XMC1100 Boot Kit

Getting Started

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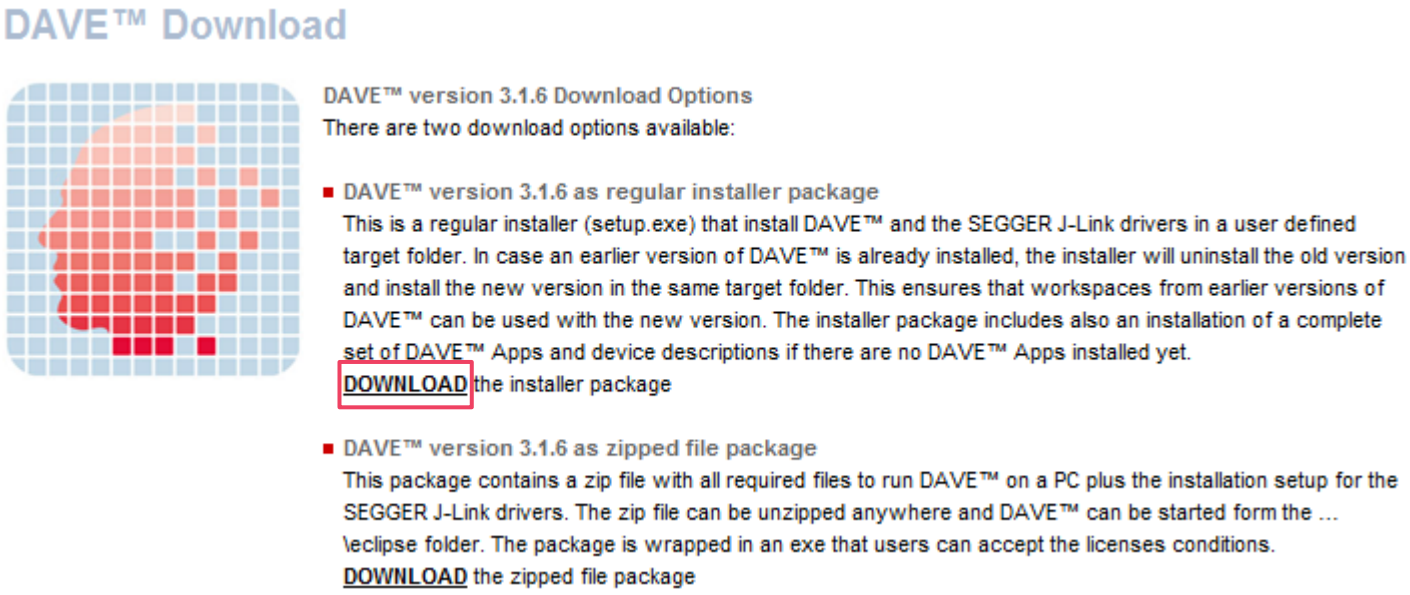
DAVE™ Setup

- Download DAVE™ installer package from:

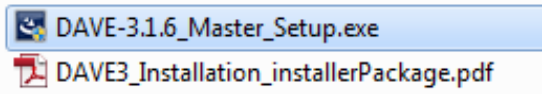
http://www.infineon.com/cms/en/product/promopages/aim-mc/DAVE_3_Download.html

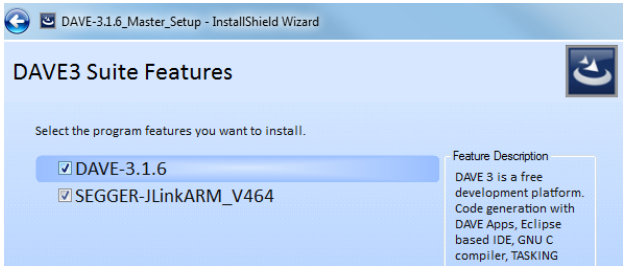


- Note: For users who have downloaded DAVE™ as a zipped file package, DAVE™ can be started via DAVE-*.exe in the eclipse folder.

DAVE™ Setup

- Download and unzip the installer package
- Run *_Setup.exe file to install DAVE and Segger J-Link drivers

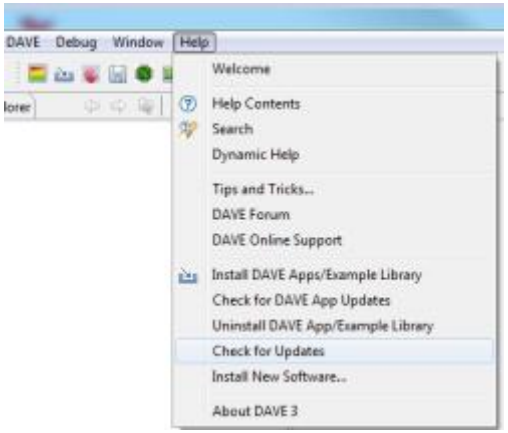




- Open DAVE™ program

- Check for DAVE updates

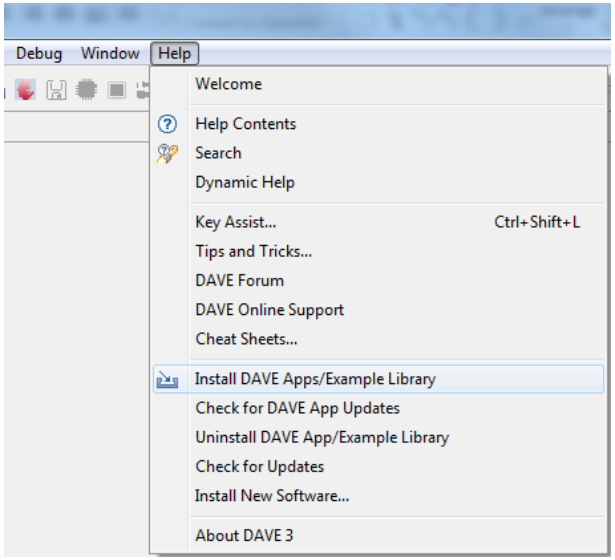
  Help → Check for Updates



DAVE™ Setup

- Install DAVE Apps and Device Descriptions

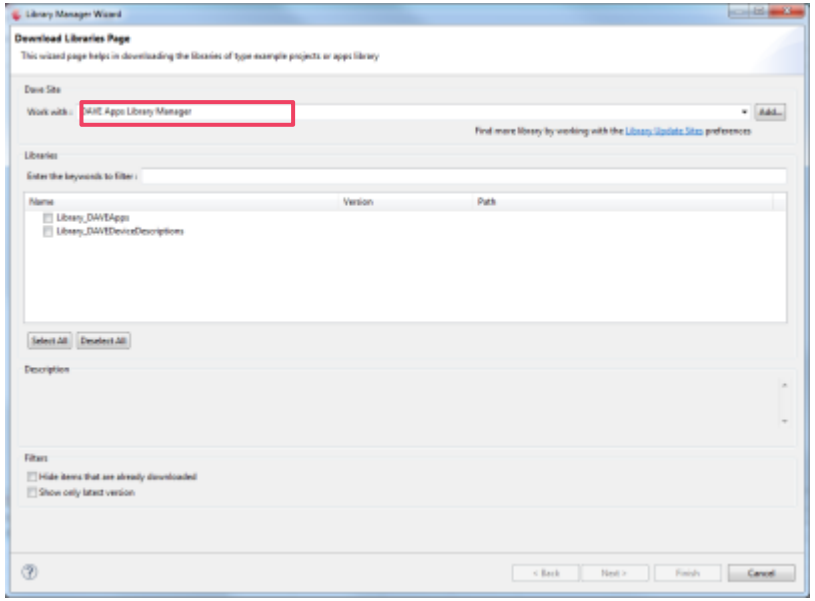
  Help → Install DAVE Apps Library



- Note: You may skip the above step if you are not using DAVE Apps

DAVE™ Setup

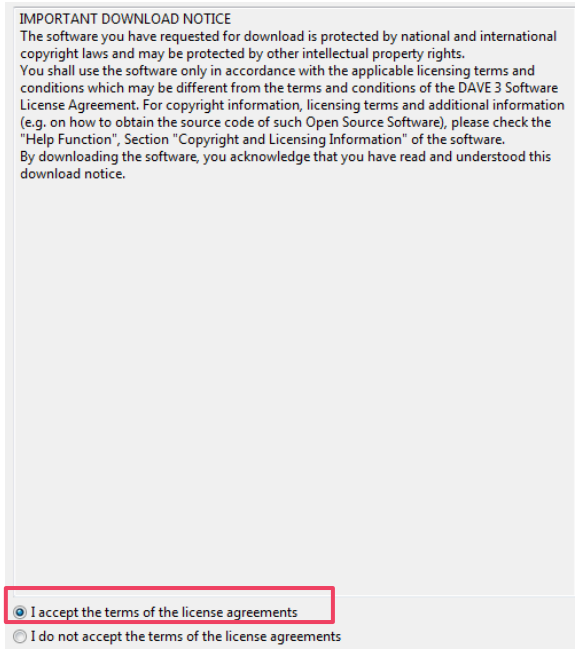
- Select DAVE Apps Library Manager in the drop-down menu



- Select Library_DAVEApps and Library_DAVEDeviceDescriptions (for XMC1100 Device) and click Next

DAVE™ Setup

- Accept terms of the license agreements and click Finish



- DAVE Apps and DAVE device descriptions are installed

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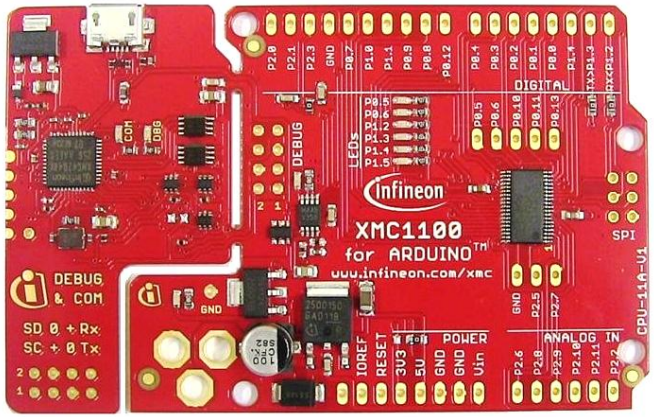
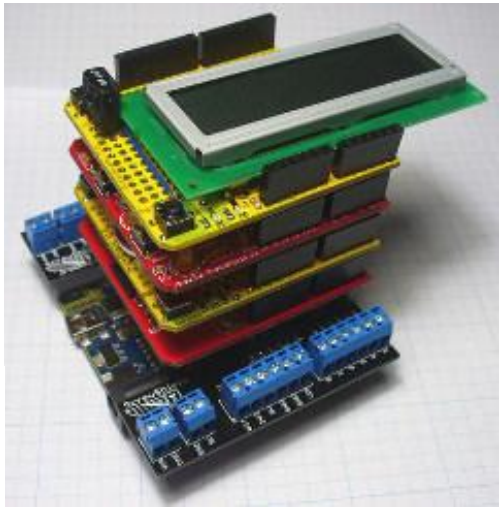
Hardware Setup

- XMC1100 Boot Kit
  - Consists of an XMC1100 CPU Card
  - Compatible with Arduino™ Shields (*http://shieldlist.org*)



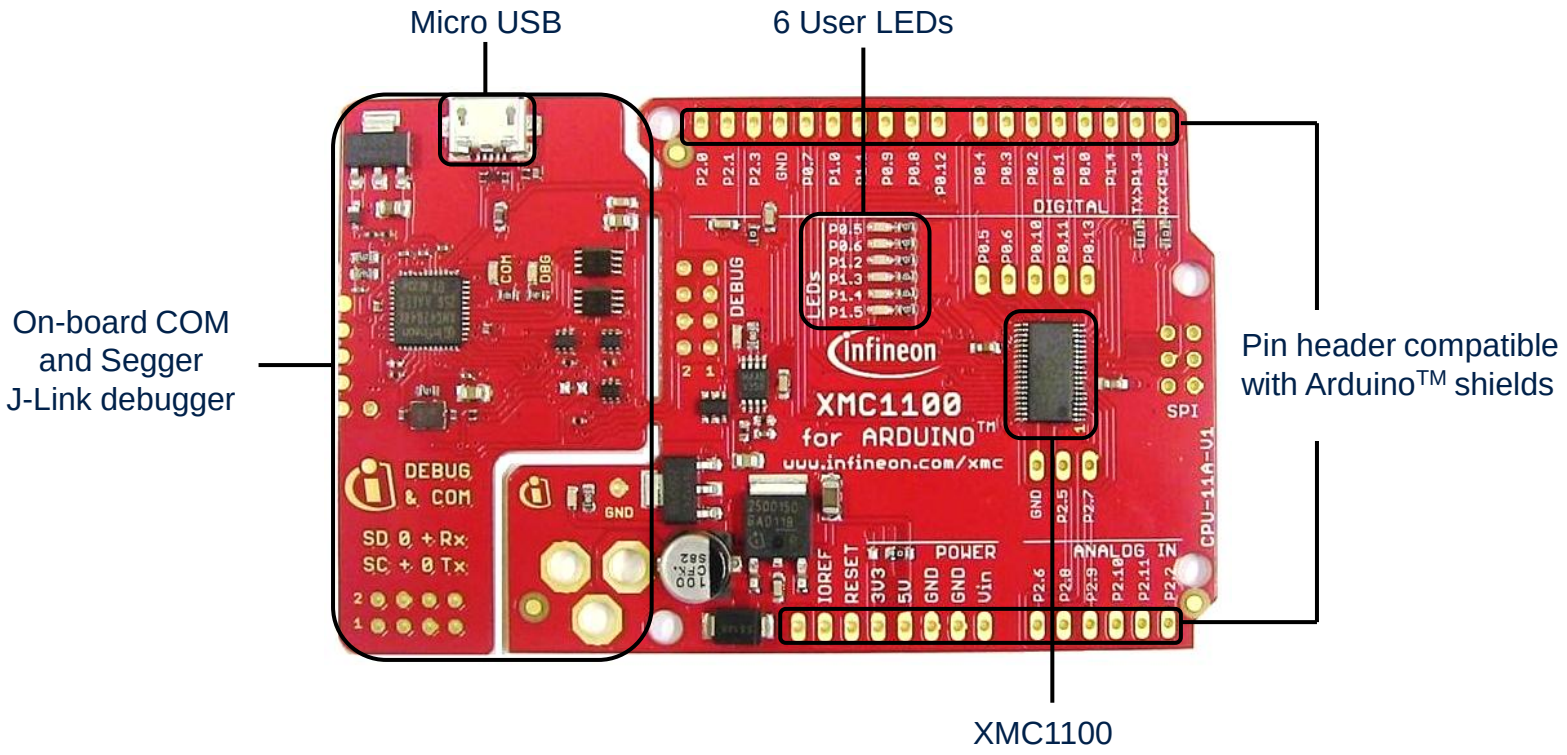
XMC1100 CPU Card



Arduino™ Shield

Hardware Setup

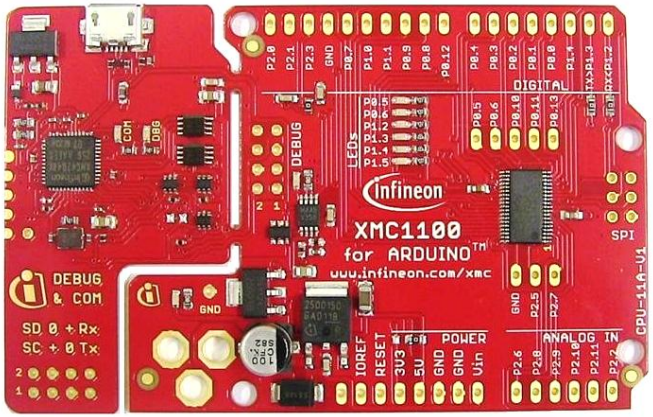
- XMC1100 CPU Card for Arduino™



Hardware Setup

- Connect XMC1100 CPU Card to PC via USB cable
- CPU Card is powered up (as indicated by LED on the card)

CPU Card powered
via USB cable



- Note: Supported Application Card may be additionally connected to the CPU card

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Boot Mode Index Configuration

- Boot Modes available
  - UART Bootstrap-Loader Mode
  - User Mode (Halt After Reset)
  - User Mode (Debug) **Default Mode of device on Boot Kit**
  - User Mode (Productive)

- Boot Modes can be configured via:
  - DAVE
    - Download DAVE

    http://www.infineon.com/cms/en/product/promopages/aim-mc/DAVE_3_Download.html
  - MemTool
    - Download MemTool

    http://www.infineon.com/cms/en/product/channel.html?channel=ff80808112ab681d0112ab6b50fe07c9

- For more information on how to configure the BMI value, please refer to the XMC1000 Tooling Guide.

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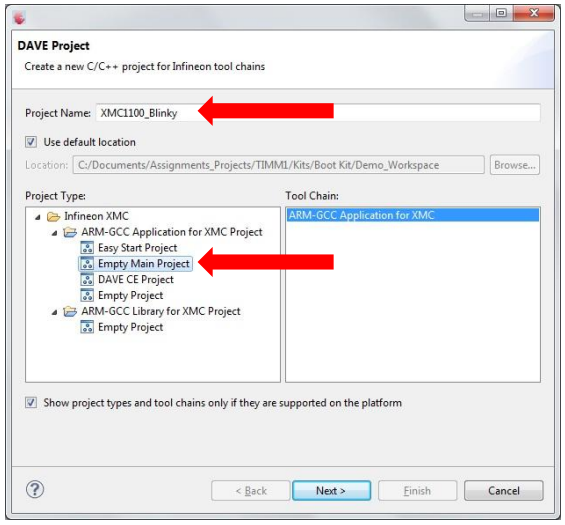
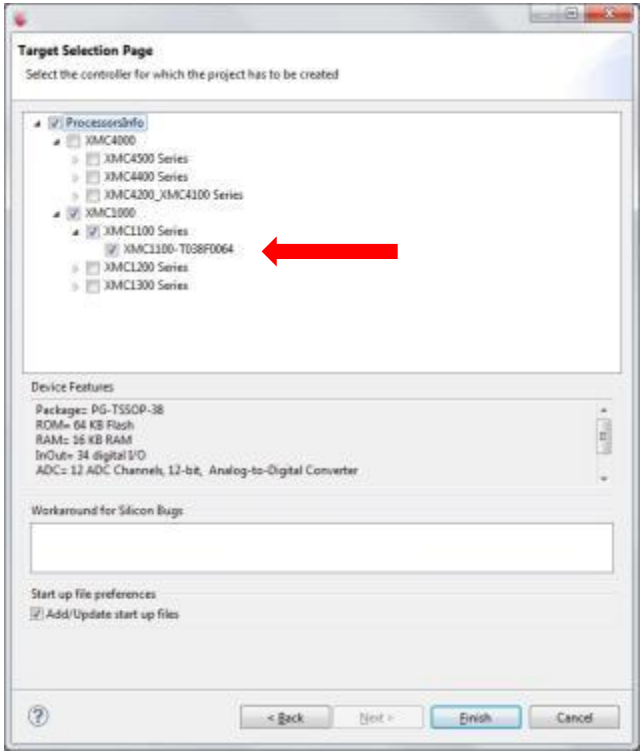
Getting Started Example Simple Blinky

1. Open DAVE™

2. In DAVE™ workspace, create a new “Empty Main” project:
   - File->New->DAVE Project
   - Give the project a name e.g. “XMC1100_Blinky”
   - Select “Empty Main Project” as Project Type



3. Select the device accordingly

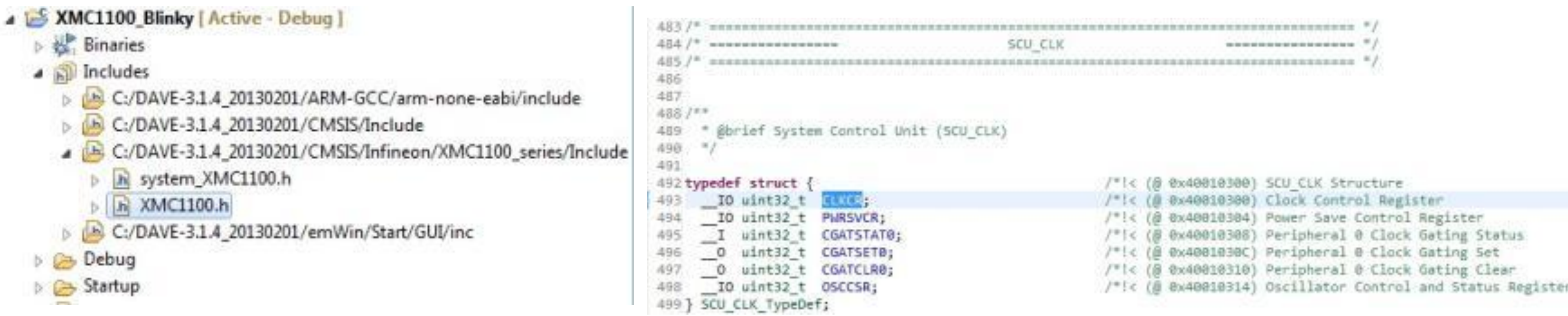


Getting Started Example
Simple Blinky

- For this project, we will use
  - System clock frequency of 8MHz
  - LED on Port pin 0.5
    - LED is toggled in the SysTick interrupt service routine
  - System timer, SysTick, as the time base for the interrupt
    - Time base of 0.2s
- Next, we will show you how to
  1. Set up the System or Main Clock (MCLK)
  2. Configure Port pin
  3. Configure SysTick and define its exception service routine

1. Set up System or Main Clock (MCLK)

- MCLK configured via **IDIV** and **FDIV** bit fields in register **CLKCR**
- CLKCR and all registers of the XMC1100 are defined in **XMC1100.h**



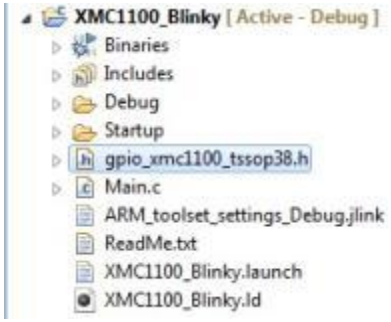
- IDIV and FDIV are protected bits, therefore access has to be opened prior to configuration via register **PASSWD**
- Configuration in **Main.c**

```
//----CLOCK-SETUP-----------------------------------------------------------
SCU_GENERAL->PASSWD = 0x000000C0UL;      // disable bit protection scheme
SCU_CLK->CLKCR = 0x3FF00400UL;           // 8 MHz MCLK, 8 MHz PCLK
while((SCU_CLK->CLKCR)&0x40000000UL);    // wait for VDDC to stabilize
SCU_GENERAL->PASSWD = 0x000000C3UL;      // enable bit protection scheme
//--------------------------------------------------------------------------
```

Getting Started Example
Simple Blinky

2. Configure Port pin

- Port registers are defined in **XMC1100.h**
- Ports-related macros and functions are provided in the header file, **gpio_xmc1100_tssop38.h**




```
22 #define OUTPUT_PP_AF6   0xB0U
23 #define OUTPUT_PP_AF7   0xB8U
24 #define OUTPUT_OD_GP    0xC0U
25 #define OUTPUT_OD_AF1   0xC8U
26 #define OUTPUT_OD_AF2   0xD0U

37 __STATIC_INLINE void P0_0_set_mode(uint8_t mode){
38     PORT0->IOCR0 &= ~0x000000f8UL;
39     PORT0->IOCR0 |= mode << 0;
40 }
```

```
672 /**
673   * @brief Port 0 (PORT0)
674   */
675
676 typedef struct {
677   __IO uint32_t  OUT;
678   __O  uint32_t  OMR;
679   __I  uint32_t  RESERVED0[2];
680   __IO uint32_t  IOCR0;
681   __IO uint32_t  IOCR4;
682   __IO uint32_t  IOCR8;
683   __IO uint32_t  IOCR12;
684   __I  uint32_t  RESERVED1;
685   __I  uint32_t  IN;
686   __I  uint32_t  RESERVED2[6];
687   __IO uint32_t  PHCR0;
688   __IO uint32_t  PHCR1;
689   __I  uint32_t  RESERVED3[6];
690   __I  uint32_t  PDISC;
691   __I  uint32_t  RESERVED4[3];
692   __IO uint32_t  PPS;
693   __IO uint32_t  HWSEL;
694 } PORT0_Type;
```

- With this header file, we can easily initialize the port pin 0.5 as a general purpose output pin in **Main.c**, using the provided macro

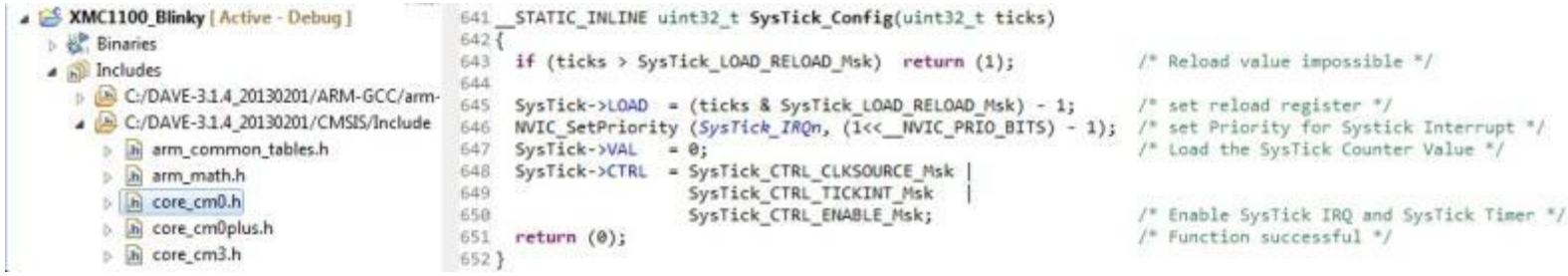
```
49 #include "gpio_XMC1100_tssop38.h"

63     //----PIN-SETUP-------------------
64     P0_5_set_mode(OUTPUT_OD_GP);
65     //-------------------------------
```

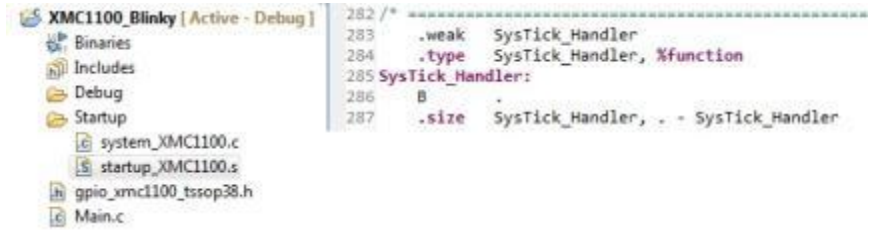
Getting Started Example
Simple Blinky

3. Configure SysTick and define its exception service routine

- Initialization function is defined in **core_cm0.h**



- SysTick exception handler is defined in **startup_XMC1100.s**



- Initialize the SysTick in **Main.c**

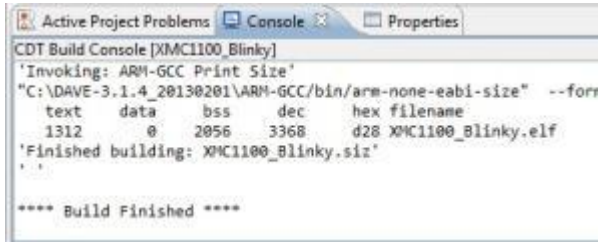
```
74    //----SYSTICK-SETUP------------------------------------------
75    SystemCoreClockUpdate();
76    SysTick_Config(SystemCoreClock / 5);    // 0.2s interrupt base
77    //------------------------------------------------------------
```

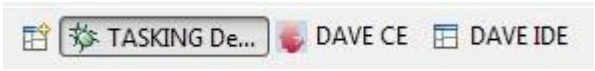
- Define the SysTick exception handler routine in **Main.c**
  - Toggle the LED

```
55 void SysTick_Handler(void)                    // 0.2s interrupt base
56 {
57     P0_5_toggle();
58 }
```

Getting Started Example
Simple Blinky

- Build project
  1. Click 
  2. Wait for Build to finish



- Download code
  1. Click 
  2. Switch to TASKING Debug view 

  3. Click  to run code

- LED blinks every 0.2s

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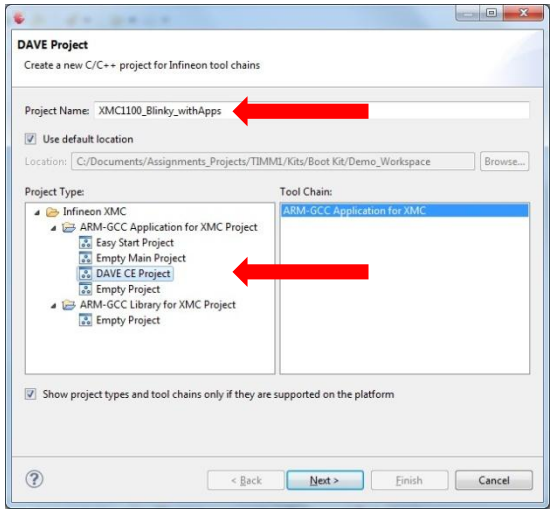
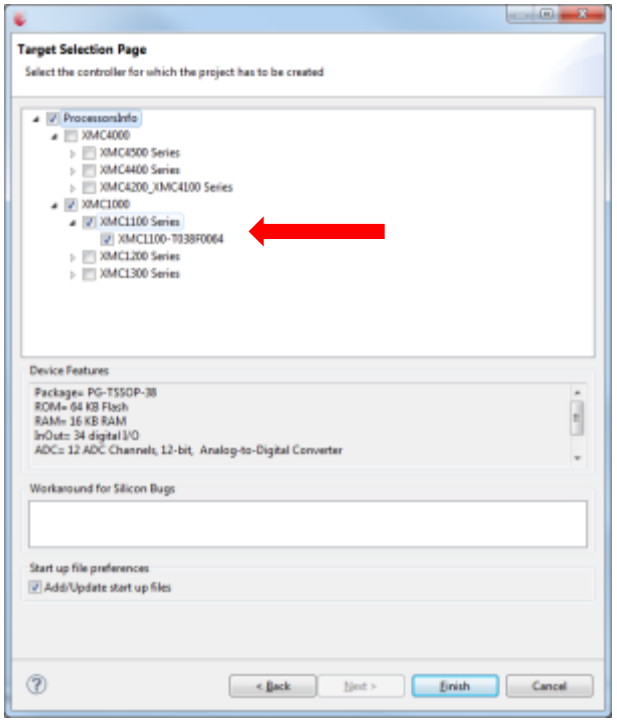
Getting Started Example Blinky based on DAVE apps

1. Open DAVE™

2. In DAVE™ workspace, create a new "DAVE CE" project:
   - File->New->DAVE Project
   - Give the project a name e.g. "XMC1100_Blinky_withApps"
   - Select "DAVE CE Project" as Project Type



3. Select the device accordingly



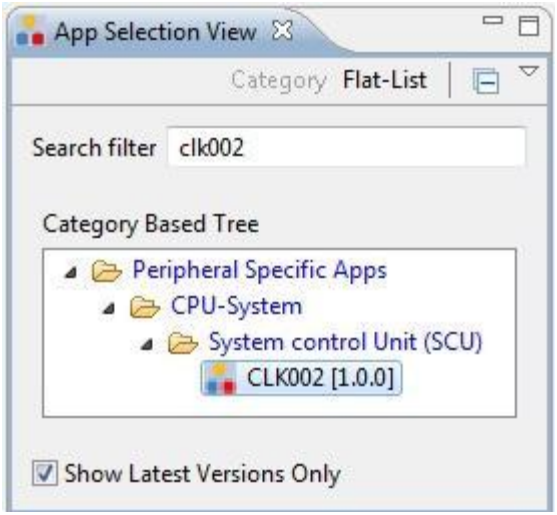
Getting Started Example
Blinky based on DAVE apps

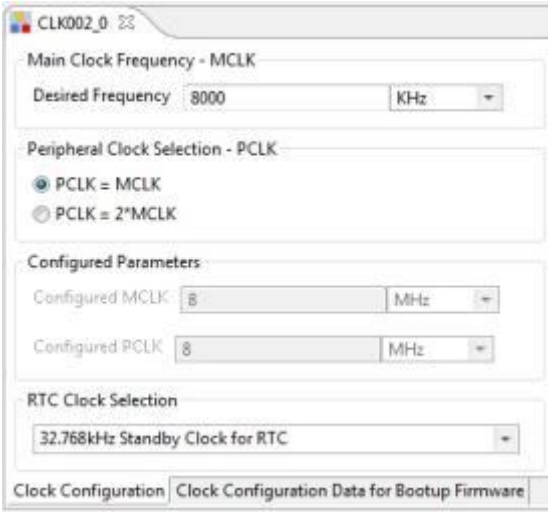
- For this project, we will use
  - System clock frequency of 8MHz
  - LED on Port pin 0.5
    - LED is toggled in the SysTick interrupt service routine
  - System timer, SysTick, as the time base for the interrupt
    - Time base of 0.2s
- Next, we will show you how to
  1. Set up the System or Main Clock (MCLK)
  2. Configure Port pin
  3. Configure SysTick and define its exception service routine

Getting Started Example
Blinky based on DAVE apps

1. Set up System or Main Clock (MCLK)
   - Select **CLK002** app from the **App Selection View** window
   - Open CLK002 **UIEditor** by double-clicking or right-click->UIEditor on the app in **S/W Connectivity View**

   - In UIEditor, under the **Clock Configuration** tab, change the **Desired Frequency** of the MCLK to 8MHz

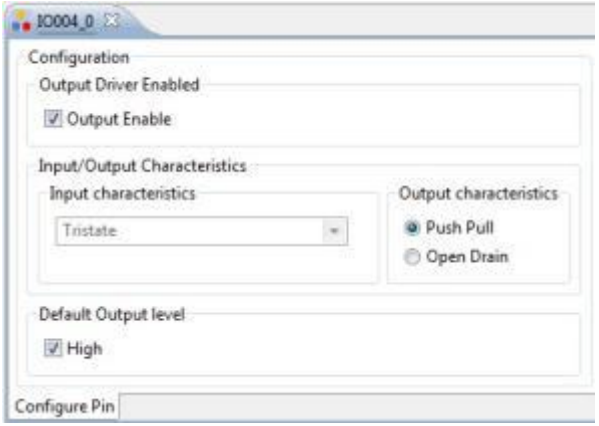


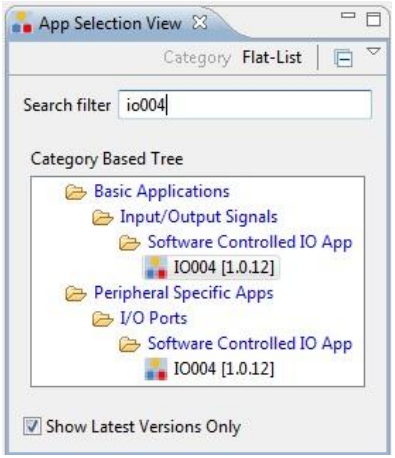


Getting Started Example Blinky based on DAVE apps

2. Configure Port pin

- Select **IO004** app from the **App Selection View** window
- Open IO004 **UIEditor** by double-clicking or right-click->UIEditor on the app in **S/W Connectivity View**
- In UIEditor, under the **Configure Pin** tab, enable the **Output Driver** and set **Output Level** to High by checking the respective check-boxes



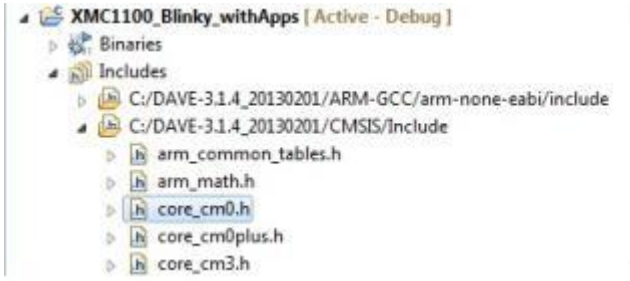


- Assign pin to P0.5
  - Right-click on app->**Manual Pin Assignment**
  - In Manual Pin Assignment window, set **pin** as Resource, **P0.5** as Port-Pin
  - **Solve And Save**

Getting Started Example
Blinky based on DAVE apps

3. Configure SysTick and define its exception service routine

- Initialization function is defined in **core_cm0.h**




```
641 __STATIC_INLINE uint32_t SysTick_Config(uint32_t ticks)
642 {
643   if (ticks > SysTick_LOAD_RELOAD_Msk)  return (1);            /* Reload value impossible */
644
645   SysTick->LOAD  = (ticks & SysTick_LOAD_RELOAD_Msk) - 1;      /* set reload register */
646   NVIC_SetPriority (SysTick_IRQn, (1<<__NVIC_PRIO_BITS) - 1);  /* set Priority for Systick Interrupt */
647   SysTick->VAL   = 0;                                          /* Load the SysTick Counter Value */
648   SysTick->CTRL  = SysTick_CTRL_CLKSOURCE_Msk |
649                    SysTick_CTRL_TICKINT_Msk   |
650                    SysTick_CTRL_ENABLE_Msk;                    /* Enable SysTick IRQ and SysTick Timer */
651   return (0);                                                  /* Function successful */
652 }
```

- SysTick exception handler is defined in **startup_XMC1100.s**

```
291     Insert_ExceptionHandler SysTick_Handler
```

- Initialize the SysTick in **Main.c**

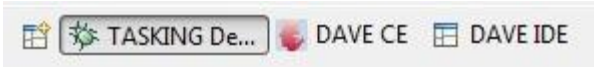
```
74    //----SYSTICK-SETUP----------------------------------------------
75    SystemCoreClockUpdate();
76    SysTick_Config(SystemCoreClock / 5);    // 0.2s interrupt base
77    //------------------------------------------------------------------
```

- Define the SysTick exception handler routine in **Main.c**
  - Toggle the LED

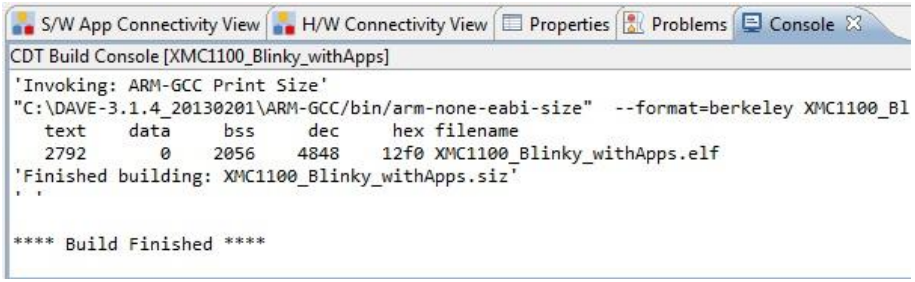
```
53 void SysTick_Handler(void)                    // 0.2s interrupt base
54 {
55     IO004_TogglePin(IO004_Handle0);
56 }
```

Getting Started Example
Blinky based on DAVE apps

- Generate code
  1. Click 
- Build project
  1. Click 
  2. Wait for Build to finish
- Download code
  1. Click 
  2. Switch to TASKING Debug view

  3. Click  to run code
- LED blinks every 0.2s



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Example Projects Download

- Two sets of Example Projects available
  - Additional Application Examples
    - Can be downloaded directly from the web
  - DAVE™ Project Library Examples
    - Can be downloaded from library in DAVE™
    - Can also be downloaded directly from the web

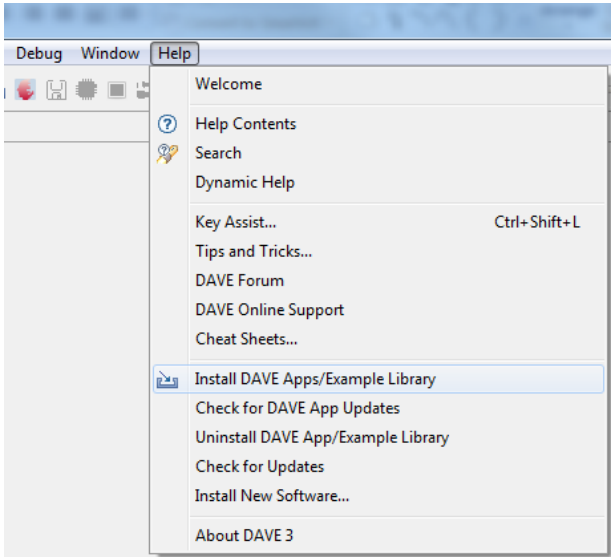
Example Projects Download
Additional Application Examples

- Additional Application Examples available
  - Running LEDs Example
    (Simple_XMC1100_RunningLEDs.zip)
  - UART Example
    (Simple_XMC1100_UART.zip)

- Can be downloaded from the web HERE

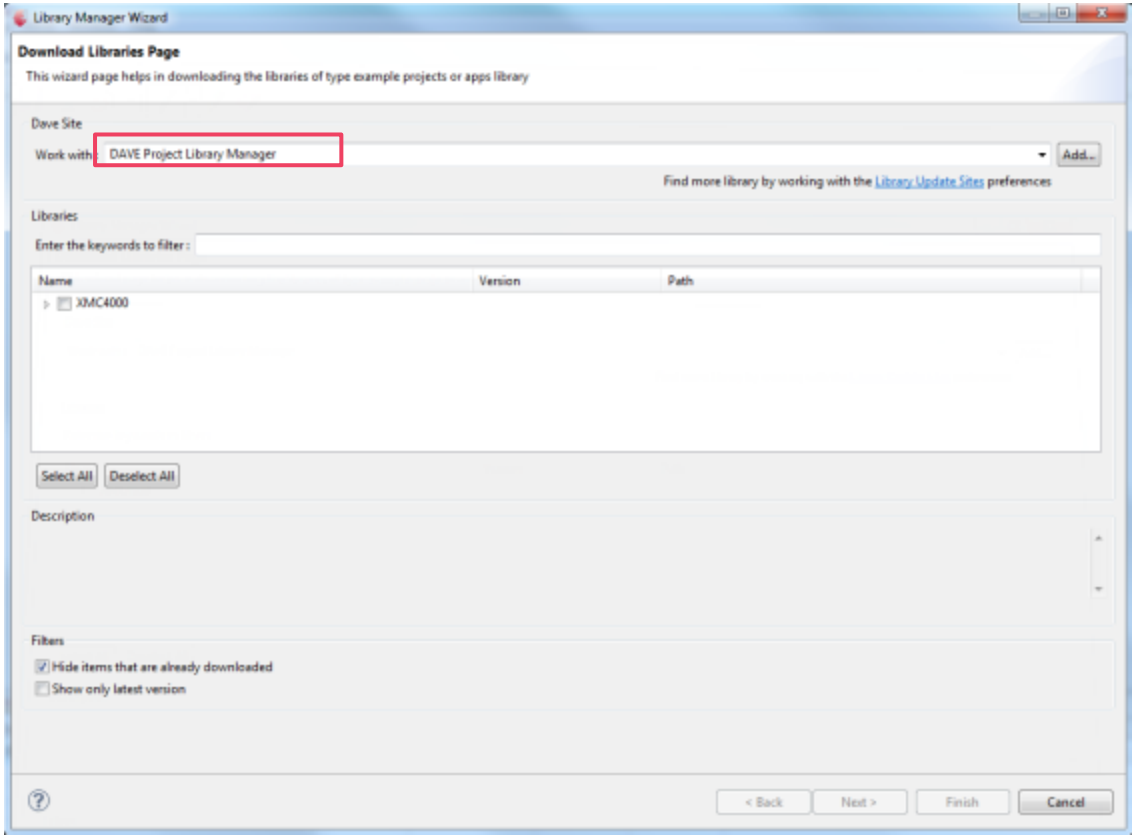
Example Projects Download DAVE™ Example Library

- Download Example Projects via DAVE™ library store
  - Help → Install DAVE Example Library



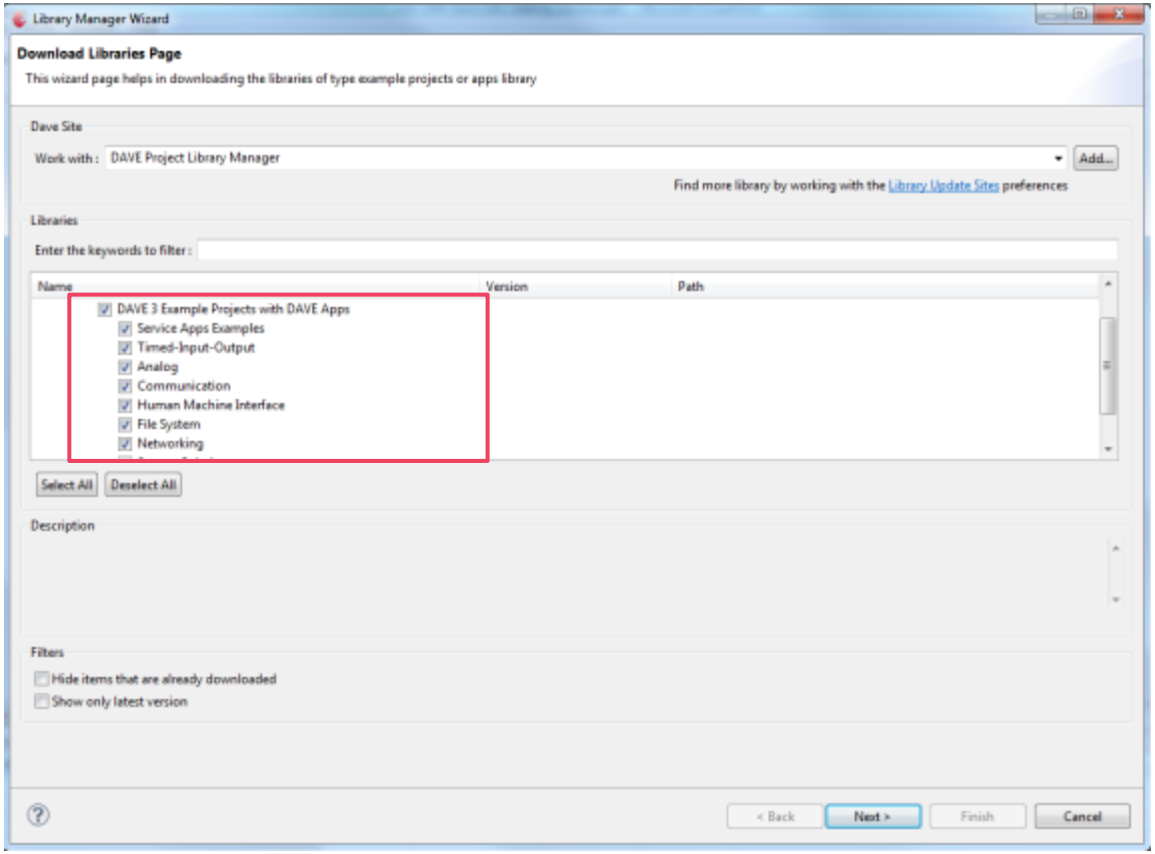
Example Projects Download
DAVE™ Example Library

- Select DAVE Project Library Manager in the drop-down menu



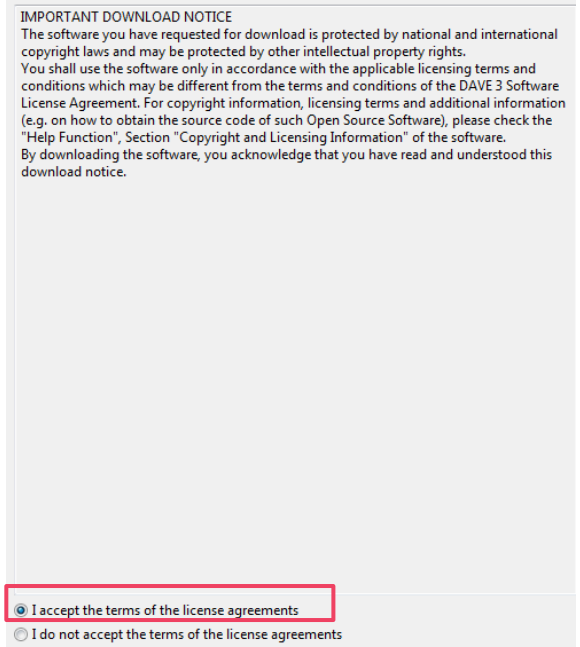
Example Projects Download
DAVE™ Example Library

- Select Examples in the Libraries window and click Next



Example Projects Download
DAVE™ Example Library

- Accept terms of the license agreements and click Finish



- DAVE Example Projects are installed

Example Projects Download
DAVE™ Example Library

- Download Example Projects from the web

http://www.infineon.com/cms/en/product/promopages/aim-mc/DAVE_3_Support_Portal/DAVE_Example_Project_Download.html

  - Download the project zip file
  - Open DAVE™ and go to File → Import → Infineon → DAVE Project
  - Check "Select Archive File"
  - Browse to the downloaded DAVE project zip file
  - Press "Open"

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  - XMC1100 Hardware Setup
  - Simple Blinky Example
  - Blinky Example based on DAVE™ Apps
  - Example Projects Download

ENERGY EFFICIENCY
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Innovative semiconductor solutions for energy efficiency, mobility and security.