

**Description**

CambridgeIC's Central Tracking Unit (CTU) is a single chip processor for sensing linear and rotary position.

CTU chips work with resonant inductive position sensors. These are manufactured with standard PCB technology. This means sensors are stable, robust and cost effective. Sensors are available in a number of measuring lengths and configurations.

Sensors work with contactless targets that comprise an electrical resonator sealed inside a precision housing. CambridgeIC's standard target is manufactured by Epcos AG, Europe's leading supplier of passive components.

The CTU Development Kit includes all of the parts needed to get a CTU position sensing system working. It includes a USB interface and software for a PC, for demonstration and evaluation. Alternatively, the CAM204 chip's interfaces are available on a 14-pin IDC connector. This enables the system to be interfaced with the customer's own host system during later development.

**Kit Features**

- CTU Development Board (CAM204 chip)
- 4 x Type 1 linear sensors from 25mm to 200mm
- 3 x Type 1 360° rotary sensors
- 4 x Targets
- CTU Adapter for SPI to USB conversion
- PC software for Windows XP/Vista
- Ready to work inside the box

**Applications**

- Demonstration
- Evaluation
- Development
- One-off position sensing solutions

Product identification	
Part no.	Description
013-7002	CTU Development Kit

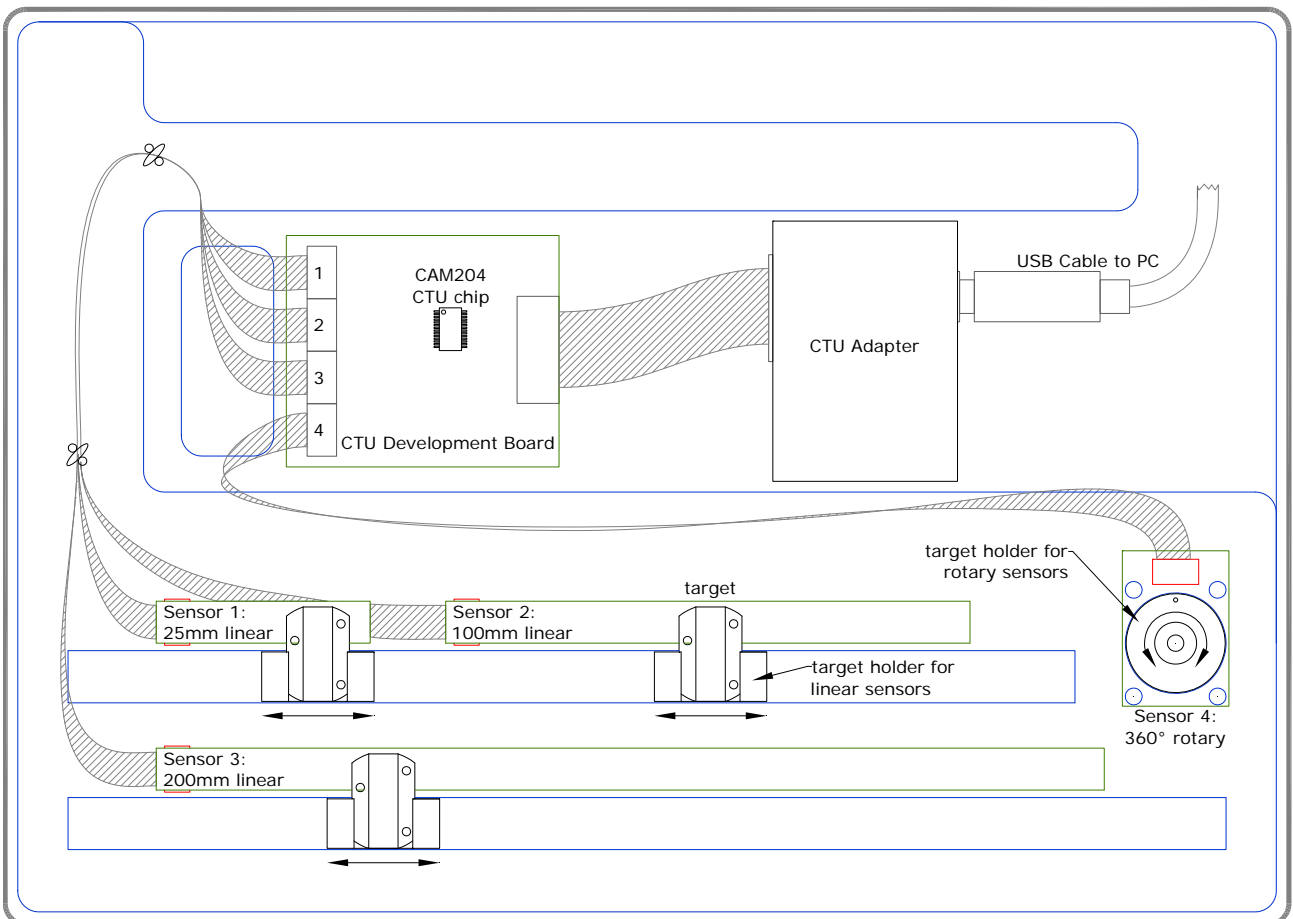


Figure 1 CTU Development Kit

# 1 Quick Start Guide

## 1.1 Start with Kit Contents in the Box

The CTU Development Kit is designed to work inside the box for preliminary demonstration and evaluation. Only the CD and the PC end of the USB cable need be removed. The CTU Development Board is already connected to the sensors and to the CTU Adapter. Sensors are clipped onto the underside of a clear plastic tray, which also acts as guide rails for aligning targets correctly with sensors.

Once the system is working, with the positions of all 4 targets displayed on a PC, parts can be removed for further evaluation and integration.

## 1.2 Plug the USB Cable into a PC

The software provided is for Windows XP and Vista. Turn the PC on and plug the USB cable into a convenient port. The *Windows Found New Hardware Wizard* should launch.

## 1.3 Install the Windows Driver for the CTU Adapter

The driver files are on the CD provided. Copy these to a convenient file location on the PC. They may be required later if the Adapter is subsequently connected to a different USB port.

In the Windows Found New hardware Wizard, select **No, not this time**, then click on **Next**. Tell Windows where to look for the driver files just copied to the PC, and press **Next**. Windows will now issue a compatibility warning. Press **Continue Anyway**. After a few seconds the wizard should complete successfully. Press **Finish** to complete half of the driver installation, and **repeat the process a second time** to load both parts of the driver.

Full details, including screenshots and how to verify installation, are in the CTU Development Applications User Guide.

## 1.4 Install the CambridgeIC CTU Software

The CTU Development Applications are on the CD provided. Save these files to an appropriate directory on the target PC. It is recommended to shut all other programs before installation.

Locate and launch the **setup.exe** program from the directory containing the installer. Follow the on-screen prompts to complete the installation. Once completed, the applications require a restart of the PC for correct operation.

## 1.5 Launch CTU Demo

From the PC's **start** menu, select **All Programs → CambridgeIC CTU Software → CtuDemo**. CTU Demo should run and display the positions of each sensor's target. Targets are supplied with holders in a bag under the CD. Please see section 2 for how to align them with linear and rotary sensors.

For full details of CTU Demo and the other applications provided please refer to the CTU Development Applications User Guide. This also includes a troubleshooting guide in case of difficulties.

## 1.6 Scaling Reported Position to Physical Units

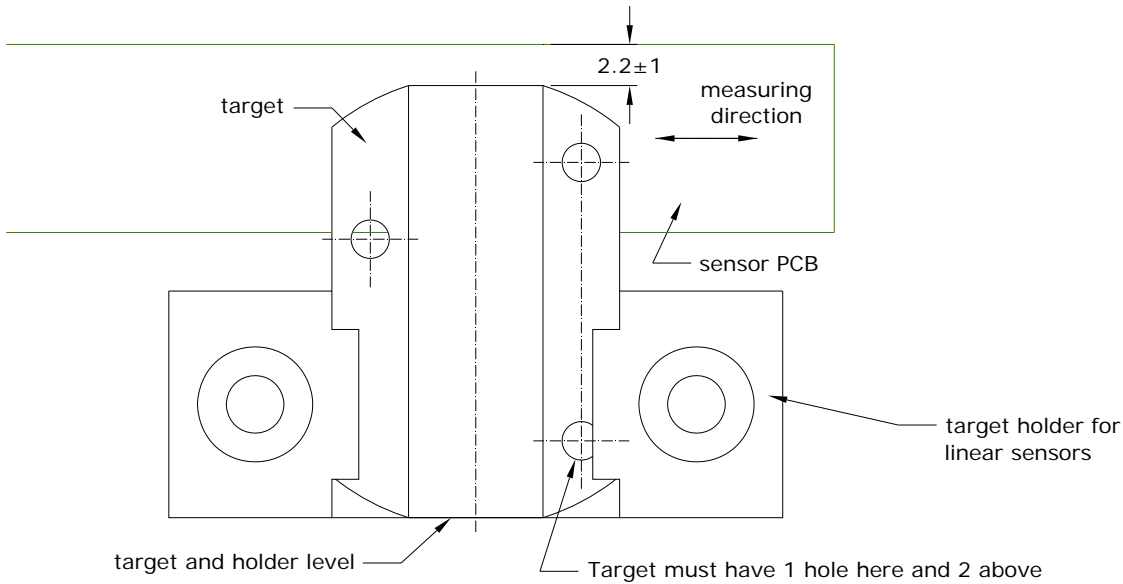
The CTU Development Applications can display reported position in physical units (mm or degrees). This requires the correct value of the **Sin Length** parameter to be entered. Free space values are listed below for convenience. Please refer to the sensor's datasheet for other conditions.

Assembled sensor part number	Configuration	Measuring Length	Nominal Target Gap	Sin Length
013-0006	Rotary	360°	1.5mm	360°
013-0007	Linear	25mm		37.9mm
013-0008	Linear	50mm		63.0mm
013-0009	Linear	100mm		113.2mm
013-0010	Linear	200mm		213.1mm

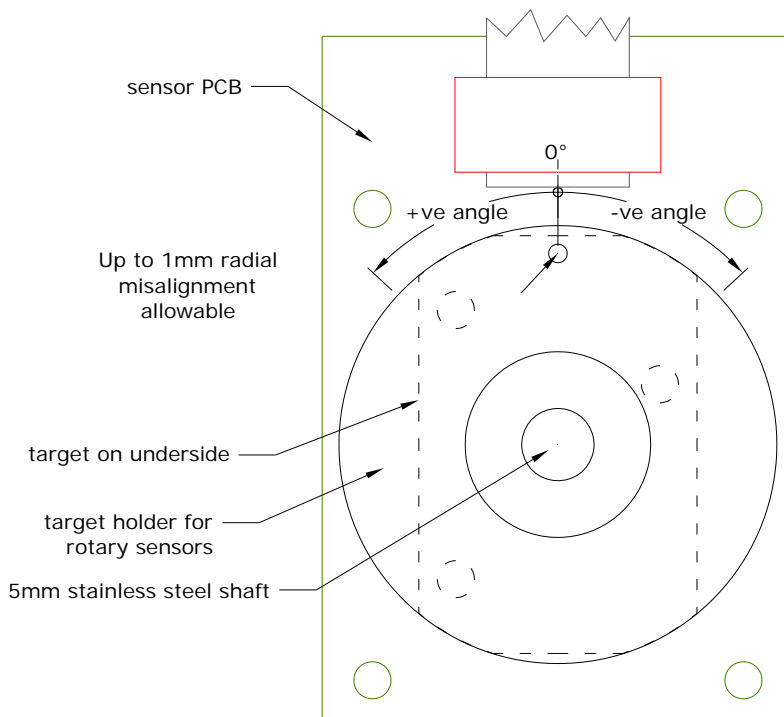
## 2 Aligning Targets and Sensors

The CTU Development Kit is supplied with 4 targets and holders for the rotary and linear sensors.

For best performance, sensors and their targets should be aligned as shown in Figure 1 and Figure 2. Dimensions are in mm. The clear plastic tray maintains a minimum gap of approximately 1mm between the sensor and target. The system will function with gap up to 5mm (an additional 4mm), although resolution will decrease.



**Figure 2 target alignment with linear sensors**



**Figure 3 target alignment with rotary sensor**

Please refer to sensor datasheets for detailed performance and alignment data.

## 3 CTU and Adapter Firmware Updates

The CTU Development Applications include UpdateCtuFirmware and UpdateAdapterFirmware which can be used to load new CTU or Adapter firmware files (.cff or .aff) respectively.

## 4 Precautions

Targets are a push fit in the holders supplied with the CTU Development Kit. These holders are not designed for high speed operation. Targets may vibrate free and cause injury.

## 5 Next Steps

Once the system's function has been verified in the CTU Development Kit's box...

- Parts can be removed and evaluated using a customer's test equipment.
- Sensors and targets can be integrated with a customer's own product.
- A customer can develop their own PC applications that communicate with the CTU through the Adapter using...
  - LabVIEW, based on CambridgeIC example VIs, or
  - Another .NET programming language, using CambridgeIC's Class Library and VB sample code.
- The CTU Development Board can be connected to the processor of an end product prototype, so that the processor can communicate with the CTU chip over its SPI interface.
- The CTU chip can be designed into the product itself.

If none of the sensors provided in the CTU Development Kit are appropriate for the end application, please contact CambridgeIC to discuss alternatives.

## 6 Kit Contents

The table below lists the contents of the CTU Development Kit. The first column is the part number for the hardware (if available separately), and the second is the part number of the datasheet (where applicable). Electronic copies of the datasheet are on the CD.

Hardware part no	Datasheet part no	Qty	Description
013-6003		1	CD with software and documentation
013-5006	033-0010	1	CTU Development Board including CAM204 CTU chip
013-7001	033-0014	1	CTU Adapter
013-0006	033-0002	1	360° 25mm diameter rotary Type 1 sensor assembly
013-0007	033-0004	1	25mm linear Type 1 sensor assembly
013-0008	033-0004	1	50mm linear Type 1 sensor assembly
013-0009	033-0004	1	100mm linear Type 1 sensor assembly
013-0010	033-0004	1	200mm linear Type 1 sensor assembly
013-0011	033-0015	1	360° 50mm diameter rotary Type 1 sensor assembly
013-0012	033-0016	1	360° 36mm diameter rotary Type 1 sensor assembly
013-6001		4	300mm 6-way sensor connecting cable
013-6002		1	60mm 14-way SPI interface connecting cable
033-0009	033-0009	1	Print-out of the CTU Development Kit User Guide
013-1005	033-0005	4	Standard targets
			Target holders, 3 linear and 1 rotary

The table below lists the contents of the CD supplied with the CTU Development Kit. The CD also includes datasheets for the items listed above. Please contact CambridgeIC for the latest versions.

Part number	Description
021-0001	Windows Adapter Driver
021-0002	CambridgeIC.DLL Class Library for communication with a CTU through the Adapter
022-0003	CTU LabVIEW VIs
023-0001	Visual Basic Sample Code
026-0001	CambridgeIC CTU Software Installer
033-0003	Datasheet for CAM204 CTU chip
033-0006	Class Library User Guide
033-0007	CambridgeIC CTU Software User Guide
033-0008	CTU LabVIEW VI User Guide
033-0012	Resonant Inductive Operating Principle
033-0013	End Shaft Sensor Operating Principle

## 7 Document History

Revision	Date	Reason
A	24 August 2009	First draft
0002	5 November 2009	Added 50mm sensor to hardware Added Visual Basic Sample Code to software Added Windows Adapter Driver
0003	23 November 2009	Updated Kit Features with extra sensor Updated introduction
0004	4 February 2010	Updated logo and style Added further documents to list of CD contents
0005	23 July 2010	Updated based on CAM204BE and new sensors
0006	16 July 2011	Illustrated new linear target holder design Updated with additional sensors Reformatted Kit Contents section

## 8 Contact Information

Cambridge Integrated Circuits Ltd  
21 Sedley Taylor Road  
Cambridge  
CB2 8PW  
UK

Tel: +44 (0) 1223 413500

[info@cambridgeic.com](mailto:info@cambridgeic.com)

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