AP08096

XC886/XC888

XC888 Starter Kit "Cookery-Book" for a "Hello world" application. Using DAvE (Code Generator) and DAvE Bench (Open Platform for Free Tools: IDE, Compiler, Debugger, Utility Tools).

Microcontrollers



Never stop thinking

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none	
Subjects (major changes since last revision)	
	none

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mcdocu.comments@infineon.com



Table of Contents

Note: Table of Contents <u>see page 8</u>.

Introduction:

This "Application Note / Appnote" is an Infineon Hands-On-Training / Cookery-Book / step-by-step-book.

It will help inexperienced users to get an XC888/XC886 Evaluation Board / Starter Kit Board / Easy Kit up and running.

With this step-by-step book you should be able to get your first useful program in less than 2 hours.

The purpose of this document is to gain know-how of the microcontroller and the tool-chain. Additionally, the "hello-world-example" can easily be expanded to suit your needs. You can connect either a part of - or your entire application to the Starter Kit Board. You are also able to benchmark any of your algorithms to find out if the selected microcontroller fulfils all the required functions within the time frame needed.

Note:

The style used in this document focuses on <u>working through</u> this material as fast and easily as possible. That means there are full screenshots instead of dialog-window-screenshots; extensive use of colours and page breaks; and listed source-code is not formatted to ease copy & paste.

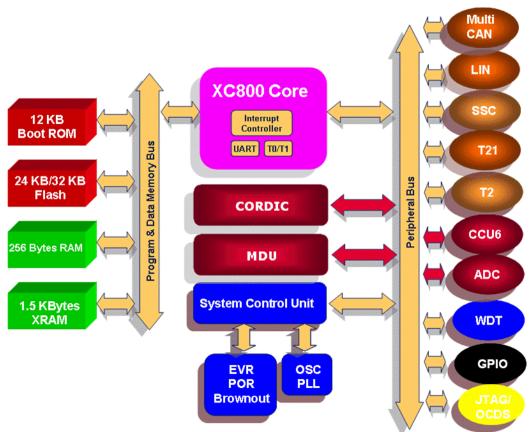
Have fun and enjoy the XC888/XC886 microcontrollers!





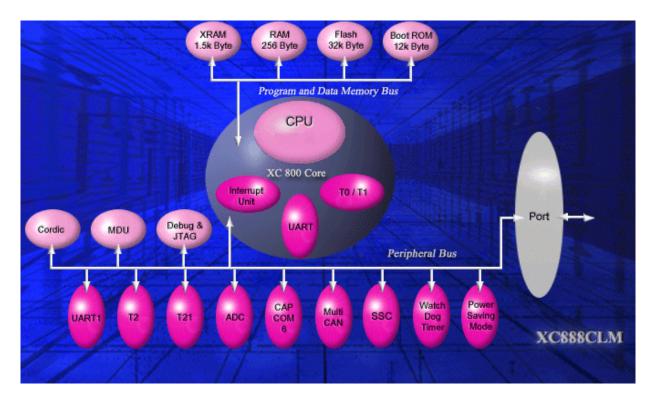




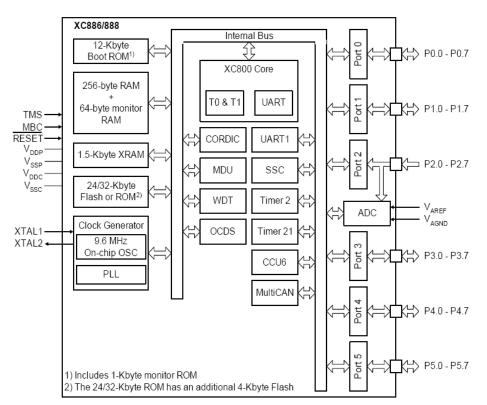


XC888CLM-8FFA Block Diagram (Source: Product Marketing)

XC888CLM-8FFA Block Diagram (Source: DAvE)







XC888CLM-8FFA Block Diagram (Source: User's Manual)

XC888CLM-8FFA functional units (Source: User's Manual)

	r ROM ¹⁾ 2K x 8	On-Chip De	ebug Support	UART	SSC	Port 0	8-bit Digital I/O
Boot ROM 12K x 8		XC800 Core			ompare Unit -bit	Port 1	8-bit Digital I/O
XRAM 1.5K x 8					are Unit -bit	Port 2	8-bit Digital/ Analog Input
RAM 256 x 8	Timer 0 16-bit	Timer 1 16-bit	Timer 2 16-bit	Watchdog Timer	ADC 10-bit 8-channel	Port 3	8-bit Digital I/O
MDU	CORDIC	MultiCAN	Timer 21 16-bit	UART1	Port 5	Port 4	8-bit Digital I/O
	d functionality	v in comparis	on to the XC8	366			
			litional 4K x 8	\$	B-bit Digital I/	c	
nonina th						h aval d h a	

Note:

Just by comparing the different sources of block diagrams, you should be able to get a complete picture of the product and to answer some of your initial questions.



"Cookery-book"

For your first programming example for the XC888 Starter Kit Board:

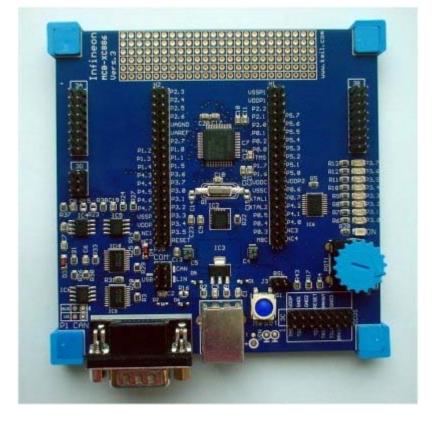
Your program:	File Edit Run Tools Help Stop Communication (F6) File <
Chapter/ Step	*** Recipes ***
1.)	<u>XC888 Starter Kit Board</u> <u>Power Supply (via USB), Jumper Setting, Serial Connection (via USB) to the notebook</u>
2.)	DAvE (program generator) DAvE Installation (mothersystem) + DAvE Update Installation (XC888.DIP) for XC888
3.)	<u>Using DAvE</u> <u>Microcontroller initialization for your programming example</u>
4.)	<u>Using DAvE Bench</u> <u>Programming of your application (hello world) with DAvE Bench tool chain</u>
5.)	Using the debugger (DAvE Bench)

Feedback

6.)	Feedback
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1.) XC888 Starter Kit Board:



Ordering information:

Starter Kits – Type	μC	Order No.
SK-XC886/888LM	SAK-XC888CM	B158-H8743-X-7600
SK-XC886/888CLM Easy Kit	SAK-XC888CM	B158-H8744-X-X-7600

Distribution Worldwide: http://www.infineon.com/cms/en/corporate/company/location/index.html



Screenshot of the XC888 Starter Kit Homepage:

🕹 SK-XC886/888CLM Starter	Kit - Infineon Teo	chnologies -	Mozilla Firefox	_ 日 >	×
<u>D</u> atei <u>B</u> earbeiten <u>A</u> nsicht <u>C</u> hronik <u>L</u> es	sezeichen E <u>x</u> tr <i>a</i> s <u>H</u> ilfe			•	
 	v.infineon.com/cms/en/pi	roduct/channel.htr	ml?channel=db3a 💌 🕨	G • Google	2
🗣 Erste Schritte 🔂 Aktuelle Nachrichten					
Infineon	Home Sitemap Se	ect Language Login	Search Go	About Infineon ≫	<u> </u>
Never stop thinking					
Get Product information	Select a Category	<u> </u>	Services for Engineer	S Select Services	
Home > Microcontrollers > Development Tools, Software > Starter Kits, Evaluation Boards and Application Kits > Sk		L	vare	Print Page Send Page	
SK-XC886/888CLM Starter Kit				Ask Infineon!	
MCU Derivatives: SAK-XC886CM				International Toll Free: 0(0)800 951 951 951 Direct Access:	
CPU Clock: 24 MHz On-Chip Memory:				+49 89 234 65555 Infineon is happy to help you:	
- 1792 Byte RAM, - 32 kByte Flash (incl. up to 8kByte data flash)				Infineon Service Center Where to buy	
Interfaces: - USB Connector for power supply, UART communication - LIN via Header, - CAND via Header and CAN1 via 9 Pin (male) D-Sub, - JTAG via Header, - Motor control connector via Header.	, and flash downloading,			Please use our location finder to get in contact with your nearest Infineon distributor or sales office ▶ Find a location	
Includings: - Cables and USB-to-JTAG Debugger-Box, - 4 port USB Hub, - Technical Documentation:e.g. user manuals (CD), - Free unlimited assembly debugger, - Evaluation Versions of development Tools: e.g. Compiler To download the latest version of the CD content, please Order Nr.: B158-H8743-X-X-7600 Price: 150,- EUR How to order ? To order your kit, please click <u>here</u> .				I	•
					-



Overview of the XC888 Starter Kit Board connection to the environment:

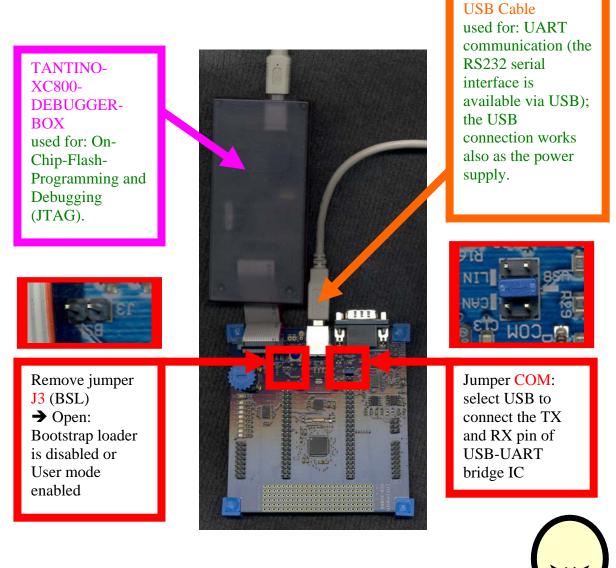
Note:

Do not connect now! This is just information! We are going to connect the board later!

Reason:

When the TANTINO-XC800-DEBUGGER-BOX is already connected to the Starter Kit Board, the Starter Kit Board must be supplied with power for the TANTINO-XC800-DEBUGGER-BOX to work properly.

For the power supply we are going to use the USB cable – by connecting the USB cable a USB driver is needed.



Note:

For further information, please refer to the XC888 Board Manual, V2.1, Sept 2006.

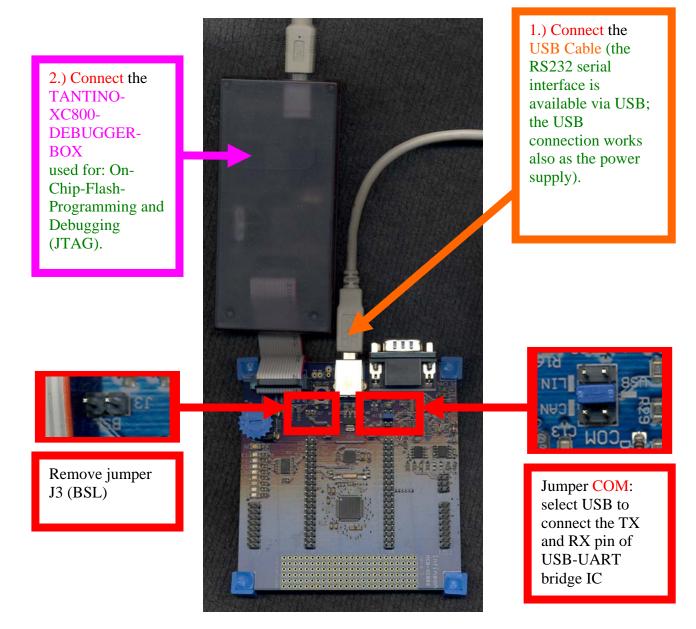




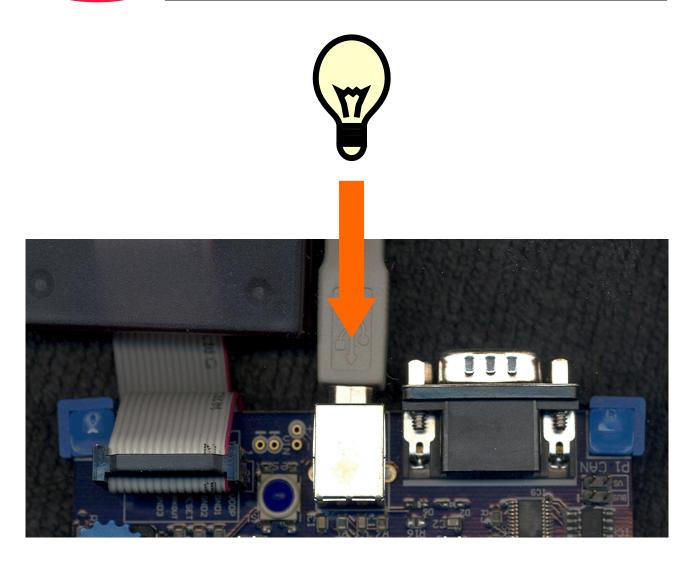
<u>Using TANTINO-XC800-DEBUGGER-BOX</u> [used for: OnChipFlash-Programming and Debugging (using the JTAG interface)]:



Connecting the XC888-Board to the Environment:







Note:

A USB driver is needed the first time while connecting the Starter Kit Board via the USB cable with your computer.

Therefore a pop-up window might appear to prompt for a driver:







If so: click Next

Found New Hardware Wizard
Install Hardware Device Drivers A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
C800 Evaluation Board
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
 Search for a suitable driver for my device (recommended)
O Display a list of the known drivers for this device so that I can choose a specific driver
< Back Next > Cancel

If so: click Next



Locate Driver Files Where do you want Windows to search	n for driver files?
Search for driver files for the following h	ardware device:
XC800 Evaluation Board	
The wizard searches for suitable drivers any of the following optional search loca	in its driver database on your computer and in ations that you specify.
To start the search, click Next. If you ar insert the floppy disk or CD before clicki	e searching on a floppy disk or CD-ROM drive, ing Next.
Optional search locations:	
Floppy disk drives	
CD-ROM drives	
🔲 Specify a location	
Microsoft Windows Update	

If so, please insert the XC88x Starter Kit CD check 🗹 CD-ROM drives and click Next

Found New Hardware Wizard
Driver Files Search Results The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
C800 Evaluation Board
Windows found a driver for this device. To install the driver Windows found, click Next.
d:\driver\xc8xbus.inf
< Back Next > Cancel

If so: click Next

Application Note





If so: click Finish



Or select the USB driver from the directory SK88xCLM_CDV3_1\Driver of your XC88x Starter Kit CD:

🔍 D:\Driver					_ & ×
File Edit View Favorites Tools H	Help				(B)
⇔Back 🕶 → 👻 🖾 Search 🔁 Fold	ders 🧭 🦉 🧏 🗙 🕫 🎟 🗸				
Address 🖻 D:\Driver					▼ 🗟 Go
Folders ×		Name 🔺	Size	Туре	Modified
Desktop My Documents My Computer PYBDC058071 (C:) SK88xCLM_CDV3_1 (D:) Documentation Driver Desktop Desktop Desktop Decumentation Desktop Decumentation D	Driver Select an item to view its description. See also: My Documents My Network Places My Computer	setup.ini slabbus.sys slabcm95.sys slabcmnt.sys slabcr.sys slabcr.sys slabcr.sys slabser.sys slabvcd.vxd slabvcd.vxd slabvcd.inf slabvxd.inf slabvh95.sys slabwhnt.sys xc8unin.u2k xc8unin.u2k xc8unin.u2k xc8unin.u2k xc8unin.u2k xc8unin.lexe xc8unin.lexe	55 KB 11 KB 6 KB 24 KB 4 KB 88 KB 13 KB 30 KB 11 KB 7 KB 6 KB 28 KB 1 KB 1 KB 1 KB 1 KB 5 KB 5 KB 5 KB	Configuration S System file System file System file System file System file System file System file Setup Informati Application U2K File U98 File Application Setup Informati Setup Informati Setup Informati Setup Informati Setup Informati Setup Informati Application	22.03.2007 10: 22.03.2007 10:
e-@ Control Panel e @ My Network Places		xc8xunin.u2k xc8xunin.u98 xc8xunin2k.exe xc8xuninme.exe xc8xuninme.exe xc8xw2k.inf xc8xwdm.inf	1 KB 47 KB 16 KB 5 KB	U2K File U98 File Application Application Setup Informati Setup Informati	
28 object(s) (Disk free space: 0 bytes)	<u> </u>		467 KB	S 📃 My C	omputer



Note:

Skip this step when the USB driver is auto-detected and auto-installed.

Note:

A default COM Port is generated after the USB driver is installed.



Using a Windows 2000 operating system, we are now going to search for the COM Port which was generated after connecting our XC888 Evaluation Board:

Start – Settings – Control Panel





Double click: Administrative Tools

🗟 Control Panel			<u>_</u> & ×
File Edit View Favorite	es Tools Help		10 M
←Back → → 🖬 🔍 Sea	arch 🔁 Folders 🥩 🎬 😤 🗙 🕫 🗏	•	
Address 🗟 Control Panel			💌 🕅 Go
12-1-1	Name 🔺	Comment	
	CACCESSIBILITY Options	Customizes accessibil	
Control Panel	S≪add/Remove Hardware	Installs, removes, an	
control Faller	- 🗟 Add/Remove Programs	Installs and removes	
	Administrative Tools	Configures administr	
Administrative Tools	Nutomatic Updates	Configures Automatic	
Configures administrative	BDE Administrator	Configures the Borlan	
settings for your computer		Sets the date, time, a	
Windows Update	🕏 Display	Customizes your des	
Windows 2000 Support	j∰Fax	Fax Properties	
	Folder Options	Customizes the displa	
	Fonts	Displays and manage	
	Gaming Options	Adds, removes, or ch	
	Internet Options	Configure your Inter	
	🖆 Java	Java(TM) Control Panel	
	🐸 Java Plug-in 1.3.1_05	Java Plug-in Control	
	i∭exeyboard	Customizes your key	
	@Mail	Microsoft Office Outl	
	©Mouse	Customizes your mo	
	Network and Dial-up Connections		
	Phone and Modern Options	Configures your telep	
	Service Options	Configures energy-sa	
	@ Printers	Adds, removes, and	
	QuickTime	Configures QuickTim	
	• RealPlayer	Configures RealPlaye	
	Regional Options	Customizes settings f	
	SAP Configuration	SAP Visual Design Se	
	SAPConsole Administrator	Maintain SAPConsole	
	Canners and Cameras	Configures installed s	
	Scheduled Tasks	Schedules computer t	•
Configures administrative se	ettings for your computer		My Computer



Double click: Computer Management

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ddress 🖻 Administrativ	re Tools				🔻 🖗 Go
	Name 🔺	Size	Туре	Modified	
Administrative	夢 Component Services 島Computer Management 夢Data Sources (ODBC)	2 KB	Shortcut Shortcut Shortcut	24.03.2003 20: 28.03.2003 18: 24.03.2003 20:	
Fools Computer Management Shortcut	Bevent Viewer Bevent Viewer Bevent Viewer Microsoft .NET Framework 1.1 Configuration Microsoft .NET Framework 1.1 Wizards Microsoft .NET Framework 2.0-Konfiguration	2 KB 2 KB 1 KB 1 KB	Shortcut Shortcut Shortcut Shortcut Shortcut	24.03.2003 20: 24.03.2003 20: 04.11.2004 10: 04.11.2004 10: 09.08.2007 15:	
Vanages disks and provides access to other pols to manage local and remote computers. Vodified: 28.03.2003	過Microsoft .NET Framework Configuration 聞Microsoft .NET Framework Wizards 愛Performance 鄧Services 司Telnet Server Administration	1 KB 2 KB 2 KB	Shortcut Shortcut Shortcut Shortcut Shortcut	24.03.2003 20: 24.03.2003 20: 24.03.2003 20: 24.03.2003 20: 24.03.2003 20:	
18:45 Gize: 1,53 KB					
Attributes: (normal)					

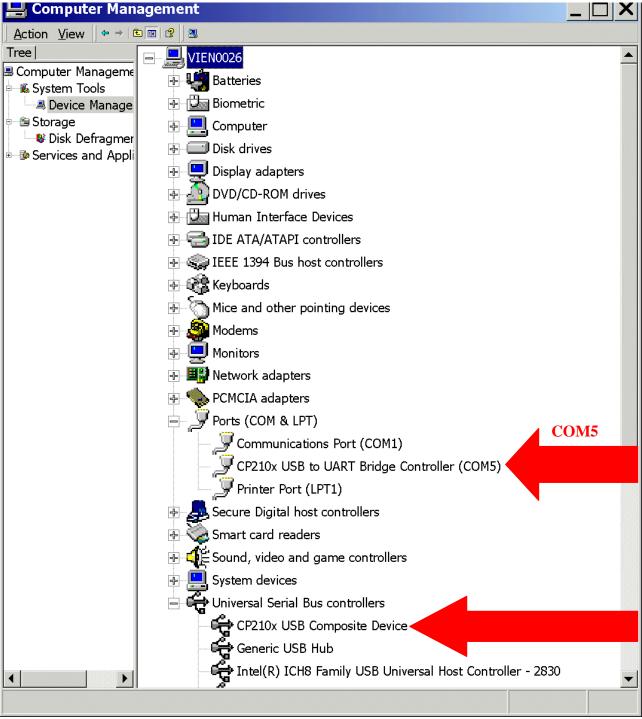


Click/Select: Device Manager

📙 Computer Management	
Action View ← → € 🖬 😫	
	VIEN0026 Image: Batteries Image: Batteries



Expand: Ports (COM & LPT): Expand: Universal Serial Bus controllers:



Note:

As we can see in the screenshot above: our COM Port for UART/RS232 communication with the Starter Kit Board via USB is COM5 !







Additional information: Using a SILICON LABS <u>CP2102</u> "Single-Chip USB To UART Bridge":

Note:

IC2 soldered on the XC888 Starter Kit is a Silicon Labs CP2102 chip (Single-Chip USB To UART Bridge) using Virtual COM Port Device Drivers.

Using Virtual COM Port drivers, the data format and baud rate are set during COM port configuration on the PC.

Supported Data Formats and Baud Rates (Source: CP2102 Data Sheet):

Data Bits	5, 6, 7, and 8	
Stop Bits	1, 1.5 ¹ , and 2	
Parity Type	None, Even, Odd, Mark, Space	
Baud Rates ²	300, 600, 1200, 1800, 2400, 4000, 4800, 7200, 9600, 14400, 16000, 19200, 28800, 38400, 51200, 56000, 57600, 64000, 76800, 115200, 128000, 153600, 230400, 250000, 256000, 460800, 500000, 576000, 921600 ³	
4. Addition		

The CP2102 Virtual COM Port (VCP) device drivers allow a CP2102-based device to appear as a COM port to the PC's application software.

The application software (e.g. Docklight) running on the PC accesses the CP2102-based device as it would access a standard hardware COM port.

Every CP2102 device is delivered with a unique Serial Number making it possible to use more than one XC888 Starter Kit at the same time.

That means every Starter Kit gets its own Virtual COM Port.

Note:

For further information, please refer to the <u>XC888 Board Manual, V2.1, Sept 2006</u>. For further information, please refer to the <u>SILICON LABS CP2102 Datasheet</u>



2.) DAvE – Installation for XC888 microcontrollers:



Install DAvE (mothersystem):

Title	Date	Version	Size
Tool Package			^
顰 DAvE - Mothersystem (DAvE_Mothersystem_v2_2r1.zip)	14 Dec 2009	V2.2	8.8 MB
🗎 DAvE - Mothersystem (setup.exe)	14 Dec 2009	V2.2	8.9 MB



Γ

Install the XC888 microcontroller support/update (XC888CLM DIP file):

1.) Download DAvE_XC888CLM_v1_6.zip (- or any higher version the DAvE-update-file (.DIP) for the required microcontroller (http://www.infineon.com/DAvE:	,		
Title	Date	Version	Size
Development Tools			^
XC864 DIP file for DAvE (Microcontroller Configuration Tool)-latest version (DAvE_XC864_v1_2.zip)	14 Dec 2009	v1.2	5.6 MB
XC878 DIP file for DAvE (Microcontroller Configuration Tool)-latest version (DAvE_XC878CLM_v2_1.zip)	14 Dec 2009	v2.1	9.4 MB
XC866 DIP file for DAvE (Microcontroller Configuration Tool)-latest version (DAvE_XC866_v2_2.zip)	14 Dec 2009	v2.2	5 MB
XC878CLM DIP file for DAvE (Microcontroller Configuration Tool) (XC878CLM.zip)	08 Jul 2008	v1.1	9.1 MB
XC888CLM DIP file for DAvE (Microcontroller Configuration Tool)-latest version (DAvE_XC888CLM_v1_6.zip)	14 Dec 2009	v1.6	7.6 MB
لي XC886CLM DIP file for DAvE (Microcontroller Configuration Tool)-latest version (DAvE_XC886CLM_v1_8.zip)	14 Dec 2009	v1.8	7.6 MB
🗐 XC866 DIP file for DAvE (Microcontroller Configuration Tool) (XC866_v2.0.zip)	08 Feb 2008	v2.0	4.9 MB
XC888CLM DIP file for DAvE (Microcontroller Configuration Tool), V1.3 (XC888CLM_v1.3.zip)	14 Jan 2008	V1.3	7.6 MB
🗐 XC866 DIP file for DAvE (Microcontroller Configuration Tool) (XC866_v1.9.zip)	14 Jan 2008	V1.9	4.9 MB
XC886CLM DIP file for DAvE (Microcontroller Configuration Tool), V1.5 (XC886CLM_v1.5.zip)	14 Jan 2008	V1.5	7.5 MB
XC888CLM DIP file for DAvE (Microcontroller Configuration Tool), V1.1 (DAvE_XC888CLM_v1.1.zip)	01 Mar 2007		7.5 MB
XC886CLM DIP file for DAvE (Microcontroller Configuration Tool), V1.3 (XC886CLM_v1.3.zip)	22 Mar 2007		7.5 MB
DAVE XC888 RELEASE NOTES (DAVE_XC888_RELEASE_NOTES.pdf)	24 May 2007		351 KB
XC886CLM DIP file for DAvE (Microcontroller Configuration Tool), V1.1 (XC886CLM_v1.1.zip)	01 Sep 2006		6.4 MB

Unzip the zip-file "DAvE_XC888CLM_v1.6.zip" (- or any higher version !!!)

and save "XC888CLM_v1.6.dip" @ e.g. D:\DAvE\XC888CLM_v1.6.dip.



2.)

Start DAvE - (click DAvE)

3.)

View Setup Wizard Default: • Installation Forward> Select: • I want to install products from the DAvE's web site Forward> Select: D:\DAvE Forward> Select: Available Products click VC888CLM Forward> Install End

4.) DAvE is now ready to generate code for the XC888CLM microcontroller.



3.) DAvE - Microcontroller Initialization after Power-On:



Start the program generator DAvE and select the XC888CLM microcontroller:

File New 8-Bit Microcontrollers Select XC888CLM Create

DAVE File View Options Ac	
DAVE - New 16-Bit Microcontrollers	r Project X 8-Bit Microcontrollers 32-Bit Microcontrollers
C505 C505A C505C C505CA C505L C508 C513 C513A	C515 C515A C515C C517A C688_r2 XC822M XC822M XC824M XC866 XC878CLM XC878CLM XC838CLM
	Create Cancel Help



Choose the Project Settings as you can see in the following screenshots:

General: Controller Details: Device: check/select XC888CLM-8FF General: Compiler Settings: For DAvE-Bench check/choose • SDCC (DAvE Bench)

😨 DAVE
File View Options Add-Ins Windows ?
DAvE XC888CLM (Release v1.6)
Project Settings 🗙
General System Clock Global Settings Notes
Device XC888CLM-8FF Device Type FLASH Flash Memory 32 K Size
Max. System Clock 96 MHz ROM Size -
Main Header File
File name MAIN.C File name MAIN.H
Compiler Settings
C Keil R Enable Startup File Generation Memory Model: SMALL
CIAR
XC888CLM (new project)



System Clock: (do nothing)

🚱 DAVE	
File View Options Add-Ins Windows ? Image:	
DAVE XC888CLM (Release v1.6)	×
General System Clock Global Settings Notes	
Clock Source Control	Clock Source Selection
○ Prescalar Mode (VCO Bypass)	© OnChip OSC C External OSC
@ PLL Mode	fOSC [MHz] 9,60
Clock System fSYS = fOSC x N /(P x K) N = 20 V K = 2	System Frequency fSYS fSYS [MHz] 96.00
Clock Output Control Use Pin P0.0 as CLKOUT Use Pin P0.7 as CLKOUT CLKOUT= fOSC CLKOUT is Selected by COREL and TLEN bits Clock Divider (COCON.COREL) fSYS/2 Enable Toggle Latch(COCON.TLEN) CLKOUT[MHz]	Clock Management Clock divider (CMCON.CLKREL) 15YS/ 4 PCLK, SCLK, CCLK [MHz] 24,00 FCLK [MHz] 48,00
XC888CLM (new project)	

Note: CPU clock is 24 MHz.

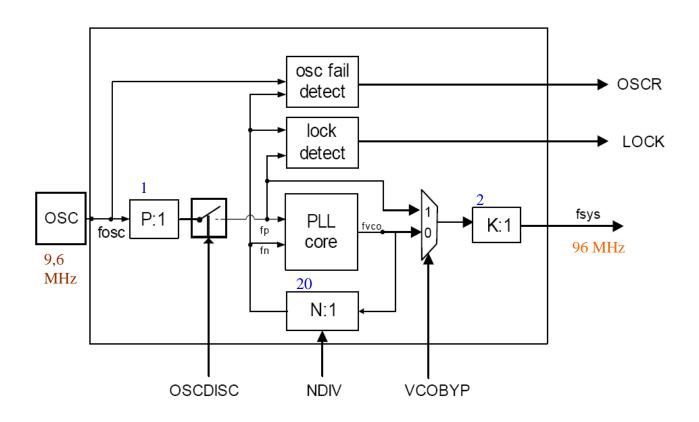






Additional information: Clock System (Source: User's Manual):

Clock Generation Unit (CGU) Block Diagram



Note:

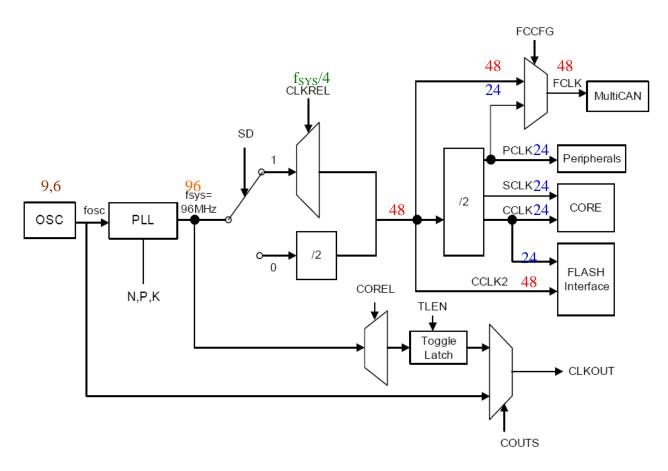
 $f_{SYS} = f_{OSC} * N / (P * K) = 9,6 MHz * 20 / (1 * 2) = 96 MHz$





Additional information: Clock System (Source: User's Manual):

Clock Generation from fsys:



Note:

 $f_{SYS} = 96 \text{ MHz}$

CPU clock: CCLK, SCLK = 24 MHz Fast clock: FCLK = 24 or 48 MHz Peripheral clock: PCLK = 24 MHz Flash Interface clock: CCLK2 = 48 MHz and CCLK = 24 MHz

CLKREL: The clock division factor $f_{SYS}/4$ (see DAvE screenshot page 17) is inclusive the fixed divider factor of 2.



Global Settings: (do not change configuration)

Prove Contraction of the second secon	
File View Options Add-Ins Windows ?	
DAVE XC888CLM (Release v1.6)	
Project Settings	
General System Clock Global Settings Notes	
Global Interrupt Enable	
Enable global interrupt (IEN0.EA)	
Interrupt Service Routine Type Select	
C CHOICE1 ISRs Push and Pop SYSCON to prevent register mapping (RMAP) problems	
CHOICE2 Global Interrupts (EA) are disabled in Functions/Macros that modify RMAP to avoid mapping issue	
Shared Interrupt Message Box Enable	
☑ Enable shared interrupt message box ★	
XC888CLM (new project)	<i>li</i> .

Note (Source: DAvE):

- // You have two choices for interrupt type select in Project Settings Page
- // under Global Settings Section.
- // If you select CHOICE 1 then ISR will be generated with push and pop.
- // If you select CHOICE 2 then ISR will be generated without push and pop.
- // Default choice is CHOICE 2.
- // Current selection is CHOICE 2

Note:

** = Interrupt Structure 2 applies to Timer 2, Timer 21, UART1, LIN, external interrupts 2 to 6, ADC, SSC, CCU6, Flash, MDU, CORDIC and MultiCAN interrupt sources.

There is a slightly different behavior between MODE=0 and MODE=1 in setting/clearing the pending interrupt request bit.

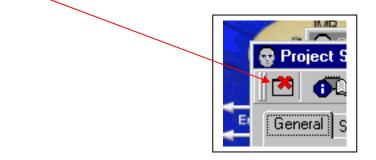
* S = If an interrupt node is shared with another interrupt node, the ISR code will be generated in the SHARED_INT.C file.





Notes: If you wish, you can insert your comments here.

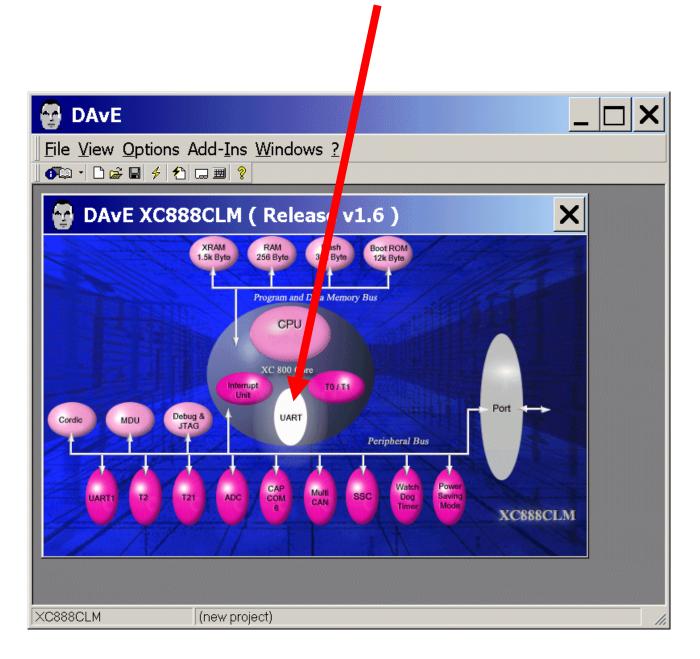
Exit and Save this dialog now by clicking the close button:





Configuration of the UART:

The configuration window/dialog can be opened by <u>clicking</u> the specific block/module (UART).





- UART: Transmitter: click [•] Use pin P1.1 (TXD_0)
- UART: Receiver: click O Use pin P1.0 (RXD_0)
- UART: Receiver Enable: tick \checkmark Enable receiver (REN)

UART: Mode Control: click • Mode 1: 8-bit shift UART, variable baud rate (see BRG or Timer1)

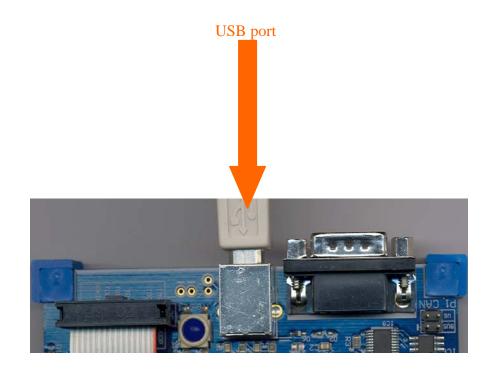
🔁 DAvE		
File View Options Add-Ins Wind Image: Ima	ows ?	
DAVE XC888CLM (Rel		×
UART (Serial Interfa		×
Transmitter C No pins are selected C Use pin P1.1 (T×D_0) C Use pin P0.2 (T×D_1) C Use pin P5.2 (T×D_1)	Receiver No pins are selected Use pin P1.0 (RXD_0) Use pin P0.1 (RXD_1)	Receiver Enable
Use pin P5.3 (T×D_2) O Use pin P5.2 (R×D_2) Mode Control (SM0, SM1) Mode 0: 8-bit shift register, fixed baud rate (fPCLK/2) Mode 1: 8-bit shift UART, variable baud rate (see BRG or Timer1) Mode 2: 9-bit shift UART, fixed baud rate (fPCLK/32 or fPCLK/64)		Baudrate Source BRG Timer 1 Interrupts Enable interrupt (ES)
Mode 3: 9-bit shift UART, variat Options Double baud rate (SMOD) (Note: Only in Mode 2)	RXDO Pin Selection No pins are selected Use pin P1.5 (RXDO_0) Use pin P0.0 (RXDO_1)	Receive interrupt will only be activated if a valid stop bit was received (SM2) Multiprocessor Enable multiprocessor communication (SM2)
XC888CLM (new project)	C Use pin P5.4 (RXDO_2)	





Note:

The RS232 serial interface (UART pins P1.0 and P1.1) is available via the <u>USB port</u> which converts the TTL-UART-signals to USB-signals (using a SILICON LABS <u>CP2102</u> "Single-Chip USB To UART Bridge").





BRG: BRG Run Control: tick/check ✓ Enable BRG

BRG: Fractional Divider Control: tick/check ✓ Enable Fractional Divider

BRG: BRG Settings: Required baud rate [kbaud] insert 9,600 <ENTER>

🛃 DAvE		
File View Options Add-Ins Winde	ows ?	
DAVE XC888CLM (Rel	ease v1.6)	
🗧 😴 UART (Serial Interfa	ce)	×
UART BRG Interrupts Functions	Parameters Notes	
BRG Run Control	Fractional Divider Control	
Enable BRG (BCON.R)	Enable Fractional Divider (FDCON.FDEN)	
BRG Settings Prescaler (BRPRE) fDIV = f	PCLK STEP Value 0xD5	
Required baud rate 9,6000 [kbaud]	Actual baud rate 9,6004 [kbaud]	
Min. baud rate 22,8882 [baud]	Percentage of 0,0038 deviation [%]	
Max. baud rate [747,070 [kbaud]	3 Reload Value 0x81 (BG)	
C888CLM (new project)		1.

Note:

Validate each alphanumeric entry by pressing ENTER.





Interrupts: (do nothing)

DAve	(C888CLM (Release v1.6)		×		
UAR	T (Serial Interface)				>
•	?		Priority	(User)	
UART BR	G Interrupts Functions Parameters Notes				
Level	Interrupt Source	Priority 0	Priority 1	Priority 2	Priority 3
Level 0	Non Maskable Interrupt (NMI)	Hj	ghest Priority	can't be char	ng <mark>e</mark> d)
Level 1	External Interrupt 0	0	0	0	0
Level 2	Timer 0 Interrupt	© _	. 0	. 0	
Level 3	External Interrupt 1	e a	0		interna
Level 4	Timer 1 Interrupt	6 B	0		
Level 5	UART Interrupt	ø	0	o	C
Level 6	Timer 2 / BRG / MultiCAN Node 0 Interpts	୍	0	o	C
Level 7	ADC / MultiCAN Node 1 and 2 Interpts	୍	0	o	C
Level 8	SSC Interrupt	୍	0	O	C
Level 9	External 2 / T21 / UART1 / BRG1 Intrpts	0	0	O	C
Level 10	External [6:3] / MultiCAN Node 3 Interpts	0	0	0	C
Level 11	CCU6 Node 0 / MultiCAN Node 4 Interpts	0	0	C	C
Level 12	CCU6 Node 1 / MultiCAN Node 5 Interpts	୍	0	0	C
Level 13	CCU6 Node 2 / MultiCAN Node 6 Interpts	0	C	C	C
Level 14	CCU6 Node 3 / MultiCAN Node 7 Interpts	0	C	C	C



Note:

For the serial communication with a terminal program running on your Personal-Computer the printf / printf_small() / printf_fast_f() - function is used. The print function uses Software-Polling-Mode therefore we do not need to configure any interrupts.





Interrupt Priorities (User):

Note (Source: Application Note AP08053):

There could be six interrupt priorities. These priorities, with 6 beeing the highest, are as follows:

Interrupt	t Priority:	
6		NMI
5 🚄		Interrupt Priority 3
4		Interrupt Priority 2
3		Interrupt Priority 1
2		Interrupt Priority 0
1		Main

Main refers to routines that run prior to any interrupt and can be interrupted by any interrupt. Each interrupt source can be programmed to any of the four interrupt priorities (0-3).

An interrupt that is currently being serviced can only be interrupted by a higher-priority interrupt, but not by another interrupt of the same or lower priority.

Hence, an interrupt of the highest priority cannot be interrupted by any other interrupt request. In any case, the NMI always has the highest priority (above level 3) and its priority cannot be programmed.



Functions: Initialization Function: tick ✓ UART_vInit Functions: Miscellaneous Functions: tick ✓ UART_bRxReady Functions: Miscellaneous Functions: tick ✓ UART_bTxReady Functions: 8-Bit Data Units: tick ✓ UART_ubGetData8 Functions: 8-Bit Data Units: tick ✓ UART_vSendData8

DAVE File View Options Add-Ins Windows ? Image: Compared to the second	
DAVE XC888CLM (Release v1.6)	×
Initialization Function	Source File File name UART.C
Miscellaneous Functions UART_vilsr UART_vilsr UART_vRxEnable UART_vRxEnable UART_vRxEnable	8-Bit Data Units UART_ubGetData8 UART_ubGetData8 UART_vSendData8 UART_vSendData8
□ UART_vRxDisable UART_vRxDisable □ UART_bRxReady UART_bRxReady □ UART_bTxReady UART_bTxReady	9-Bit Data Units UART_uwGetData9 UART_vSendData9 UART_vSendData9
	Multiprocessor Communication UART_vSendAddr UART_vSendAddr UART_bOwnAddress UART_bOwnAddress
	UART_vWakeUp UART_vWakeUp UART_vGotoSleep UART_vGotoSleep
XC888CLM (new project)	

Note:

You can change function names (e.g. UART_vInit) and file names (e.g. UART.C) anytime.





Parameters: (do nothing)

DAVE	_ 🗆 🗙
File View Options Add-Ins Windows ? ↓ ☞♀♀♀♀ ↓ ♪ ♀ ■ ♀	
DAVE XC888CLM (Release v1.6)	
UART (Serial Interface)	×
UART BRG Interrupts Functions Parameters Notes Header File File name UART.H	
XC888CLM (new project)	

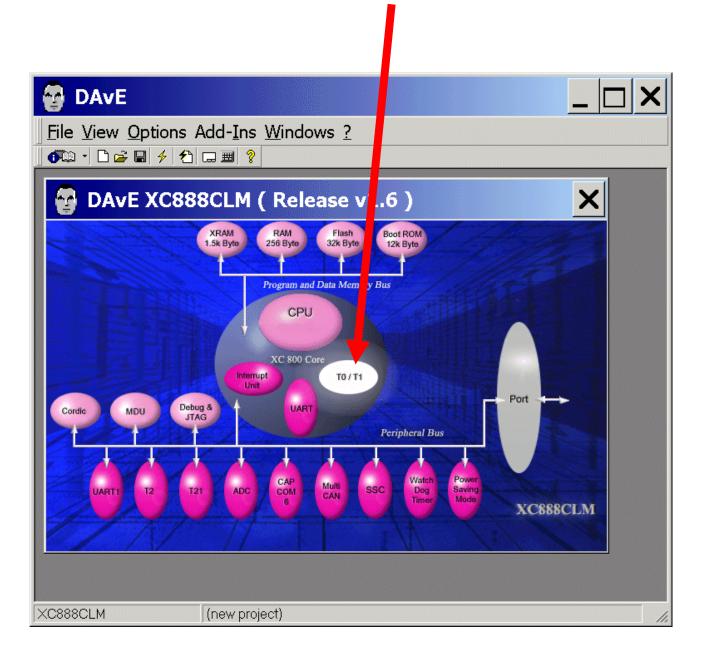
Notes: If you wish, you can insert your comments here.

Exit and Save this dialog now by clicking the close button.



Configure Timer TO:

The configuration window/dialog can be opened by <u>clicking</u> the specific block/module (T0/T1).



Note:

The LEDs on IO_Port_3 will be blinking (if selected in the main menu) with a frequency of about 1 second (done in the Timer_0-Interrupt-Service-Routine). Therefore we have to configure Timer_0.





Timer0: Timer Mode: click ⊙ Mode 1: 16-bit timer Timer0: Timer Options: tick ✓ Turn on timer (TR0) Timer0: Interrupt Control: tick ✓ Enable interrupt of timer (ET0)

e <u>View O</u> ptions Add-Ins <u>W</u> indows <u>?</u> □ • □ ☞ ■ <i>∳</i> 1 □ ■ ? DAvE XC888CLM (Release v1.6)	×
Timer 0/1	×
Timer Mode (TMOD.T0M) Mode 0: 8-bit timer (TH0) with a divide-by-32 prescaler (TL0) Mode 1: 16-bit timer (TH0/TL0) Mode 2: 8-bit timer (TL0) with 8-bit auto-reload (TH0) Mode 3: 8-bit timer (TL0) and second 8-bit timer (TH0) Timer Registers Lower byte of 16-bit timer (TL0) Higher byte of 16-bit timer (TH0) Timer overflow [us] (TF0)	Timer Options ■ Enable counter operation on C Pin P4.4 (T0_0) C Pin P1.1 (T0_1) Enable Gating Control: Timer 0 ■ is enabled only while pin EXINTO is high. (GATE0) ■ Turn on timer (TR0) Interrupt Control ■ Enable interrupt of timer (ET0)
88CLM (new project)	

Note:

We need 183 Timer_0 overflows to achieve an approximate 1 second delay. This will be handled in the Timer_0 interrupt function. 183 * 5461,333 μ s = 0,9994 s.



Timer1: do nothing (not used)

DAVE	
File View Options Add-Ins Windows ?	
Corde C	Timer Options Enable counter operation on
Mode 1: 16-bit timer (TH1/TL1) Mode 2: 8-bit timer (TL1) with 8-bit auto-reload (TH1) Mode 3: Timer holds its count	 Pin P4.5 (T1_0) Pin P1.5 (T1_1) Enable Gating Control: Timer 1 is enabled only while pin EXINT1 is high. (GATE1) Turn on timer (TR1)
5-bit prescaler (TL1) 0x00 8-bit timer (TH1) 0x00 Timer overflow [μs] (TF1) 682.667	Interrupt Control
XC888CLM (new project)	



Interrupts: (do nothing)

	?		Priori	ty (User	
	ner 1 Interrupts Functions Parameters Notes	Priority 0	Priority 1	Priority 2	Fnority 3
Level 0	Non Maskable Interrupt (NMI)			can't be chai	
Level 1	External Interrupt 0	6	C C		
Level 2	Timer 0 Interrupt		0	•	-
Level 3	External Interrupt 1			inte c	
Level 4	Timer 1 Interrupt	0	0	nterna)	interna
Level 5	UART Interrupt	0	0		0
Level 6	Timer 2 / BRG / MultiCAN Node 0 Interpts	0	c	c	0
Level 7	ADC / MultiCAN Node 1 and 2 Interpts	0	0	o	0
Level 8	SSC Interrupt	0	c	c	0
Level 9	External 2 / T21 / UART1 / BRG1 Intrpts	©	0	C	0
Level 10	External [6:3] / MultiCAN Node 3 Interpt	o	0	C	0
Level 11	CCU6 Node 0 / MultiCAN Node 4 Inter	o	0	C	0
Level 12	CCU6 Node 1 / MultiCAN Node 5 Int	o	0	C	0
Level 13	CCU6 Node 2 / MultiCAN Node 6	ø	0	o	0
Level 14	CCU6 Node 3 / MultiCAN Node	o	o	c	0
CLM	(new project) Interrupt of Timer_0 is enabled, ET0 = 1)	

Note (Source: User's Manual):

An interrupt that is currently being serviced can only be interrupted by a higher-priority interrupt, but not by another interrupt of the same or lower priority.

Hence, an interrupt of the highest priority cannot be interrupted by any other interrupt request. If two or more requests of different priority levels are received simultaneously, the request with the highest priority is serviced first. If requests of the same priority are received simultaneously, an internal polling sequence determines which request is serviced first. Thus, within each priority level, there is a second priority structure determined by a polling sequence as shown in the User's Manual and above.



Functions: Initialization Function: tick ✓ T01_vInit

DAVE XC888CLM (Release v1.6) Image: Dave XC888CLM (Release v1.6) Image: Dave Control Image: Dave Delta Image: Dave Control Image: Dave Control Image: Dave Delta Image: Dave Control Image: Dave Delta Image: Dave Delta <th>DAVE File View Options ● ● ● ● ● ● ●</th> <th>s Add-<u>I</u>ns <u>W</u>indows <u>?</u></th> <th></th>	DAVE File View Options ● ● ● ● ● ● ●	s Add- <u>I</u> ns <u>W</u> indows <u>?</u>	
Timer 0 Timer 1 Interrupts Functions Parameters Notes Initialization Function Initialization Function Source File Initialization Library T01_v1nit T01_v1nit Function Library T01_v5tartTmr T01_v5tartTmr I T01_vStopTmr T01_v5tartTmr T01_v5tartTmr I T01_vClearTmr T01_vClearTmr T01_vClearTmr I T01_vClearTmr T01_vClearTmr Timer_0 interrupt service routine I T01_vTimr0 T01_vTImr0 T01_vTImr1 I T01_vStartTmr1 T01_vStartTmr1 T01_vStartTmr1	Timer 0		
Image: To1_vStartTmr To1_vStartTmr Image: To1_vStopTmr To1_vStopTmr Image: To1_vClearTmr To1_vClearTmr Image: To1_vClearTmr To1_vClearTmr Image: To1_vLoadTmr To1_vLoadTmr Image: To1_vLoadTmr To1_vLoadTmr Image: To1_vITmr0 To1_vITmr0 Image: To1_vITmr1 To1_vITmr1 Image: To1_vStartTmr1 To1_vStartTmr1	Timer 0 Timer 1		Source File
	□ T01_vSta □ T01_vSta □ T01_vCle □ T01_vCle □ T01_vLoa □ T01_vLoa □ T01_vTm □ T01_vTm □ T01_vTm □ T01_vSta	trtTmr T01_vStartTmr pTmr T01_vStopTmr arTmr T01_vClearTmr dTmr T01_ReadTmr adTmr T01_vLoadTmr r0 T01_vITmr0 r1 T01_vStartTmr1	Timer_0 interrupt service routine



Note:

Timer_0 has a dedicated interrupt vector address $(000B_H)$, interrupt node and its own interrupt status flag TF0.

The vector is used to service the corresponding interrupt node request – when enabled (ET0=1), which means: the interrupt system will hardware-generate an LCALL to the appropriate service routine at $000B_{\rm H}$.

TF0 will be automatically cleared by hardware (the core) once its pending interrupt request is serviced.





Additional information: Interrupt Handling (Source: User's Manual):

The processor acknowledges an interrupt request by executing a hardware generated LCALL to the appropriate service routine (interrupt vector address).

In some cases, hardware also clears the flag that generated the interrupt, while in other cases, the flag must be cleared by the user's software (e.g. see DAvE Source Code).

The hardware-generated LCALL pushes the contents of the Program Counter (PC) onto the stack (but it does not save the PSW) and reloads the PC with an address that depends on the source of the interrupt being vectored to (interrupt vector addresses see User's Manual).

Program execution returns to the next instruction after calling the interrupt when the RETI instruction is encountered. The RETI instruction informs the processor that the interrupt routine is no longer in progress, then pops the two top bytes from the stack and reloads the PC. Execution of the interrupted program continues from the point where it was stopped. Note that the RETI instruction is important because it informs the processor that the program has left the current interrupt priority level.

A simple RET instruction would also have returned execution to the interrupted program, but it would have left the interrupt control system on the assumption that an interrupt was still in progress. In this case, no interrupt of the same or lower priority level would be acknowledged.



Parameters: (do nothing)

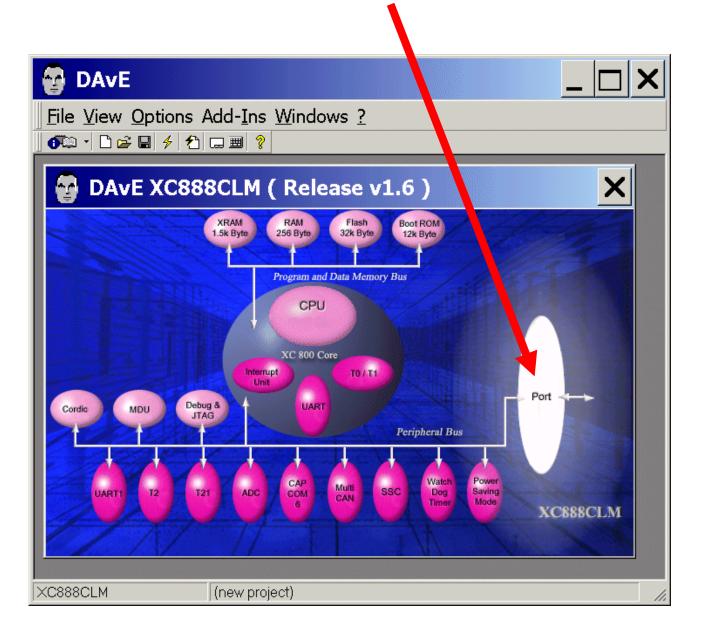
😨 DAvE	_ 🗆 🗙
File <u>V</u> iew <u>O</u> ptions Add-Ins <u>W</u> indows <u>?</u> ● ● ● ■ ● ● ● ■ ● ● ● ● ● ● ● ● ● ● ● ●	
DAVE XC888CLM (Release v1.6)	
Timer 0/1	×
Image:	
XC888CLM (new project)	

Notes: If you wish, you can insert your comments here. Exit this dialog now by clicking the close button.



Configure Port 3 to Output:

The configuration window/dialog can be opened by <u>clicking</u> the specific block/module (Port).

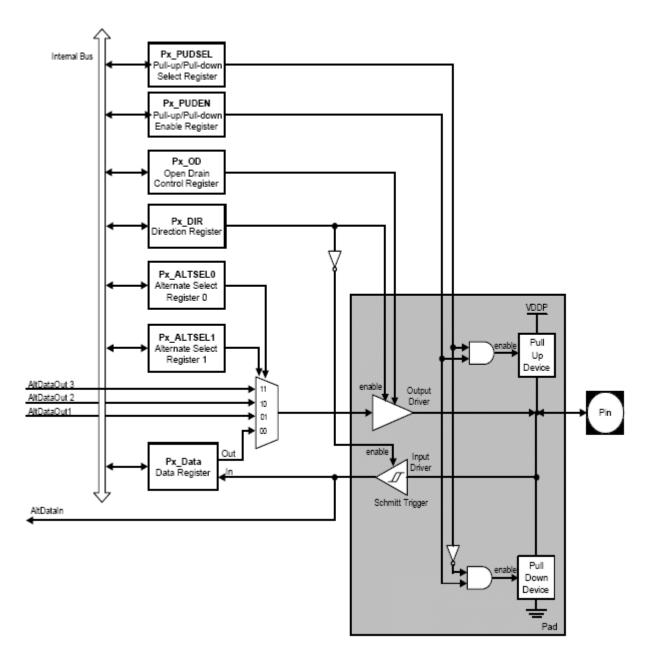








Additional information: Parallel Ports – General Structure (Source: User's Manual):





Ports: click "Configure Port 3"

DAVE	_ 🗆 🗙
File <u>V</u> iew <u>O</u> ptions Add-Ins <u>W</u> indows <u>?</u> ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	
DAVE XC888CLM (Release v1.6)	
GPIO	×
Ports Functions Parameters Notes	
Configure Port 0 Configure Port 1	
Configure Port 2 Configure Port 3	
Configure Port 4 Configure Port 5	
×C888CLM (new project)	



Port 3: Port Function: tick ✓ Use P3.0 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.1 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.2 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.3 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.4 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.5 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.6 as general IO - Port Direction: click ⊙ Out
Port 3: Port Function: tick ✓ Use P3.7 as general IO - Port Direction: click ⊙ Out

🚭 DAvE			
File View Options Add-Ins Windows ?			
🗑 DAvE XC888CLM (Rele	ase v1.6)	×	
🚱 GPIO			×
Ports Fu	ort 3		×
Port 3 Pull Device Para	ameters Notes		
Port Function:	Port Di	rection: Push Pull / Op	en Drain: Output Value:
Use P3.0 as gene	ral IO 💿 In		
Use P3.1 as gene	ral IO O In	🖸 Out 🗖 Open drain	T High
Use P3.2 as gene	ral IO C In	🖸 Out 🗖 Open drain	🗖 High
Use P3.3 as gene	ral IO O In	🖸 Out 🗖 Open drain	T High
Use P3.4 as gene	ral IO O In	🖸 Out 🗖 Open drain	F High
Use P3.5 as gene	ral IO O In	🖸 Out 🗖 Open drain	🗖 High
🔽 Use P3.6 as gene	ral IO O In	🖸 Out 🗖 Open drain	🗖 High
Use P3.7 as gene	ral IO 💿 In	🖸 Out 🗖 Open drain	🗖 High
XC888CLM (new project)			



Pull Device: (do nothing)

DAVE	_ 🗆 X
File <u>View Options Add-Ins Windows ?</u>	
🛛 😭 DAvE XC888CLM (Release v1.6)	
	×
Ports Fu Configure Port 3	×
Port 3 Pull Device Parameters Notes	
P3.0 pull device Tristate	
P3.1 pull device Tristate	
P3.2 pull device Tristate	
P3.3 pull device Tristate	
P3.4 pull device Tristate	
P3.5 pull device Tristate P3.6 pull device Tristate P3.6 pull device Tristate	
P3.7 pull device Tristate	
XC888CLM (new project)	



Parameters: (do nothing)

OAVE	
File View Options Add-Ins Windows ?	
🙀 DAvE XC888CLM (Release v1.6)	
GPIO 🗙	
Ports Fu Configure Port 3	×
Port 3 Pull Device Parameters Notes	
Parameters	
P3_0 P3_0 P3_0 P3_1 P3_1	
P3_1 P3_1 P3_2 P3_2	
P3_3 P3_3	
P3_4 P3_4	
P3_5 P3_5 P3_5	
P3_6 P3_6	
P3_7 P3_7	
XC888CLM (new project)	
XC888CLM (new project)	

Notes: If you wish, you can insert your comments here. Exit this dialog now by clicking the close button.



Functions: Initialization Functions: tick ✓ IO_vInit Functions: Function Library: tick ✓ IO_ubReadPin Functions: Function Library: tick ✓ IO_vSetPin Functions: Function Library: tick ✓ IO_vResetPin Functions: Function Library: tick ✓ IO_ubReadPort Functions: Function Library: tick ✓ IO_vWritePort Functions: Function Library: tick ✓ IO_vTogglePin

DAVE	
DAVE XC888CLM (Release v1.6)	
GPIO	×
Ports Functions Parameters Notes	
Initialization Function Source File IO_vInit IO_vInit	
Function Library I O_ubReadPin O_ubReadPin I O_vSetPin IO_vSetPin I O_vResetPin IO_ubReadPort I O_ubReadPort IO_ubReadPort I O_vWritePort IO_wWritePort I O_vSetInput IO_vSetInput I O_vSetOutput IO_vSetOutput I O_vTogglePin IO_vTogglePin	
XC888CLM (new project)	



Parameters: (do nothing)

DAVE	
File View Options Add-Ins Windows ? Image:	
DAVE XC888CLM (Release v1.6)	
🗧 🚰 GPIO	×
Ports Functions Parameters Notes	1
Header File File name IO.H	
XC888CLM (new project)	

Notes: If you wish, you can insert your comments here. Exit this dialog now by clicking the close button.





Note:

Before we save the DAvE Project we are going to create a suitable directory structure with Windows File Explorer (see next page!).



Create a suitable directory structure for DAvE-Bench (Eclipse IDE, SDCC compiler):



Start Windows File Explorer

Create directory/folder C:\XC8xx

Create directory/folder C:\XC8xx\XC888

C:\XC8xx			
File Edit View Favorites Tools Help			
[⊕] Back ▼ [→] ▼ [□] ^Q Search [□] Folders ^Q ^Q ^Q ^Q × ∞ ^{III} ▼			
Address 🗅 C:\XC8xx			▼ 🖉 Go
Folders	×	▲ Name ▲	Size Type
		XC888	File Folder
→ XC888	XC8xx		
		▼	
1 object(s) selected			My Computer



Save the project:

File Save

Save project: Save in select C:\XC8xx\XC888 File name: insert XC888

XRAM RAM Flash 15k Byto 32k Byto Program and Data Memory Bus
Save project
Save in: Save in:
File name: 🔀 Save
Save as type: DAvE project file (*.dav) Cancel
XC888CLM (new project)

Save



Generate Code:

File Generate Code	or click
-----------------------	----------



DAvE will show you all the files he has generated (File Viewer opens automatically):



	DAV	/E		_ 🗆 X
:		w Options Add-Ins Win	ndows ?	
ſ				
	🔂 D/		es in 'C:\XC8XX\XC888'	
		DAvE's Project D		
	- 2		XC888.dav	
		Project:		
		Controller: Compiler:	XC888CLM-8FF SDCC	
-		Memory Model:	SMALL	
	Cordic	Date:	13.01.2010 18:08:09	
	UAF	Please read this doc the red-colored hints	ument carefully and note	
		If you miss a file in th maybe you have forg	jotten to select the	
			of the related module.	
'		Generated Files:	MAIN.H	
			MAIN.C STARTUPXC886.S	
			IO.H IO.C	
			UART.H Generated files	
			Т01.Н	
			T01.C XC888.ASM	
r				
		Project Settings		
		Macros: Functions:		
	XC888CLM	C:\XC8xx(\XC8	188(XC888.dav	1.



Save changes?

 ${\scriptstyle Click:} Yes$



4.) Using DAvE Bench:

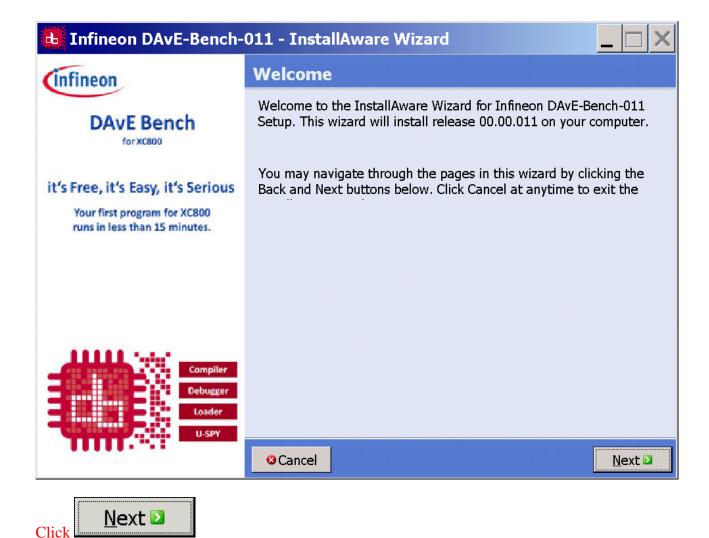


Download and install DAvE Bench (<u>http://www.infineon.com/DAvE-Bench</u>):

Double-click

InstallAware Wizard 🗙				
	The InstallAware Wizard is recomposing the data that will install this application. Please wait.			
	Cancel			







Infineon DAvE-Bench-011 - InstallAware Wizard		
(infineon	License Text	
DAvE Bench	Please carefully read the license agreement below. You must accept the license agreement to continue with setup.	
it's Free, it's Easy, it's Serious Your first program for XC800 runs in less than 15 minutes.	IMPORTANT NOTICE AND TERMS OF USE Please read the following important notice as well as the following terms and conditions carefully. The installation of this software requires that you click the acceptance button below. By clicking the acceptance button "I accept" you agree to have read the important notice set forth below and to be bound by the following terms of use. If you do not agree to the terms and conditions below, click the button "I do not accept" and the installation procedure will not be started. If you change your mind later, stop using the Software and delete all	
Compiler Debugger Loader U-SPY	copies of the Software in your possession or control. Any copies of the Software that you have already distributed, where permitted, and do not destroy will continue to be governed by these Terms of Use. Your prior use will also continue to be governed by these Terms of Use. I have read, understand, and accept the license agreement displayed above. Cancel Cancel	

Tick \square I have read, understand...





Linfineon DAvE-Bench-011 - InstallAware Wizard			
(Infineon	User Info		
DAvE Bench for XC800 it's Free, it's Easy, it's Serious Your first program for XC800 runs in less than 15 minutes.	Please personalize your copy of Infineon DAvE-Bench-011 below. All fields must be entered to proceed. Mame: Wilhelm Brezovits Company: Infineon Technologies Austria AG		
Compiler Debugger Loader U-SPY	© Cancel <u>N</u> ext ☑		

Insert Name: Your name Insert Company: Your company





👪 Infineon DAvE-Bench-011 - InstallAware Wizard		
(Infineon	Destination Folder	
DAve Bench for XC800 it's Free, it's Easy, it's Serious Your first program for XC800 runs in less than 15 minutes.	Setup will install Infineon DAvE-Bench-011 in the following folder:	
Compiler Debugger Loader U-SPY	Destination Folder: C:\Program Files\DAvE-Bench-011\ Total Required Space: 150,971 KB Disk Space Remaining: 33,935 MB SCancel Scancel Scance Next ≥	

Select a suitable directory and





👪 Infineon DAvE-Bench-011 - InstallAware Wizard		
(Infineon	Program Shortcuts	
DAvE Bench	Please specify the Program Group for the application shortcuts to be created on your client machine. Infineon DAvE-Bench-011	
it's Free, it's Easy, it's Serious Your first program for XC800 runs in less than 15 minutes.	Create icons for: [©] <u>A</u> ll Users [©] <u>C</u> urrent User Only	
Compiler Debugger Loader U-SPY	© Cancel ■ Back Next ■	





Infineon DAvE-Bench-	011 - InstallAware Wizard	
infineon	Final Confirmation	
DAvE Bench	You are now ready to install Infineon DAvE-Bench-011. Please click Next to install or Back to change your settings Selected features for installing:	
t's Free, it's Easy, it's Serious		
Your first program for XC800 runs in less than 15 minutes.	Server: DAS 2.9.2 or later, already installed. Features of DAvE-Bench for XC800: - ECLIPSE based IDE - SDCC compiler for XC800 - Debugger for XC800	
Compiler Debugger Loader U-SPY	- FLOAD (Flash load utility for XC800) -U-SPY (UART terminal)	_
	© Cancel	Next 🛽

Click

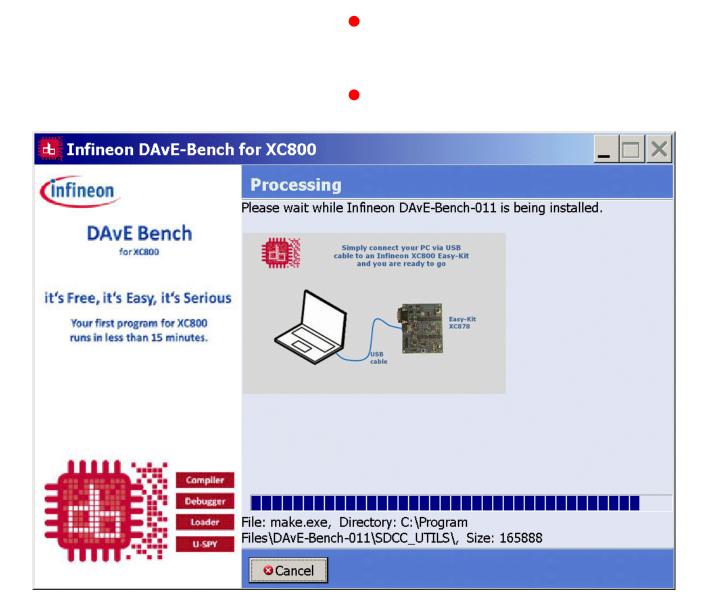
Next ≥



Linfineon DAvE-Bench for XC800		
Cinfineon	Processing	
DAve Bench for XC800 it's Free, it's Easy, it's Serious Your first program for XC800 runs in less than 15 minutes.	Please wait while Infineon DAvE-Bench-011 is being installed.	
Compiler Debugger Loader U-SPY	File: org.eclipse.debug.core_3.4.1.v20090106_r342.jar, Directory: C:\Program Files\DAvE-Bench-011\eclipse\plugins Size: 309779	









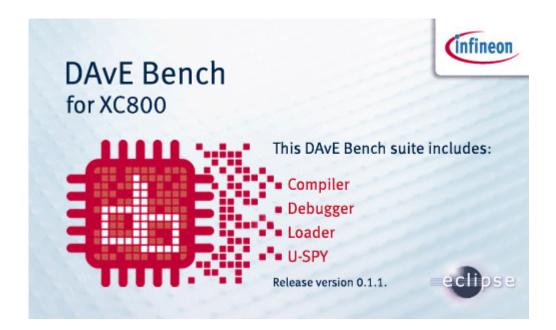
Infineon DAvE-Bench-011 - InstallAware Wizard		
Infineon	Done	
DAve Bench	Infineon DAvE-Bench-011 has been successfully installed.	
it's Free, it's Easy, it's Serious	Infineon DAvE-Bench-011 requires at least Java Runtime Environment 6 (JRE 1.6). Please select one of the install options below:	
Your first program for XC800 runs in less than 15 minutes.	 ^C Offline - internet connection is not required J2SE Runtime Environment(JRE) 6, Update17, provided together with Infineon DAvE-Bench-011. ^C Online - internet connection required Java home page http://www.java.com is opened.The connected host may be checked for current installed JRE and updated to the latest one. 	
Compiler Debugger Loader U-SPY	^c Install Java Runtime Environment later. Einish □	







Start/Launch DAvE Bench and open/add the DAvE Project:



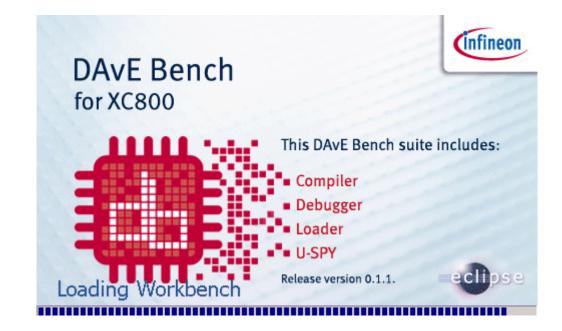


Workspace Launcher
Select a workspace
DAvE-Bench for XC800 stores your projects in a folder called a workspace. Choose a workspace folder to use for this session.
Workspace: cuments and Settings\brezovit\workspace Browse
□ Use this as the default and do not ask again OK Cancel
Click Browse and select C:\XC8xx:

📙 Wyrkspace Launch	er	×
Select a workspace		
DAvE-Bench for XC800 stor Choose a workspace folder	es your projects in a folder calle to use for this session.	d a workspace.
Workspace: C:\XC8xx		Browse
□ Use this as the default an	d do not ask again	
	01	K Cancel

OK - OK

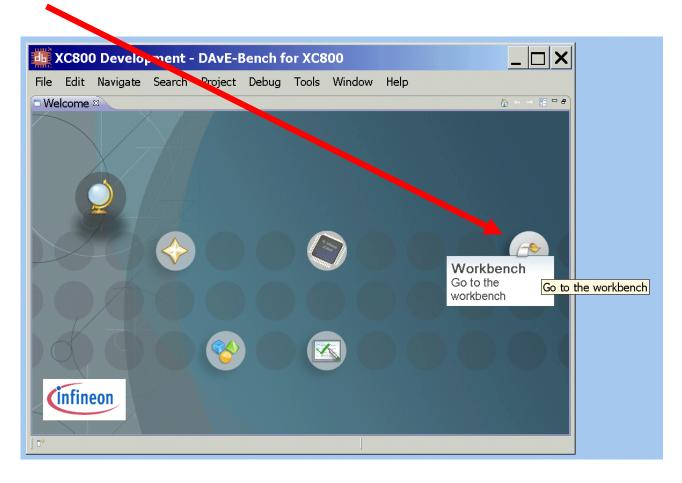




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Click "Go to the workbench":





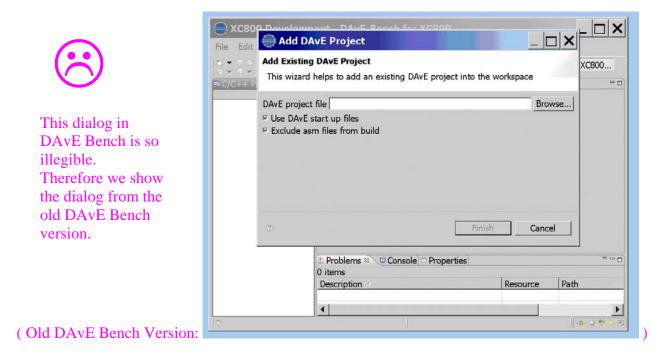
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C/C++ Projects 🛛 🦳				- 0
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File – New – Existing DAvE Project

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	New		A	lt+Shift+I		🖞 XC800 I				E [™] ■XC800
	Open Fil	e					DAvE Proj	ject		
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	Close All		C	trl+Shift+		Source Folder	Folder			
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2	Import								Resource	Path
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	Exit									





16 XC80) Development - DAvE-Bench for XC800
File Edit	Navigate Search Project Debug Tools Window Help
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ा C/C++ P	Add Existing DAvE Project
	This wizard helps to add an existing DAvE project into the workspace
	 ✓ Use DAvE st ✓ Exclude asm f Silicon bugs list
	⑦ Fuish Cancel ▼□□
	Description A Resource Path
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Add DAvE Project: Add Existing DAvE Project: DAvE project file: click Browse...

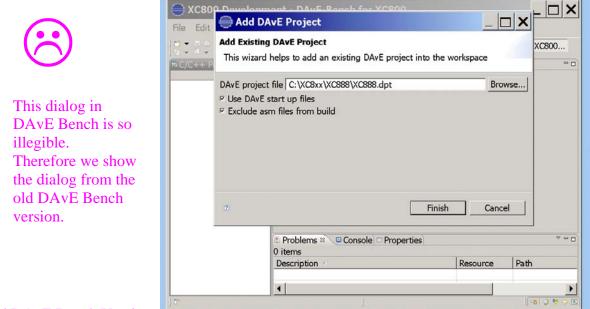


Open: Look in: select C:\XC8xx\XC888 Open: File name: select XC888.dpt

XC800 Development - DAvE-Bench for XC800	<
File Edit Navigate Search Project Debug Tools Window Help	
Add DAvE Project	
C/C++ P Open	
Look in: 🔁 XC888	
Image: Second secon	
File name: XC888.dpt	
Files of type: DPT Files(*.dpt) Cancel	-

Open





(Old DAvE Bench Version:

16 XC800	0 Development - DAvE-Bench for XC800
File Edit	Navigate Search Project Debug Tools Window Help
C3 ▼ E E 2 ▼ P ▼	Add DAvE Project
to C/C++ P	Add Existing DAvE Project This wizard helps to add an existing DAvE project into the workspace
	DAvE proj Ci)YC8vv)YC888)YC888 dot irowse. If Use DAvE st Exclude asm f Silicon bugs list Itardware Cache Miss. A NOP instruction will Itardware Cache Miss. A NOP instruction will
	⑦ Finish Cancel ▼□□
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Finish



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C/C++ Projects C/C++			CC800 □ □ □ Path
		Kesource h	ratn
∫ [™] /XC888			⊴ 🍳 💖 🔶 💌



Note:

 $\overset{\bullet}{\circledast}$ Check that the active project is

XC888 [Active - Debug] and NOT XC888 [Active - Release]



KC800 Development - DA	vE-Bench for XC800		
File Edit Navigate Search Pro	ject Debug Tools Window Help	,	
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C/C++ Projects 2 • • • • • • • • • • • • • • • • • •			
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	Problems □ Console □ Pr 0 items		
	Description	Resource P	ath
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∫ ©^ /XC888		٦	≥ 🗘 🍄 🔆 🗷
Note: Check that XC888.asm is Right mouse click on XC888.a	NOT part of the build process: sm - click Exclude from	m build	
Exclude from build			
Exclude object(s) from build in the f	ollowing configurations		
 ✓ Debug ✓ Release 			
	Select All Deselect All		
0	OK Cancel OK		





Note:

The DAvE created files can be directly accessed in the IDE (DAvE Bench) or in DAvE.

The user has to make sure that no conflicts or data losses happen.

This can be avoided by saving the files before switching from the IDE to DAvE or vice versa.



Note:

The following pages/screenshots exist for documentation purposes only.

There is nothing to do!

If you are in a hurry, we suggest you jump to <u>page 132</u> (Insert your application specific program) and continue working there.



Configure Compiler, Assembler, Linker, Locater, Hex-Converter, Build – Control, Debugger and Utilities:

Click/Mark (left mouse click on) XC888 [Active - Debug]

	- DAvE-Bench for XC800	
e Edit lavigate Search	Project Debug Tools Window Help	
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C/C++ Projects ¤		
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XC888 [Active - Debu Standard Content of		
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■ IO.E ■ IO.H		
MAIN.C		
• S MemInitxc88x.s		
■ startupxc886.s		
■ IO1.C ■ IO1.H		
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UART.H		
🖃 XC888.asm		
🗎 XC888.rtf		
	Problems □ Console Propertie 0 items	S
	Description	Resource Path
		Resource Faur



Project - Properties

4 XC800 Development	- DAvE-Bench for XC800	<u> </u>
Hermitian XC800 Development File Edit Navigate Search Image: Search Image: Search Image: Search Image: Search Im	Project Debug Tools Window Help Image: Second	□ □ X T T XC800 T □
 Startupxc886.s T01.C T01.H UART.C UART.H XC888.asm XC888.rtf 	Active Project Properties Properties	
	Problems Console Properties 0 items	
	Description A Reso	urce Path
[™] /XC888		



Project – Properties: Resource:

Properties for XC888		$_{-}\Box \mathbf{X}$
type filter text Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor ⊕ C/C++ General Project References	Resource Path: /XC888 Type: Project Location: C: \XC8xx\XC888 Last modified: 4. Februar 2010 15:07:44 Text file encoding • Inherited from container (Cp1252) • Other: Cp1252 New text file line delimiter • Inherited from container • Other:	
· · ·	• Other:	Apply
Ō	ОК	Cancel



Project – Properties: Builders:

Properties for XC888		
type filter text	Builders	$\Leftrightarrow \bullet \bullet \bullet \bullet \bullet$
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	Configure the builders for the project: ☐ ☐ CDT Builder ☐ ☐ Scanner Configuration Builder	New Import Edit Remove Up Down
Ø	ОК	Cancel



Project – Properties: C/C++ Build: Builder Settings:

Properties for XC888	
type filter text	C/C++ Build $\diamond \bullet $
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	Configuration: Debug
	Builder Settings Behaviour Builder Builder type: External builder Vise default build command Variables
	Makefile generation Image: Generate Makefiles automatically Image: Build location Description
	Build directory: \${workspace_loc:/XC888/Debug} Workspace, File system Variables
Q	Restore Defaults Apply



Project – Properties: C/C++ Build: Behaviour:

Properties for XC888			
type filter text	C/C++ Build		$\Leftrightarrow \bullet \bullet \bullet \bullet$
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page	Configuration: Debug	▼ Manage	Configurations
	 Builder Settings Behaviour Build settings F Stop on first build error 	Use parallel build Ouse optimal jobs number	
- Segment Location Page - Settings		• Use parallel jobs: 1	<u>А</u> У
– Tool Chain Editor ⊞-C/C++ General	Workbench Build Behavior Workbench build type:	Make build target:	
 Project References Refactoring History Run/Debug Settings 	□ Build on resource save (Auto build Note: See Workbench automatic build	• ,	Variables
	✓ Build (Incremental build)	all	Variables
	⊭ Clean	clean	Variables
		Restore Defau	Its Apply
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Project – Properties: C/C++ Build: Build Variables:

Properties for XC888					
type filter text	Build Vari	iables			$\Leftrightarrow \bullet \bullet \bullet \bullet$
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Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	□ Show s	ystem var	iables		
				Restore Defaults	Apply
0				ОК	Cancel



Project – Properties: C/C++ Build: Discovery Options:

Properties for XC888	
type filter text	Discovery Options $\diamond \star \star \star$
Resource Builders ⊖C/C++ Build Build Variables	Configuration: Debug
 Discovery Options Environment 	Discovery profiles scope
MCU Selection Page	Per Language
 Memory Settings Page Segment Location Page 	Tools:
Settings	No profiles found
− Tool Chain Editor	
- Project References	
Refactoring History Run/Debug Settings	
	Restore Defaults Apply
Ō	OK Cancel



Project – Properties: C/C++ Build: Environment:

Properties for XC888				$-\Box X$
type filter text	Environment			
 Resource Builders C/C++ Build Build Variables Discovery Options 	Configuration:		▼ Manage Conf	
- Environment	Variable		Origin	Add
 MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor ⊕ C/C++ General Project References Refactoring History Run/Debug Settings 	CWD PWD SDCC_HOME SDCC_UTILS	C:\XC8xx\XC888\Debug C:\XC8xx\XC888\Debug C:\Program Files/DAvE-Bench-011\SDCC_XC800 C:\Program Files/DAvE-Bench-011\SDCC_UTILS	BUILD SYSTEM BUILD SYSTEM USER: PREFS USER: PREFS	Select Edit Delete Undefine
		e environment with specified one	Restore Defaults	Apply
0			ОК	Cancel



Project – Properties: C/C++ Build: MCU Selection Page (part 1 of 2):

Properties for XC888	
type filter text	MCU Selection Page
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	ProcessorsInfo XC82x XC822-1F XC822H-1F XC824M-1F XC8664 XC8266 XC866-1FR XC866-2FR XC866-4FR XC8
	Start up file preferences □ Add/Update start up files
	Restore Defaults Apply
0	OK Cancel



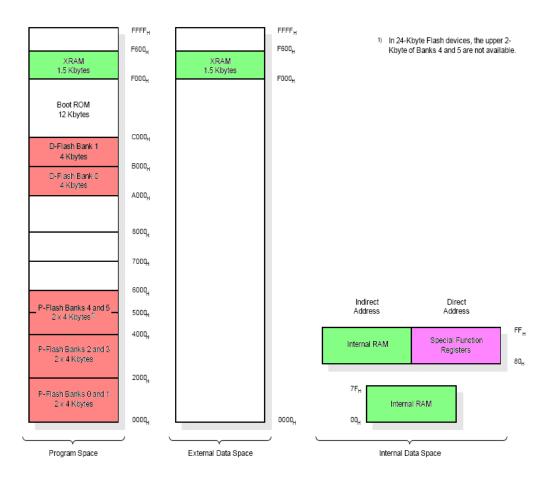
Project – Properties: C/C++ Build: MCU Selection Page (part 2 of 2):

Properties for XC888		
type filter text	MCU Selection Page	▼ ⇒ ▼ ▼
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	Image: Stress of the system Image: Stress of the system <td>ction</td>	ction
	Start up file preferences □ Add/Update start up files Restore Defaults	Apply
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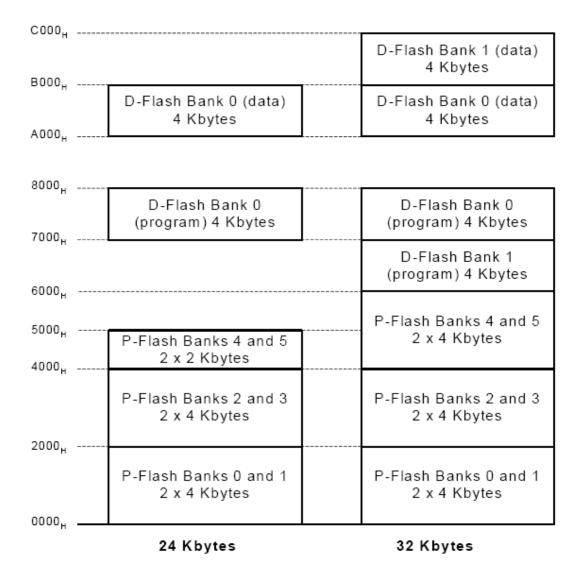
Note: On-chip Memories:







Additional information: Flash Memory Map (Source: User's Manual):



Note (Source: User's Manual):

The D-Flash bank(s) in the XC886/888 Flash devices are mapped to two program memory address spaces:

D-Flash Bank 0 is mapped to $7000_{\text{H}} - 7\text{FFF}_{\text{H}}$ and $A000_{\text{H}} - \text{AFFF}_{\text{H}}$. D-Flash Bank 1, which is only available in the 32-Kbyte Flash device, is mapped to $6000_{\text{H}} - 6\text{FFF}_{\text{H}}$ and $B000_{\text{H}} - 8\text{FFF}_{\text{H}}$.

In general, the lower address spaces $(6000_H - 6FFF_H \text{ and } 7000_H - 7FFF_H)$ should be used for D-Flash bank(s) contents that are intended to be used as program code. Alternatively, the higher address spaces $(A000_H - AFFF_H \text{ and } B000_H - BFFF_H)$ should be used for D-Flash bank(s) contents that are intended to be used as data.



Project – Properties: C/C++ Build: Memory Setting Page:

Properties for XC888			
type filter text	Memory Settings Page	Ф •	
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	Memory Settings Internal RAM start address Internal RAM end address Bit segment start address Bit segment end address XRAM start address in hex (0xNNNN) XRAM end address in hex (0xNNNN) Flash/ROM1 start address in hex (0xNNNN) Flash/ROM2 end address in hex (0xNNNN) Flash/ROM2 end address in hex (0xNNNN) Flash/ROM3 end address in hex (0xNNNN)	0x00 0xFF 0x20 0x2F 0xF000 0xF5FF 0x000 0x7FFF	ply
Ð		OK Cano	el



Project – Properties: C/C++ Build: Segment Location Page:

Properties for XC888		$_{-} \square \mathbf{X}$
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 Segment Location Page Settings 	Constant Segments	_
─ Tool Chain Editor	File Segmen	<u>Add</u>
 Refactoring History Run/Debug Settings 		
	Memory segment location	
	DSEG (IRAM) start location in hex (0xNN): 0x00	
	ISEG (IRAM) start location in hex (0xNN): 0x80	
	SSEG stack pointer start location in hex (0xNN): 0x80	
	PSEG (XRAM) start location in hex (0xNNNN): 0xF000 OxFO00 Restore Defaults	Apply
Q	ОК	Cancel



Project – Properties: C/C++ Build: Settings:

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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Compiler:

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MCU Selection Page	Global Options Command:	"\${SDCC_HOME}\bin\sdcc"
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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Compiler: Preprocessor:

Properties for XC888			
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٢		OK Cancel	



Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Compiler: Directories

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	Warnings Miscellaneous SDCC Assembler General SDCC Linker Library Miscellaneous	
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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Compiler: Optimization:

Properties for XC888	
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Q	OK Cancel



Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Compiler: Warnings:

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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Compiler: Miscellaneous:

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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Assembler:

Properties for XC888	3	
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		"\${SDCC_HOME}\bin\as-xc800"
	SDCC Compiler Preprocessor Directories Warnings Miscellaneous SDCC Assembler General SDCC Linker Miscellaneous Miscellaneous	
	<u>, , , , , , , , , , , , , , , , , , , </u>	Restore Defaults Apply
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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Assembler: General:

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Resource Builders C/C++ Build Build Variables	Configuration: Debug	Manage Configurations
 Discovery Options Environment 	Tool Settings >> Build Steps	🕲 Tool Settings 🎤 Build Steps 🕿 Build Artifact 🕮 Binary Parsers 💿 Error Parsers
MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor Tool Chain Editor Refactoring History Run/Debug Settings	© Global Options SDCC Compiler © Preprocessor © Drimization © Miscellaneous © CC Assembler © Library © Library	Command: "\${5DCC_HOME})bin/sdcc" All options:
		Restore Defaults Apply
©		OK Cancel

Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Linker:



Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Linker: Library:

Properties for XC888			
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		Restore Defaults App	ply
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Project – Properties: C/C++ Build: Settings: Tool Settings: SDCC Linker: Miscellaneous:

Properties for XC888		
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Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings	Configuration: Debug Tool Settings Build Steps Build Artifact Binary Parsers Contro Parsers Global Options Gl	Browse,
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Project – Properties: C/C++ Build: Settings: Build Steps:

Properties for XC888		
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Properties for XC888		
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Resource - Builders - C/C++ Build - Build Variables	Configuration: Debug	ions
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– MCU Selection Page – Memory Settings Page – Segment Location Page	Artifact Type: Artifact name: XC888 Artifact extension:	• • •
– Settings – Tool Chain Editor	Output prefix:	
 C/C++ General Project References Refactoring History Run/Debug Settings 		
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Project – Properties: C/C++ Build: Settings: Binary Parsers:

Properties for XC888		
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Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor C/C++ General Project References Refactoring History Run/Debug Settings		e Configurations
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Project – Properties: C/C++ Build: Settings: Error Parsers:

Properties for XC888		_ 🗆 X
type filter text	Settings	$\Leftrightarrow \bullet \bullet \bullet \bullet$
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	Restore Defaults	Apply
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Project – Properties: C/C++ Build: Tool Chain Editor:

Properties for XC888		
type filter text	Tool Chain Editor	
Resource Builders C/C++ Build Build Variables Discovery Options	Configuration: Debug	▼ Manage Configurations
- Environment - MCU Selection Page - Memory Settings Page - Segment Location Page	Current toolchain: XC800 Application Tool Chain Current builder: XC800 Builder	•
 Settings Tool Chain Editor ⊕ C/C++ General 	Used tools	
Project References Refactoring History Run/Debug Settings	SDCC Compiler SDCC Assembler SDCC Linker	Select Tools
		Restore Defaults Apply
Ō		OK Cancel



Project – Properties: C/C++ General:

Properties for XC888			$-\square X$
type filter text	C/C++ General		$ \diamondsuit \bullet $
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	□ Enable project specific settings □ Documentation tool comments	Configure Workspace Settin	
0		ОК	Cancel



Project – Properties: C/C++ General: Code Style:

Resource - Builders Builders - Enable project specific settings C/C++ Build K&R [built-in] Build Variables New Discovery Options Preview: - Environment /* - Memory Settings Page */ - Segment Location Page */	Configure M	forkspace Settings.
<pre>Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings</pre> double Point::distance(const Point& other) const double dx = x - other.x; double dy = y - other.y; return sqrt(dx * dx + dy * dy); }		aults Apply



Project – Properties: C/C++ General: Documentation:

Properties for XC888		
type filter text	Documentation	$\Leftrightarrow \checkmark \rightarrow \checkmark \checkmark$
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	Help books	Check All Uncheck All
		Restore Defaults Apply
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Project – Properties: C/C++ General: File Types:

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Builders	· · · · · · · · · · · · · · · · · · ·	_		
C/C++ Build	 Use project 	settings		
Build Variables	Filename	Description	Status	New
Discovery Options	*.asm	Assembly Source File	Locked	
Environment	*.c	XC800 Source	Locked	Remove
MCU Selection Page	*.c	C Source File	Locked	
Memory Settings Page	*.C	C++ Source File	Locked	
Segment Location Page	*.c++	C++ Source File	Locked	
Settings	*.cc	C++ Source File	Locked	
Tool Chain Editor	*.cpp	C++ Source File	Locked	
C/C++ General	*.CXX	C++ Source File	Locked	
Code Style	*.h	C Header File	Locked	
Documentation	*.h	C++ Header File	Locked	
	*.hh	C++ Header File	Locked	
File Types	*.hpp	C++ Header File	Locked	
Indexer	*.hxx	C++ Header File	Locked	
Language Mappings	*.s	Assembly Source File	Locked	
Paths and Symbols	algorithm	C++ Header File	Locked	
Project References	bitset	C++ Header File	Locked	
Refactoring History	cassert	C++ Header File	Locked	
Run/Debug Settings	cctype	C++ Header File	Locked	
	cerrno	C++ Header File	Locked	
	cfloat	C++ Header File	Locked	
	ciso646	C++ Header File	Locked	
	climits	C++ Header File	Locked	
	clocale	C++ Header File	Locked	
	cmath	C++ Header File	Locked	
	complex	C++ Header File	Locked	
	csetjmp	C++ Header File	Locked	
	csignal	C++ Header File	Locked	
	cstdarg	C++ Header File	Locked	
	cstddef	C++ Header File	Locked	
	cstdio	C++ Header File	Locked	
	cstdlib	C++ Header File	Locked	
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Project – Properties: C/C++ General: Indexer:

Properties for XC888		$_{-}$ \square \times
type filter text	Indexer	$\Leftrightarrow \bullet \Rightarrow \bullet \bullet$
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	Configure Workspace Settings. Select indexer Fast C/C++ Indexer (recommended) Index all files (files neither built nor included, also) Skip all references (Call Hierarchy and Search will not work) Skip type references (Search for type references will not work) Skip macro references (Search for macro references will not work) Skip and configuration for the indexer Use active build configuration Use a fixed build configuration Debug	Apply
0	ОК	Cancel



Project – Properties: C/C++ General: Language Mappings:

Properties for XC888					$-\Box \mathbf{X}$
type filter text	Language Mappings				$\Leftrightarrow \bullet \bullet \bullet \bullet \bullet$
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		erited from the workspace			
Run/Debug Settings	Content Type		Language		
				Restore Defaults	Apply
0				ОК	Cancel



Project – Properties: C/C++ General: Paths and Symbols: Includes:

Properties for XC888		
type filter text Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	Paths and Symbols Configuration: Debug Manage Co Includes # Symbols & Libraries & Library Paths References & Source Locat Languages Include directories C,C A\${SDCC_HOME}\include\xc800 A\${SDCC_HOME}\include\asm\xc800 A\${SDC	
	✓ Show built-in values Restore Defaults	Apply
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Project – Properties: C/C++ General: Paths and Symbols: Symbols:

type filter text	Paths and Symbol	5			$\Leftrightarrow \bullet \Rightarrow \bullet$
Resource Builders C/C++ Build Build Variables Discovery Options	Configuration: De		2 Library Paths	References 😂 Source Locatio	anage Configurations
 Environment MCU Selection Page 	Languages	Symbol	Value		Add
Memory Settings Page	-c,C	# SDCC			
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 Iool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings 	⊂ Show built-in va				
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Project – Properties: C/C++ General: Paths and Symbols: Libraries:

Properties for XC888		
type filter text	Paths and Symbols	$ \diamondsuit \bullet $
		Add Edit Delete Export Move Up Move Down
	⊂ Show built-in values Restore Defaults OK	Apply



Project – Properties: C/C++ General: Paths and Symbols: Library Paths:

Properties for XC888		
type filter text	Paths and Symbols	$\Leftrightarrow \bullet \bullet \bullet \bullet$
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Project – Properties: C/C++ General: Paths and Symbols: References:

ype filter text	Paths and Symbols	↓ ↓ ▼ ▼
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Project – Properties: C/C++ General: Paths and Symbols: Source Location:

Properties for XC888		
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		age Configurations Decation Add Folder Edit Filter Delete
	Restore De	efaults Apply
õ	OK	Cancel



Project – Properties: Project References:

Properties for XC888		
type filter text	Project References	$\Leftrightarrow \bullet \bullet \bullet \bullet \bullet$
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	Projects may refer to other projects in the workspace. Use this page to specify what other projects are referenced by the project. Project references for XC888:	
0	ОК	Cancel



Project – Properties: Refactoring History:

Properties for XC888		
type filter text	Refactoring History	$\Leftrightarrow \bullet \bullet \bullet \bullet \bullet$
Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Segment Location Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	Refactorings affecting project 'XC888':	Remove Remove All
	Details:	
	 Persist project refactoring history in project folder instead of workspace 	
Ø	OK	Cancel



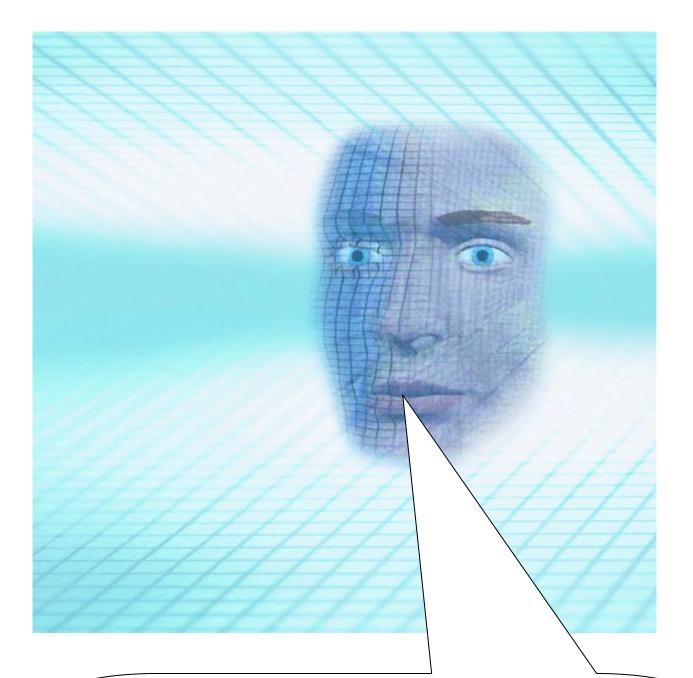
Project – Properties: Run/Debug Settings:

type filter text	Run/Debug Settings	$\diamond \bullet \bullet \bullet \bullet$
type filter text Resource Builders C/C++ Build Build Variables Discovery Options Environment MCU Selection Page Memory Settings Page Segment Location Page Settings Tool Chain Editor C/C++ General Code Style Documentation File Types Indexer Language Mappings Paths and Symbols Project References Refactoring History Run/Debug Settings	Run/Debug Settings This page allows you to manage launch configurations associated with the current resource. Launch configurations for 'XC888':	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
	Restore Defaults	Арріу

OK



Insert your application specific program:



Note:

DAVE doesn't change code which is inserted between '// USER CODE BEGIN' and '// USER CODE END'. Therefore, whenever adding code to DAVE's generated code, write it between '// USER CODE BEGIN' and '// USER CODE END'. If you wish to change DAVE's generated code or add code outside these 'USER CODE' sections you will have to insert/modify your changes each time after letting DAVE regenerate code!



Double click MAIN.C and insert Global Variables:

```
const char menu[] =
^{\prime\prime}n^{n}
"1 ... LEDs P3 ON\n"
"2 ... LEDs P3 OFF\n"
"3 ... LEDs P3 blinking\n"
"\n";
const char question[] =
"your choice: ";
const char message1[] =
"\n*** LEDs ON ***\n";
const char message2[] =
"\n*** LEDs OFF ***\n";
const char message3[] = 
"\n*** LEDs BLINKING ***\n";
volatile int RS232_wait=183; // 183 * Timer_0-overflow = 183 * 5461,333 µs = 0,9994 s
bit blinking=ON;
char select=' ';
```



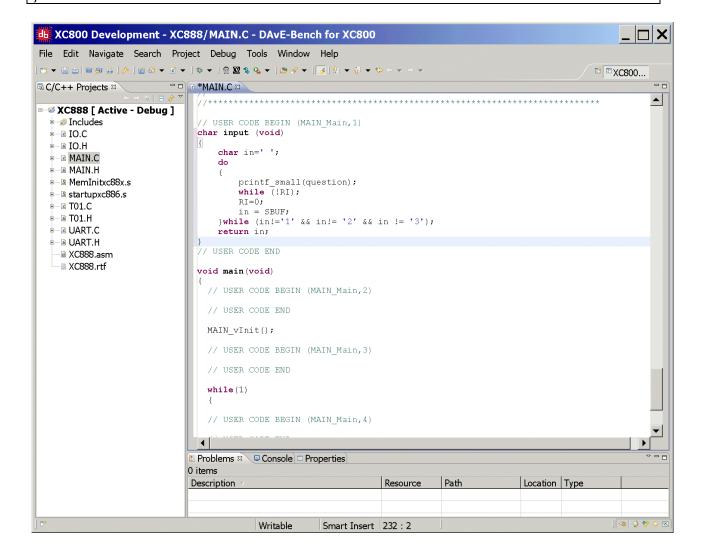
	C888/MAIN.C - DAvE-Bench for XC800 roject Debug Tools Window Help				<u> </u>	
-	▼ ※ ▼ @ @ % Q ▼ @ % ▼]	⇔ ← → → →			¹² ■XC800	
	■ *MAIN.C ≈					
		****	****	* * * * * * * * * * * *	* * * * * * *	
XC888 [Active - Debug] Includes Io.C Io.H MAIN.H MAIN.H MemInitxc88x.s Startupxc886.s TO1.C TO1.H UART.C UART.H XC888.asm XC888.rtf	<pre>// "GGlobal Variables //***********************************</pre>	**************************************	**************************************	***********	******* 333 <u>µs</u> = 0,9994	
	//************************************					
	//*************************************	* * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * * * * * * * * *	* * * * * * * *	
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Double click MAIN.C and insert the function input():

char input (void)

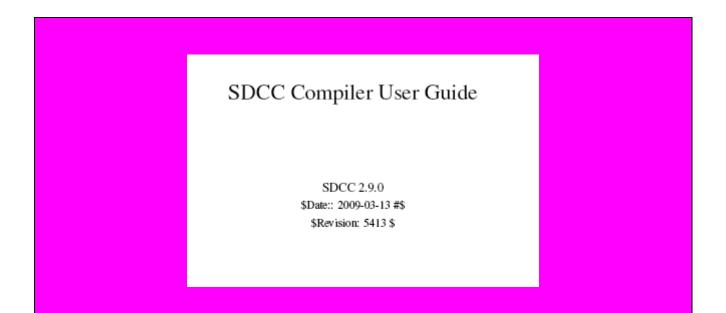
{







Additional information: printf(), printf_small(), printf_fast_f():



3.17.2 Stdclib functions (puts, printf, streat etc.)

3.17.2.1 <stdio.h>

getchar(), putchar() As usual on embedded systems you have to provide your own getchar() and putchar() routines. SDCC does not know whether the system connects to a serial line with or without handshake, LCD, keyboard or other device. And whether a lf to crlf conversion within putchar() is intended. You'll find examples for serial routines f.e. in sdcc/device/lib. For the mcs51 this minimalistic polling putchar() routine might be a start:

```
void putchar (char c) {
   while (!TI) /* assumes UART is initialized */
   ;
   TI = 0;
   SBUF = c;
}
```





printf(), printf_small(), printf_fast_f() (continuation):

printf() The default prihtf() implementation in printf_large.c does not support float (except on ds390), only <NO FLOAT> will be printed instead of the value. To enable floating point output, recompile it with the option -*DUSE_FLOATS=1* on the command line. Use --*model-large* for the mcs51 port, since this uses a lot of memory. To enable float support for the pic16 targets, see 4.6.8.

If you're short on code memory you might want to use printf_small() *instead* of printf(). For the mcs51 there additionally are assembly versions printf_tiny() (subset of printf using less than 270 bytes) and printf_fast() and printf_fast_f() (floating-point aware version of printf_fast) which should fit the requirements of many embedded systems (printf_fast() can be customized by unsetting #defines to *not* support

long variables and field widths). Be sure to use only one of these printf options within a project.

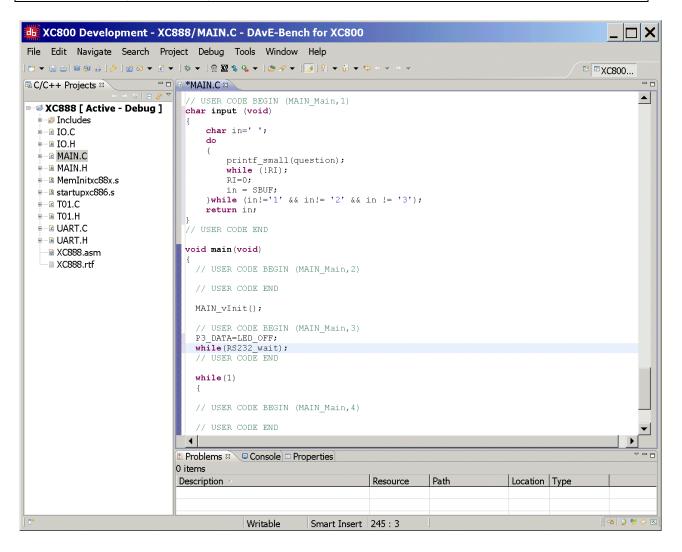
mcs51	printf	printf	printf_small	printf_fast	printf_fast_f	printf_tiny
	_	USE_FLOATS=1		_	_	
filename	printf_large.c	printf_large.c	printfl.c	printf_fast.c	printf_fast_f.c	printf_tiny.c
"Hello World"						
size	1.7k / 2.4k	4.3k / 5.6k	1.2k / 1.8k	1.3k / 1.3k	1.9k / 1.9k	0.44k / 0.44k
small / large						
code size	1.4k / 2.0k	2.8k / 3.7k	0.45k/	1.2k / 1.2k	1.6k / 1.6k	0.26k / 0.26k
small / large			0.47k (+			
			_ltoa)			
formats	cdiopsux	cdfi <i>o</i> psux	cdosx	cdsux	cdfsux	cdsux
long (32 bit)	х	х	х	х	х	_
support	л	л	л	л	л	_
byte arguments	b	b	-	-	-	-
on stack		~ 0			~ 1	
float format	-	%f	-	-	%f ⁹	-
float formats %e %g	-	-	-	-	-	-
field width	X	X		X	X	-
string speed ¹⁰ ,						
small / large	1.52 / 2.59 ms	1.53 / 2.62	0.92 / 0.93	0.45 / 0.45 ms	0.46 / 0.46	0.45 / 0.45 ms
		ms	ms		ms	
int speed ¹¹ ,	3.01 / 3.61 ms	3.01 / 3.61	3.51/	0.22 / 0.22 ms	0.23 / 0.23	0.25 / 0.25 ms ¹²
small / large		ms	18.13 ms		ms	
long speed ¹³ ,	5.37 / 6.31 ms	5.37 / 6.31	8.71/	0.40 / 0.40 ms	0.40/0.40	_
small / large	5.577 5.51 113	ms	40.65 ms	0.407 0.40 III3	ms	
float speed ¹⁴ ,			lorde mb			
small / large	-	7.49 / 22.47	-	-	1.04 / 1.04	-
		ms			ms	

Feature matrix of different *printf* options on mcs51.



Double click MAIN.C and insert the following code in the main function:

P3_DATA=LED_OFF; while(RS232_wait);





Double click MAIN.C and insert the following code in the main function into the while(1) loop:

```
printf_small(menu);
select=input();
switch (select)
{
    case '1': blinking=OFF; P3_DATA=LED_ON, printf_small(message1); break;
    case '2': blinking=OFF; P3_DATA=LED_OFF, printf_small(message2); break;
    case '3': blinking=ON, printf_small(message3); break;
```

File Edit Navigate Search Project Debug Tools Window Help C C C++ Projects : C C C C C C C C C C C C C C C C C C C	11111	888/MAIN.C - DAvE-Bench for XC800
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Image: Writable Smart Insert 260 : 5	XC888 [Active - Debug] Includes IO.C MAIN.C MAIN.H MemInitxc88x.s Startupxc886.s T01.C MOLART.C UART.C WART.H XC888.asm XC888.rtf	<pre>while (inl='1' && inl='2' && in l= '3'); return in; } // USER CODE END void main(void) { // USER CODE BEGIN (MAIN_Main,2) // USER CODE BEGIN (MAIN_Main,2) // USER CODE BEGIN (MAIN_Main,3) P3_DATA-LED_OFF; while(RS232_wait); // USER CODE END while(1) { case '1': blinking=OFF; P3_DATA-LED_ON, printf_small(message1); break; case '2': blinking=OFF; P3_DATA-LED_ON, printf_small(message2); break; case '3': blinking=OFF; P3_DATA-LED_OFF, printf_small(message3); break; description </pre>



Double click Main.h and insert the following Defines:

#define OFF 0 #define ON 1 #define LED_ON 0xFF #define LED_OFF 0x00

👍 XC800 Development - XC888/MAIN.H - DAvE-Bench for XC800	_ 🗆 🗙
File Edit Navigate Search Project Debug Tools Window Help	
C/C++ Projects X C MAIN.C MAIN.H X	- 0
E S XC888 [Active - Debug]	
// Macros used for push and pop operation of SYSCONO	
#define pushsyscon() { _asm push SDCC_SISCONO _endasm;}	
<pre>B→B IO.H #define popsyscon() { _asm pop SDCC_SYSCON0 _endasm; } B→B MAIN.C</pre>	
e− MAIN.H	
MemInity 88y s	
B Hernintecooks // USER CODE BEGIN (MAIN_Header, 3)	
e→ I TO1.C // USER CODE END	
e— ≥ T01.H	
	+++
e-⊡ UART.H	
□	* * *
→ XC888.rtf	
// USER CODE BEGIN (MAIN_Header, 4) #define OFF 0	
Hdefine ON 1	
#define LED_ON 0xFF	
#define LED_OFF 0x00	
// USER CODE END	
#define bool bit	
#define ulong unsigned long	
#define uword unsigned int	
#define ubyte unsigned char	
//*************************************	* * *
// @Prototypes Of Global Functions	_
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0 items	
Description A Resource Path Location Type	
D* Writable Smart Insert 65 : 21	a 🔮 🔮 🔶 💌



Double click Main.h and insert extern-declarations "Global Variables":

extern bit blinking; extern volatile int RS232_wait;

👫 XC800 Development - XC8	888/MAIN.H - DAvE-Bench for XC8	00		
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	▶ *MAIN.C ▶ *MAIN.H ≈			
← → ☆ = ♂ ▼ =-≝ XC888 [Active - Debug]	// @Typedefs //***********************************	* * * * * * * * * * * * * *	* * * * * * * * * * * * *	******
Includes	(LIGER CORE RECENT (MAIN Hereiter	-		
⊪—le IO.C	// USER CODE BEGIN (MAIN_Header,	0)		
IO.H	// USER CODE END			
e I MAIN.C e I∋ MAIN.H				
B MemInitxc88x.s	· · ·	* * * * * * * * * * * * * *	* * * * * * * * * * * * *	****
⊪—§ startupxc886.s	// @Imported Global Variables //***********************************	* * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *
T01.C	(LIGER CORE RECTN (MAIN Herden	7.		
■ ID1.H ■ ID1.H	// USER CODE BEGIN (MAIN_Header,	()		
	// USER CODE END			
🗟 XC888.asm				
	//************************************	* * * * * * * * * * * * * * * *	* * * * * * * * * * * * *	****
		* * * * * * * * * * * * * *	* * * * * * * * * * * * *	****
	// USER CODE BEGIN (MAIN Header,	0.1		
	extern bit blinking;	• /		
	<pre>extern volatile int RS232_wait; // USER CODE END</pre>			
	// ODEL CODE END			
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	// @Prototypes Of Global Functio	ns		
	//**************************	* * * * * * * * * * * * * * * *	* * * * * * * * * * * * * *	****
	// USER CODE BEGIN (MAIN_Header,	9)		
	// USER CODE END			
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Double click Main.h and insert include files:

#include <stdio.h>
#include <ctype.h>

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	*MAIN.C *MAIN.H B
XC888 [Active - Debug] XC888 [Active - Debug] Includes IO.C MAIN.C MAIN.H MemInitxc88x.s Startupxc886.s T01.C UART.C UART.H XC888.asm XC888.asm XC888.rtf	<pre>// User code Begin (MAIN_Header,10) // User code END //***********************************</pre>
	// ISR prototype declaration for SDCC. void T01_viTmr0(void) interrupt 1;
	// USER CODE BEGIN (MAIN_Header,11)
	<pre>#include <stdio.h> #include <ctype.h></ctype.h></stdio.h></pre>
	// USER CODE END
	<pre>#endif // ifndef MAIN_H</pre>
	Problems Console Properties Y O items
	Description A Resource Path Location Type
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Double click UART.C

Insert code into the UART_vInit function: (to start printf_small()):

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C/C++ Projects ∞		AIN.H 🕞 *UART.C 🛛 selected for baudi				
★ XC888 [Active - Debug] Includes ■ IO.C ■ IO.H	P1_ALTSEL0 P1_ALTSEL1	<pre>b2, noSST); &= ~(ubyte)0x02; = (ubyte)0x02; b0, noSST);</pre>	<pre>// configure - // configure -</pre>	alternate fu alternate fu	nction regis	- ter O
e−i MAIN.C e−i MAIN.H e−i MemInitxc88x.s	P1_DIR	= (ubyte)0x02;	// set output	direction	2	register
	BCON SCON	= 0x00; = 0x50;	<pre>// configure peripheral input select register // reset baudrate timer/reload register // load serial channel control register</pre>			
e— I UART.C e— I UART.H		e generator setti	ngs			
	/// Fractio	clock = fPCLK onal divider is en ce = 9,6004 kbaud	abled			
	FDSTEP BG FDCON BCON	= 0xD5; = 0x81; = 0x01; = 0x01;	<pre>// load baudr.</pre>	ate timer/re	load registe	r
		E BEGIN (UART_Init,	, 3)			
	TI=1; // USER CODE	E END				
		Eunction UART_vIni	t			
7	// @Function			* * * * * * * * * * * * * *	*****	******
	比 Problems ¤ ∖ <u>■ C</u> 0 items	onsole 🗆 Properties				~
	Description 4		Resource	Path	Location	Type



Double click T01.C

Insert the following global variable:

```
unsigned char Timer_0_interrupt_counter=0;
```

🎂 XC800 Development - XC8	888/T01.C - DAvE-Bench for XC800	
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-,	■ *MAIN.C ■ *MAIN.H ■ *UART.C ■ *T01.C ×	
	// USER CODE BEGIN (TO1_General,5)	
XC888 [Active - Debug]	// USER CODE END	
■ Includes ■ IO.C		
⊪⊡ IO.H	//****	
MAIN.C	// @Imported Global Variables	
B MAIN.H		
MemInitxc88x.s		
B startupxc886.s	// USER CODE BEGIN (TO1_General,6)	
- C T01.C	// USER CODE END	
⊪— I UART.C	//****	
⊪— la UART.H	// @Global Variables	
XC888.asm		
	<pre>// USER CODE BEGIN (T01_General, 7) unsigned char Timer 0 interrupt counter=0;</pre>	
	// USER CODE END	
	//*************************************	
	// @External Prototypes	
	//*************************************	
	// USER CODE BEGIN (TO1 General,8)	
	// San con bar (Ioi_ceneral;)	
	// USER CODE END	
	//*************************************	
	// @Prototypes Of Local Functions	
	//*************************************	–
		┘
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	0 items	
	Description Resource Path Location Type	
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Double click T01.C

Insert code for T0 interrupt service routine:

```
++ Timer_0_interrupt_counter;
if(RS232_wait)
    RS232_wait--; // 183 * Timer_0-overflow = 183 * 5461,333 µs = 0,9994
if(Timer_0_interrupt_counter==183) // 183 * Timer_0-overflow = 183*5461,333µs = 0,9994s
{
    Timer_0_interrupt_counter=0;
    if (blinking)
    {
        P3_DATA = P3_DATA^0xFF;
    }
```

le Edit Navigate Search Pro	oject Debug Tools Window Helr	D			
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					□ □ XC800
C/C++ Projects	MAIN.C MAIN.H MUART	or interrupt type s	elect in Pro	nect Settings Page	
XC888 [Active - Debug] Includes IO.C MAIN.C MAIN.H MemInitxc88x.s Startupxc886.s IOI.C UART.C UART.C VART.H XC888.asm XC888.rtf	<pre>// Indee Endoce En</pre>	<pre>Section. I then ISR will be g I then ISR will be g ICE 2. HOICE 2 Tmr0,1) rrupt TOINT SerTmr0,2) Inter; * Timer_0-overflow Inter==183) // 183 Inter=0; *^0xFF; //ITmr0</pre>	enerated wit enerated wit = 183 * 5461	h push and pop. hout push and pop. .333 <u>ps</u> = 0,9994	3µs = 0,9994s
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		Resource	Path	Location Type	



Generate/Build your application program:

Project – Rebuild Active Project

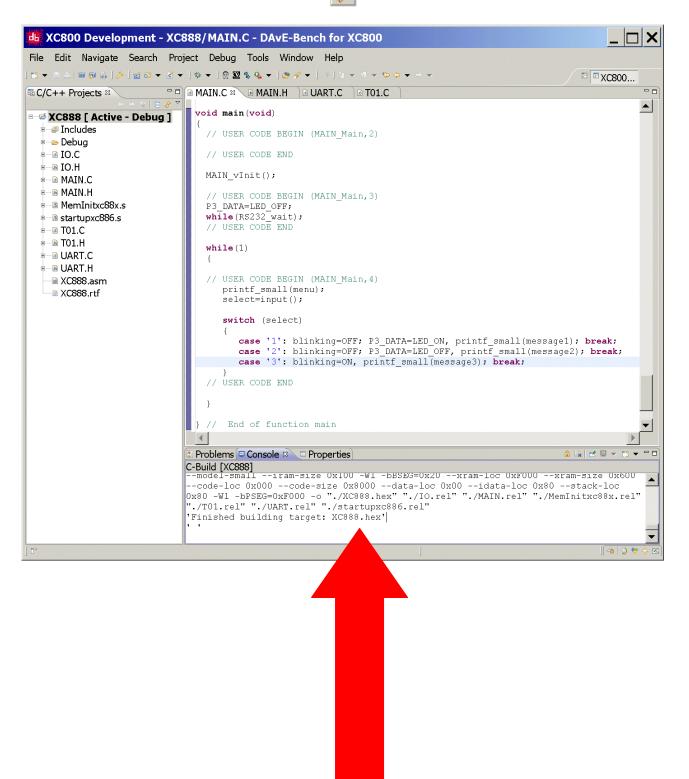
XC800 Development -	XC888/	MAIN.	C - DA	vE-Benc	h for
File Edit Navigate Search	Project	Debug	Tools	Window	Help
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C/C++ Projects • • • • • • • • • • • • • • • • • • •	Oper	uild Activ n Project e Project d All		ct Ctrl+	B IT
■ IO.C ■ IO.H ■ MAIN.C ■ MAIN.H ■ MemInitxc88x.s	Build Clea	l Project l Working n l Automa			►
 startupxc886.s T01.C T01.H UART.C 		e Projec	t Proper	ties	M

or: click 👼





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```
**** Build of configuration Debug for project XC888 ****
C:\Program Files\DAvE-Bench-011\SDCC_UTILS\make all
'Building file: ../IO.C'
'Invoking: SDCC Compiler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\sdcc" -mXC800 -pXC888_8FF --
model-small -I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include" -
I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include\xc800" -I"C:/Program
Files/DAvE-Bench-011\SDCC_XC800\include\asm\xc800" --opt-code-size --
nooverlay --noinduction --debug -S -o "IO.s" "../IO.C"
'Finished building: ../IO.C'
'Building file: IO.s'
'Invoking: SDCC Assembler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\as-xc800" -plosgffcx "IO.s"
-0 "IO.rel"
'Finished building: IO.s'
'Building file: ../MAIN.C'
'Invoking: SDCC Compiler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\sdcc" -mXC800 -pXC888_8FF --
model-small -I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include" -
I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include\xc800" -I"C:/Program
Files/DAvE-Bench-011\SDCC_XC800\include\asm\xc800" --opt-code-size --
nooverlay --noinduction --debug -S -o "MAIN.s" "../MAIN.C"
'Finished building: ../MAIN.C'
1 1
'Building file: MAIN.s'
'Invoking: SDCC Assembler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\as-xc800" -plosgffcx
"MAIN.s" -0 "MAIN.rel"
'Finished building: MAIN.s'
'Building file: ../MemInitxc88x.s'
'Invoking: SDCC Assembler'
"C:/Program Files/DAvE-Bench-011\SDCC XC800\bin\as-xc800" -plosqffcx
"../MemInitxc88x.s" -0 "MemInitxc88x.rel"
'Finished building: ../MemInitxc88x.s'
'Building file: ../T01.C'
'Invoking: SDCC Compiler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\sdcc" -mXC800 -pXC888_8FF --
model-small -I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include" -
I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include\xc800" -I"C:/Program
Files/DAvE-Bench-011\SDCC_XC800\include\asm\xc800" --opt-code-size --
nooverlay --noinduction --debug -S -o "T01.s" "../T01.C"
'Finished building: ../T01.C'
'Building file: T01.s'
'Invoking: SDCC Assembler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\as-xc800" -plosgffcx "T01.s"
-0 "T01.rel"
'Finished building: T01.s'
```



```
'Building file: ../UART.C'
'Invoking: SDCC Compiler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\sdcc" -mXC800 -pXC888_8FF --
model-small -I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include" -
I"C:/Program Files/DAvE-Bench-011\SDCC_XC800\include\xc800" -I"C:/Program
Files/DAvE-Bench-011\SDCC_XC800\include\asm\xc800" --opt-code-size --
nooverlay --noinduction --debug -S -o "UART.s" "../UART.C"
'Finished building: ../UART.C'
1 1
'Building file: UART.s'
'Invoking: SDCC Assembler'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\as-xc800" -plosgffcx
"UART.s" -0 "UART.rel"
MOV dir(0x82), dir(0x99) found at 1431 of UART.s
'Finished building: UART.s'
1 1
'Building file: ../startupxc886.s'
'Invoking: SDCC Assembler'
"C:/Program Files/DAvE-Bench-011\SDCC XC800\bin\as-xc800" -plosqffcx
"../startupxc886.s" -0 "startupxc886.rel"
'Finished building: ../startupxc886.s'
1 1
'Building target: XC888.hex'
'Invoking: SDCC Linker'
"C:/Program Files/DAvE-Bench-011\SDCC_XC800\bin\sdcc" --debug -mXC800 -
pXC888_8FF --model-small --iram-size 0x100 -Wl -bBSEG=0x20 --xram-loc 0xF000
--xram-size 0x600 --code-loc 0x000 --code-size 0x8000 --data-loc 0x00 --
idata-loc 0x80 --stack-loc 0x80 -Wl -bPSEG=0xF000 -o "./XC888.hex"
"./IO.rel" "./MAIN.rel" "./MemInitxc88x.rel" "./T01.rel" "./UART.rel"
"./startupxc886.rel"
'Finished building target: XC888.hex'
                                     1 1
```





5.) Using the debugger (DAvE Bench):





Note:

***1:** When the TANTINO-XC800-DEBUGGER-BOX is already connected to the XC888 Starter Kit Board, the Starter Kit Board must be supplied with power for the TANTINO-XC800-DEBUGGER-BOX to work properly.

If the power supply is not connected to the Board, you will see no information in the JTAG Device Chain window.



Note:

Now we need a terminal program which is able to handle COM5! As an example of "any terminal program" we are going to use Docklight. Docklight can be downloaded @ <u>http://www.docklight.de</u>.





Now, start Docklight:

🎯 Dock	light V1.:	7						_ 문 X
File Edit	Run Tool	s Help						
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🗩 🎼 🖅 Com	mmunication p	ort closed				Colors&Fonts Mode	COM16	9600, None, 8, 1
Send Sequen	ces			Communicatio	n			
Send	Name	Sequ	ence	ASCII HEX	Decimal Binary			
, Receive Sequ	iences							
Active	Name	Sequence	Answer					
				1				



Click: Project Settings

🖉 Docklı, ht V1.7			_ & ×
File Edit Run Tools Help			
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Communication Project Settin	nas (Communication Settings)	Colors&Fonts Mode COl	v16 9600, None, 8, 1
Send Sequences	Communication		
Send Name Sequ	ence ASCII HEX Decimal Binary		
Receive Sequences Active Name Sequence	Answer		



Project Settings:

Communication: Communication Mode: click • Send/Receive

Project Settings:

Communication: Communication Mode: Send/Receive on comm. channel: select COM5

Project Settings: Communication: COM Port Settings: Baud Rate: select 9600 Project Settings: Communication: COM Port Settings: Parity: select None Project Settings: Communication: COM Port Settings: Parity Error Char.: select (ignore) Project Settings: Communication: COM Port Settings: Data Bits: select 8 Project Settings: Communication: COM Port Settings: Stop Bits: select 1

💝 Docklight V	1.7		
File Edit Run	Tools Help		
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	port closed	Colors&Fonts Mode COM5	9600, None, 8, 1
Send Sequences	Communication		
Send	Project Settings Communication Flow Control Commun Communication Mode Image: Communication Image: Communication Communication Mode Image: Communication Image: Communication Image: Communication Send/Receive Image: Communication Image: Com	C Monitoring (receive only)	
	Parity Error Char. (ignore)	Cancel Help	
Receive Sequences			



Project Settings: Flow Control: Flow Control Support: click • Off

🚰 Project Settings 🛛 🗙
Communication Flow Control Communication Filter
Flow Control Support
 Manual - RTS / DTR can be set or reset manually. CTS / DSR lines are displayed, but not used for synchronization.
Hardware Handshaking - RTS/CTS
Software Handshaking - XON/XOFF
RS485 Transceiver Control - Set RTS high while sending
Warning: The"RS485 Transceiver Control" option is an expert setting for RS485 converters/interfaces that require the RTS signal. It is not available on Windows 98/ME and not supported by many USB-to-Serial devices!
OK Cancel Help



Project Settings:

Communication Filter: Contents Filter: click • Show all original communication data

Project Settings
Communication Flow Control Communication Filter
Contents Filter • Show all original communication data (channel 1 and channel 2) • Show channel 1 or [TX] data only • Show channel 2 or [RX] data only • Hide all original serial data, show additional comments only
OK Cancel Help

OK



Click:	
E cklight V1.7	
File Ed. Run Tools Help	
□ ☞ ■ ● ▶ = ☞ ♪ ♣ ⊠ 図 ∞ 늘 🕃 □	Jone, 8, 1
Colors&Fonts Mode COM5 9600, N Send Sequences Communication	
Send Name ASCII HEX Decimal Binary	1
Receive Sequences	



Tocklight V1.7				_ 🗆 X
File Edit Run Tools Help Sto	p Communication	n (F6)		
D 🛩 🖬 🕘 🕨 🖿 🖆 🖉 🖉 🛎 🗒				
G		Colors&Fonts Mode	COM5	9600, None, 8, 1
Send Sequences	Communication			
Send	ASCII HEX Dec	imal Binary		
Receive Sequences				

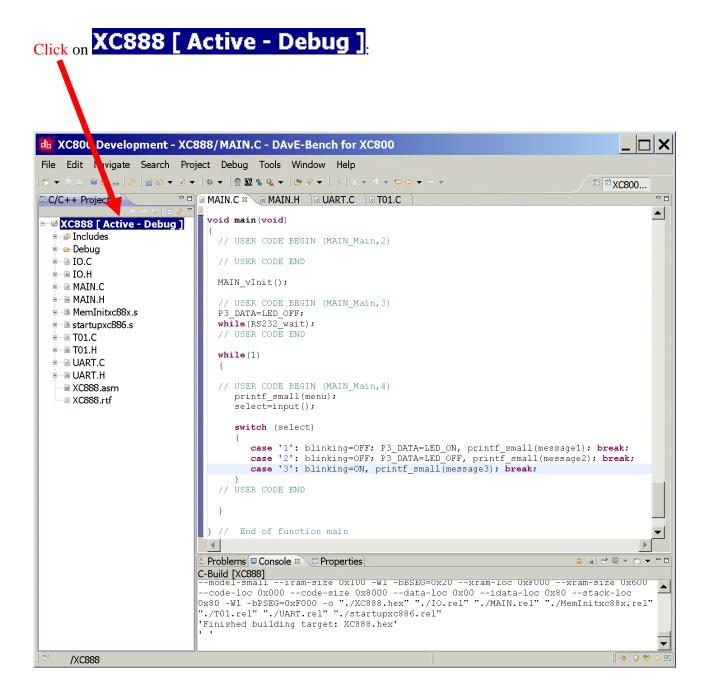
Note: Docklight is now ready for serial communication!







Go back to DAvE Bench and configure the debugger:





Debug – Debug Configurations...

KC800 Development - XC888/MAIN.C - DAvE-Bench for XC800							
File Edit Navigate Search	Project	Debug	Tools	Window	Help		
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C/C++ Projects 🛛 🖓 🗖	
← → ▷ = ♂ ▼ ■	void main (void)
Includes	{
🛛 🗠 Debug	// USER CODE BEGIN (MAIN_Main,2)
• • • • • • • • • • • • • • • • • • •	// USER CODE END
■ IO.H ■ IO.H	MAIN_vInit();
MAIN.C	// USER CODE BEGIN (MAIN Main, 3)
n - B MemInitxc88x.s	P3_DATA=LED_OFF;
startupxc886.s	<pre>while(RS232_wait); // USER CODE END</pre>
■ T01.C ■ 101.H	// USER CODE END
	while(1)
UART.H	
XC888.asm	<pre>// USER CODE BEGIN (MAIN_Main,4) printf small(menu);</pre>
└── 🖹 XC888.rtf	<pre>select=input();</pre>
	switch (select)
	<pre>case '1': blinking=OFF; P3_DATA=LED_ON, printf_small(message1); break; case '2': blinking=OFF; P3_DATA=LED_OFF, printf_small(message2); break;</pre>
	<pre>case '3': blinking=ON, printf_small(message3); break;</pre>
	} // USER CODE END
	р
	} // End of function main
	C-Build [XC888] model-small1ram-size 0x100 -WI -bBSEG=0x20xram-loc 0xF000xram-size 0x600
	code-loc 0x000code-size 0x8000data-loc 0x00idata-loc 0x80stack-loc
	"./T01.rel" "./UART.rel" "./startupxc886.rel"
	'Finished building target: XC888.hex'
) 🕫 /XC888	S ♦ ♥ Q INT



Double click: HiTOP Application HiTOP Application:

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		 Configure launch settings from this dialog: Press the 'New' button to create a configuration of the selected type. Press the 'Duplicate' button to copy the selected configuration. Press the 'Delete' button to remove the selected configuration. Press the 'Filter' button to configure filtering options. Edit or view an existing configuration by selecting it. Configure launch perspective settings from the <u>Perspectives</u> preference p 	
0		Debug	Close
	} // End	of function main	
	C-Build [XC88 model-sma code-loc 0x80 -W1 -b "./T01.rel"		-stack-loc





Debug Configurations			×
Create, manage, and run configuration Run a HiTOP debugger	15		TO TO
ype filter text C/C++ Attach to Local Application C/C++ Local Application C/C++ Postmortem debugger HiTOP Application	Name: XC888 Debug Main Debugger Source Common Project: XC888 C/C++ Application: Debug XC888.hex	Search Project	Browse Browse
Filter matched 5 of 5 items		Apply	Revert
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Debugger, Target configuration:

🏙 Debug Configurations		×
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ype filter text C/C++ Attach to Local Application C/C++ Local Application C/C++ Postmortem debugger HiTOP Application	Name: XC888 Debug Main Debugger Stop on startup at: main Advanced Debugger Options Target configuration Mandatory Parameters Device: HiSIM-XC800 Vendor: Infineon Derivative: XC888CLM-8FF Additional Parameters Port: S/N:	CPIP
Filter matched 5 of 5 items		Apply Revert
Ō		Debug Close



Debug Covfigurations		
eate, manage, and run configurat un a HiTOP debuggen	ons	Ř
★ ■ ★	Name: XC888 Debug	
pe filter text © C/C++ Attach to Local Applicatio		
🗉 C/C++ Local Application	I Stop on startup at: main Advanced	
C/C++ Postmortem debugger HiTOP Application	Debugger Options	
SC888 Debug	Target configuration Main	
	Debugger Configuration	
	Change Configuration	
	Mandatory Parameters Device: HiSIM-XC800	T
	Vendor: Infineon	
	Derivative: XC888CLM-8FF	_
	Additional Parameters	
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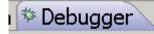


Mandatory Parameters: Device: select TantinoXC800

Bebug Configurations	
Create, manage, and run configuration Run a HiTOP debugger	ns 🔅
ype filter text C/C++ Attach to Local Application C/C++ Local Application C/C++ Postmortem debugger HITOP Application XC888 Debug	Name: XC888 Debug Main Debugger Stop on startup at: main Advanced Debugger Options Target configuration Change Configuration Change Configuration Change Configuration Mandatory Parameters Device: TantinoXC800 Vendor: Infineon Derivative: XC888CLM-8FF Additional Parameters Port: © USB © TCPIP S/N:
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Q	Debug Close



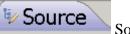




Debugger, Main: (do nothing)

u Debug Configurations		×
Create, manage, and run configurations Run a HiTOP debugger		Ó.
ype filter text C/C++ Attach to Local Application C/C++ Local Application C/C++ Postmortem debugger	Name: XC898 Debug Main Debugger Stop on startup at: main Debugger Options Target configuration Target configuration Main GDB debugger: C:\Program Files\DAvE-Bench-011\HiTOPEclipse\HiTOPEclipse.exe	Browse
Filter matched 5 of 5 items	Apply	Revert
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Source: (do nothing)

iii Debug Configurations			×
Create, manage, and run configuratio Run a HiTOP debugger	ns		T.
ype filter text C/C++ Attach to Local Application C/C++ Local Application C/C++ Postmortem debugger HiTOP Application XC888 Debug	Name: XC888 Debug Main * Debugger Source Common Source Lookup Path: Default Absolute File Path XC888 Search for duplicate source files on the path		Add Edit Remove Up Down Restore Default
Filter matched 5 of 5 items		Apply	Revert
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Common: (do nothing)

Debug Configurations		×
Create, manage, and run configuratio Run a HiTOP debugger	ns	To a construction of the c
ype filter text C/C++ Attach to Local Application C/C++ Local Application C/C++ Postmortem debugger HiTOP Application XC888 Debug	Name: XC888 Debug Main * Debugger * Source Common Save as • • Local file • • Shared file: VC888 Display in favorites menu • • Debug • Standard Input and Output • • Allocate Console (necessary for input) • • File: • • Append •	Browse, Console Encoding $^{\circ}$ Default - inherited (Cp1252) $^{\circ}$ Other ISO-8859-1
Filter matched 5 of 5 items		Apply Revert
Ø		Debug Close

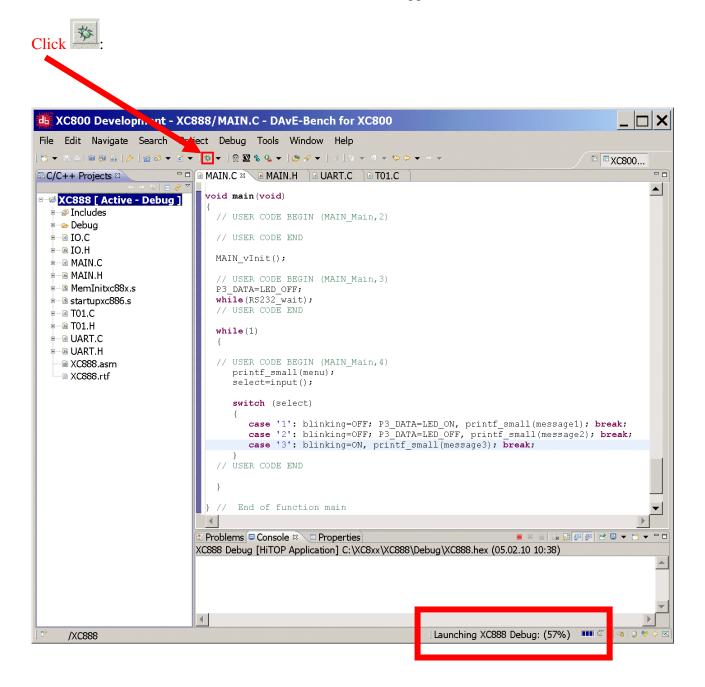
Apply

Close

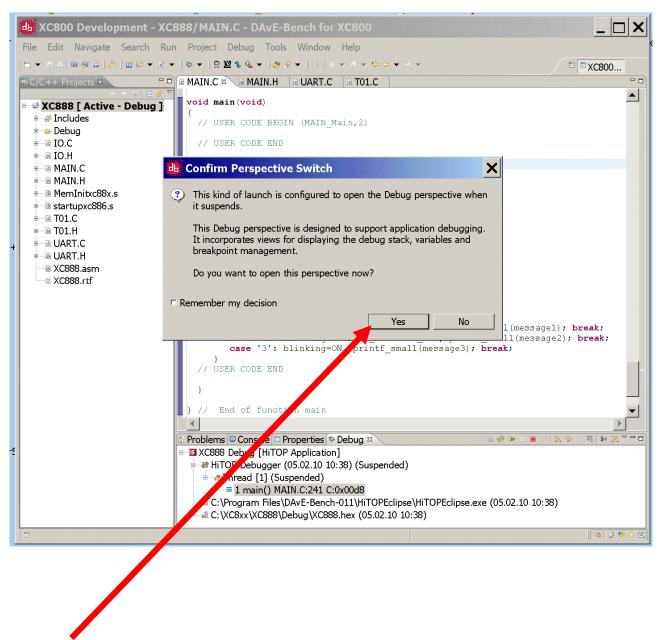




Start/Launch the debugger:











👪 Debug - XC888/MAIN.C - DAvE-Bench for XC800		
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□ - IXC888 Debug [HiTOP Application] □ - # HiTOP Debugger (05.02.10 10:38) (Suspended)	Name	Kalue
- → Thread [1] (Suspended)		
= 1 main() MAIN.C:241 C:0x00d8		
→ C:\Program Files\DAvE-Bench-011\HiTOPEclipse\HiTOPEclipse.exe C:\XC8xx\XC888\Debug\XC888.hex (05.02.10 10:38)		
	4	
MAIN.C 🛛 D MAIN.H D UART.C D TO1.C		Be Outline Disassembly 🛚 🖓
void main(void)		MAIN_vInit(); C:0x00d8 <main>:</main>
{ // USER CODE BEGIN (MAIN Main,2)		P3_DATA=LED_OFF; C:0x00db <#244>:
// USER CODE END		while(RS232_wait);
		C:0x00de <#245>: C:0x00e0 <main+8>:</main+8>
MAIN_vInit();		C:0x00e2 <main+10>: printf small(menu);</main+10>
// USER CODE BEGIN (MAIN_Main,3)		C:0x00e4 <#252>:
<pre>P3_DATA=LED_OFF; while(RS232_wait);</pre>		C:0x00e6 <main+14>: C:0x00e8 <main+16>:</main+16></main+14>
// USER CODE END	-	C:0x00ea <main+18>: C:0x00ec <main+20>:</main+20></main+18>
while(1)	-	C:0x00ee <main+22>:</main+22>
Console 🛛 🖉 Tasks 🗈 Problems O Executables 0 Memory		■ × ½
XC888 Debug [HiTOP Application] C:\XC8xx\XC888\Debug\XC888.hex (05.0	2.10 10:38)	
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Click: Resume		
bebug - XC888/M. IN.C - DAvE-Bench for XC800		
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Image: Second secon	🍽 Variables 🛛 🔏 Breakpoints 🗞 Acti	ve Project i i Registers i Modules i u u i i i i i i i i i i i i i i i i
e # HiTOP Debugger (05.02.10 10:38) (suspended) e → Thread [1] (Suspended)	Name	Value
= 1 main() MAIN.C:241 C:0x00d8		
C:\Program Files\DAvE-Bench-011\HiTOPEclipse\HiTOPEclipse.exe		
	7	
MAIN.C R MAIN.H DUART.C D TO1.C	- 0	E Outline 🖩 Disassembly 🛚 🦳 🗖
void main (void)		MAIN_vInit();
{ // USER CODE BEGIN (MAIN Main,2)		P3_DATA=LED_OFF; C:0x00db <#244>:
// USER CODE END		while(RS232_wait); C:0x00de <#245>:
<pre>MAIN vInit();</pre>		C:0x00e0 <main+8>:</main+8>
		C:0x00e2 <main+10>: printf_small(menu);</main+10>
<pre>// USER CODE BEGIN (MAIN_Main, 3) P3_DATA=LED_OFF;</pre>		C:0x00e4 <#252>: C:0x00e6 <main+14>:</main+14>
<pre>while(Rs232_wait); // USER CODE END</pre>		C:0x00e8 <main+16>: C:0x00ea <main+18>:</main+18></main+16>
while(1)	•	C:0x00ec <main+20>: C:0x00ee <main+22>:</main+22></main+20>
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© Console © Tasks © Problems © Executables © Memory XC888 Debug [HiTOP Application] C:\XC8xx\XC888\Debug\XC888.hex (05.0	10 10.38)	
	2.10 10.36)	
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Go back to Docklight and see the result:

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File Edit Run Tools Help Sto p	p Communication (F6)
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D	Colors&Fonts Mode COM5 9600, None, 8, 1
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Send Name	ASCII HEX Decimal Binary
	1 LEDs P3 ON 2 LEDs P3 OFF 3 LEDs P3 blinking your choice:
Receive Sequences	



Double click inside the red box:

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	nmunication (F6)
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Receive Sequences	



Edit Send Sequence: Sequence Definition: 1- Name: insert: LEDs ON Edit Send Sequence: Sequence Definition: 2- Sequence: insert: 1

💝 Docklight V1.7
File Edit Run Tools Help
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Send Sequence Definition
1 - Name LEDs ON
2-Sequence Edit Mode CASCII CHEX C Decimal C Binary Pos. 2/1
3-Additional Repeat
Settings
Send periodically (if not sent as an automatic answer to a receive sequence)
Repeat sequence every 5 seconds
Delete Sequence OK Cancel Apply Help
Receive Sequences

OK



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Send Name Sequence	ASCII HEX Decima	al Binary		
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Receive Sequences	1			



Edit Send Sequence: Sequence Definition: 1- Name: insert: LEDs OFF Edit Send Sequence: Sequence Definition: 2- Sequence: insert: 2

💞 Docklight V1.7	X
File Edit Run Tools Help	
De Berry Communication Contraction Contrac	. 1
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+	
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Repeat sequence every 5 seconds	
Delete Sequence OK Cancel Apply Help	
Receive Sequences	

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Receive Sequences				



Edit Send Sequence: Sequence Definition: 1- Name: insert: LEDs BLINKING Edit Send Sequence: Sequence Definition: 2- Sequence: insert: 3

^{clot} 1810 Edit Se	nd Sequence					×
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3						
3 - Additional Settings	Repeat					
	Send periodically (if	not sent as an a	utomatic answer	to a receive sequ	Jence)	
	Repeat sequence	every 5	seconds			

OK



Click LEDs ON or click LEDs OFF or click LEDs BLINKING and check the result on your Evaluation Board:

) 🛩 🛛 🔄 🕨 🔳 😭 🖉 🗛 🔀 🗏 🛎 🗎					
- Commmunication port open			Colors&Fonts Mode	COM5	9600, None, 8, 1
end Sequences		mmunication SCII HEX Decim	al Binary		
Send Name LEDs ON LEDs OFF LEDS BLINKING Receive Sequences Active Name Sequence	1 2 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	<pre> LEDS P3 LEDS P3</pre>	ON OFF blinking 1 ** ON OFF blinking 2 *** ON OFF blinking 3 (ING ***		





Conclusion:

In this step-by-step book you have learned how to use the XC888 board together with DAvE Bench.

Now you can easily expand your "hello world" program to suit your needs!

You can connect either a part of - or your entire application to the Starter Kit Board.

You are also able to benchmark any of your algorithms to find out if the selected microcontroller fulfils all the required functions within the time frame needed.

Have fun and enjoy working with XC888/XC886 microcontrollers!

Note:

There are step-by-step books for 8 bit microcontrollers (e.g. XC866 and XC88x), 16 bit microcontrollers (e.g. C16x, XC16x and XE16x) and 32 bit microcontrollers (e.g. TC1796 and TC1130).

All these step-by-step books use the same microcontroller resources and the same example code.

This means: configuration-steps, function-names and variable-names are identical.

This should give you a good opportunity to get in touch with another Infineon microcontroller family or tool chain!

There are even more programming examples using the same style available [e.g. ADC-examples, CAPCOM6-examples (e.g. BLDC-Motor, playing music), Simulator-examples, C++ examples] based on these step-by-step books.



6.) Feedback (XC888, DAvE Bench): Your opinion, suggestions and/or criticisms

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Contact Details (this section may remain blank should you wish to offer feedback anonymously):

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Your suggestions:

http://www.infineon.com