

Freescale Enablement Solutions

Xtrinsic Touch-Sensing Software

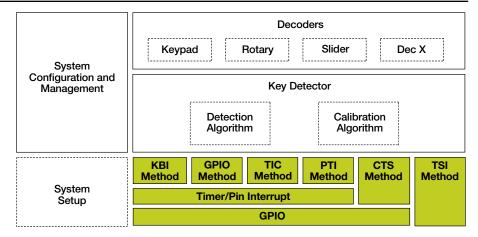
Latest touch

Overview

Freescale's fourth-generation Xtrinsic touch-sensing software (TSS) suite 2.6 is an innovative touch-sensing software library that adds value to targeted Freescale silicon. The free software library now supports a larger MCU portfolio, including the new HCS08 Kinetis ARM[®] Cortex[™]-M4 derivatives and ColdFire+ MCUs. These product families feature the recently released Touch-Sensing Input (TSI) module for more robustness, faster sampling time and greater sensitivity in capacitive touch-sensing systems.

The TSS library offers a complete solution for capacitive touch-sensing enabled projects using low-cost development tools and a complementary license for development and distribution, providing flexible solutions for a wide variety of human-machine interfaces (HMIs).

Touch-Sensing Software Library Architecture



Freescale Technology



TSS 2.6 Advantages

- Reliable touch detection using the TSI
 module provides extremely high sensitivity
- Enhances reliability by replacing mechanical button wear and tear for increased longevity
- Can be integrated with MQX[™] and Kinetis MCUs
- User interface controllers manage multiple keypad layout configurations
- Improved touch detection algorithm for reduced false touches under electrical noise
- 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 more than 1000 options in Freescale's broad 8- to 32-bit portfolio, including ColdFire+ and Kinetis MCUs
- Reduces overall system cost by simplifying mechanical design and assembly

Applications

- Mobile phones
- Personal media players
- Audio/video systems
- Multimedia Internet devices
- Home appliances
- · Home security
- · PCs and peripherals
- Medical devices
- Automotive and industrial equipment

Key Features and Specifications

- Support for S08 TSI (for S08 MCU families)
- MQX support
- KwikStik support
- Shielding
- Memory usage optimization

TSS 2.6 is based on two main conversion algorithms for the capacitive measurement. The first algorithm uses Freescale's TSI module available on new ARM Cortex-M4 Kinetis or ColdFire+ MCUs, while a second uses a GPIO-based measurement for older MCUs. The GPIO algorithm covers the advanced touch logic (ATL) measurement method and capacitive turbo sensing (CTS). These algorithms are part of Freescale's extensive IP portfolio and patent library. The modules provide the low-level conversion from capacitive analog to digital values using a simple I/O pin. The capacitance raw data is filtered and 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 and is a highly robust touchsensing method which also minimizes the need for CPU resources to process touch sensing signals. The TSI module allows increasing penetration of touch in different consumer and industrial markets with robust performance. The ATL software algorithm uses a timer module and is based on the common RC charging principle. CTS is an IP-protected solution that only requires the I/O pin and provides fast charging measurement technology in the µs range. Conversion time is guaranteed and the resolution is not reduced across typical hardware conditions.



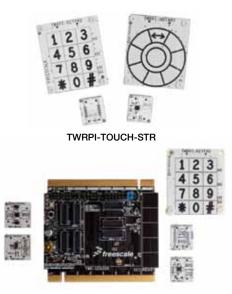
Kinetis Tower System (TWR-K40X256-KIT)



ColdFire+ MCF51QM



- Full API set support
- Support for the new HCS08 MCU 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, averaging
- Support for the new TSI module
- Ability to enable and disable keys
 on runtime
- Auto repeat, stuck key, gorilla hand and other typical HMI function capabilities
- Easy integration into pre-existing application code
- FreeMASTER application for electrode characterization and debugging
- Demos, application examples and technical documentation
- CodeWarrior 10.x, CodeWarrior 6.3 and IAR support compatibility
- Embedded Component for Processor Expert, easy graphical-based library configuration



TWRPI-TOUCH-PAK

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/touchsensing**.

Freescale has a full set of development tools that include the capacitive touch Tower plug-in starter kit (TWRPI-TOUCH-STR) which, in conjunction with Freescale's Tower sensor pack (TWR-SENSOR-PAK) and Tower boards for Kinetis, ColdFire+ and S08 MCUs, enables advanced development through rapid prototyping. TSS 2.6 includes development support using FreeMASTER graphical interface for sensitivity calibration and library configuration GUI.

Development and Evaluation Tools

- ColdFire+ TWR-MCF51QM and TWR-MCF51JF
- Kinetis TWR-K40X256-KIT, TWRK60N512-KIT, TWR-K53N512-KIT and KWIKSTIK-K40
- TWRPI-TOUCH-PAK
- TWRPI-TOUCH-STR

For more information, visit freescale.com/TSS

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