



# UM10206

## I2C Demonstration Board 2005-1 Quick Start Guide

Rev. 01 — 13 June 2006

User manual

### Document information

Info	Content
<b>Keywords</b>	bidirectional communication, microcontroller, training board
<b>Abstract</b>	The I2C Demonstration Board 2005-1 is a new expandable low cost I <sup>2</sup> C based platform that allows Field Application Engineers, designers and educators to use their Personal Computer (PC) to easily test and demonstrate I <sup>2</sup> C-bus devices from Philips Semiconductors in a platform similar to a real system environment.

**PHILIPS**

## Revision history

Rev	Date	Description
01	20060613	first release

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## 1. Introduction

The I2C Demonstration Board 2005-1 is a USB based solution that allows engineers and sales engineers to experiment with general-purpose I<sup>2</sup>C-bus devices from Philips.

The hardware connects to a standard USB port found on most IBM-compatible PCs and provides bidirectional communication with I<sup>2</sup>C-bus devices using the I<sup>2</sup>C-bus protocol. The hardware is powered directly from the PC's USB port.

An on-board LED illuminates after the USB host has successfully enumerated it.

The Win-I2CUSB Lite software from The Boardshop runs on Windows 98SE, ME, 2000, and XP and is compatible with any PC hardware having a minimum of a Pentium processor and an USB port. The software allows the user to select one of the I<sup>2</sup>C-bus devices on the board from a menu and also provides a Universal mode to allow users to create their own I<sup>2</sup>C-bus commands with the same I<sup>2</sup>C-bus devices. The Win-I2CUSB Lite software is designed to operate only with the specific devices and device addresses on the I2C Demonstration Board 2005-1.

## 2. Getting started

### 2.1 Assumptions

It is helpful to have basic experience with the I<sup>2</sup>C-bus protocol before using the demonstration board but it is not absolutely necessary. There are several exercises targeted at beginners as well as more advanced users. For beginners, the I<sup>2</sup>C-bus specification is a good source of detailed information about the I<sup>2</sup>C-bus. You can download the complete specification from the Philips Semiconductors website.

### 2.2 Static Handling Requirements

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling. You must use a ground strap or touch the PC case or other grounded source before unpacking or handling the hardware.

### 2.3 Minimum System Requirements

- PC Pentium 60 processor (or equivalent), 8MB RAM, 10MB of hard drive space
- one USB port (either 2.0 or 1.1 compatible)
- Windows 98SE, ME, 2000, or XP

### 2.4 Adapter Power Requirements

The Philips I2C Demonstration Board 2005-1 hardware obtains its power from the PC USB port.

### 3. Installation

#### 3.1 Win-I2CUSB Lite Software

1. Download the Win-I2CUSB Lite installation driver from:  
[www.semiconductors.philips.com/products/interface\\_control/i2c](http://www.semiconductors.philips.com/products/interface_control/i2c).
2. The installation software will automatically start from the executable file. If the installation software does not start automatically double-click on the Setup.exe file.
3. For software or hardware application support email us at: [i2c.support@philips.com](mailto:i2c.support@philips.com).

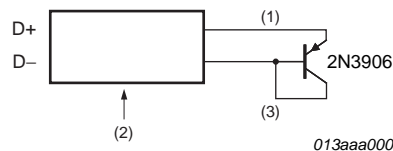
Do not contact The Boardshop for application support issues.

#### 3.2 Demonstration Board hardware connection to computer USB port

1. Touch the bare metal on the rear of your computer to neutralize any ESD (static charge) before removing the Demonstration Board Hardware from the packaging.
2. Connect the hardware to a USB port using a standard USB cable.
3. The green USB\_LINK LED on the hardware will illuminate.

#### 3.3 Connecting the remote sensor diode

1. Connect the red wire to the D+ pin and the white wire to the D- pin (see [Figure 1](#)).
2. Plug the remote sensor diode into the Demonstration Board (see [Figure 2](#)).



- (1) The cable is approximately 15cm long with the red wire connected to the emitter.
- (2) The 2-pin male connector is compatible with the 2-pin header on the pcb.
- (3) The base and collector of the transistor are connected together.

**Fig 1. I2C Demonstration Board 2005-1 remote sensor diode**

## 4. Hardware description

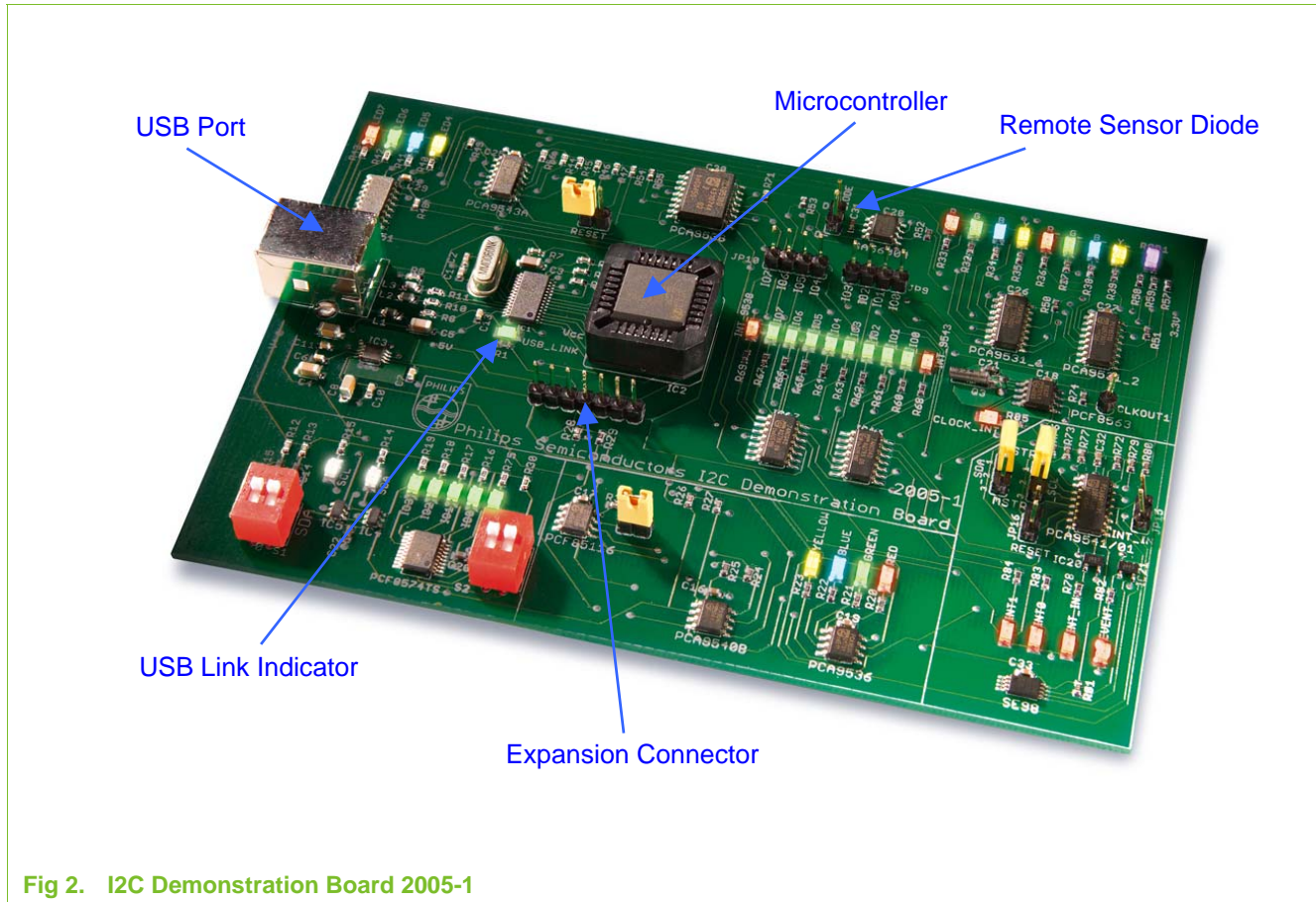


Fig 2. I2C Demonstration Board 2005-1

Figure 2 shows the following items on the hardware:

- USB Port: port where the USB cable is plugged into the board.
- USB\_LINK LED: this green LED will illuminate when the cable is connected between the PC and the hardware.
- remote sensor diode: where the remote sensor diode is plugged into the board to allow the SA56004E temperature sensor to monitor the ambient temperature.
- microcontroller: a socketed microcontroller is provided to ensure easy service in the event of damage to the device.
- extension connector: this connector is used to connect future daughter cards targeting specific Philips Semiconductors I<sup>2</sup>C-bus devices.

**Remark:** Philips recommends connecting only daughter cards developed and provided by Philips Semiconductors to the extension connector. Philips Semiconductors is not responsible for damage caused by other target cards.

## 5. I2C Demonstration Board 2005-1 block diagram

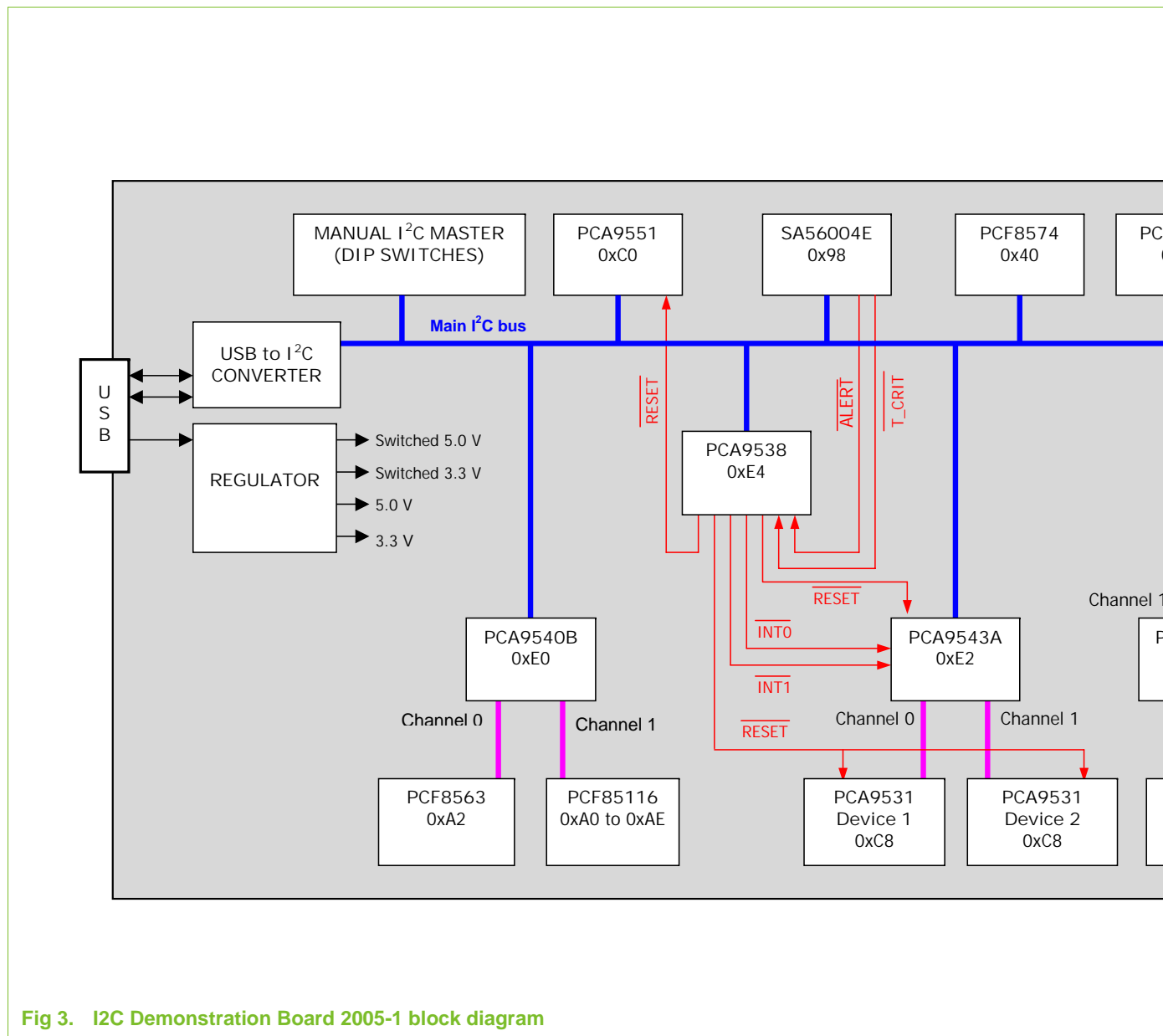


Fig 3. I2C Demonstration Board 2005-1 block diagram

## 6. I2C Demonstration Board device description

The I<sup>2</sup>C-bus devices on the I2C Demonstration Board 2005-1 are described in [Table 1](#)

**Table 1. I<sup>2</sup>C-bus devices on the Training Board**

Device	Description	I <sup>2</sup> C Address
PCF8574TS	8-bit I <sup>2</sup> C and SMBus I/O port with interrupt	0x40
PCA9536D	4-bit I <sup>2</sup> C and SMBus I/O port	0x82
PCA9540BD	2-channel I <sup>2</sup> C-bus multiplexor	0xE0
PCF85116-3TD	2048 x 8-bit CMOS EEPROM with I <sup>2</sup> C-bus interface	0xA0 to 0xAE
PCF8563TD	real time clock / calendar	0xA2
PCA9538D	8-bit I <sup>2</sup> C and SMBus low power I/O port with interrupt and reset	0xE4
PCA9551D	8-bit I <sup>2</sup> C-bus LED driver with programmable blink rates	0xC0
SA56004ED	SMBus compatible, local and remote digital temperature sensor with over temperature alarm, accuracy: $\pm 1^{\circ}\text{C}$	0x98
PCA9543AD	2 channel I <sup>2</sup> C-bus switch with interrupt logic and reset	0xE2
2 x PCA9531D	8-bit I <sup>2</sup> C-bus LED dimmer	0xC8 (both)
PCA9541D/01	2-to-1 I <sup>2</sup> C-bus master selector with interrupt logic and reset	0xFE
SE98PW	local only, temperature sensor for SO-DIMM	0x30

## 7. Starting Win-I2CUSB Lite

When you have correctly installed the software and the Demonstration Board Hardware is connected and recognized by the computer, start the Win-I2CUSB Lite software (see [Figure 4](#)).

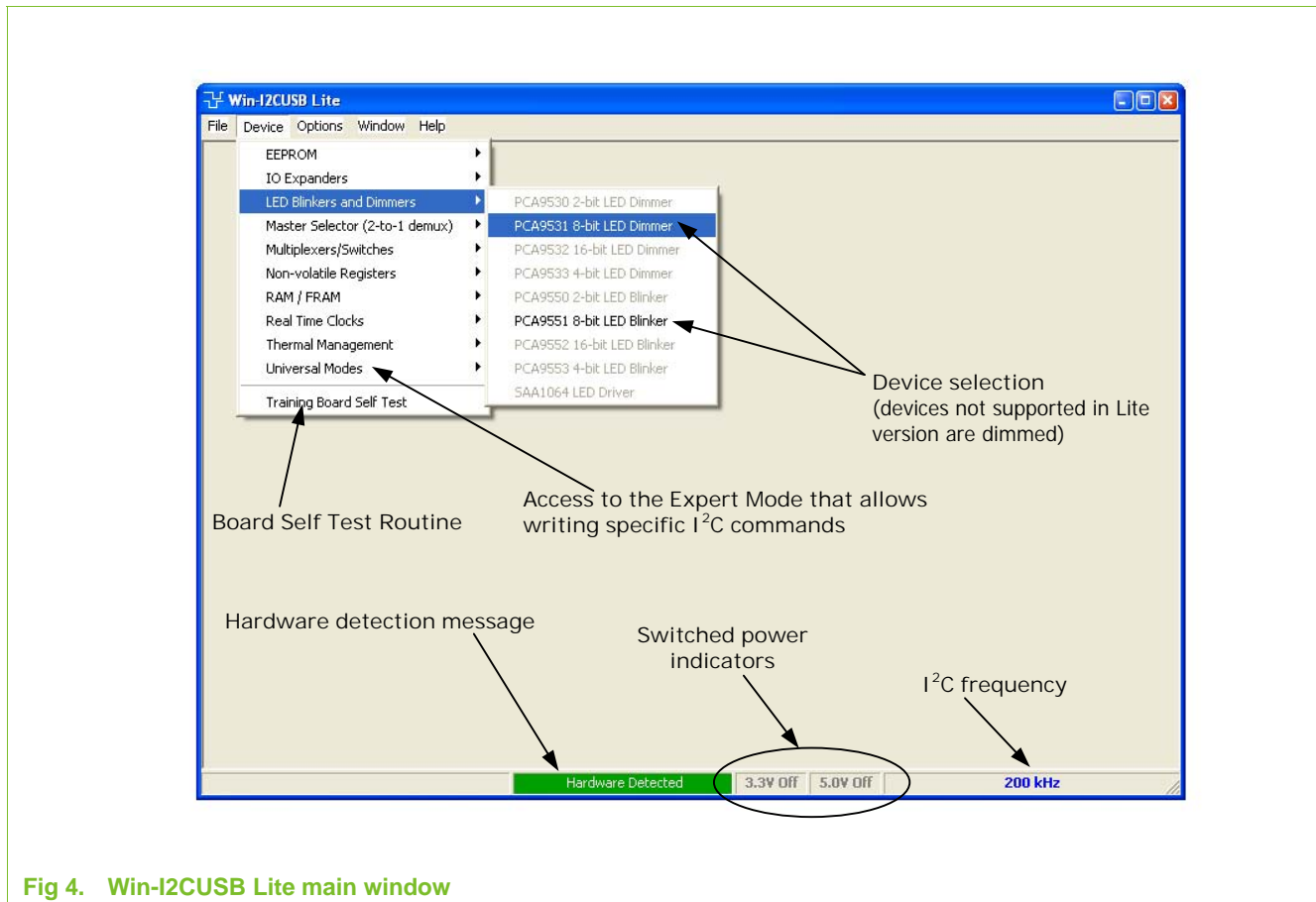


Fig 4. Win-I2CUSB Lite main window

- When the Demonstration Board hardware is correctly connected to the USB port and the computer recognizes it, the message “Hardware Detected” is displayed.
- Switched 3.3 V and 5.0 V power supplies are controlled through the “Options” menu or by double clicking on the 3.3 V or 5.0 V symbols on the lower side of the main window. Power supplies are disabled by default and you must enable them before using the I<sup>2</sup>C-bus devices on the board.
- I<sup>2</sup>C-bus frequency is controlled through the “Options” menu or by double clicking on the frequency symbol in the lower side of the main window.
- I<sup>2</sup>C-bus devices on the board are controlled using the corresponding control window in the “Device” menu. You can only select I<sup>2</sup>C-bus devices which are on the board and are highlighted in the menu.
- The Expert Mode selected through “Device → Universal Modes” allows you to send customized I<sup>2</sup>C-bus commands to any device on the board. Expert Mode is limited to 8 lines of command in the Lite version of the software. Each line of command can have up to 9 bytes of data.



- The self check routine selected through “Device → Training Board Self Test” allows a thorough self test to be performed (device, electrical connection and visual check). You can save the results of the test in a log file.

## 8. Upgrades and experimentation

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Refer to the UM10207 User Manual for more details on the Win-I2CUSB Lite Software and programming of different I<sup>2</sup>C-bus devices.

## 9. I2C Demonstration Board 2005-1 upgrades

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You can purchase a full version of the GUI, called a Win-I2CUSBDLL kit from The Boardshop (details are available on the website: [www.semiconductors.philips.com/products/interface\\_control/i2c](http://www.semiconductors.philips.com/products/interface_control/i2c)). The microcontroller included operates over the entire address range for all devices with a more powerful universal mode if you need to communicate with devices or addresses not supported by the Win-I2C Lite software.

The full version of the GUI is incompatible with the Demonstration Board USB-to-I<sup>2</sup>C-bus-microcontroller. You can make the GUI work with any Demonstration Board if you remove the microcontroller from the Win-I2CUSBDLL kit USB based I<sup>2</sup>C-bus hardware adapter v2 card and insert it into the microcontroller socket on the Demonstration Board.

Periodically daughter cards of new devices will become available and new GUIs generated for these devices. Alternatively existing GUIs will be enhanced based on operator feedback. The Win-I2CUSB Lite and Win-I2CUSBDLL kit software includes an automatic update feature which keeps the software updated to most current GUIs.

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