

**ARM® ARM926EJ-S Based
32-bit Microprocessor**

**NuMaker-emWin-NK-N9H26
User Manual
N9H26K Series**

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1 OVERVIEW

The NuMaker-emWin-NK-N9H26 is the specific development tool for N9H26 series. Users can use NuMaker-emWin-NK-N9H26 to develop and verify the application program easily.

The NuMaker-emWin-NK-N9H26 includes two portions. One is NuMaker-emWin-NK-N9H26 main board and the other is NuMaker-TFT-LCD5 LCM display board. The NuMaker-emWin-NK-N9H26 is the N9H26 series evaluation board and NuMaker-TFT-LCD5 is support Pixel Format 480(RGB)/272 display Adaptor.

The N9H26 is built on the ARM926EJ-S CPU core and is integrated with USB2.0 HS Host/Device, NAND/eMMC/SD/SDIO/SPI host controller, video codec (H.264), Jpeg codec, 32-channel SPU (Sound Processing Unit), ADC, DAC and AAC accelerator for saving the BOM cost in various kinds of application needs to the best choice.

2 NUMAKER-EMWIN-NK-N9H26 INTRODUCTION

The NuMaker-emWin-NK-N9H26 uses the ARM926EJ-S CPU core as the target microprocessor.

The NuMaker-emWin-NK-N9H26 is similar to other development boards. Users can use it to develop and verify applications to emulate the real behavior. The NuMaker-emWin-NK-N9H26 can be a real system controller to design users' target systems, supports USB2.0 Host/Device high speed interface, microphone, audio headphone out, audio amplifier, speaker out, JTAG interface, SPI Flash and RS-232 interface.

NuMaker-TFT-LCD5 is a LCM display with touch panel adaptor, it is supporting Pixel Format 480(RGB)/272 resolutions.

The NuMaker-emWin-NK-N9H26 development connects JTAG port to your target system (via JTAG adaptor tool) and allows you to program and debug embedded programs on the target hardware.

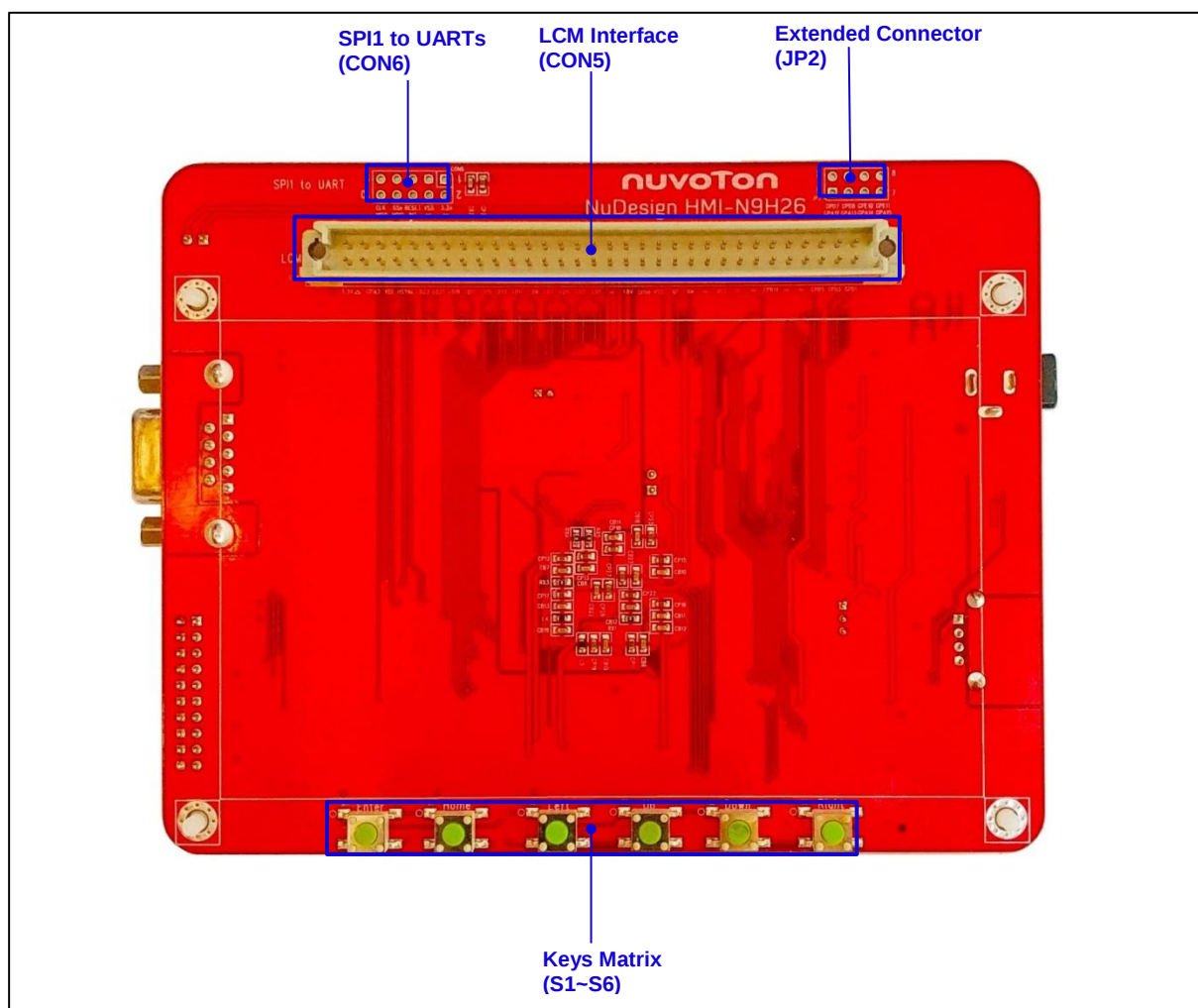


Figure 2-1 NuMaker-emWin-NK-N9H26 PCB Board (Front)

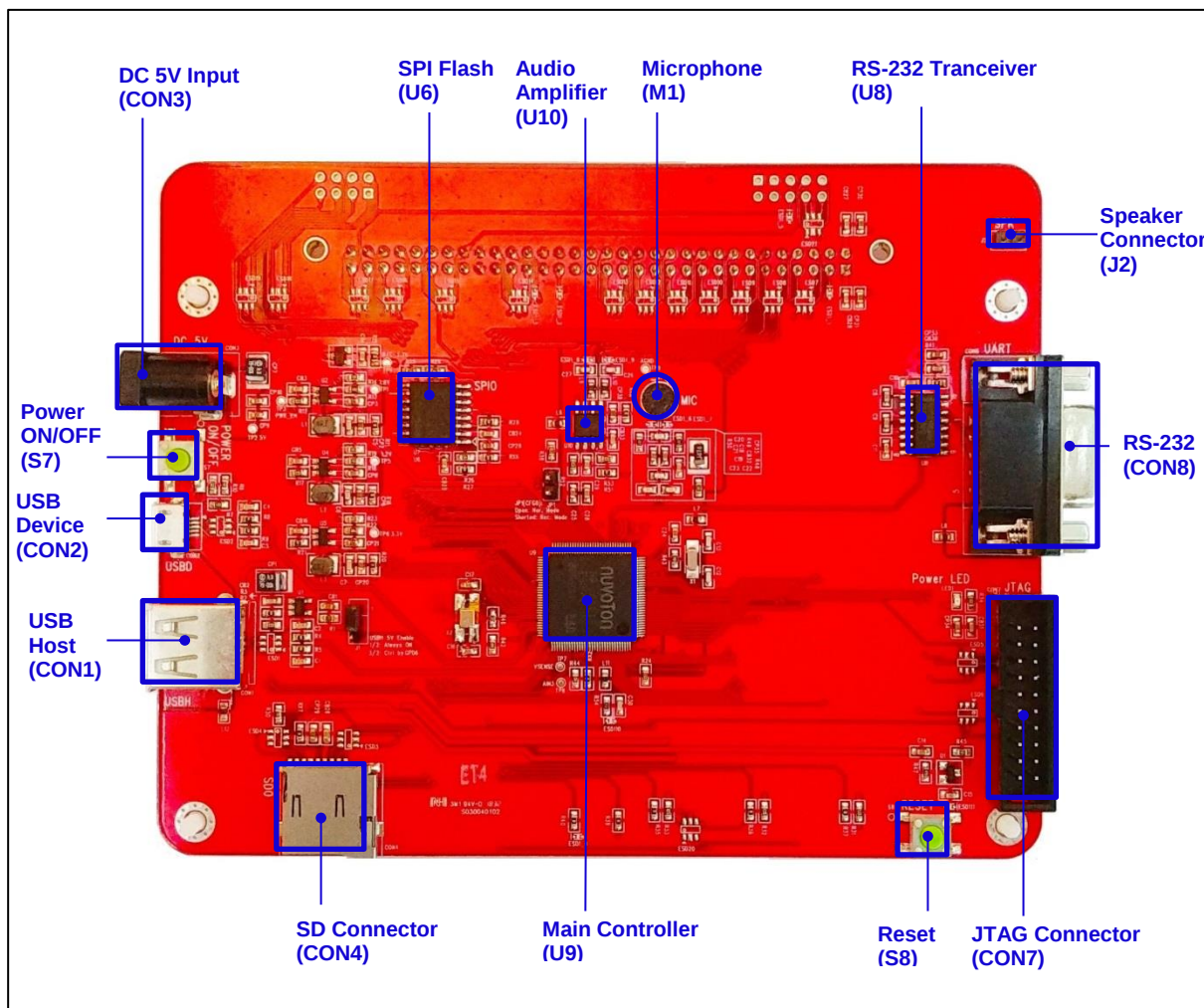


Figure 2-2 NuMaker-emWin-NK-N9H26 PCB Board (Back)

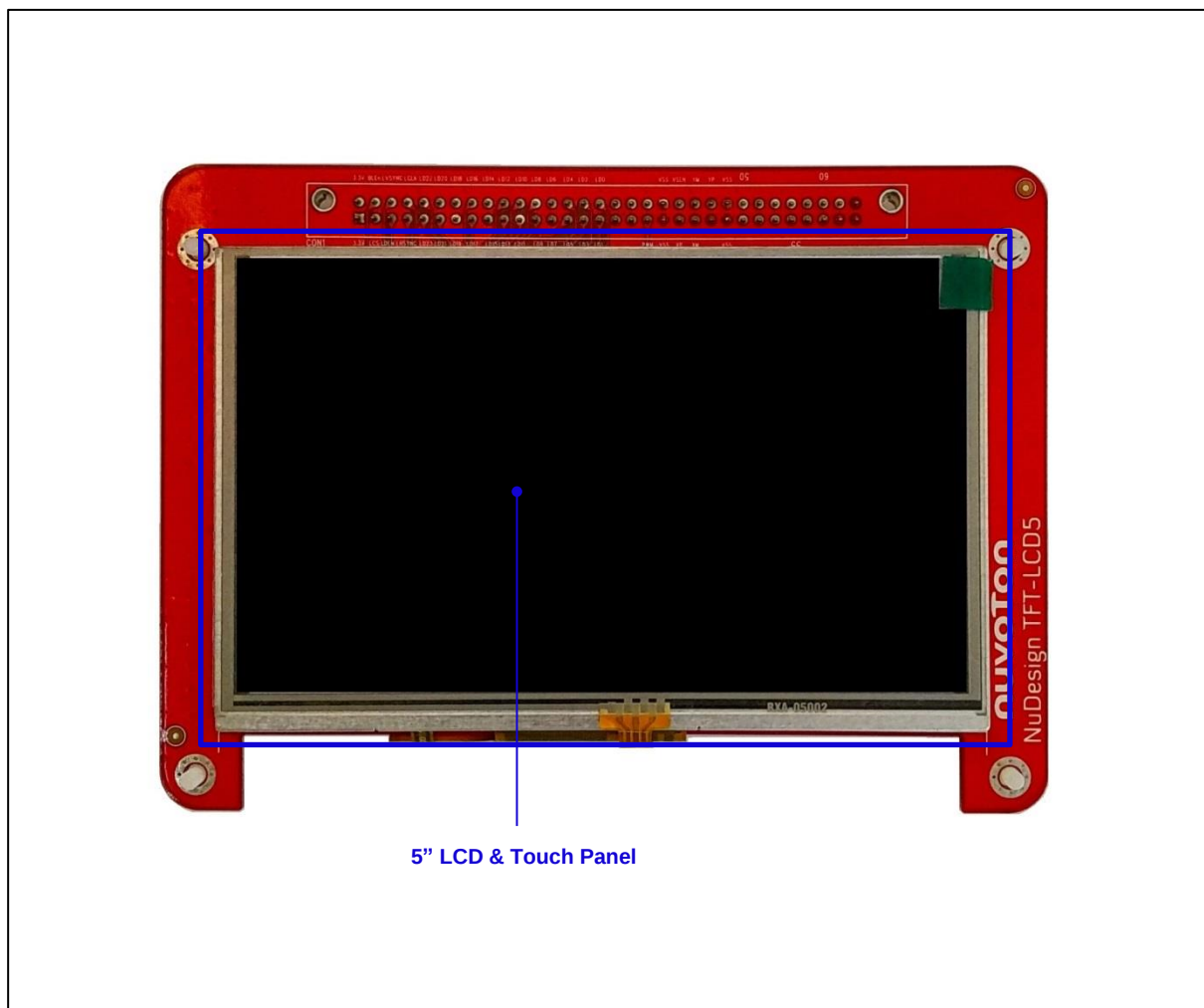


Figure 2-3 NuMaker-TFT-LCD5 PCB Board (Front)

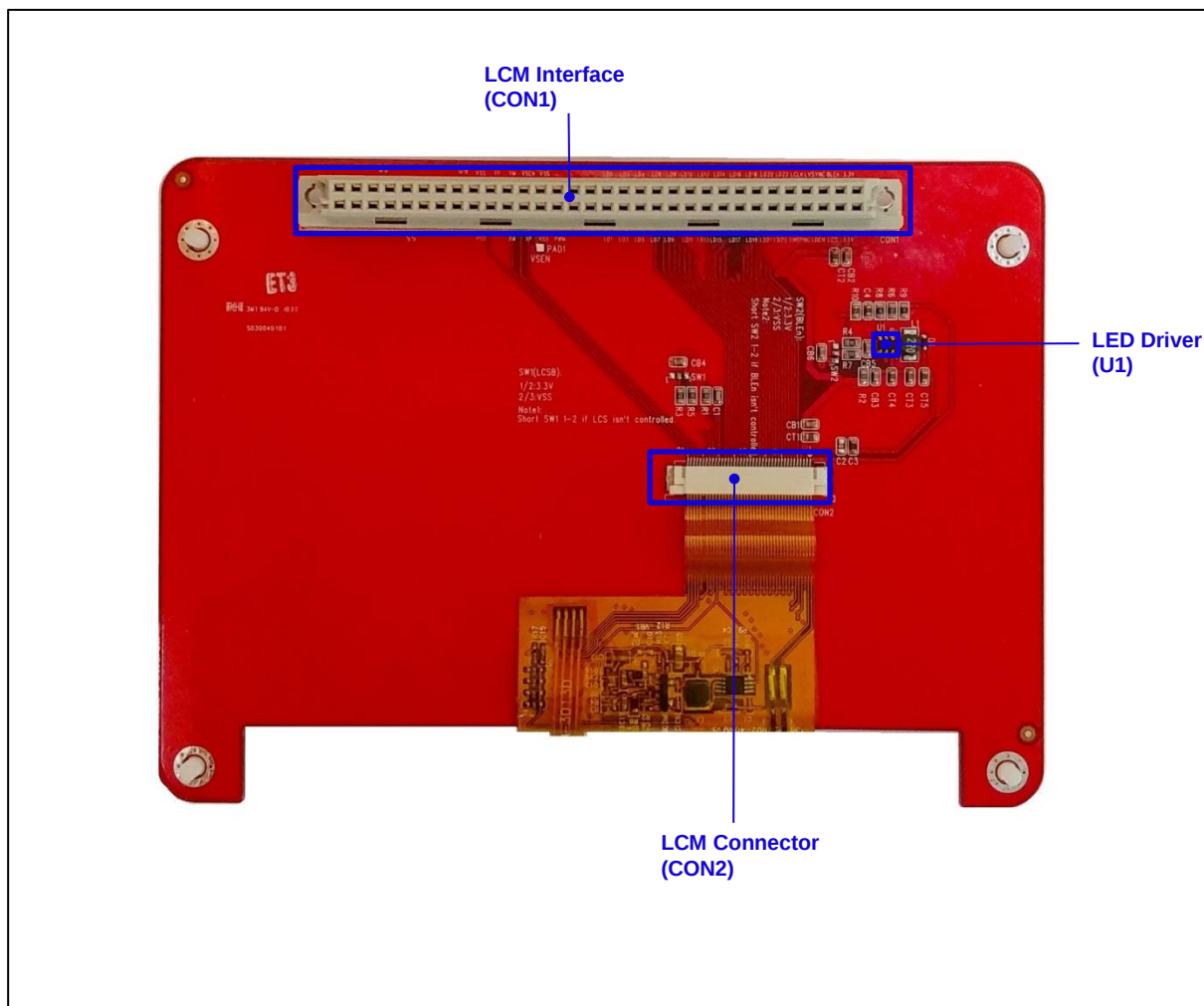


Figure 2-4 NuMaker-TFT-LCD5 PCB Board (Back)

2.1 NuMaker-emWin-NK-N9H26 & NuMaker-LCD5Tiny Jumper Description

The NuMaker-emWin-NK-N9H26 is the specific development tool for NuMaker-emWin-NK-N9H26 series. Users can use NuMaker-emWin-NK-N9H26 to develop and verify the application program easily.

The NuMaker-emWin-NK-N9H26 includes two portions. One is NuMaker-emWin-NK-N9H26 and the other is NuMaker-TFT-LCD5. The NuMaker-emWin-NK-N9H26 is the evaluation board and NuMaker-TFT-LCD5 is its Debug Adaptor. Thus, users do not need other additional ICE or debug equipment.

2.1.1 Power Setting

- CON3: VDD5V Voltage connector in NuMaker-emWin-NK-N9H26
- CON5's Pins 1 & 2: DVDD33 Voltage connector in NuMaker-emWin-NK-N9H26
- CON5's Pins 39, 40, 47 & 48: Power ground in NuMaker-emWin-NK-N9H26
- CON5's Pins 35 & 36: DVDD18 Voltage connector in NuMaker-emWin-NK-N9H26

- CON1's Pins 1 & 2: VD33 Voltage connector in NuMaker-TFT-LCD5
- CON1's Pins 39, 40, 47 & 48: Power ground in NuMaker-TFT-LCD5
- Boot Select:

JP1	BootFrom	Descriptions
0	Recovery Mode	Boot from USB
1	Norma; Mode	Boot from sequence: SD → SPI → USB

2.1.2 Debug Connector

- JP1: Shorted for Recovery Mode
- CON5: Connector in target board (NuMaker-emWin-NK-N9H26) for connecting with LCM Module board (NuMaker-TFT-LCD5)
- CON7: Connector in JTAG ICE adaptor for connecting with a target board (NuMaker-emWin-NK-N9H26)

Pin No	Pin Name	Pin No	Pin Name
1	DVDD33	2	DVDD33
3	TRST	4	GND
5	TDI	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	GND	12	GND
13	TDO	14	GND
15	RESETn	16	GND
17	NC	18	GND
19	NC	20	GND

2.1.3 USB Host Connector

- CON1: USB A type Connector in NuMaker-emWin-NK-N9H26 USB host function connected to USB device
- J1: USB host power support selection

J1	Power Enable	Descriptions
----	--------------	--------------

Pins 1 & 2 shorted	Always ON	Power Chip U1 always enable by VDD5V
Pins 2 & 3 shorted	Enable by GPD6	Power Chip U1 enable by U9's pin 115

2.1.4 USB High Device Connector

- CON2: Mini USB Connector in NuMaker-emWin-NK-N9H26 USB device high speed function connected to PC USB port

2.1.5 Extended Connector

- CON5: Pins in NuMaker-emWin-NK-N9H26

Pin No	Pin Name	Pin No	Pin Name	Pin No	Pin Name	Pin No	Pin Name
01	DVDD33	02	DVDD33	33	NC	34	NC
03	GPA3	04	NC	35	DVDD18	36	DVDD18
05	GPD11	06	GPD10	37	GPD0	38	NC
07	GPD9	08	GPB15	39	GND	40	GND
09	GPB12	10	GPB11	41	GPG13	42	GPG9
11	GPB10	12	GPB9	43	GPG14	44	GPG15
13	GPB8	14	GPB7	45	NC	46	GPG12
15	GPE1	16	GPE0	47	GND	48	GND
17	GPC15	18	GPC14	49	NC	50	RESET
19	GPC13	20	GPC12	51	NC	52	NC
21	GPC11	22	GPC10	53	GPB14	54	GPB13
23	GPC9	24	GPC8	55	NC	56	NC
25	GPC7	26	GPC6	57	NC	58	GPB6
27	GPC5	28	GPC4	59	GPB5	60	GPB4
29	GPC3	30	GPC2	61	GPB3	62	GPB2
31	GPC1	32	GPC0	63	GPB1	64	GPB0

● JP2: Pins in NuMaker-emWin-NK-N9H26

Pin No	Pin Name	Pin No	Pin Name
01	NC	02	GPD7
03	GPA12	04	GPD8
05	GPA13	06	GPE10
07	GPA14	08	GPE11

● CON6: SPI2UART in NuMaker-emWin-NK-N9H26

Pin No	Pin Name	Pin No	Pin Name
01	DVDD33	02	NC
03	VS	04	NC
05	RESET	06	GPB1
07	GPG3	08	GPG5
09	GPG2	10	GPG4

● CON4: Mini SD0 connect in NuMaker-emWin-NK-N9H26

Pin No	Pin Name
01	SDAT2
02	SDAT3
03	SDCMD
04	DVDD33
05	SDCLK
06	VS
07	SDDAT1
08	SDDTA0
09	SDDAT1

- CON1: Pins in NuMaker-TFT-LCD5

Pin No	Pin Name	Pin No	Pin Name	Pin No	Pin Name	Pin No	Pin Name
01	VD33	02	VD33	33	NC	34	NC
03	LCS	04	BLEn	35	NC	36	DVDD18
05	LDEN	06	LVsync	37	PWM	38	NC
07	LHsync	08	LCIk	39	VS	40	VS
09	LD23	10	LD22	41	XP	42	PAD1
11	LD21	12	LD20	43	XM	44	YM
13	LD19	14	LD18	45	NC	46	YP
15	LD17	16	LD16	47	VS	48	VS
17	LD15	18	LD14	49	NC	50	NC
19	LD13	20	LD12	51	NC	52	NC
21	LD11	22	LD10	53	NC	54	NC
23	LD9	24	LD8	55	NC	56	NC
25	LD7	26	LD6	57	NC	58	NC
27	LD5	28	LD4	59	NC	60	NC
29	LD3	30	LD2	61	NC	62	NC
31	LD1	32	LD0	63	NC	64	NC

2.1.6 Reset Button

- S8: Reset button in NuMaker-emWin-NK-N9H26

2.1.7 RTC wakeup Button

- S7: RTC wakeup button in NuMaker-emWin-NK-N9H26,

2.1.8 Speaker

- J2: Power Amplifier speaker connect in NuMaker-emWin-NK-N9H26.

2.1.9 Microphone

- M1: External electret condenser microphone connect in NuMaker-emWin-NK-N9H26, Pin 1 for positive connect and pin 2 for negative connect.

2.1.10 Power Connector

- CON3: 5 VCC connector in NuMaker-emWin-NK-N9H26

2.1.11 RS-232 Connector

- CON8: Supply TIA/EIA-232-F voltage levels TXD & RXD signals in NuMaker-emWin-NK-N9H26

2.1.12 KEY Matrix

- S1~S6: Key combination with Columns(GPB3 & 2) & Rows(GPB6, 5 & 4)

Row Column	GPB6	GPB5	GPB4
GPB3	S1	S2	S3
GPB2	S4	S5	S6

2.1.13 TEST Points

- TP1~TP9: Test Points in NuMaker-emWin-NK-N9H26

	Function	Descriptions
TP1	DVDD18	Memory 1.8 Voltage
TP2	VDD5V	5 Voltage Input
TP3	PWR_EN	Power Enable
TP4	RTCVDD33	RTC 3.3 Voltage
TP5	DVDD12	Core 1.2 Voltage
TP6	DVDD33	I/O 3.3 Voltage
TP7	GPG7	ADC VSENSE

TP8	GPG3	ADC AIN2
TP9	AGND	ADC Analog Ground

2.2 Pin Assignment for Extended Connector

The NuMaker-emWin-NK-N9H26 provides N9H26K51N on board and the each pin assign dedicated function as table below:

Table 2-1 is the pin assignment for NuMaker-emWin-NK-N9H26 & NuMaker-TFT-LCD5

GPIO	Pin No.	Pin Name	Function 1	Function 2	Descriptions
GPE.4	1	SDDAT[2]	SD0DAT2		SD 0
GPE.5	2	SDDAT[3]	SD0DAT3		
GPE.6	3	SDCMD	SD0CMD		
GPE.7	4	SDCLK	SD0CLK		
GPE.2	5	SDDAT[0]	SD0DAT0		
GPE.3	6	SDDAT[1]	SD0DAT1		
GPB.12	7	SPDATA[7]	LV DAT23	CON5.9	LCM
GPB.11	8	SPDATA[6]	LV DAT22	CON5.10	
	9	UD_CDET	UD_CDET		USB Device
	10	VDD	DVDD12	TP5	Core Power
	11	MVDDQ1	DVDD18	TP1	Memory Power
	12	MVDDQ1	DVDD18		
GPB.10	13	SPDATA[5]	LV DAT21	CON5.11	LCM
GPB.9	14	SPDATA[4]	LV DAT20	CON5.12	
GPB.8	15	SPDATA[3]	LV DAT19	CON5.13	
GPB.7	16	SPDATA[2]	LV DAT18	CON5.14	
GPB.6	17	SPDATA[1]	Row 3	CON5.58	Keys Matrix
GPB.5	18	SPDATA[0]	Row 2	CON5.59	
GPB.4	19	SFIELD	Row 1	CON5.60	
GPB.3	20	SVSYNC	Column 1	CON5.61	
GPB.2	21	SHSYNC	Column 2	CON5.62	
GPB.1	22	SPCLK	SPI1_INT	CON5.63	SPI2UART
GPB.0	23	SCLKO		CON5.64	GPIO
	24	XOUT	XOUT		12MHz
	25	XIN	XIN		
	26	VDD33_2	DVDD33		I/O Power
	27	VDD	DVDD12		Core Power
	28	UD_VDD12_PLL	DVDD12		
	29	UD_DM	UD_DM		USB Device
	30	UD_DP	UD_DP		
	31	UD_VDD33_TRV	DVDD33		I/O Power
	32	UD_REXT	UD_REXT		USB Device
	33	SAR_AVDD33	AVDD33		ADC
GPG.14	34	SAR_TP_XM	X2	CON5.43	ADC/Touch Panel
GPG.15	35	SAR_TP_YM	Y2	CON5.44	
GPG.13	36	SAR_TP_XP	X1	CON5.41	
GPG.12	37	SAR_TP_YP	Y1	CON5.46	
GPG.7	38	SAR_AIN3(VSENSE)	VSENSE	TP7	ADC
GPG.9	39	SAR_AHS	AHS	PAD1	
GPG.8	40	SAR_AIN2	AIN2	TP8	
	41	SAR_AVSS33	AGND	TP9	
	42	HOST_PHY_RES	UH_REXT		USB host
	43	HOST_VDD33_BIAS	UH_VDD33		
	44	HOST_PHY_DP	UH_DP		
	45	HOST_PHY_DM	UH_DM		
	46	HOST_VDD12_PLL	UH_VDD12		
GPB13	47	ISCK		CON5.54	GPIO

GPB14	48	ISDA		CON5.53	
GPA.1	49	GPA[1]	SD_CD		SD 0
GPA.0	50	GPA[0]	PA_EN		Audio
	51	RST_	RESET		System Reset
GPA.3	52	GPA[3]	LCS	CON5.3	
GPC.0	53	LVDATA[0]	LVDATA0	CON5.32	
GPC.1	54	LVDATA[1]	LVDATA1	CON5.31	
GPC.2	55	LVDATA[2]	LVDATA2	CON5.30	
GPC.3	56	LVDATA[3]	LVDATA3	CON5.29	
GPC.4	57	LVDATA[4]	LVDATA4	CON5.28	
GPC.5	58	LVDATA[5]	LVDATA5	CON5.27	LCM
GPC.6	59	LVDATA[6]	LVDATA6	CON5.26	
GPC.7	60	LVDATA[7]	LVDATA7	CON5.25	
GPC.8	61	LVDATA[8]	LVDATA8	CON5.24	
GPC.9	62	LVDATA[9]	LVDATA9	CON5.23	
GPC.10	63	LVDATA[10]	LVDATA10	CON5.22	
	64	VSS	GND		Ground
	65	VDD33_0	DVDD33		I/O Power
GPC.11	66	LVDATA[11]	LVDATA11	CON5.21	
GPC.12	67	LVDATA[12]	LVDATA12	CON5.20	
GPC.13	68	LVDATA[13]	LVDATA13	CON5.19	
GPC.14	69	LVDATA[14]	LVDATA14	CON5.18	
GPC.15	70	LVDATA[15]	LVDATA15	CON5.17	
GPE.0	71	LVDATA[16]	LVDATA16	CON5.16	LCM
GPE.1	72	LVDATA[17]	LVDATA17	CON5.15	
GPD.11	73	LVDE	LDEN	CON5.5	
GPD.10	74	LVSYN	LVSYN	CON5.6	
GPD.9	75	LHSYN	LHSYN	CON5.7	
GPB.15	76	LPCLK	LPCLK	CON5.8	
GPD.4	77	TRSTn		TRST0n	
GPD.3	78	TDO		TDO0	JTAG
GPD.2	79	TDI		TDI0	
GPD.1	80	TMS		TMS0	
GPD.0	81	TCK	Back Light Dim	TCK0	LCM/JTAG
	82	VDD	DVDD12		Core Power
	83	MVDDQ0	DVDD18		
	84	MVDDQ0	DVDD18		Memory Power
GPG.3	85	TVDAC_REXT	SPI1_CS0n	CON6.7	
GPG.5	86	TVDAC_VREF	SPI1_DO	CON6.8	
GPG.4	87	TVDAC_COMP	SPI1_DI	CON6.10	
GPG.2	88	TVDAC_TVOUT	SPI1_CLK	CON6.9	SPI2UART
	89	TVDAC_AVDD33	DVDD33		I/O Power
	90	XOSC_AVDD	RTC_VDD33	TP4	
	91	RTC_RPWR	RTC_RPWR	TP3	
	92	RTC_RWAKE_	RTC_RWAKE_		RTC
	93	RTC_XIN	RTC_XIN		
	94	RTC_XOUT	RTC_XOUT		
	95	AADC_MIC_BIAS	MIC_BIAS		
	96	ADAC_VMID	ADC_MID		
	97	AADC_MIC_IN_P	MIC_P	M1.1	Audio
	98	AADC_MIC_IN_N	MIC_N	M1.2	
	99	ADAC_AVDD33	AVDD33		
	100	ADAC_AVSS33	AGND	TP9	
	101	ADAC_HPOUT_R	RHPOUT	J2.1	

	102	ADAC_HPOUT_L	LHPOUT	J2.2	
	103	ADAC_HPVD33	AVDD33		
GPA.10	104	URTXD	TXD		UART 0
GPA.11	105	URRXD	RXD		
	106	VDD	DVDD12		Core Power
	107	ND[0]	CHIPCFG0	JP1	Power On Setting
	108	ND[1]			
	109	ND[2]			Pull-low
	110	ND[3]		JP2.1	
GPA.12	111	ND[4]		JP2.3	GPIO
GPA.13	112	ND[5]		JP2.5	
GPA.14	113	ND[6]		JP2.7	
GPA.15	114	ND[7]			
GPD.6	115	NBUSY1_	OV_FLAG		USB host
GPD.5	116	NBUSY0_	USBH_PWEN	J1	
GPD.8	117	NWR_		JP2.4	
GPD.7	118	NRE_		JP2.2	GPIO
GPE.11	119	NCLE		JP2.8	
GPE.10	120	NALE		JP2.6	
GPE.9	121	NCS1_	SPI0_D3		SPI 0
GPE.8	122	NCS0_	SPI0_D2		
	123	VDD33_1	DVDD33		I/O Power
GPD.14	124	SPI0_DI	SPI0_DI (D1)		
GPD.13	125	SPI0_CS _n	SPI0_CS0 _n		SPI 0
GPD.15	126	SPI0_DO	SPI0_DO (D0)		
GPD.12	127	SPI0_CLK	SPI0_CLK		
	128	VSS	GND		Ground

Table 2-1 Pin Assignment for N9H26K51N

2.3 NuMaker-emWin-NK-N9H26 and NuMaker-TFT-LCD5 PCB Placement

Users can refer to Figure 2-5 through Figure 2-8 for the NuMaker-emWin-NK-N9H26 PCB placements.

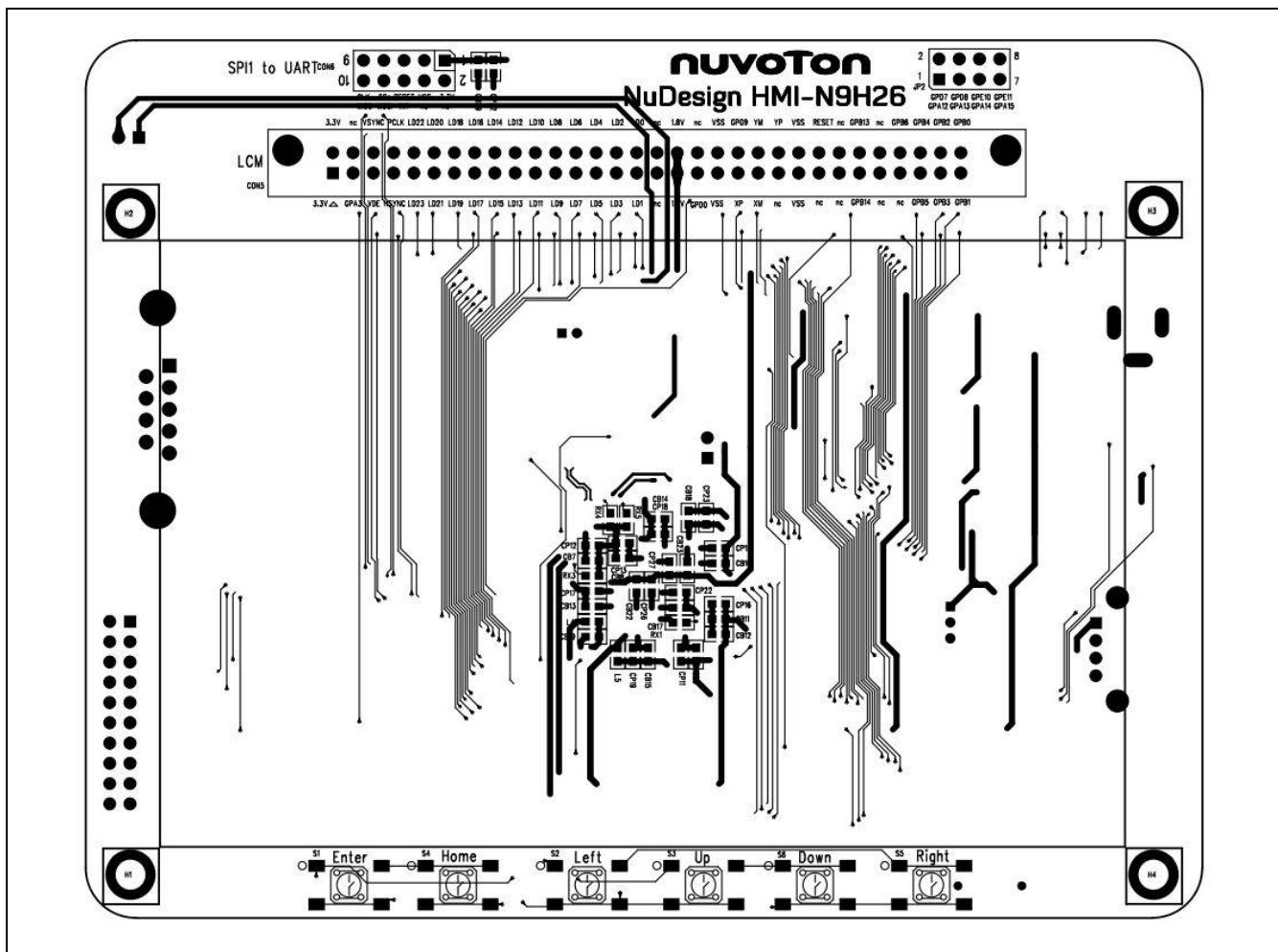


Figure 2-5 NuMaker-emWin-NK-N9H26 PCB Placement (Front)

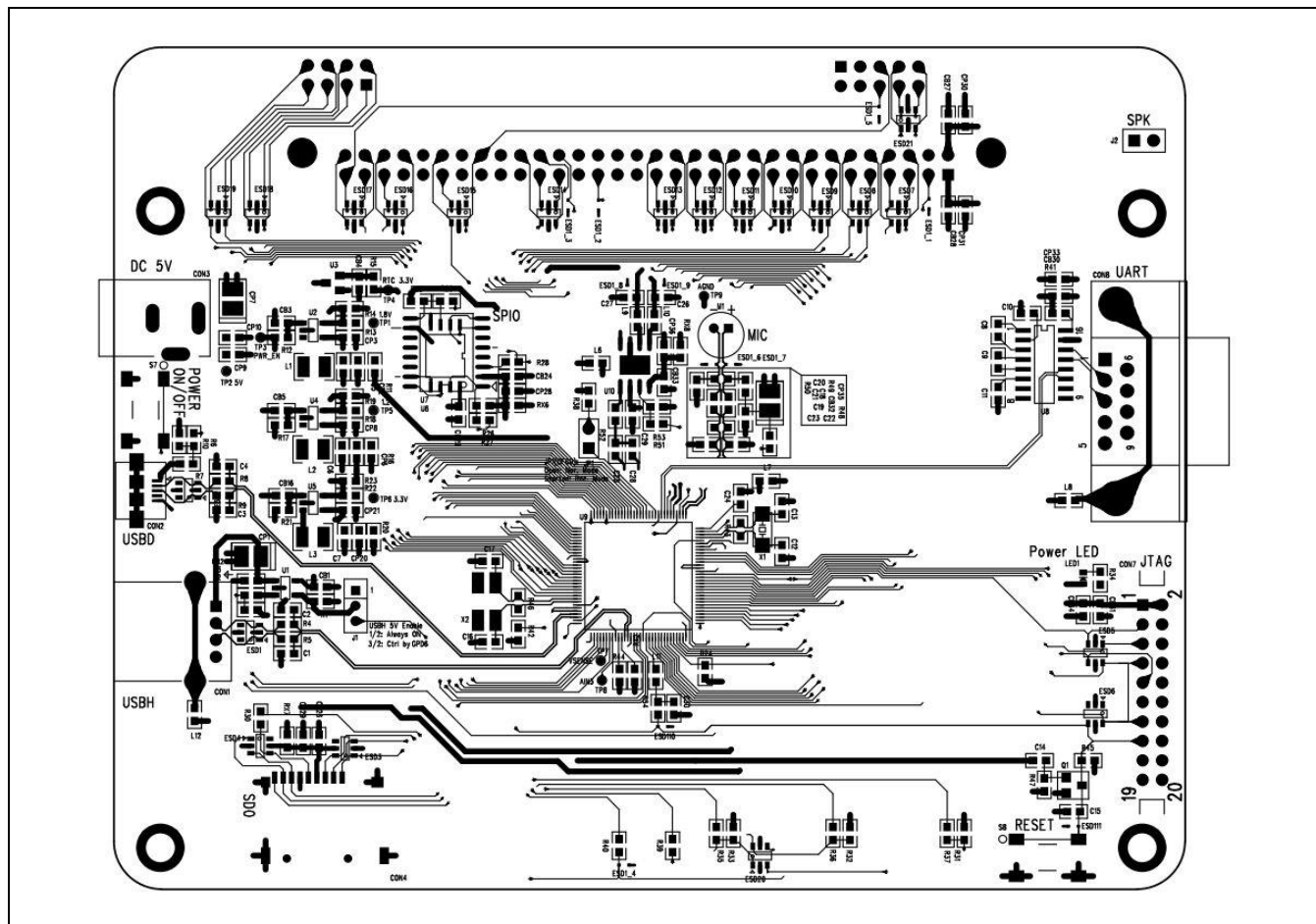


Figure 2-6 NuMaker-emWin-NK-N9H26 PCB Placement (Back)

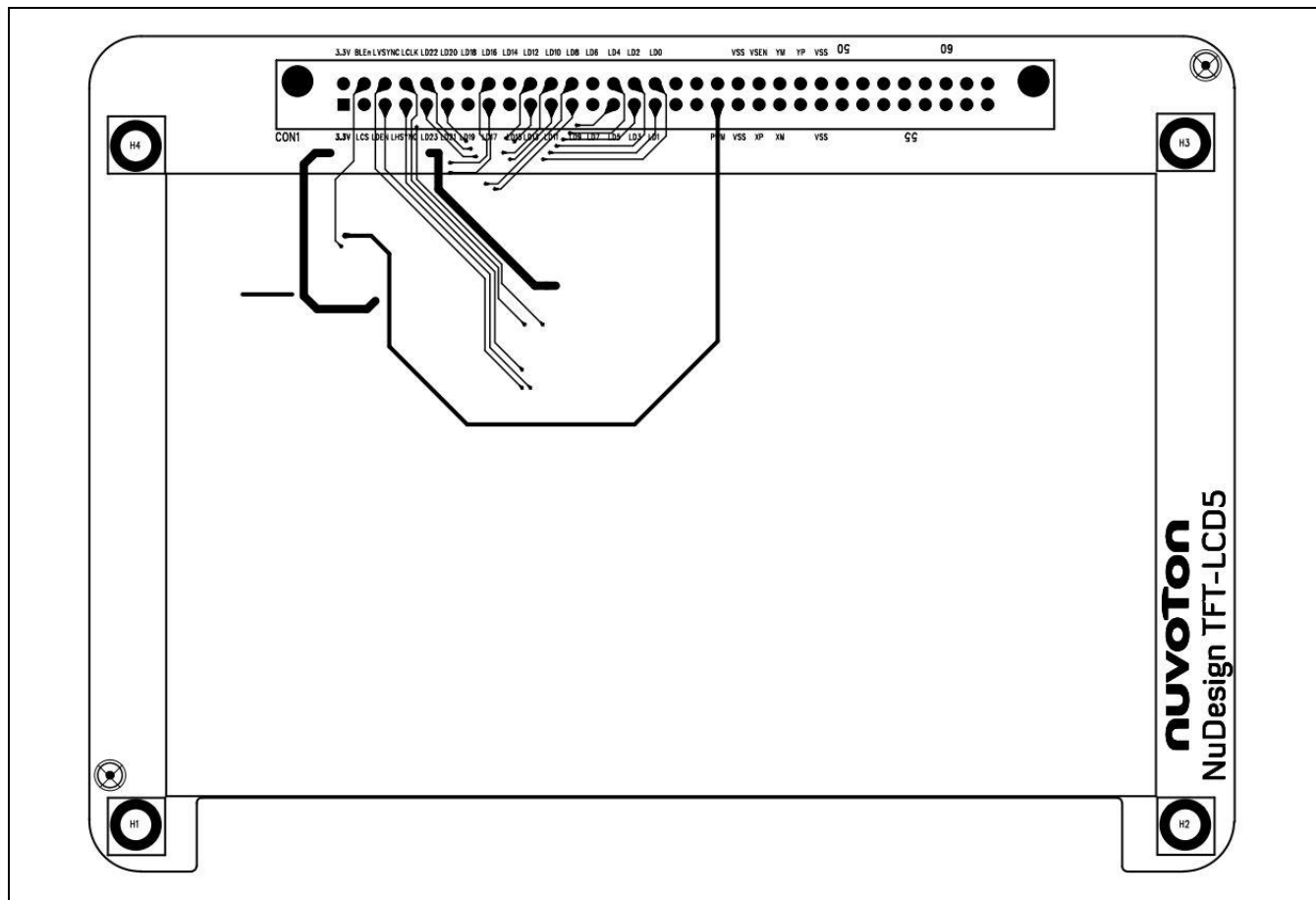


Figure 2-7 NuMaker-TFT-LCD5 PCB Placement (Front)

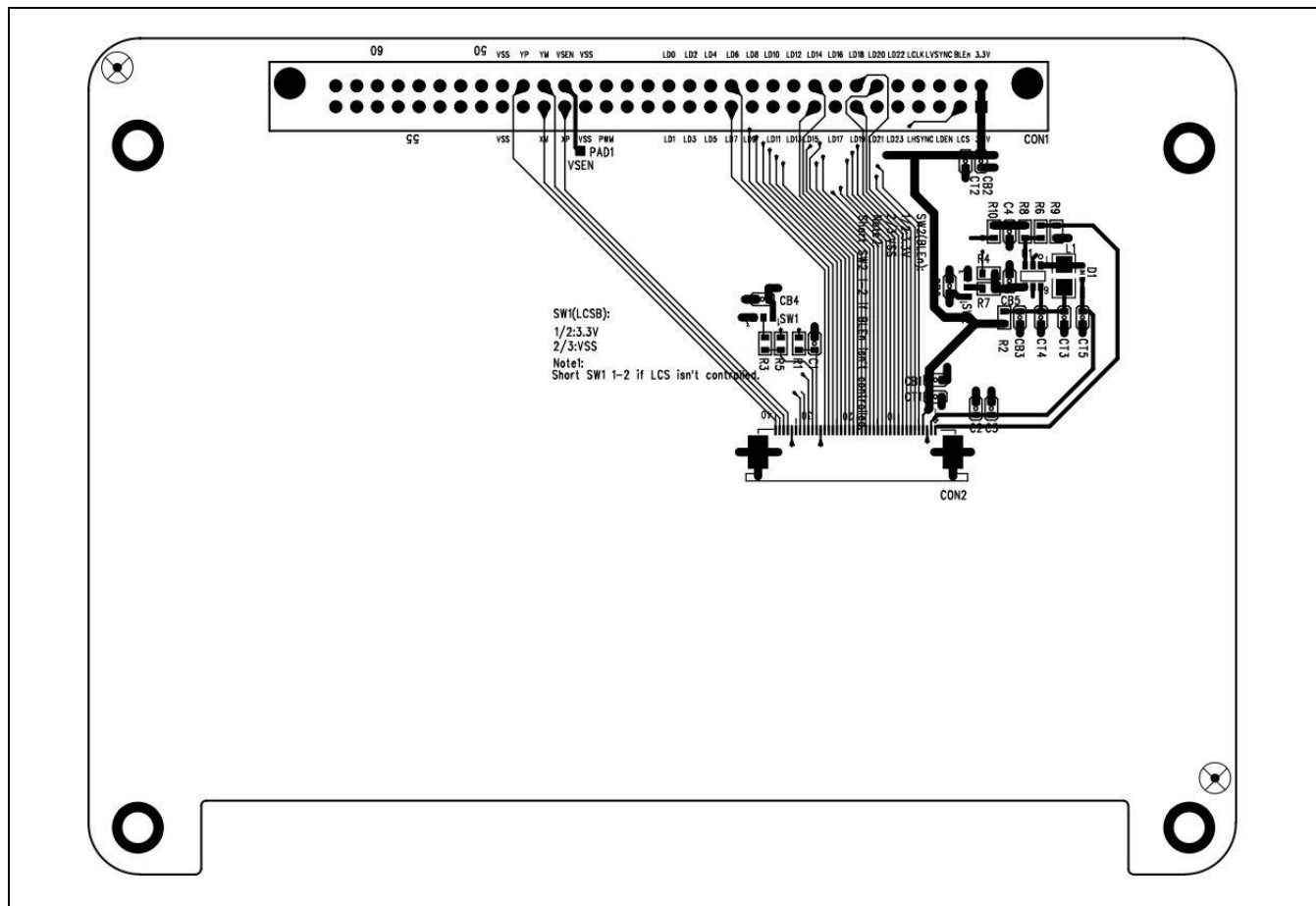
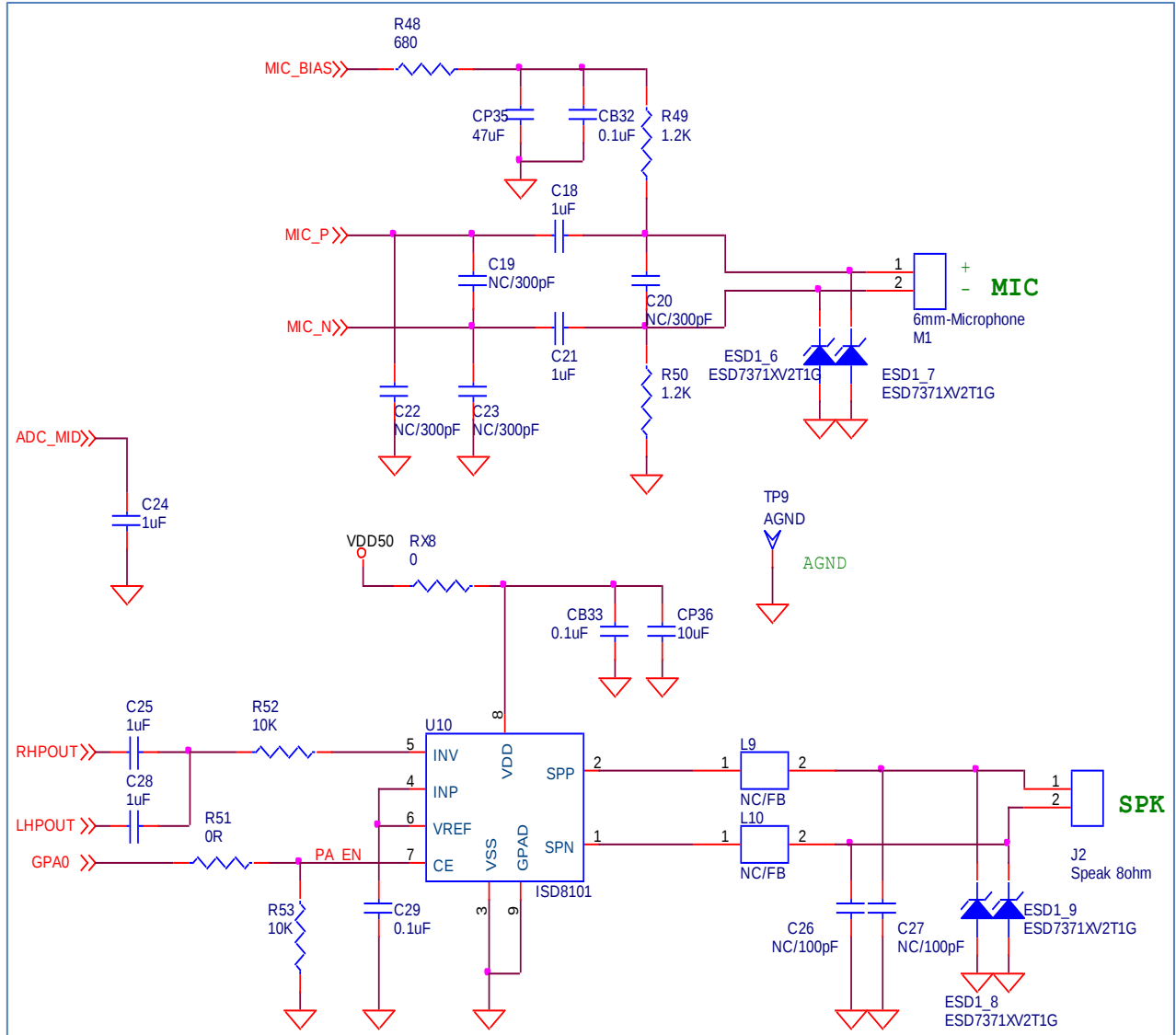


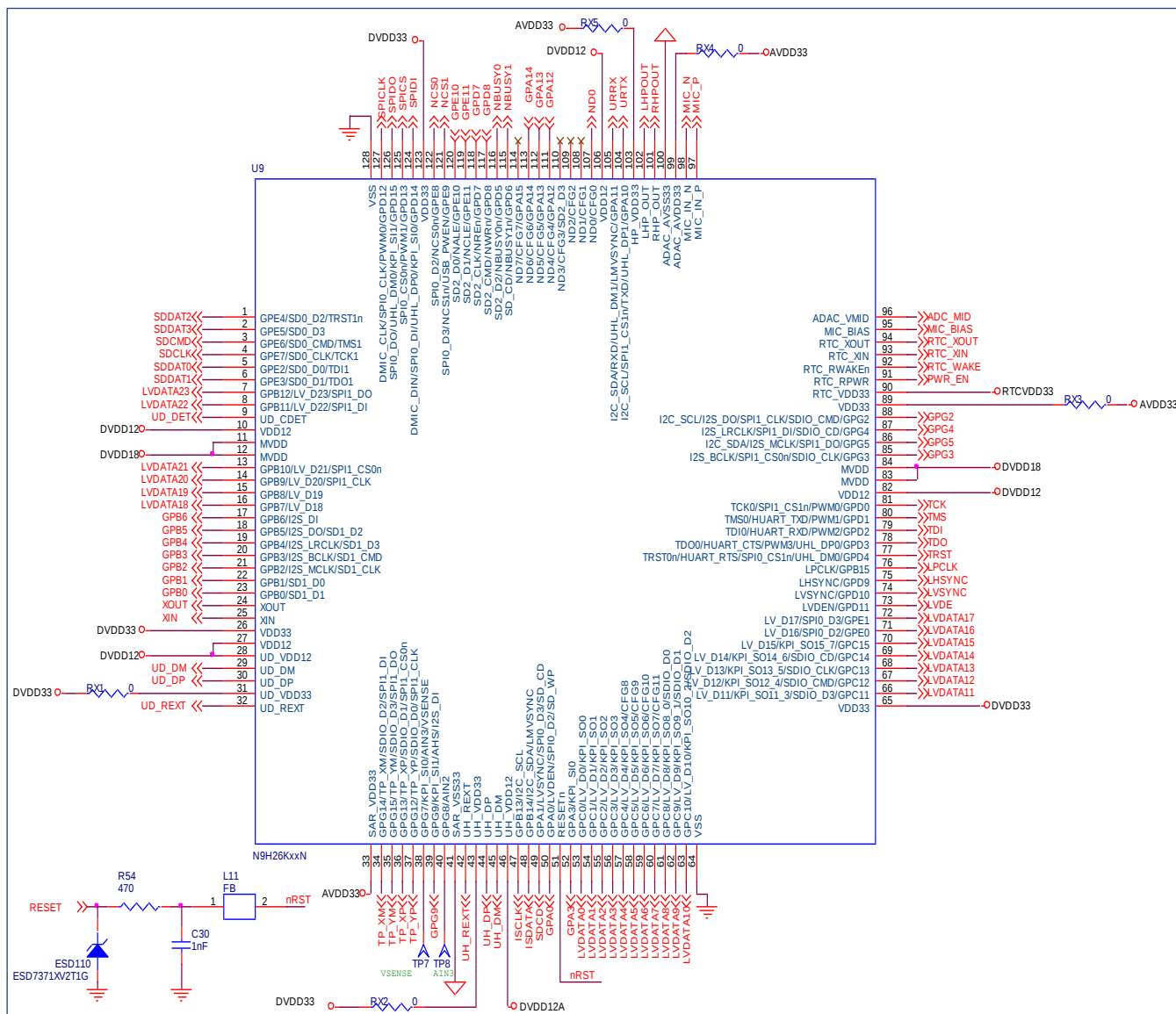
Figure 2-8 NuMaker-TFT-LCD5 PCB Placement (Back)

3 NUMAKER-EMWIN-NK-N9H26 SCHEMATIC

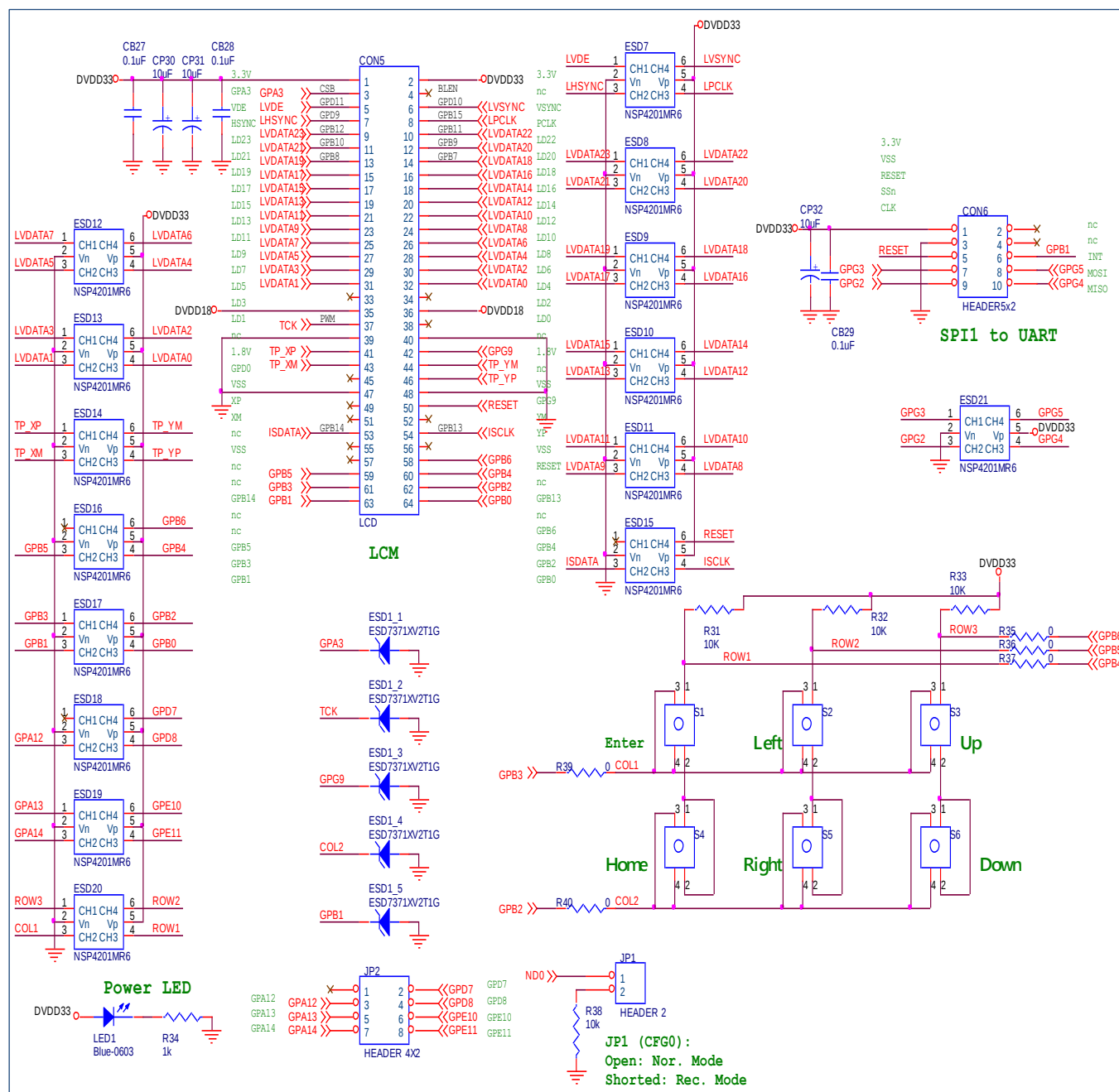
3.1 NuMaker-emWin-NK-N9H26, Audio



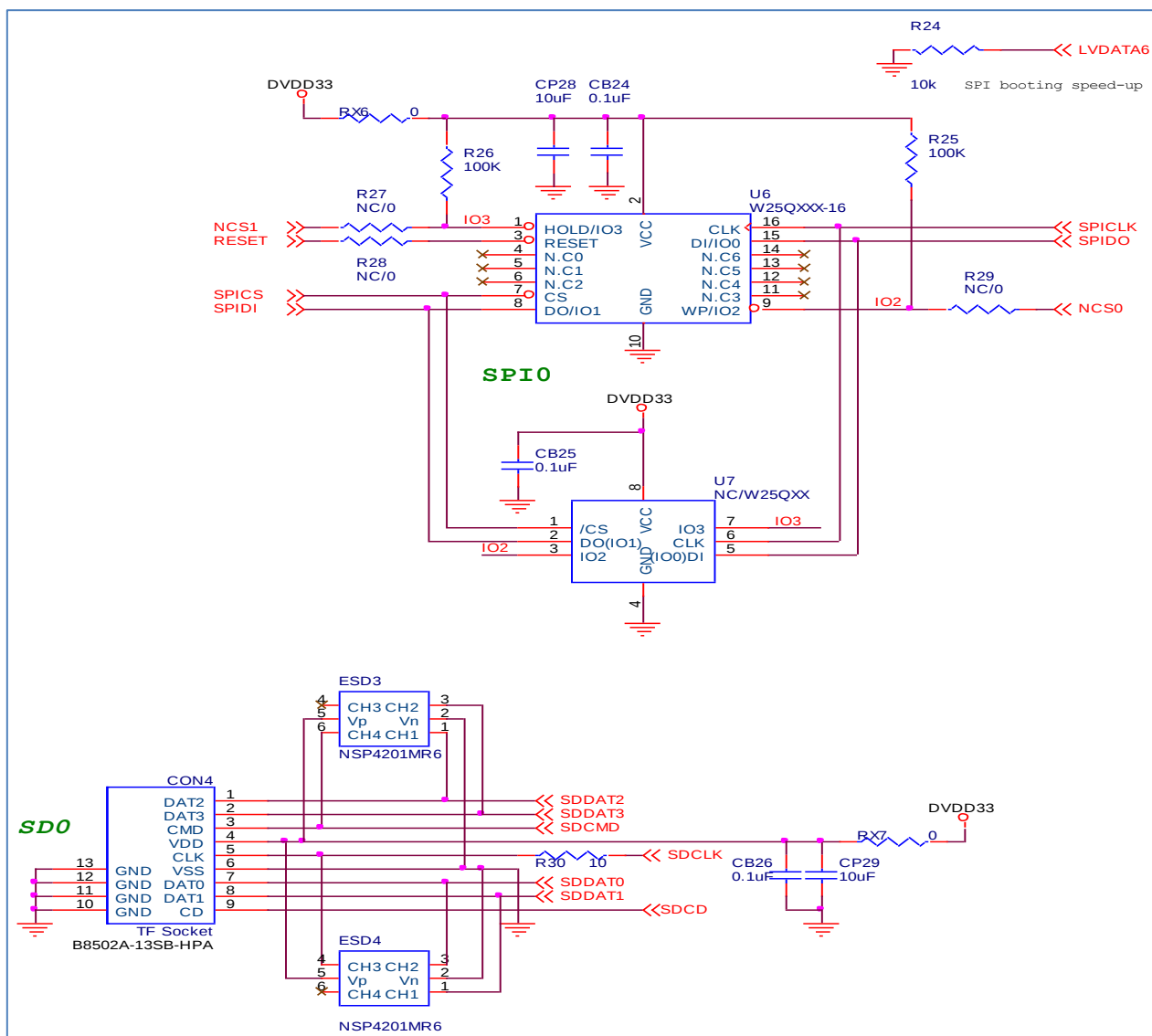
3.2 NuMaker-emWin-NK-N9H26, CPU



3.4 NuMaker-emWin-NK-N9H26, LCM



3.5 NuMaker-emWin-NK-N9H26, Memory



The image shows a detailed PCB layout for a power management system, featuring several voltage regulators and their associated components. The layout is color-coded: green for DC 5V, red for RTC 3.3V, and blue for the main regulators.

DC 5V Section: A DC 5V input is connected to a PowerJACK (CON3). The input is connected to TP2, which is also connected to VDD50. The output of the DC 5V is connected to TP1.

RTC 3.3V Section: The RTC is powered by a 3.3V regulator (U3, XC6206P332MR). The input is connected to VDD50, and the output is connected to TP4. The regulator is connected to VDD50 and GND.

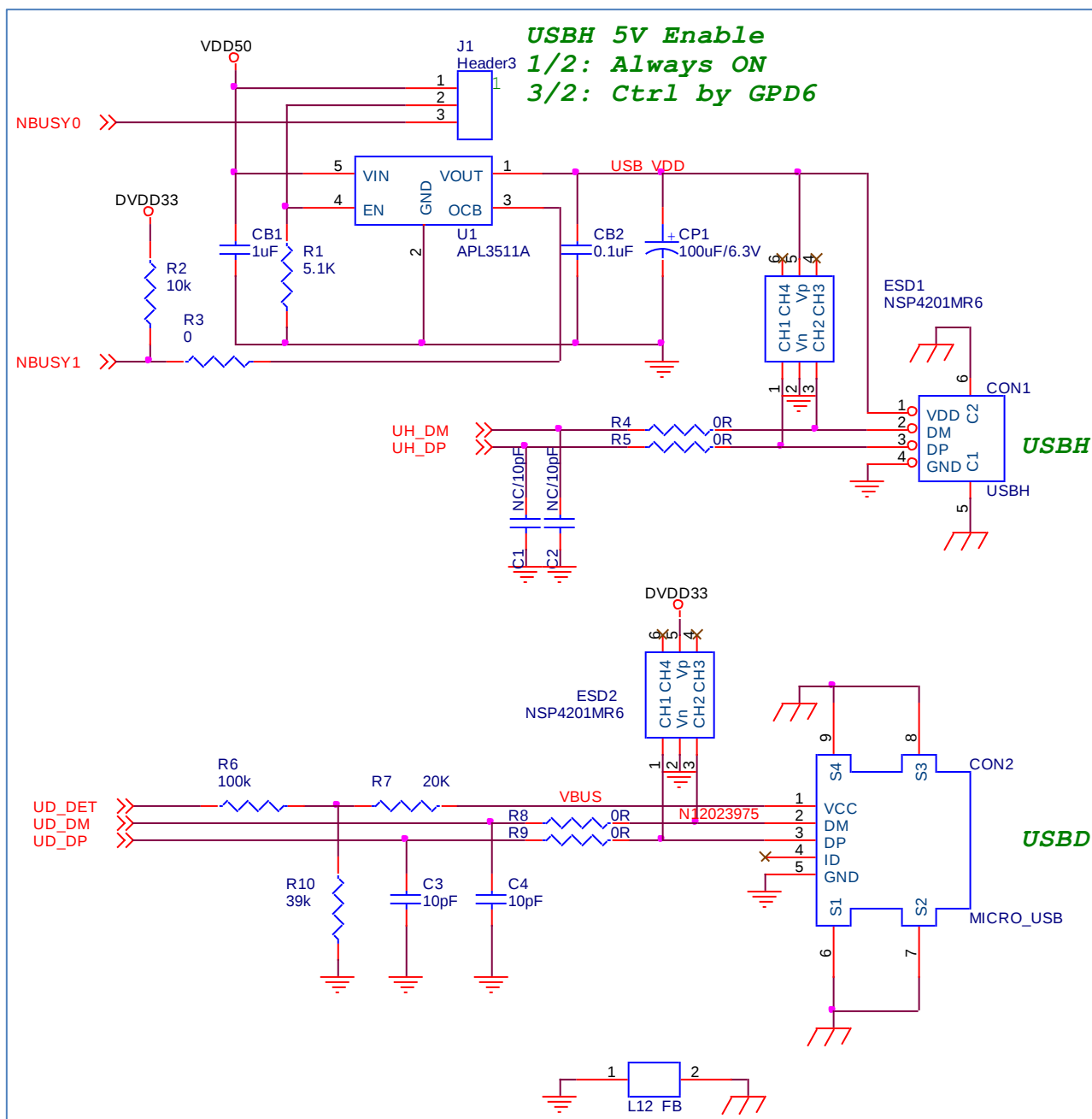
1.8V Section: A 1.8V regulator (U2, ZT7103) is used to regulate the 5V input. The input is connected to VDD50, and the output is connected to TP1. The regulator is connected to VDD50 and GND. The output is connected to VDD18.

1.2V Section: A 1.2V regulator (U4, ZT7103) is used to regulate the 5V input. The input is connected to VDD50, and the output is connected to TP5. The regulator is connected to VDD50 and GND. The output is connected to VDD12.

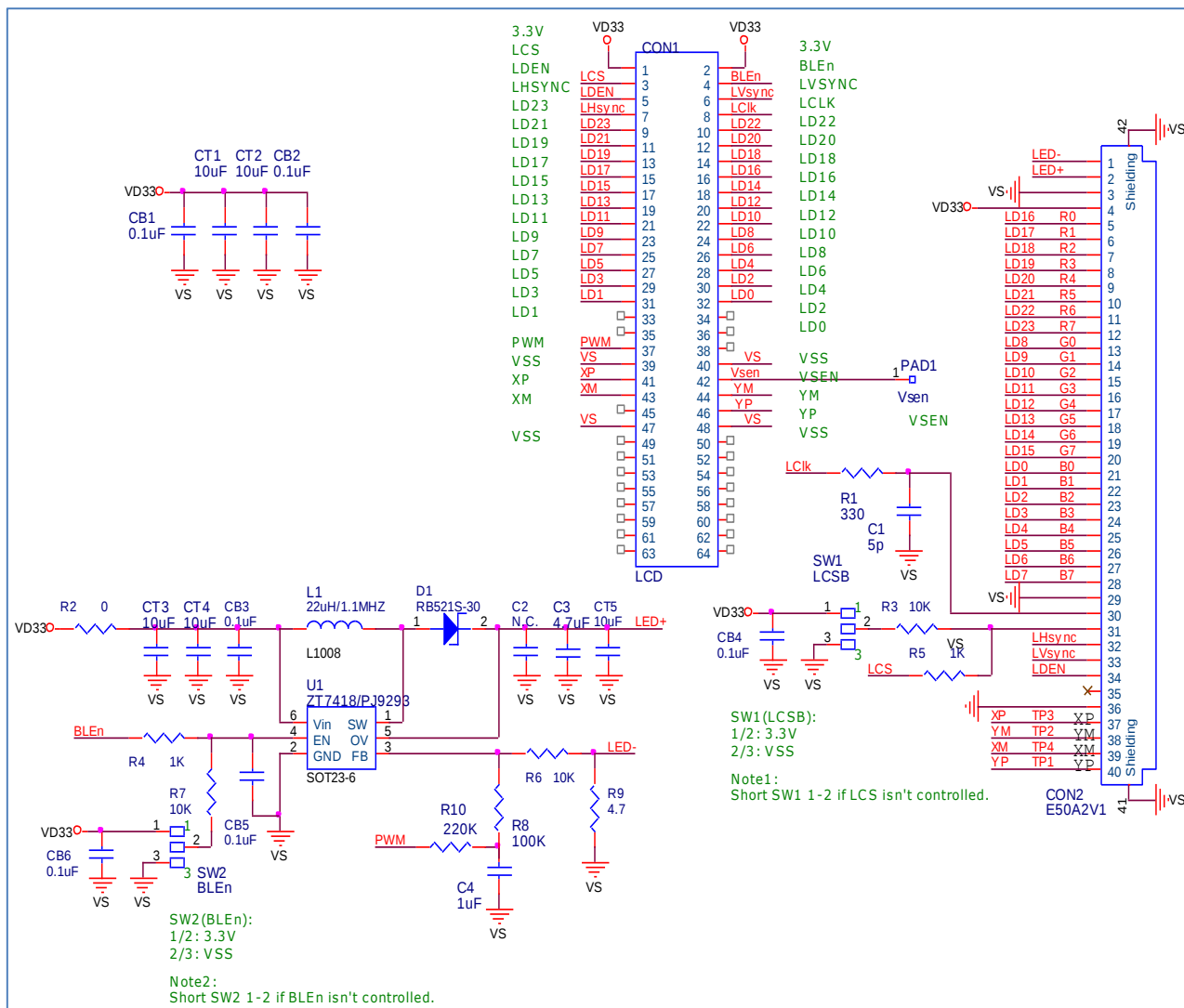
3.3V Section: A 3.3V regulator (U5, ZT7103) is used to regulate the 5V input. The input is connected to VDD50, and the output is connected to TP6. The regulator is connected to VDD50 and GND. The output is connected to VDD33.

The layout includes various capacitors (CP1 through CP23) and resistors (R1 through R23) for decoupling and filtering. The components are labeled with their values and part numbers. The layout also includes various test points (TP1 through TP6) and voltage labels (VDD50, VDD18, VDD12, VDD33, AVDD33, AVDD12, AVDD18).

3.7 NuMaker-emWin-NK-N9H26, USB



3.8 NuMaker-TFT-LCD5



4 REVISION HISTORY

Date	Revision	Description
2018.11.05	1.00	1. Initially issued.
2019.03.15	1.01	1. Corrected schematic U9 pin 110~114 multi-functions. 2. Corrected schematic JP2 pin 1,3,5 & 7 signals. 3. Corrected schematic ESD18 & 19 connected signals. 4. Corrected pin 110~114 multi-function of table2-1. 5. Corrected JP2 functions table.
2021.03.26	1.02	1. Rename NuMaker-emWin-NK-N9H26

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