Application Report
SLUA659–November 2012

# Selecting the Best bq2407x, bq2423x Single Cell Battery Charger for your Application

*Tahar Allag* *BMS / Wireless Power*

**ABSTRACT**

The bq2407x, bq2407xT, bq2423x series of devices are integrated Li-ion linear chargers and system power path management devices targeted at space-limited portable applications. The devices operate from either a USB port or AC adapter. This application note provides a selection table that highlights different specification and feature of these linear chargers. If dual input is needed, the bq2403x could be a good option. If a switch mode charger is needed, consider using bq2416x for dual input applications or bq2427x for single.

## Table 1. Selection Table

| Specification or Feature | bq24230 | bq24232 | bq24072 | bq24073 | bq24074 | bq24075 | bq24079 | bq24072T | bq24075T | bq24079T |
|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Vin (V) | 4.35 | 4.35 | 4.35 | 4.35 | 4.35 | 4.35 | 4.35 | 4.35 | 4.35 | 4.35 |
| Maximum Vin (V) | 6.4 | 10.2 | 6.4 | 6.4 | 10.2 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| VOUT(REG)(V) | 4.4 | 4.4 | $V_{BAT}$+225mV | 4.4 | 4.4 | 5.5 | 5.5 | $V_{BAT}$+225mV | 5.5 | 5.5 |
| VOVP(V) (1) | 6.6 | 10.5 | 6.6 | 6.6 | 10.5 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 |
| Battery Charge Voltage (V) | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.1 | 4.2 | 4.2 | 4.1 |
| VDPPM (V) (2) | VO(REG) – 100 mV | VO(REG) – 100 mV | VO(REG) – 100 mV | VO(REG) – 100 mV | VO(REG) – 100 mV | 4.3V | 4.3V | VO(REG) – 100 mV | 4.3V | 4.3V |
| Functions | TD (3) | ITERM (4) | TD (3) | TD (3) | ITERM (4) | SYSOFF (5) | SYSOFF (5) | TD (3) | SYSOFF (5) | SYSOFF (5) |
| Status Indication | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) | CHG, PG (6) |
| Adapter Current Limiting | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Max Input Current (A) | 0.5 | 0.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Max Charge Current | 0.5 | 0.5 | 1.500 (7) | 1.500 (7) | 1500 (7) | 1500 (7) | 1500 (7) | 1500 (7) | 1500 (7) | 1500 (7) |
| Package | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 | 3x3 QFN-16 |
| Temp Sensing Mode (TS) (8) | Current Mode | Current Mode | Current Mode | Current Mode | Current Mode | Current Mode | Current Mode | Voltage Mode | Voltage Mode | Voltage Mode |
| USB (9) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Termination Current | Internally Set | Programmable | Internally Set | Internally Set | Programmable | Internally Set | Internally Set | Internally Set | Internally Set | Internally Set |

(1) Overvoltage protection (OVP) circuit is implemented that shuts off the internal LDO and discontinues charging when $V_{IN} > V_{OVP}$ for a period long than $t_{DGL(OVP)}$.
(2) Dynamic Power-Path Managemen
(3) Termination Disable Input. Connect TD high to disable charger termination. Connect TD to VSS to enable charger termination.
(4) Termination Current Programming Input
(5) System Enable Input
(6) PG: Power Good for AC Adapter and USB Port Present Status Outputs. CHG: Charge Status Indicator Output.
(7) The IC operational charging life is reduced to 20,000 hours, when charging at 1.5A and 125°C. The thermal regulation feature reduces charge current if the IC's junction temperature reaches 125°C; thus without a good thermal design the maximum programmed charge current may not be reached.
(8) Device features an external battery pack temperature monitoring input. The TS input connects to the NTC thermistor in the battery pack to monitor battery temperature and prevent dangerous over-temperature conditions.
(9) Integrated USB Charge Control

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

| **Products** | | **Applications** | |
|---|---|---|---|
| Audio | www.ti.com/audio | Automotive and Transportation | www.ti.com/automotive |
| Amplifiers | amplifier.ti.com | Communications and Telecom | www.ti.com/communications |
| Data Converters | dataconverter.ti.com | Computers and Peripherals | www.ti.com/computers |
| DLP® Products | www.dlp.com | Consumer Electronics | www.ti.com/consumer-apps |
| DSP | dsp.ti.com | Energy and Lighting | www.ti.com/energy |
| Clocks and Timers | www.ti.com/clocks | Industrial | www.ti.com/industrial |
| Interface | interface.ti.com | Medical | www.ti.com/medical |
| Logic | logic.ti.com | Security | www.ti.com/security |
| Power Mgmt | power.ti.com | Space, Avionics and Defense | www.ti.com/space-avionics-defense |
| Microcontrollers | microcontroller.ti.com | Video and Imaging | www.ti.com/video |
| RFID | www.ti-rfid.com | | |
| OMAP Applications Processors | www.ti.com/omap | **TI E2E Community** | e2e.ti.com |
| Wireless Connectivity | www.ti.com/wirelessconnectivity | | |

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265