SENSOR PLATFORMS

SSP1492 Sensor Signal Processor
Microcontroller-based Multi-Channel Sensor Interface

Create a smart sensor with high performance, low power and few components!

At the core of the SSP1492 lies a high-speed processor, math engines and a frequency mode data converter. They provide scalable dynamic range, accuracy and speed to suit your sensor application needs. The evaluation kit and suite of design tools speed your time to market.

Powerful Math Tools

Two hardware math engines and internal firmware provide a powerful set of floating point math tools. Operations include transcendental, magnitude, square root, polynomial fit, integer-to-float etc.

Get started quickly

Create an entire smart sensor solution within hours with only a sensor and as few as 2 external passive components. Internal ROM already contains ready-to-use signal processing functions. No programming is required to operate the system as a slave from industry standard I2C or SPI interface.


Advantages
- 3 V operation
- Low power consumption
- Small footprint
- High acquisition resolution
- Large dynamic range

Features
- Draws <10 mA at 3 VDC for 150 uS in active measurement
- Standby idle current <10 uA
- Two math engines to perform both scaled trigonometric, other transcendental functions and large integer math.
- Integrated user accessible 8051 microprocessor
- EEPROM retains calibration coefficients or user data after removal of power
- Accessible 2.3 Volt regulator/reference
- Fully integrated solution requiring only a few passive external components
- SPI or IIC serial data communication protocol for interfacing to a host processor
- Optional external clock input for high accuracy applications
- Integral Op-Amp for user signal conditioning
- User code can be uploaded into internal RAM from the host or from an external serial EEPROM.
- Eight General purpose I/Os can be configured as digital I/Os or analog inputs for additional sensors or signals
- All chip functions and circuits are controllable from the serial interface using a register-based architecture
- Uncommitted registers are available for user functions
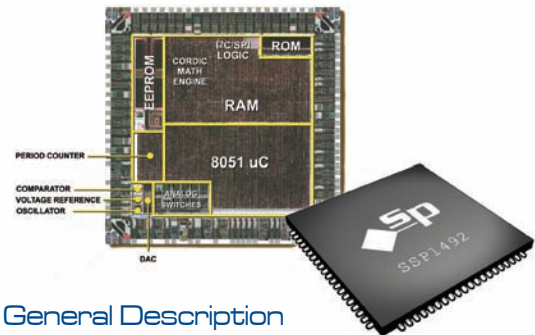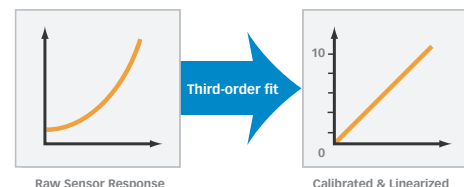

General Description

The Sensor Signal Processor (SSP1492) is a multi sensor data acquisition and signal processing system with two popular microcontroller interfaces. The SSP1492 has sensor inputs and computational resources to acquire and process a wide variety of sensor element types and perform powerful floating-point vector and scalar calculations using its built-in high speed microprocessor and multiple math engines. The SSP's precision sensor oscillator, configurable analog switches and high resolution frequency-mode data converter (FMDC; see next page) unit can measure a wide
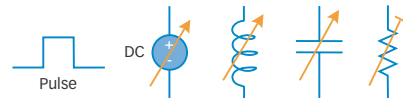
Directly interface sensors with minimal external components —pulse, voltage, current, inductive, capacitive and resistive sensors supported

range of resistive, capacitive, inductive, voltage, current or pulse mode sensors. The SSP1492 also incorporates two powerful, host accessible, math engines which can perform trigonometric, inverse trigonometric, geometric, long integer and scaled fractional multiply, divide, add and subtraction operations. The built in high-speed 8051 processor can execute user custom subroutines, algorithms, and system control functions. The SSP1492 can communicate with a host using either an SPI or IIC serial protocols. The SPI interface is configurable for polarity and phase from external pins. The IIC interface is fully compliant to established standards

Built-in third-order polynomial compensation linearizes & calibrates the sensor signal

Third-order fit

Raw Sensor Response   Calibrated & Linearized

www.sensorplatforms.com   2860 Zanker Road, Suite 210 | San Jose, CA 95134 | (408) 850-9350
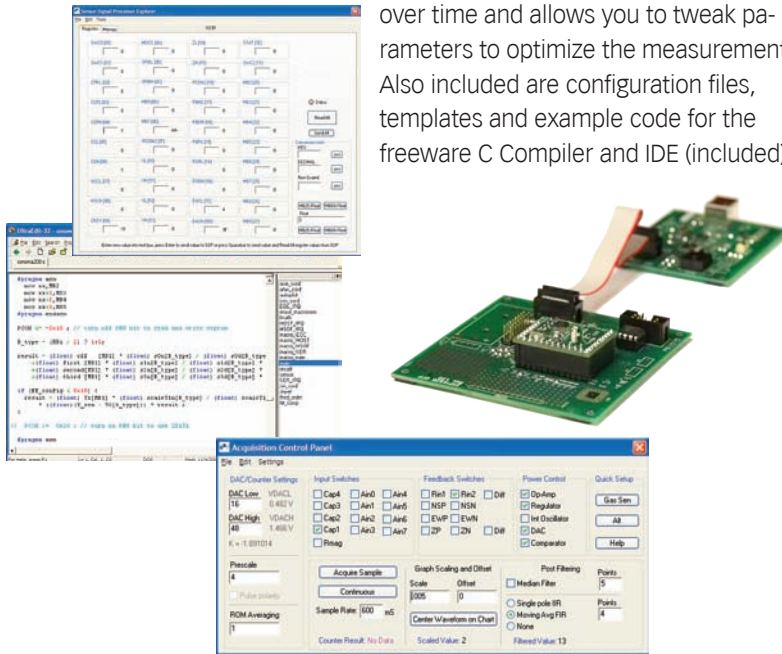
1492 Evaluation Kit

The evaluation kit for the 1492 includes everything to start working with sensors. The board uses a USB connection to interface with a PC and includes breakout pins to make it easy to test sensors. The best part however is the included six-axis sensor board with magnetometers from PNI and accelerometers from Kionix. The hardware includes:

- USB interface and serial EEPROM burner
- Data acquisition and control software
- Sensor board with
  - Three SEN S65 magnetometers from PNI, Inc.
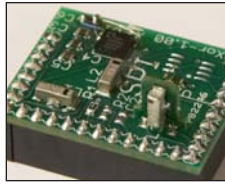 - KXP84 tri-axis accelerometer from Kionix, Inc.

Development Tools

Software tools include complete access to all registers, RAM, ROM and EEPROM. The acquisition software displays a graph of the sensor channels over time and allows you to tweak parameters to optimize the measurement. Also included are configuration files, templates and example code for the freeware C Compiler and IDE (included).

Data Converter Specifications

The SSP1492 data converter is a frequency-time mode converter. A sensor is alternately driven back and forth between a high voltage and a low voltage by the output of a comparator (see figure below). Each time a threshold voltage is reached at the sense input of a comparator, the output voltage is flipped, thus forming a relaxation oscillator. The time needed for the sensor to relax back and forth between the thresholds is indicative of the sensor impedance (capacitance, inductance, etc). A period counter is used to measure the period of oscillation. The high and low voltages, and the number of cycles to count are all user set-able, allowing the user to optimize the oscillator to a preferred (linear) range of the sensor.

RC Oscillator Period = KRC Frequency = $1 / KRC$

LR Oscillator Period = KL / R Frequency = $K(R / L)$
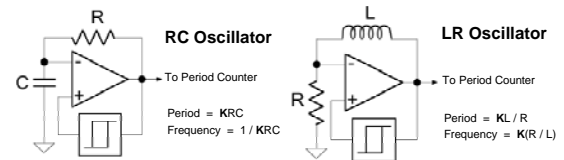
RC and LR oscillator circuits. K is a constant proportional to the high and low threshold voltages at the the input to the comparator.

Availability

The SSP1492 is available now in both bare die and packages. Hardware development kits will be available in January of 2007.

Available Packages

- 4mm square die
- 80-pin LGA (MLP)

Contact Information

For pricing and questions, please contact:
sales@sensorplatforms.com

Selected Electrical Specifications

Parameter	MIN	MAX	Units
DC Supply Voltage	2.2	3.6	Volts
Dynamic Current		11	mA
Static Current (sleep)		1	uA
Operating Temperature	-40	85	C
Storage Temperature	-40	125	C
External Clock Frequency		18	MHz