



ARM Cortex™-M0 32-BIT MICROCONTROLLER

NuTiny-SDK-100 User Manual For NuMicro™ NUC100 Series

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1 Overview

NuTiny-SDK-100 is the specific development tool for NuMicro NUC100 series. Users can use NuTiny-SDK-100 to develop and verify the application program easily.

NuTiny-SDK-100 includes 2 portions. One is NuTiny-EVB-100 and the other is Nu-Link-Me. NuTiny-EVB-100 is the evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, users do not need other additional ICE or debug equipment.

2 NuTiny-SDK-100 Introduction

NuTiny-SDK-100 uses the NUC100LE3AN as the target microcontroller. Figure 2-1 is NuTiny-SDK-100 for NUC100 series and the left portion is called NuTiny-EVB-100 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-100 is similar to other development board. Users can use it to develop and verify applications to emulate the real behavior. The on board chip covers NUC100 series features. The NuTiny-EVB-100 can be a real system controller to design user target system.

Nu-Link-Me is a Debug Adaptor. **The Nu-Link-Me Debug Adaptor connects your PC's USB port to your target system (via Serial Wired Debug Port) and allows you to program and debug embedded programs on the target hardware.** To use Nu-Link-Me Debug adaptor with IAR or Keil, please refer to “Nuvoton NuMicro™ IAR ICE driver user manual “or Nuvoton NuMicro™ Keil ICE driver user manual” in detail. These 2 documents will be stored in local hard disk when user installs each driver.

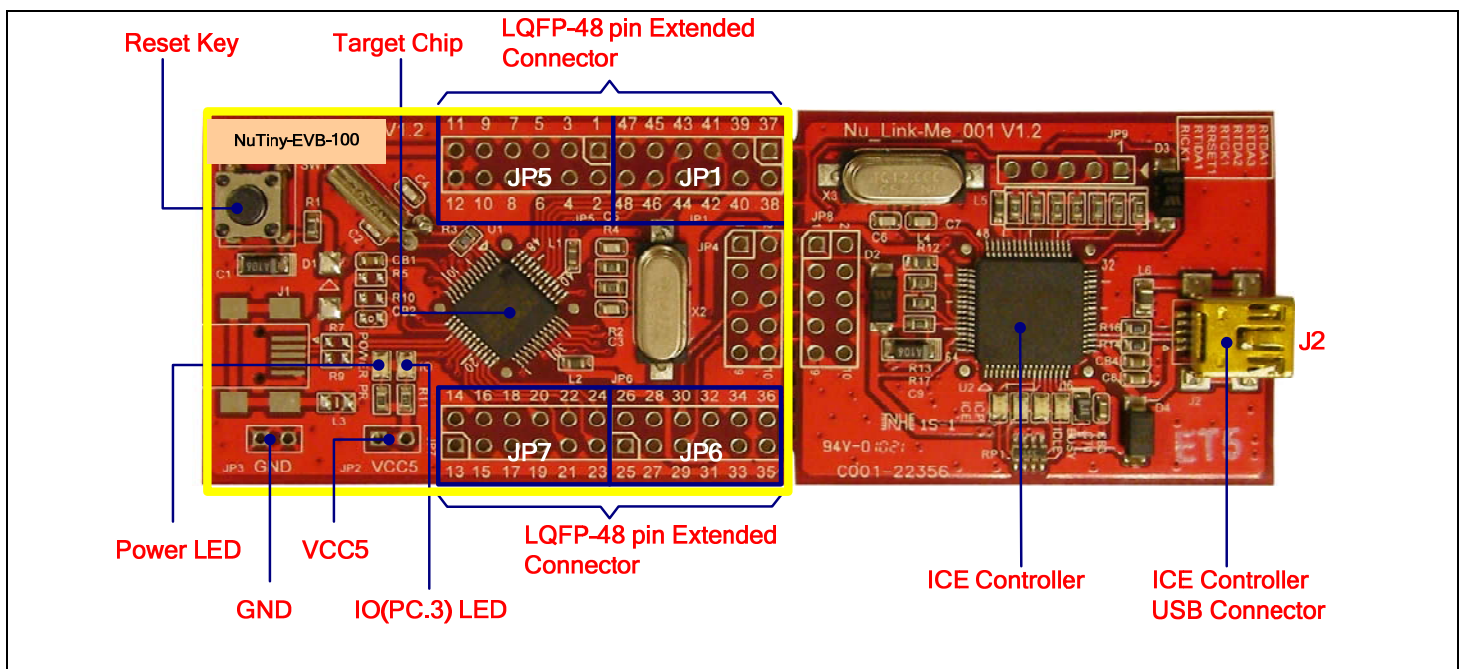


Figure 2-1 NuTiny-SDK-100 (Red Color PCB Board)

2.1 NuTiny -SDK-100 Jumper Description

2.1.1 Power Setting

- JP2: VCC5 Voltage connector in NuTiny-EVB-100
- J2: USB port in Nu-Link-Me

| POWER model | J2 USB port | JP2 VCC5 | MCU Voltage |
|-------------|---------------|-------------------|----------------------|
| Model 1 | Connect to PC | DC 5V output | DC 5V |
| Model 2 | X | DC 2.8-5.5V input | Voltage by VCC input |

X: Not use.

2.1.2 Debug Connector

- JP4: Connector in target board(NuTiny-EVB-100) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- JP8: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (for exampl NuTiny-EVB-100)

2.1.3 USB Connector

- J1: Mini USB Connector in NuTiny-EVB-100 for application use
- J2: Mini USB Connector in Nu-Link-Me connected to a PC USB port

2.1.4 Extended Connector

- JP1, JP5, JP6 and JP7: Show all of chip pins in NuTiny-EVB-100

2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-100

2.1.6 Power Connector

- JP2: VCC connector in NuTiny-EVB-100
- JP3: GND connector in NuTiny-EVB-100

2.2 Pin Assignment for Extended Connector

NuTiny-EVB-100 provides NUC100LE3AN on board and the extended connector for LQFP-48 pin. Table 2-1 is the pin assignment for NUC100LE3AN.

| Pin No | Pin Name | Pin No | Pin Name |
|--------|--------------------------|--------|----------------------|
| 01 | PB.12, CPO0. CLKO | 25 | PA.15, PWM3, I2SMCLK |
| 02 | X32O | 26 | PA.14, PWM2, |
| 03 | X32I | 27 | PA.13, PWM1 |
| 04 | PA.11, I2C1SCL | 28 | PA.12, PWM0 |
| 05 | PA.10, I2C1SDA | 29 | ICE DAT |
| 06 | PA.9, I2C0SCL | 30 | ICE CLK |
| 07 | PA.8, I2C0SDA | 31 | AVSS |
| 08 | PB.4, RX1 | 32 | PA.0, ADC0 |
| 09 | PB.5, TX1 | 33 | PA.1, ADC1 |
| 10 | LDO | 34 | PA.2, ADC2 |
| 11 | VDD | 35 | PA.3, ADC3 |
| 12 | VSS | 36 | PA.4, ADC4 |
| 13 | PB.0, RX0 | 37 | PA.5, ADC5 |
| 14 | PB.1, TX0 | 38 | PA.6, ADC6 |
| 15 | PB.2, RTS0 | 39 | PA.7, ADC7 |
| 16 | PB.3, CTS0 | 40 | AVDD |
| 17 | PC.3, MOSI00, I2SDO | 41 | PC.7, CPN0 |
| 18 | PC.2, MISO00, I2SDI | 42 | PC.6, CPP0 |
| 19 | PC.1, SPICLK0, I2SBCLK | 43 | PB.15, /INT1 |
| 20 | PC.0, /SPISS00, I2SLRCLK | 44 | XT1 OUT |
| 21 | PE.5, PWM5 | 45 | XT1 IN |
| 22 | PB.11, TM3, PWM4 | 46 | /RESET |
| 23 | PB.10, TM2, /SPISS01 | 47 | PVSS |
| 24 | PB.9/ TM1 | 48 | PB.8, STADC, TM0 |

Table 2-1 Pin Assignment for NUC100 Series

2.3 NuTiny-SDK-100 PCB Placement

Users can refer Figure 2-2 for the NuTiny -SDK-100 PCB placement.

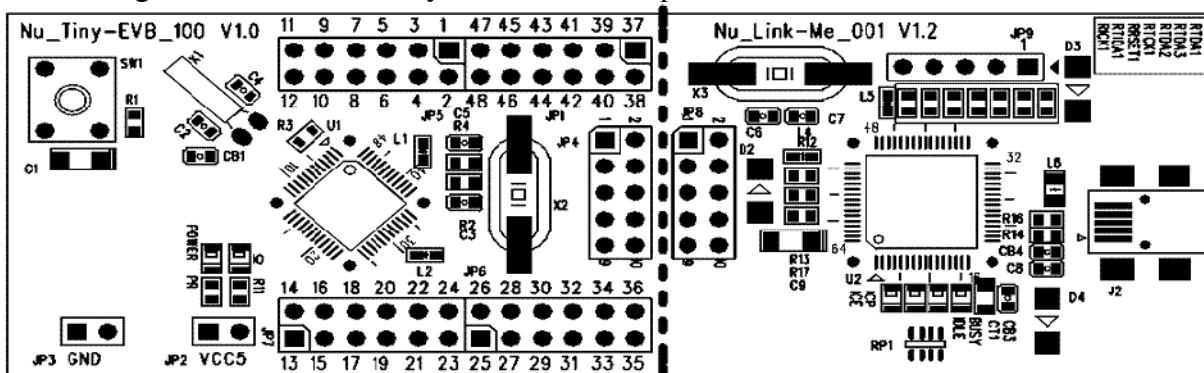


Figure 2-2 NuTiny-SDK-100 PCB Placement

3 How to Start NuTiny -SDK-100 on the Keil μ Vision[®] IDE

3.1 Keil μ Vision[®] IDE Software Download & Install

Please visit the Keil company website (<http://www.keil.com>) to download the Keil μ Vision[®] IDE and install the RVMDK.

3.2 Nuvoton Nu-Link Driver Download & Install

Please visit Nuvoton company NuMicro[™] website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro[™] Keil μ Vision[®] IDE driver” file. Please refer the Chapter 6.1 for the detail download flow. When the Nu-Link driver have been download ok, please unzip the file and execute the “Nu-Link_Keil_Driver.exe” to install the driver.

3.3 Hardware Setup

The hardware setup is shown as Figure 3-1

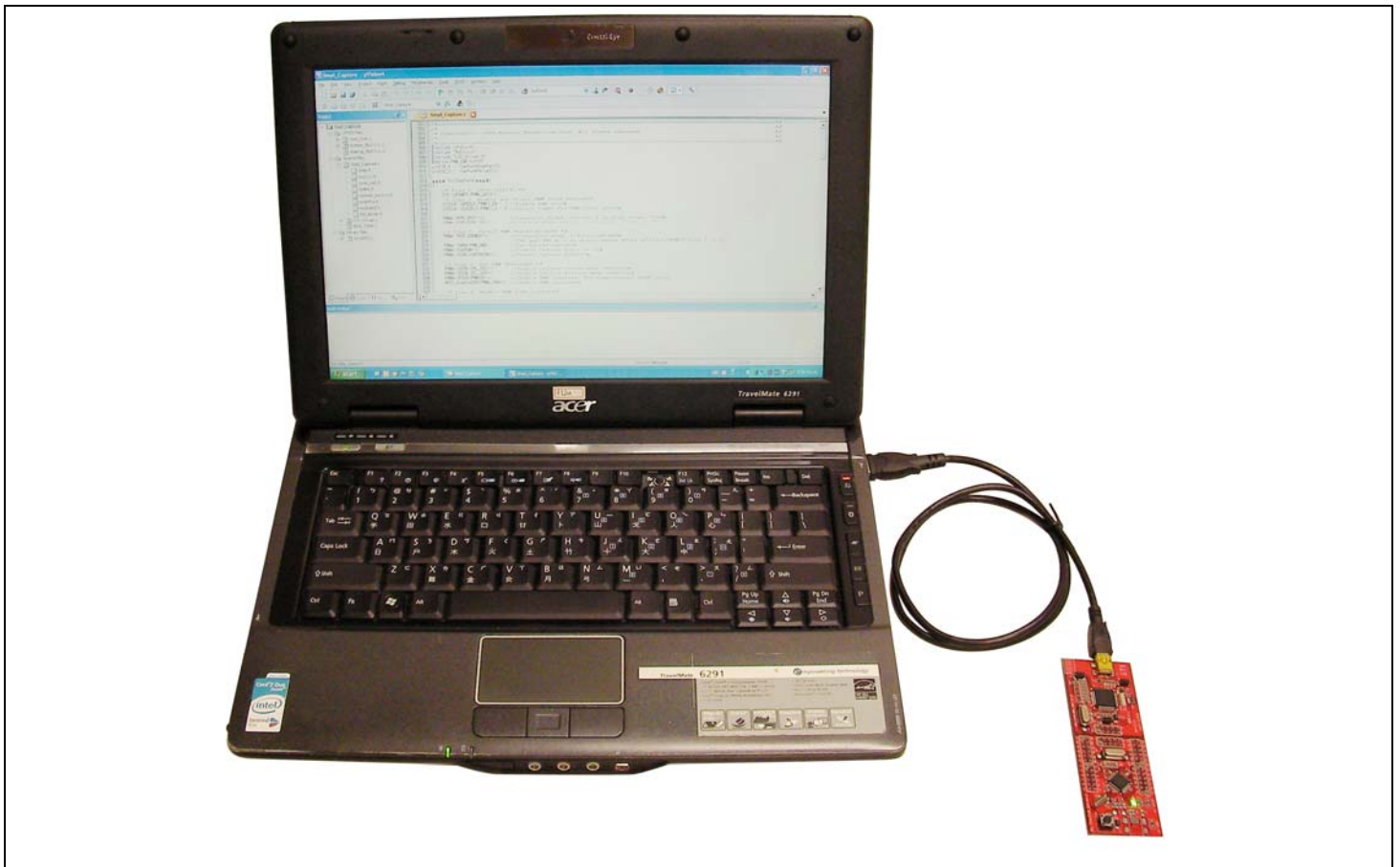


Figure 3-1 NuTiny-SDK-100 Hardware Setup

3.4 Smpl_NuTiny-NUC100 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-100 board. It can be found on the Figure 3-2 list directory and downloaded from Nuvoton NuMicro™ Website following Chapter 6.3.

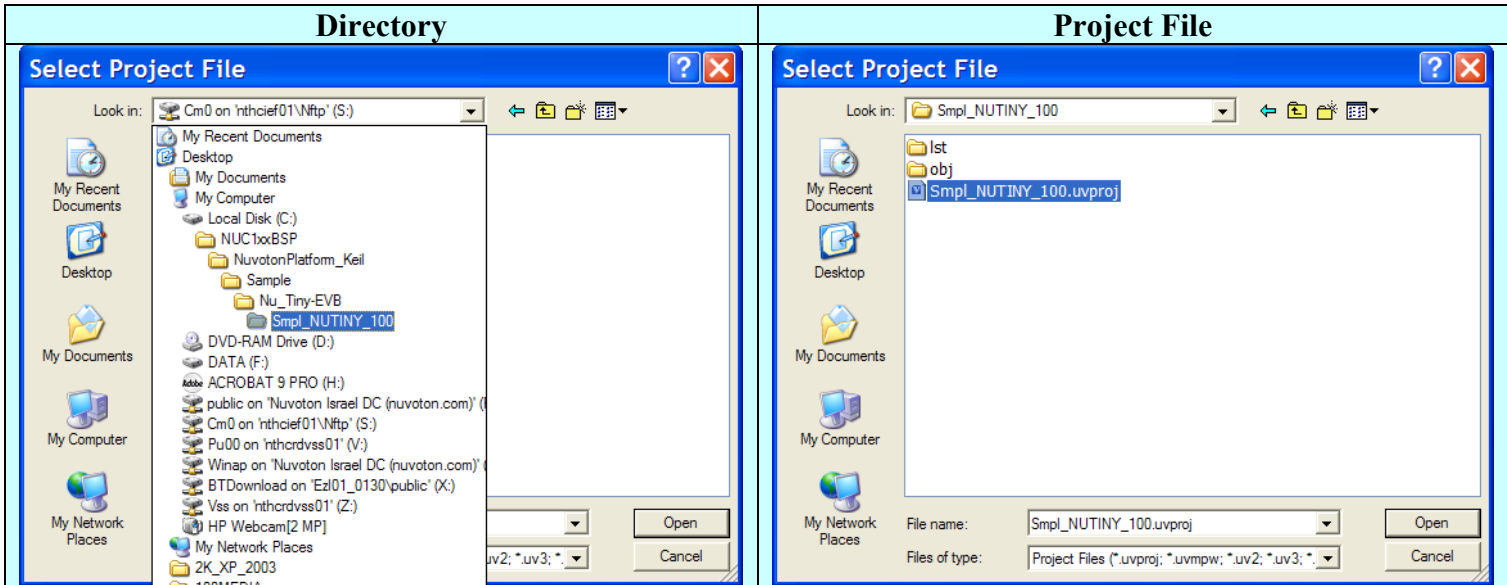










Figure 3-2 Smpl_NuTiny_100 Example Directory

To use this example:
The PC.3 LED will toggle on the NuTiny-EVB-100 board.

-  **Start µVision®**
- **Project-Open**
Open the Smpl_NuTiny_100.uvproj project file
-  **Project - Build**
Compile and link the Smpl_NuTiny-NUC100 application
-  **Flash – Download**
Program the application code into on-chip Flash ROM
-  **Start debug mode**
Using the debugger commands, you may:
 - ◆  Review variables in the watch window
 - ◆  Single step through code
 - ◆  RST Reset the device
 - ◆  Run the application

4 How to Start NuTiny-SDK-100 on the IAR Embedded Workbench

4.1 IAR Embedded Workbench Software Download and Install

Please connect to IAR company website (<http://www.iar.com>) to download the IAR Embedded Workbench and install the EWARM.

4.2 Nuvoton Nu-Link Driver Download and Install

Please connect to Nuvoton Company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro™ IAR ICE driver user manual” file. Please refer the Chap6.2 for the detail download flow. When the Nu-Link driver have been download ok, please unzip the file and execute the “Nu-Link_IAR_Driver.exe” to install the driver.

4.3 Hardware Setup

The hardware setup is shown as Figure 4-1

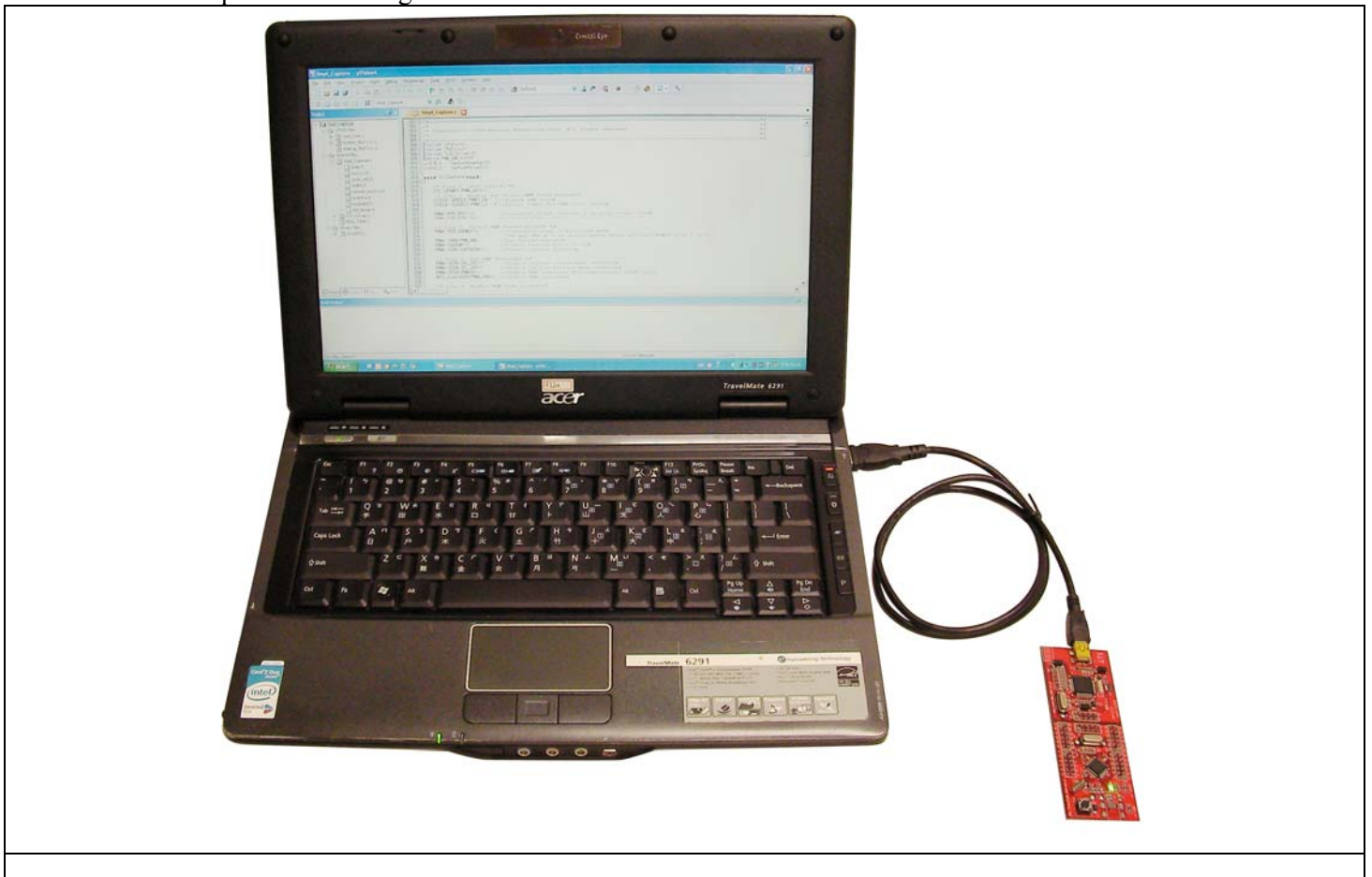


Figure 4-1 NuTiny- SDK-100 Hardware Setup

4.4 Smpl_NuTiny-NUC100 Example Program

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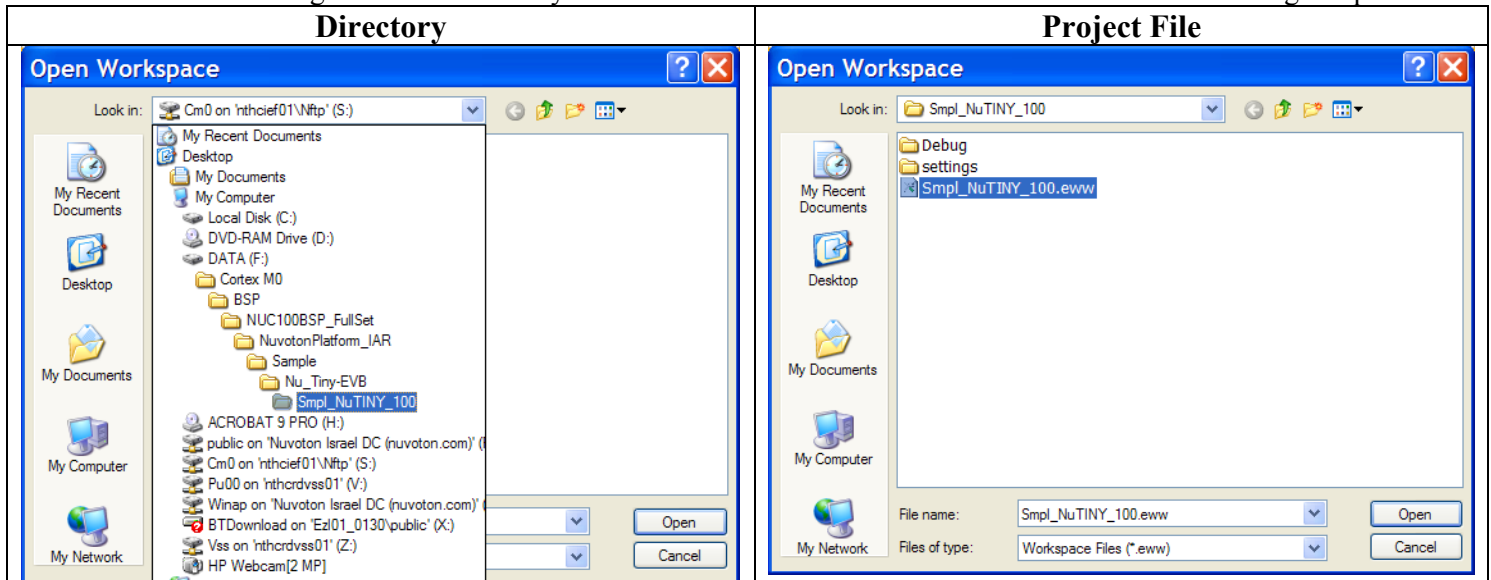








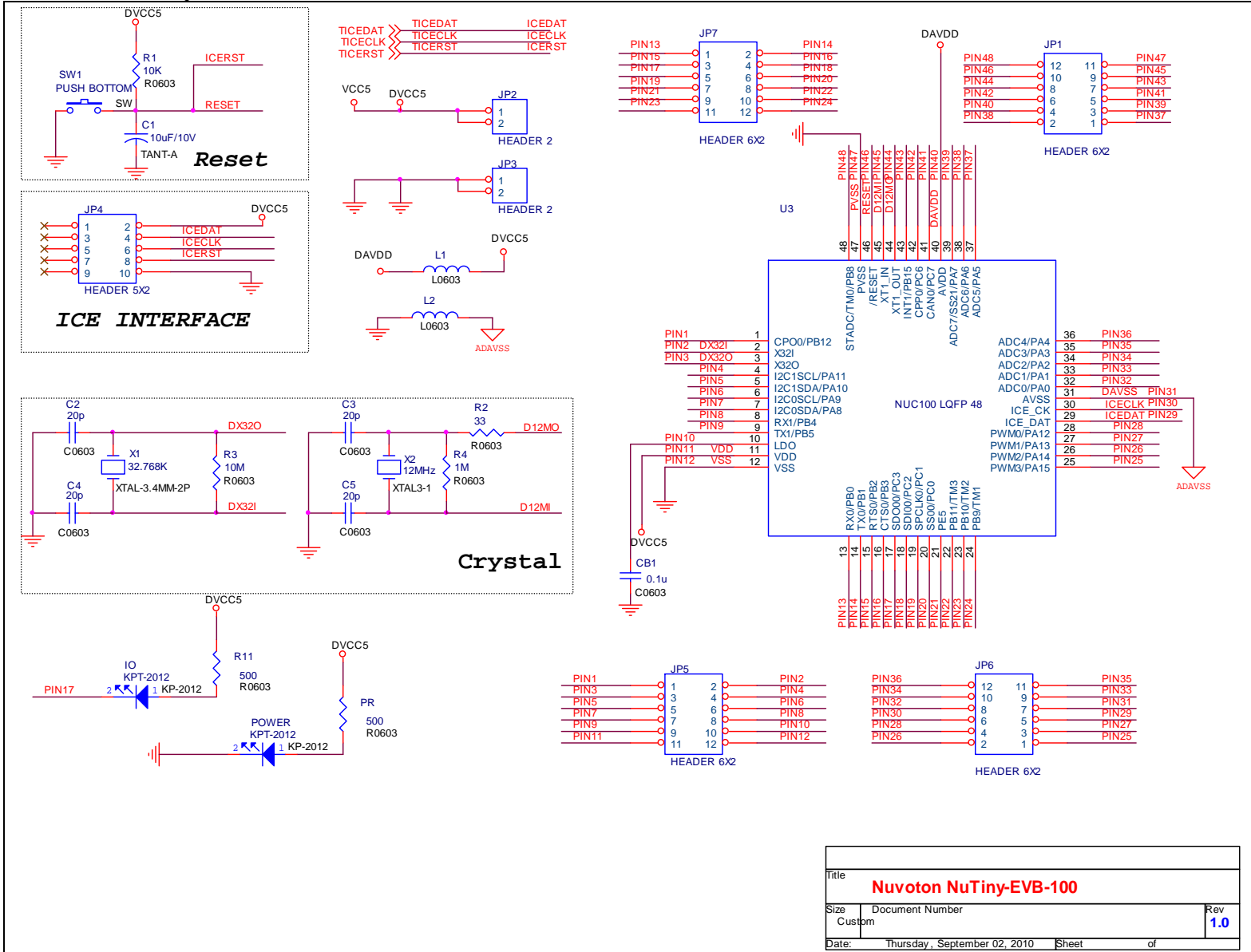
Figure 4-2 Smpl_NuTiny_100 Example Directory

To use this example:

The PC.3 LED will toggle on the NuTiny-EVB-100 board.

-  **Start IAR Embedded Workbench**
- **File-Open-Workspace**
Open the Smpl_NuTiny_100.eww workspace file
-  **Project - Make**
Compile and link the Smpl_NuTiny-100 application
-  **Project – Download and Debug**
Program the application code into on-chip Flash ROM.
 - ◆  Single step through code
 - ◆  Reset the device
 - ◆  Run the application

5 NuTiny-EVB-100 Schematic



| | | |
|-------------------------------|------------------------------|------------|
| Title | | |
| Nuvoton NuTiny-EVB-100 | | |
| Size | Document Number | Rev |
| Custom | | 1.0 |
| Date: | Thursday, September 02, 2010 | Sheet of |

6 To Download NuMicro™ Family Related Files from Nuvoton Company

6.1 To Download NuMicro™ Keil μVision® IDE driver

| <p>Step1</p> | <p>To visit the Nuvoton NuMicro™ Website: http://www.nuvoton.com/NuMicro</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--------------------------------------|--|--------------------------------------|---|--|--------------|------------|---|--------------------------------------|--|--|-------------|-------------|---|--------------------------------------|--|--|--------------|-----------|-------------|---------|--|-------------------------------------|-------|---|---|-------|---|---|-------|------------------------------------|--------------------------------|-------|----------------------|-------------------------------|-------|--|-----------------------------------|------|
| <p>Step2</p> | <p>Click here to enter Development Tools page</p> <p>ARM Cortex™-M0 NuMicro® Family</p> <p>NuMicro® Family is Nuvoton's brand new 32-bit microcontroller product line based on the ARM® Cortex™-M0 processor with rich peripherals to offer superb features and connectivity capability. Besides the NUC100, NUC120, NUC130 and NUC140 series, a new series the NuMicro M051™ series, including the M052/54/55/56 is to satisfy the worldwide customers' 8-0/10-bit microcontroller demand with a higher performance of a 32-bit microcontroller.</p> <p>Technical Library</p> <ul style="list-style-type: none"> On-Line Products Selection Guide Datasheet & Technical Reference Manual Software Library Application Notes FAQ <p>Development Tools and Study</p> <ul style="list-style-type: none"> Development Tools & File Download On-Line Training <p>Informational Notes</p> <ul style="list-style-type: none"> Events E-News M051 Series TRM New M051 Series BSP by CMSIS New NuMicro Keil uVision® IDE Driver New <p>NuMicro® Family</p> <p>M051 Base Line Up to 64KB Flash, 8KB RAM</p> <p>Up to 490 SDRAM</p> <p>NuMicro M051</p> <p>Cortex-M0</p> <p>UART</p> <p>NUC100 Advance Line</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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6.2 To Download NuMicro™ IAR EWARM driver

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|---|--|--------------------------------------|--|--------------------------------------|---|--|--------------|------------|---|--------------------------------------|--|--|-------------|-------------|---|--------------------------------------|--|--|--------------|-----------|-------------|---------|--|-------------------------------------|-------|---|---|-------|---|--|-------|------------------------------------|--------------------------------|-------|----------------------|-------------------------------|-------|---|-----------------------------------|------|
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| <p>Step 3</p> | <table border="1"> <tr> <td>Nu-LB</td> <td> <ul style="list-style-type: none"> Nu-LB </td> <td>NUC100 NUC120 NUC130 NUC140</td> <td> <ul style="list-style-type: none"> A Starter Kit made by Nuvoton Keil MDK-ARM (evaluation version) included Examples with source code included </td> <td></td> <td>Check Disty!</td> </tr> <tr> <td>Nu-IAR-SKT</td> <td> <ul style="list-style-type: none"> EVB w/M-Link USB Cable Setup CD </td> <td>NUC100 NUC120 NUC130 NUC140</td> <td> <ul style="list-style-type: none"> Starter Kit made by IAR IAR EWARM (evaluation version) Included IAR C/C++ Compiler included USB Plug & Play </td> <td></td> <td>Buy Online!</td> </tr> <tr> <td>Nu-Keil-SKT</td> <td> <ul style="list-style-type: none"> U-LINK-ME MCBNUC1XX USB Cable Setup CD </td> <td>NUC100 NUC120 NUC130 NUC140</td> <td> <ul style="list-style-type: none"> Starter Kit made by Keil Keil MDK-ARM (evaluation version) included ARM C/C++ Compiler included USB Plug & Play </td> <td></td> <td>Check Disty!</td> </tr> </table> <p>File Download</p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td> NUC1xx Quick Start Guide for Keil uVision4 V1.00.zip</td> <td>Quick start guide using Keil™ RVMDK</td> <td>V1.00</td> </tr> <tr> <td> NuMicro Keil uVision® IDE driver (Build 4033) V1.02.zip</td> <td>The Nuvoton NuMicro Keil uVision® Driver allows the Keil uVision® IDE to communicate with Nuvoton Nu-Link ICE bridge.</td> <td>V1.02</td> </tr> <tr> <td> NuMicro IAR Embedded Workbench® driver (Build 4033) V1.02.zip</td> <td>The Nuvoton NuMicro IAR Embedded Workbench® driver allows the IAR Embedded Workbench IDE above v5.41 to communicate with Nuvoton Nu-Link ICE bridge.</td> <td>V1.02</td> </tr> <tr> <td> NuMicro ICP (Build 4033) V1.02.zip</td> <td>NuMicro ICP tool & user manual</td> <td>V1.02</td> </tr> <tr> <td> NUC1xx ISP V1.08.zip</td> <td>NUC1xx ISP tool & user manual</td> <td>V1.08</td> </tr> <tr> <td> NIIC1xx Nu-EVB_001 Board Schematic v2.0.nff</td> <td>NUC1xx Nu-EVB_001 Board Schematic</td> <td>V2.0</td> </tr> </tbody> </table> <p>To download the file</p> | Nu-LB | <ul style="list-style-type: none"> Nu-LB | NUC100 NUC120 NUC130 NUC140 | <ul style="list-style-type: none"> A Starter Kit made by Nuvoton Keil MDK-ARM (evaluation version) included Examples with source code included | | Check Disty! | Nu-IAR-SKT | <ul style="list-style-type: none"> EVB w/M-Link USB Cable Setup CD | NUC100 NUC120 NUC130 NUC140 | <ul style="list-style-type: none"> Starter Kit made by IAR IAR EWARM (evaluation version) Included IAR C/C++ Compiler included USB Plug & Play | | Buy Online! | Nu-Keil-SKT | <ul style="list-style-type: none"> U-LINK-ME MCBNUC1XX USB Cable Setup CD | NUC100 NUC120 NUC130 NUC140 | <ul style="list-style-type: none"> Starter Kit made by Keil Keil MDK-ARM (evaluation version) included ARM C/C++ Compiler included USB Plug & Play | | Check Disty! | File name | Description | Version | NUC1xx Quick Start Guide for Keil uVision4 V1.00.zip | Quick start guide using Keil™ RVMDK | V1.00 | NuMicro Keil uVision® IDE driver (Build 4033) V1.02.zip | The Nuvoton NuMicro Keil uVision® Driver allows the Keil uVision® IDE to communicate with Nuvoton Nu-Link ICE bridge. | V1.02 | NuMicro IAR Embedded Workbench® driver (Build 4033) V1.02.zip | The Nuvoton NuMicro IAR Embedded Workbench® driver allows the IAR Embedded Workbench IDE above v5.41 to communicate with Nuvoton Nu-Link ICE bridge. | V1.02 | NuMicro ICP (Build 4033) V1.02.zip | NuMicro ICP tool & user manual | V1.02 | NUC1xx ISP V1.08.zip | NUC1xx ISP tool & user manual | V1.08 | NIIC1xx Nu-EVB_001 Board Schematic v2.0.nff | NUC1xx Nu-EVB_001 Board Schematic | V2.0 |
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| File name | Description | Version | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUC1xx Quick Start Guide for Keil uVision4 V1.00.zip | Quick start guide using Keil™ RVMDK | V1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NuMicro Keil uVision® IDE driver (Build 4033) V1.02.zip | The Nuvoton NuMicro Keil uVision® Driver allows the Keil uVision® IDE to communicate with Nuvoton Nu-Link ICE bridge. | V1.02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| NUC1xx ISP V1.08.zip | NUC1xx ISP tool & user manual | V1.08 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NIIC1xx Nu-EVB_001 Board Schematic v2.0.nff | NUC1xx Nu-EVB_001 Board Schematic | V2.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Step 4</p> | <p>To download the NuMicro™ IAR Embedded Workbench® driver</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

6.3 To Download NuMicro™ NUC100 series BSP Software Library

| | |
|---------------|--|
| Step1 | To visit the Nuvoton NuMicro™ Website: http://www.nuvoton.com/NuMicro |
| Step2 | <p>ARM Cortex™-M0 NuMicro® Family</p> <p>NuMicro® Family is Nuvoton's brand-new 32-bit Microcontroller product line based on the ARM® Cortex™-M0 processor with rich peripherals to offer superb features and connectivity capability. Besides the NUC100, NUC120, NUC130 and NUC140 series, a new series the NuMicro M051™ series, including the M052/54/58/516 is to satisfy the worldwide customers' 8-bit/16-bit microcontroller demand with a higher performance of a 32-bit microcontroller.</p> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid #ccc; padding: 5px; width: 30%;"> <p style="text-align: center; background-color: #f0f0f0;">Technical Library</p> <ul style="list-style-type: none"> ▪ On-Line Products Selection Guide ▪ <u>Datasheet & Technical Reference Manual</u> ▪ <u>Software Library</u> ▪ Application Notes ▪ FAQ </div> <div style="border: 1px solid #ccc; padding: 5px; width: 30%;"> <p style="text-align: center; background-color: #f0f0f0;">Development Tools and Study</p> <ul style="list-style-type: none"> ▪ Development Tools & File Download ▪ Starter Kit ▪ On-Line Training </div> <div style="border: 1px solid #ccc; padding: 5px; width: 30%;"> <p style="text-align: center; background-color: #f0f0f0;">Information Notes</p> <ul style="list-style-type: none"> ▪ Events ▪ E-News ▪ M051 Series TRM New ▪ M051 Series BSP by CMSIS New ▪ NuMicro Keil uVision® IDE Driver New </div> </div> <div style="text-align: center; margin-top: 20px;"> <p style="font-size: 1.2em; font-weight: bold; color: red;">NuMicro® Family</p> <div style="display: flex; justify-content: space-around; align-items: center; border: 1px dashed #ccc; padding: 10px;"> <div style="text-align: center;"> <p style="font-size: 0.8em;">M051 Base Line</p> <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="background-color: #c00; color: white; padding: 2px 5px; font-size: 0.7em;">Up to 64KB Flash ROM</div> <div style="background-color: #c00; color: white; padding: 2px 5px; font-size: 0.7em;">Up to 4KB SRAM</div> </div> <p style="font-weight: bold; color: white; font-size: 1.1em;">• NuMicro M051 •</p> </div> <div style="text-align: center;"> <div style="background-color: #008000; color: white; padding: 5px; border-radius: 5px; font-weight: bold; font-size: 1.1em;">Cortex-M0</div> <div style="background-color: #008000; color: white; padding: 2px 5px; font-size: 0.7em;">UART</div> </div> </div> <p style="font-size: 0.8em; margin-top: 5px;">NUC100 Advance Line</p> </div> |
| Step 3 | To download the NuMicro™ NUC100 series software library |

7 Revision History

| Version | Date | Page | Description |
|---------|---------------|------|-----------------|
| 1.0 | Aug. 20, 2010 | -- | Initial Release |

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Nuvoton products are not designed, intended, authorized or warranted for use as components in systems or equipment intended for surgical implantation, atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, or for other applications intended to support or sustain life. Further more, Nuvoton products are not intended for applications wherein failure of Nuvoton products could result or lead to a situation wherein personal injury, death or severe property or environmental damage could occur.

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