

XE2004 DVK

XE2004 Development Kit

User's Guide

For further information, please contact:

XEMICS SA

E-mail: info@xemics.com

Web: <http://www.xemics.com/>

Cool Solutions for Wireless Connectivity

XEMICS SA • e-mail: info@xemics.com • web: www.xemics.com

XE2004 DEVELOPMENT KIT

ABOUT THE XE2004

The XE2004 is a high precision capacitance-to-voltage converter, based on an analog signal path with digital programmable gain, offset and non-linearity. A low-power, low-voltage device, XE2004 provides power-on-reset and sensor overload detection.

Offset, span and linearity of the analog output signal adjusts digitally. The calibration settings are stored in on-chip registers. The power-on-reset sequence of XE2004 facilitates uploading calibration data from an external non-volatile memory or host control equipment into the registers.

RELATED DOCUMENTS

Datasheet XE2004.

Application Note AN2004.02 "Getting to a calibrated sensor in 5 steps".

INTRODUCTION

This user guide describes the installation and use of DVK2004, the XE2004 development kit.

Note: the kit requires a **PC Interface Card and flat cable**, available from National Instruments under reference number PCI-6503 (DIO-24, 24 I/O TTL levels).

The DVK2004 development kit consists of:

1. **Sample Board.** The sample board consists of a XE2004I-SW, a Microchip PIC12LC509A microcontroller with OTP memory, connector and 6-wire flat cable. Board space is available for mounting a sensor and other components required for the application under development.
2. **Programmer Board.** This constitutes the hardware interface between the PC Interface Card and the Sample Board, or any other board containing XE2004 during development and manufacturing. The board provides the required signals to communicate with the sample board, and to program the PIC12LC509A OTP memory.
3. **Graphical User Interface (GUI).** This GUI handles the two-way communication between the PC and the XE2004 Sample Board. It allows the developer to read and write registers of XE2004 from the computer screen and to store register data into the PIC12LC509A OTP memory associated with XE2004. The GUI can also be used during the manufacturing of sensors based on XE2004, and is capable of downloading the PIC12LC509A microcontroller program into the OTP memory.
4. **Compact disc,** containing GUI, PCI-6503 drivers, and documentation.

MINIMUM EQUIPMENT REQUIRED

- A PC with Pentium 90 processor or higher
- Operating system Windows 95/98 or Windows NT
- PC with PC Interface Card PCI-6503 from National Instruments, with its drivers installed as indicated in the documentation from the manufacturer
- The GUI is a compiled version of a LabView program. LabView does not require a license unless the source code is run. Contact XEMICS for source code version.

GETTING STARTED

Configure the National Instruments card DIO-24HS

This card is driven with a C++ program or LabView software and is used to generate the different signals that access the Programmer Board.

In strobe I/O mode, this card consists of two groups, each of these define the mode operation (IN/OUT). One group can have 1, 2 or 4 ports of 8 bits. The ports are labeled as port (A, B, C, D) or (0, 1, 2, 3). For this, application only ports A and B are used. Configure the ports as follows:

PA 1	PA 2	PA 3	PA 4	PA 5	PA 6	PB 0
SCK	R/W	D_OUT	3V/5V	GND_ON	VPP_ON	D_IN

- SCK Clock, provided by the PC to the PIC12LC509A
- R/W Read/Write signal gives the direction of the communication
- D_OUT Data transferred from the PC to the PIC12LC509A
- 3V/5V Select the power supply
- GND_ON Reset signal for the PIC12LC509A
- VPP_ON High voltage command for the PIC12LC509A
- D_IN Data transferred from the PIC12LC509A to the PC

The DIO card connects to the interface board with a flat cable, see also Figure 1 below.

1. Install the GUI software on the PC

The CD-ROM named "2004_soft_LabView" contains the software needed for installation.

- Open the CD-ROM with Windows Explorer
- Click on setup
- Follow the instructions
- Copy the executable named Application.exe in the appropriate folder.

2. Make all hardware connections

- Connect the PC Interface Card PCI-6503 to the Programmer Board with the flat cable from National Instruments
- Connect the Sample board to the Programmer Board with the 6-wire flat cable connector
- Connect a power supply (13 V) to the connector named "IN 13V" on the Programmer Board

3. The installation is now complete

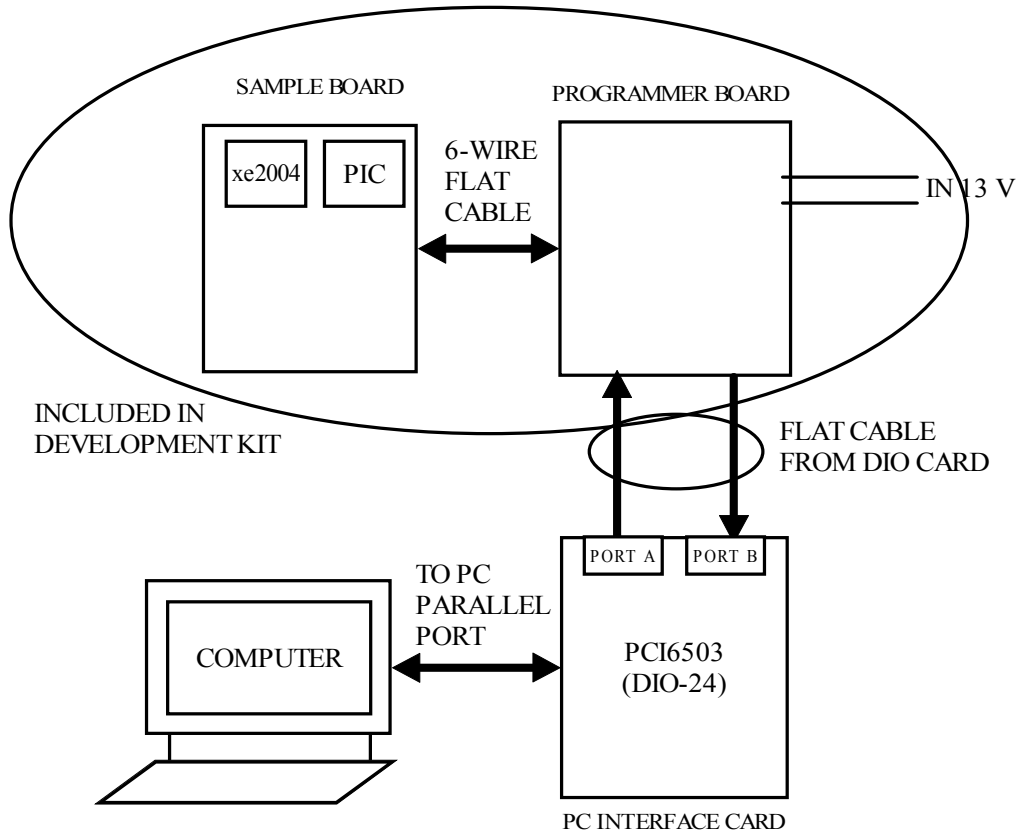


Figure 1 Connection of all hardware elements required operating DVK2004.

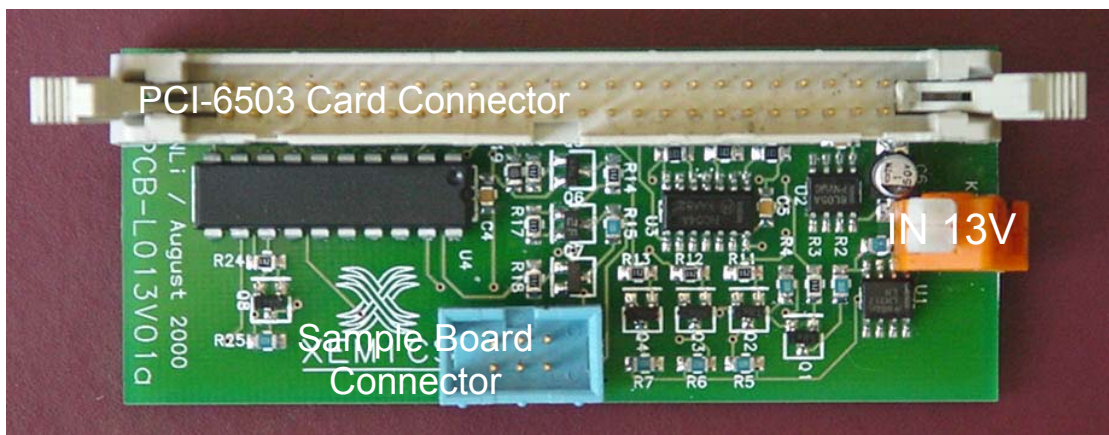
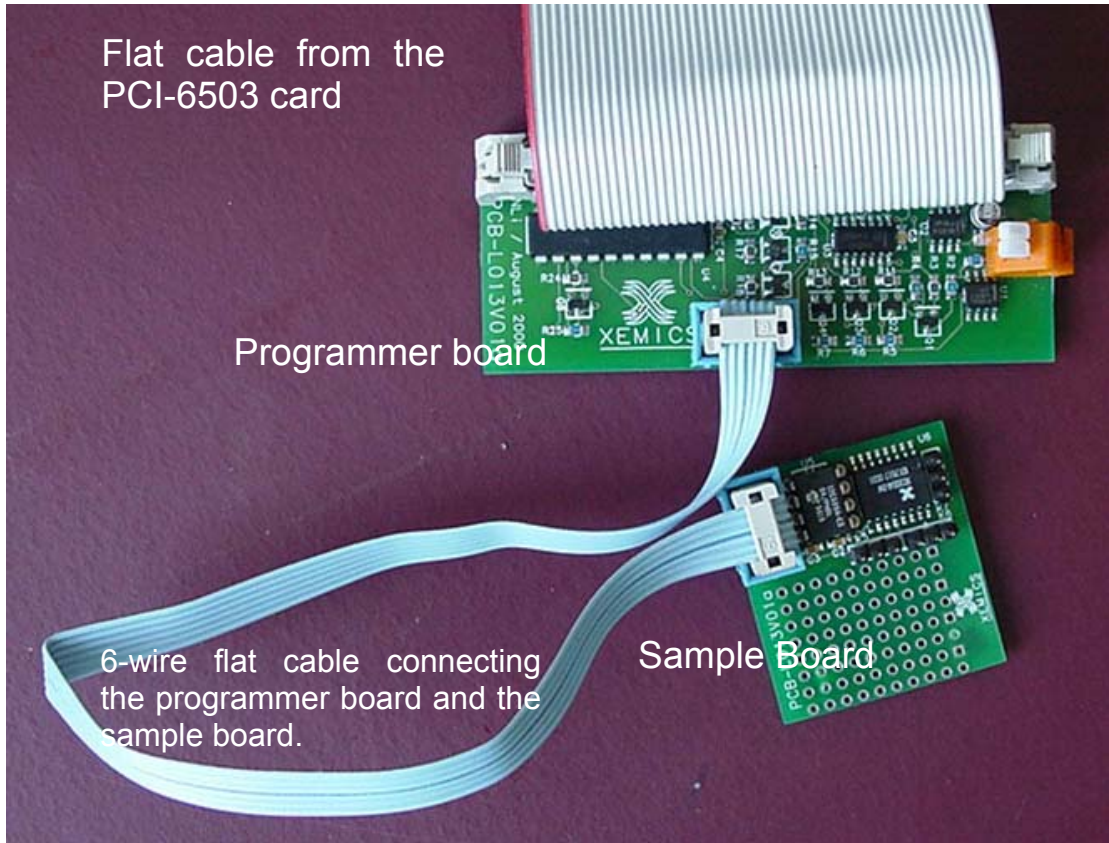


Figure 2 Picture of the Programmer Board

The picture on the next page shows the Programmer Board connected to the Sample Board.



On the Sample Board below the XE2004I-SW, the PIC12LC509A or PIC12LC508A are identified. There is free space available to implement the application. In addition, some pins are available to connect the XE2004 and the sensor.



AGND
OUT
CG

HOW TO STORE THE MICRO PROGRAM INTO THE MICROCHIP PIC12LC50X

Before launching the program, the Programmer Board must be powered on. After starting the program, the user must choose the PIC version on the Sample Board: PIC12LC508 or PIC12LC509.

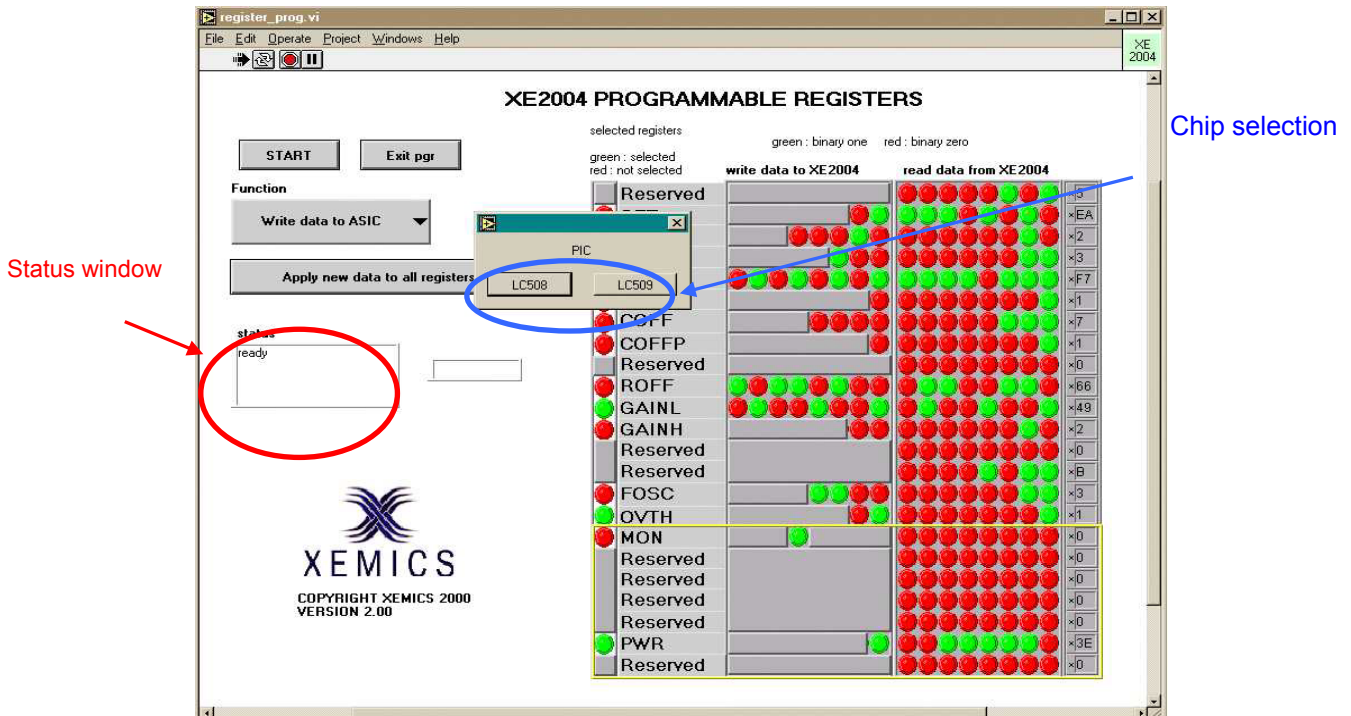


Figure 3 Selection of the microcontroller version

If the microcontroller memory is empty, the program automatically detects it and then proposes to either program the microcontroller or to cancel the operation. The micro program source code is implemented into the “XE2004 programmable registers” software.

During the programming mode, the status window blinks. At the end, a message “chip is programmed” appears on the status window. At that point, the microcontroller emulates the EEPROM and enables it to receive certain commands from the PC. The PC can read or write directly on the XE2004. (refer to the following chapter to see how to read and write onto the XE2004.).

If the microcontroller is changed, the software needs to be closed and started again. The hardware will also need to be powered down and up again.

HOW TO WRITE ONLY ONE OR SOME REGISTERS

To write some XE2004 registers:

- With the “Register Selection button” select the option “Apply new data only to the selected register(s)”.
- Select the desired registers in the “Selected Register Window” by clicking on the LED. When the LED is green, the register is selected.
- With the “Function menu” select the option “ Write data to ASIC”
- Click on “Start button”
- Read the new value by using the procedure “How to read the registers”

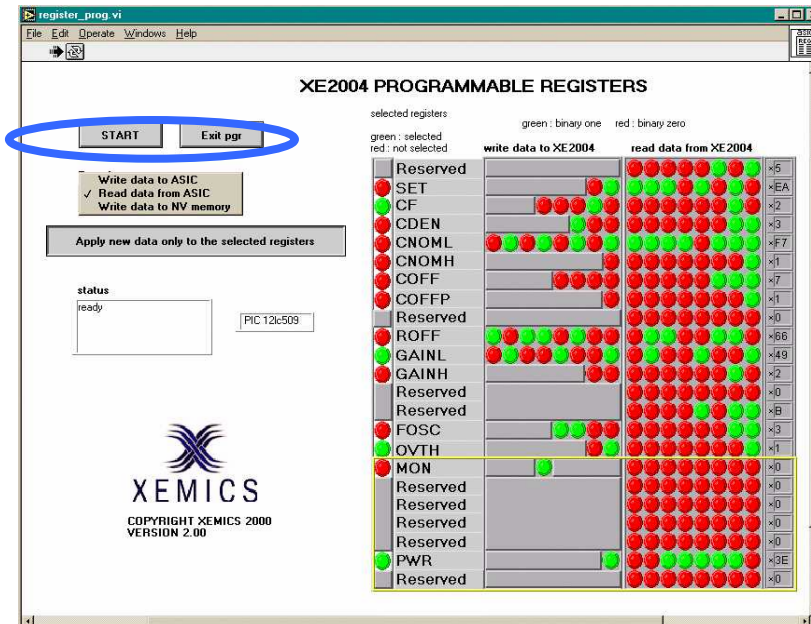


Figure 5 Writing selection

HOW TO WRITE ALL THE XE2004 REGISTERS

To write all the XE2004 registers:

- With the “Register Selection button” select the option “Apply new data to all register(s)”.
- With the “Function menu” select the option “ Write data to ASIC”
- Click on “Start button”
- Read the new value by using the procedure “How to read the registers”

HOW TO STORE AND RESTORE REGISTER VALUES INTO NON-VOLATILE MEMORY

When the sensor is calibrated correctly with the right values in the XE2004 registers (refer to XE2004 datasheet & AN2004.2 for full definition of the registers), the new calibrated values have to be memorized into the Non-Volatile Memory (PIC12LC50X). The number of new calibration depends on the type of PIC. With a PIC12LC508 microcontroller, the number of new calibration is four. With a PIC12LC509, the number of new calibrations is twenty.

