



ARM Cortex™-M0

32-BIT MICROCONTROLLER

NuTiny-SDK-NUC240 User Manual **For NuMicro™ NUC240 Series**

The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.

Nuvoton is providing this document only for reference purposes of NuMicro™ microcontroller based system design. Nuvoton assumes no responsibility for errors or omissions.

All data and specifications are subject to change without notice.

For additional information or questions, please contact: Nuvoton Technology Corporation.

1	Overview.....	3
2	NuTiny-SDK-NUC240 Introduction	3
2.1	NuTiny -SDK-NUC240 Jumper Description	4
2.2	Pin Assignment for Extended Connector	5
2.3	NuTiny-SDK-NUC240 PCB Placement	6
3	How to Start NuTiny -SDK-NUC240 on the Keil μ Vision [®] IDE.....	7
3.1	Keil uVision [®] IDE Software Download and Install	7
3.2	Nuvoton Nu-Link Driver Download and Install	7
3.3	Hardware Setup	7
3.4	Smpl_NuTiny-NUC240 Example Program	8
4	How to Start NuTiny-SDK-NUC240 on the IAR Embedded Workbench	9
4.1	IAR Embedded Workbench Software Download and Install.....	9
4.2	Nuvoton Nu-Link Driver Download and Install	9
4.3	Hardware Setup	9
4.4	Smpl_NuTiny-NUC240 Example Program	10
5	NuTiny-EVB-NUC240 Schematic	11
6	Download NuMicro [™] Family Related Files from Nuvoton Company	13
6.1	Download NuMicro [™] Keil μ Vision [®] IDE Driver.....	13
6.2	Download NuMicro [™] IAR EWARM Driver.....	15
6.3	Download NuMicro [™] NUC100 Series BSP Software Library.....	17
7	Revision History.....	18

1 Overview

NuTiny-SDK-NUC240 is the specific development tool for NuMicro NUC240 series. Users can use NuTiny-SDK-NUC240 to develop and verify the application program easily.

NuTiny-SDK-NUC240 includes two portions. One is NuTiny-EVB-NUC240 and the other is Nu-Link-Me. NuTiny-EVB-NUC240 is the evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, users do not need other additional ICE or debug equipments.

2 NuTiny-SDK-NUC240 Introduction

NuTiny-SDK-NUC240 uses the NUC240VE3AE as the target microcontroller. Figure 2-1 is NuTiny-SDK-NUC240 for NUC240 series, the left portion is called NuTiny-EVB-NUC240 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-NUC240 is similar to other development boards. Users can use it to develop and verify applications to emulate the real behavior. The on board chip covers NUC240 series features. The NuTiny-EVB-NUC240 can be a real system controller to design users' target systems.

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 two documents will be stored in the local hard disk when the user installs each driver.

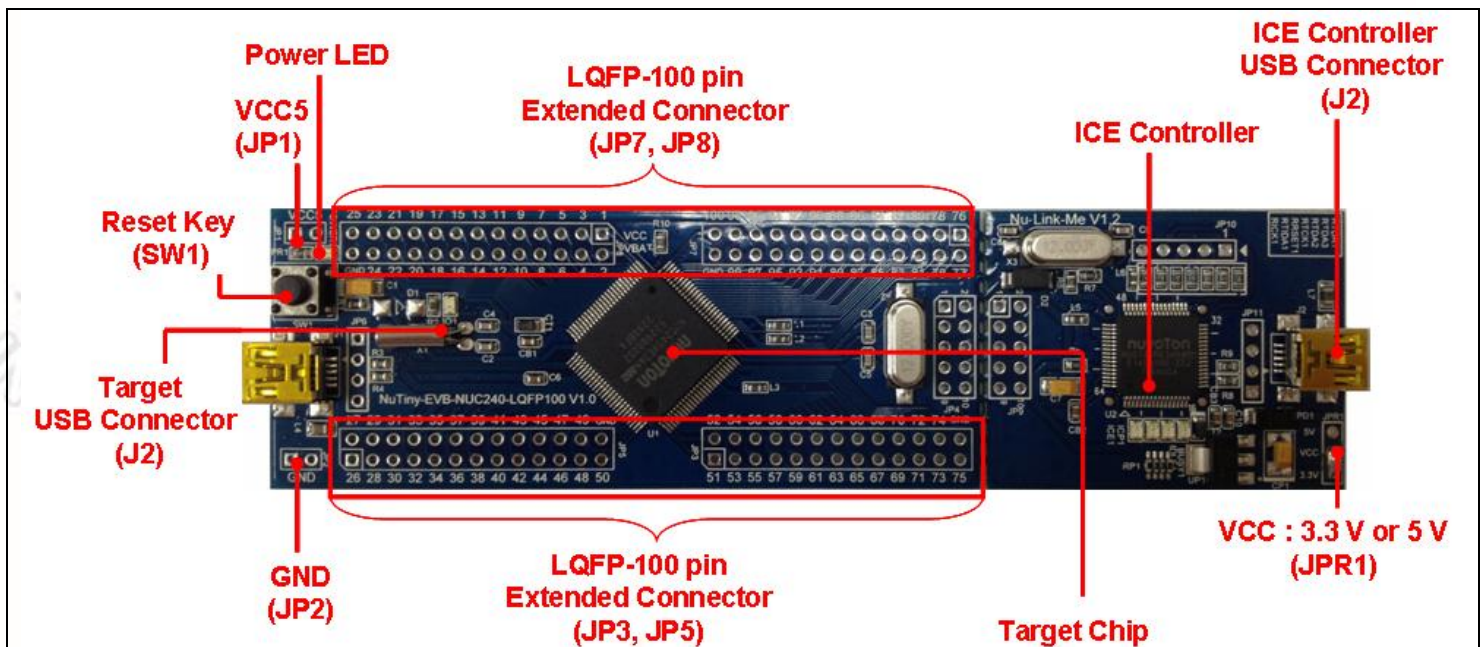


Figure 2-1 NuTiny-SDK-NUC240 (Blue PCB Board)

2.1 NuTiny -SDK-NUC240 Jumper Description

2.1.1 Power Setting

- J1: USB port in NuTiny-EVB-NUC240
- JP1: VCC5 Voltage connector in NuTiny-EVB-NUC240
- J2: USB port in Nu-Link-Me
- JPR1: Select 5V or 3V for system power

POWER model	J1 USB port	J2 USB port	JP2 VCC5	MCU Voltage
Model 1	Connect to PC	X	DC 5V output	DC 5V
Model 2	X	Connect to PC	DC 5V output	DC 5V
Model 3	X	X	DC 2.8-5.5V input	Voltage by VCC input

X: Unused.

2.1.2 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NUC240) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- JP9: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (for example NuTiny-EVB-NUC240)

2.1.3 USB Connector

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

2.1.4 Extended Connector

- JP3, JP5, JP7 and JP8: Show all chip pins in NuTiny-EVB-NUC240

2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-NUC240

2.1.6 Power Connector

- JP1: VCC connector in NuTiny-EVB-NUC240
- JP2: GND connector in NuTiny-EVB-NUC240

2.2 Pin Assignment for Extended Connector

NuTiny-EVB-NUC240 provides NUC240VE3AE on board and the extended connector for LQFP-100 pin. Table 2-1 is the pin assignment for NUC240VE3AE.

Pin No	Pin Name	Pin No	Pin Name	Pin No	Pin Name	Pin No	Pin Name
01	PE15	26	PE8	51	PE4	76	PA5
02	PE14	27	PE7	52	PE3	77	PA6
03	PE13	28	VBUS	53	PE2	78	PA7
04	PB14	29	VDD33	54	PE1	79	Vref
05	PB13	30	D-	55	PE0	80	AVDD
06	VBAT	31	D+	56	PC13	81	PD0
07	X32O	32	PB0	57	PC12	82	PD1
08	X32I	33	PB1	58	PC11	83	PD2
09	PA11	34	PB2	59	PC10	84	PD3
10	PA10	35	PB3	60	PC9	85	PD4
11	PA9	36	PD6	61	PC8	86	PD5
12	PA8	37	PD7	62	PA15	87	PC7
13	PD8	38	PD14	63	PA14	88	PC6
14	PD9	39	PD15	64	PA13	89	PC15
15	PD10	40	PC5	65	PA12	90	PC14
16	PD11	41	PC4	66	ICE_DAT	91	PB15
17	PD12	42	PC3	67	ICE_CK	92	XT1_Out
18	PD13	43	PC2	68	VDD	93	XT1_In
19	PB4	44	PC1	69	VSS	94	/RESET
20	PB5	45	PC0	70	AVSS	95	VSS
21	PB6	46	PE6	71	PA0	96	VDD
22	PB7	47	PE5	72	PA1	97	PS2DAT
23	LDO	48	PB11	73	PA2	98	PS2CLK
24	VDD	49	PB10	74	PA3	99	PVSS
25	VSS	50	PB9	75	PA4	100	PB8

Table 2-1 Pin Assignment for NUC 240 Series

2.3 NuTiny-SDK-NUC240 PCB Placement

Users can refer to Figure 2-2 for the NuTiny-SDK-NUC240 PCB placements.

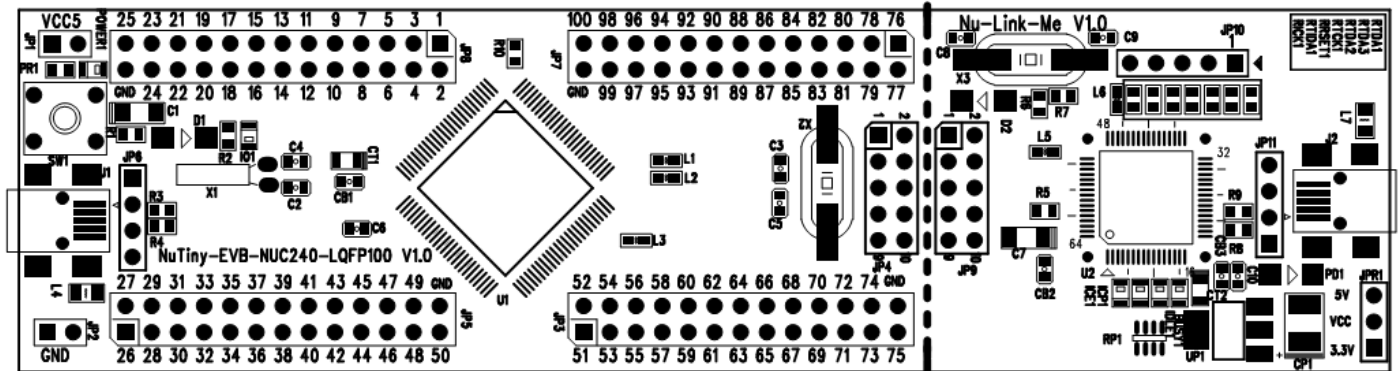


Figure 2-2 NuTiny-SDK-NUC240 PCB Placement

3 How to Start NuTiny -SDK-NUC240 on the Keil μ Vision[®] IDE

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

Please visit the Nuvoton company NuMicro[™] website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro[™] Keil μ Vision[®] IDE driver” file. Please refer to Chapter 6.1 for the detail download flow. When the Nu-Link driver has been well downloaded, 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-NUC240 Hardware Setup

3.4 Smp1_NuTiny-NUC240 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-NUC240 board. It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro™ website following on Chapter 6.3.

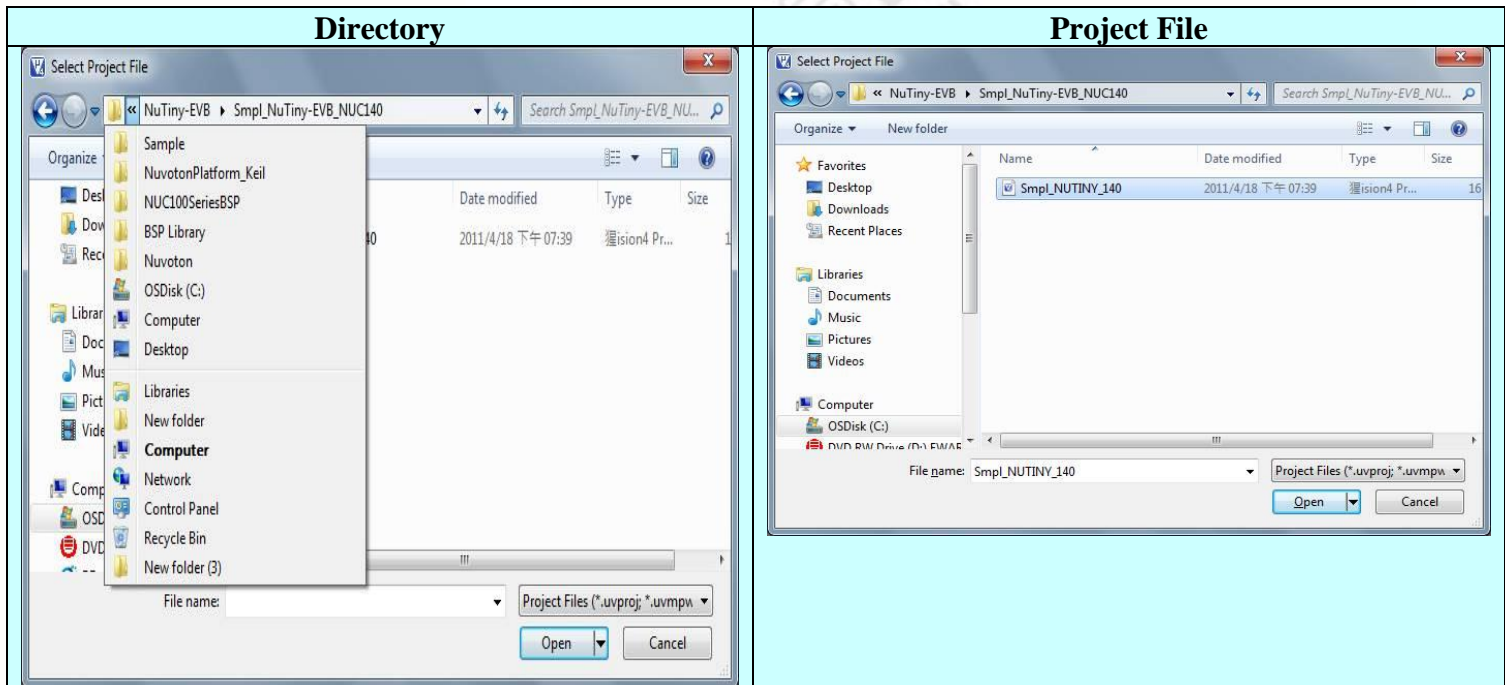










Figure 3-2 Smp1_NuTiny_240 Example Directory

To use this example:

The PA.10 LED will toggle on the NuTiny-EVB-NUC240 board.

-  **Start µVision®**
- **Project-Open**
Open the Smp1_NuTiny_240.uvproj project file
-  **Project - Build**
Compile and link the Smp1_NuTiny-NUC240 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
 - ◆  Reset the device
 - ◆  Run the application

4 How to Start NuTiny-SDK-NUC240 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 the Nuvoton Company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro™ IAR ICE driver user manual” file. Please refer to Chapter 6.2 for the detail download flow. When the Nu-Link driver has been well downloaded, 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

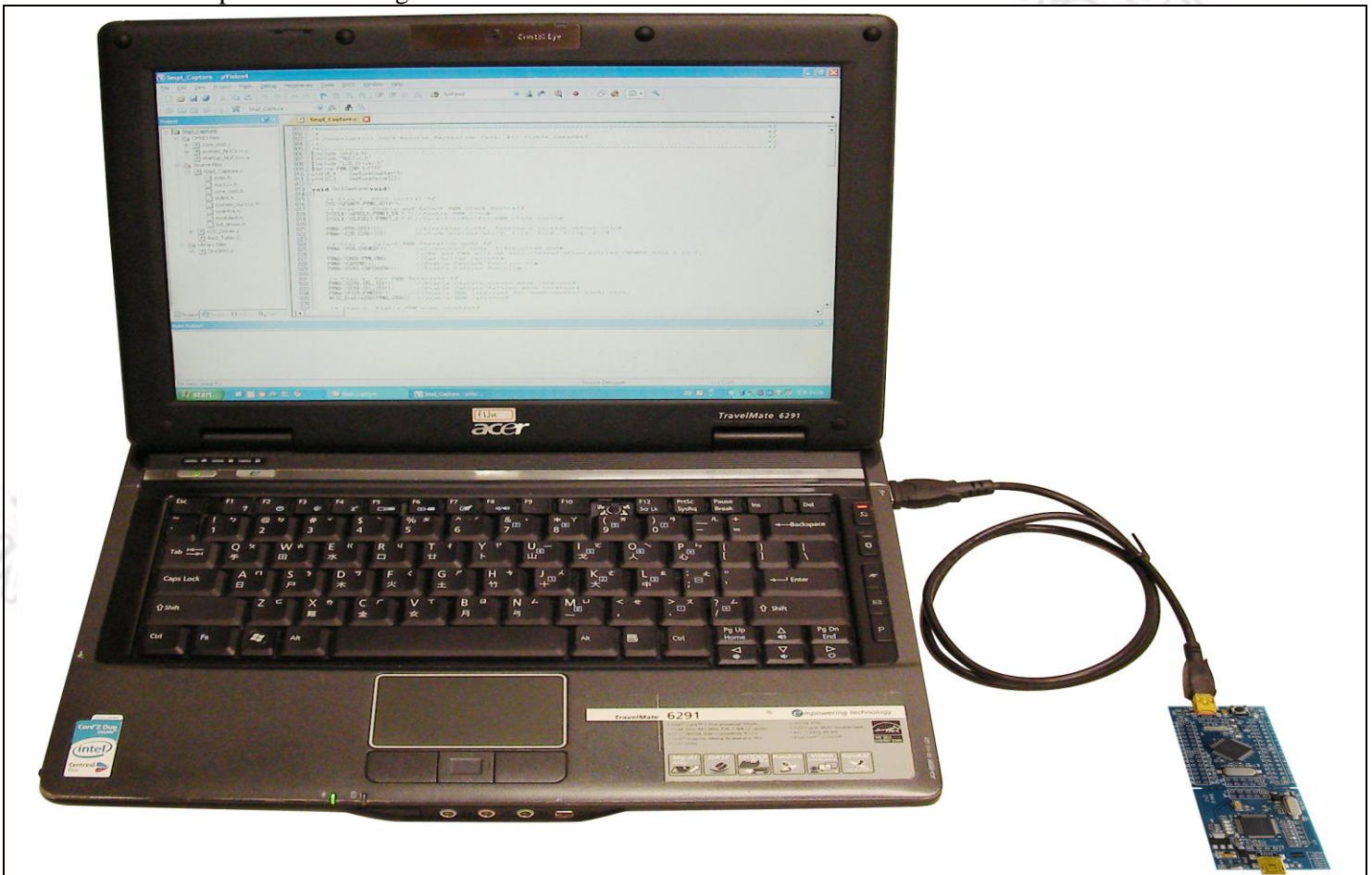


Figure 4-1 NuTiny- SDK-NUC240-100 Hardware Setup

4.4 Smpl_NuTiny-NUC240 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-NUC240 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro™ website following on Chapter 6.3.

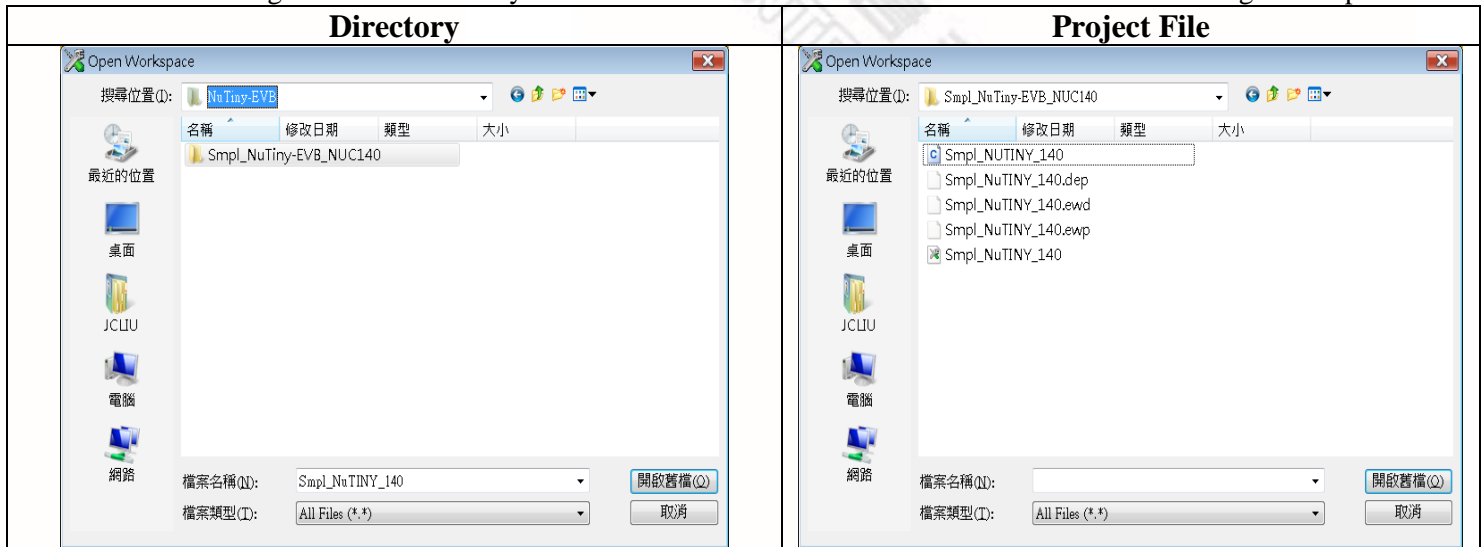



Figure 4-2 Smpl_NuTiny-NUC240 Example Directory


To use this example:




The PA.10 LED will toggle on the NuTiny-EVB-NUC240 board.

-  **Start IAR Embedded Workbench**

- **File-Open-Workspace**
Open the Smpl_NuTiny_240.eww workspace file

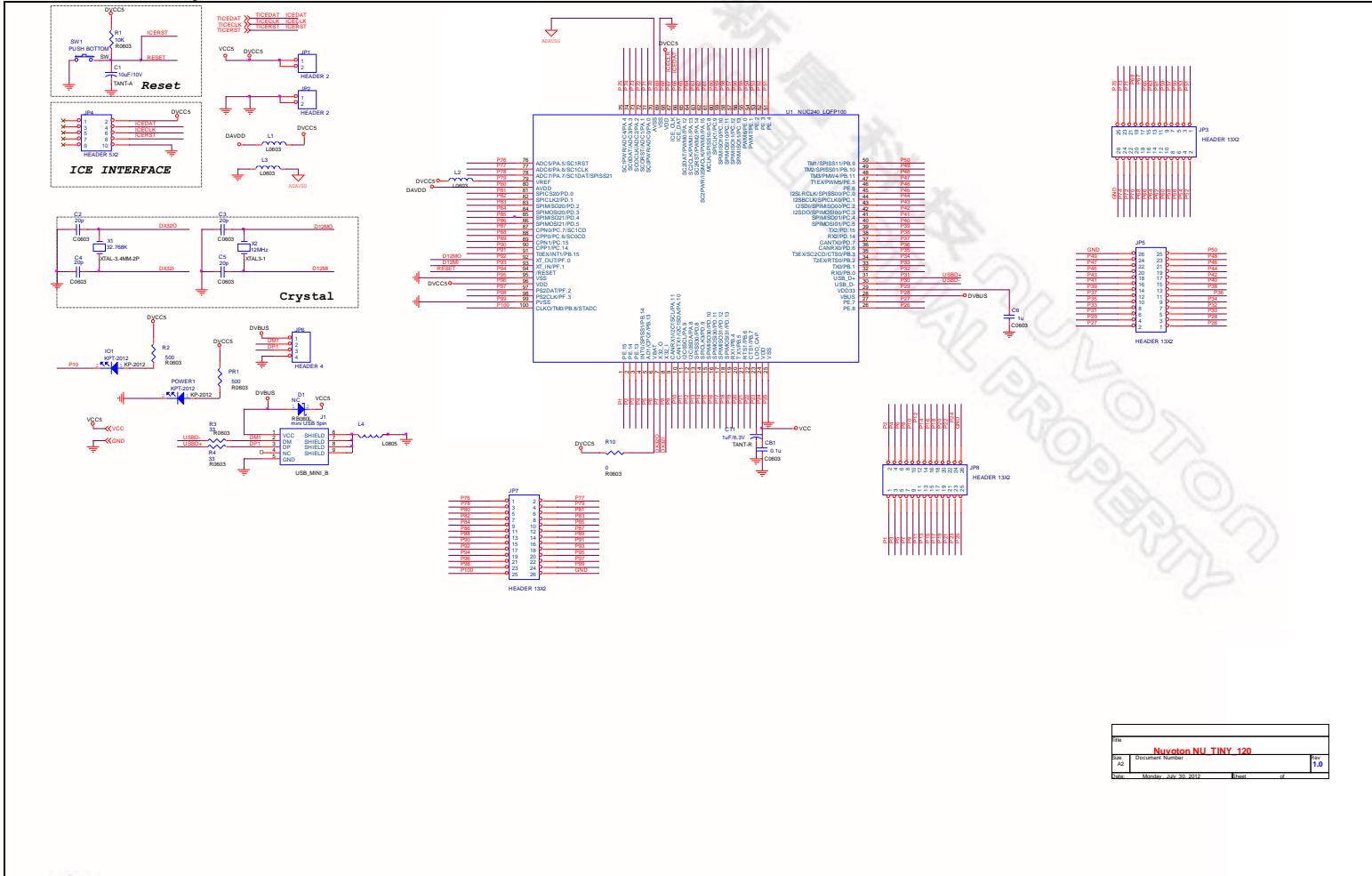
-  **Project - Make**
Compile and link the Smpl_NuTiny-240 application

-  **Project – Download and Debug**
Program the application code into on-chip Flash ROM.

- ◆  Single step through code
- ◆  Reset the device
- ◆  Run the application

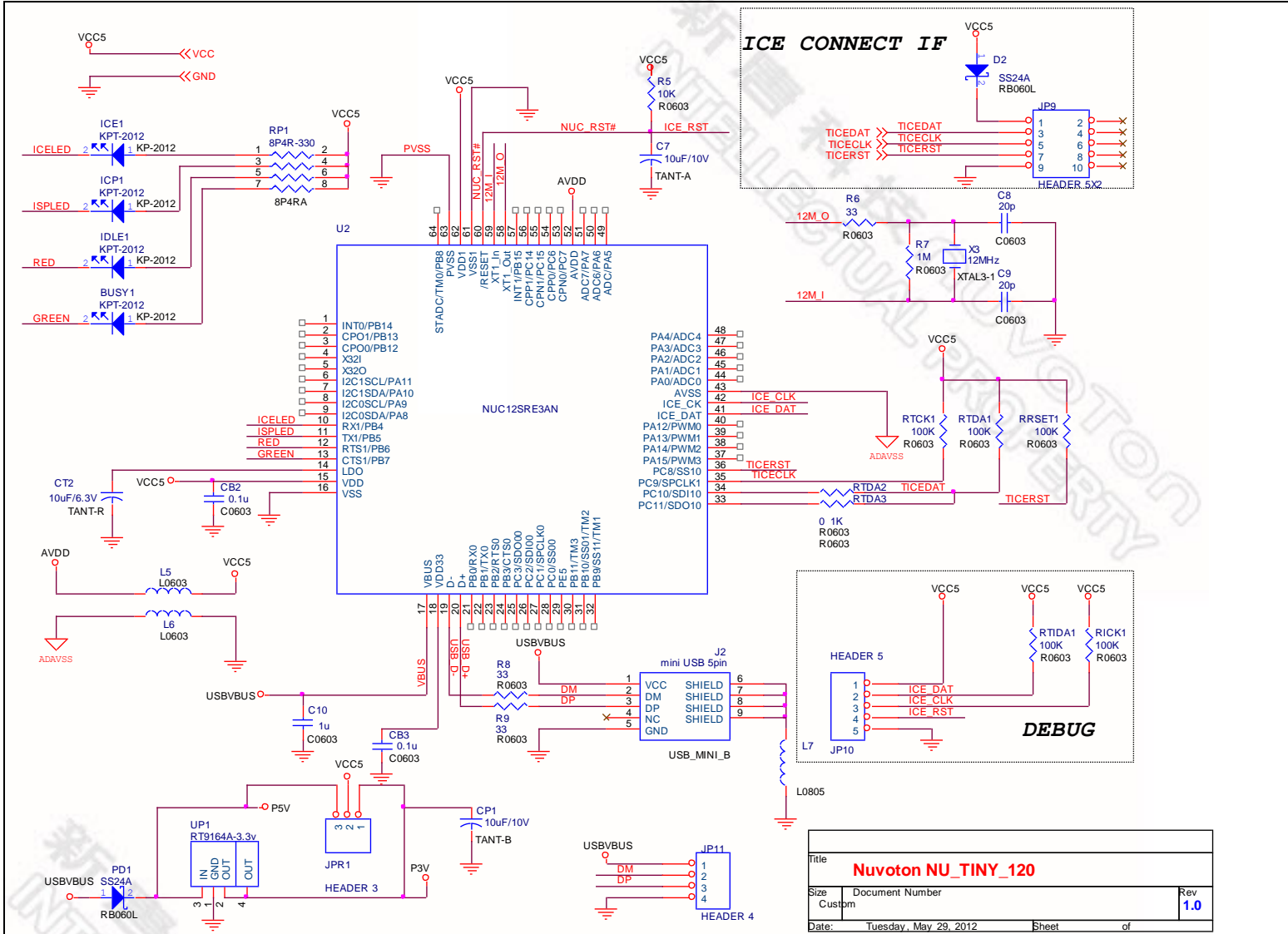


5 NuTiny-EVB-NUC240 Schematic



Rev	NuvoTon NU TINY 120		Rev
Rev A2	Document Number		1.0
Date	Monday, Jul 30, 2012	Rev	

新唐科技 NUVOTON
INTELLECTUAL PROPERTY



Title			Nuvoton NU_TINY_120		
Size	Document Number		Rev	1.0	
Custom					
Date:	Tuesday, May 29, 2012	Sheet		of	

6 Download NuMicro™ Family Related Files from Nuvoton Company

6.1 Download NuMicro™ Keil μVision® IDE Driver

<p>Step1</p>	<p>Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro</p>
<p>Step2</p>	<p>The screenshot shows the Nuvoton website for the ARM Cortex™-M0 NuMicro® Family. The 'Development Resources' section is highlighted with a red dashed box around the 'Device Driver and Software Library' link. A yellow callout bubble with a red arrow points to this link, containing the text: 'Click here to enter Device Driver and Software Library'.</p>

新唐科技 NUVOTON
INTELLECTUAL PROPERTY

Step 3	<table border="1"> <tr> <td> M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC100 Series Driver Reference Guide </td> <td>M051 series software package based on register programming coding rule for sample code & user guide.</td> <td>V1.00.001 V1.03.001</td> </tr> <tr> <td> NUC100 Series BSP_CMSIS_v1.03.002.zip NUC100 Series Driver Reference Guide (Simplified Chinese) </td> <td>NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learning Board are included. For detailed, please download it and unzip it.</td> <td>V1.03.002 V1.03.001</td> </tr> </table>	M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC100 Series Driver Reference Guide	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001	NUC100 Series BSP_CMSIS_v1.03.002.zip NUC100 Series Driver Reference Guide (Simplified Chinese)	NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learning Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001														
	M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC100 Series Driver Reference Guide	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001																		
NUC100 Series BSP_CMSIS_v1.03.002.zip NUC100 Series Driver Reference Guide (Simplified Chinese)	NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learning Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001																			
<p><u>Programmer Software Tools Package</u></p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td> ICP Programming Tool (Build 4228) V1.03.zip</td> <td>NuMicro ICP tool & user manual</td> <td>V1.03</td> </tr> <tr> <td> ISP Programming Tool.zip</td> <td>NuMicro ISP Programming Tool & user manual</td> <td>V1.40</td> </tr> <tr> <td> NuGang Programmer V5.31.zip</td> <td>NuGang Programmer software & user manual</td> <td>V5.31</td> </tr> </tbody> </table> <p><u>Nu-Link Driver</u></p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td> Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip</td> <td>This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.</td> <td>V1.03</td> </tr> <tr> <td> Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip</td> <td>This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.</td> <td>V1.03</td> </tr> </tbody> </table> <p>Contact us: NuMicro@nuvoton.com</p> <div style="text-align: center;"> <p>To download the file.</p> </div>	File name	Description	Version	ICP Programming Tool (Build 4228) V1.03.zip	NuMicro ICP tool & user manual	V1.03	ISP Programming Tool.zip	NuMicro ISP Programming Tool & user manual	V1.40	NuGang Programmer V5.31.zip	NuGang Programmer software & user manual	V5.31	File name	Description	Version	Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.	V1.03	Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.	V1.03
File name	Description	Version																			
ICP Programming Tool (Build 4228) V1.03.zip	NuMicro ICP tool & user manual	V1.03																			
ISP Programming Tool.zip	NuMicro ISP Programming Tool & user manual	V1.40																			
NuGang Programmer V5.31.zip	NuGang Programmer software & user manual	V5.31																			
File name	Description	Version																			
Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.	V1.03																			
Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.	V1.03																			
Step 4	Download the NuMicro Keil μ Vision [®] IDE driver																				

智創科技 NUVOTON
 INTELLECTUAL PROPERTY

6.2 Download NuMicro™ IAR EWARM Driver

Step1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step2	<p>The screenshot shows the Nuvoton NuMicro website. The navigation bar includes 'About Nuvoton', 'Products & Sales', 'News & Events', 'Investor', 'Human Resources', 'Member Area', and 'Download Service'. The main content area is titled 'ARM Cortex™-M0 NuMicro® Family' and features a '32-bit ARM® Cortex™-M0 MCU' image. Below this, there are four columns of links: 'Products', 'Development Resources', 'Technical Support', and 'News and Events'. A red dashed box highlights the 'Device Driver and Software Library' link under 'Development Resources'. A yellow callout bubble with a red arrow points to this link, containing the text: 'Click here to enter Device Driver and Software Library'.</p>

新唐科技 NUVOTON
INTELLECTUAL PROPERTY

Step 3	<table border="1"> <tr> <td> M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC 100 Series Driver Reference Guide </td> <td>M051 series software package based on register programming coding rule for sample code & user guide.</td> <td>V1.00.001 V1.03.001</td> </tr> <tr> <td> NUC 100 Series BSP_CMSIS_v1.03.002.zip NUC 100 Series Driver Reference Guide (Simplified Chinese) </td> <td>NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learning Board are included. For detailed, please download it and unzip it.</td> <td>V1.03.002 V1.03.001</td> </tr> </table>	M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC 100 Series Driver Reference Guide	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001	NUC 100 Series BSP_CMSIS_v1.03.002.zip NUC 100 Series Driver Reference Guide (Simplified Chinese)	NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learning Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001														
	M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC 100 Series Driver Reference Guide	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001																		
NUC 100 Series BSP_CMSIS_v1.03.002.zip NUC 100 Series Driver Reference Guide (Simplified Chinese)	NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learning Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001																			
<p>Programmer Software Tools Package</p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td> ICP Programming Tool (Build 4228) V1.03.zip</td> <td>NuMicro ICP tool & user manual</td> <td>V1.03</td> </tr> <tr> <td> ISP Programming Tool.zip</td> <td>NuMicro ISP Programming Tool & user manual</td> <td>V1.40</td> </tr> <tr> <td> NuGang Programmer V5.31.zip</td> <td>NuGang Programmer software & user manual</td> <td>V5.31</td> </tr> </tbody> </table> <p>Nu-Link Driver</p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td> Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip</td> <td>This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.</td> <td>V1.03</td> </tr> <tr style="border: 2px dashed red;"> <td> Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip</td> <td>This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.</td> <td>V1.03</td> </tr> </tbody> </table> <p>Contact us: NuMicro@nuvoton.com</p> <div style="text-align: center; margin-top: 20px;"> </div>	File name	Description	Version	ICP Programming Tool (Build 4228) V1.03.zip	NuMicro ICP tool & user manual	V1.03	ISP Programming Tool.zip	NuMicro ISP Programming Tool & user manual	V1.40	NuGang Programmer V5.31.zip	NuGang Programmer software & user manual	V5.31	File name	Description	Version	Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.	V1.03	Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.	V1.03
File name	Description	Version																			
ICP Programming Tool (Build 4228) V1.03.zip	NuMicro ICP tool & user manual	V1.03																			
ISP Programming Tool.zip	NuMicro ISP Programming Tool & user manual	V1.40																			
NuGang Programmer V5.31.zip	NuGang Programmer software & user manual	V5.31																			
File name	Description	Version																			
Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.	V1.03																			
Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.	V1.03																			
Step 4	Download the NuMicro™ IAR Embedded Workbench® driver																				

新 華 科 技 NUVOTON
 INTELLECTUAL PROPERTY

6.3 Download NuMicro™ NUC100 Series BSP Software Library

Step1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step2	<p>The screenshot shows the NuMicro Family product page. Under the 'Development Resources' section, the 'Device Driver and Software Library' link is highlighted with a red dashed box. A yellow callout bubble with a red arrow points to this link, containing the text: "Click here to enter Device Driver and Software Library".</p>
Step 3	Download the NuMicro™ NUC200 series software library

新唐科技 NUVOTON
INTELLECTUAL PROPERTY

7 Revision History

Version	Date	Page	Description
1.0	Sep. 14, 2013	--	Initial Release

Important Notice

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.

Nuvoton customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Nuvoton for any damages resulting from such improper use or sales.

Please note that all data and specifications are subject to change without notice. All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.