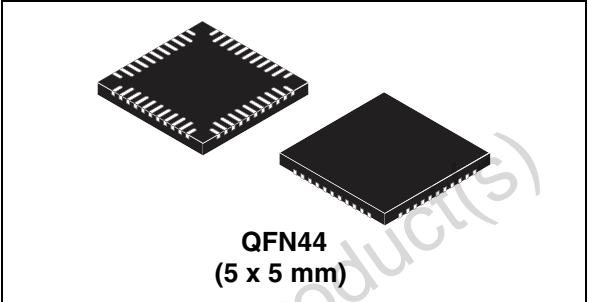


FingerTip multi-touch capacitive 3.2-inch to 4.3-inch touchscreen controller

Data brief

Features

- True multi-touch screen
 - Independent XY tracking with 10 simultaneous touches in real-time with less than 10 mm pinch separation
 - Optimized for high-end smart phones of 3.2-inch to 4.3-inch screen size
 - A total of 11 force and 19 sense channels
 - SYNC support
 - VSYNC input for LCD/OLED noise avoidance for display touchscreens
 - High SNR
 - Advanced filtering for different kinds of noise
 - 4.8 V on YForce to further boost SNR
 - High number of channels
 - 209 nodes in a QFN44 (5 x 5 mm)
 - Supports multiple touchscreen configurations including touch keys with no external components for touch channels
 - Advanced signal processing and calibration
 - Water recovery
 - Self-calibration with auto-drift compensation and fast startup
 - Advanced analog and digital filtering using both hardware engine and firmware
 - Device provides data at different levels (raw data, filtered data, baseline data) to the host
 - Report rate under 10 ms
 - Programmable response time for power saving
 - Sensors
 - Works with plastic or glass sensors, 1-layer or 2-layer ITO with different types of sensor patterns, with or without GND shield
- 

QFN44
(5 x 5 mm)
- Multiple type interface
 - I²C compatible slave mode (100 Kbps, 400 Kbps, 3.4 Mbps)
 - 4-wire SPI interface (slave select, SPI clock, SPI data in, SPI data out); 1 MHz (typ) and 3 MHz (max)
 - 3.3 V tolerant interface for I²C and SPI
 - RESETB, INTB pins to host
 - Memory configuration
 - 48 Kbyte program ROM for firmware, housekeeping and basic macro
 - 16 Kbyte patch RAM for code tuning
 - 24 Kbyte data RAM
 - Power supply scheme
 - 2.5 V to 4.8 V analog supply and 1.8 V digital supply
 - Host managed scheme where the power transitions are initiated by the host
 - Automatic scheme for active-to-idle and idle-to-hibernate
 - Power consumption
 - Under 20 mW in active mode, 10 mW in idle mode and 22 μ W in hibernate mode
 - Other features
 - Fully configurable 4 GPIOs
 - \pm 8 kV HBM ESD protection on force/sense pins

1 Description

The FingerTip uses a unique capacitance-to-voltage conversion acquisition. This allows the measurement of up to 209 mutual capacitance nodes. Coupled with the flexibility offered by the internal processor engine, the entire touchscreen sensing solution can measure, classify and track a single finger touch in under 10 ms. A built-in movement tracking engine tracks up to 10 independent touch movements.

The acquisition engine uses an optimal measurement approach to ensure almost complete immunity from parasitic capacitance on the receiver inputs (X lines). The engine includes sufficient dynamic range to cope with touchscreens of different size and configuration. This offers great flexibility for use with multiple touchscreens with different ITO designs and overlay materials. One and two layer ITO sensors are possible using glass or PET substrates.

The device uses a proprietary analog filtering scheme for noise avoidance, reduction and removal. The noise reduction mechanism is based on sophisticated algorithms that combine power and performance with different sources of noise reduction. The main processor engine offers flexibility with required performance by performing pre-processing, post-processing and housekeeping in an efficient way. This gives ample scope for the sensing algorithm, touch tracking or advanced shape-based filtering and event reporting. Built-in associated memory (ROM, RAM) of the processor is optimized to run the desired fixed program codes in the ROM and to maintain the data, event stack and system variables in a RAM. An additional patch RAM can be used for implementing additional codes or algorithms. The 16 Kbyte patch RAM loading time with 400 Kbps I²C is estimated to be 400 ms. This time can be further reduced if the SPI interface is used.

The device supports multi-finger detection and tracking, enabling smooth multi-touch performance on touchscreens while detecting and rejecting large areas such as a palm or hand on the touchscreen. The device can work with light single or multiple finger touches. The device also supports touch keys using the same ITO as for the touchscreen.

The device has an external SYNC pin for LCD noise filtering for display touchscreen technology. The synchronization of the signal acquisition with the LCD SYNC signal helps in removal of LCD noise by providing extra filtering in the device. This allows the touch module manufacturer to utilize glass screens with ITO to be used without any GND shield which significantly reduces the cost of the touch module. Additionally, it provides a better and brighter display experience for the user.

The internal device ROM can be used to store the initialization and configuration data (supplier default settings). The configuration settings can be changed by the host (I²C interface or SPI interface) by writing to the registers, if needed.

The RESETB pin provides a mechanism for a hardware-based reset from the processor which adds flexibility to the system while the INTB pin provides a hardware-based interrupt to the processor upon any pre-programmed event detection.

Additionally the device integrates GPIOs which can be fully configured as inputs or outputs and these also serve various alternate functions.

This device represents a marked improvement over competing technologies by providing an optimal mix of low power, small size, low external part count, versatile features with unmatched true multi-touch performance in a single, touchscreen controller FingerTip device.

2 Ordering information

Table 1. Ordering information

Order code	Package	Packing
STMT04EN1QTR	QFN44 (5 x 5 mm; 0.35 mm pitch; 0.55 mm thickness)	Tape and reel

Obsolete Product(s) - Obsolete Product(s)

3 Revision history

Table 2. Document revision history

Date	Revision	Changes
21-Sep-2012	1	Initial release.

Obsolete Product(s) - Obsolete Product(s)

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 TWO AUTHORIZED ST REPRESENTATIVES, 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.

© 2012 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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

