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Smart sensor conditioner chip packs 8051 core

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Aug 2 2005 (13:39 PM)
URL: http://www.embedded.com/showArticle.jhtml?articleID=167100362

Sensor Platforms, Inc. Introduces the SSP1492 Sensor Signal Processor Chip

Universal turn-key sensor signal acquisition and processing on a single chip is now available for virtually any sensor

CHICAGO, IL—Sensor Platforms, Inc., a Santa Rosa-based fabless semiconductor company dedicated to providing IC solutions to the sensor industry, announces the availability of its SSP1492 Sensor Signal Processor.

The SSP1492 provides a low cost, low power, flexible sensor signal drive, acquisition and processing platform that enables effortless development, cost effective manufacturing, and improved time-to-market of sensor applications. It utilizes highly innovative proprietary technologies that enable direct and simultaneous interfacing to almost all sensor-element types. The SSP1492 is the only monolithic IC solution that exists on the market today that simultaneously works with resistive, capacitive, inductive, voltage, and pulsed sensor elements (both MEMS and bulk-based) all on the same chip.

A high speed pipelined 8051 micro-controller core and up to 15 sensor input channels allow for highly flexible multi-sensor configurations, especially where applications call for the collaborative processing of multiple mixed sensor inputs. Additional features include two powerful hardware math engines and a software floating-point engine for high order output linearization and temperature compensation, a band-gap voltage regulator for power source stability, and an SPI/I^2C serial data communication protocol for interfacing to a host processor.

An on-board RC oscillator with an external clock option for high accuracy applications, data EEPROM for non-volatile storage of factory calibration coefficients and user settings, and user-customizable firmware memory space further enhance performance, flexibility, and product development cost.

In addition to standard sensor applications, the SSP1492's low operating voltage of down to 2.3 volts, low power consumption and its hardware-based SPI/I^2C serial data interface also makes it ideally suited to high volume, battery-powered consumer and commercial applications, where cost, size, power consumption and time to market are the critical factors that dictate success or failure.

George Hsu, President and Chief Executive Officer stated, "We're the only semiconductor company with the sole mission of enabling the development and commercialization of sensor applications.

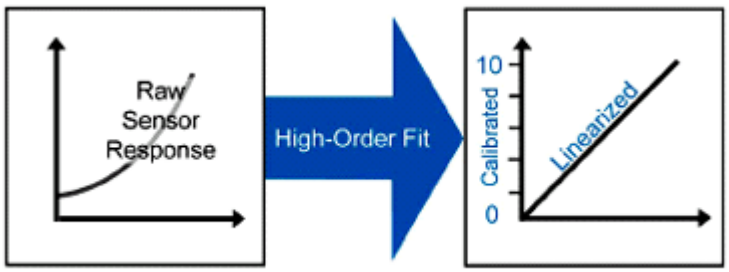
Our unique technology has successfully worked with numerous sensors in areas as diverse as pressure, temperature, acceleration, magnetism, tilt, gas, light, force, strain, position, and so forth. Our initial customers have found our unique technology tremendously useful, especially in contemplating new applications. They no longer need to engage in the costly and time consuming process of custom designing and producing an IC for a specific sensor or application.

"I believe that the sensor industry is at a crossroads in its development as the world goes increasingly digital and mobile. The opportunities at this juncture are enormous. There were 650 million cell phones sold worldwide last year, not to mention countless laptops, PDAs, GPSs and general consumer electronic products. No one can predict where the next killer sensor application is going to come from. We can only be prepared and ready when the next window appears.

"As sensor manufacturers and system integrators plan their application development to address their customers' ever-changing requirements, the SSP1492 is a huge piece of the puzzle, providing an instant IC solution meeting their cost, size, power consumption, and performance specifications. In offering the SSP1492, Sensor Platforms has ensured that sensor manufacturers and system integrators are prepared to meet the challenges of tomorrow by having a unique and powerful sensor signal processor chip available to them today."

Devices are available as 4.3mm x 4.3mm square bare die, in 80-pin ball grid array (BGA), as well as in 80 pin quad-flat package (QFP). Universal Sensor Evaluation kits are available, and include a USB interface, user-programmable ROM, and development/system software analysis tools. The user need only supply the sensor element and as few as three external passive components to create a smart sensor solution within a few hours for quick and easy evaluation.

Sensor Platforms is located at 1550 Airport Boulevard, Suite 220, Santa Rosa, CA 95403. Its Web site is at www.sensorplatforms.com. CONTACT: Kara Ameral, Operations Manager at 707.543.8540 or kameral@sensorplatforms.com.



In the course of reviewing data-acquisition and test-and-measurement gear I often come across sensor conditioning circuitry and equipment. However, you'll usually find sensor news at **eeProductCenter**'s Passives/Sensors section.

What's more, you'll typically find analog and mixed-signal chip coverage in **eeProductCenter**'s Analog ICs section. This monolithic IC product, however, begs for coverage in the Test-and-Measurement section.

The new *SSP1492* chip comes from a fab-less company called ***Sensor Platforms***. Founded just last year, it claims to be entirely dedicated to sensor applications. In line with that credo, Sensor Platforms provides a product that promises to reduce sensor application development time, while improving sensor performance.

Linearization, And More

As a "smart sensor" conditioner, the SSP1492 gives any sensor the ability for self-identification. But wait. There's more. It can also correct for zero offset and span variation. Correcting for non-linearity is a piece of cake, too, as is correction for cross-sensitivity. The SSP1492 can also handle sensor calibration.

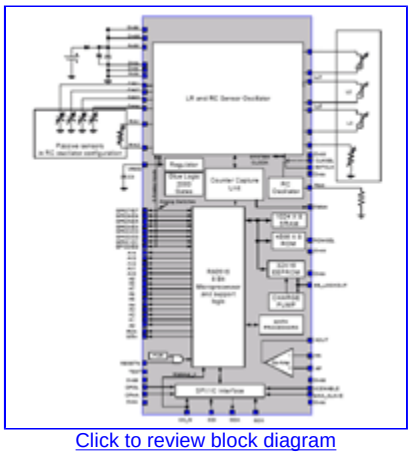
In multi-sensor systems, the SSP1492 should also be worth its salt. That's because combining several sensors together into one measurement device can easily pose a variety of disparate demands on an implementer. According to Sensor Platforms's president George Hsu, this new silicon can cost-effectively address those needs, however.

Just how cost-effectively, you might ask? Well, right now you can get unpackaged SSP1492 die for about $3.50 a pop in 1000-piece quantities. Depending on packaging you'll have to add about 30-cents to 50-cents more per chip.

When you consider how powerful these sensor conditioners are though, I think you'll agree that that's pretty low cost—especially when you factor-in that writing code for the venerable *8051* microcontroller core is relatively straightforward and is a skill that's widely known.

An Industry-Standard Core

In addition to the 8051, the 3-V (5-V compliant inputs) power-managed SSP1492 chip integrates its own so-called math engines. It also uses a unique frequency-mode data converter that gives you scalable dynamic range, accuracy, and speed.



Click to review block diagram

The 8051 core is no slouch, by the way. It has the ability to churn through 14 *MIPS* (million instructions/s), as it clocks at a moderate current-sipping 18-MHz.

Functions In ROM

The 8051 runs in conjunction with the chip's built-in math engines, with *ROM*-contained functions supporting trigonometric, polynomial, and general-purpose floating-point math. The 8051 can also execute your own customized subroutines, algorithms, and system control functions.

The two host-accessible math engines perform trig, inverse trig, geometric, long integer and scaled fractional multiply, divide, add and subtraction operations. Significantly, the math engine's architecture slashes code space, and reduces the time required for the 8051 to make its sensor calculations. The system also reduces the amount of SRAM needed to store values during a calculation.

All of this is supported by the IC's non-volatile data constant storage and user program storage space. You can select from four memory programming options: masked ROM, external ROM/flash (in which case the device comes in a larger package), a serial *EEPROM* upload, or a host-initiated upload. The device's internal ROM also contains some ready-to-use signal processing functions.

Frequency-Time Conversion

For its part, the SSP1492's data converter is essentially a frequency-time converter. It consists of a sensor oscillator stage (an oscillator modulated by a sensor element's electrical properties), and a period counter. The counter demodulates a sensor signal into a digital value.

These stages work with scalable resolution and conversion time. Interestingly, the maximum resolution is virtually infinite. The sensor oscillator, along with configurable analog switches and the counter capture unit can measure a wide range of resistive, capacitive, inductive, voltage, current, and pulse-mode sensors.

The native resolution of the device's internal registers is 16 bits, and the default ROM contains routines for 32-bit sensor measurements and an averaging filter, along with math tools.

Other on-chip blocks include a user-accessible 2.3-V regulator that can also serve as a reference, un-committed registers for user functions, and a high performance op-amp for signal conditioning.

There's also an external clock input if your sensor application requires greater accuracy than that affordable by the chip's RC oscillator function. Finally, you also get eight lines of general purpose I/O that can be configured for digital data or as analog inputs.

Standard Serial Communications

Like many 8051 cores, the SSP1492 can communicate with a host or peripherals using either the popular *Motorola*-derived *SPI* (Serial Peripheral Interconnect) or the *Philips* I^2C protocols. The SPI interface is configurable for polarity and phase from external pins, and all on-chip functions and internal circuits are controllable from the register-based serial interface.

Sensor Platforms's press release (on the left) also mentioned that *USB*-communications (Universal Serial Bus) eval kits (priced at about $400) are available for this chip, as well as development system software and analysis software.

Not said is that these tools include a plethora of config files, templates, and example freeware in *C*. You also get a C compiler and an EEPROM burner. The toolkit also includes some data-acq and control software, as well as system analysis tools. These include spreadsheets and *Spice* models.

Want more details? Click here to review a preliminary datasheet (in Adobe Acrobat .PDF format).

Sensor Platforms, 707-543-8540, www.sensorplatforms.com