NuMaker-emWin-N9H20
User Manual

Apr. 22, 2021 Rev. 2.02

Table of Contents

1 Overview 3
2 NuMaker-emWin-N9H20 Board Introduction 4
2.1 NuMaker-emWin-N9H20 Jumper Description 8
2.2 Pin Assignment for Extended Connectors 11
2.3 NuMaker-emWin-N9H20/NuMaker-TFT-LCD4.3/NuMaker-SPI2UART(B) PCB Placement 16
2.4 NuMaker-emWin-N9H20 N9H20K51N's Control Pin Functions 20
2.5 NuMaker-emWin-N9H20 BOM 23
2.6 NuMaker-TFT-LCD4.3 BOM 26
2.7 NuMaker-SPI2UART(B) BOM 26
3 NuMaker-emWin-N9H20 Schematics 27
3.1 NuMaker-emWin-N9H20 Function Blocks Schematic 27
3.2 NuMaker-emWin-N9H20 N9H20K51N MPU Schematic 28
3.3 NuMaker-emWin-N9H20 Power Supply Schematic 29
3.4 NuMaker-emWin-N9H20 Keys and Configuration Schematic 29
3.5 NuMaker-emWin-N9H20 USB2.0 and SD0 Interface Schematic 30
3.6 NuMaker-emWin-N9H20 NAND and SPI Flash Memory Schematic 30
3.7 NuMaker-emWin-N9H20 Headphone Schematic 31
3.8 NuMaker-emWin-N9H20 JTAG and UART Schematic 32
3.9 NuMaker-emWin-N9H20 Audio Codec Controller Schematic 33
3.10 NuMaker-TFT-LCD4.3 LCD Controller Schematic 34
3.11 NuMaker-SPI2UART(B) Controller Schematic 35
4 Revision History 36

1 Overview

The NuMaker-emWin-N9H20 system includes boards NuMaker-emWin-N9H20 and NuMaker-TFT-LCD4.3 that is a general development board for N9H20K51N series by which users can develop and verify the application program easily. The NuMaker-emWin-N9H20 includes Audio controller, USB 2.0 HS Device controller, SPI to UART controller, 24-bit LCD controller and integrated 32MB DDR2 memory, SRAM and external device with DMA request and ack.

2 NuMaker-emWin-N9H20 Board Introduction

The following figures show the NuMaker-emWin-N9H20 development board, in which the front and back integrated 32-bit microcontroller embeds an outstanding CPU core ARM926EJ-S, runs up to 192MHz, with 16KB I-cache, 16 KB D-cache and MMU, 32KB embedded SRAM and 12KB IBR(Internal Boot ROM) for booting from USB and SPI FLASH; Audio controller NAU8822A is a low power, high quality CODEC for portable and general purpose audio applications, it includes drivers for speaker, headphone, and differential or stereo line outputs, and integrates preamps for stereo differential microphones, significantly reducing external component requirements.

The board also supports several extended connections. Users can use it to develop and verify applications to emulate the real behavior.

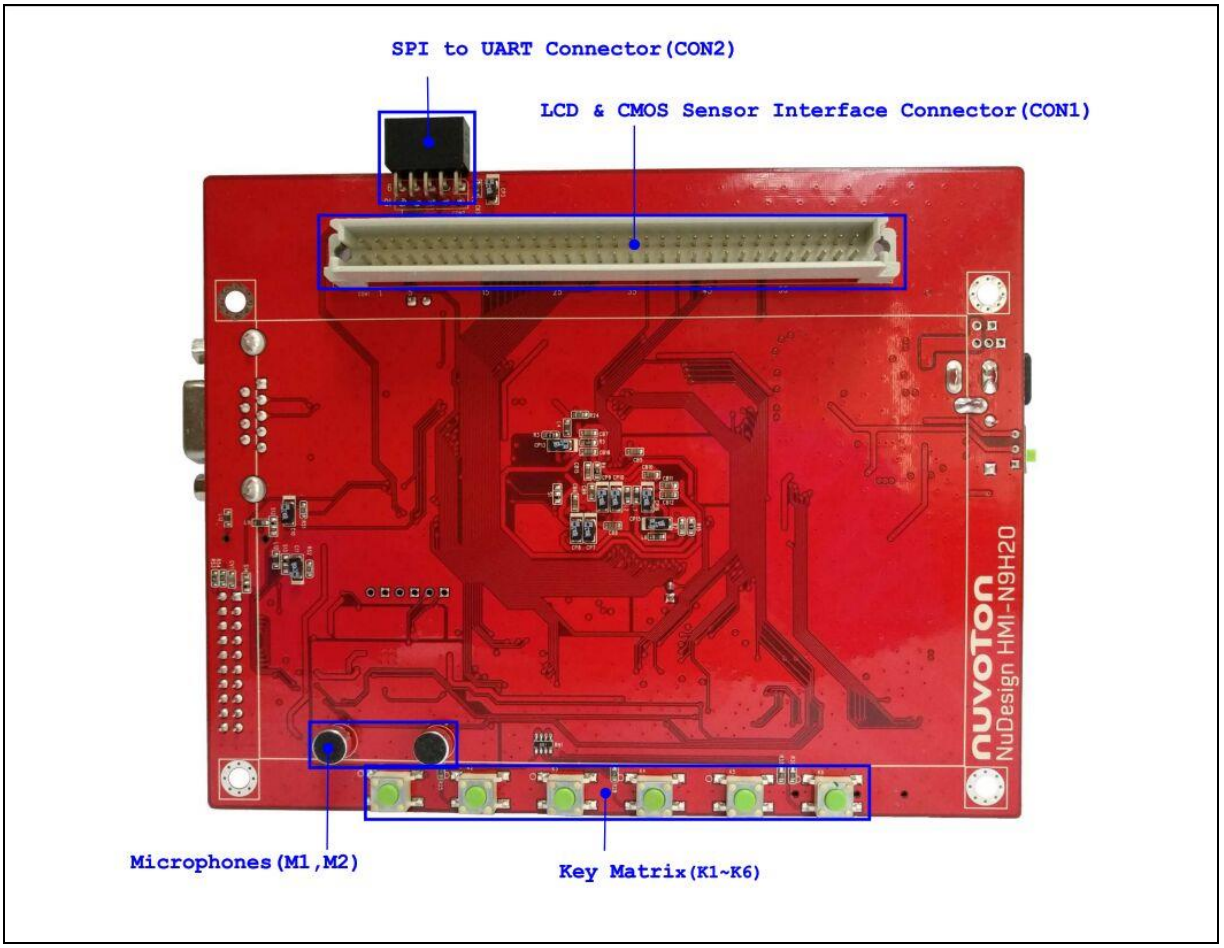


Figure 2-1 NuMaker-emWin-N9H20 PCB Board (Front)

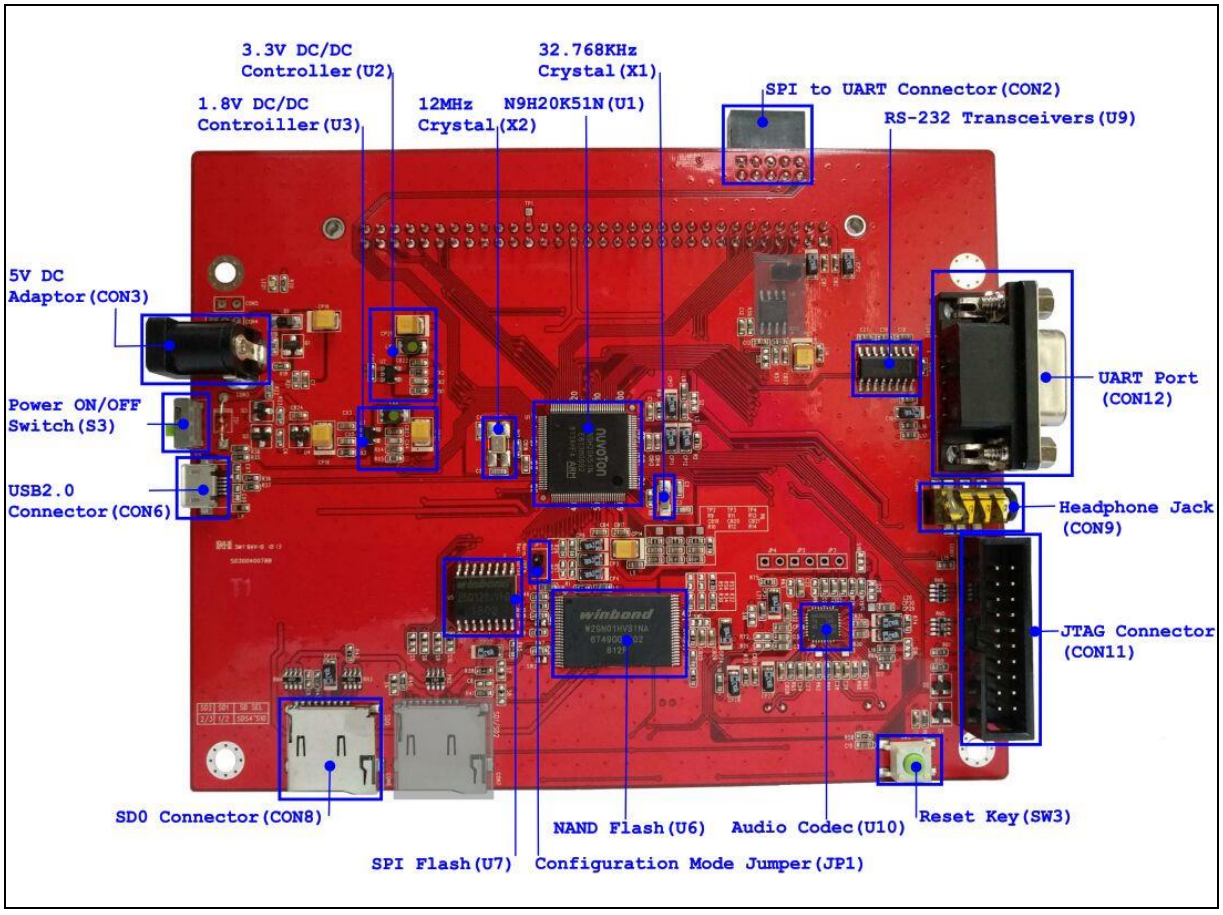


Figure 2-2 NuMaker-emWin-N9H20 PCB Board (Back)

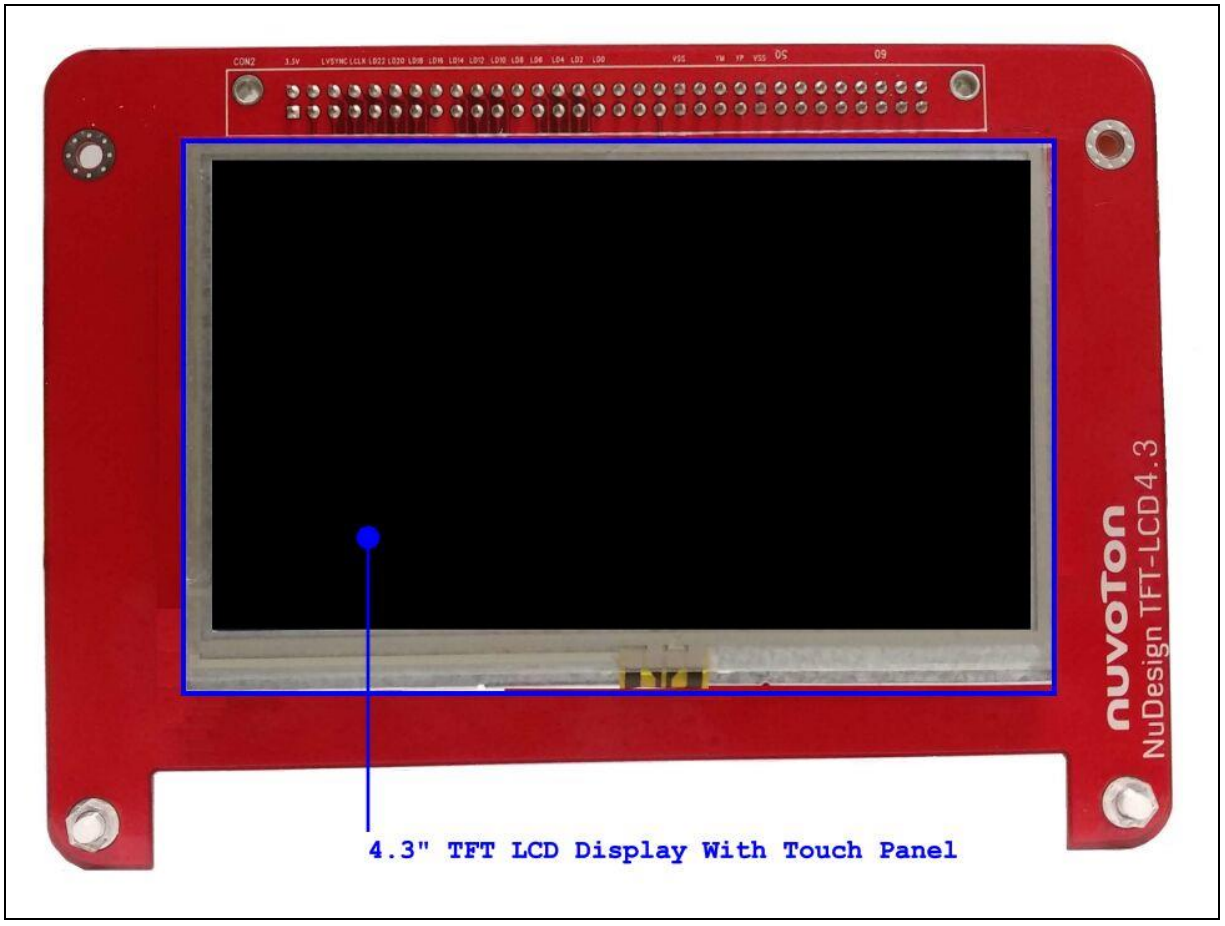


Figure 2-3 NuMaker-TFT-LCD4.3 PCB Board (Front)

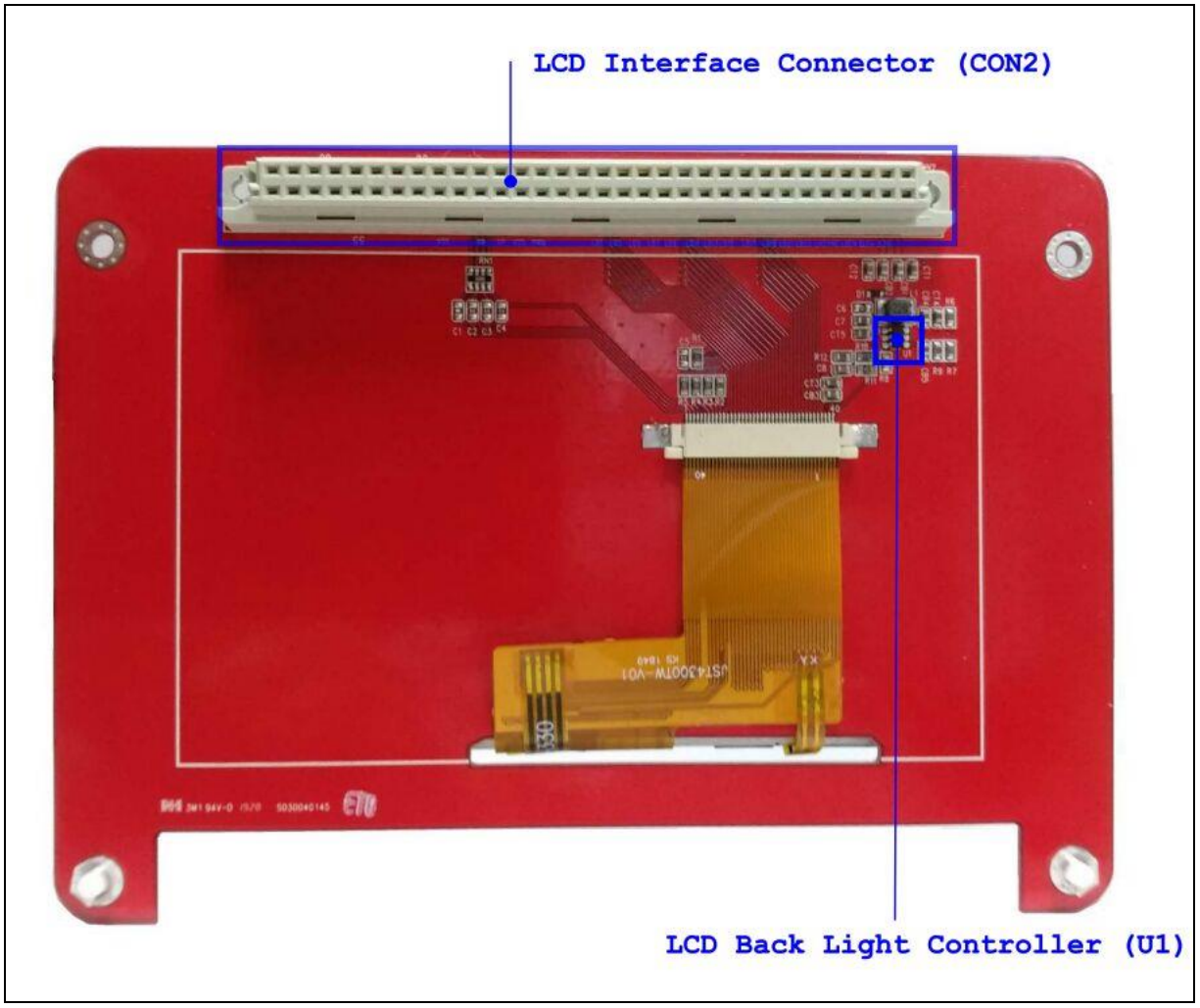


Figure 2-4 NuMarer-TFT-LCD4.3 PCB Board (Back)

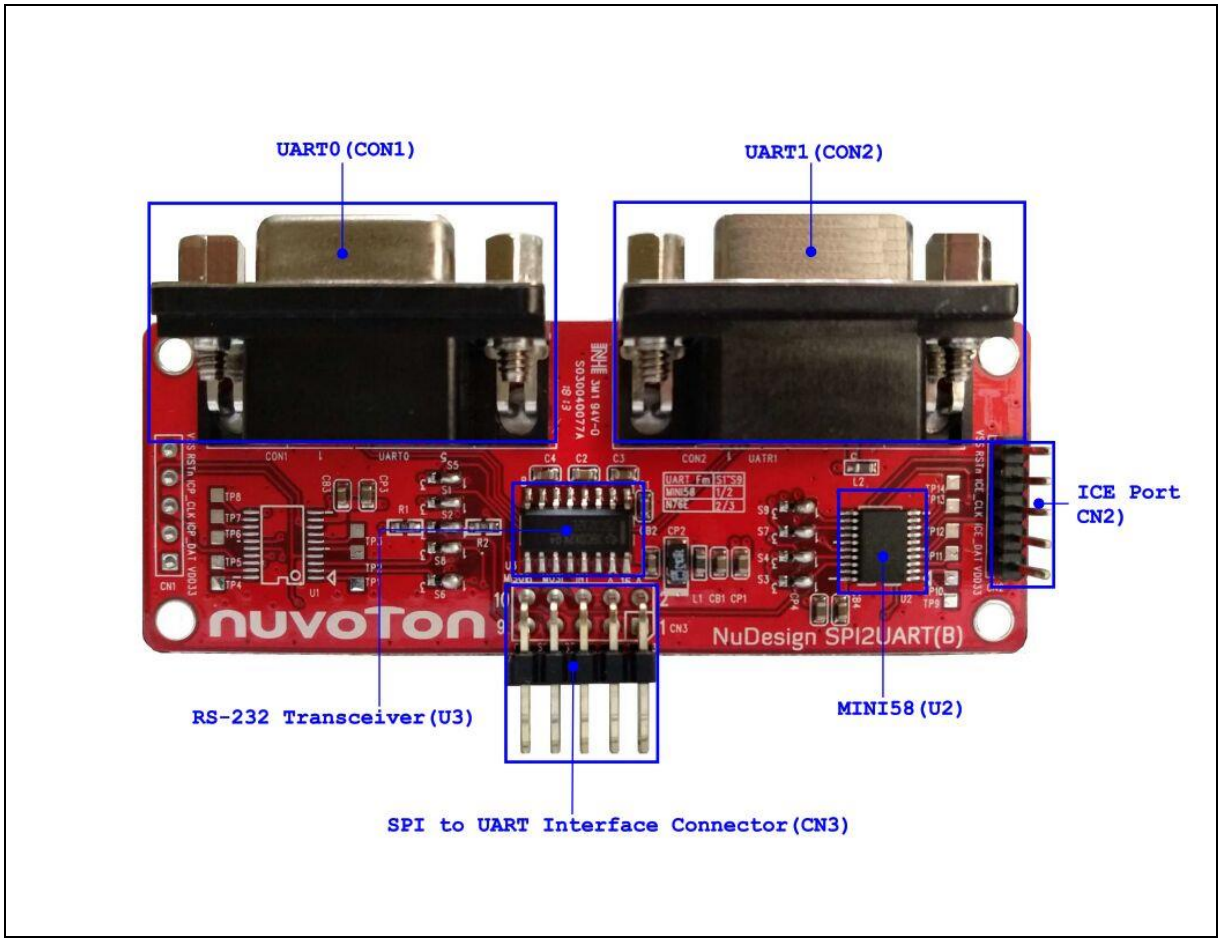


Figure 2-5 NuMaker-SPI2UART(B) PCB Board (Front)

2.1 NuMaker-emWin-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 Indicators

- **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-emWin-N9H20 (U1, N9H20K51N) for connecting with JTAG adaptor.

Pin No	Pin Name	Pin Functions
1, 2	VDD3	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 NuMaker-SPI2UART(B) (U2, MINI58FDE) for connecting with Nu-Link-Pro adaptor.

Pin No	Pin Name	Pin Functions
1	VD33	DC 3.3V
2	/TRST	JTAG Reset, Active Low
3	TDI	JTAG Test Data In
4	TMS	JTAG Mode Select
5	TCK	JTAG Clock
6	GND	Power Ground
7	TDO	JTAG Test Data Out
8	RESET	System Reset, Active Low.

Table 2-4 CN2 Pin Assignment

2.1.4 USB Connectors

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

2.1.5 Extended Connectors

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

2.1.6 Buttons and JUMPER

- **K1~K6**: Key pad button in NuMaker-emWin-N9H20.
- **SW3**: Reset button in NuMaker-emWin-N9H20.
- **JP1**: System configuration setting in NuMaker-emWin-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-emWin-N9H20 provides the N9H20K5DN target chip functions on board and several extended connectors (**NU1**, **NU2**, **NU3**, **NU4**, **NU5** and **NU6**) for user applications. The following table is the pin assignment for NuMaker-emWin-N9H20.

Pin No	Pin Name	Pin Functions
1	NC	Unused.
2	TX	UART0 TXD, Control by SPI0 Chip 1 Selected
3	RX	UART0 RXD, Control by SPI0 Chip 1 Selected
4	NC	Unused.
5	GND	Power Ground
6	NC	Unused.
7	NC	Unused.
8	NC	Unused.
9	NC	Unused.

Table 2-8 CON1 (NuMaker-SPI2UART(B)) Pin Assignment

Pin No	Pin Name	Pin Functions
1	NC	Unused.
2	TX	UART1 TXD, Control by SPI0 Chip 1 Selected
3	RX	UART1 RXD, Control by SPI0 Chip 1 Selected
4	NC	Unused.
5	GND	Power Ground
6	NC	Unused.
7	NC	Unused.
8	NC	Unused.
9	NC	Unused.

Table 2-9 CON2 (NuMaker-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-emWin-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-emWin-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 (NuMaker-TFT-LCD4.3) Pin Assignment

2.3 NuMaker-emWin-N9H20/NuMaker-TFT-LCD4.3/NuMaker-SPI2UART(B) PCB Placement

The following figure shows the NuMaker each PCB placement.

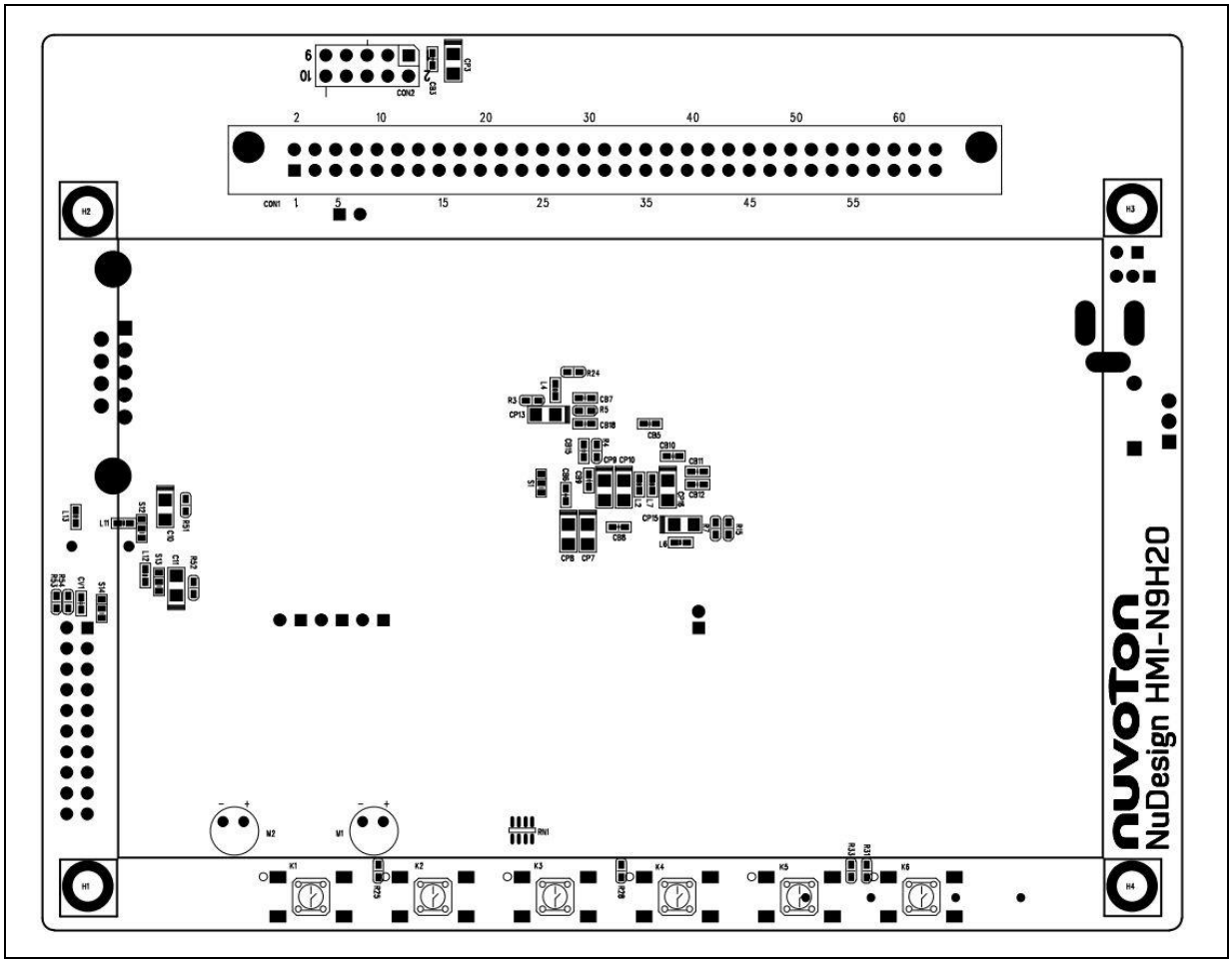


Figure 2-3 NuMaker-emWin-N9H20 PCB Placement (Front)

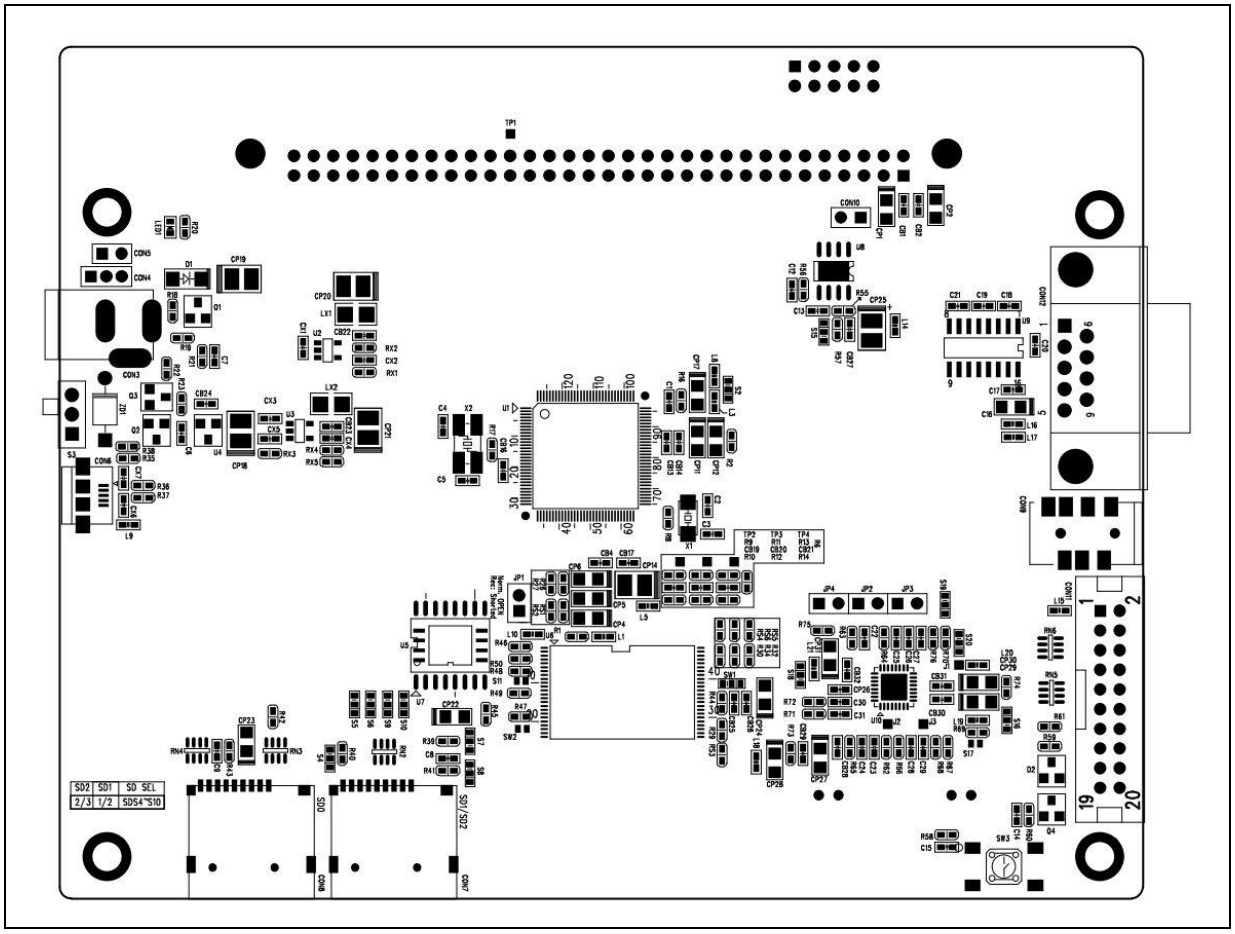


Figure 2-4 NuMaker-emWin-N9H20 PCB Placement (Back)

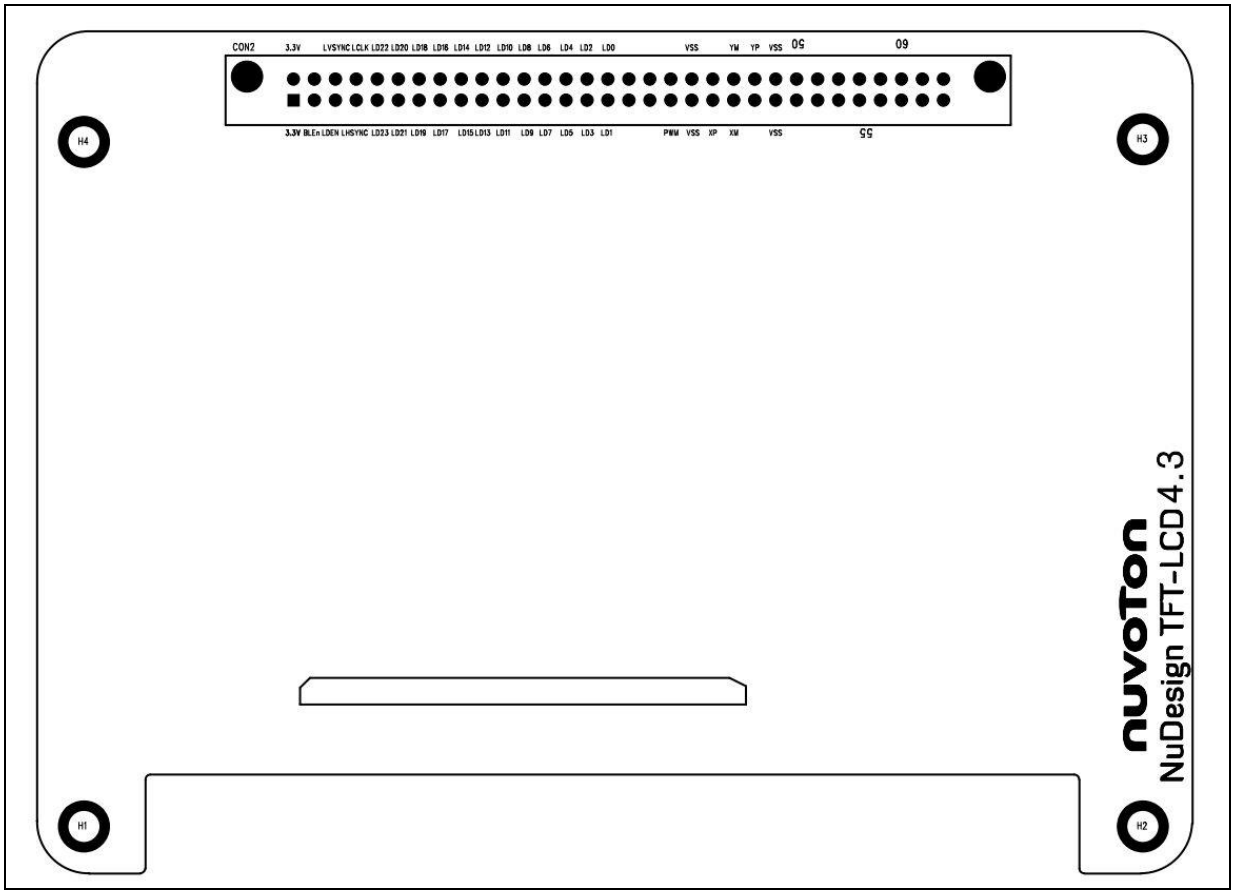


Figure 2-5 NuMaker-TFT-LCD4.3 PCB Placement (Front)

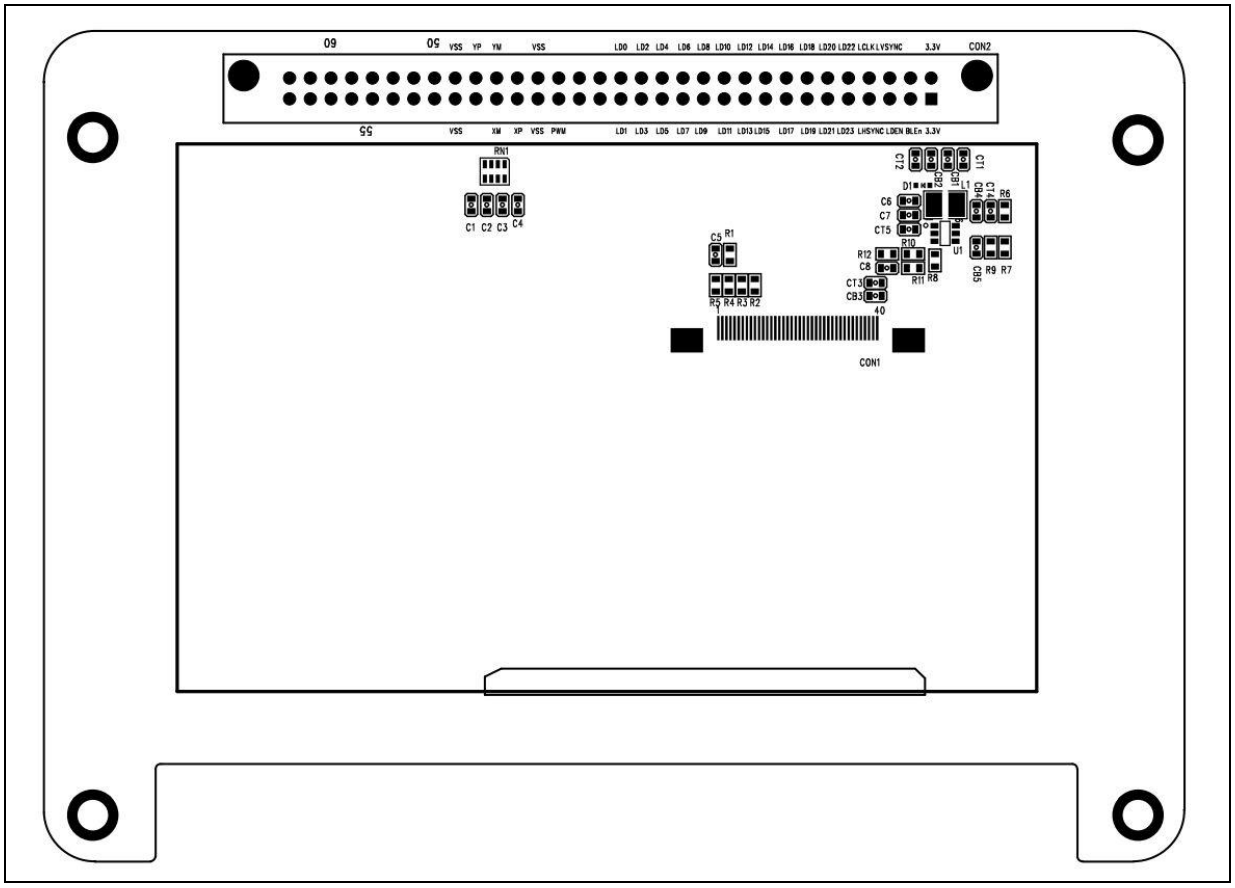


Figure 2-6 NuMaker-TFT_LCD4.3 PCB Placement (Back)

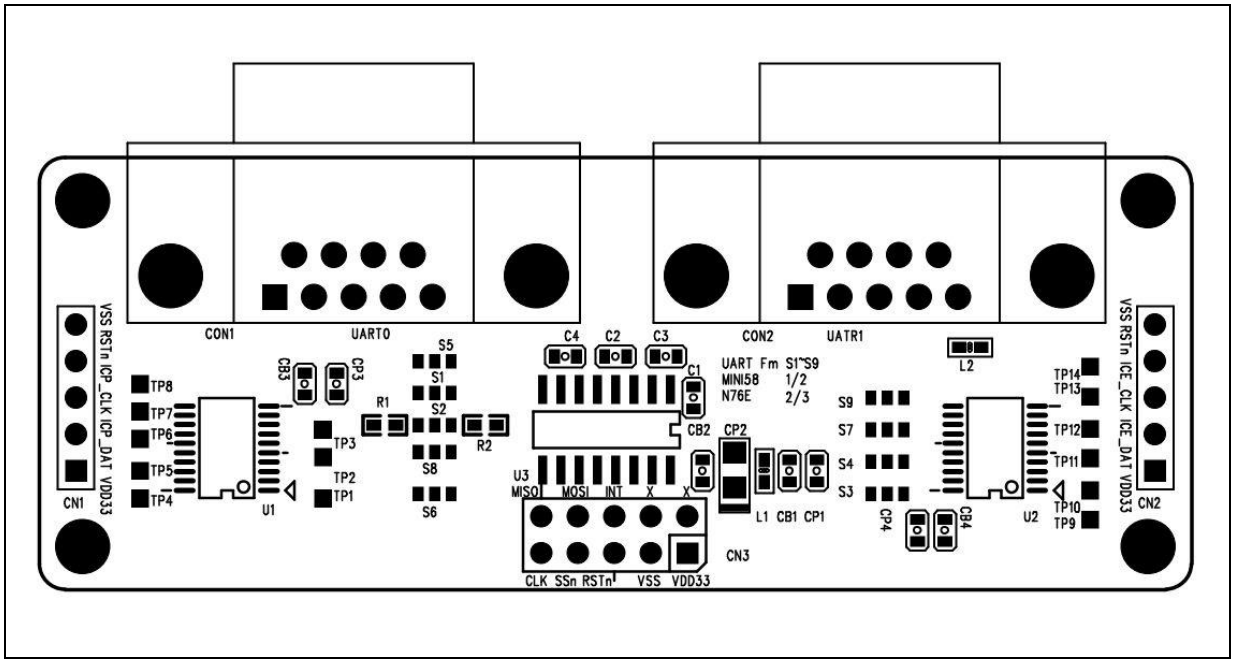


Figure 2-7 NuMaker-SPI2UART(B) PCB Placement (Front)

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

The following table shows the NuMaker-emWin-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											SPI0_CLK			
7	GPD.13											SPI0_CS0n			
8	GPD.14											SPI0_DI			
9	GPD.15											SPI0_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															DP0
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	LVDEN				WDT_RSTn		
50	GPD.10							RDn	LVSYNC						
51													VSS		
52	GPD.9							WRn	LHSYNC						
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											SPI0_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					SPI0_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					RXD0	
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-emWin-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,	0.1u	C0603
		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		
6	11	C1,C22,C23,C24,C25,	1u	C0603
		C26,C27,C28,C29,C30,C31		
7	1	CP26	4.7u	C0603
8	26	CP1,CP2,CP3,CP4,CP5,CP6,	10u	CAP_A
		CP7,CP8,CP9,CP10,C10,		
		CP11,C11,CP12,CP13,CP15,		
		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,	100K	R0603
		R53,R58,R4,R5		
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-emWin-N9H20 BOM

2.6 NuMaker-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 NuMaker-TFT-LCD4.3 BOM

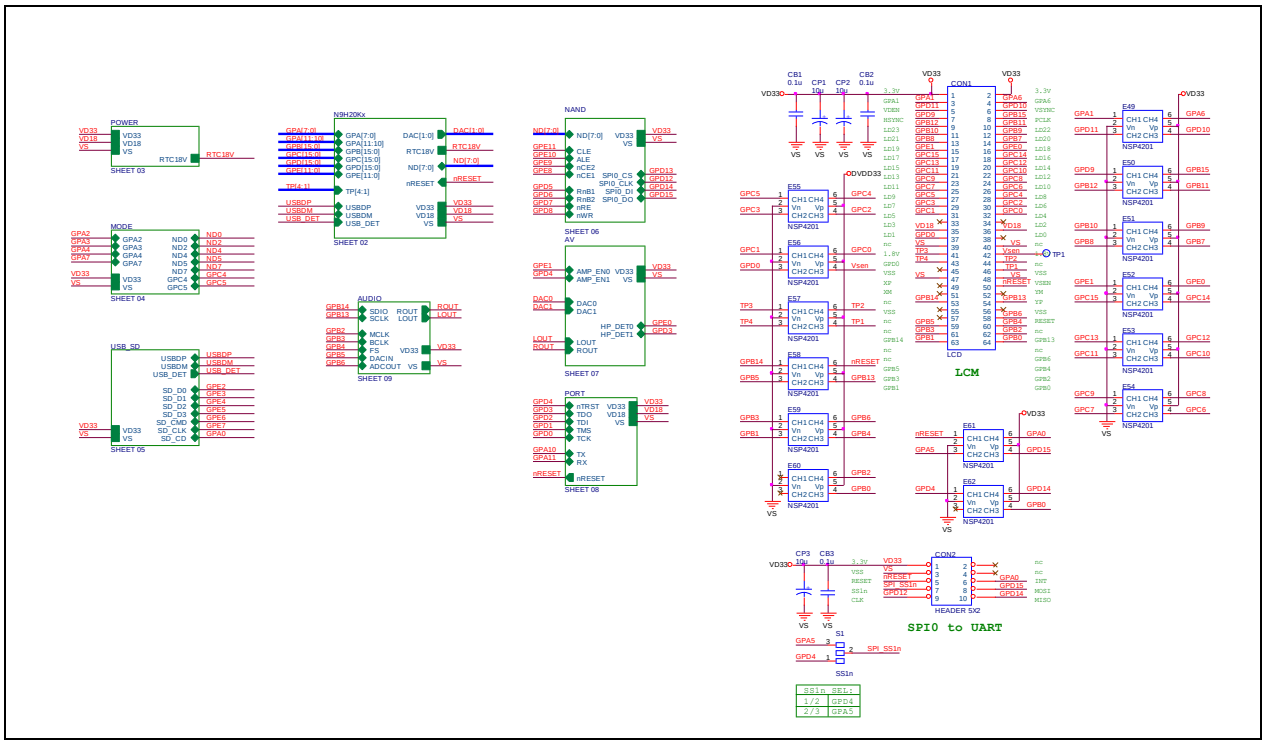
2.7 NuMaker-SPI2UART(B) BOM

Item	Q'ty	Reference	Part	Remark
1	8	CB1,CB2,CB3,CB4,	0.1u	C0603
		C1,C2,C3,C4		
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	

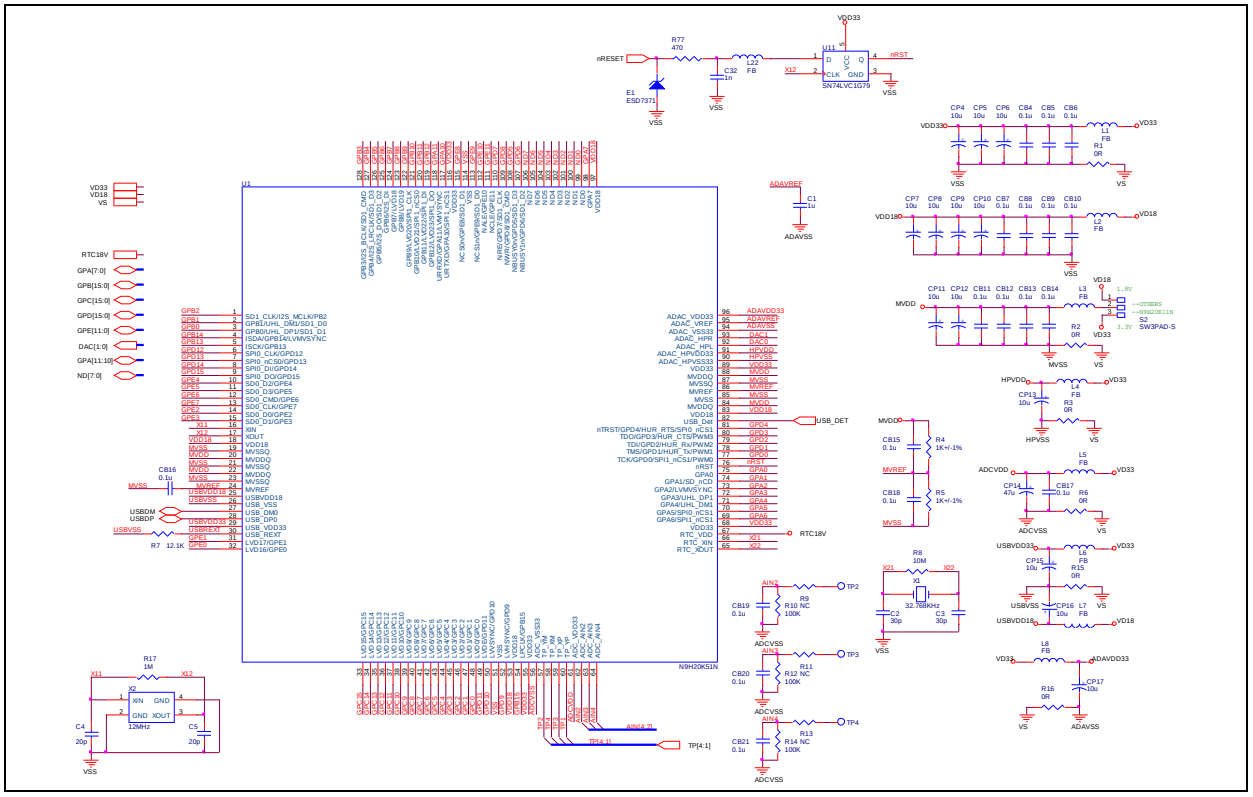
Table 2-16 NuMaker-SPI2UART(B) BOM

3 NuMaker-emWin-N9H20 Schematics

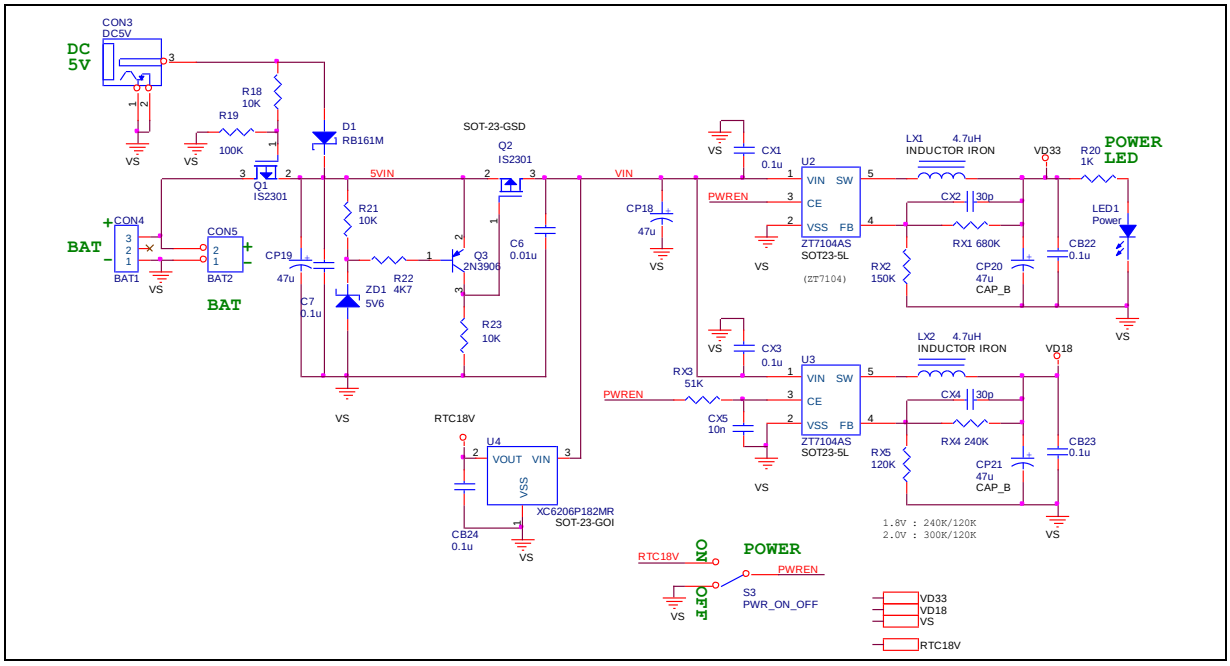
3.1 NuMaker-emWin-N9H20 Function Blocks Schematic



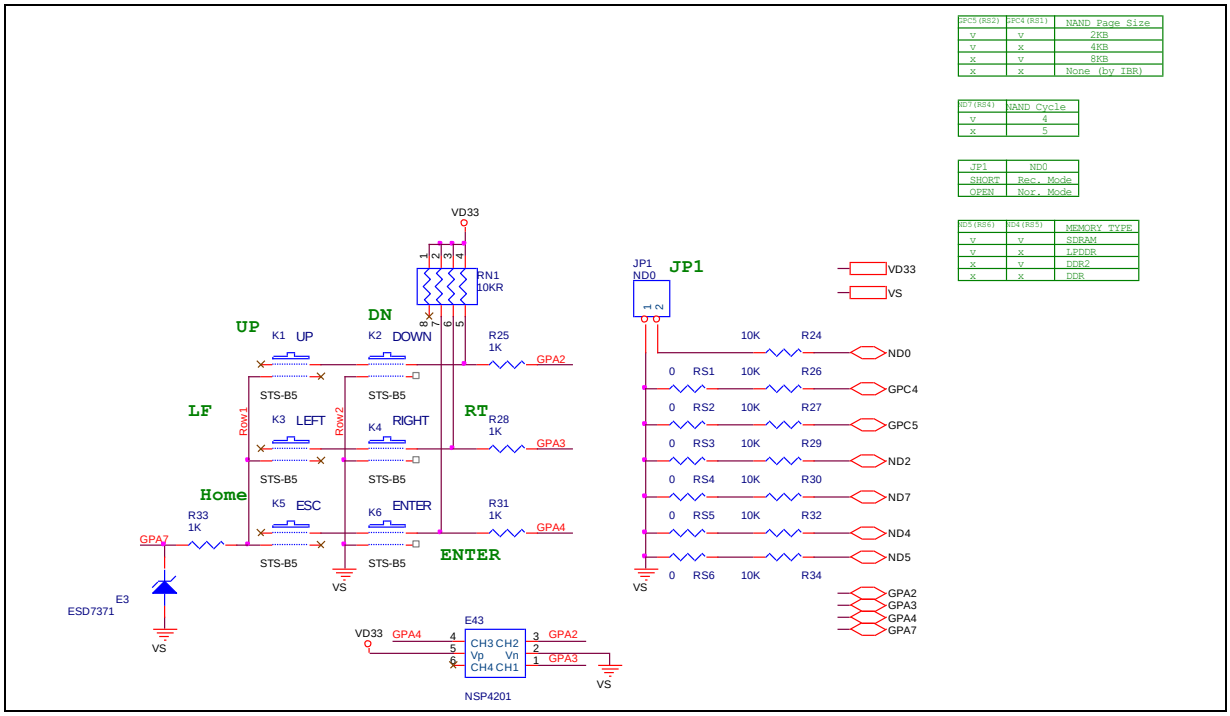
3.2 NuMaker-emWin-N9H20 N9H20K51N MPU Schematic



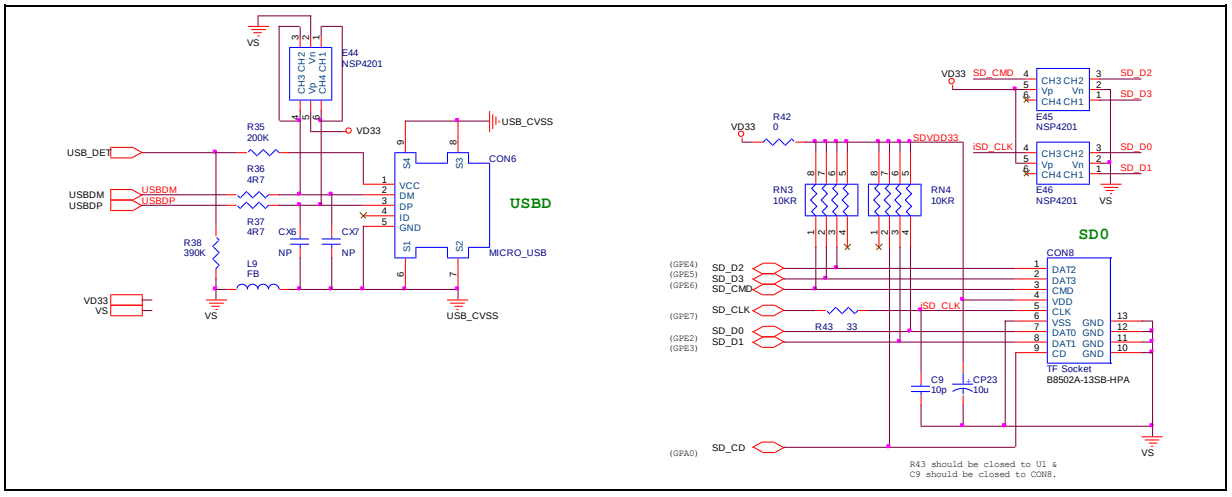
3.3 NuMaker-emWin-N9H20 Power Supply Schematic



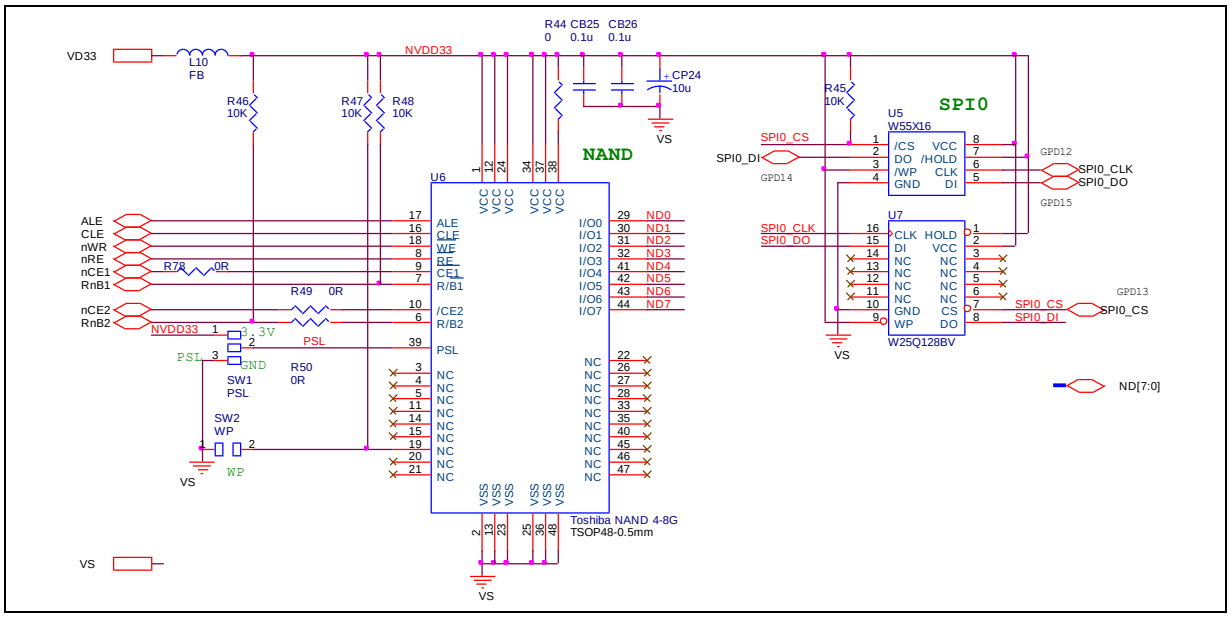
3.4 NuMaker-emWin-N9H20 Keys and Configuration Schematic



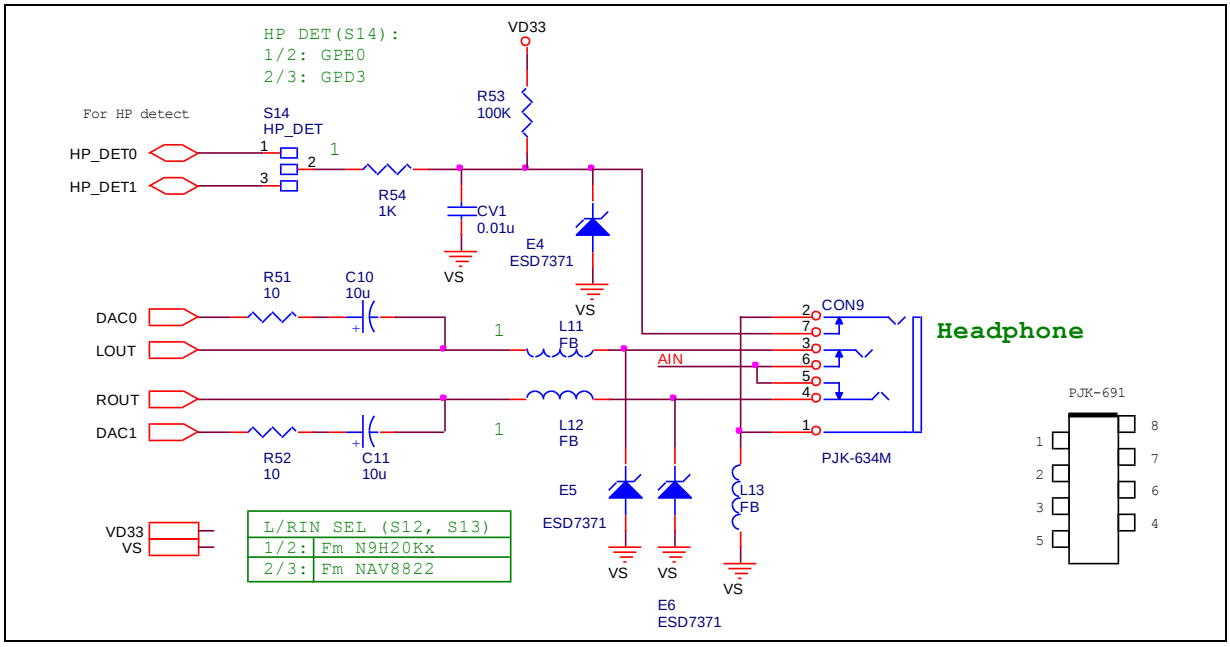
3.5 NuMaker-emWin-N9H20 USB2.0 and SD0 Interface Schematic



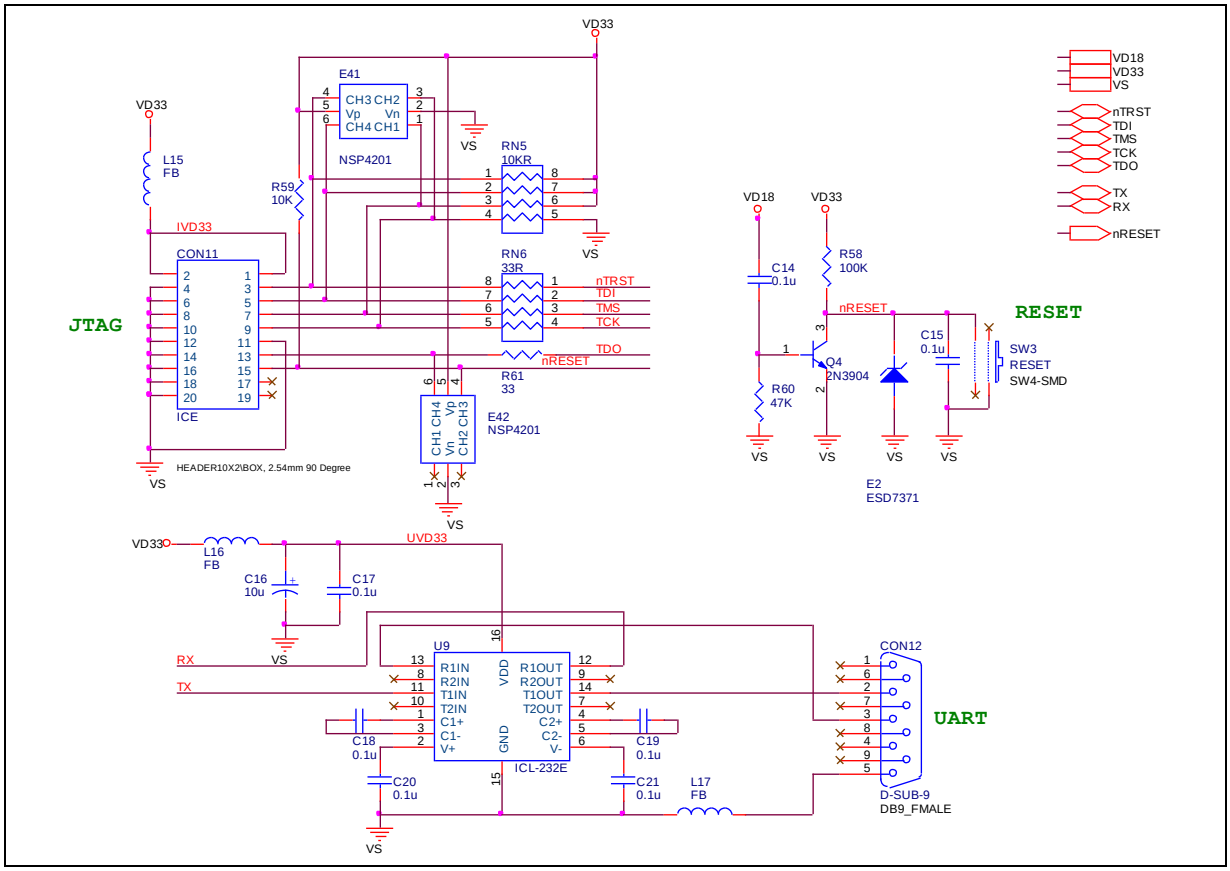
3.6 NuMaker-emWin-N9H20 NAND and SPI Flash Memory Schematic



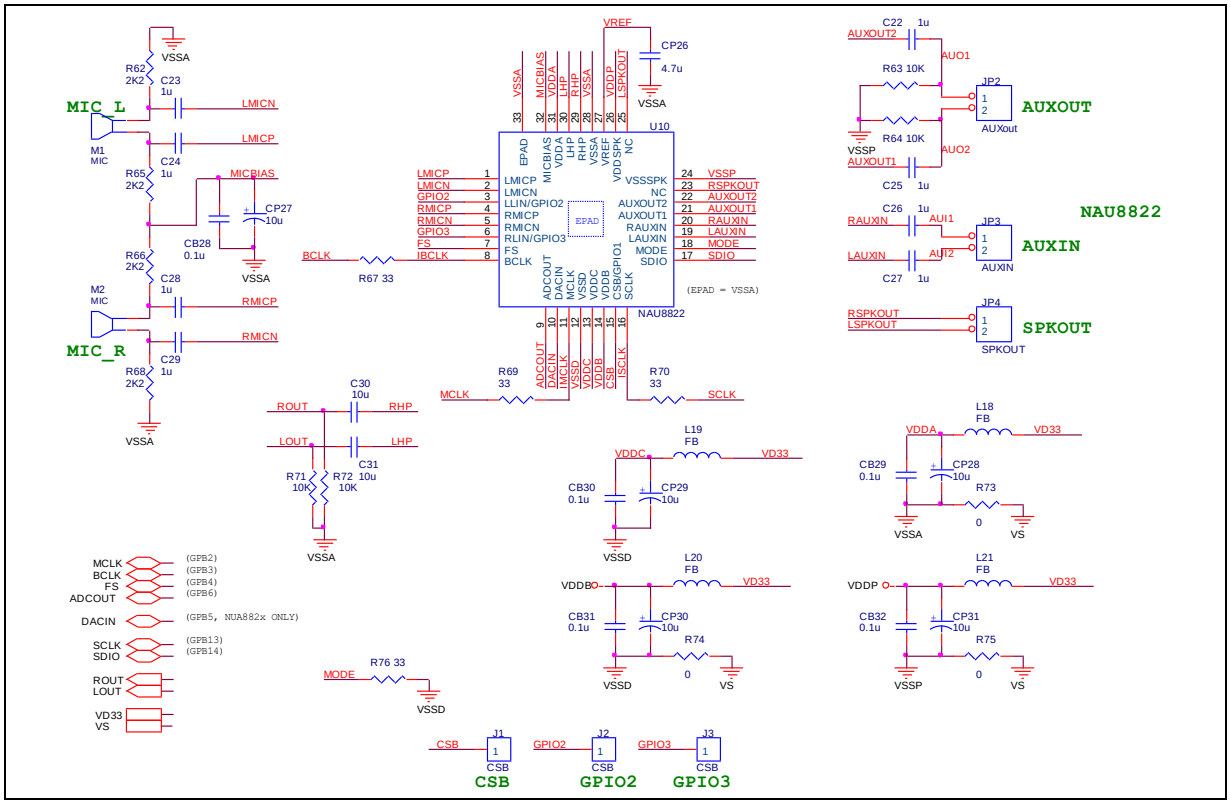
3.7 NuMaker-emWin-N9H20 Headphone Schematic



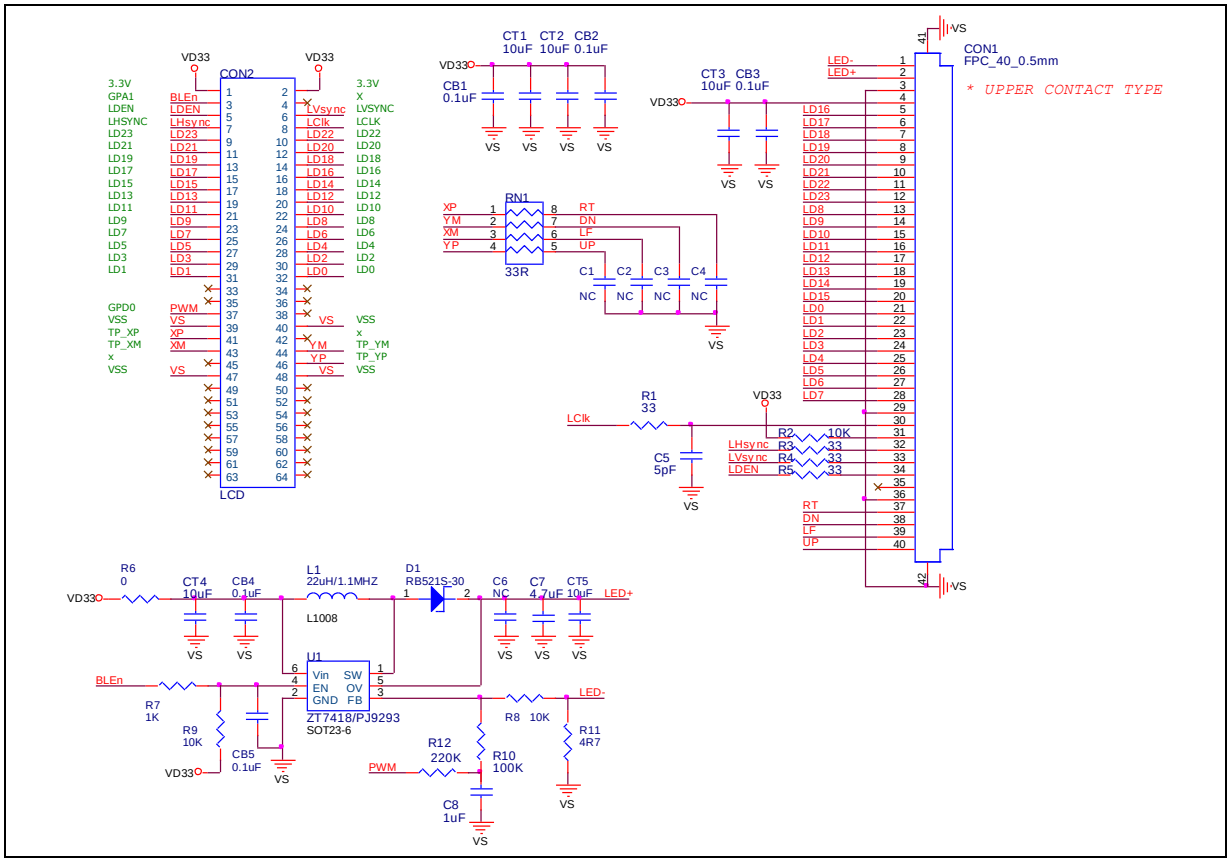
3.8 NuMaker-emWin-N9H20 JTAG and UART Schematic



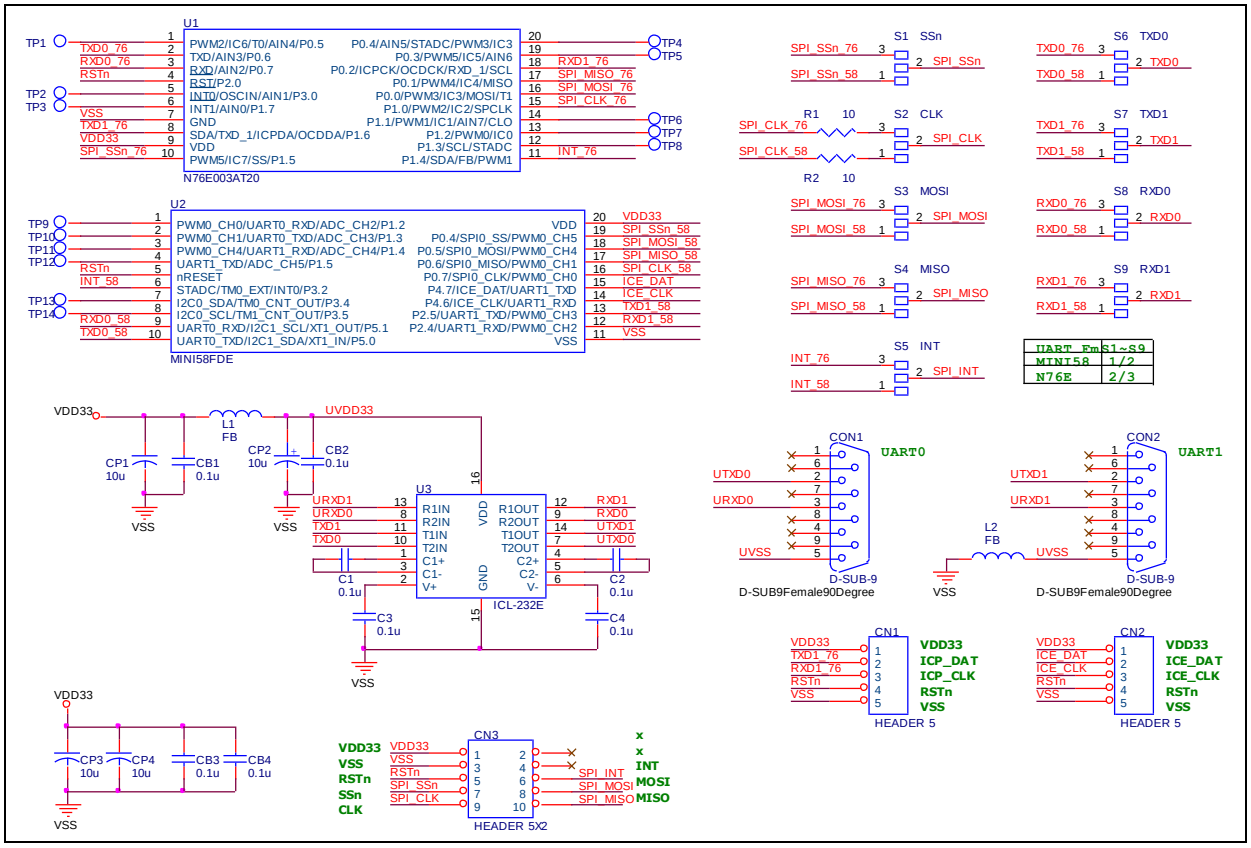
3.9 NuMaker-emWin-N9H20 Audio Codec Controller Schematic



3.10 NuMaker-TFT-LCD4.3 LCD Controller Schematic



3.11 NuMaker-SPI2UART(B) Controller Schematic



4 Revision History

Revision	Date	Description
1.00	May. 10, 2018	- Preliminary version
2.00	Oct. 02, 2019	- Removed SD1/2 Relative Components. - Removed Audio Amplifier Relative Components. - Replace LCD Module Board from 3.5 to 4.3 inch.
2.01	Mar. 03, 2021	- Rename NuMaker-emWin-NK-N9H20
2.02	Apr. 03, 2021	- Rename NuMaker-emWin-N9H20