



Freescale Enablement Solutions

Xtrinsic Touch-Sensing Software 3.0

The latest touch

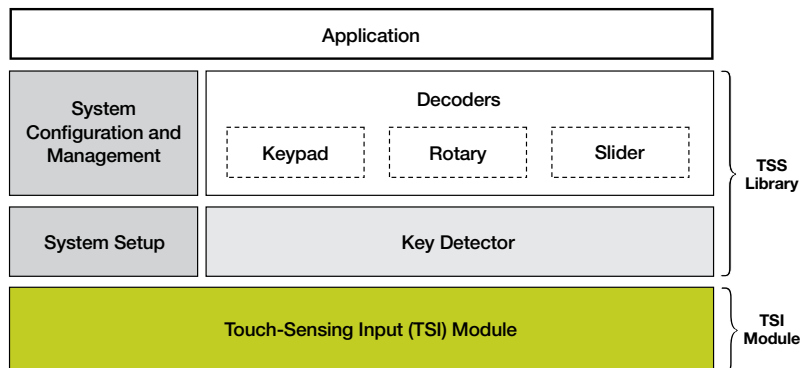
Overview

Freescale continues to offer innovative new features and benefits with the release of the fifth edition of the Xtrinsic touch-sensing software (TSS) suite, version 3.0. This advanced touch-sensing software library offers differentiated features such as water tolerance, noise detection* and a touch detection algorithm for reduced false touches under electrical noise.

The TSS 3.0 free software library supports a unified API for ARM® Cortex™-M0+, ARM Cortex™-M4, ColdFire+ and HCS08 MCU platforms, as well as different capacitance measurement algorithms. These product families feature the recently released touch-sensing input (TSI) module for more robustness and flexibility, faster sampling time and greater sensitivity in capacitive touch-sensing systems, adding value to targeted Freescale silicon.

The TSS library offers a complete solution for capacitive touch-sensing-enabled projects using low-cost development tools and a complimentary license for development and distribution, providing flexible solutions for a wide variety of human-machine interfaces (HMIs). TSS 3.0 helps to simplify user interface designs, enabling customers to develop an application within minutes using a broad range of tools and demonstration software.

Xtrinsic Touch-Sensing Software (TSS) Library



 Freescale Technology



Applications

- **Automotive:** Heating ventilation and air conditioning
- **Consumer:** Refrigerators, televisions, mobile phones, PC peripherals, portable media players, small appliances and multimedia Internet devices
- **Industrial:** Audio applications, fire and security systems, and industrial equipment
- **Medical:** Glucose meters and defibrillators

TSS 3.0 Advantages

- TSS 3.0 is able to distinguish touch/release on the electrodes even if covered with a water film
- Reliable touch detection using the TSI module provides extremely high sensitivity
- Auto sensitivity calibration: Library automatically detects the correct capacitive thresholds for a touch to be valid, which increases reliability across the application life span and simplifies the development cycle
- Enhances reliability and increases product longevity by eliminating mechanical button wear and tear
- Can be integrated into MQX™ with Kinetic MCUs
- User interface controllers manage multiple keypad layout configurations
- Noise detection* and touch detection algorithm for reduced false touches under electrical noise
- 2D matrix decoder supports multitouch in limited form of gestures

* Noise detection is scheduled to be available later in 2012

- Simplifies user interface designs, enabling customers to develop an application within minutes using a broad range of tools, including development board kits and demonstration software
- Gives greater flexibility for product designers to select from hundreds of options in our broad 8- to 32-bit portfolio including ARM Cortex-M0+, ARM Cortex-M4, ColdFire+ and HCS08 platforms with different capacitance measurement algorithms
- Reduces overall system cost by simplifying mechanical design and assembly



Kinetis Tower System
(TWR-K60X256-KIT)



ColdFire+ MCF51QM



TWRPI-TOUCH-STR



TWRPI Plug-In Starter Kits

Key Features and Specifications

- Water tolerance algorithm
- Support for S08 TSI (for S08PT and S08RN family)
- MQX support
- Shielding electrode/electrodes
- Memory usage optimization
- Analog capacitance decoders (slider and rotary)

TSS 3.0 is based on two main conversion algorithms for the capacitive measurement. The first algorithm uses the Freescale TSI module available on new ARM Cortex-M4, Kinetis or ColdFire+ MCUs. The TSI module allows increasing penetration of touch in different consumer and industrial markets with robust performance.

The capacitance digitized value is processed to avoid false touch detection and minimize electrical noise influence.

Finally, the decoding layer enables the key detected to be included in a decoder control that treats the detection as a part of the keypad, slider or rotary interface. TSI is an MCU peripheral designed to scan up to 16 electrodes. It is a highly robust touch-sensing method which also minimizes the need for CPU resources to process touch-sensing signals. Conversion time is guaranteed while the resolution is not reduced across typical hardware conditions.

TSS Design and Development Tools

The TSS library supports different kinds of hardware designs, printed circuit boards (PCB), capacitive film, flex PCB and more. For guidance on best practices for electrode and layout design, download the application note, "Designing Touch Sensing Electrodes" (document AN3863) from freescale.com/TSS.

Freescale has a full set of development tools that include the capacitive touch Tower System plug-in starter kits (TWRPI kits) which, in conjunction with Tower System boards for Kinetis, ColdFire+ and S08 MCUs, enable advanced development through rapid prototyping. TSS 3.0 includes development support using FreeMASTER graphical interface for sensitivity calibration, offers a library configuration GUI, and a series of demo applications and technical documentation.

Development and Evaluation Tools

- ColdFire+ TWR-MCF51QM and TWR-MCF51JF
- Kinetis TWR-K60X256-KIT, TWRK60N512-KIT, TWR-K53N512-KIT and KWIKSTIK-K40
- TWRPI-TOUCH-STR, TWRPITSS-Sliders kit, TWRPITSS-Shield kit

Included in the TSS Suite Free License

- Full API set support
- Support for the new HCS08 PT family and two new 90 nm families: ARM Cortex-M4, Kinetis and ColdFire+ MCUs
- Configurable rotary, slider and keypad decoders
- Smart auto-calibration mechanisms to prevent environmental hassles
- Noise rejection algorithms, IIR filtering, baseline tracking and averaging
- Support for new TSI module
- Ability to enable and disable keys on runtime
- Auto repeat, stuck key, gorilla hand and other typical HMI function capabilities
- Easy to integrate into pre-existing application code
- FreeMASTER application for electrode characterization and debugging
- Demos and application examples
- CodeWarrior V10.x, CodeWarrior V6.3 and IAR support compatibility
- Embedded component for Processor Expert, easy graphical-based library configuration

For more information about our TSS suite, visit freescale.com/touch

Freescale, the Freescale logo, CodeWarrior, ColdFire, ColdFire+, Kinetis and Processor Expert are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Xtrinsic is a trademark of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners. ARM is a registered trademark of ARM Limited. ARM Cortex-M0+ and ARM Cortex-M4 are trademarks of ARM Limited. © 2012 Freescale Semiconductor, Inc.

Document Number: TSSFS Rev 6

