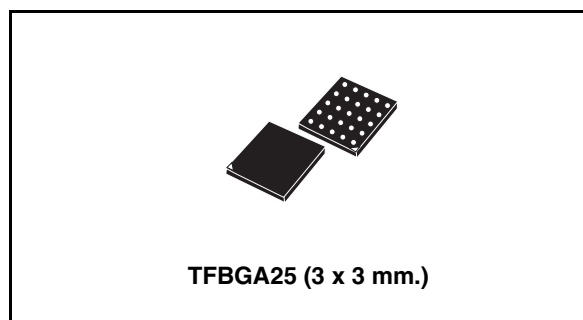


## High power white LED SuperCap driver with I<sup>2</sup>C interface

Data brief

### Features

- 1.8 MHz buck-boost converter with 1.2 A peak current limiting and synchronous rectification
- Programmable current limit
- Burst mode operation when output is charged
- Selectable 200 mA / 400 mA SuperCap charging current
- Input voltage range 2.7 V to 5.5 V
- Programmable output charging voltage up to 5.5 V
- Full I<sup>2</sup>C control
- Operation modes:
  - Shutdown mode
  - Monitoring mode with NTC and SuperCap monitoring
  - Idle mode
  - Flash mode
  - Torch mode: up to 300 mA
- Controlled LED current in all modes
- Soft and hard triggering of flash, torch and picture light modes
- Torch dimming in 12 exponential steps
- Flash dimming in 8 steps
- Torch mode safety time-out
- Active balancing of SuperCap voltage
- SuperCap status flag
- Internally or externally timed flash operation
- Digitally programmable safety time-out in flash mode
- LED overtemperature detection and protection with external NTC resistor
- Shorted LED failure detection and protection
- Chip overtemperature detection and protection



### Applications

- Cell phones and smartphones
- Camera flash/strobe
- PDAs and digital still cameras

### Description

The STCF04 is a dedicated and space optimized high efficiency solution for driving a flash LED module in camera phones, PDAs and other hand-held devices using the SuperCap technology. It is based on a DC-DC buck-boost converter, which ensures proper and efficient charging control and monitoring of the SuperCap within the entire battery voltage range. The output current control ensures good current regulation over the forward voltage spread characteristics of the flash LEDs in torch and flash mode operation. The SuperCap charging current is programmed to a defined value which avoids overload of the battery. The SuperCap discharge current flows through the LEDs and the external MOSFET which must be chosen according to the desired flash current. See [Description \(continued\)](#).

**Table 1. Device summary**

| Order code | Package             | Packaging           |
|------------|---------------------|---------------------|
| STCF04TBR  | TFBGA25 (3 x 3 mm.) | 3000 parts per reel |

# 1 Description (continued)

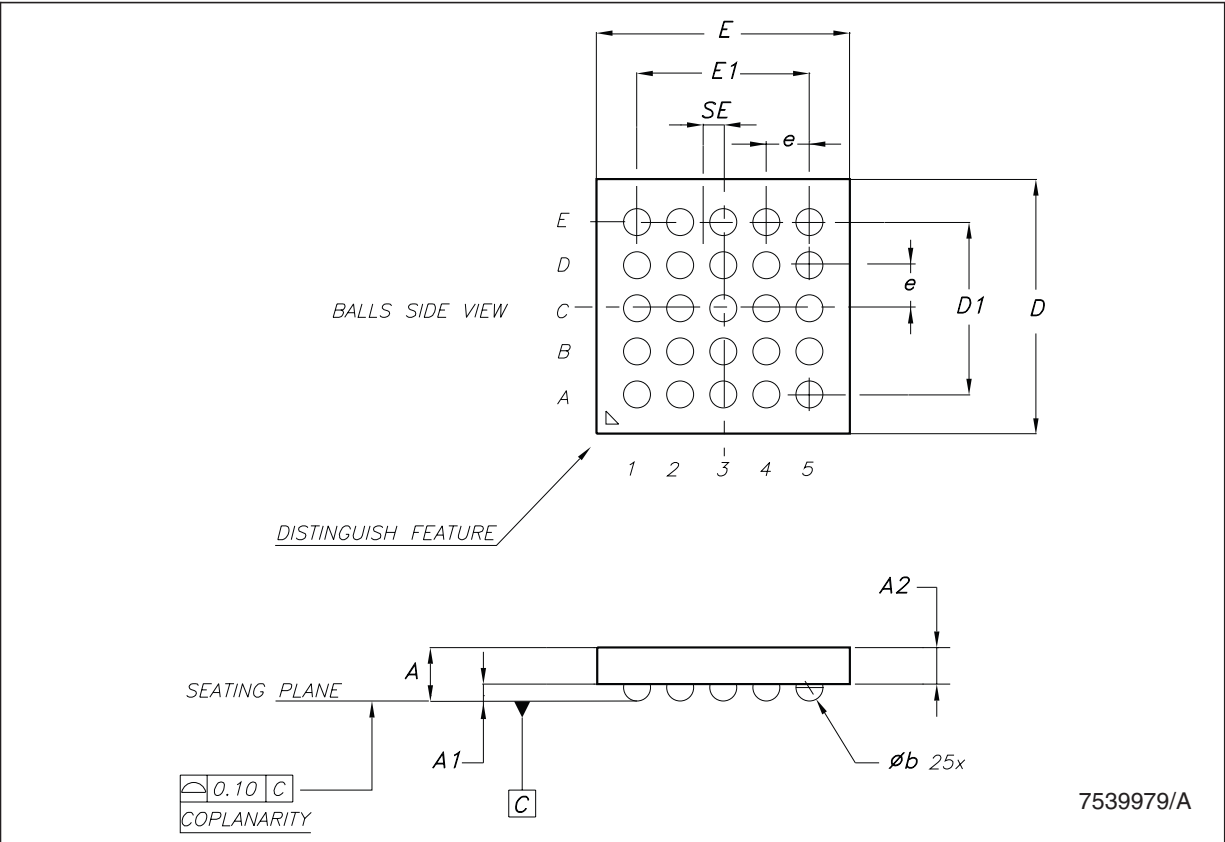
All the functions of the device are controlled through the I<sup>2</sup>C bus which reduces the number of logic pins of the package and saves PCB tracks on the application board. Hard and soft-triggering of flash and torch are both supported. The device includes many functions to protect the chip and the power LEDs. These include a soft-start control, chip over-temperature detection and protection, shorted LEDs detection and protection. In addition, a digital programmable time-out function protects the LEDs in case of a wrong command issued by the microprocessor. An optional external NTC is supported to protect the LEDs against overheating. It is possible to separately program the current intensity in flash and torch mode by I<sup>2</sup>C. In order to guarantee the proper function of flash mode, the SuperCap voltage should be monitored by the microprocessor using the READY pin feature. In case of insufficient power from the SuperCap, a warning is generated. The device is packaged in 3 x 3 mm BGA package with a 1 mm height.

## 2 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

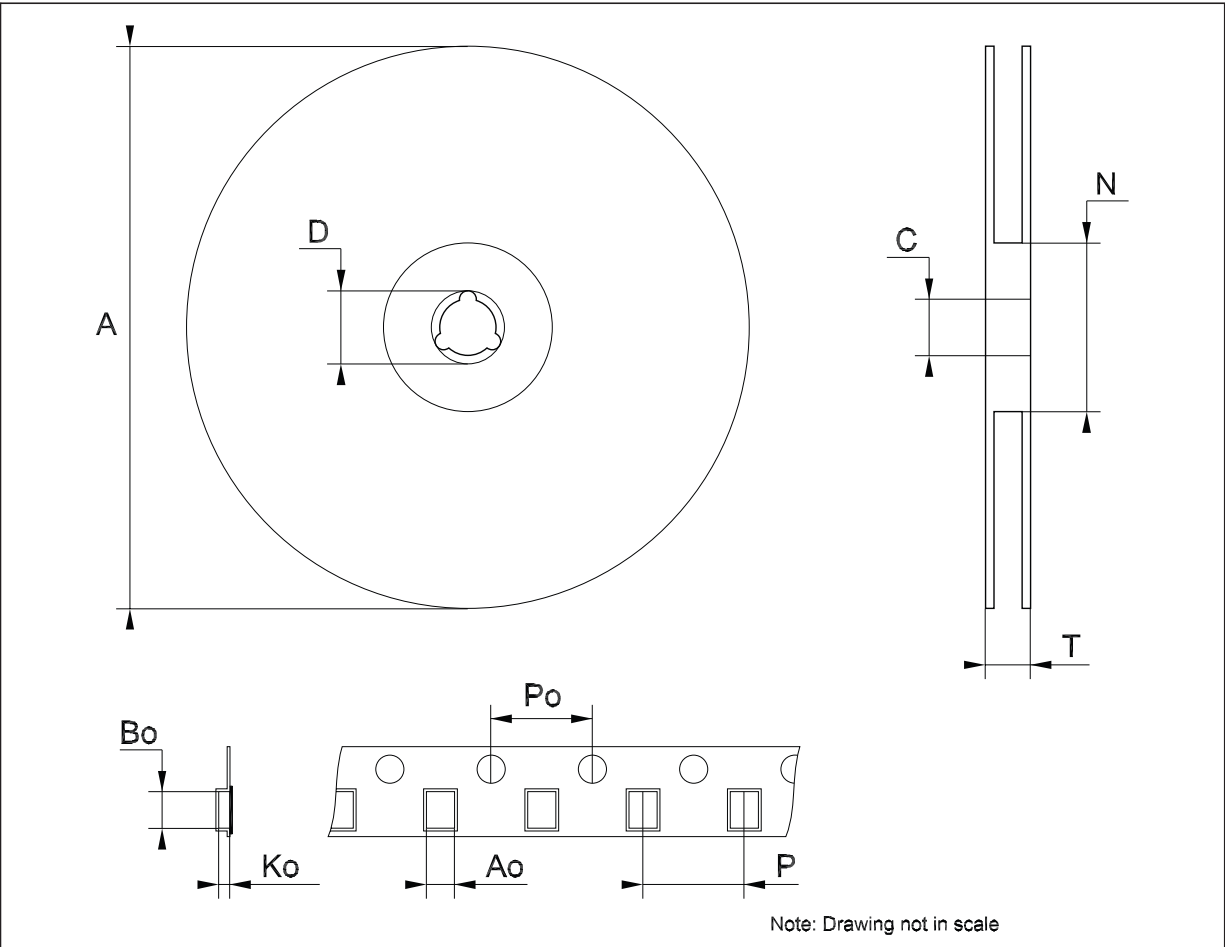
TFBGA25 mechanical data

| Dim. | mm.  |      |      | mils. |       |       |
|------|------|------|------|-------|-------|-------|
|      | Min. | Typ. | Max. | Min.  | Typ.  | Max.  |
| A    | 1.0  | 1.1  | 1.16 | 39.4  | 43.3  | 45.7  |
| A1   |      |      | 0.25 |       |       | 9.8   |
| A2   | 0.78 |      | 0.86 | 30.7  |       | 33.9  |
| b    | 0.25 | 0.30 | 0.35 | 9.8   | 11.8  | 13.8  |
| D    | 2.9  | 3.0  | 3.1  | 114.2 | 118.1 | 122.0 |
| D1   |      | 2    |      |       | 78.8  |       |
| E    | 2.9  | 3.0  | 3.1  | 114.2 | 118.1 | 122.0 |
| E1   |      | 2    |      |       | 78.8  |       |
| e    |      | 0.5  |      |       | 19.7  |       |
| SE   |      | 0.25 |      |       | 9.8   |       |



Tape & reel TFBGA25 mechanical data

| Dim. | mm.  |      |      | inch. |       |        |
|------|------|------|------|-------|-------|--------|
|      | Min. | Typ. | Max. | Min.  | Typ.  | Max.   |
| A    |      |      | 330  |       |       | 12.992 |
| C    | 12.8 |      | 13.2 | 0.504 |       | 0.519  |
| D    | 20.2 |      |      | 0.795 |       |        |
| N    | 60   |      |      | 2.362 |       |        |
| T    |      |      | 14.4 |       |       | 0.567  |
| Ao   |      | 3.3  |      |       | 0.130 |        |
| Bo   |      | 3.3  |      |       | 0.130 |        |
| Ko   |      | 1.60 |      |       | 0.063 |        |
| Po   | 3.9  |      | 4.1  | 0.153 |       | 0.161  |
| P    | 7.9  |      | 8.1  | 0.311 |       | 0.319  |



### 3 Revision history

**Table 2. Document revision history**

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 24-Mar-2009 | 1        | Initial release. |

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2009 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)