Getting Started USCALE

Examples for XC800

January 2008

Never stop thinking

Agenda

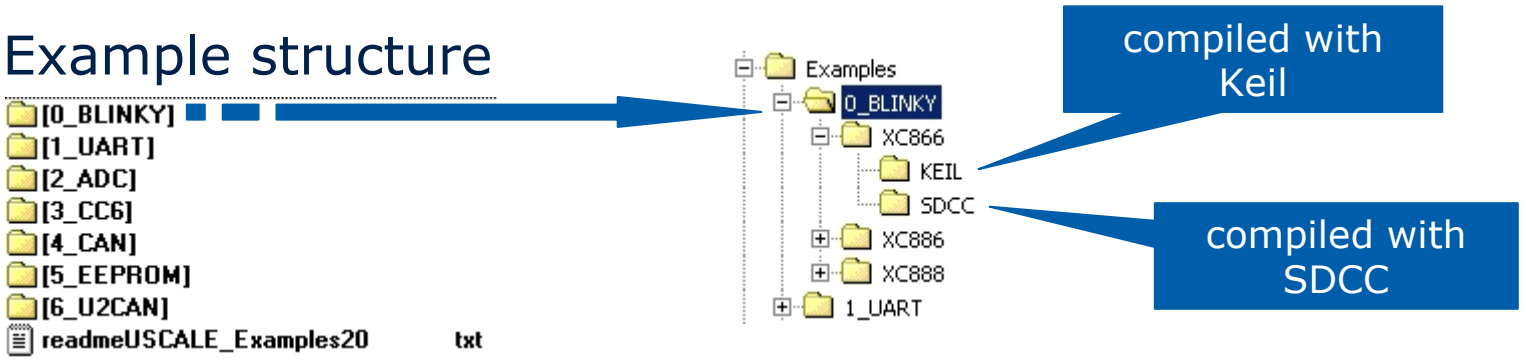
- Overview
- Codegenerator – IDE – Compiler – Debugger
  - Tool Grid for USCALE
  - USCALE Hardware
  - How to USCALE
- Examples with USCALE
  - BLINKY – toggle portpin P1.5
  - UART – communicating with a PC
  - ADC – sampling a rising / falling edge
  - CC6 – compare output and capture input
  - CAN – ping-pong in loopback mode
  - EEPROM – interactive write/erase to DFLASH
  - U2CAN – using USCALE as CANflasher and CANsniffer

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Getting Started USCALE

- This Getting Started shows the usage of a free toolchain for XC800 family based on SDCC-Compiler.
- All necessary tools are shown and explained by hands of running and tested example code.
- All examples are explained shortly showing special features of the XC800 devices.

- Example structure



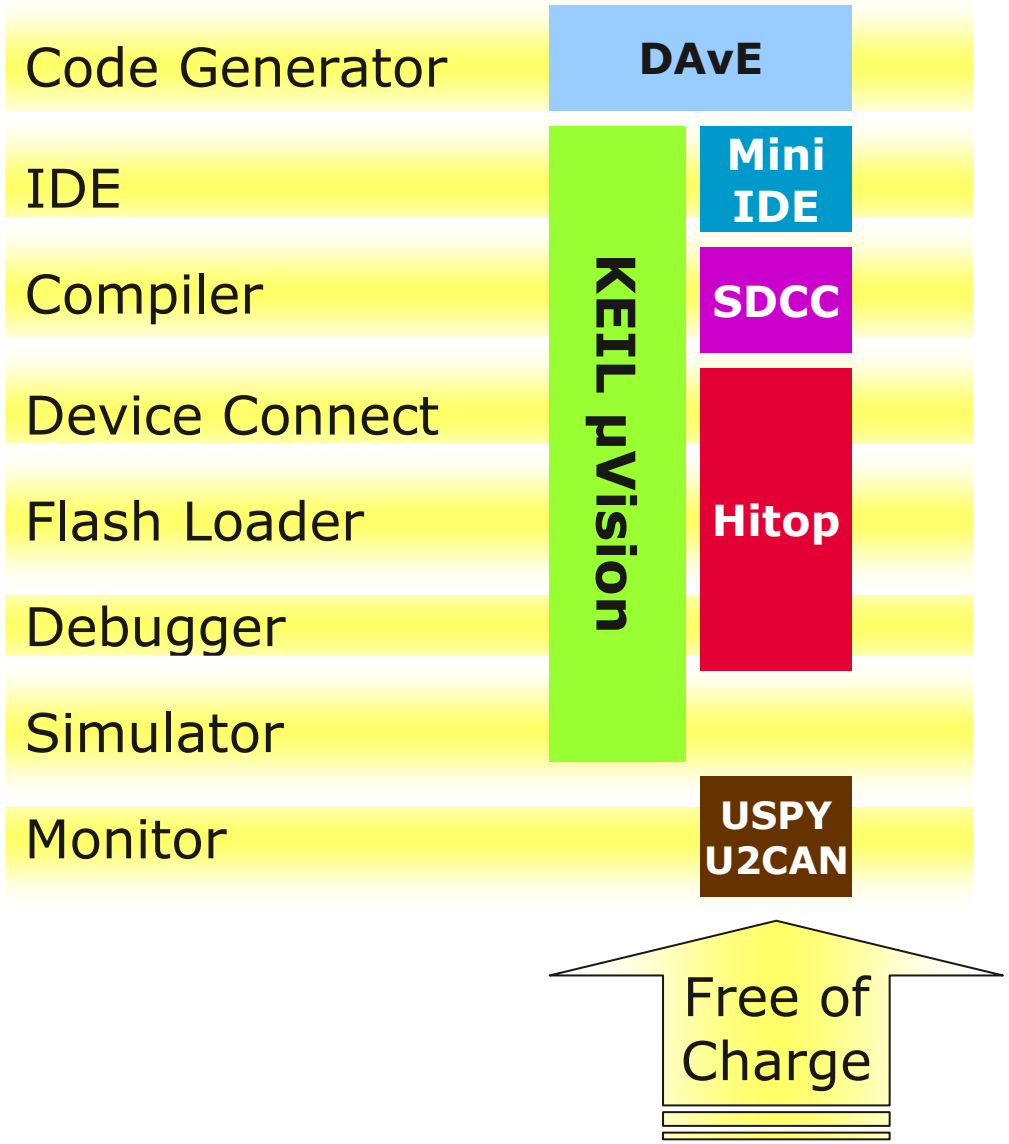
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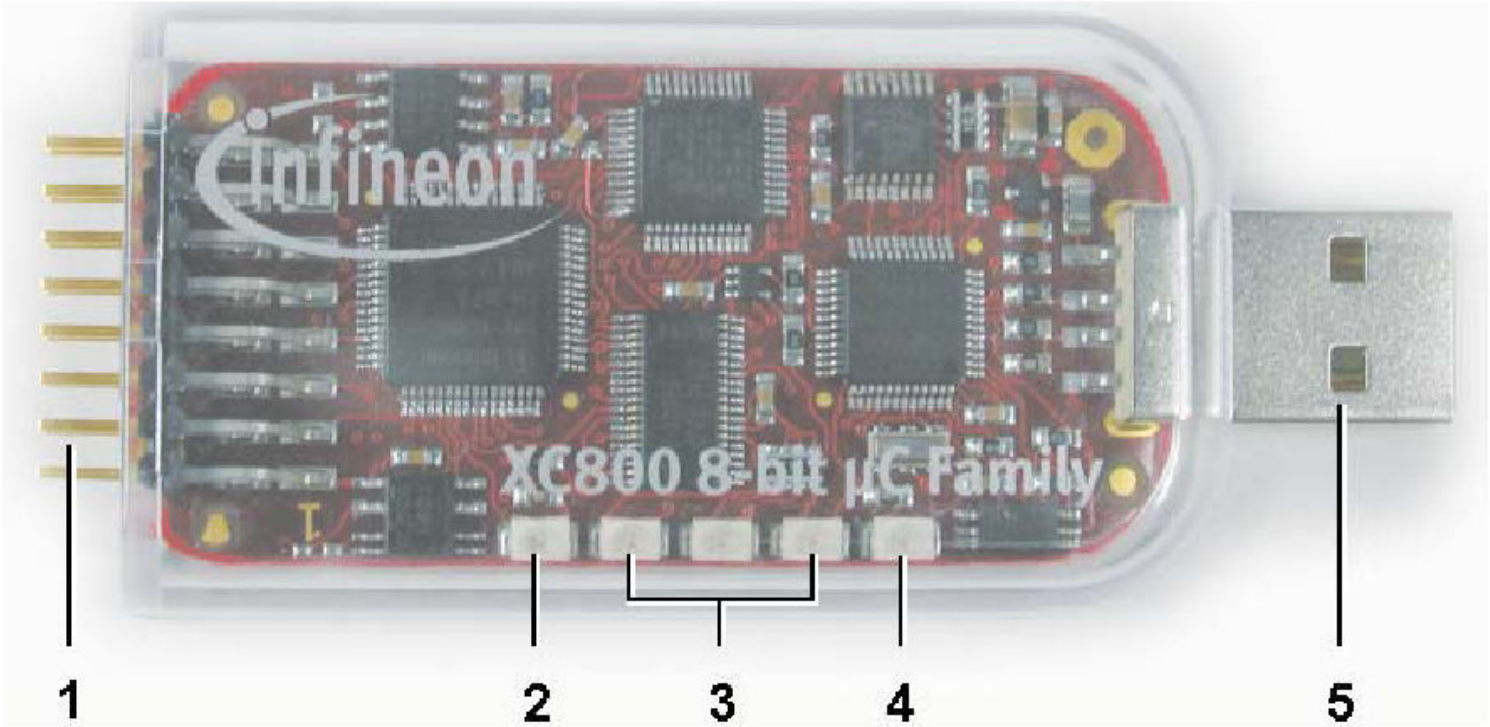
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Tool Grid for USCALE



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USCALE Hardware

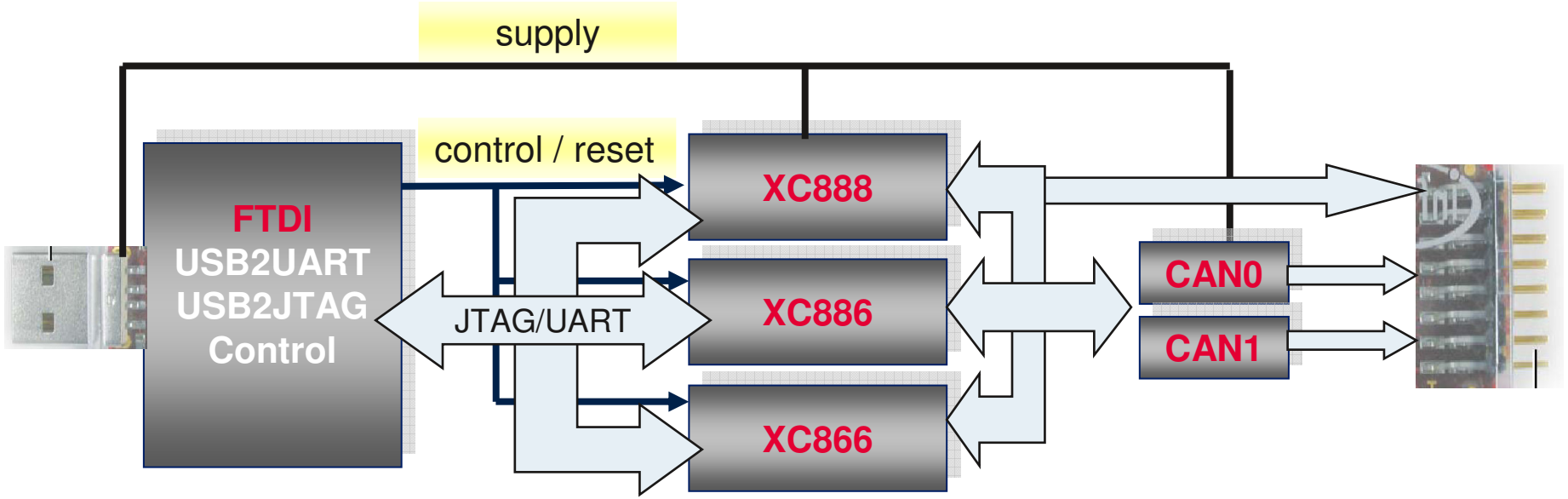


1 Target Connector (for the pin assignment see External Signals and Interfaces)
2 User LED (red)
3 Chip LEDs (yellow) indicating the derivative being active
4 Run LED (green)
5 USB Connector

U CAN XC886CM Debugger – Connections and Controls

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USCALE Hardware – Block Diagram



USCALE Connecter (front view)

15	13	11	9	7	5	3	1
P22 P25/P37	P21 P24/P26	CAN0H* P16**	P2.0 P23/P27	P35	P33	P36	+5V
P31	P34	CAN0L* P17**	CAN1H*	P32	P30	CAN1L*	GND
16	**14**	**12**	**10**	**8**	**6**	**4**	**2**

*XC886/XC888 only **X866 only

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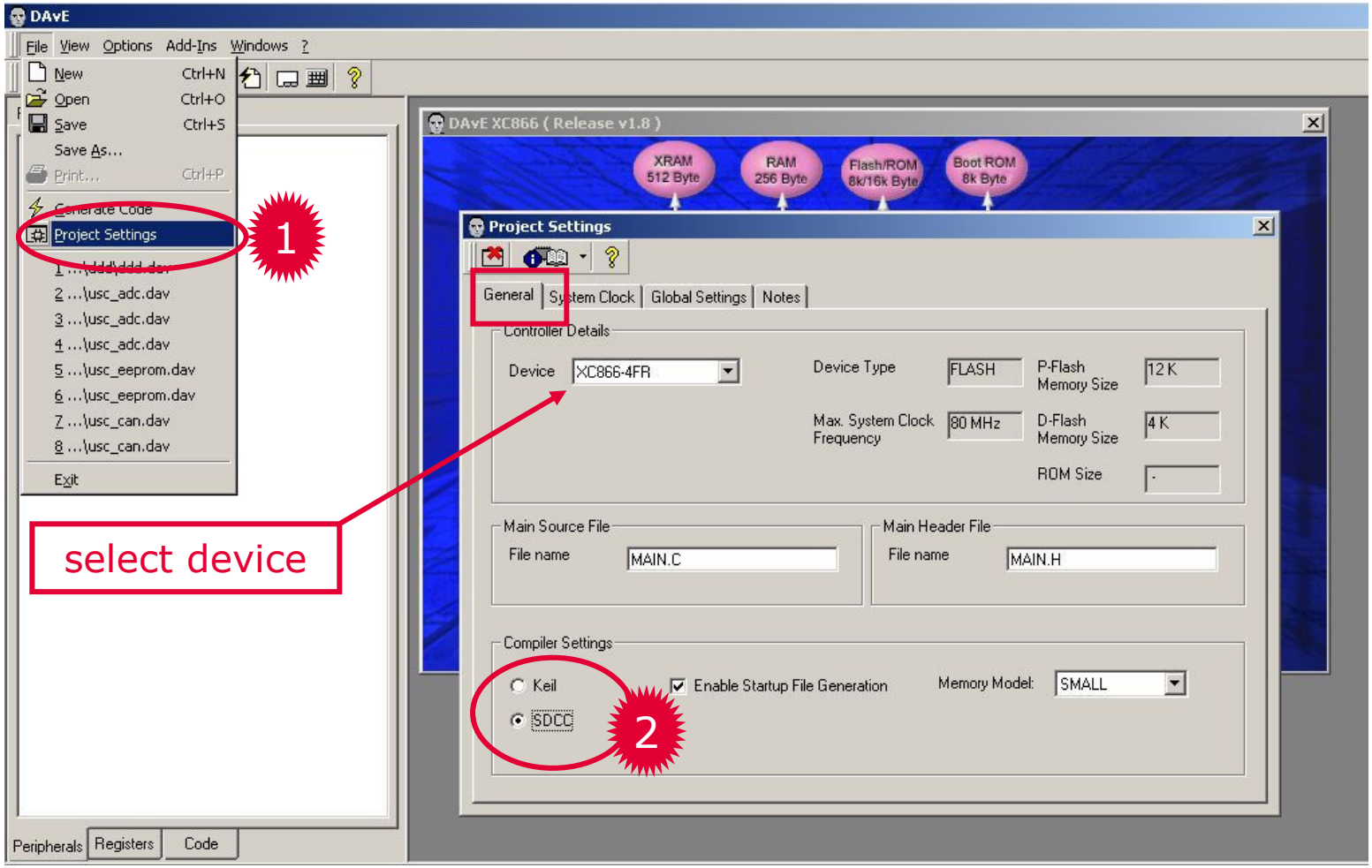
Getting Started – Tool Installation

- DAvE with DIP files (XC866/XC886/XC888)
  - www.infineon.com\dave
- Hitop for USCALE (debugger)
  - and DAS server (for debugger)
  - Note: Hitop requires different installations for different debug boxes (e.g. USCALE and TantinoBox)
  - www.hitex.com\uscale
- SDCC (compiler)
  - sdcc.sourceforge.net
- MiniIDE with DotNet framework (IDE)
  - and MiniIDEpatch (copies *.XML files to \target)
  - and MiniMon (optional debugger)
  - ftp://ftp.extra.infineon.com/xc800/
- USCALECtrl (XC8xx-select tool)
- USPY (monitor)
- PSPad (optional)
  - www.pspad.com

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Getting Started – Example USC_Blinky (1)

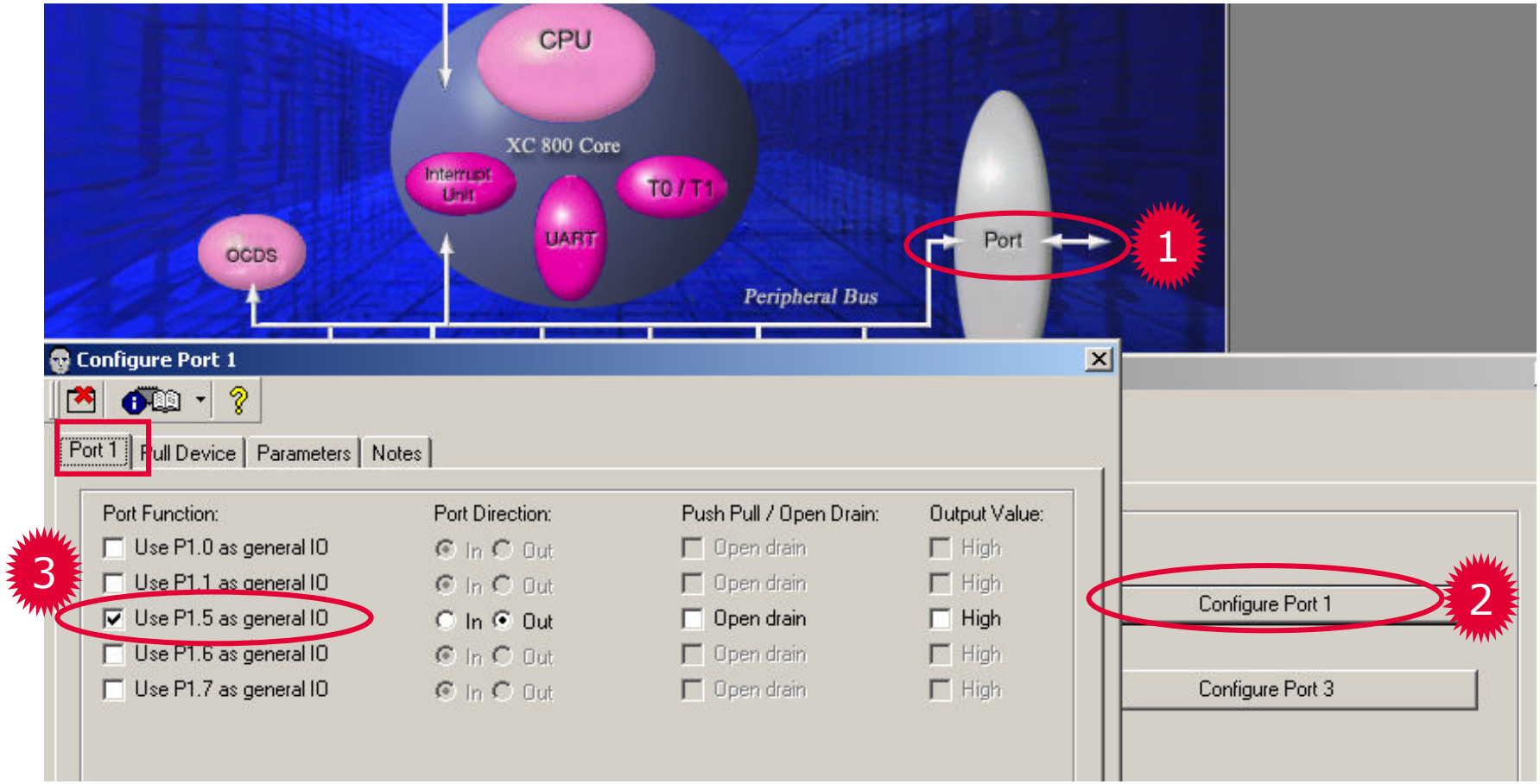
Select SDCC as Compiler and Device



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Getting Started – Example USC_Blinky (2)

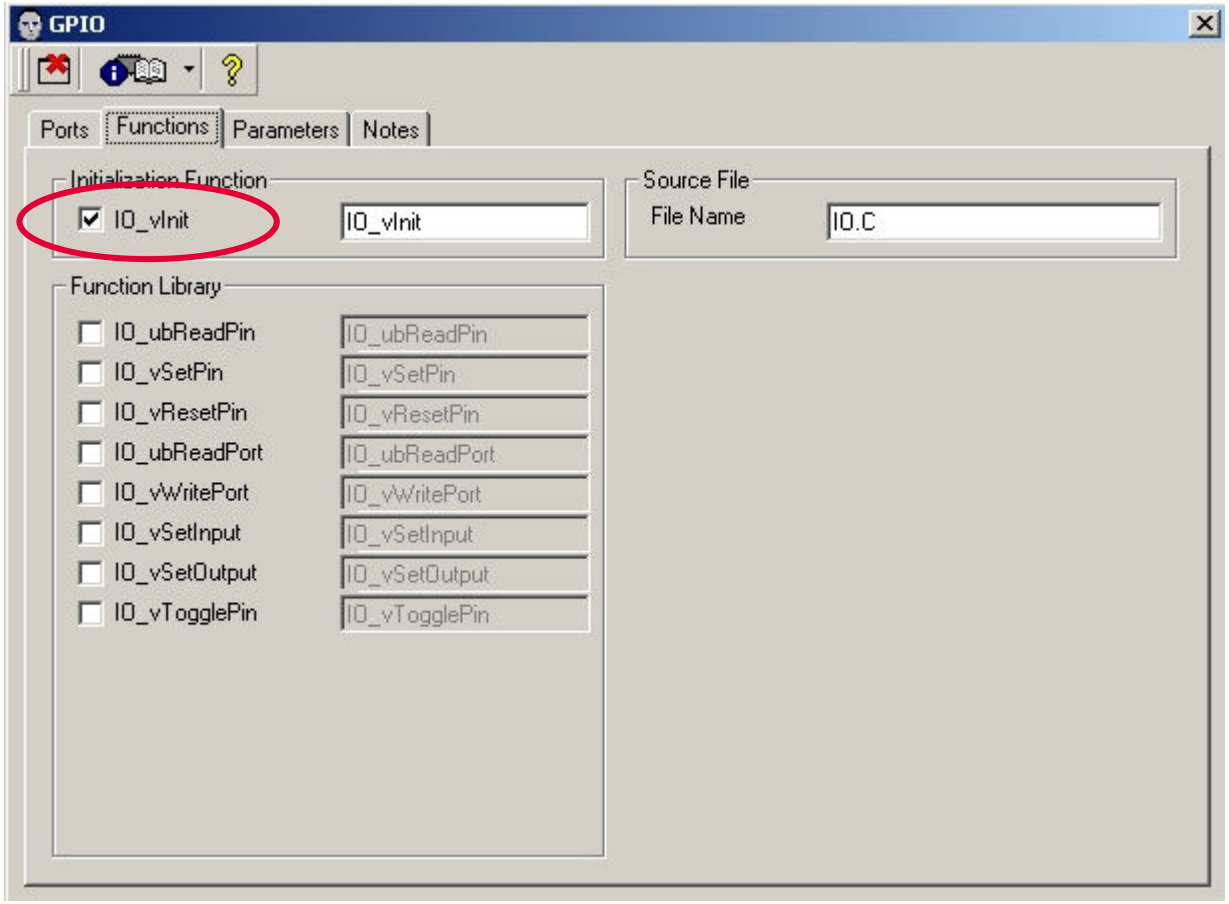
- Configure P1.5 as output



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Getting Started – Example USC_Blinky (3)

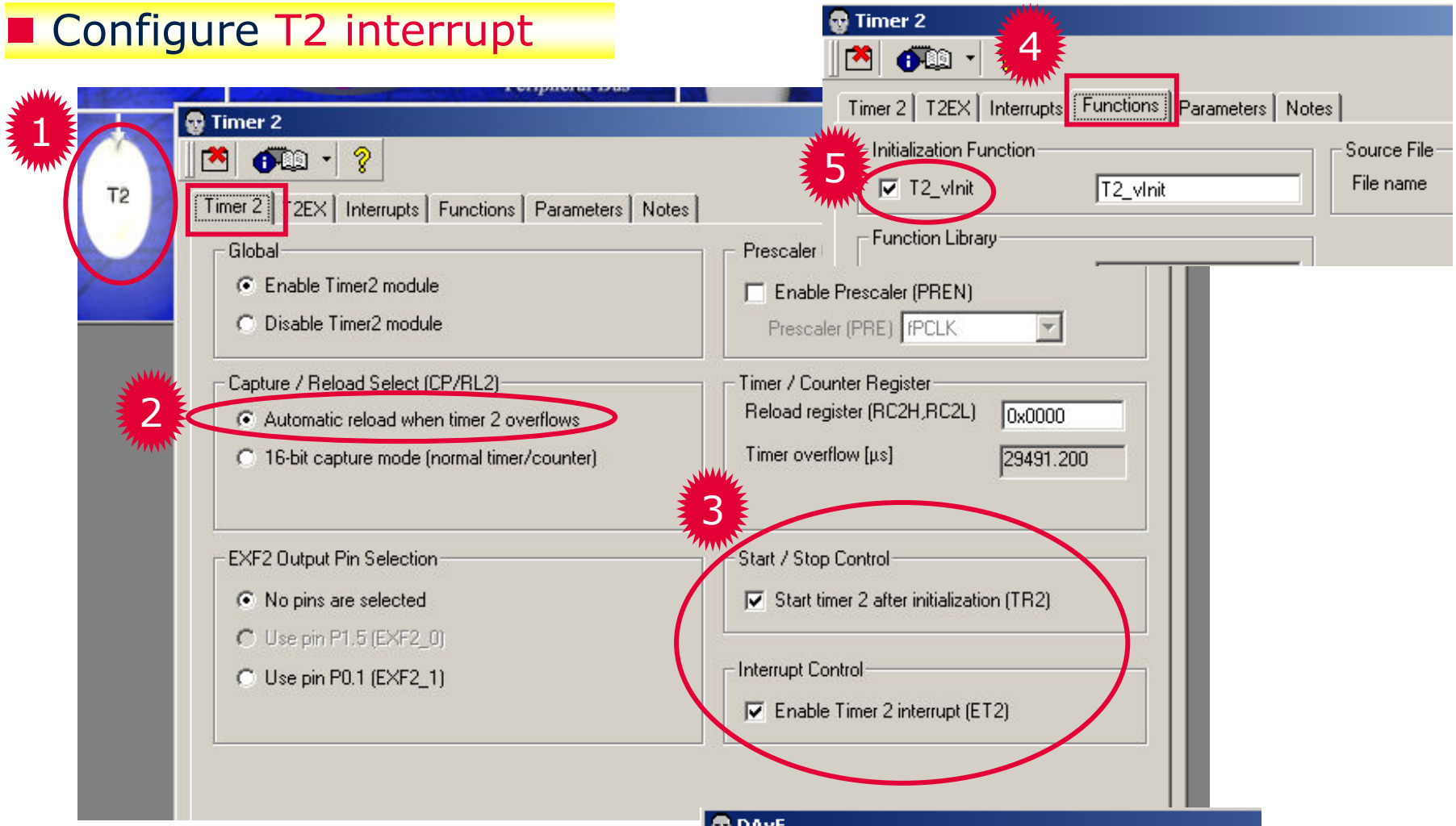
Select Port Functions – IO_vInit



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Getting Started – Example USC_Blinky (4)

- Configure T2 interrupt



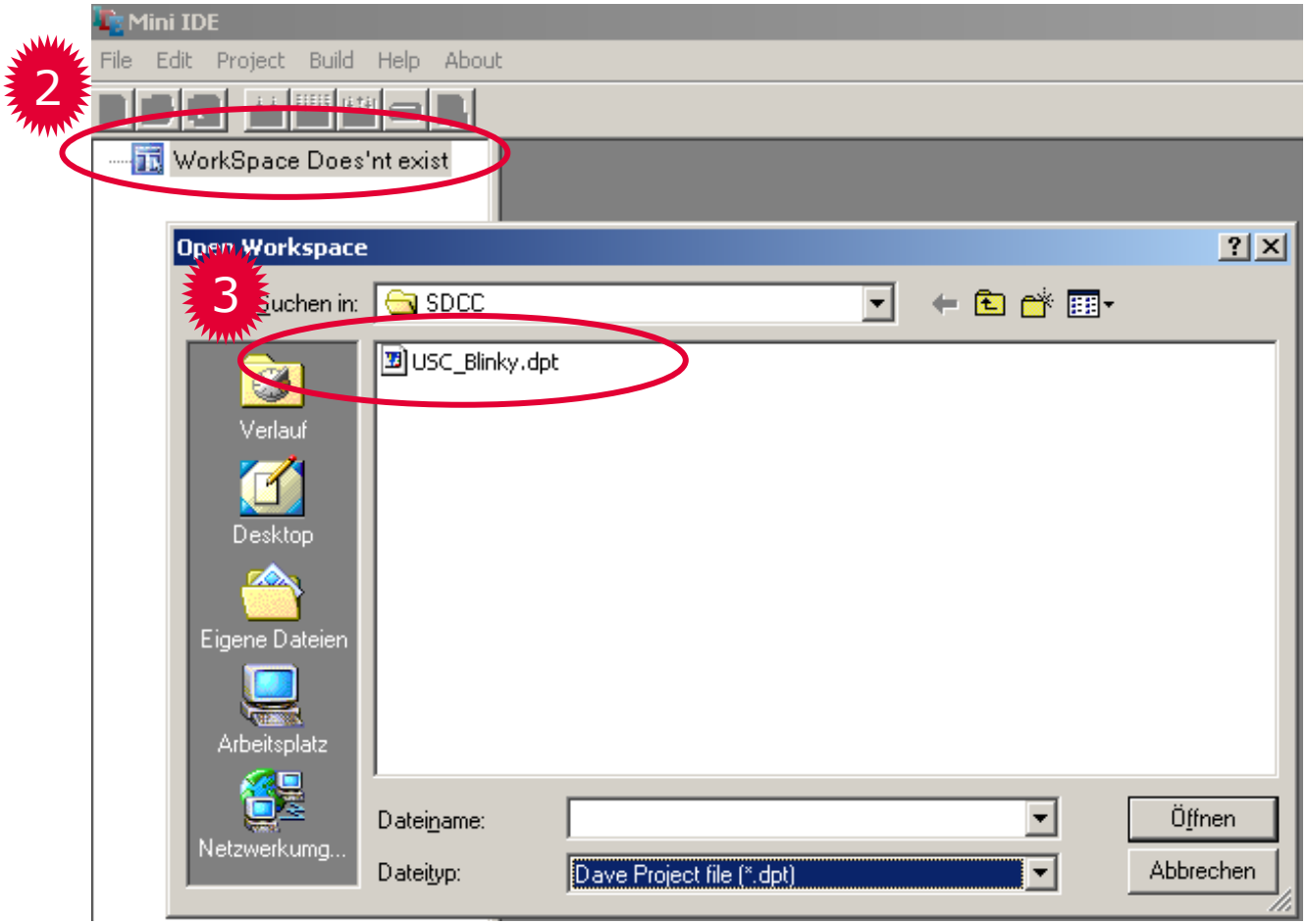
- Generate Initialization Code
  → Blinky.dpt is generated

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Getting Started – Example USC_Blinky (5)

Generate Project Workspace with MiniIDE

1. Start MiniIDE
2. Right click on empty workspace icon and select "Open Existing Workspace"
3. select Blinky.dpt file (DAvE File)

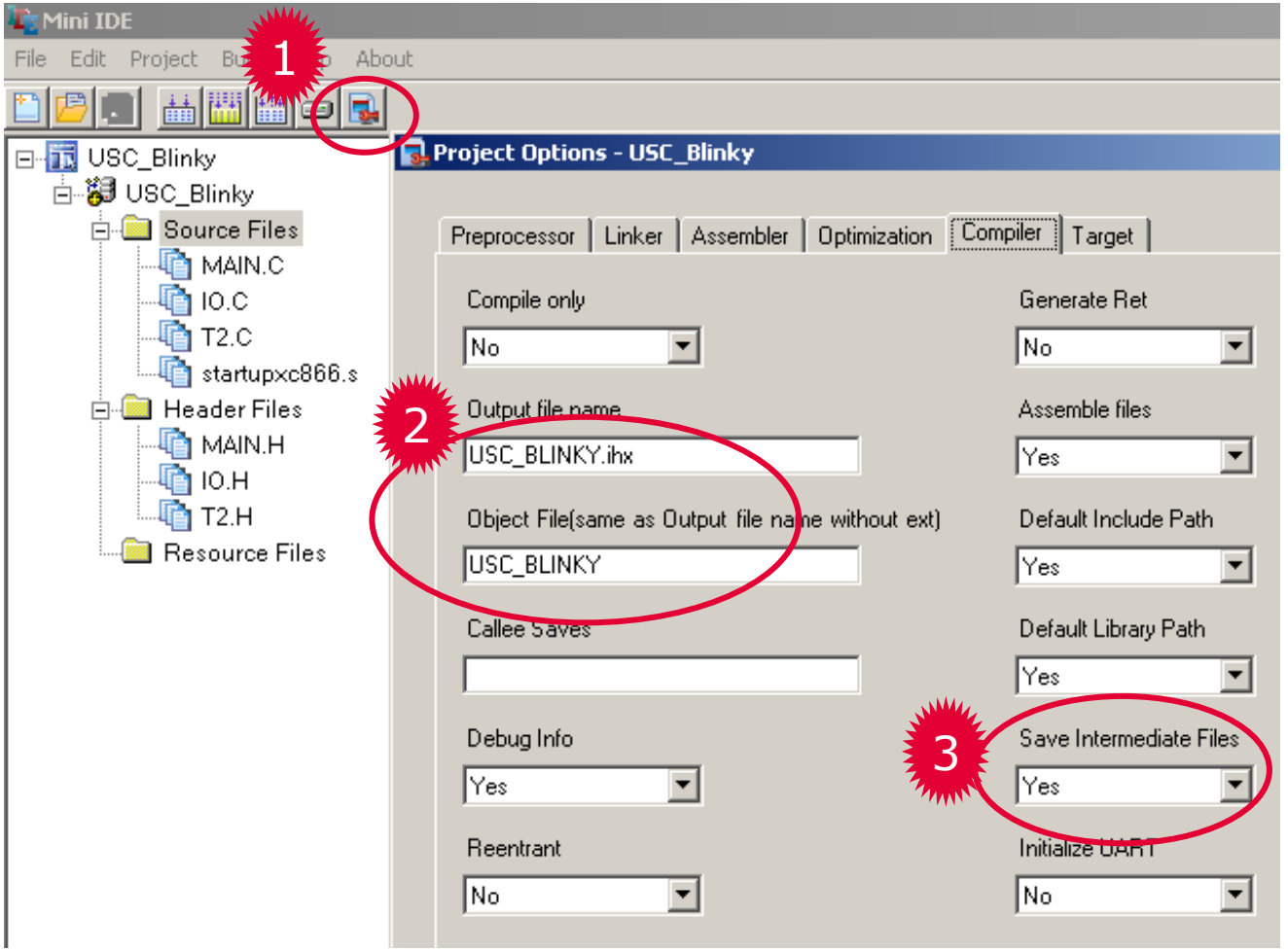


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Getting Started – Example USC_Blinky (6)

- Configure SDDC options

1. Click on "Project Options"
2. Name output file
3. Save Intermediate Files → Yes for mem/map file generation



- Note: Default setting can be changed in *\MiniIDE\IDE\IDE\Compiler\SDCC.XML*

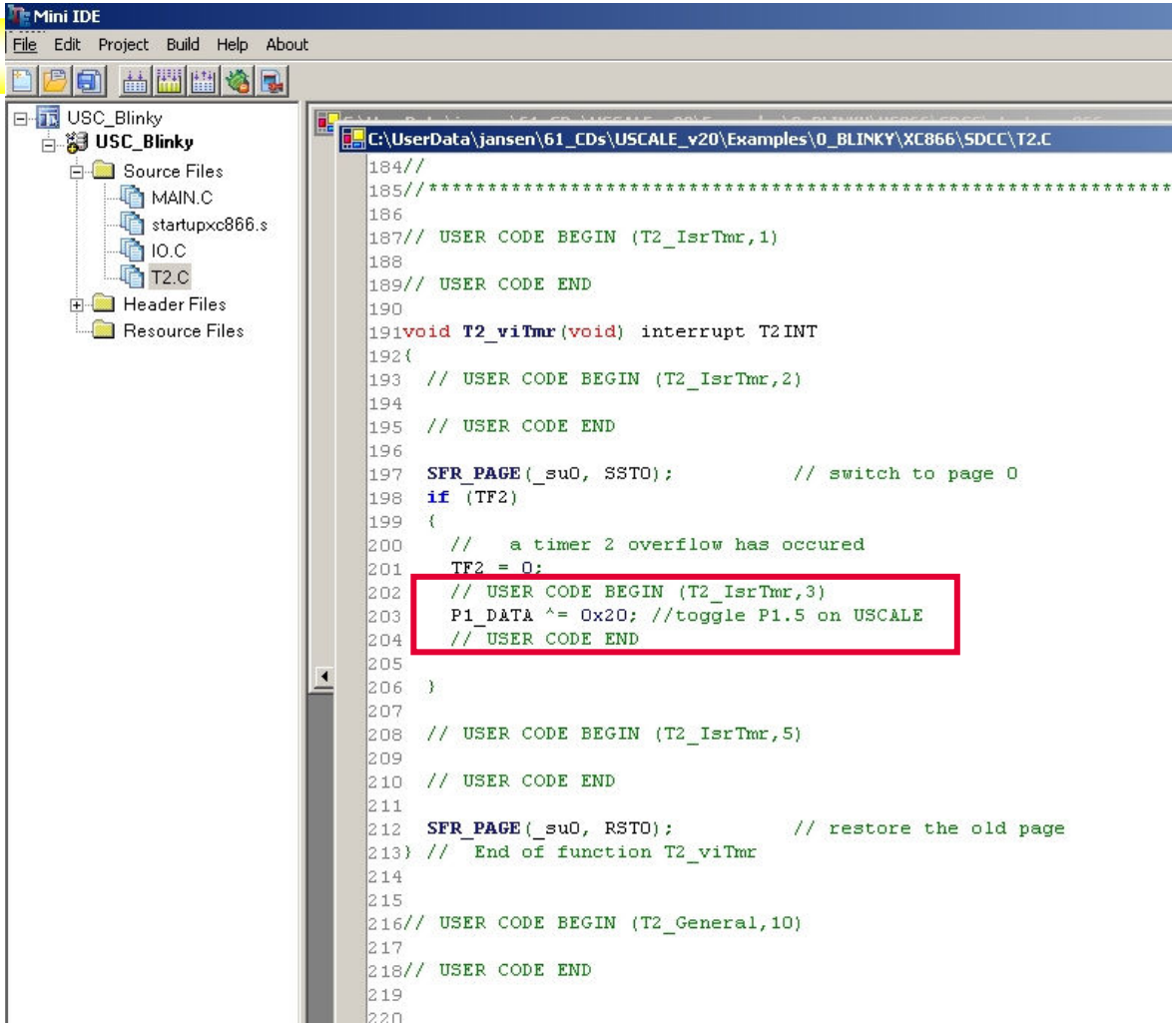
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Getting Started – Example USC_Blinky (7)

Insert User Code

Open T2.C

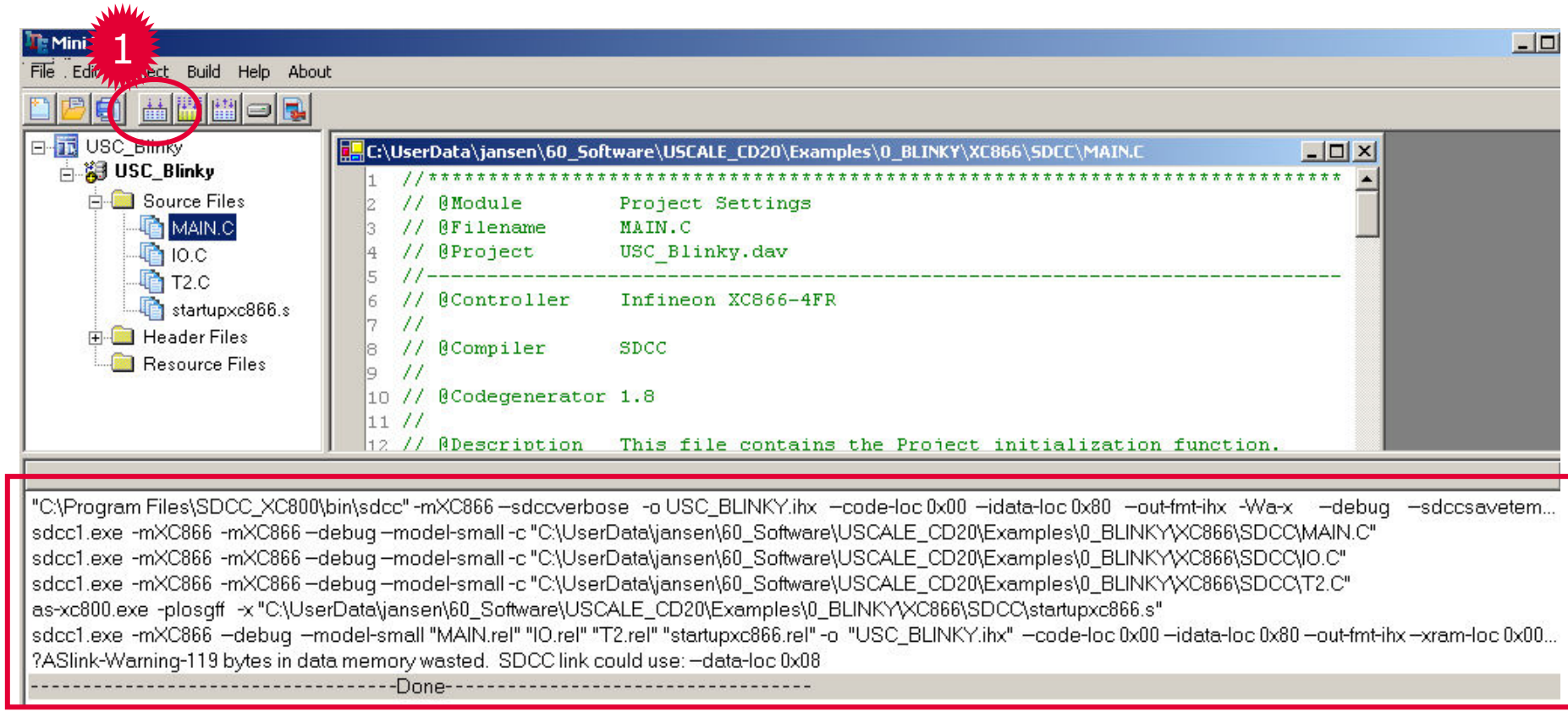
- insert inbetween
  - // user code begin
  - P1_DATA ^= 0x20;
  - // user code end
- this will toggle P1.5 every T2 interrupt



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Getting Started – Example USC_Blinky (8)

Compile



- Watch output window and check on successful compilation
- Save MiniIDE under USC_Blinky.dws

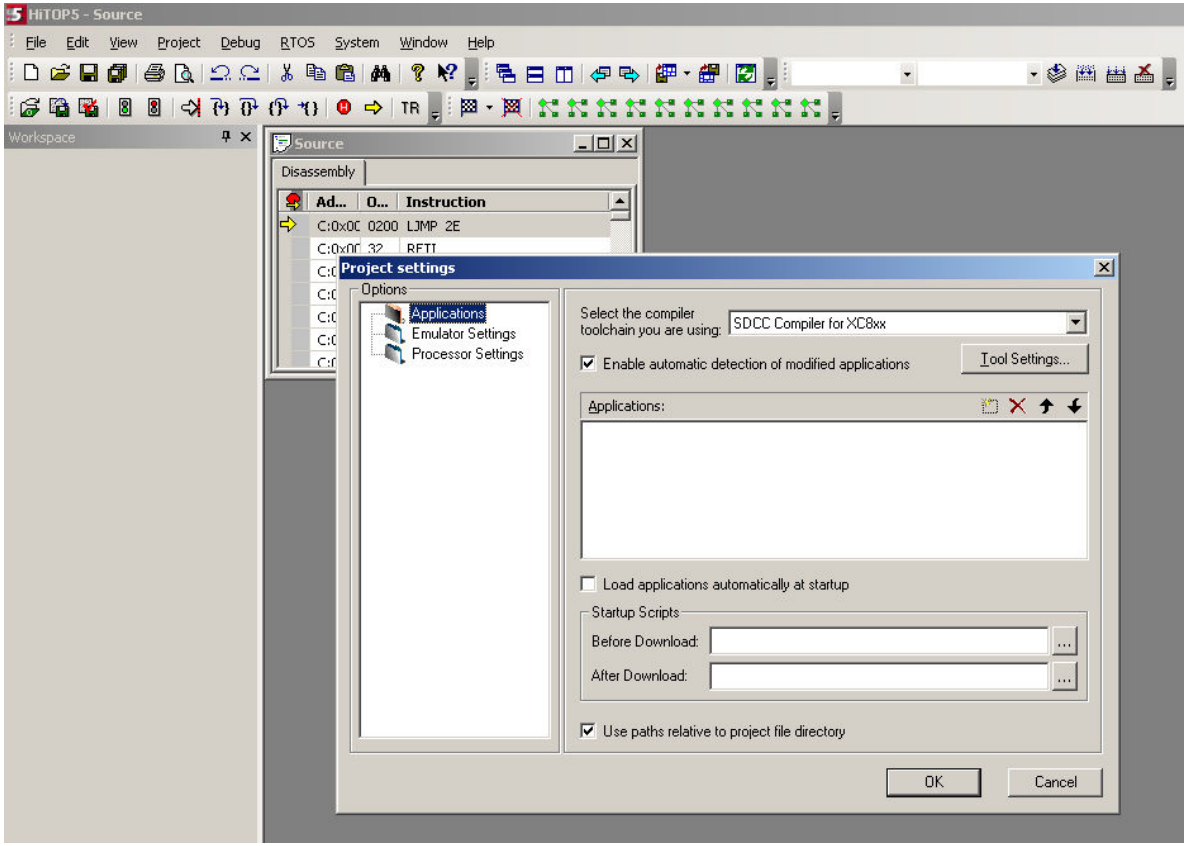
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Getting Started – Example USC_Blinky (9)

Configure Hitop (1)

Now plug in the USCALE to your USB-port

1. Start Hitop for USCALE
2. Click Create Empty Project
3. Name Project and select Folder
4. Follow Tool Selection Guide and choose the correct target device
5. Hitop will now connect to the selected device → the proper LED will turn on
6. Project Settings will pop up



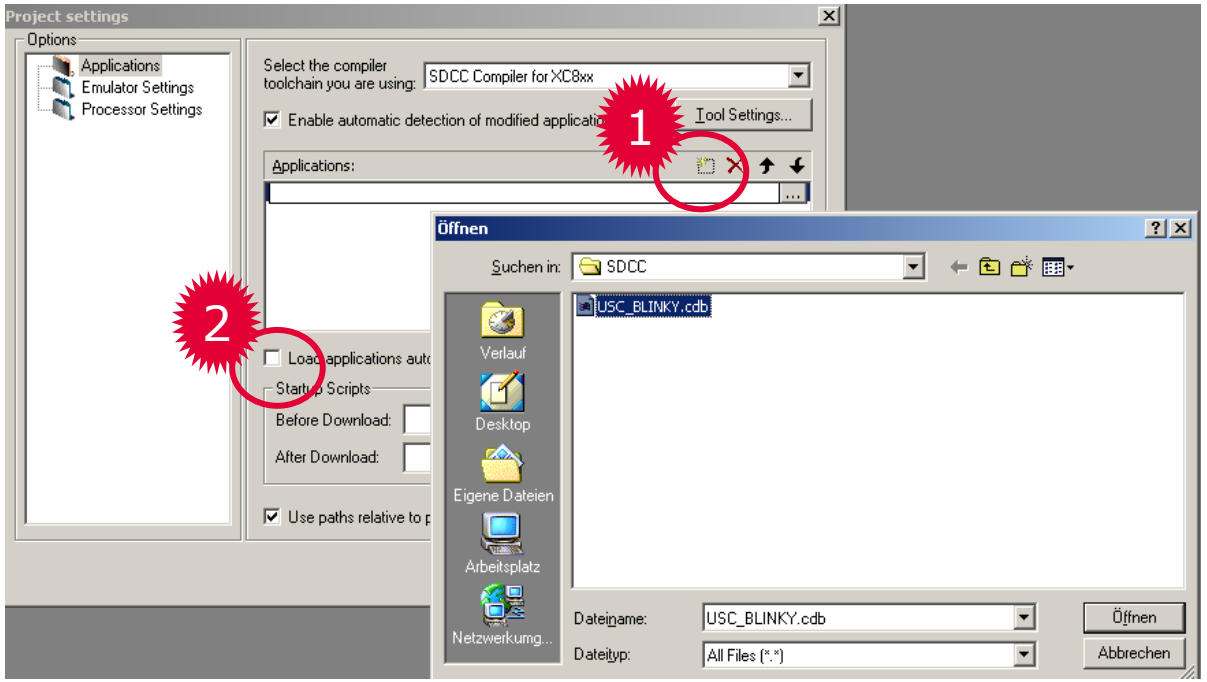
- Note: if the connection to the target device does not work at the first time just try once more.

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Getting Started – Example USC_Blinky (10)

Configure Hitop (2)

1. Add file USC_Blinky.CDB to applications window (this file contains all debug information)
2. Click Load application automatically

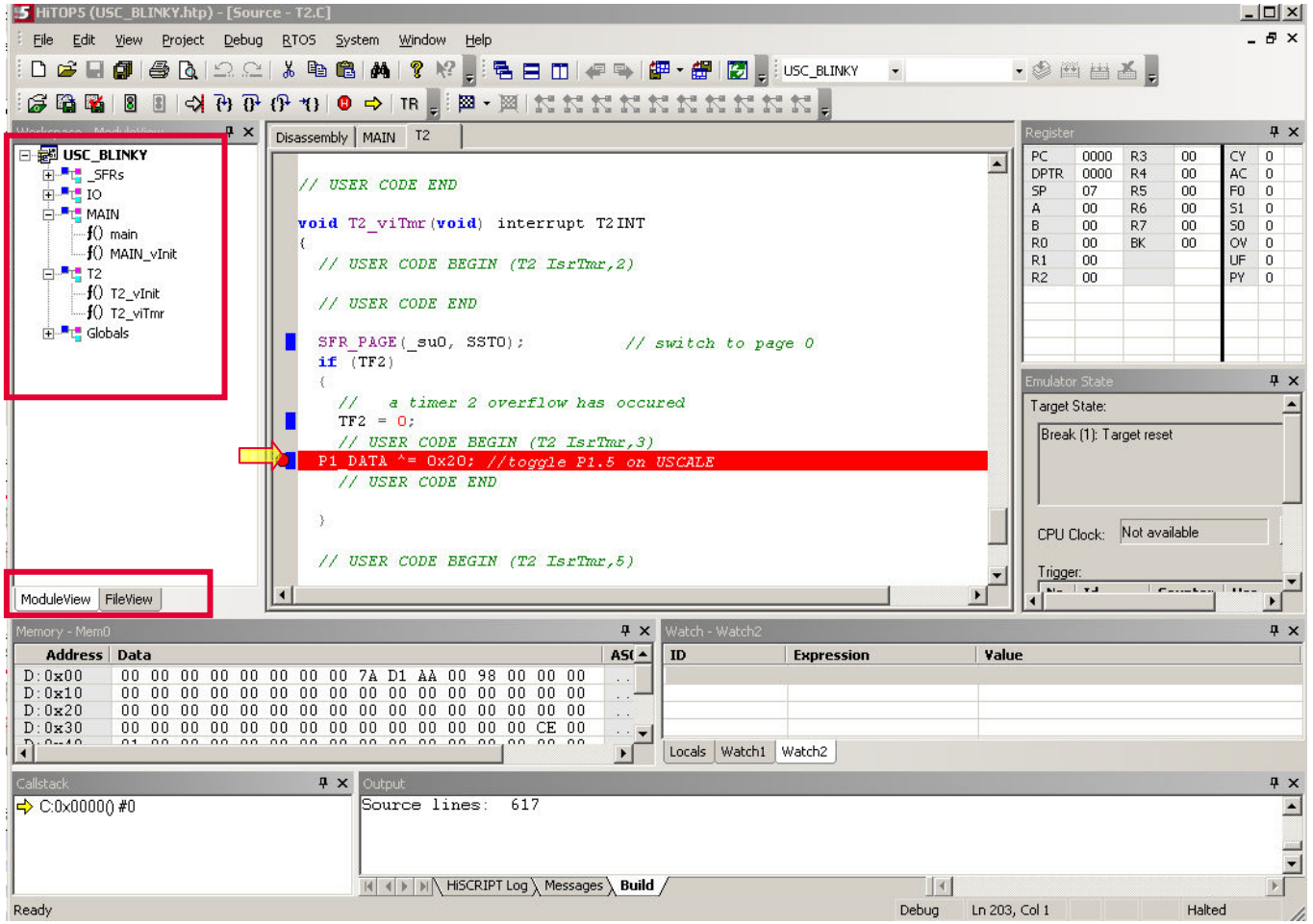


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Getting Started – Example USC_Blinky (11)

Debug with Hitop

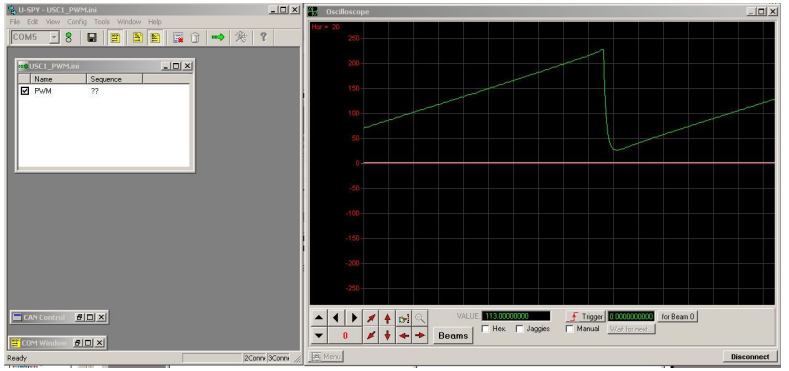
1. Project window is generated from USC_Blinky.cdb with
   - module view
   - file view
2. Click on Debug "Download"
3. Select an interesting point in your application and set a breakpoint with right mouse click
   → red point
4. Press Go (F5)
   → yellow arrow will appear on break hit
5. ... and debug with a professional tool
6. save file under USC_Blinky.dpt



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Getting Started – Monitoring Tools (12)

- USPY
- USPY is a serial (UART) monitor
- Simple commands can be sent directly to target
- → a few variables can be displayed in realtime on a SoftScope (no printf needed, as USPY understands HEX)
- → simple program control thru PC-UART/USB



- U2CAN
- U2CAN is a CAN monitor
- Simple UART-commands can be sent from PC to USCALE which acts as a UART to CAN bridge
- Data from the target can be sent to USCALE and received and displayed on PC
- → variables and buffers can be displayed in realtime on a SoftScope
  → simple program control thru PC-UART/USB

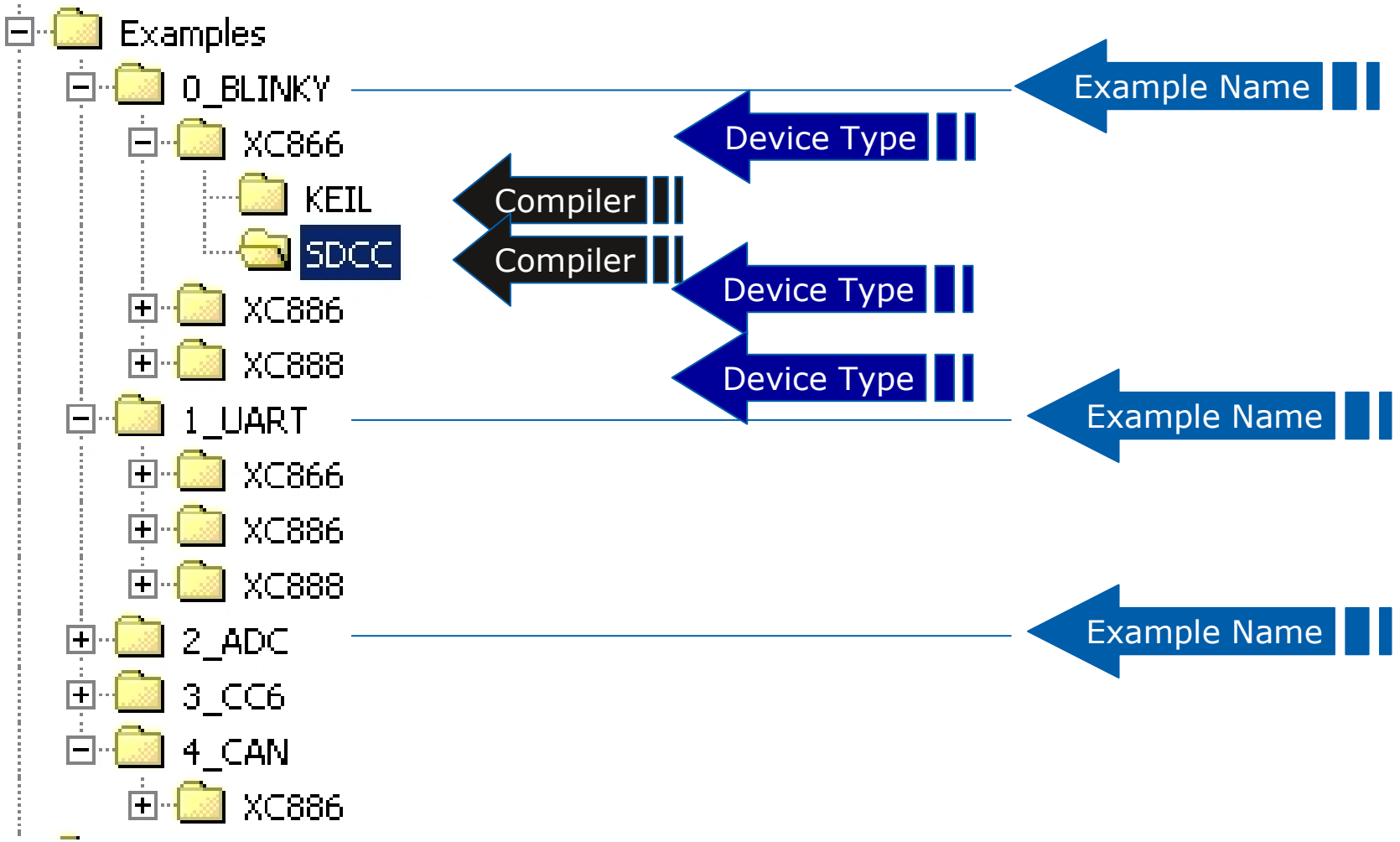
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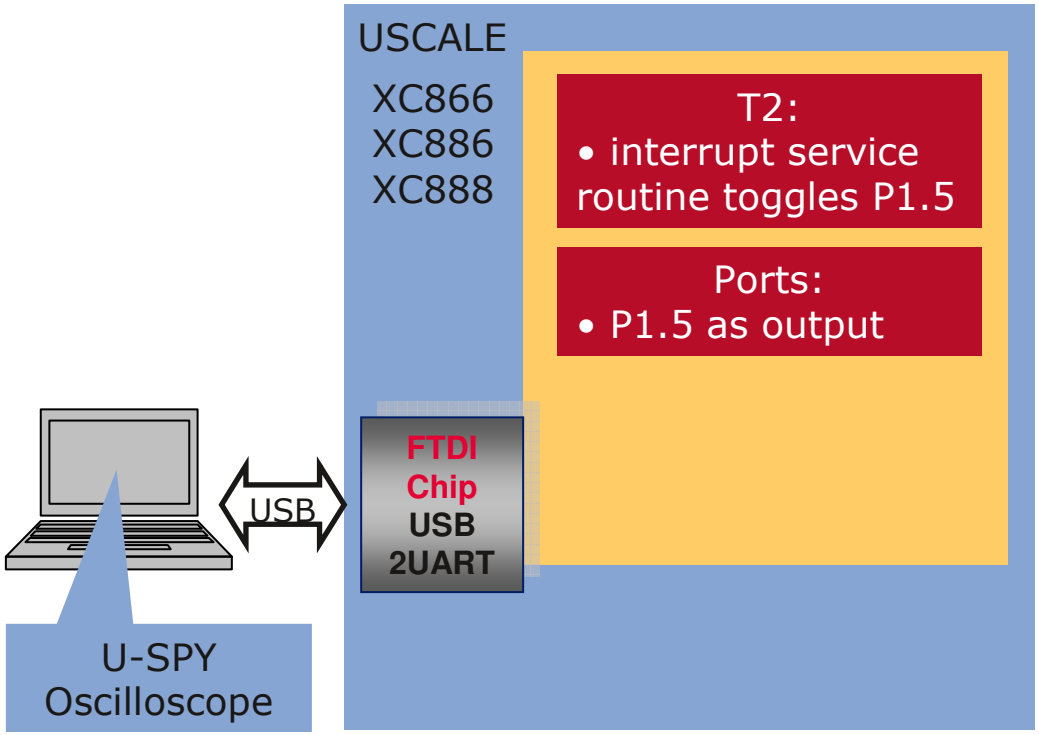
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Example Structure



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Example – USC_BLINKY



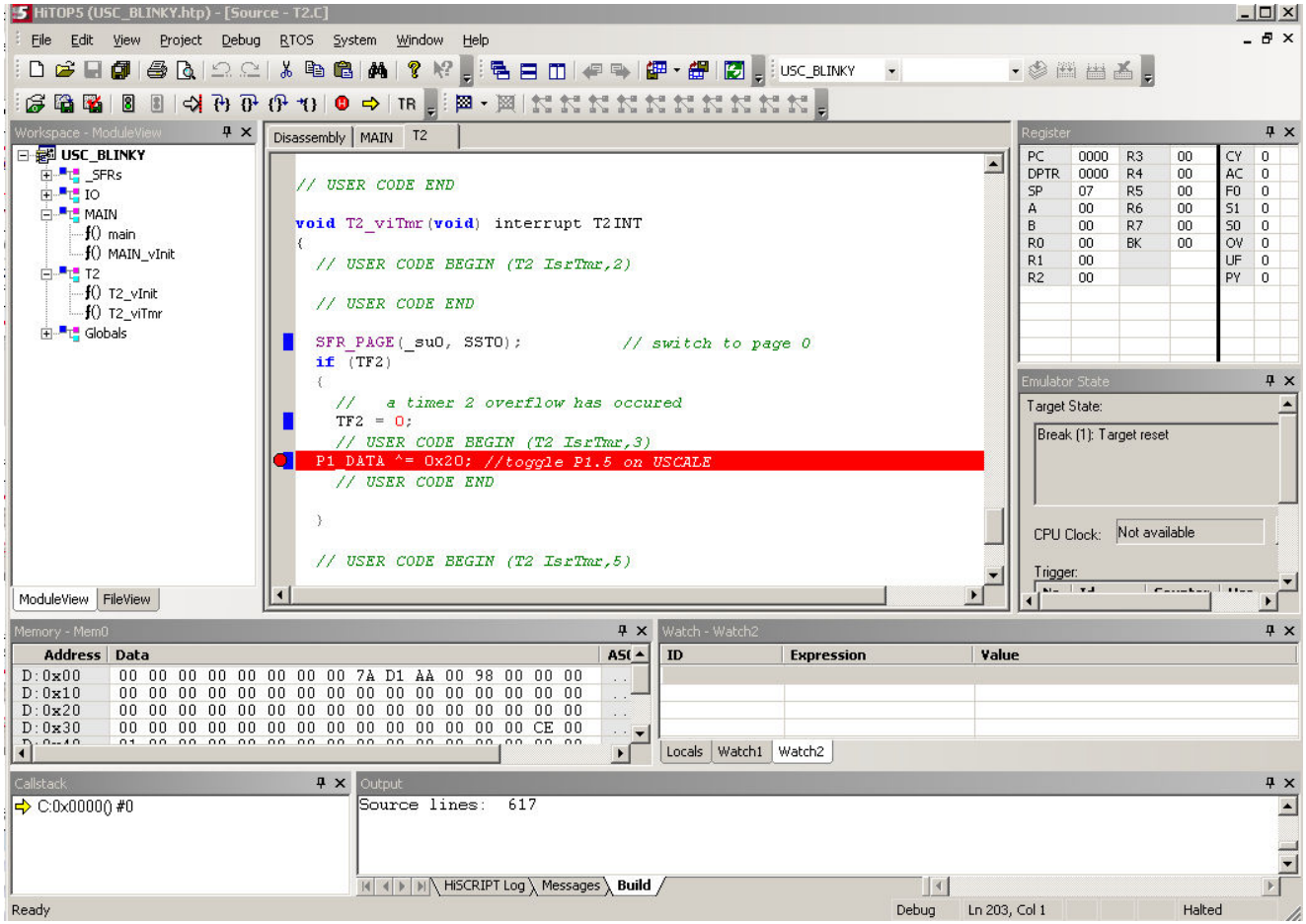
- T2 in autoreload mode, generates interrupt on overflow
- toggle P1.5 periodically
- period time adjustable
- download code through Hitop
- debug: set break / go / single step / etc.

- Note: T2-ISR function is
  - inside T2.C for XC866
  - inside SHARED_INT.C for XC886/888

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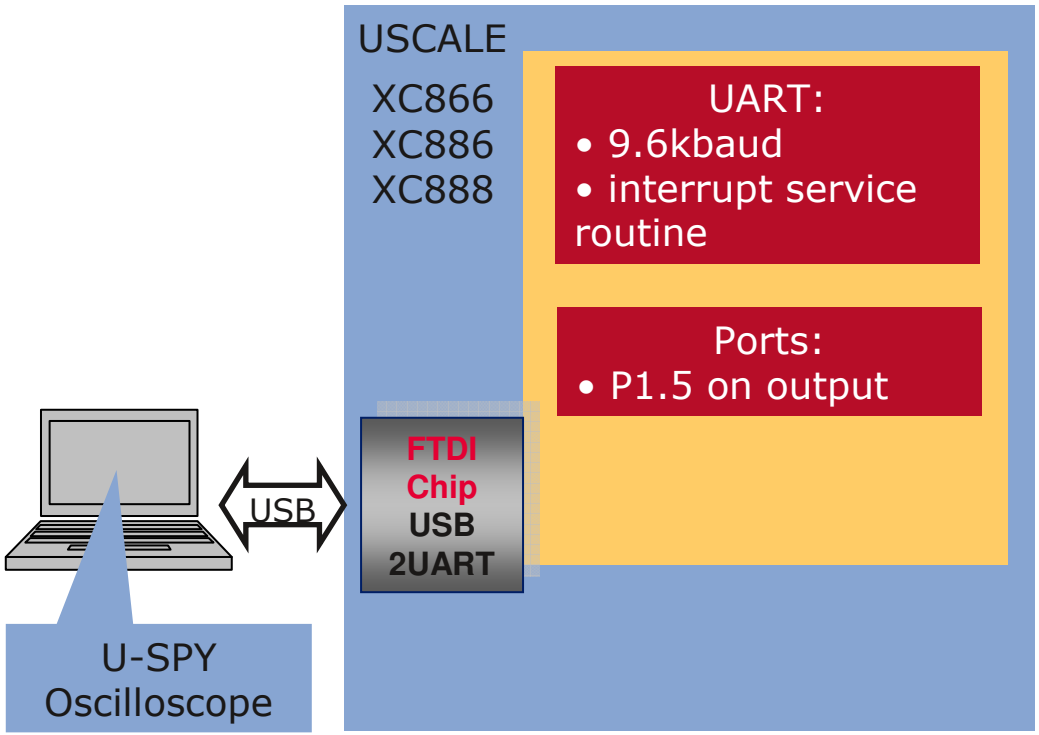
Example – USC_BLINKY

- Test Hitop Debugger
  - set breakpoint
  - go to breakpoint
  - single step
  - watch memory
  - watch variables



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Example – USC_UART



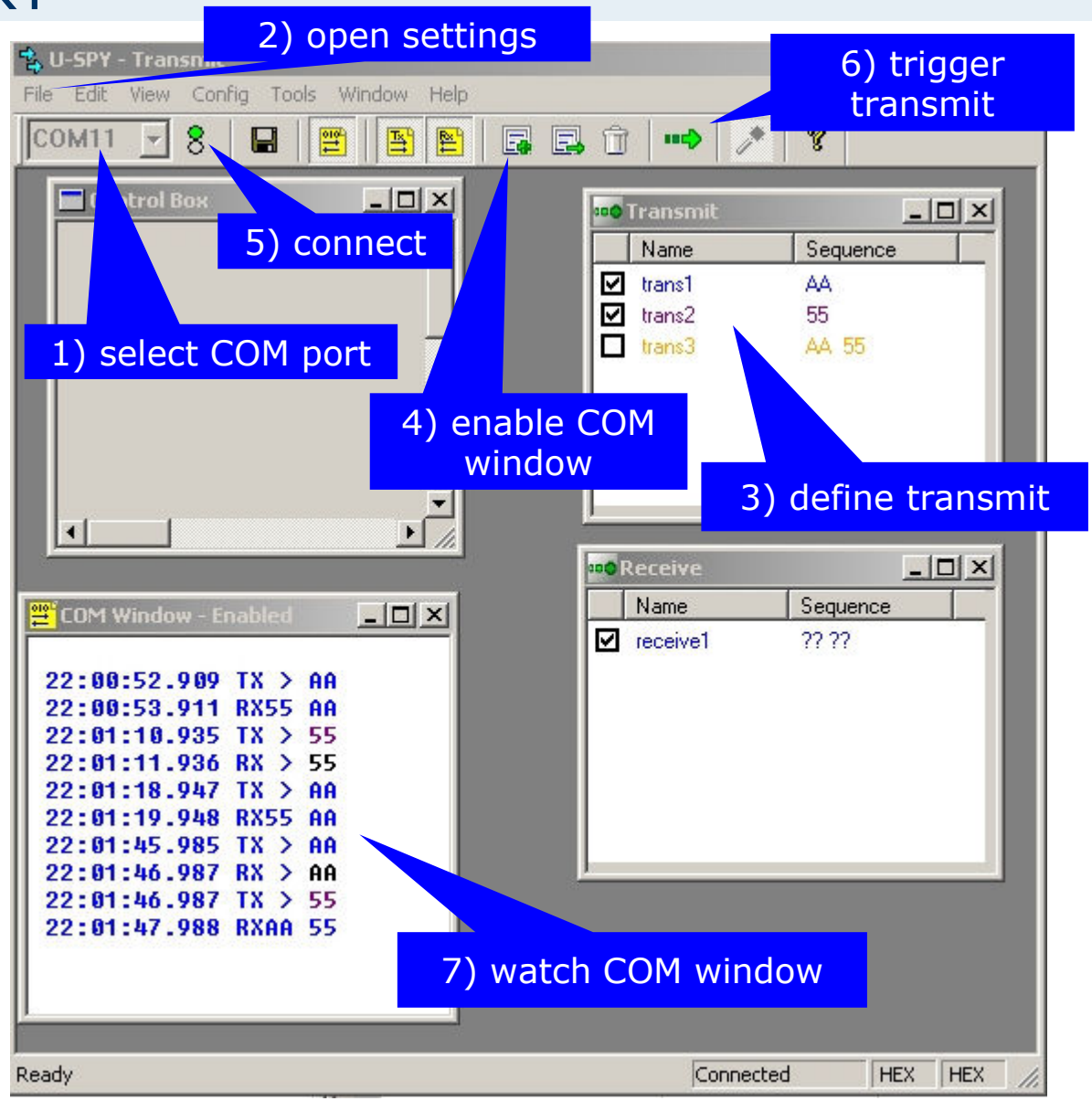
- reply a received byte within UART interrupt service routine
- toggle P1.5 at every transmit

- Note: different baudrate settings for XC866 and XC886/XC888 due to different clocking scheme

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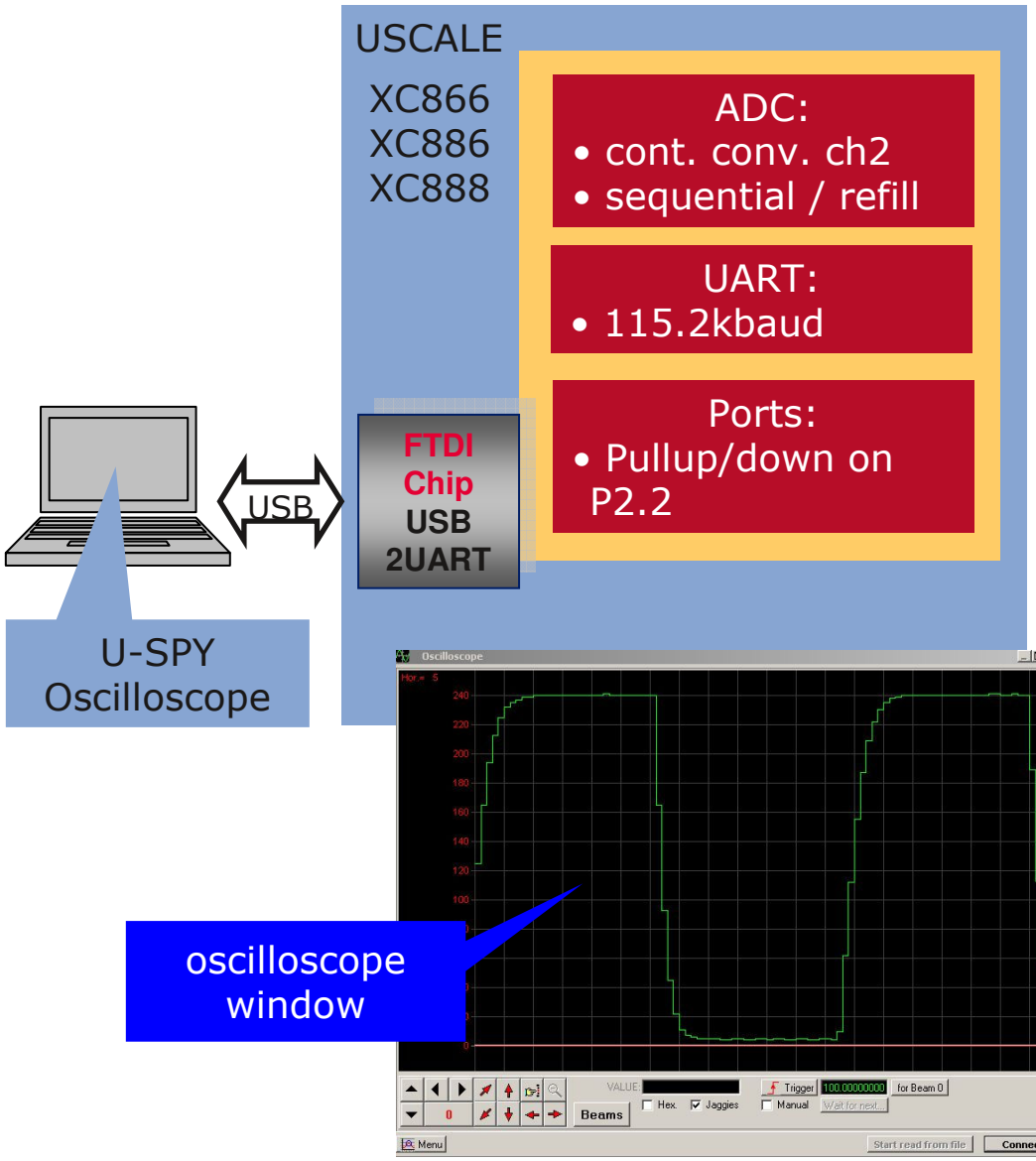
Example – USC_UART

- USPY configuration
  1. select COM port
     - use tool show_devices.exe from CD folder \tools\USCALE\FindDevices
     - just write the port number to the field
  2. open settings
     - SPY_UART.ini
  3. define transmit message
  4. enable COM window
  5. connect
  6. trigger transmit
  7. watch COM window

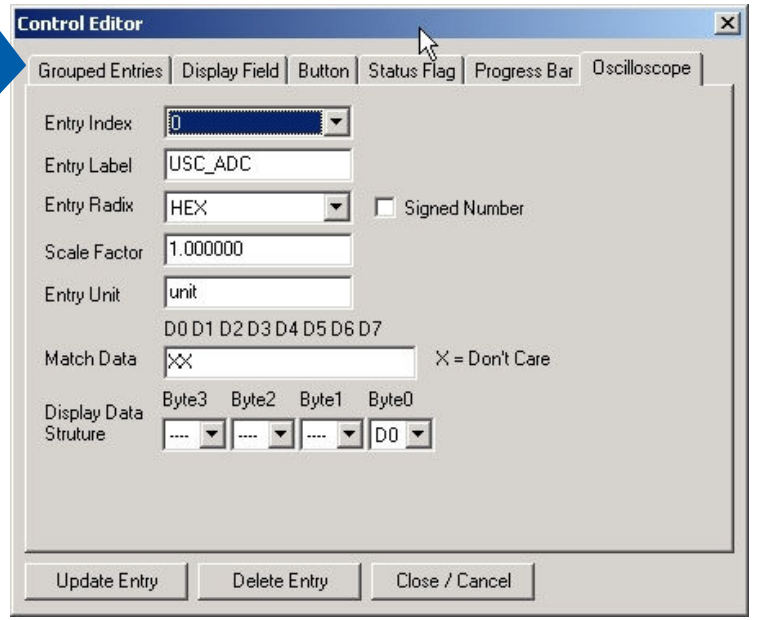


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Example – USC_ADC

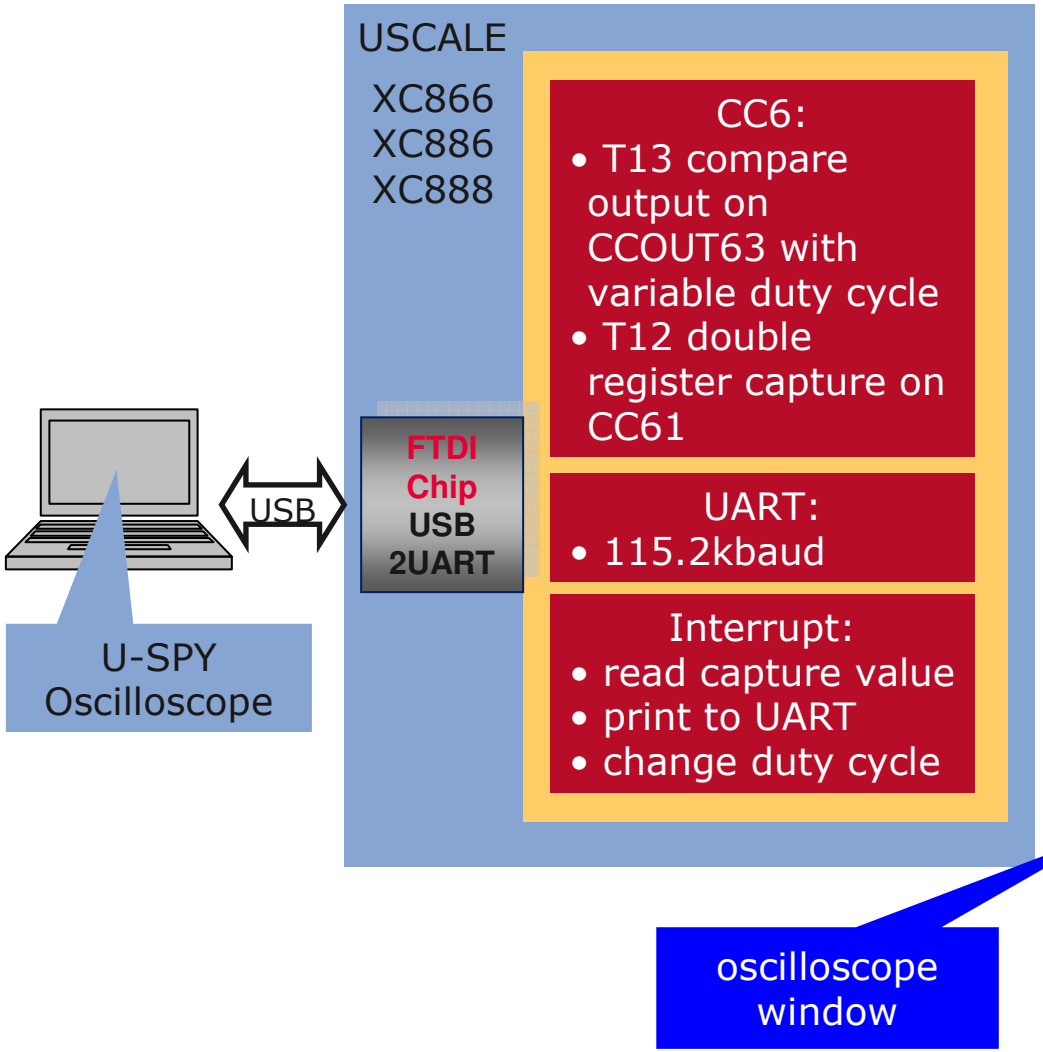


- Toggle pullup/pulldown on P2.2/CH2
  - this resistor charges the ADC's capacitor field according to an RC curve
- sample this curve with ADC (CH2)
- Dump ADC result to buffer and print to UART
- *Touch leftmost pins with your fingers and watch the result on oscilloscope window (you change the capacitve load)*
- USPY configuration:
  > Tools > ControlBox > Open Editor > Oscilloscope



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Example – USC_CC6

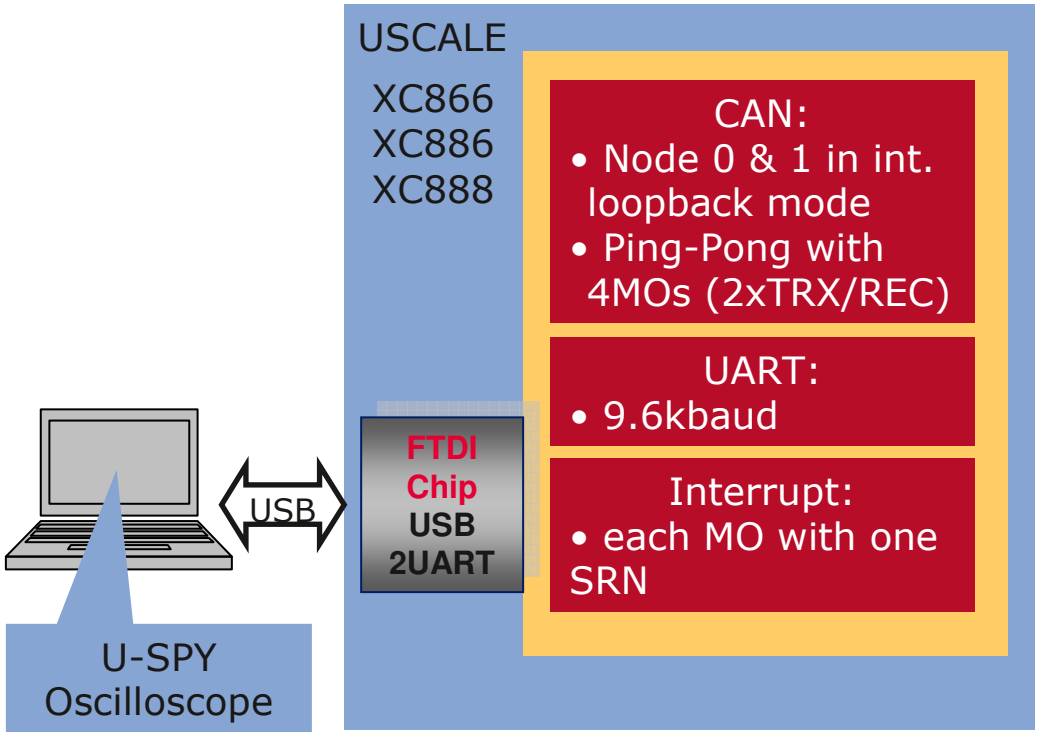


- Output PWM (on T13) with variable duty cycle on P3.7
- Capture rising and falling edge with T12 and print value to UART
- *Connect leftmost pins from upper and lower row with a jumper (P37/COUT63 ←→ P31/CC61)*

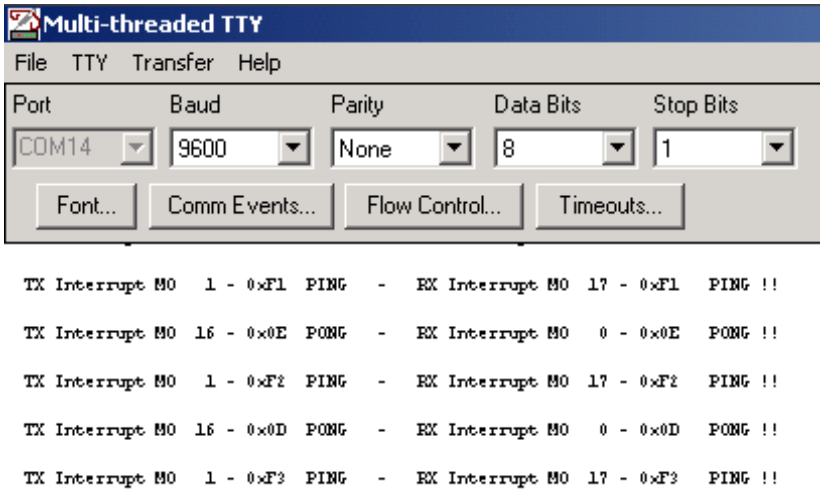


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Example – USC_CAN (1)



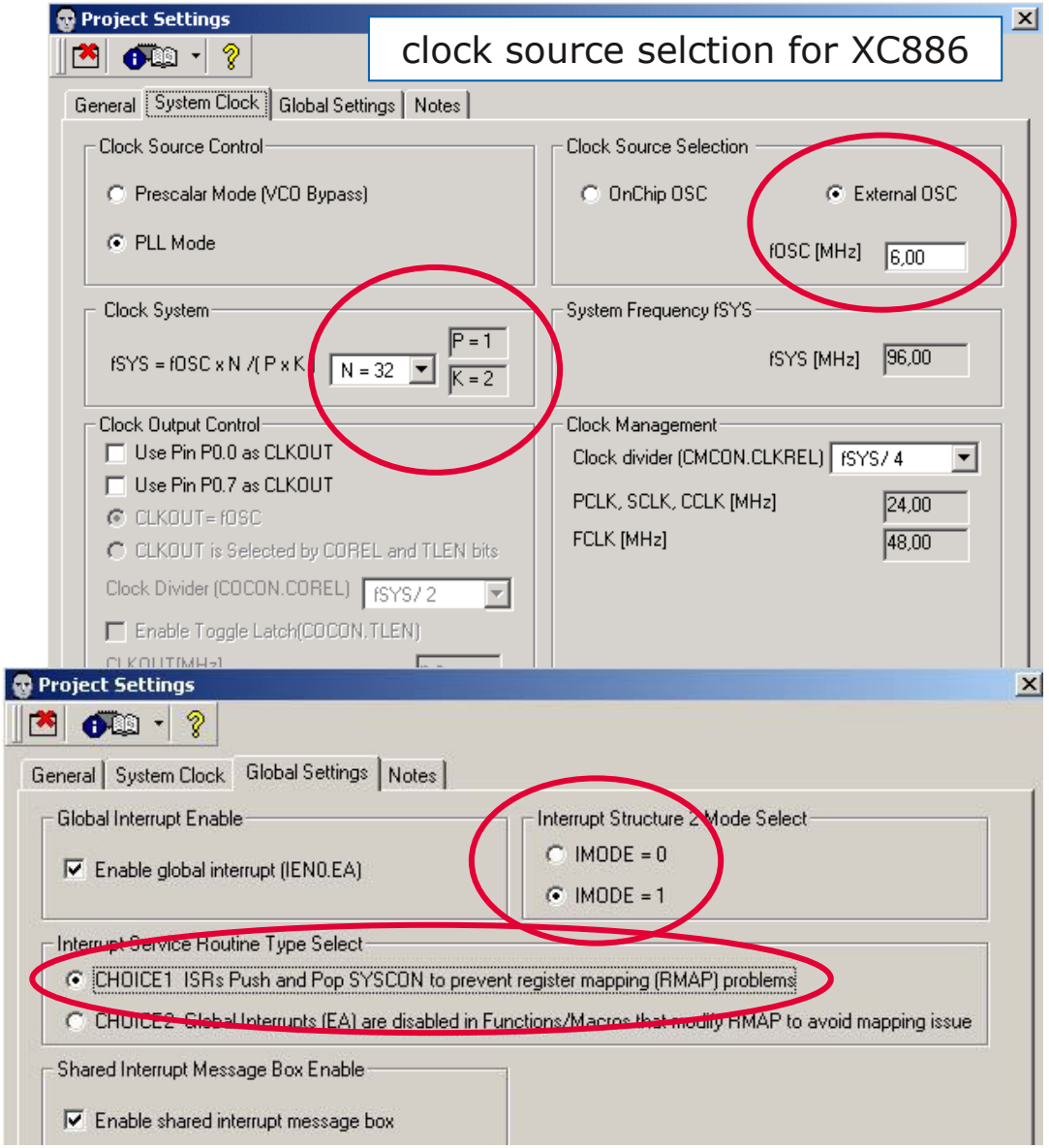
- Node 0/1
- Ping-pong with nodes and 4 MOs
- CAN Node Configuration
  - Node0 / MO01-TRX / ID7 / SRN0
  - Node0 / MO00-REC / ID5 / SRN1
  - Node1 / MO16-TRX / ID5 / SRN3
  - Node1 / MO17-REC / ID7 / SRN4
- Print REC-Object to UART
- *use terminal program (e.g. MTTY@9600bd)*



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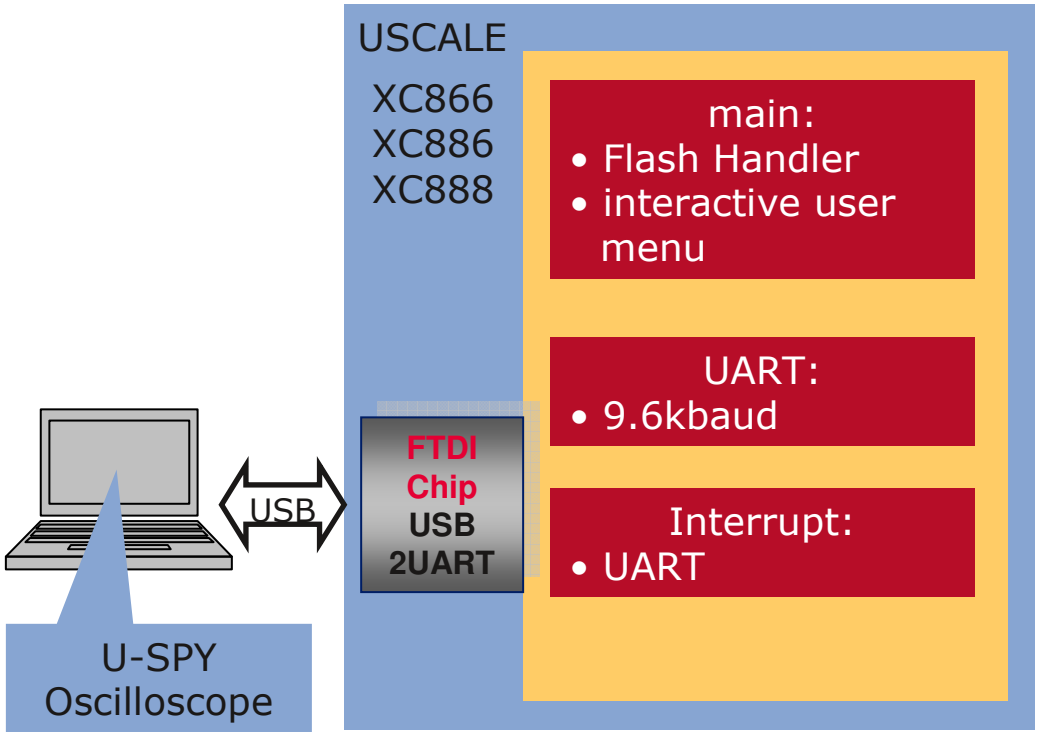
Example – USC_CAN (2)

- For CAN application an accurate clock source is needed → external crystal clock
- Configure external clock in DAvE
  - General Settings
    - USCALE has a 6MHz crystal
    - >> OSC settings not default in DAvE
  - All examples for XC886/888 are compiled with
    - IMODE = 1
      → Int. Structure 1
    - CHOICE 1
      → push-pop RMAP in every ISR



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Example – USC_EEPROM



- Write & Erase DFLASH
- DataSet size is one WL
- Print DFLASH to UART
- *Use MTTY@9600 baud or another terminal program*
  - MTTY can be found on CD folder \tools\6_Monitor\MTTY

```
001.
Albus Dumbledore

002.
Harry Potter

003.
Mickey Mouse

==== Main Menu ========
= 1  Erase FLASH      =
= 2  Entering name    =
= 3  Print Name List  =
= 4  Test Erase Abort =
 Enter the number of choices(1-4):
```

interactive menu

DFLASH memory dump

Memory - Mem0

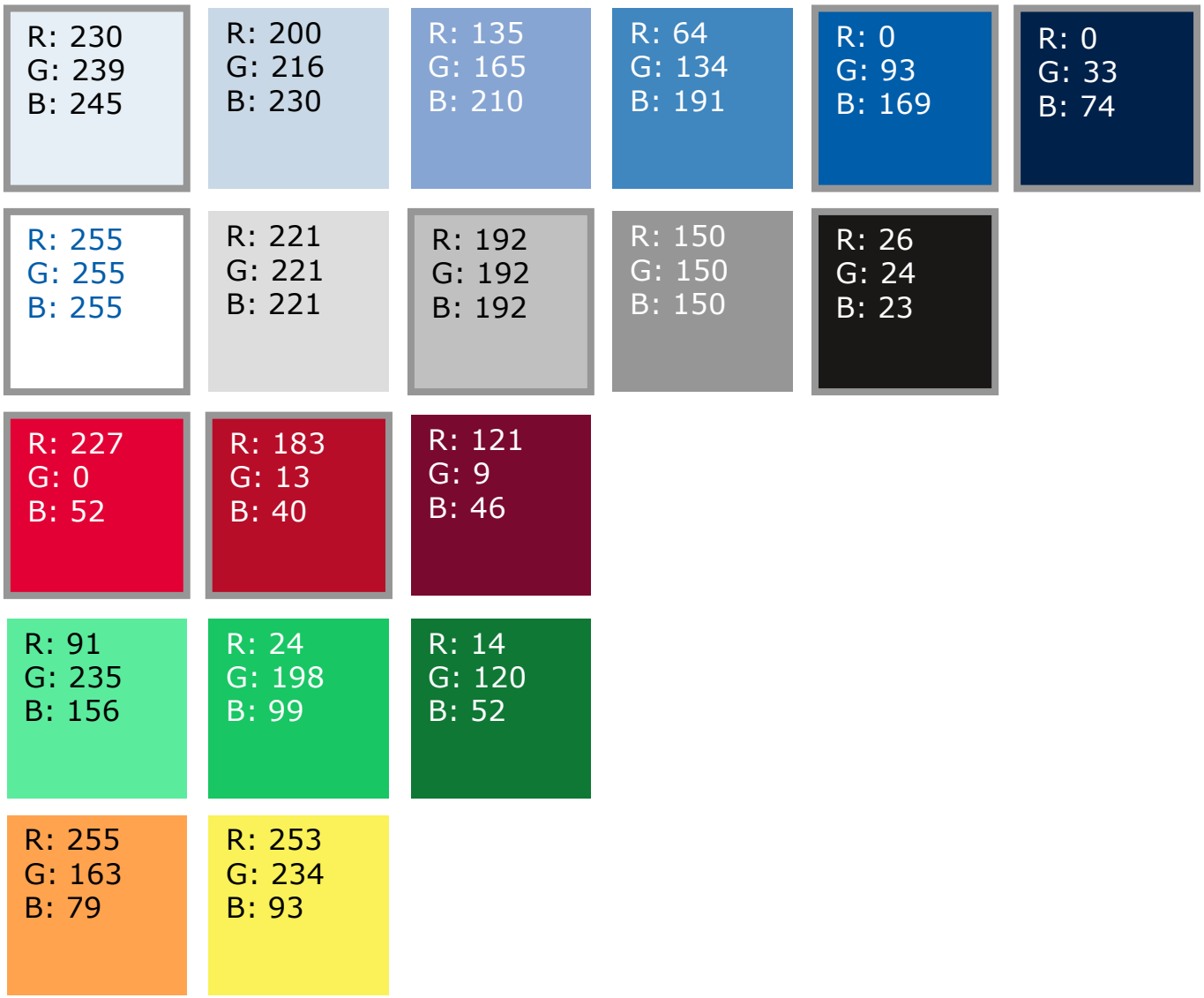
Address	Data	ASCII
C:0xA000	41 6C 62 75 73 20 44 75 6D 62 6C 65 64 6F 72 65	Albus Dumbledore
C:0xA010	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	....
C:0xA020	48 61 72 72 79 20 50 6F 74 74 65 72 00 00 00 00	Harry Potter....
C:0xA030	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	....
C:0xA040	4D 69 63 6B 65 79 20 4D 6F 75 73 65 00 00 00 00	Mickey Mouse....
C:0xA050	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	

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Never stop thinking

The Color System



Primary Colors

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