

nuvoTon NU-LB-MINI51 Arm Cortex-M0 32-Bit Microcontroller User Manual

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NU-LB-MINI51 Arm Cortex-M0 32-Bit Microcontroller User Manual

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Overview

Nu-LB-Mini51 is the specific development tool for the NuMicro Mini51 series. Users can use Nu-LB-Mini51 to learn easily how to display information, store data, communicate with PC, and interact with humans through the Mini51 series. Besides, it also integrates an ICE controller called Nu-Link-Me and users do not need other additional ICE or debug the equipment.

Nu-LB-Mini51 Introduction

Nu-LB-Mini51 uses the Mini54LAN as the target microcontroller and includes rich functional blocks on board.

Figure 2-1 is the positive and negative Nu-LB-Mini51. The positive Nu-LB-Mini51 includes a main chip (Mini54LAN), INT key, reset key, variable resistance, RGB LED, 8 LEDs, 128×64 Dot Matrix LCD and RS232 interface. The negative Nu-LB-Mini51 includes EEPROM, Flash, and an ICE controller called Nu-Link-Me. Nu-LB-Mini51 is similar to other development boards. Users can use the functional blocks connected with Mini54LAN to develop and verify applications to emulate the real behavior. The onboard chip covers Mini51 series features. The NuLB-Mini51 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 the 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.

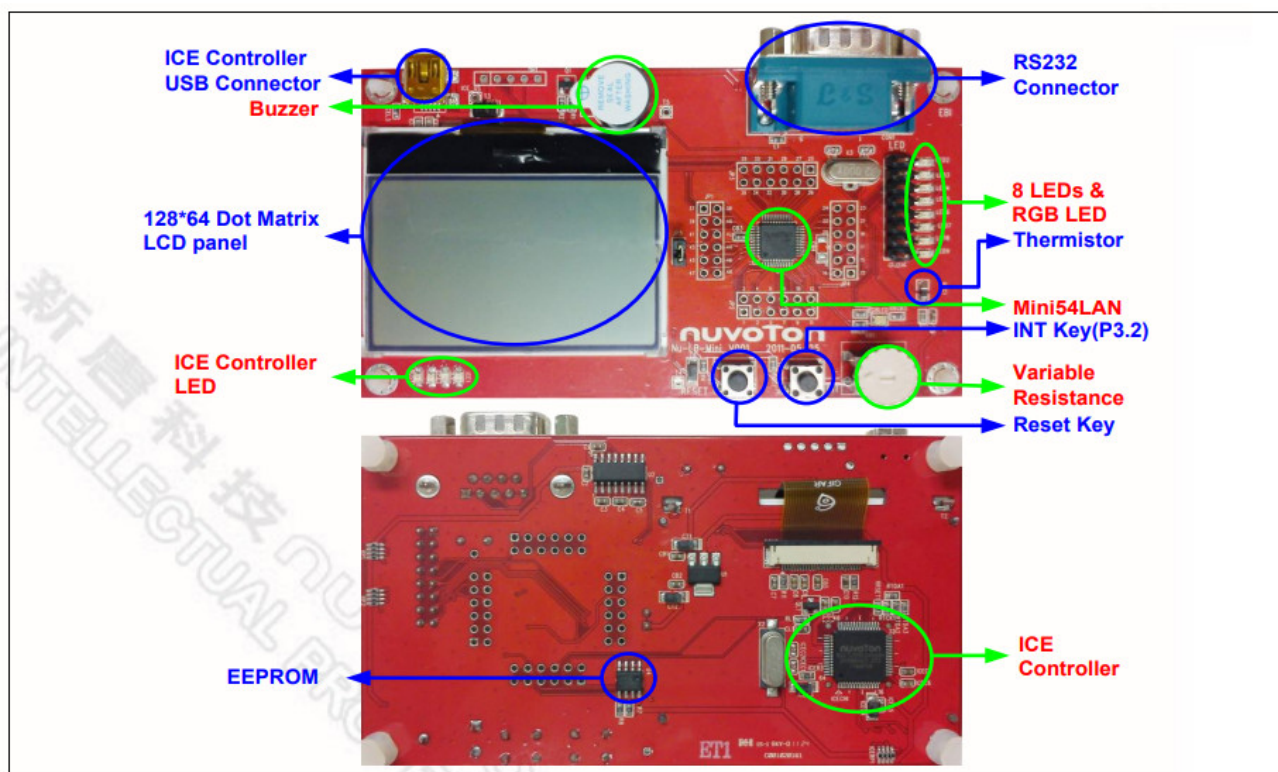


Figure 2-1 Nu-LB-Mini51

Functional Block of Nu -LB-Mini51

Nu-LB-Mini51 provides the rich functional blocks connected with Mini54LAN to display information, communicate with PC, store data, and interact with humans. Users can follow the pin assignment at Table 2-1 to control every functional block.

Functional Block	Pin assignment	Pin Function Description
ICE controller(Nu-Link-Me)	ICE_CLK ICE DATA	SWD interface
Reset Key	/RST	Reset
IN 1' Key	P3.2	INT0
Variable Resistance	P5.3	AIN0
Thermistor	P1.0	AIN1
Buzzer	P2.5	PWM3
ORB LED	P2.2 P2.3 P2.4	PWMO PWM 1 PWM2
8 LEDs	P3.1 P3.6 P5.2 P2.6 P1.2 P1.3 P1.4 P1.5	LEDO LED 1 LED2 LED3 LED4 LEADS LED6 LED7
EEPROM	P3.4 P3.5	12C SDA 12C SCL
Black Dot Matrix LCD Panel	P0.4 P0.5 P0.6 P0.7 P5.4	SPI_SS5 SPI_MOSI LCM_RST/SPI_MISO SPI_CLK LCM LED

Table 2-1 Functional Block for Nu-LB-Mini51

Pin Assignment for Extended Connector

Nu-LB-Mini51 provides Mini54LAN on board and the extended connector for the LQFP-48 pin. Table 2-2 is the pin assignment for Mini54LAN.

Pin No	Pin Name	Pin No	Pin Name
1	NC	25	P2.5, PWM3
2	P1.5, AIN5, CPPO	26	P2.6, PWM4, CPO1
3	/RESET	27	NC
4	P3.0, AIN6, CPN1	28	NC
5	AVS	29	P4.6, ICE CLK
6	P5.4	30	P4.7, ICE DAT
7	P3.1, AIN7, CPPI	31	NC
8	P3.2, INTO, STADC, TOEX	32	P0.7, SPICLK
9	P3.4, TOO, SDA	33	P0.6, MISO
10	P3.5, T1, SCL	34	P0.5, MOSI
11	NC	35	P0.4, SPISS, PWMS
12	NC	36	NC
13	NC	37	PO.1, RTS, RX, SPICES
14	P3.6, CKO, T1EX, CPU	38	P0.0, CTS, TX
15	P5.1, XTAL2	39	NC
16	P5.0, XTAL1	40	NC
17	VSS	41	P5.3, AINO
18	LDO CAP	42	VDD
19	P5.5	43	ADD
20	P5.2, INT1	44	PI.0, AIN1
21	NC	45	P1.2, AIN2, RX
22	P2.2, PWM	46	P1.3, AIN3, TX
23	P2.3, PWM1	47	P1.4, AIN4, CPNO
24	P2.4, PWM2	48	NC

Table 2-2 Pin Assignment for Mini54LAN

How to Start Nu-LB-Mini51 on the Keil μ Vision® IDE

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.

Nuvoton Nu-Link Driver Download and Install

Please visit the Nuvoton company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download the “NuMicro™ Keil® μ Vision IDE driver” file. Please refer to Chapter 6.1 for the detailed 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.

Hardware Setup

The hardware setup is shown in Figure 3-1

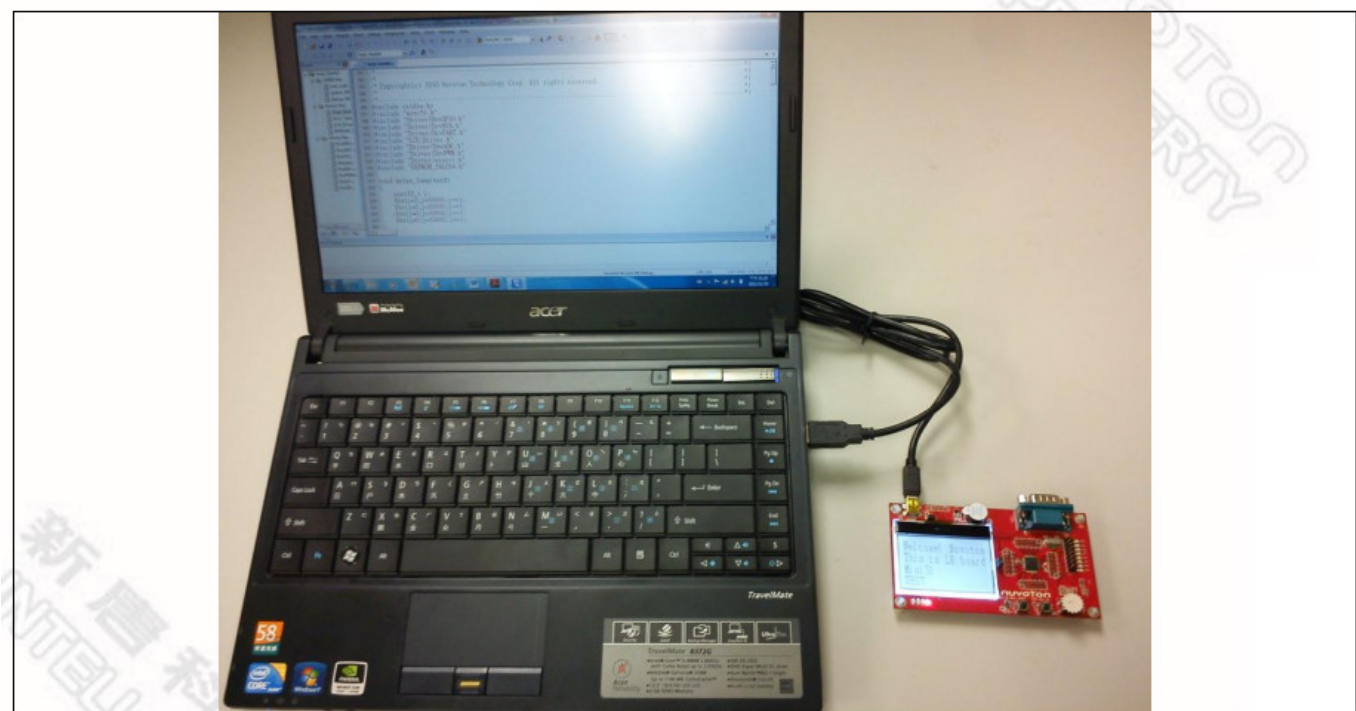


Figure 3-1 Nu-LB-Mini51 Hardware Setup

Smpl_StartKit Example Program



This example demonstrates the ease of downloading and debugging an application on a Nu-LB-Mini51 board. It can be found in Figure 3-2 list directory and downloaded from the Nuvoton NuMicro™ website following on Chapter 6.3.

Directory	C:\Nuvoton\BSP Library\Mini51SeriesBSP_v1.00.002\NuvotonPlatform_Keil\Sample\Nu-LB_Mini51\Smpl_StartKit
Project File	


Figure 3-2 Smpl_StartKit Example Directory

To use this example:


The LCD will display the result of ADC on the Nu-LB-Mini51 board.

-  Start μVision®
- Project-Open
Open the Smpl_StartKit.uvproj project file
-  Project – Build

Compile and link the Smpl_StartKit 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

How to Start Nu-LB-Mini51 on the IAR Embedded Workbench

IAR Embedded Workbench Software Download and Install

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

Nuvoton Nu-Link Driver Download and Install

Please connect to the Nuvoton Company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download™ the “NuMicro IAR ICE driver user manual” file. Please refer to Chapter 6.2 for the detailed 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.

Hardware Setup

The hardware setup is shown in Figure 4-1

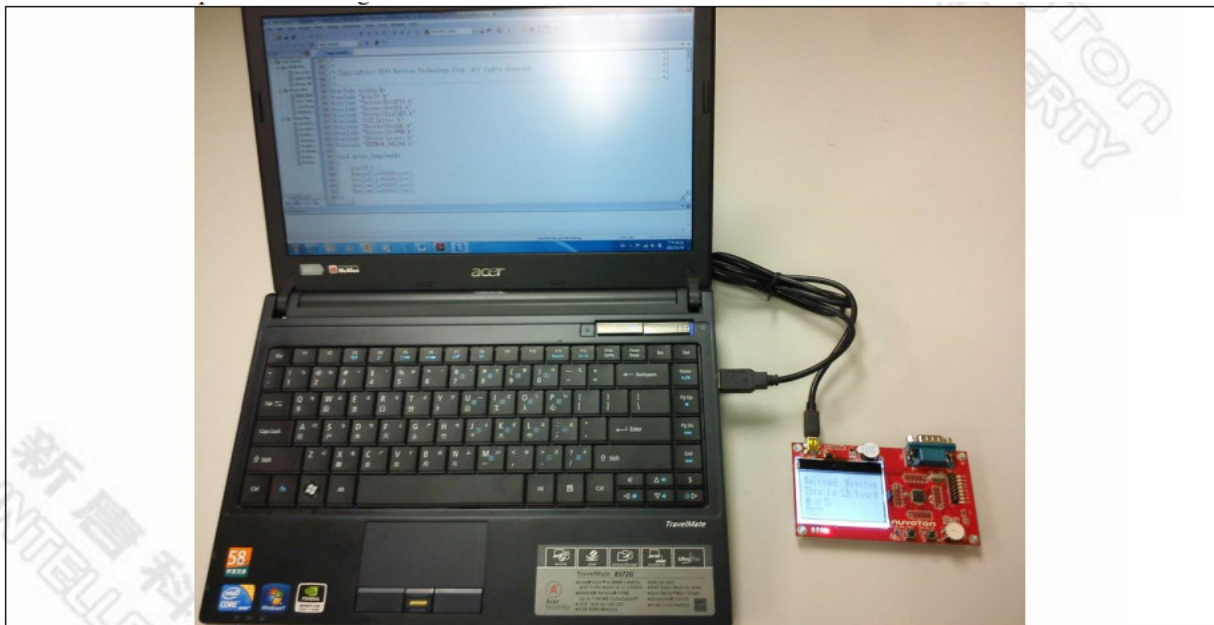


Figure 4-1 Nu-LB-Mini51 Hardware Setup

Smpl_StartKit Example Program

This example demonstrates the ease of downloading and debugging an application on a Nu-LB-Mini51 board. It can be found in Figure 4-2 list directory and downloaded from the Nuvoton NuMicro™ website following Chapter 6.3.

Directory	C:\Nuvoton\BSP Library\Mini51SeriesBSP_v1.00.002\NuvotonPlatform_IAR\Sample\Nu-LB_Mini51\Smpl_StartKit
Project File	

Figure 4-2 Smpl_StartKit Example Directory

To use this example:

The LCD will display the result of ADC on the Nu-LB-M051 board.



- **Start IAR Embedded Workbench**

- File-Open-Workspace

Open the [Smpl_StartKit.eww](#) workspace file



- **Project – Make**

Compile and link the Smpl_StartKit application



- **Project – Download and Debug**

Program the application code into on-chip Flash ROM.



- Single step through code

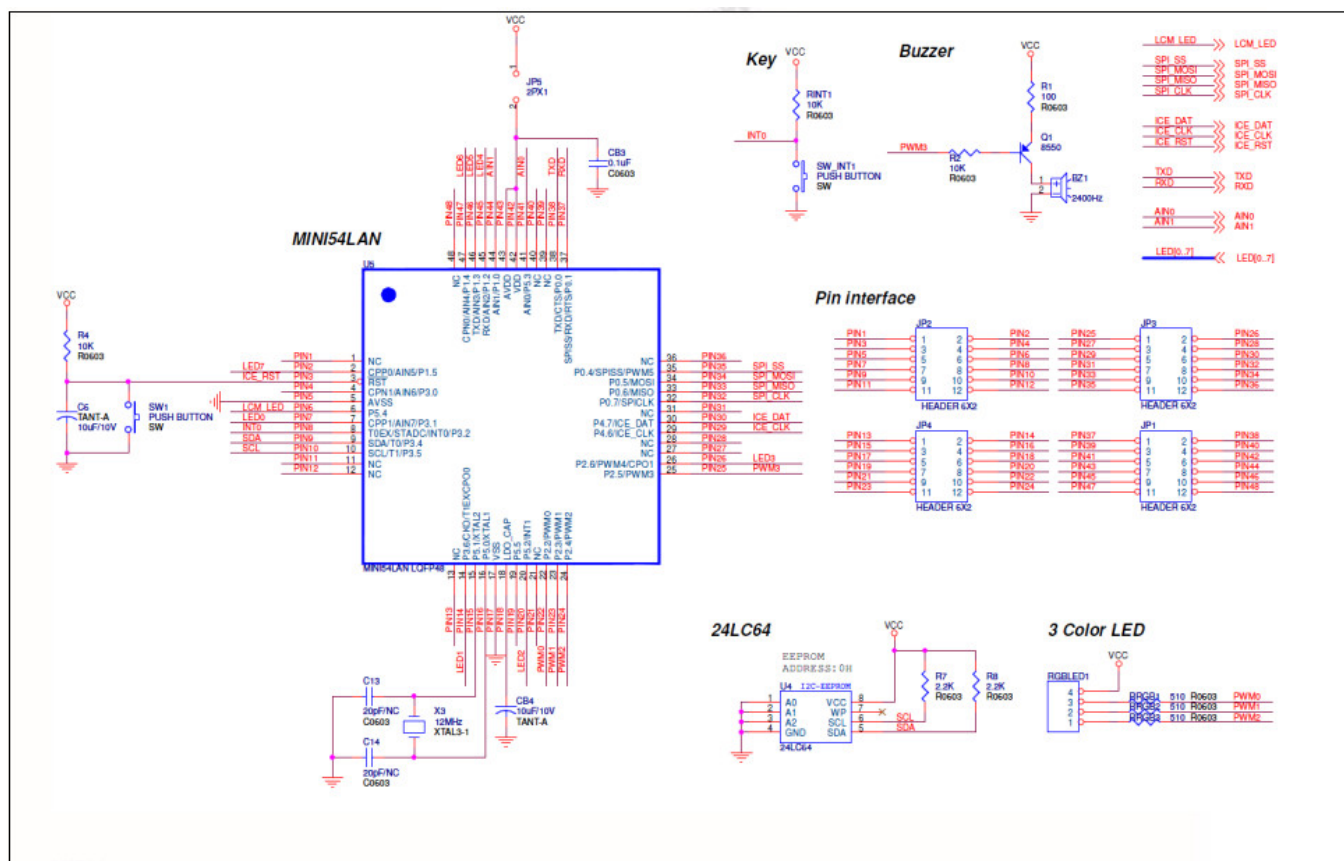


- Reset the device



- Run the application

Nu-LB-Mini51 Schematic



Download NuMicro™ Family Related Files from Nuvoton Company









































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Step.3	<div><div>Board Support Package</div><table><tr><th>File name</th><th>Description</th><th>Version</th><th>Date</th></tr><tr><td> Mini51SeriesBSP_CMSIS V1.00.002.zip</td><td rowspan="3">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</td><td>11-14-2011</td></tr><tr><td> Mini51 Series Driver Reference Guide V1.00.001</td><td>V1.00.001</td><td>11-14-2011</td></tr><tr><td> Change History</td><td></td><td></td></tr><tr><td> M051SeriesBSP_CMSIS V1.02.002.zip</td><td rowspan="2">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</td><td>09-09-2011</td></tr><tr><td> M051 Series Driver Reference Guide V1.00.005</td><td>V1.00.005</td><td>07-18-2011</td></tr><tr><td> Change History</td><td></td><td></td><td></td></tr><tr><td> M051SeriesBSP_RegCtrlPrg V1.00.002.zip</td><td>M051 series software package based on register programming coding rule for sample code & user guide.</td><td>V1.00.002</td><td>05-31-2011</td></tr><tr><td> NUC100Series BSP_CMSIS V1.05.002.zip</td><td rowspan="3">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. For detailed, please download it and unzip it.</td><td>V1.05.</td><td></td></tr><tr><td> NUC100 Series Driver Reference Guide V1.05.001</td><td>V1.05.</td><td></td></tr><tr><td> Change History</td><td></td><td></td></tr><tr><td> NUC122 BSP_CMSIS V1.01.002.zip</td><td rowspan="3">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</td><td>09-09-2011</td></tr><tr><td> NUC122 Driver Reference Guide V1.00.002</td><td>V1.00.002</td><td>07-18-2011</td></tr><tr><td> Change History</td><td></td><td></td></tr></table><div>To download the file</div></div>	File name	Description	Version	Date	 Mini51SeriesBSP_CMSIS V1.00.002.zip	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	11-14-2011	 Mini51 Series Driver Reference Guide V1.00.001	V1.00.001	11-14-2011	 Change History			 M051SeriesBSP_CMSIS V1.02.002.zip	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	09-09-2011	 M051 Series Driver Reference Guide V1.00.005	V1.00.005	07-18-2011	 Change History				 M051SeriesBSP_RegCtrlPrg V1.00.002.zip	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.002	05-31-2011	 NUC100Series BSP_CMSIS V1.05.002.zip	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. For detailed, please download it and unzip it.	V1.05.		 NUC100 Series Driver Reference Guide V1.05.001	V1.05.		 Change History			 NUC122 BSP_CMSIS V1.01.002.zip	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	09-09-2011	 NUC122 Driver Reference Guide V1.00.002	V1.00.002	07-18-2011	 Change History		
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Step.4	To download the NuMicro™ Mini51 SeriesBSP_CMSIS software library																																																	

Revision History

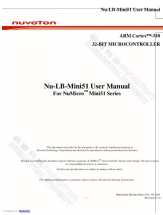
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Documents / Resources

	<p>nuvoTon NU-LB-MINI51 Arm Cortex-M0 32-Bit Microcontroller [pdf] User Manual NU-LB-MINI51, Arm Cortex-M0 32-Bit Microcontroller, NU-LB-MINI51 Arm Cortex-M0 32-Bit Microcontroller</p>
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References

-  [IAR](#)
-  [Keil Embedded Development Tools for Arm, Cortex-M, Cortex-R4, 8051, C166, and 251 processor families.](#)
-  [ARM Cortex-M0 MCUs - Nuvoton](#)

Manuals+.