



# NuTiny-SDK-Mini51 User Manual

## For NuMicro™ Mini51 Series

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## 1 Overview

NuTiny-SDK-Mini51 is the specific development tool for NuMicro™ Mini51 series. Users can use NuTiny-SDK-Mini51 to develop and verify the application program easily.

NuTiny-SDK-Mini51 includes 2 portions. One is NuTiny-EVB-Mini51 and the other is Nu-Link-Me. NuTiny-EVB-Mini51 is evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, users do not need additional ICE equipment.

## 2 NuTiny-SDK-Mini51 introduction

NuTiny-SDK-Mini51 can support NuMicro™ Mini51 series. Figure 2-1 is NuTiny-SDK-Mini51 for Mini51 series and the left portion is called NuTiny-EVB-Mini51 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-Mini51 is similar to other development board. Users can use it to develop and verify applications to emulate the real behavior. In fact, the real chip MINI54LAN is mounted on the board. The on board chip covers Mini51 series features. The NuTiny-EVB-Mini51 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 Keil or IAR Please refer to “Nuvoton NuMicro™ IAR ICE driver user manual “ or Nuvoton NuMicro™ Keil ICE driver user manual” in detail.

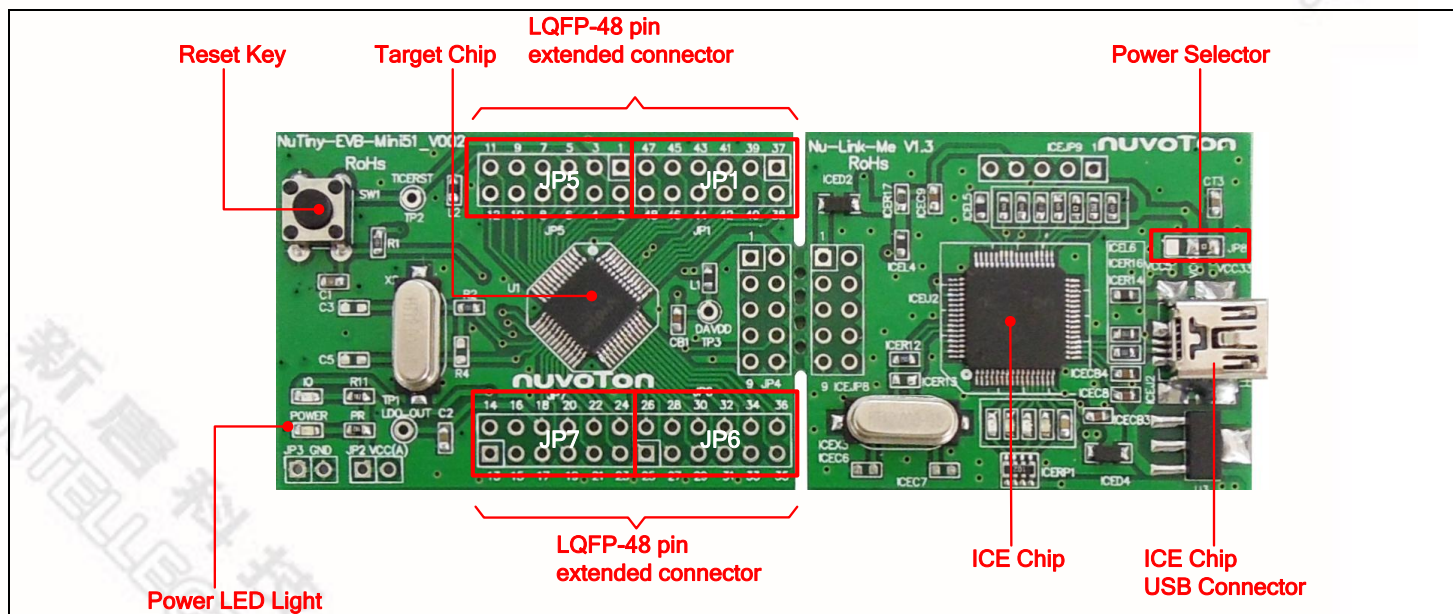


Figure 2-1 NuTiny-SDK-Mini51 (Green Color PCB Board)

## 2.1 NuTiny-SDK-Mini51 Jumper Description

### 2.1.1 Power Setting

- ICEJ2: USB port in Nu-Link-Me
- JP8: Select 5V or 3V for system power in Nu-Link-Me
- JP2 VCC(A): VCC Voltage connector in NuTiny-EVB-Mini51

POWER model	ICEJ2 USB port	JP8	JP2 VCC(A)	MCU Voltage
Model 1	Connect to PC	Select VCC3(default)	DC 3V output	DC 3V
Model 2	X	X	DC 2.8-5.5V input	Voltage by JP2 VCC(A) input

X: Not use.

### 2.1.2 Debug Connector

- JP4: Target ICE Connector in NuTiny-EVB-Mini51
- ICEJP8: Nuvoton ICE Connector in Nu-Link-Me

### 2.1.3 USB Connector

- J2: mini USB Connector in Nu-Link-Me

### 2.1.4 Extended Connector

- JP5, JP6, JP7 and JP1: Show all of chip pins in NuTiny-EVB-Mini51

### 2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-Mini51

### 2.1.6 Power Connector

- JP2 VCC(A): VCC connector in NuTiny-EVB-Mini51
- JP3 GND: GND connector in NuTiny-EVB-Mini51

## 2.2 Pin Assignment for Extended Connector

NuTiny-EVB-Mini51 provides MINI54LAN on board and the extended connector for LQFP-48 pin. Table 2-1 is the pin assignment for MINI54LAN.

Pin No	Pin Name	Pin No	Pin Name
01	NC	25	P2.5, PWM3
02	P1.5, AIN5, CPP0	26	P2.6, PWM4, CPO1
03	/RESET	27	NC
04	P3.0, AIN6, CPN1	28	NC
05	AVSS	29	P4.6, ICE_CLK
06	P5.4	30	P4.7, ICE_DAT
07	P3.1, AIN7, CPP1	31	NC
08	P3.2, INT0, STADC, T0EX	32	P0.7, SPICLK
09	P3.4, T0, SDA	33	P0.6, MISO
10	P3.5, T1, SCL	34	P0.5, MOSI
11	NC	35	P0.4, SPISS, PWM5
12	NC	36	NC
13	NC	37	P0.1, RTSn, RX, SPISS
14	P3.6, CKO, T1EX, CPO0	38	P0.0, CTSn, TX
15	P5.1, XTAL2	39	NC
16	P5.0, XTAL1	40	NC
17	VSS	41	P5.3, AIN0
18	LDO_CAP	42	VDD
19	P5.5	43	AVDD
20	P5.2, INT1	44	P1.0, AIN1
21	NC	45	P1.2, AIN2, RX
22	P2.2, PWM0	46	P1.3, AIN3, TX
23	P2.3, PWM1	47	P1.4, AIN4, CPN0
24	P2.4, PWM2	48	NC

Table 2-1 pin assignment for MINI54LAN

## 2.3 NuTiny-SDK-Mini51 PCB Placement

Users can refer Figure 2-2 for the NuTiny-SDK-Mini51 PCB placement.

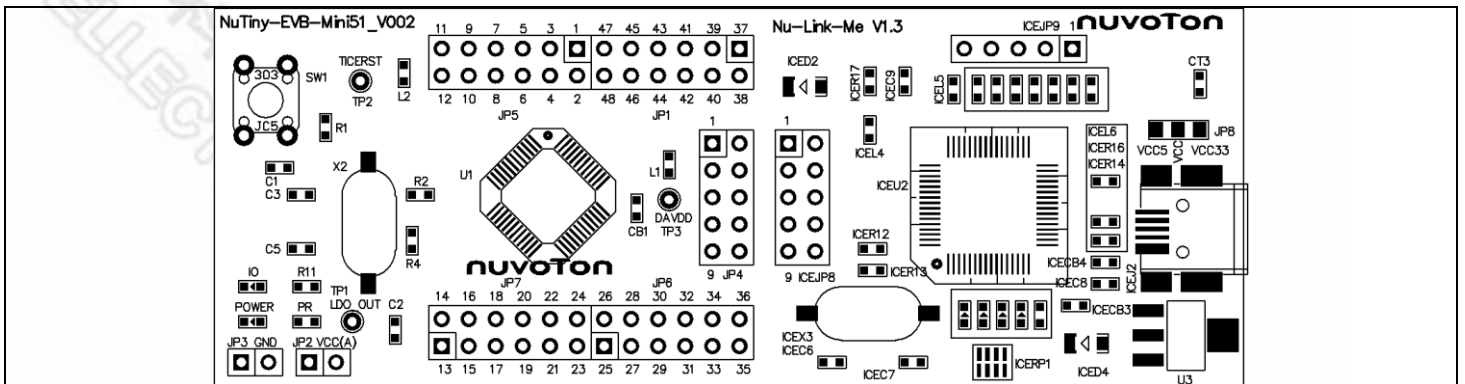


Figure 2-2 NuTiny-SDK-Mini51 PCB Placement

## 3 How to start NuTiny-SDK-Mini51 on the Keil uVision® IDE

### 3.1 Keil uVision® IDE Software Download & Install

Please connect to Keil company website (<http://www.keil.com>) to download the Keil uVision® IDE and install the RVMDK.

### 3.2 Nuvoton Nu-Link Driver Download & Install

Please connect to Nuvoton company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro™ Nu-Link Driver for Keil RVMDK” file. Please refer the Chapter 6.1 for the detail download flow. When the download had finished, 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-Mini51 Hardware Setup

## 3.4 SmpL\_NuTiny-EVB\_MINI51 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-Mini51 board. The example can be found on the Figure 3-2 list directory.

<b>Directory</b>	C:\Nuvoton\BSP Library\Mini51SeriesBSP\NuvotonPlatform_Keil\Sample\NuTiny\SmpL_NuTiny-EVB_MINI51
<b>Project File</b>	

Figure 3-2 SmpL\_NuTiny-EVB\_MINI51 Example Directory

To use this example:

- **Start uVision**

- Open the SmpL\_NUTINY\_MINI51.uvproj project file

**Project-Open**

- Compile and link the SmpL\_NUTINY\_MINI51 application

- **Project - Build**

- Program the application into on-chip Flash ROM

- **Flash – Download**

- **Start debug mode**

Using the debugger commands, you may:

- Single step through code

- Run the application\

- Review variables in the watch window

- Reset the device to re-run the application

The LED will toggle on the NuTiny-EVB-Mini51 board.

## 4 How to start NuTiny-SDK-Mini51 on the IAR Embedded Workbench

### 4.1 IAR Embedded Workbench Software Download & 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 & Install

Please connect to Nuvoton company NuMicro™ website (<http://ww.nuvoton.com/NuMicro>) to download “NuMicro™ Nu-Link Driver for IAR EWARM” file. Please refer the 6.2 for the detail download flow. When the download had finished, 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 3-1

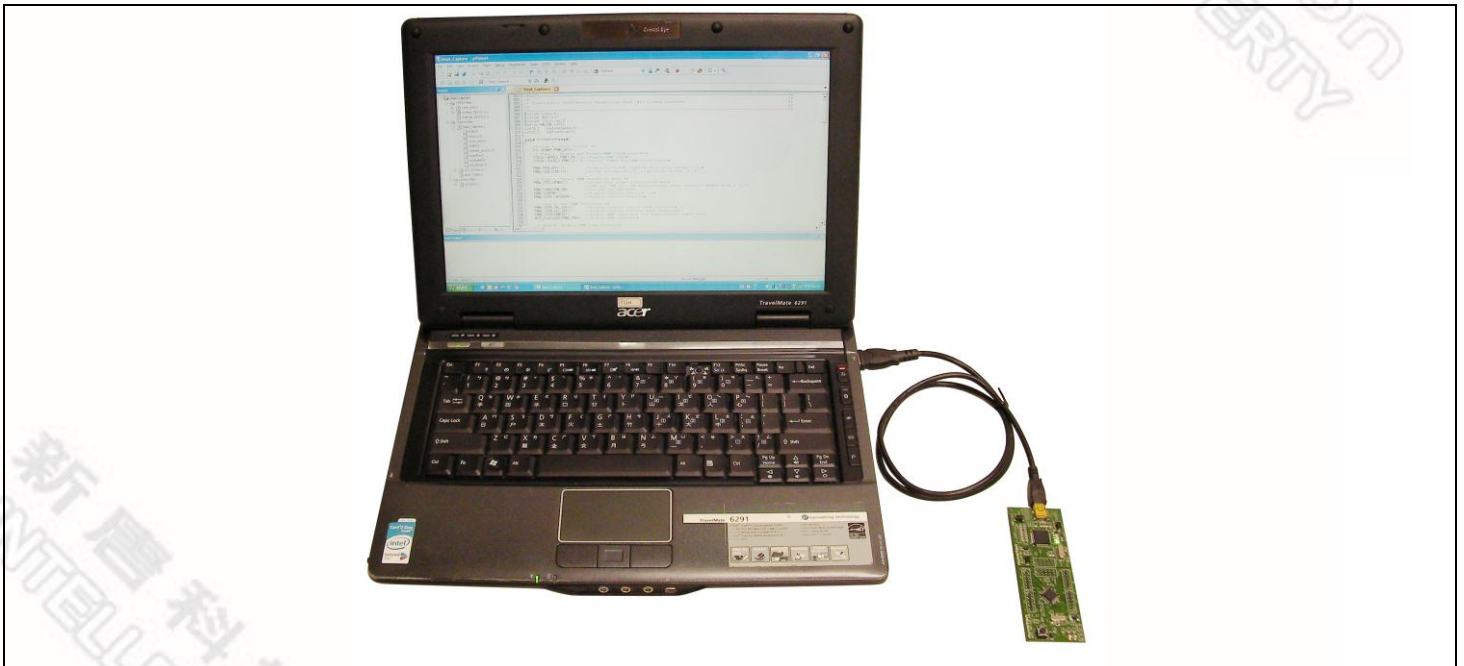


Figure 4-1 NuTiny-SDK-Mini51 Hardware Setup



## 4.4 SmpI\_NuTiny-EVB\_MINI51 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-Mini51 board. The example can be found on the Figure 4-2 list directory. (Samples code can be download from Nuvoton website)

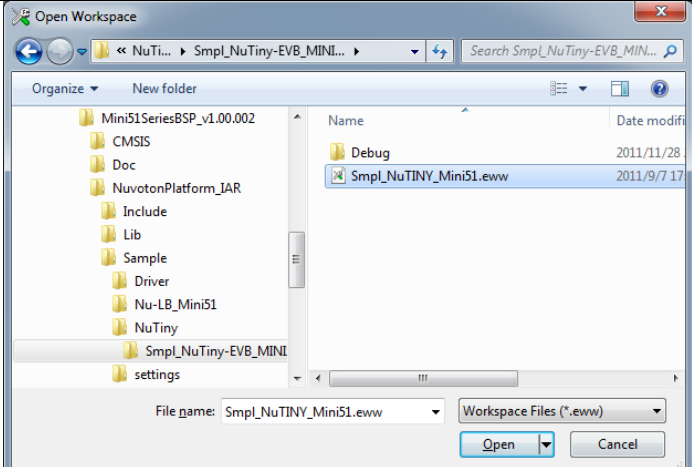

<b>Directory</b>	C:\Nuvoton\BSP Library\Mini51SeriesBSP\NuvotonPlatform_IAR\Sample \NuTiny\SmpI_NuTiny-EVB_MINI51
<b>Project File</b>	

Figure 4-2 SmpI\_NuTiny-EVB\_MINI51 Example Directory

To use this example:

-  Start IAR Embedded Workbench
- Open the SmpI\_NuTINY\_Mini51.eww workspace file

### File-Open-Workspace

- Compile and link the SmpI\_NuTINY\_Mini51 application



### Project - Make

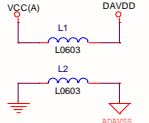
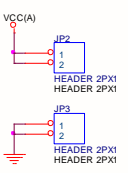
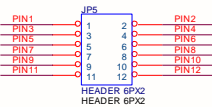
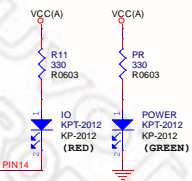
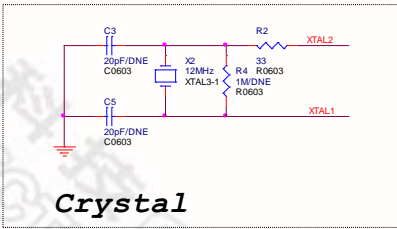
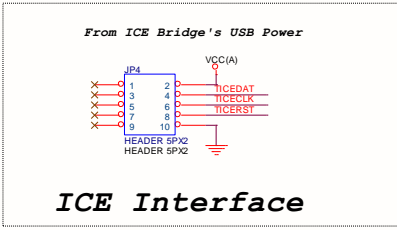
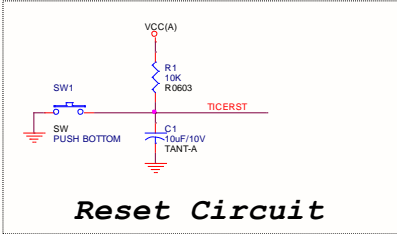
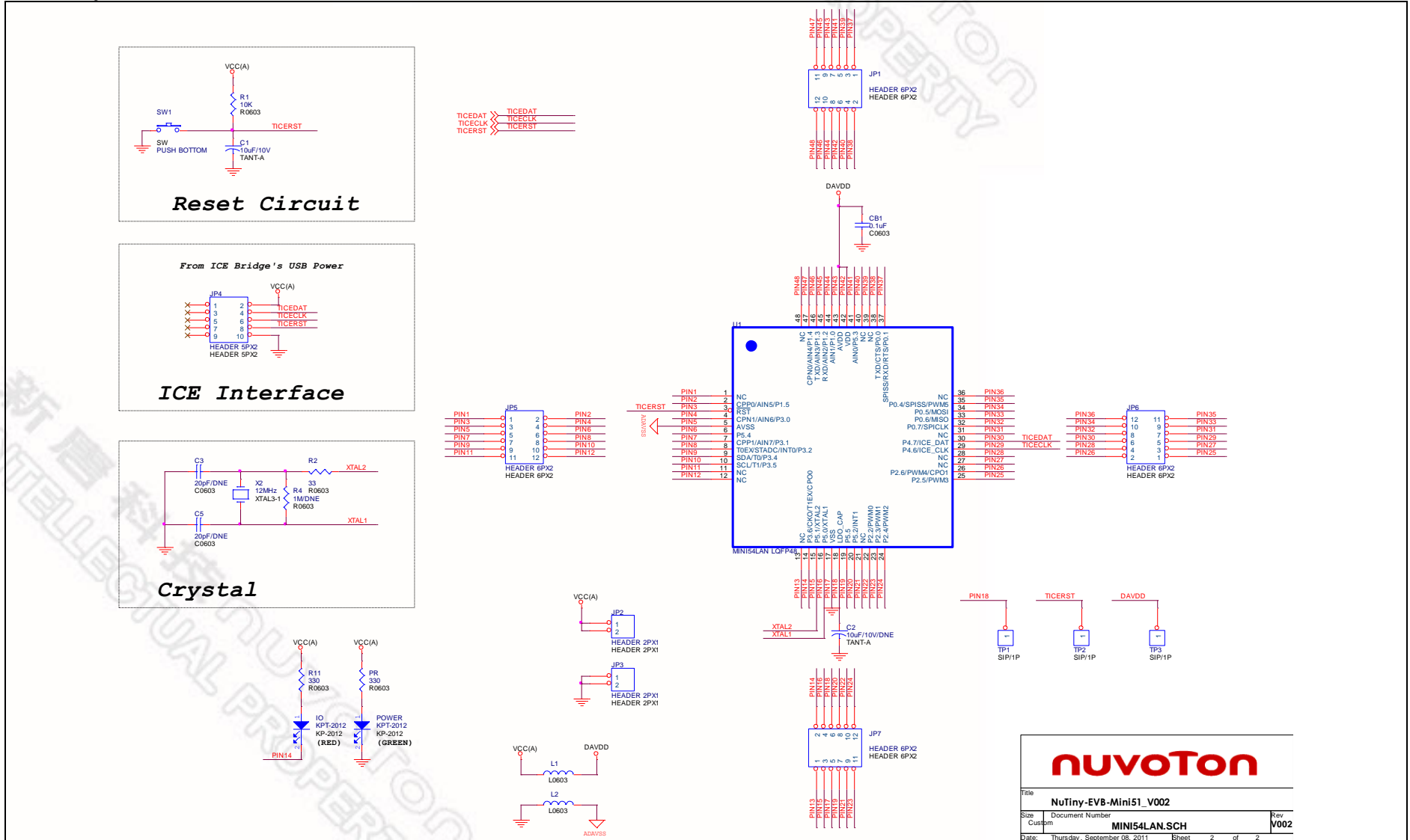
- Program the application into on-chip Flash ROM



### Project – Download and Debug

The I/O will toggle on the NuTiny-EVB-Mini51 board.

## 5 NuTiny-EVB-Mini51 Schematic



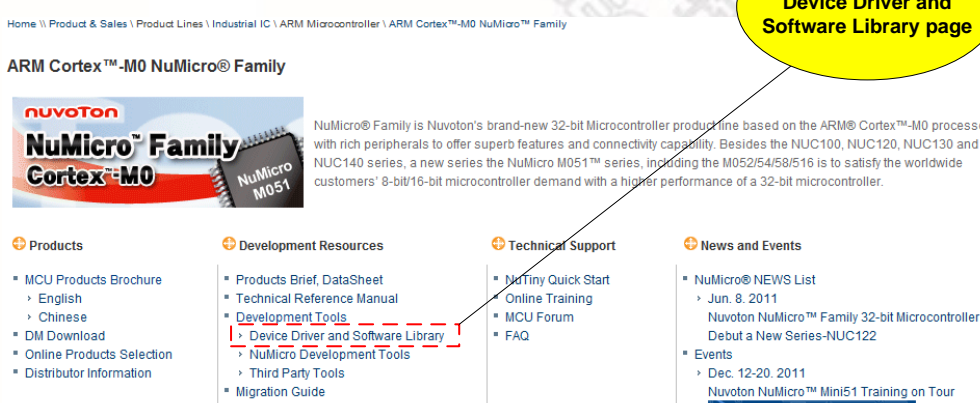
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Title	NuTiny-EVB-Mini51_V002	
Size	Document Number	Rev
Custom	MINI54LAN.SCH	V002
Date	Thursday, September 08, 2011	Sheet 2 of 2

## 6 To Download NuMicro™ Family Related Files From Nuvoton Company

### 6.1 To Download NuMicro™ Nu-Link Driver for Keil RVMDK

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## 6.3 To Download NuMicro™ Mini51 Series BSP Software Library

<p><b>Step1</b></p>	<p>To connect to the Nuvoton NuMicro™ Website: <a href="http://www.nuvoton.com/NuMicro">http://www.nuvoton.com/NuMicro</a></p>																								
<p><b>Step2</b></p>	<p>Home \ Product &amp; Sales \ Product Lines \ Industrial IC \ ARM Microcontroller \ ARM Cortex™-M0 NuMicro™ Family</p> <p><b>ARM Cortex™-M0 NuMicro® Family</b></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> <ul style="list-style-type: none"> <li><b>Products</b> <ul style="list-style-type: none"> <li>MCU Products Brochure                             <ul style="list-style-type: none"> <li>English</li> <li>Chinese</li> </ul> </li> <li>DM Download</li> <li>Online Products Selection</li> <li>Distributor Information</li> </ul> </li> <li><b>Development Resources</b> <ul style="list-style-type: none"> <li>Products Brief, DataSheet</li> <li>Technical Reference Manual</li> <li>Development Tools                             <ul style="list-style-type: none"> <li><b>Device Driver and Software Library</b> <ul style="list-style-type: none"> <li>NuMicro Development Tools</li> <li>Third Party Tools</li> </ul> </li> <li>Migration Guide</li> <li>Application Notes</li> </ul> </li> </ul> </li> <li><b>Technical Support</b> <ul style="list-style-type: none"> <li>NuTiny Quick Start</li> <li>Online Training</li> <li>MCU Forum</li> <li>FAQ</li> </ul> </li> <li><b>News and Events</b> <ul style="list-style-type: none"> <li>NuMicro® NEWS List                             <ul style="list-style-type: none"> <li>Jun. 8. 2011                                     <ul style="list-style-type: none"> <li>Nuvoton NuMicro™ Family 32-bit Microcontroller Debut a New Series-NUC122</li> </ul> </li> </ul> </li> <li>Events                             <ul style="list-style-type: none"> <li>Dec. 12-20. 2011                                     <ul style="list-style-type: none"> <li>Nuvoton NuMicro™ Mini51 Training on Tour</li> </ul> </li> </ul> </li> </ul> </li> </ul>																								
<p><b>Step 3</b></p>	<p><b>Board Support Package</b></p> <table border="1"> <thead> <tr> <th>File name</th> <th>Description</th> <th>Version</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>Mini51SeriesBSP_CMSIS V1.00.002.zip</li> <li>Mini51 Series Driver Reference Guide V1.00.001</li> <li>Change History</li> </ul> </td> <td>Mini51 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-Mini51 and Learning Board are included. For detailed, please download it and unzip it.</td> <td>V1.00.002 V1.00.001</td> <td>11-14-2011 11-14-2011</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>M051SeriesBSP_CMSIS V1.02.002.zip</li> <li>M051 Series Driver Reference Guide V1.00.005</li> <li>Change History</li> </ul> </td> <td>M051 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-M051 and Learning Board are included. For detailed, please download it and unzip it.</td> <td>V1.02.002 V1.00.005</td> <td>09-09-2011 07-18-2011</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>M051SeriesBSP_RegCtrlPrg V1.00.002.zip</li> </ul> </td> <td>M051 series software package based on register programming coding rule for sample code &amp; user guide.</td> <td>V1.00.002</td> <td>05-31-2011</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>NUC100Series BSP_CMSIS V1.05.002.zip</li> <li>NUC100 Series Driver Reference Guide V1.05.001</li> <li>Change History</li> </ul> </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-100/120/130/140 and Learning Board are included, please download it and unzip it.</td> <td>V1.05.002 V1.05.001</td> <td>09-09-2011 07-18-2011</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>NUC122 BSP_CMSIS V1.01.002.zip</li> <li>NUC122 Driver Reference Guide V1.00.002</li> <li>Change History</li> </ul> </td> <td>NUC122 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-122 are included. For detailed, please download it and unzip it.</td> <td>V1.01.002 V1.00.002</td> <td>09-09-2011 07-18-2011</td> </tr> </tbody> </table> <p>A yellow callout bubble points to the first row of the table with the text: "To download the file".</p>	File name	Description	Version	Date	<ul style="list-style-type: none"> <li>Mini51SeriesBSP_CMSIS V1.00.002.zip</li> <li>Mini51 Series Driver Reference Guide V1.00.001</li> <li>Change History</li> </ul>	Mini51 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-Mini51 and Learning Board are included. For detailed, please download it and unzip it.	V1.00.002 V1.00.001	11-14-2011 11-14-2011	<ul style="list-style-type: none"> <li>M051SeriesBSP_CMSIS V1.02.002.zip</li> <li>M051 Series Driver Reference Guide V1.00.005</li> <li>Change History</li> </ul>	M051 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-M051 and Learning Board are included. For detailed, please download it and unzip it.	V1.02.002 V1.00.005	09-09-2011 07-18-2011	<ul style="list-style-type: none"> <li>M051SeriesBSP_RegCtrlPrg V1.00.002.zip</li> </ul>	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.002	05-31-2011	<ul style="list-style-type: none"> <li>NUC100Series BSP_CMSIS V1.05.002.zip</li> <li>NUC100 Series Driver Reference Guide V1.05.001</li> <li>Change History</li> </ul>	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-100/120/130/140 and Learning Board are included, please download it and unzip it.	V1.05.002 V1.05.001	09-09-2011 07-18-2011	<ul style="list-style-type: none"> <li>NUC122 BSP_CMSIS V1.01.002.zip</li> <li>NUC122 Driver Reference Guide V1.00.002</li> <li>Change History</li> </ul>	NUC122 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-122 are included. For detailed, please download it and unzip it.	V1.01.002 V1.00.002	09-09-2011 07-18-2011
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<p><b>Step 4</b></p>	<p>To download the NuMicro™ Mini51 SeriesBSP_CMSIS software library</p>																								

## 7 Revision History

Version	Date	Page	Description
1.0	Nov. 29, 2011	--	Initial Issued

## Important Notice

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