CY3242-IOXlite

I2C Port Expander Lite Demo Kit Getting Started Guide

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Getting Started with the I2C Port Expander Lite Demo Kit

Associated Project: Yes

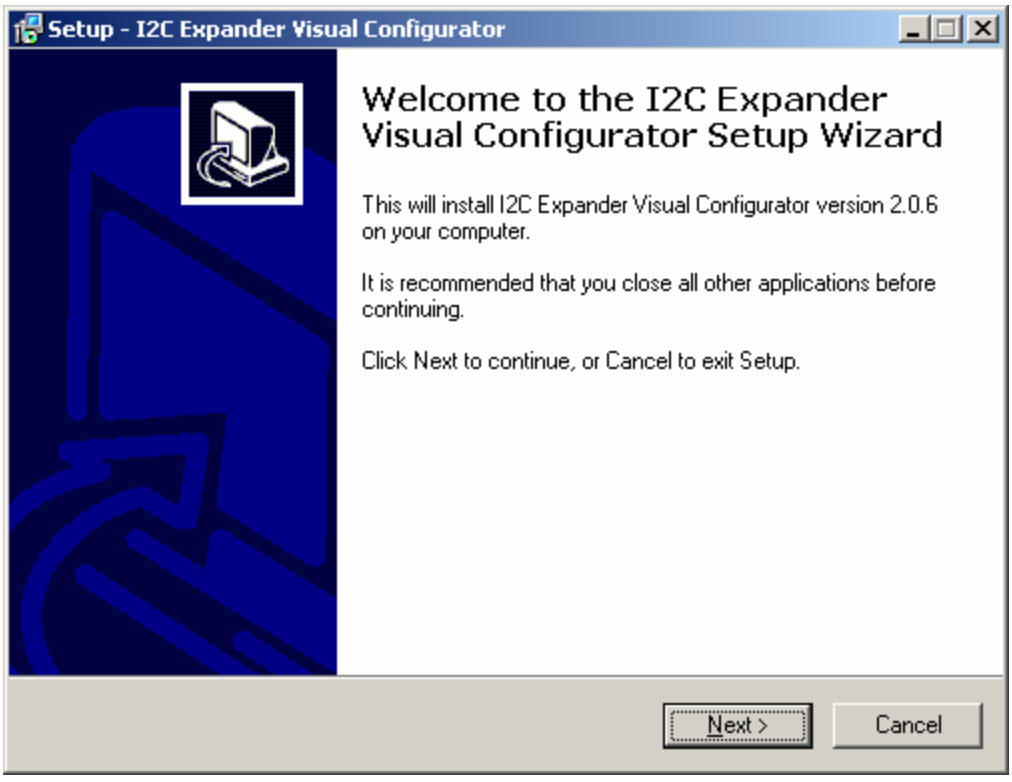
Associated Part Family: CY8C9520A

Software Version: PSoC Designer™ V4.3

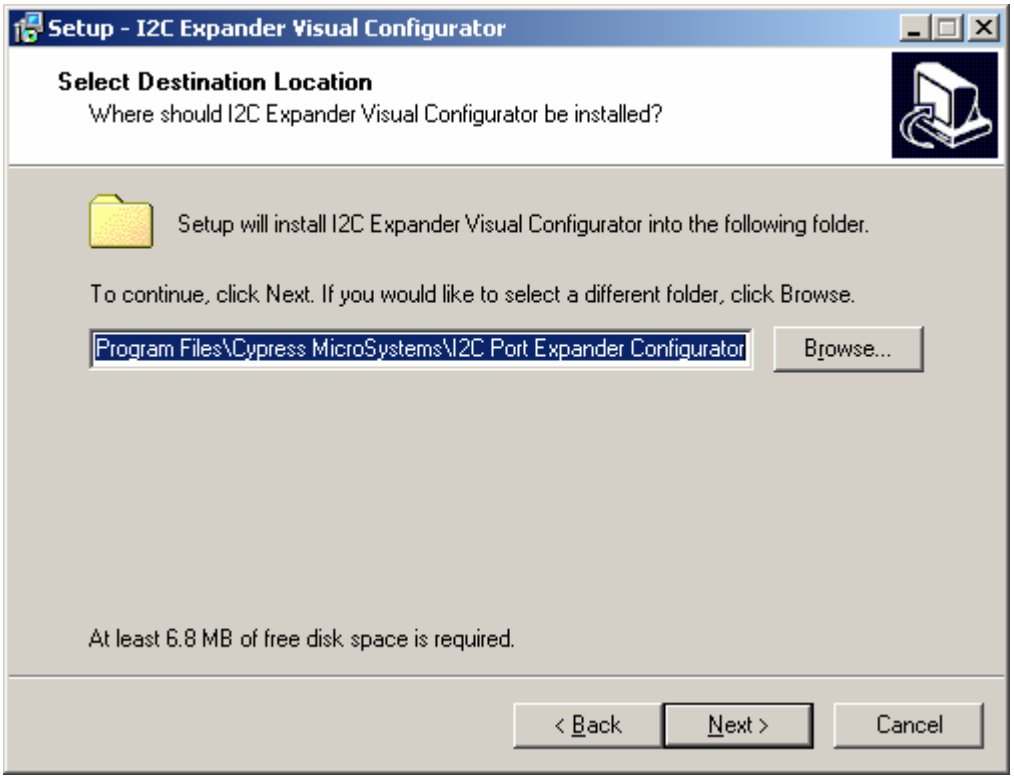
Associated Application Notes and Kits: AN2352, CY3242-IOX, and CY3240-I2USB

Step 1. Expander Configuration Software Installation

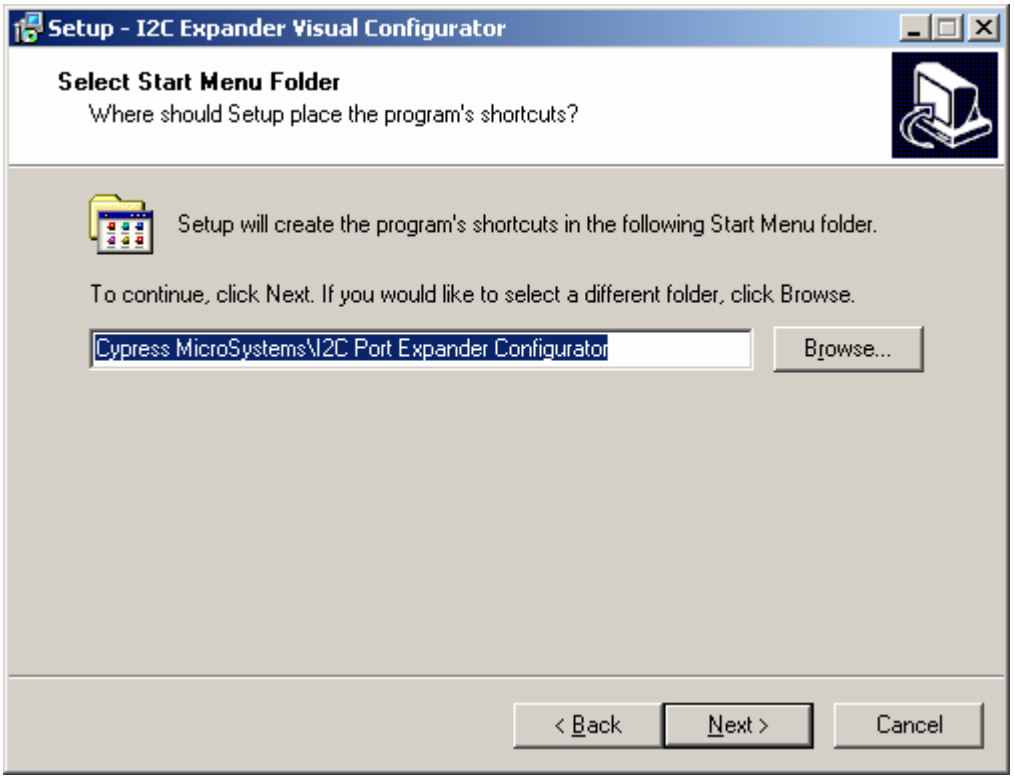
1. Insert CD into CD-ROM drive.
2. Run “ExpanderConfigSetup.exe.”
3. Click the **Next** button.



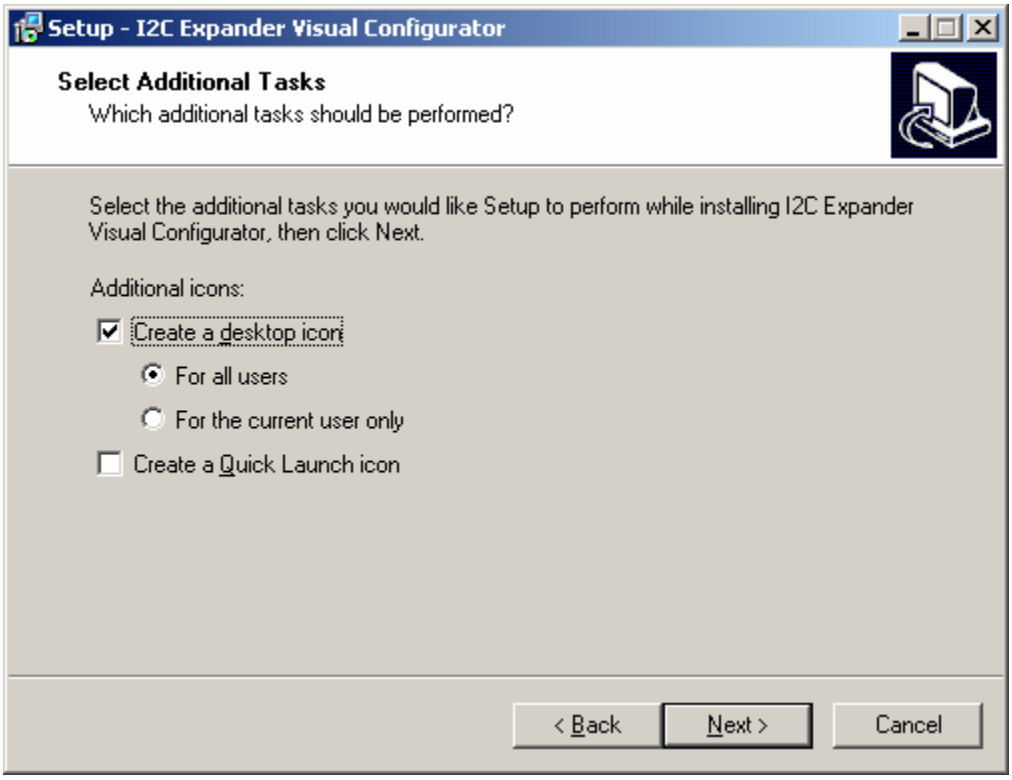
4. Specify software destination. Click the **Next** button.



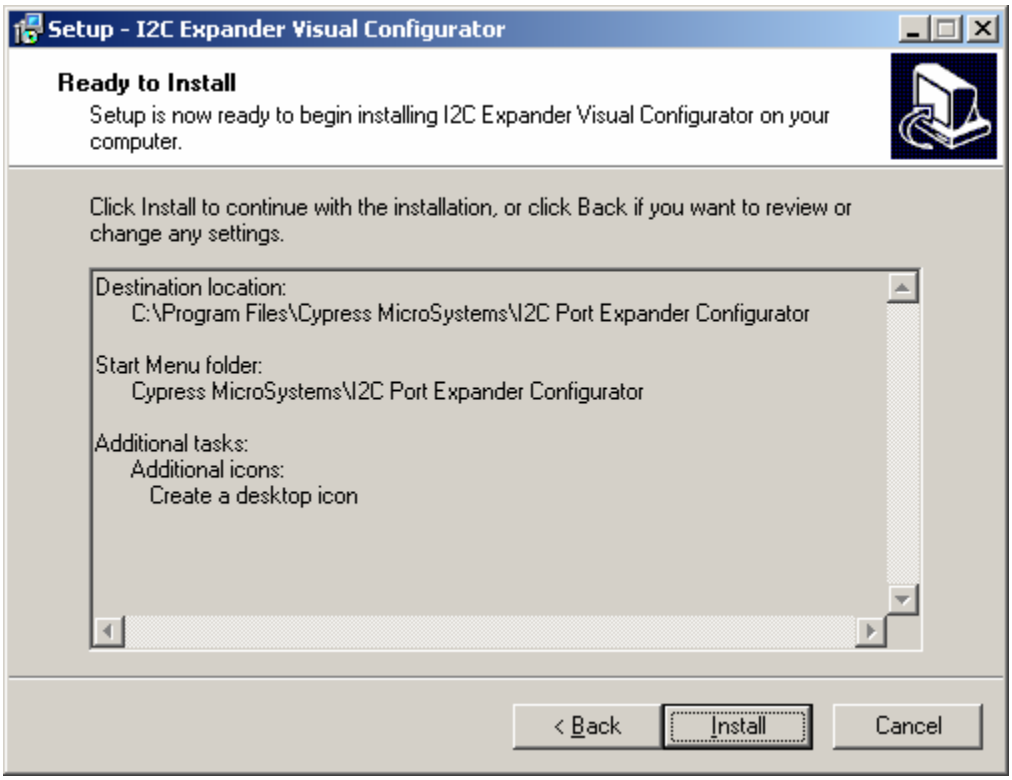
5. Select the Start Menu folder. Click the **Next** button.



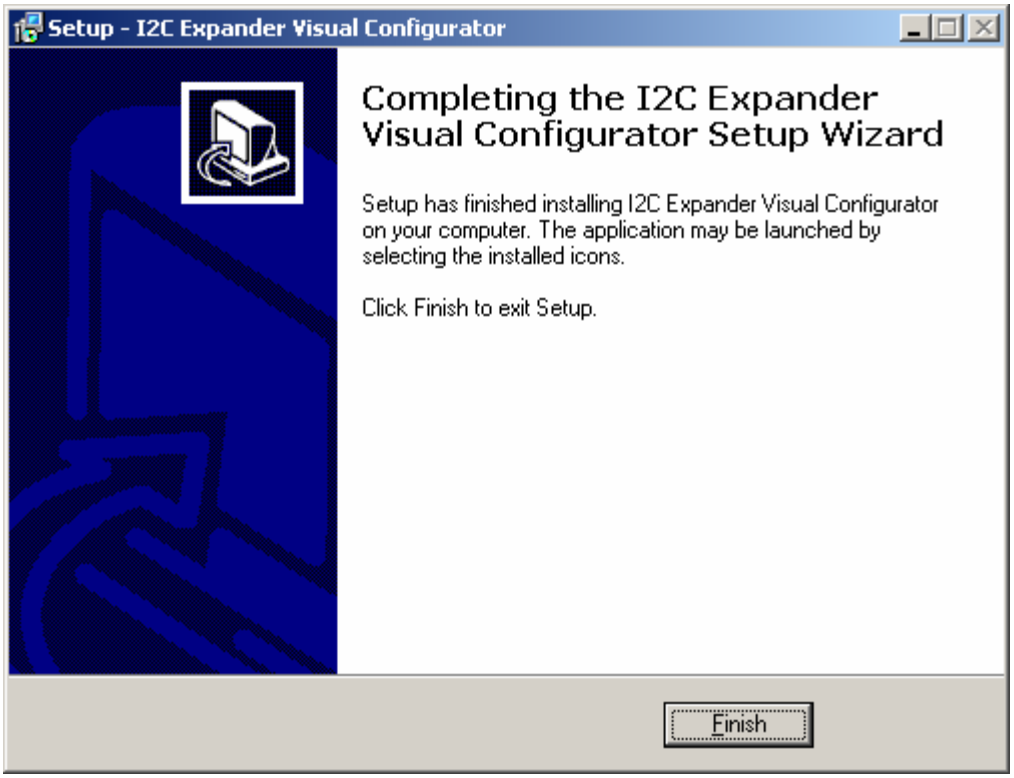
6. Select installation options.



7. Confirm installation settings. If everything is fine, click **Install**.



8. Wait until program installation finishes. Click the **Finish** button.



Installation is complete. The Program icon is located under Start Menu >> Programs >> Cypress MicroSystems… by default.

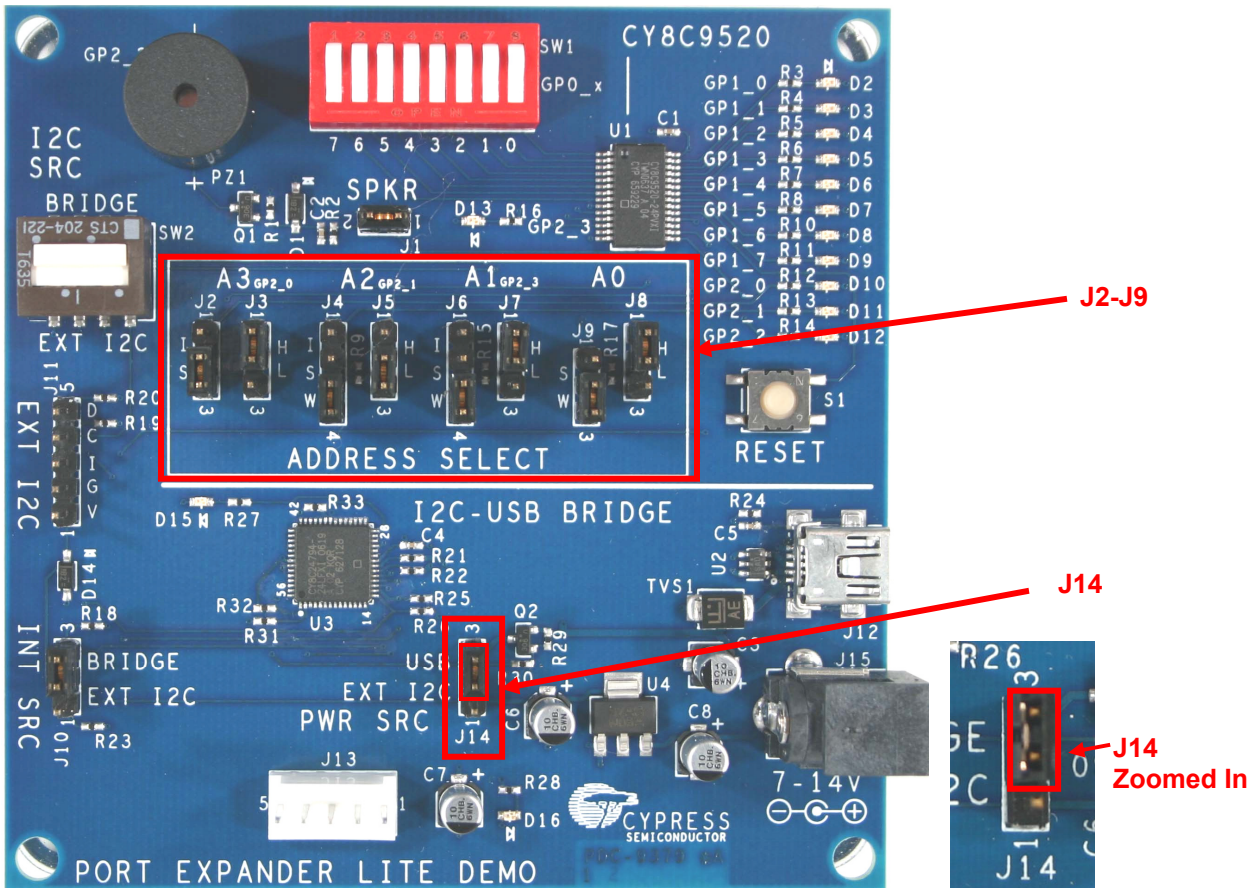
The remainder of this quick start guide outlines creating an example project, configuring the hardware, setting up and generating a project in the Expander Configuration software, and downloading the project to the target device.

The example project uses the Port Expander CY8C9520 device with I2C address 0x2B. It shows how to obtain two timing signals with frequencies 1 Hz and 4 Hz at pins GP1_0 and GP1_1, respectively. The EEPROM will contain the familiar string, “Hello world!” at address 0x0000.

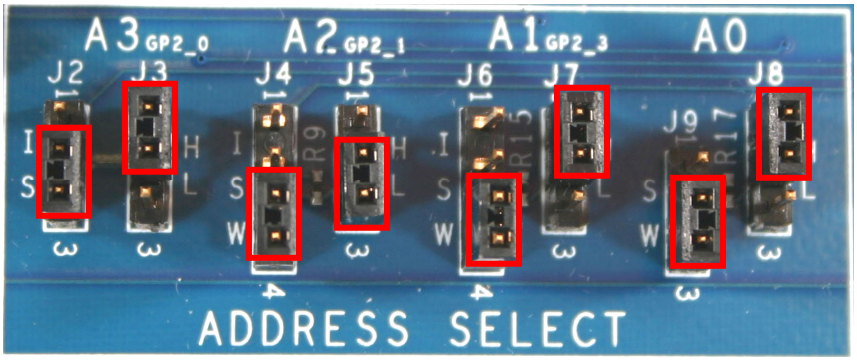
Step 2. Hardware Configuration

1. Remove the Port Expander Lite demonstration board from the kit box.

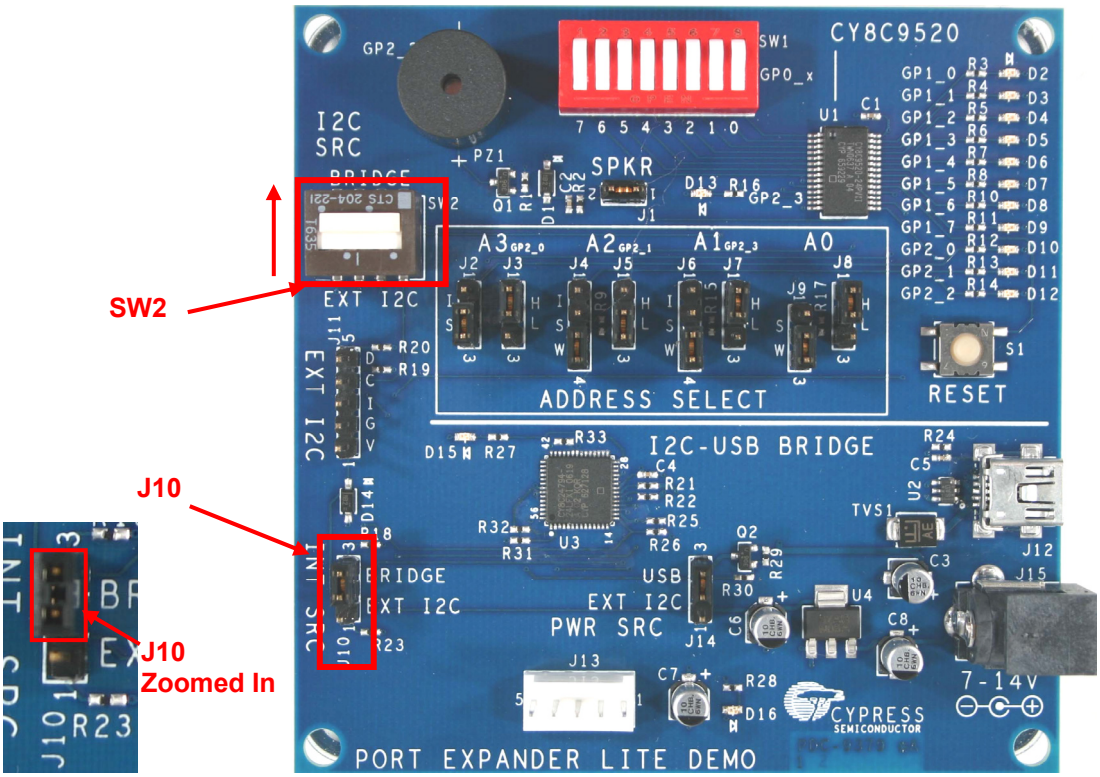
2. Select power source. The demonstration board can be powered by one of three independent power sources: an external 7-14V DC supply via a linear regulator, a regulated 3.3-5V supply by connection to J11, or 5V power supply from a PC via the USB cable. This example will use the third option, which requires J14 to be set in the 2-3 position, as shown in the photo below.



3. Set I2C Port Expander device address to 0x2B. Use the eight dedicated jumpers, J2-J9, to set the device address. The settings of these jumpers are shown below. Note that the corresponding EEPROM device address is 0x5B.



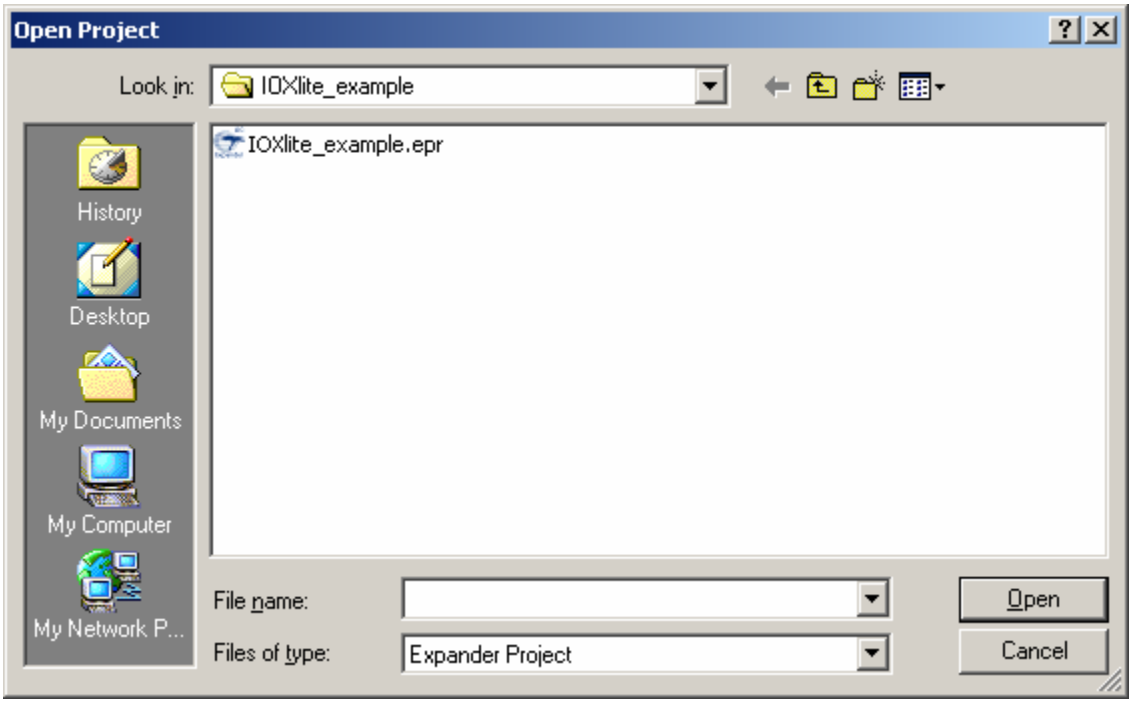
4. Be sure that jumper J10 and switch SW2 are set as shown below.
5. Connect the USB cable to the PC and the board as shown below. Once the connection is made, the green LED, D15, will light up. The red power LED, D16, should also light.



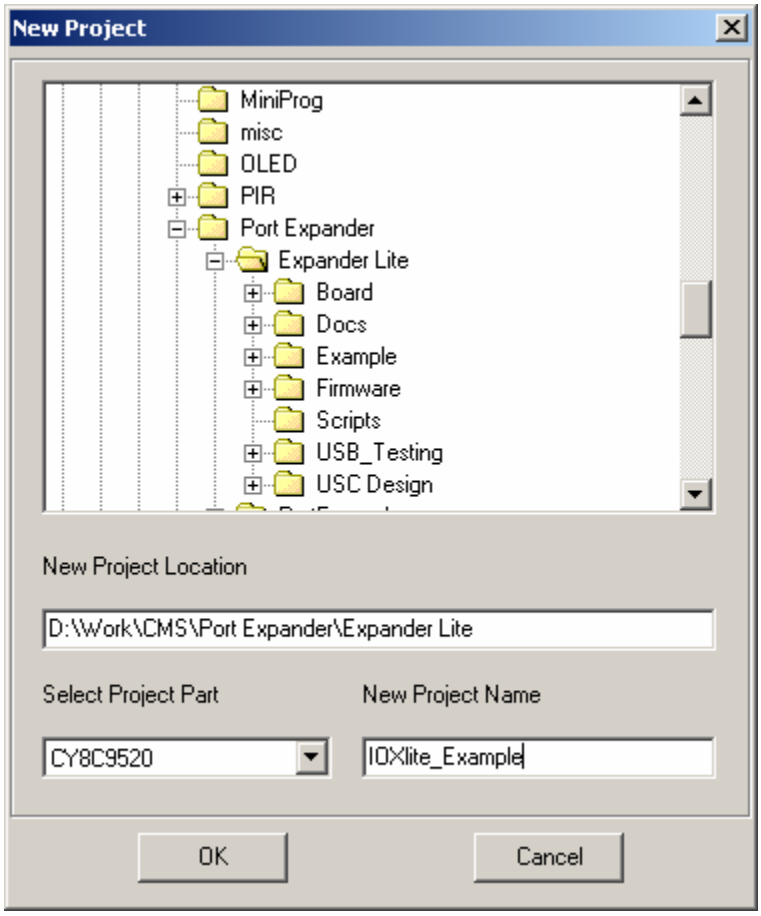
Hardware configuration is now complete.

Step 3. Software Configuration

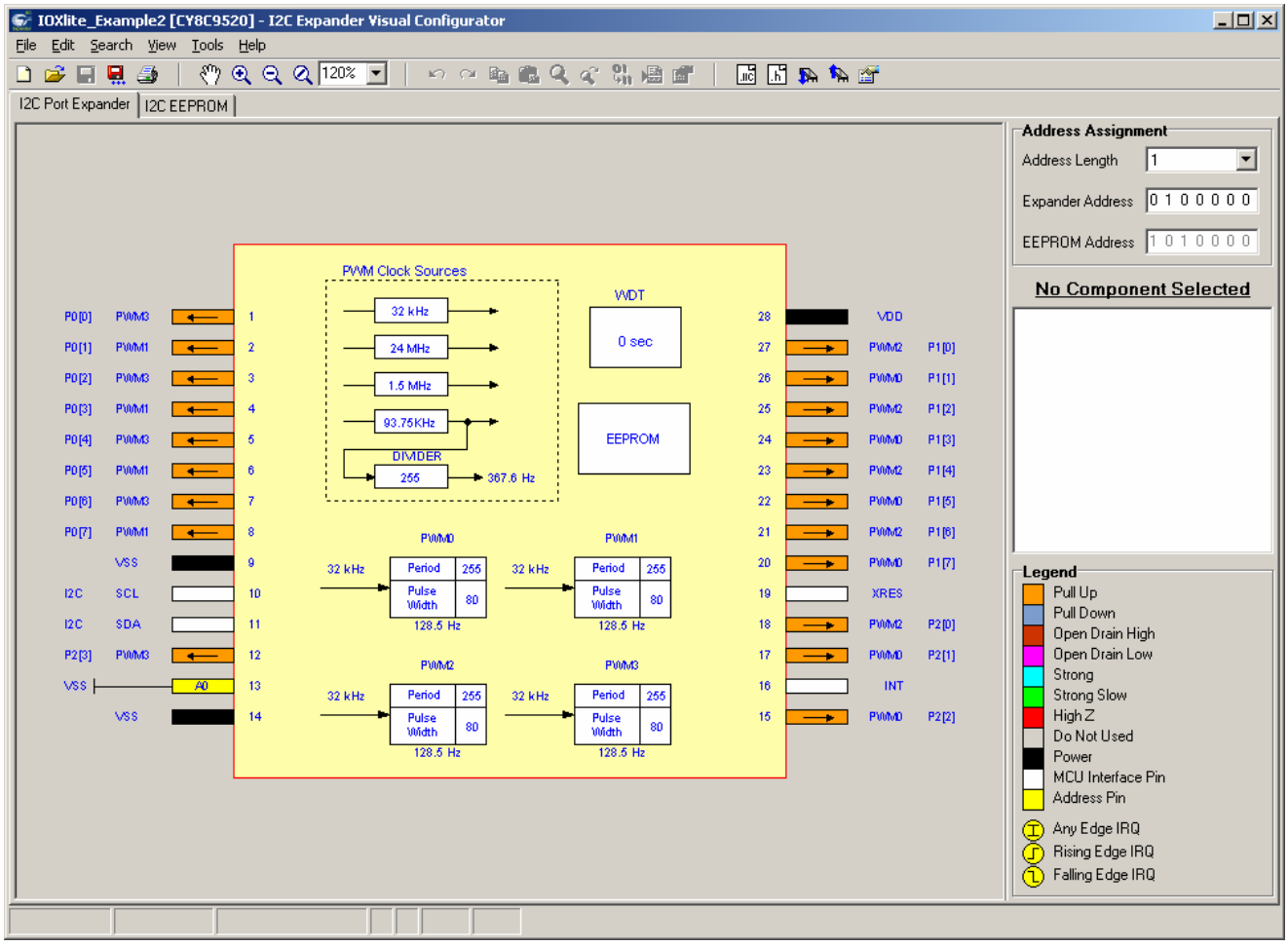
1. Open an existing or create a new Expander Configuration software project (the software was installed in Step 1). The software program icon is located under Start Menu >> Programs >> Cypress MicroSystems. To open an existing project, click the menu item File >> Open Project. In the Open Project dialog box select your project and click the Open button.



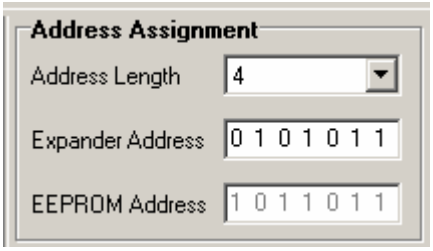
Or, to create a new project, click the menu item File >> New Project. In the New Project dialog box specify project location, part type and project name. Click the **OK** button.



You will then see a workspace similar to the image below. The I2C Port Expander window shows all internal resources of the target device. The I2C EEPROM window shows an image of the EEPROM data.



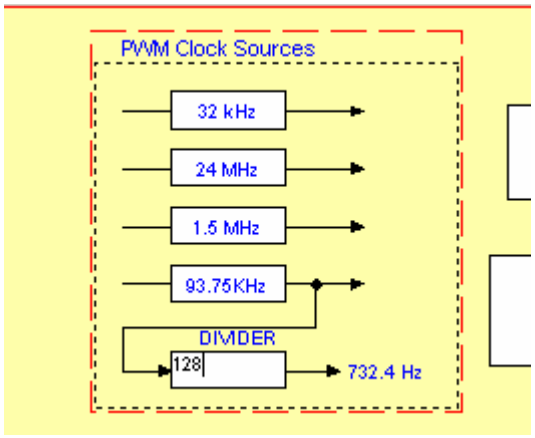
2. Set the Port Expander address. To do this, click the I2C Port Expander tab. In the Address Assignment Section (upper-right corner), specify address length and expander address. Note that the EEPROM device address is automatically defined, and not accessible for user editing. Assign address length to 4 pins and define expander address as 0101011 (0x2Bh). The corresponding EEPROM device address is 1011011 (0x5Bh).



3. Configure Port Expander internal resources. To do this we must generate two output signals on pins P1[0] and P1[1]. The signal frequencies are 1 Hz and 4 Hz, respectively. For this purpose we utilize three PWMs, and two pins and the clock divider resources. Also, the EEPROM must contain the "Hello world!" text string placed at address 0x0000. Follow these steps:

   a. Click the PWM Clock Sources on the device image to select it. The relevant resource properties are shown in the Properties window.

   b. Enter DIVIDER value equal to 128. This can be done either in the Properties window or directly on the DIVIDER space of PWM Clock Sources.



   c. Click on the PWM0 resource and define its properties as follows:

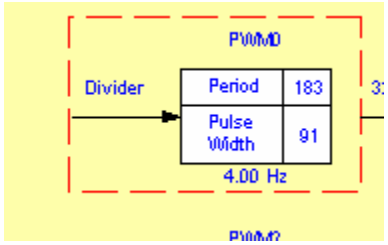
      Clock: cv_Divider

      IntLogic: Falling_Edge

      Period: 183

      PulseWidth: 91

      Note that the Clock, Period and PulseWidth properties can be defined directly in the corresponding areas of PWM0 resource.



   d. Click on the PWM1 resource and define its properties as follows:

      Clock: cv_PrevPWM

      IntLogic: Falling_Edge

      Period: 2

      PulseWidth: 1

e. Click on the PWM2 resource and define its properties as follows:

Clock: cv_PrevPWM

IntLogic: Falling_Edge

Period: 2

PulseWidth: 1

f. Select P1[0] and P1[1] pins by holding the [**Shift**] key down and clicking the corresponding pin images. Some editing can be done at this time in the Properties window. Configure the selected pin properties as follows:

Data: High

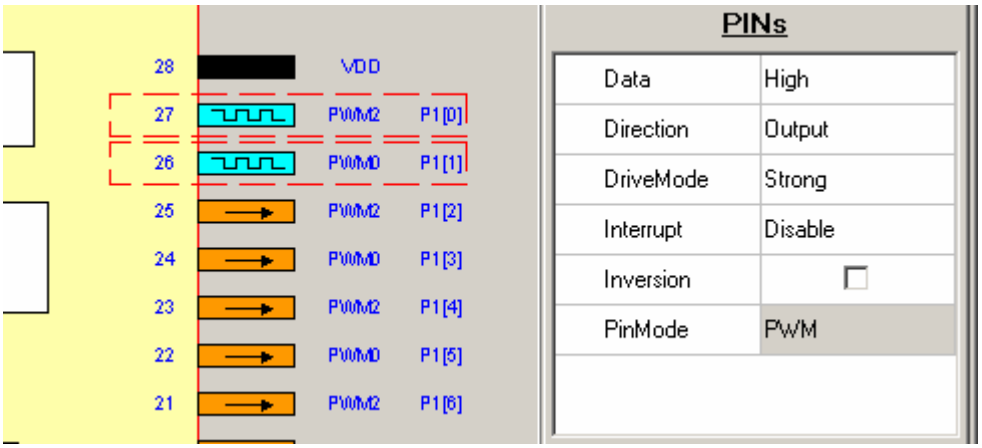
Direction: Output

DriveMode: Strong

Interrupt: Disable

Inversion: Not Checked (Disable)

PinMode: PWM



g. Enable the switch inputs

Select all of the P0[x] pins by dragging a box around them in the window, or by using the <SHIFT> key. Set them all to:

Data: Low

Direction: Input

DriveMode: Pull-down

Interrupt: Disable

Inversion: Not Checked (Disable)

PinMode: GPIO

h. Turn off the other LEDs

Select all the unused P1[x] and P2[x] pins and set them to:

Data: Low

Direction: Output

DriveMode: Strong

Interrupt: Disable

Inversion: Not Checked (Disable)

PinMode: GPIO

i. Enable the EEPROM

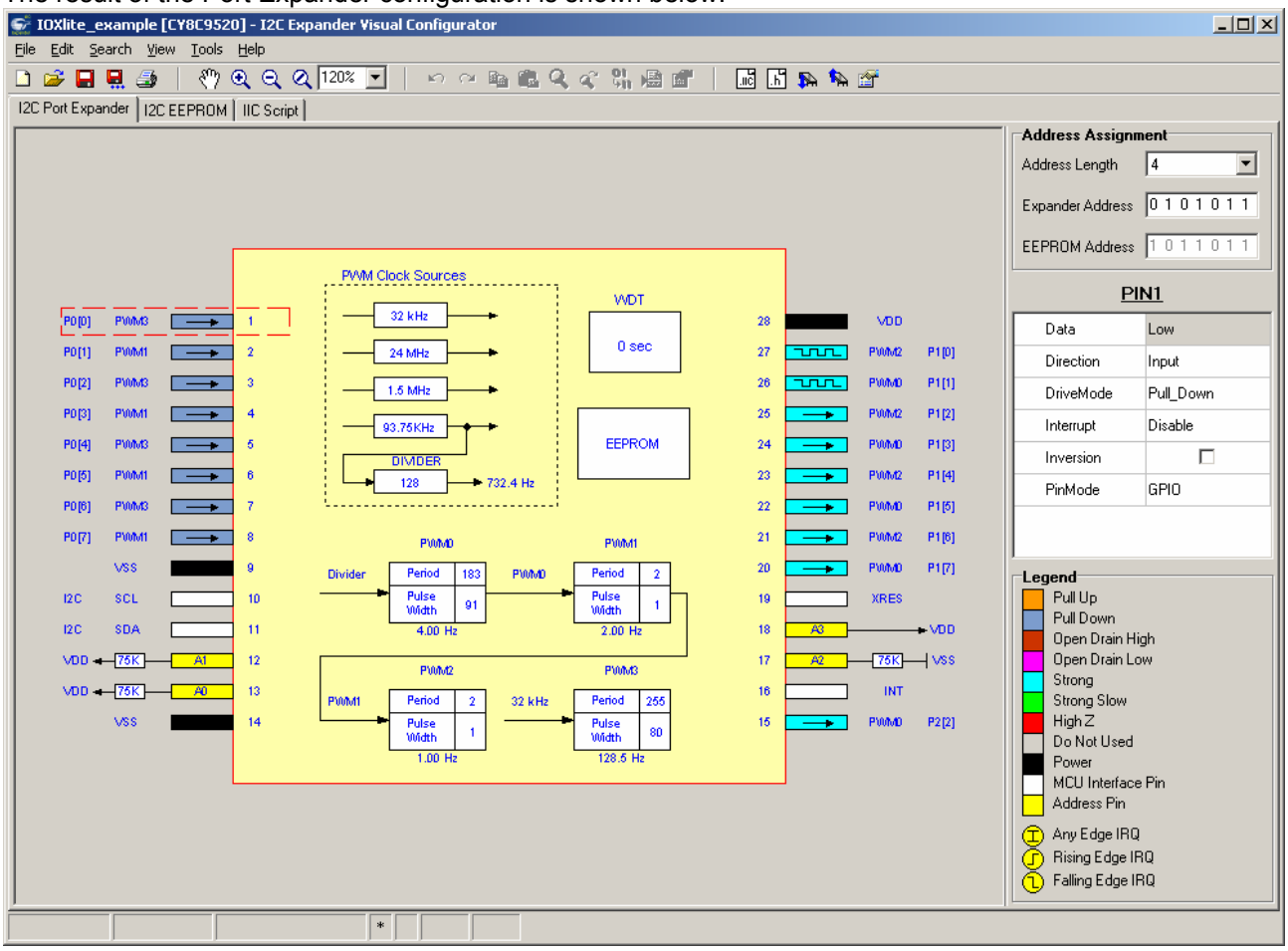
Click on the EEPROM block and set the options using the Properties Window:

EnableEEPROM: Checked

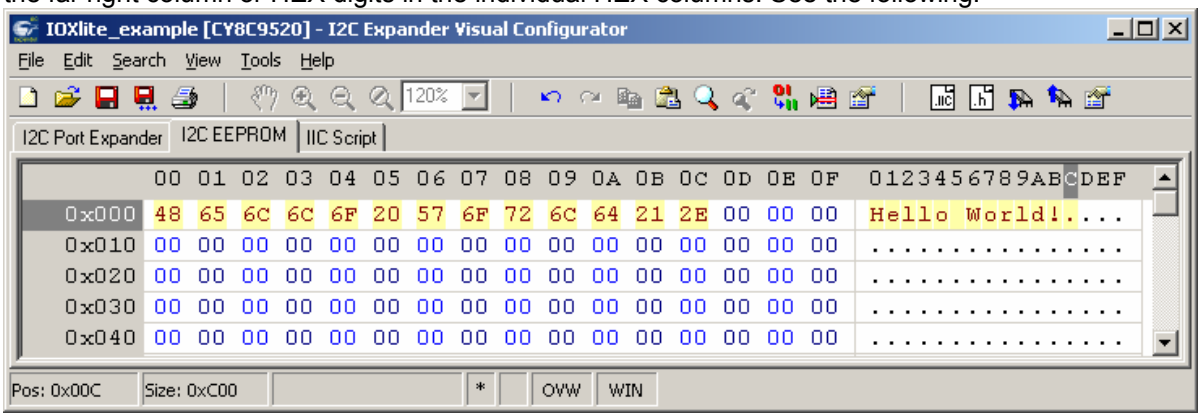
ReadOnly: Unchecked

WriteDisablePin: Unchecked

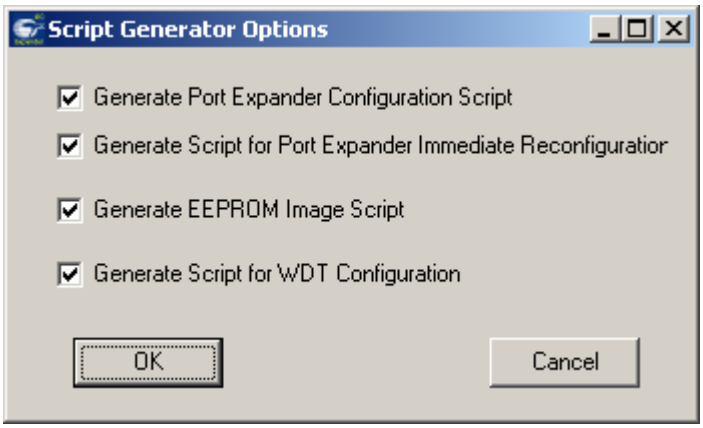
The result of the Port Expander configuration is shown below:



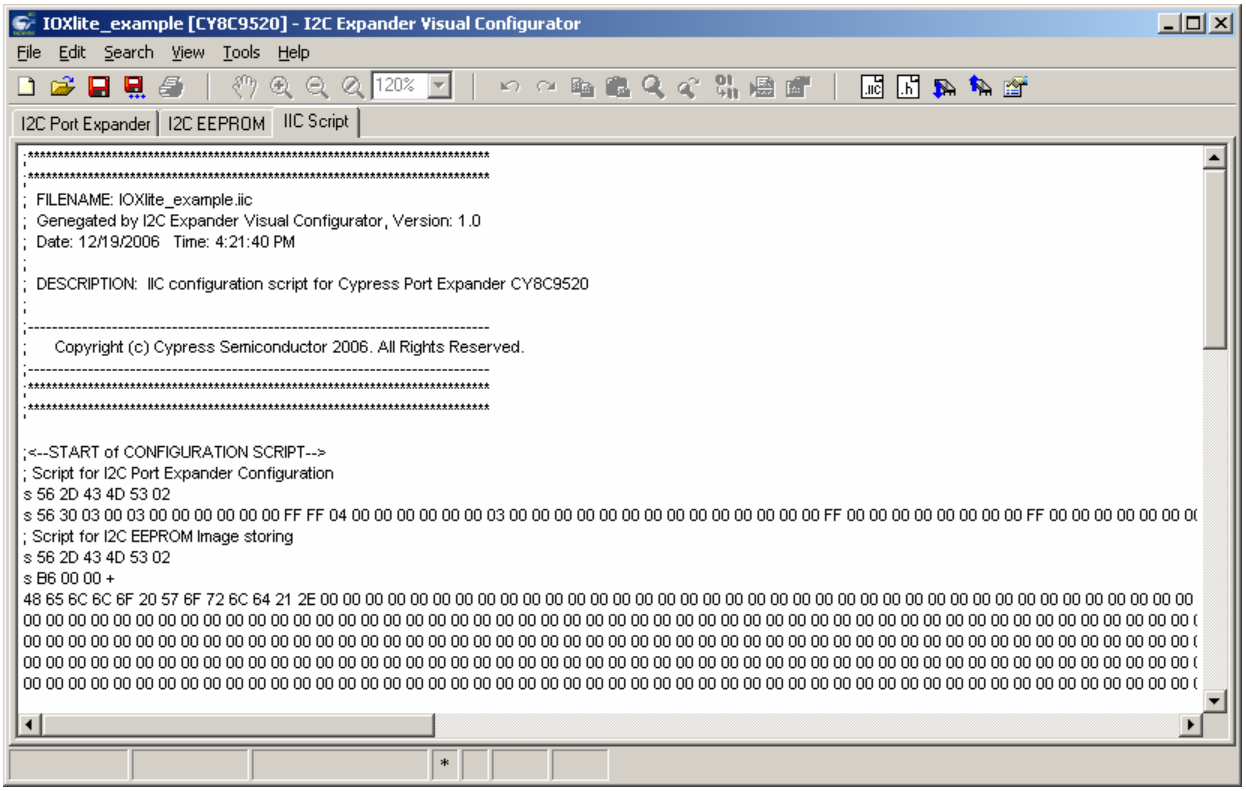
4. Define EEPROM image addresses/text string. Click the I2C EEPROM tab. You can type characters in the far right column or HEX digits in the individual HEX columns. See the following:

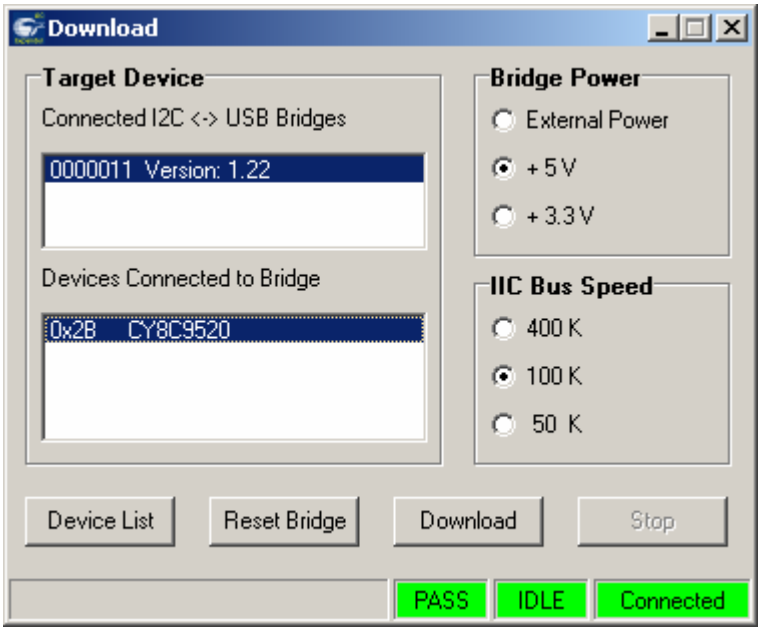


5. Set configuration script options. To set the options, click the menu item Tools >> Script Generator Options. In the Script Generator Options dialog box (shown below) click a check in all options to generate a full configuration script. Click **OK**.



6. Generate configuration script. To generate the configuration script, click the menu item Tools >> Generate Configuration Script File. Once generation is complete, the script is located in the project folder and has the same name as the project and “iic” extension, for example, *FirstExpanderProject.iic*.


IOXlite_example [CY8C9520] - I2C Expander Visual Configurator
File Edit Search View Tools Help
120%
I2C Port Expander
I2C EEPROM
IIC Script
; FILENAME: IOXlite_example.iic
; Genegated by I2C Expander Visual Configurator, Version: 1.0
; Date: 12/19/2006 Time: 4:21:40 PM
; DESCRIPTION: IIC configuration script for Cypress Port Expander CY8C9520
; Copyright (c) Cypress Semiconductor 2006. All Rights Reserved.
;<--START of CONFIGURATION SCRIPT-->
; Script for I2C Port Expander Configuration
s 56 2D 43 4D 53 02
s 56 30 03 00 03 00 00 00 00 00 FF FF 04 00 00 00 00 00 00 03 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 00 00 00 00 00 00 00 FF 00 00 00 00 00 00
; Script for I2C EEPROM Image storing
s 56 2D 43 4D 53 02
s B6 00 00 +
48 65 6C 6C 6F 20 57 6F 72 6C 64 21 2E 00 00 00 00 00 00 00 00 00 00 00 00 00 00



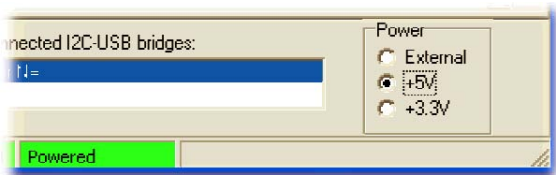
Step 4b Download Configuration using the I2C-USB Bridge GUI

If this software is not installed, you will need to install it in order to download the script and program the target device. For details, refer to the *I2C-USB Bridge Quick Start Guide*. Following is a simplified version of the instructions:

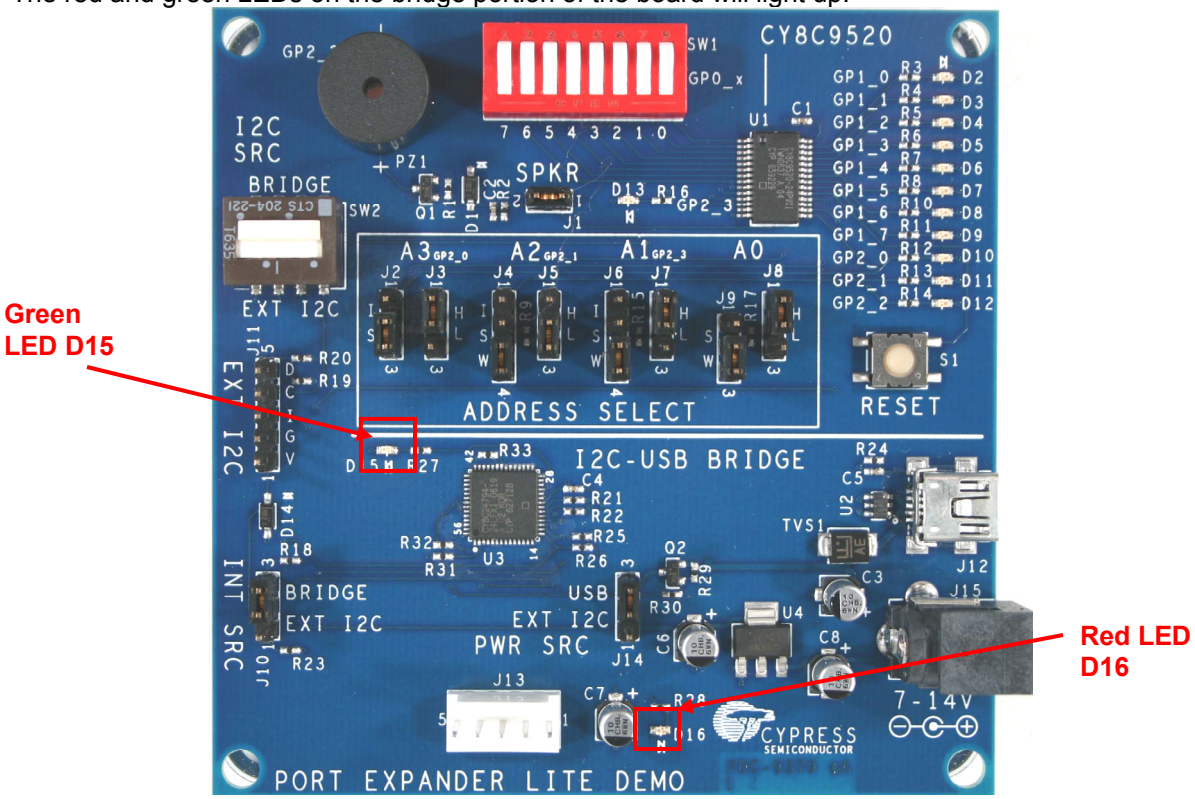
1. Run the “I2C-USB Bridge” software program.



2. Select +5V to supply the Port Expander board with power from the bridge board.

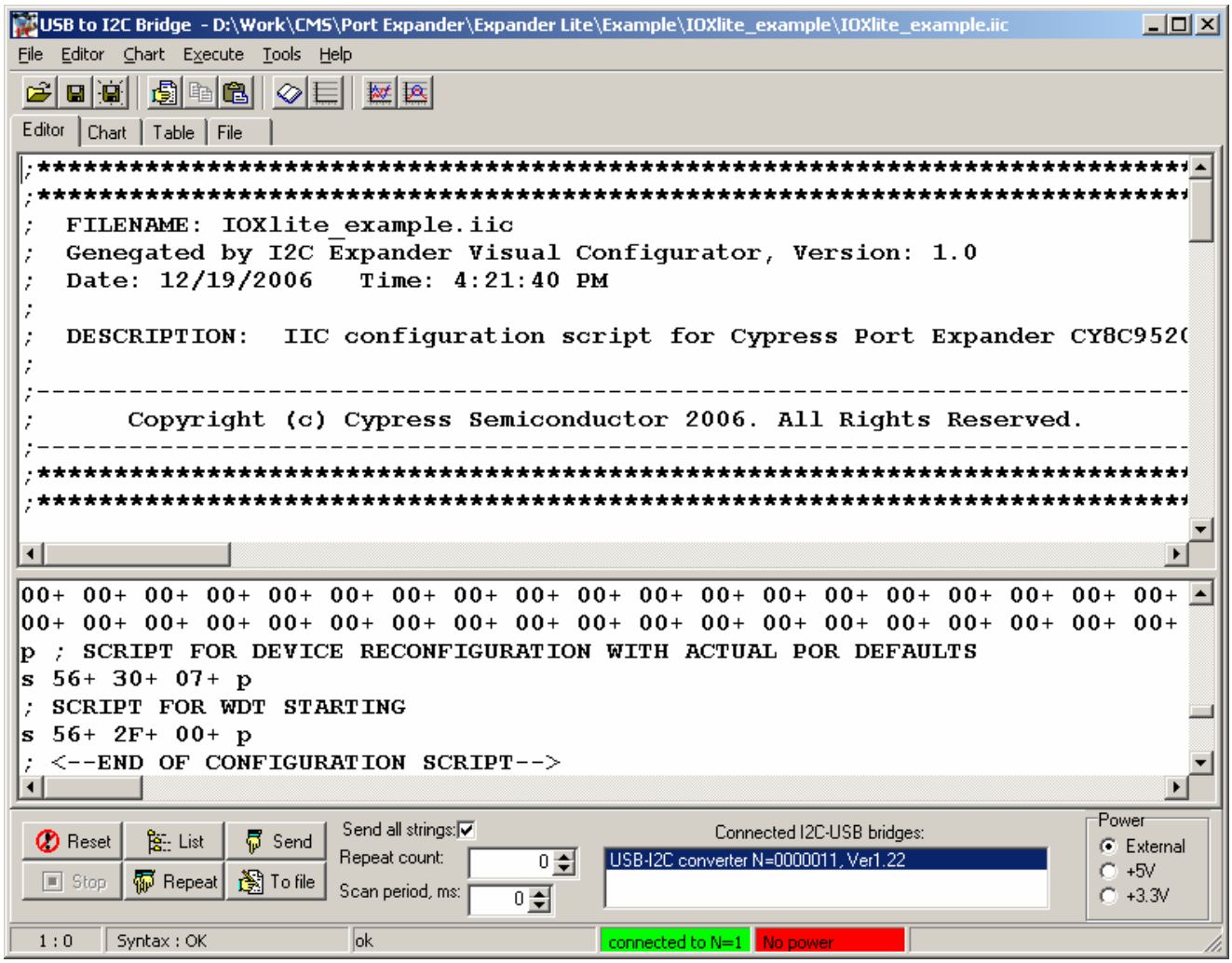


The red and green LEDs on the bridge portion of the board will light up.



3. Click the 

button and make sure that the corresponding device (CY8C9520) with address 0x2B is connected.
4. Click the  button. Load the *.iic* file you created in the last step.
5. Click a check in the "Send all strings" field.
6. Click the **Send** button.



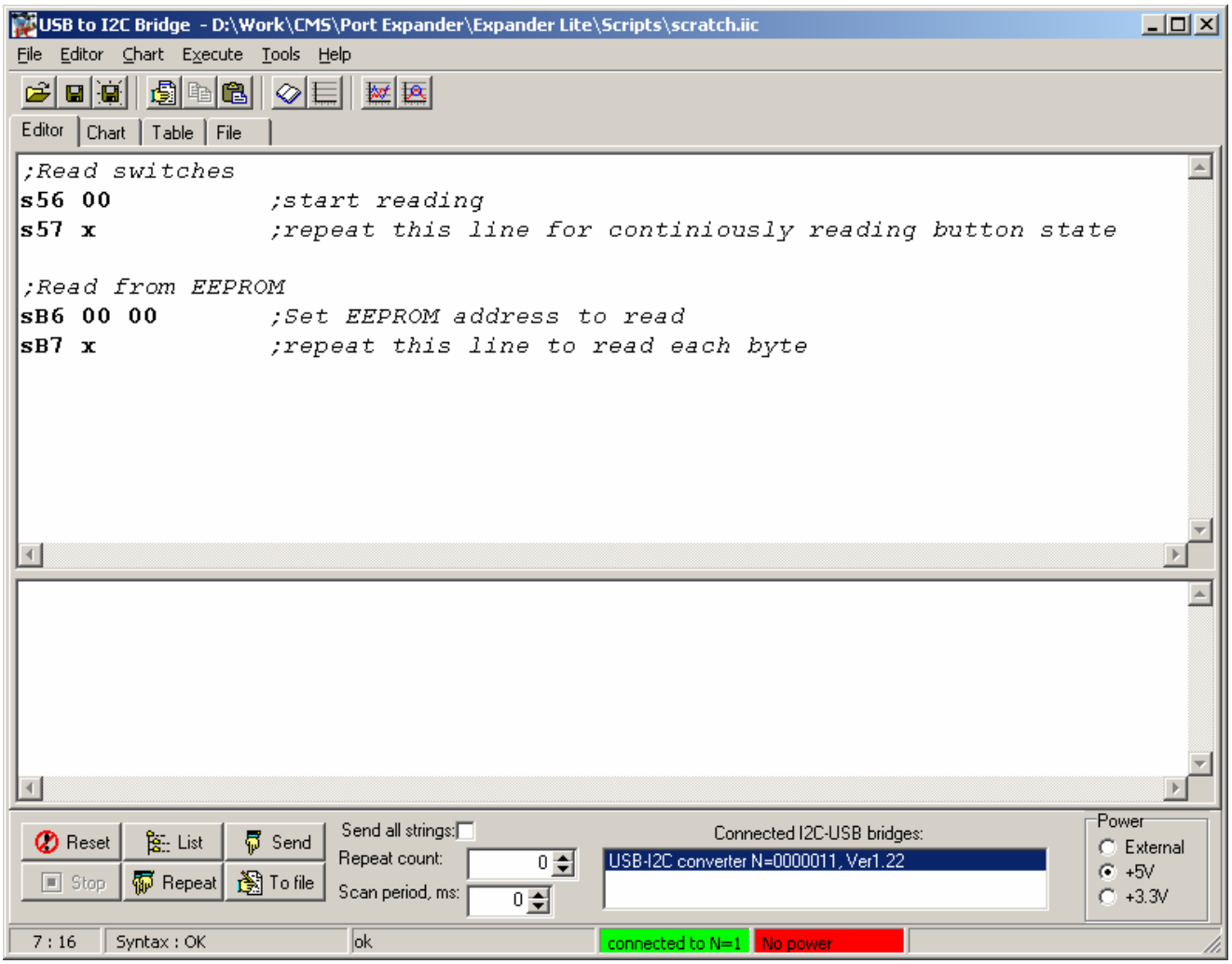
Step 5. Your first project is finished.

If everything was done correctly, there will be 1 Hz and 4 Hz frequencies on pins P1[0] and P1[1] and the corresponding LEDs should be blinking. Also, the EEPROM will contain the "Hello World!" string. This can be verified using the I2C-USB Bridge GUI by sending the following command strings.

```
;Read from EEPROM
sB6 00 00                ;Set EEPROM address to start reading
sB7 x                    ;repeat this line to read each byte
```

The switch operation can be verified using the following command strings.

```
;Read switches
s56 00                   ;start reading
s57 x                    ;repeat this line to read the switch state
```


USB to I2C Bridge - D:\Work\CMS\Port Expander\Expander Lite\Scripts\scratch.iic
File Editor Chart Execute Tools Help
Editor Chart Table File
;Read switches
s56 00 ;start reading
s57 x ;repeat this line for continiously reading button state
;Read from EEPROM
sB6 00 00 ;Set EEPROM address to read
sB7 x ;repeat this line to read each byte
Reset List Send
Stop Repeat To file
Send all strings:
Repeat count: 0
Scan period, ms: 0
Connected I2C-USB bridges:
USB-I2C converter N=0000011, Ver1.22
Power
External
+5V
+3.3V
7 : 16
Syntax : OK
ok
connected to N=1
No power