



### DESCRIPTION

The TBMA is a test board for the MagAlpha magnetic position sensor family. The TBMA allows users to run and test MagAlpha sensors quickly. TBMA boards come in two different formats: round (RD) and long (LT). In the RD format, the sensor is mounted in an end-of-shaft configuration. In the LT format, the sensor is mounted on the edge of the board and can be used in both side-shaft and end-of-shaft configurations.

TBMA test boards are compatible with the MACOM evaluation kit, offering seamless connection and operation of MagAlpha sensors, and allowing users to evaluate MagAlpha functionalities and performances with their own set-up.

The TBMA test board only includes the assembled board with the sensor and decoupling capacitors. It does not include connectors.

### FEATURES

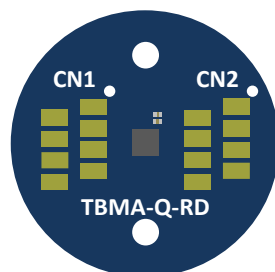
- Round Board Format for End-of-Shaft Mounting
- Long Board Format for Side Shaft and End-of-Shaft Mounting
- Compatible with the MagAlpha Communication Interface Kit (EVKT-MACOM)

### APPLICATIONS

- Servo Drives
- Robotics
- Automotive
- BLDC Motor Commutation
- Encoders

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### OVERVIEW



Round (RD) Format

**Not Recommended for New Designs,  
Refer to Long (LT) Format**



Long (LT) Format

Figure 1: TBMA Test Boards

## Board Types

Different board types are available, and each has a different schematic and layout design (see Table 1 on page 3). The board type to use is determined by the selected sensor part number.

Each board type is also available in two different formats: a round test board (RD), or a long test board (LT). The board part number specifies which format is used:

- TBMAXXX-Q-**RD**-XXX = Round test board *(Not Recommended for New Designs, Refer to TBMAXXX-Q-LT-XXX)*
- TBMAXXX-Q-**LT**-XXX = Long test board

Both RD and LT board formats can be used for end-of-shaft configurations where the sensor is positioned at the end of the motor or knob shaft. For side-shaft configurations where the sensor is positioned perpendicularly to the motor or knob shaft, only the RD board format can be used.

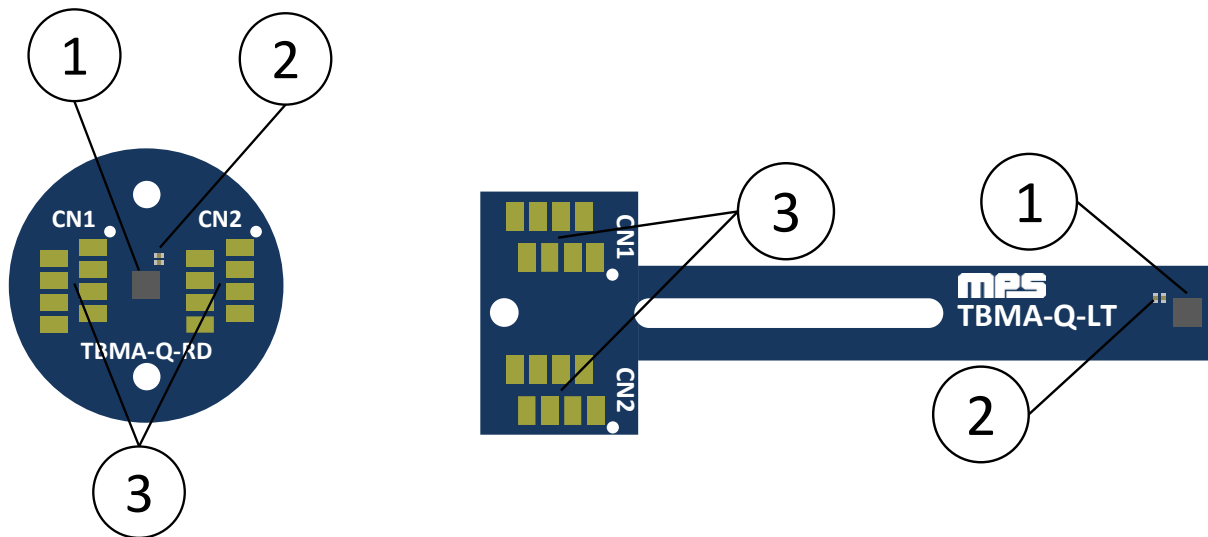
**Table 1: Board Type**

| Board Type   | Board Part Number                                   | MPS Chip Part Number |
|--------------|---|----------------------|
| BOARD TYPE 1 | TBMA100-Q-RD<br><i>NRFND, Refer to TBMA100-Q-LT</i> | MA100                |
|              | TBMA100-Q-LT  |                      |
|              | TBMA300-Q-RD<br><i>NRFND, Refer to TBMA300-Q-LT</i> | MA300                |
|              | TBMA300-Q-LT  |                      |
|              | TBMA700-Q-RD<br><i>NRFND, Refer to TBMA700-Q-LT</i> | MA700                |
|              | TBMA700-Q-LT  |                      |
|              | TBMA750-Q-RD<br><i>NRFND, Refer to TBMA750-Q-LT</i> | MA750                |
|              | TBMA750-Q-LT  |                      |
| Board type 2 | TBMA102-Q-RD<br><i>NRFND, Refer to TBMA102-Q-LT</i> | MA102                |
|              | TBMA102-Q-LT  |                      |
|              | TBMA302-Q-RD<br><i>NRFND, Refer to TBMA302-Q-LT</i> | MA302                |
|              | TBMA302-Q-LT  |                      |
|              | TBMA310-Q-RD<br><i>NRFND, Refer to TBMA310-Q-LT</i> | MA310                |
|              | TBMA310-Q-LT  |                      |
|              | TBMA702-Q-RD<br><i>NRFND, Refer to TBMA702-Q-LT</i> | MA702                |
|              | TBMA702-Q-LT  |                      |
|              | TBMA710-Q-RD<br><i>NRFND, Refer to TBMA710-Q-LT</i> | MA710                |
|              | TBMA710-Q-LT  |                      |
|              | TBMA730-Q-RD<br><i>NRFND, Refer to TBMA730-Q-LT</i> | MA730                |
|              | TBMA730-Q-LT  |                      |
|              | TBMA800-Q-RD<br><i>NRFND, Refer to TBMA800-Q-LT</i> | MA800                |
|              | TBMA800-Q-LT  |                      |
|              | TBMA820-Q-RD<br><i>NRFND, Refer to TBMA820-Q-LT</i> | MA820                |
|              | TBMA820-Q-LT  |                      |
|              | TBMA850-Q-RD<br><i>NRFND, Refer to TBMA850-Q-LT</i> | MA850                |
|              | TBMA850-Q-LT  |                      |
|              | TBMA704-Q-RD<br><i>NRFND, Refer to TBMA704-Q-LT</i> | MA704                |
|              | TBMA704-Q-LT  |                      |
|              | TBMA330-Q-RD<br><i>NRFND, Refer to TBMA330-Q-LT</i> | MA330                |
|              | TBMA330-Q-LT  |                      |

|              |   |        |
|--------------|---|--------|
| Board type 2 | TBMA732-Q-RD<br><i>NRFND, Refer to TBMA732-Q-LT</i>   | MA732  |
|              | TBMA732-Q-LT  |        |
|              | TBMAQ430-Q-RD<br><i>NRFND, Refer to TBMAQ430-Q-LT</i> | MAQ430 |
|              | TBMAQ430-Q-LT   |        |
|              | TBMAQ470-Q-RD<br><i>NRFND, Refer to TBMAQ470-Q-LT</i> | MAQ470 |
|              | TBMAQ470-Q-LT   |        |
|              | TBMAQ473-Q-RD<br><i>NRFND, Refer to TBMAQ473-Q-LT</i> | MAQ473 |
|              | TBMAQ473-Q-LT   |        |
| Board type 3 | TBMA780-Q-RD<br><i>NRFND, Refer to TBMA780-Q-LT</i>   | MA780  |
|              | TBMA780-Q-LT  |        |
| Board type 4 | TBMA782-Q-RD<br><i>NRFND, Refer to TBMA782-Q-LT</i>   | MA782  |
|              | TBMA782-Q-LT  |        |
| Board type 5 | TBMA734-Q-RD<br><i>NRFND, Refer to TBMA734-Q-LT</i>   | MA734  |
|              | TBMA734-Q-LT  |        |

## TBMA Contents

Figure 2 shows the TBMA test board contents, with each element described in the list below.



**Not Recommended for New Designs, Refer to LT Version**

**Figure 2: TBMA Contents**

1. One TBMA board with MagAlpha mounted (RD or LT).
2. Decoupling capacitors.
3. Connector footprints (connectors not included).

## BOARD TYPE 1

### RD Format Overview

Figure 3 shows an overview of the Type 1 round (RD) board.

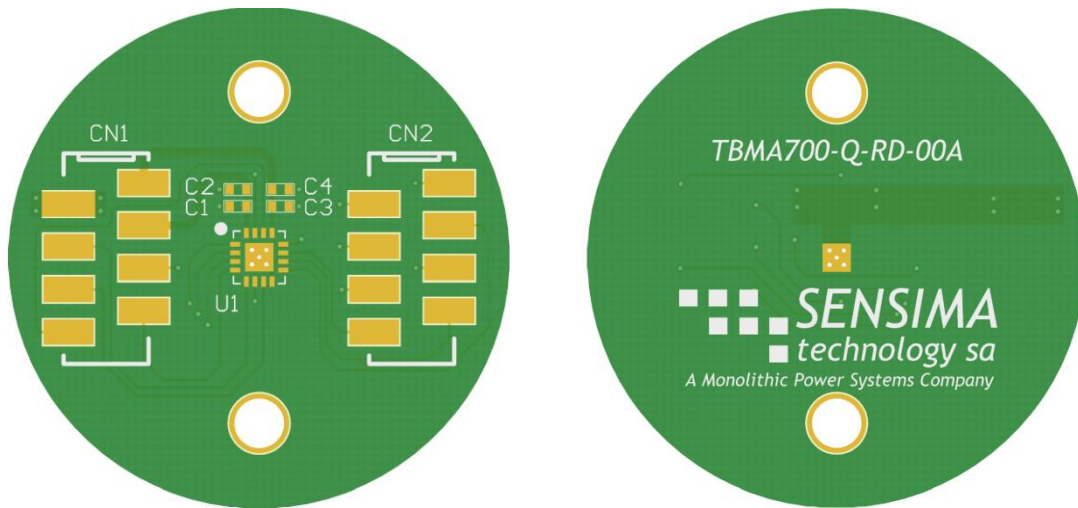


Figure 3: RD Type 1 Board Overview

**Not Recommended for New Designs, Refer to LT Type 1 Board Overview**

### LT Format Overview

Figure 4 shows an overview of the Type 1 long (LT) board.

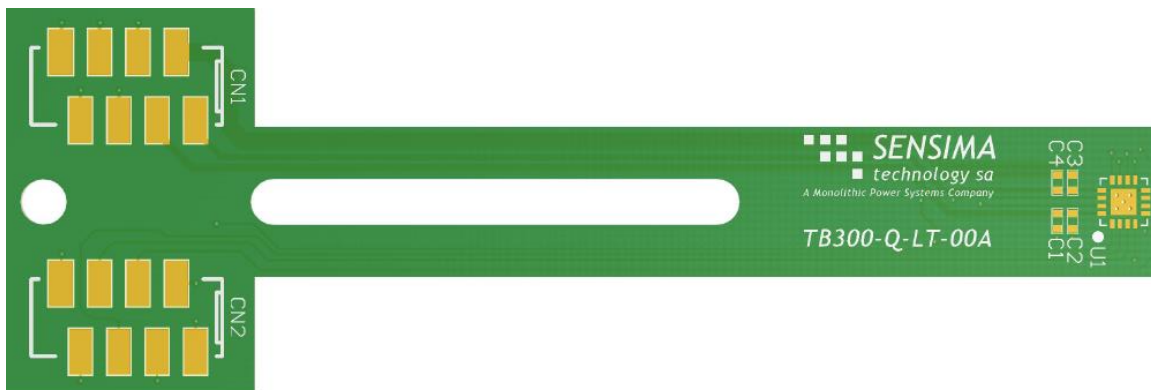
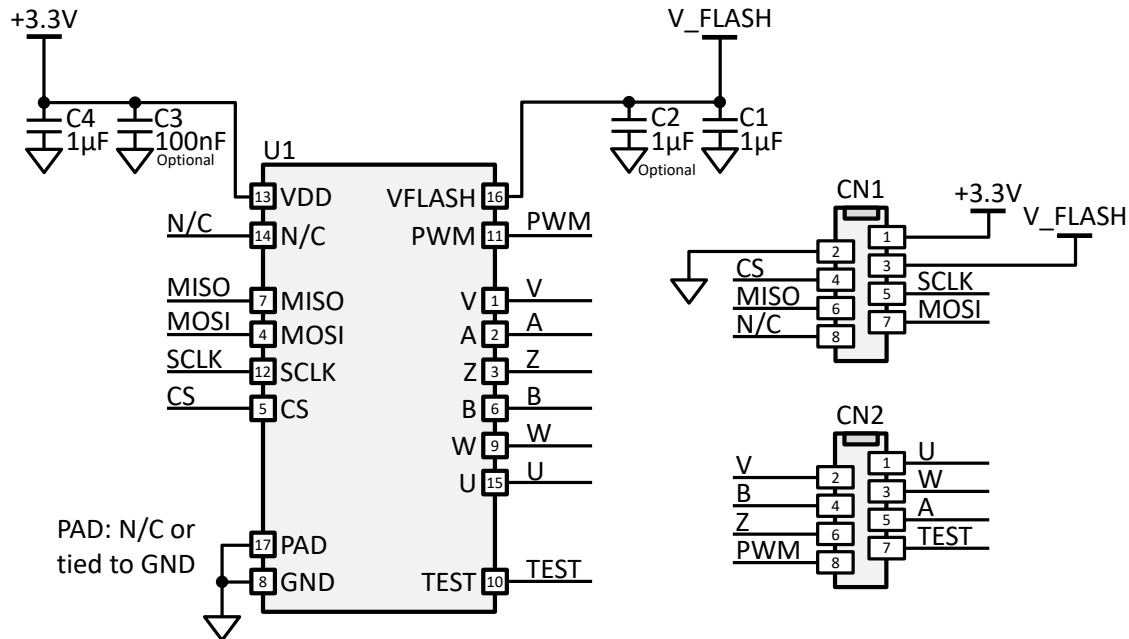


Figure 4: LT Type 1 Board Overview

## Schematic

Figure 5 shows a schematic for the Type 1 boards.



**Figure 5: RD/LT Type 1 Schematic**

## Bill of Materials

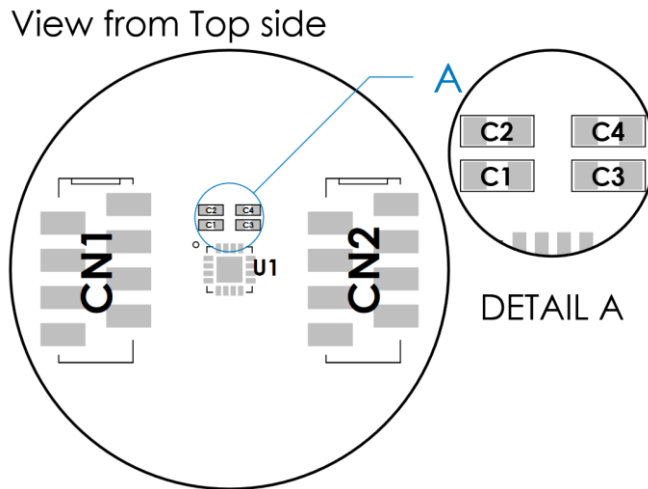
Table 2 shows the Type 1 board bill of materials (BOM).

**Table 2: Type 1 Board Bill of Materials**

| Quantity | Designator               | Description   | Value | Manufacturer             | Manufacturer PN             |
|----------|--------------------------|---|-------|--------------------------|-----------------------------|
| 2        | C1, C4                   | Ceramic capacitor, 10V, X6S, 0402                                   | 1µF   | Murata                   | GRM155C81A105KA12D          |
| 1        | C2 (optional)            | Ceramic capacitor, 10V, X6S, 0402                                   | 1µF   | Murata                   | GRM155C81A105KA12D          |
| 1        | C3 (optional)            | Ceramic capacitor, 16V, X7R, 0402                                   | 100nF | Murata                   | GRM155R71C104KA88J          |
| 1        | U1                       | MagAlpha magnetic position sensor                                   | MAxxx | MPS                      | N/A                         |
| 2        | CN1, CN2 (not populated) | 8-position receptacle connector, 0.100" (2.54mm), surface-mount tin |       | Würth or TE Connectivity | 690367280876 or 7-2178711-8 |

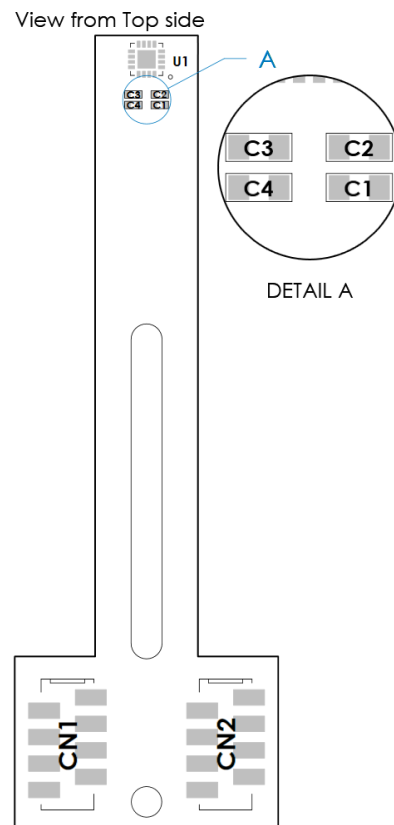
## Assembly View

Figure 6 shows the top-side assembly view of the Type 1 round board. Figure 7 shows the top-side assembly view of the Type 1 long board.



**Figure 6: RD Type 1 Assembly View**

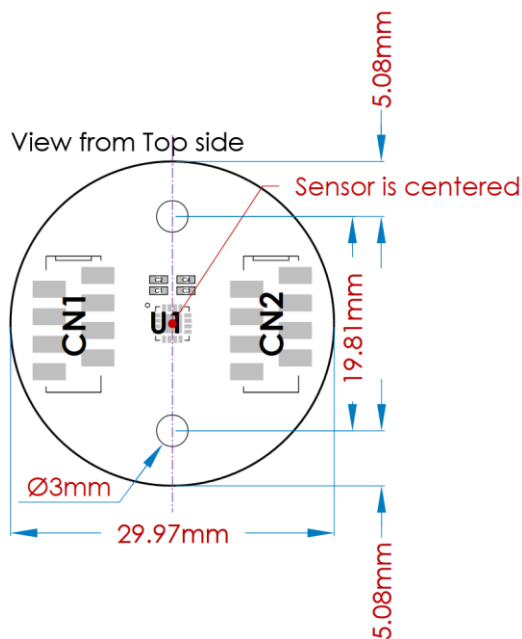
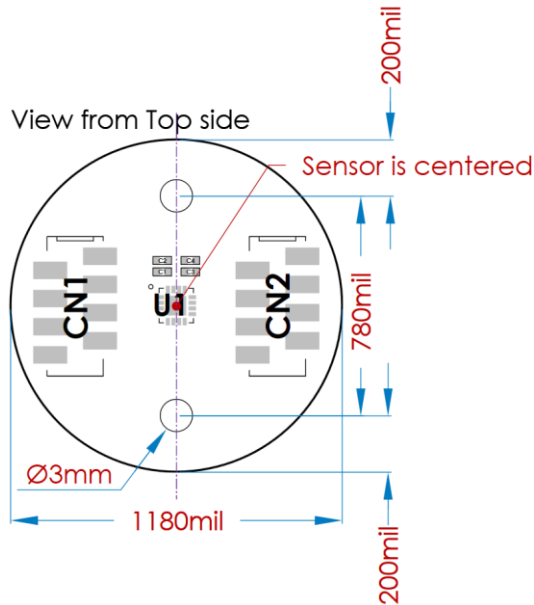
***Not Recommended for New Designs, Refer to LT Type 1 Assembly View***



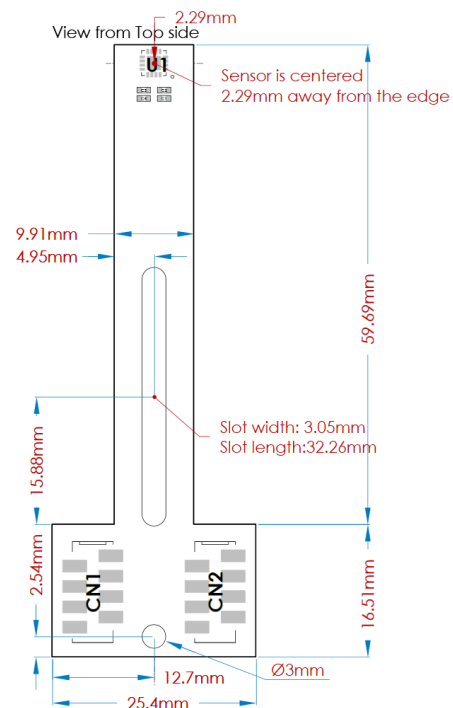
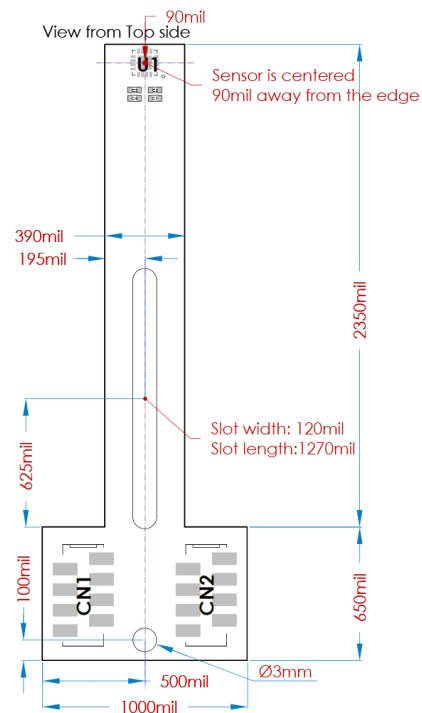
**Figure 7: LT Type 1 Assembly View**

## Mechanical Drawing

Figure 8 shows the top-side mechanical drawing of the Type 1 round board. Figure 9 shows the top-side mechanical drawing of the Type 1 long board.



**Figure 8: RD Type 1 Mechanical Drawing**  
**Not Recommended for New Designs, Refer to LT**  
**Type 1 Mechanical Drawing**

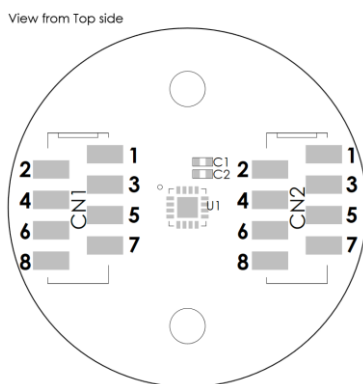


**Figure 9: LT Type 1 Mechanical Drawing,**  
**mil = 0.001" = 0.0254mm**



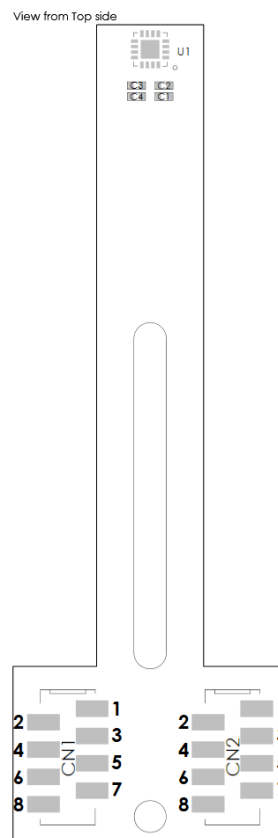
### Connector Pinout

Figure 10 shows the Type 1 round board connector pinout. Figure 11 shows the Type 1 long board connector pinout.



**Figure 10: RD Type 1 Connector Pinout**

**Not Recommended for New Designs, Refer to LT Type 1 Connector Pinout**



**Figure 11: LT Type 1 Connector Pinout**

Table 3 shows the Type 1 pin registers.

**Table 3: Type 1 Board Connector Pin Registers**

| Pin   | Name               | Description   |
|-------|--------------------|---|
| CN1.1 | VDD                | 3.3V supply.  |
| CN1.2 | GND                | Ground.   |
| CN1.3 | VFLASH             | Flash power supply (3.9V only powered during flashing). |
| CN1.4 | CS                 | Chip select (serial).                                   |
| CN1.5 | SCLK               | Clock (serial).   |
| CN1.6 | MISO               | Master in slave out (serial).                           |
| CN1.7 | MOSI               | Master out slave in (serial).                           |
| CN1.8 | -                  | Leave unconnected.                                      |
| CN2.1 | U <sup>(1)</sup>   | U output (optional motor commutation).                  |
| CN2.2 | V <sup>(1)</sup>   | V output (optional motor commutation).                  |
| CN2.3 | W <sup>(1)</sup>   | W output (optional motor commutation).                  |
| CN2.4 | A <sup>(1)</sup>   | A output (optional incremental encoder).                |
| CN2.5 | B <sup>(1)</sup>   | B output (optional incremental encoder).                |
| CN2.6 | Z <sup>(1)</sup>   | Z output (optional incremental encoder).                |
| CN2.7 | TEST               | Test pin.   |
| CN2.8 | PWM <sup>(1)</sup> | Pulse-width modulation output (optional).               |

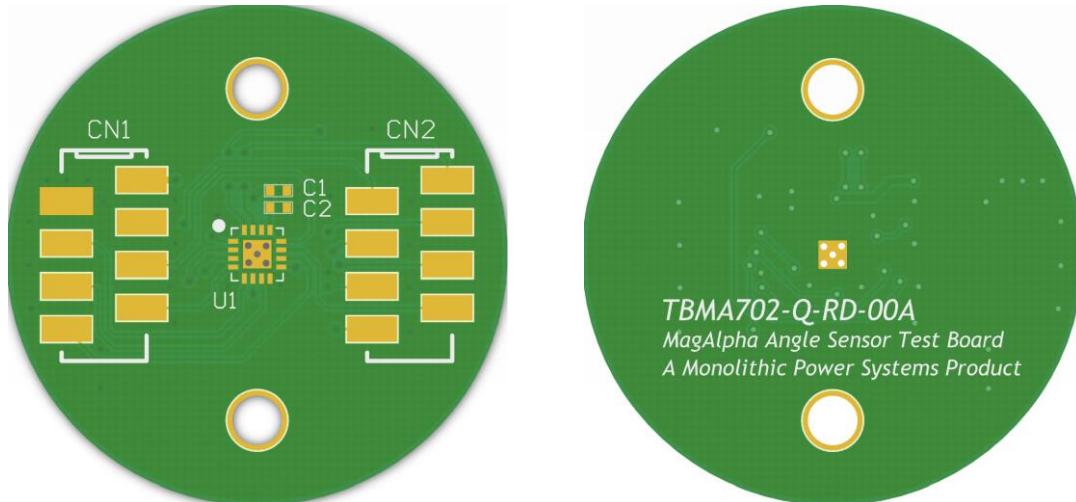
**Note:**

1) Availability of this option depends of the MagAlpha part number. Please refer directly to the part datasheet.

## BOARD TYPE 2

### RD Format Overview

Figure 12 shows an overview of the Type 2 round (RD) board.



**Figure 12: RD Type 2 Board Overview**

**Not Recommended for New Designs, Refer to LT Type 2 Board Overview**

### LT Format Overview

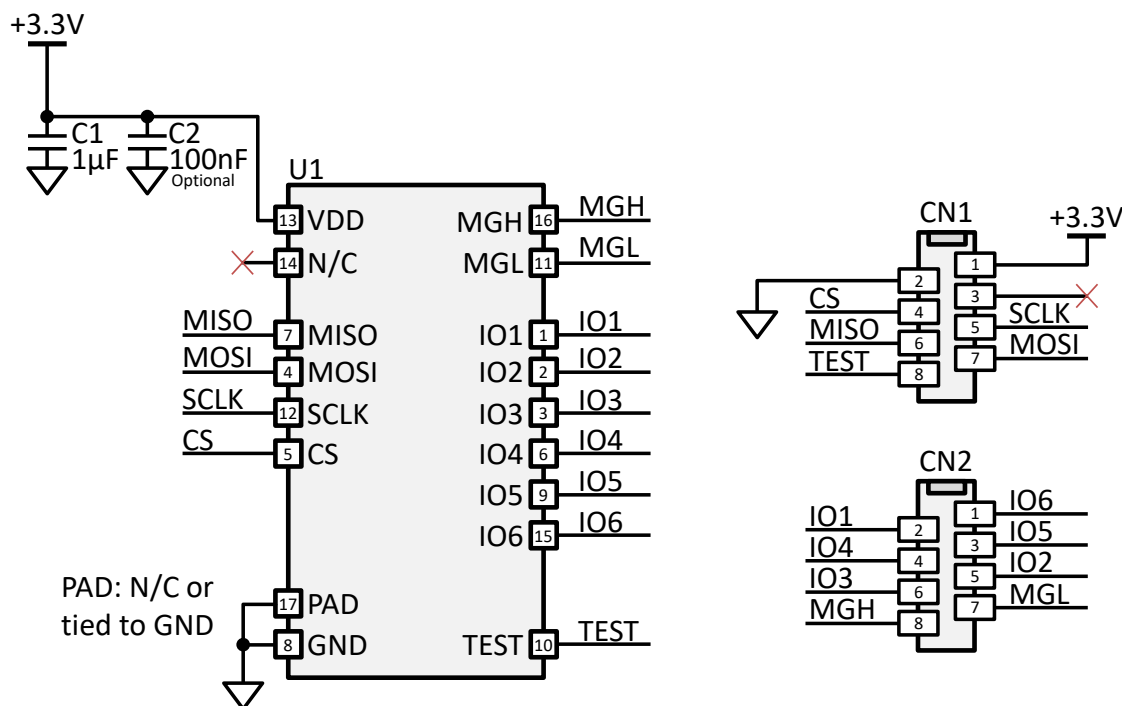
Figure 13 shows an overview of the Type 2 long (LT) board.



**Figure 13: LT Type 2 Board Overview**

## Schematic

Figure 1 shows a schematic for the Type 2 boards.



**Figure 1: RD/LT Type 2 Schematic**

## Bill of Materials

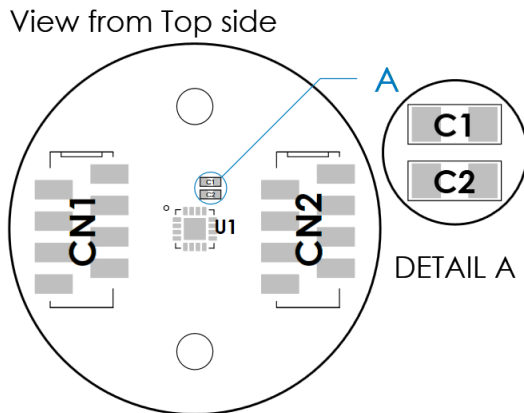
Table 4 shows the Type 2 board bill of materials (BOM).

**Table 4: Type 2 Board Bill of Materials**

| Quantity | Designator               | Description   | Value | Manufacturer             | Manufacturer P/N            |
|----------|--------------------------|---|-------|--------------------------|-----------------------------|
| 1        | C1                       | Ceramic capacitor, 10V, X6S, 0402                                   | 1µF   | Murata                   | GRM155C81A105KA12D          |
| 1        | C2 (not populated)       | Ceramic capacitor, 16V, X7R, 0402                                   | 100nF | Murata                   | GRM155R71C104KA88J          |
| 1        | U1                       | MagAlpha magnetic position sensor                                   | MAxxx | MPS                      | N/A                         |
| 2        | CN1, CN2 (not populated) | 8-position receptacle connector, 0.100" (2.54mm), surface-mount tin |       | Würth or TE Connectivity | 690367280876 or 7-2178711-8 |

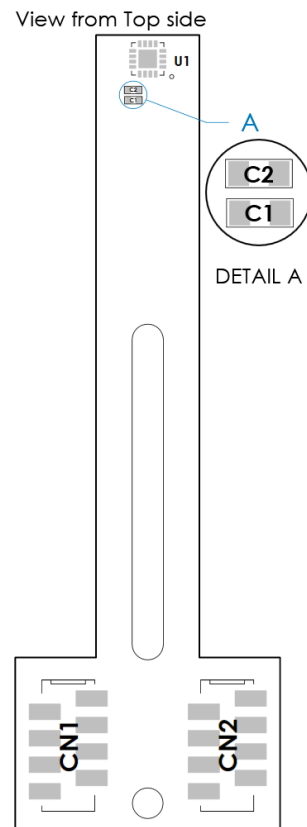
## Assembly View

Figure 15 shows the top-side assembly view of the Type 2 round board. Figure 16 shows the top-side assembly view of the Type 2 long board.



**Figure 15: RD Type 2 Assembly View**

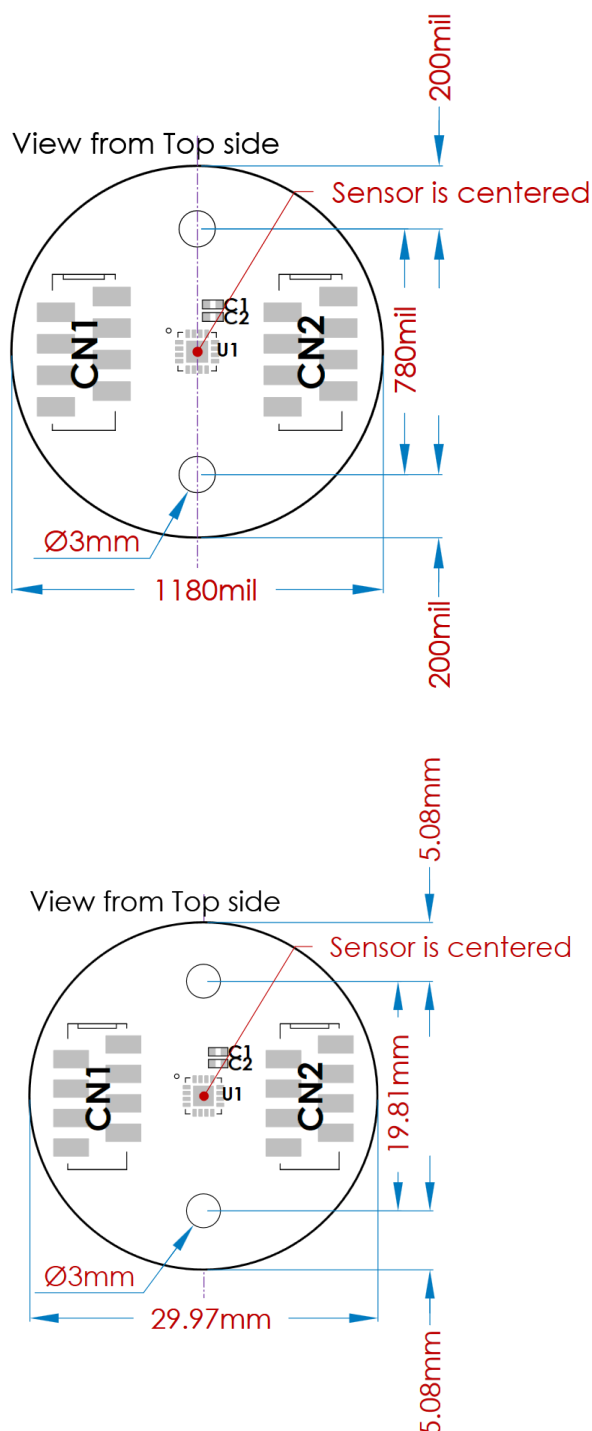
***Not Recommended for New Designs, Refer to  
LT Type 2 Assembly View***



**Figure 16: LT Type 2 Assembly View**

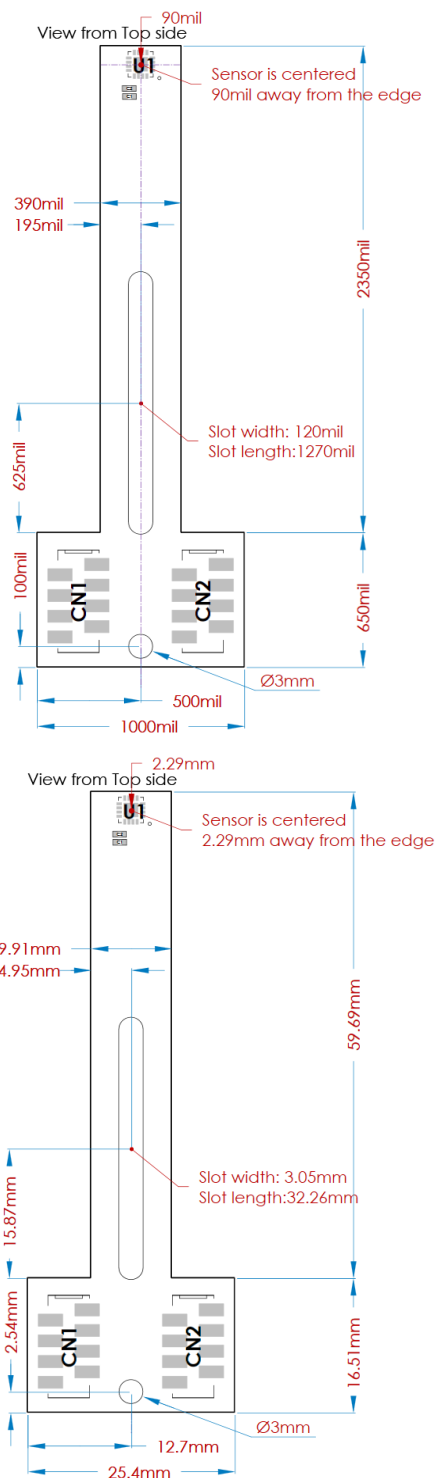
## Mechanical Drawing

Figure 17 shows the top-side mechanical drawing of the Type 2 round board. Figure 18 shows the top-side mechanical drawing of the Type 2 long board.



**Figure 17: RD Type 2 Mechanical Drawing**

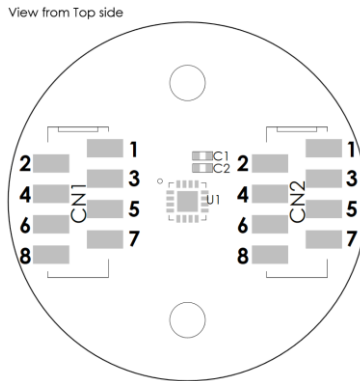
**Not Recommended for New Designs, Refer to LT Type 2 Mechanical Drawing**



**Figure 18: LT Type 2 Mechanical Drawing,  
mil = 0.001" = 0.0254mm**

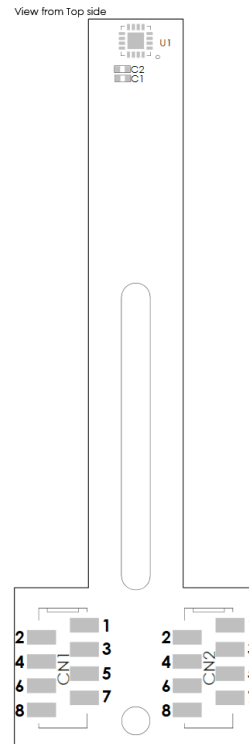
### Connector Pinout

Figure 19 shows the Type 2 round board connector pinout. Figure 20 shows the Type 2 long board connector pinout.



**Figure 19: RD Type 2 Connector Pinout**

**Not Recommended for New Designs, Refer to LT Type 2 Connector Pinout**



**Figure 20: LT Type 2 Connector Pinout**

Table 2 shows the Type 2 pin registers.

**Table 2: Type 2 Board Connector Pin Registers**

| Pin   | Name               | Description                     |
|-------|--------------------|---------------------------------|
| CN1.1 | VDD                | 3.3V supply.                    |
| CN1.2 | GND                | Ground.                         |
| CN1.3 | -                  | -                               |
| CN1.4 | CS                 | Chip select (serial).           |
| CN1.5 | SCLK               | Clock (serial).                 |
| CN1.6 | MISO               | Master in slave out (serial).   |
| CN1.7 | MOSI               | Master out slave in (serial).   |
| CN1.8 | TEST               | Test pin.                       |
| CN2.1 | IO6 <sup>(2)</sup> | Pin 15 (IO).                    |
| CN2.2 | IO1 <sup>(2)</sup> | Pin 1 (IO).                     |
| CN2.3 | IO5 <sup>(2)</sup> | Pin 9 (IO).                     |
| CN2.4 | IO4 <sup>(2)</sup> | Pin 6 (IO).                     |
| CN2.5 | IO2 <sup>(2)</sup> | Pin 2 (IO).                     |
| CN2.6 | IO3 <sup>(2)</sup> | Pin 3 (IO).                     |
| CN2.7 | MGL <sup>(3)</sup> | Magnetic level low (optional).  |
| CN2.8 | MGH <sup>(3)</sup> | Magnetic level high (optional). |

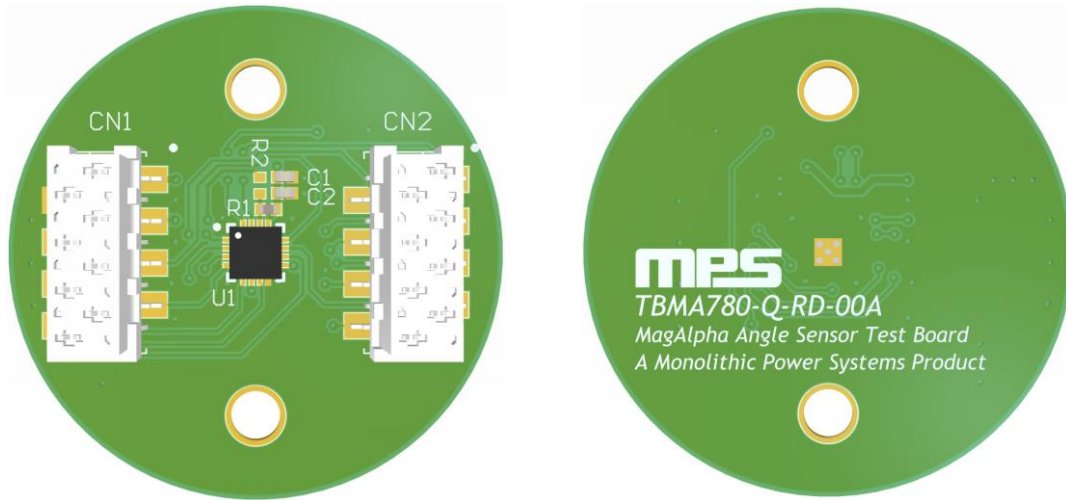
#### Notes:

- 2) Refer to the MagAlpha part datasheet to know which features are available on these pins.
- 3) Availability of this option depends of the MagAlpha part number. Please refer directly to the part datasheet.

## BOARD TYPE 3

### RD Format Overview

Figure 21 shows an overview of the Type 3 round (RD) board.

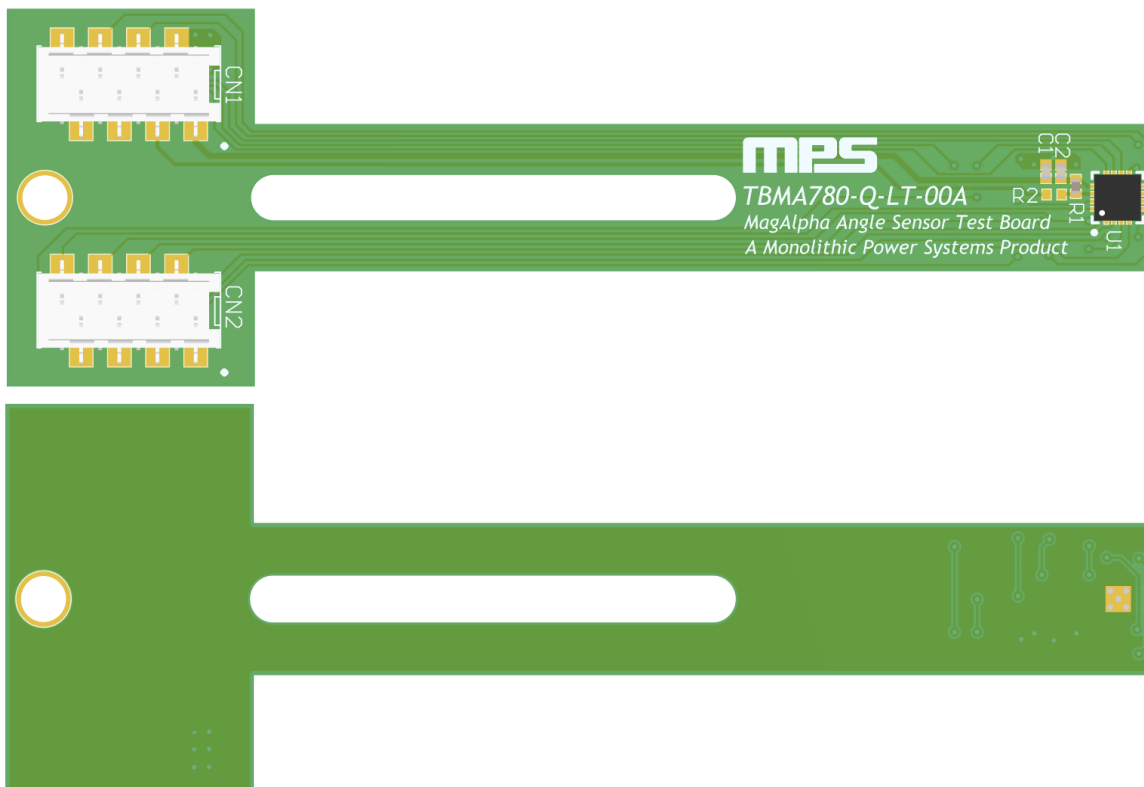


**Figure 21: RD Type 3 Board Overview**

***Not Recommended for New Designs, Refer to LT Type 3 Board Overview***

### LT Format Overview

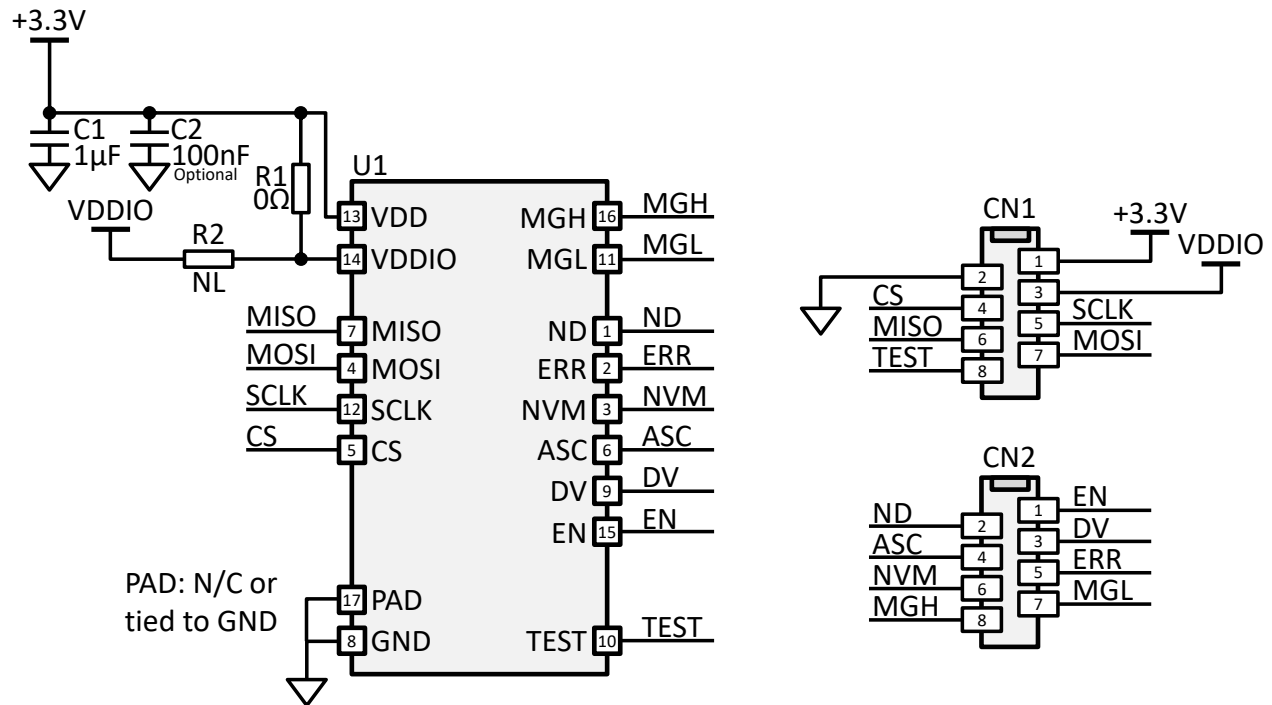
Figure 22 shows an overview of the Type 3 long (LT) board.



**Figure 22: LT Type 3 Board Overview**

### Schematic

Figure 23 shows a schematic for the Type 3 boards.



**Figure 23: RD/LT Type 3 Schematic**

### Bill of Materials

Table 6 shows the Type 3 board bill of materials (BOM).

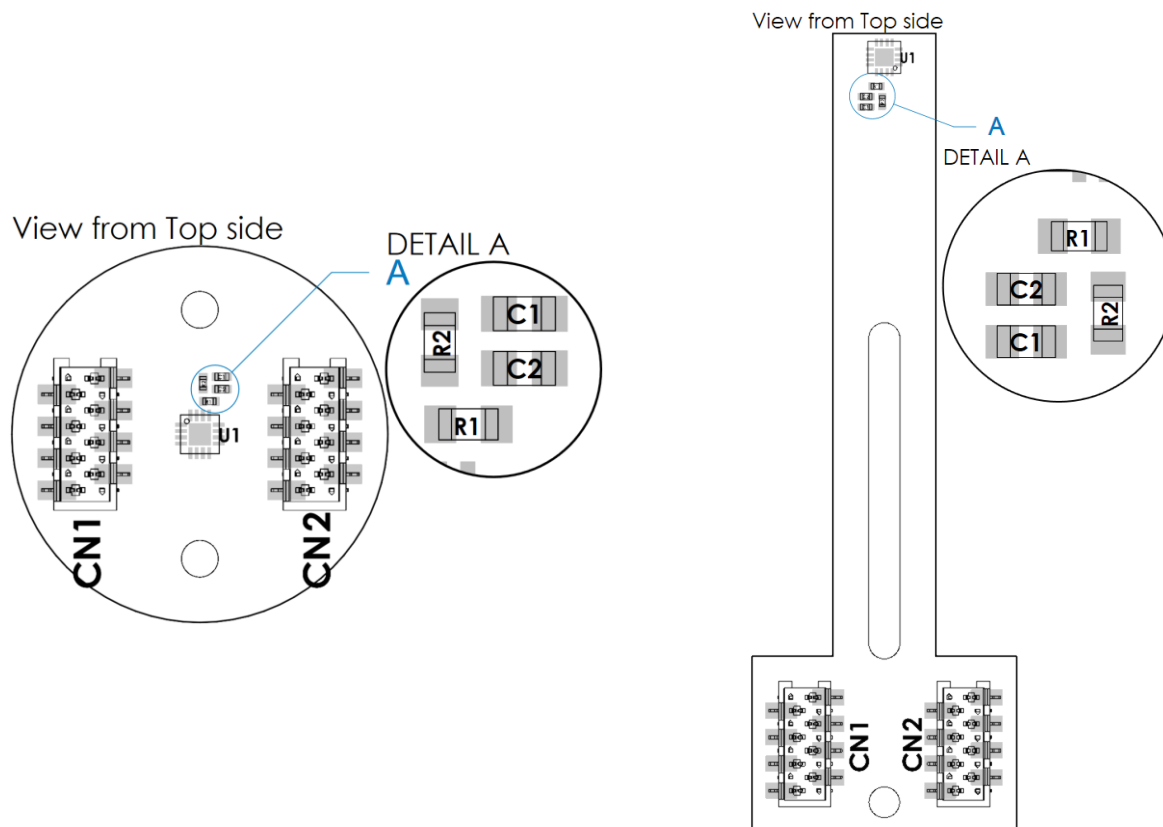
**Table 6: Type 3 Board Bill of Materials**

| Quantity | Designator                         | Description   | Value | Manufacturer             | Manufacturer PN             |
|----------|------------------------------------|---|-------|--------------------------|-----------------------------|
| 1        | C1                                 | Ceramic capacitor, 10V, X6S, 0402                                   | 1µF   | Murata                   | GRM155C81A105KA12D          |
| 1        | C2 (not populated)                 | Ceramic capacitor, 16V, X7R, 0402                                   | 100nF | Murata                   | GRM155R71C104KA88J          |
| 1        | R1 (populated), R2 (not populated) | 0Ω resistor, 0402   | 0Ω    | Panasonic                | ERJ-2GE0R00X                |
| 1        | U1                                 | MagAlpha magnetic position sensor                                   | MA780 | MPS                      | MA780GQ                     |
| 2        | CN1, CN2 (not populated)           | 8-position receptacle connector, 0.100" (2.54mm), surface-mount tin |       | Würth or TE Connectivity | 690367280876 or 7-2178711-8 |



## Assembly View

Figure 24 shows the top-side assembly view of the Type 3 round board. Figure 25 shows the top-side assembly view of the Type 3 long board.



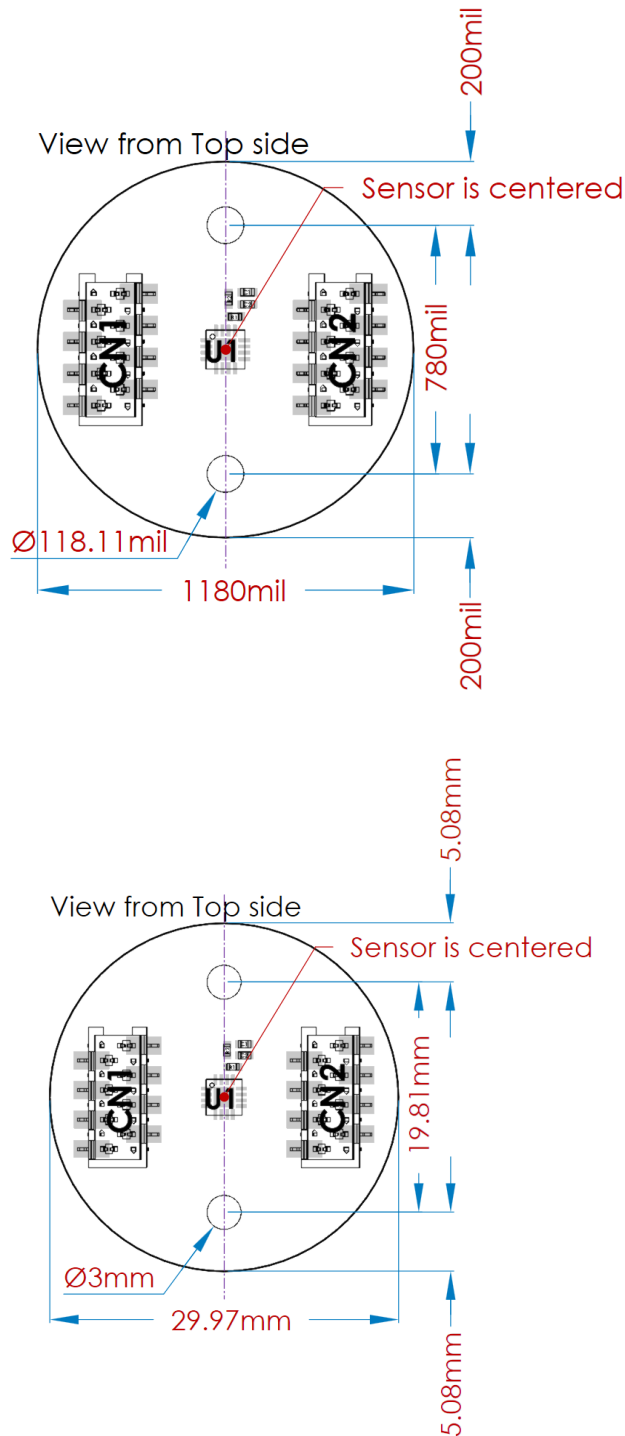
**Figure 2: RD Type 3 Assembly View**

**Not Recommended for New Designs, Refer to  
LT Type 3 Assembly View**

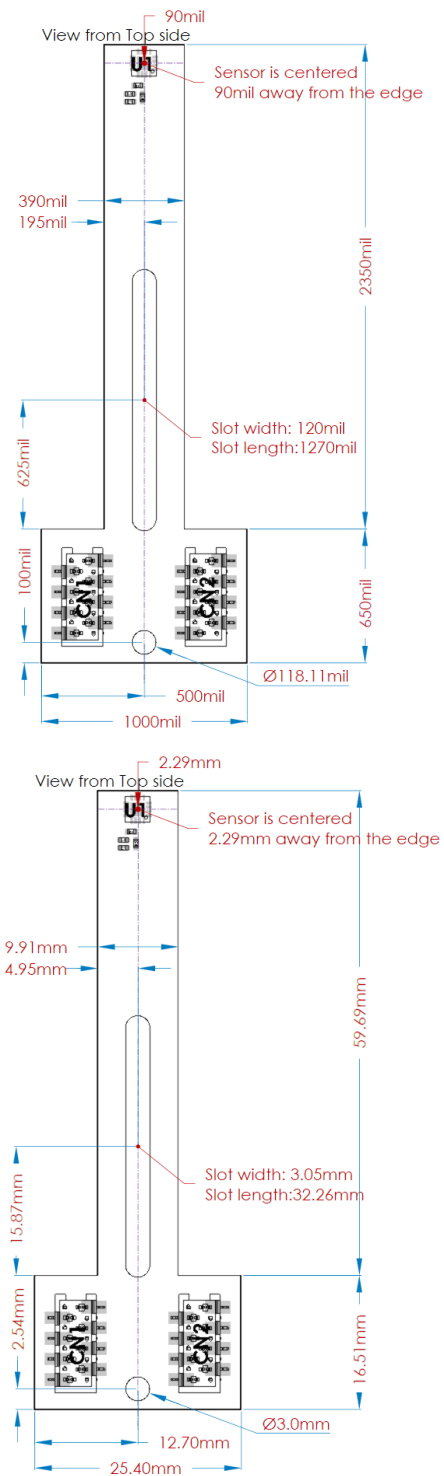
**Figure 25: LT Type 3 Assembly View**

## Mechanical Drawing

Figure 26 shows the top-side mechanical drawing of the Type 3 round board. Figure 27 shows the top-side mechanical drawing of the Type 3 long board.



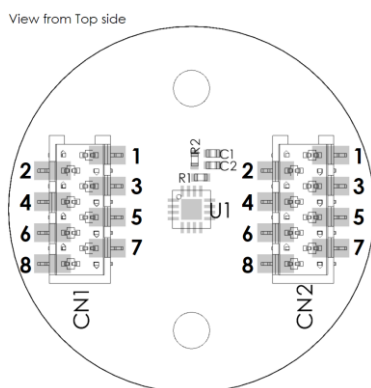
**Figure 3: RD Type 3 Mechanical Drawing**  
**Not Recommended for New Designs, Refer to LT**  
**Type 3 Mechanical Drawing**



**Figure 4: LT Type 3 Mechanical Drawing,**  
**mil = 0.001" = 0.0254mm**

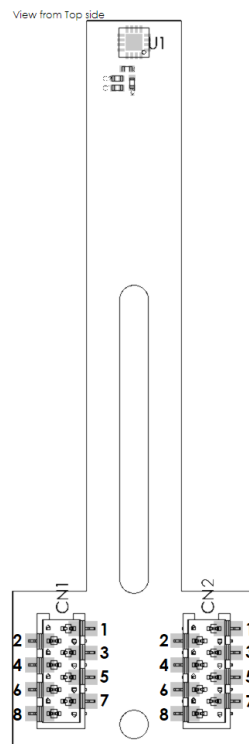
## Connector Pinout

Figure 28 shows the Type 3 round board connector pinout. Figure 29 shows the Type 3 long board connector pinout.



**Figure 28: RD Type 3 Connector Pinout**

**Not Recommended for New Designs, Refer to LT Type 3 Connector Pinout**



**Figure 29: LT Type 3 Connector Pinout**

Table 3 shows the Type 3 pin registers.

**Table 3: Type 3 Board Connector Pin Registers**

| Pin   | Name               | Description   |
|-------|--------------------|---|
| CN1.1 | VDD                | 3.3V supply.  |
| CN1.2 | GND                | Ground.   |
| CN1.3 | VDDIO              | 1.8V to 3.3V supply for IOs.                        |
| CN1.4 | CS                 | Chip select (serial).                               |
| CN1.5 | SCLK               | Clock (serial).                                     |
| CN1.6 | MISO               | Master in slave out (serial).                       |
| CN1.7 | MOSI               | Master out slave in (serial).                       |
| CN1.8 | TEST               | Test pin.   |
| CN2.1 | EN                 | Enable (input). Switches the sensor to active mode. |
| CN2.2 | ND                 | New data (output).                                  |
| CN2.3 | DV                 | Data valid (output).                                |
| CN2.4 | ASC                | Auto-power cycling mode (input).                    |
| CN2.5 | ERR                | Error flag (output).                                |
| CN2.6 | NVM                | Non-volatile memory (output).                       |
| CN2.7 | MGL <sup>(4)</sup> | Magnetic level low (optional).                      |
| CN2.8 | MGH <sup>(4)</sup> | Magnetic level high (optional).                     |

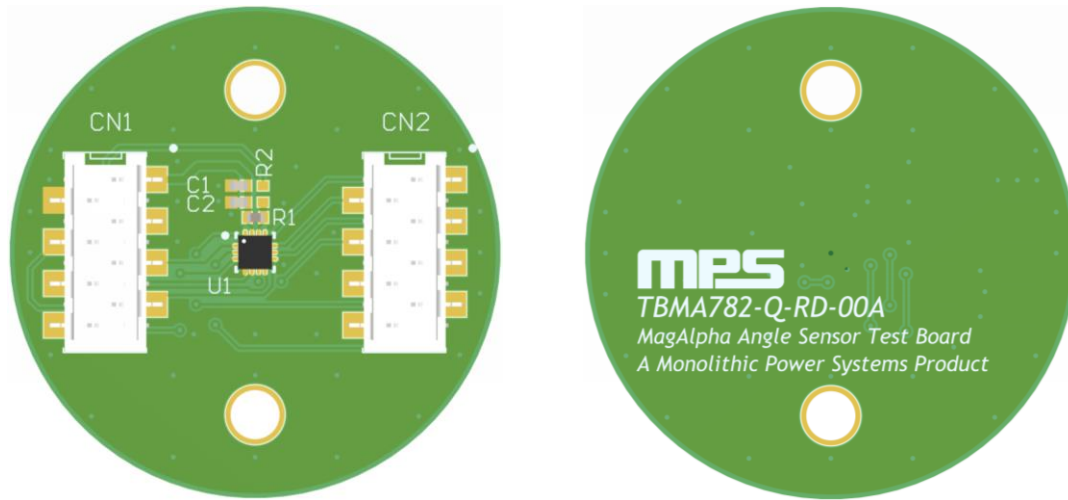
**Note:**

- 4) Availability of this option depends of the MagAlpha part number. Please refer directly to the part datasheet.

## BOARD TYPE 4

### RD Format Overview

Figure 30 shows an overview of the Type 4 round (RD) board.

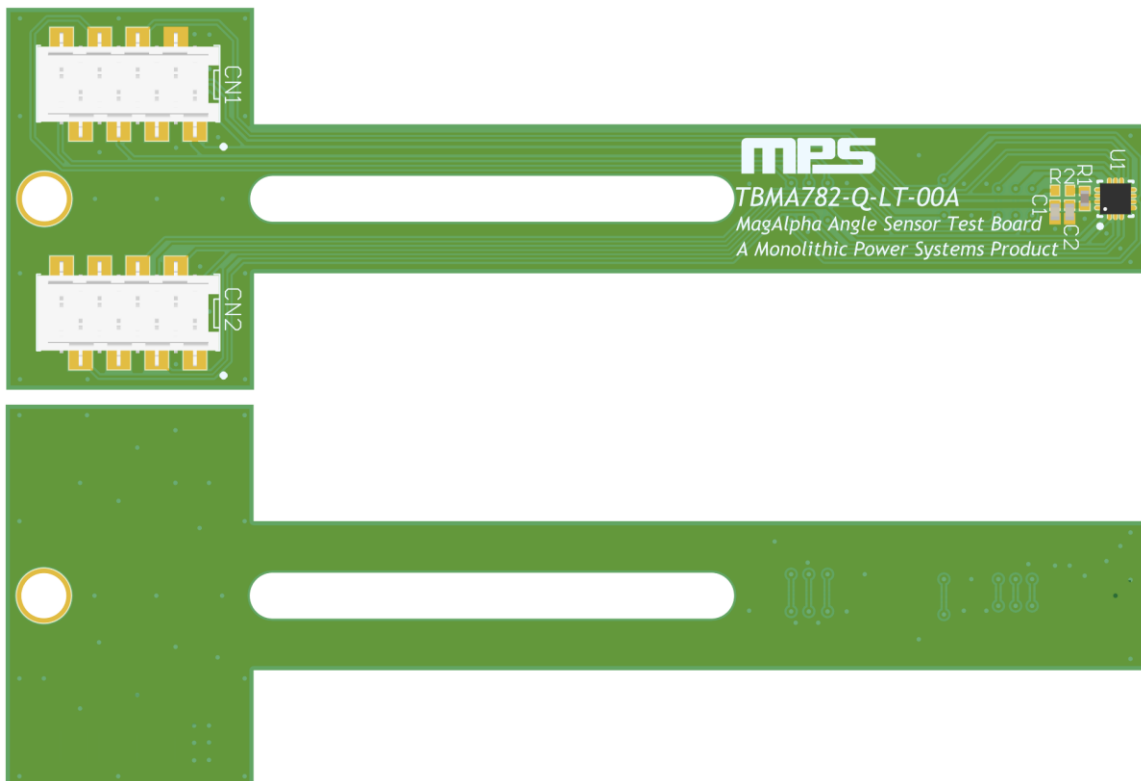


**Figure 30: RD Type 4 Board Overview**

*Not Recommended for New Designs, Refer to LT Type 4 Board Overview*

### LT Format Overview

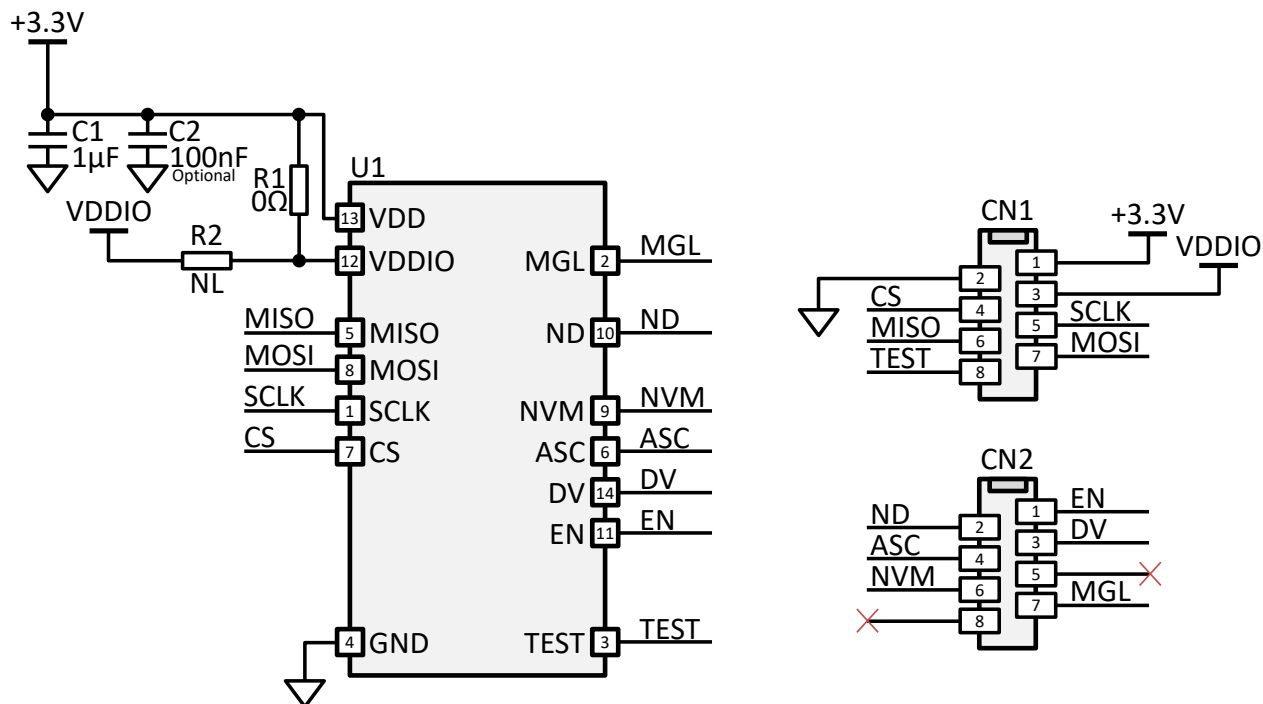
Figure 31 shows an overview of the Type 4 long (LT) board.



**Figure 5: LT Type 4 Board Overview**

## Schematic

Figure 32 shows a schematic for the Type 4 boards.



**Figure 32: RD/LT Type 4 Schematic**

## Bill of Materials

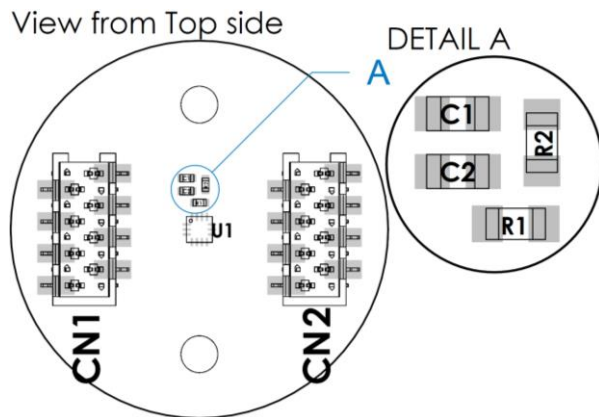
Table 8 shows the Type 4 board bill of materials (BOM).

**Table 8: Type 4 Board Bill of Materials**

| Quantity | Designator                         | Description   | Value | Manufacturer             | Manufacturer PN             |
|----------|------------------------------------|---|-------|--------------------------|-----------------------------|
| 1        | C1                                 | Ceramic capacitor, 10V, X6S, 0402                                   | 1µF   | Murata                   | GRM155C81A105KA12D          |
| 1        | C2 (not populated)                 | Ceramic capacitor, 16V, X7R, 0402                                   | 100nF | Murata                   | GRM155R71C104KA88J          |
| 1        | R1 (populated), R2 (not populated) | 0Ω resistor, 0402   | 0Ω    | Panasonic                | ERJ-2GE0R00X                |
| 1        | U1                                 | MagAlpha magnetic position sensor                                   | MA782 | MPS                      | MA782GGU                    |
| 2        | CN1, CN2 (not populated)           | 8-position receptacle connector, 0.100" (2.54mm), surface-mount tin |       | Würth or TE Connectivity | 690367280876 or 7-2178711-8 |

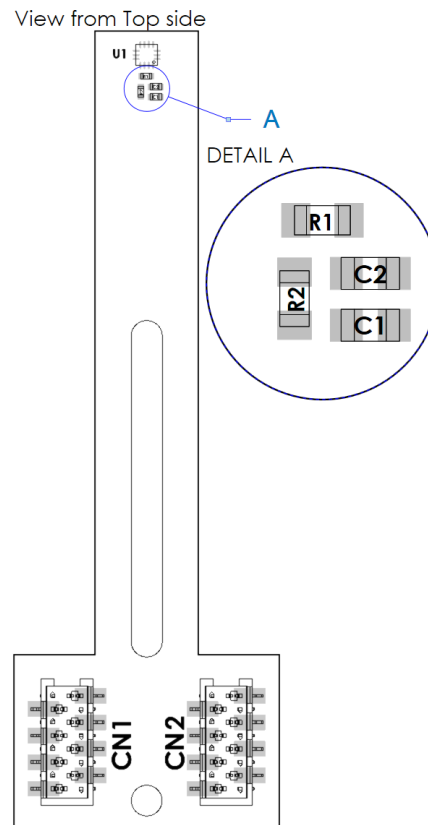
## Assembly View

Figure 33 shows the top-side assembly view of the Type 4 round board. Figure 34 shows the top-side assembly view of the Type 4 long board.



**Figure 33: RD Type 4 Assembly View**

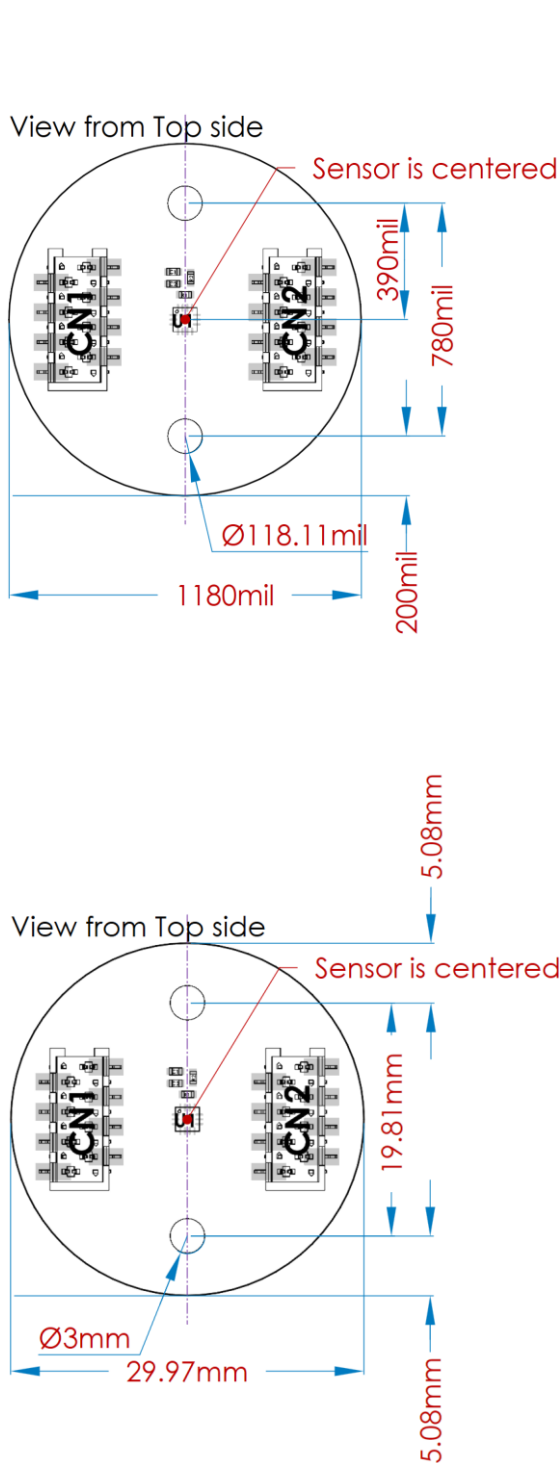
**Not Recommended for New Designs, Refer to  
LT Type 4 Assembly View**



**Figure 34: LT Type 4 Assembly View**

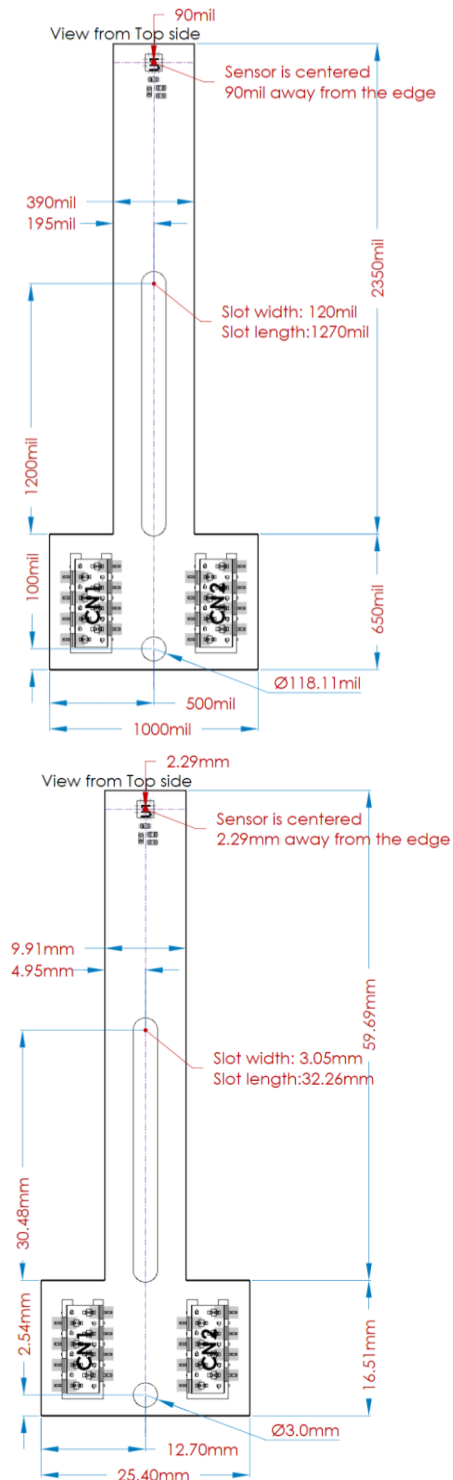
## Mechanical Drawing

Figure 35 shows the top-side mechanical drawing of the Type 4 round board. Figure 36 shows the top-side mechanical drawing of the Type 4 long board.



**Figure 35: RD Type 4 Mechanical Drawing**

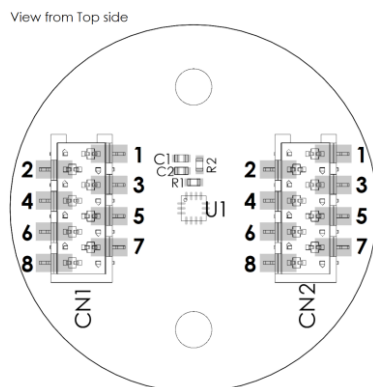
**Not Recommended for New Designs, Refer to LT Type 4 Mechanical Drawing**



**Figure 36: LT Type 4 Mechanical Drawing, mil = 0.001" = 0.0254mm**

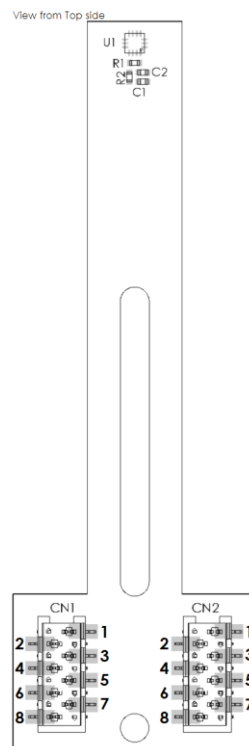
## Connector Pinout

Figure 37 shows the Type 4 round board connector pinout. Figure 38 shows the Type 4 long board connector pinout.



**Figure 37: RD Type 4 Connector Pinout**

**Not Recommended for New Designs, Refer to LT Type 4 Connector Pinout**



**Figure 38: LT Type 4 Connector Pinout**

Table 9 shows the Type 4 board pin registers.

**Table 9: Type 4 Board Connector Pin Registers**

| Pin   | Name               | Description   |
|-------|--------------------|---|
| CN1.1 | VDD                | 3.3V supply.  |
| CN1.2 | GND                | Ground.   |
| CN1.3 | VDDIO              | 1.8V to 3.3V supply for IOs.                        |
| CN1.4 | CS                 | Chip select (serial).                               |
| CN1.5 | SCLK               | Clock (serial).                                     |
| CN1.6 | MISO               | Master in slave out (serial).                       |
| CN1.7 | MOSI               | Master out slave in (serial).                       |
| CN1.8 | TEST               | Test pin.   |
| CN2.1 | EN                 | Enable (input). Switches the sensor to active mode. |
| CN2.2 | ND                 | New data (output).                                  |
| CN2.3 | DV                 | Data valid (output).                                |
| CN2.4 | ASC                | Auto-power cycling mode (input).                    |
| CN2.5 | -                  | -   |
| CN2.6 | NVM                | Non-volatile memory (output).                       |
| CN2.7 | MGL <sup>(5)</sup> | Magnetic level low (optional).                      |
| CN2.8 | -                  | -   |

### Note:

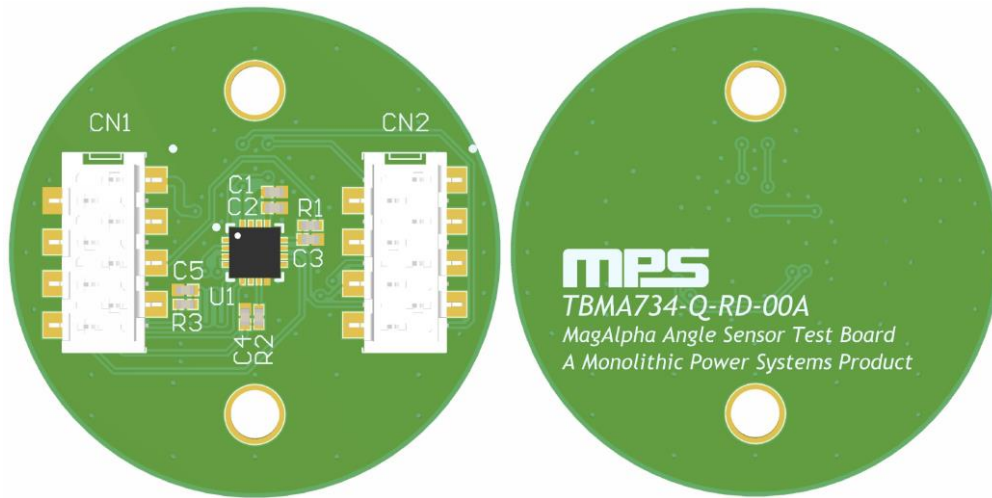
5) Availability of this option depends of the MagAlpha part number. Refer directly to the related part's datasheet.



## BOARD TYPE 5

### RD Format Overview

Figure 39 shows an overview of the Type 5 round board.

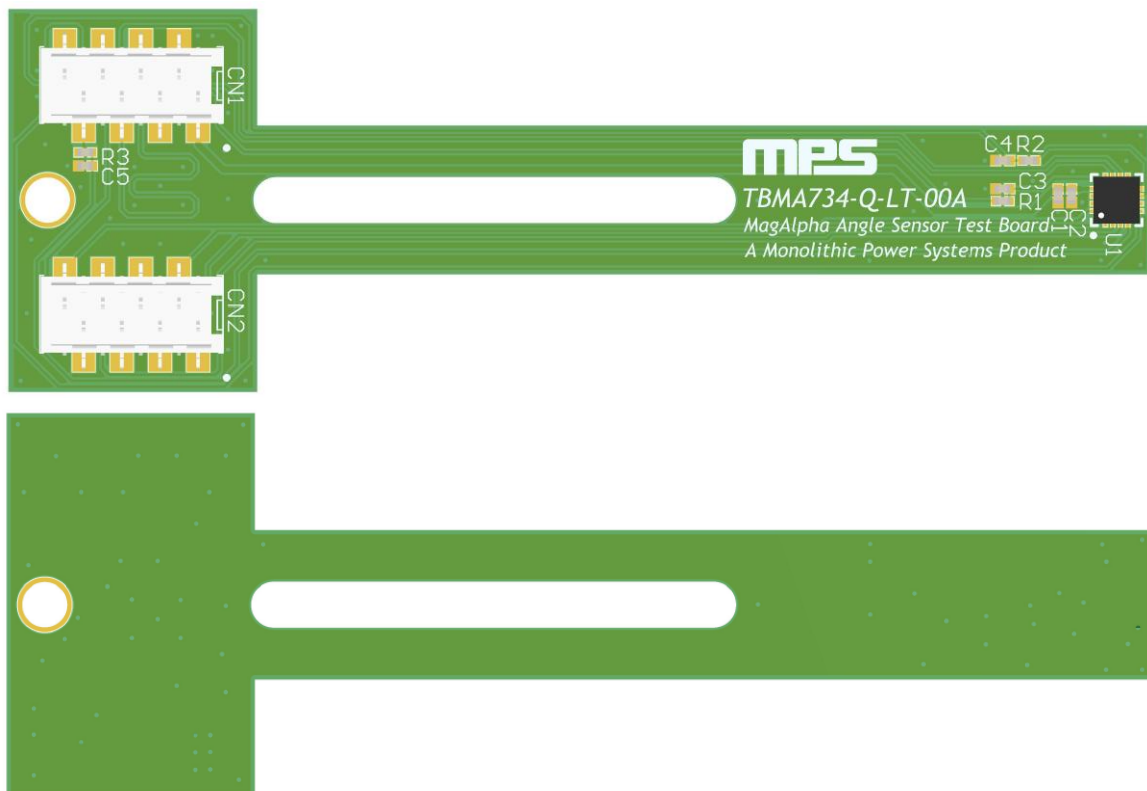


**Figure 39: RD Type 5 Board Overview**

***Not Recommended for New Designs, Refer to LT Type 5 Board Overview***

### LT Format Overview

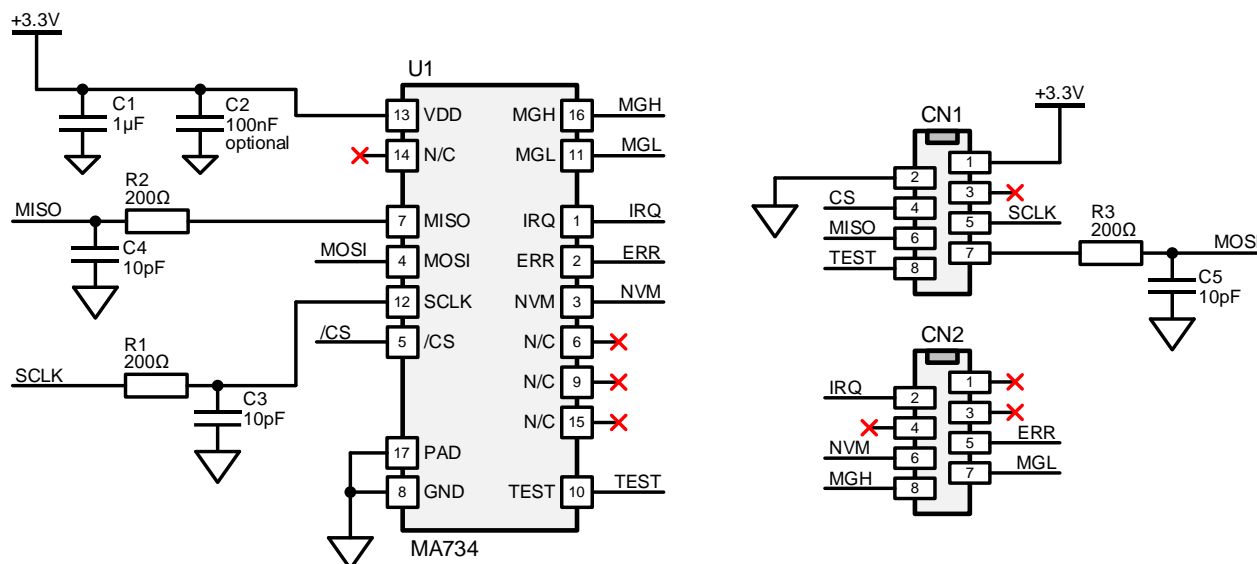
Figure 40 shows an overview of the Type 5 long board.



**Figure 40: LT Type 5 Board Overview**

## Schematic

Figure 41 shows a schematic for the Type 5 boards.



**Figure 41: RD/LT Type 5 Schematic**

## Bill of Materials

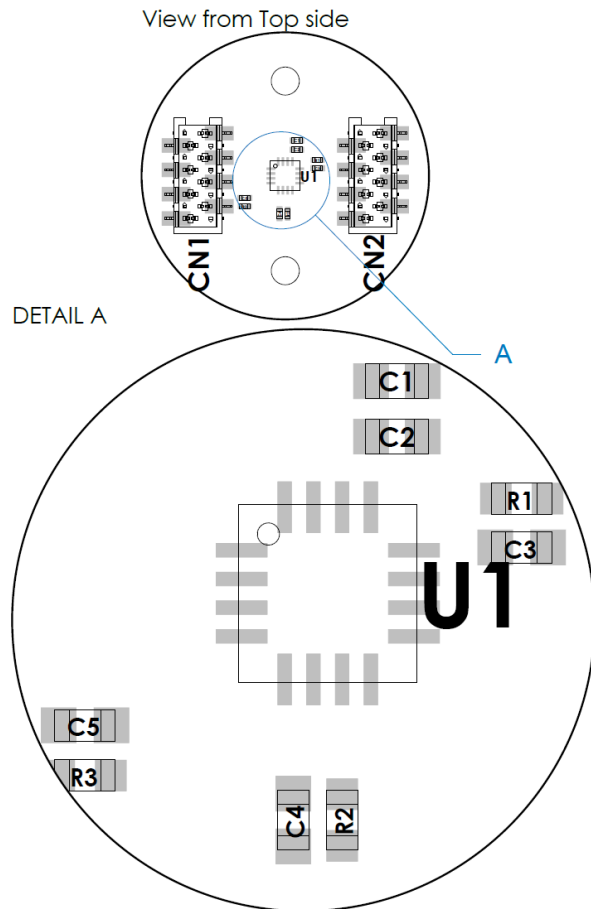
Table 10 shows the Type 5 board bill of materials (BOM).

**Table 10: Type 5 Board Bill of Materials**

| Quantity | Designator    | Description   | Value | Manufacturer             | Manufacturer PN             |
|----------|---------------|---|-------|--------------------------|-----------------------------|
| 1        | C1            | Ceramic capacitor, 10V, X6S, 0402                                   | 1µF   | Murata                   | GRM155C81A105KA12D          |
| 1        | C2 (optional) | Ceramic capacitor, 16V, X7R, 0402                                   | 100nF | Murata                   | GRM155R71C104KA88J          |
| 3        | R1, R2, R3    | 200Ω resistor, 0402   | 200Ω  | Yageo                    | RC0402FR-07200RL            |
| 3        | C3, C4, C5    | Ceramic capacitor, 50V, C0G, 0402                                   | 10pF  | Yageo                    | CC0402JRNPO9BN100           |
| 1        | U1            | MagAlpha magnetic position sensor                                   | MA734 | MPS                      | MA734                       |
| 2        | CN1, CN2      | 8-position receptacle connector, 0.100" (2.54mm), surface-mount tin |       | Würth or TE Connectivity | 690367280876 or 7-2178711-8 |

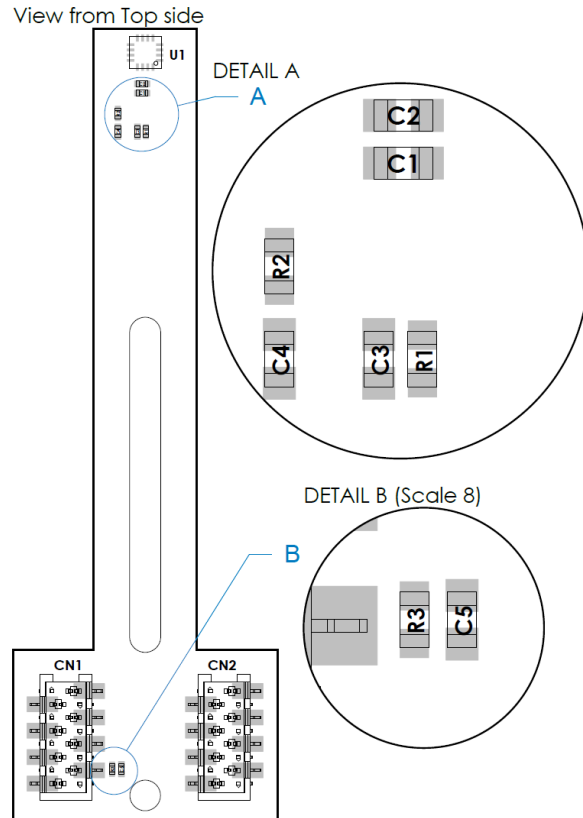
### Assembly View

Figure 42 shows the top-side assembly view of the Type 5 round board. Figure 43 shows the top-side assembly view of the Type 5 long board.



**Figure 42: RD Type 5 Assembly View**

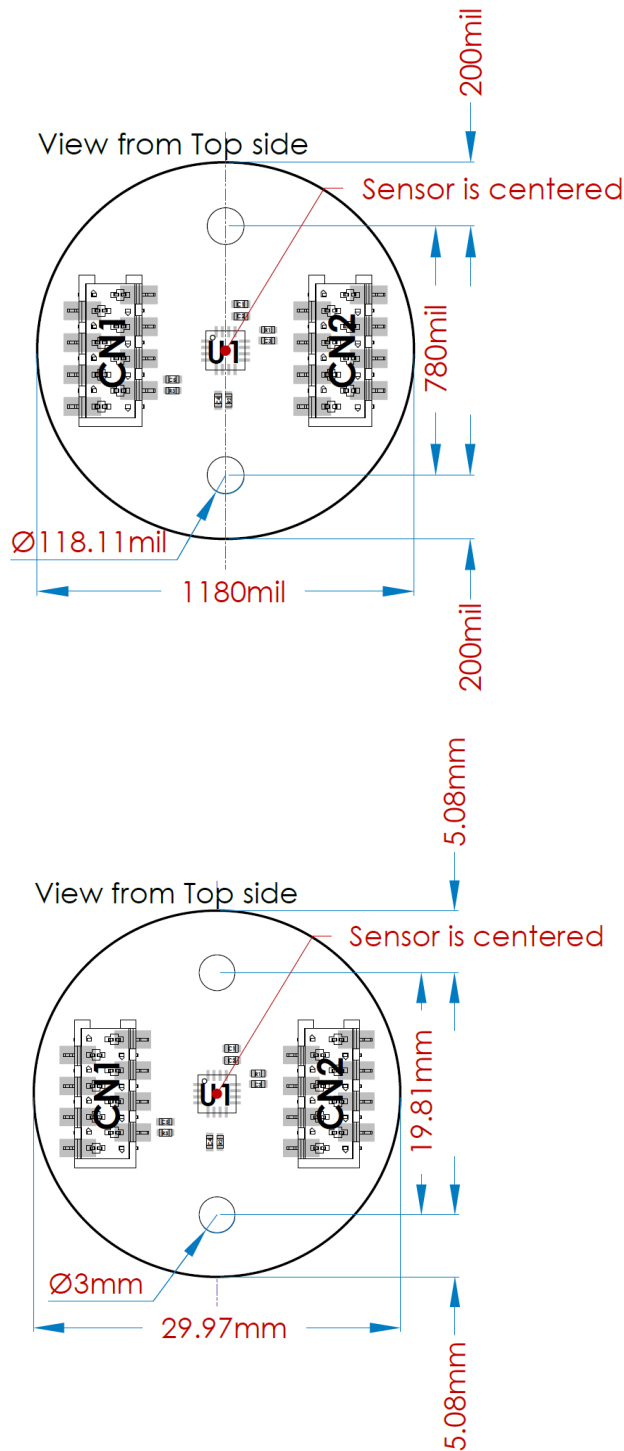
***Not Recommended for New Designs, Refer to LT Type 5 Assembly View***



**Figure 43: LT Type 5 Assembly View**

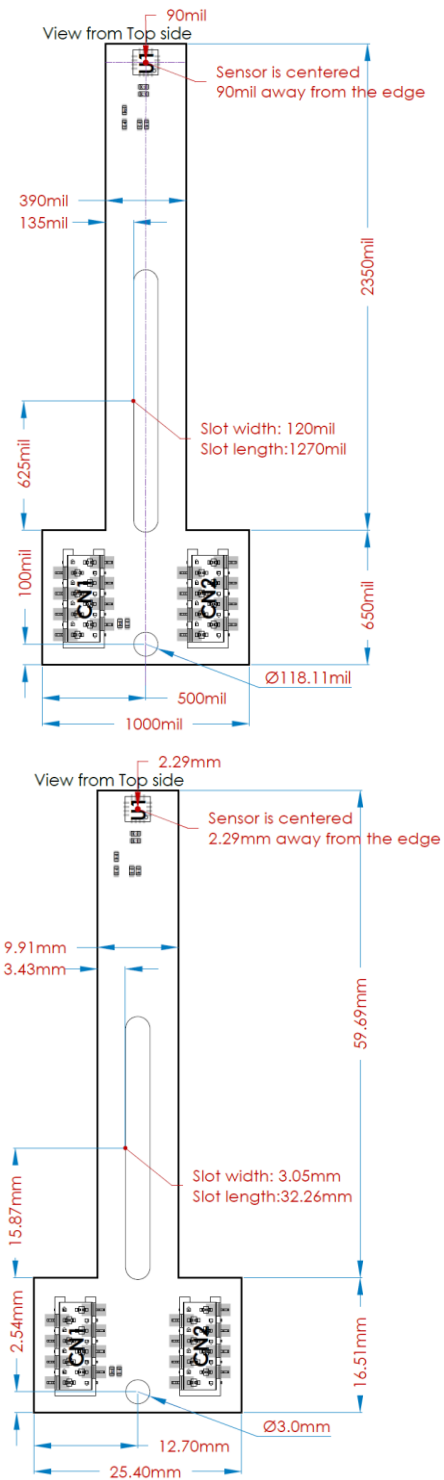
## Mechanical Drawing

Figure 44 shows the top-side mechanical drawing of the Type 5 round board. Figure 45 shows the top-side mechanical drawing of the Type 5 long board.



**Figure 44: RD Type 5 Mechanical Drawing**

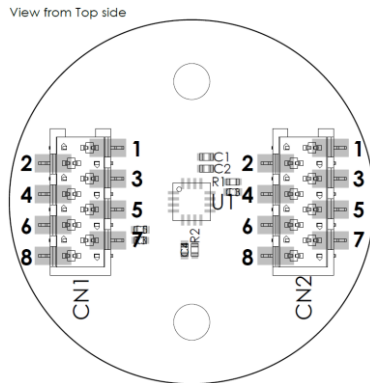
**Not Recommended for New Designs, Refer to LT Type 5 Mechanical Drawing**



**Figure 45: LT Type 5 Mechanical Drawing, mil = 0.001" = 0.0254mm**

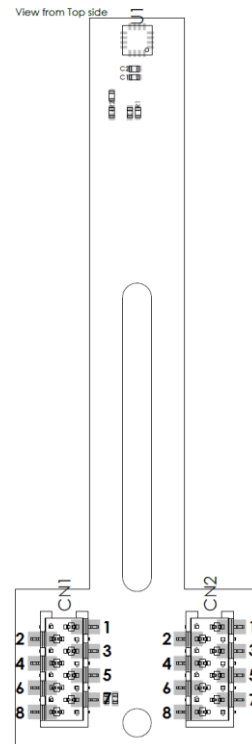
## Connector Pinout

Figure 46 shows the Type 5 round board connector pinout. Figure 47 shows the Type 5 long board connector pinout.



**Figure 46: RD Type 5 Connector Pinout**

**Not Recommended for New Designs, Refer to LT Type 5 Connector Pinout**



**Figure 47: LT Type 5 Connector Pinout**

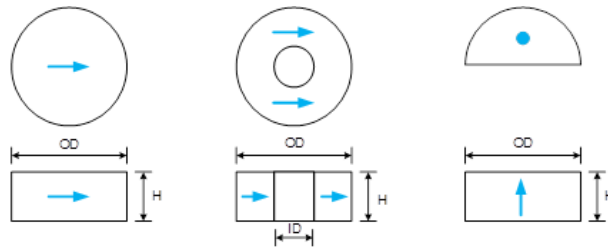
Table 11 shows the Type 5 pin registers.

**Table 11: Type 5 Board Connector Pin Registers**

| Pin   | Name | Description                         |
|-------|------|-------------------------------------|
| CN1.1 | VDD  | 3.3V supply.                        |
| CN1.2 | GND  | Ground.                             |
| CN1.3 | NC   | Not connected.                      |
| CN1.4 | CS   | Chip select (serial).               |
| CN1.5 | SCLK | Clock (serial).                     |
| CN1.6 | MISO | Master in, slave out (serial).      |
| CN1.7 | MOSI | Master out, slave in (serial).      |
| CN1.8 | TEST | Test pin.                           |
| CN2.1 | NC   | Not connected.                      |
| CN2.2 | IRQ  | Interrupt on angle change (output). |
| CN2.3 | NC   | Not connected.                      |
| CN2.4 | NC   | Not connected.                      |
| CN2.5 | ERR  | Error flag (output).                |
| CN2.6 | NVM  | Non-volatile memory (output).       |
| CN2.7 | MGL  | Magnetic level low (optional).      |
| CN2.8 | MGH  | Magnetic level high (optional).     |

## MAGNET SUPPLIERS

A selection of magnets are available with the MPS MAG10 magnet product family. This family offers three different magnet geometries: cylinder, ring, and half-cylinder. Figure 6 shows the available magnet geometries. The MPS MAG10 magnet product family can be purchased directly from MPS.



**Figure 6: MPS MAG10 Magnet Geometries**

Visit our website learn more about our magnet portfolio:

<https://www.monolithicpower.com/en/products/sensors/position-sensors/position-sensor-magnets.html>

If the magnet required for your application is not listed on our website, consider the following non-exhaustive list of possible magnet suppliers (see Table 4). The magnetization direction must be chosen wisely given that most sold magnets are often axially magnetized, which is not a magnetization direction typically required in magnetic angle-sensing applications. Angle-sensing applications typically use diametrically magnetized magnets.

**Table 4: Magnet Suppliers**

| Company                      | Website  | Address   | Comments  |
|------------------------------|--|---|---|
| Bomatec AG                   | <a href="http://www.bomatec.com">www.bomatec.com</a>                 | Hofstrasse 1,<br>8181 Höri,<br>Switzerland                        | An MPS partner for many projects.                                       |
| Maurer Magnetics AG          | <a href="http://www.maurermagnetic.ch">www.maurermagnetic.ch</a>     | Industriestrasse 8<br>8627 Grüningen,<br>Switzerland              | Maurer offers a selection of diametrically magnetized magnets in stock. |
| Arnold Technologies AG       | <a href="http://www.arnoldmagnetics.com">www.arnoldmagnetics.com</a> | Hübelacherstrasse 15<br>5242 Birr-Lupfig,<br>Switzerland          |   |
| Dexter Magnetic Technologies | <a href="http://www.dextermag.com">www.dextermag.com</a>             | 1050 Morse Avenue,<br>Elk Grove Village,<br>IL 60007-5110<br>USA  |   |
| JPMF                         | <a href="http://www.jpmpf.com.cn">www.jpmpf.com.cn</a>               | 8 LongWan Road,<br>Jiangmen City,<br>GuangDong Province,<br>China | Magnet overmolding.   |
| IMA                          | <a href="http://www.imamagnets.com">www.imamagnets.com</a>           | Avda. Cataluña 5,<br>08291 Ripollet, Barcelona,<br>Spain          | Magnet overmolding, magnetic tapes.                                     |

## Revision History

| Revision # | Revision Date | Description  | Pages Updated |
|------------|---------------|--|---------------|
| 0.2        | 3/15/2017     | Initial Release  | -             |
| 1.0        | 9/17/2020     | Added TBMAQ family into list of board types; expanded Magnet Suppliers section and modified list of magnet suppliers; grammar and formatting updates | All           |
| 1.1        | 9/22/2021     | Added Type 5 Board (MA734)   | 4, 25–29      |

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