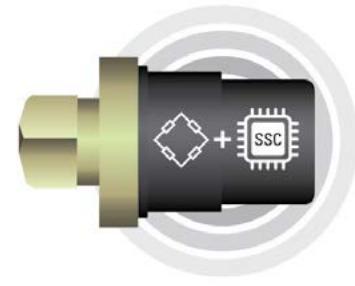
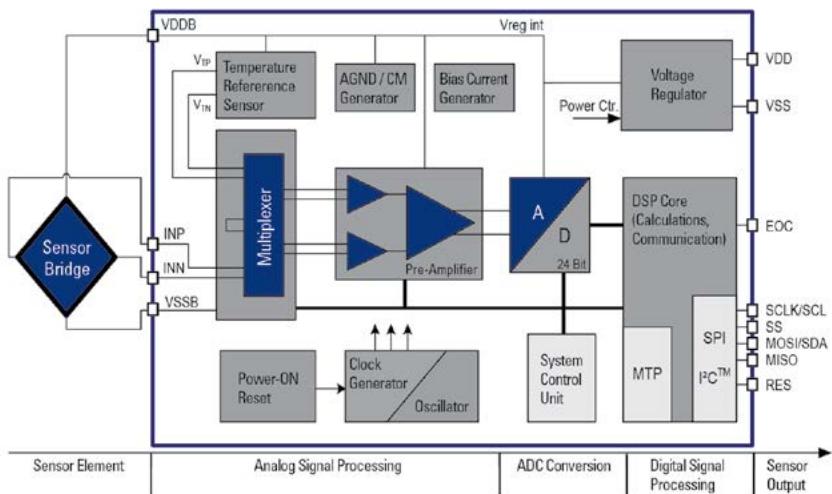




Choosing the Right Sensor Signal Conditioning IC

Designing and implementing sensor interface designs for nonlinear, temperature-dependent transducers presents some difficult challenges. The advent of dedicated and powerful Sensor Signal Conditioning (SSC) ICs has made the job easier, but choosing the right IC for a particular sensor and application is critical for making optimal performance and cost tradeoffs. This document provides a guideline on some of the most important features and functions to consider when choosing the best SSC for your application.

TYPICAL SSC BLOCK DIAGRAM



KNOWING YOUR SENSOR

The first step in choosing an SSC is to understand the characteristics of the sensor that it interfaces. Sometimes a designer is tempted to skip this step and pick an SSC with the most powerful and complex correction techniques that are available or affordable. This is not only wasteful in terms of cost and loading on expensive production testing resources, but often detrimental. Depending on the intelligence designed into the correction algorithms, sometimes a higher-order equation fit will create more error than a simpler equation that more closely matches the inherent response of the sensor. Characterizing and analyzing sensor behavior over all environments is time well spent.

THE RIGHT PARTNER

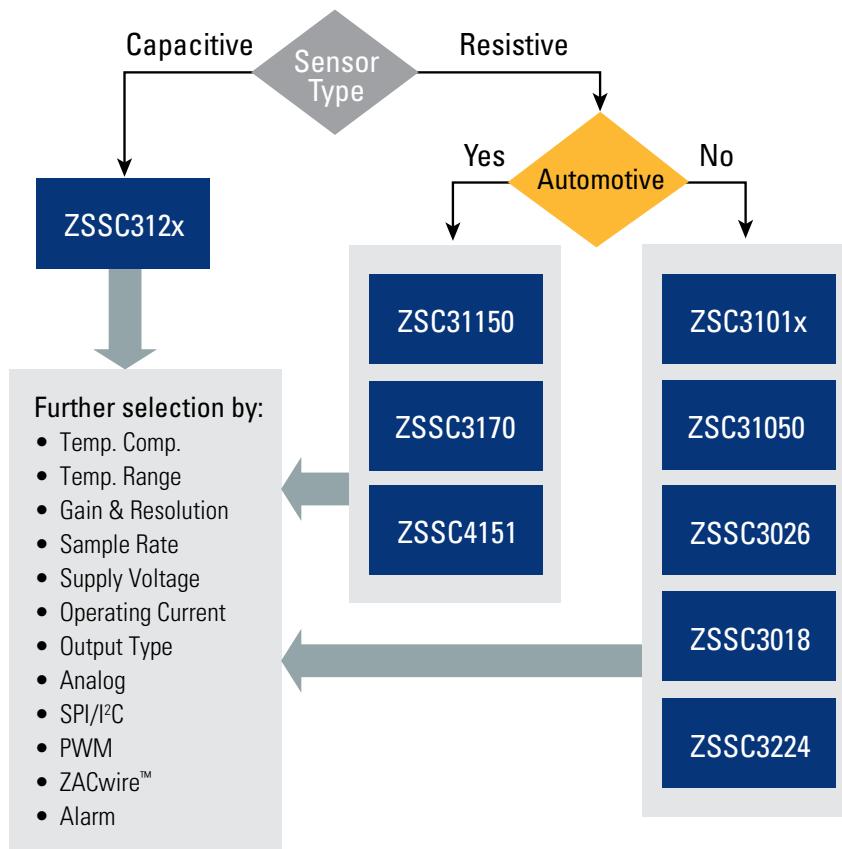
Before plodding through pages and pages of datasheets to understand every tedious detail of dozens of potential SSC candidates, take a step back and evaluate what level of support and overall experience the manufacturer provides with their products. This is especially important for a product like an SSC where complex equations are used to calculate the correction coefficients. If the manufacturer does not provide development hardware and software to automate and evaluate the calibration routines, you will be left to develop those resources on your own. Even more important is the ability and willingness of the manufacturer to answer questions about their product and support materials that routinely arise during the development phase.

TOTAL SYSTEM COST

Another commonly overlooked factor in SSC selection is the production cost of calibration, especially for high-volume applications. Sometimes a cheaper part will actually end up costing more overall because it uses an unsophisticated calibration routine that requires more time on costly testers and environmental chambers. The IDT family of SSC products is designed with this in mind. Their intelligent correction algorithms allow for “single pass” calibration that minimizes the time required for data collection and for coefficient calculation and programming. This is a tremendous benefit and should be given serious consideration in the selection process.



BASIC SELECTION GUIDE FOR IDT SSC FAMILY



NARROWING THE FIELD

After selecting the right partner and family of products, the choice must be narrowed to an individual part. Typically, the process of elimination is the easiest and fastest way to accomplish this. For example, the IDT SSC product family is broadly divided into resistive and capacitive bridge sensor types. If your sensor is capacitive, the candidates will be limited to the ZSC312X series.

After sensor type, the next criteria to narrow the range of products most quickly are the qualification level and environmental requirements. For automotive level quality (AEC-Q100), the available choices are the ZSC31150, ZSSC3170 and ZSSC4151 products. Applications that do not require automotive qualification can use any of the ZSC310xx or ZSSC30xx parts.

Once the field has been narrowed to this point, the remaining criteria for completing the selection process are operational constraints such as gain and resolution, response time, supply voltage and current, and output interface type (analog, I²C, SPI, etc.). If multiple parts meet all these requirements, the final selection can be made based on price or special features like alarm outputs or sensor diagnostics.

OPTIONS + PROCESS + EXPERIENCE = SUCCESS!

Abundance of choice can be a double-edged sword, but a methodical approach combined with an experienced partner will make the selection process smooth, efficient, and successful.

Visit our online product selector at: idt.com/ssc