

Мікропроцесорна техніка

(лекція 4)
Благітко Б.Я.
2019 р.

PSoC Creator 4.2
Designing with PSoC 3/5



PSoC@3/5 Interrupts

PSoC Creator 4.2
Designing with PSoC 3/5



Project Objective

- Generate interrupt for rising edge signal on pin
- Set a Flag in Interrupt Service routine (ISR)
- Increment Count variable in main code if Flag is set
- Clear the Flag in main code

Figure 1-1. Simplified Block Diagram

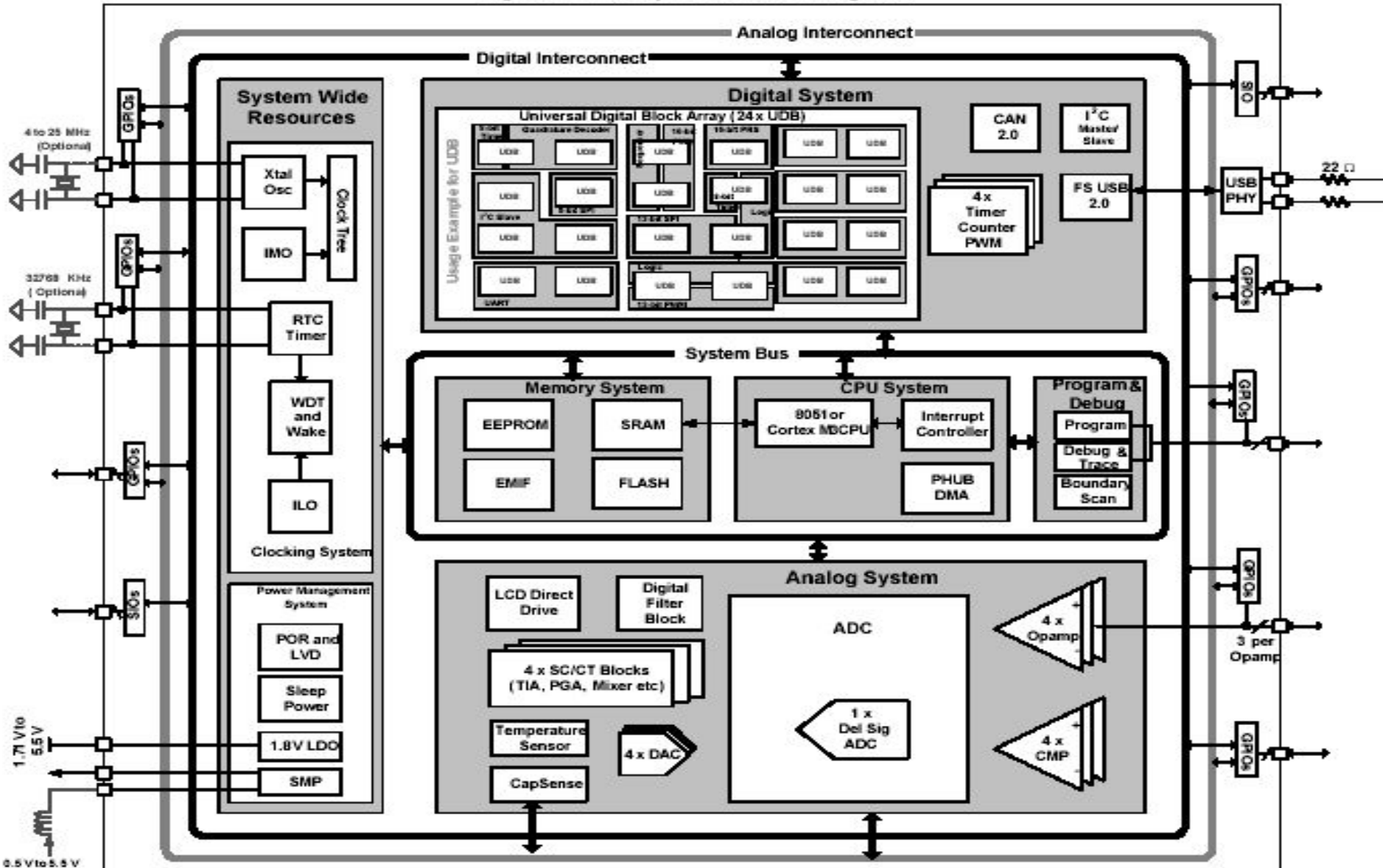
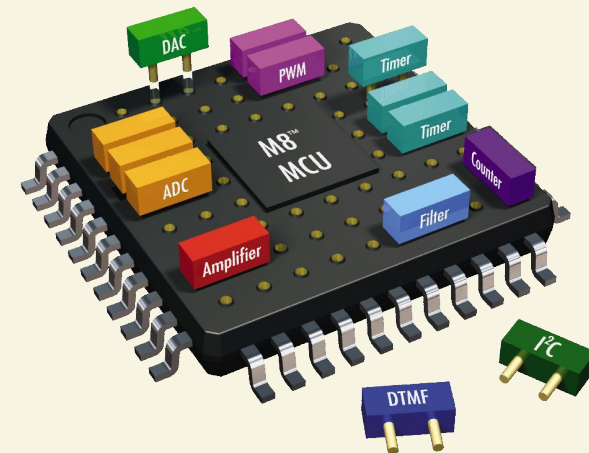
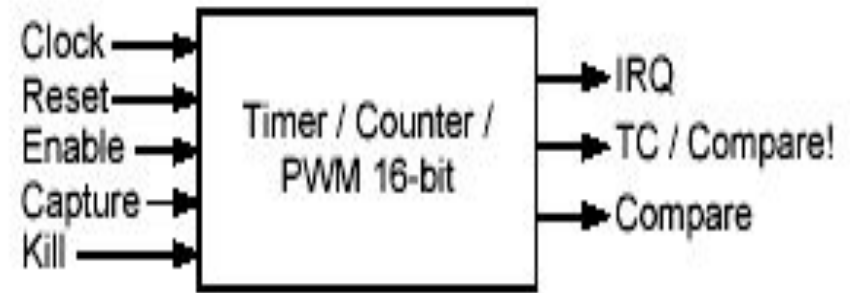


Figure 7-3. Component Catalog



Figure 7-21. Timer/Counter/PWM





PWMs, Timers and Counters share many capabilities but each provides specific capabilities.

When to Use a PWM

The most common use of the **PWM** is to generate periodic waveforms with adjustable duty cycles. The PWM also provides optimized features for power control, motor control, switching regulators and lighting control. The PWM can also be used as a clock divider by driving a clock into the clock input and using the terminal count or a PWM output as the divided clock output.

When to Use a Counter

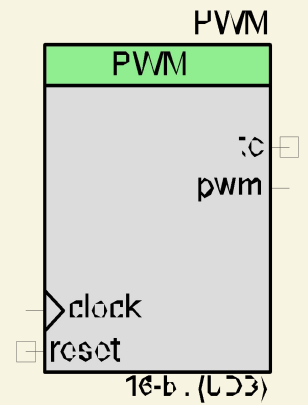
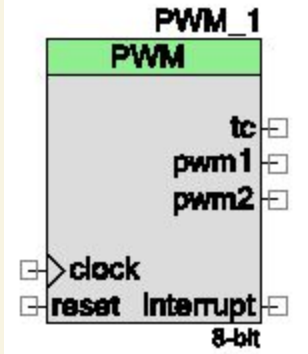
A **Counter** component is better used in situations that require the counting of a number of events but also provides rising edge capture input as well as a compare output.

When to Use a Timer

A **Timer** component is better used in situations focused on timing the length of events, measuring the interval of multiple rising and/or falling edges, or for multiple capture events.

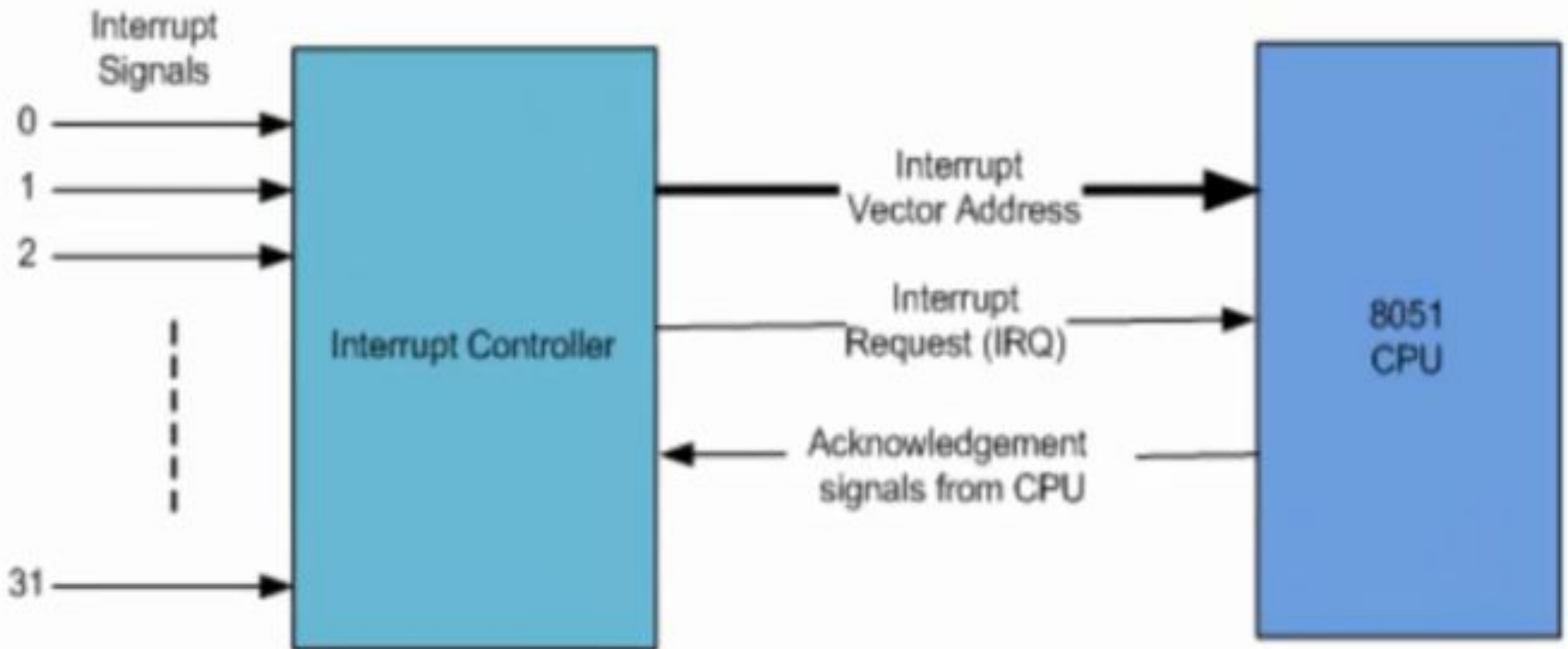
PWM

Output	May Be Hidden	Description
tc	N	The terminal count output is '1' when the period counter is equal to zero. In normal operation this output will be '1' for a single cycle where the counter is reloaded with period. If the PWM is stopped with the period counter equal to zero then this signal will remain high until the period counter is no longer zero. This output is synchronized to the block clock input of the component.
interrupt	Y	The interrupt output is the logical OR of the group of possible interrupt sources. This signal will go high while any of the enabled interrupt sources are true. The interrupt output shall remain asserted until the Status Register is read out by the software. In order to receive subsequent interrupts, the interrupt shall be cleared by reading the Status Register using the PWM_ReadStatusRegister() API. The interrupt output is not visible if the Use Interrupt parameter is not set. This allows the status register to be removed for resource optimization as necessary.
pwm/pwm1	Y	The pwm or pwm1 output is the first or only pulse width modulated output. This signal is defined by PWM Mode, compare modes(s), and compare value(s) as indicated in waveforms in the Configure dialog. When the instance is configured in one output, Dual Edged, Hardware Select, Center Aligned, or Dither PWM Modes, then the output "pwm" is visible. Otherwise the output "pwm1" is visible with "pwm2" the other pulse width signal. This output is synchronized to the block clock input of the component.

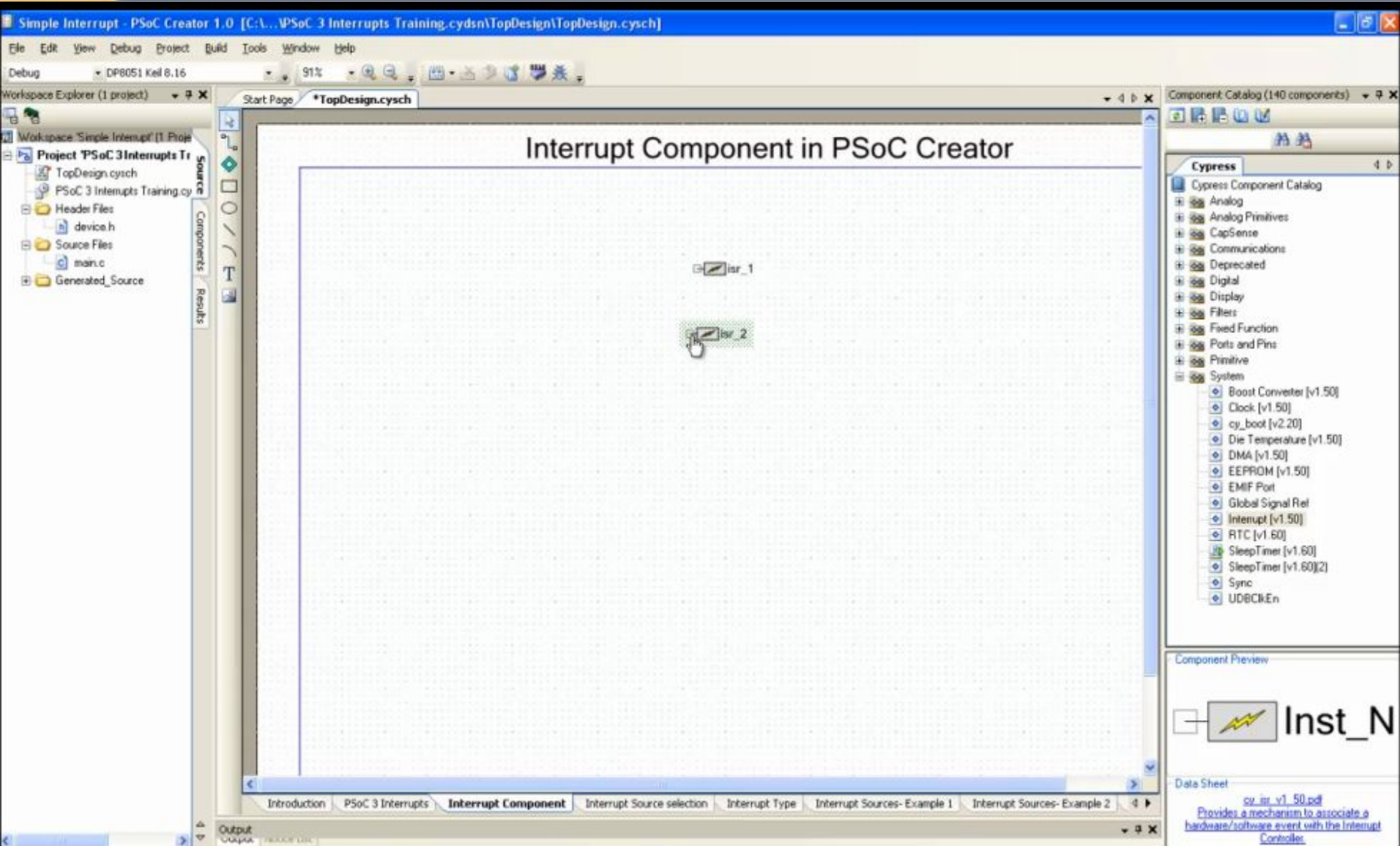


Interrupts

PSoC 3



Interrupts

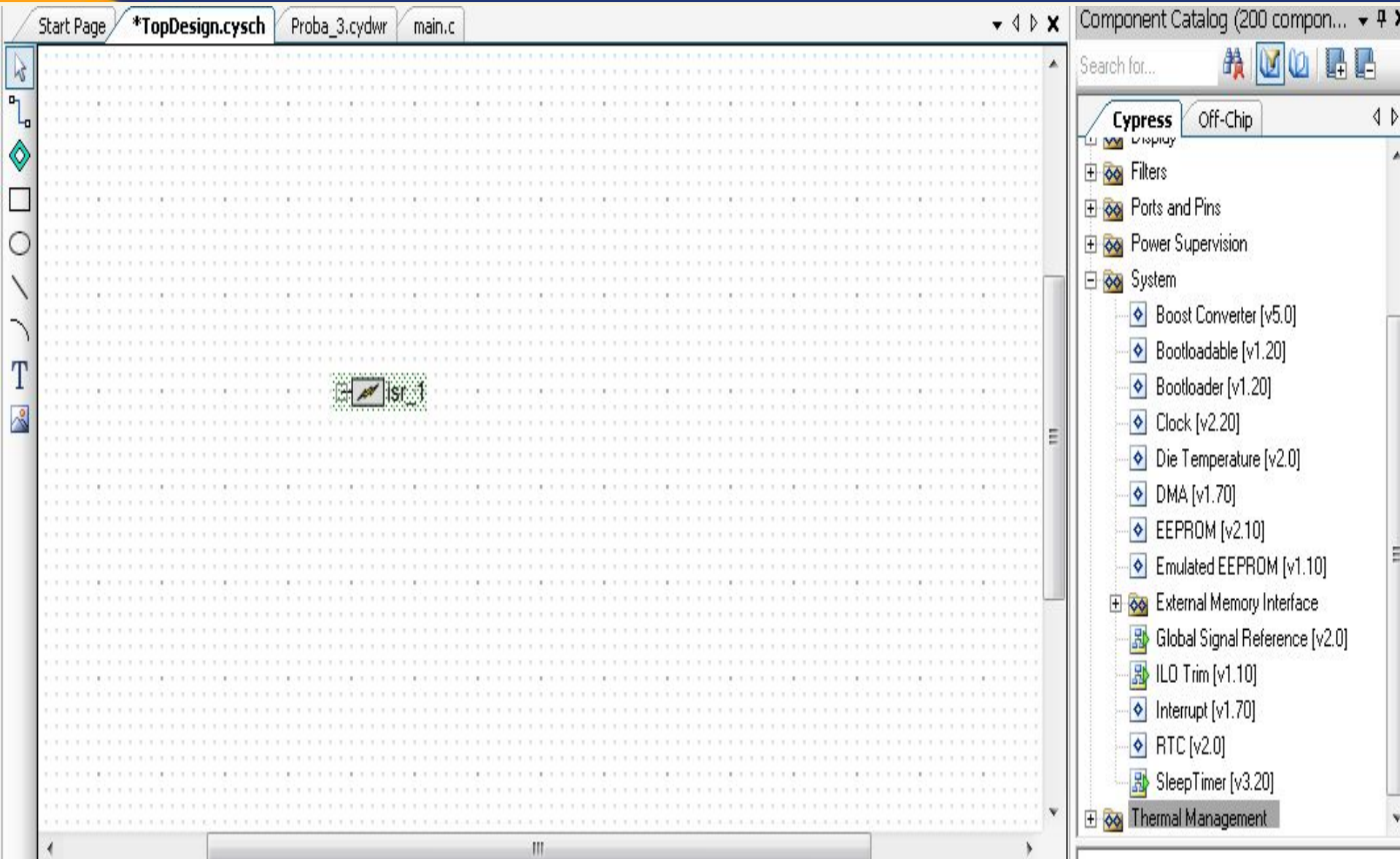


The screenshot displays the PSoC Creator IDE interface. The main workspace is titled "Interrupt Component in PSoC Creator" and shows a schematic with two interrupt components labeled "isr_1" and "isr_2". A mouse cursor is positioned over "isr_2".

The left sidebar shows the "Workspace Explorer" with a project tree for "Project 'PSoC 3 Interrupts Training'". The right sidebar contains the "Component Catalog" with a tree view of components under the "Cypress" category, including "Interrupt [v1.50]". Below the catalog is a "Component Preview" section showing a lightning bolt icon and the label "Inst_N".

The bottom status bar includes a navigation pane with tabs: "Introduction", "PSoC 3 Interrupts", "Interrupt Component", "Interrupt Source selection", "Interrupt Type", "Interrupt Sources- Example 1", and "Interrupt Sources- Example 2". The "Interrupt Component" tab is currently selected.

Interrupts



Start Page *TopDesign.cysch Proba_3.cydwr main.c

Component Catalog (200 compon... Search for...

- Cypress
- Off-Chip
- Filters
- Ports and Pins
- Power Supervision
- System
 - Boost Converter [v5.0]
 - Bootloadable [v1.20]
 - Bootloader [v1.20]
 - Clock [v2.20]
 - Die Temperature [v2.0]
 - DMA [v1.70]
 - EEPROM [v2.10]
 - Emulated EEPROM [v1.10]
 - External Memory Interface
 - Global Signal Reference [v2.0]
 - ILD Trim [v1.10]
 - Interrupt [v1.70]
 - RTC [v2.0]
 - SleepTimer [v3.20]
- Thermal Management

Start Page *TopDesign.cysch Proba_3.cydwr main.c

Configure 'cy_isr'

Name:

Basic Built-in

Parameter	Value
InterruptType	DERIVED

Parameter Information

[Datasheet](#)

Start Page

*TopDesign.cysch

Proba_3.cydwr

main.c

Configure 'cy_isr'

Name: isr_1

Basic

Built-in

Parameter	Value
InterruptType	RISING_EDGE

Parameter Information

InterruptType: DERIVED - infers the interrupt type based on the signal source.

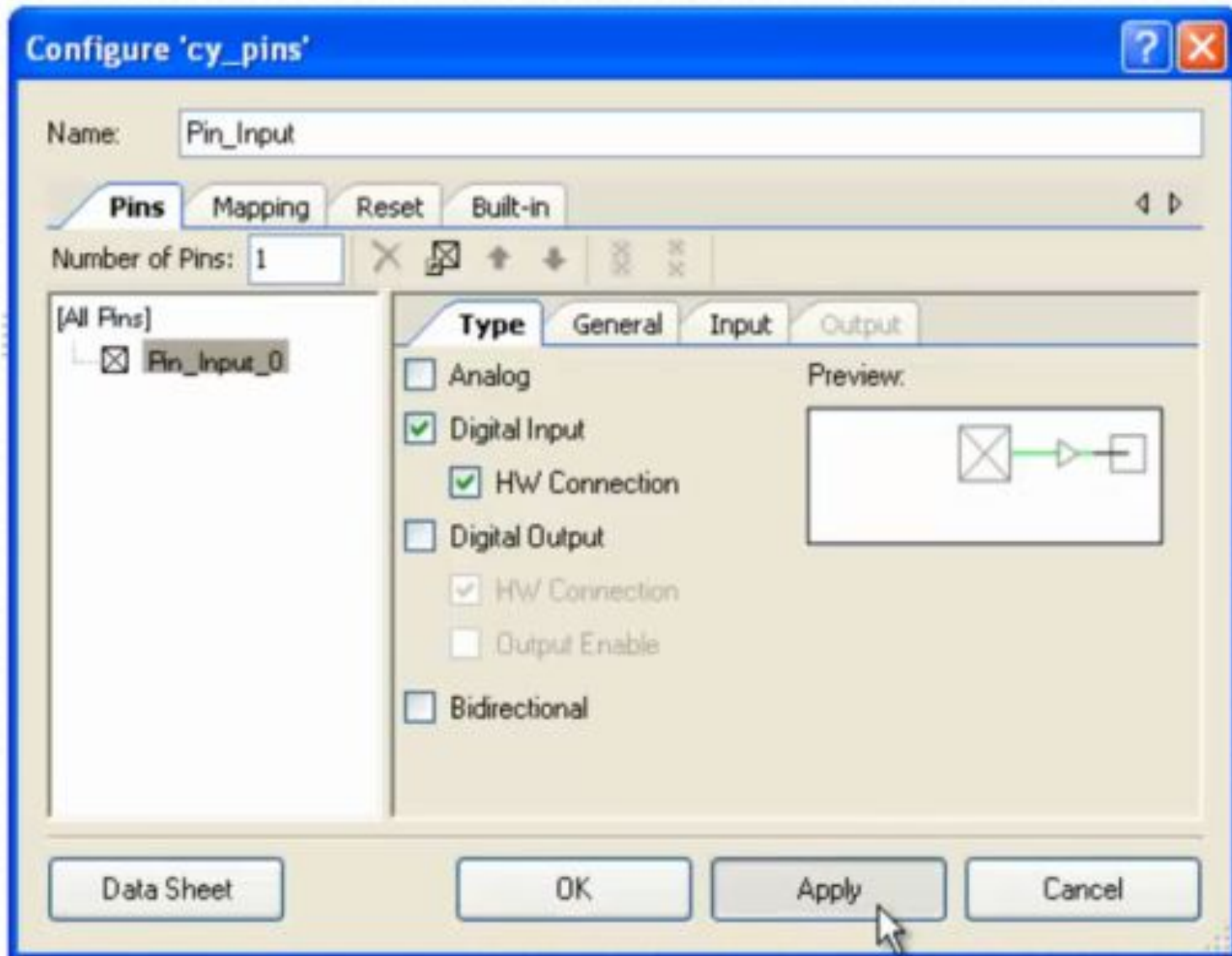
RISING_EDGE - selects the source connection to the ISR component as a rising edge connection via the DSI.

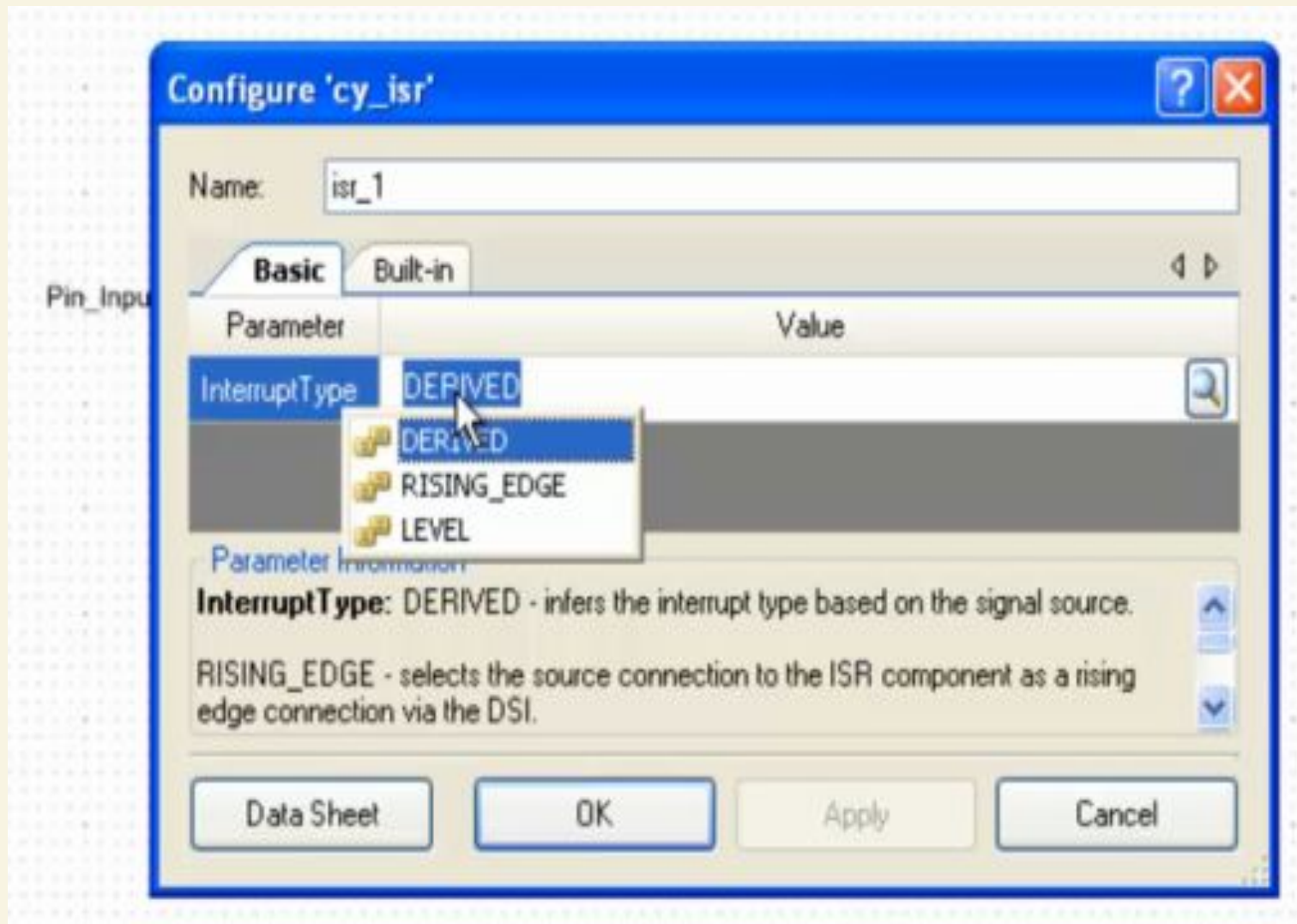
Datasheet

OK

Apply

Cancel

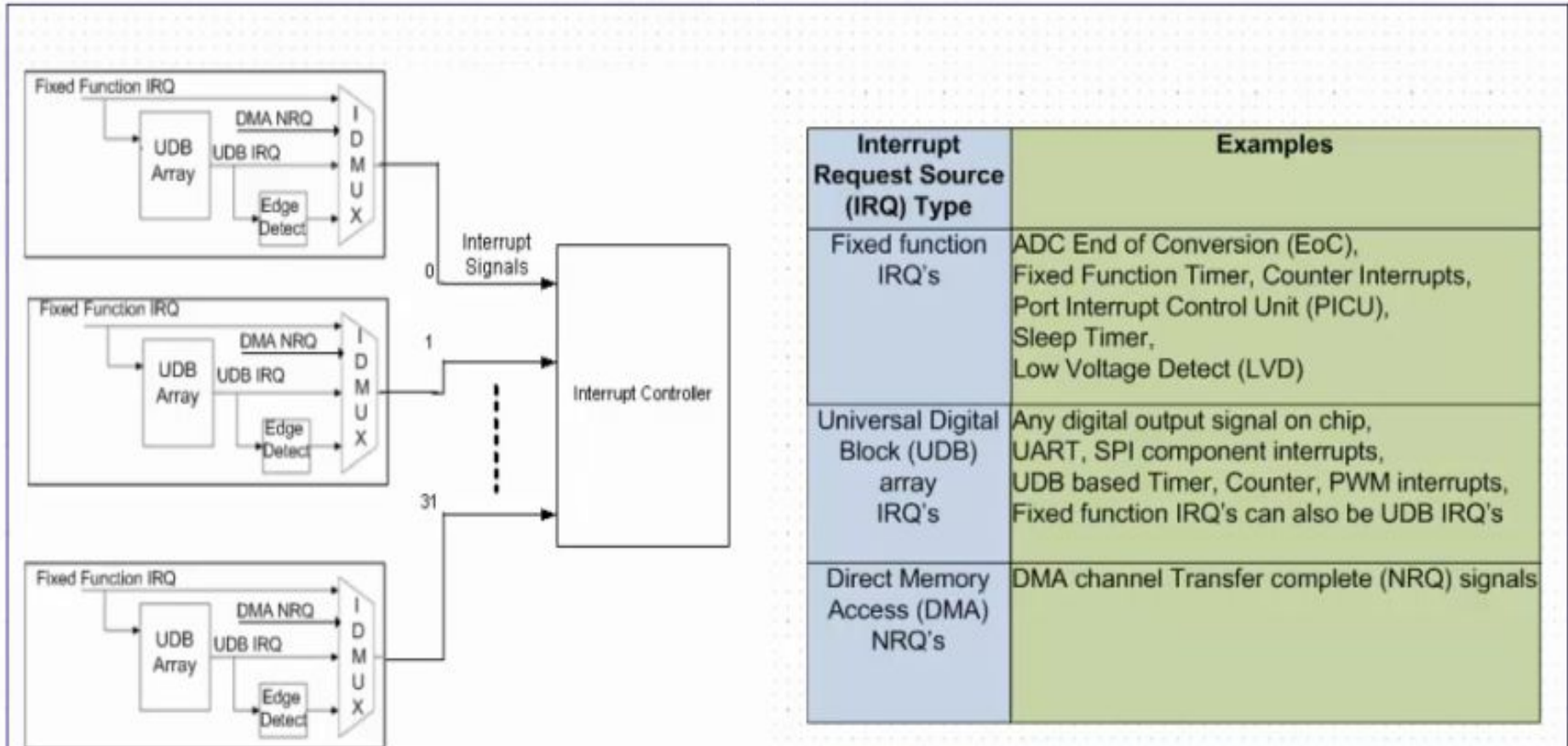




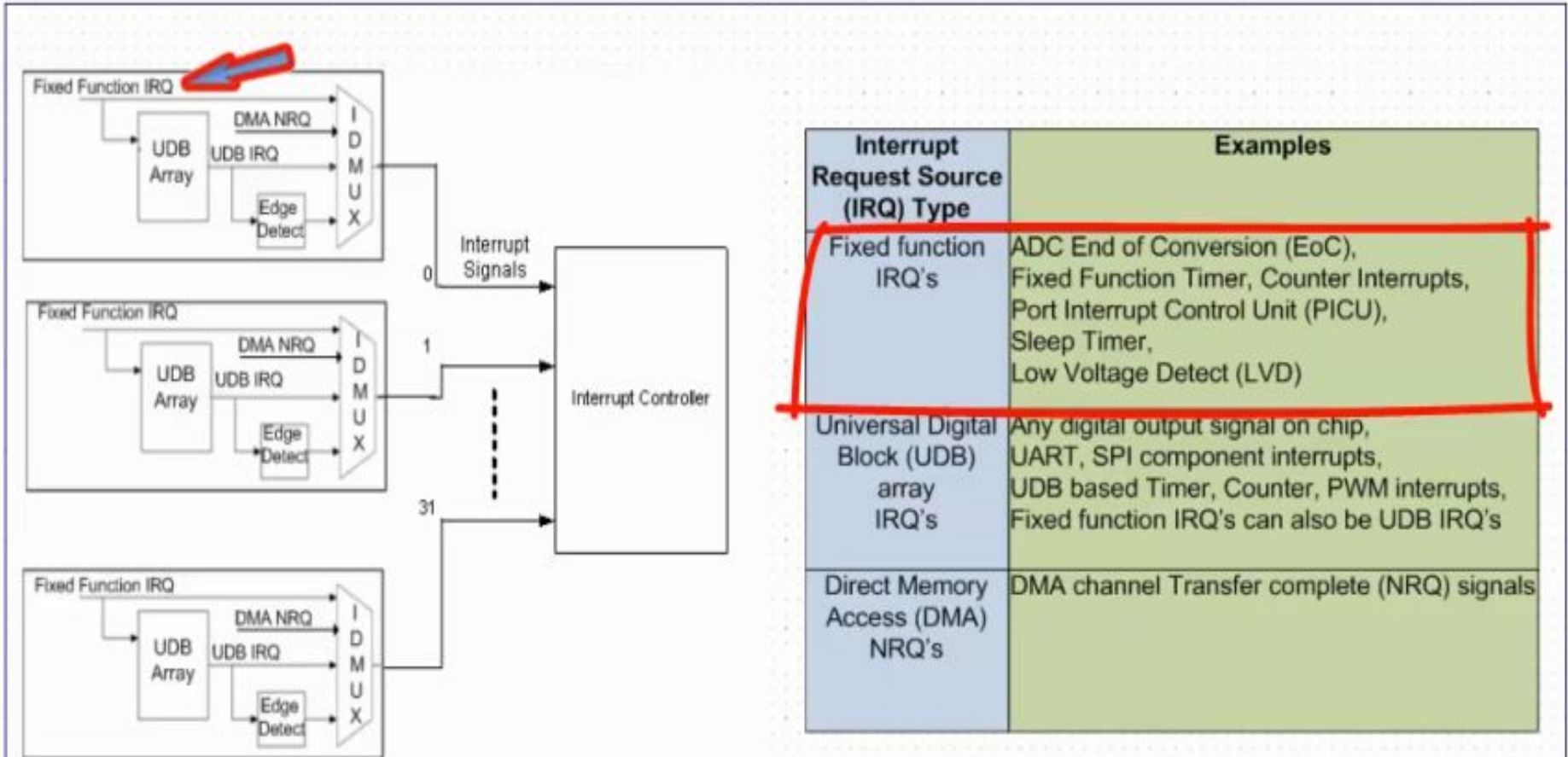
Interrupts



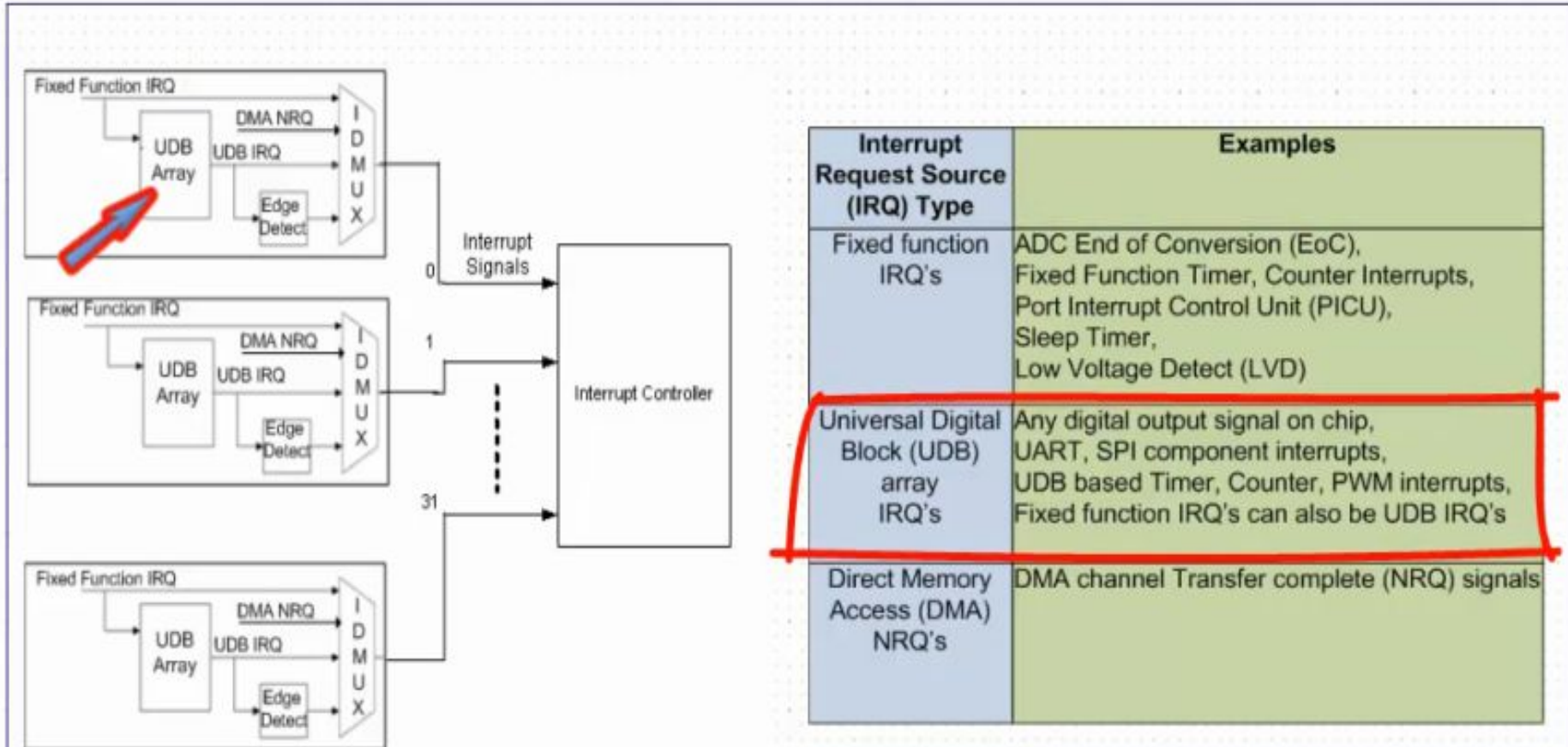
Interrupt Sources



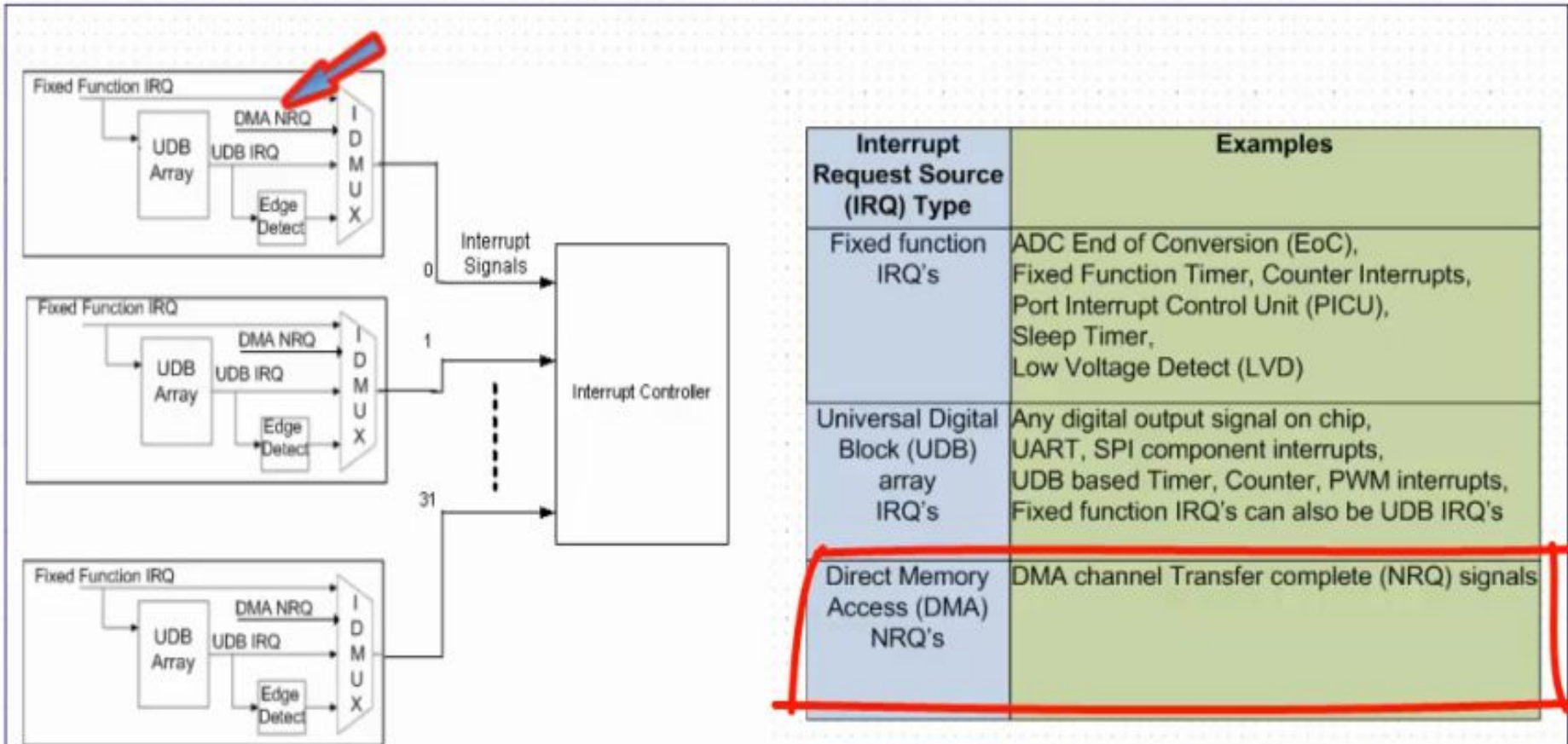
Interrupt Sources



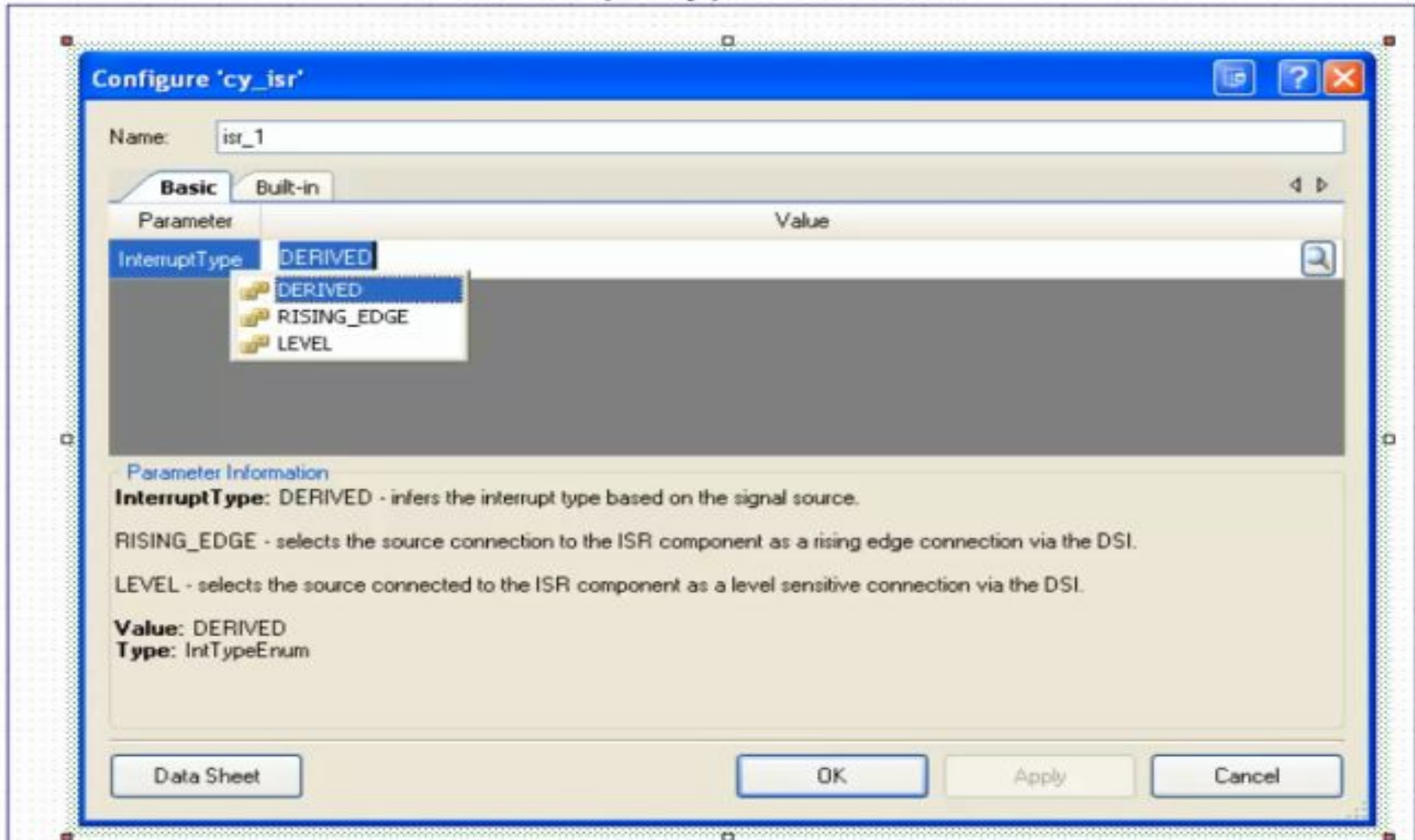
Interrupt Sources



Interrupt Sources

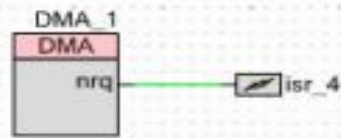


Interrupt Type selection

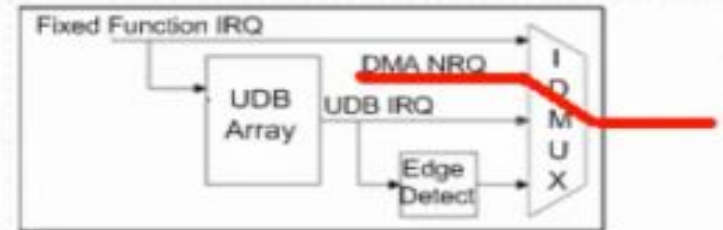


Interrupt Sources

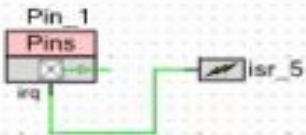
1.) DMA nrq Interrupt



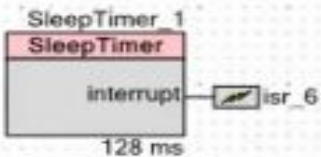
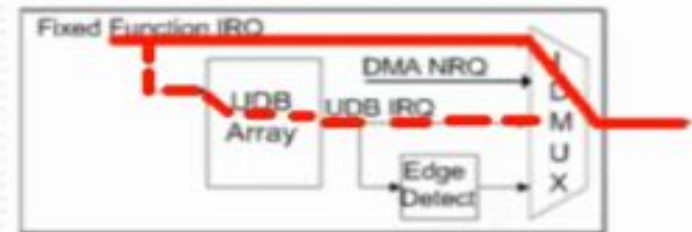
Derived



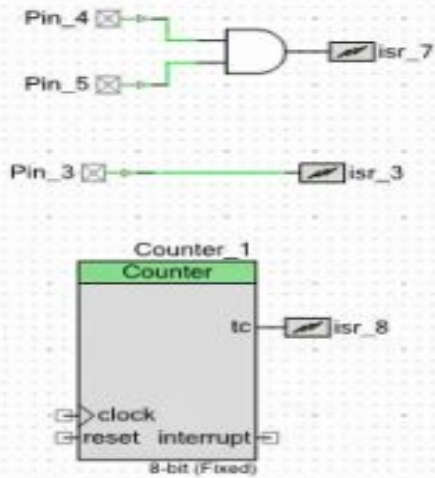
2.) Fixed Function Interrupts



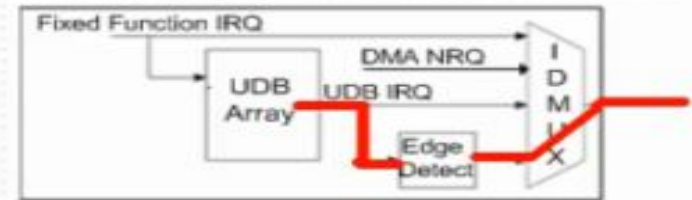
Derived



3.) Edge Triggered Interrupts



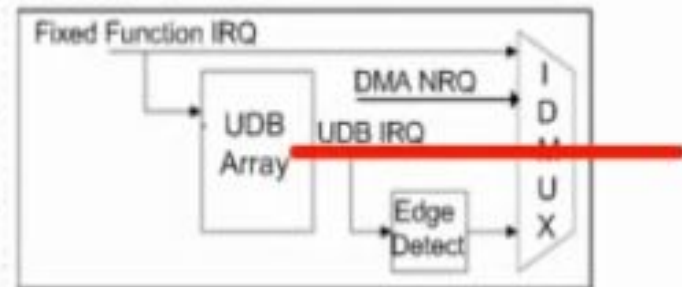
Derived
(or)
Rising Edge →



4.) Level Interrupt



Level →



PSoC Creator 2.1


File Edit View Debug Project Build Tools Window Help

Workspace Explorer

Source Components Datasheets Results

Start Page

PSoC® Creator™



Recent Projects

- HelloWorld_Blinky01.cywrk
- CapSense_CSD_Design01...
- CapSense_CSD_Design01...
- CharLCD_CustomFont01.c...
- CharLCD_CustomFont01.c...

Create New Project...
Open Existing Project...

Getting Started

- PSoC Creator Start Page
- Quick Start Guide
- Intro to PSoC
- Intro to PSoC Creator
- PSoC Creator Training
- Help Tutorials
- Getting Started With PSoC 3
- Getting Started With PSoC 5

Examples and Kits

- Find Example Project...
- No Kit Packages Installed

简体中文 日本語 한국어 English

PSoC Creator News and Information


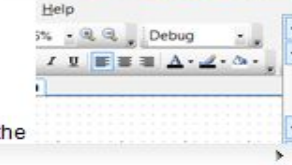
Happy Lunar New Year!
Posted on 02/11/2013

Gong Xi Fa Cai! As many of my friends and colleagues are celebrating the New Year and welcoming in the year of the water snake, I wanted to take a minute and wish you all well. May the New Year bring each of you prosperity, good luck and a new PSoC design.
...

[Read More](#)

Tips + Tricks: Menu Customization
Posted on 01/24/2013

Did you know you can create a customized menu in PSoC® Creator? Right click in a blank area of the top menu and select customize from the

Notice List

0 Errors 0 Warnings

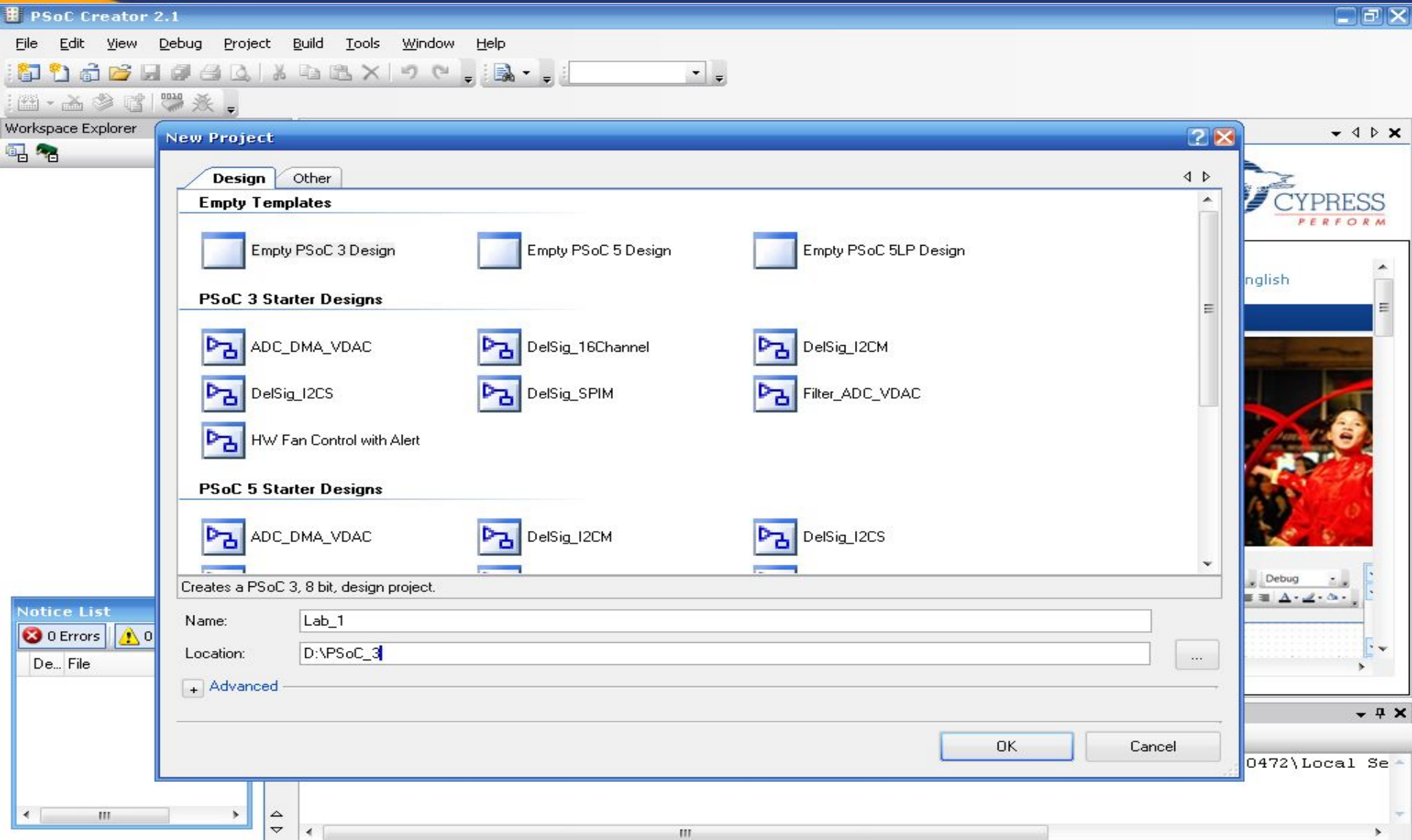
De... File Error L

Output

Show output from: All

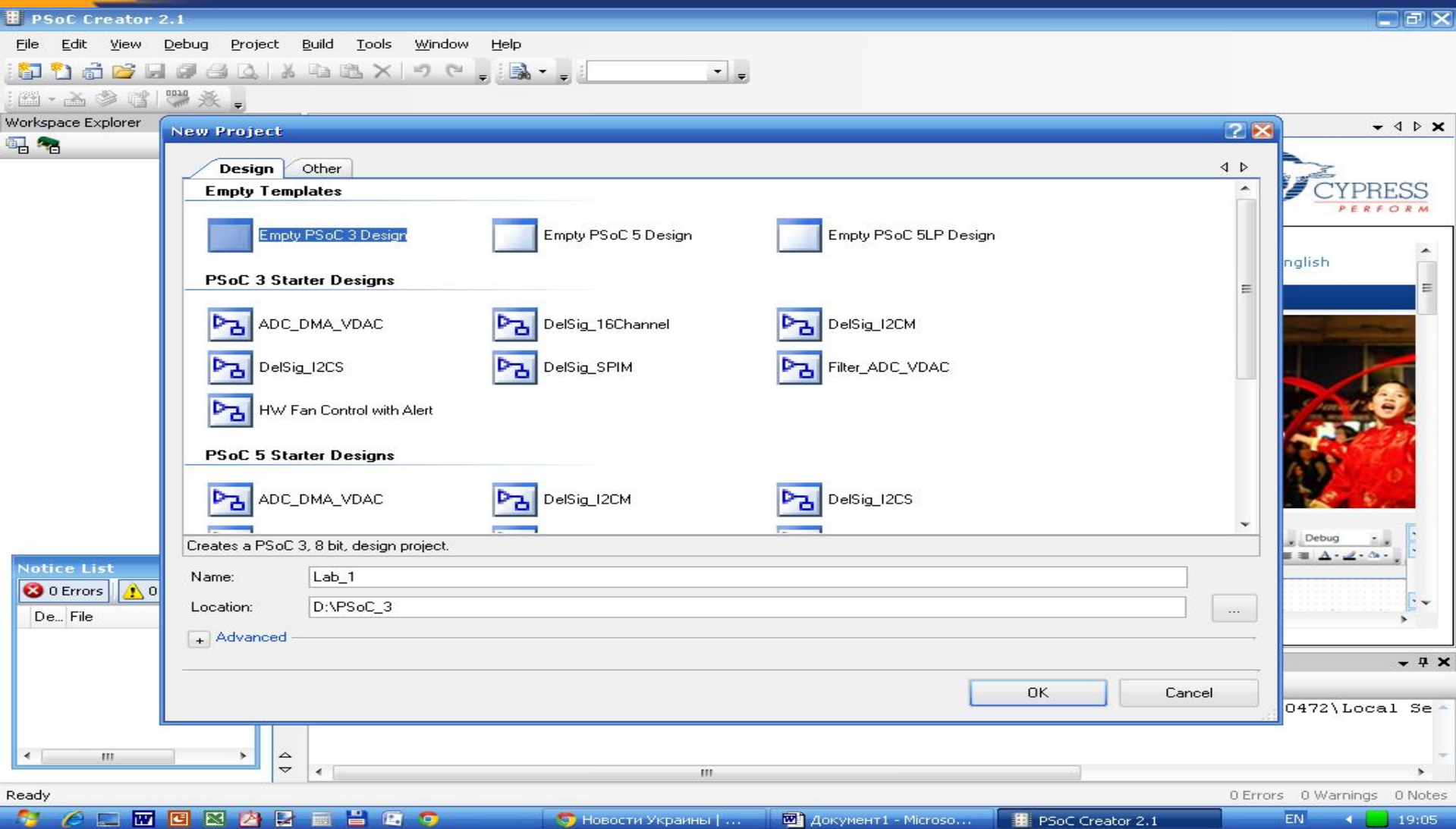
Log file for this session is located at: C:\Documents and Settings\Admin.MICROSOFT-7D0472\Local Se

File – New - Projekt



The screenshot shows the PSoC Creator 2.1 application window. The 'File' menu is open, and the 'New' option is selected, which has opened the 'New Project' dialog box. The dialog box has two tabs: 'Design' and 'Other'. Under the 'Design' tab, there are three sections: 'Empty Templates', 'PSoC 3 Starter Designs', and 'PSoC 5 Starter Designs'. The 'Empty Templates' section contains three options: 'Empty PSoC 3 Design', 'Empty PSoC 5 Design', and 'Empty PSoC 5LP Design'. The 'PSoC 3 Starter Designs' section contains six options: 'ADC_DMA_VDAC', 'DelSig_16Channel', 'DelSig_I2CM', 'DelSig_I2CS', 'DelSig_SPIM', and 'Filter_ADC_VDAC'. The 'PSoC 5 Starter Designs' section contains three options: 'ADC_DMA_VDAC', 'DelSig_I2CM', and 'DelSig_I2CS'. Below these sections, there is a description: 'Creates a PSoC 3, 8 bit, design project.' There are two input fields: 'Name:' with the value 'Lab_1' and 'Location:' with the value 'D:\PSoC_3'. There is also an 'Advanced' button with a plus sign. At the bottom right of the dialog box are 'OK' and 'Cancel' buttons. In the background, the main application window is visible, showing the 'Workspace Explorer' on the left and a 'Notice List' at the bottom left. The 'Notice List' shows '0 Errors' and '0 Warnings'. The taskbar at the bottom shows the Windows Start button, several application icons, and the system tray with the date and time '19:02'.

Empty PSoC 3 Design



The screenshot displays the PSoC Creator 2.1 application interface. The main window is titled "New Project" and is divided into several sections:

- Design** tab is selected.
- Empty Templates** section contains three options: "Empty PSoC 3 Design" (highlighted), "Empty PSoC 5 Design", and "Empty PSoC 5LP Design".
- PSoC 3 Starter Designs** section includes: "ADC_DMA_VDAC", "DelSig_16Channel", "DelSig_I2CM", "DelSig_I2CS", "DelSig_SPIM", and "Filter_ADC_VDAC".
- PSoC 5 Starter Designs** section includes: "ADC_DMA_VDAC", "DelSig_I2CM", and "DelSig_I2CS".

Below the design options, a description reads: "Creates a PSoC 3, 8 bit, design project." The "Name" field is set to "Lab_1" and the "Location" field is set to "D:\PSoC_3". There is an "Advanced" button with a plus sign. At the bottom right of the dialog are "OK" and "Cancel" buttons.

The background shows the PSoC Creator 2.1 main menu (File, Edit, View, Debug, Project, Build, Tools, Window, Help) and a workspace explorer. A "Notice List" window in the bottom left corner shows "0 Errors" and "0 Warnings". The Windows taskbar at the bottom shows the system tray with "0 Errors 0 Warnings 0 Notes" and the time "19:05".

Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\A_MyFirstInterruptProject.cydsn\TopDesign\TopDesig...

File Edit View Debug Project Build Tools Window Help

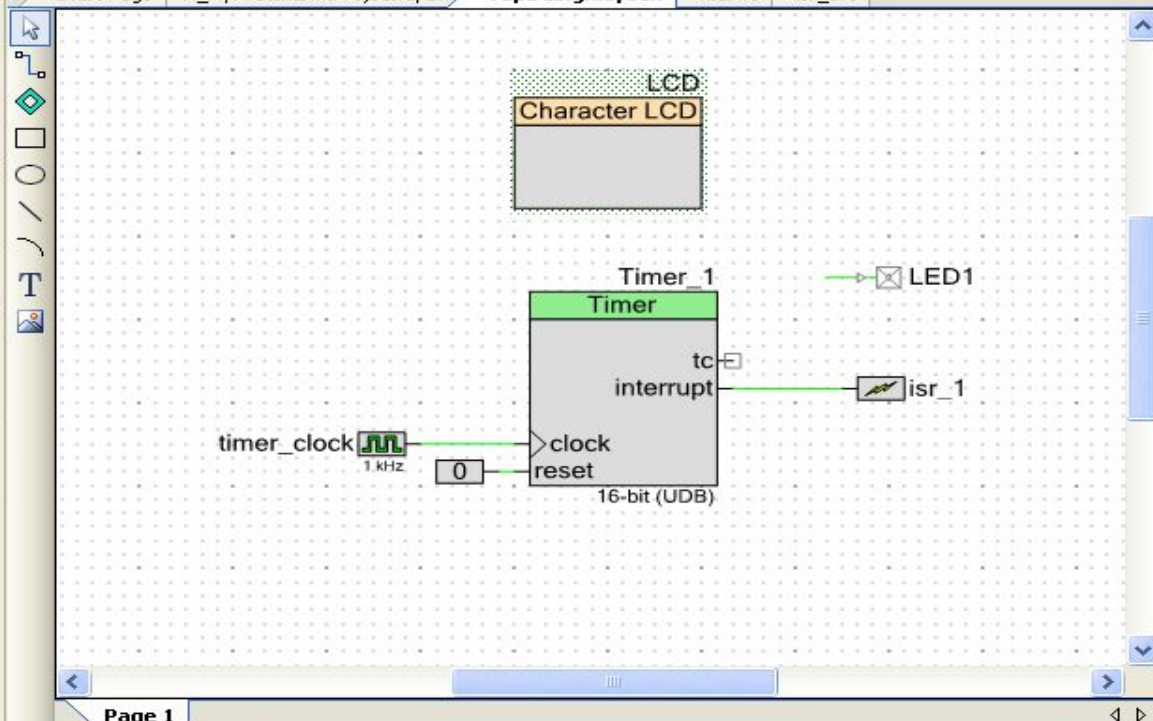
104% Debug

Microsoft Sans Serif 10

Workspace Explorer Start Page A_MyFirstInte...tProject.cydw TopDesign.cysch main.c isr_1.c Component Catalo...

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt'
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cupins.h



Component Catalog

- Concept
 - Cypress
 - PrISM [v2.10]
 - PRS [v2.10]
 - PwM [v2.20]
 - Quadrature De
 - Shift Register
 - Timer [v2.30]
 - Logic
 - Registers
 - Control Regist
 - Status Registe
 - Display
 - Character LCD [v1]
 - Graphic LCD 8-bit
 - Graphic LCD 16-b
 - Graphic LCD Cont
 - Graphic LCD Cont
 - Graphic LCD Para
 - Resistive Touch [v
 - Segment LCD - St
 - Segment LCD [v3.

Notice List

0 Errors 0 Warnings

De...	File

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013
```

Component Preview

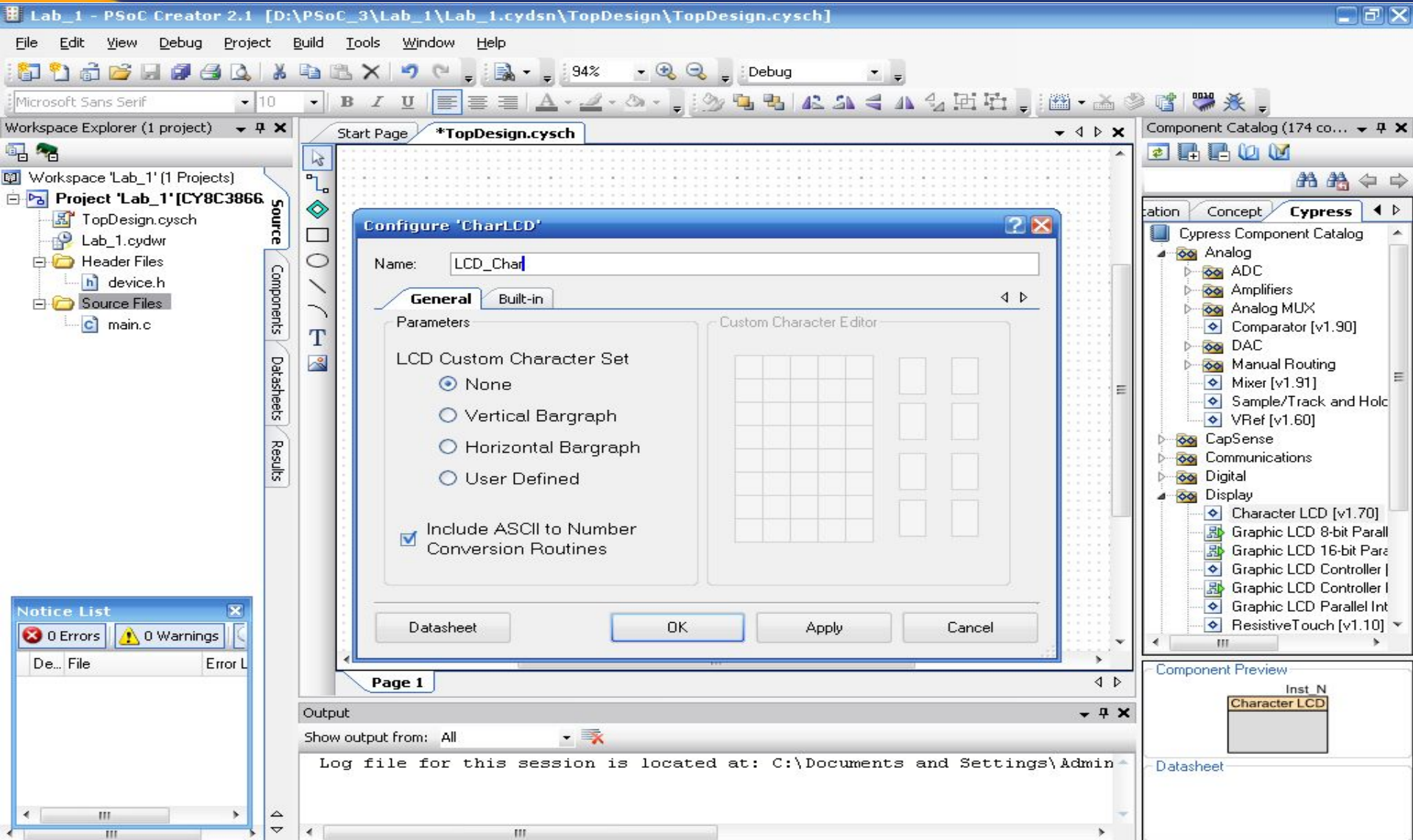
Inst N

Character LCD

Datasheet

[Character LCD Component](#)

Configure LCD



Lab_1 - PSoC Creator 2.1 [D:\PSoc_3\Lab_1\Lab_1.cydsn\TopDesign\TopDesign.cysch]

File Edit View Debug Project Build Tools Window Help

Microsoft Sans Serif 10 B I U

Workspace Explorer (1 project)

Project 'Lab_1' [CY8C3866]

- TopDesign.cysch
- Lab_1.cydwr
- Header Files
- device.h
- Source Files
- main.c

Start Page *TopDesign.cysch

Component Catalog (174 co...)

Character LCD [v1.70]

Graphic LCD 8-bit Paralle...

Graphic LCD 16-bit Paralle...

Graphic LCD Controller I...

Graphic LCD Controller I...

Graphic LCD Parallel Int...

Resistive Touch [v1.10]

Notice List

0 Errors 0 Warnings

De... File Error L

Output

Show output from: All

Log file for this session is located at: C:\Documents and Settings\Admin

Page 1

Configure 'CharLCD'

Name: LCD_Char

General Built-in

Parameters Custom Character Editor

LCD Custom Character Set

- None
- Vertical Bargraph
- Horizontal Bargraph
- User Defined

Include ASCII to Number Conversion Routines

Datasheet OK Apply Cancel

Component Preview

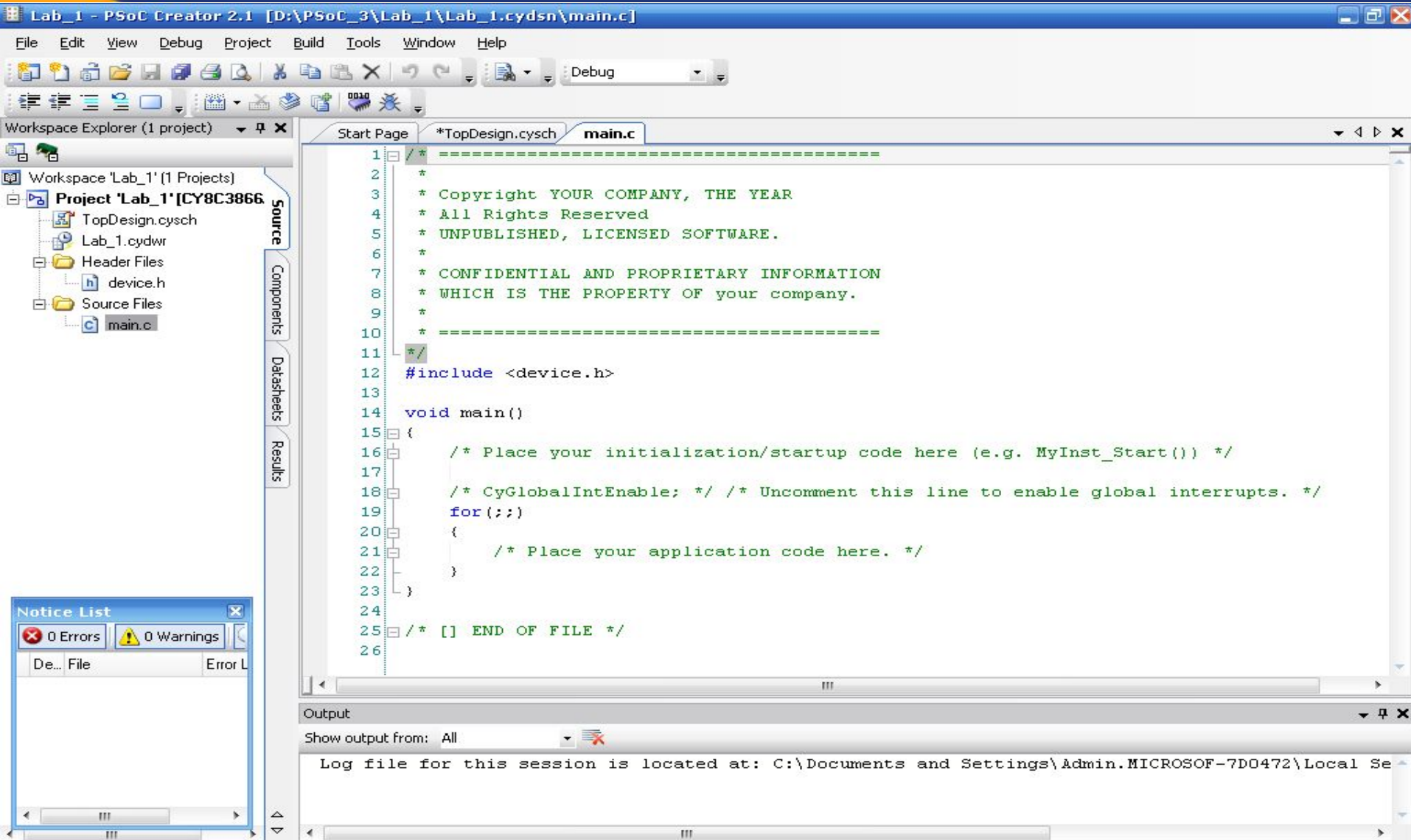
Inst N

Character LCD

Datasheet

Ready {X=295,Y=131} 0 Errors 0 Warnings 0 Notes

Новости Украины | ... Do_Present_1.doc - ... PSoC Creator 2.1 EN 19:25



The screenshot shows the PSoC Creator 2.1 IDE interface. The main window displays the source code for `main.c`. The code includes a copyright notice, an include directive for `device.h`, and a `main()` function with several comments and a `for` loop placeholder. A `Notice List` window is open in the bottom-left corner, showing 0 Errors and 0 Warnings. The Output window at the bottom shows a message about the log file location.

```
1  /* -----  
2  *  
3  * Copyright YOUR COMPANY, THE YEAR  
4  * All Rights Reserved  
5  * UNPUBLISHED, LICENSED SOFTWARE.  
6  *  
7  * CONFIDENTIAL AND PROPRIETARY INFORMATION  
8  * WHICH IS THE PROPERTY OF your company.  
9  *  
10 * -----  
11 */  
12 #include <device.h>  
13  
14 void main()  
15 {  
16     /* Place your initialization/startup code here (e.g. MyInst_Start()) */  
17  
18     /* CyGlobalIntEnable; */ /* Uncomment this line to enable global interrupts. */  
19     for (;;)   
20     {  
21         /* Place your application code here. */  
22     }  
23 }  
24  
25 /* [] END OF FILE */  
26
```

Notice List
0 Errors 0 Warnings
De... File Error L

Output
Show output from: All
Log file for this session is located at: C:\Documents and Settings\Admin.MICROSOFT-7D0472\Local Se

Lab_1 - PSoC Creator 2.1 [D:\PSoC_3\Lab_1\Lab_1.cydsn\Lab_1.cydw] 37% Debug

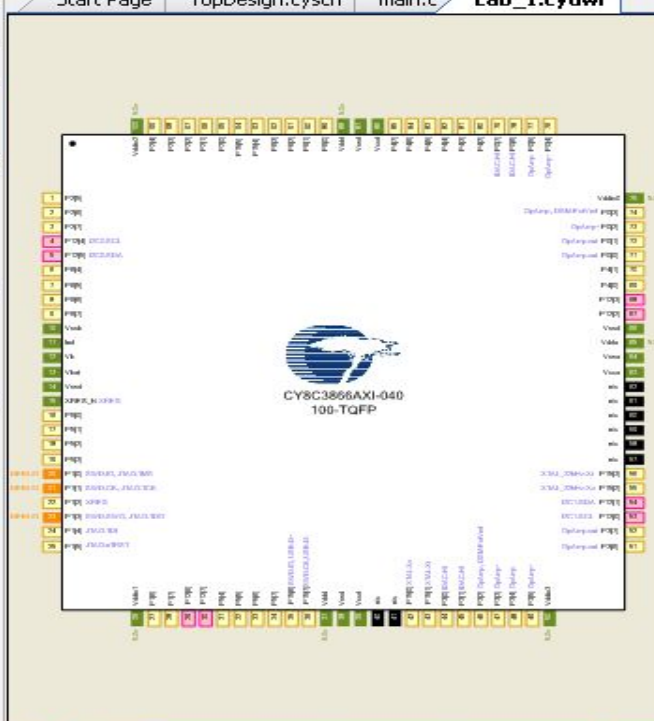
File Edit View Debug Project Build Tools Window Help

Workspace Explorer (1 project)

- Workspace 'Lab_1' (1 Projects)
 - Project 'Lab_1' [CY8C3866
 - TopDesign.cysch
 - Lab_1.cydw
 - Header Files
 - device.h
 - Source Files
 - main.c

Source Components Datasheets Results

Start Page TopDesign.cysch main.c Lab_1.cydw



CY8C3866AXI-040
100-TQFP

Alias	Name	Port	Pin	Lock
	\LCD_Char:LCDPort[6:0]\			
	P0[6:0]	IDAC:HC		
	P0[7:1]	IDAC:HC		
	P2[6:0]			
	P2[7:1]			
	P3[6:0]	OpAmp:c		
	P3[7:1]	OpAmp:c		
	P4[6:0]			
	P4[7:1]			
	P5[6:0]			

LCD_Char_LCDPort_6 - Digital
LCD_Char_LCDPort_5 - Digital
LCD_Char_LCDPort_4 - Digital

Pins Analog Clocks Interrupts DMA System Directives Flash Security

Output

Show output from: All

Log file for this session is located at: C:\Documents and Settings\Admin.MICROSOFT-7D0472\Local Se

Notice List: 0 Errors, 0 Warnings

Ready 0 Errors 0 Warnings 0 Notes

Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\A_MyFirstInterruptProject.cydsn\TopDesign\TopDesig...

File Edit View Debug Project Build Tools Window Help

104% Debug

Microsoft Sans Serif 10

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt'
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cyupis.h

Start Page A_MyFirstInte...tProject.cydw TopDesign.cysch main.c isr_1.c

Configure 'Timer'

Name:

Configure Built-in

Resolution: 8-Bit 16-Bit 24-Bit 32-Bit

Implementation: Fixed Function UDB

Period: **Period = 1s**

Trigger Mode:

Capture Mode: Enable Capture Counter

Enable Mode:

Run Mode:

Interrupts: On TC On Capture [1-4]

Component Catalog...

- Concept Cypress
 - PrISM [v2.10]
 - PRS [v2.10]
 - PwM [v2.20]
 - Quadrature De
 - Shift Register
 - Timer [v2.30]
 - Logic
 - Registers
 - Control Regist
 - Status Registe
 - Display
 - Character LCD [v1]
 - Graphic LCD 8-bit
 - Graphic LCD 16-b
 - Graphic LCD Cont
 - Graphic LCD Cont
 - Graphic LCD Para
 - ResistiveTouch [v
 - Segment LCD - St
 - Segment LCD [v3.

Component Preview

Inst N

Character LCD

Datasheet

[Character LCD Component](#)

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013
```

Notice List

0 Errors 0 Warnings

De... File

Ready {X=659,Y=498} 0 Errors 0 Warnings 2 Notes

Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\A_MyFirstInterruptProject.cydsn\TopDesign\TopDesig...

File Edit View Debug Project Build Tools Window Help

104% Debug

Microsoft Sans Serif 10

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt'
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cypins.h

Start Page A_MyFirstInte...tProject.cydw *TopDesign.cysch main.c isr_1.c

Configure 'cy_clock'

Name: timer_clock

Configure Clock | Advanced | Built-in

Clock Type: New Existing

Source: <Auto>

Specify: Frequency kHz - +

Summary
API Generated: Yes
Uses Clock Tree Resource: Yes

By default, all clocks are marked as 'start on reset'. The setting can be changed in the Design Wide Resources editor.

Datasheet OK Apply Cancel

Component Catalog

- Concept Cypress
 - Functions
 - Counter [v2.20]
 - CRC [v2.20]
 - Debouncer
 - Glitch Filter [v2.20]
 - PrISM [v2.10]
 - PRS [v2.10]
 - PWM [v2.20]
 - Quadrature De
 - Shift Register
 - Timer [v2.30]
 - Logic
 - Registers
 - Control Register
 - Status Register
 - Display
 - Character LCD [v1.00]
 - Graphic LCD 8-bit
 - Graphic LCD 16-bit
 - Graphic LCD Cont
 - Graphic LCD Cont

Component Preview

Datasheet

[8, 16, 24 or 32-bit Timer](#)

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013
```

Notice List

0 Errors 0 Warnings

Ready {X=545,Y=481} 0 Errors 0 Warnings 2 Notes

Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\A_MyFirstInterruptProject.cydsn\TopDesign\TopDesig...

File Edit View Debug Project Build Tools Window Help

Microsoft Sans Serif 10 B I U

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt'
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cy_pins.h

Start Page A_MyFirstInte...tProject.cydwv *TopDesign.cysch main.c isr_1.c

Component Catalogue

- Concept Cypress
 - Digital Bidirection...
 - Digital Input Pin [v...
 - Digital Output Pin
 - Power Supervision
 - System
 - Boost Converter [v...
 - Bootloadable
 - Bootloader
 - Clock [v1.70]
 - Die Temperature [v...
 - DMA [v1.60]
 - EEPROM [v2.0]
 - External Memory I...
 - Global Signal Refe...
 - Interrupt [v1.60]
 - RTC [v1.70]
 - SleepTimer [v3.10]
 - Sync
 - UDBClkEn
 - Thermal Management

Component Preview

Datasheet

[8, 16, 24 or 32-bit Timer](#)

Configure 'cy_isr'

Name: isr_1

Basic Built-in

Parameter	Value
InterruptType	LEVEL

Parameter Information

Datasheet OK Apply Cancel

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013
```

Notice List

0 Errors 0 Warnings

Ready

0 Errors 0 Warnings 2 Notes

Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\A_MyFirstInterruptProject.cydsn\TopDesign\TopDesig...

File Edit View Debug Project Build Tools Window Help

Microsoft Sans Serif 10

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt'
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cyupins.h

Start Page A_MyFirstInte...tProject.cydw *TopDesign.cysch main.c isr_1.c

Configure 'cy_pins'

Name: LED1

Pins Mapping Reset Built-in

Number of Pins: 1


[All Pins]

- LED1_0

Type General Input Output

- Analog
- Digital Input
 - HW Connection
- Digital Output
 - HW Connection
 - Output Enable
- Bidirectional
- Show Annotation Terminal

Preview:



Datasheet OK Apply Cancel

Output

Show output from: All


```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013
```

Component Catalogue

Concept Cypress

- Digital Bidirection...
- Digital Input Pin [v...
- Digital Output Pin
- Power Supervision
- System
 - Boost Converter [v...
 - Bootloadable
 - Bootloader
 - Clock [v1.70]
 - Die Temperature [v...
 - DMA [v1.60]
 - EEPROM [v2.0]
 - External Memory I...
 - Global Signal Refe...
 - Interrupt [v1.60]
 - RTC [v1.70]
 - SleepTimer [v3.10]
 - Sync
 - UDBClkEn
 - Thermal Management

Component Preview



Datasheet

[8, 16, 24 or 32-bit Timer](#)

Notice List

0 Errors 0 Warnings

De... File

Ready {X=470,Y=312} 0 Errors 0 Warnings 2 Notes



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\A_MyFirstInterruptProject.cydsn\A_MyFirstInterruptProject.cy...

File Edit View Debug Project Build Tools Window Help

39% Debug

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt' (4 Projects)
 - TopDesign.cysch
 - A_MyFirstInterruptProject.cysch
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cyupis.h

Source Components Datasheets Results

Start Page A_MyFirstIn...oject.cydwr *TopDesign.cysch main.c isr_1.c

CY8C3866AXI-040
100-TQFP

Alias	Name	Port	Pin
	\LCD:LCDPort[6:0]\	P2[6:0]	95..99,1..2
LED1		P0[0] OpAmp:out	71

Pins Analog Clocks Interrupts DMA System Directives Flash Security

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
```

Notice List

- 0 Errors
- 0 Warnings

Ready

0 Errors 0 Warnings 2 Notes

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\AN54460\A_MyFirstInterruptProject.cydsn\main.c]

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt' (4 Files)
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cy pins.h

Source Components Datasheets Results

```
1  /*  
2  * Copyright YOUR COMPANY, THE YEAR  
3  * All Rights Reserved  
4  * UNPUBLISHED, LICENSED SOFTWARE.  
5  * CONFIDENTIAL AND PROPRIETARY INFORMATION  
6  * WHICH IS THE PROPERTY OF your company.  
7  *  
8  *  
9  */  
10 #include <device.h>  
11  
12 /* Global variable defined in Timer ISR file isr_1.c */  
13 extern volatile uint8 toggle_flag;  
14  
15 void main()  
16 {  
17     CYGlobalIntEnable; /* Enable global interrupts. */  
18  
19     /* Initialize, start components */  
20     Timer_1_Start();  
21     isr_1_Start();  
22     LCD_Start();  
23     LCD_Position(0,2);  
24     LCD_PrintString("My Name");  
25 }
```

Notice List

0 Errors 0 Warnings

De...	File
-------	------

Output

Show output from: All

```
Protecting...  
Verify Checksum...  
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
```



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\AN54460\A_MyFirstInterruptProject.cydsn\main.c]

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer

- Workspace 'AN54460' (4 Projects)
 - Project 'A_MyFirstInterrupt' (Source)
 - TopDesign.cysch
 - A_MyFirstInterruptProject.c (Components)
 - Header Files
 - device.h
 - Source Files
 - main.c
 - Generated_Source (Datashheets)
 - PSoC3
 - cy_boot
 - CyBootAsmKeil
 - CyDmac.c
 - CyDmac.h
 - CyFlash.c
 - CyFlash.h
 - CyLib.c
 - CyLib.h
 - cymem.a51
 - cy pins.h

```
18
19 /* Initialize, start components */
20 Timer_1_Start();
21 isr_1_Start();
22 LCD_Start();
23 LCD_Position(0,2);
24 LCD_PrintString("My Name");
25
26 for(;;)
27 {
28     /* Check if flag is set in ISR */
29     if(toggle_flag == 1)
30     {
31         /* Toggle the LED1 pin */
32         LED1_Write(~LED1_ReadDataReg());
33
34         /* Clear the flag */
35         toggle_flag = 0;
36     }
37 }
38
39
40 /* [] END OF FILE */
41
```

Notice List

0 Errors 0 Warnings

De...	File
-------	------

Output

Show output from: All

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.

Ready Ln 5 Col 2 INS 0 Errors 0 Warnings 2 Notes



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSoC3\...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_PK
 - LCD_LCDP1
 - LCD_LCD
 - LCD_LCD
 - LCD_LCD
 - LED1
 - LED1.c

Source Components Datasheets Results

```
1 /*****  
2 * File Name: isr_1.c  
3 * Version 1.60  
4 *  
5 * Description:  
6 *   API for controlling the state of an interrupt.  
7 *  
8 *  
9 * Note:  
10 *  
11 *****/  
12 * Copyright 2008-2010, Cypress Semiconductor Corporation. All rights reserved.  
13 * You may use this file only in accordance with the license, terms, conditions,  
14 * disclaimers, and limitations in the end user license agreement accompanying  
15 * the software package with which this file was provided.  
16 *****/  
17  
18  
19 #include <CYDEVICE.H>  
20 #include <CYDEVICE_TRM.H>  
21 #include <CYLIB.H>  
22 #include <isr_1.H>  
23  
24  
25 /*****
```

Notice List

0 Errors 0 Warnings

De...	File
-------	------

Output

Show output from: All

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSoC3\...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_PK
 - LCD_LCDP1
 - LCD_LCD
 - LCD_LCD
 - LCD_LCD
 - LED1
 - LED1.c

Source Components Datasheets Results

```
25 | /*****  
26 | * Place your includes, defines and code here  
27 | *****/  
28 | /* `#START isr_1_intc` */  
29 | /* `#END` */  
30 | /*****  
31 | * Function Name: isr_1_Start  
32 | *****/  
33 | * Summary:  
34 | * Set up the interrupt and enable it.  
35 | * Parameters:  
36 | * void.  
37 | * Return:  
38 | * void.  
39 | *****/  
40 | void isr_1_Start(void)  
41 | {  
42 |     /* For all we know the interrupt is active. */  
43 |     isr_1_Disable();  
44 |  
45 |     /* Set the ISR to point to the isr_1 Interrupt. */  
46 |     isr_1_SetVector(isr_1_Interrupt);  
47 |  
48 |     /* Set the priority. */  
49 |     isr_1_SetPriority(isr_1_Intc_Prior_Number);  
50 | }
```

Output

Show output from: All

```
Protecting...  
Verify Checksum...  
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
```

Notice List

- 0 Errors
- 0 Warnings

De...	File
-------	------

Ready

Ln 39 Col 1 INS 0 Errors 0 Warnings 2 Notes

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PiculInterruptProject.cydsn\Generated_Source\PSoC3\cy_boot\isr_1.c]

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_PK
 - LCD_LCDP
 - LCD_LCD
 - LCD_LCD
 - LCD_LCD
 - LED1
 - LED1.c

```

50
51     /* Enable it. */
52     isr_1_Enable();
53 }
54 /*****
55  * Function Name: isr_1_StartEx
56  *
57  * Summary:
58  * Set up the interrupt and enable it.
59  * Parameters:
60  * address: Address of the ISR to set in the interrupt vector table.
61  * Return:
62  * void.
63  *****/
64 void isr_1_StartEx(cyisraddress address)
65 {
66     /* For all we know the interrupt is active. */
67     isr_1_Disable();
68
69     /* Set the ISR to point to the isr_1 Interrupt. */
70     isr_1_SetVector(address);
71
72     /* Set the priority. */
73     isr_1_SetPriority(isr_1_INTC_PRIOR_NUMBER);
74

```

Notice List

0 Errors 0 Warnings

De...	File

Output

Show output from: All

```

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.

```

Ready

Ln 63 Col 1 INS 0 Errors 0 Warnings 2 Notes

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PiculInterruptProject.cydsn\Generated_Source\PSoC3\main.c]

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_Pt
 - LCD_LCDP...
 - LCD_LC
 - LCD_LC
 - LCD_LC
 - LED1
 - LED1.c

```

74
75     /* Enable it. */
76     isr_1_Enable();
77 }
78
79 /*****
80 * Function Name: isr_1_Stop
81 *****/
82 * Summary:
83 *   Disables and removes the interrupt.
84 *
85 * Parameters:
86 *
87 *
88 * Return:
89 *   void.
90 *
91 *****/
92 void isr_1_Stop(void)
93 {
94     /* Disable this interrupt. */
95     isr_1_Disable();
96 }
97
98 /*****
  
```

Notice List

0 Errors 0 Warnings

De...	File

Output

Show output from: All

```

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
  
```

Ready

Ln 63 Col 1 INS 0 Errors 0 Warnings 2 Notes



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PiculInterruptProject.cydsn\Generated_Source\PSoc...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_Pt
 - LCD_LCDP...
 - LCD_LC
 - LCD_LC
 - LCD_LC
 - LED1
 - LED1.c

Source Components Datasheets Results

```
98 /*****
99 * Function Name: isr_1_Interrupt
100 *****/
101 * Summary:
102 *   The default Interrupt Service Routine for isr_1.
103 *   Add custom code between the coments to keep the next version of this file
104 *   from over writing your code.
105 * Parameters:
106 * Return:
107 *   void.
108 *****/
109 CY_ISR(isr_1_Interrupt)
110 {
111     /* Place your Interrupt code here. */
112     /* `#START isr_1_Interrupt` */
113
114     /* `#END` */
115
116     /* PSoC3 ES1, ES2 RTC ISR PATCH */
117     #if(CYDEV_CHIP_FAMILY_USED == CYDEV_CHIP_FAMILY_PSOC3)
118         #if((CYDEV_CHIP_REVISION_USED <= CYDEV_CHIP_REVISION_3A_ES2) && (isr_1__ES2_PATCH))
119             isr_1_ISR_PATCH();
120         #endif
121     #endif
122 }
```

Notice List

0 Errors 0 Warnings

De... File

Output

Show output from: All

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.

Ready

Ln 108 Col 1 INS 0 Errors 0 Warnings 2 Notes

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSoC3\...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_P1
 - LCD_LCDP1
 - LCD_LC
 - LCD_LC
 - LCD_LC
 - LED1
 - LED1.c

```

124 /*****
125 * Function Name: isr_1_SetVector
126 *****/
127 * Summary:
128 *   Change the ISR vector for the Interrupt. Note calling isr_1_Start
129 *   will override any effect this method would have had. To set the vector before
130 *   the component has been started use isr_1_StartEx instead.
131 * Parameters:
132 *   address: Address of the ISR to set in the interrupt vector table.
133 * Return:
134 *   void.
135 *****/
136 void isr_1_SetVector(cyisraddress address)
137 {
138     CY_SET_REG16(isr_1_INTC_VECTOR, (uint16) address);
139 }
140
141 /*****
142 * Function Name: isr_1_GetVector
143 *****/
144 * Summary:
145 *   Gets the "address" of the current ISR vector for the Interrupt.
146 * Parameters:
147 *   void.
148 *

```

Notice List

0 Errors 0 Warnings

De...	File

Output

Show output from: All

```

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.

```

Ready

Ln 146 Col 1 INS 0 Errors 0 Warnings 2 Notes



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSoC3\LED1\LED1.c]

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_P1
 - LCD_LCDP1
 - LCD_LCD
 - LCD_LCD
 - LCD_LCD
 - LED1
 - LED1.c

```
146 * Parameters:
147 * void.
148 * Return:
149 * Address of the ISR in the interrupt vector table.
150 *****/
151 cyisraddress isr_1_GetVector(void)
152 {
153     return (cyisraddress) CY_GET_REG16(isr_1_INTC_VECTOR);
154 }
155
156 /******
157 * Function Name: isr_1_SetPriority
158 *****/
159 * Summary:
160 * Sets the Priority of the Interrupt. Note calling isr_1_Start
161 * or isr_1_StartEx will override any effect this method would have had.
162 * This method should only be called after isr_1_Start or
163 * isr_1_StartEx has been called. To set the initial
164 * priority for the component use the cydwr file in the tool.
165 * Parameters:
166 * priority: Priority of the interrupt. 0 - 7, 0 being the highest.
167 * Return:
168 * void.
169 *
170 *****/
```

Notice List

0 Errors 0 Warnings

De...	File
-------	------

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
```



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSoC3\...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_PK
 - LCD_LCDP1
 - LCD_LC
 - LCD_LC
 - LCD_LC
 - LED1
 - LED1.c

Source Components Datasheets Results

```
170 | *****/
171 | void isr_1_SetPriority(uint8 priority)
172 | {
173 |     *isr_1_INTC_PRIOR = priority << 5;
174 | }
175 |
176 | /*****/
177 | * Function Name: isr_1_GetPriority
178 | *****/
179 | * Summary:
180 | * Gets the Priority of the Interrupt.
181 | * Parameters:
182 | * void.
183 | * Return:
184 | * Priority of the interrupt. 0 - 7, 0 being the highest.
185 | *****/
186 | uint8 isr_1_GetPriority(void)
187 | {
188 |     uint8 priority;
189 |
190 |
191 |     priority = *isr_1_INTC_PRIOR >> 5;
192 |
193 |     return priority;
194 | }
```

Output

Show output from: All

Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.

Notice List

0 Errors 0 Warnings

De...	File
-------	------

Ready

Ln 185 Col 1 INS 0 Errors 0 Warnings 2 Notes



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSoc...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_PH
 - LCD_LCDP1
 - LCD_LCD
 - LCD_LCD
 - LCD_LCD
 - LED1
 - LED1.c

Source Components Datasheets Results

```
196 /*****
197 * Function Name: isr_1_Enable
198 *****/
199 * Summary:
200 *   Enables the interrupt.
201 * Parameters:
202 *   void.
203 * Return:
204 *   void.
205 *****/
206 void isr_1_Enable(void)
207 {
208     /* Enable the general interrupt. */
209     *isr_1_INTC_SET_EN = isr_1__INTC_MASK;
210 }
211 /*****
212 * Function Name: isr_1_GetState
213 *****/
214 * Summary:
215 *   Gets the state (enabled, disabled) of the Interrupt.
216 * Parameters:
217 *   void.
218 * Return:
219 *   1 if enabled, 0 if disabled.
220 *****/
```

Notice List

- 0 Errors
- 0 Warnings

De...	File
-------	------

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
```

Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PiculInterruptProject.cydsn\Generated_Source\PSoC3\...

File Edit View Debug Project Build Tools Window Help

Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_Pt
 - LCD_LCDP
 - LCD_LCD
 - LCD_LCD
 - LCD_LCD
 - LED1
 - LED1.c

```

220 | *****/
221 | uint8 isr_1_GetState(void)
222 | {
223 |     /* Get the state of the general interrupt. */
224 |     return (*isr_1_INTC_SET_EN & isr_1__INTC_MASK) ? 1:0;
225 | }
226 |
227 | /*****
228 | * Function Name: isr_1_Disable
229 | *****/
230 | * Summary:
231 | *   Disables the Interrupt.
232 | * Parameters:
233 | *   void.
234 | * Return:
235 | *   void.
236 | *
237 | *****/
238 | void isr_1_Disable(void)
239 | {
240 |     /* Disable the general interrupt. */
241 |     *isr_1_INTC_CLR_EN = isr_1__INTC_MASK;
242 | }
243 |
244 | *****/
    
```

Notice List

0 Errors 0 Warnings

De...	File

Output

Show output from: All

Protecting...
 Verify Checksum...
 Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.



Lab_4 Interrupts

AN54460 - PSoC Creator 2.1 [D:\...\AN54460\B_PicInterruptProject.cydsn\Generated_Source\PSo...

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Debug

Workspace Explorer (4 ...)

- Header Files
 - device.h
- Source Files
 - main.c
- Generated_Source
 - PSoC3
 - cy_boot
 - isr_1
 - isr_1.c
 - isr_1.h
 - LCD
 - LCD.c
 - LCD.h
 - LCD_PH
 - LCD_LCDP
 - LCD_LC
 - LCD_LC
 - LCD_LC
 - LED1
 - LED1.c

```
246 *****
247 * Summary:
248 * Causes the Interrupt to enter the pending state, a software method of
249 * generating the interrupt.
250 * Parameters:
251 * void.
252 * Return:
253 * void.
254 *****/
255 void isr_1_SetPending(void)
256 {
257     *isr_1_INTC_SET_PD = isr_1_INTC_MASK;
258 }
259
260 /*****
261 * Function Name: isr_1_ClearPending
262 *****
263 * Summary:
264 * Clears a pending interrupt.
265 * Parameters:
266 * void.
267 * Return:
268 * void.
269 *
270 *****/
```

Notice List

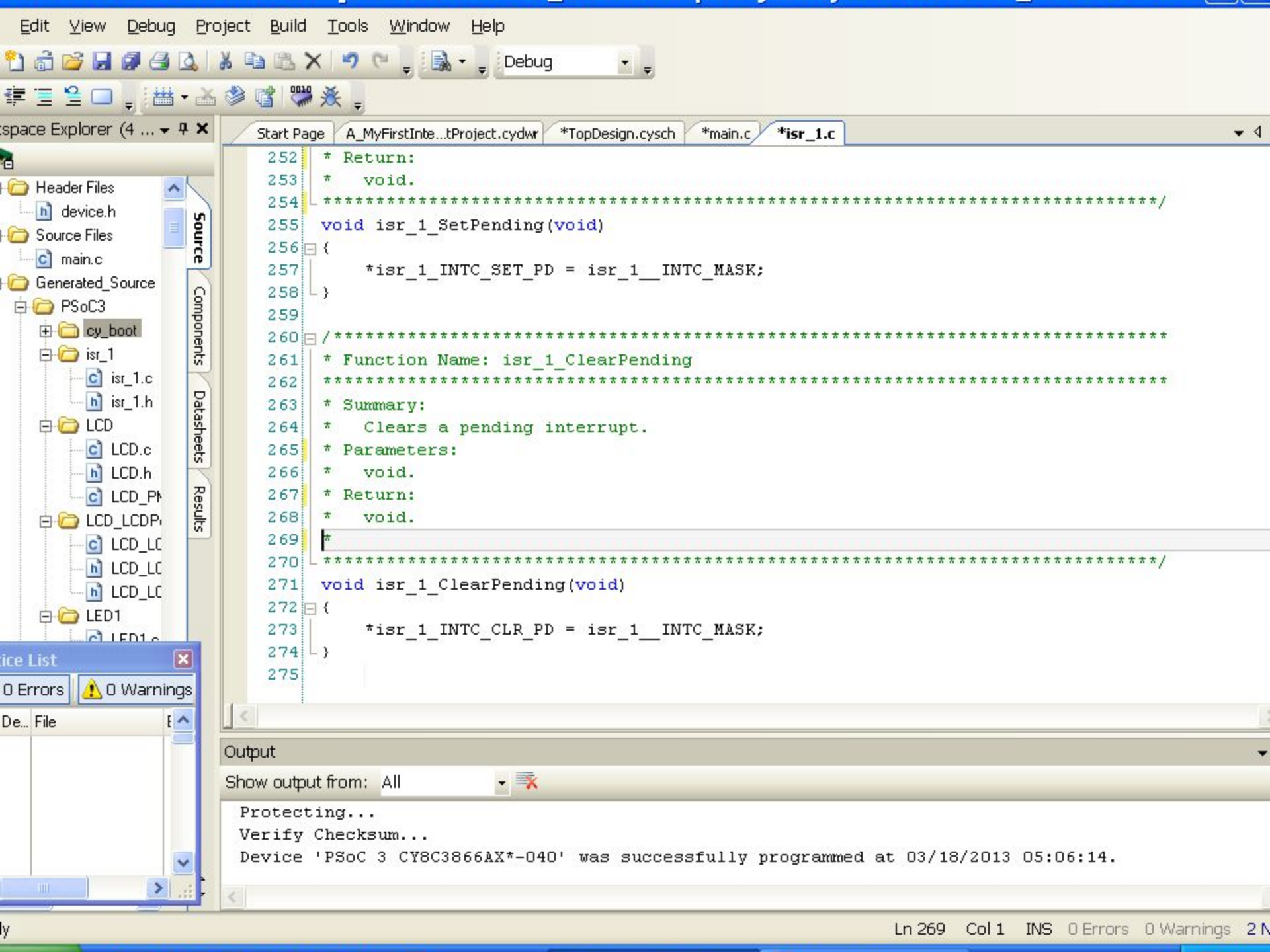
0 Errors 0 Warnings

De...	File
-------	------

Output

Show output from: All

```
Protecting...
Verify Checksum...
Device 'PSoC 3 CY8C3866AX*-040' was successfully programmed at 03/18/2013 05:06:14.
```

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Product Family	Descriptive Name	Date	Downloads
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PSoC Mixed-Signal Array	AN2260 - Standard - Rapid NiCd/NiMH Battery Charger and DC Brushed Motor Controller for Autonomous Appliances	Apr 15, 2005	AN2260.PDF AN2260.ZIP
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PSoC Mixed-Signal Array	AN2277 - Support - Capacitive Front Panel Display Demonstration	Mar 29, 2005	AN2277.PDF AN2277.ZIP

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