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ams SPI Configuration AN001003 Instruction Manual

Application Note
AN001003
AS8579
SPI Configuration (Quick Setup)
v1-00 · 2020-Dec-24

Contents

Introduction

This application note describes minimum necessary configuration for measurement setup and gives a rough overview of configurable parameters, which can be set over SPI Interface.

The parameter values are dependent on the load and its application. This application note gives a general overview and help at first quick evaluation.
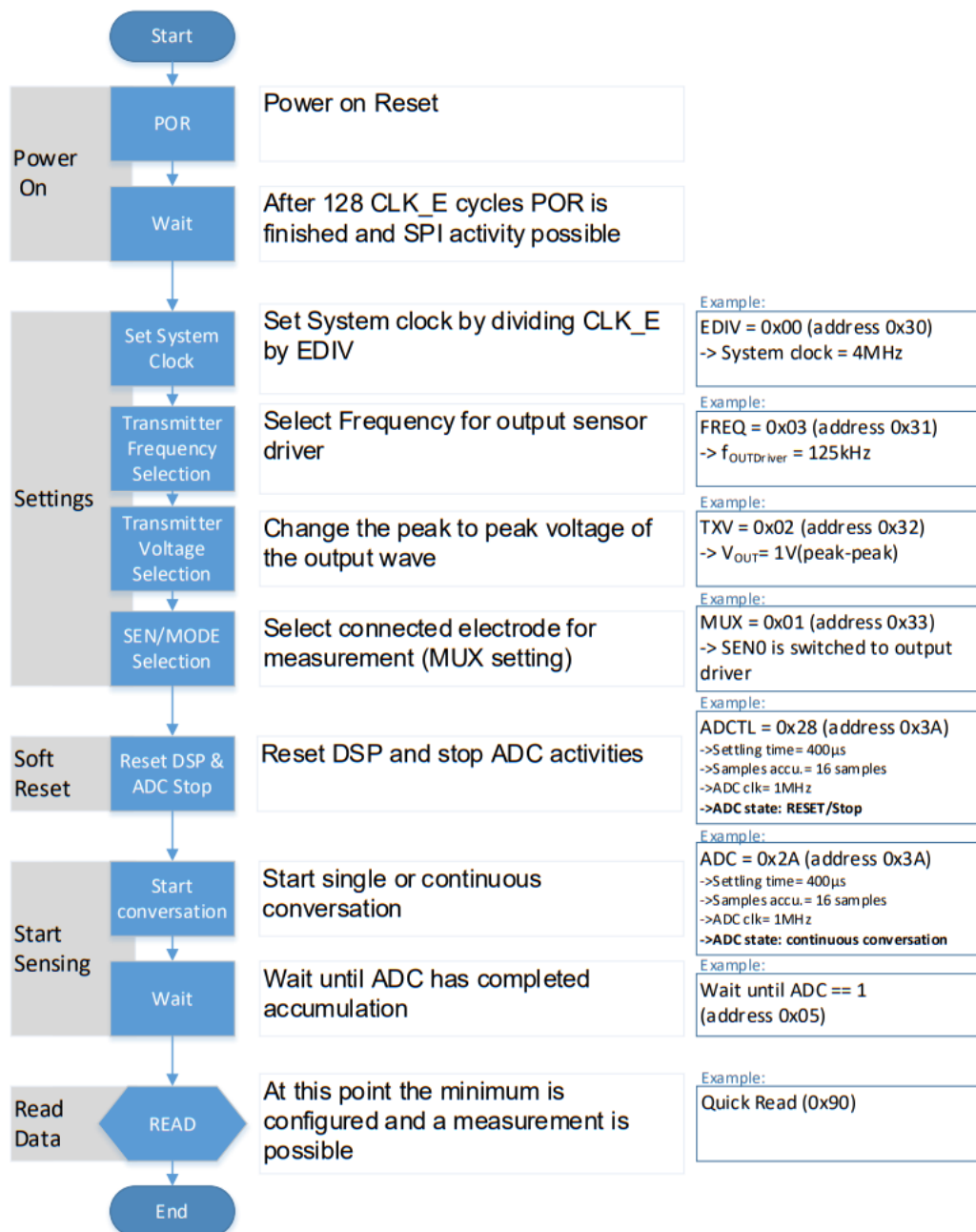
Figure 1:
Application Circuitry – Minimum Circuitry for Evaluation

System Parameters Overview

Figure 2:
Block Diagram and Configurable Parameters

Figure 3:
Configurable Parameters

| Name	Description
TXV	Sensor Driver Voltage Selection
SDG	Shield (VAR_SEN) Gain Selection: programmable scaling factor for shielding (e.g.: cable shielding)
MUX	Control of internal connection of SEN-channels
CBG	Current Buffer Gain Selection: programmable scaling factors for trans-impedance amplifier (current – voltage conversion)
DCLK	Demodulation clock frequency for I and Q-path
PGA	PGA voltage Gain. Adjusts the input voltage to the ADC to optimize its conversion resolution.
OFFSET_I PGA	The offset compensates for the parasitic offsets in the sensor system and allows shifting DC operating point in order to maximize the ADC range.
OFFSET_Q PGA	
ADCTL	ADC Control

Initialization

Figure 4:
Starting Sequence with Minimum Configurations

Flowchart

Power On
- **POR** → Power on Reset
- **Wait** → After 128 CLK_E cycles POR is finished and SPI activity possible

Settings
- **Set System Clock** → Set System clock by dividing CLK_E by EDIV

  Example:
  EDIV = 0x00 (address 0x30)
  -> System clock = 4MHz

- **Transmitter Frequency Selection** → Select Frequency for output sensor driver

  Example:
  FREQ = 0x03 (address 0x31)
  -> $f_{OUTDriver}$ = 125kHz

- **Transmitter Voltage Selection** → Change the peak to peak voltage of the output wave

  Example:
  TXV = 0x02 (address 0x32)
  -> V_{OUT} = 1V(peak-peak)

- **SEN/MODE Selection** → Select connected electrode for measurement (MUX setting)

  Example:
  MUX = 0x01 (address 0x33)
  -> SEN0 is switched to output driver

Soft Reset
- **Reset DSP & ADC Stop** → Reset DSP and stop ADC activities

  Example:
  ADCTL = 0x28 (address 0x3A)
  ->Settling time= 400µs
  ->Samples accu.= 16 samples
  ->ADC clk= 1MHz
  ->ADC state: RESET/Stop

Start Sensing
- **Start conversation** → Start single or continuous conversation

  Example:
  ADC = 0x2A (address 0x3A)
  ->Settling time= 400µs
  ->Samples accu.= 16 samples
  ->ADC clk= 1MHz
  ->ADC state: continuous conversation

- **Wait** → Wait until ADC has completed accumulation

  Example:
  Wait until ADC == 1
  (address 0x05)

Read Data
- **READ** → At this point the minimum is configured and a measurement is possible

  Example:
 Quick Read (0x90)

End

Example

The AS8579 is using a standard SPI Interface to write and read the Registers. To configure the AS8579 properly for a continuous readout, please perform the following steps.
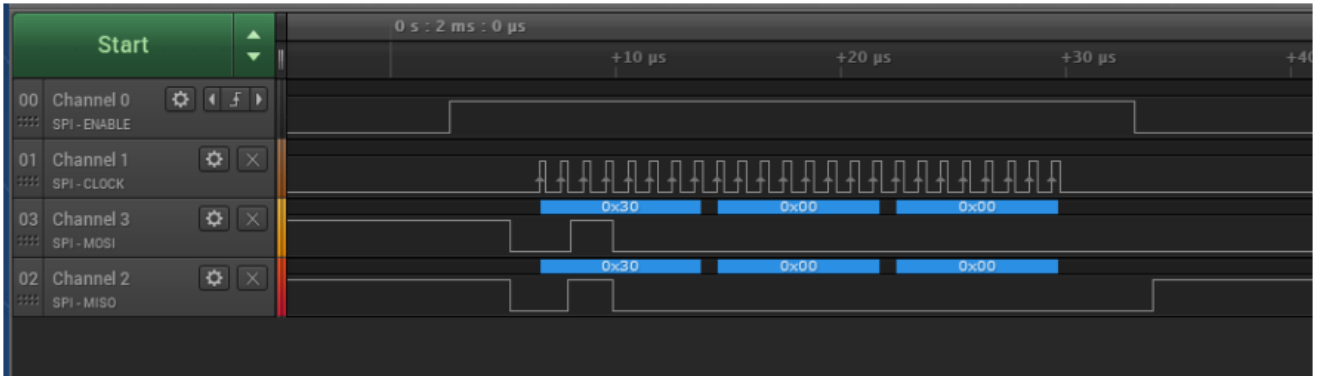After configuring all this settings the sensor can be read out permanently.

1. Verify SPI Communication (Read Sensor ID)
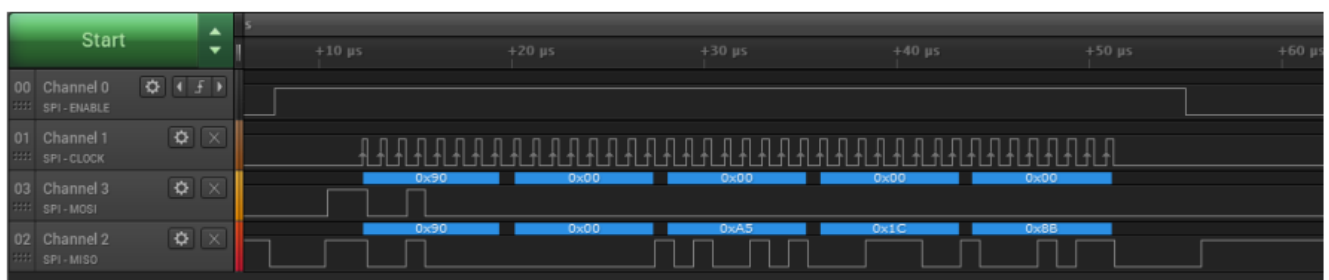
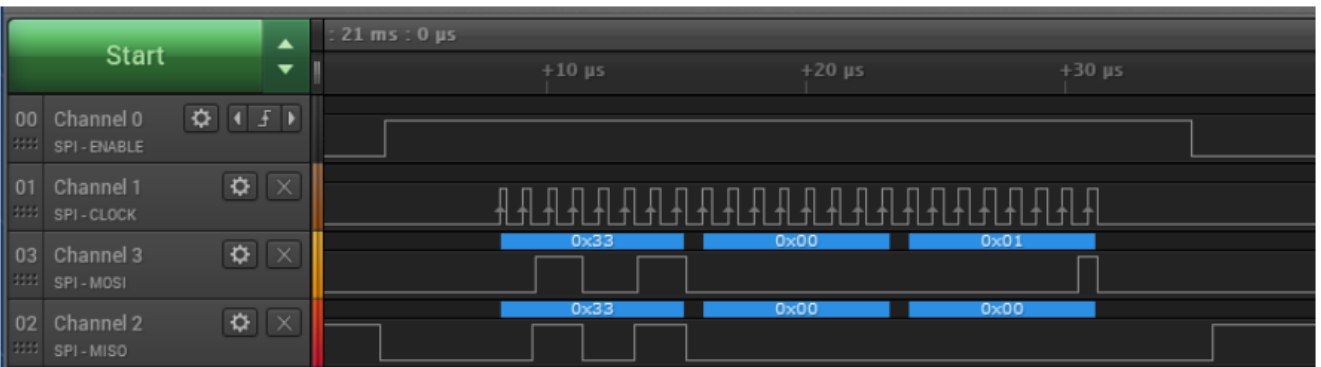2. SET EDIV Register (Address 0x30) to 0x00 –> set ECLK=4 MHz
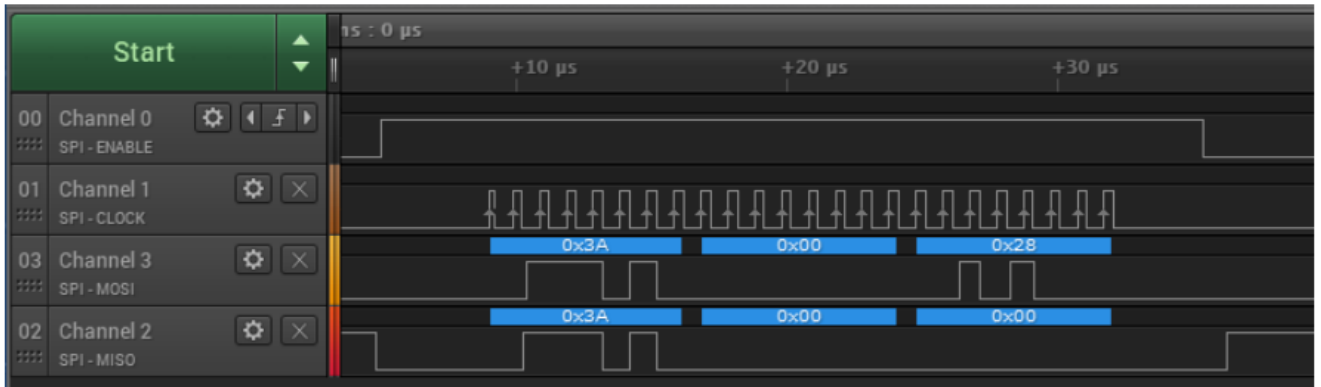
3. SET FREQ Register (Address 0x31) to 0x03 –> set fOUTDriver=125 kHz

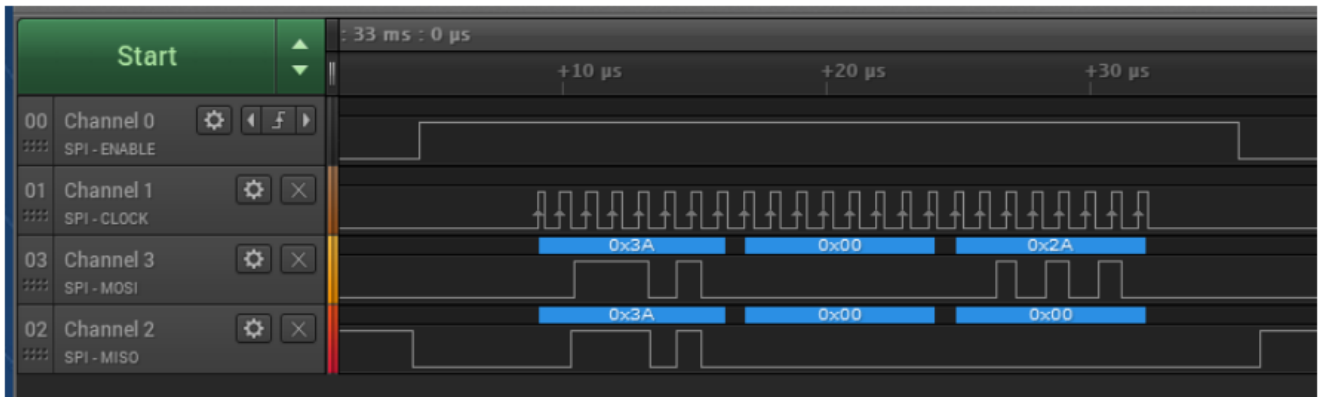4. SET TXV Register (Address 0x32) to 0x02 –> VOUT=1Vp-p

5. SET SEN0 Line to the Sensor Driver (enable SEN0 Line) (Address 0x33; Value 0x01)
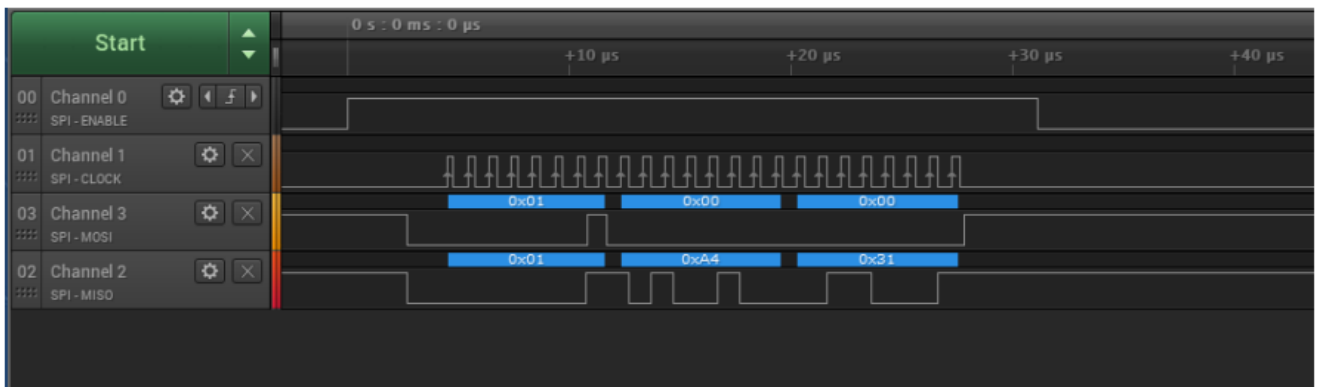

6. Reset DSP & ADC Stop (Write 0x28 into Address 0x3A)

7. Start Continuous Conversation (write 0x2A into address 0x3A)

8. Wait for ADC complete Bit (Address: 0x05 / Value: 0x01)

9. Perform Readout (Command: 0x90 / 5 Bytes transferred)

Revision Information

Initial version————————————————
————————————————————————-

- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- Correction of typographical errors is not explicitly mentioned.

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