EVKT-MACOM

MagAlpha Communication Kit

END OF LIFE, REFER TO EVKT-MagAlpha-MagDiff

DESCRIPTION

The EVKT-MACOM is a communication kit for the MagAlpha magnetic position sensor family. The EVKT-MACOM offers a seamless connection and operation with MagAlpha test boards (TBMA) and evaluation kits (EVKT-KNOB). The kit contains a microcontroller motherboard, a collection of daughter boards adapted to different sensor boards and the related cables.

FEATURES

- USB 2.0 Hi-Speed Interface
- LPC4370, ARM Cortex-M4 microcontroller from NXP
- Connector board to interface with TBMA test boards (TBMA-CONN)
- Connector board to interface with EVMA test kits (EVMA-CONN)
- Compatible with Macom Application Software (MACOM App)

APPLICATIONS

- Sensor test and evaluation
- Performance characterization
- Production configuration and test

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OVERVIEW

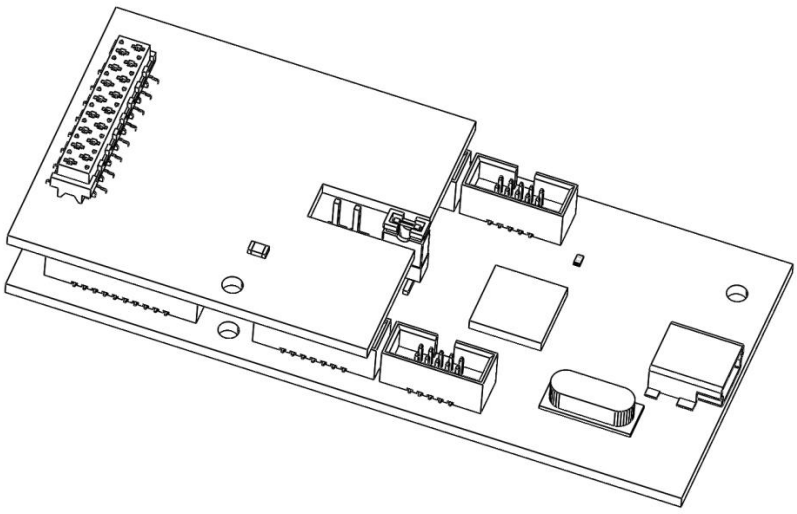

Figure 1: EVKT-MACOM with EVMA-CONN daughter board

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Kit content

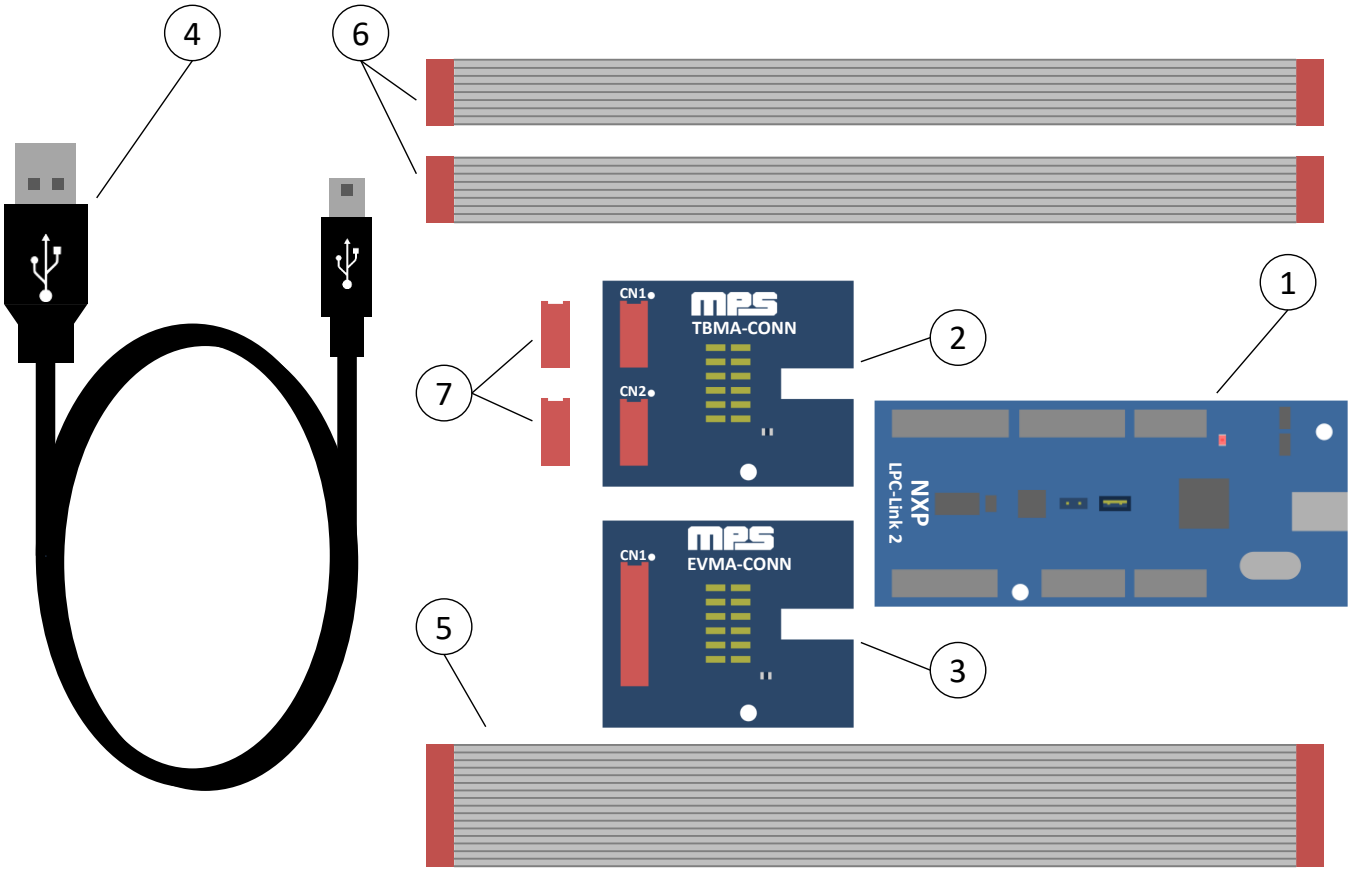

Figure 2: Kit Contents

1. 1x LPC-Link2 board with LPC4370 microcontroller from NXP
2. 1x TBMA-CONN board (LPC-Link2 daughterboard)
3. 1x EVMA-CONN board (LPC-Link2 daughterboard)
4. 1x USB cable (Type A to Type Mini-B)
5. 1x 16 conductors ribbon cable
6. 2x 8 conductors ribbon cable
7. 2x Würth Elektronik female SMT WR-MM 8 pin Connector (690367280876) for the TBMA

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EVMA CONNECTOR BOARD (EVMA-CONN)

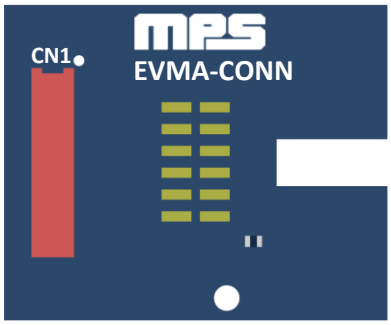

Figure 3: EVMA Board overview

Schematic

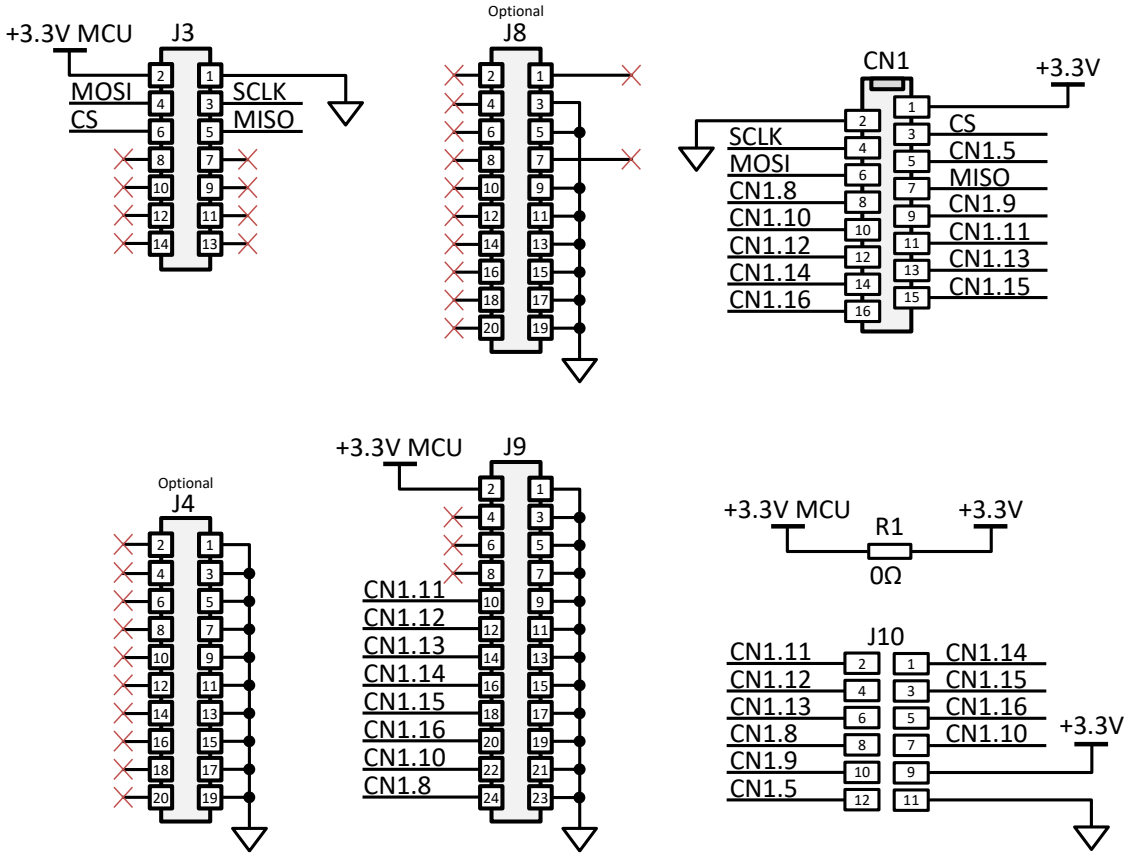

Figure 4: Schematic EVMA-CONN Rev B and Rev C

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Assembly view

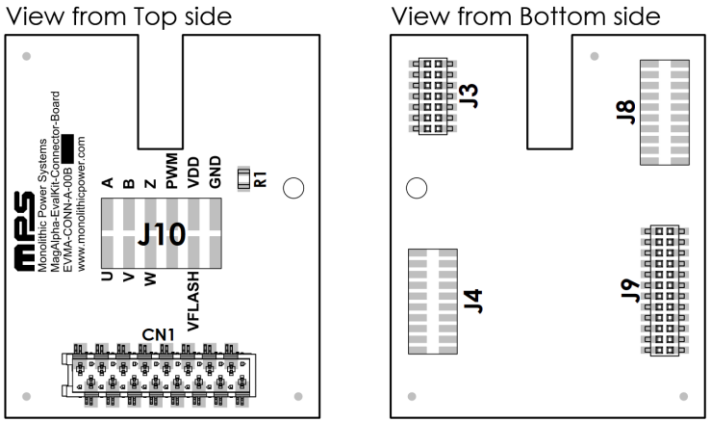

Figure 5: Assembly view EVMA-CONN Rev B

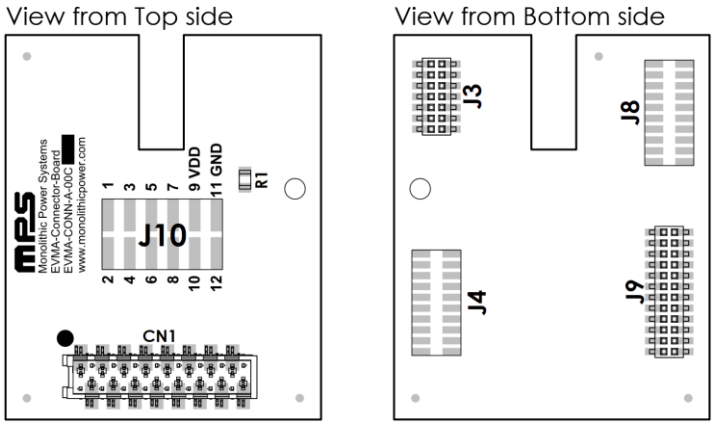

Figure 6: Assembly view EVMA-CONN Rev C

Bill of materials

Both board versions share the same bill of materials.

Table 1: Bill of materials EVMA-CONN Rev B and Rev C

Quantity	Designator	Description	Value	Manufacturer	Manufacturer PN
1	R1	Chip resistor; 0.125W; 0805 (2012 Metric);	0Ω	Yageo	ERJ-6GEY0R00V
1	J3	14 Position Receptacle Connector 0.050" (1.27mm) Surface Mount Gold		Amphenol FCI	20021321-00014T4LF
1	J9	24 Position Receptacle Connector 0.050" (1.27mm) Surface Mount Gold		Amphenol FCI	20021321-00024T4LF
2	J4, J8 (optional)	20 Position Receptacle Connector 0.050" (1.27mm) Surface Mount Gold		Amphenol FCI	20021321-00020C4LF
1	J10 (optional)	12 Positions, Header, Breakaway Connectors, 0.100" (2.54mm), Surface Mount, Gold		Molex	0015910120

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1	CN1	16 position receptacle connector 0.100" (2.54mm) surface mount tin		Würth Elektronik or TE Connectivity	690367281676 or 8-2178711-6

Connector pinout

Refer to EVKT-KNOB user guide for CN1 pin mapping.

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TBMA CONNECTOR BOARD (TBMA-CONN)

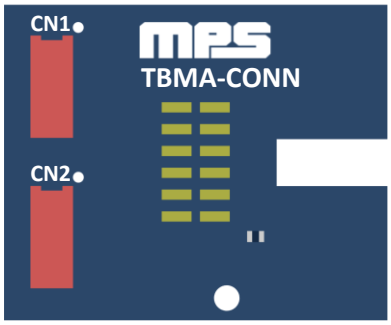

Figure 7: TBMA Board overview

See board schematics below (according to board marking, you may refer to schematic Rev B or Rev C).

Schematic Rev B

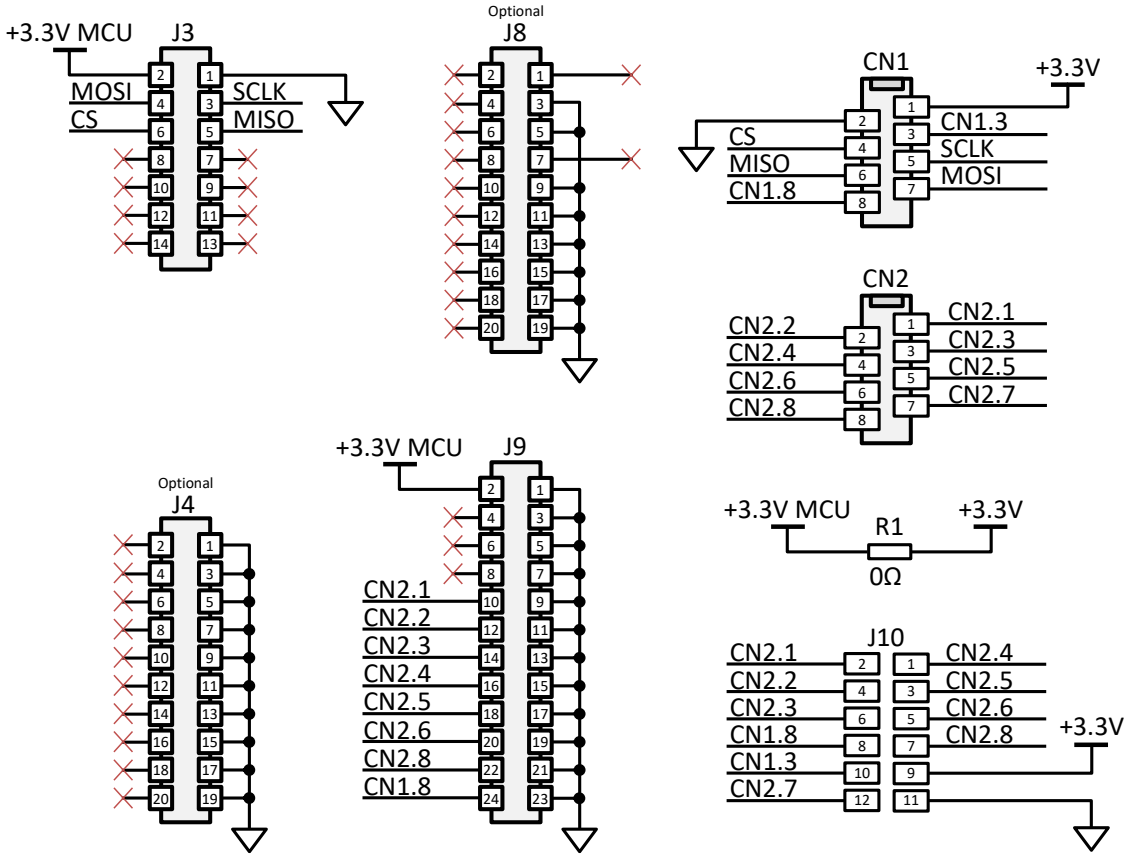

Figure 8: Schematic TBMA-CONN Rev B

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Assembly view Rev B

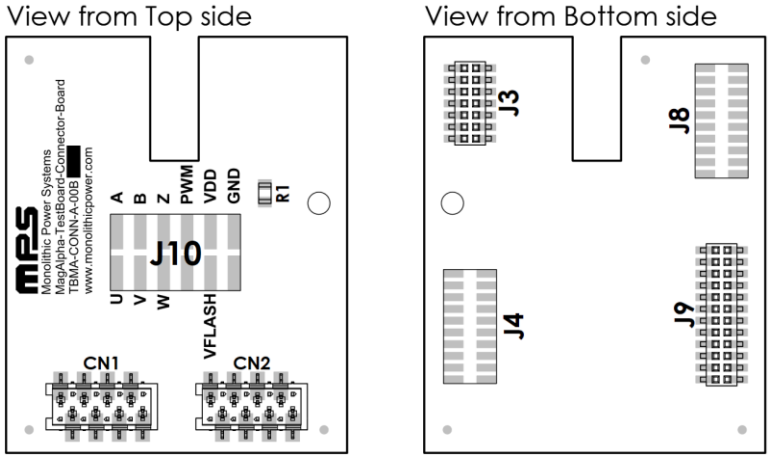

Figure 9: Assembly TBMA-CONN Rev B

Schematic Rev C

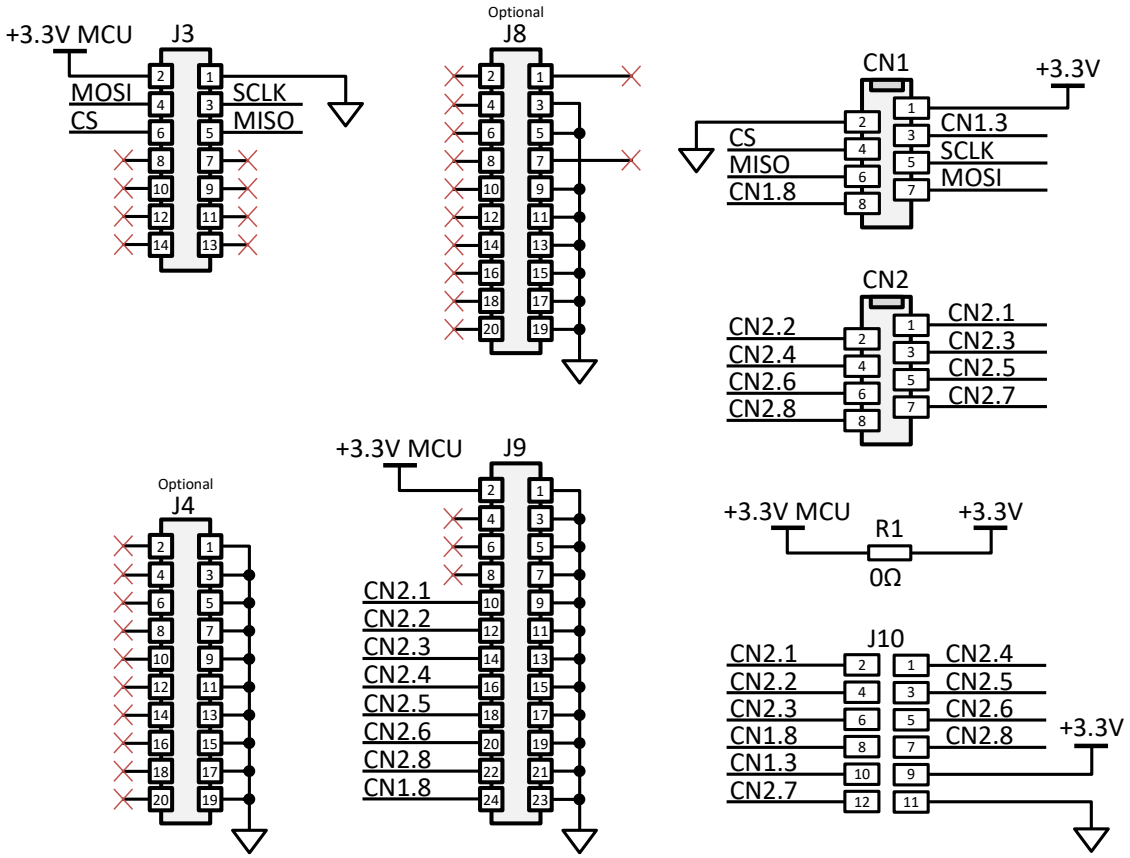

Figure 10: Schematic TBMA-CONN Rev C

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Assembly view Rev C

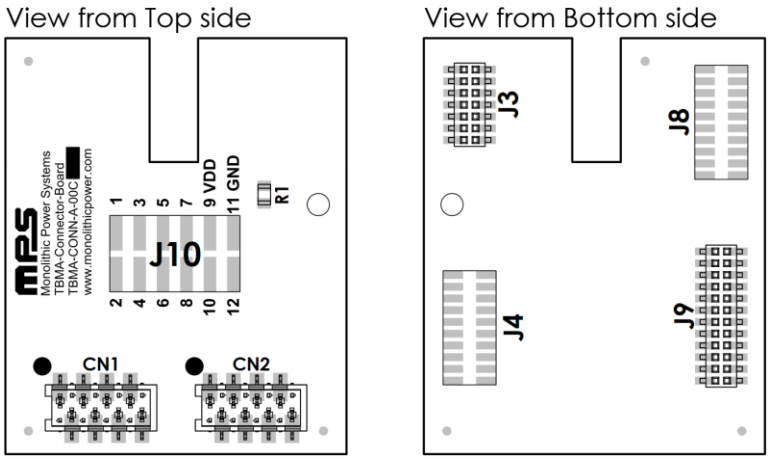

Figure 11: Assembly TBMA-CONN Rev C

Bill of materials

Both board versions share the same bill of materials.

Table 2: Bill of materials TBMA-CONN Rev B and Rev C

Quantity	Designator	Description	Value	Manufacturer	Manufacturer PN
1	R1	Chip resistor; 0.125W; 0805 (2012 Metric);	0Ω	Yageo	ERJ-6GEY0R00V
1	J3	14 Position Receptacle Connector 0.050" (1.27mm) Surface Mount Gold		Amphenol FCI	20021321-00014T4LF
1	J9	24 Position Receptacle Connector 0.050" (1.27mm) Surface Mount Gold		Amphenol FCI	20021321-00024T4LF
2	J4, J8 (optional)	20 Position Receptacle Connector 0.050" (1.27mm) Surface Mount Gold		Amphenol FCI	20021321-00020C4LF
1	J10 (optional)	12 Positions, Header, Breakaway Connectors, 0.100" (2.54mm), Surface Mount, Gold		Molex	0015910120
2	CN1, CN2	8 position receptacle connector 0.100" (2.54mm) surface mount tin		Würth Elektronik or TE Connectivity	690367280876 or 7-2178711-8

Connector pinout

Refer to TBMA user guide for CN1 and CN2 pin mapping.

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MAGALPHA COMMUNICATION KIT SETUP

Follow the step below to setup MagAlpha Communication Kit.

1. Install Macom Application Software (Windows only)
2. Configure LPC-Link2 board in flash boot mode.
3. Plug connector board to the LPC-Link2 (EVMA-CONN or TBMA-CONN).
4. Connect daughter board to the sensor board (EVKT-KNOB or TBMA).
5. Connect LPC-Link2 to computer.
6. Start Macom App.

Install Macom Application Software

Visit the Monolithic Power Systems website at www.monolithicpower.com and go to the ***Position Sensors Design Support*** page. The Macom App can be found on the Software section.

Configure LPC-Link2 Board In Flash Boot Mode

Plug the jumper on JP1 to configure the microcontroller in flash boot mode. In this mode, the microcontroller will load the firmware binary stored in the flash.

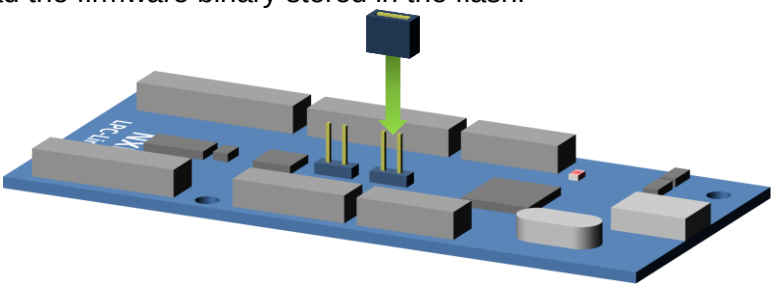

Figure 12: Configure LPC-Link2 to flash boot mode

Plug Connector Board To The LPC-Link2

Plug carefully the desired connector board to the LPC-Link2 as shown on the figure below. Check that female headers are correctly aligned with the LPC-Link2 pins before connecting the two boards together.

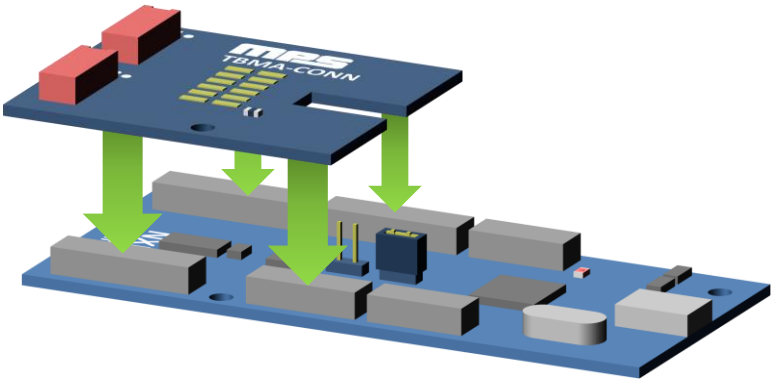

Figure 13: Plug connector board to the LPC-Link2

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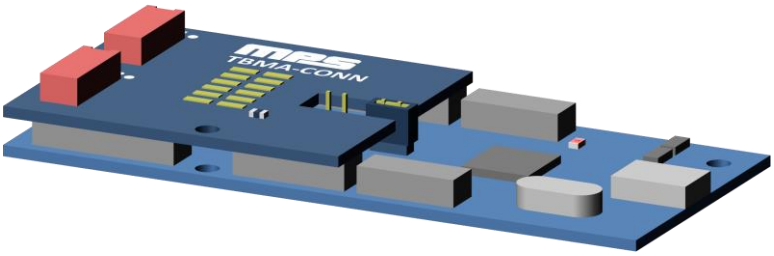

Figure 14: Assembled LPC-Link2 with TBMA-CONN daughter board

Connect Daughter Board To The Sensor Board (EVKT-KNOB or TBMA)

Use the provided ribbon cable to connect the connector board to the sensor board.

EVKT-KNOB is delivered with pre-soldered female socket connector while TBMA boards are delivered without it. TBMA boards require therefore to hand solder the female connectors in order to be used with the EVKT-MACOM. Before soldering, make sure to place correctly the connector polarization slot next to pin 1 (as shown below).

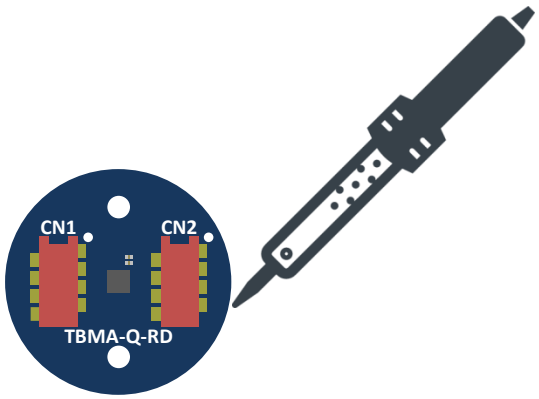

Figure 15: Solder connectors CN1 and CN2 to TBMA

On TBMA boards (RD and LT), CN1 connector must be connected to the TBMA-CONN CN1 connector using one of the provided 8 conductors ribbon cable. CN2 connection is not required for SPI communication but provides an easy access to MagAlpha output signals on the LPC-Link2 daughter board.

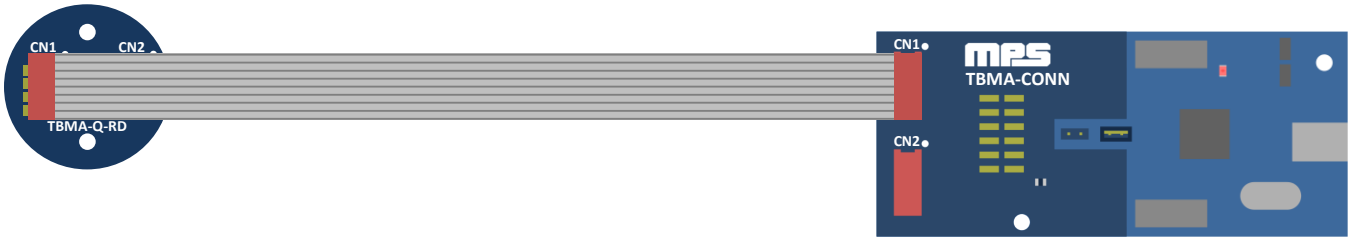

Figure 16: Connect TBMA-RD to TBMA-CONN board

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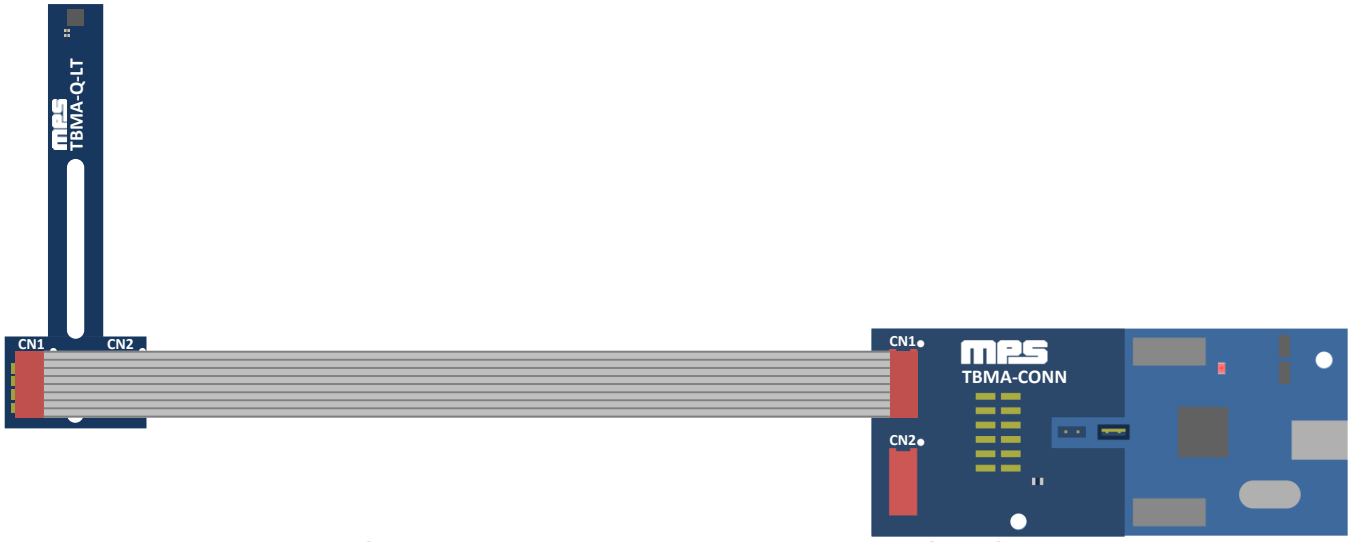

Figure 17: Connect TBMA-LT to TBMA-CONN board

On EVKT-KNOB, CN1 connector must be connected to EVMA-CONN CN1 connector.

Figure 18: Connect EVKT-KNOB to EVMA-CONN board (view from the top)

Figure 19: Connect EVKT-KNOB to EVMA-CONN board (view from the side)

Connect LPC-Link2 To Computer

Connect the LPC-Link2 board to the computer using the provided USB cable (Type A to Type Mini-B). The red LED (LED1) on the LPC-Link2 should blink.

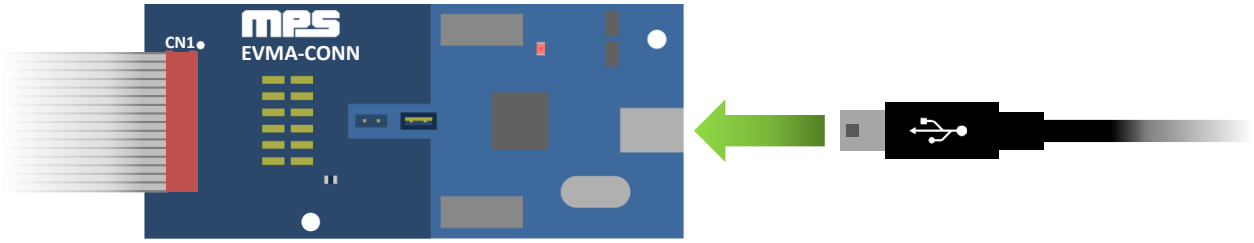

Figure 20: Connect LPC-Link2 to computer

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Start Macom App

Launch the Macom App from the Start Menu. Angle data should be displayed right away.

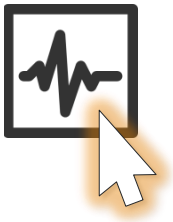

Figure 21: Start Macom App

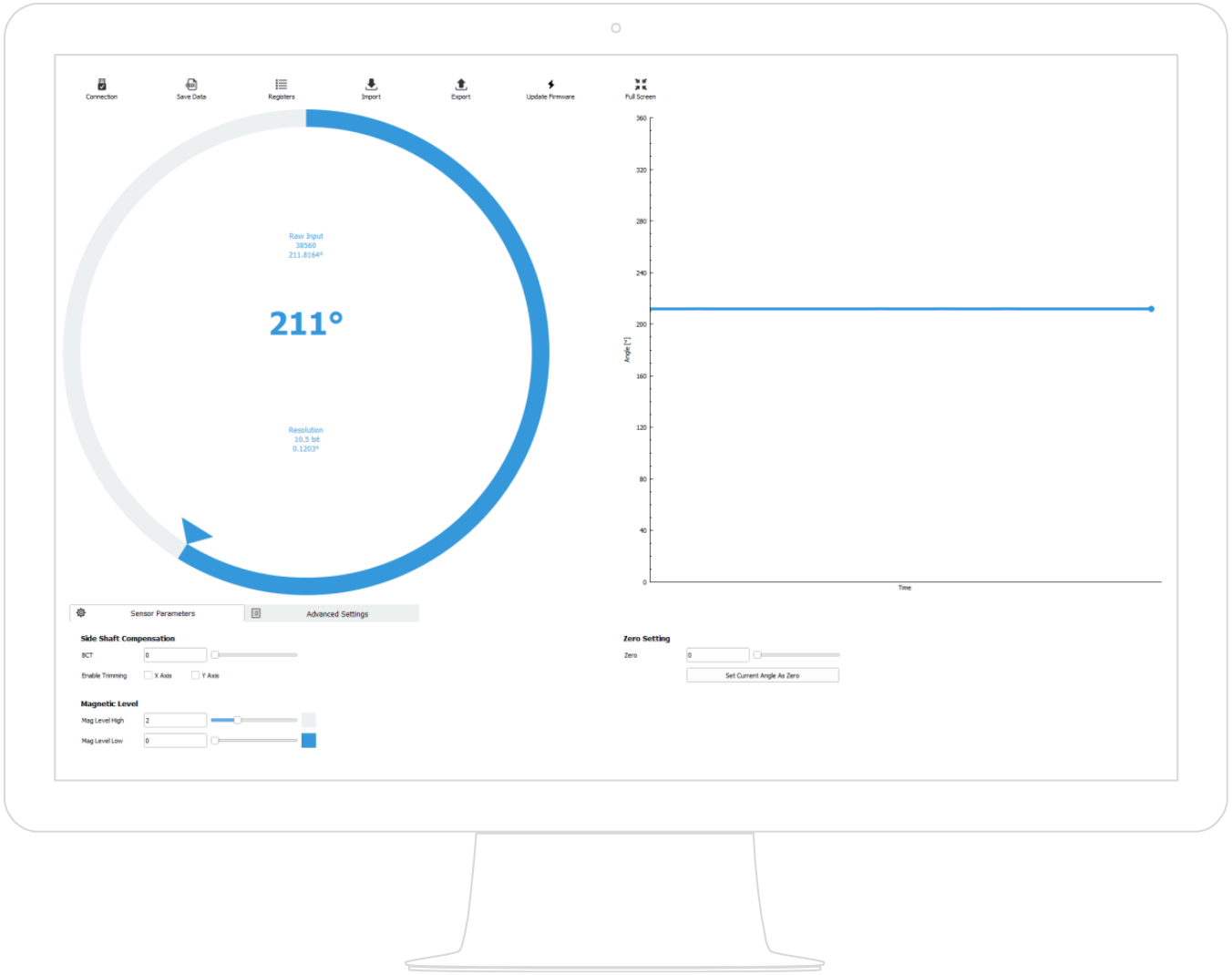

Figure 22: Overview of the Macom App graphical interface

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MACOM APP

The Macom software is a powerful and easy to use application to interact with the MagAlpha sensor family. It provides a graphical visualization of the angle output and a convenient way to read and write sensor parameters. In addition this App also offers the following features:

- Register map overview (Read/Write sensor registers)
- Import configuration script (JSON)
- Export current configuration (JSON)
- Save measurement data
- Update EVKT-MACOM firmware (stored on LPC-Link2 Flash)
- Sensor Auto Discovery (automatic detection of the available parameters and of the sensor generation)

The Macom graphical user interface is divided in 3 areas:

- The toolbar
- The angle readback
- The sensor parameters

Toolbar

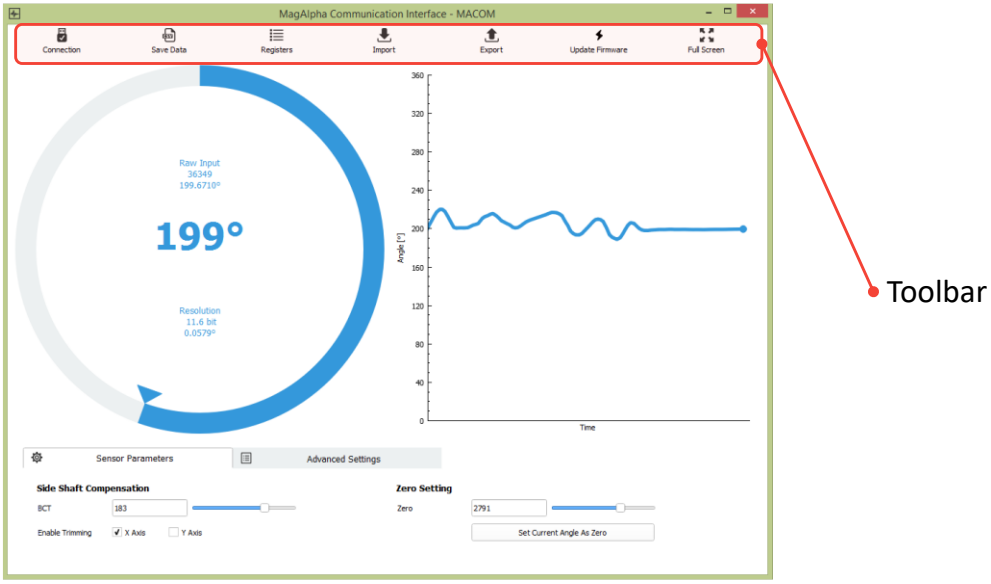

Figure 23: Macom App Toolbar

Feature Name	Description
Connection	**Switch On/Off the USB connection to the EVKT-MACOM. It also launches a sensor auto discovery when connection is switched On (see** Sensor Parameters).
Save Data	Save the latest 2000 measured angle in a csv file (can be also open natively by any Spreadsheet applications like Excel).
Registers	Switch On/Off the registers overview window display (see Figure 24). This window provide the overview of the complete register map in a glance. Users can switch between decimal, hexadecimal and binary register value representation by using the dropdown button. It is also possible to refresh all registers value by pressing the Read button.
Import	Import sensor register settings and/or Macom configurations from a JSON file.
Export	Export sensor register settings and Macom configurations to a JSON file.

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Update Firmware	Update the LPC-Link2 microcontroller firmware. To perform a firmware update, click on this feature and follow the step-by-step instructions displayed on the firmware update wizard.
Full Screen	Switch On/Off Full Screen Mode

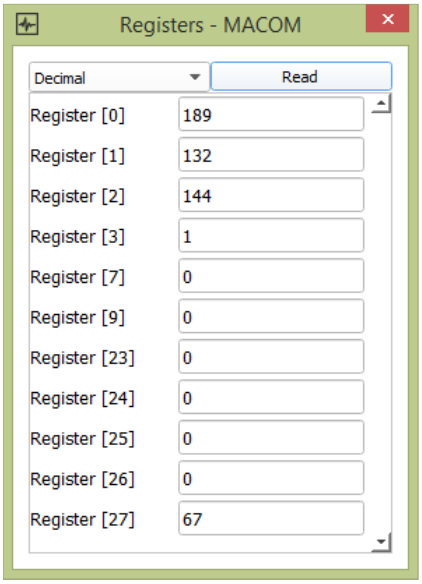

Figure 24: Macom App Registers overview feature

Angle Readback

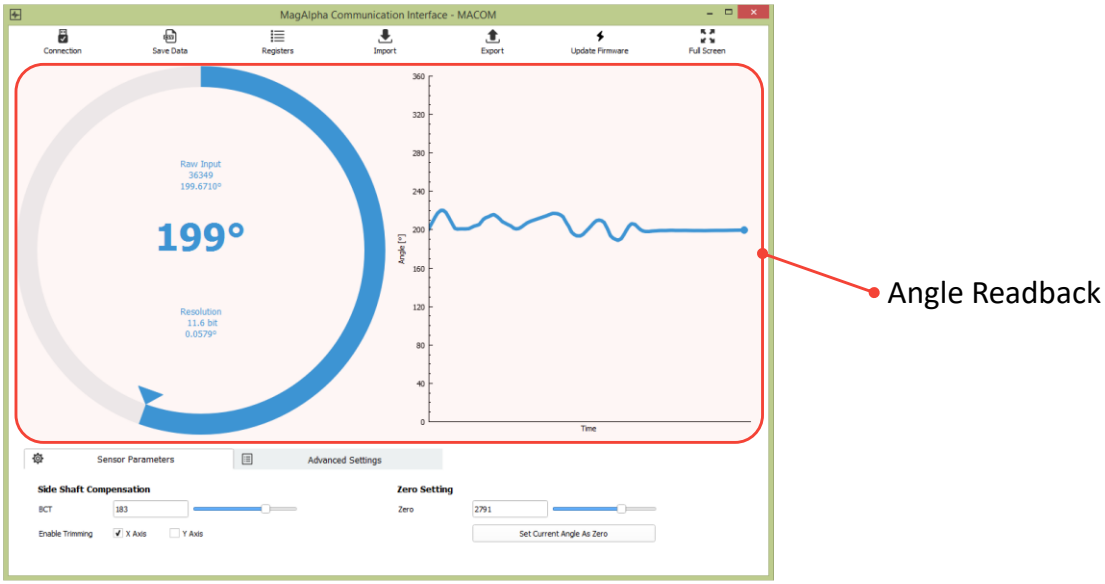

Figure 25: Macom App Angle Readback

Feature Name	Description
Raw input	Measured angle value coded on 16-bits (0 to 65535) and in degree (0 to 360)
Resolution	Gives 6σ resolution in bit (n) and 3σ resolution in degree (m). Which means that 99.7% of the measurement performed on this sensor will have the same **n** MSB **bits** and will be within ± **m degrees** from the latest angle measurement.

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Sensor Parameters

The user-configurable parameters are defined during the “Auto Discovery” process. During this discovery process (at Macom App startup or when users do a disconnection/connection cycle) the software will automatically discover which sensor generation is connected and then find out which parameters are available for this specific product.

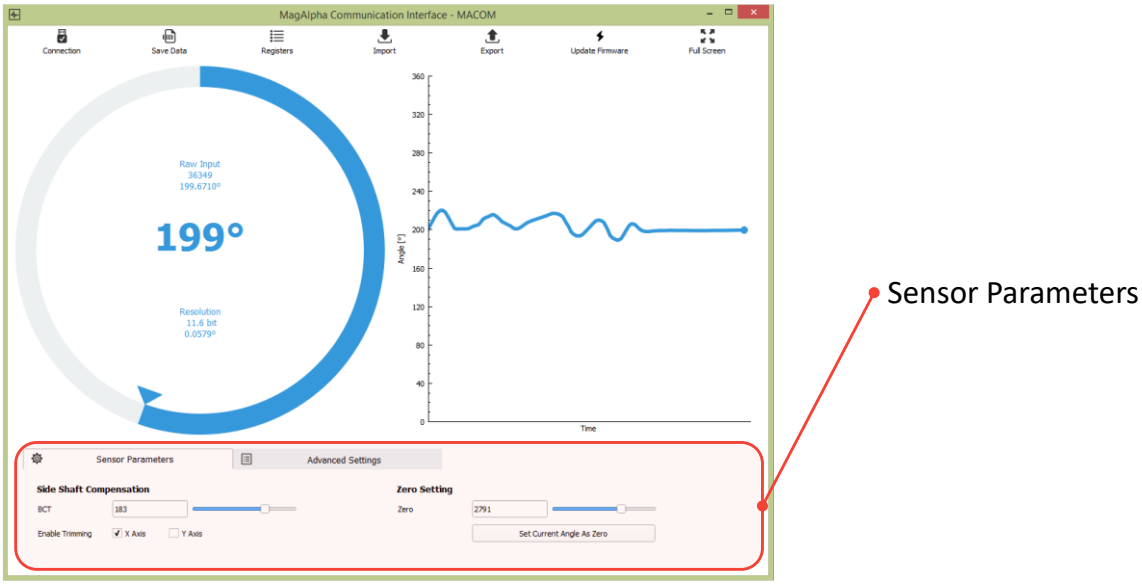

Figure 26: Macom App Sensor Parameters

A connection cycle is required after a sensor “Hot Swap” (connecting or unplugging the sensor while the system is ON), in order to rerun the auto discovery process on the freshly connected sensor.

To perform a connection cycle simply click on connection twice; the first time to disconnect the device and the second time to reconnect it.

Figure 27: Macom App connection cycle

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APPENDIX A: SENSOR GENERATION

Table 3: Sensor Generation

Sensor Generation	MPS Chip Part Number
2nd (Gen2)	MA100
	MA300
	MA700
	MA750
3rd (Gen3)	MA102
	MA302
	MA310
	MA702
	MA710
	MA730
	MA800
	MA820
	MA850

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