Description

CambridgeIC's CAM312 Central Tracking Unit (CTU) chip is a single-chip processor for position measurement. It implements the electronic processing for resonant inductive position sensing technology.

The CAM312 measures the position of contactless, inductively coupled targets relative to sensors that are built from printed circuit boards manufactured to CambridgeIC's design. A selection of sensor geometries is possible, including rotary and linear.

The CAM312 Development Board is a PCB including the CAM312 CTU chip, circuitry for Type 2, 4 and 6 sensors and components for power supply conditioning and SPI interface signal protection.

Please refer to the CAM312 datasheet for more details on features and specifications of the CAM312 chip, and to the appropriate sensor datasheet for sensor details and performance.

Features

- CAM312 CTU chip
- Processes up to two Type 4 or Type 1 sensors
- Processes one Type 2 or Type 6 sensor
- Operates from 3.3V
- 3.3V SPI interface

Applications

- Prototyping CAM312 chip based applications
- Processor board for position sensor systems

Table 1 Pin-Out of SPI Interface Connector P1

Pin	Signal	Description
1	VDD_HOST	Supply voltage input
2	GND	Supply voltage return (0V)
3	IO1	User IO outputs
4	IO2	
5	IO3	
6	IO4	
7	GND	Supply voltage return (0V)
8	MOSI	Master Out Slave In input
9	nSS	Slave Select input
10	SCK	Serial Clock input
11	MISO	Master In Serial Out output
12	IO5	User IO outputs
13	IO6	
14	nRST	CTU chip reset input

Product identification	
Part no.	**Description**
013-5034	CAM312 Development Board

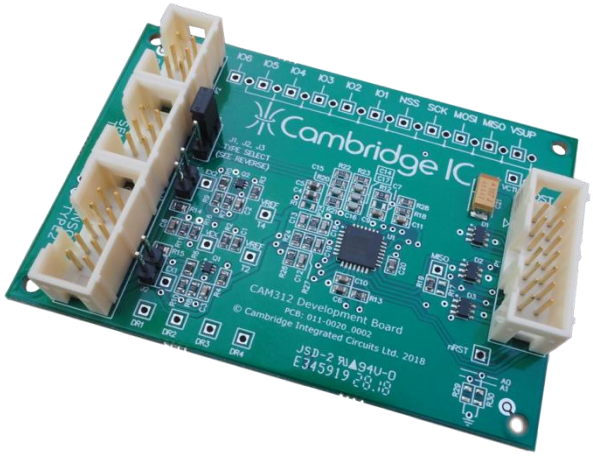

Figure 1 CAM312 Development Board

Table 2 P3 pinout, Type 4 sensor 1 connection

Pin	Signal	Description
1	EX1	Excitation coil
2	VREF	Common return for EX coil
3		Do not connect
4	COS1	COS coil
5	VREF	Common return for sensor coils
6	SIN1	SINA coil

Table 3 P3 pinout, Type 6 sensor connection

Pin	Signal	Description
1	EX1	Excitation coil
2	COS2	COSB sensor coil
3	SIN2	SINB sensor coil
4	COS1	COSA sensor coil
5	VREF	Common return for all coils
6	SIN1	SINA sensor coil

1 Specifications

1.1 Electrical Specifications

Table 4 Electrical Specifications

Parameter	Min	Max	Comments
Supply voltage range, VDD_3V3	3.0V	3.6V	If using with CTU Adapter, set jumper for 3.3V or 3.6V not 2.7V

1.2 Environmental Specifications

Table 5 Environmental Specifications

Parameter	Value	Comments
Maximum ambient operating temperature	85°C	Limited by connector specifications, not CAM312

1.3 Connector Pin-Outs

The locations and numbering of the 4 connectors are illustrated in Figure 2.

Connector P1 is a 14-way header for the CAM312 chip's SPI interface signals, power supply and user IOs, and its pin-out is shown in Table 1.

When configured for operation with Type 4 sensors, P3 is for sensor 1, with the pinout of Table 2. A second Type 4 sensor may be connected to P2 with the pinout of Table 6.

If instead the board is to be used with a Type 6 sensor, it is also plugged into P3 with the alternative pinout shown in Table 3.

If the board is to be used with a Type 2 sensor, it may be plugged in to P5 with the pinout shown in Table 7.

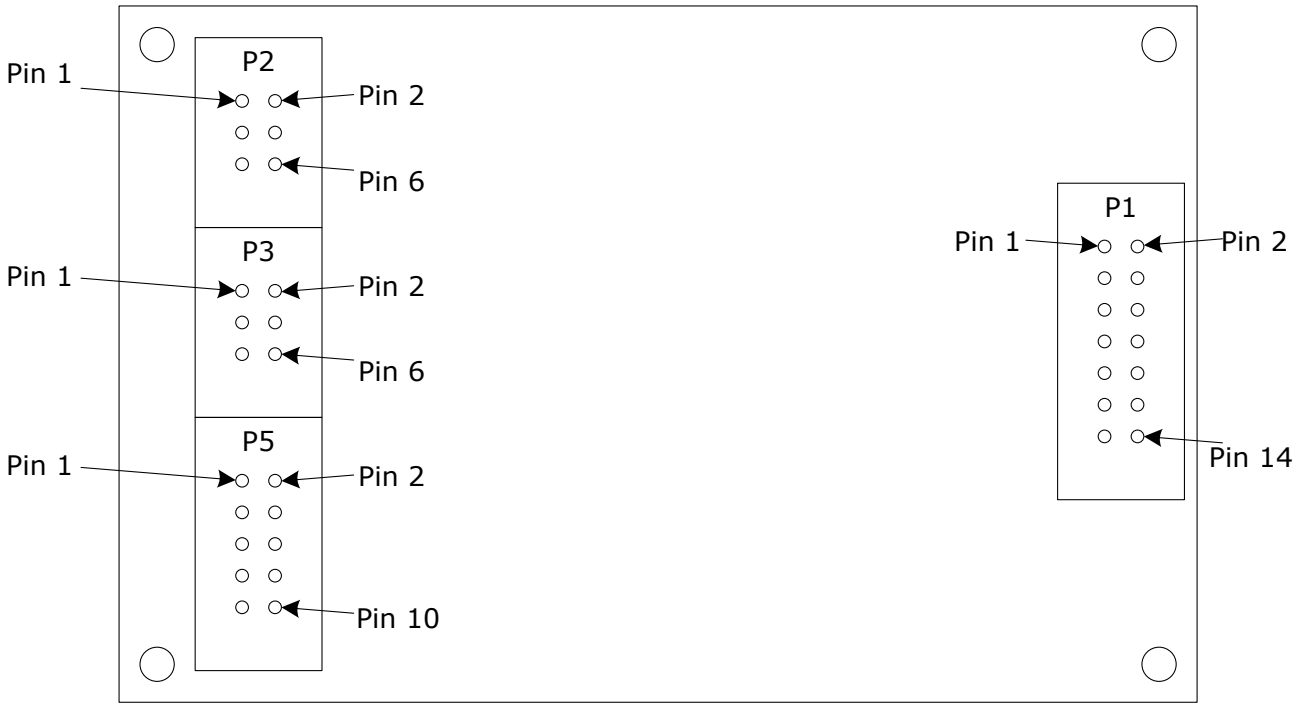

Figure 2 Connector locations and pin numbering

Table 6 P2 pinout, Type 4 sensor 2 connection

Pin	Signal	Description
1	EX2	Excitation coil
2	VREF	Common return for EX coil
3		Do not connect
4	COS2	COS coil
5	VREF	Common return for sensor coils
6	SIN2	SINA coil

Table 7 P5 pinout, Type 2 sensor connection

Pin	Signal	Description
1	EX+	Excitation coil +
2	VREF	Common return for sensor coils
3	EX-	Excitation coil -
4	COS1	COSA coil
5	VREF	Common return for sensor coils
6	SIN1	SINA coil
7	VREF	Common return for sensor coils
8	COS2	COSB coil
9	VREF	Common return for sensor coils
10	SIN2	SINB coil

1.4 Mechanical

Figure 3 shows the CAM312 Development Board's overall dimensions and fixing centres.

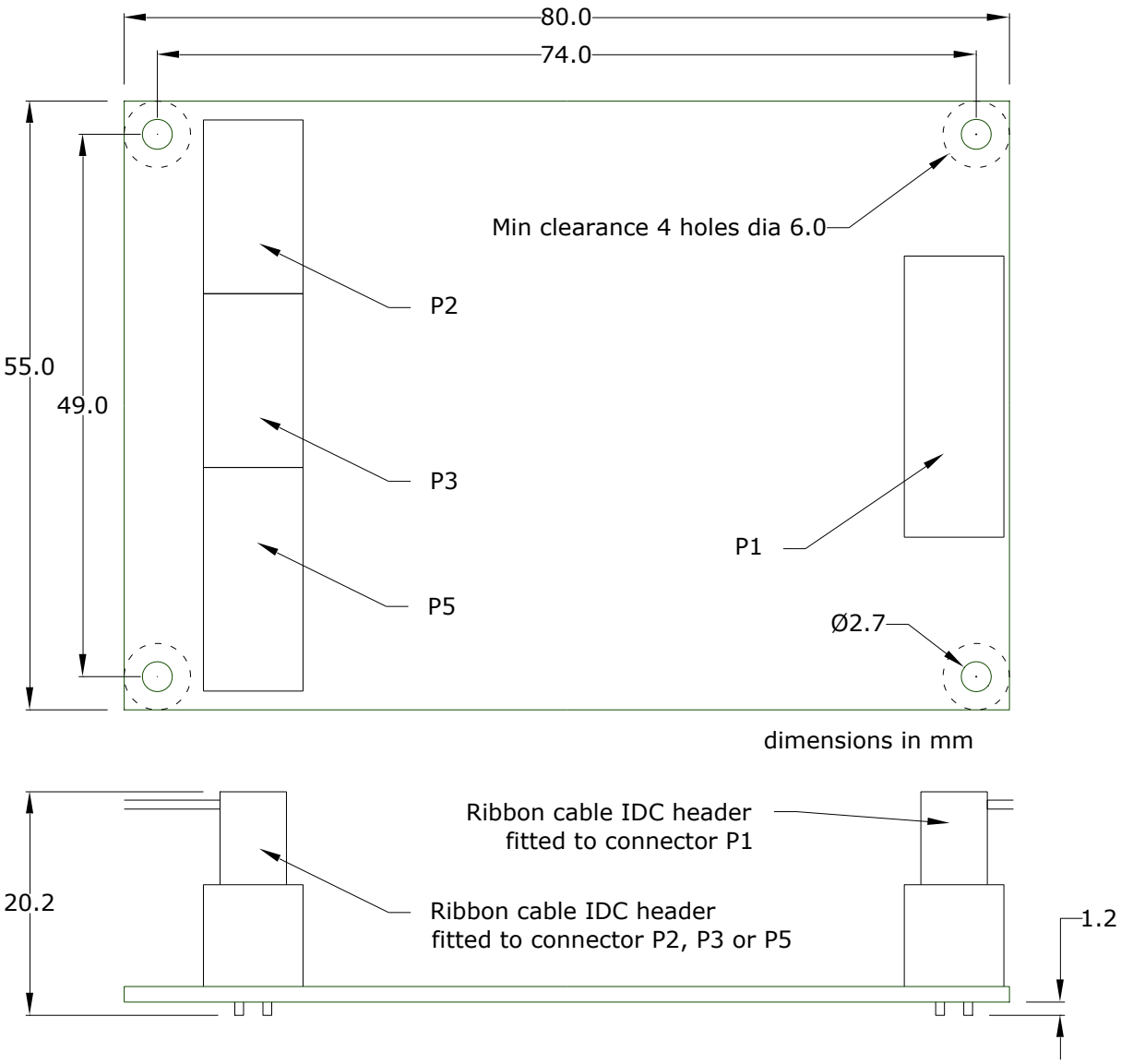

Figure 3 CAM312 Development Board dimensions

The areas immediately around the mounting holes are connected to GND and coated in solder resist. The board should not be screwed to a metal object with metal (conductive) screws unless it is acceptable for that object to become connected to GND.

2 Configuring Links and Connections

The CAM312 Development Board includes jumpers. The board is configured for use with different sensor Types by adding or removing links to these jumpers. This section describes what link settings to use, depending on sensor Type. Link settings are also summarised in text on the rear of the board for easy reference.

2.1 Operation with Type 4 Sensors (or Type 1)

Type 4 sensors include a single excitation coil and one COS/SIN sensor coil pair. All three coils may share a common return connected to VREF. The CAM312 Development Board can process either one or two Type 4 sensors when configured as shown in Figure 4.

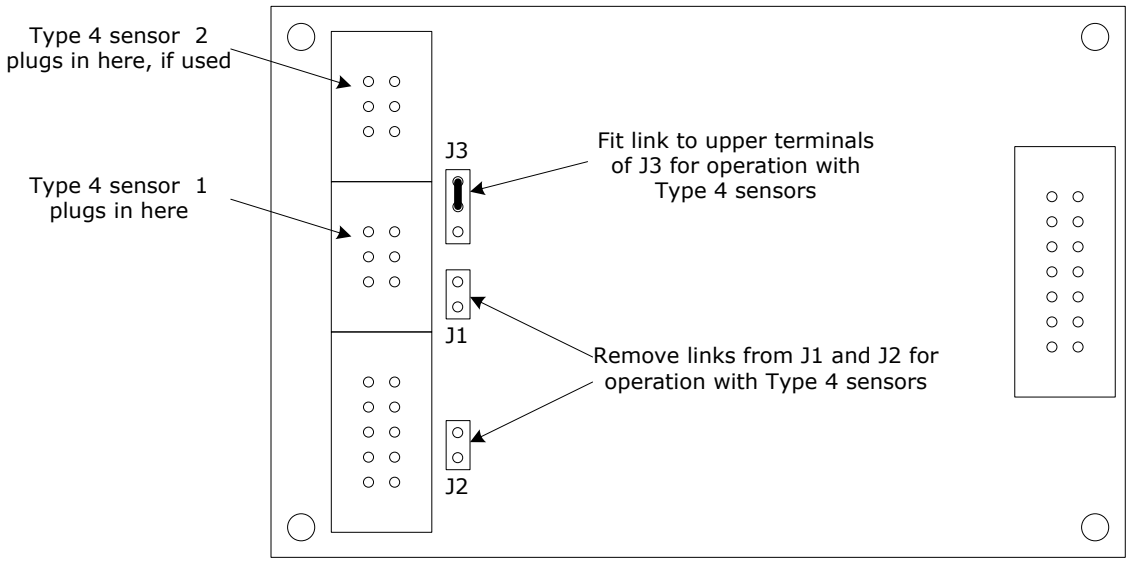

Figure 4 Link settings for Type 4 sensors (default)

This configuration of J3 connects connector P3's pin 2 to VREF, for the pinout shown in Table 2.

Type 1 sensors are almost identical to Type 4, except that the excitation coil does not share a common return with the COS and SIN coils. The CAM312 Development Board's circuitry is designed to process Type 1 sensors too, when configured for Type 4 circuitry as in Figure 4.

2.2 Operation with Type 6 Sensor

Type 6 sensors include a single excitation coil and two COS/SIN sensor coil pairs, one fine (A) and one coarse (B). All five coils share a common return connected to VREF. The CAM312 Development Board can process one Type 6 sensor when configured as shown in Figure 5.

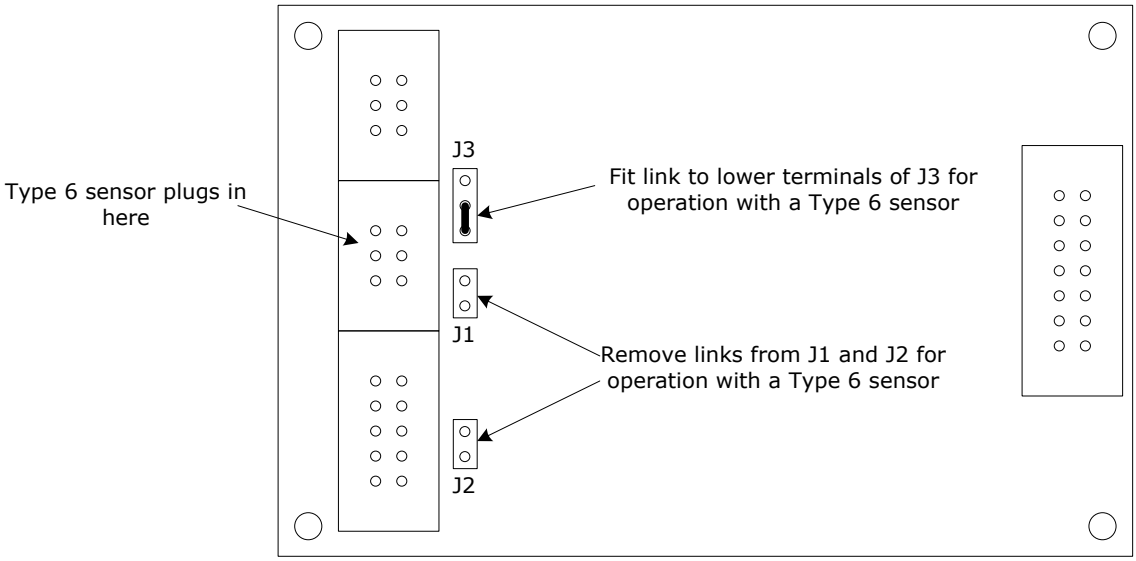

Figure 5 Link settings for a Type 6 sensor

This configuration of J3 connects connector P3's pin 2 to COS2, for the pinout shown in Table 3.

2.3 Operation with Type 2 Sensor

Type 2 sensors include a single excitation coil and two COS/SIN sensor coil pairs, one fine (A) and one coarse (B), like Type 6 sensors. The difference is that the excitation coil is driven from full bridge MOSFET circuitry, so that both excitation coil connections are separately connected. The remaining four sensor coils may share a common return connected to VREF. The CAM312 Development Board can processes one Type 2 sensor when configured as shown in Figure 6.

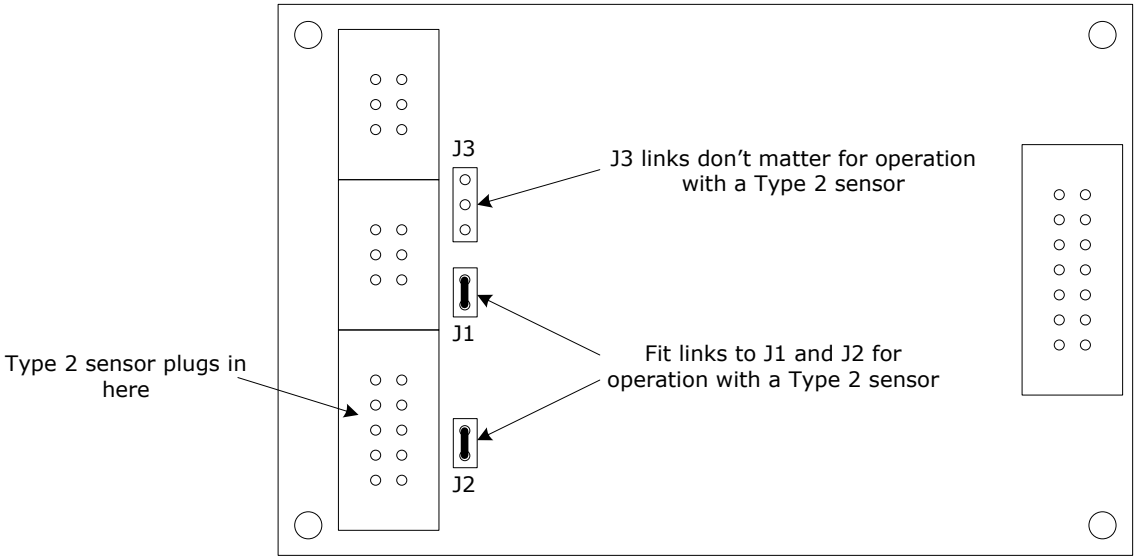

Figure 6 Link settings for a Type 2 sensor

3 Component Layout and Schematic

Figure 7 shows an overview of the CAM312 component layout, labeling the functions of the main blocks of circuitry.

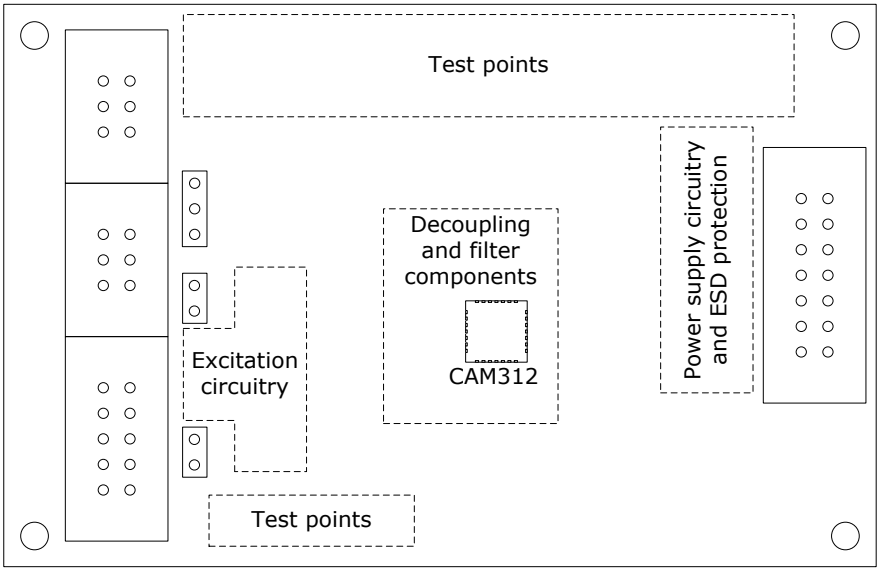

Figure 7 CAM312 Development Board layout overview

Figure 8 shows the location of the CAM312 Development Board's components. Figure 9 shows the board's schematic. This includes the CAM312's external circuitry for all sensor Types 2, 4 and 6. For more details, please refer to the CAM312 datasheet. Circuitry also includes power supply conditioning and ESD protection for IOs.

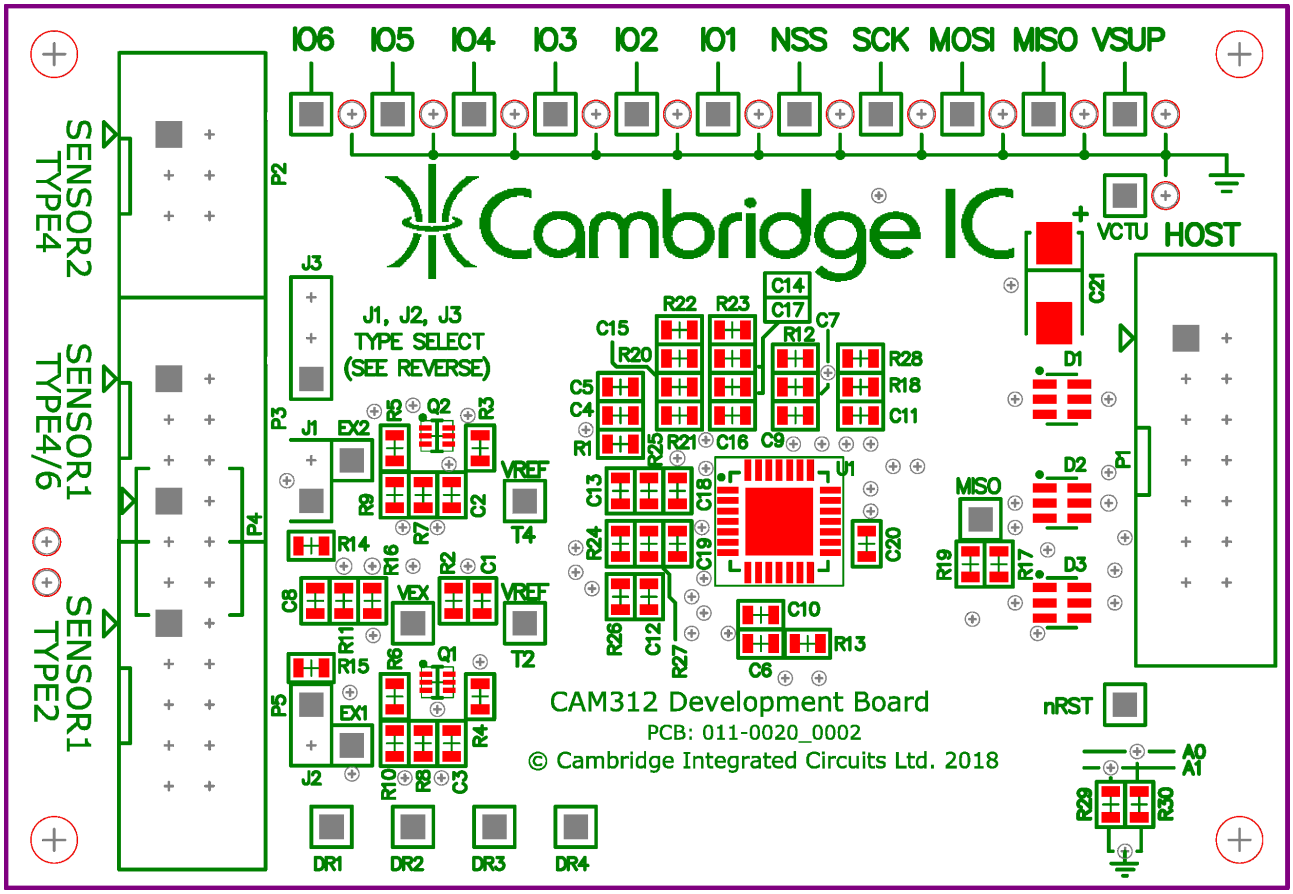

Figure 8 Component locations

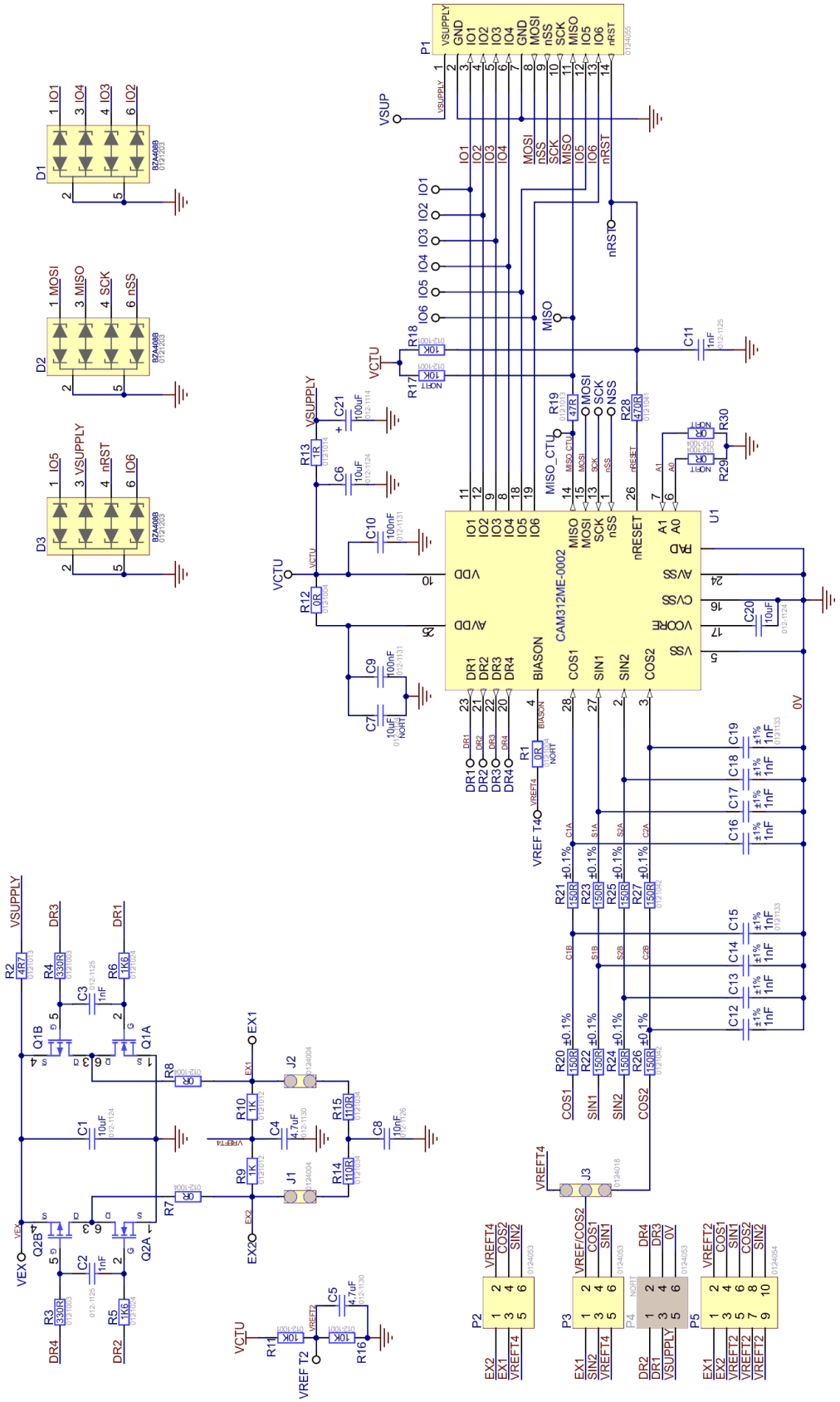

Figure 9 CAM312 Development Board Schematic

4 Document History

Revision	Date	Reason
0001	4 September 2018	First draft
0004	21 January 2020	Removed "5V tolerant inputs" in reference to SPI (only MOSI is 5V tolerant)

5 Contact Information

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