

BQ25713 I²C Narrow VDC Buck-Boost Battery Charge Controller With System Power Monitor and Processor Hot Monitor

1 Features

- Pin-to-Pin And Software Compatible with BQ25703A
- Charge 1- to 4-Cell Battery From Wide Range of Input Sources
 - 3.5-V to 24-V Input Operating Voltage
 - Supports USB2.0, USB 3.0, USB 3.1 (Type C), and USB Power Delivery (USB-PD) Input Current Settings
 - Seamless Transition Among Buck, Buck-Boost and Boost Operations
 - Input Current and Voltage Regulation (IDPM and VDPM) Against Source Overload
- Power/Current Monitor for CPU Throttling
 - Comprehensive **PROCHOT** Profile, IMVP8/IMVP9 Compliant
 - Input and Battery Current Monitor
 - System Power Monitor, IMVP8/IMVP9 Compliant
- Narrow-VDC (NVDC) Power Path Management
 - Instant-On With No Battery or Deeply Discharged Battery
 - Battery Supplements System When Adapter is Fully-Loaded
 - Battery MOSFET Ideal Diode Operation in Supplement Mode
- Power Up USB Port From Battery (USB OTG)
 - 3-V to 20.8-V OTG Output Voltage With 8 mV Resolution
 - Output Current Limit up to 6.4 A with 50 mA Resolution
- Input Current Optimizer (ICO) to Extract Max Input Power
- 800-kHz or 1.2-MHz Programmable Switching Frequency for 2.2- μ H or 1.0- μ H Inductor
- Host Control Interface for Flexible System Configuration
 - I²C (BQ25713) Port for Optimal System Performance and Status Reporting
 - Hardware Pin to Set Input Current Limit Without EC Control

- Integrated ADC to Monitor Voltage, Current and Power
- High Accuracy for the Regulation and Monitor
 - $\pm 0.5\%$ Charge Voltage Regulation
 - $\pm 2\%$ Input/Charge Current Regulation
 - $\pm 2\%$ Input/Charge Current Monitor
 - $\pm 3\%$ Power Monitor
- Safety
 - Thermal Shutdown
 - Input, System, Battery Overvoltage Protection
 - Input, MOSFET, Inductor Overcurrent Protection
- Low Battery Quiescent Current
- Package: 32-Pin 4 x 4 WQFN

2 Applications

- Drones, Bluetooth Speakers, IP Cameras, Detachable, Tablet PCs and Power Bank
- Industrial and Medical Equipment
- Portable Equipment With Rechargeable Batteries

3 Description

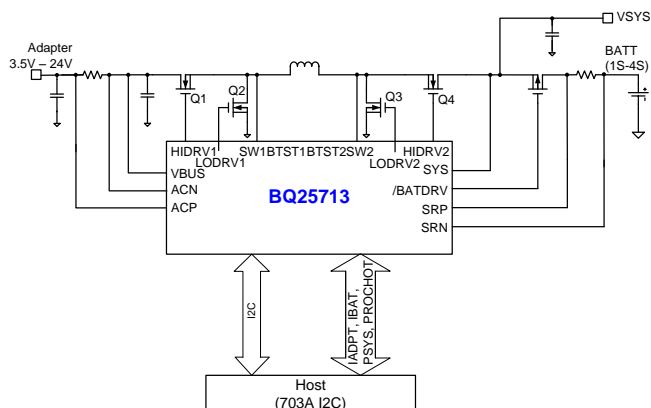
The BQ25713 is a synchronous NVDC buck-boost battery charge controller, offering a low component count, high efficiency solution for space-constrained, 1-cell to 4-cell battery charging applications.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
BQ25713	WQFN (32)	4.00 mm x 4.00 mm

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

Application Diagram



4 Description (continued)

The NVDC configuration allows the system to be regulated at battery voltage, but not drop below system minimum voltage. The system keeps operating even when the battery is completely discharged or removed. When load power exceeds input source rating, the battery goes into supplement mode and prevents the system from crashing.

BQ25713 charges battery from a wide range of input sources including USB adapter, high voltage USB PD sources and traditional adapters.

During power up, the charger sets converter to buck, boost or buck-boost configuration based on input source and battery conditions. The charger automatically transits among buck, boost and buck-boost configuration without host control.

In the absence of an input source, BQ25713 supports USB On-the-Go (OTG) function from 1- to 4-cell battery to generate adjustable 3 V to 20.8 V on VBUS with 8 mV resolution. The OTG output voltage transition slew rate can be configurable, which is complied with the USB PD 3.0 PPS specifications.

BQ25713 monitors adapter current, battery current and system power. The flexibly programmed $\overline{\text{PROCHOT}}$ output goes directly to CPU for throttle back when needed.

5 Device and Documentation Support

5.1 Device Support

5.1.1 Third-Party Products Disclaimer

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5.2 Documentation Support

5.2.1 Related Documentation

For related documentation see the following:

- *Semiconductor and IC Package Thermal Metrics* Application Report [SPRA953](#)
- *BQ2571x Evaluation Module* User's Guide [SLUUBT8](#)
- *QFN/SOIC PCB Attachment* Application Report [SLUA271](#)

5.3 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.

5.4 Community Resources

The following links connect to TI community resources. Linked contents are 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](#).

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5.5 Trademarks

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5.6 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.

5.7 Glossary

[SLYZ022](#) — *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.

ADVANCE INFORMATION

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
BQ25713RSNR	PREVIEW	QFN	RSN	32	3000	TBD	Call TI	Call TI	-40 to 85	BQ25713	
BQ25713RSNT	PREVIEW	QFN	RSN	32	250	TBD	Call TI	Call TI	-40 to 85	BQ25713	
PQ25713RSNT	ACTIVE	QFN	RSN	32	250	TBD	Call TI	Call TI	-40 to 85		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.

OBSELETE: 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.

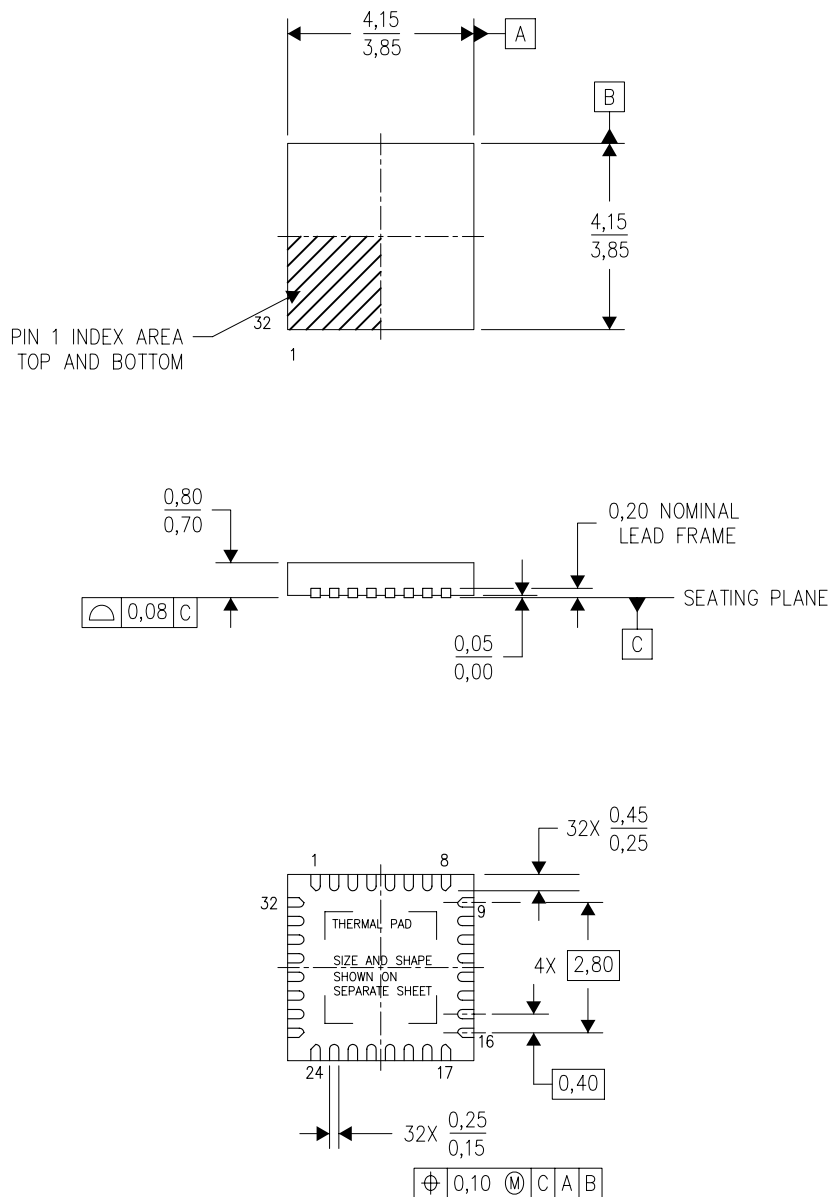
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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RSN (S-PWQFN-N32)

PLASTIC QUAD FLATPACK NO-LEAD



4207561/C 08/11

- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - QFN (Quad Flatpack No-Lead) Package configuration.
 - The package thermal pad must be soldered to the board for thermal and mechanical performance.
 - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.

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