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AS5115

Programmable 360° Magnetic Angle Encoder with

SINE & COSINE Output Signals

1 General Description

The AS5115 is a contactless rotary encoder sensor for accurate angular measurement over a full turn of 360º and over an extended ambient temperature range of -40ºC…+150ºC.
Based on an integrated Hall element array, the angular position of a simple two-pole magnet is translated into analog output voltages. The angle information is provided by means of buffered sine and cosine voltages. This approach gives maximum flexibility in system design, as it can be directly integrated into existing architectures and optimized for various applications in terms of speed and accuracy.

An SSI Interface is implemented for signal path configurations, as well as a one time programmable register block (OTP), which allows the customer to adjust the signal path gain for different mechanical constraints and magnetic fields.

2 The AS5115 Adapter board

2.1 Board description

The AS5115 adapter board is a simple circuit allowing test and evaluation the rotary encoder quickly without building a test fixture or PCB. The connections of JP1 are required for supplying, communicating and measuring. Connector JP2 provides access to PROG, CM_COS and CM_SIN. The common mode voltage at JP2 – 2 and JP – 3 provide the same level. Resistor R1 (100k) is used as Pull-up on CS pin and capacitor C1 (2.2uF) is placed between VDD and GND.
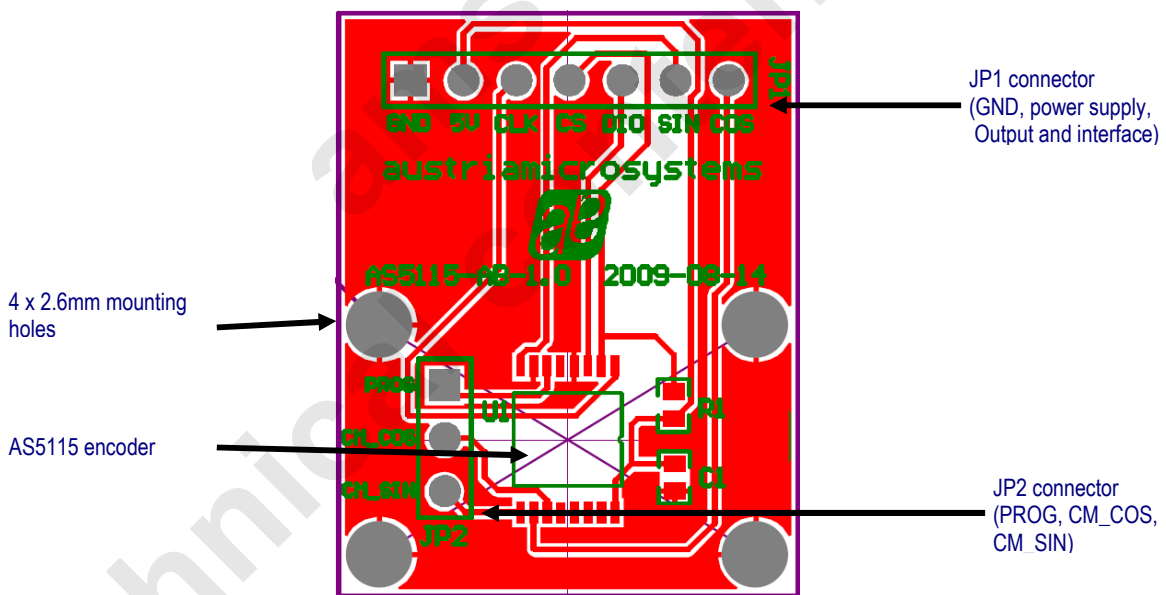

JP1 connector
(GND, power supply,
 Output and interface)

4 x 2.6mm mounting
holes

AS5115 encoder

JP2 connector
(PROG, CM_COS,
CM_SIN)

Figure 1: AS5115 Adapterboard
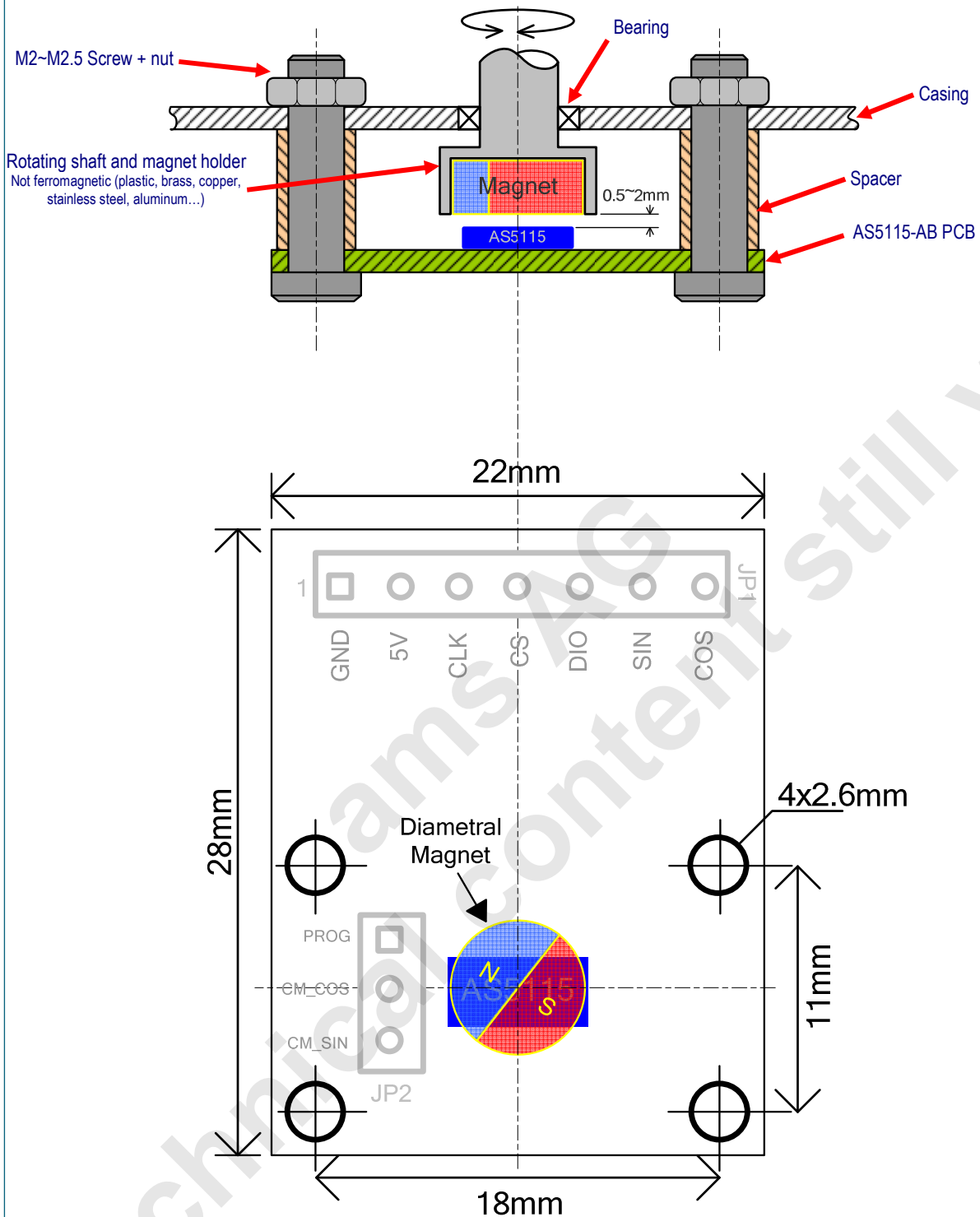
2.2   Mounting the AS5115 adapter board

Figure 2: AS5115 adapter board mounting and dimension

A 6x2.5mm (standard magnet: AS5000-MD6H-2 from BOMATEC) diametric magnet must be placed over on under the AS5115 encoder, and should be centered on the middle of the package with a tolerance of 0.5mm.
The airgap between the magnet and the encoder casing should be maintained in the range 0.5mm~2mm.
The magnet holder must not be ferromagnetic. Materials as brass, copper, aluminum, stainless steel are the best choices to make this part.
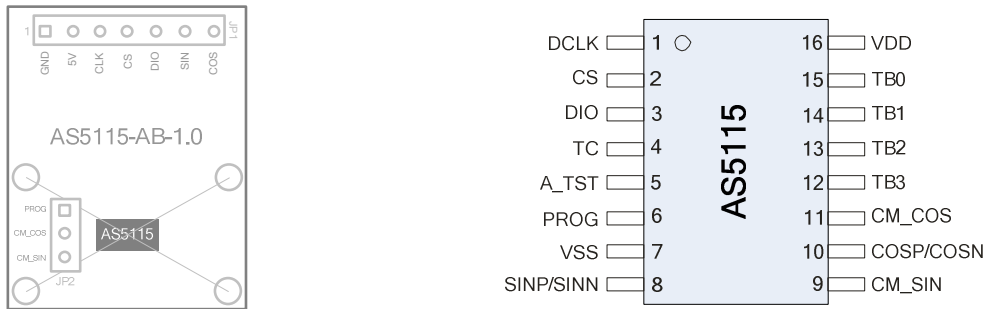
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3 AS5115 adapter board and pinout

Figure 3: AS5115 adapter board connectors and encoder pinout

Pin# Board	Pin# AS5115	Symbol Board	Type	Description
JP1 - 1	7	GND	S	Supply ground
JP1 - 2	16	5V	S	Positive supply
JP1 - 3	1	CLK	DI	Clock input for digital interface
JP1 - 4	2	CS	DI	Chip select
JP1 - 5	3	DIO	DIO	Data I/O for digital interface
JP1 - 6	8	SIN	AO	Switchable buffered analog outputs
JP1 - 7	10	COS	AO	Switchable buffered analog outputs
JP2 – 1	6	PROG		OTP Programming Pad
JP2 – 2	11	CM_COS	AO	Switchable buffered analog or common mode output
JP2 - 3	9	CM_SIN	AO	Switchable buffered analog or common mode output

Table 1: Pin description

Pin types: DIO digital input/output
     DI   digital input
     AO   analog output
     S   supply pin

4 Operation case

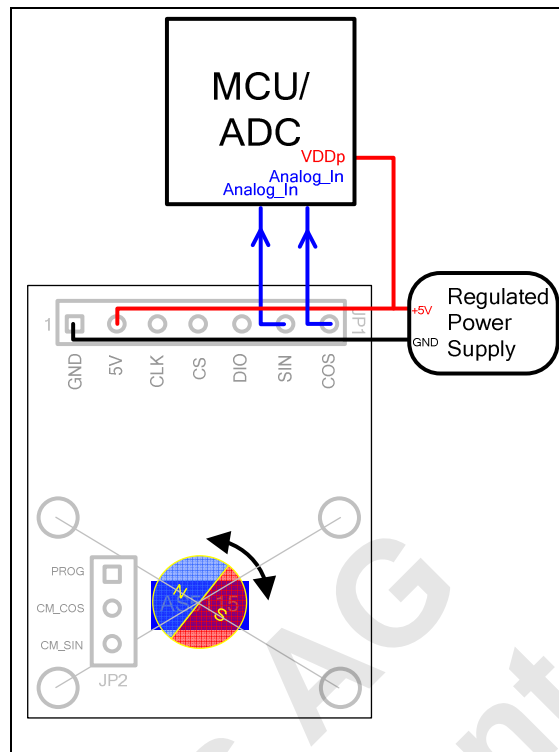## 4.1 4.1 Standalone Sine-Cosine Output

Figure 4: Operation cases with the adapter board

The AS5115 provides analog Sine and Cosine outputs (JP1 – 6 and JP1 – 7). These outputs allow the user to perform the angle calculation by an external ADC + µC, e.g. to compute the angle with a high resolution. The signal lines should be kept as short as possible, longer lines should be shielded in order to achieve best noise performance.
Through the programming of one bit, you have the possibility to choose between the analog Sine and Cosine outputs (SINP, COSP) and their inverted signals (SINN, COSN). Furthermore, by programming the bits <9:10> you can enable the common mode output signals of SIN and COS (JP2 – 2 and JP – 3). The DC bias voltage is 1.5 or 2.5 V.

For further information, please refer to datasheet.
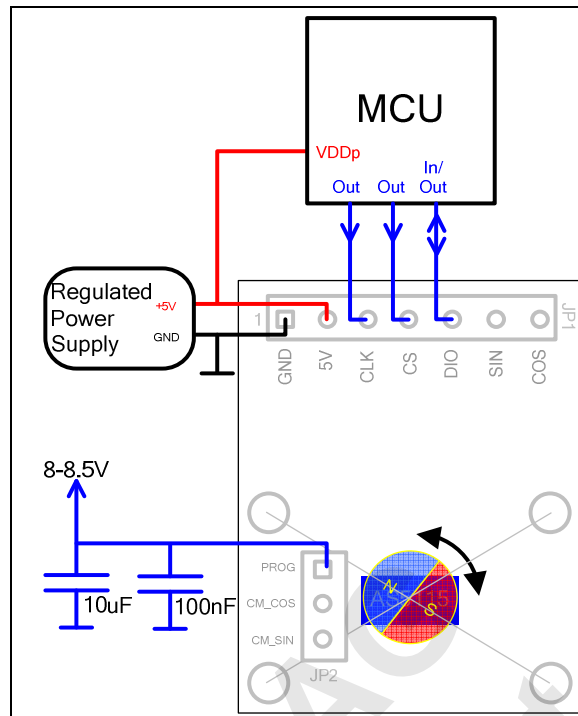
4.2 Programming the AS5115

Figure 5: Programming with the adapter board

For programming of the OTP, an additional voltage has to be applied to the pin PROG. It has to be buffered by a fast 100nF capacitor (ceramic) and a 10µF capacitor (as close as possible to PROG pin).
Programming of the AS5115 OTP memory does not require a dedicated programming hardware. The programming can be simply accomplished over the serial 3-wire interface (see Figure 5). For permanent programming (command PROG OTP, #25), a constant DC voltage of 8.0 – 8.5V (=100mA) must be connected to PROG. For temporary OTP write ("soft write"; command WRITE OTP, #31), the programming voltage is not required.

For further information, please refer to datasheet.

5   AS5115 adapter board hardware
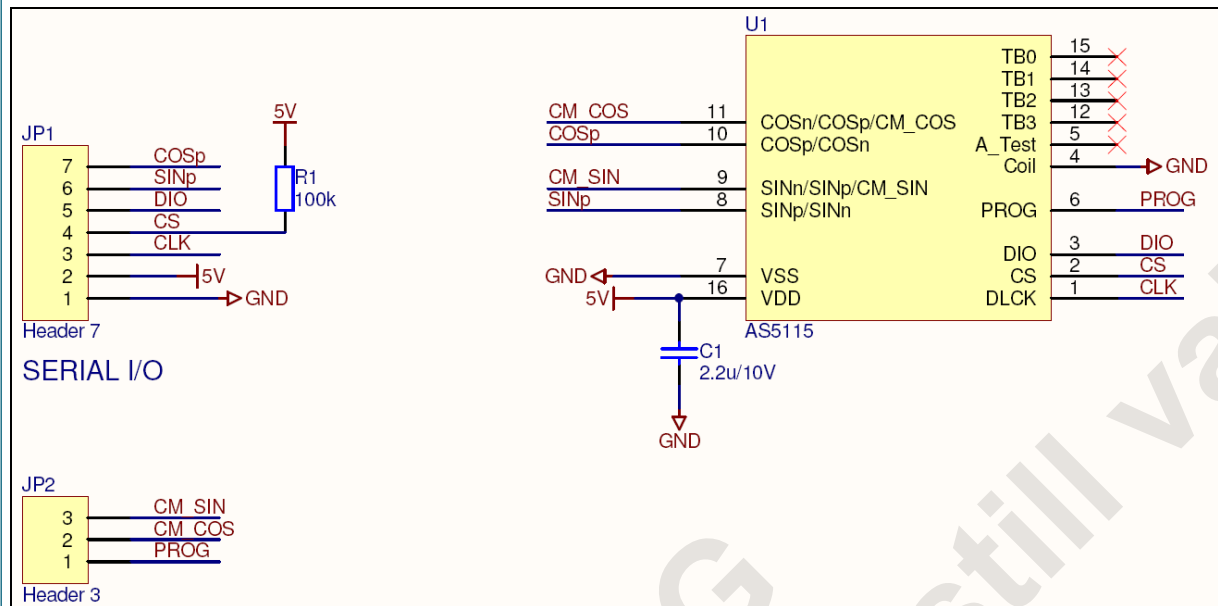
5.1   AS5115-AB-1.0 schematics

Figure 6: AS5115-AB-1.0 adapterboard schematics
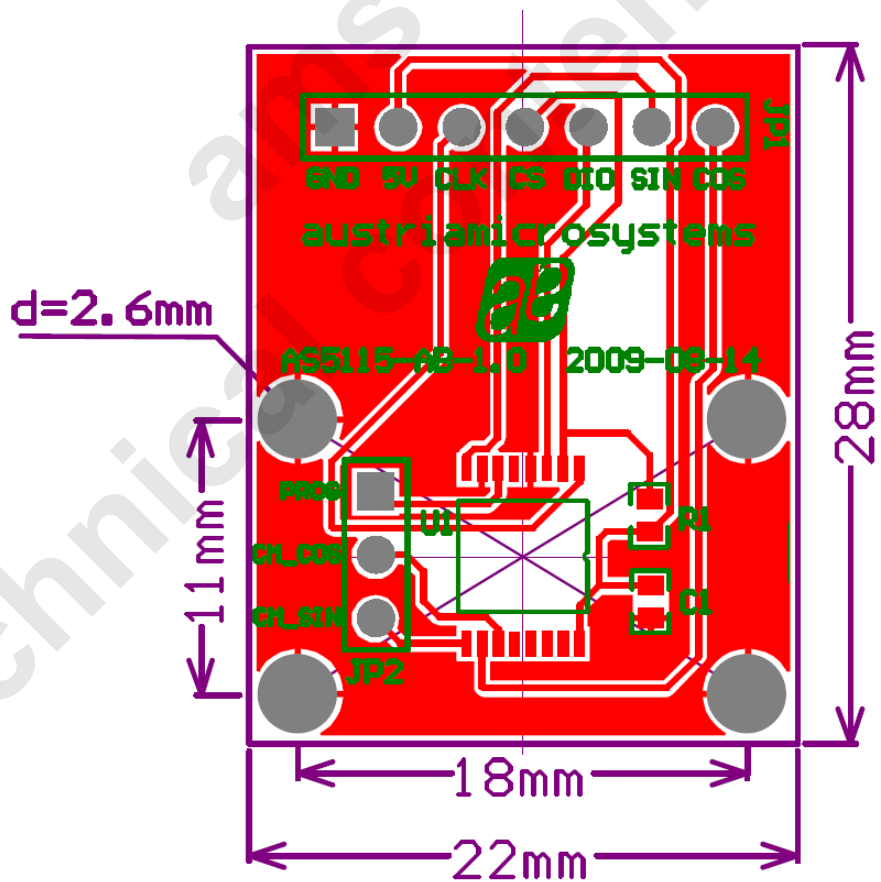
5.2   AS5115-AB-1.0 PCB layout

Figure 7: AS5115-AB-1.0 adapter board layout

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Revision History

Revision	Date	Description
1.0	05.March 2010	First release

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