# EVKT-MACOM

## MagAlpha Communication Kit

## 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 EVKT-MACOM kit contains a microcontroller motherboard, a collection of daughter boards adapted to different sensor boards, and the related cables.

## FEATURES

- USB 2.0 High-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 Tests and Evaluation
- Performance Characterization
- Production Configurations and Tests

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## OVERVIEW

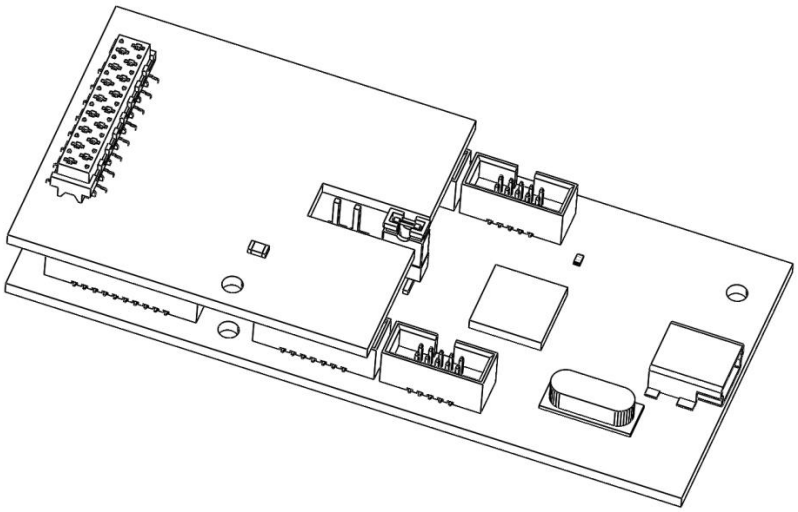

**Figure 1: EVKT-MACOM with EVMA-CONN Daughter Board**


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## KIT CONTENTS

See Figure 2 for a list of EVKT-MACOM communication kit contents.

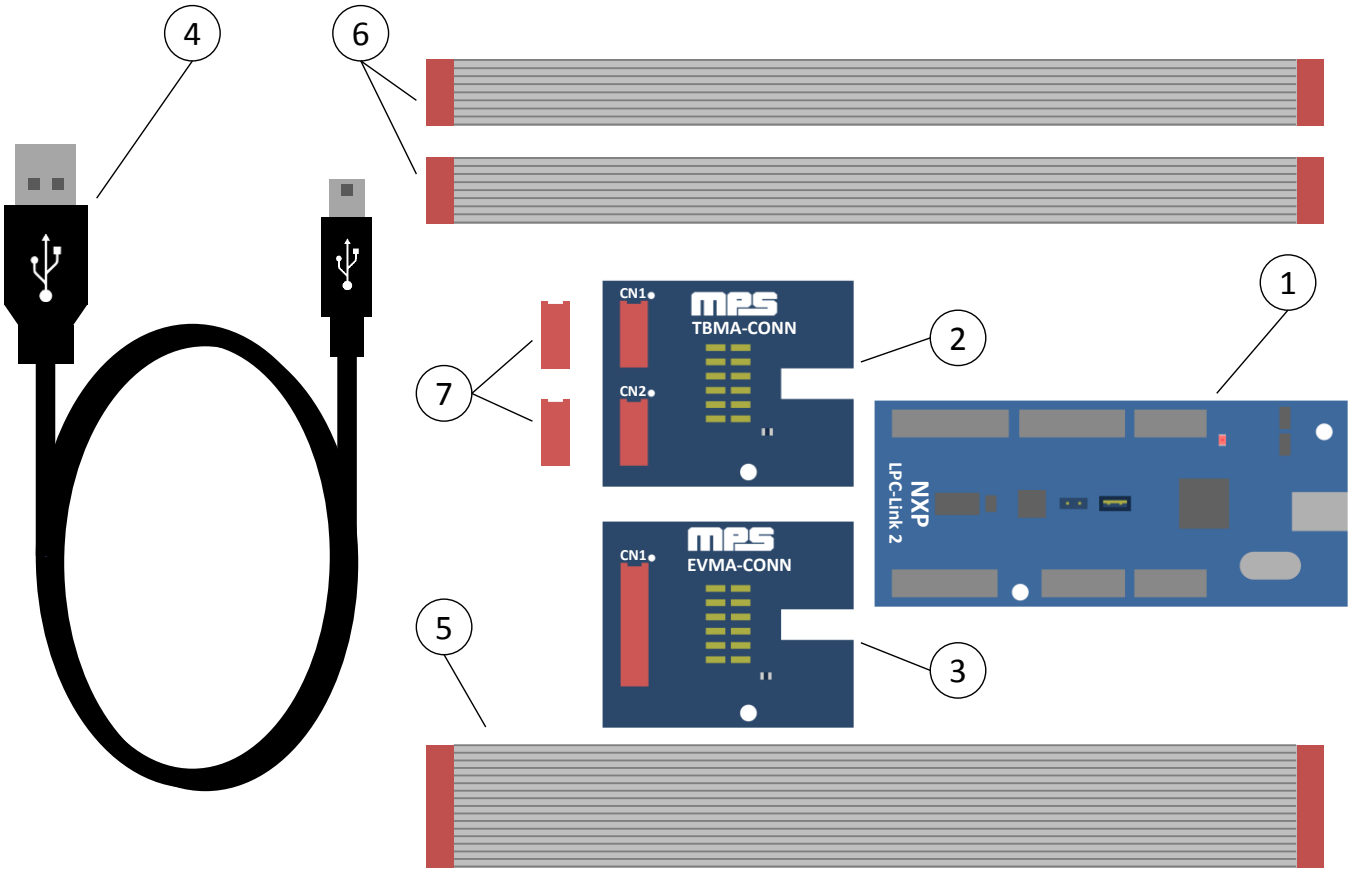


**Figure 2: Kit Contents**

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)

See Figure 3 for an overview of the EVMA board.

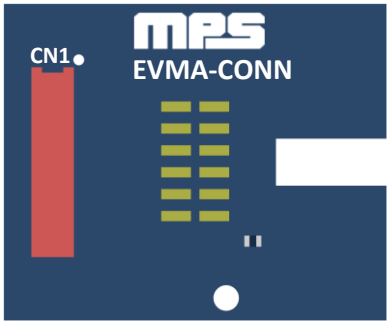


**Figure 3: EVMA Board Overview**

## SCHEMATIC

The schematics for Rev B and Rev C of the EVMA-CONN are shown in Figure 4.

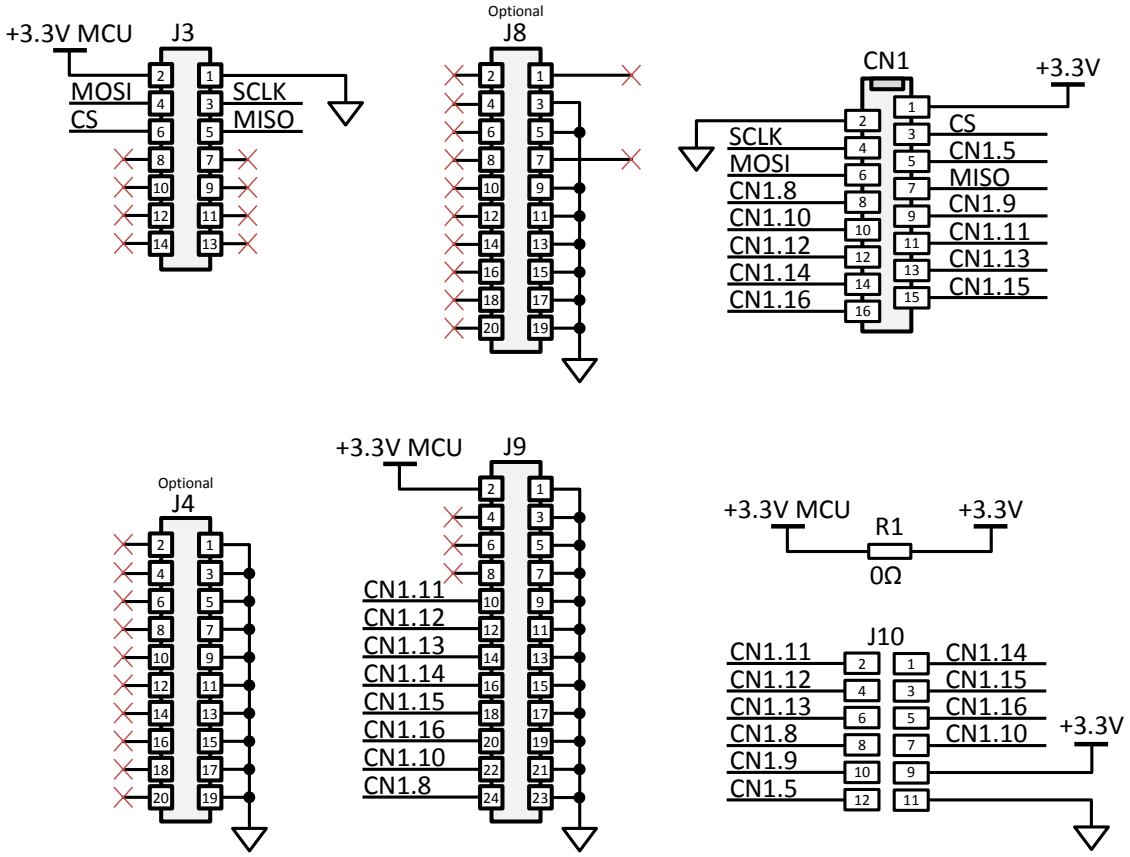


**Figure 4: Schematic EVMA-CONN Rev B and Rev C**


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## ASSEMBLY VIEW

Figure 5 shows the assembly view of Rev B.

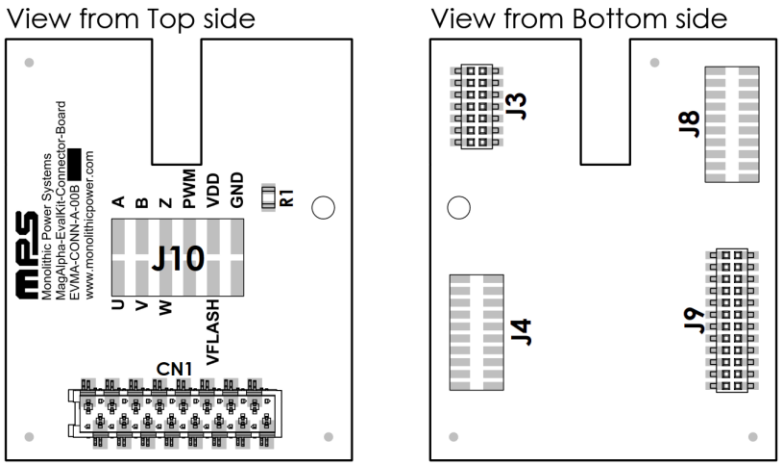


**Figure 5: Assembly View EVMA-CONN Rev B**

Figure 6 shows the assembly view of Rev C.

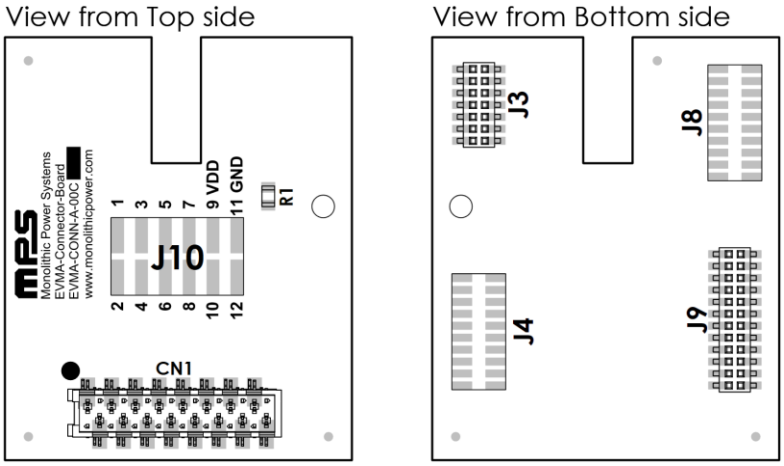


**Figure 6: Assembly View EVMA-CONN Rev C**


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## BILL OF MATERIALS

Both board versions share the same bill of materials (see Table 1).

**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 |
| 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 the EVKT-KNOB user guide for CN1 pin mapping.


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## TBMA CONNECTOR BOARD (TBMA-CONN)

See Figure 7 for an overview of the TBMA board.

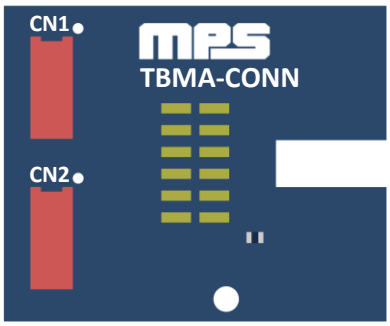


**Figure 7: TBMA Board Overview**

The board schematics are shown in Figure 8 and Figure 10. The assembly views are shown in Figure 9 and Figure 11. According to the board marking, refer to Figure 8 for the Rev B schematic or Figure 10 for the Rev C schematic.

### Schematic Rev B

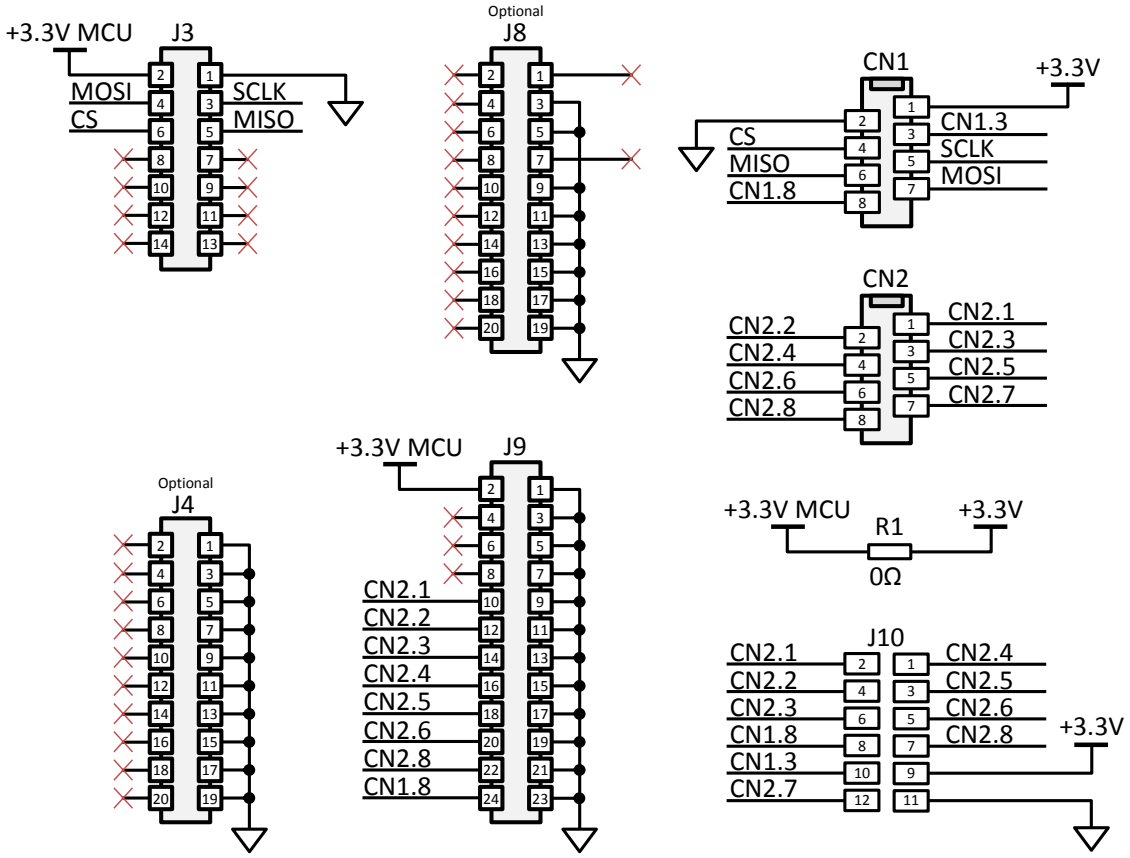


**Figure 8: Schematic TBMA-CONN Rev B**


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## Assembly View Rev B

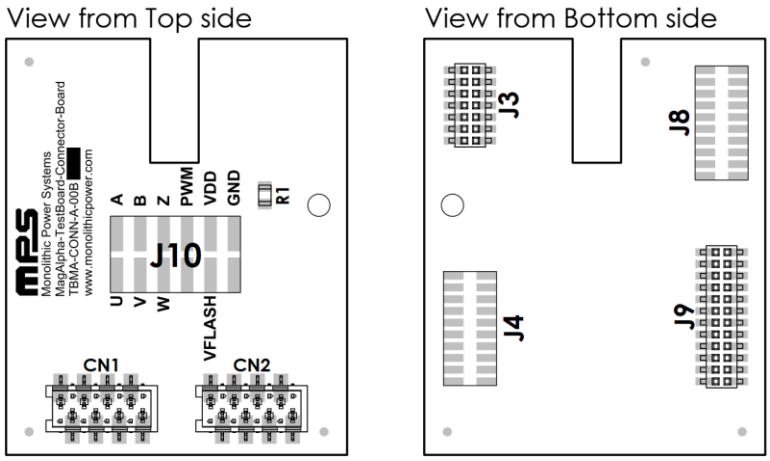


**Figure 9: Assembly TBMA-CONN Rev B**

## Schematic Rev C

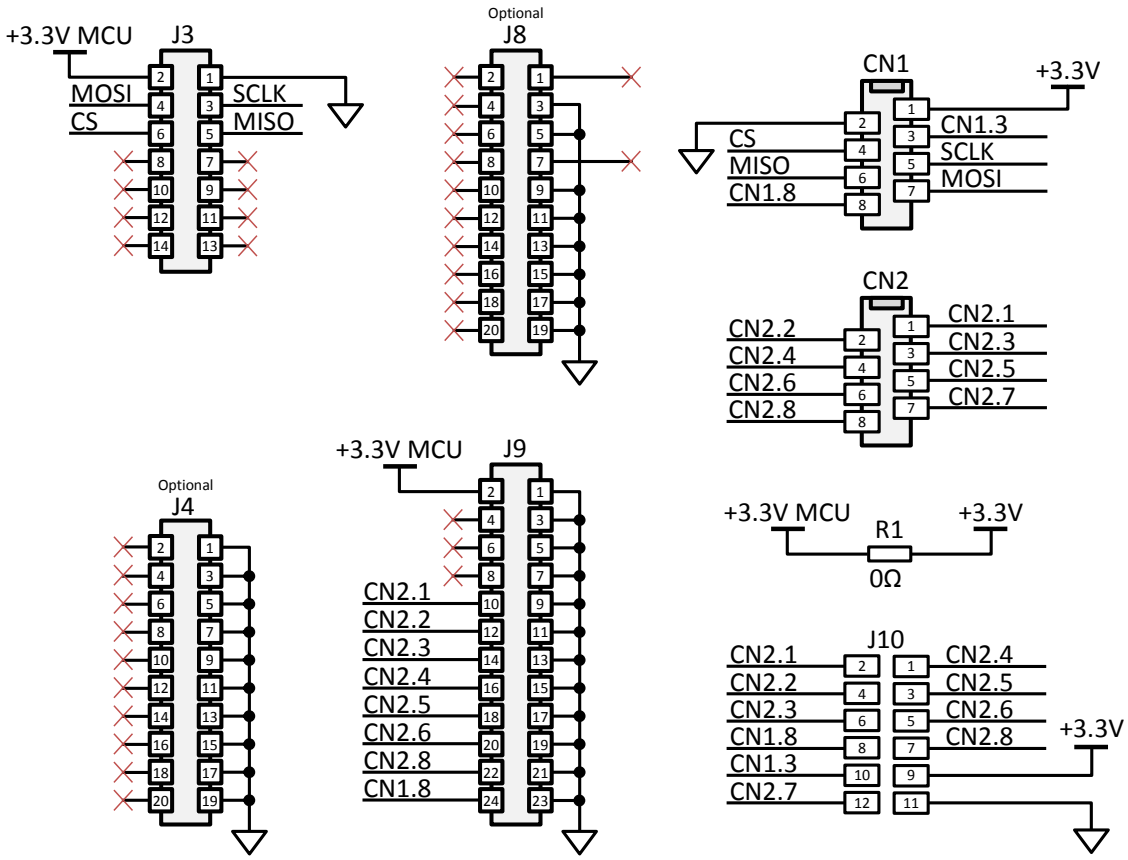


**Figure 10: Schematic TBMA-CONN Rev C**


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Assembly View Rev C

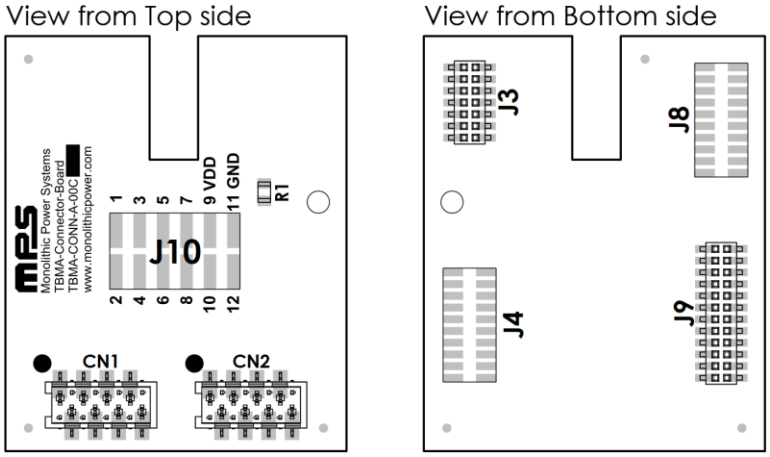


**Figure 11: Assembly TBMA-CONN Rev C**


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## BILL OF MATERIALS

Both board versions share the same bill of materials (see Table 2).

**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 the TBMA user guide for CN1 and CN2 pin mapping.


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# MAGALPHA COMMUNICATION KIT SETUP

Follow the steps below to set up the MagAlpha communication kit.

### 1. Install Macom Application Software

To find the Macom app, visit the Position Sensors Design Support page on the Monolithic Power Systems website (www.monolithicpower.com).

### 2. Configure the LPC-Link2 Board in Flash Boot Mode

Plug the jumper onto JP1 to configure the microcontroller in flash boot mode (see Figure 12). In this mode, the microcontroller loads the firmware binary stored in the flash.

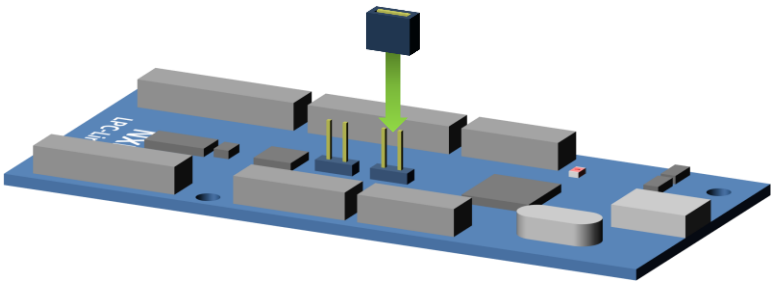

**Figure 12: Configure LPC-Link2 in Flash Boot Mode**

### 3. Plug Connector Board onto the LPC-Link2

carefully Plug the desired connector board to the LPC-Link2 (See Figure 13). Ensure that the female headers are correctly aligned with the LPC-Link2 pins before connecting the two boards together (see Figure 14).

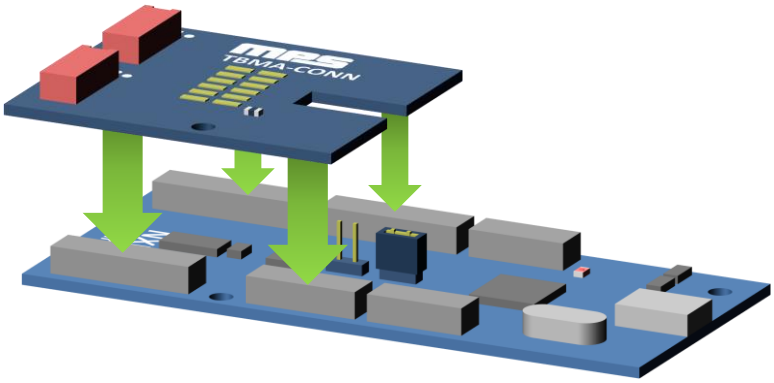


**Figure 13: Plug Connector Board to the LPC-Link2**

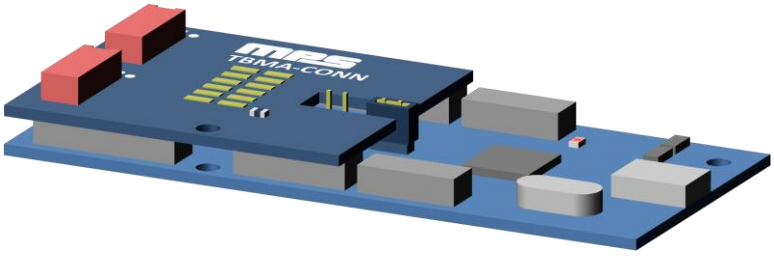


**Figure 14: Assembled LPC-Link2 with TBMA-CONN Daughter Board**


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4. **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.

The EVKT-KNOB comes with a pre-soldered female socket connector, while TBMA boards do not. The TBMA boards require the female connectors to be hand soldered in order to be used with the EVKT-MACOM. Before soldering, place the connector polarization slot next to pin 1 (see Figure 15).

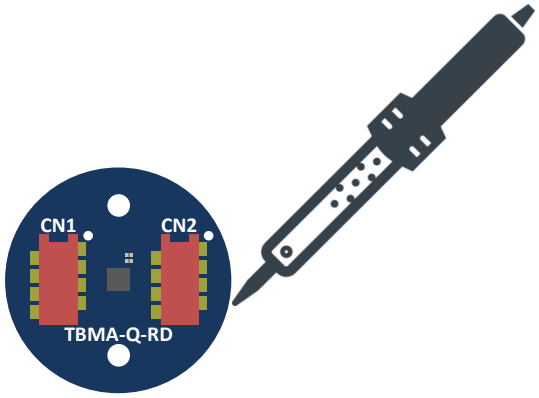


**Figure 15: Solder Connectors CN1 and CN2 to TBMA**

On the TBMA boards (RD and LT), the CN1 connector must be connected to the TBMA-CONN CN1 connector using one of the two provided ribbon cable with 8 conductors (see Figure 16 and Figure 17). The CN2 connection is not required for SPI communication but provides easy access to the MagAlpha output signals on the LPC-Link2 daughter board.

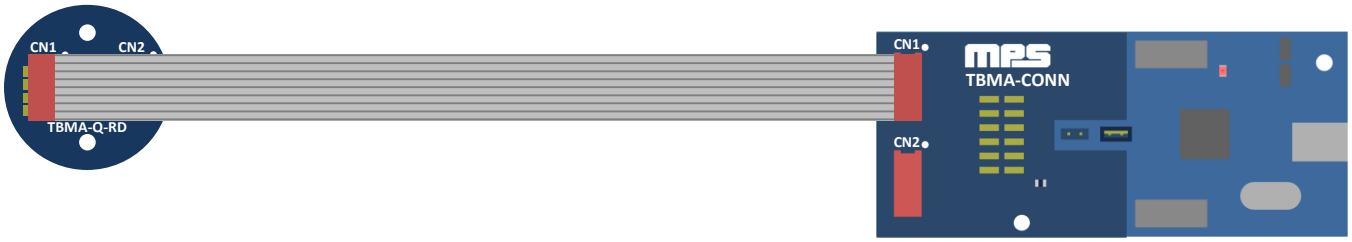


**Figure 16: Connect TBMA-RD to TBMA-CONN Board**

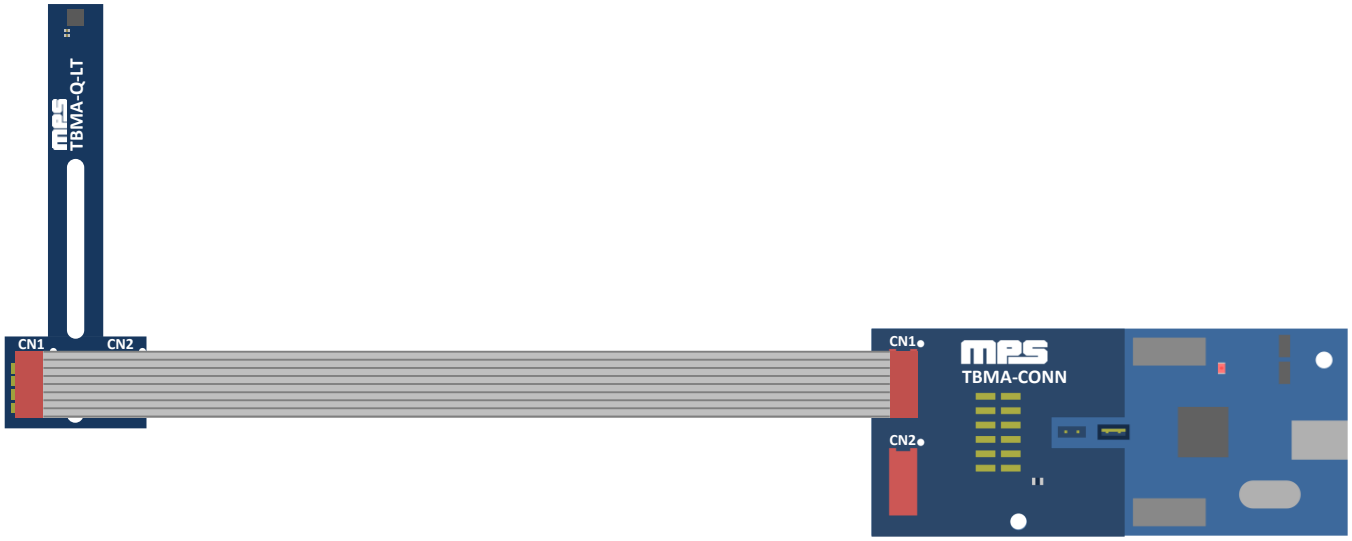


**Figure 17: Connect TBMA-LT to TBMA-CONN Board**


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On the EVKT-KNOB, the CN1 connector must be connected to the EVMA-CONN CN1 connector (see Figure 18 and Figure 19).

**Figure 18: Connect EVKT-KNOB to EVMA-CONN Board (Top View)**

**Figure 19: Connect EVKT-KNOB to EVMA-CONN Board (Side View)**

### 5. Connect LPC-Link2 to Computer

Connect the LPC-Link2 board to the computer using the provided USB cable (Type A to Type Mini-B) (see Figure 20). The red LED (LED1) on the LPC-Link2 should blink.

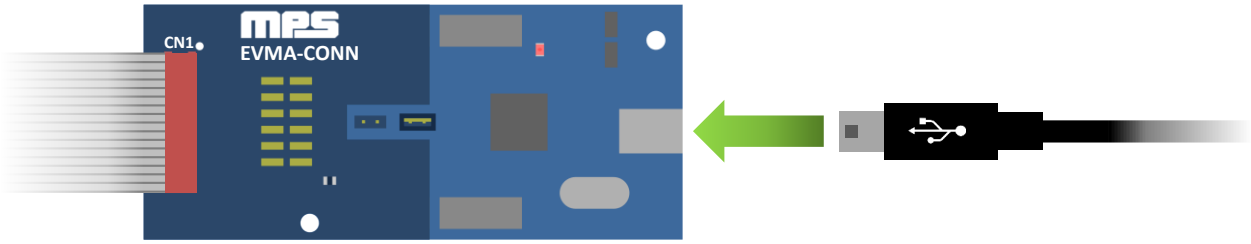


**Figure 20: Connect LPC-Link2 to Computer**

### 6. Start Macom App

Launch the Macom App from the start menu (See Figure 21).

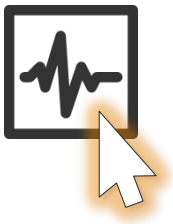

**Figure 21: Start Macom App**


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Angle data should be displayed right away (see Figure 22).

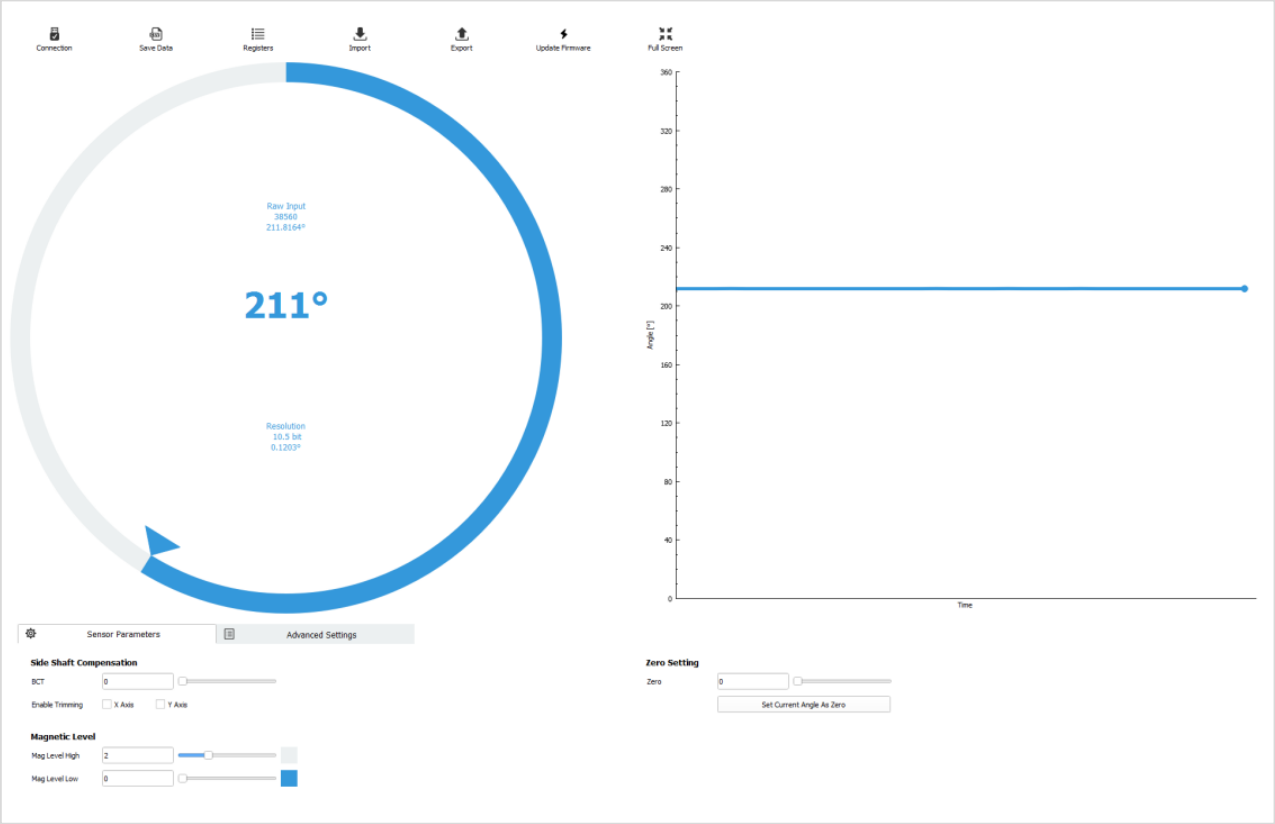


**Figure 22: Overview of Macom App Graphical Interface**


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## MACOM APP

The Macom software is a powerful and easy-to-use application used to interact with the MagAlpha sensor family. The Macom app provides a graphical visualization of the angle output and a convenient way to read and write sensor parameters. 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 three areas: the toolbar, the angle readback, and the sensor parameters.

### 1. Toolbar

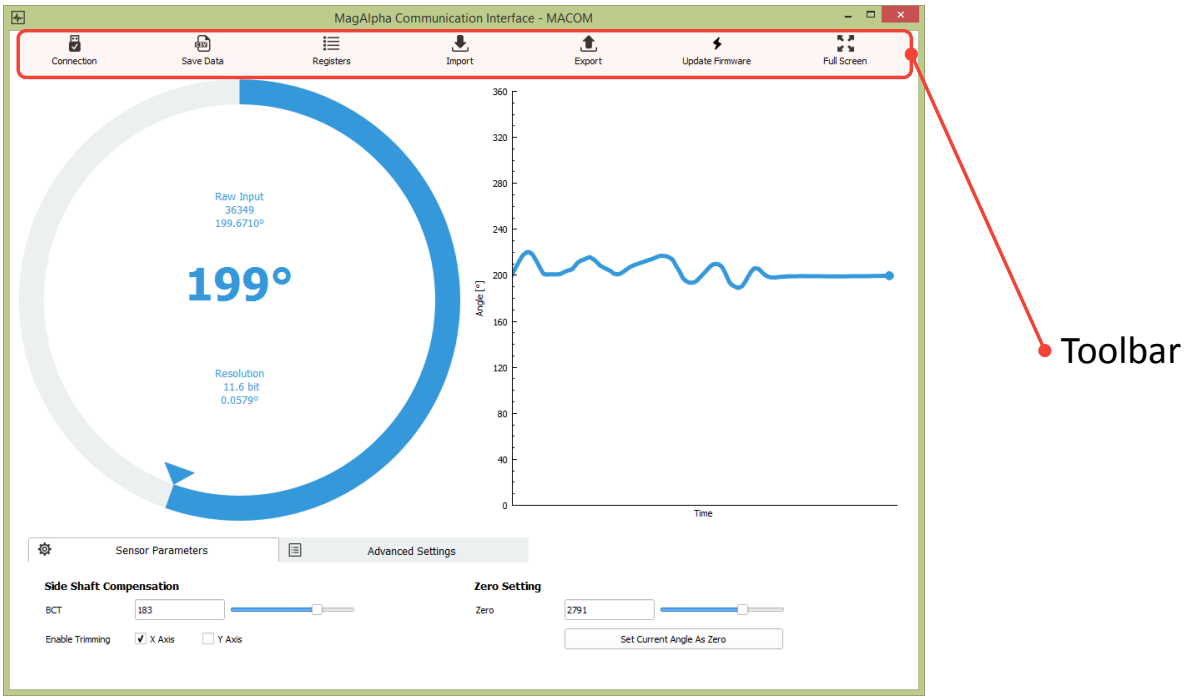


**Figure 23: Macom App Toolbar**

| Feature Name | Description |
|---|---|
| Connection | Switch the USB connection to the EVKT-MACOM on or off. This feature also launches a sensor auto-discovery when the connection is switched ON (see Sensor Parameters section on page 15). |
| Save Data | Saves the latest 2000 measured angles in a CSV file. This file can be also open natively by any spreadsheet applications (e.g.: Microsoft Excel). |
| Registers | Switch the registers overview window display on or off (see Figure 24). This window provides the overview of the complete register map at 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 clicking 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. |
| 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. |


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| | |
|---|---|
| Full Screen | Switch full screen mode on or off. |

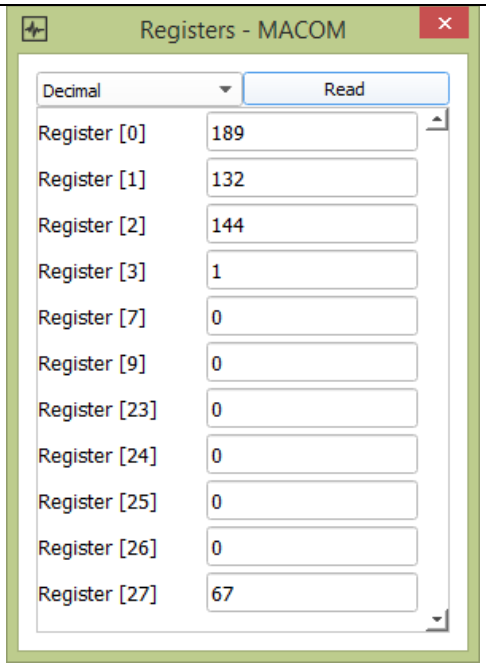


**Figure 24: Macom App Registers Overview Feature**

## 2. Angle Readback

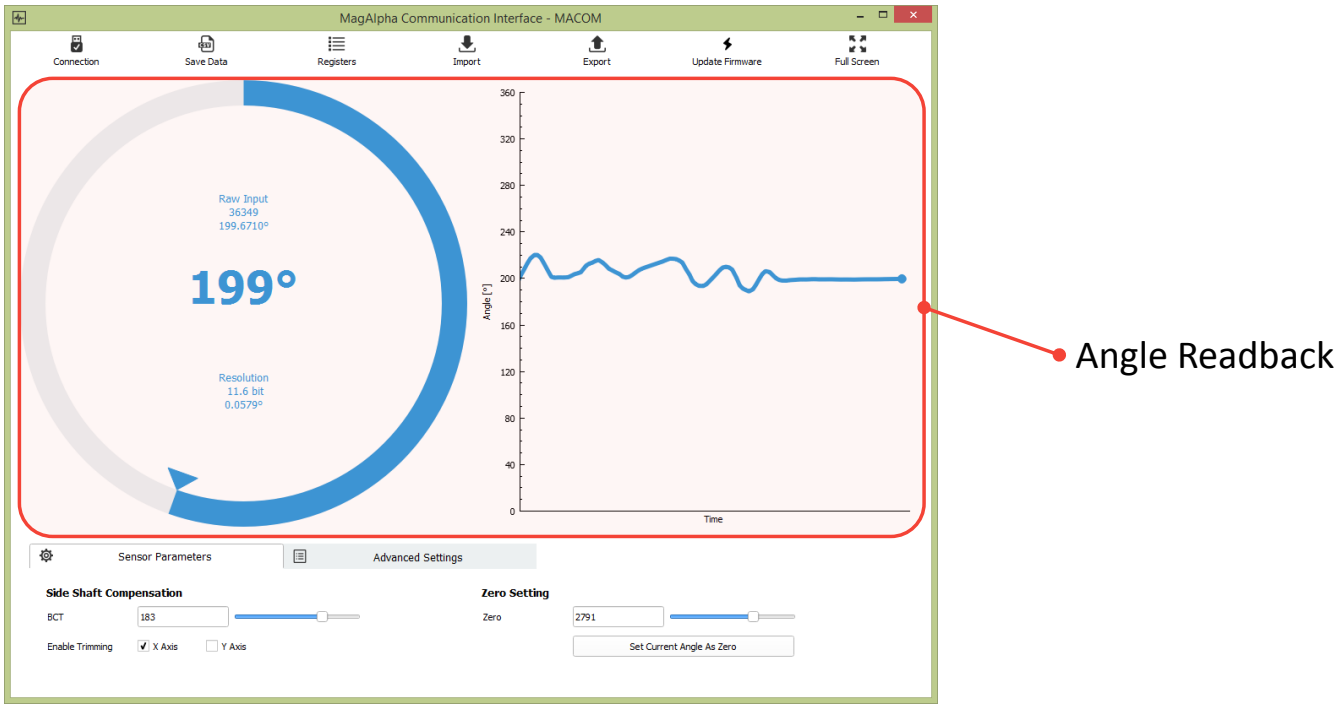


**Figure 25: Macom App Angle Readback**

| Feature Name | Description |
|---|---|
| Raw Input | Measured angle value coded on 16 bits (0 to 65535) and in degrees (0 to 360). |
| Resolution | Gives 6σ resolution in bits (n) and 3σ resolution in degrees (m). This 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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## 3. Sensor Parameters

The user-configurable parameters are defined during the auto-discovery process. This process occurs at Macom App start-up or when a disconnection/connection cycle occurs. The software discovers which sensor generation is connected automatically and finds out which parameters are available for this specific product (see Figure 26).

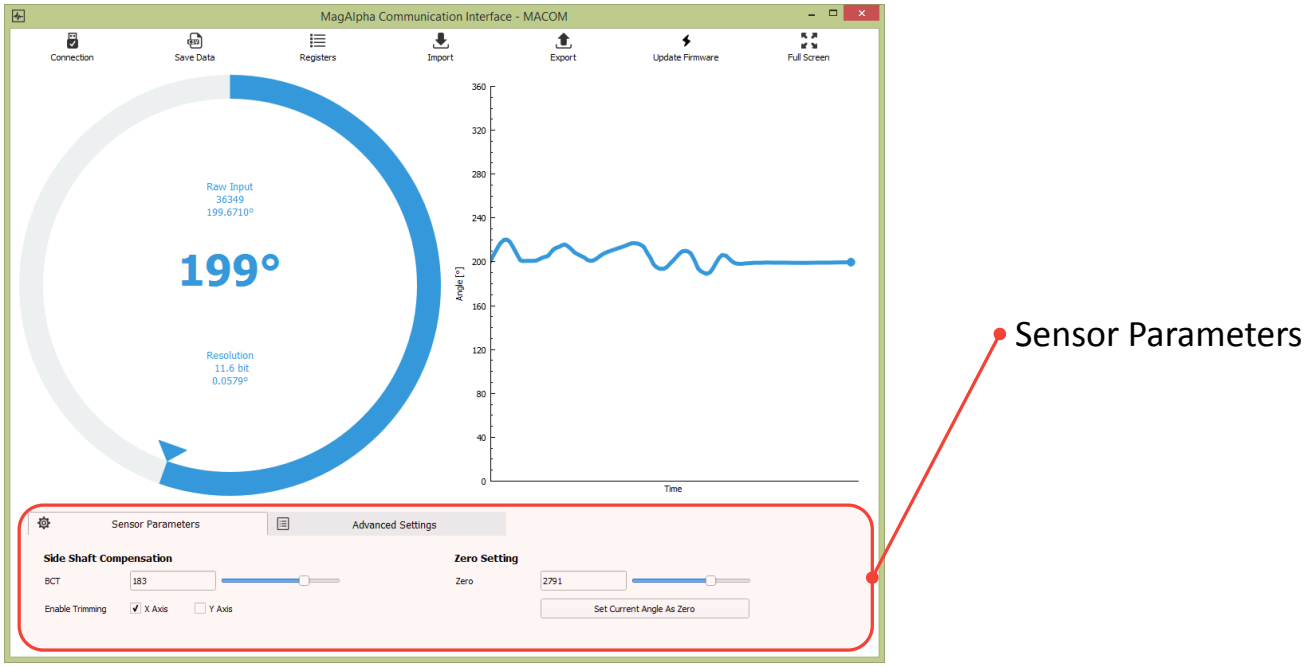


**Figure 26: Macom App Sensor Parameters**

A connection cycle is required after a sensor hot swap (connecting or unplugging the sensor while the system is on) in order to re-run the auto-discovery process on the freshly connected sensor.

To perform a connection cycle, simply click on connection twice: once to disconnect the device and again to reconnect it.

**Figure 27: Macom App Connection Cycle**


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# APPENDIX A: SENSOR GENERATION

See Table 3 for a list of sensor generations and their corresponding MPS part numbers.

**Table 3: Sensor Generation**

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

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Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

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**Офис по работе с юридическими лицами:**

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9