

AD7142 Sensor Board In-Line Production Test Procedure

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INTRODUCTION

This application note describes the in-line testing procedure for the AD7142 sensor board.

Use this procedure to check that the AD7142 sensor board is properly connected to the system host controller board and that the AD7142 sensor board and sensor elements are operating as expected.

PRINCIPLE OPERATION

Figure 1 shows an example circuit diagram for a 3-button sensor board application to be tested. In this example, the sensor buttons (S1, S2, and S3) are connected to STAGE0, STAGE1, and STAGE 2, respectively, as shown in Figure 2.

Once the AD7142 sensor board is powered up and configured, the S1, S2, and S3 sensor output values can be measured via the ADC_RESULTS_Sx registers for each sensor. By monitoring these values, with and without the sensor excitation source (SRC) enabled, the system processor determines if the AD7142 sensor board and sensors are outputting the expected values.

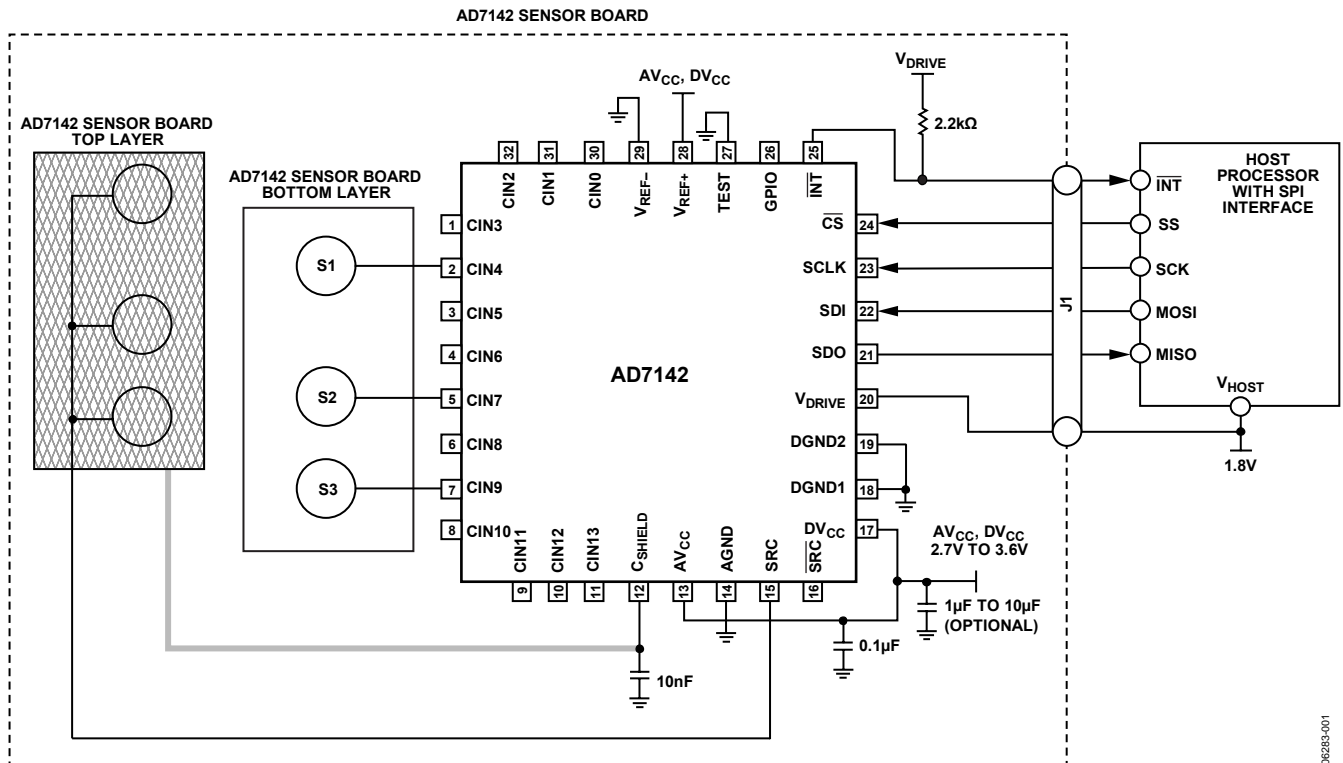


Figure 1. Example of a 3-Button (S1, S2, and S3) Circuit Application

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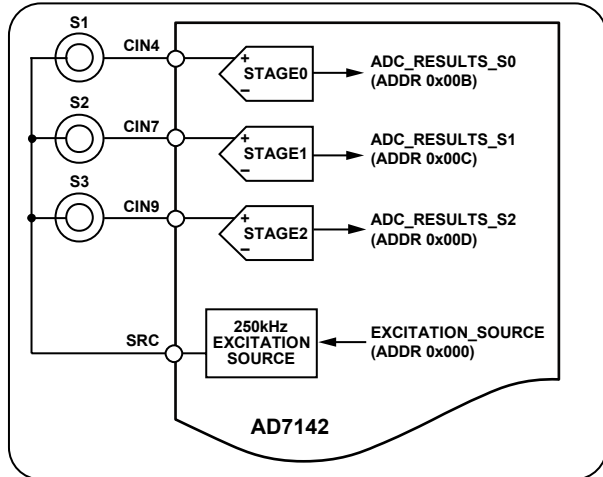


Figure 2. AD7142 3-Button Configuration Example

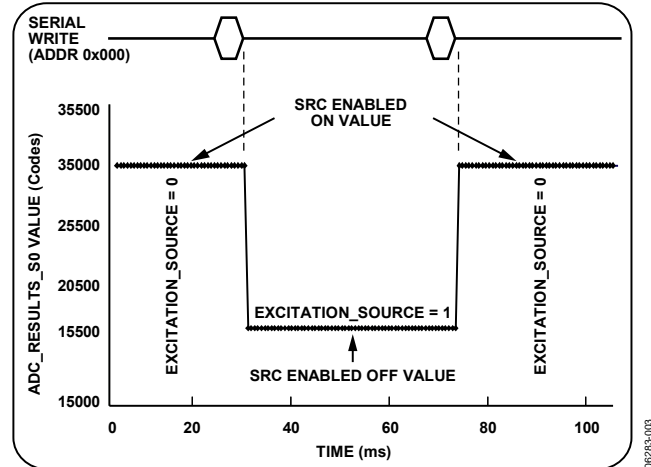


Figure 3. Disabling SRC While Measuring Sensor S0 CDC Output

SENSOR CHARACTERIZATION

The ADC_RESULTS registers are measured while enabling and disabling the SRC. This information is used to determine if the AD7142 sensor board is operating as expected. Therefore, a precharacterization of each sensor on several sensor boards is necessary to obtain an expected range of sensor values.

Sensor Characterization Procedure

The following steps comprise the recommended sensor characterization procedure. Perform this procedure on several known good sensor boards.

1. Power up and configure the AD7142 device.
2. Set the EXCITATION_SOURCE register, located at Register Address 0x000, to 0 to enable the SRC source.
3. Measure and record the ADC_RESULTS_Sx register values for each sensor and store the values as SRC Enabled On.
4. Set the EXCITATION_SOURCE register, located at Register Address 0x000, to 1 to disable the SRC source.
5. Measure and record the ADC_RESULTS_Sx register values for each sensor and store them as SRC Enabled Off.
6. Calculate the mean and standard deviation for the SRC Enabled On and SRC Enabled Off values.

These mean values are used in the in-line production test procedure as described in the In-Line Production Test Procedure section.

IN-LINE PRODUCTION TEST PROCEDURE

1. Install the AD7142 sensor board, connecting it to the host processor.
2. Power up and configure the AD7142 device.
3. Set the EXCITATION_SOURCE register, located at Register Address 0x000, to 0 to enable the SRC source.
4. Measure the ADC_RESULTS_Sx register values for each sensor and compare this value to the mean SRC Enabled On value obtained in Step 3.

Continue to Step 5 if the value is within the expected range.

Otherwise, troubleshoot the sensor board to identify why the value is out of range. Then proceed to Step 5.

5. Set the EXCITATION_SOURCE register, located at Register Address 0x000, to 1 to disable the SRC source.
6. Measure the ADC_RESULTS_Sx register values for each sensor and compare this value to the mean SRC Enabled Off value obtained in Step 5.

If the value is within the expected range, the test is complete.

Otherwise, troubleshoot the sensor board to identify why the value is out of range.

Figure 3 shows an example of the ADC_RESULTS_S0 register while enabling and disabling the EXCITATION_SOURCE for Sensor Button S1.