Nu-LB-Nano130 User Manual

Application Note for 32-bit NuMicro® Family

Rev.1.01 — Dec.17, 2012

Document Information

Abstract	This user manual provides information about hardware features and information about using this learning board. The Nu-LB-Nano130 learning board is similar to other development boards. Users can use it to develop and verify applications to emulate the real behavior.
Apply to	Nu-LB-Nano130 Board

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1 Introduction

The Nu-LB-Nano130 is an evaluation board for NUVOTON's Cortex™-M0 based Nano100 series microcontrollers, and provides a complete development environment for Nano130 microcontrollers which has 8/16K-byte internal SRAM and 32/64/128K-byte embedded flash, build-in 1.8V LDO, integrated

LCD 4x40 dots, USB 2.0 full-speed port, RTC, 12-bit SAR ADC, 12-bit DAC, capacitive Touch-Key and provide high performance connectivity peripheral interfaces such as UART, SPI, I2C, I2S, GPIOs, EBI (External Bus Interface) and ISO-7816-3 for Smart card. It supports Brown-Out Detector, power down mode with RAM retention and fast wake up via all peripheral interfaces.

The Nu-LB-Nano130 learning board 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 Nano130 series features. The Nu-LB-Nano130 can be a real system controller to design users' target systems.

This user manual provides information about hardware features and information about using this learning board. The following figure shows the Nu-LB-Nano130 board.

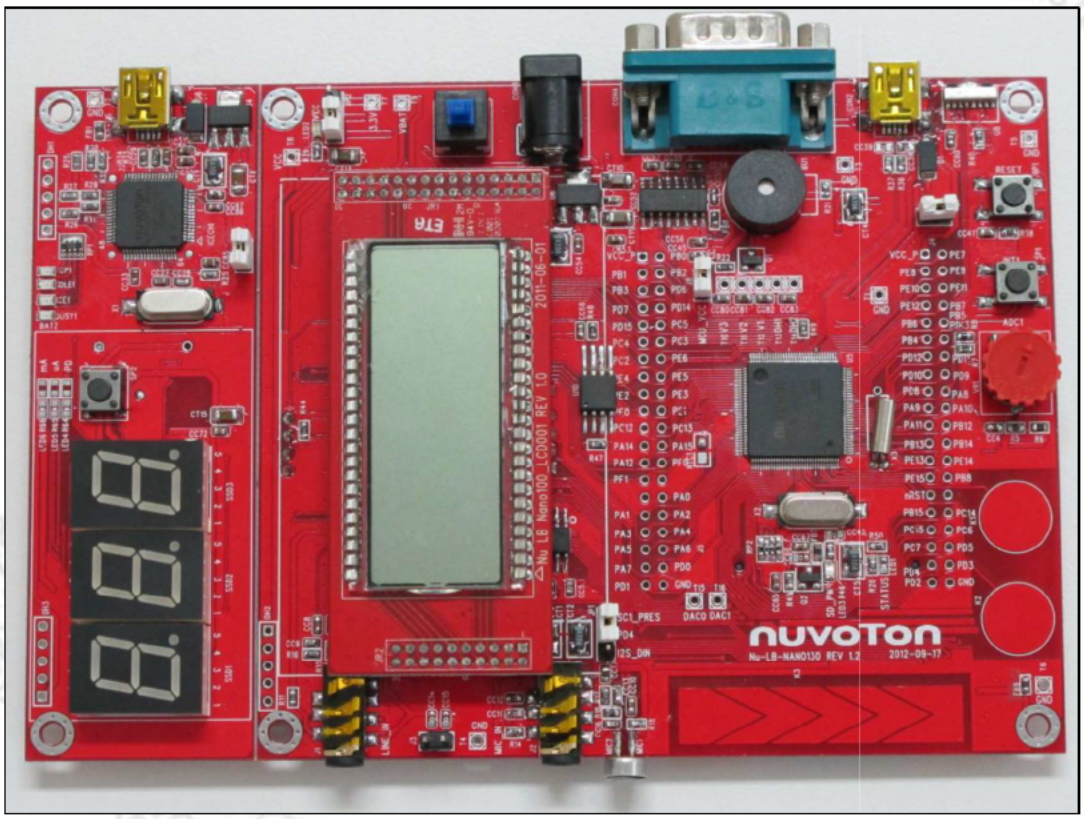


Figure 1-1 Nu-LB-Nano130 Board (Red)

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1.1 Nu-LB-Nano130

The Nu-LB-Nano130 is built around the NuMicro™ Nano130 MCU and provides versatile external devices such as one SPI flash for data storage, one SD card slot supported by SPI port1, one I²C interface serial EEPROM, one UART port with a RS-232 level shifter for console connection (UART0) and one 5-pin SWD interface for ICE debugging.

The following lists the main components of the Nu-LB-Nano130 board:

Main Components:

1. MCU: NuMicro™ Nano130 MCU, which can run up to 32MHz operating speed.
2. GPIO extension slot: GPIO extension slots that support all the GPI/O pins interface.
3. AUDIO: On-board WAU8822 audio codec.
4. I²C EEPROM: On-board 24LC64 I²C E²PROM.
5. SPI FLASH: On-board 25Q16 SPI serial FLASH for data storage.
6. UART: UART port0 connecting to Male type DSUB-9 connector.
7. SD card Slot: One SD card slot supported by SPI port1.
8. Smart card Slot: One Smart card slot supported by SMC port1.
9. Nu-Link ICE bridge: On-board ICE bridge parts.
10. SWD connector: One 5-pin SWD ICE port for ICE connection.
11. LCD connector: Supports TN/STN LCD glass and TFT LCM module.
12. Touch Pads: 5-key slider and 2-key touch pads onboard.
13. DC power jack: 5V/1A power adapter input.

12. LDO: A 5V to 3.3V/1A LDO that supports Nano130 and on-board devices.

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1.1.1 PCB Placement and Connectors Location

This section provides board placement and peripheral connectors' information for using the Nu-LB-Nano130 board. The following figure shows the connectors' location of Nu-LB-Nano130 board.

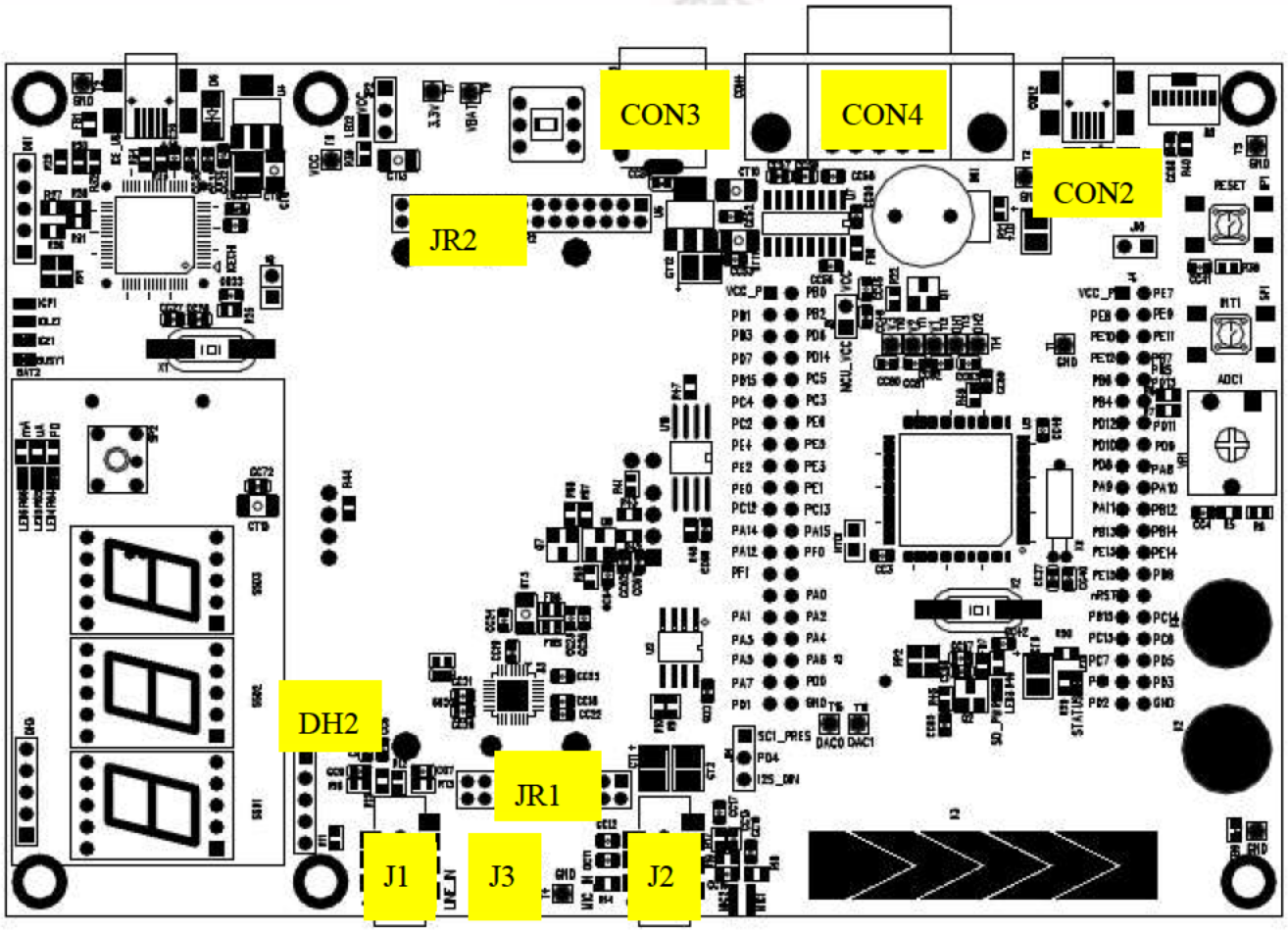
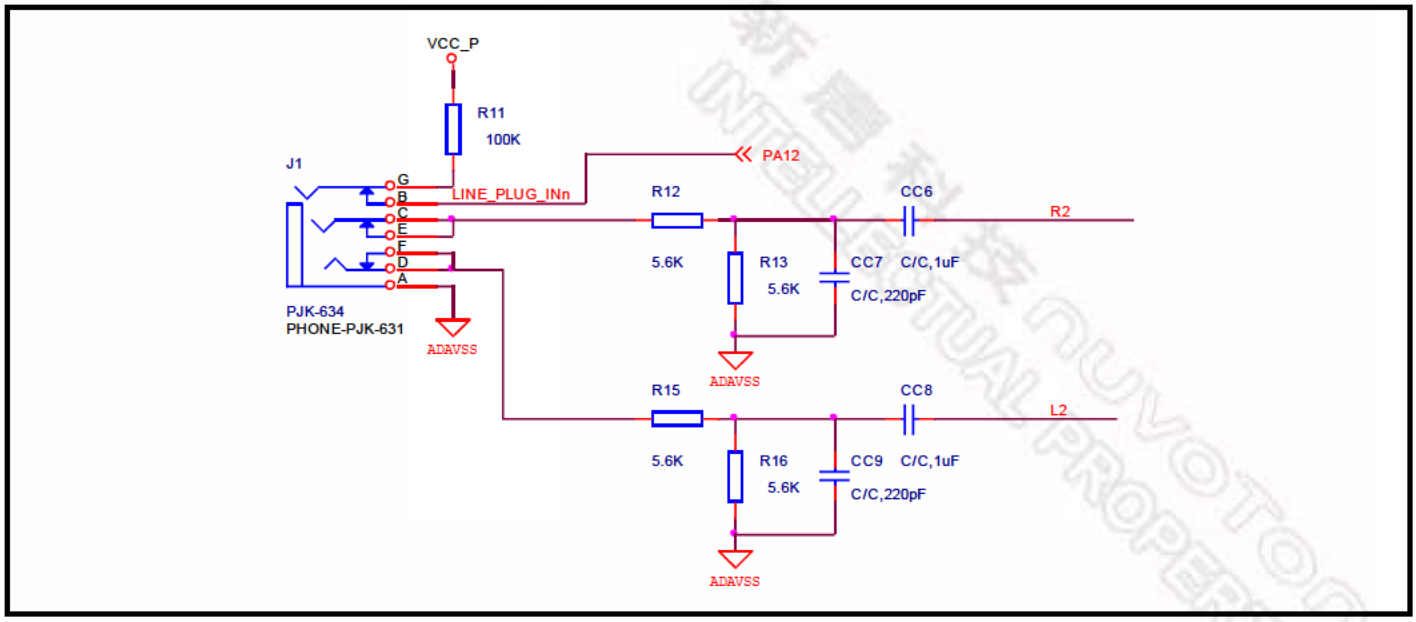


Figure 1-2 PCB Placement of Nu-LB-Nano130 Board

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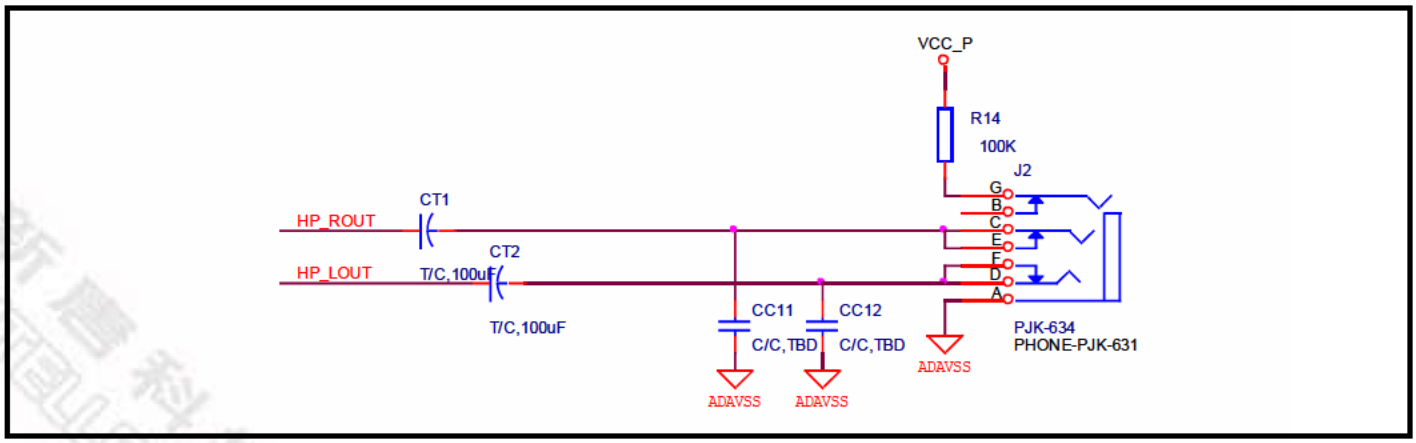
AUDIO Line-in connector: J1

- Audio Line-in connector of WAU8822



AUDIO HP out connector: J2

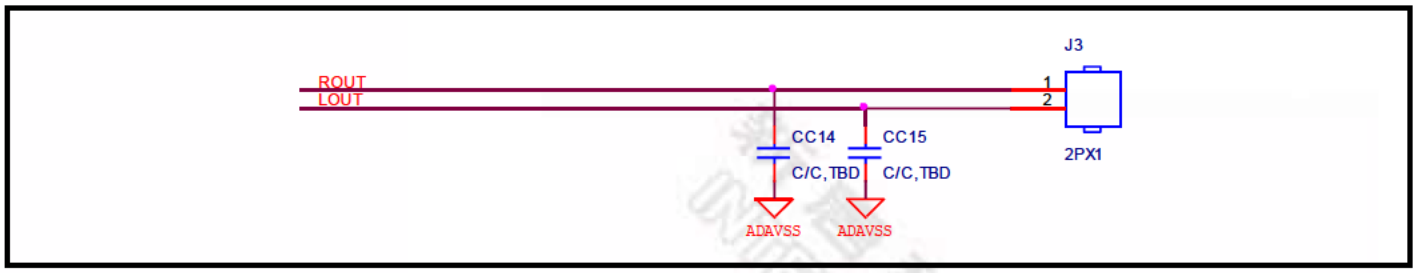
- Stero audio HP output of WAU8822



AUDIO SPK out connector: J3

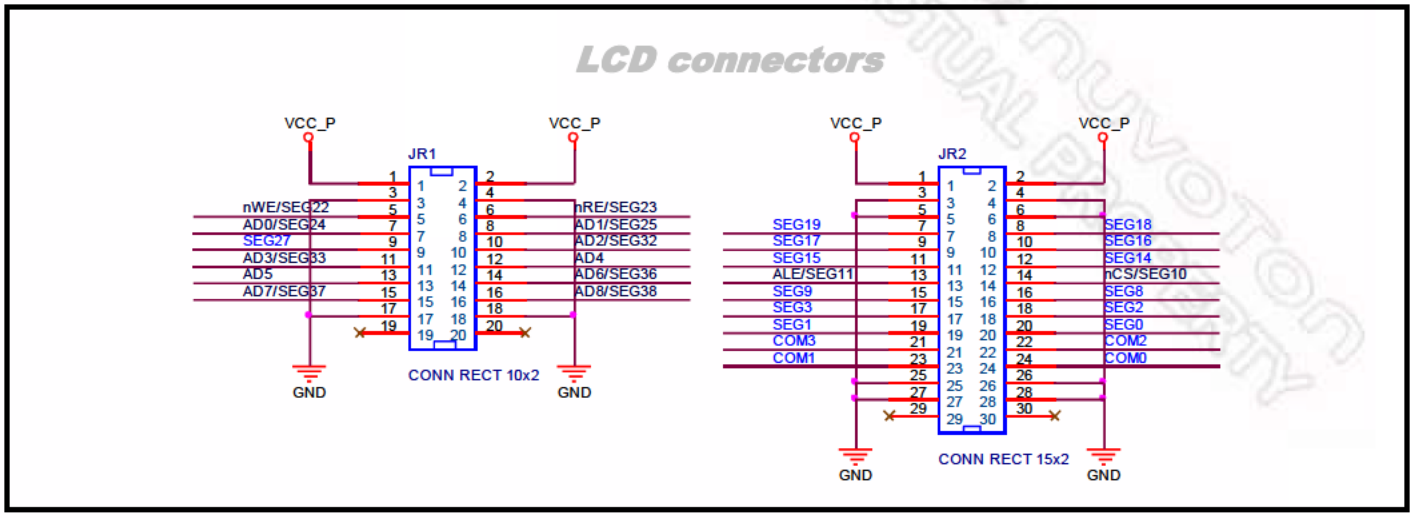
- Speaker output of WAU8822

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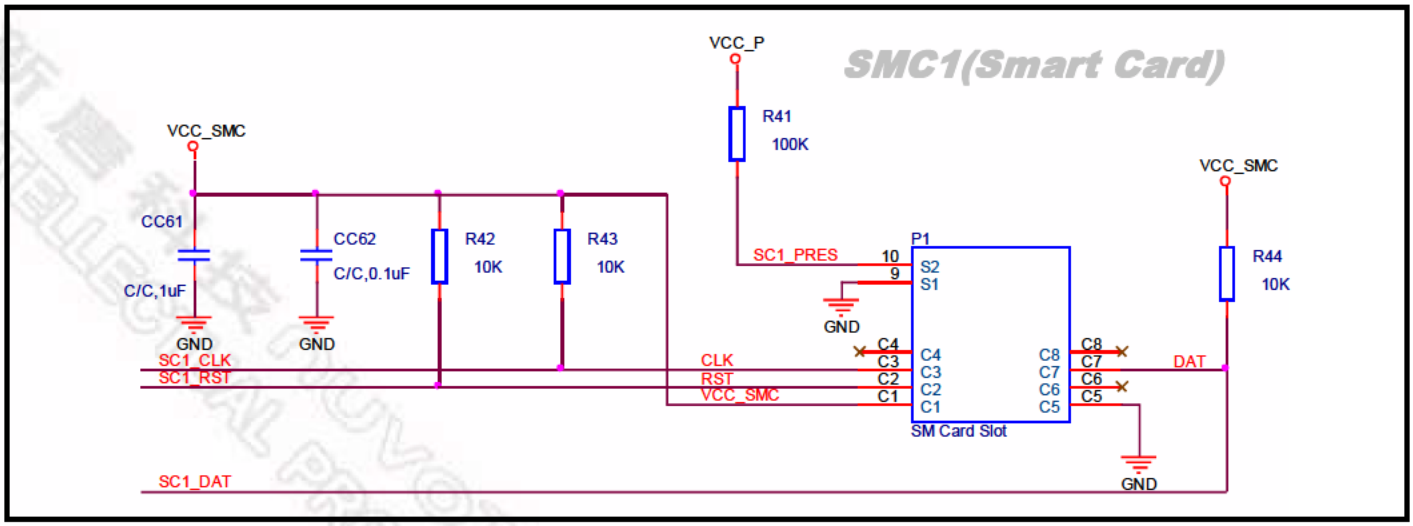
LCD interface: JR1,JR2

- LCD interface for connecting LCD glass and TFT LCM board.



SMC Port 1 connector: P1

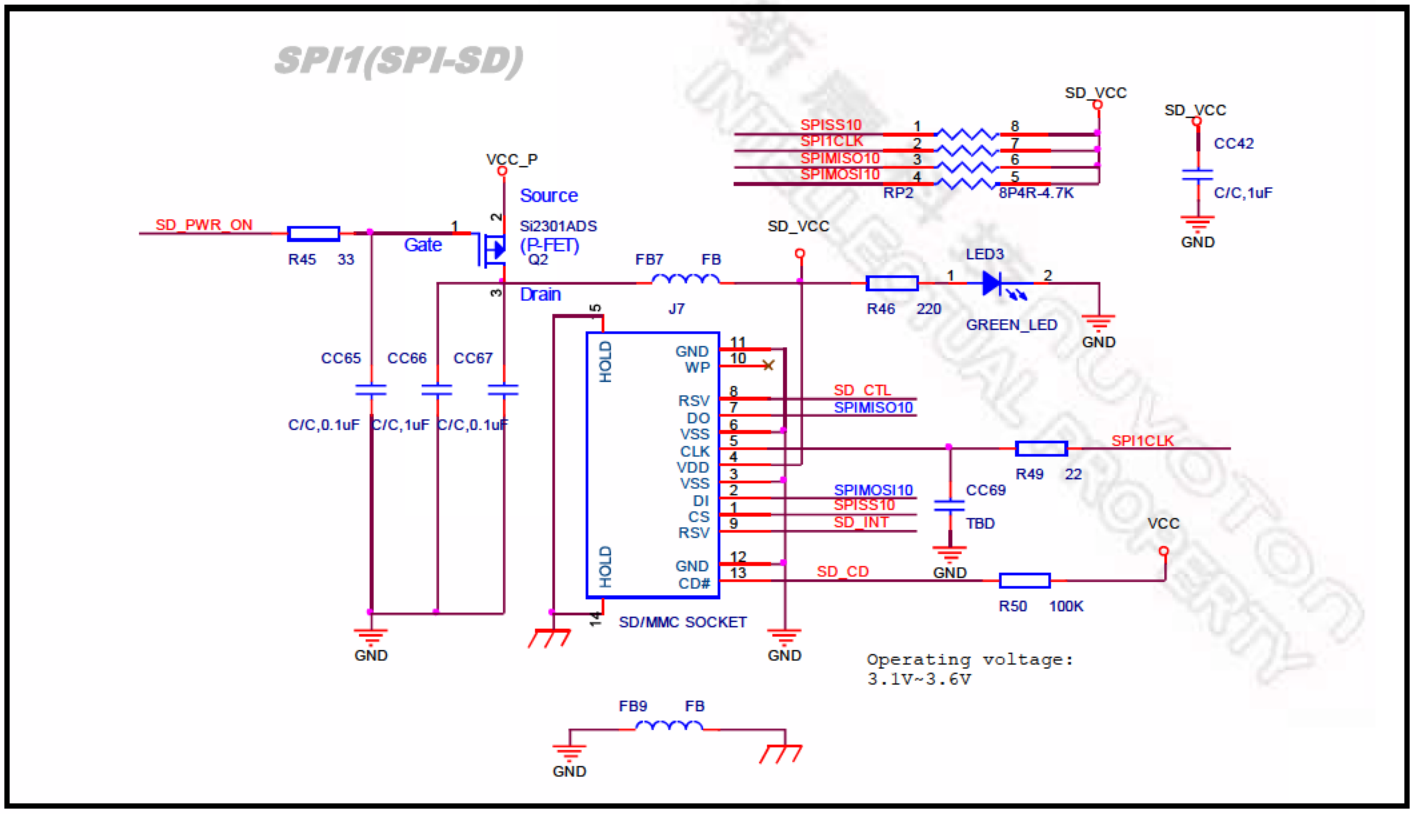
- SMC Port 1 interface.



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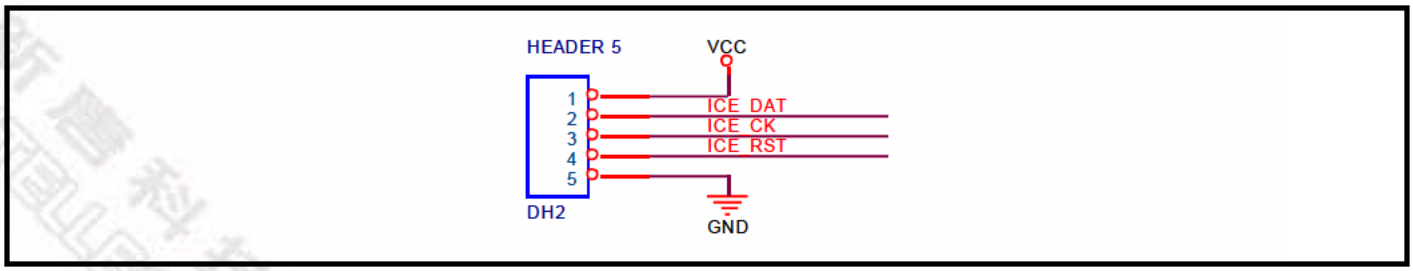
SD card slot: J7

- SD card interface (SPI mode only) connected to SPI port1.



SWD connector: DH2

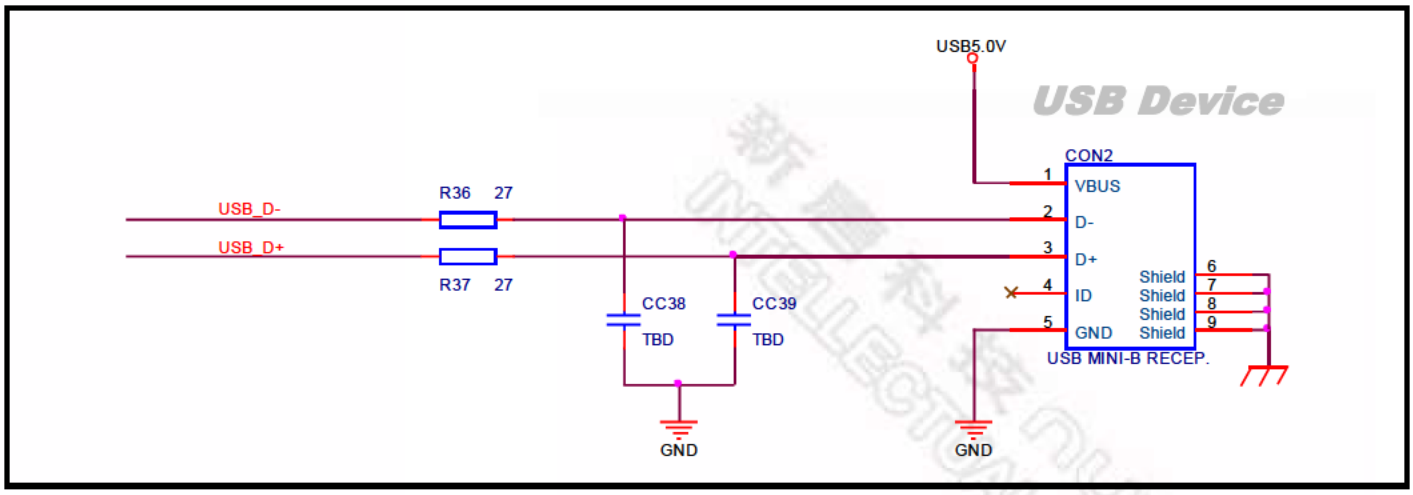
- 5-pin SWD interface for Nano130.



USB Device connector: CON2

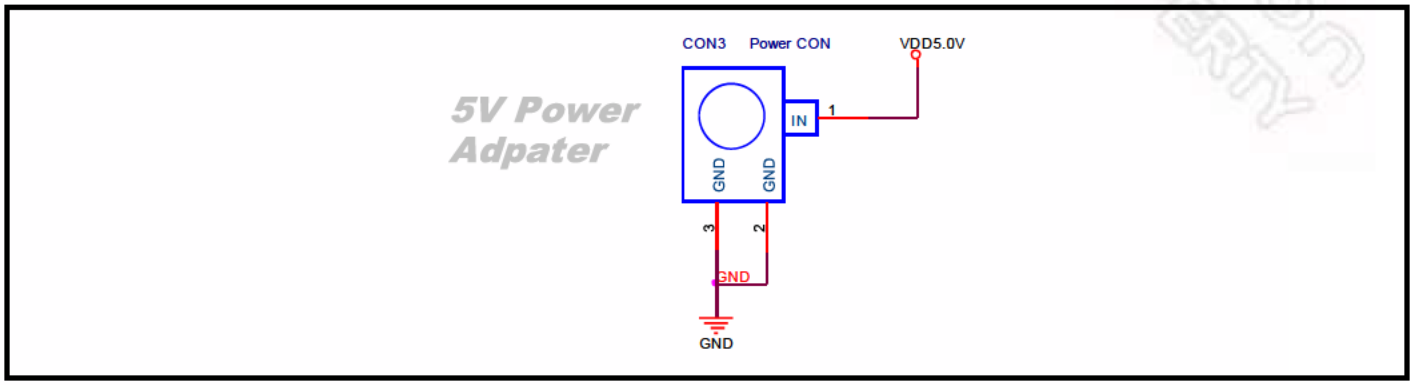
- Mini-B type USB connector.

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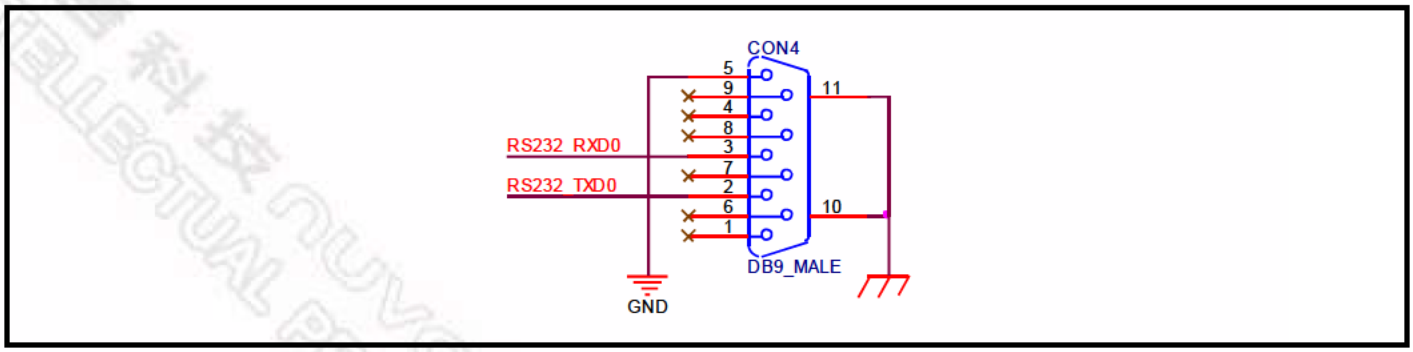
Power adapter input: CON3

- 5V/1A power adapter input connector.



UART Port 0 connector: CON4

- UART port 0 with RS-232 level shifter for debug console.



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1.2 Nu-Link ICE Bridge Parts

The Nu-Link-Me is a Debug Adaptor which 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*" for details. The two documents will be stored in the local hard disk when user installs each driver. Please refer to the following figure for Nu-Link ICE bridge parts on the Nu-LB-Nano130 board.

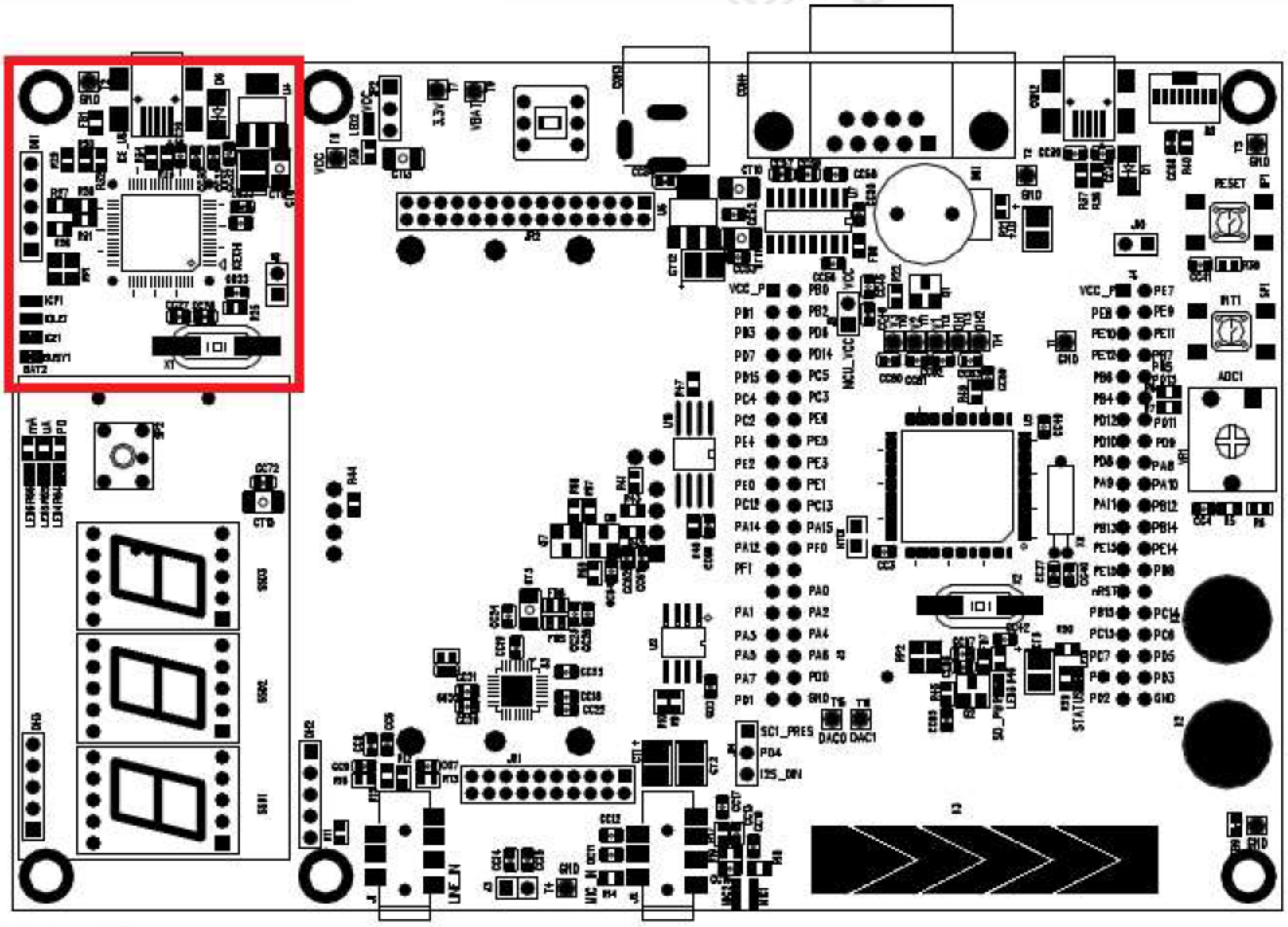


Figure 1-3 Nu-Link ICE Bridge Parts

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1.2.1 Nu-Link ICE Layout and Connectors

The following figure shows the layout of the Nu-Link ICE connectors.

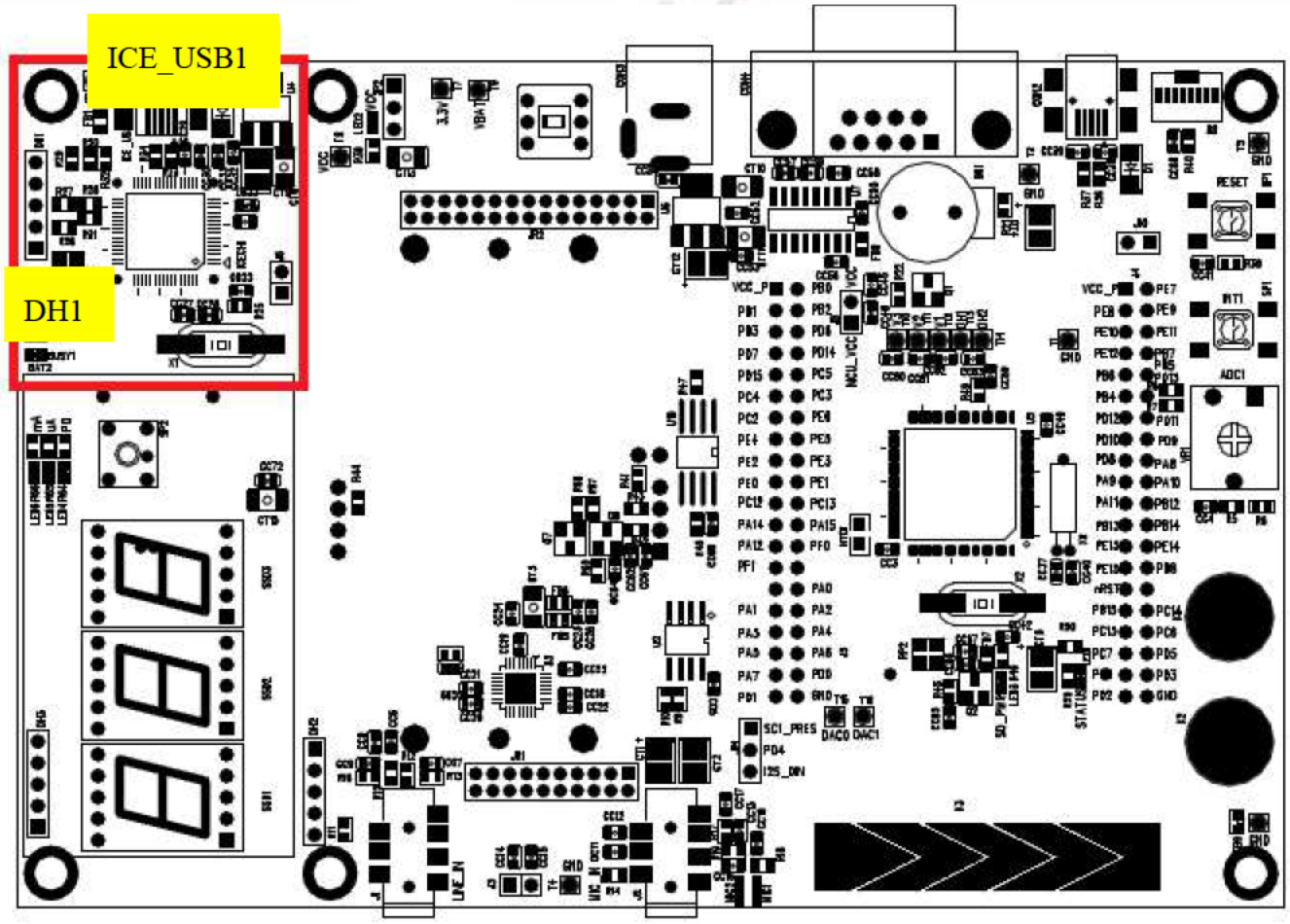
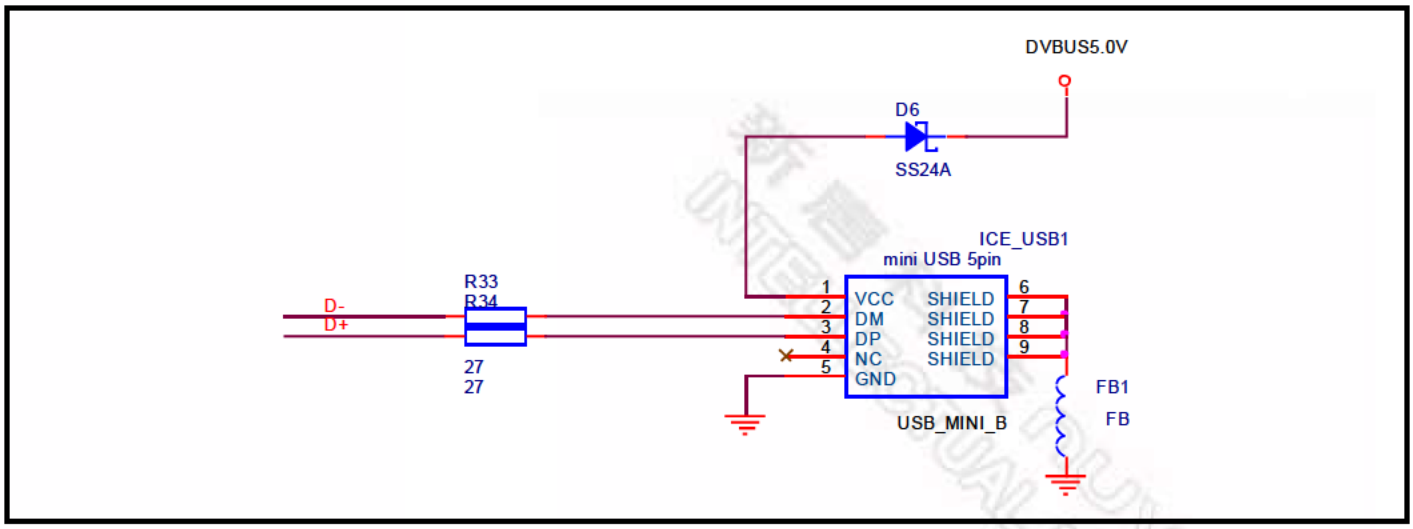


Figure 1-4 Nu-Link ICE Layout and Connectors

USB device connector: ICE_USB1

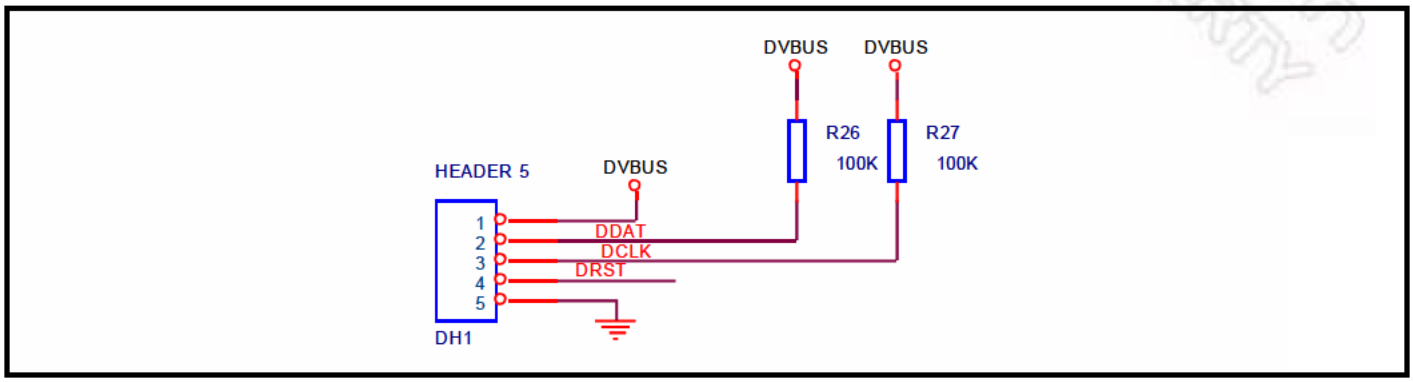
- Mini-B type USB connector.

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SWD interface: HEADER5

- 5-pin interface for SWD connector.



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1.3 LCD Interface

The following shows the interface for LCD glass module and TFT LCM board and provides the connectors information.

LCD interface: JR1 and JR2

- 30-pin + 20-pin interface for LCD module connectors.

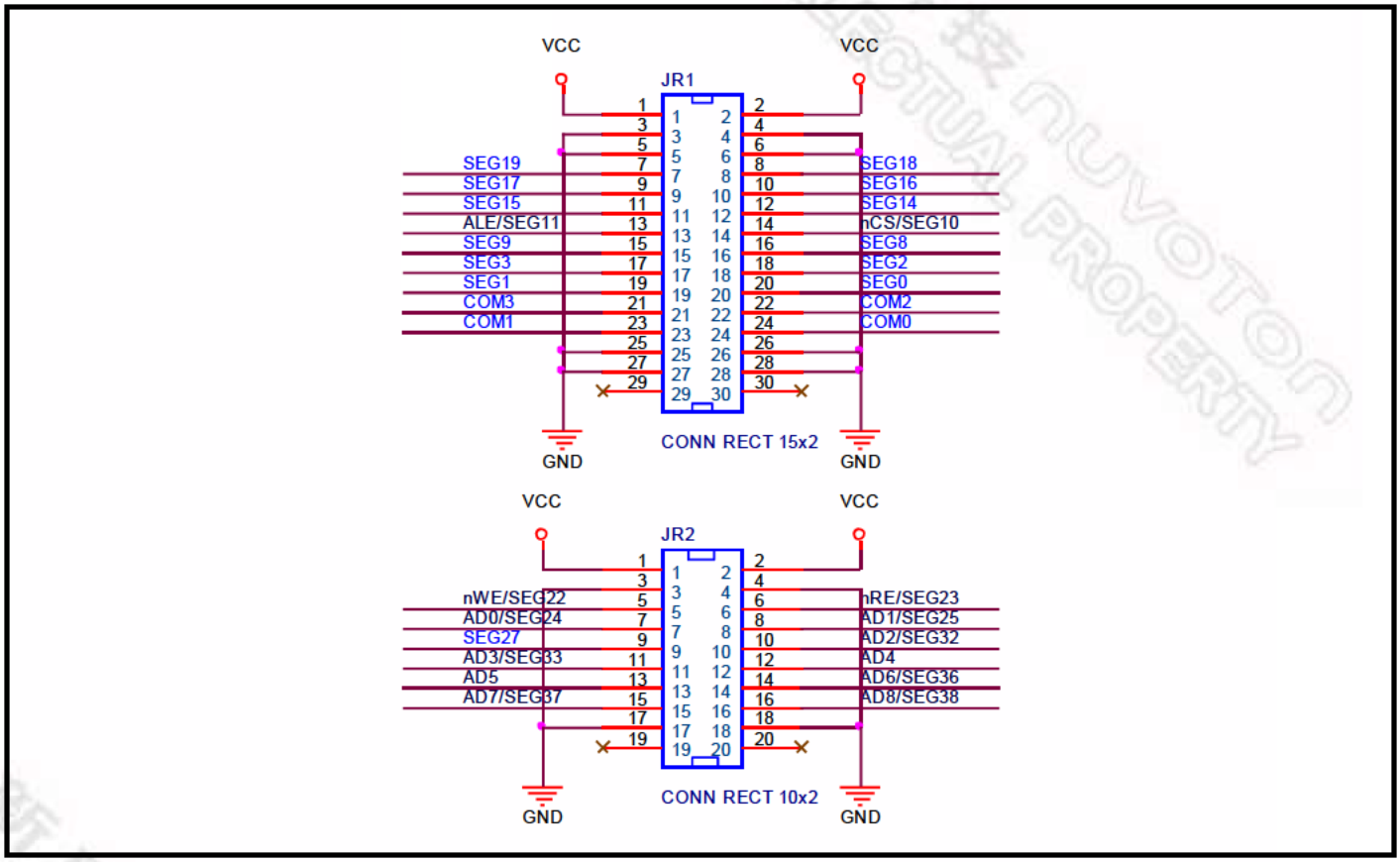


Figure 1-5 Connector Information

1.3.1 LCD Glass Board

This section provides LCD glass board figure, layout and 4x40 LCD glass socket information.

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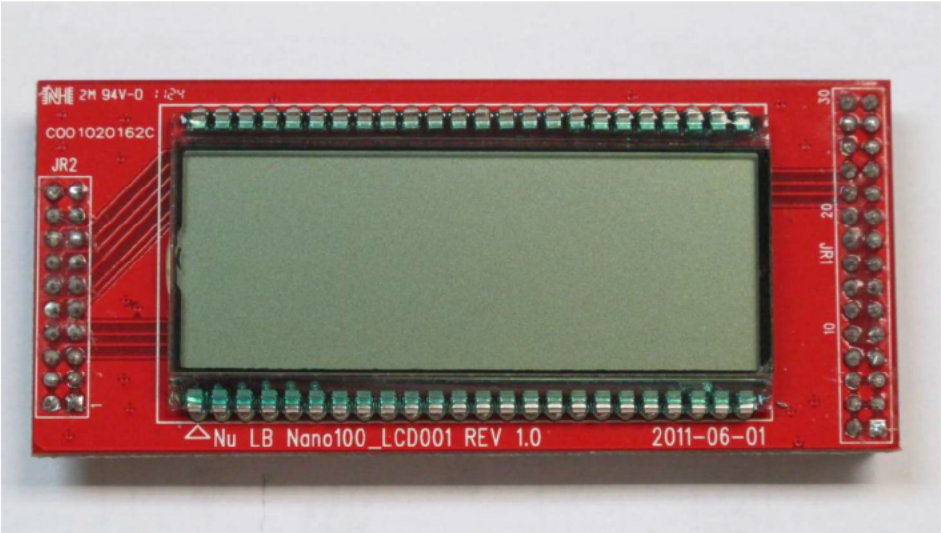


Figure 1-6 LCD Glass Board

LCD Interface: U1

- 48-pin interface for LCD glass socket.

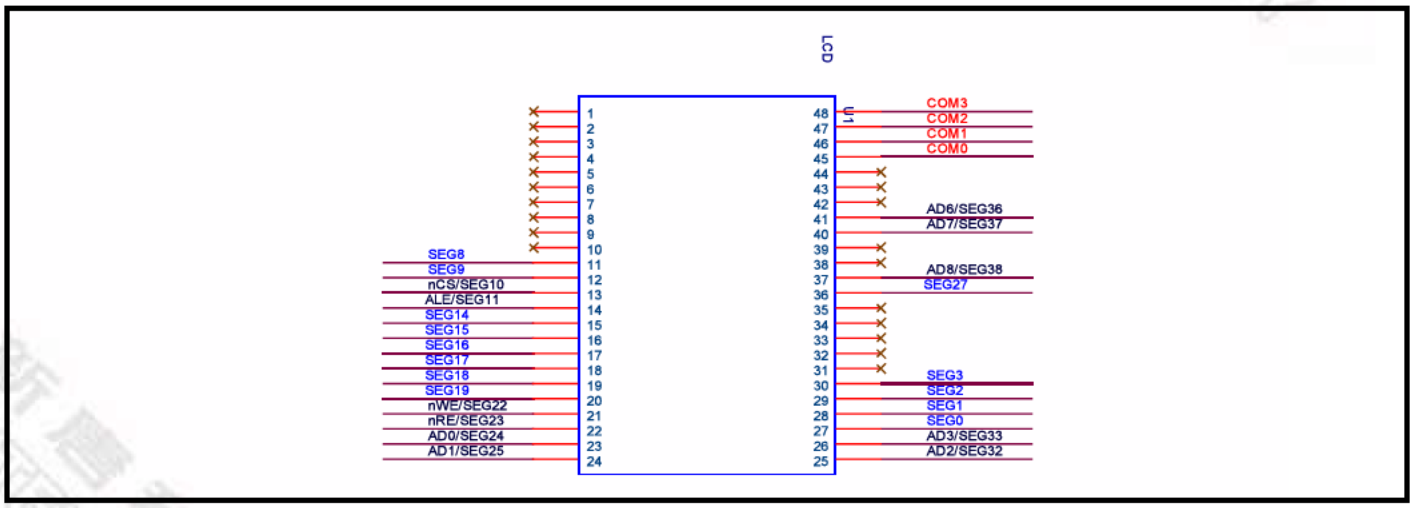


Figure 1-7 LCD Glass Socket Information

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1.3.2 TFT LCM Board

This section provides information about 240x320 TFT panel (GFT024CA240320).

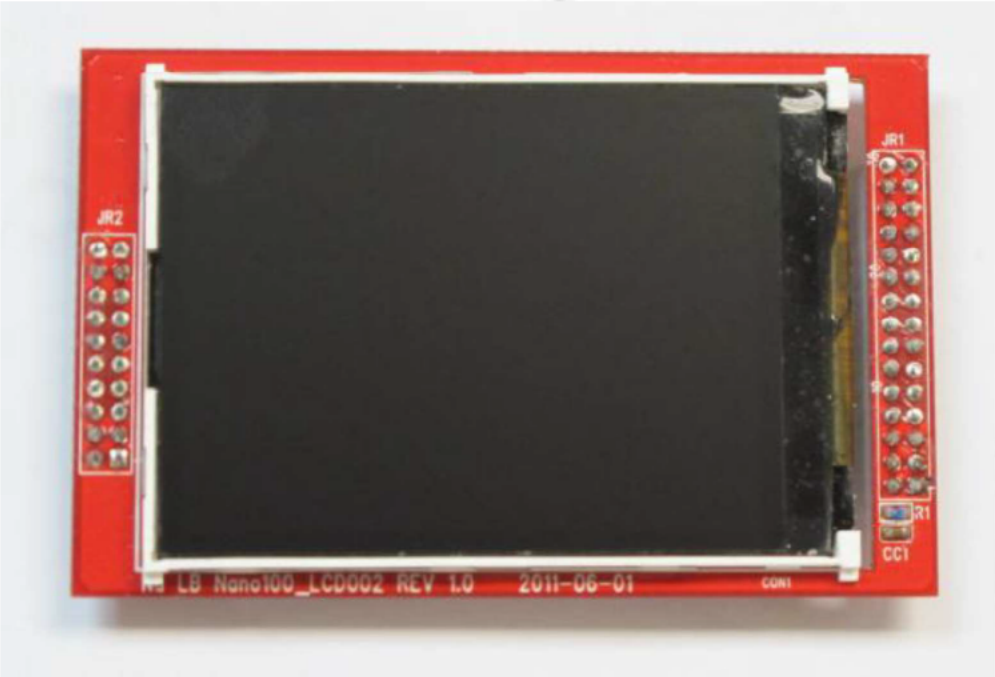
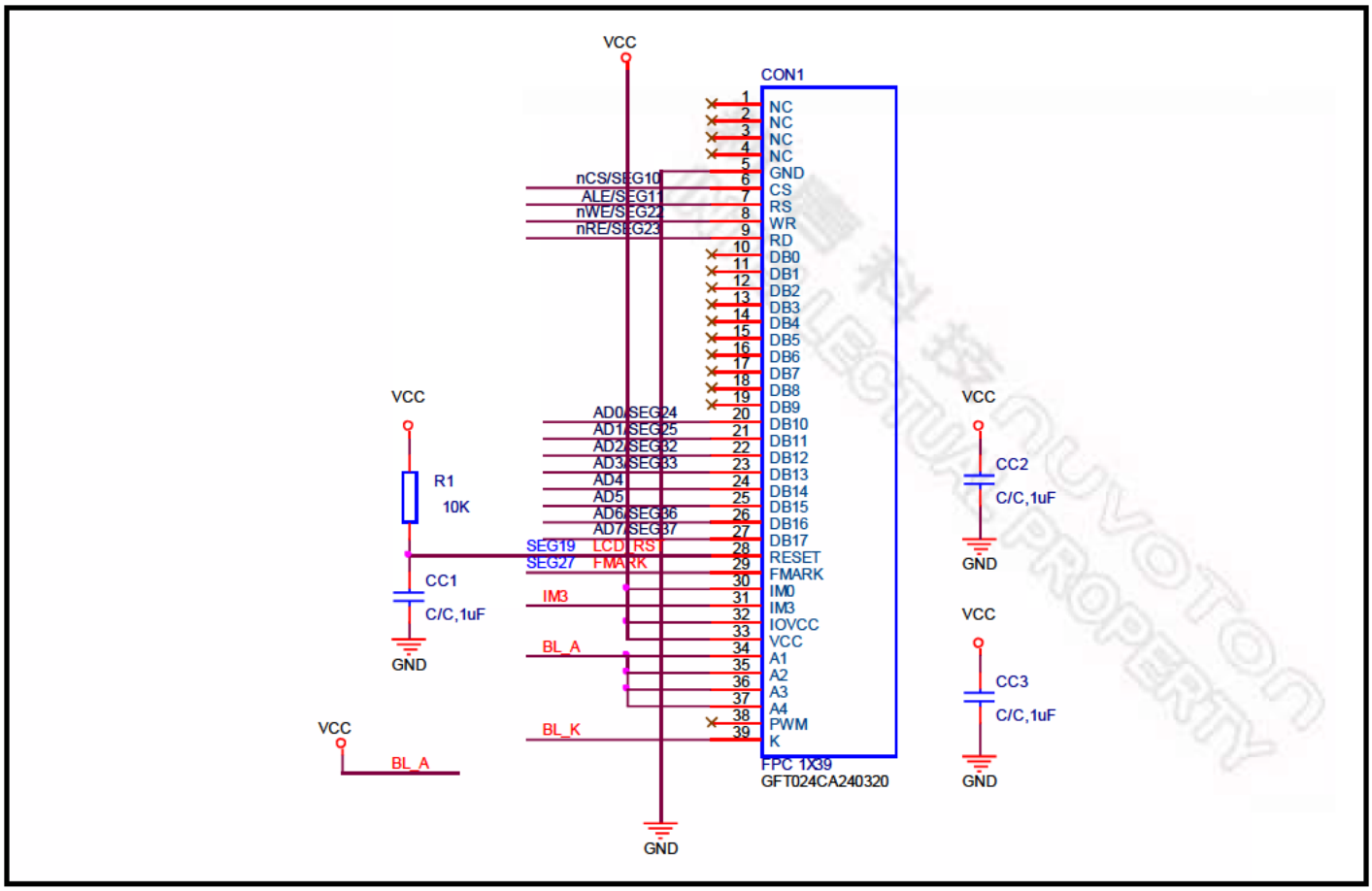


Figure 1-5 TFT LCM Board

LCM interface: CON1

- 39-pin FPC connector for GFT024CA240320.

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2 Getting Started

There are a few hardware jumpers need to be set for selecting corresponding configuration you want. The following sections provide multi-function I/O information and all the jumper settings for configuring your Nu-LB-Nano130 board. Due to many IP function are sharing the same I/O pins in Nano130 series MCU, please be carefully to set on-board jumpers to avoid conflicts between functions.

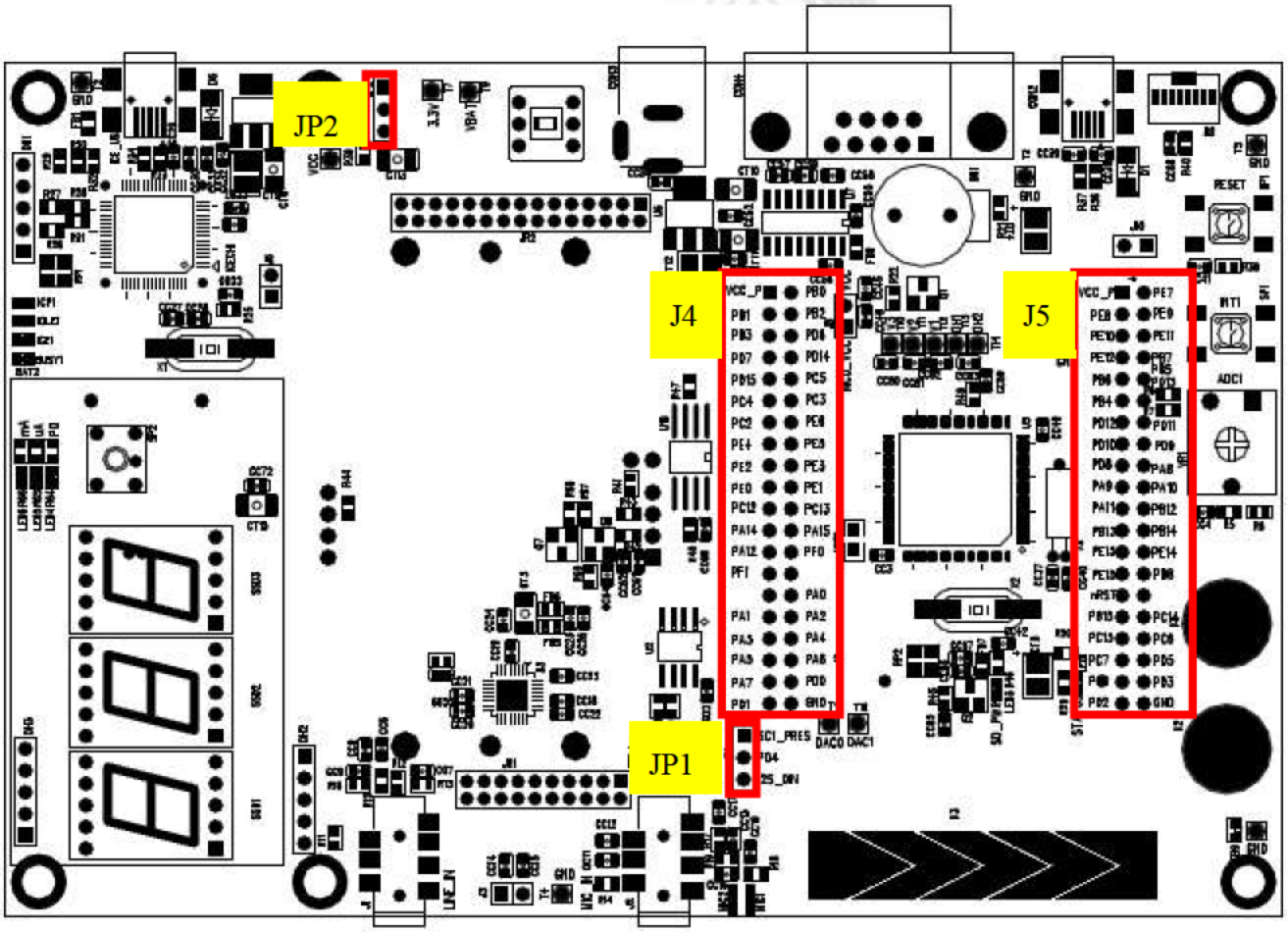


Figure 1-6 Nano130 Learning Board

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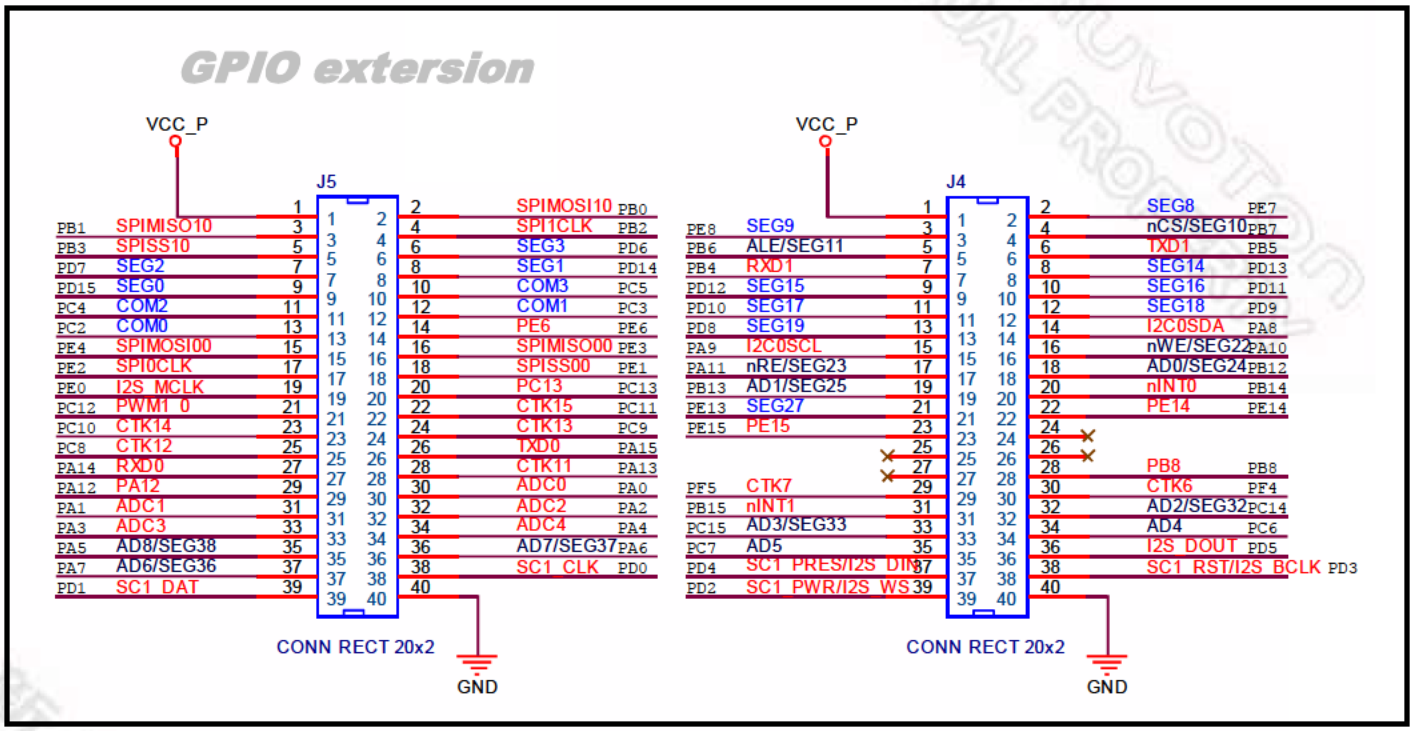
2.1 Nu-LB-Nano130 I/O Extension Connectors

The Nu-LB-Nano130 has 55 I/O pads and 13 power pads for a total of 68 pads. Two 50-pin male headers J4 and J5 can be connected to a daughterboard or standard wrapping board to the Nu-LB-Nano130 board.

Each pin on J4 and J5 can be used by a daughterboard after disconnecting it from the corresponding function block on the Nu-LB-Nano130 board. Please refer to the following for detailed pin description.

GPIO extension interface: J4, J5

- Two 40 pin interfaces support power, ground, reset and all GPI/O pins interface. The connection can be made by soldering wires directly to these pads, or by using 2.54 mm pitch headers and sockets.



2.1.1 NuMicro™ Nano130 Pin Description

Pin No.	Pin Name	Pin Type	Description
1	PE.13	I/O	General purpose digital I/O pin
	LCD_SEG27	O	LCD segment output 27 at LQFP128
2	PB.14	I/O	General purpose digital I/O pin

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Pin No.	Pin Name	Pin Type	Description
	INT0	I	External interrupt0 input pin
	SC2_CD	I	SmartCard2 card detect
	SPI2_SS1	O	SPI2 2nd slave select pin
	LCD_SEG12	O	LCD segment output 12 at LQFP64
	LCD_SEG26	O	LCD segment output 26 at LQFP128
3	PB.13	I/O	General purpose digital I/O pin
	EBI_AD1	I/O	EBI Address/Data bus bit1
	LCD_SEG11	O	LCD segment output 11 at LQFP64
	LCD_SEG25	O	LCD segment output 25 at LQFP128
4	PB.12	I/O	General purpose digital I/O pin
	EBI_AD0	I/O	EBI Address/Data bus bit0
	CLKO	O	Frequency Divider output pin
	LCD_SEG10	O	LCD segment output 10 at LQFP64
	LCD_SEG24	O	LCD segment output 24 at LQFP128
5			NC
6	X32O	O	External 32.768 kHz crystal output pin
7	X32I	I	External 32.768 kHz crystal input pin
8			NC
9	PA.11	I/O	General purpose digital I/O pin
	I2C1_SCL	I/O	I2C 1 clock pin

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Pin No.	Pin Name	Pin Type	Description
	EBI_nRD	O	EBI read enable output pin
	SC0_RST	O	SmartCard0 RST pin
	SPI2_MOSI0	I/O	SPI2 1st MOSI (Master Out, Slave In) pin
	LCD_SEG9	O	LCD segment output 9 at LQFP64
	LCD_SEG23	O	LCD segment output 23 at LQFP128
10	PA.10	I/O	General purpose digital I/O pin
	I2C1_SDA	I/O	I2C 1 data I/O pin
	EBI_nWR	O	EBI write enable output pin
	SC0_PWR	O	SmartCard0 Power pin
	SPI2_MISO0	I/O	SPI2 1st MISO (Master In, Slave Out) pin
	LCD_SEG8	O	LCD segment output 8 at LQFP64
	LCD_SEG22	O	LCD segment output 22 at LQFP128
11	PA.9	I/O	General purpose digital I/O pin
	I2C0_SCL	I/O	I2C 0 clock pin
	SC0_DAT	I/O	SmartCard0 DATA pin
	SPI2_CLK	O	SPI2 serial clock pin
	LCD_SEG7	O	LCD segment output 7 at LQFP64
	LCD_SEG21	O	LCD segment output 21 at LQFP128
12	PA.8	I/O	General purpose digital I/O pin
	I2C0_SDA	I/O	I2C 0 data I/O pin

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Pin No.	Pin Name	Pin Type	Description
	SC0_CLK	O	SmartCard0 clock pin
	SPI2_SS0	O	SPI2 1st slave select pin
	LCD_SEG6	O	LCD segment output 6 at LQFP64
	LCD_SEG20	O	LCD segment output 20 at LQFP128
13	PD.8	I/O	General purpose digital I/O pin
	LCD_SEG19	O	LCD segment output 19 at LQFP128
14	PD.9	I/O	General purpose digital I/O pin
	LCD_SEG18	O	LCD segment output 18 at LQFP128
15	PD.10	I/O	General purpose digital I/O pin
	LCD_SEG17	O	LCD segment output 17 at LQFP128
16	PD.11	I/O	General purpose digital I/O pin
	LCD_SEG16	O	LCD segment output 16 at LQFP128
17	PD.12	I/O	General purpose digital I/O pin
	LCD_SEG15	O	LCD segment output 15 at LQFP128
18	PD.13	I/O	General purpose digital I/O pin
	LCD_SEG14	O	LCD segment output 14 at LQFP128
19	PB.4	I/O	General purpose digital I/O pin
	UART1_RXD	I	UART1 Data receiver input pin
	SC0_CD	I	SmartCard0 card detect pin
	SPI2_SS0	O	SPI2 1st slave select pin

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Pin No.	Pin Name	Pin Type	Description
	LCD_SEG5	O	LCD segment output 5 at LQFP64
	LCD_SEG13	O	LCD segment output 13 at LQFP128
20	PB.5	I/O	General purpose digital I/O pin
	UART1_TXD	O	UART1 Data transmitter output pin
	SC0_RST	O	SmartCard0 RST pin
	SPI2_CLK	O	SPI2 serial clock pin
	LCD_SEG4	O	LCD segment output 4 at LQFP64
	LCD_SEG12	O	LCD segment output 12 at LQFP128
21	PB.6	I/O	General purpose digital I/O pin
	UART1_nRTS	O	UART1 Request to Send output pin
	EBI_ALE	O	EBI address latch enable output pin
	SPI2_MISO0	I/O	SPI2 2nd MISO (Master In, Slave Out) pin
	LCD_SEG3	O	LCD segment output 3 at LQFP64
	LCD_SEG11	O	LCD segment output 11 at LQFP128
22	PB.7	I/O	General purpose digital I/O pin
	UART1_nCTS	I	UART1 Clear to Send input pin
	EBI_nCS	O	EBI chip select enable output pin
	SPI2_MOSI0	I/O	SPI2 1st MOSI (Master Out, Slave In) pin
	LCD_SEG2	O	LCD segment output 2 at LQFP64
	LCD_SEG10	O	LCD segment output 10 at LQFP128

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Pin No.	Pin Name	Pin Type	Description
23			NC
24	LDO_CAP	P	LDO output pin
25			NC
26			NC
27	VDD	P	Power supply for I/O ports and LDO source
28			NC
29	VSS	P	Ground
30	VSS	P	Ground
31	VSS	P	Ground
32	VSS	P	Ground
33	PE.12	I/O	General purpose digital I/O pin
34	PE.11	I/O	General purpose digital I/O pin
35	PE.10	I/O	General purpose digital I/O pin
36	PE.9	I/O	General purpose digital I/O pin
37	PE.8	I/O	General purpose digital I/O pin
	LCD_SEG9	O	LCD segment output 9 at LQFP128
38	PE.7	I/O	General purpose digital I/O pin
	LCD_SEG8	O	LCD segment output 8 at LQFP128
39			NC
40	USB_VBUS	USB	POWER SUPPLY: From USB Host or HUB.

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Pin No.	Pin Name	Pin Type	Description
41	USB_VDD33_CAP	USB	Internal Power Regulator Output 3.3V Decoupling Pin
42	USB_D-	USB	USB Differential Signal D-
43	USB_D+	USB	USB Differential Signal D+
44	PB.0	I/O	General purpose digital I/O pin
	UART0_RXD	I	UART0 Data receiver input pin
	SPI1_MOSI0	I/O	SPI1 1st MOSI (Master Out, Slave In) pin
	LCD_SEG1	O	LCD segment output 1 at LQFP64
	LCD_SEG7	O	LCD segment output 7 at LQFP128
45	PB.1	I/O	General purpose digital I/O pin
	UART0_TXD	O	UART0 Data transmitter output pin
	SPI1_MISO0	I/O	SPI1 1st MISO (Master In, Slave Out) pin
	LCD_SEG0	O	LCD segment output 0 at LQFP64
	LCD_SEG6	O	LCD segment output 6 at LQFP128
46	PB.2	I/O	General purpose digital I/O pin
	UART0_nRTS	O	UART0 Request to Send output pin
	EBI_nWRL	O	EBI low byte write enable output pin
	SPI1_CLK	O	SPI1 serial clock pin
	LCD_COM3	O	LCD common output 3 at LQFP64
	LCD_SEG5	O	LCD segment output 5 at LQFP128
47	PB.3	I/O	General purpose digital I/O pin

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Pin No.	Pin Name	Pin Type	Description
	UART0_nCTS	I	UART0 Clear to Send input pin
	EBI_nWRH	O	EBI high byte write enable output pin
	SPI1_SS0	O	SPI1 1st slave select pin
	LCD_COM2	O	LCD common output 2 at LQFP64
	LCD_SEG4	O	LCD segment output 4 at LQFP128
48	PD.6	I/O	General purpose digital I/O pin
	LCD_SEG3	O	LCD segment output 3 at LQFP128
49	PD.7	I/O	General purpose digital I/O pin
	LCD_SEG2	O	LCD segment output 2 at LQFP128
50	PD.14	I/O	General purpose digital I/O pin
	LCD_SEG1	O	LCD segment output 1 at LQFP128
51	PD.15	I/O	General purpose digital I/O pin
	LCD_SEG0	O	LCD segment output 0 at LQFP128
52	PC.5	I/O	General purpose digital I/O pin
	SPI0_MOSI1	O	SPI0 2nd MOSI (Master Out, Slave In) pin
	LCD_COM3	O	LCD common output 3 at LQFP128
53	PC.4	I/O	General purpose digital I/O pin
	SPI0_MISO1	I	SPI0 2nd MISO (Master In, Slave Out) pin
	LCD_COM2	O	LCD common output 2 at LQFP128
54	PC.3	I/O	General purpose digital I/O pin

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Pin No.	Pin Name	Pin Type	Description
	SPI0_MOSI0	O	SPI0 1st MOSI (Master Out, Slave In) pin
	I2S_DO	O	I2S data output
	SC1_RST	O	SmartCard1 RST pin
	LCD_COM1	O	LCD common output 1 at LQFP64
	LCD_COM1	O	LCD common output 1 at LQFP128
55	PC.2	I/O	General purpose digital I/O pin
	SPI0_MISO0	I	SPI0 1st MISO (Master In, Slave Out) pin
	I2S_DI	I	I2S data input
	SC1_PWR	O	SmartCard1 PWR pin
	LCD_COM0	O	LCD common output 0 at LQFP64
	LCD_COM0	O	LCD common output 0 at LQFP128
56	PC.1	I/O	General purpose digital I/O pin
	SPI0_CLK	I/O	SPI0 serial clock pin
	I2S_BCLK	I/O	I2S bit clock pin
	SC1_DAT	I/O	SmartCard1 DATA pin
	LCD_DH2	O	LCD external capacitor pin of charge pump circuit at LQFP64
	LCD_DH2	O	LCD external capacitor pin of charge pump circuit at LQFP128
57	PC.0	I/O	General purpose digital I/O pin
	SPI0_SS0	I/O	SPI0 1st slave select pin

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Pin No.	Pin Name	Pin Type	Description
	I2S_LRCLK	I/O	I2S left right channel clock
	SC1_CLK	O	SmartCard1 clock pin
	LCD_DH1	O	LCD external capacitor pin of charge pump circuit at LQFP64
	LCD_DH1	O	LCD external capacitor pin of charge pump circuit at LQFP128
58	PE.6	I/O	General purpose digital I/O pin
59	LCD_VLCD	AO	LCD power supply pin
60			NC
61	PE.5		General purpose digital I/O pin
62	PB.11	I/O	General purpose digital I/O pin
	PWM1_CH0	I/O	PWM1 Channel0 output
	TM3	O	Timer3 external counter input
	SC2_DAT	I/O	SmartCard2 DATA pin
	SPI0_MISO0	I/O	SPI0 1st MISO (Master In, Slave Out) pin
	LCD_V1	O	LCD Unit voltage for LCD charge pump circuit at LQFP64
	LCD_V1	O	LCD Unit voltage for LCD charge pump circuit at LQFP128
63	PB.10	I/O	General purpose digital I/O pin
	SPI0_SS1	I/O	SPI0 2nd slave select pin
	TM2	O	Timer2 external counter input

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Pin No.	Pin Name	Pin Type	Description
	SC2_CLK	O	SmartCard2 clock pin
	SPI0_MOSI0	I/O	SPI0 1st MOSI (Master Out, Slave In) pin
	LCD_V2	O	LCD driver biasing voltage at LQFP64
	LCD_V2	O	LCD driver biasing voltage at LQFP128
64	PB.9	I/O	General purpose digital I/O pin
	SPI1_SS1	I/O	SPI1 2nd slave select pin
	TM1	O	Timer1 external counter input
	SC2_RST	O	SmartCard2 RST pin
	INT0	I	External interrupt0 input pin
	LCD_V3	O	LCD driver biasing voltage at LQFP64
	LCD_V3	O	LCD driver biasing voltage at LQFP128
65	PE.4	I/O	General purpose digital I/O pin
	SPI0_MOSI0	I/O	SPI0 1st MOSI (Master Out, Slave In) pin
66	PE.3	I/O	General purpose digital I/O pin
	SPI0_MISO0	I/O	SPI0 1st MISO (Master In, Slave Out) pin
67	PE.2	I/O	General purpose digital I/O pin
	SPI0_CLK	O	SPI0 serial clock pin
68	PE.1	I/O	General purpose digital I/O pin
	PWM1_CH3	I/O	PWM1 Channel3 output
	SPI0_SS0	O	SPI0 1st slave select pin

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Pin No.	Pin Name	Pin Type	Description
69	PE.0	I/O	General purpose digital I/O pin
	PWM1_CH2	I/O	PWM1 Channel2 output
	I2S_MCLK	O	I2S master clock output pin
70	PC.13	I/O	General purpose digital I/O pin
	SPI1_MOSI1	O	SPI1 2nd MOSI (Master Out, Slave In) pin
	PWM1_CH1	O	PWM1 Channel1 output
	SNOOPER	I	Snooper pin
	INT0	I	External interrupt 0 input pin
	I2C0_SCL	O	I2C 0 clock pin
71	PC.12	I/O	General purpose digital I/O pin
	SPI1_MISO1	I	SPI1 2nd MISO (Master In, Slave Out) pin
	PWM1_CH0	O	PWM1 Channel0 output
	INT0	I	External interrupt0 input pin
	I2C0_SDA	I/O	I2C 0 data I/O pin
72	PC.11	I/O	General purpose digital I/O pin
	SPI1_MOSI0	O	SPI1 1st MOSI (Master Out, Slave In) pin
	UART1_TXD	O	UART1 Data transmitter output pin
	CTK15	I	Touch key 15
	LCD_SEG31	O	LCD segment output 31 at LQFP64
73	PC.10	I/O	General purpose digital I/O pin

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Pin No.	Pin Name	Pin Type	Description
	SPI1_MISO0	I	SPI1 1st MISO (Master In, Slave Out) pin
	UART1_RXD	I	UART1 Data receiver input pin
	CTK14	I	Touch key 14
	LCD_SEG30	O	LCD segment output 30 at LQFP64
74	PC.9	I/O	General purpose digital I/O pin
	SPI1_CLK	I/O	SPI1 serial clock pin
	I2C1_SCL	I/O	I2C 1 clock pin
	CTK13	I	Touch key 13
	LCD_SEG29	O	LCD segment output 29 at LQFP64
75	PC.8	I/O	General purpose digital I/O pin
	SPI1_SS0	I/O	SPI1 1st slave select pin
	EBI_MCLK	O	EBI external clock output pin
	I2C1_SDA	I/O	I2C 1 data I/O pin
	CTK12	I	Touch key 12
	LCD_SEG28	O	LCD segment output 28 at LQFP64
76	PA.15	I/O	General purpose digital I/O pin
	PWM0_CH3	I/O	PWM0 Channel3 output
	I2S_MCLK	O	I2S master clock output pin
	TC3	I	Timer3 capture input
	SC0_PWR	O	SmartCard0 Power pin

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Pin No.	Pin Name	Pin Type	Description
	UART0_TXD	O	UART0 Data transmitter output pin
	LCD_SEG27	O	LCD segment output 27 at LQFP64
77	PA.14	I/O	General purpose digital I/O pin
	PWM0_CH2	I/O	PWM0 Channel2 output
	EBI_AD15	I/O	EBI Address/Data bus bit15
	TC2	I	Timer 2 capture input
	UART0_RXD	I	UART0 Data receiver input pin
	LCD_SEG26	O	LCD segment output 26 at LQFP64
78	PA.13	I/O	General purpose digital I/O pin
	PWM0_CH1	I/O	PWM0 Channel1 output
	EBI_AD14	I/O	EBI Address/Data bus bit14
	TC1	I	Timer1 capture input
	I2C0_SCL	I/O	I2C 0 clock pin
	CTK11	I	Touch key 11
	LCD_SEG25	O	LCD segment output 25 at LQFP64
79	PA.12	I/O	General purpose digital I/O pin
	PWM0_CH0	I/O	PWM0 Channel0 output
	EBI_AD13	I/O	EBI Address/Data bus bit13
	TC0	I	Timer 0 capture input
	I2C0_SDA	I/O	I2C 0 data I/O pin

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Pin No.	Pin Name	Pin Type	Description
	CTK10	I	Touch key 10
	LCD_SEG24	O	LCD segment output 24 at LQFP64
80	ICE_DAT	I/O	Serial Wired Debugger Data pin
	PF.0	I/O	General purpose digital I/O pin
	INT0	I	External interrupt0 input pin
81	ICE_CLK	I	Serial Wired Debugger Clock pin
	PF.1	I/O	General purpose digital I/O pin
	CLKO	O	Frequency Divider output pin
	INT1	I	External interrupt1 input pin
82			NC
83	VDD	P	Power supply for I/O ports and LDO source for internal PLL and digital circuit
84			NC
85	VSS	P	Ground
86	VSS	P	Ground
87	AVSS	AP	Ground Pin for analog circuit
88	AVSS	AP	Ground Pin for analog circuit
89	PA.0	I/O	General purpose digital I/O pin
	AD0	AI	ADC analog input0
	SC2_CD	I	SmartCard2 card detect
	CTK8	AI	Touch key 1

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Pin No.	Pin Name	Pin Type	Description
90	PA.1	I/O	General purpose digital I/O pin
	AD1	AI	ADC analog input1
	EBI_AD12	I/O	EBI Address/Data bus bit12
	CTK9	AI	Touch key 9
91	PA.2	I/O	General purpose digital I/O pin
	AD2	AI	ADC analog input2
	EBI_AD11	I/O	EBI Address/Data bus bit11
	UART1_RXD	I	UART1 Data receiver input pin
	LCD_SEG23	AO	LCD segment output 23 at LQFP64
92	PA.3	I/O	General purpose digital I/O pin
	AD3	AI	ADC analog input3
	EBI_AD10	I/O	EBI Address/Data bus bit10
	UART1_TXD	O	UART1 Data transmitter output pin
	LCD_SEG22	AO	LCD segment output 22 at LQFP64
93	PA.4	I/O	General purpose digital I/O pin
	AD4	AI	ADC analog input4
	EBI_AD9	I/O	EBI Address/Data bus bit9
	SC2_PWR	O	SmartCard2 Power pin
	I2C0_SDA	I/O	I2C 0 data I/O pin
	LCD_SEG21	AO	LCD segment output 21 at LQFP64

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Pin No.	Pin Name	Pin Type	Description
	LCD_SEG39	AO	LCD segment output 39 at LQFP128
94	PA.5	I/O	General purpose digital I/O pin
	AD5	AI	ADC analog input5
	EBI_AD8	I/O	EBI Address/Data bus bit8
	SC2_RST	O	SmartCard2 RST pin
	I2C0_SCL	I/O	I2C 0 clock pin
	LCD_SEG20	AO	LCD segment output 20 at LQFP64
	LCD_SEG38	AO	LCD segment output 38 at LQFP128
95	PA.6	I/O	General purpose digital I/O pin
	AD6	AI	ADC analog input6
	EBI_AD7	I/O	EBI Address/Data bus bit7
	TC3	I	Timer3 capture input
	SC2_CLK	O	SmartCard2 clock pin
	PWM0_CH3	O	PWM0 Channel3 output
	LCD_SEG19	AO	LCD segment output 19 at LQFP64
	LCD_SEG37	AO	LCD segment output 37 at LQFP128
96	PA.7	I/O	General purpose digital I/O pin
	AD7	AI	ADC analog input7
	EBI_AD6	I/O	EBI Address/Data bus bit6
	TC2	I	Timer2 capture input

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Pin No.	Pin Name	Pin Type	Description
	SC2_DAT	I/O	SmartCard2 DATA pin
	PWM0_CH2	O	PWM0 Channel2 output
	CTK_CAP	AI	Touch key Capacitor pin
	LCD_SEG18	AO	LCD segment output 18 output at LQFP64
	LCD_SEG36	AO	LCD segment output 36 output at LQFP128
97	VREF	AP	Voltage reference input for ADC
98			NC
99	AVDD	AP	Power supply for internal analog circuit
100	PD.0	I/O	General purpose digital I/O pin
	UART1_RXD	I	UART1 Data receiver input pin
	SPI2_SS0	I/O	SPI2 2nd slave select pin
	SC1_CLK	O	SmartCard1 clock pin
	CTK0	AI	Touch key 0
	AD8	AI	ADC analog input8
101	PD.1	I/O	General purpose digital I/O pin
	TX1	O	UART1 Data transmitter output pin
	SPI2_CLK	I/O	SPI2 serial clock pin
	SC1_DAT	I/O	SmartCard1 DATA pin
	AD9	AI	ADC analog input9
	CTK1	AI	Touch key 1

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Pin No.	Pin Name	Pin Type	Description
102	PD.2	I/O	General purpose digital I/O pin
	UART1_nRTS		UART1 Request to Send output pin
	I2S_LRCLK	I/O	I2S left right channel clock
	SPI2_MISO0	I	SPI2 1st MISO (Master In, Slave Out) pin
	SC1_PWR	O	SmartCard1 Power pin
	AD10	AI	ADC analog input10
	CTK2	AI	Touch key 2
103	PD.3	I/O	General purpose digital I/O pin
	UART1_nCTS		UART1 Clear to Send input pin
	I2S_BCLK	I/O	I2S bit clock pin
	SPI2_MOSI0	O	SPI2 1st MOSI (Master Out, Slave In) pin
	SC1_RST	O	SmartCard1 RST pin
	AD11	AI	ADC analog input11
	CTK3	AI	Touch key 3
104			NC
105	PD.4	I/O	General purpose digital I/O pin
	I2S_DI	I	I2S data input
	SPI2_MISO1	I	SPI2 2nd MISO (Master In, Slave Out) pin
	SC1_CD	I	SmartCard1 card detect
	CTK4	AI	Touch key 4

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Pin No.	Pin Name	Pin Type	Description
	LCD_SEG35	AO	LCD segment output 35 at LQFP128
106	PD.5	I/O	General purpose digital I/O pin
	I2S_DO	O	I2S data output
	SPI2_MOSI1	O	SPI2 2nd MOSI (Master Out, Slave In) pin
	CTK5	AI	Touch key 5
	LCD_SEG34	AO	LCD segment output 34 at LQFP128
107	PC.7	I/O	General purpose digital I/O pin
	DA1_OUT	AO	DAC 1 output
	EBI_AD5	I/O	EBI Address/Data bus bit5
	TC1	I	Timer1 capture input
	PWM0_CH1	O	PWM1 Channel1 output
	LCD_SEG17	AO	LCD segment output 17 at LQFP64
108	PC.6	I/O	General purpose digital I/O pin
	DA0_OUT	I	DAC0 output
	EBI_AD4	I/O	EBI Address/Data bus bit4
	TC0	I	Timer 0 capture input
	SC1_CD		SmartCard1 card detect pin
	PWM0_CH0	O	PWM0 Channel0 output
109	PC.15	I/O	General purpose digital I/O pin
	EBI_AD3	I/O	EBI Address/Data bus bit3

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Pin No.	Pin Name	Pin Type	Description
	TC0	I	Timer0 capture input
	PWM1_CH2	O	PWM1 Channel1 output
	LCD_SEG16	AO	LCD segment output 16 at LQFP64
	LCD_SEG33	AO	LCD segment output 33 at LQFP128
110	PC.14	I/O	General purpose digital I/O pin
	EBI_AD2	I/O	EBI Address/Data bus bit2
	PWM1_CH3	I/O	PWM1 Channel3 output
	LCD_SEG15	AO	LCD segment output 15 at LQFP64
	LCD_SEG32	AO	LCD segment output 32 at LQFP128
111	PB.15	I/O	General purpose digital I/O pin
	INT1	I	External interrupt1 input pin
	SNOOPER	I	Snooper pin
	SC1_CD	I	SmartCard1 card detect
	LCD_SEG14	AO	LCD segment output 14 at LQFP64
	LCD_SEG31	AO	LCD segment output 31 at LQFP128
112			NC
113	XT1_IN	O	External 4~24 MHz crystal output pin
114	XT1_OUT	I	External 4~24 MHz crystal input pin
115			NC

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Pin No.	Pin Name	Pin Type	Description
116	nRESET	I	External reset input: Low active, set this pin low reset chip to initial state. With internal pull-up.
117	VSS	P	Ground
118	VSS	P	Ground
119			NC
120	VDD	P	Power supply for I/O ports and LDO source for internal PLL and digital circuit
121			NC
122	PF.4	I/O	General purpose digital I/O pin
	I2C0_SDA	I/O	I2C 0 data I/O pin
	CTK6	AI	Touch key 6
123	PF.5	I/O	Digital GPI/O pin
	I2C0_SCL	I/O	I2C 0 clock pin
	CTK7	AI	Touch key 7
124	VSS	P	Ground
125	PVSS	I/O	PLL Ground
126	PB.8	I/O	General purpose digital I/O pin
	STADC	I	ADC external trigger input.
	TM0	I	Timer0 external counter input
	INT0	I	External interrupt0 input pin
	SC2_PWR	O	SmartCard2 Power pin

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Pin No.	Pin Name	Pin Type	Description
	LCD_SEG13	AO	LCD segment output 13 at LQFP64
	LCD_SEG30	AO	LCD segment output 30 at LQFP128
127	PE.15	I/O	General purpose digital I/O pin
	LCD_SEG29	O	LCD segment output 29 at LQFP128
128	PE.14	I/O	General purpose digital I/O pin
	LCD_SEG28	O	LCD segment output 28 at LQFP128

Note:

Pin Type I=Digital Input, O=Digital Output; AI=Analog Input; AO=Analog Output; P=Power Pin; AP=Analog Power

When some pin is not available in some packages, hardware will auto pull this pin high.

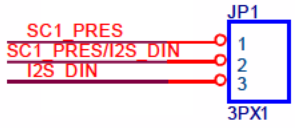
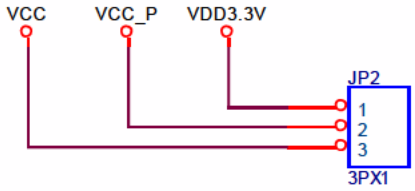
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2.2 Jumpers on Nu-LB-Nano130

The following section describes all the jumpers on Nano130 Learning board.

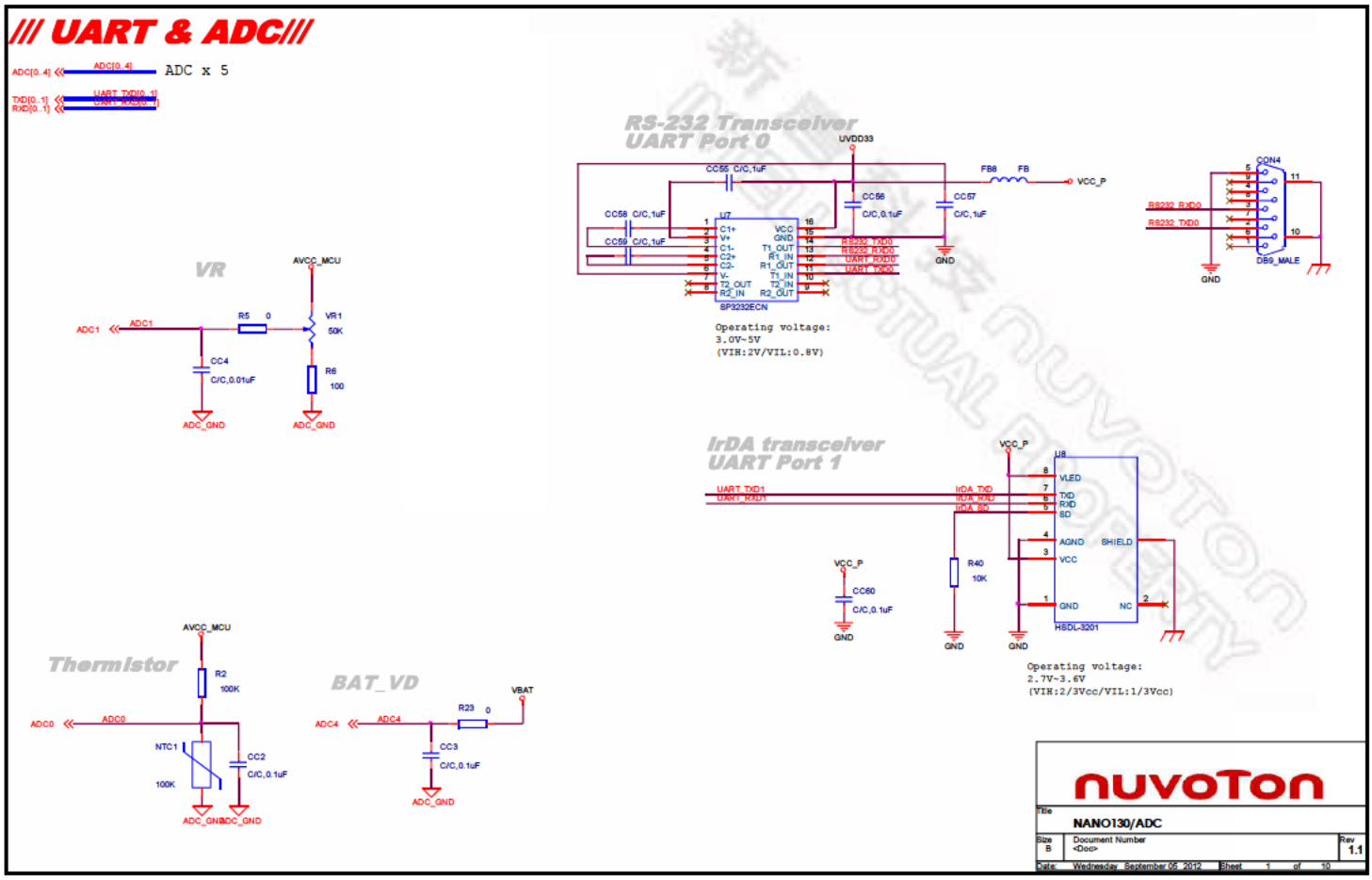
2.2.1 Jumper Settings

The jumper settings are used to configure the PD4(JP1) and peripherals' power source(JP2). Since the PD4 has two roles on this learning board, please confirm to selet right side of JP1 before using the I2S and SC1 function.

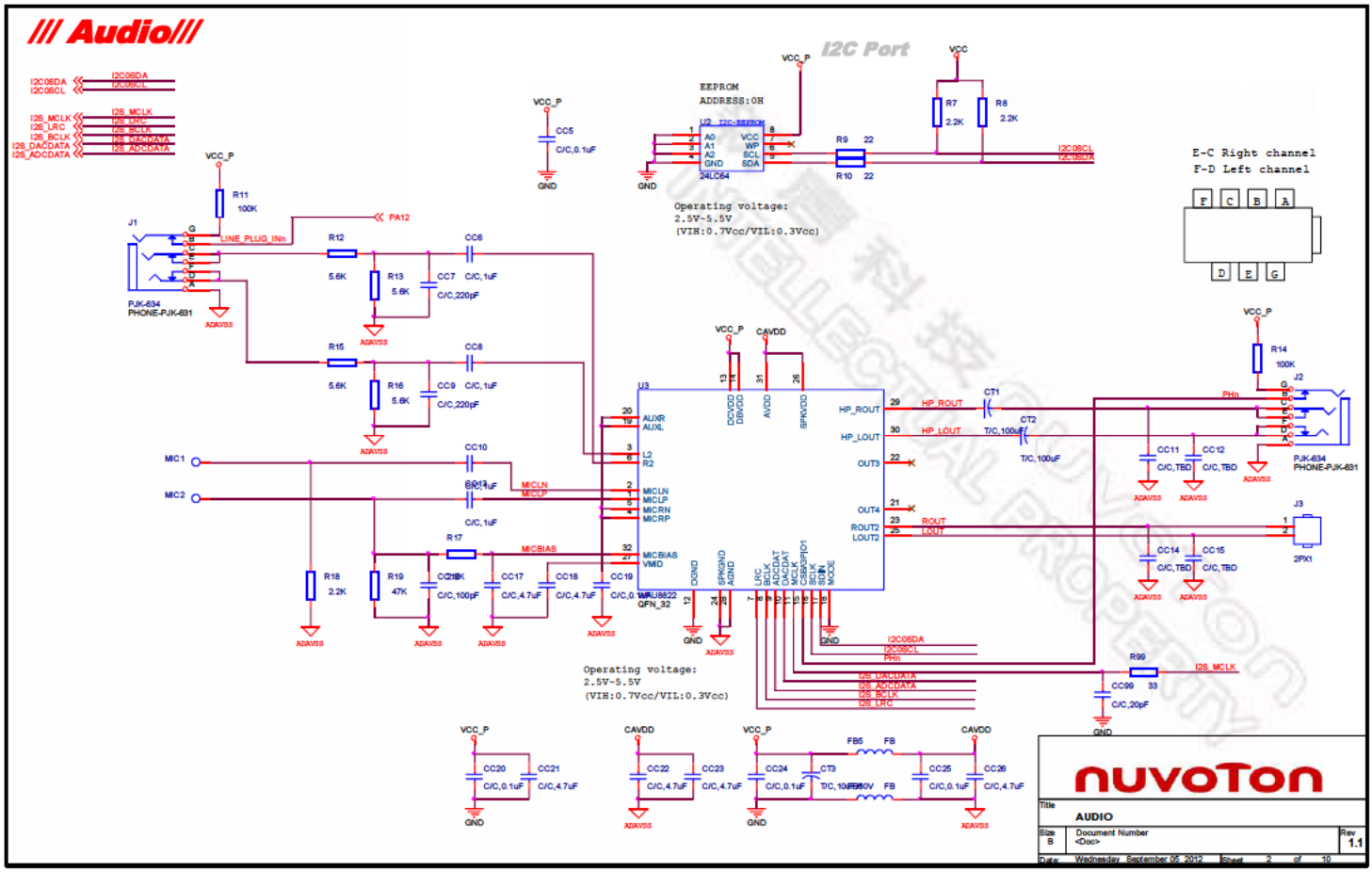
Jumper	Location	Description
JP1		PD4 onboard function selection: 1-2:SC1_PRES 2-3:I2S_DIN
JP2		Peripherals power source selection: 1-2:Power from VDD3.3V 2-3:Power from VCC

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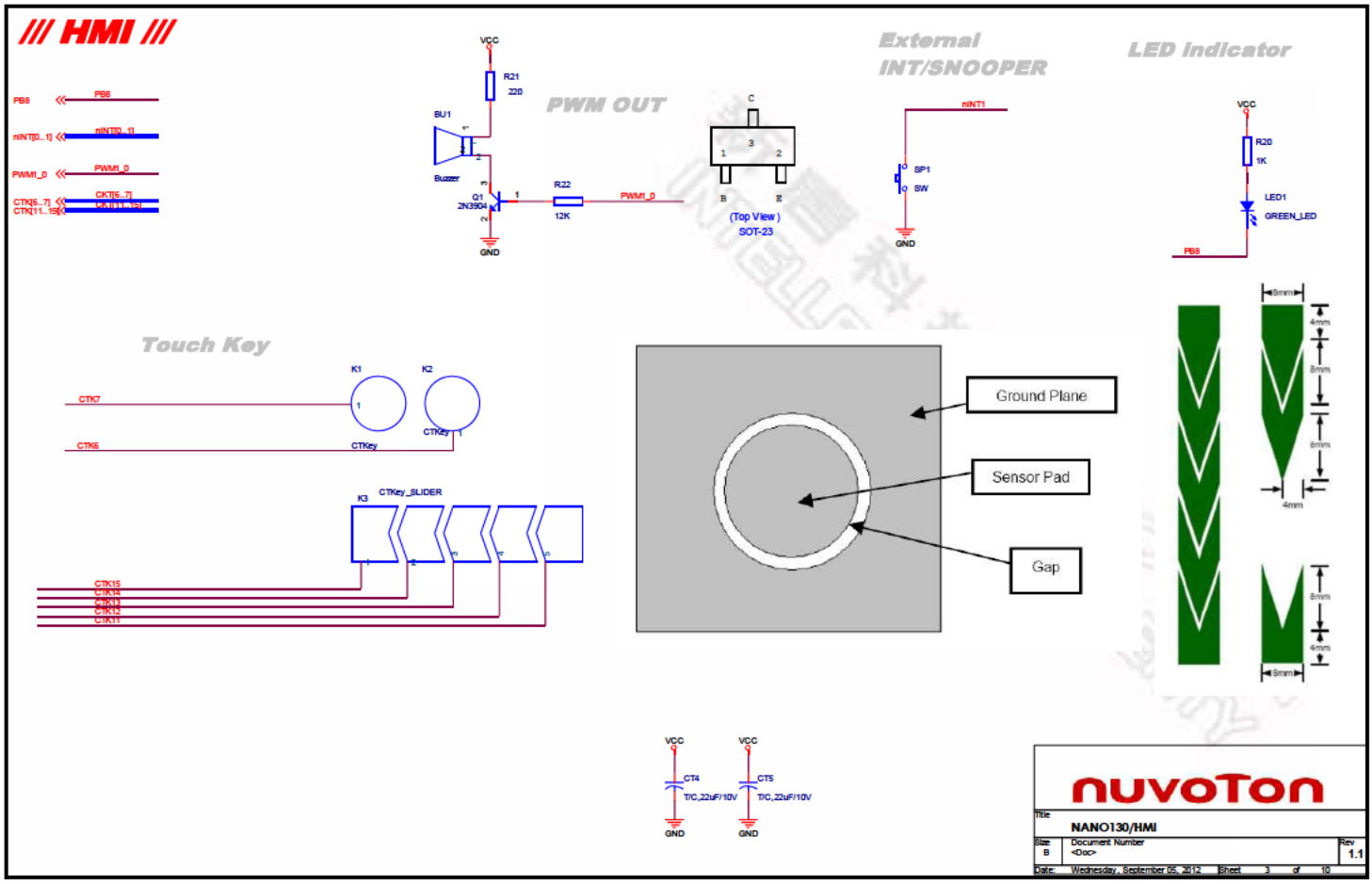
3 Schematic



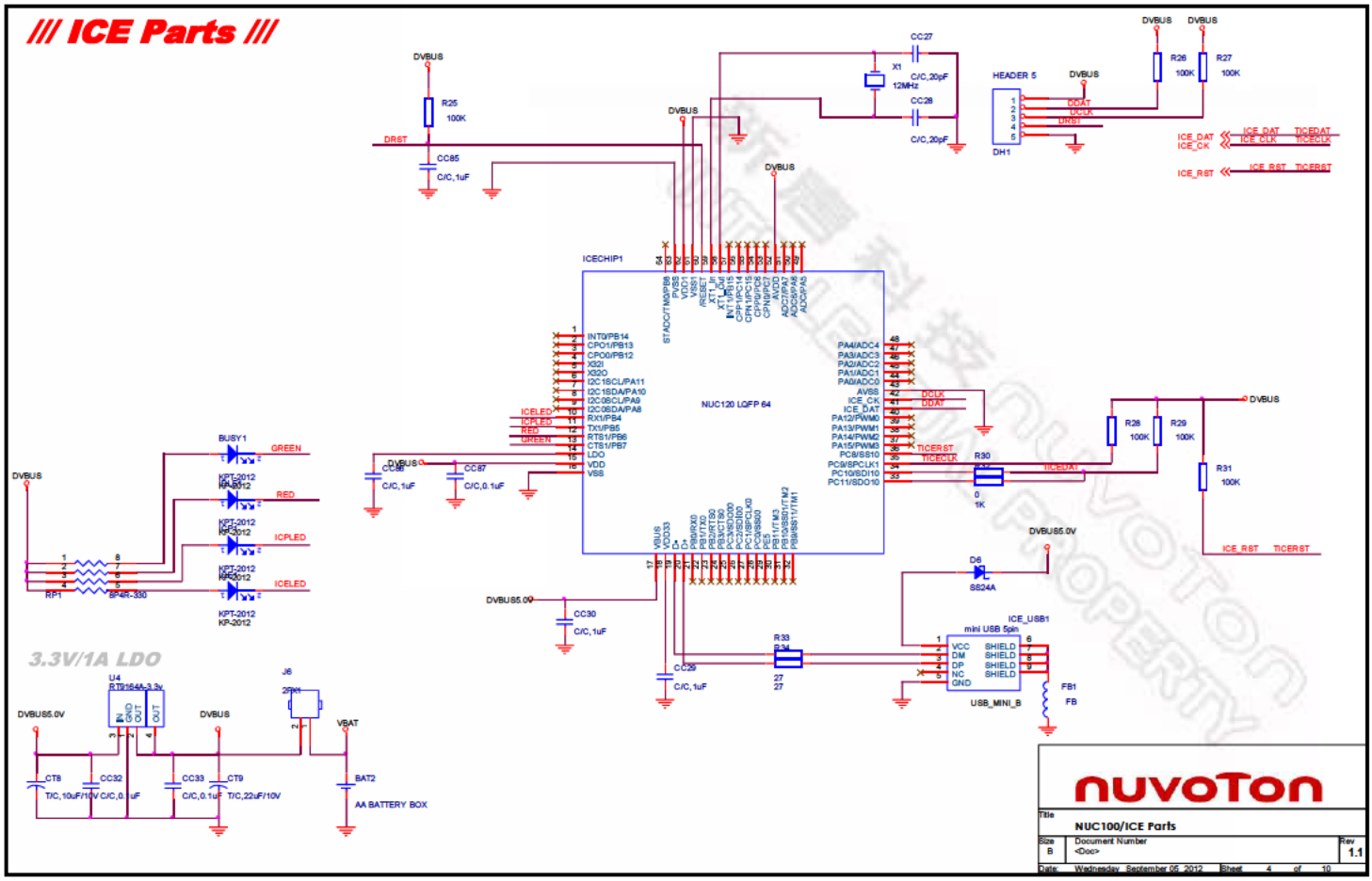
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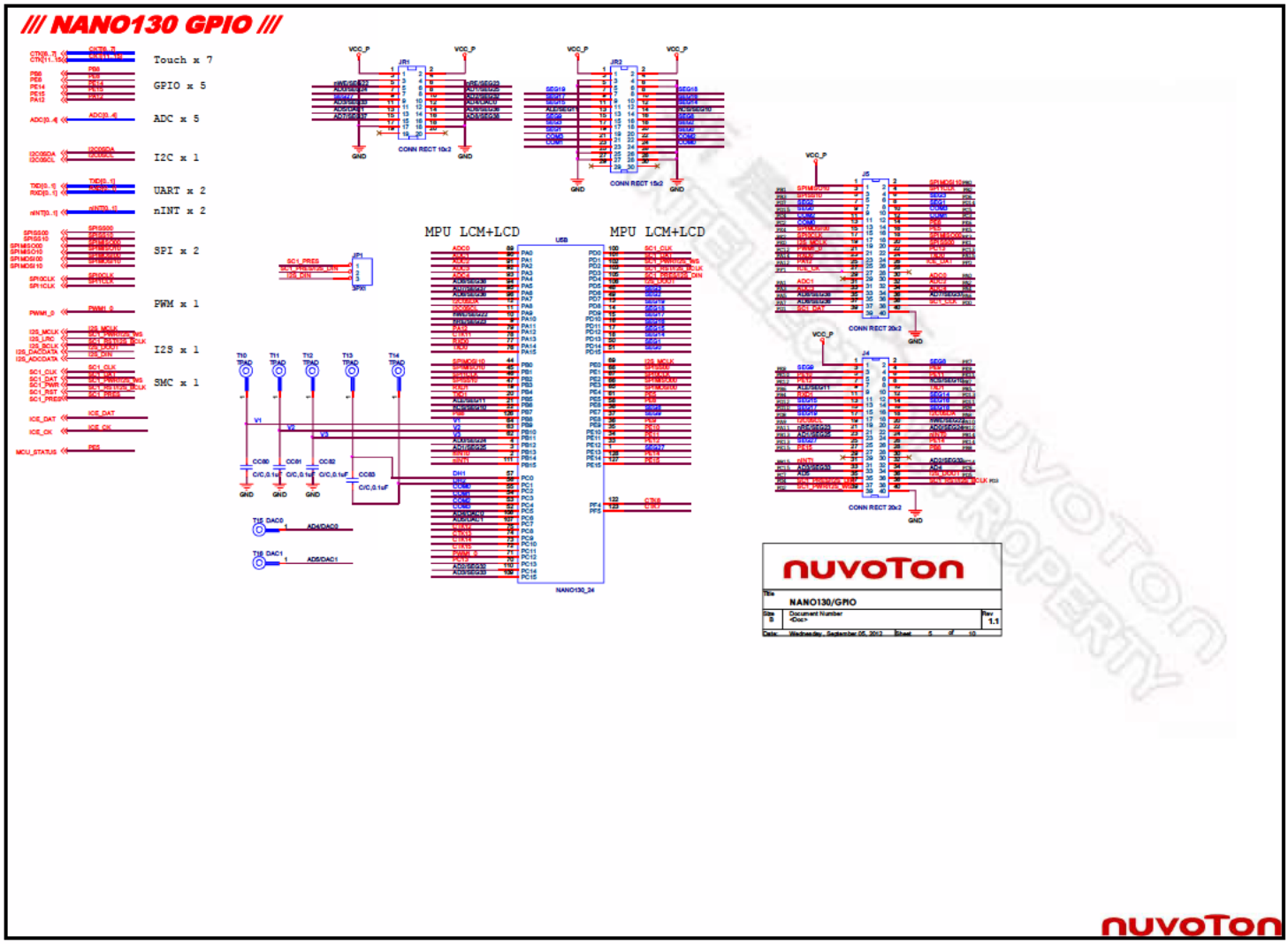
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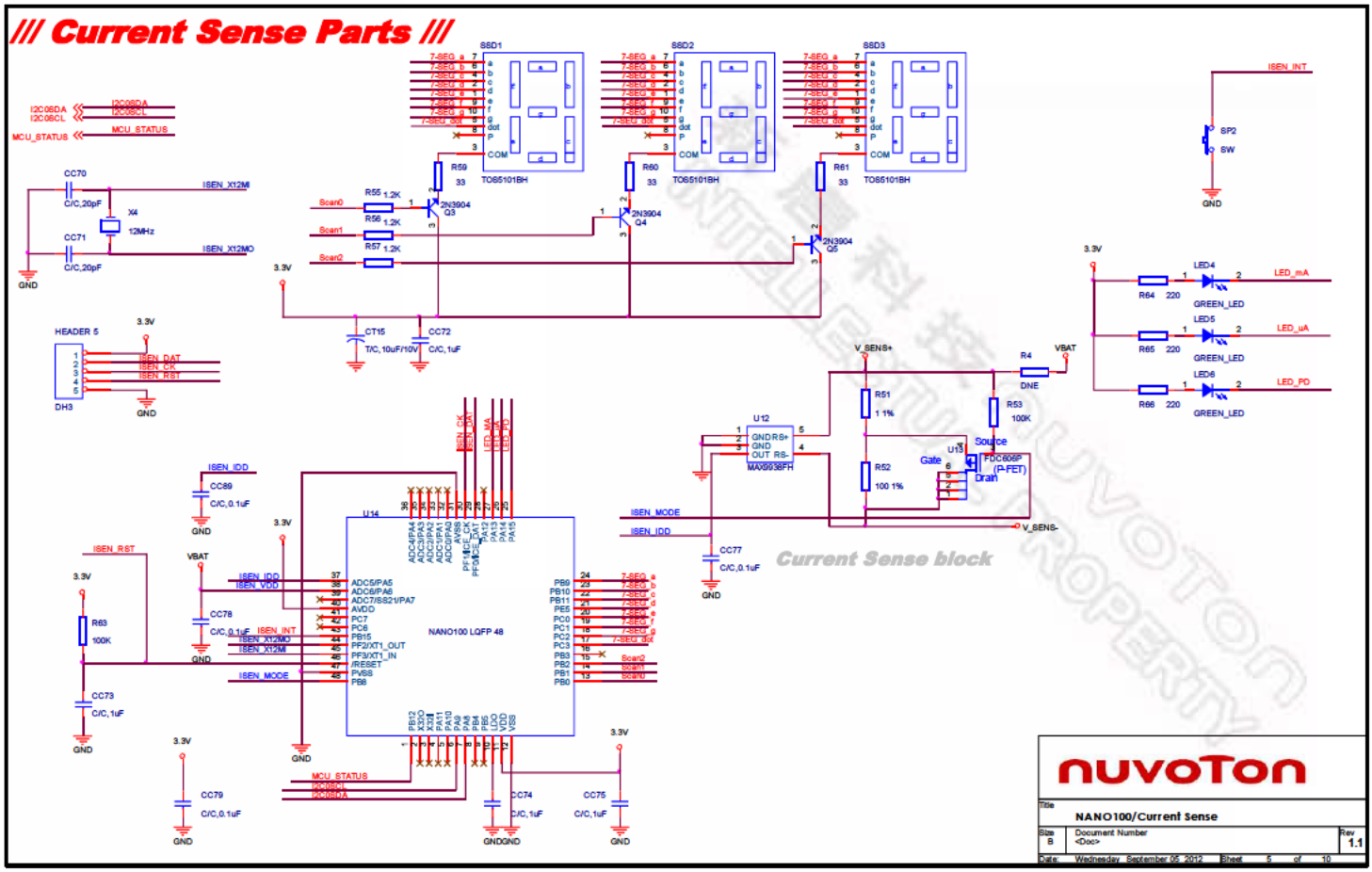
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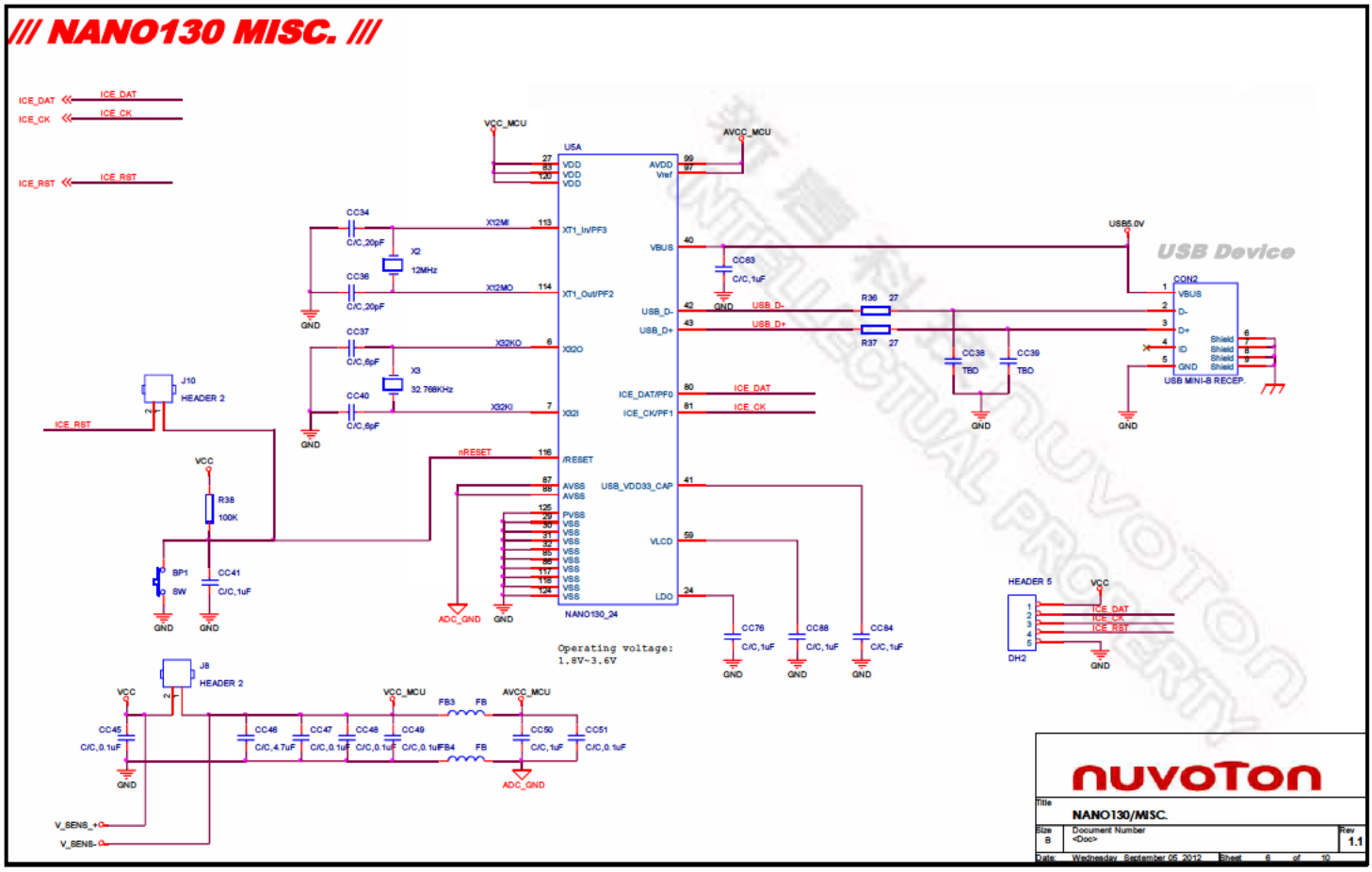
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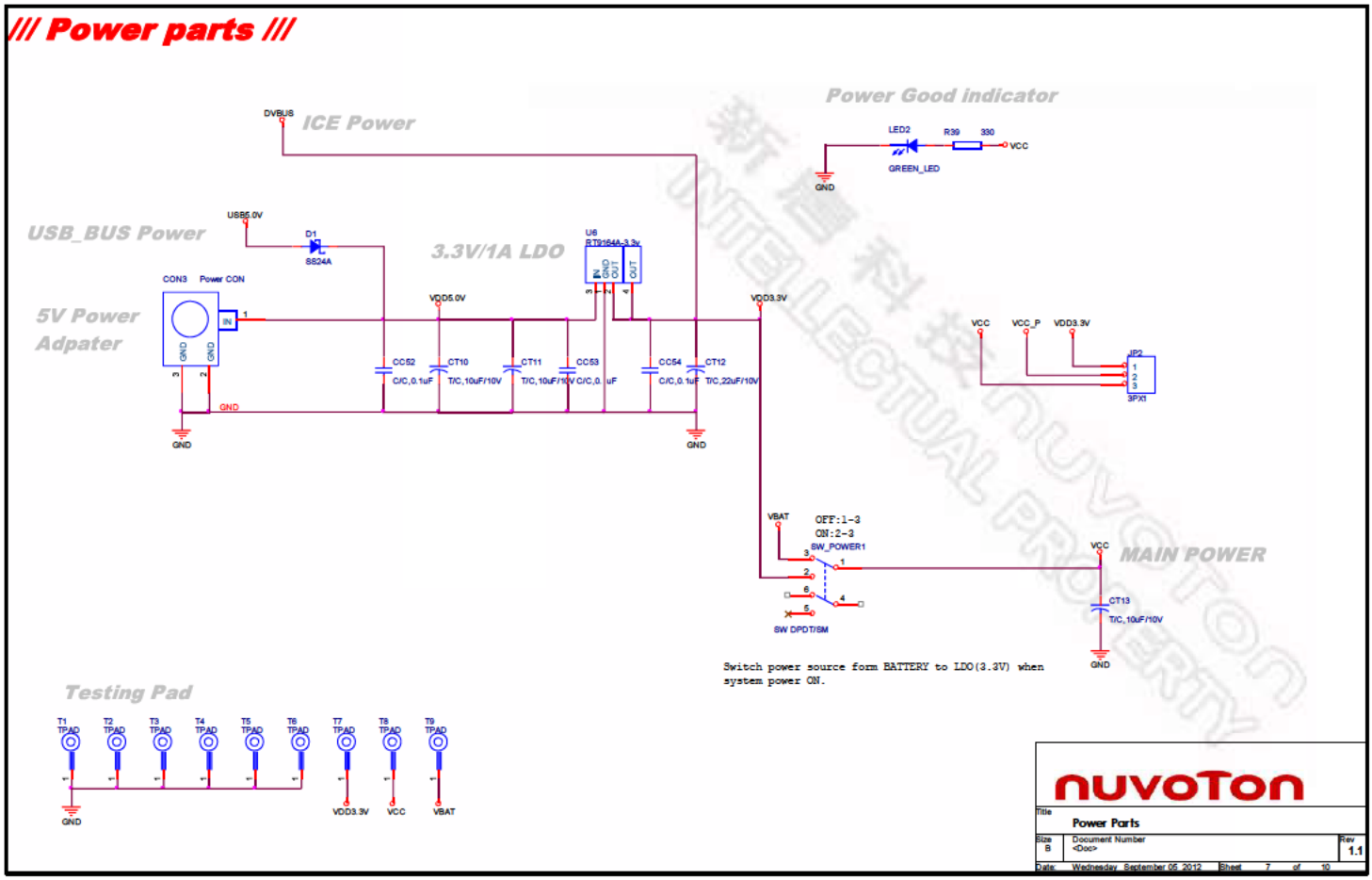
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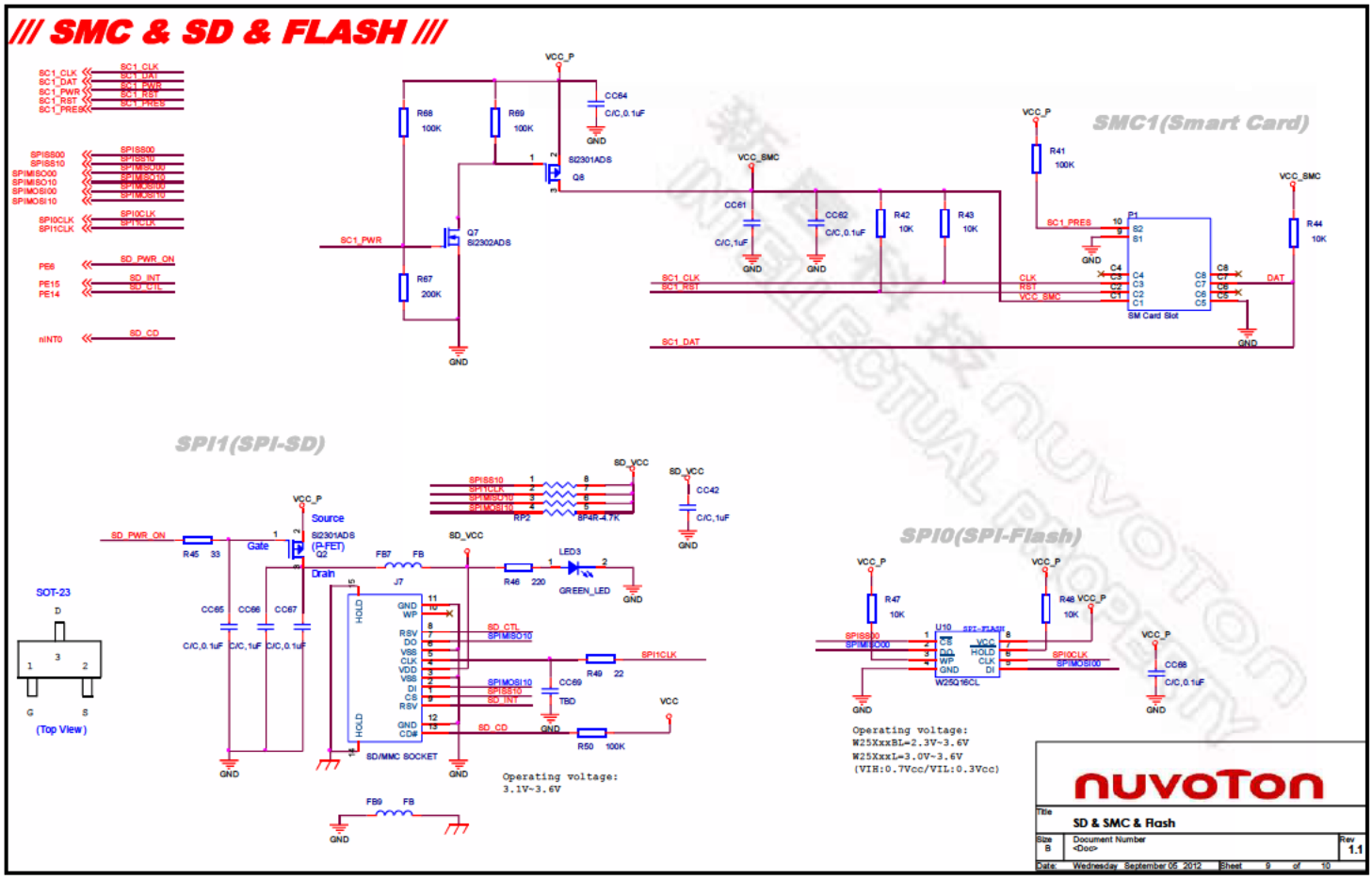
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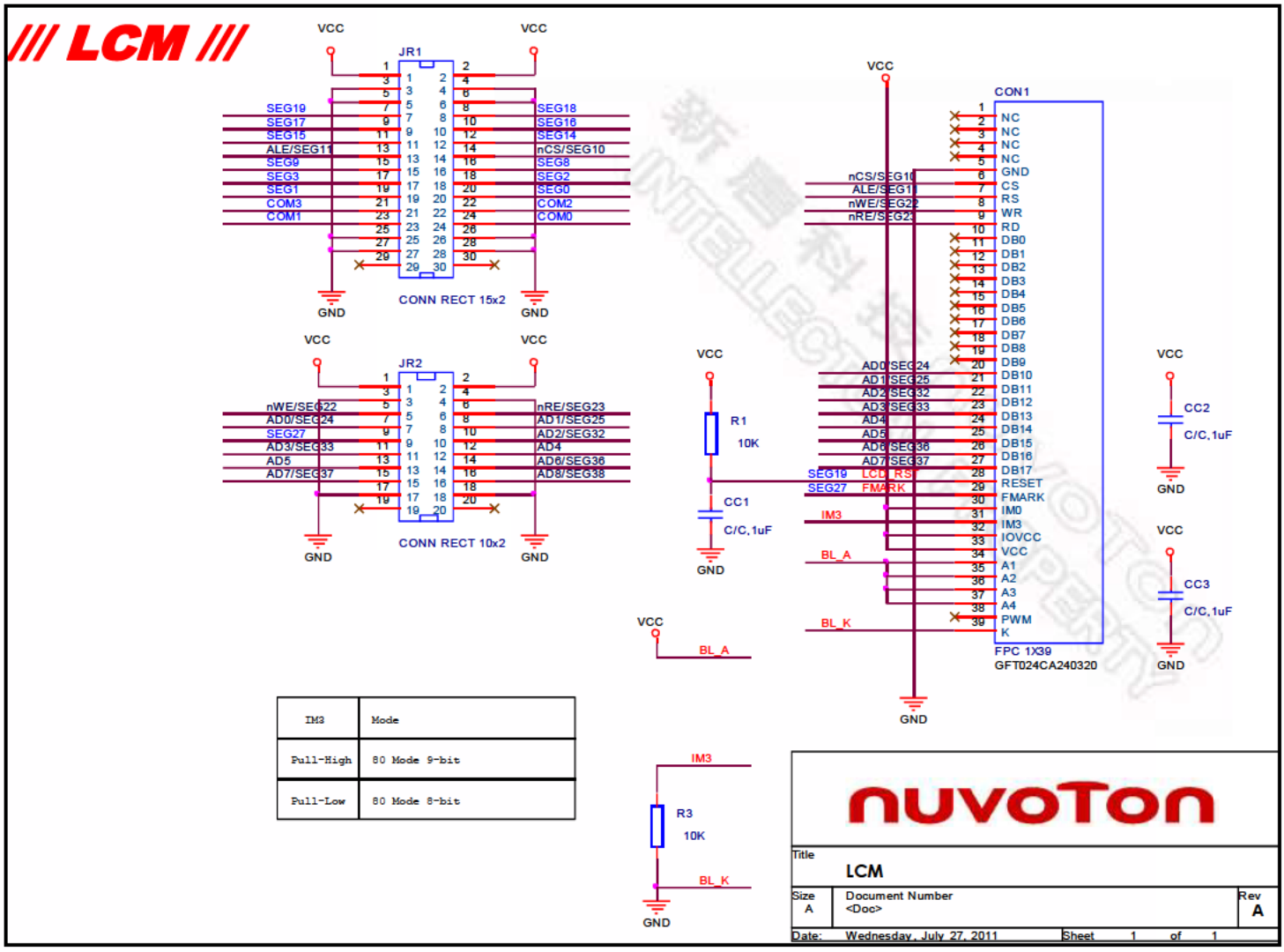
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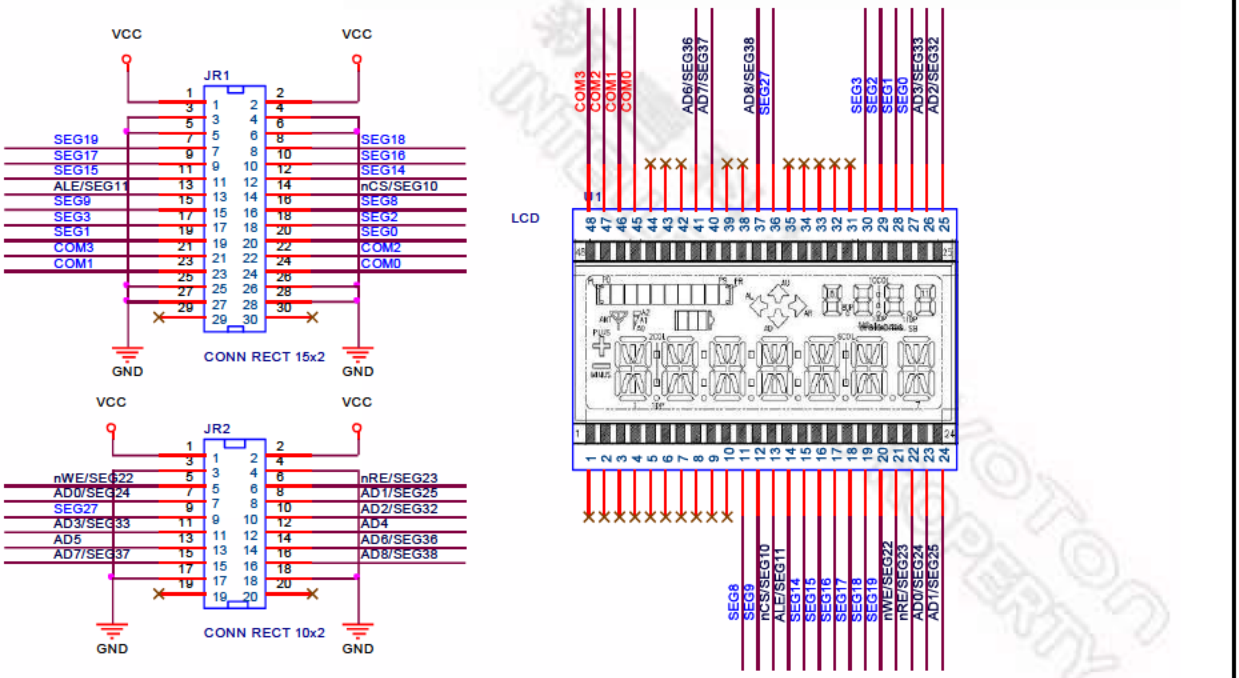


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Title: LCD		
Size: A	Document Number: <Doc>	Rev: A
Date: Monday, April 18, 2011	Sheet 1 of 1	

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4 BOM List

Nu-LB-Nano130 Board BOM List:

NANO130 Revised: Wednesday, September 05, 2012 Revision: 1.1

Bill Of Materials December 17, 2012 9:54:05 Page1

Item	Quantity	Reference	Part
1	1	BAT2	AA BATTERY BOX
2	3	SP1,BP1,SP2	SW
3	4	IDLE1,ICP1,ICE1,BUSY1	KPT-2012
4	1	BU1	Buzzer
5	33	CC2,CC3,CC5,CC19,CC20, CC24,CC25,CC32,CC33,CC45, CC47,CC48,CC49,CC51,CC52, CC53,CC54,CC56,CC60,CC62, CC64,CC65,CC67,CC68,CC77, CC78,CC79,CC80,CC81,CC82, CC83,CC87,CC89	C/C,0.1uF
6	1	CC4	C/C,0.01uF
7	25	CC6,CC8,CC10,CC13,CC29, CC30,CC41,CC42,CC50,CC55, CC57,CC58,CC59,CC61,CC63, CC66,CC72,CC73,CC74,CC75, CC76,CC84,CC85,CC86,CC88	C/C,1uF
8	2	CC7,CC9	C/C,220pF
9	4	CC11,CC12,CC14,CC15	C/C,TBD
10	1	CC16	C/C,100pF
11	7	CC17,CC18,CC21,CC22,CC23, CC26,CC46	C/C,4.7uF
12	9	CC27,CC28,CC34,CC36,CC37, CC40,CC70,CC71,CC99	C/C,20pF

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13	3	CC38,CC39,CC69 TBD
14	1	CON2 USB MINI-B RECEP.
15	1	CON3 Power CON
16	1	CON4 DB9_MALE
17	2	CT1,CT2 T/C,100uF
18	6	CT3,CT8,CT10,CT11,CT13, T/C,10uF/10V CT15
19	4	CT4,CT5,CT9,CT12 T/C,22uF/10V
20	3	DH1,DH2,DH3 HEADER 5
21	2	D1,D6 SS24A
22	8	FB1,FB3,FB4,FB5,FB6,FB7, FB FB8,FB9
23	1	ICECHIP1 NUC120 LQFP 64
24	1	ICE_USB1 mini USB 5pin
25	2	JP1,JP2 3PX1
26	1	JR1 CONN RECT 10x2
27	1	JR2 CONN RECT 15x2
28	2	J1,J2 PJK-634
29	2	J3,J6 2PX1
30	2	J4,J5 CONN RECT 20x2
31	1	J7 SD/MMC SOCKET
32	2	J8,J10 HEADER 2
33	2	K1,K2 CTKey
34	1	K3 CTKey_SLIDER
35	6	LED1,LED2,LED3,LED4,LED5, GREEN_LED LED6
36	2	MIC1,MIC2 TP
37	17	NTC1,R2,R11,R14,R25,R26, 100K R27,R28,R29,R31,R38,R41, R50,R53,R63,R68,R69

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38	1	P1	SM Card Slot
39	4	Q1,Q3,Q4,Q5	2N3904
40	2	Q2,Q8	Si2301ADS
41	1	Q7	Si2302ADS
42	1	RP1	8P4R-330
43	1	RP2	8P4R-4.7K
44	1	R4	DNE
45	3	R5,R23,R30	0
46	1	R6	100
47	4	R7,R8,R17,R18	2.2K
48	3	R9,R10,R49	22
49	4	R12,R13,R15,R16	5.6K
50	1	R19	47K
51	2	R20,R32	1K
52	5	R21,R46,R64,R65,R66	220
53	1	R22	12K
54	4	R33,R34,R36,R37	27
55	1	R39	330
56	6	R40,R42,R43,R44,R47,R48	10K
57	5	R45,R59,R60,R61,R99	33
58	1	R51	1 1%
59	1	R52	100 1%
60	3	R55,R56,R57	1.2K
61	1	R67	200K
62	3	SSD1,SSD2,SSD3	TOS5101BH
63	1	SW_POWER1	SW DPDT/SM
64	14	T1,T2,T3,T4,T5,T6,T7,T8, T9,T10,T11,T12,T13,T14	TPAD
65	1	T15	DAC0
66	1	T16	DAC1

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67	1	U2	24LC64
68	1	U3	WAU8822
69	2	U4,U6	RT9164A-3.3v
70	1	U5	NANO130_24
71	1	U7	SP3232ECN
72	1	U8	HSDL-3201
73	1	U10	W25Q16CL
74	1	U12	MAX9938FH
75	1	U13	FDC606P
76	1	U14	NANO100 LQFP 48
77	1	VR1	50K
78	3	X1,X2,X4	12MHz
79	1	X3	32.768KHz

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LCD Glass Module Board BOM List:

LCD Revised: Tuesday, August 23, 2011 Revision: A

Bill Of Materials September 2,2011 15:04:49 Page1

Item	Quantity	Reference	Part
1	1	JR1	CONN RECT 15x2
2	1	JR2	CONN RECT 10x2
3	1	U1	LCD

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Color LCM Board BOM List:

LCM Revised: Wednesday, July 27, 2011 Revision: A

Bill Of Materials October 4,2012 10:43:19 Page1

Item	Quantity	Reference	Part
1	3	CC1,CC2,CC3	C/C,1uF
2	1	CON1	FPC 1X39
3	1	JR1	CONN RECT 15x2
4	1	JR2	CONN RECT 10x2
5	2	R3,R1	10K

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Revision History

Rev.	Date	Description
1.00	11-09-2012	Initially issued.
1.01	12-17-2012	Modified the schematics and the BOM list of Nu-LB-Nano130.

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