

ARM[®] Cortex[®]-M0
32-bit Microcontroller

NuMicro[®] Family
NuTiny-SDK-Nano112
User Manual

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1 OVERVIEW

The NuTiny-SDK-Nano112 is a specific development tool for NuMicro® Nano102/112 series. With the NuTiny-SDK-Nano112, users can develop and verify the application program easily.

The NuTiny-SDK-Nano112 includes two portions – NuTiny-EVB-Nano112 and Nu-Link-Me. The NuTiny-EVB-Nano112 is an evaluation board and the Nu-Link-Me is its debug adaptor. Thus, users do not need other additional ICE or debug equipment.

2 INTRODUCTION TO NUTINY-SDK-NANO112

The NuTiny-SDK-Nano112 uses the Nano112VC2AN as the target microcontroller (MCU). Figure 2-1 shows the NuTiny-SDK-Nano112 board for the Nano102/112 series. The left portion is called NuTiny-EVB-Nano112 and the right portion is a debug adaptor called Nu-Link-Me.

The NuTiny-EVB-Nano112 is similar to other development boards. It can be used as a real system controller to design user target systems and develop and verify applications to emulate the real behavior. The on-board chip covers the Nano102/112 features.

The Nu-Link-Me is a Debug Adaptor, which connects the USB port of a computer to a target system (via Serial Wired Debug port) for users 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 the “Nuvoton NuMicro® IAR ICE Driver User Manual” or “Nuvoton NuMicro® Keil ICE Driver User Manual” for details. The two documents will be stored in the local hard disk when each driver is installed.

Additionally, the TNLCD panel, another portion of NuTiny-SDK-Nano112, can provide 4 x 36 COM/SEG LCD display function. With the TNLCD panel, user can implement LCD driver function of Nano112 easily.

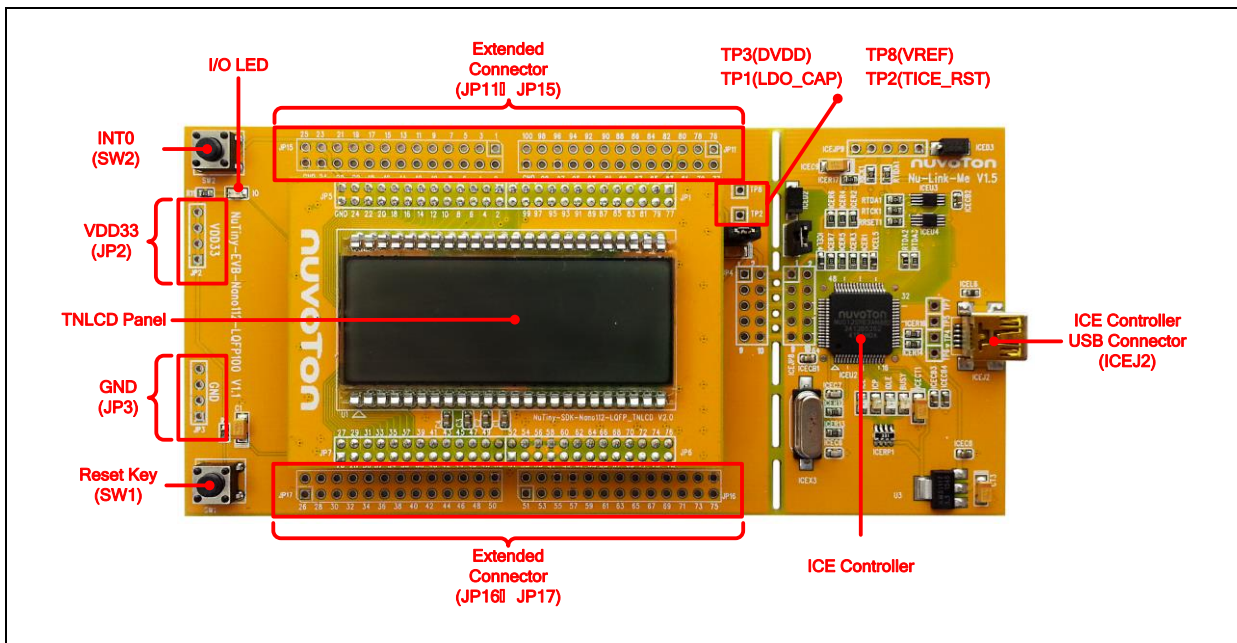


Figure 2-1 NuTiny-SDK-Nano112 (PCB Board)

2.1 NuTiny-SDK-Nano112 System

2.1.1 Power Settings

- **ICEJ2:** The USB port on the Nu-Link-Me
- **JP2:** The VCC33 voltage connector on the NuTiny-EVB-Nano112

Model	ICEJ2 USB port	JP2 VDD33	MCU Voltage
Model 1	Connect to PC	DC 3.3V output	DC 3.3V
Model 2	X	DC 1.8 V - 3.6 V Input	Voltage by JP2 input

2.1.2 Debug Connectors

- **JP4:** The connector on the target board (NuTiny-EVB-Nano112) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- **ICEJP8:** The connector on the ICE adaptor (Nu-Link-Me) for connecting with a target board (e.g., NuTiny-EVB-Nano112)

2.1.3 ICE USB Connector

- **ICEJ2:** The Mini USB Connector in Nu-Link-Me connected to a PC USB port

2.1.4 Extended Connectors

- **JP11, JP15, JP16 and JP17:** Show all pins in NuTiny-EVB-Nano112
- **TP1:** Show LDO_CAP pin in Nano112VC2AN
- **TP2:** Show Reset pin in Nano112VC2AN
- **TP3:** Show DVDD pin in Nano112VC2AN
- **TP8:** Show V_{REF} pin in Nano112VC2AN

2.1.5 Buttons

- **SW1:** Reset button in NuTiny-EVB-Nano112
- **SW2:** INT0 button in NuTiny-EVB-Nano112

2.1.6 Power Connectors

- **JP2:** 3.3 VCC connector in NuTiny-EVB-Nano112
- **JP3:** GND connector in NuTiny-EVB-Nano112

2.1.7 TNLCD Panel

- Provides 4 x 36 COM/SEG C-type LCD display

2.2 Pin Assignment for Extended Connectors

The NuTiny-EVB-Nano112 provides Nano112VC2AN on board and the extended connectors for LQFP100 pins. Table 2-1 shows the pin assignment for Nano112VC2AN.

Pin No	Pin Function	Pin No	Pin Function
1	PB.7/SC0_CD/UART1_CTSn/LCD_SEG33	51	nRESET
2	PB.8/INT1/TMR0_CNT/PWM0_CH0/SNOOPER/LCD_SEG32/TMR0_OUT	52	LDO_CAP
3	PB.9/PWM0_CH1/LCD_SEG31	53	V _{DD}
4	PE.8/PWM0_CH2/LCD_SEG30	54	PF.0/TMR3_CNT/TMR3_OUT/X32_IN
5	PE.9/PWM0_CH3/LCD_SEG29	55	PF.1/TMR2_CNT/TMR2_OUT/X32_OUT
6	PB.10/SPI0_MOSI1/UART1_RXD/LCD_SEG28	56	VSS_PLL
7	PB.11/TMR1_CNT/SPI0_MISO1/UART1_RTsn/LCD_SEG27/TMR1_OUT	57	V _{SS}
8	PB.12/FCLK0/TMR0_CNT/SPI0_MOSI0/UART0_RTsn/LCD_SEG26/TMR0_OUT	58	V _{SS}
9	PB.13/SPI0_MISO0/UART0_RXD/LCD_SEG25	59	PF.2/INT1/TC3/UART1_RXD/XT1_IN
10	PB.14/SPI0_CLK/UART0_TXD/LCD_SEG24	60	PF.3/INT0/TC2/UART1_TXD/XT1_OUT
11	NC	61	NC
12	PB.15/SPI0_SS0/UART0_CTSn/LCD_SEG23	62	PE.0/SPI0_MOSI0
13	PC.0/PWM0_CH0/I2C0_SCL/SPI0_SS1/LCD_SEG22	63	PE.1/SPI0_MISO0
14	PC.1/PWM0_CH1/I2C0_SDA/LCD_SEG21	64	PE.2/SPI0_CLK
15	PC.2/PWM0_CH2/I2C1_SCL/LCD_SEG20	65	PE.3/SPI0_SS0
16	PC.3/PWM0_CH3/I2C1_SDA/LCD_SEG19	66	PE.4/SC1_RST
17	PC.4/INT0/SC0_CLK/UART1_CTSn/LCD_SEG18	67	PE.5/SC1_PWR
18	PC.5/SC0_CD/LCD_SEG17	68	PE.6/SC1_CLK
19	PC.6/SC0_DAT/UART1_RTsn/LCD_SEG16	69	PE.7/SC1_DAT
20	PC.7/SC0_PWR/UART1_RXD/LCD_SEG15	70	AV _{SS}
21	PC.8/SC0_RST/UART1_TXD/LCD_SEG14	71	AV _{SS}
22	PC.9/LCD_SEG13	72	PA.0/AD0
23	V _{DD}	73	PA.1/AD1/ACMP0_P3/ACMP0_CHDIS
24	V _{SS}	74	PA.2/INT0/AD2/ACMP0_P2/SC0_CLK/ACMP0_CHDIS
25	V _{SS}	75	PA.3/INT1/AD3/ACMP0_P1/SC0_DAT/ACMP0_CHDIS
26	PC.10/SC1_CD/I2C1_SCL/LCD_SEG12	76	PA.4/AD4/ACMP0_P0/SC0_CD/ACMP0_CHDIS
27	PC.11/SC1_PWR/I2C1_SDA/LCD_SEG11	77	PA.5/AD5/ACMP0_N/SC0_PWR/I2C1_SDA/SP

	EG11		I1_SS0/ACMP0_CHDIS
28	PC.12/SC1_CLK/LCD_SEG10	78	PA.6/AD6/ACMP0_OUT/SC0_RST/ACMP0_C HDIS
29	PC.13/SC1_DAT/LCD_SEG9	79	PA.7/AD7/SC1_CD
30	PC.14/SC1_CD/LCD_SEG8	80	V _{REF}
31	PC.15/SC1_PWR/LCD_SEG7	81	AV _{DD}
32	PD.0/LCD_SEG6	82	PF.4/FCLK1/TC1/PWM0_CH2/CLK_Hz/ICE_C LK
33	PD.1/LCD_SEG5	83	PF.5/TC0/PWM0_CH3/ACMP0_CHDIS/ICE_D AT
34	PD.2/LCD_SEG4	84	PA.8/SC0_PWR
35	PD.3/LCD_SEG3	85	PA.9/SC0_RST
36	PD.4/SC1_RST/LCD_SEG2	86	PA.10/SC0_CLK
37	PD.5/LCD_SEG1	87	PA.11/STADC/SC0_DAT
38	PD.6/LCD_SEG0	88	PA.12/ACMP1_P/I2C0_SCL/SPI1_MOSI0/UAR T0_TXD
39	PD.7/SC1_CLK/LCD_COM3	89	PA.13/ACMP1_N/I2C0_SDA/SPI1_MISO0/UA RT0_RXD
40	PD.8/SC1_DAT/LCD_COM2	90	PA.14/I2C1_SCL/SPI1_CLK/ACMP0_CHDIS
41	PD.9/PWM0_CH3/SC1_RST/LCD_C OM1	91	PA.15/TC3/ACMP1_OUT/I2C1_SDA/SPI1_SS 0
42	PD.10/TC1/PWM0_CH2/LCD_COM0	92	PB.0/FCLK1/UART0_TXD
43	PD.11/TC0/PWM0_CH1/LCD_DH2	93	PB.1/INT1/TC2/UART0_RXD
44	PD.12/FCLK0/TMR1_CNT/PWM0_C H0/LCD_DH1/CLK_Hz/TMR1_OUT	94	PB.2/TMR3_CNT/I2C0_SCL/SPI1_MOSI1/UA RT0_RTSn/TMR3_OUT
45	NC	95	PB.3/TMR2_CNT/I2C0_SDA/SPI1_MISO1/UA RT0_CTSn/TMR2_OUT
46	VLCD	96	V _{DD}
47	NC	97	V _{SS}
48	PD.13/INT1/LCD_V1	98	PB.4/SPI1_MISO1/UART1_RTSn
49	PD.14/LCD_V2	99	PB.5/SPI1_MOSI1/UART1_RXD/LCD_SEG35
50	PD.15/LCD_V3	100	PB.6/FCLK0/SPI1_SS1/UART1_TXD/LCD_SE G34

Table 2-1 Pin Assignment for Nano112VC2AN

2.3 NuTiny-SDK-Nano112 PCB Placement

Figure 2-2 and Figure 2-3 show the NuTiny-SDK-Nano112 and NuTiny-SDK-Nano112-TNLCD PCB placement.

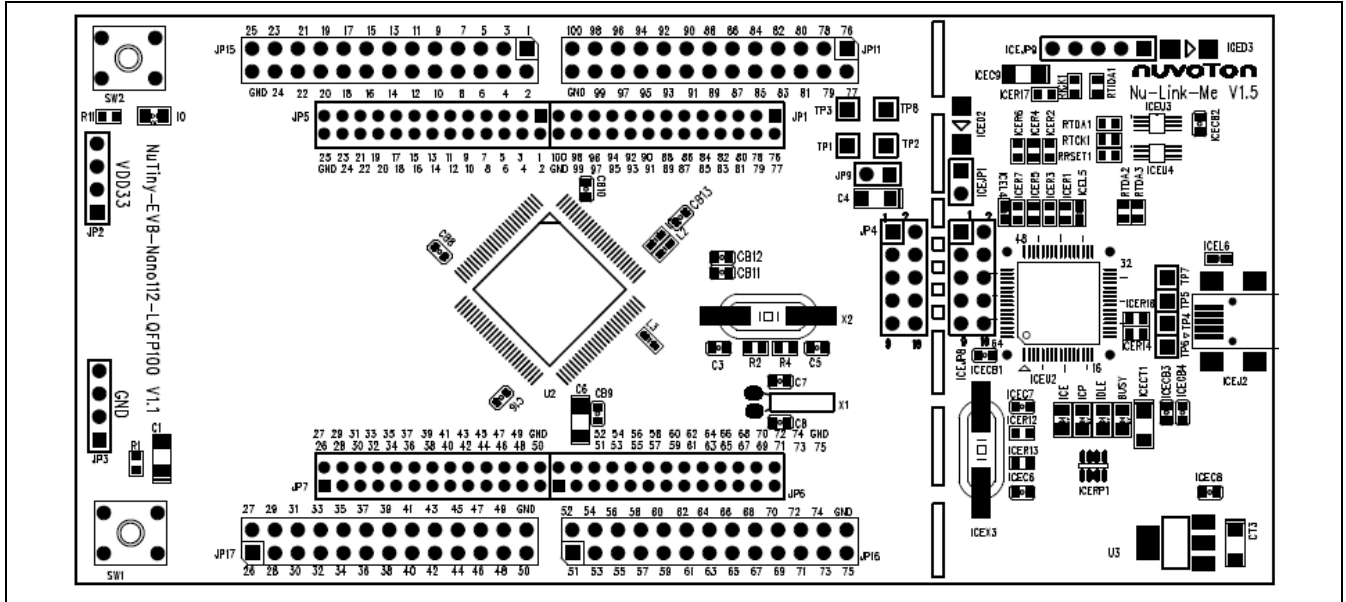


Figure 2-2 NuTiny-SDK-Nano112 PCB Placement

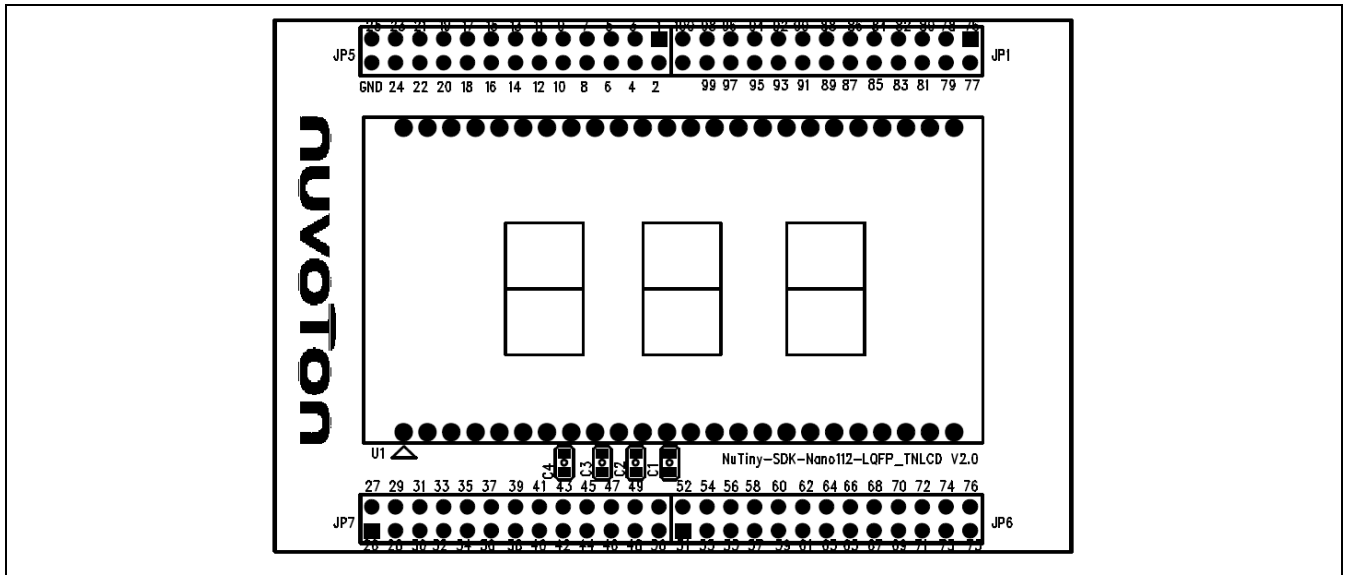


Figure 2-3 NuTiny-SDK-Nano112-TNLCD PCB Placement

3 STARTING TO USE NUTINY-SDK-NANO112 ON THE KEIL UVISION® IDE

3.1 Downloading and Installing Keil µVision® IDE Software

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

3.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton NuMicro® website (<http://www.nuvoton.com/NuMicro>) to download the “NuMicro® Keil µVision® IDE driver” file. Please refer to section 6.1 for the detailed download flow. After the Nu-Link driver is 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 in Figure 3-1.



Figure 3-1 NuTiny-SDK-Nano112 Hardware Setup

3.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-Nano112 board. It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro® website.

The example file can be found in the directory list shown in the following figure.

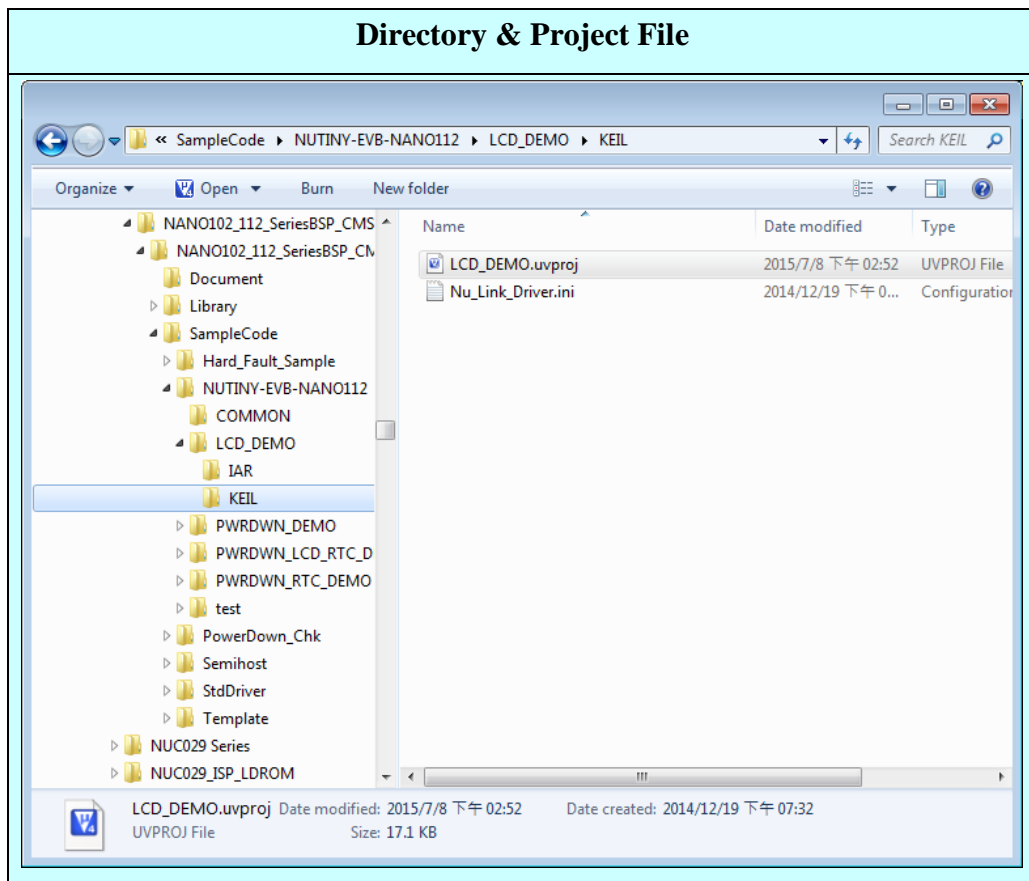










Figure 3-2 Keil Example Directory and Project File

To use this example:

The word “Nano112” and “NUVOTON” will be displayed on TNLCD panel of NuTiny-SDK-Nano112.

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

4 STARTING TO USE NUTINY-SDK-NANO112 ON THE IAR EMBEDDED WORKBENCH

4.1 Downloading and Installing IAR Embedded Workbench Software

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

4.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton NuMicro® website (<http://www.nuvoton.com/NuMicro>) to download the “NuMicro® IAR EWARM Driver” file. Please refer to section 6.2 for the detailed download flow. After the Nu-Link driver is 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-Nano112 Hardware Setup

4.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-Nano112 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro® website.

The example file can be found in the directory list shown in the following figure.

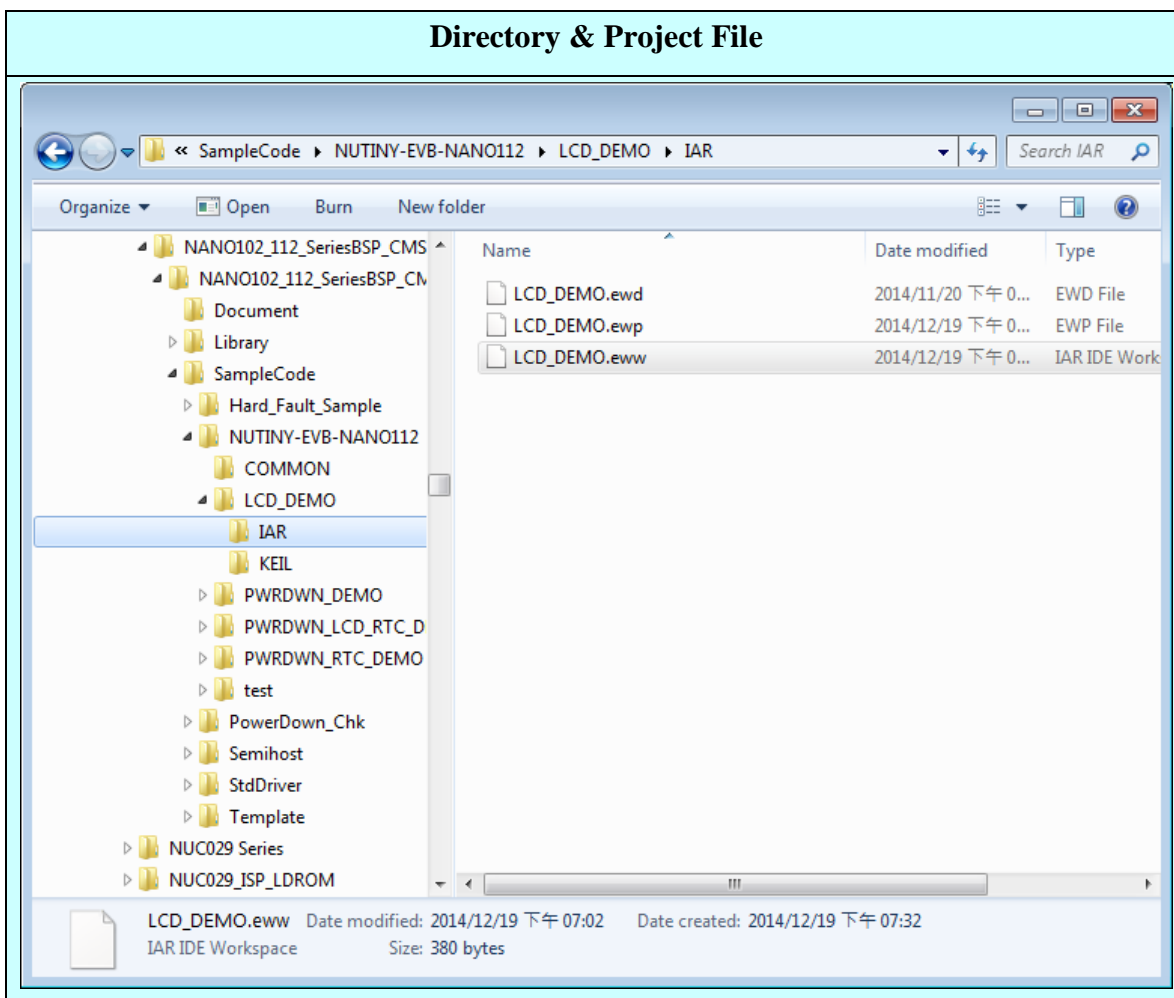








Figure 4-2 IAR Example Directory and Project File

To use this example:

The word “Nano112” and “NUVOTON” will be displayed on TNLCD panel of NuTiny-SDK-Nano112.

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

5 DOWNLOADING NUMICRO[®] RELATED FILES FROM NUVOTON WEBSITE

5.1 Downloading NuMicro[®] Keil μ Vision[®] IDE Driver

Step1 Visit the Nuvoton NuMicro[®] website: <http://www.nuvoton.com/NuMicro>.


Step2

2-1. Move to "Support"

2-2. Click here to enter Tool & Software

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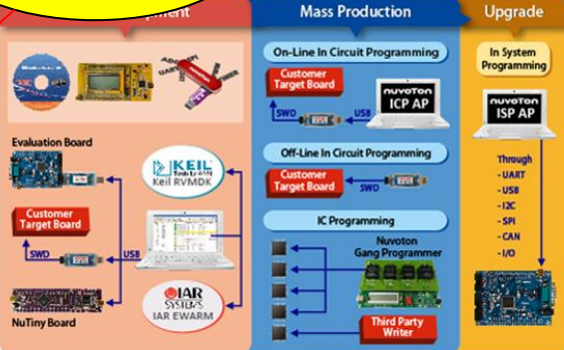
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- Third Party Tool
- Reference Design
- FAQ
- Sales Support
- Technical Support
- Forum

Click here to enter Software download page







Step3


Programmer Software Tools Package

File name	Description	Version	Date
 ICP Programming Tool V1.25.6287.zip  Revision History	NuMicro ICP tool & user manual	V1.25.6287	2014-01-16
 ISP Programming Tool V1.44.zip  Revision History	NuMicro ISP tool & user manual	V1.44	2014-01-20
 NuGang Programmer V6.21.zip  Revision History	NuMicro NuGang Programmer user manual	V6.21	2014-01-24

Step4

Nu-Link Driver

File name	Description	Version	Date
 Nu-Link Driver for Keil RVMDK V1.25.6287.zip  Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16
 Nu-Link Driver for IAR EWARM V1.25.6287.zip  Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16

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Step5 Download the NuMicro[®] Keil μ Vision[®] IDE driver.

NUTINY-SDK-NANO112 USER MANUAL

5.2 Downloading NuMicro® IAR EWARM Driver

Step1 Visit the Nuvoton NuMicro® website: <http://www.nuvoton.com/NuMicro>.

Step2

The screenshot shows the Nuvoton website interface. At the top, there is a navigation bar with links for Products, Applications, Support, Foundry Service, Buy, myNuvoton, and About Nuvoton. A search bar and a language selector are also present. Below the navigation bar, there is a breadcrumb trail: Home > Products > Microcontrollers > ARM Cortex™-M0 MCUs. A dropdown menu is open under the 'Support' link, showing options: Learning, Product Related Information, Tool & Software, Reference Design, and FAQ. A yellow oval highlights the 'Support' link in the navigation bar with the text '2-1. Move to "Support"'. Another yellow oval highlights the 'Tool & Software' link in the dropdown menu with the text '2-2. Click here to enter Tool & Software'. The main content area features a product matrix with various MCU models (NUC100, Nano120, NUC120, NUC230, NUC140, NUC130, NUC220, NUC240, AU9110, AU9120*, Nano110, Nano100, Nano102, Nano112, M051, Mini51) plotted against memory size (16K, 32K, 64K) and application categories (Industrial Control, Low Power, USB Application, Automotive Application, Audio Application). A sidebar on the left lists resources for ARM Cortex™-M0 MCUs, including Application Note (2), Data Sheet (24), Development Tool (32), Online Training (14), Product Brief (22), Software (24), Technical Reference Manual (14), and User Guide (51). On the right, there is a featured product section for NuMicro M4 MCU NUC472 with Ethernet MAC, and sections for Online Support (Online Training, Forum, FAQ), Featured Products (M0516LDE, MINI54FDE, NANO130KE3BN), and Featured Videos (M0 Introduction(06:35)).

Step3

Click here to enter Software download page

Step4

Programmer Software Tools Package

File name	Description	Version	Date
ICP Programming Tool V1.25.6287.zip Revision History	NuMicro ICP tool & user manual	V1.25.6287	2014-01-16
ISP Programming Tool V1.44.zip Revision History	NuMicro ISP Programming Tool & user manual	V1.44	2014-01-20
NuGang Programmer V6.21.zip Revision History	NuGang Programmer Software & user manual	V6.21	2014-01-24

Nu-Link Driver

File name	Description	Version	Date
Nu-Link Driver for Keil RVMDK V1.25.6287.zip Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16
Nu-Link Driver for IAR EWARM V1.25.6287.zip Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16

[User Feedback](#) [↑ TOP](#)

Step5

Download the NuMicro® IAR EWARM driver.

5.3 Downloading NuMicro® Nano102/112 Series BSP Software Library

Step 1 Visit the Nuvoton NuMicro® website: <http://www.nuvoton.com/NuMicro>.

Step 2

2-1. Move to "Support"

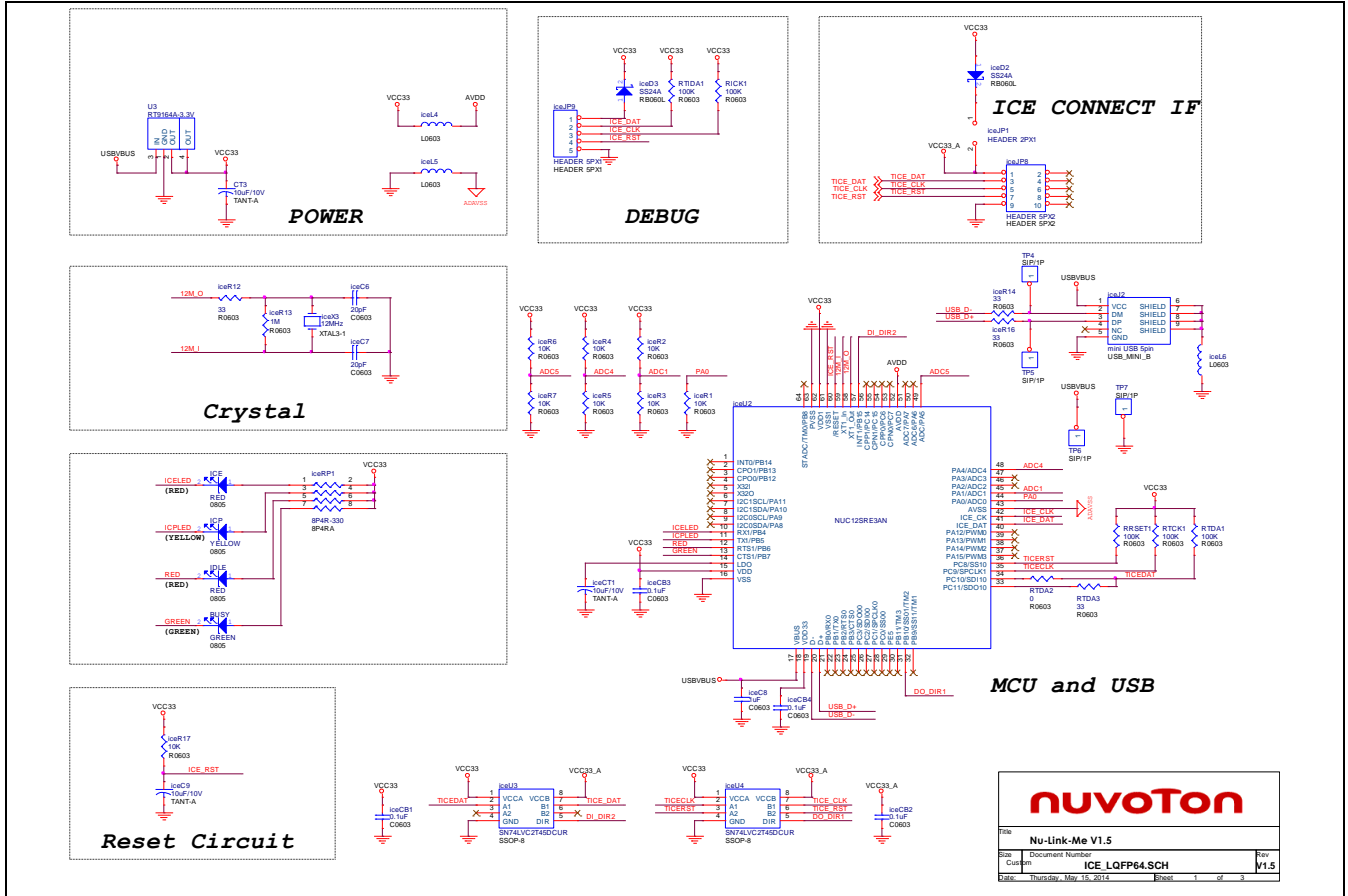
2-2. Click here to enter Tool & Software

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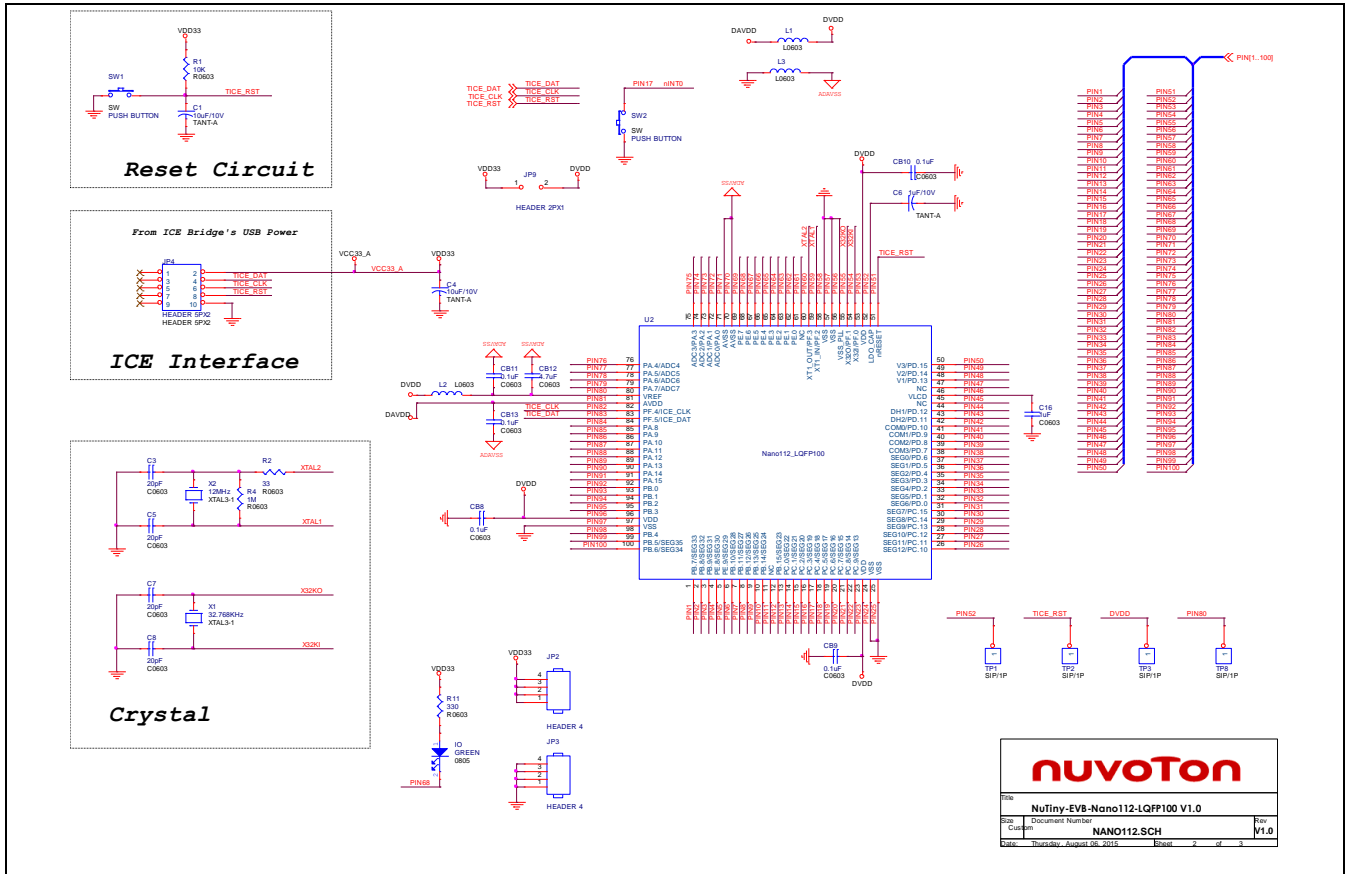
<p>Step 3</p>	 <p>The screenshot shows the NuvoTon website's 'Development Tool Hardware' page. The left sidebar contains a navigation menu with 'Software' highlighted by a red dashed box and a red arrow pointing to a yellow callout bubble. The main content area features three columns: 'Development', 'Mass Production', and 'Upgrade'. The 'Development' column includes links for 'Evaluation Board', 'Customer Target Board', and 'NuTiny Board'. The 'Mass Production' column includes 'On-Line In Circuit Programming', 'Off-Line In Circuit Programming', and 'IC Programming'. The 'Upgrade' column includes 'In System Programming' and 'Through - UART - USB - I2C - SPI - CAN - I/O'. A search bar and navigation links are visible at the top of the page.</p>
<p>Step 4</p>	<p>Download the NuMicro® Nano102/112 Series CMSIS BSP.</p>

6 NUTINY-SDK-NANO112 SCHEMATICS

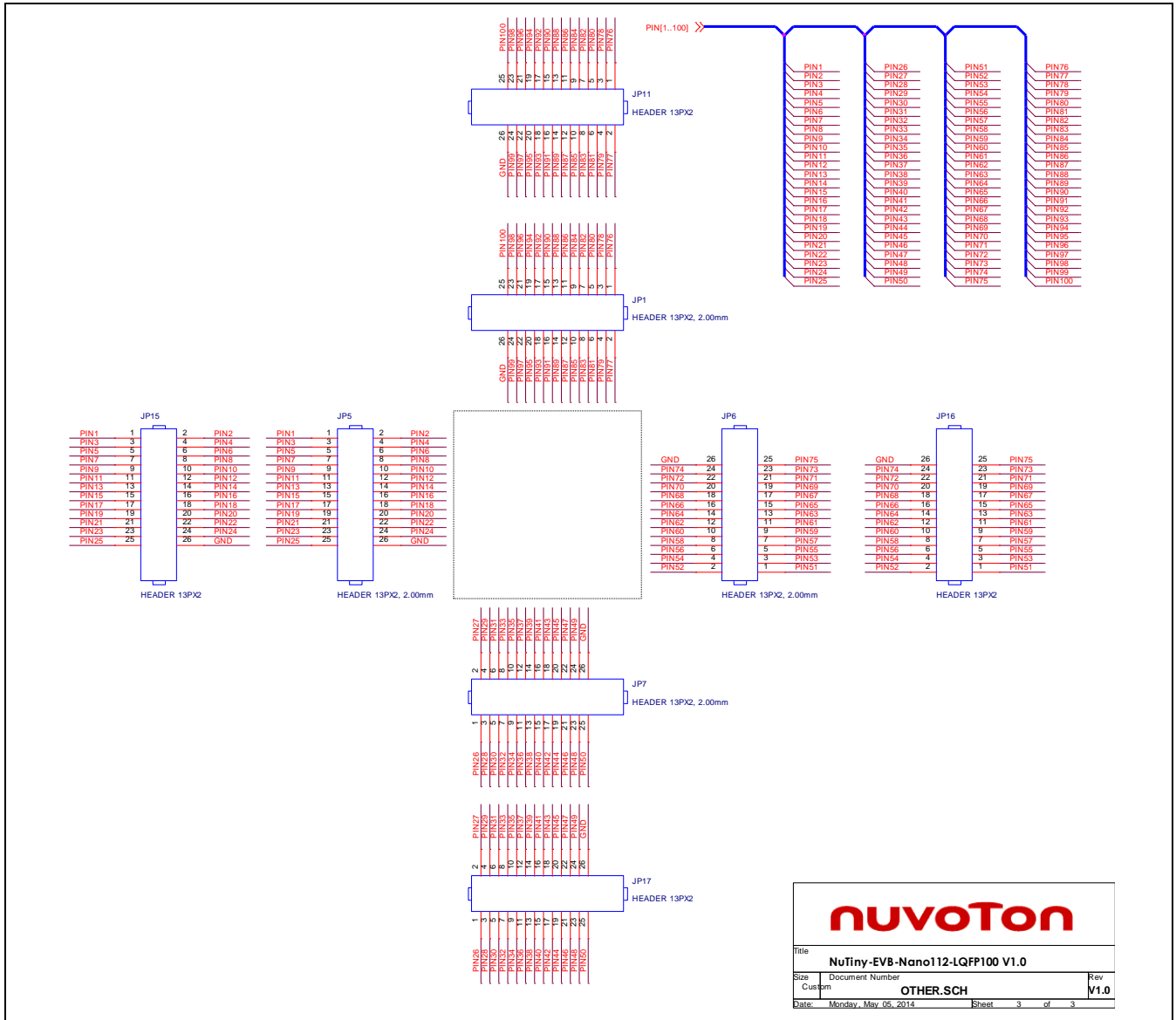
6.1 Nu-Link-Me Schematic



6.2 NuTiny-EVB-Nano112 Schematic



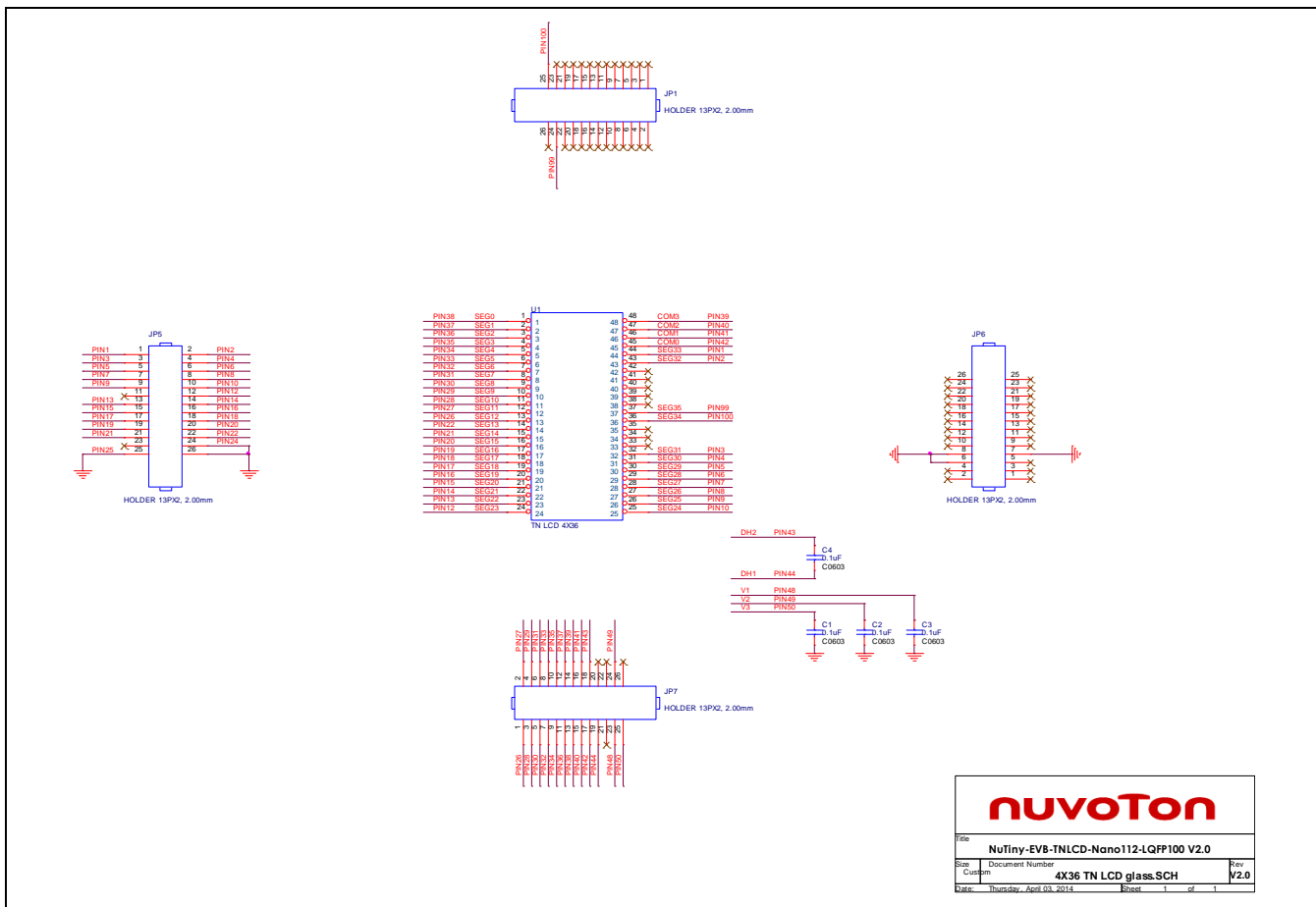
6.3 GPIO for 100 Pin Schematic



nuvoTon

Title		
NuTiny-EVB-Nano112-LQFP100 V1.0		
Size	Document Number	Rev
Custom	OTHER.SCH	V1.0
Date:	Monday, May 05, 2014	Sheet 3 of 3

6.4 NuTiny-EVB-TNLCD-Nano112 Schematic



nuvoTon

File		NuTiny-EVB-TNLCD-Nano112-LQFP100 V2.0	
Size	Document Number	Revision	Rev
	4X36 TN LCD glass.SCH		V2.0
Date	Thursday, April 03, 2015	Page	1 of 1

7 REVISION HISTORY

Date	Revision	Description
2015.07.08	1.00	1. Preliminary version.

Important Notice

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