User Guide

UG000424

AS6500-DK

Development Kit

Hardware and Graphical User Interface

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Content Guide

1 Introduction 3

1.1 Kit Content & Ordering Information 3

2 Quick Start Guide 4

2.1 Manual Driver Installation 5

3 Hardware Description 7

3.1 Introduction 7

3.2 Communication Interface 8

4 Software Description 9

4.1 Main Window 9

4.2 Menu & Support Windows 11

5 Schematics, Layers and BOM 14

6 Revision Information 17

7 Legal Information 18

1 Introduction

1.1 Kit Content & Ordering Information

Figure 1:
Kit Content

AS6500-QF_DK_RB (Based on AS6500 in QFN40 package)

Cable connecting board and PICOPROG

PICOPROG V3.0 (Programmer and interface)

USB cable (Connects PICOPROG V3.0 to PC)

Please download the latest software for the kit from
https://download.ams.com/SPECIALTY-SENSORS/AS6500

Ordering Code	Part Number	Description
AS6500-QF_DK	221050003	AS6500 Demo Kit including PICOPROG and cables
AS6500-QF_DK_RB	221050002	AS6500 Reference board

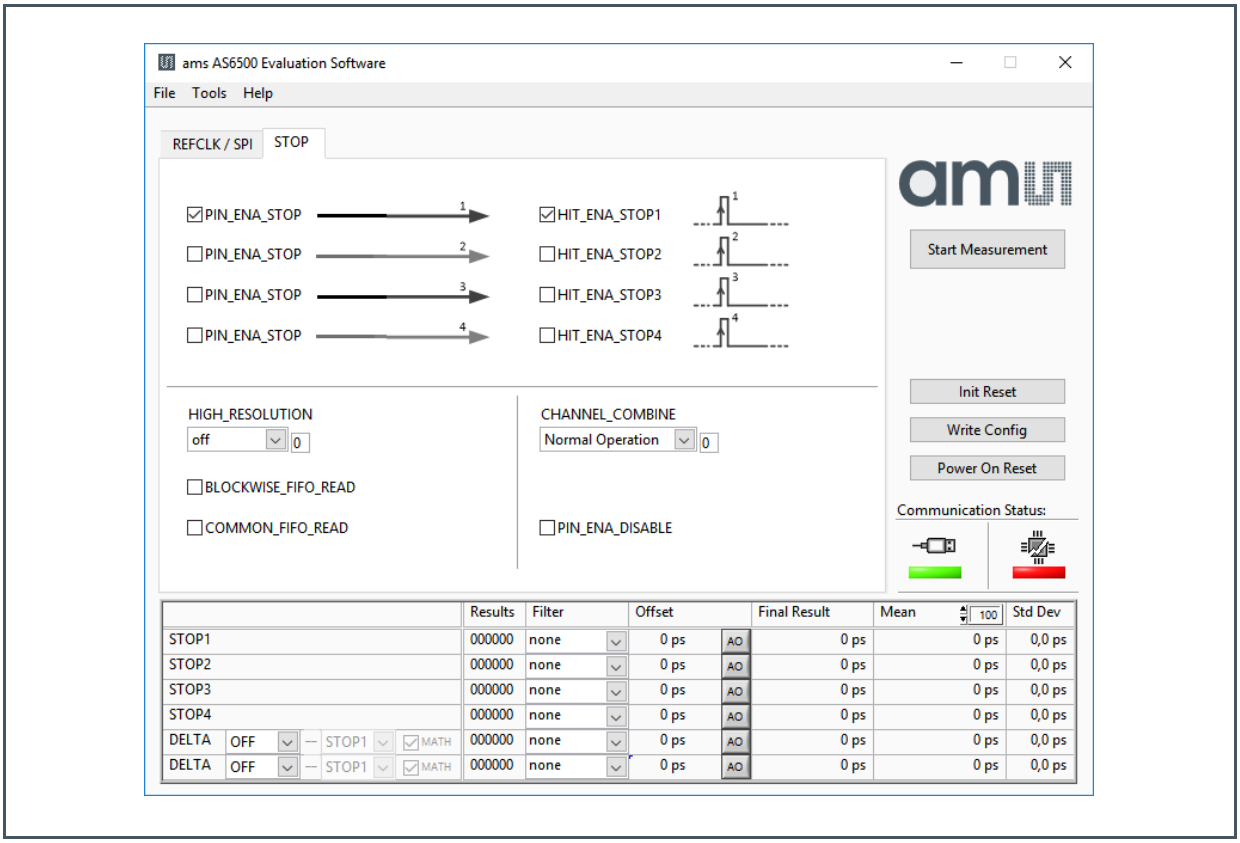
2 Quick Start Guide

This section describes how to quickly set up the AS6500-DK, establish basic operation and make measurements.

- It is crucial to install the software before connecting the development kit to your computer: https://download.ams.com/SPECIALTY-SENSORS/AS6500
- Unzip the package to the desired directory, open “setup.exe” and follow the instructions on the screen
- Connect the PICOPROG V3.0 to the computer using the USB cable and connect the board to the PICOPROG using the DB15 connector cable.
- Quick Start for Initial Measurements

From the “**Start**” menu, go to “**All Programs**” and then to the “**ams AG**” directory. Click the “**AS6500 Evaluation Software**” icon to begin execution of the evaluation software. The following screen should appear:

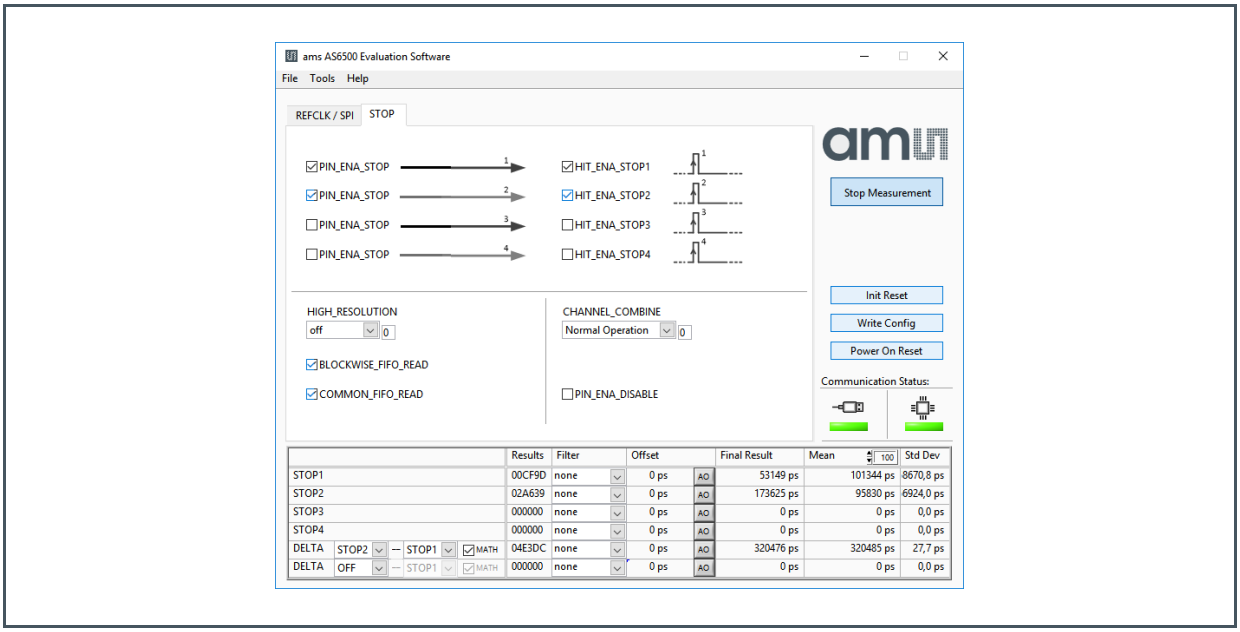
Figure 2 :
Opening Page



- First click “**Power On Reset**”, “**Write Config**” and “**Init Reset**”.
  The lights for the communication status should both become green.
- Enable the channels that are used.
- Check the REFCLK/SPI page settings
- Connect your signal source
- Press “**Start Measurement**”

At this point, after successful completion of the above steps, a basic operation of the development kit should be possible.

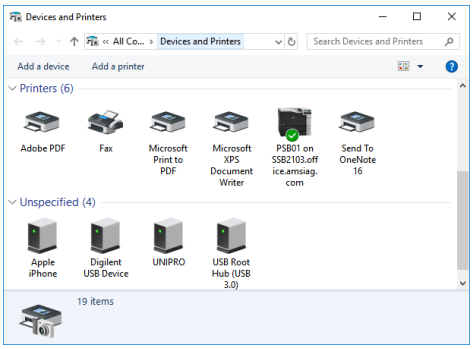
Figure 3:
Setup Window



2.1 Manual Driver Installation

If PICOPROG is not displayed correctly then go to the drivers folder, e.g. *C:\Program Files\ams AG\AS6500 Evaluation Software* and install the driver for your operating system manually.

Figure 4:
Device Manager

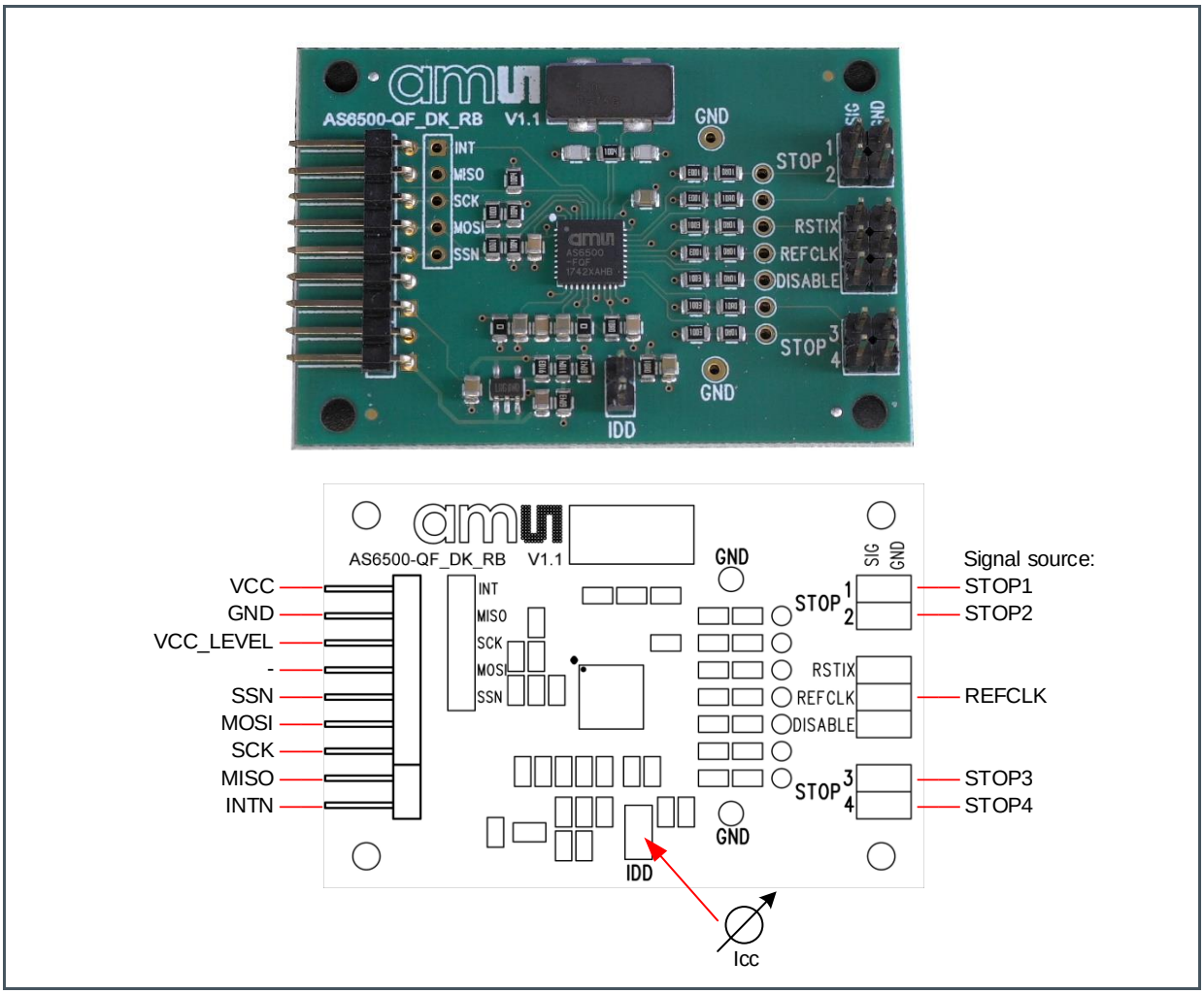


3 Hardware Description

3.1 Introduction

The AS6500-QF_DK_RB board, shown in Figure 5, is a basic board for the 4-channel time-to-digital converter AS6500. The reference clock can be applied from external via pin or from the on-board 4 MHz quartz oscillator (X1).

Figure 5:
AS6500-QF_DK_RB



3.2 Communication Interface

The PICOPROG device is a USB-to-SPI converter box that interfaces all UFC evaluation systems. The PICOPROG is registered by the operating system initially as “PICOPROG v2.0 unprogrammed”. As soon as the AS6500-QF_DK_RB evaluation software starts, a special firmware is written into the PICOPROG to handle the SPI communication with the AS6500-DK. The PICOPROG is now listed as “UNIPRO” in the device manager. For SPI communication only, PICOPROG version 2.0 is sufficient.

The flat connector connecting the PICOPROG and the AS6500-QF_DK_RB. includes the power lines and the SPI communication lines. VCC_LEVEL is the voltage feedback for the PICOPROG level shifters.

4 Software Description

4.1 Main Window

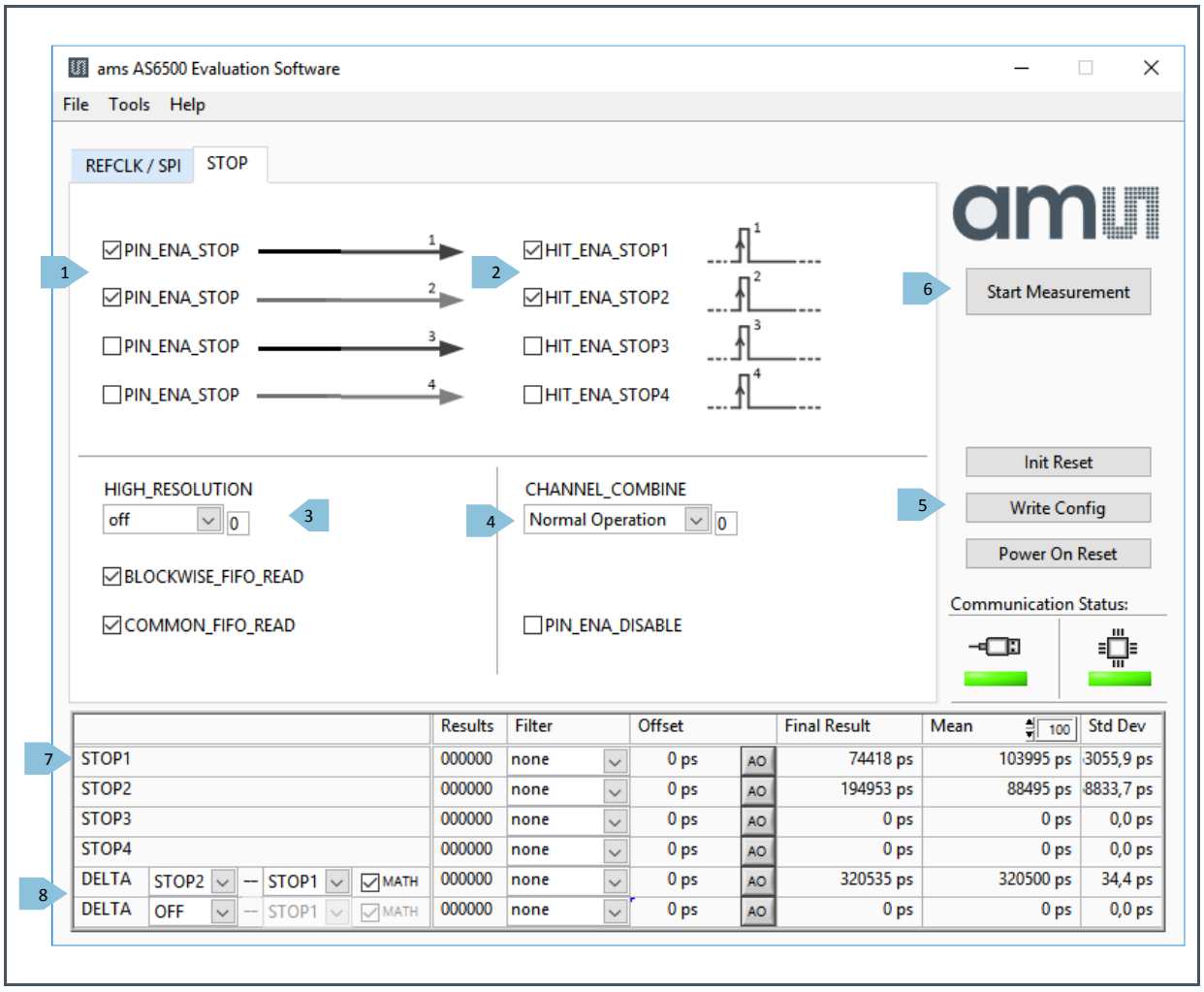
The main windows shows two pages for configuration and result display:

4.1.1 Stop Page

On this window major settings are made:

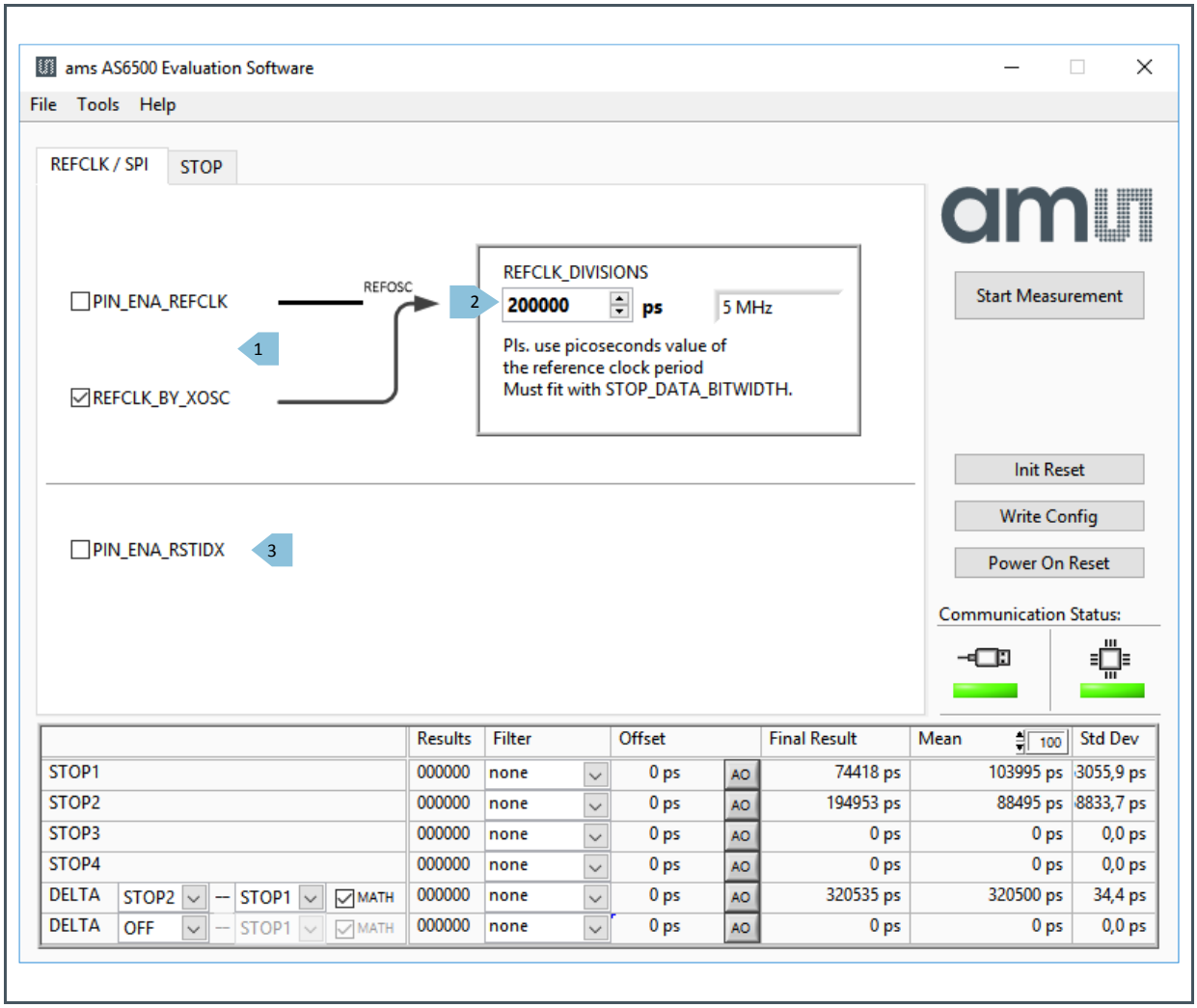
1. Selects the input pins that are used in the application
2. Enable the internal measurement channels. Each pin refers to minimum one internal channel. Two will be needed in case of channel combination.
3. Select the resolution. High resolution achieves a betters single-shot rms noise, but at the cost of pulse-pair resolution.
4. Selects optional channel combination
   This can be for better pulse-pair resolution or for pulse width measurement. Both options demand internally two channels per stop pin.
5. Having done the settings, download the configuration and initialize the chip.
6. Start the measurement.
7. At the bottom the results for the four stop channels are displayed.
8. In many cases the differences between the channels are of interest. This can be activated here.

Figure 6:
Stop Page



4.1.2 REFCLK/SPI Page

Figure 7:
REFCLK/SPI Page



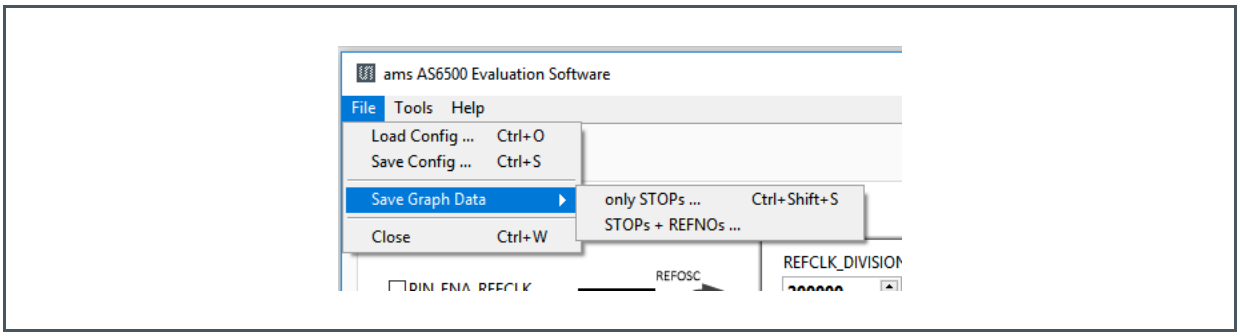
4.2 Menu & Support Windows

Beside main window, the software menu allows the opening of other windows. There are some menu items which are redundant to available buttons of main window.

4.2.1 File

- Load Config
  This dialog box allows the path selection of a configuration file, covering the register settings, necessary for a proper configuration of the AS6500. After opening this file, the control settings are updated in the GUI.
- Save Config
  This menu item allows the saving of the current GUI control settings into a configuration file
- Save Graph Data
  Allows to store the measurement data as they are stored in the data buffer for the graphical display. It is possible to store the STOP data only or the STOP together with the reference numbers.

Figure 8:
File Menu

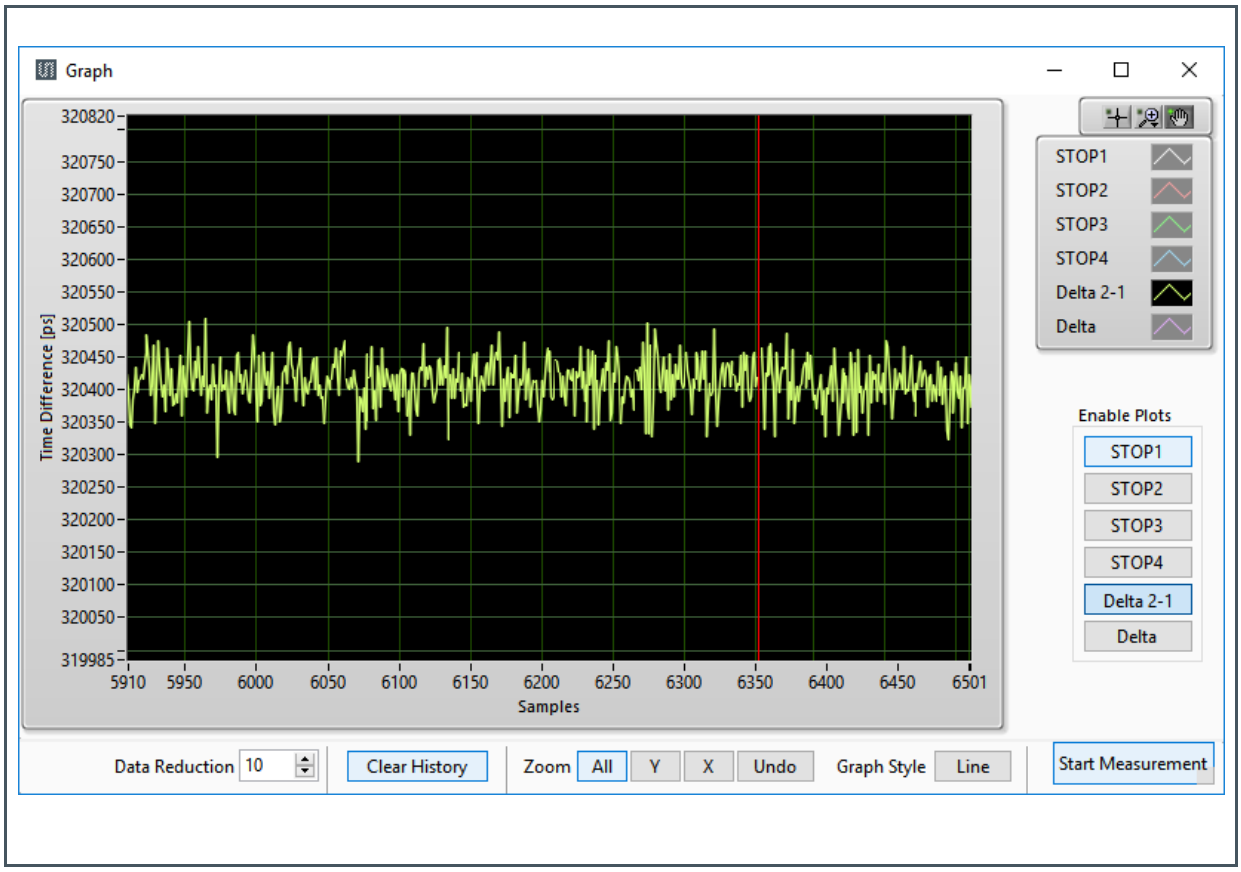


- Close
  Close all open windows of the AS6500-QF_DK Evaluation software.

4.2.2 Tools

- Run Measurement
  Same function as “Start/Stop Measurement” button in “Measurement” tab of main window.
- Graph…
  Opens the window for a graphical display of the measurement data

Figure 9:
Graph Window



- Registers
  Opens a separate window for the display and setting of the configuration registers and the display of the read registers.

Figure 10:
Configuration Registers

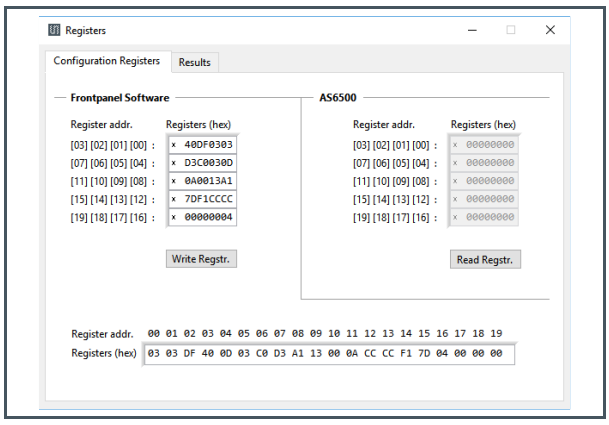
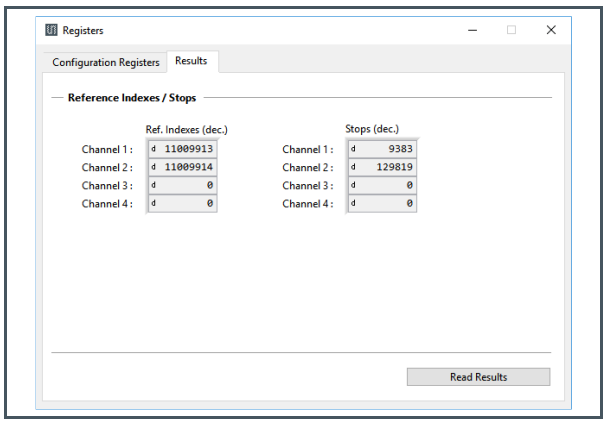


Figure 11:
Result Registers



5 Schematics, Layers and BOM

Figure 12:
AS6500-QF_DK_RB Schematics

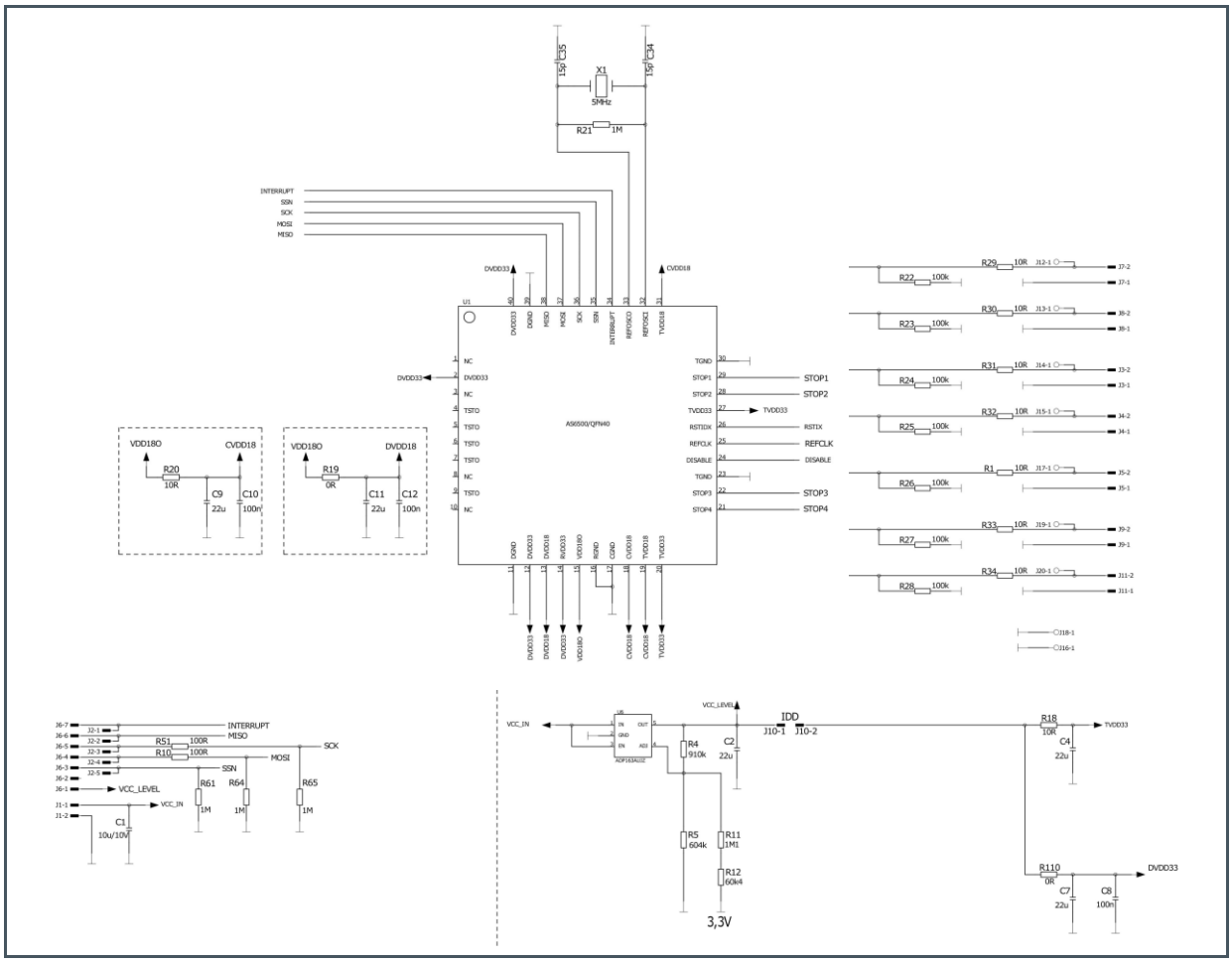


Figure 13:
AS6500-QF_DK_RB Layout & Assembly

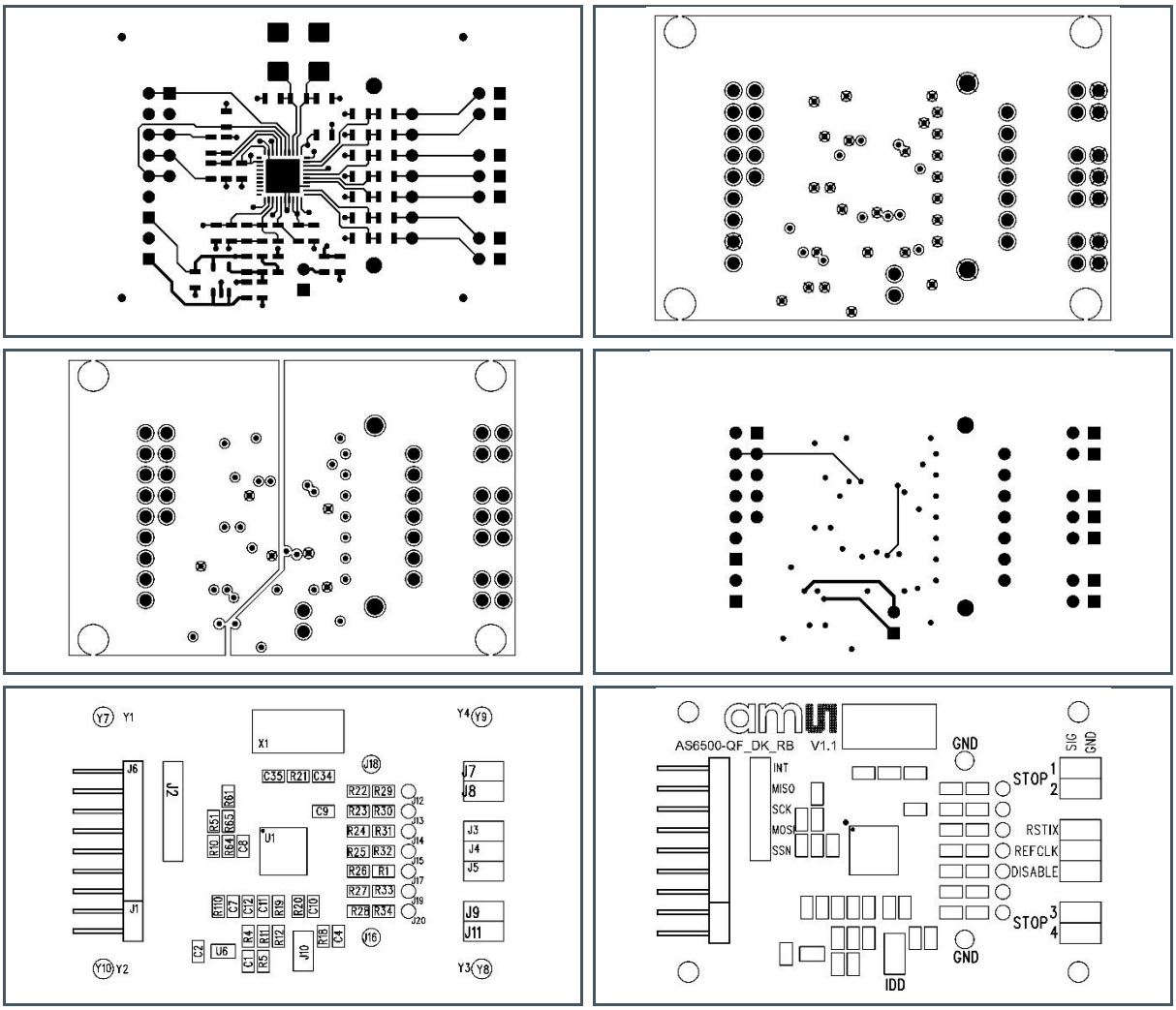


Figure 14:
Bill of Materials for AS6500-QF_DK_RB

Item	Qty	Reference	Value	Part Desc	Type
1	1	U1	AS6500	QFN40	AS6500 TDC **ams**
2	1	U6	3.0 V	ADP163AUJZ	Linear regulator, Analog Devices
3	1	X1	5 MHz	KX-20	Quartz crystal Geyer
4	3	C8, C10, C12	100 nF	0805	Chip capacitor
5	2	C34,C35	15 pF	0805	Chip capacitor
6	5	C2,C4,C7,C9,C11	22 µF	0805	Chip capacitor
7	2	R19,R110	0 Ω	0805	Chip resistor

Item	Qty	Reference	Value	Part Desc	Type
8	2	R10,R51	100 Ω	0805	Chip resistor
9	7	R22,R23,R24,R25,R26,R27,R28	100 kΩ	0805	Chip resistor
10	9	R1,R18,R20,R29,R30,R31,R32,R33	1 MΩ	0805	Chip resistor
11	4	R21,R61,R64,R65	1.1 MΩ	0805	Chip resistor
12	1	R5	604 kΩ	0805	Chip resistor
13	1	R12	60.4 kΩ	0805	Chip resistor
14	1	R4	910 kΩ	0805	Chip resistor
15	1	R8	10 MΩ	0805	Chip resistor
16	1	J6	7 x 1 x 90°		2.54
17	1	J1	2 x 1 x 90°		2.54
18	1	J2	5 x 1 x 180°		2.54

6 Revision Information

Changes from previous version to current revision v1-00	Page
First edition	All

- 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.

7 Legal Information

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