User Guide

UG000458

AS5715R_PB_2.1

Evaluation Programmer Board

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Content Guide

1 Introduction

This document describes how to use the AS5715_PB_x.x programmer board (SAP: 990601073) together with the AS5715-TS_EK_AB adapter board (SAP: 990601011). These two boards were developed to allow a quick and easy evaluation of the functionality of the AS5715R inductive position sensors.

1.1 Kit Content

- 1 x AS5715R evaluation programmer board
- 1 x USB cable
- 1 x 6 pin ribbon cable

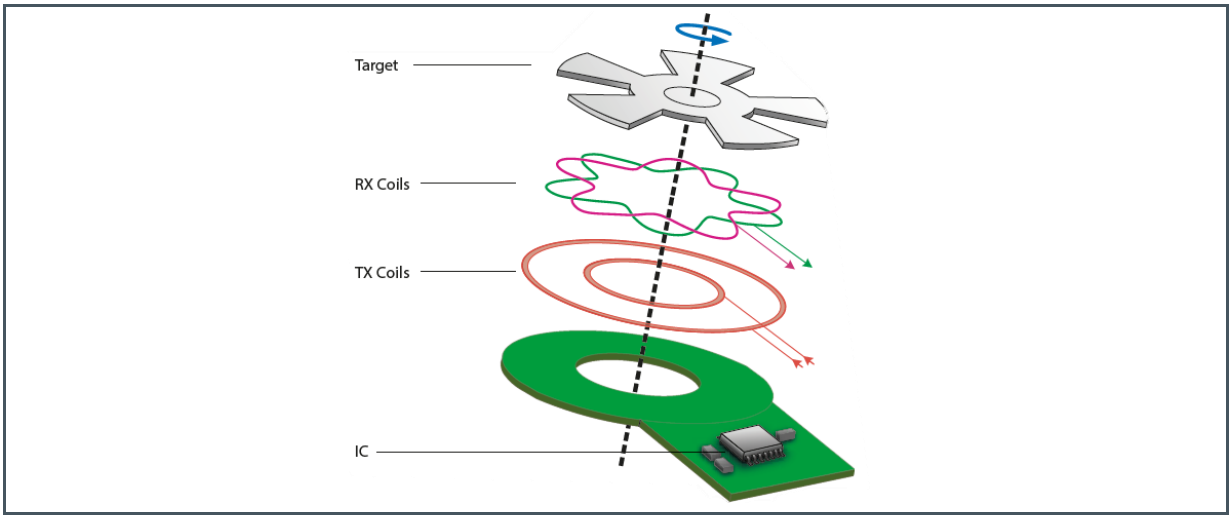
1.2 Ordering Information

Ordering Code	Description
AS5715_PB_2.1	AS5715R Evaluation Programmer Board

2 Hardware Description

Figure 1 shows an inductive position sensor system, like the one that is integrated on the AS5715-TS_EK_AB. It consists of the AS5715R sensing IC, a coil system and a target. The coil system consists of one transmitting coil (TX Coil) and two receiving coils (RX Coil). The coils are connected to the AS5715R device which is soldered on the AS5715-TS_EK_AB.

Figure 1:
Inductive Position Sensing System

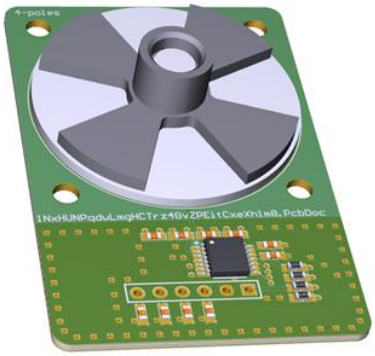


2.1 Adapter Board

The AS5715-TS_EK_AB adapter board is out of the box a fully functional inductive position sensing system with an analog differential SIN/COS output.

For detailed information have a look on our webpage www.ams.com/as5715rreferenceboard

Figure 2:
AS5715-TS_EK_AB Reference Board



To allow a quick evaluation of the AS5715 device, **ams** offers additionally the AS5715_BP_x.x evaluation programmer with accompanying evaluation software.

2.2 Power Supply AS5715_PB_x.x Evaluation Programmer Board

The AS5715_PB_x.x evaluation programmer board is designed to be connected to the adapter board and to a PC.

Figure 3:
AS5715_BP_x.x Top View

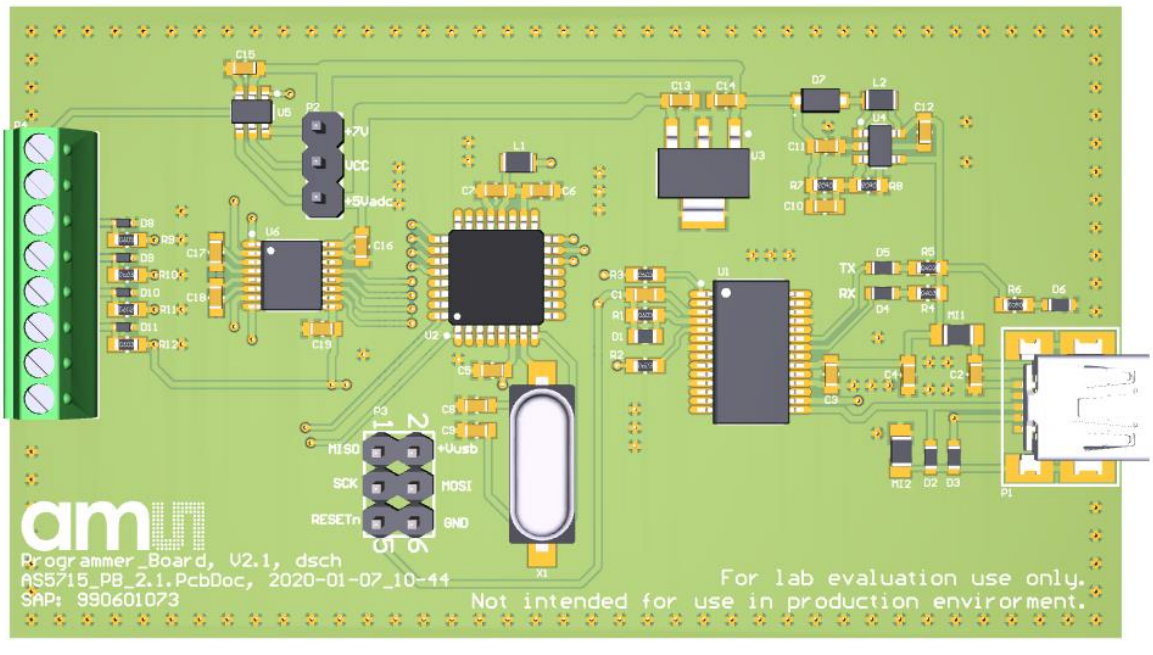


Figure 4:
AS5715_BP_x.x Bottom View

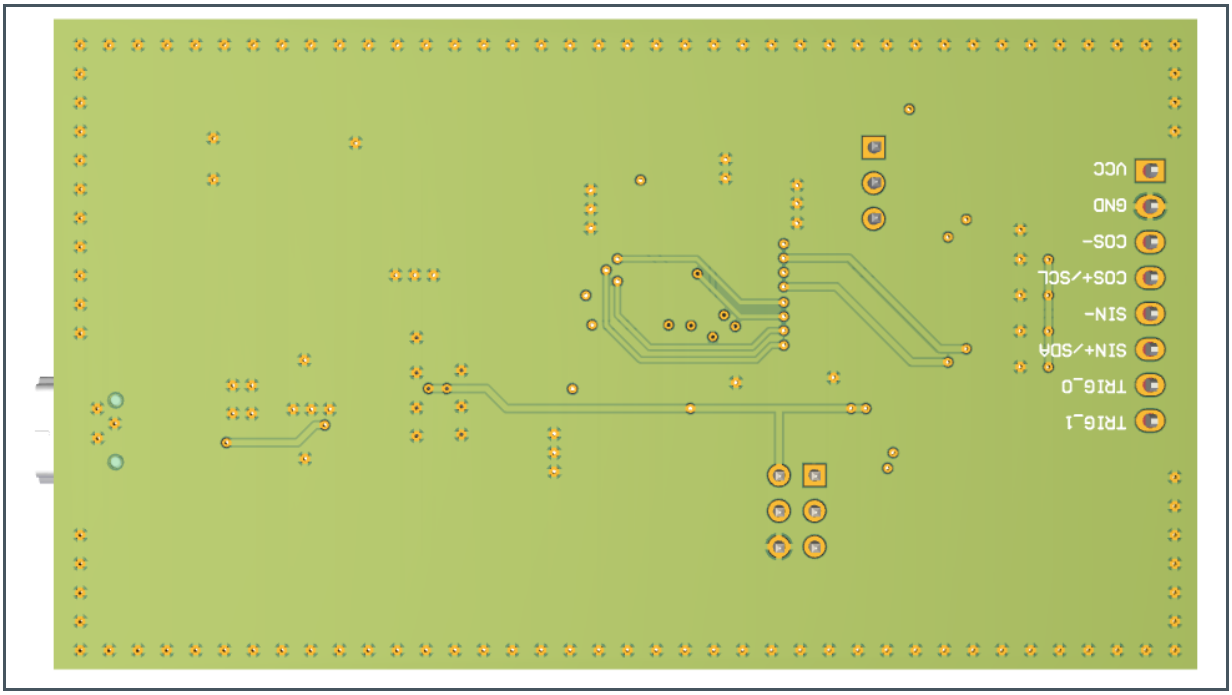


Figure 5:
AS5715_BP_x.x Assembly Plan

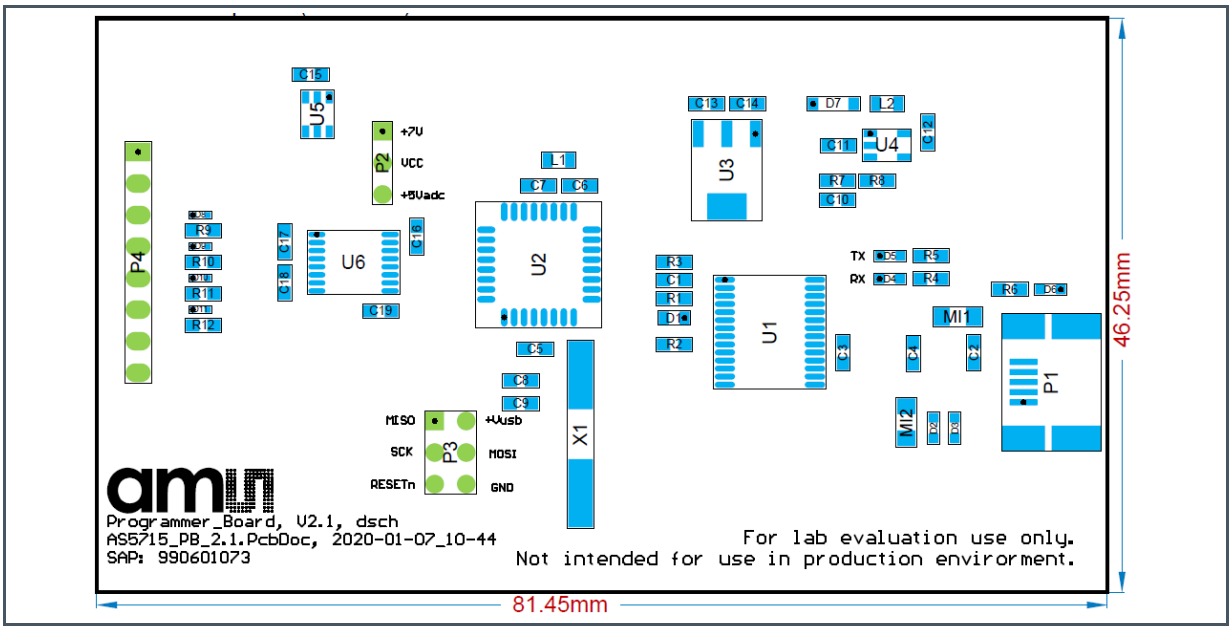
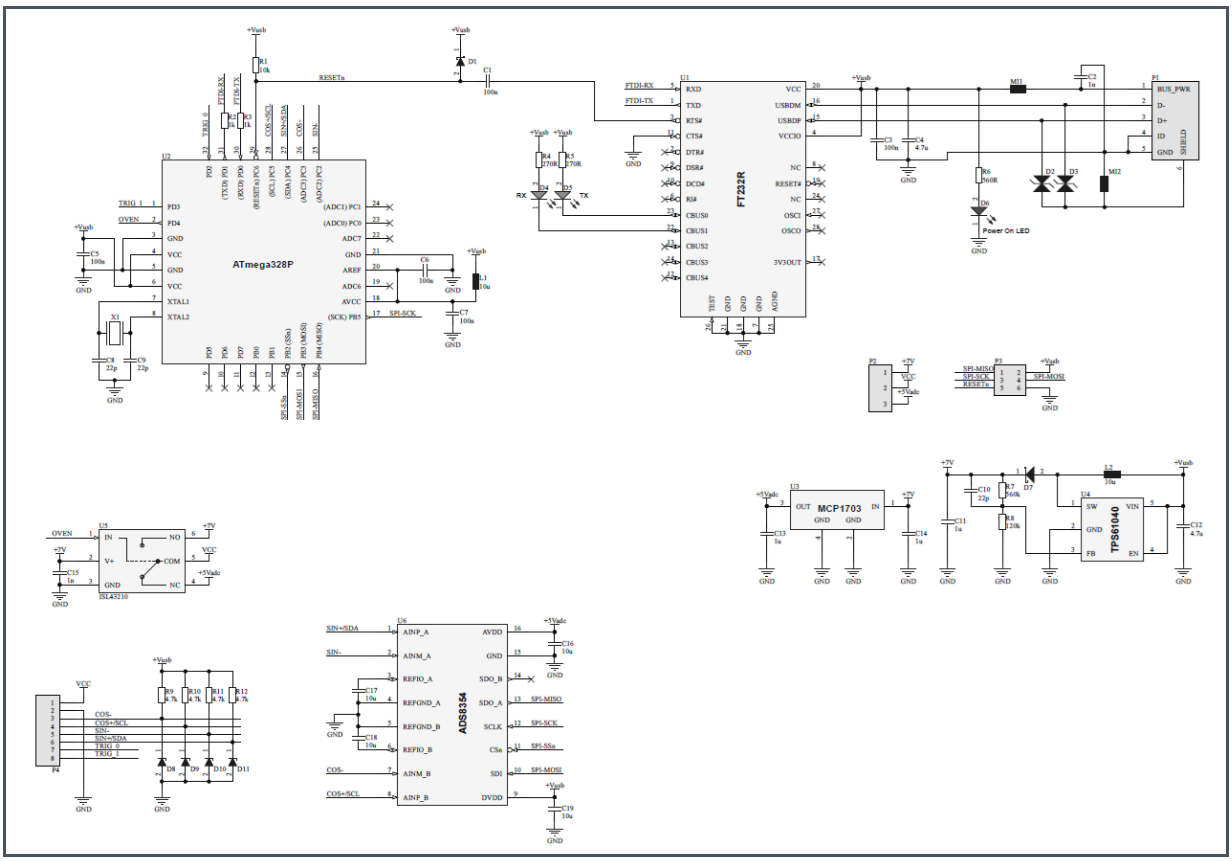


Figure 6:
AS5715_BP_x.x Bill of Materials

Line #	Designator	Comment	Quantity	Supplier 1	Supplier Part Number 1
1	C1, C3, C5, C6, C7	100n	5	Farnell	
2	C2, C15	1n	2	Farnell	
3	C4, C12	4.7u	2	Farnell	
4	C8, C9, C10	22p	3	Farnell	
5	C11, C13, C14	1u	3	Farnell	
6	C16, C17, C18, C19	10u	4	Farnell	
7	D1	CD0603-B0340R	1	Farnell	2807975
8	D2, D3	PGB1010603	2	Farnell	1757240
9	D4, D5	LED_YELLOW-GREEN	2	Farnell	2507528
10	D6	LED_RED	1	Farnell	1685094
11	D7	MBR0530	1	Farnell	2463401
12	D8, D9, D10, D11	VDZFHT2R5.1B	4	Farnell	2772493
13	L1, L2	10u	2	Farnell	2215635
14	MI1, MI2	Ferrite	2	Farnell	2292459
15	P1	USB_B_MINI_Socket_SMD_01	1	Farnell	1125348
16	P2	Header 3	1	Farnell	1593412
17	P3	Header 3X2	1	Farnell	1593440
18	P4	Header 8	1	Farnell	1725711
19	R1	10k	1	Farnell	
20	R2, R3	1k	2	Farnell	
21	R4, R5	270R	2	Farnell	
22	R6	560R	1	Farnell	
23	R7	560k	1	Farnell	
24	R8	120k	1	Farnell	
25	R9, R10, R11, R12	4.7k	4	Farnell	
26	U1	FT232R	1	Farnell	1146032
27	U2	ATmega328P	1	Farnell	2425124
28	U3	MCP1703	1	Farnell	1627178
29	U4	TPS61040	1	Farnell	1461061
30	U5	ISL43210	1	Farnell	2843181
31	U6	ADS8354	1	Mouser	595-ADS8354IPWR
32	X1	16 MHz	1	Farnell	1842293

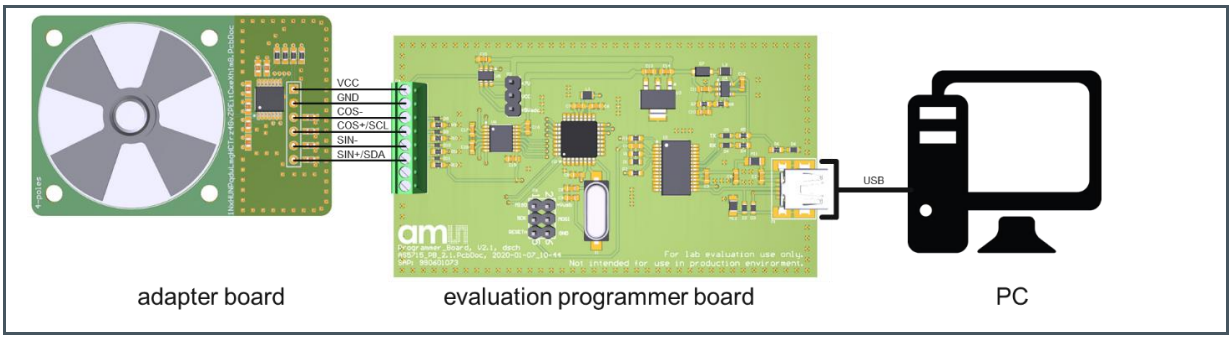
Figure 7:
AS5715_BP_x.x Schematic



2.3 Connecting Adapter Board and Evaluation Programmer Board

The boards can be connected as shown in Figure 8.

Figure 8:
Connecting Programmer Board and Adapter Board



When the evaluation programmer board is connected to the PC, then the red power on LED will light up.

3 Software

The **AS5715_EvalSW_Vx.x** evaluation software is the user interface for the evaluation programmer board.

It provides the following functions:

- Measure voltages on the SIN/COS outputs
- Calculate an angle from the measured voltages
- Read and write the registers of the AS5715 device
- Burn the OTP of the AS5715 device

The evaluation software was developed with LabVIEW. **ams** can provide its source code on request. Also, the firmware of the evaluation programmer can be provided.

AS5715_EvalSW_Vx.x evaluation software is the user interface for the evaluation programmer board.

3.1 Installation

The AS5715_EvalSW_Vx.x evaluation software is distributed as .exe file and does not need to be installed. The software however needs drivers and runtime environments to work properly.

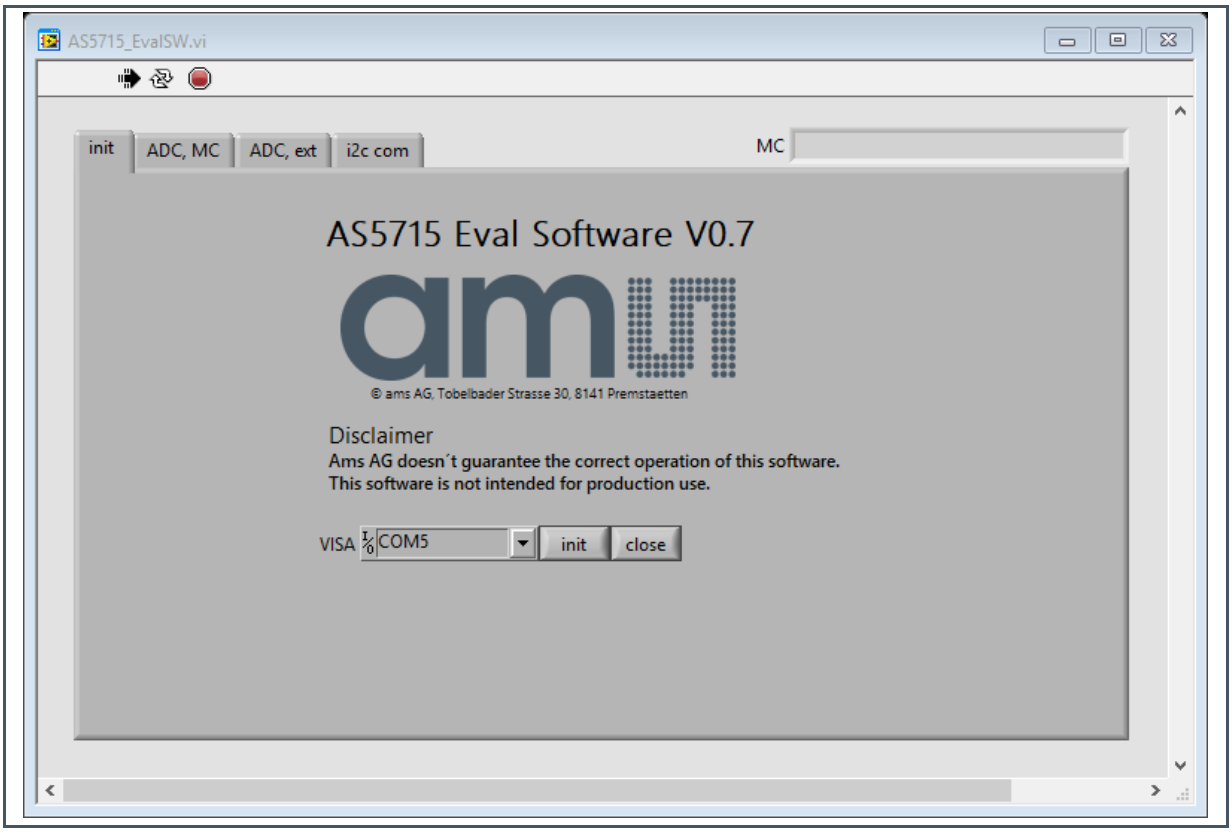
Following drivers and runtime environments need to be installed before it can be used:

1. LabVIEW runtime engine
2. LabVIEW visa drivers
3. FTDI driver (usually not needed with Windows 10 or higher)

After that, the evaluation software will start after a double click on the icon.

3.2 User Interface Description

Figure 9:
User Interface of the Evaluation Software

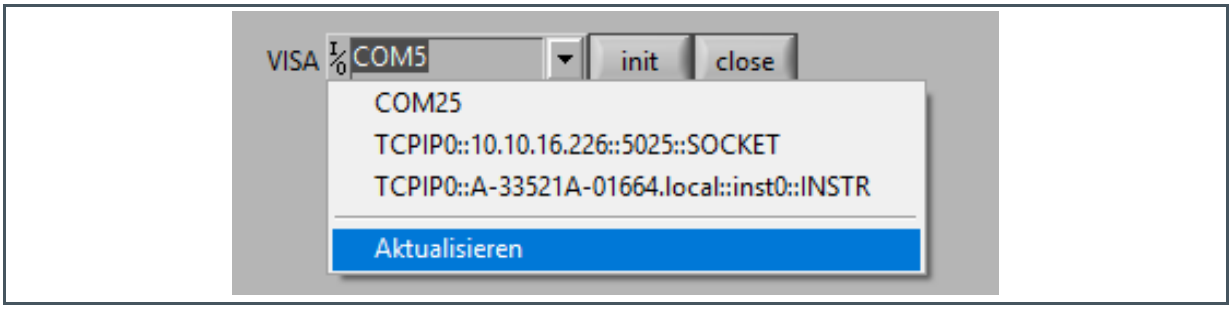


3.2.1 Initializing the Evaluation Programmer Board

Before the software can be used the hardware needs to be selected in the VISA control and initialized with the **init** button.

1. A new COM port will appear after the VISA control is refreshed.

Figure 10:
New COM Port Window



2. Select the desired COM port of the evaluation programmer board and click the init button.

Figure 11:
COM Port Selection

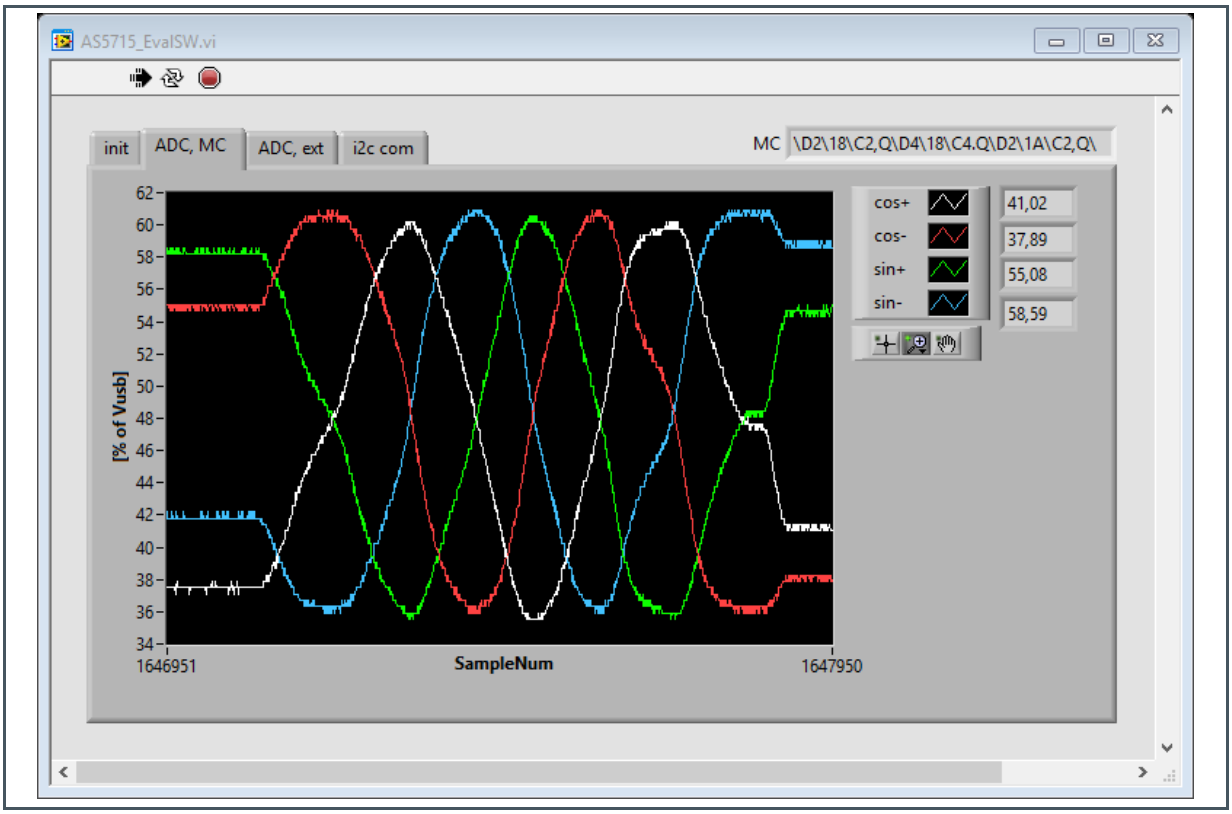
3. If the initialization was successful, the evaluation software displays the firmware version of the evaluation programmer board on the MC indicator. In this case the firmware version v0.7 was detected.

Figure 12:
Display of Firmware Version

3.2.2 ADC, MC

In this tab the 4 analog outputs are visualized. All 4 voltages are measured from the outputs to ground. The ADC of the ATmega328P is used for this purpose.

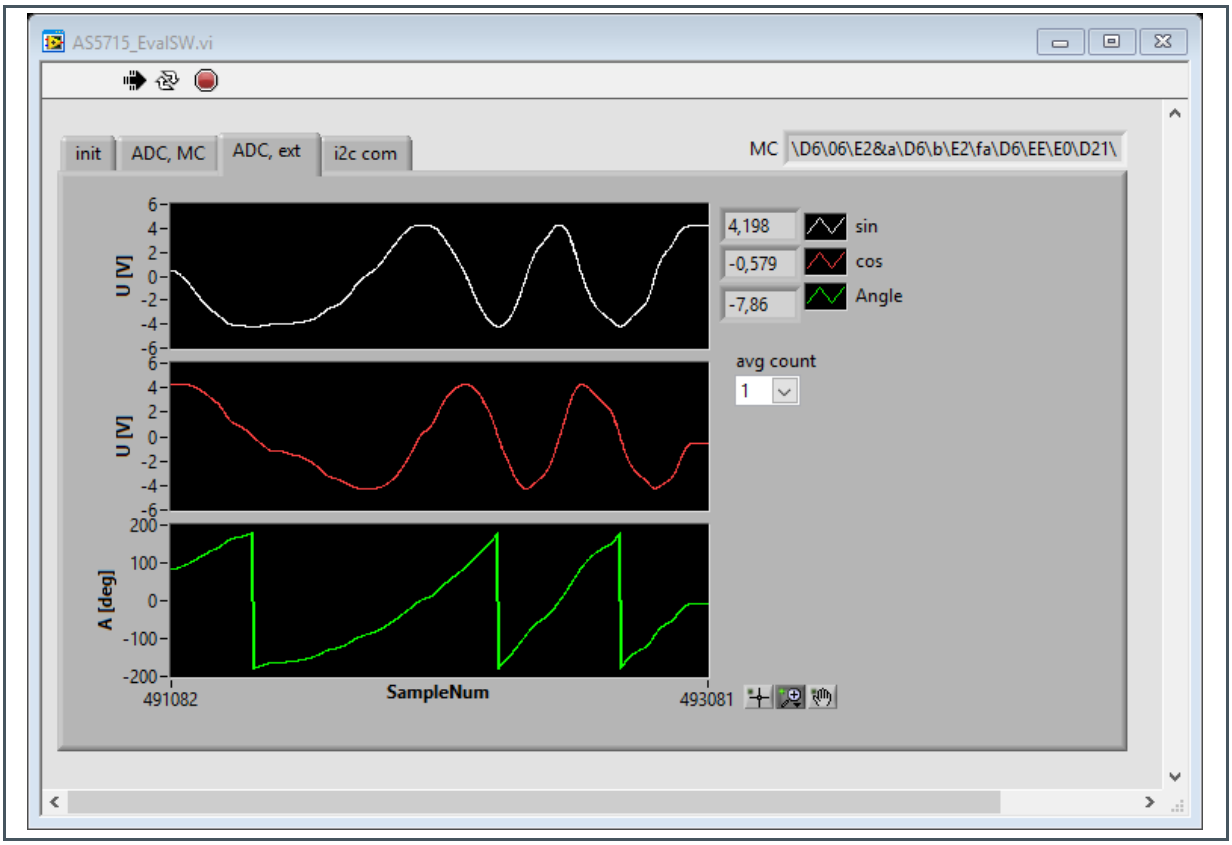
Figure 13:
Visualization of the Single Ended Measured Outputs



3.2.3 ADC, Ext

In this tab the 4 analog outputs are visualized. The SIN voltage is measured from SIN+ to SIN- and the COS voltage is measured from COS+ to COS-. The ADS8354 analog to digital converter is used for this purpose. From this SIN and COS voltages the evaluation software calculates an angle A [deg].

Figure 14:
Visualization of the Differential Measured Outputs



A angle in $[deg]$

U_{SIN} voltage measured from SIN+ to SIN- $[V]$

U_{COS} voltage measured from COS+ to COS- $[V]$

Equation 1:

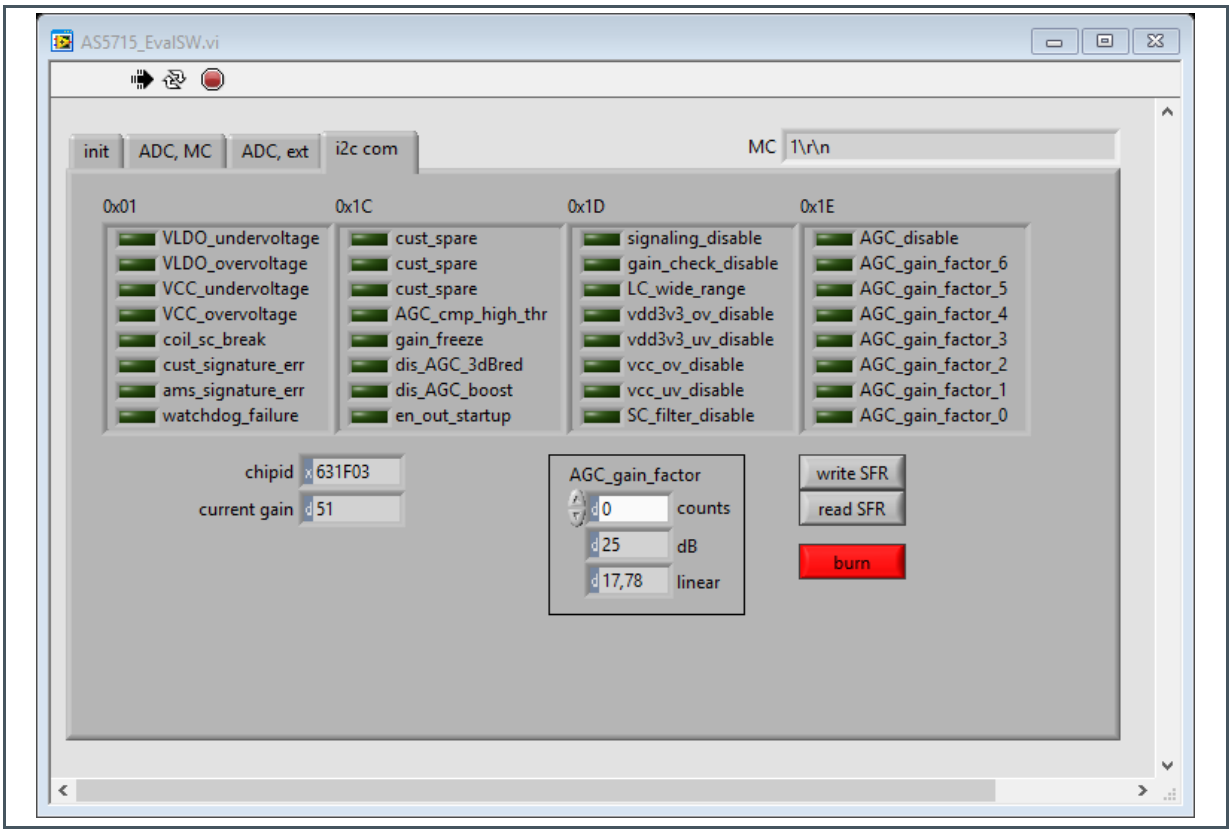
$$A = \text{atan2}(U_{SIN}; U_{COS})$$

The **avg count** control can be used to calculate an average of up to 256 samples. This average is calculated for SIN and COS. The calculation is done in the ATmega328P microcontroller.

3.2.4 I²C Com

When switching to this tab, the evaluation programmer board deactivates the analog output of the AS5715 and activates the I²C interface. To do this, the customer RMA procedure is applied. This procedure is described in the datasheet.

Figure 15:
Visualization of the Differential Measured Outputs



Button **write SFR**:

Clicking on this button reads special function registers from the AS5715 device. The button has to be clicked two times to update the user interface of the software. On first click, only non persistent error flags are cleared in register 0x01. A one-time click however may be useful to check what error flags appeared while the analog output of the device was activated. If for instance after switching from **ADC, MC** or **ADC, ext** to **i²c com** the **read SFR** button is clicked, the **VCC_overvoltage** is always visible and cleared after the second click of **read SFR**. This is because an overvoltage was applied on VCC to switch the device from analog output mode to I²C mode.

Button **read SFR**:

Clicking on this button writes the current user interface selection in the special function registers (SFR) of the AS5715 device. The special function registers are a volatile memory. After a power on reset the SFR content is lost.

Button **burn**:

Clicking on this button opens a dialog that prompts the user if the burn procedure should be performed. The burn procedure programs the current user interface settings to the one time programmable (OTP) memory of the device. Afterwards the AS5715 device must be disconnected

from VCC to complete the procedure. After this procedure, the I^2C interface is locked, therefore it is not possible to read the register content of a burned device. It is although ensured that the correct data was burned, because the AS5715 device periodically calculates a signature of its current OTP content and compares it with the reference signature of the OTP content. This reference signature is calculated by the evaluation software before the burn process is executed.

4 Revision Information

Changes from previous version to current revision v1-00	Page
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.

5 Legal Information

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