



LDS6010

PureTouch™ Capacitance Touch IC with Integrated TouchSense®-Ready Haptics Driver

The LDS6010 PureTouch™ controller empowers system designers to create streamlined, attractive and reliable product designs with capacitive touch controls. An integrated TouchSense®-ready haptics driver enables high quality tactile feedback when a touch occurs, enhancing the user experience.

LDS6010 Features

Versatile, accurate capacitance-to-digital converter (CDC)

- 500 kHz sigma-delta CDC
- 15 capacitance sensor input channels
- 2 ms update rate per active sensor

Full-featured haptics driver for portable applications

- Drives both linear and rotating actuators
- Intelligent PWM input enabling automatic standby mode
- Internal voltage regulator enables direct connection to Vbattery with no degradation in haptics effects

Integrated, automatic calibration algorithms

- Environmental compensation
- On-chip RAM to store calibration data

Integrated touch preference modes

- Strongest single touch
- Strongest two touches
- Unrestricted (all) touches

Ultra-low touch sensor power consumption*

- Operating mode (typical): <math>< 150 \mu\text{W}</math> ($V_{DD1}=1.8\text{V}</math>)$
- Shutdown mode (typical): <math>< 1 \mu\text{W}</math> ($V_{DD1}=1.8\text{V}</math>)$

* Excludes haptics driver current and I/F and voltage dependent V_{DDIO} current

Description

The LDS6010 is a programmable capacitance-to-digital converter (CDC) designed for use with capacitive sensor arrays implementing touch-based input controls including sliders, scroll wheels, and buttons. A built-in TouchSense®-ready haptics driver enables efficient integration of advanced tactile feedback, providing positive confirmation when a touch occurs. Touch sensor inputs are directed through an integrated switch matrix to a 500 kHz sigma-delta CDC which senses changes in the external sensor array. Featuring 15 sensor inputs, the LDS6010 provides the flexibility required to implement multiple tactile-enabled touch inputs using a single controller.

On-chip calibration logic continuously monitors the environment and automatically adjusts on-and-off threshold levels to prevent false sensor activation. The LDS6010 is offered with both SPI-compatible and I²C-compatible interfaces (active interface selected by I/F select pin) and features a general-purpose input/output (GPIO) and interrupt output for additional communication with the host processor.

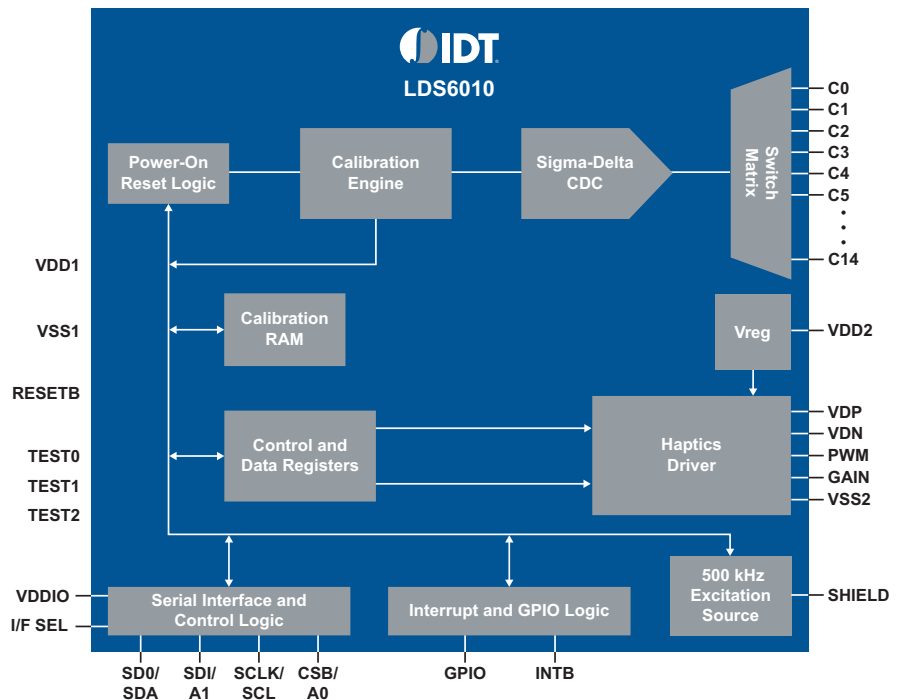


Figure 1. LDS6010 block diagram

Flexible interface options

- SPI-compatible serial I/F
- I²C-compatible serial I/F
- Separate V_{DDIO} level for serial interface
- GPIO and Interrupt Output

Power supply range:

- Touch supply (VDD1): 1.65V - 1.95V
- Haptics supply (VDD2): 2.4V - 3.6V
- V_{DDIO}=1.65V - 3.6V

Small footprint package:

- 40 pin 5mm x 5mm QFN,
0.8mm max height

Applications:

- Mobile handsets and smartphones
- Personal music and media players (MP3/MP4)
- Gaming devices
- Remote controls

Integrated TouchSense[®]-ready haptics driver for portable applications

The LDS6010 features an integrated TouchSense[®]-ready haptics driver, ensuring compatibility with Immersion's TouchSense[®] Platform of advanced haptics effects for enhanced gaming feedback, vibrating ringtones, and tactile confirmation for touch-based controls. Compatible with both ERM (eccentric rotating mass) and LRA (linear resonant actuator) vibration motors, the LDS6010 haptics driver supports crisp response times and a high degree of control over vibration magnitude and attenuation. An internal voltage regulator enables direct connection of the haptics driver supply to the system battery while still ensuring a consistent haptics experience across the entire battery discharge cycle.

Ideal solution for portable applications

The LDS6010 is optimized for minimal power consumption, with touch sensor circuits operating from a 1.8V supply voltage. In full power mode, sensor conversion and calibration occur continuously, minimizing the time between touch event and touch detection. With its ultra-low touch sensor power consumption of <150 μ W (typical), the LDS6010 may be operated continuously in full power mode, eliminating the need for introduced latencies that can cause noticeable delays and degrade the user experience.

The total solution footprint is also optimized for portable applications, with the functionality of multiple components consolidated into a single device. With integrated haptics driver functionality, the LDS6010 is a flexible solution combining the functionality of two discrete ICs into a compact 5mm x 5mm TQFN package with 0.75mm package thickness.

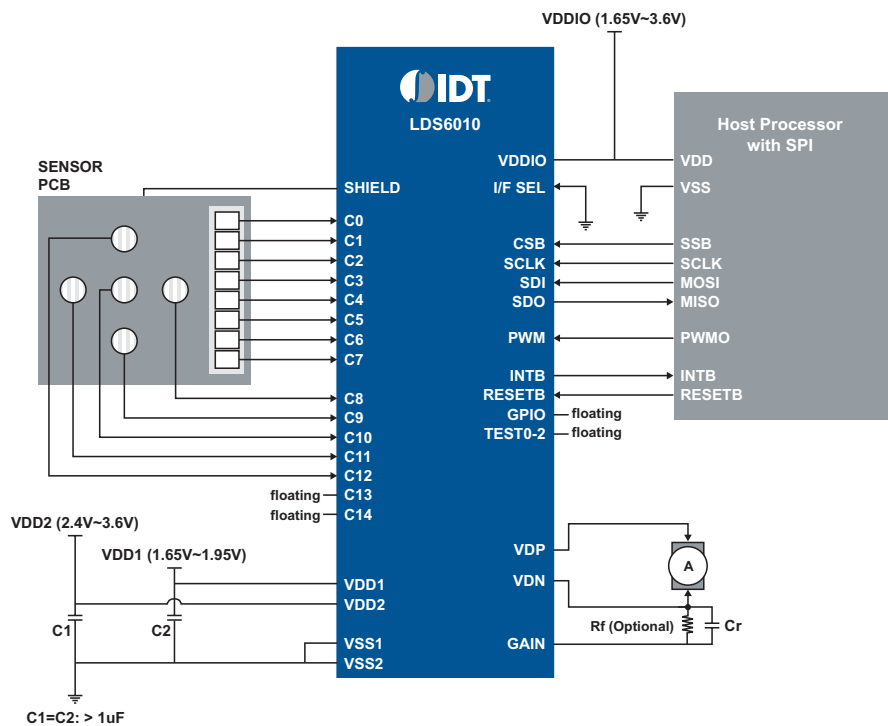


Figure 2. LDS6010 application diagram

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