



## TouchSense® Solution for Mobile Data Terminals

Mobile data terminals need to be rugged, reliable, and capable. Immersion's TouchSense® touch feedback system supplies a user interface to match.

Adding Immersion touch feedback to mobile data terminals and enterprise digital assistants improves usability, supports increased productivity, and can provide clear differentiation and competitive advantage. Market-proven TouchSense technology gives touchscreens and touch controls the feel of mechanical buttons, and mechanical buttons more certain response. Both uses help to increase user efficiency and confidence.

### Highlights

- Allows touch controls to “touch back,” supplying positive confirmation even through gloves
- Supplies more effective interactions in noisy or bright environments where audio and visual cues are insufficient
- Helps improve data entry speed and accuracy
- Reduces cognitive load, which can reduce errors
- Contributes to touchscreen and LCD longevity

Adding Immersion's touch feedback to mobile data terminals can lead to fewer and less forceful touchscreen presses because the user immediately understands when their input is received: the touchscreen touches them back.

#### **Unmistakable confirmation**

Touchscreens are efficient for both user input and data display, but using them in distractive environments presents a challenge. Their sound cues can be hard to hear over noise, and visual cues are often hard to see in direct sunlight. The result is that the user cannot be certain that the device took their input, which can be frustrating, distracting, and time consuming. A common reaction is to repeatedly press the touchscreen—or to press much harder to get a response—which can increase wear on the device.

Adding Immersion's touch feedback to mobile data terminals can lead to fewer and less forceful finger and stylus presses because the user immediately understands when their input is received: the touchscreen touches them back.

In addition to helping reduce touchscreen wear, TouchSense feedback supplies more certain response than conventional mechanical buttons. Mechanical buttons provide tactile response whenever they're pressed, regardless of whether the input was received and recognized by the system processor. TouchSense touch feedback is closed-loop, supplying tactile response only when the system processor receives and recognizes the input and sends out a confirming signal. With the TouchSense system, users can be more confident of their interactions because the response is certain, unambiguous, and instantaneous.

#### **Competitive advantage**

The TouchSense system can be used in unique ways to secure competitive advantage. For example, it can make mechanical-button response more pronounced or specific onscreen or mechanical buttons feel unique. Differentiating button feel increases what can be understood quickly and intuitively through a simple press. This differentiation may also help you add features without adding complexity.

#### **Greater usability**

Independent research\* shows that touch feedback can:

- Increase speed and accuracy of data input
- Reduce cognitive loading
- Reduce user frustration
- Increase user satisfaction

\*For a summary of recent published findings on the value of tactile feedback in human-computer interaction, see the Immersion white paper *The Value of Haptics*, available at [www.immersion.com/docs/Value-of-Haptics\\_Jun10-v2.pdf](http://www.immersion.com/docs/Value-of-Haptics_Jun10-v2.pdf).

## The TouchSense system

The Immersion TouchSense system uses software and firmware to control an actuator in producing vibrations, or tactile “effects,” in response to touchscreen presses. These effects provide immediate and unmistakable confirmation to the user that their input was accepted by the system.

TouchSense system components include:

- TouchSense player
- Off-the-shelf, eccentric rotating mass (ERM) actuator
- Tactile effects library for common touchscreen actions

## How it works

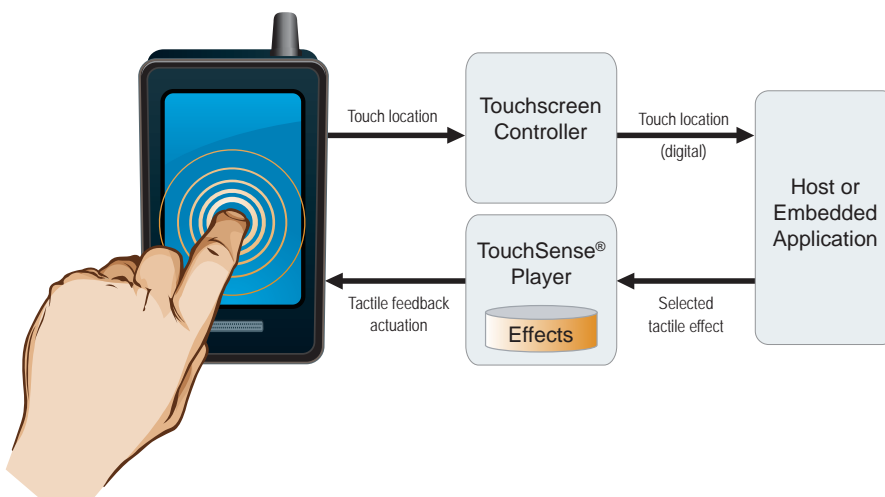
When the user touches the screen, a position signal is sent to the microprocessor. The host application interprets this position and commands the lightweight TouchSense player, embedded on the processor, to play a specified tactile effect. The player responds by exerting control over a small actuator, causing it to play the tactile effect, which gives the user the perception of pressing a button.

The tactile effects library, stored on the microprocessor, supplies a rich tactile feedback vocabulary. It contains predefined waveforms that vary in frequency, magnitude, wave shape, and duration, creating a wide range of tactile effects—from those that reproduce the press and push-away characteristics of various mechanical switches to complex nonlinear vibrations. Customized effects can be added to achieve unique tactile sensations for various UI functions, such as button-press confirmation, map scrolling and zooming, and menu item selection.

The TouchSense system is designed to work with microprocessors commonly used in mobile data terminals. It is also designed to work with a selection of market-proven third-party actuators, like those used in billions of mobile phones. Full electromechanical design and integration guidelines help ensure an optimal implementation of the TouchSense system in your device.



Adding Immersion TouchSense touch feedback to mobile data terminals helps improve data input accuracy and speed.





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## About Immersion

Haptic technologies are transforming digital devices everywhere. Electronics manufacturers are providing digital controls with authentic tactile confirmation. Industrial and commercial manufacturers are increasing the accuracy, efficiency, and safety of the user experience. Content developers are creating a more engaging experience for mobile handset users. Game developers are captivating users with more intense and enjoyable entertainment. Medical schools and hospitals create a more realistic and engaging multisensory experience for surgical simulation training. Immersion technology puts the sensation of touch in the hands of visionary manufacturers worldwide.

Founded in 1993, Immersion Corporation is the recognized leader in digital touch technology and products. Immersion's technology is deployed across automotive, consumer electronics, entertainment, industrial, medical training, and mobile products. Immersion holds more than 900 issued or pending patents in the U.S. and other countries.

### Learn more

Adding Immersion's TouchSense touch feedback to mobile data terminals not only improves data input accuracy and speed, it contributes to less touchscreen wear and fewer product returns. For more information about adding tactile feedback to your mobile data terminals, visit us at: [www.immersion.com/products/touchsense-tactile-feedback/2000-series/](http://www.immersion.com/products/touchsense-tactile-feedback/2000-series/) or email [touch@immersion.com](mailto:touch@immersion.com).

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