BQ62809 Multichannel Active Cell Balancing Converter

1 Features

- Architecture for bidirectional charge distribution in an active cell balancing application
  - Up to 9 cells in series per device
  - Programmable balancing current up to 2.5A
  - Wide Input Voltage range of 2-4.5V/cell
  - Support for flexible balancing schemes to enable charge distribution for cell-to-cell, cell-to-pack, and pack-to-cell schemes
  - Integrated current sharing controller
  - Typical charge efficiency of 85% for adjacent cell transfer
- Integrated accurate current monitor per device and channel
- Integrated thermal regulation and shutdown mode
- Stackable Architecture to support up to 4 devices in series or up to 36 cells in series
- 1MHz daisy-chainable SPI with internal level shifting capabilities for flexible system configuration
- Integrated 3-level protection features for cell, device, and communication fault detection
  - Overvoltage
  - Undervoltage
  - Open-Wire
  - Short Circuit
  - Overcurrent
  - Thermal Regulation
  - Watchdog Support
  - Dedicated FAULT pin for reporting across connected devices

2 Applications

- Grid Energy Storage Systems
- Residential Energy Storage Systems
- Industrial Battery Packs
- High Power UPS

3 Description

The BQ62809 is a 9-channel current converter that enables charge redistribution for Active Cell Balancing (ACB) within a battery pack/module. The balancing current and cell input range support a wide array of battery chemistries and the control topology supports flexible configuration of charge redistribution over an industry standard stackable communication bus. Integrated protection features support fault detection at multiple levels to protect the battery cell, device channel, and digital communication bus.

Each BQ62809 can support up to 9 series battery cells and can connect in series to support configurations up to 36 series cells. The architecture supports multiple charge re-distribution schemes that allows energy to transfer between multiple cells simultaneously. Charge can be transferred between stacked BQ62809 devices and support for concurrent, independent, and simultaneous charge transfer between multiple groups of cells. Independent device and channel reporting allow for reporting of integrated current monitors as well as device status bits.

The device offers a low component count requiring one inductor and two bulk capacitors per channel. The topology allows for standard off-the-shelf components allowing for a dense layout.

Integrated fault protection features include overvoltage, undervoltage, openwire, shortcircuit, overcurrent, thermal regulation and thermal protection of both the battery cells and device channels. When a fault condition is reported, the device has a dedicated pin for FAULT reporting between stacked devices to enable a prompt shutdown of any active balancing conditions.

The BQ62809VDXR is available in a 36-pin 4.50mm × 6.00mm WQFN package

Package Information

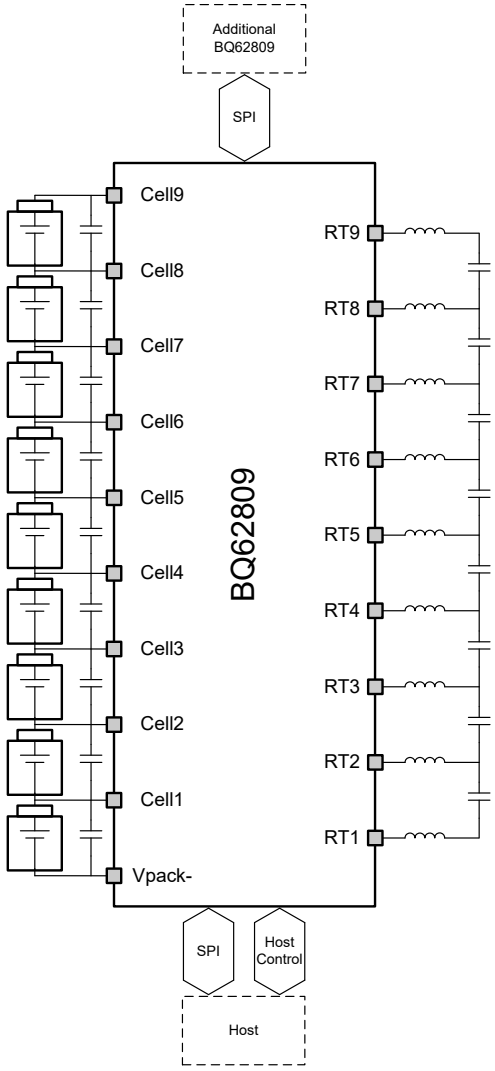
PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)
BQ62809VDXR	WQFN	4.50mm × 6.00mm

(1) For all available packages, see Section 6.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.

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BQ62809 Simplified Application Diagram

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4 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

4.1 Typical Application

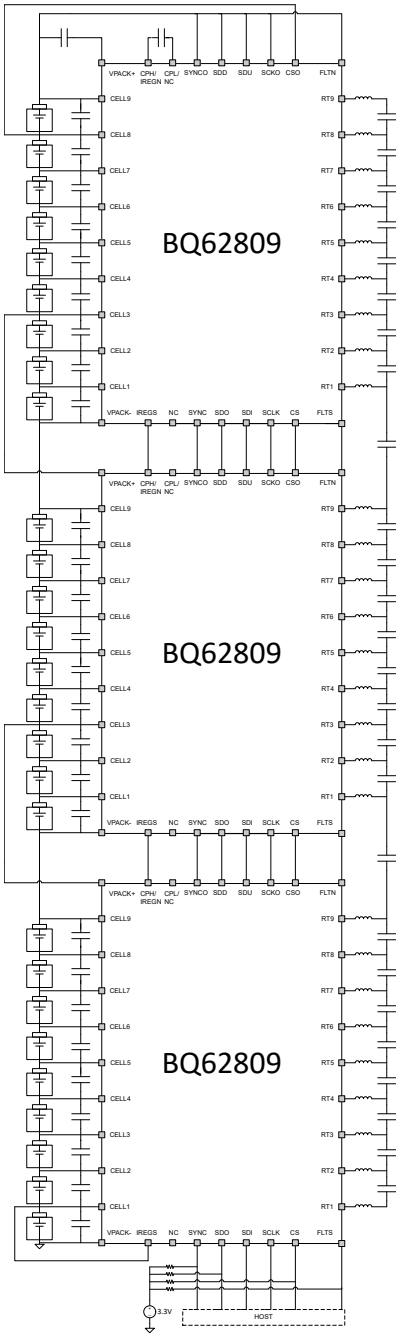


Figure 4-1. BQ62809 Application Diagram

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5 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

5.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* 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.

5.2 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.

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5.3 Trademarks

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5.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

5.5 Glossary

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

6 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.

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PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
PQ62807VDXR	Preview	Preproduction	WQFN-FCRLF (VDX) | 36	3000 | LARGE T&R	-	Call TI	Call TI	-40 to 125	
PQ62809VDXR	Active	Preproduction	WQFN-FCRLF (VDX) | 36	3000 | LARGE T&R	-	Call TI	Call TI	-40 to 125	

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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