

**NuMicro<sup>®</sup> Family**  
**Arm<sup>®</sup> ARM926EJ-S Based****NuMaker-HMI-N9H20**  
**User Manual*****Evaluation Board for NuMicro<sup>®</sup> N9H20 Series***

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**Table of Contents**

**1 OVERVIEW ..... 5**

    1.1 Features ..... 5

        1.1.1 NuMaker-N9H20 Main Board Features .....5

        1.1.2 NuDesign-TFT-LCD4.3 Extension Board Features .....5

        1.1.3 NuDesign-SPI2UART(B) Extension Board Features .....5

    1.2 Supporting Resources ..... 6

**2 NUMAKER-HMI-N9H20 BOARD HARDWARE CONFIGURATION..... 7**

    2.1 NuMaker-HMI-N9H20 Jumper Description..... 10

        2.1.1 Power Source.....10

        2.1.2 LED Indicator .....10

        2.1.3 Debug Connectors .....10

        2.1.4 USB Connector .....11

        2.1.5 Extended Connectors .....11

        2.1.6 Buttons and JUMPER.....11

        2.1.7 Audio Connectors .....11

    2.2 Pin Assignment for Extended Connectors ..... 12

    2.3 NuMaker-HMI-N9H20 PCB Placement..... 18

    2.4 NuMaker-N9H20 N9H20K51N’s Control Pin Functions ..... 21

    2.5 NuMaker-N9H20 BOM..... 24

    2.6 NuDesign-TFT-LCD4.3 BOM..... 28

    2.7 NuDesign-SPI2UART(B) BOM..... 29

**3 NUMAKER-HMI-N9H20 SCHEMATICS ..... 30**

    3.1 NuMaker-N9H20 Function Blocks Circuit ..... 30

    3.2 NuMaker-N9H20 N9H20K51N MPU Circuit..... 31

    3.3 NuMaker-N9H20 Power Supply Circuit..... 32

    3.4 NuMaker-N9H20 Keys and Configuration Circuit..... 33

    3.5 NuMaker-N9H20 USB2.0 and SD0 Interface Circuit ..... 34

    3.6 NuMaker-N9H20 NAND and SPI Flash Memory Circuit ..... 35

    3.7 NuMaker-N9H20 Headphone Circuit..... 36

    3.8 NuMaker-N9H20 JTAG and UART Circuit..... 37

    3.9 NuMaker-N9H20 Audio Codec Controller Circuit ..... 38

    3.10 NuDesign-TFT-LCD4.3 LCD Controller Circuit ..... 39

    3.11 NuDesign-SPI2UART(B) Controller Circuit ..... 40

**4 REVISION HISTORY ..... 41**

**List of Figures**

Figure 2-1 NuMaker-N9H20 PCB Board (Front View) ..... 7

Figure 2-2 NuMaker-N9H20 PCB Board (Rear View)..... 8

Figure 2-3 NuDesign-TFT-LCD4.3 PCB Board (Front View) ..... 8

Figure 2-4 NuDesign-TFT-LCD4.3 PCB Board (Rear View)..... 9

Figure 2-5 NuDesign-SPI2UART PCB Board(B) (Front View) ..... 9

Figure 2-6 NuMaker-N9H20 PCB Placement (Front View)..... 18

Figure 2-7 NuMaker-N9H20 PCB Placement (Rear View) ..... 19

Figure 2-8 NuDesign-TFT-LCD4.3 PCB Placement (Front View) ..... 19

Figure 2-9 NuDesign-TFT\_LCD4.3 PCB Placement (Rear View) ..... 20

Figure 2-10 NuDesign-SPI2UART(B) PCB Placement (Front View) ..... 20

Figure 3-1 NuMaker-N9H20 Function Blocks Circuit ..... 30

Figure 3-2 NuMaker-N9H20 N9H20K51N MPU Circuit ..... 31

Figure 3-3 NuMaker-N9H20 Power Supply Circuit ..... 32

Figure 3-4 NuMaker-N9H20 Keys and Configuration Circuit ..... 33

Figure 3-5 NuMaker-N9H20 USB2.0 and SD0 Interface Circuit ..... 34

Figure 3-6 NuMaker-N9H20 NAND and SPI Flash Memory Circuit ..... 35

Figure 3-7 NuMaker-N9H20 Headphone Circuit..... 36

Figure 3-8 NuMaker-N9H20 JTAG and UART Circuit ..... 37

Figure 3-9 NuMaker-N9H20 Audio Codec Controller Circuit ..... 38

Figure 3-10 NuDesign-TFT-LCD4.3 LCD Controller Circuit ..... 39

Figure 3-11 NuDesign-SPI2UART(B) Controller Circuit ..... 40

**List of Tables**

Table 2-1 System Power Connectors ..... 10

Table 2-2 LED1 Power Indicator ..... 10

Table 2-3 CON11 Pin Assignment ..... 10

Table 2-4 CN2 (NuDesign-SPI2UART(B)) Pin Assignment..... 11

Table 2-5 JP1 Connection Setting Assignment ..... 11

Table 2-6 JP4 Pin Assignment..... 11

Table 2-7 JP2 and JP3 Pin Assignment ..... 11

Table 2-8 CON1 (NuMaker-N9H20) Pin Assignment ..... 12

Table 2-9 CN3 (NuDesign-SPI2UART(B)) Pin Assignment..... 12

Table 2-10 CON12 (NuMaker-N9H20) Pin Assignment ..... 13

Table 2-11 CON1 (NuMaker-N9H20) Pin Assignment ..... 15

Table 2-12 CON2 (NuDesign-TFT-LCD4.3) Pin Assignment ..... 17

Table 2-13 N9H20K51N Pin Functions Assignment ..... 24

Table 2-14 NuMaker-N9H20 BOM..... 27

Table 2-15 NuDesign-TFT-LCD4.3 BOM..... 28

Table 2-16 NuDesign-SPI2UART(B) BOM ..... 29

## 1 OVERVIEW

The NuMaker-HMI-N9H20 is an evaluation board for GUI application development. The NuMaker-HMI-N9H20 consists of three parts: a NuMaker-N9H20 main board, a NuDesign-TFT-LCD4.3 extension board and a NuDesign-SPI2UART(B) extension board. The NuMaker-HMI-N9H20 is designed for project evaluation, prototype development and validation with HMI (Human Machine Interface) function.

The NuMaker-HMI-N9H20 integrates touchscreen display, voice input/output, rich serial port service and I/O interface, providing multiple external storage methods.

The NuDesign-TFT-LCD4.3 can be plugged into the main board via the DIN\_32x2 extension connector. The NuDesign-TFT-LCD4.3 includes one 4.3" LCD with the resolution 480x272, RGB 24 bits and embedded 4-wires resistive type touch panel.

The NuDesign-SPI2UART(B) can be plugged into the main board via the 5x2 extension connector. The NuDesign-SPI2UART includes two DB9 RS-232 ports with used ICL-232E transceiver chip.

### 1.1 Features

#### 1.1.1 NuMaker-N9H20 Main Board Features

- N9H20K51N chip: LQFP128 pin MCP package with DDR (32 MB)
- SPI Flash using W25Q256JVEQ (32 MB) booting with quad mode or storage memory
- NAND Flash using W29N01HVSINA (128 MB) booting or storage memory
- One Micro-SD/TF card slot served either as a SD memory card for data storage or SDIO (Wi-Fi) device
- One DB9 RS-232 port with UART\_0 used ICL-232E transceiver chip can be served for function debug and system development
- JTAG interface provided for software development
- Microphone input and Earphone/Speaker output with 24-bit stereo audio codec (NAU88C22) for I2S interfaces
- Six sets of user-configurable push button keys
- SPI Flash and RS-232 interface expansion port
- USB\_0 that can be used as Device
- System power could be supplied by DC-5V adaptor or USB VBUS

#### 1.1.2 NuDesign-TFT-LCD4.3 Extension Board Features

- 4.3" resolution 480x272 4-wire resistive touch panel for 24-bits RGB888 interface.
- DIN\_32x2 extension connector

#### 1.1.3 NuDesign-SPI2UART(B) Extension Board Features

- Two DB9 RS-232 ports with UART used ICL-232E transceiver chip can be served for system development.
- 5x2 extension connector

## 1.2 Supporting Resources

For sample codes and introduction about NuMaker-N9H20, please refer to N9H20 BSP:

<https://www.nuvoton.com/products/gui-solution/gui-platform/numaker-hmi-n9h20/?group=Software&tab=2>

Visit NuForum for further discussion about the NuMaker-HMI-N9H20:

<http://forum.nuvoton.com/viewforum.php?f=31&sid=7c6724e4048c11d6ce90f10ac837d52f>

## 2 NUMAKER-HMI-N9H20 BOARD HARDWARE CONFIGURATION

Figure 2-1 shows the front view of NuMaker-N9H20 PCB board.

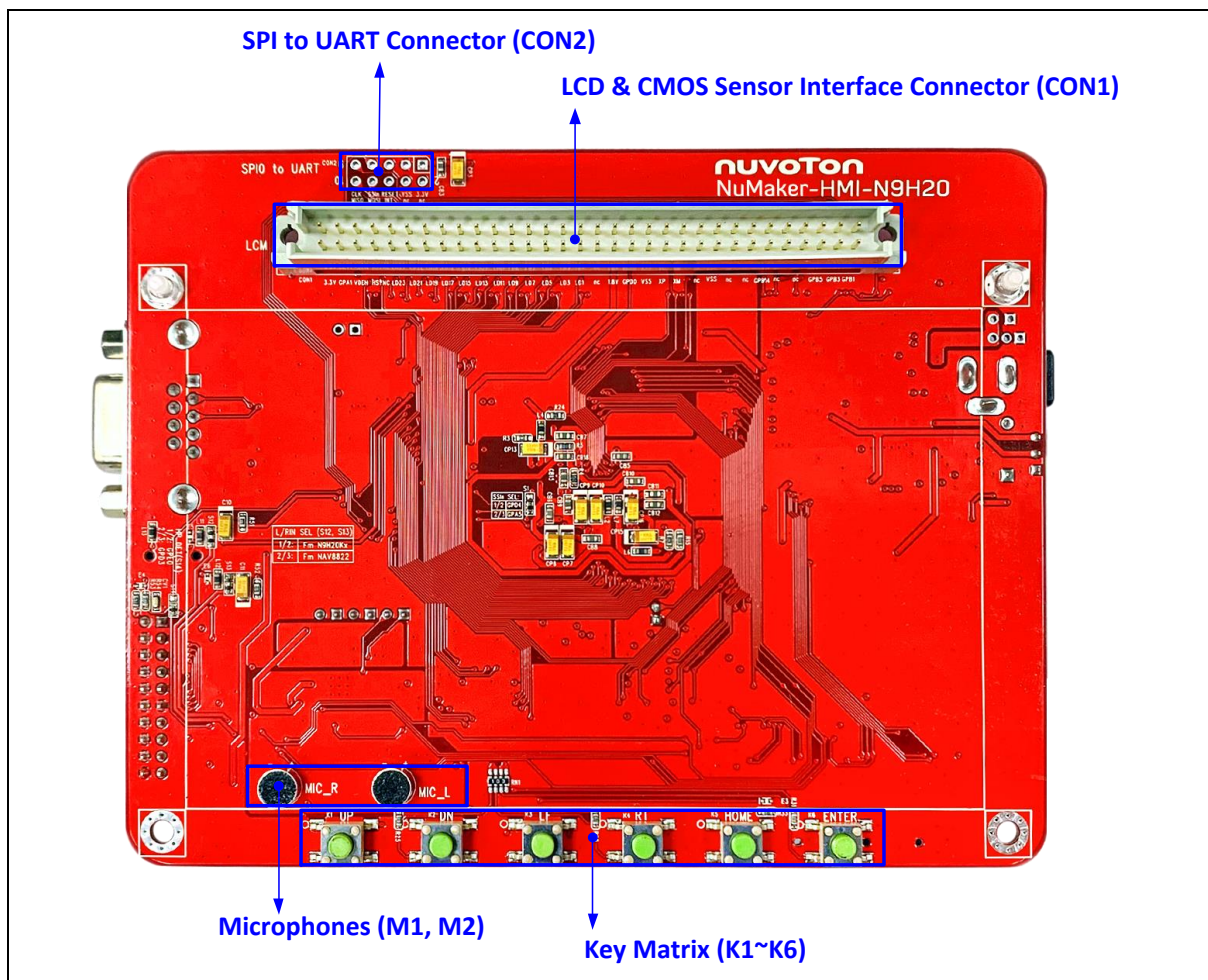


Figure 2-1 NuMaker-N9H20 PCB Board (Front View)



Figure 2-2 shows the rear view of NuMaker-N9H20 PCB board.

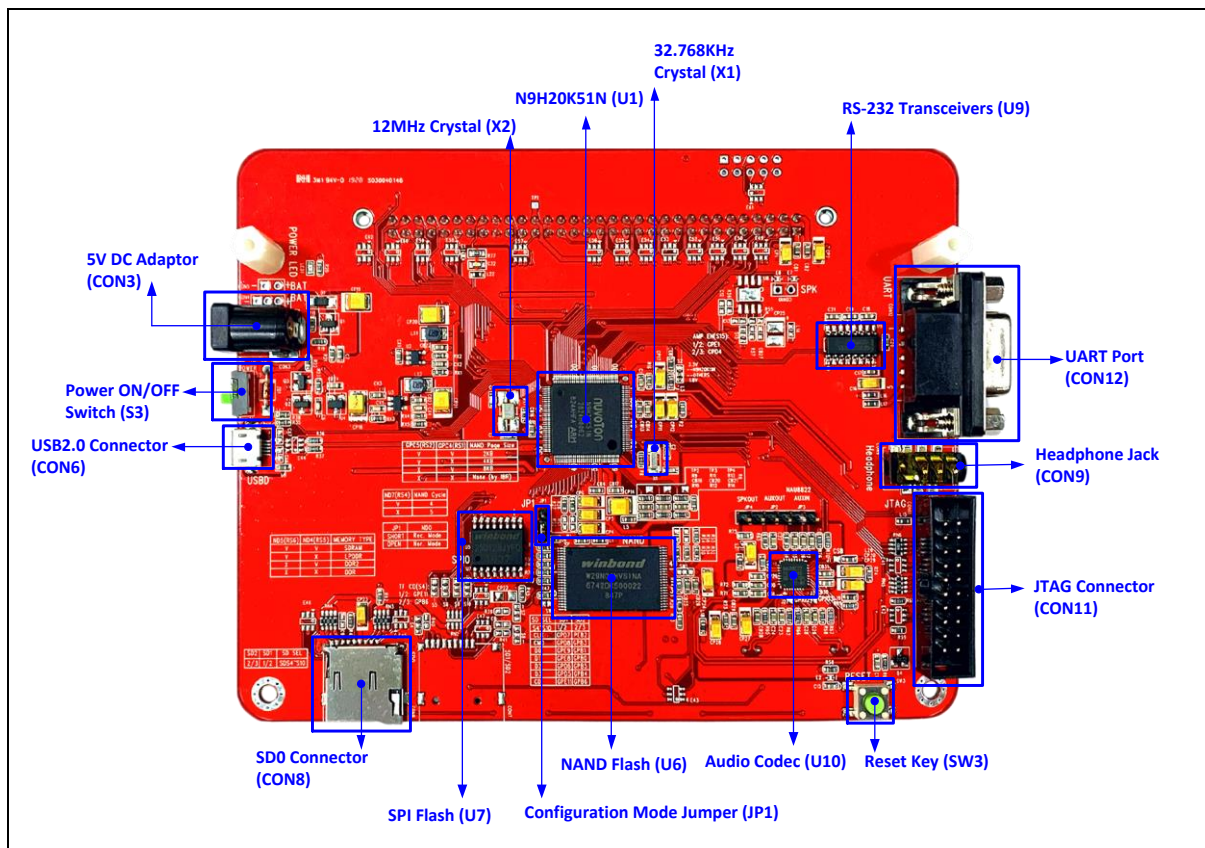


Figure 2-2 NuMaker-N9H20 PCB Board (Rear View)

Figure 2-6 shows the front view of NuDesign-TFT-LCD4.3 PCB board.

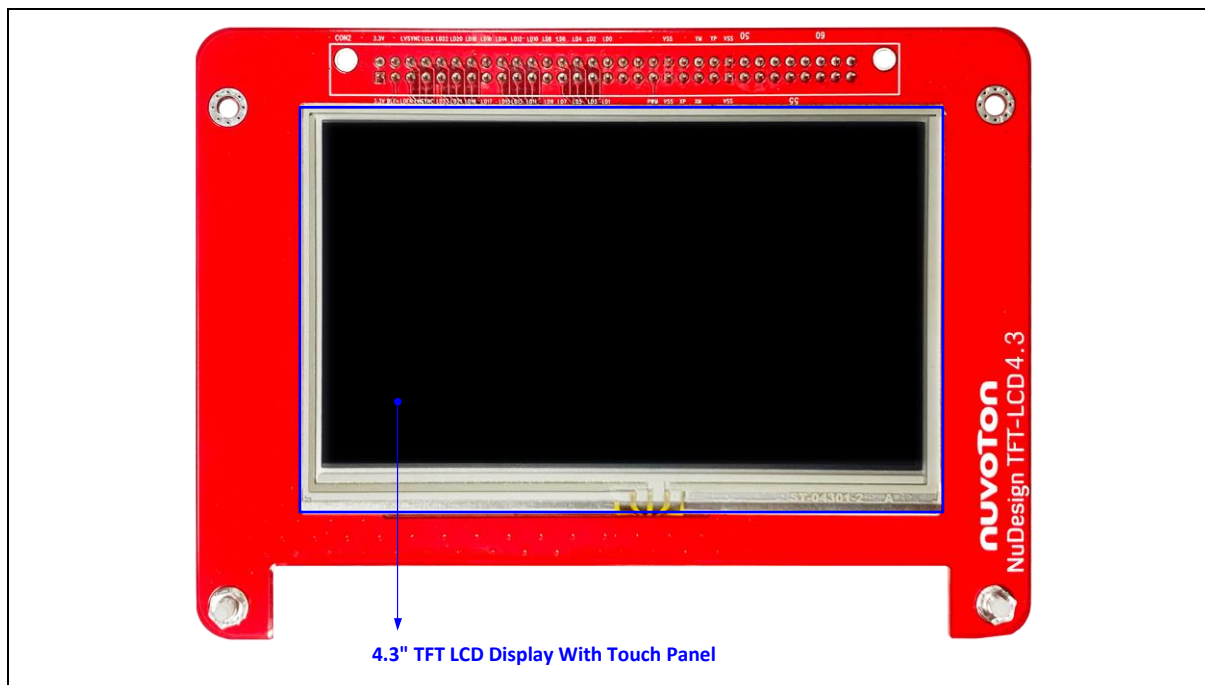


Figure 2-3 NuDesign-TFT-LCD4.3 PCB Board (Front View)



Figure 2-7 shows the rear view of NuDesign-TFT-LCD4.3 PCB board.

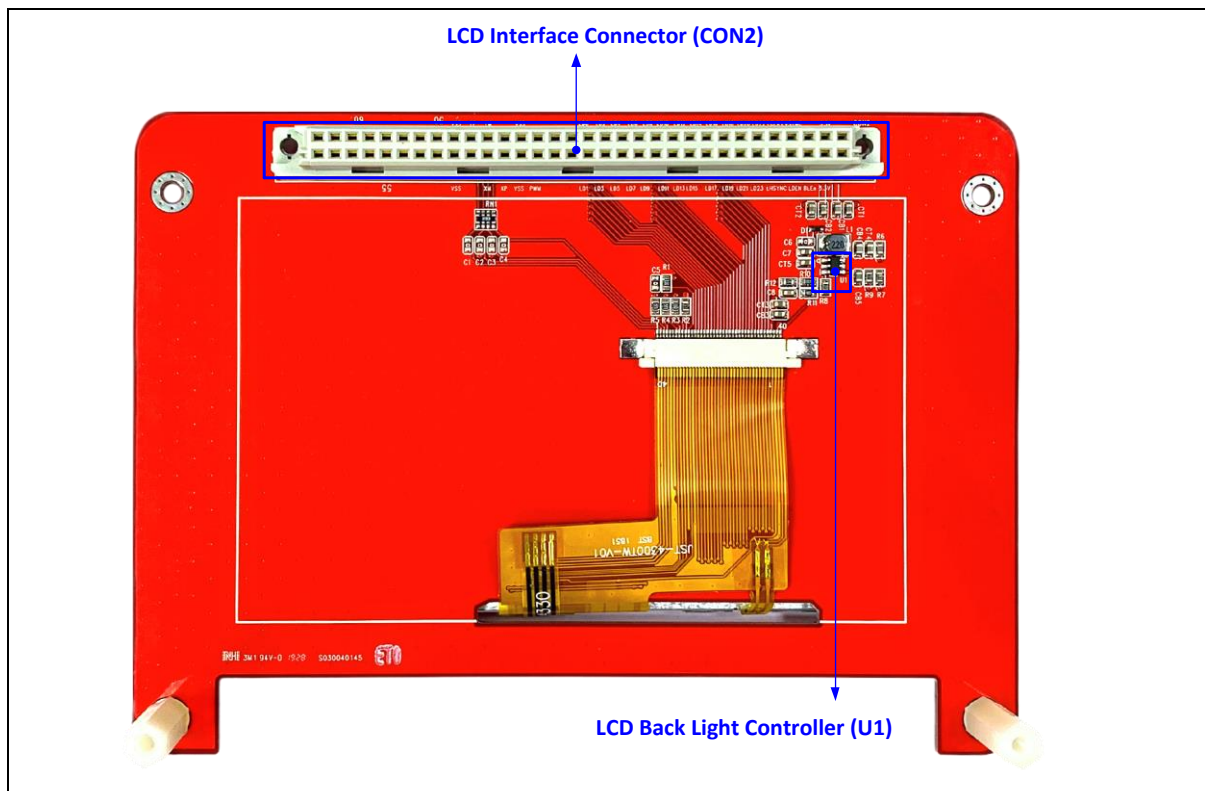


Figure 2-4 NuDesign-TFT-LCD4.3 PCB Board (Rear View)

Figure 2-5 shows the front view of NuDesign-SPI2UART(B) PCB board.

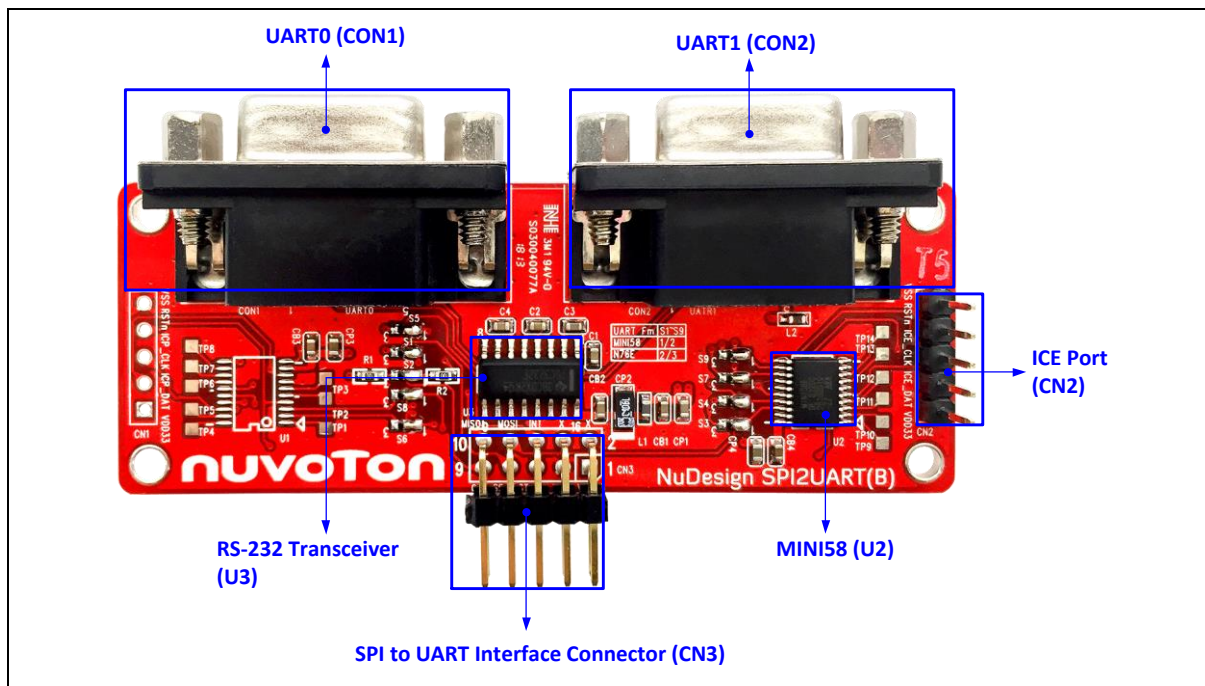


Figure 2-5 NuDesign-SPI2UART PCB Board(B) (Front View)

## 2.1 NuMaker-HMI-N9H20 Jumper Description

### 2.1.1 Power Source

- **CON3**: 5V DC Adaptor input connector
- **CON4 & CON5**: External Battery connector
- **S3**: Power ON/OFF Switch

Source	Power port	VIN	VD33
CON3	Connect to 5V DC Adaptor	5V	DC 3.3V
S3	VD33 & VD18 Power Enable	PWREN of U2 & U3	DC 3.3V

Table 2-1 System Power Connectors

### 2.1.2 LED Indicator

- **LED1**: 5V DC Adaptor Connecting CN3 and S3 Switching ON

Pin No	Pin Name	Pin Functions
LED1	POWER	Power ON Indicator

Table 2-2 LED1 Power Indicator

### 2.1.3 Debug Connectors

- **CON11**: Connector in target board NuMaker-N9H20 (U1, N9H20K51N) for connecting with JTAG adaptor

Pin No	Pin Name	Pin Functions
1, 2	VD33	DC 3.3V
3	nTRST	JTAG Interface Test Reset, Input, Active Low
5	TDI	JTAG Interface Test Data In, Input.
7	TMS	JTAG Interface Test Mode Select, Input.
9	TCK	JTAG Interface Test Clock, Input.
13	TDO	JTAG Interface Test Data Out, Output.
15	nRESET	System Reset, Input, Active Low.
11,4~20(Even)	GND	Power Ground

Table 2-3 CON11 Pin Assignment

- **CN2**: Connector in target board NuDesign-SPI2UART(B) (U2, MINI58FDE) for connecting with Nu-Link-Pro adaptor.

Pin No	Pin Name	Pin Functions
1	VD33	DC 3.3V
2	ICE_DAT	ICE Interface DATA

3	ICE_CLK	ICE Interface Clock
4	RSTn	ICE Interface Reset, Active Low
5	GND	Power Ground

Table 2-4 CN2 (NuDesign-SPI2UART(B)) Pin Assignment

**2.1.4 USB Connector**

- **CON6:** Mini USB Connector (USB 2.0 HS Device)

**2.1.5 Extended Connectors**

- **CON1 and CON2:** Show all extended pins in NuMaker-N9H20

**2.1.6 Buttons and JUMPER**

- **K1~K6:** Key pad button in NuMaker-N9H20.
- **SW3:** Reset button in NuMaker-N9H20.
- **JP1:** System configuration setting in NuMaker-N9H20.

JP1	Connection	Mode
1-2	Open	Normal Mode
1-2	Shorted	USB Booting

Table 2-5 JP1 Connection Setting Assignment

**2.1.7 Audio Connectors**

- **CON9:** Headphone Positive Output or Line Output Right and Headphone Negative Output or Line Output Left.
- **JP4:** Audio Codec Speaker Out.

Pin No	Pin Name	Pin Functions
1	RSPKOUT	U1, NAU8822A BTL Speaker Positive Output or Right high current output.
2	LSPKOUT	U1, NAU8822A BTL Speaker Negative Output or Left high current output.

Table 2-6 JP4 Pin Assignment

- **JP2 and JP3:** Auxiliary Input and Output.

Pin No	Pin Name	Pin Functions
JP2.2	AUXOUT1	Headphone / Mono Mixed Output / Line Output
JP2.1	AUXOUT2	Headphone / Line Output
JP3.1	RAUXIN	Right Auxiliary Input
JP3.2	LAUXIN	Left Auxiliary Input

Table 2-7 JP2 and JP3 Pin Assignment

## 2.2 Pin Assignment for Extended Connectors

The NuMaker-N9H20 provides the N9H20K51N target chip functions on board and several extended connectors for user applications.

Pin No	Pin Name	Pin Functions
1	VD33	DC 3.3V
2	NC	Unused
3	VSS	Power Ground
4	NC	Unused
5	nRESET	System Reset, Input, Active Low
6	GPA0	SPI_INT
7	GPA5/GPD4	SPI_SS1n
8	GPD15	SPI_MOSI
9	GPD12	SPI_CLK
10	GPD14	SPI_MISO

Table 2-8 CON1 (NuMaker-N9H20) Pin Assignment

Pin No	Pin Name	Pin Functions
1	VDD33	DC 3.3V
2	NC	Unused
3	VSS	Power Ground
4	NC	Unused.
5	RSTn	System Reset, Input, Active Low
6	SPI_INT	SPI_INT
7	SPI_SS <sub>n</sub>	SPI_CS
8	SPI_MOSI	SPI_MOSI
9	SPI_CLK	SPI_CLK
10	SPI_MISO	SPI_MISO

Table 2-9 CN3 (NuDesign-SPI2UART(B)) Pin Assignment

Pin No	Pin Name	Pin Functions
1	NC	Unused.
2	TX	UART0 TXD, GPIO Port A Bit 10
3	RX	UART0 RXD, GPIO Port A Bit 11

4	NC	Unused.
5	GND	Power Ground
6	NC	Unused.
7	NC	Unused.
8	NC	Unused.
9	NC	Unused.

Table 2-10 CON12 (NuMaker-N9H20) Pin Assignment

Pin No	Pin Name	Pin Function
1	VD33	DC 3.3V
2	VD33	DC 3.3V
3	GPA1	GPIO Port A bit 1.
4	GPA6	GPIO Port A bit 6.
5	GPD11	GPIO Port D bit 11; LCD Data Enable
6	GPD10	GPIO Port D bit 10; LCD Vertical Sync.
7	GPD9	GPIO Port D bit 9; LCD Horizontal Sync.
8	GPB15	GPIO Port B bit 15; LCD Pixel Clock
9	GPB12	GPIO Port B bit 12; LCD Data Bit 23
10	GPB11	GPIO Port B bit 11; LCD Data Bit 22
11	GPB10	GPIO Port B bit 10; LCD Data Bit 21
12	GPB9	GPIO Port B bit 9; LCD Data Bit 20
13	GPB8	GPIO Port B bit 8; LCD Data Bit 19
14	GPB7	GPIO Port B bit 7; LCD Data Bit 18
15	GPE1	GPIO Port E bit 1; LCD Data Bit 17
16	GPE0	GPIO Port E bit 0; LCD Data Bit 16
17	GPC15	GPIO Port C bit 15; LCD Data Bit 15
18	GPC14	GPIO Port C bit 14; LCD Data Bit 14
19	GPC13	GPIO Port C bit 13; LCD Data Bit 13
20	GPC12	GPIO Port C bit 12; LCD Data Bit 12
21	GPC11	GPIO Port C bit 11; LCD Data Bit 11
22	GPC10	GPIO Port C bit 10; LCD Data Bit 10
23	GPC9	GPIO Port C bit 9; LCD Data Bit 9

24	GPC8	GPIO Port C bit 8; LCD Data Bit 8
25	GPC7	GPIO Port C bit 7; LCD Data Bit 7
26	GPC6	GPIO Port C bit 6; LCD Data Bit 6
27	GPC5	GPIO Port C bit 5; LCD Data Bit 5
28	GPC4	GPIO Port C bit 4; LCD Data Bit 4
29	GPC3	GPIO Port C bit 3; LCD Data Bit 3
30	GPC2	GPIO Port C bit 2; LCD Data Bit 2
31	GPC1	GPIO Port C bit 1; LCD Data Bit 1
32	GPC0	GPIO Port C bit 0; LCD Data Bit 0
33	NC	Unused.
34	NC	Unused.
35	VD18	DC 1.8V
36	VD18	DC 1.8V
37	GPD0	GPIO Port D bit 0
38	NC	Unused.
39	GND	Power Ground
40	GND	Power Ground
41	TP3	Touch Panel, XP
42	NC	Unused.
43	TP4	Touch Panel, XM
44	TP2	Touch Panel, YM
45	NC	Unused.
46	TP1	Touch Panel, YP
47	GND	Power Ground
48	GND	Power Ground
49	NC	Unused.
50	nRESET	System Reset, Active Low.
51	NC	U System Reset, Active Low.
52	NC	Unused.
53	GPB14	GPIO Port B bit 14; I2C SDIO
54	GPB13	GPIO Port B bit 13; I2C SCLK
55	NC	Unused.



56	NC	Unused.
57	NC	Unused.
58	GPB6	GPIO Port B bit 6; CMOS Sensor Bit 6
59	GPB5	GPIO Port B bit 5; CMOS Sensor Bit 5
60	GPB4	GPIO Port B bit 4; CMOS Sensor Bit 4
61	GPB3	GPIO Port B bit 3; CMOS Sensor Bit 3
62	GPB2	GPIO Port B bit 2; CMOS Sensor Bit 2
63	GPB1	GPIO Port B bit 1; CMOS Sensor Bit 1
64	GPB0	GPIO Port B bit 0; CMOS Sensor Bit 0.

Table 2-11 CON1 (NuMaker-N9H20) Pin Assignment

Pin No	Pin Name	Pin Function
1	VD33	DC 3.3V.
2	VD33	DC 3.3V.
3	GPA1	GPIO Port A bit 1, LCD Back Light Control.
4	NC	Unused.
5	GPD11	GPIO Port D bit 11; LCD Data Enable
6	GPD10	GPIO Port D bit 10; LCD Vertical Sync.
7	GPD9	GPIO Port D bit 9; LCD Horizontal Sync.
8	GPB15	GPIO Port B bit 15; LCD Pixel Clock.
9	GPB12	GPIO Port B bit 12; LCD Data Bit 23.
10	GPB11	GPIO Port B bit 11; LCD Data Bit 22.
11	GPB10	GPIO Port B bit 10; LCD Data Bit 21.
12	GPB9	GPIO Port B bit 9; LCD Data Bit 20.
13	GPB8	GPIO Port B bit 8; LCD Data Bit 19.
14	GPB7	GPIO Port B bit 7; LCD Data Bit 18.
15	GPE1	GPIO Port E bit 1; LCD Data Bit 17.
16	GPE0	GPIO Port E bit 0; LCD Data Bit 16.
17	GPC15	GPIO Port C bit 15; LCD Data Bit 15.
18	GPC14	GPIO Port C bit 14; LCD Data Bit 14.
19	GPC13	GPIO Port C bit 13; LCD Data Bit 13.
20	GPC12	GPIO Port C bit 12; LCD Data Bit 12.

21	GPC11	GPIO Port C bit 11; LCD Data Bit 11.
22	GPC10	GPIO Port C bit 10; LCD Data Bit 10.
23	GPC9	GPIO Port C bit 9; LCD Data Bit 9.
24	GPC8	GPIO Port C bit 8; LCD Data Bit 8.
25	GPC7	GPIO Port C bit 7; LCD Data Bit 7.
26	GPC6	GPIO Port C bit 6; LCD Data Bit 6.
27	GPC5	GPIO Port C bit 5; LCD Data Bit 5.
28	GPC4	GPIO Port C bit 4; LCD Data Bit 4.
29	GPC3	GPIO Port C bit 3; LCD Data Bit 3.
30	GPC2	GPIO Port C bit 2; LCD Data Bit 2.
31	GPC1	GPIO Port C bit 1; LCD Data Bit 1.
32	GPC0	GPIO Port C bit 0; LCD Data Bit 0.
33	NC	Unused.
34	NC	Unused.
35	NC	Unused.
36	NC	Unused.
37	GPD0	GPIO Port D bit 0; LCD Back Light Dim Control.
38	NC	Unused.
39	GND	Power Ground.
40	GND	Power Ground.
41	XP	Touch Panel, XP.
42	NC	Unused.
43	XM	Touch Panel, XM.
44	YM	Touch Panel, YM.
45	NC	Unused.
46	YP	Touch Panel, YP.
47	GND	Power Ground.
48	GND	Power Ground.
49	NC	Unused.
50	NC	Unused.
51	NC	Unused.
52	NC	Unused.

53	NC	Unused.
54	NC	Unused.
55	NC	Unused.
56	NC	Unused.
57	NC	Unused.
58	NC	Unused.
59	NC	Unused.
60	NC	Unused.
61	NC	Unused.
62	NC	Unused.
63	NC	Unused.
64	NC	Unused.

Table 2-12 CON2 (NuDesign-TFT-LCD4.3) Pin Assignment

### 2.3 NuMaker-HMI-N9H20 PCB Placement

Figure 2-6 shows the front view of NuMaker-N9H20 PCB placement.

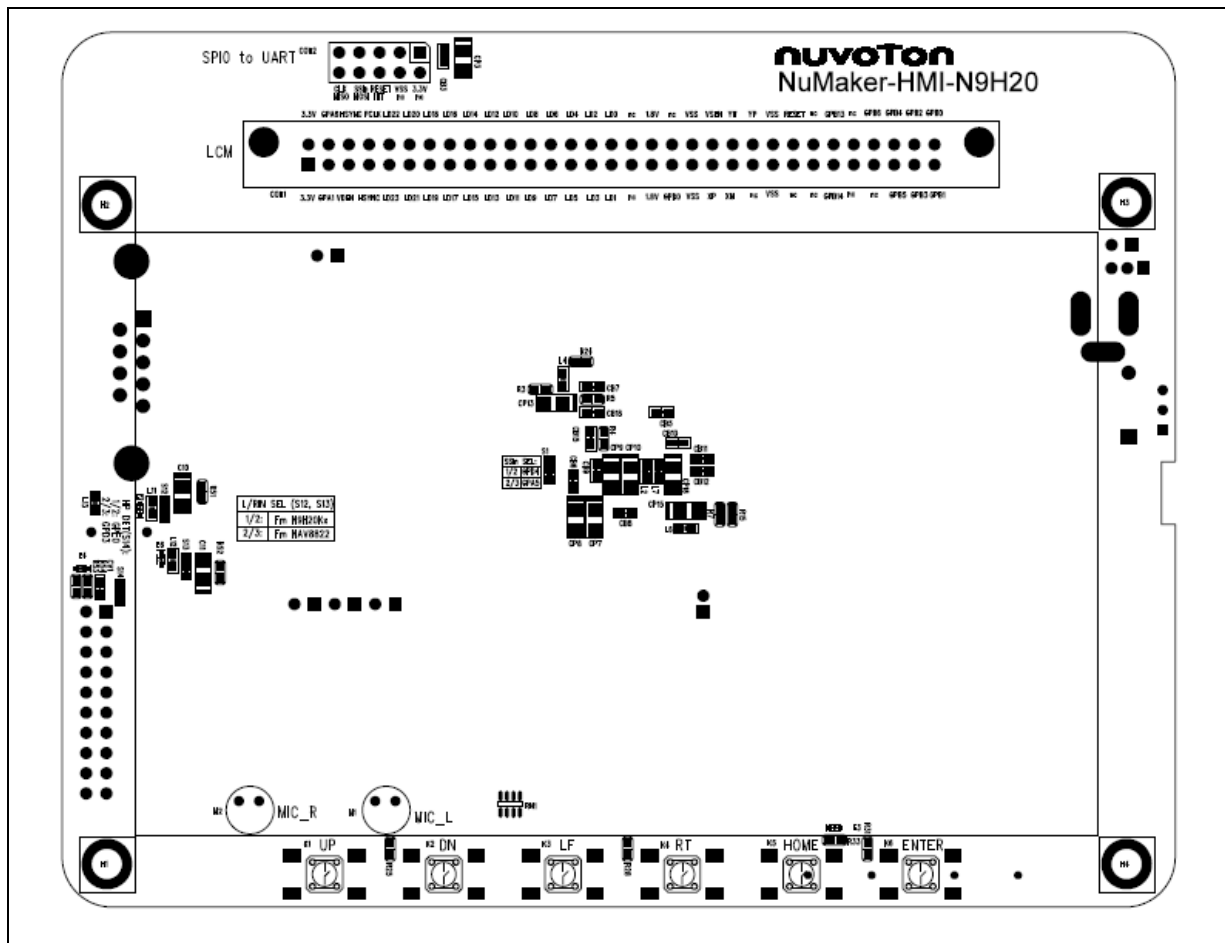


Figure 2-6 NuMaker-N9H20 PCB Placement (Front View)

Figure 2-7 shows the rear view of NuMaker-N9H20 PCB placement.

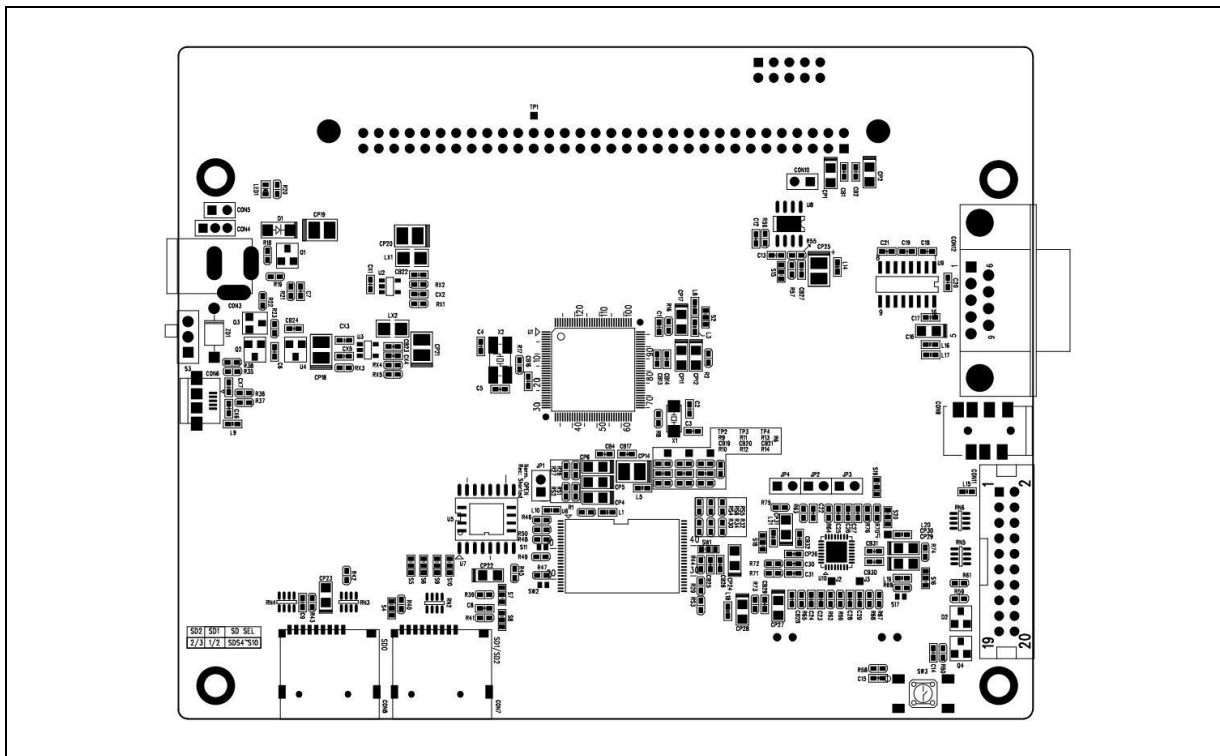


Figure 2-7 NuMaker-N9H20 PCB Placement (Rear View)

Figure 2-8 shows the front view of NuDesign-TFT-LCD4.3 PCB placement.

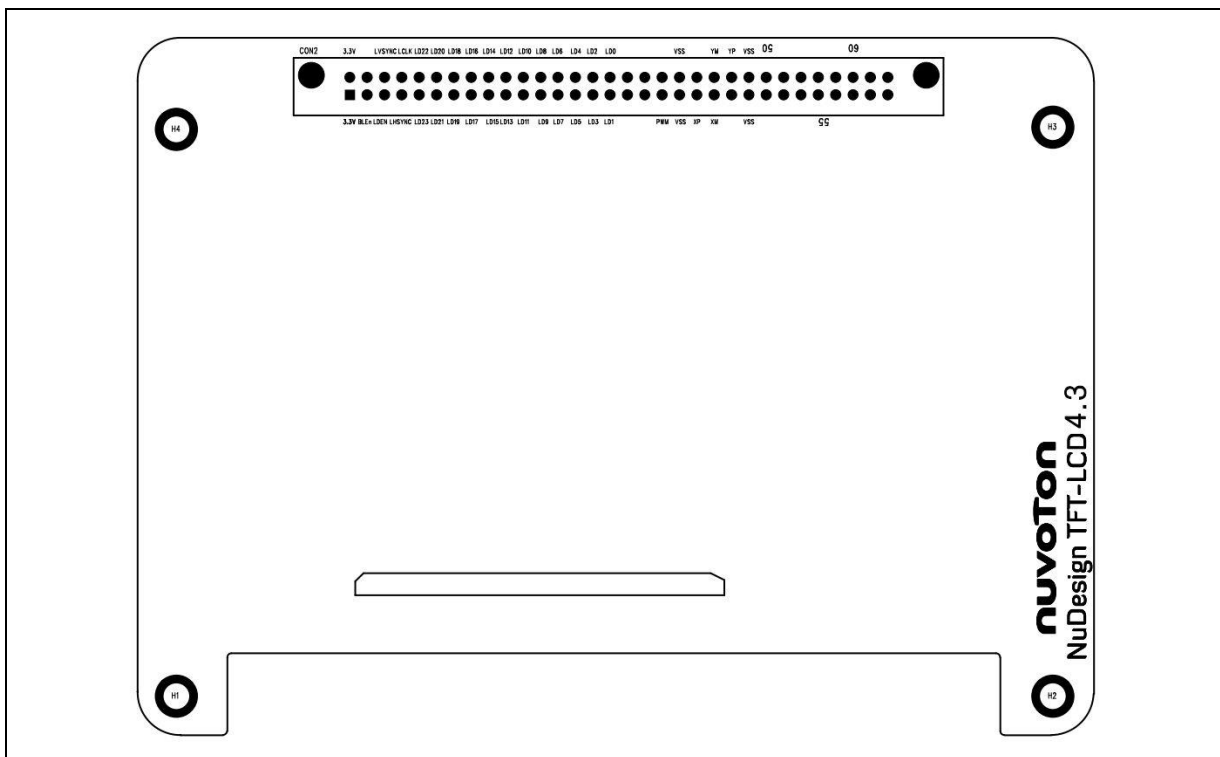


Figure 2-8 NuDesign-TFT-LCD4.3 PCB Placement (Front View)

Figure 2-9 shows the rear view of NuDesign-TFT-LCD4.3 PCB placement.

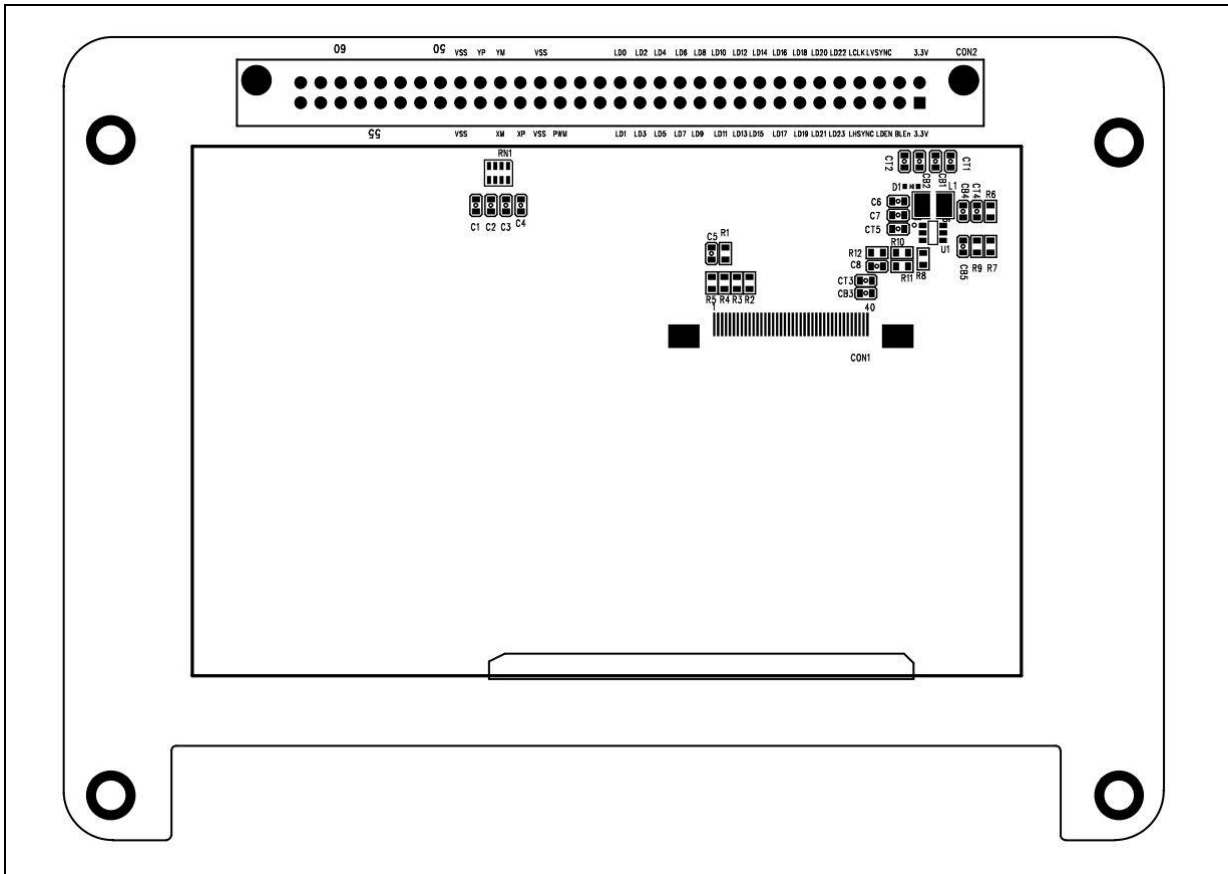


Figure 2-9 NuDesign-TFT\_LCD4.3 PCB Placement (Rear View)

Figure 2-10 shows the front view of NuDesign-SPI2UART(B) PCB placement.

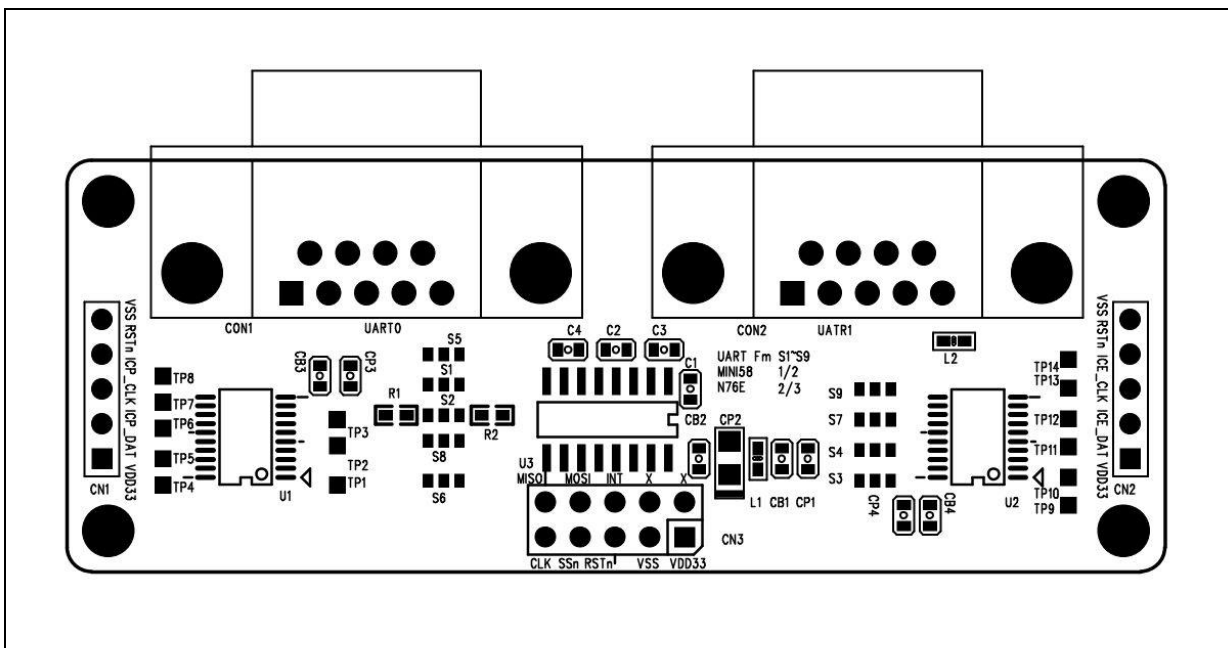


Figure 2-10 NuDesign-SPI2UART(B) PCB Placement (Front View)



## 2.4 NuMaker-N9H20 N9H20K51N's Control Pin Functions

Table 2-13 shows the NuMaker-N9H20 Function Control Pins Assignment.

Pin No.	GPIO	ADC	AUDIO	CMOS	I2C	I2S	JTAG	LCM-80	LCM	NAND	SD	SPI	SYSTEM	UART	USB
3	GPB.0			SP_CLKO							SD1_D1				UHL_DP1
4	GPB.14				SDA				LMVSYNC						
5	GPB.13				SCL								WDT_RSTn		
6	GPD.12											SPIO_CLK			
7	GPD.13											SPIO_CS0n			
8	GPD.14											SPIO_DI			
9	GPD.15											SPIO_DO			
10	GPE.4										SD0_D2				
11	GPE.5										SD0_D3				
12	GPE.6										SD0_CMD				
13	GPE.7										SD0_CLK				
14	GPE.2										SD0_D0				
15	GPE.3										SD0_D1				
16													XIN		
17													XOUT		
18													VDD18		
19													MVSSQ		
20													MVDDQ		
21													MVSSQ		
22													MVDDQ		
23													MVSSQ		
24													MVREF		
25															UD_VDD18
26															UD_VSS
27															DM0
28															DPO
29															UD_VDD33
30															UD_REXT
31	GPE.1			SP_VSYNC				BL_EN	LV_D17						
32	GPE.0			SP_HSYNC				LCSB	LV_D16						
33	GPC.15			SP_D7				LV_D15	LV_D15						
34	GPC.14			SP_D6				LV_D14	LV_D14						
35	GPC.13			SP_D5				LV_D13	LV_D13						
36	GPC.12			SP_D4				LV_D12	LV_D12						
37	GPC.11			SP_D3				LV_D11	LV_D11						
38	GPC.10			SP_D2				LV_D10	LV_D10						
39	GPC.9			SP_D1				LV_D9	LV_D9						

40	GPC.8			SP_D0				LV_D8	LV_D8						
41	GPC.7							LV_D7	LV_D7						
42	GPC.6							LV_D6	LV_D6						
43	GPC.5							LV_D5	LV_D5						
44	GPC.4							LV_D4	LV_D4						
45	GPC.3							LV_D3	LV_D3						
46	GPC.2							LV_D2	LV_D2						
47	GPC.1							LV_D1	LV_D1						
48	GPC.0							LV_D0	LV_D0						
49	GPD.11							RS	LV DEN					WDT_RSTn	
50	GPD.10							RDn	LVS YNC						
51														VSS	
52	GPD.9							WRn	LHS YNC						
53														VDD18	
54	GPB.15							CSn	LPCLK						
55														VDD33	
56		SAR_VSS33													
57		TP_YM													
58		TP_XM													
59		TP_XP													
60		TP_YP													
61		SAR_VDD33													
62		AIN_2													
63		AIN_3													
64		AIN_4													
65														RTC_XOUT	
66														RTC_XIN	
67														RTC_VDD18	
68														VDD33	
69	GPA.6												SPI1_CS1n		
70	GPA.5												SPIO_CS1n		
71	GPA.4														UHL_DM1
72	GPA.3														UHL_DP1
73	GPA.2								LMVSYNC						
74	GPA.1														
75	GPA.0														
76														RESETn	
77	GPD.0						TCK						SPI1_CS1n		
78	GPD.1						TMS								HUR_TXD
79	GPD.2						TDI								HUR_RXD

80	GPD.3						TDO											HUR_CTS	
81	GPD.4						TRSTn					SPIO_CS1n						HUR_RTS	
82																			UD_CDET
83																		VDD18	
84																		MVDD	
85																		MVSS	
86																		MVREF	
87																		MVSSQ	
88																		MVDDQ	
90							HP_VSS33												
91							HP_VDD33												
92							LHP_OUT												
93							RHP_OUT												
94							ADAC_VSS33												
95							ADAC_VREF												
96							ADAC_VDD33												
89																		VDD33	
97																		VDD18	
98	GPA.7																	WDT_RSTn	
99																			ND0
100																			ND1
101																			ND2
102																			ND3
103																			ND4
104																			ND5
105																			ND6
106																			ND7
107	GPD.6											NBUSY1n	SD2_D2						
108	GPD.5											NBUSY0n	SD2_D3						
109	GPD.8											NWR0n	SD2_CMD						
110	GPD.7											NREn	SD2_CLK						
111	GPE.11											NCLE							
112	GPE.10											NALE							
113	GPE.9											NCS1n	SD2_D0						
114																			VSS
115	GPE.8											NCS0n	SD2_D1						
116																			VDD33
117	GPA.10																	SPI1_CS1n	TXD0
118	GPA.11																		LMVSYNC
119	GPB.12						SP_D7												LV_D23
																			SPI1_DO

120	GPB.11			SP_D6				LV_D22			SPI1_DI			
121	GPB.10			SP_D5				LV_D21			SPI1_CS0n			
122	GPB.9			SP_D4				LV_D20			SPI1_CLK			
123	GPB.8			SP_D3				LV_D19						
124	GPB.7			SP_D2				LV_D18						
125	GPB.6			SP_D1	I2S_DI									
126	GPB.5			SP_D0	I2S_DO					SD1_D2				
127	GPB.4			PWR_DN	I2S_LRCLK					SD1_D3				
128	GPB.3			SP_VSYNC	I2S_BCLK					SD1_CMD				
1	GPB.2			SP_HSYNC	I2S_MCLK					SD1_CLK				
2	GPB.1			SP_PCLK						SD1_D0				UHL_DM1

Table 2-13 N9H20K51N Pin Functions Assignment

### 2.5 NuMaker-N9H20 BOM

Item	Q'ty	Reference	Part	Remark
1	1	C9	10p	C0603
2	2	C4,C5	20p	C0603
3	4	C2,C3,CX4,CX2	30p	C0603
4	3	C6,CV1,CX5	0.01u	C0603
5	41	CX1,CB1,CB2,CX3,CB3,CB4, CB5,CB6,CB7,C7,CB8,CB9, CB10,CB11,CB12,CB13, CB14,C14,CB15,C15,CB16, CB17,C17,CB18,C18,CB19, C19,CB20,C20,CB21,C21, CB22,CB23,CB24,CB25,CB26, CB28,CB29,CB30,CB31, CB32	0.1u	C0603
6	11	C1,C22,C23,C24,C25, C26,C27,C28,C29,C30,C31	1u	C0603
7	1	CP26	4.7u	C0603
8	26	CP1,CP2,CP3,CP4,CP5,CP6, CP7,CP8,CP9,CP10,C10, CP11,C11,CP12,CP13,CP15,	10u	CAP_A

		CP16,C16,CP17,CP23,		
		CP24,CP27,CP28,CP29,CP30,		
		CP31		
9	5	CP14,CP18,CP19,CP20,CP21,	47u	CAP_B
10	2	CX7,CX6	NP	
11	1	D1	RB161M	
12	1	D2	IN4148	SOT23
13	1	LED1	Red LED	LED0603
14	2	LX1,LX2	4.7uH	
15	20	L1,L2,L3,L4,L5,L6,L7,L8,	FB	L0603
		L9,L10,L11,L12,L13,		
		L15,L16,L17,L18,L19,L20,		
		L21		
16	1	RN6	33R	
17	4	RN1,RN3,RN4,RN5	10KR	
18	19	RS1,RS2,RS4,RS6,	0	R0603
		RS3,RS5,R42,R44,R73,R74,R75		
		R1,R2,R3,R6,R15,R16,R49,		
		R50,R9,R11,R13,R54		
19	2	R37,R36	4R7	R0603
20	2	R52,R51	10	R0603
21	6	R43,R61,R67,R69,R70,	33	R0603
		R76		
22	5	R20,R25,R28,R31,R33	1K	R0603
23	2	R5,R4	1K+/-1%	R0603
24	4	R62,R65,R66,R68	2K2	R0603
25	1	R22	4K7	R0603
26	16	R18,R21,R23,R24,R26,R27,	10K	R0603
		R29,R30,R32,R34,R45,R46,		
		R47,R48,R55,R59		
27	1	R7	12.1K	R0603
28	1	R60	47K	R0603

29	1	RX3	51K	R0603
30	8	R10,R12,R14,R19, R53,R58,R4,R5	100K	R0603
31	1	RX5	120K	R0603
32	1	RX2	154K	R0603
33	1	R35	200K	R0603
34	1	RX4	240K	R0603
35	1	R38	390K	R0603
36	1	RX1	680K	R0603
37	1	R17	1M	R0603
38	1	R8	10M	R0603
39	4	R63,R64,R71,R72	NC	R0603
40	2	M2,M1	MIC	LF-6027-OPC-4
41	2	Q1,Q2	IS2301	SOT23
42	1	Q3	2N3906	SOT23
43	1	Q4	2N3904	SOT23
44	1	CON1	Header 32x2, 2.54mm, Male	
45	1	CON11	Header 10x2, w/ Box, Male	
46	1	CON2	Header 5x2, 90 degree, Female	
47	1	CON5	Header 2, 2.54mm, Male	
48	1	JP2,JP3,JP4	Header 6, 2.54mm, Male	
49	1	JP1	Header 2, 2.0mm, Male	
50	1	CON3	Power Jack, 3P	
51	1	CON6	MICRO_USB	
52	1	CON8	TF Socket	TF Socket
53	1	CON9	PJK-634M	
54	1	CON12	D-SUB-9, 90 degree, Female	
55	7	K1,K2,K3,K4,K5,K6,SW3	Push Button, SMD	
56	1	S3	SST-1200	
57	1	U1	N9H20K51N	LQFP128
58	2	U3,U2	ZT7104AS	SOT23-5



59	1	U4	XC6206P182MR	SOT23
60	1	U5	W55X16	SOIC-8 (208mil)
61	1	U6	Toshiba NAND 4-8G	TSOP-48
62	1	U7	W25Q128BV	SOIC-16 (300mil)
63	1	U9	ICL-232E	NOSIC-16L
64	1	U10	NAU8822	32-QFN
65	1	U11	SN74LVC1G79	SOT23-6
66	1	X1	32.768KHz	
67	1	X2	12MHz	
68	1	ZD1	5V6	
69	4	S1(2/3), S12(1/2),S13(1/2),S15(2/3)	0	R0402
70	1	S14(2/3)	1K	R0402
71	6	SW1,S2,S16,S18,S19,S20	NC	
72	2	SW2,S17	Short Pad	
73	3	J1,J2,J3	Pin Hole	
74	4	TP1,TP2,TP3,TP4	TEST Pad	
75	1	CON4	Header 3, 2.0mm, Male	

Table 2-14 NuMaker-N9H20 BOM

2.6 NuDesign-TFT-LCD4.3 BOM

Item	Q'ty	Reference	Part	Remark
1	1	C5	5pF	C0603
2	5	CB1, CB2, CB3, CB4, CB5	0.1u	C0603
3	1	C8	1u	C0603
4	1	C7	4.7u	C0603
5	5	CT1, CT2, CT3, CT4, CT5	10u	C0603
6	5	C1, C2, C3, C4, C6	NC	
7	1	L1	22uH/1.1MHZ	SMTDR32
8	1	D1	RB521S-30	SOD-523
9	1	RN1	33R	8P4R
10	1	R6	0	R0603
11	1	R11	4R7	R0603
12	4	R1, R3, R4, R5	33	R0603
13	1	R7	1K	R0603
14	3	R2, R8, R9	10K	R0603
15	1	R10	100K	R0603
16	1	R12	220K	R0603
17	1	U1	ZT7418	SOT23-6
18	1	CON1	FPC-40/0.5mm, Upper Contacted.	
19	1	CON2	Header32x2, 2.54mm, Female.	

Table 2-15 NuDesign-TFT-LCD4.3 BOM

**2.7 NuDesign-SPI2UART(B) BOM**

Item	Q'ty	Reference	Part	Remark
1	8	CB1, CB2, CB3, CB4, C1, C2, C3, C4	0.1u	C0603
2	3	CP1, CP3, CP4	10u	C0603
3	1	CP2	10u	CAP_A
4	2	L2, L1	FB	L0603
5	2	R1, R2	10	R0603
6	9	Pad 1/2 (S1, S2, S3, S4, S5, S6, S7, S8, S9)	0	R0402
7	1	U2	MINI58FDE	TSSOP_20L
8	1	U3	ICL-232E	NOSIC-16L
9	1	CN3	Header 5x2, 2.54mm, 90 degree, Male	
10	1	CN2, CN1	Header 5, 2.54mm, Male	
11	2	CON1, CON2	D-SUB-9, 90 degree, Female	

Table 2-16 NuDesign-SPI2UART(B) BOM

### 3 NUMAKER-HMI-N9H20 SCHEMATICS

#### 3.1 NuMaker-N9H20 Function Blocks Circuit

Figure 3-1 shows the NuMaker-N9H20 function blocks circuit.

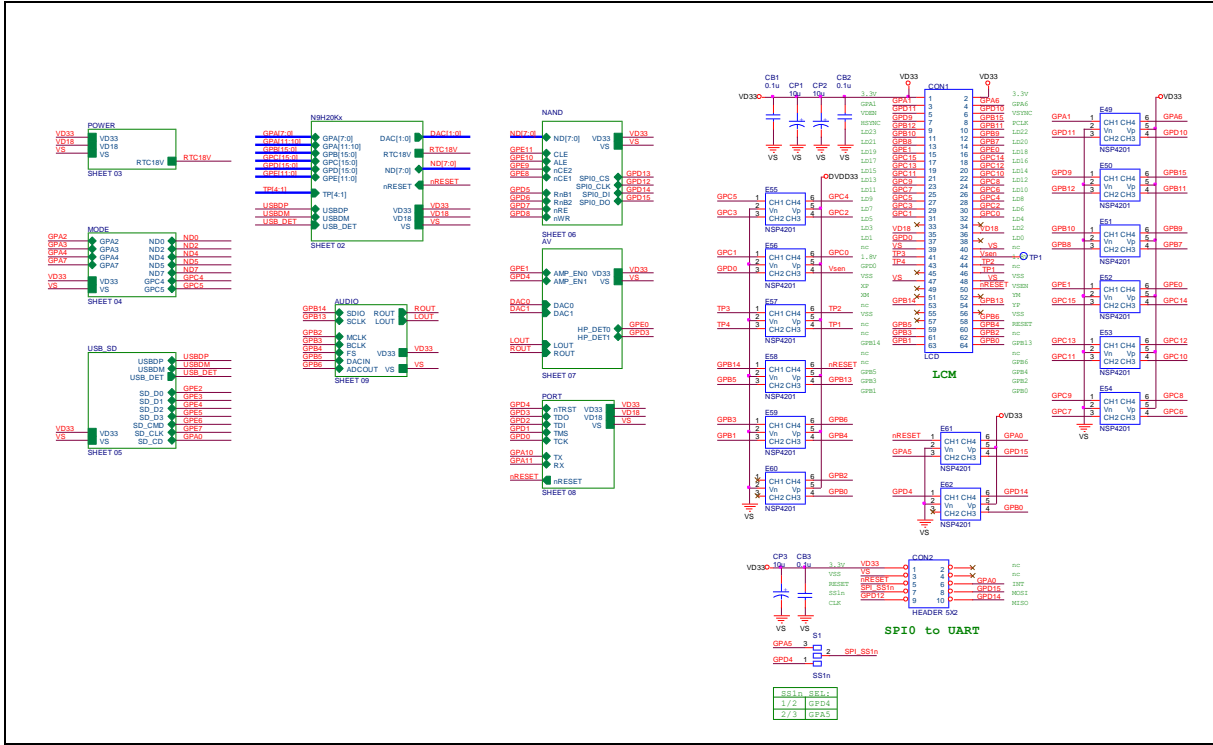
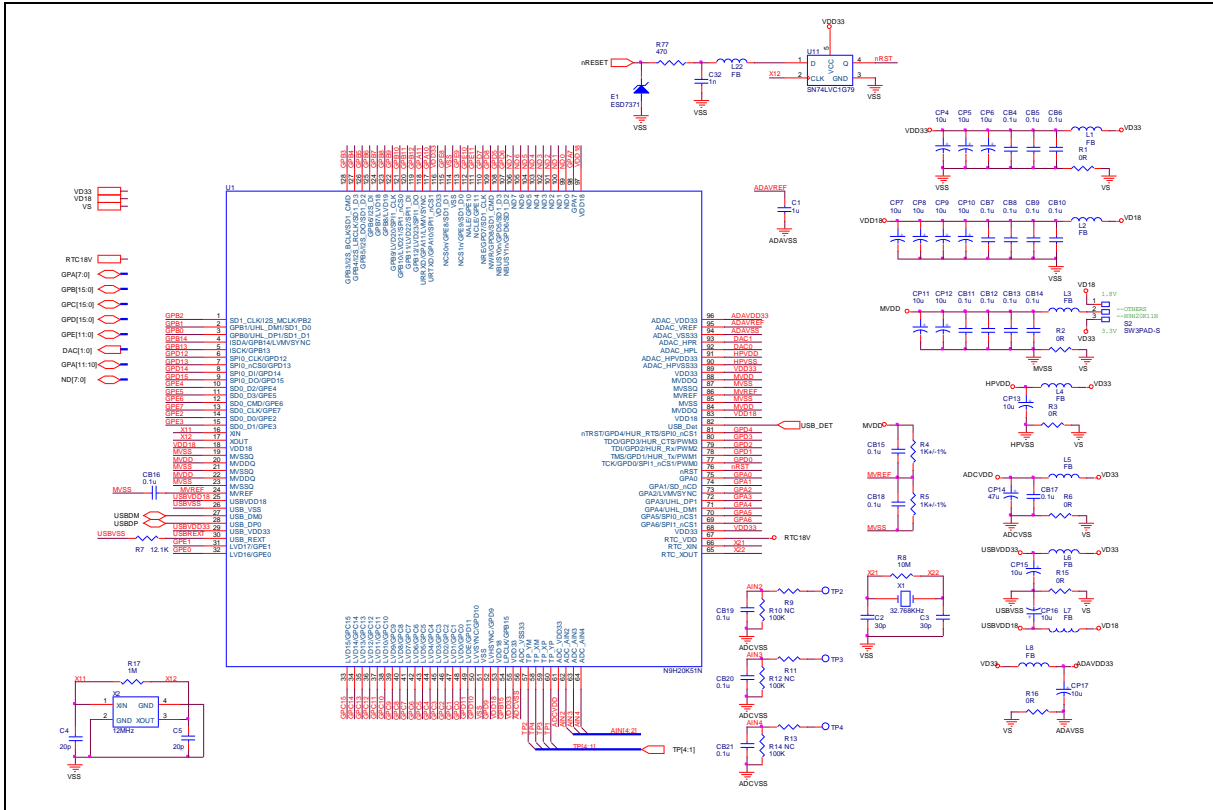


Figure 3-1 NuMaker-N9H20 Function Blocks Circuit

### 3.2 NuMaker-N9H20 N9H20K51N MPU Circuit

Figure 3-2 shows the NuMaker-N9H20 N9H20K51N MPU circuit.



### 3.3 NuMaker-N9H20 Power Supply Circuit

Figure 3-3 shows the NuMaker-N9H20 power supply circuit.

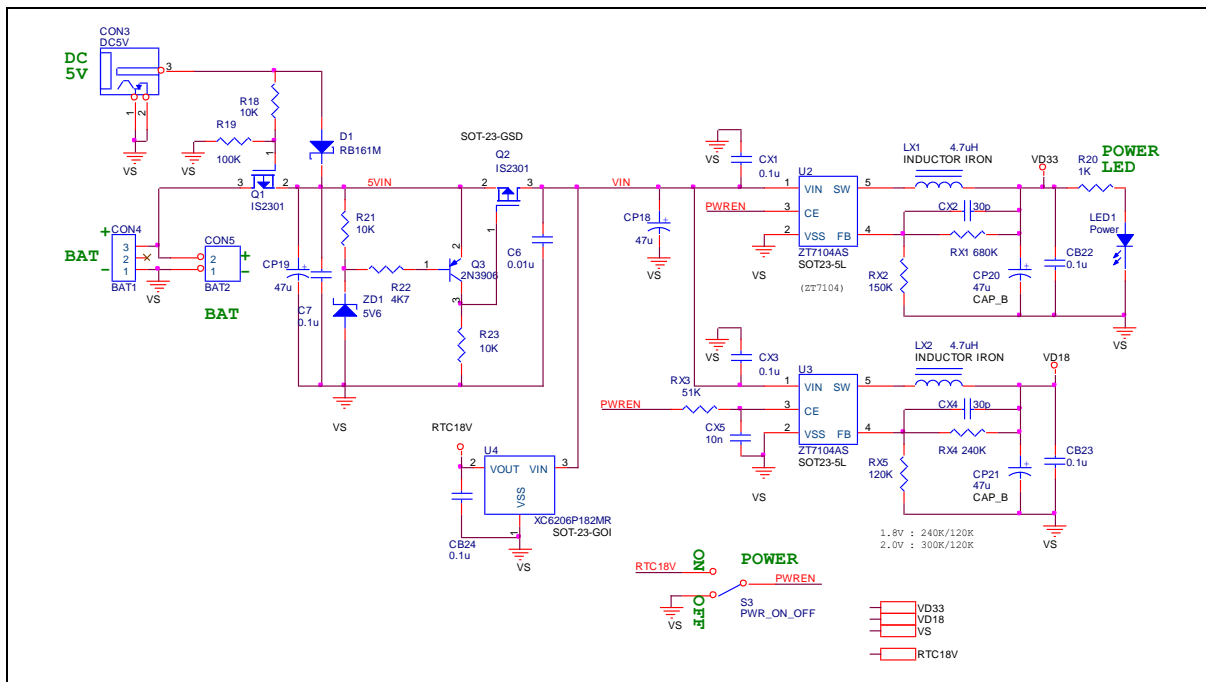


Figure 3-3 NuMaker-N9H20 Power Supply Circuit

### 3.4 NuMaker-N9H20 Keys and Configuration Circuit

Figure 3-4 shows the NuMaker-N9H20 keys and configuration circuit.

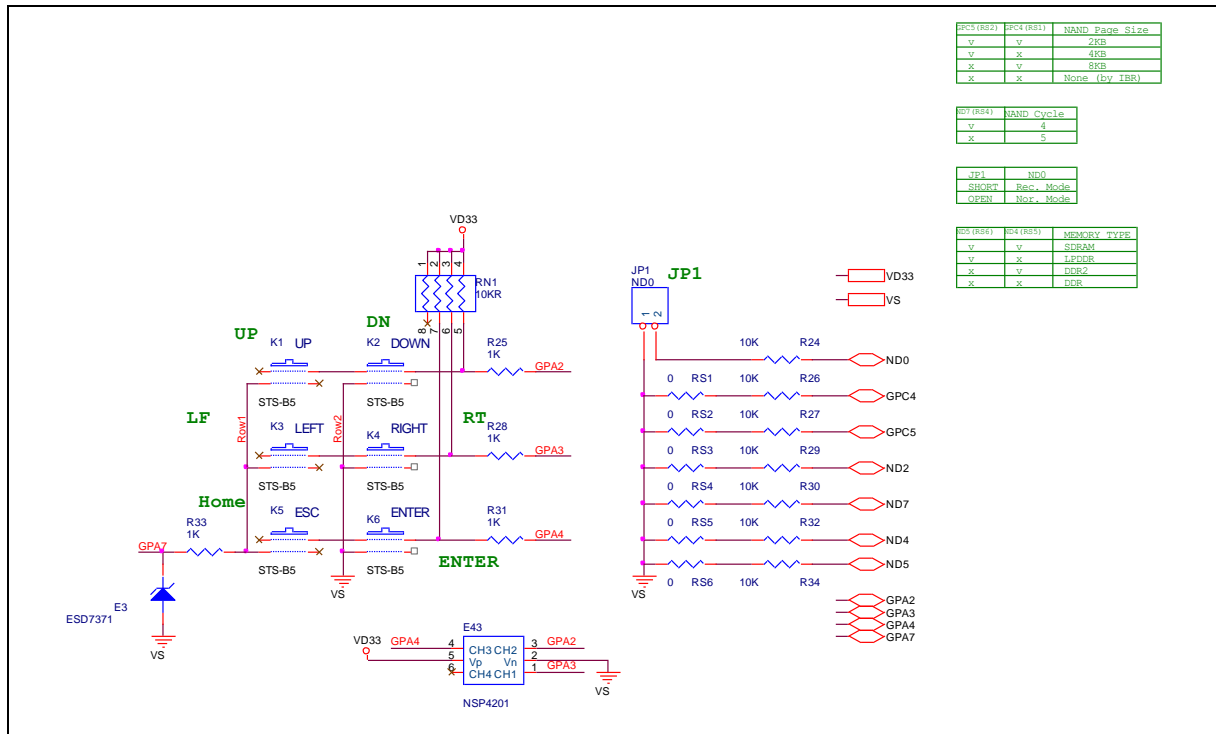


Figure 3-4 NuMaker-N9H20 Keys and Configuration Circuit



### 3.5 NuMaker-N9H20 USB2.0 and SD0 Interface Circuit

Figure 3-5 shows the NuMaker-N9H20 USB2.0 and SD0 interface circuit.

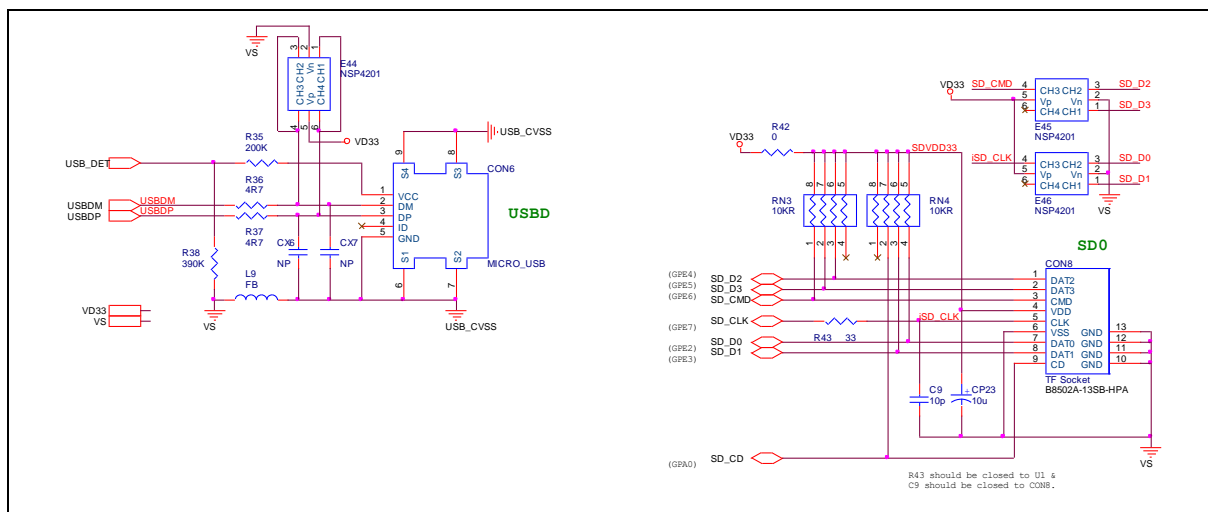


Figure 3-5 NuMaker-N9H20 USB2.0 and SD0 Interface Circuit

### 3.6 NuMaker-N9H20 NAND and SPI Flash Memory Circuit

Figure 3-6 shows the NuMaker-N9H20 NAND and SPI flash memory circuit.

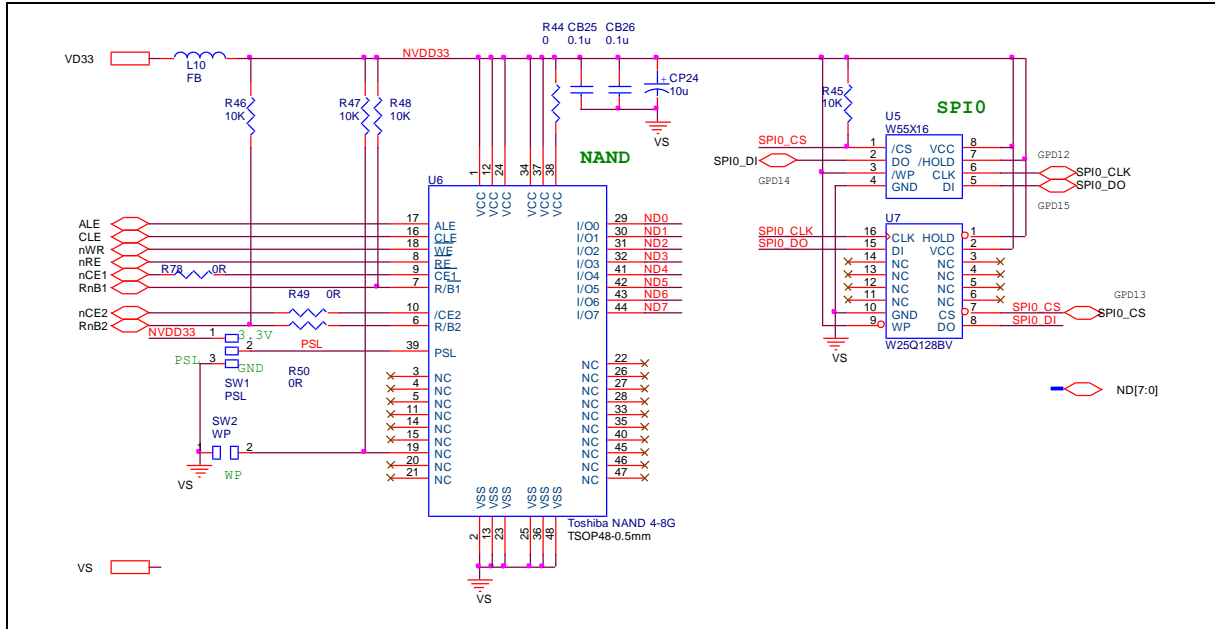


Figure 3-6 NuMaker-N9H20 NAND and SPI Flash Memory Circuit

### 3.7 NuMaker-N9H20 Headphone Circuit

Figure 3-7 shows the NuMaker-N9H20 headphone circuit.

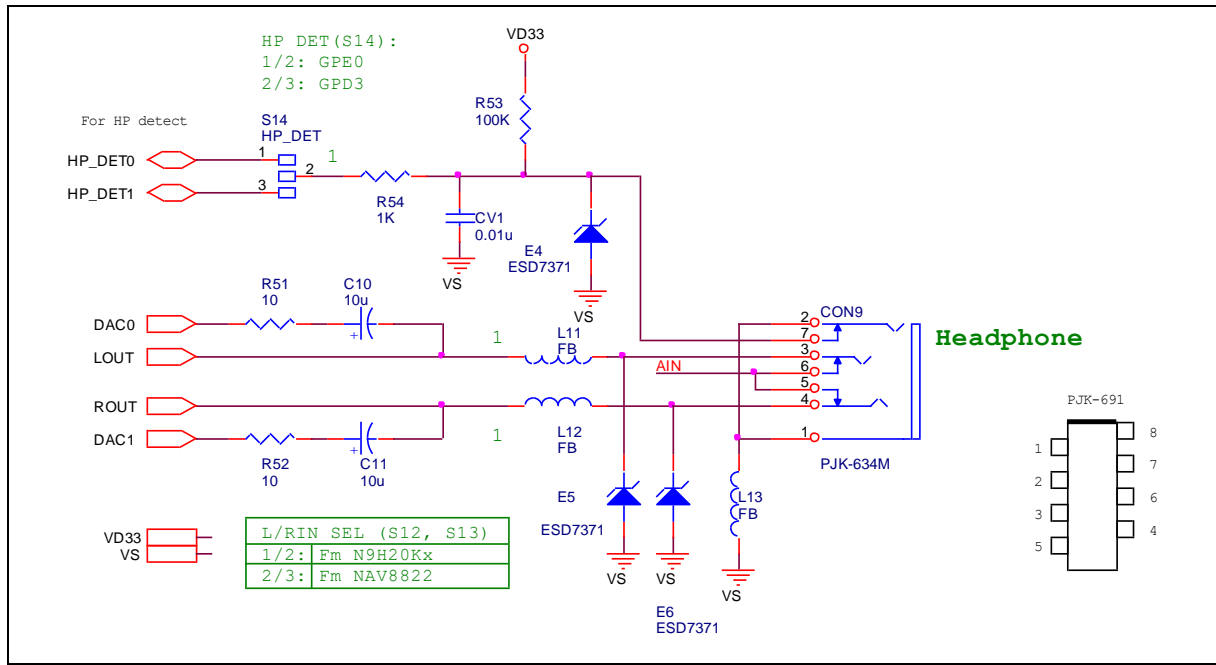


Figure 3-7 NuMaker-N9H20 Headphone Circuit

### 3.8 NuMaker-N9H20 JTAG and UART Circuit

Figure 3-8 shows the NuMaker-N9H20 JTAG and UART circuit.

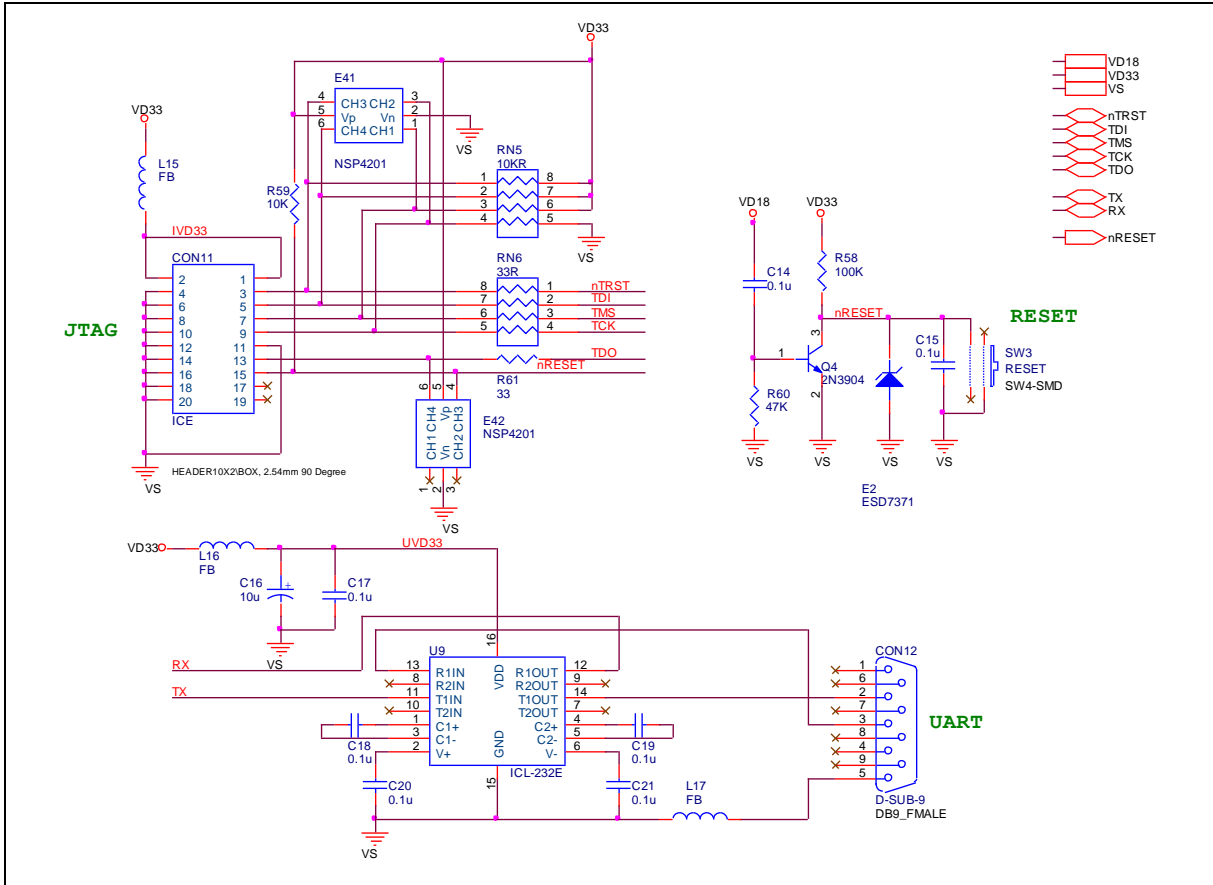


Figure 3-8 NuMaker-N9H20 JTAG and UART Circuit

### 3.9 NuMaker-N9H20 Audio Codec Controller Circuit

Figure 3-9 shows the NuMaker-N9H20 audio codec controller circuit.

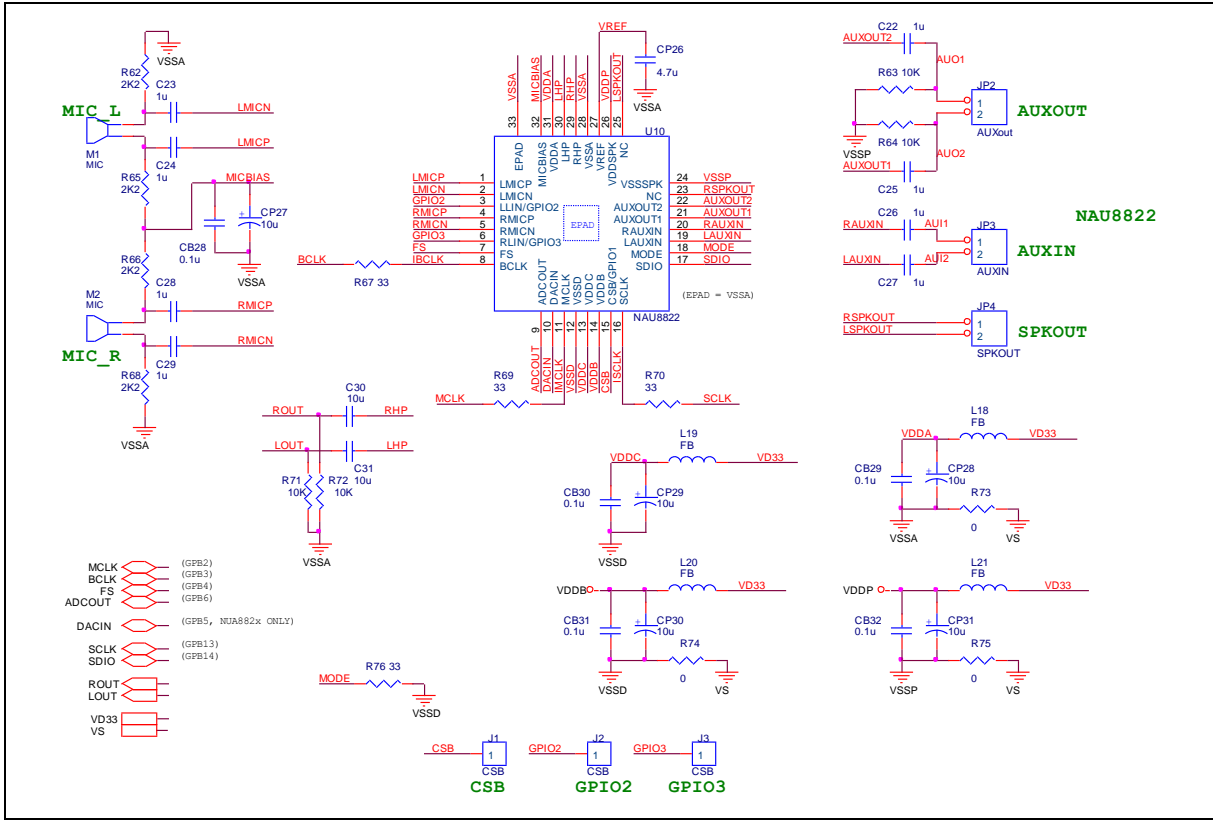


Figure 3-9 NuMaker-N9H20 Audio Codec Controller Circuit

### 3.10 NuDesign-TFT-LCD4.3 LCD Controller Circuit

Figure 3-10 shows the NuDesign-TFT-LCD4.3 LCD controller circuit.

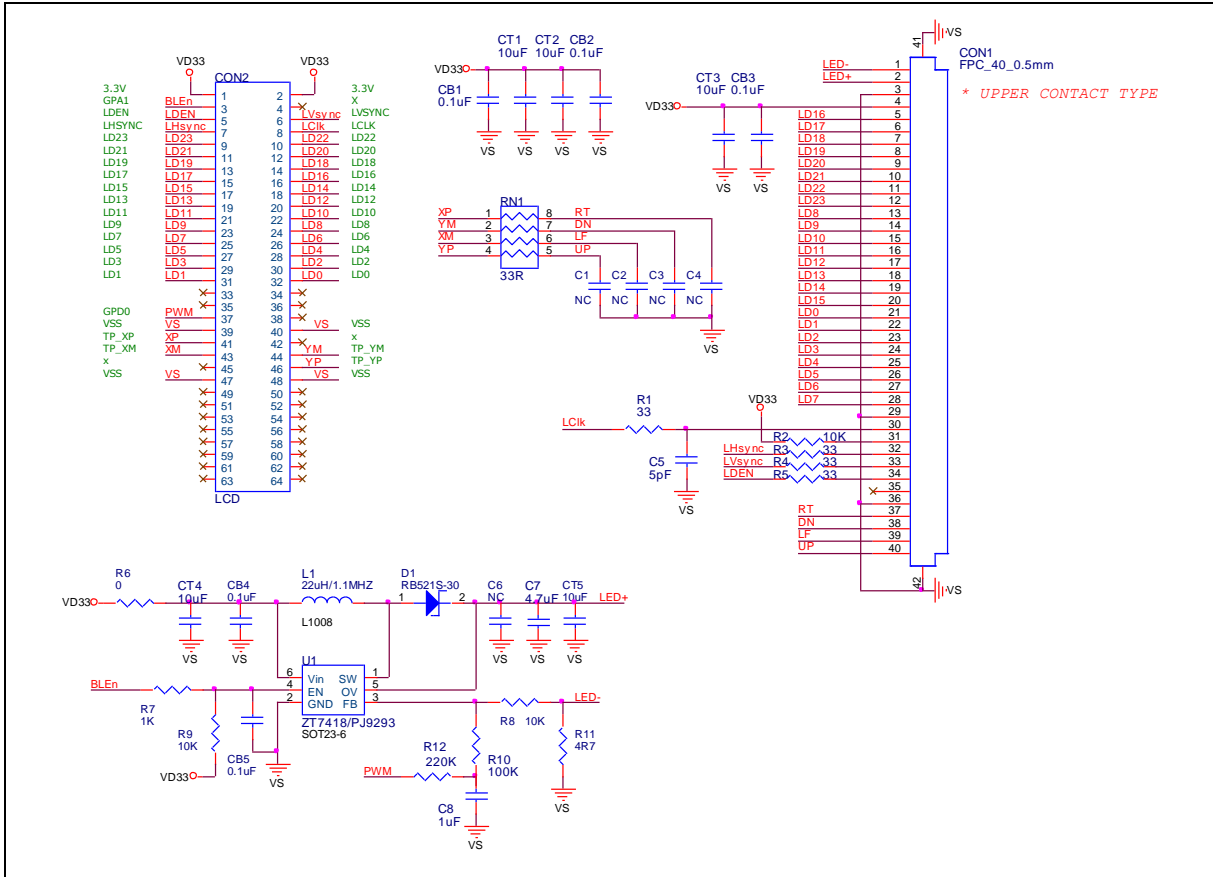


Figure 3-10 NuDesign-TFT-LCD4.3 LCD Controller Circuit

### 3.11 NuDesign-SPI2UART(B) Controller Circuit

Figure 3-11 shows the NuDesign-SPI2UART(B) Controller circuit.

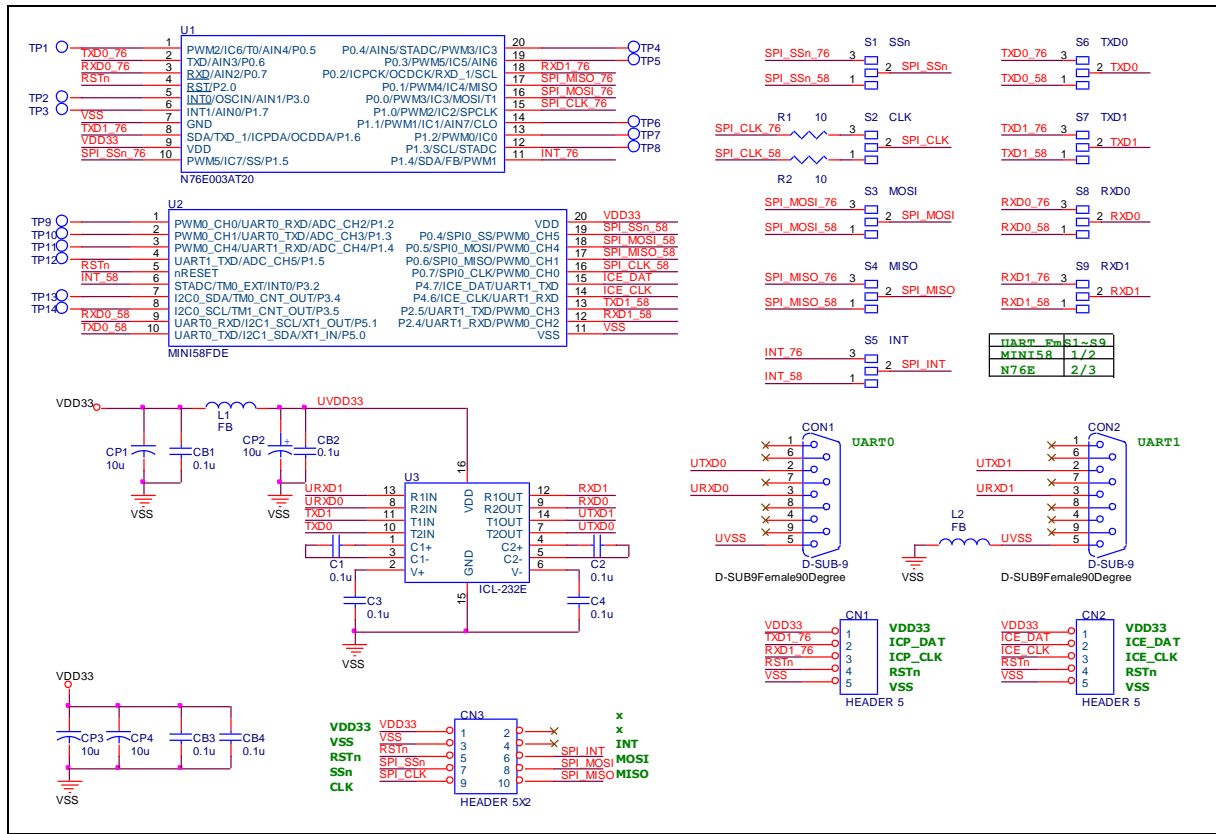


Figure 3-11 NuDesign-SPI2UART(B) Controller Circuit

**4 REVISION HISTORY**

Date	Revision	Description
2022.03.15	1.00	● Initial version.



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