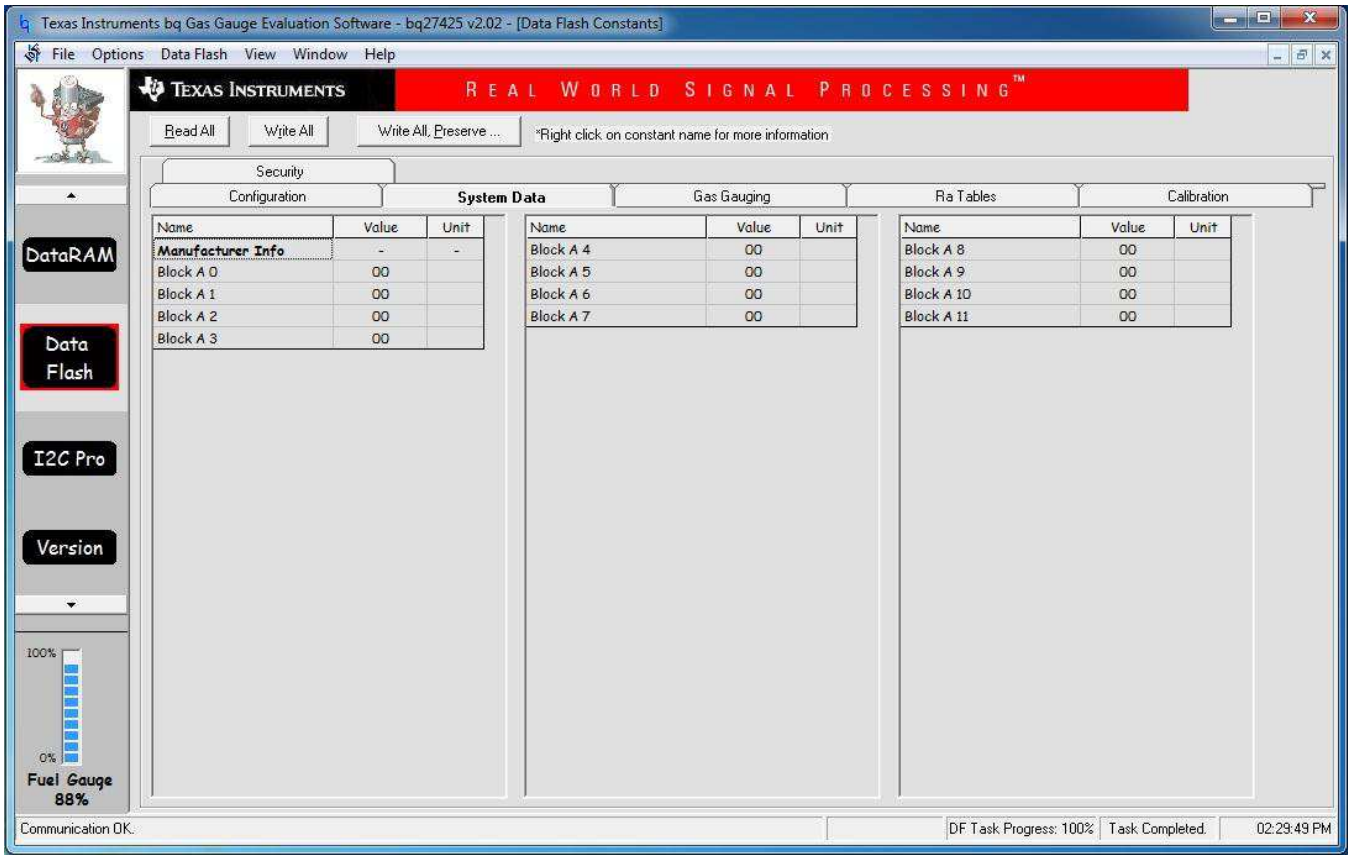


**Figure 2. System Data**

## 3.1 Manufacturer Info

*Block A [NVM]*

This is string data that can hold any user data. It can be a maximum of 24 bytes.

**Normal Setting:** Can be used for any user data. The default is all data set to 0.

# 4 Gas Gauging

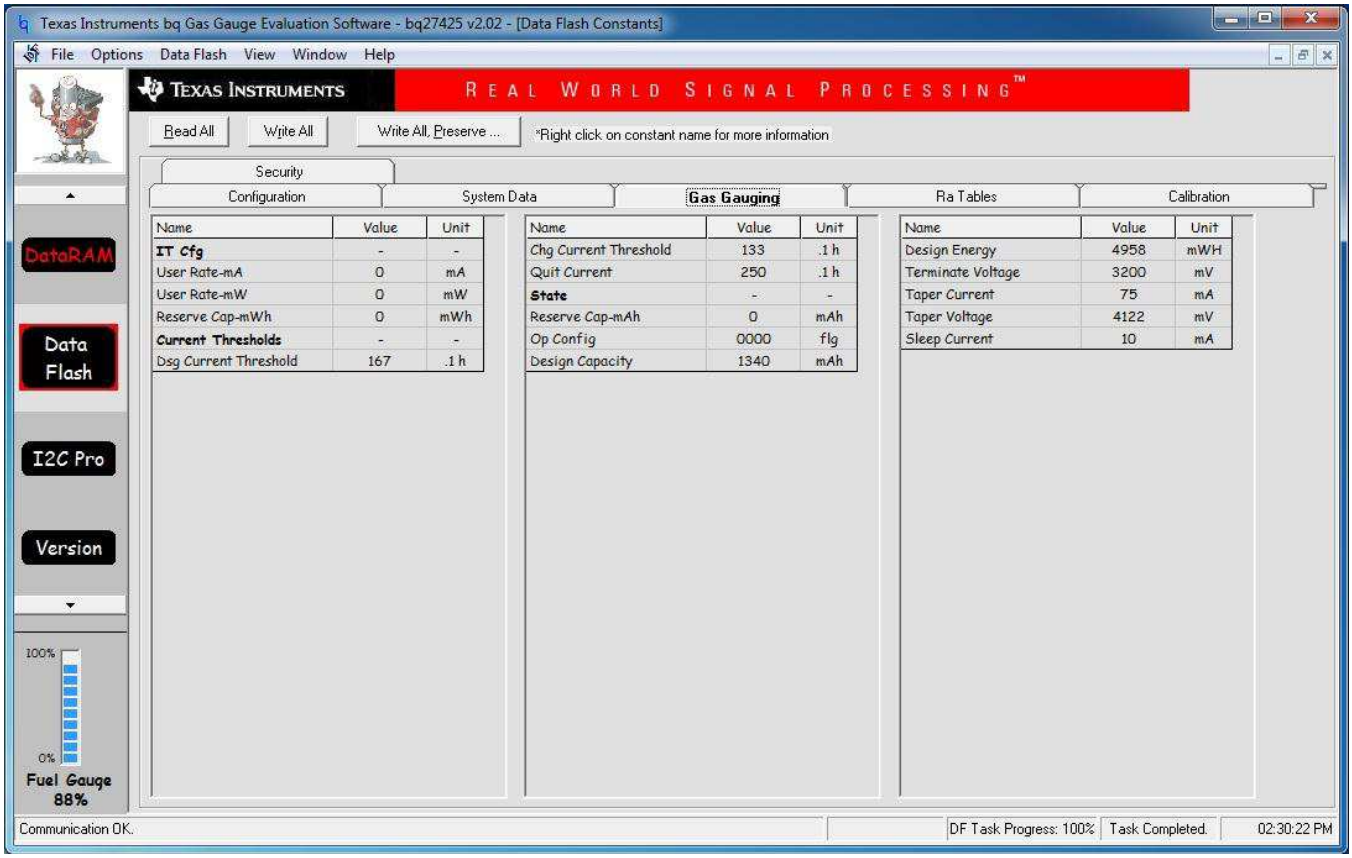


**Figure 3. Gas Gauging**

## *4.1 IT Cfg*

*User Rate-mA [RAM]*

**Normal Setting:** *User Rate-mA* is not utilized and does not affect gauging performance. The default value is set to 0 mA.

*User Rate-mW (User Rate-Pwr) [RAM]*

**Normal Setting:** *User Rate-mW* is not utilized and does not affect gauging performance. The default value is set to 0 mW.

*Reserve Cap-mWh (Reserve Energy) [RAM]*

*Reserve Cap-mWh* is used to store the amount of reserve capacity in mWh. *Reserve Cap-mWh* is based off of *Reserve Cap-mWh* and is calculated by multiplying *Reserve Cap-mAh* by 3.6 V.

**Normal Setting:** The default value is set to 0 mWh. Refer to *Reserve Cap-mAh* for more details.

## 4.2 Current Thresholds

*Dsg Current Threshold [RAM]*

*Dsg Current Threshold* is a scaling factor that is used set a current threshold in order to determine if actual discharge current is flowing out of the battery. The *Dsg Current Threshold* parameter is stored in as an absolute value and has units of 0.1 h. When ***AverageCurrent()*** is less than *Design Capacity/((–)Dsg Current Threshold* × 0.1) for 1 second, the bq27425-G1 enters discharge mode. The discharge current threshold value in mA can be determined by dividing *Design Capacity/((–)Dsg Current Threshold* × 0.1).

**Normal Setting:** The default value is set to 167. Therefore, the discharge current threshold in mA is set to *Design Capacity*/(–)16.7.

*Chg Current Threshold [RAM]*

*Chg Current Threshold* is a scaling factor that is used to set a current threshold in order to determine if actual charge current is flowing into the battery. The *Chg Current Threshold* parameter has units of 0.1 h. When ***AverageCurrent()*** is greater than *Design Capacity/(Chg Current Threshold* × 0.1) for 1 second, the bq27425-G1 enters charge mode. The *Chg Current Threshold* parameter is independent from the (Fast) Charge Allowed [CHG] bit in the ***Flags()*** register. The charge current threshold value in mA can be determined by dividing *Design Capacity by (Chg Current Threshold* × 0.1).

**Normal Setting:** The default value is set to 133. Therefore, the charge current threshold in mA is set to Design Capacity/13.3.

Quit Current [RAM]

Quit Current is a scaling factor that is used to set a current threshold in order to determine when the bq27425-G1 goes into relaxation mode from either charge or discharge mode. The Quit Current parameter has units of 0.1 h. Either of the following criteria must be met to enter relaxation mode:

1. ***AverageCurrent()*** is ***greater than*** *Design Capacity/((–)Quit Current* × 0.1) for 60 seconds. This is the condition to exit discharge mode and enter relaxation mode.
2. ***AverageCurrent()*** is ***less than*** *Design Capacity/(Quit Current* × 0.1) for 60 seconds. This is the condition to exit charge mode and enter relaxation mode

After 30 minutes in relaxation mode, the bq27425-G1 starts checking if the dV/dt < 1 µV/s requirement for OCV readings is satisfied. When the battery relaxes sufficiently to satisfy this criterion, the bq27425-G1 takes an OCV reading for updating $Q_{max}$. These updates are used by the Impedance Track™ algorithm. Refer to *Theory and Implementation of Impedance Track Battery Fuel-Gauging Algorithm in bq2750x Family* (SLUA450) for more details on the Impedance Track algorithm.

**Normal Setting:** It is critical that the battery voltage be relaxed during OCV readings to get the most accurate results. The quit current threshold must not be higher than *Design Capacity*/20 when attempting to go into relaxation mode; however, it should not be so low as to prevent going into relaxation mode due to noise. The current threshold that the *Quit Current* parameter sets should always be less than the magnitude of the current threshold the *Chg Current Threshold* sets and less than the magnitude of the current threshold the *Dsg Current Threshold* sets. The default value is set to 250. Therefore, the quit current threshold in mA is set to *Design Capacity*/25.0.

## 4.3 State

*Reserve Cap-mAh [NVM]*

*Reserve Cap-mAh* is used to store the amount of capacity, in mAh, that is left in the battery when the bq27425-G1 reports ***RemainingCapacity()*** = 0 mAh. The *Reserve Cap-mAh* parameters allows for a controlled shutdown after the gauge reports ***RemainingCapacity()*** = 0 mAh. *Reserve Cap-mWh* is calculated by multiplying *Reserve Cap-mAh* by 3.6 V.

**Normal Setting:** *Reserve Cap-mAh* should be carefully selected based upon the system requirements. The default value is set to 0 mAh.

*Op Config [NVM]*

*Op Config* is a register used to enable or disable various functions of the bq27425-G1.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| INTSNSEN | RSVD0 | BIE | BI_PU_EN | GNDSEL | RSVD0 | RSVD0 | RSVD1 |
| RSVD1 | RSVD1 | SLEEP | RMFCC | RSVD1 | BATLOWEN | GPIOPOL | WRTEMP |

- INTSNSEN [15]: Enables temperature compensation of the integrated sense resistor.
  **Normal Setting:** The default value is set to 0.
- BIE [13]: Battery Insertion Enable. If set, battery insertion is detected via the BIN pin input. If cleared, the detection relies on the host to issue the BAT_INSERT (0x000C) subcommand to indicate the battery presence in the system and the BAT_REMOVE (0x000D) subcommand to indicate the battery is not present in the system. Refer to the bq27425-G1 datasheet for more details on battery insertion/removal.
  **Normal Setting:** The default value is set to 0.
- BI_PU_EN [12]: Enables internal weak pull-up on the BIN pin.
  **Normal Setting:** The default value is set to 0. This means there is an assumed external pull-up resistor.
- GNDSEL [11]: The ADC ground select control. The Vss (Pin D1) is selected as ground reference when this bit is clear. Pin A1 is selected when the bit is set.
  **Normal Setting:** The default value is set to 0.
- SLEEP [5]: This bit indicates if the bq27425-G1 is allowed to enter SLEEP mode if operating conditions allow. SLEEP mode is allowed when set and disabled when cleared
  **Normal Setting:** The default value is set to 1. Refer to the bq27425-G1 datasheet for more information on SLEEP mode.
- RMFCC [4]: On a valid charge termination ***RemainingCapacity()*** is set equal to ***FullChargeCapacity()***. This functionality is true when set.
  **Normal Setting:** The default value is set to 1.
- BATLOWEN [2]: If set, the BAT_LOW function for the GPOUT pin is selected. If cleared, the SOC_INT function is selected for the GPOUT pin.
  **Normal Setting:** The default value is set to 0.
- GPIO_POL [1]: If set, the GPOUT pin is active-HIGH. If cleared, the GPOUT pin is active-LOW.
  **Normal Setting:** The default value is set to 0.
- WRTEMP [0]: If set, the host is allowed to write ***Temperature()*** to the gauge. If cleared, the internal temperature sensor is used for ***Temperature()***.
  **Normal Setting:** The default value is set to 0.
- RSVD0 [14, 10, 0]: These bits are reserved and set to 0 for proper operation.
- RSVD1 [8, 7, 6, 3]: These bits are reserved and set to 1 for proper operation.

*Design Capacity [NVM]*

*Design Capacity* is used to store the typical capacity, in mAh, of the cell being used in the system. *Design Capacity* is used to calculate the current thresholds in which the gauge enters charge mode, discharge mode and relaxation mode. *Design Capacity* is also used by the gauge in ***RemainingCapacity()***, ***FullChargeCapacity()*** and ***StateOfHealth()*** calculations.

**Normal Setting:** *Design Capacity* should be set based on the application battery specification. See the battery manufacturer's data sheet. The default value is set to 1340 mAh.

*Design Energy [NVM]*

*Design Energy* is used to store the value of *Design Capacity* multiplied by 3.7 V.

**Normal Setting:** *Design Energy* should be set based on the application battery specification. See the battery manufacturer's data sheet. The default value is set to 4958 mWh (*Design Capacity* × 3.7).

*Terminate Voltage [NVM]*

*Terminate Voltage* is used to store the voltage for the end of discharge where ***RemainingCapacity()*** is set to 0 mAh. Terminate Voltage is used in the Impedance Track algorithm to help compute ***RemainingCapacity()***.

**Normal Setting:** *Terminate Voltage* should be set based on battery cell specifications to prevent damage to the cell or set to the absolute minimum system voltage, taking into account impedance drop from the PCB traces, FETs, and wires. The default value is set to 3200 mV.

*Taper Current [NVM]*

Taper Current sets a current threshold that is used as one of the three requirements to detect charge termination. The current threshold requirement for charge termination detection is that the gauge must detect AverageCurrent() that is below the Taper Current threshold during two consecutive periods of the Current Taper Window threshold. In order for the bq27425-G1 to detect charge termination, during two consecutive periods of Current Taper Window, the following requirements must be satisfied:

1. ***AverageCurrent()*** < *Taper Current*.
2. Accumulated capacity is > *Min Taper Capacity*
3. ***Voltage()*** > *Taper Voltage*

**Normal Setting:** *Taper Current* should be set based on battery cell characteristics and charger specifications, but typical values are (*Design Capacity*/10) to (*Design Capacity*/20). The default value is set to 100 mA.

*Taper Voltage [NVM]*

*Taper Voltage* sets a voltage threshold that is used as one of the three requirements to detect charge termination. The voltage threshold requirement for charge termination detection is that the gauge must detect Voltage() that is above the *Taper Voltage* threshold during two consecutive periods of the *Current Taper Window* threshold. In order for the bq27425-G1 to detect charge termination, during two consecutive periods of *Current Taper Window*, the following requirements must be satisfied:

1. ***AverageCurrent()*** < *Taper Current*.
2. Accumulated capacity is > *Min Taper Capacity*
3. ***Voltage()*** > *Taper Voltage*

**Normal Setting:** Taper *Taper Voltage* should be set based on battery cell characteristics and charger specifications, but typical values are set 100 mV below the maximum battery cell charging voltage. The default value is set to 4100 mV.

*Sleep Current [NVM]*

*Sleep Current* sets a current threshold that is used to determine if the bq27425-G1 can enter SLEEP mode. When ***AverageCurrent()*** is less than *Sleep Current* or greater than (–)*Sleep Current* the bq27425-G1 enters SLEEP mode if the feature is enabled (*Op Config* [SLEEP] = 1).

**Normal Setting:** *Sleep Current* should be below any normal application currents. The default value is set to 10 mA.

# 5 Ra Tables

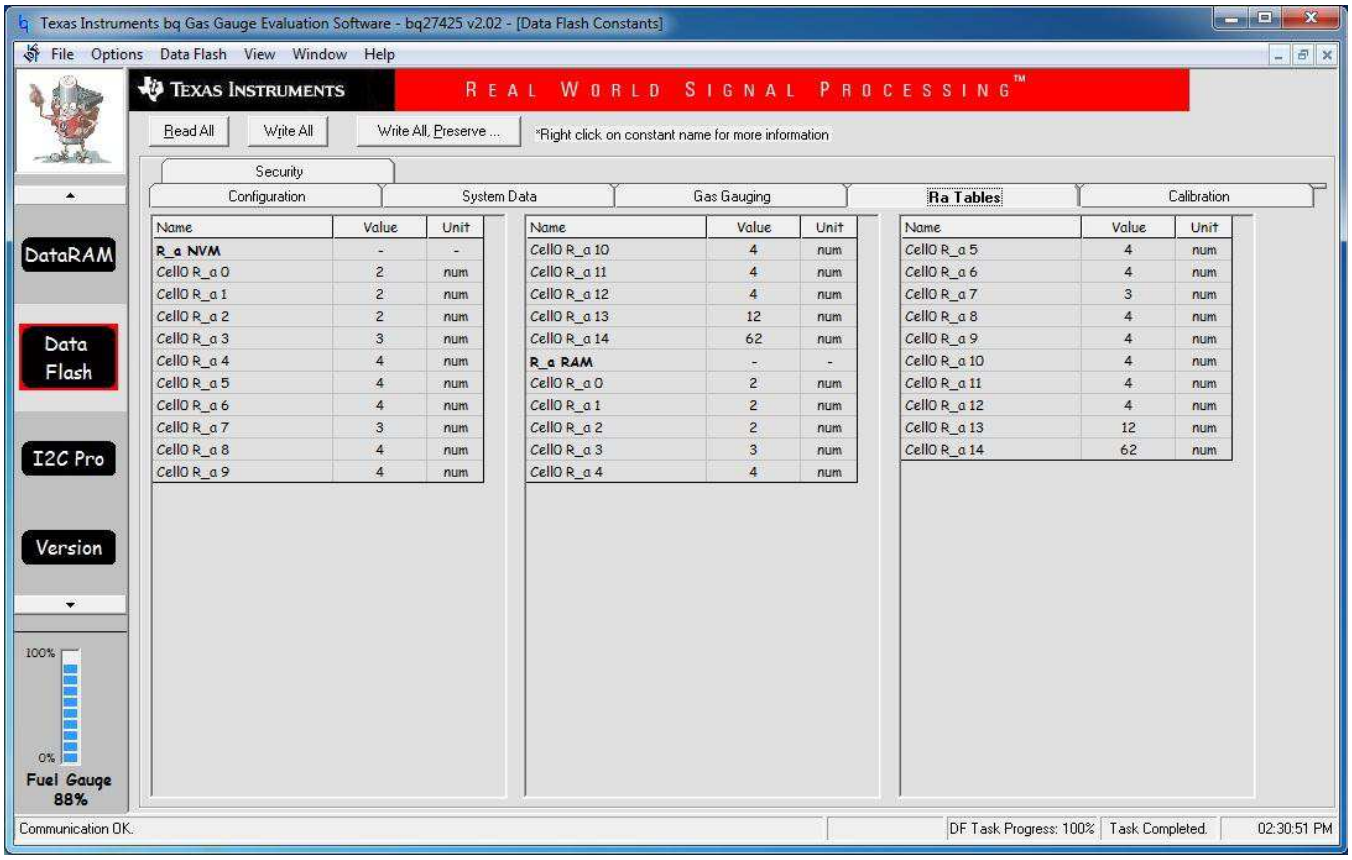


**Figure 4. Ra Tables**

*R_a NVM [NVM]*

*R_a NVM* stores the battery cell resistance tables. The values in this table are updated automatically from the R_a RAM table values during device operation and should not be altered. The values in the *R_a RAM* table start out as a copy of the values in the *R_a NVM* table. Each resistance value in the Ra Table has a format of *Cell0 R_a* M where M corresponds to a resistance value at a certain ***StateOfCharge()***.

*Cell0 R_a0 – Cell0 R_a14,*

The Ra table contains 15 values. Each value in the Ra table represents a resistance value normalized at 25°C for the associated Qmax-based ***StateOfCharge()*** grid point as found by the following rules for Cell0 R_aM:

1. If 0 ≤ M ≤ 7: The value is the resistance normalized at 25°C for ***StateOfCharge()*** = 100% – (M × 11.1%)
2. If 8 ≤ M ≤ 14: The value is the resistance normalized at 25°C for ***StateOfCharge()*** = 100% – [77.7% + (M – 7) × 3.3%]

This gives a profile of resistance throughout the entire ***StateOfCharge()*** profile of the battery cells concentrating more on the values closer to ***StateOfCharge()*** = 0%.

**Normal Setting:** *R_a NVM* is for information purposes only. The *R_a NVM* table should never need to be modified.

*R_a RAM [RAM]*

Refer to *R_a NVM*. The values in the *R_a RAM* table start out as a copy of the values in the *R_a NVM* table. The R_a RAM table is automatically updated during device operation and should not be altered. The values in the R_a RAM table are copied over to the R_a NVM table at the end of discharge.

**Normal Setting:** *R_a RAM* is for information purposes only. The *R_a RAM* table should never need to be modified.

# 6 Calibration

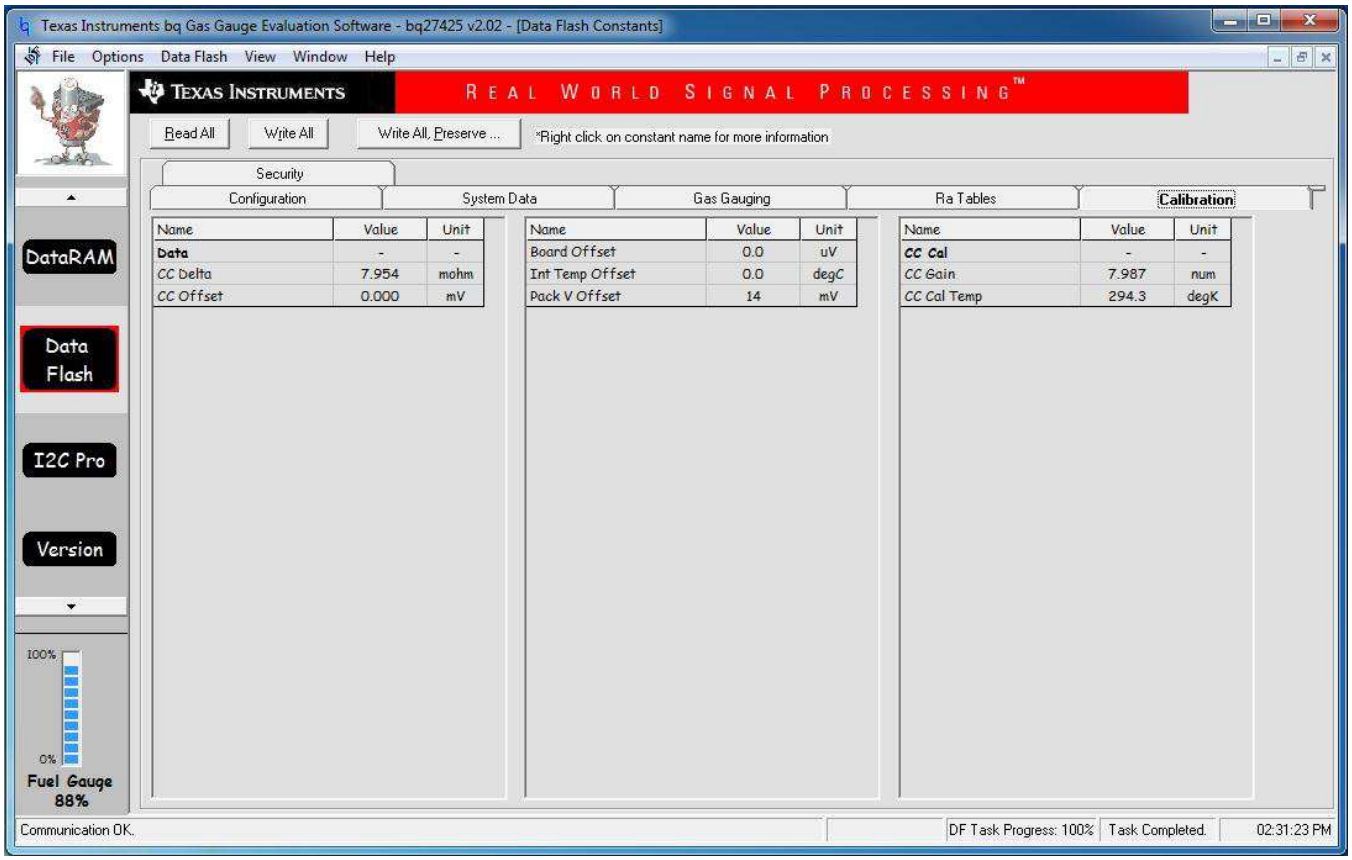


**Figure 5. Calibration**

## 6.1 Data

*CC Delta [NVM]*

**Normal Setting:** *CC Delta* should never need to be modified. Current measurements do not require calibration and reported current by the bq27425-G1 is accurate enough to result in accurate gauging.

*CC Offset [NVM]*

*CC Offset* is a calibration value that corrects for small noise/error in the bq27425-G2 coulomb counter circuitry. The *Board Offset* calibration includes a *CC Offset* calibration; therefore, only the *Board Offset* calibration procedure needs to be completed. Refer to *Board Offset* .

**Normal Setting:** *CC Offset* should never be modified. *CC Offset* is modified by the *Board Offset* calibration procedure and when the gauge performs automatic calibration before entering SLEEP mode.

*Board Offset [NVM]*

*Board Offset* is a calibration value that is used to correct for noise/error that the *CC Offset* does not calibrate out. *Board Offset* corrects errors that can come from board layout, copper traces, and other offsets that are external to the bq27425-G1 integrated circuit (IC).

**Normal Setting:** *Board Offset* should never be modified. The *Board Offset* calibration procedure also modifies *CC Offset*. Refer to *Going to Production with the bq27425* (SLUA642) for more information about the calibration procedure for the bq27425-G1.

*Int Temp Offset [NVM]*

**Normal Setting:** *Int Temp Offset* should never be modified. Temperature measurements do not require calibration and reported temperature by the bq27425-G1 is accurate enough to result in accurate gauging.

*Pack V Offset [NVM]*

*Pack V Offset* is a calibration value that is used to correct for any offset relating to the bq27425-G1 analog-to-digital converter's (ADC) cell voltage measurement.

**Normal Setting:** *Pack V Offset* should never be modified. *Pack V Offset* is modified by the voltage calibration process. Refer to *Going to Production with the bq27425* (SLUA642) for more information about the calibration procedure for the bq27425-G1.

## 6.2 CC Cal

*CC Gain [NVM]*

**Normal Setting:** *CC Gain* should never need to be modified. Current measurements do not require calibration and reported current by the bq27425-G1 is accurate enough to result in accurate gauging.

*CC Cal Temp*

**Normal Setting:** *CC Cal Temp* should never be modified. Temperature measurements do not require calibration and reported temperature by the bq27425-G1 is accurate enough to result in accurate gauging.

# 7 Security

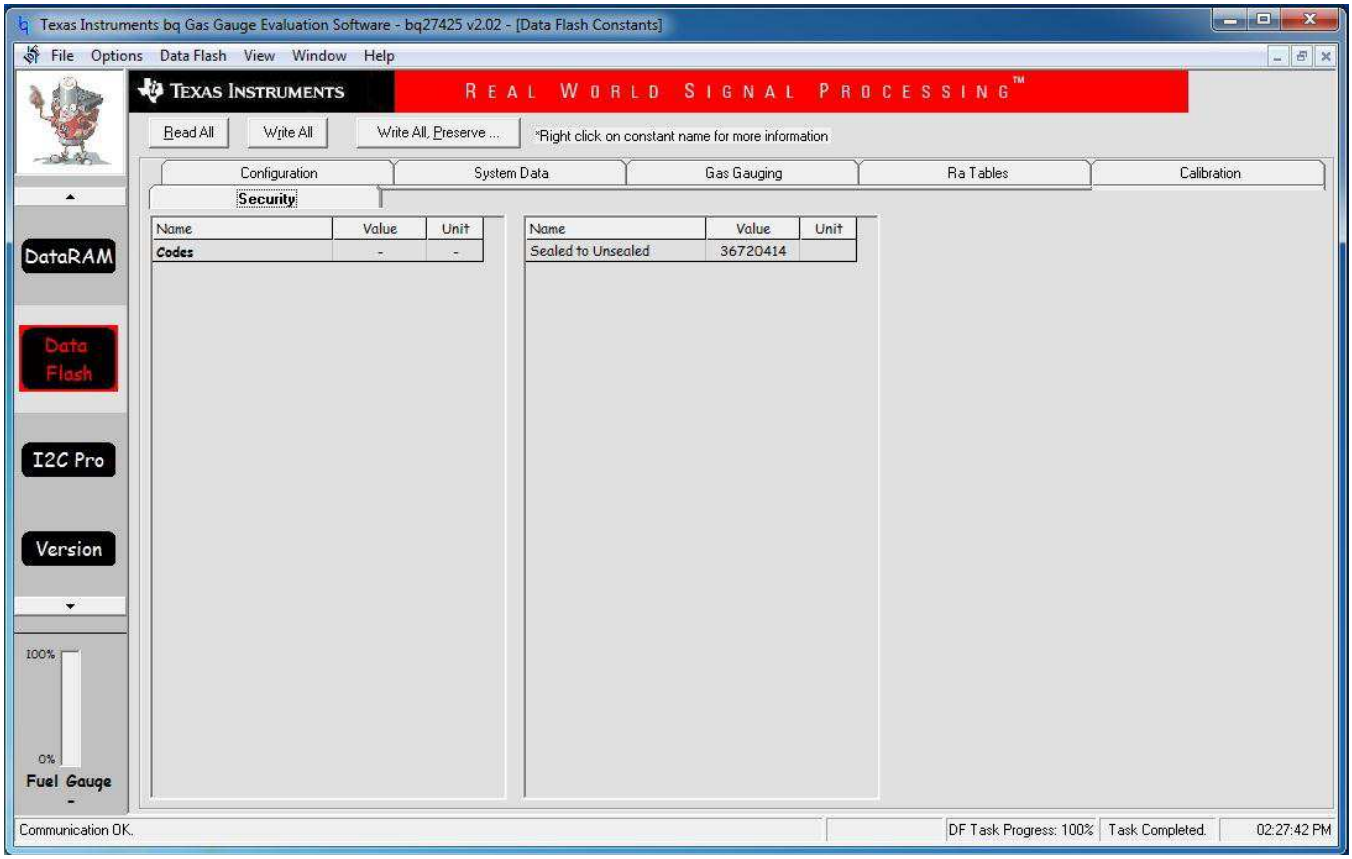


**Figure 6. Security**

## 7.1 Codes

*Sealed to Unsealed [RAM]*

This is the register to store the security code to set the device from sealed mode to unsealed mode.

**Normal Setting:** The default code is set to 0x36720414.

# 8 Glossary

FCC: Full Charge Capacity, typically referred to in context with the bq27425-G1's Standard Command ***FullChargeCapacity()***

Flag: This word usually represents a read-only status bit that indicates some action has occurred or is occurring. This bit typically cannot be modified.

RM: Remaining Capacity, typically referred to in context with the bq27425-G1's Standard Command ***RemainingCapacity()***

SOC: State of Charge, typically referred to in context with the bq27425-G1's Standard Command ***StateOfCharge()***

Relaxation Mode: Refers to a mode to where the gauge has read ***AverageCurrent()*** < (*Design Capacity/Quit Current* × 0.1) for at least 60 seconds.

Discharge Mode: Refers to a mode to where the gauge read ***AverageCurrent()*** < (*Design Capacity/(–)Dsg Current Threshold* × 0.1) for at least 1 second.

Charge Mode: Refers to a mode to where the gauge read AverageCurrent() > (*Design Capacity/Chg Current Threshold* × 0.1) for at least 1 second.

Set: Refers to a bit in a register becoming a logic HIGH or 1. The bqEvaluation Software (EVSW) represents a set bit with the color red.

Clear: Refers to a bit in a register becoming a logic LOW or 0. The bq Evaluation Software (EVSW) represents a clear bit with the color green.

System: The word system is sometimes used in this document. When used, it always means a host system that is consuming current from the battery pack.

*Italics:* All words in this document that are in italics represent names of EEPROM or RAM parameters. Refer to the bq27425-G1 datasheet for more details concerning the EEPROM or RAM parameters.

***Bold Italics:*** All words that are bold italic represent Standard Data Commands. Refer to the bq27425-G1 datasheet for more details concerning Standard Data Commands.

[brackets]: All words or letters in brackets represent bit/flag names found in defined registers. Refer to the bq27425-G1 datasheet for more details concerning the registers used.

(–): This is commonly used in this document to represent a minus sign. It is written this way to ensure that the sign is not lost in the translation of formulas in the text of this document.

## IMPORTANT NOTICE

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