ARM Cortex™-M0

32-BIT MICROCONTROLLER

NuTiny-SDK-NUC140 User Manual

For NuMicro™ NUC140 Series

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1 Overview 3

2 NuTiny-SDK-NUC140 Introduction 3

2.1 NuTiny -SDK-NUC140 Jumper Description 4
2.2 Pin Assignment for Extended Connector 5
2.3 NuTiny-SDK-NUC140 PCB Placement 6

3 How to Start NuTiny -SDK-NUC140 on the Keil µVision® 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-NUC140 Example Program 8

4 How to Start NuTiny-SDK-NUC140 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-NUC140 Example Program 10

5 NuTiny-EVB-NUC140 Schematic 11

6 Download NuMicro™ Family Related Files from Nuvoton Company 13

6.1 Download NuMicro™ Keil µVision® IDE Driver 13
6.2 Download NuMicro™ IAR EWARM Driver 15
6.3 Download NuMicro™ NUC100 Series BSP Software Library 17

7 Revision History 19

1 Overview

NuTiny-SDK-NUC140 is the specific development tool for NuMicro NUC140 series. Users can use NuTiny-SDK-NUC140 to develop and verify the application program easily.
NuTiny-SDK-NUC140 includes two portions. One is NuTiny-EVB-NUC140 and the other is Nu-Link-Me. NuTiny-EVB-NUC140 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-NUC140 Introduction

NuTiny-SDK-NUC140 uses the NUC140VE3AN as the target microcontroller. Figure 2-1 is NuTiny-SDK-NUC140 for NUC140 series, the left portion is called NuTiny-EVB-NUC140 and the right portion is Debug Adaptor called Nu-Link-Me.
NuTiny-EVB-NUC140 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 NUC140 series features. The NuTiny-EVB-NUC140 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.

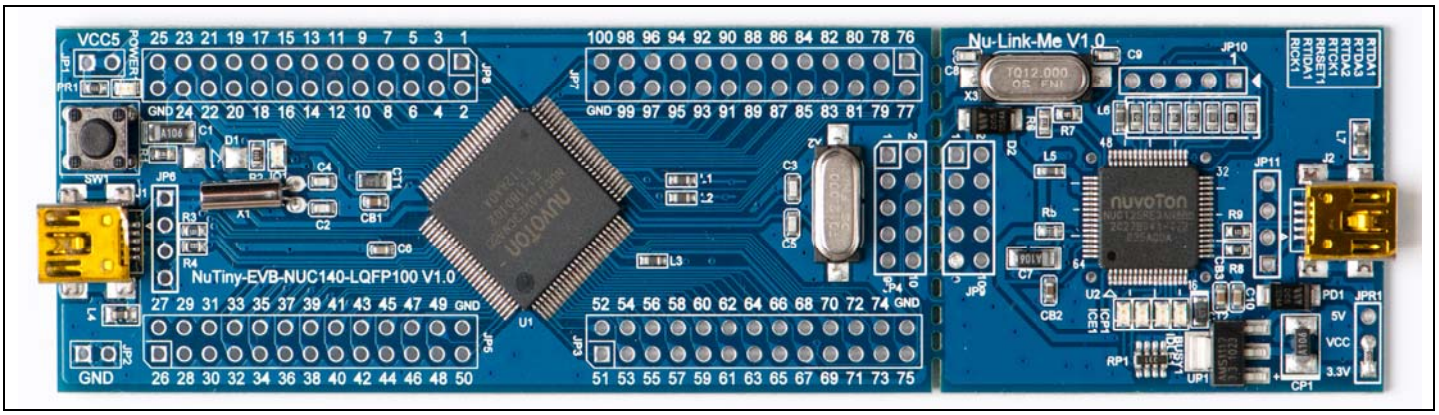

Figure 2-1 NuTiny-SDK-NUC140 (Blue PCB Board)

2.1 NuTiny -SDK-NUC140 Jumper Description

2.1.1 Power Setting

- J1: USB port in NuTiny-EVB-NUC140
- JP1: VCC5 Voltage connecter in NuTiny-EVB-NUC140
- 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-NUC140) 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-NUC140)

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

- JP3, JP5, JP7 and JP8: Show all chip pins in NuTiny-EVB-NUC140

2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-NUC140

2.1.6 Power Connector

- JP1: VCC connector in NuTiny-EVB-NUC140
- JP2: GND connector in NuTiny-EVB-NUC140

2.2 Pin Assignment for Extended Connector

NuTiny-EVB-NUC140 provides NUC140VE3AN on board and the extended connector for LQFP-100 pin. Table 2-1 is the pin assignment for NUC140VE3AN.

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	PB12	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	PD14	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 140 Series

2.3 NuTiny-SDK-NUC140 PCB Placement

Users can refer to Figure 2-2 for the NuTiny-SDK-NUC140 PCB placements.

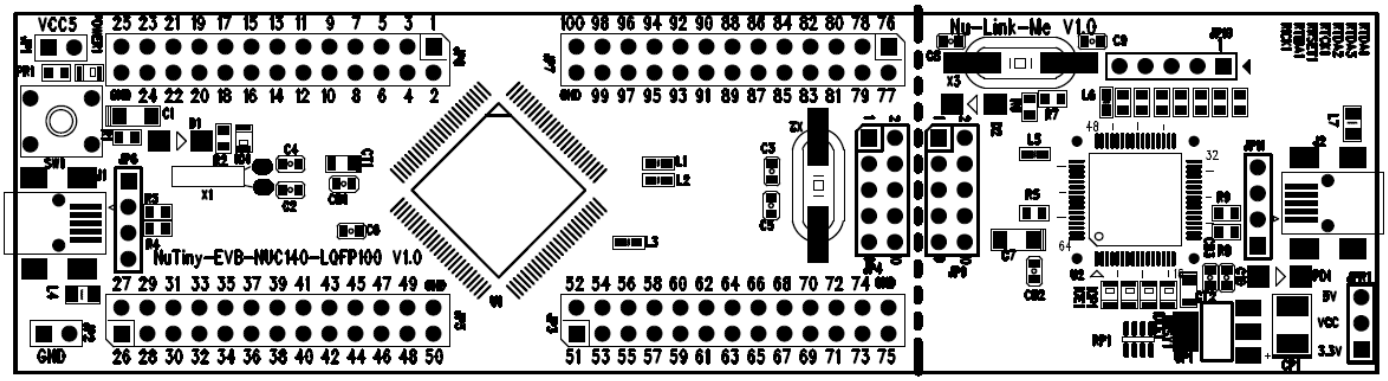

Figure 2-2 NuTiny-SDK-NUC140 PCB Placement

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3 How to Start NuTiny -SDK-NUC140 on the Keil µVision® IDE

3.1 Keil uVision® IDE Software Download and Install

Please visit the Keil company website (http://www.keil.com) to download the Keil µVision® 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 µVision® 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

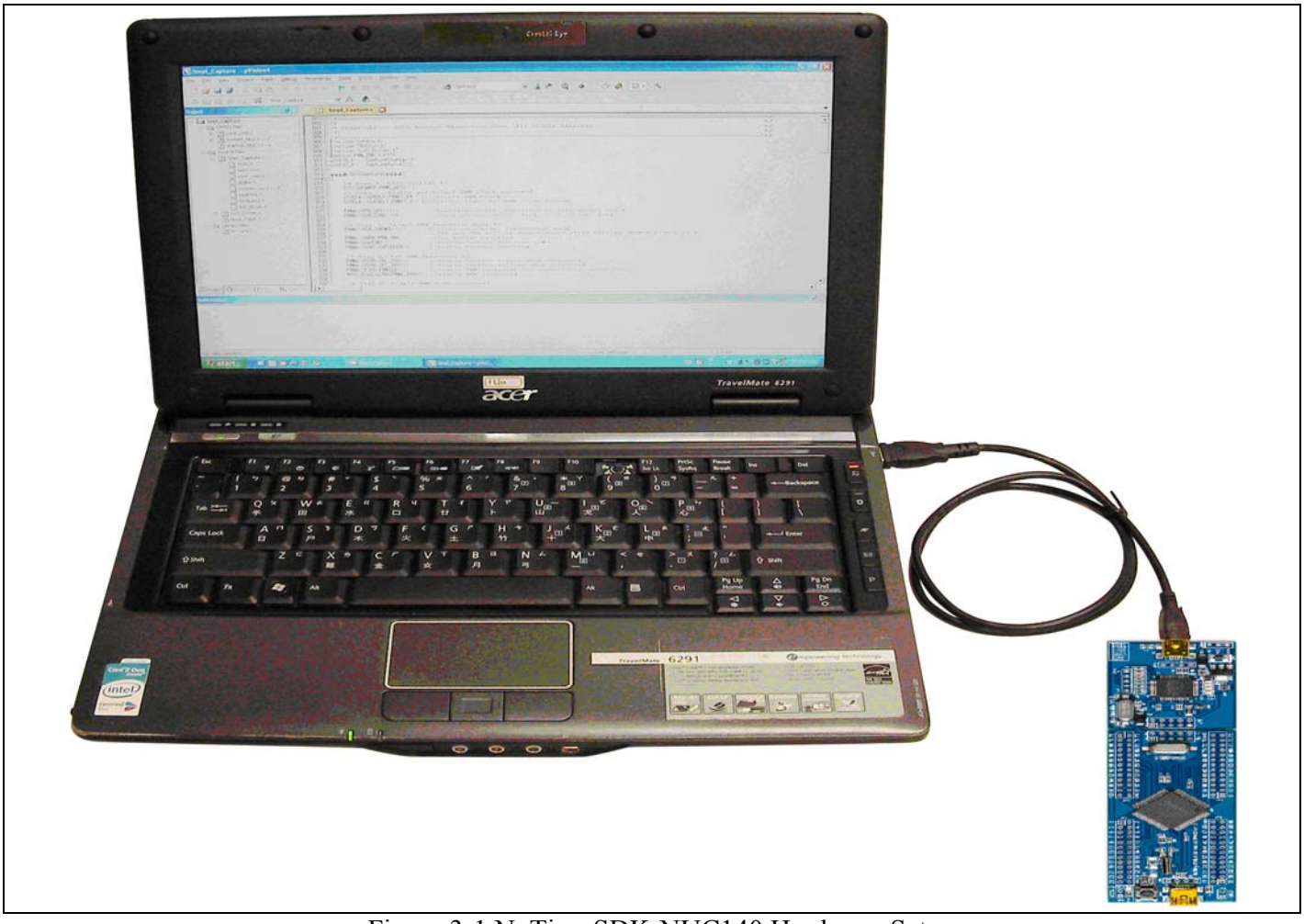


Figure 3-1 NuTiny-SDK-NUC140 Hardware Setup

3.4 Smpl_NuTiny-NUC140 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-NUC140 board.
It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro™ website following on Chapter 6.3.

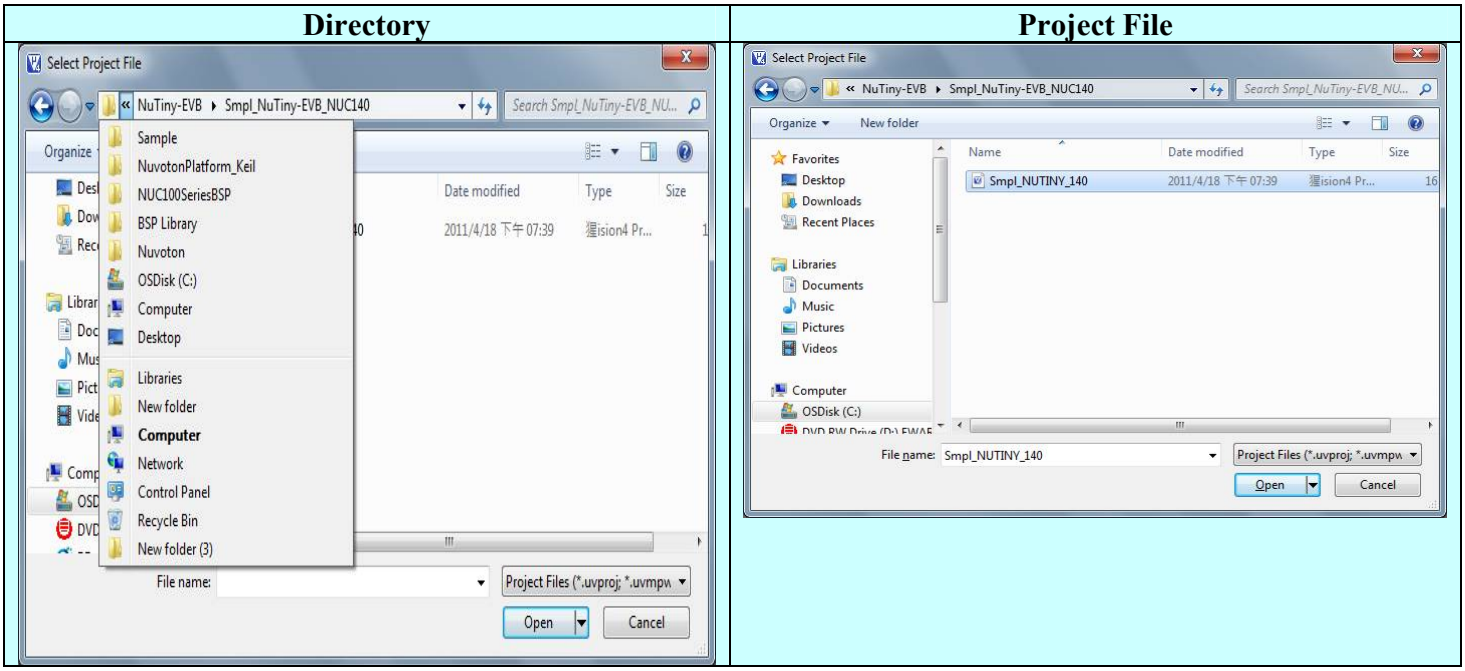


Figure 3-2 Smpl_NuTiny_140 Example Directory

To use this example:
The PA.11 LED will toggle on the NuTiny-EVB-NUC140 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
  - Reset the device
  - Run the application

4 How to Start NuTiny-SDK-NUC140 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

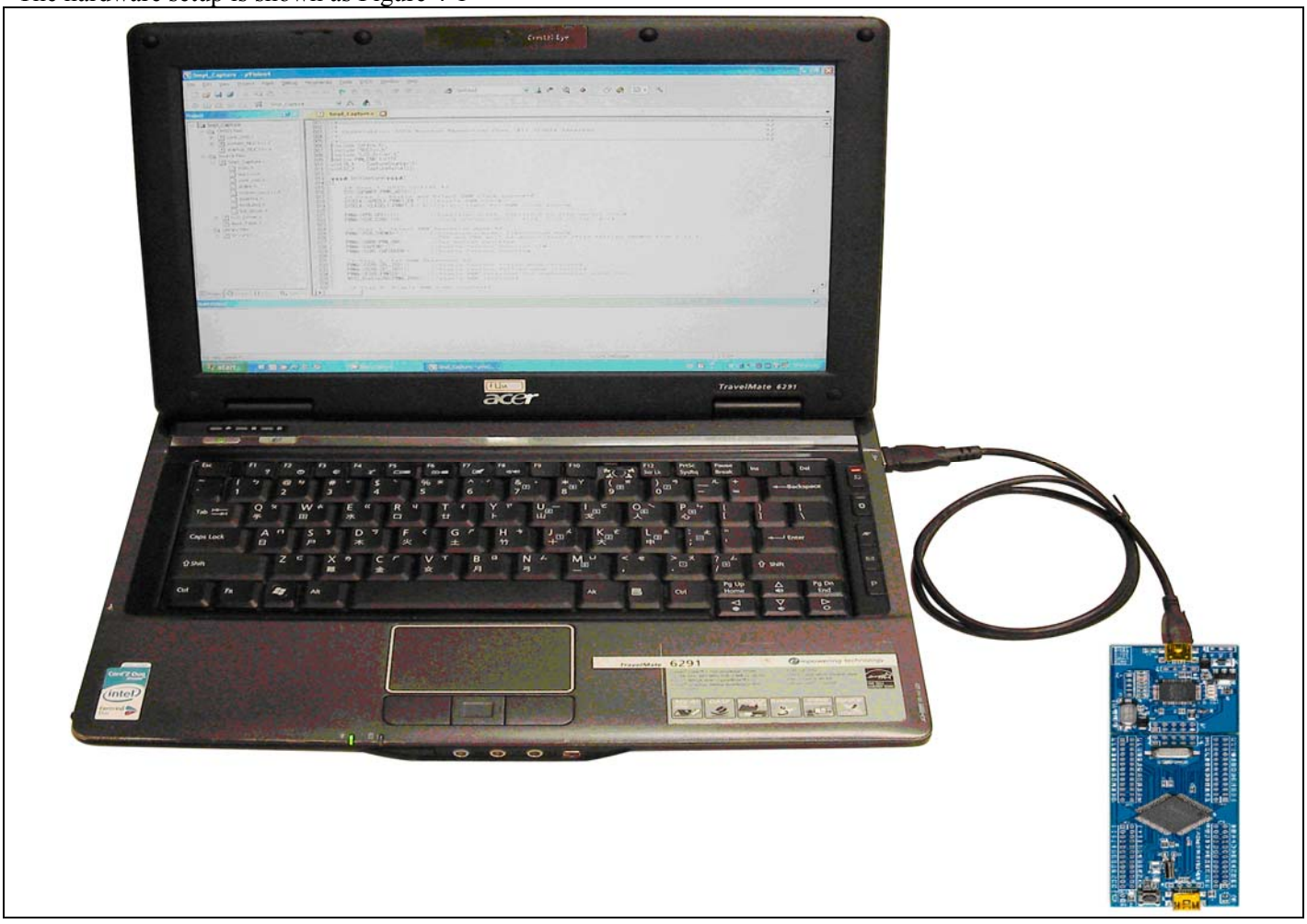


Figure 4-1 NuTiny- SDK-NUC140-100 Hardware Setup

4.4 Smpl_NuTiny-NUC140 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-NUC140 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro™ website following on Chapter 6.3.

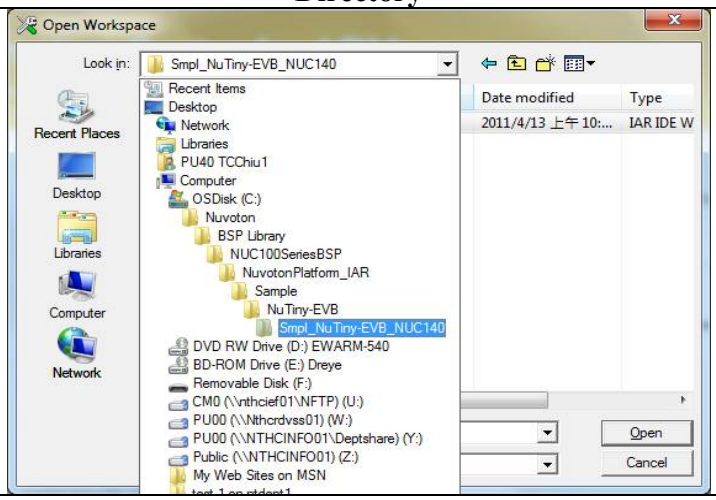
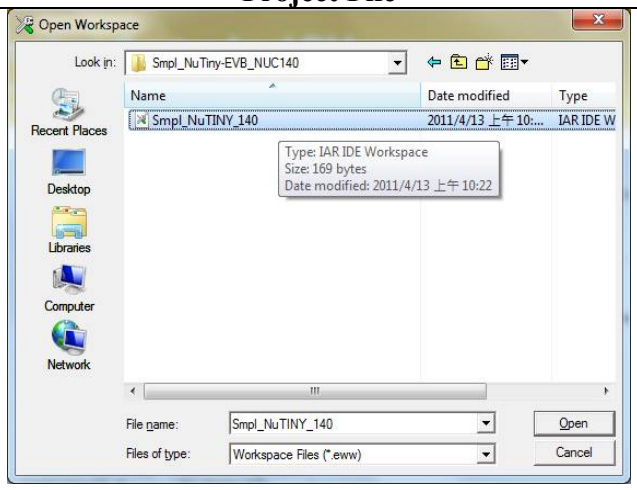
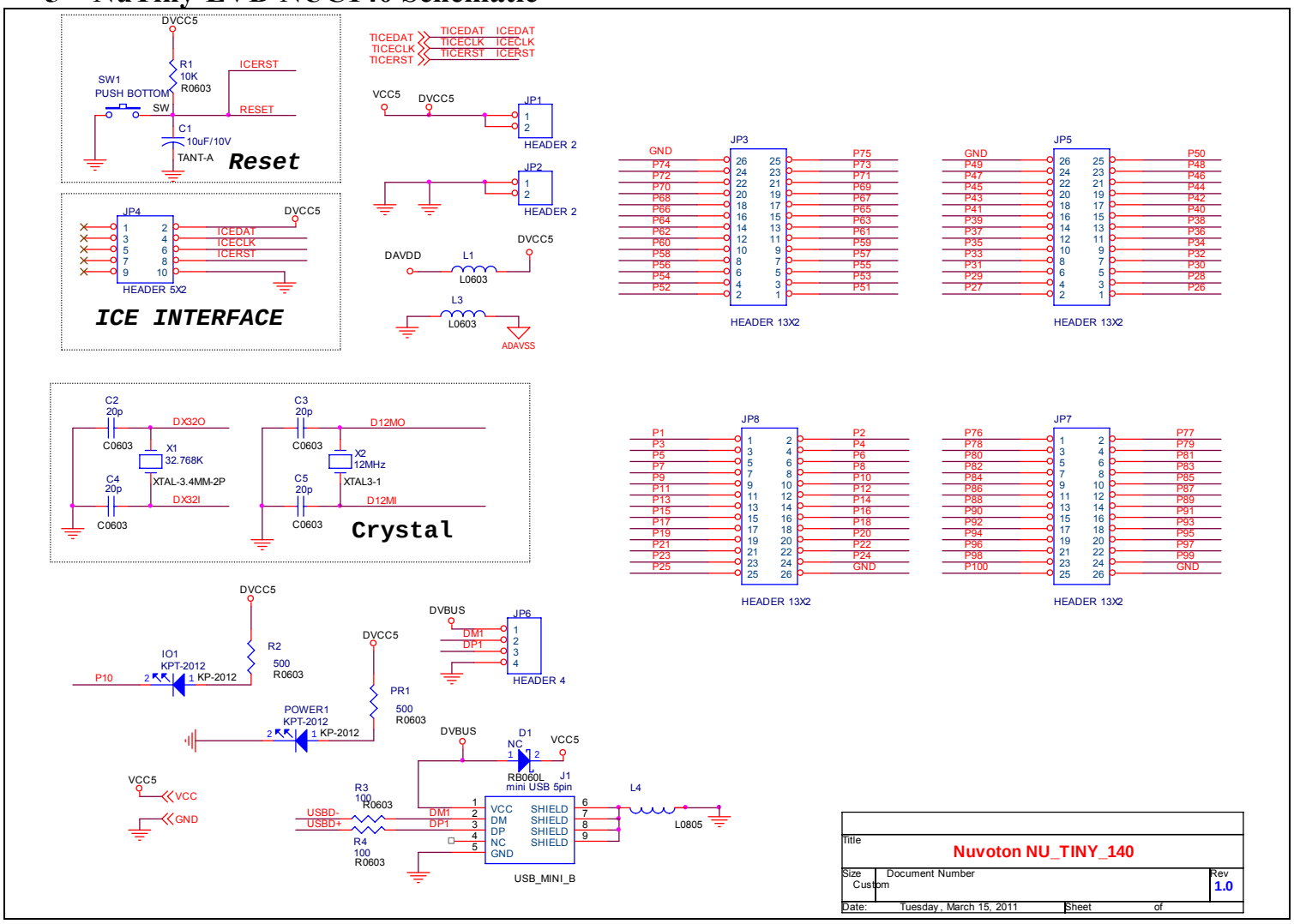
Directory	Project File
	

Figure 4-2 Smpl_NuTiny-NUC140 Example Directory

To use this example:
The PB.0 LED will toggle on the NuTiny-EVB-NUC140 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-NUC140 Schematic



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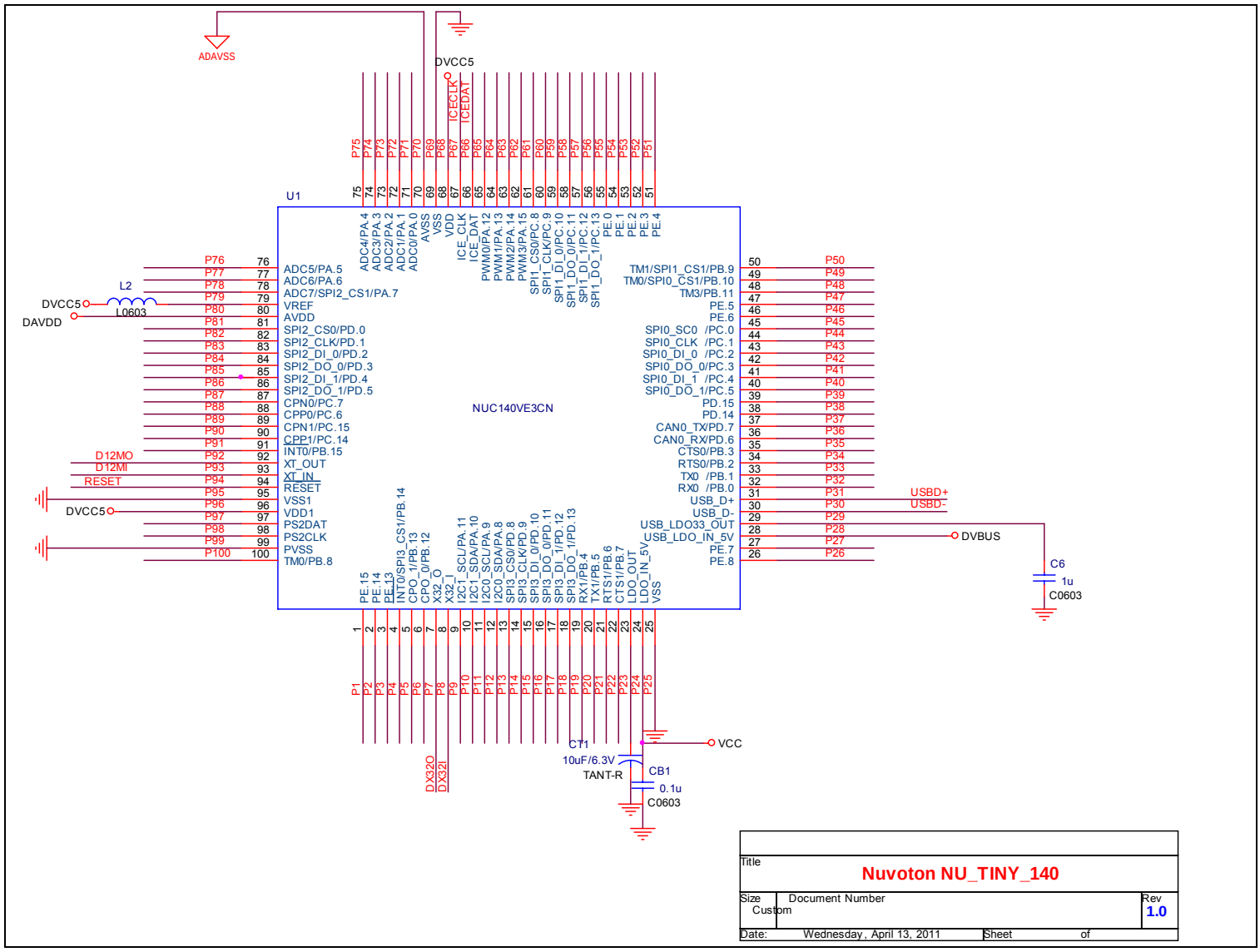
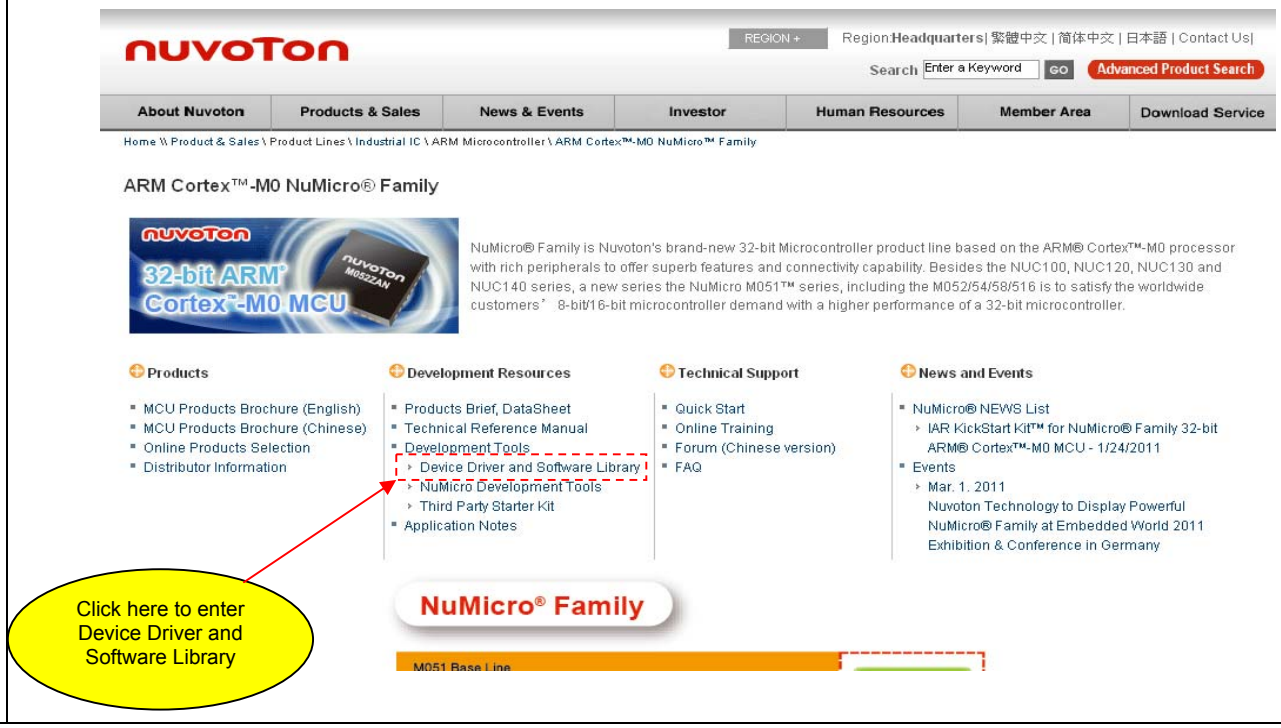

ADAVSS
DVCC5
U1
NUC140VE3CN
ADC5/PA.5
ADC6/PA.6
ADC7/SPI2_CS1/PA.7
VREF
AVDD
SPI2_CS0/PD.0
SPI2_CLK/PD.1
SPI2_DI_0/PD.2
SPI2_DO_0/PD.3
SPI2_DI_1/PD.4
SPI2_DO_1/PD.5
CPN0/PC.7
CPP0/PC.6
CPN1/PC.15
CPP1/PC.14
INT0/PB.15
XT_OUT
XT_IN
RESET
VSS1
VDD1
PS2DAT
PS2CLK
PVSS
TM0/PB.8
TM1/SPI1_CS1/PB.9
TM0/SPI0_CS1/PB.10
TM3/PB.11
PE.5
PE.6
SPI0_SC0 /PC.0
SPI0_CLK /PC.1
SPI0_DI_0 /PC.2
SPI0_DO_0/PC.3
SPI0_DI_1 /PC.4
SPI0_DO_1/PC.5
PD.15
PD.14
CAN0_TX/PD.7
CAN0_RX/PD.6
CTS0/PB.3
RTS0/PB.2
TX0 /PB.1
RX0 /PB.0
USB_D+
USB_D-
USB_LDO33_OUT
USB_LDO_IN_5V
PE.7
PE.8
L2
L0603
DVCC5
DAVDD
D12MO
D12MI
RESET
USBD+
USBD-
DVBUS
C6
1u
C0603
CT1
10uF/6.3V
TANT-R
CB1
0.1u
C0603
VCC
Title
Nuvoton NU_TINY_140
Size
Custom
Document Number
Rev
1.0
Date:
Wednesday, April 13, 2011
Sheet
of

6 Download NuMicro™ Family Related Files from Nuvoton Company

6.1 Download NuMicro™ Keil µVision® IDE Driver

Step1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step2	

Step 3

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 Learining Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001

Programmer Software Tools Package

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

Nu-Link Driver

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

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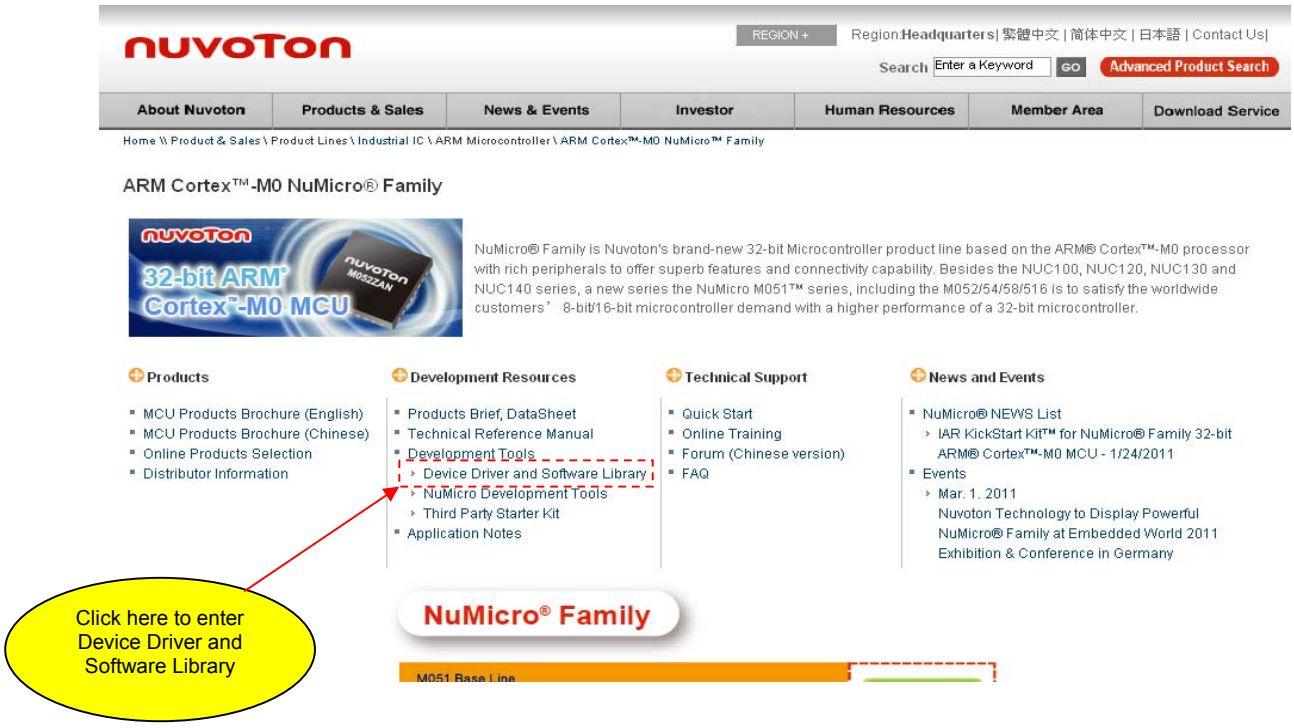
Step 4

Download the NuMicro Keil µVision® IDE driver

6.2 Download NuMicro™ IAR EWARM Driver

Step1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step2	

Step 3

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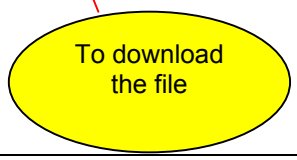
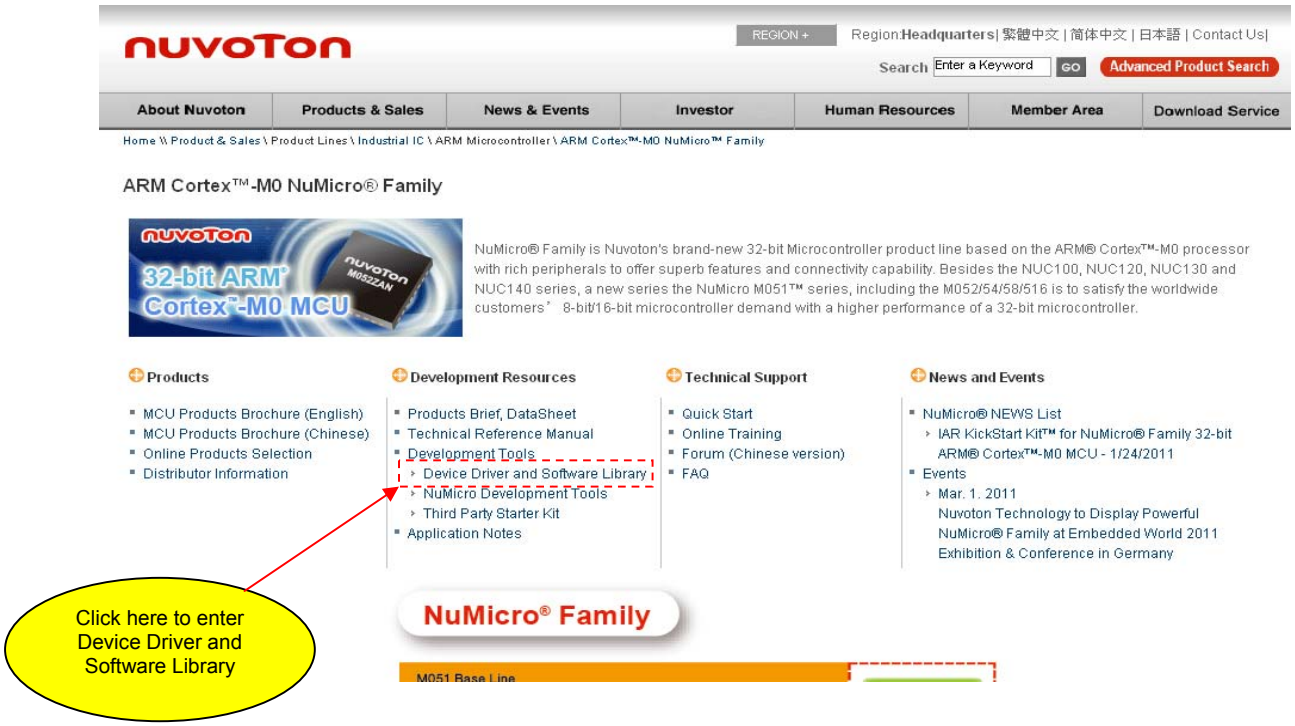


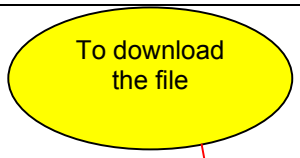
Step 4

Download the NuMicro™ IAR Embedded Workbench® driver

6.3 Download NuMicro™ NUC100 Series BSP Software Library

Step1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step2	

Step 3



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Step 4

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7 Revision History

Version	Date	Page	Description
1.0	April 20, 2011	--	Initial Release

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