DEVKIT-MPC5748G SOFTWARE INTEGRATION GUIDE (SWIG)

Ultra-Reliable MCUs for Industrial and Automotive Applications

www.nxp.com/DEVKIT-MPC5748G





EXTERNAL USE

S32 DESIGN STUDIO IDE FOR POWER ARCHITECTURE www.nxp.com/S32DS

- To develop an application one need an Integrated Development Environment (IDE)
- S32 Design Studio IDE is the solution to the need
- This document provides step wise tutoring on "How to use S32 Design Studio IDE for Power Architecture" to build an application



SECURE CONNECTIONS FOR A SMARTER WORLD

Contents

- S32 Design Studio IDE for Power Architecture Supported Devices
- Installing S32 Design Studio IDE for Power Architecture
 - Download and Install the new IDE
- Getting started with a New Project
 - -Create, build and debug the new project
- Making Projects from built-in Examples



S32 Design Studio IDE for Power Architecture Supported Devices

- MPC560xB/C/D Family
- MPC560xE Family
- MPC560xP Family
- MPC560xS Family
- MPC564xA Family
- MPC564xB Family
- MPC564xC Family
- MPC564xL Family
- MPC567xR Family

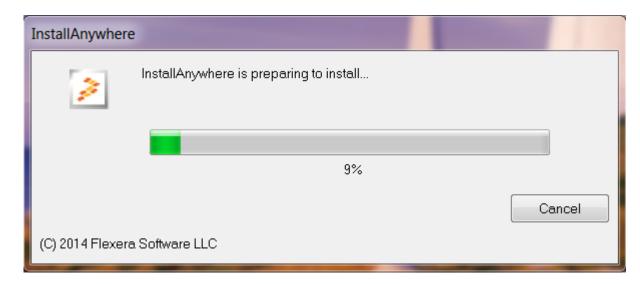
- MPC574xB/C Family
- MPC574xG Family
- MPC577xK Family
- MPC574xP Family
- MPC574xR Family
- MPC5777C
- MPC5777M
- S32R274



INSTALLING S32 DESIGN STUDIO IDE FOR POWER ARCHITECTURE



- Go to <u>www.nxp.com/S32DS</u> to download latest version
- From Downloads folder, run the installation file
- Click on Run if any administrative privilege issues results from unknown software publisher
- The "preparing to install" dialogue box will appear





An Installer welcome window will be displayed, click Next to continue

S32 Design Studio for Pow	er Architecture v1.1 Installer
Welcome	to the S32 Design Studio for Power Architecture v1.1 Setup Wizard
 Welcome to the S32 Desi Choose additional feature License Agreement Choose Install Location Choose Shortcut Folder Pre-Installation Summary Installing Install Complete 	This wizard will guide you through the installation of S32 Design Studio for Power Architecture v1.1. It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer. Click Next to continue.
InstallAnywhere Cancel	Previous



S32 Design Studio for Power Architecture v1.1 Installer Choose additional Features Choose additional feature(s) - Selecting "S32 Design Studio" option will Welcome to the S32 Desi.. S32 Design Studio ۲ Only S32 Design Studio for Power Architecture v1.1 will be installed. Choose additional feature. only install S32 Design Studio O License Agreement O Choose Install Location O Choose Shortcut Folder - Selecting "Additionally install..." will allow Pre-Installation Summary O Installing... you to install other software too Install Complete Click on Next Additionally install... 0 🄉 🌇 Choose this option to customize the features to be installed S32 Design Studio for Power Architecture v1.1 Installer Choose additional feature(s) Welcome to the S32 Desi. Install Set Additionally install... Ŧ InstallAnwhere Choose additional feature 1 S32 Desian Studi . . O License Agreement Previous Cancel Next FreeMASTER 2.0 Choose Install Location



- Scroll down the text and read the license agreement.
- Select the radio button acknowledging the license agreement terms and click Next to continue.

S32 Design Studio for Pow	er Architecture v1	1.1 Installer	X
		License Agree	ment
 Welcome to the S32 Desi Choose additional feature License Agreement Choose Install Location 	Please review the Atheros	license terms before installing S32 Design Studio for Power Use of Atheros software is limited to evaluation and demonstration only. Permitted distributions must be similarly limited. Further rights must be obtained directly from Atheros.	*
 Choose Shortcut Folder Pre-Installation Summary Installing 	Vivante	Distribution of Vivante software must be a part of, or embedded within, Authorized Systems that include a Vivante Graphics Processing Unit.	
O Install Complete	MQX RTOS Source Code	MQX RTOS source code may not be re-distributed by any FSL Licensee under any circumstance, even by a signed written amendment to this Agreement.	
	Oracle JRE (Java)	The Oracle JRE must be used consistent with terms found here: http://java.com/license P&E Software must be used consistent with the terms	
	Segger	found here: http://www.pemicro.com/licenses/gdbserver/license_gdb.pdf Segger software must be used consistent with the terms	
	Microcontroller	found here: http://www.segger.com/jlink-software.html	-
		I accept the terms of the License Agreement I do NOT accept the terms of the License Agreement	
InstallAnywhere Cancel		Previous	xt



 Click Next to accept the default installation location (could be changed, but recommended to install into path without spaces).

S32 Design Studio for Pow	ver Architecture v1.1 Installer	
		Choose Install Location
 Welcome to the S32 Desi Choose additional feature License Agreement Choose Install Location Choose Shortcut Folder 	Setup will install S32 Design Studio for Pov To install in a different folder, click Choose. continue.	wer Architecture v1.1 in the following folder. and select another folder. Click Next to
 Pre-Installation Summary Installing Install Complete 	Where Would You Like to Install? C:\Freescale\S32 Power v1.1	
		Restore Default Folder Choose
InstallAnywhere Cancel		Previous



 Select folder where you want to generate a Shortcut and click on Next to continue.

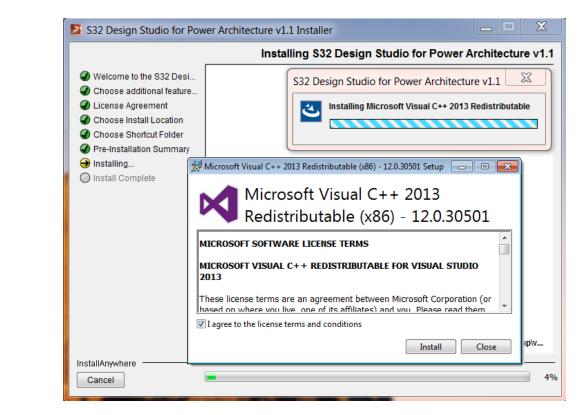
S32 Design Studio for Pow	er Architecture v1.1 Installer
	Choose Shortcut Folder
 Welcome to the S32 Desi Choose additional feature License Agreement Choose Install Location Choose Shortcut Folder Pre-Installation Summary Installing Install Complete 	Where would you like to create product icons? In a new Program Group: S32 Design Studio for Power Architecture v1.1 In an existing Program Group: Accessories In the Start Menu In the Desktop In the Quick Launch Bar Other: tudio\S32 Design Studio for Power Architecture v1.1 Choose Don't create icons Don't create icons
InstallAnywhere Cancel	Create Icons for All Users Previous Next

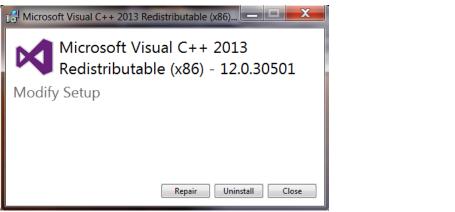
 Verify settings on "Pre-Installation Summery" tab and click Install to start Installation

S32 Design Studio for Pow	er Architecture v1.1 Installer
	Pre-Installation Summary
 Welcome to the S32 Desi Choose additional feature License Agreement Choose Install Location Choose Shortcut Folder Pre-Installation Summary Installing Install Complete 	Please Review the Following Before Continuing: Product Name: S32 Design Studio for Power Architecture v1.1 Install Folder: C:\Freescale\S32_Power_v1.1 Shortcut Folder: C:\Users\B55457\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Freescale S32 Design Studio\S32 Design Studio for Power Architecture v1.1 Disk Space Information (for Installation Target): Required: 3,421,221,386 Bytes Available: 410,208,083,968 Bytes
InstallAnywhere Cancel	Previous Install



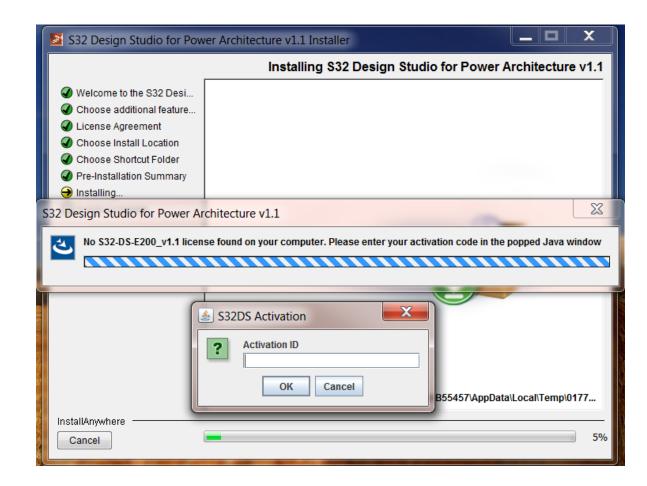
- The installation starts by installing required libraries from the Microsoft Visual C++ 2013 package. Read the license terms and select I agree... option and hit the Install
- If the libraries of the Visual C++ 2013 package were already installed on the system then the Modify Setup dialog box appears. Now click on Repair to continue





- When asked for Activation ID, copy and pest the key from the Download page
- Then click on OK.
- Next: In activation type window. Click on Online



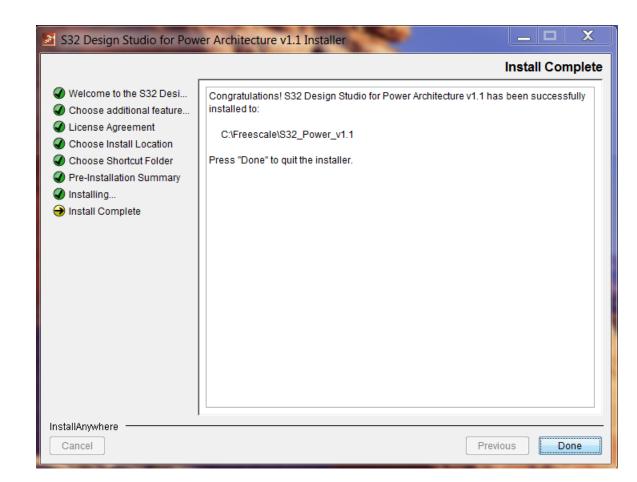




- During the Installation it may ask you to install P&E Device Drivers
- Read license agreement and Click on I Agree.
- In next window Select the destination folder and click Install
- Once the installation is done. Click on Close to close the P&E Device Driver Setup window.

💆 S32 Design Stuc	dio for Power Architecture v1.1 Installer S32 Design Studio for Power Ar
Welcome to the S Choose addition	
CLicense Agreeme	
 Installing Install Complet 	Please review the license terms before installing P&E Device Drivers. Press Page Down to see the rest of the agreement.
	Software License This software and accompanying documentation are protected by United States Copyright law and also by International Treaty provisions. Any use of this software in violation of copyright law or the terms of this agreement will be prosecuted.
	All the software in this envelope is copyrighted by P&E Microcomputer Systems, Inc. Copyright notices have been included in the software.
InstallAnywhere — Cancel	If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install P&E Device Drivers.
XeX	P&E Microcomputer Systems, Inc I Agree Cancel

• Once the installation is completed click on Done to exit the installation wizard.





GETTING STARTED WITH A NEW PROJECT



- Start program: Click on "S32 Design Studio for Power Architecture vx.x" icon
- Select workspace:
 - Choose default or specify new one
 - Suggestion: Uncheck the box "Use this as the default and do not ask again"
 - -Click OK

Workspace	e Launcher
Select a wo	orkspace
	Studio for Power Architecture stores your projects in a folder called a workspace. orkspace folder to use for this session.
Workspace:	C:\Users\B55457\workspaceS32DS.Power.v1.1 Browse
🔲 Use this a	as the default and do not ask again
	OK Cancel



1 of 5

• Go to: File – New – New S32DS Project

» C	/C++ - S32 Design Studio for Power Architecture	e			
File	Edit Source Refactor Navigate Search I	Project Run	Window	w Help	
	New	Alt+Shift+I	N 🕨 🛃	New S32DS Project	
	Open File		2	New S32DS Project from Example	
	Close Close All	Ctrl+V Ctrl+Shift+V	N 🛤	Makefile Project with Existing Code C++ Project	
	Save Save As Save All	Ctrl+ Ctrl+Shift+		C Project New S32DS Project Project	
٩a	Revert	Curtonnut	5 [Convert to a C/C++ Autotools Project Convert to a C/C++ Project (Adds C/C++ Nature)	
	Move	_	_ <u></u>	Source Folder	
	Rename	F		Folder	
\$ <u></u>]	Refresh Convert Line Delimiters To	F	5 •	Source File Header File	
₿	Print	Ctrl+	-	File from Template	
	Switch Workspace Restart		• 🗳	Class Task	
	•			Other	Ctrl+N



- Project Name:
 - Example: FirstProject
- Project Type:
 - Recommended: use Elf S32DS Project
- Select Controller:
 - Example: MPC5748G

New S32DS Project				
New S32DS Project				
Create New S32DS Project				
Project name:				
FirstProject				
Use default location				
Location: C:\Users\B55457\w	orkspaceS32DS.P	ower.v1.1\Fire	stProject	Browse
Elf S32DS project Library pro	oject			
Processors :	ToolChain Sele	ection:		
type filter text	Core Kind	Name	ToolChain	
Family MPC574xG	Z4	Z4	Standard S32DS toolchair	n for E200 👻
MPC5746G MPC5747G	Z4	Z4	Standard S32DS toolchair	
MPC5747G	Z2	Z2	Standard S32DS toolchair	for E200 👻
► Family MPC577xK				
MPC5775K				
MPC5774K	Description :			
E Family MPC574xP				^
MPC5744P				
MPC5742P				
MPC5741P				
				· ·
1				
(?)	< Back	Ne	xt > Finish	Cancel
0	< DACK	INE	rinish	Cancer



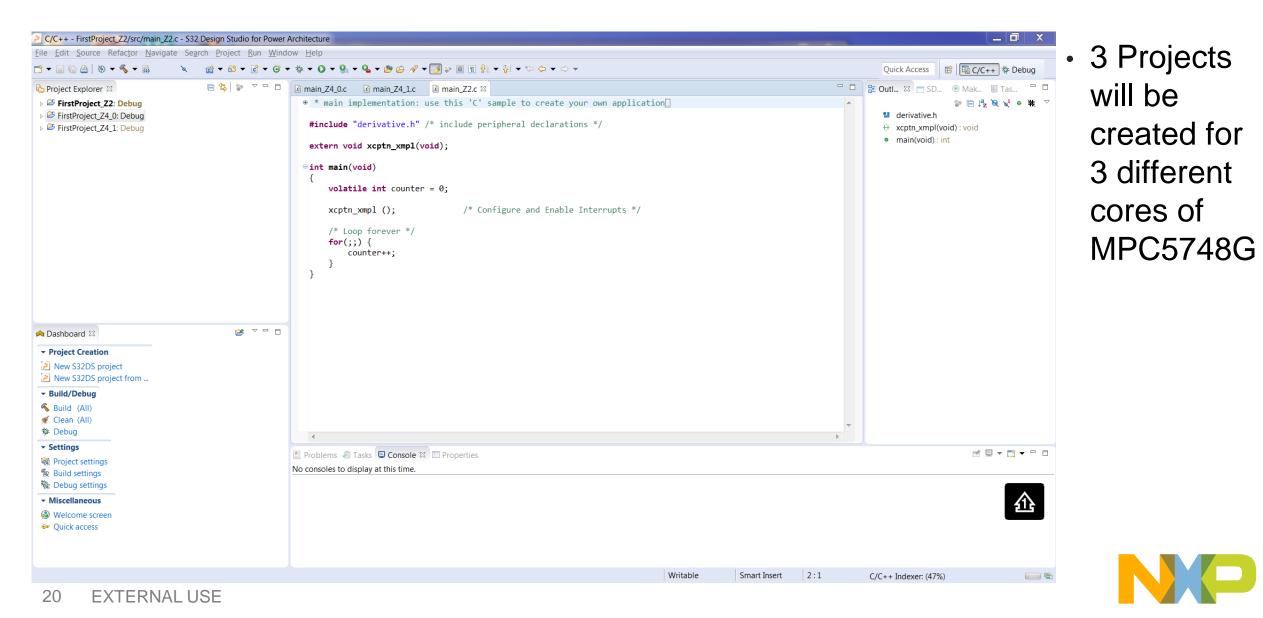


- Select Cores
- Select Flash and RAM size
- Select Programming Language
- Select the Library
- Select the Debugger
- Recommended: use Default settings (for beginners)

New S32DS Project New S32DS Project for MPC5748G Select required cores and parameters for them. Project Name FirstProject_Z4_0 FirstProject_Z4_1 FirstProject_Z2 ✓ Z4 ✓ Z2 Core ✓ Z4 FLASH Start Address 0x13a0000 0x1000000 0x11d0000 - 1856 FLASH Size, KB 1856 - 1856 -Unused FLASH, KB 64 RAM Start Address 0x40000000 0x40040000 0x40080000 256 256 * RAM Size, KB 256 Unused RAM, KB 0 С • C Language - C • SDKs ...) Library EWL ▼ EWL ▼ EWL Ŧ Debugger PE Micro GDB server Ŧ ? Next > < Back Finish Cancel

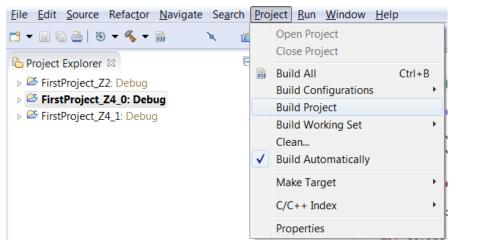


5 of 5



Build a Project

- To build a project follow one of the methods below:
 - 1. Project Build Project



 If project is built successfully, following message will be displayed on the Console

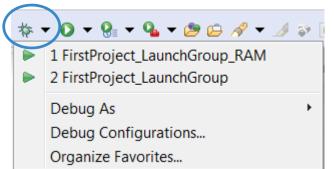
😰 Problems 🧔 Tasks 🗳 Console 🛛 🗖 Properties
CDT Build Console [FirstProject_Z4_0]
Building target: FirstProject_Z4_0.elf Executing target #8 FirstProject_Z4_0.elf Invoking: Standard S32DS C Linker powerpc-eabivle-gcc -o "FirstProject_Z4_0.elf" "@FirstProject_Z4_0.args" Finished building target: FirstProject_Z4_0.elf
14:00:42 Build Finished (took 2s.629ms)
✓ [

- 2. Click no hammer symbol to build that project
 - Click on page symbol to build all projects



Debug a Project

- Connect a debugger to both, the board
 - and the PC
 - For DEVKIT-MPC5748G, OpenSDA works as a debug adapter, so no standalone debugger is required
- Click on arrow in the * icon
- And Open Debug Configurations...





Debug a Project

- Select Project:
 - Example:FirstProject_Z4_0_Debug
- Select Interface:
 - Example: OpenSDA for DEVKIT-MPC5748G
- Port:
 - The comport where device is connected
- Click on Debug to start debugging

 Debug Configurations Create, manage, and run configur Plugin has not been registered. Some 	ations
 Type filter text GDB Hardware Debugging GDB PEMicro Interface Debuggin FirstProject_Z2_Debug FirstProject_Z2_Debug FirstProject_Z4_0_Debug FirstProject_Z4_0_Debug FirstProject_Z4_1_Debug FirstProject_Z4_1_Debug_RAM Launch Group FirstProject_LaunchGroup_RAN 	Name: FirstProject_Z4_0_Debug Main * Debugger Startup * Source Common # OS Awareness Software Registration Please register your software to remove this message. Register now PEMicro Interface Settings Interface OpenSDA Embedded Debug - USB Port Compatible Hardware Port: USB1 - OpenSDA (42ED7E19) Refresh Device Name: MPC5748G Core: Z4_0 Additional Options Advanced Options Advanced Options
Filter matched 11 of 15 items	Hardware Interface Power Control (Voltage> Power-Out Jack) Apply Revert



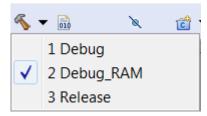
2 of 2

Debug a Project from RAM

- Firstly, Configure a project to debug from RAM Follow one of the Steps:
 - Project Build Configurations Set Active Debug_RAM

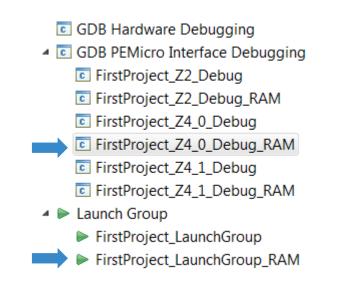
	Open Project Close Project		9- ▼ 29 (≏ /? ▼] ≈ II I] 🔮 🔻	Ŷ	▼ ∜> (> ▼ <> ▼
010	Build All	Ctrl+B				
	Build Configurations	•	Set Active	•	<	1 Debug
	Build Project		Manage			2 Debug_RAM
	Build Working Set	+	Build by Working Set	•		3 Release
	Clean		Set Active by Working Set	- T	_	
✓	Build Automatically		Manage Working Sets			
	Make Target	•	d xcptn_xmpl(void);			
	C/C++ Index	+	it(void)			
	Properties		/			

2. Select Debug_RAM by clicking Down Arrow next to hammer



- Repeat above for all related projects.
- Follow the steps shown on "Build a Project" Page
- 24 EXTERNAL USE

 Lastly, to debug from RAM select the RAM related session while debugging

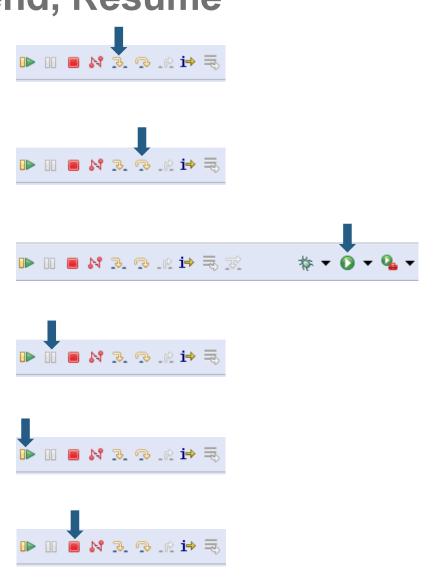


• Follow the Steps shown on Debug a Project pages



Debug Basics: Step, Run, Suspend, Resume

- Step Into (F5)
- Step Over (F6)
- Run
- Suspend
- Resume (F8)
- Terminate (Ctrl+F2)





Debug Basics: View & Alter Variables

- View variables in "Variables" tab.
- Click on a value to allow typing in a different value.

(x)= Variables 🖾 💁 Breakpoints 🕮 Registers	🛋 Modules 💠 EmbSysReg View 2.0	‱ ≈ ⊑ ∦ × ⅔ ◘ ≤ ▽ □ □
Name	Туре	Value
⇔= counter	volatile int	1
Name : counter Details:1		•
Default:1		T



1 of 2

Debug Basics: View & Alter Registers

- View CPU registers in the "Registers" tab
- Click on a value to allow typing in a different value

lame	Value	Description
🛗 General Registers		General Purpose and FPU Register Group
1010 rO	16788676	
1010 r1	1073745824	
1010 r2	1073774592	
1010 r3	16781312	
1010 r4	0	
	III	•

View peripheral registers in the EmbSysReg tab

(x)= Variables • Breakpoints ¹⁰¹⁰ Reg	isters 🛋 Mo	odules 🖾 EmbSysReg View 2.	2 X 0			E 🔏 🗐 🗎	
Project: [FirstProject_Z4_0] =>Arch: e	200 Vendor:	Freescale Chip: MPC5748G	(Double cl	ick on I	register to re	ad values)	
Register	Hex	Bin	Reset	Acc	Address	Description	
D D JDC						JDC	=
D 🗁 SEMA						SEMA42	
AIPS						AIPS-Lite Bridge	
eMIOS						eMIOS200	
▷ 🗁 I2S						Inter-IC Sound / Synchronous Audio Interfa	
🔺 🗁 ADC						12-bit SAR ADC	
▲ ## ADC_1						12-bit SAR ADC	
▲ ISH MCR	0x000000	0000000000000000000000	0x000001	RW	0xFBE000	Main Configuration Register	
PWDN (bit 0)	0x0	0				Power-down enable.	
REFSEL (bits 2-1)	0x0	00				O0: Select Vrefh as reference voltage	
ACKO (bit 5)	0x0	0				Auto clock off enable.	
ABORT (bit 6)	0x0	0				Abort Conversion.	
ABORT_CHAIN (bit 7)	0x0	0				Abort Chain.	-



Debug Basics: View Memory

Add Memory Monitor
 Click on <u>+</u> icon

🗏 Console 🧔 Tasks 🖹 Problems	Executables	🔋 Memory 🛛	
Monitors		κ.	

Select Base Address
 Example : 0x0000fff8

Monitor Memory	X
Enter address or expression to monito	r:
0x0000fff8	-
OK Cance	:I

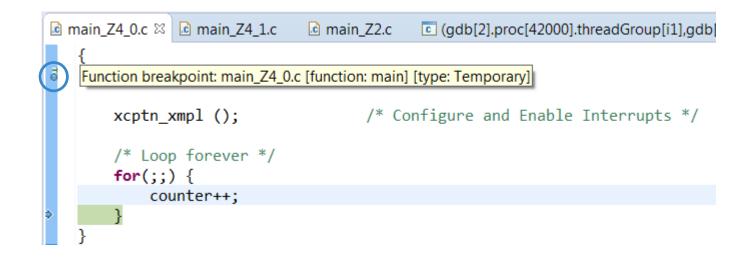
View Memory

🖻 Console 🧔 Tasks 🖹 Problems 🕠 E	xecutables 🚺	Memory 🛛					
Monitors	🕂 🕂 🐈 🕻	0x0000fff8 : 0	xFFF8 <hex></hex>	ន 🔶 New R	enderings		
 0x0000fff8 		Address	0 - 3	4 - 7	8 - B	C - F	
		0000FFF0	00000000	00000000	00000000	00000000	
		00010000	00000000	00000000	00000000	00000000	
		00010010	00000000	00000000	00000000	00000000	
		00010020	00000000	00000000	00000000	00000000	
		00010030	00000000	00000000	00000000	00000000	
		00010040	00000000	00000000	00000000	00000000	



Debug Basics: Breakpoints

Add Breakpoint: Point mouse pointer at circled area and Double Click there
 Light blue dot will pop up that represents debugger breakpoint

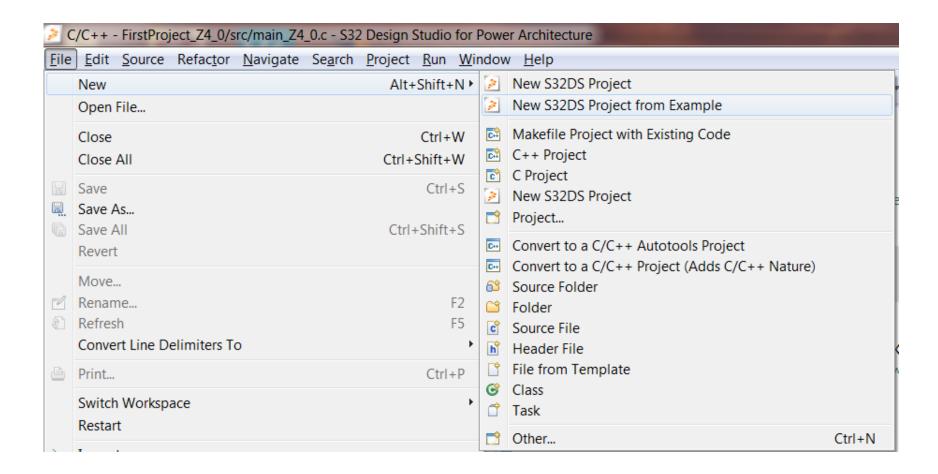




MAKING PROJECTS FROM BUILT-IN EXAMPLES

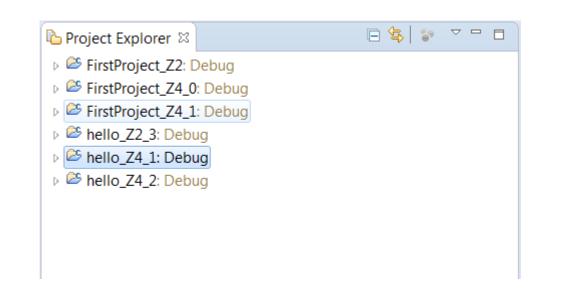


• Go to: File – New – New S32DS Project from Example





- Select the built-in project of your choice
- Click on Finish
- Project will be copied to the active workspace as shown below



Import		×
Import example project		
Project		
S32DS Example Projects		-
Mixed_VLE_BookE_MPC5646C		
▲ 🗁 MPC5748G		
🗁 adc		
➢ bctu_pit_adc ➢ edma		
🖙 edma 😂 emios		
Ilash_rw Ilash_rw Ilash_rwa_receive		Ξ
flexcan_cma_receive		
flexcan_receive		
🗁 hello+pll		
 Indicipal Indicipa		
➢ linflexd lin		
linflexd_uart		
➢ Ip_stop		
reg_protection		
🗁 sema4		
Name		
hello		
Description		
Description DEVKIT-MPC5748G board: First program for beginers		
*Turns on the the DS4, DS6 and DS8 LEDs using different cores		
*Also outputs FIRC clock on port pin		
? Finish	Cance	el



IMPORTING PROJECTS



• Go to: File – Import

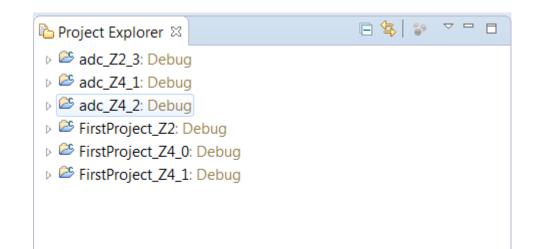
Search Project Ru Alt+Shift+N♪
Alt+Shift+N ►
Ctrl+W
Ctrl+Shift+W
Ctrl+S
Ctrl+Shift+S
F2 F5
•
Ctrl+P
•
Alt+Enter

Click on: "Existing Projects into • Workspace" – Hit Next

Click on: Browse & Select Example Folder •

	Import
	Import Projects Select a directory to search for existing Eclipse projects.
Import Select Create new projects from an archive file or directory.	Select root directory: Browse Select archive file: Projects: Select All
Select an import source:	Deselect All Refresh
 ▷ ▷ C/C++ ▷ ▷ CVS ▷ ▷ Install ▷ ▷ Remote Systems ▷ ▷ RPM 	Options Search for nested projects Copy projects into workspace Hide projects that already exist in the workspace
? < Ba Next > Finish Cancel	Working sets Add project to working sets Working sets: Select
	? < Back

- Select the Project
- Click on Finish to Import a Project into Workspace



Import Projects Some projects cannot	be imported because they already exist in the workspace	e T
Select root directory:		Browse
Select archive file:	C:\Users\B55457\Desktop\OneDrive - NXP\MPC574 ▼	Browse
Projects:		
adc_Z2_3 (adc_Z2		Select All
✓ adc_Z4_1 (adc_Z4) ✓ adc_Z4_2 (adc_Z4)		Deselect All
	3 (bctu_pit_adc_Z2_3)	Refresh
	L (bctu_pit_adc_Z4_1)	
	2 (bctu_pit_adc_Z4_2)	
edma_Z2_3 (edma edma_Z4_1 (edma		
edma_Z4_2 (edm		
emios 72 3 (emio	ne 72 3)	
Options		
Search for nested pro Copy projects into w	-	
	ready exist in the workspace	
Working sets		
	ing sets	
Add project to work	ing sets	Select



MORE INFORMATION.....

- For more information about S32 Design Studio IDE for Power Architecture go to Start – All Programs – Freescale S32 Design Studio – S32 Design Studio for power Architecture vx.x – Quick Start/Documentation
- Also Visit <u>NXP S32DS Community</u> to post questions about S32 Design Studio





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