



Test Procedure



EDU 05



How-to Manual



CONTENTS



General information

1. WHAT'S ON THE BOARD?.....	3
2. TESTING THE BOARD	4
3. TESTING THE COMMUNICATION WITH THE PC	6



Test & examples software

1. DOWNLOAD THE TEST PROGRAMS.....	7
2. INSTALL THE TEST PROGRAMS	7
3. TESTING THE TEST PROGRAMS.....	8
3.1 TESTING WITH THE GRAPHICAL DEMO.....	8
<i>Showing the binary value of the pressed button</i>	9
3.2 TESTING WITH THE TEST & DIAGNOSE DEMO.....	10
<i>What we see?.....</i>	10
<i>Adding / clearing text on the LCD-display.....</i>	10
<i>Disable / Enable the Startup-demo</i>	11



HOW TO : Programming in Visual Basic 2010 Express edition

HOW TO : PROGRAMMING IN VISUAL BASIC 2010 EXPRESS EDITION.....	11
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GENERAL INFORMATION

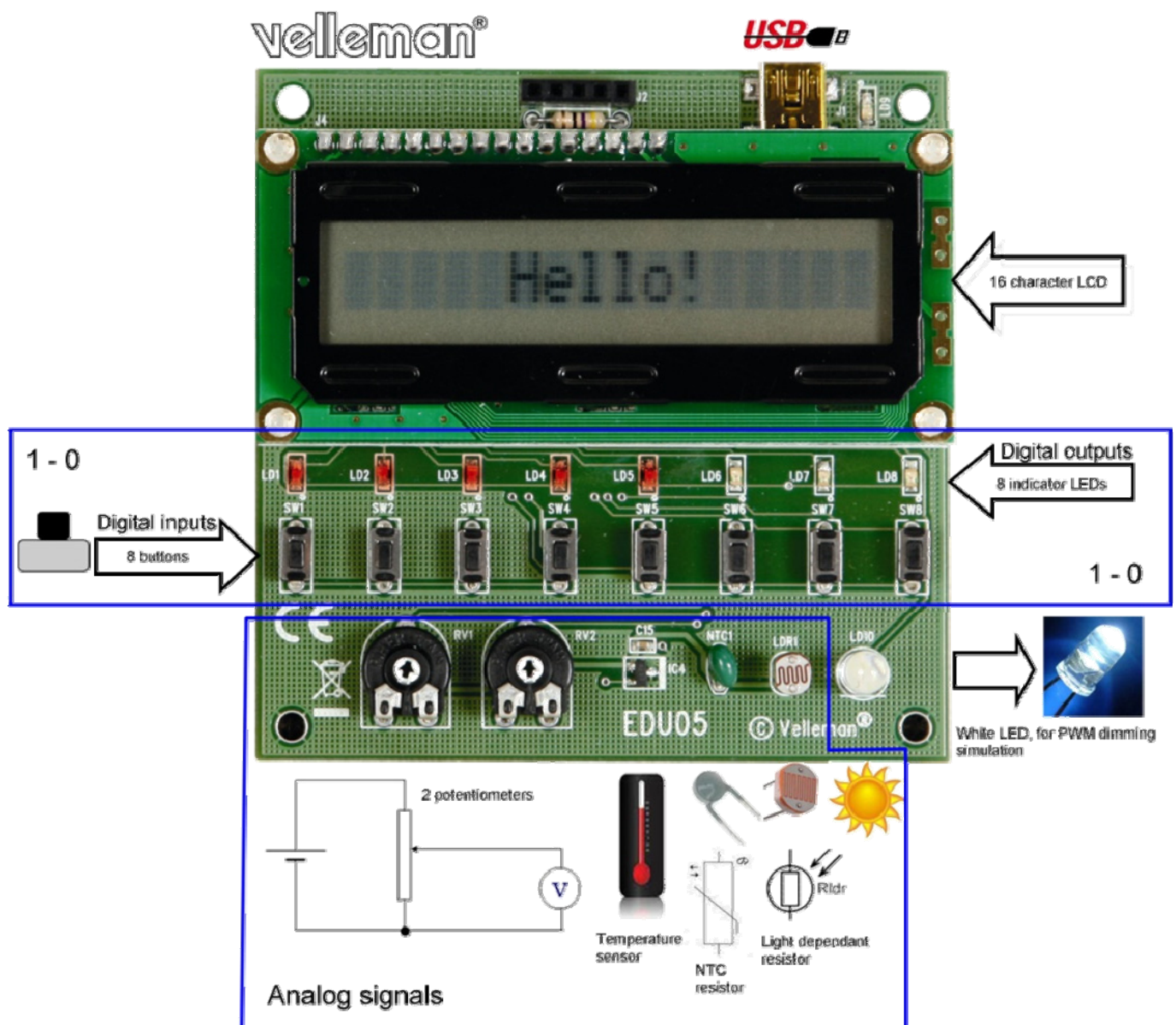
This manual teaches you how to master the USB connection with the PC.



Search for reference code on YouTube.

1. What's on the board?

All the inputs and outputs are on the board.



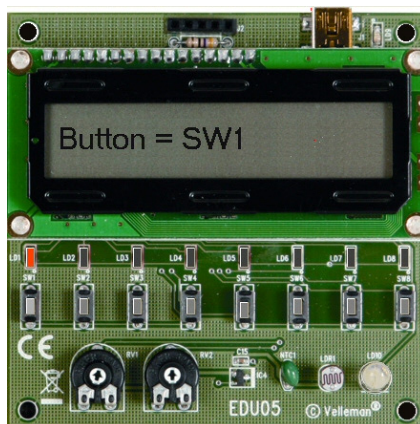
2. Testing the board

Make a connection between the board and PC using the included USB cable. The LCD will display the message "Press button SW3 ... SW7 to show analog input values SW8 to exit". In the meantime the LEDs will light up in sequence. LD1 and LD2 are digital inputs.

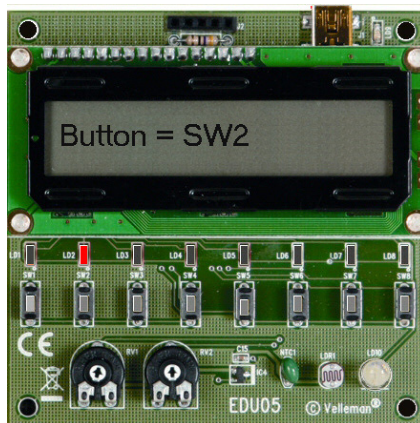


Press each button and check the LCD readout to check if the board functions correctly. Press button 1 ... 7 one after the other. When you press a button, the corresponding LED lights up, and the LCD displays the corresponding value

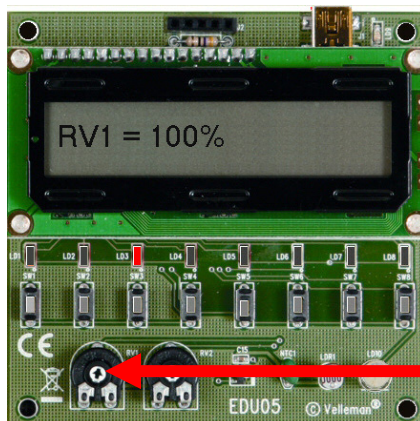
Press button 1



Press button 2



Press button 3

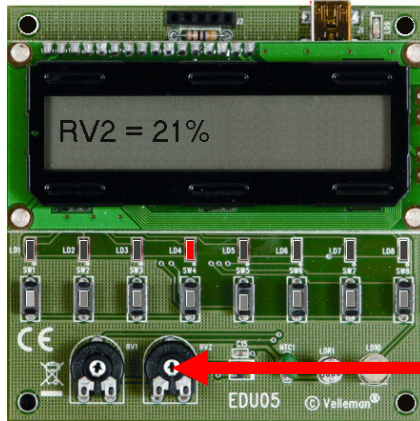


Press this button to read the value of potentiometer 1.

When you adjust the potentiometer, the value on the display changes.

Potentiometer 1

Press button 4

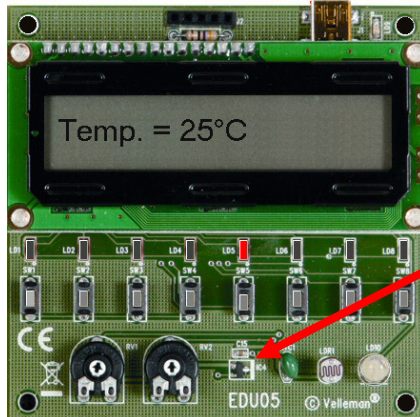


Press this button to read the value of potentiometer 2.

When you adjust the potentiometer, the value on the display changes.

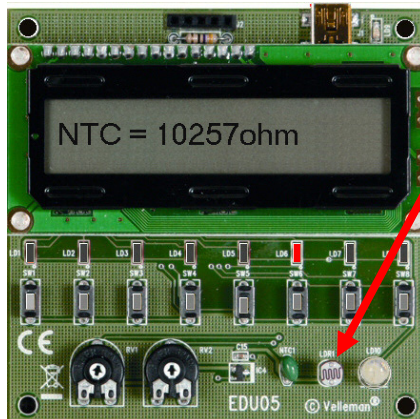
Potentiometer 2

Press button 5



Press this button to read the temperature in the room from the temperature sensor.

Press button 6

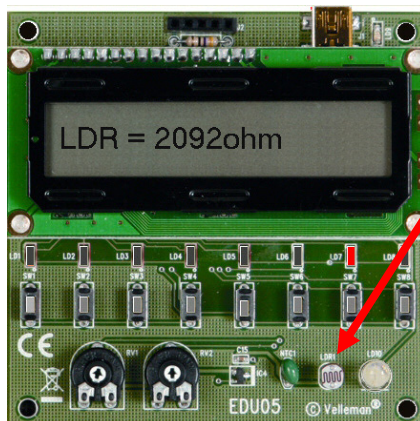


This shows you the value of the temperature dependent resistor (NTC).

The resistance of this type of resistor varies with the temperature.

When the temperature goes up, the value of the resistor goes down.

Press button 7



This shows you the value of the light dependent resistor (LDR).

If you cover the resistor the value will change. More light will decrease the value of the resistor.

This test shows us that the board is functional. The next test will show you how to communicate with the PC.

3. Testing the communication with the PC

Press button "8" to start the communication with the PC. The LCD shows the message "**CONNECTING**". When the connection has succeeded, the display indicates "**USB CONNECTED**".



YOU MUST PRESS BUTTON 8 TO BE ABLE TO COMMUNICATE WITH THE PC!



TEST & EXAMPLES SOFTWARE

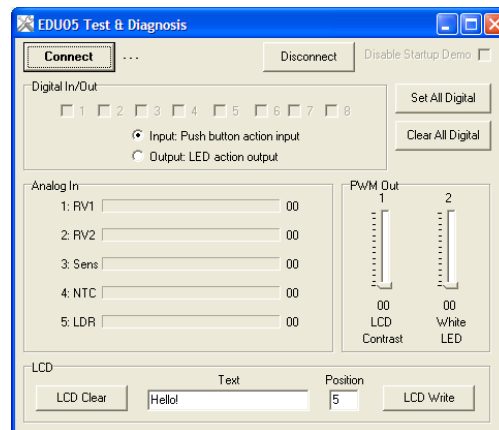
We have 2 types of programs: a graphical demo and a Test & Diagnosis program.

1. Downloading the test programs

Download the software package from the EDU05 product page (www....)



Graphical demo



Test & Diagnosis

2. Installing the test programs

Extract the files in a folder on your drive. The folder "EDU05" and several subfolders will be created: C:\EDU05\

subfolder: \DLL contains the dynamic link library file EDU05.DLL. This file is required for every program, this file must always be included. In your current projects folder, it can be handy to copy this file to your \windows\system32 folder.

- \GraphicalDemo\ → Contains the graphical demonstration and test program. See chapter 4.
- \TestDiagnosis\ → Contains the test & diagnosis (numerical version) demonstration and test program.
- \EDU05_VB2010_tutorial\ → Step-by-step manual: how to make your first program in Visual Basic
- \Examples\EDU05DemoVB_2008\ → Example 1 in Visual Basic 2008
- \Examples\EDU05DemoVC#_2008\ → Example 1 in C#
- \Examples\EDU05DemoVC_2008\ → Example 1 in Visual C 2008
- \Examples\EDU05Demo2VB_2008\ → Example 2 in Visual Basic 2008
- \Examples\EDU05Demo2VC#_2008\ → Example 2 in C#
- \Examples\EDU05Demo2VC_2008\ → Example 2 in Visual C 2008

3. Testing the test programs

3.1 Testing with the Graphical Demo

The graphical demo reproduces an image of the board on your screen.

- First click the “Connect” button to connect the board with the software.



- Next, perform the same test as described in chapter 2 “Testing the board”. Because the board and the PC communicate, you can see the exact same on your screen as while testing the board itself.



Button 1 pressed



Button 2 pressed



Button 3 pressed



Button 4 pressed



Button 5 pressed



Button 6 pressed



Button 7 pressed

Button 8 pressed

- You can click the buttons on the screen and see the result on the board.

Remark: You need to press and hold the buttons on the board to see the result. The buttons on the screen have a toggle function: click once to switch on, click again to switch off.

Showing the binary value of the pressed button



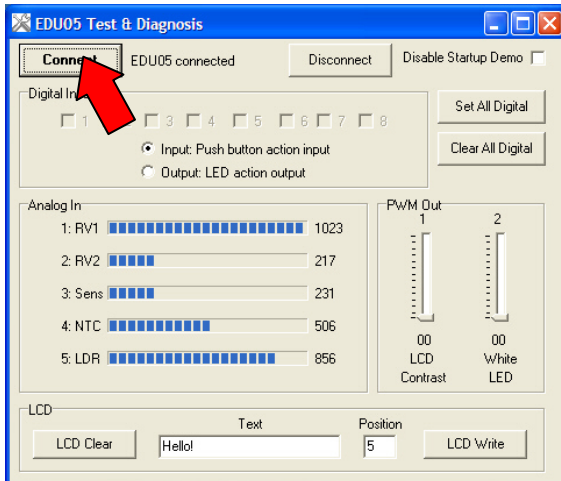
When you switch on the "Show binary value of button pressed" option, the PC screen and board will indicate the binary value of the clicked button. In the example above button 5 was clicked.

- If all tests were successful, you can disconnect the board by clicking the "Disconnect" button. Then continue with the next test. (testing with the test & diagnosis demo).

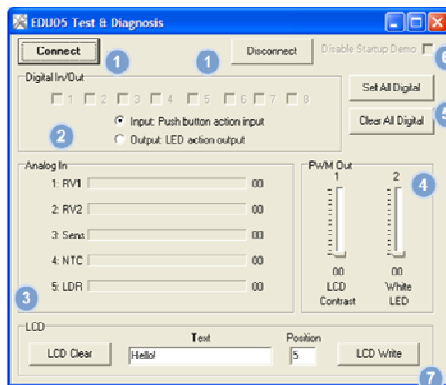


3.2 Testing with the test & diagnosis demo

Start the “Test & diagnosis” software and click the “Connect” button to connect the board with the software.

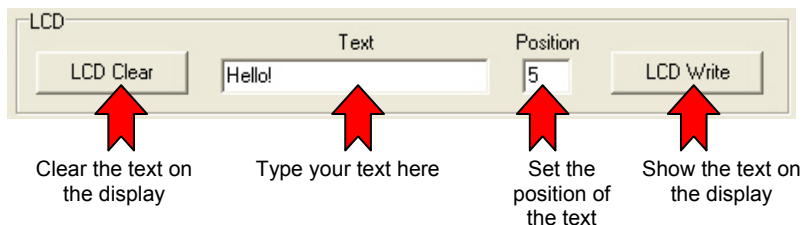


What is on the screen?



- 1 **Connect and Disconnect buttons to connect/disconnect the board with the PC via the USB cable**
- 2 **Digital in/output selection**
Input selected: each time you push a button on the board, it is shown on the screen
Output selected: each action you make in the software screen is shown on the board
- 3 **Analog In**
 The bars indicate changes in the values of the potentiometers, LDR, NTC and temperature sensor on the board.
- 4 **PWM Out**
 This acts like a regulation of an output value. (1) changes the LCD contrast, and (2) changes the LCD brightness.
- 5 **Set All Digital / Clear All Digital**
 The digital is represented by the LEDs on the board.
- 6 **Disable the Start-up demo of the board**
- 7 **Adding or erasing text on the LCD-display**

Adding / erasing text on the LCD-display



Disabling / Enabling the Start-up demo

Disable the demo:

- Switch on “Disable Startup Demo”
- Disconnect the software
- Disconnect the USB cable of the board.

When you re-connect the USB cable you’ll see that demo has been disabled.

Enable the demo:

- Connect the USB cable with the board & PC *
- Run the “Test & diagnosis” software
- Connect the software
- Switch off “Disable Startup Demo”

* Because the start-up demo is disabled, you don’t need to press button “8” on the board to start the communication with the PC.



HOW TO: PROGRAMMING IN VISUAL BASIC 2010 EXPRESS EDITION

STEP 1

Download and install Visual Basic 2010 Express edition.

You can download the software from here: <http://www.microsoft.com/visualstudio/en-us/products/2010-editions/visual-basic-express>

STEP2

If you are not experienced in Visual Basic programming, please check these links:

Visual Basic Language Reference: <http://msdn.microsoft.com/en-us/library/sh9ywfdk.aspx>

Getting Started Tutorials: <http://msdn.microsoft.com/en-us/library/dd492171.aspx>

Visual Basic: <http://msdn.microsoft.com/en-us/library/2x7h1hfk.aspx>

Book "Microsoft Visual Basic 2008 Express Edition: Build a Program Now!":

<http://www.microsoft.com/learning/en/us/book.aspx?ID=12282&>

STEP3

Download and extract the EDU05 software package from:

<http://www.velleman.eu/support/downloads/?code=EDU05>

STEP4

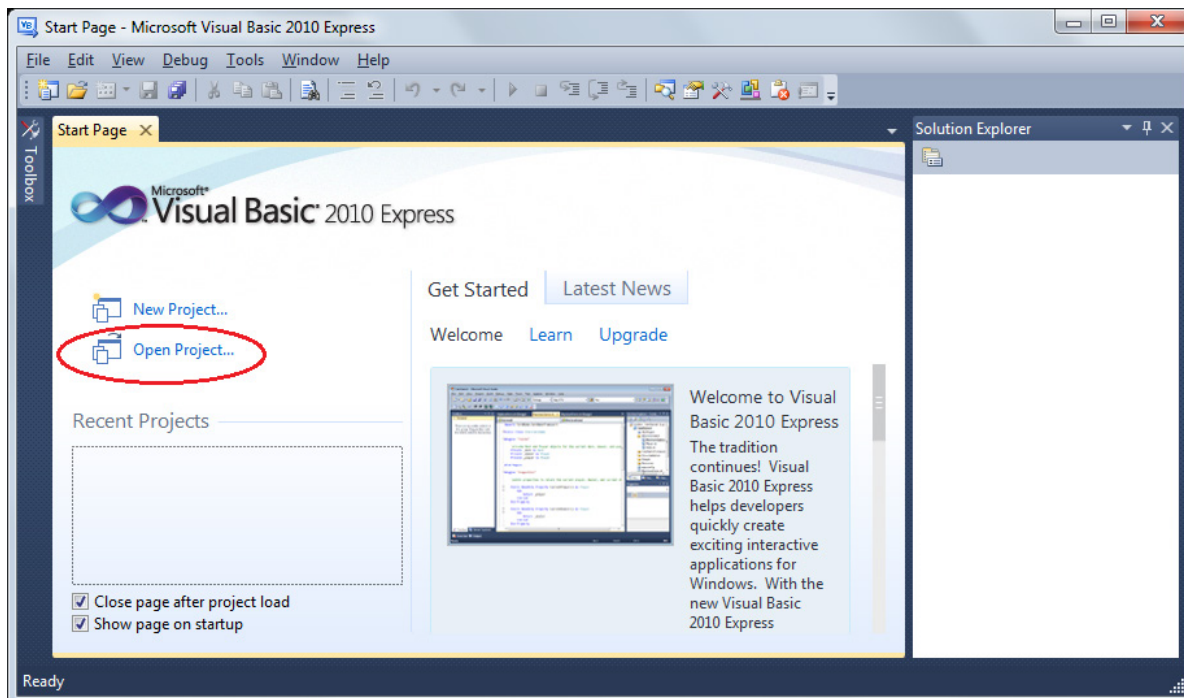
Connect the EDU05 card and press button SW8 to select USB communication.

STEP5

Start Visual Basic 2010 Express edition.

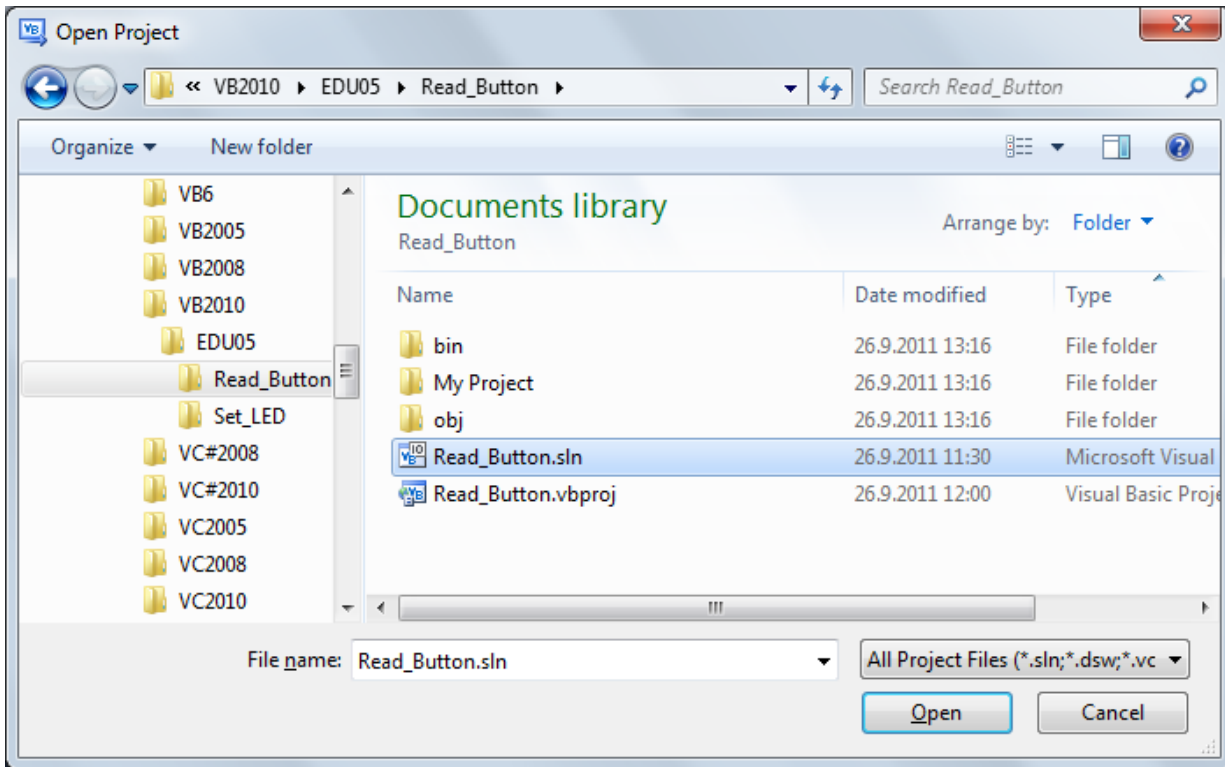
STEP6

Click "Open Project".



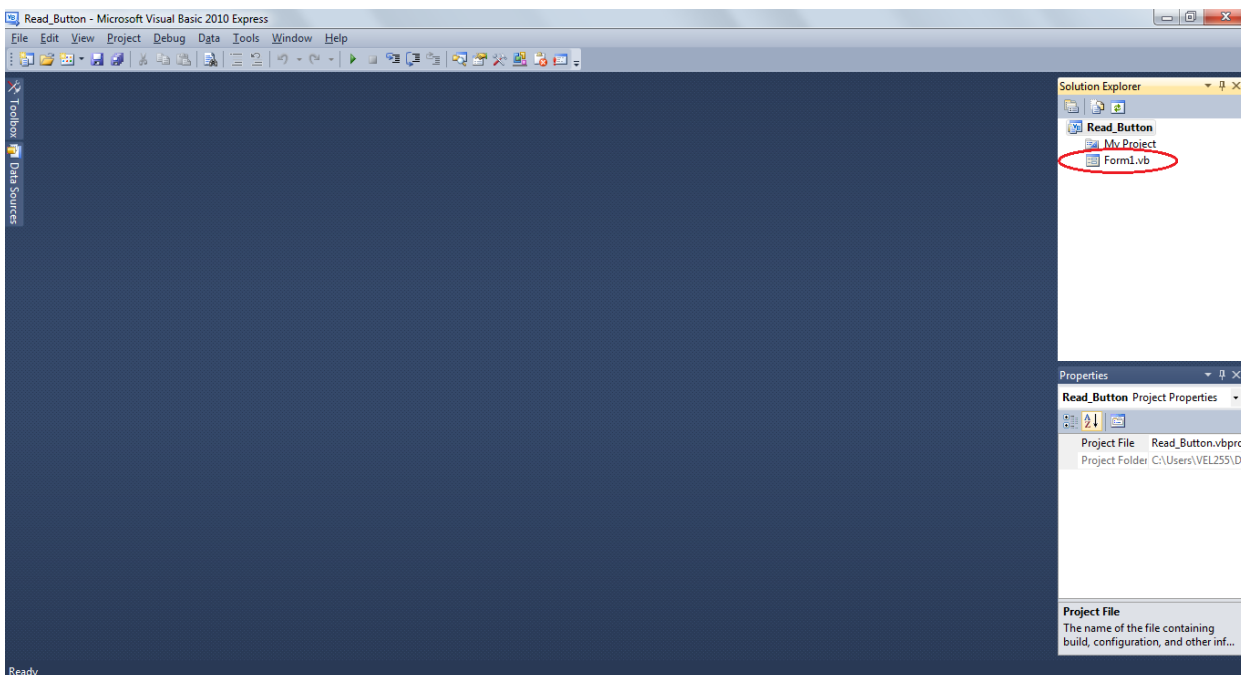
STEP7

Locate and select "Read_Button.sln" and click Open.



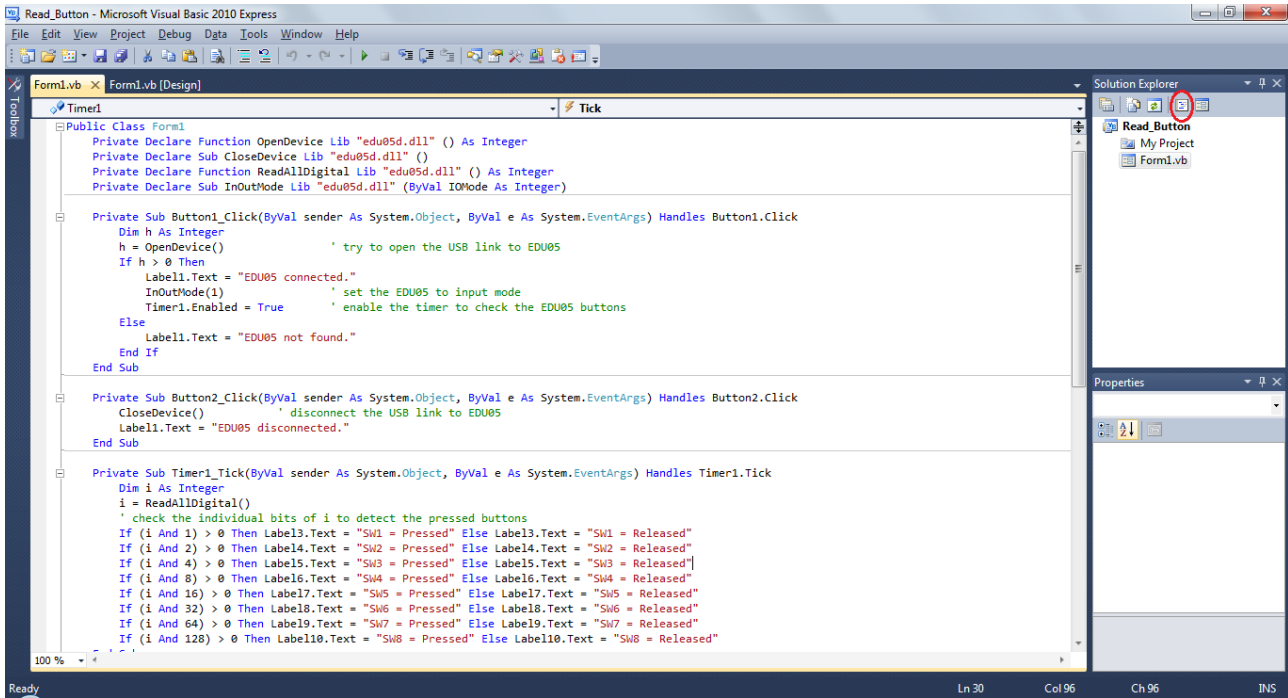
STEP8

In the Solution Explorer double-click Form1.vb to show the form editor (if not visible).



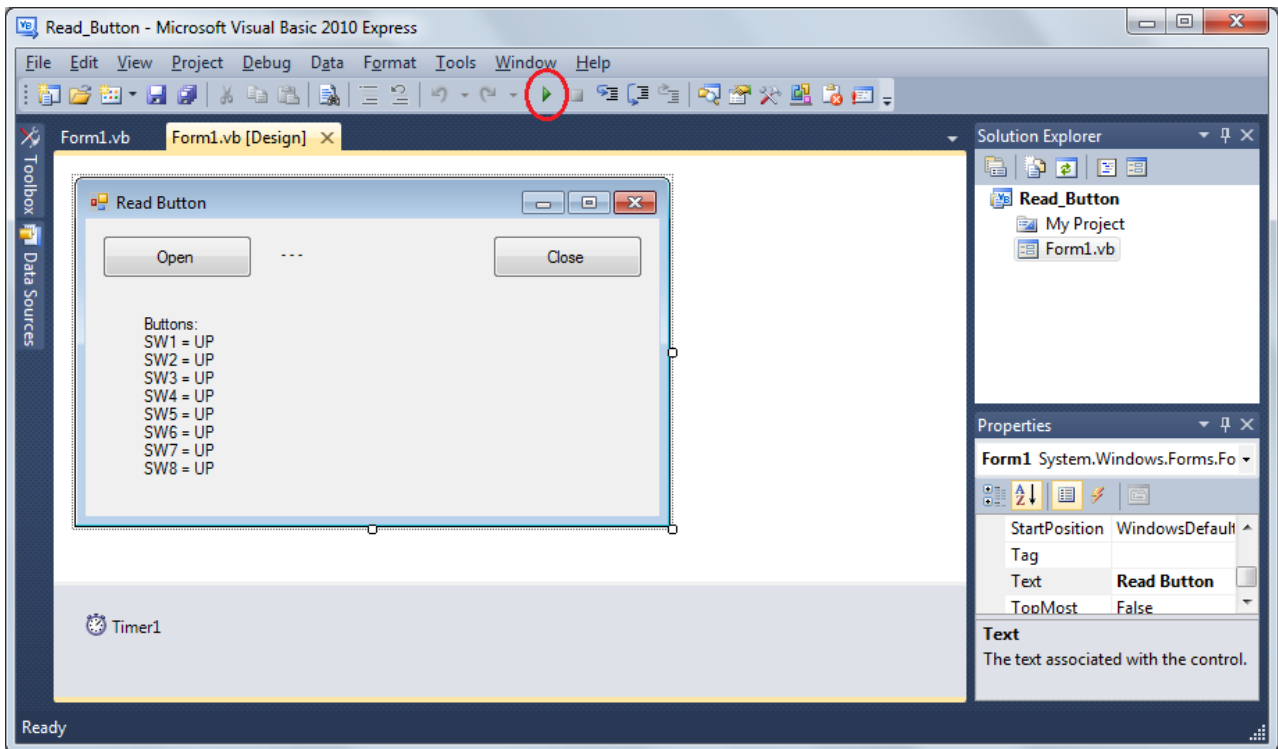
STEP9

In the Solution Explorer click the “View Code” button to show the code editor.



STEP10

Click the “Debug” button to run the code.



To read the status of the buttons you can use the function `ReadAllDigital()`.

This function returns a 32 bit integer.

The eight lowest bits of this return value represent the status of the eight buttons. If you press a button, the corresponding bit is set to "1".

You can use Visual Basic's `And` operator to mask the other bits and check the value of an individual bit.

Example: If buttons SW1, SW2 and SW8 are pressed, the eight last bits of the value are 10000011.

In this code example the button status value is read to integer `i`.

Every bit is checked if it is "1" or "0". If the bit is "1", it means the corresponding switch is pressed. The text "DOWN" is displayed for this button.

```
Dim i As Integer
i = ReadAllDigital()
' check the individual bits of i to detect the pressed buttons
If (i And 1) > 0 Then Label13.Text = "SW1 = Pressed" Else Label13.Text = "SW1 = Released"
If (i And 2) > 0 Then Label14.Text = "SW2 = Pressed" Else Label14.Text = "SW2 = Released"
If (i And 4) > 0 Then Label15.Text = "SW3 = Pressed" Else Label15.Text = "SW3 = Released"
If (i And 8) > 0 Then Label16.Text = "SW4 = Pressed" Else Label16.Text = "SW4 = Released"
If (i And 16) > 0 Then Label17.Text = "SW5 = Pressed" Else Label17.Text = "SW5 = Released"
If (i And 32) > 0 Then Label18.Text = "SW6 = Pressed" Else Label18.Text = "SW6 = Released"
If (i And 64) > 0 Then Label19.Text = "SW7 = Pressed" Else Label19.Text = "SW7 = Released"
If (i And 128) > 0 Then Label110.Text = "SW8 = Pressed" Else Label110.Text = "SW8 = Released"
```

STEP11

When you are finished evaluating this project, you can close it. Next, open the project `Set_LED` to study how to turn LEDs on and off on the EDU05 board.



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