

BQ75614-Q1 14S or 16S Standalone Precision Automotive Battery Monitor, Balancer and Integrated Current Sense with up to SafeTI™-26262 ASIL-D ASIL-D Compliance

1 Features

- Qualified for automotive applications
- AEC-Q100 Qualified with the following results:
 - Device temperature grade 1: -40°C to $+125^{\circ}\text{C}$ ambient operating temperature range
 - Device HBM ESD classification level 2
 - Device CDM ESD classification level C4B
- SafeTI™-26262 ASIL-D compliance
 - Cell voltage measurements
 - Current measurement
 - Temperature measurements
 - Communication
- SafeTI™-26262 ASIL-B compliant
 - OV, UV Protector (hardware comparators)
 - OT, UT Protector (hardware comparators)
- Pin-package and software compatible device family:
 - Stackable monitor 16S (BQ79616), 14S (BQ79614), and 12S (BQ79612)
 - Standalone monitor 48 V system (BQ75614)
- Direct support on fuse and relay open and close diagnostics
- Built-in redundancy path for voltage and temperature and current diagnostics
- Highly accurate cell voltage measurements within $128\ \mu\text{s}$ for all cell channels
- Integrated post-ADC configurable digital low-pass filters
- Supports bus bar connection and measurement
- Built-in host-controlled hardware reset to emulate POR-like device reset
- Supports internal cell balancing
 - Balancing current at 240 mA
 - Built-in balancing thermal management with automatic pause and resume control
- 5 V LDO output to power external digital isolator
- UART Host interface
- Built-in SPI master

2 Applications

- Automotive 48 V Li-Ion battery systems
- E-bikes, E-Scooters

3 Description

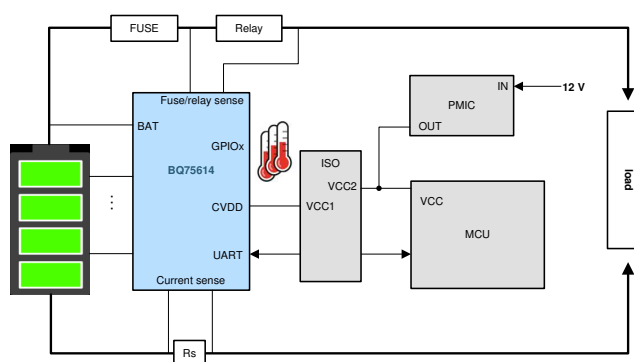
The BQ75614-Q1 device provides high-accuracy cell voltage measurements up to 16S battery modules in less than $200\ \mu\text{s}$. The integrated front-end filters enable the system to implement with simple, low voltage raring, differential RC filters on the cell input channels. The integrated, post-ADC, low-pass filters enable filtered, DC-like, voltage measurements. Integrated current measurement with option to synchronize with cell voltage measurements for better state of charge (SOC) calculation. The device supports autonomous internal cell balancing with temperature monitoring to auto-pause and resume balancing to avoid an overtemperature condition. The device includes option to support fuse and relay open/close diagnostics. The device also includes eight GPIOs/auxiliary inputs that can be used for external thermistor measurements.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
BQ75614-Q1	HTQFP (64-pin)	10.00 mm x 10.00 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Simplified System Diagram



4 Device and Documentation Support

4.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

4.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

4.3 Trademarks

SafeTI, E2E are trademarks of Texas Instruments.

4.4 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

4.5 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

5 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PBQ75614PAPQ1	ACTIVE	HTQFP	PAP	64	160	TBD	Call TI	Call TI	-40 to 125		Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

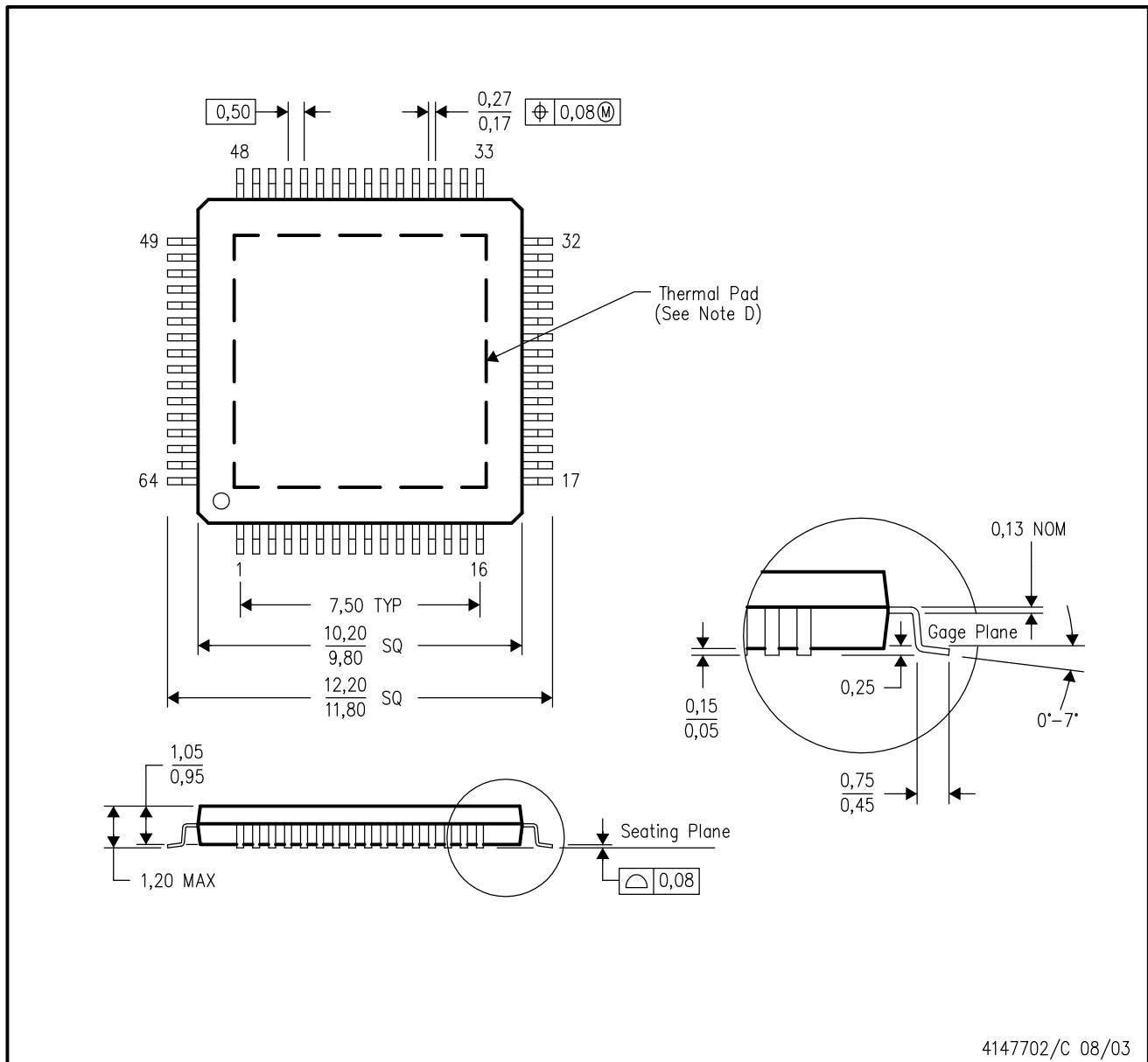
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

PAP (S-PQFP-G64)

PowerPAD™ PLASTIC QUAD FLATPACK



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion
 - D. This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at www.ti.com <<http://www.ti.com>>.
 - E. Falls within JEDEC MS-026

PowerPAD is a trademark of Texas Instruments.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2019, Texas Instruments Incorporated