Introduction

The “DAQ on a Stick, Renesas Strain Gauge” is one of a series of reference designs highlighting Intersil’s precision products with different microcontrollers. This reference design is a self-contained demo showing a complete signal chain solution using Intersil parts and a Renesas microcontroller. The complete reference design is conveniently housed in a USB stick form factor. This compact design enables the user to power the application through the USB port and monitor the voltage resulting from a bridge strain gauge through the GUI interface on a computer. Figure 1 shows the Data Acquisition on a Stick Strain Gauge reference design.

Key Components

- **ISL28134**: 5V, Low Noise, Zero-Drift Op Amp
- **ISL26102**: Low-Noise 24-bit Delta Sigma ADC
- **ISL21010**: Micropower Precision Bandgap Voltage Reference
- **ISL43741**: Differential 4 to 1 Multiplexer
- **ISL22316**: 128 Taps Digital Potentiometer
- **R5F10JBC**: Integrated USB Controller

Graphical User Interface (GUI) Software and USB Drivers

The GUI Software and USB drivers have to be installed on a PC running Windows NT/2000/XP/Vista/Win7 Operation System before connecting the ISLRE-BDGSTKEV2Z evaluation board to the USB port.

The software and a quick video on the operation of this application demo can be downloaded or viewed from the Intersil website (http://www.intersil.com/en/tools/reference-designs/renesas-strain-gauge-reference-design.html). Details of the software can be found in app note AN1834.
Pressure Strain Gauge Signal Conditioning

The strain gauge design is a bridge solution that is able to extract a small sensor signal from a high voltage common mode signal of 10V or higher. Figure 2 shows a simplified schematic of the strain gauge design. The strain gauge design enables the user to measure the strain from an onboard foil strain gauge, or disconnect the onboard foil strain gauge via logic command to the ISL43741 differential MUX, and connect their own external signal to the IN1+ and IN1- inputs. Depending upon the sensor, the gain of the amplifier might need to be adjusted. Adjustment of the gain is accomplished by changing the value of the ISL22316 DCP via the GUI interface.

Reference Documents

- Intersil “DAQ on a Stick, Renesas Thermocouple” App Note: AN1834
- Intersil ISL28134 Data Sheet, FN6957
- Intersil ISL21010 Data Sheet, FN7896
- Intersil ISL26102 Data Sheet, FN7608
- Intersil ISL22316 Data Sheet, FN6186
- Intersil ISL23741 Data Sheet, FN6053
- Renesas R5F10JBC

FIGURE 4. ISLRE-BDGSTKEV2Z EVALUATION BOARD SCHEMATIC