

Brief Description

The ZSSC3122 is a CMOS integrated circuit for accurate capacitance-to-digital conversion and sensor-specific correction of capacitive sensor signals. Digital compensation of sensor offset, sensitivity, and temperature drift is accomplished via an internal digital signal processor running a correction algorithm with calibration coefficients stored in a non-volatile EEPROM.

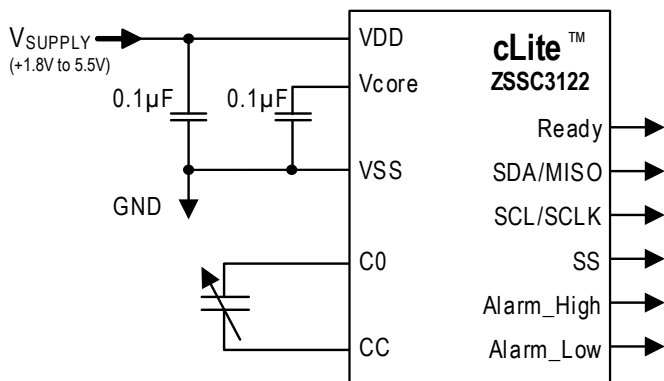
The ZSSC3122 is configurable for capacitive sensors with capacitances up to 10pF and a sensitivity of 125aF/LSB. It is compatible with both single capacitive sensors (both terminals must be accessible) and differential capacitive sensors. Measured and corrected sensor values can be output as I2C, SPI, PDM, or alarms.

The I2C interface can be used for a simple PC-controlled calibration procedure to program a set of calibration coefficients into an on-chip EEPROM. The calibrated ZSSC3122 and a specific sensor are mated digitally: fast, precise, and without the cost overhead of trimming by external devices or laser.

Available Support

- ZSSC3122 SSC Evaluation Kit available: SSC Evaluation Board, samples, software, documentation.
- Support for industrial mass calibration available.
- Quick circuit customization option for large production volumes.

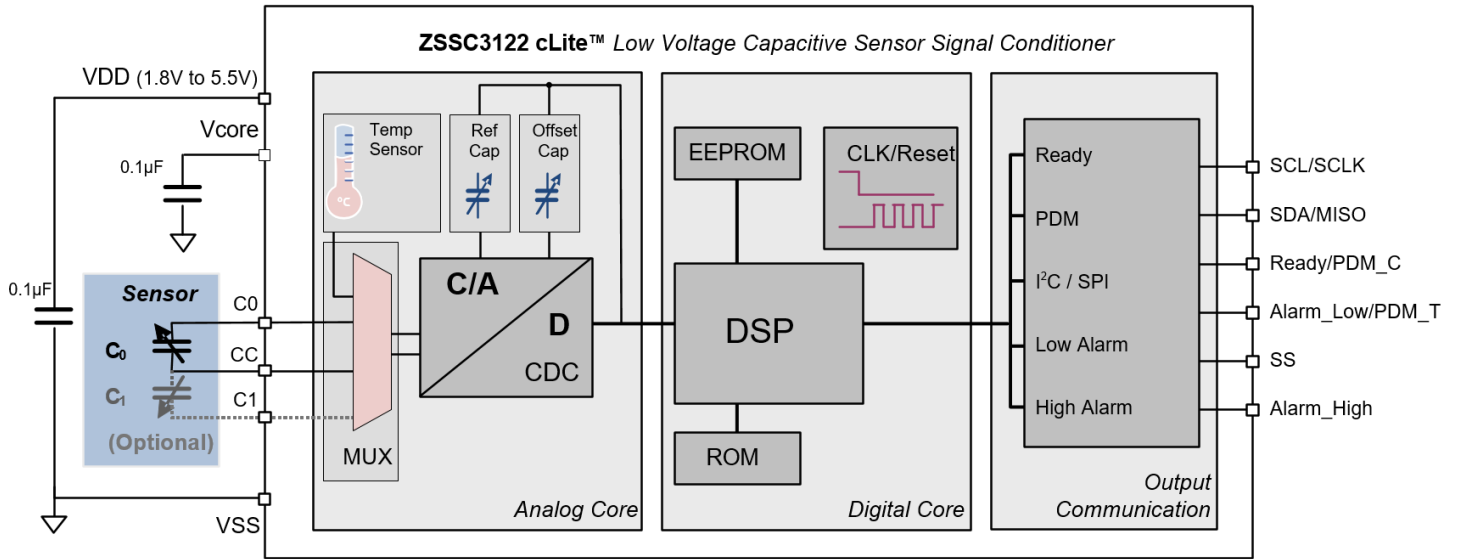
Application Circuit: Digital Output, Alarms



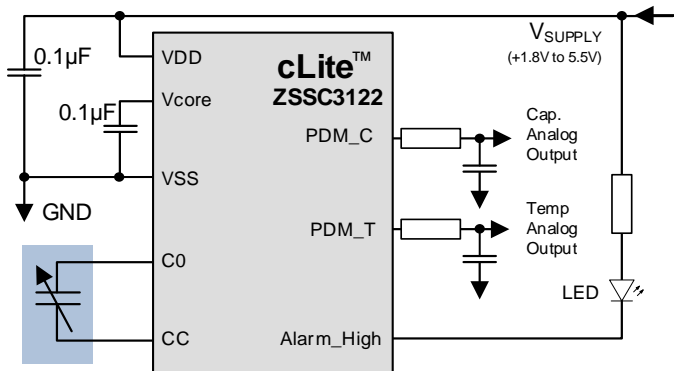
Features

- Maximum target input capacitance: 10pF
- Sampling rates as fast as 0.7ms at 8-bit resolution; 1.6ms at 10-bit; 5.0ms at 12-bit; 18.5ms at 14-bit
- Digital compensation of sensor: piece-wise 1st and 2nd order sensor compensation or up to 3rd order single-region sensor compensation
- Digital compensation of 1st and 2nd order temperature gain and offset drift
- Internal temperature compensation reference (no external components)
- Programmable capacitance span and offset
- Layout customized for die-die bonding with sensor for low-cost, high-density chip-on-board assembly
- Accuracy as high as ±0.25% FSO@ -20 to 125°C, 3V, 5V, V_{supply} ±10% (see data sheet section 1.3 for restrictions)
- Minimized calibration costs: no laser trimming, one-pass calibration using a digital interface
- Excellent for low-power battery applications
- Two interface options
 - I2C or SPI interface—easy connection to a microcontroller
 - PDM outputs (Filtered Analog Ratiometric) for both capacitance and temperature
- Up to two alarms that can act as full push-pull or open-drain switches
- Supply voltage: 1.8 to 5.5V
- Typical current consumption 650µA down to 60µA depending on configuration
- Typical Sleep Mode current: ≤ 1µA at 85°C
- Operation temperature: -20°C to +125°C
- Die or TSSOP14 package

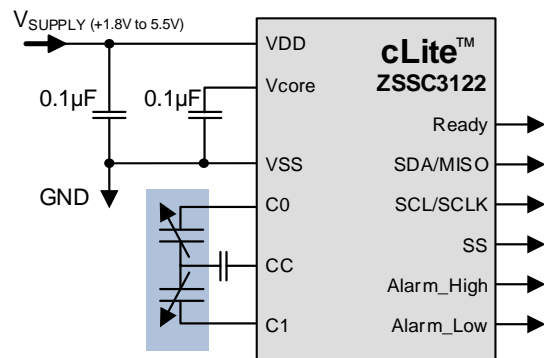
ZSSC3122 Block Diagram



Application: Analog Output



Application: Differential Capacitance Input



IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01 Jan 2024)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.