OVERVIEW

This Application Note shows you how to:

- Connect the Cypress EZ-USB Development Board to the PC and start the Keil Monitor-51.
- Verify that the Cypress EZ-USB Development Board works and download a sample test application.
- configure Keil µVision2 to download user code to the Cypress EZ-USB Development Board.

PREPARE YOUR PC FOR THE EZ-USB BOARD

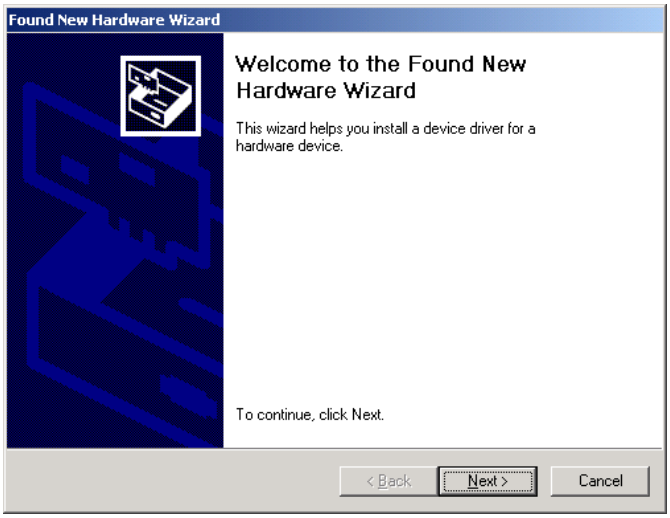
The following section describes the steps that need to be performed for debugging with µVision2 debugger.

The EZ-USB board comes with complete USB drivers for the PC. If you want to debug your application code with the Keil Monitor-51 you should copy the following files to a floppy disk and locate this in to drive A:

- Cypress\USB\Drivers\EZMON\Lib\I386\Checked\EZMON.SYS
- Cypress\USB\Drivers\EZUSBDRV\Lib\I386\Checked\EZUSB.SYS
- Cypress\USB\Drivers\EZUSBW2K.INF

When you conn0ect the EZ-USB board to the PC via the supplied standard USB cable, your computer should display the following message:

Since there is no existing driver for the EZ-USB board on your computer, Windows starts the Found New Hardware Wizard.

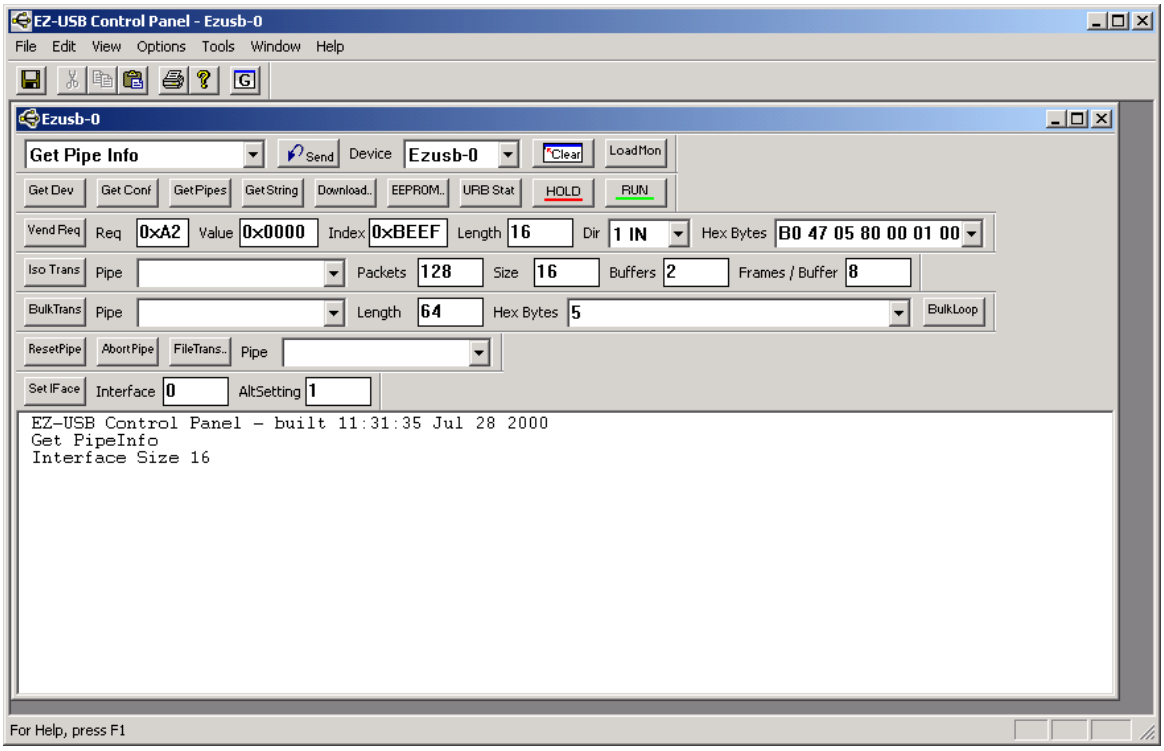


Then you select the floppy disk drive A: as source for the driver files.

EXAMPLE CYPRESS PROJECT

After you have connected the EZ-USB board to the PC, you may check if the sample application that is provided with this Application Note works correct. Therefore perform the following steps:

- From the Windows Start menu run Programs – Cypress – USB – EZ-USB Control panel. This should open the EZ-USB Control Panel with **Ezusb-0** as device name. When you send the command **Get Pipe Info** to the board you should get **Interface Size 16** as return message. This is shown in the following picture:

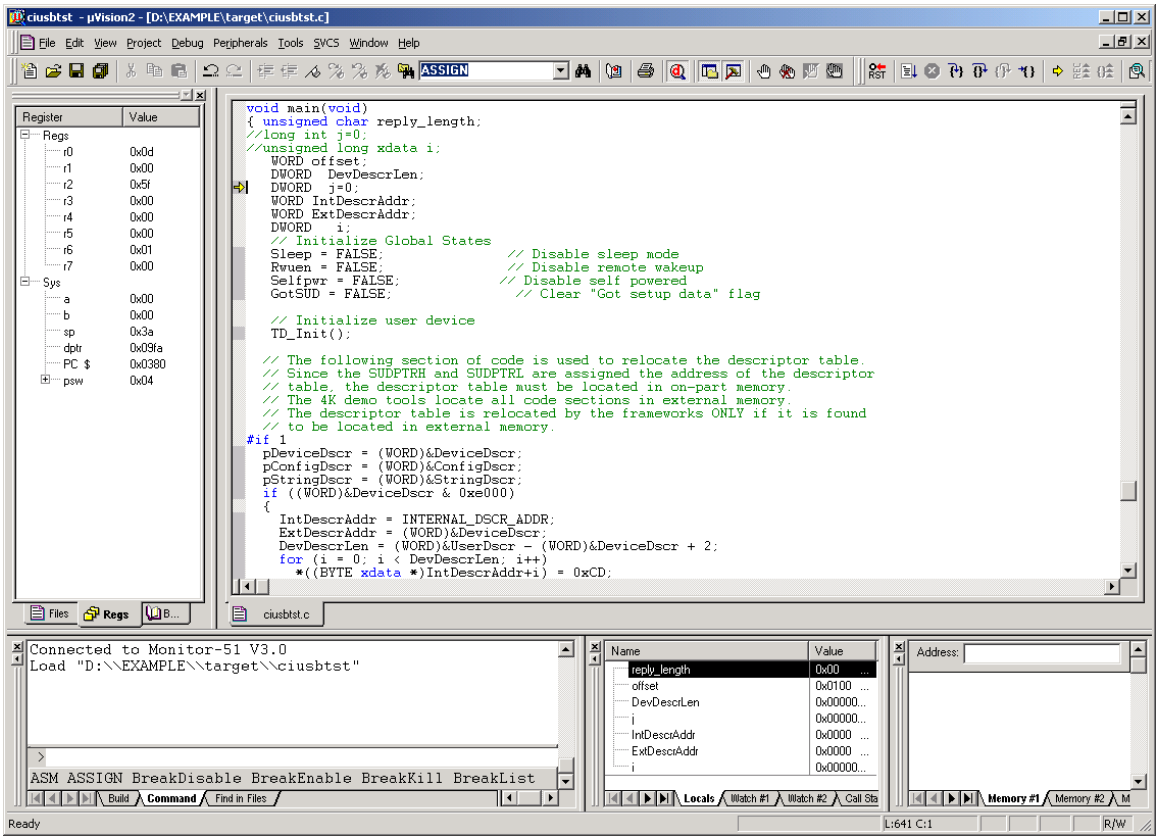


- Connect the SIO-1 connect on the EZ-USB Development Board with a standard 9-pin serial cable to the PC COM1 port.

- Then start Keil µVision2 and open the project **TARGET\CIUSBTST.UV2** that comes with this application note. This sample project allows you to display a single digit on the EZ-USB Development Board.

- With **Project – Rebuild all Target Files** (µVision2 menu) you may check that all development software packages are installed correctly. This generates the example project, but may generate two Warning 16 messages, since some library functions are not used.

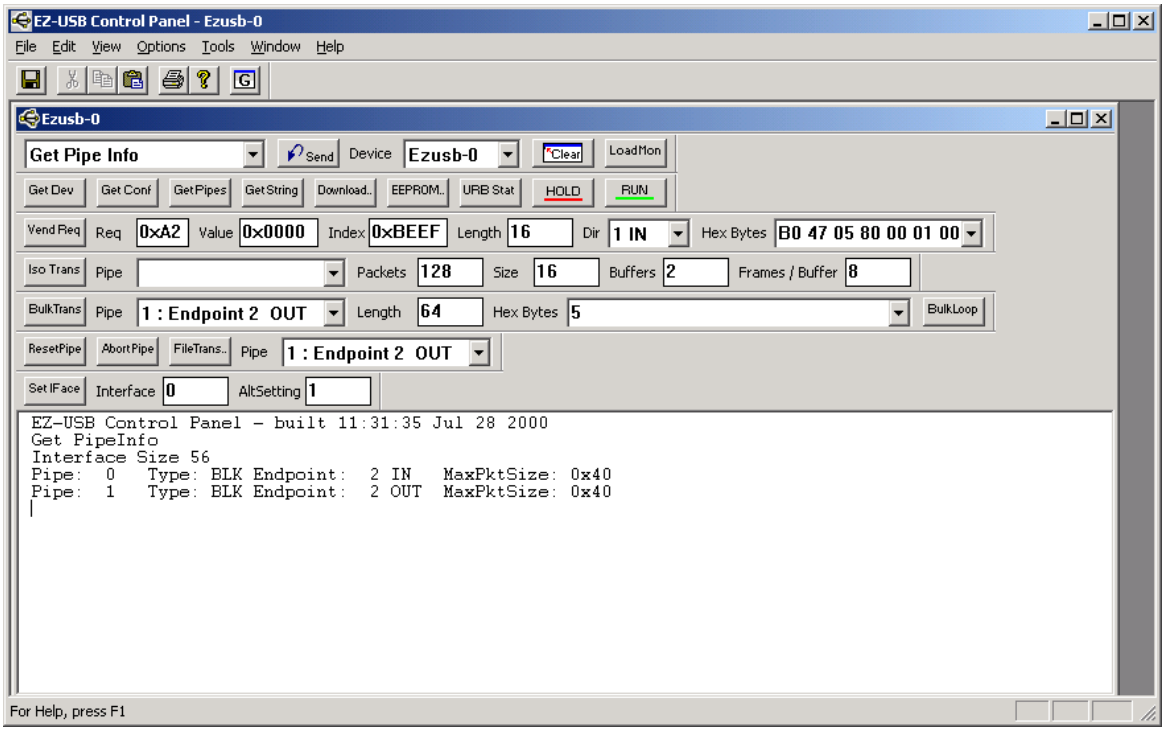
- With **Debug – Start/Stop Debug Session** (µVision2 menu) you can start the µVision2 debugger. (Make sure that you have connected the EZ-USB port via a serial cable as described above!). µVision2 should connect to Monitor-51 and start with the debug screen as shown in the following picture:



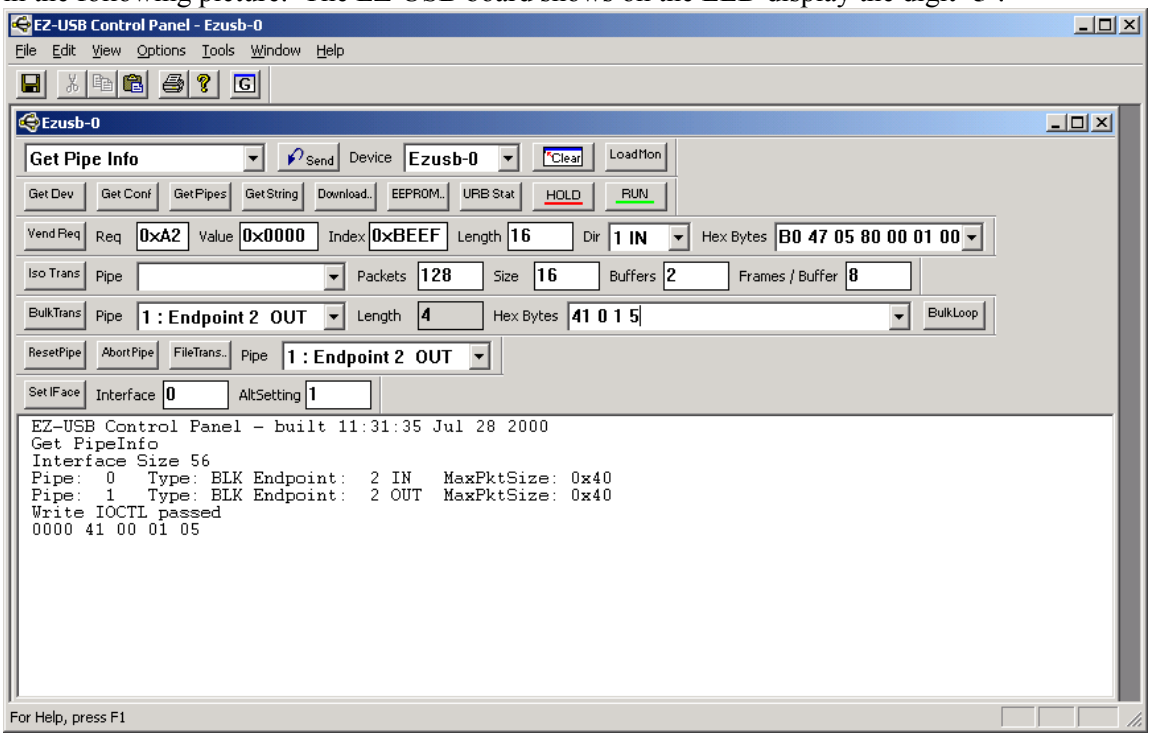
- Start the USB application via the µVision2 menu: **Debug – Go**.

- Microsoft Windows will start again the **Found New Hardware Wizard**. You should perform the same steps and use the same floppy disk as described under PREPARE YOUR PC FOR THE EZ-USB BOARD described above.

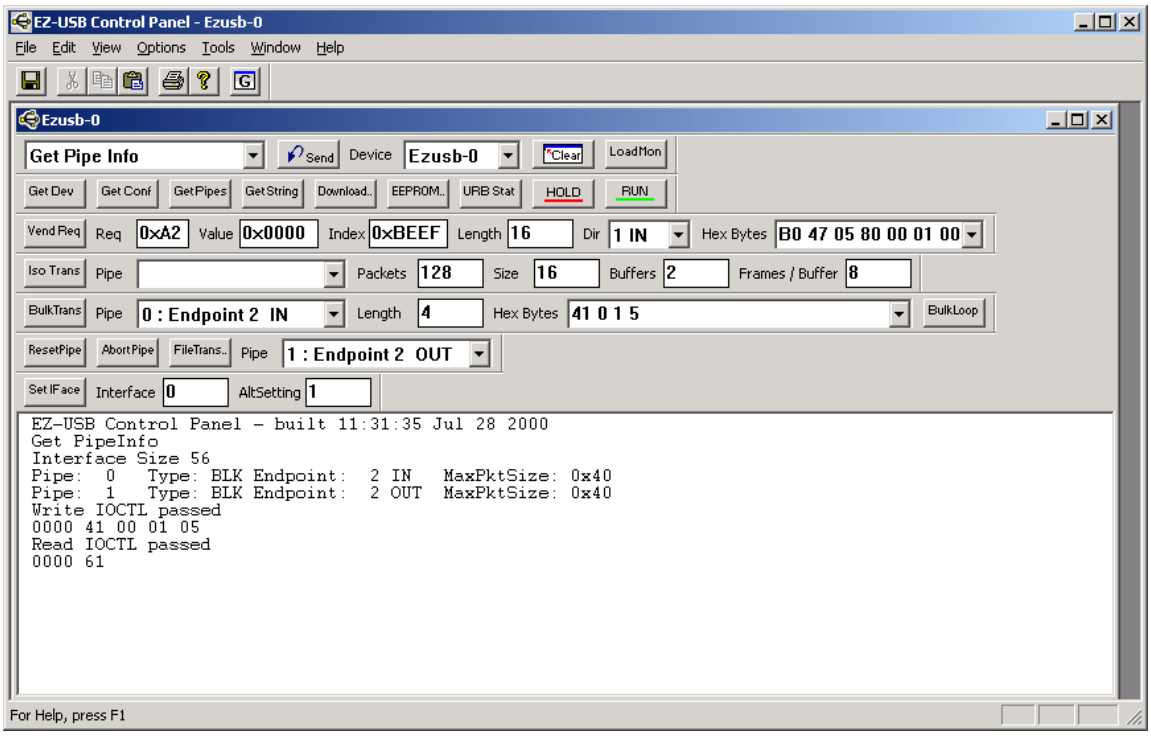
- The renumeration process described in the file DSCR.A51 that is part of the project, the board connects again to the PC. In the EZ-USB Control Panel you can send again the command **Get Pipe Info**. The board should react as in the following picture with the message Interface Size 56…



- Then use the button **BulkTrans** with Pipe 1: Endpoint 2 OUT, Hex Bytes: 41 0 1 5 as shown in the following picture. The EZ-USB board shows on the LED display the digit **'5'**.

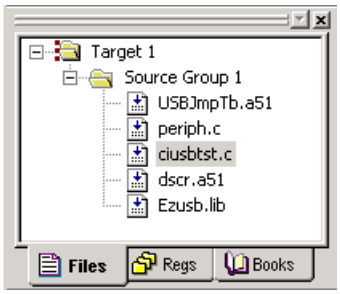


- With the button **BulkTrans** Pipe 1: Endpoint 2 IN the Read IOCTL should display the value 61. This ensures that the command is process correct on the EZ-USB board.



CREATE OWN µVISION2 PROJECTS

The Cypress EZ-USB board comes with a complete firmware example that can be found in the folder Cypress\USB\Examples\EZ-USB\Bulktest\Target. The project file **Bulktest.UV2** might be use as starting point for own USB application programs. You should copy all the files to a new folder.



With **Project – Create New Project** you may create a new firmware project for the Cypress EZ-USB board. Enter your project name and select as device **Cypress Semiconductor, EZ-USB (AN21XX)**. Then you should add all the source files of the original EZ-USB example. We have renamed the original file Bulktest.C to **CIUSBTST.C**. This is the file where you add your application code. The other files need not to be modified.

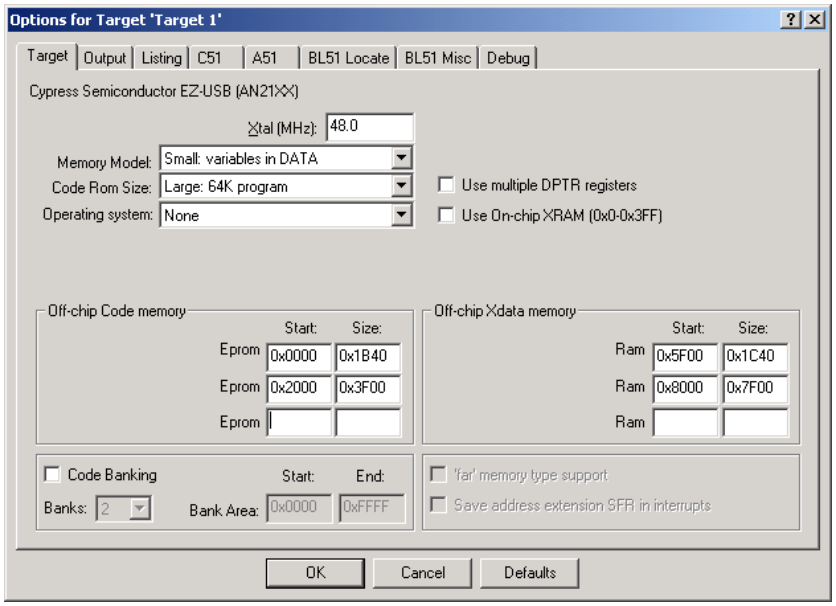
REQUIRED TOOL CONFIGURATION

The following section shows you the tool configuration that is required to generate proper firmware code for the Cypress EZ-USB part.

Dialog: Project – Options for Target – Target
The Cypress **EZUSB.LIB** uses the SMALL memory model. Therefore you need to select as the memory model: **Small: variables in DATA**.

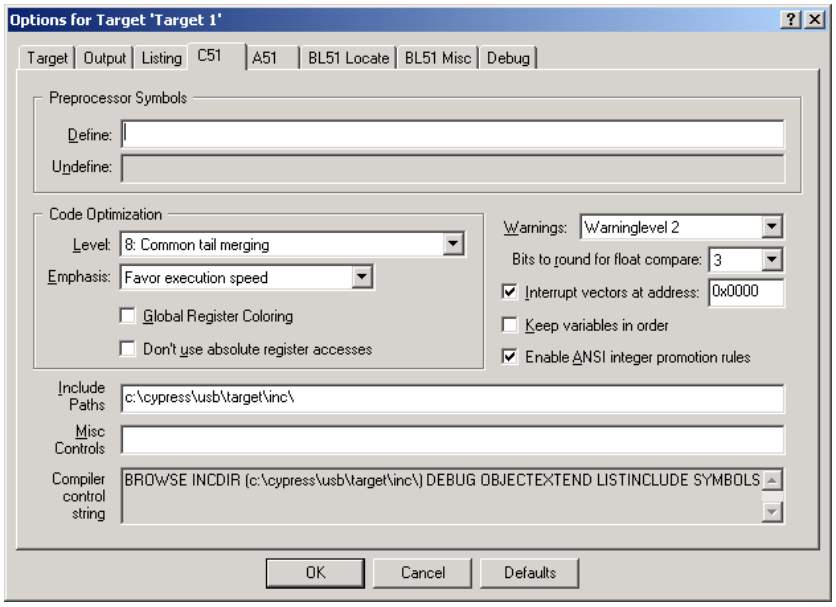
When you debug your application with Monitor-51, you need to configure the Memory Map ***Configuration 11*** as described in the *Cypress Technical Reference Manual, Chapter 5.8 Memory Maps*.

Under **Off-chip memory**, the memory layout of the target system needs to be defined. With ***Configurartion 11*** the Cypress EZ-USB contains gaps in the code/xdata memory at addresses 0x1B40 – 0x1FFF and 0x7B40 – 0x7FFF due to the EZ-USB registers. Therefore you need to exclude this memory areas. The xdata area 0xFF00 .. 0xFFFF is used by the Keil Monitor-51 as data area. Also it is very important to configure the off chip Code memory and the off chip Xdata memory as non-overlapping areas. Below is an example for code memory til address 0x5EFF:



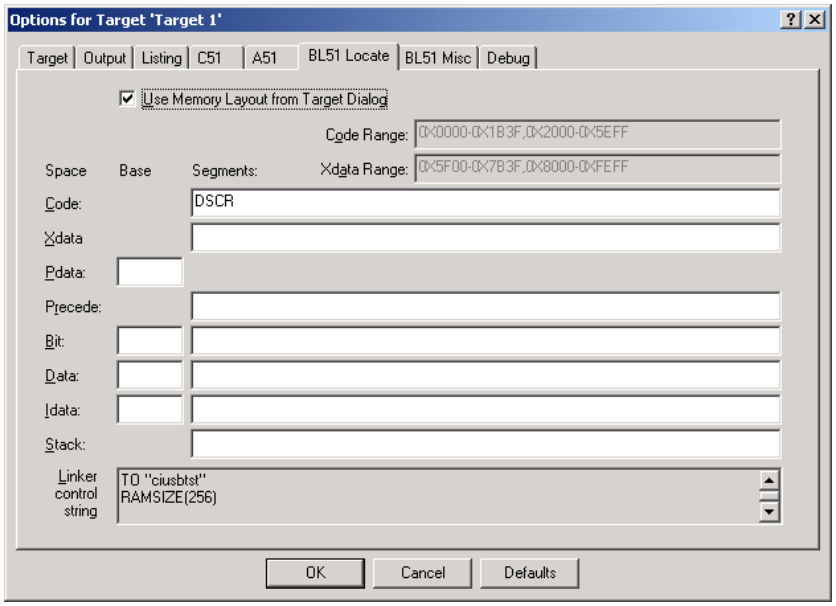
Dialog: Project – Options for Target – C51

The EZ-USB firmware uses the include files **ezusb.h** and **ezregs.h** that are located in the folder **c:\cypress\usb\target\inc**. You may specify this folder under **Include Paths** as shown below:



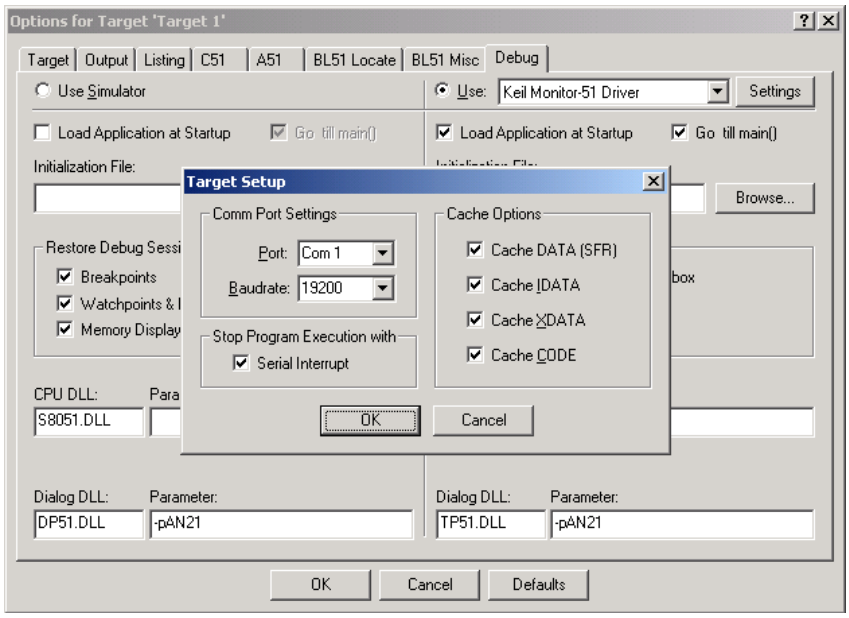
Dialog: Project – Options for Target – BL51 Locate

The file **DSCR.A51** that comes with the Cypress firmware code contains a segment **DSCR** that needs to be located in the on-chip memory of the EZ-USB part. This is required for correct operation of the enumeration. When you enter this segment under **CODE** the linker locates this segment before other segments. In this way it is ensured that this segment is located in on-chip code memory.



Dialog: Project – Options for Target – Debug

Select **Use: Keil Monitor-51 Driver** as shown below to debug your application with the Monitor program. Since the µVision2 debugger allows you debugging with different drivers, this driver needs to be selected for each µVision2 project target. Under **Settings** you need to select the PC COM port and the baudrate for the communication to the Cypress EZ-USB board. The Monitor that we have loaded into the Cypress EZ-USB board works with **19200** bps as baudrate.



MONITOR ERROR 22

In case that you receive MONITOR ERROR 22: NO CODE MEMORY AT ADDRESS: 0045H you are using the original file USBJMPTB.A51 or you did not specify under Options for Target – A51 – Set: Monitor. The USB autovector interrupt modifies the code byte location 0x45 by hardware. Therefore Monitor cannot alter this memory location and displays the above error message. If you change the code in the file USBJMPTB.A51 the error message will be no longer displayed:

```
;------------------------------------------------------------------------------
; Interrupt Vectors
;------------------------------------------------------------------------------
      CSEG   AT 43H
USB_AutoVector      equ    $ + 2
             DB     02H    ; LJMP
             DB     HIGH   USB_Jump_Table  ; Autovector Jump Table5
             DS     1                      ; Autovector will replace byte 45
```

CONCLUSION

When you follow the information in this application notes it is easy to develop programs for the Cypress EZ-USB board with the µVision2 and the C51 Compiler. The µVision2 debugger allows you to download and test your code on the EZ-USB board. You may single step set breakpoints in your application program.